



**GOVERNMENT OF ORISSA**  
**WORKS DEPARTMENT**

**CIVIL WORKS CONTRACT**

[PACKAGE No. OSRP-CW-ICB-Y1-P03]

**For**

*Widening & Strengthening of existing carriageway to 2-lane road from  
Berhampur to Taptapani  
(Km. 0/0 to 41/0 of SH – 17)*

*under  
Orissa State Roads Project*

between

**Chief Engineer, World Bank Projects, Orissa  
on behalf of  
Orissa Works Department, Government of Orissa**

and

**BACKBONE – ARSS JV**  
Plot No. 38, SECTOR – A, Zone – D  
Mancheswar Industrial Estate, Mancheswar, Bhubaneswar – 751010 [INDIA]

[ VOLUME – I ]

**Agreement Value: Rs. 81,97,23,707**

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

**Dated: 5<sup>th</sup> September, 2008**


## CONTENTS of CONTRACT

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<b>Volume – III</b>	:	Specifications
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## CONTENTS of VOLUME I

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Chief Engineer  
World Bank Projects, Orissa  
World Bank Projects  
Officer in Charge (Civil) Orissa,  
Bhubaneswar



उड़ीसा ORISSA

419102

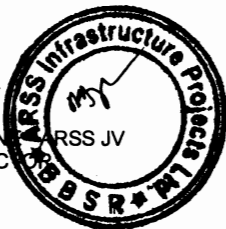
**CIVIL WORKS CONTRACT**

For

**Widening & Strengthening of existing carriageway to 2-lane road from Berhampur to Taptapani (Km. 0/0 to 41/0 of SH – 17) under Orissa State Roads Project**

THIS AGREEMENT made the 5<sup>th</sup> day of September, 2008, between the Chief Engineer, World Bank Projects, Orissa, office of the Engineer-in-Chief(Civil), Orissa, Nirman South, Unit-V, Kesari Nagar, Bhubaneswar-751001, Orissa (India) on behalf of the Government of Orissa in Works Department, Orissa Secretariat, Bhubaneswar-751001 (hereinafter “the Employer”), of the one part, and BACKBONE-ARSS J.V of Plot No-38, Sector-A, Zone-D, Mancheswar Industrial Estate, Mancheswar, Bhubaneswar-750 010, Orissa (India) (hereinafter “the Contractor”), of the other part for an amount of Rs.81,97,23,707.00 ( Indian Rupees Eighty One crore Ninety Seven lakh Twenty Three thousand Seven Hundred Seven ) only:

WHEREAS the Employer desires that the Works known as “Widening and Strengthening of existing carriageway to 2-lane road from Berhampur to Taptapani (Km 0/0 to Km 41/0 of SH-17)” should be executed by the Contractor, and has accepted a Bid by the Contractor for the execution and completion of these Works and the remedying of any defects therein,



The Employer and the Contractor agree as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Contract documents referred to.
2. The following documents shall be deemed to form and be read and construed as part of this Agreement. This Agreement shall prevail over all other Contract documents.

**Volume - I**

- (i) the Letter of Acceptance
- (ii) of the Letter Bid
- (iii) the addenda 78 Pages

**Volume - II**

- (iv) the Particular Conditions
- (v) the General Conditions;

**Volume - III**

- (vi) the Specification

**Volume - IV**

- (vii) the Drawings; and

**Volume - V**

- (viii) the completed Schedules,


3. In consideration of the payments to be made by the Employer to the Contractor as indicated in this Agreement, the Contractor hereby covenants with the Employer to execute the Works and to remedy defects therein in conformity in all respects with the provisions of the Contract.

4. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects therein, 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.





IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with the laws of INDIA on the day, month and year indicated above.

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

  
**Er. J.M. Nayak**  
**Chief Engineer, World Bank Project, Orissa**  
**Chief Engineer**  
**World Bank Projects**  
**of the E.I.C (Civil) Orissa,**  
**Bhubaneswar:**

For and on behalf of each of the Partners of the Joint Venture Backbone – ARSS JV


  
**Mr. Kishor Viramgama**  
**Chairman & Managing Director**  
**BACKBONE INFRASTRUCTURE PROJECTS LIMITED**

  
**Mr. Rajesh Agarwal**  
**Managing Director**  
**ARSS INFRASTRUCTURE PROJECTS LTD.**


**Witness :**

**Witness**

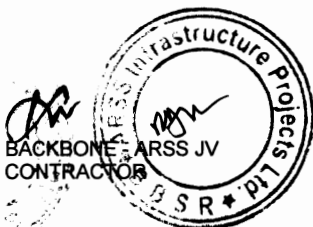
**Managing Director**

  
**1. ER. B. K. SAHOO,**  
**CHIEF ENGINEER, WORKS, ARSS INFRASTRUCTURE PROJECTS**

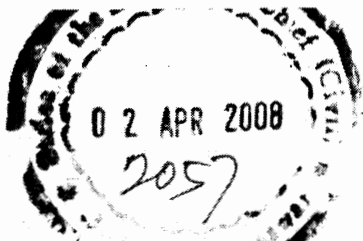
  
**2. MR. S. P. DASH**  
**GENERAL MANAGER, CONTRACTS, ARSS INFRASTRUCTURE PROJECTS**

  
**3. MR. MANORANJAN MISRA**  
**EXECUTIVE ENGINEER, PROJECT IMPLEMENTATION UNIT,**  
**ORISSA STATE ROADS PROJECT**

  
**4. MR. JAYDEV MISHRA**  
**SR. DIVISIONAL ACCOUNTS OFFICER, PROJECT IMPLEMENTATION UNIT,**  
**ORISSA STATE ROADS PROJECT**



  
**Chief Engineer**  
**World Bank Projects**  
**of the E.I.C (Civil) Orissa,**  
**Bhubaneswar:**



Confidential

**Government of Orissa  
Works Department**

No II-T-(WBP)-1/2008 6057 W Dated the Bhubaneswar, 31.3.08 2008  
From:

Sri P.K.Patnaik,  
F.A-cum-Addl. Secretary to Govt.



1017  
2/4/08 To

The Chief Engineer, World Bank Project.  
Orissa, Bhubaneswar.

Sub: - Widening and strengthening of existing carriageway to 2-lane road from Berhampur to Taptapani (Km 0/0 to 41/0 of SH-17).

Sir,

I am directed to invite a reference to your Letter No-7806 dated- 18.02.2008 on the subject noted above and to convey the approval of the Government to the lowest responsive offer of BACKBONE - ARSS JV, Bhubaneswar amounting to Rs. 81,97,23,707.00 at 8.80 % excess over the corresponding estimated of cost of Rs.75,33,96,605.00 subject to the following conditions.

1. Prior to drawal of agreement with the Agency, authentication of experience in execution of works of similar nature, as submitted by the bidder in his proposal, must be verified from the employer of those works.
2. The Chief Engineer, World Bank Projects, Orissa will ensure that the executing agency shall not engage any person, who has been associated with the DPR Consultant, i.e. M/s Consulting Engineering Group Ltd., Jaipur.

The copies of proceedings of the Tender Committee Meetings held on 26.02.2008 at 4.30 P.M for the above work are enclosed herewith for reference.

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

Yours faithfully,

*[Signature]*  
F.A-cum-Addl. Secretary to Govt.

*EE IV, P20  
for immediate action  
to transmit the same to WBP  
with copy to the Govt.*

*J. Patnaik  
2.7.08  
K. Patnaik, JE  
P. put up.  
2/4/08*



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

May 19, 2008

Mr. J. M. Nayak  
Chief Engineer (WB Projects)  
Government of Orissa  
Orissa Nirman Soudha  
Keshari Nagar, Unit - V  
Bhubaneswar – 751 001  
India  
(Facsimile: 0674-239 6783)

Dear Mr. Nayak:

*INDIA: Proposed Orissa State Roads Project (P096023)  
Bid Packages for Construction Supervision of the First Year Roads Contracts –  
Widening and Strengthening of Existing Carriageway to 2-Lane Road from Berhampur to  
Taptapani KM 0 to 41/0 of SH-17 (Package OSRP-CW-Y1-P03)*

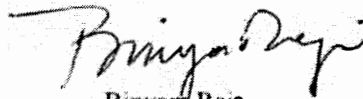
Thank you for your letter of May 15, 2008. We have reviewed the bid evaluation report and based on the information provided and circumstances explained, we have no objection to your proposal to award the contract to the lowest evaluated bidder M/s Backbone – ARSS JV, Bhubaneswar (India), at a contract price of INRs.819,723,707.

The Bank has reviewed the bid evaluation report as if the process were governed by the Bank's Procurement Guidelines, in order that the contract might be eligible for Bank financing in the event that the Loan agreement is signed between the Government and the Bank. Please note, however, that such advance contracting is undertaken at your own risk and that the Bank's concurrence with your recommendation for award does not commit the Bank to make a Loan for this Project. Please also note that if the contract is signed, reimbursement by the Bank of any payments made under the contract prior to Loan signing is permitted only within the limits specified in the Legal Agreement.

We look forward to receiving, for our review, a copy of the signed contract along with the pre-award review checklist duly completed.

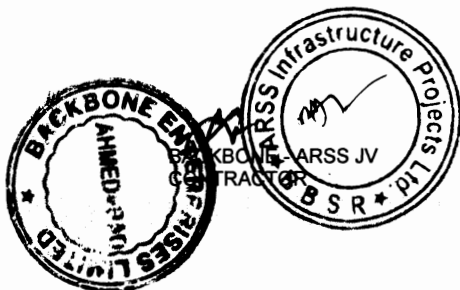
With regards,


Sincerely,



Binyam Reja  
Senior Transport Economist and  
Task Team Leader  
of the proposed India Orissa State Roads Project

RCA 248423. ☐ WUI 64145 ☐ FAX (202) 477-6391



  
Chief Engineer  
World Bank Projects, Orissa  
EMPLOYER  
**Chief Engineer**  
World Bank Projects  
Of the E.I.C (Civil) Orissa  
Bhubaneswar:

Government of Orissa  
Works Department  
\*\*\*\*

No 10128 /W Dated the Bhubaneswar, 29 the May-2008  
II-T-WBP-1/2008

1396  
29/5/08

From:

Sri P.K.Patnaik.  
F.A-cum-Addl Secretary to Govt.

To

The Chief Engineer, World Bank Project.  
Orissa, Bhubaneswar.

Sub: Tender for the work "Widening & Strengthening of existing carriageway to 2-lane road from Berhampur to Taptapani (Km 0/0 to 41/0 of SH-17).

Sir,

I am directed to invite a reference to your Letter No-23077 dtd-20.05.2008 on the subject noted above and communicate the approval of Government to authorize the Chief Engineer, World Bank Project, Orissa for issuing the Notification of Award and signing the contract on behalf of Government of Orissa.

Yours faithfully,

*[Handwritten Signature]*  
29-5-08

F.A-cum-Addl. Secretary to Government

*Sri S.K. Mishra, EE.  
Put up for issue of L.O.A.  
J.S.V.*



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



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

Letter No. OSRP - CW - Y1 - P03 - E - 24381

Dt. 29.5.08

**From**

**Er. Jayamangal Nayak**  
Chief Engineer, World Bank Projects, Orissa  
Tel.: + 91 - 674 - 239 6783 / Fax: + 91 674 - 239 1476  
Email: [piuosrp@gmail.com](mailto:piuosrp@gmail.com)

**To**

**M/s BACKBONE - ARSS JV**  
Plot No. 38, Sector - A, Zone - D  
Mancheswar Industrial Estate, Mancheswar,  
Bhubaneswar - 751 010  
Fax: 0674 - 258 5074

**Sub:** Civil Works **ICB Package OSRP-CW-ICB-Y1-03** under the proposed **Orissa State Roads Project** with World Bank Assistance

- Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taptapani (0/0 km to 41/0 km of SH-17)"

**LETTER OF ACCEPTANCE**

- Ref: i. IFB No: CW-ICB-Y1-P03 - E - 44114 Dt. 19th Oct, 2007  
ii. Your BID Dt. 2.1.2008

Sir,

This is to notify you that, your Bid dated **2<sup>nd</sup> January, 2008** for execution of the Civil Works **ICB Package OSRP-CW-ICB-Y1-03** under the proposed **Orissa State Roads Project** with World Bank Assistance for "Widening & Strengthening of existing carriageway to 2-lane from Berhampur to Taptapani ( Km. 0/0 to Km. 41/0 of SH - 17 ) amounting to **Indian Rs. 81,97,23,707** ( Indian Rupees Eighty one crore ninety seven lakh twenty three thousand seven hundred seven) only, as corrected and modified in accordance with the Instructions to Bidders, has been accepted by the **Government of Orissa**.


You are requested to furnish the Performance Security in shape of a **Bank Guarantee** in favour of the **Chief Engineer, World Bank Projects, Orissa, Bhubaneswar** on **State Bank of India, Government Treasury Branch, Bhubaneswar**, valid till **30<sup>th</sup> July, 2011**, amounting not less than **Indian Rs.4,09,86,186** ( Indian Rupees Four crore nine lakh, eighty six thousand one hundred eighty six ) only within 28 days of issuance of this letter, in accordance with the Conditions of Contract, using for that purpose one of the Performance Security Forms included in Section IX, Annex to the Particular Conditions - Contract Forms, of the Bidding Document.

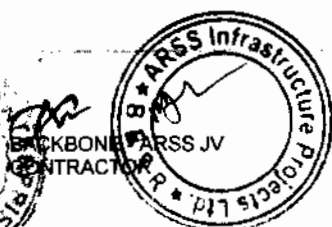
Upon submission of a satisfactory Performance Security as stated above, the formal Contract agreement shall be signed.

Yours sincerely,

  
[ Authorised Signatory on behalf of Employer ]  
**Chief Engineer**  
World Bank Projects, Orissa

Page 7

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



**LETTER of BID & ADDENDA**

**Bid Submission Sheet**

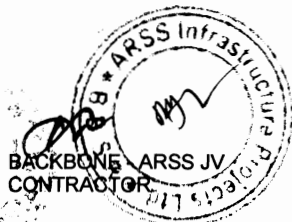
(Agreed & Modified as per the evaluated bid)  
[Vide No. ARSSJV/ CEWBP/08-09/1846 Dt. 02.09.2008]

Date: .02.01.2008  
(Original submission date)  
No.: OSRP-CW-Y1-P03  
Invitation for Bid No.: CW-ICB-Y1-P03-E-44114

To:  
Attention: **Chief Engineer, World Bank Project**  
Street Address: Nirman Soudh  
Floor/ Room No: Ground Floor  
City: Bhubaneswar  
Zip Code: 751001  
Country: India

We, the undersigned, declare that:

- (a) We have examined and have no reservations to the Bidding Document, including Addenda issued in accordance with Instructions to Bidders (ITB)8 **No Reservation** ;
- (b) We offer to execute in conformity with the Bidding Document the following Works: **Construction for Widening & Strengthening of existing carriageway to two lane from Berhampur to Taptapani ( Km 0/0 to Km 41/0 of SH-17) ;**
- (c) The total price of our Bid, excluding any discounts offered in item (d) below is: **Rs. 87,20,17,773.10 ( Rupees Eighty Seven Crore Twenty Lakh Seventeen Thousand Seven Hundred Seventy-three and Paise Ten only** including specified provisional sums of Rs. 4,50,000/-;
- (d) The discounts offered and the methodology for their application are: **6% (six percent)**  
**[The discount to be effected on total value of work in each bill];**
- (e) Our bid shall be valid for a period of **One Hundred Fifty** days from the date fixed for the bid submission deadline in accordance with the Bidding Document, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;
- (f) If our bid is accepted, we commit to obtain a performance security in accordance with the Bidding Document;
- (g) We, including any subcontractors or suppliers for any part of the contract, have or will have nationalities from eligible countries, in accordance with ITB 4.2;



- (h) We, including any subcontractors or suppliers for any part of the contract, do not have any conflict of interest in accordance with ITB 4.3;
- (i) We are not participating, as a Bidder or as a subcontractor, in more than one bid in this bidding process in accordance with ITB 4.3, other than alternative offers submitted in accordance with ITB 13;
- (j) We, including any of our subcontractors or suppliers for any part of the contract, have not been declared ineligible by the Bank, under the Employer's country laws or official regulations or by an act of compliance with a decision of the United Nations Security Council;
- (k) We are not a government owned entity/ We are a government owned entity but meet the requirements of ITB-4.5;<sup>1</sup>
- (l) We have paid, or will pay the following commissions, gratuities, or fees with respect to the bidding process or execution of the Contract:

Name of Recipient	Address	Reason	Amount
<u>NONE</u>	<u>NONE</u>	<u>NONE</u>	<u>NONE</u>

(If none has been paid or is to be paid, indicate "none.")

- (m) We understand that this bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal contract is prepared and executed; and
- (n) We understand that you are not bound to accept the lowest evaluated bid or any other bid that you may receive.
- (o) We hereby certify that we have taken steps to ensure that no person acting for us or on our behalf will engage in bribery.

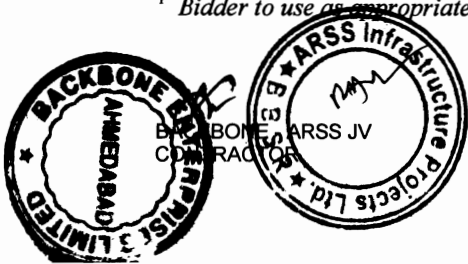
Name **S.P.Dash** In the capacity of **Power of Attorney Holder**

Signed Sd/- (S.P.Dash)

Duly authorized to sign the bid for and on behalf of **BACKBONE-ARSS J.V.**

Dated on **2<sup>nd</sup>** day of **January, 2008**

<sup>1</sup> Bidder to use as appropriate



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

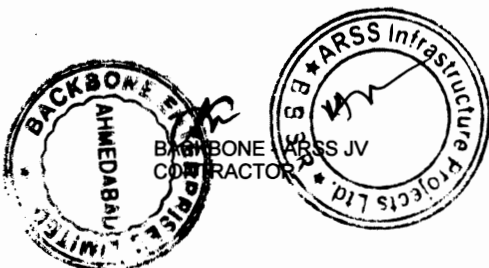
## Appendix to Bid

### Schedule of Adjustment Data

[In Tables A, B, and C, below, the Bidder shall (a) indicate its amount of local currency payment, (b) indicate its proposed source and base values of indices for the different foreign currency elements of cost, (c) derive its proposed weightings for local and foreign currency payment, and (d) list the exchange rates used in the currency conversion. In the case of very large and/or complex works contracts, it may be necessary to specify several families of price adjustment formulae corresponding to the different works involved.]

**Table A. Local Currency**

Index code*	Index description*	Source of index*	Base value and date*	Bidder's related currency amount	Bidder's proposed weighting
A	Nonadjustable				0.35
B	Steel	Office of Economic advisor	279.20 Dec-2007		0.08
C	Cement	Office of Economic advisor	219.70 Dec-2007		0.07
D <sub>1</sub>	Bitumen 60/70 (Bulk)	HPCL at Vizag	24700/MT 16.12.2007		0.10
D <sub>2</sub>	CRMB (Bulk CR-55)	HPCL at Vizag	25010/MT 16.12.2007		0.05
E	Labour	Labour & Employment Department, Orissa	Rs. 70.00 Per Day		0.06
F	POL	Detail Price of HSD in Berhampur, Orissa	33.35/ Ltr 23.12.2007		0.12
G	Other Materials	Office of Economic advisor	216.40 Dec-2007		0.17
<b>Total</b>					<b>1.00</b>



Reference for Base Index for STEEL  
**Monthly Wholesale Price Index**

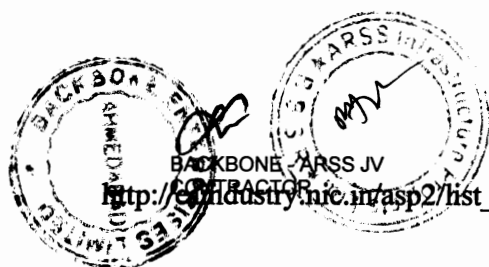
**Base Year 1993-94 = 100**

**Name of Commodity : a1. Iron & Steel**

**Type : Group Item**

Month /Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>2007</b>	260	260.4	261.9	266.6	267.9	268.1	268.8	267.5	276.7	277.6	278.4	279.2
<b>2006</b>	231.4	225.6	226.4	243.7	243.8	243.6	251.5	253.8	256	259.2	259.4	259.4
<b>2005</b>	239.8	239.4	244.8	257.8	258.3	257.6	254.7	257.3	259.3	258.5	257.5	256.6
<b>2004</b>	198.6	200.3	201.1	201.8	201.9	235.1	240.7	241.6	237.2	237.3	237.5	237.5


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



BACKBONE - ARSS JV

[http://industry.nic.in/asp2/list\\_d.asp?Fcomm\\_code=1310010100&Fyear1=2007](http://industry.nic.in/asp2/list_d.asp?Fcomm_code=1310010100&Fyear1=2007)

Page 1310010100&Fyear1=2007&Font=Arial

  
**Chief Engineer**  
 World Bank Projects, Orissa  
 Office of the E.I.C (Civil) Orissa  
 Bhubaneswar:

Reference for Base Index of CEMENT

**Monthly Wholesale Price Index**

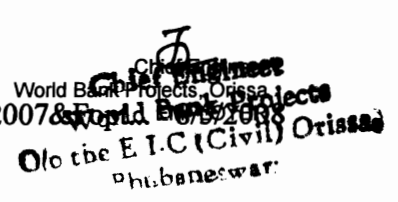
**Base Year 1993-94 = 100**

**Name of Commodity : c. Cement**

**Type : Group Item**

Month /Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>2007</b>	198.4	200.5	210.7	211.6	211.9	213.3	215.1	215.6	219.8	220	219.6	219.7
<b>2006</b>	168.2	174.1	181.8	191.2	193.5	193.6	194.5	195	194.6	196.8	198.8	198.6
<b>2005</b>	149.2	161.3	163.8	164.3	163.8	163.4	162.2	162.2	164.2	165.9	165.4	164.3
<b>2004</b>	150.2	152.6	151.2	153.1	153.8	152.9	151.4	150.6	150.8	150	147.4	149.3

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



[http://oia.nic.in/asp2/list\\_d.asp?Fcomm\\_code=1309030000&Fyear1=2007&Fyear2=2008](http://oia.nic.in/asp2/list_d.asp?Fcomm_code=1309030000&Fyear1=2007&Fyear2=2008)

Reference for Base Index of Bitumen

Transpak  
Rs 1.45/km/l  
Rshampin  
Taptapani  
Rs 1100/cen

2500

HINDUSTAN RETROLEUM CORPORATION LIMITED, BHUBANESWAR																	
Price List As On: 16-December-2007																	
Revision W.E.F.	LOCATION	TRANS-PORT MODE	SU	BASIC PRICE	State Specific Charge	Sid/Shn (Load)	Sid/Shn (Unload)	Freight	SUB TOTAL	ED @ 16.48%	SUB TOTAL	Less Sid/Shn	ENTRY TAX	SUB TOTAL	CST @ 3% or VAT 4/12 5/20%	Add Sid/Shn	GRAND TOTAL
16-Dec-07	HALDIA	BY RAIL	RS/KL	21470.00	79.00	33.22	0.00	0.00	21582.22	3556.75	25138.97	-33.22		25105.75	753.17	33.22	25892.14
	VIZAG	BY RAIL	RS/KL	21400.00	79.00	22.44	0.00	0.00	21501.44	3543.44	25044.88	-22.44		25022.44	750.67	22.44	25795.55
	HALDIA	BY ROAD	RS/KL	21470.00	79.00	0.00	0.00	0.00	21549.00	3551.28	25100.28	0.00		25100.28	753.01		25853.29
	VIZAG	BY ROAD	RS/KL	21400.00	79.00	0.00	0.00	0.00	21479.00	3539.74	25018.74	0.00		25018.74	750.56		25769.30
	PARADEEP	BY ROAD	RS/KL	21470.00	79.00			1109.22	22658.22	3734.07	26392.29		263.92	26656.21	3332.03		29988.24
	SOMNATHPUR	BY ROAD	RS/KL	21470.00	79.00	33.22	36.94	359.01	21978.17	3622.00	25600.17		256.00	25856.17	3232.02		29088.19
	SAMBALPUR	BY ROAD	RS/KL	21400.00	79.00	22.44	36.94	703.16	22241.54	3665.41	25906.95		259.07	26166.02	3270.75		29436.77
	RAIPUR	BY ROAD	RS/KL	21400.00	79.00	22.44		703.16	22204.60	3659.32	25863.92			25863.92	775.92		26639.84
	BUDGE BUDGE	BY ROAD	RS/KL	21470.00	79.00	33.22	12.19	306.41	21900.82	3609.26	25510.08			25510.08	765.30		26275.38
	VIZAG	BY ROAD	RS/MT	22300.00	82.35			0.00	22382.35	3688.61	26070.96	0.00		26070.96	782.13		26853.09
16-Dec-07	VIZAG	BY ROAD	RS/MT	21870.00	82.35	0.00	0.00	0.00	21952.35	3617.75	25570.10	0.00		25570.10	767.10	0.00	26337.20
	VIZAG	BY ROAD	RS/KL	22710.00	79.00				22789.00	3755.63	26544.63	0.00		26544.63	796.34		27340.97
	VIZAG	BY ROAD	RS/MT	22300.00	0.00	0.00	0.00	0.00	22300.00	3675.04	25975.04	0.00		25975.04	779.25		26754.29
	VIZAG	BY RAIL	RS/KL	21090.00	295.00	20.87	0.00	0.00	21405.87	6102.89	27508.76	-20.87		27487.89	824.63	20.87	28333.19
	VIZAG	BY ROAD	RS/KL	21090.00	295.00	0.00	0.00	0.00	21385.00	6099.25	27484.25	0.00		27484.25	824.53		28308.78
	BUDGE BUDGE	BY ROAD	RS/KL	21090.00	295.00	25.09	32.42	340.00	21782.51	6164.76	27947.27			27947.27	838.42		28785.69
	SAMBALPUR	BY ROAD	RS/KL	21090.00	295.00	20.87	34.35	630.66	22070.86	6212.28	28283.14			28283.14	5713.20		34278.19
	CUTTACK	BY ROAD	RS/KL	21090.00	295.00	20.87	34.35	585.68	22025.90	6204.67	28230.57			28230.57	5702.62		34215.70
	PARADEEP	BY ROAD	RS/KL	21090.00	295.00	20.87	34.35		21090.00	6282.05	27772.05			27772.05	5813.25		34879.48
	VIZAGHALDIA	BY ROAD	RS/KL	32810.00	67.00	0.00	0.00	0.00	32577.00	5368.69	37945.69			37945.69	4743.21		42688.90
1-Dec-07	BUDGE-BUDGE	BY ROAD	RS/KL	37700.00					37700.00	6212.98	43912.98			43912.98	317.39		46030.36
	VIZAGHALDIA	BY ROAD	RS/KL	34320.00					34320.00	5655.94	39975.94			39975.94	1199.28		41175.22
	MUMBAI	BY ROAD	RS/MT	34500.00					34500.00	5685.60	40185.60			40185.60	1205.57		41391.17
	VIZAG	BY ROAD	RS/MT	41800.00					41800.00	6888.64	48688.64			48688.64	1460.66		50149.30
	BUDGE-BUDGE	BY ROAD	RS/KL	34800.00					34800.00	5735.04	40535.04			40535.04	1216.05		41751.09
	BUDGE-BUDGE	BY ROAD	RS/KL	37800.00					37800.00	12458.88	50258.88			50258.88	1507.77		51766.65
	MUMBAI	BY ROAD	RS/KL	36000.00					36000.00	11865.60	47865.60			47865.60	1435.97		49301.57
	BULK 80/100	BY ROAD	RS/MT	22370.00					22870.00	3769.96	26639.96			26639.96	799.17		27438.15
	VIZAG / HALDIA	PKD 80/100	RS/MT	24870.00				100.00	25070.00	4131.54	29201.54			29201.54	876.05		30077.59
	MUMBAI	BULK 60/70	RS/MT	24700.00				100.00	24700.00	4070.56	28770.56			28770.56	863.12		29633.68
16-Dec-07	PKD 60/70	RS/MT	26800.00					100.00	26900.00	4433.12	31333.12			31333.12	939.99		32273.11
	BULK 30/40	RS/MT	26150.00					100.00	26150.00	4309.52	30459.52			30459.52	913.79		31373.31
	PKD 30/40	RS/MT	28250.00					100.00	28350.00	4672.08	33022.08			33022.08	990.66		34012.74
	PKD 80/100	RS/MT	24970.00				633.41	25603.41	4219.44	29822.85			29822.85	1216.77		31039.62	
	BERHAMPUR	PKD 60/70	RS/MT	26800.00				633.41	27433.41	4521.03	31954.44			31954.44	1303.74		33887.27
	SAMBALPUR	PKD 80/100	RS/MT	24970.00				1091.59	26061.59	4294.95	30356.54			30356.54	1236.55		32202.22
	PKD 60/70	RS/MT	26800.00				1091.59	27891.59	4596.53	32488.12			32488.12	1325.52		34483.40	
	PKD 80/100	RS/MT	24970.00				926.28	25896.28	4171.71	30068.00			30068.00	1230.69		31887.69	
	CUTTACK	PKD 60/70	RS/MT	26800.00				926.28	27726.28	4569.26	32295.54			32295.54	1317.66		34268.14









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vocational institute and the performance of which calls for initiative and judgment.

- (4) The category "Highly Skilled" includes Stenographer, Accountant, Supervisor, Head Cashier, Manager, Sales Promotion Employees and any other job of highly skilled nature involving 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 of the judgment or decisions involved in execution of those tasks;
- (5) The minimum rates of wages are all inclusive rates including the basic rates, the cost of Living allowance and the cash value of the concessional supply, if any of essential commodities;
- (6) The daily minimum rates of wages shall be inclusive of wages payable for the weekly day of rest;
- (7) An adult employee shall work for 8 (eight) hours per day excluding half-an-hour of rest;
- (8) The minimum rates of wage are applicable to employees employed by Contractors also;
- (9) The minimum rates of wages for disabled persons shall be same as payable to the workers of the appropriate category ;
- (10) There shall not be any discrimination between Male and Female workers in matters of payment of minimum wages in any category of employment.

By order of the Governor,  
*P. Singh*  
 Joint Secretary to Government



*Chief Engineer*  
 World Bank Projects  
 EMPLOYER  
 O/o the E.T.C (Civil) Orissa  
 Bhubaneswar

Reference for Base Index for POL

To SRI B.K. SAHOO, C.E (ARSS)

No. 72 Cash Memo No : 2203227  
**M/s. R.K. Walia & Sons**  
 Dealers : Indian Oil Corporation Ltd.  
 Kommapalli, BERHAMPUR - 4  
 Date 28/12/07  
 Sri DRD/P 5667

Particulars	Rate	Amount	
		Rs.	Ps.
<u>30</u> Ltrs. HSD	<u>33/20</u>	<u>999</u>	<u>00</u>
		<u>999</u>	

Thank You E.&O.E. Salesman

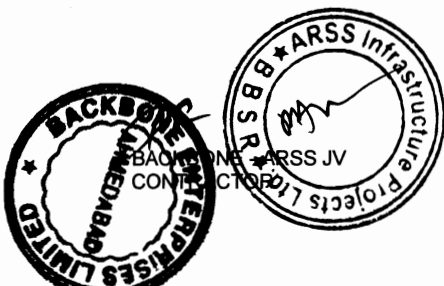
376 Cash/Credit Memo No. 2270383  
**M/S. P. V. N. RAO**  
 Dealers : Bharat Petroleum Corp. Ltd.  
 Pump No. 2, Aska Road, Berhampur  
 TIN-21211903799 Date 27/12/07  
 Sri \_\_\_\_\_

Particulars	Rate	Amount	
		Rs.	Ps.
<u>45</u> Ltrs. H.S.D.	<u>33/30</u>	<u>1598</u>	<u>50</u>



E & O E

Signature



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

Reference for Base Index of Other Materials

**Monthly Wholesale Price Index**

**Base Year 1993-94 = 100**

**Name of Commodity : ALL COMMODITIES**

**Type : Group Item**

Month /Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>2008</b>	218.1	219.9	225.5	228.5								
<b>2007</b>	208.8	208.9	209.8	211.5	212.3	212.3	213.6	213.8	215.1	215.2	215.9	216.4
<b>2006</b>	196.3	196.4	196.8	199	201.3	203.1	204	205.3	207.8	208.7	209.1	208.4
<b>2005</b>	188.6	188.8	189.4	191.6	192.1	193.2	194.6	195.3	197.2	197.8	198.2	197.2

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



http://www.backbonearss.com.in/asp2/list\_d.asp?Fcomm\_code=1000000000&Fyear1=2008

Chief Engineer  
 Chief Engineer  
 World Bank Projects  
 World Bank Projects  
 Office of the EMO (P&M) Orissa  
 Bhubaneswar

### Table C. Summary of Payment Currencies

Table: Alternative A

For .....[insert name of Section of the Works]

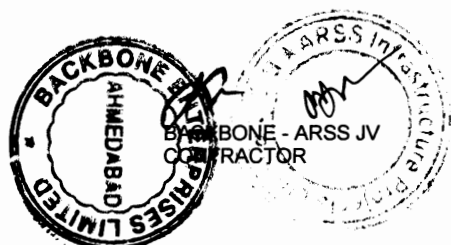
Name of payment currency	A Amount of currency	B Rate of exchange (local currency per unit of foreign)	C Local currency equivalent $C = A \times B$	D Percentage of Net Bid Price (NBP) $\frac{100 \times C}{NBP}$
Local currency INR	100.00	1.00	100	$100 \times 100 / 100 = 100$ INR
Foreign currency #1				Not Applicable
Foreign currency #2				NA
Foreign currency #				NA
Net Bid Price				872,017,773.10
Discount				(-)52,294,066.39
Provisional sums expressed in local currency	Rs.0.45 M			450,000.00
<b>BID PRICE</b>				<b>819,723,706.71</b>



Chief Engineer  
World Bank Projects, Orissa  
World Bank Projects  
EMPLOYER  
Officer to the E.I.C (Civil) Orissa  
Bhubaneswar

## ELI - 1: Bidder's Information Sheet

Bidder's Information	
<b>Bidder's legal name</b>	<b>BACKBONE-ARSS (J.V)</b>
<b>In case of JV, legal name of each partner</b>	<b>Backbone Enterprises Limited ( Lead Partner) ARSS Infrastructure Projects Limited (Partner)</b>
<b>Bidder's country of constitution</b>	<b>India</b>
<b>Bidder's year of constitution</b>	<b>2007</b>
<b>Bidder's legal address in country of constitution</b>	<b>Plot No-38, Sector-A, Zone-D, Mancheswar Industrial Estate, Bhubaneswar- 751010, Orissa.</b>
<b>Bidder's authorized representative</b> (name, address, telephone numbers, fax numbers, e-mail address)	<b>Mr. S.P.Dash</b> <b>Plot No-38, Sector-A, Zone-D, Mancheswar Industrial Estate, Bhubaneswar- 751010, Orissa.</b> <b>Tel: 0674-2588552, 2588554</b> <b>Fax: 0674-2585074</b> <b>Email: response@arssgroup.in</b>
<b>Attached: 1) Joint Venture Agreement</b> <b>2) Power of Attorney</b>	



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415820

**JOINT VENTURE AGREEMENT**

This Joint Venture Agreement (hereinafter referred to as the "Agreement") is made and entered into **12<sup>th</sup> day of December, 2007** by and between:

**Backbone Enterprises Limited.**, duly organized and existing under and by virtue of the laws of Republic of India with its Registered office at BACKBONE HOUSE, M-43 Gujarat Housing Board, Kalawad Road, Rajkot 360002, Gujarat. (hereinafter referred to as "BACKBONE")

AND

**ARSS INFRASTRUCTURE PROJECTS LIMITED**, duly organized and existing under and by virtue of the laws of Republic of India with its Registered office at Plot No. 38, Sector-A, Zone-D, Mancheswar Industrial Estate, Bhubaneswar 751010., Orissa. (hereinafter referred to as "ARSS")

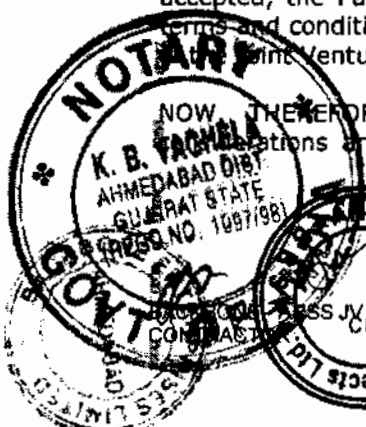
The Parties being jointly referred to as the Parties or individually as the Party in this Agreement.

**WITNESSETH:**

WHEREAS, the Parties hereto have agreed to form a Joint Venture (hereinafter referred to as the "Joint Venture" or the "J.V.") for the purpose of preparing and submitting Tender to Chief Engineer, World Bank Project, Nirman Soudha, Ground Floor, Bhubaneswar - (hereinafter referred to as the "Client"), for the "Construction for Widening & Strengthening of existing carriage way to 2-lane for Barhampur to Taptapani (Km. 0/0 to 41/0 of SH-17)", within the scope of Tender (hereinafter referred to as the "Contract" or the "Project", where applicable).

WHEREAS, in the event that the Joint Venture is successful in its tender and the tender is accepted, the Parties have agreed to perform the Contract in accordance with the agreed terms and conditions thereof and in the spirit of mutual co-operation to achieve the objective of the Joint Venture.

NOW, THEREFORE, for and in consideration of the foregoing promises and other covenants and conditions hereinafter set forth, the Parties hereby agree as follows:

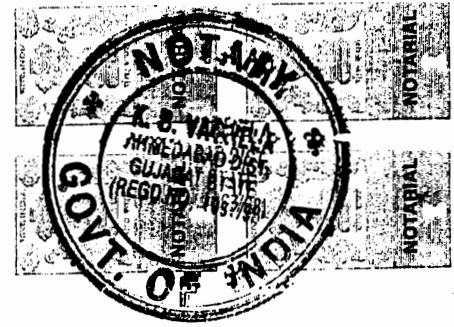


Signature of K. B. Yachela  
 K. B. YACHELA  
 CHAIRMAN  
 BACKBONE ENTERPRISES LIMITED  
 RAJKOT, GUJARAT  
 Page 21

Signature of Arss Infrastructure Projects Limited  
 ARSS Infrastructure Projects Limited  
 Bhubaneswar, Orissa  
 O/o the E.I.C (Civil) Orissa, Bhubaneswar

SERIAL NO. 415820  
 2007  
 NOTARY

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**Article 1. Form of Agreement**

The Parties shall jointly prepare and submit the tender documents for the Project and shall jointly perform the Project, if awarded to the Joint Venture.

- 1.2. Any alteration of this Agreement shall not be permitted without prior written consent of all Parties.
- 1.3. The relationship between the Parties shall be limited to performance of the Contract in accordance with the terms of this Agreement, and nothing in this Agreement shall limit either of the Parties from other activities.

**Article 2. Joint Venture**

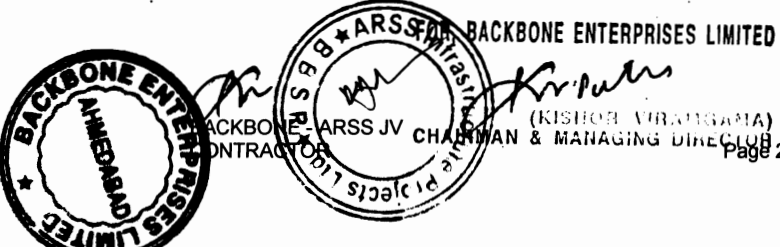
- 2.1. If the Joint Venture is awarded the Project, both Parties agree to maintain a Joint Venture office at site of Project for the performance of the Project.
- 2.2. The name of the Joint Venture shall be " **BACKBONE-ARSS (J.V.)** and its present office at Plot No. 38, Sector-A, Zone-D, Mancheswar Industrial Estate, Bhubaneswar-751 010."
- 2.3. Each Party's share in the equity and its share in profit or loss of the Joint Venture shall be as follows:
  - BACKBONE : 51% (Fifty One Percent) of the Project Value.
  - ARSS : 49% (Forty Nine Percent) of the Project Value.

**Article 3. Lead Company**

- 3.1. The Parties have agreed to appoint **BACKBONE** as the Lead Partner of the Joint Venture for performance of the Contract.
- 3.2. The Lead Partner of the Joint Venture will provide suitable experienced personnel for the purpose of general planning, site management and plant operations during the whole period of contract execution.
- 3.3. The Lead Partner is nominated as Partner in charge. The Partner in Charge shall be authorized to incur liabilities and to receive instructions for and on behalf of the partners of the Joint Venture, whether jointly or severally, and entire execution of the Contract (including payment) shall be carried out exclusively through partner in charge.
- 3.4. In connection with the Contract, if necessary, the Parties shall make a decision by mutual consent.

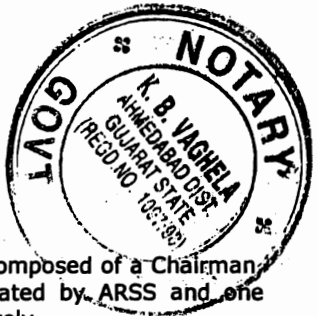
**Article 4. Tender/Estimation Work**

- 4.1. Preparation for the tender shall be coordinated between both Parties, led by **BACKBONE** as Lead Party.
- 4.2. Both Parties shall co-operate on the estimation work for the Project.
- 4.3. Any expenses and costs incurred by either Party for and in connection with the preparation, submission, negotiation, etc. for the tender of the Project shall be borne separately and individually by the Party incurring the same except where all the Parties agree otherwise.
- 4.4. Bid bond will be issued to the Client in the name of the J.V.
- 4.5. ARSS Infrastructure Projects Limited to furnish the Bond Money (i.e. Bid Security, Performance Security and Security Mobilisation Advance).



ARSS Infrastructure Projects Ltd.  
Client Engineer  
World Bank Projects, Orissa  
World Bank Projects  
EMPLOYER  
O/o the E.I.C (Civil) Orissa  
Bhubaneswar.





**Article 5. Organization**

Management Board shall be formed with **Four (4)** members composed of a Chairman, to be nominated by **BACKBONE**, Vice Chairman to be nominated by **ARSS** and one Director each to be appointed by **BACKBONE** and **ARSS** respectively.

**Article 6. Execution of the Project**

- 6.1. The Parties shall be jointly and severally liable to the Client for the execution of the Contract in accordance with the contract terms.
- 6.2. The working capital required for the Project will be arranged by the parties Jointly in proportion to their participation.
- 6.3. All works shall be carried out through joint site operation under the integrated site organization to be established for the Project. The responsibility of each partner in JV in terms of physical and financial are as detailed below.

Participation	[Lead Partner] BACKBONE	[Partner] (ARSS)
Financial	51%	49%
Planning	51%	49%
Construction Equipment	51%	49%
Key Personnel	Project Manager, Planning Engineer, Equipment, Plant and Transport Manager and supporting staff	Other Key Personnel (except Project Manager, Planning Engineer, Equipment, Plant and Transport Manager) and supporting staff
Execution of Work	All items of works required for execution of road approximating to 51% of contract value	All items of works required for execution of road approximating to 49% of contract value

- 6.4. Neither party of the J.V. shall be allowed to sign, pledge, sell or otherwise dispose all or part of its respective interest in J.V. to any party including existing partner(s) of the J.V. The employer reserves right for any consequent action (including black listing) against any or all J.V. partners in case of any breach in this regard.
- 6.5. In the event of default by any partner, in the execution of his part of the Contract, the Employer will be so notified with in 30 days by the Partner in Charge, or in case of Partner in Charge being the defaulter, by the partner nominated as Partner in Charge of the remaining Joint Venture. The Partner in Charge shall, within 60 days of the said notice, assign the work of the defaulting partner to any other equally competent party acceptable to the Employer to ensure the execution of that part of the Contract.

**Article 7. Bank Account**

- 7.1. A Joint Venture account shall be opened in a bank, in India, to be nominated mutually for handling payments from the Client. The financial obligations of the J.V. shall be discharged through the J.V. Bank Account.
- 7.2. The Joint Venture account shall be operated under joint signatures of the authorized representative of BACKBONE and ARSS.

**Article 8. Validity**

- 8.1. This Agreement shall come into effect from the date of signing and remain valid until and unless terminated as provided for in this Article hereunder.
- 8.2. This Agreement shall automatically be terminated if any one of the following events occurs:

- 1) Cancellation of the Project by the Client; or
- 2) Failure of the J.V. to win the Project from the Client.



ARSS JV  
 TRACTOR  
 (KISHOR VIRAMGAMA)  
 CHAIRMAN & MANAGING DIRECTOR

ARSS Infrastructure Projects Ltd.

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

(12)



of termination of the Agreement according to any event provided for in the Article above, the Party shall make any claim for indemnification against the other Party for whatsoever reason.

**Article 9. Confidentiality**

No Party shall use this Agreement or information supplied by the other Party for any purpose other than intended by this agreement, nor transmit any written information or documents or this Agreement, to any third party for any purpose not intended by the Agreement without permission in writing to do so by the other Party.

**Article 10. Governing Law**

This Agreement shall be governed and construed in accordance with the laws by the Republic of India.

**Article 11. Arbitration**

11.1. All disputes or differences that may arise out of, in relation to or in connection with this Agreement shall be settled amicably between the Parties hereto.

However, in case any dispute or difference is not so settled, each Party may refer the matter to arbitration for final settlement in conformity with the Rules or Arbitration and Conciliation Act of India, 1996.

11.2. The arbitration shall take place in **Ahmedabad** and be conducted in English language.

11.3. This JV and all deals and transactions under this JV would be under the jurisdiction of the competent courts in Ahmedabad only.

11.4. None of the Parties shall be entitled to suspend the performance of the Contract merely by reason of a dispute and/or a dispute referred to arbitration.

**IN WITNESS WHEREOF**, the authorized representatives of the Parties hereto have executed this Agreement on the day, month and year first above written.

FOR, BACKBONE ENTERPRISES LIMITED

*Kishor V. Mangam*  
**Kishor V. Mangam (GAMA)**  
CHAIRMAN & MANAGING DIRECTOR  
For and on behalf of  
**Backbone Enterprises Limited**

ARSS Infrastructure Projects Ltd.

*Rajesh Agarwal*  
**Rajesh Agarwal** Director  
Managing Director  
For and on behalf of  
**ARSS INFRASTRUCTURE PROJECTS LIMITED**

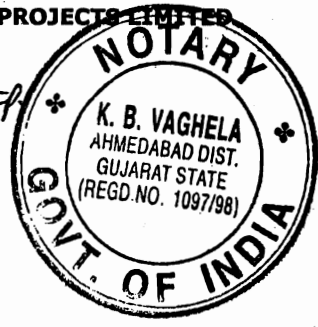
WITNESS:

1. *Mansinder*  
JAGRU BHANGOR  
3 JAWIHAR SOCIETY  
NR SEVSCHOOL, GOPAL, AHMEDABAD-380056.

2. *Amit m. Patel*  
Amit m. Patel,  
B-1104, Pustheri Apartment,  
Nr. Jee. Petrol Pump,  
Judges Bungalow Road,  
AHMEDABAD.

SIGNED BEFORE ME

*K. B. Vaghela*  
**K. B. VAGHELA**  
NOTARY  
GOVT. OF INDIA  
27/12/17



## ELI - 2: JV Information Sheet

JV / Specialist Subcontractor Information	
<b>Bidder's legal name</b>	<b>BACKBONE-ARSS (J.V)</b>
<b>JV Partner's or Subcontractor's legal name</b>	<b>BACKBONE ENTERPRISES LTD. ( LEAD PARTNER)</b>
<b>JV Partner's or Subcontractor's country of constitution</b>	<b>India</b>
<b>JV Partner's or Subcontractor's year of constitution</b>	<b>Started as Partnership Firm in the Year 1991 and converted into Limited Company in the Year- 2002</b>
<b>JV Partner's or Subcontractor's legal address in country of constitution</b>	<b>B-2, Ambika House, Nr. Hotel Grand Bhagwati, Bodakdev, S.G.Highway, Ahmedabad 380 054</b>
<b>JV Partner's or Subcontractor's authorized representative information</b> (name, address, telephone numbers, fax numbers, e-mail address)	<b>Mr. S.P.Dash</b> <b>Plot No-38, Sector-A, Zone-D, Mancheswar Industrial Estate, Bhubaneswar- 751010, Orissa.</b> <b>Tel: 0674-2588552, 2588554</b> <b>Fax: 0674-2585074</b> <b>Email: response@arssgroup.in</b>
<b>Attached the Following Documents</b>	
<ul style="list-style-type: none"> <li>• <b>Certificate of Incorporation</b></li> <li>• <b>Resolution to sign the documents</b></li> </ul>	



BACKBONE ARSS JV  
CONTRACTOR





FORM I. R.

# CERTIFICATE OF INCORPORATION

U45203GJ2002PLC40988

I hereby certify that

## **BACKBONE ENTERPRISES LIMITED**

is this day incorporated under the Companies Act, 1956  
(No. 1 of 1956) and that the Company is Limited..

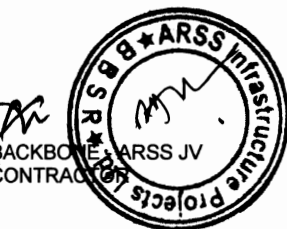
Given under my hand at AHMEDABAD this  
TWENTYTHIRD day of JULY TWO THOUSAND TWO.



Sd/-

**(D. A. VARDE)**

Asstt. Registrar of Companies,  
GUJARAT  
Dadra & Nagar Haveli



U45203GJ2002PLC40988

## CERTIFICATE FOR COMMENCEMENT OF BUSINESS

Pursuant to Section 149(3) of The Companies Act. 1956

I hereby certify that the  
**BACKBONE ENTERPRISES LIMITED**  
which was incorporated under the Companies Act, 1956  
on 23/07/2002 and which has this day filed a duly verified  
declaration in the prescribed form that the conditions of  
section 149 (1) (a) to (d) / 149 (2) (a) to (c) of the said Act,  
have been complied with, is entitled to commence business.

Given under my hand at AHMEDABAD this  
THIRTEENTH day of AUGUST TWO THOUSAND TWO.



Sd/-

(U. S. PATOLE)

Asstt. Registrar of Companies,  
GUJARAT  
Dadra & Nagar Haveli





# BACKBONE ENTERPRISES LTD.

Construction, Infrastructure & Development Company

B-2, Ambika House, Nr. Hotel Grand Bhagwati, Bodakdev, S.G. Road, Ahmedabad - 380 054.

Phone : +91 - 79 - 26840710, 26841598 Fax : +91 - 79 - 40040710


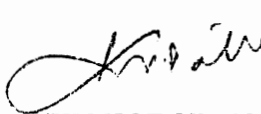
E-mail : bbone\_ent@yahoo.co.uk Web : www.bbel.co.in

"EXTRACTS OF THE MINUTES OF THE MEETING OF THE BOARD OF DIRECTORS OF BACKBONE ENTERPRISES LIMITED, HELD AT REGISTERED OFFICE OF THE COMPANY ON TENTH JULY TWO THOUSAND THREE"

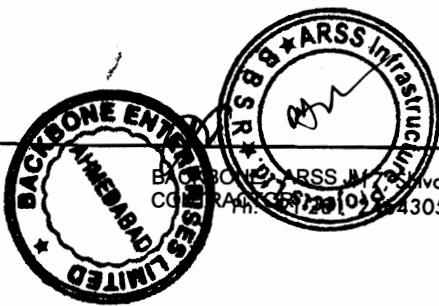
The Chairman explained to the Board that for the ease of operations necessary power to be given to all Directors of the Company to sign all necessary bidding documents as well as related papers thereof. The Board has accepted proposal and passed the following resolution:

RESOLVED THAT all Directors of the Company, namely (1) Shri Kishor Viramgama, (2) Shri Bhupendrakumar T. Pachani and (3) Shri Bhovanbhai P. Rangani are authorized to sign all bidding documents and related papers thereof such as Joint Venture Agreements and/or Special Power of Attorney given on behalf of Joint Venture units formed.

CERTIFIED that the above is a correct copy of the resolution passed on by the Board of Directors and that it has been entered in the usual course of business in the minutes book of the company and signed thereon by the Chairman of the Company and is in accordance with the Memorandum and Articles of Association of the Company.



(KISHOR VIRAMGAMA)  
CHAIRMAN & M.D.



Accredited by the Dutch Council for Certification

Chief Engineer

World Bank Projects, One

Office of the E.I.C (Civil) Orissa

## ELI - 2: JV Information Sheet

JV / Specialist Subcontractor Information	
Bidder's legal name	BACKBONE-ARSS (J.V)
JV Partner's or Subcontractor's legal name	ARSS INFRASTRUCTURE PROJECTS LTD. (PARTNER)
JV Partner's or Subcontractor's country of constitution	India
JV Partner's or Subcontractor's year of constitution	Started as ARSS Stones Private Limited in the Year 2000 and converted into ARSS Infrastructure Projects Limited in the Year-2005
JV Partner's or Subcontractor's legal address in country of constitution	Plot No-38, Sector-A, Zone-D, Mancheswar Industrial Estate, Bhubaneswar- 751010, Orissa.
JV Partner's or Subcontractor's authorized representative information <small>(name, address, telephone numbers, fax numbers, e-mail address)</small>	<b>Mr. S.P.Dash</b> Plot No-38, Sector-A, Zone-D, Mancheswar Industrial Estate, Bhubaneswar- 751010, Orissa. Tel: 0674-2588552, 2588554 Fax: 0674-2585074 Email: <a href="mailto:response@arssgroup.in">response@arssgroup.in</a>
Attached the Following Documents <ul style="list-style-type: none"> <li>• Certificate of Incorporation</li> <li>• Resolution to sign the documents</li> </ul>	





**COMPANY REGISTRATION NO : 15-06230 OF 2000-2001**

**CIN NO.U14103OR2000PTC006230**

**FRESH CERTIFICATE OF INCORPORATION CONSEQUENT ON CHANGE OF NAME  
IN THE OFFICE OF THE REGISTRAR OF COMPANIES, ORISSA, CUTTACK**

**(UNDER THE COMPANIES ACT, 1956)**

**IN THE MATTER OF M/S. ARSS STONES PRIVATE LIMITED**

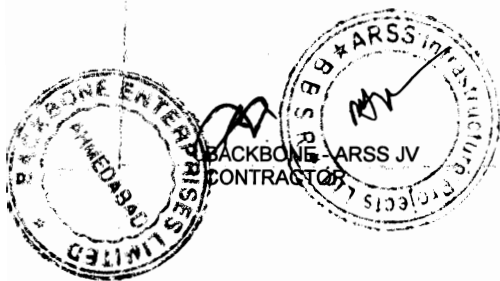
I hereby certify that *M/S. ARSS STONES PRIVATE LIMITED* which was originally incorporated on the SEVENTEENTH day of MAY, TWO THOUSAND under the Companies Act, 1956 and under the name "ARSS STONES PRIVATE LIMITED" the said Company passed necessary resolution in terms of Section 21 of the Companies Act, 1956 on 19<sup>th</sup> April 2005 and the approval of the Central Government, signified in writing having been accorded hereto in the Ministry of Company Affairs, Registrar of Companies, Orissa letter No. TS/S.21/6230/410 dated 20<sup>th</sup> MAY, 2005 the name of the said Company this day changed to "ARSS INFRASTRUCTURE PROJECTS PRIVATE LIMITED"

Given under my hand at CUTTACK this TWENTIETH day of MAY, TWO THOUSAND FIVE.

*B. Mohanty*  
(B. MOHANTY)

REGISTRAR OF COMPANIES, ORISSA.

कम्पनी रजिस्ट्रार  
Registrar of Companies  
उड़ीसा / Orissa







निगमन का प्रमाण पत्र  
CERTIFICATE OF INCORPORATION

ता०..... की म०.....

No..... 15-06230 ..... of ..... 2000-2001 .....

में एतद द्वारा प्रमाणित करता हूँ कि आज.....

कम्पनी अधिनियम 1956 (1956 का स० -1) के अधीन निगमित की गई है; और वह कम्पनी पारसीमित है।


I hereby certify that **ARSS STONES PRIVATE LIMITED**.....

is this day incorporated under the Companies Act, 1956 (No.1 of 1956)  
and that the Company is limited.

मेरे हस्ताक्षर से आज ता०..... को दिया गया।

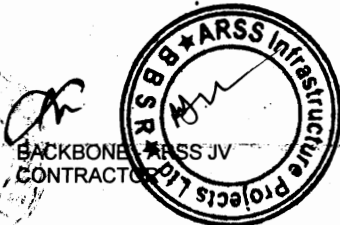
Given under my hand at..... **CUTTACK** ..... this **SEVENTEENTH**.....

day of ..... **MAY** ..... Two thousand.....

  
( **G. MUKHOPADHYAY** )  
कम्पनियों का रजिस्ट्रार, उड़ीसा  
Registrar of Companies,  
Orissa

जे०एस०सी-1  
J.S.C.-1

कम्पनी रजिस्ट्रार,  
Registrar of Companies  
उड़ीसा / Orissa





# ARSS INFRASTRUCTURE PROJECTS LIMITED

**THE EXTRACT OF THE MINUTES OF THE RESOLUTION PASSED AT THE MEETING OF THE BOARD OF DIRECTORS OF ARSS INFRASTRUCTURE PROJECTS LIMITED HELD AT ITS REGISTERED OFFICE SITUATED AT PLOT NO.-38, SECTOR-A, ZONE-D, MANCHESWAR INDUSTRIAL ESTATE, BHUBANESWAR- 751010 ON THE 27<sup>th</sup> NOVEMBER, 2007 AT 11. 30 A.M.**

**"RESOLVED THAT** approval of the Board be and is hereby granted to enter into a Joint Venture Agreement with Backbone Enterprises Limited, Backbone House, M-43, Gujarat Housing Board, Kalawad Road, Rajkot - 360002, Gujarat in the name and style of BACKBONE-ARSS JOINT VENTURE with effect from 27<sup>th</sup> November, 2007 for the World Bank Projects for "Construction for widening & strengthening of existing carriageway to 2-Lane from Berhampur to Tatapani (Km. 0/0 to Km. 41/0 of SH-17)"

**"RESOLVED FURTHER THAT** the draft deed of Joint Venture Agreement duly initialled by the Chairman placed before the meeting be and is hereby approved.

**"RESOLVED FURTHER THAT** Mr. S.P. Dash, General Manager of the Company be and is hereby authorized to sign and execute the said Joint Venture Agreement and do all such acts ,deeds and things as may be necessary to give effect or any matter incidental or ancillary in this regard.

For ARSS Infrastructure Projects Ltd.

  
Managing Director

Certified true copy,

For ARSS Infrastructure Projects Ltd.

  
Company Secretary

Regd. Office : Sector-A, Zone-D, Plot No.-38, Mancheswar Industrial Estate, Bhubaneswar-751010 (ORISSA)  
TEL : (0674) 2585074, 2585075, 2585074, Fax : (0674) 2585074, E-mail : response@arssgroup.in, Website : www.arssgroup.in

Corporate Office : 141, SBI Colony, Pachim Vihar, New Delhi-110 063, INDIA  
Tel : (011) 2538638, Fax : (011) 25287357, E-mail : response@arssgroup.in, Website : www.arssgroup.in

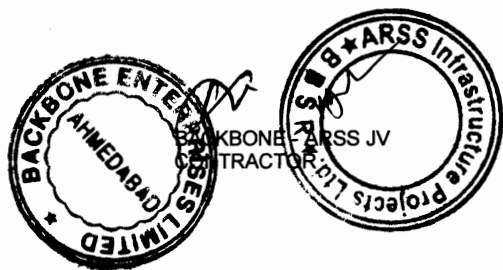
BACKBONE - ARSS JV  
CONTRACTOR

World Bank Projects, Orissa  
World Bank Projects  
O/o the E.I.C (Civil) Orissa,  
Bhubaneswar.



# Technical Proposal

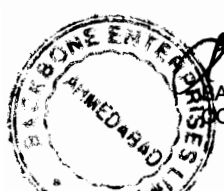
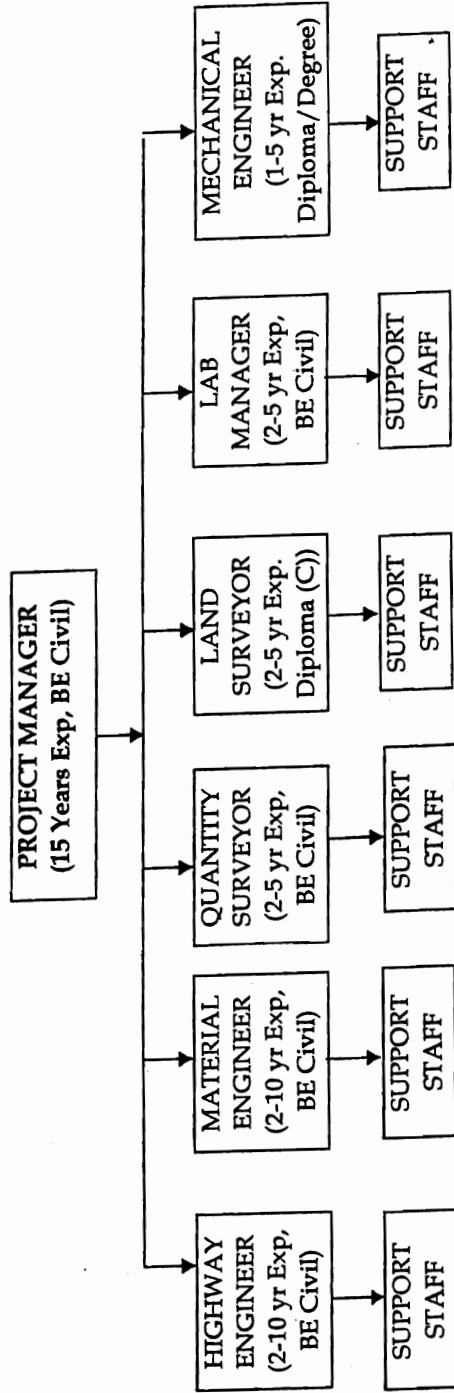
- **Site Organization**
- **Method Statement**
- **Mobilization Schedule**
- **Construction Schedule**
- **Equipment**
- **Others**



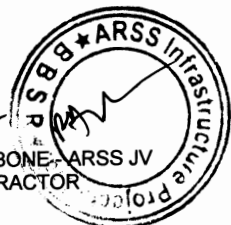
Widening & Strengthening of existing carriageway to 2-lane road from Berhampur to Taptapani (Km. 0/0 to 41/0 of SH - 17)

BACKBONE-ARSS I.V.

SITE ORGANISATION



BACKBONE-ARSS JV  
CONTRACTOR



## Method Statement

### 1. Introduction:-

The section of Berhampur to Tapatapni from chainage 0/000 KM to 41/000KM is going to be widened from single lane to double lane with improvement of riding quality.

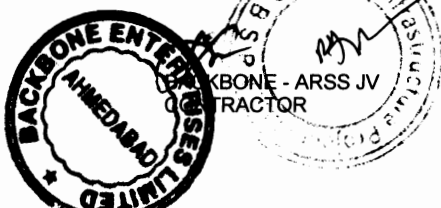
The work comprises of providing double lane carriage way with earthen shoulders on either side. The principal items of work to be executed are Earthwork in subgrade, providing GSB, WMM, BM, and SDBC including widening of CD works. The work shall be carried out with the running traffic.

#### A. General preparatory works And Pre-Construction Activities

- (i) Studying of the design and Alignment, Setting-out and Fixing of toe pillars: Studying of the design & alignment available with the Consultant /Client and checking the correctness of the centre line through professionally well qualified survey team, the centre line marking and fixing of toe pillars shall be taken up. The Survey Engineer of the firm shall have regular interaction with his counterpart of the Consultant for setting out, measuring levels etc.
- (ii) Deployment of Key Personnel in consultation with the Consultant/Client: Qualified & experienced Technical and Supervisory personnel shall be deployed to meet the requirement in line with tender stipulations.

Necessary arrangement shall be made for the payment, housing, fooding and transport of the labourers engaged in conformity with the prevalent labour law.

- (iii) Camp and Accommodation: Arrangement of adequate land for installation of, workshop, go-down, stores, stockyard for materials, camp office, staff quarters, field testing laboratory, hiring of houses for staff shall be taken up. The land shall be minimum 500m away from habitation.
- (iv) Deployment of Machineries & equipment: All required equipments & machineries for completion of the work within stipulated time shall be procured & deployed at site well before start of the event. It is also planned to have enough spare parts and trained personnel to carry out necessary maintenance of plant and machineries. The principal machinery /plant requirements for this work are JCB, Paver, Hot-mix plant, WMM plant, Grader, Roller, dozer, tipper, water tanker etc. The equipment deployment schedule shall be carried out in consultation with the Engineer. The Plant Engineer of the firm shall be exclusively in charge of the Concrete Batch mix Plant, Hot-mix and WMM plants.
- (v) Material planning: The materials to be used for the work shall be located and tested for suitability. Borrow areas to be identified at different locations along the road. Testing for suitability of soil shall be taken up. Stone products are proposed to be used from local quarries along the road. Materials from these quarries shall be tested in approved laboratory. The water from the local source shall also be tested. All these testing work shall be carried out in consultation with the Employer/Engineer and records maintained.

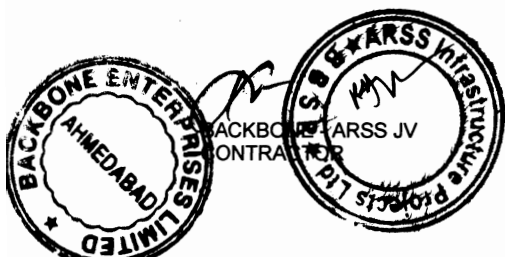


- (vi) Mix designs, specifying methods, manufacturing of concrete, sampling and testing procedure, Quality Control measures: The work shall require finalization of mix design for GSB, WMM and concrete over M15 grade as well as bituminous mix designs. For lower grade of concrete, nominal mix shall be followed. It is proposed to use Ultratech/ ACC/ Konark cement of appropriate grade for the entire work and the same shall be got tested in approved laboratory. Similarly steel from SAIL/TATA/ RINL shall be used after conforming to the relevant tests.
- (vii) **Establishment of laboratories & quality assurance plan of various components of the works:** Field laboratory with required testing equipments and qualified engineer with support staff shall be in position before commencement of work. To save delay in progress, we may take the service of approved laboratory/Government laboratories to render necessary services. The activity specific Quality Assurance Plan (QAP) conforming to specification appended to the contract shall be finalized in consultation with the Engineer so as to ensure quality construction. The QAP shall cover activities from approval of sources of materials, to finalization of bituminous mix designs and concrete mix designs, laying methods, sampling and testing procedure and Quality Control measures to ensure required standard and consistency in quality, at the commencement of item, etc.
- (viii) **Maintaining the road to keep traffic worthy during construction period.:** Since heavy traffic use this road, necessary maintenance will be taken up with care to ensure safe movement of traffic. Required sign boards/ warnings/ cautionary boards shall be in position before start of events including barricading danger zones.

**B. Construction Activities:**

**Major items of work of the project consists of**

- (i) **Construction/extension/repair of cross drainage works:** After finalization of the centre line & fixing of Toe pillars, priority will be given for layout of Construction/ reconstructions/ rehabilitation of HP Culverts, box culverts, bridges. These works shall be completed before starting of road works in these reaches. The widening/ reconstruction/ rehabilitation of culvert works shall be mostly carried out in the first mile stone. Individual design and programme of construction shall be finalized in consultation with the Engineer.
- (ii) **Construction of Embankment, sub grade including rehabilitation of embankment/sub-grade:** The existing road embankment slope and the ground from existing toe line to the final toe line shall be stripped of vegetation and necessary benching shall be done to receive earth work in layers. The widening of the embankment shall be carried out for one side and after reaching the sub-grade level the other sided shall be taken up. The work for embankment and sub-grade shall be carried out as per specification appended to the Contract & relevant codes. The detail methodology for execution of this item shall be prepared separately in consultation with the Engineer.



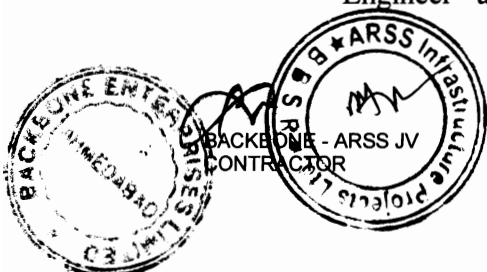
- (iii) **Construction of Granular Sub base:** Granular sub base shall be done with approved close graded materials of grading-I of clause 401, MoRTH specification. The mix design shall be carried out and provided to the plant. The detailed methodology for execution of this item shall be prepared separately in consultation with the Engineer.
- (iv) **WMM:** The WMM shall be machine mixed as per approved design mix done before start of work and field tests conducted to check the correctness of the mix. WMM to be laid by paver & watered rolled to achieve designed compaction and as per detailed specification of Clause 407, MoRTH.
- (v) **DBM:-** After WMM is laid of required thickness with acceptable compaction and approved by the Engineer preparation works shall be done for laying DBM. DBM as per design mix shall be laid by paver strictly as per technical specifications & MoRTH guidelines Clause 507.
- (vi) **BC:- CRMB-55** The item shall be executed as per direction of Engineer-in-charge & Technical specifications Clause 509 and 21, MoRTH Specifications.
- (vii) **Protective Works:** The embankment after construction shall be dressed neatly to desired slopes & shape. Stone pitching wherever planned shall be provided on filter media as per drawing. Turfing as per provision shall be laid & watered will survival of the sods.
- (viii) **Road markings, road signs and kilometer/hectometer stones; Guard posts etc:** The colour, width and layout of road markings shall be as per IRC 35 and as per specification in the drawings. The road surface shall be cleaned by compressed air before layout is given. Materials shall be of approved quality and as per specifications. Road signs and kilometer/hectometer stones; Guard posts etc shall be provided as per drawing and relevant codes. The job has many items and there are specific construction methodology enshrined in the Specification. Some times execution of some items shall have combined methodology for more than one item. From the broader guidelines provided in the specification site specific methodology shall be finalized without deviating from the quality and performance requirement. Construction methodology covering all aspects such as from manufacturing to transportation including Quality control & precautions for each item shall be prepared in consultation with the Engineer.

**C. Post-Construction activities**

- (i) **Rectification of the defects in the completed works during the Defects Liability Period:** The road stretches after handing over on completion shall be observed carefully. Any defects noticed shall be rectified immediately in consultation with the Engineer.

**D. Management Meetings**


- (i) In order to maintain time and cost control it is necessary that the Employer and Engineer are apprised of the progress and ground difficulties requiring



intervention. 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. Project Manager of the firm shall attend all management meetings and have regular interaction with the Engineer and Employer.

- (ii) While expediting works with quality assurance, due care shall be taken to control Environmental Pollution to the bare minimum. Also adequate measures will be taken to ensure minimum public in-convenience. All steps/measures shall be taken to carry the general public of the locality to confidence along with our team of Engineers/Workers.

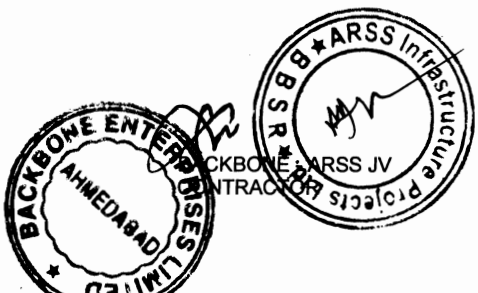


  
Chief Engineer  
World Bank Projects, Orissa  
World Bank Projects  
Office of the E.I.C (Civil) Orissa,  
Bhubaneswar



### Mobilization Schedule

<b>Man Power</b>	<b>Start Date</b>	7 days from Signing Agreement
	<b>Completion Date</b>	50 days from Signing Agreement
<b>Machinery</b>	<b>Start Date</b>	15 days from Signing Agreement
	<b>Completion Date</b>	90 days from Signing Agreement

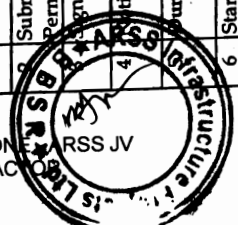


*J. K. Ghosh*  
Civil Engineer  
World Bank Projects, Orissa Projects  
EMPLOYER  
Office of the E.I.C (Civil) Orissa  
Bhubaneswar

Widening & Strengthening existing carriageway to 2-lane road from Berhampur to Taptapani (Km. 0/0 to 41/0 of SH - 17)

BACKBONE-ARSS(IV)

Sl No	Task Name	Duration	Start	Finish	2008				2009				2010							
					Qtr-1	Qtr-2	Qtr-3	Qtr-4	Qtr-1	Qtr-2	Qtr-3	Qtr-4	Qtr-1	Qtr-2	Qtr-3	Qtr-4				
1	Contract Award	1 day	1/9/2008	1/9/2008																
2	Submission of Bank Guarantee towards Performance Security	1 day	29/9/2008	29/9/2008																
3	Signing of Agreement	1 day	20/10/2008	20/10/2008																
4	Notice to proceed with the work	1 day	28/10/2008	28/10/2008																
5	Duration of the project	679 days	10/11/2008	31/8/2010																
6	Start of Project	1 day	10/11/2008	10/11/2008																
7	Mobilisation & Plant Setup	50 days	10/11/2008	30/12/2008																
8	Construction of Site Offices & Laboratory	50 days	10/11/2008	30/12/2008																
9	Identification of Quarries and setting up crusher	50 days	10/11/2008	30/12/2008																
10	Establishment of Centreline and Benchmark	12 days	10/11/2008	22/11/2008																
11	Approved by Engineer	10 days	14/11/2008	24/11/2008																
12	Remedial work, Repair & Restoration Work	55 days	21/11/2008	15/01/2009																
13	Clearing & Grubbing	15 days	21/11/2008	6/12/2008																
14	Recording Levels	26 days	1/12/2008	27/12/2008																
15	Culverts & Bridges	503 days	15/12/2008	30/04/2010																
16	Earthwork	500 days	15/12/2008	15/05/2010																
17	Granular Subbase	495 days	10/10/2008	16/02/2010																
18	Wet mix Macadam	408 days	1/11/2008	25/02/2010																
19	Bituminous Items	405 days	10/1/2009	20/02/2010																
20	Miscellaneous Items	477 days	1/5/2008	31/8/2010																
21	Completion of Project	1 day	31/8/2010	31/8/2010																



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

## Equipment

### PLANTS AND EQUIPMENTS OWNED AND PROPOSED FOR THE PROJECT BY M/s BACKBONE ENTERPRISERS LTD. RAJKOT

1.

Item of equipment: <b>VOGELE ELECTRONIC PAVER FINISHER</b>		
Equipment information	Name of manufacturer:- JOSEPH VOGELE AG-GERMANY	Model and power rating SUPER 1800 WITH AB 575 T.V.SCREEN
	Capacity 120-150 TPH	Year of manufacture 2000
Current status	Current location KHAMBHALIA SITE-Khambhalia (Village)	
	Details of current commitments FALLA-KHAMBHALIA-GSHP-11	
Source	Indicate source of the equipment <input checked="" type="checkbox"/> <b>Owned</b> <input type="checkbox"/> <del>Rented</del> <input type="checkbox"/> <del>Leased</del> <input type="checkbox"/> <del>Specially manufactured</del>	

2.

Item of equipment:- <b>SENSOR PAVER FINISHER-2UNITS</b>		
Equipment information	Name of manufacturer: GUJARAT APOLLO EQUIPMENT LTD	Model and power rating AP-550
	Capacity 5.5 TO 6 MTR WIDTH	Year of manufacture 2003
Current status	Current location BHARUCH-DAHEJ	
	Details of current commitments BHARUCH-DAHEJ ROAD PROJECT	
Source	Indicate source of the equipment <input checked="" type="checkbox"/> <b>Owned</b> <input type="checkbox"/> Rented <input type="checkbox"/> Leased <input type="checkbox"/> Specially manufactured	

3.

Item of equipment: <b>Motor Grader-4 UNITS</b>		
Equipment information	Name of manufacturer CATERPILLAR	Model and power rating 120H
	Capacity 120H	Year of manufacture 2003
Current status	Current location BHARUCH-DAHEJ	
	Details of current commitments BHARUCH-DAHEJ ROAD PROJECT	
Source	Indicate source of the equipment <input checked="" type="checkbox"/> <b>Owned</b> <input type="checkbox"/> Rented <input type="checkbox"/> Leased <input type="checkbox"/> Specially manufactured	

4.

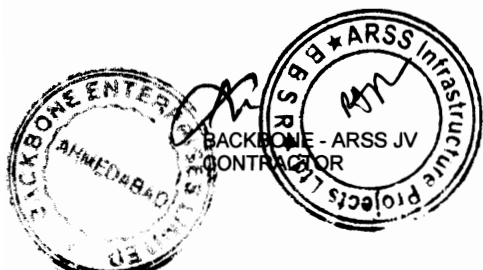
Item of equipment: <b>HYDRAULIC EXCAVATOR-6 UNITS</b>		
Equipment information	Name of manufacturer CATERPILLAR	Model and power rating 320H
	Capacity 1.1. CUM	Year of manufacture 2004
Current status	Current location RAJKOT	
	Details of current commitments RAJKOT GONDAL PROJECT	
Source	Indicate source of the equipment <input checked="" type="checkbox"/> <b>Owned</b> <input type="checkbox"/> Rented <input type="checkbox"/> Leased <input type="checkbox"/> Specially manufactured	

5.

Item of equipment: <b>SOIL COMPACTOR-7 UNITS</b>		
Equipment information	Name of manufacturer INGERSOLL-RAND-BANGALORE	Model and power rating ISD-100 SOIL/110
	Capacity 10-12 MT	Year of manufacture 1997-2003-2004
Current status	Current location BHARUCH-DAHEJ	
	Details of current commitments BHARUCH-DAHEJ ROAD PROJECT	
Source	Indicate source of the equipment <input checked="" type="checkbox"/> <b>Owned</b> <input type="checkbox"/> Rented <input type="checkbox"/> Leased <input type="checkbox"/> Specially manufactured	

6.

Item of equipment: <b>Pnumatic Tyres Static Roller 2 Nos</b>		
Equipment information	Name of manufacturer SAKAI	Model and power rating TS200
	Capacity 10 M.T.	Year of manufacture 1990-1 UNIT 1992-1 UNIT
Current status	Current location BHARUCH-DAHEJ	
	Details of current commitments BHARUCH-DAHEJ ROAD PROJECT	
Source	Indicate source of the equipment <input checked="" type="checkbox"/> <b>Owned</b> <input type="checkbox"/> Rented <input type="checkbox"/> Leased <input type="checkbox"/> Specially manufactured	



7.

Item of equipment: <b>Pnumatic Tyres Static Roller</b>		
Equipment information	Name of manufacturer HEPCO	Model and power rating HR 105
	Capacity 26 TONNE	Year of manufacture 2001
Current status	Current location BHARUCH-DAHEJ	
	Details of current commitments BHARUCH-DAHEJ ROAD PROJECT	
Source	Indicate source of the equipment <input checked="" type="checkbox"/> <b>Owned</b> <input type="checkbox"/> Rented <input type="checkbox"/> Leased <input type="checkbox"/> Specially manufactured	

8.

Item of equipment: <b>SPECO ASPHALT MIXING PLANT</b>		
Equipment information	Name of manufacturer SPECO LIMITED, SOUTH KOREA, SEOUL	Model and power rating Portable Asphalt Mixing Plant Model: TASP-1550P(124 TPH) Type: Mobile and Batch Type
	Capacity 124 TPH	Year of manufacture 2001
Current status	Current location Raipur	
	Details of current commitments No commitments at present	
Source	Indicate source of the equipment <input checked="" type="checkbox"/> <b>Owned</b> <input type="checkbox"/> Rented <input type="checkbox"/> Leased <input type="checkbox"/> Specially manufactured	

9.

Item of equipment: <b>CONCRETE BATCH MIXING PLANT</b>		
Equipment information	Name of manufacturer MAXOCRETE EQUIPMENTS	Model and power rating MAXOCRETE M-30
	Capacity 30 CUM	Year of manufacture 2005
Current status	Current location BHARUCH-DAHEJ	
	Details of current commitments BHARUCH-DAHEJ ROAD PROJECT	
Source	Indicate source of the equipment <input checked="" type="checkbox"/> <b>Owned</b> <input type="checkbox"/> Rented <input type="checkbox"/> Leased <input type="checkbox"/> Specially manufactured	



BACKBONE - ARSS JV  
CONTRACTOR

10.

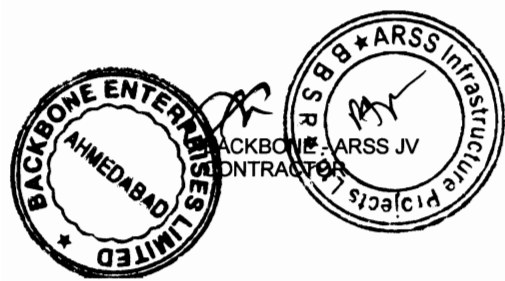
Item of equipment: <b>CONCRETE BATCH MIXING PLANT 2 NOS</b>		
Equipment information	Name of manufacturer MACONS ENGINEERS	Model and power rating MACON RMC-30
	Capacity 30 CUM	Year of manufacture 2005
Current status	Current location BHOPAL	
	Details of current commitments BHOPAL-VIDISHA ROAD PROJECT	
Source	Indicate source of the equipment <input checked="" type="checkbox"/> <b>Owned</b> <input type="checkbox"/> Rented <input type="checkbox"/> Leased <input type="checkbox"/> Specially manufactured	

11.

Item of equipment: <b>GREAVES CIFA TRANSIT MIXER-8 Units</b>		
Equipment information	Name of manufacturer CIFA	Model and power rating RHL 65 XL
	Capacity 3.4T	Year of manufacture 2004,2005
Current status	Current location Bhruch	
	Details of current commitments No commitments at present	
Source	Indicate source of the equipment <input checked="" type="checkbox"/> <b>Owned</b> <input type="checkbox"/> Rented <input type="checkbox"/> Leased <input type="checkbox"/> Specially manufactured	

12.

Item of equipment: <b>CATERPILLAR LOADER MACHINE</b>		
Equipment information	Name of manufacturer CATERPILAR	Model and power rating PILLAR
	Capacity 1CUM	Year of manufacture 2005-06
Current status	Current location BHARUCH-DAHEJ SITE	
	Details of current commitments BHARUCH-DAHEJ -GSHP-9B	
Source	Indicate source of the equipment <input checked="" type="checkbox"/> <b>Owned</b> <input type="checkbox"/> Rented <input type="checkbox"/> Leased <input type="checkbox"/> Specially manufactured	



13.

Item of equipment: <b>J.C.B. Exacavator-cum-Loader</b>		
Equipment information	Name of manufacturer Escort JCB Limited	Model and power rating JCB-3D Exacavator cum Loader
	Capacity 0.90 cum	Year of manufacture 2000
Current status	Current location KHAMBHALIA SITE-Khambhalia(Village)	
	Details of current commitments FALLA-KHAMBHALIA-GSHP-11	
Source	Indicate source of the equipment <input checked="" type="checkbox"/> <b>Owned</b> <input type="checkbox"/> Rented <input type="checkbox"/> Leased <input type="checkbox"/> Specially manufactured	

14.

Item of equipment: <b>Tractor Bulldozer- 4 No</b>		
Equipment information	Name of manufacturer Gujarat Agro Industries Corporation Ltd.	Model and power rating HMT 5911
	Capacity 60 HP	Year of manufacture 1993 1994
Current status	Current location KHAMBHALIA SITE-Khambhalia(Village)	
	Details of current commitments FALLA-KHAMBHALIA-GSHP-11	
Source	Indicate source of the equipment <input checked="" type="checkbox"/> <b>Owned</b> <input type="checkbox"/> Rented <input type="checkbox"/> Leased <input type="checkbox"/> Specially manufactured	

15.

Item of equipment: <b>DUMPERS &amp; TIPPERS- 40 Nos</b>		
Equipment information	Name of manufacturer TATA MOTORS LIMITED JAMSHEDPUR	Model and power rating TATA HYWA APK 2516R
	Capacity 16 CUM	Year of manufacture 2004-6 Nos, 2003- 2 Nos and 2005-32 Nos
Current status	Current location BHARUCH-DAHEJ	
	Details of current commitments BHARUCH-DAHEJ ROAD PROJECT	
Source	Indicate source of the equipment <input checked="" type="checkbox"/> <b>Owned</b> <input type="checkbox"/> Rented <input type="checkbox"/> Leased <input type="checkbox"/> Specially manufactured	



**PLANTS AND EQUIPMENTS OWNED AND PROPOSED FOR THE PROJECT  
By M/s ARSS Infrastructure Projects Limited, Bhubaneswar**

1.

Item of equipment: <b>Sensor paver</b>		
Equipment information	Name of manufacturer Appolo Construction Equipments (P) Ltd.	Model and power rating
	Capacity	Year of manufacture 2004
Current status	Current location <b>Chadheidhara Camp Site</b>	
	Details of current commitments <b>Free</b>	
Source	Indicate source of the equipment <input checked="" type="checkbox"/> <b>Owned</b> <input type="checkbox"/> <b>Rented</b> <input type="checkbox"/> <b>Leased</b> <input type="checkbox"/> <b>Specially manufactured</b>	

2.

Item of equipment: <b>Motor Garder</b>		
Equipment information	Name of manufacturer <b>CATERPILLAR</b>	Model and power rating
	Capacity <b>200 Cum/Hour</b>	Year of manufacture 2007
Current status	Current location <b>Chadheidhara Camp Site</b>	
	Details of current commitments <b>Free</b>	
Source	Indicate source of the equipment <input checked="" type="checkbox"/> <b>Owned</b> <input type="checkbox"/> <b>Rented</b> <input type="checkbox"/> <b>Leased</b> <input type="checkbox"/> <b>Specially manufactured</b>	

3.

Item of equipment: <b>Hydraulic Excavator</b>		
Equipment information	Name of manufacturer <b>Telco Construction Equipment Company Ltd.</b>	Model and power rating <b>EX-210LCH-V</b>
	Capacity <b>60 Cum/Hour</b>	Year of manufacture 2006
Current status	Current location <b>Chaheidhara Camp Site</b>	
	Details of current commitments <b>Free</b>	
Source	Indicate source of the equipment <input checked="" type="checkbox"/> <b>Owned</b> <input type="checkbox"/> <b>Rented</b> <input type="checkbox"/> <b>Leased</b> <input type="checkbox"/> <b>Specially manufactured</b>	





4.

Item of equipment: <b>Hydraulic Excavator</b>		
Equipment information	Name of manufacturer <b>Telco Construction Equipment Company Ltd.</b>	Model and power rating <b>EX-70</b>
	Capacity <b>60 Cum/Hour</b>	Year of manufacture <b>2005</b>
Current status	Current location <b>Chadheidhara Camp Site</b>	
	Details of current commitments <b>Free</b>	
Source	Indicate source of the equipment <input checked="" type="checkbox"/> <b>Owned</b> <input type="checkbox"/> <b>Rented</b> <input type="checkbox"/> <b>Leased</b> <input type="checkbox"/> <b>Specially manufactured</b>	

5.

Item of equipment: <b>Vibratory Roller</b>		
Equipment information	Name of manufacturer <b>Escorts Construction Equipment Ltd.</b>	Model and power rating <b>EC-5250</b>
	Capacity <b>100 Cum/Hour</b>	Year of manufacture <b>2005</b>
Current status	Current location <b>Chadheidhara Camp Site</b>	
	Details of current commitments <b>Free</b>	
Source	Indicate source of the equipment <input checked="" type="checkbox"/> <b>Owned</b> <input type="checkbox"/> <b>Rented</b> <input type="checkbox"/> <b>Leased</b> <input type="checkbox"/> <b>Specially manufactured</b>	

6.

Item of equipment: <b>Vibratory Roller</b>		
Equipment information	Name of manufacturer <b>Escorts Construction Equipment Ltd.</b>	Model and power rating <b>EC-5250</b>
	Capacity <b>100 Cum/Hour</b>	Year of manufacture <b>2005</b>
Current status	Current location <b>Chadheidhara Camp Site</b>	
	Details of current commitments <b>Free</b>	
Source	Indicate source of the equipment <input checked="" type="checkbox"/> <b>Owned</b> <input type="checkbox"/> <b>Rented</b> <input type="checkbox"/> <b>Leased</b> <input type="checkbox"/> <b>Specially manufactured</b>	



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7.

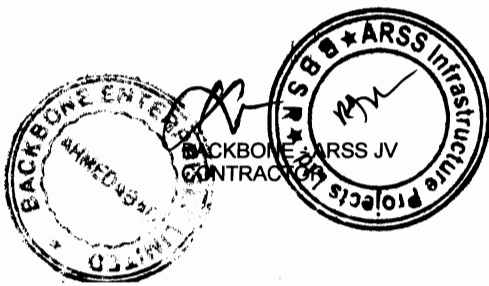
Item of equipment: <b>Pneumatic Roller</b>		
Equipment information	Name of manufacturer <b>Ingersoll-Rand (India) Limited</b>	Model and power rating <b>DD-90</b>
	Capacity <b>8-10 Ton (100Cum/Hour)</b>	Year of manufacture <b>2006</b>
Current status	Current location <b>Chadheidhara Camp Site</b>	
	Details of current commitments <b>Free</b>	
Source	Indicate source of the equipment <input checked="" type="checkbox"/> <b>Owned</b> <input type="checkbox"/> Rented <input type="checkbox"/> Leased <input type="checkbox"/> Specially manufactured	

8.

Item of equipment: <b>Pneumatic Roller</b>		
Equipment information	Name of manufacturer <b>Ingersoll-Rand (India) Limited</b>	Model and power rating <b>DD-90</b>
	Capacity <b>8-10 Ton (100 Cum/Hour)</b>	Year of manufacture <b>2007</b>
Current status	Current location <b>Chadheidhara Camp Site</b>	
	Details of current commitments <b>Free</b>	
Source	Indicate source of the equipment <input checked="" type="checkbox"/> <b>Owned</b> <input type="checkbox"/> Rented <input type="checkbox"/> Leased <input type="checkbox"/> Specially manufactured	

9.

Item of equipment: <b>Hot Mix Plant</b>		
Equipment information	Name of manufacturer <b>Appolo Earthmoovers Limited</b>	Model and power rating <b>DM-45</b>
	Capacity <b>40-60TPH (17 Cum/Hour)</b>	Year of manufacture <b>2007</b>
Current status	Current location <b>Chadheidhara Camp Site</b>	
	Details of current commitments <b>Free</b>	
Source	Indicate source of the equipment <input checked="" type="checkbox"/> <b>Owned</b> <input type="checkbox"/> Rented <input type="checkbox"/> Leased <input type="checkbox"/> Specially manufactured	



10.

Item of equipment: <b>Hot Mix Plant</b>		
Equipment information	Name of manufacturer <b>Appolo Earthmovers Limited</b>	Model and power rating <b>DM-45</b>
	Capacity <b>40-60TPH (17 Cum/Hour)</b>	Year of manufacture <b>2007</b>
Current status	Current location <b>Chadheidhara Camp Site</b>	
	Details of current commitments <b>Free</b>	
Source	Indicate source of the equipment <input checked="" type="checkbox"/> <b>Owned</b> <input type="checkbox"/> Rented <input type="checkbox"/> Leased <input type="checkbox"/> Specially manufactured	

11.

Item of equipment: <b>Concrete Batch Mix Plant</b>		
Equipment information	Name of manufacturer <b>Macons Equipments</b>	Model and power rating <b>MA-18</b>
	Capacity <b>18 Cum/Hr.</b>	Year of manufacture <b>2007</b>
Current status	Current location <b>Chadheidhara Camp Site</b>	
	Details of current commitments <b>Free</b>	
Source	Indicate source of the equipment <input checked="" type="checkbox"/> <b>Owned</b> <input type="checkbox"/> Rented <input type="checkbox"/> Leased <input type="checkbox"/> Specially manufactured	

12.

Item of equipment: <b>Concrete Batch Mix Plant</b>		
Equipment information	Name of manufacturer <b>Macons Equipments</b>	Model and power rating <b>MA-18</b>
	Capacity <b>18 Cum/Hr.</b>	Year of manufacture <b>2006</b>
Current status	Current location <b>Chaheidhara Camp Site</b>	
	Details of current commitments <b>Free</b>	
Source	Indicate source of the equipment <input checked="" type="checkbox"/> <b>Owned</b> <input type="checkbox"/> Rented <input type="checkbox"/> Leased <input type="checkbox"/> Specially manufactured	



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 World Bank Projects  
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13.

Item of equipment: <b>Transit Mixture</b>		
Equipment information	Name of manufacturer <b>TATA Motors Limited</b>	Model and power rating
	Capacity <b>4.5 Cum/Hr.</b>	Year of manufacture <b>2006</b>
Current status	Current location <b>Chadheidhara Camp Site</b>	
	Details of current commitments <b>Free</b>	
Source	Indicate source of the equipment <input checked="" type="checkbox"/> <b>Owned</b> <input type="checkbox"/> Rented <input type="checkbox"/> Leased <input type="checkbox"/> Specially manufactured	

14.

Item of equipment: <b>Front End Loader</b>		
Equipment information	Name of manufacturer <b>TATA Motors Limited</b>	Model and power rating <b>2021Z</b>
	Capacity <b>1.7 Cum Bucket. (60 Cum/Hour)</b>	Year of manufacture <b>2006</b>
Current status	Current location <b>Chadheidhara Camp Site</b>	
	Details of current commitments <b>Free</b>	
Source	Indicate source of the equipment <input checked="" type="checkbox"/> <b>Owned</b> <input type="checkbox"/> Rented <input type="checkbox"/> Leased <input type="checkbox"/> Specially manufactured	

15.

Item of equipment: <b>Front End Loader</b>		
Equipment information	Name of manufacturer <b>TATA Motors Limited</b>	Model and power rating <b>2021Z</b>
	Capacity <b>1.7 Cum Bucket. (60 Cum/Hour)</b>	Year of manufacture <b>2006</b>
Current status	Current location <b>Chadheidhara Camp Site</b>	
	Details of current commitments <b>Free</b>	
Source	Indicate source of the equipment <input checked="" type="checkbox"/> <b>Owned</b> <input type="checkbox"/> Rented <input type="checkbox"/> Leased <input type="checkbox"/> Specially manufactured	



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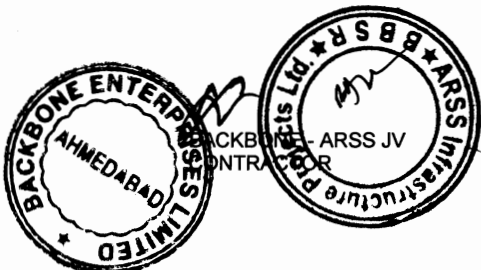
Chief Engineer  
World Bank Projects, Orissa  
World Bank EMPLOYER  
O/o the E.I.C (Civil) Orissa  
Bhubaneswar

16.

Item of equipment: <b>Tipper-11 Nos</b>		
Equipment information	Name of manufacturer <b>TATA Motors Limited</b>	Model and power rating <b>HYVA</b>
	Capacity <b>14 Cum</b>	Year of manufacture <b>2006</b>
Current status	Current location <b>Chadheidhara Camp Site</b>	
	Details of current commitments <b>Free</b>	
Source	Indicate source of the equipment <input checked="" type="checkbox"/> <b>Owned</b> <input type="checkbox"/> <b>Rented</b> <input type="checkbox"/> <b>Leased</b> <input type="checkbox"/> <b>Specially manufactured</b>	

17.

Item of equipment: <b>Tipper- 9 Nos</b>		
Equipment information	Name of manufacturer <b>TATA Motors Limited</b>	Model and power rating <b>HYVA</b>
	Capacity <b>14 Cum</b>	Year of manufacture <b>2007</b>
Current status	Current location <b>Chaheidhara Camp Site</b>	
	Details of current commitments <b>Free</b>	
Source	Indicate source of the equipment <input checked="" type="checkbox"/> <b>Owned</b> <input type="checkbox"/> <b>Rented</b> <input type="checkbox"/> <b>Leased</b> <input type="checkbox"/> <b>Specially manufactured</b>	

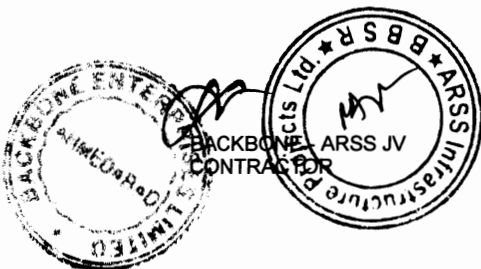


## PERSONNEL

### PERSONNEL PROPOSED FOR THE PROJECT BY M/s BACKBONE ENTERPRISERS LTD. RAJKOT

1.	Title of position* PROJECT MANAGER
	Name – Mr. G.V Sutariya
2.	Title of position* HIGHWAY ENGINEER
	Name –Mr. D.G.Lalkiya
3.	Title of position* MATERIAL & QUALITY CONTROL ENGINEER
	Name-Mr. Rajesh Gajera
4.	Title of position* QUANTITY SURVEYOR
	Name-Mr. V.J.Sojitra
5.	Title of position* LAB MANAGER/ TECHNICIAN
	Name-Mr.Rajkumar Shrivastav
6.	Title of position* LAND SURVEYER
	Name-Mr.C.Godhani
7.	Title of position* MACH./ EQUP.MAINT.ENGINEER
	Name-Mr.Santosh Singh

\*As listed in Section III.

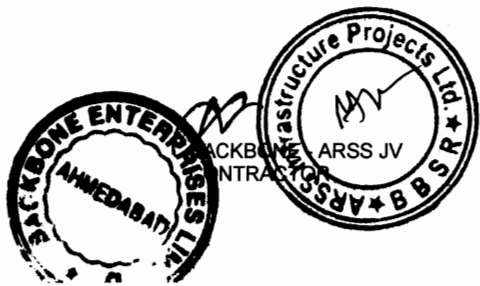


## Resume of Proposed Personnel-1

<b>Position-PROJECT MANAGER</b>		
<b>Personnel information</b>	Name- Mr. GRISHKUMAR SUTARIA	Date of birth-10/06/1969
	Professional qualifications-B.E.Civil	
<b>Present employment</b>	Name of employer- BACKBONE ENTERPRISES LTD	
	Address of employer - B-2 AMBIKA HOUSE,NR,HOTEL GRANDBHAGWATI,S.G.HIGHWAY,BODAKDEV,AHMEDABAD.	
	Telephone: 079-26840710,26851598	Contact (manager / personnel officer)
	Fax No:079-40040710	E-mail:-bbone_ent@yahoo.co.uk
	Job title:-Project Manager	Years with present employer: 15 Years

Summarize professional experience over the last 20 years, in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

From	To	Company / Project / Position / Relevant technical and management experience
1992		I joined as Project Manager in Backbone Enterprises Ltd. Looking to Four lanning of NH-8B. Project costing Rs.40 Crores in year 2002 was completed satisfactory.
	Till date	I have completed four lane Bambore bypass of NH-8B km 207 to 215 km project costing Rs.18 Crores.
		I have been allotted Bharuch-Dahej additional two lane project costing Rs.103 Crores.

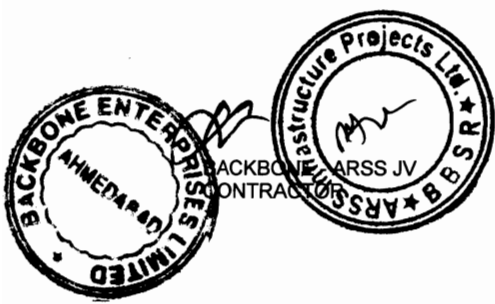


## Resume of Proposed Personnel-2

<b>Position- HIGHWAY ENGINEER</b>		
<b>Personnel information</b>	Name –Mr. D.G LALAKIA	Date of birth-19/06/66
	Professional qualifications:- B.E (Civil)	
<b>Present employment</b>	Name of employer- BACKBONE ENTERPRISES LTD.	
	Address of employer- B-2 AMBIKA HOUSE,NR,HOTEL GRANDBHAGWATI,S.G.HIGHWAY,BODAKDEV,AHMEDABAD.	
	Telephone:079-26840710,26851598	Contact (manager / personnel officer)
	Fax No:- 079-40040710	E-mail: bbone_ent@yahoo.co.uk
	Job title:- Highway Engineer	Years with present employer- 12 Years

Summarize professional experience over the last 20 years, in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

From	To	Company / Project / Position / Relevant technical and management experience
1991	1994	My career was started in Prakash Construction company. I got rich experience of Building and majority in Road Work.I was promoted as Sr.Engineer.
1994	Till date	<p>He joined as a Highway Engineer in Backbone Enterprises Limited in 1994, some of the major project where I have been given responsibility are as under</p> <p>(1) Construction of Toll Plaza and ancillary work at Km 309.Samakhiali-Gandhidham NH 8 A</p> <p>(2) I have been given responsibility to complete water supply projects.i.e work of Distribution Pipeline network incl.Sump's Esr's ect.Based on Mahi pipeline for the district Bhavnagar for UMRALA ZONE Costing Rs.2,81,76,421/-</p> <p>(3) Four lanning of Km 143 to 160 of Gondal Ribda section of NH-8B Project costing Rs.40 Croes in year 2002</p> <p>(4) Bharuch Dahej additional two lane work of costing Rs.103 Croes.</p>



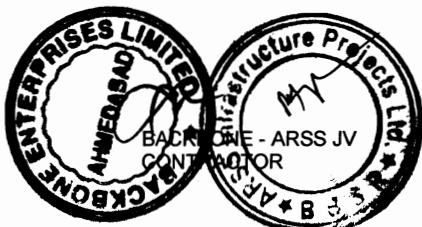


### Resume of Proposed Personnel-3

<b>Position-MATERIAL &amp; QUALITY CONTROL ENGINEER</b>		
<b>Personnel information</b>	Name- MR. RAJESH GAJERA	Date of birth-15/05/1970
	Professional qualifications-B.E (Civil)	
<b>Present employment</b>	Name of employer- <b>BACKBONE ENTERPRISES LTD.</b>	
	Address of employer <b>B-2 AMBIKA HOUSE,NR.HOTEL GRANDBHAGWATI, S.G.HIGHWAY,BODAKDEV,AHMEDABAD.</b>	
	Telephone: <b>079-26840710,26851598</b>	Contact (manager / personnel officer)
	Fax:079-40040710	E-mail: <b><u>bbone_ent@yahoo.co.uk</u></b>
	Job title: <b>Material &amp; Q.C.engineer</b>	Years with present employer: <b>12 Years</b>

Summarize professional experience over the last 20 years, in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

From	To	Company / Project / Position / Relevant technical and management experience
1992	1995	Self employment during this period.I have executed some Roads & Building works as Sub-Contractor.
1995	Till Date	<p>I joined as material &amp; Q.C.Engineer in Backbone Enterprises Ltd. I was engaged in high way construction work.</p> <p>Responsibility of Materials handling,testing and Quality Control was given me as Material Engineer in 2000.</p> <p>(1) I was involved in construction of four laning Chotila to Bambore for section of N.H 8 A.</p> <p>(2) Four laning of Km 143 Km to 160 Km of Gondal-Ribda section of NH-8B Project costing Rs.40 Crores in year 2002</p> <p>(3) Additional two lane project of Bharuchi-Dahej Road costing Rs.103 Crores.</p>

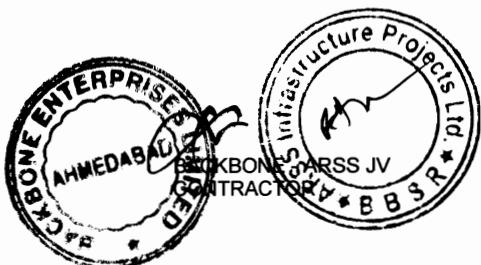


### Resume of Proposed Personnel-4

<b>Position-QUANTITY SURVEYOR</b>		
<b>Personnel information</b>	Name –Mr.V.J.SOJITRA	Date of birth:-05/08/1970
	Professional qualifications-B.E (Civil)	
<b>Present employment</b>	Name of employer-BACKBONE ENTERPRISES LTD.	
	Address of employer-B-2 AMBIKA HOUSE,NR.HOTEL GRANDBHAGWATI, S.G.HIGHWAY,BODAKDEV,AHMEDABAD.	
	Telephone;079-26840710,26851598	Contact (manager / personnel officer)
	Fax:079-40040710	E-mail:bbone_ent@yahoo.co.uk
	Job title-Quantity Surveyor	Years with present employer-17 Years

Summarize professional experience over the last 20 years, in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

From	To	Company / Project / Position / Relevant technical and management experience
1992	Till date	Quantity Surveyor to Backbone Enterprises Limited for the following projects. (1) For laning of km 143 km to 160 of Gondal-Ribda section of NH-8B Project costing Rs.40 Crores in year 2002 (2) Additional two lane project of Bharuch-Dahej Road costing Rs.103 Crores



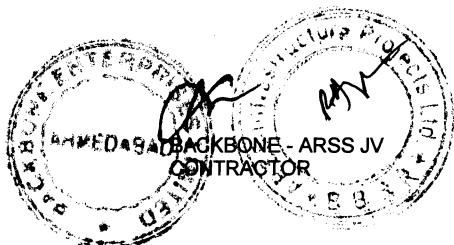
Chief Engineer  
 World Bank Projects  
 Orissa  
 EMPLOYER  
 Of the E.T.C (Civil) Orissa  
 Phubaneswar

## Resume of Proposed Personnel-5

<b>Position-LAND SURVEYOR</b>		
<b>Personnel information</b>	Name –Mr.CHANDRAKANT GODHANI	Date of birth-25/07/1967
	Professional qualifications-DCE (Civil)	
<b>Present employment</b>	Name of employer- BACKBONE ENTERPRISES LTD.	
	Address of employer- B-2 AMBIKA HOUSE,NR.HOTEL GRANDBHAGWATI, S.G.HIGHWAY,BODAKDEV,AHMEDABAD.	
	Telephone;079-26840710,26851598	Contact (manager / personnel officer)
	Fax No:079-40040710	E-mail:bbone_ent@yahoo.co.uk
	Job title- Land Surveyor	Years with present employer- 17 Years

Summarize professional experience over the last 20 years, in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

From	To	Company / Project / Position / Relevant technical and management experience
1997	Till date	<p>He is surveying as Land &amp; Construction supervisor in Backbone Enterprises Ltd. One of the best project in which he has done nice job was</p> <p>Four lanning of km.143.00 to km 160.00 of Gondal to Ribda section of NH 8B project costing Rs.18 Crores in the state of Gujarat.</p>



## Resume of Proposed Personnel-6

<b>Position-LAB MANAGER/TECHNICIAN</b>		
<b>Personnel information</b>	Name –RAJKUMAR SHRIVASTAVA	Date of birth-15/09/1960
	Professional qualifications-B.E (Civil)	
<b>Present employment</b>	Name of employer- BACKBONE ENTERPRISES LTD.	
	Address of employer- B-2 AMBIKA HOUSE,NR.HOTEL GRANDBHAGWATI, S.G.HIGHWAY,BODAKDEV,AHMEDABAD.	
	Telephone;079-26840710,26851598	Contact (manager / personnel officer)
	Fax No:079-40040710	E-mail:bbone_ent@yahoo.co.uk
	Job title- Lab Manager/Technician	Years with present employer- 7 Years

Summarize professional experience over the last 20 years, in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

From	To	Company / Project / Position / Relevant technical and management experience
1985	1990	Site supervisor with Singh and Desai Construction, Bhopal.
1990	1996	Site Supervisor with BM construction Pvt ltd, Bhopal
1996	2000	Site Engineer with United project construction Limited, He has executed so many projects in the filed of civil and Structural Engineering
2000	Till Date	He is a Senior Lab Manager / Technician with backbone Enterprises limited. And responsible for complete monitoring of multi location projects pertaining to road projects One of the best project of his career was Rajkot-Gondal-Jetalpur NHAI BOT work on NH-8B.



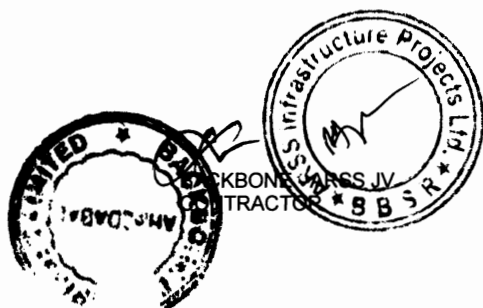
**Chief Engineer**  
Chief Engineer  
**Work Bank Dept Projects**  
EMPLOYER  
**Of the E.I.C (Civil) Orissa**  
**Bhubaneswar**

## Resume of Proposed Personnel-7

<b>Position-MECH./EQUP.MAINT.ENGINEER</b>		
<b>Personnel information</b>	Name –Mr.SANTOSH KUMAR SINGH	Date of birth-11/10/1969
	Professional qualifications-DME.(Mechanical)	
<b>Present employment</b>	Name of employer- BACKBONE ENTERPRISES LTD.	
	Address of employer- B-2 AMBIKA HOUSE,NR.HOTEL GRANDBHAGWATI, S.G.HIGHWAY,BODAKDEV,AHMEDABAD.	
	Telephone;079-26840710,26851598	Contact (manager / personnel officer)
	Fax No:079-40040710	E-mail:bbone_ent@yahoo.co.uk
	Job title- Mech./Equip.Maint.Engineer	Years with present employer- 10 Years

Summarize professional experience over the last 20 years, in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

From	To	Company / Project / Position / Relevant technical and management experience
1997	Till date	He is a Mechanical Equipment Maintenance Engineer with a special duty for the plants as a plant engineer for Four lanning of Km.143.00 to km 160.00 of Gondal to Ribda section of NH 8B project costing Rs. 18 Crores in the state of Gujart..

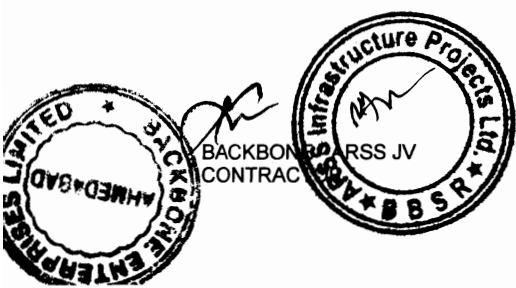


## PERSONNEL

PERSONNEL PROPOSED FOR THE PROJECT  
By M/s ARSS Infrastructure Projects Limited, Bhubaneswar

1.	Title of position* Highway Engineer
	Name –Er. J.P Soni
2.	Title of position* Material Engineer
	Name –Er. Partha Sarthi Panda
3.	Title of position* Quantity Surveyor
	Name- Er. Saroj Kumar Tripathy
4.	Title of position* Land Surveyor
	Name – Er.Kailash Chandra Sahoo
5.	Title of position* Lab Manager/Technician
	Name-Er.B.K.Rao

\*As listed in Section III.

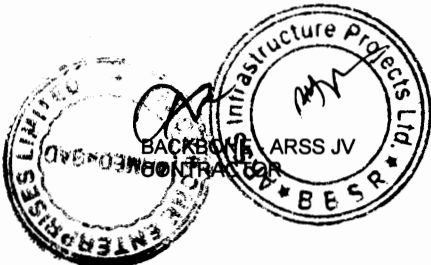


## Resume of Proposed Personnel-1

<b>Position- Highway Engineer</b>		
<b>Personnel information</b>	Name - Er J.P Soni	Date of birth- 17.05.1940
	Professional qualifications B.E.(Civil) Hons	
<b>Present employment</b>	Name of employer- ARSS Infrastructure Projects Ltd	
	Address of employer-Sector-A,Zone-D,Plot No-38,Mancheswar Industrial Estate, Mancheswar Bhubaneswar-751010(Orissa)	
	Telephone:(0674)-2588552,2588554	Contact (manager / personnel officer)
	Fax No:-(0674)-2585074	E-mail:response@arssgroup.in
	Job title- Sr Engineer	Years with present employer- 2 Years

Summarize professional experience over the last 20 years, in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

From	To	Company / Project / Position / Relevant technical and management experience
		<b>DETAILS ATTACHED</b>



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

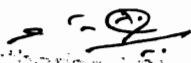
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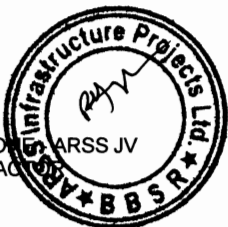
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**PERSONAL RESUME**

1. Proposed Position : \_\_\_\_\_
2. Name : J.P. Soni
3. Date of Birth : 17<sup>th</sup> May 1940
4. Nationality : Indian
5. Personal Address : 62/7, Nehru Nagar (East)  
Bhilai, District: Durg.  
Chhattisgarh – India
- Telephone No. : +91-788-2293949 & 4040505  
Mobile No. : 098271-63303  
E-mail Address : jpsoni17@yahoo.co.in
6. Qualification : B.E. (Hons.) Civil Engineering, 1964 from  
Government Engineering College, Jabalpur (MP)
7. Other Trainings :
- \* Participated in various 'Quality Control Workshops/ Seminars' in PWD
  - \* Attended training on 'Project Management' 'Narmada Valley Development Authority (NVDA) at Punasa (MP)
  - \* Attended Seminars on 'Construction Methodology' of Concrete Roads.
  - \* Participated in Seminar on 'Infrastructure Financing' organized by World Bank in Goa during January, 2002.
  - \* Participated in Workshop on 'BOT Road Projects in Malaysia' at Hyderabad in the Year 2003.
  - \* Attended Seminar on 'Public Private Partnership' (PPP) in Delhi organized by CES in the year 2003.
  - \* Organized Workshop on Development of Road Sector in Chhattisgarh, funded by ADB (Asian Development Bank) in the Year 2005.
  - \* Organized Workshop on 'Master Plan' of Roads in Chhattisgarh State in the year 2005.
  - \* Attended Workshop on 'Quality Assurance' organized by 'Indian Roads Congress' (IRC) at Raipur in the year 2005.
  - \* Attended IRC Sessions as an official delegate at Thiruanantapuram (1983), Bhubneswar (1995) and Gauahati (2003).
  - \* Attended IRC Sessions at Chandigarh (1974), Kolkata (1975), Bhopal and Patna (1993) in personal capacity.
  - \* Accompanied 'Study Tour' to U.K. and South Africa as Highway Engineer in August 2004 organized by World Bank for on spot study of Private Sector participation in Road Sector.
  - \* Organized Workshop in "Financial Modeling" of PPP Projects in Road Sector.

BACKBONE - ARSS - J.V.

  
Authorized Signatory





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8. **Membership in Professional Societies** : Life Member, Indian Roads Congress
9. **Other Activities** : \* Secretary, Lions Club of Raigarh City  
\* Secretary - Officers Club at Durg, Sagar & Badwani
10. **Countries of Work Experience** : India
11. **Languages Known and Proficiency** : **Language** : **Read** **Write** **Speak**  
English : Excellent Excellent Excellent  
Hindi : Excellent Excellent Excellent

12. **Track Record of Employment:**

- (i) **Period** : From April 2001 till date  
**Employer** : Chhattisgarh Infrastructure Development Corporation Ltd  
Government of Chhattisgarh  
**Position held** : Chief General Manager

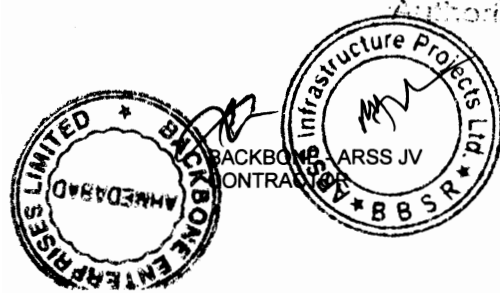
**Description of Duties:**

In the newly formed State of Chhattisgarh, CIDC was created to act as Nodal Agency to Government of Chhattisgarh for planning large infrastructure projects under Public Private Partnership (PPP) with funding from multinational agencies and other financial institutions. To start with following projects were handled as Chief General Manager:-

- \* Tendering for 1<sup>st</sup> Phase of Pradhan Mantri Gram Sadak Yojana Roads costing about Rs.92 Crores including bid documents, pre-qualification of contractors, bid evaluation and finalization of contracts till signing of agreement.
- \* Techno-Economic Feasibility Study of 'Raipur-Durg Expressway' got done by Consultants CES, of New Delhi (Project Cost Rs.90.00 crores).
- \* Economic Viability of proposed City Centres in Raipur & Bilaspur carried out by CB Richard Allis, New Delhi (Project Cost Rs.650.00 crores).
- \* Feasibility Study of "Flyovers/ Elevated ways in Raipur City" got done through 'Development Consultants Private Limited' (DCPL), Kolkata. The cost of project is Rs.220.00 crores.
- \* **Empanelment of Consultants** for different Infrastructure Sectors. 192 applications were received in an overwhelming response from all over India, out of which 43 firms were empanelled.
- \* Five Sections of Road Corridors identified by PWD for Inter-State connectivity were selected for BOT contracts. The process involved scrutinizing of sections for viability, determining technical specifications, costing, pre-qualifying contractors, preparation of toll policy and bid documents etc.
- \* Preparation of Tender Documents for construction of mega godowns of 2,50,000 MT capacity costing about Rs.30.00 crores.

BACKBONE - ARSS - J.V.

Authorized Signatory



Chief Engineer  
World Bank Project  
O/o the E.I.C. (CI) EMPLOYER  
Raipur

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\* **ADB Loan Project Road Sector Development in Chhattisgarh**

CIDC was executing agency for ADB Project upto PPTA Stage and got approved a loan of 180 Million US Dollars (Rs.900 crores approximately) for Public Works Department. In the process, loan application, institutional reforms required, loan negotiations and signing of Agreement was handled by CIDC.

\* **PPIAF Project sponsored by World Bank**

CIDC conducted study for Private Sector Participation (PSP) in Road Sector in Chhattisgarh through World Bank grant of 2,55,000 USD of which Phase-I programme of identification of road sections and Study Tour has been completed and Phase-II work started in October, 2005. Identified roads will be given on BOT Contract by PWD for which all formalities e.g. preparation of DPR BID Documents, BOQs, Tendering, Pre-qualification of agencies. Bidding and fixing agencies was to be carried out by Government of Chhattisgarh through World Bank Consultants ' Adam Smith International (ASI) of London.

\* **UNDP Project for (i) Visioning of New States and (ii) Modernization of State PWD**

CIDC was the executing agency for UNDP Project of ' Visioning of New States' under which 'Vision - 2020' was being got prepared through the Consultants "PricewaterhouseCoopers" New Delhi . UNDP had sanctioned a grant of Rs.40.00 lakhs for the project.

Another grant of Rs.100.00 lakhs had been approved by UNDP for 'Modernization of PWD' in the State, under which CIDC conducted 'Business Process Re-organization' (BPR) Study before implementation of the field work being executed by PWD.

**Task Assignment and Nature of Duties in present position:**

As Chief General Manager all technical aspects of the above mentioned projects have been handled in a lean and thin organization of CIDC. The nature of duties involved over-viewing of the Infrastructure Projects, Planning, Designing Contractual Documents, co-ordination with the infrastructure related departments for clearances, implementation and execution of projects and interactions with financial institutions and multinationals e.g. ADB, World Bank, UNDP, CIDB - Malaysia etc.

- (ii) **Period from** - July 1998 to May, 2000  
**Employer** - Government of Madhya Pradesh  
**Position held** - Chief Engineer Raipur Development Authority (RDA)  
(July, 1998 to January, 1999)  
on deputation to Health Department.  
(January, 1999 to May, 2000)

As Chief Engineer, RDA (Raipur Development Authority), responsible for planning and execution of residential colonies, shopping complexes, public utilities, community building including roads, drainage, electrification and other amenities.

As Chief Engineer in the Directorate of Health Department, Government of M.P. responsible for monitoring building projects of Health Department in the whole state of MP,



BACKBONE ENTERPRISES  
CONTRACTS

BACKBONE - ARSS - J.V.



Chief Engineer  
Chief Engineer  
World Bank Projects, Orissa  
O/o the E.I.E.M.P. (Orissa) Orissa  
Rhubaneswar

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- (iii) **Period** - From May, 1994 to June, 1998  
**Employer** - Public Works Department, Government of MP  
**Position held** - Superintending Engineer at Durg & Raipur

**Description of Duties:**

Administrative control over the field divisions executing developmental works in respect of buildings and roads from beginning to end i.e. survey, planning, design, estimating, awarding contracts and construction supervision till completion and handling over of the projects.

Also responsible for controlling construction and maintenance works of State Highways, Major District Roads, Village Roads and all Government Buildings, budgeting, allocating funds, controlling expenditure, obtaining approval from Government etc. In addition, site inspections for overviewing of the progress of works, quality control, requirement of funds, etc. were carried out as per specified duties in the works manual.

- (iv) **Period** - From July 1990 to April, 1994  
**Employer** - Narmada Valley Development Authority (NVDA), Madhya Pradesh  
**Position held** - Executive Engineer (July, 1990 to April, 1992)  
Superintending Engineer (May, 1992 to April '94)

**Description of Duties:**

The works involved were (i) relocation of roads and bridges within submergence area of Sardar Sarovar Project in Madhya Pradesh and (ii) rehabilitation of villages in submergence area. Total 12 bridges costing about Rs. 17.50 crores were to be constructed, out of which 10 bridges were completed from foundation to formation. 'Uri-bagh' Bridge (Length 780 meters) was completed 60% including all foundations and substructure and part of decking.

The longest bridge of Madhya Pradesh over river 'Narmada' near Kasravad Village was started on July 23, 1991 at 'Baba Amte' point. During my tenure as Executive Engineer & Superintending Engineer upto April, 1994, 20 foundations out of total 32 were completed including substructure. Foundations were open type in river-bed and well type on banks. Three Spans of T-Beam Girder of 50m length were laid. The cost of this single bridge was estimated to be Rs.640 lakhs which rose upto about 1150 lakhs.

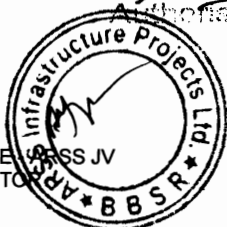
Work on relocation of SH-26 (Khandwa to Baroda) was started on field after completing survey, estimates, tendering and fixing agencies. The cost involved was Rs.3.00 crores approximately for single lane road.

The success storey involved carrying out the works from Badwani (District: Khargone in MP) the heart center of 'Narmada Bachao Andolan' in close vicinity of 'Baba Amte's hut on the banks of Narmada.

BACKBONE - ARSS - J.V.



BACKBONE ARSS JV  
CONTRACTORS



Authorized Signatory

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- (v) **Period** - From May 1980 to June, 1990  
**Employer** - Madhya Pradesh, PWD  
**Position held** - Executive Engineer at Durg & Sagar

**Description of Duties:**

Held territorial charge of PWD Division in District Headquarters at Durg. Construction of 200 Staff Quarters in Government Colony were completed from beginning to end. A major building for 'Testing Laboratory Bhilai' was also completed from tendering to occupation of the building. Large number of Village Roads were completed under Scarcity, RLEGP, NREP and other programmes. In a tenure of 5 years the road density rose from 9 km to 19 km per 100 sq.km.

At Sagar, work on construction of Engineer College Buildings started in January, 1986. Workshops and Staff Quarters were completed. Layout for Administration Building finalized and contracted.

Improvement works on SH-14 and SH-15 carried out. Proposals for strengthening and widening of roads were submitted to Government of MP for approval. An "Air Strip" at Dhana, 14 km away from Sagar was completed and put to use.

- (vi) **Period** - From February 1969 to 1980  
**Employer** - Government of MP, PWD  
**Position held** - Assistant Engineer at Manendragarh (6 Years)  
Raigarh (3 Years) and Durg (2 Years)

**Description of Duties:**

Construction of roads and buildings in respective jurisdiction. Survey, fixing alignment, estimation and design of roads and bridges. Preparation and checking of bills of contractors. A major road project of 96 km length from Manendragarh to Janakpur was approved by the Government at a cost of 90.00 lakhs in the year 1973 on the basis of proposal submitted.

- (vii) **Period** - From August 1964 to January, 1969  
**Employer** - Government of MP PWD  
**Position held** - Junior Engineer

In first 9 months a series of structural design of following major building projects were done:-

1. Government Engineering College, Bilaspur
2. Government Girls Degree College, Bilaspur
3. PGBT College at Bilaspur
4. District Court Buildings at Bilaspur
5. Family Planning Training Centre at Bilaspur

Survey and design of Culverts, Minor & Medium Bridges, Supervision of construction of Government Engineering College Building, Bilaspur, Government Girls College, Bilaspur and Family Planning Training Centre at Bilaspur.

BACKBONE - ARSS - J.V.

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BACKBONE - ARSS JV  
CONTRACTOR

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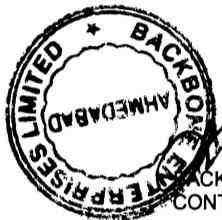
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**Works undertaken that illustrate capability to handle Roads/ Bridges Project**

Tasks Assigned	Details of Works undertaken
<ul style="list-style-type: none"> <li>* Design contract documents</li> <li>* Fix-up selection criteria for pre-qualification</li> <li>* Bid Management</li> <li>* Check contractors work programme, methodology</li> <li>* Review Quality Assurance System</li> <li>* Ensure conformity of Contracts/ Seminars</li> <li>* Derive special condition of contracts</li> <li>* Review Contractor's conditions</li> <li>* Negotiations with the contractors</li> <li>* Finalize contract conditions</li> <li>* Interaction with the Government Department for signing and execution of contract agreements.</li> </ul>	<p><b>Project</b> - Tenders for construction of PMGSY Roads Phase-I</p> <p><b>Cost</b> - Rs.92 crores</p> <p><b>Location</b> - Chhattisgarh, India</p> <p><b>Period</b> - April, 01 to September '01</p> <p><b>Position</b> - Chief General Manager, CIDC</p> <p>As CGM responsible for framing bid documents, inviting RFQ, Shortlisting of bidders, organizing pre-bid Meeting, inviting financial offers, Evaluation of Tenders and recommending the best offer for execution of contract.</p> <p><b>Project</b> - Techno Economic Feasibility Study of 6 Lane Expressway between Raipur-Durg</p> <p><b>Cost</b> - Rs.90 crores</p> <p><b>Location</b> - Chhattisgarh, India</p> <p><b>Period</b> - September '01 to August '02</p> <p><b>Position</b> - Chief General Manager, CIDC</p> <p><b>Duties:</b> Responsible for framing Terms of Reference (TOR), inviting EOI, Evaluation of Offers, Short-listing of Applicants, Scrutiny and Examination of Technical and Financial Bids, recommending the best offer for approval, execution of contract agreements, supervision of field work carried out by the firm, scrutiny of progress reports, finalizing alignment, cost calculations and verifying viability of the project.</p> <p><b>Project</b> - Development of Road Sector in Chhattisgarh by Loan from ADB</p> <p><b>Project Cost</b> - 180 Million USD</p> <p><b>Location</b> - Chhattisgarh, India</p> <p><b>Period</b> - March '02 to December '04</p> <p><b>Position</b> - CGM, CIDC</p> <p><b>Duties:</b> Responsible for identification of roads proposed for development, assessment of the improvement works required, traffic study, finalization of specifications for road construction costing of the project, submission of proposals to ADB, contract negotiations and obtaining approval of the project by ADB Liaisoning with PWD for finalization of TOR for RFQ, RFP for civil works and construction supervision, evaluation of proposals and recommending the most suitable offer for carrying out the projects.</p>

BACKBONE - ARSS - J.V.



  
**Chief Engineer**  
 World Bank Projects, Orissa  
 World Bank Projects  
 EMPLOYER  
**O/o the E.I.C (Civil) Orissa**  
**Bhubaneswar:**

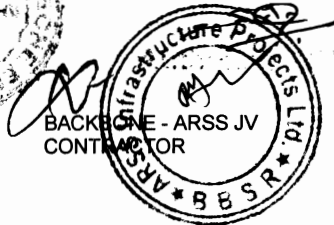
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Tasks Assigned	Details of Works undertaken
<ul style="list-style-type: none"> <li>* Interpret contract documents.</li> <li>* Review contract drawings</li> <li>* Review contractor's work programme.</li> <li>* Co-ordination for handling over of sites.</li> <li>* Provide necessary drawings.</li> <li>* Review contractor's work system.</li> <li>* Review quality checks.</li> <li>* Perform quality tests.</li> <li>* Check quantities &amp; invoices</li> <li>* Verify interim payments to contractors.</li> <li>* Review contractors request for advance payments.</li> <li>* Preparation of monthly progress reports and financial statements.</li> <li>* Check and ensure validity of contractor's insurances and guarantees.</li> <li>* Inspection/ Supervising of works.</li> <li>* Monitor progress of works.</li> <li>* Inspection of contractor's plant &amp; machineries.</li> <li>* Inspection of labour camps and ensuring regulations.</li> <li>* Readiness for emergent work.</li> <li>* Ensure safety provisions.</li> <li>* Review defect liability conditions, its implementation and certification of the completion of work during defect liability period.</li> </ul>	<p><b>Project</b> – Techno-Economic Feasibility Study of Flyovers/Elevated Way in Raipur City</p> <p><b>Project Cost</b> – Rs.220 crores</p> <p><b>Location</b> – Chhattisgarh, India</p> <p><b>Period</b> – November'04 to August'05</p> <p><b>Position</b> – CGM, CIDC.</p> <p><b>Duties:</b> Responsible for framing TOR for inviting EOI, Short-listing of firms inviting Technical/ Financial Bids. Evaluation of proposals and recommending the best proposal for approval, execution of agreement with the selected agency, signing agreement and award of the contract. Supervision of field work monitoring progress, organizing Workshops and Meetings for working out suitability of the proposals, submission of draft report to Government of Chhattisgarh for approval and finalization of Final Report to be handed over to PWD.</p> <p><b>Project:</b></p> <ul style="list-style-type: none"> <li>* Strengthening &amp; widening of SH-5, SH-9, SH-37 in Durg- Raipur Districts.</li> <li>* Construction of Roads and Buildings in various districts.</li> </ul> <p><b>Location</b> : Madhya Pradesh, India</p> <p><b>Year</b> :1994 to 1998</p> <p><b>Position</b> :Superintendent Engineer. PWD, MP</p> <p><b>Duties:</b> Responsible for renewal and maintenance of State Highways of Durg, Rajnandgaon &amp; Raipur Districts. Strengthening &amp; widening of various reaches of State Highways. Checking designs &amp; estimates, pavement evaluation, condition survey of bridges, culverts, submission of proposals to Government for approval, monitoring and execution of works at sites, inspection of works, ensuring quality control tests, maintenance of NH-6 in city limits of Raipur &amp; Durg. Construction of buildings of Health Department under State Plan and World Bank schemes including estimates approval, tendering, execution of works, inspection and monitoring progress of works, quality control of construction work.</p>

BACKDUNE - ARSS - J.V.



Chief Engineer  
World Bank Projects  
EMPLOYER  
O/o the E.I.C (Civil) Orissa.  
Bhubaneswar

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Tasks Assigned	Details of Works undertaken
<ul style="list-style-type: none"> <li>* Certify completion of drawings on 'as-is' basis.</li> <li>* Evaluation of claims.</li> <li>* Co-ordination with the various Government Departments.</li> </ul>	<p><b>Project:</b> Relocation of Bridges and Roads (SH-26) in the submergence area of Sardar Sarovar Project. <b>Location :</b> Madhya Pradesh, India <b>Cost :</b> Rs. 18 crores approximately <b>Year :</b> July 1990 to April, 1994 <b>Position :</b> Executive Engineer/ Superintending Engineer MP PWD, Narmada Valley Development Authority (NVDA) <b>Duties:</b> Verification of design of Bridges lay-out and construction of bridges and fixing alignment of road, survey, design, preparation of estimates obtaining approval, inviting tenders, signing agreements. Monitoring and execution of work on sites, inspecting works and carrying out quality control tests, monitoring progress of works. Verification of measurements and bills, payment of bills of the contractors. Preparation of completion reports and 'as-is' drawings of bridges.</p> <p><b>Project:</b> * Strengthening and widening of SH-5, SH-37 in Durg District. * Strengthening &amp; widening of SH-14, SH-15 in Sagar District. * Construction of Air Strip at Sagar * Construction of Engineering College at Sagar. <b>Location :</b> Madhya Pradesh, India <b>Year :</b> 1980 to 1990 <b>Position :</b> Executive Engineer, PWD <b>Duties:</b> Responsible for preparation of detailed estimates, obtaining approval from Government, inviting tenders, obtaining allotments for the works, execution of works, submission of physical &amp; financial progress reports. Checking bills of the contractors, checking measurement of work payments to contractors, carrying out quality checks, preparation of completion reports including 'as-is' drawings. As Executive Engineer Durg, preparation of projects for scarcity works, construction of village roads, widening and strengthening of reaches of SH-5 and SH-37. As Executive Engineer Sagar, responsible for construction of Engineering College Buildings at Sagar, improvement works on Sagar-Bhopal road, Sagar-Chhatarpur road (SH-15), Sagar-Khurai road (SH-14). Construction of six medium bridges on inter-state road (Khimlasa-Karanja Road).</p>



BACKBONE - ARSO - J.V.

BACKBONE  
CONTRACTOR



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

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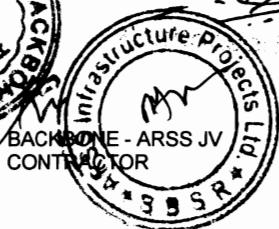
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	Tasks Assigned	Details of Works undertaken
		<p><b>Project:</b></p> <ul style="list-style-type: none"> <li>* Widening &amp; strengthening of State Highways SH-14, SH-1.</li> <li>* Construction of road of Economic importance between Chirmiri-Korba including bridges.</li> <li>* Construction of 2 bridges over river 'Mand' in Raigarh district.</li> <li>* Construction of Fair-Weather Air Strip at Raigarh.</li> <li>* Construction of roads under scarcity, NREP, RLEGP programme.</li> </ul> <p><b>Location :</b> Madhya Pradesh, India  <b>Year :</b> 1969 to 1980  <b>Position :</b> Assistant Engineer, PWD  <b>Duties:</b> Responsible for construction of roads under State Plan, construction of roads under 'Crash Programme' in tribal district of Sarguja, construction of roads under Famine Relief Programme in Durg District, including survey preparation of estimates, obtaining approval and execution of works by employing labour on task basis. Survey, design of roads, preparation of estimates, construction supervision of works, checking &amp; recording measurements, quality checks, billing and making payments to contractors, maintaining progress reports and financial accounts of works.</p> <p><b>Project:</b>  Construction &amp; supervision of various Government Buildings at Bilaspur including Engineering College Building at Bilaspur.  <b>Location :</b> Madhya Pradesh, India  <b>Year :</b> 1964 to 1969  <b>Position :</b> Junior Engineer  <b>Duties:</b> Responsible for RCC design of various buildings, medium bridges and culverts, construction &amp; supervision of Engineering College Buildings at Bilaspur, Girls Degree College at Bilaspur, Regional Family Planning Centre at Bilaspur. Preparation of structural design, planning estimates, execution of works, recording measurements, checking bills for payment to contractors.</p>



BACKBONE - ARSS - J.V.



BACKBONE - ARSS JV  
CONTRACTOR

  
Chief Engineer  
World Bank Projects  
EMPLOYER  
World Bank Projects  
O/o the E.I.C (Civil) Orissa  
Bhubaneswar



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**Declaration:**

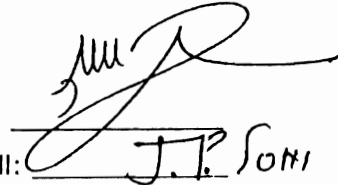
I, hereby declare that the information contained above in my bio-data is correct and true to the best of my knowledge and belief.

Place : BHUBHANEWAR

Date : 1.9.07

Signature :

Name in full:

  
J.P. SONI


Witness:

Signature: \_\_\_\_\_

Name & Designation: \_\_\_\_\_

Address : \_\_\_\_\_  
\_\_\_\_\_


BACHIONI - ARSS - J.V.

  
Authorised Signatory



BACKBONI - ARSS JV  
CONTRACTOR



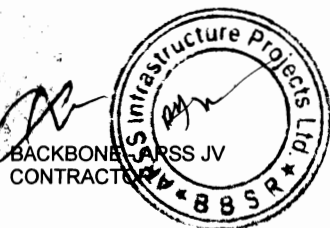
  
Chief Engineer  
World Bank Projects, Orissa  
World Bank Projects  
Office of the E.I.C (Civil) Orissa  
Bhubaneswar


## Resume of Proposed Personnel-2

<b>Position- Material Engineer</b>		
<b>Personnel information</b>	Name - Er. Partha Sarathi Panda	Date of birth- 30.03.1972
	Professional qualifications-B.E.(Civil)	
<b>Present employment</b>	Name of employer- ARSS Infrastructure Projects Ltd	
	Address of employer-Sector-A,Zone-D,Plot No-38,Mancheswar Industrial Estate, Mancheswar Bhubaneswar-751010(Orissa)	
	Telephone:(0674)-2588552,2588554	Contact (manager / personnel officer)
	Fax No:-(0674)-2585074	E-mail:response@arssgroup.in
	Job title- Site Engineer	Years with present employer- 1 Years

Summarize professional experience over the last 20 years, in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

From	To	Company / Project / Position / Relevant technical and management experience
		DETAILS ATTACHED



  
**Chief Engineer**  
 World Bank Projects, Orissa  
 World Bank Projects  
 EMPLOYER  
**Officer in Charge (Civil) Orissa**  
 Bhubaneswar

434

Plot No. L-1914, Phase - II  
O.S.H.B. Colony, Dumdumma  
Bhubaneswar - 751 019 (Orissa)  
Tel.: +91-674-2471320 (R)  
Cell: +91-9337106242  
E-mail: panda\_parthasarathi@rediffmail.com

# Partha Sarathi Panda

## Professional Profile

- ⇒ A Civil Engineering Professional having more than 13 years' rich cross-functional experience in Planning, Designing, Project Management, Quality Assurance & Control in different type of Building Projects, Interior Design Projects and Infrastructure Development (Townships) Projects.
- ⇒ Currently working as Project Manager in "M/s. RATH ARCHITECTONIC" a Consulting Firm at Bhubaneswar.
- ⇒ Skilled in different functions of project like Engineering, Planning, Project Management, Erection Supervision during Execution, Co-ordination with other discipline and Consultants
- ⇒ Liaison with Statutory bodies like Pollution Control Board, Airports Development Authority, Dept. of Surface Transport, Ministry of Railways, Public Health Department and others for obtaining no objection / clearance certificates.
- ⇒ Excellent Planning, Organisational and Interpersonal Skills.

## Areas of Responsibility & Discharge

- ⇒ Strategic Planning
  - Taking the clients requirement and carrying out the Architectural, Structural, Water Supply, Sanitary installation, Sewerage Disposal System, Rain Water Harvesting System, Electrical Installation Work, Heating & Ventilation Work, Design & Drawings for Execution of Work.
  - Co-ordination between different Agencies during Execution of Work including carrying out of Quality Control measures & Safety Measures during Execution of Work.
  - Liaison with different Statutory Authority for obtaining approval of different Project and clearance for Construction Work.
- ⇒ Business Development & Marketing
  - Visits different Corporate Houses and gives Presentation about the firm for empanelment as a Consulting Architecture for their Township, Building and other projects.
  - Analyse and Structuring of bidding documents and participate in different national building for comprehensive architectural services.
- ⇒ Project Management
  - Experience in handling both Technical and Commercial aspects of the Project.
  - Experience in preparing Tender Documents, Estimates, Inviting Tenders, Evaluation of Tenders and Selecting Agencies for award of job and doing necessary negotiation with the agency.

## Employment History

**Rath Architectonic, Bhubaneswar**  
Currently designation - Project Manager

From October '93 till date

RATH ARCHITECTONIC having its Head Office at Bhubaneswar (Orissa) is a leading Consulting Architectural Firm with a turnover of Rs. 1.20 Crores renders all kind of services relating to Architectural, Structural Engineering (RCC & Steel), Water Supply & Sanitation,

BACKBONE ENTERPRISES - J.V.

- 1 -



BACKBONE ENTERPRISES  
CONTRACT



Chief Engineer  
World Bank Projects, Orissa  
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Bhubaneswar

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Electrical Heating & Ventilation, Interior Design, Land Scapping, Site Development, Geo-Technical Investigation under one roof with a staff strength of 25 technical and 15 non-technical staffs.

It is presently handling Projects worth more than Rs. 300 Crores.

### Major Projects

#### ⇒ National Thermal Power Station (NTPC)

- Recreation Centre at Talcher Super Thermal Power Station, Kaniha with seating capacity for 600 persons – Project Cost Rs. 2.0 Crores.
- 15 Rooms Transit Office-cum-Guest House at Bhubaneswar – Project Cost Rs. 2.0 Crores.

#### ⇒ Utkal Alumina International Limited (UAIL)

- Complete Township over 250 Acres of land with 250 Quarters, Club, Guest House, Recreation Centre, School, Playground, Health Club, Market Complex, etc. of UAIL for their Alumina Refinery Project in Rayagada district, Orissa – Project Cost Rs. 250 Crores.

#### ⇒ Vedanta Alumina Limited (VAL)

- 50 rooms guest house at Lanjigarh for Vedanta Alumina Ltd., Kalahandi, Orissa – Project Cost Rs. 5.5 Crores.
- 52 Rooms Guest House at Jharsuguda – Project Cost Rs. 6.0 Crores.

#### ⇒ IFFCO

- Complete Township over 150 Acres of land with Quarters, Club House, Hospital, Guest House, Recreation Centre, School, Playground, Market Complex, Temple etc. of IFFCO Paradeep, Orissa – Project Cost Rs. 180 Crores.

#### ⇒ South Eastern Railways

- Office Annexe Building having a plinth area of 15,000 sq. mtrs. – Project Cost Rs. 6.0 Crores.

#### ⇒ South Eastern Central Railways

- Divisional Head Quarter at W.R.S. Raipur, consisting of D.R.M.'s office building with 8,000 sqm, various types of quarters, club house, officers rest house, transit house, children's park, auditorium and other auxiliary service buildings – Project Cost Rs. 40.0 Crores.

#### ⇒ East Coast Railways

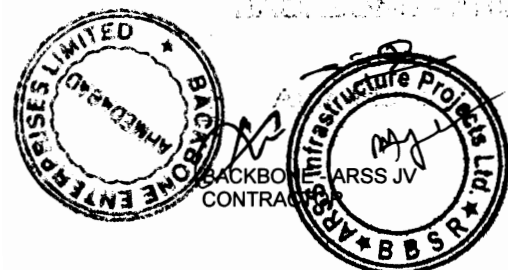
- Zonal Head Quarter Building at Chandrasekharapur, Bhubaneswar, having plinth area of 28,000 sq. mtrs. in two blocks (4 Storied building) – Project Cost Rs. 60.0 Crores.
- Quarters, Club House, Officers Rest House, Transit House, Children's Park, Auditorium & Auxiliary Services Building – Project Cost Rs. 40.0 Crores.
- Route Relay Inter-locking building at Cuttack & Puri Railway Stations – Project Cost Rs. 1.5 Crores.

#### ⇒ Infrastructure Development Projects

- Metro House at Vani Vihar, Bhubaneswar a commercial complex having 50,000 sqft. Area (7 stories building) – Project Cost Rs. 2.5 Crores.
- Metro River view at Ganesh Ghat, Cuttack a Residential Apartment with 50 Nos. of Residential Unit (7 storied building) – Project Cost Rs. 1.2 Crores.
- Metro Bellview at Sati Choura, Cuttack a Residential Apartment with 10 Nos. of Residential Unit (4 storied building) – Project Cost Rs. 0.8 Crores.

MANAGEMENT - J.V.

- 2 -



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- Metro Arcade at Gouri Sankar Park, Cuttack a Centrally Air-conditioned market complex with a floor area of 30,000 Sq. Ft. (3 Storied building) – Project Cost Rs. 1.5 Crores.
- Shanti Enclave at Cantonment Road, Cuttack a commercial complex having 40,000 Sq. Ft. Floor area (4 storied building) – Project Cost Rs. 2.5 Crores.
- Cambridge school - New Block at Cantonment Road, Cuttack with a floor area of 60,000 Sq. Ft. (7 storied building) – Project Cost Rs. 0.8 Crores.
- Riviresa, Kokar, Ranchi a Multi-Storied building Residential complex having 40 nos. of luxury units (13 storied building) – Project Cost Rs. 3.5 Crores.
- Ashadeep, Namkom, Ranchi a Multi-Storied building residential complex having 88 nos. of luxury units (13 storied building) – Project Cost Rs. 3.8 Crores.
- Commercial Complex for Big Bazaar, Ranchi with 85,000 Sq. Ft. – Project Cost Rs. 15 Crores.

⇒ Hotels & Resorts

- Toshali Sands Resort, Puri consisting of 4 Nos. Multi-Storied building building over an area of 2 Acres.
- Hotel Niladri, Puri having 32 Nos. of rooms (3 storied building).
- Hotel Pravupad, Puri having 28 Nos. of rooms (3 storied building).
- Hotel Gajapati, Puri having 36 Nos. of rooms (3 storied building).
- Hotel Richi Regalee, Puri having 36 Nos. of rooms (3 storied building).
- Hotel Richi Palace, Puri having 25 Nos. of rooms (3 storied building).
- Hotel Richi Residency, Bhubaneswar having 50 Nos. of rooms (5 storied building).
- Hotel Presidency, Bhubaneswar having 34 nos. of rooms with conference hall, banquet & restaurant etc. (5 Storied building).
- Hotel Mahavir Sheraton, Puri having 40 Nos. of rooms (3 storied building).
- Hotel Blue Lagoon, Cuttack

**Education / Qualifications**

- B. E in Civil Engineering from Utkal University, Bhubaneswar – 1993 with 1<sup>st</sup> Class Honours (76 %).

**Additional Professional Activities**

- Working familiarity MS Office

**Personal Information**

- Date of birth : 30.03.1972
- Sex : Male
- Marital status : Married
- Father's Name : Mr. Birabar Panda

BACKBONE INFRA JV

A. B. S. R. COMPANY



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

### Resume of Proposed Personnel-3

<b>Position- Quantity Surveyor</b>		
<b>Personnel information</b>	Name - Er. Saroj Kumar Tripathy	Date of birth- 08.02.1962
	Professional qualifications-A.M.I.E.(Civil)	
<b>Present employment</b>	Name of employer- ARSS Infrastructure Projects Ltd	
	Address of employer-Sector-A,Zone-D,Plot No-38,Mancheswar Industrial Estate, Mancheswar Bhubaneswar-751010(Orissa)	
	Telephone:(0674)-2588552,2588554	Contact (manager / personnel officer)
	Fax No:-(0674)-2585074	E-mail:response@arssgroup.in
	Job title- Site Engineer	Years with present employer- 1 Years

Summarize professional experience over the last 20 years, in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

From	To	Company / Project / Position / Relevant technical and management experience
		<b>DETAILS ATTACHED</b>



BACKBONE - ARSS JV  
CONTRACTOR

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

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**PERSONNEL**

**MR. SAROJ KUMAR TRIPATHY**  
N-6/208, IRC Village,  
Bhubaneswar – 751 015

ct Phone No. : 0674-2360208  
Mobile : 943701400

**BORN ON** : 08.02.1962

**EDUCATIONAL**

A.M.I.E. (Civil)

Institution of Engineers (INDIA)

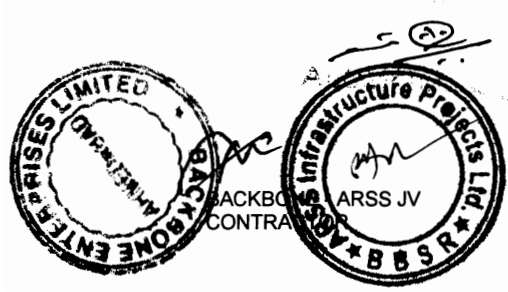
**SKILLS ACQUIRED**

- Building Construction : Execution of building works like foundation, concreting and super structures with bricks as well as frameworks.
- Hard Rock Excavation : Execution of controlled blasting near Upper Kolab Power House under the guidance of C.M.R.S. Nagpur.
- Canal Works : Execution of canal cutting, filling embankment of main canals, branch canals, distributaries, minors and subminors and their structure works like drainage syphons, aqueducts, inlets, outlets etc.
- Road Works : Execution of new road formation, metaling with blacktopping and necessary culverts on the way.

**EXPERIENCE**

1. From March 1992 : Manager (Civil)  
Orissa Construction Corpn. Ltd.  
(A Govt. of Orissa undertaking)
- (i) March 1992 to Jan. 1994 : Upper Kolab Power House Project, Jeypore, Koraput.
- (ii) From Jan. 1994 to April 2001 : Potteru Canal Project, Balimela, Malkangiri
- (iii) From April 2001 to July 2002 : High School Building Project Adaba, Gajapati.

BACI...



Chief Engineer  
World Bank Projects  
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Bhubaneswar

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- (iv) From Aug 2002 Consultant Engineer  
New construction, one time repair & renovation of Jagatsinghpur DHH under Orissa Health Systems Development Project.
- (v) From Oct. 2004 to Nov. 2005 Construction of Head Works of Janlabadia Minor Irrigation Project, Baramba, Cuttack.
- (vi) From February 2007 Construction of Ekalabya Model Residential School Project, Raygama

2. From Sept. 1988 to March 1992 : Site Engineer (Civil) Under a construction Company of Special Class status.

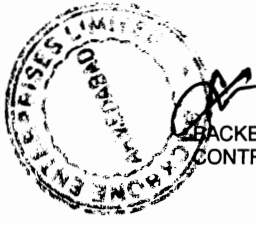
Work – Construction of housing (Residential and Commercial) at various location in the State of Orissa, with the support of State Housing Board.

**LANGUAGE** English, Oriya, Hindi

**JOB HANDLED / WORK PERFORMED**

- Execution of 112 Nos. H.I.G. Residential Houses including development of infrastructural facilities of Orissa State Housing Board, with a Budgeted cost of Rs. 1.50 Crores at Chandrasekharpur, followed by sanitary and Electrical works.
- Execution of Upper Kolab Power House Works i.e. Widening of Right side of Tail-pool of Upper Kolab Power House. The work includes excavation of hard stone by control blasting under the supervision of Central Mine Research Station, Nagpur. This unique project was taken up to protect the existing power house for the first time in Orissa which was completed in record time.
- Estimation and execution of potteru canal works, a World Bank financed project amounting Rs. 10.50 Crores is over. This includes the works like canal excavation in hard soil and hard rocks with blasting, filling works by excavators and tippers, turfing and the structure works as well. One stone crusher was under operation for the work also.
- Estimation and execution of Orissa Hydro Power Corporation road of 3.50 kms to Gompakoanda Mini Hydel in the district of Malkangiri amounting Rs. 1.00 crore is in progress.
- Execution of 7 Nos. High School Buildings in Gajapati District financed by Orissa State Disaster Mitigation Authority amounting Rs. 0.70 crores within a distance of 150 kms including supply of construction material to labour contractors engaged for the works.
- Estimation and execution of "New construction, one time repair & renovation of District Head Quarter Hospital of Jagatsinghpur" a world Bank financed project under Orissa Health Systems Development project which consists of both Residential and Non-residential multi storied framed structures completed with all Civil, PH & Electrical works. Final billing of the work is in progress which is amounting Rs. 3.00 crores. Quality control Tests at different levels at site are being obtained to ensure better quality.

BACKBONE CONTRACTORS - J.V.



**Chief Engineer**  
World Bank Projects, Orissa  
World Bank Projects  
To the E.I.C (Civil) Orissa.  
Chubabeswar



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- Execution of a Minor Irrigation structure i.e. Diversion Weir on River Hadua at Janlabadia in Baramba Block of Cuttack. This work amounting Rs. 0.75 crores a NABARD financed project is completed which includes mass concreting and R.R. Masonry specially.
- Education of Ekalabya Model Residential School complex at Rayganj is in progress.

**REPORTING PERSONNEL AND ADMINISTRATION**

A team of Junior Engineers, site supervisor, other mechanical and supporting staff assisted me in the above mentioned works. Headed one subdivision independently with total technical and financial control under me. Used to report next senior authority regarding progress and performance.

**STORE / PURCHASE**

Under the projects, I used to supervise excavators, Cranes, compressors, tippers, trucks, jeeps and other mechanical means to run the work used to assess the requirements of consumable and procurement of POL and spares of the vehicles within the budgeted frame work and periodically used to do physical verification. Two major stores (I) UKP (ii) PCP were under my supervision and control.

**MAN AND MACHINE MANAGEMENT**

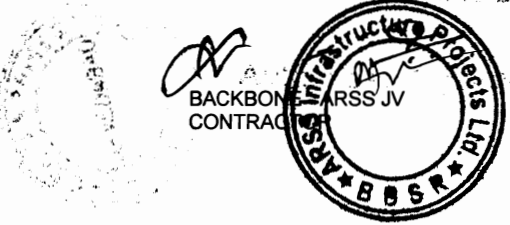
Used to assess the man power requirement and need of equipment and machineries for several projects and report to the competent authorities for financial approval of budgeted expenditures. My major thrust was to work within in the budget and timely completion of the projects. maintained adequate coherence among the people of the team and ensured routine / preventive maintenance of the machineries under the project.

- SALARY DRAWN :** As per the State Govt. norms.
- SALARY EXPECTED :** Negotiable to match with the nature of work.
- NOTICE PERIOD :** One month from the date of final selection.
- REFERENCES :** Available can be given if required.

Place : Bhubaneswar  
Date : 17.11.07

Saroj Kumar Tripathy  
SIGNATURE

BACKBONE - ARDS - J.V.



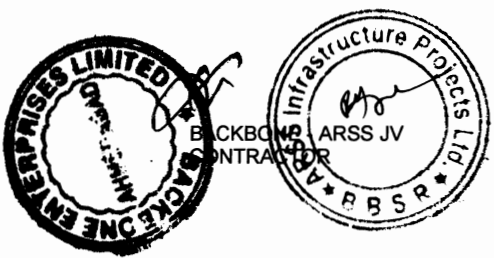
Chief Engineer  
World Bank Projects, Orissa  
World Bank Projects  
Employer  
O/o the E. I. C (Civil) Orissa.  
Bhubaneswar


### Resume of Proposed Personnel-4

<b>Position- Land Surveyor</b>		
<b>Personnel information</b>	Name – Mr Kailash Ch Sahoo	Date of birth- 08.02.1962
	Professional qualifications-Diploma in Civil Engineering	
<b>Present employment</b>	Name of employer- ARSS Infrastructure Projects Ltd	
	Address of employer-Sector-A,Zone-D,Plot No-38,Mancheswar Industrial Estate, Mancheswar Bhubaneswar-751010(Orissa)	
	Telephone:(0674)-2588552,2588554	Contact (manager / personnel officer)
	Fax No:-(0674)-2585074	E-mail:response@arssgroup.in
	Job title- Junior Engineer	Years with present employer- 1 Years

Summarize professional experience over the last 20 years, in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

From	To	Company / Project / Position / Relevant technical and management experience
		<b>DETAILS ATTACHED</b>



  
**Chief Engineer**  
 World Bank Projects, Orissa  
 World Bank EMPLOYER  
 O/o the E.I.C (Civil) Orissa  
 Bhubaneswar

26 (442)

# RESUME



Name : Mr. Kailash Chandra Sahoo.  
Address : C/O Nabaghan sahuo  
AT/PO Banguari  
VIA Fullnakhara  
: DIST Khurda  
Mobile No -09437101724

**Objective** I look forward to join an organization that provides an environment, which asks for high standard of intellect professionalism, human values and ethics to be able to stand what others expect from me. I am willing to learn and adapt to new challenges to see myself as a part of new globalize infrastructural development world.

**Prof. Qualification** Diploma in Civil Engineering from Barapada Engineering School, Bhadrak in 1996

H S C From B.O.S.E in 1992

**Exposure on Survey Equipment** Total station -Topcon GTS 701; Auto Levels; Theodolite;

Language : Oriya ; Hindi ; English;

**Prof. Qualification** Total 12 yrs of field experience in survey, Road Site supervision.

## Employment Record

Presently at

**RKD & SD construction PVT LTD with Joint Venture SMJ Malaysia.**

Duration -May 2001 to till date

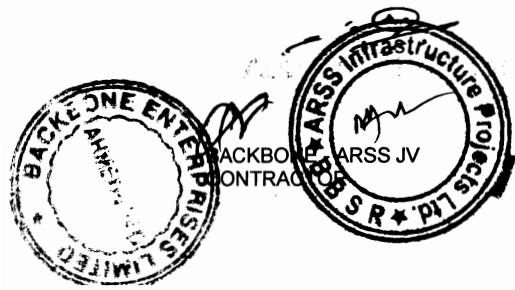
Designation - Field Engineer

### Project Detail.

- (A) Construction Supervision for 4 laning as Strengthening of Existing 2 lane stretches From sunakhala (KM 335/000) to Khurda (388/000) NH-5 in Orissa Pkg VI
- , Improvement of 4/6 lane roads From Jayadev vihar to Damana Chhaka (BBSR - Nandankanan Road ) 2005 - 2007

## Responsibilities

Fixing of TBM & Taking of O G L . Execution at sites like that Earth Work Embankment; Sub grade Construction KERB DBM BC SDBC as per MOST Specifications



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Previously Record

Worked for APIL-AMIL JOINT VENTURE (AFCONS) for 5 yrs ( from jan1997-May 2001 Junior Engineer.

**JOB RESPONSIBILITY:**

- Fixing of TBM ; Taking of OGL
- Execution at site work like that Earth Work Sub Grade GSB & WMM etc

**Work responsibilities**

Organizing and Monitoring Highway Engineering Surveys like Fixing the Temporary Bench mark & taking Cross Sectional levels by using the total stations Auto levels & Theodolite.

**Key Experience**

More than 12 yrs of Experience in Survey works Related to National Highways, State Highways ; Responsible for Carrying out Temporary Bench mark ; Cross Section Survey ; Quantity Calculation ;

Excution of Different Pavement layers like Earth Work ; GSB; WMM; WBM; DBM; AC and Maintenance works as per Most & IRC Specification

Organizing Operator;Helper;Labour and Preparation of bills for Subcontractors;

Having Sound Knowledge in latest Road Machinaries like bulldozer;Hydraulic grader; Vibratory Roller ; Excavators (tata Hitachi L&T Poclain & Jcb) & Electronic Sensor Paver (Appolo ;Titan;Vogele;Bittle) Wet mix paver; Tandam Roller;Pneumatic roller;Bituminious Sprayer etc;

**Declaration :**

I here by declare that the above information is true to the best of my knowledge and

Place:

Date:

BANGALORE, 12/05/2017

*Kailash Chandra*

Kailash Chandra Saini



*J*  
 Chief Engineer  
 World Bank Project

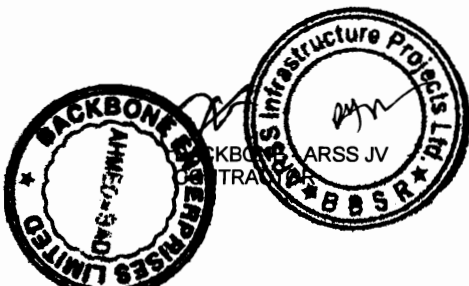
## Resume of Proposed Personnel-5

Name of Bidder- <b>BACKBONE-ARSS(J.v.) ARSS Infrastructure Projects Ltd(Partner)</b>
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<b>Position- Lab Manager/Technician</b>		
<b>Personnel information</b>	Name – Mr B.K.Rao	Date of birth- 03.05.1960
	Professional qualifications-B.E in Civil engineering	
<b>Present employment</b>	Name of employer- ARSS Infrastructure Projects Ltd	
	Address of employer-Sector-A,Zone-D,Plot No-38,Mancheswar Industrial Estate, Mancheswar Bhubaneswar-751010(Orissa)	
	Telephone:(0674)-2588552,2588554	Contact (manager / personnel officer)
	Fax No:-(0674)-2585074	E-mail:response@arssgroup.in
	Job title- Junior Engineer	Years with present employer- 1 Years

Summarize professional experience over the last 20 years, in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

From	To	Company / Project / Position / Relevant technical and management experience
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**Chief Engineer**  
 World Bank Projects, Orissa  
 W.B. EMPLOYER  
 O/o the E.I.C (Civil) Orissa  
 Bhubaneswar

Proposed Position:

Vice President

Name of Firm:

M/S ARSS Infrastructures

Name of Staff:

BATALA KRISHNA RAO

Profession:

Civil Engineer

Date of Birth:

3rd May 1960

Communication address:

N2-108,IRC village,Bhubaneswar-15

Nationality:

Indian

Contact No:

09937622815

**Membership in Professional Societies:**

Fellow of Institution of Engineers - (FO16387-9)

Life Member of Indian Roads Congress - (LM.21044)

Associate Member of Institute of Material Management

**Detailed Tasks Assigned:**

- Serve as Vice President for the projects.
- Responsible for the project and Team Management.
- Maintain close liaison with Clients.
- Review and Standardize quality control procedures.
- Coordinate with all Key Personnel for timely implementation of the Project.

**Key Qualifications:**

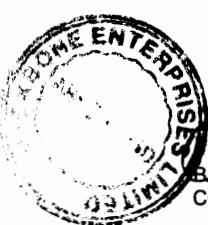
Mr. Rao, a Civil Engineer with Post Graduation in Geo-technical Engineering for IIT, Kharagpur and B.E from NIT, Surat has 24 years professional experience in dealing with Construction Supervision and Quality Control of Highways projects.

He has been responsible for preparation of Detailed Project Report, Construction Supervision, Material Testing, Quality Assurance and Quality Control, maintenance for Highways projects, road and bridge works funded by NHAI and ADB funded Highway projects. He has been also managing activities of designing and preparation of JMF for Sub-base, Non Bituminous Courses, mix design of different grades of concrete and bridges, culverts and piles etc.

Thoroughly conversant with IS, IRC standards and MOST specifications involved in the design and execution of Highways projects, road and bridge work under FIDIC Condition of Contract.

His relevant project experience is as follows:

- Performance Specified Maintenance Contract (PSMC-II) from Km 233.000 to Km 418.000 of Vishakhapatnam – Bhubaneswar Section of NH-5 (under NHAI)
- Widening to 4/6-lanes and strengthening of existing 20lane carriageway from Ichapuram to Khurda (Km 233.000 to Km 388.000) of NH-5 Construction Package OR-VI, OR-VII and OR-VIII (under NHAI)
- Widening and Strengthening of SH-10 from Sambalpur – Rourkela road (Km 0.000 to Km 162.000) under ADB funded project (under PWD, Govt. of Orissa)
- Preparation of Feasibility and Detailed Project Report for rehabilitation and upgrading of existing of 2-lane road to 4/6-lane divided carriageway configuration from Ichapuram (Km 233.000) to Khurda (Km 388.000) in Vishakhapatnam – Bhubaneswar Section of NH-5 in the State of Orissa
- Preparation of Feasibility and Detailed Project Report for roads under Pradhan Mantri Gram Sadak Yojana (PMGSY) and execution of 146.716 Kms.



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CONTRACTOR



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EMPLOYER  
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Bhubaneswar

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**Education:**

M. Tech, Civil Engineering, with specialization in Soil Mechanics and Foundation Engineering IIT, Kharagpur, India, 1994

Bachelors Degree, Civil Engineering, SVR College of Engineering, Surat, (NIT), 1983

**Employment Record:**

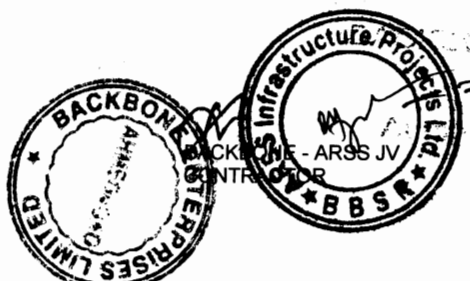
- (A) Period: > April 2007 to Till date
- Employer: > Aryan Infrastructures.
- Position held: > General Manager (projects)
- Project Location > Bhubaneswar
- Clients > Vedanta, BILT, IDCO, Mittal Steels, OTDC, Arya Steels & ITC
- Responsibilities > Project Execution, Tendering, claims, and design & detaining of multi storied building Projects.
- (B) Period: > March 2004 to March 2007
- Employer: > Govt. of Orissa, Works Department
- Position held: > PIU HEAD
- Project Location > Detailed Project Report and Construction Supervision of 50 packages of PMGSY works Phase I, II, III, IV & VI under Bhadrak District
- Responsibilities >
  - Project monitoring and management
  - Approving Contractors work programme method statement and material sources
  - Supervision of tests on materials being used on site as per the required sequences
  - Regular inspection of construction works
  - Design and testing of cement concrete mixes for high strength concrete
  - Setting up of quantity and quality control procedure
  - Conducting mix designing for WMM, BM and SDBC
- (C) Period: > June 2003 to February 2004
- Employer: > National Highways Authority of India
- Position held: > Project Director & DGM
- Project Location > Construction Supervision of 4/6-laning of NH-5A from Chandikhole to Paradip
- Responsibilities > Detailed Project Report studies, Contract evaluation, pre-construction activities and Construction Supervision of NH-5A works
- (D) Period: > January 2002 to May 2003
- Employer: > National Highways Authority of India



Chief Engineer  
World Bank Projects, Orissa  
to the E.M.C. (Orissa) Orissa  
Bhubaneswar

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- Position held: > **Project Director & DGM**
- Project Location > Construction Supervision of 4/6-laning of NH-5 from Ichapuram to Ganjam
- Responsibilities > Supervision of construction including design of flexible and rigid pavements, layout of interchanges, cross drainage works, road geometries of construction package OR-VI, OR-VII & OR-VIII under NHDP of section NH-5
  
- (E) Period: > **January 2001 to December 2001**
- Employer: > **National Highways Authority of India**
- Position held: > **Project Director & DGM**
- Project Location > Performance Specified Maintenance Contract (PSMC II) Vishakhapatnam - Bhubaneswar section of NH-5
- Responsibilities > Responsibility included Pavement Evaluation for maintenance of existing National Highway, improvement of existing alignment, Geometry & maintenance of Cross drainage works
  
- (F) Period: > **July 1999 to December 2000**
- Employer: > **National Highways Authority of India**
- Position held: > **Project Director & MANAGER**
- Project Location > Chennai - Vijayawada, Vijayawada - Bhubaneswar, Bhubaneswar - Kolkata Section of NH-5
- Responsibilities > Responsibilities included detail feasibility studies, sub-soil investigation, design of road alignment geometry, flexible and rigid pavements, interchanges, and cross drainage works.
  
- (G) Period: > **November 1996 to May 1999**
- Employer: > **Steel & Mines Department, Govt. of Orissa**
- Position held: > **Valuation Officer**
- Project Location > TATA Integrated steel plant at Gopalpur
- Responsibilities > Valuation of structures affected by TATA Steel Plant
  
- (H) Period: > **July 1994-October 1996**
- Employer: > **Works Department, Govt. of Orissa**
- Position held: > **Resident Engineer in charge**
- Project Location > Construction Supervision of widening and strengthening of SH-10 from Sambalpur to Rourkela Road
- Responsibilities > Responsible for design and construction of roads and bridges, structural and functional evaluation of pavements, asphalt and cement concrete mix designs, survey and testing of road materials, identification of quarry sites and borrow areas, laboratory



Chief Engineer  
 World Bank Projects, Orissa  
 (to the E.M.C. (Civil) Orissa)  
 Bhubaneswar



448

testing of soil, rock and bitumen, use of economical road construction materials, quality control, new and alternate materials for road construction rehabilitation of damaged pavements, etc.

- (I) Period: > November 1983 to June 1994
- Employer: > Govt. of Orissa, Works Department
- Position held: > Assistant Engineer
- Project Location > Design of Multi storied buildings, pile foundation and roof trusses
- Responsibilities > Responsible for design of structures including Hydroelectric power station components, pile foundations, and multistoried framed buildings. Also supervised civil construction activities such as concreting, reinforcement scheduling, shuttering, manpower planning, materials and machinery deployment and quality assurance of materials and works. Also involved in measurement of work and preparation of bills and construction associated works of roads, drains, water supply and sewerage in the township.

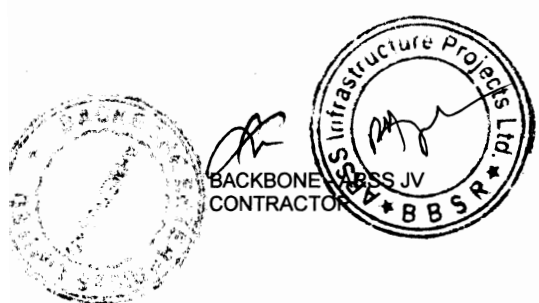
Languages:	Speaking	Reading	Writing
English	Excellent	Excellent	Excellent
Hindi	Excellent	Good	Good
Oriya	Excellent	Good	Good
Telugu	Excellent	Excellent	Excellent

**Certification:**

I, the undersigned certify that to the best of my knowledge and belief, this biodata correctly describes myself, my qualification and my experience.

(Bataala Krishna Rao)

BACKBONE - BSS JV



World Bank Project  
 O/o the E.I.C (Civil) Orissa.  
 Bhubaneswar



# BACKBONE-ARSS J.V.



Plot No.-3, Sector-A, Zone-D, Mancheswar Industrial Estate, MANCHESWAR, Bhubaneswar-751 010, (Orissa)

Phone : (0674) 2588552, 2588554, Fax : (0674) 2585074

Ref.....

Date:.....

1594  
26.6.08

No. ARSS/CE/WBP/08-09/1567

Dt. 26.06.2008

To  
**The Chief Engineer,**  
World Bank Project,  
Nirman Soudha,  
Keshari Nagar  
Orissa, Bhubaneswar.

**Sub:** Widening and Strengthening of Existing Carriage way to 2 lane from Berhampur-Taptapani (0/0 km to 41/0 km of SH-17) - IFB No.: CW-ICB-Y1-PO3-E-44114 Dt. 19<sup>th</sup> Oct, 2007.

**Ref:** Your Letter No. 24381 dt. 29.05.08.

Dear Sir,


A kind reference to invited to the above letter on subject work.

We convey our sincere thanks for the kind letter of Acceptance and assure you to extend our full cooperation in completing the works with quality and within time.

We are furnishing herewith a Bank Guarantee bearing No. 0665708BG0000226 dt. 26.06.08 from State Bank of India, Commercial Branch, Bhubaneswar for Rs. 4,09,86,186/- (Rupees Four Crore Nine Lax Eighty Six Thousand One Hundred Eighty Six Only) towards performance security as per section-IX, annex to the particular conditions - contract forms of the bidding document for further necessary action at your end.

Thanking you and assuring best of our services always.

Yours faithfully,  
For **BACKBONE-ARSS JV.**

  
(S.P. Dash)  
Authorised Signatory

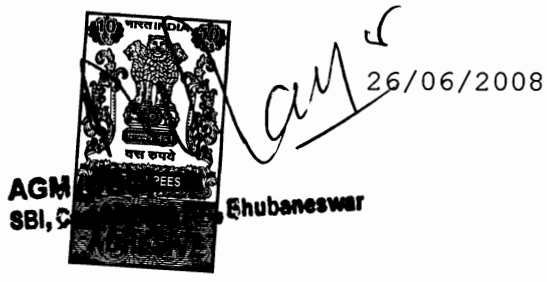
EEIV, PIU  
for us  
J. N. Dash  
26.6.08

STATE BANK OF INDIA  
COMMERCIAL BRANCH  
UNIT-II, ASHOK NAGAR  
BHUBANESHWAR, ORISSA

TEL NO:  
FAX NO:0674-2530803  
SWIFT NO:SBININBB119  
PIN CODE:751009

1582  
26.6.08

CHIEF ENGINEER  
WORLD BANK PROJECTS,  
ORISSA, BHUBANESHWAR.

  
AGM  
SBI, Bhubaneswar  
26/06/2008

DEAR SIRs,

GUARANTEE NO : 0665708BG0000226  
AMOUNT OF GUARANTEE : INR4,09,86,186.00  
GUARANTEE COVER FROM : 26/06/2008 TO 30/07/2011  
LAST DATE FOR LODGEMENT OF CLAIM : 30/07/2011

THIS DEED OF GUARANTEE IS EXECUTED BY THE STATE BANK OF INDIA, CONSTITUTED UNDER THE STATE BANK OF INDIA ACT, 1955 HAVING THE CENTRAL OFFICE AT NARIMAN POINT, MUMBAI AND AMONGST OTHER PLACES. A BRANCH AT COMMERCIAL BRANCH (HEREIN AFTER REFERRED TO AS 'THE BANK'). IN FAVOUR OF CHIEF ENGINEER, *World Bank Projects Orissa, Bhubaneswar.* (HEREIN AFTER REFERRED TO AS 'BENEFICIARY') FOR AN AMOUNT NOT EXCEEDING 4,09,86,186.00 *SP* four crore nine lakh eighty six thousand one hundred eighty six INDIAN RUPEE only AT THE REQUEST OF ARSS INFRASTRUCTURE PROJECTS LTD AND THE GUARANTEE SHALL REMAIN IN FULL FORCE UPTO 30/07/2011 AND CANNOT BE INVOKED OTHERWISE THAN BY WRITTEN DEMAND OR CLAIM UNDER THIS GUARANTEE SERVED ON THE BANK ON OR BEFORE THE 30/07/2011 *SP*

SUBJECT TO AS AFORESAID

NOTWITHSTANDING ANYTHING CONTAINED HEREIN ABOVE, OUR LIABILITY UNDER THIS GUARANTEE IS RESTRICTED TO 4,09,86,186.00 four crore nine lakh eighty six thousand one hundred eighty six INDIAN RUPEE only OUR GUARANTEE SHALL REMAIN IN FORCE UNTIL 30/07/2011. UNLESS A DEMAND OR CLAIM UNDER THE GUARANTEE IS MADE ON OUR BANK IN WRITING ON OR BEFORE 30/07/2011 ALL YOURS RIGHTS UNDER THE SAID GUARANTEE BE FORFEITED AND WE SHALL BE RELIEVED AND DISCHARGED FROM ALL LIABILITES THEREUNDER.

*SP*  
AUTHORISED SIGNATORY  
S.S.RATH  
R-4051



*Debaraj Sahu*  
AUTHORISED SIGNATORY  
Debaraj Sahu  
S-13606





उड़ीसा ORISSA

A 810130

Enclosure to B.G. No. 0665708BG0000226

**PERFORMANCE SECURITY  
(DEMAND GUARANTEE)**


State Bank of India,  
Commercial Branch,  
IDCOL House,  
Unit-II, Ashok Nagar,  
Bhubaneswar - 751 009.

Beneficiary: **Chief Engineer,  
World Bank Projects,  
Orissa,  
Bhubaneswar.**


Date: 26<sup>th</sup> June 2008

Performance Guarantee No:-

We have been informed that BACKBONE - ARSS J.V, Plot No - 38, Sector-A, Zone - D, Mancheswar Industrial Estate, Bhubaneswar - 751010. (Hereinafter called "the Contractor")

  
S.S.RATH  
R-4051



  
Debaraj Sahu  
S-13606

has entered into Contract No OSRP-CW-Y1-P03-24381 dated 29.05.2008 with you, for the execution of **Widening & Strengthening of existing carriageway to 2-lane road from Berhampur to Taptapani (Km. 0/0 to 41/0 of SH-17)** (hereinafter called "the Contract")

Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required.


At the request of the Contractor, we State Bank of India, Commercial Branch, Bhubaneswar, Orissa hereby irrevocably undertake to pay you any sum of sums not exceeding in total an amount of Rs 4,09,86,186/- (Rupees Four Crore Nine lakh Eighty Six Thousand One Hundred Eighty Six Only), such sum being payable in the types and proportions of currencies in which the Contract Price is payable, upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation(s) under the Contract, without your needing to prove or to show grounds for your demand or the sum specified therein.


This guarantee shall expire, ~~not~~ later than the 30th Day July, 2011, and any demand for payment under it must be received by us at this office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 458, except that subparagraph (ii) of Sub-article 20(a) is hereby excluded.

Notwithstanding anything Contained herein above, the Bank's liability under this guarantee is restricted to Rs 4,09,86,186/- (Rupees Four Crore Nine lakh Eighty Six Thousand One Hundred Eighty Six Only) and the guarantee shall remain in force until 30.07.2011. Until a demand or claim under the guarantee is made on our bank in writing on or before 30.07.2011, all your rights under the said guarantee be forfeited and we shall be relieved and discharged from all liabilities thereunder.

[signature(s)]

  
S.S.RATH  
R-4051

  
Debaraj Sahu  
13606



**GOVERNMENT OF ORISSA  
WORKS DEPARTMENT**

**CIVIL WORKS CONTRACT**

**[ PACKAGE No. OSRP-CW-ICB-Y1-P03 ]**

**For**

***Widening & Strengthening of existing carriageway to 2-lane road from  
Berhampur to Taptapani  
(Km. 0/0 to 41/0 of SH – 17)***

***under  
Orissa State Roads Project***

between

**Chief Engineer, World Bank Projects, Orissa  
on behalf of  
Orissa Works Department, Government of Orissa**

and

**BACKBONE – ARSS JV  
Plot No. 38, SECTOR – A, Zone – D  
Mancheswar Industrial Estate, Mancheswar, Bhubaneswar – 751010 [INDIA]**

**[ VOLUME – II : PARTICULAR CONDITIONS & GENERAL CONDITIONS ]  
Agreement Value: Rs. 81,97,23,707**

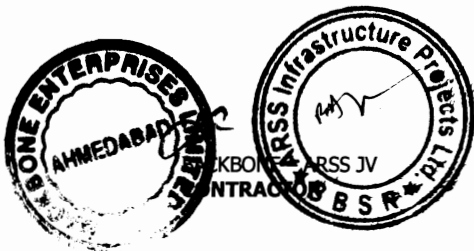
***Project Implementation Unit, Orissa State Roads Project  
Office of the Engineer-in-Chief (Civil), Orissa,  
Nirman Soudha, Keshari Nagar, Unit – V, Bhubaneswar – 751 001  
Dated: 5<sup>th</sup> September, 2008***

## CONTENTS of CONTRACT

Volume – I	:	Letter of Acceptance, Letter Bid and addenda
Volume – II	:	Particular Conditions and the General Conditions;
Volume – III	:	Specifications
Volume – IV	:	Drawings
Volume – V	:	Completed Schedules,

## CONTENTS of VOLUME II

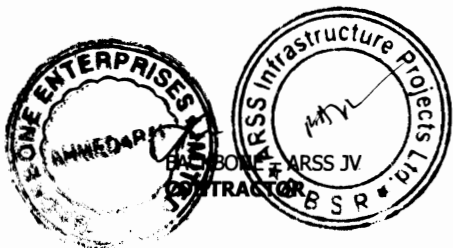
Sl.	Description	Page No.
1	<b>PARTICULAR CONDITIONS</b>	1
	PART – A : Contract Data	2
	PART – B : Specific Provisions	6
	Annexure – AI : Salient features of some major Labour Laws applicable to establishments engaged in Construction of Civil Works	9
	Annexure – AII : Safety & Welfare Provisions for labour to be employed by the Contractor	12
2	<b>GENERAL CONDITIONS</b>	18




  
Chief Engineer  
World Bank Projects, Orissa  
~~Chief Engineer~~  
World Bank Projects  
Officer to the E.I.C (Civil) Orissa  
Bhubaneswar

# Particular Conditions (PC)

The following Particular Conditions shall supplement the GC. Whenever there is a conflict, the provisions herein shall prevail over those in the GC.



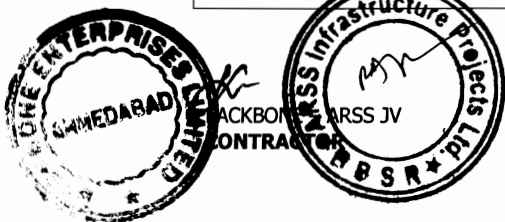
Volume – II - Page No. 1

  
**Chief Engineer**  
World Bank Projects, Orissa  
**Chief Engineer**  
World Bank Projects  
Office of the E.I.C (Civil) Orissa  
Bhubaneswar:

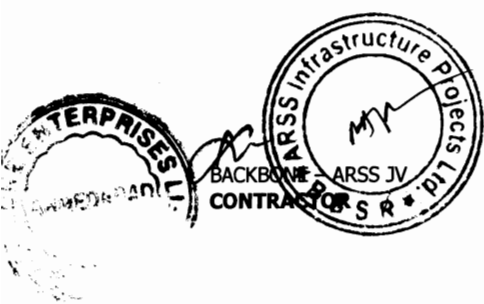



## Part A - Contract Data

Conditions	Sub-Clause	Data
Employer's name and address	1.1.2.2 & 1.3	Works Department, Government of Orissa Orissa Secretariat, Bhubaneswar – 751 001
Engineer's name and address	1.1.2.4 & 1.3	M/s SMEC International Pty. Ltd., Australia with Sub-Consultants M/s SMEC India Pvt. Ltd and CMEC Consulting Engineers, India Address: M/s SMEC International Pty. Ltd. [ India Regional Office] 5th Floor, DLF Building No. 8, Tower C, DLF Cyber City, Phase – II, GURGAON – 122 002 (Haryana) Fax: 0124 - 4380043 Email: smec@vsnl.com
Bank's name	1.1.2.11	International Bank for Reconstruction and Development, ( The World Bank )
Borrower's name	1.1.2.12	Government of Orissa through Government of India
Time for Completion	1.1.3.3	<u>24 Months</u> <i>Refer to Table: Summary of Sections below</i>
Defects Notification Period	1.1.3.7	365 days.
Sections	1.1.5.6	<i>Refer to Table: Summary of Sections below</i>
Electronic transmission systems	1.3	Email
Governing Law	1.4	Law in force in the Union of India.
Ruling language	1.4	English
Language for communications	1.4	English
Time for the Parties entering	1.6	28 days

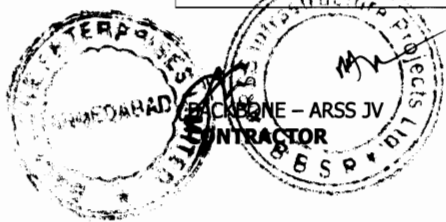


Conditions	Sub-Clause	Data
<b>into a Contract Agreement</b>		
<b>Time for access to the Site</b>	2.1	No later than the <u>Commencement Day</u> , except for the following parts (if applicable, with detailed description of parts concerned: <u>15</u> days after Commencement Date
<b>Engineer's Duties and Authority</b>	3.1(b)(ii)	Variations resulting in an increase of the Accepted Contract Amount in excess of <u>2</u> % shall require approval of the Employer.
<b>Performance Security</b>	4.2	The performance security will be in the form of a demand guarantee in the amount(s) of 5 percent of the Accepted Contract Amount and in the same currency(ies) of the Accepted Contract Amount.
<b>Normal working hours</b>	6.5	08:00 Hours to 18:00 Hours Except otherwise stipulated by the Government of Orissa in exceptional climatic conditions
<b>Delay damages for the Works</b>	8.7 & 14.15(b)	<u>0.05</u> % of the Contract Price per day. <i>Refer to Table: Summary of Sections below</i>
<b>Maximum amount of delay damages</b>	8.7	10% of the final Contract Price.
<b>Provisional Sums</b>	13.5.(b)(ii)	<i>[If there are Provisional Sums, insert a percentage for adjustment of Provisional Sums]</i> NIL
<b>Adjustments for Changes in Cost</b>	13.8	Period "n" applicable to the adjustment multiplier "Pn": 3 months.



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

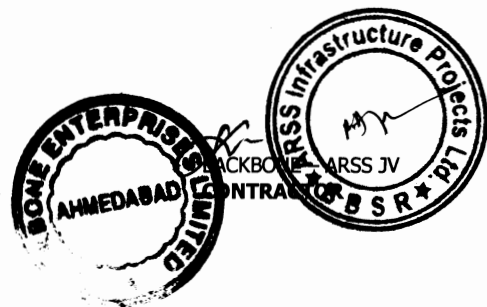
Conditions	Sub-Clause	Data
<b>Total advance payment</b>	14.2	<u>5</u> % Percentage of the Accepted Contract Amount payable in the currencies and proportions in which the Accepted Contract Amount is payable in two installments. The 2nd installment of the advance payment shall be paid to the contractor after 30days from the date of release of 1st installment.
<b>Repayment amortization rate of advance payment</b>	14.2(b)	10 %
<b>Percentage of Retention</b>	14.3	10 %
<b>Limit of Retention Money</b>	14.3	5 % of the Accepted Contract Amount
<b>Plant and Materials</b>	14.5(b)	Not Applicable
	14.5(c)(i)	Not Applicable
	14.5(c)(ii)	Applicable only for material with approved quality and limited to 5% of the accepted contract amount.
<b>Minimum Amount of Interim Payment Certificates</b>	14.6	3 % of the Accepted Contract Amount.
<b>Publishing source of commercial interest rates for financial charges in case of delayed payment</b>	14.8	State Bank Of India.
<b>Maximum total liability of the Contractor to the Employer</b>	17.6	The accepted contract amount.
<b>Periods for submission of insurance:</b> a. evidence of insurance. b. relevant policies	18.1	14 days 28 days
<b>Maximum amount of deductibles for insurance of the Employer's risks</b>	18.2(d)	<i>US\$ 5000 or Rs. 200,000 per occurrence</i>
<b>Minimum amount of third party insurance</b>	18.3	<i>Rs. 10,000,000 per occurrence with unlimited number of occurrences</i>



Conditions	Sub-Clause	Data
Date by which the DB shall be appointed	20.2	28 days after the Commencement date
The DB shall be comprised of	20.2	Three Members
List of potential DB sole members	20.2	None
Appointment (if not agreed) to be made by	20.3	President, Indian Roads Congress, New Delhi.
Rules of arbitration	20.6(a)	Rules and Procedures laid out for Arbitration & Reconciliation Act, 1996 of Government of India

**Table: Summary of Sections**

Section Name/Description (Sub-Clause 1.1.5.6)	Time for Completion (Sub-Clause 1.1.3.3)	Damages for Delay (Sub-Clause 8.7)
Km. 2/0 to Km. 15/0 Km of SH – 17	8 Months from Commencement of Works	IRs. 100,000 per day
Km. 15/0 to Km. 30/0 Km of SH – 17	16 Months from Commencement of Works	IRs. 100,000 per day
Completion of Whole of the Stretch	24 Months from Commencement of Works	IRs. 100,000 per day



Chief Engineer  
World Bank Projects, Orissa  
World Bank Projects  
EMPLOYER  
to the E.I.C (Civil) Orissa  
Bhubaneswar:

## Part B - Specific Provisions

### Sub-Clause 14.1

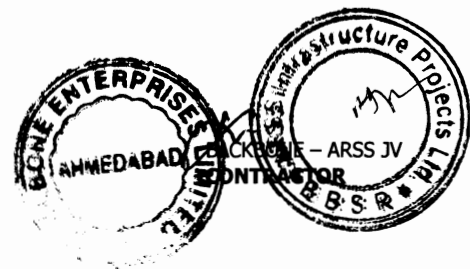
#### The Contract Price

*(Alternative paragraph)*

- (e) Notwithstanding the provisions of subparagraph (b), Contractor's Equipment, including essential spare parts therefore, imported by the Contractor for the sole purpose of executing the Contract shall be temporarily exempt from the payment of import duties and taxes upon initial importation, provided the Contractor shall post with the customs authorities at the part of entry an approved export bond or bank guarantee, valid until the Time for Completion plus six months, in an amount equal to the full import duties and taxes which would be payable on the assessed imported value of such Contractor's Equipment and spare parts, and callable in the event the Contractor's Equipment is not exported from the Country on completion of the Contract. A copy of the bond or bank guarantee endorsed by the customs authorities shall be provided by the Contractor to the Employer upon the importation of individual items of Contractor's Equipment and spare parts. Upon export of individual items of Contractor's Equipment or spare parts, or upon the completion of the Contract, the Contractor shall prepare, for approval by the customs authorities, an assessment of the residual value of the Contractor's Equipment and spare part to be exported, based on the depreciation scale(s) and other criteria used by the customs authorities for such purposes under the provisions of the applicable Laws. Import duties and taxes shall be due and payable to the customs authorities by the Contractor on (a) the difference between the initial imported value and the residual value of the Contractor's Equipment and spare parts to be exported; and (b) on the initial imported value of Contractor's Equipment and spare parts remaining in the Country after completion of the Contract. Upon payment of such dues within 28 days of being invoiced, the bond or bank guarantee shall be reduced or released accordingly; otherwise the security shall be called in the full amount remaining.

### Sub-Clause 4.1 Contractor's General Obligations

Add the following at the end of 5<sup>th</sup> Paragraph.  
Working Drawings / fabrication drawings for temporary works (such as form work, staging, centering, scaffolding, specialized construction, handling and launching facilities and the like), material list for structural fabrication as well as detailed drawings for anchorage and temporary support details for pre-



stressing cables as well as bar bending and cutting schedules for reinforcement etc. shall be prepared by the Contractor at his own cost and forwarded in triplicate to the Engineer at least four weeks in advance of actual constructional requirements. The Engineer will scrutinize and return one copy of the same for the Contractor's use with amendments, if any, noted in red ink within two weeks of submission. Such approval shall not relieve the Contractor of any of his responsibilities in connection with temporary works. The Contractor will supply six copies of the approved drawings for the Engineer's use. The cost of preparing all such items of work shall be deemed to have been included in the respective rates/prices quoted by the Contractor in the Bill of Quantities.

The Contractor shall ensure that his representative or Senior Site Representative attends all the periodic review meetings notified by the Engineer / Employer / Employer's representative.

**Clause 4.14  
Avoidance of  
Interference**

Add the following paras (c), (d) and (e) after para (b) as follows:

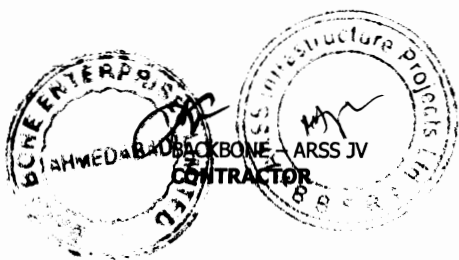
- (c) "In case, any operation connected with traffic necessitated diversion, obstruction or closure of any road, railway or any other Right of Way, the approval of the Engineer or the Engineer's Representative and the concerned authorities shall be obtained well in advance by the Contractor."
- (d) The Contractor shall so conduct his operations as to have under construction no greater length or amount of work than he can carry out efficiently with due regard to the convenience of the public.
- (e) The Contractor shall maintain the existing road in its normal condition suitable for the season of the year, from the time he commences the work on Site until the completion of the works.

**Sub-Clause 6.4  
Staff and Labour**

Add the following at end of Sub-Clause 6.4:

The employees of the Contractor and the Sub-contractor shall in no case 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 Construction of Civil Works are given in Annexure A-1 for reference purpose.



The contractor and sub contractor shall comply with the safety and welfare provisions as detailed in Annexure A-II

**Sub-Clause 7.3  
Inspection**

Amend the first line of last para as follows:  
The Contractor shall give **“not less than 48 (forty eight) hours”** notice to the Engineer whenever any...

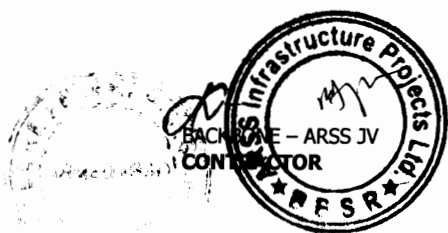
**17.2 Contractor's  
Care of the Works**


Add the following after end of para:

The Contractor has to maintain the stretches handed over to him in a particular mile-stone. A penalty shall be levied at the rate Rs.1000/- per km per day for non-conformity of maintenance of the road as per the decision of the Engineer.

The Contractor has to follow all traffic safety measures as defined in the Technical Specifications. A penalty shall be levied at the rate Rs.2000/- per day per location for non-conformity of Traffic Safety measures as per the decision of the Engineer.

The Contractor has to follow all Environmental Mitigation Measures as defined in the Technical Specifications read alongwith the EMP for the specific corridor. A penalty shall be levied at the rate Rs.1000/- per day per location for non-conformity of EMP measures as per the decision of the Engineer.



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

## Annexure-AI

### **Salient features of some major Labour Laws applicable to establishments engaged in Construction of Civil Works**

#### **(i) Workmen Compensation Act, 1923**

The Act provides for compensation in case of injury by accident arising out of and during the course of employment.

#### **(ii) 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 at the rate of 15 days wages for every completed year of service. The Act is applicable to all establishments employing 10 or more employees.

#### **(iii) Employees' PF and Miscellaneous Provisions Act, 1952**

The Act provides for monthly contributions by the employer plus workers @10 % or 8.33 %. The benefits payable under the Act are:

- (a) Pension or family pension on retirement or death as the case may be.
- (b) Deposit linked insurance on the death in harness of the worker.
- (c) Payment of PF accumulation on retirement/death etc.

#### **(iv) Maternity Benefit Act, 1951**

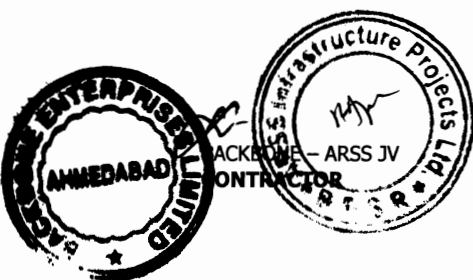
The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.

#### **(v) Contract Labour (Regulation and 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 a 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.

#### **(vi) 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, and Runways are scheduled employment.





**(vii) 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.

**(viii) Equal Remuneration Act, 1979**

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

**(ix) Payment of Bonus Act, 1965**

The Act is applicable to all establishments employing 20 or more workmen. 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. 3,500/- per month or less. The bonus to be paid to employees getting Rs. 2,500/- per month or above up to Rs.3, 500/- per month shall be worked out by taking wages as Rs.2, 500/- 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 the Act.

**(x) 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.

**(xi) 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.

**(xii) Trade Unions Act, 1926**

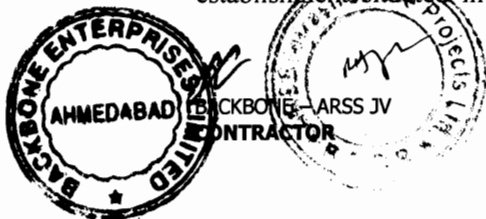
The Act lays down the procedure for registration of trade unions of workmen and employees. The trade unions registered under the Act have been given certain immunities from civil and criminal liabilities.

**(xiii) Child Labour (Prohibition and 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.

**(xiv) Inter-State Migrant Workmen's (Regulation of Employment and 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



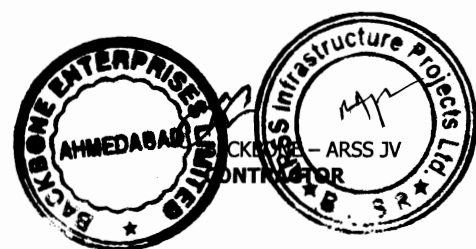
which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, travelling expenses from home upto the establishment and back, etc

**(xv) The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and the 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 rate not exceeding 2% of the cost of construction as may be notified by the Government. The employer of the establishment is required to provide safety measures at the Building or Construction work and other welfare measures, such as Canteens, First-aid facilities, Ambulance, Housing accommodation for Workers near the workplace etc. The employer to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the Government.

**(xvi) The Factories Act, 1948**

The Act lays down the procedure for approval of 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.



  
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**Safety & Welfare Provisions for labour to be employed by the Contractor**

All necessary personal safety equipment as considered adequate by the Engineer shall be available for use of persons employed on the Site and maintained in a condition suitable for immediate use; and the Contractor shall take adequate steps to ensure proper use of such equipment by those concerned.

**1. Safety Provisions:**

The Contractor shall comply with all the precautions as required for the safety of the workmen.

(i) All workmen at site shall be provided with safety helmets and yellow/orange jackets. Workmen required on site during night hours shall be provided with fluorescent yellow jackets with reflective lopes.

(ii) Workers employed on mixing asphaltic materials, cement, lime mortars, concrete etc. shall be provided with protective footwear, protective goggles.

(iii) Those engaged in handling any material, which is injurious to the eyes, shall be provided with protective goggles.

(iv) Those engaged in welding works shall be provided with welder's protective eye-shield.

(v) Stone breakers shall be provided with protective goggles and protective clothing and seated at sufficiently safe intervals.

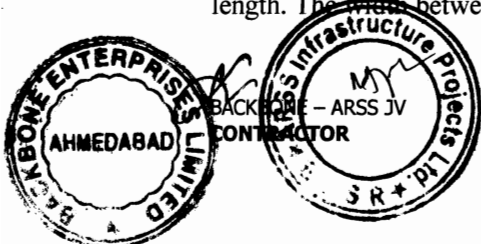
(vi) Suitable scaffolds shall be provided for workmen for all work that cannot safely be done from the ground, or from solid construction except for such short period work as can be done safely from ladders. When a ladder is used, an extra labourer shall be engaged for holding the ladder and if the ladder is used for carrying materials as well, suitable foot-holds and hand-holds shall be provided on the ladder, which shall be given an inclination not steeper than 1/4 to 1.

(vii) Scaffolding or staging more than 3.25 metres above the ground or floor, swung or suspended from an overhead support or erected with stationary support, shall have a guard rail properly attached, bolted, braced and otherwise secured at least 1 metre high above the floor or platform of such scaffolding or staging and extending along the entire length of the outside and ends thereof with only such openings as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the support or structure.

(viii) Working platforms, gangways, and stairways shall be so constructed that they do not sag unduly or unequally, and if the height of any platform or gangway or stairway is more than 3.25 metres above ground level or floor level, it shall have closely spaced boards, have adequate width and be suitably provided with guard rails as described in (ii) above.

(ix) Every opening in the floor of a structure or in a working platform shall be provided with suitable means to prevent fall of persons or materials by providing suitable fencing or railing with a minimum height of one metre.

(x) Safe means of access and egress shall be provided to all working platforms and other working places. Every ladder shall be securely fixed. No portable single ladder shall be over 9 metres in length. The width between side rails in a rung ladder shall in no case be less than 30 cm for ladders up



to and including 3 metres in length. For longer ladders the width shall be increased at least 6 mm for each additional 30 cm of length. Spacing of steps shall be uniform and shall not exceed 30 cm.

(xi) Adequate precautions shall be taken to prevent danger from electrical equipment. No materials on any of the sites shall be so stacked or placed as to cause danger or inconvenience to any person or the public. The Contractor shall provide all necessary fencing and lights to protect the public from accidents and shall be bound to bear the expenses of defending every suit, action or other proceedings at law that may be brought by any person for injury sustained owing to neglect of the above precautions and to pay any damages and costs which may be awarded in any such suit, action or proceedings to any such person or which may with the consent of the Contractor be paid to compromise any claim by any such person.

(xii) Excavation and Trenching: All trenches, 1.5 metres or more in depth, shall at all times be supplied with at least one ladder for each 20 metres in length or fraction thereof. Ladders shall be extended from the bottom of the trench to at least 1 metre above the surface of the ground. The sides of a trench, which is 1.5 metres or more in depth shall be stepped back to provide a suitable slope, or be securely held by timber bracing so as to avoid the danger of side collapse. Excavated material shall not be placed within 1.5 metres of the edge of any trench or half the depth of the trench, whichever is more. Excavation shall be made from the top to the bottom. Under no circumstances shall undermining or undercutting be done.

(xiii) When workers are employed in sewers and manholes, which are in use, the Contractor shall ensure that manhole covers are open and manholes are ventilated at least for an hour before workers are allowed to go into them. Manholes so open shall be cordoned off with suitable railing and provide warning signals or boards to prevent accidents to the public.

(xiv) Demolition: Before any demolition work is commenced and also during the process of the work:

- a) All roads and open areas adjacent to the work site shall either be closed or suitably protected.
- b) No electric cable or apparatus, which is liable to be a source of danger other than a cable or apparatus used by operators, shall remain electrically charged:
- c) All practical steps shall be taken to prevent danger to persons employed by the Employer, from risk of fire or explosion, or flooding. No floor, roof or other part of a building shall be so overloaded with debris or materials as to render it unsafe.

(xv) When work is performed near any place where there is risk of drowning all necessary equipment shall be provided and kept ready for use and all necessary steps taken for prompt first aid treatment of all injuries likely to be sustained during the course of the work.

(xvi) Use of hoisting machines and tackle including their attachments, anchorage and supports shall conform to the following:

- (a) These shall be of good mechanical construction, sound material and adequate strength and free from patent defects and shall be kept in good working order be regularly inspected and properly maintained.
- (b) Every rope used in hoisting or lowering materials or as a means of suspension shall be of durable quality and adequate strength, and free from defects.



(c) For every hoisting machine and every chain hook, shackle, swivel and pulley block used in hoisting, lowering or as means of suspension, safe working load shall be ascertained by adequate means. Every hoisting machine and all gear referred to above shall be plainly marked with safe working load. In case of a hoisting machine or a variable safe working load, each safe working load and conditions under which it is applicable shall be clearly indicated. No part of any machine or any gear referred to in the paragraph above shall be loaded beyond safe working load except for the purpose of testing

(xvii) Motors, gearing, transmission, electric wiring and other dangerous parts of hoisting appliances shall be provided with efficient safeguards; hoisting appliances shall be provided with such means as will reduce the risk of accident during descent of load to the minimum. Adequate precautions shall be taken to reduce to the minimum risk of any part of a suspended load becoming accidentally displaced. When workers are employed on electrical installations which are already energised, insulating mats, working apparel such as gloves, sleeves and boots, as may be necessary, shall be provided. Workers shall not wear any rings, watches and carry keys or other material which are good conductors of electricity.

(xviii) All scaffolds, ladders and other safety devices mentioned or described herein shall be maintained in a safe condition and no scaffold, ladder or equipment shall be altered or removed while it is in use. Adequate washing facilities shall be provided at or near places of work.

(xix) These safety provisions shall be brought to the notice of all concerned by displaying on a notice board at a prominent place at the work location. Persons responsible for ensuring compliance with the Safety Code shall be named therein by the Contractor.

(xx) To ensure effective enforcement of the rules and regulations relating to safety precautions, arrangements made by the Contractor shall be open to inspection by the Engineer or his Representative.

(xxi) Notwithstanding anything contained in condition (i) to (xv) above, the Contractor shall remain liable to comply with the provisions of all acts, rules, regulations and bylaws for the time being in force in India and applicable in this matter.

The Contractor shall be responsible for observance, by his sub-contractors, of the foregoing provisions.

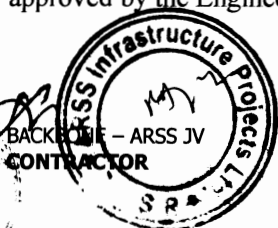
## **2. Labour Welfare Provisions:**

### **(i) First Aid:**

At every workplace, there shall be maintained in a readily accessible place first aid appliances including an adequate supply of sterilised dressings and sterilised cotton wool as prescribed in the Factory Rules of the State in which the work is carried on. The appliances shall be kept in good order and, in large work places, they shall be placed under the charge of a responsible person who shall be readily available during working hours.

### **(ii) Accommodation for Labour:**

The Contractor shall during the progress of the work provide, erect and maintain necessary temporary living accommodation and ancillary facilities for labour at his own expense to standards and scales approved by the Engineer.



**(iii) Drinking Water:**

In every workplace, there shall be provided and maintained at suitable places easily accessible to labour, a sufficient supply of cold water fit for drinking.

Where drinking water is obtained from an intermittent public water supply each workplace shall be provided with storage tanks where drinking water shall be stored.

Every water supply storage shall be at a distance of not less than 15 metres from any latrine, drain or other source of pollution. Where water has to be drawn from an existing well, which is within such proximity of any latrine, drain or any other source of pollution, the well shall be properly chlorinated before water is drawn from it for drinking. All such wells shall be entirely closed in and be provided with a trap door, which shall be dust proof and waterproof.

A reliable pump shall be fitted to each covered well. The trap door shall be kept locked and opened only for cleaning or inspection, which shall be done at least once a month.

**(iv) Washing and Bathing Places:**

Adequate washing and bathing places shall be provided separately for men and women. Such places shall be kept in clean and drained condition.

**(v) Scale of Accommodation in Latrines and Urinals:**

There shall be provided within the precincts of every workplace, latrines and urinals in an accessible place, and the accommodation, separately for each for these, shall not be less than at the following scale:

No. of Seats

(a) Where number of persons does not exceed 50 2

(b) Where number of persons exceed 50 but does

not exceed 100 3

(c) For additional persons per 100 or part thereof 3

In particular cases, the Engineer shall have the power to increase the requirement, wherever necessary.

**(vi) Latrines and Urinals:**

Except in workplaces provided with water-flushed latrines connected with a water borne sewage system, all latrines shall be provided with dry-earth system (receptacles) which shall be cleaned at least four times daily and at least twice during working hours and kept in a strictly sanitary condition. Receptacles shall be tarred inside and outside at least once a year.



If women are employed, separate latrines and urinals, screened from those for men and marked in the vernacular in conspicuous letters "For women only", shall be provided. Those for men shall be similarly marked "For men only". A poster showing the figure of a man and a woman shall also be exhibited at the entrance to latrines for each sex. There shall be adequate supply of water, close to latrines and urinals.

**(vii) Construction of Latrines:**

Inside walls shall be constructed of masonry or other non-absorbent material and shall be cement-washed inside and outside at least once a year. The dates of cement washing shall be noted in a register maintained for the purpose and kept available for inspection. Latrines shall have at least a thatched roof.

**(viii) Disposal of Excreta:**

Unless otherwise arranged for by the local sanitary authority, arrangement for proper disposal of excreta by incineration at the workplace shall be made by means of a suitable incinerator approved by the local medical health and municipal or cantonment authorities. Alternatively, excreta may be disposed of by putting a layer of night soils at the bottom of a pucca tank prepared for the purpose and covering it with a 15 cm layer of waste or refuse and then covering it with a layer of earth for a fortnight (when it will turn into manure).

The Contractor shall, at his own expense, carry out all instructions issued to him by the Engineer to effect proper disposal of soil and other conservancy work in respect of Contractor's work-purpose or employees on the site. The Contractor shall be responsible for payment of any charges, which may be levied by municipal or cantonment authority for execution of such work on his behalf.

**(ix) Provisions of shelters during rest:**

At every workplace, there shall be provided, free of cost, four suitable sheds, two for meals and two others for rest, separately for use of men and women labour. The height of each shelter shall not be less than 3 metres from floor level to lowest part of roof. Sheds shall be kept clean and the space provided shall be on the basis of at least 0.5 sq.m. per head.

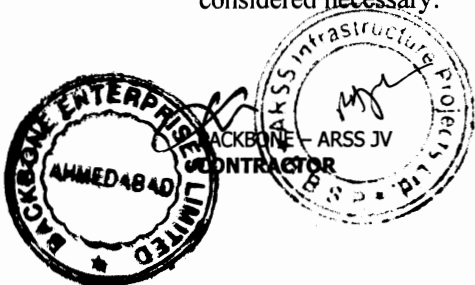
**(x) Crèches:**

At a place where women are ordinarily employed, there shall be provided at least one hut for use of children under the age of 6 years belonging to such women. Huts shall not be constructed to a standard lower than that of thatched roof, mud floor and wall with wooden planks spread over mud floor and covered with matting.

Huts shall be provided with suitable and sufficient openings, for light and ventilation. There shall be adequate provision of sweepers to keep the places clean. There shall be a maidservant in attendance. Sanitary utensils shall be provided to the satisfaction of local medical, health a municipal or cantonment authorities. Use of huts shall be restricted to children, their attendants and mothers of children.

**(xi) Canteen:**

A cooked food canteen on a moderate scale shall be provided for the benefit of workers wherever it is considered necessary.



(xii) Planning, siting and erection of the above mentioned structures shall be approved by the Engineer or his Representative and the whole of such temporary accommodation shall at all times during the progress of the Works be kept tidy and in a clean and sanitary condition to the satisfaction of the Engineer or his Representative and at the Contractor's expense. The Contractor shall conform generally to sanitary requirements of local medical, health and municipal or cantonment authorities and at all times adopt such precautions as may be necessary to prevent soil pollution of the Site.

On completion of the Works, the whole of such temporary structures shall be cleared away, all rubbish burnt, excreta or other disposal pits or trenches filled in and effectively sealed off and the whole of the site left clean and tidy, at the Contractor's expense, to the entire satisfaction of the Engineer.

**(xiii) Anti-malarial precautions:**

The Contractor shall, at his own expense, conform to all anti malarial instructions given to him by the Engineer, including filling up any borrow pits which may have been dug by him.

**(xiv) Awareness and Education of HIV/AIDS**

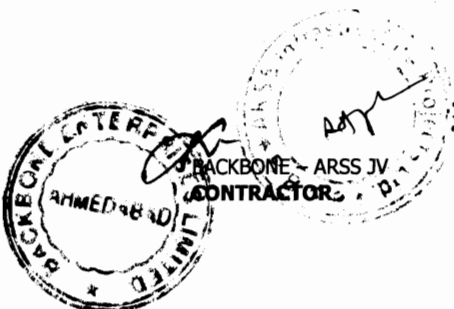
The contractor shall provide/carryout HIV/AIDS awareness and training programme to its labour and management, at least twice per year during the construction period.

**(xv) Child Labour Prohibition**

The contractor shall not employ Child Labour for any works or in any manner under the Contract at any time. In the event that the Contractor uses child labour, the Employer shall terminate the Contract.

**(xvi) Amendments:**

The Employer may, from time to time, add to, or amend these Rules and issue such directions as it may be considered necessary for the proper implementation of these Rules or for the purpose of removing any difficulty, which may arise in the administration thereof




  
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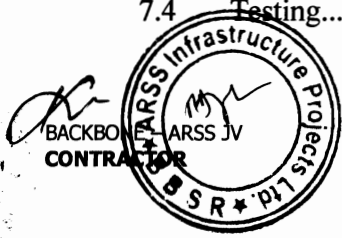
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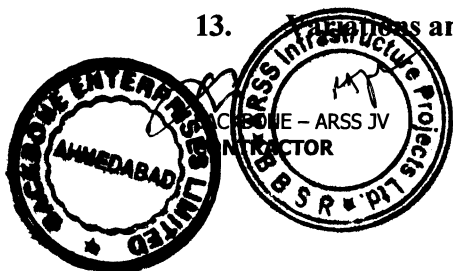
  
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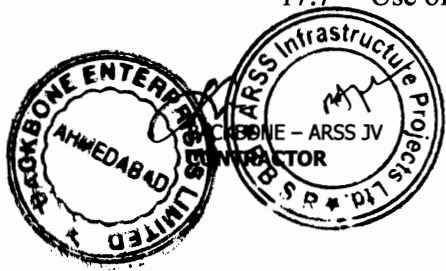
  
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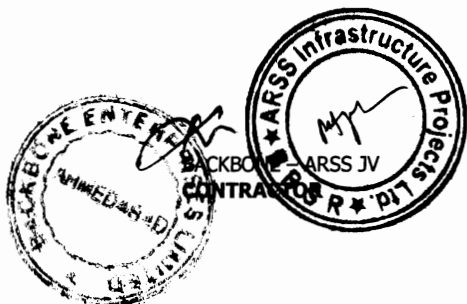
  
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# General Conditions (GC)

Chief Engineer, World Bank Projects, Orissa State Road Project  
on behalf of Works Department, Government of Orissa  
[Name of Employer]

**CIVIL WORKS CONTRACT [ PACKAGE NO. OSRP-CW-ICB-Y1-P03]**

For

**Widening & Strengthening of existing carriageway to 2-lane road from  
Berhampur to Taptapani (Km. 0/0 to 41/0 of SH – 17 )  
under Orissa State Roads Project  
[Name of Contract]**

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# General Conditions

## 1. General Provisions

### 1.1 Definitions

In the Conditions of Contract (“these Conditions”), which include Particular Conditions, Parts A and B, and these General Conditions, the following words and expressions shall have the meanings stated. Words indicating persons or parties include corporations and other legal entities, except where the context requires otherwise.

#### 1.1.1 The Contract

1.1.1.1 “Contract” means the Contract Agreement, the Letter of Acceptance, the Letter of Tender, these Conditions, the Specification, the Drawings, the Schedules, and the further documents (if any) which are listed in the Contract Agreement or in the Letter of Acceptance.

1.1.1.2 “Contract Agreement” means the contract agreement referred to in Sub-Clause 1.6 [Contract Agreement].

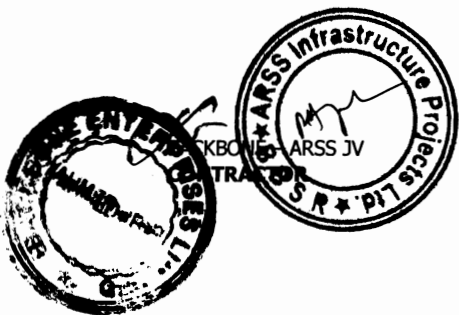
1.1.1.3 “Letter of Acceptance” means the letter of formal acceptance, signed by the Employer, of the Letter of Tender, including any annexed memoranda comprising agreements between and signed by both Parties. If there is no such letter of acceptance, the expression “Letter of Acceptance” means the Contract Agreement and the date of issuing or receiving the Letter of Acceptance means the date of signing the Contract Agreement.

1.1.1.4 “Letter of Tender” means the document entitled letter of tender or letter of bid, which was completed by the Contractor and includes the signed offer to the Employer for the Works.

1.1.1.5 “Specification” means the document entitled specification, as included in the Contract, and any additions and modifications to the specification in accordance with the Contract. Such document specifies the Works.

1.1.1.6 “Drawings” means the drawings of the Works, as included in the Contract, and any additional and modified drawings issued by (or on behalf of) the Employer in accordance with the Contract.

1.1.1.7 “Schedules” means the document(s) entitled schedules, completed by the Contractor and



submitted with the Letter of Tender, as included in the Contract. Such document may include the Bill of Quantities, data, lists, and schedules of rates and/or prices.

1.1.1.8 “Tender” means the Letter of Tender and all other documents which the Contractor submitted with the Letter of Tender, as included in the Contract.

1.1.1.9 “Bill of Quantities”, “Daywork Schedule” and “Schedule of Payment Currencies” mean the documents so named (if any) which are comprised in the Schedules.

1.1.1.10 “Contract Data” means the pages completed by the Employer entitled contract data which constitute Part A of the Particular Conditions.

## 1.1.2 Parties and Persons

1.1.2.1 “Party” means the Employer or the Contractor, as the context requires.

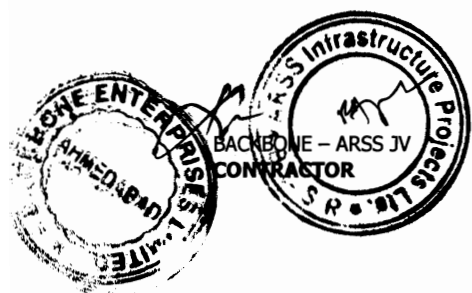
1.1.2.2 “Employer” means the person named as employer in the Contract Data and the legal successors in title to this person.

1.1.2.3 “Contractor” means the person(s) named as contractor in the Letter of Tender accepted by the Employer and the legal successors in title to this person(s).

1.1.2.4 “Engineer” means the person appointed by the Employer to act as the Engineer for the purposes of the Contract and named in the Contract Data, or other person appointed from time to time by the Employer and notified to the Contractor under Sub-Clause 3.4 [Replacement of the Engineer].

1.1.2.5 “Contractor’s Representative” means the person named by the Contractor in the Contract or appointed from time to time by the Contractor under Sub-Clause 4.3 [Contractor’s Representative], who acts on behalf of the Contractor.

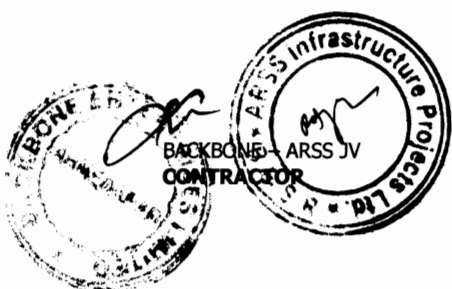
1.1.2.6 “Employer’s Personnel” means the Engineer, the assistants referred to in Sub-Clause 3.2 [Delegation by the Engineer] and all other staff, labour and other employees of the Engineer and of the Employer; and any other personnel notified to the Contractor, by the Employer or the Engineer, as Employer’s Personnel.





- 1.1.2.7 “Contractor’s Personnel” means the Contractor’s Representative and all personnel whom the Contractor utilises on Site, who may include the staff, labour and other employees of the Contractor and of each Subcontractor; and any other personnel assisting the Contractor in the execution of the Works.
- 1.1.2.8 “Subcontractor” means any person named in the Contract as a subcontractor, or any person appointed as a subcontractor, for a part of the Works; and the legal successors in title to each of these persons.
- 1.1.2.9 “DB” means the person or three persons appointed under Sub-Clause 20.2 [Appointment of the Dispute Board] or Sub-Clause 20.3 [Failure to Agree on the Composition of the Dispute Board]
- 1.1.2.10 “FIDIC” means the Fédération Internationale des Ingénieurs-Conseils, the international federation of consulting engineers.
- 1.1.2.11 “Bank” means the financing institution (if any) named in the Contract Data.
- 1.1.2.12 “Borrower” means the person (if any) named as the borrower in the Contract Data.
- 1.1.3.1 “Base Date” means the date 28 days prior to the latest date for submission of the Tender.
- 1.1.3.2 “Commencement Date” means the date notified under Sub-Clause 8.1 [Commencement of Works].
- 1.1.3.3 “Time for Completion” means the time for completing the Works or a Section (as the case may be) under Sub-Clause 8.2 [Time for Completion], as stated in the Contract Data (with any extension under Sub-Clause 8.4 [Extension of Time for Completion]), calculated from the Commencement Date.
- 1.1.3.4 “Tests on Completion” means the tests which are specified in the Contract or agreed by both Parties or instructed as a Variation, and which are carried out under Clause 9 [Tests on Completion] before the Works or a Section (as the case may be) are taken over by the Employer.
- 1.1.3.5 “Taking-Over Certificate” means a certificate issued under Clause 10 [Employer’s Taking Over].

**1.1.3 Dates, Tests, Periods and Completion**



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1.1.3.6 “Tests after Completion” means the tests (if any) which are specified in the Contract and which are carried out in accordance with the Specification after the Works or a Section (as the case may be) are taken over by the Employer.

1.1.3.7 “Defects Notification Period” means the period for notifying defects in the Works or a Section (as the case may be) under Sub-Clause 11.1 [Completion of Outstanding Work and Remedying Defects], which extends over twelve months except if otherwise stated in the Contract Data (with any extension under Sub-Clause 11.3 [Extension of Defects Notification Period]), calculated from the date on which the Works or Section is completed as certified under Sub-Clause 10.1 [Taking Over of the Works and Sections].

1.1.3.8 “Performance Certificate” means the certificate issued under Sub-Clause 11.9 [Performance Certificate].

1.1.3.9 “day” means a calendar day and “year” means 365 days.

#### 1.1.4 Money and Payments

1.1.4.1 “Accepted Contract Amount” means the amount accepted in the Letter of Acceptance for the execution and completion of the Works and the remedying of any defects.

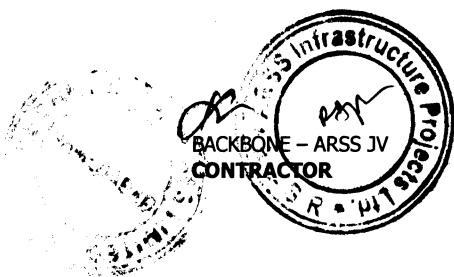
1.1.4.2 “Contract Price” means the price defined in Sub-Clause 14.1 [The Contract Price], and includes adjustments in accordance with the Contract.


1.1.4.3 “Cost” means all expenditure reasonably incurred (or to be incurred) by the Contractor, whether on or off the Site, including overhead and similar charges, but does not include profit.

1.1.4.4 “Final Payment Certificate” means the payment certificate issued under Sub-Clause 14.13 [Issue of Final Payment Certificate].

1.1.4.5 “Final Statement” means the statement defined in Sub-Clause 14.11 [Application for Final Payment Certificate].

1.1.4.6 “Foreign Currency” means a currency in which part (or all) of the Contract Price is payable, but not the Local Currency.

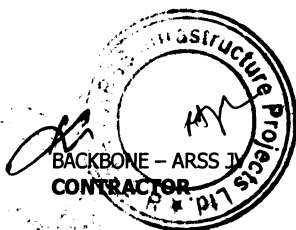


  
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- 1.1.4.7 “Interim Payment Certificate” means a payment certificate issued under Clause 14 [Contract Price and Payment], other than the Final Payment Certificate.
- 1.1.4.8 “Local Currency” means the currency of the Country.
- 1.1.4.9 “Payment Certificate” means a payment certificate issued under Clause 14 [Contract Price and Payment].
- 1.1.4.10 “Provisional Sum” means a sum (if any) which is specified in the Contract as a provisional sum, for the execution of any part of the Works or for the supply of Plant, Materials or services under Sub-Clause 13.5 [Provisional Sums].
- 1.1.4.11 “Retention Money” means the accumulated retention moneys which the Employer retains under Sub-Clause 14.3 [Application for Interim Payment Certificates] and pays under Sub-Clause 14.9 [Payment of Retention Money].
- 1.1.4.12 “Statement” means a statement submitted by the Contractor as part of an application, under Clause 14 [Contract Price and Payment], for a payment certificate.

**1.1.5 Works and Goods**

- 1.1.5.1 “Contractor’s Equipment” means all apparatus, machinery, vehicles and other things required for the execution and completion of the Works and the remedying of any defects. However, Contractor’s Equipment excludes Temporary Works, Employer’s Equipment (if any), Plant, Materials and any other things intended to form or forming part of the Permanent Works.
- 1.1.5.2 “Goods” means Contractor’s Equipment, Materials, Plant and Temporary Works, or any of them as appropriate.
- 1.1.5.3 “Materials” means things of all kinds (other than Plant) intended to form or forming part of the Permanent Works, including the supply-only materials (if any) to be supplied by the Contractor under the Contract.
- 1.1.5.4 “Permanent Works” means the permanent works to be executed by the Contractor under the Contract.
- 1.1.5.5 “Plant” means the apparatus, machinery and other equipment intended to form or forming part of the



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Permanent Works, including vehicles purchased for the Employer and relating to the construction or operation of the Works.

1.1.5.6 “Section” means a part of the Works specified in the Contract Data as a Section (if any).

1.1.5.7 “Temporary Works” means all temporary works of every kind (other than Contractor’s Equipment) required on Site for the execution and completion of the Permanent Works and the remedying of any defects.

1.1.5.8 “Works” mean the Permanent Works and the Temporary Works, or either of them as appropriate.

#### 1.1.6 Other Definitions

1.1.6.1 “Contractor’s Documents” means the calculations, computer programs and other software, drawings, manuals, models and other documents of a technical nature (if any) supplied by the Contractor under the Contract.

1.1.6.2 “Country” means the country in which the Site (or most of it) is located, where the Permanent Works are to be executed.

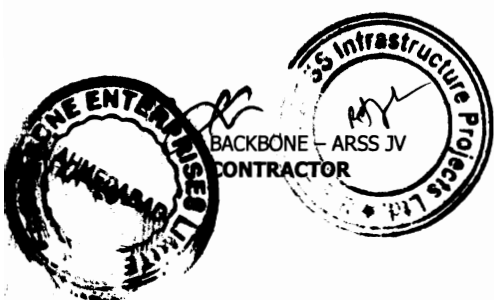
1.1.6.3 “Employer’s Equipment” means the apparatus, machinery and vehicles (if any) made available by the Employer for the use of the Contractor in the execution of the Works, as stated in the Specification; but does not include Plant which has not been taken over by the Employer.

1.1.6.4 “Force Majeure” is defined in Clause 19 [Force Majeure].

1.1.6.5 “Laws” means all national (or state) legislation, statutes, ordinances and other laws, and regulations and by-laws of any legally constituted public authority.

1.1.6.6 “Performance Security” means the security (or securities, if any) under Sub-Clause 4.2 [Performance Security].

1.1.6.7 “Site” means the places where the Permanent Works are to be executed including storage and working areas and to which Plant and Materials are to be delivered, and any other places as may be specified in the Contract as forming part of the Site.



1.1.6.8 "Unforeseeable" means not reasonably foreseeable by an experienced contractor by the Base Date.

1.1.6.9 "Variation" means any change to the Works, which is instructed or approved as a variation under Clause 13 [Variations and Adjustments].

## 1.2 Interpretation

In the Contract, except where the context requires otherwise:

- (a) words indicating one gender include all genders;
- (b) words indicating the singular also include the plural and words indicating the plural also include the singular;
- (c) provisions including the word "agree," "agreed" or "agreement" require the agreement to be record in writing;
- (d) "written" or "in writing" means hand-written, type-written, printed or electronically made, and resulting in a permanent record; and
- (e) the word "tender" is synonymous with "bid", and "tenderer" with "bidder" and the words "tender documents" with "bidding documents"

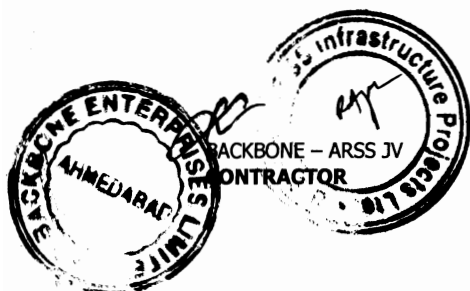
The marginal words and other headings shall not be taken into consideration in the interpretation of these Conditions.


In these Conditions, provisions including the expression "Cost plus profit" require this profit to be one-twentieth (5%) of this Cost unless otherwise indicated in the Contract Data.

## 1.3 Communications

Wherever these Conditions provide for the giving or issuing of approvals, certificates, consents, determinations, notices, requests and discharges, these communications shall be:

- (a) in writing and delivered by hand (against receipt), sent by mail or courier, or transmitted using any of the agreed systems of electronic transmission as stated in the Contract Data; and
- (b) delivered, sent or transmitted to the address for the recipient's communications as stated in the Contract Data. However:
  - (i) if the recipient gives notice of another address, communications shall thereafter be delivered accordingly; and



  
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- (ii) if the recipient has not stated otherwise when requesting an approval or consent, it may be sent to the address from which the request was issued.

Approvals, certificates, consents and determinations shall not be unreasonably withheld or delayed. When a certificate is issued to a Party, the certifier shall send a copy to the other Party. When a notice is issued to a Party, by the other Party or the Engineer, a copy shall be sent to the Engineer or the other Party, as the case may be.

**1.4 Law and Language** The Contract shall be governed by the law of the country or other jurisdiction stated in the Contract Data.

The ruling language of the Contract shall be that stated in the Contract Data.

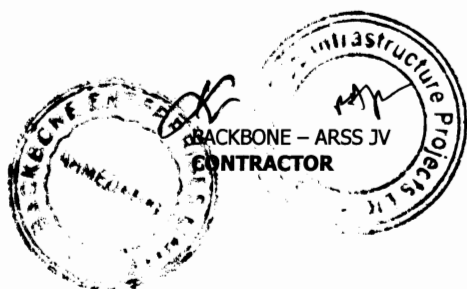
The language for communications shall be that stated in the Contract Data. If no language is stated there, the language for communications shall be the ruling language of the Contract.

**1.5 Priority of Documents**

The documents forming the Contract are to be taken as mutually explanatory of one another. For the purposes of interpretation, the priority of the documents shall be in accordance with the following sequence:

- (a) the Contract Agreement (if any),
- (b) the Letter of Acceptance,
- (c) the Tender,
- (d) the Particular Conditions – Part A,
- (e) the Particular Conditions – Part B
- (f) these General Conditions
- (g) the Specification,
- (h) the Drawings, and
- (i) the Schedules and any other documents forming part of the Contract.

If an ambiguity or discrepancy is found in the documents, the Engineer shall issue any necessary clarification or instruction.



  
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**1.6 Contract Agreement**

The Parties shall enter into a Contract Agreement within 28 days after the Contractor receives the Letter of Acceptance, unless the Particular Conditions establish otherwise. The Contract Agreement shall be based upon the form annexed to the Particular Conditions. The costs of stamp duties and similar charges (if any) imposed by law in connection with entry into the Contract Agreement shall be borne by the Employer.

**1.7 Assignment**

Neither Party shall assign the whole or any part of the Contract or any benefit or interest in or under the Contract. However, either Party:

- (a) may assign the whole or any part with the prior agreement of the other Party, at the sole discretion of such other Party, and
- (b) may, as security in favour of a bank or financial institution, assign its right to any moneys due, or to become due, under the Contract.

**1.8 Care and Supply of Documents**

The Specification and Drawings shall be in the custody and care of the Employer. Unless otherwise stated in the Contract, two copies of the Contract and of each subsequent Drawing shall be supplied to the Contractor, who may make or request further copies at the cost of the Contractor.

Each of the Contractor's Documents shall be in the custody and care of the Contractor, unless and until taken over by the Employer. Unless otherwise stated in the Contract, the Contractor shall supply to the Engineer six copies of each of the Contractor's Documents.

The Contractor shall keep, on the Site, a copy of the Contract, publications named in the Specification, the Contractor's Documents (if any), the Drawings and Variations and other communications given under the Contract. The Employer's Personnel shall have the right of access to all these documents at all reasonable times.

If a Party becomes aware of an error or defect in a document which was prepared for use in executing the Works, the Party shall promptly give notice to the other Party of such error or defect.



**1.9 Delayed Drawings or Instructions**

The Contractor shall give notice to the Engineer whenever the Works are likely to be delayed or disrupted if any necessary drawing or instruction is not issued to the Contractor within a particular time, which shall be reasonable. The notice shall include details of the necessary drawing or instruction, details of why and by when it should be issued, and the nature and amount of the delay or disruption likely to be suffered if it is late.

If the Contractor suffers delay and/or incurs Cost as a result of a failure of the Engineer to issue the notified drawing or instruction within a time which is reasonable and is specified in the notice with supporting details, the Contractor shall give a further notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
- (b) payment of any such Cost plus profit, which shall be included in the Contract Price.

After receiving this further notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

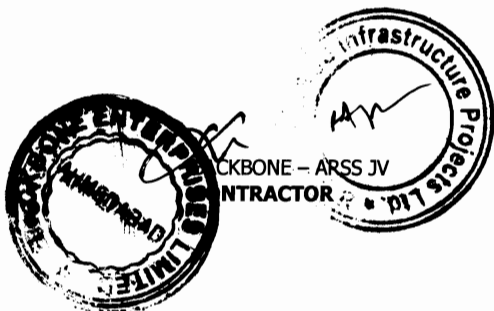
However, if and to the extent that the Engineer's failure was caused by any error or delay by the Contractor, including an error in, or delay in the submission of, any of the Contractor's Documents, the Contractor shall not be entitled to such extension of time, Cost or profit

**1.10 Employer's Use of Contractor's Documents**

As between the Parties, the Contractor shall retain the copyright and other intellectual property rights in the Contractor's Documents and other design documents made by (or on behalf of) the Contractor.

The Contractor shall be deemed (by signing the Contract) to give to the Employer a non-terminable transferable non-exclusive royalty-free licence to copy, use and communicate the Contractor's Documents, including making and using modifications of them. This licence shall:

- (a) apply throughout the actual or intended working life (whichever is longer) of the relevant parts of the Works,
- (b) entitle any person in proper possession of the relevant



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part of the Works to copy, use and communicate the Contractor's Documents for the purposes of completing, operating, maintaining, altering, adjusting, repairing and demolishing the Works, and

- (c) in the case of Contractor's Documents which are in the form of computer programs and other software, permit their use on any computer on the Site and other places as envisaged by the Contract, including replacements of any computers supplied by the Contractor.

The Contractor's Documents and other design documents made by (or on behalf of) the Contractor shall not, without the Contractor's consent, be used, copied or communicated to a third party by (or on behalf of) the Employer for purposes other than those permitted under this Sub-Clause.

### 1.11 Contractor's Use of Employer's Documents

As between the Parties, the Employer shall retain the copyright and other intellectual property rights in the Specification, the Drawings and other documents made by (or on behalf of) the Employer. The Contractor may, at his cost, copy, use, and obtain communication of these documents for the purposes of the Contract. They shall not, without the Employer's consent, be copied, used or communicated to a third party by the Contractor, except as necessary for the purposes of the Contract.

### 1.12 Confidential Details

The Contractor's and the Employer's Personnel shall disclose all such confidential and other information as may be reasonably required in order to verify the Contractor's compliance with the Contract and allow its proper implementation.

Each of them shall treat the details of the Contract as private and confidential, except to the extent necessary to carry out their respective obligations under the Contract or to comply with applicable Laws. Each of them shall not publish or disclose any particulars of the Works prepared by the other Party without the previous agreement of the other Party. However, the Contractor shall be permitted to disclose any publicly available information, or information otherwise required to establish his qualifications to compete for other projects.



**1.13 Compliance with Laws**

The Contractor shall, in performing the Contract, comply with applicable Laws. Unless otherwise stated in the Particular Conditions:

- (a) the Employer shall have obtained (or shall obtain) the planning, zoning, building permit or similar permission for the Permanent Works, and any other permissions described in the Specification as having been (or to be) obtained by the Employer; and the Employer shall indemnify and hold the Contractor harmless against and from the consequences of any failure to do so; and
- (b) the Contractor shall give all notices, pay all taxes, duties and fees, and obtain all permits, licences and approvals, as required by the Laws in relation to the execution and completion of the Works and the remedying of any defects; and the Contractor shall indemnify and hold the Employer harmless against and from the consequences of any failure to do so, unless the Contractor is impeded to accomplish these actions and shows evidence of its diligence.

**1.14 Joint and Several Liability**


If the Contractor constitutes (under applicable Laws) a joint venture or other unincorporated grouping of two or more persons:

- (a) these persons shall be deemed to be jointly and severally liable to the Employer for the performance of the Contract;
- (b) these persons shall notify the Employer of their leader who shall have authority to bind the Contractor and each of these persons; and
- (c) the Contractor shall not alter its composition or legal status without the prior consent of the Employer.

**1.15 Inspections and Audit 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 Sub-Clause 15.6 [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 1.15 constitute a prohibited practice subject to contract termination (as well as to a determination of ineligibility under the Procurement Guidelines).



  
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## 2. The Employer

### 2.1 Right of Access to the Site

The Employer shall give the Contractor right of access to, and possession of, all parts of the Site within the time (or times) stated in the Contract Data. The right and possession may not be exclusive to the Contractor. If, under the Contract, the Employer is required to give (to the Contractor) possession of any foundation, structure, plant or means of access, the Employer shall do so in the time and manner stated in the Specification. However, the Employer may withhold any such right or possession until the Performance Security has been received.

If no such time is stated in the Contract Data, the Employer shall give the Contractor right of access to, and possession of, the Site within such times as required to enable the Contractor to proceed without disruption in accordance with the programme submitted under Sub-Clause 8.3 [Programme].

If the Contractor suffers delay and/or incurs Cost as a result of a failure by the Employer to give any such right or possession within such time, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
- (b) payment of any such Cost plus profit, which shall be included in the Contract Price.

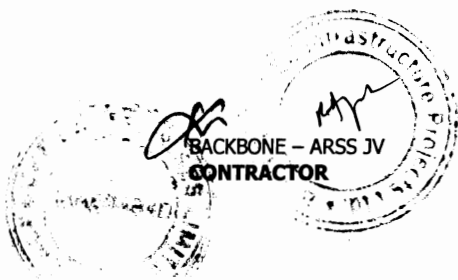
After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

However, if and to the extent that the Employer's failure was caused by any error or delay by the Contractor, including an error in, or delay in the submission of, any of the Contractor's Documents, the Contractor shall not be entitled to such extension of time, Cost or profit.

### 2.2 Permits, Licences or Approvals

The Employer shall provide, at the request of the Contractor, such reasonable assistance as to allow the Contractor to obtain properly:

- (a) copies of the Laws of the Country which are relevant to the Contract but are not readily available, and



- (b) any permits, licences or approvals required by the Laws of the Country:
  - (i) which the Contractor is required to obtain under Sub-Clause 1.13 [Compliance with Laws],
  - (ii) for the delivery of Goods, including clearance through customs, and
  - (iii) for the export of Contractor's Equipment when it is removed from the Site.

**2.3 Employer's Personnel**

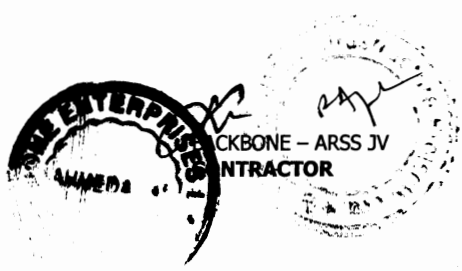
The Employer shall be responsible for ensuring that the Employer's Personnel and the Employer's other contractors on the Site:


- (a) co-operate with the Contractor's efforts under Sub-Clause 4.6 [Co-operation], and
- (b) take actions similar to those which the Contractor is required to take under sub-paragraphs (a), (b) and (c) of Sub-Clause 4.8 [Safety Procedures] and under Sub-Clause 4.18 [Protection of the Environment].

**2.4 Employer's Financial Arrangements**

The Employer shall submit, before the Commencement Date and thereafter within 28 days after receiving any request from the Contractor, reasonable evidence that financial arrangements have been made and are being maintained which will enable the Employer to pay the Contract Price punctually (as estimated at that time) in accordance with Clause 14 [Contract Price and Payment]. Before the Employer makes any material change to his financial arrangements, the Employer shall give notice to the Contractor with detailed particulars.

In addition, if the Bank has notified to the Borrower that the Bank has suspended disbursements under its loan, which finances in whole or in part the execution of the Works, the Employer shall give notice of such suspension to the Contractor with detailed particulars, including the date of such notification, with a copy to the Engineer, within 7 days of the Borrower having received the suspension notification from the Bank. If alternative funds will be available in appropriate currencies to the Employer to continue making payments to the Contractor beyond a date 60 days after the date of Bank notification of the suspension, the Employer shall provide reasonable evidence in such notice of the extent to which such funds will be available.



  
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**2.5 Employer's Claims** If the Employer considers himself to be entitled to any payment under any Clause of these Conditions or otherwise in connection with the Contract, and/or to any extension of the Defects Notification Period, the Employer or the Engineer shall give notice and particulars to the Contractor. However, notice is not required for payments due under Sub-Clause 4.19 [Electricity, Water and Gas], under Sub-Clause 4.20 [Employer's Equipment and Free-Issue Material], or for other services requested by the Contractor.

The notice shall be given as soon as practicable and no longer than 28 days after the Employer became aware, or should have become aware, of the event or circumstances giving rise to the claim. A notice relating to any extension of the Defects Notification Period shall be given before the expiry of such period.

The particulars shall specify the Clause or other basis of the claim, and shall include substantiation of the amount and/or extension to which the Employer considers himself to be entitled in connection with the Contract. The Engineer shall then proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine (i) the amount (if any) which the Employer is entitled to be paid by the Contractor, and/or (ii) the extension (if any) of the Defects Notification Period in accordance with Sub-Clause 11.3 [Extension of Defects Notification Period].

This amount may be included as a deduction in the Contract Price and Payment Certificates. The Employer shall only be entitled to set off against or make any deduction from an amount certified in a Payment Certificate, or to otherwise claim against the Contractor, in accordance with this Sub-Clause.

### 3. The Engineer

**3.1 Engineer's Duties and Authority** The Employer shall appoint the Engineer who shall carry out the duties assigned to him in the Contract. The Engineer's staff shall include suitably qualified engineers and other professionals who are competent to carry out these duties.

The Engineer shall have no authority to amend the Contract.

The Engineer may exercise the authority attributable to the Engineer as specified in or necessarily to be implied from the Contract. If the Engineer is required to obtain the approval of the Employer before exercising a specified authority, the requirements shall be as stated in the Particular Conditions. The



  
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Employer shall promptly inform the Contractor of any change to the authority attributed to the Engineer.

However, whenever the Engineer exercises a specified authority for which the Employer's approval is required, then (for the purposes of the Contract) the Employer shall be deemed to have given approval.

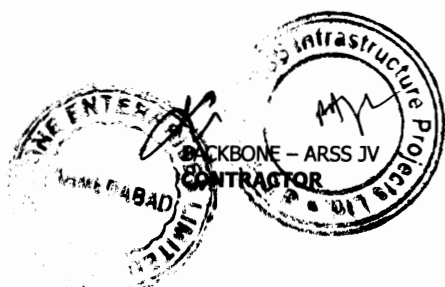
Except as otherwise stated in these Conditions:


- (a) whenever carrying out duties or exercising authority, specified in or implied by the Contract, the Engineer shall be deemed to act for the Employer;
- (b) the Engineer has no authority to relieve either Party of any duties, obligations or responsibilities under the Contract; and
- (c) any approval, check, certificate, consent, examination, inspection, instruction, notice, proposal, request, test, or similar act by the Engineer (including absence of disapproval) shall not relieve the Contractor from any responsibility he has under the Contract, including responsibility for errors, omissions, discrepancies and non-compliances.
- (d) Any act by the Engineer in response to a Contractor's request except otherwise expressly specified shall be notified in writing to the Contractor within 28 days of receipt.

The following provisions shall apply:

The Engineer shall obtain the specific approval of the Employer before taking action under the following Sub-Clauses of these Conditions:

- (a) Sub-Clause 4.12 [Unforeseeable Physical Conditions]: Agreeing or determining an extension of time and/or additional cost.
- (b) Sub-Clause 13.1 [Right to Vary]: Instructing a Variation, except;
  - (i) in an emergency situation as determined by the Engineer, or
  - (ii) if such a Variation would increase the Accepted Contract Amount by less than the percentage



  
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specified in the Contract Data.

- (c) Sub-Clause 13.3 [Variation Procedure]: Approving a proposal for Variation submitted by the Contractor in accordance with Sub Clause 13.1 [Right to Vary] or 13.2 [Value Engineering].
- (d) Sub-Clause 13.4 [Payment in Applicable Currencies]: Specifying the amount payable in each of the applicable currencies

Notwithstanding the obligation, as set out above, to obtain approval, if, in the opinion of the Engineer, an emergency occurs affecting the safety of life or of the Works or of adjoining property, he may, without relieving the Contractor of any of his duties and responsibility under the Contract, instruct the Contractor to execute all such work or to do all such things as may, in the opinion of the Engineer, be necessary to abate or reduce the risk. The Contractor shall forthwith comply, despite the absence of approval of the Employer, with any such instruction of the Engineer. The Engineer shall determine an addition to the Contract Price, in respect of such instruction, in accordance with Clause 13 [Variations and Adjustments] and shall notify the Contractor accordingly, with a copy to the Employer.

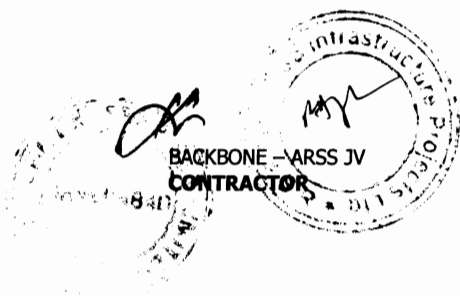
### 3.2 Delegation by the Engineer


The Engineer may from time to time assign duties and delegate authority to assistants, and may also revoke such assignment or delegation. These assistants may include a resident engineer, and/or independent inspectors appointed to inspect and/or test items of Plant and/or Materials. The assignment, delegation or revocation shall be in writing and shall not take effect until copies have been received by both Parties.

However, unless otherwise agreed by both Parties, the Engineer shall not delegate the authority to determine any matter in accordance with Sub-Clause 3.5 [Determinations].

Assistants shall be suitably qualified persons, who are competent to carry out these duties and exercise this authority, and who are fluent in the language for communications defined in Sub-Clause 1.4 [Law and Language].

Each assistant, to whom duties have been assigned or authority has been delegated, shall only be authorised to issue instructions to the Contractor to the extent defined by the delegation. Any approval, check, certificate, consent, examination, inspection, instruction, notice, proposal, request, test, or similar act by an



  
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assistant, in accordance with the delegation, shall have the same effect as though the act had been an act of the Engineer. However:

- (a) any failure to disapprove any work, Plant or Materials shall not constitute approval, and shall therefore not prejudice the right of the Engineer to reject the work, Plant or Materials;
- (b) if the Contractor questions any determination or instruction of an assistant, the Contractor may refer the matter to the Engineer, who shall promptly confirm, reverse or vary the determination or instruction.

### 3.3 Instructions of the Engineer

The Engineer may issue to the Contractor (at any time) instructions and additional or modified Drawings which may be necessary for the execution of the Works and the remedying of any defects, all in accordance with the Contract. The Contractor shall only take instructions from the Engineer, or from an assistant to whom the appropriate authority has been delegated under this Clause. If an instruction constitutes a Variation, Clause 13 [Variations and Adjustments] shall apply.

The Contractor shall comply with the instructions given by the Engineer or delegated assistant, on any matter related to the Contract. Whenever practicable, their instructions shall be given in writing. If the Engineer or a delegated assistant:

- (a) gives an oral instruction,
- (b) receives a written confirmation of the instruction, from (or on behalf of) the Contractor, within two working days after giving the instruction, and
- (c) does not reply by issuing a written rejection and/or instruction within two working days after receiving the confirmation,

then the confirmation shall constitute the written instruction of the Engineer or delegated assistant (as the case may be).

### 3.4 Replacement of the Engineer

If the Employer intends to replace the Engineer, the Employer shall, not less than 21 days before the intended date of replacement, give notice to the Contractor of the name, address and relevant experience of the intended replacement Engineer. If the Contractor considers the intended replacement Engineer to be unsuitable, he has the right to raise objection against him by notice to the Employer, with supporting particulars, and the Employer shall give full and fair consideration to this objection.





**3.5 Determinations**

Whenever these Conditions provide that the Engineer shall proceed in accordance with this Sub-Clause 3.5 to agree or determine any matter, the Engineer shall consult with each Party in an endeavour to reach agreement. If agreement is not achieved, the Engineer shall make a fair determination in accordance with the Contract, taking due regard of all relevant circumstances.

The Engineer shall give notice to both Parties of each agreement or determination, with supporting particulars within 28 days from the receipt of the corresponding claim or request except when otherwise specified. Each Party shall give effect to each agreement or determination unless and until revised under Clause 20 [Claims, Disputes and Arbitration].

**4. The Contractor**

**4.1 Contractor's General Obligations**

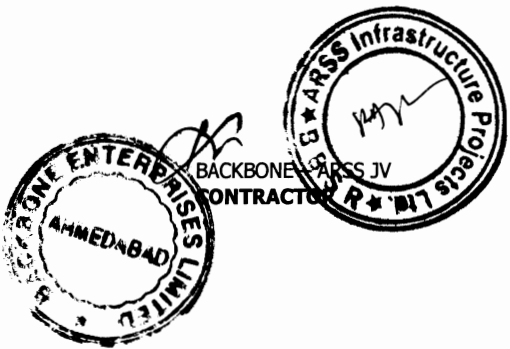
The Contractor shall design (to the extent specified in the Contract), execute and complete the Works in accordance with the Contract and with the Engineer's instructions, and shall remedy any defects in the Works.

The Contractor shall provide the Plant and Contractor's Documents specified in the Contract, and all Contractor's Personnel, Goods, consumables and other things and services, whether of a temporary or permanent nature, required in and for this design, execution, completion and remedying of defects.

All equipment, material, and services to be incorporated in or required for the Works shall have their origin in any eligible source country as defined by the Bank.

The Contractor shall be responsible for the adequacy, stability and safety of all Site operations and of all methods of construction. Except to the extent specified in the Contract, the Contractor (i) shall be responsible for all Contractor's Documents, Temporary Works, and such design of each item of Plant and Materials as is required for the item to be in accordance with the Contract, and (ii) shall not otherwise be responsible for the design or specification of the Permanent Works.

The Contractor shall, whenever required by the Engineer, submit details of the arrangements and methods which the Contractor proposes to adopt for the execution of the Works. No significant alteration to these arrangements and methods shall be made without this having previously been notified to the Engineer.



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If the Contract specifies that the Contractor shall design any part of the Permanent Works, then unless otherwise stated in the Particular Conditions:

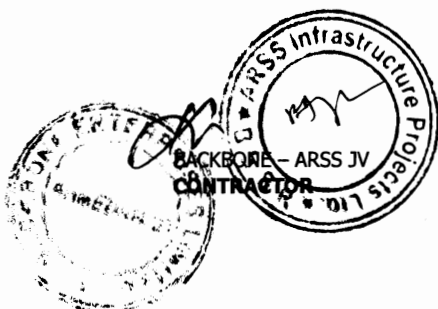
- (a) the Contractor shall submit to the Engineer the Contractor's Documents for this part in accordance with the procedures specified in the Contract;
- (b) these Contractor's Documents shall be in accordance with the Specification and Drawings, shall be written in the language for communications defined in Sub-Clause 1.4 [Law and Language], and shall include additional information required by the Engineer to add to the Drawings for co-ordination of each Party's designs;
- (c) the Contractor shall be responsible for this part and it shall, when the Works are completed, be fit for such purposes for which the part is intended as are specified in the Contract; and
- (d) prior to the commencement of the Tests on Completion, the Contractor shall submit to the Engineer the "as-built" documents and, if applicable, operation and maintenance manuals in accordance with the Specification and in sufficient detail for the Employer to operate, maintain, dismantle, reassemble, adjust and repair this part of the Works. Such part shall not be considered to be completed for the purposes of taking-over under Sub-Clause 10.1 [Taking Over of the Works and Sections] until these documents and manuals have been submitted to the Engineer.

#### 4.2 Performance Security

The Contractor shall obtain (at his cost) a Performance Security for proper performance, in the amount and currencies stated in the Contract Data. If an amount is not stated in the Contract Data, this Sub-Clause shall not apply.

The Contractor shall deliver the Performance Security to the Employer within 28 days after receiving the Letter of Acceptance, and shall send a copy to the Engineer. The Performance Security shall be issued by an entity and from within a country (or other jurisdiction) approved by the Employer, and shall be in the form annexed to the Particular Conditions or in another form approved by the Employer.

The Contractor shall ensure that the Performance Security is valid and enforceable until the Contractor has executed and completed the Works and remedied any defects. If the terms of the Performance Security specify its expiry date, and the



  
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Contractor has not become entitled to receive the Performance Certificate by the date 28 days prior to the expiry date, the Contractor shall extend the validity of the Performance Security until the Works have been completed and any defects have been remedied.

The Employer shall not make a claim under the Performance Security, except for amounts to which the Employer is entitled under the Contract.

The Employer shall indemnify and hold the Contractor harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from a claim under the Performance Security to the extent to which the Employer was not entitled to make the claim.

The Employer shall return the Performance Security to the Contractor within 21 days after receiving a copy of the Performance Certificate.

Without limitation to the provisions of the rest of this Sub-Clause, whenever the Engineer determines an addition or a reduction to the Contract Price as a result of a change in cost and/or legislation or as a result of a Variation amounting to more than 25 percent of the portion of the Contract Price payable in a specific currency, the Contractor shall at the Engineer's request promptly increase, or may decrease, as the case may be, the value of the Performance Security in that currency by an equal percentage.

#### 4.3 Contractor's Representative

The Contractor shall appoint the Contractor's Representative and shall give him all authority necessary to act on the Contractor's behalf under the Contract.

Unless the Contractor's Representative is named in the Contract, the Contractor shall, prior to the Commencement Date, submit to the Engineer for consent the name and particulars of the person the Contractor proposes to appoint as Contractor's Representative. If consent is withheld or subsequently revoked in terms of Sub-Clause 6.9 [Contractor's Personnel], or if the appointed person fails to act as Contractor's Representative, the Contractor shall similarly submit the name and particulars of another suitable person for such appointment.

The Contractor shall not, without the prior consent of the Engineer, revoke the appointment of the Contractor's Representative or appoint a replacement.



The whole time of the Contractor's Representative shall be given to directing the Contractor's performance of the Contract. If the Contractor's Representative is to be temporarily absent from the Site during the execution of the Works, a suitable replacement person shall be appointed, subject to the Engineer's prior consent, and the Engineer shall be notified accordingly.

The Contractor's Representative shall, on behalf of the Contractor, receive instructions under Sub-Clause 3.3 [Instructions of the Engineer].

The Contractor's Representative may delegate any powers, functions and authority to any competent person, and may at any time revoke the delegation. Any delegation or revocation shall not take effect until the Engineer has received prior notice signed by the Contractor's Representative, naming the person and specifying the powers, functions and authority being delegated or revoked.

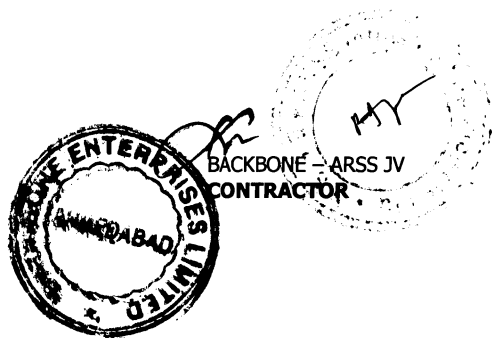
The Contractor's Representative shall be fluent in the language for communications defined in Sub-Clause 1.4 [Law and Language]. If the Contractor's Representative's delegates are not fluent in the said language, the Contractor shall make competent interpreters available during all working hours in a number deemed sufficient by the Engineer.

#### 4.4 Subcontractors

The Contractor shall not subcontract the whole of the Works.

The Contractor shall be responsible for the acts or defaults of any Subcontractor, his agents or employees, as if they were the acts or defaults of the Contractor. Unless otherwise stated in the Particular Conditions:

- (a) the Contractor shall not be required to obtain consent to suppliers solely of Materials, or to a subcontract for which the Subcontractor is named in the Contract;
- (b) the prior consent of the Engineer shall be obtained to other proposed Subcontractors;
- (c) the Contractor shall give the Engineer not less than 28 days' notice of the intended date of the commencement of each Subcontractor's work, and of the commencement of such work on the Site; and
- (d) each subcontract shall include provisions which would entitle the Employer to require the subcontract to be assigned to the Employer under Sub-Clause 4.5 [Assignment of Benefit of Subcontract] (if or when applicable) or in the event of termination under Sub-



Clause 15.2 [Termination by Employer].

The Contractor shall ensure that the requirements imposed on the Contractor by Sub-Clause 1.12 [Confidential Details] apply equally to each Subcontractor.

Where practicable, the Contractor shall give fair and reasonable opportunity for contractors from the Country to be appointed as Subcontractors.

**4.5 Assignment of Benefit of Subcontract**

If a Subcontractor's obligations extend beyond the expiry date of the relevant Defects Notification Period and the Engineer, prior to this date, instructs the Contractor to assign the benefit of such obligations to the Employer, then the Contractor shall do so. Unless otherwise stated in the assignment, the Contractor shall have no liability to the Employer for the work carried out by the Subcontractor after the assignment takes effect.

**4.6 Co-operation**

The Contractor shall, as specified in the Contract or as instructed by the Engineer, allow appropriate opportunities for carrying out work to:

- (a) the Employer's Personnel,
- (b) any other contractors employed by the Employer, and
- (c) the personnel of any legally constituted public authorities,

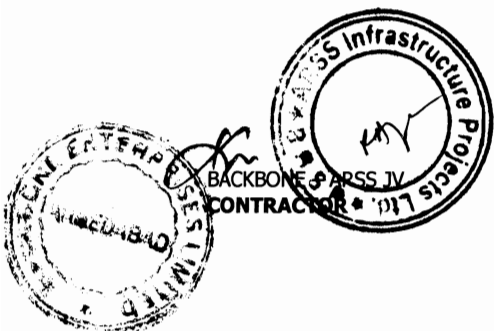
who may be employed in the execution on or near the Site of any work not included in the Contract.

Any such instruction shall constitute a Variation if and to the extent that it causes the Contractor to suffer delays and/or to incur Unforeseeable Cost. Services for these personnel and other contractors may include the use of Contractor's Equipment, Temporary Works or access arrangements which are the responsibility of the Contractor.

If, under the Contract, the Employer is required to give to the Contractor possession of any foundation, structure, plant or means of access in accordance with Contractor's Documents, the Contractor shall submit such documents to the Engineer in the time and manner stated in the Specification.

**4.7 Setting Out**

The Contractor shall set out the Works in relation to original points, lines and levels of reference specified in the Contract or notified by the Engineer. The Contractor shall be responsible for the correct positioning of all parts of the Works, and shall rectify any error in the positions, levels, dimensions or



alignment of the Works.

The Employer shall be responsible for any errors in these specified or notified items of reference, but the Contractor shall use reasonable efforts to verify their accuracy before they are used.

If the Contractor suffers delay and/or incurs Cost from executing work which was necessitated by an error in these items of reference, and an experienced contractor could not reasonably have discovered such error and avoided this delay and/or Cost, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
- (b) payment of any such Cost plus profit, which shall be included in the Contract Price.


After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine (i) whether and (if so) to what extent the error could not reasonably have been discovered, and (ii) the matters described in sub-paragraphs (a) and (b) above related to this extent.

**4.8 Safety Procedures** The Contractor shall:

- (a) comply with all applicable safety regulations,
- (b) take care for the safety of all persons entitled to be on the Site,
- (c) use reasonable efforts to keep the Site and Works clear of unnecessary obstruction so as to avoid danger to these persons,
- (d) provide fencing, lighting, guarding and watching of the Works until completion and taking over under Clause 10 [Employer's Taking Over], and
- (e) provide any Temporary Works (including roadways, footways, guards and fences) which may be necessary, because of the execution of the Works, for the use and protection of the public and of owners and occupiers of adjacent land.

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#### 4.9 Quality Assurance

The Contractor shall institute a quality assurance system to demonstrate compliance with the requirements of the Contract. The system shall be in accordance with the details stated in the Contract. The Engineer shall be entitled to audit any aspect of the system.

Details of all procedures and compliance documents shall be submitted to the Engineer for information before each design and execution stage is commenced. When any document of a technical nature is issued to the Engineer, evidence of the prior approval by the Contractor himself shall be apparent on the document itself.

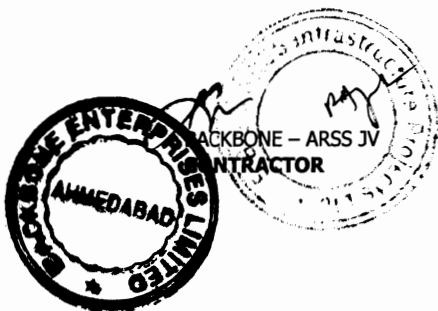
Compliance with the quality assurance system shall not relieve the Contractor of any of his duties, obligations or responsibilities under the Contract.


#### 4.10 Site Data

The Employer shall have made available to the Contractor for his information, prior to the Base Date, all relevant data in the Employer's possession on sub-surface and hydrological conditions at the Site, including environmental aspects. The Employer shall similarly make available to the Contractor all such data which come into the Employer's possession after the Base Date. The Contractor shall be responsible for interpreting all such data.

To the extent which was practicable (taking account of cost and time), the Contractor shall be deemed to have obtained all necessary information as to risks, contingencies and other circumstances which may influence or affect the Tender or Works. To the same extent, the Contractor shall be deemed to have inspected and examined the Site, its surroundings, the above data and other available information, and to have been satisfied before submitting the Tender as to all relevant matters, including (without limitation):

- (a) the form and nature of the Site, including sub-surface conditions,
- (b) the hydrological and climatic conditions,
- (c) the extent and nature of the work and Goods necessary for the execution and completion of the Works and the remedying of any defects,
- (d) the Laws, procedures and labour practices of the Country, and
- (e) the Contractor's requirements for access, accommodation,



  
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facilities, personnel, power, transport, water and other services.

**4.11 Sufficiency of the Accepted Contract Amount**

The Contractor shall be deemed to:

- (a) have satisfied himself as to the correctness and sufficiency of the Accepted Contract Amount, and
- (b) have based the Accepted Contract Amount on the data, interpretations, necessary information, inspections, examinations and satisfaction as to all relevant matters referred to in Sub-Clause 4.10 [Site Data].

Unless otherwise stated in the Contract, the Accepted Contract Amount covers all the Contractor's obligations under the Contract (including those under Provisional Sums, if any) and all things necessary for the proper execution and completion of the Works and the remedying of any defects.

**4.12 Unforeseeable Physical Conditions**

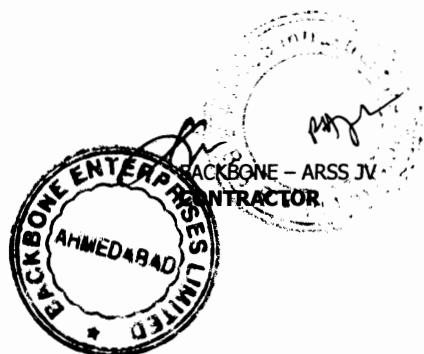
In this Sub-Clause, "physical conditions" means natural physical conditions and man-made and other physical obstructions and pollutants, which the Contractor encounters at the Site when executing the Works, including sub-surface and hydrological conditions but excluding climatic conditions.

If the Contractor encounters adverse physical conditions which he considers to have been Unforeseeable, the Contractor shall give notice to the Engineer as soon as practicable.

This notice shall describe the physical conditions, so that they can be inspected by the Engineer, and shall set out the reasons why the Contractor considers them to be Unforeseeable. The Contractor shall continue executing the Works, using such proper and reasonable measures as are appropriate for the physical conditions, and shall comply with any instructions which the Engineer may give. If an instruction constitutes a Variation, Clause 13 [Variations and Adjustments] shall apply.

If and to the extent that the Contractor encounters physical conditions which are Unforeseeable, gives such a notice, and suffers delay and/or incurs Cost due to these conditions, the Contractor shall be entitled subject to notice under Sub-Clause 20.1 [Contractor's Claims] to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
- (b) payment of any such Cost, which shall be included in the





### Contract Price.

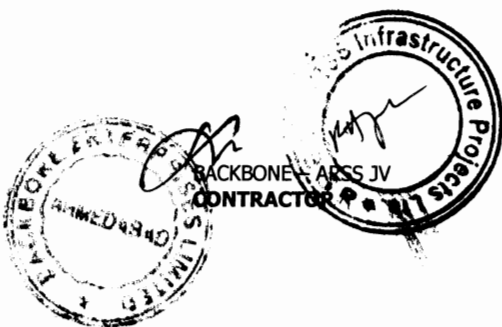
Upon receiving such notice and inspecting and/or investigating these physical conditions, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine (i) whether and (if so) to what extent these physical conditions were Unforeseeable, and (ii) the matters described in sub-paragraphs (a) and (b) above related to this extent.


However, before additional Cost is finally agreed or determined under sub-paragraph (ii), the Engineer may also review whether other physical conditions in similar parts of the Works (if any) were more favourable than could reasonably have been foreseen when the Contractor submitted the Tender. If and to the extent that these more favourable conditions were encountered, the Engineer may proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine the reductions in Cost which were due to these conditions, which may be included (as deductions) in the Contract Price and Payment Certificates. However, the net effect of all adjustments under sub-paragraph (b) and all these reductions, for all the physical conditions encountered in similar parts of the Works, shall not result in a net reduction in the Contract Price.

The Engineer shall take account of any evidence of the physical conditions foreseen by the Contractor when submitting the Tender, which shall be made available by the Contractor, but shall not be bound by the Contractor's interpretation of any such evidence.

#### 4.13 Rights of Way and Facilities

Unless otherwise specified in the Contract the Employer shall provide access to and possession of the Site including special and/or temporary rights-of-way which are necessary for the Works. The Contractor shall obtain, at his risk and cost, any additional rights of way or facilities outside the Site which he may require for the purposes of the Works.



  
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World Bank Projects  
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#### 4.14 Avoidance of Interference

The Contractor shall not interfere unnecessarily or improperly with:

- (a) the convenience of the public, or
- (b) the access to and use and occupation of all roads and footpaths, irrespective of whether they are public or in the possession of the Employer or of others.

The Contractor shall indemnify and hold the Employer harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from any such unnecessary or improper interference.

#### 4.15 Access Route


The Contractor shall be deemed to have been satisfied as to the suitability and availability of access routes to the Site at Base Date. The Contractor shall use reasonable efforts to prevent any road or bridge from being damaged by the Contractor's traffic or by the Contractor's Personnel. These efforts shall include the proper use of appropriate vehicles and routes.

Except as otherwise stated in these Conditions:

- (a) the Contractor shall (as between the Parties) be responsible for any maintenance which may be required for his use of access routes;
- (b) the Contractor shall provide all necessary signs or directions along access routes, and shall obtain any permission which may be required from the relevant authorities for his use of routes, signs and directions;
- (c) the Employer shall not be responsible for any claims which may arise from the use or otherwise of any access route;
- (d) the Employer does not guarantee the suitability or availability of particular access routes; and
- (e) Costs due to non-suitability or non-availability, for the use required by the Contractor, of access routes shall be borne by the Contractor.

  
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**4.16 Transport of Goods**

Unless otherwise stated in the Particular Conditions:

- (a) the Contractor shall give the Engineer not less than 21 days' notice of the date on which any Plant or a major item of other Goods will be delivered to the Site;
- (b) the Contractor shall be responsible for packing, loading, transporting, receiving, unloading, storing and protecting all Goods and other things required for the Works; and
- (c) the Contractor shall indemnify and hold the Employer harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from the transport of Goods, and shall negotiate and pay all claims arising from their transport.

**4.17 Contractor's Equipment**

The Contractor shall be responsible for all Contractor's Equipment. When brought on to the Site, Contractor's Equipment shall be deemed to be exclusively intended for the execution of the Works. The Contractor shall not remove from the Site any major items of Contractor's Equipment without the consent of the Engineer. However, consent shall not be required for vehicles transporting Goods or Contractor's Personnel off Site.

**4.18 Protection of the Environment**

The Contractor shall take all reasonable steps to protect the environment (both on and off the Site) and to limit damage and nuisance to people and property resulting from pollution, noise and other results of his operations.

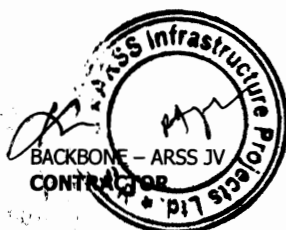
The Contractor shall ensure that emissions, surface discharges and effluent from the Contractor's activities shall not exceed the values stated in the Specification or prescribed by applicable Laws.


**4.19 Electricity, Water and Gas**

The Contractor shall, except as stated below, be responsible for the provision of all power, water and other services he may require for his construction activities and to the extent defined in the Specifications, for the tests.

The Contractor shall be entitled to use for the purposes of the Works such supplies of electricity, water, gas and other services as may be available on the Site and of which details and prices are given in the Specification. The Contractor shall, at his risk and cost, provide any apparatus necessary for his use of these services and for measuring the quantities consumed.

The quantities consumed and the amounts due (at these prices) for such services shall be agreed or determined by the Engineer in accordance with Sub-Clause 2.5 [Employer's Claims] and



  
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Sub-Clause 3.5 [Determinations]. The Contractor shall pay these amounts to the Employer.

**4.20 Employer's Equipment and Free-Issue Materials**

The Employer shall make the Employer's Equipment (if any) available for the use of the Contractor in the execution of the Works in accordance with the details, arrangements and prices stated in the Specification. Unless otherwise stated in the Specification:

- (a) the Employer shall be responsible for the Employer's Equipment, except that
- (b) the Contractor shall be responsible for each item of Employer's Equipment whilst any of the Contractor's Personnel is operating it, driving it, directing it or in possession or control of it.

The appropriate quantities and the amounts due (at such stated prices) for the use of Employer's Equipment shall be agreed or determined by the Engineer in accordance with Sub-Clause 2.5 [Employer's Claims] and Sub-Clause 3.5 [Determinations]. The Contractor shall pay these amounts to the Employer.

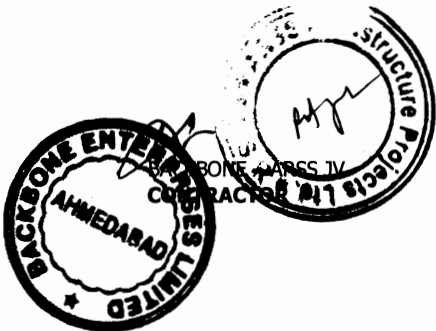
The Employer shall supply, free of charge, the "free-issue materials" (if any) in accordance with the details stated in the Specification. The Employer shall, at his risk and cost, provide these materials at the time and place specified in the Contract. The Contractor shall then visually inspect them, and shall promptly give notice to the Engineer of any shortage, defect or default in these materials. Unless otherwise agreed by both Parties, the Employer shall immediately rectify the notified shortage, defect or default.

After this visual inspection, the free-issue materials shall come under the care, custody and control of the Contractor. The Contractor's obligations of inspection, care, custody and control shall not relieve the Employer of liability for any shortage, defect or default not apparent from a visual inspection.

**4.21 Progress Reports**

Unless otherwise stated in the Particular Conditions, monthly progress reports shall be prepared by the Contractor and submitted to the Engineer in six copies. The first report shall cover the period up to the end of the first calendar month following the Commencement Date. Reports shall be submitted monthly thereafter, each within 7 days after the last day of the period to which it relates.

Reporting shall continue until the Contractor has completed all work which is known to be outstanding at the completion date

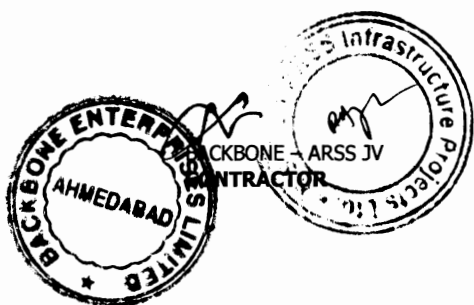


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stated in the Taking-Over Certificate for the Works.

Each report shall include:

- (a) charts and detailed descriptions of progress, including each stage of design (if any), Contractor's Documents, procurement, manufacture, delivery to Site, construction, erection and testing; and including these stages for work by each nominated Subcontractor (as defined in Clause 5 [Nominated Subcontractors]),
- (b) photographs showing the status of manufacture and of progress on the Site;
- (c) for the manufacture of each main item of Plant and Materials, the name of the manufacturer, manufacture location, percentage progress, and the actual or expected dates of:
  - (i) commencement of manufacture,
  - (ii) Contractor's inspections,
  - (iii) tests, and
  - (iv) shipment and arrival at the Site;
- (d) the details described in Sub-Clause 6.10 [Records of Contractor's Personnel and Equipment];
- (e) copies of quality assurance documents, test results and certificates of Materials;
- (f) list of notices given under Sub-Clause 2.5 [Employer's Claims] and notices given under Sub-Clause 20.1 [Contractor's Claims];
- (g) safety statistics, including details of any hazardous incidents and activities relating to environmental aspects and public relations; and
- (h) comparisons of actual and planned progress, with details of any events or circumstances which may jeopardise the completion in accordance with the Contract, and the measures being (or to be) adopted to overcome delays.



  
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**4.22 Security of the Site**

Unless otherwise stated in the Particular Conditions:

- (a) the Contractor shall be responsible for keeping unauthorised persons off the Site, and
- (b) authorised persons shall be limited to the Contractor's Personnel and the Employer's Personnel; and to any other personnel notified to the Contractor, by the Employer or the Engineer, as authorised personnel of the Employer's other contractors on the Site.

**4.23 Contractor's Operations on Site**

The Contractor shall confine his operations to the Site, and to any additional areas which may be obtained by the Contractor and agreed by the Engineer as additional working areas. The Contractor shall take all necessary precautions to keep Contractor's Equipment and Contractor's Personnel within the Site and these additional areas, and to keep them off adjacent land.

During the execution of the Works, the Contractor shall keep the Site free from all unnecessary obstruction, and shall store or dispose of any Contractor's Equipment or surplus materials. The Contractor shall clear away and remove from the Site any wreckage, rubbish and Temporary Works which are no longer required.

Upon the issue of a Taking-Over Certificate, the Contractor shall clear away and remove, from that part of the Site and Works to which the Taking-Over Certificate refers, all Contractor's Equipment, surplus material, wreckage, rubbish and Temporary Works. The Contractor shall leave that part of the Site and the Works in a clean and safe condition. However, the Contractor may retain on Site, during the Defects Notification Period, such Goods as are required for the Contractor to fulfil obligations under the Contract.

**4.24 Fossils**

All fossils, coins, articles of value or antiquity, and structures and other remains or items of geological or archaeological interest found on the Site shall be placed under the care and authority of the Employer. The Contractor shall take reasonable precautions to prevent Contractor's Personnel or other persons from removing or damaging any of these findings.

The Contractor shall, upon discovery of any such finding, promptly give notice to the Engineer, who shall issue instructions for dealing with it. If the Contractor suffers delay and/or incurs Cost from complying with the instructions, the Contractor shall give a further notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:



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- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
- (b) payment of any such Cost, which shall be included in the Contract Price.

After receiving this further notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

## 5. Nominated Subcontractors

### 5.1 Definition of “nominated Subcontractor”

In the Contract, “nominated Subcontractor” means a Subcontractor:

- (a) who is stated in the Contract as being a nominated Subcontractor, or
- (b) whom the Engineer, under Clause 13 [Variations and Adjustments], instructs the Contractor to employ as a Subcontractor subject to Sub-Clause 5.2 [Objection to Notification].

### 5.2 Objection to Nomination

The Contractor shall not be under any obligation to employ a nominated Subcontractor against whom the Contractor raises reasonable objection by notice to the Engineer as soon as practicable, with supporting particulars. An objection shall be deemed reasonable if it arises from (among other things) any of the following matters, unless the Employer agrees in writing to indemnify the Contractor against and from the consequences of the matter:

- (a) there are reasons to believe that the Subcontractor does not have sufficient competence, resources or financial strength;
- (b) the nominated Subcontractor does not accept to indemnify the Contractor against and from any negligence or misuse of Goods by the nominated Subcontractor, his agents and employees; or
- (c) the nominated Subcontractor does not accept to enter into a subcontract which specifies that, for the subcontracted work (including design, if any), the nominated Subcontractor shall:
  - (i) undertake to the Contractor such obligations and liabilities as will enable the Contractor to discharge his obligations and liabilities under the Contract;



- (ii) indemnify the Contractor against and from all obligations and liabilities arising under or in connection with the Contract and from the consequences of any failure by the Subcontractor to perform these obligations or to fulfil these liabilities; and
- (iii) be paid only if and when the Contractor has received from the Employer payments for sums due under the Subcontract referred to under Sub-Clause 5.3 [Payment to nominated Subcontractors].

**5.3 Payments to nominated Subcontractors**

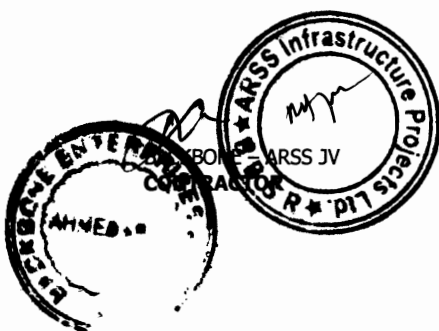
The Contractor shall pay to the nominated Subcontractor the amounts shown on the nominated Subcontractor's invoices approved by the Contractor which the Engineer certifies to be due in accordance with the subcontract. These amounts plus other charges shall be included in the Contract Price in accordance with sub-paragraph (b) of Sub-Clause 13.5 [Provisional Sums], except as stated in Sub-Clause 5.4 [Evidence of Payments].


**5.4 Evidence of Payments**

Before issuing a Payment Certificate which includes an amount payable to a nominated Subcontractor, the Engineer may request the Contractor to supply reasonable evidence that the nominated Subcontractor has received all amounts due in accordance with previous Payment Certificates, less applicable deductions for retention or otherwise. Unless the Contractor:

- (a) submits this reasonable evidence to the Engineer, or
- (b)
  - (i) satisfies the Engineer in writing that the Contractor is reasonably entitled to withhold or refuse to pay these amounts, and
  - (ii) submits to the Engineer reasonable evidence that the nominated Subcontractor has been notified of the Contractor's entitlement,

then the Employer may (at his sole discretion) pay, direct to the nominated Subcontractor, part or all of such amounts previously certified (less applicable deductions) as are due to the nominated Subcontractor and for which the Contractor has failed to submit the evidence described in sub-paragraphs (a) or (b) above. The Contractor shall then repay, to the Employer, the amount which the nominated Subcontractor was directly paid by the Employer.



  
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**Chief Engineer**  
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## 6. Staff and Labour

- 6.1 Engagement of Staff and Labour** Except as otherwise stated in the Specification, the Contractor shall make arrangements for the engagement of all staff and labour, local or otherwise, and for their payment, feeding, transport, and, when appropriate, housing.

The Contractor is encouraged, to the extent practicable and reasonable, to employ staff and labor with appropriate qualifications and experience from sources within the Country.

- 6.2 Rates of Wages and Conditions of Labour** The Contractor shall pay rates of wages, and observe conditions of labour, which are not lower than those established for the trade or industry where the work is carried out. If no established rates or conditions are applicable, the Contractor shall pay rates of wages and observe conditions which are not lower than the general level of wages and conditions observed locally by employers whose trade or industry is similar to that of the Contractor.

The Contractor shall inform the Contractor's Personnel about their liability to pay personal income taxes in the Country in respect of such of their salaries, wages, allowances and any benefits as are subject to tax under the Laws of the Country for the time being in force, and the Contractor shall perform such duties in regard to such deductions thereof as may be imposed on him by such Laws.

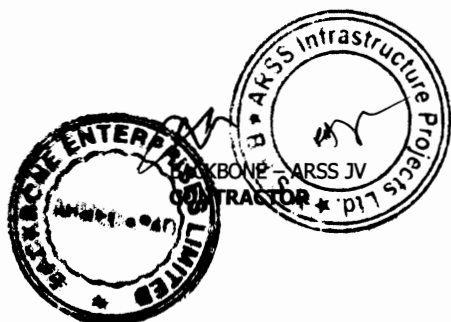
- 6.3 Persons in the Service of Employer** The Contractor shall not recruit, or attempt to recruit, staff and labour from amongst the Employer's Personnel.

- 6.4 Labour Laws** The Contractor shall comply with all the relevant labour Laws applicable to the Contractor's Personnel, including Laws relating to their employment, health, safety, welfare, immigration and emigration, and shall allow them all their legal rights.

The Contractor shall require his employees to obey all applicable Laws, including those concerning safety at work.

- 6.5 Working Hours** No work shall be carried out on the Site on locally recognised days of rest, or outside the normal working hours stated in the Contract Data, unless:

- (a) otherwise stated in the Contract,
- (b) the Engineer gives consent, or
- (c) the work is unavoidable, or necessary for the protection of



life or property or for the safety of the Works, in which case the Contractor shall immediately advise the Engineer.

**6.6 Facilities for Staff and Labour**

Except as otherwise stated in the Specification, the Contractor shall provide and maintain all necessary accommodation and welfare facilities for the Contractor's Personnel. The Contractor shall also provide facilities for the Employer's Personnel as stated in the Specification.

The Contractor shall not permit any of the Contractor's Personnel to maintain any temporary or permanent living quarters within the structures forming part of the Permanent Works.

**6.7 Health and Safety**

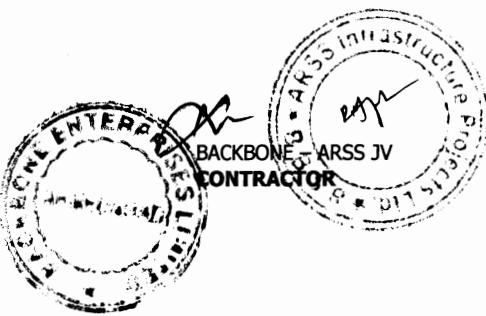
The Contractor shall at all times take all reasonable precautions to maintain the health and safety of the Contractor's Personnel. In collaboration with local health authorities, the Contractor shall ensure that medical staff, first aid facilities, sick bay and ambulance service are available at all times at the Site and at any accommodation for Contractor's and Employer's Personnel, and that suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics.


The Contractor shall appoint an accident prevention officer at the Site, responsible for maintaining safety and protection against accidents. This person shall be qualified for this responsibility, and shall have the authority to issue instructions and take protective measures to prevent accidents. Throughout the execution of the Works, the Contractor shall provide whatever is required by this person to exercise this responsibility and authority.

The Contractor shall send, to the Engineer, details of any accident as soon as practicable after its occurrence. The Contractor shall maintain records and make reports concerning health, safety and welfare of persons, and damage to property, as the Engineer may reasonably require.

HIV-AIDS Prevention. The Contractor shall conduct an HIV-AIDS awareness programme via an approved service provider, and shall undertake such other measures as are specified in this Contract to reduce the risk of the transfer of the HIV virus between and among the Contractor's Personnel and the local community, to promote early diagnosis and to assist affected individuals.

The Contractor shall throughout the contract (including the



  
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Defects Notification Period): (i) conduct Information, Education and Consultation Communication (IEC) campaigns, at least every other month, addressed to all the Site staff and labor (including all the Contractor's employees, all Sub-Contractors and Consultants' employees, and all truck drivers and crew making deliveries to Site for construction activities) and to the immediate local communities, concerning the risks, dangers and impact, and appropriate avoidance behavior with respect to of Sexually Transmitted Diseases (STD)—or Sexually Transmitted Infections (STI) in general and HIV/AIDS in particular; (ii) provide male or female condoms for all Site staff and labor as appropriate; and (iii) provide for STI and HIV/AIDS screening, diagnosis, counseling and referral to a dedicated national STI and HIV/AIDS program, (unless otherwise agreed) of all Site staff and labor.


The Contractor shall include in the program to be submitted for the execution of the Works under Sub-Clause 8.3 [Programme] an alleviation program for Site staff and labour and their families in respect of Sexually Transmitted Infections (STI) and Sexually Transmitted Diseases (STD) including HIV/AIDS. The STI, STD and HIV/AIDS alleviation program shall indicate when, how and at what cost the Contractor plans to satisfy the requirements of this Sub-Clause and the related specification. For each component, the program shall detail the resources to be provided or utilized and any related sub-contracting proposed. The program shall also include provision of a detailed cost estimate with supporting documentation. Payment to the Contractor for preparation and implementation this program shall not exceed the Provisional Sum dedicated for this purpose.

#### 6.8 Contractor's Superintendence

Throughout the execution of the Works, and as long thereafter as is necessary to fulfil the Contractor's obligations, the Contractor shall provide all necessary superintendence to plan, arrange, direct, manage, inspect and test the work.

Superintendence shall be given by a sufficient number of persons having adequate knowledge of the language for communications (defined in Sub-Clause 1.4 [Law and Language]) and of the operations to be carried out (including the methods and techniques required, the hazards likely to be encountered and methods of preventing accidents), for the satisfactory and safe execution of the Works.



  
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**6.9 Contractor's Personnel**

The Contractor's Personnel shall be appropriately qualified, skilled and experienced in their respective trades or occupations. The Engineer may require the Contractor to remove (or cause to be removed) any person employed on the Site or Works, including the Contractor's Representative if applicable, who:

- (a) persists in any misconduct or lack of care,
- (b) carries out duties incompetently or negligently,
- (c) fails to conform with any provisions of the Contract, or
- (d) persists in any conduct which is prejudicial to safety, health, or the protection of the environment.

If appropriate, the Contractor shall then appoint (or cause to be appointed) a suitable replacement person.

**6.10 Records of Contractor's Personnel and Equipment**

The Contractor shall submit, to the Engineer, details showing the number of each class of Contractor's Personnel and of each type of Contractor's Equipment on the Site. Details shall be submitted each calendar month, in a form approved by the Engineer, until the Contractor has completed all work which is known to be outstanding at the completion date stated in the Taking-Over Certificate for the Works.

**6.11 Disorderly Conduct**


The Contractor shall at all times take all reasonable precautions to prevent any unlawful, riotous or disorderly conduct by or amongst the Contractor's Personnel, and to preserve peace and protection of persons and property on and near the Site.

**6.12 Foreign Personnel**

The Contractor may bring in to the Country any foreign personnel who are necessary for the execution of the Works to the extent allowed by the applicable Laws. The Contractor shall ensure that these personnel are provided with the required residence visas and work permits. The Employer will, if requested by the Contractor, use his best endeavours in a timely and expeditious manner to assist the Contractor in obtaining any local, state, national, or government permission required for bringing in the Contractor's personnel.

The Contractor shall be responsible for the return of these personnel to the place where they were recruited or to their domicile. In the event of the death in the Country of any of these personnel or members of their families, the Contractor shall similarly be responsible for making the appropriate arrangements for their return or burial.

  
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- 6.13 Supply of Foodstuffs** The Contractor shall arrange for the provision of a sufficient supply of suitable food as may be stated in the Specification at reasonable prices for the Contractor's Personnel for the purposes of or in connection with the Contract.
- 6.14 Supply of Water** The Contractor shall, having regard to local conditions, provide on the Site an adequate supply of drinking and other water for the use of the Contractor's Personnel.
- 6.15 Measures against Insect and Pest Nuisance** The Contractor shall at all times take the necessary precautions to protect the Contractor's Personnel employed on the Site from insect and pest nuisance, and to reduce their danger to health. The Contractor shall comply with all the regulations of the local health authorities, including use of appropriate insecticide.
- 6.16 Alcoholic Liquor or Drugs** The Contractor shall not, otherwise than in accordance with the Laws of the Country, import, sell, give barter or otherwise dispose of any alcoholic liquor or drugs, or permit or allow importation, sale, gift barter or disposal thereto by Contractor's Personnel.
- 6.17 Arms and Ammunition** The Contractor shall not give, barter, or otherwise dispose of, to any person, any arms or ammunition of any kind, or allow Contractor's Personnel to do so.
- 6.18 Festivals and Religious Customs** The Contractor shall respect the Country's recognized festivals, days of rest and religious or other customs.
- 6.19 Funeral Arrangements** The Contractor shall be responsible, to the extent required by local regulations, for making any funeral arrangements for any of his local employees who may die while engaged upon the Works.
- 6.20 Prohibition of Forced or Compulsory Labour** The contractor shall not employ "forced or compulsory labour" in any form. "Forced or compulsory labour" consists of all work or service, not voluntarily performed, that is extracted from an individual under threat of force or penalty.
- 6.21 Prohibition of Harmful Child Labour** The Contractor shall not employ any child to perform any work that is economically exploitative, or is likely to be hazardous to, or to interfere with, the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral, or social development.



**6.22 Employment Records of Workers**

The Contractor shall keep complete and accurate records of the employment of labour at the Site. The records shall include the names, ages, genders, hours worked and wages paid to all workers. These records shall be summarized on a monthly basis and submitted to the Engineer, and these records shall be available for inspection by Auditors during normal working hours. These records shall be included in the details to be submitted by the Contractor under Sub-Clause 6.10 [Records of Contractor's Personnel and Equipment].

**7. Plant, Materials and Workmanship**

**7.1 Manner of Execution**

The Contractor shall carry out the manufacture of Plant, the production and manufacture of Materials, and all other execution of the Works:

- (a) in the manner (if any) specified in the Contract,
- (b) in a proper workmanlike and careful manner, in accordance with recognised good practice, and
- (c) with properly equipped facilities and non-hazardous Materials, except as otherwise specified in the Contract.

**7.2 Samples**

The Contractor shall submit the following samples of Materials, and relevant information, to the Engineer for consent prior to using the Materials in or for the Works:

- (a) manufacturer's standard samples of Materials and samples specified in the Contract, all at the Contractor's cost, and
- (b) additional samples instructed by the Engineer as a Variation.

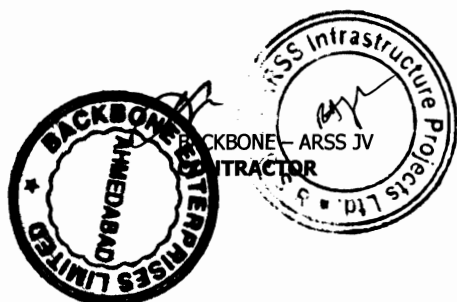
Each sample shall be labelled as to origin and intended use in the Works.

**7.3 Inspection**

The Employer's Personnel shall at all reasonable times:

- (a) have full access to all parts of the Site and to all places from which natural Materials are being obtained, and
- (b) during production, manufacture and construction (at the Site and elsewhere), be entitled to examine, inspect, measure and test the materials and workmanship, and to check the progress of manufacture of Plant and production and manufacture of Materials.

The Contractor shall give the Employer's Personnel full opportunity to carry out these activities, including providing access, facilities, permissions and safety equipment. No such activity shall relieve the Contractor from any obligation or



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responsibility.

The Contractor shall give notice to the Engineer whenever any work is ready and before it is covered up, put out of sight, or packaged for storage or transport. The Engineer shall then either carry out the examination, inspection, measurement or testing without unreasonable delay, or promptly give notice to the Contractor that the Engineer does not require to do so. If the Contractor fails to give the notice, he shall, if and when required by the Engineer, uncover the work and thereafter reinstate and make good, all at the Contractor's cost.

#### 7.4 Testing

This Sub-Clause shall apply to all tests specified in the Contract, other than the Tests after Completion (if any).

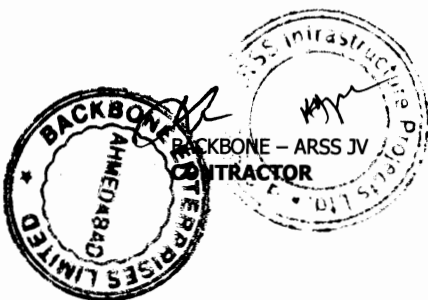
Except as otherwise specified in the Contract, the Contractor shall provide all apparatus, assistance, documents and other information, electricity, equipment, fuel, consumables, instruments, labour, materials, and suitably qualified and experienced staff, as are necessary to carry out the specified tests efficiently. The Contractor shall agree, with the Engineer, the time and place for the specified testing of any Plant, Materials and other parts of the Works.

The Engineer may, under Clause 13 [Variations and Adjustments], vary the location or details of specified tests, or instruct the Contractor to carry out additional tests. If these varied or additional tests show that the tested Plant, Materials or workmanship is not in accordance with the Contract, the cost of carrying out this Variation shall be borne by the Contractor, notwithstanding other provisions of the Contract.

The Engineer shall give the Contractor not less than 24 hours' notice of the Engineer's intention to attend the tests. If the Engineer does not attend at the time and place agreed, the Contractor may proceed with the tests, unless otherwise instructed by the Engineer, and the tests shall then be deemed to have been made in the Engineer's presence.

If the Contractor suffers delay and/or incurs Cost from complying with these instructions or as a result of a delay for which the Employer is responsible, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and



- (b) payment of any such Cost plus profit, which shall be included in the Contract Price.

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

The Contractor shall promptly forward to the Engineer duly certified reports of the tests. When the specified tests have been passed, the Engineer shall endorse the Contractor's test certificate, or issue a certificate to him, to that effect. If the Engineer has not attended the tests, he shall be deemed to have accepted the readings as accurate.

### 7.5 Rejection

If, as a result of an examination, inspection, measurement or testing, any Plant, Materials or workmanship is found to be defective or otherwise not in accordance with the Contract, the Engineer may reject the Plant, Materials or workmanship by giving notice to the Contractor, with reasons. The Contractor shall then promptly make good the defect and ensure that the rejected item complies with the Contract.

If the Engineer requires this Plant, Materials or workmanship to be retested, the tests shall be repeated under the same terms and conditions. If the rejection and retesting cause the Employer to incur additional costs, the Contractor shall subject to Sub-Clause 2.5 [Employer's Claims] pay these costs to the Employer.

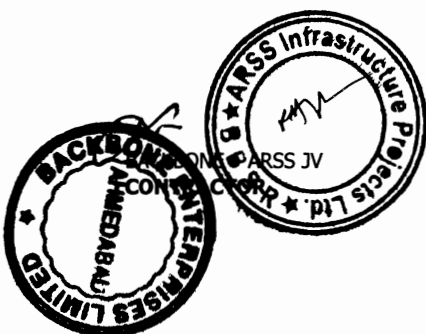
### 7.6 Remedial Work

Notwithstanding any previous test or certification, the Engineer may instruct the Contractor to:

- (a) remove from the Site and replace any Plant or Materials which is not in accordance with the Contract,
- (b) remove and re-execute any other work which is not in accordance with the Contract, and
- (c) execute any work which is urgently required for the safety of the Works, whether because of an accident, unforeseeable event or otherwise.

The Contractor shall comply with the instruction within a reasonable time, which shall be the time (if any) specified in the instruction, or immediately if urgency is specified under subparagraph (c).

If the Contractor fails to comply with the instruction, the Employer shall be entitled to employ and pay other persons to



  
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carry out the work. Except to the extent that the Contractor would have been entitled to payment for the work, the Contractor shall subject to Sub-Clause 2.5 [Employer's Claims] pay to the Employer all costs arising from this failure.

**7.7 Ownership of Plant and Materials**

Except otherwise specified in the Contract, each item of Plant and Materials shall, to the extent consistent with the Laws of the Country, become the property of the Employer at whichever is the earlier of the following times, free from liens and other encumbrances:

- (a) when it is incorporated in the Works;
- (b) when the Contractor is paid the corresponding value of the Plant and Materials under Sub-Clause 8.10 [Payment for Plant and Materials in Event of Suspension].

**7.8 Royalties**

Unless otherwise stated in the Specification, the Contractor shall pay all royalties, rents and other payments for:

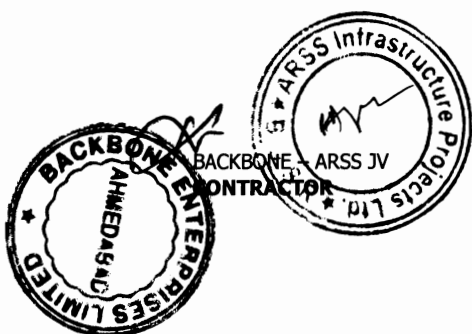
- (a) natural Materials obtained from outside the Site, and
- (b) the disposal of material from demolitions and excavations and of other surplus material (whether natural or man-made), except to the extent that disposal areas within the Site are specified in the Contract.

**8. Commencement, Delays and Suspension**

**8.1 Commencement of Works**

Except otherwise specified in the Particular Conditions, the Commencement Date shall be the date at which the following precedent conditions have all been fulfilled and the Engineer's instruction recording the agreement of both Parties on such fulfilment and instructing to commence the Works is received by the Contractor:

- (a) signature of the Contract Agreement by both Parties, and if required, approval of the Contract by relevant authorities in the Country;
- (b) delivery to the Contractor of reasonable evidence of the Employer's Financial arrangements (under Sub-Clause 2.4 [Employer's Financial Arrangements])
- (c) except if otherwise specified in the Contract Data, possession of the Site given to the Contractor together with such permission(s) under (a) of Sub-Clause 1.13 [Compliance with Laws] as required for the



  
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commencement of the Works; and

- (d) receipt by the Contractor of the Advance Payment under Sub-Clause 14.2 [Advance Payment] provided that the corresponding bank guarantee has been delivered by the Contractor.
- (e) If the said Engineer's instruction is not received by the Contractor within 180 days from his receipt of the Letter of Acceptance, the Contractor shall be entitled to terminate the Contract under Sub-Clause 16.2 [Termination by Contractor].

The Contractor shall commence the execution of the Works as soon as is reasonably practicable after the Commencement Date, and shall then proceed with the Works with due expedition and without delay.

## 8.2 Time for Completion

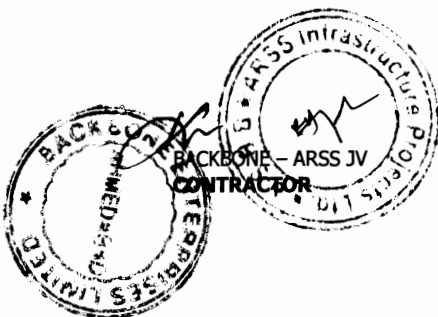
The Contractor shall complete the whole of the Works, and each Section (if any), within the Time for Completion for the Works or Section (as the case may be), including:

- (a) achieving the passing of the Tests on Completion, and
- (b) completing all work which is stated in the Contract as being required for the Works or Section to be considered to be completed for the purposes of taking-over under Sub-Clause 10.1 [Taking Over of the Works and Sections].

## 8.3 Programme

The Contractor shall submit a detailed time programme to the Engineer within 28 days after receiving the notice under Sub-Clause 8.1 [Commencement of Works]. The Contractor shall also submit a revised programme whenever the previous programme is inconsistent with actual progress or with the Contractor's obligations. Each programme shall include:

- (a) the order in which the Contractor intends to carry out the Works, including the anticipated timing of each stage of design (if any), Contractor's Documents, procurement, manufacture of Plant, delivery to Site, construction, erection and testing,
- (b) each of these stages for work by each nominated Subcontractor (as defined in Clause 5 [Nominated Subcontractors]),
- (c) the sequence and timing of inspections and tests specified in the Contract, and



- (d) a supporting report which includes:
- (i) a general description of the methods which the Contractor intends to adopt, and of the major stages, in the execution of the Works, and
  - (ii) details showing the Contractor's reasonable estimate of the number of each class of Contractor's Personnel and of each type of Contractor's Equipment, required on the Site for each major stage.

Unless the Engineer, within 21 days after receiving a programme, gives notice to the Contractor stating the extent to which it does not comply with the Contract, the Contractor shall proceed in accordance with the programme, subject to his other obligations under the Contract. The Employer's Personnel shall be entitled to rely upon the programme when planning their activities.

The Contractor shall promptly give notice to the Engineer of specific probable future events or circumstances which may adversely affect the work, increase the Contract Price, or delay the execution of the Works. The Engineer may require the Contractor to submit an estimate of the anticipated effect of the future event or circumstances, and/or a proposal under Sub-Clause 13.3 [Variation Procedure].

If, at any time, the Engineer gives notice to the Contractor that a programme fails (to the extent stated) to comply with the Contract or to be consistent with actual progress and the Contractor's stated intentions, the Contractor shall submit a revised programme to the Engineer in accordance with this Sub-Clause.

#### 8.4 Extension of Time for Completion

The Contractor shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to an extension of the Time for Completion if and to the extent that completion for the purposes of Sub-Clause 10.1 [Taking-Over of the Works and Sections] is or will be delayed by any of the following causes:

- (a) a Variation (unless an adjustment to the Time for Completion has been agreed under Sub-Clause 13.3 [Variation Procedure]) or other substantial change in the quantity of an item of work included in the Contract,
- (b) a cause of delay giving an entitlement to extension of time under a Sub-Clause of these Conditions,
- (c) exceptionally adverse climatic conditions,



- (d) Unforeseeable shortages in the availability of personnel or Goods caused by epidemic or governmental actions, or
- (e) any delay, impediment or prevention caused by or attributable to the Employer, the Employer's Personnel, or the Employer's other contractors.

If the Contractor considers himself to be entitled to an extension of the Time for Completion, the Contractor shall give notice to the Engineer in accordance with Sub-Clause 20.1 [Contractor's Claims]. When determining each extension of time under Sub-Clause 20.1, the Engineer shall review previous determinations and may increase, but shall not decrease, the total extension of time.

**8.5 Delays Caused by Authorities**

If the following conditions apply, namely:

- (a) the Contractor has diligently followed the procedures laid down by the relevant legally constituted public authorities in the Country,
- (b) these authorities delay or disrupt the Contractor's work, and
- (c) the delay or disruption was Unforeseeable,

then this delay or disruption will be considered as a cause of delay under sub-paragraph (b) of Sub-Clause 8.4 [Extension of Time for Completion].

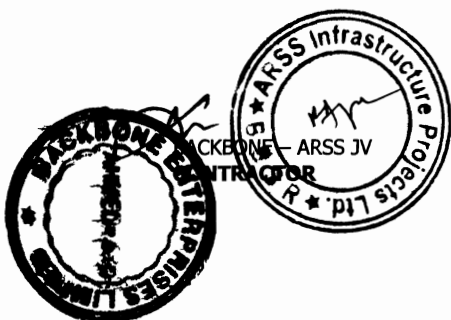
**8.6 Rate of Progress**

If, at any time:

- (a) actual progress is too slow to complete within the Time for Completion, and/or
- (b) progress has fallen (or will fall) behind the current programme under Sub-Clause 8.3 [Programme],

other than as a result of a cause listed in Sub-Clause 8.4 [Extension of Time for Completion], then the Engineer may instruct the Contractor to submit, under Sub-Clause 8.3 [Programme], a revised programme and supporting report describing the revised methods which the Contractor proposes to adopt in order to expedite progress and complete within the Time for Completion.

Unless the Engineer notifies otherwise, the Contractor shall adopt these revised methods, which may require increases in the working hours and/or in the numbers of Contractor's Personnel and/or Goods, at the risk and cost of the Contractor. If these



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revised methods cause the Employer to incur additional costs, the Contractor shall subject to notice under Sub-Clause 2.5 [Employer's Claims] pay these costs to the Employer, in addition to delay damages (if any) under Sub-Clause 8.7 [Delay Damages] below.

Additional costs of revised methods, including acceleration measures, instructed by the Engineer to reduce delays resulting from causes listed under Sub-Clause 8.4 [Extension of Time for Completion] shall be paid by the Employer, without generating, however, any other additional payment benefit to the Contractor.

### 8.7 Delay Damages

If the Contractor fails to comply with Sub-Clause 8.2 [Time for Completion], the Contractor shall be subject to notice under Sub-Clause 2.5 [Employer's Claims] pay delay damages to the Employer for this default. These delay damages shall be the sum stated in the Contract Data, which shall be paid for every day which shall elapse between the relevant Time for Completion and the date stated in the Taking-Over Certificate. However, the total amount due under this Sub-Clause shall not exceed the maximum amount of delay damages (if any) stated in the Contract Data.

These delay damages shall be the only damages due from the Contractor for such default, other than in the event of termination under Sub-Clause 15.2 [Termination by Employer] prior to completion of the Works. These damages shall not relieve the Contractor from his obligation to complete the Works, or from any other duties, obligations or responsibilities which he may have under the Contract.

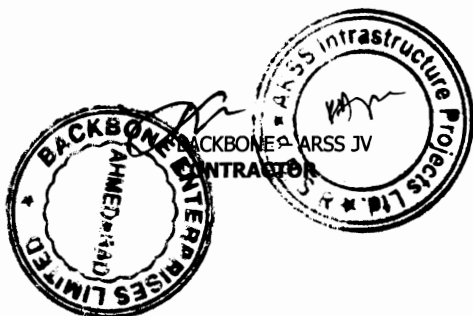
### 8.8 Suspension of Work


The Engineer may at any time instruct the Contractor to suspend progress of part or all of the Works. During such suspension, the Contractor shall protect, store and secure such part or the Works against any deterioration, loss or damage.

The Engineer may also notify the cause for the suspension. If and to the extent that the cause is notified and is the responsibility of the Contractor, the following Sub-Clauses 8.9 [Consequences of Suspension], 8.10 [Payment for Plant and Materials in Event of Suspension] and 8.11 [Prolonged Suspension] shall not apply.

### 8.9 Consequences of Suspension

If the Contractor suffers delay and/or incurs Cost from complying with the Engineer's instructions under Sub-Clause 8.8 [Suspension of Work] and/or from resuming the work, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:



  
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- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
- (b) payment of any such Cost, which shall be included in the Contract Price.

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

The Contractor shall not be entitled to an extension of time for, or to payment of the Cost incurred in, making good the consequences of the Contractor's faulty design, workmanship or materials, or of the Contractor's failure to protect, store or secure in accordance with Sub-Clause 8.8 [Suspension of Work].

**8.10 Payment for Plant and Materials in Event of Suspension**

The Contractor shall be entitled to payment of the value (as at the date of suspension) of Plant and/or Materials which have not been delivered to Site, if:

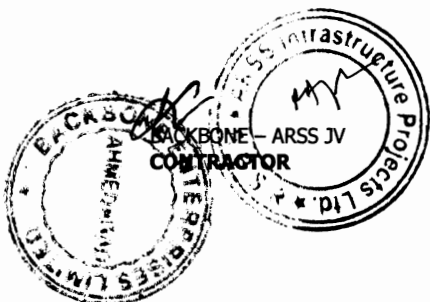
- (a) the work on Plant or delivery of Plant and/or Materials has been suspended for more than 28 days, and
- (b) the Contractor has marked the Plant and/or Materials as the Employer's property in accordance with the Engineer's instructions.

**8.11 Prolonged Suspension**

If the suspension under Sub-Clause 8.8 [Suspension of Work] has continued for more than 84 days, the Contractor may request the Engineer's permission to proceed. If the Engineer does not give permission within 28 days after being requested to do so, the Contractor may, by giving notice to the Engineer, treat the suspension as an omission under Clause 13 [Variations and Adjustments] of the affected part of the Works. If the suspension affects the whole of the Works, the Contractor may give notice of termination under Sub-Clause 16.2 [Termination by Contractor].

**8.12 Resumption of Work**

After the permission or instruction to proceed is given, the Contractor and the Engineer shall jointly examine the Works and the Plant and Materials affected by the suspension. The Contractor shall make good any deterioration or defect in or loss of the Works or Plant or Materials, which has occurred during the suspension after receiving from the Engineer an instruction to this effect under Clause 13 [Variations and Adjustments].



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## 9. Tests on Completion

### 9.1 Contractor's Obligations

The Contractor shall carry out the Tests on Completion in accordance with this Clause and Sub-Clause 7.4 [Testing], after providing the documents in accordance with sub-paragraph (d) of Sub-Clause 4.1 [Contractor's General Obligations].

The Contractor shall give to the Engineer not less than 21 days' notice of the date after which the Contractor will be ready to carry out each of the Tests on Completion. Unless otherwise agreed, Tests on Completion shall be carried out within 14 days after this date, on such day or days as the Engineer shall instruct.

In considering the results of the Tests on Completion, the Engineer shall make allowances for the effect of any use of the Works by the Employer on the performance or other characteristics of the Works. As soon as the Works, or a Section, have passed any Tests on Completion, the Contractor shall submit a certified report of the results of these Tests to the Engineer.

### 9.2 Delayed Tests

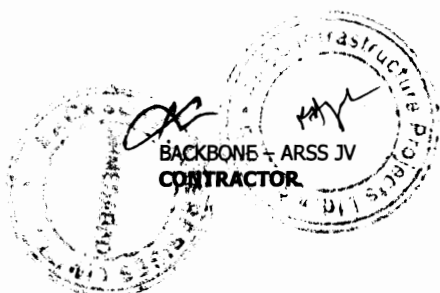
If the Tests on Completion are being unduly delayed by the Employer, Sub-Clause 7.4 [Testing] (fifth paragraph) and/or Sub-Clause 10.3 [Interference with Tests on Completion] shall be applicable.

If the Tests on Completion are being unduly delayed by the Contractor, the Engineer may by notice require the Contractor to carry out the Tests within 21 days after receiving the notice. The Contractor shall carry out the Tests on such day or days within that period as the Contractor may fix and of which he shall give notice to the Engineer.

If the Contractor fails to carry out the Tests on Completion within the period of 21 days, the Employer's Personnel may proceed with the Tests at the risk and cost of the Contractor. The Tests on Completion shall then be deemed to have been carried out in the presence of the Contractor and the results of the Tests shall be accepted as accurate.

### 9.3 Retesting

If the Works, or a Section, fail to pass the Tests on Completion, Sub-Clause 7.5 [Rejection] shall apply, and the Engineer or the Contractor may require the failed Tests, and Tests on Completion on any related work, to be repeated under the same terms and conditions.



  
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**9.4 Failure to Pass Tests on Completion**

If the Works, or a Section, fail to pass the Tests on Completion repeated under Sub-Clause 9.3 [Retesting], the Engineer shall be entitled to:

- (a) order further repetition of Tests on Completion under Sub-Clause 9.3;
- (b) if the failure deprives the Employer of substantially the whole benefit of the Works or Section, reject the Works or Section (as the case may be), in which event the Employer shall have the same remedies as are provided in sub-paragraph (c) of Sub-Clause 11.4 [Failure to Remedy Defects]; or
- (c) issue a Taking-Over Certificate, if the Employer so requests.

In the event of sub-paragraph (c), the Contractor shall proceed in accordance with all other obligations under the Contract, and the Contract Price shall be reduced by such amount as shall be appropriate to cover the reduced value to the Employer as a result of this failure. Unless the relevant reduction for this failure is stated (or its method of calculation is defined) in the Contract, the Employer may require the reduction to be (i) agreed by both Parties (in full satisfaction of this failure only) and paid before this Taking-Over Certificate is issued, or (ii) determined and paid under Sub-Clause 2.5 [Employer's Claims] and Sub-Clause 3.5 [Determinations].

**10. Employer's Taking Over**

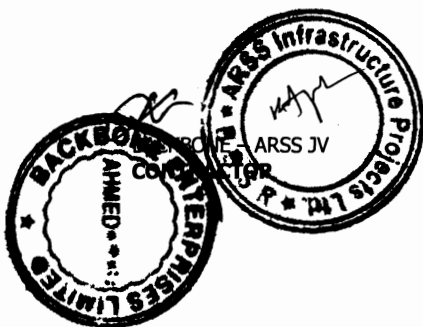
**10.1 Taking Over of the Works and Sections**

Except as stated in Sub-Clause 9.4 [Failure to Pass Tests on Completion], the Works shall be taken over by the Employer when (i) the Works have been completed in accordance with the Contract, including the matters described in Sub-Clause 8.2 [Time for Completion] and except as allowed in sub-paragraph (a) below, and (ii) a Taking-Over Certificate for the Works has been issued, or is deemed to have been issued in accordance with this Sub-Clause.

The Contractor may apply by notice to the Engineer for a Taking-Over Certificate not earlier than 14 days before the Works will, in the Contractor's opinion, be complete and ready for taking over. If the Works are divided into Sections, the Contractor may similarly apply for a Taking-Over Certificate for each Section.

The Engineer shall, within 28 days after receiving the Contractor's application:

- (a) issue the Taking-Over Certificate to the Contractor, stating



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the date on which the Works or Section were completed in accordance with the Contract, except for any minor outstanding work and defects which will not substantially affect the use of the Works or Section for their intended purpose (either until or whilst this work is completed and these defects are remedied); or

- (b) reject the application, giving reasons and specifying the work required to be done by the Contractor to enable the Taking-Over Certificate to be issued. The Contractor shall then complete this work before issuing a further notice under this Sub-Clause.

If the Engineer fails either to issue the Taking-Over Certificate or to reject the Contractor's application within the period of 28 days, and if the Works or Section (as the case may be) are substantially in accordance with the Contract, the Taking-Over Certificate shall be deemed to have been issued on the last day of that period.

## 10.2 Taking Over of Parts of the Works

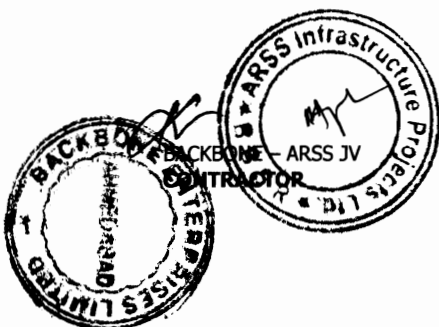
The Engineer may, at the sole discretion of the Employer, issue a Taking-Over Certificate for any part of the Permanent Works.

The Employer shall not use any part of the Works (other than as a temporary measure which is either specified in the Contract or agreed by both Parties) unless and until the Engineer has issued a Taking-Over Certificate for this part. However, if the Employer does use any part of the Works before the Taking-Over Certificate is issued:

- (a) the part which is used shall be deemed to have been taken over as from the date on which it is used,
- (b) the Contractor shall cease to be liable for the care of such part as from this date, when responsibility shall pass to the Employer, and
- (c) if requested by the Contractor, the Engineer shall issue a Taking-Over Certificate for this part.

After the Engineer has issued a Taking-Over Certificate for a part of the Works, the Contractor shall be given the earliest opportunity to take such steps as may be necessary to carry out any outstanding Tests on Completion. The Contractor shall carry out these Tests on Completion as soon as practicable before the expiry date of the relevant Defects Notification Period.

If the Contractor incurs Cost as a result of the Employer taking over and/or using a part of the Works, other than such use as is



specified in the Contract or agreed by the Contractor, the Contractor shall (i) give notice to the Engineer and (ii) be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to payment of any such Cost plus profit, which shall be included in the Contract Price. After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine this Cost and profit.

If a Taking-Over Certificate has been issued for a part of the Works (other than a Section), the delay damages thereafter for completion of the remainder of the Works shall be reduced. Similarly, the delay damages for the remainder of the Section (if any) in which this part is included shall also be reduced. For any period of delay after the date stated in this Taking-Over Certificate, the proportional reduction in these delay damages shall be calculated as the proportion which the value of the part so certified bears to the value of the Works or Section (as the case may be) as a whole. The Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these proportions. The provisions of this paragraph shall only apply to the daily rate of delay damages under Sub-Clause 8.7 [Delay Damages], and shall not affect the maximum amount of these damages.

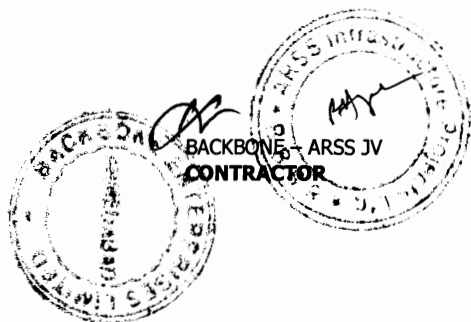
### 10.3 Interference with Tests on Completion

If the Contractor is prevented, for more than 14 days, from carrying out the Tests on Completion by a cause for which the Employer is responsible, the Employer shall be deemed to have taken over the Works or Section (as the case may be) on the date when the Tests on Completion would otherwise have been completed.

The Engineer shall then issue a Taking-Over Certificate accordingly, and the Contractor shall carry out the Tests on Completion as soon as practicable, before the expiry date of the Defects Notification Period. The Engineer shall require the Tests on Completion to be carried out by giving 14 days' notice and in accordance with the relevant provisions of the Contract.

If the Contractor suffers delay and/or incurs Cost as a result of this delay in carrying out the Tests on Completion, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
- (b) payment of any such Cost plus profit, which shall be



  
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included in the Contract Price.

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

**10.4 Surfaces  
Requiring  
Reinstatement**

Except as otherwise stated in a Taking-Over Certificate, a certificate for a Section or part of the Works shall not be deemed to certify completion of any ground or other surfaces requiring reinstatement.

**11. Defects Liability**

**11.1 Completion of  
Outstanding  
Work and  
Remedying  
Defects**

In order that the Works and Contractor's Documents, and each Section, shall be in the condition required by the Contract (fair wear and tear excepted) by the expiry date of the relevant Defects Notification Period or as soon as practicable thereafter, the Contractor shall:

- (a) complete any work which is outstanding on the date stated in a Taking-Over Certificate, within such reasonable time as is instructed by the Engineer, and
- (b) execute all work required to remedy defects or damage, as may be notified by (or on behalf of) the Employer on or before the expiry date of the Defects Notification Period for the Works or Section (as the case may be).

If a defect appears or damage occurs, the Contractor shall be notified accordingly, by (or on behalf of) the Employer.

**11.2 Cost of  
Remedying  
Defects**

All work referred to in sub-paragraph (b) of Sub-Clause 11.1 [Completion of Outstanding Work and Remedying Defects] shall be executed at the risk and cost of the Contractor, if and to the extent that the work is attributable to:

- (a) any design for which the Contractor is responsible,
- (b) Plant, Materials or workmanship not being in accordance with the Contract, or
- (c) failure by the Contractor to comply with any other obligation.

If and to the extent that such work is attributable to any other cause, the Contractor shall be notified promptly by (or on behalf of) the Employer and Sub-Clause 13.3 [Variation Procedure] shall apply.



**11.3 Extension of Defects Notification Period**

The Employer shall be entitled subject to Sub-Clause 2.5 [Employer's Claims] to an extension of the Defects Notification Period for the Works or a Section if and to the extent that the Works, Section or a major item of Plant (as the case may be, and after taking over) cannot be used for the purposes for which they are intended by reason of a defect or by reason of a damage attributable to the Contractor. However, a Defects Notification Period shall not be extended by more than two years.

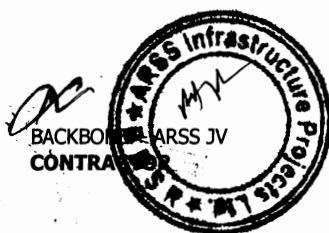
If delivery and/or erection of Plant and/or Materials was suspended under Sub-Clause 8.8 [Suspension of Work] or Sub-Clause 16.1 [Contractor's Entitlement to Suspend Work], the Contractor's obligations under this Clause shall not apply to any defects or damage occurring more than two years after the Defects Notification Period for the Plant and/or Materials would otherwise have expired.

**11.4 Failure to Remedy Defects**

If the Contractor fails to remedy any defect or damage within a reasonable time, a date may be fixed by (or on behalf of) the Employer, on or by which the defect or damage is to be remedied. The Contractor shall be given reasonable notice of this date.

If the Contractor fails to remedy the defect or damage by this notified date and this remedial work was to be executed at the cost of the Contractor under Sub-Clause 11.2 [Cost of Remedying Defects], the Employer may (at his option):

- (a) carry out the work himself or by others, in a reasonable manner and at the Contractor's cost, but the Contractor shall have no responsibility for this work; and the Contractor shall subject to Sub-Clause 2.5 [Employer's Claims] pay to the Employer the costs reasonably incurred by the Employer in remedying the defect or damage;
- (b) require the Engineer to agree or determine a reasonable reduction in the Contract Price in accordance with Sub-Clause 3.5 [Determinations]; or
- (c) if the defect or damage deprives the Employer of substantially the whole benefit of the Works or any major part of the Works, terminate the Contract as a whole, or in respect of such major part which cannot be put to the intended use. Without prejudice to any other rights, under the Contract or otherwise, the Employer shall then be entitled to recover all sums paid for the Works or for such part (as the case may be), plus financing costs and the cost of dismantling the same, clearing the Site and returning Plant and Materials to the Contractor.



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**11.5 Removal of Defective Work**

If the defect or damage cannot be remedied expeditiously on the Site and the Employer gives consent, the Contractor may remove from the Site for the purposes of repair such items of Plant as are defective or damaged. This consent may require the Contractor to increase the amount of the Performance Security by the full replacement cost of these items, or to provide other appropriate security.

**11.6 Further Tests**

If the work of remedying of any defect or damage may affect the performance of the Works, the Engineer may require the repetition of any of the tests described in the Contract. The requirement shall be made by notice within 28 days after the defect or damage is remedied.

These tests shall be carried out in accordance with the terms applicable to the previous tests, except that they shall be carried out at the risk and cost of the Party liable, under Sub-Clause 11.2 [Cost of Remedying Defects], for the cost of the remedial work.

**11.7 Right of Access**

Until the Performance Certificate has been issued, the Contractor shall have such right of access to the Works as is reasonably required in order to comply with this Clause, except as may be inconsistent with the Employer's reasonable security restrictions.

**11.8 Contractor to Search**

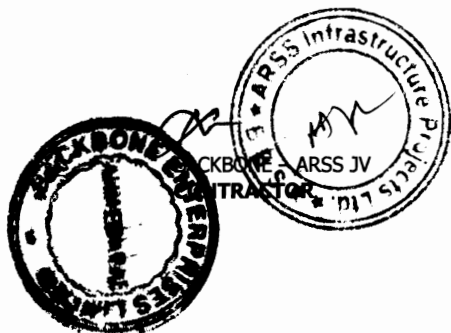
The Contractor shall, if required by the Engineer, search for the cause of any defect, under the direction of the Engineer. Unless the defect is to be remedied at the cost of the Contractor under Sub-Clause 11.2 [Cost of Remedying Defects], the Cost of the search plus profit shall be agreed or determined by the Engineer in accordance with Sub-Clause 3.5 [Determinations] and shall be included in the Contract Price.

**11.9 Performance Certificate**

Performance of the Contractor's obligations shall not be considered to have been completed until the Engineer has issued the Performance Certificate to the Contractor, stating the date on which the Contractor completed his obligations under the Contract.

The Engineer shall issue the Performance Certificate within 28 days after the latest of the expiry dates of the Defects Notification Periods, or as soon thereafter as the Contractor has supplied all the Contractor's Documents and completed and tested all the Works, including remedying any defects. A copy of the Performance Certificate shall be issued to the Employer.

Only the Performance Certificate shall be deemed to constitute acceptance of the Works.



  
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**11.10 Unfulfilled Obligations**

After the Performance Certificate has been issued, each Party shall remain liable for the fulfilment of any obligation which remains unperformed at that time. For the purposes of determining the nature and extent of unperformed obligations, the Contract shall be deemed to remain in force.

**11.11 Clearance of Site**

Upon receiving the Performance Certificate, the Contractor shall remove any remaining Contractor's Equipment, surplus material, wreckage, rubbish and Temporary Works from the Site.

If all these items have not been removed within 28 days after receipt by the Contractor of the Performance Certificate, the Employer may sell or otherwise dispose of any remaining items. The Employer shall be entitled to be paid the costs incurred in connection with, or attributable to, such sale or disposal and restoring the Site.

Any balance of the moneys from the sale shall be paid to the Contractor. If these moneys are less than the Employer's costs, the Contractor shall pay the outstanding balance to the Employer.

**12. Measurement and Evaluation**

**12.1 Works to be Measured**

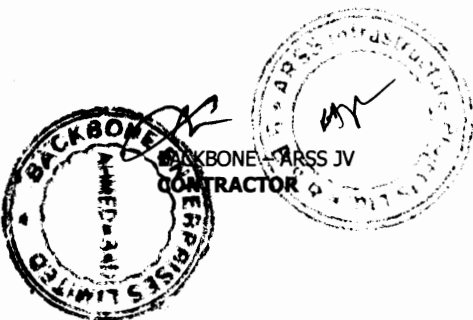
The Works shall be measured, and valued for payment, in accordance with this Clause. The Contractor shall show in each application under Sub-Clauses 14.3 [Application for Interim Payment Certificates], 14.10 [Statement at Completion], and 14.11 [Application for Final Payment Certificate] the quantities and other particulars detailing the amounts which he considers to be entitled under the Contract.

Whenever the Engineer requires any part of the Works to be measured, reasonable notice shall be given to the Contractor's Representative, who shall:

- (a) promptly either attend or send another qualified representative to assist the Engineer in making the measurement, and
- (b) supply any particulars requested by the Engineer.

If the Contractor fails to attend or send a representative, the measurement made by (or on behalf of) the Engineer shall be accepted as accurate.

Except as otherwise stated in the Contract, wherever any Permanent Works are to be measured from records, these shall be prepared by the Engineer. The Contractor shall, as and when



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requested, attend to examine and agree the records with the Engineer, and shall sign the same when agreed. If the Contractor does not attend, the records shall be accepted as accurate.

If the Contractor examines and disagrees the records, and/or does not sign them as agreed, then the Contractor shall give notice to the Engineer of the respects in which the records are asserted to be inaccurate. After receiving this notice, the Engineer shall review the records and either confirm or vary them and certify the payment of the undisputed part. If the Contractor does not so give notice to the Engineer within 14 days after being requested to examine the records, they shall be accepted as accurate.

## 12.2 Method of Measurement

Except as otherwise stated in the Contract and notwithstanding local practice:

- (b) measurement shall be made of the net actual quantity of each item of the Permanent Works, and
- (c) the method of measurement shall be in accordance with the Bill of Quantities or other applicable Schedules.

## 12.3 Evaluation

Except as otherwise stated in the Contract, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine the Contract Price by evaluating each item of work, applying the measurement agreed or determined in accordance with the above Sub-Clauses 12.1 [Works to be Measured] and 12.2 [Method of Measurement] and the appropriate rate or price for the item.

For each item of work, the appropriate rate or price for the item shall be the rate or price specified for such item in the Contract or, if there is no such item, specified for similar work.

Any item of work included in the Bill of Quantities for which no rate or price was specified shall be considered as included in other rates and prices in the Bill of Quantities and will not be paid for separately.

However, a new rate or price shall be appropriate for an item of work if:

- (a)
  - (i) the measured quantity of the item is changed by more than 25% from the quantity of this item in the Bill of Quantities or other Schedule,



- (ii) this change in quantity multiplied by such specified rate for this item exceeds 0.25% of the Accepted Contract Amount,
- (iii) this change in quantity directly changes the Cost per unit quantity of this item by more than 1%, and
- (iv) this item is not specified in the Contract as a "fixed rate item";

or

(b)

- (i) the work is instructed under Clause 13 [Variations and Adjustments],
- (ii) no rate or price is specified in the Contract for this item, and
- (iii) no specified rate or price is appropriate because the item of work is not of similar character, or is not executed under similar conditions, as any item in the Contract.

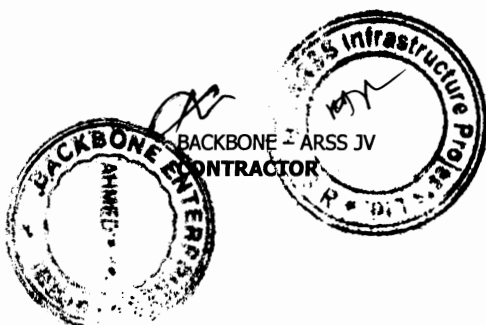
Each new rate or price shall be derived from any relevant rates or prices in the Contract, with reasonable adjustments to take account of the matters described in sub-paragraph (a) and/or (b), as applicable. If no rates or prices are relevant for the derivation of a new rate or price, it shall be derived from the reasonable Cost of executing the work, together with profit, taking account of any other relevant matters.

Until such time as an appropriate rate or price is agreed or determined, the Engineer shall determine a provisional rate or price for the purposes of Interim Payment Certificates as soon as the concerned Works commences.

#### 12.4 Omissions

Whenever the omission of any work forms part (or all) of a Variation, the value of which has not been agreed, if:

- (a) the Contractor will incur (or has incurred) cost which, if the work had not been omitted, would have been deemed to be covered by a sum forming part of the Accepted Contract Amount;
- (b) the omission of the work will result (or has resulted) in this sum not forming part of the Contract Price; and
- (c) this cost is not deemed to be included in the evaluation of



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any substituted work;

then the Contractor shall give notice to the Engineer accordingly, with supporting particulars. Upon receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine this cost, which shall be included in the Contract Price.

### 13. Variations and Adjustments

#### 13.1 Right to Vary

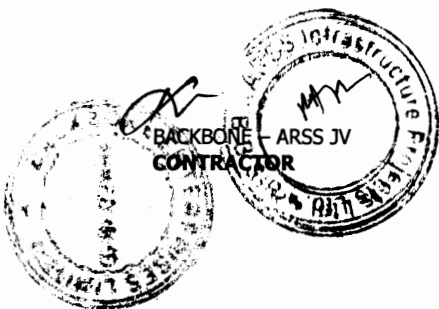
Variations may be initiated by the Engineer at any time prior to issuing the Taking-Over Certificate for the Works, either by an instruction or by a request for the Contractor to submit a proposal.

The Contractor shall execute and be bound by each Variation, unless the Contractor promptly gives notice to the Engineer stating (with supporting particulars) that (i) the Contractor cannot readily obtain the Goods required for the Variation, or (ii) such Variation triggers a substantial change in the sequence or progress of the Works. Upon receiving this notice, the Engineer shall cancel, confirm or vary the instruction.

Each Variation may include:

- (a) changes to the quantities of any item of work included in the Contract (however, such changes do not necessarily constitute a Variation),
- (b) changes to the quality and other characteristics of any item of work,
- (c) changes to the levels, positions and/or dimensions of any part of the Works,
- (d) omission of any work unless it is to be carried out by others,
- (e) any additional work, Plant, Materials or services necessary for the Permanent Works, including any associated Tests on Completion, boreholes and other testing and exploratory work, or
- (f) changes to the sequence or timing of the execution of the Works.

The Contractor shall not make any alteration and/or modification of the Permanent Works, unless and until the Engineer instructs or approves a Variation.



### 13.2 Value Engineering

The Contractor may, at any time, submit to the Engineer a written proposal which (in the Contractor's opinion) will, if adopted, (i) accelerate completion, (ii) reduce the cost to the Employer of executing, maintaining or operating the Works, (iii) improve the efficiency or value to the Employer of the completed Works, or (iv) otherwise be of benefit to the Employer.

The proposal shall be prepared at the cost of the Contractor and shall include the items listed in Sub-Clause 13.3 [Variation Procedure].

If a proposal, which is approved by the Engineer, includes a change in the design of part of the Permanent Works, then unless otherwise agreed by both Parties:

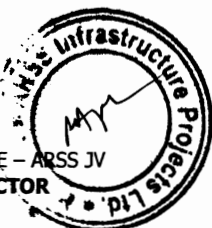
- (a) the Contractor shall design this part,
- (b) sub-paragraphs (a) to (d) of Sub-Clause 4.1 [Contractor's General Obligations] shall apply, and
- (c) if this change results in a reduction in the contract value of this part, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine a fee, which shall be included in the Contract Price. This fee shall be half (50%) of the difference between the following amounts:
  - (i) such reduction in contract value, resulting from the change, excluding adjustments under Sub-Clause 13.7 [Adjustments for Changes in Legislation] and Sub-Clause 13.8 [Adjustments for Changes in Cost], and
  - (ii) the reduction (if any) in the value to the Employer of the varied works, taking account of any reductions in quality, anticipated life or operational efficiencies.

However, if amount (i) is less than amount (ii), there shall not be a fee.

### 13.3 Variation Procedure

If the Engineer requests a proposal, prior to instructing a Variation, the Contractor shall respond in writing as soon as practicable, either by giving reasons why he cannot comply (if this is the case) or by submitting:

- (a) a description of the proposed work to be performed and a programme for its execution,
- (b) the Contractor's proposal for any necessary modifications to the programme according to Sub-Clause 8.3



[Programme] and to the Time for Completion, and

- (c) the Contractor's proposal for evaluation of the Variation.

The Engineer shall, as soon as practicable after receiving such proposal (under Sub-Clause 13.2 [Value Engineering] or otherwise), respond with approval, disapproval or comments. The Contractor shall not delay any work whilst awaiting a response.

Each instruction to execute a Variation, with any requirements for the recording of Costs, shall be issued by the Engineer to the Contractor, who shall acknowledge receipt.

Each Variation shall be evaluated in accordance with Clause 12 [Measurement and Evaluation], unless the Engineer instructs or approves otherwise in accordance with this Clause.

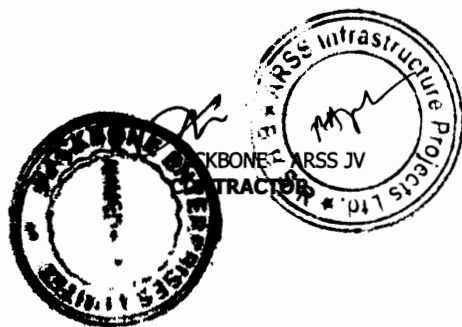
### 13.4 Payment in Applicable Currencies

If the Contract provides for payment of the Contract Price in more than one currency, then whenever an adjustment is agreed, approved or determined as stated above, the amount payable in each of the applicable currencies shall be specified. For this purpose, reference shall be made to the actual or expected currency proportions of the Cost of the varied work, and to the proportions of various currencies specified for payment of the Contract Price.

### 13.5 Provisional Sums

Each Provisional Sum shall only be used, in whole or in part, in accordance with the Engineer's instructions, and the Contract Price shall be adjusted accordingly. The total sum paid to the Contractor shall include only such amounts, for the work, supplies or services to which the Provisional Sum relates, as the Engineer shall have instructed. For each Provisional Sum, the Engineer may instruct:

- (a) work to be executed (including Plant, Materials or services to be supplied) by the Contractor and valued under Sub-Clause 13.3 [Variation Procedure]; and/or
- (b) Plant, Materials or services to be purchased by the Contractor, from a nominated Subcontractor (as defined in Clause 5 [Nominated Subcontractors]) or otherwise; and for which there shall be included in the Contract Price:
  - (i) the actual amounts paid (or due to be paid) by the Contractor, and
  - (ii) a sum for overhead charges and profit, calculated as a percentage of these actual amounts by applying the relevant percentage rate (if any) stated in the



appropriate Schedule. If there is no such rate, the percentage rate stated in the Contract Data shall be applied.

The Contractor shall, when required by the Engineer, produce quotations, invoices, vouchers and accounts or receipts in substantiation.

### 13.6 Daywork

For work of a minor or incidental nature, the Engineer may instruct that a Variation shall be executed on a daywork basis. The work shall then be valued in accordance with the Daywork Schedule included in the Contract, and the following procedure shall apply. If a Daywork Schedule is not included in the Contract, this Sub-Clause shall not apply.

Before ordering Goods for the work, the Contractor shall submit quotations to the Engineer. When applying for payment, the Contractor shall submit invoices, vouchers and accounts or receipts for any Goods.

Except for any items for which the Daywork Schedule specifies that payment is not due, the Contractor shall deliver each day to the Engineer accurate statements in duplicate which shall include the following details of the resources used in executing the previous day's work:

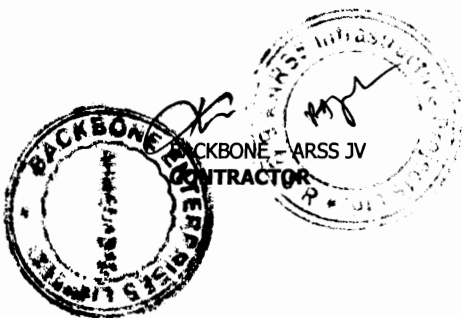
- (a) the names, occupations and time of Contractor's Personnel,
- (b) the identification, type and time of Contractor's Equipment and Temporary Works, and
- (c) the quantities and types of Plant and Materials used.

One copy of each statement will, if correct, or when agreed, be signed by the Engineer and returned to the Contractor. The Contractor shall then submit priced statements of these resources to the Engineer, prior to their inclusion in the next Statement under Sub-Clause 14.3 [Application for Interim Payment Certificates].

### 13.7 Adjustments for Changes in Legislation

The Contract Price shall be adjusted to take account of any increase or decrease in Cost resulting from a change in the Laws of the Country (including the introduction of new Laws and the repeal or modification of existing Laws) or in the judicial or official governmental interpretation of such Laws, made after the Base Date, which affect the Contractor in the performance of obligations under the Contract.

If the Contractor suffers (or will suffer) delay and/or incurs (or



  
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will incur) additional Cost as a result of these changes in the Laws or in such interpretations, made after the Base Date, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
- (b) payment of any such Cost, which shall be included in the Contract Price.

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

Notwithstanding the foregoing, the Contractor shall not be entitled to such an extension of time if the relevant delay has already have been taken into account in determining an extension and such Cost shall not be separately paid if the same shall already have been taken into account in the indexing of any inputs to the table of adjustment data in accordance with the provisions of Sub-Clause 13.8 [Adjustments for Changes in Cost].

### 13.8 Adjustments for Changes in Cost

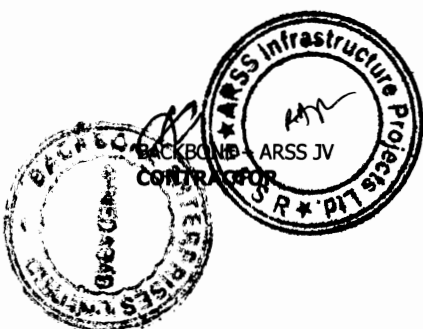
In this Sub-Clause, "table of adjustment data" means the completed table of adjustment data for local and foreign currencies included in the Schedules. If there is no such table of adjustment data, this Sub-Clause shall not apply.


If this Sub-Clause applies, the amounts payable to the Contractor shall be adjusted for rises or falls in the cost of labour, Goods and other inputs to the Works, by the addition or deduction of the amounts determined by the formulae prescribed in this Sub-Clause. To the extent that full compensation for any rise or fall in Costs is not covered by the provisions of this or other Clauses, the Accepted Contract Amount shall be deemed to have included amounts to cover the contingency of other rises and falls in costs.

The adjustment to be applied to the amount otherwise payable to the Contractor, as valued in accordance with the appropriate Schedule and certified in Payment Certificates, shall be determined from formulae for each of the currencies in which the Contract Price is payable. No adjustment is to be applied to work valued on the basis of Cost or current prices. The formulae shall be of the following general type:

$P_n = a + b L_n / L_o + c E_n / E_o + d M_n / M_o + \dots$  where:

"P<sub>n</sub>" is the adjustment multiplier to be applied to the estimated



  
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contract value in the relevant currency of the work carried out in period “n”, this period being a month unless otherwise stated in the Contract Data ;

“a” is a fixed coefficient, stated in the relevant table of adjustment data, representing the non-adjustable portion in contractual payments;

“b”, “c”, “d”, ... are coefficients representing the estimated proportion of each cost element related to the execution of the Works, as stated in the relevant table of adjustment data; such tabulated cost elements may be indicative of resources such as labour, equipment and materials;

“Ln”, “En”, “Mn”, ... are the current cost indices or reference prices for period “n”, expressed in the relevant currency of payment, each of which is applicable to the relevant tabulated cost element on the date 49 days prior to the last day of the period (to which the particular Payment Certificate relates); and

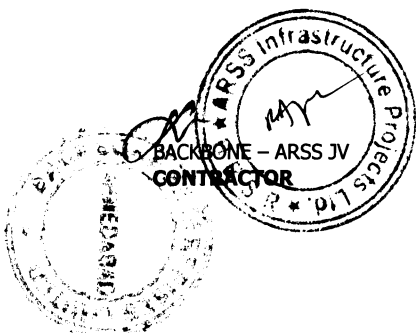
“Lo”, “Eo”, “Mo”, ... are the base cost indices or reference prices, expressed in the relevant currency of payment, each of which is applicable to the relevant tabulated cost element on the Base Date.

The cost indices or reference prices stated in the table of adjustment data shall be used. If their source is in doubt, it shall be determined by the Engineer. For this purpose, reference shall be made to the values of the indices at stated dates (quoted in the fourth and fifth columns respectively of the table) for the purposes of clarification of the source; although these dates (and thus these values) may not correspond to the base cost indices.

In cases where the “currency of index” (stated in the table) is not the relevant currency of payment, each index shall be converted into the relevant currency of payment at the selling rate, established by the central bank of the Country, of this relevant currency on the above date for which the index is required to be applicable.

Until such time as each current cost index is available, the Engineer shall determine a provisional index for the issue of Interim Payment Certificates. When a current cost index is available, the adjustment shall be recalculated accordingly.

If the Contractor fails to complete the Works within the Time for Completion, adjustment of prices thereafter shall be made using either (i) each index or price applicable on the date 49 days prior to the expiry of the Time for Completion of the



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Works, or (ii) the current index or price: whichever is more favourable to the Employer.

The weightings (coefficients) for each of the factors of cost stated in the table(s) of adjustment data shall only be adjusted if they have been rendered unreasonable, unbalanced or inapplicable, as a result of Variations.

#### 14. Contract Price and Payment

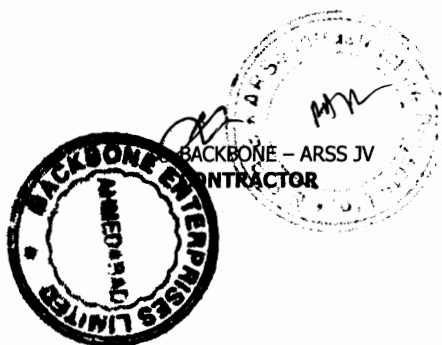
##### 14.1 The Contract Price

Unless otherwise stated in the Particular Conditions:

- (a) the Contract Price shall be agreed or determined under Sub-Clause 12.3 [Evaluation] and be subject to adjustments in accordance with the Contract;
- (b) the Contractor shall pay all taxes, duties and fees required to be paid by him under the Contract, and the Contract Price shall not be adjusted for any of these costs except as stated in Sub-Clause 13.7 [Adjustments for Changes in Legislation];
- (c) any quantities which may be set out in the Bill of Quantities or other Schedule are estimated quantities and are not to be taken as the actual and correct quantities:
  - (i) of the Works which the Contractor is required to execute, or
  - (ii) for the purposes of Clause 12 [Measurement and Evaluation]; and
- (d) the Contractor shall submit to the Engineer, within 28 days after the Commencement Date, a proposed breakdown of each lump sum price in the Schedules. The Engineer may take account of the breakdown when preparing Payment Certificates, but shall not be bound by it.
- (e) Notwithstanding the provisions of subparagraph (b), Contractor's Equipment, including essential spare parts therefor, imported by the Contractor for the sole purpose of executing the Contract shall be exempt from the payment of import duties and taxes upon importation.

##### 14.2 Advance Payment

The Employer shall make an advance payment, as an interest-free loan for mobilisation and cash flow support, when the Contractor submits a guarantee in accordance with this Sub-Clause. The total advance payment, the number and timing of instalments (if more than one), and the applicable currencies and



proportions, shall be as stated in the Contract Data.

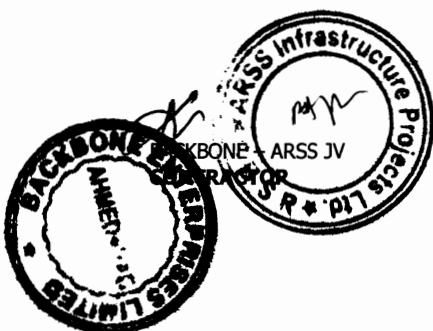
Unless and until the Employer receives this guarantee, or if the total advance payment is not stated in the Contract Data, this Sub-Clause shall not apply.


The Engineer shall deliver to the Employer and to the Contractor an Interim Payment Certificate for the advance payment or its first instalment after receiving a Statement (under Sub-Clause 14.3 [Application for Interim Payment Certificates]) and after the Employer receives (i) the Performance Security in accordance with Sub-Clause 4.2 [Performance Security] and (ii) a guarantee in amounts and currencies equal to the advance payment. This guarantee shall be issued by an entity and from within a country (or other jurisdiction) approved by the Employer, and shall be in the form annexed to the Particular Conditions or in another form approved by the Employer.

The Contractor shall ensure that the guarantee is valid and enforceable until the advance payment has been repaid, but its amount shall be progressively reduced by the amount repaid by the Contractor as indicated in the Payment Certificates. If the terms of the guarantee specify its expiry date, and the advance payment has not been repaid by the date 28 days prior to the expiry date, the Contractor shall extend the validity of the guarantee until the advance payment has been repaid.

Unless stated otherwise in the Contract Data, the advance payment shall be repaid through percentage deductions from the interim payments determined by the Engineer in accordance with Sub-Clause 14.6 [Issue of Interim Payment Certificates], as follows:.

- (a) deductions shall commence in the next interim Payment Certificate following that in which the total of all certified interim payments (excluding the advance payment and deductions and repayments of retention) exceeds 30 percent (30%) of the Accepted Contract Amount less Provisional Sums; and
- (b) deductions shall be made at the amortisation rate stated in the Contract Data of the amount of each Interim Payment Certificate (excluding the advance payment and deductions for its repayments as well as deductions for retention money) in the currencies and proportions of the advance payment until such time as the advance payment has been repaid; provided that the advance payment shall be completely repaid prior to the time when 90 per cent (90%) of the Accepted Contract Amount less Provisional Sums has been



  
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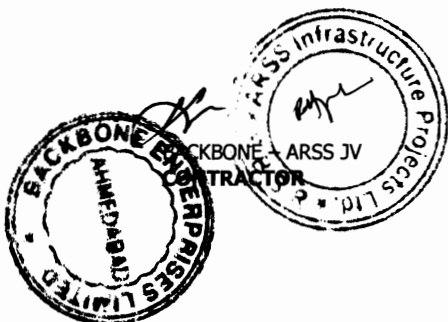
If the advance payment has not been repaid prior to the issue of the Taking-Over Certificate for the Works or prior to termination under Clause 15 [Termination by Employer], Clause 16 [Suspension and Termination by Contractor] or Clause 19 [Force Majeure] (as the case may be), the whole of the balance then outstanding shall immediately become due and in case of termination under Clause 15 [Termination by Employer] and Sub-Clause 19.6 [Optional Termination, Payment and Release], payable by the Contractor to the Employer.

### 14.3 Application for Interim Payment Certificates

The Contractor shall submit a Statement in six copies to the Engineer after the end of each month, in a form approved by the Engineer, showing in detail the amounts to which the Contractor considers himself to be entitled, together with supporting documents which shall include the report on the progress during this month in accordance with Sub-Clause 4.21 [Progress Reports].

The Statement shall include the following items, as applicable, which shall be expressed in the various currencies in which the Contract Price is payable, in the sequence listed:

- (a) the estimated contract value of the Works executed and the Contractor's Documents produced up to the end of the month (including Variations but excluding items described in sub-paragraphs (b) to (g) below);
- (b) any amounts to be added and deducted for changes in legislation and changes in cost, in accordance with Sub-Clause 13.7 [Adjustments for Changes in Legislation] and Sub-Clause 13.8 [Adjustments for Changes in Cost];
- (c) any amount to be deducted for retention, calculated by applying the percentage of retention stated in the Contract Data to the total of the above amounts, until the amount so retained by the Employer reaches the limit of Retention Money (if any) stated in the Contract Data;
- (d) any amounts to be added for the advance payment and (if more than one instalment) and to be deducted for its repayments in accordance with Sub-Clause 14.2 [Advance Payment];
- (e) any amounts to be added and deducted for Plant and Materials in accordance with Sub-Clause 14.5 [Plant and Materials intended for the Works];
- (f) any other additions or deductions which may have become



  
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due under the Contract or otherwise, including those under Clause 20 [Claims, Disputes and Arbitration]; and

- (g) the deduction of amounts certified in all previous Payment Certificates.

#### 14.4 Schedule of Payments

If the Contract includes a schedule of payments specifying the instalments in which the Contract Price will be paid, then unless otherwise stated in this schedule:

- (a) the instalments quoted in this schedule of payments shall be the estimated contract values for the purposes of sub-paragraph (a) of Sub-Clause 14.3 [Application for Interim Payment Certificates];
- (b) Sub-Clause 14.5 [Plant and Materials intended for the Works] shall not apply; and
- (c) if these instalments are not defined by reference to the actual progress achieved in executing the Works, and if actual progress is found to be less or more than that on which this schedule of payments was based, then the Engineer may proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine revised instalments, which shall take account of the extent to which progress is less or more than that on which the instalments were previously based.

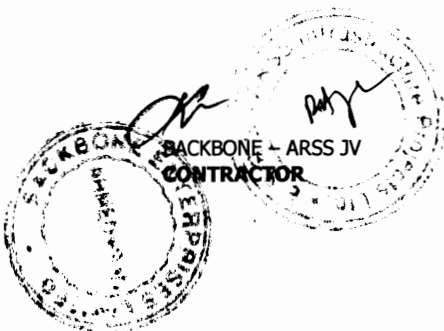
If the Contract does not include a schedule of payments, the Contractor shall submit non-binding estimates of the payments which he expects to become due during each quarterly period. The first estimate shall be submitted within 42 days after the Commencement Date. Revised estimates shall be submitted at quarterly intervals, until the Taking-Over Certificate has been issued for the Works.

#### 14.5 Plant and Materials intended for the Works

If this Sub-Clause applies, Interim Payment Certificates shall include, under sub-paragraph (e) of Sub-Clause 14.3, (i) an amount for Plant and Materials which have been sent to the Site for incorporation in the Permanent Works, and (ii) a reduction when the contract value of such Plant and Materials is included as part of the Permanent Works under sub-paragraph (a) of Sub-Clause 14.3 [Application for Interim Payment Certificates].

If the lists referred to in sub-paragraphs (b)(i) or (c)(i) below are not included in the Schedules, this Sub-Clause shall not apply.

The Engineer shall determine and certify each addition if the following conditions are satisfied:



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- (a) the Contractor has:
- (i) kept satisfactory records (including the orders, receipts, Costs and use of Plant and Materials) which are available for inspection, and
  - (ii) submitted a statement of the Cost of acquiring and delivering the Plant and Materials to the Site, supported by satisfactory evidence;

and either:

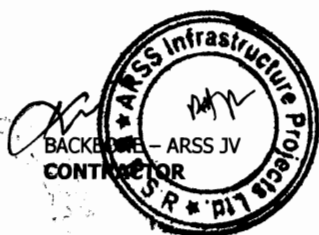
- (b) the relevant Plant and Materials:
- (i) are those listed in the Schedules for payment when shipped,
  - (ii) have been shipped to the Country, en route to the Site, in accordance with the Contract; and
  - (iii) are described in a clean shipped bill of lading or other evidence of shipment, which has been submitted to the Engineer together with evidence of payment of freight and insurance, any other documents reasonably required, and a bank guarantee in a form and issued by an entity approved by the Employer in amounts and currencies equal to the amount due under this Sub-Clause: this guarantee may be in a similar form to the form referred to in Sub-Clause 14.2 [Advance Payment] and shall be valid until the Plant and Materials are properly stored on Site and protected against loss, damage or deterioration;

or

- (c) the relevant Plant and Materials:
- (i) are those listed in the Schedules for payment when delivered to the Site, and
  - (ii) have been delivered to and are properly stored on the Site, are protected against loss, damage or deterioration, and appear to be in accordance with the Contract.

The additional amount to be certified shall be the equivalent of eighty percent of the Engineer's determination of the cost of the Plant and Materials (including delivery to Site), taking account of the documents mentioned in this Sub-Clause and of the contract value of the Plant and Materials.

The currencies for this additional amount shall be the same as



  
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those in which payment will become due when the contract value is included under sub-paragraph (a) of Sub-Clause 14.3 [Application for Interim Payment Certificates]. At that time, the Payment Certificate shall include the applicable reduction which shall be equivalent to, and in the same currencies and proportions as, this additional amount for the relevant Plant and Materials.

#### **14.6 Issue of Interim Payment Certificates**

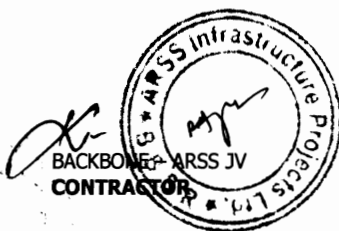
No amount will be certified or paid until the Employer has received and approved the Performance Security. Thereafter, the Engineer shall, within 28 days after receiving a Statement and supporting documents, deliver to the Employer and to the Contractor an Interim Payment Certificate which shall state the amount which the Engineer fairly determines to be due, with all supporting particulars for any reduction or withholding made by the Engineer on the Statement if any.

However, prior to issuing the Taking-Over Certificate for the Works, the Engineer shall not be bound to issue an Interim Payment Certificate in an amount which would (after retention and other deductions) be less than the minimum amount of Interim Payment Certificates (if any) stated in the Contract Data. In this event, the Engineer shall give notice to the Contractor accordingly.

An Interim Payment Certificate shall not be withheld for any other reason, although:

- (a) if any thing supplied or work done by the Contractor is not in accordance with the Contract, the cost of rectification or replacement may be withheld until rectification or replacement has been completed; and/or
- (b) if the Contractor was or is failing to perform any work or obligation in accordance with the Contract, and had been so notified by the Engineer, the value of this work or obligation may be withheld until the work or obligation has been performed.

The Engineer may in any Payment Certificate make any correction or modification that should properly be made to any previous Payment Certificate. A Payment Certificate shall not be deemed to indicate the Engineer's acceptance, approval, consent or satisfaction.



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## 14.7 Payment

The Employer shall pay to the Contractor:

- (a) the first instalment of the advance payment within 42 days after issuing the Letter of Acceptance or within 21 days after receiving the documents in accordance with Sub-Clause 4.2 [Performance Security] and Sub-Clause 14.2 [Advance Payment], whichever is later;
- (b) the amount certified in each Interim Payment Certificate within 56 days after the Engineer receives the Statement and supporting documents or, at a time when the Bank's loan or credit (from which part of the payments to the Contractor is being made) is suspended, the amount shown on any statement submitted by the Contractor, within 14 days after such statement is submitted, any discrepancy being rectified in the next payment to the Contractor; and
- (c) the amount certified in the Final Payment Certificate within 56 days after the Employer receives this Payment Certificate or, at a time when the Bank's loan or credit (from which part of the payments to the Contractor is being made) is suspended, the undisputed amount shown in the Final Statement, within 56 days after the date of notification of the suspension in accordance with Sub-Clause 16.2.

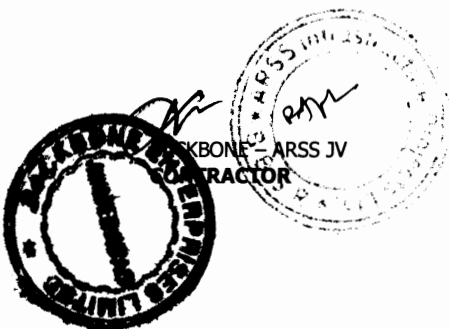
Payment of the amount due in each currency shall be made into the bank account, nominated by the Contractor, in the payment country (for this currency) specified in the Contract.


## 14.8 Delayed Payment

If the Contractor does not receive payment in accordance with Sub-Clause 14.7 [Payment], the Contractor shall be entitled to receive financing charges compounded monthly on the amount unpaid during the period of delay. This period shall be deemed to commence on the date for payment specified in Sub-Clause 14.7 [Payment], irrespective (in the case of its sub-paragraph (b)) of the date on which any Interim Payment Certificate is issued.

Unless otherwise stated in the Particular Conditions, these financing charges shall be calculated at the annual rate of three percentage points above the discount rate of the central bank in the country of the currency of payment, or if not available, the interbank offered rate, and shall be paid in such currency.

The Contractor shall be entitled to this payment without formal notice or certification, and without prejudice to any other right or remedy.



  
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**14.9 Payment of Retention Money**

When the Taking-Over Certificate has been issued for the Works, the first half of the Retention Money shall be certified by the Engineer for payment to the Contractor. If a

Taking-Over Certificate is issued for a Section or part of the Works, a proportion of the Retention Money shall be certified and paid. This proportion shall be half (50%) of the proportion calculated by dividing the estimated contract value of the Section or part, by the estimated final Contract Price.

Promptly after the latest of the expiry dates of the Defects Notification Periods, the outstanding balance of the Retention Money shall be certified by the Engineer for payment to the Contractor. If a Taking-Over Certificate was issued for a Section, a proportion of the second half of the Retention Money shall be certified and paid promptly after the expiry date of the Defects Notification Period for the Section. This proportion shall be half (50%) of the proportion calculated by dividing the estimated contract value of the Section by the estimated final Contract Price.

However, if any work remains to be executed under Clause 11 [Defects Liability], the Engineer shall be entitled to withhold certification of the estimated cost of this work until it has been executed.

When calculating these proportions, no account shall be taken of any adjustments under Sub-Clause 13.7 [Adjustments for Changes in Legislation] and Sub-Clause 13.8 [Adjustments for Changes in Cost].

Unless otherwise stated in the Particular Conditions, when the Taking-Over Certificate has been issued for the Works and the first half of the Retention Money has been certified for payment by the Engineer, the Contractor shall be entitled to substitute a guarantee, in the form annexed to the Particular Conditions or in another form approved by the Employer and provided by an entity approved by the Employer, for the second half of the Retention Money. The Contractor shall ensure that the guarantee is in the amounts and currencies of the second half of the Retention Money and is valid and enforceable until the Contractor has executed and completed the Works and remedied any defects, as specified for the Performance Security in Sub-Clause 4.2. On receipt by the Employer of the required guarantee, the Engineer shall certify and the Employer shall pay the second half of the Retention Money. The release of the second half of the Retention Money against a guarantee shall then be in lieu of the release under the second paragraph of this Sub-Clause. The Employer shall return the guarantee to the



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Contractor within 21 days after receiving a copy of the Performance Certificate.

If the Performance Security required under Sub-Clause 4.2 is in the form of a demand guarantee, and the amount guaranteed under it when the Taking-Over Certificate is issued is more than half of the Retention Money, then the Retention Money guarantee will not be required. If the amount guaranteed under the Performance Security when the Taking-Over Certificate is issued is less than half of the Retention Money, the Retention Money guarantee will only be required for the difference between half of the Retention Money and the amount guaranteed under the Performance Security.

#### 14.10 Statement at Completion

Within 84 days after receiving the Taking-Over Certificate for the Works, the Contractor shall submit to the Engineer six copies of a Statement at completion with supporting documents, in accordance with Sub-Clause 14.3 [Application for Interim Payment Certificates], showing:

- (a) the value of all work done in accordance with the Contract up to the date stated in the Taking-Over Certificate for the Works,
- (b) any further sums which the Contractor considers to be due, and
- (c) an estimate of any other amounts which the Contractor considers will become due to him under the Contract. Estimated amounts shall be shown separately in this Statement at completion.

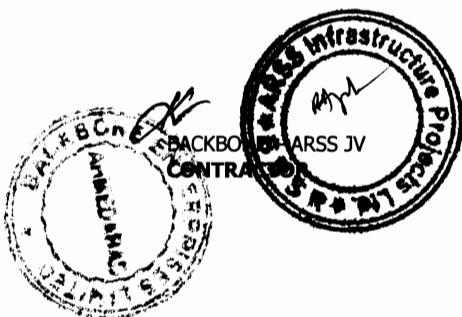
The Engineer shall then certify in accordance with Sub-Clause 14.6 [Issue of Interim Payment Certificates].

#### 14.11 Application for Final Payment Certificate

Within 56 days after receiving the Performance Certificate, the Contractor shall submit, to the Engineer, six copies of a draft final statement with supporting documents showing in detail in a form approved by the Engineer:

- (a) the value of all work done in accordance with the Contract, and
- (b) any further sums which the Contractor considers to be due to him under the Contract or otherwise.

If the Engineer disagrees with or cannot verify any part of the draft final statement, the Contractor shall submit such further information as the Engineer may reasonably require within 28 days from receipt of the said draft and shall make such changes in the draft as may be agreed between them. The Contractor



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shall then prepare and submit to the Engineer the final statement as agreed. This agreed statement is referred to in these Conditions as the "Final Statement".

However if, following discussions between the Engineer and the Contractor and any changes to the draft final statement which are agreed, it becomes evident that a dispute exists, the Engineer shall deliver to the Employer (with a copy to the Contractor) an Interim Payment Certificate for the agreed parts of the draft final statement. Thereafter, if the dispute is finally resolved under Sub-Clause 20.4 [Obtaining Dispute Board's Decision] or Sub-Clause 20.5 [Amicable Settlement], the Contractor shall then prepare and submit to the Employer (with a copy to the Engineer) a Final Statement.

#### 14.12 Discharge

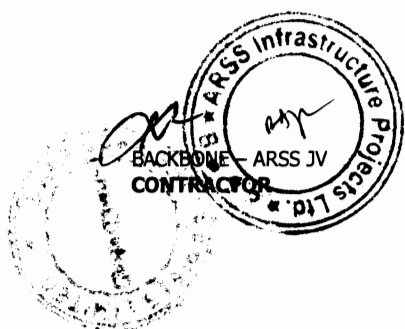
When submitting the Final Statement, the Contractor shall submit a discharge which confirms that the total of the Final Statement represents full and final settlement of all moneys due to the Contractor under or in connection with the Contract. This discharge may state that it becomes effective when the Contractor has received the Performance Security and the outstanding balance of this total, in which event the discharge shall be effective on such date.

#### 14.13 Issue of Final Payment Certificate

Within 28 days after receiving the Final Statement and discharge in accordance with Sub-Clause 14.11 [Application for Final Payment Certificate] and Sub-Clause 14.12 [Discharge], the Engineer shall deliver to the Employer and to the Contractor, the Final Payment Certificate which shall state:

- (a) the amount which he fairly determines is finally due, and
- (b) after giving credit to the Employer for all amounts previously paid by the Employer and for all sums to which the Employer is entitled, the balance (if any) due from the Employer to the Contractor or from the Contractor to the Employer, as the case may be.

If the Contractor has not applied for a Final Payment Certificate in accordance with Sub-Clause 14.11 [Application for Final Payment Certificate] and Sub-Clause 14.12 [Discharge], the Engineer shall request the Contractor to do so. If the Contractor fails to submit an application within a period of 28 days, the Engineer shall issue the Final Payment Certificate for such amount as he fairly determines to be due.



  
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**14.14 Cessation of  
Employer's  
Liability**

The Employer shall not be liable to the Contractor for any matter or thing under or in connection with the Contract or execution of the Works, except to the extent that the Contractor shall have included an amount expressly for it:

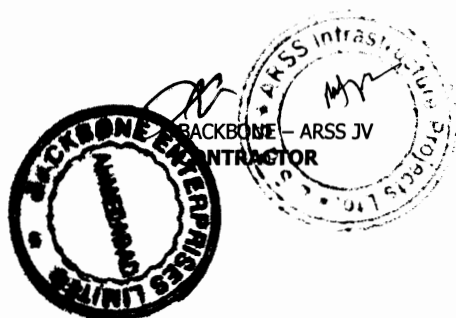
- (a) in the Final Statement and also
- (b) (except for matters or things arising after the issue of the Taking-Over Certificate for the Works) in the Statement at completion described in Sub-Clause 14.10 [Statement at Completion].

However, this Sub-Clause shall not limit the Employer's liability under his indemnification obligations, or the Employer's liability in any case of fraud, deliberate default or reckless misconduct by the Employer.

**14.15 Currencies of  
Payment**

The Contract Price shall be paid in the currency or currencies named in the Schedule of Payment Currencies. If more than one currency is so named, payments shall be made as follows:

- (a) if the Accepted Contract Amount was expressed in Local Currency only:
  - (i) the proportions or amounts of the Local and Foreign Currencies, and the fixed rates of exchange to be used for calculating the payments, shall be as stated in the Schedule of Payment Currencies, except as otherwise agreed by both Parties;
  - (ii) payments and deductions under Sub-Clause 13.5 [Provisional Sums] and Sub-Clause 13.7 [Adjustments for Changes in Legislation] shall be made in the applicable currencies and proportions; and
  - (iii) other payments and deductions under sub-paragraphs (a) to (d) of Sub-Clause 14.3 [Application for Interim Payment Certificates] shall be made in the currencies and proportions specified in sub-paragraph (a)(i) above;
- (b) payment of the damages specified in the Contract Data, shall be made in the currencies and proportions specified in the Schedule of Payment Currencies;
- (c) other payments to the Employer by the Contractor shall be made in the currency in which the sum was expended by the Employer, or in such currency as may be agreed by



both Parties;

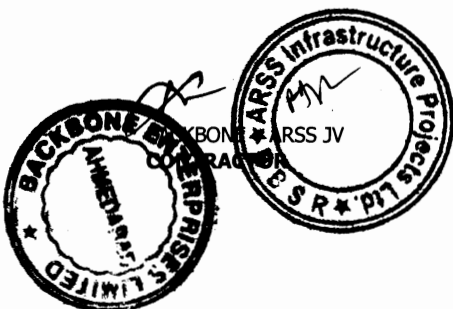
- (d) if any amount payable by the Contractor to the Employer in a particular currency exceeds the sum payable by the Employer to the Contractor in that currency, the Employer may recover the balance of this amount from the sums otherwise payable to the Contractor in other currencies; and
- (e) if no rates of exchange are stated in the Schedule of Payment Currencies, they shall be those prevailing on the Base Date and determined by the central bank of the Country.

### 15. Termination by Employer

**15.1 Notice to Correct** If the Contractor fails to carry out any obligation under the Contract, the Engineer may by notice require the Contractor to make good the failure and to remedy it within a specified reasonable time.

**15.2 Termination by Employer** The Employer shall be entitled to terminate the Contract if the Contractor:

- (a) fails to comply with Sub-Clause 4.2 [Performance Security] or with a notice under Sub-Clause 15.1 [Notice to Correct],
- (b) abandons the Works or otherwise plainly demonstrates the intention not to continue performance of his obligations under the Contract,
- (c) without reasonable excuse fails:
  - (i) to proceed with the Works in accordance with Clause 8 [Commencement, Delays and Suspension], or
  - (ii) to comply with a notice issued under Sub-Clause 7.5 [Rejection] or Sub-Clause 7.6 [Remedial Work], within 28 days after receiving it,
- (d) subcontracts the whole of the Works or assigns the Contract without the required agreement,
- (e) becomes bankrupt or insolvent, goes into liquidation, has a receiving or administration order made against him, compounds with his creditors, or carries on business under a receiver, trustee or manager for the benefit of his creditors, or if any act is done or event occurs which (under applicable Laws) has a similar effect to any of these



*[Signature]*  
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acts or events, or

- (f) gives or offers to give (directly or indirectly) to any person any bribe, gift, gratuity, commission or other thing of value, as an inducement or reward:
  - (i) for doing or forbearing to do any action in relation to the Contract, or
  - (ii) for showing or forbearing to show favour or disfavour to any person in relation to the Contract,

or if any of the Contractor's Personnel, agents or Subcontractors gives or offers to give (directly or indirectly) to any person any such inducement or reward as is described in this sub-paragraph (f). However, lawful inducements and rewards to Contractor's Personnel shall not entitle termination.

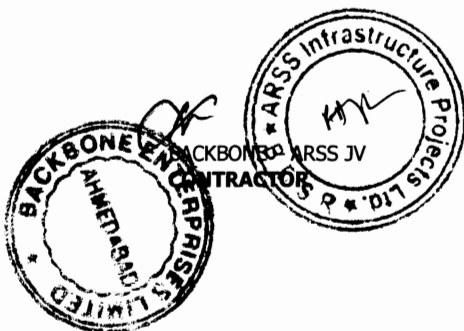
In any of these events or circumstances, the Employer may, upon giving 14 days' notice to the Contractor, terminate the Contract and expel the Contractor from the Site. However, in the case of sub-paragraph (e) or (f), the Employer may by notice terminate the Contract immediately.


The Employer's election to terminate the Contract shall not prejudice any other rights of the Employer, under the Contract or otherwise.

The Contractor shall then leave the Site and deliver any required Goods, all Contractor's Documents, and other design documents made by or for him, to the Engineer. However, the Contractor shall use his best efforts to comply immediately with any reasonable instructions included in the notice (i) for the assignment of any subcontract, and (ii) for the protection of life or property or for the safety of the Works.

After termination, the Employer may complete the Works and/or arrange for any other entities to do so. The Employer and these entities may then use any Goods, Contractor's Documents and other design documents made by or on behalf of the Contractor.

The Employer shall then give notice that the Contractor's Equipment and Temporary Works will be released to the Contractor at or near the Site. The Contractor shall promptly arrange their removal, at the risk and cost of the Contractor. However, if by this time the Contractor has failed to make a payment due to the Employer, these items may be sold by the Employer in order to recover this payment. Any balance of the proceeds shall then be paid to the Contractor.



  
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~~Chief Engineer~~  
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**15.3 Valuation at Date of Termination**

As soon as practicable after a notice of termination under Sub-Clause 15.2 [Termination by Employer] has taken effect, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine the value of the Works, Goods and Contractor's Documents, and any other sums due to the Contractor for work executed in accordance with the Contract.

**15.4 Payment after Termination**

After a notice of termination under Sub-Clause 15.2 [Termination by Employer] has taken effect, the Employer may:

- (a) proceed in accordance with Sub-Clause 2.5 [Employer's Claims],
- (b) withhold further payments to the Contractor until the costs of execution, completion and remedying of any defects, damages for delay in completion (if any), and all other costs incurred by the Employer, have been established, and/or
- (c) recover from the Contractor any losses and damages incurred by the Employer and any extra costs of completing the Works, after allowing for any sum due to the Contractor under Sub-Clause 15.3 [Valuation at Date of Termination]. After recovering any such losses, damages and extra costs, the Employer shall pay any balance to the Contractor.

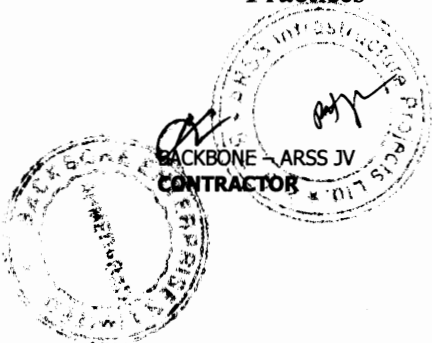
**15.5 Employer's Entitlement to Termination for Convenience**

The Employer shall be entitled to terminate the Contract, at any time for the Employer's convenience, by giving notice of such termination to the Contractor. The termination shall take effect 28 days after the later of the dates on which the Contractor receives this notice or the Employer returns the Performance Security. The Employer shall not terminate the Contract under this Sub-Clause in order to execute the Works himself or to arrange for the Works to be executed by another contractor or to avoid a termination of the Contract by the Contractor under Sub-Clause 16.4 [Payment on Termination].

After this termination, the Contractor shall proceed in accordance with Sub-Clause 16.3 [Cessation of Work and Removal of Contractor's Equipment] and shall be paid in accordance with Sub-Clause 19.6 [Optional Termination, Payment and Release].

**15.6 Corrupt or Fraudulent Practices**

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



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expel him from the Site, and the provisions of Clause 15 shall apply as if such expulsion had been made under Sub-Clause 15.2 [Termination by Employer].

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 Sub-Clause 6.9 [Contractor's Personnel].

For the purposes of this Sub-Clause:

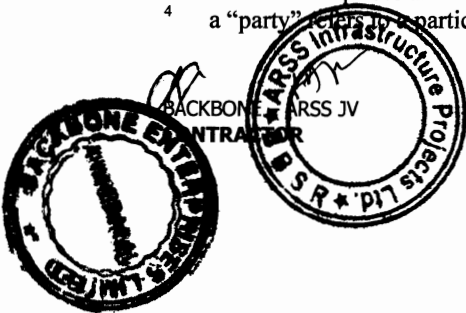
- (i) "corrupt practice"<sup>1</sup> is the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;
- (ii) "fraudulent practice"<sup>2</sup> is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;
- (iii) "collusive practice"<sup>3</sup> 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"<sup>4</sup> 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

<sup>1</sup> "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.

<sup>2</sup> 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.

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

<sup>4</sup> a "party" refers to a participant in the procurement process or contract execution.



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

- (bb) acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under Sub-Clause 1.15 [Inspections and Audits by the Bank].

## 16. Suspension and Termination by Contractor

### 16.1 Contractor's Entitlement to Suspend Work

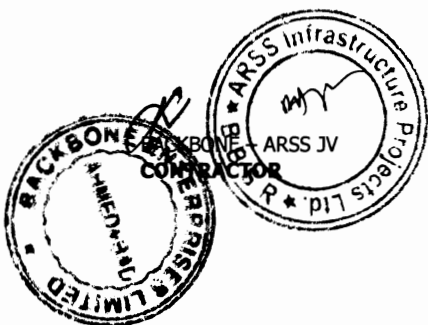
If the Engineer fails to certify in accordance with Sub-Clause 14.6 [Issue of Interim Payment Certificates] or the Employer fails to comply with Sub-Clause 2.4 [Employer's Financial Arrangements] or Sub-Clause 14.7 [Payment], the Contractor may, after giving not less than 21 days' notice to the Employer, suspend work (or reduce the rate of work) unless and until the Contractor has received the Payment Certificate, reasonable evidence or payment, as the case may be and as described in the notice.

Notwithstanding the above, if the Bank has suspended disbursements under the loan or credit from which payments to the Contractor are being made, in whole or in part, for the execution of the Works, and no alternative funds are available as provided for in Sub-Clause 2.4 [Employer's Financial Arrangements], the Contractor may by notice suspend work or reduce the rate of work at any time, but not less than 7 days after the Borrower having received the suspension notification from the Bank.

The Contractor's action shall not prejudice his entitlements to financing charges under Sub-Clause 14.8 [Delayed Payment] and to termination under Sub-Clause 16.2 [Termination by Contractor].

If the Contractor subsequently receives such Payment Certificate, evidence or payment (as described in the relevant Sub-Clause and in the above notice) before giving a notice of termination, the Contractor shall resume normal working as soon as is reasonably practicable.

If the Contractor suffers delay and/or incurs Cost as a result of suspending work (or reducing the rate of work) in accordance with this Sub-Clause, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:



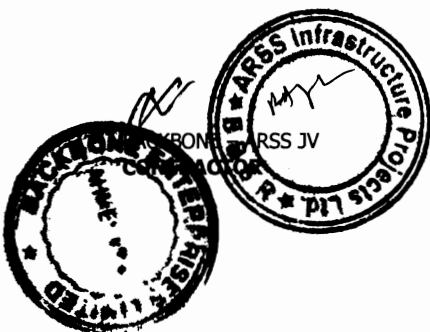
- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
- (b) payment of any such Cost plus profit, which shall be included in the Contract Price.

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

## 16.2 Termination by Contractor

The Contractor shall be entitled to terminate the Contract if:

- (a) the Contractor does not receive the reasonable evidence within 42 days after giving notice under Sub-Clause 16.1 [Contractor's Entitlement to Suspend Work] in respect of a failure to comply with Sub-Clause 2.4 [Employer's Financial Arrangements],
- (b) the Engineer fails, within 56 days after receiving a Statement and supporting documents, to issue the relevant Payment Certificate,
- (c) the Contractor does not receive the amount due under an Interim Payment Certificate within 42 days after the expiry of the time stated in Sub-Clause 14.7 [Payment] within which payment is to be made (except for deductions in accordance with Sub-Clause 2.5 [Employer's Claims]),
- (d) the Employer substantially fails to perform his obligations under the Contract in such manner as to materially and adversely affect the economic balance of the Contract and/or the ability of the Contractor to perform the Contract,
- (e) the Employer fails to comply with Sub-Clause 1.6 [Contract Agreement] or Sub-Clause 1.7 [Assignment],
- (f) a prolonged suspension affects the whole of the Works as described in Sub-Clause 8.11 [Prolonged Suspension], or
- (g) the Employer becomes bankrupt or insolvent, goes into liquidation, has a receiving or administration order made against him, compounds with his creditors, or carries on business under a receiver, trustee or manager for the benefit of his creditors, or if any act is done or event occurs which (under applicable Laws) has a similar effect to any of these acts or events.



- (h) In the event the Bank suspends the loan or credit from which part of the payments to the Contractor are being made, if the Contractor has not received the sums due to him upon expiration of the 14 days referred to in Sub-Clause 14.7 [Payment] for payments under Interim Payment certificates, the Contractor may, without prejudice to the Contractor's entitlement to financing charges under Sub-Clause 14.8 [Delayed Payment], take one or both of the following actions, namely (i) suspend work or reduce the rate of work, and (ii) terminate his employment under the Contract by giving notice to the Employer, with a copy to the Engineer, such termination to take effect 14 days after the giving of the notice.
- (i) the Contractor does not receive the Engineer's instruction recording the agreement of both Parties on the fulfilment of the conditions for the Commencement of Works under Sub-Clause 8.1 [Commencement of Works].

In any of these events or circumstances, the Contractor may, upon giving 14 days' notice to the Employer, terminate the Contract. However, in the case of sub-paragraph (f) or (g), the Contractor may by notice terminate the Contract immediately.

The Contractor's election to terminate the Contract shall not prejudice any other rights of the Contractor, under the Contract or otherwise.

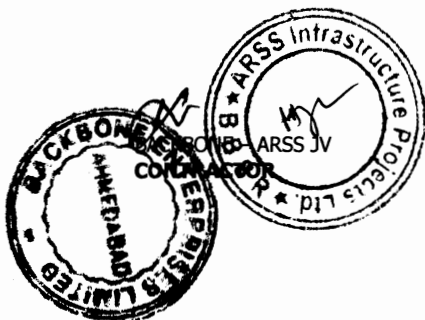
### 16.3 Cessation of Work and Removal of Contractor's Equipment

After a notice of termination under Sub-Clause 15.5 [Employer's Entitlement to Termination for Convenience], Sub-Clause 16.2 [Termination by Contractor] or Sub-Clause 19.6 [Optional Termination, Payment and Release] has taken effect, the Contractor shall promptly:

- (a) cease all further work, except for such work as may have been instructed by the Engineer for the protection of life or property or for the safety of the Works,
- (b) hand over Contractor's Documents, Plant, Materials and other work, for which the Contractor has received payment, and
- (c) remove all other Goods from the Site, except as necessary for safety, and leave the Site.

### 16.4 Payment on Termination

After a notice of termination under Sub-Clause 16.2 [Termination by Contractor] has taken effect, the Employer shall promptly:





- (a) return the Performance Security to the Contractor,
- (b) pay the Contractor in accordance with Sub-Clause 19.6 [Optional Termination, Payment and Release], and
- (c) pay to the Contractor the amount of any loss or damage sustained by the Contractor as a result of this termination.

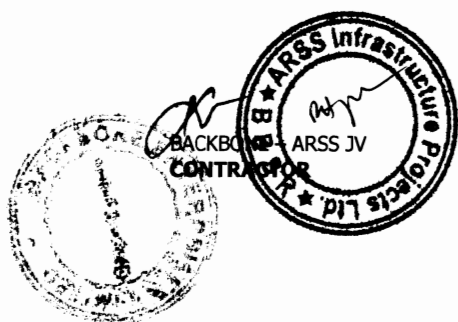
**17. Risk and Responsibility**


**17.1 Indemnities**

The Contractor shall indemnify and hold harmless the Employer, the Employer's Personnel, and their respective agents, against and from all claims, damages, losses and expenses (including legal fees and expenses) in respect of:

- (a) bodily injury, sickness, disease or death, of any person whatsoever arising out of or in the course of or by reason of the Contractor's design (if any), the execution and completion of the Works and the remedying of any defects, unless attributable to any negligence, wilful act or breach of the Contract by the Employer, the Employer's Personnel, or any of their respective agents, and
- (b) damage to or loss of any property, real or personal (other than the Works), to the extent that such damage or loss arises out of or in the course of or by reason of the Contractor's design (if any), the execution and completion of the Works and the remedying of any defects, unless and to the extent that any such damage or loss is attributable to any negligence, wilful act or breach of the Contract by the Employer, the Employer's Personnel, their respective agents, or anyone directly or indirectly employed by any of them.

The Employer shall indemnify and hold harmless the Contractor, the Contractor's Personnel, and their respective agents, against and from all claims, damages, losses and expenses (including legal fees and expenses) in respect of (1) bodily injury, sickness, disease or death, which is attributable to any negligence, wilful act or breach of the Contract by the Employer, the Employer's Personnel, or any of their respective agents, and (2) the matters for which liability may be excluded from insurance cover, as described in sub-paragraphs (d)(i), (ii) and (iii) of Sub-Clause 18.3 [Insurance Against Injury to Persons and Damage to Property].



  
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## 17.2 Contractor's Care of the Works

The Contractor shall take full responsibility for the care of the Works and Goods from the Commencement Date until the Taking-Over Certificate is issued (or is deemed to be issued under Sub-Clause 10.1 [Taking Over of the Works and Sections]) for the Works, when responsibility for the care of the Works shall pass to the Employer. If a Taking-Over Certificate is issued (or is so deemed to be issued) for any Section or part of the Works, responsibility for the care of the Section or part shall then pass to the Employer.

After responsibility has accordingly passed to the Employer, the Contractor shall take responsibility for the care of any work which is outstanding on the date stated in a Taking-Over Certificate, until this outstanding work has been completed.

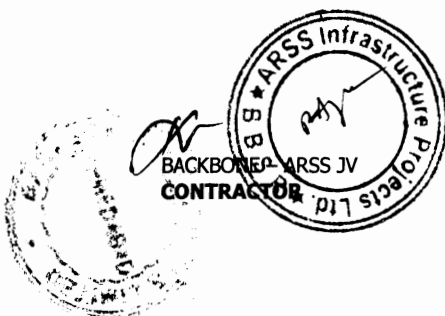
If any loss or damage happens to the Works, Goods or Contractor's Documents during the period when the Contractor is responsible for their care, from any cause not listed in Sub-Clause 17.3 [Employer's Risks], the Contractor shall rectify the loss or damage at the Contractor's risk and cost, so that the Works, Goods and Contractor's Documents conform with the Contract.


The Contractor shall be liable for any loss or damage caused by any actions performed by the Contractor after a Taking-Over Certificate has been issued. The Contractor shall also be liable for any loss or damage which occurs after a Taking-Over Certificate has been issued and which arose from a previous event for which the Contractor was liable.

## 17.3 Employer's Risks

The risks referred to in Sub-Clause 17.4 [Consequences of Employer's Risks] below, insofar as they directly affect the execution of the Works in the Country, are:

- (a) war, hostilities (whether war be declared or not), invasion, act of foreign enemies,
- (b) rebellion, terrorism, sabotage by persons other than the Contractor's Personnel, revolution, insurrection, military or usurped power, or civil war, within the Country,
- (c) riot, commotion or disorder within the Country by persons other than the Contractor's Personnel,
- (d) munitions of war, explosive materials, ionising radiation or contamination by radio-activity, within the Country, except as may be attributable to the Contractor's use of such munitions, explosives, radiation or radio-activity,
- (e) pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds,



  
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- (f) use or occupation by the Employer of any part of the Permanent Works, except as may be specified in the Contract,
- (g) design of any part of the Works by the Employer's Personnel or by others for whom the Employer is responsible, and
- (h) any operation of the forces of nature which is Unforeseeable or against which an experienced contractor could not reasonably have been expected to have taken adequate preventative precautions.

**17.4 Consequences of Employer's Risks**

If and to the extent that any of the risks listed in Sub-Clause 17.3 above results in loss or damage to the Works, Goods or Contractor's Documents, the Contractor shall promptly give notice to the Engineer and shall rectify this loss or damage to the extent required by the Engineer.

If the Contractor suffers delay and/or incurs Cost from rectifying this loss or damage, the Contractor shall give a further notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
- (b) payment of any such Cost, which shall be included in the Contract Price. In the case of sub-paragraphs (f) and (g) of Sub-Clause 17.3 [Employer's Risks], Cost plus profit shall be payable.

After receiving this further notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.


**17.5 Intellectual and Industrial Property Rights**

In this Sub-Clause, "infringement" means an infringement (or alleged infringement) of any patent, registered design, copyright, trade mark, trade name, trade secret or other intellectual or industrial property right relating to the Works; and "claim" means a claim (or proceedings pursuing a claim) alleging an infringement.

Whenever a Party does not give notice to the other Party of any claim within 28 days of receiving the claim, the first Party shall be deemed to have waived any right to indemnity under this Sub-Clause.

The Employer shall indemnify and hold the Contractor harmless



  
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against and from any claim alleging an infringement which is or was:

- (a) an unavoidable result of the Contractor's compliance with the Contract, or
- (b) a result of any Works being used by the Employer:
  - (i) for a purpose other than that indicated by, or reasonably to be inferred from, the Contract, or
  - (ii) in conjunction with any thing not supplied by the Contractor, unless such use was disclosed to the Contractor prior to the Base Date or is stated in the Contract.

The Contractor shall indemnify and hold the Employer harmless against and from any other claim which arises out of or in relation to (i) the manufacture, use, sale or import of any Goods, or (ii) any design for which the Contractor is responsible.

If a Party is entitled to be indemnified under this Sub-Clause, the indemnifying Party may (at its cost) conduct negotiations for the settlement of the claim, and any litigation or arbitration which may arise from it. The other Party shall, at the request and cost of the indemnifying Party, assist in contesting the claim. This other Party (and its Personnel) shall not make any admission which might be prejudicial to the indemnifying Party, unless the indemnifying Party failed to take over the conduct of any negotiations, litigation or arbitration upon being requested to do so by such other Party.

## 17.6 Limitation of Liability

Neither Party shall be liable to the other Party for loss of use of any Works, loss of profit, loss of any contract or for any indirect or consequential loss or damage which may be suffered by the other Party in connection with the Contract, other than as specifically provided in Sub-Clause 8.7 [Delay Damages]; Sub-Clause 11.2 [Cost of Remedying Defects]; Sub-Clause 15.4 [Payment after Termination]; Sub-Clause 16.4 [Payment on Termination]; Sub-Clause 17.1 [Indemnities]; Sub-Clause 17.4 (b) [Consequences of Employer's Risks] and Sub-Clause 17.5 [Intellectual and Industrial Property Rights].

The total liability of the Contractor to the Employer, under or in connection with the Contract other than under Sub-Clause 4.19 [Electricity, Water and Gas], Sub-Clause 4.20 [Employer's Equipment and Free-Issue Material], Sub-Clause 17.1 [Indemnities] and Sub-Clause 17.5 [Intellectual and Industrial Property Rights], shall not exceed the sum resulting from the application of a multiplier (less or greater than one) to the



Accepted Contract Amount, as stated in the Contract Data, or (if such multiplier or other sum is not so stated), the Accepted Contract Amount.

This Sub-Clause shall not limit liability in any case of fraud, deliberate default or reckless misconduct by the defaulting Party.

**17.7 Use of Employer's Accommodation/Facilities**

The Contractor shall take full responsibility for the care of the Employer provided accommodation and facilities, if any, as detailed in the Specification, from the respective dates of hand-over to the Contractor until cessation of occupation (where hand-over or cessation of occupation may take place after the date stated in the Taking-Over Certificate for the Works).

If any loss or damage happens to any of the above items while the Contractor is responsible for their care arising from any cause whatsoever other than those for which the Employer is liable, the Contractor shall, at his own cost, rectify the loss or damage to the satisfaction of the Engineer.

**18. Insurance**

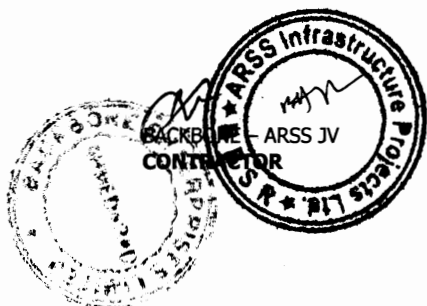
**18.1 General Requirements for Insurances**


In this Clause, "insuring Party" means, for each type of insurance, the Party responsible for effecting and maintaining the insurance specified in the relevant Sub-Clause.

Wherever the Contractor is the insuring Party, each insurance shall be effected with insurers and in terms acceptable to the Contractor. These terms shall be consistent with any terms agreed by both Parties before the date of the Letter of Acceptance. This agreement of terms shall take precedence over the provisions of this Clause.

Wherever the Employer is the insuring Party, each insurance shall be effected with insurers and in terms acceptable to the Contractor. These terms shall be consistent with any terms agreed by both Parties before the date of the Letter of Acceptance. This agreement of terms shall take precedence over the provisions of this Clause.

If a policy is required to indemnify joint insured, the cover shall apply separately to each insured as though a separate policy had been issued for each of the joint insured. If a policy indemnifies additional joint insured, namely in addition to the insured specified in this Clause, (i) the Contractor shall act under the policy on behalf of these additional joint insured except that the Employer shall act for Employer's Personnel, (ii) additional joint insured shall not be entitled to receive payments directly from the insurer or to have any other direct dealings with the



  
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insurer, and (iii) the insuring Party shall require all additional joint insured to comply with the conditions stipulated in the policy.

Each policy insuring against loss or damage shall provide for payments to be made in the currencies required to rectify the loss or damage. Payments received from insurers shall be used for the rectification of the loss or damage.

The relevant insuring Party shall, within the respective periods stated in the Contract Data (calculated from the Commencement Date), submit to the other Party:

- (a) evidence that the insurances described in this Clause have been effected, and
- (b) copies of the policies for the insurances described in Sub-Clause 18.2 [Insurance for Works and Contractor's Equipment] and Sub-Clause 18.3 [Insurance against Injury to Persons and Damage to Property].

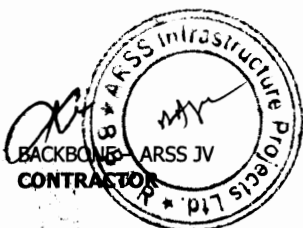
When each premium is paid, the insuring Party shall submit evidence of payment to the other Party. Whenever evidence or policies are submitted, the insuring Party shall also give notice to the Engineer.

Each Party shall comply with the conditions stipulated in each of the insurance policies. The insuring Party shall keep the insurers informed of any relevant changes to the execution of the Works and ensure that insurance is maintained in accordance with this Clause.

Neither Party shall make any material alteration to the terms of any insurance without the prior approval of the other Party. If an insurer makes (or attempts to make) any alteration, the Party first notified by the insurer shall promptly give notice to the other Party.

If the insuring Party fails to effect and keep in force any of the insurances it is required to effect and maintain under the Contract, or fails to provide satisfactory evidence and copies of policies in accordance with this Sub-Clause, the other Party may (at its option and without prejudice to any other right or remedy) effect insurance for the relevant coverage and pay the premiums due. The insuring Party shall pay the amount of these premiums to the other Party, and the Contract Price shall be adjusted accordingly.

Nothing in this Clause limits the obligations, liabilities or



responsibilities of the Contractor or the Employer, under the other terms of the Contract or otherwise. Any amounts not insured or not recovered from the insurers shall be borne by the Contractor and/or the Employer in accordance with these obligations, liabilities or responsibilities. However, if the insuring Party fails to effect and keep in force an insurance which is available and which it is required to effect and maintain under the Contract, and the other Party neither approves the omission nor effects insurance for the coverage relevant to this default, any moneys which should have been recoverable under this insurance shall be paid by the insuring Party.

Payments by one Party to the other Party shall be subject to Sub-Clause 2.5 [Employer's Claims] or Sub-Clause 20.1 [Contractor's Claims], as applicable.

The Contractor shall be entitled to place all insurance relating to the Contract (including, but not limited to the insurance referred to Clause 18) with insurers from any eligible source country.

## 18.2 Insurance for Works and Contractor's Equipment

The insuring Party shall insure the Works, Plant, Materials and Contractor's Documents for not less than the full reinstatement cost including the costs of demolition, removal of debris and professional fees and profit. This insurance shall be effective from the date by which the evidence is to be submitted under sub-paragraph (a) of Sub-Clause 18.1 [General Requirements for Insurances], until the date of issue of the Taking-Over Certificate for the Works.

The insuring Party shall maintain this insurance to provide cover until the date of issue of the Performance Certificate, for loss or damage for which the Contractor is liable arising from a cause occurring prior to the issue of the Taking-Over Certificate, and for loss or damage caused by the Contractor in the course of any other operations (including those under Clause 11 [Defects Liability]).

The insuring Party shall insure the Contractor's Equipment for not less than the full replacement value, including delivery to Site. For each item of Contractor's Equipment, the insurance shall be effective while it is being transported to the Site and until it is no longer required as Contractor's Equipment.

Unless otherwise stated in the Particular Conditions, insurances under this Sub-Clause:

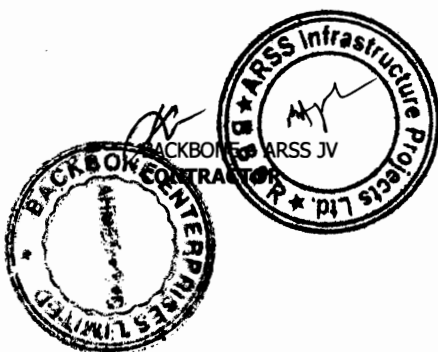
- (a) shall be effected and maintained by the Contractor as insuring Party,



  
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- (b) shall be in the joint names of the Parties, who shall be jointly entitled to receive payments from the insurers, payments being held or allocated to the Party actually bearing the costs of rectifying the loss or damage,
- (c) shall cover all loss and damage from any cause not listed in Sub-Clause 17.3 [Employer's Risks],
- (d) shall also cover, to the extent specifically required in the bidding documents of the Contract, loss or damage to a part of the Works which is attributable to the use or occupation by the Employer of another part of the Works, and loss or damage from the risks listed in sub-paragraphs (c), (g) and (h) of Sub-Clause 17.3 [Employer's Risks], excluding (in each case) risks which are not insurable at commercially reasonable terms, with deductibles per occurrence of not more than the amount stated in the Contract Data (if an amount is not so stated, this sub-paragraph (d) shall not apply), and
- (e) may however exclude loss of, damage to, and reinstatement of:
  - (i) a part of the Works which is in a defective condition due to a defect in its design, materials or workmanship (but cover shall include any other parts which are lost or damaged as a direct result of this defective condition and not as described in sub-paragraph (ii) below),
  - (ii) a part of the Works which is lost or damaged in order to reinstate any other part of the Works if this other part is in a defective condition due to a defect in its design, materials or workmanship,
  - (iii) a part of the Works which has been taken over by the Employer, except to the extent that the Contractor is liable for the loss or damage, and
  - (iv) Goods while they are not in the Country, subject to Sub-Clause 14.5 [Plant and Materials intended for the Works].

If, more than one year after the Base Date, the cover described in sub-paragraph (d) above ceases to be available at commercially reasonable terms, the Contractor shall (as insuring Party) give notice to the Employer, with supporting particulars. The Employer shall then (i) be entitled subject to Sub-Clause



  
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2.5 [Employer's Claims] to payment of an amount equivalent to such commercially reasonable terms as the Contractor should have expected to have paid for such cover, and (ii) be deemed, unless he obtains the cover at commercially reasonable terms, to have approved the omission under Sub-Clause 18.1 [General Requirements for Insurances].

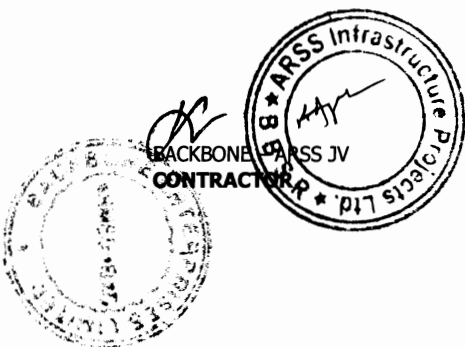
**18.3 Insurance against Injury to Persons and Damage to Property**

The insuring Party shall insure against each Party's liability for any loss, damage, death or bodily injury which may occur to any physical property (except things insured under Sub-Clause 18.2 [Insurance for Works and Contractor's Equipment]) or to any person (except persons insured under Sub-Clause 18.4 [Insurance for Contractor's Personnel]), which may arise out of the Contractor's performance of the Contract and occurring before the issue of the Performance Certificate.

This insurance shall be for a limit per occurrence of not less than the amount stated in the Contract Data, with no limit on the number of occurrences. If an amount is not stated in the Contract Data, this Sub-Clause shall not apply.

Unless otherwise stated in the Particular Conditions, the insurances specified in this Sub-Clause:

- (a) shall be effected and maintained by the Contractor as insuring Party,
- (b) shall be in the joint names of the Parties,
- (c) shall be extended to cover liability for all loss and damage to the Employer's property (except things insured under Sub-Clause 18.2) arising out of the Contractor's performance of the Contract, and
- (d) may however exclude liability to the extent that it arises from:
  - (i) the Employer's right to have the Permanent Works executed on, over, under, in or through any land, and to occupy this land for the Permanent Works,
  - (ii) damage which is an unavoidable result of the Contractor's obligations to execute the Works and remedy any defects, and
  - (iii) a cause listed in Sub-Clause 17.3 [Employer's Risks], except to the extent that cover is available at commercially reasonable terms.



  
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#### 18.4 Insurance for Contractor's Personnel

The Contractor shall effect and maintain insurance against liability for claims, damages, losses and expenses (including legal fees and expenses) arising from injury, sickness, disease or death of any person employed by the Contractor or any other of the Contractor's Personnel.

The insurance shall cover the Employer and the Engineer against liability for claims, damages, losses and expenses (including legal fees and expenses) arising from injury, sickness, disease or death of any person employed by the Contractor or any other of the Contractor's Personnel, except that this insurance may exclude losses and claims to the extent that they arise from any act or neglect of the Employer or of the Employer's Personnel.

The insurance shall be maintained in full force and effect during the whole time that these personnel are assisting in the execution of the Works. For a Subcontractor's employees, the insurance may be effected by the Subcontractor, but the Contractor shall be responsible for compliance with this Clause.

#### 19. Force Majeure

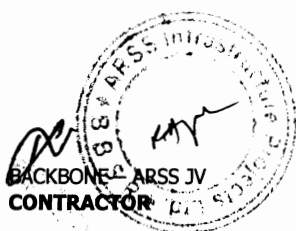
##### 19.1 Definition of Force Majeure

In this Clause, "Force Majeure" means an exceptional event or circumstance:

- (a) which is beyond a Party's control,
- (b) which such Party could not reasonably have provided against before entering into the Contract,
- (c) which, having arisen, such Party could not reasonably have avoided or overcome, and
- (d) which is not substantially attributable to the other Party.

Force Majeure may include, but is not limited to, exceptional events or circumstances of the kind listed below, so long as conditions (a) to (d) above are satisfied:

- (i) war, hostilities (whether war be declared or not), invasion, act of foreign enemies,
- (ii) rebellion, terrorism, sabotage by persons other than the Contractor's Personnel, revolution, insurrection, military or usurped power, or civil war,
- (iii) riot, commotion, disorder, strike or lockout by persons other than the Contractor's Personnel,
- (iv) munitions of war, explosive materials, ionising



radiation or contamination by radio-activity, except as may be attributable to the Contractor's use of such munitions, explosives, radiation or radio-activity, and

- (v) natural catastrophes such as earthquake, hurricane, typhoon or volcanic activity.

### 19.2 Notice of Force Majeure

If a Party is or will be prevented from performing its substantial obligations under the Contract by Force Majeure, then it shall give notice to the other Party of the event or circumstances constituting the Force Majeure and shall specify the obligations, the performance of which is or will be prevented. The notice shall be given within 14 days after the Party became aware, or should have become aware, of the relevant event or circumstance constituting Force Majeure.

The Party shall, having given notice, be excused performance of its obligations for so long as such Force Majeure prevents it from performing them.

Notwithstanding any other provision of this Clause, Force Majeure shall not apply to obligations of either Party to make payments to the other Party under the Contract.

### 19.3 Duty to Minimise Delay

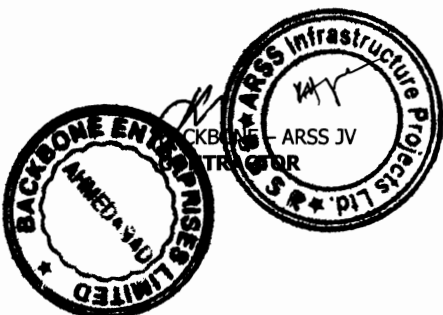
Each Party shall at all times use all reasonable endeavours to minimise any delay in the performance of the Contract as a result of Force Majeure.


A Party shall give notice to the other Party when it ceases to be affected by the Force Majeure.

### 19.4 Consequences of Force Majeure

If the Contractor is prevented from performing its substantial obligations under the Contract by Force Majeure of which notice has been given under Sub-Clause 19.2 [Notice of Force Majeure], and suffers delay and/or incurs Cost by reason of such Force Majeure, the Contractor shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
- (b) if the event or circumstance is of the kind described in sub-paragraphs (i) to (iv) of Sub-Clause 19.1 [Definition of Force Majeure] and, in the case of sub-paragraphs (ii) to (iv), occurs in the Country, payment of any such Cost, including the costs of rectifying or replacing the Works and/or Goods damaged or destroyed by Force Majeure, to the extent they are not indemnified through the insurance policy referred to in Sub-Clause 18.2 [Insurance for



  
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Works and Contractor's Equipment].

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

**19.5 Force Majeure Affecting Subcontractor**

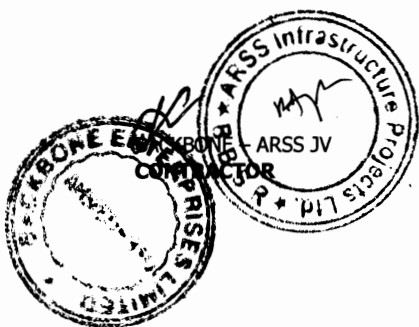
If any Subcontractor is entitled under any contract or agreement relating to the Works to relief from force majeure on terms additional to or broader than those specified in this Clause, such additional or broader force majeure events or circumstances shall not excuse the Contractor's non-performance or entitle him to relief under this Clause.

**19.6 Optional Termination, Payment and Release**

If the execution of substantially all the Works in progress is prevented for a continuous period of 84 days by reason of Force Majeure of which notice has been given under Sub-Clause 19.2 [Notice of Force Majeure], or for multiple periods which total more than 140 days due to the same notified Force Majeure, then either Party may give to the other Party a notice of termination of the Contract. In this event, the termination shall take effect 7 days after the notice is given, and the Contractor shall proceed in accordance with Sub-Clause 16.3 [Cessation of Work and Removal of Contractor's Equipment].

Upon such termination, the Engineer shall determine the value of the work done and issue a Payment Certificate which shall include:

- (a) the amounts payable for any work carried out for which a price is stated in the Contract;
- (b) the Cost of Plant and Materials ordered for the Works which have been delivered to the Contractor, or of which the Contractor is liable to accept delivery: this Plant and Materials shall become the property of (and be at the risk of) the Employer when paid for by the Employer, and the Contractor shall place the same at the Employer's disposal;
- (c) other Costs or liabilities which in the circumstances were reasonably and necessarily incurred by the Contractor in the expectation of completing the Works;
- (d) the Cost of removal of Temporary Works and Contractor's Equipment from the Site and the return of these items to the Contractor's works in his country (or to any other destination at no greater cost); and



  
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World Bank Projects  
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- (e) the Cost of repatriation of the Contractor's staff and labour employed wholly in connection with the Works at the date of termination.

**19.7 Release from Performance**

Notwithstanding any other provision of this Clause, if any event or circumstance outside the control of the Parties (including, but not limited to, Force Majeure) arises which makes it impossible or unlawful for either or both Parties to fulfil its or their contractual obligations or which, under the law governing the Contract, entitles the Parties to be released from further performance of the Contract, then upon notice by either Party to the other Party of such event or circumstance:

- (a) the Parties shall be discharged from further performance, without prejudice to the rights of either Party in respect of any previous breach of the Contract, and
- (b) the sum payable by the Employer to the Contractor shall be the same as would have been payable under Sub-Clause 19.6 [Optional Termination, Payment and Release] if the Contract had been terminated under Sub-Clause 19.6.

**20. Claims, Disputes and Arbitration**

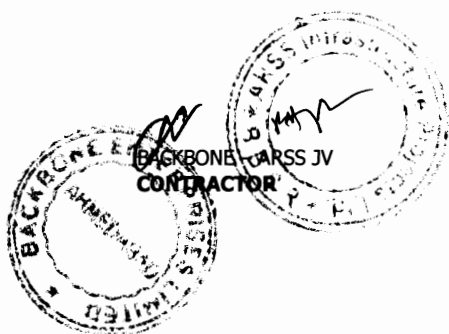
**20.1 Contractor's Claims**


If the Contractor considers himself to be entitled to any extension of the Time for Completion and/or any additional payment, under any Clause of these Conditions or otherwise in connection with the Contract, the Contractor shall give notice to the Engineer, describing the event or circumstance giving rise to the claim. The notice shall be given as soon as practicable, and not later than 28 days after the Contractor became aware, or should have become aware, of the event or circumstance.

If the Contractor fails to give notice of a claim within such period of 28 days, the Time for Completion shall not be extended, the Contractor shall not be entitled to additional payment, and the Employer shall be discharged from all liability in connection with the claim. Otherwise, the following provisions of this Sub-Clause shall apply.

The Contractor shall also submit any other notices which are required by the Contract, and supporting particulars for the claim, all as relevant to such event or circumstance.

The Contractor shall keep such contemporary records as may be necessary to substantiate any claim, either on the Site or at another location acceptable to the Engineer. Without admitting the Employer's liability, the Engineer may, after receiving any



  
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notice under this Sub-Clause, monitor the record-keeping and/or instruct the Contractor to keep further contemporary records. The Contractor shall permit the Engineer to inspect all these records, and shall (if instructed) submit copies to the Engineer.

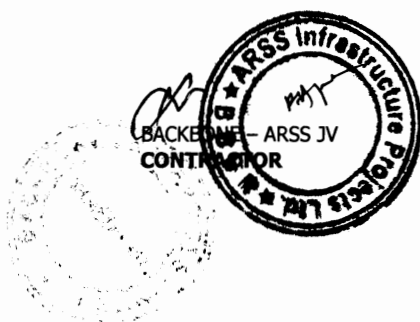
Within 42 days after the Contractor became aware (or should have become aware) of the event or circumstance giving rise to the claim, or within such other period as may be proposed by the Contractor and approved by the Engineer, the Contractor shall send to the Engineer a fully detailed claim which includes full supporting particulars of the basis of the claim and of the extension of time and/or additional payment claimed. If the event or circumstance giving rise to the claim has a continuing effect:


- (a) this fully detailed claim shall be considered as interim;
- (b) the Contractor shall send further interim claims at monthly intervals, giving the accumulated delay and/or amount claimed, and such further particulars as the Engineer may reasonably require; and
- (c) the Contractor shall send a final claim within 28 days after the end of the effects resulting from the event or circumstance, or within such other period as may be proposed by the Contractor and approved by the Engineer.

Within 42 days after receiving a claim or any further particulars supporting a previous claim, or within such other period as may be proposed by the Engineer and approved by the Contractor, the Engineer shall respond with approval, or with disapproval and detailed comments. He may also request any necessary further particulars, but shall nevertheless give his response on the principles of the claim within the above defined time period.

Within the above defined period of 42 days, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine (i) the extension (if any) of the Time for Completion (before or after its expiry) in accordance with Sub-Clause 8.4 [Extension of Time for Completion], and/or (ii) the additional payment (if any) to which the Contractor is entitled under the Contract.

Each Payment Certificate shall include such additional payment for any claim as have been reasonably substantiated as due under the relevant provision of the Contract. Unless and until the particulars supplied are sufficient to substantiate the whole of the claim, the Contractor shall only be entitled to payment for



  
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such part of the claim as he has been able to substantiate.

If the Engineer does not respond within the timeframe defined in this Clause, either Party may consider that the claim is rejected by the Engineer and any of the Parties may refer it to the Dispute Board in accordance with Sub-Clause 20.4 [Obtaining Dispute Board's Decision].

The requirements of this Sub-Clause are in addition to those of any other Sub-Clause which may apply to a claim. If the Contractor fails to comply with this or another Sub-Clause in relation to any claim, any extension of time and/or additional payment shall take account of the extent (if any) to which the failure has prevented or prejudiced proper investigation of the claim, unless the claim is excluded under the second paragraph of this Sub-Clause.

## 20.2 Appointment of the Dispute Board

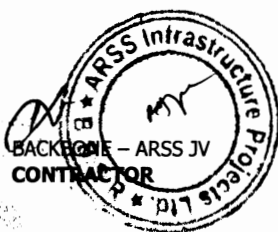
Disputes shall be referred to a DB for decision in accordance with Sub-Clause 20.4 [Obtaining Dispute Board's Decision]. The Parties shall appoint a DB by the date stated in the Contract Data.


The DB shall comprise, as stated in the Contract Data, either one or three suitably qualified persons ("the members"), each of whom shall be fluent in the language for communication defined in the Contract and shall be a professional experienced in the type of construction involved in the Works and with the interpretation of contractual documents. If the number is not so stated and the Parties do not agree otherwise, the DB shall comprise three persons.

If the Parties have not jointly appointed the DB 21 days before the date stated in the Contract Data and the DB is to comprise three persons, each Party shall nominate one member for the approval of the other Party. The first two members shall recommend and the Parties shall agree upon the third member, who shall act as chairman.

However, if a list of potential members has been agreed by the Parties and is included in the Contract, the members shall be selected from those on the list, other than anyone who is unable or unwilling to accept appointment to the DB.

The agreement between the Parties and either the sole member or each of the three members shall incorporate by reference the General Conditions of Dispute Board Agreement contained in the Appendix to these General Conditions, with such



  
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amendments as are agreed between them.

The terms of the remuneration of either the sole member or each of the three members, including the remuneration of any expert whom the DB consults, shall be mutually agreed upon by the Parties when agreeing the terms of appointment. Each Party shall be responsible for paying one-half of this remuneration.

If at any time the Parties so agree, they may jointly refer a matter to the DB for it to give its opinion. Neither Party shall consult the DB on any matter without the agreement of the other Party.

If a member declines to act or is unable to act as a result of death, disability, resignation or termination of appointment, a replacement shall be appointed in the same manner as the replaced person was required to have been nominated or agreed upon, as described in this Sub-Clause.

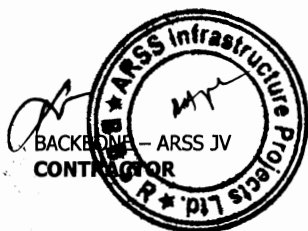
The appointment of any member may be terminated by mutual agreement of both Parties, but not by the Employer or the Contractor acting alone. Unless otherwise agreed by both Parties, the appointment of the DB (including each member) shall expire when the discharge referred to in Sub-Clause 14.12 [Discharge] shall have become effective.


**20.3 Failure to Agree on the Composition of the Dispute Board**

If any of the following conditions apply, namely:

- (a) the Parties fail to agree upon the appointment of the sole member of the DB by the date stated in the first paragraph of Sub-Clause 20.2, [Appointment of the Dispute Board],
- (b) either Party fails to nominate a member (for approval by the other Party), or fails to approve a member nominated by the other Party, of a DB of three persons by such date,
- (c) the Parties fail to agree upon the appointment of the third member (to act as chairman) of the DB by such date, or
- (d) the Parties fail to agree upon the appointment of a replacement person within 42 days after the date on which the sole member or one of the three members declines to act or is unable to act as a result of death, disability, resignation or termination of appointment,

then the appointing entity or official named in the Contract Data shall, upon the request of either or both of the Parties and after due consultation with both Parties, appoint this member of the DB. This appointment shall be final and conclusive. Each Party shall be responsible for paying one-half of the remuneration of



  
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**20.4 Obtaining  
Dispute Board's  
Decision**

the appointing entity or official.

If a dispute (of any kind whatsoever) arises between the Parties in connection with, or arising out of, the Contract or the execution of the Works, including any dispute as to any certificate, determination, instruction, opinion or valuation of the Engineer, either Party may refer the dispute in writing to the DB for its decision, with copies to the other Party and the Engineer. Such reference shall state that it is given under this Sub-Clause.

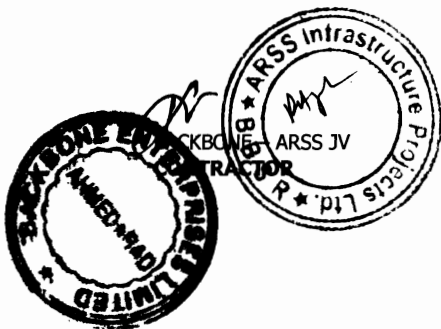
For a DB of three persons, the DB shall be deemed to have received such reference on the date when it is received by the chairman of the DB.

Both Parties shall promptly make available to the DB all such additional information, further access to the Site, and appropriate facilities, as the DB may require for the purposes of making a decision on such dispute. The DB shall be deemed to be not acting as arbitrator(s).

Within 84 days after receiving such reference, or within such other period as may be proposed by the DB and approved by both Parties, the DB shall give its decision, which shall be reasoned and shall state that it is given under this Sub-Clause. The decision shall be binding on both Parties, who shall promptly give effect to it unless and until it shall be revised in an amicable settlement or an arbitral award as described below. Unless the Contract has already been abandoned, repudiated or terminated, the Contractor shall continue to proceed with the Works in accordance with the Contract.

If either Party is dissatisfied with the DB's decision, then either Party may, within 28 days after receiving the decision, give notice to the other Party of its dissatisfaction and intention to commence arbitration. If the DB fails to give its decision within the period of 84 days (or as otherwise approved) after receiving such reference, then either Party may, within 28 days after this period has expired, give notice to the other Party of its dissatisfaction and intention to commence arbitration.

In either event, this notice of dissatisfaction shall state that it is given under this Sub-Clause, and shall set out the matter in dispute and the reason(s) for dissatisfaction. Except as stated in Sub-Clause 20.7 [Failure to Comply with Dispute Board's Decision] and Sub-Clause 20.8 [Expiry of Dispute Board's Appointment], neither Party shall be entitled to commence arbitration of a dispute unless a notice of dissatisfaction has been given in accordance with this Sub-Clause.



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If the DB has given its decision as to a matter in dispute to both Parties, and no notice of dissatisfaction has been given by either Party within 28 days after it received the DB's decision, then the decision shall become final and binding upon both Parties.

## 20.5 Amicable Settlement

Where notice of dissatisfaction has been given under Sub-Clause 20.4 above, both Parties shall attempt to settle the dispute amicably before the commencement of arbitration. However, unless both Parties agree otherwise, arbitration may be commenced on or after the fifty-sixth day after the day on which a notice of dissatisfaction and intention to commence arbitration was given, even if no attempt at amicable settlement has been made.

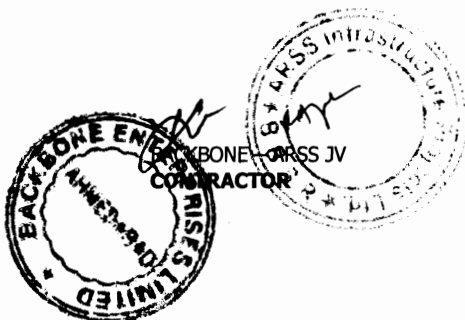
## 20.6 Arbitration


Unless indicated otherwise in the Particular Conditions, any dispute not settled amicably and in respect of which the DB's decision (if any) has not become final and binding shall be finally settled by arbitration. Unless otherwise agreed by both Parties:

- (a) For contracts with foreign contractors, international arbitration with proceedings administered by the international arbitration institution appointed in the Contract Data, conducted in accordance with the rules of arbitration of the appointed institution, if any, or in accordance with UNCITRAL arbitration rules, at the choice of the appointed institution,
- (b) the place of arbitration shall be the city where the headquarters of the appointed arbitration institution is located,
- (c) the arbitration shall be conducted in the language for communications defined in Sub-Clause 1.4 [Law and Language], and
- (d) For contracts with domestic contractors, arbitration with proceedings conducted in accordance with the laws of the Employer's country.

The arbitrators shall have full power to open up, review and revise any certificate, determination, instruction, opinion or valuation of the Engineer, and any decision of the DB, relevant to the dispute. Nothing shall disqualify representatives of the Parties and the Engineer from being called as a witness and giving evidence before the arbitrators on any matter whatsoever relevant to the dispute.

Neither Party shall be limited in the proceedings before the



  
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arbitrators to the evidence or arguments previously put before the DB to obtain its decision, or to the reasons for dissatisfaction given in its notice of dissatisfaction. Any decision of the DB shall be admissible in evidence in the arbitration.

Arbitration may be commenced prior to or after completion of the Works. The obligations of the Parties, the Engineer and the DB shall not be altered by reason of any arbitration being conducted during the progress of the Works.

**20.7 Failure to Comply with Dispute Board's Decision**


In the event that a Party fails to comply with a final and binding DB decision, then the other Party may, without prejudice to any other rights it may have, refer the failure itself to arbitration under Sub-Clause 20.6 [Arbitration]. Sub-Clause 20.4 [Obtaining Dispute Board's Decision] and Sub-Clause 20.5 [Amicable Settlement] shall not apply to this reference.

**20.8 Expiry of Dispute Board's Appointment**

If a dispute arises between the Parties in connection with, or arising out of, the Contract or the execution of the Works and there is no DB in place, whether by reason of the expiry of the DB's appointment or otherwise:

- (a) Sub-Clause 20.4 [Obtaining Dispute Board's Decision] and Sub-Clause 20.5 [Amicable Settlement] shall not apply, and
- (b) the dispute may be referred directly to arbitration under Sub-Clause 20.6 [Arbitration].



  
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## APPENDIX

### A General Conditions of Dispute Board Agreement

#### 1. Definitions

Each "Dispute Board Agreement" is a tripartite agreement by and between:

- (a) the "Employer";
- (b) the "Contractor"; and
- (c) the "Member" who is defined in the Dispute Board Agreement as being:
  - (i) the sole member of the "DB" and, where this is the case, all references to the "Other Members" do not apply, or
  - (ii) one of the three persons who are jointly called the "DB" (or "Dispute Board") and, where this is the case, the other two persons are called the "Other Members."

The Employer and the Contractor have entered (or intend to enter) into a contract, which is called the "Contract" and is defined in the Dispute Board Agreement, which incorporates this Appendix. In the Dispute Board Agreement, words and expressions which are not otherwise defined shall have the meanings assigned to them in the Contract.

#### 2. General Provisions

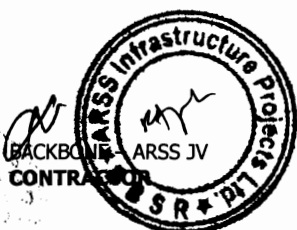
Unless otherwise stated in the Dispute Board Agreement, it shall take effect on the latest of the following dates:

- (a) the Commencement Date defined in the Contract,
- (b) when the Employer, the Contractor and the Member have each signed the Dispute Board Agreement, or
- (c) when the Employer, the Contractor and each of the Other Members (if any) have respectively each signed a dispute board agreement.

This employment of the Member is a personal appointment. At any time, the Member may give not less than 70 days' notice of resignation to the Employer and to the Contractor, and the Dispute Agreement shall terminate upon the expiry of this period.

#### 3. Warranties

The Member warrants and agrees that he/she is and shall be impartial and independent of the Employer, the Contractor and the Engineer. The Member shall promptly disclose, to each of them and to the Other Members (if any), any fact or circumstance which might appear inconsistent with his/her warranty and agreement of impartiality and independence.



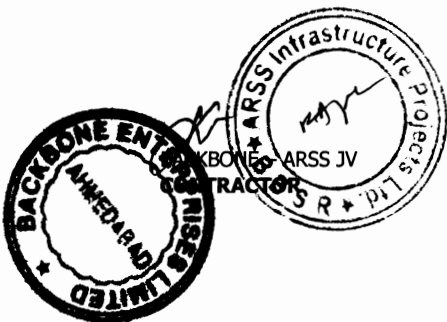
When appointing the Member, the Employer and the Contractor relied upon the Member's representations that he/she is:

- (a) experienced in the work which the Contractor is to carry out under the Contract,
- (b) experienced in the interpretation of contract documentation, and
- (c) fluent in the language for communications defined in the Contract.

**4. General Obligations of the Member**

The Member shall:

- (a) have no interest financial or otherwise in the Employer, the Contractor or Engineer, nor any financial interest in the Contract except for payment under the Dispute Board Agreement;
- (b) not previously have been employed as a consultant or otherwise by the Employer, the Contractor or the Engineer, except in such circumstances as were disclosed in writing to the Employer and the Contractor before they signed the Dispute Board Agreement;
- (c) have disclosed in writing to the Employer, the Contractor and the Other Members (if any), before entering into the Dispute Board Agreement and to his/her best knowledge and recollection, any professional or personal relationships with any director, officer or employee of the Employer, the Contractor or the Engineer, and any previous involvement in the overall project of which the Contract forms part;
- (d) not, for the duration of the Dispute Board Agreement, be employed as a consultant or otherwise by the Employer, the Contractor or the Engineer, except as may be agreed in writing by the Employer, the Contractor and the Other Members (if any);
- (e) comply with the annexed procedural rules and with Sub-Clause 20.4 of the Conditions of Contract;
- (f) not give advice to the Employer, the Contractor, the Employer's Personnel or the Contractor's Personnel concerning the conduct of the Contract, other than in accordance with the annexed procedural rules;
- (g) not while a Member enter into discussions or make any agreement with the Employer, the Contractor or the Engineer regarding employment by any of them, whether as a consultant or otherwise, after ceasing to act under the Dispute Board



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Agreement;

- (h) ensure his/her availability for all site visits and hearings as are necessary;
- (i) become conversant with the Contract and with the progress of the Works (and of any other parts of the project of which the Contract forms part) by studying all documents received which shall be maintained in a current working file;
- (j) treat the details of the Contract and all the DB's activities and hearings as private and confidential, and not publish or disclose them without the prior written consent of the Employer, the Contractor and the Other Members (if any); and
- (k) be available to give advice and opinions, on any matter relevant to the Contract when requested by both the Employer and the Contractor, subject to the agreement of the Other Members (if any).

**5. General Obligations of the Employer and the Contractor**

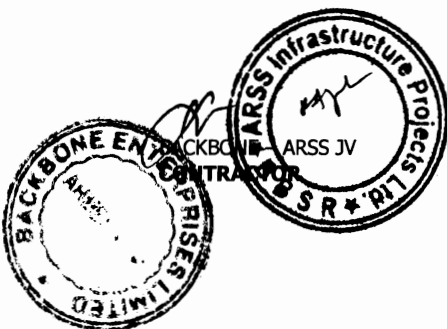
The Employer, the Contractor, the Employer's Personnel and the Contractor's Personnel shall not request advice from or consultation with the Member regarding the Contract, otherwise than in the normal course of the DB's activities under the Contract and the Dispute Board Agreement. The Employer and the Contractor shall be responsible for compliance with this provision, by the Employer's Personnel and the Contractor's Personnel respectively.

The Employer and the Contractor undertake to each other and to the Member that the Member shall not, except as otherwise agreed in writing by the Employer, the Contractor, the Member and the Other Members (if any):

- (a) be appointed as an arbitrator in any arbitration under the Contract;
- (b) be called as a witness to give evidence concerning any dispute before arbitrator(s) appointed for any arbitration under the Contract; or
- (c) be liable for any claims for anything done or omitted in the discharge or purported discharge of the Member's functions, unless the act or omission is shown to have been in bad faith.

The Employer and the Contractor hereby jointly and severally indemnify and hold the Member harmless against and from claims from which he is relieved from liability under the preceding paragraph.

Whenever the Employer or the Contractor refers a dispute to the



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DB under Sub-Clause 20.4 of the Conditions of Contract, which will require the Member to make a site visit and attend a hearing, the Employer or the Contractor shall provide appropriate security for a sum equivalent to the reasonable expenses to be incurred by the Member. No account shall be taken of any other payments due or paid to the Member.

## 6. Payment

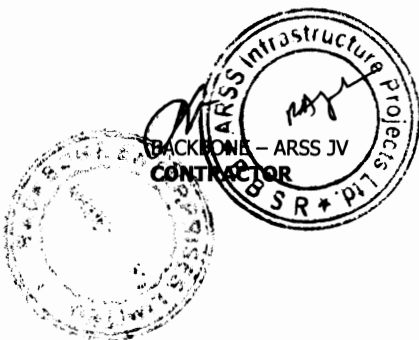
The Member shall be paid as follows, in the currency named in the Dispute Board Agreement:


- (a) a retainer fee per calendar month, which shall be considered as payment in full for:
  - (i) being available on 28 days' notice for all site visits and hearings;
  - (ii) becoming and remaining conversant with all project developments and maintaining relevant files;
  - (iii) all office and overhead expenses including secretarial services, photocopying and office supplies incurred in connection with his duties; and
  - (iv) all services performed hereunder except those referred to in sub-paragraphs (b) and (c) of this Clause.

The retainer fee shall be paid with effect from the last day of the calendar month in which the Dispute Board Agreement becomes effective; until the last day of the calendar month in which the Taking-Over Certificate is issued for the whole of the Works.

With effect from the first day of the calendar month following the month in which the Taking-Over Certificate is issued for the whole of the Works, the retainer fee shall be reduced by one third. This reduced fee shall be paid until the first day of the calendar month in which the Member resigns or the Dispute Board Agreement is otherwise terminated.

- (b) a daily fee which shall be considered as payment in full for:
  - (i) each day or part of a day up to a maximum of two days' travel time in each direction for the journey between the Member's home and the site, or another location of a meeting with the Other Members (if any);
  - (ii) each working day on Site visits, hearings or preparing decisions; and
  - (iii) each day spent reading submissions in preparation for a hearing.



  
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- (c) all reasonable expenses including necessary travel expenses (air fare in less than first class, hotel and subsistence and other direct travel expenses) incurred in connection with the Member's duties, as well as the cost of telephone calls, courier charges, faxes and telexes: a receipt shall be required for each item in excess of five percent of the daily fee referred to in sub-paragraph (b) of this Clause;
- (d) any taxes properly levied in the Country on payments made to the Member (unless a national or permanent resident of the Country) under this Clause 6.

The retainer and daily fees shall be as specified in the Dispute Board Agreement. Unless it specifies otherwise, these fees shall remain fixed for the first 24 calendar months, and shall thereafter be adjusted by agreement between the Employer, the Contractor and the Member, at each anniversary of the date on which the Dispute Board Agreement became effective.

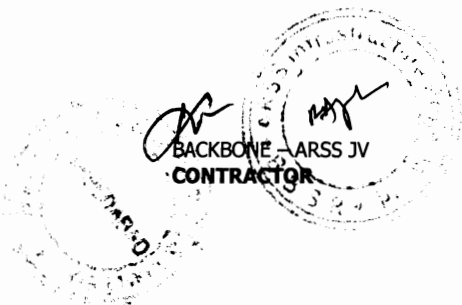
If the parties fail to agree on the retainer fee or the daily fee, the appointing entity or official named in the Contract Data shall determine the amount of the fees to be used.

The Member shall submit invoices for payment of the monthly retainer and air fares quarterly in advance. Invoices for other expenses and for daily fees shall be submitted following the conclusion of a site visit or hearing. All invoices shall be accompanied by a brief description of activities performed during the relevant period and shall be addressed to the Contractor.

The Contractor shall pay each of the Member's invoices in full within 56 calendar days after receiving each invoice and shall apply to the Employer (in the Statements under the Contract) for reimbursement of one-half of the amounts of these invoices. The Employer shall then pay the Contractor in accordance with the Contract.

If the Contractor fails to pay to the Member the amount to which he/she is entitled under the Dispute Board Agreement, the Employer shall pay the amount due to the Member and any other amount which may be required to maintain the operation of the DB; and without prejudice to the Employer's rights or remedies. In addition to all other rights arising from this default, the Employer shall be entitled to reimbursement of all sums paid in excess of one-half of these payments, plus all costs of recovering these sums and financing charges calculated at the rate specified in Sub-Clause 14.8 of the Conditions of Contract.

If the Member does not receive payment of the amount due within 70 days after submitting a valid invoice, the Member may (i)





suspend his/her services (without notice) until the payment is received, and/or (ii) resign his/her appointment by giving notice under Clause 7.

## 7. Termination

At any time: (i) the Employer and the Contractor may jointly terminate the Dispute Board Agreement by giving 42 days' notice to the Member; or (ii) the Member may resign as provided for in Clause 2.

If the Member fails to comply with the Dispute Board Agreement, the Employer and the Contractor may, without prejudice to their other rights, terminate it by notice to the Member. The notice shall take effect when received by the Member.

If the Employer or the Contractor fails to comply with the Dispute Board Agreement, the Member may, without prejudice to his other rights, terminate it by notice to the Employer and the Contractor. The notice shall take effect when received by them both.

Any such notice, resignation and termination shall be final and binding on the Employer, the Contractor and the Member. However, a notice by the Employer or the Contractor, but not by both, shall be of no effect.

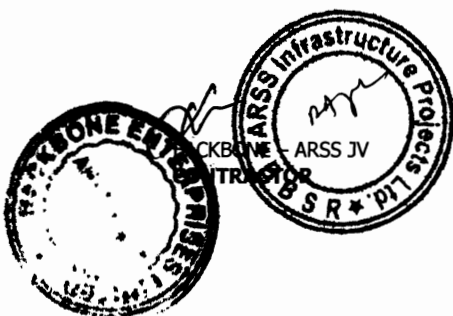
## 8. Default of the Member

If the Member fails to comply with any of his obligations under Clause 4 (a) - (d) above, he shall not be entitled to any fees or expenses hereunder and shall, without prejudice to their other rights, reimburse each of the Employer and the Contractor for any fees and expenses received by the Member and the Other Members (if any), for proceedings or decisions (if any) of the DB which are rendered void or ineffective by the said failure to comply.

If the Member fails to comply with any of his obligations under Clause 4 (e) - (k) above, he shall not be entitled to any fees or expenses hereunder from the date and to the extent of the non-compliance and shall, without prejudice to their other rights, reimburse each of the Employer and the Contractor for any fees and expenses already received by the Member, for proceedings or decisions (if any) of the DB which are rendered void or ineffective by the said failure to comply.

## 9. Disputes

Any dispute or claim arising out of or in connection with this Dispute Board Agreement, or the breach, termination or invalidity thereof, shall be finally settled by institutional arbitration. If no other arbitration institute is agreed, the arbitration shall be conducted under the Rules of Arbitration of the International Chamber of Commerce by one arbitrator appointed in accordance with these Rules of Arbitration.



## PROCEDURAL RULES

Unless otherwise agreed by the Employer and the Contractor, the DB shall visit the site at intervals of not more than 140 days, including times of critical construction events, at the request of either the Employer or the Contractor. Unless otherwise agreed by the Employer, the Contractor and the DB, the period between consecutive visits shall not be less than 70 days, except as required to convene a hearing as described below.

The timing of and agenda for each site visit shall be as agreed jointly by the DB, the Employer and the Contractor, or in the absence of agreement, shall be decided by the DB. The purpose of site visits is to enable the DB to become and remain acquainted with the progress of the Works and of any actual or potential problems or claims, and, as far as reasonable, to endeavour to prevent potential problems or claims from becoming disputes.

Site visits shall be attended by the Employer, the Contractor and the Engineer and shall be co-ordinated by the Employer in co-operation with the Contractor. The Employer shall ensure the provision of appropriate conference facilities and secretarial and copying services. At the conclusion of each site visit and before leaving the site, the DB shall prepare a report on its activities during the visit and shall send copies to the Employer and the Contractor.

The Employer and the Contractor shall furnish to the DB one copy of all documents which the DB may request, including Contract documents, progress reports, variation instructions, certificates and other documents pertinent to the performance of the Contract. All communications between the DB and the Employer or the Contractor shall be copied to the other Party. If the DB comprises three persons, the Employer and the Contractor shall send copies of these requested documents and these communications to each of these persons.

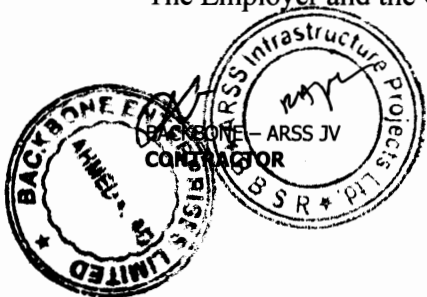
If any dispute is referred to the DB in accordance with Sub-Clause 20.4 of the Conditions of Contract, the DB shall proceed in accordance with Sub-Clause 20.4 and these Rules. Subject to the time allowed to give notice of a decision and other relevant factors, the DB shall:

- (a) act fairly and impartially as between the Employer and the Contractor, giving each of them a reasonable opportunity of putting his case and responding to the other's case, and
- (b) adopt procedures suitable to the dispute, avoiding unnecessary delay or expense.

The DB may conduct a hearing on the dispute, in which event it will decide on the date and place for the hearing and may request that written documentation and arguments from the Employer and the Contractor be presented to it prior to or at the hearing.

Except as otherwise agreed in writing by the Employer and the Contractor, the DB shall have power to adopt an inquisitorial procedure, to refuse admission to hearings or audience at hearings to any persons other than representatives of the Employer, the Contractor and the Engineer, and to proceed in the absence of any party who the DB is satisfied received notice of the hearing; but shall have discretion to decide whether and to what extent this power may be exercised.

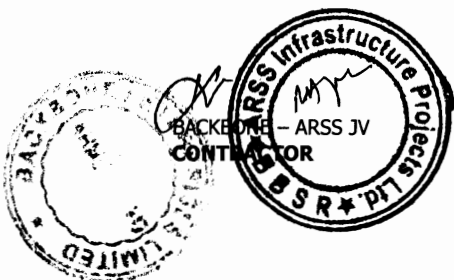
The Employer and the Contractor empower the DB, among other things, to:




- (a) establish the procedure to be applied in deciding a dispute,
- (b) decide upon the DB's own jurisdiction, and as to the scope of any dispute referred to it,
- (c) conduct any hearing as it thinks fit, not being bound by any rules or procedures other than those contained in the Contract and these Rules,
- (d) take the initiative in ascertaining the facts and matters required for a decision,
- (e) make use of its own specialist knowledge, if any,
- (f) decide upon the payment of financing charges in accordance with the Contract,
- (g) decide upon any provisional relief such as interim or conservatory measures, and
- (h) open up, review and revise any certificate, decision, determination, instruction, opinion or valuation of the Engineer, relevant to the dispute.

The DB shall not express any opinions during any hearing concerning the merits of any arguments advanced by the Parties. Thereafter, the DB shall make and give its decision in accordance with Sub-Clause 20.4, or as otherwise agreed by the Employer and the Contractor in writing. If the DB comprises three persons:

- (a) it shall convene in private after a hearing, in order to have discussions and prepare its decision;
- (b) it shall endeavour to reach a unanimous decision: if this proves impossible the applicable decision shall be made by a majority of the Members, who may require the minority Member to prepare a written report for submission to the Employer and the Contractor; and
- (c) if a Member fails to attend a meeting or hearing, or to fulfil any required function, the other two Members may nevertheless proceed to make a decision, unless:
  - (i) either the Employer or the Contractor does not agree that they do so, or
  - (ii) the absent Member is the chairman and he/she instructs the other Members not to make a decision.



  
**Chief Engineer**  
 World Bank Projects, Orissa  
~~Chief Engineer~~  
**World Bank Projects**  
 Office of the E.I.C (Civil) Orissa  
 Bhubaneswar



**GOVERNMENT OF ORISSA**  
**WORKS DEPARTMENT**

**CIVIL WORKS CONTRACT**

[ PACKAGE No. OSRP-CW-ICB-Y1-P03 ]

**For**

*Widening & Strengthening of existing carriageway to 2-lane road from  
Berhampur to Taptapani  
(Km. 0/0 to 41/0 of SH – 17)*

*under  
Orissa State Roads Project*

between

**Chief Engineer, World Bank Projects, Orissa**  
**on behalf of**  
**Orissa Works Department, Government of Orissa**

and

**BACKBONE – ARSS JV**  
Plot No. 38, SECTOR – A, Zone – D  
Mancheswar Industrial Estate, Mancheswar, Bhubaneswar – 751010 [INDIA]

[ VOLUME – III: SPECIFICATIONS ]

Agreement Value: Rs. 81,97,23,707

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

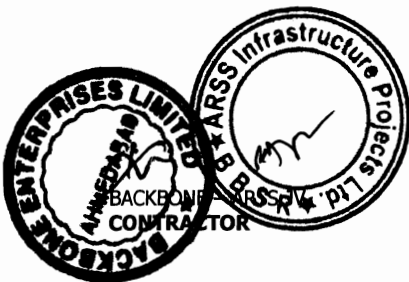
**Dated: 5<sup>th</sup> September, 2008**

## CONTENTS of CONTRACT

<b>Volume – I</b>	:	Letter of Acceptance, Letter Bid and addenda
<b>Volume – II</b>	:	Particular Conditions and the General Conditions;
<b>Volume – III</b>	:	Specifications
<b>Volume – IV</b>	:	Drawings
<b>Volume – V</b>	:	Completed Schedules,

## CONTENTS of VOLUME III

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EMPLOYER  
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# Scope of Works

## 1. BACKGROUND

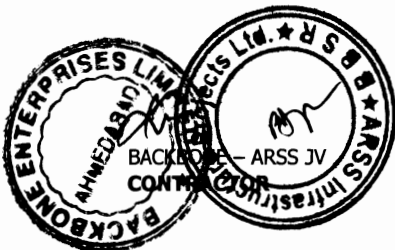
- 1.1 The Government of Orissa through Government of India has applied for financial assistance in the form of a Loan from the International Bank for Reconstruction and Development (the Bank) for the Orissa State Roads Project. Part of this financial assistance will be applied towards civil works for the widening and strengthening of about 900 km of State Highways (SH).
- 1.2 The executing agency for the Orissa State Road Project is the Orissa Works Department (OWD). The OWD has established a Project Implementation Unit (PIU) exclusively to be in-charge of the Orissa State Road Project. The PIU is headed by the Chief Engineer, World Bank Projects, Orissa assisted by appropriate professional and support staff.
- 1.3 The proposed construction packages to be taken up in the first year of the project are as follows:

Sl.	Package No.	Name of the Road	Approximate Length of Construction in Km	Period of Construction
1	OSRP-CW- Y1-P03	Berhampur – Taptapani ( SH 17) [ Km. 0/0 – 41/0]	41 kms	24 Months

### Geographical & Climatic Information

#### 1.3.1 Berhampur – Tatpapani

This road located in the south-eastern part of Orissa and takes off from NH 217 at 18th km near Berhampur. Berhampur, a principal commercial town of south Orissa, is located at about 8km from Bay of Bengal. The total length of the road is from Berhampur to Bhangi is 150km, but in the year-I, improvement of 41 km has been considered. The terrain is predominantly plain and villages are closely located between 0/0 to 27/0. The stretch of road is located in Ganjam district. This area experiences rainfall of average 1500mm per annum and bulk of the rainfall occurs during June to October, which is the monsoon period in Orissa. Highest temperature in the area during , March to May is 40 degree Celsius and the temperature dips to the lowest of 10 degree Celsius during winter season. This project stretch passes through Berhampur, Digapahandi, villages/semi urban area. Principal river in the area is river Malabhanja, which crosses the project road at 28/600 Km near Digapahandi.



## 2.0 WORKS

The civil works will comprise of the following, as required, mostly on 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

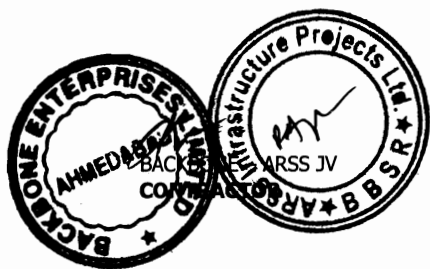
The Chief Engineer, World Bank Projects, Orissa, hereinafter the “Employer’s Representative”, on behalf of the Government of Orissa in Works Department, hereinafter the “Employer”, now wishes to engage a contractor/Joint venture of construction firms of multi-disciplinary international and local expertise, hereafter the “Contractor”, to carry out construction work of the proposed project in accordance with the terms of reference below.

The supervision of the civil works will be carried out by qualified consultants with satisfactory experience in implementing projects of similar nature and size.

## 3. REPORTING REQUIREMENTS

The Contractor shall prepare and submit to the Employer alongwith softcopy of each of the following reports:

SI	Document	Number of Copies	Time
1	Work Programme	5	Two weeks of commencement of Works.
2	Monthly progress report	5	10 business days after end of month
3	Quarterly progress report	5	15 business days after end of quarter
4	Maintenance Manual for Defect liability Period	5	12 months after commencement of Works.
5	RFI Database month wise	5	1 months after commencement of Works.
6	Sectional/Substantial Completion Reports	5	After substantial completion



**a. MONTHLY REPORT:**

The Contractor will, no later than 10th of each month, prepare a brief progress report summarizing the work accomplished by the supervision team for the preceding month. The report will outline any problems encountered (administrative, technical or financial) and propose suggestions on how these problems may be overcome. Brief work progress summaries will be included for on going road and bridge works, outlining problems encountered and required solutions. The report should record the status of payment of contractors monthly certificates, previous month payments and cumulative payments of all claims for cost or time extensions, and of action required of government and other agencies to permit unconstrained works implementation.

The monthly progress report shall also include one chapter each on environmental, signage, safety utility and community asset shifting, tree felling, details of initial rectification, routine maintenance and traffic diversion during construction. The PERT chart in Microsoft Project for all activities shall be enclosed with the monthly progress report.


**b. QUARTERLY PROGRESS REPORTS**

The Contractor will prepare a comprehensive report summarizing all activities under the services at the end of each quarter, and also at other times when considered warranted by either the Consultant or the Employer because of delay of the construction works or because of the occurrence of technical or contractual difficulties. Such reports shall the status of Contractor's claims, if any and will include brief descriptions of the technical and contractual problems being encountered, physical and financial progress on approved formats, financial status of the contracts as a whole consisting the cost incurred, and cost forecast and other relevant information for the ongoing contracts.

**c. SECTIONAL AND SUBSTANTIAL / FINAL COMPLETION REPORTS**

The Contractor will prepare a comprehensive final Completion Report for each defined section of the construction contract, after such sections reaches a stage of substantial completion during the period of the services. These reports must be submitted immediately after the completion of the work by the contractor and before taking over of such sections by the Employer. The report shall incorporate summary of the method of construction, as built construction drawings problems encountered & solutions undertaken thereon.



  
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# Specification

## a. GENERAL TECHNICAL SPECIFICATIONS

1. The General Technical Specifications shall be the “SPECIFICATIONS FOR ROAD AND BRIDGE WORKS” (FOURTH REVISION-2001) published by the Indian Roads Congress (IRC), hereinafter referred to as MORTH Specifications with a cross reference to relevant Bureau of Indian Standards (BIS) for materials or other aspects not covered by the IRC.
2. 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 BIS in that order with the approval of Engineer. 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.
3. 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.

## b. SUPPLEMENTARY TECHNICAL SPECIFICATION

(AMENDEMENTS/ MODIFICATIONS/ ADDITIONS TO EXISTING CLAUSES OF GENERAL TECHNICAL SPECIFICATIONS)



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# PART-I

## 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.

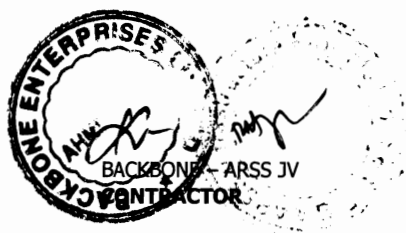
1.2.1 A particular Clause or a part thereof in “SPECIFICATIONS FOR ROAD AND BRIDGE WORKS (FOURTH REVISION - 2001, Reprint 2006)” as corrected in the original referred in PART - I above, where Amended/Modified/Added upon, and incorporated in PART-II, referred to above, such Amendment/Modification/Addition 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.



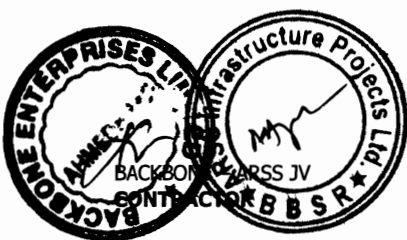
### 1.2.6 Additional Specifications

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.



**PART- II**  
**SUPPLEMENTARY TECHNICAL SPECIFICATION**  
**(AMENDEMENTS/ MODIFICATIONS/ ADDITIONS TO EXITING 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**

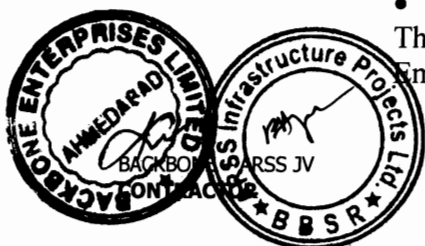
The contractor shall establish, adhere to monitor and maintain an adequate quality assurance programme (QA-Programme)

The QA-programme 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 QA-programme shall as a minimum, 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

The general procedures of the QA-programme 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 QA-programme shall be submitted successively to the effect that it shall have been approved prior to the commencement of the activities to which the programme shall apply.

**Clause 105.4**

**Replace the following**

Word “15 days” with “28 days” in first line

**Add as the penultimate 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**

**Construction Equipment**

**Add the following below sub Para (f)**

g) Adequate standby equipment including spare parts shall be available at site as decided in consultation with the Engineer.

h) All measuring devices and gauges shall be in good working condition. Measuring devices that can affect product quality shall be calibrated prior to use and at prescribed intervals against certified equipment. Calibration procedures shall be established maintained and documented and corrective actions taken when results are unsatisfactory. Accuracy and fitness of measuring devices shall be ensured by proper maintenance.

**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 and Road Over Bridge are vetted 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 less than 21 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 4 weeks before commencement of construction of culverts.

**Clause 108 Site Information**

**Clause 108.4 This Clause shall be replaced as follows**

The Contractor shall identify quarries, borrow areas and other sources of materials required for the work. He shall satisfy himself that the required materials are available in adequate quantities and complying with the requirements of specifications. No claims shall be entertained on account of non-availability of materials and increase in leads.

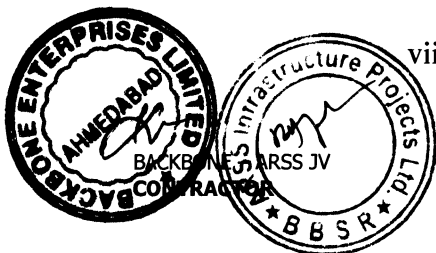
It is the sole responsibility of the contractor to arrange the quarries, borrow areas etc. on license / lease basis or otherwise, and study in detail before tendering the scope of taking the quarry on lease. Advance information must be collected by the contractor regarding the procedure laid down and the consequent delay in arranging the quarries on lease and must make alternative arrangement to procure the quarry products from lease holders. No separate payment will be made for arranging such quarries, borrow areas.”

**Clause 109  
Clause 109.8**

**Setting Out  
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 equipment shall be of high quality standard as approved by the Engineer, in good working condition with 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 and to 1mm accuracy by estimation or better.
- ii) Theodolites with tripod – Electronically operated with computerized output attachment reading to 20 seconds of angle accuracy or better.
- iii) Total station with 2 spare batteries and a charger, three tripods plus tangents sufficient for a 4km. range, together with an electronic data recorder, 6 data packs and all necessary software for operation.
- iv) Precision staff.
- v) 3 meter straight edge and measuring wedge fitted with handles wedges 100 mm ht. and 1 mm accuracy.
- vi) Field Umbrellas
- vii) Ranging rods 50mm dia. 3m long straight with one end each metallic conical and painted alternatively black and white along the length.
- viii) Camber templates 2 lane fitted with handles



  
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- ix) Sprit Level
- x) Invar/Steel tape graduated in meters, centimeter and millimeter.
  - a) 10m long
  - b) 20m long
  - c) 50m long
  - d) Reference markers and pegs

The Contractor shall maintain the surveying equipment in good condition during the full duration of works and replace the ones, which get worn out otherwise become unworkable.

The surveying equipment 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.”

**Clause 110                Public Utilities**

**Clause 110.1            Revise the clause as under**

Existing services like water pipes, sewers, oil pipelines, cables, gas ducts etc. owned by various authorities including Public Undertaking and Local Authorities shall be checked and located by the Contractor prior to commencement of work.

**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            This Clause shall read as under**

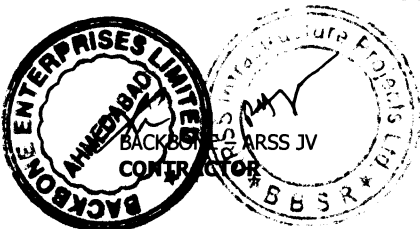
Any utility services likely to be affected by the contractor’s work shall be brought to the notice of the Engineer/ employer and such work shall be undertaken only after getting written clearance from the Engineer.


**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**



  
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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 may be acceptable to the Engineer. The cost of this work shall be deemed to be included in the rates generally.

**Clause 111.2 Borrow pits for Embankment Construction**

**The clause shall be read as follows**

Borrow pits shall not be dug within the Right-of-Way of the road Contractor will ensure that proper excavation techniques are used to improve stability and safety of the borrow 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.

**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 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.

**Clause 111.5 Pollution from Hot Mix Plants and Batching Plants**

**Add the following paragraph at the end of this Sub-clause.**

The contractor shall ensure the use of relatively new, well maintained batching plant so that noise and emission conforms to the regulatory norms and be fitted with dust extraction unit to avoid prolonged engine powered equipment idleness.

**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 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 6 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 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 111.9.1**

**Add new clause as follows**

**Haulage Road**

Same steps as above are to be taken for all of the haulage roads made by the contractor for the work.

**Clause 111.10.1**

**Add the new clause as follows**

**Sanitation & Waste Disposal in Construction Camp**

Contractor shall ensure that construction camps are located at a distance of minimum 200m, from water sources. Construction camps are to be located away from vulnerable people and adequate health care is to be provided for the work force. All temporary accommodation must be constructed and maintained in such a fashion that uncontaminated water is available for drinking, cooking and washing. . At every workplace, good & sufficient water supply will be maintained to avoid waterborne/ water related diseases. The sewage system for the camp must be properly designed, built and operated so that no health hazard occurs and no pollution to the air, ground or adjacent watercourses take place. Compliance with relevant legislation must be strictly adhered to, Garbage bins must be provided in the camp and regularly emptied and the garbage disposed of in a hygienic manner.

Contractor shall provide adequate measures for the health care of workers and arrange their regular medical check-up to ensure that they do not suffer from communicable diseases. If any pits are dug at construction/ camp site which are not filled and may turn into mosquito breeding sites during monsoons, either these shall be filled up properly so that no water gets accumulated. The area shall also be sprayed frequently with pesticides to prevent mosquito breeding.

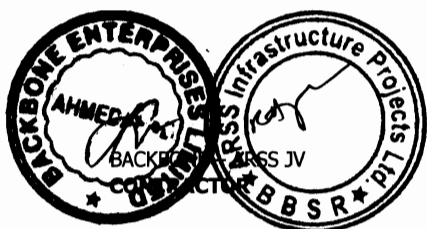
**Clause 111.10.2**


**Environmental Monitoring**

**Add new clause as follows:**

In order to carry out periodic checks environmental monitoring will be carried out by the Engineer as per schedule and if any parameter is found above the acceptable standards, mitigation measures/ control measures as decided by the Engineer shall be compiled with by the Contractor.

**NOISE:**



  
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The Contractor shall mitigate against any sustained increase in base line ambient sound levels at sensitive receptors during construction of work.

All construction operations shall be performed in a manner to minimize noise and Vibration. The parameters for noise are detailed below.

- 70 dB(A) for day and night;
- 50 dB (A) for day and 45 dB(A) for night for sensitive receptors

If the noise level are found to be above these standards and it is determined by the Engineer that these levels are due to the equipments or plants being deployed by the Contractor, he shall undertake, at his own cost measures as approved by the Engineer, to bring these levels down to the specified levels. Blasting should be done as per Indian Explosive Act. People living near such blasting sites shall have prior information of operational hazards. Blasting will not be undertaken normally in night. Worker at blasting sites will be provided with earplug. Material haulage road will be properly regulated.

Labour shall be warned against the hunting of wild life, if any. No archaeological site shall be disturbed, vandalized.

**Clause 111.10.3 Add as new sub clause**

**Protection of Existing Trees**

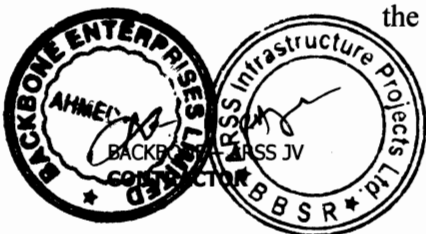
The Employer prior to handing over of the site to the contractor will cut some of the existing trees within the right of way. The contractor shall take all necessary measures to ensure safety and protection of the remaining trees from any action whatsoever relating to his construction operations in the adjoining areas. Giant neighborhood trees recognized locally as important shall be preserved and engineering designs modified to accommodate these.


All works are to be carried out in such a fashion that the damage or disruption to the flora and fauna is reduced to a minimum wherever possible. Trees or shrubs will only be felled or removed that impinge directly on the permanent works or necessary temporary works, after seeking approval of the Engineer.

**Clause 111.10.4 Add as new sub-clause**

**Disposal of Materials outside Work Site**

Notwithstanding other relevant provision in the contract, the excess material generated by dismantling, excavation, waste material and lubricants, used oil, gasoline and other such substance etc., shall be removed from site, outside the right of way at regular intervals and site shall kept clean from all such disposable materials. Grease, cotton and other wastes construction material will be disposed off in shallow soakage wells constructed in each construction site. Such intervals shall not exceed one month under any circumstances. The selection of the disposal site shall be the responsibility of the contractor and he



  
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World Bank Projects, Orissa  
EMPLOYER  
Chief Engineer  
World Bank Projects  
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Bhubaneswar:

shall insure that the selected site does not result in any claim for damages to the employer or violation of any existing laws.

**Clause 111.10.5 Add as new sub-clause**

:

“The Discharge Standards promulgated under the Environment Protection Act, 1986 shall be adhered to strictly. All waste arising from the project is to be disposed of in a manner, which is acceptable to the State Pollution Control Board and the Engineer.”

All vehicles and machinery employed in the execution of the works shall be regularly maintained to ensure that pollutant emission levels comply with the relevant requirements of current pollution control legislation. During routine servicing operations, the effectiveness of exhaust silencers must be checked and if found to be defective must be replaced. Notwithstanding this requirement, noise levels from any item of plant must comply with the relevant legislation for levels of sound emission. Non-compliant plant is to be removed from site.

Vehicle maintenance and refueling shall be carried out in such a fashion that spillage of fuels and lubricants do not contaminate the ground or nearby watercourse. An “oil interceptor” shall be provided for wash down and refueling areas. Fuel storage shall be in proper bounded areas. All spilt and collected petroleum products shall be disposed of in accordance with the relevant legislation.

Construction vehicles machinery & equipment will move or be stationed in the designated area to avoid compaction of soil to ensure the perseverance of the top- soil for agriculture.

**Clause 111.10.6**

Compliance with the foregoing will not relieve the contractor of any responsibility for complying with the requirement of any Highway Authority in respect of the roads used and constructed by him.

**Clause 112 Arrangement for Traffic during Construction**

**Clause 112.1 General**

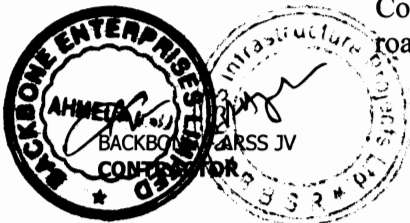
**Delete the last sentence and add the following**

“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.



**Clause 112.2**

Temporary diversions will be constructed only with the approval of the Engineer.

**Passage of Traffic along a part of the Existing Carriage way under improvement:**

**Replace the clause as follows**

If the existing road is used as diversion, then contractor will maintain it at his cost only.

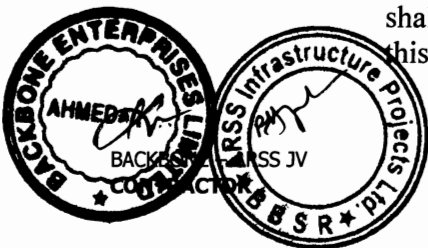
Most of the carriageway of the project has single/intermediate lane carriageway. Due to poor in geometries and drainage consideration the finished road surface shall require raising. The average formation width in plain terrain is about 8m to 10m and in the hilly terrain about 7m to 10m. None of the 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.

**1. Passage of traffic in Plain/Rolling terrain**

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 with 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 2000m 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. 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.

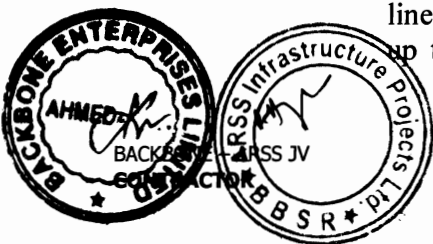
The work of providing earth embankment, sub-grade and granular sub-base material so carried out shall be paid under relevant items of bill of quantities. It may be ensured to provide minimum availability of width of 4.0m for plying of vehicles. At the end of diversion, a suitable link with proper gradient 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.

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.

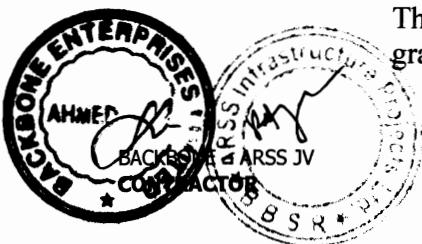
## 2. Passage of traffic in Hilly/Mountaneous terrain

For facilitating passage of traffic during construction, following methodology shall be followed. However the contractor may discuss any improved method with the Engineer and the client. 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, at 50 m long passing places having gradient below 4% with granular sub base with minimum width of 4.0 m shall be provided at 200m interval. If the appropriate gradient is not available, the hill side may be leveled to achieve the required gradient. Work in one stretch should not exceed 1000 m.

The proposed centerline of the alignment shall be marked. The toe line of the embankment shall be marked on both sides of the alignment. If the embankment toe line falls in the hill, cut the hill up to proposed embankment toe line till the proposed sub grade bottom level by blasting or any other means. 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. Over this the same construction methodology should be adopted as mentioned above. Provision of drain as per drawing shall be taken up simultaneous to the construction of GSB. During such time the existing carriageway width of minimum 3.5m and one side of treated shoulder (total of 4.5 m) shall be left for plying of vehicles.

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.

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 (hill 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.

If the excavation is only for temporary traffic diversion, the excavation height should not be more than 1.0 m. If the excavation is more than 1.0m in depth, alternate route should be planned for traffic diversion. 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.

### 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:

Embankments as per clause 305. The use of fly ash in temporary diversions will not be permitted.

Pavement 5.5m wide consisting of 200mm granular sub-base as per clause 401, 225mm 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



Earth shoulders 2.5m wide on both side of the pavement as per clause 407

Minimum horizontal radius on curves 50m

(v) Maximum gradient 5 percent and minimum camber of 2.5 percent

Restriction of maximum speed to 30kmph

Cross drainage structures (if any) shall be adequate to deal with the water flow at all seasons at that location. Account 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. Adequate erosion protection must be provided.

The Contractor shall be responsible for the design of temporary diversions and submit the designs to the Engineer for his approval. 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. Any roadside trees that have to be removed for the construction of temporary diversions shall be the responsibility of the Contractor. The Contractor shall provide 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, all to the approval of the Engineer. The Contractor shall be responsible for the dismantling and disposal of all temporary diversions when approved by the Engineer.

#### **Clause 112.4**

#### **Traffic safety and Control**

#### **Add as the continuation of the first paragraph**

If there is traffic jams during construction, measures shall be taken to relieve the congestion with the assistance of traffic police. Safety of workers undertaking various operations during construction will be ensured by providing helmets, masks, safety goggles etc.

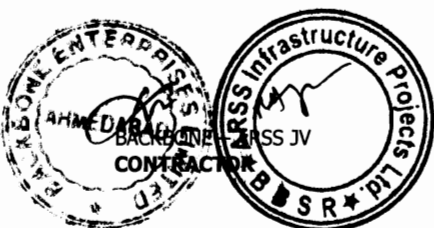
#### **Add the following sub-clauses under 112.4**

#### **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*

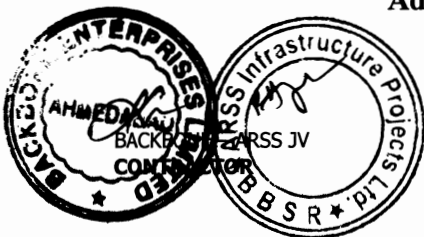
“The rates in the Bill of Quantities are deemed to include the costs of haulage from source of supply to the plant as well as to the construction site as the case may be for all materials required for the Works.”

**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 software) in a form, 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**



  
Chief Engineer  
World Bank Projects, Orissa  
**Chief Engineer**  
World Bank Projects  
O/o the E. I. C (Civil) Orissa  
Bhubaneswar:

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**

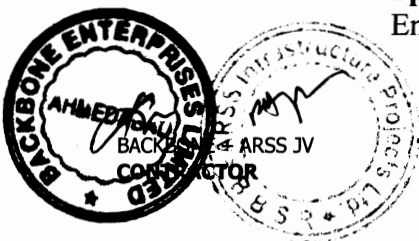
The Contractor shall submit methods statement. The methods statement shall be submitted in two parts.

**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 borrow 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.
- 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.

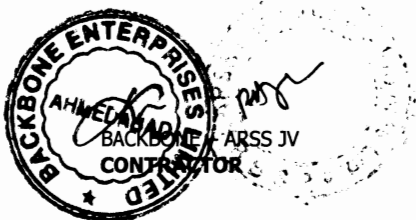
#### Clause 115.1

#### 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 120**

**Site office for Engineer and other Supervisory Staff Deleted**

**Clause 121**

**Field Laboratory**

**Clause 121.1**

**Add the following at the end of the clause**

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**

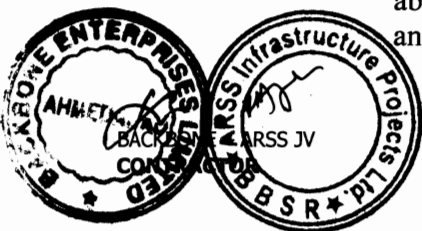
**Description**

**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:

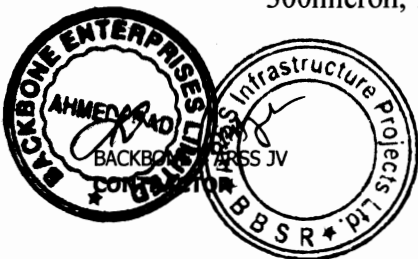
**A.**

**General**

**i)**

**Balance**

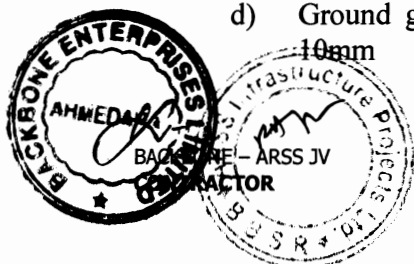
- |      |   |        |
|------|---|--------|
| a)   | 10 kg capacity semi-self indicating type – Accuracy 1 gm  |        |
|      | ELECTRONIC  | 1 No.  |
|      | MECHANICAL  | 1 No.  |
| b)   | 500 gm capacity – Accuracy 0.01 gm  |        |
|      | ELECTRONIC  | 1 No.  |
|      | Mechanical (semi-self 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 |



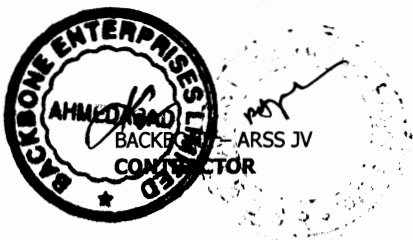
- |        |   |               |
|--------|---|---------------|
| iv)    | Sieve shaker capable of taking 200mm and 450mm dia sieves- electrically operated with time switch assembly  | 1 No.         |
| v)     | 200 tonnes compression testing machine electric cum manually operated   | 2 Nos.        |
| 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<br>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.  |



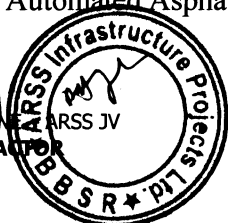
- ii) Hydrometer analysis
- a) High speed stirrer with stainless still beaker 1 No.
- b) Soil hydrometer set including jar 1 Set
- iii) Sampling pipettes fitted with pressure and suction inlets, 10ml. Capacity 1 Set
- iv) Laboratories compaction
- a) Compaction apparatus (Proctor) complete with collar, 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 :
- 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



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**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**

- i) Vicat needle apparatus for setting time with plungers, as per IS-269-1968 1Set  
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
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 compact 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 1<sup>st</sup> line of the last para**

The photographs and materials including digital version in CD shall form a part

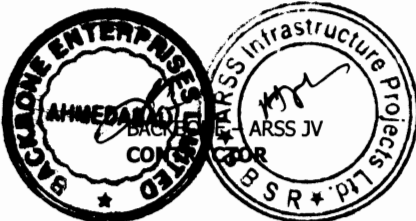
**Clause 126.1**

**Replace the last line of the 1st para**

The video films 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 :**



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”

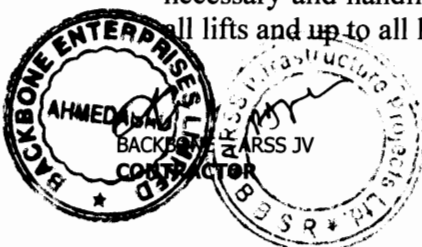
Add the following paragraph:

“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**

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 202.1 Add at the end of this clause**

Water shall be sprayed to reduce dust while dismantling work is in progress. Dismantling work shall not be carried out at night, during storms or heavy rain.

Goggles and gas masks shall be worn at the time of dismantling. Leather gloves shall be worn by the workers. Screens made of G.I. sheets shall be placed wherever necessary to prevent the flying pieces from injuring the workers.

Damage caused to any component of the bridge structure during removal operations shall be restored by the Contractor at his cost. The service lines, if any, shall be disconnected/diverted before dismantling work commences.

**Clause 202.5 Disposal of Materials**

**Add the following as the last para**

“The material may be disposed of at the nearest tip or other approved location in accordance with all statutory requirements. The Engineer may permit the disposal of boulders, concrete fragments and other incombustible materials by burial within the road reserve, outside paved area. When buried, the tops of these materials shall not be less than 300mm below finished surface level.”

**Clause 202.7 Rates**

**Add the following at the end of the para**

“The cost of cartage of materials with no salvage value to disposal sites with all leads 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**

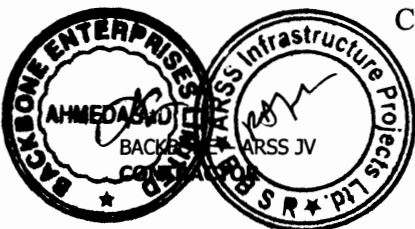
**Clause 301.3.7 This clause shall be read as under:**

“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”.

**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 305.2.1.1**

**The first sentence of this Clause shall be read as under**

The materials used in embankments, sub-grades, earthen shoulders and miscellaneous backfills shall be soil, moorum, gravel, sand, a mixture of these or any other material as approved by the Engineer and in the embankment fly ash modified soil may also be used conforming to requirement in accordance with additional Technical Specification “A-4: EMBANKMENT CONSTRUCTION WITH FLY ASH MODIFIED SOIL” enclosed hereof and as per IRC-SP:58-2001 as per the directions of Engineer.

**Clause 305.2.1.4**

**Delete the second & third sentence of the clause.**

**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 ,when tested as per IS: 2720 (Part 16) at 97% of maximum laboratory dry density (IS:2720-Part 8).

**Clause 305.2.2.2**

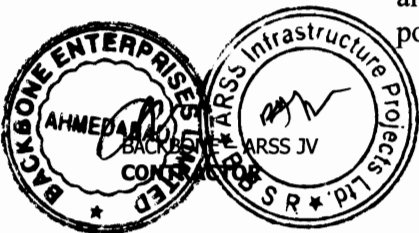
**Borrow materials**

**The first Para graph of this clause shall be read as under**

“No borrow area shall be made available by the Employer for this work and Borrow 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 borrow areas as stipulated from time to time by the Ministry of Environment and Forest, Government of India and the local bodies, as applicable shall be the sole responsibility of the Contractor.”

**Add after the second para**

The top soil of the borrow area selected by the contractor shall be removed and preserved. Care shall be taken not to create any low lying area; if any borrow 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 borrow area and watered for three days. No part of the borrow 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

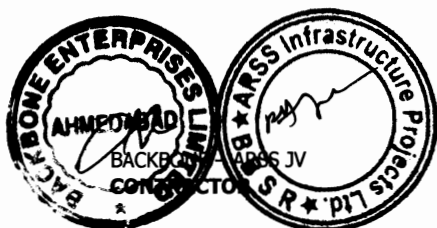
“the contractor shall, at least 7 working days before commencement of compaction, submit the following to the Engineer for approval:


- (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.



  
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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 borrow 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.

**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

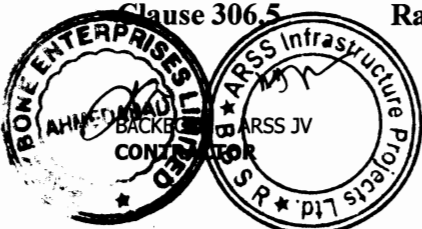
**Clause 306.4** Measurement for payment

**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."

**Rates**

**Clause 306.5**



**This Clause shall be deleted**

**SECTION 400**

**SUB-BASES, BASES (NON-BITUMINOUS) AND SHOULDERS**

**Clause 401**

**GRANULAR SUB-BASE**

**Clause 401.2**

**Materials**

**Clause 401.2.1**

**Replace the last line of second para as**

The grading for this project to be adopted is grading I for Coarse Graded Granular Sub-Base (naturally occurring) as per Table 400-2 with minimum Soaked CBR value of 30%.

**Clause 402.2.3**

**Replace the first line of this para as below:**

Quantity of lime to be added @4% to 5% by weight of the dry soil or should be determined in accordance to IRC:51 and as approved by the Engineer. The other important governing factors to be considered for stabilization of expansive soil by lime should be determined as per IRC:51 and as approved by Engineer.

**Clause 406.**

**WET MIX MACADAM SUB-BASE/BASE**

**Clause 406.2.**

**MATERIALS**

**Clause 406.2.1**

**Aggregate**

**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**

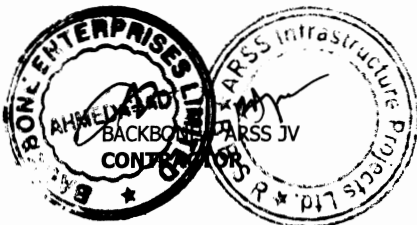
404.3.1 shall be applicable by replacing the work "Water Bound Macadam" by "Wet Mix Macadam".

**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 2<sup>nd</sup> 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 406.3.5. 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.

**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**

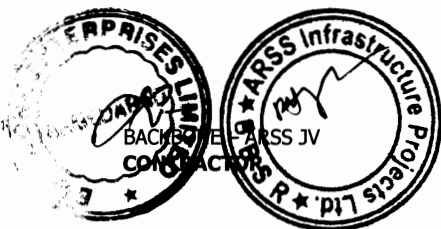
The hard shoulder shall be compacted not less than 98% of maximum laboratory dry density as per IS:2720 (Part-8).

**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****Replace the clause as follows**

The bituminous material to be used as primer should be such that it can penetrate deep into base course (about 10mm depth) to perform its intended function in environment friendly manner.

Cationic bitumen emulsion SS-1 grade conforming to IS:8887 shall be used as primer. The quantity of bitumen emulsion for WMM/WBM types of surfaces shall be 0.7-1.0 Kg/m<sup>2</sup>.

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**

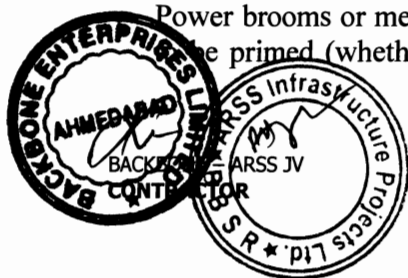
Bitumen emulsion grade SS-1 as well as Cutback Bitumen as Primer shall not be applied on wet surface. The moisture content in the surface to be primed shall not exceed 3.5%. Primer shall not be applied during dust storm, rainy, foggy or windy weather. The ambient temperature during priming by bitumen emulsion should be above 10<sup>0</sup>C.

**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 10<sup>0</sup>C.

#### **Clause 502.4.4 Curing of Primer and opening for traffic**

##### **Replace the clause as follows**

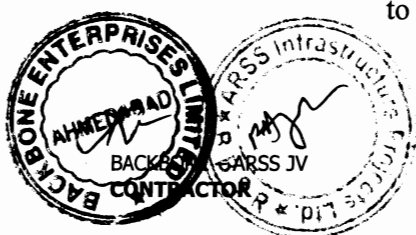
The primed surface shall be allowed to cure for at least 24 hours or such other period as is found to be necessary to allow all the volatiles to evaporate before any subsequent surface treatment or mix is laid. Excessive and unabsorbed primer if any shall be blotted with an application of sand using 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 Clause 503.1**

##### **Tack Coat 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 10<sup>0</sup>C.

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.

Table as mentioned below will replace table 500-2:

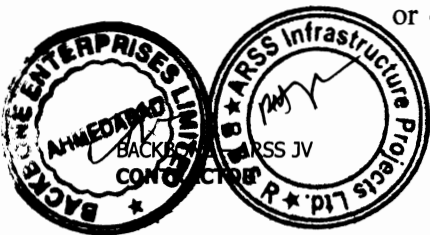
**TABLE : RATE OF APPLICATION OF TACK COAT**

Type of surface	Quantity of liquid bituminous material in Kg per sq. m. area
i)Normal Bituminous surfaces	0.20 to 0.30
ii)Dry and Hungry bituminous surfaces	0.25 to 0.35 0.25 to 0.35
iii)Granular surfaces treated with primer	
iv)Non bituminous surfaces	0.30 to 0.40
a. Granular base ( not primed)	0.30 to 0.35
b. Cement concrete pavement	

**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 /m<sup>2</sup>. with 0.30 kg/m<sup>2</sup> in fourth line.

**Clause 509.1**

**Add the following after 2<sup>nd</sup> line of this para.**

Where modified bitumen is specified to be used as a binder shall have a softening point not less than 60<sup>0</sup> 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**

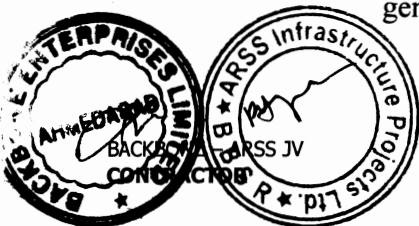
**Clause 601.5.2.1.1**

**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**

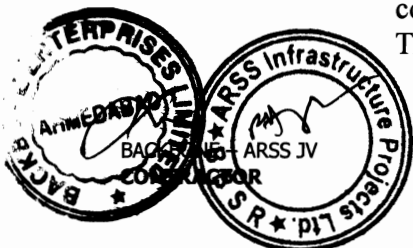
**Clause 602.3.4.2**

**Add after fourth sentence of the clause**

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.

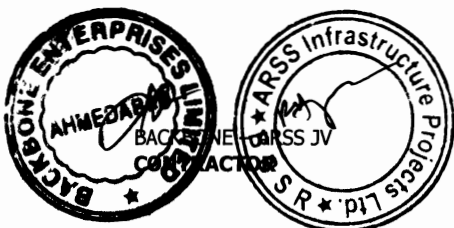
Formed by a joint cutting machine when a pavement width of more than one lane is laid and to relieve warping stresses when the pavement width exceeds 4.5 m.


**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.



  
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**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.

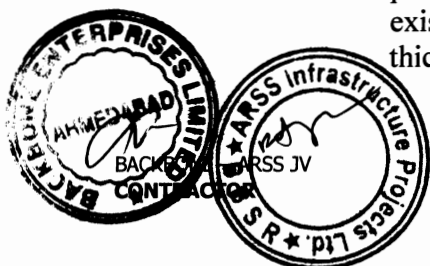
**Clause 602.6.5 Dowel bars:**  
**Clause 602.6.5.1 Add after first sentence of the clause**  
Epoxy coating shall treat these or any approved anti-corrosion treatment.

**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. “

**Clause 602.9.1.1 Add as new clause**  
**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.

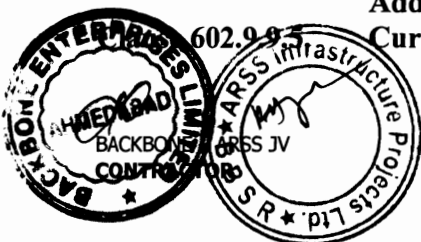
**Clause 602.9.9.2.**

**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**

**Curing by manual methods:**



  
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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.**

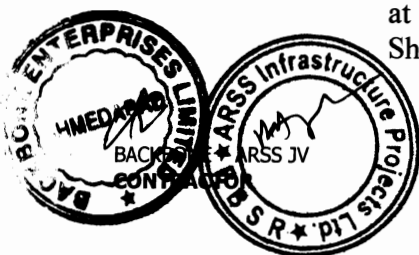
**Clause 602.10.5.3.**

**Trial Length**

**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.**

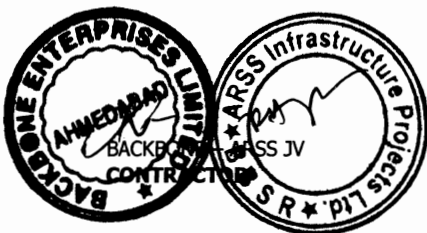
**Add to the last of the paragraph**

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-a-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**



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**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 as per Type 8/9 of ASTM D 4956 a 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

**Clause 803.6.6 Add as a new clause**

**General**

Road traffic markings shall be constructed to accuracy within the tolerances given below:

The width of lines and other markings shall not deviate from the specified width by more than 5%.

The position of lines, letters, figures, arrows and other markings shall not deviate from the true position specified by more than 20mm.

The alignment of any edge of a longitudinal line shall not deviate from the true alignment by more than 10 mm. in 15 m.

The length of segments of broken longitudinal lines shall not deviate from the specified length by more than 150 mm.



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.

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."

**Add new sub clause as 903.4.3 as follows**

**Clause 903.4.3**

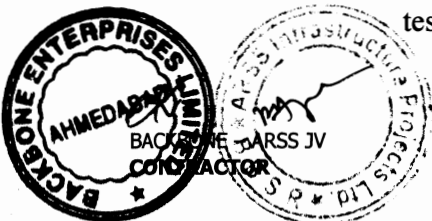
Bituminous mix shall be spread with paver fitted with electronic sensing device and string line arrangement (supported by steel pegs @ 5 m apart) on either side of paving width for automatic levelling, surface evenness and profile control. Use of string line is compulsory to provide signal to the electronic 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):**

<b>Core Density</b>	<b>Deduction in the payable rate</b>
- Less upto 1% of requirement	@ 5%
-Less above 1% and upto 2% of requirement	@15%
-Less above 2% and upto 3% of requirement	@30%
-Less above 3% of requirement	@ 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**

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:

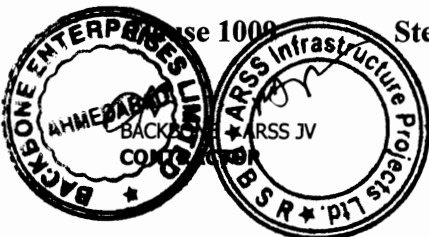
<b>Measured Roughness</b>	<b>Deduction in the payable rate</b>
- Upto 5% more than the requirement	Nil
-More than 5% and upto 30% more than the requirement	@ (10%+1% for every 1% in excess of 5% of prescribed limit)
-More than 30% more than the requirement	Works to be rejected and to be relayed.

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 m<sup>2</sup>)

**SECTION 1000**

**MATERIALS FOR STRUCTURES**

**Steel For Pre-Stressing**



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**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.**

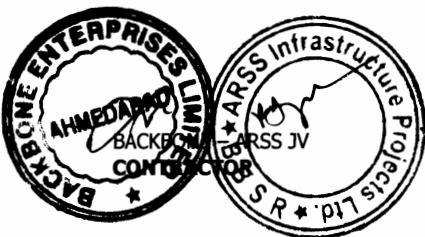
After selecting a few acceptable brands & types of admixture based on the manufacturer's data/technical literature. Independent acceptance tests should be carried out for the same using the approved combinations of cement / sand / aggregates intended for use in the Project. After establishing the basic 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.



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**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**

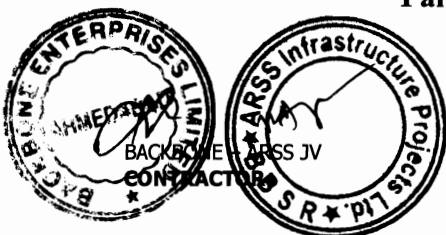
**Add the following at the end of the first para**

"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**



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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 used. Fluid mixes can be pumped satisfactorily after adding plasticizers and super plasticizers. Suitability of concrete shall be verified by trial mixes and by performing pumping test.

**Clause 1707 Equipment**

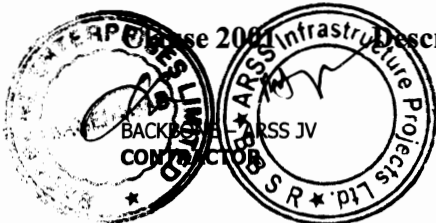
**Para 1 of this Clause shall read as under**

“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**



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**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**

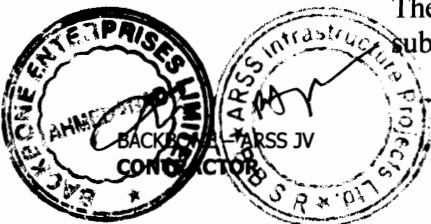
**Add the following paragraph at the end of clause**

**"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)**

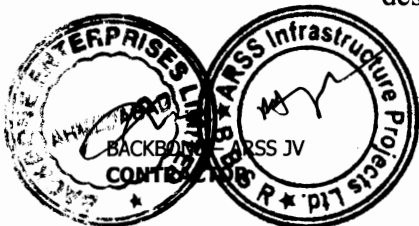
(c) If reinforcement is exposed the same shall also be cleaned thoroughly. Sand blasting shall be done to clean the rusting on reinforcement. The reinforcement shall be coated with PMC slurry or epoxy phenolic based / epoxy based protective coating within one hour of cleaning to prevent rusting. The 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.



  
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**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.

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.

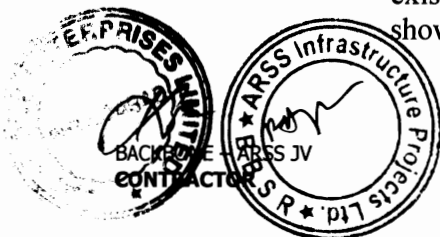
Epoxy resin shall be of following specifications:

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**

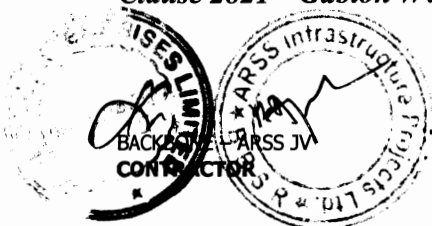
Approach slabs, which are cracked or otherwise damaged, shall be recasted after dismantling of the existing slab as specified in drawing.

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  $30 \pm 1$  percent. The particle shall be of nearly spherical shape with a diameter of  $0.35 \pm 0.05$  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.

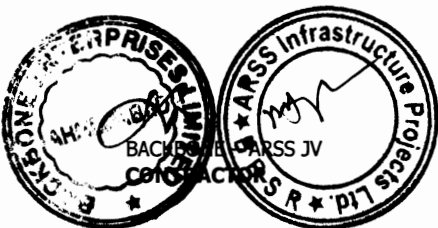
Portland Cement conforming to IS:8112 shall be used for production of polymer modified cement repair mortar and polymer modified cementitious coating system, which is to be used as a bonding medium concrete substrata.

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 curing 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

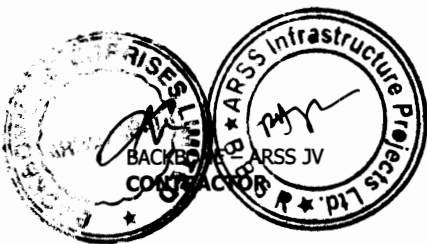
Under unusual weather conditions e.g. high humidity and / or high wind velocity or imposed constraints special curing procedures shall be followed for which approval shall be obtained from the Engineer.


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 as 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.



  
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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.

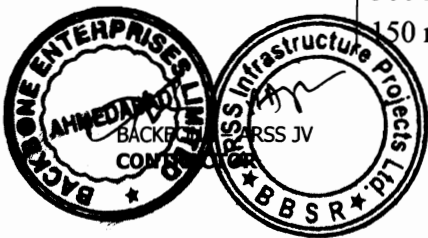
Mix for about 5 minutes until solids have been well dispersed. The resulting mix should look uniform, feel creamy and be free from lumps and grits.


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



  
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75 micron	3max	0-3	3max
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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.

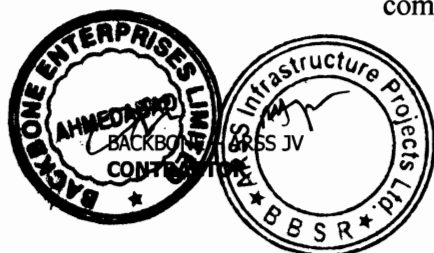
In unexposed and exposed areas the initial air drying of 4 to 6 hours shall be followed by moist curing for 24 hours by spraying or another approved curing method.

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.



  
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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.

## ADDITIONAL TECHNICAL SPECIFICATIONS

### A-1 DIVERSION AND FILLING OF EXISTING WATER COURSES ALONG THE ROAD ALIGNMENT.

#### 1. Scope

Where water courses have to be diverted from the sites of embankments or other works, the original channels shall be cleared of all vegetation and soft deposits as directed by the Engineer and carefully filled in with suitable materials deposited and compacted as specified. The new channel shall be formed as shown in the drawings or as directed by the Engineer”.

#### 2. Measurement for Payment

The work involved in filling existing water course shall be measured as follows.

- (i) the work involved in filing existing water courses shall be measured under clearing and grubbing item on area basis.
- ii) Excavation and removal of soft deposits shall be measured in cubic metre.
- iii) Filling with suitable material shall be measured in cubic metre.
- iv) The works involved in forming the new channel shall be measured under the relevant items of work.

#### 3. Rates

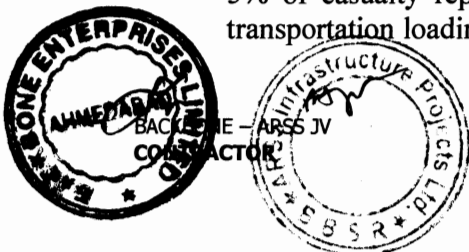
Clause 201.6.1 shall apply for clearing of vegetation growth.

Clause 301.9.3. shall apply for removal of soft deposits and filling with suitable materials . The contract unit rates for the item of new channel formation shall be payment in full for carrying out the operations required for the relevant items.”

### A-2 PLANTATION OF TREES

#### 1. Scope

The work shall consist of survey and demarcation, alignment and staking, soil working, pitting of trees ad shrubs at the rate of 100 plants, 800 shrubs per km with 5% of casualty replacement, plants to be 4 to 5 years of age of 10cm. of girth, transportation loading, unloading of plants and shrubs within all lead and lift, refilling



earth after mixing oil cake, manure, watering and providing and fixing tree -guards, post planting operation with weeding , soil working, applying insecticides, replacement, pruning, watch and wards of the plant etc. all complete.

## 2. Materials

### 2.1 Dump Manure

Dump manure shall be of well decayed organic or vegetable matter obtained in the dry state from the municipal dump or other similar sources approved by the engineer. The manure shall be free from earth, stone, brick , bats or other extraneous stuff. Manure sieved through sieve of IS designation 16mm is generally used for mixing with the excavated soil to be refilled in trenches.

### 2.2. Sapling of Trees

The sapling of trees shall be of good quality as directed by the Engineer.

### 2.3 Farm Yard Manure

It shall be well decayed free from grits and any other unwanted materials.

### 2.4. Good Earth

The soil shall be agricultural soil of loamy texture free from kankar, moorum, shingle, stone brick, bats, building rubbish and any other foreign matter. The earth shall be free from clods or lumps of sizes bigger than 75mm in any direction. It shall have PH value ranging between 6 to 8.5.

### 2.5 Oil Cake (Neam/Castor/ Groundnut)

The cake shall be free from bush, dust, grit and any other foreign matter.

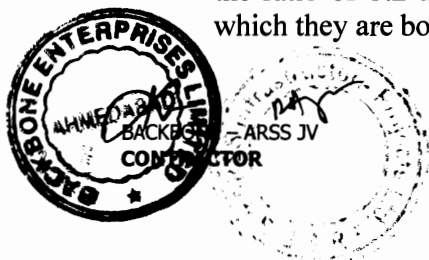
## 3. Planting and Refilling Earth after Mixing with Oil Cake, Manure and Watering

Holes of circular shape of 60cm dia and 45 cm in depth in ordinary soil shall be excavated and the excavated soil, broken to clods of sizes not exceeding 75mm in any direction, shall be stacked outside the hole, stones, brick bats, unsuitable earth and other rubbish all roots and other undesirable growth met with during excavation , shall be separated out and unserviceable material removed from the site as directed. Useful material if any shall be stacked properly and separately. Good earth in quantities required to replace such discarded stuff shall be brought and stacked at site by the contractor.

The tree hole shall be manured with powdered neem/ castor oil cake at the specified rate alongwith farm yard manure dump manure/ screened through sieve IS designation 16mm, or slugged shall be uniformly mixed with the excavated soil after the manure has been broken down to powder, (size of particles not to exceed 6mm in any direction ) in the specified proportion. The sapling of trees shall be placed at the center of the hole and then the mixture shall be filled into the hole upto the level of adjoining ground and then profusely watered to enable the soil to subside. The refilled soil shall then be dressed evenly with its surface about 50 to 75mm below the adjoining ground level or as directed by the Engineer.

## 4. Circular Iron Tree Guard with Bars

The tree guard shall be 50 cm in diameter. The tree guards shall be formed of (i) 3 Nos. 25 x 25 x 3 mm angle iron verticals 1.95m long excluding splayed outward at lower end upto an extent of 5 cms., (ii) 3 Nos. 25 x 5 mm M.S. flat rings fixed as per design (iii) 15 Nos. 1.55 metre long 6mm dia bars. Each ring shall be in two parts in the ratio of 1:2 and their ends shall be turned in radically for a length of 4 cm. at which they are bolted together with 8mm dia and 30mm long M.S. bolts and nuts.



The vertical irons shall be welded to rings along the circumference with electric plant 15 nos. bars shall be welded to rings at equal spacing along the circumference of ring. The lower end of the angle iron verticles shall be splayed outwards upto an extent of 5 cm. The lower end of the flat of lower ring shall be at the height of 70cm and upper end of the flat of top ring shall be at the height 70cm and upper end of the flat of top ring shall be in the centre of top and lower ring. The entire tree guard shall be given two coats of paint of approved brand and of required shade over a priming coat of ready mixed primer of approved brand. The design of the tree guard shall be approved by the Engineer.

#### **5. Maintenance**

Trees shall be maintained for a period of 12 (twelve) months which require watering applying insecticides, replacing, pruning, watch and ward of the plant as directed by the Engineer.

#### **6. Measurements**

Planting of trees shall be measured in number. Planting plants and shrubs in the central verge and landscaping shall be measured in linear m/km. as specified in the item.

#### **7. Rate**

The rate shall include the cost of all labour and material involved in all the operations described above including cost of trees sapling tree-guard and maintenance as mentioned above and the cost of supplying and stacking the requisite quantity of manure and oil cake.

### **A-3 VOID FORMER**

Void formers are to be supplied with suitable end blockers to seal the void former ends.

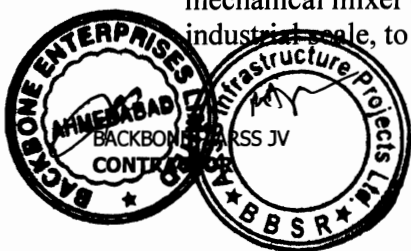
Specialized form work shall be manufactured by use of form lining materials with ring stiffeners as per design requirements. The form lining may either be Marine Plywood. PVC/HDPE sheet or steel sheet of appropriate thickness and the ring stiffeners should preferably be of structural steel sections. Manufactured void formers shall be absolutely leak proof.

The contractor may use PVC/HDPE pipes, Galvanised corrugated light metal tubes of required sizes from market or specially manufactured for use as void formers. However, the specifications & design for such pipes/ tubes shall be submitted for approval of Engineer.

The Void Formers shall be strong enough to withstand all pressure, ramming and vibration during placing of concrete and handling / erection streses. The void formers shall be placed and tied in position so that they are not displaced during concreting.

### **A-4 EMBANKMENT CONSTRUCTION WITH FLY ASH MODIFIED SOIL**

Over the years Fly Ash are discharged and deposited in Ash ponds. Pond Ash with fly ash produced daily are allowed to be used for the construction of embankment mixing with the soil from borrow area in proportion of 60% of soil and 40% of Fly Ash. The mixing of the soil with Flyash should be satisfactorily demonstrated by use of mechanical mixer capable of producing homogeneous mixture of soil and flyash on an industrial scale, to the satisfaction of the engineer.



The quality of fly ash should be tested as per IRC :SP:58 to determine its suitability for embankment construction.

Density and compaction requirement of the embankment with Fly Ash modified soil in the above proportion shall conform to the Table 300-1 and 300-2 and Embankment construction is to confirm to Clause 305 of the MORTH Specifications.


Fly Ash from Ash Ponds are to be transported to site of work with tarpaulin covered dump trucks to minimize the fugitive emission . It is to be ensured that pond ash is free from unsuitable materials like peat, marsh, excessive salt which can leach, expansive clays and such material as are susceptible to spontaneous combustion.

(a) **Tests** . All tests and quality control on Fly Ash modified soil shall conform to Clause 900 of MORTH Specifications and IRC: SP: 58.

Rate for embankment construction with Fly Ash modified soil shall include all the items as prescribed under Clause 305.9 of MORTH Specifications and in addition it shall cover the full compensation for transportation of Fly Ash from Thermal power station to the site of works in tarpaulin covered dump trucks including all haulage and transportation, spreading and mixing with soil from borrowed area and all tests required. The embankment using flyash should be properly designed through slope stability analysis with suitable earth cover as per IRC: 75.

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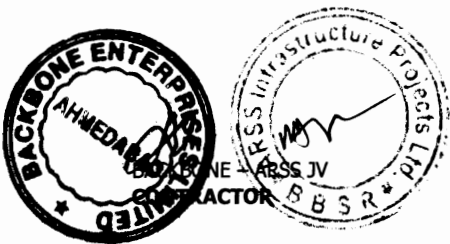
  
Chief Engineer  
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**Chief Engineer**  
World Bank Projects  
Office of the E.I.C (Civil) Orissa  
Bhubaneswar

# 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.

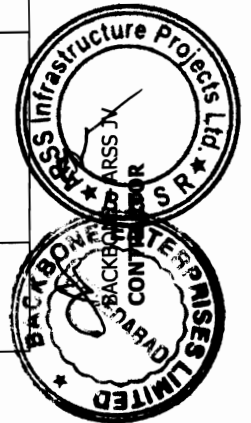
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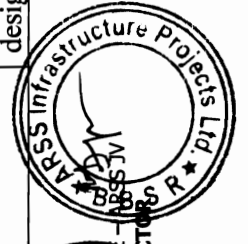
## ENVIRONMENTAL MANAGEMENT PLAN

### Pre-Construction Stage

S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
Pre-construction activities by Project Implementation Unit, Orissa Works Department					
P.1	Land Acquisition	<p>The acquisition of land and properties (govt./private) will be carried out in accordance with the Rehabilitation Action Plan and the entitlement framework for the project.</p> <p>The PIU has to ascertain that any environmental impacts resulting from additional acquisition of land shall be addressed and integrated into the EMP and other relevant contract documents.</p>	Land Acquisition Act 1984 and its Amendments; R&R Policy and RAP of OSRP.	PIU, Revenue Dept., NGOs, Collaborating Agencies	PIU/OWD
P.2	EMP Preparation of Resettlement Sites	All R & R activities will be undertaken in accordance with the RAP document. It will be ensured that all R&R activities including preparation and implementation of environmental management plan for such site/s are completed before the construction activity starts on any section of ROW of existing/proposed road including bypasses.	R&R Policy and RAP of OSRP.	PIU, Revenue Dept., NGOs, Collaborating Agencies	PIU

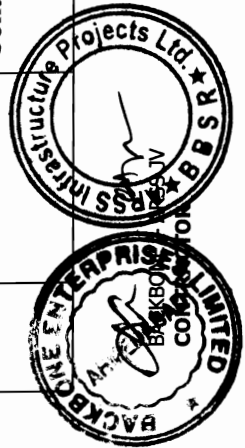


S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
P.3	Tree Cutting	<p>EMPs for such a Resettlement Site will be prepared in consultation with the concerned community. Plans will include specific actions in relation to basic services, health, hygiene and plantation.</p> <p>Tree cutting is to proceed only after all the legal requirements including attaining of in-principle and formal clearances from the Forest Dept./MoEF are obtained by OWD. In case of plantation outside forest areas, a joint enumeration of the trees to be cut shall be conducted by the PIU/OWD in association with Orissa Forest Development Corporation (OFDC) and the Forest Department, GoO.</p> <p>Subsequent approval orders shall be obtained from the concerned Divisional Forest Officers to fell the trees in compliance with the Orissa Timber and Other Forest Produce Transit Rules, 1980 and Orissa Forest Act, 1972. The tree felling operations will to be carried out by OFDC. No construction activity and tree felling can be taken up in any location of the contract package, which has not been cleared by the Regional C.C.F., Eastern Region, Bhubaneswar or the MoEF, Govt. of India.</p> <p>In all, 1112 trees have been identified for cutting after design finalization. Details can be referred in Annexure 1.</p>	<p>Orissa Forest Act, 1972; Orissa Timber and Other Forest Produce Transit Rules, 1980; MoRTH 201.2; Framework on Arrangements with the Forest Department for OSRP</p>	<p>Forest Dept., OFDC, Tree Felling Contractor, PIU/OWD</p>	<p>PIU/OWD, Site Engineer/Supervision Consultant</p>

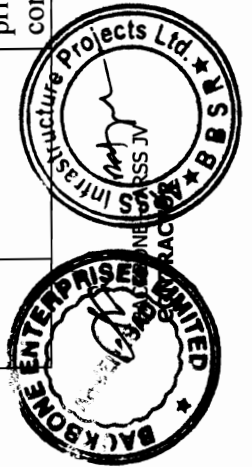




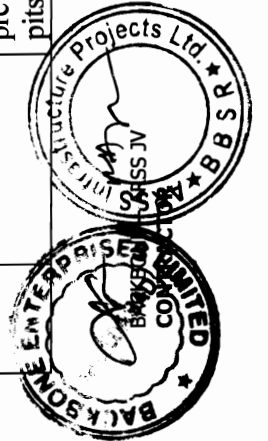
S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
		<p>This doesn't include trees on forest land or those on private properties, which are proposed to be acquired for the project. The records shall be updated by the PIU as these figures are available upon completion of joint enumeration exercises for such sites.</p> <p>Activities pertaining to tree felling, logging, stacking of fire wood and passing of timber are to be synchronized and removal of the converted materials shall be taken up by the responsible agencies as per tree cutting and removal rules as prescribed by the Competent Authority.</p> <p>Trees will be removed from the Corridor of Impact before the actual commencement of the construction work to prevent traffic problems and accidents.</p> <p>Tree cutting should not be carried out simultaneously all along the corridor as this will adversely impact the traffic movement and road safety. It should be carried out on priority basis at locations of diversions, bridge and culvert construction, and such other places where the construction work is scheduled to be started early ie. is under priority one stretch as identified in the Contract Package.</p>			



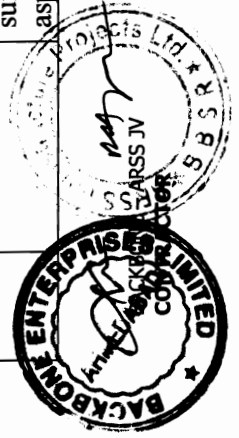
S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
		<p>All workers involved in the cutting and removal of trees and demolition of structures shall wear safety helmets, gloves, and protective shoes and shall provided with a batch of first aid facility for attending to basic unforeseen and freak accidents. Emergency numbers and details of nearest hospitals shall be identified during work in each stretch of the road corridor and this information shall be with the Site Supervisor.</p> <p>On the spot records shall be maintained for all trees felled and logs, fire wood, stacks, obtained from such trees in the conversion register, which shall be available for verification by any competent supervising authority of the Forest Department, OWD/PIU and SC.</p> <p>No sooner the trees are felled, the same has to be kept under watch and ward by the felling agency and steps taken for its authentication by 'passing' carried out at stump side.</p> <p>The 'passing' by any Forest Officer not below the rank of an ACF of the Forest Department irrespective of the location of the tree (either with in RoW or the acquired private land and govt. forest land) should be considered for quick removal of such trees. Uprooting</p>			



S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
P.4	Relocation of Community Utilities and Common Property Resources	<p>of the stumps should start immediately after the logs and firewood are removed from the stump site to speed-up road construction.</p> <p>To the extent possible, felling of trees which are located beyond the hard shoulder - that is on the slopes of the embankment can be retained for reducing the loss of vegetative cover by careful selection of young and sound trees within 30cm girth and up to 1mtr girth.</p> <p>All community utilities and common property resources such as stand posts, bore wells, wells, ponds, water supply lines, toilets, sewage lines, drainage systems, optical fiber cables, electric power supply lines, transformers, irrigation pump houses, telephone and television cables shall have to be relocated and restored before the commencement of the road improvement activity. Details can be referred in Annex 2. The fittings/pipes that can be re-utilized shall be salvaged and reused.</p> <p>While relocating these utilities and facilities, all concerned agencies including PIU shall take necessary pre-cautions and provide for barricading/delineation of such sites to prevent accidents including accidental fall into bore holes, pits, drains both during demolition and construction/</p>	EMP Annexure2 and RAP document of OSRP.	OWD/PIU; Concerned Agencies/Departments ; Contractor	PIU/OWD, Site Engineer/Super vision Consultant



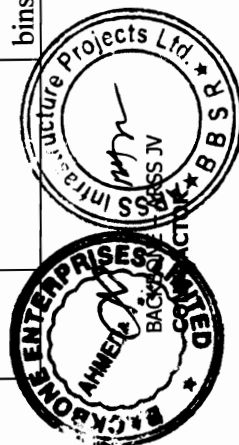
S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
		<p>relocation of such facilities. Standard safety practices shall be adopted for all such works.</p> <p>Early completion of works for schools, colleges and health centres including shifting of gates and construction of boundary walls will be planned during holidays so that the risk of accidents and disturbance to day-to-day activity of such institutions is minimized.</p> <p>The schools and health centers will be constructed as per the relevant state norms. In case of govt. buildings, staff quarters, weekly and kisan markets, proper planning and extra care has to be taken to prevent unusual hardship to public on account of demolition/discontinuance of functioning of such facilities along with provision of appropriate safety measures during the construction /relocation process.</p> <p>Relocation sites for all CPRs shall be selected in consultation with concerned communities, local administrative authorities/departments and the gram sabha. Environmental considerations with suitable/required actions including health and hygiene aspects will be kept in mind while relocating all</p>			



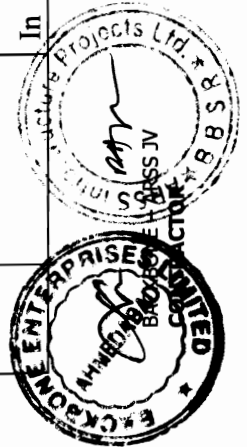
S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
		<p>community utilities and resources.</p> <p>The PIU/OWD will relocate these properties in consultation and written agreement with the agency/owner/community prior to initiation of any type of construction work/activity in such stretches. This includes construction of noise barrier walls, boundary walls, shifting of entrance gates and other protection works, specifically at school, college and health centre sites.</p> <p>Proper placement (as per codes) of passenger shelters/bus stops will be ensured to prevent distress to the commuters and passengers.</p> <p>The dismantled bore holes, wells and tap points shall be properly packed and sealed so that no external water or pollutants can enter such openings.</p>			
P.5	Relocation of affected Cultural and Religious Properties	<p>All religious structures, statues (idols), mandaps and boundaries coming within the corridor of impact will be relocated after alternative sites are selected for relocation of these structures in consultation with the concerned communities, management committee/trust/endowment authority and after disbursement of the due payments are made or construction is taken up and completed by the</p>	EMP Annexure 2; RAP document of OSRP	PIU/OWD; NGOs; Contractor; Concerned Community	PIU/OWD, Site Engineer/Super vision Consultant



S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
		<p>PIU /Contractor as per the design and specification approved by the community /endowment.</p> <p>No cultural properties or religious structures shall be removed or relocated without the knowledge and written consent of the concerned parties or communities and local administration.</p> <p>Sites for the relocation of these religious structures will be identified in accordance with the choice of the community. The NGO and PIU in consultation with local people will finalize design of these temples.</p> <p>As far as possible, the architectural elements of the structure should be conserved/reflected/translated into the design of new structures in accordance with wishes of the community.</p> <p>The relocation of such properties must be completed before commencement of any physical road improvement activity.</p> <p>Proper drainage and garbage disposal at such sites will be ensured to prevent unhygienic conditions, blocking of drains etc. at/near relocated structures. Garbage collection bins, soaks pits or other appropriate measures will be</p>			



S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
P.6	Orientation of Implementing Agencies	provided apart from simple enhancement of such sites.  The OWD/PIU shall organize orientation sessions during all stages of the project. This shall include on-site training (general as well as specific to the context of this sub-project) as well.  These sessions shall involve concerned division-level staff of the OWD involved in this sub-project, Staff of the Site Engineer/ Supervision Consultant and the implementing agencies. Refer details in Chapter 4.	Training Plan (EMP) – Chapter 4	PIU/OWD, Site Engineer/Supervision Consultant	PIU/OWD
Pre-construction activities by the Contractor/Environmental Officer of the Site Engineer/Supervision Consultant (SC)					
P.7	Field Verification and Modification of the Contract Documents				
P.7.1	Joint Field Verification	The Environmental Officer of Supervision Consultant and the Contractor will carry out joint field verification to ascertain the possibility to saving trees, environmental and community resources wherever such representations or suggestions in writing have been received and forwarded by the project authority or by the site engineer in accordance with the local situations.  In all such cases the interested		Contractor; Environmental Officer of SC	PIU/OWD



S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
		<p>organization/representatives, authority, expert (as required for a specific situation), executing and supervising agencies together with the local administrative set-up has to under take a joint field verification for assessing the pros and cons of such demands/suggestions to assess the need for any changes in the design and implementation plan for the activities earlier approved by the project authority.</p> <p>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 measures including the efficacy of enhancement measures suggested in the EMP shall be summarized in a written document containing all the details with date, time, place and signature of the individuals involved and this shall be sent to the PIU/OWD for approval.</p> <p>The PIU shall maintain proper documentation and justifications/reasons in all such cases where deviation from the original EMP is proposed.</p>			
P.7.2	Assessment of Impact	The Environmental Officer of SC will assess impacts and revise/modify the EMP in consultation with the	EA; Biodiversity Management Plan;	Contractor; Environmental Officer	PIU/OWD



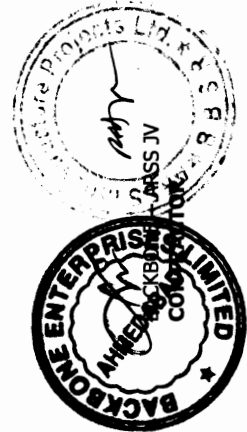
  
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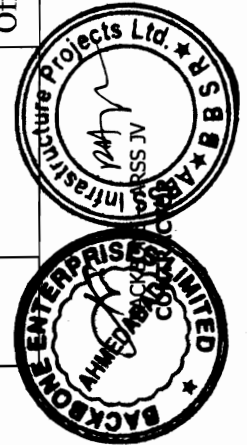
S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
	Changes/ Revisions in the Project Work	PIU/OWD in accordance to the recommendation made by the field survey party in the event of changes /revisions (including addition or deletion) in the project's scope of work.	EMP Document of OSRP	of SC	
P.8	Crushers, Hot-mix Plants and Batching Plants Location	<p>Hot-mix and batching plants will be located 1000 mts. away from settlements, forests, wildlife movement areas and commercial establishments, preferably in the downwind direction. No plants can be set-up within 1000 mts. from the following locations :</p> <ul style="list-style-type: none"> <li>• 0 Km Berhampur</li> <li>• 2.7 Km Gunthubandha</li> <li>• 4.7 Km Lanjia</li> <li>• 7.9 Km Baghajhari</li> <li>• 24 – 26 Km Digapahandi</li> <li>• 32.800 Km Dengausta</li> <li>• 36.500 Km Pudamari</li> <li>• 2.130, 9.780, 26.500 – 29.000km points for Wildlife Movement Area</li> </ul>	MoRTH 111.1; Air Pollution Control Act; Noise Rules; EMP document of OSRP		Environmental Officer of SC ; PIU/OWD
		The Contractor shall submit a detailed layout plan for all such sites and seek prior approval of Environmental			



S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
		<p>Officer of SC before entering into formal agreement with a land owner for setting-up such sites. Actions by SC and PIU/OWD against any non-compliance shall be borne by the Contractor at his own cost.</p> <p>Arrangements to minimize dust pollution through provision of windcreens, mist spray units, and dust encapsulation will have to be provided at all such sites. Specifications of crushers, hot mix plants and batching plants should have to comply with the requirements of the relevant current emission control legislations and Consent / NOC for all such plants shall be submitted to the SC and PIU/OWD.</p> <p>No such installation by the Contractor shall be allowed till all the required legal clearances are obtained from the competent authority and the same is submitted to the PIU/OWD and the SC.</p>			



S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
P.9	Other Construction Vehicles, Equipment and Machinery	<p>All vehicles, equipment and machinery to be procured for construction will confirm to the relevant Bureau of India Standard (BIS) norms. The discharge standards promulgated under Environment Protection Act, 1986 will be strictly adhered to.</p> <p>Efficient and environment friendly equipment conforming to the latest noise and effluent emission control measures available in the market should be used in the project.</p> <p>The Contractor shall maintain a record of PUC for all vehicles and machinery used during the contract period, which shall be produced to the PIU/OWD and the Supervision Consultant for verification whenever required.</p>	<p>Air Pollution Control Act, 1981; Noise Rules; Motor Vehicle Act, 1988; EMP document of OSRP</p>	Contractor	Environmental Officer of SC; PIU/OWD
P.10	Identification and Selection of Material Sources				
P.10.1	Borrow Areas	Finalizing borrows areas for borrowing earth and all logistic arrangements as well as compliance to environmental requirements, as applicable, will be the sole responsibility of the Contractor. Locations finalized by the Contractor shall be reported to the Environmental Officer of SC and who will in turn report to PIU/OWD.	IRC Guidelines; Borrow Area Management Framework given in the EMP of OSRP	Contractor	Supervision Consultant; PIU/OWD




S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
		<p>Format for reporting will be as per the Reporting Format for Borrow Area and will include a reference map and proposed rehabilitation plan. The Environmental Officer of the SC will be required to inspect every borrow area location and evaluate such proposals in accordance to environmental requirements prior to issuing approval for use of such sites.</p> <p>No borrow areas shall be opened within 500 mts. from wildlife movement zones and forest areas. The borrow areas shall be atleast 300 mts. from schools and village access roads.</p> <p>The Contractor will not start borrowing earth from the selected borrow area until a formal agreement is signed between land owner and Contractor and a copy of this agreement is submitted to the Environmental Officer of the SC. The Supervision Consultant shall report these facts to the PIU/OWD along with remarks in the prescribed format along with documentary proofs.</p> <p>Planning of haul roads for accessing borrow materials will be undertaken by the Contractor and these details will be provided in the format given in the EMP. The haul roads shall be routed to avoid agricultural areas as far as possible and will use the existing village roads</p>			

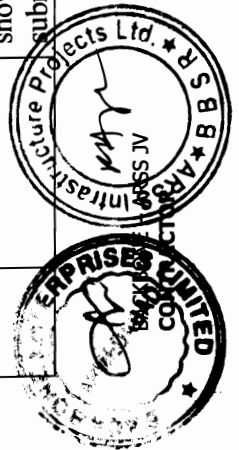


S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
		<p>wherever available. In case such agricultural land is disturbed, the Contractor will rehabilitate it as per Borrow Area Rehabilitation Framework given in this EMP or as approved by the Environmental Officer of SC.</p> <p>Haul roads shall be maintained throughout the operation period of the borrow areas by undertaking the required maintenance and repair works, which may include strengthening, pot hole repairing and diversions. Improvements shall be done to reduce inconvenience to users of these roads, residents living along the haul roads and minimize air and water pollution.</p> <p>Such measures will include, but not limited to, frequent sprinkling of water, repairing of the road, road safety provisions (warning and informative signage, flagmen etc.), ensuring covering of loaded vehicles by waterproof tarpaulin and consultation with public and special precautions required near schools, health centers and settlement areas.</p> <p>All borrow areas whether in private, community or govt. land shall be restored either to the original condition or as per the approved rehabilitation plan immediately upon</p>			



  
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S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
P.10. 2	Quarry	<p>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.</p> <p>Action against non-compliance in this regard shall be the sole responsibility of the Contractor and shall be made good at his own cost. Substantial completion or completion certificates for the civil work shall not be issued unless restoration and rehabilitation works are completed and the same has been approved by the SC and the PIU/OWD in writing.</p> <p>Contractor will finalize the quarry for procurement of construction materials after assessment of the availability of sufficient materials and other logistical arrangements. The Contractor will procure necessary legal permission for quarry opening and operation from Directorate of Mines, GoO; District Administration; SPCB and will obtain written approval from the local Tahasildar. A copy of such approval along with the rehabilitation plan shall be submitted to the PIU/OWD and Environmental Officer of Supervision Consultant.</p> <p>Format on quarry/ crushers along with the required maps showing site details and haul road network shall be submitted to PIU/OWD through the Environmental</p>	MoRTH 111.3; Quarry Area Management Framework given in the EMP of OSRP	Contractor	Supervision Consultant; PIU/OWD



S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
		<p>Officer of SC prior to initiating and operation of quarry sites for the project.</p> <p>No quarry and/or crusher units shall be selected or used, which is within 1000 mts. from a forest boundary, wildlife movement path, breeding and nesting habitats and national parks/sanctuaries. No quarries or crusher units for this contract package shall be established within 1000 mts. from the following locations:</p> <ul style="list-style-type: none"> <li>• 0 Km Berhampur</li> <li>• 2.7 Km Gunthubandha</li> <li>• 4.7 Km Lanjia</li> <li>• 7.9 Km Baghajhari</li> <li>• 24 – 26 Km Digapahandi</li> <li>• 32.800 Km Dengausta</li> <li>• 36.500 Km Pudamari</li> <li>• 2.130, 9.780, 26.500 – 29.000km points for Wildlife Movement Area</li> </ul> <p>Contractor will also work out haul road network and report to Environmental Officer of Supervision Consultant who shall inspect and in turn report to PIU/OWD on the suitability of such haul roads from safety of residents, biodiversity and other environment point of views. All precautions for preventing accidents,</p>			

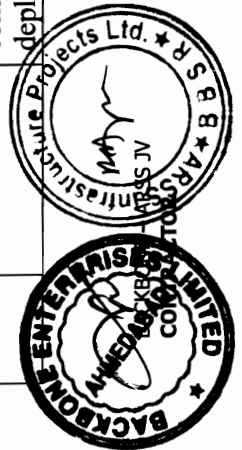


S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
P.10. 3	Sand (all river and stream beds used directly or indirectly for the project)	<p>spillage of materials and pollution, as mentioned in P.11.1 shall be adhered to by the Contractor.</p> <p>Quality sand can be procured from riverbeds adjacent to the corridors i.e. from River Ghodahada at 29.300km, free from silt and other impurities. This procurement shall be made only after declaration of sand quarry sites by the local Tehsildar with the concurrence of the District Collector with due regard to Orissa Miner Mineral Concession Rules, 2004.</p> <p>In case of selection of new sites for sand quarrying, the Contractor shall obtain prior approval and concurrence from Competent District Authority and the Environment Officer of the SC keeping in view the objections and convenience of the local population, who may restrain such activities for their own security and safety.</p> <p>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 SC and PIU/OWD Executive Engineer of the project before any procurement is made from such a site.</p>	MoRTH 111.3; Miner Mineral Concession Rules, 1984	Contractor	Supervision Consultant; PIU/OWD





S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
P.10. 4	Arrangement for Construction Water	<p>To avoid accidents and caving in of sand banks at quarry sites, sand shall be removed layer by layer. Digging deeper than the permissible limit has to be completely avoided by the Contractor. Such quarry should be barricaded 10 mtr away from the periphery on all sides except the entry point, so as to prevent accidental fall of domestic cattle, wildlife and human beings.</p> <p>The flood embankment on either side of the river shall not be used for movement of tippers and loaders, which are likely to be damage and destroy such structures. Instead alternative haul roads will be constructed, avoiding the embankment for safety and security of the vehicles, road users and the habitations along the banks of the river.</p> <p>To avoid disruption/disturbance to other water users, the Contractor will extract water from fixed locations and consult the Environmental Officer of SC before finalizing the locations. The Contractor will provide a list of locations and type of sources from where water for construction will be used to the SC and the PIU/OWD.</p> <p>All efforts shall be made to ensure avoidance of competitive use of a single water source, which may be depleted on account of the stress caused by drawing of</p>	State Norms and Water Policy	Contractor	Environmental Officer of SC ; PIU/OWD

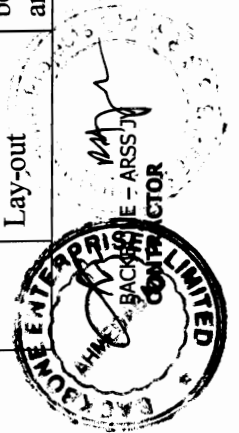


S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
		<p>water for road construction activity by the Contractor.</p> <p>The Contractor should use surface water depending on the availability and quality by developing its own water storage units in a river bed during sand quarrying or by developing</p> <p>ponds during borrowing earth from where water can be lifted using diesel or electric pump sets.</p> <p>In case of nalas and water scarcity areas, 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, these structures when abandoned will serve as a ground water recharge after suitable modification.</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 as declared by the State Govt.. The Contractor shall pay the royalty for use of such water as decided by the State Govt. under relevant norms. A copy of the permission obtained from the Competent Authority shall</p>			



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S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
		<p>be submitted to Supervision Consultant and OWD prior to initiation of construction activity.</p> <p>Use of any other water source such as irrigation canals, ponds, water harvesting structures and river/stream, which is likely to strain and deplete availability for surrounding and downstream inhabitants will not be allowed. Contractor can use ponds, which are not in use by the community/wildlife or have been identified for filling-in for the proposed works, but in such a case, he will obtain a written consent from the owner and submit this to the SC.</p>			
P.11	Labor Requirements	The Contractor preferably will use unskilled labor drawn from local areas to provide maximum benefit to the local community especially to the SC and ST population along the corridor.	General Conditions of the Contract Document	Contractor	Supervision Consultant; PIU/OWD
P.12	Construction Camp Locations – Selection, Design and Lay-out	Construction camps will not be proposed within 500 mts. from the nearest settlement and 1000 mts. from the nearest reserved or protected forest to avoid conflicts and stress on the local infrastructure facilities resources. Stock piling of construction materials and godowns shall be at least 500 mts. from the nearest water source. These are to be located on higher ground to avoid impact during	Framework for Construction Camps; General Conditions of Contract Document	Contractor	Supervision Consultant; PIU/OWD



S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
		<p>floods due to pollution or due to any accidental spillage of stored /stockpiled materials.</p> <p>All location and lay-out plans of such sites will be submitted by the Contractor prior to their establishment and will be approved by the Environmental Officer of SC and OWD/PIU. Other conditions laid out in the Framework for Construction Camps (part of this EMP) shall apply.</p> <p>The waste disposal and sewage treatment shall be such that the environment is not polluted with the waste material and foul order including the effluents and wastewater generated at the campsite. The designing and setting up of these structures should be as per the approved site plan. This should include soak pits, septic tanks and arrangements for carriage of extra sewage by sealed mechanized containers for disposal at designated sites, as available in the locality, with due written permission from the Competent Local Authority.</p> <p>In case of non-receipt of any such permission from the</p>			



S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
P.13	Arrangements for Temporary Land Requirement	<p>competent authority as stated above, the provision of wider safety tanks and storage facility for garbage has to be made at the camp site as additional measures.</p> <p>The Contractor will carry out negotiations with the landowners for obtaining their consent for temporary use of their lands for haulage roads, approach roads, temporary diversions; stockpiling of bulk construction materials; establishment of camps, hot-mix plants, batching plants and crusher units with proper agreement, detailing the terms and conditions agreed between both the parties. This needs to include conditions governing activities to be ensured during the construction stage and at the time of decommissioning of the project.</p> <p>The agreement must contain the details of the land involved with relevant records of ownership. A copy of such agreement/s (use and clean-up operations) shall have to be submitted to the Supervision Consultant and PIU/OWD.</p>	Contract Document	Contractor	Supervision Consultant; PIU/OWD



S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
P.14	Orientation of Implementing Agencies	<p>The OWD/PIU shall organize orientation sessions during all stages of the Project. This shall include on-site training (general as well as specific to the context of this sub-project) as well.</p> <p>These sessions shall involve staff of the Site Engineer/Supervision Consultant and the contractor/s. Refer details in Chapter 4.</p>	Training Plan (EMP) – Chapter 4	PIU/OWD, Site Engineer/Supervision Consultant	PIU/OWD




  
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Table 3.2

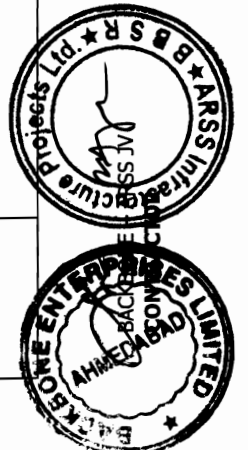
ENVIRONMENTAL MANAGEMENT PLAN


Construction Stage

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
<b>Activities to be Carried Out by the Contractor</b>					
<b>C.1</b>	<b>Site Clearance</b>				
C.1.1	Clearing and Grubbing	<p>Site clearance including clearance of marked trees for felling and removal has to be carried out much before the actual road construction takes place.</p> <p>Structures and utilities (cabins, commercial properties, hoardings, overhead power transmission lines, cable connections, telephone lines, bore wells, stand posts, wells, statues, temples etc.) should have been compensated/relocated as per RAP and EMP provisions before tree felling work and clearing or grubbing activities are undertaken since such activities may damage structures (private and govt.) and essential facilities/utilities of public use.</p> <p>All works shall be carried out in a manner such that the damage or disruption to flora is minimum.</p>	MoRTH 201.2	Contractor	Supervision Consultant; PIU/OWD



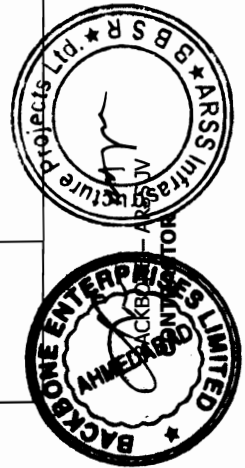
Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		<p>Only ground cover/shrubs that impinge directly on the permanent works or necessary temporary works will be removed with prior approval from Environmental Officer of SC.</p> <p>Any tree between 30 to 45 cm girth at breast height shall be uprooted mechanically with ball of earth intact for relocation and transplantation at various degraded sites, embankment of water body, ponds, temples, market places, schools and along road corridors for preventing complete loss of such vegetative cover.</p> <p>The Contractor, under any circumstances will not cut or damage trees. Vegetation above 30 cm girth will be considered as trees and can be compensated, in the event of OWD/PIU's written instruction to undertake tree cutting.</p>			
C.1.2	Generation of Debris from dismantling structures and road surface	<p>Debris generated due to the dismantling of the existing road will be suitably reused in the proposed construction as follows:</p> <ul style="list-style-type: none"> <li>➤ Eighty percent (80%) of the sub-grade excavated from the existing road surface, excluding the scarified layer of bitumen, shall be reused in the civil works after improving the</li> </ul>	<p>Framework for Waste Management (EMP);</p> <p>Guidelines of Orissa State Pollution Control</p>	Contractor	Supervision Consultant; PIU/OWD



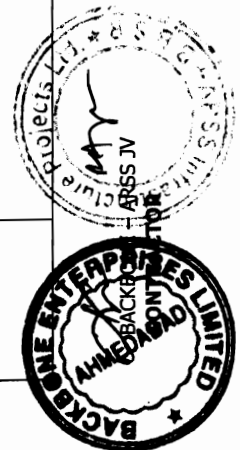
  
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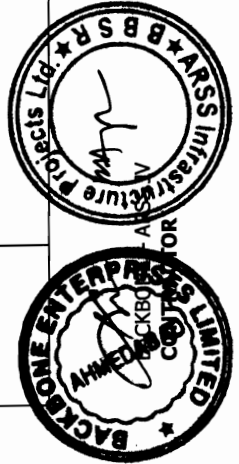
Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		<p>soil below the sub-grade through addition of sand and suitable cementing material for qualitative up-gradation.</p> <ul style="list-style-type: none"> <li>➤ The dismantled scraps of bitumen will be utilized 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 Environmental Officer of SC.</li> <li>➤ 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.</li> <li>➤ The Contractor will suitably dispose off unutilized non-toxic debris either through filling up of borrows areas located in wasteland or at pre-designated disposal sites, subject to the approval of the Environmental Officer of SC.</li> <li>➤ 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</li> </ul>	Board.		



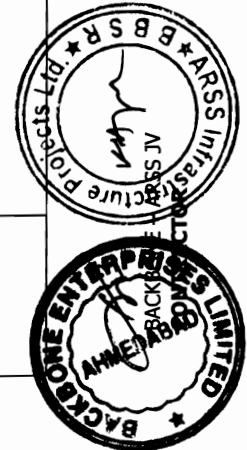
Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		<p>into the surface water bodies or form puddles in the area.</p> <p>The pre-designated disposal locations will be a part of Comprehensive Solid Waste Management Plan to be prepared by Contractor in consultation and with approval of Environmental Officer of SC and approval local competent authority.</p> <p>All arrangements for transportation during construction including provision, maintenance, dismantling and clearing debris, considered incidental to the work, will be planned and implemented by the Contractor as approved and directed by the Environmental Officer of SC and OWD/PIU.</p> <p>All disposal sites 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 in the approved format. These shall be verified and approved by the Environment Officer of SC in consultation with the Local Competent Authority after joint site visits, prior to disposal of any debris or waste materials.</p> <p>The Contractor shall then enter into an agreement</p>			



Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
C.1.3	Other Construction Wastes Disposal including Fly Ash	<p>with the concerned land owner/s and a copy of this document shall be submitted to OWD/PIU through Environment Officer of SC.</p> <p>The pre-identified disposal locations will be a part of Comprehensive Waste Disposal &amp; Solid Waste Management Plan to be prepared by the Contractor, which needs to be approved by the Environmental Officer of SC (as per the process described in C.1.2). Disposal sites will be finalized prior to initiation of any work on a particular section of the road.</p> <p>Contractor will ensure that any spoils/materials unsuitable for embankment fill shall not be disposed off near any water course; water body; agricultural land; natural habitats like grass lands, wet lands, flood plains, forests etc.; pastures; eroded slopes; and in ditches, which may pollute the surrounding including water sources.</p> <p>Such spoils from excavation can be used to reclaim borrow pits and filling-up of depressions which are not connected to any water source in the locality nor under use by the local people.</p> <p>Surplus fly ash, bottom ash and lime, if any</p>	<p>Framework for Waste Management (EMP);</p> <p>Guidelines of Orissa State Pollution Control Board.</p>	Contractor	Supervision Consultant; PIU/OWD



Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		<p>transported for use on this corridor shall not be left open and dumped at any disposal site. Contractor shall take care of such residual materials for use at any other location/s of new embankment construction work with proper protection measures.</p> <p>The re-use and disposal of debris from diversions shall be the responsibility of the Contractor, which includes rehabilitation and restoration of such sites. These quantities also need to be reflected in the Solid Waste Disposal Plan.</p> <p>Non-bituminous wastes other than fly ash may be dumped in borrow pits (preferably located in barren lands) where such borrow pits are not suitable to develop as an economic source like pisci-culture or a source of irrigation. Such borrow 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 will be taken-up by the Contractor as a part of site rehabilitation. The species suitable for such rehabilitation work shall be at least one-year-old saplings of Alstonea, Zizyphus, Bel, Papal, Banyan, Babool, Chirounji, Arjuna, Karanja, Samania etc.</p>			

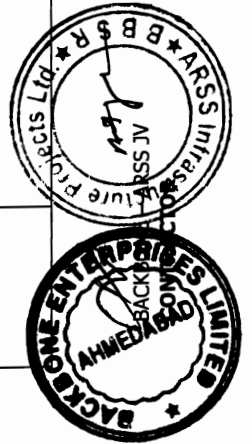


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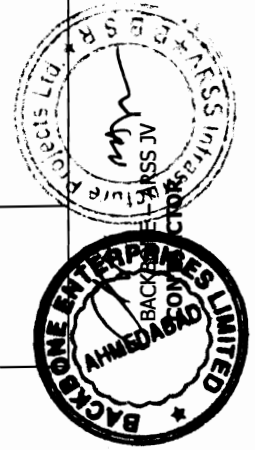
Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		<p>No disposal site shall be created as part of the project, without prior approval of the Environmental Officer of SC, OWD/PIU and Local Competent Authority. SC will keep strict vigil on this aspect and ensure that work is not permitted without appropriate Solid Waste Disposal Plan in place.</p> <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>			
C.1.4	Stripping, stacking and preservation of top soil	<p>The top soil from all sites including road side widening and working area, cutting areas, quarry sites, borrows 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 reuse.</p> <p>A portion of the temporarily acquired area and/or RoW edges will be earmarked for storing top soil. The locations for stacking will be pre-identified in consultation and with approval of Environmental Officer of SC. The following precautionary</p>	<p>MoRTH: 301.3.2; MoRTH: 301.7; MoRTH: 301.3.3; MoRTH: 305.3; Framework for Borrow Areas</p>	Contractor	Supervision Consultant; PIU/OWD



Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		<p>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.</p> <p>(b) To retain soil and to allow percolation of water, the edges of the pile will be protected by silt fencing.</p> <p>(c) Multiple handling kept to a minimum to ensure that no compaction occurs.</p> <p>(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"> <li>➤ Covering reclamation sites or other disturbed areas including borrow areas (not those in barren areas)</li> <li>➤ Top dressing of road embankment and fill slopes</li> <li>➤ Filling up of tree pits and</li> <li>➤ In the agricultural fields of farmers, acquired</li> </ul>			



Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
C.1.5	Accessibility	<p>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.</p> <p>The stripping, preservation and reuse shall be carefully inspected, closely supervised and properly recorded by the SC.</p> <p>The Contractor will provide safe and convenient passage for vehicles, pedestrians and livestock to and from roadsides and property accesses connecting the project road by providing temporary connecting road, as necessary.</p> <p>Construction activities that shall affect the use of side roads and existing accesses to individual properties, whether public or private, shall not be undertaken without providing adequate provision approved by the SC.</p> <p>The Contractor will take care that the cross roads are constructed in such a sequence that construction work over the adjacent cross roads are taken up in a manner that traffic movement in</p>	MoRTH specifications and IRC guidelines	Contractor	Supervision Consultant; PIU/OWD

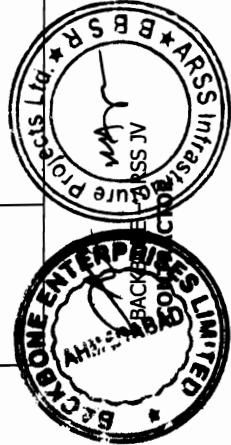


Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
C.1.6	Planning for Traffic Diversions and Detours	<p>any given area does not get affected.</p> <p>Detailed traffic control plans will be prepared and submitted to the Resident Engineer of SC for approval, minimum seven days prior to commencement of works on any section of road.</p> <p>The traffic control plans shall contain details of temporary diversions, traffic safety arrangements including night time safety measures, details of traffic arrangement after cessation of work each day, safety measures undertaken for transport of hazardous materials and arrangement of flagmen etc. to regulate traffic congestion.</p> <p>The Contractor will provide specific measures for safety of pedestrians and workers as a part of traffic control plans.</p> <p>Temporary diversions will be constructed with the approval of the Resident Engineer and Environmental Officer of Supervision Consultant.</p> <p>The temporary traffic detours will be kept free of dust by sprinkling of water three times a day or as required under specific conditions and directed by the SC (depending on weather conditions, construction in the settlement areas and volume of</p>	MoRTH: 112; IRC SP:55	Contractor	Supervision Consultant; PIU/OWD

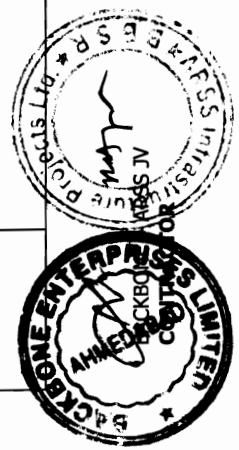




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				Execution / Civil Work	Supervision/ Monitoring
		<p>traffic). The Contractor will ensure that the diversion/detour is always maintained in running condition, particularly during the monsoon to avoid disruption to traffic flow.</p> <p>The Contractor will also inform local community of changes in traffic routes and pedestrian access arrangements with assistance from SC and OWD.</p>			
<b>C.2</b>	<b>Construction Material</b>				
C.2.1	Earth from Borrow Areas for Construction	<p>No borrow area will be opened without permission of the Environmental Expert of Supervision Consultant. The location, shape and size of the designated borrow areas will be as approved by the Environmental Expert of Supervision Consultant and in accordance to the IRC recommended practice for borrow pits for road embankments (IRC 10: 1961).</p> <p>The borrowing operations will be carried out as specified in the guidelines for setting and operation of borrow areas.</p> <p>The unpaved surfaces used for the haulage of borrow materials, if passing through the settlement areas or habitations; will be maintained dust free</p>	MoRTH: 305.2; Framework for Borrow Area Management	Contractor	Supervision Consultant; PIU/OWD



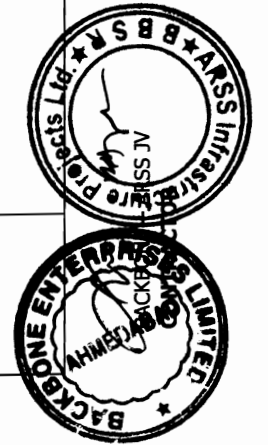
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				Execution / Civil Work	Supervision/ Monitoring
		<p>by the Contractor. Sprinkling of water will be carried out thrice a day to control dust along such roads during their period of use.</p> <p>During dry seasons (winter and summer) frequency of water sprinkling will have to be increased according to the site and climatic conditions in the settlement areas and Environmental Officer of SC will decide the numbers of sprinkling depending on the local requirements.</p> <p>Contractor will rehabilitate the borrow areas as soon as borrowing is over from a particular borrow area in accordance with the Framework for Borrow Area Management (Refer Annexure 4) or as suggested by Environmental Expert of Supervision Consultant.</p>			
C.2.2	Quarry Operations	<p>The Contractor shall obtain materials for quarries only after the approval of Department of Mines, Govt. of Orissa and the District Administration. A copy of this consent must be submitted to OWD/PIU through Environment Expert of SC.</p> <p>The Contractor will develop a Comprehensive Quarry Redevelopment Plan, as per the Mining</p>	MoRTH:111.3	Contractor	Supervision Consultant; PIU/OWD



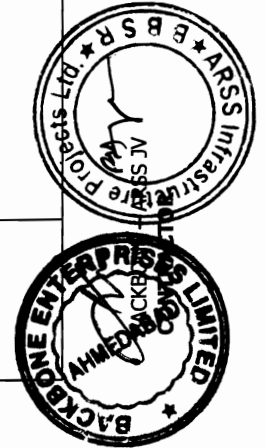
Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
C.2.3	Transporting Materials and Haul Road Management	<p>Rules of the State and submit a copy to OWD and SC prior to opening of the quarry site.</p> <p>The quarry operations will be undertaken within the rules and regulations in vogue.</p> <p>Contractor shall maintain properly (as directed by SC) all roads (existing or constructed for the project), which are used for transporting construction materials, equipment and machineries.</p> <p>All vehicles delivering goods to the site shall be covered to avoid spillage of materials and air pollution.</p> <p>It shall be the responsibility of the Contractor to ensure that highways and other roads used for transportation of construction materials are clear from any dust, sand, soil, aggregates etc., fallen from the transporting vehicles used for the project.</p> <p>Contractor will arrange for regular water sprinkling for dust suppression of all such roads and surfaces, as directed by Environmental Officer of SC.</p> <p>The unloading of all materials at construction sites will be limited to day time only to avoid accidents.</p>	MoRTH specifications	Contractor	Supervision Consultant; PIU/OWD



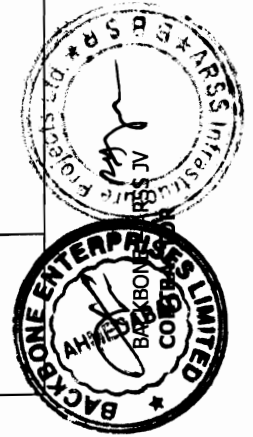
Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
C.2.4	Construction Water	Screens of hessian cloth, agro-net and such other barricading material are to be erected along all dumping and stockpiling sites, so that generation of the dust in the vicinity of such locations can be minimized to a great extent.  Contractor will arrange adequate supply and storage of water for the whole construction period at his own cost.  The Contractor will take all precaution to minimize the wastage of water in the construction process and related operations.	State Water Policy; Water Act and Rules	Contractor	Supervision Consultant; PIU/OWD
<b>C.3 Construction Work</b>					
C.3.1	Disruption to Other Users of Water	While working across or close to any perennial water bodies, Contractor will not obstruct/ prevent the flow of water.  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 community.	MoRTH:304.3.2 ; Water Rules and Policy of the State	Contractor	Supervision Consultant; PIU/OWD



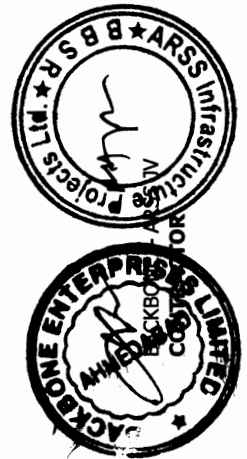
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				Execution / Civil Work	Supervision/ Monitoring
		<p>Such water body may be ponds, water harvesting structures (WHS), feeder channels to pond, irrigation sources etc.</p> <p>If the supply of water or access to a source is being completely cut off, 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> <p>In all such cases specific provision of lessening the impact of construction has been elaborated in the design plan of retaining walls, spillways and ghats in Drawing No. OSRP/CEG/SH/ENVV/03</p> <p>Wherever excavation for diverting water flow will be required as per the engineering designs, the Contractor will ensure that such diversion channels have no steeper slopes than 1:2 (V:H). Proper slope protection measures have to be taken as approved by the Environmental Officer of SC and OWD/PIU.</p> <p>The Contractor will take prior approval of the River Authority or Irrigation Department and SC for any such activity. The OWD/PIU will ensure that Contractor has served the notice to the downstream users of water well in advance where</p>			



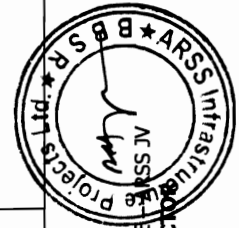
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				Execution / Civil Work	Supervision/ Monitoring
		<p>such diversion of the flow is likely to affect the down stream population subject to the condition that under no circumstances the down stream flow shall be stopped putting the wildlife, the aquatic fauna and the shore line settlement under distress.</p> <p>Minimum eco-flow shall be maintained even during the construction stage by ensuring downstream connection to the main channel.</p>			
C.3.2	Drainage and Flood Control	<p>Contractor will ensure that no construction materials like earth, stone, ash or appendage disposed off so as not to block the flow of water of any water course and cross drainage channels.</p> <p>Where necessary adequate mechanical devices to bail out accumulated water from construction sites, camp sites, storage yard, excavation areas are to be pre-settled and arranged well in advance of the rainy season besides providing temporary cross drainage systems.</p> <p>The contractor will take all adequate precautions to ensure that construction materials and excavated materials are enclosed in such a manner that erosion or run-off of sediments is controlled. Silt fencing shall be installed prior to the onset of the</p>	MoRTH:305.3.7 ; MoRTH:306	Contractor	Supervision Consultant; PIU/OWD



Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		<p>monsoon at all the required locations, as directed by Environmental Officer of SC and OWD/PIU.</p> <p>The contractor will also ensure that no material blocks the natural flow of water in any water course or cross drainage channel.</p> <p>Prior to monsoon, the contractor will provide either permanent or temporary drains to prevent water accumulation in surrounding residential, commercial and agricultural areas. Additionally, all structure construction sites shall be cleared/cleaned-up.</p> <p>A pre-monsoon joint inspection (in May first week) by SC and/or PIU/OWD will be conducted to identify all such areas which need to be cleared and restored before the onset of rains.</p>			

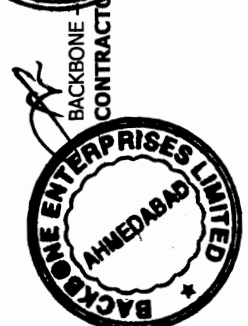


Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
C.3.3	Siltation of Water Bodies and Degradation of Water Quality	<p>Contractor will construct silt fencing at the base of the embankment construction near all water bodies (including wells) and around the stockpiles at the construction sites.</p> <p>Silt fencing will be provided prior to the commencement of earthwork and continue till the stabilization of the embankment slopes is complete on the particular sub-section of the road.</p> <p>The contractor will also put up sedimentation cum grease traps at the outer mouth of the drains located in truck lay byes and bus bays which are ultimately entering into any surface water bodies / water channels with a fall exceeding 1.5 m.</p> <p>Contractor will ensure that construction materials containing fine particles are stored in an enclosure such that sediment-laden water does not drain into nearby water bodies.</p>	MoRTH: 306; Silt Fencing Details in Annexure 4	Contractor	Supervision Consultant; PIU/OWD
C.3.4	Slope Protection and Control of Soil Erosion	<p>➤ The contractor will construct slope protection works as per design, or as directed by the Environmental Officer of SC to control soil erosion and sedimentation through use of dykes, sedimentation chambers, basins, fiber</p>	MoRTH: 305.2.2.2; MoRTH: 306.2; Framework for	Contractor	Supervision Consultant; PIU/OWD





Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		<p>mats, mulches, grasses, slope drains and other devices as required under specific local conditions.</p> <ul style="list-style-type: none"> <li>➤ 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.</li> </ul> <p>Contractor will ensure the following:</p> <ul style="list-style-type: none"> <li>➤ 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.</li> <li>➤ Terfing works will be taken up as soon as possible provided the season is favorable for the establishment of grass sods.</li> <li>➤ Other measures of slope stabilization will include mulching netting and seeding of batters and drains immediately on completion of earthworks with sowing of seeds of grass, shrub and bushes 30cm interval from line to line across the slope and sprinkling of water on such slopes after completion of the earth</li> </ul>	Soil Erosion and Sedimentation Control		



Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		<p>work.</p> <ul style="list-style-type: none"> <li>➤ Regular watering shall be provided at such locations as required. In all these cases, seeds of Banachakunda (Cassia tora), Banakolthi (Tephrosia), Bala (Sida species), Vetiver grass, Pamarosa grass, Croton bonplandianus (Gandha tulasi), Jatropha gossypifolia etc. will be used.</li> <li>➤ In borrow pits, the depth shall be regulated so that the sides of the excavation should not be steeper than 1 vertical to 2 horizontal, from the edge of the final section of the bank.</li> <li>➤ Along sections abutting water bodies, stone pitching as per design specification will be provided to protect slopes. All such stone pitching should have a filter layer to prevent scouring and settlement of the pitched surface when the water level recedes.</li> <li>➤ Stabilization of the embankment with appropriate technique/s shall commence soon after the embankment formation.</li> <li>➤ Any existing drainage channel or body shall not be obstructed during filling operations.</li> </ul>			



BACKBONE CONTRACTORS



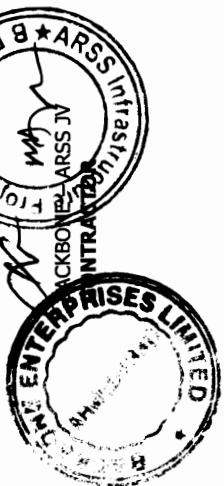
Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
C.4	Pollution	➤ The embankment slope shall be maintained as per IRC specifications.			
C.4.1	Water Pollution				
C.4.1.1	Water Pollution from Construction Wastes	<p>The Contractor will take all precautionary measures to prevent the wastewater generated during construction from entering into streams, water bodies or the irrigation system by providing safe wastewater soak pits away from any aquifers or water body.</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 collection pits.</p> <p>Construction materials containing fine particles like lime stone, lime, cement, fine aggregates etc. shall be stored in enclosures away from water bodies on high land to ensure that any run off from such locations does not drain into nearby water</p>	<p>MoRTH: 111.4; MoRTH: 111.1; Water Act, 1974</p>	Contractor	Supervision Consultant; PIU/OWD, SPCB



Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		<p>courses.</p> <p>No garbage, sludge, lubricants, fuel, sewerage or contaminated waste water is to be released in the settlement areas, water bodies, forests and wildlife habitats or grazing areas. All waste arising from the project is to be disposed off in the manner that is acceptable to the State Pollution Control Board or as directed by Environmental Expert of Supervision Consultant.</p> <p>The Environmental Expert of SC will specify in the progress reports on whether the all liquid wastes disposed off from the various sites meets the discharge standards as specified by the CPCB Govt. of India. If case of non-compliance actions taken by SC shall also be specified.</p> <p>This shall be done on the basis of pollution monitoring results received from the Contractor and that from the Independent Agency hired by OWD/PIU.</p>			
C.4.1.2	Water Pollution from Fuel, Lubricants and Chemicals	The Contractor will ensure that location of parking lots; garage; fuel/lubricants storage sites; POL waste collection sites; vehicle, machinery and equipment maintenance and refueling sites (other	MoRTH: 111.4; MoRTH: 111.1; Petroleum Act	Contractor	Supervision Consultant; PIU/OWD, SPCB



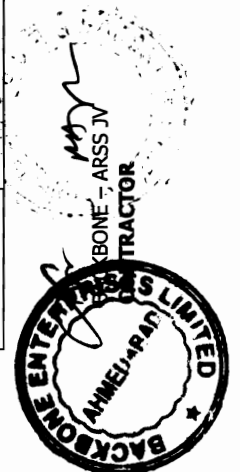
Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		<p>than those located inside construction camps, for which the relevant clause is applicable); are located on high ground at least 500 m from rivers, streams, canals, ponds, wildlife movement areas, forests and ground water sources.</p> <p>If such areas are located on agricultural land, top soil will be stripped, stockpiled and returned after cessation of such use.</p> <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 will ensure that all vehicle/machinery and equipments operation, maintenance and refueling will be carried out in such a fashion that any spillage (while working or accidental) of fuel and lubricants does not contaminate the land and water resources.</p> <p>There shall be lined drains and service ramps with oil and grease traps/oil interceptors (as per the design provided) in such areas to prevent liquid wastes from entering into any aquifer, local water source, abandoned well, bore well, pond and other water bodies.</p>	and Rules; MoEF/CPCB Notifications; Framework for Construction Camps		



Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		<p>Storage of drums (both filled and empty) and refueling shall be done on concrete platforms (impervious surface). Additionally, roofing (of any type) 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, paints etc. Covered bins/drums (marked specifically regarding the contents) shall be kept separately at maintenance and refueling areas.</p> <p>Disposal shall be at pre-identified sites (list to be submitted to SC and OWD/PIU) as approved by the Environmental Officer of SC. All spills and collected petroleum products will be disposed off in accordance with the prevailing MoEF and SPCB guidelines issued for such purpose. Environmental Officer of SC will certify that all arrangements comply with the guidelines of SPCB/ MoEF or any other relevant laws such as the Central Excise and Explosive Substances Act.</p>			



Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
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C.4.2	Air Pollution				
C.4.2.1	Dust Pollution	<p>The contractor will take every precaution to reduce the level of dust (SPM and RSPM) from crushers, material storage yards, haul roads and construction sites (including earthwork, dismantling, scarification and material mixing sites) by sprinkling of water, mist spray, encapsulation of dust source and erection of screen /barriers.</p> <p>Hot mix plant and batch mix plant will be fitted with dust extraction units and mist spray to keep down the dust emission levels. The suspended particulate matter value at a distance of 40m from a unit located in such a cluster should be less than 500 µg/m<sup>3</sup>.</p> <p>Dust screening vegetation such as Dwarf bamboo, Justiacea, Vitex negundo, Lawsonia inermis will be planted around the crusher sites besides provision of dust screens.</p> <p>The contractor will provide necessary certificates to confirm that all crushers used in the project conform to relevant dust emission control legislation. Air pollution monitoring will be conducted as per the Pollution Monitoring Plan</p>	<p>MoRTH:111.1; MoRTH:111.5; MoRTH:111.9; MoRTH:111.10; Air Act; SPCB Rules and Guidelines</p>	Contractor	Supervision Consultant; PIU/OWD, SPCB

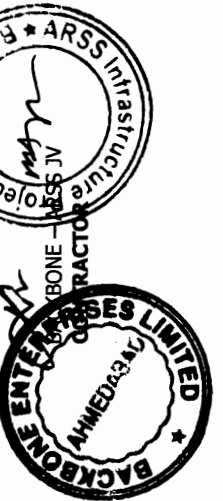


Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		and results shall be used to strengthen/rectify problematic areas. If other existing crushers are used, such units need to have valid license from the SPCB.  Copies of the required certificates and consents of the operator owner shall be procured by the Contractor and submitted to OWD/PIU through Environment Officer of SC prior to the procurement of material from such units. The Resident Engineer will ensure that the necessary documents have been submitted by the contractor before material procurement permission is issued by the Materials Engineer of SC.			
C.4.2.2	Emission from Construction Vehicles, Equipment and Machineries	Contractor will 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 obtained from designated/approved authority shall be submitted along with the specified reporting format. The contractor will maintain a separate file and submit PUC certificates for all vehicles/equipment/machinery used for the	Motor Vehicles Act	Contractor	Supervision Consultant; PIU/OWD, SPCB






Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
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		project. Monitoring results will also be submitted to SC and OWD/PIU as per the Pollution Monitoring Plan in the specified format.			
<b>C.4.3</b>	<b>Noise Pollution</b>				
C.4.3.1	Noise Pollution: Noise from Vehicles, Plants and Equipment	<p>The Contractor will ensure the following:</p> <ul style="list-style-type: none"> <li>➤ 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.</li> <li>➤ All vehicles and equipment used in construction will be fitted with exhaust silencers.</li> <li>➤ 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.</li> <li>➤ Limits for construction equipment used in the project such as compactors, rollers, front</li> </ul>	Noise Rules, 2002	Contractor	Supervision Consultant; PIU/OWD; SPCB, Affected Communities ; PRIs; NGOs; Staff at Schools and Health Centres

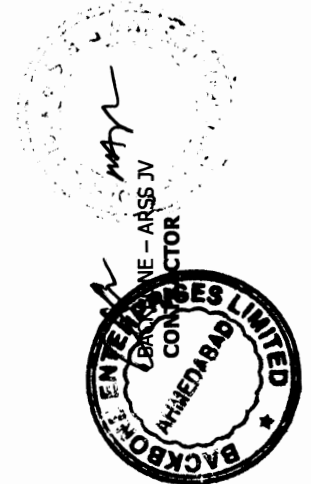


Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
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		<p>loaders, concrete mixers, cranes (moveable), vibrators and saws shall not exceed 75 dB (A) (measured at one meter from the edge of equipment in the free field), as specified in the Environment (Protection) Rules, 1986.</p> <ul style="list-style-type: none"> <li>➤ Maintenance of equipment, machinery and vehicles (including proper lubrication, tuning, checks for muffler effectiveness) shall be regular and upto the satisfaction of the Environmental Officer of SC to keep noise levels under control .</li> <li>➤ Construction activity at sites within 100m habitations and hospitals shall not be carried out during night (10:00 pm to 06:00 am).</li> <li>➤ 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.</li> <li>➤ The Contractor will not take any construction activity around educational institutes within a distance of 100 m between the working hours of these sensitive receptors.</li> <li>➤ Contractor will provide noise barriers at all sensitive receptors mentioned in Tabular</li> </ul>			

  
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Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		<p>statement under Chapter -2 of EMP, which includes masonry walls and vegetative screens (creepers) as per the design <b>drawing no. OSRP/CEG/SH/ENV/04B.</b></p> <p>These locations include 14 temples (km 0.416, 0.466, 3.3, 4.738, 7.15, 13.7, 14.7, 14.81, 18.0, 23.6, 30.9, 32.75, 34.2 and 34.438Km.) and 3 burial rounds (km 2.115, 2.120 and 36.150); 10 schools (km0.03, 3.51, 7.8, 10.26, 13.654, 20.8, 34.5, 34.35, 36.675 and 38.547km) and 3 govt. offices (km 13.575, 36.286 and 36.908).</p> <ul style="list-style-type: none"> <li>➤ Blasting operations, if any shall be carried out with full safety precautions and in compliance with measures as specified in the legal provisions.</li> <li>➤ Monitoring shall be carried out at the construction sites as per the noise monitoring plan and results will be submitted to SC and OWD/PIU.</li> </ul> <p>Environmental Officer of SC will be required to regularly inspect all above mentioned sites to ensure proper compliance of the said measures.</p>			



Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
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C.5	Safety				
C.5.1	Personal Safety Measures for Labour	<p>Contractor shall provide (including enforcement with zero tolerance):</p> <ul style="list-style-type: none"> <li>➤ Protective footwear and protective goggles to all workers employed on mixing asphalt materials, cement, mortars, concrete, welding sites, blasting, crusher and stockpiling locations etc. as per the Factory Act, 1948.</li> <li>➤ Welder's protective eye-shields to workers engaged in welding works.</li> <li>➤ Earplugs to workers exposed to high noise levels (above 65db) at quarries, crushers, compaction sites, concrete mixing, batch mixing, drilling, fabricating and heavy machinery operations.</li> <li>➤ Hard hat or helmets to all workers, supervising staff and inspecting officials entering a construction site, plant area, quarry, loading and unloading site.</li> <li>➤ Protective goggles and clothing to workers engaged in stone breaking activities.</li> </ul>	Factories Act, 1948; Building and Other Construction Workers (Regulation of Employment and Conditions of Services) Act, 1996	Contractor	Supervision Consultant; PIU/OWD

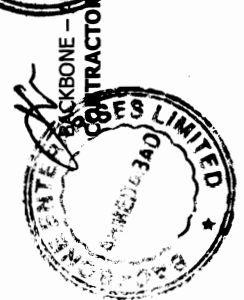


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Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
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		<p>➤ Earplugs to workers exposed to noise in crushing, compaction, blasting, dismantling or concrete mixing operations.</p> <p>➤ Adequate safety measures for workers during handling of materials at site.</p> <p>➤ Nettings and platforms below and on the sides of overhead construction and excavation work to prevent mishaps due to accidental fall of workmen and debris.</p> <p>The Contractor will comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches and safe means of entry and egress.</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.</p> <p>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</p>			



Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
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		<p>those are applicable to this contract.</p> <p>The Contractor will not employ any person below the age of 18 years for any work and no woman of productive age will be engaged in the work of painting containing lead in any form. The Contractor will also ensure that no paint containing lead or lead products is used except in the form of paste or readymade paint.</p> <p>Contractor will provide facemasks to the workers engaged in spray painting or manual painting when lead based compound is one of the constituents of such surface to be scrubbed, cleaned and painted. These masks shall also be provided to workers to minimize risks from inhaling toxic fumes and dust.</p> <p>'No smoking' and other 'high risk' areas are to be provided with warning signage besides strict enforcement of PPE with zero tolerance limits.</p> <p>These arrangements need to be reflected in the Construction Safety Plan to be prepared by the Contractor during mobilization, which shall be approved by SC and OWD/PIU after proper scrutiny.</p>			



Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
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C.5.2	Traffic Safety	<p>The Contractor will take all necessary measures for the safety of traffic during construction and provide, erect and maintain such barricades, including signage, markings, flags, lights, reflectors and flagmen as proposed in the Traffic Control Plan/Drawings and as required by the Environmental Officer of SC for the information and protection of road users approaching or passing through the section of any construction site of activity or diversion.</p> <p>The Contractor will ensure that all signs, barricades, pavement markings are provided as per the MoRTH/ IRC specifications.</p> <p>Before taking up construction on any section of the existing lanes of the highway, a Traffic Control Plan will be devised and implemented to the satisfaction of the Environmental Officer of SC and local administrative authorities including traffic police.</p>	MoRTH specifications and IRC guidelines	Contractor	Resident Engineer; Bridge Engineers PIU/OWD



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C.5.3	Risk from Electrical Equipment(s)	<p>All power transmission lines whether claded or sufficiently covered are potential hazards at construction sites. The Contractor will take all required precautions to prevent danger from electrical cables, wires and equipment and ensure that –</p> <ul style="list-style-type: none"> <li>➤ 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.</li> <li>➤ All such electrical installations and wirings shall be barricaded in manner that ensures safety of the road users, wildlife and operating vehicles/equipment such as cranes, excavators, loaders, fabricating units etc.</li> <li>➤ Necessary fencing, illumination and proper insulation of the electrical lines shall be ensured by the contractor for safety and security of the public, road users, workers and the wildlife.</li> <li>➤ The contractor shall ensure proper maintenance of electrical supply lines/points.</li> <li>➤ All such electrical operating units shall be</li> </ul>	-	Contractor	Supervision Consultant; PIU/OWD






Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		<p>switched off before operations are closed every day or night as the case may be.</p> <ul style="list-style-type: none"> <li>➤ All electrical equipment/cables/wires to be used in the construction shall have to conform to the relevant BIS specifications/codes.</li> <li>➤ The contractor will ensure that such equipment/cables/wires are free from patent defect, and under good working conditions 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.</li> </ul>			
C.5.4	Risk Force Measure	<p>The contractor will 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, borrow 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-</p>	-	Contractor	Supervision Consultant; PIU/OWD



  
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		<p>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>Construction Safety Plan to be prepared by the contractor 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 approved by the Supervision Consultant and the Environmental Officer of the OWD/PIU as per the standard practice adopted under labour welfare activities and Factories Act.</p>			
C.5.5	First Aid	<p>The Contractor shall arrange for -</p> <ul style="list-style-type: none"> <li>➤ A readily available first aid unit including an adequate supply of sterilized dressing materials and appliances as per the Factories Rules in</li> </ul>	Building and the other Construction Workers (Regulation of	Contractor	Supervision Consultant; PIU/OWD

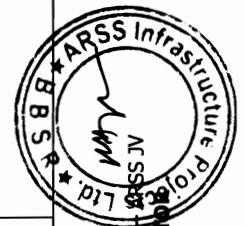


  
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				Execution / Civil Work	Supervision/ Monitoring
<b>C.6</b>	<b>Cultural Property</b>				
C.6	Chance Found Archaeological Property	<p>every work zone with life saving first aid kits.</p> <ul style="list-style-type: none"> <li>➤ Availability of suitable transport at all times to take injured or sick person(s) to the nearest hospital.</li> <li>➤ Equipment and trained nursing /paramedical staff at construction camps.</li> <li>➤ Periodic health checks for workers</li> </ul>	Employment and Conditions of Service) Act, 1996		
		<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> <p>The contractor will take reasonable precautions to prevent his workmen or any other persons from removing and damaging any such article or property. He will, immediately upon discovery thereof intimate the Environmental Officer of SC, local police and administration of such discovery and carry out the given instructions for dealing with the same.</p> <p>The SC will seek direction from the State Archaeological Department before instructing the</p>	Central and State Laws	Contractor	Supervision Consultant; PIU/OWD, State Archeological Department



Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		contractor to recommence the work in the site. Till such time, the site and the findings shall be under strict watch and ward of the contractor, SC and local administration to prevent any pilferage, alteration of the findings by the workmen or locals as the case may be.			
<b>C.7</b>	<b>Labor Camp Management</b>				
C.7.1	Accommodation	<p>Contractor will follow all relevant provisions of the Factories Act, 1948 and the Building and the other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 for construction and maintenance of labour camp.</p> <p>The location, layout and basic provision of facilities at each labour camp site will be submitted to SC. The construction or hiring of such facilities shall commence only after the written approval from the SC.</p> <p>The Contractor will maintain necessary living accommodation and ancillary facilities (including provision of clean fuel to prevent damage to forests and to prevent fuel wood cutting and</p>	<p>Building and the other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996</p>	Contractor	Supervision Consultant; PIU/OWD



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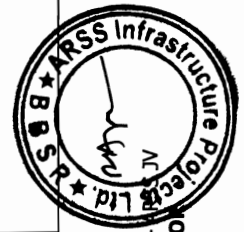
Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
C.7.2	Potable Water	<p>burning by labour) in functional and hygienic manner. Any non-compliance or damage shall be made good by the contractor at his own cost.</p> <p>The contractor will also provide availability of potable water within the precincts of every workplace in a cool and shaded area, which is easily accessible as per standards set by the Building and other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996.</p> <p>The contractor will ensure the fulfillment of the following conditions at all work places for the benefit of workers:</p> <p>a) Supply of sufficient quantity of potable water (as per IS) in every workplace/labor camp site at suitable and easily accessible places shall be made. Such facilities shall be regularly maintained from health and hygiene point of view.</p> <p>b) All potable water storage facilities will be on a safely raised platform that is at least 1m above the surrounding ground level.</p> <p>c) In the camp sites, water purifier units shall be</p>	<p>Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996</p>	Contractor	Supervision Consultant; PIU/OWD



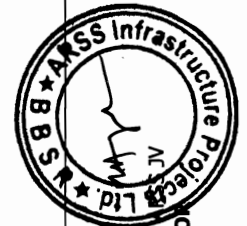
Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		<p>installed for providing potable water.</p> <p>d) As far as possible shallow well will not be used as potable source of water. However, if water is drawn from any existing well, irrespective of its location from any polluting sources, regular disinfection of the water source (which may include application of lime, bleaching powder and potassium permanganate solution) has to be ensured at weekly/fort nightly interval.</p> <p>e) 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>f) A drain shall be constructed around the well to prevent flow of contaminated water into the well from road, camp or other sources.</p> <p>g) The trap door will be kept locked and opened only for cleaning or inspection, which will be done at least once in a month.</p> <p>h) Water quality testing of all potable water sources will be done every month as per</p>			



Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		<p>parameters prescribed in IS 10500:1991.</p> <p>Environmental Officer of SC will be required to inspect the labour camp once in a week to ensure compliance to these health and hygienic standards prescribed in the EMP. The camp-in-charge will be responsible for day-to-day monitoring.</p>			
C.7.3	Sanitation and Sewage System	<p>The contractor will ensure that -</p> <ul style="list-style-type: none"> <li>➤ The sewage system for the camp are designed, built and operated in such a fashion that no health hazards occurs and no pollution to the air, ground water or adjacent water courses takes place.</li> <li>➤ Separate toilets and bathrooms for women workers wherever required, screened from those of men, are provided with markings in vernacular language.</li> <li>➤ All such facilities must have adequate water supply with proper drainage and disposal facility.</li> <li>➤ All toilets in workplaces are with dry earth systems which are to be maintained, cleaned</li> </ul>	<p>Building and the other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996</p>	Contractor	Supervision Consultant; PIU/OWD



Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		<p>and disinfected daily using proper disinfectants. The location of such provisions should not affect the air, surface water and ground water of the locality or the agricultural fields located near-by.</p> <ul style="list-style-type: none"> <li>➤ 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.</li> <li>➤ 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.</li> </ul> <p>All these facilities shall be inspected on a weekly basis to check the hygiene standards.</p>			
C.7.4	Waste Disposal	<p>The Contractor will provide garbage bins in the camps and ensure that these are regularly emptied and disposed off in a hygienic manner as per the Comprehensive Solid Waste Management Plan approved by the Environmental Officer of SC.</p> <p>No incineration or burning of wastes shall be carried out by the Contractor. The disposal of kitchen waste and other biodegradable matter shall</p>	Environment Protection Act, 1986 and Rules	Contractor	Supervision Consultant; PIU/OWD, SPCB, Local Authorities



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Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		<p>be carried out in pits covered with a layer of earth within the camp site. The contractor may use the compost from such wastes as manure in the plantation sites.</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, tires, belts, filters, waste oil, drums and other such materials shall be either reused or will be sold / given out for recycling.</p>			
<b>C.8</b>	<b>Contractor's Demobilization and Decommissioning of Established Setup</b>				
C.8.1	Clean-up Operations, Restoration and Rehabilitation	<p>Contractor will prepare site restoration plan, which will be submitted for approval to the Resident Engineer of SC. The Resident Engineer and the Environmental Officer of SC will be jointly responsible for approving and monitoring these plans.</p> <p>The contractor needs to submit his plan at least 60 days prior to 'substantial handing over of the site.' All clean-up and restoration operations shall be completed by the contractor prior to</p>	-	Contractor; Resident Engineer of SC; Environment Officer of SC	OWD/PIU



Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		<p>demobilization.</p> <p>The contractor will clear all temporary structures; dispose all garbage, night soils and POL waste as per the approved Comprehensive Waste Management Plan. 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 that has been impacted on account of accidental spillage.</p> <p>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 left clean and tidy, at the Contractor's expense, to the entire satisfaction of Environmental Officer of SC and OWD/PIU.</p> <p>The Resident 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' is issued/recommended. The OWD/PIU shall ensure through site inspection that the Contractor and SC</p>			



Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		have complied with all these provisions.			

Table 3.3

ENVIRONMENTAL MANAGEMENT PLAN

Operation Stage

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference Document	Responsibility	
				Execution/Civil Work	Supervision /Monitoring
<b>OPERATION STAGE</b>					
<b>Activities to be Carried Out by the OWD</b>					
O.1	Monitoring and Evaluation of Operational Performance of Environmental Mitigation Measures provided	The OWD/PIU will monitor the operational performance of the various mitigation/enhancement measures carried out as a part of the project. Monitoring and performance indicators have been indicated in Chapter 4. These include – ➤ Tree preservation and plantation	-	OWD Field Divisions; OWD/PIU	OWD/PIU; Concerned Departments/Agencies



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Sl. No.	Environmental Aspect/Issue in the Project	Management Measures	Reference Document	Responsibility	
				Execution/Civil Work	Supervision /Monitoring
O.2	Maintenance of Drainage	<ul style="list-style-type: none"> <li>➤ Biodiversity Works</li> <li>➤ Construction Camp Management</li> <li>➤ Top Soil Preservation</li> <li>➤ Borrow and Quarry Area Management</li> <li>➤ Traffic Safety and Management</li> <li>➤ Pollution Control and Waste Management</li> <li>➤ Site enhancements etc.</li> </ul> <p>Also, the rehabilitation works at degraded sites along nalas, streams and gullies after soil and water conservation measures has to be inspected, recorded and damages timely repaired for effective functioning and maintenance of such efforts in the field.</p> <p>All observations and data shall be added/updated in the Database/Information Management System developed for the project. This also covers other points given in this table.</p> <p>OWDPIU will ensure that all drains (side drains and all cross drainages) are periodically cleared especially before monsoon season to facilitate the quick passage of rainwater and avoid flooding without damaging the spurs and check dams erected to stabilize the course and flow of all such drainage channels.</p>	MoRTH specifications; IRC guidelines	OWD Field Divisions	OWD/PIU




Sl. No.	Environmental Aspect/Issue	Management Measures	Reference Document	Responsibility	
				Execution/Civil Work	Supervision /Monitoring
O.3	Pollution Monitoring	<p>OWD/PIU will ensure that all the sediment/oil and grease traps set up at the truck and bus lay bye are cleared once in every three months.</p> <p>The periodic monitoring of the ambient air quality, noise level, water (both ground and surface water) quality, soil pollution/contamination are to be continued at pre-designated locations as identified in the Pollution Monitoring Plan and if necessary, at additional locations for comparative study of pre and post operation data in order to ensure further improvement/modification in similar future works. OWD/PIU will appoint specific pollution monitoring agency for this purpose.</p>	Pollution Monitoring Plan (EMP)	Pollution Monitoring Agency; OWD/PIU	OWD/PIU
O.3.1	Atmospheric Pollution	<p>Ambient air concentrations of various pollutants shall be monitored as envisaged in the pollution-monitoring plan at pre designated locations to compare the levels with the pre construction data.</p> <p>Additional data at other location may be collected as per any site specific requirement.</p>	Pollution Monitoring Plan (EMP)	Pollution Monitoring Agency; OWD/PIU	OWD/PIU

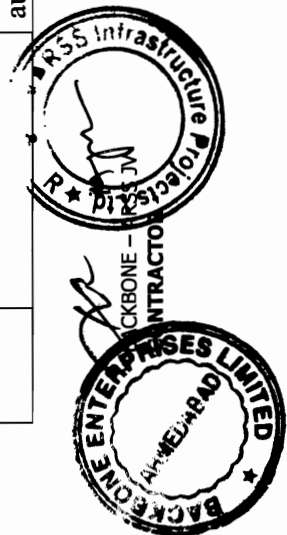


Sl. No.	Environmental Aspect/Issue	Management Measures	Reference Document	Responsibility	
				Execution/Civil Work	Supervision /Monitoring
0.3.2	Noise Pollution	Noise pollution will be monitored as per monitoring plan at sensitive locations where pre-construction noise data was collected. The survival rate and functioning of the noise control plantations and noise control walls has to be specifically supervised and monitored for further improvement/replication at other affected points if necessary. The survival rate of dwarf bamboo plantation at such locations along the road avenue in this cyclone ravaged corridor needs to be specifically monitored. Signage indicating 'no horn zones' near sensitive locations shall be maintained and kept clean. Monitoring the effectiveness of the pollution attenuation barriers will be taken up thrice in the operation period.	Pollution Monitoring Plan (EMP)	Pollution Monitoring Agency; OWD/PIU	OWD/PIU
0.4.	Soil Erosion and Monitoring of Borrow Areas	Visual monitoring and inspection of soil erosion at borrow areas, quarries (if closed and rehabilitated), embankments and other places expected to be affected, will be carried out before monsoon, during monsoon and after winter rains to record and monitor the effectiveness of such structures for five years after the completion of project, so as to evaluate the beneficial effects of	Frameworks on Prevention of Soil Erosion and Borrow Area Management (EMP)	OWD Field Divisions; OWD/PIU	OWD/PIU



  
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Sl. No.	Environmental Aspect/Issue	Management Measures	Reference Document	Responsibility	
				Execution/Civil Work	Supervision /Monitoring
0.5	Changes in Land Use Pattern	<p>each type of activity together with the cost involved.</p> <p>OWD shall take initiative and act as a facilitator in preparing an action plan to encourage balanced, congestion free, safe, hygienic, environment friendly activity on either side of the developed highway during and after completion of the project. This to avoid irregular, ugly, unhygienic and destructive ribbon development, close to the road corridor which adversely affects agricultural and water harvesting capabilities and drainage system of the area.</p> <p>The OWD may consider effective promulgation through some legislation and guidelines controlling such unbridled activity, which are self destructive and distressful for the poor farmers and a drain on the state's economic resources.</p> <p>A state-wide anti-encroachment policy to ensure safety (of the residents and the road users), highway aesthetics and future possibilities for expansion of highway facilities should be considered by OWD. This could include notification and legal recourse against local authorities, which supply power, water, sanitary</p>	<p>Legal Provisions under Prevention and Control of Ribbon Development Act</p>	<p>OWD/PIU, Local Authorities, Revenue Department and Local Civic Bodies, District Administration</p>	<p>OWD/PIU; Govt. of Orissa</p>



Sl. No.	Environmental Aspect/Issue	Management Measures	Reference Document	Responsibility	
				Execution/Civil Work	Supervision /Monitoring
		<p>connections and register commercial activities to encroachers, squatters and illegal settlers on the OWD land. This policy should also cover religious structures, mandaps and puja pandals etc.</p> <p>A land use-zoning map may be developed, under which up to a particular distance from the RoW of the alignment especially in new bypass stretches, no development will be allowed.</p> <p>Necessary hoardings along the corridor will be provided to warn encroachers against any such activity (including punitive action such as forfeiture of the structures and belongings without prior notice, legal action in the court of law barring any stay over such action by the state from any court of law). Budgetary provisions may be made to control the ribbon development along project road.</p>			
0.6	Road Safety and Maintenance of Assets	<p>No advertisement/hoardings shall be allowed within the Right of Way limits of the project road.</p> <p>Regular maintenance and cleaning of assets such as sign boards, bus stops, drains etc. shall be</p>	-	OWD Divisions (and its contractors, if any), District Administration/ Local	. OWD/PIU; Govt. of Orissa





Sl. No.	Environmental Aspect/Issue	Management Measures	Reference Document	Responsibility	
				Execution/Civil Work	Supervision /Monitoring
		undertaken.		Authorities, Local Police	

Table 3.4

**BIODIVERSITY MANAGEMENT PLAN**

Sl. No.	Environmental Aspect/Issue	Management Measures	Responsibility	
			Execution/Civil Work	Supervision /Monitoring
<b>PRE-CONSTRUCTION STAGE</b>				
<b>Activities to be Carried Out by the OWD/Forest Department, GoO/Contractor</b>				
B.1	Preservation of road side trees	<p>Cutting of trees along the avenue and those in the strips of land to be diverted from the forest area for road widening and strengthening, construction of bridges/culverts and for creating temporary diversions is required for the project. A total of 1112 trees will be cut along Berhampur-Taptapani road for the purpose of the project (excluding those in the forest and private land – these numbers shall be clearly reflected in the monitoring sheets after the surveys with Revenue and Forest Department area completed).</p> <p>Attempts to minimize tree cutting particularly of green tunnels, giant healthy trees and young avenue plantation have been done to reduce the impact of cyclones, which are common to this belt of the state. A total</p>	<p>PIU/OWD; DPR consultants; Tree Felling Contractor; Supervision Consultant</p>	<p>Project Director, PIU/OWD</p>

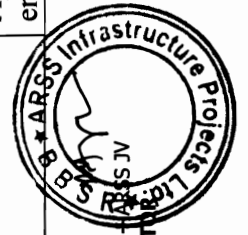
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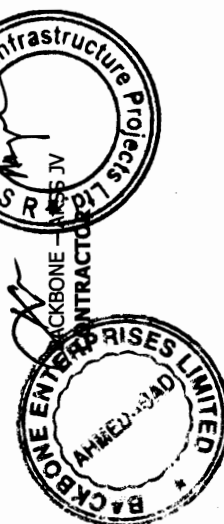
Sl. No.	Environmental Aspect/Issue	Management Measures	Responsibility	
			Execution/Civil Work	Supervision /Monitoring
		<p>of 346 trees shall be preserved in this contract package. The location, no. and side to be saved as per the fringe benefit of retainson given to all sound and healthy plants above 30 cm girth at BH coming on the toe margin as per the horizontal drawing.</p> <p>Saving or retaining at least one side of the green tunnels, avenue plantation giant trees and young plantation has not been done for facilitating nesting, parching, hunting and vintage observation points of aviary fauna, which also provides resting and breeding habitat for rodents, reptiles and amphibians. Besides this, protection of fruit bearing trees used by human beings and wildlife offers additional economic and ecological benefits which is not projected here .In the event of design changes during the course of the project, additional assessments including the possibility to save trees shall be made by the PIU/OWD and the SC. Documentation of such exercises shall be maintained by the PIU/OWD. This includes evaluation of on-the-spot minor design adjustments (as applicable) to save trees.</p> <p>Specific attention will be given for protecting giant trees, green tunnels and locally important trees (religiously important etc.). However, if necessary removal of hollow, rotten and dismembered giant old trees from the corridor of impact may be allowed after site verification by the Forestry Expert of OWD/PIU.</p> <p>As necessary, separate proposals for felling of such trees will be submitted to the concerned Divisional Forest Officer after joint enumeration exercises are completed.</p> <p>Systematic corridor level documentation for the trees to be cut and those</p>		



Sl. No.	Environmental Aspect/Issue	Management Measures	Responsibility	
			Execution/Civil Work	Supervision /Monitoring
B.2	Transplantation	<p>retained shall be maintained by PIU. A separate list will be maintained by the PIU/OWD in a bound register for each contract package duly signed by the site-in-charge from OWD, the tree cutting Contractor and designed officer of the OFDC Ltd., so that no unmarked trees are cut or removed from the corridor.</p> <p>Wherever possible, all trees up to <b>45cm girth</b> at breast height and naturally occurring medicinal shrubs/bushes/grass clumps with in the RoW shall be uprooted mechanically with ball of earth intact for relocation and transplantation at various pre-identified locations such as degraded sites, embankments of road-side water bodies, temples, near-by market places, religious properties, schools and along road corridors for preventing loss of diverse vegetative cover and for reducing growth period.</p>	PIU/OWD; Forest Dept., GoO; OFDC; Tree Felling Contractor	Project Director, PIU/OWD
B.3	Tree Cutting	Trees with bird nesting sites, shall not be felled between August to mid-April to facilitate the young birds/new generations to fly out. Additionally, all provisions stated clause P.3 of Table 3.1 shall be adhered to.	PIU/OWD; Forest Dept., GoO; OFDC; Tree Felling Contractor	PIU/OWD
B.4	Nursery Creation	A nursery (preferably close to the road) will be created/raised for bud grafting, cleft grafting, rooting of off-sets of lesser found indigenous/exotic species available along the corridor so that these can be replicated and planted along the corridor for preserving biodiversity. Apart from this, saplings for plantation along the road or at various enhancement sites shall be raised to meet the plantation targets in a time	PIU/OWD; Forest Dept., GoO	PIU/OWD; Forest Dept., GoO Supervision Consultant



Sl. No.	Environmental Aspect/Issue	Management Measures	Responsibility	
			Execution/Civil Work	Supervision /Monitoring
B.5	Compensatory Afforestation	<p>The diversion of forest land for the development of Berhampur-Taptapani highway is minimal. Approximately, 0.5088ha of forest land diversion will be required for the project.</p> <p>As the legal requirements of the Forest Act, compensatory afforestation shall be undertaken as 10times the number of trees to be removed from such forest land to be planted in any forest by the affected forest /wildlife division, since the total forest area proposed to be acquired is less than 1ha..</p>	Forest Dept., GoO;	Forest Dept., GoO; PIU/OWD;
B.6	Drainage	<p>Adequate number of drainage structures <b>7 bridges; to be rehabilitated 2 to be replaced, 41 pipe culverts; 51 slab culvert, 24 stone slab culvert, 11 arch culvert and 15 chocked culvert</b> shall be taken up for rehabilitation, reconstruction /replacement /widening in the shape of box culvert or pipe culvert numbering 137. With sufficient vantage to enable smooth flow of storm water and flood water have been provided. Construction of drains along the road on both the sides to facilitate quick drainage of the rain water including cross drainage has also been provided.</p> <p>If additional requirements for drainage emerge during the construction period, these will be properly assessed. Water flow modifications and drainage alterations resulting from such exercises shall not affect the forest and water ecosystems of the region.</p>	PIU/OWD; Supervision Consultant	PIU/OWD
B.7	Water holes for	The existing water hole (on LHS near km 27) will be developed and renovated prior to the initiation of construction activity to reduce	PIU/OWD; Forest Dept.,	PIU/OWD;

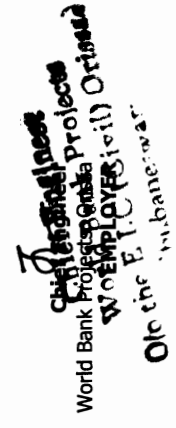
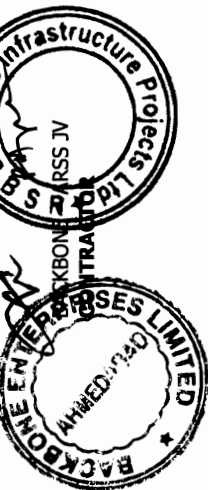


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Sl. No.	Environmental Aspect/Issue	Management Measures	Responsibility	
			Execution/Civil Work	Supervision /Monitoring
	wildlife and birds	distress to wildlife (particularly sloth bear) and birds during construction activities (disturbing their approach to water sources near/across the road).	GoO	Forest Dept., GoO
<b>CONSTRUCTION STAGE</b>				
<b>Activities to be Carried Out by the OWD/Forest Department, GoO/Contractor</b>				
B.8	Construction management and related aspects	The contractor shall adhere to all clauses /specifications covered under the contract including EMP requirements mentioned in <b>Tables 3.1 and 3.2 (and the related frameworks)</b> . Any non-compliance in this regard may lead to suspension/withholding of works and stoppage/deduction of payments or any other action as deemed appropriate within the contractual framework.	Contractor	PIU/OWD; Supervision Consultant
B.9	Preservation of Trees and Vegetation	All existing trees within the RoW but beyond the corridor of impact shall be protected /preserved during the construction of the road. The contractor shall ensure that damages resulting from operation of machinery, dumping and stacking of materials etc. do not occur. Trees within the construction camps, borrow areas and those close to haul roads shall not be cut. These shall be integrated into the lay-out plan for such operations.	Contractor	PIU/OWD; Supervision Consultant
B.10	Underpasses or	Construction of wildlife underpasses and development of approaches to such underpasses by camouflage plantations shall be undertaken at the following locations to promote safety of road users and to reduce the risk of accidents for	Contractor	PIU/OWD; Forest Dept., GoO ; Supervision

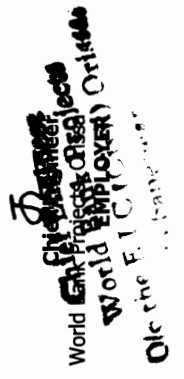
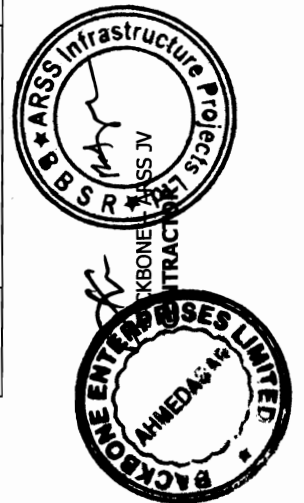


Sl. No.	Environmental Aspect/Issue	Management Measures	Responsibility	
			Execution/Civil Work	Supervision /Monitoring Consultant
	crossing sites for wildlife	<p>wildlife:</p> <ul style="list-style-type: none"> <li>o Km 2.140 -Underpass (primarily for small animals, reptiles and rodents) (Refer Drawing No. ER/BC/S/B/WC/ XXVI, BIOSRP/CEG/SH/ENV/12)</li> <li>o Km 9.810 – Underpass (primarily for small mammals, amphibians, reptiles and rodents) (Refer Drawing No. ER/BC/S/B/WC/ XXVI B1, OSRP/CEG/SH/ENV/12)</li> <li>o Km 27.020 - Underpass (primarily for Sloth Bear) (Refer Drawing No. New/BC/S/B/WC/ XXVI B1)</li> </ul> <p>Additionally, reptile underpass with trap drain and pipe culvert at 4 locations on either side of the culvert at chainage 2.140 and 9.810 barricading on both sides for a length of 20mts away to serve as a via duct connectivity. As per <b>Drawing No. OSRP/CEG/SH/ENV-12.</b></p> <p>Additional barricade at 27.020 underpass on either side as provided in the culvert design for this location.</p> <p>The sequencing of construction activity for wildlife underpasses will be such that no two structures are opened for construction at the same point of time. Also, the construction timing and duration shall be closely monitored to reduce the distress period for wildlife.</p> <p>Advice and assistance will be sought from the Forest Department for undertaking plantation near wildlife underpasses and for the various soil and water conservation measures that will be required in the wildlife habitat/movement zones.</p>		Consultant

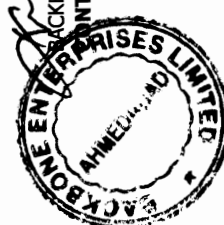
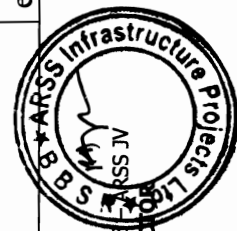


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Sl. No.	Environmental Aspect/Issue	Management Measures	Responsibility	
			Execution/Civil Work	Supervision /Monitoring
B.11	Material Stacking and Debris Management	<p>No materials or debris or silt (including excavated earth and waste materials) shall be stacked/dumped at the following locations at any point of time along <b>Berhampur-Taptapani</b> road:</p> <ul style="list-style-type: none"> <li>• 0 Km Berhampur</li> <li>• 2.7 Km Gunthubandha</li> <li>• 4.7 Km Lanjia</li> <li>• 7.9 Km Baghajhari</li> <li>• 24 – 26 Km Digapahandi</li> <li>• 32.800 Km Dengausta</li> <li>• 36.500 Km Pudamari</li> <li>• 2.130, 9.780, 26.500 – 29.000km points for Wildlife Movement Area</li> </ul> <p>Debris shall be directly loaded into dumpers/tractors and disposed at the pre-identified location/s. Construction management shall be such that operations are completed during the day and materials stacks are not left behind.</p> <p>All excavated boulders and rocks which are not fit for use in road construction should be used near streams, water bodies or wildlife underpasses to prevent scouring and to provide camouflage cover to animals.</p> <p>Uprooted stumps, discarded logs etc. can also be used at such locations. These can also be placed at selected enhancement locations.</p>	Contractor	PIU/OWD; Forest Dept., GoO ; Supervision Consultant



Sl. No.	Environmental Aspect/Issue	Management Measures	Responsibility	
			Execution/Civil Work	Supervision /Monitoring
B. 12	Water Pollution	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.	Contractor	PIU/OWD; Supervision Consultant
B. 13	Damage to aquatic life in ponds	The construction of retaining walls in the ponds, bathing ghats, spillways, minor bridges etc., shall be in manner that causes minimal disturbance/damage to users and the aquatic life (like fish on which local people use for sustenance/livelihood).	Contractor	PIU/OWD; Supervision Consultant
B. 14	Fire Safety	No lighting of fire or setting-up of labour camps within one kilometer of the forest areas and wildlife movement zones shall be permitted.	Contractor	PIU/OWD; Forest Dept.; Supervision Consultant
B. 15	Strengthening Forest Check Gates	The two existing forest check gates at the under-mentioned locations will be reconstructed along with provision of lay bye to enable proper checking of vehicles and preventing congestion on the highway : o <b>Km 24.700 (Punjikayan)</b> o <b>Km 36.900 (Pudamari)</b>	Plantation near underpasses and/or crossing sites	
B. 16	Informatory and	Signage (10no.) regarding speed limits and protecting wildlife/environment shall be put-up along the road. This may include information/warnings about for preventing forest fires, hunting, snaring, encroaching, smuggling, obstruction of natural water courses,	Contractor	PIU/OWD; Forest Dept.; Supervision Consultant





Sl. No.	Environmental Aspect/Issue	Management Measures	Responsibility	
			Execution/Civil Work	Supervision /Monitoring
B.17	Warning Signage Avenue or side Road Plantation Strategy	<p>confrontation with wildlife etc. The content of such signage (samples provided in Biodiversity Assessment Report) will be finalized in consultation with the Forest Department, GoO.</p> <p>Avenue plantation at the edge of the RoW shall be undertaken to improve highway side aesthetics, reduce micro-climatic impacts of loss of roadside vegetation and provide for some livelihood benefits to the local communities. Additionally, some species that provide shelter and food to birds and small organisms shall also be planted to reduce ecological stress on such species in the medium and long run.</p> <p>The tree planting along the corridor within the RoW (but outside Forest Areas) shall be taken up by the Contractor assigned with the job of planting, which may be local Self help groups (SHG) or any other independent party. This works shall be undertaken in a phased manner and tied-up with the civil works schedule.</p> <p>A total of <b>16514 poly pot seedlings</b> (1.5 year old) including 674 plants to be up rooted and re-planted shall be planted with 20% extra to be raised in the nursery for casualty replacement along the Right of Way, ponds and other water bodies, camouflage corridor. A minimum of 75 percent survival rate of the saplings shall be required for the clearance of payments. Any damage beyond this threshold shall be made good by the contractor at his own cost. The contractor will maintain the plantation for a minimum of three years beyond which it shall be handed over to the OWD for maintenance.</p> <p>The plantation shall be taken up in areas beyond the ROW inside</p>	Contractor	Supervision Consultant; PIU/OWD

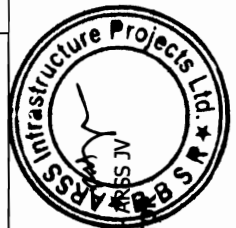


BACKBONE CONTRACTOR

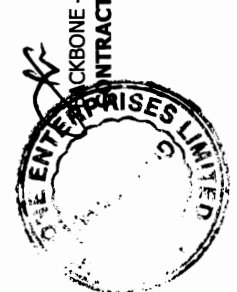
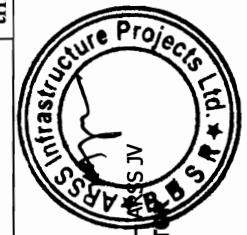


Chief Engineer  
World Bank Projects  
Chief Engineer  
World Bank Projects  
Olotpe E. I. C (Civil) Orissa  
Bhubaneswar.

Sl. No.	Environmental Aspect/Issue	Management Measures	Responsibility	
			Execution/Civil Work	Supervision /Monitoring
		<p>degraded forest land by Forest Department through a memo of understanding MoU between OWD and Forest Department as site enhancement for wildlife and environment. In case of Govt. waste land this will be taken up by local SHG, after signing MoU with OSRP of OWD.</p> <p>The species, spacing, age and height of the plant together with condition of seedlings at the time of plantation shall be as per the Tree Plantation Framework provided in <b>Framework - 1</b>. All other conditions as mentioned in this framework including those of transportation, plantation, and maintenance shall be strictly adhered to.</p> <p>The Environmental Officer of SC and Forestry Expert of OWD/PIU will inspect and monitor regularly the plantation works, survival rate of all such plantations and record their observations in the plantation register at the time of inspection besides making official correspondence on deficiencies or improvements or changes, as warranted in specific situations.</p>		
B.18	Site Enhancement Plantation	Plantation of trees such as Banyan, Pipal, Mango, Samania, Champa, Karanja, Anla, Harida, Bahada, Kadamba, Gulmohar, Bengal almond, Arjuna, and Tamarind along with medicinal plants and shrubs such as Adhatoda, Cassia fistula, Harasingar, Dhatuki, Ganiary(Premna), Barakoli etc. shall be undertaken near ponds and community gathering areas. The final plantation number will depend upon the interest and involvement of local communities /groups / individuals.	Contractor; PRIs; Local Communities/S HG/ Individuals	PIU/OWD; Supervision Consultant



Sl. No.	Environmental Aspect/Issue	Management Measures	Responsibility	
			Execution/Civil Work	Supervision /Monitoring
B.19	Flora and Chance found Fauna	<p>The contractor will take reasonable precaution to prevent his workmen or any other persons from removing and damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body and hunting of any animal whether in forest or non-forest land along the corridor. Only permissive activities like fishing may be allowed in the local non-forest areas with prior written consent of the local authorities and villagers. Copies of such permission shall be submitted to the Supervision Consultant.</p> <p>Collection of specimens, hunting, snaring, shooting, mining, fishing and burning fire in an around wildlife movement zones and, protected or reserved forests areas is strictly prohibited under law. Any such action by the contractor (and his staff) or the Supervision Consultant (and his staff) shall be reported to Forest Department, GoO and the local police/administration.</p> <p>If any wild animal is found near the construction site at any point of time, the contractor or his representative will immediately upon discovery thereof inform the Environmental Officer of SC, the Resident Engineer and the local forest authority and will abide by the necessary action/s as suggested by these officials.</p> <p>The Environmental Officer of SC will report to the near by Forest Office (range office or divisional office) and will take appropriate steps/measures, if required in consultation with the Forest Officials – this could include rescue, first-aid or sending back the animal towards</p>	<p>Contractor; Supervision Consultant</p>	<p>PIU/OWD; Supervision Consultant; Forest Dept., GoO</p>



Sl. No.	Environmental Aspect/Issue	Management Measures	Responsibility	
			Execution/Civil Work	Supervision /Monitoring
		the forest.		
B.20	Involvement of Local Communities	As far as possible, employment to local people/communities/SHGs should be provided for the plantation (including raising of saplings in the nurseries and maintenance), enhancement and other environmental works along the corridor.	Contractor; Supervision Consultant	PIU/OWD; Supervision Consultant
B.21	Awareness Generation	Leaflets and/or booklets for generating awareness among the public including road users on 'dos' and 'don'ts' during the various stages of the project shall be prepared and distributed.	PIU/OWD; Supervision Consultant	PIU/OWD



Sl. No.	Environmental Aspect/Issue	Management Measures		Responsibility	
				Execution/Civil Work	Supervision /Monitoring
<b>OPERATION STAGE</b>					
<b>Activities to be Carried Out by the OWD/Forest Department, GoO</b>					
B.22	Immunization of Cattle	Mass immunization of cattle within 5 km aerial distance in villages/ habitations (on either side of the corridor) adjoining the forest and wildlife movement zones may be taken-up by the Forest Department, GoO in association with the local animal husbandry wing to prevent spread of communicable diseases.		Forest Department, GoO (District Level); Animal Husbandry Wing	Forest Department, GoO
B.23	Monitoring and Evaluation of Operational Performance Biodiversity Protection Measures provided under the Project	<ul style="list-style-type: none"> <li>o The completion of wildlife underpasses as per design and specifications with survival and development of plantation near the approach into a wildlife corridor shall be closely monitored and evaluated.</li> <li>o Monitoring of the wildlife movement (type, frequency and season) along the identified wildlife corridors shall be undertaken at fixed intervals.</li> <li>o The function and stability of water holes provided to remove distress to the wildlife shall be monitored for five years.</li> <li>o The avenue plantation and site enhancement plantation raised under the project and the old avenue trees retained /saved, are to be checked every year with respect to the details in the plantation register for evaluating their survival and benefits to the local community.</li> </ul> <p>All these observations and data (including number, condition/status and utility/benefits) shall be systematically recorded for assessment and evaluation.</p>		PIU/OWD; Forest Department, GoO	PIU/OWD; Forest Department, GoO

**Note: The complete EMP Document may be read alongwith the above stipulations which is available on our official website at <http://osrp.gov.in>**





**GOVERNMENT OF ORISSA**  
**WORKS DEPARTMENT**

**CIVIL WORKS CONTRACT**

[ PACKAGE No. OSRP-CW-ICB-Y1-P03 ]

**For**

*Widening & Strengthening of existing carriageway to 2-lane road from  
Berhampur to Taptapani  
(Km. 0/0 to 41/0 of SH – 17 )*

*under  
Orissa State Roads Project*

between

**Chief Engineer, World Bank Projects, Orissa  
on behalf of  
Orissa Works Department, Government of Orissa**

and

**BACKBONE – ARSS JV**  
Plot No. 38, SECTOR – A, Zone – D  
Mancheswar Industrial Estate, Mancheswar, Bhubaneswar – 751010 [INDIA]

[ **VOLUME – IV: DRAWINGS** ]  
**Agreement Value: Rs. 81,97,23,707**

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

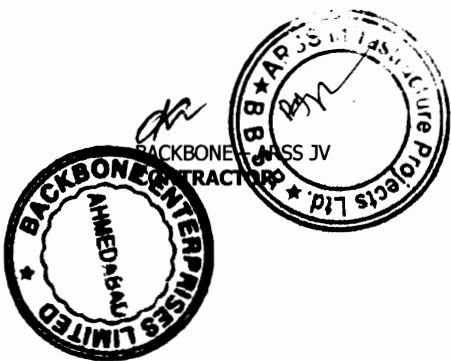
**Dated: 5<sup>th</sup> September, 2008**

**CONTENTS of CONTRACT**

<b>Volume – I</b>	:	Letter of Acceptance, Letter Bid and addenda
<b>Volume – II</b>	:	Particular Conditions and the General Conditions;
<b>Volume – III</b>	:	Specifications
<b>Volume – IV</b>	:	Drawings
<b>Volume – V</b>	:	Completed Schedules,

**CONTENTS of VOLUME IV**

<b>Sl.</b>	<b>Description</b>	<b>Page No.</b>
1	Plan and Profile	1
2	Standard Drawing for Highways	81
3	Drawings of Bridges and Culverts	160



*[Signature]*  
Chief Engineer  
World Bank Projects, Orissa  
EMPLOYER  
Chief Engineer  
World Bank Projects  
Office of the E.I.C (Civil) Orissa  
Bhubaneswar

# GOVERNMENT OF ORISSA

## WORKS DEPARTMENT ORISSA STATE ROAD PROJECT

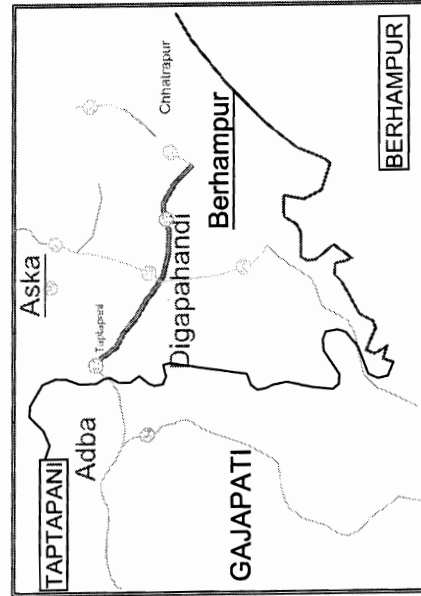
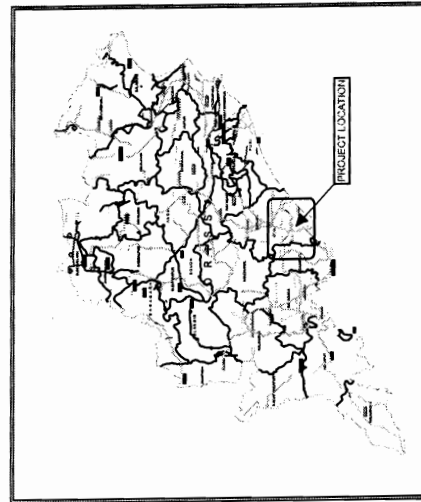
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT  
PREPARATION OF PHASE (I) ROADS FOR ORISSA STATE ROAD PROJECT  
UNDER WORLD BANK ASSISTANCE

FOR  
BERHAMPUR TO TAPTAPANI  
(SH - 17) FROM KM 0 / 000 TO 41 / 000

### PLAN AND PROFILE

#### INDEX

- (1) - COVER SHEET
- (2) - INDEX OF DRAWINGS
- (3) - LIST OF STRUCTURES
- (4) - CURVE DETAILS
- (5) - PLAN AND PROFILE SHEETS
- (6) - SCHEDULING



#### LEGEND

	EXISTING CARRIAGE WAY
	PRO. CARRIAGE WAY EDGES
	PRO. CENTER LINE
	EXISTING CENTER LINE
	PRO. SHOULDER EDGES
	ELECTRIC POLE
	TRANSFORMER
	TELEPHONE POLE
	TELEPHONE LINE
	H.T. TOWER
	H.T. LINE
	PIPE LINE
	HOUSE/BUILDING/STRUCTURE
	EXISTING ROW BOUNDARY
	PROPOSED ROW BOUNDARY
	BRIDGE/CULVERT
	DRAINAGE CHANNEL
	HAND PUMP, TAP
	EMBANKMENT
	CULVERT
	BOX/SLAB CULVERT
	TREE
	NAME BOARD

**C O N 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@cegindia.com





# INDEX OF DRAWINGS

Sl.No.	Description	Drawing No.
A	COVER SHEET	OSRP/CEG/SH-17/INDEX
B	INDEX SHEET	OSRP/CEG/SH-17/LOC/01
C	List of Structures (SHEET 1 OF 2)	OSRP/CEG/SH-17/LOC/02
D	List of Structures (SHEET 2 OF 2)	OSRP/CEG/SH-17/HC/01
E	Horizontal curve details (Sheet 1 of 2)	OSRP/CEG/SH-17/HC/02
F	Horizontal curve details (Sheet 2 of 2)	OSRP/CEG/SH-17/VC/01
G	Vertical curve details (Sheet 1 of 4)	OSRP/CEG/SH-17/VC/02
H	Vertical curve details (Sheet 2 of 4)	OSRP/CEG/SH-17/VC/03
I	Vertical curve details (Sheet 3 of 4)	OSRP/CEG/SH-17/VC/04
J	Vertical curve details (Sheet 4 of 4)	OSRP/CEG/SH-17/VC/04
	<u>PLAN &amp; PROFILE</u>	
01	Plan & Profile km 0/00 to km 1/00	OSRP/CEG/SH-17/P&P/01
02	Plan & Profile km 1/00 to km 2/00	OSRP/CEG/SH-17/P&P/02
03	Plan & Profile km 2/00 to km 3/00	OSRP/CEG/SH-17/P&P/03
04	Plan & Profile km 3/00 to km 4/00	OSRP/CEG/SH-17/P&P/04
05	Plan & Profile km 4/00 to km 5/00	OSRP/CEG/SH-17/P&P/05
06	Plan & Profile km 5/00 to km 6/00	OSRP/CEG/SH-17/P&P/06
07	Plan & Profile km 6/00 to km 7/00	OSRP/CEG/SH-17/P&P/07
08	Plan & Profile km 7/00 to km 8/00	OSRP/CEG/SH-17/P&P/08
09	Plan & Profile km 8/00 to km 9/00	OSRP/CEG/SH-17/P&P/09
10	Plan & Profile km 9/00 to km 10/00	OSRP/CEG/SH-17/P&P/10
11	Plan & Profile km 10/00 to km 11/00	OSRP/CEG/SH-17/P&P/11
12	Plan & Profile km 11/00 to km 12/00	OSRP/CEG/SH-17/P&P/12
13	Plan & Profile km 12/00 to km 13/00	OSRP/CEG/SH-17/P&P/13
14	Plan & Profile km 13/00 to km 14/00	OSRP/CEG/SH-17/P&P/14
15	Plan & Profile km 14/00 to km 15/00	OSRP/CEG/SH-17/P&P/15
16	Plan & Profile km 15/00 to km 16/00	OSRP/CEG/SH-17/P&P/16
17	Plan & Profile km 16/00 to km 17/00	OSRP/CEG/SH-17/P&P/17
18	Plan & Profile km 17/00 to km 18/00	OSRP/CEG/SH-17/P&P/18
19	Plan & Profile km 18/00 to km 19/00	OSRP/CEG/SH-17/P&P/19
20	Plan & Profile km 19/00 to km 20/00	OSRP/CEG/SH-17/P&P/20
21	Plan & Profile km 20/00 to km 21/00	OSRP/CEG/SH-17/P&P/21
22	Plan & Profile km 21/00 to km 22/00	OSRP/CEG/SH-17/P&P/22

Sl.No.	Description	Drawing No.
23	Plan & Profile km 22/00 to km 23/00	OSRP/CEG/SH-17/P&P/23
24	Plan & Profile km 23/00 to km 24/00	OSRP/CEG/SH-17/P&P/24
25	Plan & Profile km 24/00 to km 25/00	OSRP/CEG/SH-17/P&P/25
26	Plan & Profile km 25/00 to km 26/00	OSRP/CEG/SH-17/P&P/26
27	Plan & Profile km 26/00 to km 27/00	OSRP/CEG/SH-17/P&P/27
28	Plan & Profile km 27/00 to km 28/00	OSRP/CEG/SH-17/P&P/28
29	Plan & Profile km 28/00 to km 29/00	OSRP/CEG/SH-17/P&P/29
30	Plan & Profile km 29/00 to km 30/00	OSRP/CEG/SH-17/P&P/30
31	Plan & Profile km 30/00 to km 31/00	OSRP/CEG/SH-17/P&P/31
32	Plan & Profile km 31/00 to km 32/00	OSRP/CEG/SH-17/P&P/32
33	Plan & Profile km 32/00 to km 33/00	OSRP/CEG/SH-17/P&P/33
34	Plan & Profile km 33/00 to km 34/00	OSRP/CEG/SH-17/P&P/34
35	Plan & Profile km 34/00 to km 35/00	OSRP/CEG/SH-17/P&P/35
36	Plan & Profile km 35/00 to km 36/00	OSRP/CEG/SH-17/P&P/36
37	Plan & Profile km 36/00 to km 37/00	OSRP/CEG/SH-17/P&P/37
38	Plan & Profile km 37/00 to km 38/00	OSRP/CEG/SH-17/P&P/38
39	Plan & Profile km 38/00 to km 39/00	OSRP/CEG/SH-17/P&P/39
40	Plan & Profile km 39/00 to km 40/00	OSRP/CEG/SH-17/P&P/40
41	Plan & Profile km 40/00 to km 41/00	OSRP/CEG/SH-17/P&P/41
	<u>MAJOR JUNCTION</u>	
42	Plan for Major Junction at 0/000	OSRP/CEG/SH-17/MJ/0+000
43	Plan for Major Junction at 24/590	OSRP/CEG/SH-17/MJ/24+590
	<u>SCHEDULES</u>	
44	Schedule of Road Sign	OSRP/CEG/SH-17/ISCH/01
45	Schedule of Road Sign	OSRP/CEG/SH-17/ISCH/02
46	Schedule of Road Sign	OSRP/CEG/SH-17/ISCH/03
47	Schedule of Crash Barriers & Delineators	OSRP/CEG/SH-17/ISCH/04
48	Schedule of Bus Bays, Extra Widening	OSRP/CEG/SH-17/ISCH/05
49	Rumble strip, RPM, Bunk & eating place	OSRP/CEG/SH-17/ISCH/06
50	Schedule of Road humps, Line drain Pedestrian crossing & Minor Junction Schedule of Pavement composition	OSRP/CEG/SH-17/ISCH/07
	<u>CULVERTS FOR ENVIRONMENTAL</u>	
51	Typical Animal Pass (With Cushion)	NEW/BC/S/IB/EC / XXVI A2
52	Typical Animal Pass (With out Cushion)	ER/BC/S/B/W/C / XXVI B1



ARSS JV  
CONTRACTOR

**Chief Engineer**  
 World Bank Projects, Orissa  
 Of the P. I. EMPLOYER  
 hubaneswar

**INDEX SHEET**

**BERHAMPUR TO TAPTANI, (SH-17, KM 0 TO 41)**

DRG NO.	OSRP/CEG/SH-17/INDEX	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	B	DATE	REV	RO	
SCALE					

**B.M.** J.P. **R.R.D.K** **S.G**  
 NTS

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

LIST OF STRUCTURES

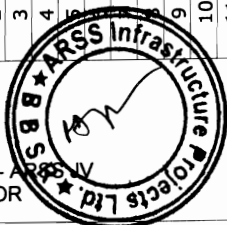
Sl.No.	Existing Chainage	Proposed Chainage	Type of Structure	Span Arrangement
1	0/190	213.0	New Double Pipe	2 x 1.0
2	0/350	369.0	Slab Widening	1 x 1.75
3	0/830	847.0	Slab Widening	1 x 2.0
4	0/950	975.0	New Double Pipe	2 x 1.0
5	1/150	1146.0	New Single Cell Box	1 x 2.0
6	1/310	1310.0	New Single Cell Box	1 x 2.0
7	1/785	1781.0	New Single Cell Box	1 x 2.0
8	2/140	2137.0	New Single Cell Box	1 x 2.0
9	2/285	2332.0	New Single Cell Box	1 x 2.0
10	2/515	2515.0	New Single Cell Box	1 x 4.0
11	2/630	2629.0	Slab Widening	1 x 1.5
12	2/745	2742.0	New Single Cell Box	1 x 3.0
13	3/105	3095.0	New Single Pipe	1 x 1.0
14	3/265	3259.0	New Single Pipe	1 x 1.0
15	3/390	3382.0	New Single Cell Box	1 x 2.0
16	3/505	3498.0	New Single Cell Box	1 x 3.0
17	3/775	3765.0	New Single Pipe	1 x 1.0
18	3/895	3890.0	New Double Pipe	2 x 1.0
19	4/115	4115.0	New Single Cell Box	1 x 2.0
20	5/145	5127.0	Slab Widening	1 x 1.5
21	5/230	5215.0	New Single Pipe	1 x 1.0
22	5/535	5521.0	New Single Cell Box	1 x 3.0
23	5/775	5761.0	New Single Cell Box	1 x 3.0
24	6/090	6069.0	New Single Cell Box	1 x 2.0
25	6/555	6497.0	New Single Pipe	1 x 1.0
26	6/590	6573.0	New Single Pipe	1 x 1.0
27	7/020	7000.0	New Single Pipe	1 x 1.0
28	7/240	7217.0	New Single Pipe	1 x 1.0
29	7/540	7520.0	New Single Pipe	1 x 1.0
30	7/630	7605.0	Slab Widening	1 x 1.5
31	7/795	7769.0	Slab Widening	1 x 1.5
32	8/030	8008.0	New Single Cell Box	1 x 2.0
33	8/210	8193.0	New Double Pipe	2 x 1.0
34	8/385	8363.0	New Single Pipe	1 x 1.0
35	8/550	8530.0	New Single Cell Box	1 x 3.0

Sl.No.	Existing Chainage	Proposed Chainage	Type of Structure	Span Arrangement
36	8/700	8685.0	New Double Pipe	2 x 1.0
37	9/175	9152.0	New Single Cell Box	1 x 2.0
38	9/600	9538.0	New Double Pipe	2 x 1.0
39	9/810	9786.0	New Single Cell Box	1 x 2.0
40	10/370	10340.0	New Single Cell Box	1 x 2.0
41	10/965	10933.0	Slab Widening	2 x 1.5
42	11/120	11120.0	New Double Pipe	2 x 1.0
43	11/500	11500.0	New Single Cell Box	1 x 2.0
44	12/040	12065.0	New Double Pipe	2 x 1.0
45	12/380	12407.0	New Single Pipe	1 x 1.0
46	12/585	12611.0	New Single Pipe	1 x 1.0
47	12/810	12836.0	New Single Cell Box	1 x 3.0
48	12/880	12907.0	Pipe Extension	1 x 0.9
49	13/110	13132.0	New Single Pipe	1 x 1.0
50	13/265	13288.0	New Single Cell Box	1 x 2.0
51	13/450	13470.0	New Single Cell Box	1 x 3.0
52	13/600	13619.0	New Single Pipe	1 x 1.0
53	13/790	13809.0	New Single Cell Box	1 x 2.0
54	13/895	13916.0	Pipe Extension	1 x 1.0
55	14/135	14157.0	Slab Widening	1 x 3.0
56	14/510	14531.0	New Single Pipe	1 x 1.0
57	14/855	14877.0	New Single Cell Box	1 x 2.0
58	15/430	15440.0	New Single Pipe	1 x 1.0
59	15/880	15897.0	New Single Pipe	1 x 1.0
60	16/050	16068.0	New Single Pipe	1 x 1.0
61	16/400	16417.0	New Single Cell Box	1 x 3.0
62	16/505	16521.0	New Single Pipe	1 x 1.0
63	16/750	16770.0	New Single Pipe	1 x 1.0
64	16/950	16970.0	New Single Pipe	1 x 1.0
65	17/650	17666.0	New Single Pipe	1 x 1.0
66	18/020	18028.0	New Single Cell Box	1 x 4.0
67	18/105	18115.0	New Single Cell Box	1 x 2.0
68	18/470	18480.0	New Single Pipe	1 x 1.0
69	19/240	19192.0	New Double Pipe	2 x 1.0
70	19/430	19382.0	New Single Pipe	1 x 1.0



CONTRACTOR



Chief Engineer  
 World Bank Project  
 EMPLOYER  
 E. I. C. (Civil) Orissa  
 Bhubaneswar

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

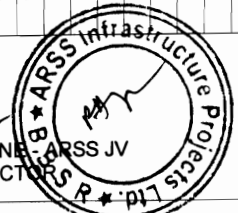
STRUCTURES DETAILS  
 BERHAMPUR TO BANGI Jn. (SH-17, KM 0 TO 41)

DRG. NO. CEGP/SEB/SH-17/02/01	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO. C	DATE	REV	RD	SCALE
				NTS
				B.M.
				R.J.
				R.R.D.K
				S.G

LIST OF STRUCTURES

Sl.No.	Existing Chainage	Proposed Chainage	Type of Structure	Span Arrangement
71	19/570	19530.0	New Single Cell Box	1 x 2.0
72	19/845	19799.0	Pipe Extension	1 x 1.0
73	20/355	20361.0	New Single Pipe	1 x 1.0
74	20/610	20614.0	New Single Pipe	1 x 1.0
75	20/930	20935.0	New Single Pipe	1 x 1.0
76	21/015	21005.0	New Single Pipe	1 x 1.0
77	21/230	21224.0	New Single Pipe	1 x 1.0
78	21/420	21411.0	New Single Pipe	1 x 1.0
79	21/875	21865.0	Pipe Extension	1 x 1.2
80	22/210	22189.0	New Single Pipe	1 x 1.0
81	22/605	22582.0	Slab Widening	1 x 1.6
82	22/790	22761.0	Pipe Extension	1 x 1.0
83	22/985	22961.0	New Single Pipe	1 x 1.0
84	23/180	23147.0	New Single Pipe	1 x 1.0
85	23/300	23255.0	New Single Cell Box	1 x 2.0
86	23/515	23484.0	New Single Cell Box	1 x 2.0
87	23/750	23713.0	New Single Cell Box	1 x 2.0
88	23/850	23821.0	New Single Cell Box	1 x 2.0
89	24/365	24351.0	New Single Cell Box	1 x 2.0
90	24/650	24636.0	New Single Cell Box	1 x 2.0
91	25/020	25106.0	New Single Cell Box	1 x 2.0
92	25/050	25214.0	Slab Widening	1 x 1.5
93	25/695	25861.0	New Single Cell Box	1 x 2.0
94	25/905	26072.0	New Single Cell Box	1 x 2.0
95	26/150	26314.0	New Single Cell Box	1 x 2.0
96	26/430	26612.0	New Single Cell Box	1 x 4.0
97	26/850	27026.0	New Single Cell Box	1 x 2.0
98	27/600	27743.0	New Single Pipe	1 x 1.0
99	27/850	28008.0	New Single Cell Box	1 x 2.0
100	28/375	28547.0	New Single Pipe	1 x 1.0
101	28/800	28954.0	New Single Cell Box	1 x 3.0
102	30/040	30060.0	New Single Cell Box	1 x 2.0
103	30/060	30241.0	New Single Cell Box	1 x 3.0
104	30/460	30637.0	New Single Pipe	1 x 1.0
105	30/700	30720.0	New Single Cell Box	1 x 2.0

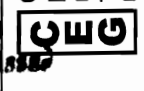
Sl.No.	Existing Chainage	Proposed Chainage	Type of Structure	Span Arrangement
106	30/720	30889.0	New Single Cell Box	1 x 2.0
107	31/960	32128.0	New Single Cell Box	1 x 2.0
108	32/300	32465.0	New Single Pipe	1 x 1.0
109	33/220	33402.0	New Single Cell Box	1 x 2.0
110	33/310	33476.0	New Single Cell Box	1 x 2.0
111	33/806	33976.0	New Single Pipe	1 x 1.0
112	33/900	34069.0	New Single Pipe	1 x 1.0
113	34/250	34463.0	New Single Pipe	1 x 1.0
114	34/525	34670.0	New Single Cell Box	1 x 3.0
115	34/640	34813.0	New Single Cell Box	1 x 2.0
116	34/675	34858.0	New Single Cell Box	1 x 3.0
117	35/204	35378.0	New Single Pipe	1 x 1.0
118	35/350	35533.0	New Single Pipe	1 x 1.0
119	35/825	36003.0	New Single Pipe	1 x 1.0
120	36/060	36238.0	New Single Pipe	1 x 1.0
121	36/220	36358.0	New Single Pipe	1 x 1.0
122	36/500	36594.0	New Single Pipe	1 x 1.0
123	36/575	36758.0	New Single Pipe	1 x 1.0
124	36/800	36961.0	New Single Pipe	1 x 1.0
125	36/990	37164.0	New Single Pipe	1 x 1.0
126	37/440	37619.0	New Single Cell Box	1 x 2.0
127	37/985	38157.0	New Single Pipe	1 x 1.0
128	38/450	38483.0	Slab Widening	1 x 1.5
129	38/600	38746.0	New Single Cell Box	1 x 2.0
130	38/810	39002.0	New Single Pipe	1 x 1.0
131	38/960	39118.0	New Single Cell Box	1 x 2.0
132	39/195	39375.0	New Single Cell Box	1 x 2.0
133	39/340	39517.0	Slab Widening	1 x 3.2
134	39/455	39671.0	New Single Cell Box	1 x 2.0
135	39/900	40090.0	New Single Cell Box	1 x 2.0
136	40/100	40280.0	New Single Cell Box	1 x 2.0
137	40/240	40437.0	New Single Cell Box	1 x 2.0
138	40/420	40610.0	New Single Cell Box	1 x 2.0
139	40/815	41000.0	New Single Cell Box	1 x 2.0



Chief Engineer  
World Bank Project  
To the P.C.E.P.O. Prissu  
Rhubaneswar

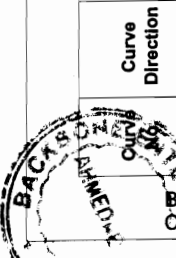
PROJECT:-  
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE-(1) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE.

**CONSULTING ENGINEERS GROUP LTD.**  
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STRUCTURES DETAILS  
BERHAMPUR TO BANGI Jn. (SH-17, KM 0 TO 41)

DRG NO. / SHEET / OF	DATE	REV	RD	ISSUED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	D						
SCALE	NTS			B.M.	R.J.	R.R.D.K	S.G



BACKBONE CONSTRUCTION  
CONTRACTORS  
ARSS JV

Curve Direction	HIP Details		Total Deviation Angle	Design Speed (Km/Hr)	Curve Radius (m.)	Transition Length (m.)	Circular Curve Length (m.)	Tangent Distance (m.)	Shift	Straight Distance from TP to PC	Superelevation (%)	Transition Start Chainage	Circular Start Chainage	Circular End Chainage	Transition End Chainage
	Chainage	Easting													
1	Right	261.588	265442.652	2138364.653	0.469	50000	0	409.414	204.708	0.000	2.500	119.936	403.239		
2	Right	1082.045	264827.868	2138907.881	0.373	875	55	-49.297	30.351	0.144	5.079	947.941	1214.078	1269.078	
3	Left	1689.87	264534.284	2139442.351	26.473	700	65	258.427	197.210	0.251	6.349	1534.689	1779.062	1844.062	
4	Right	2144.978	264198.842	2139751.224	12.075	1000	50	160.756	130.780	0.104	4.444	2057.733	2182.189	2232.189	
5	Right	2683.238	263764.933	2140069.661	0.143	800	60	-56.003	30.997	0.187	5.556	2366.223	2426.223	2923.589	2983.589
6	Left	3503.146	263530.637	2140872.623	0.285	850	60	-55.779	32.110	0.176	5.229	3256.951	3316.951	3683.551	3743.551
7	Left	4458.498	262866.106	2141566.293	0.177	65	200	-59.383	30.287	0.749	7.000	4374.507	4434.507	4482.261	4542.261
8	Right	4834.488	262505.381	2141671.922	0.234	100	5000	20.451	10.226	0.000	2.500	4730.3	4938.646		
9	Left	5725.489	261656.557	2141942.909	9.264	100	25000	4041.981	2025.405	0.000	2.500	5515.624	5935.344		
10	Right	6678.157	260744.646	2142218.579	0.297	100	800	-25.851	17.075	0.047	5.556	6620.548	6735.568	6785.568	
11	Right	8228.758	259753.708	2143340.422	5.254	200	60	-41.660	39.188	0.749	7.000	7129.286	7244.265	7304.265	
12	Left	9599.895	258277.672	2144144.615	0.823	80	240	-86.553	46.681	1.404	44.947	8162.134	8222.134	8235.377	8295.377
13	Left	10006.278	258277.672	2144144.615	0.575	100	600	-73.980	43.006	0.444	7.000	9450.024	9540.024	9657.372	9747.372
14	Right	11221.038	257091.922	2144293.019	0.687	100	1000	-88.694	45.004	1.404	44.947	9834.974	9914.974	10096.191	10176.191
15	Left	11679.808	256921.384	2144261.998	1.234	100	15000	322.985	161.499	0.000	2.500	10786.174	10876.174	10893.571	10876.174
16	Right	12003.57	256323.612	2144144.542	0.955	100	2000	33.350	16.675	0.000	2.500	11877.956	11887.956	12118.928	
17	Right	13172.945	255207.604	2143794.619	0.896	100	1000	-34.370	32.815	0.104	4.444	12939.462	12989.461	13352.391	13402.391
18	Left	13573.689	254804.383	2143829.87	0.978	100	1000	-32.926	33.538	0.104	4.444	13455.375	13505.375	13641.791	13691.791
19	Right	14550.565	253831.359	2143741.573	8.969	100	50000	7826.999	6921.511	0.000	2.500	13774.746	13774.746	13929.564	
20	Right	14925.101	253424.946	2143684.839	0.827	100	2000	179.732	89.867	0.000	2.500	14830.972	15019.229		
21	Right	15141.711	253021.989	2143665.292	0.272	100	5000	72.136	36.069	0.000	2.500	15107.091	15176.33		
22	Right	15673.813	252713.211	2143634.763	0.201	100	15000	71.274	35.637	0.000	2.500	15286.19	15440.868		
23	Right	15916.206	252471.618	2143615.05	0.650	100	20000	226.755	113.379	0.000	2.500	15630.973	15716.65		
24	Right	16489.696	251900.401	2143564.028	5.214	100	6500	591.555	295.982	0.000	2.500	15839.502	15992.909		
25	Right	17174.291	251216.67	2143529.072	10.631	100	25000	4638.770	2326.062	0.000	2.500	16366.17	16613.193		
26	Right	17785.048	250606.953	2143493.429	0.651	100	15000	170.517	85.259	0.000	2.500	17082.92	17285.661		
27	Right	18294.373	250098.307	2143467.137	21.643	100	2500	944.357	477.874	0.000	2.500	18185.934	18402.676	18909.68	
28	Right	18808.755	249588.323	2143399.735	5.919	100	500	-43.345	73.375	0.752	7.000	18802.83	18814.68		
29	Right	19131.745	249266.093	2143420.486	0.316	100	10000	55.174	27.587	0.000	2.500	19001.155	19262.32		
30	Right	19308.442	248095.113	2143535.881	0.203	100	800	-57.159	31.419	0.187	5.556	20166.474	20389.84	20449.84	
31	Right	21409.344	247009.396	2143350.814	6.899	100	1000	66.912	83.528	0.104	4.444	21186.949	21624.616	21674.616	
32	Right	21799.634	246629.165	2143466.311	0.545	100	1800	17.118	8.559	0.000	2.500	21730.06	21869.139		
33	Right	22063.421	246372.419	2143527.15	0.432	100	2500	18.858	9.429	0.000	2.500	21876.178	22249.967		
34	Right	22567.122	245904.412	2143715.265	0.378	100	2800	18.494	9.247	0.000	2.500	22432.204	22701.83		
35	Right	24202.414	244450.959	2144465.031	0.724	100	800	-49.891	35.055	0.187	5.556	24065.015	24279.334	24339.334	
36	Right	24623.659	244042.181	2144565.081	0.477	40	90	-54.251	27.795	1.396	7.000	24558.097	24634.125	24689.125	
37	Right	24539.495	243649.486	2145227.039	5.904	80	240	-65.269	57.396	1.404	44.947	25299.072	25399.072	25489.915	
38	Right	26282.644	242937.62	2145757.462	0.462	100	1500	-22.909	23.546	0.034	2.963	26089.428	26124.428	26439.694	26474.694
39	Right	26634.228	242609.728	2145898.884	0.568	100	2000	19.836	9.918	0.000	2.500	26508.029	26760.092		
40	Right	27014.8	242280.632	2146090.679	11.530	100	25000	5030.848	2523.947	0.000	2.500	26891.249	27138.349		

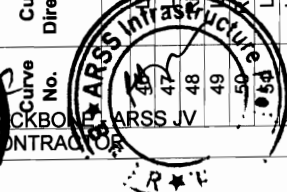
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**PROJECT:-**  
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE-(1) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE.

**HORIZONTAL CURVE DETAILS**  
BERHAMPUR TO BANGI Jn. (SH-17, KM 0 TO 41)

DRG NO. (SECT/SH-17/MS/01)	DATE	REV	RD	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	E						
SCALE	NTS			B.M.	R.J.	R.R.D.K	S.G

World Bank, India Projects  
EMPLOYER  
Bhubaneswar



Curve No.	Curve Direction	HIP Details		Total Deviation Angle (Δ)	Design Speed (Km/hr)	Curve Radius (m.)	Transition Length (m.)	Circular Curve Length (m.)	Tangent Distance (m.)	Shift (s)	Straight Distance from TP to PC (k)	Superelevation (%)	Transition Start Chainage	Circular Start Chainage	Circular End Chainage	Transition End Chainage
		Chalnage	Easting													
47	Right	27347.662	241991.401	2146255.433	100	7000	0	71.888	35.944	0.000	0.000	2.500	27290.898	27404.423		
48	Right	27816.787	241580.056	2146480.99	100	10000	0	42.970	21.485	0.000	0.000	2.500	27732.069	27901.501		
49	Right	28124.301	241307.948	2146624.256	100	10000	0	37.149	18.575	0.000	0.000	2.500	27981.474	28267.11		
50	Right	28709.166	240798.407	2146911.409	100	15000	0	64.809	32.404	0.000	0.000	2.500	28537.546	28880.772		
51	Right	29196.966	240369.085	2147142.941	80	500	30	-49.565	25.216	0.208	24.998	5.689	29121.848	29222.041	29272.041	
52	Left	29471.319	240155.214	2147314.773	80	400	30	-28.529	15.735	0.094	14.999	7.000	29405.605	29506.844	29536.844	
53	Left	29708.186	239940.965	2147416.154	100	1200	40	-32.983	23.508	0.056	20.000	3.704	29640.887	29735.476	29775.476	
54	Right	30137.355	239539.356	2147567.482	100	13000	0	1840.472	921.776	0.000	0.000	2.500	30012.74	30261.961		
55	Left	30419.145	239277.446	2147671.468	100	9000	0	683.267	341.797	0.000	0.000	2.500	30294.934	30543.341		
56	Right	30676.001	239037.871	2147763.814	100	500	90	-87.718	46.131	0.675	44.988	7.000	30655.852	30696.128	30786.128	
57	Right	31051.952	238727.438	2147975.691	100	50000	0	461.651	230.827	0.000	0.000	2.500	30859.316	31244.587		
58	Right	31509.794	238350.39	2148235.413	100	50000	0	790.940	395.478	0.000	0.000	2.500	31390.993	31628.595		
59	Left	31843.551	238076.433	2148426.049	100	25000	0	11659.497	5937.768	0.000	0.000	2.500	31758.794	31928.308		
60	Left	32492.697	237541.097	2148793.207	100	2200	0	267.956	134.144	0.000	0.000	2.500	32380.068	32605.129		
61	Right	32953.972	237135.866	2149013.987	100	35000	0	10881.692	5485.101	0.000	0.000	2.500	32859.293	33048.65		
62	Right	33356.75	236784.028	2149210.006	100	800	60	-56.446	31.776	0.187	29.999	5.556	33273.487	33333.487	33380	33440
63	Right	33934.65	236321.851	2149556.631	80	500	90	-89.276	45.350	0.675	44.988	5.689	33907.555	33961.692	34051.692	
64	Left	34408.419	236020.942	2149921.697	100	400	120	-117.790	61.064	1.499	59.955	7.000	34222.814	34472.866	34592.866	
65	Right	34753.516	235697.02	2150042.399	100	500	95	-92.027	48.975	0.752	47.486	7.000	34652.274	34747.274	34759.758	34854.758
66	Right	35352.787	235173.958	2150334.648	100	25000	0	344.941	172.473	0.000	0.000	2.500	35237.969	35467.603		
67	Right	36008.855	234606.15	2150663.314	100	10000	0	51.480	25.740	0.000	0.000	2.500	35874.775	36142.919		
68	Left	36460.641	234223.85	2150904.027	100	1000	50	-42.187	28.906	0.104	24.999	4.444	36239.188	36289.188	36628.793	36678.793
69	Left	36975.986	233910.68	2151317.285	80	400	60	13.162	66.712	0.375	29.994	7.000	36868.568	36928.568	37022.963	37082.963
70	Right	37615.478	233372.717	2151663.338	80	500	90	-65.035	57.490	0.675	44.988	5.689	37494.391	37646.485	37736.485	
71	Right	38422.311	232841.815	2152270.761	100	15000	0	136.607	68.304	0.000	0.000	2.500	38346.734	38497.888		
72	Right	38740.341	232636.596	2152513.719	100	25000	0	4007.207	2007.904	0.000	0.000	2.500	38665.246	38815.437		
73	Left	38999.669	232470.45	2152712.834	100	13000	0	4993.661	2527.992	0.000	0.000	2.500	38855.019	39144.308		
74	Right	39363.852	232230.953	2152987.205	100	10000	0	1021.235	511.062	0.000	0.000	2.500	39272.579	39455.121		
75	Left	39646.472	232049.015	2153203.48	100	8000	0	61.034	30.517	0.000	0.000	2.500	39561.793	39731.144		
76	Left	40013.561	231806.806	2153479.331	100	15000	0	207.611	103.807	0.000	0.000	2.500	39894.291	40132.827		
77	Left	40415.422	231542.798	2153782.235	100	800	60	178.790	150.316	0.187	29.999	5.556	40244.168	40304.168	40525.258	40585.258
78	Right	40961.285	231069.502	2154056.892	100	1000	50	-44.355	27.822	0.104	24.999	4.444	40883.373	40933.373	40989.182	41039.182
79	Left	41375.471	230727.287	2154288.896	50	125	60	-58.616	30.641	1.198	29.942	7.000	41297.1	41357.1	41393.581	41453.581
80	Right	41584.842	230519.447	2154280.139	50	90	75	-73.186	38.217	2.588	37.284	7.000	41501.87	41576.87	41667.772	41667.772
81	Left	41835.781	230342.258	2154455.879	80	400	60	-56.306	31.843	0.375	29.994	7.000	41718.402	41778.402	41892.382	41952.382
82	Right	42274.965	229952.861	2154658.866	65	200	60	-58.730	30.615	0.749	29.978	7.000	42107.21	42167.21	42364.884	42424.884
83	Left	42502.061	229962.998	2154903.155	65	200	60	-58.344	30.809	0.749	29.978	7.000	42426.719	42486.719	42517.343	42577.343
84	Right	42805.646	229875.599	2155193.684	100	1000	50	-46.032	26.984	0.104	24.999	4.444	42746.836	42796.836	42814.456	42864.456
85	Left	42978.311	229829.518	2155359.971	80	300	75	-34.812	57.657	0.781	37.480	7.000	42897.193	42972.193	42984.427	43059.427

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

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HORIZONTAL CURVE DETAILS  
BERHAMPUR TO BANGI Jn. (SH-17, KM 0 TO 41)

DRG. NO. CESP/CEG/SH-17/NC/02	DATE	REV	RO	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SCALE	NTS			B.M.	R.J.	R.R.D.K	S.G



Chief Engineer  
 Chief Engineer  
 Chief Engineer  
 World Bank Projects  
 to the E.I.C. (M.O. Orissa)  
 R. Subhaswar.



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

**VERTICAL CURVE DETAILS**  
 BERHAMPUR TO BANGI Jn. (SH-17, KM 0 TO 41)

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	Valley	405.76	54.867	75	0.941	368.26	54.984	443.26	55.049	-0.313	0.484	-0.797
2	Summit	574.631	55.685	1	0.060	574.131	55.683	575.131	55.687	0.484	0.318	0.166
3	Summit	808.65	56.429	1	0.027	808.15	56.427	809.15	56.429	0.318	-0.057	0.375
4	Valley	905.638	56.374	1	0.027	905.138	56.374	906.138	56.376	-0.057	0.317	-0.374
5	Summit	1027.55	56.761	1	0.164	1027.05	56.759	1028.05	56.762	0.317	0.256	0.061
6	Summit	1241.863	57.309	1	0.054	1241.363	57.308	1242.363	57.309	0.256	0.07	0.186
7	Valley	1497.352	57.488	1	0.054	1496.852	57.488	1497.852	57.489	0.07	0.255	-0.185
8	Valley	1907.693	58.535	1	0.025	1907.193	58.534	1908.193	58.538	0.255	0.65	-0.395
9	Summit	2037.918	59.382	1	0.029	2037.418	59.379	2038.418	59.384	0.65	0.308	0.342
10	Summit	2351.637	60.349	150	2.641	2276.637	60.118	2426.637	60.154	0.308	-0.26	0.568
11	Valley	2564.072	59.797	60	1.261	2534.072	59.875	2594.072	59.862	-0.26	0.216	-0.476
12	Valley	2863.126	60.444	60	1.235	2833.126	60.379	2893.126	60.655	0.216	0.702	-0.486
13	Summit	3177.191	62.65	1	0.043	3176.691	62.646	3177.691	62.652	0.702	0.472	0.23
14	Valley	3619.779	64.74	1	0.023	3619.279	64.738	3620.279	64.745	0.472	0.912	-0.44
15	Summit	3764.284	66.058	1	0.024	3763.784	66.053	3764.784	66.06	0.912	0.489	0.423
16	Valley	3889.514	66.671	60	1.107	3859.514	66.524	3919.514	66.98	0.489	1.031	-0.542
17	Valley	4048.133	68.306	60	1.051	4018.133	67.997	4078.133	68.787	1.031	1.602	-0.571
18	Summit	4291.362	72.202	175	1.520	4203.862	70.8	4378.862	72.597	1.602	0.451	1.151
19	Valley	4487.992	73.089	75	0.626	4450.492	72.92	4525.492	73.707	0.451	1.649	-1.198
20	Summit	4686.494	76.362	75	1.670	4648.994	75.744	4723.994	76.812	1.649	1.2	0.449
21	Summit	4849.762	78.321	100	1.397	4799.762	77.721	4899.762	78.563	1.2	0.484	0.716
22	Summit	5069.25	79.383	90	1.630	5024.25	79.165	5114.25	79.352	0.484	-0.068	0.552
23	Summit	5314.645	79.215	200	1.388	5214.645	79.283	5414.645	77.706	-0.068	-1.509	1.441
24	Valley	5454.669	77.102	75	0.468	5417.169	77.668	5492.169	77.137	-1.509	0.093	-1.602
25	Valley	5690.466	77.507	60	0.418	5660.466	77.479	5920.466	77.966	0.093	1.53	-1.437
26	Summit	6957.249	93.831	160	1.348	6877.249	92.606	7037.249	94.105	1.53	0.343	1.187
27	Summit	7370	95.247	150	1.364	7295	94.99	7445	94.679	0.343	-0.757	1.1
28	Summit	8080	89.873	60	0.995	8050	90.1	8110	89.465	-0.757	-1.36	0.603
29	Valley	8442.354	84.944	60	0.665	8412.354	85.352	8472.354	84.806	-1.36	-0.458	-0.902
30	Valley	8591.813	84.259	125	0.482	8529.313	84.545	8654.313	85.593	-0.458	2.135	-2.593
31	Summit	8753.603	87.713	100	1.368	8703.603	86.646	8803.603	88.415	2.135	1.404	0.731
32	Summit	9031.972	91.62	1	0.500	9031.472	91.613	9032.472	91.627	1.404	1.384	0.02
33	Summit	9421.769	97.014	200	0.869	9321.769	95.63	9521.769	96.097	1.384	-0.917	2.301
34	Valley	9595.613	95.419	100	0.411	9545.613	95.878	9645.613	96.176	-0.917	1.514	-2.431
35	Summit	9859.419	99.414	150	0.620	9784.419	98.278	9934.419	98.734	1.514	-0.907	2.421
36	Summit	10102.913	97.205	75	1.566	10065.413	97.545	10140.413	96.685	-0.907	-1.386	0.479
37	Summit	10448.99	92.41	100	1.661	10398.99	93.103	10498.99	91.416	-1.386	-1.988	0.602
38	Valley	10596.007	89.487	60	1.304	10566.007	90.083	10626.007	89.029	-1.988	-1.528	-0.46
39	Valley	10857.561	85.49	60	1.066	10827.561	85.948	10887.561	85.2	-1.528	-0.965	-0.563
40	Valley	11205.465	82.131	75	0.628	11167.965	82.493	11242.965	82.217	-0.965	0.229	-1.194
41	Summit	11573.923	82.974	1	0.035	11573.423	82.973	11574.423	82.974	0.229	-0.057	0.286
42	Valley	11798.537	82.846	60	0.570	11768.537	82.863	11828.537	83.145	-0.057	0.996	-1.053
43	Summit	11902.116	83.878	1	0.025	11901.616	83.873	11902.616	83.881	0.996	0.593	0.403
44	Summit	12388.268	86.759	75	1.410	12350.768	86.537	12425.768	86.782	0.593	0.061	0.532
45	Valley	12633.947	86.91	60	0.563	12603.947	86.892	12663.947	87.248	0.061	1.126	-1.065

DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	G	DATE	REV. / RO
SCALE			NTS
B.M.		R.J.	R.R.D.K
S.G.			

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	Summit	12827.079	89.085	200	1.359	12727.079	87.959	12927.079	88.739	1.126	-0.346	1.472
47	Valley	12992.227	88.514	60	0.651	13962.227	88.618	13022.227	88.686	-0.346	0.575	-0.921
48	Summit	13485.418	91.348	250	1.525	13360.418	90.63	13610.418	90.018	0.575	-1.064	1.639
49	Valley	13669.019	89.395	60	1.293	13639.019	89.714	13699.019	89.215	-1.064	-0.6	-0.464
50	Valley	14002.787	87.391	1	0.045	14002.287	87.394	14003.287	87.389	-0.6	-0.377	-0.223
51	Valley	14191.922	86.678	60	0.501	14161.922	86.791	14221.922	86.924	-0.377	0.821	-1.198
52	Summit	14373.447	88.168	1	0.026	14372.947	88.164	14373.947	88.17	0.821	0.439	0.382
53	Valley	14531.176	88.861	1	0.040	14530.676	88.859	14531.676	88.864	0.439	0.687	-0.248
54	Summit	14912.727	91.481	200	1.523	14812.727	90.794	15012.727	90.855	0.687	-0.626	1.313
55	Valley	15119.36	90.187	75	0.920	15081.86	90.422	15156.86	90.258	-0.626	0.189	-0.815
56	Summit	15305.687	90.54	1	0.027	15305.187	90.539	15306.187	90.539	0.189	-0.184	0.373
57	Valley	15450.62	90.273	60	0.641	15420.62	90.328	15480.62	90.499	-0.184	0.752	-0.936
58	Summit	15765.4	92.64	275	1.680	15627.9	91.606	15902.9	91.423	0.752	-0.885	1.637
59	Valley	15956.393	90.95	60	0.543	15926.393	91.215	15986.393	91.016	-0.885	0.219	-1.104
60	Summit	16068.048	91.194	75	1.670	16030.548	91.112	16105.548	91.108	0.219	-0.23	0.449
61	Valley	16404.393	90.42	1	0.065	16403.893	90.421	16404.893	90.42	-0.077	-0.077	-0.153
62	Valley	16588.001	90.279	60	0.591	16558.001	90.302	16618.001	90.56	-0.277	0.938	-1.015
63	Summit	16769.513	91.982	180	1.373	16679.513	91.138	16859.513	91.646	0.938	-0.373	1.311
64	Summit	17081.605	90.817	150	1.928	17006.605	91.097	17156.605	89.954	-0.373	-1.151	0.778
65	Summit	17506.172	85.929	1	0.111	17505.672	85.935	17506.672	85.923	-1.151	-1.241	0.09
66	Valley	17698.895	83.538	75	0.486	17661.395	84.003	17736.395	83.651	-1.241	0.301	-1.542
67	Valley	18146.18	84.886	75	0.540	18108.68	84.773	18183.68	85.52	0.301	1.69	-1.389
68	Summit	18364.559	88.576	150	1.684	18289.559	87.309	18439.559	89.175	1.69	0.799	0.891
69	Valley	18660.98	90.945	60	0.915	18630.98	90.705	18690.98	91.381	0.799	1.455	-0.656
70	Summit	18924.713	94.782	250	1.366	18799.713	92.963	19049.713	94.314	1.455	-0.375	1.83
71	Valley	19446.119	92.828	1	0.042	19445.619	92.83	19446.619	92.827	-0.375	-0.139	-0.236
72	Valley	19821.469	92.308	100	0.574	19771.469	92.377	19871.469	93.11	-0.139	1.603	-1.742
73	Summit	20115.919	97.029	250	1.360	19990.919	95.025	20240.919	96.735	1.603	-0.235	1.838
74	Summit	20622.097	95.839	150	1.476	20547.097	96.015	20697.097	94.901	-0.235	-1.251	1.016
75	Summit	20992.833	91.202	1	0.028	20992.333	91.208	20993.333	91.194	-1.251	-1.611	0.36
76	Valley	21281.03	86.56	60	0.889	21251.03	87.043	21311.03	86.279	-1.611	-0.936	-0.675
77	Summit	21413.822	85.317	90	1.508	21368.822	85.738	21458.822	84.627	-0.936	-1.533	0.597
78	Valley	21545.912	83.292	100	0.637	21495.912	84.059	21595.912	83.31	-1.533	0.036	-1.569
79	Summit	21765.996	83.372	1	0.028	21765.496	83.372	21766.496	83.37	0.036	-0.32	0.356
80	Valley	21980.784	82.685	60	1.029	21950.784	82.781	22010.784	82.764	-0.32	0.263	-0.583
81	Valley	22170.529	83.184	1	0.027	22170.029	83.183	22171.029	83.187	0.263	0.635	-0.372
82	Valley	22366.301	84.428	1	0.046	22365.801	84.425	22366.801	84.432	0.635	0.852	-0.217
83	Summit	22588.035	86.317	75	1.399	22550.535	85.998	22625.535	86.435	0.852	0.316	0.536
84	Valley	22983.796	87.566	1	0.057	22983.296	87.564	22984.296	87.568	0.316	0.492	-0.176
85	Summit	23429.038	89.756	150	1.894	23354.038	89.387	23504.038	89.531	-0.492	-0.3	0.792
86	Valley	23784.112	88.691	60	0.541	23754.112	88.781	23814.112	88.934	-0.3	0.81	-1.11
87	Valley	24360.09	93.355	1	0.031	24359.59	93.351	24360.59	93.361	0.81	1.136	-0.326
88	Summit	24650.182	96.65	75	1.550	24612.682	96.224	24687.682	96.895	1.136	0.652	0.484
89	Valley	24849.482	97.95	60	0.882	24819.482	97.754	24879.482	98.35	0.652	1.332	-0.68
90	Valley	25260.653	103.426	1	0.026	25260.153	103.419	25261.153	103.435	1.332	1.71	-0.378

PROJECT:-

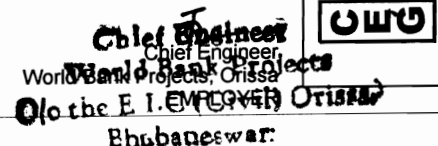
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE-(1) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE.

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



VERTICAL CURVE DETAILS  
BERHAMPUR TO BANGI Jn. (SH-17, KM 0 TO 41)

DRG NO. CSPP/CEG/SH-17/NC/02	DESIGNED (A) DRAWN (B)	CHECKED (C) APPROVED (D)
SH. NO. H	DATE	REV. RD
SCALE	NTS	
	B.M.	R.J.
		R.R.D.K
		S.G





ARSS JV  
FOR

Chief Engineer  
Work Bank Projects  
Of the E.I.C. (Civil Division)  
Bhubaneswar

**CONSULTING**  
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**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  
BERHAMPUR TO BANGI Jn. (SH-17, KM 0 TO 41)

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	Summit	25425.168	106.24	75	1.488	25387.668	105.599	25462.668	106.692	1.71	1.206	0.504
92	Summit	25730.788	109.925	200	1.398	25630.788	108.719	25830.788	109.7	1.206	-0.225	1.431
93	Valley	25900.985	109.542	75	0.463	25863.485	109.626	25938.485	110.065	-0.225	1.394	-1.619
94	Summit	26405.365	116.573	180	1.357	26315.365	115.318	26495.365	116.634	1.394	0.068	1.326
95	Summit	26701.512	116.776	350	1.352	26526.512	116.658	26876.512	112.365	0.067	-2.521	2.588
96	Valley	26943.32	110.681	75	0.460	26905.82	111.626	26980.82	110.347	-2.521	-0.892	-1.629
97	Summit	27292.379	107.569	150	1.468	27217.379	108.238	27367.379	106.133	-0.892	-1.914	1.022
98	Valley	27545.811	102.718	75	0.468	27508.311	103.436	27583.311	102.602	-1.914	-0.31	-1.604
99	Valley	27968.826	101.406	60	0.788	27938.826	101.499	27998.826	101.541	-0.31	0.451	-0.761
100	Summit	28198.639	102.442	200	1.401	28098.639	101.991	28298.639	101.465	0.451	-0.977	1.428
101	Summit	28419.141	100.287	1	0.025	28418.641	100.292	28419.641	100.28	-0.977	-1.382	0.405
102	Valley	28537.903	98.646	60	1.255	28507.903	99.061	28567.903	98.375	-1.382	-0.904	-0.478
103	Summit	28706.903	97.119	100	1.786	28656.903	97.571	28756.903	96.387	-0.904	-1.464	0.56
104	Valley	28908.779	94.163	140	0.414	28838.779	95.188	28978.779	95.503	-1.464	1.914	-3.378
105	Summit	29218.925	100.1	115	0.601	29161.425	98.999	29276.425	100.1	1.914	0	1.914
106	Summit	29444.375	100.1	115	0.611	29386.875	100.1	29501.875	99.018	0	-1.882	1.882
107	Valley	29540	98.3	60	0.319	29510	98.865	29570	98.3	-1.882	0	-1.882
108	Summit	29638.675	98.3	70	0.607	29603.675	98.3	29673.675	97.896	0	-1.154	1.154
109	Valley	29886.656	95.438	60	0.429	29856.656	95.784	29916.656	95.511	-1.154	0.244	-1.398
110	Summit	30126.547	96.022	60	2.083	30096.547	95.949	30156.547	96.009	0.244	-0.044	0.288
111	Valley	30309.931	95.941	60	1.744	30279.931	95.954	30339.931	96.031	-0.044	0.3	-0.344
112	Summit	30464.561	96.405	100	1.667	30414.561	96.255	30514.561	96.255	0.3	-0.3	0.6
113	Valley	30639.082	95.882	60	0.733	30609.082	95.972	30669.082	96.037	-0.3	0.518	-0.818
114	Summit	30729.323	96.349	115	1.406	30671.823	96.051	30786.823	96.177	0.518	-0.3	0.818
115	Valley	30873.434	95.917	60	0.577	30843.434	96.007	30903.434	96.139	-0.3	0.74	-1.04
116	Valley	30953.594	96.51	60	1.172	30923.594	96.288	30983.594	96.885	0.74	1.252	-0.512
117	Summit	31047.071	97.68	1	0.026	31046.571	97.674	31047.571	97.684	1.252	0.862	0.39
118	Summit	31582.39	102.294	75	1.546	31544.89	101.971	31619.89	102.435	0.862	0.377	0.485
119	Valley	31673.594	102.638	60	1.232	31643.594	102.525	31703.594	102.897	0.377	0.864	-0.487
120	Valley	31948.594	105.013	1	0.052	31948.094	105.009	31949.094	105.018	0.864	1.056	-0.192
121	Summit	32044.899	106.03	75	1.638	32007.399	105.634	32082.399	106.258	1.056	0.598	0.458
122	Summit	32185.962	106.873	60	1.442	32155.962	106.694	32215.962	106.928	0.598	0.182	0.416
123	Valley	32272.224	107.03	60	1.596	32242.224	106.975	32302.224	107.197	0.182	0.558	-0.376
124	Valley	32586.553	108.784	60	0.993	32556.553	108.617	32616.553	109.133	0.558	1.162	-0.604
125	Summit	32753.603	110.725	200	1.642	32703.603	110.144	32803.603	111.001	1.162	0.553	0.609
126	Summit	33097.024	112.624	200	1.559	32997.024	112.071	33197.024	111.894	0.553	-0.73	1.283
127	Summit	33297.145	111.163	125	1.570	33234.645	111.619	33359.645	110.209	-0.73	-1.526	0.796
128	Valley	33438.822	109.001	125	0.535	33376.322	109.955	33501.322	109.508	-1.526	0.811	-2.337
129	Valley	33598.254	110.294	60	0.753	33568.254	110.051	33628.254	110.776	0.811	1.608	-0.797
130	Summit	33743.127	112.623	200	1.411	33643.127	111.015	33843.127	112.814	1.608	0.191	1.417
131	Valley	33940.992	113	60	0.651	33910.992	112.943	33970.992	113.334	0.191	1.113	-0.922
132	Summit	34313.424	117.146	175	1.473	34225.924	116.172	34400.924	117.081	1.113	-0.075	1.188
133	Summit	34571.383	116.953	150	1.591	34496.383	117.009	34646.383	116.189	-0.075	-1.018	0.943
134	Valley	34690.218	115.743	75	0.498	34652.718	116.125	34727.718	115.926	-1.018	0.488	-1.506
135	Valley	34993.057	117.222	75	0.521	34955.557	117.039	35030.557	117.945	0.488	1.927	-1.439

DRG NO. (SHP/ESH/SH-17/03)	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO. 1	DATE	REV	RO	
SCALE	NTS			
	B.M.	R.J.	R.R.D.K	S.G





ARSS JV

Chief Engineer  
World Bank & Donor Projects  
O/o the E.L.C. (Employer)  
Bhubaneswar



**CONSULTING**  
**ENGINEERS GROUP LTD.**  
E-12, Moj Colony, Mahatma Nagar, Cuttack-75  
Tel: +91-141-2520899, 2521899, 2520556  
Fax: 2521348, e-mail: ceg@cegindia.com

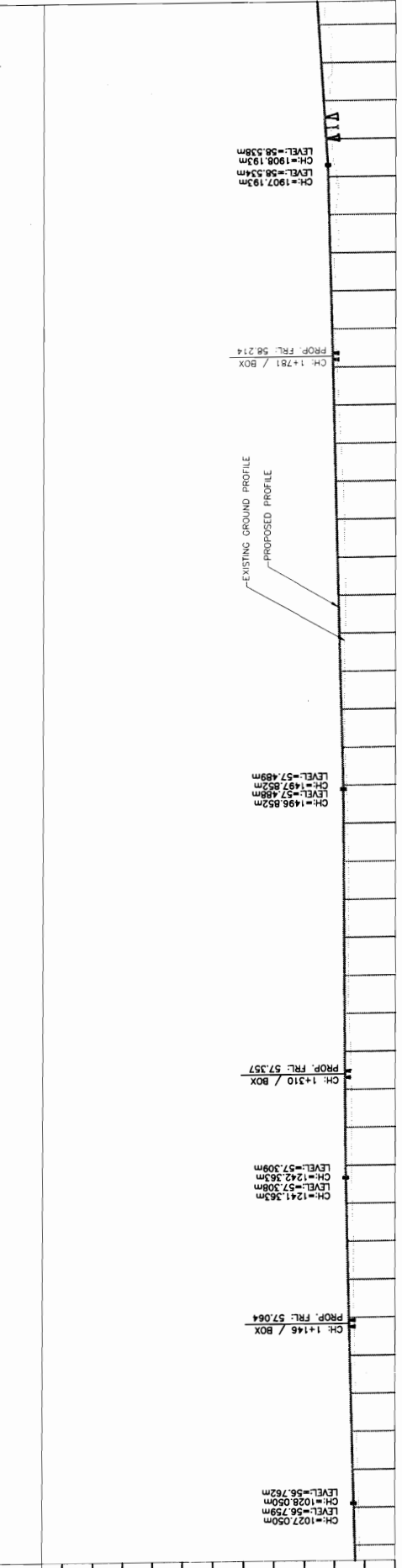
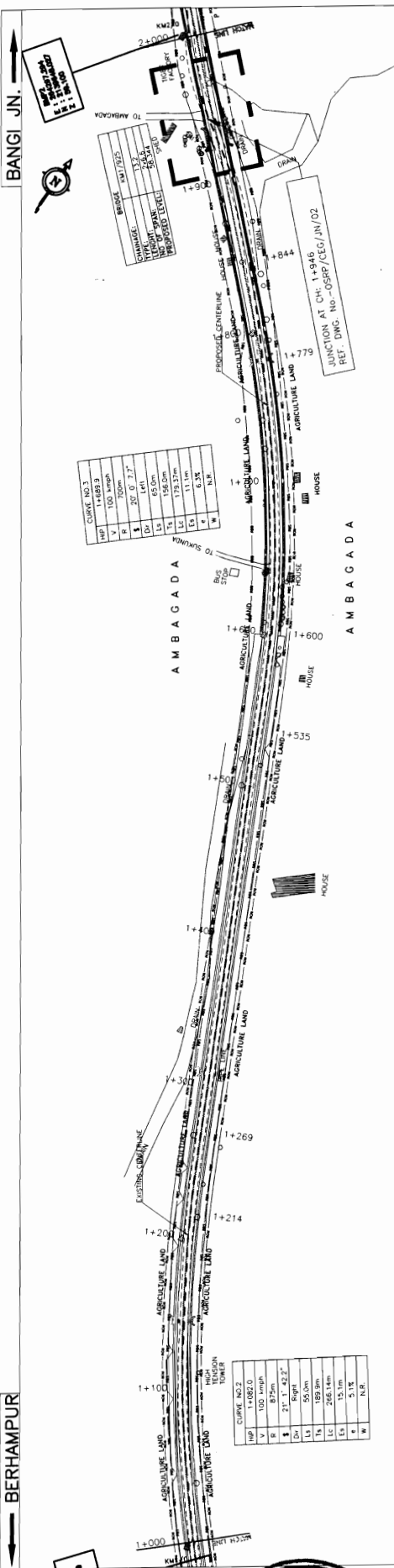
**PROJECT:-**  
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION  
OF PHASE-(1) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK  
ASSISTANCE.

VERTICAL CURVE DETAILS  
BERHAMPUR TO BANGI Jn. (SH-17, KM 0 TO 41)

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	Summit	35142.275	120.098	180	1.371	35052.275	118.363	35232.275	120.651	1.927	0.614	1.313
137	Summit	35307.342	121.112	1	0.040	35306.842	121.109	35307.842	121.114	0.614	0.367	0.247
138	Valley	35398.594	121.447	60	0.786	35368.594	121.337	35428.594	121.786	0.367	1.13	-0.763
139	Valley	35498.594	122.577	1	0.143	35498.094	122.571	35499.094	122.583	1.13	1.2	-0.07
140	Summit	35688.458	124.855	1	0.027	35687.958	124.849	35688.958	124.859	1.2	0.834	0.366
141	Summit	36001.498	127.465	60	1.471	35971.498	127.215	36031.498	127.593	0.834	0.426	0.408
142	Summit	36232.75	128.45	1	0.097	36232.25	128.448	36233.25	128.452	0.426	0.323	0.103
143	Summit	36375.121	128.91	75	1.354	36337.621	128.789	36412.621	128.823	0.323	-0.231	0.554
144	Valley	36593.705	128.405	60	0.480	36563.705	128.474	36623.705	128.711	-0.231	1.019	-1.25
145	Summit	36812.825	130.638	275	1.429	36675.325	129.237	36950.325	129.393	1.019	-0.906	1.925
146	Valley	37126.398	127.798	150	1.045	37051.398	128.477	37201.398	128.196	-0.906	0.53	-1.436
147	Valley	37315.566	128.801	60	0.900	37285.566	128.642	37345.566	129.16	0.53	1.197	-0.667
148	Summit	37486.129	130.842	250	1.392	37361.129	129.346	37611.129	130.094	1.197	-0.599	1.796
149	Valley	37673.063	129.723	100	0.457	37623.063	130.022	37723.063	130.519	-0.599	1.591	-2.19
150	Summit	38062.119	135.913	125	1.403	37999.619	134.919	38124.619	136.35	1.591	0.7	0.891
151	Valley	38178.178	136.725	60	1.079	38148.178	136.515	38208.178	137.102	0.7	1.256	-0.556
152	Valley	38403.086	139.55	1	0.036	38402.586	139.544	38403.586	139.558	1.256	1.535	-0.279
153	Summit	38558.949	141.943	125	1.464	38496.449	140.983	38621.449	142.369	1.535	0.681	0.854
154	Summit	38966.519	144.719	1	0.042	38966.019	144.716	38967.019	144.721	0.681	0.445	0.236
155	Valley	39118.198	145.394	60	0.620	39088.198	145.26	39148.198	145.818	0.445	1.412	-0.967
156	Summit	39282.834	147.719	200	1.364	39182.834	146.307	39382.834	147.665	1.412	-0.054	1.466
157	Valley	39492.396	147.606	60	0.798	39462.396	147.622	39522.396	147.815	-0.054	0.698	-0.752
158	Valley	39672.068	148.86	75	0.496	39634.568	148.598	39709.568	149.689	0.698	2.211	-1.513
159	Summit	39869.02	153.214	225	0.835	39756.52	150.727	39981.52	152.669	2.211	-0.484	2.695
160	Valley	40084.703	152.17	100	0.536	40034.703	152.412	40134.703	152.86	-0.484	1.38	-1.864
161	Valley	40304.253	155.2	75	0.468	40266.753	154.682	40341.753	156.318	1.38	2.983	-1.603
162	Summit	40450.098	159.55	175	1.445	40362.598	156.94	40537.598	161.1	2.983	1.772	1.211
163	Summit	40796.091	165.68	400	1.478	40596.091	162.137	40996.091	163.811	1.772	-0.935	2.707
164	Valley	41072.145	163.1	1	0.004	41071.645	163.105	41072.645	163.107	-0.935	1.419	-2.354
165	Summit	41352.525	167.079	225	0.628	41240.025	165.482	41465.025	164.646	1.419	-2.162	3.581
166	Valley	41557.49	162.647	100	0.315	41507.49	163.728	41607.49	163.153	-2.162	1.012	-3.174
167	Valley	41711.304	164.204	100	0.267	41661.304	163.698	41761.304	166.582	1.012	4.756	-3.744
168	Summit	41847.05	170.66	160	0.351	41767.05	166.855	41927.05	170.822	4.756	0.202	4.554
169	Valley	42009.541	170.989	100	0.474	41959.541	170.888	42059.541	172.146	0.202	2.313	-2.111
170	Summit	42127.565	173.719	60	0.830	42097.565	173.025	42157.565	174.196	2.313	1.59	0.723
171	Summit	42257.071	175.778	125	0.381	42194.571	174.784	42319.571	174.72	1.59	-1.693	3.283
172	Valley	42435.54	172.757	125	0.259	42373.04	173.815	42498.04	174.718	-1.693	3.137	-4.83
173	Summit	42749.868	182.617	125	0.391	42687.368	180.656	42812.368	182.581	3.137	-0.057	3.194
174	Valley	42890.379	182.537	75	0.204	42852.879	182.558	42927.879	183.892	-0.057	3.614	-3.671
175	Summit	42970.65	185.438	60	0.349	42940.65	184.354	43000.65	186.006	3.614	1.895	1.719
176	Valley	43057.26	187.079	60	0.475	43027.26	186.511	43087.26	188.026	1.895	3.158	-1.263

DRG. NO. (SHP/CEP/SH-17/MS/04)	DATE	REV	RO	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	J						
SCALE				NTS			
				B.M.	R.J.	R.R.D.K	S.G





DATUM = 54.00

PROPOSED ROAD LEVEL (m)	EXISTING LEVEL (m)	HORIZONTAL ALIGNMENT	VERTICAL PROFILE
56.674	56.674		
56.751	56.751		
56.812	56.812		
56.878	56.878		
56.892	56.892		
56.946	56.946		
56.975	56.975		
57.010	57.010		
57.074	57.074		
57.138	57.138		
57.202	57.202		
57.266	57.266		
57.315	57.315		
57.332	57.332		
57.350	57.350		
57.367	57.367		
57.402	57.402		
57.420	57.420		
57.437	57.437		
57.455	57.455		
57.472	57.472		
57.496	57.496		
57.519	57.519		
57.539	57.539		
57.577	57.577		
57.621	57.621		
57.649	57.649		
57.791	57.791		
57.904	57.904		
58.196	58.196		
58.250	58.250		
58.324	58.324		
58.388	58.388		
58.452	58.452		
58.515	58.515		
58.648	58.648		
58.810	58.810		
58.965	58.965		
59.252	59.252		
59.633	59.633		

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 Fax: 2521346, e-mail: ceege@rediffmail.com

**PROJECT:-**  
 WIDENING AND STRENGTHENING TO TWO LANE  
 PLAN AND LONGITUDINAL SECTION  
 BAHAMPUR TO BANGI JN. (SH-17) KM 1/000 TO KM 2/000

**LEGEND**

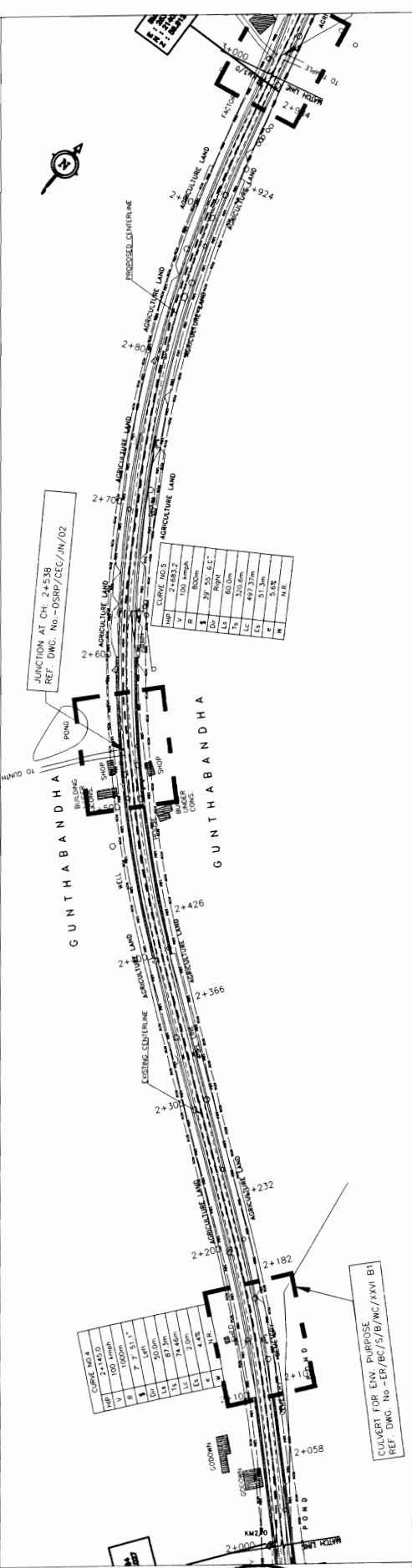
PROPOSED ROAD	EXISTING ROAD
PROPOSED CENTERLINE	EXISTING CENTERLINE
PROPOSED CROWN	EXISTING CROWN
PROPOSED GRADE	EXISTING GRADE
PROPOSED SLOPE	EXISTING SLOPE
PROPOSED CURVE	EXISTING CURVE
PROPOSED DISTANCE	EXISTING DISTANCE
PROPOSED AREA	EXISTING AREA
PROPOSED VOLUME	EXISTING VOLUME
PROPOSED STRUCTURE	EXISTING STRUCTURE
PROPOSED FENCE	EXISTING FENCE
PROPOSED SIGN	EXISTING SIGN
PROPOSED LIGHTING	EXISTING LIGHTING
PROPOSED UTILITIES	EXISTING UTILITIES
PROPOSED EROSION CONTROL	EXISTING EROSION CONTROL
PROPOSED LANDSCAPE	EXISTING LANDSCAPE
PROPOSED ENVIRONMENTAL	EXISTING ENVIRONMENTAL



On the **Project Office**  
 EMPLOYER

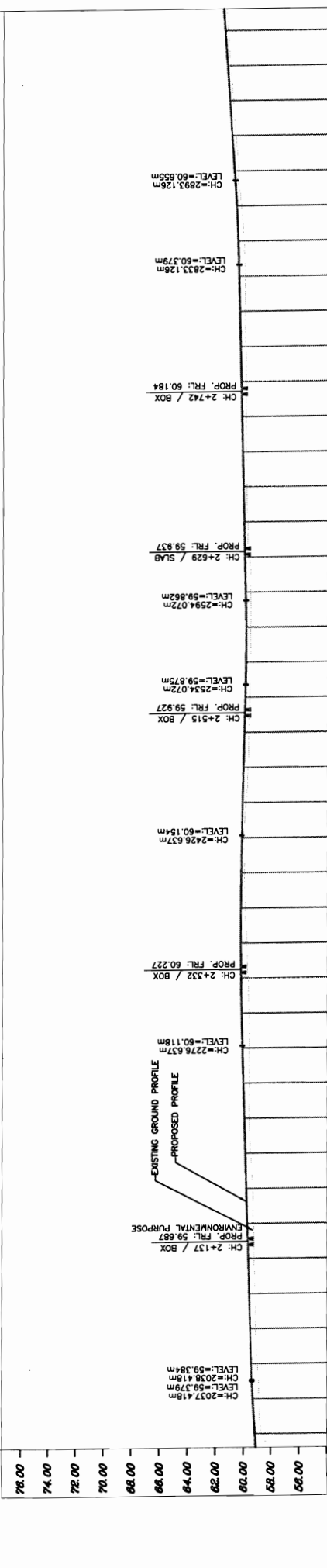
BERHAMPUR

BANGI JN.



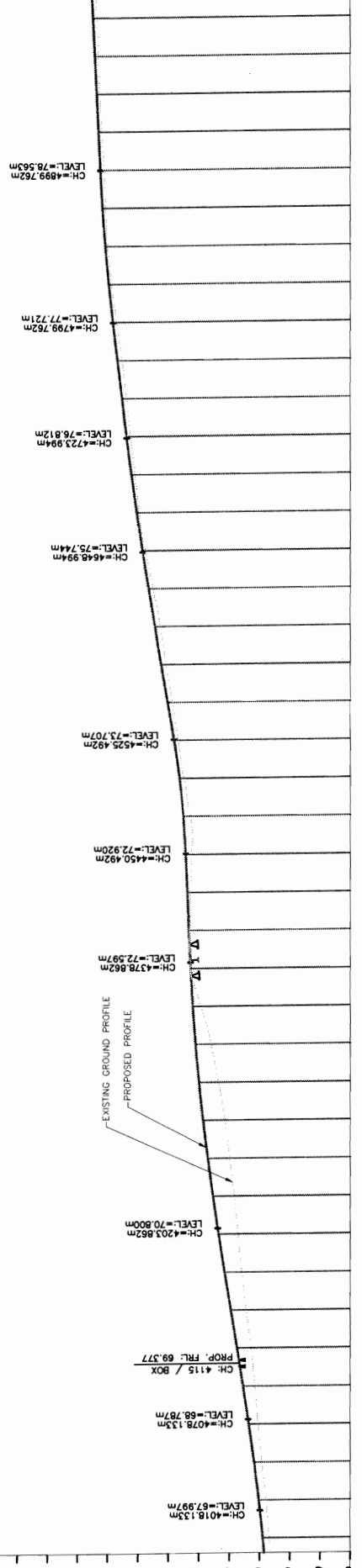
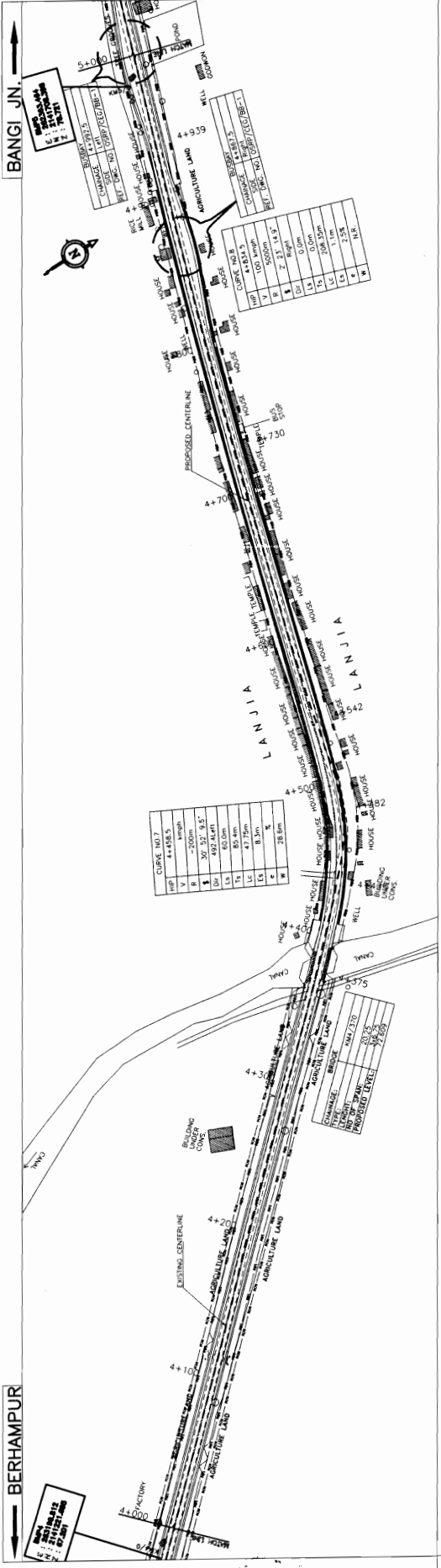
CURVE NO.	CH	LC	EC	ES	N.R.
1	2+145.0	50.0m	0.00	0.00	1
2	2+182	50.0m	0.00	0.00	1
3	2+200	50.0m	0.00	0.00	1
4	2+232	50.0m	0.00	0.00	1
5	2+276.537m	50.0m	0.00	0.00	1
6	2+332	50.0m	0.00	0.00	1
7	2+372	50.0m	0.00	0.00	1
8	2+426.537m	50.0m	0.00	0.00	1
9	2+472	50.0m	0.00	0.00	1
10	2+515	50.0m	0.00	0.00	1
11	2+538	50.0m	0.00	0.00	1

CULVERT FOR ENV. PURPOSE.  
REF. DWG. No.-ER/BC/S/B/W/C/XVII B1



PROPOSED ROAD LEVEL (m)	EXISTING LEVEL (m)	VERTICAL CURVE DATA
78.00	78.00	
74.00	74.00	
72.00	72.00	
70.00	70.00	
68.00	68.00	
66.00	66.00	
64.00	64.00	
62.00	62.00	
60.00	60.00	
66.00	66.00	
68.00	68.00	
70.00	70.00	
72.00	72.00	
74.00	74.00	
76.00	76.00	
78.00	78.00	
79.00	79.00	
80.00	80.00	
81.00	81.00	
82.00	82.00	
83.00	83.00	
84.00	84.00	
85.00	85.00	
86.00	86.00	
87.00	87.00	
88.00	88.00	
89.00	89.00	
90.00	90.00	
91.00	91.00	
92.00	92.00	
93.00	93.00	
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105.00	105.00	
106.00	106.00	
107.00	107.00	
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127.00	127.00	
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367.00	367.00	
368.00	368.00	
369.00	369.00	
370.00	370.00	
371.00	371.00	
372.00	372.00	
373.00	373.00	
374.00	374.00	
375.00	375.00	
376		





PROPOSED ROAD LEVEL (m)	EXISTING LEVEL (m)	HORIZONTAL ALIGNMENT	VERTICAL PROFILE	RELEVATION	CROSSFALL
84.00					
82.00					
80.00					
78.00					
76.00					
74.00					
72.00					
70.00					
68.00					
66.00					
64.00					
62.00					
60.00					
58.00					
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20.00					
18.00					
16.00					
14.00					
12.00					
10.00					
8.00					
6.00					
4.00					
2.00					
0.00					

**LEGEND**

- PROPOSED CENTERLINE
- EXISTING CENTERLINE
- PROPOSED ROAD
- EXISTING ROAD
- PROPOSED SIDE DRAIN
- EXISTING SIDE DRAIN
- PROPOSED SIDE CHANNEL
- EXISTING SIDE CHANNEL
- PROPOSED SIDE FENCE
- EXISTING SIDE FENCE
- PROPOSED SIDE BOUNDARY
- EXISTING SIDE BOUNDARY
- PROPOSED SIDE LINE
- EXISTING SIDE LINE
- PROPOSED SIDE MARK
- EXISTING SIDE MARK
- PROPOSED SIDE CURVE
- EXISTING SIDE CURVE

**PROJECT:-**

**WIDENING AND STRENGTHENING TO TWO LANE PLAN AND LONGITUDINAL SECTION BERHAMPUR TO BANGI JN. (SH-17) KM 4/000 TO KM 5/000**

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

**CONSUULTING ENGINEERS GROUP LTD.**  
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Tel: +91-11-2520899, 2521899, 2520556  
Fax: 2521346, e-mail: ceg@cegroupindia.com

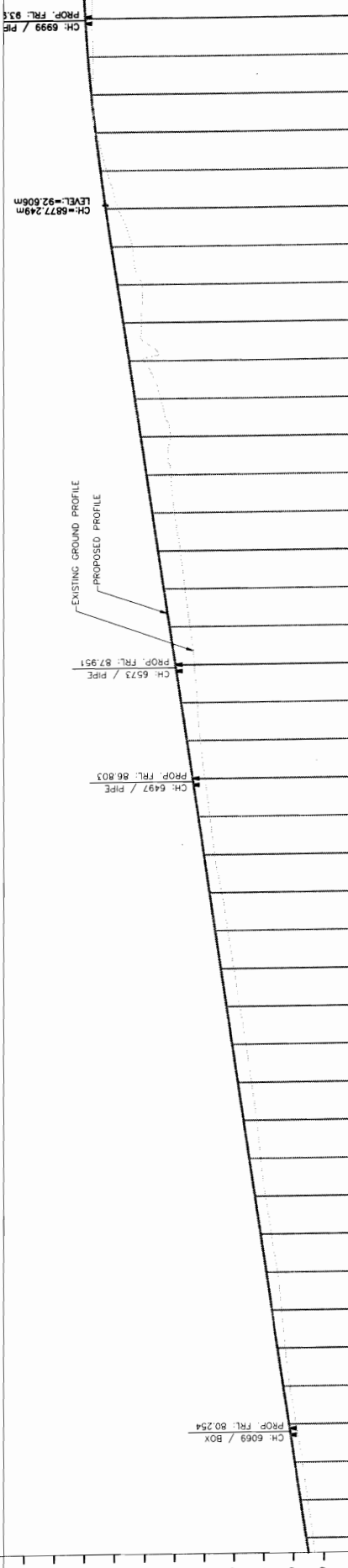
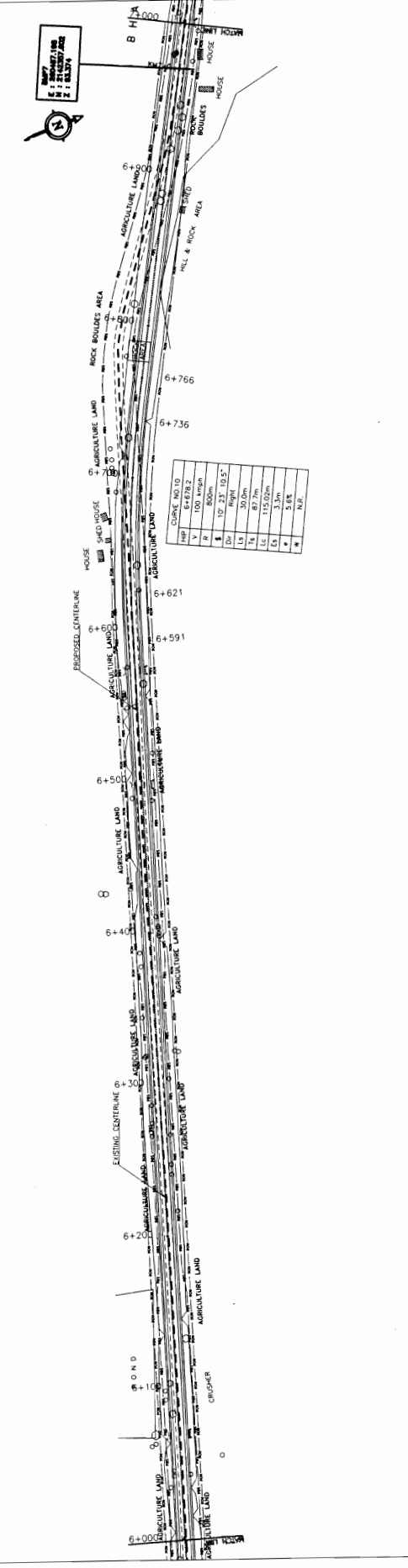
BACKBONE - ARSS JV CONTRACTOR

World Bank Project



BERHAMPUR

BANGI JN.



STATION	PROPOSED ROAD LEVEL (m)	EXISTING LEVEL (m)
0+00	78.00	78.00
0+100	78.00	78.00
0+200	78.00	78.00
0+300	78.00	78.00
0+400	78.00	78.00
0+500	78.00	78.00
0+600	78.00	78.00
0+700	78.00	78.00
0+800	78.00	78.00
0+900	78.00	78.00

**LEGEND**

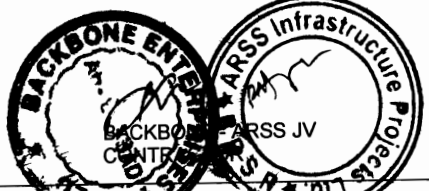
- ROAD CENTER LINE
- EXISTING CENTER LINE
- PROPOSED CENTER LINE
- PROPOSED ROAD LEVEL
- EXISTING ROAD LEVEL
- PROPOSED ROAD WIDTH
- EXISTING ROAD WIDTH
- PROPOSED ROAD GRADE
- EXISTING ROAD GRADE
- PROPOSED ROAD CURVE
- EXISTING ROAD CURVE
- PROPOSED ROAD ALIGNMENT
- EXISTING ROAD ALIGNMENT
- PROPOSED ROAD CROSSFALL
- EXISTING ROAD CROSSFALL
- PROPOSED ROAD DRAINAGE
- EXISTING ROAD DRAINAGE
- PROPOSED ROAD ELEVATION
- EXISTING ROAD ELEVATION
- PROPOSED ROAD REVISION
- EXISTING ROAD REVISION
- PROPOSED ROAD PROJECT
- EXISTING ROAD PROJECT

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

**CONSULTING ENGINEERS GROUP LTD.**  
 E-12, May Colony, Malviya Nagar, Jaipur-17  
 Tel: +91-141-2520899, 2521899, 2520056  
 Fax: 2521346, e-mail: cege@cegroup.com

**WIDENING AND STRENGTHENING TO TWO LANE PLAN AND LONGITUDINAL SECTION BERHAMPUR TO BANGI JN. (SH-17) KM 6/000 TO KM 7/000**

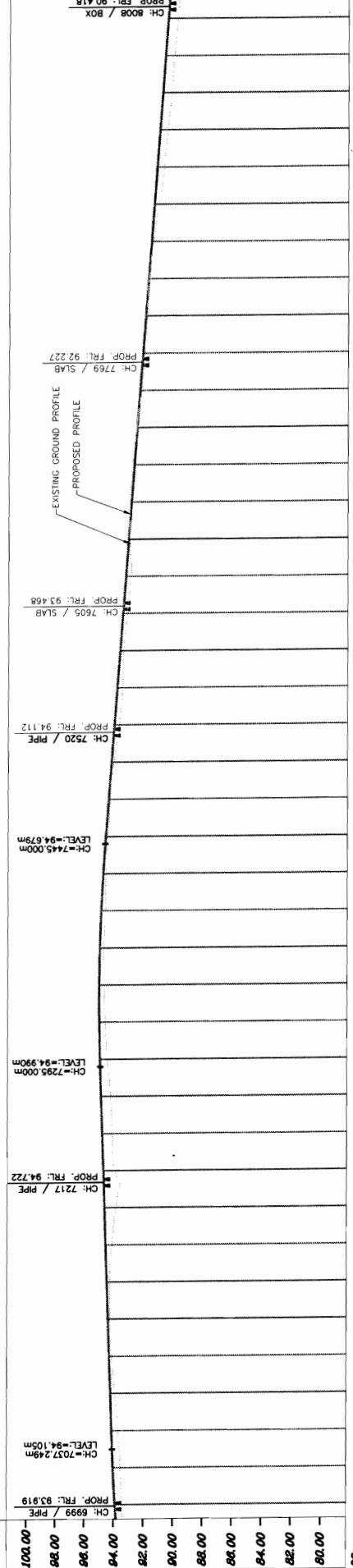
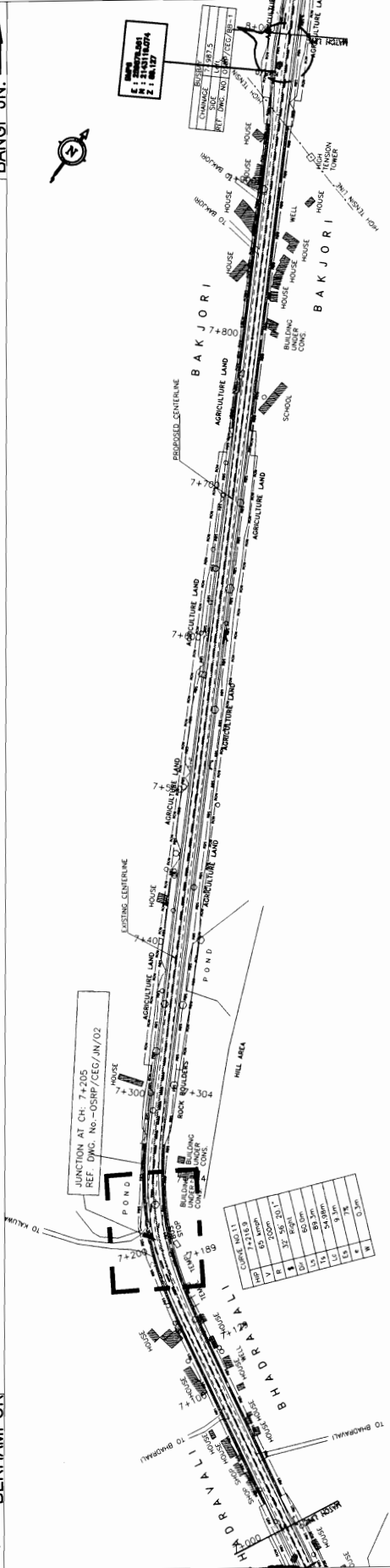
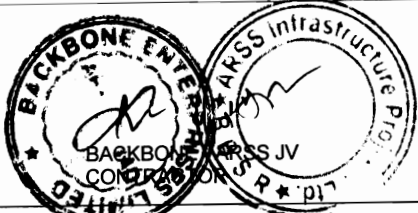
DRG NO: SMP/2024/17/MS/17  
 SH. NO. 07  
 DATE: 11/07/2024  
 REV: 01  
 RO: 11/07/2024  
 B.M: 11/07/2024  
 R.J: 11/07/2024  
 R.R.D.K: 11/07/2024  
 S.G: 11/07/2024





BERHAMPUR

BANGI JN.



PROPOSED ROAD LEVEL (m)	EXISTING ROAD LEVEL (m)	PROPOSED ROAD LEVEL (m)	EXISTING ROAD LEVEL (m)
93.465	93.926	93.465	93.926
93.553	94.056	93.553	94.056
93.711	94.149	93.711	94.149
93.935	94.235	93.935	94.235
94.147	94.320	94.147	94.320
94.268	94.406	94.268	94.406
94.283	94.492	94.283	94.492
94.157	94.578	94.157	94.578
93.866	94.664	93.866	94.664
93.985	94.749	93.985	94.749
94.168	94.835	94.168	94.835
94.259	94.921	94.259	94.921
94.518	95.006	94.518	95.006
94.633	95.090	94.633	95.090
94.731	95.077	94.731	95.077
94.750	95.029	94.750	95.029
94.653	94.946	94.653	94.946
94.608	94.816	94.608	94.816
94.508	94.641	94.508	94.641
94.351	94.452	94.351	94.452
94.105	94.263	94.105	94.263
93.753	94.074	93.753	94.074
93.534	93.885	93.534	93.885
93.478	93.695	93.478	93.695
93.220	93.506	93.220	93.506
92.967	93.317	92.967	93.317
93.037	93.128	93.037	93.128
93.055	92.938	93.055	92.938
92.887	92.749	92.887	92.749
92.560	92.560	92.560	92.560
92.261	92.371	92.261	92.371
92.025	92.182	92.025	92.182
91.893	91.992	91.893	91.992
91.786	91.803	91.786	91.803
91.614	91.614	91.614	91.614
91.106	91.425	91.106	91.425
90.754	91.235	90.754	91.235
90.506	91.046	90.506	91.046
90.251	90.857	90.251	90.857
90.052	90.668	90.052	90.668
90.824	90.479	90.824	90.479

DATUM = 78.00

PROPOSED ROAD LEVEL (m)	EXISTING ROAD LEVEL (m)	PROPOSED ROAD LEVEL (m)	EXISTING ROAD LEVEL (m)
93.465	93.926	93.465	93.926
93.553	94.056	93.553	94.056
93.711	94.149	93.711	94.149
93.935	94.235	93.935	94.235
94.147	94.320	94.147	94.320
94.268	94.406	94.268	94.406
94.283	94.492	94.283	94.492
94.157	94.578	94.157	94.578
93.866	94.664	93.866	94.664
93.985	94.749	93.985	94.749
94.168	94.835	94.168	94.835
94.259	94.921	94.259	94.921
94.518	95.006	94.518	95.006
94.633	95.090	94.633	95.090
94.731	95.077	94.731	95.077
94.750	95.029	94.750	95.029
94.653	94.946	94.653	94.946
94.608	94.816	94.608	94.816
94.508	94.641	94.508	94.641
94.351	94.452	94.351	94.452
94.105	94.263	94.105	94.263
93.753	94.074	93.753	94.074
93.534	93.885	93.534	93.885
93.478	93.695	93.478	93.695
93.220	93.506	93.220	93.506
92.967	93.317	92.967	93.317
93.037	93.128	93.037	93.128
93.055	92.938	93.055	92.938
92.887	92.749	92.887	92.749
92.560	92.560	92.560	92.560
92.261	92.371	92.261	92.371
92.025	92.182	92.025	92.182
91.893	91.992	91.893	91.992
91.786	91.803	91.786	91.803
91.614	91.614	91.614	91.614
91.106	91.425	91.106	91.425
90.754	91.235	90.754	91.235
90.506	91.046	90.506	91.046
90.251	90.857	90.251	90.857
90.052	90.668	90.052	90.668
90.824	90.479	90.824	90.479

**LEGEND**

- EXISTING CENTERLINE
- PROPOSED CENTERLINE
- PROPOSED ROAD LEVEL
- EXISTING ROAD LEVEL
- PROPOSED ROAD WIDTH
- EXISTING ROAD WIDTH
- PROPOSED SHOULDER WIDTH
- EXISTING SHOULDER WIDTH
- PROPOSED GRADE
- EXISTING GRADE
- PROPOSED DRAINAGE
- EXISTING DRAINAGE
- PROPOSED STRUCTURE
- EXISTING STRUCTURE
- PROPOSED POND
- EXISTING POND

**PROJECT:**

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

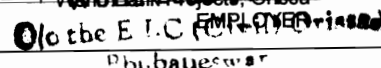
**CONSULTING ENGINEERS GROUP LTD.**

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**WIDENING AND STRENGTHENING TO TWO LANE PLAN AND LONGITUDINAL SECTION BERHAMPUR TO BANGI JN. (SH-17) KM 7/000 TO KM 8/000**

DRG NO. 088/2018/17/18/19/20/21/22/23/24/25/26/27/28/29/30/31/32/33/34/35/36/37/38/39/40/41/42/43/44/45/46/47/48/49/50/51/52/53/54/55/56/57/58/59/60/61/62/63/64/65/66/67/68/69/70/71/72/73/74/75/76/77/78/79/80/81/82/83/84/85/86/87/88/89/90/91/92/93/94/95/96/97/98/99/100

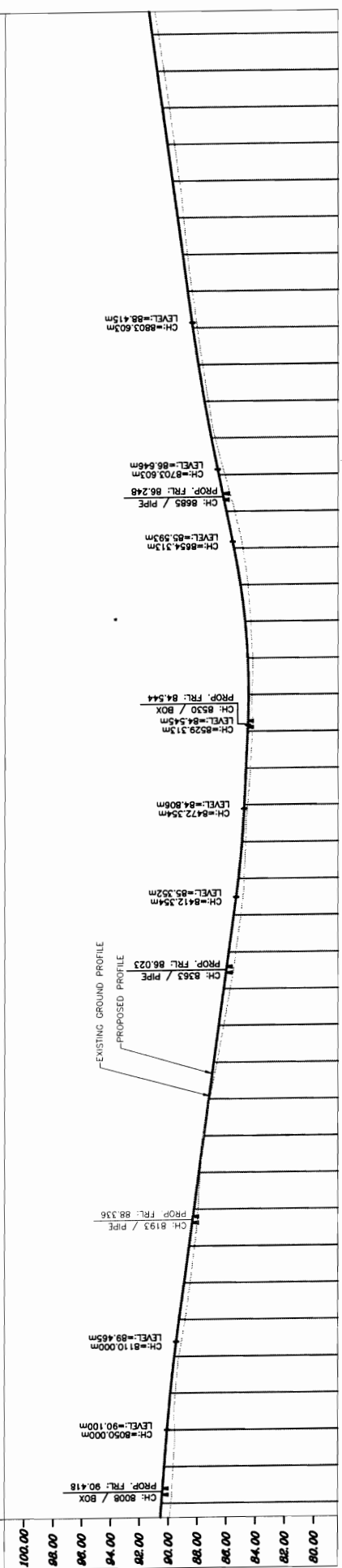
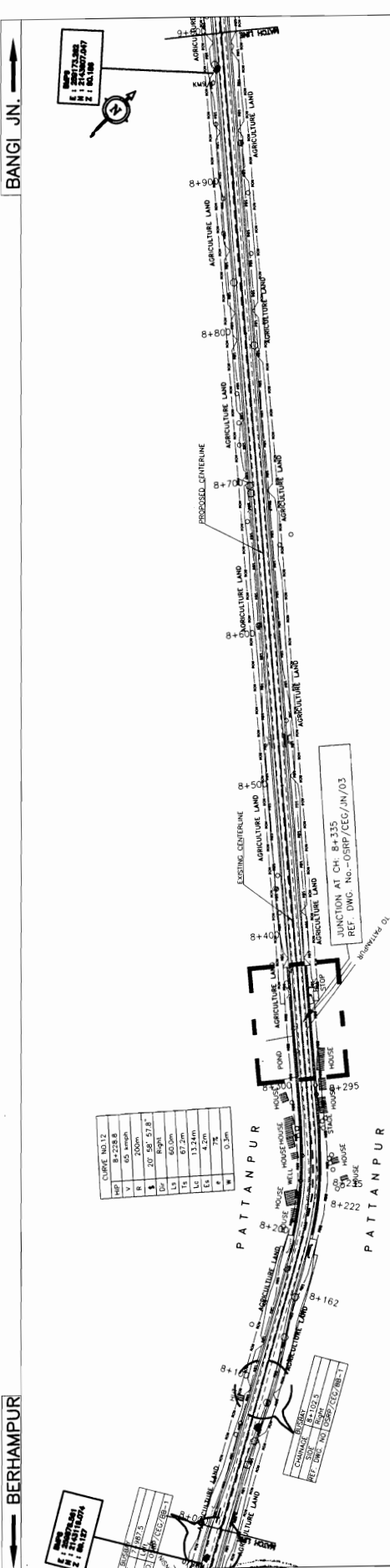
SCALE: HORIZONTAL: 1:1000 VERTICAL: 1:100



BERHAMPUR

BANGI JN.

STATION	PC	PT	LC	LC	LC	LC	LC	LC	LC
219+00	219+00	219+00	219+00	219+00	219+00	219+00	219+00	219+00	219+00



PROPOSED ROAD LEVEL (m)	EXISTING LEVEL (m)	HORIZONTAL ALIGNMENT	VERTICAL CURVE DATA	ELEVATION
90.732	90.820			90.732
90.352	90.470			90.352
89.985	90.119			89.985
89.642	89.768			89.642
89.289	89.417			89.289
88.914	89.066			88.914
88.737	88.715			88.737
88.410	88.364			88.410
88.050	87.983			88.050
87.679	87.577			87.679
87.278	87.066			87.278
86.806	86.569			86.806
86.148	85.035			86.148
85.449	84.503			85.449
84.892	84.057			84.892
84.548	83.740			84.548
84.329	84.553			84.329
84.173	84.495			84.173
84.230	84.565			84.230
84.224	84.680			84.224
84.383	84.794			84.383
84.572	84.946			84.572
84.703	85.192			84.703
84.798	85.520			84.798
85.019	85.860			85.019
85.354	86.200			85.354
85.746	86.540			85.746
86.199	86.880			86.199
86.653	87.220			86.653
87.163	87.560			87.163
87.604	87.901			87.604
87.810	88.241			87.810
87.958	88.581			87.958
88.192	88.921			88.192
88.498	89.261			88.498
88.844	89.596			88.844
89.262	89.879			89.262
89.516	90.100			89.516
89.578	90.289			89.578
89.664	90.478			89.664
89.824	90.732			89.824

DATUM = 78.00  
 PROPOSED ROAD LEVEL (m)  
 EXISTING LEVEL (m)  
 HORIZONTAL ALIGNMENT  
 VERTICAL CURVE DATA  
 ELEVATION

**PROJECT:-**  
 WIDENING AND STRENGTHENING TO TWO LANE  
 PLAN AND LONGITUDINAL SECTION  
 BERHAMPUR TO BANGI Jn. (SH-17) KM 8/000 TO 9/000

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

**ENGINEERS GROUP LTD.**  
 E-12, May Colony, Malviya Nagar, Jaipur-17  
 Tel: 91-79-1343 2520899, 2520899, 2520556  
 Fax: 2521346, e-mail: ceg@engineersgroup.com

**LEGEND**

- ROAD CENTERLINE
- EXISTING CENTERLINE
- PROPOSED CENTERLINE
- EXISTING ROAD BOUNDARY
- PROPOSED ROAD BOUNDARY
- PROPOSED ROAD CROSS SECTION
- PROPOSED ROAD CROSS SECTION
- PROPOSED ROAD CROSS SECTION

SCALE: HORIZONTAL: 1:5000 VERTICAL: 1:1000

DATE: \_\_\_\_\_

REV: \_\_\_\_\_

BY: \_\_\_\_\_

CHKD: \_\_\_\_\_

APPRD: \_\_\_\_\_

DRG. NO: \_\_\_\_\_

SHL. NO: \_\_\_\_\_

DATE: \_\_\_\_\_

REV: \_\_\_\_\_

BY: \_\_\_\_\_

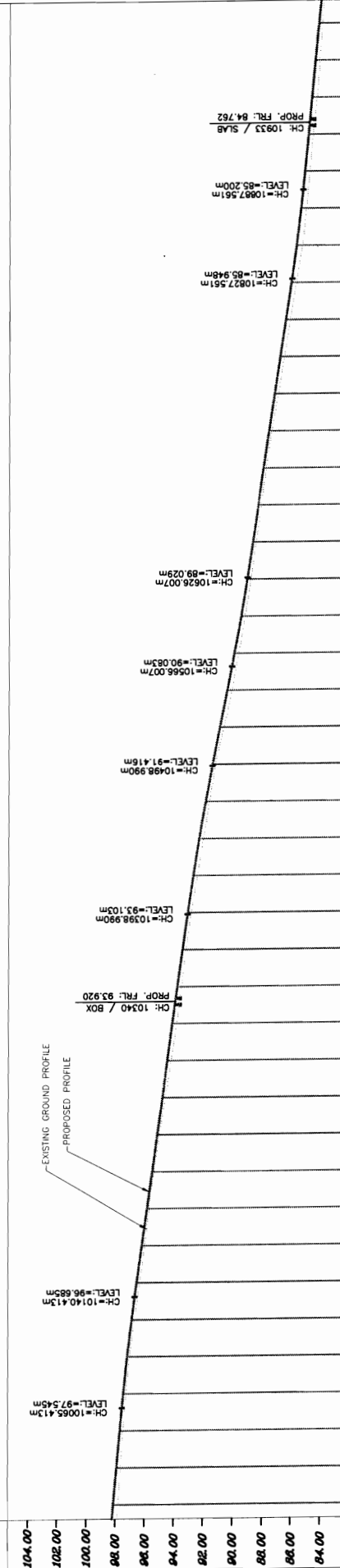
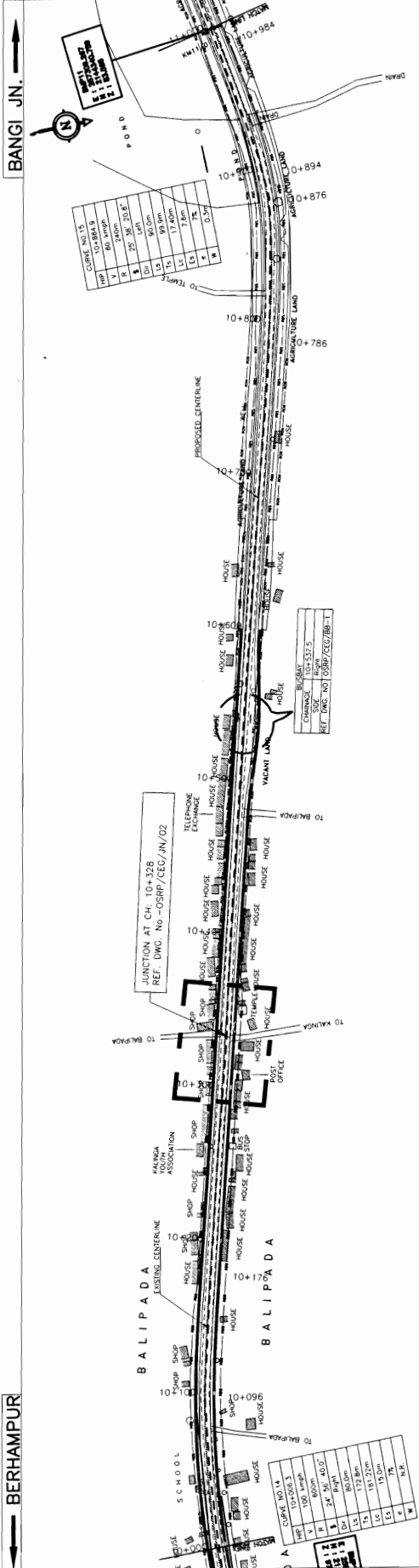
CHKD: \_\_\_\_\_

APPRD: \_\_\_\_\_

**BACKBONE ENGINEERS GROUP LTD.**  
**CONTRACTOR**

Signature: \_\_\_\_\_





PROPOSED ROAD LEVEL (m)	EXISTING LEVEL (m)	HORIZONTAL ALIGNMENT	VERTICAL CURVE	GRADE (%)
84.115	84.115			
84.048	84.048			
84.237	84.237			
84.531	84.531			
84.738	84.738			
84.973	84.973			
85.251	85.251			
85.656	85.656			
86.071	86.071			
86.474	86.474			
86.876	86.876			
87.322	87.322			
87.693	87.693			
88.054	88.054			
88.421	88.421			
88.785	88.785			
89.197	89.197			
89.621	89.621			
90.079	90.079			
90.626	90.626			
91.182	91.182			
91.605	91.605			
92.022	92.022			
92.429	92.429			
92.838	92.838			
93.184	93.184			
93.502	93.502			
93.817	93.817			
94.193	94.193			
94.602	94.602			
95.167	95.167			
95.382	95.382			
95.714	95.714			
96.011	96.011			
96.335	96.335			
96.683	96.683			
97.023	97.023			
97.255	97.255			
97.488	97.488			
97.634	97.634			
97.806	97.806			

**WIDENING AND STRENGTHENING TO TWO LANE PLAN AND LONGITUDINAL SECTION**  
**BERHAMPUR TO BANGI JN. (SH-17) KM 10/700 TO KM 11/000**

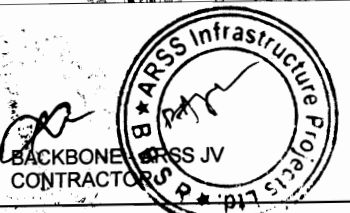
**PROJECT:-**  
**CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE**

**CONSULTING ENGINEERS GROUP LTD.**  
 E-12, 3rd Floor, Colony Malaya Nagar, Jagpur-17,  
 Tel: +91-141-2520899, 2521899, 2520556  
 Fax: 2521348, e-mail: ceg@ceginfolia.com

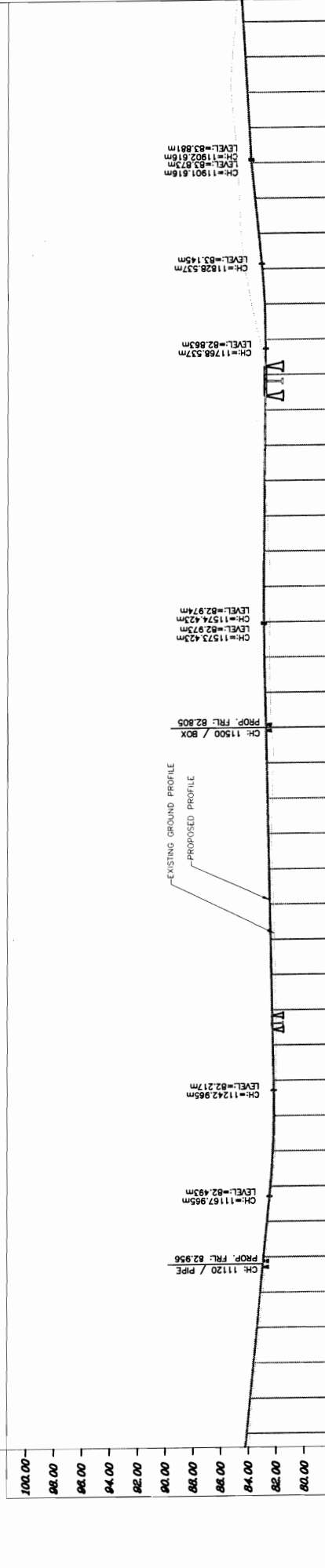
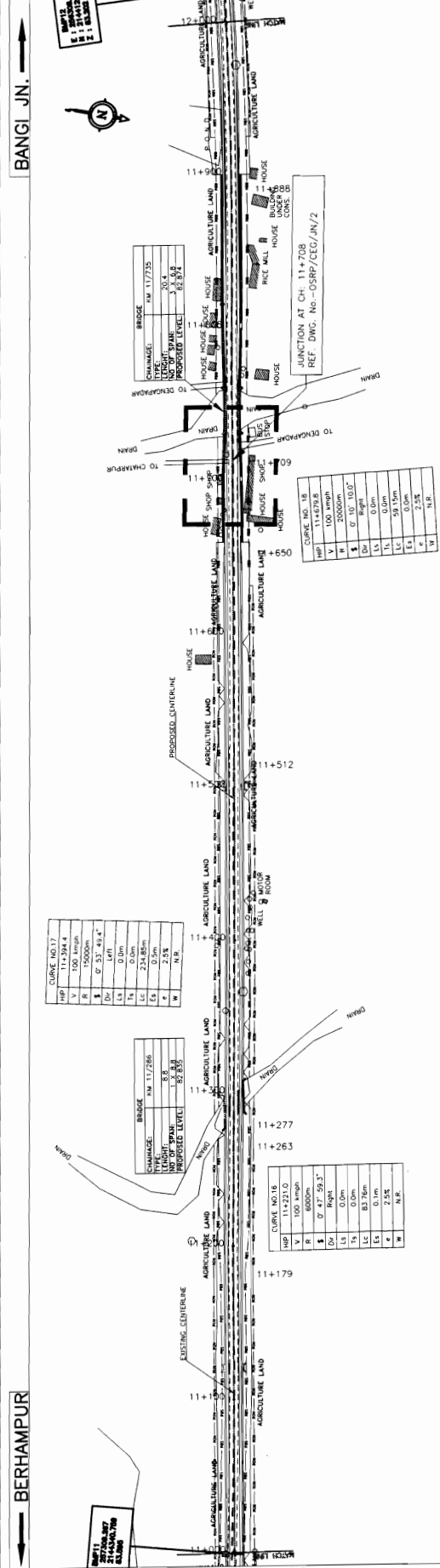
**LEGEND**

PROPOSED CENTER LINE	EXISTING CENTER LINE
PROPOSED RIGHT OF WAY	EXISTING RIGHT OF WAY
PROPOSED ROAD CROSSING	EXISTING ROAD CROSSING
PROPOSED ROAD STRUCTURE	EXISTING ROAD STRUCTURE
PROPOSED ROAD BRIDGE	EXISTING ROAD BRIDGE
PROPOSED ROAD TUNNEL	EXISTING ROAD TUNNEL
PROPOSED ROAD CUT	EXISTING ROAD CUT
PROPOSED ROAD FILL	EXISTING ROAD FILL
PROPOSED ROAD EMBANKMENT	EXISTING ROAD EMBANKMENT
PROPOSED ROAD DRAINAGE	EXISTING ROAD DRAINAGE
PROPOSED ROAD LIGHTING	EXISTING ROAD LIGHTING
PROPOSED ROAD SIGNAGE	EXISTING ROAD SIGNAGE
PROPOSED ROAD SAFETY	EXISTING ROAD SAFETY
PROPOSED ROAD MAINTENANCE	EXISTING ROAD MAINTENANCE

**DATE:** 11/11/2011  
**SCALE:** HORIZONTAL: 1:1000, VERTICAL: 1:1000  
**REV:** 1, 2, 3  
**BY:** R.P.R.K  
**CHECKED BY:** R.P.R.K  
**APPROVED BY:** S.G



EMPLOYER (Orissa)



DATUM = 78.00

PROPOSED ROAD LEVEL (m)	EXISTING LEVEL (m)	HORIZONTAL ALIGNMENT	VERTICAL CURVE	ELEVATION	VERTICAL
85.060	84.458				
85.266	84.310				
85.372	84.162				
85.124	84.014				
84.922	83.857				
84.759	83.698				
84.596	83.539				
84.332	83.381				
83.835	83.932				
83.277	82.863				
82.891	82.874				
82.847	82.888				
82.925	82.902				
82.877	82.916				
82.730	82.831				
82.597	82.945				
82.508	82.959				
82.532	82.973				
82.556	82.919				
82.496	82.982				
82.400	82.805				
82.298	82.748				
82.349	82.690				
82.420	82.633				
82.342	82.576				
82.261	82.519				
82.182	82.462				
82.118	82.404				
82.054	82.347				
82.063	82.290				
82.070	82.233				
82.093	82.201				
82.127	82.265				
82.336	82.429				
82.547	82.667				
82.718	82.908				
82.943	83.149				
83.182	83.391				
83.460	83.632				
83.686	83.873				
83.878	84.115				

**PROJECT:**  
**WIDENING AND STRENGTHENING TO TWO LANE PLAN AND LONGITUDINAL SECTION**  
 BERHAMPUR TO BANGI JN. (SH-17) KM 11/000 TO KM 12/000

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

**LEGEND**

**EXISTING CENTERLINE**  
 PROPOSED CENTERLINE  
 PROPOSED ROAD LEVEL  
 EXISTING LEVEL  
 HORIZONTAL ALIGNMENT  
 VERTICAL CURVE  
 ELEVATION  
 VERTICAL

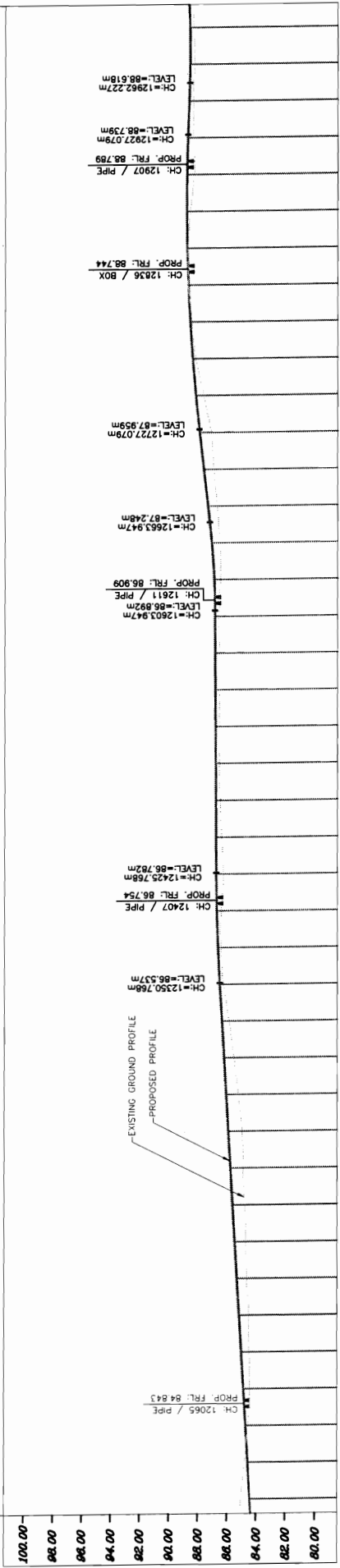
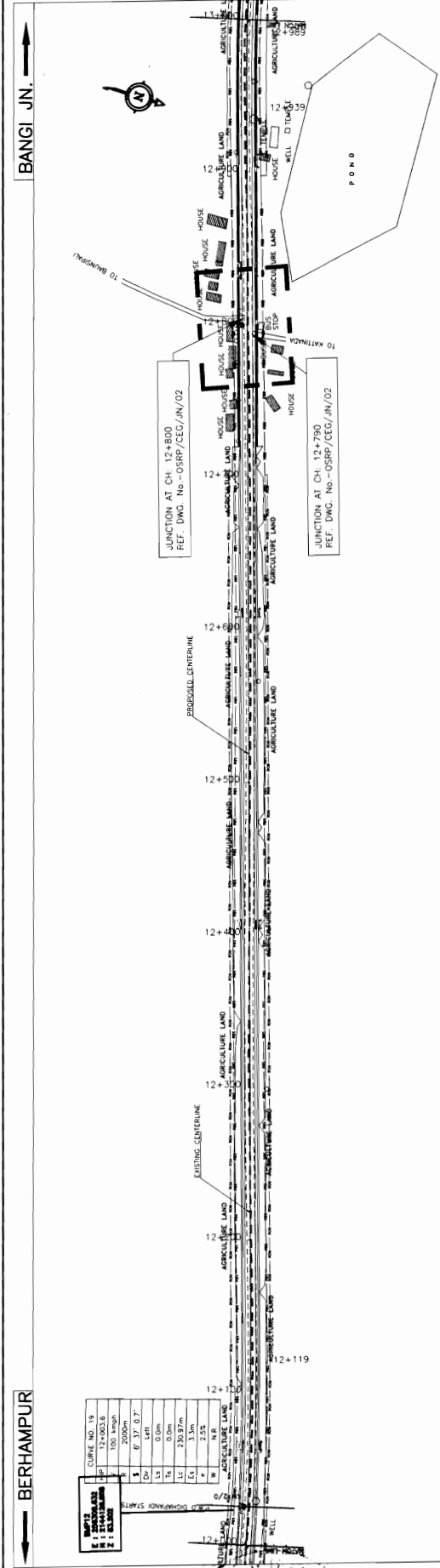
**SCALE**  
 HORIZONTAL: 1:1000  
 VERTICAL: 1:100

**DATE:** 12/08/2017  
**REV:** 01  
**RO:** R.J.  
**B.M:** B.M.  
**R.R.D.K:** R.R.D.K.  
**S.C:** S.C.





CURVE NO. 19	
1	12+803.6
2	100.00m
3	200.00m
4	0.00m
5	0.00m
6	0.00m
7	0.00m
8	0.00m
9	0.00m
10	0.00m
11	0.00m
12	0.00m
13	0.00m
14	0.00m
15	0.00m
16	0.00m
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92	0.00m
93	0.00m
94	0.00m
95	0.00m
96	0.00m
97	0.00m
98	0.00m
99	0.00m
100	0.00m



PROPOSED ROAD LEVEL (m)	EXISTING LEVEL (m)	VERTICAL CURVE DATA
85.060	84.456	
85.026	84.606	
85.581	84.754	
84.449	84.903	
84.487	85.051	
84.488	85.199	
84.653	85.347	
84.716	85.495	
84.803	85.643	
84.921	85.791	
85.011	85.940	
85.263	86.088	
85.556	86.236	
85.885	86.384	
86.275	86.532	
86.429	86.680	
86.420	86.743	
86.275	86.782	
86.413	86.797	
86.511	86.812	
86.592	86.826	
86.602	86.843	
86.527	86.858	
86.556	86.874	
86.622	86.889	
86.507	86.944	
86.533	87.108	
86.728	87.372	
86.964	87.654	
87.140	87.935	
87.655	88.198	
88.215	88.414	
88.446	88.584	
88.709	88.709	
88.730	88.787	
88.570	88.820	
88.316	88.806	
88.329	88.745	
88.360	88.660	
88.284	88.586	
88.338	88.597	

**PROJECT:-**  
**WIDENING AND STRENGTHENING TO TWO LANE PLAN AND LONGITUDINAL SECTION**  
**BERHAMPUR TO BANGI JN. (SH-17) KM 12/000 TO KM 13/000**

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

**CEG CONSULTING ENGINEERS GROUP LTD.**  
 E-12, Mohi Colony, Malviya Nagar, Jaipur-31  
 Tel: +91-141-2520899, 2521899, 2520556  
 Fax: 2521348, e-mail: ceg@cegroup.com

**LEGEND**

1	EXISTING CENTERLINE
2	PROPOSED CENTERLINE
3	PROPOSED ROAD LEVEL
4	EXISTING ROAD BOUNDARY
5	PROPOSED ROAD BOUNDARY
6	PROPOSED ROAD WIDTH
7	PROPOSED ROAD CROSS SECTION
8	PROPOSED ROAD PROFILE
9	PROPOSED ROAD ELEVATION
10	PROPOSED ROAD FALL
11	PROPOSED ROAD GRADE
12	PROPOSED ROAD SLOPE
13	PROPOSED ROAD CURVE
14	PROPOSED ROAD ALIGNMENT
15	PROPOSED ROAD RIGHT OF WAY
16	PROPOSED ROAD EASEMENT
17	PROPOSED ROAD INTERSECTION POINT
18	PROPOSED ROAD INTERSECTION ANGLE
19	PROPOSED ROAD INTERSECTION POINT
20	PROPOSED ROAD INTERSECTION ANGLE
21	PROPOSED ROAD INTERSECTION POINT
22	PROPOSED ROAD INTERSECTION ANGLE
23	PROPOSED ROAD INTERSECTION POINT
24	PROPOSED ROAD INTERSECTION ANGLE
25	PROPOSED ROAD INTERSECTION POINT
26	PROPOSED ROAD INTERSECTION ANGLE
27	PROPOSED ROAD INTERSECTION POINT
28	PROPOSED ROAD INTERSECTION ANGLE
29	PROPOSED ROAD INTERSECTION POINT
30	PROPOSED ROAD INTERSECTION ANGLE

**DATE = 78.00**

**Scale:**  
 HORIZONTAL: 1:1000  
 VERTICAL: 1:100

**APPROVED BY:** [Signature]

**DATE:** 13/08/2013

**PROJECT NO.:** 13/08/2013

**SCALE:** HORIZONTAL: 1:1000, VERTICAL: 1:100

**DATE:** 13/08/2013

**PROJECT NO.:** 13/08/2013

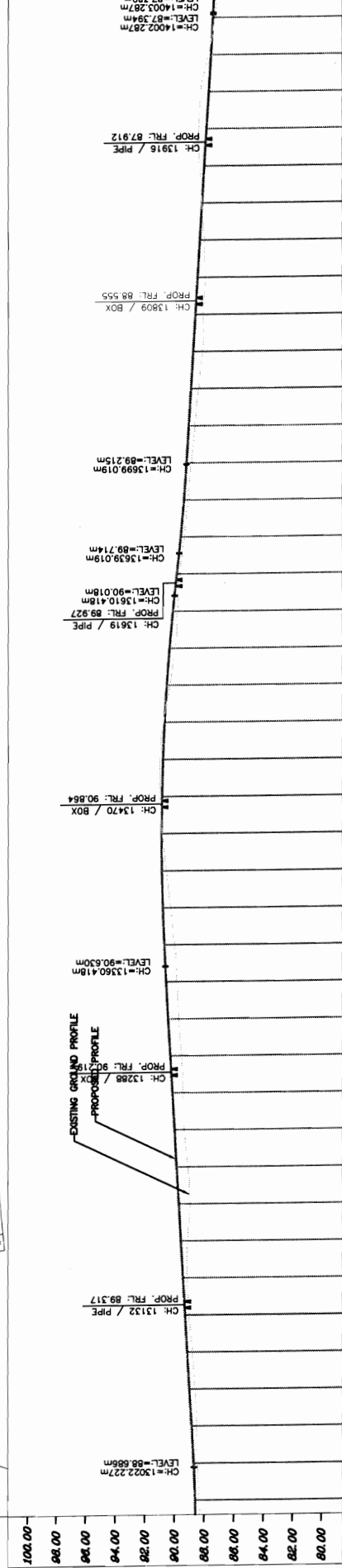
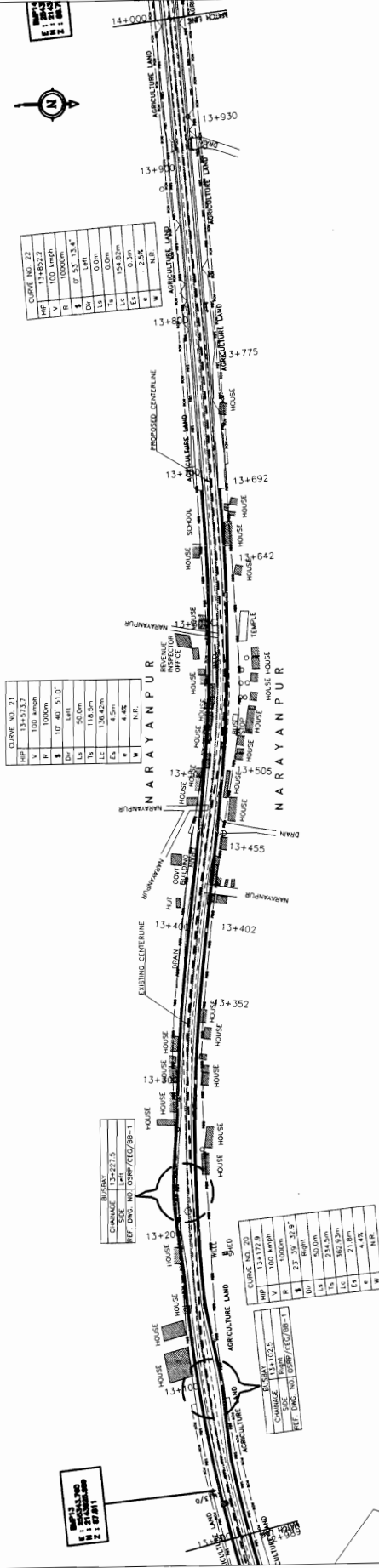
**SCALE:** HORIZONTAL: 1:1000, VERTICAL: 1:100



BARSS JV  
CONTRACTOR

BERHAMPUR

BANGI JN.



DATUM = 78.00

PROPOSED ROAD LEVEL (m)	EXISTING LEVEL (m)	HORIZONTAL ALIGNMENT	VERTICAL CURVE	PER ELEVATION	PER FALL
87.315	87.315				
87.358	87.358				
88.250	87.708				
88.379	87.856				
88.326	88.008				
88.172	88.156				
88.021	88.308				
87.957	88.456				
88.041	88.608				
88.134	88.756				
88.402	88.908				
88.634	89.059				
88.880	89.209				
89.120	89.361				
89.357	89.602				
89.646	89.663				
89.821	90.126				
89.981	90.354				
90.333	90.541				
90.761	90.698				
90.889	90.793				
90.973	90.658				
90.839	90.882				
90.547	90.864				
90.267	90.806				
90.004	90.707				
89.838	90.570				
89.713	90.426				
89.531	90.283				
89.408	90.139				
89.356	89.996				
89.086	89.852				
89.948	89.708				
89.102	89.564				
89.153	89.421				
89.012	89.277				
88.791	89.133				
88.613	88.990				
88.502	88.846				
88.447	88.702				
88.338	88.597				

**LEGEND**

- RESERVE AREA
- N.T. LINE TOWER
- PROPOSED CENTER LINE
- EXISTING CENTER LINE
- WELLTOP & HAND PUMP
- ELECTRIC LINE & POLE
- PRO. SHOULDER EDGES
- EXISTING ROAD BOUNDARY
- HOUSE/SHED/STRUCTURE
- PIPE CULVERT
- PROPOSED CATCH BASIN
- PROPOSED CULVERT
- RESERVATION ANGLE
- STARTING OF SPiral CURVE
- ENDING OF SPiral CURVE
- STARTING OF CIRCULAR CURVE
- ENDING OF CIRCULAR CURVE
- APPROX. POINT
- END OF CIRCULAR CURVE
- PIECEWISE INTERSECTION POINT
- DEVIATION ANGLE

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

**WIDENING AND STRENGTHENING TO TWO LANE PLAN AND LONGITUDINAL SECTION BERHAMPUR TO BANGI Jn. (SH-17) KM 13/000 TO KM 14/000**

DATE: 14/06/2017  
SCALE: HORIZONTAL: 1:5000, VERTICAL: 1:1000

NO.	REV.	NO.	DATE
01		01	14/06/2017

DRG. NO. SH-17-2520866-2521866-2522858  
SHEET NO. 14

NO.	REV.	NO.	DATE
01		01	14/06/2017

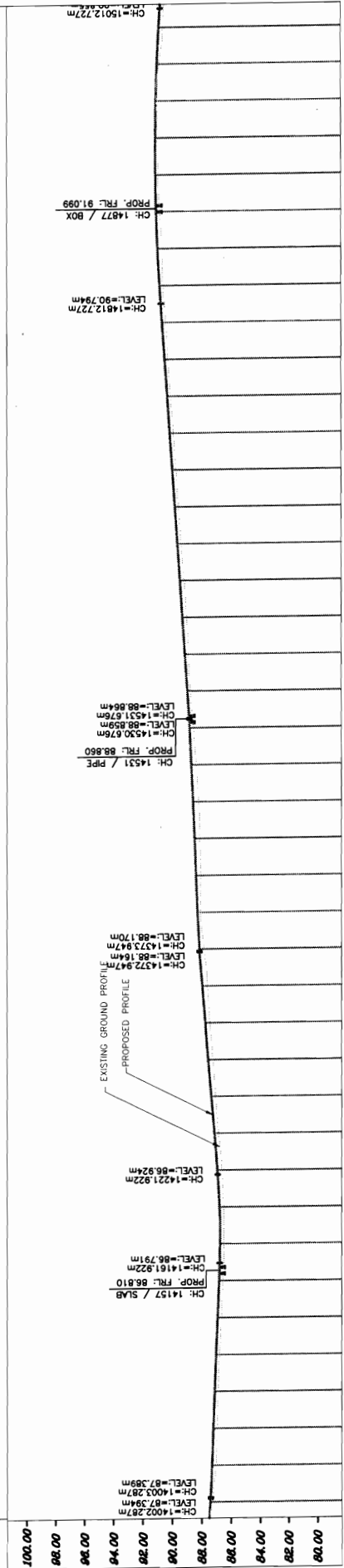
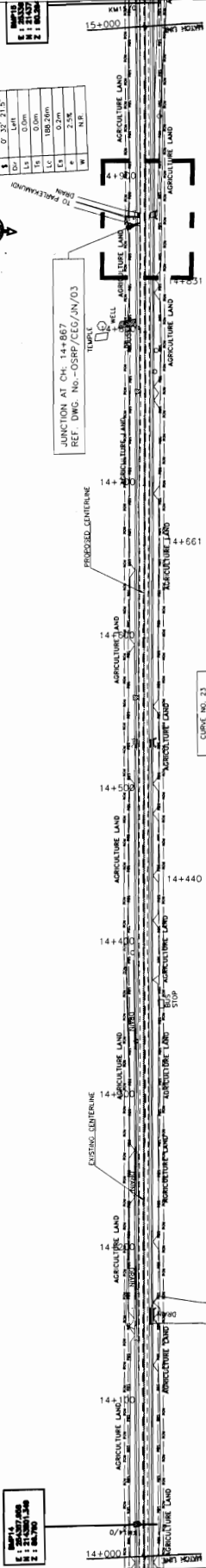
DESIGNED BY: **BARSS**  
DRAWN BY: **BARSS**  
CHECKED BY: **BARSS**  
APPROVED BY: **BARSS**

BANGI JN.

BERHAMPUR

HP	144325.1
V	100 m/HP
R	20000m
L	0.37, 71.5
G	0.0%
Ls	0.0m
Lc	186.20m
Lt	0.7m
W	2.5%
W	2.5%

HP	144550.6
V	100 m/HP
R	20000m
L	0.37, 10.7
G	0.0%
Ls	0.0m
Lc	2252.64m
Lt	0.1m
W	2.5%
W	2.5%



PROPOSED ROAD LEVEL (m)	EXISTING LEVEL (m)
90.656	90.929
90.905	91.044
91.085	91.118
91.025	91.152
90.966	91.144
90.834	91.095
90.704	91.005
90.637	90.874
90.447	90.707
90.294	90.535
90.128	90.364
89.943	90.192
89.770	90.020
89.589	89.849
89.406	89.677
89.203	89.505
89.033	89.334
88.922	89.162
88.773	88.990
88.564	88.814
88.349	88.724
88.215	88.614
88.130	88.504
88.082	88.395
88.089	88.285
88.083	88.175
87.853	88.065
87.619	87.976
87.449	87.770
87.243	87.565
87.057	87.360
86.850	87.155
86.614	86.950
86.522	86.792
86.508	86.759
86.563	86.636
86.850	86.930
86.803	87.025
86.892	87.118
86.952	87.213
87.031	87.307
87.315	87.408

**PROJECT:-**  
**WIDENING AND STRENGTHENING TO TWO LANE PLAN AND LONGITUDINAL SECTION**  
 BERHAMPUR TO BANGI JN. (SH-17) KM 14.7/00 TO KM 15.0/00

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

**LEGEND**

EXISTING CENTERLINE	---
PROPOSED CENTERLINE	---
PROPOSED ROAD LEVEL	---
EXISTING ROAD LEVEL	---
EXISTING GROUND PROFILE	---
PROPOSED PROFILE	---
PROF. F.R.L. / PIPE	---
PROPOSED LANE MARKING	---
PROPOSED LANE WIDTH	---
PROPOSED LANE SPACING	---
PROPOSED LANE WIDTH	---
PROPOSED LANE SPACING	---
PROPOSED LANE WIDTH	---
PROPOSED LANE SPACING	---

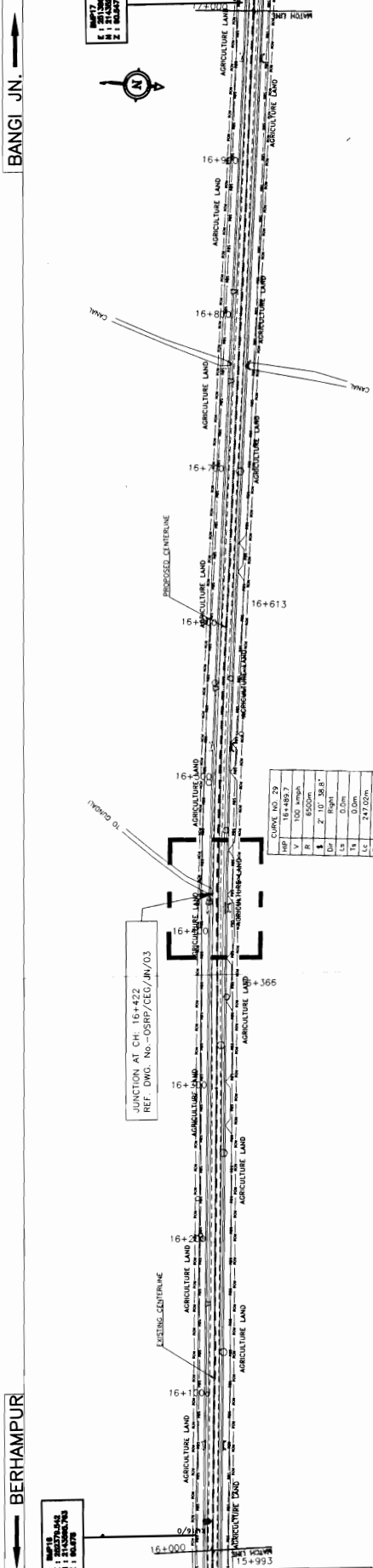
**SCALE**  
 HORIZONTAL: 1:1000  
 VERTICAL: 1:100

**DATE** = 78.00

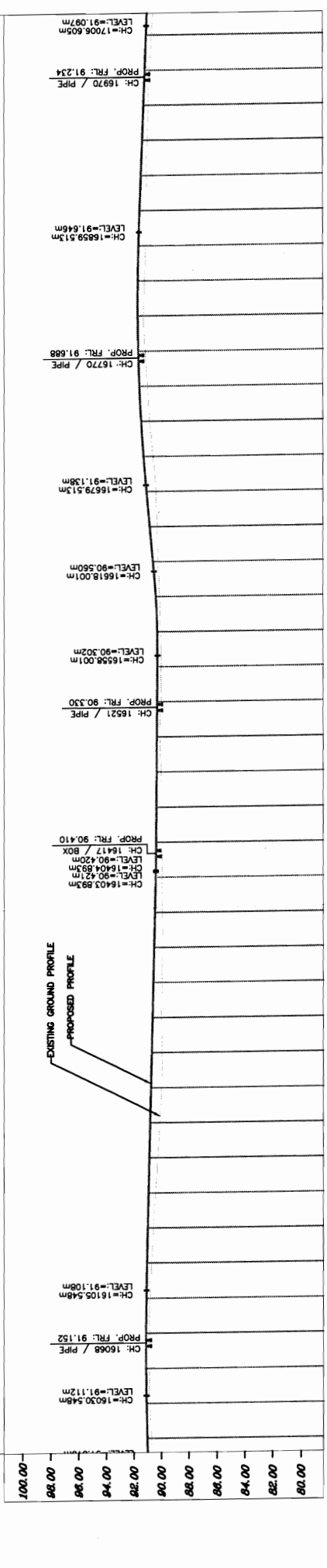








CURVE NO. 29	
HP	16+489.7
V	100 mtrph
R	8500m
Z	100.3818
Ls	100.00m
Lc	0.00m
Lt	247.00m
Ls	1.20m
Lc	2.5%
Lt	10.1%



DATUM = 76.00	
PROPOSED ROAD LEVEL (m)	90.703
EXISTING LEVEL (m)	91.215
HORIZONTAL ALIGNMENT	90.922
VERTICAL ALIGNMENT	91.022
VERTICAL CURVE	91.098
VERTICAL CURVE	91.128
VERTICAL CURVE	91.134
VERTICAL CURVE	91.226
VERTICAL CURVE	91.739
VERTICAL CURVE	91.186
VERTICAL CURVE	91.701
VERTICAL CURVE	91.029
VERTICAL CURVE	91.618
VERTICAL CURVE	90.871
VERTICAL CURVE	91.469
VERTICAL CURVE	90.613
VERTICAL CURVE	91.315
VERTICAL CURVE	90.401
VERTICAL CURVE	91.095
VERTICAL CURVE	90.304
VERTICAL CURVE	90.861
VERTICAL CURVE	90.244
VERTICAL CURVE	90.626
VERTICAL CURVE	90.138
VERTICAL CURVE	90.419
VERTICAL CURVE	90.063
VERTICAL CURVE	90.313
VERTICAL CURVE	90.030
VERTICAL CURVE	90.308
VERTICAL CURVE	90.046
VERTICAL CURVE	90.327
VERTICAL CURVE	90.134
VERTICAL CURVE	90.347
VERTICAL CURVE	90.040
VERTICAL CURVE	90.366
VERTICAL CURVE	90.003
VERTICAL CURVE	90.385
VERTICAL CURVE	90.998
VERTICAL CURVE	90.404
VERTICAL CURVE	90.963
VERTICAL CURVE	90.430
VERTICAL CURVE	90.937
VERTICAL CURVE	90.488
VERTICAL CURVE	90.925
VERTICAL CURVE	90.545
VERTICAL CURVE	90.969
VERTICAL CURVE	90.803
VERTICAL CURVE	90.013
VERTICAL CURVE	90.660
VERTICAL CURVE	90.966
VERTICAL CURVE	90.718
VERTICAL CURVE	90.011
VERTICAL CURVE	90.775
VERTICAL CURVE	90.117
VERTICAL CURVE	90.833
VERTICAL CURVE	90.269
VERTICAL CURVE	90.890
VERTICAL CURVE	90.440
VERTICAL CURVE	90.948
VERTICAL CURVE	90.588
VERTICAL CURVE	91.005
VERTICAL CURVE	90.722
VERTICAL CURVE	91.063
VERTICAL CURVE	90.839
VERTICAL CURVE	91.120
VERTICAL CURVE	90.895
VERTICAL CURVE	91.150
VERTICAL CURVE	90.905
VERTICAL CURVE	91.143
VERTICAL CURVE	90.846
VERTICAL CURVE	91.100
VERTICAL CURVE	90.729
VERTICAL CURVE	91.045

**WIDENING AND STRENGTHENING TO TWO LANE PLAN AND LONGITUDINAL SECTION**  
**BERHAMPUR TO BANGI Jn. (SH-17) KM 16/000 TO KM 17/000**

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

**CONSULTING ENGINEERS GROUP LTD.**  
 E-12, Major Colony, Malviya Nagar, Jaipur-17  
 Tel: +91-141-2520895, 2521869, 2520556  
 Fax: 2521348, e-mail: ceg@engineersindia.com

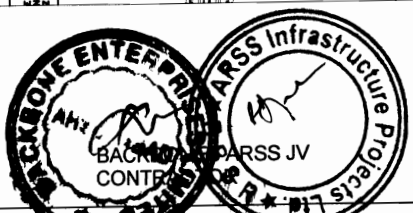
**LEGEND**

PROPOSED CENTERLINE	---
EXISTING CENTERLINE	---
PROPOSED ROAD BOUNDARY	---
EXISTING ROAD BOUNDARY	---
PROPOSED LAND MARK	---
EXISTING LAND MARK	---
PROPOSED WATER MARK	---
EXISTING WATER MARK	---
PROPOSED EARTH WORK	---
EXISTING EARTH WORK	---

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

**DATE:** 17/08/2017  
**SCALE:** HORIZONTAL: 1:5000, VERTICAL: 1:1000

**DESIGNER:** [Signature]  
**CHECKER:** [Signature]  
**APPROVED BY:** [Signature]



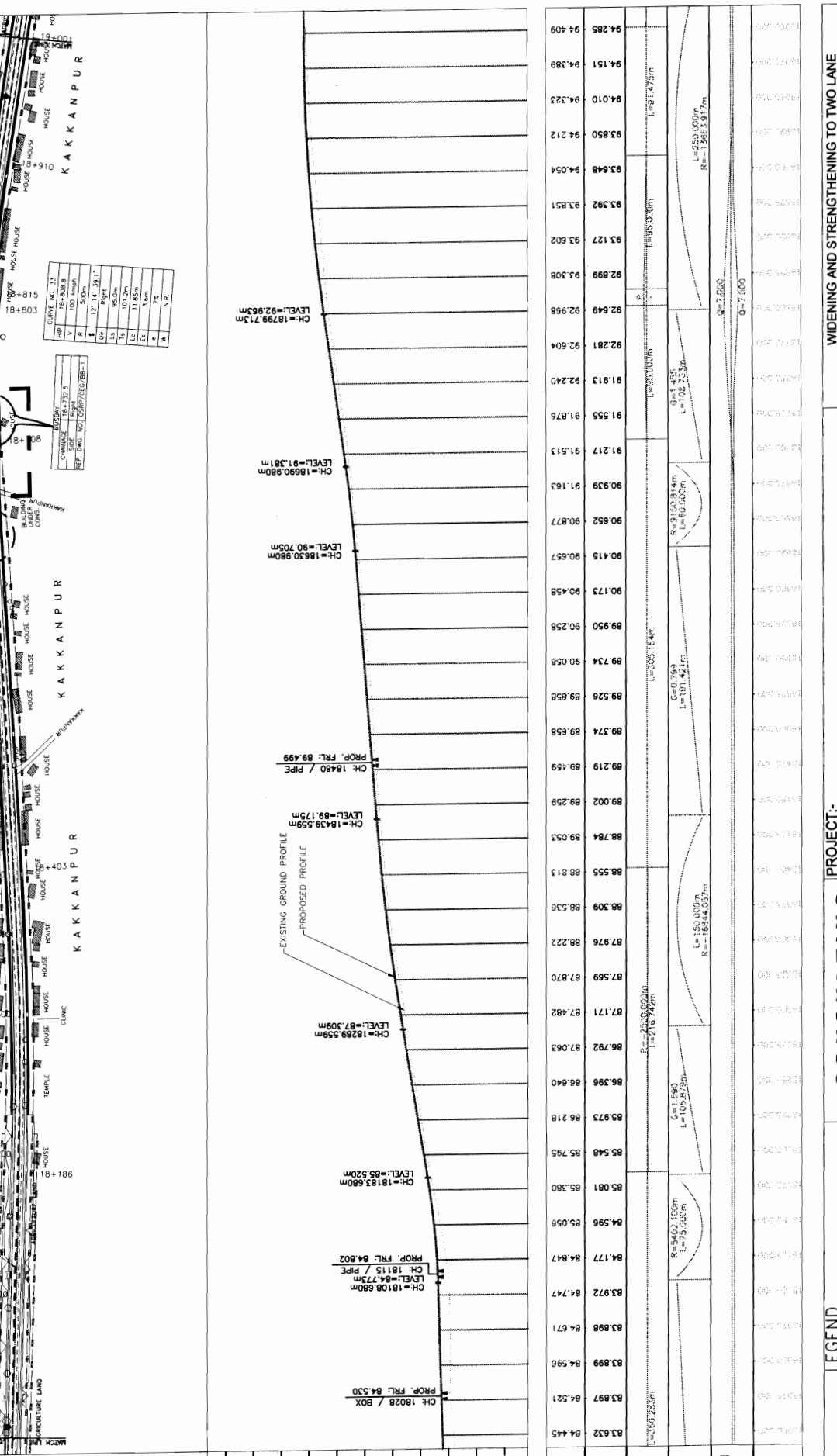


BERHAMPUR

BANGI JN.

CURVE NO.32	
HP	18+294.4
V	100 m/HP
R	7500m
K	3.98
L	1.50
L1	0.0m
L2	0.0m
L3	2.167m
L4	0.0m
L5	2.4m
L6	2.58
L7	0.0m
L8	0.0m
L9	0.0m
L10	0.0m
L11	0.0m
L12	0.0m
L13	0.0m
L14	0.0m
L15	0.0m
L16	0.0m
L17	0.0m
L18	0.0m
L19	0.0m
L20	0.0m
L21	0.0m
L22	0.0m
L23	0.0m
L24	0.0m
L25	0.0m
L26	0.0m
L27	0.0m
L28	0.0m
L29	0.0m
L30	0.0m
L31	0.0m
L32	0.0m
L33	0.0m
L34	0.0m
L35	0.0m
L36	0.0m
L37	0.0m
L38	0.0m
L39	0.0m
L40	0.0m
L41	0.0m
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L44	0.0m
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L46	0.0m
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L69	0.0m
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L77	0.0m
L78	0.0m
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L80	0.0m
L81	0.0m
L82	0.0m
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L85	0.0m
L86	0.0m
L87	0.0m
L88	0.0m
L89	0.0m
L90	0.0m
L91	0.0m
L92	0.0m
L93	0.0m
L94	0.0m
L95	0.0m
L96	0.0m
L97	0.0m
L98	0.0m
L99	0.0m
L100	0.0m

CURVE NO.33	
HP	18+804.8
V	100 m/HP
R	5000m
K	3.98
L	1.50
L1	0.0m
L2	0.0m
L3	0.0m
L4	0.0m
L5	0.0m
L6	0.0m
L7	0.0m
L8	0.0m
L9	0.0m
L10	0.0m
L11	0.0m
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L14	0.0m
L15	0.0m
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L91	0.0m
L92	0.0m
L93	0.0m
L94	0.0m
L95	0.0m
L96	0.0m
L97	0.0m
L98	0.0m
L99	0.0m
L100	0.0m



<p><b>LEGEND</b></p> <ul style="list-style-type: none"> <li>EXISTING CENTERLINE</li> <li>PROPOSED CENTERLINE</li> <li>EXISTING ROADWAY</li> <li>PROPOSED ROADWAY</li> <li>EXISTING SIDE BOUNDARY</li> <li>PROPOSED SIDE BOUNDARY</li> <li>PROPOSED EARTH WORK</li> <li>PROPOSED CUT/CLVERT</li> <li>PROPOSED DRAIN</li> <li>PROPOSED CHANNEL</li> <li>PROPOSED FENCE</li> <li>PROPOSED SIGN</li> <li>PROPOSED LIGHT</li> <li>PROPOSED TELEPHONE</li> <li>PROPOSED POWER</li> <li>PROPOSED WATER</li> <li>PROPOSED GAS</li> <li>PROPOSED OIL</li> <li>PROPOSED CABLE</li> <li>PROPOSED TELEVISION</li> <li>PROPOSED RADIO</li> <li>PROPOSED TELEPHONE</li> <li>PROPOSED POWER</li> <li>PROPOSED WATER</li> <li>PROPOSED GAS</li> <li>PROPOSED OIL</li> <li>PROPOSED CABLE</li> <li>PROPOSED TELEVISION</li> <li>PROPOSED RADIO</li> </ul>		<p><b>PROJECT:-</b></p> <p>WIDENING AND STRENGTHENING TO TWO LANE PLAN AND LONGITUDINAL SECTION BERHAMPUR TO BANGI JN. (SH-17) KM 18/000 TO KM 19/000</p> <p>PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE</p>	
<p><b>CONSULTING ENGINEERS GROUP LTD.</b></p> <p>E-12, Maji Colony, Malviya Nagar, Jaipur-17</p> <p>Tel: +91-141-2520899, 2521889, 2520556</p> <p>Fax: 2521348, e-mail: cegeg@rediffmail.com</p>		<p><b>SCALE</b></p> <p>HORIZONTAL: 1:1000</p> <p>VERTICAL: 1:200</p>	
<p><b>DATE</b> = 78.00</p> <p><b>PROPOSED ROAD LEVEL (m)</b></p> <p><b>EXISTING GROUND LEVEL (m)</b></p>		<p><b>HORIZONTAL ALIGNMENT</b></p> <p><b>VERTICAL PROFILE</b></p> <p><b>CROSSFALL</b></p> <p><b>DRAINAGE</b></p>	



BACKBONE - ARSS JV CONTRACTOR

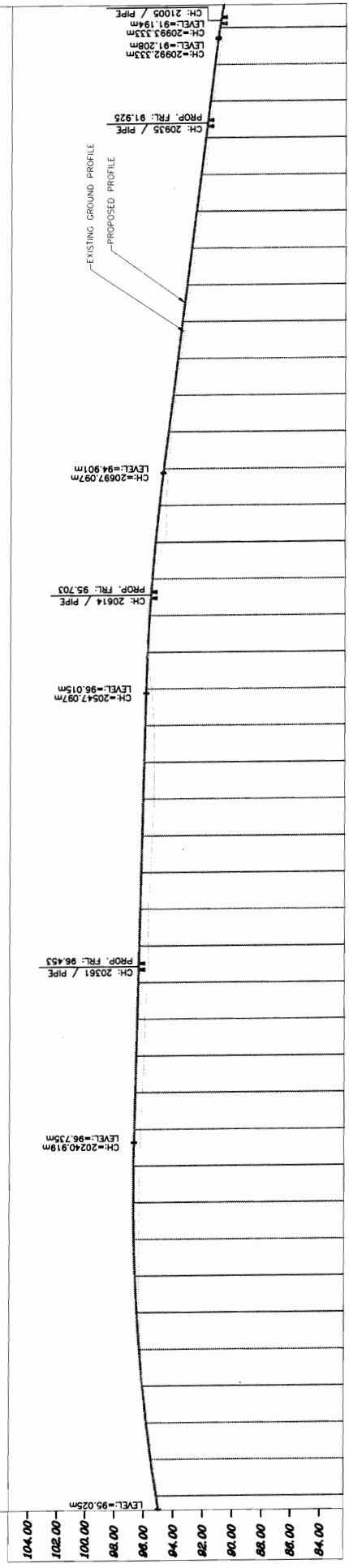
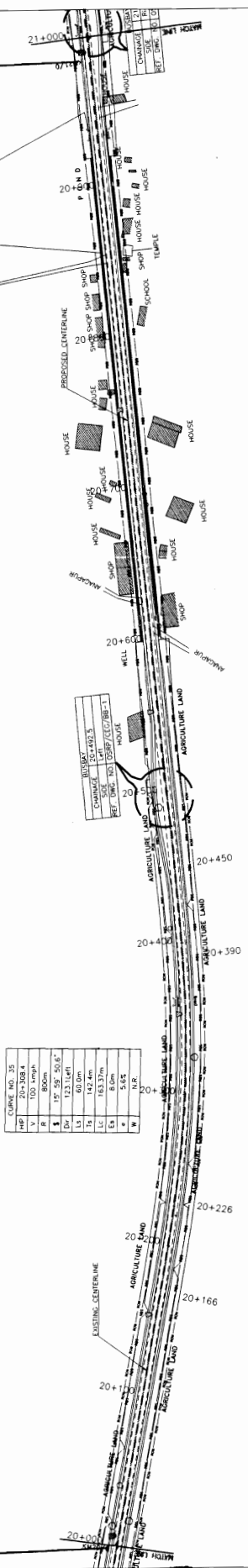


BERHAMPUR

BANGI JN.



CURVE NO. 35	
W	750.00m
R	800.00m
Δ	137.52° 56.6'
Ch	123.14m
Ls	142.4m
Lc	127.2m
Es	8.62m
M	5.85
N	N.R.



PROPOSED ROAD LEVEL (m)	EXISTING LEVEL (m)	HORIZONTAL ALIGNMENT	VERTICAL PROFILE	ELEVATION CROSSFALL	MANAGE
90.794	91.087				
91.151	91.425				
91.515	91.736				
91.824	92.050				
92.081	92.363				
92.370	92.676				
92.709	92.986				
93.048	93.301				
93.387	93.614				
93.737	93.927				
94.088	94.239				
94.346	94.552				
94.544	94.865				
94.670	95.161				
94.813	95.415				
95.648	95.627				
95.982	95.796				
95.936	95.923				
95.653	96.008				
95.484	96.067				
95.443	96.126				
95.464	96.185				
95.588	96.244				
95.680	96.302				
95.804	96.361				
95.820	96.420				
95.888	96.479				
96.024	96.537				
96.074	96.596				
96.176	96.655				
96.291	96.714				
96.342	96.763				
96.350	96.770				
96.343	96.730				
96.362	96.645				
96.328	96.514				
96.229	96.336				
96.037	96.113				
95.717	95.844				
95.397	95.529				
95.054	95.167				

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

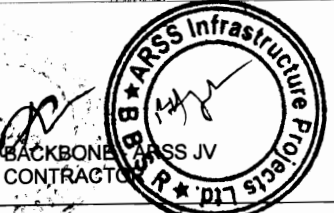
**WIDENING AND STRENGTHENING TO TWO LANE PLAN AND LONGITUDINAL SECTION**  
 BERHAMPUR TO BANGI JN. (SH-17) KM. 20/000 TO KM. 21/000

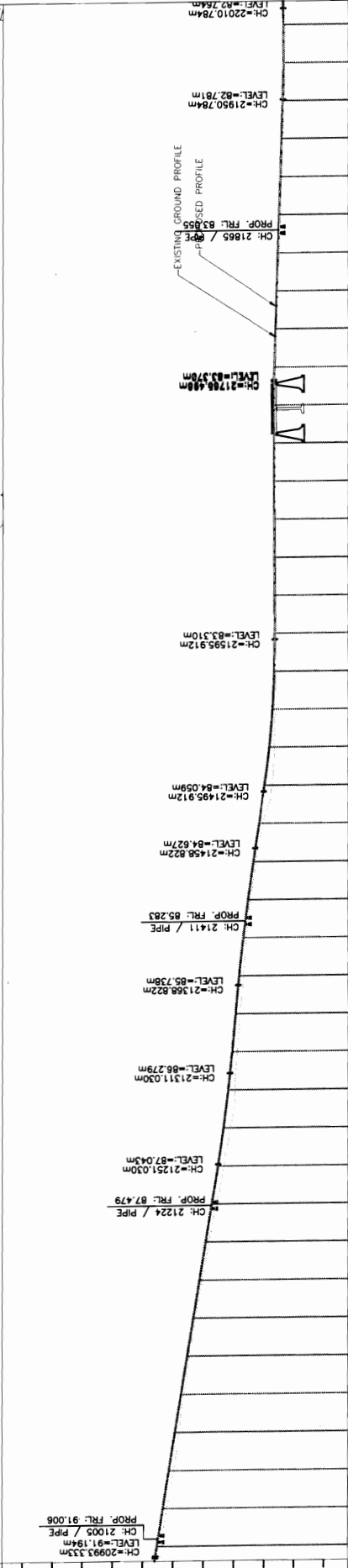
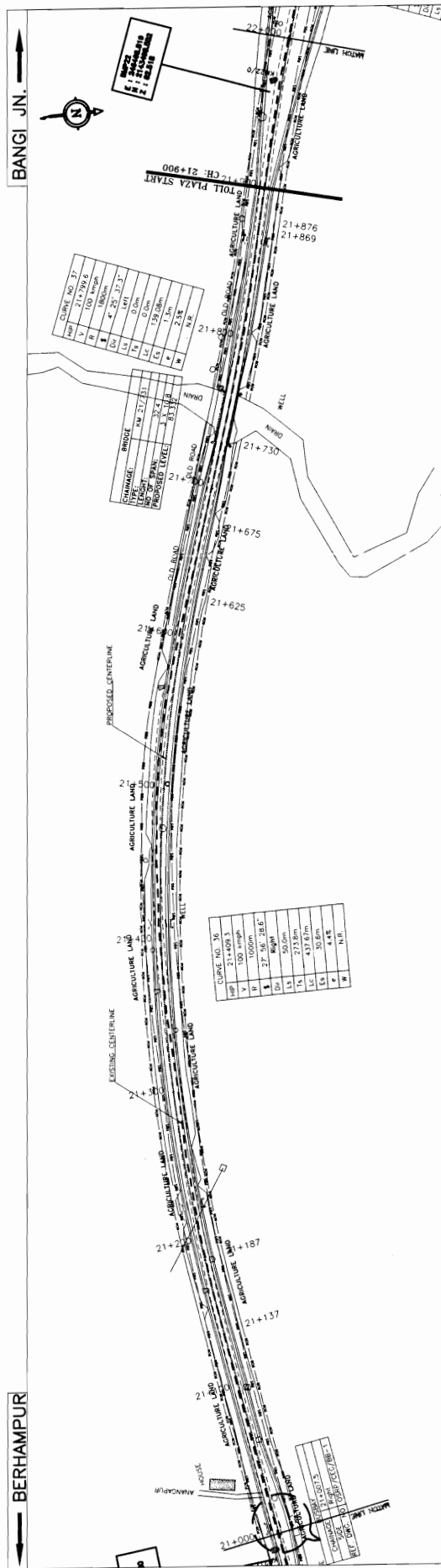
Scale: HORIZONTAL 1:1000, VERTICAL 1:100

**CONSULTING ENGINEERS GROUP LTD.**  
 E-12, Mohi Colony, Walviya Nagar, Jaipur-302015  
 Tel: +91-141-2520895, 2521893, 2520556  
 Fax: 2521346, e-mail: ceg@cegroup.com

**LEGEND**

- PROPOSED CENTERLINE
- EXISTING CENTERLINE
- PROPOSED ROAD
- EXISTING ROAD
- PROPOSED SIDEWALK
- EXISTING SIDEWALK
- PROPOSED SHOULDER
- EXISTING SHOULDER
- PROPOSED BOUNDARY
- EXISTING BOUNDARY
- PROPOSED PAVEMENT
- EXISTING PAVEMENT
- PROPOSED CURB
- EXISTING CURB
- PROPOSED DRAINAGE
- EXISTING DRAINAGE
- PROPOSED UTILITY
- EXISTING UTILITY
- PROPOSED SIGNAGE
- EXISTING SIGNAGE
- PROPOSED LIGHTING
- EXISTING LIGHTING
- PROPOSED FENCE
- EXISTING FENCE
- PROPOSED LANDSCAPING
- EXISTING LANDSCAPING
- PROPOSED MAINTENANCE
- EXISTING MAINTENANCE
- PROPOSED SAFETY
- EXISTING SAFETY
- PROPOSED SECURITY
- EXISTING SECURITY
- PROPOSED COMPLIANCE
- EXISTING COMPLIANCE
- PROPOSED DOCUMENTATION
- EXISTING DOCUMENTATION
- PROPOSED TRAINING
- EXISTING TRAINING
- PROPOSED MONITORING
- EXISTING MONITORING
- PROPOSED EVALUATION
- EXISTING EVALUATION
- PROPOSED REPORTING
- EXISTING REPORTING
- PROPOSED ARCHIVING
- EXISTING ARCHIVING
- PROPOSED PRESERVATION
- EXISTING PRESERVATION
- PROPOSED RESTORATION
- EXISTING RESTORATION
- PROPOSED REPAIR
- EXISTING REPAIR
- PROPOSED REPLACEMENT
- EXISTING REPLACEMENT
- PROPOSED RECONSTRUCTION
- EXISTING RECONSTRUCTION
- PROPOSED REDEMPTION
- EXISTING REDEMPTION
- PROPOSED REVERSAL
- EXISTING REVERSAL
- PROPOSED REVISION
- EXISTING REVISION
- PROPOSED REVIEW
- EXISTING REVIEW
- PROPOSED REUSE
- EXISTING REUSE
- PROPOSED REPAIR
- EXISTING REPAIR
- PROPOSED REPLACEMENT
- EXISTING REPLACEMENT
- PROPOSED RECONSTRUCTION
- EXISTING RECONSTRUCTION
- PROPOSED REDEMPTION
- EXISTING REDEMPTION
- PROPOSED REVERSAL
- EXISTING REVERSAL
- PROPOSED REVISION
- EXISTING REVISION
- PROPOSED REVIEW
- EXISTING REVIEW
- PROPOSED REUSE
- EXISTING REUSE





PROPOSED ROAD LEVEL (m)	EXISTING LEVEL (m)	HORIZONTAL ALIGNMENT	VERTICAL CURVE DATA
80.794	91.057		
90.415	90.684		
89.968	90.251		
89.624	89.879		
89.291	89.476		
88.947	89.073		
88.534	88.671		
88.089	88.268		
87.625	87.865		
87.180	87.462		
86.671	87.060		
86.228	86.659		
85.941	86.398		
85.789	86.148		
85.621	85.914		
85.373	85.679		
85.207	85.414		
84.931	85.108		
84.750	84.760		
84.379	84.379		
83.997	83.997		
83.315	83.679		
83.307	83.459		
83.268	83.337		
83.304	83.312		
83.310	83.321		
83.347	83.330		
83.323	83.339		
83.294	83.348		
83.313	83.357		
83.329	83.366		
83.327	83.343		
83.193	83.262		
83.134	83.183		
83.069	83.103		
82.994	83.023		
82.955	82.943		
82.813	82.853		
82.768	82.762		
82.738	82.732		
82.688	82.741		

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

**CONSULTING ENGINEERS GROUP LTD.**  
 E-12, Major Colony, Mohiyo Nagar, Jodipur-17  
 Tel: +91-141-2520899, 2521899, 2520556  
 Fax: 2521346, e-mail: ceg@cegroupindia.com

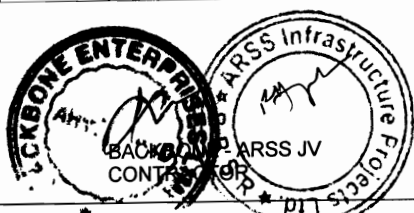
**LEGEND**

- PROPOSED CENTERLINE
- EXISTING CENTERLINE
- PROPOSED ROAD WIDTH
- EXISTING ROAD WIDTH
- PROPOSED SIDEWAYS
- EXISTING SIDEWAYS
- PROPOSED DRAINAGE
- EXISTING DRAINAGE
- PROPOSED ROAD PROFILE
- EXISTING ROAD PROFILE
- PROPOSED ROAD CROSS FALL
- EXISTING ROAD CROSS FALL
- PROPOSED ROAD MANAGE
- EXISTING ROAD MANAGE

**WIDENING AND STRENGTHENING TO TWO LANE PLAN AND LONGITUDINAL SECTION**  
 BERHAMPUR TO BANGI JN. (SH-17) KM. 21/000 TO KM. 22/000

DRG. NO. 22 DATE: 22/08/2012  
 SCALE: HORIZONTAL: 1:5000 VERTICAL: 1:1000

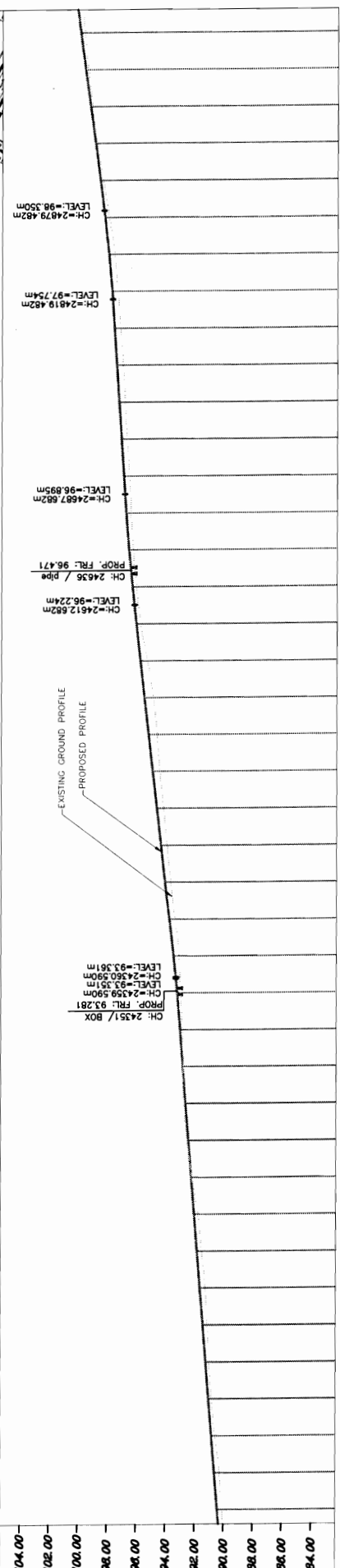
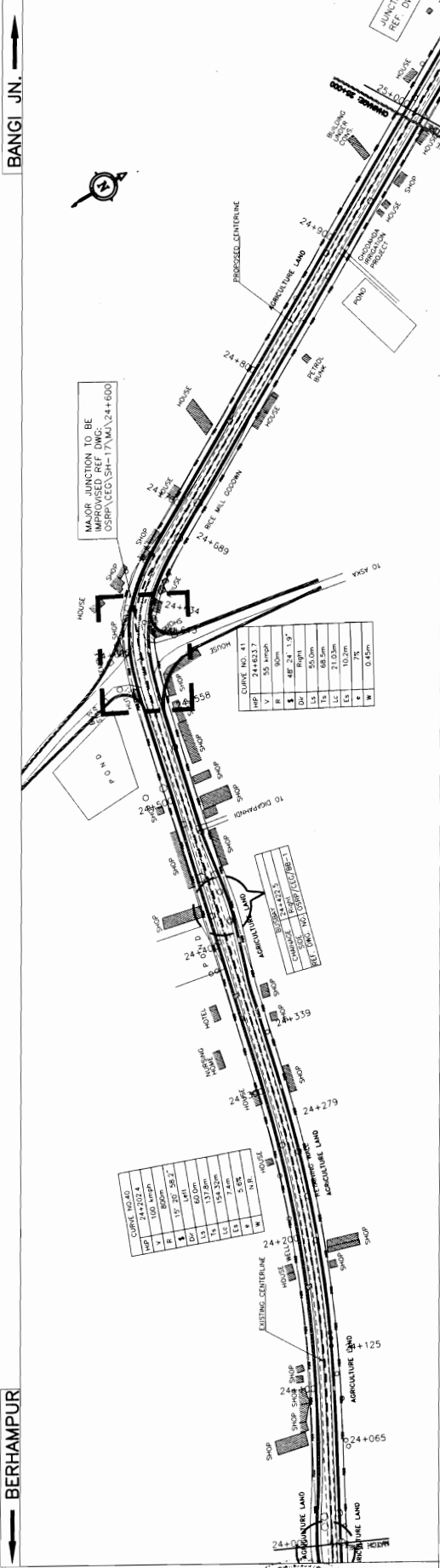
APPROVED BY: [Signature] DATE: 22/08/2012  
 CHECKED BY: [Signature] DATE: 22/08/2012  
 DRAWN BY: [Signature] DATE: 22/08/2012  
 R.R.D.K. S.G.











PROPOSED ROAD LEVEL (m)	EXISTING LEVEL (m)	HORIZONTAL ALIGNMENT	VERTICAL CURVE	ELEVATION
90.105	90.439			
90.280	90.642			
90.590	90.844			
90.831	91.046			
91.027	91.249			
91.125	91.451			
91.278	91.654			
91.530	91.856			
91.785	92.059			
92.201	92.261			
92.569	92.464			
92.811	92.666			
92.811	92.666			
92.880	92.868			
93.020	93.071			
93.147	93.273			
93.410	93.808			
93.699	94.092			
93.959	94.376			
94.204	94.660			
94.447	94.944			
94.650	95.228			
94.893	95.512			
95.300	95.796			
95.786	96.080			
96.055	96.359			
96.308	96.603			
96.466	96.807			
96.580	96.975			
96.733	97.138			
96.874	97.301			
97.017	97.464			
97.205	97.627			
97.403	97.792			
97.622	97.956			
97.865	98.291			
98.403	98.623			
98.829	98.956			
99.158	99.289			
99.444	99.622			
99.686	99.955			

**WIDENING AND STRENGTHENING TO TWO LANE PLAN AND LONGITUDINAL SECTION**

BERHAMPUR TO BANGI JN. (SH-17) KM 24/000 TO KM 25/000

SH. NO. 25 DATE REV. RO. SCALE HORIZONTAL VERTICAL

DESIGNED (A) DRAWN (B) CHECKED (C) APPROVED (D) S/G

PROJECT: **WIDENING AND STRENGTHENING TO TWO LANE PLAN AND LONGITUDINAL SECTION**

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

**CONSULTING ENGINEERS GROUP LTD.**  
E-12, May Colony, Mayapuri, New Delhi - 110028  
Tel: +91-11-2520899, 2521899, 2520556  
Fax: 2521348, e-mail: ceg@cegindia.com

**CEG**

**LEGEND**

PROPOSED CENTERLINE, PROPOSED CARBANK WAY, PROPOSED SIDEWAYS, EXISTING CARBANK WAY, EXISTING SIDEWAYS, PROPOSED LANE MARKING, PROPOSED LANE WIDTH, PROPOSED LANE CENTERLINE, PROPOSED LANE BOUNDARY, PROPOSED LANE MARKING, PROPOSED LANE WIDTH, PROPOSED LANE CENTERLINE, PROPOSED LANE BOUNDARY.

LENGTH OF SPINAL CURVE, BEGINNING OF SPINAL CURVE, END OF SPINAL CURVE, LENGTH OF CIRCULAR CURVE, RATE OF CURVE, SUPPLEMENTATION, BESSER SPED, RADIUS OF CURVE.

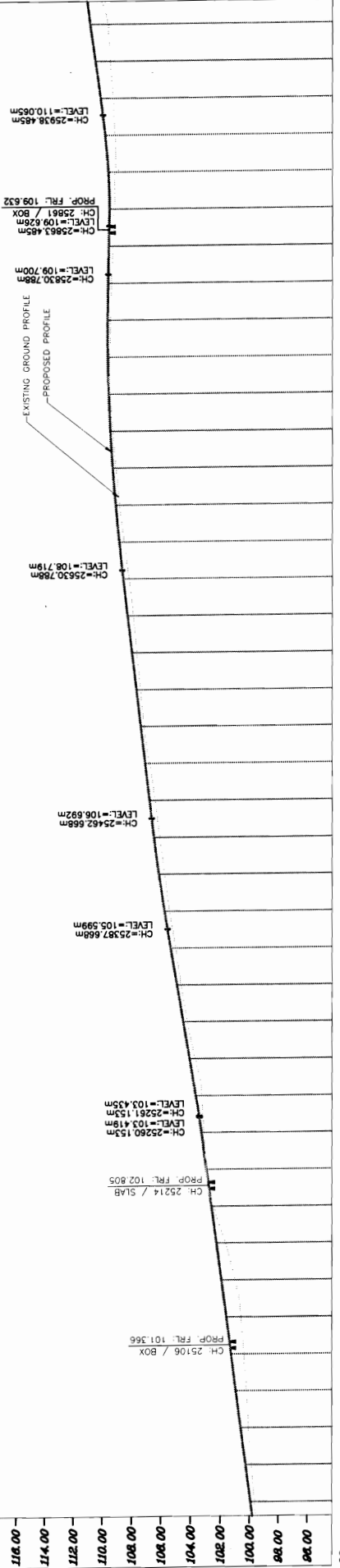
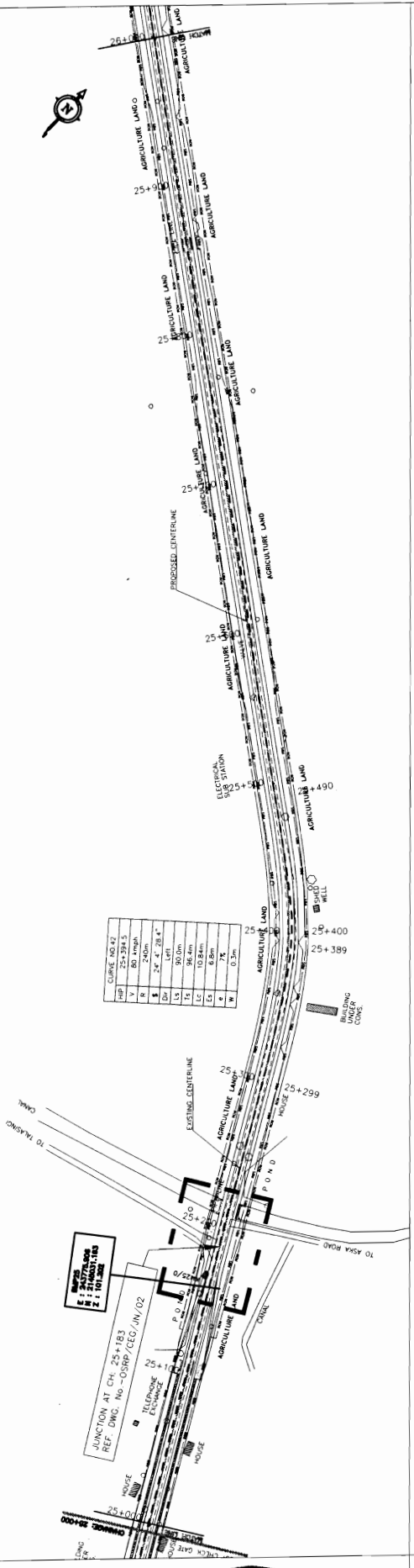
WATER, WELLS, TELEPHONE, POWER, GAS, CEMENT, SAND, GRAVEL, BRICK, CONCRETE, ASPHALT, BITUMEN, POLYMER, BITUMEN, POLYMER, BITUMEN, POLYMER.

PROPOSED LANE MARKING, PROPOSED LANE WIDTH, PROPOSED LANE CENTERLINE, PROPOSED LANE BOUNDARY.

K. K. BONE - ARSS JV  
CONTRACTOR

BANGI JN. →

← BERHAMPUR



PROPOSED ROAD LEVEL (m)	EXISTING LEVEL (m)	HORIZONTAL ALIGNMENT	VERTICAL CURVE DATA
99.855	99.855	CH-25106 / BOX	CH-25106 / BOX
99.898	99.898	CH-25106 / BOX	CH-25106 / BOX
100.081	100.081	CH-25106 / BOX	CH-25106 / BOX
100.217	100.217	CH-25106 / BOX	CH-25106 / BOX
100.398	100.398	CH-25106 / BOX	CH-25106 / BOX
100.609	100.609	CH-25106 / BOX	CH-25106 / BOX
101.012	101.012	CH-25106 / BOX	CH-25106 / BOX
101.676	101.676	CH-25106 / BOX	CH-25106 / BOX
102.480	102.480	CH-25106 / BOX	CH-25106 / BOX
102.952	102.952	CH-25106 / BOX	CH-25106 / BOX
103.126	103.126	CH-25106 / BOX	CH-25106 / BOX
103.261	103.261	CH-25106 / BOX	CH-25106 / BOX
103.707	103.707	CH-25106 / BOX	CH-25106 / BOX
104.225	104.225	CH-25106 / BOX	CH-25106 / BOX
104.665	104.665	CH-25106 / BOX	CH-25106 / BOX
105.055	105.055	CH-25106 / BOX	CH-25106 / BOX
105.461	105.461	CH-25106 / BOX	CH-25106 / BOX
105.795	105.795	CH-25106 / BOX	CH-25106 / BOX
106.130	106.130	CH-25106 / BOX	CH-25106 / BOX
106.441	106.441	CH-25106 / BOX	CH-25106 / BOX
106.839	106.839	CH-25106 / BOX	CH-25106 / BOX
107.205	107.205	CH-25106 / BOX	CH-25106 / BOX
107.461	107.461	CH-25106 / BOX	CH-25106 / BOX
107.708	107.708	CH-25106 / BOX	CH-25106 / BOX
108.348	108.348	CH-25106 / BOX	CH-25106 / BOX
108.252	108.252	CH-25106 / BOX	CH-25106 / BOX
108.599	108.599	CH-25106 / BOX	CH-25106 / BOX
108.895	108.895	CH-25106 / BOX	CH-25106 / BOX
109.182	109.182	CH-25106 / BOX	CH-25106 / BOX
109.382	109.382	CH-25106 / BOX	CH-25106 / BOX
109.538	109.538	CH-25106 / BOX	CH-25106 / BOX
109.648	109.648	CH-25106 / BOX	CH-25106 / BOX
109.657	109.657	CH-25106 / BOX	CH-25106 / BOX
109.712	109.712	CH-25106 / BOX	CH-25106 / BOX
109.735	109.735	CH-25106 / BOX	CH-25106 / BOX
109.714	109.714	CH-25106 / BOX	CH-25106 / BOX
109.590	109.590	CH-25106 / BOX	CH-25106 / BOX
109.470	109.470	CH-25106 / BOX	CH-25106 / BOX
109.231	109.231	CH-25106 / BOX	CH-25106 / BOX
108.688	108.688	CH-25106 / BOX	CH-25106 / BOX
108.221	108.221	CH-25106 / BOX	CH-25106 / BOX
107.574	107.574	CH-25106 / BOX	CH-25106 / BOX
106.724	106.724	CH-25106 / BOX	CH-25106 / BOX

**WIDENING AND STRENGTHENING TO TWO LANE PLAN AND LONGITUDINAL SECTION**  
**BERHAMPUR TO BANGI JN. (SH-17) KM 25/000 TO KM 26/000**

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

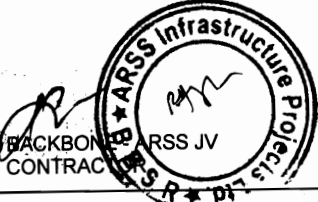
**PROJECT:**  
**CONSULTING ENGINEERS GROUP LTD.**  
 E-12, Moh. Colony, Mayapuri, New Delhi - 110 062  
 Tel: +91-11-2610899, 2521899, 2520556  
 Fax: 2521348, e-mail: ceg@cegroup.com

**LEGEND**

1	LINE DRAIN	14	LENGTH OF SPINAL CURVE
2	LINE TOWER	15	TANGENT LENGTH
3	LINE POLE	16	BEG/END OF CIRCULAR CURVE
4	LINE & POLE	17	LENGTH OF CIRCULAR CURVE
5	TELEPHONE LINE & POLE	18	END OF SPINAL CURVE
6	HOUSE/STRUCTURE	19	END OF CIRCULAR CURVE
7	HOUSE/STRUCTURE	20	SUPERELEVATION
8	HOUSE/STRUCTURE	21	DEGREE OF CURVE
9	HOUSE/STRUCTURE	22	RADIUS OF CURVE
10	HOUSE/STRUCTURE	23	HORIZONTAL INTERSECTION POINT
11	HOUSE/STRUCTURE	24	LOCATION MODEL

**SCALE**  
 HORIZONTAL: 1:2000  
 VERTICAL: 1:500

**APPROVED BY:** [Signature]  
**DATE:** 26/05/2017



BANGI JN.

BERHAMPUR



CH	26131A	BOX	LEVEL=115.316m
PROP. FRL	115.299		

CH	2612	BOX	LEVEL=116.658m
PROP. FRL	116.440		

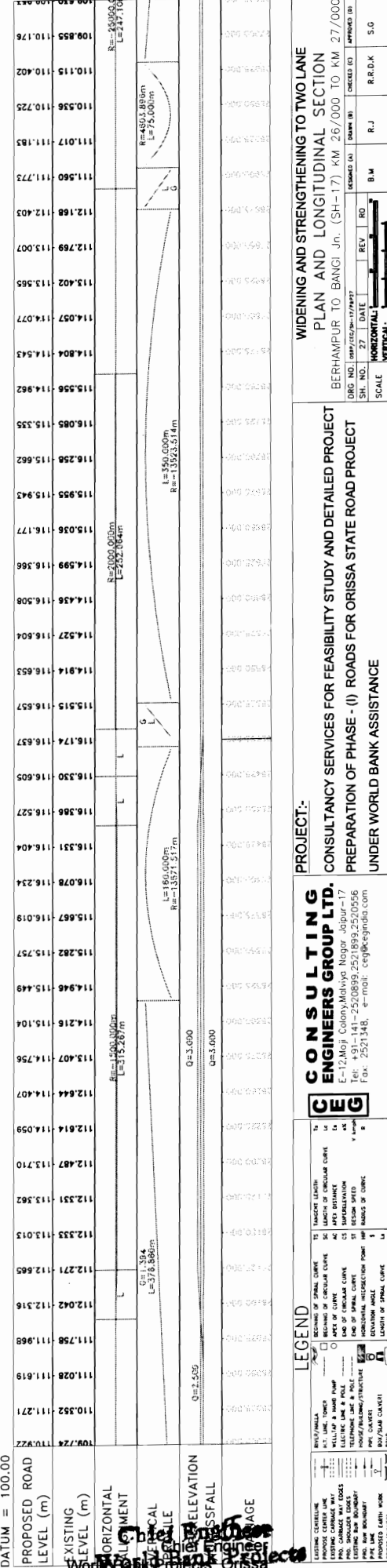
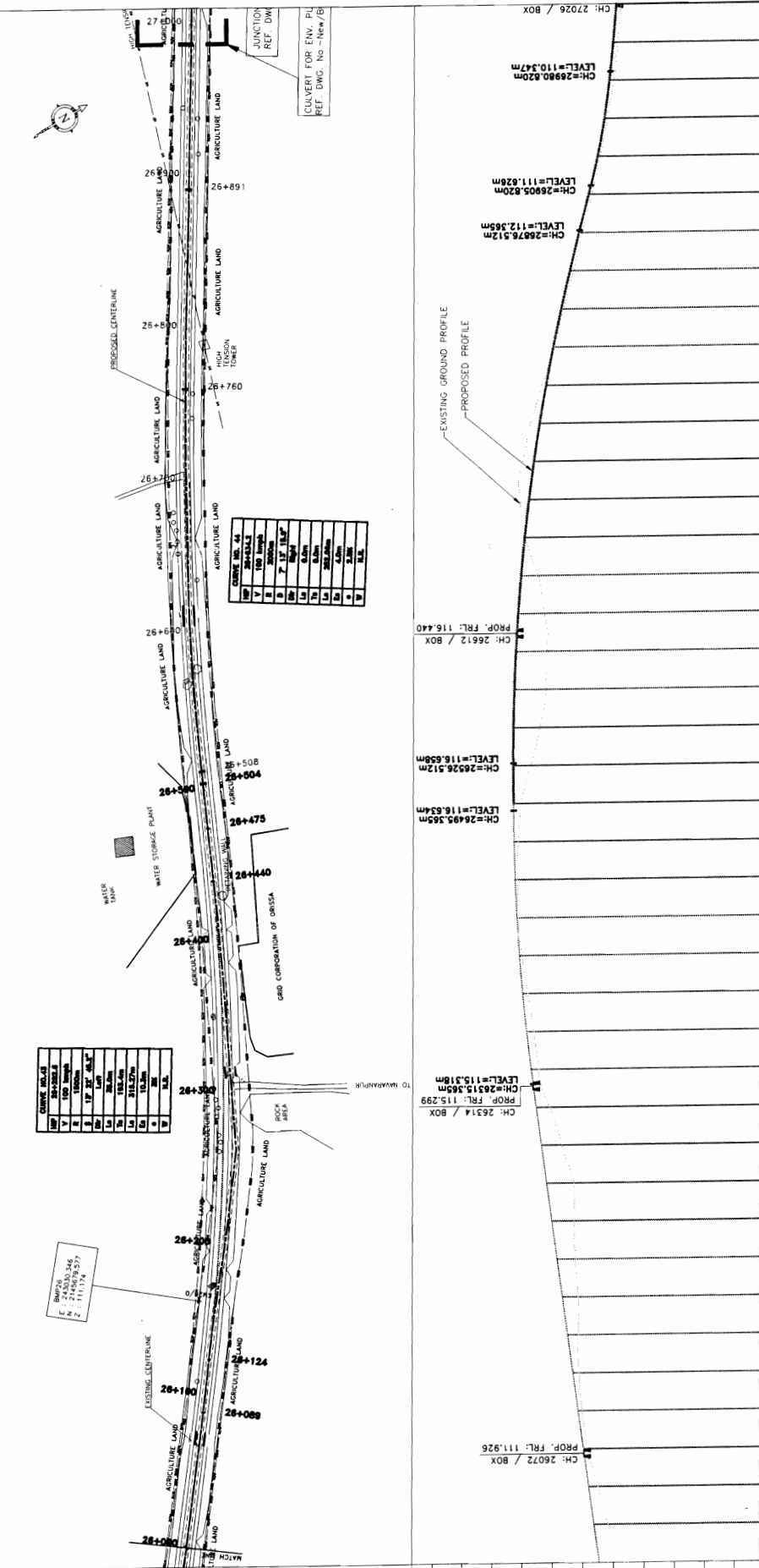
CH	2631A	BOX	LEVEL=115.316m
PROP. FRL	115.299		

CH	2612	BOX	LEVEL=116.658m
PROP. FRL	116.440		

CH	26272	BOX	LEVEL=111.926
PROP. FRL	111.926		

CH	26905	BOX	LEVEL=111.826m
PROP. FRL	111.826m		

CH	26976	BOX	LEVEL=110.347m
PROP. FRL	110.347m		



**WIDENING AND STRENGTHENING TO TWO LANE PLAN AND LONGITUDINAL SECTION**  
 BERHAMPUR TO BANGI Jn. (SH-17) KM 26,000 TO KM 27,000

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

**CONSULTING ENGINEERS GROUP LTD.**  
 E-12, 6th Cross, Malviya Nagar, Delhi-110 047  
 Tel: +91-11-44-250899, 2521899, 2520556  
 Fax: 2521348, e-mail: ceeg@ceegindia.com

**LEGEND**

1	EXISTING CENTER LINE	14	REBOUND OF SPINAL CURVE
2	PROPOSED CENTER LINE	15	REBOUND OF CIRCULAR CURVE
3	PROPOSED CENTER LINE	16	REBOUND OF SPINAL CURVE
4	PROPOSED CENTER LINE	17	REBOUND OF CIRCULAR CURVE
5	PROPOSED CENTER LINE	18	REBOUND OF SPINAL CURVE
6	PROPOSED CENTER LINE	19	REBOUND OF CIRCULAR CURVE
7	PROPOSED CENTER LINE	20	REBOUND OF SPINAL CURVE
8	PROPOSED CENTER LINE	21	REBOUND OF CIRCULAR CURVE
9	PROPOSED CENTER LINE	22	REBOUND OF SPINAL CURVE
10	PROPOSED CENTER LINE	23	REBOUND OF CIRCULAR CURVE
11	PROPOSED CENTER LINE	24	REBOUND OF SPINAL CURVE
12	PROPOSED CENTER LINE	25	REBOUND OF CIRCULAR CURVE
13	PROPOSED CENTER LINE	26	REBOUND OF SPINAL CURVE
14	PROPOSED CENTER LINE	27	REBOUND OF CIRCULAR CURVE
15	PROPOSED CENTER LINE	28	REBOUND OF SPINAL CURVE
16	PROPOSED CENTER LINE	29	REBOUND OF CIRCULAR CURVE
17	PROPOSED CENTER LINE	30	REBOUND OF SPINAL CURVE
18	PROPOSED CENTER LINE	31	REBOUND OF CIRCULAR CURVE
19	PROPOSED CENTER LINE	32	REBOUND OF SPINAL CURVE
20	PROPOSED CENTER LINE	33	REBOUND OF CIRCULAR CURVE
21	PROPOSED CENTER LINE	34	REBOUND OF SPINAL CURVE
22	PROPOSED CENTER LINE	35	REBOUND OF CIRCULAR CURVE
23	PROPOSED CENTER LINE	36	REBOUND OF SPINAL CURVE
24	PROPOSED CENTER LINE	37	REBOUND OF CIRCULAR CURVE
25	PROPOSED CENTER LINE	38	REBOUND OF SPINAL CURVE
26	PROPOSED CENTER LINE	39	REBOUND OF CIRCULAR CURVE
27	PROPOSED CENTER LINE	40	REBOUND OF SPINAL CURVE
28	PROPOSED CENTER LINE	41	REBOUND OF CIRCULAR CURVE
29	PROPOSED CENTER LINE	42	REBOUND OF SPINAL CURVE
30	PROPOSED CENTER LINE	43	REBOUND OF CIRCULAR CURVE
31	PROPOSED CENTER LINE	44	REBOUND OF SPINAL CURVE
32	PROPOSED CENTER LINE	45	REBOUND OF CIRCULAR CURVE
33	PROPOSED CENTER LINE	46	REBOUND OF SPINAL CURVE
34	PROPOSED CENTER LINE	47	REBOUND OF CIRCULAR CURVE
35	PROPOSED CENTER LINE	48	REBOUND OF SPINAL CURVE
36	PROPOSED CENTER LINE	49	REBOUND OF CIRCULAR CURVE
37	PROPOSED CENTER LINE	50	REBOUND OF SPINAL CURVE
38	PROPOSED CENTER LINE	51	REBOUND OF CIRCULAR CURVE
39	PROPOSED CENTER LINE	52	REBOUND OF SPINAL CURVE
40	PROPOSED CENTER LINE	53	REBOUND OF CIRCULAR CURVE
41	PROPOSED CENTER LINE	54	REBOUND OF SPINAL CURVE
42	PROPOSED CENTER LINE	55	REBOUND OF CIRCULAR CURVE
43	PROPOSED CENTER LINE	56	REBOUND OF SPINAL CURVE
44	PROPOSED CENTER LINE	57	REBOUND OF CIRCULAR CURVE
45	PROPOSED CENTER LINE	58	REBOUND OF SPINAL CURVE
46	PROPOSED CENTER LINE	59	REBOUND OF CIRCULAR CURVE
47	PROPOSED CENTER LINE	60	REBOUND OF SPINAL CURVE
48	PROPOSED CENTER LINE	61	REBOUND OF CIRCULAR CURVE
49	PROPOSED CENTER LINE	62	REBOUND OF SPINAL CURVE
50	PROPOSED CENTER LINE	63	REBOUND OF CIRCULAR CURVE
51	PROPOSED CENTER LINE	64	REBOUND OF SPINAL CURVE
52	PROPOSED CENTER LINE	65	REBOUND OF CIRCULAR CURVE
53	PROPOSED CENTER LINE	66	REBOUND OF SPINAL CURVE
54	PROPOSED CENTER LINE	67	REBOUND OF CIRCULAR CURVE
55	PROPOSED CENTER LINE	68	REBOUND OF SPINAL CURVE
56	PROPOSED CENTER LINE	69	REBOUND OF CIRCULAR CURVE
57	PROPOSED CENTER LINE	70	REBOUND OF SPINAL CURVE
58	PROPOSED CENTER LINE	71	REBOUND OF CIRCULAR CURVE
59	PROPOSED CENTER LINE	72	REBOUND OF SPINAL CURVE
60	PROPOSED CENTER LINE	73	REBOUND OF CIRCULAR CURVE
61	PROPOSED CENTER LINE	74	REBOUND OF SPINAL CURVE
62	PROPOSED CENTER LINE	75	REBOUND OF CIRCULAR CURVE
63	PROPOSED CENTER LINE	76	REBOUND OF SPINAL CURVE
64	PROPOSED CENTER LINE	77	REBOUND OF CIRCULAR CURVE
65	PROPOSED CENTER LINE	78	REBOUND OF SPINAL CURVE
66	PROPOSED CENTER LINE	79	REBOUND OF CIRCULAR CURVE
67	PROPOSED CENTER LINE	80	REBOUND OF SPINAL CURVE
68	PROPOSED CENTER LINE	81	REBOUND OF CIRCULAR CURVE
69	PROPOSED CENTER LINE	82	REBOUND OF SPINAL CURVE
70	PROPOSED CENTER LINE	83	REBOUND OF CIRCULAR CURVE
71	PROPOSED CENTER LINE	84	REBOUND OF SPINAL CURVE
72	PROPOSED CENTER LINE	85	REBOUND OF CIRCULAR CURVE
73	PROPOSED CENTER LINE	86	REBOUND OF SPINAL CURVE
74	PROPOSED CENTER LINE	87	REBOUND OF CIRCULAR CURVE
75	PROPOSED CENTER LINE	88	REBOUND OF SPINAL CURVE
76	PROPOSED CENTER LINE	89	REBOUND OF CIRCULAR CURVE
77	PROPOSED CENTER LINE	90	REBOUND OF SPINAL CURVE
78	PROPOSED CENTER LINE	91	REBOUND OF CIRCULAR CURVE
79	PROPOSED CENTER LINE	92	REBOUND OF SPINAL CURVE
80	PROPOSED CENTER LINE	93	REBOUND OF CIRCULAR CURVE
81	PROPOSED CENTER LINE	94	REBOUND OF SPINAL CURVE
82	PROPOSED CENTER LINE	95	REBOUND OF CIRCULAR CURVE
83	PROPOSED CENTER LINE	96	REBOUND OF SPINAL CURVE
84	PROPOSED CENTER LINE	97	REBOUND OF CIRCULAR CURVE
85	PROPOSED CENTER LINE	98	REBOUND OF SPINAL CURVE
86	PROPOSED CENTER LINE	99	REBOUND OF CIRCULAR CURVE
87	PROPOSED CENTER LINE	100	REBOUND OF SPINAL CURVE

BANGI JN. →

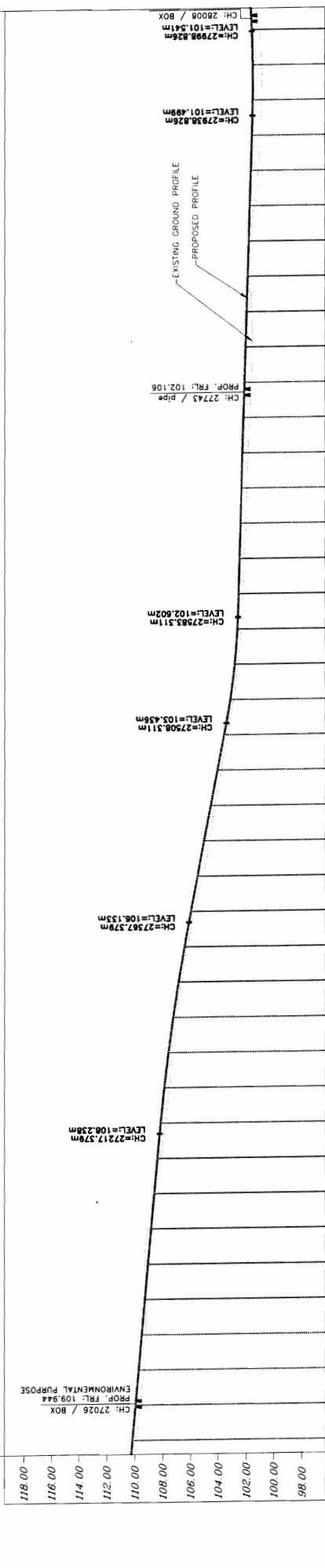
← BERHAMPUR

CURVE NO. 27							
HP	27+451.8	100	100	100	100	100	100
V	100	100	100	100	100	100	100
A	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F	0.00	0.00	0.00	0.00	0.00	0.00	0.00
G	0.00	0.00	0.00	0.00	0.00	0.00	0.00
H	0.00	0.00	0.00	0.00	0.00	0.00	0.00
I	0.00	0.00	0.00	0.00	0.00	0.00	0.00
J	0.00	0.00	0.00	0.00	0.00	0.00	0.00
K	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L	0.00	0.00	0.00	0.00	0.00	0.00	0.00
M	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N	0.00	0.00	0.00	0.00	0.00	0.00	0.00

CURVE NO. 28							
HP	27+447.7	100	100	100	100	100	100
V	100	100	100	100	100	100	100
A	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F	0.00	0.00	0.00	0.00	0.00	0.00	0.00
G	0.00	0.00	0.00	0.00	0.00	0.00	0.00
H	0.00	0.00	0.00	0.00	0.00	0.00	0.00
I	0.00	0.00	0.00	0.00	0.00	0.00	0.00
J	0.00	0.00	0.00	0.00	0.00	0.00	0.00
K	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L	0.00	0.00	0.00	0.00	0.00	0.00	0.00
M	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N	0.00	0.00	0.00	0.00	0.00	0.00	0.00

CURVE NO. 29							
HP	27+447.7	100	100	100	100	100	100
V	100	100	100	100	100	100	100
A	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F	0.00	0.00	0.00	0.00	0.00	0.00	0.00
G	0.00	0.00	0.00	0.00	0.00	0.00	0.00
H	0.00	0.00	0.00	0.00	0.00	0.00	0.00
I	0.00	0.00	0.00	0.00	0.00	0.00	0.00
J	0.00	0.00	0.00	0.00	0.00	0.00	0.00
K	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L	0.00	0.00	0.00	0.00	0.00	0.00	0.00
M	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N	0.00	0.00	0.00	0.00	0.00	0.00	0.00

CURVE NO. 30							
HP	27+447.7	100	100	100	100	100	100
V	100	100	100	100	100	100	100
A	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F	0.00	0.00	0.00	0.00	0.00	0.00	0.00
G	0.00	0.00	0.00	0.00	0.00	0.00	0.00
H	0.00	0.00	0.00	0.00	0.00	0.00	0.00
I	0.00	0.00	0.00	0.00	0.00	0.00	0.00
J	0.00	0.00	0.00	0.00	0.00	0.00	0.00
K	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L	0.00	0.00	0.00	0.00	0.00	0.00	0.00
M	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N	0.00	0.00	0.00	0.00	0.00	0.00	0.00



118+00	116+00	114+00	112+00	110+00	108+00	106+00	104+00	102+00	100+00	98+00	DATUM = 96.00																																																																																																																																																																																																																						
108.855	109.955	109.730	109.507	109.284	109.061	108.836	108.615	108.393	108.166	107.947	107.720	107.498	107.274	107.051	106.828	106.605	106.382	106.159	105.936	105.713	105.490	105.267	105.044	104.821	104.598	104.375	104.152	103.929	103.706	103.483	103.260	103.037	102.814	102.591	102.368	102.145	101.922	101.699	101.476	101.253	101.030	100.807	100.584	100.361	100.138	99.915	99.692	99.469	99.246	99.023	98.800	98.577	98.354	98.131	97.908	97.685	97.462	97.239	97.016	96.793	96.570	96.347	96.124	95.901	95.678	95.455	95.232	95.009	94.786	94.563	94.340	94.117	93.894	93.671	93.448	93.225	93.002	92.779	92.556	92.333	92.110	91.887	91.664	91.441	91.218	90.995	90.772	90.549	90.326	90.103	89.880	89.657	89.434	89.211	88.988	88.765	88.542	88.319	88.096	87.873	87.650	87.427	87.204	86.981	86.758	86.535	86.312	86.089	85.866	85.643	85.420	85.197	84.974	84.751	84.528	84.305	84.082	83.859	83.636	83.413	83.190	82.967	82.744	82.521	82.298	82.075	81.852	81.629	81.406	81.183	80.960	80.737	80.514	80.291	80.068	79.845	79.622	79.399	79.176	78.953	78.730	78.507	78.284	78.061	77.838	77.615	77.392	77.169	76.946	76.723	76.500	76.277	76.054	75.831	75.608	75.385	75.162	74.939	74.716	74.493	74.270	74.047	73.824	73.601	73.378	73.155	72.932	72.709	72.486	72.263	72.040	71.817	71.594	71.371	71.148	70.925	70.702	70.479	70.256	70.033	69.810	69.587	69.364	69.141	68.918	68.695	68.472	68.249	68.026	67.803	67.580	67.357	67.134	66.911	66.688	66.465	66.242	66.019	65.796	65.573	65.350	65.127	64.904	64.681	64.458	64.235	64.012	63.789	63.566	63.343	63.120	62.897	62.674	62.451	62.228	62.005	61.782	61.559	61.336	61.113	60.890	60.667	60.444	60.221	60.000

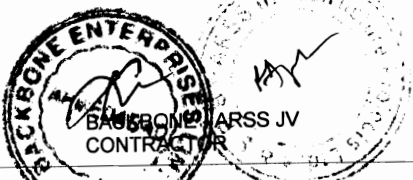
**CONSULTING ENGINEERS GROUP LTD.**  
 E-12, Mid. Colony Market, Nagar, Bhubaneswar-75  
 Tel: +91-141-2520899/2520899/2520556  
 Fax: 2521348, e-mail: ceeg@cegroup.com

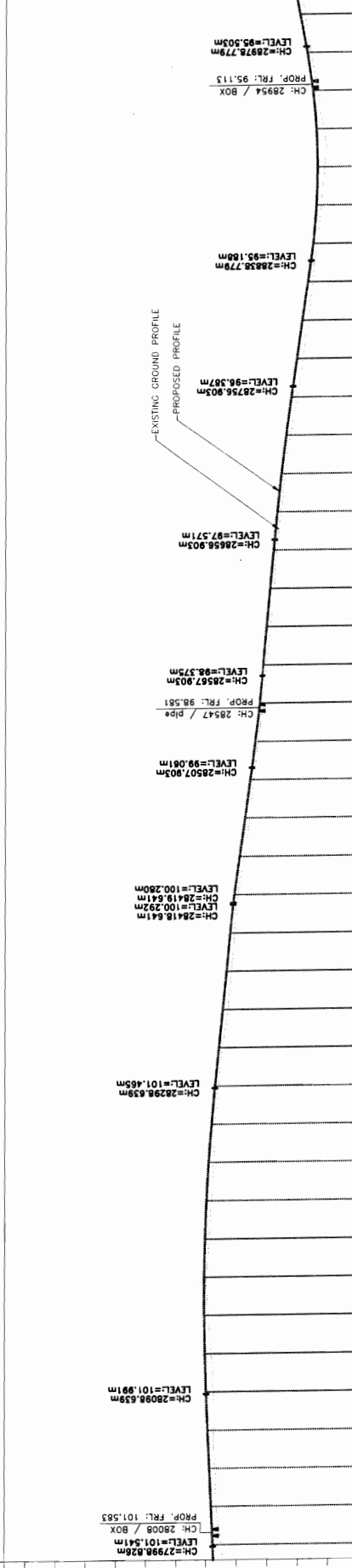
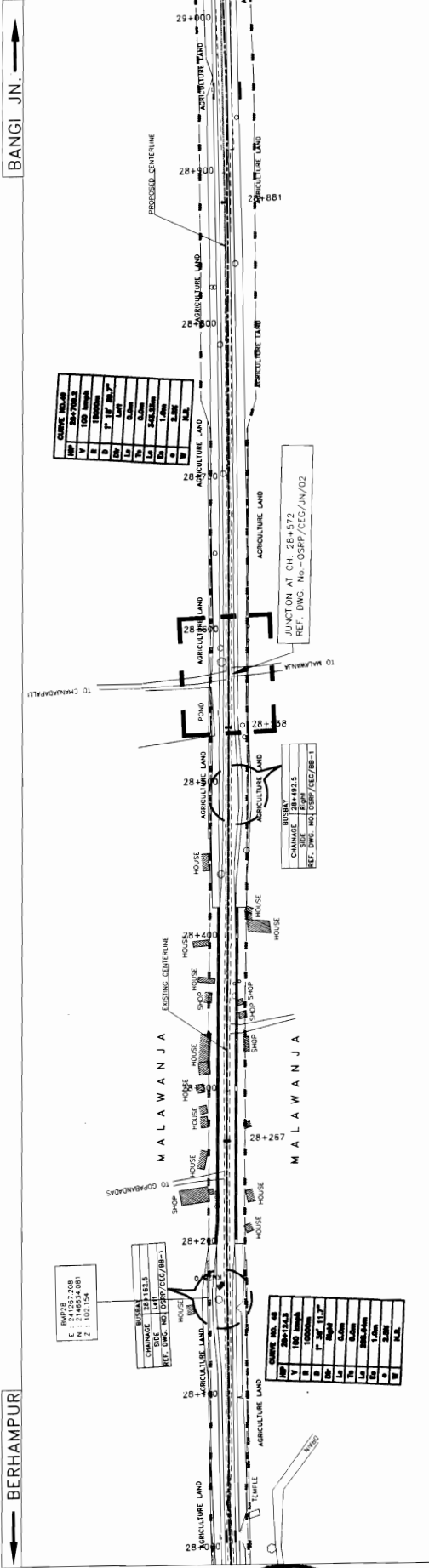
**PROJECT:-**  
 WIDENING AND STRENGTHENING TO TWO LANE  
 PLAN AND LONGITUDINAL SECTION  
 BERHAMPUR TO BANGI JN. (SH-17) KM 27/000 TO KM 28/000  
 PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT  
 UNDER WORLD BANK ASSISTANCE

**LEGEND**

1	EXISTING CENTERLINE	11	INVERT/PAVEMENT	21	VERTICAL CURVE
2	PROPOSED CENTERLINE	12	WORKING OF SPINAL CURVE	22	SPINAL CURVE
3	PROPOSED RIGHT OF WAY	13	WORKING OF CIRCULAR CURVE	23	INTERSECTION POINT
4	PROPOSED LEFT OF WAY	14	WORKING OF PARABOLIC CURVE	24	DEVIATION WHOLE
5	PROPOSED ROAD	15	MAXIMUM LENGTH	25	LENGTH OF SPINAL CURVE
6	PROPOSED GRADE	16	LENGTH OF CIRCULAR CURVE	26	LENGTH OF CIRCULAR CURVE
7	PROPOSED ELEVATION	17	MINIMUM LENGTH	27	LENGTH OF PARABOLIC CURVE
8	PROPOSED RELEVATION	18	LENGTH OF PARABOLIC CURVE	28	LENGTH OF SPINAL CURVE
9	PROPOSED FALL	19	LENGTH OF SPINAL CURVE	29	DEVIATION WHOLE
10	PROPOSED SHALIMMENT	20	LENGTH OF SPINAL CURVE	30	LENGTH OF SPINAL CURVE

Scale: HORIZONTAL: 1:1000, VERTICAL: 1:100  
 Date: 28/08/2017, Rev: 01  
 Checked by: R.J., R.S.D.K., S.C.





PROPOSED ROAD LEVEL (m)	EXISTING LEVEL (m)	HORIZONTAL ALIGNMENT	VERTICAL CURVE DATA
95.909	95.771		R=4143.362m L=140.000m
95.432	95.177		R=81.875m L=81.875m G=-1.164
95.052	94.745		R=89.020m L=89.020m G=-0.804
94.822	94.337		R=60.000m L=60.000m
94.743	94.743		R=188.742m L=188.742m G=1.352
94.816	94.504		R=1500.000m L=313.227m
95.039	94.792		R=150.000m L=150.000m G=-0.977
95.399	95.079		
95.756	95.377		
96.122	95.721		
96.487	96.097		
96.825	96.527		
97.129	96.880		
97.398	97.192		
97.633	97.423		
97.859	97.602		
98.085	97.812		
98.311	98.086		
98.549	98.368		
98.836	98.656		
99.170	98.950		
99.515	99.216		
99.861	99.582		
100.206	99.983		
100.474	100.184		
100.716	100.392		
100.963	100.604		
101.207	100.866		
101.451	101.236		
101.676	101.427		
101.856	101.536		
101.991	101.656		
102.081	101.796		
102.127	101.978		
102.129	101.846		
102.085	101.662		
101.997	101.523		
101.885	101.518		
101.772	101.404		
101.659	101.314		
101.547	101.314		

**PROJECT:**  
WIDENING AND STRENGTHENING TO TWO LANE  
PLAN AND LONGITUDINAL SECTION  
BERHAMPUR TO BANGI Jn. (SH-17) KM 28/000 TO KM 29/000  
PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT  
UNDER WORLD BANK ASSISTANCE

**CONSULTING ENGINEERS GROUP LTD.**  
E-12, M-2, Colony, Malviya Nagar, Jaipur-302017  
Tel: 0141-2520896, 2521899, 2520556  
Fax: 2521348, e-mail: ceg@cegroupia.com

**LEGEND**

1	EXISTING CENTERLINE	15	TANGENT LENGTH
2	PROPOSED CENTER LINE	16	LENGTH OF SPINAL CURVE
3	PROPOSED CENTER LINE	17	BEGINNING OF SPINAL CURVE
4	PROPOSED CENTER LINE	18	END OF SPINAL CURVE
5	PROPOSED CENTER LINE	19	LENGTH OF SPINAL CURVE
6	PROPOSED CENTER LINE	20	LENGTH OF SPINAL CURVE
7	PROPOSED CENTER LINE	21	LENGTH OF SPINAL CURVE
8	PROPOSED CENTER LINE	22	LENGTH OF SPINAL CURVE
9	PROPOSED CENTER LINE	23	LENGTH OF SPINAL CURVE
10	PROPOSED CENTER LINE	24	LENGTH OF SPINAL CURVE
11	PROPOSED CENTER LINE	25	LENGTH OF SPINAL CURVE
12	PROPOSED CENTER LINE	26	LENGTH OF SPINAL CURVE
13	PROPOSED CENTER LINE	27	LENGTH OF SPINAL CURVE
14	PROPOSED CENTER LINE	28	LENGTH OF SPINAL CURVE

BERHAMPUR ←

BANGI JN. →

BACKHOME ENTERPRISES  
CONSULTANTS  
2007/2008  
E: 21465542081  
F: 1021154

MURRAY  
CHANGE 28+82.5  
DATE 12/02/2007  
REF. DWG. NO. 102/07/BB-1

MURRAY  
CHANGE 28+82.5  
DATE 12/02/2007  
REF. DWG. NO. 102/07/BB-1

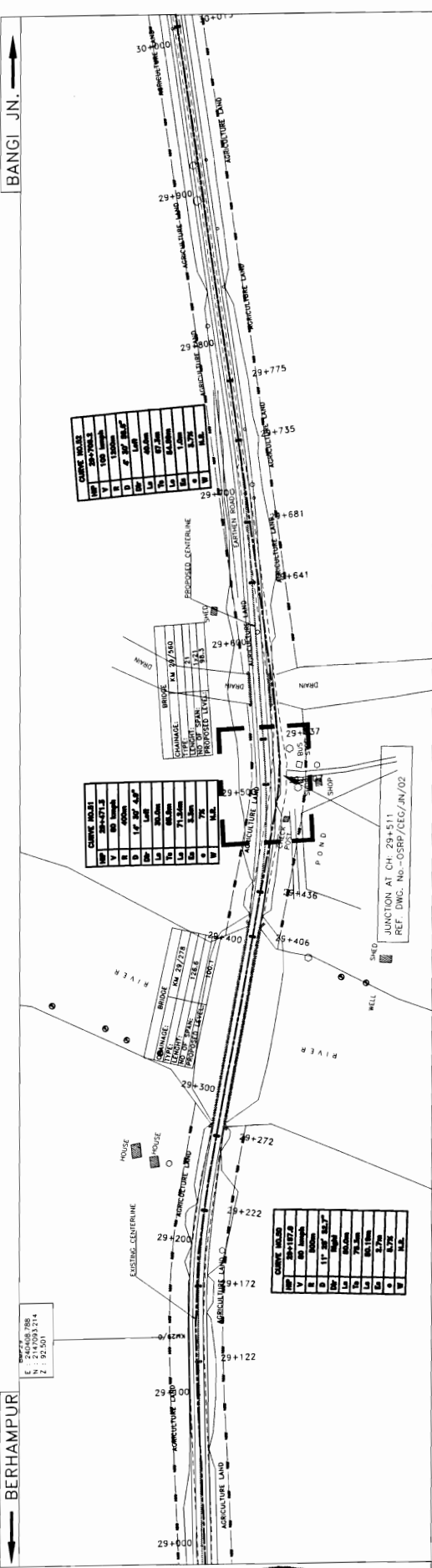
BERHAMPUR PROJECTS  
2007/2008  
E: 21465542081  
F: 1021154

BERHAMPUR PROJECTS  
2007/2008  
E: 21465542081  
F: 1021154

World Bank Project, Orissa  
Phubane war

BERHAMPUR

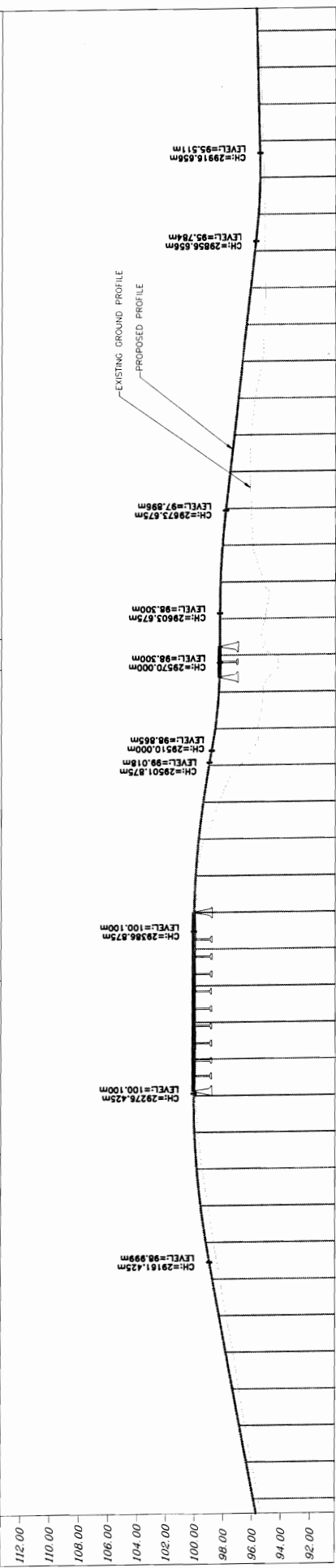
BANGI JN.



CURVE DATA	NO.	TYPE	PC	PT	PI	LC	SC	EA	EB	EC	ED	EA	EB	EC	ED
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

CURVE DATA	NO.	TYPE	PC	PT	PI	LC	SC	EA	EB	EC	ED	EA	EB	EC	ED
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

CURVE DATA	NO.	TYPE	PC	PT	PI	LC	SC	EA	EB	EC	ED	EA	EB	EC	ED
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3



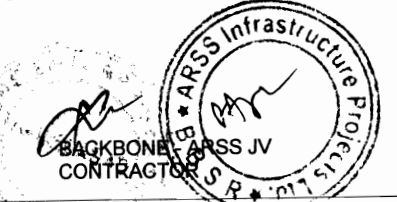
STATION	PROPOSED ROAD LEVEL (m)	EXISTING GROUND LEVEL (m)	VERTICAL CURVE DATA
95.571	95.509	95.509	
96.040	95.588	95.588	
96.467	95.666	95.666	
96.892	97.545	97.545	
97.304	97.823	97.823	
97.793	98.302	98.302	
98.235	98.781	98.781	
98.694	99.244	99.244	
99.110	99.614	99.614	
99.485	99.880	99.880	
99.780	100.042	100.042	
99.977	100.100	100.100	
100.078	100.100	100.100	
100.098	100.100	100.100	
100.069	100.100	100.100	
100.049	100.100	100.100	
100.016	100.086	100.086	
99.955	99.981	99.981	
99.560	99.774	99.774	
98.325	99.464	99.464	
98.933	99.053	99.053	
98.637	98.618	98.618	
98.259	98.363	98.363	
94.432	98.300	98.300	
95.149	98.300	98.300	
95.221	98.263	98.263	
95.977	98.123	98.123	
96.094	97.861	97.861	
96.932	97.592	97.592	
97.304	97.304	97.304	
97.015	96.726	96.726	
95.826	96.278	96.278	
95.347	96.278	96.278	
95.188	96.438	96.438	
95.121	96.149	96.149	
95.141	95.861	95.861	
95.172	95.611	95.611	
95.235	95.503	95.503	
95.291	95.531	95.531	
95.367	95.592	95.592	
95.448	95.653	95.653	
95.488	95.714	95.714	

**CONSULTING ENGINEERS GROUP LTD.**  
 C-12, 1st Floor, Colony, 19/199, Sector-17, Faridkot  
 Tel: 2510893, 2510894, 2510556  
 Fax: 2511348, e-mail: ceg@cegroupindia.com

**LEGEND**

INTERPOLATION	15	MARKET LIMITS
PROPOSED CENTER LINE	16	LENGTH OF SPIRAL CURVE
EXISTING CENTER LINE	17	LENGTH OF CIRCULAR CURVE
PROPOSED CENTER LINE	18	APPROXIMATE POSITION
EXISTING CENTER LINE	19	APPROXIMATE POSITION
PROPOSED CENTER LINE	20	APPROXIMATE POSITION
EXISTING CENTER LINE	21	APPROXIMATE POSITION
PROPOSED CENTER LINE	22	APPROXIMATE POSITION
EXISTING CENTER LINE	23	APPROXIMATE POSITION
PROPOSED CENTER LINE	24	APPROXIMATE POSITION
EXISTING CENTER LINE	25	APPROXIMATE POSITION
PROPOSED CENTER LINE	26	APPROXIMATE POSITION
EXISTING CENTER LINE	27	APPROXIMATE POSITION
PROPOSED CENTER LINE	28	APPROXIMATE POSITION
EXISTING CENTER LINE	29	APPROXIMATE POSITION
PROPOSED CENTER LINE	30	APPROXIMATE POSITION
EXISTING CENTER LINE	31	APPROXIMATE POSITION
PROPOSED CENTER LINE	32	APPROXIMATE POSITION
EXISTING CENTER LINE	33	APPROXIMATE POSITION
PROPOSED CENTER LINE	34	APPROXIMATE POSITION
EXISTING CENTER LINE	35	APPROXIMATE POSITION
PROPOSED CENTER LINE	36	APPROXIMATE POSITION
EXISTING CENTER LINE	37	APPROXIMATE POSITION
PROPOSED CENTER LINE	38	APPROXIMATE POSITION
EXISTING CENTER LINE	39	APPROXIMATE POSITION
PROPOSED CENTER LINE	40	APPROXIMATE POSITION
EXISTING CENTER LINE	41	APPROXIMATE POSITION
PROPOSED CENTER LINE	42	APPROXIMATE POSITION
EXISTING CENTER LINE	43	APPROXIMATE POSITION
PROPOSED CENTER LINE	44	APPROXIMATE POSITION
EXISTING CENTER LINE	45	APPROXIMATE POSITION
PROPOSED CENTER LINE	46	APPROXIMATE POSITION
EXISTING CENTER LINE	47	APPROXIMATE POSITION
PROPOSED CENTER LINE	48	APPROXIMATE POSITION
EXISTING CENTER LINE	49	APPROXIMATE POSITION
PROPOSED CENTER LINE	50	APPROXIMATE POSITION

**WIDENING AND STRENGTHENING TO TWO LANE PLAN AND LONGITUDINAL SECTION**  
 BERHAMPUR TO BANGI JN. (SH-17) KM 29/000 TO KM 30/000  
 DRG NO. CEG/CEG/SH-17/2019  
 SH. NO. 30 DATE REV. RO. R.J. R.R.D.K. S.C.  
 SCALE HORIZONTAL: 1:1500 VERTICAL: 1:100



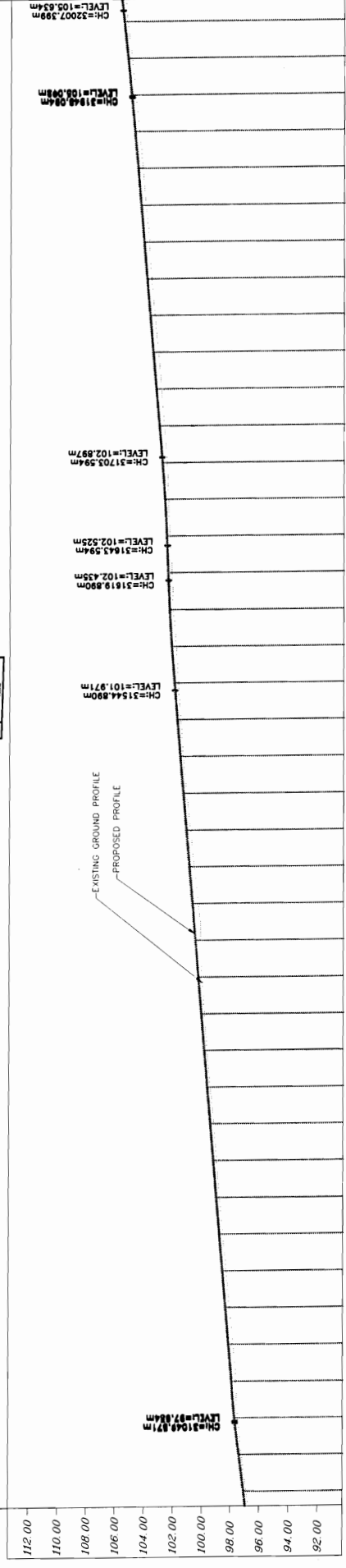
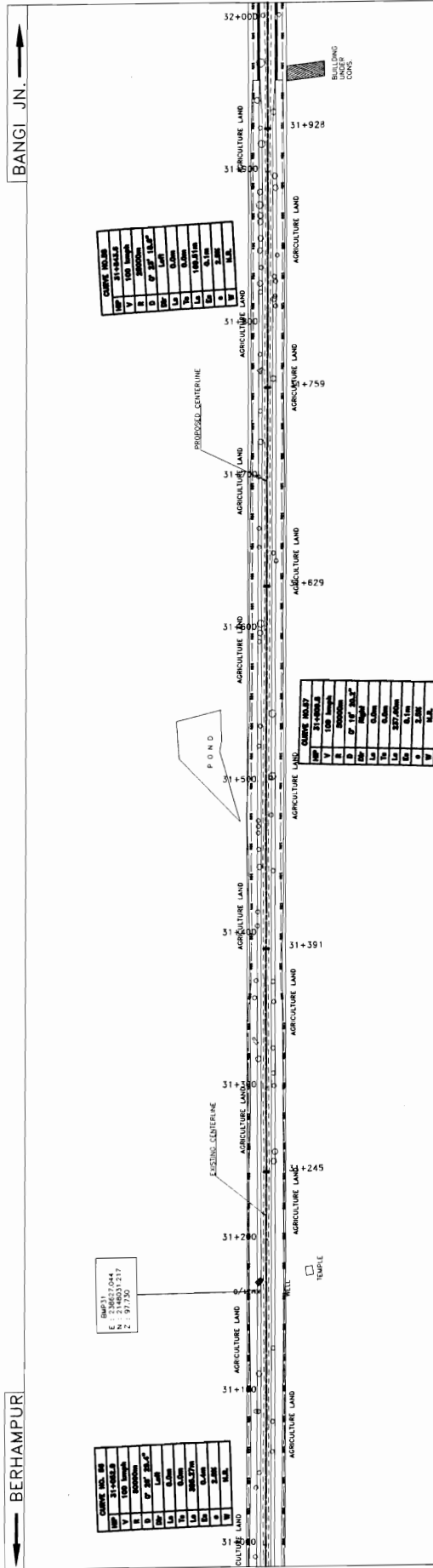






ARSS JV  
CONTRACTOR

World Bank Projects  
Employed by  
the E.I.C. (India) Pvt. Ltd.



DATUM = 90.00		105.508	105.556
PROPOSED ROAD LEVEL (m)	EXISTING LEVEL (m)	105.024	105.292
92.00	97.091	104.889	104.809
94.00	97.252	104.251	104.593
96.00	97.488	104.020	104.377
98.00	97.705	103.789	104.162
100.00	97.914	103.629	103.946
102.00	98.114	103.402	103.730
104.00	98.314	103.142	103.514
106.00	98.514	102.935	103.298
108.00	98.714	102.736	103.082
110.00	98.914	102.544	102.867
112.00	99.114	102.358	102.651
		102.191	102.435
		102.072	102.348
		101.871	102.201
		101.713	102.014
		101.554	101.799
		101.381	101.584
		101.146	101.368
		100.873	101.153
		100.591	100.937
		100.296	100.722
		100.114	100.506
		100.026	100.291
		99.849	100.076
		99.654	99.860
		99.432	99.645
		99.178	99.429
		98.990	99.214
		98.779	98.998
		98.543	98.783
		98.302	98.567
		98.058	98.352
		97.814	98.136
		97.617	97.921
		97.468	97.705
		97.252	97.404
		97.091	97.091

**WIDENING AND STRENGTHENING TO TWO LANE PLAN AND LONGITUDINAL SECTION**

BERHAMPUR TO BANGI JN. (SH-17) KM 31/000 TO KM 32/000

(DRG NO: BHP/2009/177941)

REV. NO. \_\_\_\_\_

SCALE \_\_\_\_\_

DATE: \_\_\_\_\_

BY: \_\_\_\_\_

CHECKED BY: \_\_\_\_\_

APPROVED BY: \_\_\_\_\_

PROJECT:-  
**CONSULTING ENGINEERS GROUP LTD.**  
E-12, Moji Colony, Malviya Nagar, Jaipur-17  
Tel: +91-141-2520899, 2521899, 2520956  
Fax: 2521348, e-mail: cege@india.com

**LEGEND**

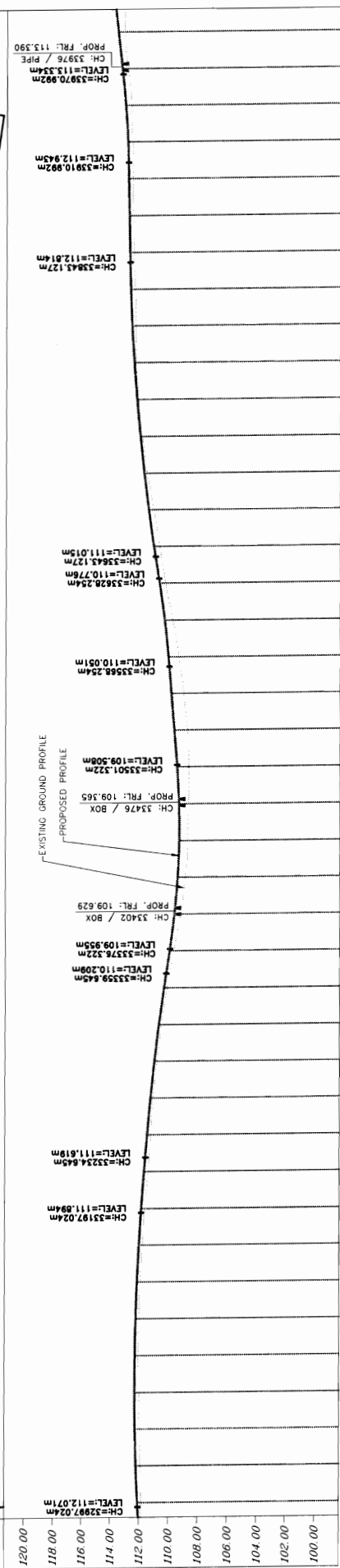
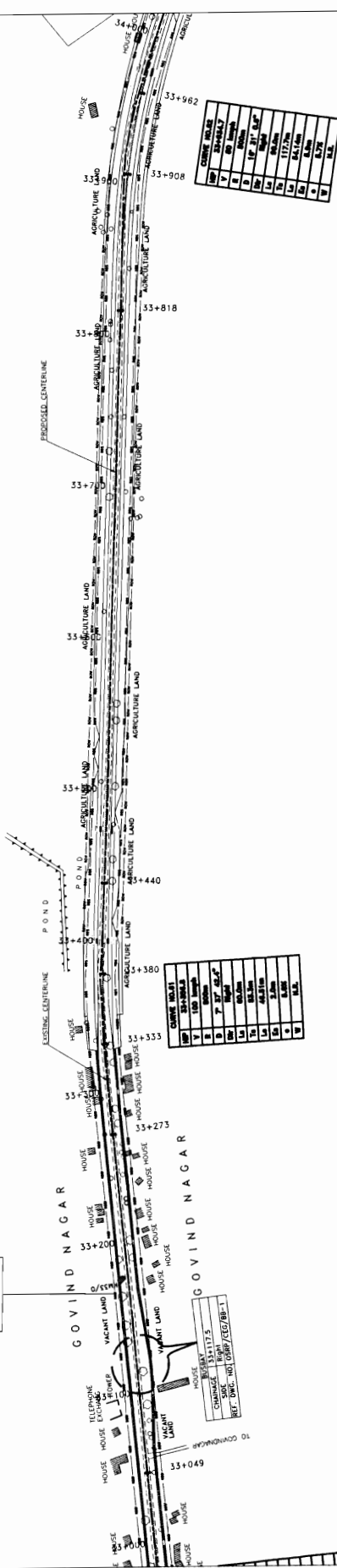
EXISTING CENTERLINE	PROPOSED CENTERLINE	EXISTING GROUND PROFILE	PROPOSED ROAD PROFILE
EXISTING ROAD BOUNDARY	PROPOSED ROAD BOUNDARY	EXISTING DRAINAGE	PROPOSED DRAINAGE
EXISTING UTILITY	PROPOSED UTILITY	EXISTING STRUCTURE	PROPOSED STRUCTURE
EXISTING CONCRETE	PROPOSED CONCRETE	EXISTING ASPHALT	PROPOSED ASPHALT
EXISTING GRAVEL	PROPOSED GRAVEL	EXISTING SAND	PROPOSED SAND
EXISTING SOIL	PROPOSED SOIL	EXISTING VEGETATION	PROPOSED VEGETATION
EXISTING WATER	PROPOSED WATER	EXISTING POWER	PROPOSED POWER
EXISTING TELEPHONE	PROPOSED TELEPHONE	EXISTING FENCE	PROPOSED FENCE
EXISTING LIGHTING	PROPOSED LIGHTING	EXISTING SIGNAGE	PROPOSED SIGNAGE



BERHAMPUR

BANGI JN.

UTM 33  
E 236944.523  
N 1111553



STATION	PROPOSED ROAD LEVEL (m)	EXISTING LEVEL (m)	VERTICAL CURVE DATA
690+00	111.845	112.087	
700+00	111.902	112.201	
710+00	111.962	112.274	
720+00	112.006	112.307	
730+00	112.061	112.300	
740+00	112.105	112.253	
750+00	111.947	112.166	
760+00	111.800	112.039	
770+00	111.634	111.872	
780+00	111.409	111.690	
790+00	111.282	111.500	
800+00	111.087	111.275	
810+00	110.837	111.006	
820+00	110.538	110.700	
830+00	109.975	109.975	
840+00	109.246	109.646	
850+00	108.750	109.358	
860+00	108.716	109.359	
870+00	108.789	109.700	
880+00	109.063	109.803	
890+00	109.398	110.108	
900+00	109.821	110.375	
910+00	110.316	110.725	
920+00	110.722	111.124	
930+00	111.150	111.492	
940+00	111.623	111.815	
950+00	111.960	112.094	
960+00	112.219	112.329	
970+00	112.403	112.519	
980+00	112.423	112.655	
990+00	112.462	112.767	
1000+00	112.549	112.827	
1010+00	112.590	112.874	
1020+00	112.640	112.922	
1030+00	112.741	113.134	
1040+00	113.004	113.379	
1050+00	113.186	113.657	

**WIDENING AND STRENGTHENING TO TWO LANE PLAN AND LONGITUDINAL SECTION BERHAMPUR TO BANGI Jn. (SH-17) KM 33/000 TO KM 34/000**

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

**CON S U L T I N G ENGINEERS GROUP LTD.**  
L-12, M.G. Colony, Mohiyo Nagar, Jajpur-751007  
Tel: 0674-2520899, 2520899, 2520356  
Fax: 2521348, e-mail: ceg@cegroup.com

**LEGEND**

- PROPOSED CENTERLINE
- PROPOSED ROAD
- EXISTING GROUND PROFILE
- PROPOSED PROFILE
- EXISTING ROAD
- EXISTING LEVEL
- PROPOSED LEVEL
- PROPOSED ROAD LEVEL
- EXISTING LEVEL
- VERTICAL CURVE DATA
- PROPOSED ROAD
- EXISTING LEVEL
- PROPOSED LEVEL
- PROPOSED ROAD LEVEL
- EXISTING LEVEL
- VERTICAL CURVE DATA
- PROPOSED ROAD
- EXISTING LEVEL
- PROPOSED LEVEL
- PROPOSED ROAD LEVEL
- EXISTING LEVEL
- VERTICAL CURVE DATA

**SCALE**  
HORIZONTAL: 1:1000  
VERTICAL: 1:100

**REVISIONS**

NO.	DATE	REV.	RO.
1			
2			
3			
4			
5			
6			
7			
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9			
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11			
12			
13			
14			

**APPROVED BY**

SCALE	HORIZONTAL	VERTICAL
1:1000	1:1000	1:100

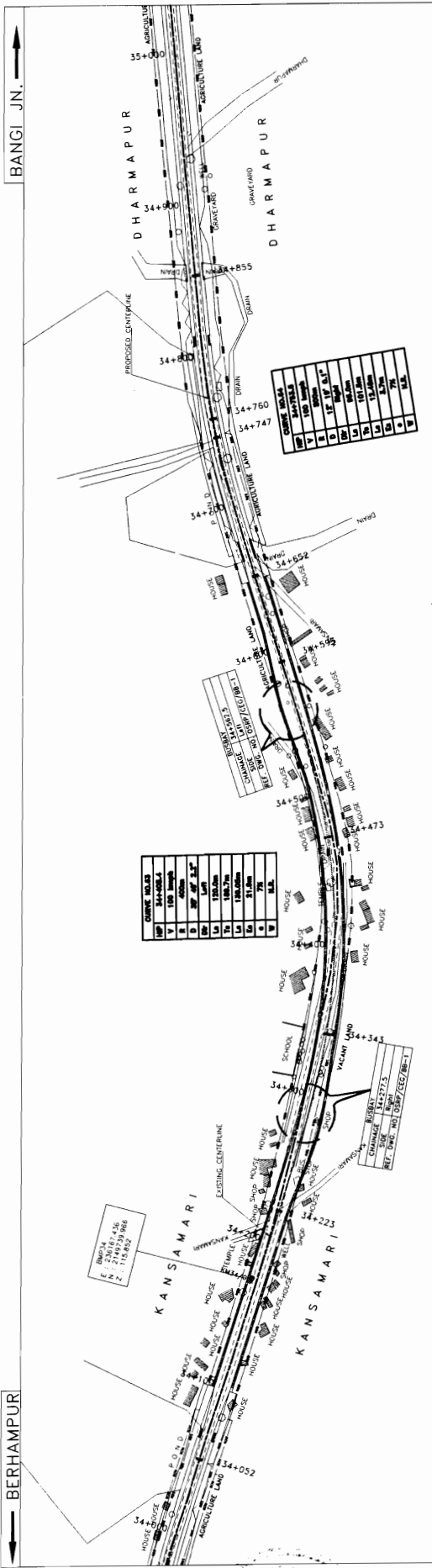
**APPROVED BY**

SCALE	HORIZONTAL	VERTICAL
1:1000	1:1000	1:100

**APPROVED BY**

SCALE	HORIZONTAL	VERTICAL
1:1000	1:1000	1:100

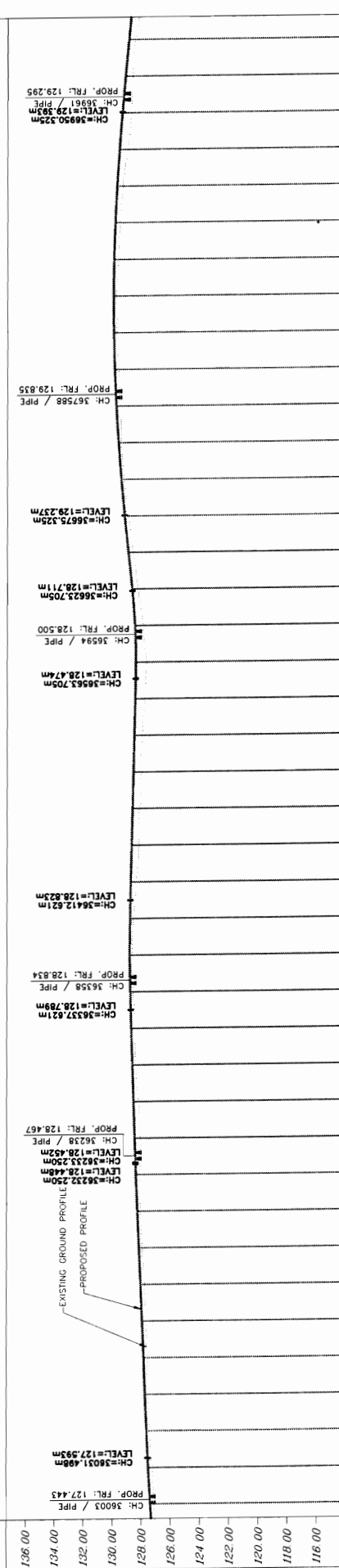
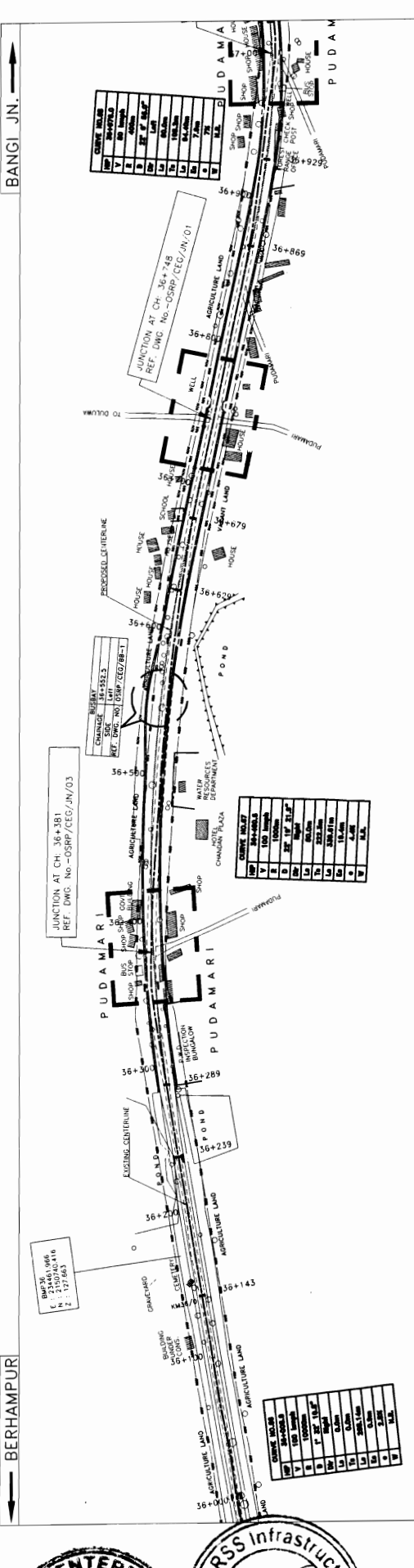






BERHAMPUR

BANGI JN.



PROPOSED ROAD LEVEL (m)	EXISTING LEVEL (m)	VERTICAL CURVE DATA
127.425	127.564	
127.458	127.672	
127.571	127.778	
127.637	127.885	
127.708	127.991	
127.838	128.098	
127.977	128.204	
128.124	128.311	
128.108	128.417	
128.135	128.506	
128.245	128.587	
128.245	128.587	
128.444	128.687	
128.513	128.748	
128.605	128.823	
128.602	128.856	
128.607	128.847	
128.423	128.795	
128.249	128.737	
128.197	128.679	
128.098	128.621	
128.009	128.564	
127.813	128.506	
127.710	128.482	
127.978	128.528	
128.304	128.724	
128.643	128.979	
128.965	129.233	
129.230	129.467	
129.470	129.657	
129.510	129.603	
129.629	129.905	
129.739	129.963	
129.830	129.978	
129.546	129.760	
129.027	129.600	
128.800	129.396	
128.701	129.169	
128.518	128.945	

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

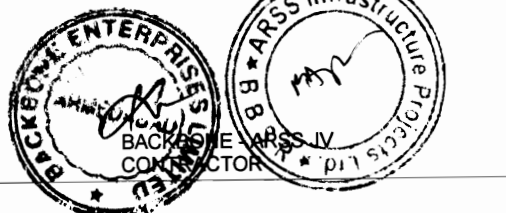
**LEGEND**

INTERVALS	15	LENGTH OF SPIRAL CURVE
PROPOSED CENTERLINE	16	INFLUENCE OF SPIRAL CURVE
PROPOSED ROAD LEVEL	17	INFLUENCE OF CIRCULAR CURVE
EXISTING LEVEL	18	INFLUENCE OF CIRCULAR CURVE
PROPOSED CENTERLINE	19	INFLUENCE OF CIRCULAR CURVE
PROPOSED ROAD LEVEL	20	INFLUENCE OF CIRCULAR CURVE
EXISTING LEVEL	21	INFLUENCE OF CIRCULAR CURVE
PROPOSED CENTERLINE	22	INFLUENCE OF CIRCULAR CURVE
PROPOSED ROAD LEVEL	23	INFLUENCE OF CIRCULAR CURVE
EXISTING LEVEL	24	INFLUENCE OF CIRCULAR CURVE
PROPOSED CENTERLINE	25	INFLUENCE OF CIRCULAR CURVE
PROPOSED ROAD LEVEL	26	INFLUENCE OF CIRCULAR CURVE
EXISTING LEVEL	27	INFLUENCE OF CIRCULAR CURVE
PROPOSED CENTERLINE	28	INFLUENCE OF CIRCULAR CURVE
PROPOSED ROAD LEVEL	29	INFLUENCE OF CIRCULAR CURVE
EXISTING LEVEL	30	INFLUENCE OF CIRCULAR CURVE
PROPOSED CENTERLINE	31	INFLUENCE OF CIRCULAR CURVE
PROPOSED ROAD LEVEL	32	INFLUENCE OF CIRCULAR CURVE
EXISTING LEVEL	33	INFLUENCE OF CIRCULAR CURVE
PROPOSED CENTERLINE	34	INFLUENCE OF CIRCULAR CURVE
PROPOSED ROAD LEVEL	35	INFLUENCE OF CIRCULAR CURVE
EXISTING LEVEL	36	INFLUENCE OF CIRCULAR CURVE
PROPOSED CENTERLINE	37	INFLUENCE OF CIRCULAR CURVE
PROPOSED ROAD LEVEL	38	INFLUENCE OF CIRCULAR CURVE
EXISTING LEVEL	39	INFLUENCE OF CIRCULAR CURVE
PROPOSED CENTERLINE	40	INFLUENCE OF CIRCULAR CURVE
PROPOSED ROAD LEVEL	41	INFLUENCE OF CIRCULAR CURVE
EXISTING LEVEL	42	INFLUENCE OF CIRCULAR CURVE
PROPOSED CENTERLINE	43	INFLUENCE OF CIRCULAR CURVE
PROPOSED ROAD LEVEL	44	INFLUENCE OF CIRCULAR CURVE
EXISTING LEVEL	45	INFLUENCE OF CIRCULAR CURVE

**WIDENING AND STRENGTHENING TO TWO LANE PLAN AND LONGITUDINAL SECTION**  
 BERHAMPUR TO BANGI JN. (SH-17) KM 36/000 TO KM 37/000

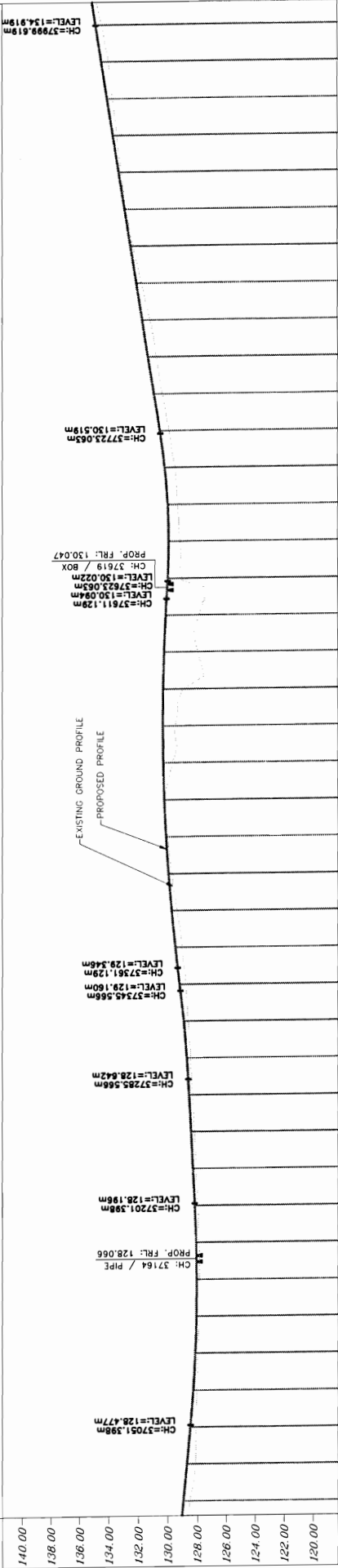
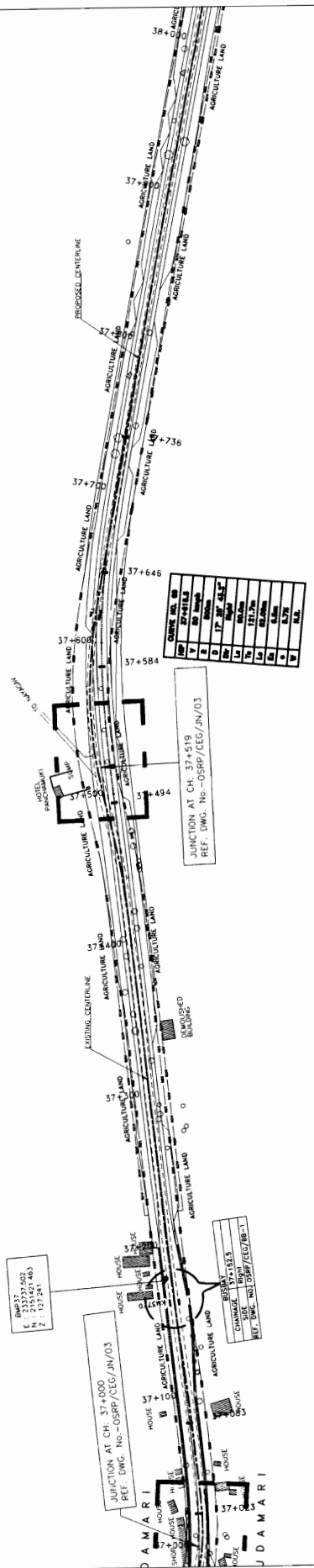
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 SH. NO. 37 DATE REV. RO SCALE  
 HORIZONTAL: 1:1000 VERTICAL: 1:100

APPROVED BY: R.R.D.K. S.C.  
 CHECKED BY: R.J.  
 DESIGNED BY: B.M.



BERHAMPUR

BANGI JN.



PROPOSED ROAD LEVEL (m)	EXISTING LEVEL (m)	VERTICAL CURVE DATA
128.945	128.518	
128.716	128.090	
128.490	128.090	
128.280	128.056	
128.150	127.960	
128.070	127.879	
128.050	127.860	
128.089	127.872	
128.188	127.950	
128.321	128.073	
128.453	128.213	
128.586	128.353	
128.730	128.470	
128.937	128.642	
129.215	128.807	
129.505	128.958	
129.757	129.367	
129.964	129.741	
130.126	130.052	
130.243	130.250	
130.316	129.681	
130.343	128.478	
130.325	128.976	
130.263	127.958	
130.158	127.888	
130.011	129.044	
129.940	129.193	
130.007	129.535	
130.007	129.526	
130.210	129.812	
130.549	129.812	
130.947	130.363	
131.345	130.767	
131.743	131.207	
132.140	131.784	
132.538	132.362	
132.936	132.870	
133.334	133.359	
133.731	133.454	
134.129	133.741	
134.527	134.036	
134.925	134.505	

**CONSULTING ENGINEERS GROUP LTD.**  
 E-12/10/1 Colony, Alaknanda Nagar, Bhubaneswar-751017  
 Tel: 2521348, Fax: 2521348, e-mail: cege@cegeplus.com

**PROJECT:-**  
 WIDENING AND STRENGTHENING TO TWO LANE  
 PLAN AND LONGITUDINAL SECTION  
 BERHAMPUR TO BANGI JN. (SH-17) KM 37/000 TO KM 38/000

**PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE**

**LEGEND:**  
 1. PROPOSED CENTERLINE  
 2. EXISTING CENTERLINE  
 3. PROPOSED ROADWAY  
 4. EXISTING ROADWAY  
 5. PROPOSED SIDEWALK  
 6. EXISTING SIDEWALK  
 7. PROPOSED DRAINAGE  
 8. EXISTING DRAINAGE  
 9. PROPOSED STRUCTURE  
 10. EXISTING STRUCTURE  
 11. PROPOSED BRIDGE  
 12. EXISTING BRIDGE  
 13. PROPOSED TUNNEL  
 14. EXISTING TUNNEL  
 15. PROPOSED UNDERPASS  
 16. EXISTING UNDERPASS  
 17. PROPOSED OVERPASS  
 18. EXISTING OVERPASS  
 19. PROPOSED CULVERT  
 20. EXISTING CULVERT  
 21. PROPOSED PIPE  
 22. EXISTING PIPE  
 23. PROPOSED MANHOLE  
 24. EXISTING MANHOLE  
 25. PROPOSED CHECK DAM  
 26. EXISTING CHECK DAM  
 27. PROPOSED BARRAGE  
 28. EXISTING BARRAGE  
 29. PROPOSED WEIR  
 30. EXISTING WEIR  
 31. PROPOSED DAM  
 32. EXISTING DAM  
 33. PROPOSED EMBANKMENT  
 34. EXISTING EMBANKMENT  
 35. PROPOSED CUTTING  
 36. EXISTING CUTTING  
 37. PROPOSED BRIDGE PIERS  
 38. EXISTING BRIDGE PIERS  
 39. PROPOSED BRIDGE DECK  
 40. EXISTING BRIDGE DECK  
 41. PROPOSED BRIDGE ABUTMENT  
 42. EXISTING BRIDGE ABUTMENT  
 43. PROPOSED BRIDGE PILE  
 44. EXISTING BRIDGE PILE  
 45. PROPOSED BRIDGE SCOUR  
 46. EXISTING BRIDGE SCOUR  
 47. PROPOSED BRIDGE SPILLWAY  
 48. EXISTING BRIDGE SPILLWAY  
 49. PROPOSED BRIDGE GATE  
 50. EXISTING BRIDGE GATE  
 51. PROPOSED BRIDGE VALVE  
 52. EXISTING BRIDGE VALVE  
 53. PROPOSED BRIDGE LOCK  
 54. EXISTING BRIDGE LOCK  
 55. PROPOSED BRIDGE DAM  
 56. EXISTING BRIDGE DAM  
 57. PROPOSED BRIDGE WALL  
 58. EXISTING BRIDGE WALL  
 59. PROPOSED BRIDGE FENCE  
 60. EXISTING BRIDGE FENCE  
 61. PROPOSED BRIDGE SIGN  
 62. EXISTING BRIDGE SIGN  
 63. PROPOSED BRIDGE LIGHT  
 64. EXISTING BRIDGE LIGHT  
 65. PROPOSED BRIDGE SOUNDING  
 66. EXISTING BRIDGE SOUNDING  
 67. PROPOSED BRIDGE VIBRATION  
 68. EXISTING BRIDGE VIBRATION  
 69. PROPOSED BRIDGE COLLAPSE  
 70. EXISTING BRIDGE COLLAPSE  
 71. PROPOSED BRIDGE REPAIR  
 72. EXISTING BRIDGE REPAIR  
 73. PROPOSED BRIDGE MAINTENANCE  
 74. EXISTING BRIDGE MAINTENANCE  
 75. PROPOSED BRIDGE INSPECTION  
 76. EXISTING BRIDGE INSPECTION  
 77. PROPOSED BRIDGE SURVEY  
 78. EXISTING BRIDGE SURVEY  
 79. PROPOSED BRIDGE DESIGN  
 80. EXISTING BRIDGE DESIGN  
 81. PROPOSED BRIDGE CONSTRUCTION  
 82. EXISTING BRIDGE CONSTRUCTION  
 83. PROPOSED BRIDGE OPERATION  
 84. EXISTING BRIDGE OPERATION  
 85. PROPOSED BRIDGE DESTRUCTION  
 86. EXISTING BRIDGE DESTRUCTION  
 87. PROPOSED BRIDGE RECONSTRUCTION  
 88. EXISTING BRIDGE RECONSTRUCTION  
 89. PROPOSED BRIDGE RENOVATION  
 90. EXISTING BRIDGE RENOVATION  
 91. PROPOSED BRIDGE RESTORATION  
 92. EXISTING BRIDGE RESTORATION  
 93. PROPOSED BRIDGE PRESERVATION  
 94. EXISTING BRIDGE PRESERVATION  
 95. PROPOSED BRIDGE PROTECTION  
 96. EXISTING BRIDGE PROTECTION  
 97. PROPOSED BRIDGE ENHANCEMENT  
 98. EXISTING BRIDGE ENHANCEMENT  
 99. PROPOSED BRIDGE IMPROVEMENT  
 100. EXISTING BRIDGE IMPROVEMENT

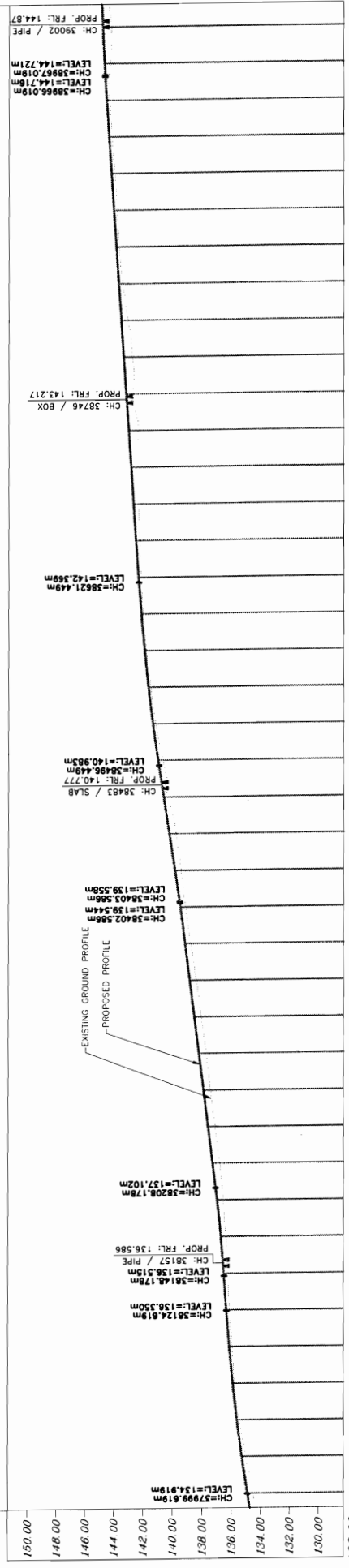
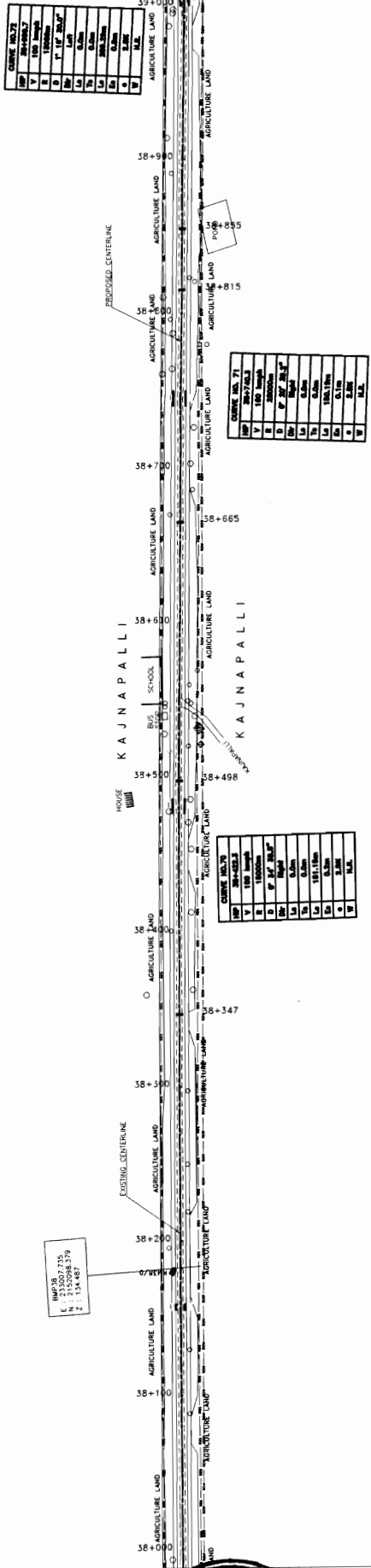
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 VERTICAL: 1:200

**DATE:** 08/05/2017  
**REV:** 1  
**RD:** 1  
**B/M:** 1  
**R.R.D.K:** R.J  
**S.G:** S.G

**BACKBONE ARSS JV CONTRACTOR**

BERHAMPUR

BANGI JN.



PROPOSED ROAD LEVEL (m)	EXISTING LEVEL (m)	VERTICAL CURVE DATA
144.925	134.925	L=125.000m R=14023.083m
135.022	135.630	
135.460	135.915	L=60.000m R=1514.408m
136.388	136.236	
136.268	136.353	L=151.134m R=1511.134m
139.156	139.511	
140.584	140.270	L=125.000m R=14833.300m
141.708	141.708	
142.207	142.207	L=150.191m R=1501.911m
143.244	143.244	
143.415	143.415	L=244.570m R=244.570m
144.003	144.003	
144.757	144.757	L=287.288m R=287.288m
144.858	144.858	

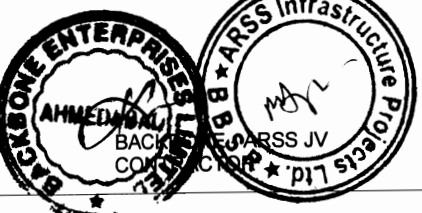
CH	PROPOSED ROAD LEVEL (m)	EXISTING LEVEL (m)	REMARKS
3799.819m	134.925	134.925	CH=3799.819m LEVEL=134.919m
3815.719m	136.268	136.353	PROP. R.L.=136.586 LEVEL=137.102m
3843.519m	140.584	140.270	CH=3843.519m LEVEL=140.983m
3876.319m	142.207	142.207	CH=3876.319m LEVEL=142.569m
3902.119m	144.003	144.003	PROP. R.L.=144.217 LEVEL=144.719m
3902.119m	144.858	144.858	CH=3902.119m LEVEL=144.719m

### PROJECT:-

WIDENING AND STRENGTHENING TO TWO LANE  
PLAN AND LONGITUDINAL SECTION  
BERHAMPUR TO BANGI JN. (SH-17) KM 38/000 TO KM 39/000  
PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT  
UNDER WORLD BANK ASSISTANCE

**CONSULTING ENGINEERS GROUP LTD.**  
E-12, 1st Colony, Midway, Bhubaneswar - 751005  
Ph: 93-0671-235226, 235227, 235228, 235229, 235230, 235231, 235232, 235233, 235234, 235235  
Fax: 2321346, e-mail: ceg@cegroupindia.com

SR. NO. 39 DATE 17/09/23 REV. NO. 01  
SCALE: HORIZONTAL: 1:10000 VERTICAL: 1:1000  
DRAWN (D) CHECKED (C) APPROVED (A) S.G.



World Bank Project No. IDA 4740

World Bank Project No. IDA 4740

World Bank Project No. IDA 4740



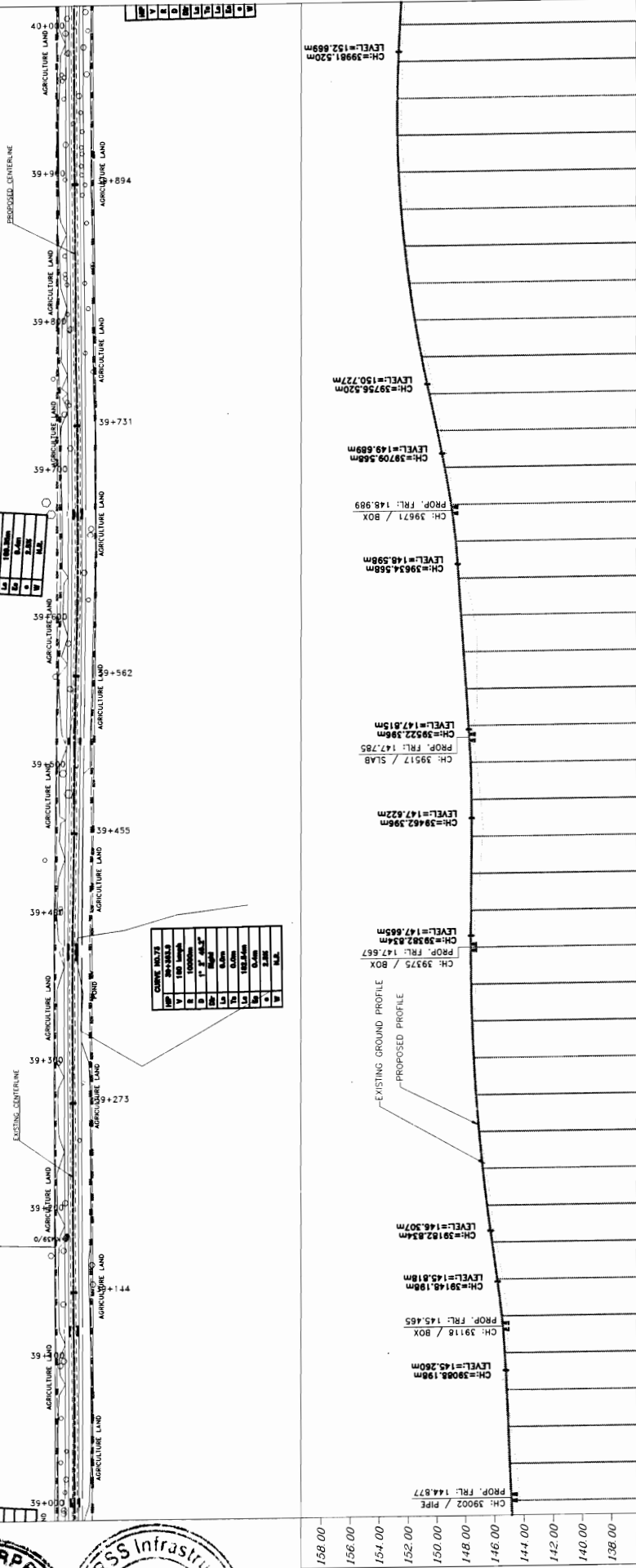
BERHAMPUR

BANGI JN.

BMS 33  
E : 2152617 323  
N : 2152617 323  
Z : 145 003

CH	NO.	TYPE	LEVEL
1	1	PROP. FLL / BOX	147.85
2	2	PROP. FLL / SLAB	147.85
3	3	PROP. FLL / BOX	148.989
4	4	PROP. FLL / BOX	149.569
5	5	PROP. FLL / BOX	150.727
6	6	PROP. FLL / BOX	152.689

CH	NO.	TYPE	LEVEL
1	1	PROP. FLL / BOX	147.65
2	2	PROP. FLL / BOX	147.65
3	3	PROP. FLL / BOX	147.65
4	4	PROP. FLL / BOX	147.65
5	5	PROP. FLL / BOX	147.65
6	6	PROP. FLL / BOX	147.65



PROPOSED ROAD LEVEL (m)	EXISTING LEVEL (m)	VERTICAL CURVE DATA
144.856	144.856	
144.979	144.979	
145.091	145.091	
145.192	145.202	
145.324	145.324	
145.435	145.435	
145.468	145.843	
145.902	146.196	
146.284	146.538	
146.622	146.837	
147.028	147.090	
147.348	147.297	
147.466	147.458	
147.428	147.574	
147.599	147.657	
147.440	147.656	
147.872	147.629	
148.872	147.825	
148.996	147.825	
147.296	147.690	
147.484	147.834	
147.256	148.008	
147.248	148.183	
147.485	148.357	
148.133	148.531	
148.760	148.730	
148.914	149.045	
149.230	149.487	
149.724	150.030	
150.210	150.583	
150.789	151.115	
151.575	151.575	
151.839	151.860	
152.095	152.270	
152.079	152.506	
152.291	152.666	
152.498	152.752	
152.502	152.763	
152.396	152.698	
152.366	152.560	

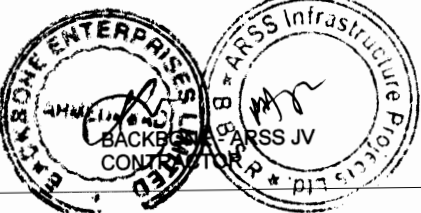
**LEGEND**

- EXISTING CENTERLINE
- PROPOSED CENTERLINE
- PROPOSED ROADWAY
- PROPOSED SIDEWALK
- PROPOSED DRAINAGE
- PROPOSED UTILITY
- PROPOSED FENCE
- PROPOSED SIGN
- PROPOSED LIGHTING
- PROPOSED LANDSCAPE
- PROPOSED TREE
- PROPOSED BENCH
- PROPOSED BIKEWAY
- PROPOSED TRAIL
- PROPOSED BRIDGE
- PROPOSED TUNNEL
- PROPOSED UNDERPASS
- PROPOSED OVERPASS
- PROPOSED VIADUCT
- PROPOSED ELEVATION
- PROPOSED FALL
- PROPOSED GRADE

**PROJECT:-**  
 WIDENING AND STRENGTHENING TO TWO LANE  
 PLAN AND LONGITUDINAL SECTION  
 BERHAMPUR TO BANGI JN. (SH-17) KM 39/000 TO KM 40/000  
 PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT  
 UNDER WORLD BANK ASSISTANCE

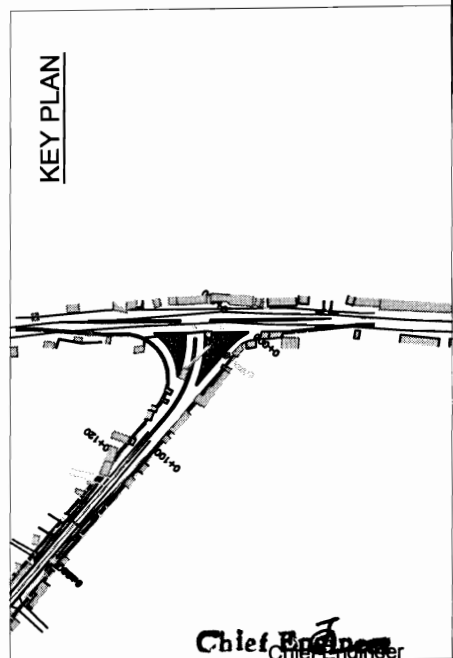
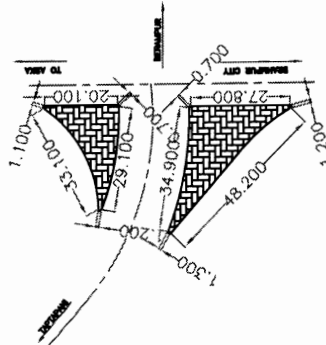
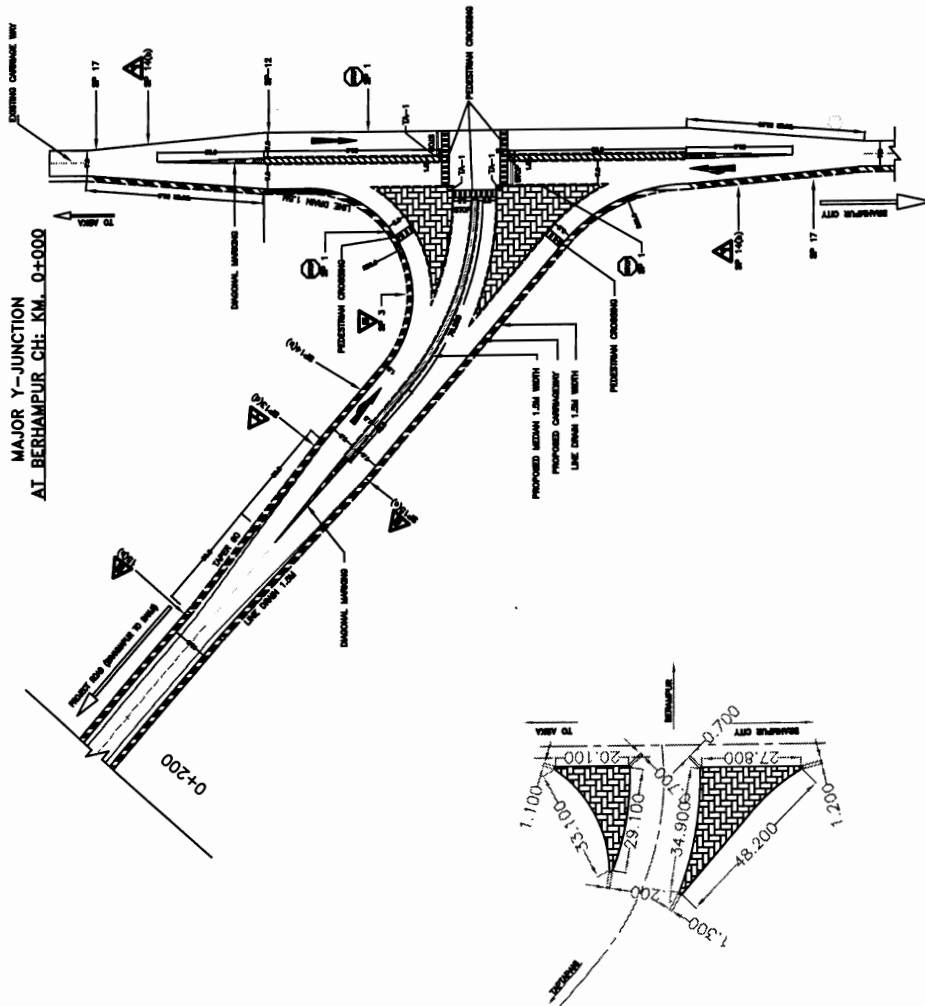
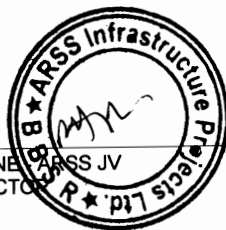
**CONSULTING ENGINEERS GROUP LTD.**  
 E-12, 1st Floor, Colocotron Market, Bhubaneswar, Odisha-751017  
 T: 2521348, 2521349, 2521350, 2521351, 2521352, 2521353, 2521354  
 F: 2521348, e-mail: ceg@cegindia.com

**DATE:** 15/05/2017  
**SCALE:** HORIZONTAL: 1:1000, VERTICAL: 1:100  
**APPROVED BY:** [Signature]  
**DATE:** 15/05/2017





# MAJOR JUNCTION KM. 0/000



- NOTES:**
1. ALL DIMENSION ARE IN METER.
  2. FOR DETAILS OF ROAD SIGNS NUMBERED SP-1, SP-3, SP-14(b), SP-17, ETC., SEE DRAWING NO. CSR/CEG/RS/01 - 03
  3. FOR PAVEMENT MARKING AT INTERSECTIONS & BEYOND INTERSECTIONS REFER DRAWING No. CSR/CEG/RM/01 & 02
  4. KERBS OF DIRECTIONAL ISLANDS SHALL BE PAINTED BLACK AND WHITE ALTERNATELY IN STRIPES OF 500mm WIDTH. FOR DETAILS REFER DRAWING No. CSR/CEG/DR
  5. KERBS OF DIRECTIONAL ISLANDS AND CENTRAL ISLANDS SHALL BE OF TYPE I

SCALE		DATE		REV		RD		BLM		J.P.		R.A.D.K		S.O	
DIRG. NO.	17/2017	DATE	17/04/2017	REV		RD		BLM		J.P.		R.A.D.K		S.O	

**PROJECT:-**  
 WIDENING AND STRENGTHENING TO TWO LANE  
 PLAN FOR MAJOR JUNCTION  
 BERHAMPUR TO BANGI Jn. (SH-17) KM. 0/000  
 CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT  
 PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT  
 UNDER WORLD BANK ASSISTANCE

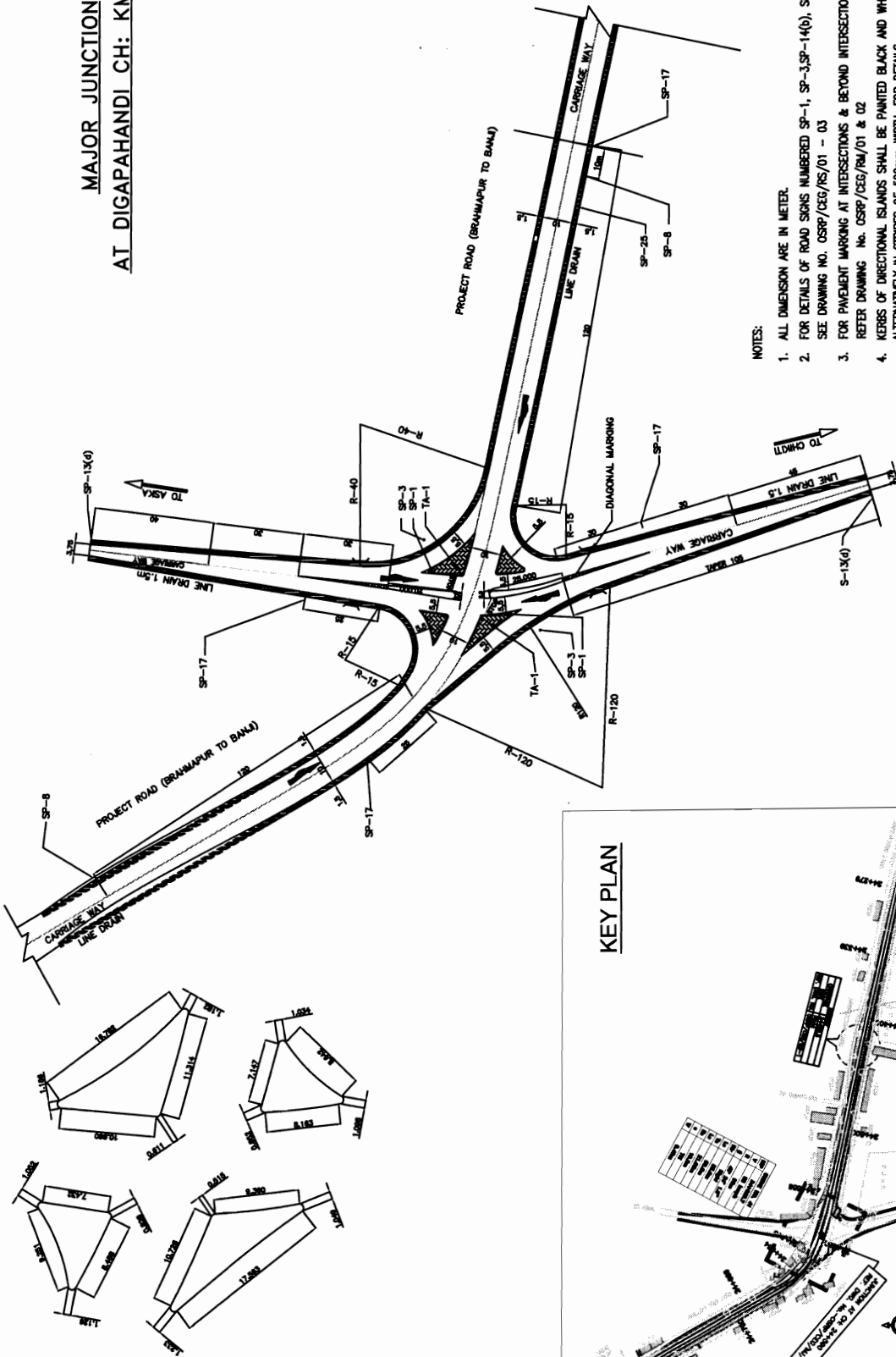
**CEG CONSULTING ENGINEERS GROUP LTD.**  
 E-12, Mg Colony, Midway Nagar, Jagpur-17  
 Tel: +91-141-2520898, 2521899, 2520556  
 Fax: 2521345, e-mail: ceg@cegroup.co.in

**LEGEND**

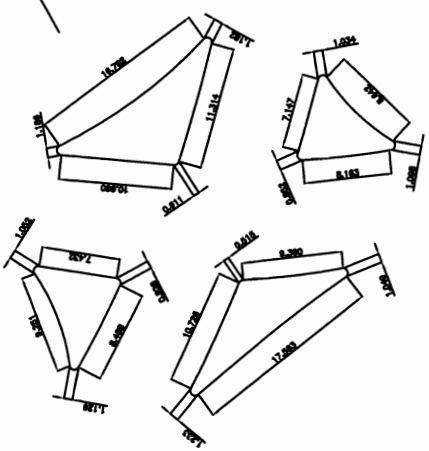
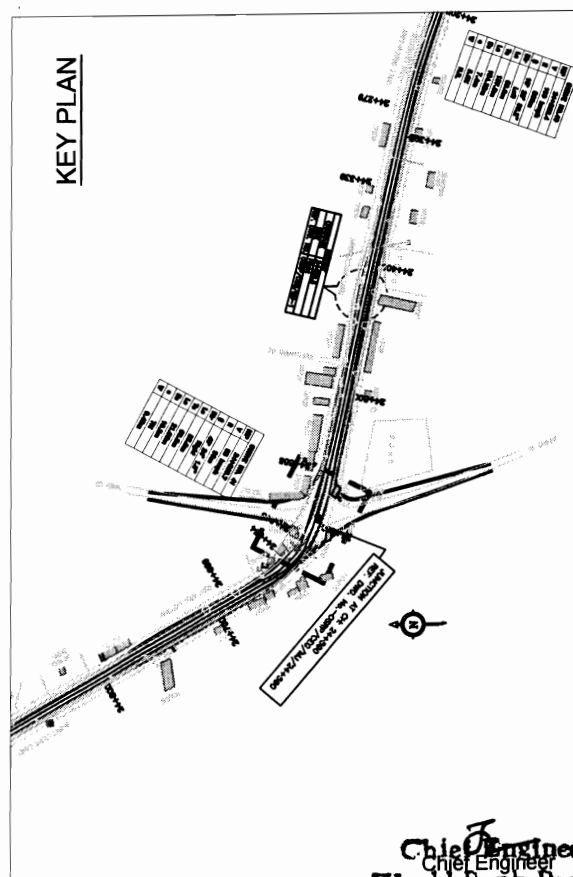
Symbol	Description
(Symbol)	Proposed Kerbs 1.5m Width
(Symbol)	Proposed Compacted Lime Dunn 1.5m Width
(Symbol)	Directional Islands
(Symbol)	Central Islands
(Symbol)	Other Details

Chief Engineer  
 WOND Bank Projects  
 EMPLOYER  
 of the E.I.C. Group  
 Bhubaneswar

**MAJOR JUNCTION  
AT DIGAPAHANDI CH: KM. 24+590**



- NOTES:**
1. ALL DIMENSION ARE IN METER.
  2. FOR DETAILS OF ROAD SIGNS NUMBERED SP-1, SP-3, SP-14(0), SP-17, ETC., SEE DRAWING NO. OGRP/CEG/RS/01 - 03
  3. FOR PAVEMENT MARKING AT INTERSECTIONS & BEYOND INTERSECTIONS REFER DRAWING NO. OGRP/CEG/RM/01 & 02
  4. KERBS OF DIRECTIONAL ISLANDS SHALL BE PAINTED BLACK AND WHITE ALTERNATIVELY IN STRIPES OF 500mm WIDTH. FOR DETAILS REFER DRAWING NO. OGRP/CEG/UR
  5. KERBS OF DIRECTIONAL ISLANDS AND CENTRAL ISLANDS SHALL BE OF TYPE I



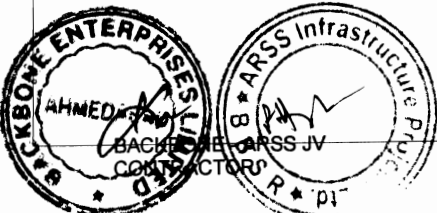
WIDENING AND STRENGTHENING TO TWO LANE PLAN FOR MAJOR JUNCTION BERHAMPUR TO BANU Jn. (SH-17) KM 24/590	
DRG NO. OGRP/CEG/RS/01-03	REV. NO.
SPL. NO. 23	DATE
SCALE	HORIZONTAL 1 : 1000
J.P.	B.M.
R.D.D.K.	S.G.

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

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

**LEGEND**

Symbol	Description
(Symbol)	Proposed Road
(Symbol)	Existing Road
(Symbol)	Right of Way
(Symbol)	Water Body
(Symbol)	Setback
(Symbol)	Utility Pole
(Symbol)	Building
(Symbol)	Tree
(Symbol)	Other



Chief Engineer  
Chief Engineer  
World Bank Projects  
EMPLOYER  
O/o the E.P.C.(CR-II) Orissa  
Rhubaneswar



CONTRACTOR



Chief Engineer  
World Bank Project  
EMPLOYER  
to the E.I.C. (Civil) Office  
Bhubaneswar

SIGN POST ID	DESCRIPTION OF THE SIGN BOARD	CHANGE		LOCATION	
		LL	RL	LL	RL
SP-1	Stop	1946		✓	CR(L)
		3011		✓	CR(R)
		5550		✓	
		7205		✓	
		11708		✓	
		12800		✓	
		16422		✓	
		22835		✓	
		25183		✓	
		32602		✓	
		37519		✓	
		2538		✓	
		8335		✓	
		12780		✓	
		15088		✓	
		15846		✓	
		19704		✓	
		27127		✓	
		28572		✓	
		29511		✓	
		32518		✓	
		36381		✓	
		37000		✓	
		24590		✓	
		36748		✓	
SP-4(a)	Speed Limit - 30	-Nil-		✓	
SP-4(b)	Speed Limit - 40	24583		✓	
		24643		✓	
SP-4(c)	Speed Limit - 50	41327		✓	
		41387		✓	
		41547		✓	
		41607		✓	
SP-4(d)	Speed Limit - 65	4405		✓	
		4465		✓	
		7159		✓	
		7219		✓	
		8252		✓	
		42137		✓	
		42197		✓	
		42457		✓	
		42517		✓	

SIGN POST ID	DESCRIPTION OF THE SIGN BOARD	CHANGE		LOCATION	
		LL	RL	LL	RL
SP-6	School Zone	9910		✓	CR(L)
		10190		✓	CR(R)
		13610		✓	
		13690		✓	
		17160		✓	
		17290		✓	
		20760		✓	
		20840		✓	
		34320		✓	
		34345		✓	
		36510		✓	
		36590		✓	
SP-8	CROSS ROAD	24630		✓	
		36786		✓	
		24630		✓	
		36788		✓	
SP-9(a)	Right Side Road	1826		✓	
		2658		✓	
		7085		✓	
		11588		✓	
		12690		✓	
		12910		✓	
		15968		✓	
		19824		✓	
		25063		✓	
		27247		✓	
		28692		✓	
		29651		✓	
		32482		✓	
		32638		✓	
SP-9(b)	Left Side Road	2066		✓	
		2418		✓	
		7325		✓	
		11828		✓	
		12670		✓	
		12920		✓	
		15726		✓	
		18584		✓	
		25303		✓	
		27007		✓	
		28452		✓	
		29391		✓	
		32399		✓	
		32722		✓	

SIGN POST ID	DESCRIPTION OF THE SIGN BOARD	CHANGE		LOCATION	
		LL	RL	LL	RL
SP-10(a)	Right Hand Curve	7159		✓	CR(R)
		24583		✓	
		41547		✓	
		42137		✓	
		8265		✓	
		4512		✓	
		9687		✓	
		10924		✓	
		25430		✓	
		29537		✓	
		34503		✓	
		37053		✓	
		41424		✓	
		41922		✓	
		42547		✓	
SP-10(b)	Left Hand Curve	43014		✓	
		4405		✓	
		8192		✓	
		9510		✓	
		10846		✓	
		25359		✓	
		29408		✓	
		34313		✓	
		36989		✓	
		41327		✓	
		41748		✓	
		42457		✓	
		42942		✓	
		7274		✓	
		24684		✓	
		41623		✓	
		42395		✓	
SP-10(c)	Right Handpin Band	-Nil-		✓	
SP-10(d)	Left Handpin Band	-Nil-		✓	
SP-10(e)	Right Reverse Band	-Nil-		✓	
SP-10(f)	Left Reverse Band	-Nil-		✓	

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

**SCHEDULE OF SIGN POSTS**  
BERHAMPUR TO TAPTAPANI (SH-17, KM 0 TO 41)

**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

DRG NO. CSR/CEG/SH-17/SH 01  
SH. NO. 44 DATE REV RD  
SCALE NTS  
DESIGNED (A) DRAWN (B) CHECKED (C) APPROVED (D)  
S.G. R.R.D.K. J.P. B.M.

SIGN POST ID	DESCRIPTION OF THE SIGN BOARD	CHANGE		LOCATION			
		CH	NGE	LL	RL	CR(L)	CR(R)
SP-11	T-Intersection	1896	7155	✓			
		7155	11858	✓			
		11858	12750	✓			
		12750	25133	✓			
		25133	32952	✓			
		32952	1996	✓			
		1996	7255	✓			
		7255	11758	✓			
		11758	12950	✓			
		12950	25233	✓			
		25233	32652	✓			
		32652	2498	✓			
		2498	12740	✓			
		12740	15796	✓			
		15796	18654	✓			
		18654	27077	✓			
		27077	28522	✓			
		28522	29461	✓			
		29461	32468	✓			
		32468	32468	✓			
		32468	2588	✓			
		2588	12840	✓			
		12840	15896	✓			
		15896	18754	✓			
		18754	27177	✓			
		27177	28622	✓			
		28622	28561	✓			
		28561	32568	✓			

SIGN POST ID	DESCRIPTION OF THE SIGN BOARD	CHANGE		LOCATION			
		CH	NGE	LL	RL	CR(L)	CR(R)
SP-12	Protestant Crossing	288	773	✓			
		773	3036	✓			
		3036	3401	✓			
		3401	4838	✓			
		4838	4963	✓			
		4963	7170	✓			
		7170	7958	✓			
		7958	8073	✓			
		8073	9173	✓			
		9173	10070	✓			
		10070	10508	✓			
		10508	13073	✓			
		13073	13188	✓			
		13188	13854	✓			
		13854	17200	✓			
		17200	18613	✓			
		18613	18703	✓			
		18703	20463	✓			
		20463	20770	✓			
		20770	20978	✓			
		20978	28133	✓			
		28133	28463	✓			
		28463	32363	✓			
		32363	34248	✓			
		34248	34310	✓			
		34310	34533	✓			
		34533	36523	✓			
		36523	36650	✓			
		36650	37123	✓			
		37123	38570	✓			
		38570	328	✓			
		328	833	✓			
		833	3068	✓			
		3068	3468	✓			
		3468	4888	✓			
		4888	5023	✓			
		5023	7180	✓			
		7180	8018	✓			
		8018	8133	✓			
		8133	9833	✓			
		9833	10130	✓			
		10130	10688	✓			
		10688	13133	✓			
		13133	14698	✓			
		14698	17268	✓			
		17268	18673	✓			
		18673	18763	✓			
		18763	20523	✓			
		20523	20830	✓			
		20830	21038	✓			
		21038	28193	✓			
		28193	28523	✓			
		28523	32363	✓			
		32363	33148	✓			
		33148	34308	✓			
		34308	34370	✓			
		34370	34593	✓			
		34593	36583	✓			
		36583	36710	✓			
		36710	37183	✓			
		37183	38630	✓			
		38630	-NIL-	✓			
		-NIL-	12750	✓			
		12750	12830	✓			
		12830	-NIL-	✓			
		-NIL-	100	✓			

SIGN POST ID	DESCRIPTION OF THE SIGN BOARD	CHANGE		LOCATION			
		CH	NGE	LL	RL	CR(L)	CR(R)
SP-14(b)	Y-Intersection	2981	5520	✓			
		5520	18392	✓			
		18392	22605	✓			
		22605	37468	✓			
		37468	8365	✓			
		8365	15119	✓			
		15119	38411	✓			
		38411	37030	✓			
		37030	3041	✓			
		3041	5580	✓			
		5580	18452	✓			
		18452	22685	✓			
		22685	37549	✓			
		37549	8305	✓			
		8305	15059	✓			
		15059	38351	✓			
		38351	38970	✓			
		38970	-NIL-	✓			
		-NIL-	7990	✓			
		7990	21182	✓			
		21182	21282	✓			
		21282	28790	✓			
		28790	28890	✓			
		28890	27520	✓			
		27520	27820	✓			
		27820	1875000	✓			
		1875000	1986200	✓			
		1986200	4320000	✓			
		4320000	4440250	✓			
		4440250	11801000	✓			
		11801000	11801400	✓			
		11801400	15143000	✓			
		15143000	15256600	✓			
		15256600	18872000	✓			
		18872000	15799200	✓			
		15799200	17796000	✓			
		17796000	17923200	✓			
		17923200	21878000	✓			
		21878000	21808400	✓			
		21808400	29228000	✓			

1. LL = LEFT LANE
2. RL = RIGHT LANE
3. CR(L) = CROSS ROAD LEFT
4. CR(R) = CROSS ROAD RIGHT
5. SIGN POST SHALL BE INSTALLED AT AN OFFSET DISTANCE OF 2M FROM THE EDGE OF CARRIAGE WAY
6. FOR DETAILS OF ROAD SIGNS REFER DWG-Nos FROM

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

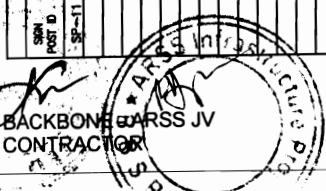
**CONSULTING ENGINEERS GROUP LTD.**  
E-12, Moj Colony, Malviya Nagar, Jaipur-17  
Tel: +91-141-2520899, 2521899, 2520556  
Fax: 2521348, e-mail: ceg@cegindia.com



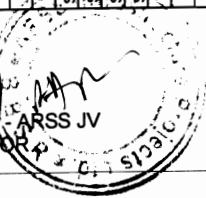
SCALE	DATE	REV	RO	NTS		
				B.M.	J.P.	S.G

**SCHEDULE OF SIGN POSTS**  
BERHAMPUR TO TAPTAPANI (SH-17, KM 0 TO 41)

DRG. NO.	DATE	REV	RO	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO. 45							



Chief Engineer  
World Bank Projects, Jaipur  
O/o the E.I.C (I) P.O. Jaipur  
Ph: Jaipur



Chief Engineer  
World Bank Projects  
E-12, Moji Colony, Malviya Nagar Jaipur-17  
Tel: +91-141-2520899, 2521899, 2520556  
Fax: 2521348, e-mail: ceg@ceginidia.com

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

SCHEDULE OF SIGN POSTS

SIGN POST ID	DESCRIPTION OF THE SIGN BOARD	CHANGGE	LOCATION		
			LL	RL	CR(L) CR(R)
		29455.000	✓		
		41599.500	✓		
		41748.250	✓		
		42340.000	✓		
		42446.500	✓		
SP-15(b)	Dual C' way Starts	-NIL-			
SP-15(G)	Dual C' way End	-NIL-			
SP-15(d)	Series of Bends	-NIL-			
SP-16(G)	Hump or Roughroad	9850	✓		
		9950	✓		
		10150	✓		
		10250	✓		
		13550	✓		
		13750	✓		
		17100	✓		
		17350	✓		
		20700	✓		
		20900	✓		
		34260	✓		
		34405	✓		
		38450	✓		
		38650	✓		
SP-16(b)	Barrier Ahead	-NIL-			
SP-17	State Route Marker Sign	100	✓		
		150	✓		
		40050	✓		
		41000	✓		
SP-18(G)	Guarded Railway Crossing at 200m	-NIL-			
SP-18(b)	Guarded Railway Crossing at 50-100m	-NIL-			
SP-19	Advance direction	2400	✓		
		40525	✓		

1. LL = LEFT LANE
2. RL = RIGHT LANE
3. CR(L) = CROSS ROAD LEFT
4. CR(R) = CROSS ROAD RIGHT
5. SIGN POST SHALL BE INSTALLED AT AN OFFSET DISTANCE OF 2M FROM THE EDGE OF CARRIAGE WAY
6. FOR DETAILS OF ROAD SIGNS REFER DWG.Nos FROM

SCHEDULE OF SIGN POSTS

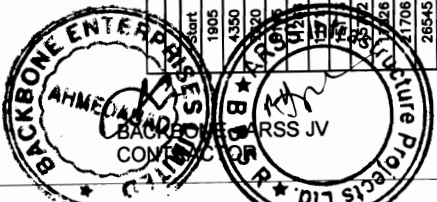
SIGN POST ID	DESCRIPTION OF THE SIGN BOARD	CHANGGE	LOCATION		
			LL	RL	CR(L) CR(R)
SP-21	Village Name Direction	2498	✓		
		5510	✓		
		11668	✓		
		12750	✓		
		22595	✓		
		36960	✓		
		37479	✓		
		2578	✓		
		5590	✓		
		11748	✓		
		12630	✓		
		22675	✓		
		37040	✓		
		37559	✓		
SP-22	Petrol Bunk	22300	✓		
		22400	✓		
		24760	✓		
		24860	✓		
SP-23(G)	Hospital	-NIL-			
SP-23(b)	Dispensary	-NIL-			
SP-24	Public Telephone	24500	✓		
SP-25	Advance direction	24680	✓		
		24290	✓		
SP-26	Eating Place	24390	✓		
		35900	✓		
		36000	✓		
		49450	✓		
		49550	✓		
SP-27	Truck Lay Bye	22275	✓		
		22500	✓		
SP-28	Toll Plaza	21800	✓		
		22340	✓		
SP-36	Environmental Signage	26976	✓		
		27076	✓		
SP-37	Environmental Signage	26996	✓		
		27056	✓		
SP-47	Environmental Signage	27006	✓		
		27046	✓		

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

SCHEDULE OF SIGN POSTS  
BERHAMPUR TO TAPTAPANI (SH-17, KM 0 TO 41)

DWG NO. OSRP/330/SH-17/504 03	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO. 46	DATE	REV	RD	
SCALE	NTS	B.M.	J.P.	R.R.D.K S.G





**SCHEDULE OF GUARD POSTS**  
LHS

Start	End	Length	Ref. Drawings
1905	1958	53	ORSP/CEG/CB
4350	4410	60	-do-
8145	8180	35	-do-
11266	11315	49	-do-
11711	11771	60	-do-
15173	15227	54	-do-
15702	15770	68	-do-
17828	17894	66	-do-
21706	21779	73	-do-
29186	29238	52	-do-
29258	29425	167	-do-
29541	29875	134	-do-
39425	39452	27	-do-
41630	41719	89	-do-
42365	42417	52	-do-
42820	42905	85	-do-
Total Length of LHS = > 1083			

**SCHEDULE OF GUARD POSTS**  
RHS

Start	End	Length	Ref. Drawings
1905	1958	53	ORSP/CEG/CB
4350	4410	60	-do-
8145	8180	35	-do-
11266	11315	49	-do-
11711	11771	60	-do-
15173	15227	54	-do-
15702	15770	68	-do-
17828	17894	66	-do-
21706	21779	73	-do-
29186	29238	52	-do-
29258	29425	167	-do-
29541	29875	134	-do-
39425	39452	27	-do-
41630	41719	89	-do-
42365	42417	52	-do-
42820	42905	85	-do-
Total Length of RHS = > 1126			

**SCHEDULE OF ROAD DELINEATORS AT CURVES UPTO 1000M**

HAND OF CURVE	START	END	CURVE LENGTH	RADIUS	SPACING	NO ON THE OUTER	NO. ON THE INNER	TOTAL
Right	947.941	1214.078	266.137	875	45	6	3	15
Left	1599.69	1779.082	179.372	700	42	4	2	12
Left	2107.733	2182.189	74.456	1000	50	1	1	8
Right	2426.223	2923.589	497.366	800	45	11	6	23
Left	3316.951	3683.551	366.6	850	45	8	4	18
Right	6620.548	6735.568	115.02	800	45	3	1	10
Right	7189.286	7244.265	54.979	200	20	3	1	10
Left	9540.024	9657.372	117.348	240	20	6	3	15
Right	9914.974	10096.191	181.217	800	38	5	2	13
Left	10876.174	10893.571	17.397	240	20	1	0	7
Right	12889.461	13352.391	362.93	1000	50	7	4	17
Left	13505.375	13641.791	136.416	1000	50	3	1	10
Left	20226.474	20389.84	163.366	800	45	4	2	11
Right	21186.949	21824.616	437.667	1000	50	9	4	19
Left	24125.015	24279.334	154.319	800	45	3	2	11
Right	24613.097	24634.125	21.028	90	8	3	1	10
Right	29171.848	29222.041	50.193	500	35	1	1	8
Left	29435.605	29506.844	71.239	400	30	2	1	10
Right	30655.852	30896.128	40.276	500	35	1	1	8
Right	33333.487	33390	46.513	800	45	1	1	8
Right	33907.555	33961.692	54.137	500	35	2	1	8
Left	34342.814	34472.866	130.052	400	30	4	2	13
Right	36289.188	36828.793	339.605	1000	50	7	3	16
Left	36928.588	37022.963	94.395	400	30	3	2	11
Right	37584.391	37846.485	62.094	500	35	2	1	9
Left	40304.168	40525.258	221.09	800	45	5	2	13
Right	40933.373	40989.182	55.809	1000	50	1	1	8
Left	41357.1	41393.581	36.481	125	12	3	2	11
Right	41576.87	41592.772	15.902	90	8	2	1	9
Left	41778.402	41892.362	113.98	400	30	4	2	12
Right	42167.21	42364.864	197.674	200	20	10	5	21
Left	42486.719	42517.343	30.624	200	20	2	1	8
TOTAL =							>	391

NOTE:

1. ROAD DELINEATORS SHALL BE PROVIDED AS PER THE GUIDELINES IN IRC:79-1981
2. FOR THE DETAILS OF ROAD DELINEATORS REFER DWG NO OSRP/CEG/RD

- NOTE:
1. GUARD POSTS SHALL BE PROVIDED AS PER THE DRAWING NO OSRP/CEG/KM & GP
  2. GUARD POSTS SHALL BE PROVIDED AT ALL THE SECTIONS WITH HT OF EMBANKMENT MORE THAN 3m AND BRIDGE LOCATIONS AS PER DRAWING NO OSRP/CEG/TR

**SCHEDULE OF CRASH BARRIER & DELINEATORS**  
BERHAMPUR TO TAPIPANI (SH-17, KM 0 TO 41)

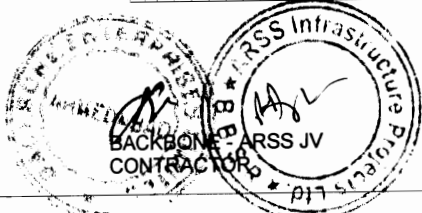
DRG NO.	OSRP/CEG/SH-17/SCH 04	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	47	DATE	REV	RD	
SCALE	NTS				
			B.M.	J.P.	R.R.D.K
					S.G

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

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





Schedule of Bus Bay Details

Start	End	LHS	Type	Ref. Drawings
750	865		1	ORSP/CEG/BB/01
3015	3120		1	ORSP/CEG/BB/01
4940	5045		1	ORSP/CEG/BB/01
7935	8040		1	ORSP/CEG/BB/01
9750	9855		1	ORSP/CEG/BB/01
13175	13280		1	ORSP/CEG/BB/01
18590	18695		1	ORSP/CEG/BB/01
20440	20545		1	ORSP/CEG/BB/01
23950	24055		1	ORSP/CEG/BB/01
28110	28215		1	ORSP/CEG/BB/01
32260	32365		1	ORSP/CEG/BB/01
34510	34615		1	ORSP/CEG/BB/01
36500	36605		1	ORSP/CEG/BB/01

Schedule of Bus Bay Details

Start	End	RHS	Type	Ref. Drawings
245	350		1	ORSP/CEG/BB/01
3385	3490		1	ORSP/CEG/BB/01
4815	4920		1	ORSP/CEG/BB/01
8050	8155		1	ORSP/CEG/BB/01
10485	10590		1	ORSP/CEG/BB/01
13050	13155		1	ORSP/CEG/BB/01
16680	16785		1	ORSP/CEG/BB/01
20855	20960		1	ORSP/CEG/BB/01
24370	24475		1	ORSP/CEG/BB/01
28440	28545		1	ORSP/CEG/BB/01
32605	32710		1	ORSP/CEG/BB/01
34225	34330		1	ORSP/CEG/BB/01
37100	37205		1	ORSP/CEG/BB/01

SCHEDULE OF EXTRA WIDENING

START	END	LENGTH	WIDENING IN MT.	SIDE
4434.507	4482.261	48	0.300	Both side
7189.286	7244.265	55	0.300	Both side
8222.134	8235.377	13	0.300	Both side
9540.024	9657.372	117	0.300	Both side
10876.174	10983.571	17	0.300	Both side
24613.097	24634.125	21	0.450	Both side
25399.072	25399.015	11	0.300	Both side
41357.100	41363.581	36	0.300	Both side
41576.670	41582.772	16	0.450	Both side
42167.210	42364.864	196	0.300	Both side
42486.719	42517.343	31	0.300	Both side

NOTE:

- FOR DETAILS OF BUS BAYS REFER DWG NO. OSRP/CEG/BB/01 AND 02
- LOCATIONS OF THE BUS BAYS MAY BE CHANGED AT SITE AS PER THE REQUIREMENTS AND CONDITION DURING THE CONSTRUCTION
- LOWER BUS BAYS STANDARDS SHALL BE ADOPTED AS PER THE REQUIREMENTS AND CONDITIONS DURING THE TIME OF CONSTRUCTION (TYPE-2 STANDARDS SHALL BE ADOPTED WHEREVER TYPE-1 STANDARDS ARE NOT FEASIBLE FROM ECONOMIC POINT OF VIEW)

NOTE:

- EXTRA WIDENING HAS BEEN DONE AS PER THE GUIDELINES DETAILED IN IRC:73-1980
- WIDENING SHALL BE DONE EQUALLY ON BOTH THE INNER AND OUTER CURVES
- THE SLOPE OF THE CARRIAGEWAY SHALL EXTEND IN TH WIDENING SECTIONS

Schedule of Petrol Bunk

Km.	LHS/RHS	Ref. Drawings
22350	LHS	SP-22
24810	RHS	SP-22

Rumble Strip

CHANGES		
50	4400	5400
10600	18200	19150
24450	24750	32150
		33350

SCHEDULE OF RPMs ALONG CURVES

SL. NO.	CURVE START	CURVE END	RADIUS	CURVE LENGTH	TRANSITION	NO. OF RPM
1	24608.738	24629.767	90	21.028	55	44
2	41356.508	41394.967	125	38.481	90	52
3	41578.278	41584.178	90	15.902	75	55

SCHEDULE OF EATING PLACE

Km.	LHS/RHS	Ref. Drawings
24340	Lhs	SP-26
32200	Lhs	SP-26
35950	Lhs	SP-26
37500	Lhs	SP-26
48500	Lhs	SP-26

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 GROUP LTD.**  
E-12, Moj Colony, Malviya Nagar Jaipur-17

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SCHEDULE OF BUS BAY, EXTRA WIDENING, RUMBLE STRIP, PETROLE BUNK, RPMs & EATING PLACE  
BERHAMPUR TO TAPTAPANI (SH-17, KM 0 TO 41)

DRG. NO.	OSRP/CEG/SH-17/SCH 06	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	48	DATE	REV	RD	
SCALE	NTS				B.M.
					J.P.
					R.R.D.K
					S.G

SCHEDULE OF ROAD HUMP

SL. NO.	CHAINAGE	TYPE OF JUNCTION	Description	LHS/RHS
1	1944	T-Type	Village Cross Road	LHS
2	2538	T-Type	Village Cross Road	RHS
3	5011	Y-Type	Village Cross Road	LHS
4	5550	Y-Type	Village Cross Road	LHS
5	7205	T-Type	Village Cross Road	RHS
6	8335	Y-Type	Village Cross Road	RHS
7	11708	T-Type	Village Cross Road	LHS
8	12800	T-Type	Village Cross Road	RHS
9	12780	T-Type	Village Cross Road	RHS
10	15088	Y-Type	Village Cross Road	RHS
11	15846	T-Type	Village Cross Road	RHS
12	16422	Y-Type	Village Cross Road	LHS
13	18704	T-Type	Village Cross Road	RHS
14	22635	Y-Type	Village Cross Road	LHS
15	24590	Typical 4-Legged	Village Cross Road	Both Side
16	25183	T-Type	Village Cross Road	LHS
17	27127	T-Type	Village Cross Road	RHS
18	28572	T-Type	Village Cross Road	RHS
19	29511	T-Type	Village Cross Road	RHS
20	32518	T-Type	Village Cross Road	RHS
21	32602	T-Type	Village Cross Road	RHS
22	36381	Y-Type	Village Cross Road	RHS
23	36748	Typical 4-Legged	Village Cross Road	Both Side
24	37000	Y-Type	Village Cross Road	RHS
25	37519	Y-Type	Village Cross Road	LHS
26	8900	School Zone	Main Carriageway	
27	10200	School Zone	Main Carriageway	
28	13600	School Zone	Main Carriageway	
29	13700	School Zone	Main Carriageway	
30	17150	School Zone	Main Carriageway	
31	17300	School Zone	Main Carriageway	
32	20750	School Zone	Main Carriageway	
33	20850	School Zone	Main Carriageway	
34	34310	School Zone	Main Carriageway	
35	34355	School Zone	Main Carriageway	
36	38500	School Zone	Main Carriageway	
37	38600	School Zone	Main Carriageway	

Schedule of Junction Details

Sl. No.	Chainage	Type of Junction	LHS/RHS	Ref. Dwg. No.
1	0	Y-Type	Major Junct.	OSRP/CEG/AM/04+000
1	1944	T-Type	LHS	OSRP/CEG/AM/02
2	2538	T-Type	RHS	OSRP/CEG/AM/02
3	3011	Y-Type	LHS	OSRP/CEG/AM/03
4	5550	Y-Type	LHS	OSRP/CEG/AM/03
5	7205	T-Type	RHS	OSRP/CEG/AM/02
6	8335	Y-Type	RHS	OSRP/CEG/AM/03
7	11708	T-Type	LHS	OSRP/CEG/AM/02
8	12800	T-Type	RHS	OSRP/CEG/AM/02
9	12780	T-Type	RHS	OSRP/CEG/AM/02
10	15088	Y-Type	RHS	OSRP/CEG/AM/02
11	15846	T-Type	RHS	OSRP/CEG/AM/02
12	16422	Y-Type	LHS	OSRP/CEG/AM/03
13	18704	T-Type	RHS	OSRP/CEG/AM/02
14	22635	Y-Type	LHS	OSRP/CEG/AM/03
15	24590	Typical 4-Legged	Major Junct.	OSRP/CEG/AM/24+580
16	25183	T-Type	LHS	OSRP/CEG/AM/02
17	27127	T-Type	RHS	OSRP/CEG/AM/02
18	28572	T-Type	RHS	OSRP/CEG/AM/02
19	29511	T-Type	RHS	OSRP/CEG/AM/02
20	32518	T-Type	RHS	OSRP/CEG/AM/02
21	32602	T-Type	LHS	OSRP/CEG/AM/02
22	36381	Y-Type	RHS	OSRP/CEG/AM/03
23	36748	Typical 4-Legged		OSRP/CEG/AM/01
24	37000	Y-Type	RHS	OSRP/CEG/AM/03
25	37519	Y-Type	LHS	OSRP/CEG/AM/03

SCHEDULE OF PEDESTRIAN CROSSING

School Zone	Hospital Zone	CHAINAGE	Bus Bays
7750	-	803	298
10100	-	3068	3438
13664	-	4993	4868
17230	-	7988	8103
20800	-	9803	10538
34340	-	13228	13103
36680	-	18643	18733
38600	-	20493	21008
-	-	28163	28493
-	-	32333	33118
-	-	34563	34278
-	-	36553	37153

SCHEDULE OF LINE DRAIN

Sl. No.	Chainage		Length	LHS/RHS
	Start	End		
1	0.000	820.000	820	Both Side
2	1600.000	2100.000	500	Both Side
3	2400.000	2600.000	200	Both Side
4	3060.000	3460.000	380	Both Side
5	4410.000	4910.000	500	Both Side
6	6785.000	10545.000	760	Both Side
7	7025.000	7270.000	245	Both Side
8	8200.000	8380.000	180	Both Side
9	8645.000	10600.000	755	Both Side
10	11685.000	11900.000	235	Both Side
11	12725.000	13690.000	965	Both Side
12	15645.000	15880.000	235	Both Side
13	17200.000	17460.000	260	Both Side
14	18235.000	19100.000	865	Both Side
15	20600.000	20920.000	320	Both Side
16	23000.000	25100.000	1900	Both Side
17	26200.000	28420.000	2220	Both Side
18	31980.000	33330.000	1370	Both Side
19	34100.000	34650.000	550	Both Side
20	36285.000	37200.000	915	Both Side

Total Line Drain Length = 24600

- NOTE:-
- FOR DETAILS OF PEDESTRIAN CROSSING REFER ROAD MARKINGS
  - FOR DETAILS OF RPMs AT PEDESTRIAN CROSSING REFER STANDARD DRAWINGS

BACKBONE - ARSS JV  
CONTRACTOR

Chief Engineer  
World Bank Projects, Orissa  
O/c the E.I.C. (Civil) Deptt.  
Bhubaneswar

**CONSULTING ENGINEERS GROUP LTD.**  
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Fax: 2521348, e-mail: ceg@ceginodia.com

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

SCHEDULE OF HUMPS, JUNCTION, PEDESTRIAN CROSSING, LINE DRAIN  
BERHAMPUR TO TAPTAPANI (SH-17, KM 0 TO 41)

DRG. NO.	OSRP/CEG/SH-17/SCH 06	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)			
SH. NO.	48	DATE	REV	RO				
SCALE		NTS			B.M.	J.P.	R.R.D.K	S.G

SCHEDULE FOR PAVEMENT COMPOSITION AND TYPE OF CONSTRUCTION FOR BERHAMPUR TO TAPTAPANI (SH-17)

Sl.No.	Prop chalnage		Length in KM	Thickness Design (RC-37) Crust Details for Existing Pavement					Thickness Design (RC-37) Crust Details for New Roadway					Type of Construction			
	From	To		Base	Sub Base	Sub grade	Embankment (FM)	Total Thickness	Surface Course	Base	Sub Base	Sub grade	Total Thickness				
1	0.000	14.000	14.000	WM2	GM2	110	150	215	40	75	100	150	100	150	500	1125	Reconstruction
2	14.000	14.850	0.850	WM2	GM2	110	150	215	40	75	100	150	100	150	500	1125	Reconstruction
3	14.850	20.000	5.150	WM2	GM2	110	150	215	40	75	100	150	100	150	500	1125	Reconstruction
4	20.000	25.170	5.170	WM2	GM2	110	150	215	40	75	100	150	100	150	500	1125	Reconstruction
5	25.170	27.150	2.980	WM2	GM2	110	150	215	40	75	100	150	100	150	500	1125	Reconstruction
6	27.150	28.000	0.850	WM2	GM2	110	150	215	40	75	100	150	100	150	500	1125	Reconstruction
7	28.000	29.100	1.100	WM2	GM2	110	150	215	40	75	100	150	100	150	500	1125	Reconstruction
8	29.100	30.950	1.850	WM2	GM2	110	150	215	40	75	100	150	100	150	500	1125	Reconstruction
9	30.950	32.150	1.200	WM2	GM2	110	150	215	40	75	100	150	100	150	500	1125	Reconstruction
10	32.150	36.150	4.000	WM2	GM2	110	150	215	40	75	100	150	100	150	500	1125	Reconstruction
11	36.150	40.180	4.030	WM2	GM2	110	150	215	40	75	100	150	100	150	500	1125	Reconstruction
12	40.180	41.000	0.820	WM2	GM2	110	150	215	40	75	100	150	100	150	500	1125	Reconstruction
13	41.000	41.000	0.000	WM2	GM2	110	150	215	40	75	100	150	100	150	500	1125	Reconstruction

DETAILED PAVEMENT SCHEDULE FOR BERHAMPUR TO TAPTAPANI (SH-17)

Sl.No.	Prop chalnage		Length in KM	Total Thickness	Type of Construction	Type of Area	TCS	SI.No.	Prop chalnage		Length in KM	Total Thickness	Type of Construction	Type of Area	TCS	SI.No.
	From	To							From	To						
1	0.000	0.820	0.820	1125	Reconstruction	Built up	TCS-5	27	17.200	17.450	0.250	1625	New Construction	Built up	TCS-19	27
2	0.820	1.600	0.780	1125	Reconstruction	Built up	TCS-8	28	17.450	18.230	0.780	1625	New Construction	Built up	TCS-18	28
3	1.600	2.100	0.500	1125	Reconstruction	Built up	TCS-5	29	18.230	19.100	0.870	1625	New Construction	Built up	TCS-19	29
4	2.100	2.400	0.300	1125	Reconstruction	Built up	TCS-8	30	19.100	20.000	0.900	1625	New Construction	Built up	TCS-18	30
5	2.400	2.600	0.200	1125	Reconstruction	Built up	TCS-5	31	20.000	20.900	0.900	1125	Reconstruction	Built up	TCS-5	31
6	2.600	3.090	0.490	1125	Reconstruction	Built up	TCS-8	32	20.900	20.920	0.020	1125	Reconstruction	Built up	TCS-8	32
7	3.090	3.460	0.370	1125	Reconstruction	Built up	TCS-5	33	20.920	23.200	2.280	1125	Reconstruction	Built up	TCS-5	33
8	3.460	4.410	0.950	1125	Reconstruction	Built up	TCS-8	34	23.200	25.100	1.900	1125	Reconstruction	Built up	TCS-8	34
9	4.410	4.810	0.400	1125	Reconstruction	Built up	TCS-5	35	25.100	25.170	0.070	1125	Reconstruction	Built up	TCS-5	35
10	4.810	7.820	3.010	1125	Reconstruction	Built up	TCS-8	36	25.170	27.170	2.000	1100	Reconstruction	Built up	TCS-8	36
11	7.820	7.970	0.150	1125	Reconstruction	Built up	TCS-5	37	27.170	27.650	0.480	1100	Reconstruction	Built up	TCS-5	37
12	7.970	7.740	-0.230	1125	Reconstruction	Built up	TCS-8	38	27.650	28.900	1.250	1100	Reconstruction	Built up	TCS-8	38
13	7.740	7.940	0.200	1125	Reconstruction	Built up	TCS-5	39	28.900	28.42	-0.480	1100	Reconstruction	Built up	TCS-5	39
14	7.940	8.200	0.260	1125	Reconstruction	Built up	TCS-8	40	28.42	29.100	0.680	1100	Reconstruction	Built up	TCS-8	40
15	8.200	8.380	0.180	1125	Reconstruction	Built up	TCS-5	41	29.100	30.850	1.750	1100	Reconstruction	Built up	TCS-5	41
16	8.380	9.840	1.460	1125	Reconstruction	Built up	TCS-8	42	30.850	31.960	1.110	1100	Reconstruction	Built up	TCS-8	42
17	9.840	10.600	0.760	1125	Reconstruction	Built up	TCS-5	43	31.960	32.160	0.200	1100	Reconstruction	Built up	TCS-5	43
18	10.600	11.660	1.060	1125	Reconstruction	Built up	TCS-8	44	32.160	33.330	1.170	1100	Reconstruction	Built up	TCS-8	44
19	11.660	11.900	0.240	1125	Reconstruction	Built up	TCS-5	45	33.330	34.100	0.770	1100	Reconstruction	Built up	TCS-5	45
20	11.900	12.720	0.820	1125	Reconstruction	Built up	TCS-8	46	34.100	34.650	0.550	1100	Reconstruction	Built up	TCS-8	46
21	12.720	13.690	0.970	1125	Reconstruction	Built up	TCS-5	47	34.650	36.150	1.500	1100	Reconstruction	Built up	TCS-5	47
22	13.690	14.000	0.310	1125	Reconstruction	Built up	TCS-8	48	36.150	36.265	0.135	1625	New Construction	Built up	TCS-8	48
23	14.000	14.850	0.850	1125	Reconstruction	Built up	TCS-5	49	36.265	37.200	0.935	1625	New Construction	Built up	TCS-5	49
24	14.850	15.940	1.090	1625	New Construction	Built up	TCS-18	50	37.200	40.180	2.980	1625	New Construction	Built up	TCS-18	50
25	15.940	15.880	-0.060	1625	New Construction	Built up	TCS-19	51	40.180	41.000	0.820	1100	Reconstruction	Built up	TCS-19	51
26	15.880	17.200	1.320	1625	New Construction	Built up	TCS-18	52	41.000	41.000	0.000	1100	Reconstruction	Built up	TCS-18	52

Note:

1. The pavement design has been based on IRC : 37- 2001 & IRC:81 - 1997
  2. The Borrowed CBR (not less than 10) shall be used for new construction Section
  3. The typical crosssection applicable for different sections are given in "Standard drawing set"
  4. Lined drain with 10m (7m Carriageway + 1.5m Paved shoulder) shall be provided
- Ref. Dwg. No. TCS-4, TCS-5 & TCS-6

PROJECT:-

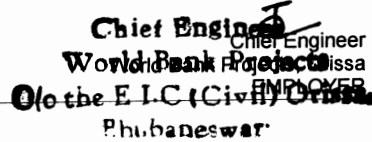
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE-(1) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE.

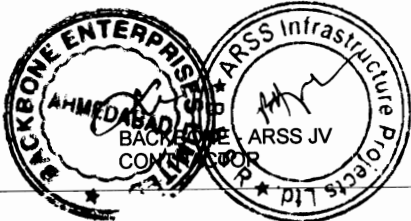
**CONSULTING ENGINEERS GROUP LTD.**  
 E-12, Moj Colony, Matviya Nagar Jaipur-17  
 Tel: +91-141-2520899, 2521899, 2520556  
 Fax: 2521348, e-mail: ceg@ceginia.com

PAVEMENT SCHEDULE  
 BERHAMPUR TO TAPTAPANI (SH-17, KM 0 TO 41)

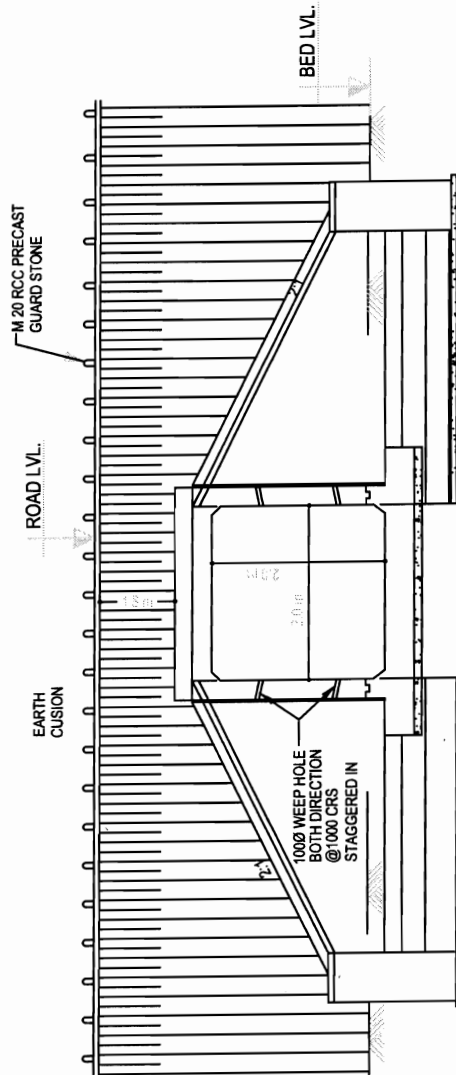
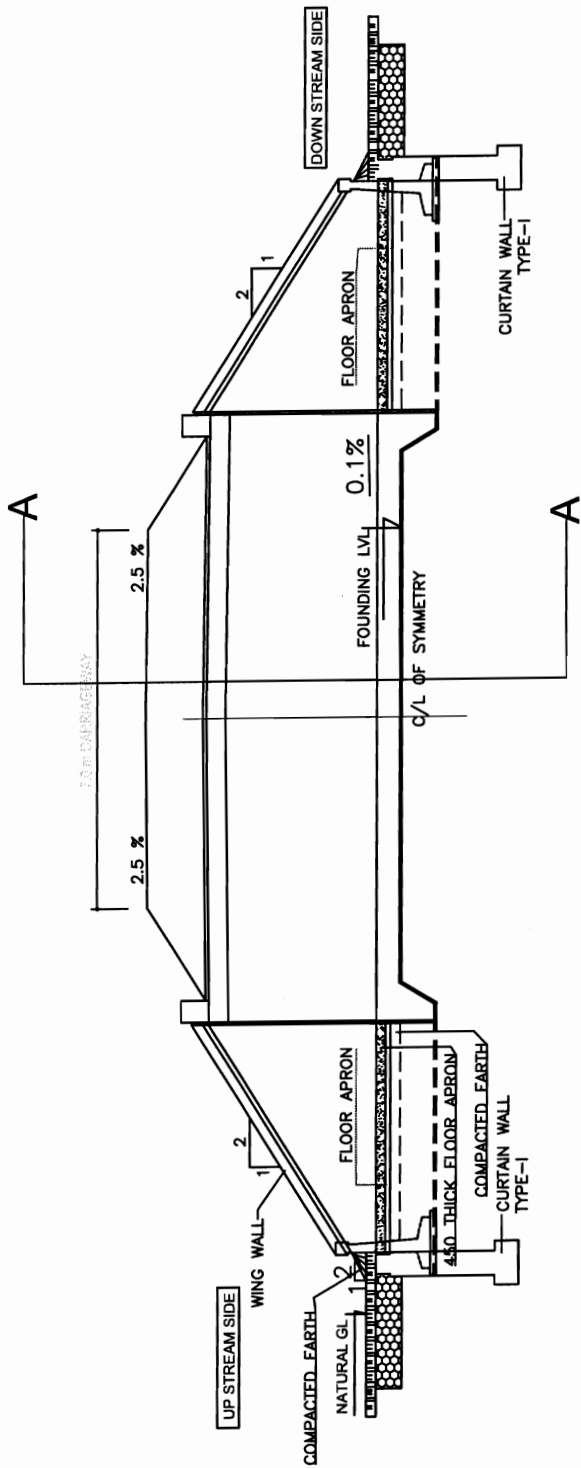
DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
DATE	REV	RO	SCALE
50			

B.M. J.P. R.R.D.K S.G  
 NTS





Chief Engineer  
 Work Bank Project  
 of the E.I.C. (Civil) Orissa  
 Bhubaneswar



SECTION A-A

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

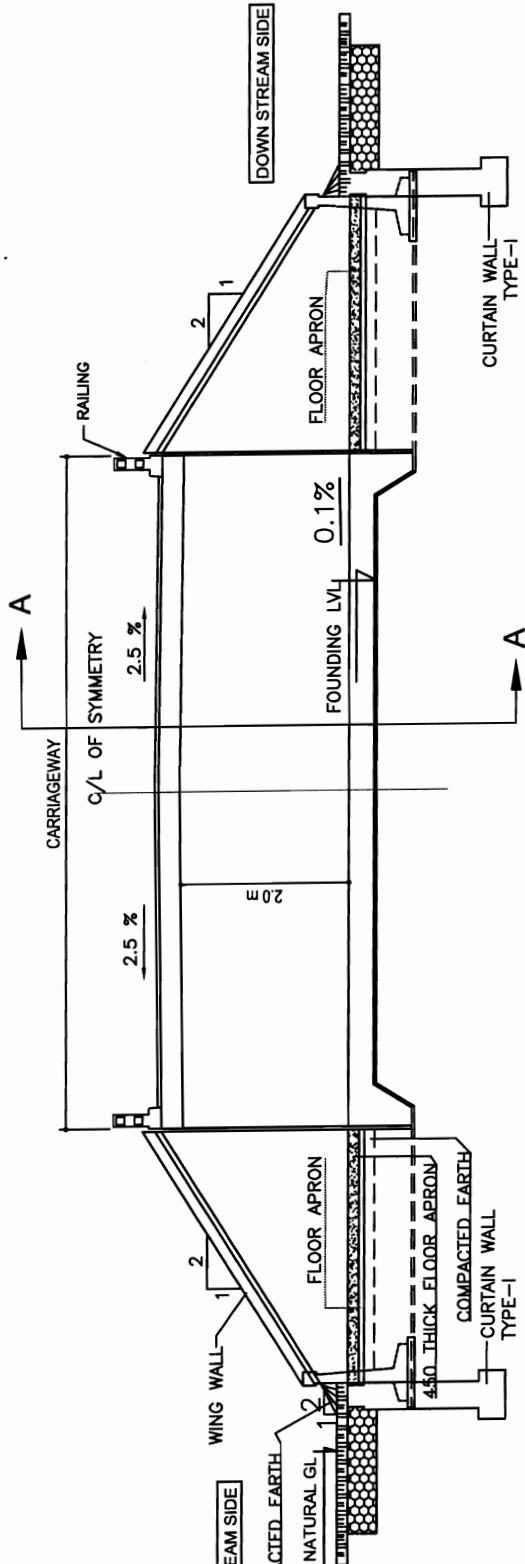
TYPICAL ANIMAL PASS (WITH CUSHION)

BERHAMPUR TO TAPTAPANI (SH-17, KM 0 TO 41)

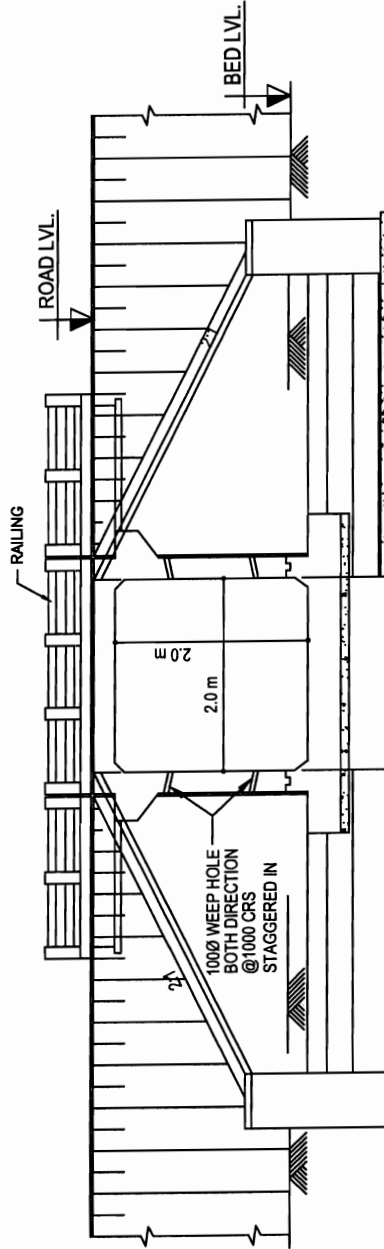
DRG. NO.	NEW/REV	DATE	REV	RO	SCALE
SH. NO. 51					

DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)

B.M.	J.P.	R.R.D.K	S.G



LONGITUDINAL SECTION



SECTION A-A

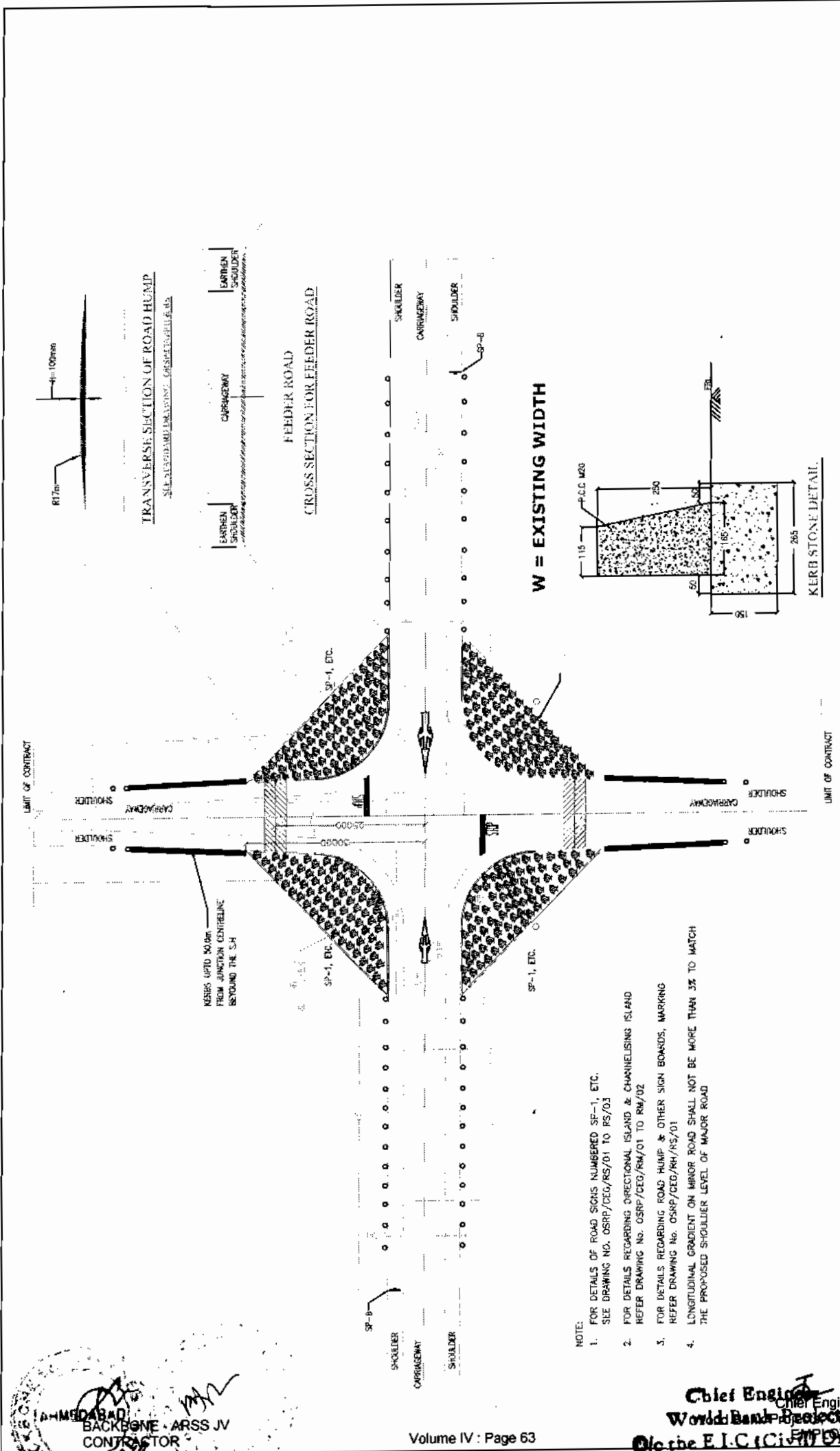
BACKBONE - ARSS JV
   
 CONTRACTOR

Chief Engineer
   
 World Bank Projects, Orissa
   
 O/o the E.I.C (Civil) PHUNESWAR
   
 Phubaneswar

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

TYPICAL ANIMAL PASS		BERHAMPUR TO TAPTAPANI (SH-17, KM 0 TO 41)	
DRG. NO. / REV. / DATE	DESIGNED (A)	DRAWN (B)	CHECKED (C)
SH. NO. 52	DATE	REV	RO
SCALE	B.M.	J.P.	R.R.D.K
			S.G



CONCEPTUAL SITE ENHANCEMENT DESIGNS FOR ROAD JUNCTIONS AS ENVIRONMENTAL IMPACT MITIGATION.

DRG. NO.	OSRP/CEG/SH/EN/01-1-A	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	61	DATE	REV	RD	
SCALE	N.T.S.				
	M	JYOTI	G.P.M	S.G	

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

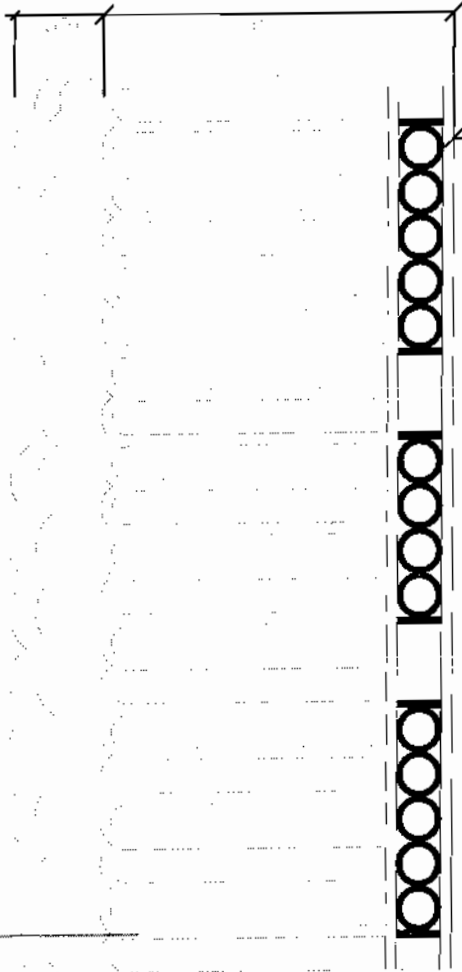
**CONSULTING ENGINEERS GROUP LTD.**  
 E-12, Moji Colony, Malviya Nagar, Jaipur-17  
 Tel: +91-141-2520899, 2521899, 2520556  
 Fax: 2521348, e-mail: ceg@cegroupindia.com

**CEG**

AMMADABAD  
 BACKBONE - ARSS JV  
 CONTRACTOR

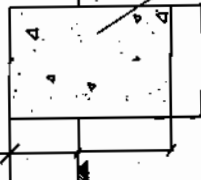
Chief Engineer  
 World Bank Project  
 Chief Engineer  
 Bhubaneswar

M.S FLAT 10mm x 2mm



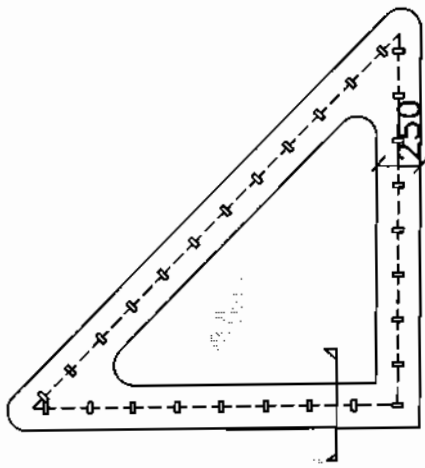
FRONT ELEVATION  
MS GRILL FOR JUNCTION

SECTION A-A



(ALL DIMENSIONS ARE IN mm)

NOTE : SURFACE TO BE PAINTED WITH APPROVED ANTI-GLARE PAINT YELLOW & BLACK. NOTE : SURFACE TO BE PAINTED WITH APPROVED ANTI-GLARE PAINT YELLOW & BLACK.



PLAN OF TS LAND AT JUNCTION

CORNERS AS SITE ENHANCEMENT AND PREVENTION OF ENCRCHED COMMERCIAL ACTIVITY AND KIOSKS WITHIN 20m ON EITHER SIDE OF FEEDER ROAD & SH JUNCTION.ZEBRA CROSSINGS & SPEED ARRESTER RUMBLERS TO BE 10m AND 50m AWAY FROM THE JUNCTION.

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

**CONSULTING ENGINEERS GROUP LTD.**  
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Fax: 2521348, e-mail: ceg@cegroupindia.com

TYPICAL DESIGN OF  
MS GRILL FOR JUNCTION

DRG NO. / OSRP / CEG / SH / ENV / 01 - 8	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO. 62	DATE	REV.	RO	
SCALE	NTS		M	JYOTI
			G.P.M	S.G

BACKBONE  
CONTRACT

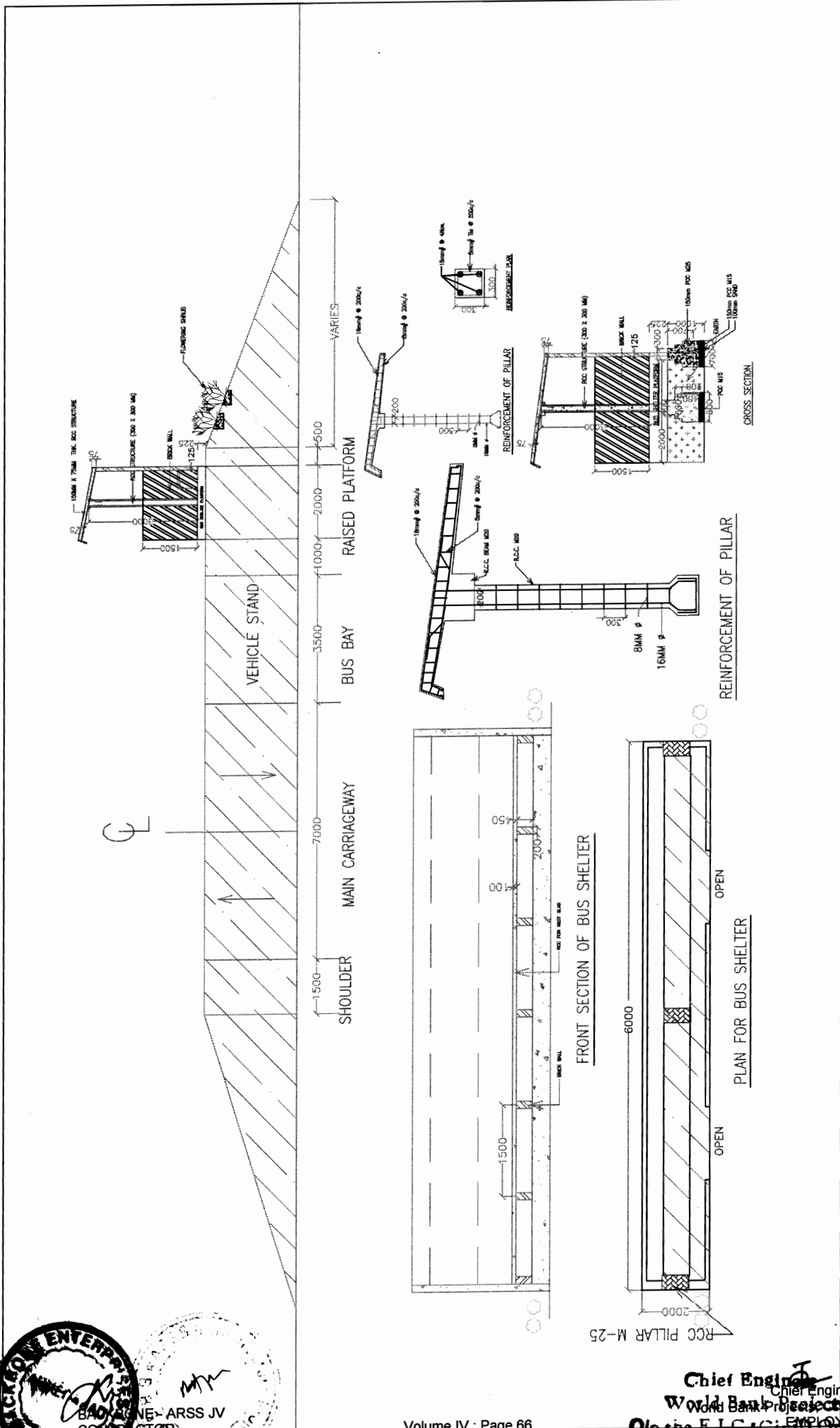
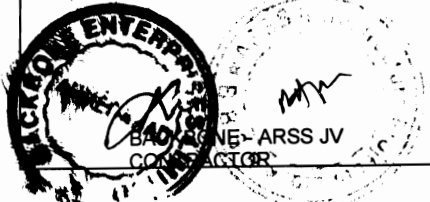


Chief Engineer  
World Bank Project  
EMPLOYER  
To the E.T.C (Civil) Office,  
Bhubaneswar







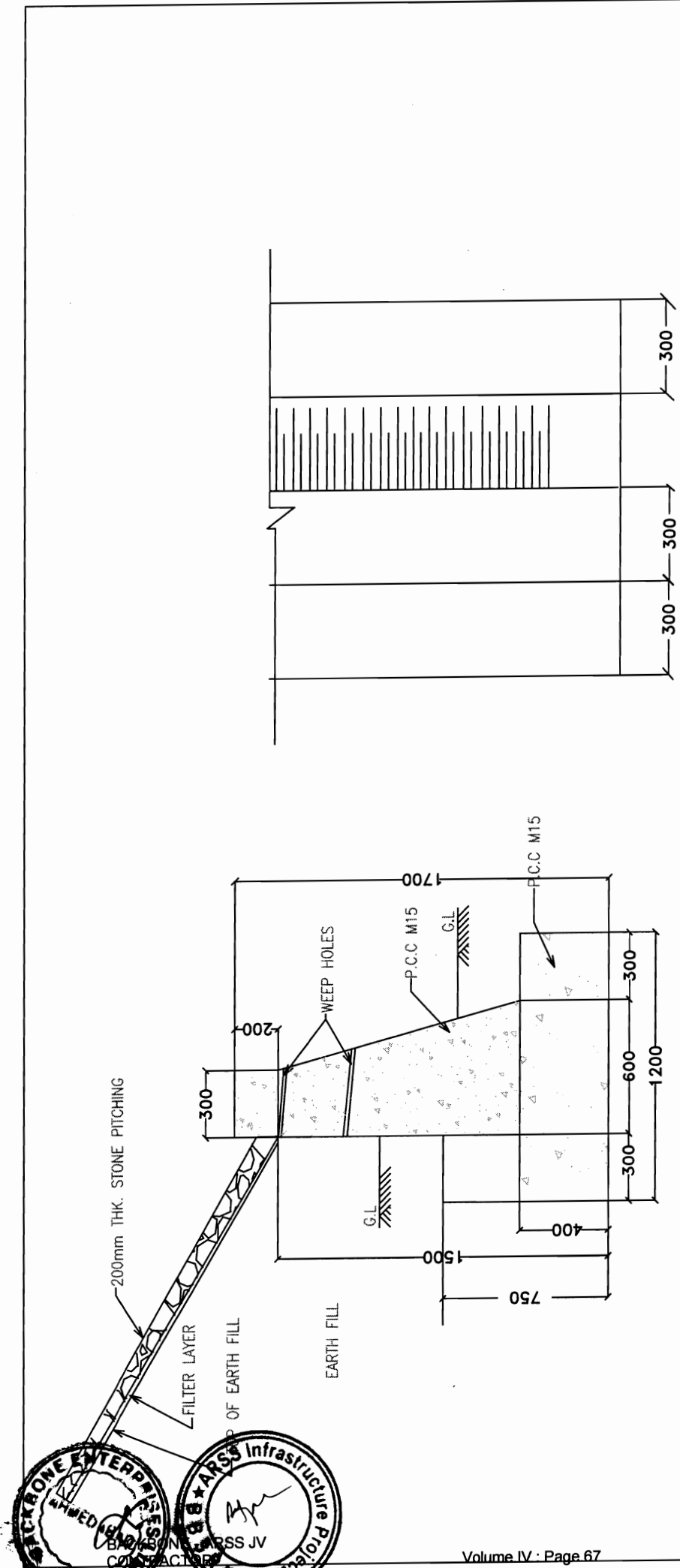


**PROJECT:-**  
 CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND  
 DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS  
 FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK  
 ASSISTANCE

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

**DESIGN OF PASSENGER SHED AT BUS BAY & BUS STOP**

DRG NO.	OSRP/CEG/SH/ENV/02	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	64	DATE	REV	RD	
SCALE		NTS			
		M	JYOTI	G.P.M	S.G



TOE WALL FOR POND  
( CROSS SECTION )

PLAN OF TOE WALL FOR WATER BODY

TO MINIMISE IMPACT ON STORAGE CAPACITY & WATER SPREAD OF PONDS, WATER BODY, NALA BED RETAINING WALLS TO BE ERECTED SUCH THAT IT PREVENTS ACCIDENTAL FALL INTO THE DEPRESSION AND WASHING OF VEHICLES/BATHING/ WASHING GHAT ON THE ROAD SIDE

**PROJECT:-**

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

**CONSULTING ENGINEERS GROUP LTD.**

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



Chief Engineer  
World Bank Project  
EMPLOYER  
Bhubaneswar

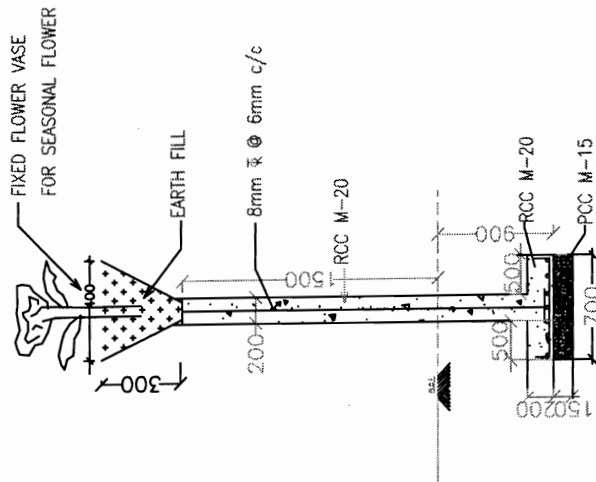
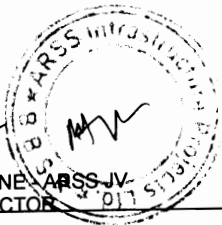
**TYPICAL PCC TOE WALL FOR**

**WATER BODIES AS ENVIRONMENTAL MITIGATION.**

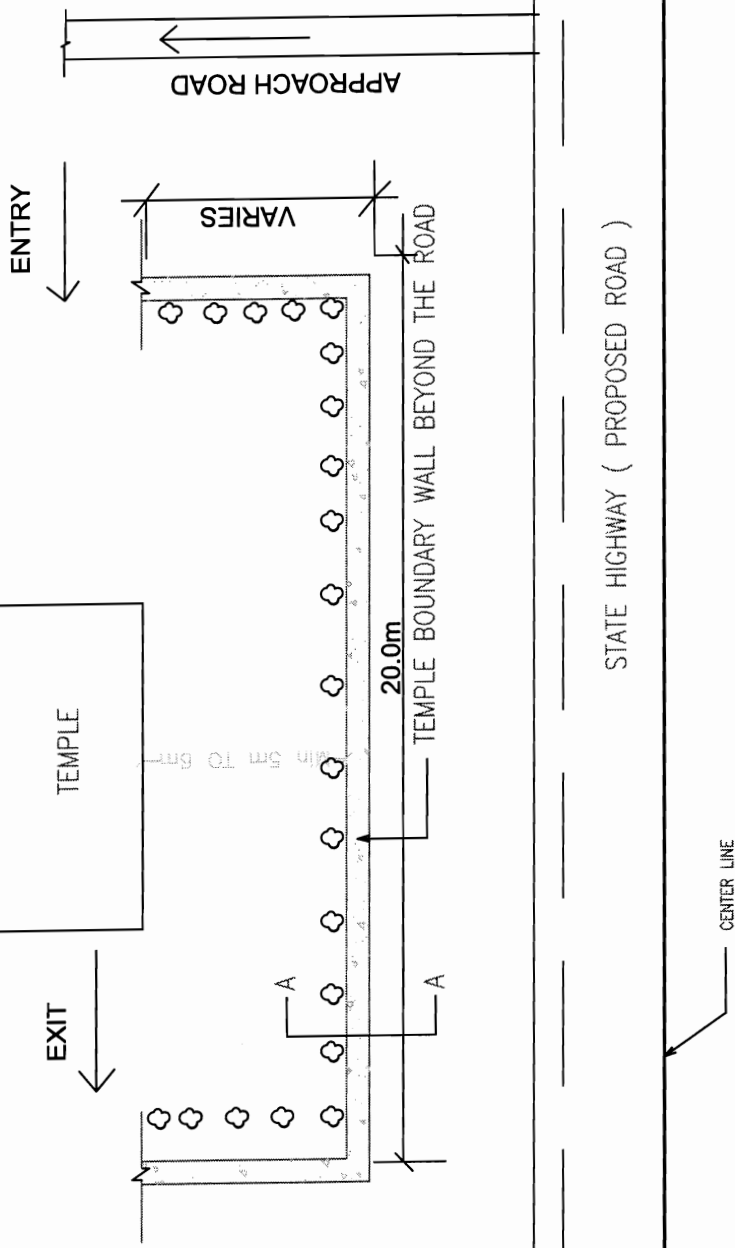
DRG NO.	OSRP/CEG/SH/ENV/03	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	65	DATE	REV	RD	
SCALE		NTS			
		M	JYOTI	G.P.M	S.G



CONTRACTOR  
 ARSS JV  
 011



RCC RETAINING WALL FOR TEMPLE  
 ( CROSS SECTION A-A )



- ALL RELOCATED TEMPLES TO HAVE ENTRY AND EXIT AWAY FROM ROAD AND ROW
- EVERGREEN SHRUBS & MEDIUM TREES LIKE TAGAR, TARAT, MANDAR, PLUMERIA NICTANTHES, MALLIKA, JASHMINE, KUNDA, KANCHAN, KARABIRA, TULSI, BELA, SHAMI, ASHOK (saraca asoka), KAMINI, NAGESWAR AND CHAMPA [PLANT TO PLANT SPACE 1.5m TO 2.0m DEPENDING ON THE SPECIES]
- FIXED FLOWER VASE ON THE BOUNDARY WALL FOR SEASONAL FLOWER & TULSI.

CONCEPTUAL RCC BOUNDARY WALL OF TEMPLES, STATUES  
 RELIGIOUS TREES AS SITE ENHANCEMENT UNDER  
 ENVIRONMENT MITIGATION PLAN.

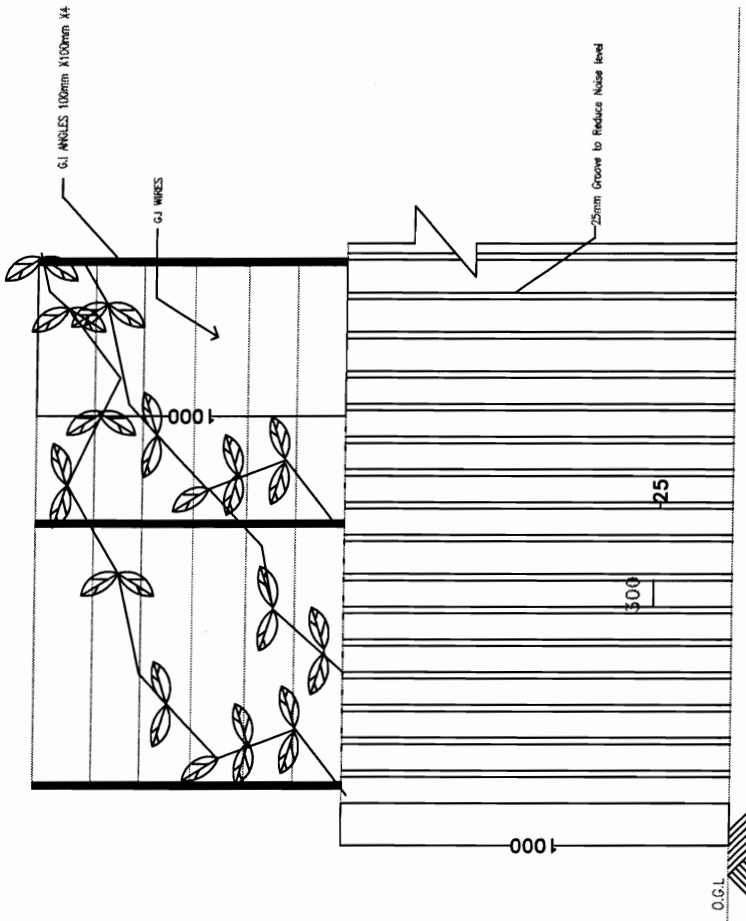
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SH. NO. 66	DATE	REV	RO	
SCALE	NTS	M	JYOTI	G.P.M
				S.G

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

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

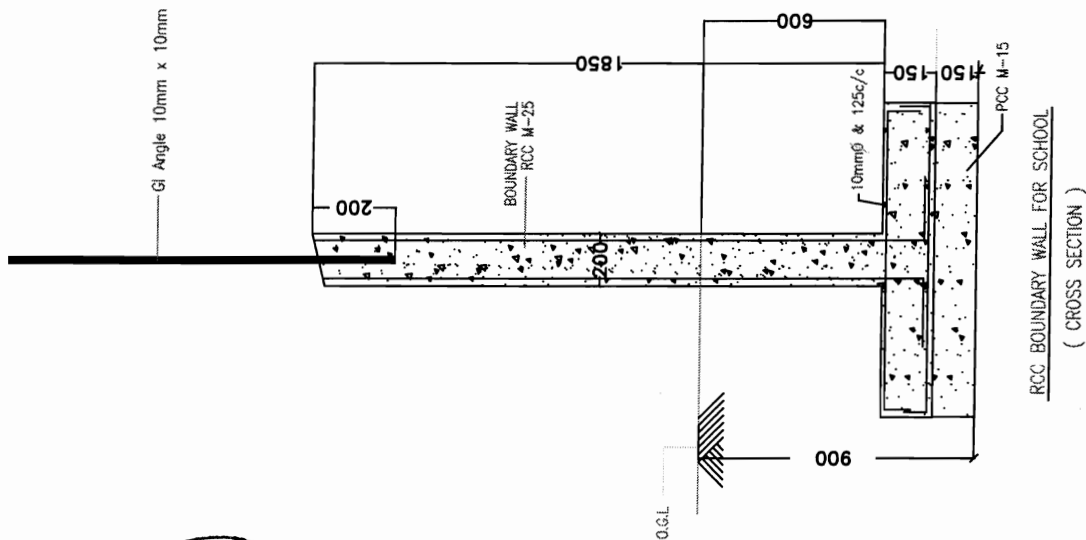


Chief Engineer  
 World Bank Project  
 EMPLOYER



FRONT ELEVATION

RCC BOUNDARY WALL FOR SENSITIVE RECEPTORS WITH NOISE & DUST REDUCTION ARRANGEMENT



PROJECT:-

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

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

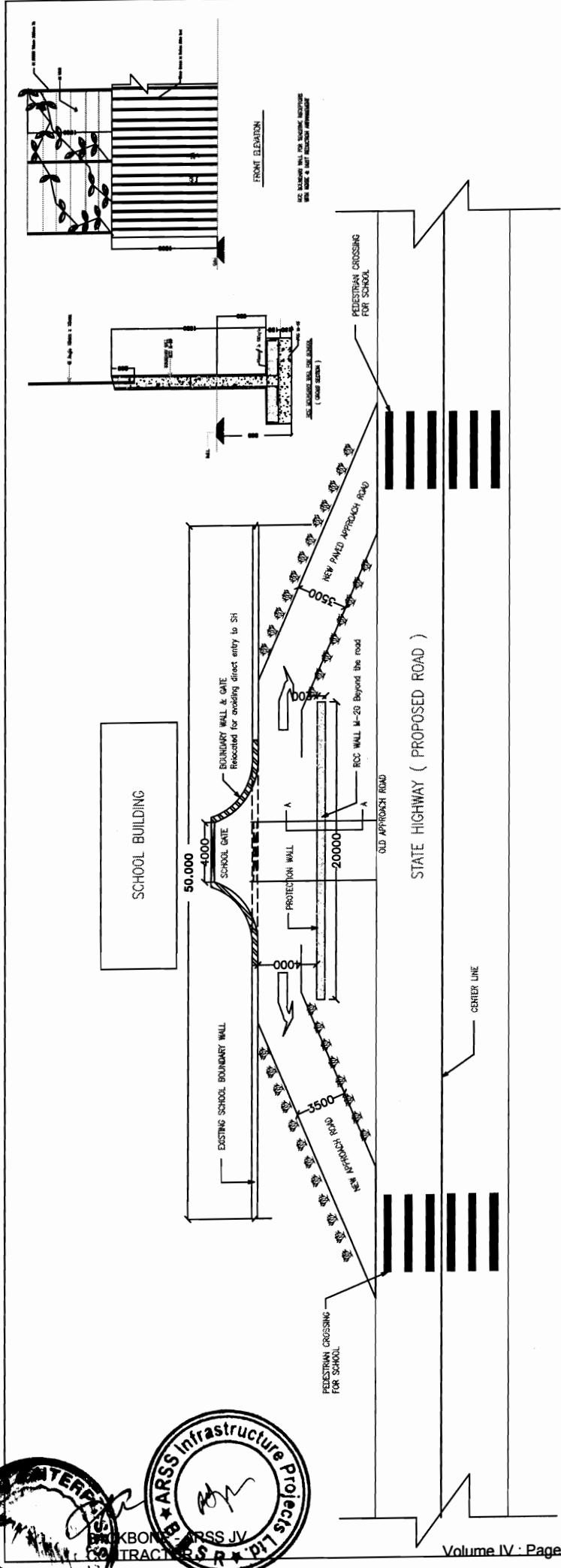


DRG NO.	OSRP/CEG/SH/ENV/04-B	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	67	DATE	REV	RO	
SCALE				NTS	
				M	JYOTI G.P.M S.G



BACKBONE ARSS JV CONTRACTOR

Chief Engineer  
 World Bank Project  
 Of the E.T.C. (OR) Project  
 Sub-base

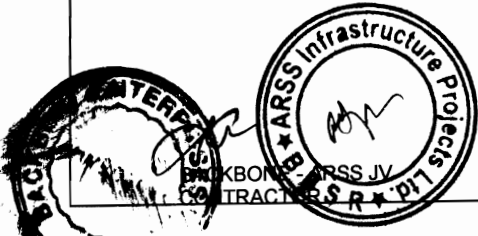


- THERE SHALL BE RUMBLER STRIPS & SPEED BREAKERS 150m & 10m AWAY FROM PEDESTRIAN CROSSINGS NEAR SCHOOLS, COLLEGES, HOSTELS, TEMPLES, HOSPITALS, DISPENSARIES AND OLD AGE HOMES, WEEKLY MARKET AREA, G.P MARKET COMPLEX ADJACENT TO THE ROAD WITHIN 25m TO 50m DISTANCE FROM CENTRE LINE. THE BOUNDARY WALL SHOULD 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 ERRECTED 4m AWAY FROM THE ENTRY POINT INFRONT OF THE GATE

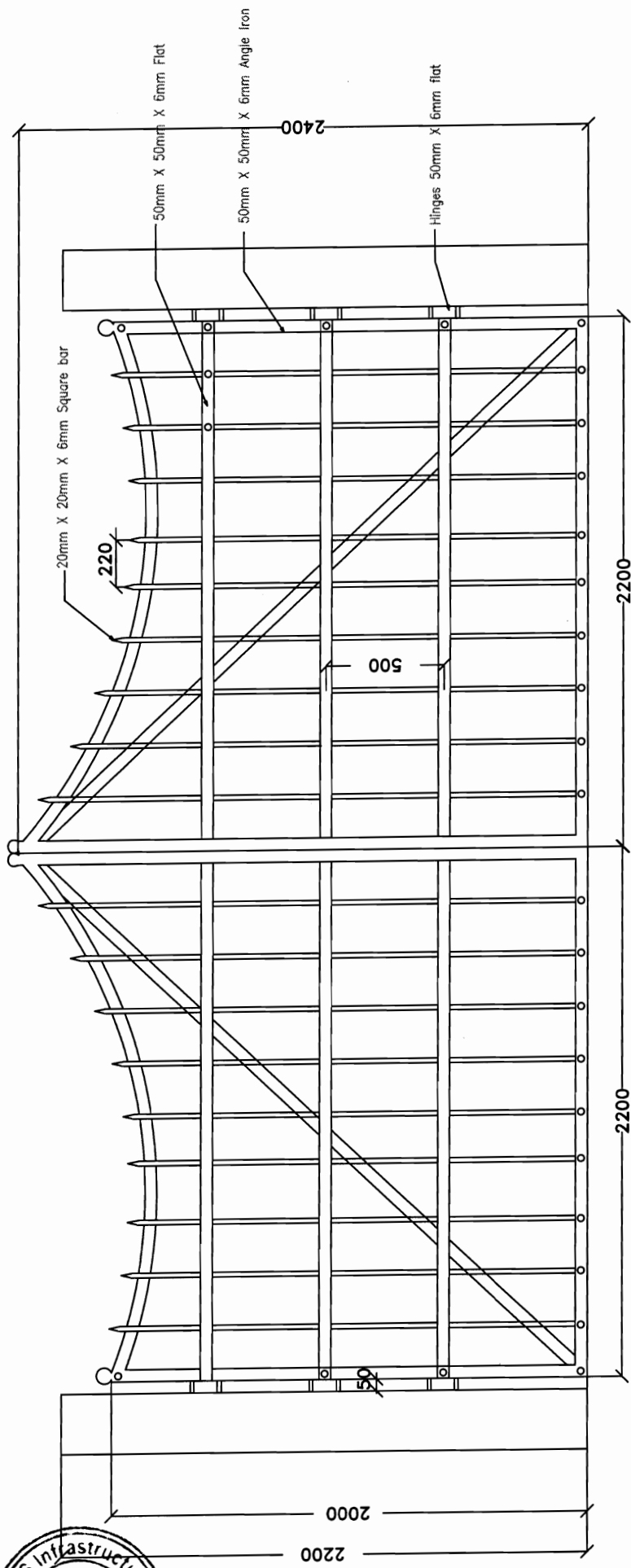
**PROJECT:-**  
 CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

**CONCEPTUAL APPROACH DESIGN FOR EDUCATIONAL AND MEDICAL INSTITUTIONAL APPROACHES AS ENVIRONMENTAL MITIGATION PLAN.**

DRG NO.	OSRP/CEG/SH/ENV/05	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	68	DATE	REV	RO	
SCALE		NTS	M	JYOTI	G.P.M S.G



Chief Engineer  
 World Bank Project  
 EMPLOYER  
 of the E.T.C. (M.T.C.)  
 Bhubaneswar

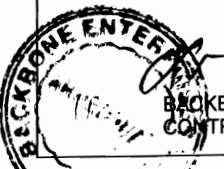


ORNAMENTAL GATE DESIGN FOR EDUCATIONAL AND MEDICAL INSTITUTIONAL APPROACHES AS ENVIRONMENTAL MITIGATION PLAN.

DRG NO.	OSRP/CEG/SH/ENV/05 A	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	69	DATE	REV	RO	
SCALE	NTS		M	JYOTI	G.P.M
					S.G

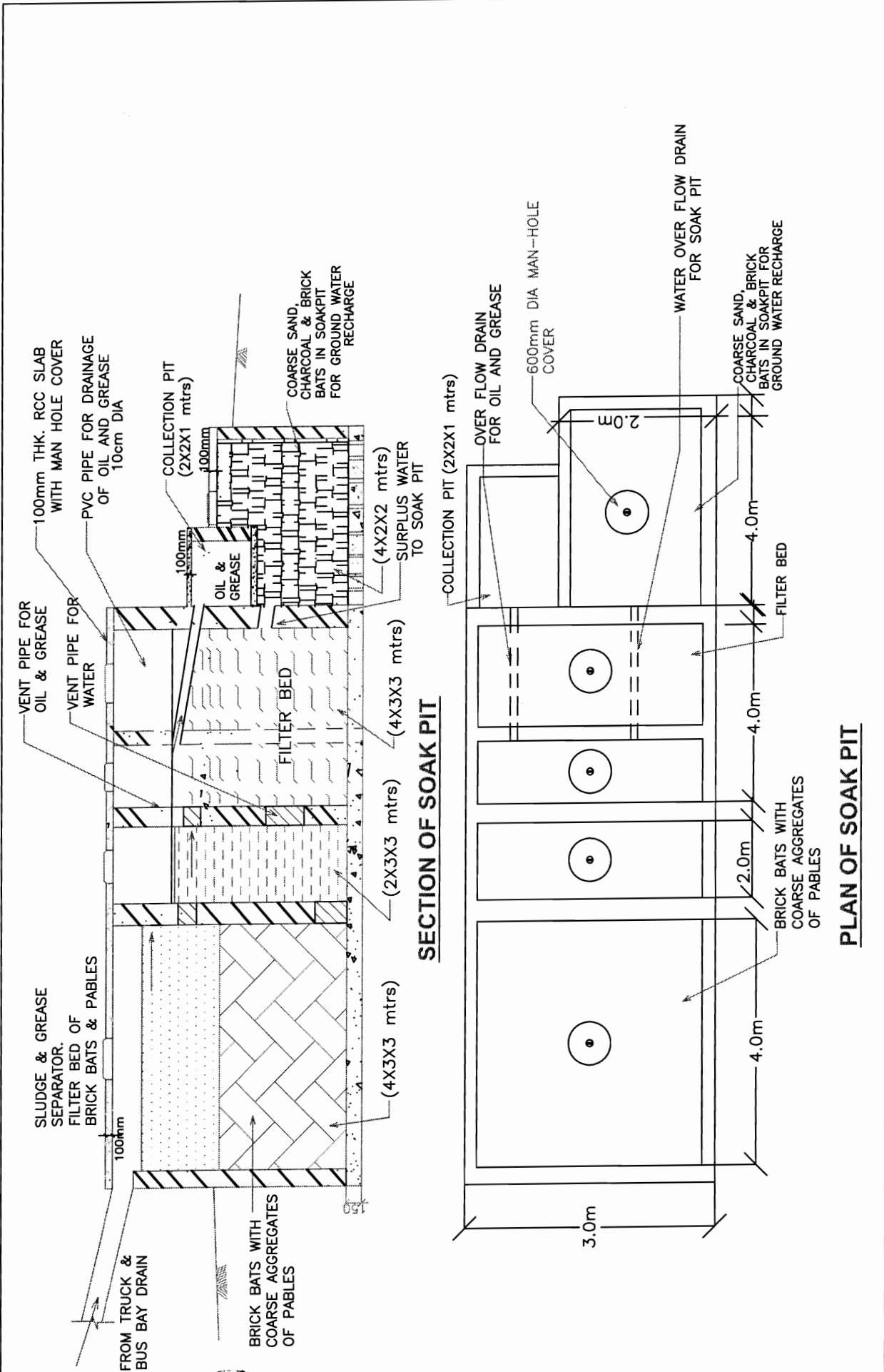
PROJECT:-  
 CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND  
 DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS  
 FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK  
 ASSISTANCE

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



Chief Engineer  
 World Bank Projects  
 EMPLOYER  
 O/o the E.I.C (Civil) Deptt  
 Bhubaneswar





<b>CONCEPTUAL DESIGN FOR SEPARATION OF OIL, GREASE AND SLUDGE OF TRUCK &amp; BUS TERMINALS &amp; BUS BAY</b>			
DRG NO. OSRP/CEG/SH/ENV/06 SH. NO. 70	DATE	REV	RO
DESIGNED (A)		DRAWN (B)	CHECKED (C) / APPROVED (D)
M		JYOTI	G.P.M
NTS		S.G	

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

**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



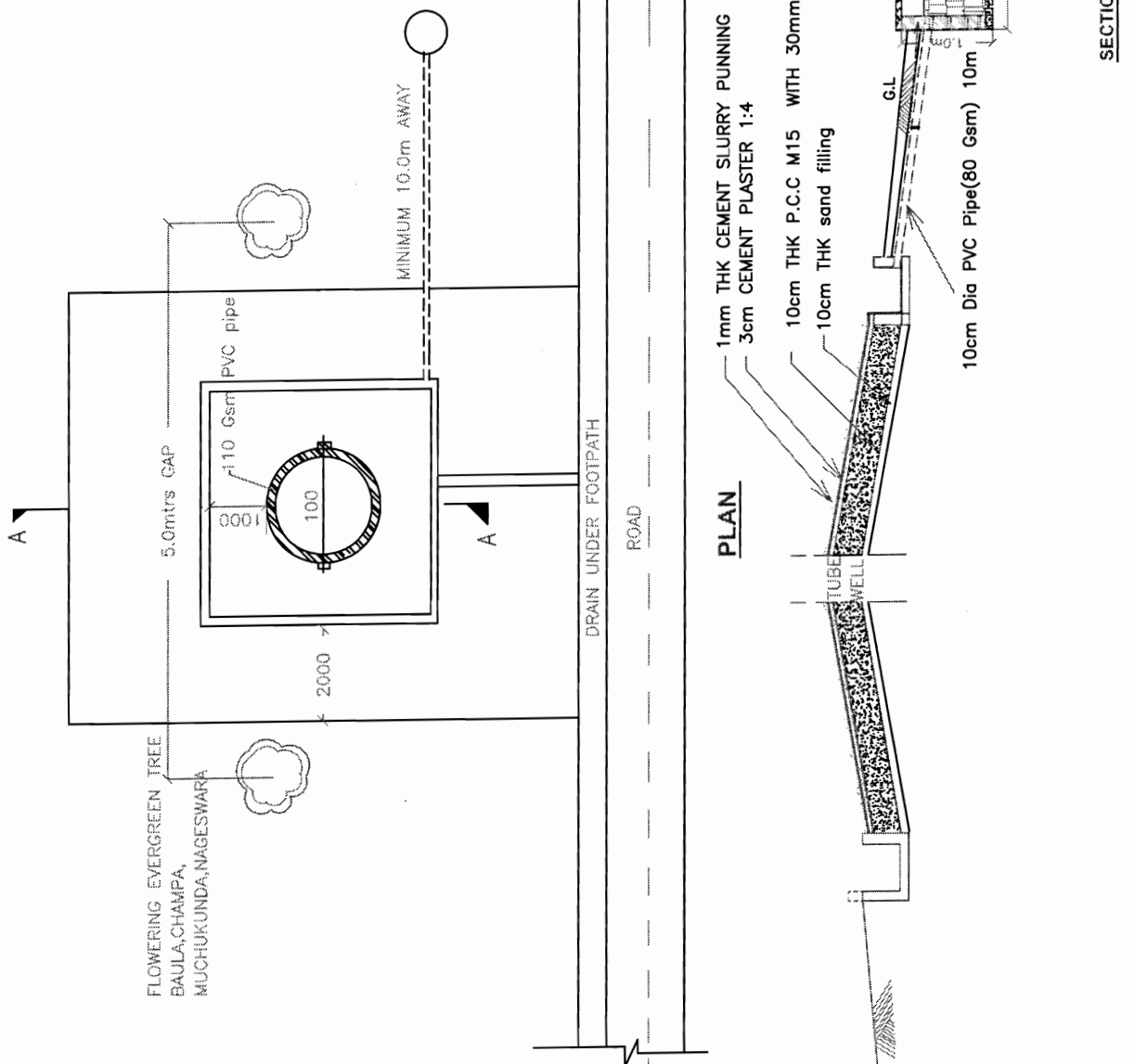
BACKBONED ARSS JV  
 CONTRACTOR

Chief Engineer  
 World Bank Project  
 O/o the E.I.C (Civil) Office  
 Phubaneswar



BACKBONE ARSS JV  
CONTRACTOR

Chief Engineer  
World Bank Projects, Orissa  
Rajyansmar



SECTION OF SOAK PIT

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

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



CONCEPTUAL C.C. PLATFORM AND DRAINAGE DESIGN FOR  
HAND PUMPS AND TAPS.

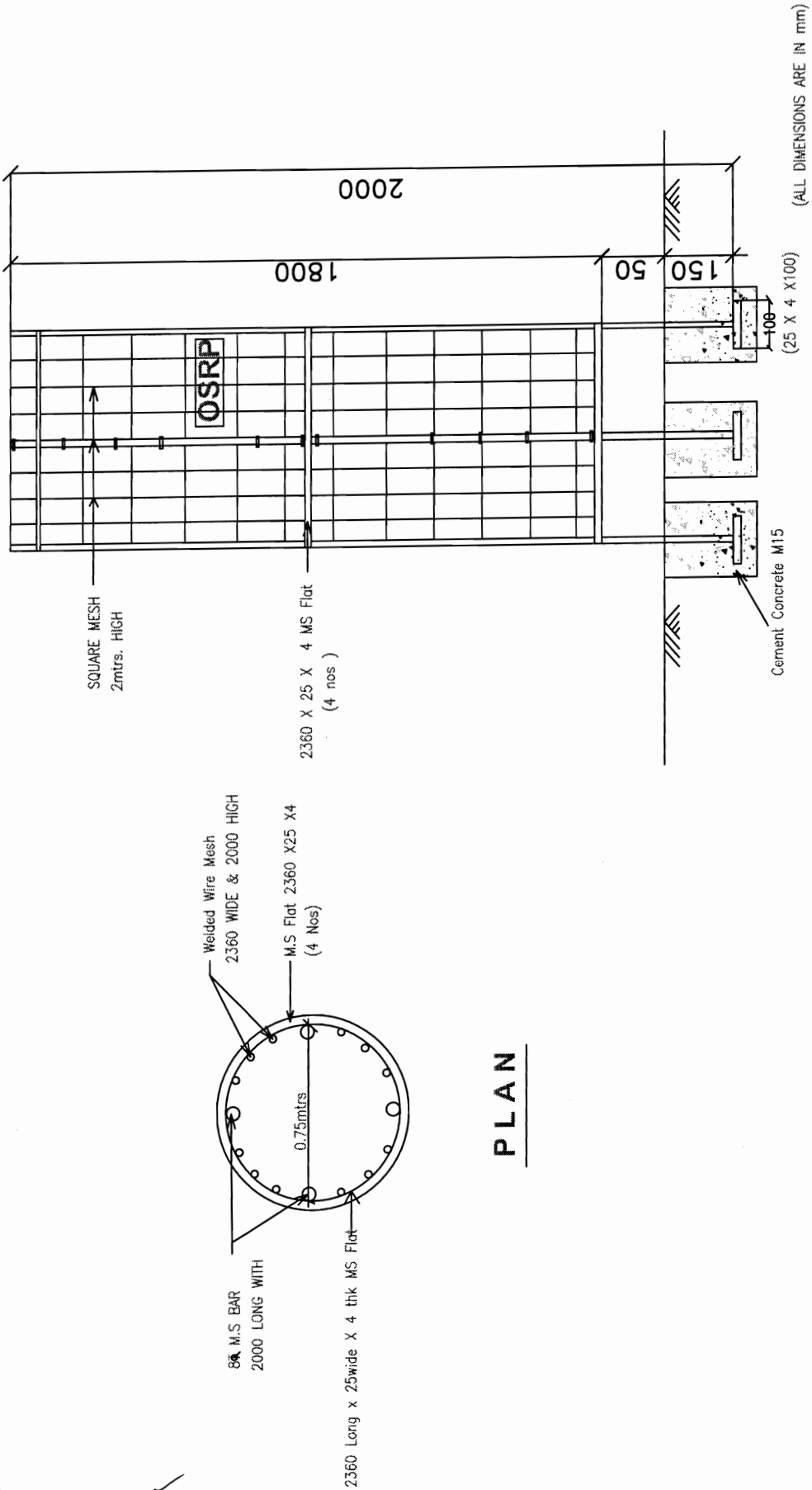
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SH. NO. 71	DATE	REV	RO	
SCALE	NTS	M	JYOTI	G.P.M
				S.G





BACKBONE - ARSS JV  
CONTRACTOR

### TREE GUARD



### PLAN

### ELEVATION

### TYPICAL PLAN OF TREE GUARD WITH MS BARS

#### PROJECT:-

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

**CONSULTING  
ENGINEERS GROUP LTD.**

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Tel: +91-141-2520899, 2521899, 2520556  
Fax: 2521348, e-mail: ceg@cegindia.com



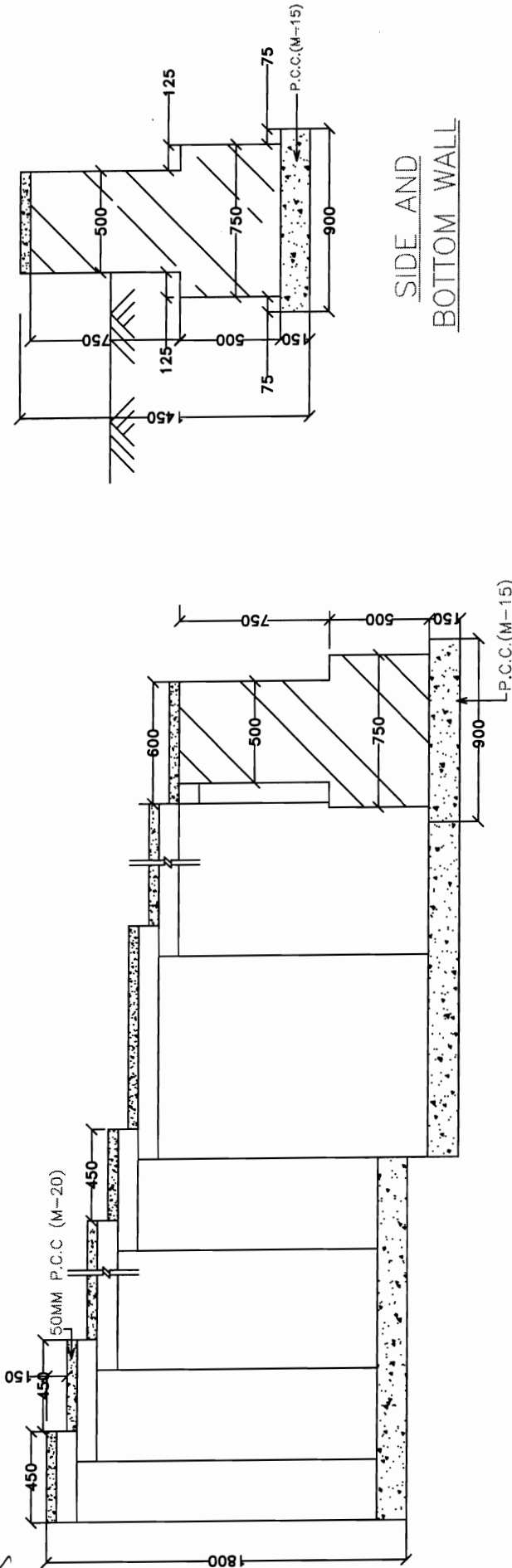
Chief Engineer  
World Bank  
EMPLOYER  
Of the E.T.C (Civil) Office,  
Rhubaneswar

CONCEPTUAL DESIGN FOR TYPICAL TREE GUARD  
WITH M.S BARS.

DRG NO. OSRP/CEG/SH/EN/08	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO. 72	DATE	REV	RO	
SCALE	NTS		M	JYOTI
				G.P.M.
				S.G



BACKBONE - ARSS JV  
CONTRACTOR



SIDE AND  
BOTTOM WALL

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

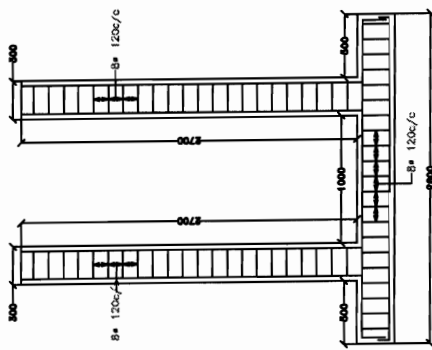
**C O N S U L T I N G**  
**ENGINEERS GROUP LTD.**  
E-12, Moji Colony, Malviya Nagar Jaipur-17  
Tel: +91-141-2520899, 2521899, 2520556  
Fax: 2521348, e-mail: ceg@cegroupindia.com



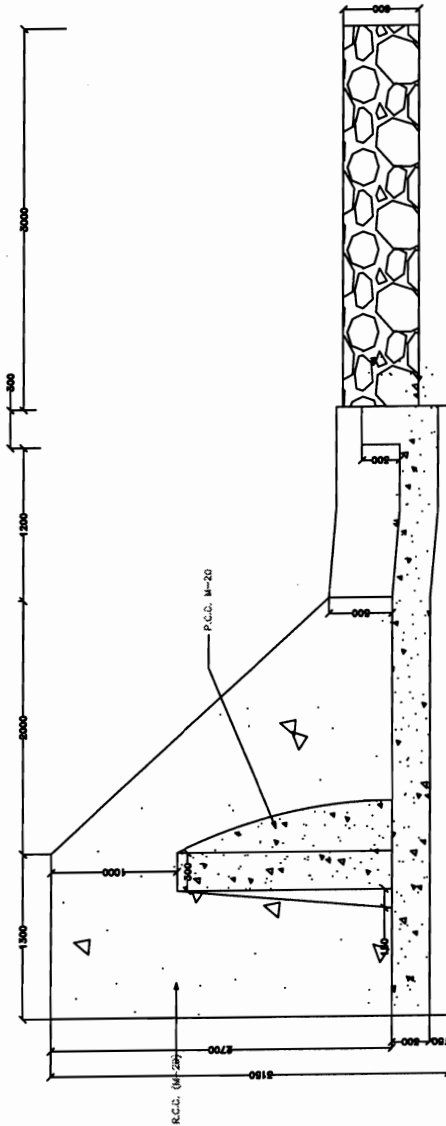
Chief Engineer  
World Bank Projects  
EMPLOYER  
Of the E.T.C (M) Phase  
Ph. banerwar

CONCEPTUAL DESIGN FOR BATHING GHAT

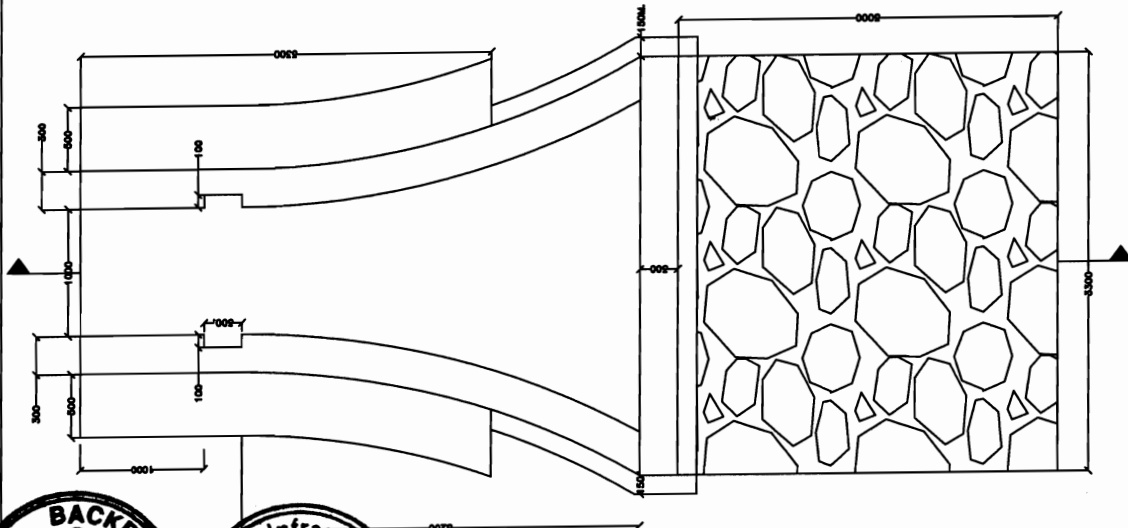
DRG. NO.	OSRP/CEG/SH/ENV/08	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	73	DATE	REV	RO	
SCALE	NTS				
		M	JYOTI	G.P.M	S.G



CROSS-SECTION AT B-B



CROSS-SECTION AT A-A



PLAN

PROJECT:-

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

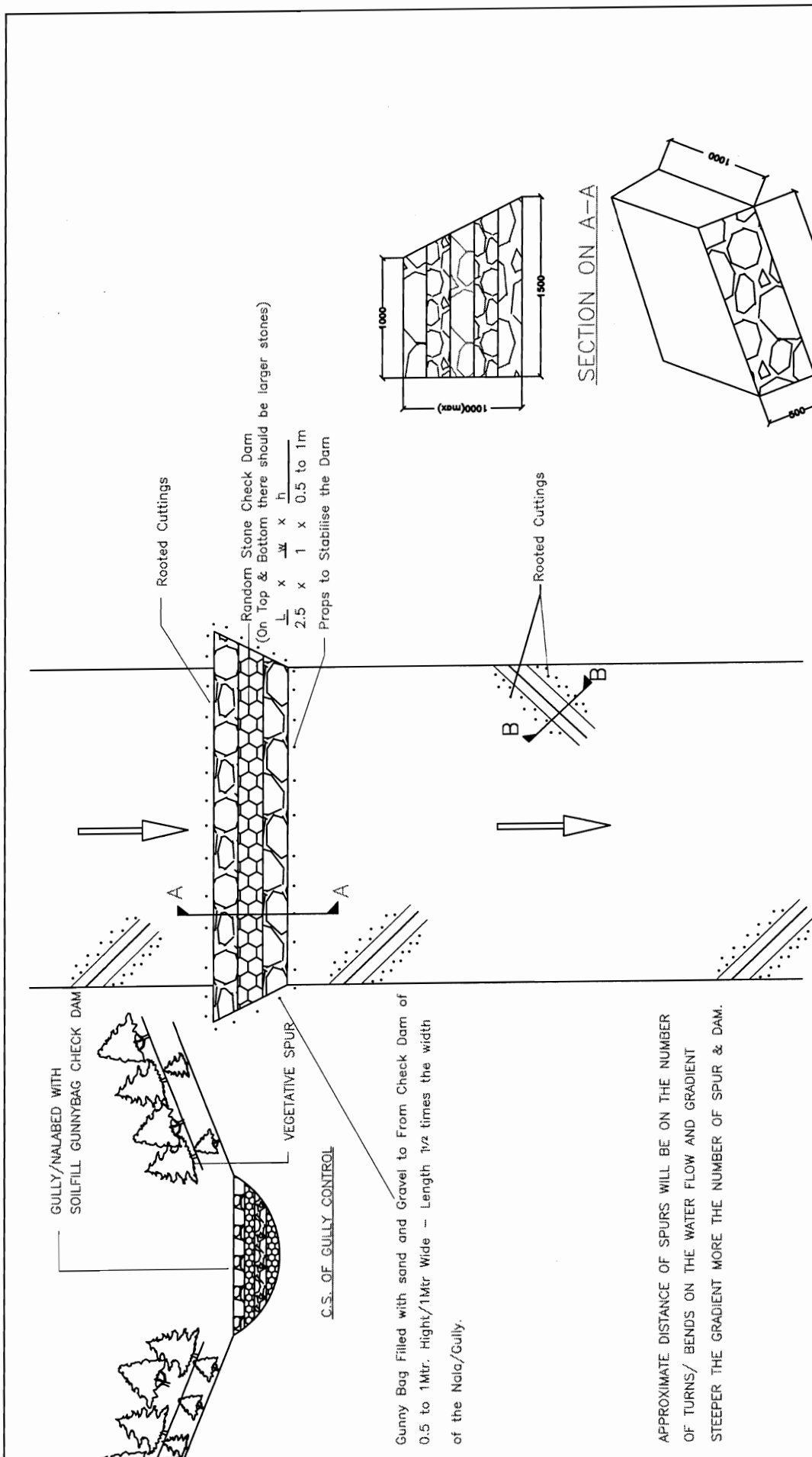
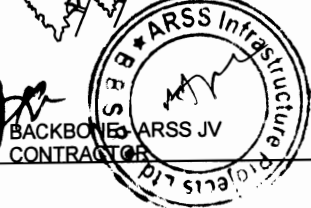
**CONSULTING ENGINEERS GROUP LTD.**  
 E-12, Moji Colony, Malviya Nagar Jaipur-17  
 Tel: +91-141-2520899, 2521899, 2520556  
 Fax: 2521348, e-mail: ceg@cegroupindia.com



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

CONCEPTUAL DESIGN FOR SPILLWAY GATE

DRG NO. DSRP/CEG/SH/EN/10	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO. 74	DATE	REV	RO	
SCALE	NTS		M	JYOTI
			G.P.M	S.G



PLAN OF NALLA/ GULLY CONTROL

SECTION ON B-B

GULLY/NALABED WITH SOILFILL GUNNYBAG CHECK DAM

VEGETATIVE SPUR

C.S. OF GULLY CONTROL

Gunny Bag Filled with sand and Gravel to Form Check Dam of 0.5 to 1Mtr. Height/1Mtr Wide - Length 1/2 times the width of the Nalla/Gully.

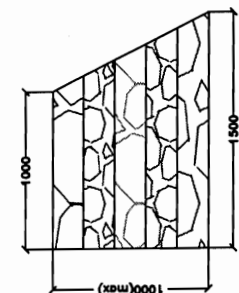
APPROXIMATE DISTANCE OF SPURS WILL BE ON THE NUMBER OF TURNS/ BENDS ON THE WATER FLOW AND GRADIENT STEEPER THE GRADIENT MORE THE NUMBER OF SPUR & DAM.

Rooted Cuttings

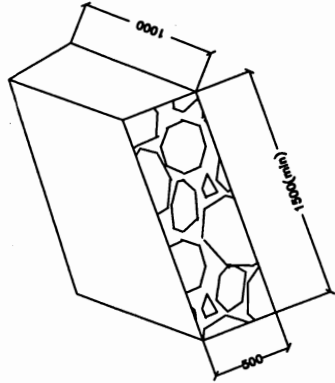
Random Stone Check Dam (On Top & Bottom there should be larger stones)

2.5 x 1 x 0.5 to 1m

Props to Stabilise the Dam



SECTION ON A-A



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

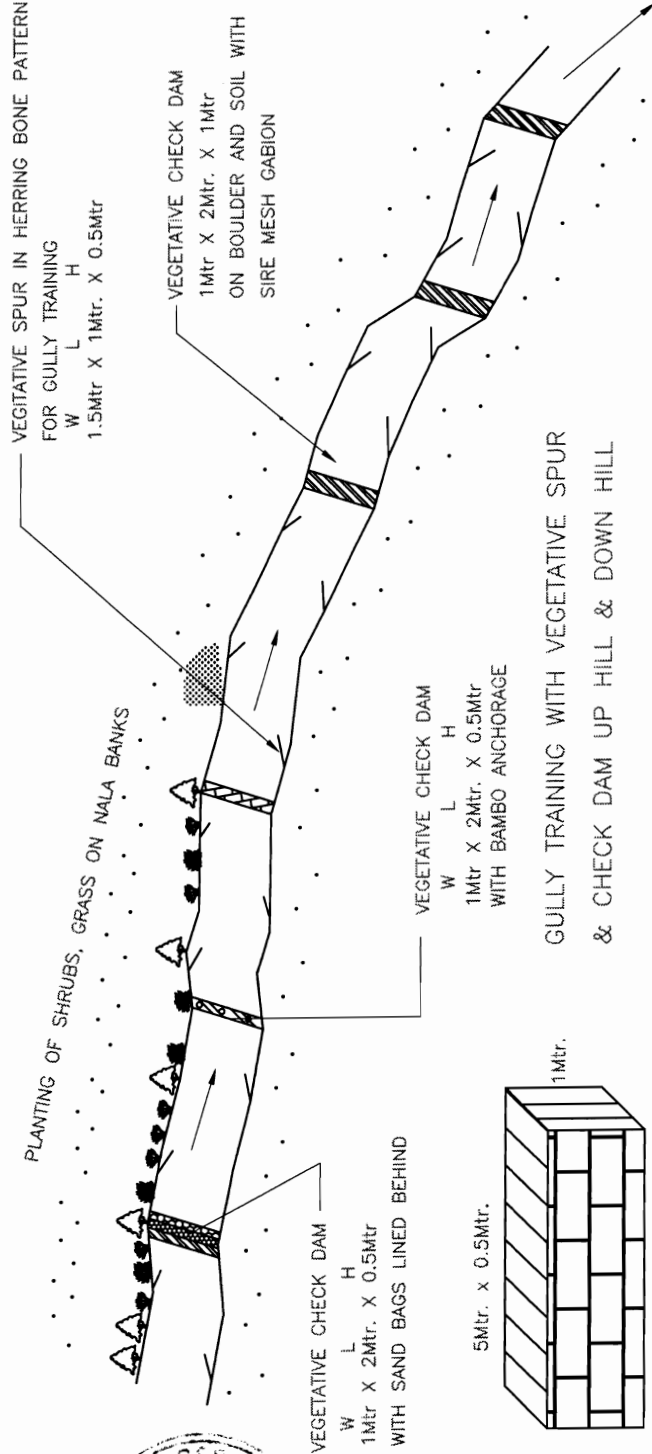
**CONSULTING ENGINEERS GROUP LTD.**  
 E-12, Moji Colony, Malviya Nagar, Jaipur-17  
 Tel: +91-141-2520899, 2521899, 2520556  
 Fax: 2521348, e-mail: ceg@cegroupindia.com



SCALE		NTS		DESIGNED (A)		DRAWN (B)		CHECKED (C)		APPROVED (D)	
SH. NO.	75	DATE		REV	RO					JYOTI	G.P.M
				M						S.G	

Chief Engineer  
 World Bank Project  
 Odisha  
 Rhubaneswar

# EROSION CONTROL AND HABITAT DEVELOPMENT MEASURES



MAXIMUM HIGHT OF THE SPUR SHOULD NOT BE EXCEEDING LENGTH 1.5Mtr. WIDTH 1Mtr. HEIGHT 0.5Mtr's

THE TREES/ GRASSES/ SHRUBS/HERBS (ROOTED CUTTINGS) TOBE PLANED AT 1 Mtr. INTERIOR LENGTH AS PER LOCAL CONDITION.

AROUND 5 nala on Bramhapur Bangi Jn. to be Gully Plugged and Check dams done.

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**SOIL AND WATER CONSERVATION MEASURES (GULLY PLUGGING AND CHECK DAMMING)**

DRG. NO.	OSRP/CEG/SH/ENV/11 B	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	76	DATE	REV	RO	
SCALE	NTS				M
				JYOTI	G.P.M
					S.G

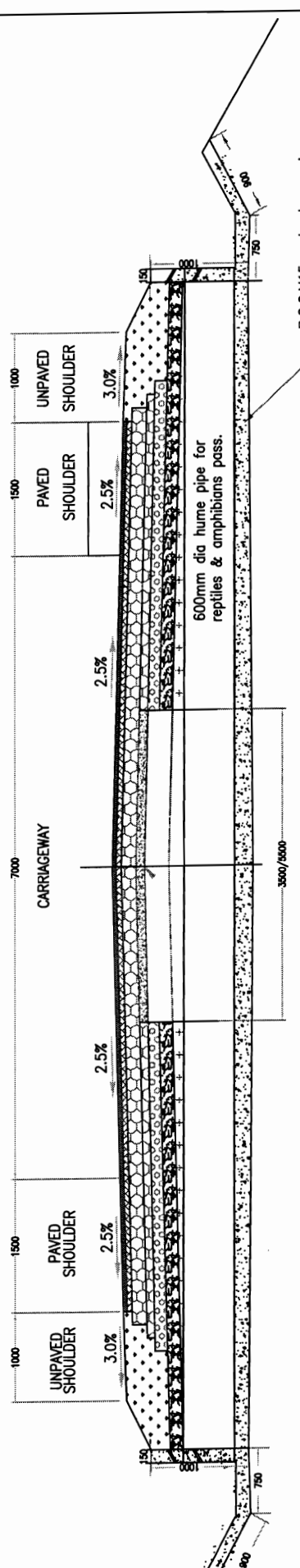


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 CONTRACTOR

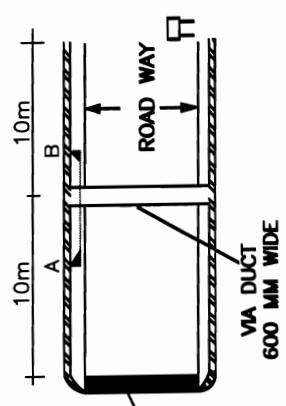
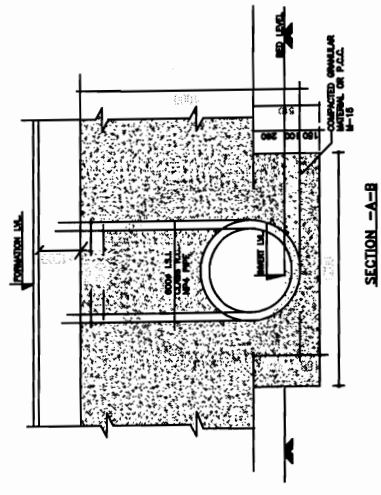


Chief Engineer  
 World Bank Projects, Orissa  
 Chief Engineer  
 World Bank Projects, Orissa





CROSS SECTION OF REPTILES & AMPHIBIANS UNDERPASS WITH TRAP DRAINS AT WET LANDS



PLAN OF REPTILES & AMPHIBIANS UNDERPASS WITH TRAP DRAINS

TRAP DRAIN WITH HUME PIPE VIA DUCT PASSAGE AT WET LAND LOCATIONS TO FACILITATE MOVEMENT ACROSS SH BY RODENTS/AMPHIBIANS/REPTILES/SMALL ANIMALS.	
DRG. NO. OSRP/CEG/SH/EN/12	DESIGNED (A) DRAWN (B) CHECKED (C) APPROVED (D)
SH. NO. 77	DATE REV RO
SCALE	NTS
	M JYOTI G.P.M S.G

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

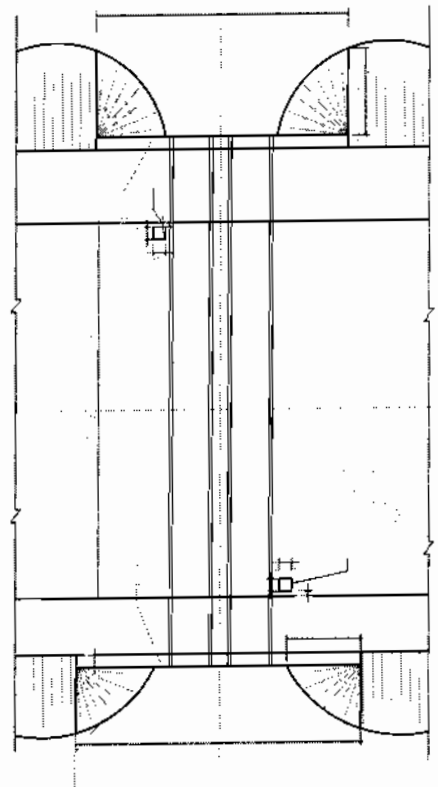
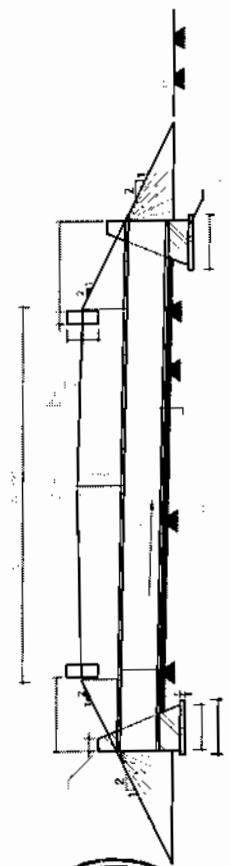
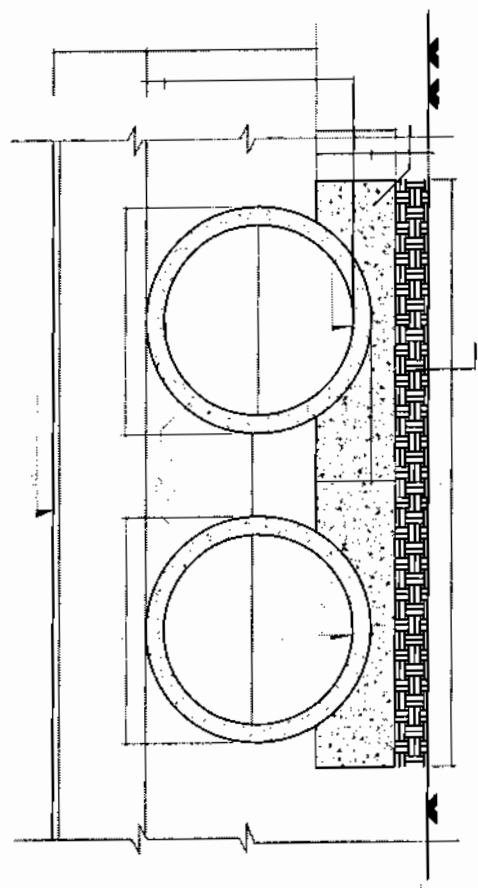
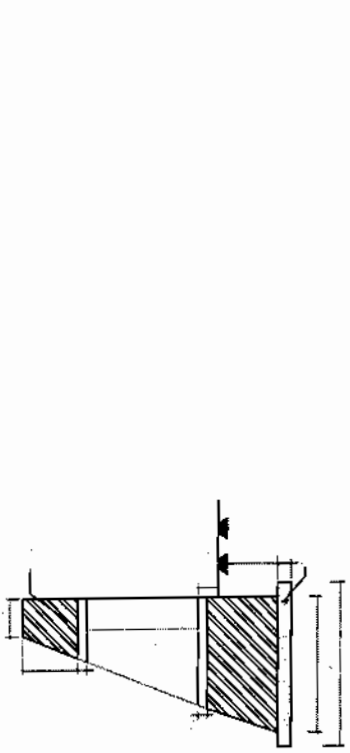
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BACKBONE CONTRACTORS



Chief Engineer  
 Chief Engineer  
 World Bank Projects Officer  
 EMPLOYER  
 To the F.I.C. (C.P.I.D.)  
 Bhubaneswar



TYPICAL ARRANGEMENT FOR UTILITY DUCT

DRG. NO. OSRP/CEG/SH/JD/01	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO. 78	DATE	REV	RO	
SCALE	NTS		M	JYOTI
				A.J.
				S.G

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

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 Tel: +91-141-2520899, 2521899, 2520556  
 Fax: 2521346, e-mail: ceg@cegindia.com



JACKBONE ENTERPRISES LIMITED  
 AHMEDABAD  
 JACKBONE ARSS JV  
 CONTRACTOR

Chief Engineer  
 World Bank  
 O/o the E.C.C. (N) Office  
 Phulabari

# GOVERNMENT OF ORISSA

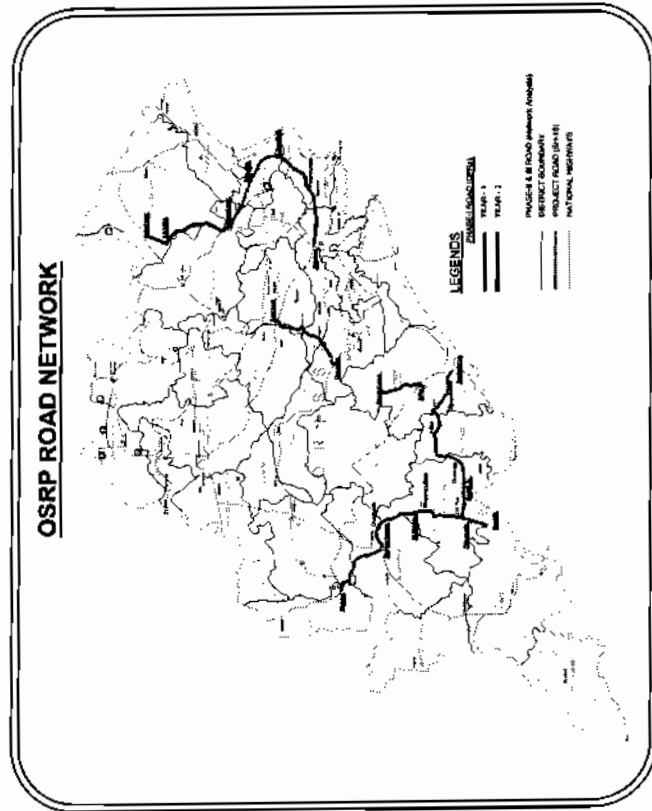
## WORKS DEPARTMENT ORISSA STATE ROAD PROJECT

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

### STANDARD DRAWINGS FOR HIGHWAYS

#### INDEX

- (1) - COVER SHEET
- (2) - INDEX OF DRAWINGS
- (3) - STANDARD DRAWING



FINAL DPR

**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  
Fax: 2521348, E-mail: ceg@cegindia.com



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CONTRACTOR



Chief Engineer  
Chief Engineer  
World Bank Projects  
Orissa  
Rhubenece ar



# INDEX OF DRAWINGS

Si.No.	Description	Drawing No.
01	Typical X-section	
02	Typical Cross Section	OSRP/CEG/TCS/01 & 02
03	Typical Cross Section	OSRP/CEG/TCS/03 & 04
04	Typical Cross Section	OSRP/CEG/TCS/05 & 06
05	Typical Cross Section	OSRP/CEG/TCS/07 & 08
06	Typical Cross Section	OSRP/CEG/TCS/09 & 10
07	Typical Cross Section	OSRP/CEG/TCS/11 & 12
08	Typical Cross Section	OSRP/CEG/TCS/13, 14 & 15
09	Typical Cross Section	OSRP/CEG/TCS/16, 17 & 18
09/A	Typical Cross Section	OSRP/CEG/TCS/19, 20 & 21
10	Typical Slope Protection work	OSRP/CEG/TCS/22, 23, 24 & 25
11	Typical Details of Dowel Bar and Tie Bar Arrangement	OSRP/CEG/RIGID/01
12	Typical Details of Transition Slab between Rigid & Flexible Pavement	OSRP/CEG/RIGID/02
13	Typical Details of Pavement Layer	OSRP/CEG/IOD
14	Standard Drawings Retaining Wall	OSRP/CEG/RW
15	Typical Details of Transition of Different Road Section	OSRP/CEG/TR
16	Standard Drawings Details of Drain and Kerb	OSRP/CEG/DR
17	Details of Application of Super Elevation	OSRP/CEG/SE
<b>Junction/Intersection Details</b>		
18	Typical 4-Legged Intersection with Single Lane BT Road	OSRP/CEG/JN/01
19	Typical T-Junction with Single Lane BT Road	OSRP/CEG/JN/02
20	Typical Y-Junction with Single Lane BT/Earthen Road	OSRP/CEG/JN/03
21	Standard Drawings Typical - Cross Drain Single Lane BT Road/Earth Road	OSRP/CEG/CDJN

Si.No.	Description	Drawing No.
<b>Road Signs, Markings and Misc. Roadway Furnitures</b>		
22	Standard Drawings Details of Road Hump and Rumble Strips	OSRP/CEG/RH & RS
23	Standard Drawings Details of Footpath Barriers	OSRP/CEG/FB
24	Standard Drawings Metal Beam Crash Barrier Details	OSRP/CEG/CB
25	Standard Drawings Typical KM Stone & 5th Km Stone	OSRP/CEG/KM/01
26	Standard Drawings Typical Details of 200m Stone & Guard Post	OSRP/CEG/KM & GP
27	Standard Drawings Details of Road Delineators	OSRP/CEG/RD
28	Standard Drawings Details of RPMs & Chevron Markers	OSRP/CEG/RPM
29	Standard Drawings Typical Road Marking Details (Sheet 1 of 2)	OSRP/CEG/RM/01
30	Standard Drawings Typical Road Marking Details (Sheet 2 of 3)	OSRP/CEG/RM/02
31	Standard Drawings Typical Road Signs (Sheet 1 of 4)	OSRP/CEG/RS/01
32	Standard Drawings Typical Road Signs (Sheet 2 of 4)	OSRP/CEG/RS/02
33	Standard Drawings Typical Road Signs (Sheet 3 of 4)	OSRP/CEG/RS/03
34	Standard Drawings Typical Road Signs (Sheet 4 of 4)	OSRP/CEG/RS/04
35	Standard Drawings Typical Bus Bay Type - I	OSRP/CEG/BB/01
36	Standard Drawings Typical Bus Bay Type - II	OSRP/CEG/BB/02
37	Standard Drawings Details of Truck Laybys (Sheet 1 of 2)	OSRP/CEG/TLB/01
38	Standard Drawings Details of Truck Laybys (Sheet 2 of 2)	OSRP/CEG/TLB/02
39	Slope Protection Measure	OSRP/CEG/SP/01
<b>Toll Plaza Details</b>		
40	Standard Drawings Toll Plaza Layout	OSRP/CEG/TP/01
41	Standard Drawings Toll Plaza Main Office	OSRP/CEG/TP/02
42	Standard Drawings Toll Booth	OSRP/CEG/TP/03
43	Standard Drawings Barrier Gate for Toll Plaza	OSRP/CEG/TP/04
44	Standard Drawings Electrical Layout Toll Plaza and Main Office	OSRP/CEG/TP/05
45	Standard Drawings Electrical Layout Toll Plaza	OSRP/CEG/TP/06
46	Standard Drawings Eplumbing Layout - Toll Plaza	OSRP/CEG/TP/07

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

**INDEX OF STANDARD DRAWINGS**

**CON S U L T I N G  
ENGINEERS GROUP LTD.**  
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Tel: +91-141-2520899, 2521899, 2520556  
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DRG NO.	OSRP/CEG/INDEX/01	DESIGNED (A)	DATE	REV	RO	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.						R.J	R.R.D.K	S.G
SCALE		NTS						



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**Chief Engineer**  
 Chief Engineer  
 World Bank Projects, Orissa  
 Office of the E.L.C. (Contract) Orissa  
 Bhubaneswar

# INDEX OF DRAWINGS

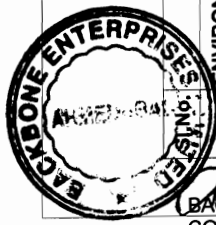
Description	Drawing No.
<b>ENVIRONMENTAL DRAWING</b>	
Typical Animal Pass - Single Box Culvert (8.0x4.5)(Earth Cushion)	ER/BC/S/B/EC/XXVI - A1
Typical Animal Pass - Single Box Culvert (2.0x2.0)(Earth Cushion)	ER/BC/S/B/EC/XXVI - A2
Typical Animal Pass - Single Box Culvert (2.0x2.0)	ER/BC/B/S/MC/XXV - B1
Typical Animal Pass - Double Box Culvert (2.0x2.0)	ER/BC/B/D/MC/XXV - B2
Typical Animal Pass - Single Pipe Culvert	ER/PC/S/B/EC/XXVI - C1
Typical Animal Pass - Double Pipe Culvert	ER/PC/D/B/EC/XXVI - C2
Site Enhancement Design for 4 Legged Junction	OSRP/CEG/ENV-01A
MS Grill for Feeder Road Junction	OSRP/CEG/ENV-01B
Site Enhancement Design for 3 Legged Junction	OSRP/CEG/ENV-01C
Passenger Shed at Bus Bay	OSRP/CEG/ENV-02
PCC Toe Wall for Water Bodies	OSRP/CEG/ENV-03
RCC Boundary Wall Temples and Statues	OSRP/CEG/ENV-04 A
Noises & Dust Barrier	OSRP/CEG/ENV-04 B
Approaches of Educational & Medical Institutions	OSRP/CEG/ENV-05
Gate for Educational & Medical Institutions	OSRP/CEG/ENV-05 A
Separation of Oil & Grease - Truck & Bus Bays	OSRP/CEG/ENV-06
C.C.Platform and Drainage-Handpumps and Taps	OSRP/CEG/ENV-07
Tree Guard with M.S.Bars	OSRP/CEG/ENV-08
Typical Bathing Ghat	OSRP/CEG/ENV-09
Typical Spilway Ghat	OSRP/CEG/ENV-10
Soil and Water Conservation Measures	OSRP/CEG/ENV-11 A
Soil and Water Conservation Measures	OSRP/CEG/ENV-11 B
Typical Trap Drain with Hume Pipe	OSRP/CEG/ENV-12
Schedule for Environmental Aspects	OSRP/CEG/ENV-13
<b>MISCELLANEOUS</b>	
Typical Arrangement of Utility Duct	OSRP/CEG/MISC - 01

## INDEX OF STANDARD DRAWINGS

DRG NO.	OSRP/CEG/MISC/02	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	DATE	REV	RO	R.J	R.R.D.K
SCALE	NTS				
				B.M	S.G

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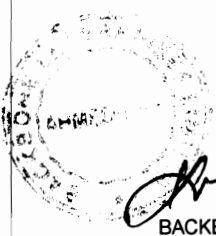
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 CONTRACT NO. \_\_\_\_\_

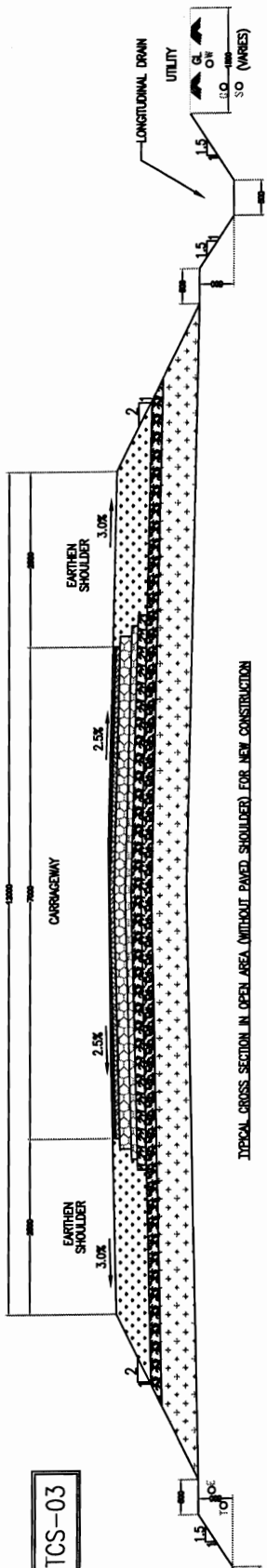
Chief Engineer  
 Chief Engineer  
 World Bank Project  
 EMPLOYER  
 O/o the E.T.C (CIVIL) Orissa,  
 Bhubaneswar:





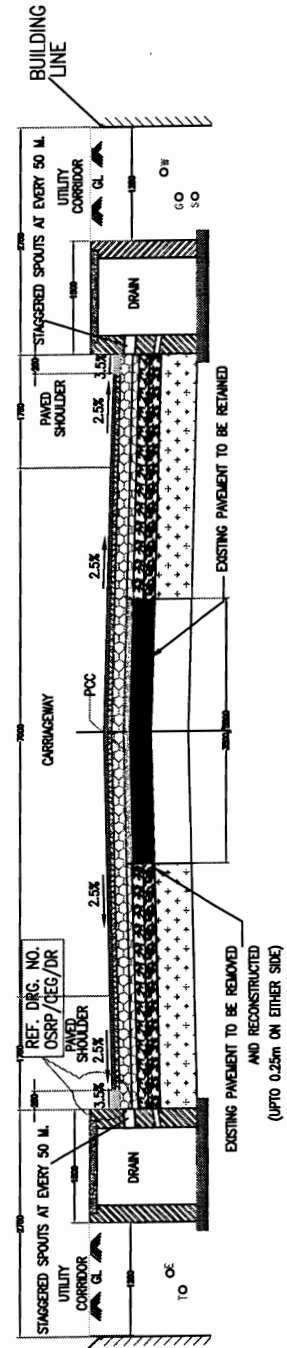
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CONTRACTOR

TCS-03



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

TCS-04



TYPICAL CROSS SECTION IN BUILT-UP AREA FOR OVERLAY / WIDENING

LEGENDS

1	100	100	100	100	100
2	100	100	100	100	100
3	100	100	100	100	100
4	100	100	100	100	100
5	100	100	100	100	100
6	100	100	100	100	100
7	100	100	100	100	100
8	100	100	100	100	100
9	100	100	100	100	100
10	100	100	100	100	100
11	100	100	100	100	100
12	100	100	100	100	100
13	100	100	100	100	100
14	100	100	100	100	100
15	100	100	100	100	100
16	100	100	100	100	100
17	100	100	100	100	100
18	100	100	100	100	100
19	100	100	100	100	100
20	100	100	100	100	100
21	100	100	100	100	100
22	100	100	100	100	100
23	100	100	100	100	100
24	100	100	100	100	100
25	100	100	100	100	100
26	100	100	100	100	100
27	100	100	100	100	100
28	100	100	100	100	100
29	100	100	100	100	100
30	100	100	100	100	100

- NOTES
1. ALL DIMENSIONS ARE IN MILLIMETERS
  2. FOR DRAIN DETAILS REFER DRAWING NO.OSRP/CEG/DR
  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.OSRP/CEG/RIGID 02.
  5. FOR PAVEMENT EDGE DETAILS REFER DRAWING NO. OSRP/CEG/00
  6. PCC-PROFILE CORRECTIVE COURSE WITH THE MATERIAL SAME AS THAT OF OVERLAYING LAYER ABOVE IT.
  7. PLEASE THE UTILITIES/TREES OBSTRUCTING THE LONGITUDINAL DRAINS, DRAINS MAY BE DIVERTED AS PER ENGINEERS DIRECTIONS

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

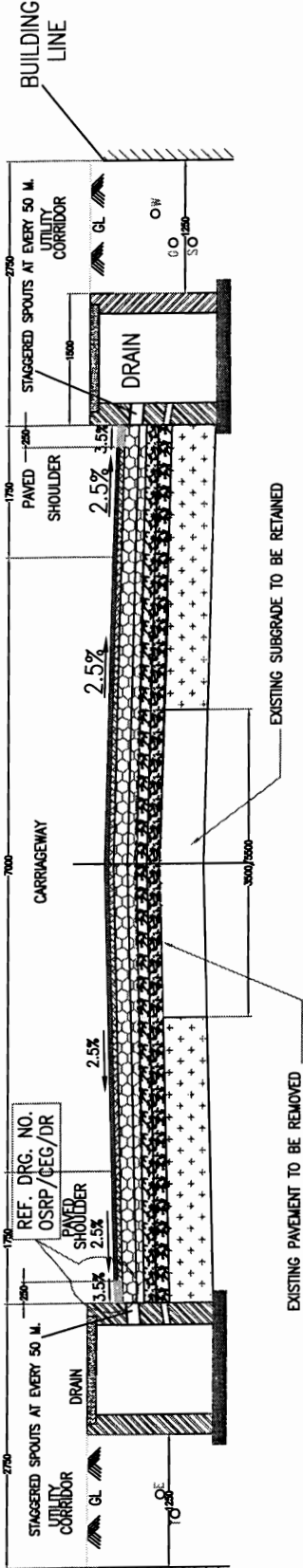
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SH. NO.	02	DATE	REV	RO	
SCALE	NTS			B.M	R.J
				R.R.D.K	S.G

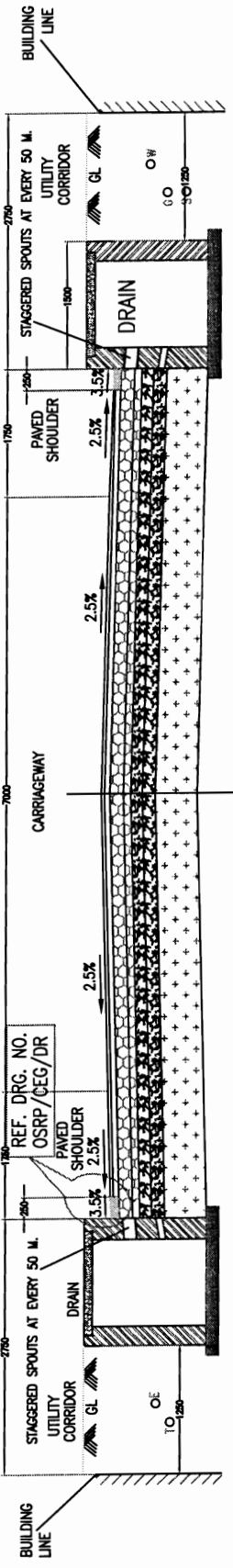
Do the E.T.C EMPLOYER  
Bhubaneswar

TCS-05



TYPICAL CROSS SECTION IN BUILT-UP AREA FOR RECONSTRUCTION \ WIDENING

TCS-06



TYPICAL CROSS SECTION IN BUILT-UP AREA FOR NEW CONSTRUCTION

LEGENDS

1) BC	6) B.C.	11) W - Water Supply Line
2) DM	7) PC	12) G - Gas Line
3) DM	8) DMW PILL	13) S - Sewer
4) DM	9) E - Electricity Cables	
5) SURFACE	10) T - Telephone Cables	

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  5. FOR PAVEMENT EDGE DETAILS REFER DRAWING NO. OSRP/CEG/00
  6. FOR CORRECTIVE COURSE WITH THE MATERIAL SAME AS THAT OF OVERLAYING LAYER ABOVE IT.
  7. TO UNDO THE UTILITIES/TREES OBSTRUCTING THE LONGITUDINAL DRAINS, THE DRAINS MAY BE DIVERTED AS PER ENGINEERS DIRECTIONS

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

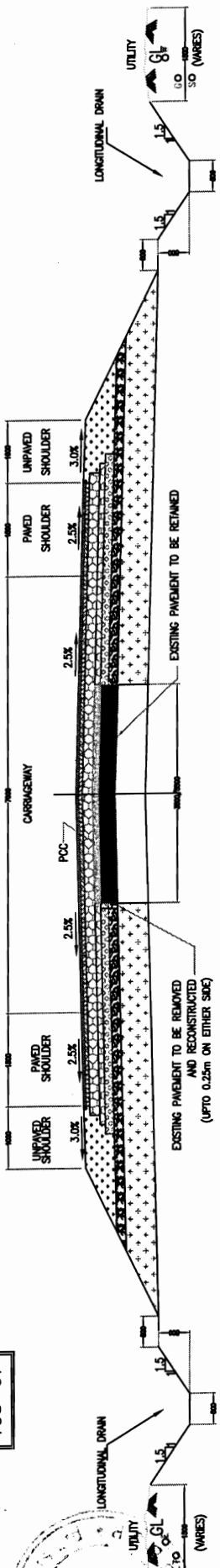
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 E-12, Moji Colony, Malviya Nagar Jaipur-17  
 Tel: +91-141-2520899, 2521899, 2520556  
 Fax: 2521348, e-mail: ceg@cegroupindia.com

TYPICAL CROSS-SECTION  
 TCS - 05 & TCS - 06

DRG. NO. OSRP/CEG/TCS/05 & 06	DESIGNED (A)	DRAWN (D)	CHECKED (C)	APPROVED (O)
SH. NO. 03	DATE	REV	RO	
SCALE	NTS			
	B.M	R.J	R.R.D.K	S.G

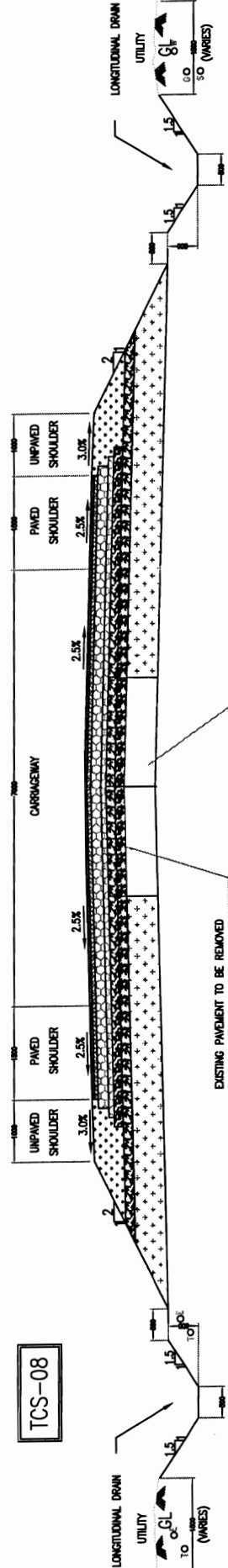


TCS-07



TYPICAL CROSS SECTION IN OPEN AREA (WITH PAVED SHOULDER) FOR OVERLAY / WIDENING

TCS-08



TYPICAL CROSS SECTION IN OPEN AREA (WITH PAVED SHOULDER) FOR RECONSTRUCTION / WIDENING

LEGENDS

1	Sub	100 - 1000	100 - 1000	100 - 1000
2	Sub	100 - 1000	100 - 1000	100 - 1000
3	Sub	100 - 1000	100 - 1000	100 - 1000
4	Sub	100 - 1000	100 - 1000	100 - 1000
5	Sub	100 - 1000	100 - 1000	100 - 1000
6	Sub	100 - 1000	100 - 1000	100 - 1000
7	Sub	100 - 1000	100 - 1000	100 - 1000
8	Sub	100 - 1000	100 - 1000	100 - 1000
9	Sub	100 - 1000	100 - 1000	100 - 1000
10	Sub	100 - 1000	100 - 1000	100 - 1000

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  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. OSRP/CEG/RIGID 02.
  5. FOR PAVEMENT EDGE DETAILS REFER DRAWING NO. OSRP/CEG/00
  6. PCC-PROFILE CORRECTIVE COURSE WITH THE MATERIAL SAME AS THAT OF OVERLAYING LAYER ABOVE IT.
  7. INCREASE THE UTILITIES/TREES OBSTRUCTING THE LONGITUDINAL DRAINS. THE DRAINS MAY BE INVERTED AS PER ENGINEERS DIRECTIONS

TYPICAL CROSS-SECTION  
TCS - 07 & TCS - 08

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

**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

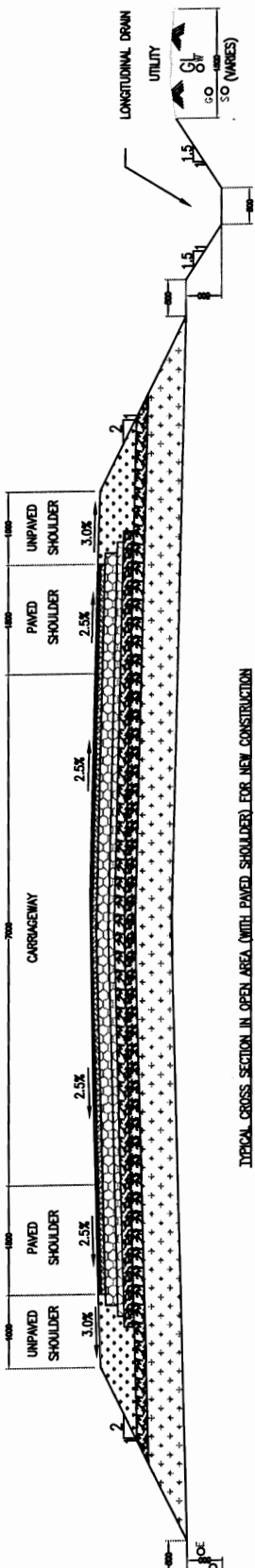


DRG NO.	OSRP/CEG/TCS/07 & 08	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	04	DATE	REV	RO	
SCALE			B.M	R.J	R.R.D.K
					S.G

BACKBONE ARSS JV  
CONTRACTOR

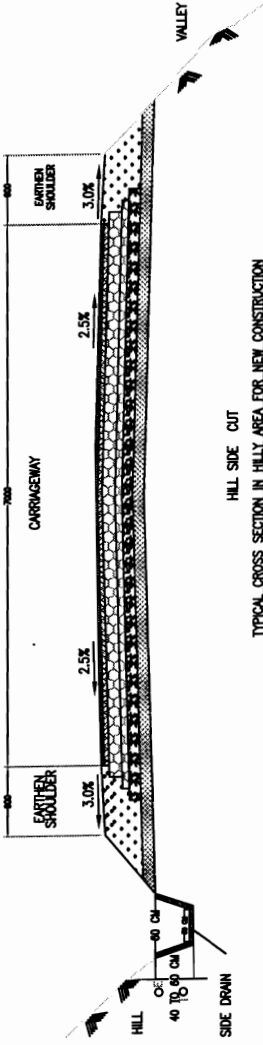


TCS-09



TYPICAL CROSS SECTION IN OPEN AREA (WITH PAVED SHOULDER) FOR NEW CONSTRUCTION

TCS-10



TYPICAL CROSS SECTION IN HILLY AREA FOR NEW CONSTRUCTION

**LEGENDS**

1) 12 - Water Supply Line	1) 12 - Water Supply Line
2) 12 - Sewer Line	2) 12 - Sewer Line
3) 12 - Gas Line	3) 12 - Gas Line
4) 12 - Fire Line	4) 12 - Fire Line
5) 12 - Storm Water	5) 12 - Storm Water
6) 12 - Telephone Cable	6) 12 - Telephone Cable
7) 12 - Electric Cable	7) 12 - Electric Cable

- NOTES**
1. ALL DIMENSIONS ARE IN MILLIMETERS
  2. FOR DRAIN DETAILS REFER DRAWING NO.OSRP/CEG/DR
  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.OSRP/CEG/RIGID 02.
  5. FOR PAVEMENT EDGE DETAILS REFER DRAWING NO. OSRP/CEG/00
  6. FOR CORRECTIVE COURSE WITH THE MATERIAL SAME AS THAT OF OVERLAYING LAYER ABOVE IT.
  7. TO INCREASE THE UTILITIES/TREES OBSTRUCTING THE LONGITUDINAL DRAINS, THE DRAINS MAY BE DIVERTED AS PER ENGINEERS DIRECTIONS

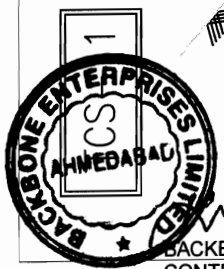
**PROJECT:-**  
**CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE**

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



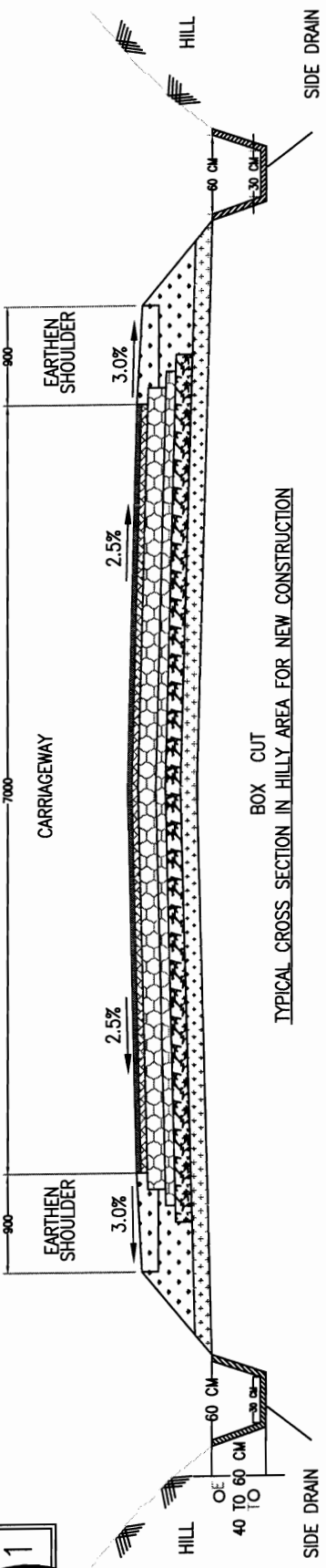
**TYPICAL CROSS-SECTION**  
**TCS - 09 & TCS - 10**

DRG. NO.	OSRP/CEG/TCS/09 & 10	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	05	DATE	REV	RO	
SCALE	NTS			B.M	R.J
				R.R.D.K	S.G

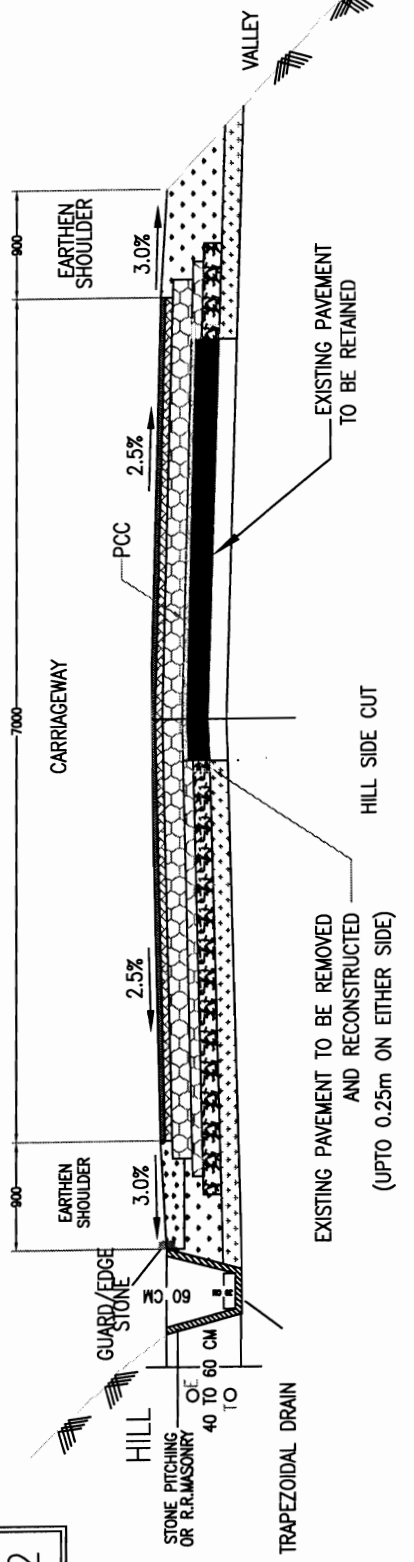


CONTRACTOR  
 BACKBONE - ARSS JV  
 Projects Ltd. ARSS INFRASTRUCTURE

TCS-12



TYPICAL CROSS SECTION IN HILLY AREA FOR NEW CONSTRUCTION



TYPICAL CROSS SECTION IN HILLY AREA FOR OVERLAY AND WIDENING

**LEGENDS**

1) BC	6) B.L.C.	11) W - Water Supply Line
2) CEM	7) P.C.	12) G - Gas Line
3) W.M.	8) CHERTY FILL	13) S - Sewer
4) C.S.P.	9) E - Electricity Cable	
5) SUBGRADE	10) T - Telecom Cable	

- NOTES**
1. ALL DIMENSIONS ARE IN MILLIMETERS
  2. FOR DRAIN DETAILS REFER DRAWING NO. OSRP/CEG/DR
  3. FOR LAYER THICKNESS DETAILS REFER 'SCHEDULE OF WIDENING AND LAYER THICKNESS DETAILS'
  4. ALL CROSS SECTIONS SHALL BE READ WITH DETAILS OF TRANSITION BETWEEN RIGID AND FLEXIBLE REFER DRAWING NO. OSRP/CEG/RIGID 02.
  5. FOR PAVEMENT EDGE DETAILS REFER DRAWING NO. OSRP/CEG/00
  6. ALL CORRECTIVE COURSE WITH THE MATERIAL SAME AS THAT OF RELAYING LAYER ABOVE IT.
  7. REMOVE THE UTILITIES/TREES OBSTRUCTING THE LONGITUDINAL DRAINS. DRAINS MAY BE DIVERTED AS PER ENGINEERS DIRECTIONS

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

TYPICAL CROSS-SECTION  
 TCS - 11 & TCS - 12

DRG. NO.	OSRP/CEG/TCS/011 & 12	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	06	DATE	REV	RO	
SCALE	NTS			B.M.	R.J
				R.R.D.K	S.G

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

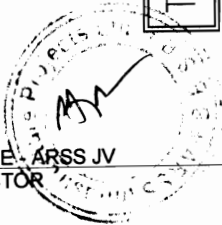


World Bank Project, Orissa  
 Olo the P.T.C. EMPLOYER  
 Chubandwar



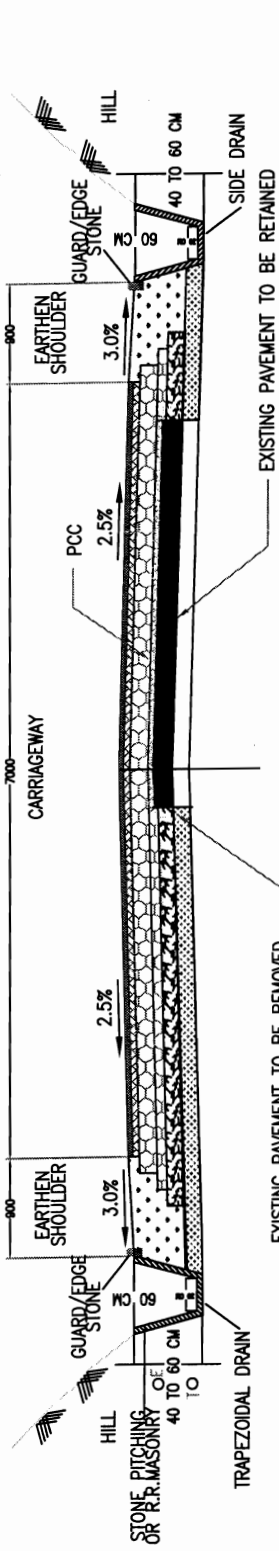


BACKBONE ARSS JV  
CONTRACTOR

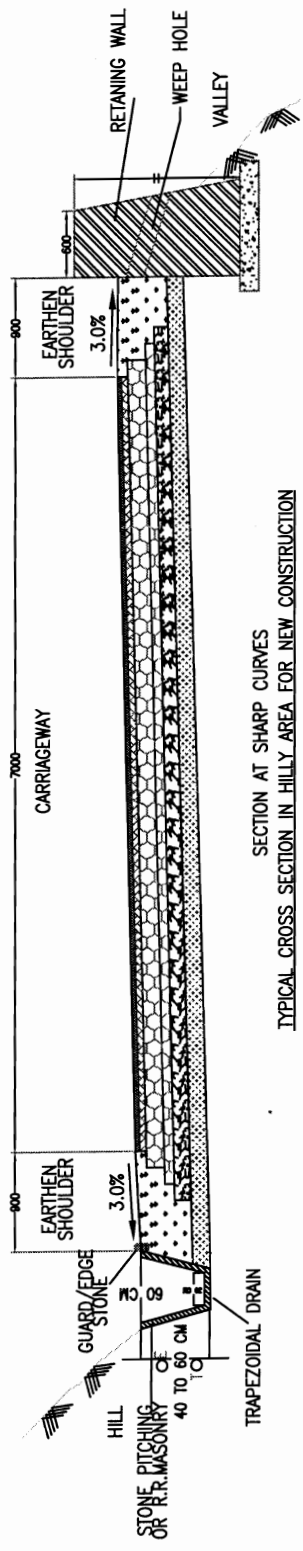


TCS-14

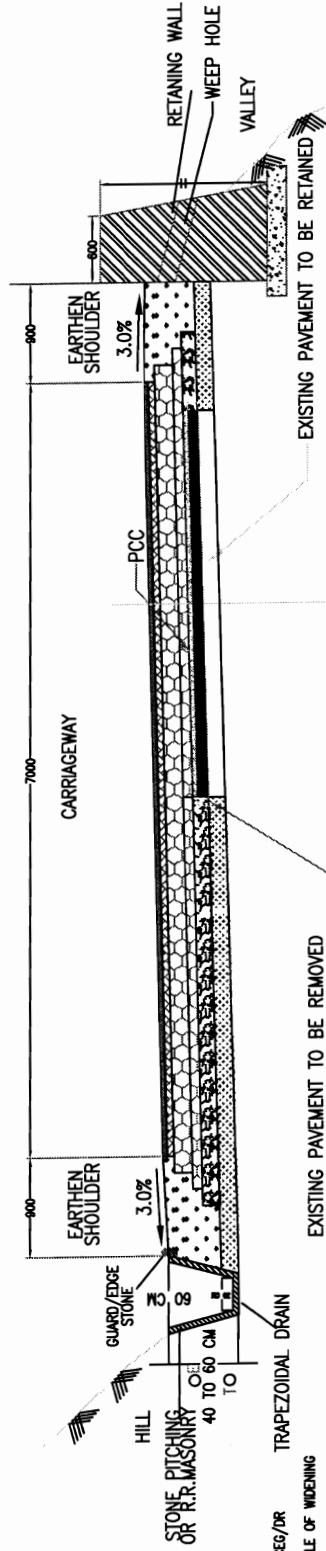
TCS-15



TYPICAL CROSS SECTION IN HILLY AREA FOR OVERLAY / WIDENING



SECTION AT SHARP CURVES  
TYPICAL CROSS SECTION IN HILLY AREA FOR NEW CONSTRUCTION



SECTION AT SHARP CURVES  
TYPICAL CROSS SECTION IN HILLY AREA FOR OVERLAY / WIDENING

ITEM NO.	DESCRIPTION	UNIT	QUANTITY
1	...	...	...
2	...	...	...
3	...	...	...
4	...	...	...
5	...	...	...
6	...	...	...
7	...	...	...
8	...	...	...
9	...	...	...
10	...	...	...

- NOTES
- ALL DIMENSIONS ARE IN MILLIMETERS
  - FOR DRAIN DETAILS REFER DRAWING NO. OSRP/CEG/DR
  - FOR LAYER THICKNESS DETAILS REFER 'SCHEDULE OF WIDENING AND LAYER THICKNESS DETAILS'
  - THE CROSS SECTIONS SHALL BE READ WITH DETAILS OF TRANSITION BETWEEN RIGID AND FLEXIBLE REFER DRAWING NO. OSRP/CEG/RIGID 02
  - FOR PAVEMENT EDGE DETAILS REFER DRAWING NO. OSRP/CEG/00
  - PCC-PROFILE CORRECTIVE COURSE WITH THE MATERIAL SAME AS THAT OF OVERLAYING LAYER ABOVE IT.
  - INCREASE THE UTILITIES/TREES OBSTRUCTING THE LONGITUDINAL DRAINS. THE DRAINS MAY BE INVERTED AS PER ENGINEERS DIRECTIONS
  - FOR DETAILS OF RETAINING WALL REFERE DRW. NO. OSRP/CEG/RW.

PROJECT:-  
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND  
DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS  
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ASSISTANCE

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



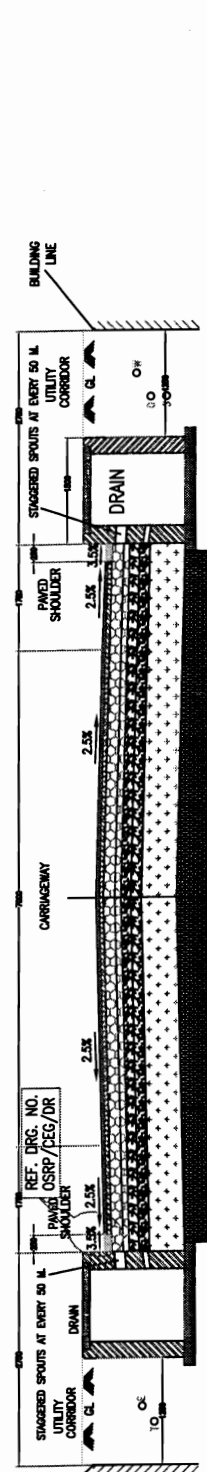
TYPICAL CROSS-SECTION  
TCS - 13, TCS- 14 & TCS-15

DRG NO.	OSRP/CEG/TCS/13, 14 & 15	DESIGNED (A)	DESIGNED (V)	DESIGNED (W)	DESIGNED (X)	DESIGNED (Y)	DESIGNED (Z)	APPROVED (O)
SH. NO.	07	DATE	REV	RO	R1	R2	R3	R4
SCALE	NTS							
					B.M	R.J	R.R.D.K	S.G

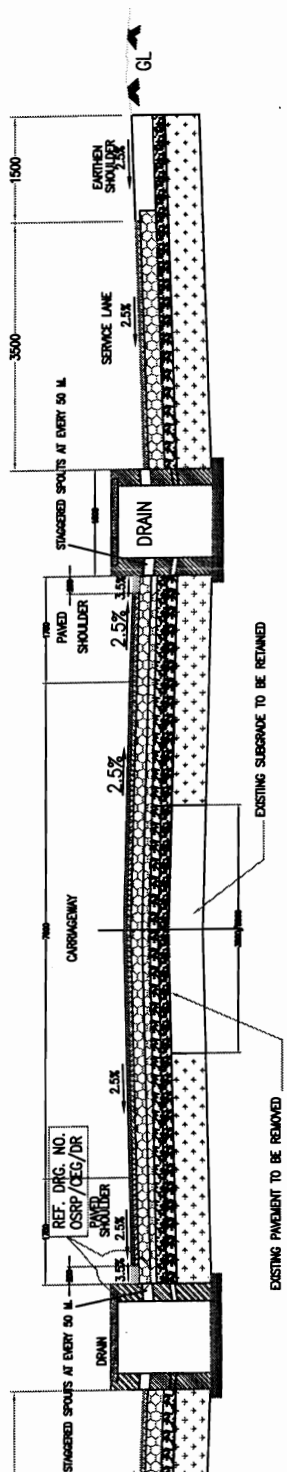




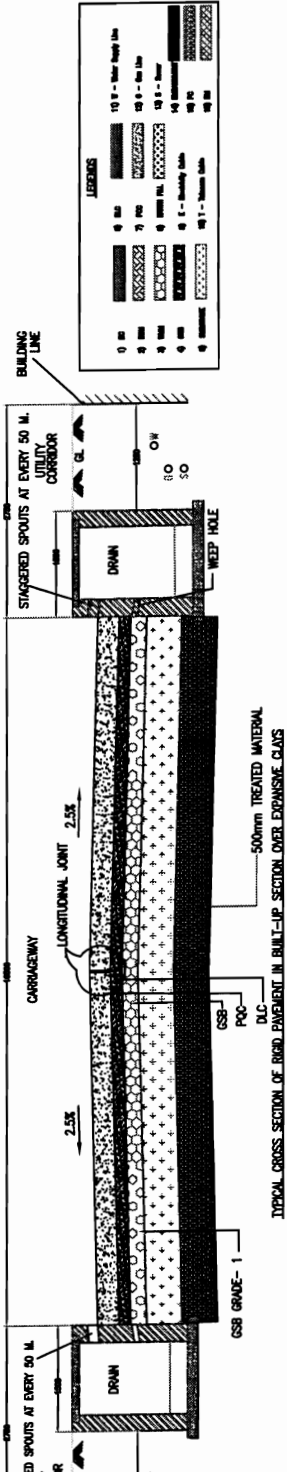
TCS-19



TCS-20



TCS-21



LEGEND

0	mm	100	mm	100	mm
1	mm	100	mm	100	mm
2	mm	100	mm	100	mm
3	mm	100	mm	100	mm
4	mm	100	mm	100	mm
5	mm	100	mm	100	mm
6	mm	100	mm	100	mm
7	mm	100	mm	100	mm
8	mm	100	mm	100	mm
9	mm	100	mm	100	mm
10	mm	100	mm	100	mm
11	mm	100	mm	100	mm
12	mm	100	mm	100	mm
13	mm	100	mm	100	mm
14	mm	100	mm	100	mm
15	mm	100	mm	100	mm
16	mm	100	mm	100	mm
17	mm	100	mm	100	mm
18	mm	100	mm	100	mm
19	mm	100	mm	100	mm
20	mm	100	mm	100	mm

- FOR PAVEMENT EDGE DETAILS REFER DRAWING NO. OCSR/CEG/00
- POC-PROFILE CORRECTIVE COURSE WITH THE MATERIAL SAME AS THAT OF OVERLAYING LAYER ABOVE IT.
- INCREASE THE UTILITIES/TREES OBSTRUCTING THE LONGITUDINAL DRAINS. THE DRAINS MAY BE DIVERTED AS PER ENGINEERS DIRECTIONS
- FOR DETAILS OF RETAINING WALL REFER DRAW. NO. OCSR/CEG/RW.

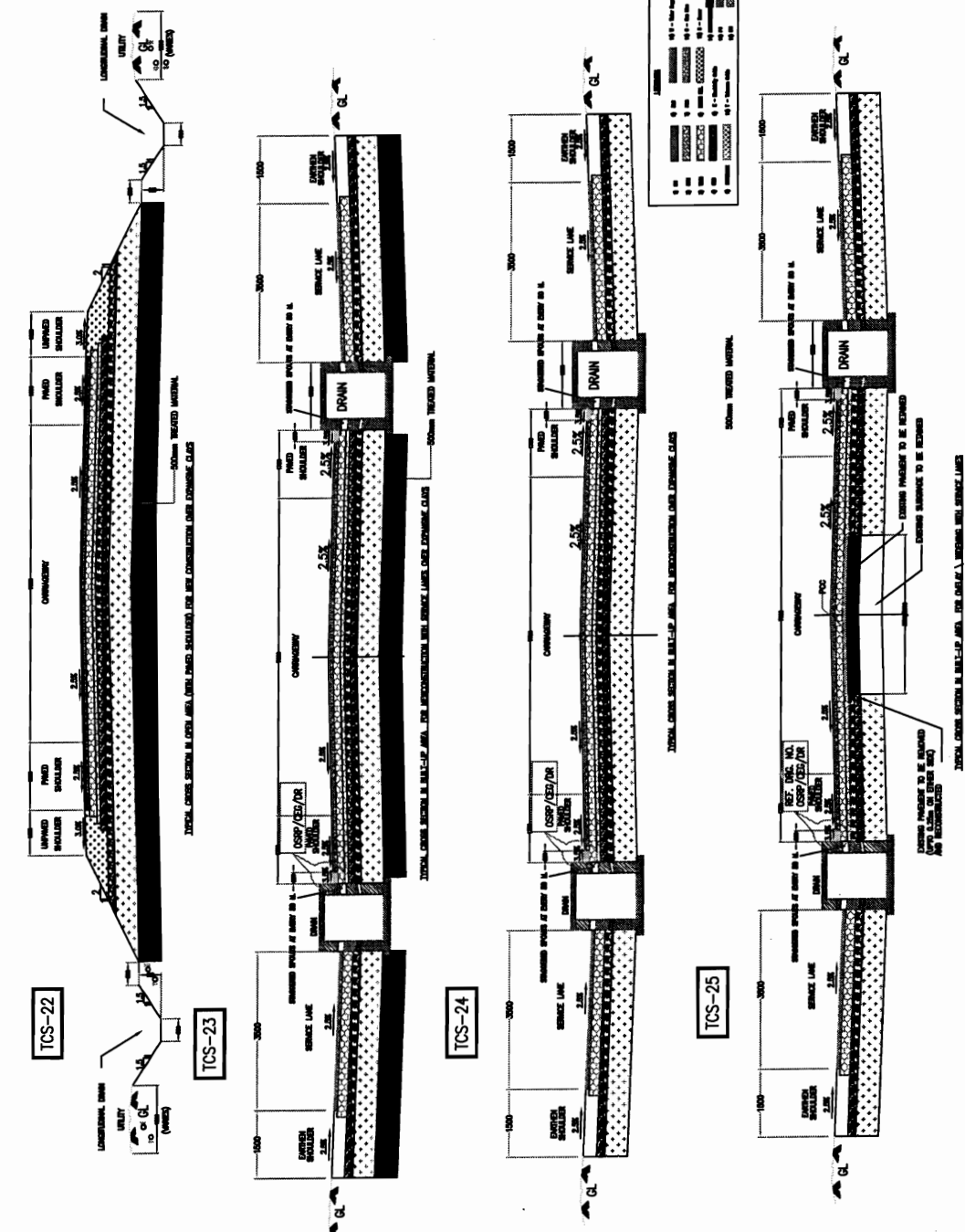
ALL DIMENSIONS ARE IN MILLIMETERS  
 FOR DRAIN DETAILS REFER DRAWING NO. OCSR/CEG/DR  
 FOR LAYER THICKNESS DETAILS REFER 'SCHEDULE OF WIDENING LAYER THICKNESS DETAILS'  
 THE CROSS SECTIONS SHALL BE READ WITH DETAILS OF TRANSITION BETWEEN RIGID AND FLEXIBLE REFER DRAWING NO. OCSR/CEG/RIGID 02.

TYPICAL CROSS-SECTION  
 TCS - 19, TCS - 20 & TCS - 21

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

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

DRG NO.	OCSR/CEG/TCS-19,20 & 21	DESIGNED (A)	DATE	REV	RO	B.M	R.J	R.R.D.K	APPROVED (B)	S.G
SH. NO.	09	DATE								
SCALE	NTS									



**TYPICAL CROSS-SECTION**  
TCS - 22, TCS - 23, TCS - 24 & TCS - 25

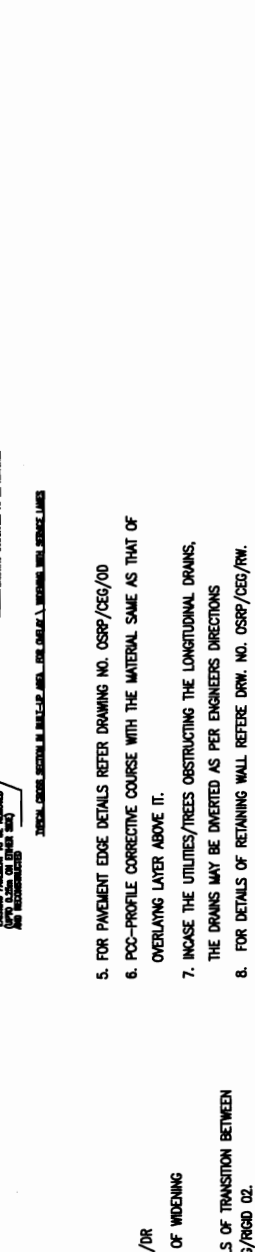
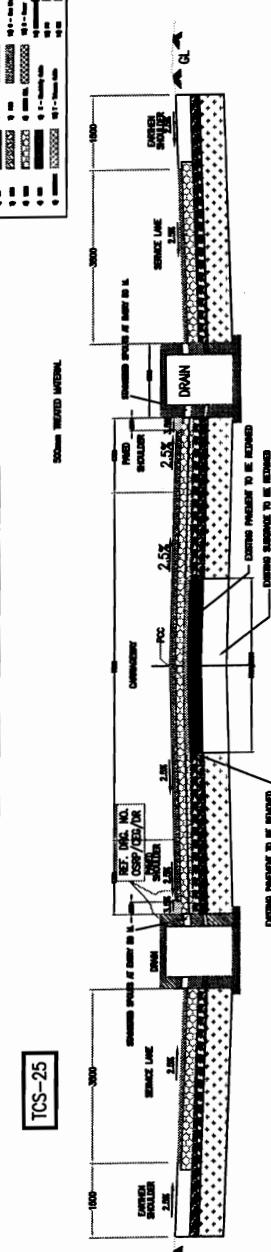
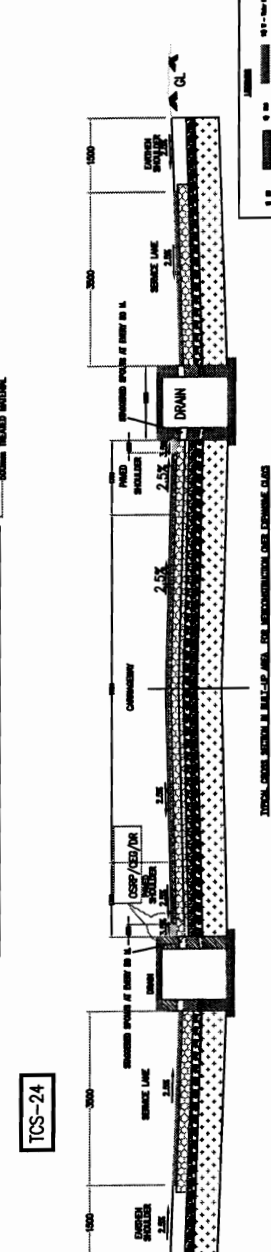
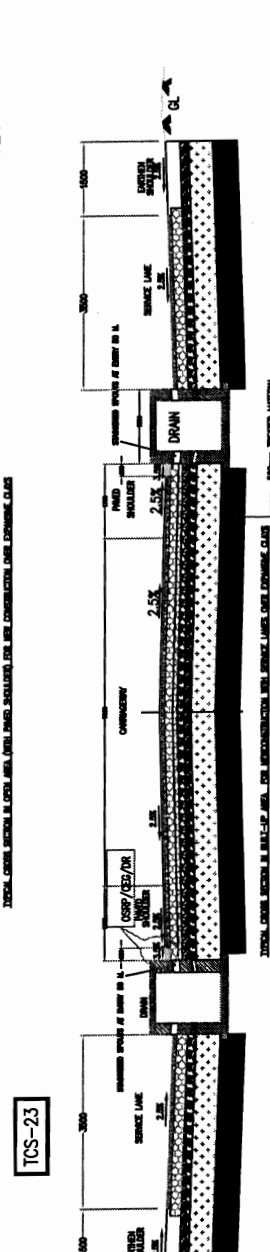
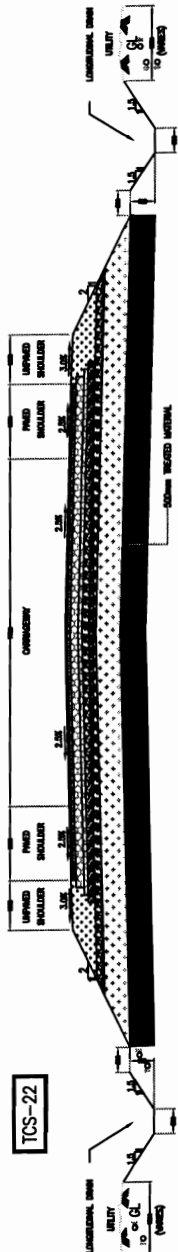
**PROJECT:-**  
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

**CEG**  
**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

DRG NO.	CGRP/CEG/TCS-22,23,24 & 25	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	09/A	DATE	REV	RO	
SCALE	NTS				
				B.M	R.J
				R.R.D.K	S.G

BACKBONE CONTRACTORS  
ARRS JV  
Infrastructure Projects Ltd. \* S R B S R

Chief Engineer  
World Bank  
the E.I.C (CIVIL) Division  
Bhubaneswar



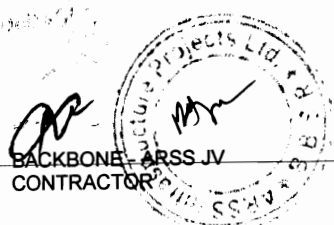
SYMBOL	DESCRIPTION
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2	150mm Thick Bit
3	150mm Thick Bit
4	150mm Thick Bit
5	150mm Thick Bit
6	150mm Thick Bit
7	150mm Thick Bit
8	150mm Thick Bit
9	150mm Thick Bit
10	150mm Thick Bit

- FOR PAVEMENT EDGE DETAILS REFER DRAWING NO. O/SRP/CEG/00
- PCC-PROFILE CORRECTIVE COURSE WITH THE MATERIAL SAME AS THAT OF OVERLAYING LAYER ABOVE IT.
- INCREASE THE UTILITIES/TREES OBSTRUCTING THE LONGITUDINAL DRAINS, THE DRAINS MAY BE DIVERTED AS PER ENGINEERS DIRECTIONS
- FOR DETAILS OF RETAINING WALL REFER DRAW. NO. O/SRP/CEG/RW.

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

**TYPICAL CROSS-SECTION**  
**TCS - 22, TCS - 23, TCS - 24 & TCS - 25**

DRG NO.	O/SRP/CEG/TCS-22,23,24 & 25	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	09/A	DATE	REV	RO	
SCALE	NTS				
				B.M	R.J
					R.R.D.K
					S.G



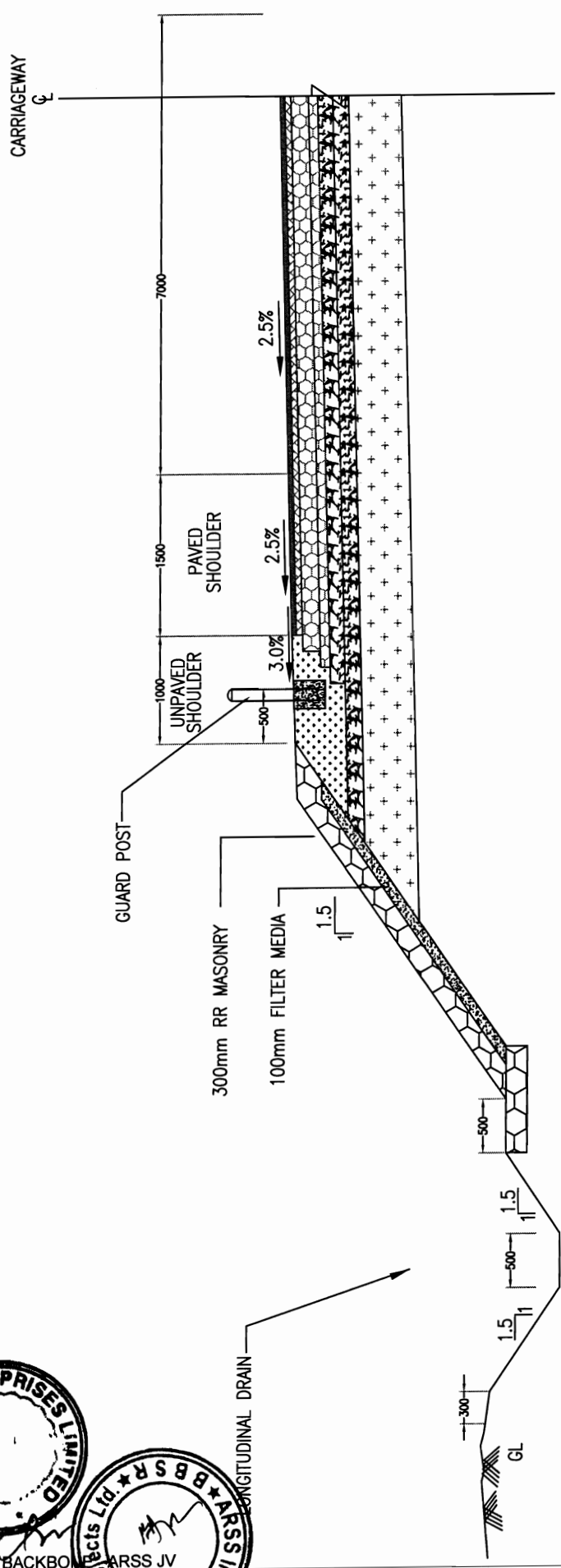
BACKBONE - ARSS JV  
 CONTRACTOR

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

Chief Engineer  
 World Bank  
 the E.T.C.I.C. P.O. Box  
 Bhubaneswar



BACKBONE ENTERPRISES LIMITED  
 Projects Ltd. (Pvt.)  
 B.S.R. JV  
 CONTRACT



HIGH EMBANKMENT PROTECTION WORK WITH STONE PITCHING AND CRASH BARRIER

- NOTES:**
1. ALL DIMENSIONS ARE IN MILLIMETERS
  2. THE STONE PITCHING SHALL BE PROVIDED FOR EMBANKMENT HIGHT MORE THEN 3M ALONG WITH METAL CRASH BARRIERS.
  3. FOR CRASH BARRIERS REFER DWG. NO. CSR/CEG/08.

**LEGENDS**

1) MC	4) H.C	11) 8 - Water Supply Lin
2) CM	7) P.C	12) 6 - Gas Lin
3) M.M	8) S.P.H. P.L.	13) 8 - Sewer
4) CM	9) E - Blanking Cable	
5) STAINLESS	10) T - Telecom Cable	

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

**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

Chief Engineer  
 World Bank Projects, Jaipur  
 EMP/10/05/08  
 O/o the E.I.C (G.V.N) Orissa,  
 Bhubaneswar

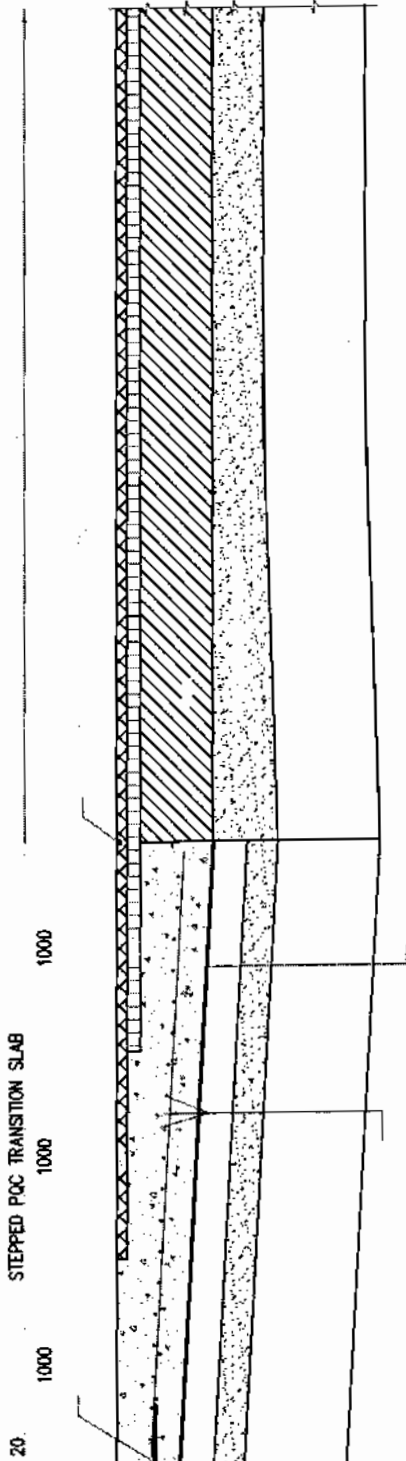
**TYPICAL SLOPE PROTECTION WORK**

DRG NO. CSR/CEG/PW	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO. 10	DATE	REV	RO	
SCALE	NTS			
	B.M	R.J	R.R.D.K	S.G





BACKBONE ARSS JV  
CONTRACTOR



Chief Engineer  
World Bank Project  
EMPLOYER  
of the E.I.C (I) Ltd, Orissa,  
Bhubaneswar:

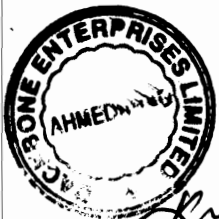
TYPICAL DETAILS OF TRANSITION SLAB BETWEEN RIGID AND FLEXIBLE PAVEMENT									
DRG. NO.	COMP/CON/REV/02	DATE	REV	RO	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)	S.G.
SH. NO.	12								
SCALE	NTS				B.M.	R.J.	R.R.D.K		

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

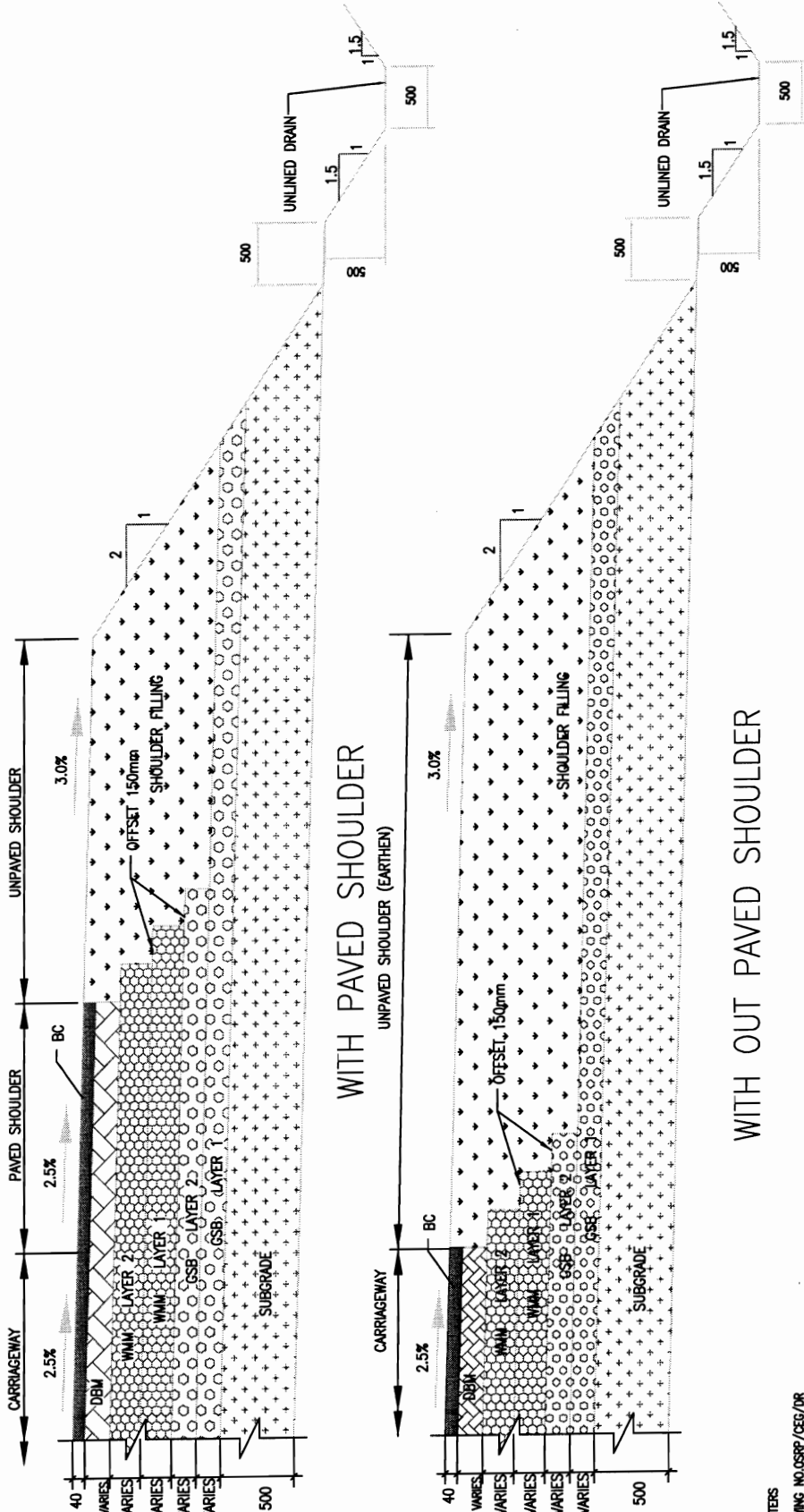
**CONSULTING  
ENGINEERS GROUP LTD.**  
E-12, Moji Colony, Malviya Nagar, Jaipur-17  
Tel: +91-141-2520899, 2521899, 2520556  
Fax: 2521348, e-mail: cseg@ceghdla.com







BACKBONE ARSS JV  
CONTRACTOR



**LEGENDS**

1) MC	6) B.C.	11) W - Water Supply Line
2) DBM	7) P.C.C.	12) G - Gas Line
3) WBM	8) EARTH FILL	13) S - Sewer
4) GSB	9) E - Existing Cables	
5) SUBGRADE	10) T - Telecom Cables	

**WITH OUT PAVED SHOULDER**

- NOTES:**
1. ALL DIMENSIONS ARE IN MILLIMETERS
  2. FOR DRAIN DETAILS REFER DRAWING NO. OSRP/CEG/DR
  3. FOR LAYER THICKNESS DETAILS REFER 'SCHEDULE OF WIDENING AND LAYER THICKNESS DETAILS' ROAD AND FLEXIBLE.
  4. THE CROSS SECTIONS SHALL BE READ WITH DETAILS OF TRANSITION BETWEEN OVERLAYING LAYER ABOVE IT.
  5. FOR PAVEMENT EDGE DETAILS REFER DRAWING NO. OSRP/CEG/DO
  6. P.C.C-PROFILE CORRECTIVE COURSE WITH THE MATERIAL SAME AS THAT OF OVERLAYING LAYER ABOVE IT.
  7. INCREASE THE UTILITIES/TREES OBSTRUCTING THE LONGITUDINAL DRAINS, THE DRAINS MAY BE DIVERTED AS PER ENGINEERS DIRECTIONS

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

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

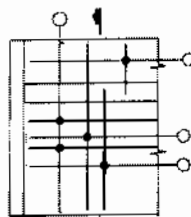
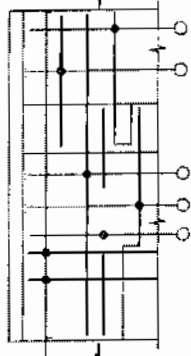
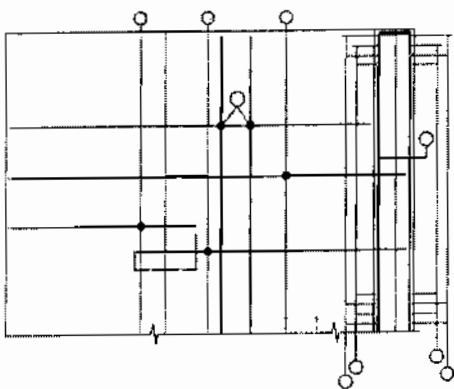
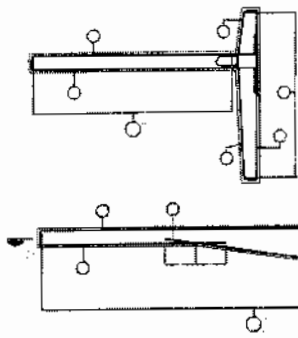
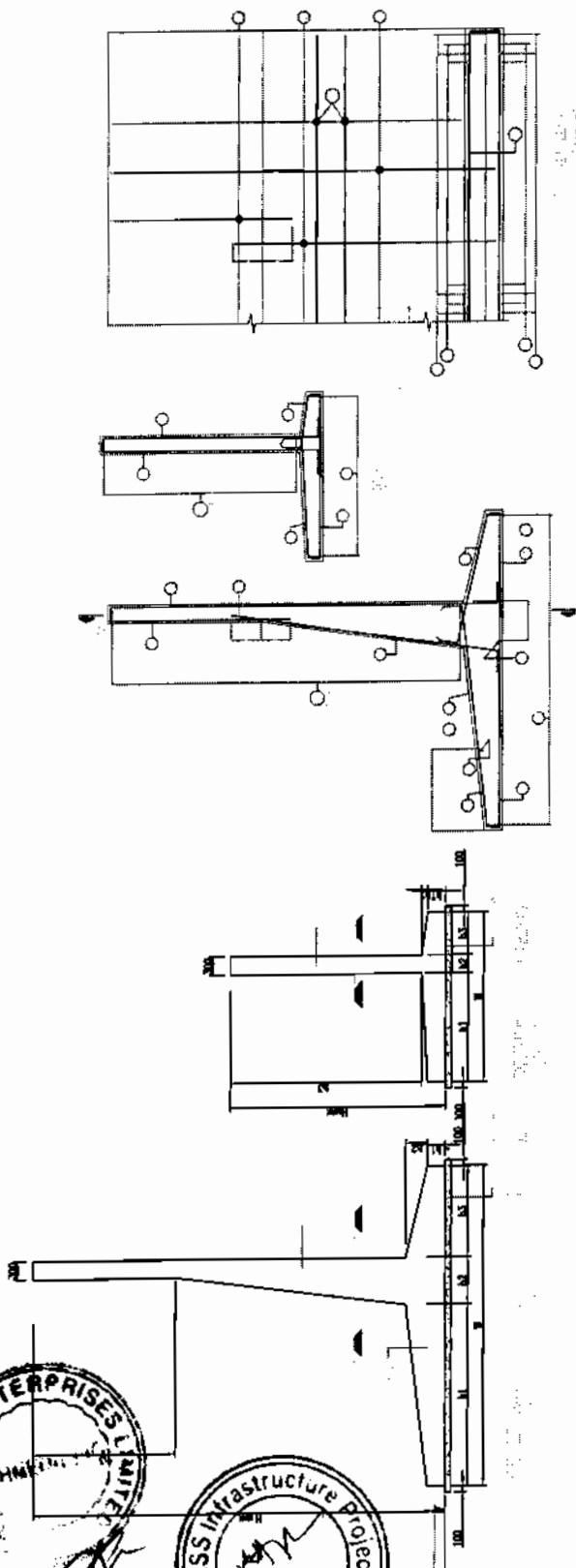


**TYPICAL DETAILS OF PAVEMENT LAYER**

DRG NO.	OSRP/CEG/DO	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	13	DATE	REV	RO	
SCALE				NTS	
			B.M	R.J	R.R.D.K
					S.G



BACKBONE CONTRACTOR  
ARRSS JV



BAR MARK.	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
BAR SHAPE	10	10	10	10	10	10	10	10	10	10
A	10 @ 100mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c
B	10 @ 100mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c

CATEGORY	H	W	H1	H2	N1	N2	N3	B1	B2	B3
A	2000	2100	300	300	2000	1300	300	650	650	650
B	3000	2500	300	300	2000	1875	300	650	650	650
C	4000	3150	300	300	128	2400	1665	410	775	775
D	5000	3330	300	300	200	2400	2700	520	1000	1000
E	6000	4035	300	300	200	2400	3180	618	1175	1175

CATEGORY	L1	L2
A	-	-
B	-	-
C	600	1200
D	-	-
E	-	-

BAR MARK.	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
BAR SHAPE	10	10	10	10	10	10	10	10	10	10
C	10 @ 100mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c
D	10 @ 100mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c
E	10 @ 100mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c	10 @ 200mm/c

Chief Engineer  
World Bank Projects, Orissa  
To the E.T.C EMPLOYER  
Phubaneswar

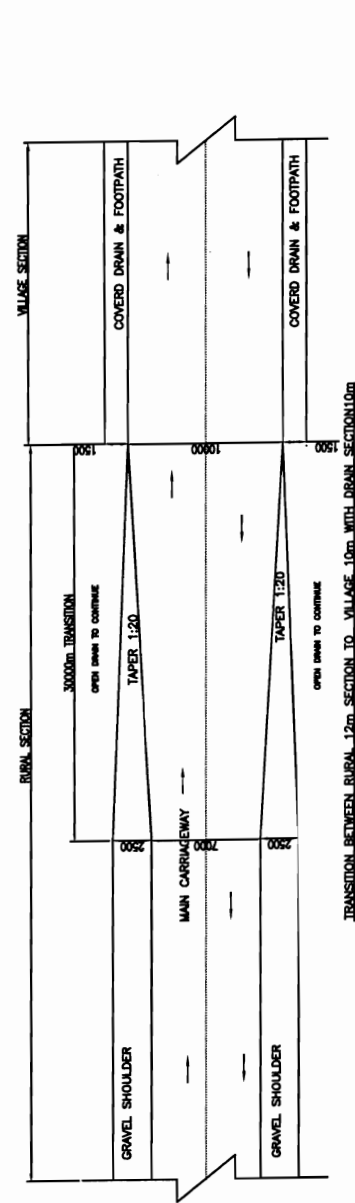
**CONSULTING ENGINEERS GROUP LTD.**  
E-12, Moji Colony, Malviya Nagar Jaipur-17  
Tel: +91-141-2520899, 2521899, 2520556  
Fax: 2521348, e-mail: ceg@cegindia.com



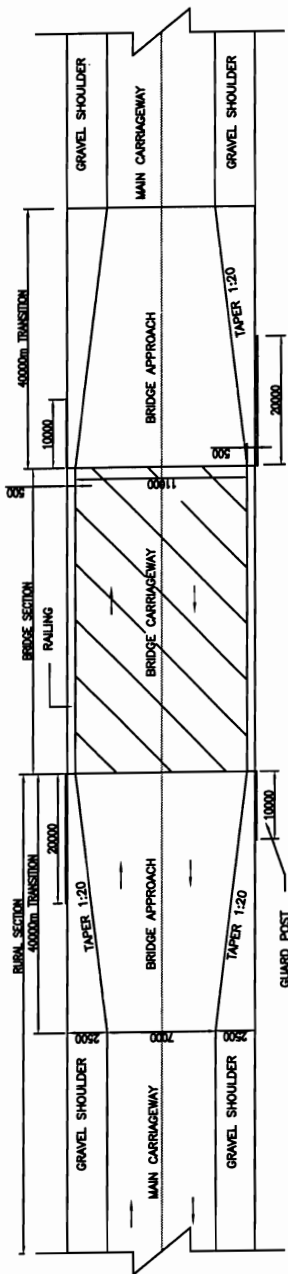
**PROJECT:-**  
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND  
DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS  
FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK  
ASSISTANCE

STANDARD DRAWINGS  
RETAINING WALL

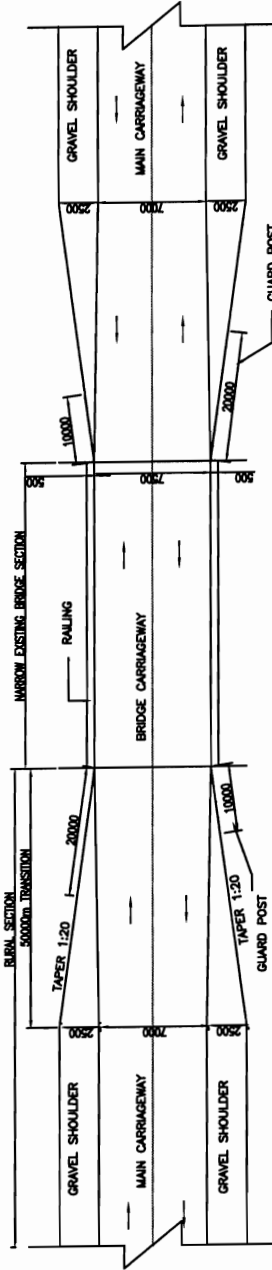
DRG. NO.	DATE	SCALE	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	14		REV	RO	R.R.D.K	S.G
					B.M	R.J



TRANSITION BETWEEN RURAL 12m SECTION TO VILLAGE 10m WITH DRAIN SECTION 10m



TRANSITION BETWEEN RURAL 12m SECTION TO BRIDGES WITH 11m CLEAR CARRIAGEWAY



TRANSITION BETWEEN RURAL 12m SECTION TO NARROW EXISTING BRIDGE SECTION

- NOTE
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS INDICATED OTHERWISE.
  2. FOR DETAILS OF STRUCTURES REFER STRUCTURAL DRGS.
  3. GUARD POSTS ARE INSTALLED WHERE EMBANKMENT HEIGHT IS MORE THAN 3 METRES & AT BRIDGE APPROACHES.
  4. FOR GUARD POST DETAIL REFER DWG. NO. OSRP/CEG/KM & GP DETAILS OF ROAD DELINEATORS
  5. FOR HAZARD MARKER DETAIL REFER TYPICAL ROAD SIGN & DETAILS OF ROAD DELINEATORS
  6. DRAWING TO BE READ WITH TCS- 1 TO TCS-16 AND DWG. NO. OSRP/CEG/RG02/02

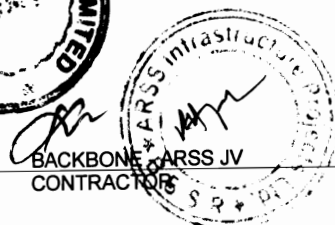
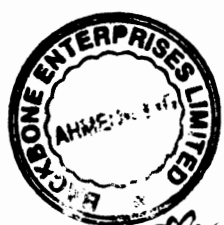
TYPICAL DETAILS OF TRANSITION OF DIFFERENT ROAD SECTION

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

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

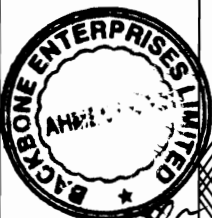


DRG. NO.	OSRP/CEG/TR	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	15	DATE	REV	RO	
SCALE	NTS				
		B.M	R.J	R.R.D.K	S.G

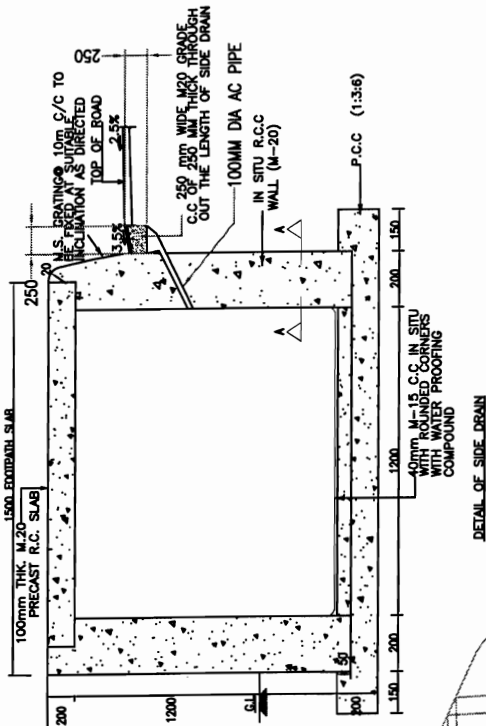
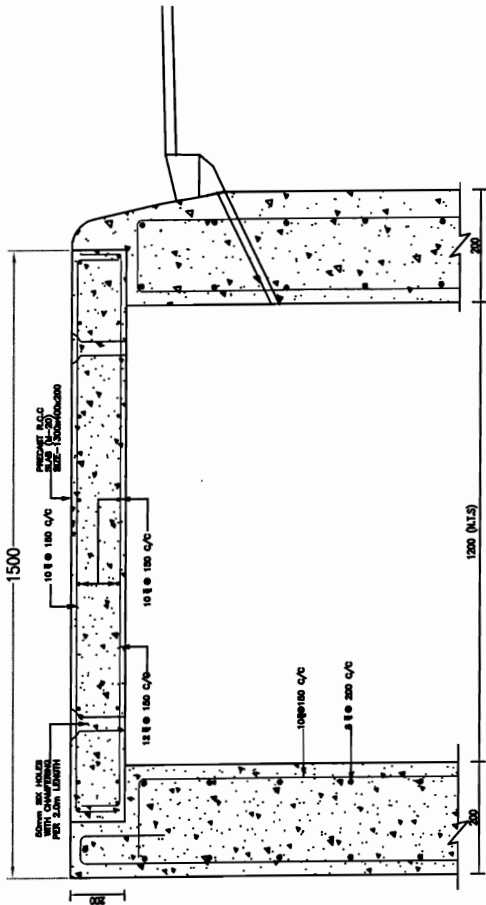


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CONTRACTOR

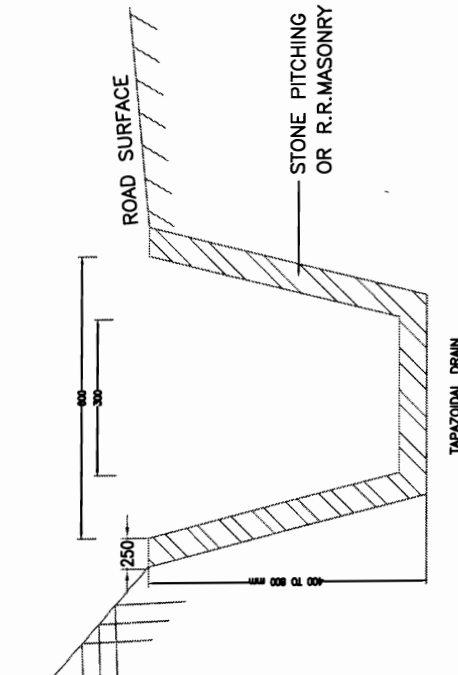
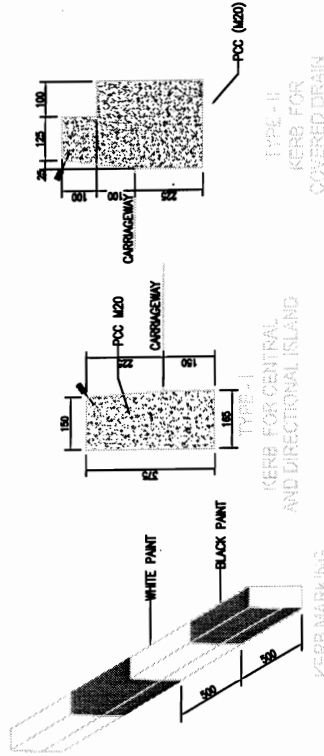
Chief Engineer  
World Bank Projects, Orissa  
O/o the E. I. EMPLOYER Orissa  
Phubaneswar



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CONTRACTOR



DETAIL OF REINFORCEMENT



STANDARD DRAWINGS  
DETAILS OF DRAIN AND KERB

DRG NO. / OSP / CEB / RR	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO. 16	DATE	REV	RO	
SCALE	NTS			
	B.M	R.J	R.R.D.K	S.G

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

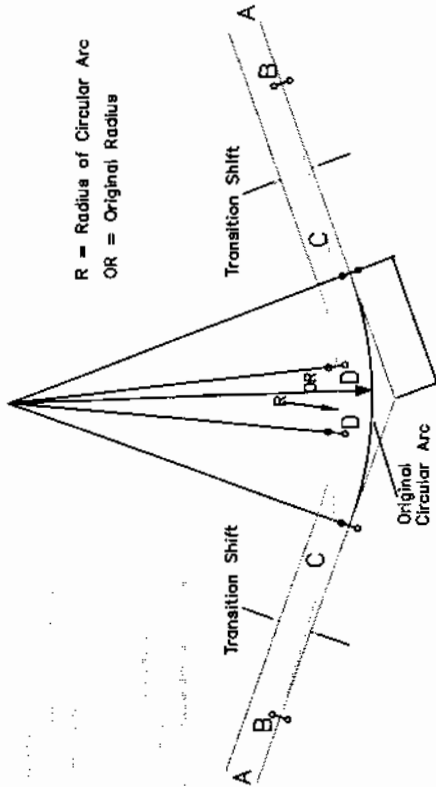
**CONSULTING  
ENGINEERS GROUP LTD.**  
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Tel: +91-141-2520899, 2521899, 2520556  
Fax: 2521348, e-mail: ceg@ceginia.com



World Bank Projects / Projects of Employer  
to the E.I.C. (Civil) Orissa,  
Bhubaneswar



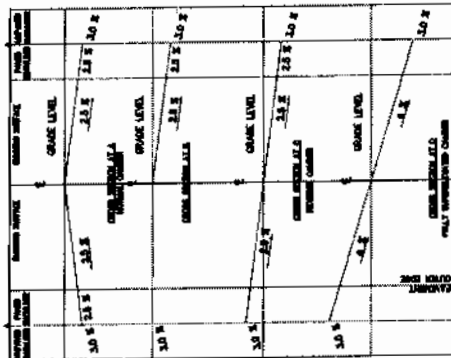
BACKBONE ARSS JV  
CONTRACTOR



APPLICATION OF SUPERELEVATION



LONGITUDINAL SECTION THROUGH HORIZONTAL CURVE  
ROTATION ABOUT PAVEMENT CENTRELINE



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

**DETAILS OF APPLICATION OF SUPERELEVATION**

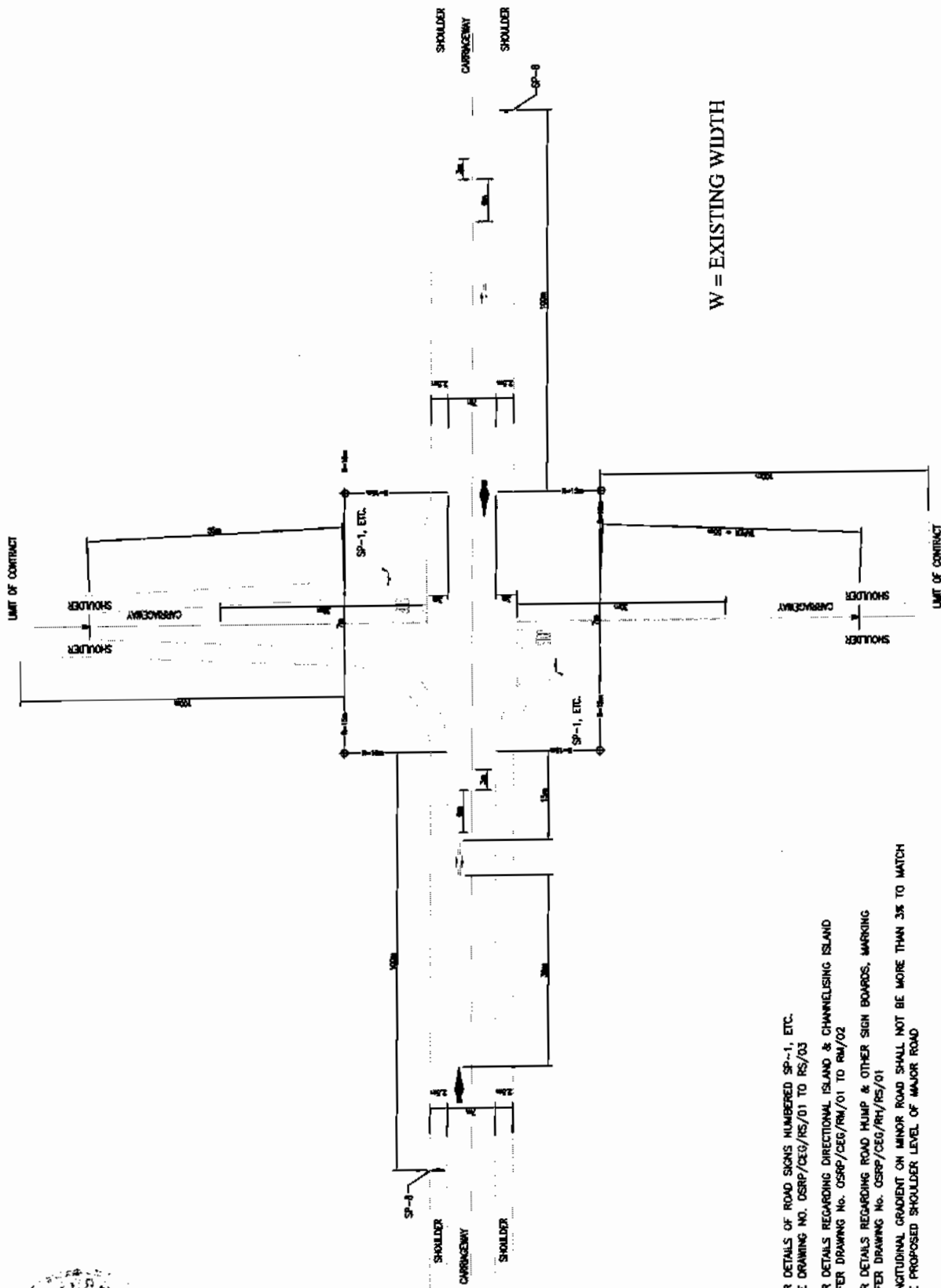
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SH. NO. 17	DATE	REV	RO	
SCALE	NTS			B.M
				R.J
				R.R.D.K
				S.G

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Chief Engineer  
World Bank Projects  
O/o the E.T.C. EMPLOYERS  
Rhubaneswar



W = EXISTING WIDTH

NOTE:

1. FOR DETAILS OF ROAD SIGNS NUMBERED SP-1, ETC. SEE DRAWING NO. OGRP/CEG/RS/01 TO RS/03
2. FOR DETAILS REGARDING DIRECTIONAL ISLAND & CHANNELISING ISLAND REFER DRAWING NO. OGRP/CEG/RM/01 TO RM/02
3. FOR DETAILS REGARDING ROAD PUMP & OTHER SIGN BOARDS, MARKING REFER DRAWING NO. OGRP/CEG/RH/RS/01
4. LONGITUDINAL GRADIENT ON MINOR ROAD SHALL NOT BE MORE THAN 3% TO MATCH THE PROPOSED SHOULDER LEVEL OF MAJOR ROAD

STANDARD DRAWINGS  
TYPICAL 4-LEGGED INTERSECTION WITH  
WITH SINGLE LANE BT ROAD

DRG NO. 18	DATE	REV	RO	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	18						
SCALE				B.M	R.J	R.R.D.K	S.G
				NTS			

PROJECT:-  
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DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS  
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ASSISTANCE

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ENGINEERS GROUP LTD.**

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



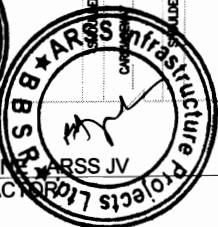
BACKBONE ARSS JV  
CONTRACTOR



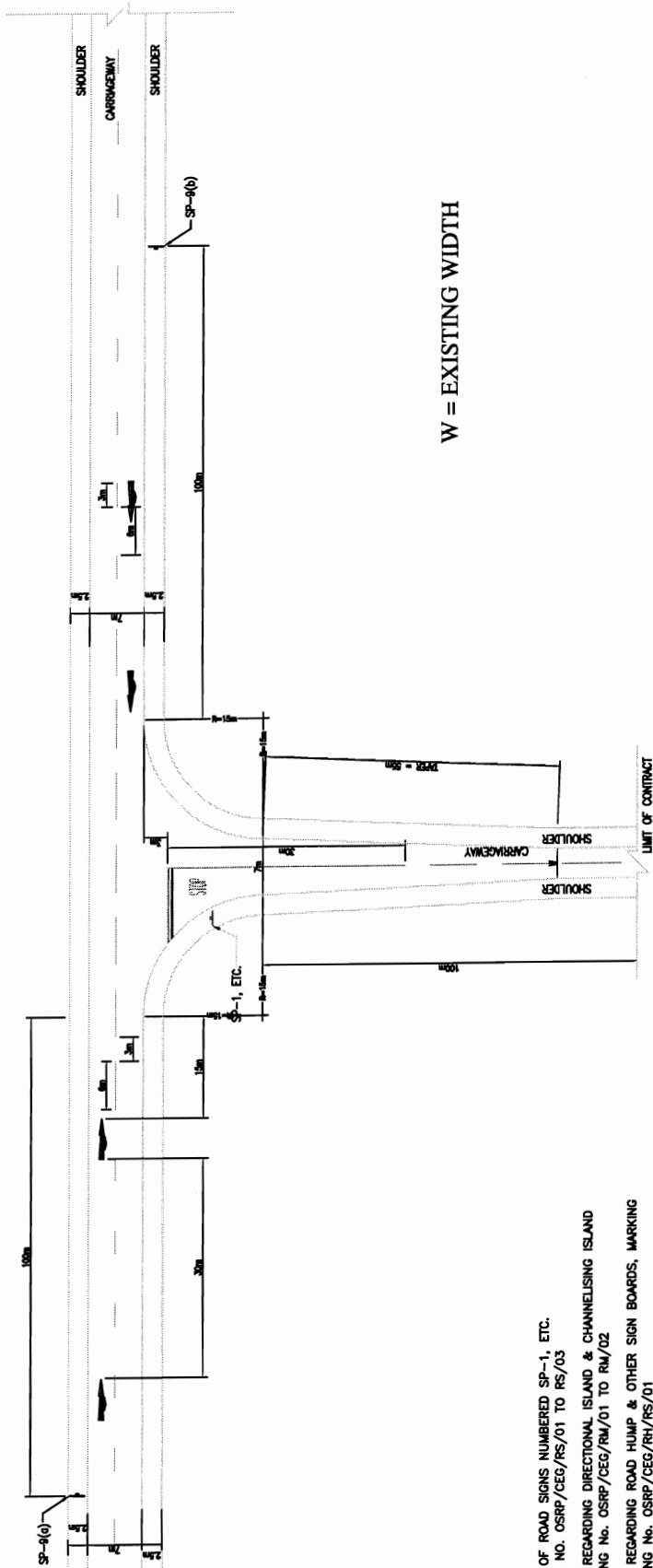
Chief Engineer  
World Bank Projects  
Orissa  
of the E.I.C (EMPLOYER)  
Phubaneswar



BACKBONE ENTERPRISES LIMITED  
CONTRACTOR



ARS JV  
EMPLOYER



W = EXISTING WIDTH

**NOTE:**

1. FOR DETAILS OF ROAD SIGNS NUMBERED SP-1, ETC. SEE DRAWING NO. OSRP/CEG/RS/01 TO RS/03
2. FOR DETAILS REGARDING DIRECTIONAL ISLAND & CHANNELISING ISLAND REFER DRAWING NO. OSRP/CEG/RM/01 TO RM/02
3. FOR DETAILS REGARDING ROAD HUMPS & OTHER SIGN BOARDS, MARKING REFER DRAWING NO. OSRP/CEG/RH/RS/01
4. LONGITUDINAL GRADIENT ON MINOR ROAD SHALL NOT BE MORE THAN 3% TO MATCH THE PROPOSED SHOULDER LEVEL OF MAJOR ROAD

**STANDARD DRAWINGS  
TYPICAL T- JUNCTION  
WITH SINGLE LANE BT ROAD**

DRG. NO.	OSRP/CEG/JN/02	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	19	DATE	REV	R.O	
SCALE			B.M	R.J	S.G
			NTS		

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

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Tel: +91-141-2520899, 2521899, 2520556  
Fax: 2521348, e-mail: ceg@cegingdia.com



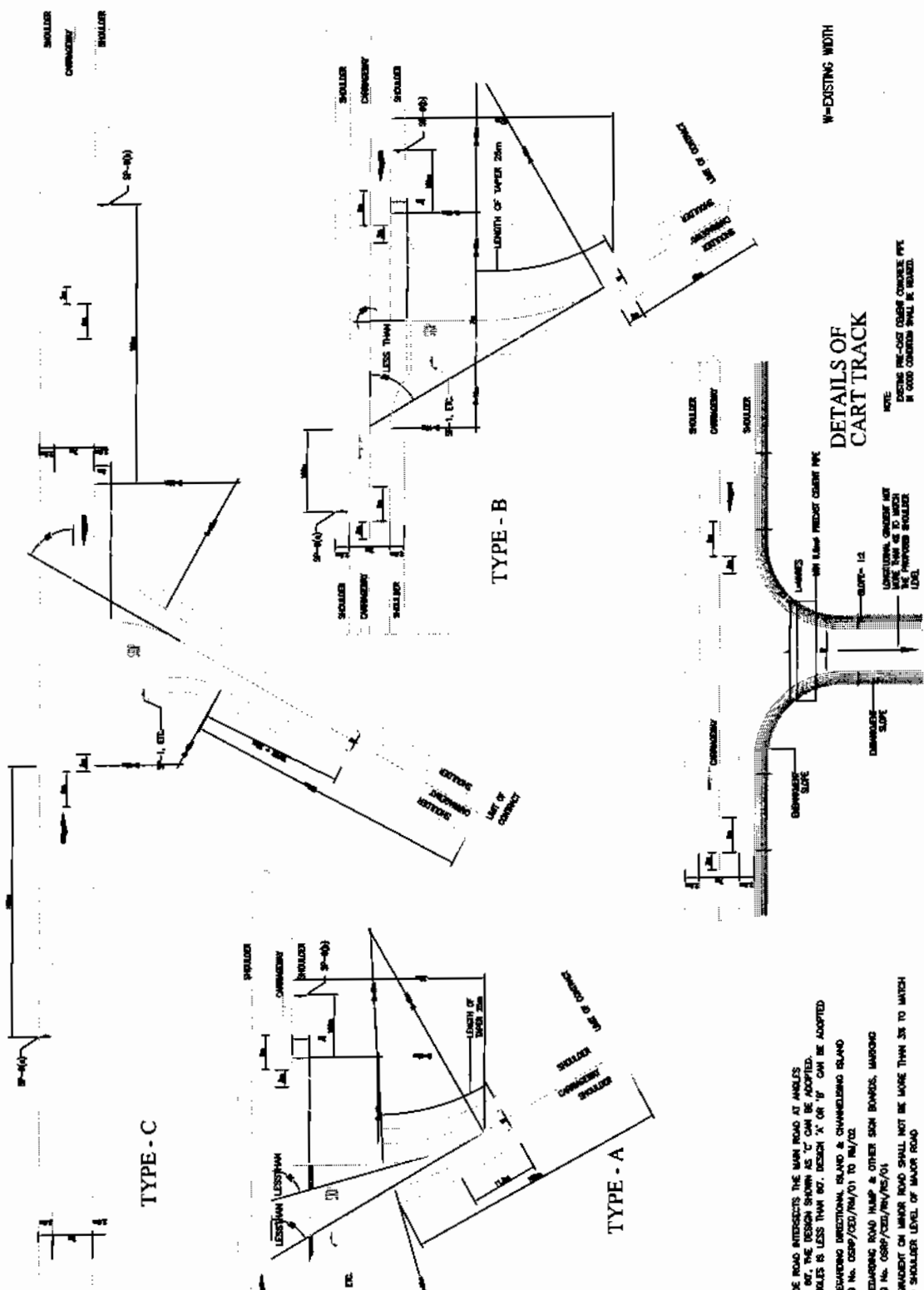
Chief Engineer  
World Bank Projects Orissa  
EMPLOYER  
O/o the E.I.C. (Civil) Orissa  
hubaneswar



BACKBONE ENTERPRISES JV  
CONTRACTOR



Chief Engineer  
World Bank  
of the E.I.C.I.C. (INDIA)  
Phubaneswar



- NOTE:
1. WHERE THE SIDE ROAD INTERSECTS THE MAIN ROAD AT ANGLES GREATER THAN 90°, THE DESIGN SHOWN AS 'C' CAN BE ADOPTED. WHERE THE ANGLES IS LESS THAN 90°, DESIGN 'X' OR 'Y' CAN BE ADOPTED.
  2. FOR DETAILS REGARDING DIRECTIONAL ISLAND & CHANNELISING ISLAND REFER DRAWING No. CESP/CES/MS/01 TO MS/02.
  3. FOR DETAILS REGARDING ROAD HUMP & OTHER SIGN BORDERS, MARKING REFER DRAWING No. CESP/CES/MS/MS/01.
  4. LONGITUDINAL GRADIENT ON MAJOR ROAD SHALL NOT BE MORE THAN SIX TO MATCH THE PROPOSED SHOULDER LEVEL OF MAJOR ROAD.

DETAILS OF CART TRACK

NOTE:  
DISTING PRE-CAST CONCRETE PYS IN GOOD CONDITION SHALL BE REUSED.

PROJECT:-

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

**CONSULTING ENGINEERS GROUP LTD.**  
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Fax: 2521348, e-mail: [ceg@cegroupindia.com](mailto:ceg@cegroupindia.com)



STANDARD DRAWINGS  
TYPICAL Y-JUNCTION WITH  
SINGLE LANE BT ROAD/EARTHEN ROAD

DRG. NO.	CESP/CES/MS/01	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	20	DATE	REV	RO	
SCALE	NTS				
		B.M	R.J	R.R.D.K	S.G

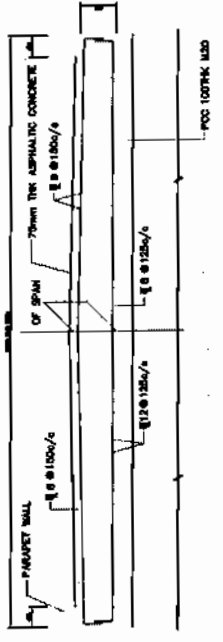
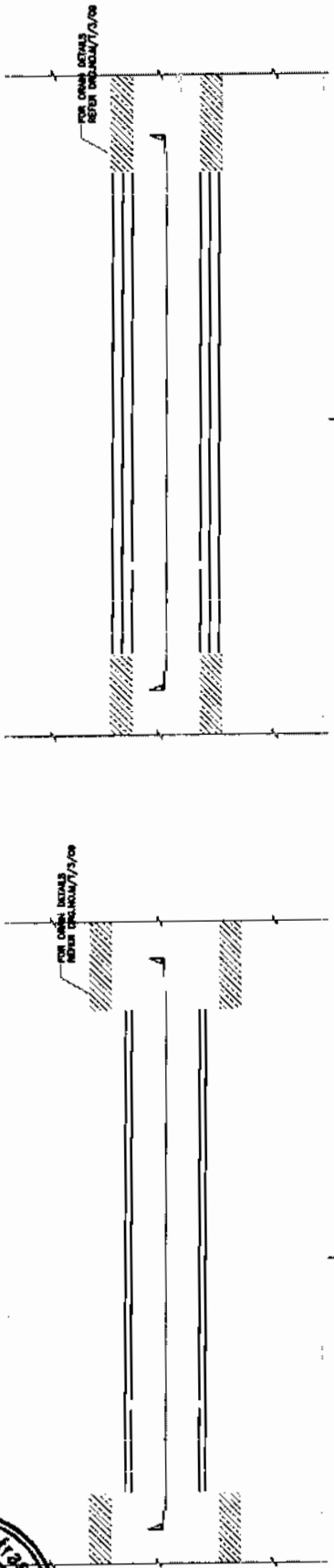
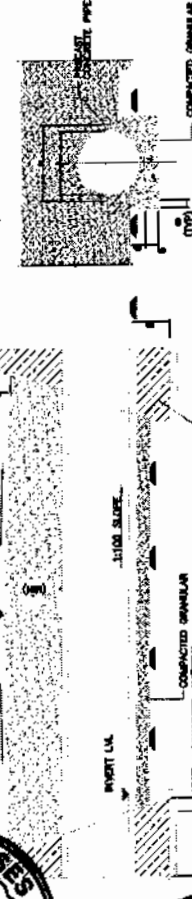




BACKBONE ENTERPRISES LIMITED  
AHMEDABAD



ARSS Infrastructure  
Projects Ltd.



1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
2. ALL PRECAST CONCRETE PIPES TO BE OF GRADE MFS CONFORMING TO IS 436.
3. REINFORCEMENT BARS SHALL BE HIGH YIELD STRENGTH DEFORMED BARS (DENOTED AS ) HAVING YIELD STRENGTH OF 415 MPa AND CONFORMING TO IS 1786
4. CLEAR COVER TO ANY REINFORCEMENT SHALL BE 50mm. UNLESS OTHERWISE MENTIONED.
5. THE SUITABILITY OF PIPE OR SLAB CURBET FOR CROSS ROADS SHOULD BE DECIDED AT SITE BY ENGINEER-IN-CHARGE DEPENDING ON SITE CONDITIONS.

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

**CONSULTING ENGINEERS GROUP LTD.**  
E-12, Moji Colony, Malviya Nagar Jaipur-17  
Tel: +91-141-2520899, 2521899, 2520556  
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Chief Engineer  
World Bank Projects, Orissa  
the E.T.C. & H.O. Delhi.  
Phubane ar

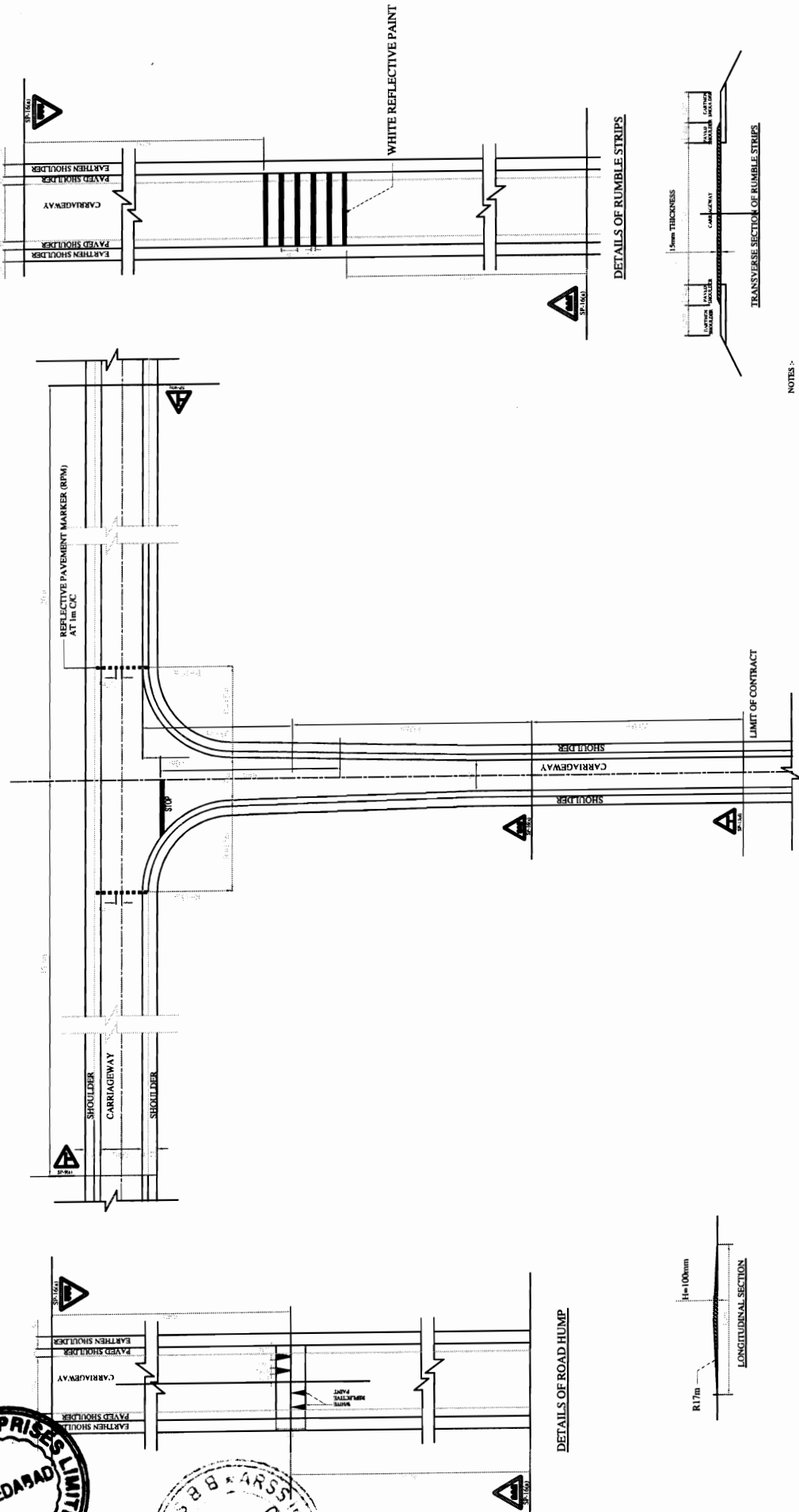
STANDARD DRAWINGS		TYPICAL - CROSS DRAIN		SINGLE LANE BT ROAD/EARTHEN ROAD	
DRG. NO.	COMP/ISS/DATE	ISSUED (A)	REVISED (B)	CHECKED (C)	APPROVED (D)
SH. NO.	21	DATE	REV	RO	
SCALE	NTS				
		B.M	R.J	R.R.D.K	S.G



BACKBONE ARSS JV  
CONTRACTOR



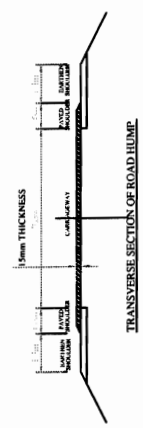
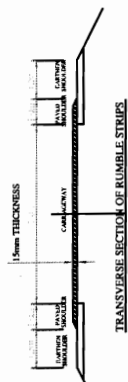
Chief Engineer  
World Bank  
World Bank Projects, Orissa  
O/o the E.T.C. (EMPLOYER)  
Ehubaneswar



**LOCATION OF ROADHUMP AT MINORROAD INTERSECTIONS**

**NOTES :-**

1. THE DESIGN OF ROAD HUMP IS IN ACCORDANCE WITH I.C. 94:1986 GUIDE LINES.
2. ROAD HUMP IS PROVIDED AT UNCONTROLLED INTERSECTIONS OF MINOR ROADS WITH MAJOR ROADS.
3. THE WARNING SIGNS SHOULD BE OF THE DESIGN HUMP OR ROAD HUMP DETAILED IN I.C. 10:2001 SHOULD BE INSTALLED AT SPECIFIED DISTANCE AHEAD OF RUMBLE STRIP.
4. REFLECTIVE PAINT SHALL BE NOT APPLIED THERMOPLASTIC MATERIAL CONFORMING TO M.O.T & H.S.P.C. CL. 404.
5. RUMBLE STRIPS ARE PROVIDED ON ALL SHARP CURVES WITH RADII LESS THAN 10m.
6. THE HEIGHT OF RUMBLE STRIP IS 5mm.
7. MATERIAL OF CONSTRUCTION FOR RUMBLE STRIP IS OPEN GRADED PREMIUM BITUMINOUS CONCRETE.
8. MATERIAL OF CONSTRUCTION FOR ROAD HUMP IS BITUMINOUS CONCRETE AS PER TECH. SPEC. CL. 509.
9. ALL NECESSARY DIMENSIONS ARE PROVIDED AS SHOWN IN DRAWING IN CONFORMANCE WITH I.C. 94:1986 AND I.C. 10:2001.

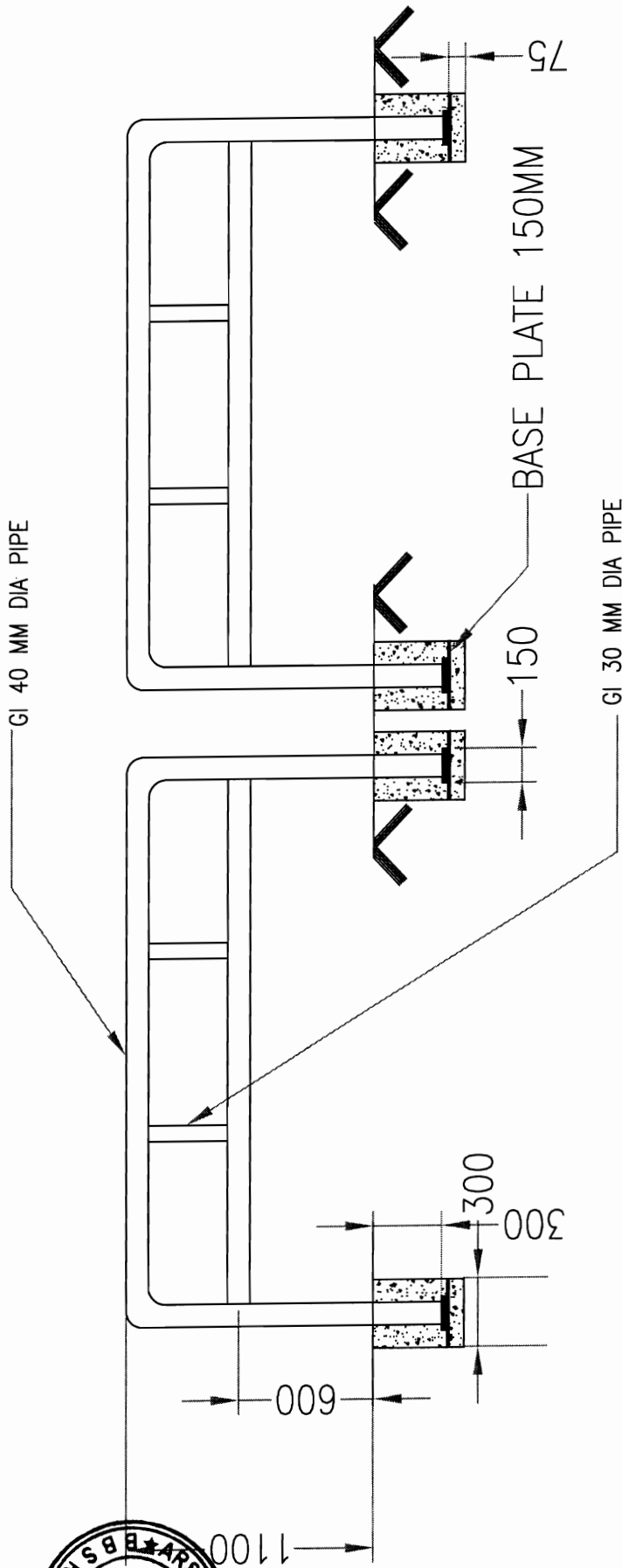


**STANDARD DRAWING**  
**DETAILS OF ROAD HUMPS AND RUMBLE STRIPS**

DRG NO. I OSRP/CEGR/HI & RS	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO. 22	DATE	REV	R0	
SCALE	NTS			
	K.S.R.	R.B.	R.R.D.K	S.G

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

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ELEVATION OF FOOTPATH BARRIER

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

STANDARD DRAWINGS  
 DETAILS OF FOOTPATH BARRIERS

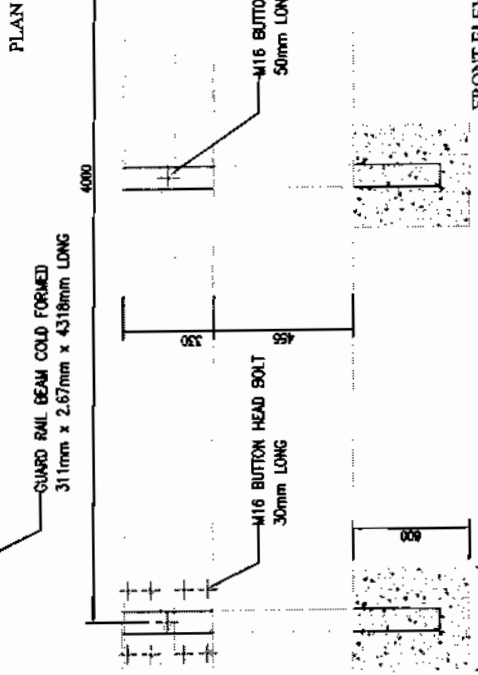
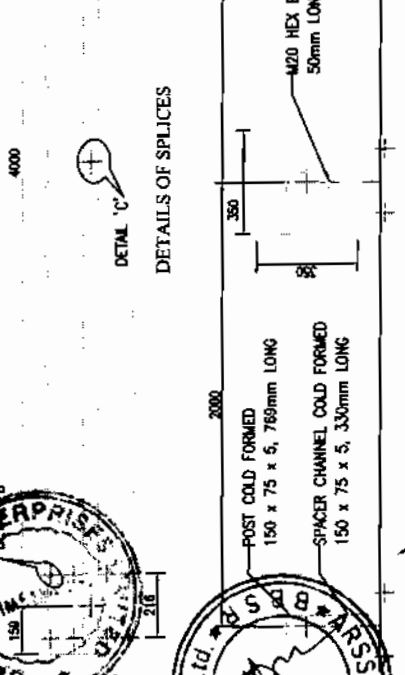
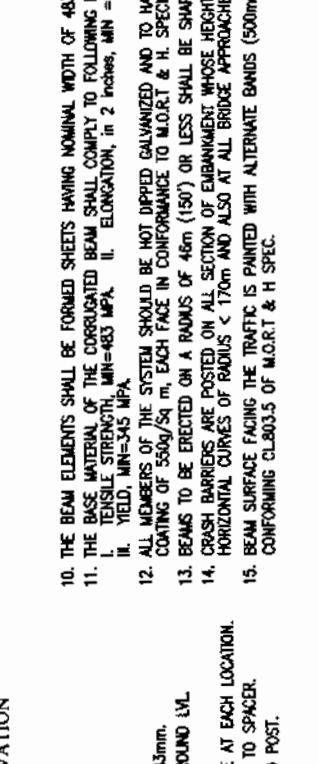
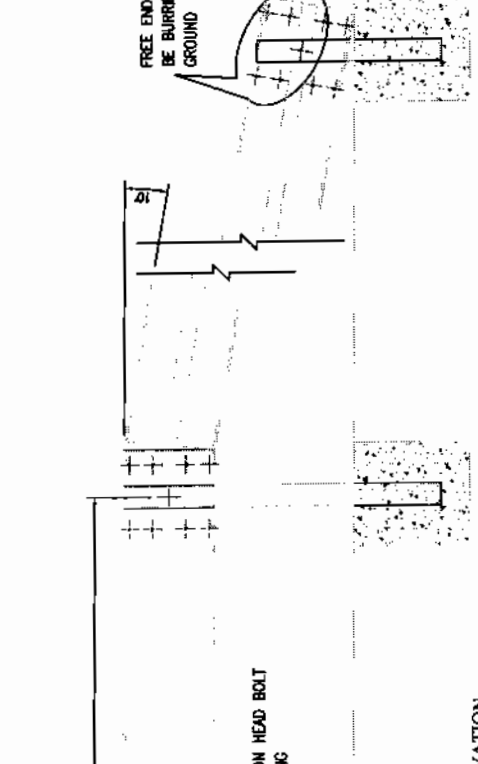
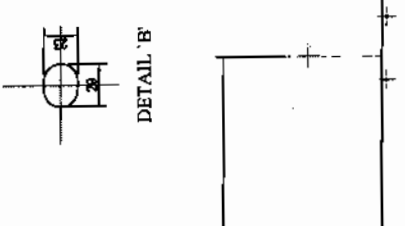
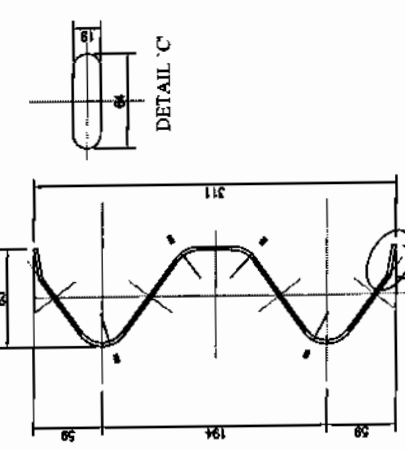
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SH. NO.	23	DATE	REV	RO	
SCALE					
			B.M	R.J	S.G

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



Chief Engineer  
 World Bank Projects, Orissa  
 to the E.T.C. (EMALD) GROUP  
 Phubaneswar

**DETAILS OF W-BEAM CRASH BARRIERS**



- HEIGHT OF POSTS SHOULD BE 785mm LONG ABOVE THE FINISHED ROAD LEVEL.
- SPACING OF POSTS SHOULD BE 2.0m C/C.
- 1 No. SPACER CHANNEL SHOULD BE PLACED AT EACH POST.
- W-PROFILE FORMED CORRUGATED BEAMS (EFFECTIVE LENGTH OF 4318mm), 311mm x 85mm.
- POST CONSISTS OF FORMED CHANNEL OF SIZE 150 x 75 x 5, 789mm LONG ABOVE GROUND LVL.
- SPACER CONSISTS OF FORMED CHANNEL OF SIZE 150 x 75 x 5, 330mm LONG.
- BUTTON HEAD BOLTS M16 x 30mm LONG, 8 Nos FOR THE SPLICING OF THE W PROFILE AT EACH LOCATION.
- BUTTON HEAD BOLTS M16 x 50mm LONG, 1 Nos AT THE CONNECTION OF THE W BEAM TO SPACER.
- HEX HEAD BOLTS M20 x 50mm LONG, 2 Nos AT THE CONNECTION OF THE SPACER TO POST.
- THE BEAM ELEMENTS SHALL BE FORMED SHEETS HAVING NOMINAL WIDTH OF 483mm.
- THE BASE MATERIAL OF THE CORRUGATED BEAM SHALL COMPLY TO FOLLOWING MECHANICAL PROPERTIES:-
  - TENSILE STRENGTH, MIN=483 MPA.
  - ELONGATION, in 2 inches, MIN = 12%
  - YIELD, MIN=345 MPA.
- ALL MEMBERS OF THE SYSTEM SHOULD BE NOT DIPPED GALVANIZED AND TO HAVE A MINIMUM COATING OF 550g/Sq m, EACH FACE IN CONFORMANCE TO M.O.R.T & H. SPECIFICATIONS (CLAUSE 810).
- BEAMS TO BE ERRECTED ON A RADIUS OF 46m (150') OR LESS SHALL BE SHAPE CURVED TO APPROPRIATE CURVATURE.
- 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.
- BEAM SURFACE FACING THE TRAFFIC IS PAINTED WITH ALTERNATE BANDS (500mm WIDE) OF BLACK & YELLOW COLOR REFLECTORIZED PAINT CONFORMING CL.803.5 OF M.O.R.T & H SPEC.

**STANDARD DRAWINGS**

**METAL BEAM CRASH BARRIER DETAILS**

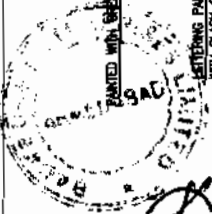
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SH. NO.	24	DATE	REV	RO	
SCALE	MTS				
			B.M	R.J	S.G

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

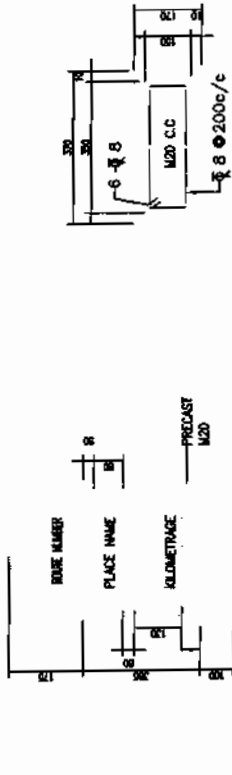
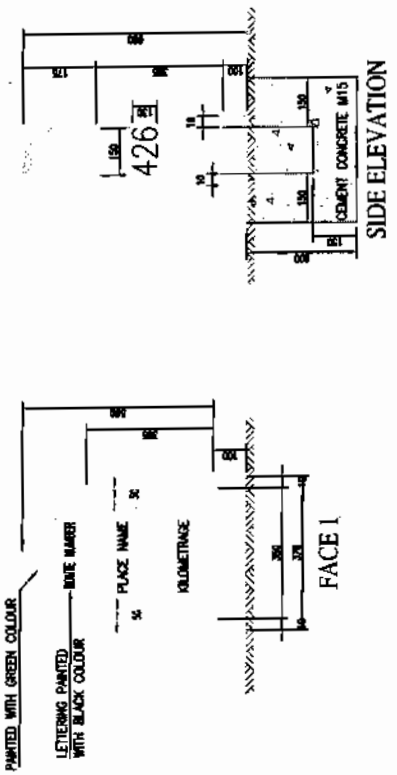
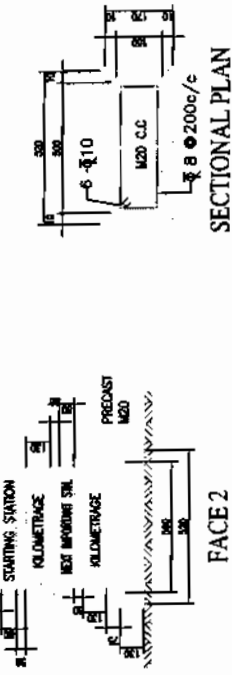
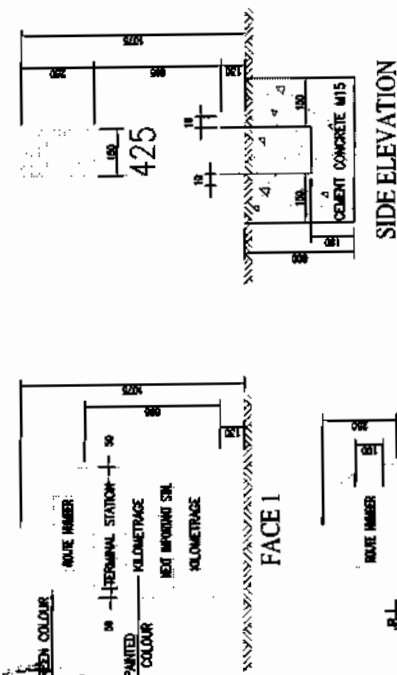
**CEG**

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 E-12, Moji Colony, Malviya Nagar Jaipur-17  
 Tel: +91-141-2520899, 2521899, 2520556  
 Fax: 2521346, e-mail: ceg@cegindia.com

**BACKBONE ENTERPRISES**  
**ARSS Infrastructure Projects Ltd.**  
 CONTRACTOR



CONTRACTOR



INDEX FOR KILOMETRE STONES

Km No.	SCRIPT FOR PLACE NAMES	PLACE TO BE SHOWN
0	ROMAN	TERMINAL/STARTING STATION AND NEXT IMPORTANT TOWN
1	HINDI (DEVANAGARI SCRIPT)	NEXT IMPORTANT TOWN
2	LOCAL LANGUAGE (ORISSA)	NEXT IMPORTANT TOWN
3	HINDI (DEVANAGARI SCRIPT)	TERMINAL / STARTING STATION
4	LOCAL LANGUAGE (ORISSA)	TERMINAL / STARTING STATION
5	ROMAN	TERMINAL/STARTING STATION AND NEXT IMPORTANT TOWN
6	HINDI (DEVANAGARI SCRIPT)	NEXT IMPORTANT TOWN

..... TO BE REPEATED IN THE SAME ORDER.

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. REFLECTORISED PAINT SHALL BE IN ACCORDANCE WITH CL803.5 OF M.O.R.T & H SPEC.
3. FOR TYPE & STYLE SIZE OF LETTERING RELEVANT IRC CODE OF PRACTICE SHALL BE REFERED.
4. LETTERING IS DONE WITH APPROVED QUALITY BLACK ENAMEL PAINT USING STENCIL

STANDARD DRAWINGS  
TYPICAL KM STONE & 5TH KM STONE

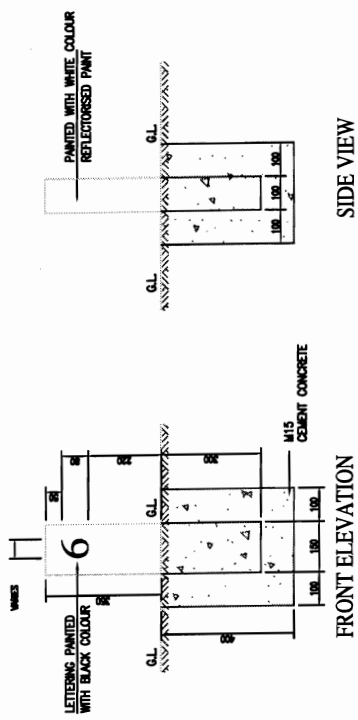
PROJECT:-  
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND  
DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS  
FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK  
ASSISTANCE

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



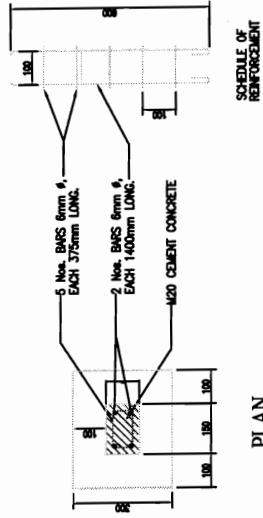
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SH. NO.	25	DATE	REV	RO	SCALE
			B.M	R.J	R.R.D.K
			S.G		

Chief Engineer  
World Bank Project  
World Bank Project, Orissa  
Ehabaueswar:



FRONT ELEVATION

SIDE VIEW



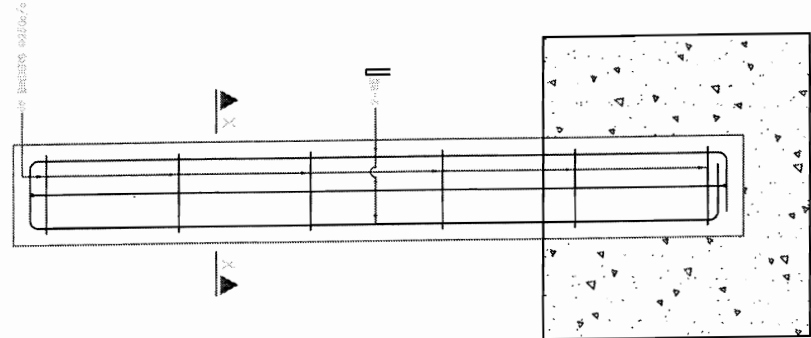
PLAN

SCHEDULE OF REINFORCEMENT

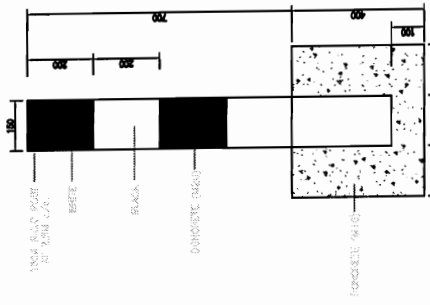
TYPICAL DESIGN FOR 200M STONES

NOTES:

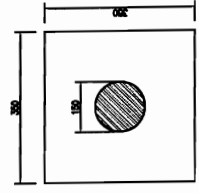
1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. REFLECTORISED PAINT SHALL BE IN ACCORDANCE WITH CL803.5 OF M.O.R.T & H SPEC.
3. FOR TYPE & STYLE SIZE OF LETTERING RELEVANT IRC CODE OF PRACTICE SHALL BE REFERRED.
4. LETTERING IS DONE WITH APPROVED QUALITY BLACK ENAMEL PAINT USING STENCIL



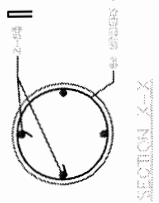
REINFORCEMENT DETAIL OF GUARD POST



TYPICAL DETAILS OF GUARD POST



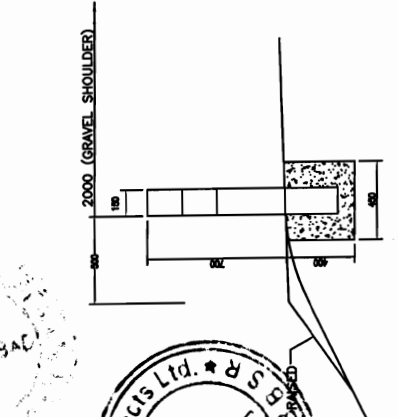
PLAN OF GUARD POST



SECTION X-X

NOTES:

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.



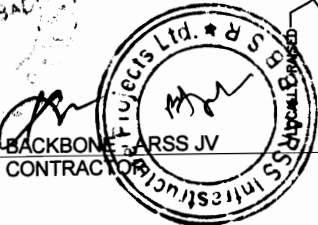
FIXING DETAILS OF GUARD POST

STANDARD DRAWINGS  
TYPICAL DETAILS OF 200M STONE & GUARD POST

DRG NO.	OSRP/CEG/Jaipur & OP	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	26	DATE	REV	RO	
SCALE	NTS				
		B.M	R.J	R.R.D.K	S.G

PROJECT:-  
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND  
DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS  
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ASSISTANCE

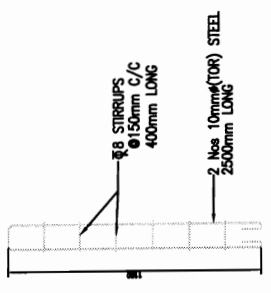
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Tel: +91-141-2520899, 2521899, 2520556  
Fax: 2521348, e-mail: ceg@cegroupindia.com



Chief Engineer  
World Bank Projects, Orissa  
Rhubaneswar



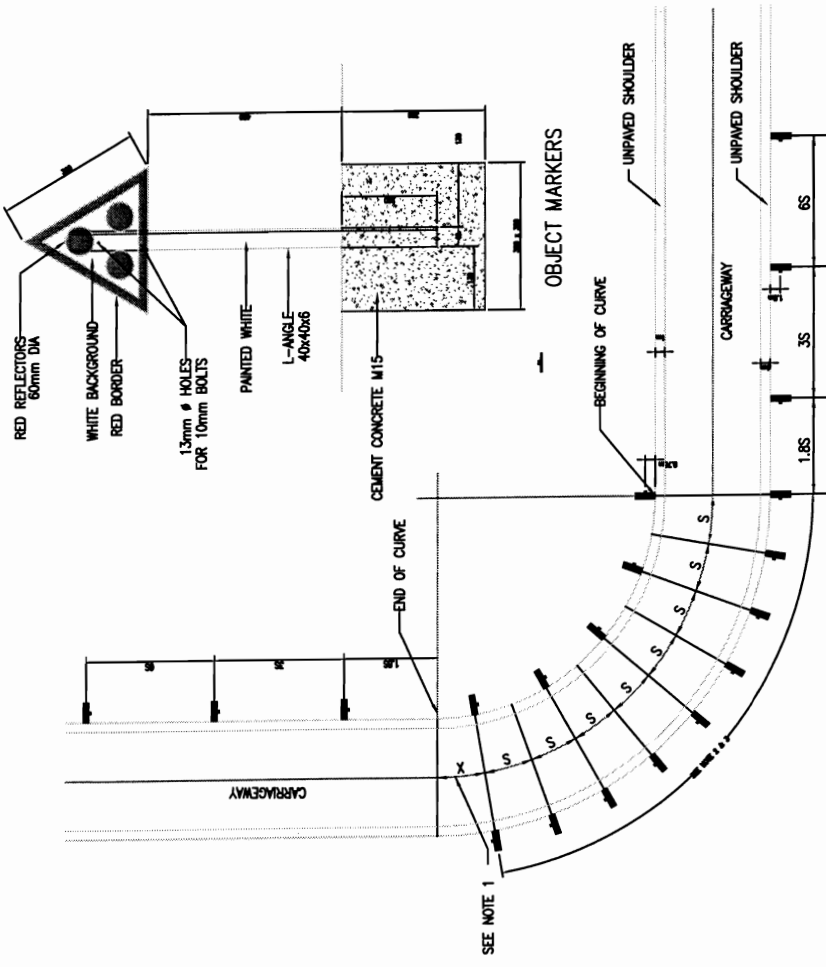
BACKBONE ENTERPRISES LTD.   
 CONTRACTOR



SCHEDULE OF REINFORCEMENT

ROAD DELINEATORS

- NOTES:
1. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
  2. ADJUST DISTANCE 'X' SUITABLY SO THAT THE LAST ROADWAY DELINEATOR IS AT THE END OF THE CURVE.
  3. INSTALL ALL DELINEATORS AT EDGE AS SHOWN IN THE DRAWING PERPENDICULAR TO THE ONCOMING TRAFFIC.
  4. SEE TABLE FOR VALUE OF 'S' i.e. SPACING OF DELINEATORS ON THE CURVE.
  5. ON STRAIGHT SECTIONS DELINEATORS SHOULD BE SPACED UNIFORMLY 50m FROM EACH OTHER, THE POSTS BEING IN PAIRS, ONE ON EACH SIDE OF THE ROADWAY.
  6. LOCATIONS OF OBJECT MARKERS
    - I. TRAFFIC ISLANDS AT APPROACHES TO INTERSECTIONS
    - II. MEDIAN OPENINGS
    - III. ON MEDANS & ISLANDS ON FAR SIDE OF THE INTERSECTIONS
    - IV. FACING APPROACHING TRAFFIC AT ISLANDS FORMING LEFT INFILTRATION LANES
  7. OBJECT MARKERS SHOULD BE SET BACK FROM THE FACE OF THE KERB A DISTANCE OF ATLEAST 500mm
  8. REQUIREMENT OF REFLECTORS SHALL BE IN ACCORDANCE WITH IRC:79-1981 CODE OF PRACTICE.
  9. ON EMBANKMENTS WITH HEIGHT MORE THAN 2m CLEAR SPACING OF DELINEATORS SHALL BE 25m.
  10. DELINEATORS ARE NOT PROVIDED AT LOCATIONS WHERE CHEVRON SIGN BOARDS ARE PROPOSED
  11. GAURO POSTS ARE PROVIDED ON EMBANKMENTS OF HEIGHT >2m AND <3m AT 5m INTERVAL
  12. DELINEATORS ARE PROVIDED BEFORE AND AFTER PARAPET WALL ON BOTH SIDES AT ALL BRIDGE LOCATIONS AND ALSO AT CULVERT LOCATIONS WHOSE WIDTH IS LESS THAN 12m AND MORE THAN 10m.
  13. REFLECTIVE PAINT SHALL BE IN ACCORDANCE WITH CLR03.5 OF M.O.R.T & H SPEC.



SPACING OF DELINEATORS ON CURVES

S.L. NO.	RADIUS OF CURVE (METRES)	SPACING ON CURVE (METRES)
1	30	6
2	50	8
3	100	12
4	200	20
5	300	25
6	400	30
7	500	35
8	600	38
9	700	42
10	800	45
11	900	48
12	1000	50

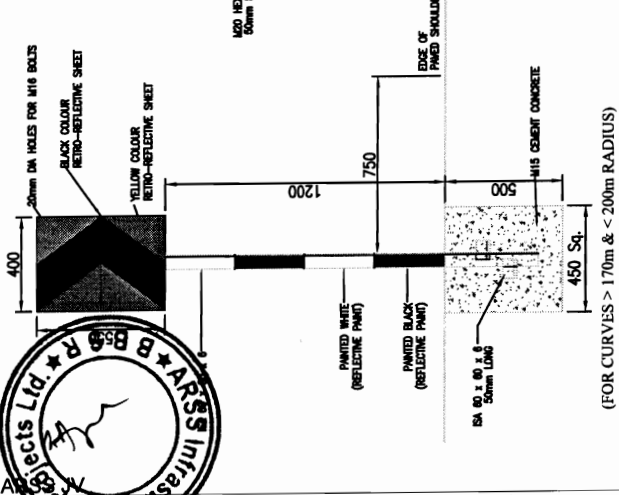
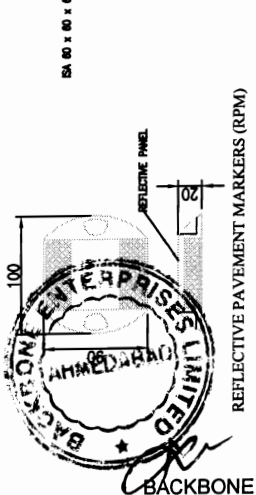
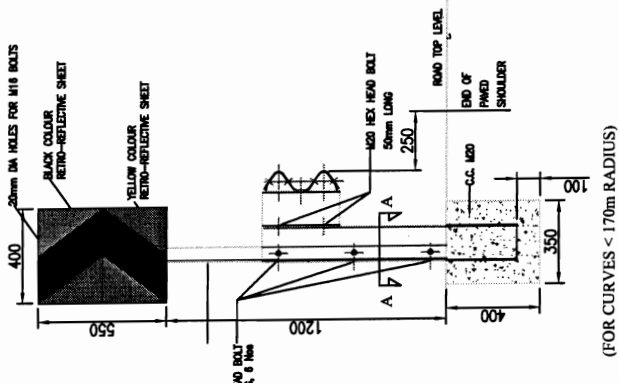
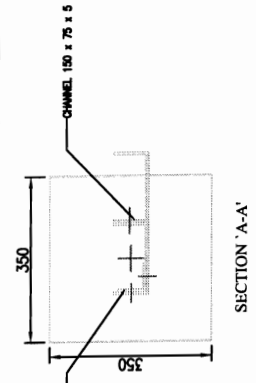
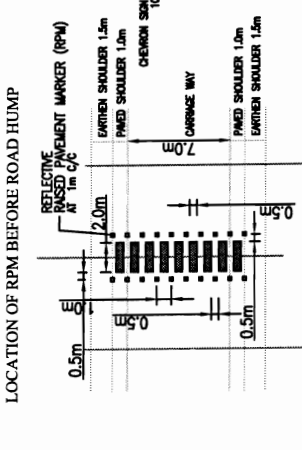
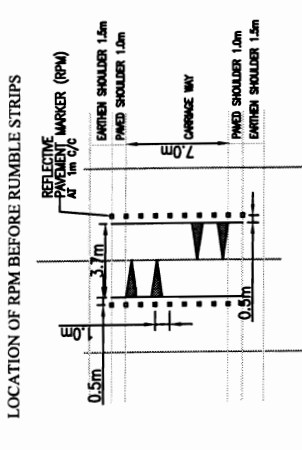
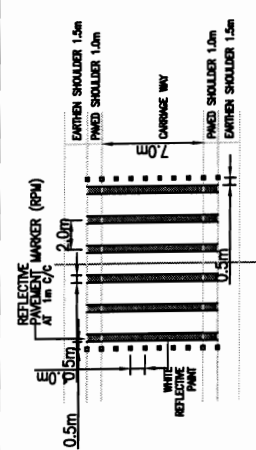
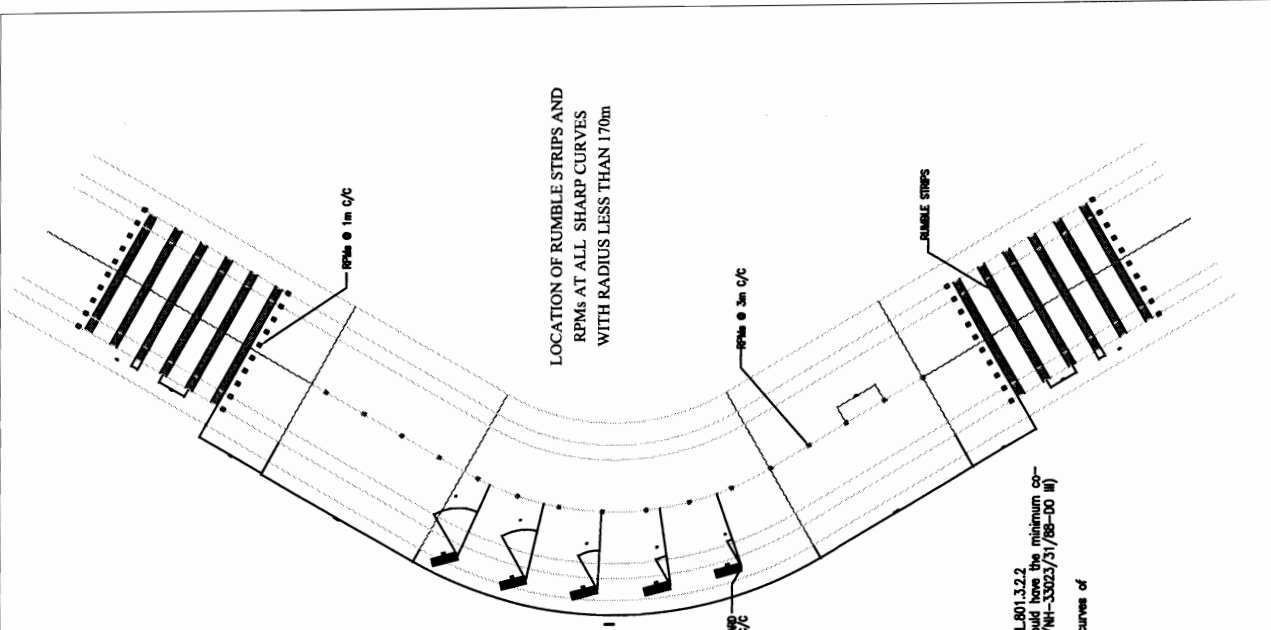
PROJECT:-  
 CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND  
 DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS  
 FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK  
 ASSISTANCE

STANDARD DRAWINGS  
 DETAILS OF ROAD DELINEATORS

DRG. NO.	CEMP/CEB/RO	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	27	DATE	REV	RO	
SCALE	NTS				
		B.M	R.J	R.R.D.K	S.G

Chief Engineer  
 World Bank Projects  
 O/o the E. I. C. (EMP) Deptt.  
 Bhubaneswar.

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



**CHEVRON SIGN BOARD**

- The size of 'Chevron' Signboard is 400mm x 550mm.
- The sign board should be wide-angle micro-prismatic lens conforming to tech.spec. CL.801.3.2.2
- The retro - reflective surface after cleaning with soap and water in dry condition should have the minimum coefficient of retro-reflection (MOR) as indicated below for encapsulated lens.
- Chevron sign boards shall be installed at 10m c/c as shown in the drawings at all curves of radius less than 200m along the outer edge facing the traffic of nearby lane.

**REFLECTIVE PAVEMENT MARKERS**

- SPECIFICATION OF MATERIAL, DESIGN, OPTICAL PERFORMANCE, TESTS AND FIXING OF RPM SHALL BE IN ACCORDANCE WITH TECH.SPEC. CL.812.
- LOCATIONS OF RPM

CLOUR OF RPM	LOCATION	SPACING
WHITE	RUMBLE STRIP & ROAD HUMP AS SHOWN IN DRG.	1m C/C
AMBER	CURVES < 60m RADIUS ALONG CENTERLINE	3m C/C
RED	BEFORE AND AFTER PEDESTRIAN CROSSING AS SHOWN IN DRG. AND AT APPROACHES TO ROAD INTERSECTION AS SHOWN IN DRG. U/1/6/11	1m C/C

- RPM SHOULD MEET MINIMUM CL VALUES EQUIVALENT TO CATEGORY 'A' STUDS AS PER CAUSE 812 OF TECH.SPEC.

BACKBONE - A.A. CONTRACTOR

Volume IV : Page 113

Chief Engineer  
World Bank Projects, Orissa  
Of the E.T.C. EMPLOYEES  
Shubashan

STANDARD DRAWINGS  
DETAILS OF RPMs & CHEVRON MARKERS

DRG NO.	OSPP/CEP/RPM	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	28	DATE	REV	RO	
SCALE	NTS				
		B.M	R.J	R.R.D.K	S.G

PROJECT:-  
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND  
DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS  
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ASSISTANCE

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

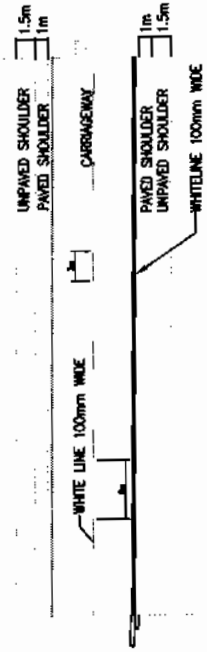
**CEG**



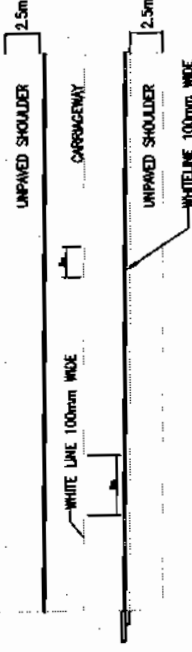
LONGITUDINAL MARKING

DETAILS OF CENTRE LINE

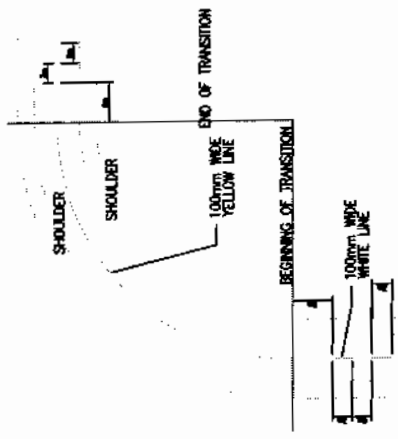
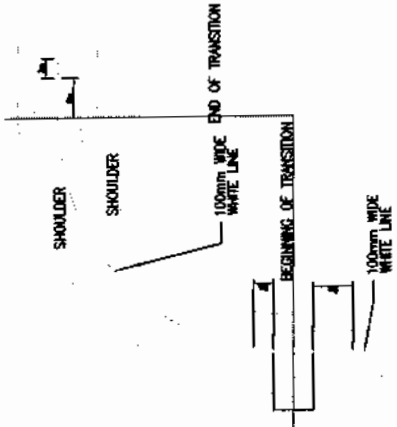
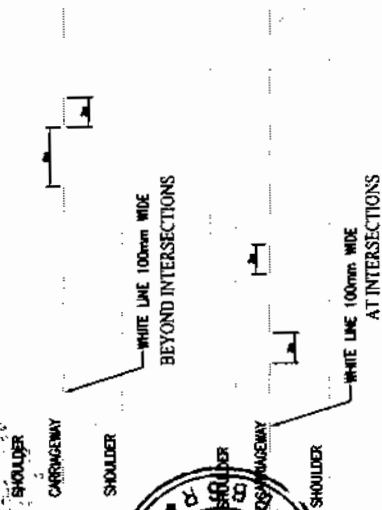
DETAILS OF EDGE LINE MARKING



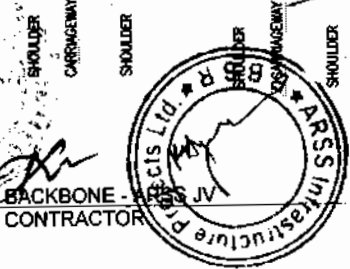
DETAILS OF EDGE LINE MARKING



DETAILS OF CENTRE LINE



1. EDGE LINE MARKINGS SHOULD NOT BE CARRIED ACROSS THE MOUTHS OF SIDE ROADS.
2. EDGE 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 803.4 OF M.O.R.T. & H. SPECIFICATIONS.
4. DETAILS OF ROAD MARKING ARE AS PER IRC: 35-1987, CODE OF PRACTICE FOR ROAD MARKINGS.



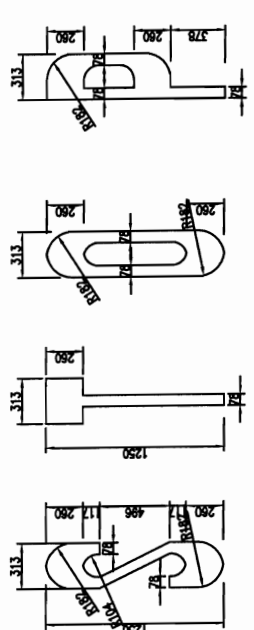
Chief Engineer  
World Bank Projects, Orissa  
of the E.T.C. (M.P.O.)  
hubateswar

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

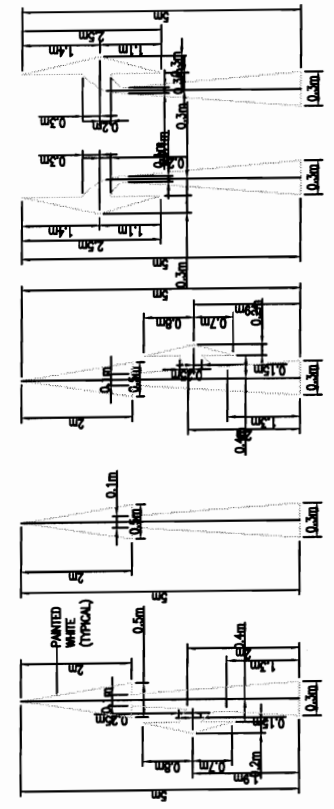
**STANDARD DRAWINGS**  
TYPICAL ROAD MARKING DETAILS  
(SHEET 1 OF 2)

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SH. NO.	29				R.J	B.M	R.R.D.K
SCALE	NTS						

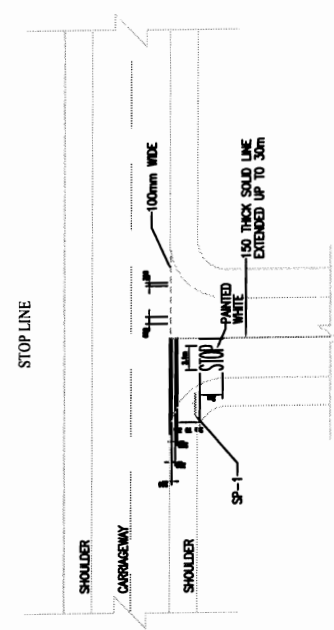
**CEG ENGINEERS GROUP LTD.**  
E-12, Moji Colony, Malviya Nagar Jaipur-17  
Tel: +91-141-2520899, 2521899, 2520556  
Fax: 2521348, e-mail: ceg@ceginia.com



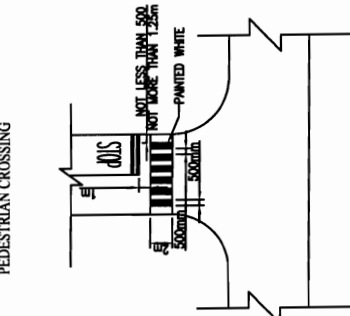
SIZE OF LETTERS



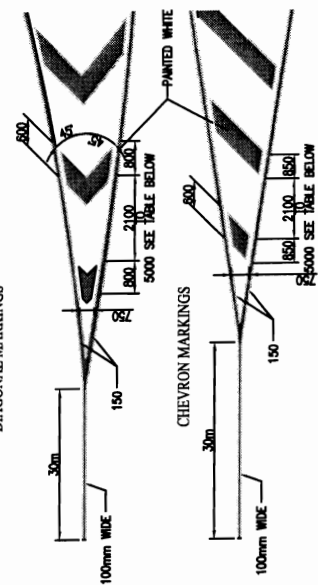
DIRECTIONAL ARROWS



STOP LINE



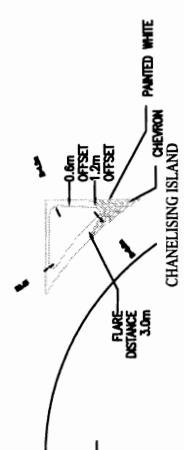
PEDESTRIAN CROSSING



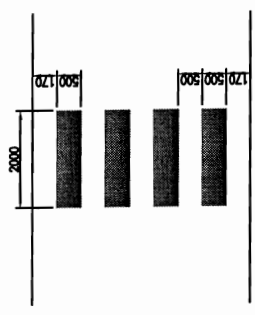
DIAGONAL MARKINGS

CHEVRON MARKINGS

TOTAL LENGTH OF MARKING (m)	SPEED (<math><75 \text{ km/h}</math>)	SPEED (>75 km/h)
<math>< 8</math>	2100	-
8 TO 22	3000	-
>22	5000	-
<math>< 10</math>	-	4000
>10	-	6000



CHANELISING ISLAND



PEDESTRIAN CROSSING

1. ALL LENGTHS AND SPACINGS IN THE TABLE ARE MEASURED PARALLEL TO ROAD CENTRE LINE.
2. FIRST DIAGONAL OR CHEVRON IS TO BE SO LOCATED THAT ITS LENGTH IS ATLEAST EQUAL TO ITS WIDTH
3. WIDTH OF ALL DIAGONALS/CHEVRONS MEASURED AT RIGHT ANGLES TO THE DIAGONALS OR CHEVRONS IS 600mm.
4. WIDTH OF ALL DIAGONALS/CHEVRONS MEASURED AT RIGHT ANGLES TO THE DIAGONALS OR CHEVRONS IS 600mm.
5. ROAD MARKINGS SHOULD BE DONE WITH THERMOPLASTIC PAINT CONFORMING TO C. BOOK OF MATERIAL & H SPECIFICATIONS
6. DETAILS OF MARKING AT INTERSECTIONS ARE AS PER M.O.R.T & H TYPE DESIGNS FOR INTERSECTIONS ON NATIONAL HIGHWAYS

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

DRG NO.	OSRP/CEB/PM/02	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	30	DATE	REV	RO	
SCALE			B.M	R.J	S.G

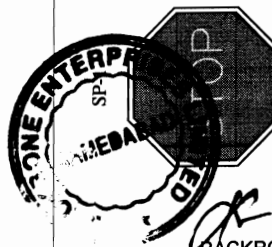
PROJECT:-  
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ASSISTANCE

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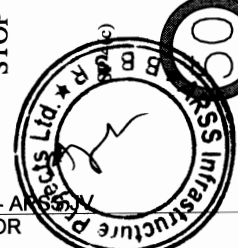


BACKBONE - JVS JV  
CONTRACTOR

Chief Engineer  
World Bank Project, Orissa  
O/o the E.T.C.C. EMPLOYER  
Bhubaneswar:



BACKBONE - ANDhra Pradesh  
CONTRACTOR



SP-2		SP-2(a)		SP-3		SP-4(a)		SP-4(b)	
	COMPULSORY KEEP LEFT		RESTRICTION ENDS		GIVE WAY		SPEED LIMIT		SPEED LIMIT
SP-4(d)		SP-5(a)		SP-5(b)		SP-10(a)		SP-10(b)	
	SPEED LIMIT		OVERTAKING PROHIBITED		ONE WAY		RIGHT HAND CURVE		LEFT HAND CURVE
SP-7		SP-9(a)		SP-9(b)		SP-11		SP-12	
	COMPULSORY SOUND HORN		RIGHT SIDE ROAD		LEFT SIDE ROAD		T-INTERSECTION		PEDESTRIAN CROSSING
SP-10(c)		SP-10(e)		SP-10(f)					
	RIGHT HAIR PIN BEND		RIGHT REVERSE BEND		LEFT REVERSE BEND				

**CEG**

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

STANDARD DRAWINGS  
TYPICAL ROAD SIGNS (SHEET 1 OF 4)

DRG. NO.	OSRP/CEG/RS/01	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	31	DATE	REV	RO	
SCALE			NTS	B.M	R.J
					S.G

Chief Engineer  
World Bank Project, Orissa  
Rhubaneswar

SP-13(a)



STAGGERED INTERSECTION

SP-13(b)



STAGGERED INTERSECTION

SP-13(c)



MAJOR ROAD AHEAD

SP-13(d)



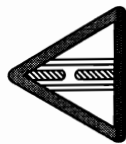
MAJOR ROAD AHEAD

SP-14(c)



Y-INTERSECTION

SP-14(d)



Y-INTERSECTION

SP-14(e)



MAJOR ROAD AHEAD

SP-15(a)



NARROW BRIDGE

SP-15(b)



DUAL C' WAY STARTS

SP-15(c)



DUAL C' WAY ENDS

SP-15(d)



SERIES OF BENDS

SP-16(a)



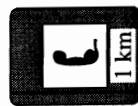
HUMP OR ROUGH ROAD

SP-16(b)



BARRIER AHEAD

SP-24



PUBLIC TELEPHONE

SP-22



PETROL BUNK

SP-23



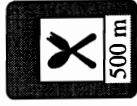
HOSPITAL

SP-25



DISPENSARY

SP-26



EATING PLACE

SP-14(b)



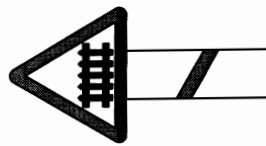
Y-INTERSECTION

SP-14(a)



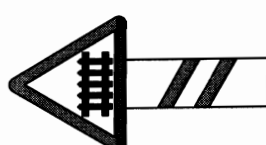
Y-INTERSECTION

SP-18 (b)



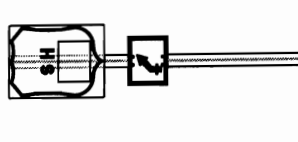
GUARDED RAILWAY CROSSING AT 50-100m

SP-18 (a)



GUARDED RAILWAY CROSSING AT 200m

SP-17



STATE ROUTE MARKER SIGN

LEGEND

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

NOTE:

- DETAILS OF ROAD SIGNS ARE AS PER IRC: 67-2001.
- DETAIL OF STATEROUTE MARKER SIGN IS AS PER IRC: 31-1969.
- ALL MANDATORY AND CAUTIONARY SIGNS SHOULD BE HIGH INTENSITY WIDE ANGLE MICRO PRISMATIC SHEETING CONFORMING TO CL-901 OF TECH. SPECIFICATION.
- ALL INFORMATION SIGNS SHOULD CONFORM TO STANDARDS OF HIGH INTENSITY ENCAPSULATED TYPE RETRO REFLECTIVE SHEETING AS PER CL. 831.1 OF TECH. SPECIFICATION.

STANDARD DRAWINGS

TYPICAL ROAD SIGNS (SHEET 2 OF 4)

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

CONSULTING ENGINEERS GROUP LTD.

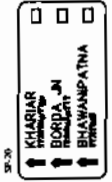
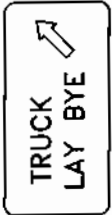
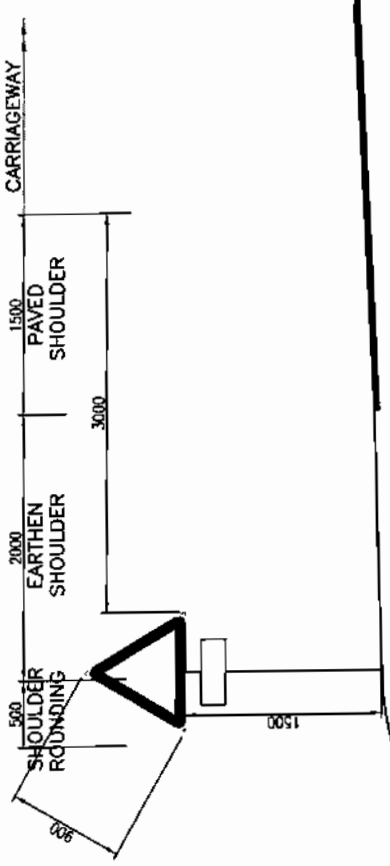
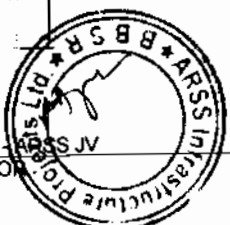
E-12, Moji Colony, Malviya Nagar Jaipur-17 Tel: +91-141-2520899, 2521899, 2520556 Fax: 2521348, e-mail: ceg@cegindia.com



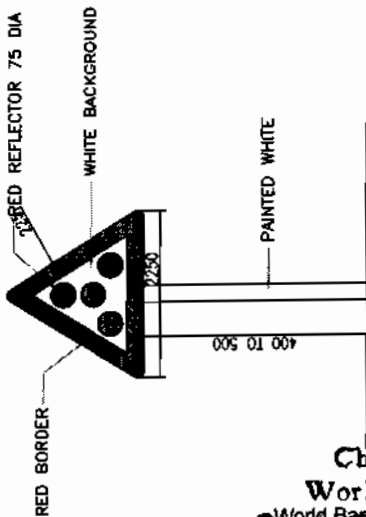
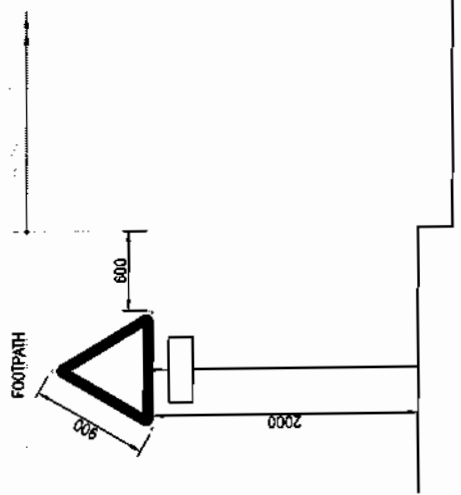
DRG NO.	OSMP/CEB/MS/02	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	32	DATE	REV	RO	
SCALE				NTS	
		B.M	R.J	R.R.D.K	S.G



BACKBONE ENTERPRISES LIMITED  
CONTRACTOR



1. ALL DIMENSIONS ARE IN MM UNLESS INDICATED OTHERWISE.
2. ROAD SIGNS, SIZES OF ARROWS, LETTERS & NUMERALS IS AS PER IRC-87-2001.
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-2-1984.
7. SIGNS WITH AN AREA UP TO 0.1sq. 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-CORROSION) ENAMEL PAINT OVER TWO COATS OF GOOD QUALITY PRIMER.



TA 1

STANDARD DRAWINGS  
TYPICAL ROAD SIGNS (SHEET 3 OF 4)

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

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



DRG NO.	08P/02P/RS/V	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	33	DATE	REV	RO	
SCALE	NTS				
		B.M	R.J	R.R.D.K	S.G

Chief Engineer  
World Bank Projects, Orissa  
EMPLOYER  
Rhubane war



BACKBONE -  
CONTRACTOR



Chief Engineer  
World Bank Project  
O/o the E.I. EMPLOYER  
Rhubaneswar



**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  
Fax: 2521348, e-mail: ceg@cegindia.com

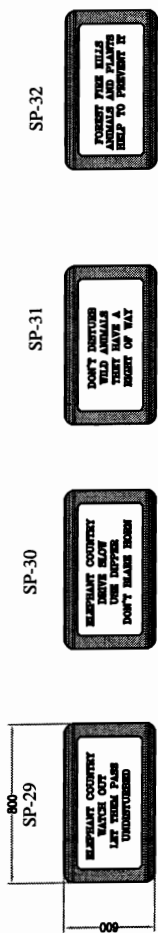
PROJECT:-

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

STANDARD DRAWINGS

TYPICAL ROAD SIGNS (SHEET 4 OF 4)

DRG. NO.	OSRP/CEG/MS/04	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	34	DATE	REV	RO	
SCALE	NTS			B.M.	R.J
				R.R.D.K	S.G



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-46



SP-45



SP-47



SP-48



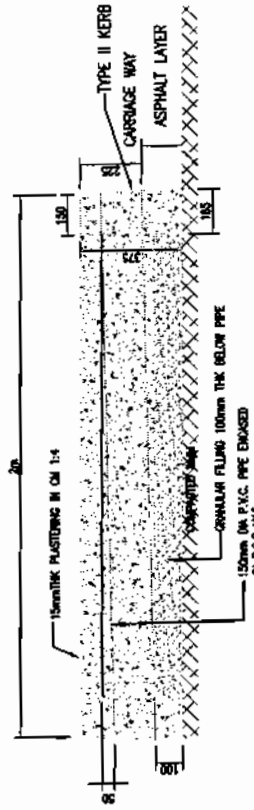
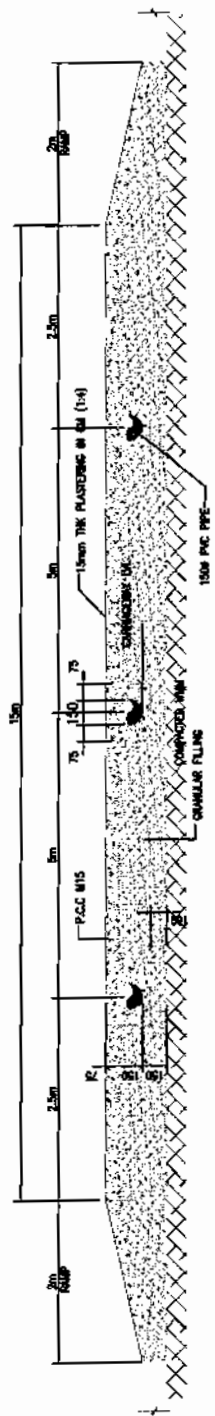
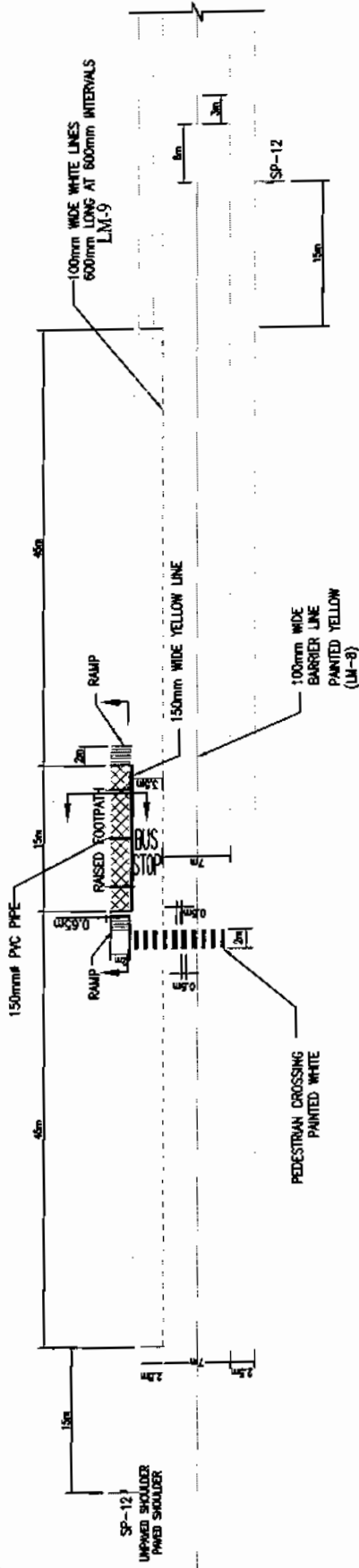
SP-49



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



BACKBONE ENTERPRISES JV  
CONTRACTOR



1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED
2. PVC PIPE SHALL BE OF CLASS 4 AND AS PER SPECIFICATION OF IS: 4985-2000
3. PAVEMENT LAYERS OF CARRIAGEWAY SHALL BE EXTENDED IN THE BUS BAY AREA.
4. GRANULAR FILLING AS PER TECH. SPEC. CI 401
5. PLAN CEMENT CONCRETE M15 AS PER TECH. SPEC. CI 1500 & 1700
6. 15mm THK PLASTERING IN CM 1:4 AS PER TECH. SPEC. CI 1312.4
7. PRECAST KERB TYPE-II AS PER DRAWING No. OSRP/CEG/DR
8. PAINTING
  - a) KERB PAINTING AS PER TECH. SPEC. CI 803.5
  - b) ROAD BARRING AS PER TECH. SPEC. CI 803.4

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

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

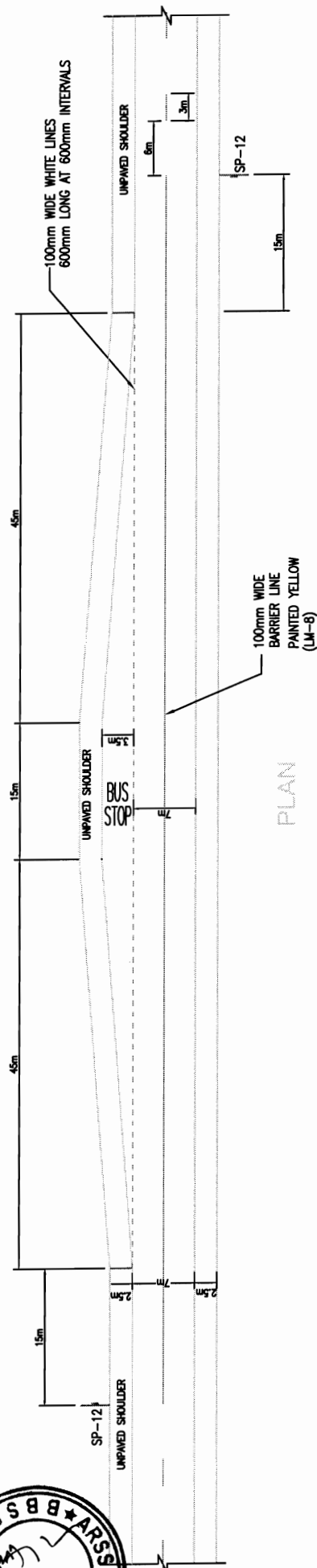


Chief Engineer  
 World Bank Projects, Orissa  
 O/o the E.I.C. (Civil) Sector  
 Bhubaneswar:

**STANDARD DRAWINGS**  
 TYPICAL BUS BAY TYPE - 1

DRG. NO.	OSRP/CEG/DR/01	ISSUED (U)	DESIGN (D)	CHECKED (C)	APPROVED (A)
SH. NO.	35	DATE	REV	RO	
SCALE	NTS				
		B.M	R.J	R.R.D.K	S.G

# BUS BAY DETAILS



PLAN

**NOTE:**

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED
2. PAVEMENT LAYERS OF CARRIAGEWAY SHALL BE EXTENDED IN THE BUS BAY AREA.
3. LOWER STANDARD TYPE-II SHALL BE ADOPTED IN PLACE OF TYPE - I AS PER ENGINEER IN CHARGE
4. CARRIAGEWAY WIDTH MAY VARY ACCORDING TO THE LOCATION OF THE BUS BAY FROM 7m TO 10m

STANDARD DRAWINGS  
TYPICAL BUS BAY TYPE - II

DRG. NO.	OSPP/CEG/RS/02	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	36	DATE	REV	RO	
SCALE	NTS				
		B.M	R.J	R.R.D.K	S.G

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

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



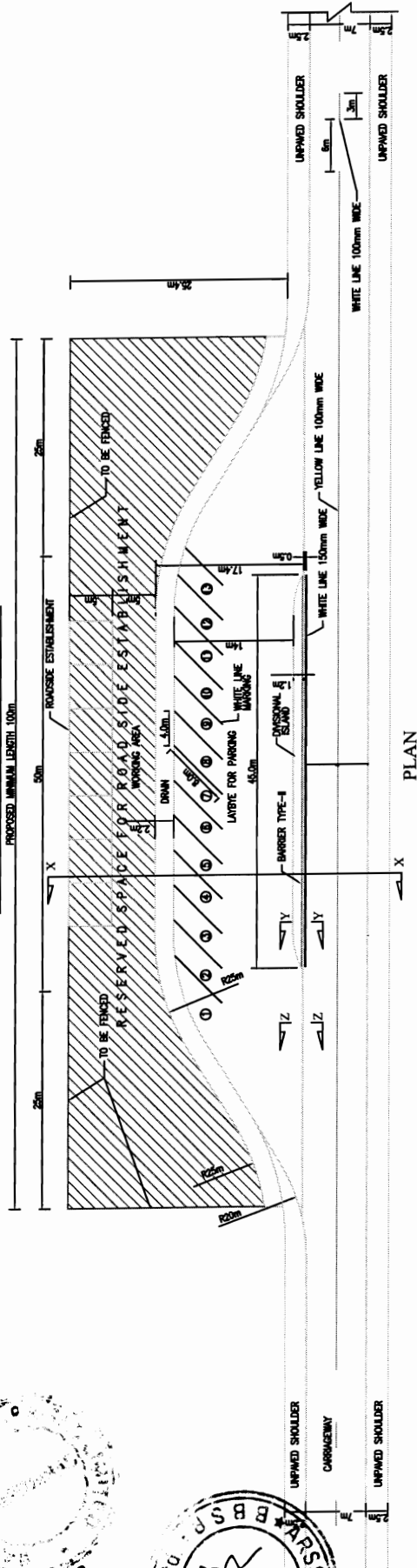
BACKBONE ENTERPRISES JV  
CONTRACTOR



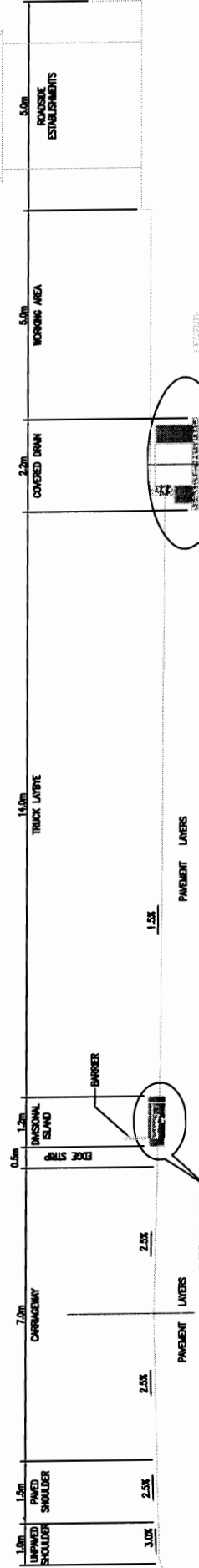
Chief Engineer  
World Bank Projects, Orissa  
to the E.T.C. EMPLOYERS  
Phubane war



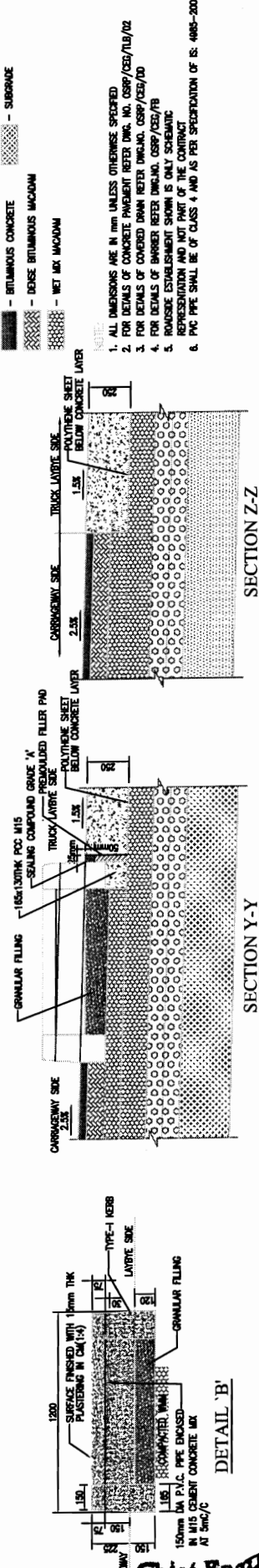
**DETAILS OF TRUCK LAYBYE**



PLAN



CROSS SECTION X-X



SECTION Y-Y

SECTION Z-Z

- LEGEND:**
- - CEMENT CONCRETE
  - ▨ - BITUMINOUS CONCRETE
  - ▩ - DENSE BITUMINOUS MACADAM
  - ▧ - WET MIX MACADAM
  - - GRANULAR SUBBASE
  - - SUBGRADE

- NOTE:**
1. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED
  2. FOR DETAILS OF CONCRETE PAVEMENT REFER DMC. NO. GSP/CEB/119/12
  3. FOR DETAILS OF COVERED DRAIN REFER DMC. NO. GSP/CEB/119/12
  4. FOR DETAILS OF BARRIER REFER DMC. NO. GSP/CEB/120
  5. ROADSIDE ESTABLISHMENT SHOWN IS ONLY SCHEMATIC REPRESENTATION AND NOT PART OF THE CONTRACT
  6. P.C. PIPE SHALL BE OF CLASS 4 AND AS PER SPECIFICATION OF IS. 4885-2000

BACKBONE - RISS JV  
CONTRACTOR

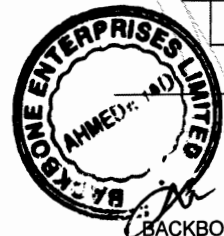
Chief Engineer  
World Bank Projects, Orissa  
Phubaneswar

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

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

**STANDARD DRAWINGS**  
DETAILS OF TRUCK LAYBYES (SHEET 1 OF 2)

DRG. NO.	GSP/CEB/119/01	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	37	DATE	REV	RO	
SCALE					
					NTS
				B.M	R.R.D.K
				R.J	S.G



BACKBONE - ANSARV  
CONTRACTOR



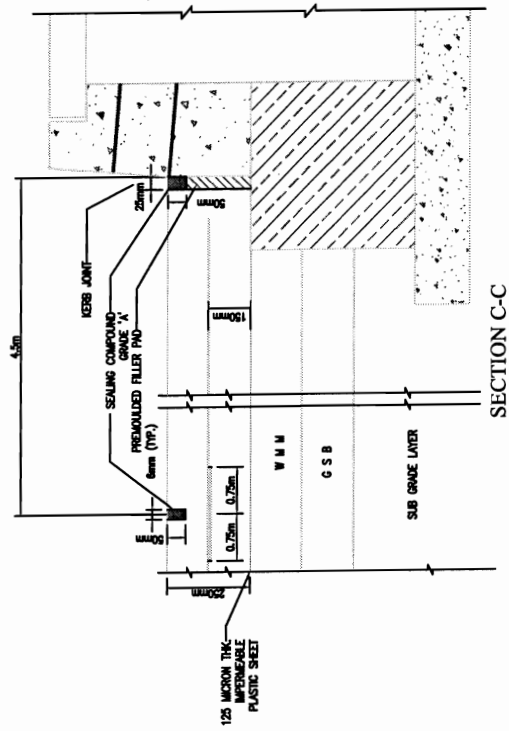
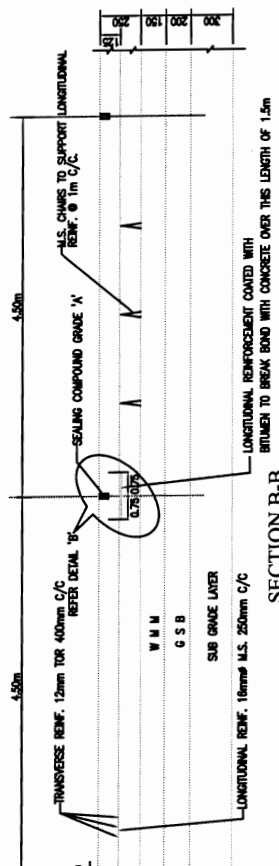
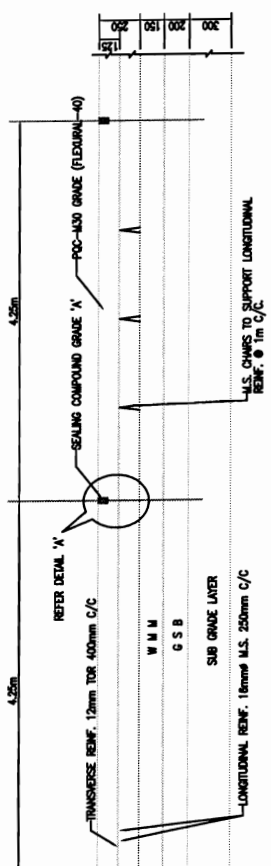
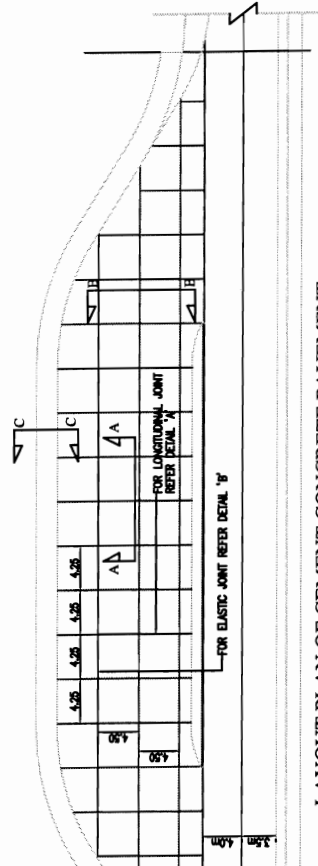
Chief Engineer  
World Bank Projects, Orissa  
EMPLOYER  
O/o the E.I.C. (Civil) Orissa  
Bhubaneswar

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

**STANDARD DRAWINGS**  
**DETAILS OF TRUCK LAYBYES (SHEET 2 OF 2)**

DRG NO. ORSP/CEG/118/02	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO. 38	DATE	REV	RO	
SCALE	NTS			
	B.M	R.J	R.R.D.K	S.G

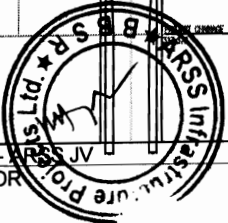


- LEGEND:-
- CEMENT CONCRETE
  - BITUMINOUS CONCRETE
  - BITUMINOUS MACADAM
  - DENSE BITUMINOUS MACADAM
  - WET MIX MACADAM
  - GRANULAR SUBBASE
  - SUBGRADE

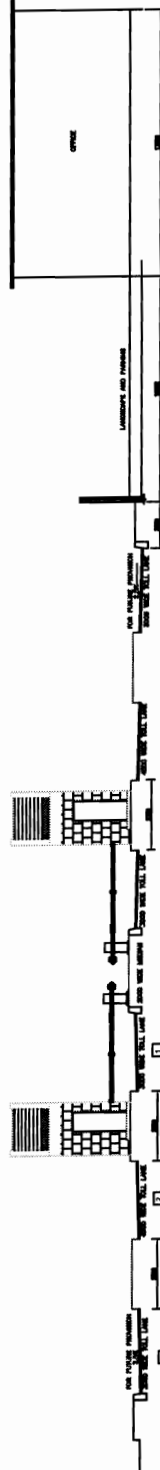
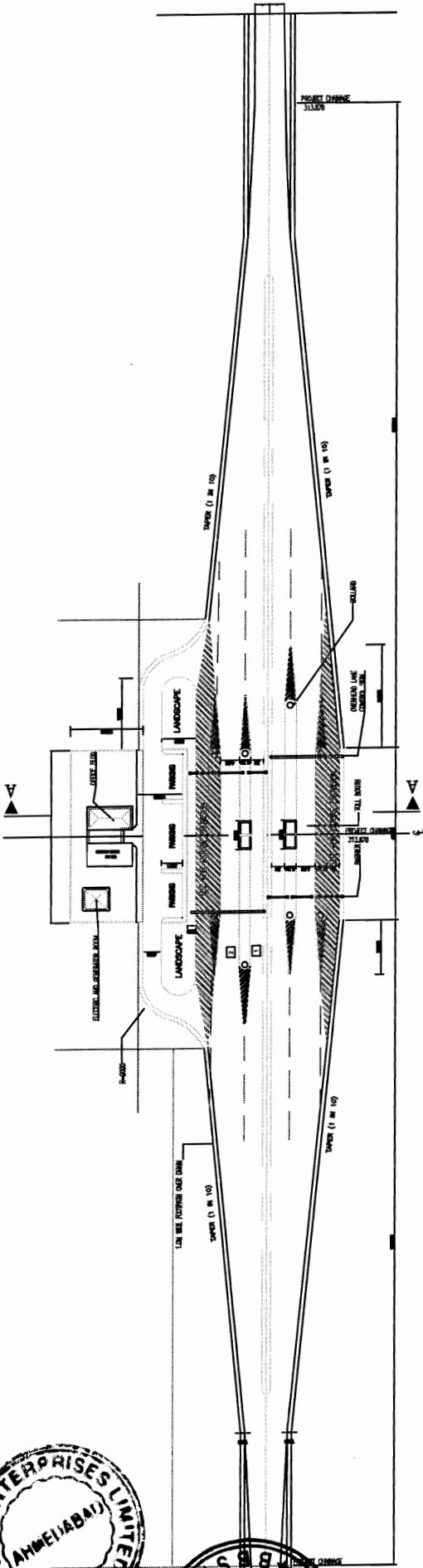
- NOTES:-
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
  2. MATERIAL TYPE, CONSTRUCTION EQUIPMENT, CONSTRUCTION METHODOLOGY SHALL BE AS PER RELEVANT CLAUSES OF MOU & H SPECIFICATIONS.
  3. WET MIX SHALL BE PROPERLY LAID TO OBTAIN A PLANE SURFACE FREE FROM UNDESIRABLES, PRECIPITATIONS & LOOSE POCKETS OF ADHESIVES.
  4. CONSTRUCTION JOINTS SHALL BE LOCATED AS TO CONDUCE WITH THE ELASTIC JOINT.
  5. MAX DESIGN FOR PFC SHALL BE OBTAINED BY ED PRIOR TO CONSTRUCTION.
  6. TRANSVERSE REINFORCEMENT SHALL BE CONTINUED ACROSS THE LONGITUDINAL JOINT.
  7. ELASTIC, LONGITUDINAL & KERB JOINTS SHALL BE AS SHOWN IN THE DRAWINGS AND AS PER CLAUSES & BOLL.1 OF MOU & H SPEC.
  8. SEALING COMPOUND SHALL BE OF GRADE 'X' (AS PER IS:1824-1961) AND METHOD OF SEALING SHALL BE AS PER CLAUSE 11.3 OF MOU & H SPECIFICATION.
  9. CONSTRUCTION OF DIVERSION ISLAND
    - a) PROVIDE A 10% PRECAST KERB TYPE-I AS PER DRAWING No. ORSP/CEG/10
    - b) PROVIDE 10% PRECAST KERB TYPE-II AS PER DRAWING No. ORSP/CEG/10
    - c) PCC M.S. AS PER TECH. SPEC. CL 1800 & 1700
    - d) 15mm THICK PLASTERING IN CM 1:4 AS PER TECH. SPEC. CL 1312.4
  10. LAY BYE PAVING AREA AND ITS APPROACHES
    - a) SUBGRADE AS PER TECH. SPEC. CL 301
    - b) WET MIX MACADAM AS PER TECH. SPEC. CL 400
    - c) NET MIX MACADAM AS PER TECH. SPEC. CL 401
    - d) POLYMER SHEET 125 MICRON THK. AS APPROVED BY ENGINEER SHALL BE PROVIDED OVER THE PROPERLY LAID SUBGRADE AS PER CL. OF MOU & H SPECIFICATION.
    - e) PAVEMENT SHALL BE MADE WITH 400 PCC AS PER CL. OF MOU & H SPECIFICATION.
    - f) JOINTS AT THE JUNCTION OF SLAB WITH DRAIN/KERB SHALL BE 25mm WIDE FILLED WITH PREQUALIFIED FILLER PFC (CL. 1802.7 OF MOU & H SPEC.) AND SEALING COMPOUND AS SHOWN.
    - g) STEEL REINFORCEMENT AS PER TECH. SPEC. CL 1800
  11. ROAD MARKING AND PAINTING AS PER TECH. SPEC. CL 803
    - a) KERB PAINTING AS PER TECH. SPEC. CL 803
    - b) THERMOPLASTIC ROAD MARKING AS PER TECH. SPEC. CL 803.4



BACKBONE ENTERPRISES LIMITED  
CONTRACTOR



Chief Engineer  
World Bank Project  
to the E.I.C.T. EMPLOYER  
Bhubaneswar



RESERVED LANE FOR THROUGH TRAFFIC (VEHICLES WHO HAVE PAID TOLL AT PREVIOUS TOLL PLAZA)  
 GENERAL LANE  
 RESERVED LANE FOR MULTI AXLE VEHICLES  
 NOTES:-  
 ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED  
 DIMENSIONS ARE NOT TO BE SCALED AND ONLY WRITTEN DIMENSIONS TO BE FOLLOWED

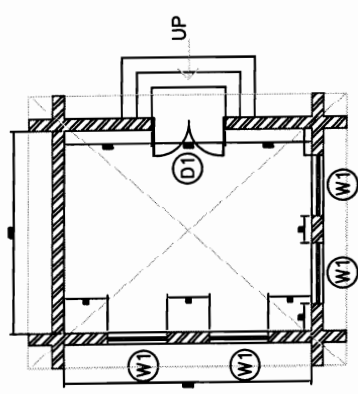
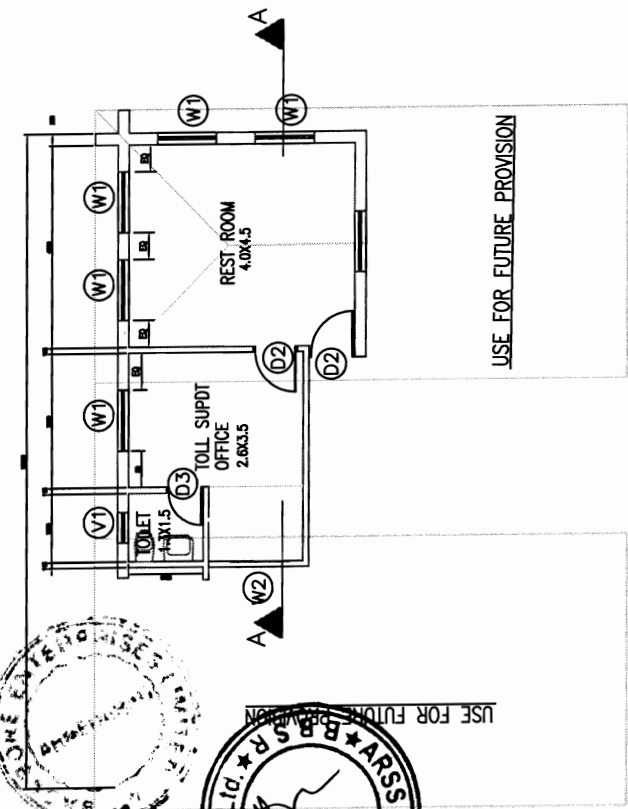
STANDARD DRAWINGS  
TOLL PLAZA LAYOUT

DRG. NO.	OSP/CEG/TP/01	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	40	DATE	REV	RO	
SCALE					NTS
			B.M	R.J	R.R.D.K
					S.G

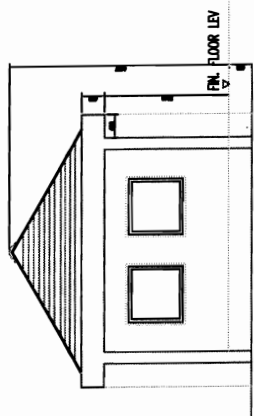
PROJECT:-  
 CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND  
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 FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK  
 ASSISTANCE

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

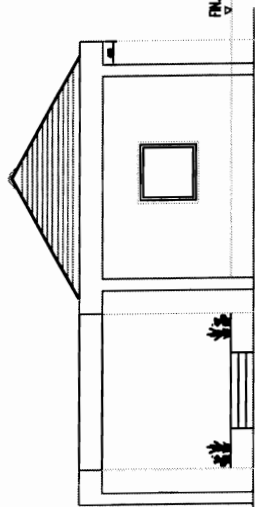




PLAN: ELECTRIC ROOM  
(Plinth Area = 25 sq m)

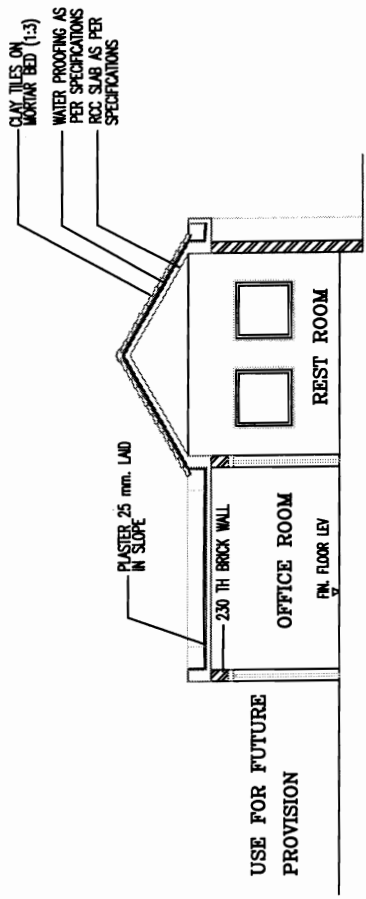


FRONT ELEVATION: ELECTRIC ROOM



FRONT ELEVATION: TOLL MAIN OFFICE

PLAN: TOLL MAIN OFFICE



SECTION - A A

SCHEDULE OF DOORS & WINDOWS

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

PROJECT:-

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

STANDARD DRAWINGS

TOLL PLAZA MAIN OFFICE

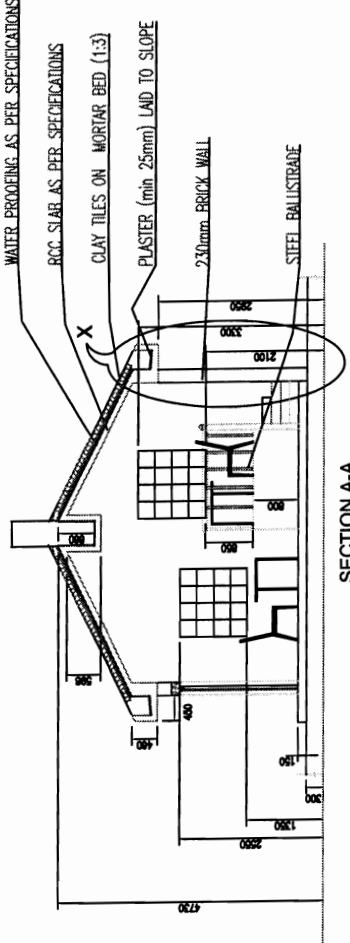
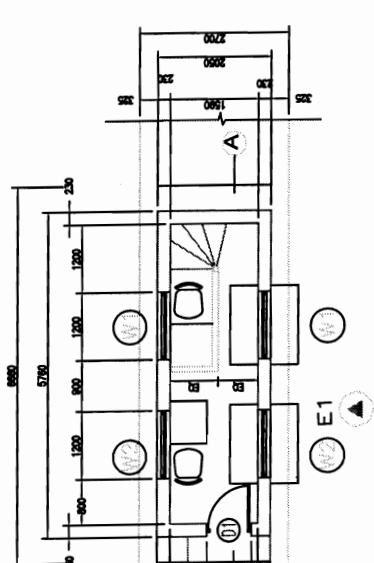
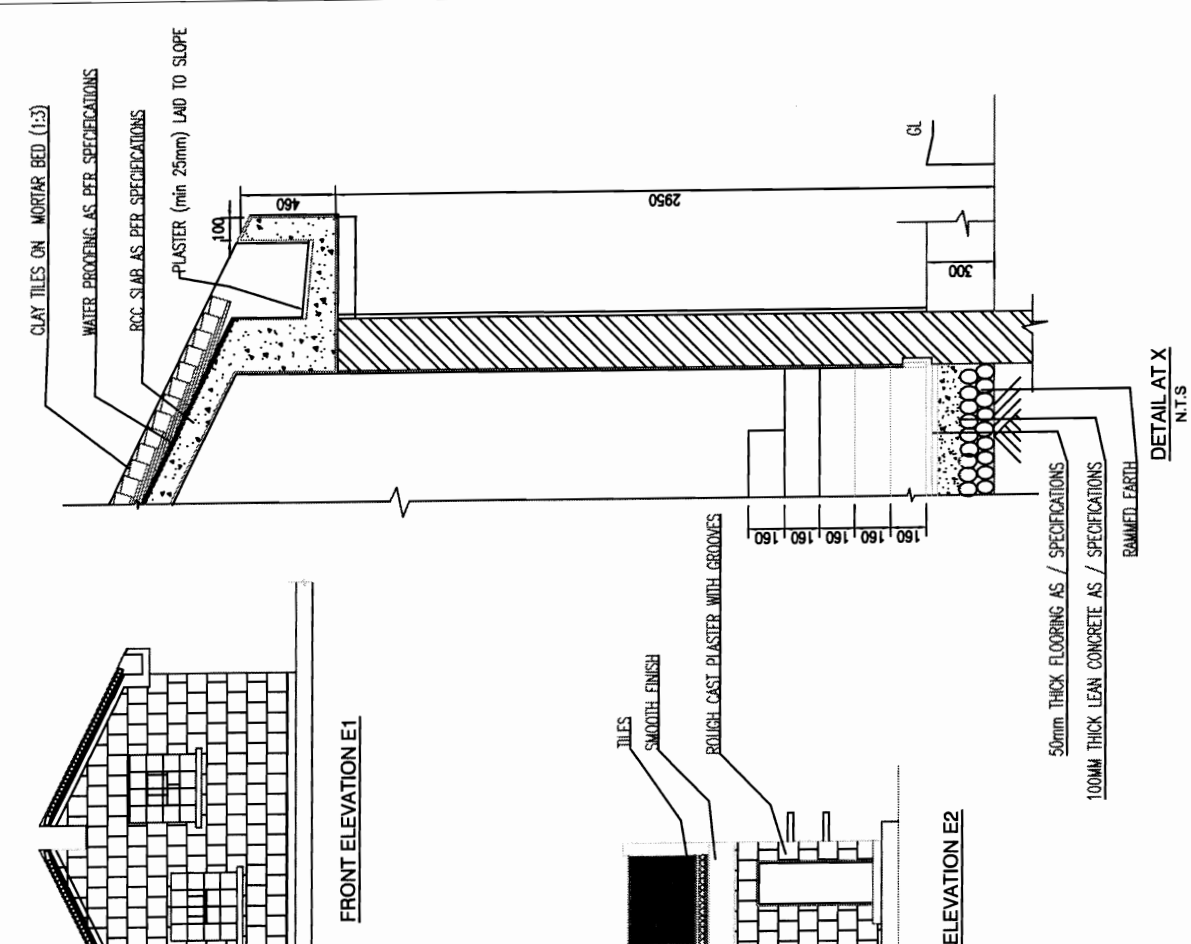
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SH. NO.	41	DATE	REV	RO	
SCALE		NTS	B.M	R.J	S.G

**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



BACKBONE CONTRACTORS JV

Chief Engineer  
World Bank Projects, Orissa  
O/o the E.C.C. (EM) D/O  
Bhubaneswar



SCHEDULE OF DOORS & WINDOWS

S. NO	TYPE	MASONRY OPENING WIDTH	HEIGHT	CHILL LEV	LINTEL LEV
1.	D1	800	2100	00	2100
2.	W1	1200	1200	900	1800
3.	W2	1200	1200	1650	3300

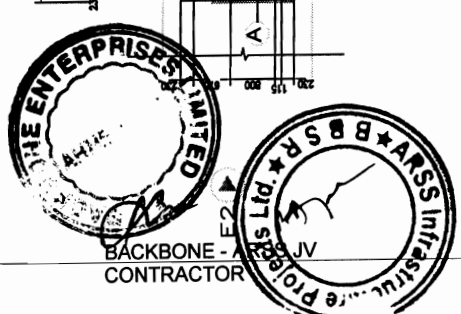
STANDARD DRAWINGS  
TOLL BOOTH

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

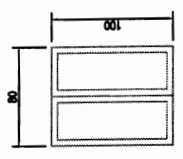
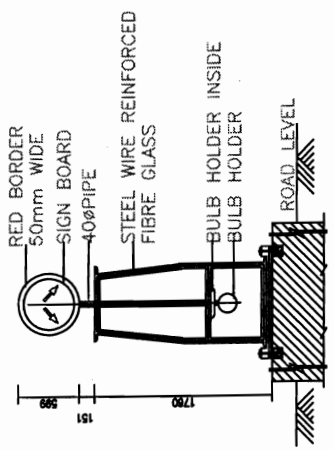
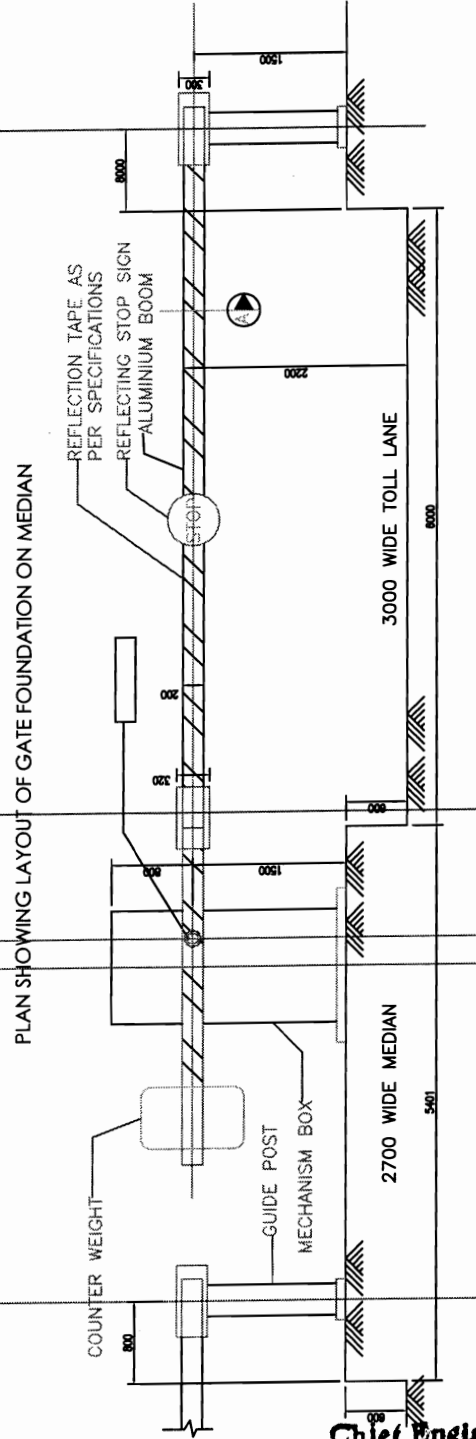
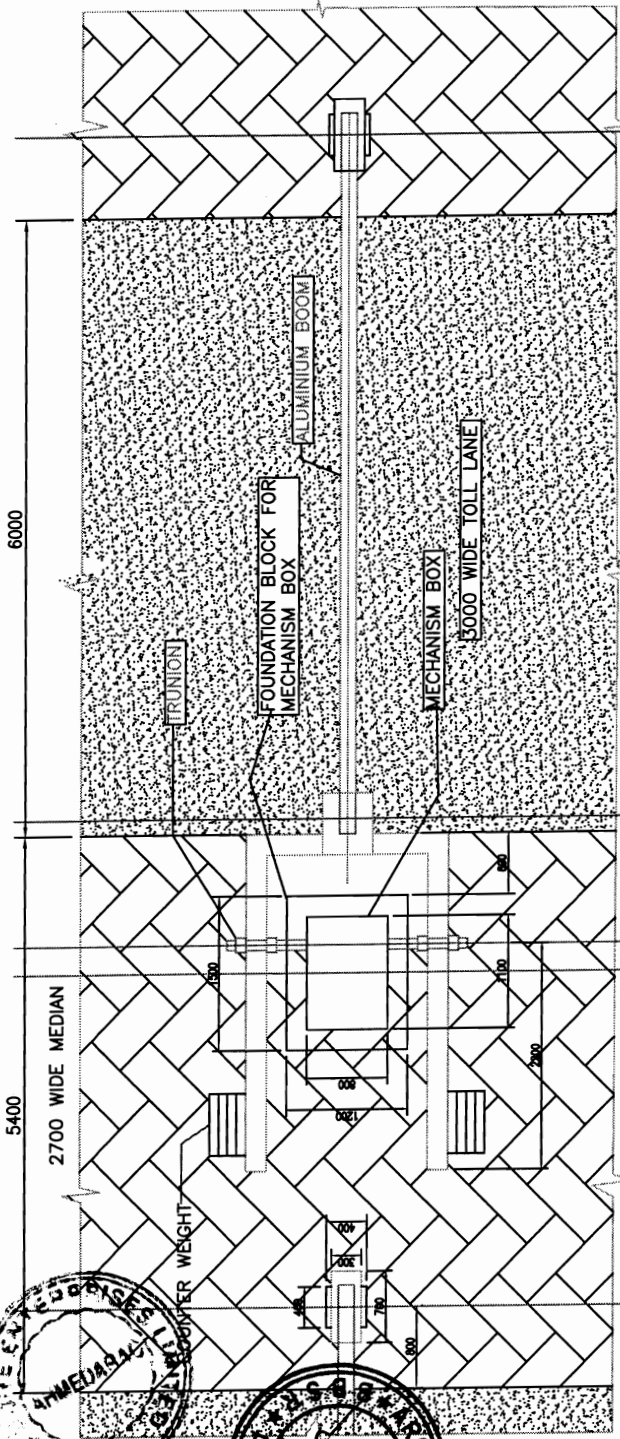
**CONSULTING ENGINEERS GROUP LTD.**  
E-12, Moji Colony, Malviya Nagar Jaipur-17  
Tel: +91-141-2520899, 2521899, 2520556  
Fax: 2521348, e-mail: ceg@ceindia.com



DRG. NO.	ORSP/CEB/TP/A3	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	42	DATE	REV	RO	
SCALE					



Chief Engineer  
World Bank Projects  
E.I.C. (CEMP) Division  
Rhubanswar



Note: All dimensions in millimetres if not specified

TYPICAL DETAILS OF BOLLARD

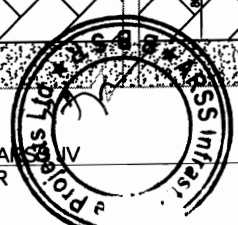
DETAIL AT A

STANDARD DRAWINGS  
BARRIER GATE FOR TOLL PLAZA

DRG NO. 0897/050/TP/04	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO. 43	DATE	REV	RO	
SCALE	NTS			
	B.M	R.J	R.R.D.K	S.G

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

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



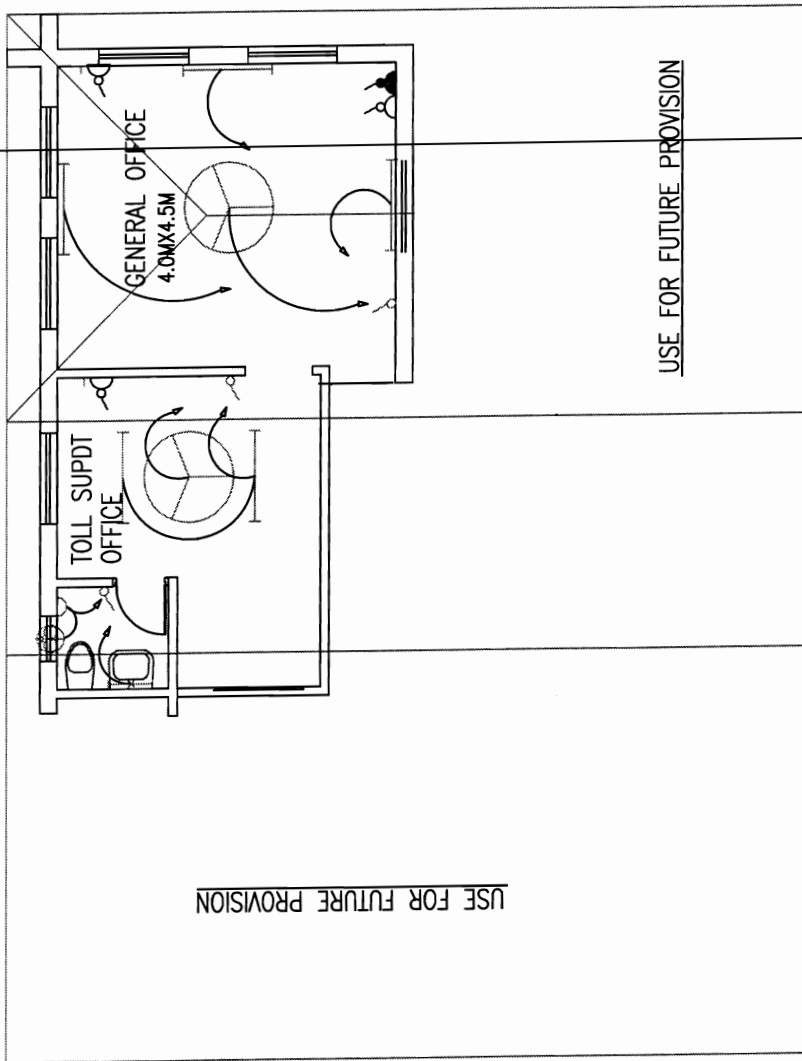
BACKBONE - AN IV  
CONTRACTOR

Chief Engineer  
World Bank Project  
World Bank Project  
EMPLOYER  
Rhubaneswar

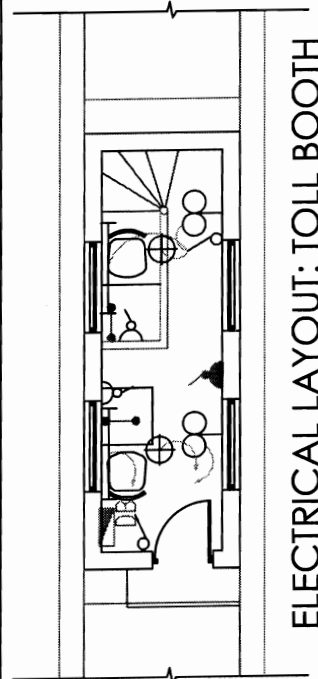
BACKBONE - A  
CONTRACTOR



Chief Engineer  
World Bank Projects  
Chief Engineer  
World Bank Projects  
EMPLOYER  
Bhubaneswar



ELECTRICAL LAYOUT: TOLL PLAZA MAIN OFFICE



ELECTRICAL LAYOUT: TOLL BOOTH

**LEGEND**

- 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)
- GEISER 15 A SOCKET
- 15 A SWITCH FOR GEISER
- 25 A A/C OUTLET (150 MM FROM FFL)
- 5 A LIGHT PLUG WITHOUT SWITCH FOR EXHAUST FAN (1800 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
- EXHAUST FAN
- DISTRIBUTION BOARD
- CEILING FAN

**PROJECT:-**

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

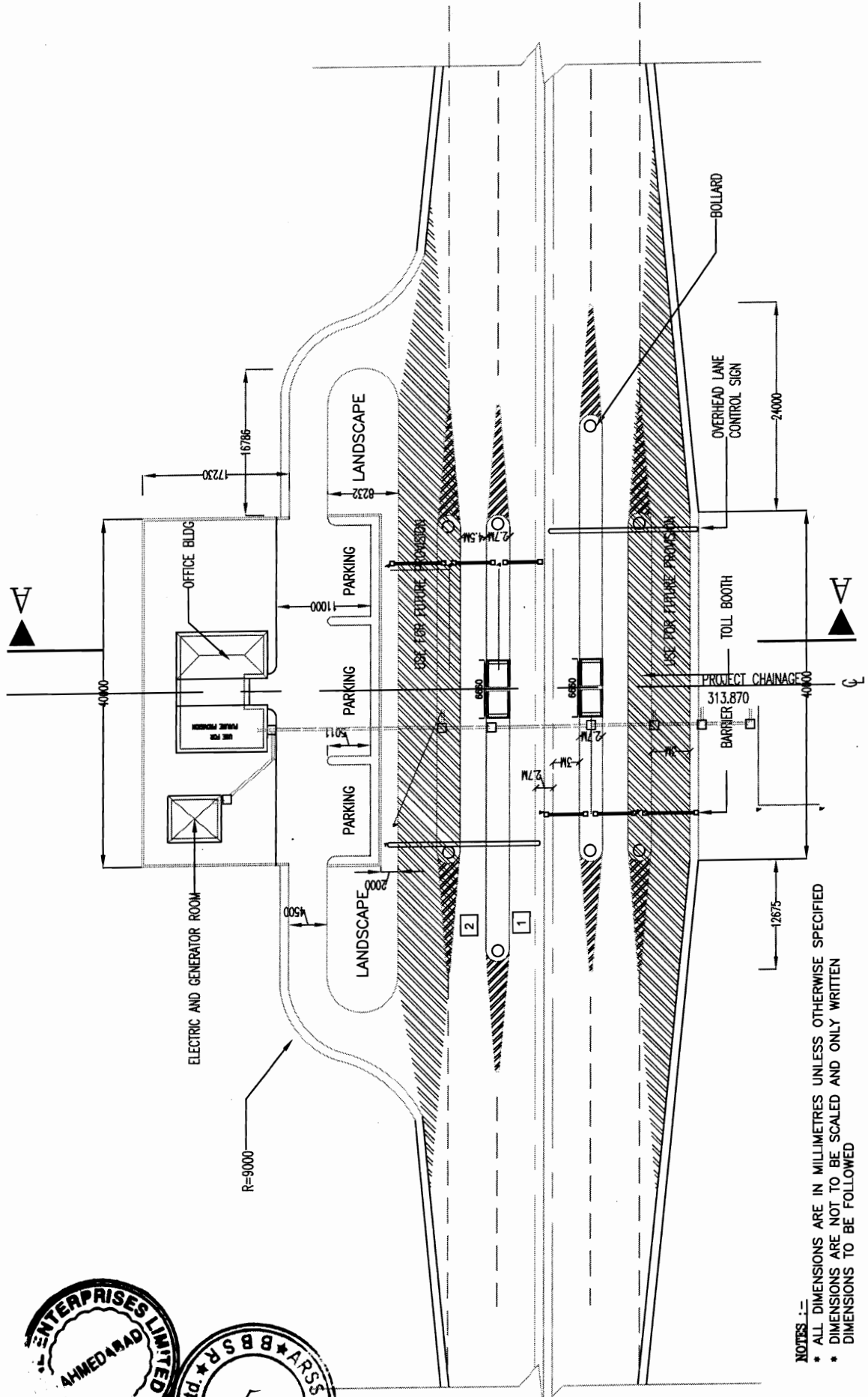
**CONSULTING ENGINEERS GROUP LTD.**  
E-12, Moji Colony, Malviya Nagar Jaipur-17  
Tel: +91-141-2520899, 2521899, 2520556  
Fax: 2521348, e-mail: ceg@cegindia.com



**STANDARD DRAWINGS**

ELECTRICAL LAYOUT  
TOLL PLAZA AND MAIN OFFICE

DRG NO.	DATE	REV	RO	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	44						
SCALE	NTS			B.M	R.J	R.R.D.K	S.G



**NOTES :-**  
 \* ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED  
 \* DIMENSIONS ARE NOT TO BE SCALED AND ONLY WRITTEN DIMENSIONS TO BE FOLLOWED



BACKBONE - A  
 CONTRACTOR

Chief Engineer  
 World Bank Projects  
 O/o the E.I.C. for Orissa  
 Bhubaneswar:

STANDARD DRAWINGS  
 ELECTRICAL LAYOUT - TOLL PLAZA

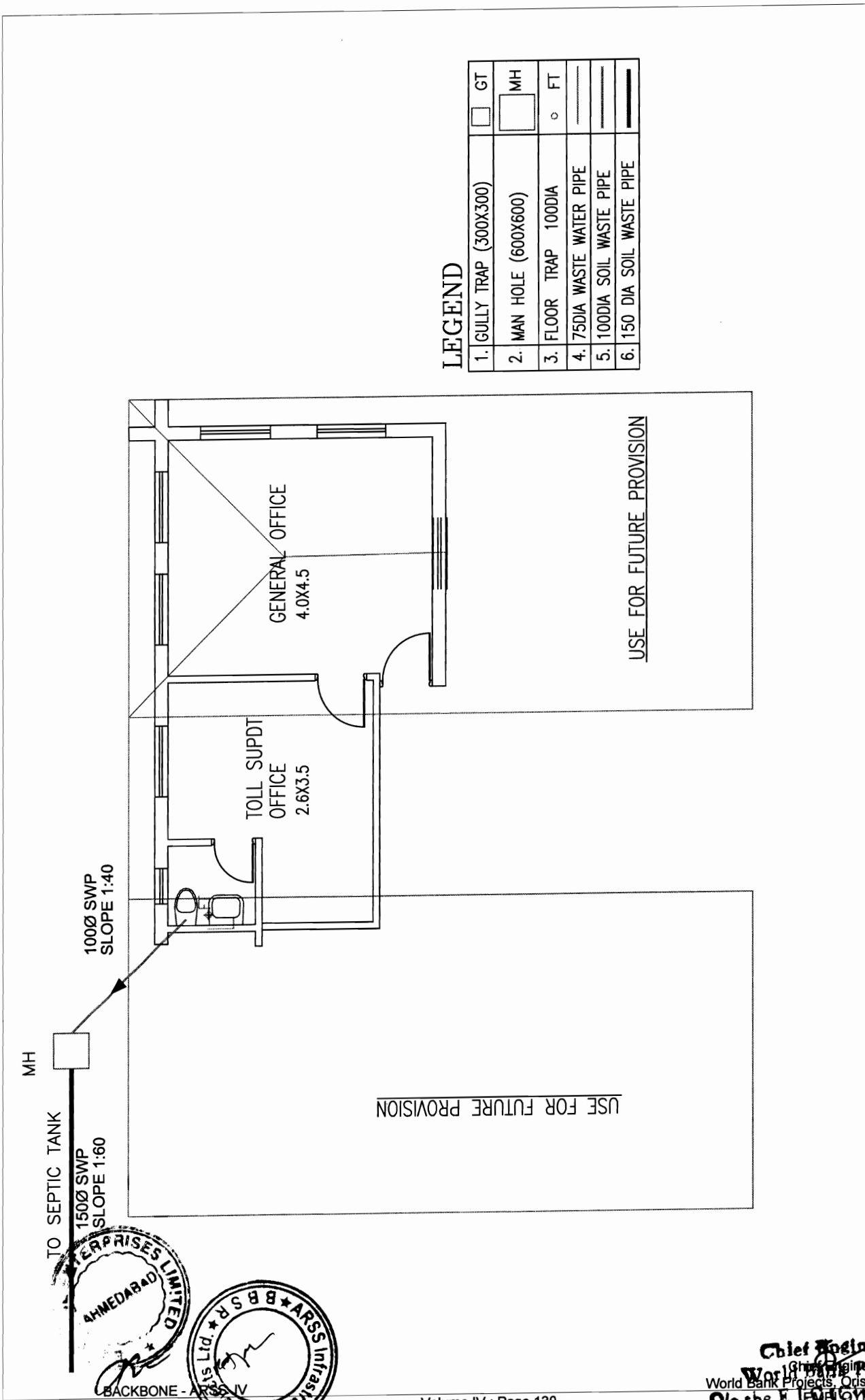
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SH. NO. 45	DATE	REV	RO	
SCALE	NTS			
	B.M.	R.J.	R.R.D.K	S.G

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

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







**LEGEND**

1. GULLY TRAP (300X300)		GT
2. MAN HOLE (600X600)		MH
3. FLOOR TRAP 100DIA		FT
4. 75DIA WASTE WATER PIPE		
5. 100DIA SOIL WASTE PIPE		
6. 150 DIA SOIL WASTE PIPE		

**STANDARD DRAWINGS  
PLUMBING LAYOUT - TOLL PLAZA**

DRG NO.	OSIP/CEG/TP/07	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	46	DATE	REV	RO	
SCALE	NTS				
		B.M	R.J	R.R.D.K	S.G

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

**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**

TO SEPTIC TANK  
1500 SWP  
SLOPE 1:60

**ENTERPRISES LIMITED**  
AHMEDABAD

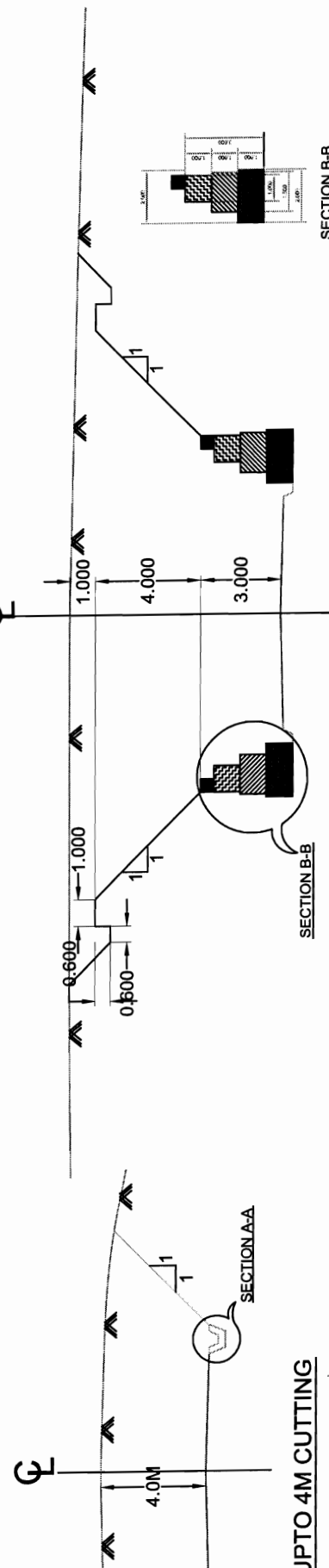
**BACKBONE - ARTS & VV**  
CONTRACTOR

**ARTS Infrastructure Projects Ltd.**  
B.B.S.R.

Chief Engineer  
World Bank Projects, Orissa  
Bhubaneswar



BACKBONE - ARS & JV  
CONTRACTOR



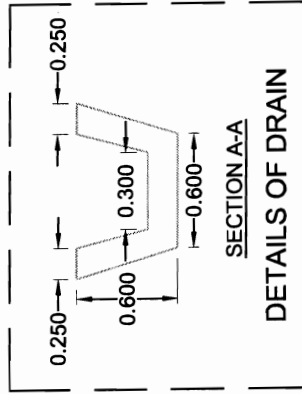
UPTO 4M CUTTING

SECTION A-A

SECTION B-B

4M TO 8M CUTTING

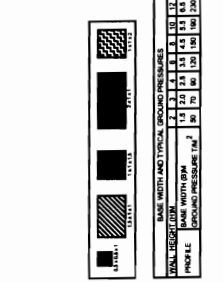
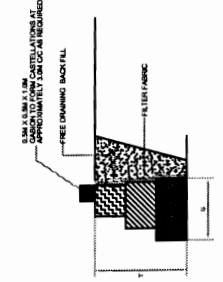
SECTION B-B



SECTION A-A

DETAILS OF DRAIN

DATE	DESCRIPTION	BY	CHKD
18	1	2	3
19	2	3	4
20	3	4	5
21	4	5	6
22	5	6	7
23	6	7	8
24	7	8	9
25	8	9	10
26	9	10	11
27	10	11	12
28	11	12	13
29	12	13	14
30	13	14	15
31	14	15	16
1	15	16	17
2	16	17	18
3	17	18	19
4	18	19	20
5	19	20	21
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77	91	92	93
78	92	93	94
79	93	94	95
80	94	95	96
81	95	96	97
82	96	97	98
83	97	98	99
84	98	99	100



- Note:**
1. Ensure drainage is provided from the lowest point of the foundation.
  2. Gabion should be made with 10 SWG wire.
  3. Mesh should be either an available welded mesh or a triple-twist hexagonal mesh of 100mm width & 120mm length.
  4. Panel frames should be made using 8 SWG wire and mesh should be made using 10 SWG wire.
  5. Wire all gabion boxes together using additional wire of 10 SWG wire.
  6. During construction add four or five cross-trusses (of 10 SWG wire) per square metre in each horizontal dimension.
  7. Ensure that the minimum dimension of all stones should be larger than the wire mesh size.
  8. Stone should be labular size of even size and angularity.
  9. Where river terrace deposits are likely to form the predominant source of gabion stone, rounded stone should be limited to a third of the total stone placed in the gabion.
  10. If the stone is covered by 'hard' soil, the stone should be carefully packed and laid the facing.
  11. Wire the lids down with additional wire of 10 SWG.
  12. Back fill behind the gabion structure using even sized filter material.
  13. The top of a gabion wall should be finished with a course of masonry.

**CLIENT :-**  
WORKS DEPARTMENT  
GOVT. OF ORISSA

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

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

**DRG NO.** OSRP/CEG/SF/01  
**SH. NO.** 39  
**DATE** / /  
**REV** / /  
**RO** / /

**DESIGNED (A)** / /  
**DRAWN (D)** / /  
**CHECKED (C)** / /  
**APPROVED (O)** / /

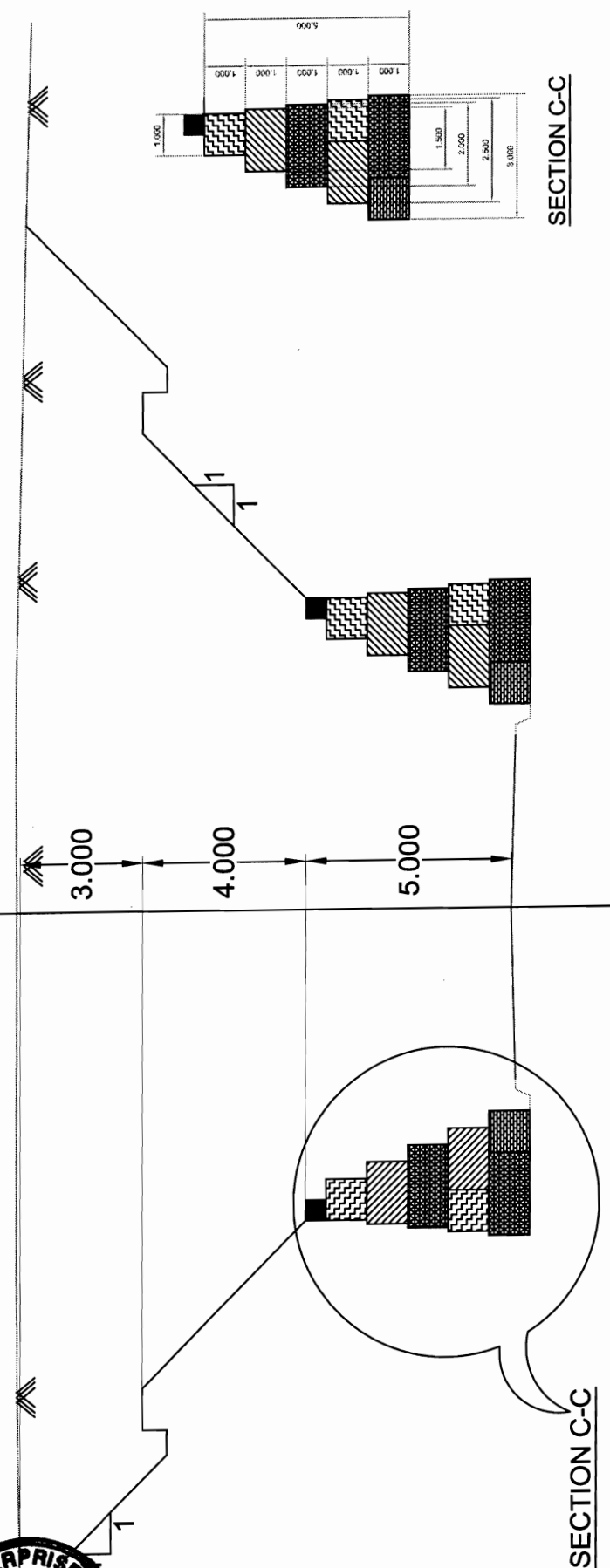
**K.S.R** / /  
**R.B.** / /  
**R.R.D.K** / /  
**S.G** / /

**SCALE** NTS

**SLOPE PROTECTION MEASURE (UPTO 4M & 4M TO 8M CUTTING)**

Chief Engineer  
World Bank Project  
Chief Engineer  
On the Bank Project  
EMPLOYER  
huband war

CL

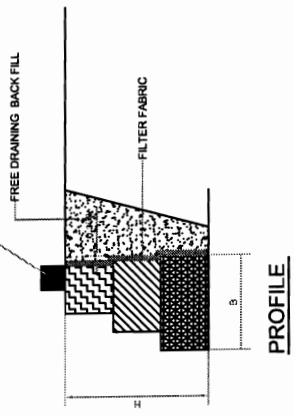


SECTION C-C

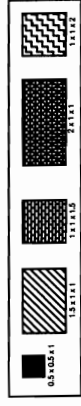
SECTION C-C

8M TO 12M CUTTING

0.5M X 0.5M X 1.0M GABION TO FORM CASTELLATIONS AT APPROXIMATELY 3.0M C/C AS REQUIRED



PROFILE



BASE WIDTH AND TYPICAL GROUND PRESSURES	
WALL HEIGHT (M)	2 3 4 6 8 10 12
BASE WIDTH (BM)	1.5 2.0 2.5 3.5 4.5 5.5 6.5
PROFILE	GROUND PRESSURE T/M <sup>2</sup> 50 70 90 120 150 190 230

- Note:**
1. Ensure drainage is provided from the lowest point of the foundation.
  2. Use high grade wire with a thick galvanised.
  3. Mesh should be either a proprietary welded mesh or a triple-twist hexagonal mesh of 100mm width & 120mm length
  4. Panel frames should be made using 8 SWG wire and mesh should be made using 10 SWG wire.
  5. Wire all gabion boxes together using additional wire of 10 SWG wire.
  6. During construction add four or five cross-tusses ( of 10 SWG wire) per square metre in each horizontal dimension
  7. Ensure that the minimum dimension of all stones should be larger than the wire mesh size.
  8. Stone should be tabular size of even size and angularity.
  9. Where river terrace deposits are likely to form the predominant source of gabion stone, rounded stone should be limited to a third of the total stone content, and evenly distributed throughout each box.
  10. If the boxes are packed by hand, all of the stone should be carefully packed, not just the facing.
  11. Wire the lids down with additional wire of 10 SWG.
  12. Back fill behind the gabion structure using even sized filter material.
  13. The top of a gabion wall should be finished with a course of masonry



BACKBONE ENTERPRISES LTD. CONTRACTOR

Chief Engineer  
World Bank Projects  
Bhubaneswar

**CLIENT :-**  
WORKS DEPARTMENT  
GOVT. OF ORISSA

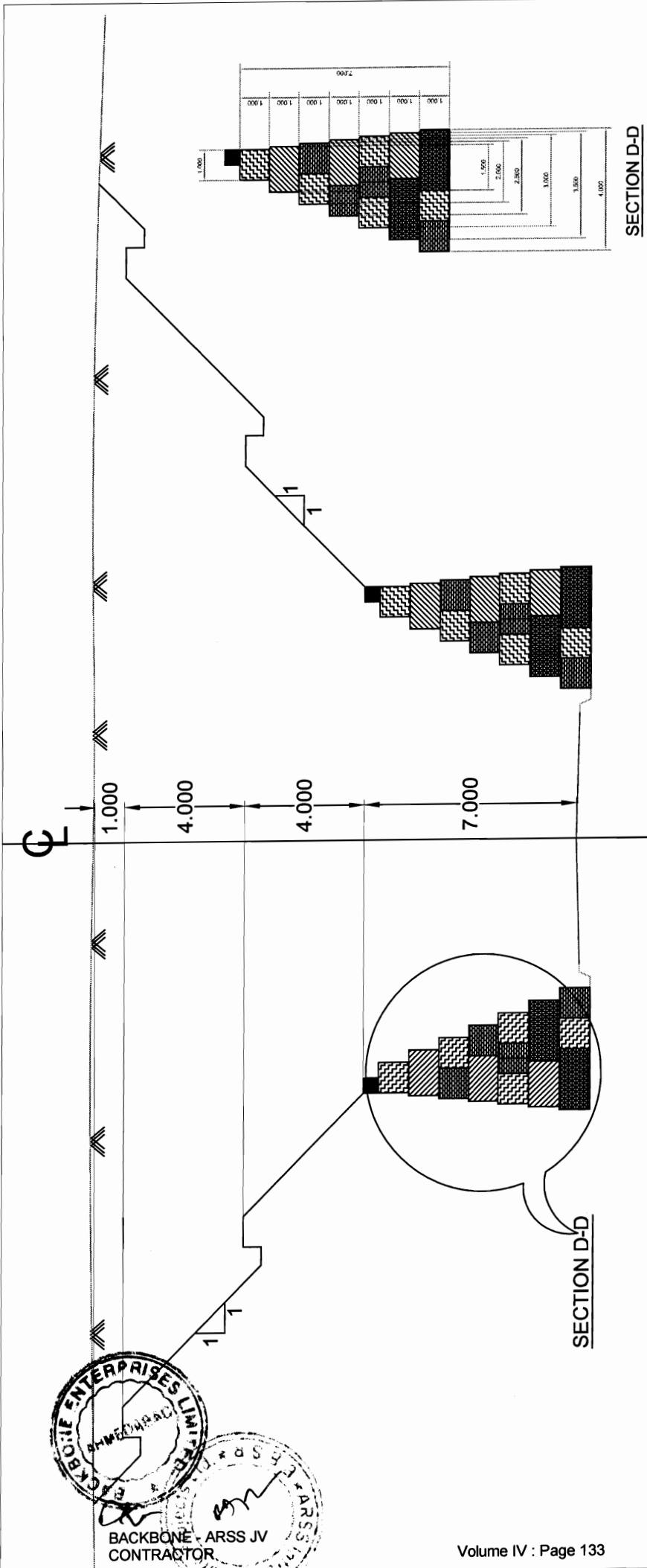
**PROJECT :-**  
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE.

**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**

**SLOPE PROTECTION MEASURE (8M TO 12M CUTTING)**

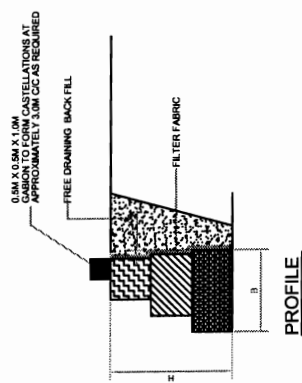
DRG NO.	OSRP/CEG/SP/02	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	DATE	REV	RO	R.R.D.K	S.G
SCALE	NTS				



SECTION D-D

12M TO 16M CUTTING

- Note:**
1. Ensure drainage is provided from the lowest point of the foundation.
  2. Use high grade wire with a thick galvanneal.
  3. Mesh should be either a proprietary welded mesh or a triple-twist hexagonal mesh of 100mm width & 120mm length.
  4. Panel frames should be made using 8 SWG wire and mesh should be made
  5. Wire all gabion boxes together using additional wire of 10 SWG wire.
  6. During construction add four or five cross-bruses (of 10 SWG wire) per square metre in each horizontal dimension.
  7. Ensure that the minimum dimension of all stones should be larger than the wire mesh size.
  8. Stone should be tabular size of even size and angularity.
  9. Where river terrace deposits are likely to form the predominant source of gabion fill, the mesh should be made of a third of the total stone content, and evenly distributed throughout each layer.
  10. If the boxes are packed by hand, all of the stones should be carefully packed, not just the facing.
  11. Wire the lids down with additional wire of 10 SWG.
  12. Back fill behind the gabion structure using even sized filter material.
  13. The top of a gabion wall should be finished with a course of masonry.



WALL HEIGHT (BM)	2	3	4	6	8	10	12
BASE WIDTH (BM)	1.5	2.0	2.5	3.5	4.5	5.5	6.5
PROFILE	50	70	90	120	150	190	230
GROUND PRESSURE (TM <sup>2</sup> )							

**BACKBONE ENTERPRISES LIMITED**  
 AMMECH ROAD  
 P.O. BOX 100  
 Bhubaneswar - 751 001  
 INDIA

**BACKBONE - ARSS JV CONTRACTOR**

**Chief Engineer**  
 World Bank Projects  
 World Bank Projects, Orissa  
 O/o the E.I.C. Govt. of Orissa  
 EMPLOYER  
 Bhubaneswar

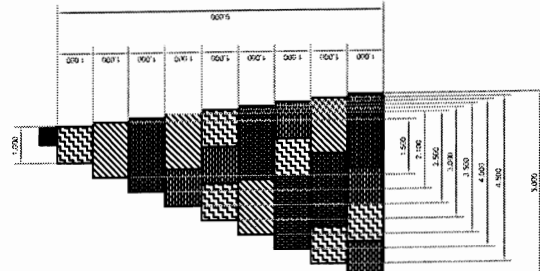
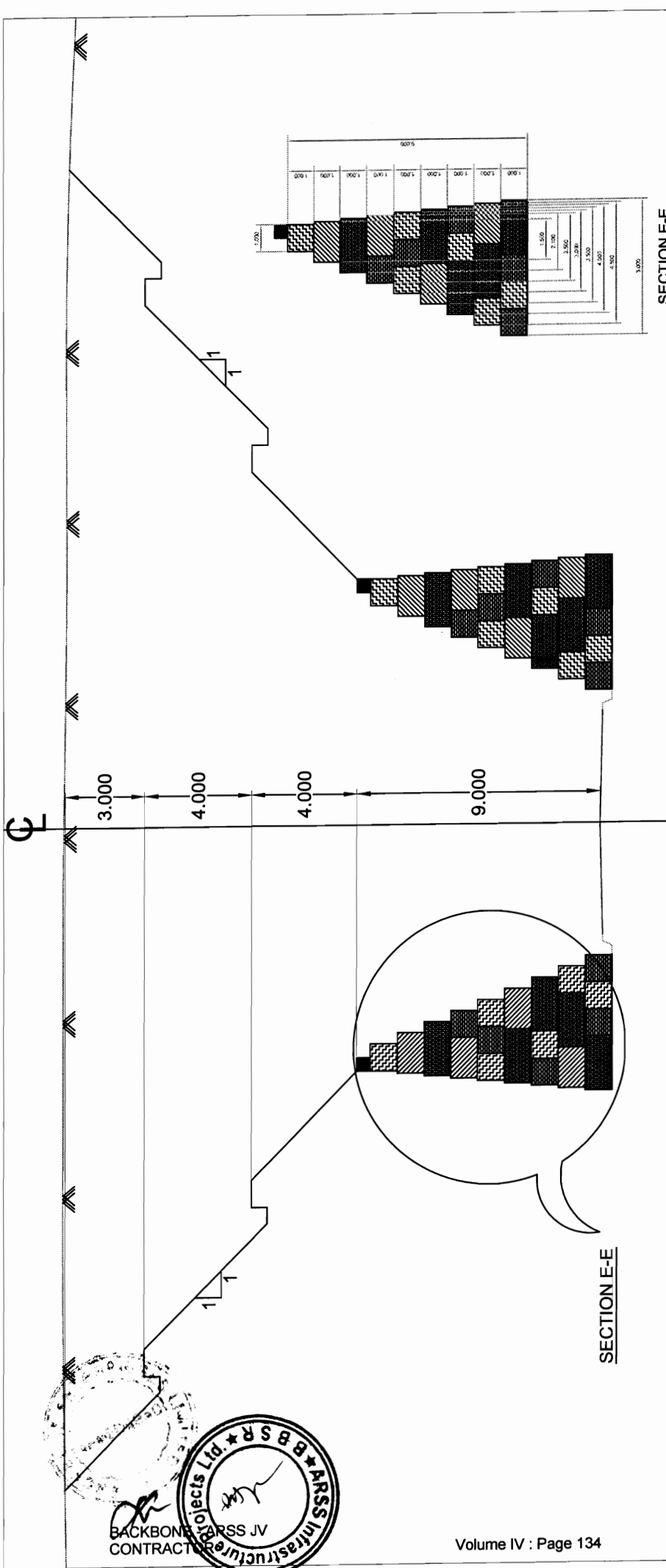
**CEG ENGINEERS GROUP LTD.**  
 E-12, Moji Colony, Malviya Nagar Jaipur-17  
 Tel: +91-141-2520899, 2521899, 2520556  
 Fax: 2521348, e-mail: ceg@cegindia.com

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

**CLIENT :-**  
 WORKS DEPARTMENT  
 GOVT. OF ORISSA

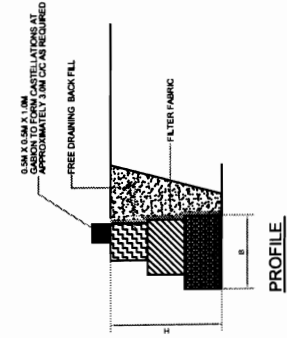
**SLOPE PROTECTION MEASURE (12M TO 16M CUTTING)**

DRG NO.	OSRP/CEG/SP/03	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.		DATE	REV	RO	
SCALE		NTS			
			K.S.R	R.B.	R.R.D.K
					S.G



**16M TO 20M CUTTING**

- Note:**
1. Ensure drainage is provided from the lowest point of the foundation.
  2. Use high grade wire with a thick galvanised.
  3. Mesh should be either a proprietary welded mesh or a triple-twist hexagonal mesh of 100mm width & 120mm length.
  4. Gabion boxes should be made using 6 SWG wire and mesh should be made using 10 SWG wire.
  5. Wire all gabion boxes together using additional wire of 10 SWG wire.
  6. During construction add four or five cross-ties (of 10 SWG wire) per square metre in each horizontal dimension.
  7. Ensure that the minimum dimension of all stones should be larger than the wire mesh size.
  8. Where there is a variation in the angularity of the stones, the angularity of the larger size of open size and angularity.
  9. Where there are large deposits are likely to form the predominant source of gabion stone, rounded stones should be limited to a third of the total stone content, and evenly distributed throughout each box.
  10. If the boxes are packed by hand, all of the stone should be carefully packed, not just the facing.
  11. Wire the fill down with additional wire of 10 SWG.
  12. The top of the gabion wall should be finished with a course of masonry.
  13. The top of a gabion wall should be finished with a course of masonry.



BASE WIDTH (DM)	BASE WIDTH AND TYPICAL GROUND PRESSURES														
	2	3	4	5	6	8	10	12	1.5	2.0	2.5	3.0	4.0	5.0	6.0
PROFILE	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	1.5	2.0	2.5	3.0	4.0	5.0	6.0
GROUND PRESSURE (T/M <sup>2</sup> )	50	70	90	100	100	100	100	100	100	100	100	100	100	100	100

**CLIENT :-**  
WORKS DEPARTMENT  
GOVT. OF ORISSA

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

**CON SULT I N G**  
**ENGINEERS GROUP LTD.**  
E-12, Moji Colony, Maivya Nagar Jaipur-17  
Tel: +91-141-2520899, 2521899, 2520556  
Fax: 2521348, e-mail: ceg@cegindia.com

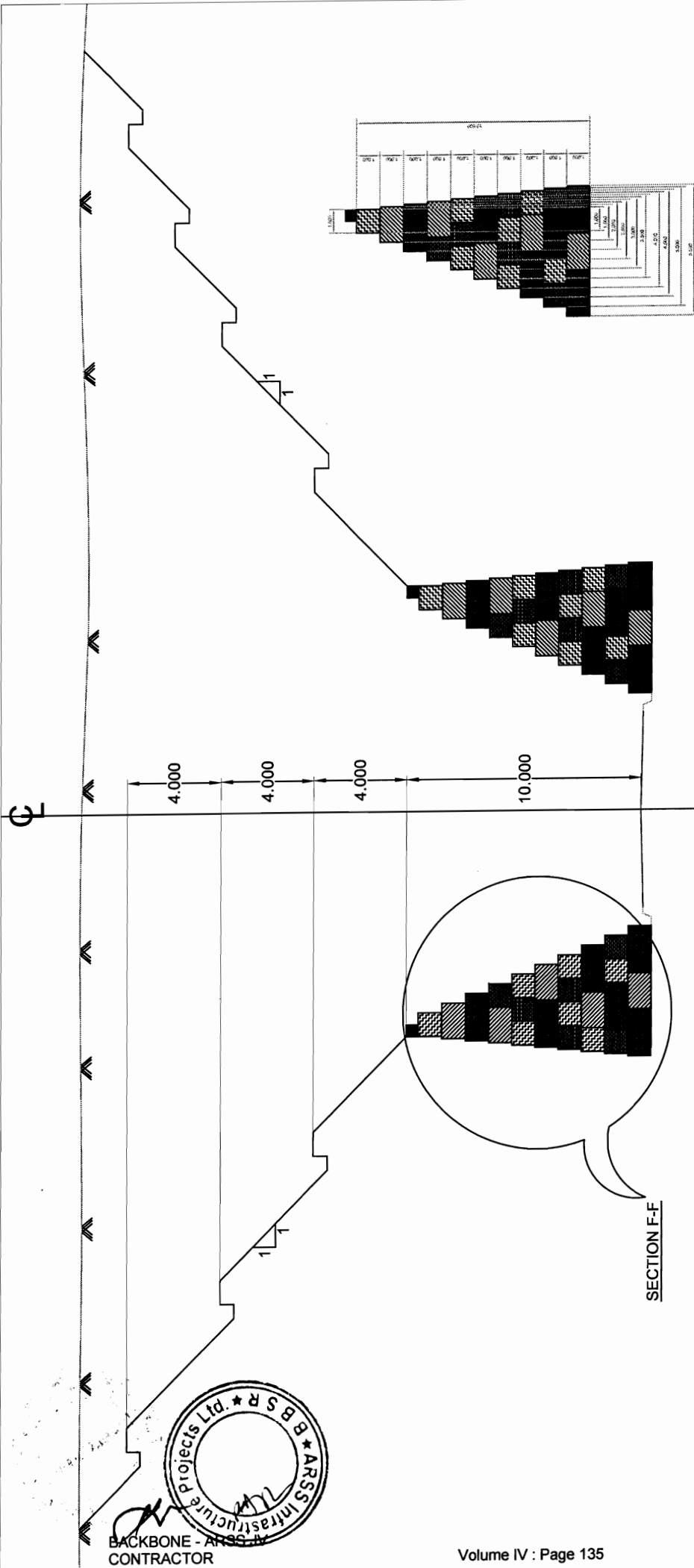
**Chief Engineer**  
World Bank Project  
Chief Engineer  
Employer

**SCALE** OSRP/CEG/SP/04  
**DATE** \_\_\_\_\_ **REV** \_\_\_\_\_ **RO** \_\_\_\_\_  
**NTS**

**DESIGNED (A)** \_\_\_\_\_ **DRAWN (B)** \_\_\_\_\_ **CHECKED (C)** \_\_\_\_\_ **APPROVED (D)** \_\_\_\_\_

**K.S.R** **R.B.** **R.R.D.K** **S.G**



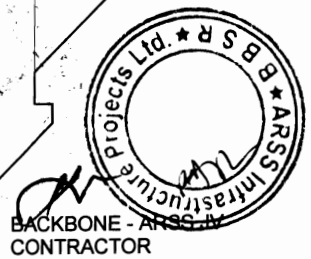
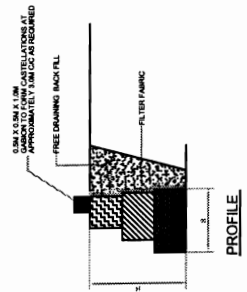


**>20M CUTTING**

**SECTION F-F**

- Note:**
1. Ensure drainage is provided from the lowest point of the foundation.
  2. Use high grade wire with a thick galvannead.
  3. Mesh should be either a proprietary welded mesh or a triple-helical hexagonal or diamond mesh with 120mm length and 100mm width.
  4. Place the mesh on the ground using 8 SWG wire and mesh should be made using 10 SWG wire.
  5. Wire all gabion boxes together using additional wire of 10 SWG wire.
  6. During construction add four or five cross-braces (of 10 SWG wire) to each box.
  7. Ensure that the minimum dimension of all stones should be larger than the wire mesh size.
  8. Stones should be tabular size of even size and angularity.
  9. Where river silt deposits are likely to form the permanent surface of the gabion structure, the mesh should be placed on the top of the last stone contact, and evenly distributed throughout each box.
  10. If the boxes are packed by hand, all of the stones should be carefully packed, not just the facing.
  11. Apply 100mm thick additional wire of 10 SWG.
  12. Back fill the gabion structure with well graded filter material.
  13. The top of a gabion wall should be finished with a course of masonry.

BASE WIDTH AND TYPICAL GROUND PRESSURE	SMALL RECTANGULAR	TRAPZOIDAL	TRIANGULAR
DEPTH (M)	1.5	2.0	2.5
WIDTH (M)	1.5	2.0	2.5
PEOPLE	50	75	100
GROUND PRESSURE (kN/m <sup>2</sup> )	50	75	100
	100	150	200



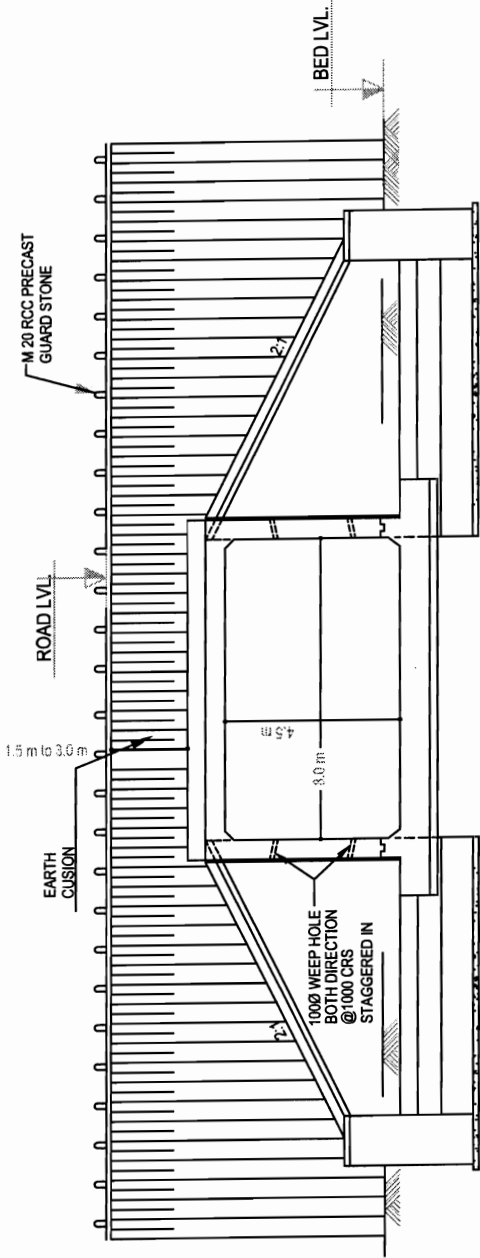
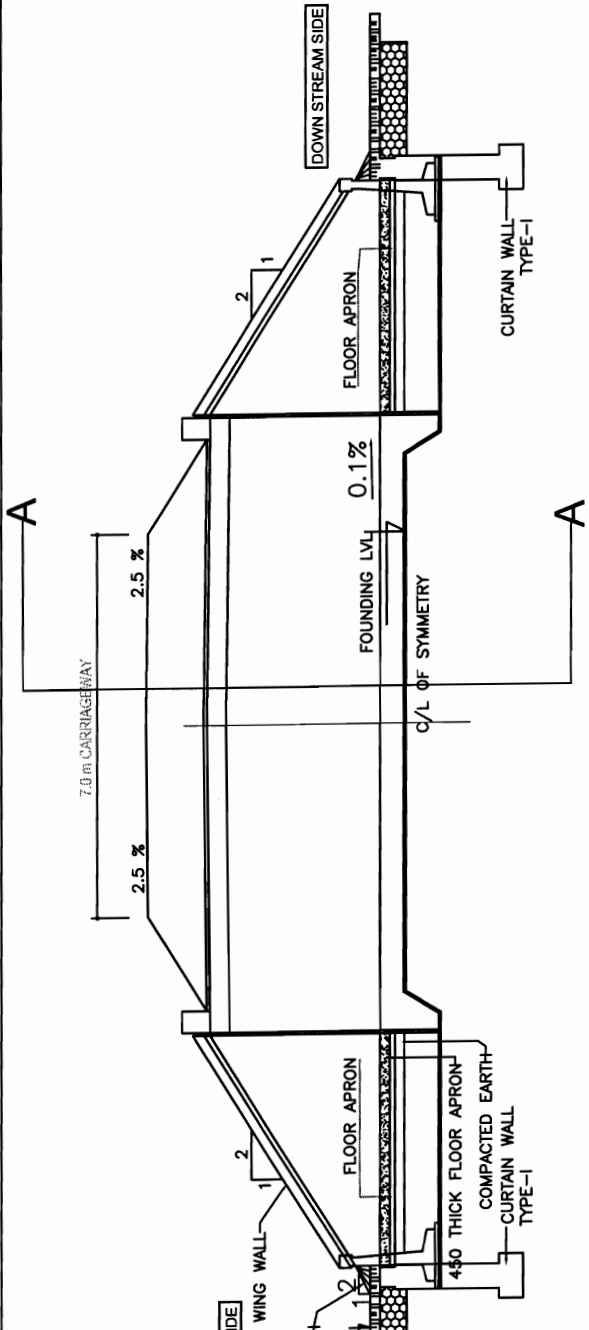
**Chief Engineer**  
**World Bank Projects**  
**Chief Engineer**  
**World Bank Projects**  
**EMPLOYER**

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

**CLIENT :-**  
 WORKS DEPARTMENT  
 GOVT. OF ORISSA

SLOPE PROTECTION MEASURE (>20M CUTTING)		CHECKED (C)	APPROVED (D)
DRG NO.	OSR/ICE/G/S/P/05	DRAWN (B)	
SP. NO.	DATE	REV	R.D.
SCALE			NTS
		K.S.R	R.B.
		R.R.D.K	S.G



SECTION A-A

TYPICAL ANIMAL PASS - SINGLE BOX CULVERT (8.0X4.5)  
(EARTH CUSHION)

DRG NO.	ER/EC/S/IEC/XXVI - A1	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	47	DATE	REV	R0	
SCALE	NTS				B/M
				R.J	R.R.D.K
					S.G

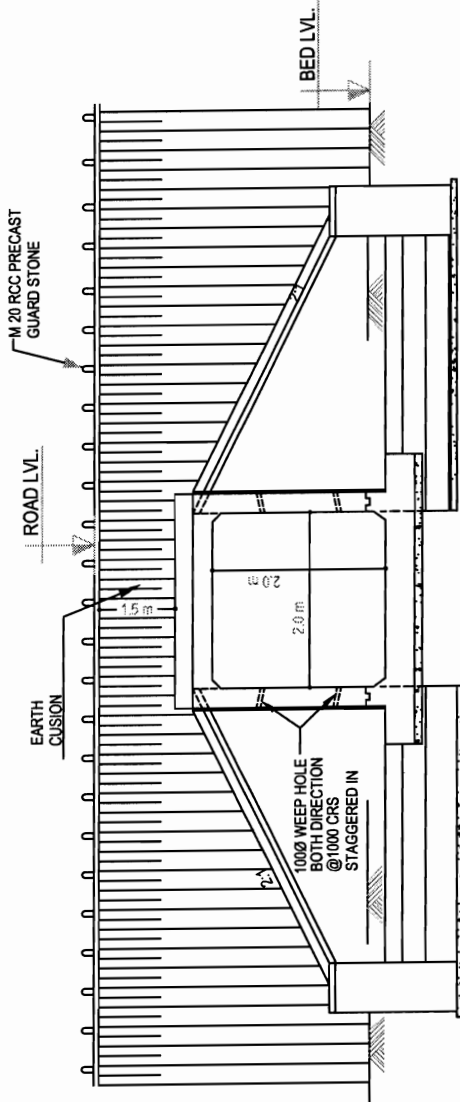
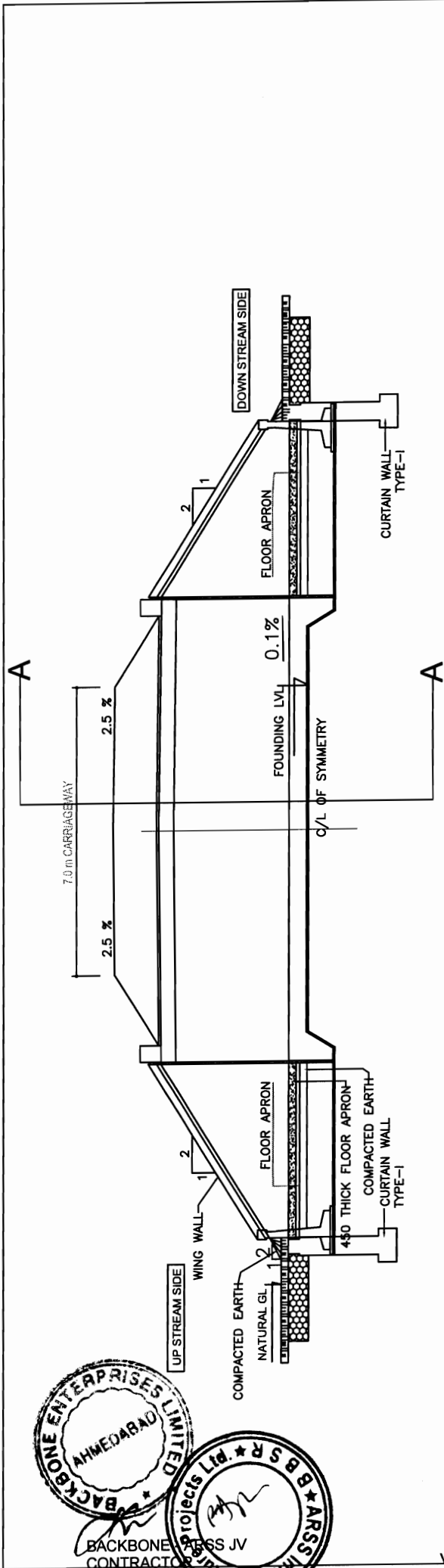
PROJECT:-  
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND  
DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS  
FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK  
ASSISTANCE

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



BACKBONE - ARSS JV  
CONTRACTOR

Chief Engineer  
World Bank Projects  
EMPLOYER  
CEG



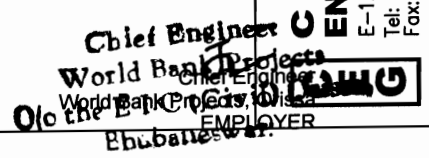
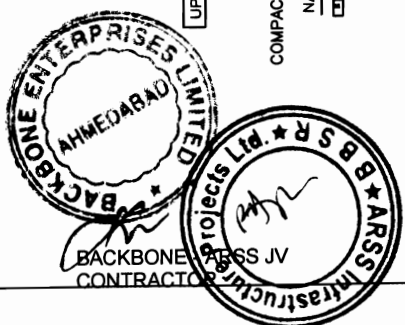
SECTION A-A

TYPICAL ANIMAL PASS - SINGLE BOX CULVERT (2.0X2.0) (EARTH CUSHION)

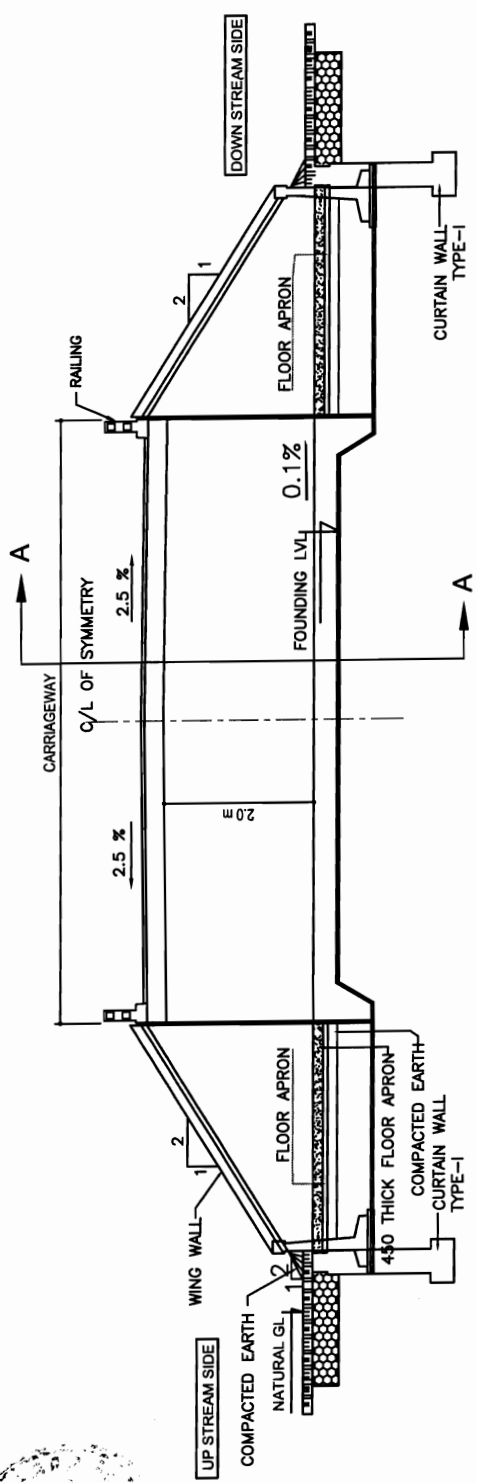
DRG NO.	ER/BC/S/IEC/XXVI - A2	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	48	DATE	REV	R0	
SCALE	NTS				B.M
				R.R.D.K	S.G

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

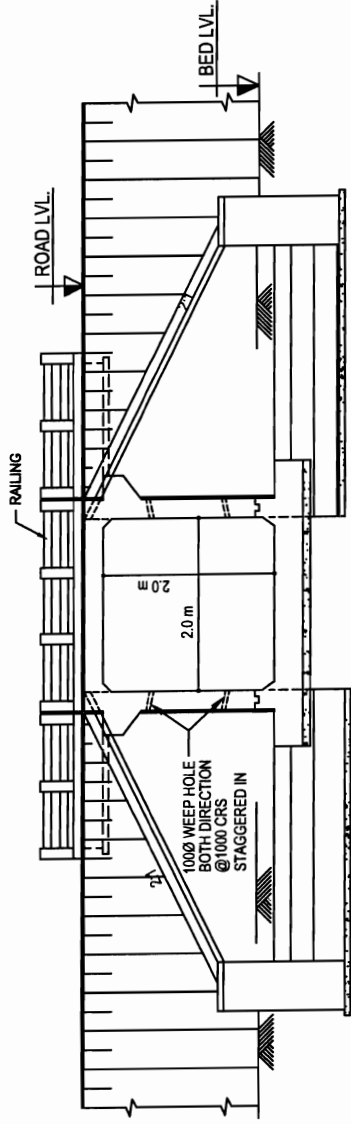
**CONSULTING ENGINEERS GROUP LTD.**  
 E-12, Moji Colony, Matiyva Nagar Jaipur-17  
 Tel: +91-141-2520899, 2521899, 2520556  
 Fax: 2521348, e-mail: ceg@cegindia.com







LONGITUDINAL SECTION



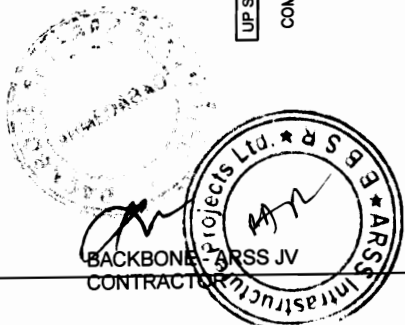
SECTION A-A

DRG NO. ER/BC/BS/WC/XXV - B1		DESIGNED (A)	CHECKED (C)	APPROVED (D)
SH. NO. 49	DATE	REV	R0	
SCALE		B.M		R.R.D.K
		R.J		S.G
NTS				

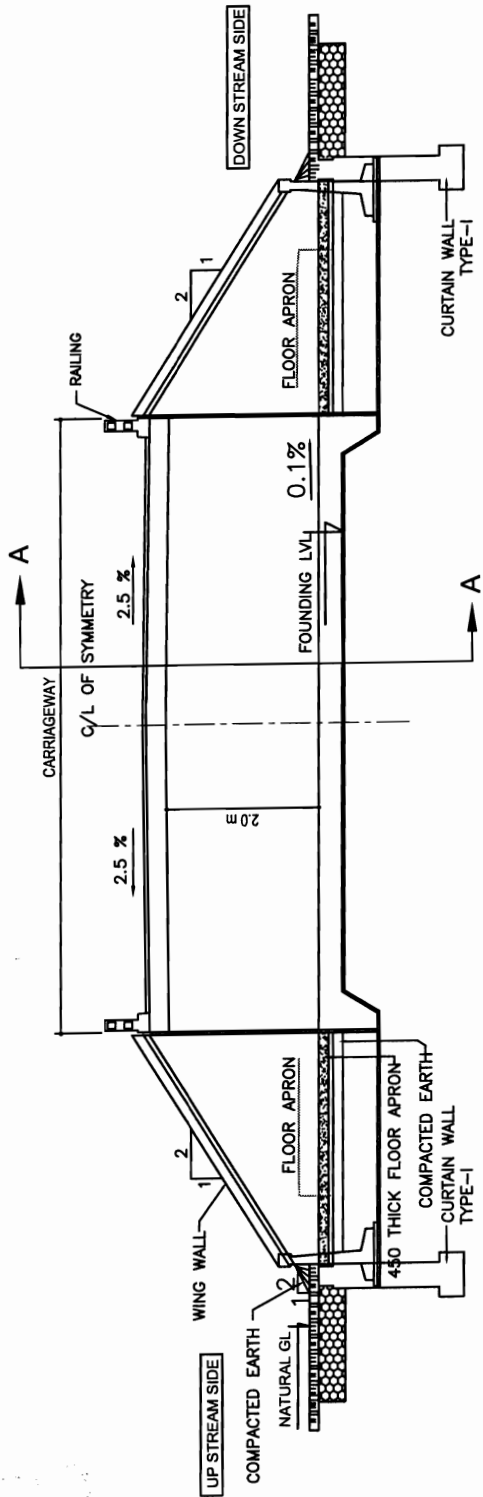
TYPICAL ANIMAL PASS - SINGLE BOX CULVERT (2.0X2.0)

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

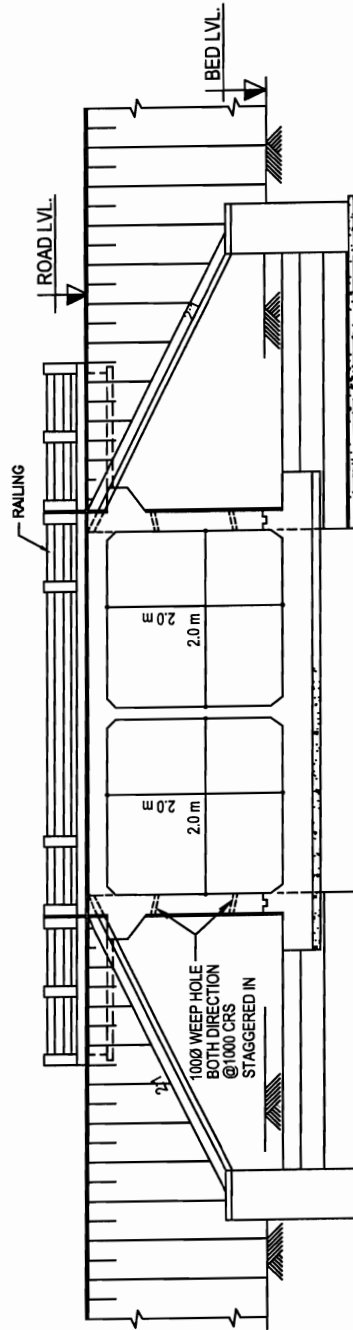
**CONSULTING ENGINEERS GROUP LTD.**  
 E-12, Moji Colony, Malviya Nagar Jaipur-17  
 Tel: +91-141-2520899, 2521899, 2520556  
 Fax: 2521348, e-mail: ceg@cegindia.com



Chief Engineer  
 World Bank Project  
 World Bank Project, District  
 P.O. the P.L. Choudhary, District  
 Employer  
 P.H. Banerjee



LONGITUDINAL SECTION

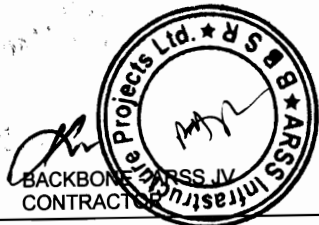


SECTION A-A

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

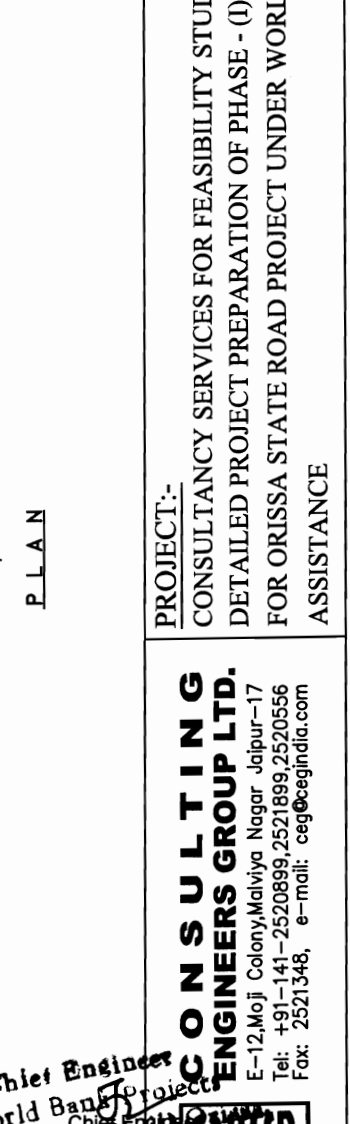
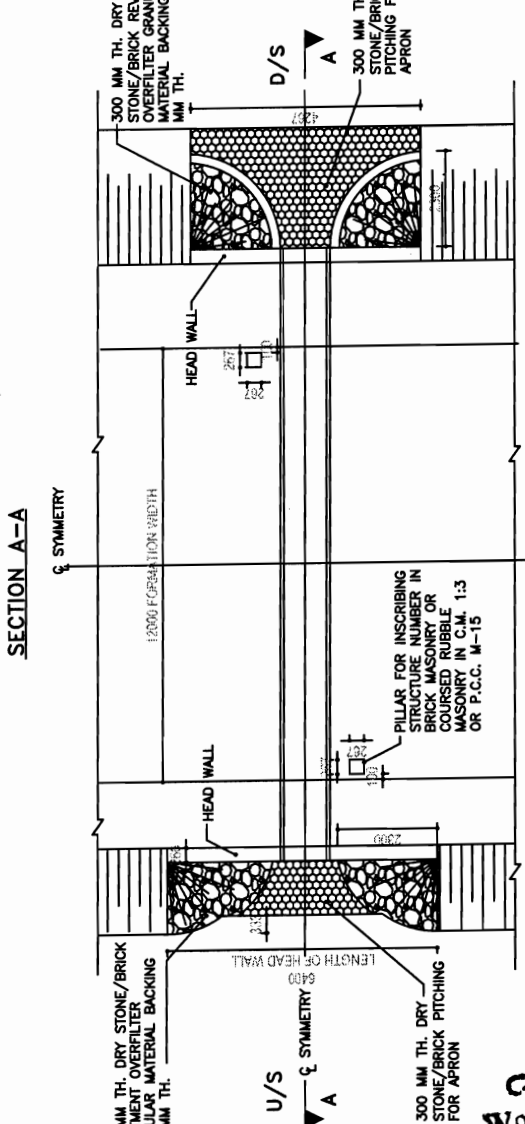
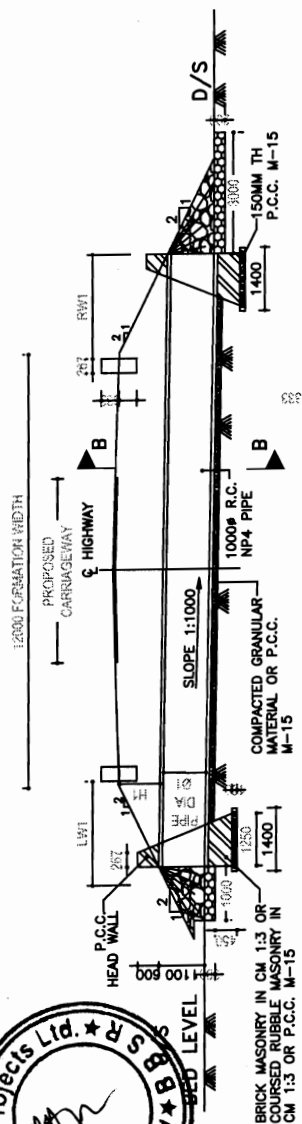
TYPICAL ANIMAL PASS - DOUBLE BOX CULVERT (2.0X2.0)

DRG NO.	ER/BC/ID/WC/XXV - B2	DESIGNED (A)	DESIGNED (B)	CHECKED (C)	APPROVED (D)
SH. NO.	50	DATE	REV	RO	
SCALE	NTS			B.M	R.R.D.K
					S.G



Chief Engineer  
 World Bank Projects  
 Olo the E.P. EMPLOYER  
 Ghuabangwar

**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



PLAN

TYPICAL ANIMAL PASS - SINGLE PIPE CULVERT

DRG NO.	ER/PC/S/BE/EC/XXVI - C1	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	51	DATE	REV	R0	
SCALE	NTS				
			B.M	R.J	R.R.D.K
					S.G

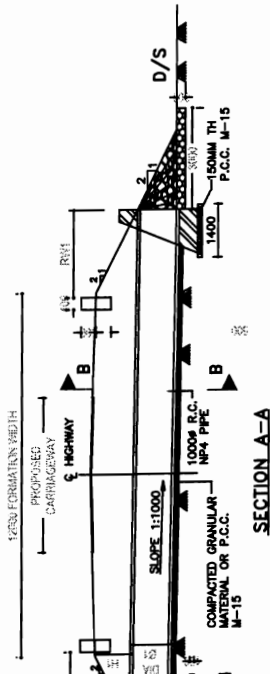
PROJECT:-  
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

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

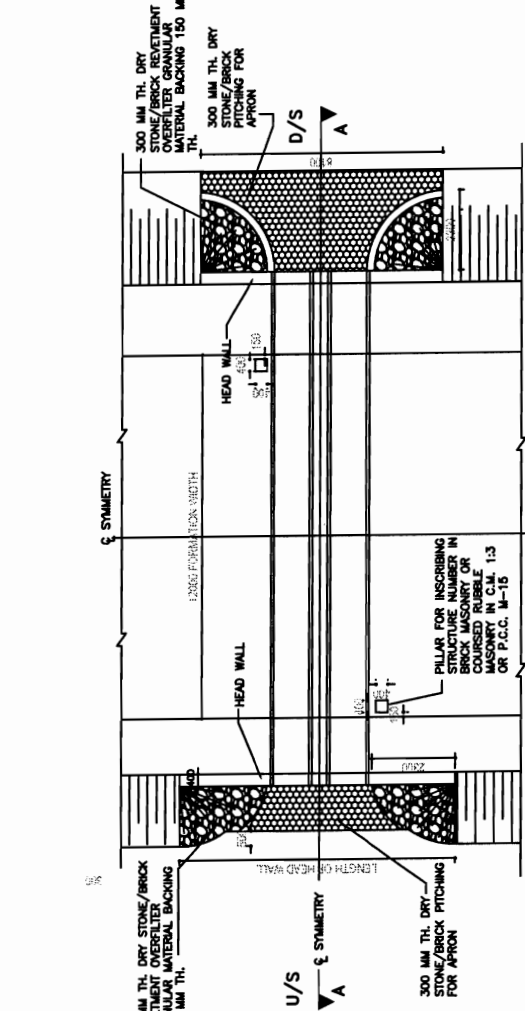
Chief Engineer  
World Bank Projects  
Chief Engineer  
World Bank Projects, Orissa  
Engr. M. S. SINGH



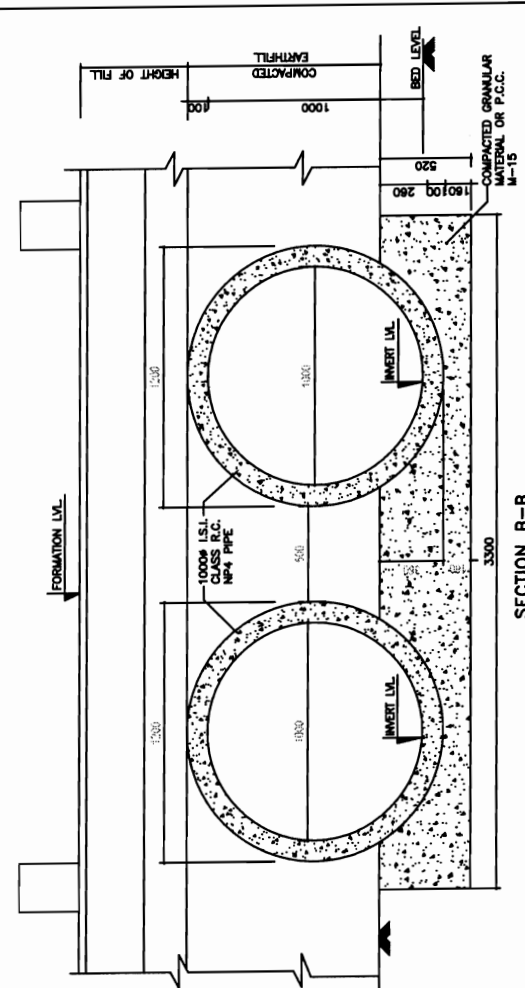
CONTRACTOR



SECTION A-A



PLAN



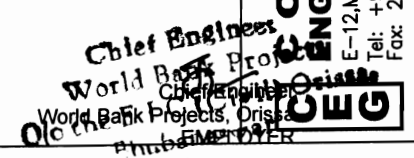
SECTION B-B

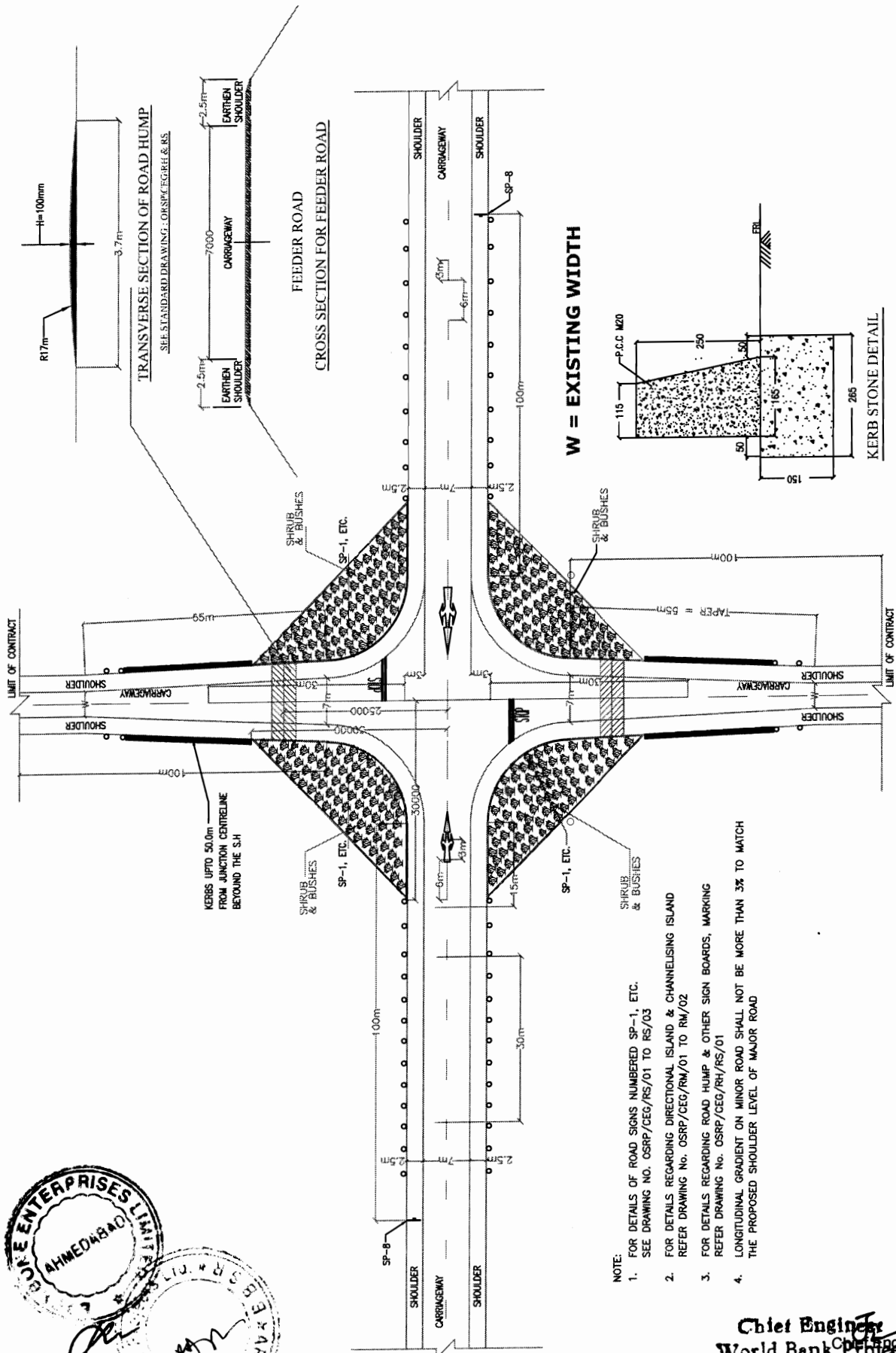
**PROJECT:-**  
 CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND  
 DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS  
 FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK  
 ASSISTANCE

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

**TYPICAL ANIMAL PASS - DOUBLE PIPE CULVERT**

DRG NO.	ER/PC/D/IEC/XXVI - C2		DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
	SH. NO.	52	DATE	REV	RO	
SCALE	NTS			B.M	R.J	R.R.D.K
						S.G





- NOTE:
1. FOR DETAILS OF ROAD SIGNS NUMBERED SP-1, ETC. SEE DRAWING NO. OSRP/CEG/RS/01 TO RS/03 REFER DRAWING NO. OSRP/CEG/RM/01 TO RM/02
  2. FOR DETAILS REGARDING DIRECTIONAL ISLAND & CHANNELISING ISLAND REFER DRAWING NO. OSRP/CEG/RH/RS/01
  3. FOR DETAILS REGARDING ROAD HUMP & OTHER SIGN BOARDS, MARKING REFER DRAWING NO. OSRP/CEG/RH/RS/01
  4. LONGITUDINAL GRADIENT ON MINOR ROAD SHALL NOT BE MORE THAN 3% TO MATCH THE PROPOSED SHOULDER LEVEL OF MAJOR ROAD

**CEG ENGINEERS LTD.**  
**AHMEDABAD**  
 BACKBONE - ARSS JV  
 CONTRACTOR

**Chief Engineer**  
**World Bank Project**  
 Olo the E.I.C (Civil) Division  
 Phubaneswar

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

**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



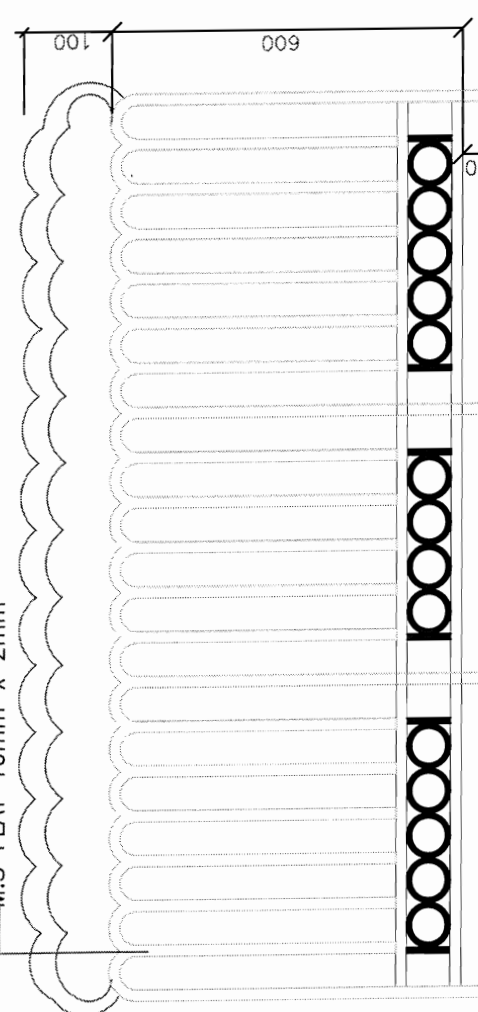
SCALE		NTS		M		JYOTTI		G.P.M		S.G	
DRG NO.	OSRP/CEG/SH/ENV/01-A	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)						
SH. NO.	61	DATE	REV	RO							

**CONCEPTUAL SITE ENHANCEMENT DESIGNS FOR ROAD JUNCTIONS AS ENVIRONMENTAL IMPACT MITIGATION.**



BACKBONE  
CONTRACTOR

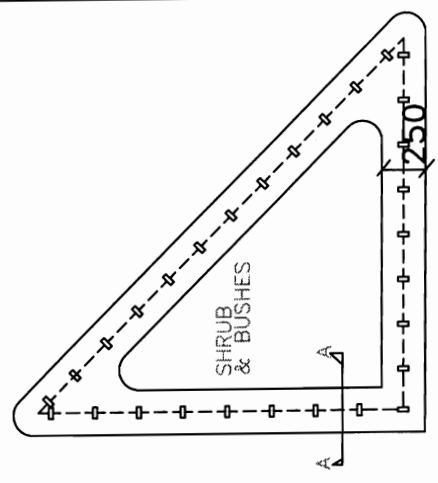
M.S FLAT 10mm x 2mm



FRONT ELEVATION  
MS GRILL FOR JUNCTION

(ALL DIMENSIONS ARE IN mm)

PLAN OF TS LAND AT JUNCTION



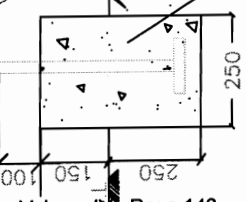
G.L.

G.L.

G.L.

PCC M-20 Grade

SECTION A-A



NOTE : SURFACE TO BE PAINTED WITH APPROVED ACRYLACK PAINT YELLOW & BLACK NOTE : SURFACE TO BE PAINTED WITH APPROVED ACRYLACK PAINT YELLOW & BLACK

CORNERS AS SITE ENHANCEMENT AND PREVENTION OF ENCRCHED COMMERCIAL ACTIVITY  
AND KIOSKS WITHIN 20m ON EITHER SIDE OF FEEDER ROAD & SH JUNCTION.ZEBRA CROSSINGS  
& SPEED ARRESTER RUMBLERS TO BE 10m AND 50m AWAY FROM THE JUNCTION.

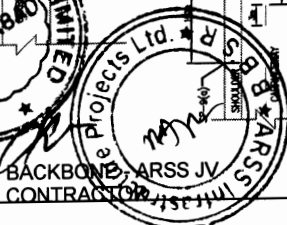
PROJECT:-  
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND  
DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS  
FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK  
ASSISTANCE

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

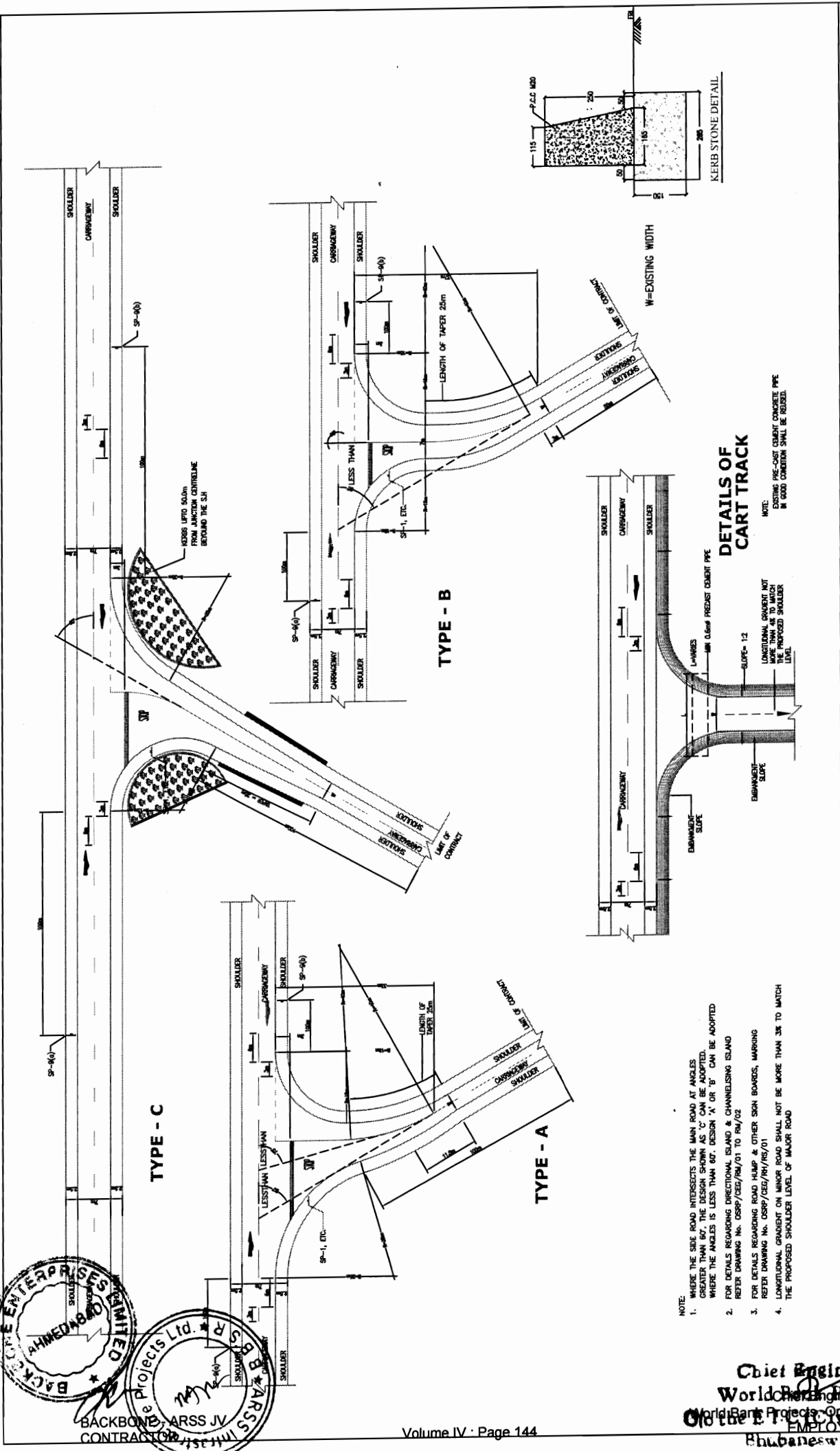
TYPICAL DESIGN OF  
MS GRILL FOR JUNCTION

DRG NO.	OSRP/CEG/SH/ENV/01-B	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	62	DATE	REV	RO	
SCALE	NTS		M	JYOTI	G.P.M S.G

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



BACKBONE ARSS JV  
CONTRACTOR



- NOTE:
- WHERE THE SIDE ROAD INTERSECTS THE MAIN ROAD AT ANGLES GREATER THAN 60°, THE DESIGN SHOWN AS 'C' CAN BE ADOPTED. WHERE THE ANGLES IS LESS THAN 60°, DESIGN 'A' OR 'B' CAN BE ADOPTED
  - FOR DETAILS REGARDING DIRECTIONAL ISLAND & CHANNELISING ISLAND REFER DRAWING NO. CSR/CEG/SH/EN/01 TO 04/02
  - FOR DETAILS REGARDING ROAD HUMP & OTHER SIGN BOARDS, MARKING REFER DRAWING NO. CSR/CEG/SH/RE/01
  - LONGITUDINAL GRADIENT ON MINOR ROAD SHALL NOT BE MORE THAN 3% TO MATCH THE PROPOSED SHOULDER LEVEL OF MAJOR ROAD

**DETAILS OF CART TRACK**

NOTE:  
EXISTING PRE-CAST CONCRETE PIPE IN GOOD CONDITION SHALL BE REUSED.

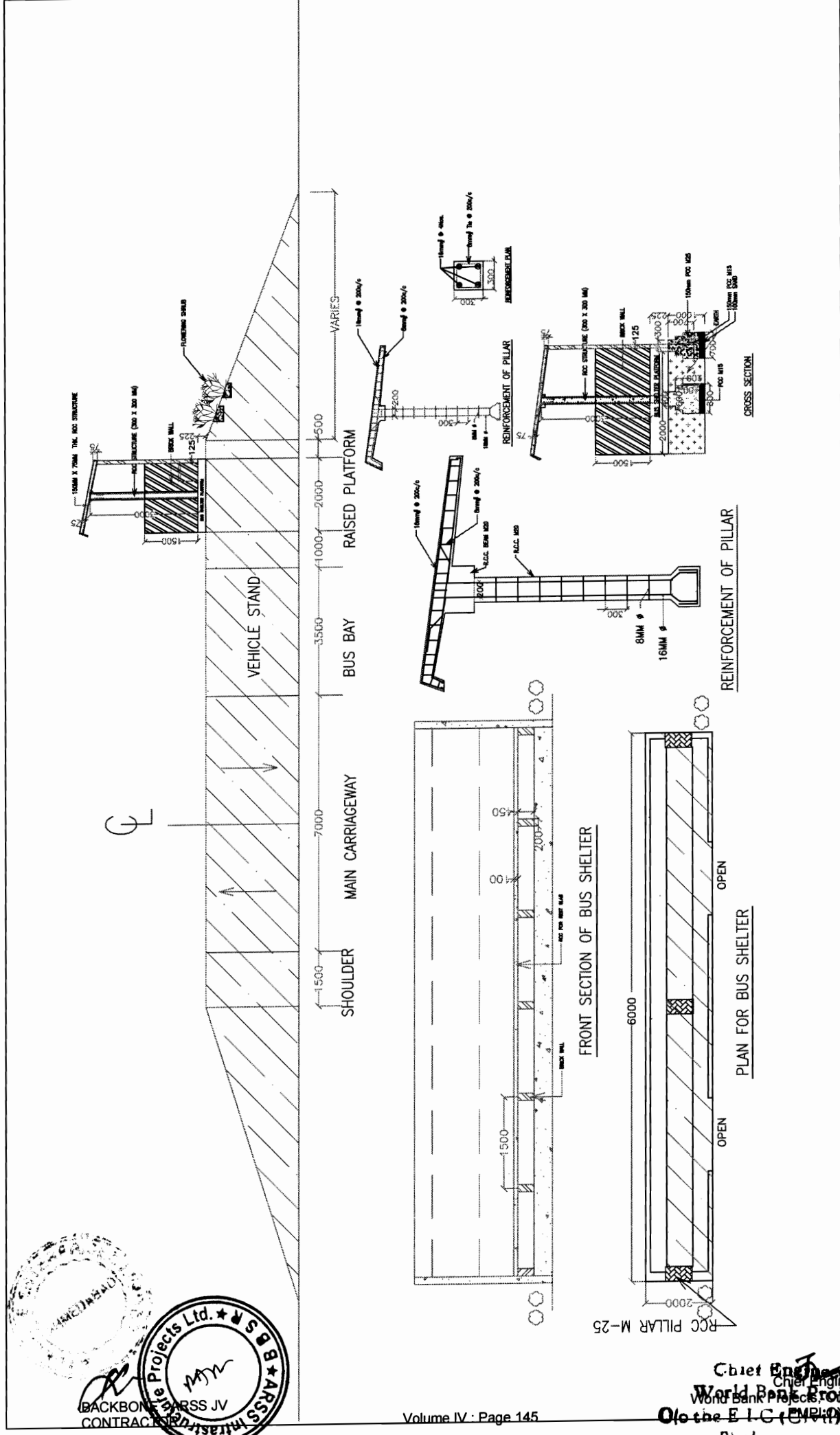
**PROJECT:-**  
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

**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

**CONCEPTUAL SITE ENHANCEMENT DESIGNS FOR ROAD JUNCTIONS AS ENVIRONMENTAL IMPACT MITIGATION.**

DRG NO.	CSR/CEG/SH/EN/01-C	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	63	DATE	REV	RO	
SCALE		NTS		M	JYOTI G.P.M S.G

Chief Engineer  
World Bank Project  
Employer  
Rhubaneswar



**DESIGN OF PASSENGER SHED AT BUS BAY & BUS STOP**

DRG NO.	OSRP/CEG/SH/EN/02	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	64	DATE	REV	RO	
SCALE		NTS			
		M	JYOTI	G.P.M	S.G

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

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

**CEG**

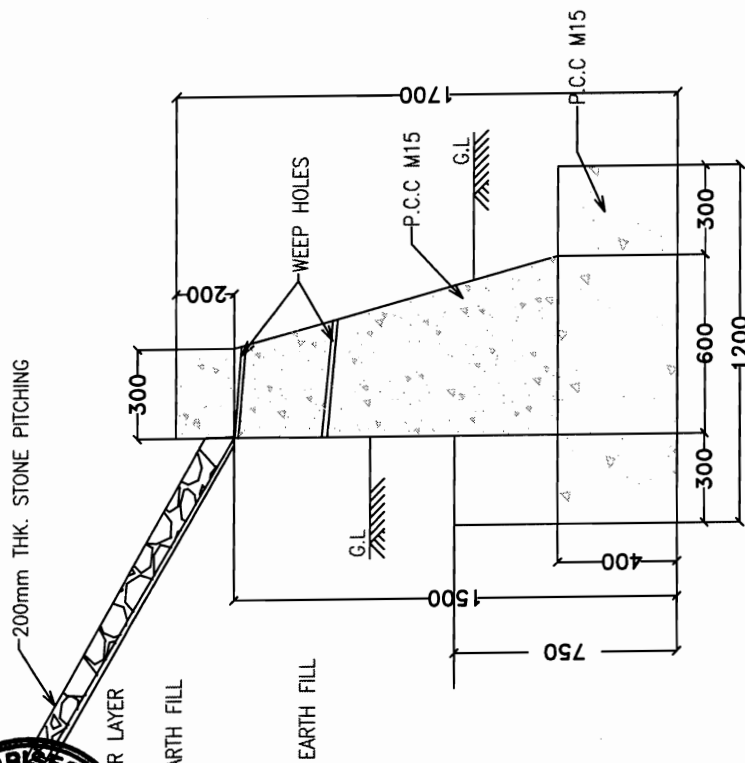
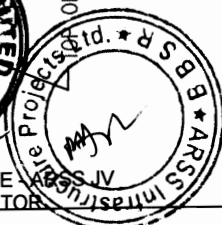
BACKBONE TRUSS JV  
 CONTRACTOR

**BBARS**  
 Projects Ltd.

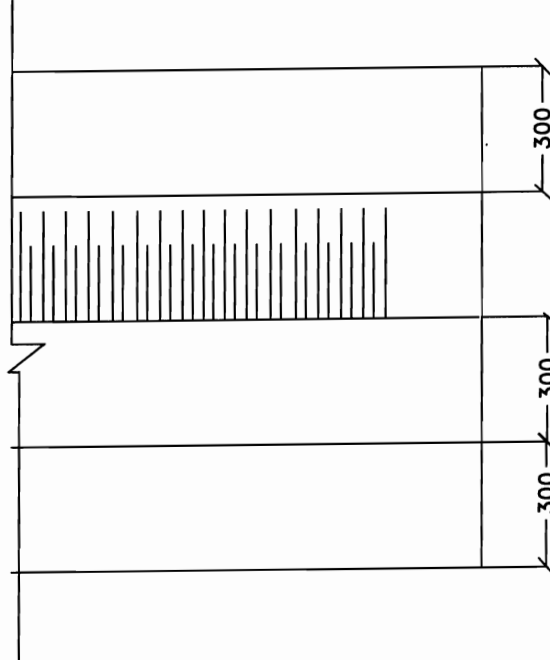




BACKBONE CONTRACTOR



TOE WALL FOR POND  
( CROSS SECTION )



PLAN OF TOE WALL FOR WATER BODY

TO MINIMISE IMPACT ON STORAGE CAPACITY & WATER SPREAD OF PONDS, WATER BODY, NALA BED RETAINING WALLS TO BE ERRECTED SUCH THAT IT PREVENTS ACCIDENTAL FALL INTO THE DEPRESSION AND WASHING OF VEHICLES/BATHING/ WASHING GHAT ON THE ROAD SIDE

PROJECT:-

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

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



Chief Engineer  
World Bank Project - Officer  
EMPLOYER

O/o the E.I.C. (Civil) Office,

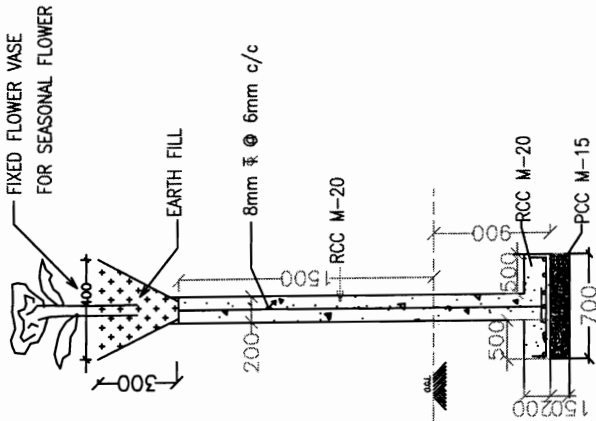
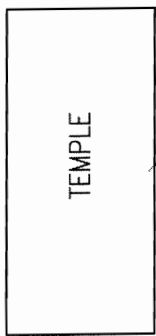
Rhubaneswar:

TYPICAL PCC TOE WALL FOR WATER BODIES AS ENVIRONMENTAL MITIGATION.

DRG NO.	OSRP/CEG/SH/ENV/03	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	65	DATE	REV	RO	
SCALE		NTS		M	JYOTI
					G.P.-M
					S.G



BACKBONE ENTERPRISES LTD.  
CONTRACTOR



RCC RETAINING WALL FOR TEMPLE  
( CROSS SECTION A-A )

STATE HIGHWAY ( PROPOSED ROAD )

CENTER LINE

- ALL RELOCATED TEMPLES TO HAVE ENTRY AND EXIT AWAY FROM ROAD AND ROW
- EVERGREEN SHRUBS & MEDIUM TREES LIKE TAGAR, TARAT, MANDAR, PLUMERIA NICTANTHES, MALLIKA, JASHMINE, KUNDA, KANCHAN, KARABIRA, TULSI, BELA, SHAMI, ASHOK (saraca asoka), KAMINI, NAGESWAR AND CHAMPA [PLANT TO PLANT SPACE 1.5m TO 2.0m DEPENDING ON THE SPECIES]
- FIXED FLOWER VASE ON THE BOUNDARY WALL FOR SEASONAL FLOWER & TULSI.

CONCEPTUAL RCC BOUNDARY WALL OF TEMPLES, STATUES  
RELIGIOUS TREES AS SITE ENHANCEMENT UNDER  
ENVIRONMENT MITIGATION PLAN.

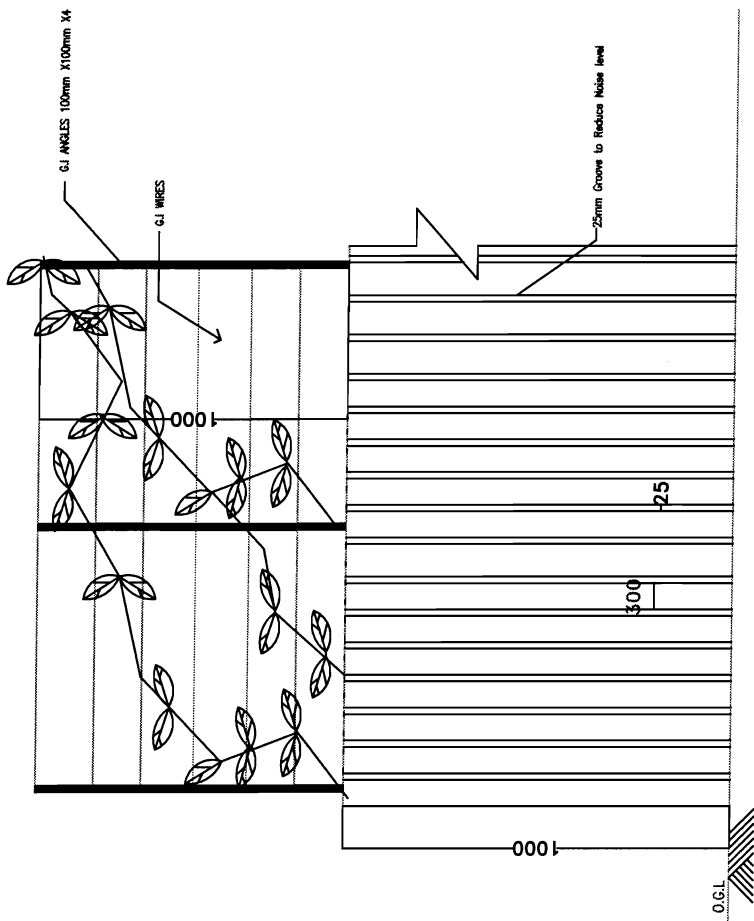
PROJECT:-  
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND  
DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS  
FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK  
ASSISTANCE

**CONSULTING  
ENGINEERS GROUP LTD.**

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

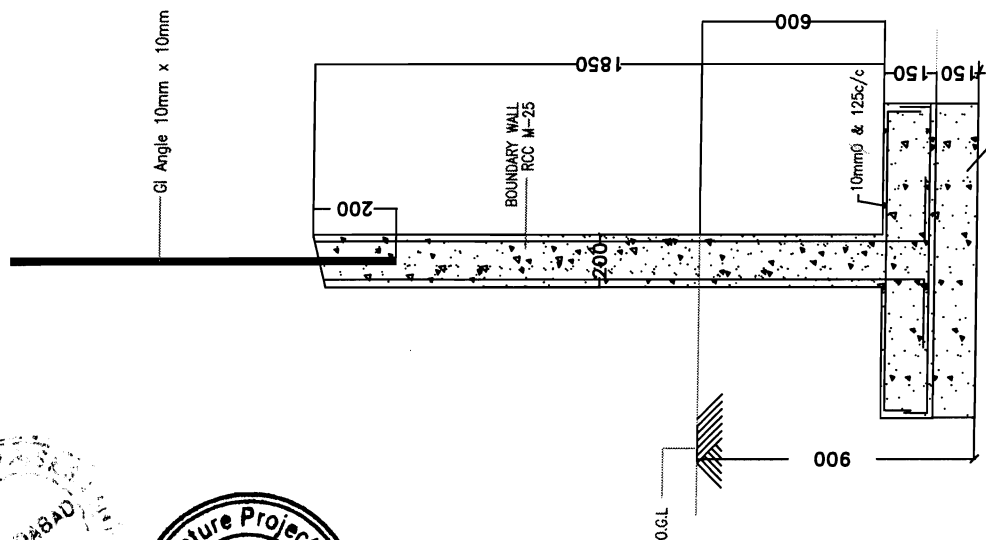


DRG NO.	OSRP/CEG/SH/ENV/04-A	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	66	DATE	REV	RO	
SCALE					
				M	JYOTI
					G.P.M
					S.G



FRONT ELEVATION

RCC BOUNDARY WALL FOR SENSITIVE RECEPTORS WITH NOISE & DUST REDUCTION ARRANGEMENT



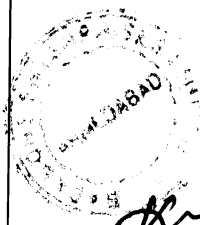
RCC BOUNDARY WALL FOR SCHOOL ( CROSS SECTION )

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

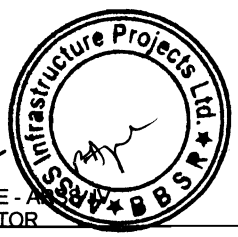
**CONSULTING ENGINEERS GROUP LTD.**  
E-12, Moji Colony, Malviya Nagar Jaipur-17  
Tel: +91-141-2520899, 2521899, 2520556  
Fax: 2521348, e-mail: ceg@cegindia.com

TYPICAL NOISES & DUST BARRIER FOR ENVIRONMENTAL MITIGATION.

DRG. NO.	OSRP/CEG/SH/ENV/04-B	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	67	DATE	REV	RO	
SCALE	NTS				
	M	JYOTI	G.P.M	S.G	

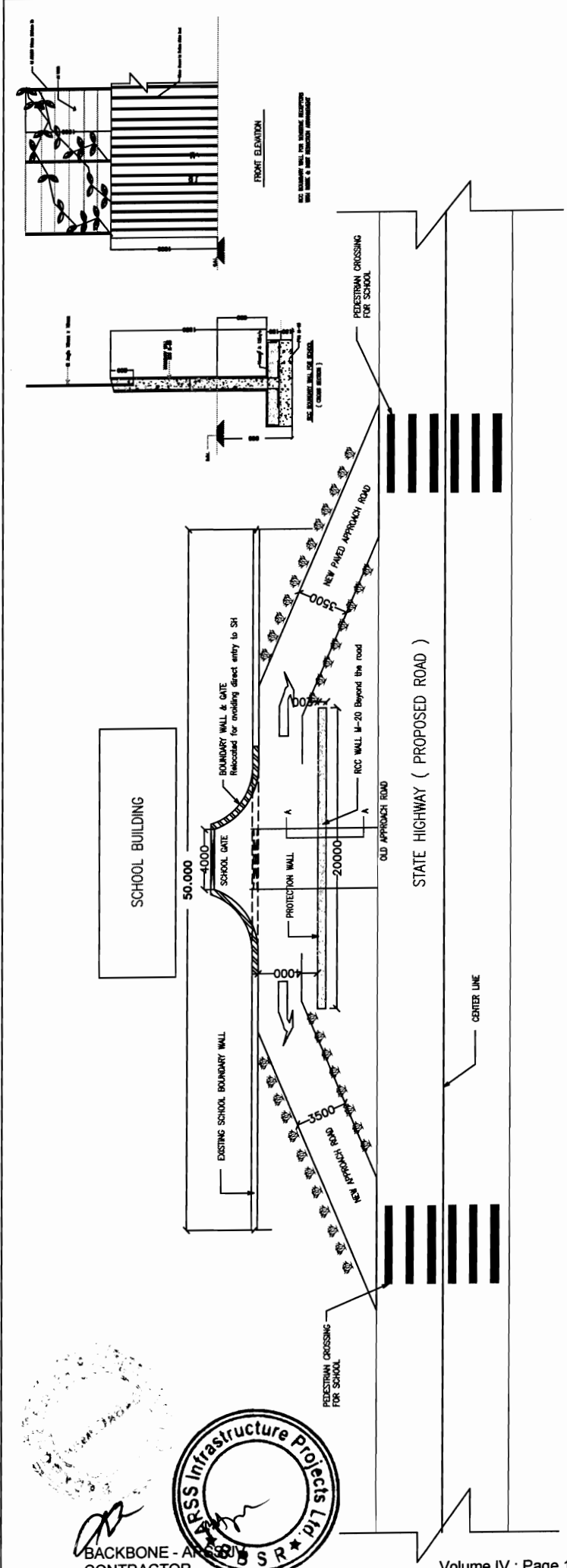


BACKBONE - A CONTRACTOR



Chief Engineer  
World Bank Project  
World Bank Projects Organisation  
EMPLOYER  
Bhubaneswar





- 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

CONCEPTUAL APPROACH DESIGN FOR EDUCATIONAL AND MEDICAL INSTITUTIONAL APPROACHES AS ENVIRONMENTAL MITIGATION PLAN.

DRG NO.	OSRP/CEG/SH/ENV/05	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	68	DATE	REV	RO	
SCALE	NTS		M	JYOTI	G.P.M
					S.G

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

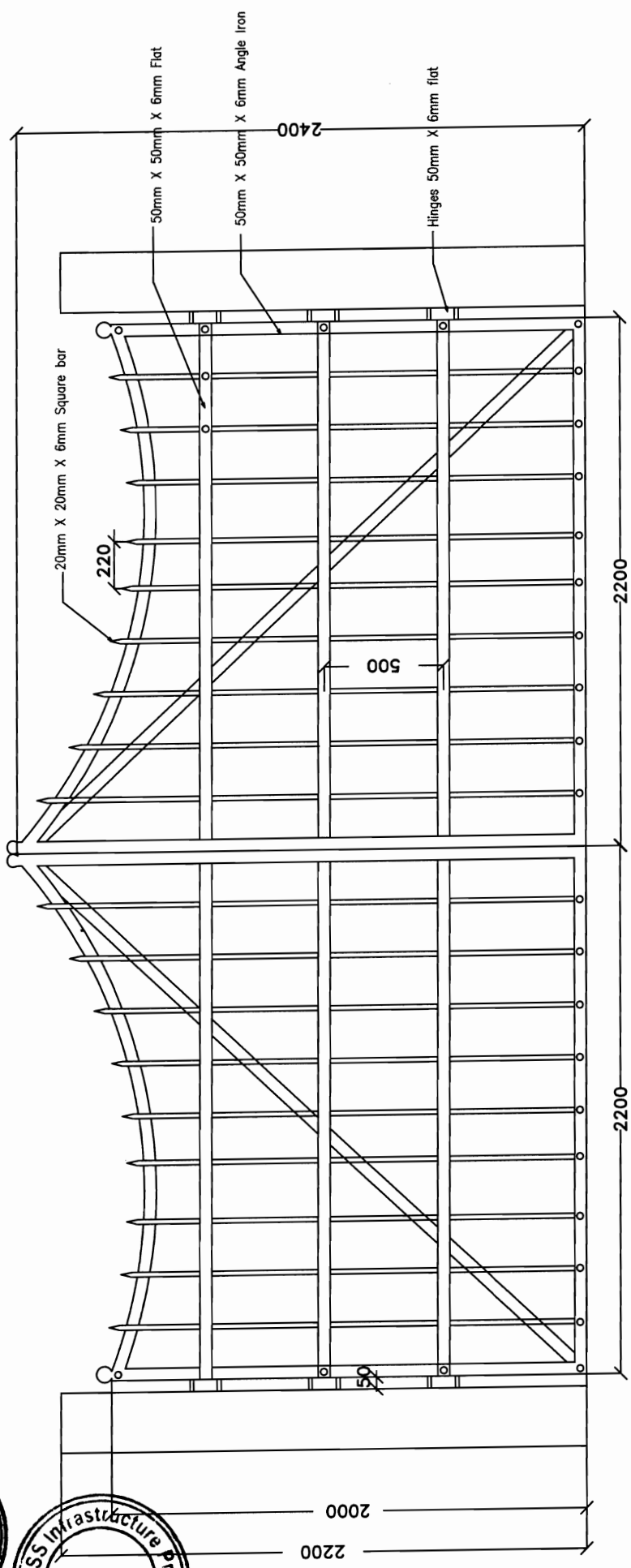
**CONSULTING ENGINEERS GROUP LTD.**  
 E-12, Moji Colony, Malviya Nagar, Jaipur-17  
 Tel: +91-141-2520899, 2521899, 2520556  
 Fax: 2521348, e-mail: ceg@cegroupindia.com

**CEG**

BACKBONE - APPROACH ROAD CONTRACTOR



Chief Engineer  
 World Bank Project, India  
 EMPLOYEE  
 R. Bhambhani



ORNAMENTAL GATE

ORNAMENTAL GATE DESIGN FOR EDUCATIONAL AND MEDICAL INSTITUTIONAL APPROACHES AS ENVIRONMENTAL MITIGATION PLAN.

DRG. NO. CSR/CEG/SH/EN/05 A	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO. 69	DATE	REV	RO	
SCALE	NTS	M	JYOTI	G.P.M
				S.G

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

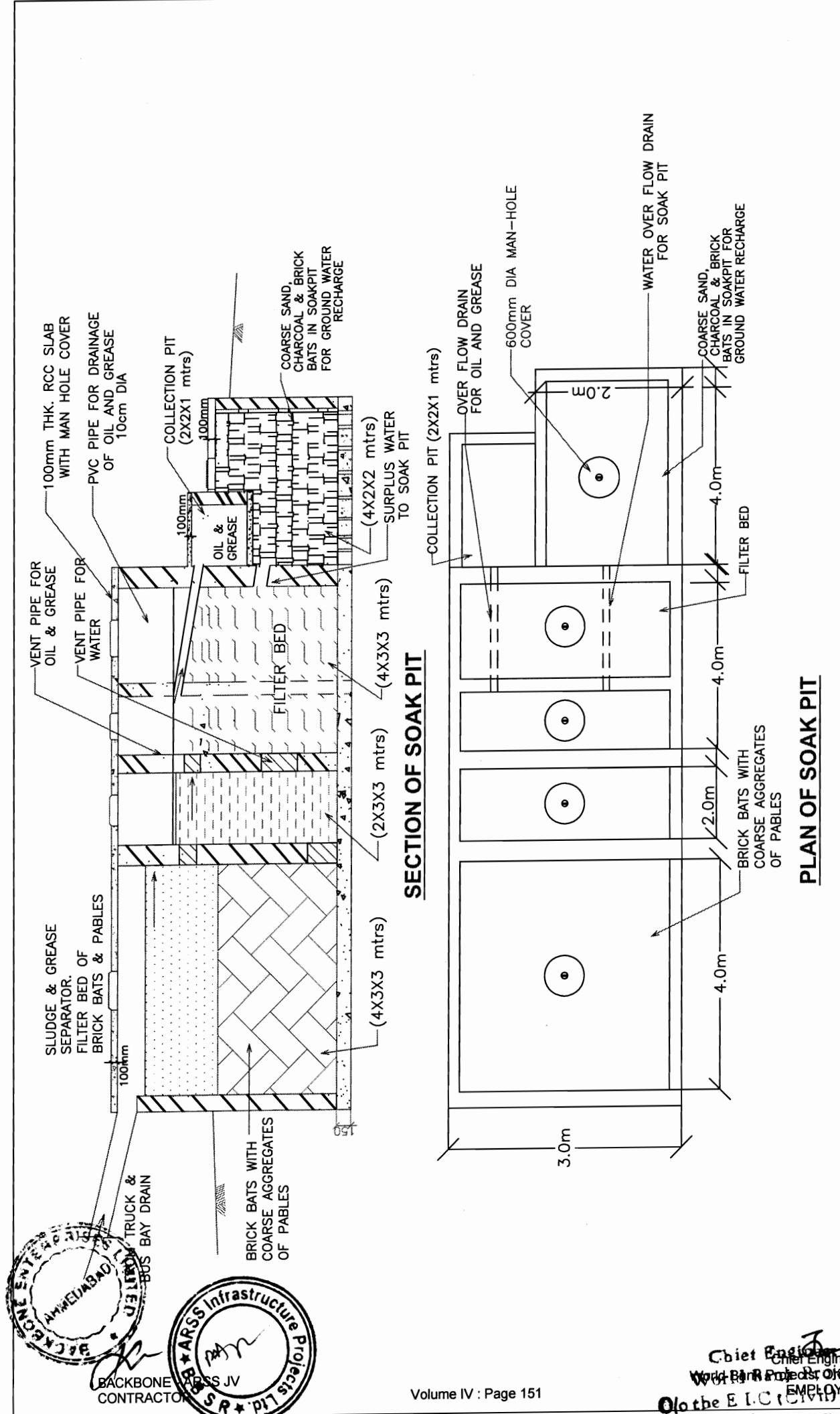
**CONSULTING ENGINEERS GROUP LTD.**  
 E-12, Moji Colony, Malviya Nagar, Jaipur-17  
 Tel: +91-141-2520899, 2521899, 2520556  
 Fax: 2521348, e-mail: ceg@cegindia.com



BACKBONE - CONTRACTOR

Chief Engineer  
 Chief Engineer  
 World Bank Projects, Orissa  
 O/o the E.I.C (CEMP), Cuttack  
 Bhubaneswar.





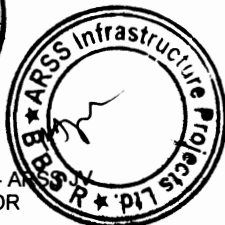
<b>PROJECT:-</b> CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE		<b>CONCEPTUAL DESIGN FOR SEPARATION OF OIL, GREASE          AND SLUDGE OF TRUCK &amp; BUS TERMINALS &amp; BUS BAY</b>	
<b>DRG NO.</b> OSRP/CEG/SH/ENV/06 <b>SH. NO.</b> 70 <b>DATE</b>	<b>DESIGNED (A)</b> <b>DRAWN (B)</b> <b>REV</b>	<b>RO</b> <b>NTS</b>	<b>CHECKED (C)</b> <b>APPROVED (D)</b> <b>G.P.M</b> <b>S.G</b>
<b>CEG ENGINEERS GROUP LTD.</b> E-12, Moji Colony, Malviya Nagar Jaipur-17 Tel: +91-141-2520899, 2521899, 2520556 Fax: 2521348, e-mail: ceg@ceginia.com		<b>CEG</b> Chief Engineer Water & Sewerage Projects EMPLOYER	

BACKBONE CONTRACTOR  
 ARSS JV  
 ARSS Infrastructure Projects  
 SR \* P11

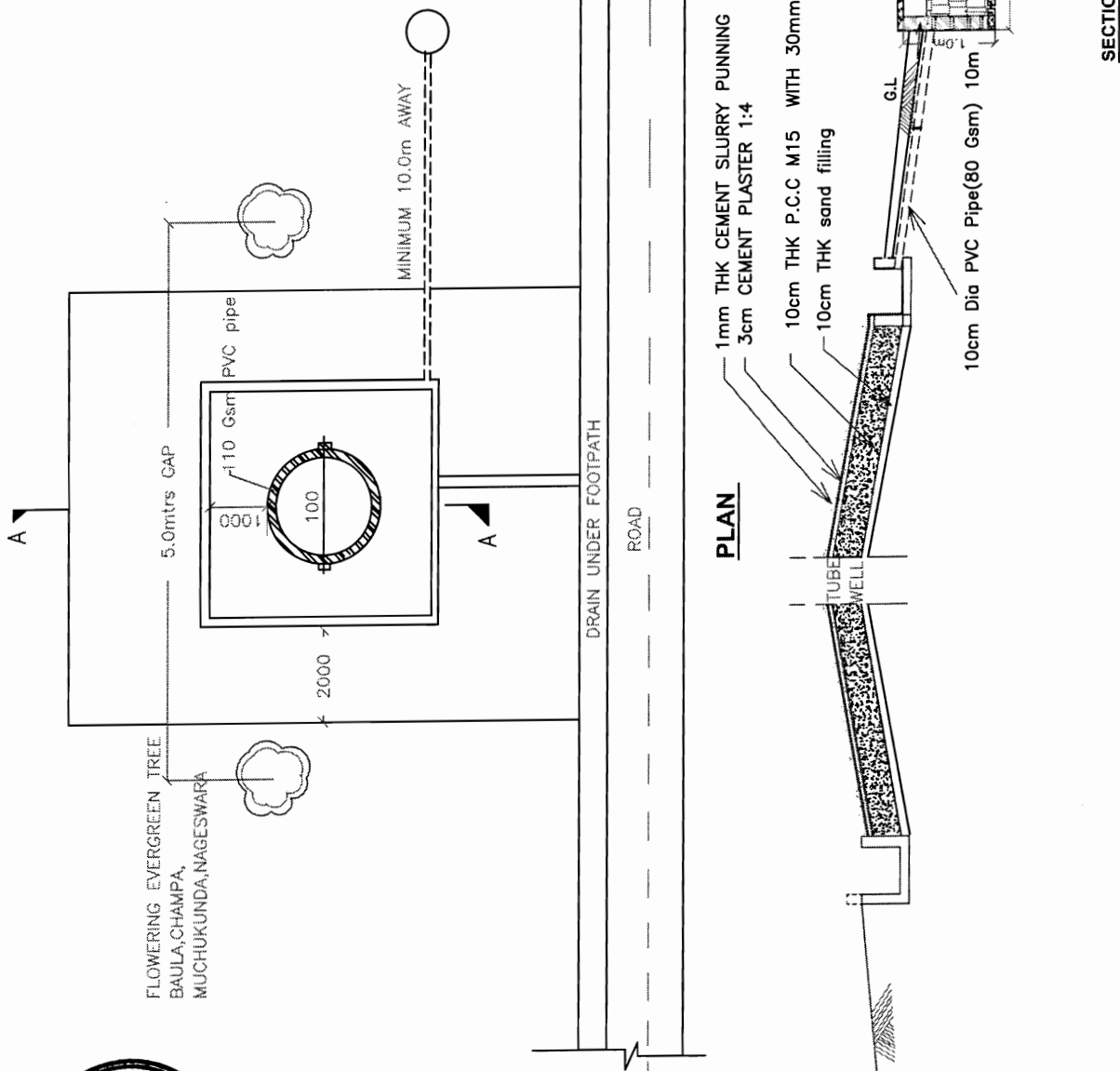
Chief Engineer  
 Water & Sewerage Projects  
 EMPLOYER  
 R. Bhuvaneshwar



BACKBONE - ARCHITECTS & CONTRACTORS



Chief Engineer  
 Chief Engineer  
 World Bank Projects, G.O. Secy  
 EMPLOYER  
 Phubatuwar



SECTION OF SOAK PIT

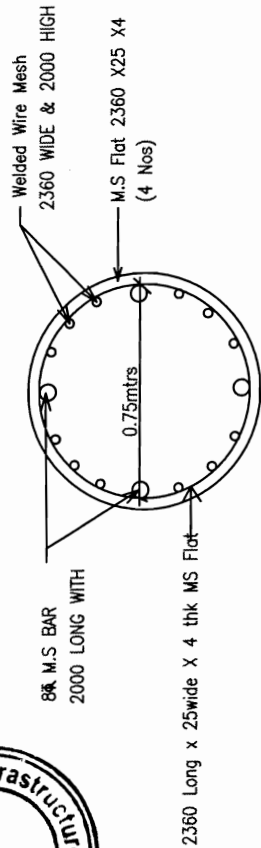
PROJECT:-  
 CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND  
 DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS  
 FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK  
 ASSISTANCE

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

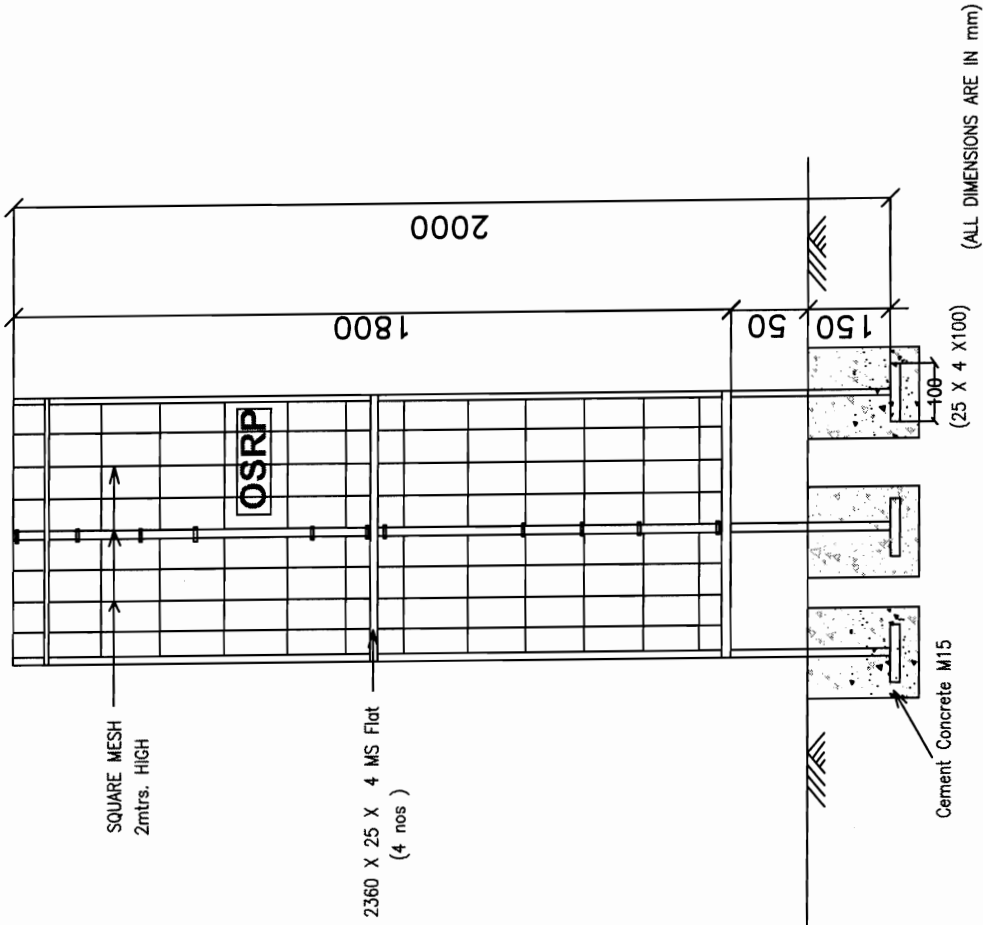
CONCEPTUAL C.C. PLATFORM AND DRAINAGE DESIGN FOR  
 HAND PUMPS AND TAPS.

DRG NO.	OSRP/CEG/SH/ENV/07	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	71	DATE	REV	RO	
SCALE		NTS			
				JYOTI	G.P.M
				M	S.G

# TREE GUARD



# PLAN



# ELEVATION

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

CONCEPTUAL DESIGN FOR TYPICAL TREE GUARD  
WITH M.S BARS.

DRG NO.	OSRP/CEG/SH/EN/08	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	72	DATE	REV	RO	
SCALE	NTS			JYOTI	G.P.M.
				M	S.G

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



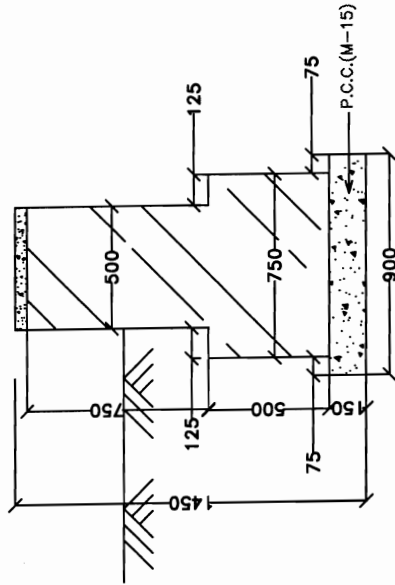
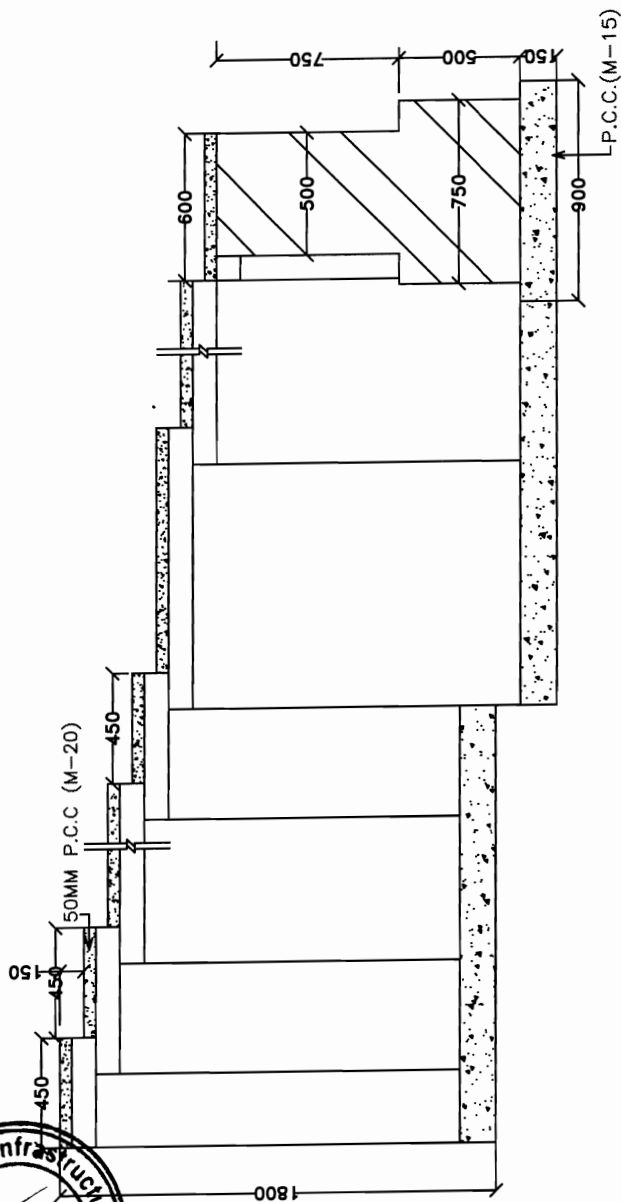
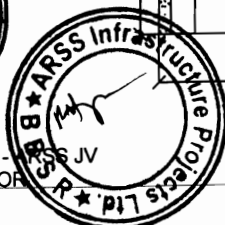
BACKBONE - AIR  
CONTRACTOR

Chief Engineer  
World Bank Project Officer  
EMPLOYER  
O/o the E.I.C. (Civil) Office  
Rhubane-war





BACKBONE -  
CONTRACTOR



SIDE AND  
BOTTOM WALL

Chief Engineer  
World Bank  
of the E.I. EMPLOYER  
Rhubaneswar

**PROJECT:-**

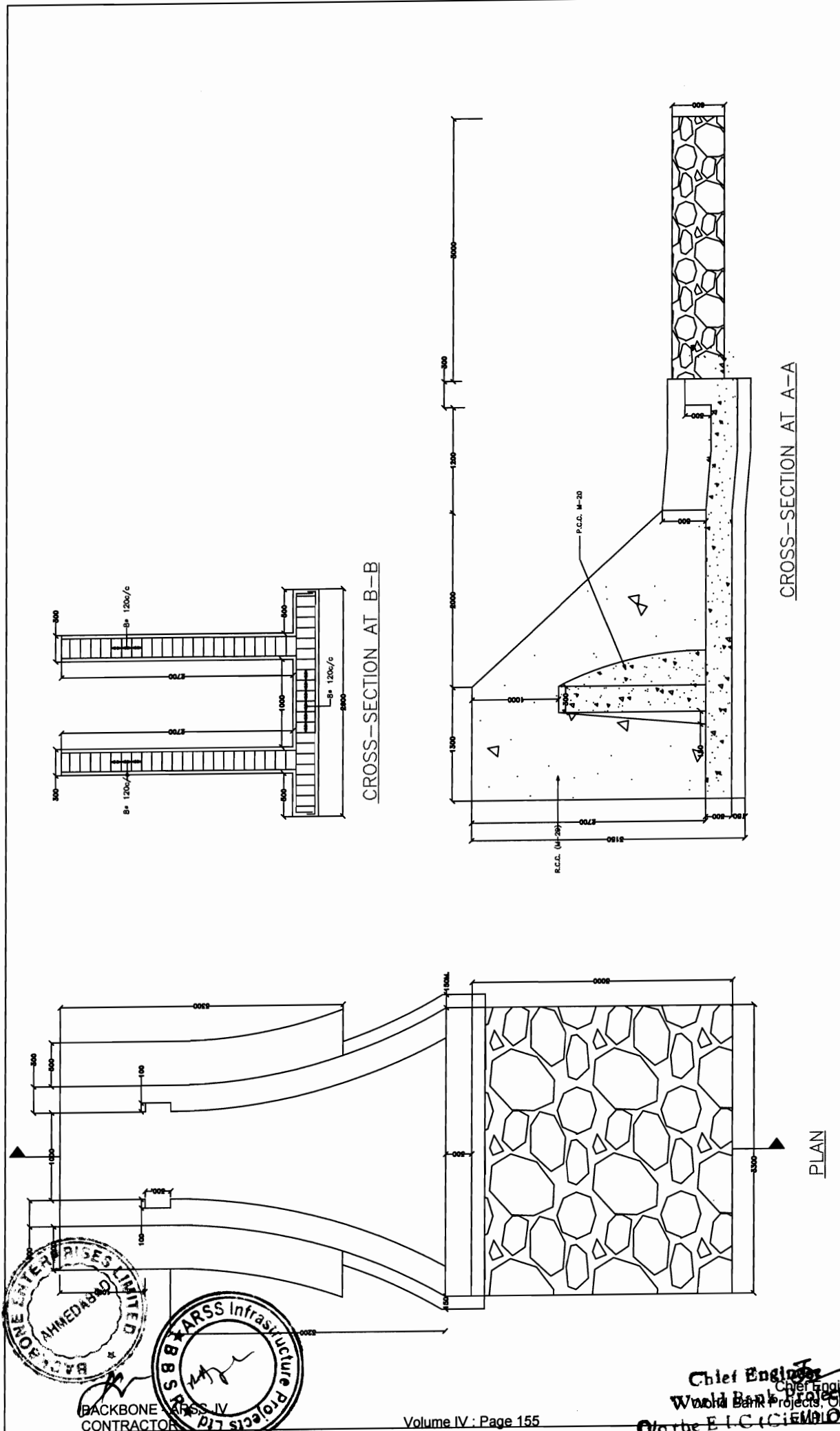
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND  
DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS  
FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK  
ASSISTANCE

**CONSULTING  
ENGINEERS GROUP LTD.**

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

CONCEPTUAL DESIGN FOR BATHING GHAT

DRG. NO.	OSRP/CEG/SH/EN/09	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	73	DATE	REV	RO	
SCALE	NTS		M	JYOTI	G.P.M
					S.G



**CONCEPTUAL DESIGN FOR SPILLWAY GATE**

DRG. NO. OSRP/CEG/SH/ENV/10	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO. 74	DATE	REV	RO	
SCALE			NTS	
		M	JYOTI	G.P.M
				S.G

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

**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

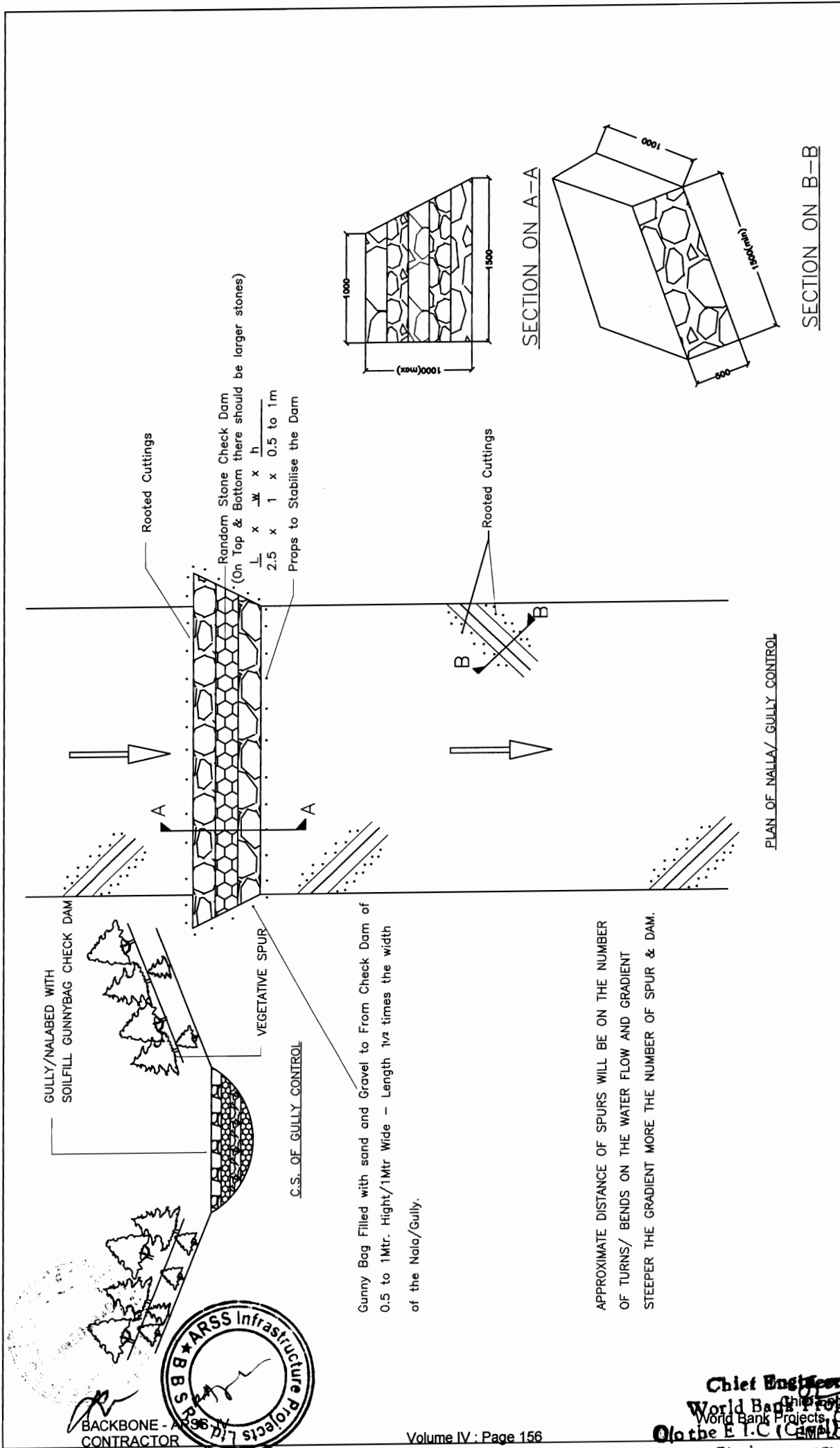
**CEG**

**BACKBONE ENTERPRISES LIMITED**  
 AMMEDABAD

**S B ARSS Infrastructure Projects Ltd**

CONTRACTOR

Chief Engineer  
 World Bank Project  
 to the E.I.C.C. (EM) Office  
 Jaipur



PLAN OF NALLA/ GULLY CONTROL

SECTION ON B-B

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

**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

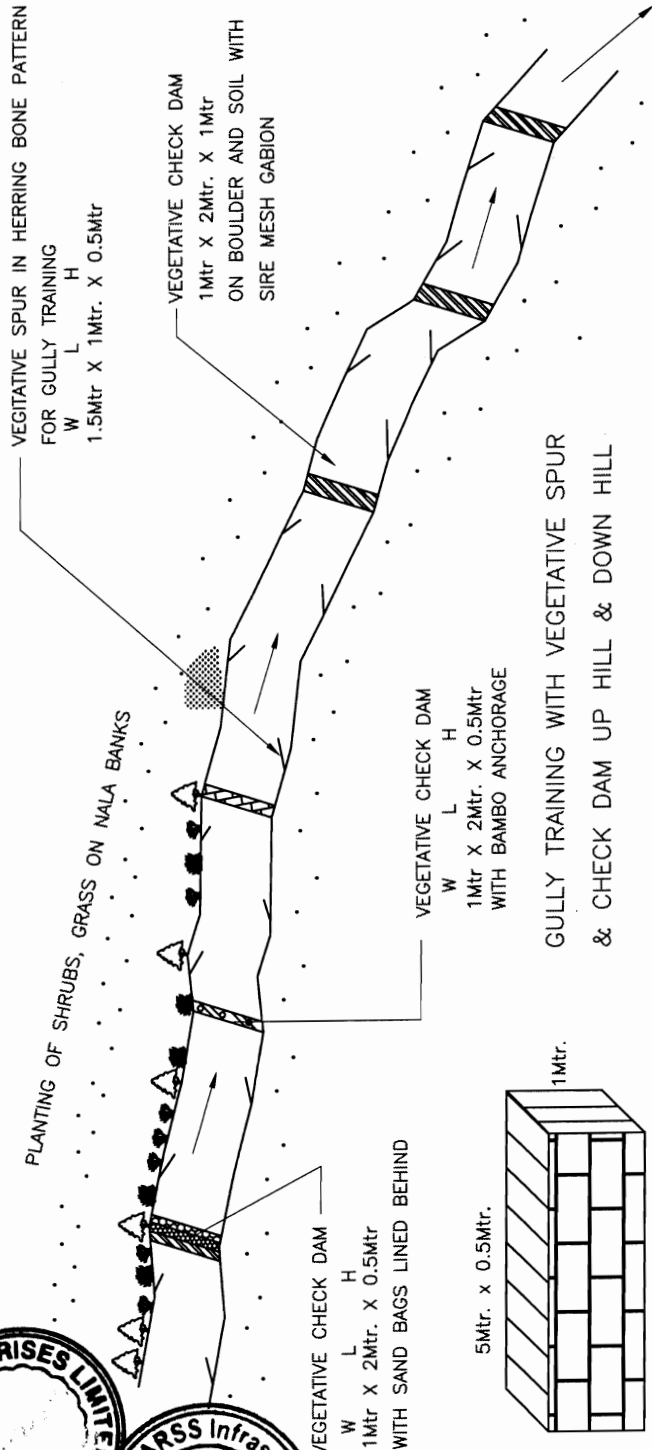
**SOIL AND WATER CONSERVATION MEASURES  
 (GULLY PLUGGING AND CHECK DAMING)**

DRG NO.	OSRP/CEG/SH/EN/11 A	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	75	DATE	REV	RO	
SCALE	NTS				M
				JYOTI	G.P.M
					S.G

BACKBONE - A  
 CONTRACTOR

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

# EROSION CONTROL AND HABITAT DEVELOPMENT MEASURES



MAXIMUM HIGHT OF THE SPUR SHOULD NOT BE EXCEEDING LENGTH 1.5Mtr. WIDTH 1Mtr. HEIGHT 0.5Mtrs

THE TREES/ GRASSES/ SHRUBS/HERBS (ROOTED CUTTINGS) TOBE PLANNED AT 1 Mtr. INTERIOR LENGTH AS PER LOCAL CONDITION.

AROUND 5 nala on Bramhapur Bangi Jn. to be Gully Plugged and Check dams done.

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

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 Tel: +91-141-2520899, 2521899, 2520556  
 Fax: 2521348, e-mail: ceg@cegindia.com

**SOIL AND WATER CONSERVATION MEASURES (GULLY PLUGGING AND CHECK DAMING)**

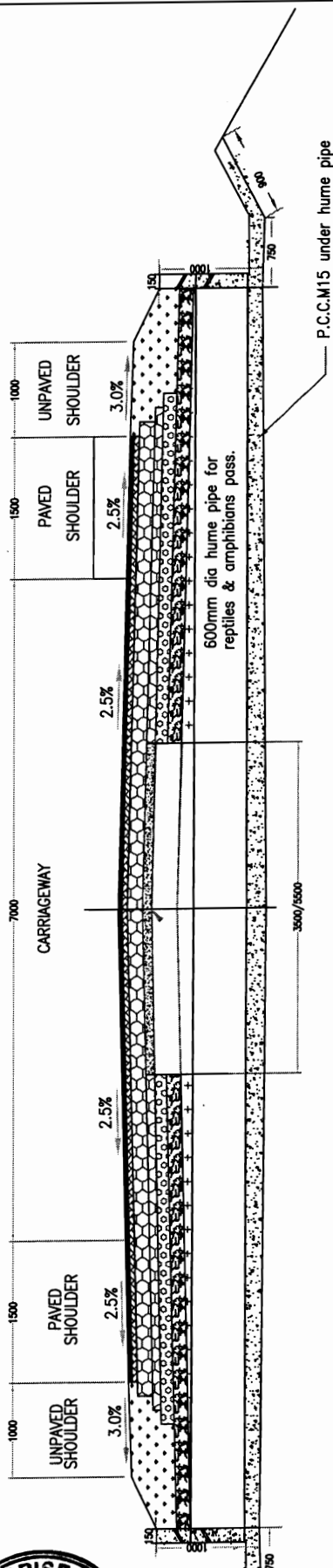
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SH. NO.	76	DATE	REV	RO	NTS
SCALE				M	JYOTI
				G.P.M	S.G

BACKBONE - ROADS  
 CONTRACTOR

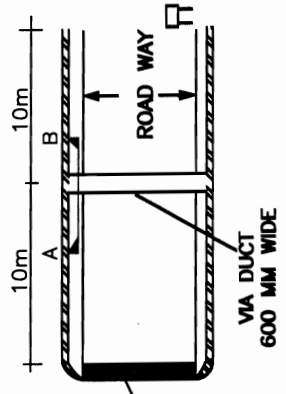
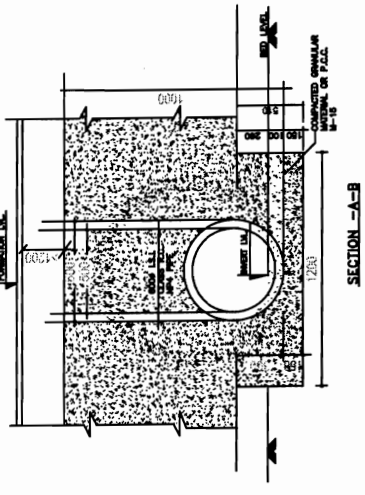
Chief Engineer  
 Chief Engineer  
 World Bank Projects, Orissa  
 O/o the E.L.C.R.M.P. Office  
 Bhubaneswar



BACKBONE Enterprises Limited  
CONTRACTOR



CROSS SECTION OF REPTILES & AMPHIBIANS UNDERPASS WITH TRAP DRAINS AT WET LANDS



PLAN OF REPTILES & AMPHIBIANS UNDERPASS WITH TRAP DRAINS

**PROJECT:-**  
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND  
DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS  
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ASSISTANCE

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Tel: +91-141-2520899, 2521899, 2520556  
Fax: 2521348, e-mail: ceg@ceginodia.com

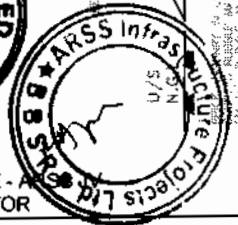


DRG. NO. OSRP/CEG/SH/EN/12	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO. 77	DATE	REV	RO	
SCALE	NTS		M	JYOTI
			G.P.M	S.G

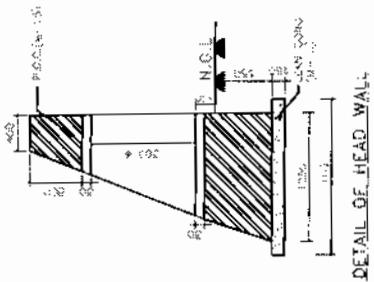
Chief Engineer  
World Bank Projects  
EMPLOYER  
O/o the E.T.C. (Civil) Office  
Phubaneswar



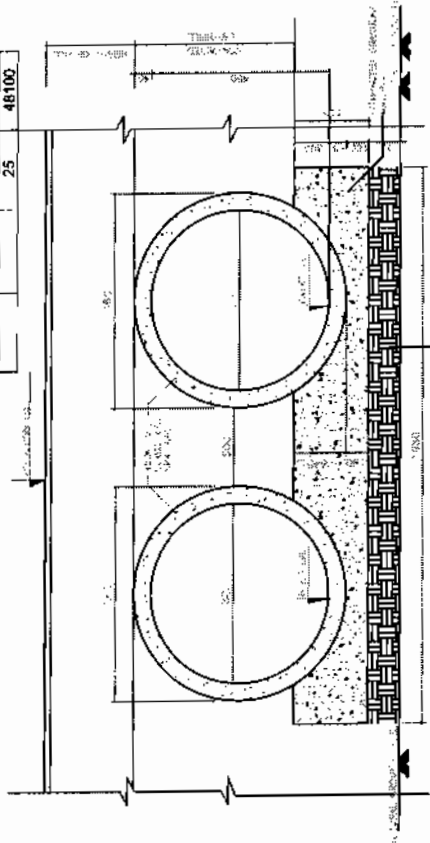
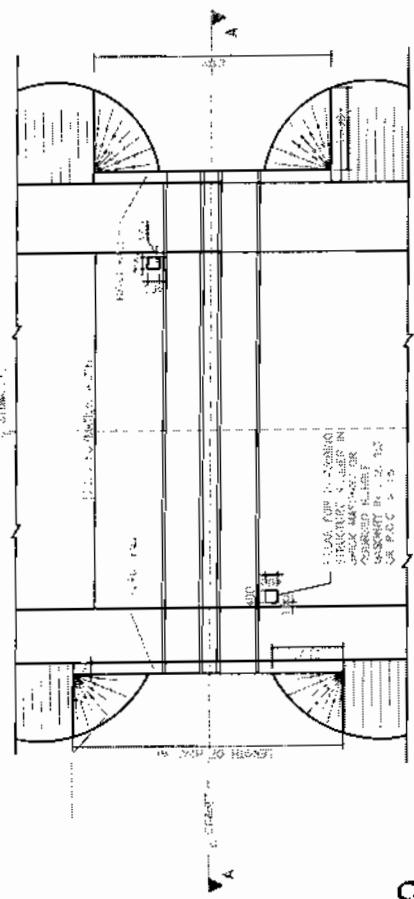
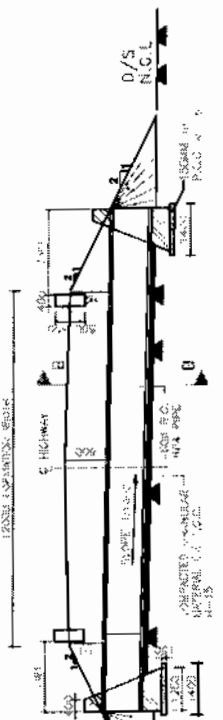
BACKBONE - A CONTRACTOR



- NOTES:**
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
  2. SOILS OF THIS AREA ARE CLASSIFIED AS 'C' - CLAYEY SANDS.
  3. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.
  4. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.
  5. THE PROPOSED ROAD LEVEL SHALL BE 10% ABOVE THE FINISHED GROUND LEVEL.
  6. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.



SL.No.	Chainage	SL.No.	Chainage
1	1740	13	30980
2	4260	14	32720
3	7300	15	33150
4	8880	16	33620
5	11950	17	35050
6	13240	18	36820
7	16600	19	40160
8	20810	20	40360
9	23920	21	44590
10	25430	22	45570
11	26200	23	46700
12	27000	24	47120
		25	48100



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

**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

TYPICAL ARRANGEMENT FOR  
 UTILITY DUCT

DRG. NO.	OSRP/CEG/SH/UD/01	DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	83	DATE	REV	RO	
SCALE		NTS		M	JYOTI
					G.P.M
					S.G

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

GOVERNMENT OF ORISSA  
WORKS DEPARTMENT

# ORISSA STATE ROAD PROJECT

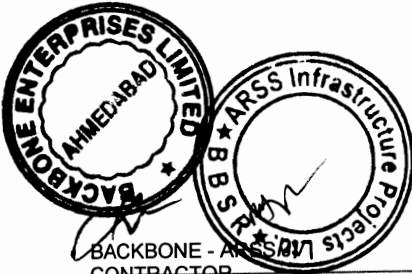
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT  
PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT  
UNDER WORLD BANK ASSISTANCE

FINAL DETAIL ENGINEERING REPORT FOR PHASE - I ROADS  
( BERHAMPUR TO BANGI JUNCTION, SH-17 )  
( 0 TO 41 KM )

DRAWING OF BRIDGES & CULVERTS

MARCH 2007

**CEG**  
**CONSULTING**  
**Engineers Group Ltd.**  
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BACKBONE - AN  
CONTRACTOR

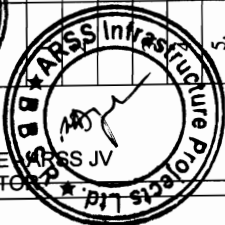
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BACKBONE ENTERPRISES JV  
CONTRACTOR



Chief Engineer  
World Bank Projects, Orissa  
World Bank Projects





1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE MENTIONED. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED. NO DRAWING SHALL BE SCALED.

2. DESIGN CRITERIA:

3. DESIGN IS ACCORDING TO FOLLOWING CODES:

IS : 5-1988

IS : 6-2000

IS : 21-2000

IS : 78-2000

4. FOLLOWING LOADS HAVE BEEN CONSIDERED IN THE DESIGN:

(a) TRACKED & ONE LANE OF CLASS A

(b) WHEELED & ONE LANE OF CLASS A

(c) THREE LANE OF CLASS A

(d) WHEEL LOAD OF 2.20 KV/SQ. M.

(e) WIND LOAD VARIATION = ±25%

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

6. WEARING COAT SHALL CONSIST OF THE FOLLOWING

1a. A COAT OF MASTIC ASPHALT 12mm THICK, WITH A PRIME COAT OVER THE TOP OF DECK IS TO BE PROVIDED BEFORE THE WEARING COAT IS LAID.

1b. 53mm THICK ASPHALT CONCRETE WEARING COAT AS PER CLAUSE 512 OF MOST'S SPECIFICATIONS FOR ROADS AND BRIDGE WORKS (THIRD REV -1995).

5. WEARING COAT SHALL BE DISCONTINUED AT EXPANSION JOINT LOCATION. JOINT FILLERS SHALL EXTEND UP TO THE TOP OF WEARING COAT.

6. WIDTH OF EXPANSION JOINT HAS BEEN KEPT 20 MM ONLY WHICH DOES NOT CATER FOR ANY ALLOWANCE FOR POSSIBLE TITLING OF ABOUTMENT.

7. SUPPORT FOR THE DEC SLAB SHALL PROVIDE A BEARING WIDTH OF 400 MM MEASURED IN A DIRECTION PERPENDICULAR TO SUPPORT.

8. 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 CONFIRM TO CL 302.3 OF IRC:21-2000

**REINFORCEMENT**

1. ALL REINFORCEMENT SHALL BE HIGH YIELD STRENGTH DEFORMED BARS (GRADE DESIGNATION S 415) CONFORMING TO IS:1786 CONFIGURATION IS SHOWN AS :

TOR BAR  
#10 @200C/C

DIA OF BAR } SPACING OF BARS

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

**EARTH FILL/EMBANKMENT**

1. BACK FILLING MATERIAL SHOULD CONFIRM TO CL 305.2 OF MoRT&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.

**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:**

I THE LOCATION PROVISION OF CONSTRUCTION JOINTS SHALL BE APPROVED BY ENGINEER-IN-CHARGE. THE CONSTRUCTION OPERATION SHALL BE CARRIED OUT CONTINUOUSLY UP TO THE CONSTRUCTION JOINT.

II 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.

III 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/LAITANCE 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.

IV NEW CONCRETE SHALL BE THOROUGHLY COMPACTED IN THE REGION OF THE JOINT.

3. WELDING OF REINFORCEMENT BARS SHALL NOT BE PERMITTED.

4. LAPS IN REINFORCEMENT:

I MINIMUM LAP LENGTH OF REINFORCEMENT SHALL BE DECIDED AS PER THE REINFORCEMENT ARRANGEMENT BASED ON THE CLAUSE - 304.6.6 OF IRC:21-2000.

II 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 LITS. 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 SCREED 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. FILTER MEDIA SHOULD BE PROVIDED IN ACCORDANCE TO CLAUSE 2504.2.2 OF MOST SPECIFICATIONS (FOURTH REV. 2001).

12. 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 MoRT&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.

World E.C.C (Civil) Order  
Rhubaneswar

	<b>CONSULTING</b> ENGINEERS GROUP LTD. E-12(a) Odisha Sahaja Nagar, Jagun-17 Tel. 991-141-220099, 220186, 2202068 Fax: 2201340, E-mail: oeg@backbone.com	<b>PROJECT:</b> CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE	<b>GENERAL NOTES</b> (FOR RCC SLAB BRIDGES)
DRAWING NO. : 10007/2019/01-17/001/0001/01 DATE : 10.03.2017		DESIGNER : CHECKED : APPROVED :	



THESE NOTES ARE APPLICABLE FOR RCC T-BEAM BRIDGES.  
 ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE MENTIONED. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED. NO DRAWING SHALL BE SCALED.  
 DESIGN CRITERIA:  
 (a) IRC : 5-1988  
 (b) IRC : 6-2000  
 (c) IRC : 21-2000  
 (d) IRC : 78-2000  
 (e) IRC : 83-1987(PART-II)

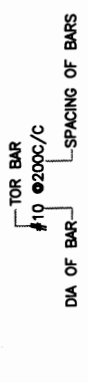
THE DESIGN IS ACCORDING TO FOLLOWING CODES:  
 (a) IRC : 5-1988  
 (b) IRC : 6-2000  
 (c) IRC : 21-2000  
 (d) IRC : 78-2000  
 (e) IRC : 83-1987(PART-II)

THE FOLLOWING LOADS HAVE BEEN CONSIDERED IN THE DESIGN:  
 (a) IRC 709 (UNIFORM & ONE LANE OF CLASS A)  
 (b) IRC 709 (UNIFORM & ONE LANE OF CLASS A)  
 (c) THREE LANE OF CLASS A  
 (d) WEARING SURF LOAD OF 2.20 KV/SQ. M.  
 (e) TEMPORARY LOAD VARIATION = ±25%  
 THE ABOVE LOADS ARE APPLICABLE FOR 'MODERATE' CONDITIONS OF EXPOSURE.

WEARING COAT SHALL CONSIST OF THE FOLLOWING  
 1. 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 LAID.  
 1. 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 415) CONFORMING TO IS:1786  
 CONFIGURATION IS SHOWN AS :



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 MoRT&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:**  
 I CONSTRUCTION JOINTS SHALL BE PROVIDED ONLY AT LOCATIONS SHOWN ON THE DRAWING. CONCRETING OPERATION SHALL BE CARRIED OUT CONTINUOUSLY UP TO THE CONSTRUCTION JOINTS  
 II 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.  
 III 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/LANTAGE 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.

IV NEW CONCRETE SHALL BE THOROUGHLY COMPACTED IN THE REGION OF THE JOINT.  
 3 WELDING OF REINFORCEMENT BARS SHALL NOT BE PERMITTED.  
 4 LAPS IN REINFORCEMENT:  
 I MINIMUM LAP LENGTH OF REINFORCEMENT SHALL BE DECIDED AS PER THE REINFORCEMENT ARRANGEMENT BASED ON THE CLAUSE - 304.6.6 OF IRC:21-2000.  
 II 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 LITS. 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 SCREENED 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 ETCHAEAD 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 MoRT&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.	REVISED	BY	APPROVED

GENERAL NOTES  
 (FOR RCC T-BEAM BRIDGES)

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

**CONSULTING ENGINEERS GROUP LTD.**  
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 Tel: 0141-2520495, 2520189, 2520256  
 Fax: 0141-2520496, 2520497  
 www.cegroup.com

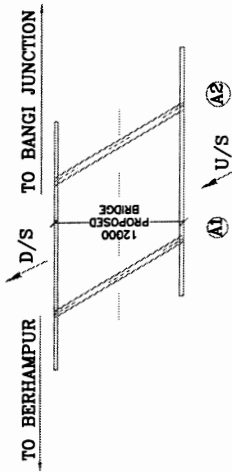
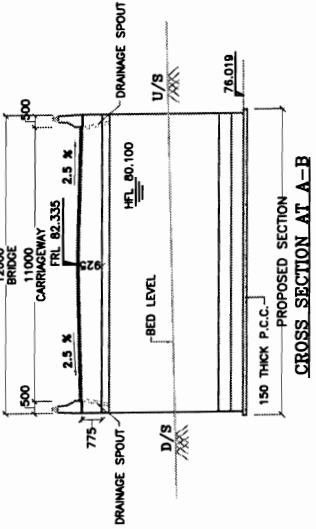
Chief Engineer  
 World Bank Projects  
 EMPLOYED  
 O to the E.I.C (Civil) Orissa  
 Bhubaneswar

**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 GROSS SAFE BEARING CAPACITY OF SOIL AT THE PROPOSED FOUNDATION OF THE ABUTMENTS, RETURN WALL IN NO CASE BE LESS THAN 20.31 T/M<sup>2</sup>.
- 4 GRADE OF CONCRETE :
  - M-20
  - M-20
  - M-25
  - M-30
  - M-30
  - M-40
  - M-20
- 5 OPEN FOUNDATION
- 6 REINFORCEMENT H.Y.S.D. BARS IS CONFORM TO IS:1786 GRADE - F<sub>8</sub>-415.
- 7 FOR DETAIL OF CRASH BARRIER REFER DRG.NO. OSRP/CEG/BR/MISC-02
- 8 THE SUPER STRUCTURE REFER MOST STANDARD DRAWING FOR ROAD BRIDGES FOR R.C.C. SOLID SLAB STRUCTURE (15' & 30' SKEW) DRG. NO. SD/172
- 9 THE BRIDGE HAS BEEN DESIGNED FOR ONE LANE OF I.R.C. CLASS 70-R+ 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 &  $\phi$  30°.
- 12 CLEAR COVER TO ANY REINFORCEMENT IN BASE SLAB = 75mm IN ALL OTHER COMPONENTS = 40mm
- 13 FOR DETAIL OF RETAINING WALL REFER DRAWING NO. OSRP/CEG/RW/MISC-02

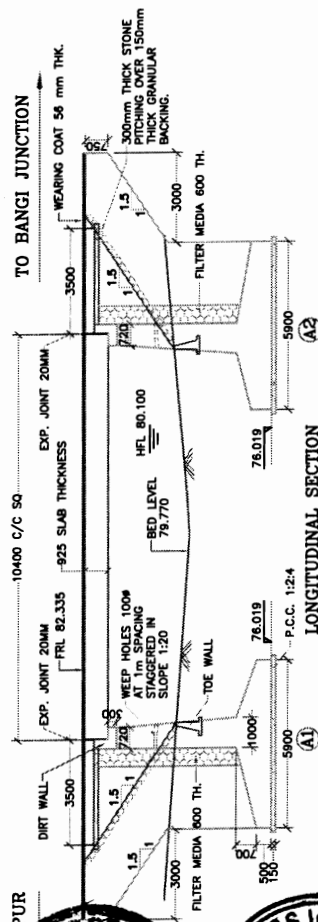
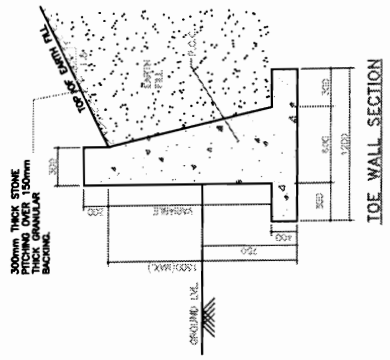
**REFERENCE DRAWING:-**

- 1 OSRP/CEG/SH-17/BR/11+270/01
- 2 OSRP/CEG/SH-17/BR/11+270/02
- 3 OSRP/CEG/SH-17/BR/11+270/03

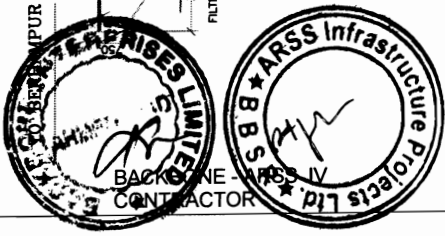
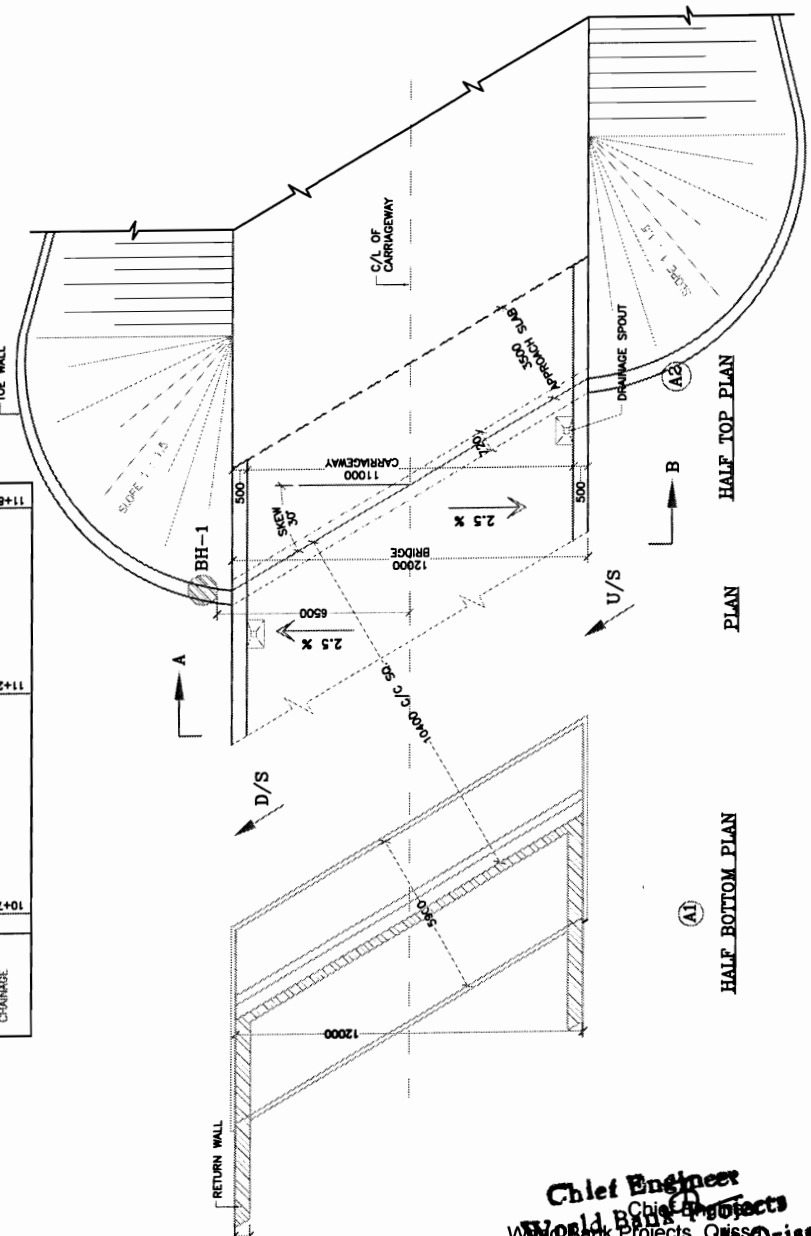


**KEY PLAN**

Design Discharge (in m <sup>3</sup> /s)	5.99
Design Velocity (in m/sec)	1.15
Waterway (in m)	9.6
Max. Scour Level (in m)	78.658
HFL (in m)	80.1
Foundation Level (in m)	76.019



FORMATION LEVEL (m)	11+810	80.516	82.335
BED LEVEL (m)	11+270	79.770	82.335
CHANNELAGE	10+730	80.142	82.335



Chief Engineer  
World Bank Projects  
Of the E.I.C. EMPLOYER  
Rhubaneswar

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

CONSULTING ENGINEERS GROUP LTD.  
E-12, 1st Floor, Colony, Malabar Nagar, Jaipur-17  
Tel: +91-141-2520859, 2521899, 2520556  
Fax: 2521348, E-mail: ceg@cegroupindia.com

GENERAL ARRANGEMENT DRAWING  
BRIDGE AT KM 11+270  
(BALIPARHA / DENGAPADAR)

DRAWING NO. : OSRP/CEG/SH-17/BR/11+270/01	DATE : 08.05.2017	DESIGNED :	APPROVED :
SCALE :	DATE :	CHECKED :	DATE :
NO. :	NO. :	DATE :	DATE :

**REINFORCEMENT DETAILS.**

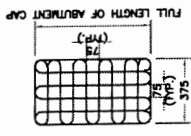
BAR NO.	DIA (mm)	SPACING/NOSE (mm)	SHAPE
1	12	200 c/c	[Symbol]
2	10	200 c/c	[Symbol]
3	10	200 c/c	[Symbol]
4	12	6-45 Mesh	[Symbol]
5	25	200 c/c	[Symbol]
6	18	200 c/c	[Symbol]
7	15	6 Nos.	[Symbol]
8	16	150 c/c	[Symbol]
9	12	150 c/c	[Symbol]
10	12	150 c/c	[Symbol]
11	12	150 c/c	[Symbol]
12	20	150 c/c	[Symbol]
13	12	150 c/c	[Symbol]
14	12	150 c/c	[Symbol]
15	20	140 c/c	[Symbol]
16	12	200 c/c	[Symbol]
17	10	150 c/c	[Symbol]
17a	16	150 c/c	[Symbol]
18	32	4 Nos.	[Symbol]
19	18	150 c/c	[Symbol]
20	10	150 c/c	[Symbol]
21	16	4 Nos.	[Symbol]
22	16	2 Nos.	[Symbol]
23	12	150 c/c	[Symbol]
24	12	130 c/c	[Symbol]

- 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 GROSS SAFE BEARING CAPACITY OF SOIL AT THE PROPOSED FOUNDATION OF THE ABUTMENTS, RETURN WALL IN NO CASE BE LESS THAN 20.31 T/M<sup>2</sup>.
  - 4 GRADE OF CONCRETE : REFER DRAWING NO- OSRP/CEG/SH-17/BR/11+270/01
  - 5 REINFORCEMENT H.V.S.D. BARS IS CONFORM TO IS:1786 GRADE - Fe-415.
  - 6 TAR PAPER BEARING SHALL BE USED.
  - 7 CLEAR COVER TO ANY REINFORCEMENT IN BASE SLAB = 75mm IN ALL OTHER COMPONENTS = 40mm

- B GRADE OF CONCRETE :**
- M-20
  - M-20
  - M-25
  - M-25

**REFERENCE DRAWING:-**

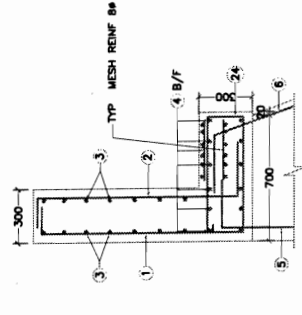
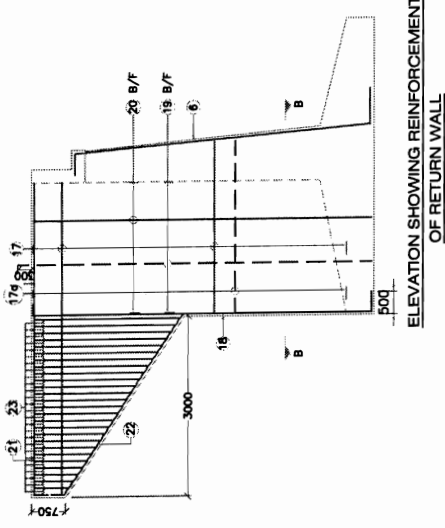
- 1 OSRP/CEG/SH-17/BR/11+270/01
- 2 OSRP/CEG/SH-17/BR/11+270/03



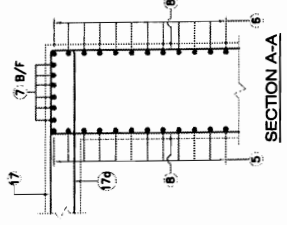
TYP MESH REINF 600 IN ABUTMENT CAP TO BE PROVIDED IN TWO LAYER 20 MM & 100 MM BELOW ABUTMENT CAP TOP

**LEGENDS:**

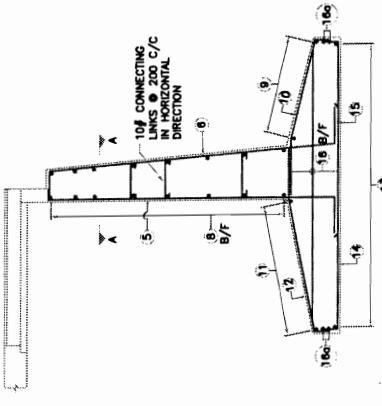
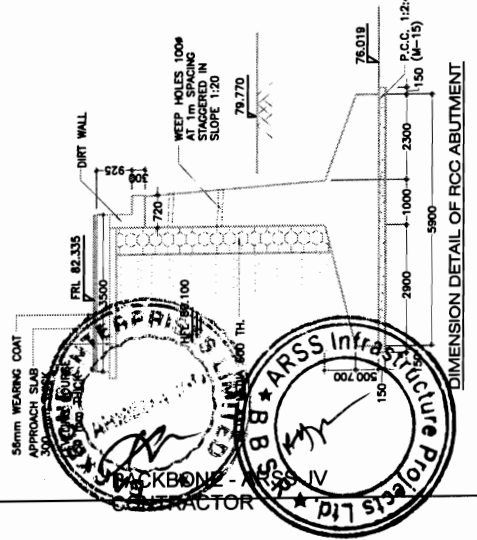
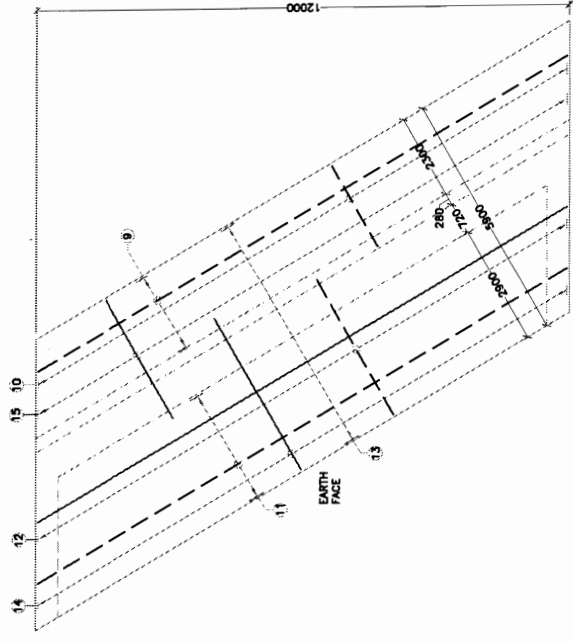
- BAR ON TOP/ EARTH RETAINING FACE
- BAR ON BOTTOM/ OTHER FACE
- BAR ON BOTH FACES
- STIRRUPS



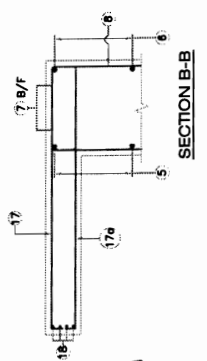
**DETAILS OF ABUTMENT CAP & DIRT WALL**



**DETAIL OF FOUNDATION OF ABUTMENT**



**REINFORCEMENT DETAIL OF ABUTMENT**



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

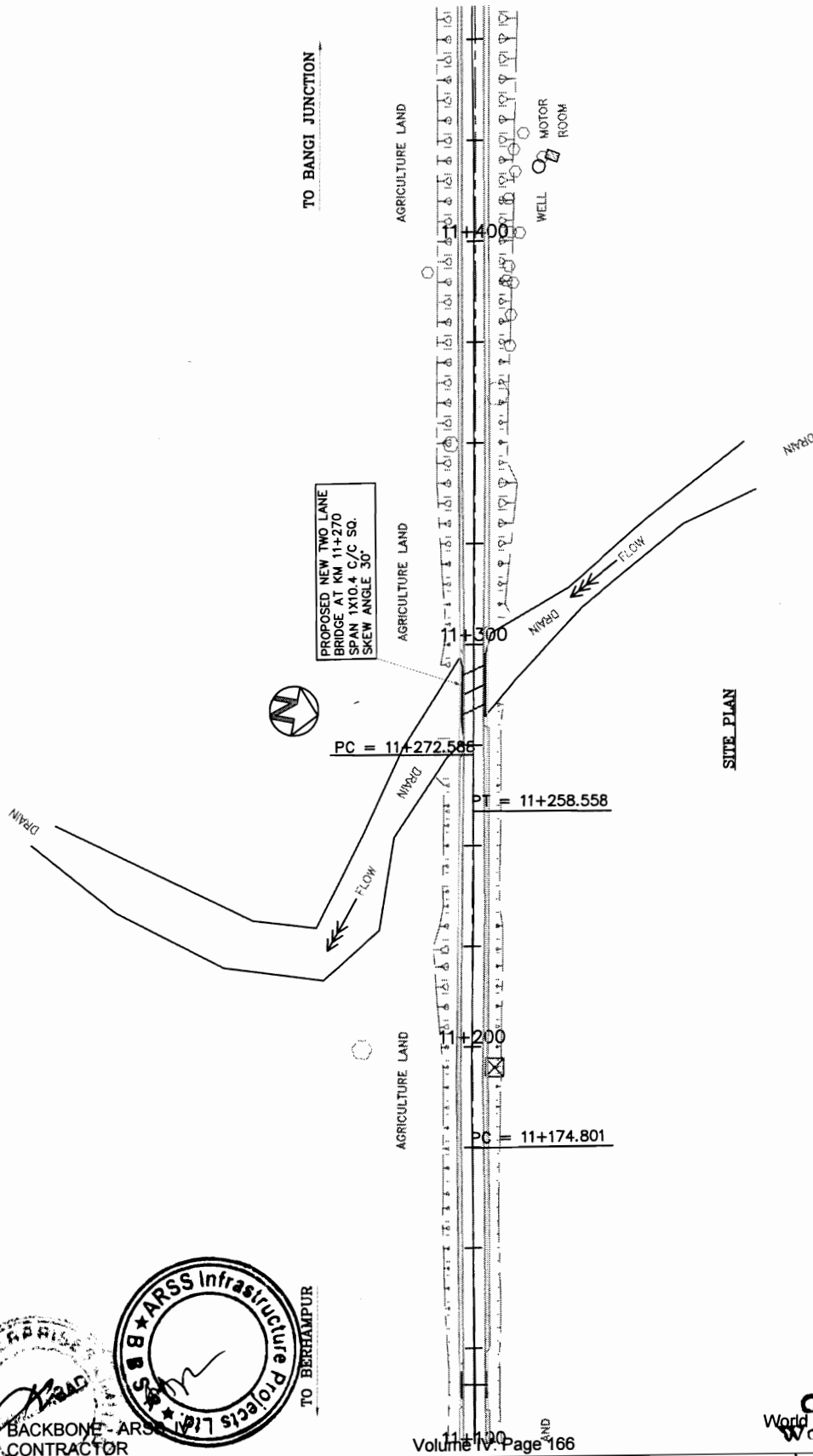
**CONSULTING ENGINEERS GROUP LTD.**  
 E-12, 3rd Cross, 2nd Stage, Indira Nagar, Bangalore-56  
 Ph: 2011-248, E-Mail: cege@cegeindia.com

**DIMENSION & REINFORCEMENT DETAILS OF SUB STRUCTURE**  
 BRIDGE AT KM 11+270  
 (BALIPARHA / DENGAPADAR)

DATE	DESIGN	CHECKED	APPROVED

Chief Engineer  
 World Bank Projects, District  
 EMPLOYER  
 O/o the E.I.C (Civil) Orissa  
 Bhubaneswar

NOTES:-



SITE PLAN

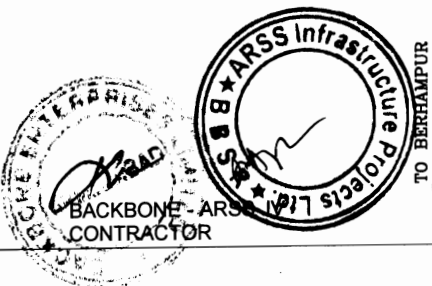
SITE PLAN

BRIDGE AT KM 11+270  
(BALIPARHA / DENGAPADAR)

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

PROJECT:

CONSULTING  
ENGINEERS GROUP LTD.  
E-12/103 Colony, Mahara Nagar, Bhubaneswar-751017  
Tel: 251-141, 2520898, 2521886, 2520556  
Fax: 2521346, E-mail: ce@egpltd.com



Chief Engineer  
World Bank Projects  
EMPLOYER  
O/c the F.I.C.T. Orissa  
Bhubaneswar

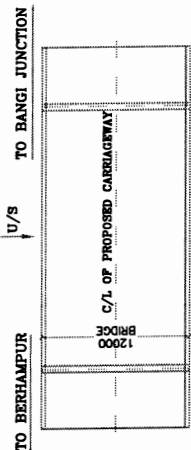
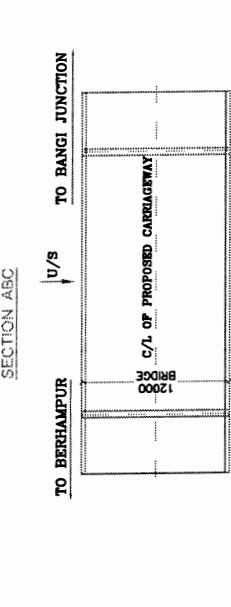
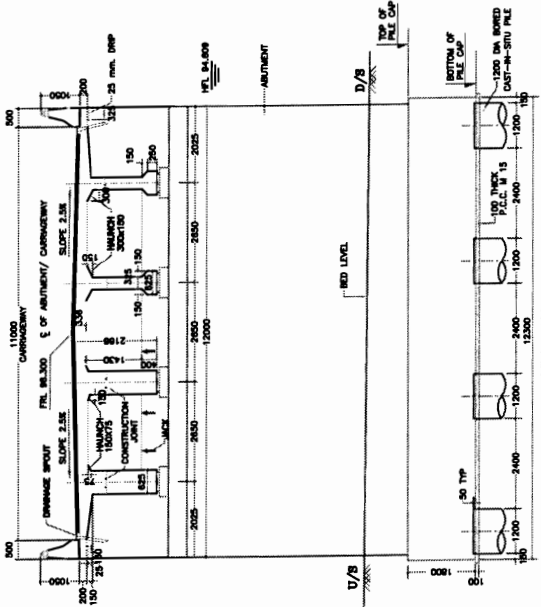
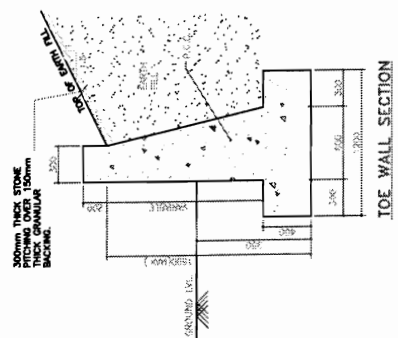
DRAWING NO. : 1007/2009/17/KM/11+270/03	DATE : 10.05.2009	APPROVED
DESIGNER	CHECKED	
DRAWN	REVISION	
SCALE	DATE READY	

**NOTES:-**

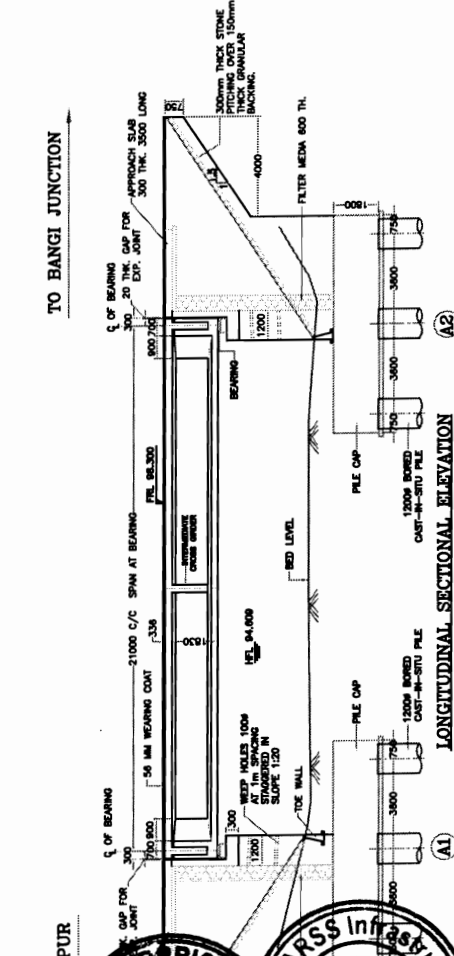
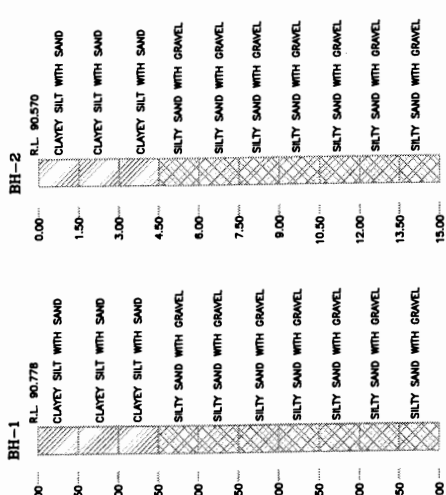
- 1 ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED. LEVELS ARE IN METRES.
- 2 DIMENSIONS ARE NOT TO BE SCALED. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED.
- 3 BORED CAST-IN-SITU PILE CAPACITY AT A LENGTH OF 13.5 M. FROM CUT OFF LEVEL SHALL BE TAKEN AS 207 T.
- 4 GRADE OF CONCRETE :  
 PILE & PILE CAP - M-35  
 ABUTMENT/ABUTMENT CAP - M-25  
 DIRT WALL - M-25  
 APPROACH SLAB - M-30  
 CRASH BARRIER - M-25  
 RETURN WALL - M-40  
 PEDESTAL - M-35
- 5 REINFORCEMENT H.Y.S.D. BARS IS CONFORM TO IS:1786 GRADE - Fe-415.
- 6 FOR DETAIL OF CRASH BARRIER REFER SEPARATE DRAWING.
- 7 FOR BEARING DETAILS REFER MOST STANDARD DMC. NO. SD/203.
- 8 THE SUPER STRUCTURE REFER STANDARD PLANS FOR HIGHWAY BRIDGES FOR R.C.C. T-BEAM AND SLAB SUPERSTRUCTURE IRC. NO. SD/220, SD/222 SD/224, SD/225, SD/226 SH.1, SD/226 SH.2.
- 9 THE BRIDGE HAS BEEN DESIGNED FOR 70R (M) + 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-0 &  $\phi$  30°.
- 12 CLEAR COVER TO ANY REINFORCEMENT IN PILE, PILE CAP & ABUTMENT = 75mm IN ALL OTHER COMPONENTS = 40mm
- 13 INDEX PLAN ON SEPARATE SHEET.

REFERENCE DRAWING:-

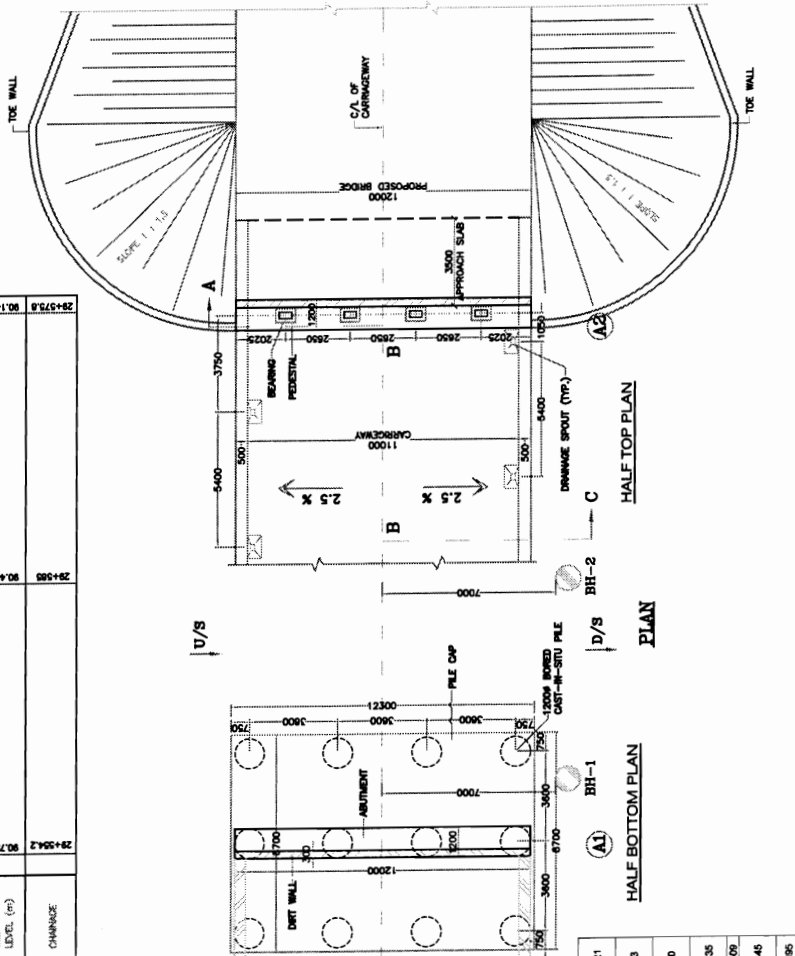
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- 3 OSRP/CEG/SH-17/BR/29+500/04
- 4 OSRP/CEG/SH-17/BR/29+500/05
- 5 OSRP/CEG/SH-17/BR/NOTES/01
- 6 OSRP/CEG/BR/MISC-02



LOCATION PLAN OF BORE HOLES AT BRIDGE NO. 28/500



FORMATION LEVEL (m)	RED LEVEL (m)	CHANGE
28+538.8	28+542.2	
28+538.8	28+542.2	
28+538.8	28+542.2	



ITEM NO.	DESCRIPTION	QUANTITY	UNIT	AMOUNT
28.21	PILE CAP	0.63	20.0	89.835
28.22	ABUTMENT	0.63	20.0	89.835
28.23	APPROACH SLAB	0.63	20.0	89.835
28.24	TOE WALL	0.63	20.0	89.835
28.25	PILE	0.63	20.0	89.835
28.26	DIRT WALL	0.63	20.0	89.835
28.27	RETURN WALL	0.63	20.0	89.835
28.28	CRASH BARRIER	0.63	20.0	89.835
28.29	PEDESTAL	0.63	20.0	89.835
28.30	WEEP HOLES	0.63	20.0	89.835
28.31	CONCRETE	0.63	20.0	89.835
28.32	REINFORCEMENT	0.63	20.0	89.835
28.33	BACKFILL	0.63	20.0	89.835
28.34	PAVEMENT	0.63	20.0	89.835
28.35	GRANULAR	0.63	20.0	89.835
28.36	GEOTEXTILE	0.63	20.0	89.835
28.37	CRASH BARRIER	0.63	20.0	89.835
28.38	PEDESTAL	0.63	20.0	89.835
28.39	WEEP HOLES	0.63	20.0	89.835
28.40	CONCRETE	0.63	20.0	89.835
28.41	REINFORCEMENT	0.63	20.0	89.835
28.42	BACKFILL	0.63	20.0	89.835
28.43	PAVEMENT	0.63	20.0	89.835
28.44	GRANULAR	0.63	20.0	89.835
28.45	GEOTEXTILE	0.63	20.0	89.835
28.46	CRASH BARRIER	0.63	20.0	89.835
28.47	PEDESTAL	0.63	20.0	89.835
28.48	WEEP HOLES	0.63	20.0	89.835
28.49	CONCRETE	0.63	20.0	89.835
28.50	REINFORCEMENT	0.63	20.0	89.835
28.51	BACKFILL	0.63	20.0	89.835
28.52	PAVEMENT	0.63	20.0	89.835
28.53	GRANULAR	0.63	20.0	89.835
28.54	GEOTEXTILE	0.63	20.0	89.835
28.55	CRASH BARRIER	0.63	20.0	89.835
28.56	PEDESTAL	0.63	20.0	89.835
28.57	WEEP HOLES	0.63	20.0	89.835
28.58	CONCRETE	0.63	20.0	89.835
28.59	REINFORCEMENT	0.63	20.0	89.835
28.60	BACKFILL	0.63	20.0	89.835
28.61	PAVEMENT	0.63	20.0	89.835
28.62	GRANULAR	0.63	20.0	89.835
28.63	GEOTEXTILE	0.63	20.0	89.835
28.64	CRASH BARRIER	0.63	20.0	89.835
28.65	PEDESTAL	0.63	20.0	89.835
28.66	WEEP HOLES	0.63	20.0	89.835
28.67	CONCRETE	0.63	20.0	89.835
28.68	REINFORCEMENT	0.63	20.0	89.835
28.69	BACKFILL	0.63	20.0	89.835
28.70	PAVEMENT	0.63	20.0	89.835
28.71	GRANULAR	0.63	20.0	89.835
28.72	GEOTEXTILE	0.63	20.0	89.835
28.73	CRASH BARRIER	0.63	20.0	89.835
28.74	PEDESTAL	0.63	20.0	89.835
28.75	WEEP HOLES	0.63	20.0	89.835
28.76	CONCRETE	0.63	20.0	89.835
28.77	REINFORCEMENT	0.63	20.0	89.835
28.78	BACKFILL	0.63	20.0	89.835
28.79	PAVEMENT	0.63	20.0	89.835
28.80	GRANULAR	0.63	20.0	89.835
28.81	GEOTEXTILE	0.63	20.0	89.835
28.82	CRASH BARRIER	0.63	20.0	89.835
28.83	PEDESTAL	0.63	20.0	89.835
28.84	WEEP HOLES	0.63	20.0	89.835
28.85	CONCRETE	0.63	20.0	89.835
28.86	REINFORCEMENT	0.63	20.0	89.835
28.87	BACKFILL	0.63	20.0	89.835
28.88	PAVEMENT	0.63	20.0	89.835
28.89	GRANULAR	0.63	20.0	89.835
28.90	GEOTEXTILE	0.63	20.0	89.835
28.91	CRASH BARRIER	0.63	20.0	89.835
28.92	PEDESTAL	0.63	20.0	89.835
28.93	WEEP HOLES	0.63	20.0	89.835
28.94	CONCRETE	0.63	20.0	89.835
28.95	REINFORCEMENT	0.63	20.0	89.835
28.96	BACKFILL	0.63	20.0	89.835
28.97	PAVEMENT	0.63	20.0	89.835
28.98	GRANULAR	0.63	20.0	89.835
28.99	GEOTEXTILE	0.63	20.0	89.835
28.100	CRASH BARRIER	0.63	20.0	89.835

**GENERAL ARRANGEMENT DRAWING**

BRIDGE AT KM 29+500  
(RAM NADI)

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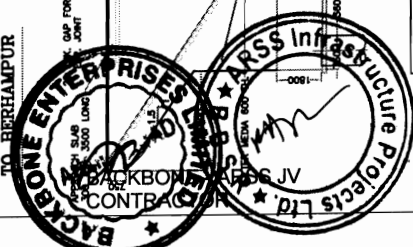
**CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE**

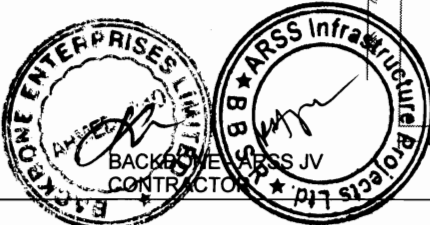
PROJECT NO. : OSRP/CEG/SH-17/BR/29+500/0001  
 DRAWING NO. : OSRP/CEG/SH-17/BR/29+500/0001  
 SHEET NO. : 28/500/0001

DATE : 12/11/2017

DESIGNED : [Signature]  
 CHECKED : [Signature]  
 APPROVED : [Signature]

DATE : 12/11/2017





BACKED BY ARSS JV  
CONTRACTOR

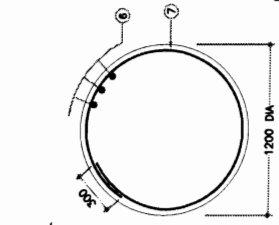
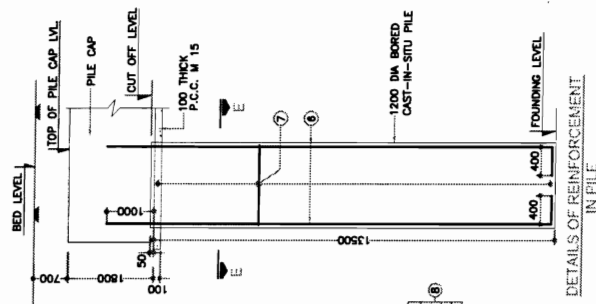
**REINFORCEMENT DETAILS**

BAR NO.	BAR DIA.	SPACING	SHAPE
1	20	130 C/C	
2	32	180 C/C	
3	16	130 C/C	
4	16	180 C/C	
5	12	200 C/C	
6	25	28 NOS.	
7	8	180 C/C	
8	10	6 NOS.	

**LEGENDS:**  
  
 --- BAR ON TOP FACE  
 - - - BAR ON BOTTOM FACE

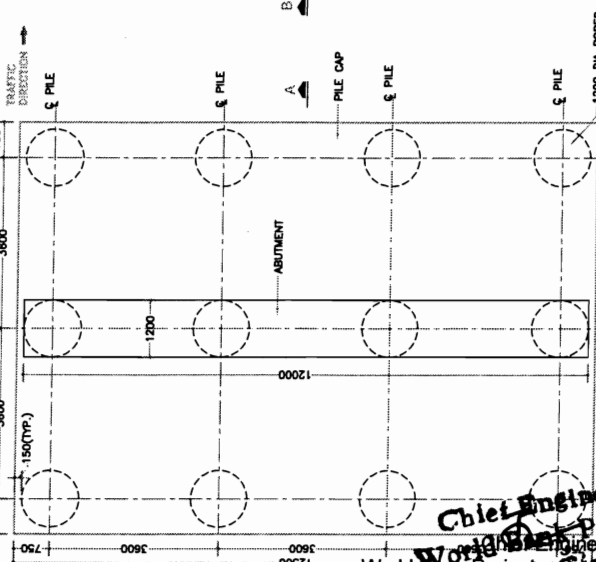
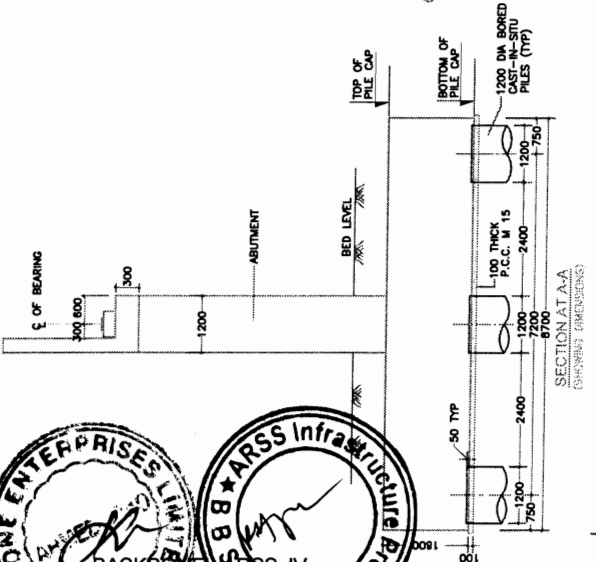
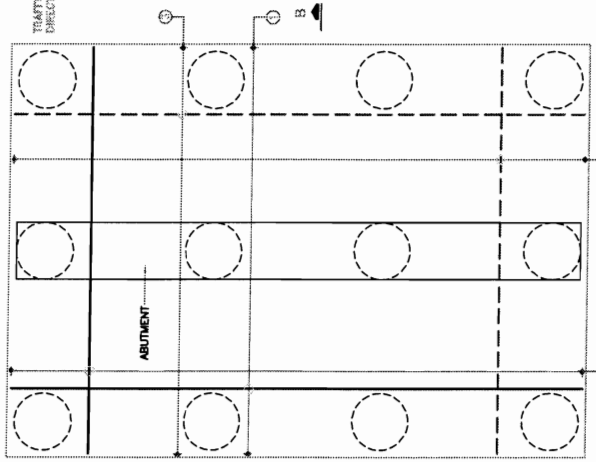
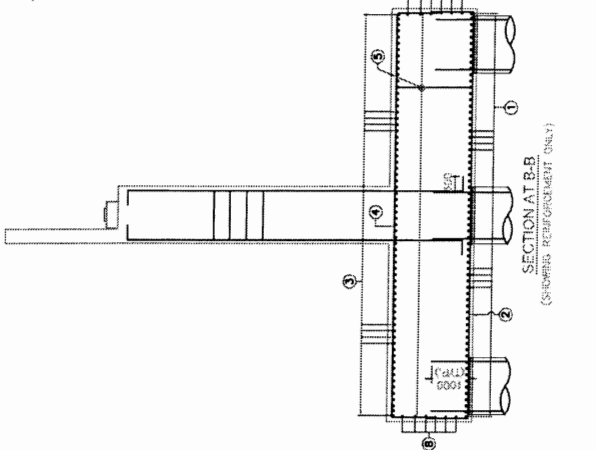
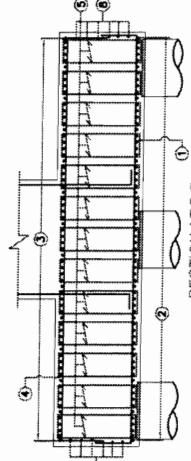
- REFERENCE DRAWING:--**
- OSRP/CEG/SH-17/BR/29+500/01
  - OSRP/CEG/SH-17/BR/29+500/03
  - OSRP/CEG/SH-17/BR/29+500/04
  - OSRP/CEG/SH-17/BR/29+500/05
  - OSRP/CEG/SH-17/BR/NOTES/01
  - OSRP/CEG/BR/MISC-02

- NOTES:**
- ALL DIMENSIONS ARE IN mm AND LEVELS IN METRE.
  - GRADE OF CONCRETE FOR PILES SHALL BE M-35.
  - ALL T.M.T. BARS SHALL CONFORM TO IS:1788 GRADE Fe 415.
  - CLEAR COVER FOR PILE CAP = 75mm
  - LAPS SHALL BE STAGGERED AND NOT MORE THAN 50% OF BARS SHALL BE LAPPED AT ANY LOCATION. LAP LENGTH SHALL BE 83 TIMES DIA OF BAR
  - PILE CAPACITY = 207 T
  - TOP OF PILE CAP SHALL BE 1000 mm BELOW BED LEVEL.
  - THE LEVELS SHALL BE IDENTIFIED AT SITE AND IN CASE OF ANY DISCREPANCY, IT SHALL BE BROUGHT INTO THE NOTICE OF CONSULTANT.



**LEVELS CHART FOR PILE CAP LAYOUT**

ABUTMENT DESIGNATION	BED LEVELS	TOP OF PILE CAP LEVELS	CUT OFF LEVELS	FOUNDING LEVELS
A1	90.145	89.145	87.395	73.895
A2	90.145	89.145	87.395	73.895



DESIGN NO. : OSRP/CEG/SH-17/BR/29+500/02	DATE :	SCALE :
APPROVED :	DESIGNED :	CHECKED :
REVISION :	DATE :	BY :
REVISION :	DATE :	BY :

**DIMENSION & REINFORCEMENT DETAIL FOR PILE & PILE CAP**  
 BRIDGE AT KM 29+500 (RAM/NADI)

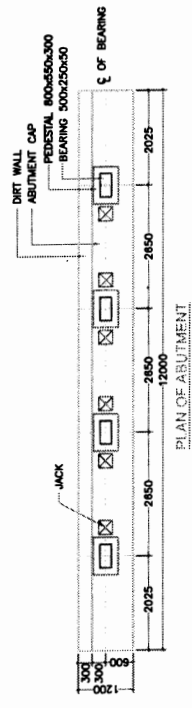
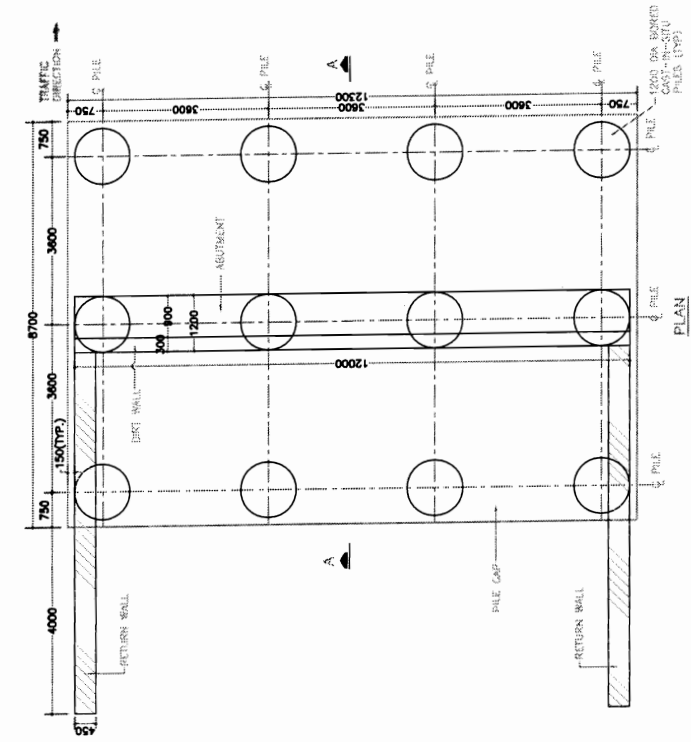
**CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE-(I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE**

**PROJECT:**  
 CONSULTING ENGINEERS GROUP LTD.  
 E-12/101 Connaught Place  
 New Delhi-110022  
 Tel: +91-11-2520889, 2521895, 2520256  
 Fax: 2521346, E-Mail: ce@cegroupindia.com

Chief Engineer  
 World Bank Project  
 Olo the E (Orissa) Oriss  
 EMPLOYER:  
 phibankover

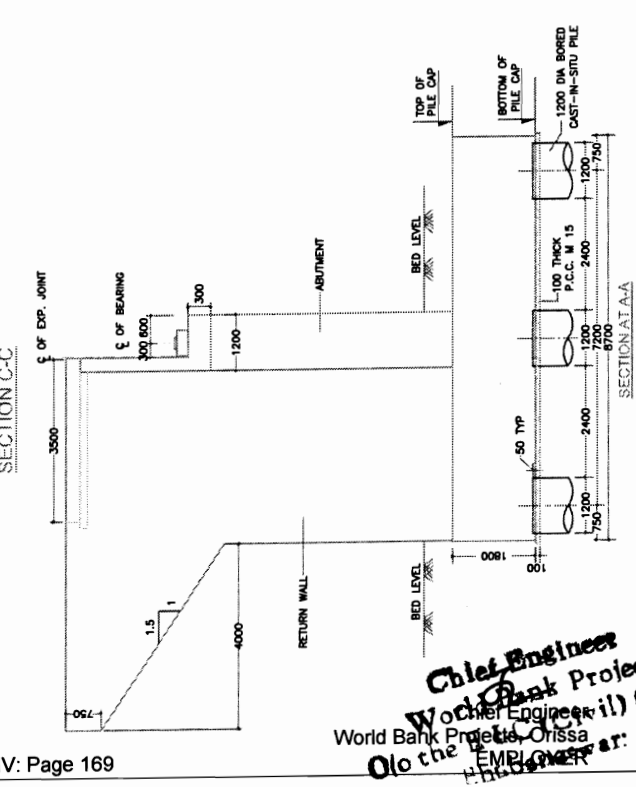
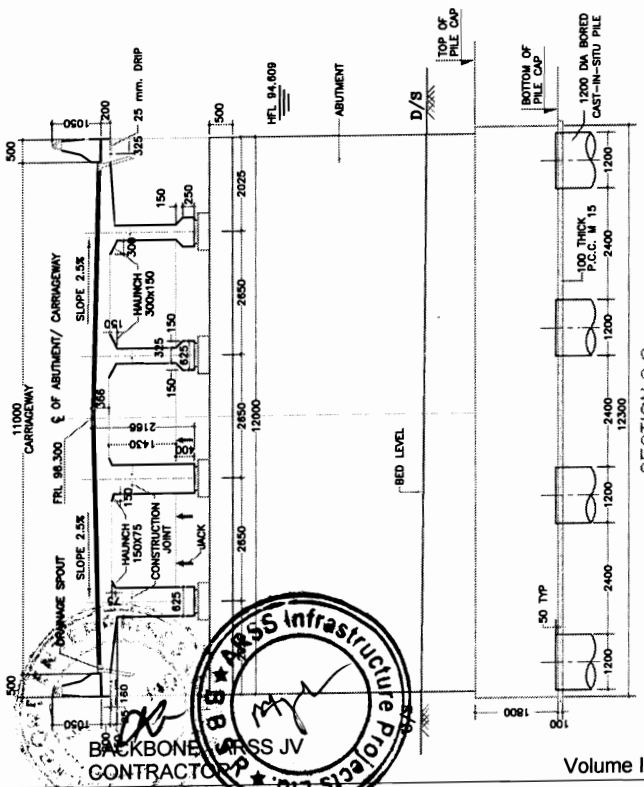
- NOTES:-**
1. ALL DIMENSION ARE IN MM & LEVELS ARE IN METERS.
  2. DO NOT SCALE THE DIMENSIONS. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED.
  3. GRADE OF CONC. FOR ABUTMENT -----M-30  
GRADE OF CONC. FOR PILE & PILE CAP -----M-35  
GRADE OF CONC. FOR PEDESTAL -----M-35
  4. ALL T.M.T. BARS IS CONFORMED TO IS:1788  
GRADE Fe 415.
  5. MINIMUM CLEAR COVER TO ANY REINFORCEMENT FOR ABUTMENT - 40mm  
FOR PILE CAP - 75mm
  6. LAPS IS STAGGERED AND NOT MORE THAN 50% OF BARS IS LAPPED AT ANY LOCATION.
  7. LAPS LENGTH SHALL BE PROVIDED AS PER IRC : 21-2000, CLAUSE 304.8.6.3.

- REFERENCE DRAWING:-**
- 1 OSRP/CEG/SH-17/BR/29+500/01
  - 2 OSRP/CEG/SH-17/BR/29+500/02
  - 3 OSRP/CEG/SH-17/BR/29+500/04
  - 4 OSRP/CEG/SH-17/BR/29+500/05
  - 5 OSRP/CEG/SH-17/BR/NOTES/01
  - 6 OSRP/CEG/BR/MISC-02



**LEVELS CHART FOR ABUTMENTS**

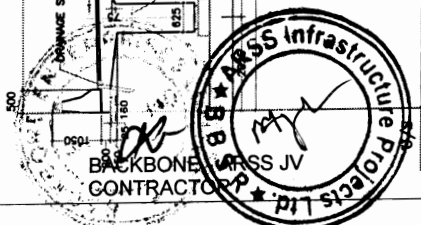
ABUTMENT DESIGNATION	FORMATION ROAD LEVELS	BED LEVEL	HFL
A1	98.300	90.145	94.609
A2	98.300	90.145	94.609



**DIMENSION DETAILS FOR ABUTMENT & ABUTMENT CAP**  
BRIDGE AT KM 29+500  
(RAM NADI)

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

**CONSULTING ENGINEERS GROUP LTD.**  
Plot No. 17, Sector 17, Gurgaon  
Tel: +91-11-2320858, 2321899, 2520556  
Fax: 2521348, E-Mail: ceg@cegroupindia.com



**Chief Engineer**  
**World Bank Projects**  
**Olo the (Rail) Orissa**  
**EMPL**

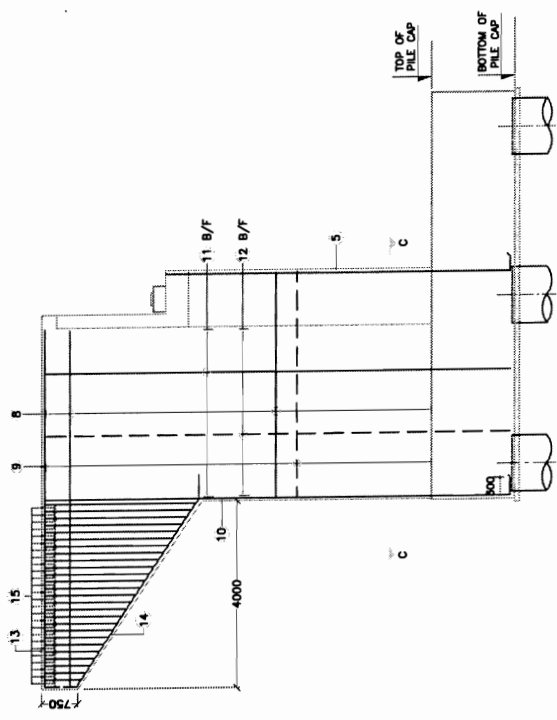


**NOTES:-**

1. ALL DIMENSION ARE IN MM & LEVELS ARE IN METERS.
2. DO NOT SCALE THE DIMENSIONS. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED.
3. DIMENSIONS ARE TO BE FOLLOWED.
  - M-25
  - M-35
4. ALL I.M.T. BARS IS CONFORMED TO IS:1786 GRADE Fe 415.
5. MINIMUM CLEAR COVER TO ANY REINFORCEMENT FOR ABUTMENT - 40mm FOR PILE CAP - 75mm
6. LAPS IS STAGGERED AND NOT MORE THAN 50% OF BARS IS LAPPED AT ANY LOCATION.
7. LAPS LENGTH SHALL BE PROVIDED AS PER IRC : 21-2000, CLAUSE 304.6.6.3.

**REFERENCE DRAWING:-**

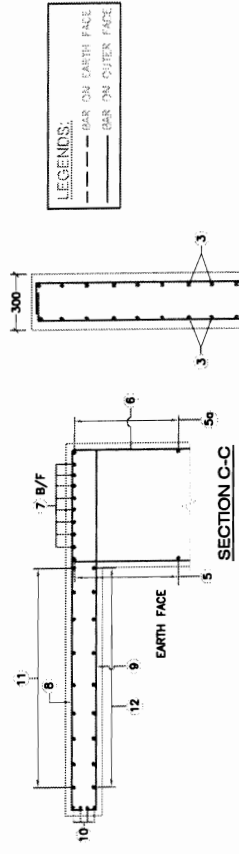
- 1 OSRP/CEG/SH-17/BR/29+500/01
- 2 OSRP/CEG/SH-17/BR/29+500/02
- 3 OSRP/CEG/SH-17/BR/29+500/03
- 4 OSRP/CEG/SH-17/BR/29+500/05
- 5 OSRP/CEG/SH-17/BR/NOTES/01
- 6 OSRP/CEG/BR/MISC-02



**ELEVATION SHOWING REINFORCEMENT OF RETURN WALL**

**REINFORCEMENT DETAILS**

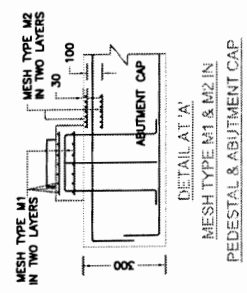
BAR MKD. (mm)	DIA. (mm)	SPACING/Nos	SHAPE
1	12	150 c/c	[Diagram]
2	10	200 c/c	[Diagram]
3	10	200 c/c	[Diagram]
4	12	10+10 Nos.	[Diagram]
5	25	40+60 Nos.	[Diagram]
5a	18	60 Nos.	[Diagram]
6	10	150 c/c	[Diagram]
7	16	8 Nos.	[Diagram]
8	12	120 c/c	[Diagram]
9	20	120 c/c	[Diagram]
10	32	4 Nos.	[Diagram]
11	12	150 c/c	[Diagram]
12	20	120 c/c	[Diagram]
13	16	4 Nos.	[Diagram]
14	18	2 Nos.	[Diagram]
15	12	150 c/c	[Diagram]
16	12	150 c/c	[Diagram]
17	16	8 Nos.	[Diagram]
18	10	150 c/c	[Diagram]
19	10	150 c/c	[Diagram]
20	10	150 c/c	[Diagram]



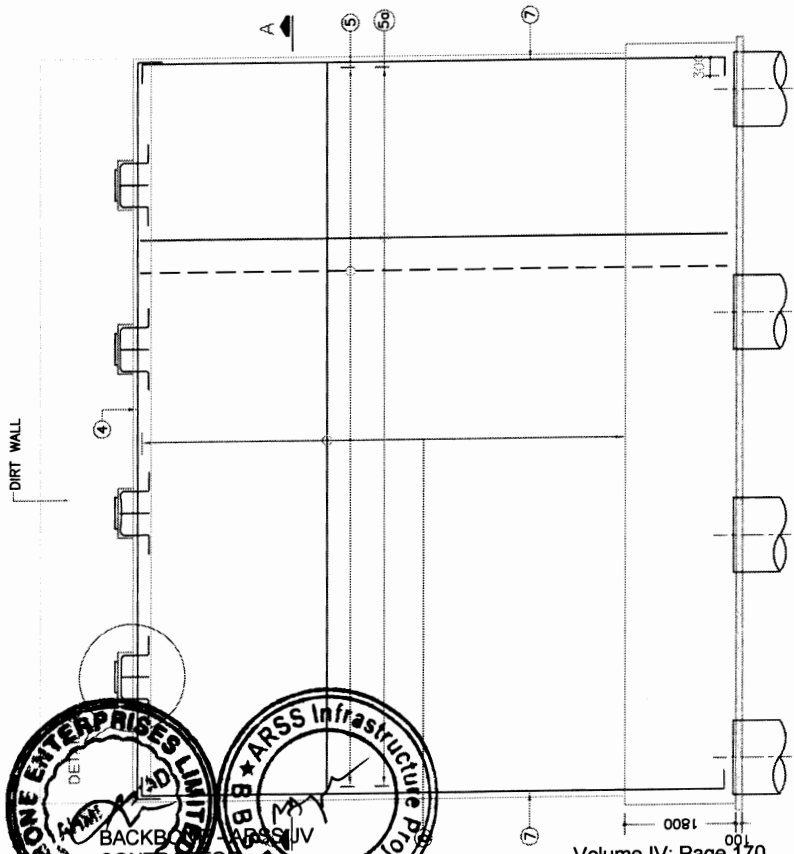
**SECTION C-C**

**LEVELS CHART FOR ABUTMENTS**

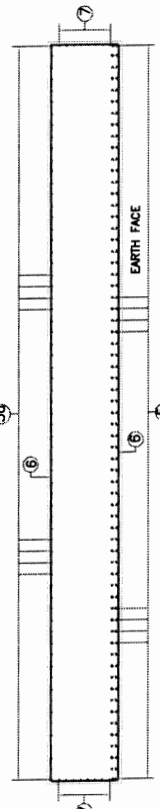
ABUTMENT DESIGNATION	FORMATION ROAD LEVELS	BED LEVEL	HFL
A1	98.300	90.145	94.609
A2	98.300	90.145	94.609



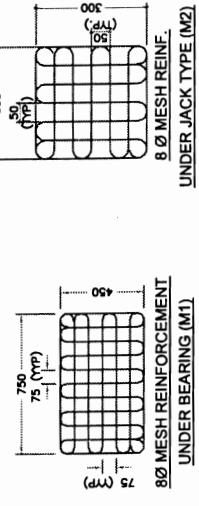
**DETAIL AT 'A'**



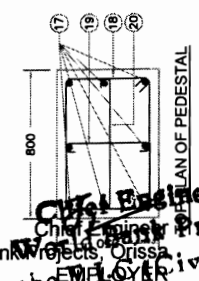
**REINFORCEMENT DETAIL OF ABUTMENT & ABUTMENT CAP**



**SECTION OF ABUTMENT AT A-A**



**UNDER BEARING (M1)**

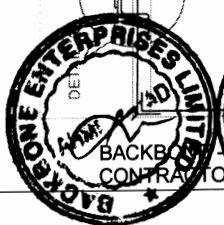


**UNDER JACK TYPE (M2)**

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

REINFORCEMENT DETAILS FOR ABUTMENT & ABUTMENT CAP BRIDGE AT KM 29+500 (RAM NADI)

DATE	BY	CHECKED	APPROVED



World Bank Projects, Orissa  
 Chief Engineer  
 (to the Chief Engineer)  
 P.hubaneswar

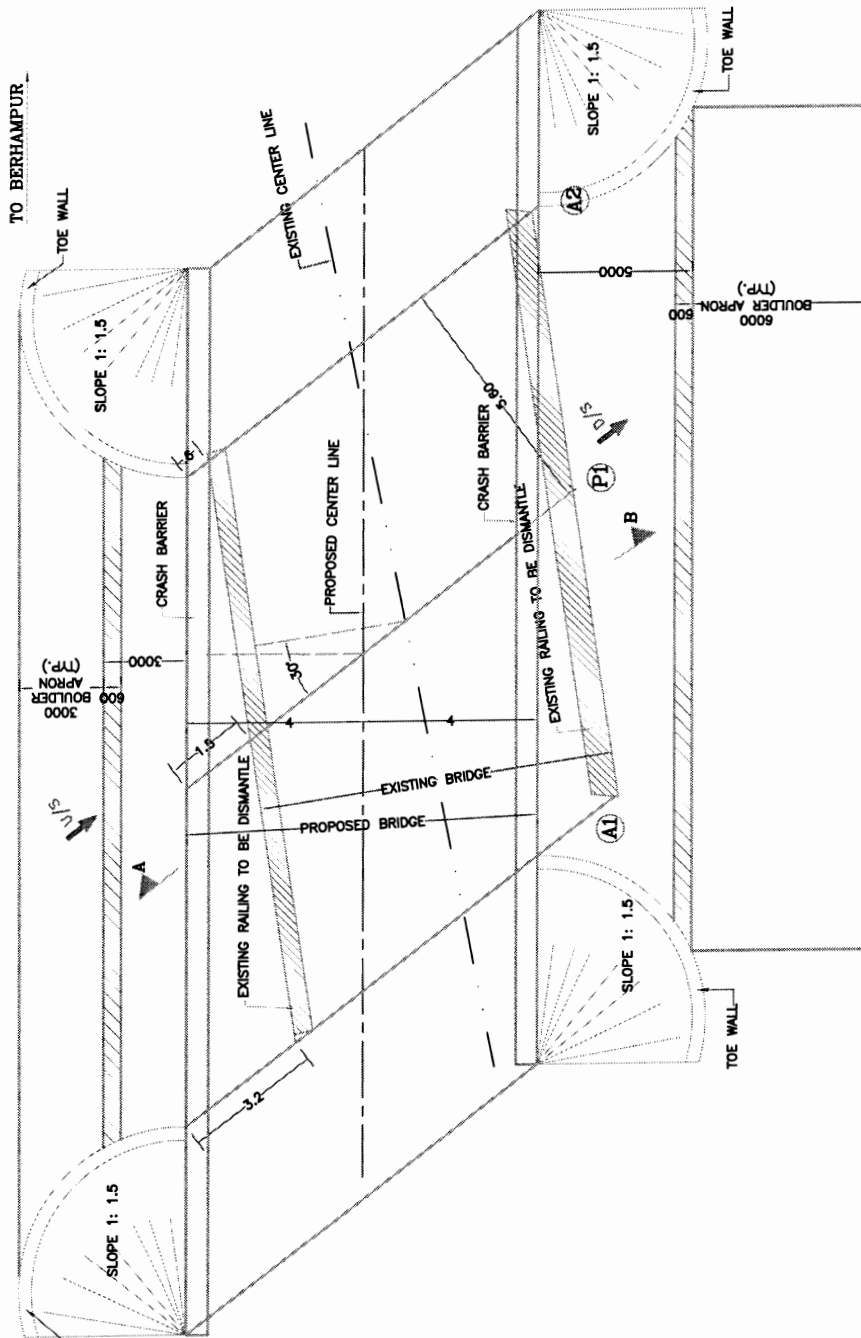


**NOTES:**

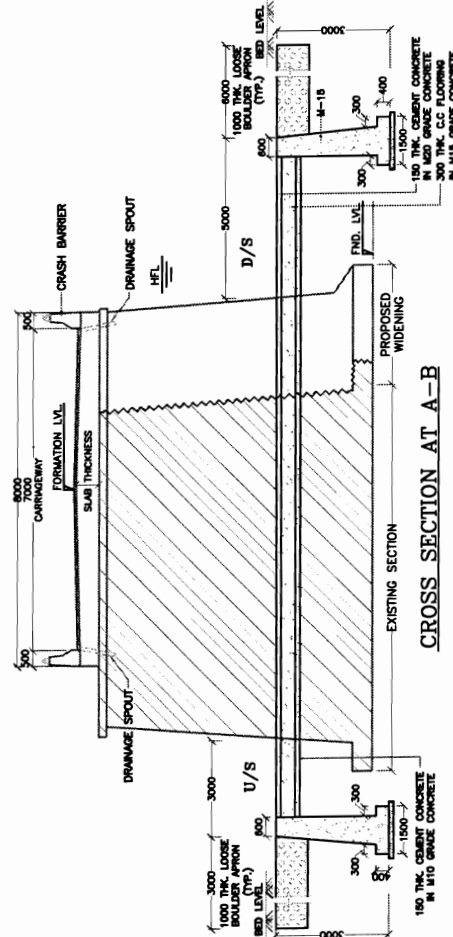
1. ALL DIMENSIONS ARE IN MM.
2. DO NOT SCALE THE DIMENSIONS. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.
3. P.C.C. STRUCTURE SHALL BE WIDENED BY P.C.C. AND R.C.C. STRUCTURE SHALL BE WIDENED BY R.C.C.
4. SIZE OF ALL THE COMPONENTS FOR THE NEW WIDENED PORTION SHALL BE IDENTICAL TO THE OLD STRUCTURE.
5. FOUNDING LEVEL OF ALL THE FOUNDATIONS SHALL BE SAME AS FOR THE RESPECTIVE EXISTING STRUCTURE.
6. SKIN REINFORCEMENT OF 10mm@200C/C BOTH WAYS SHALL BE PROVIDED ON ALL EXPOSED SURFACES OF P.C.C. STRUCTURES.
7. MINIMUM CLEAR COVER TO ANY REINFORCEMENT SHALL BE 40mm.
8. ALL H.Y.S.D. BARS SHALL CONFORM TO IS:1786 GRADE Fe 415.
9. LAPS SHALL BE STAGGERED AND NOT MORE THAN 25% OF BARS SHALL BE LAPPED AT ANY LOCATION. MINIMUM LAP LENGTH SHALL BE 56 TIMES DIA OF BAR.
10. CLEAN & APPLY A COAT OF NEAT CEMENT SLURRY TO ALL THE OLD EXPOSED REINFORCEMENT.
11. 100 DIA WEEP HOLES @1000 C/C BOTH WAYS SHALL BE PROVIDED ABOVE GROUND LEVEL AS SHOWN.
12. THE SUPER STRUCTURE REFER MOST STANDARD DRAWING FOR ROAD BRIDGES FOR R.C.C. SOLID SLAB STRUCTURE (15' & 30' SKEN) DRG. NO. 50/170.
13. FOR DETAIL OF RETURN WALL REFER DRAWING NO. OSRP/CEG/RW/MISC-02

**REFERENCE DRAWING:-**

- 1 OSRP/CEG/SH-17/BR/1+915/02
- 2 OSRP/CEG/SH-17/BR/1+915/03



**PLAN OF EXISTING BRIDGE**



**CROSS SECTION AT A-B**

TO BANGI JUNCTION

BACKBONE PROJECTS

ARSS Infrastructure Projects Ltd

ARSS JV

CONTRACTOR

Chief Engineer  
World Bank Projects, Orissa  
Bhubaneswar

to the E.I.C (Civil) Orissa

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

GENERAL ARRANGEMENT DRAWING

BRIDGE AT KM 1+915

DATE	ISSUED	APPROVED
DATE	ISSUED	APPROVED
DATE	ISSUED	APPROVED

DRAWING NO. : OSRP/CEG/SH-17/BR/1+915/01  
DATE : 15.01.2007

NOTES:

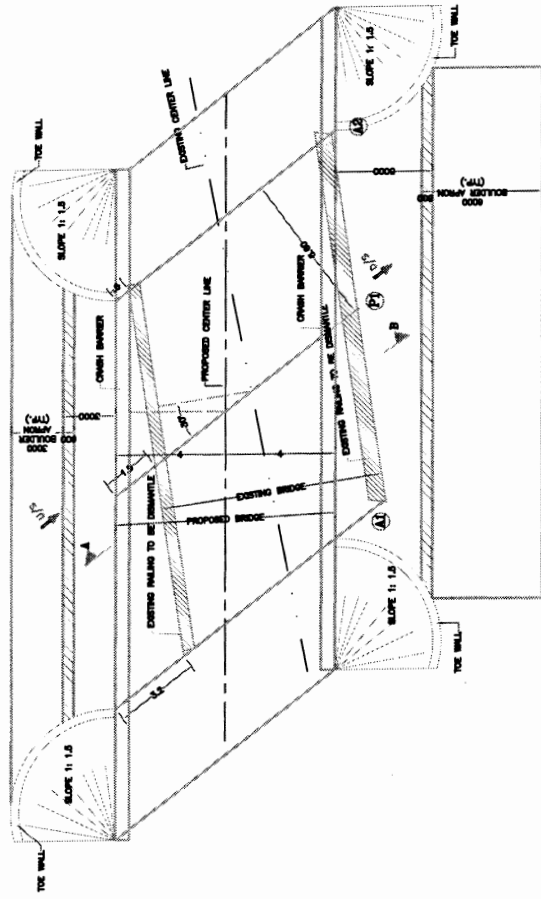
REFERENCE DRAWING:-  
 1 OSRP/CEG/SH-17/BR/1+915/01  
 2 OSRP/CEG/SH-17/BR/1+915/03

EXISTING BRIDGE DETAILS	
1	Chaimage 1915
2	Name of the mallah Ambegada Nallah
3	Year of construction 1991
4	Type of bridge High Level Bridge
5	Existing span arrangement 2 x 6.6 m
6	Existing carriage way width 7.0 m
7	Thickness of superstructure 0.5 m
8	Type of foundation Open foundation
9	Type of substructure PCC wall type
10	Type of superstructure RCC solid slab
11	Existing Formation Level 58.344 m
12	Final Formation Level 58.344 m
13	Bed Level 55.753 m
14	Top level of Cap 57.663 m
15	Bottom level of Cap 57.363 m
16	Distance of PCL w.r.t ECL (max.) 1.25 m Right

REHABILITATION MEASURES SUGGESTED		
S. no.	Items	Reference Drawings
1	Widening of existing bridge	OSRP/CEG/SH-17/BR/1+915/01
2	Superstructure	MOST STANDARD DRAWING FOR ROAD BRIDGES (R.G. NO. SB/70) (Proposed carriage way wide modified to 10.0m)
3	Crash barrier	OSRP/CEG/BR/MISC-02
4	Expansion joint	OSRP/CEG/BR/MISC-02
5	Wearing coat	OSRP/CEG/BR/MISC-02
6	Drainage spout	OSRP/CEG/BR/MISC-02
7	Approach slab	OSRP/CEG/BR/MISC-02
8	Return wall	OSRP/CEG/RW/MISC-02
9	Bearing	-
10	Bed Protection	OSRP/CEG/SH-17/BR/1+915/01

TO BANGI JUNCTION



TO BERHAMPUR



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

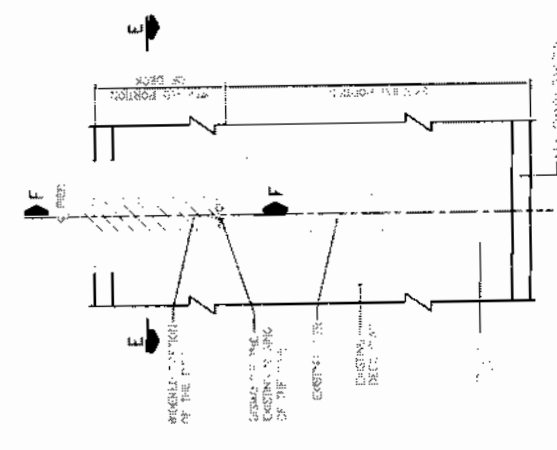
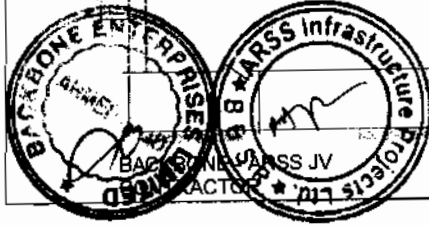
DATE: 10.07.2017	DESIGNED	APPROVED
DATE: 10.07.2017	CHECKED	
DATE: 10.07.2017	REVISION	
DATE: 10.07.2017	DATE ISSUED	
DATE: 10.07.2017	BY	

REHABILITATION BRIDGE DETAILS  
 BRIDGE AT KM 1+915

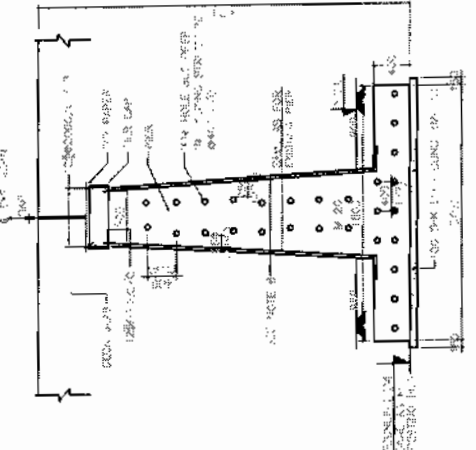
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

CONSULTING ENGINEERS GROUP LTD.  
 E-12/6/3 Colaba Station Road, Mumbai-400029  
 Tel: +91-22-23520899, 25218994, 25202558  
 Fax: 25213448, E-mail: ce@cegroupindia.com

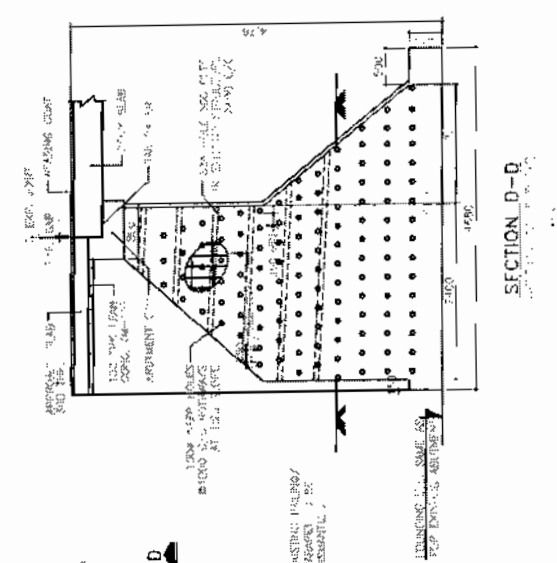




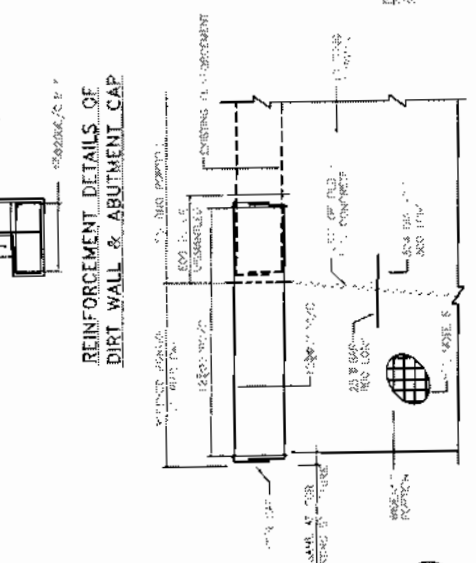
PLAN AT DECK LEVEL



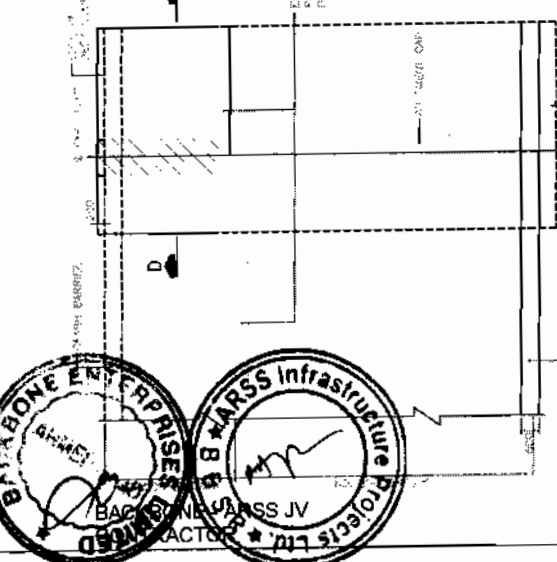
SECTION E-E  
(WIDENING & PIER)



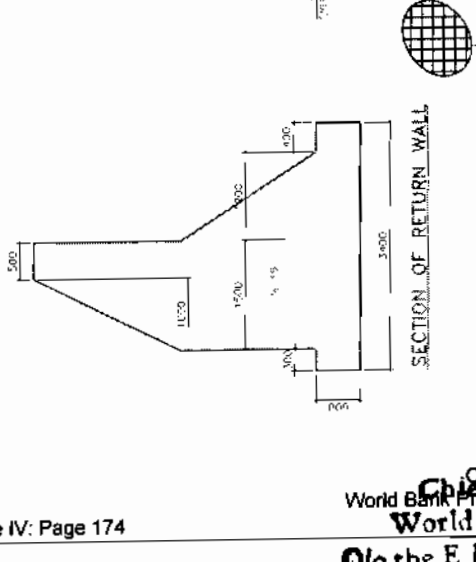
SECTION D-D



REINFORCEMENT DETAILS OF  
DIRT WALL & ABUTMENT CAP



PLAN AT DECK LEVEL



SECTION OF RETURN WALL

NOTES:

1. ALL DIMENSIONS ARE IN MM.
2. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.
3. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.
4. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.
5. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.
6. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.
7. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.
8. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.
9. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.
10. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.
11. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.
12. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.

WIDENING METHODOLOGY:

FOR ABUTMENT:

FOR PIER:

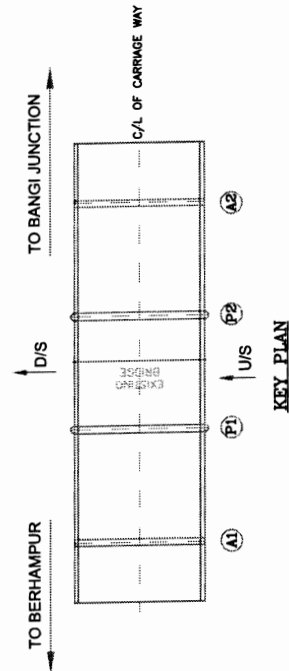
FOR ABUTMENT/PIER CAP:

FOR APPROACH SLAB:

PROJECT: CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE		BRIDGE AT KM 149/15	
CONSULTING ENGINEERS GROUP LTD. E-15/16, Chhatrapati Maharaj, Bhubaneswar, Odisha, 751005. Ph: 9830311111, E-mail: info@cegroup.com		DETAILS FOR WIDENING METHODOLOGY OF MINOR BRIDGES	

NOTES:

EXISTING BRIDGE DETAILS			
1	Chainage	4/400	
2	Name of the naah	Lanjia Canal	
3	Year of construction	1992	
4	Type of bridge	High level Bridge	
5	Existing span arrangement	3 x 6.75 m	
6	Existing carriage way width	7.5 m	
7	Thickness of superstructure	0.5 m	
8	Type of foundation	Open foundation	
9	Type of substructure	PCC Wall type	
10	Type of superstructure	RCC solid slab	
11	Existing Formation Level	72.609 m	
12	Final Formation Level	72.609 m	
13	Bed Level	69.162 m	
14	Distance of PCL w.r.t ECL	0.57 m Right	
REHABILITATION MEASURES SUGGESTED			
S. no.	Items	Rehabilitation Measures	Reference Drawings
1	Expansion joint	Expansion joint burried and shall be replaced by filler type Expansion joint	OSRP/CEG/BR/MISC-02
2	Railing	8.0 mts of railings to be replaced	MOST STANDARD SHEET OF CULVERTS NO. SD115 (SHEET 1 OF 4), SD115 (SHEET 2 OF 4)
3	Wearing coat	Touch up repair shall be done in C.C. wearing coat	MOST STANDARD PLANS FOR HIGHWAY BRIDGES DRG. NO. SD205
4	Approach slab	Approach slab to be reconstructed	OSRP/CEG/BR/MISC-02
5	Distress on substructure	Reinforcement exposed on pier P2 of area 0.2 m <sup>2</sup> to be take care by epoxy mortar	-
6	Vegetation growth	Vegetation to be removed from the structure and bed	-



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

CONSULTING ENGINEERS GROUP LTD.  
 F-12, 1st Floor, Market, Bhubaneswar - 751005  
 Tel: 6711144 - 252008/1, 252185/2, 252045/3  
 Fax: 2521345, e-mail: ceg@cegindia.com



REHABILITATION BRIDGE DETAILS  
 BRIDGE AT CH. 4+400

SHEET NO. : 00P/128/PH-17/NA-100/VI	DATE : 10/07/2017
DESIGNED	CHECKED
DRAWN	APPROVED
DATE REVISY	A.U. NO.



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

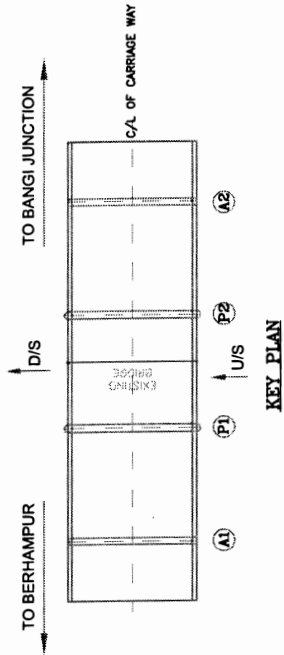
NOTES:

**EXISTING BRIDGE DETAILS**

1	Chainage	11/660
2	Name of the nallah	Bijayghana Ghat
3	Year of construction	1984
4	Type of bridge	High Level Bridge
5	Existing span arrangement	3 x 6.80
6	Existing carriage way width	7.5 m
7	Thickness of superstructure	0.5 m
8	Type of foundation	Open foundation
9	Type of substructure	Course Stone Masonry Wall type
10	Type of superstructure	RCC solid slab
11	Existing Formation Level	82.874 m
12	Final Formation Level	82.874 m
13	Bed Level	78.073 m
14	Top level of Cap	82.099 m
15	Bottom level of Cap	81.599 m
16	Distance of PCL w.r.t ECL	0.138 m Left

**REHABILITATION MEASURES SUGGESTED**

S. no.	Items	Rehabilitation Measures	Reference Drawings
1	Superstructure	Existing slab shall be dismantled and new slab shall be constructed	MOST STANDARD DRAWINGS FOR ROAD BRIDGES, SO/1/3 adopted as per with shall be modified to 8.3. am
2	Substructure	Abutment & pier caps shall be dismantled and new caps shall be constructed, jacking shall be done in piers and abutments	OSRP/CEG/BR/JT-01
3	Crash barrier	Existing railings shall be dismantled and crash barrier shall be cast	OSRP/CEG/BR/MISC-02
4	Expansion joint	Filler type expansion joints shall be provided	OSRP/CEG/BR/MISC-02
5	Wearing coat	50mm BC laid over 6mm thick mastic asphalt	OSRP/CEG/BR/MISC-02
6	Drainage spout	Drainage spouts shall be provided on @.50m c/c distance on both sides	OSRP/CEG/BR/MISC-02
7	Approach slab	Approach slab to be constructed	OSRP/CEG/BR/MISC-02
8	Return Wall	Return Walls shall be constructed on right side (2 NOS.)	OSRP/CEG/BR/MISC-01
9	Bearing	Tar paper bearing shall be provided	-
10	Vegetation growth	Vegetation to be removed from the structure and bed	-

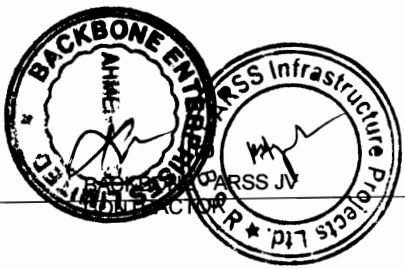


CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

**CONSULTING ENGINEERS GROUP LTD.**  
 E-12/1st Cross-Street, Bhubaneswar-751017  
 Tel: 49111-41-2520898/2523859/25230558  
 Fax: 2521343, e-mail: ceng@cegroup.com

REHABILITATION BRIDGE DETAILS  
 BRIDGE AT CH. 11+660

SHEET NO. : 08P/03A/01-17/06/11+660/01		
DATE : MAR, 2007		
DESIGNED	CHECKED	APPROVED
DRAWN	ISS. RECDY	A.C. JAIN



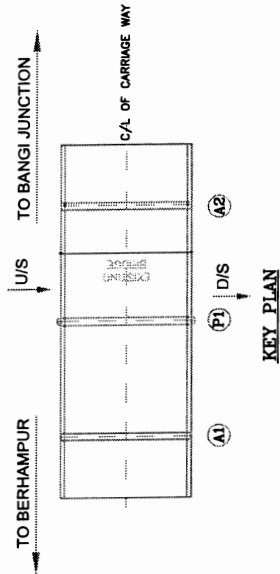
NOTES:

**EXISTING BRIDGE DETAILS**

1	Chainage	15/185
2	Name of the naallah	Khari Nallah
3	Year of construction	1990
4	Type of bridge	High level Bridge
5	Existing span arrangement	2 x 6.8m
6	Existing carriage way width	7.5 m
7	Thickness of superstructure	0.6 m
8	Type of foundation	Open foundation
9	Type of substructure	PCC Wall type
10	Type of superstructure	RCC solid slab
11	Existing Formation Level	90.35 m
12	Final Formation Level	90.35 m
13	Bed Level	87.372 m
14	Distance of PCL w.r.t ECL	0.08 m Left

**REHABILITATION MEASURES SUGGESTED**

S. no.	Items	Rehabilitation Measures	Reference Drawings
1	Expansion joint	Expansion joint buried due to overlay of BT and shall be replaced by filler type	OSRP/CEG/BR/MISC-02
2	Wearing coat	Overlay of BT shall be removed and W.C. shall be replaced completely by 50 mm thick bituminous W.C.	OSRP/CEG/BR/MISC-02
3	Railing	Minor touch up repair in railings	MOST STANDARD SHEET OF CULVERTS NO. SD/115 (SH. 1 OF 4), SD/115 (SH. 2 OF 4)
4	Vegetation growth	Vegetation to be removed from the structure and bed	-



Chief Engineer  
World Bank Projects, Orissa  
World Bank Projects  
EMPLOYER  
O/o the E.T.C (Civil) Orissa  
Bhubaneswar

APPROVED	DATE: 15/01/2022	SHEET NO.: 08P/025/09-17/04/18-188/01
CHECKED	DATE: 15/01/2022	
DESIGNED		
DRAWN		
REVISION		

REHABILITATION BRIDGE DETAILS  
BRIDGE AT CH. 15+185

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

CONSULTING ENGINEERS GROUP LTD.  
15/1, Midij Colony, Khandagiri, Cuttack  
Ph: 2521344, 2521345, e-mail: ceg@egpnl.com



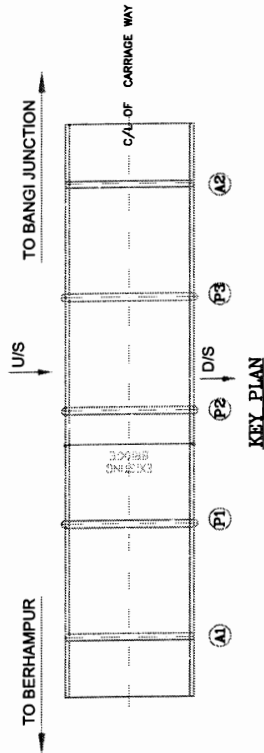


NOTES:

EXISTING BRIDGE DETAILS	
1	Chainage 15/680
2	Name of the nallah Ghana Nallah
3	Year of construction 1988
4	Type of bridge High level Bridge
5	Existing span arrangement 4 x 6.8m
6	Existing carriage way width 7.5 m
7	Thickness of superstructure 0.6 m
8	Type of foundation Open foundation
9	Type of substructure PCC Wall type
10	Type of superstructure RCC solid slab
11	Existing Formation Level 92.049 m
12	Final Formation Level 92.049 m
13	Bed Level 86.462 m
14	Distance of PCL w.r.t ECL 0.35 m Left

REHABILITATION MEASURES SUGGESTED		
S. no.	Items	Reference Drawings
1	Expansion joint Expansion joint burried due to overlay of BT and shall be replaced by filler type	OSRP/CEG/BR/MISC-02
2	Wearing coat Overlay of BT shall be removed and W.C shall be replaced completely by 56 mm thick bituminous W.C.	OSRP/CEG/BR/MISC-02
3	Railing 2.0 mts of railings to be replaced	MOST STANDARD SHEET OF CULVERTS NO. SD-115 (SH. 1 OF 4), SD-115 (SH. 2 OF 4)
4	Vegetation growth Vegetation to be removed from the structure and bed	-



Client's Engineer  
World Bank Projects, Consultants  
World Bank Projects, Consultants  
EMPLOYER  
O/c the E. I. C. (Civil) Office  
Bhubaneswar

CONSULTING ENGINEERS GROUP LTD.  
ENGINEERS GROUP LTD.  
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, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

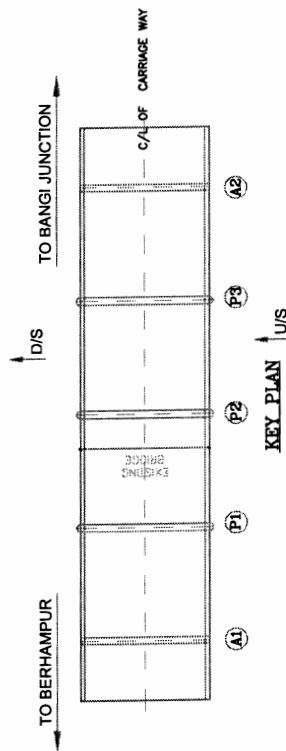
REHABILITATION BRIDGE DETAILS  
BRIDGE AT CH. 15+680

DESIGNED	DATE	BY
CHECKED	DATE	BY
APPROVED	DATE	BY

SHEET NO. : OSRP/CEG/BR-17/W/14-000/71  
DATE : 15/06/2017

NOTES:

EXISTING BRIDGE DETAILS			
1	Chainage 17/900		
2	Name of the nallah Sugar Nallah		
3	Year of construction 1990		
4	Type of bridge High level Bridge		
5	Existing span arrangement 4 x 6.8 m		
6	Existing carriage way width 7.5 m		
7	Thickness of superstructure 0.6 m		
8	Type of foundation Open foundation		
9	Type of substructure PCC Wall type		
10	Type of superstructure RCC solid slab		
11	Existing Formation Level 84.011 m		
12	Final Formation Level 84.011 m		
13	Bed Level 79.981 m		
14	Distance of PCL w.r.t ECL 0.205 m Left		
REHABILITATION MEASURES SUGGESTED			
S. no.	Items	Rehabilitation Measures	Reference Drawings
1	Superstructure	Existing slab shall be dismantled and new slab shall be constructed	MOST STANDARD DRAWINGS FOR ROAD BRIDGES, SD/111
2	Expansion joint	Expansion joint burried due to overlay of wearing coat and shall be replaced by filler type	OSRP/CEG/BR/MISC-02
3	Crash barrier	Existing railings shall be dismantled and crash barrier shall be cast	OSRP/CEG/BR/MISC-02
4	Approach slab	Approach slab to be constructed	OSRP/CEG/BR/MISC-02
5	Wearing coat	Overlay of FBT shall be removed and W.C. shall be replaced completely by 56 mm thick bituminous W.C.	OSRP/CEG/BR/MISC-02
6	Bearing	Tar paper bearing shall be provided	-
7	Vegetation growth	Vegetation to be removed from pier cap and abutment	-



Chief Engineer  
World Bank Projects  
O/o the E.T.C. (Civil) Office  
Bhubaneswar.

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

CONSULTING ENGINEERS GROUP LTD.  
F-12/141, Chhatrapati Shivaji Maharaj, Bhubaneswar-751005  
Tel: 991-141-2520898, 2521898/2520899  
Fax: 2521348, e-mail: sag@engineersgroup.com

REHABILITATION BRIDGE DETAILS  
BRIDGE AT CH. 17+900

DESIGNED	DATE	BY	DATE
CHECKED	DATE	BY	DATE
APPROVED	DATE	BY	DATE

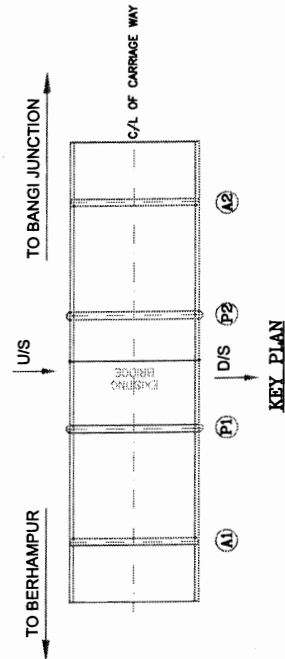
SHEET NO. 1: 0997/030/00-17/00/11-000/01  
SHEET NO. 1/07

NOTES:

EXISTING BRIDGE DETAILS	
1	Chainage
2	Name of the naillah
3	Year of construction
4	Type of bridge
5	Existing span arrangement
6	Existing carriage way width
7	Thickness of superstructure
8	Type of foundation
9	Type of substructure
10	Type of superstructure
11	Existing Formation Level
12	Final Formation Level
13	Bed Level
14	Distance of PCL w.r.t ECL

REHABILITATION MEASURES SUGGESTED			
S. no.	Items	Rehabilitation Measures	Reference Drawings
1	Expansion joint	Expansion joint burried due to overlay of BT and shall be replaced by filter type	OSRP/CEG/BR/MISC-02
2	Vegetation growth	Vegetation to be removed from the structure and bed	-



Chief Engineer  
 World Bank Projects  
 Olo the E.I.C (Civil) Orissa  
 Phrhanewar

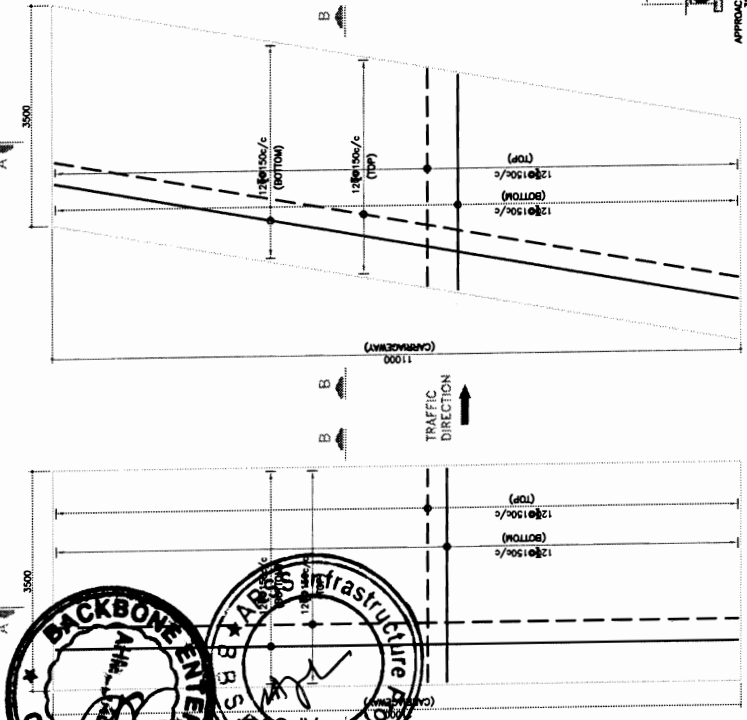
SHEET NO. : 08P/CEG/BR-17/P/1+850/P1
DATE : 14/07/2017
DESIGNED
CHECKED
APPROVED

REHABILITATION BRIDGE DETAILS  
 BRIDGE AT CH. 21+850

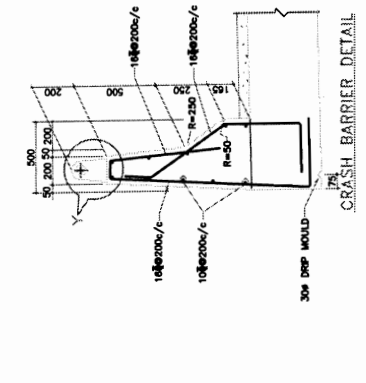
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

CONSULTING ENGINEERS GROUP LTD.  
 E-12/4/3, Calcutta Market, Major, Sec-17  
 Tel: 91-11-23220894, 23220895, 23220896  
 Fax: 23221343, e-mail: ceg@cegroupindia.com

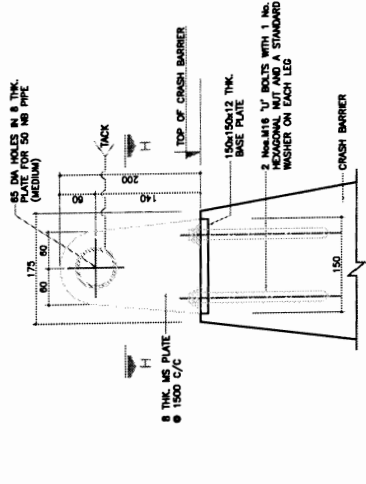




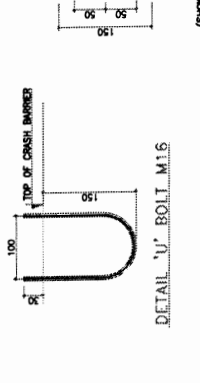
PLAN OF APPROACH SLAB (RIGHT) SHOWING REINFORCEMENT



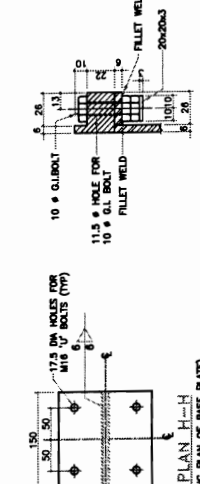
CRASH BARRIER DETAIL



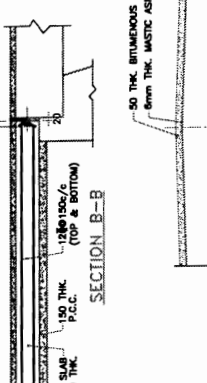
DETAIL Y (SHOWING RAILING & ITS FIXTURES)



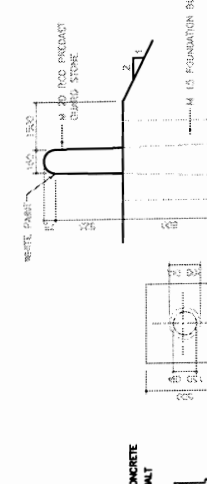
DETAIL V-BOLT M16



DETAIL AT X

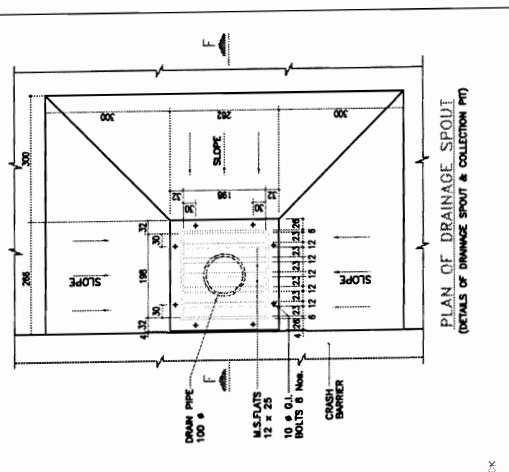


SECTION B-B

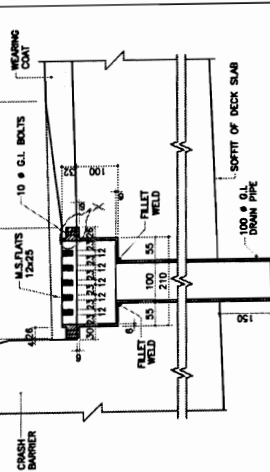


DETAIL AT Y

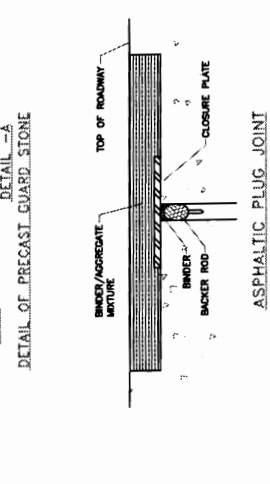
- NOTES:**
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE MENTIONED.
  2. DIMENSIONS ARE TO BE FOLLOWED.
  3. JOINT FILLER IS CONFORMED TO IS 1038.
  4. DRAINAGE SPOUT AND COLLECTION PIT ASSEMBLY & PRODUCTS WITH I.S.I. CERTIFICATION MARK IS ONLY TO BE USED.
  5. THE REINFORCEMENT OF THE DECK SLAB IS SUITABLY MODIFIED TO ACCOMMODATE THE DRAINAGE SPOUT.
  6. GRADE OF CONCRETE:
    - M-15
    - M-20
    - M-30
    - M-40
    - M-50
  7. CLEAR COVER TO REINFORCEMENT - 40mm
  8. GRADE OF FINISH IS CONFORMED TO IS:1786



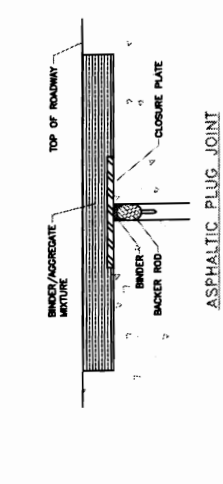
PLAN OF DRAINAGE SPOUT (DETAILS OF DRAINAGE SPOUT & COLLECTION PIT)



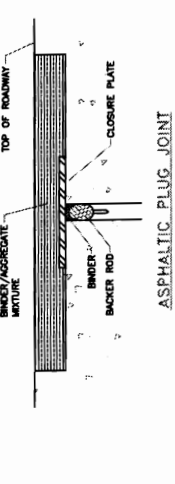
SECTION E-E



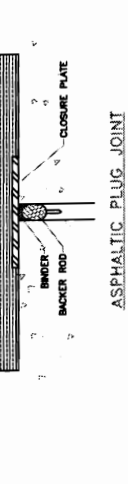
DETAIL - A



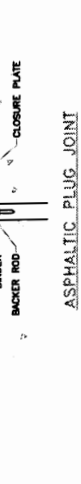
DETAIL - B



DETAIL - C



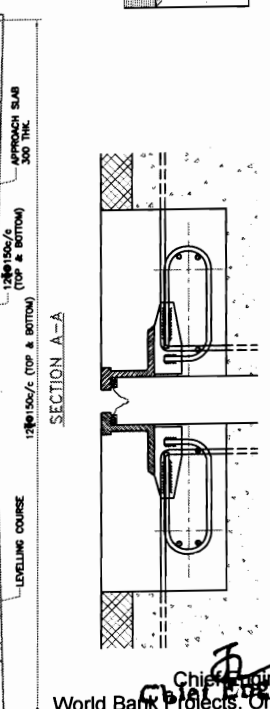
DETAIL - D



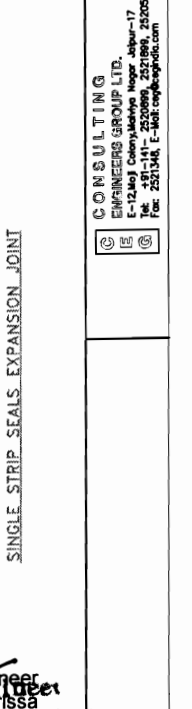
DETAIL - E



DETAIL - F



SECTION A-A



SINGLE STRIP SEALS EXPANSION JOINT

<p>CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE</p>	<p>DETAILS OF CRASH BARRIER, EXPANSION JOINT, APPROACH SLAB &amp; DRAINAGE SPOUT</p>
<p>PROJECT NO. : ORISSA/2008/100/100-10</p> <p>DATE : 12.05.2007</p> <p>SCALE : 1:100</p> <p>DESIGNED : [Signature]</p> <p>CHECKED : [Signature]</p> <p>APPROVED : [Signature]</p>	<p>DATE: 12.05.2007</p> <p>SCALE: 1:100</p> <p>DESIGNED: [Signature]</p> <p>CHECKED: [Signature]</p> <p>APPROVED: [Signature]</p>

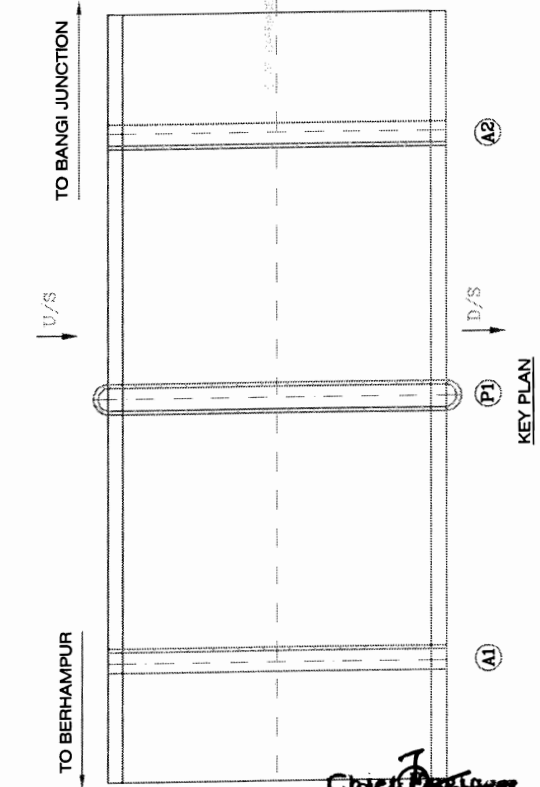
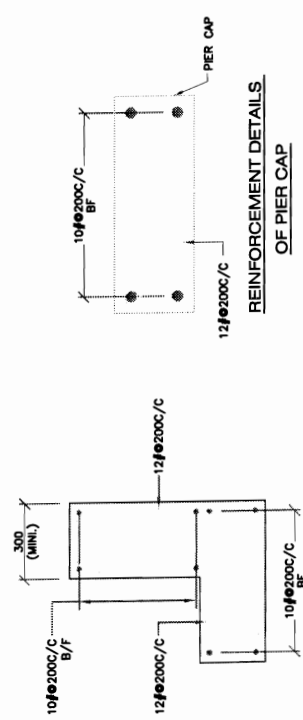
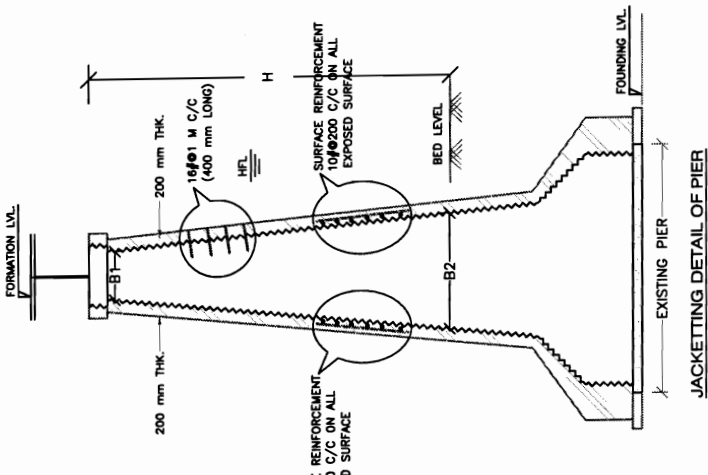
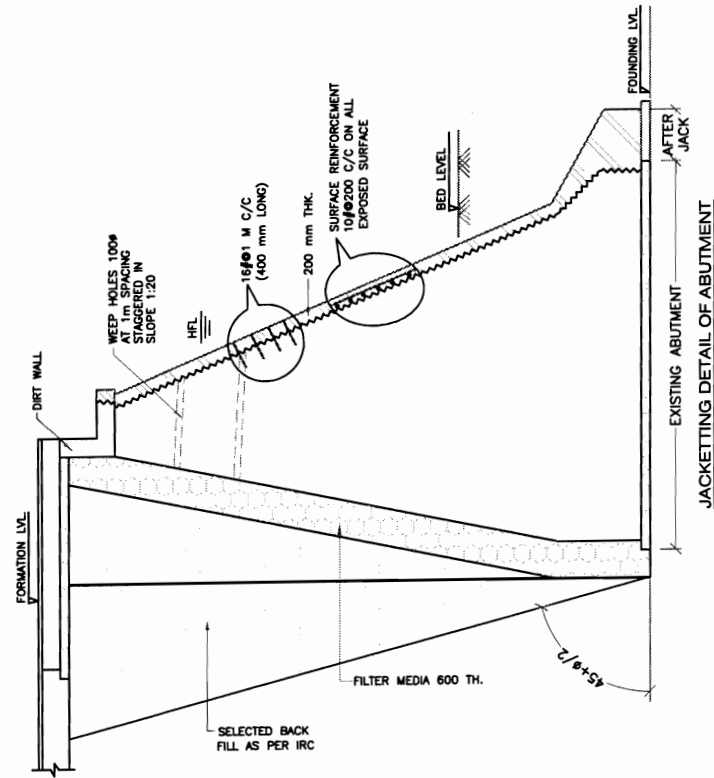
Chief Engineer  
World Bank Projects, Orissa  
World Bank Projects  
Bhubaneswar

**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 AS PER CLAUSE 710.1.1 OF IRC 78-2000, SURFACE REINFORCEMENT @ 2.5KG/SQM HAS TO BE PROVIDED ON ALL EXPOSED SURFACE HORIZONTALLY AND VERTICALLY.
- 4 GRADE OF CONCRETE :  
 PIER - M-15  
 ABUTMENT - M-25  
 DIRT WALL - M-25  
 PIER CAP - M-25  
 APPROACH SLAB - M-30  
 SOLID SLAB - M-25
- 5 GRADE OF STEEL - Fe-415.

REFERENCE DRAWING:-

1 OSRP/CEG/SH-17/BR/11+660/01



Bridge Location	FRL	Top Level of Cap	Bottom level of Cap	H (in mt)	B1 (in mt)	B2 (in mt)
11/660	82.874	82.099	81.599	4.026	0.8	1.2



World Wide Projects  
 Employer  
 Bhubaneswar

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

PROJECT NO. : OSRP/CEG/SH/17/01

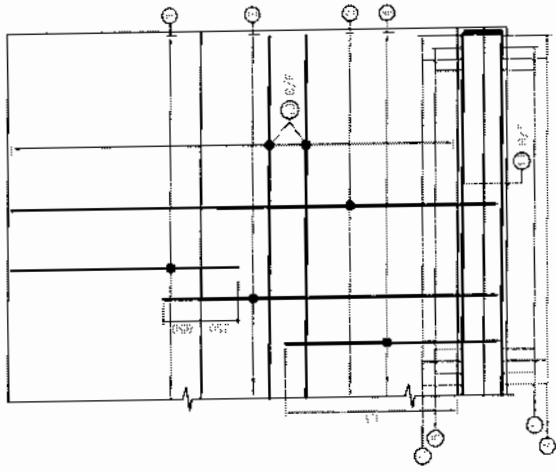
DATE : 11/11/2017

APPROVED	DATE
CHECKED	DATE
DESIGNED	DATE
DRAWN	DATE

JACKETING DETAIL OF ABUTMENT & PIER

**NOTES**

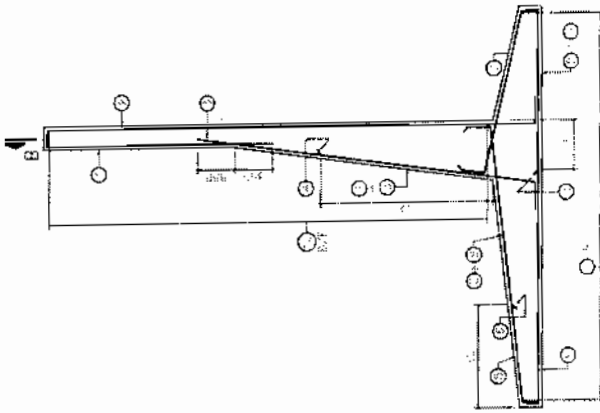
1. ALL DIMENSIONS ARE IN METERS & LEVELS ARE IN METERS.
2. DO NOT COPY THE DIMENSIONS, ONLY REFER TO ORIGINALS AND TO BE FOLLOWED.
3. CHANGE OF CLASS FOR R.C.C. WORK IS INDICATED BY CHANGE OF COLOR FOR S.C.C. WORK IS INDICATED BY CHANGE OF LINE FOR P.C.C. WORK IS INDICATED BY CHANGE OF LINE.
4. ALL REINFORCING BARS AS COMBINED (1) OR (2) OR (3) OR (4) OR (5) CLEAR FROM TO ANY OTHER.
5. ALL OFFSET DIMENSIONS ARE IN METERS.
6. ALL OFFSET DIMENSIONS ARE IN METERS.
7. LAPPING IS CONSIDERED AS PER IS: 456-1978 AND IS TO BE PROVIDED AS A STANDARD MEMBER OF THE STRUCTURE FOR ALL BARS FOR ALL WORKS AND TO TAKE CARE OF ALL OTHER WORKS.
8. PROVISIONS FOR COMPRESSION SHALL BE AS PER IS: 456-1978.



SECTION B-B  
(FOR WALL REINFORCEMENT)

**LEGENDS:**

---	As per IS: 456-1978
---	As per IS: 456-1978
---	As per IS: 456-1978
---	As per IS: 456-1978
---	As per IS: 456-1978



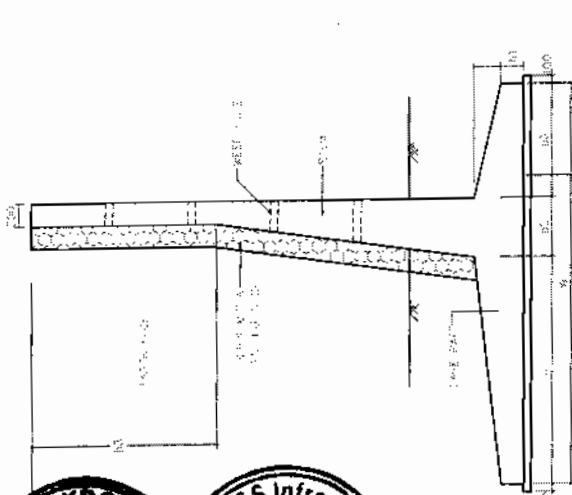
SECTION A-A  
(FOR WALL REINFORCEMENT)

**DIMENSIONAL DETAILS**

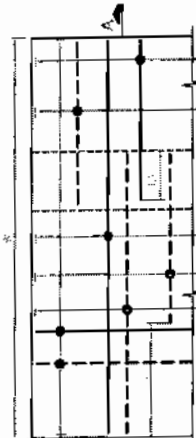
REINFORCEMENT	1	2	3	4	5	6	7	8
Bar	10	10	10	10	10	10	10	10
Bar	10	10	10	10	10	10	10	10
Bar	10	10	10	10	10	10	10	10
Bar	10	10	10	10	10	10	10	10
Bar	10	10	10	10	10	10	10	10
Bar	10	10	10	10	10	10	10	10
Bar	10	10	10	10	10	10	10	10
Bar	10	10	10	10	10	10	10	10

**LENGTH OF CURTAILMENT**

REINFORCEMENT	L1	L2	L3	L4
Bar	10	10	10	10
Bar	10	10	10	10
Bar	10	10	10	10
Bar	10	10	10	10
Bar	10	10	10	10
Bar	10	10	10	10
Bar	10	10	10	10
Bar	10	10	10	10



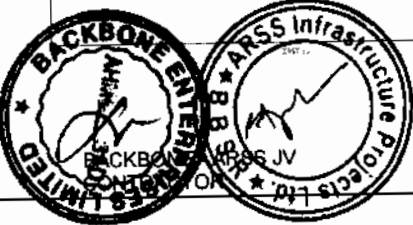
CROSS SECTION OF RETAINING WALL  
(FOR CATEGORY A & K)



PLAN SHOWING REINFORCEMENT IN BASE RAFT  
(FOR CATEGORY A & K)

**REINFORCEMENT DETAILS**

REINFORCEMENT	1	2	3	4	5	6	7	8
Bar	10	10	10	10	10	10	10	10
Bar	10	10	10	10	10	10	10	10
Bar	10	10	10	10	10	10	10	10
Bar	10	10	10	10	10	10	10	10
Bar	10	10	10	10	10	10	10	10
Bar	10	10	10	10	10	10	10	10
Bar	10	10	10	10	10	10	10	10
Bar	10	10	10	10	10	10	10	10
Bar	10	10	10	10	10	10	10	10



DIMENSION & REINFORCEMENT DETAILS  
OF RETAINING WALL

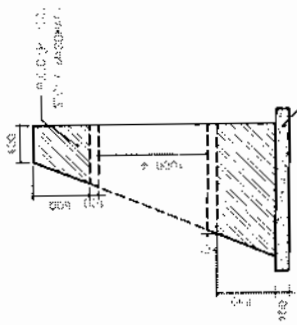
BRIDGE AT KM 11+915 & 11+660

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

**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**  
F-13/14/15/16/17/18/19/20/21/22/23/24/25/26/27/28/29/30/31/32/33/34/35/36/37/38/39/40/41/42/43/44/45/46/47/48/49/50/51/52/53/54/55/56/57/58/59/60/61/62/63/64/65/66/67/68/69/70/71/72/73/74/75/76/77/78/79/80/81/82/83/84/85/86/87/88/89/90/91/92/93/94/95/96/97/98/99/100/101/102/103/104/105/106/107/108/109/110/111/112/113/114/115/116/117/118/119/120/121/122/123/124/125/126/127/128/129/130/131/132/133/134/135/136/137/138/139/140/141/142/143/144/145/146/147/148/149/150/151/152/153/154/155/156/157/158/159/160/161/162/163/164/165/166/167/168/169/170/171/172/173/174/175/176/177/178/179/180/181/182/183/184/185/186/187/188/189/190/191/192/193/194/195/196/197/198/199/200/201/202/203/204/205/206/207/208/209/210/211/212/213/214/215/216/217/218/219/220/221/222/223/224/225/226/227/228/229/230/231/232/233/234/235/236/237/238/239/240/241/242/243/244/245/246/247/248/249/250/251/252/253/254/255/256/257/258/259/260/261/262/263/264/265/266/267/268/269/270/271/272/273/274/275/276/277/278/279/280/281/282/283/284/285/286/287/288/289/290/291/292/293/294/295/296/297/298/299/300/301/302/303/304/305/306/307/308/309/310/311/312/313/314/315/316/317/318/319/320/321/322/323/324/325/326/327/328/329/330/331/332/333/334/335/336/337/338/339/340/341/342/343/344/345/346/347/348/349/350/351/352/353/354/355/356/357/358/359/360/361/362/363/364/365/366/367/368/369/370/371/372/373/374/375/376/377/378/379/380/381/382/383/384/385/386/387/388/389/390/391/392/393/394/395/396/397/398/399/400/401/402/403/404/405/406/407/408/409/410/411/412/413/414/415/416/417/418/419/420/421/422/423/424/425/426/427/428/429/430/431/432/433/434/435/436/437/438/439/440/441/442/443/444/445/446/447/448/449/450/451/452/453/454/455/456/457/458/459/460/461/462/463/464/465/466/467/468/469/470/471/472/473/474/475/476/477/478/479/480/481/482/483/484/485/486/487/488/489/490/491/492/493/494/495/496/497/498/499/500/501/502/503/504/505/506/507/508/509/510/511/512/513/514/515/516/517/518/519/520/521/522/523/524/525/526/527/528/529/530/531/532/533/534/535/536/537/538/539/540/541/542/543/544/545/546/547/548/549/550/551/552/553/554/555/556/557/558/559/560/561/562/563/564/565/566/567/568/569/570/571/572/573/574/575/576/577/578/579/580/581/582/583/584/585/586/587/588/589/590/591/592/593/594/595/596/597/598/599/600/601/602/603/604/605/606/607/608/609/610/611/612/613/614/615/616/617/618/619/620/621/622/623/624/625/626/627/628/629/630/631/632/633/634/635/636/637/638/639/640/641/642/643/644/645/646/647/648/649/650/651/652/653/654/655/656/657/658/659/660/661/662/663/664/665/666/667/668/669/670/671/672/673/674/675/676/677/678/679/680/681/682/683/684/685/686/687/688/689/690/691/692/693/694/695/696/697/698/699/700/701/702/703/704/705/706/707/708/709/710/711/712/713/714/715/716/717/718/719/720/721/722/723/724/725/726/727/728/729/730/731/732/733/734/735/736/737/738/739/740/741/742/743/744/745/746/747/748/749/750/751/752/753/754/755/756/757/758/759/760/761/762/763/764/765/766/767/768/769/770/771/772/773/774/775/776/777/778/779/780/781/782/783/784/785/786/787/788/789/790/791/792/793/794/795/796/797/798/799/800/801/802/803/804/805/806/807/808/809/810/811/812/813/814/815/816/817/818/819/820/821/822/823/824/825/826/827/828/829/830/831/832/833/834/835/836/837/838/839/840/841/842/843/844/845/846/847/848/849/850/851/852/853/854/855/856/857/858/859/860/861/862/863/864/865/866/867/868/869/870/871/872/873/874/875/876/877/878/879/880/881/882/883/884/885/886/887/888/889/890/891/892/893/894/895/896/897/898/899/900/901/902/903/904/905/906/907/908/909/910/911/912/913/914/915/916/917/918/919/920/921/922/923/924/925/926/927/928/929/930/931/932/933/934/935/936/937/938/939/940/941/942/943/944/945/946/947/948/949/950/951/952/953/954/955/956/957/958/959/960/961/962/963/964/965/966/967/968/969/970/971/972/973/974/975/976/977/978/979/980/981/982/983/984/985/986/987/988/989/990/991/992/993/994/995/996/997/998/999/1000/1001/1002/1003/1004/1005/1006/1007/1008/1009/1010/1011/1012/1013/1014/1015/1016/1017/1018/1019/1020/1021/1022/1023/1024/1025/1026/1027/1028/1029/1030/1031/1032/1033/1034/1035/1036/1037/1038/1039/1040/1041/1042/1043/1044/1045/1046/1047/1048/1049/1050/1051/1052/1053/1054/1055/1056/1057/1058/1059/1060/1061/1062/1063/1064/1065/1066/1067/1068/1069/1070/1071/1072/1073/1074/1075/1076/1077/1078/1079/1080/1081/1082/1083/1084/1085/1086/1087/1088/1089/1090/1091/1092/1093/1094/1095/1096/1097/1098/1099/1100/1101/1102/1103/1104/1105/1106/1107/1108/1109/1110/1111/1112/1113/1114/1115/1116/1117/1118/1119/1120/1121/1122/1123/1124/1125/1126/1127/1128/1129/1130/1131/1132/1133/1134/1135/1136/1137/1138/1139/1140/1141/1142/1143/1144/1145/1146/1147/1148/1149/1150/1151/1152/1153/1154/1155/1156/1157/1158/1159/1160/1161/1162/1163/1164/1165/1166/1167/1168/1169/1170/1171/1172/1173/1174/1175/1176/1177/1178/1179/1180/1181/1182/1183/1184/1185/1186/1187/1188/1189/1190/1191/1192/1193/1194/1195/1196/1197/1198/1199/1200/1201/1202/1203/1204/1205/1206/1207/1208/1209/1210/1211/1212/1213/1214/1215/1216/1217/1218/1219/1220/1221/1222/1223/1224/1225/1226/12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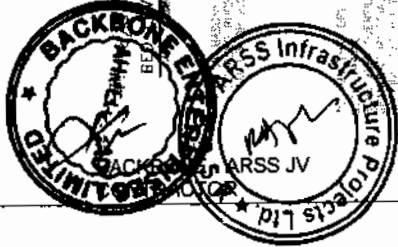
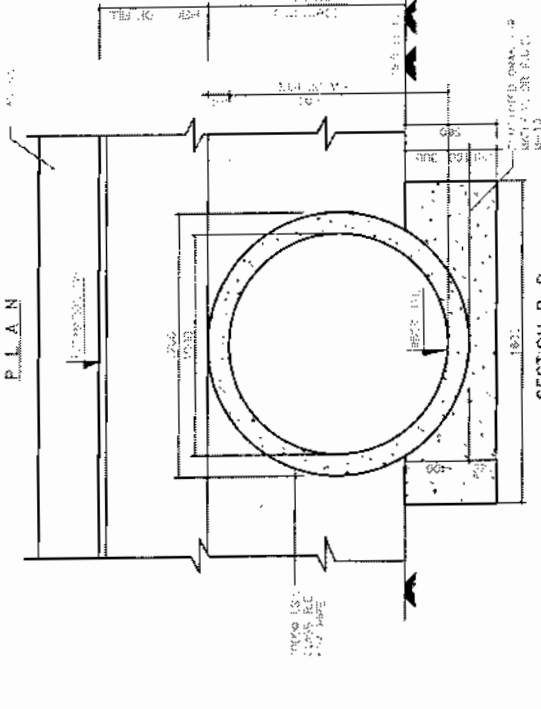
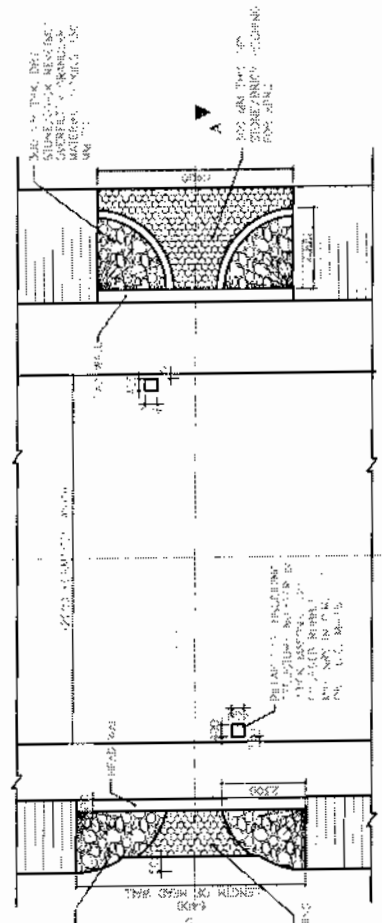
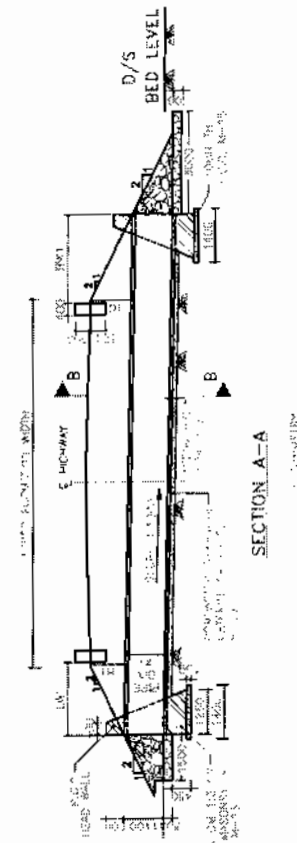
1. DIMENSIONS IN BRACKETED ARE TO BE MAINTAINED.
2. ALL DIMENSIONS ARE TO BE MAINTAINED UNLESS OTHERWISE SPECIFIED.
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DETAIL OF HEAD WALL

**SINGLE PIPE CULVERTS LEVEL DETAIL**

Sl. No.	Existing Location	Proposed Chaugage	Proposed Formwork Level	Center/Super Elevation		Bed level		Height of fill		Direction of flow	Total Length	No. of Piles		
				Left	Right	Left	Right	Left	Right					
1	31105	3095	62.073	-2.5%	-2.5%	60.441	60.276	0.5	0.9	1.7	1.7	L TOR	15.4	6
2	3265	3259	63.041	-2.5%	-2.5%	61.461	61.061	1.0	1.2	2.1	2.4	L TOR	16.4	6.5
3	3775	3766	66.082	-2.5%	-2.5%	64.291	64.225	0.9	0.8	1.8	1.6	L TOR	15.6	6.5
4	6230	5215	73.293	-2.5%	-2.5%	77.509	77.346	1.0	1.0	2.0	2.0	L TOR	18.0	6.5
5	6585	6487	86.803	-2.5%	-2.5%	84.260	84.000	1.0	1.0	2.0	2.0	L TOR	16.0	6.5
6	6590	6573	87.951	-2.5%	-2.5%	85.510	85.456	1.5	1.5	3.1	3.1	R TOR	18.2	7.5
7	7020	7000	93.819	-2.5%	-2.5%	92.300	92.430	0.7	0.7	1.4	1.3	R TOR	14.7	6
8	7040	7217	94.722	7.0%	-2.0%	92.580	92.953	1.6	0.9	3.5	1.6	R TOR	17.3	7
9	7045	7520	94.112	-2.5%	-2.5%	92.453	92.743	0.7	0.7	1.4	1.4	R TOR	14.9	6
10	8185	8383	86.023	-2.5%	-2.5%	84.118	84.018	1.1	1.1	2.1	2.1	R TOR	16.2	6.5
11	8200	8207	86.154	-2.5%	-2.5%	85.250	85.157	0.7	0.8	1.3	1.3	R TOR	14.6	6
12	8296	8211	86.309	-2.5%	-2.5%	85.449	84.253	1.7	1.7	3.4	3.4	R TOR	18.6	7.5
13	8310	8132	89.317	4.4%	-4.4%	88.505	87.758	1.0	0.3	2.1	1.0	L TOR	15.1	6
14	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
15	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
16	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
17	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
18	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
19	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
20	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
21	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
22	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
23	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
24	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
25	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
26	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
27	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
28	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
29	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
30	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
31	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
32	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
33	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
34	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
35	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
36	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
37	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
38	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
39	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
40	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
41	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
42	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
43	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
44	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
45	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
46	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
47	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
48	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
49	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
50	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6
51	8360	8318	89.327	4.4%	-4.4%	88.513	88.278	0.9	1.2	1.3	2.4	L TOR	15.7	6



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 e-mail: ceg@cegroup.com

**ARSS JV**

**ARSS Infrastructure Projects Ltd**

**World Bank Projects**

**Chief Engineer**

**World Bank Projects**

**Phubaneswar**

**Typical Arrangement**  
 FOR R.C SINGLE PIPE CULVERTS (1.0m DIA)  
 (HEIGHT OF FILL VARYING FROM 0.6 TO 4.0 M)

**Consistency Services for Feasibility Study and Detailed Project Preparation of Phase-I Roads for Orissa State Road Project Under World Bank Assistance**

**Drawn: Consistency Services for Feasibility Study and Detailed Project Preparation of Phase-I Roads for Orissa State Road Project Under World Bank Assistance**

**Checked: Consistency Services for Feasibility Study and Detailed Project Preparation of Phase-I Roads for Orissa State Road Project Under World Bank Assistance**

**Approved: Consistency Services for Feasibility Study and Detailed Project Preparation of Phase-I Roads for Orissa State Road Project Under World Bank Assistance**

**Scale: As per drawing**

**Sheet No: 184**

**Project No: 2000/001/001/001/001**

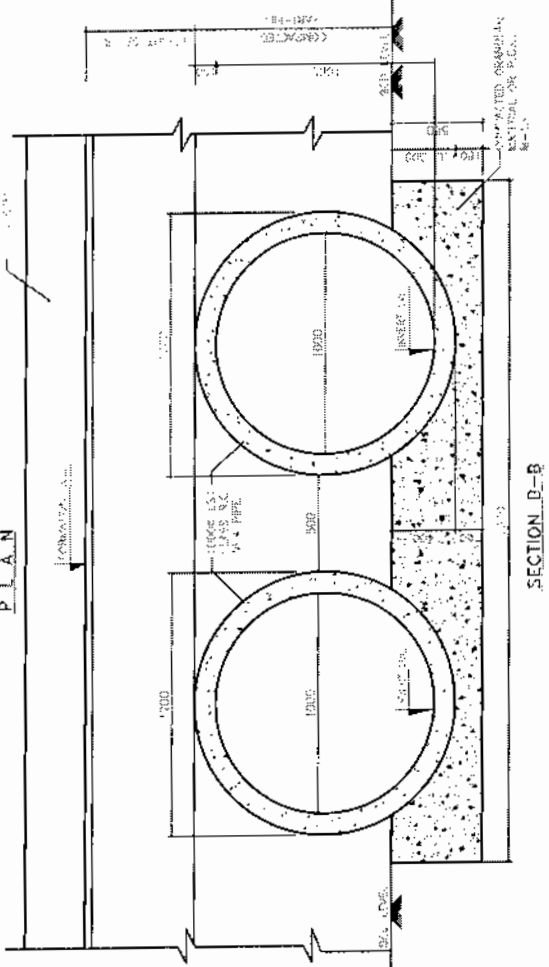
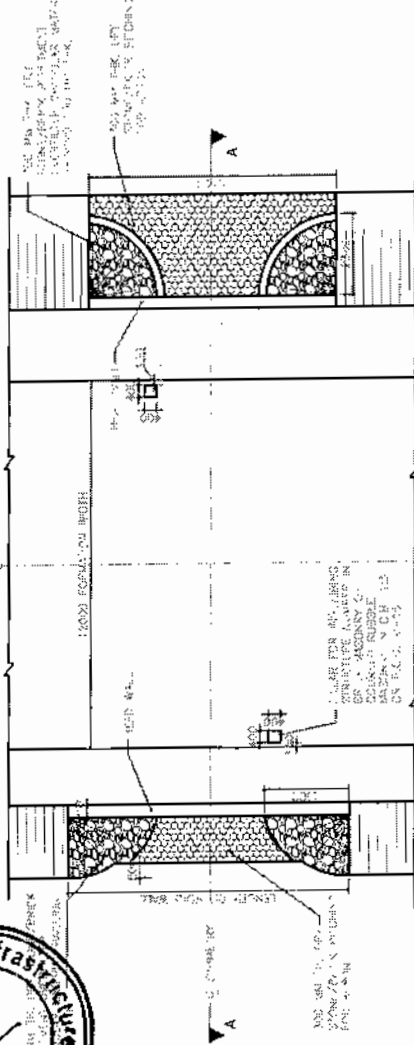
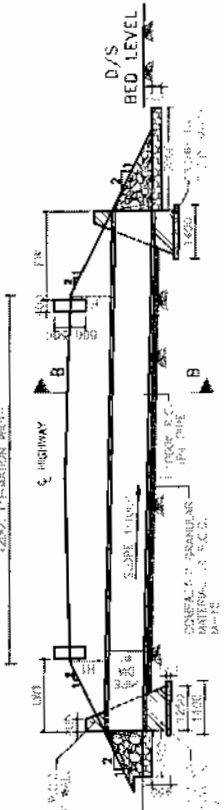
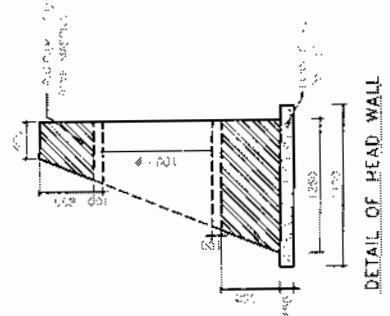
**Date: 2000/001/001/001/001**

**NOTES:**

1. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS FOR ROAD AND BRIDGE WORK, 2007 EDITION, AS APPLICABLE.
2. THE PROPOSED CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS FOR ROAD AND BRIDGE WORK, 2007 EDITION, AS APPLICABLE.
3. THE PROPOSED CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS FOR ROAD AND BRIDGE WORK, 2007 EDITION, AS APPLICABLE.
4. THE PROPOSED CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS FOR ROAD AND BRIDGE WORK, 2007 EDITION, AS APPLICABLE.
5. THE PROPOSED CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS FOR ROAD AND BRIDGE WORK, 2007 EDITION, AS APPLICABLE.
6. THE PROPOSED CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS FOR ROAD AND BRIDGE WORK, 2007 EDITION, AS APPLICABLE.
7. THE PROPOSED CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS FOR ROAD AND BRIDGE WORK, 2007 EDITION, AS APPLICABLE.
8. THE PROPOSED CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS FOR ROAD AND BRIDGE WORK, 2007 EDITION, AS APPLICABLE.
9. THE PROPOSED CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS FOR ROAD AND BRIDGE WORK, 2007 EDITION, AS APPLICABLE.

**DOUBLE PIPE CULVERTS LEVEL DETAIL**

Sl. No	Existing Location	Proposed Chainage	Proposed Formation Level	Camber/Super Elevation		Bed level		Height of Fill		Direction of flow	Total Length	No. of Pipes
				Left	Right	Left	Right	Left	Right			
1	0/190	213	55.469	-2.5%	53.907	54.100	0.6	0.6	1.22	L TOR	14.5	11.5
2	0/950	975	56.594	5.1%	55.402	55.830	0.7	0.7	1.40	L TOR	14.8	12
3	3/895	3890	66.716	-2.5%	65.068	65.107	0.7	0.7	1.40	L TOR	14.8	12
4	8/210	8193	68.336	3.4%	66.028	68.108	1.3	1.3	2.81	R TOR	17.2	14
5	8/700	8695	66.248	-2.5%	65.907	64.264	1.0	1.0	2.09	R TOR	16.2	13
6	9/600	9538	95.948	6.8%	93.239	93.689	1.5	1.5	3.00	L TOR	18.0	14.5
7	11/120	11120	82.956	-2.5%	81.946	81.118	0.9	0.9	1.78	L TOR	15.6	12.5
8	12/040	12065	84.843	-2.5%	82.959	82.872	1.0	1.0	2.04	L TOR	16.1	13
9	19/240	19192	93.760	-2.5%	91.837	91.697	1.4	1.4	2.87	L TOR	17.8	14.5



**TYPICAL ARRANGEMENT**  
FOR R.C.C DOUBLE PIPE CULVERTS (1.0m DIA)  
(HEIGHT OF FILL VARYING FROM 0.6 TO 4.0 M)

Consultancy Services for Feasibility Study and Detailed Project Preparation of Phase-I Roads for Orissa State Road Project Under World Bank Assistance

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www.cegroup.com

**World Bank Projects**  
World Bank Projects  
EMPLOYER  
Dr. the P. C. (Civil) Orissa  
Prabhatkumar





**NOTES:**

1. ALL DIMENSIONS ARE IN METERS UNLESS SPECIFIED OTHERWISE.
2. ALL DIMENSIONS ARE TO FACE UNLESS SPECIFIED OTHERWISE.
3. ALL DIMENSIONS ARE TO FACE UNLESS SPECIFIED OTHERWISE.
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9. ALL DIMENSIONS ARE TO FACE UNLESS SPECIFIED OTHERWISE.
10. ALL DIMENSIONS ARE TO FACE UNLESS SPECIFIED OTHERWISE.

**REFERENCE DRAWING:-**

1. FOR GENERAL INFORMATION SEE DETAIL DRAWINGS.
2. FOR GENERAL INFORMATION SEE DETAIL DRAWINGS.
3. FOR GENERAL INFORMATION SEE DETAIL DRAWINGS.
4. FOR GENERAL INFORMATION SEE DETAIL DRAWINGS.
5. FOR GENERAL INFORMATION SEE DETAIL DRAWINGS.
6. FOR GENERAL INFORMATION SEE DETAIL DRAWINGS.
7. FOR GENERAL INFORMATION SEE DETAIL DRAWINGS.
8. FOR GENERAL INFORMATION SEE DETAIL DRAWINGS.
9. FOR GENERAL INFORMATION SEE DETAIL DRAWINGS.
10. FOR GENERAL INFORMATION SEE DETAIL DRAWINGS.

**GENERAL ARRANGEMENT DRAWING**  
**SINGLE CELL R.C.C. BOX CULVERT**

**BOX CULVERT 10200**

Sl. No.	Existing Location	Proposed Location	Camber/Elevation		Invert Level	Direction of Flow	Clear Height	Thick Wall	Thick Wall	Thick Wall	Height of Return Wall	Length of Return Wall
			Left	Right								
1	1210	1310	52.57	52.57	52.43	L TO R	1.8	0.5	0.35	0.38	3.3	4.0
2	2028	2332	60.22	60.22	59.37	L TO R	1.8	0.5	0.35	0.38	3.3	4.0
3	4115	4115	69.37	69.37	67.16	L TO R	1.8	0.5	0.35	0.38	3.3	4.0
4	5089	6068	80.26	80.26	77.16	L TO R	1.8	0.5	0.35	0.38	3.3	4.0
5	10379	10379	93.09	93.09	91.85	L TO R	1.8	0.5	0.35	0.38	3.3	4.0
6	14655	14655	107.07	107.07	105.84	L TO R	1.8	0.5	0.35	0.38	3.3	4.0
7	19425	19425	121.05	121.05	119.82	L TO R	1.8	0.5	0.35	0.38	3.3	4.0
8	23570	23570	135.03	135.03	133.80	L TO R	1.8	0.5	0.35	0.38	3.3	4.0
9	28305	28305	149.01	149.01	147.78	L TO R	1.8	0.5	0.35	0.38	3.3	4.0
10	32835	32835	162.99	162.99	161.76	L TO R	1.8	0.5	0.35	0.38	3.3	4.0
11	37365	37365	176.97	176.97	175.74	L TO R	1.8	0.5	0.35	0.38	3.3	4.0
12	41895	41895	190.95	190.95	189.72	L TO R	1.8	0.5	0.35	0.38	3.3	4.0
13	46425	46425	204.93	204.93	203.70	L TO R	1.8	0.5	0.35	0.38	3.3	4.0
14	50955	50955	218.91	218.91	217.68	L TO R	1.8	0.5	0.35	0.38	3.3	4.0
15	55485	55485	232.89	232.89	231.66	L TO R	1.8	0.5	0.35	0.38	3.3	4.0
16	60015	60015	246.87	246.87	245.64	L TO R	1.8	0.5	0.35	0.38	3.3	4.0
17	64545	64545	260.85	260.85	259.62	L TO R	1.8	0.5	0.35	0.38	3.3	4.0
18	69075	69075	274.83	274.83	273.60	L TO R	1.8	0.5	0.35	0.38	3.3	4.0
19	73605	73605	288.81	288.81	287.58	L TO R	1.8	0.5	0.35	0.38	3.3	4.0
20	78135	78135	302.79	302.79	301.56	L TO R	1.8	0.5	0.35	0.38	3.3	4.0
21	82665	82665	316.77	316.77	315.54	L TO R	1.8	0.5	0.35	0.38	3.3	4.0
22	87195	87195	330.75	330.75	329.52	L TO R	1.8	0.5	0.35	0.38	3.3	4.0
23	91725	91725	344.73	344.73	343.50	L TO R	1.8	0.5	0.35	0.38	3.3	4.0
24	96255	96255	358.71	358.71	357.48	L TO R	1.8	0.5	0.35	0.38	3.3	4.0
25	100785	100785	372.69	372.69	371.46	L TO R	1.8	0.5	0.35	0.38	3.3	4.0
26	105315	105315	386.67	386.67	385.44	L TO R	1.8	0.5	0.35	0.38	3.3	4.0
27	109845	109845	400.65	400.65	399.42	L TO R	1.8	0.5	0.35	0.38	3.3	4.0

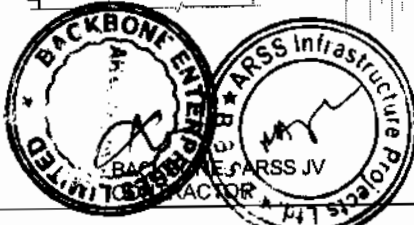
**BOX CULVERT 12300**

Sl. No.	Existing Location	Proposed Location	Camber/Elevation		Invert Level	Direction of Flow	Clear Height	Thick Wall	Thick Wall	Thick Wall	Height of Return Wall	Length of Return Wall
			Left	Right								
1	17550	17550	51.14	51.14	50.90	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
2	17985	17985	52.74	52.74	52.50	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
3	18420	18420	54.34	54.34	54.10	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
4	18855	18855	55.94	55.94	55.70	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
5	19290	19290	57.54	57.54	57.30	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
6	19725	19725	59.14	59.14	58.90	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
7	20160	20160	60.74	60.74	60.50	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
8	20595	20595	62.34	62.34	62.10	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
9	21030	21030	63.94	63.94	63.70	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
10	21465	21465	65.54	65.54	65.30	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
11	21900	21900	67.14	67.14	66.90	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
12	22335	22335	68.74	68.74	68.50	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
13	22770	22770	70.34	70.34	70.10	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
14	23205	23205	71.94	71.94	71.70	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
15	23640	23640	73.54	73.54	73.30	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
16	24075	24075	75.14	75.14	74.90	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
17	24510	24510	76.74	76.74	76.50	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
18	24945	24945	78.34	78.34	78.10	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
19	25380	25380	79.94	79.94	79.70	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
20	25815	25815	81.54	81.54	81.30	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
21	26250	26250	83.14	83.14	82.90	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
22	26685	26685	84.74	84.74	84.50	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
23	27120	27120	86.34	86.34	86.10	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
24	27555	27555	87.94	87.94	87.70	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
25	27990	27990	89.54	89.54	89.30	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
26	28425	28425	91.14	91.14	90.90	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
27	28860	28860	92.74	92.74	92.50	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
28	29295	29295	94.34	94.34	94.10	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
29	29730	29730	95.94	95.94	95.70	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
30	30165	30165	97.54	97.54	97.30	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
31	30600	30600	99.14	99.14	98.90	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
32	31035	31035	100.74	100.74	100.50	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
33	31470	31470	102.34	102.34	102.10	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
34	31905	31905	103.94	103.94	103.70	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
35	32340	32340	105.54	105.54	105.30	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
36	32775	32775	107.14	107.14	106.90	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
37	33210	33210	108.74	108.74	108.50	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
38	33645	33645	110.34	110.34	110.10	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
39	34080	34080	111.94	111.94	111.70	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
40	34515	34515	113.54	113.54	113.30	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
41	34950	34950	115.14	115.14	114.90	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
42	35385	35385	116.74	116.74	116.50	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
43	35820	35820	118.34	118.34	118.10	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
44	36255	36255	119.94	119.94	119.70	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
45	36690	36690	121.54	121.54	121.30	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
46	37125	37125	123.14	123.14	122.90	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
47	37560	37560	124.74	124.74	124.50	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
48	37995	37995	126.34	126.34	126.10	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
49	38430	38430	127.94	127.94	127.70	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
50	38865	38865	129.54	129.54	129.30	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
51	39300	39300	131.14	131.14	130.90	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
52	39735	39735	132.74	132.74	132.50	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
53	40170	40170	134.34	134.34	134.10	L TO R	2.1	1.3	0.37	0.42	3.8	4.4
54	40605	40605	135.94	135.94	135.70	L TO R	2.1	1.3	0.37	0.42	3.8	4.4

**BOX CULVERT 14300**

Sl. No.	Existing Location	Proposed Location	Camber/Elevation		Invert Level	Direction of Flow	Clear Height	Thick Wall	Thick Wall	Thick Wall	Height of Return Wall	Length of Return Wall
			Left	Right								
1	24065	24065	92.21	92.21	90.01	L TO R	3.2	1.7	0.45	0.48	4.9	6.0
2	24500	24500	93.81	93.81	91.61	L TO R	3.2	1.7	0.45	0.48	4.9	6.0
3	24935	24935	95.41	95.41	93.21	L TO R	3.2	1.7	0.45	0.48	4.9	6.0
4	25370	25370	97.01	97.01	94.81	L TO R	3.2	1.7	0.45	0.48	4.9	6.0
5	25805	25805	98.61	98.61	96.41	L TO R	3.2	1.7	0.45	0.48	4.9	6.0
6	26240	26240	100.21	100.21	98.01	L TO R	3.2	1.7	0.45	0.48	4.9	6.0
7	26675	26675	101.81	101.81	99.61	L TO R	3.2	1.7	0.45	0.48	4.9	6.0
8	27110	27110	103.41	103.41	101.21	L TO R	3.2	1.7	0.45	0.48	4.9	6.0
9	27545	27545	105.01	105.01	102.81	L TO R	3.2	1.7	0.45	0.48	4.9	6.0
10	27980	27980	106.61	106.61	104.41	L TO R	3.2	1.7	0.45	0.48	4.9	6.0
11	28415	28415	108.21	108.21	106.01	L TO R	3.2	1.7	0.45	0.48	4.9	6.0
12	28850	28850	109.81	109.81	107.61							



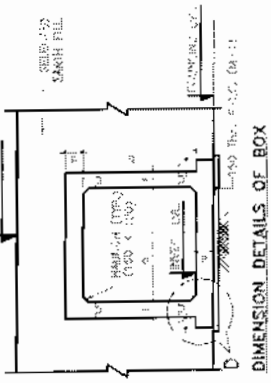


**NOTES:**

1. ALL DIMENSIONS ARE IN MM & LEVELS ARE IN METER.
2. ALL DIMENSIONS ARE TO BE FOLLOWED, DO NOT SCALE THE DRAWING.
3. FACE OF UNSUPPLIED SOIL BELOW THE CURBSETS IS TO BE FILL WITH SUITABLE GRANULAR MATERIAL.
4. IN CASE OF THE CURBSETS ARE NOT PROVIDED AT THE ENDS OF THE CULVERT AND AT THE EXISTING CURBSETS, THE CURBSETS SHALL BE PROVIDED AT THE ENDS OF THE CULVERT WITH ANCHORAGE AS SHOWN.
5. THE CURBSETS SHALL BE PROVIDED AT THE ENDS OF THE CULVERT WITH ANCHORAGE AS SHOWN.
6. THE CURBSETS SHALL BE PROVIDED AT THE ENDS OF THE CULVERT WITH ANCHORAGE AS SHOWN.
7. THE CURBSETS SHALL BE PROVIDED AT THE ENDS OF THE CULVERT WITH ANCHORAGE AS SHOWN.
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9. THE CURBSETS SHALL BE PROVIDED AT THE ENDS OF THE CULVERT WITH ANCHORAGE AS SHOWN.
10. THE CURBSETS SHALL BE PROVIDED AT THE ENDS OF THE CULVERT WITH ANCHORAGE AS SHOWN.

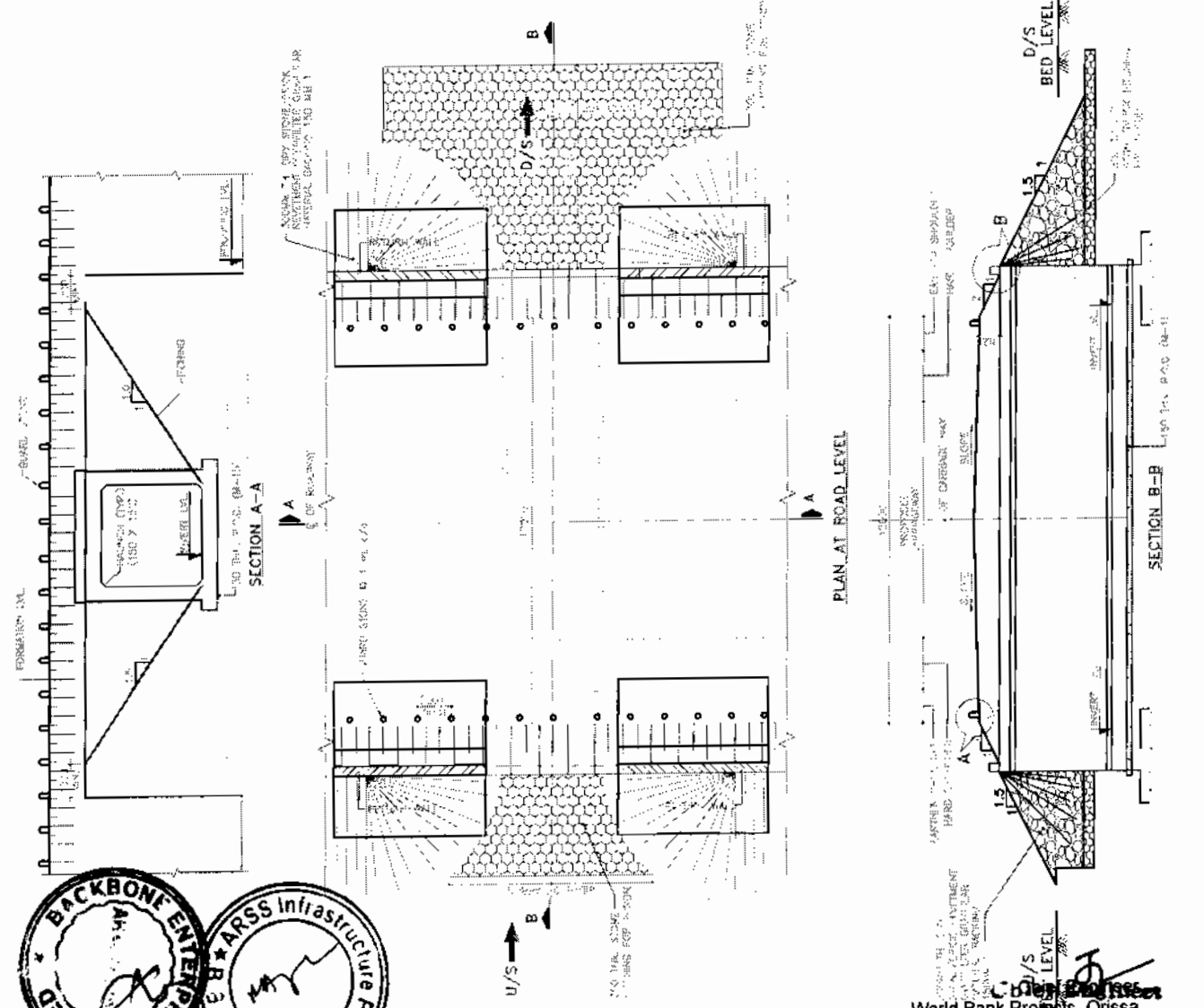
**REFERENCE DRAWING:-**

1. GENERAL NOTES ON CULVERTS.
2. GENERAL NOTES ON CULVERTS.
3. GENERAL NOTES ON CULVERTS.
4. GENERAL NOTES ON CULVERTS.
5. GENERAL NOTES ON CULVERTS.
6. GENERAL NOTES ON CULVERTS.
7. GENERAL NOTES ON CULVERTS.
8. GENERAL NOTES ON CULVERTS.
9. GENERAL NOTES ON CULVERTS.
10. GENERAL NOTES ON CULVERTS.



Sl. No.	Existing Location	Proposed Chaining Level	Proposed Invert Level	Camber/Elevation		Bed Level	Clear Length	Clear Height	Clear Width	Thick. (mm)	Thick. (mm)	Thick. (mm)	Height of Return Wall	Length of Return Wall	
				Left	Right										Left
1	288250	27000	109.894	2.5%	2.5%	109.894	107.000	107.000	2.8	2.1	1.7	0.45	0.46	4.1	4.4

**BOX CULVERT 12x23**

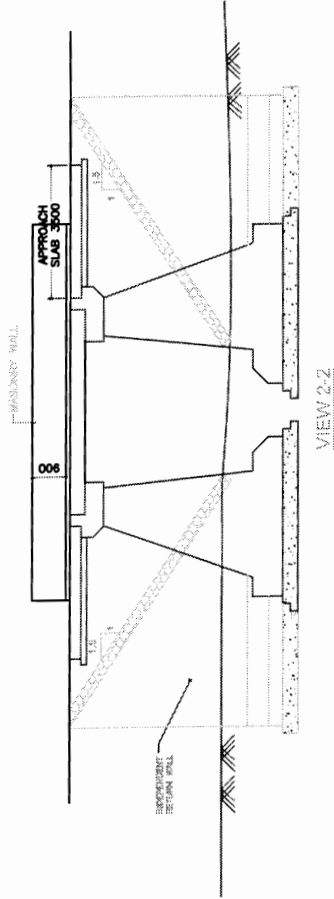
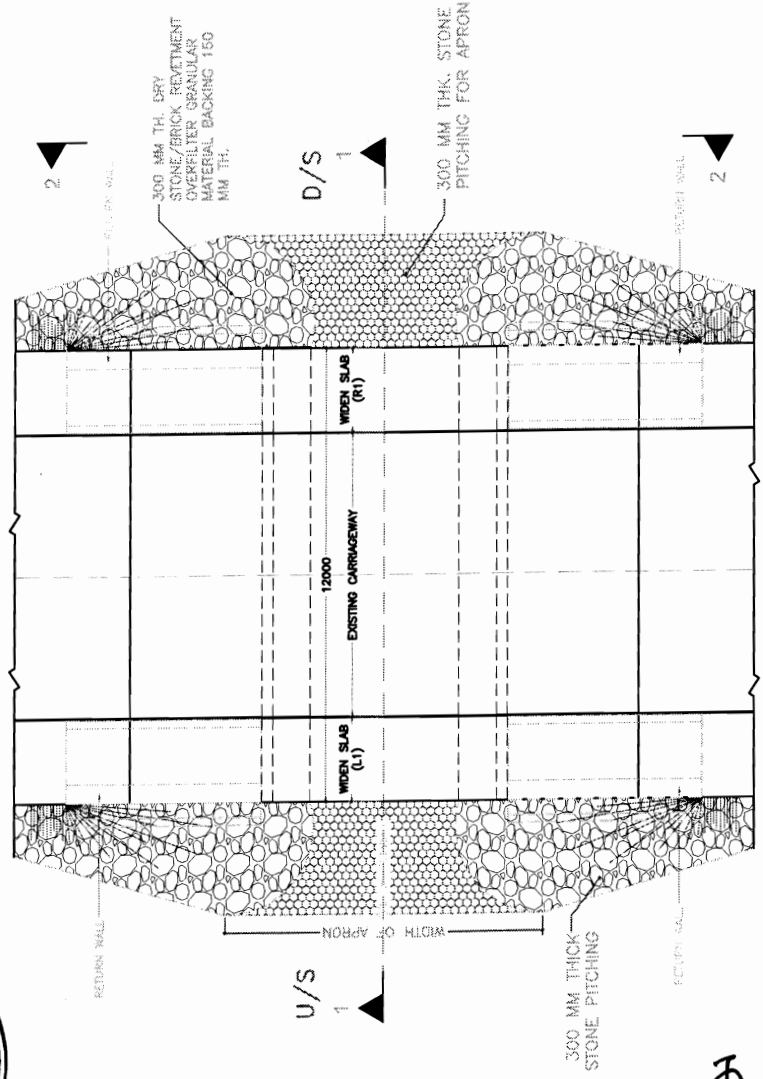
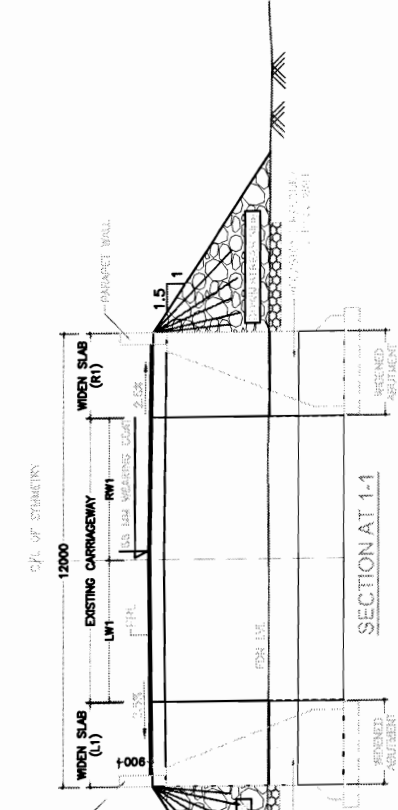


**CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD ASSISTANCE UNDER WORLD BANK ASSISTANCE**

**CONSULTING ENGINEERS GROUP LTD.**  
 C-12, 1st Floor, Connaught Place, New Delhi-110028  
 Tel: 2610141-2520888, 2520856 Fax: 2610141, 2520888, 2520856  
 e-mail: ceg@cegindia.com

**GENERAL ARRANGEMENT DRAWING**  
 SINGLE CELL R.C.C. BOX CULVERT (WITH EARTH CUSHION)

Drawn: [ ] Checked: [ ] Approved: [ ]  
 Date: [ ] Scale: [ ]



**NOTES :-**

- 1 ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
- 2 DIMENSIONS ARE NOT TO BE SCALED. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED.
- 3 CONCRETE GRADE IN SUPER STRUCTURE IS M-25.
- 4 STEEL GRADE IS Fe 415.
- 5 SUB STRUCTURE SHALL BE IN CONCRETE GRADE M-15 WITH SURFACE REINFORCEMENT #8 @200C/C BOTHWAYS.
- 6 GRADE OF CONG. RCC SLAB - M-25 PCC - M-15

**REFERENCE DRAWING:-**

- 1 CSR/P/CEG/SH-17/SLAB CUL/W-02

**SLAB RR EXTENSION**

Sl. No	Existing Location	Proposed Chainage	Existing Span	Proposed Formation Level	Camber/Super Elevation		Bed level/Invert Level		Clear Height	LW1	RW1	Direction of flow		Total Length to be widened		Length of Return wall	
					Left	Right	Left	Right				Left	Right	Left	Right	Left	Right
1	0/350	369	1 x 1.75	54.982	2.5%	-2.5%	53.590	53.511	1.6	4.9	5.7	L TOR	1.1	-	3.3	3.0	
2	0/830	847	1 x 2.0	56.407	-2.5%	-2.5%	54.329	54.686	1.9	4.1	4.2	L TOR	1.9	1.8	3.9	3.4	
3	2/630	2829	1 x 1.5	59.937	5.6%	-5.6%	57.851	58.044	2.4	5.3	2.2	L TOR	0.7	3.8	4.6	3.3	
4	5/145	5127	1 x 1.5	79.343	-2.5%	-2.5%	77.584	77.463	1.7	2.6	4.5	L TOR	3.4	1.5	3.4	3.6	
5	7/630	7605	1 x 1.5	93.468	-2.5%	-2.5%	90.863	90.853	2.4	4.8	4.7	L TOR	1.2	1.3	4.7	4.5	
6	7/795	7769	1 x 1.5	92.227	-2.5%	-2.5%	90.078	90.268	2.0	4.4	5.0	L TOR	1.6	1.0	4.0	3.7	
7	10/965	10933	2 x 1.5	84.762	-3.9%	3.9%	83.199	83.087	1.9	5.3	1.3	L TOR	0.7	4.7	3.0	3.9	
8	14/135	14157	1 x 3.0	86.810	2.5%	2.5%	84.256	84.543	2.7	4.8	4.1	L TOR	1.2	1.9	4.6	4.6	
9	22/605	22582	1 x 1.6	86.229	2.5%	-2.5%	84.663	84.616	1.8	4.8	4.4	L TOR	1.2	1.6	3.5	3.2	
10	25/050	25214	1 x 1.5	96.471	6.8%	-6.8%	94.546	94.761	2.3	3.9	5.5	R TOR	2.1	0.5	4.5	3.0	
11	38/450	38463	1 x 1.5	140.777	2.5%	-2.5%	139.355	139.015	1.9	4.1	3.3	L TOR	1.9	2.7	3.4	3.4	
12	39/340	39517	1 x 3.2	147.795	-2.5%	-2.5%	144.443	144.213	3.4	4.4	3.2	L TOR	1.6	2.9	5.8	6.1	

**CEG CONSULTING ENGINEERS GROUP LTD.**  
 E-13/10/1, Gyaneshwari Nagar, Kathmandu-17  
 Tel: 977-1-4411141, 977-1-4411142, 977-1-4411143

**GENERAL ARRANGEMENT DRAWING**  
 TYPICAL WIDENING FOR EXISTING SLAB CULVERTS

Project: Consultancy Services for Feasibility Study and Detailed Project Preparation of Phase-I Roads for Orissa State Road Project Under World Bank Assistance

Drawn: H.S. Date: 08/07/2017  
 Checked: H.S. Date: 08/07/2017  
 Approved: H.S. Date: 08/07/2017

NOTES :-  
 1 ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.  
 2 DIMENSIONS ARE NOT TO BE SCALED. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED.  
 3 CONCRETE GRADE IN SUPER STRUCTURE IS M-25.  
 4 SUB STRUCTURE SHALL BE IN CONCRETE GRADE M-15 WITH SURFACE REINFORCEMENT #8 @200C/C BOTHWAYS.  
 5 STEEL GRADE IS Fe 415.

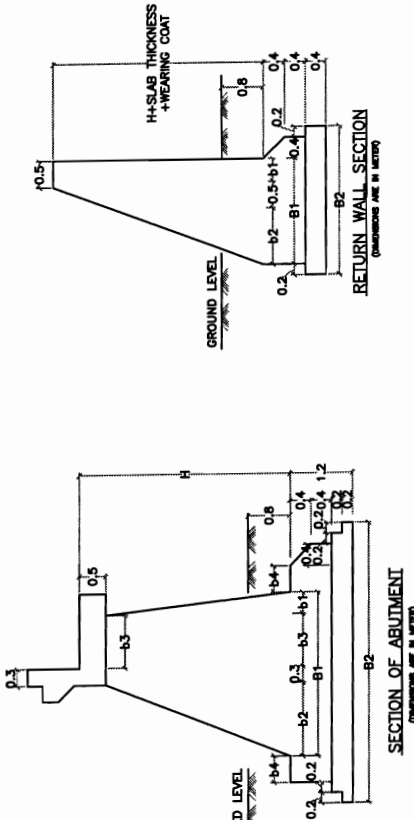
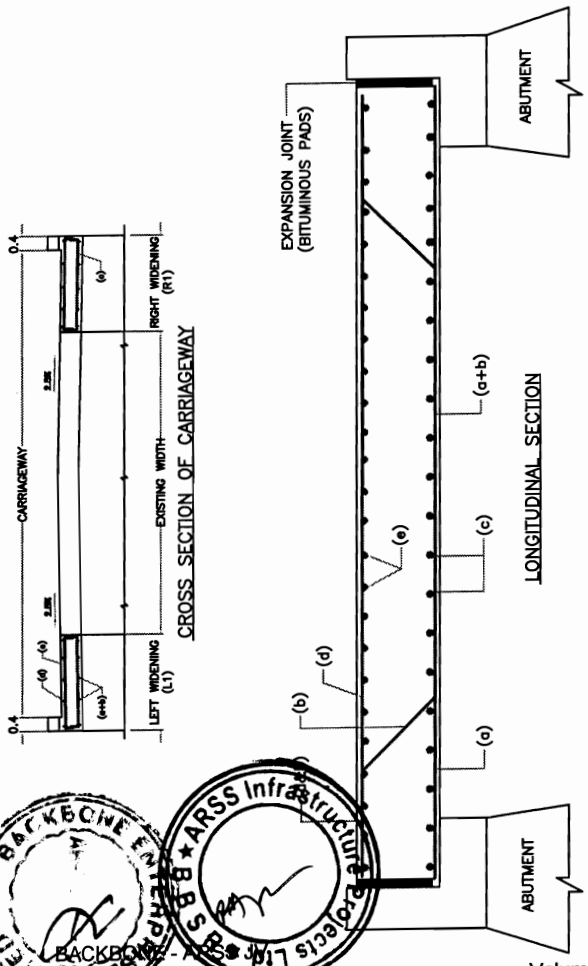
REFERENCE DRAWING:-  
 1 OBRP/CEB/SH-17/SUB CUL/M-01

TABLE OF DIMENSIONS FOR RETURN WALL

SPAN	3 METRES			4 METRES		
	UPTO 2 METRES	3 METRES	4 METRES	UPTO 2 METRES	3 METRES	4 METRES
H	1.50	2.00	2.50	3.00	3.50	4.00
b1	0.18	0.23	0.28	0.33	0.38	0.44
b2	0.45	0.57	0.70	0.82	1.07	1.10
b3	1.13	1.30	1.48	1.65	2.00	2.04
b4	1.93	2.10	2.28	2.45	2.80	2.84

TABLE OF DIMENSIONS FOR ABUTMENT

Effective Span	6m and 5m			3m, 2m, 1.5m and 1m			3.5m and 4m							
	H	b1	b2	b3	b4	B1	B2	H	b1	b2	b3	b4	B1	B2
2.0m	2.5m	3.0m	3.5m	4.0m	1.5m	2.0m	2.5m	3.0m	3.5m	4.0m	1.5m	2.0m	2.5m	3.0m
0.2	0.25	0.3	0.35	0.4	0.15	0.2	0.25	0.3	0.35	0.4	0.15	0.2	0.25	0.3
0.6	0.85	1.0	1.2	1.4	0.5	0.7	0.85	1.1	1.25	1.4	0.5	0.7	0.85	1.1
1.0	1.0	1.0	1.0	1.0	0.5	0.5	0.5	0.5	0.5	1.0	1.0	1.0	1.0	1.0
0.1	0.2	0.4	0.5	0.5	0.1	0.2	0.3	0.5	0.5	0.1	0.2	0.3	0.5	0.5
2.1	2.4	2.6	2.85	3.1	1.45	1.7	2.0	2.20	2.4	2.6	1.85	2.2	2.5	2.7
3.3	3.8	4.2	4.85	5.3	2.65	2.9	3.4	3.8	4.2	4.8	3.15	3.4	3.9	4.3



REINFORCEMENT TABLE FOR SLAB/CULVERTS  
 CONCRETE M-25, STEEL Fe-415

Clear depth of span (m)	M.A.I.N. S.L.A.B										K.E.R.B.S			
	a		b		c		d		e		f		g	
Total depth of slab (mm)	Di. Spacing (mm)	Di. Spacing (mm)	Di. Spacing (mm)	Di. Spacing (mm)	Di. Spacing (mm)	Di. Spacing (mm)	Di. Spacing (mm)	Di. Spacing (mm)	Di. Spacing (mm)	Di. Spacing (mm)	Di. Spacing (mm)	Di. Spacing (mm)	Di. Spacing (mm)	Di. Spacing (mm)
	1.0	280	1700	16	280	1700	10	300	1700	10	180	10	300	10
2.0	280	1700	16	280	1700	10	300	2700	10	180	10	300	10	300
3.0	320	16	240	3700	16	240	3700	10	300	180	10	300	10	300
4.0	380	20	280	4700	20	280	4700	10	300	120	10	300	10	300
5.0	430	20	240	5700	20	240	5700	10	300	110	10	300	10	300
6.0	480	20	220	6700	20	220	6700	10	300	100	10	300	10	300

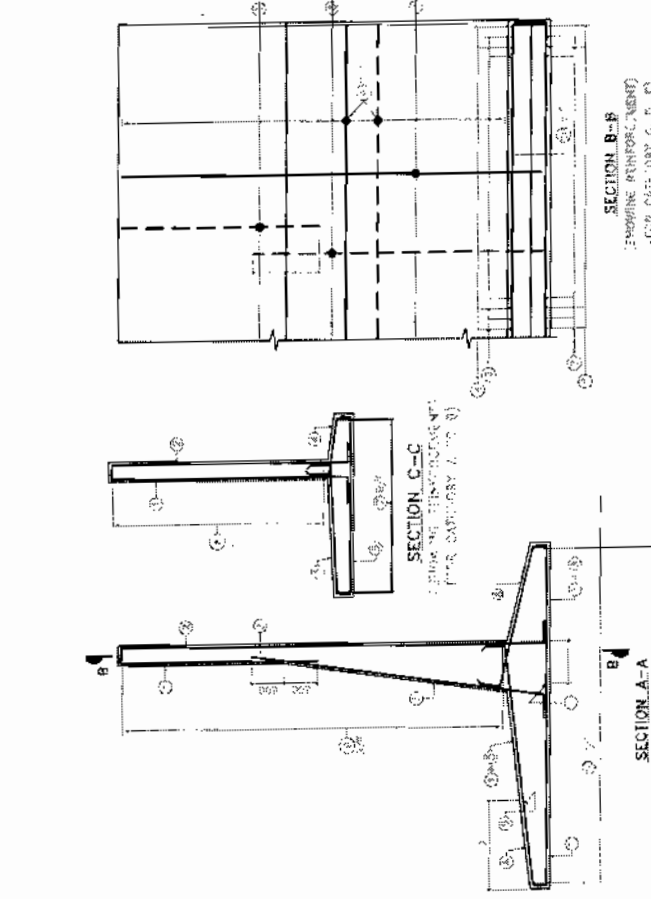
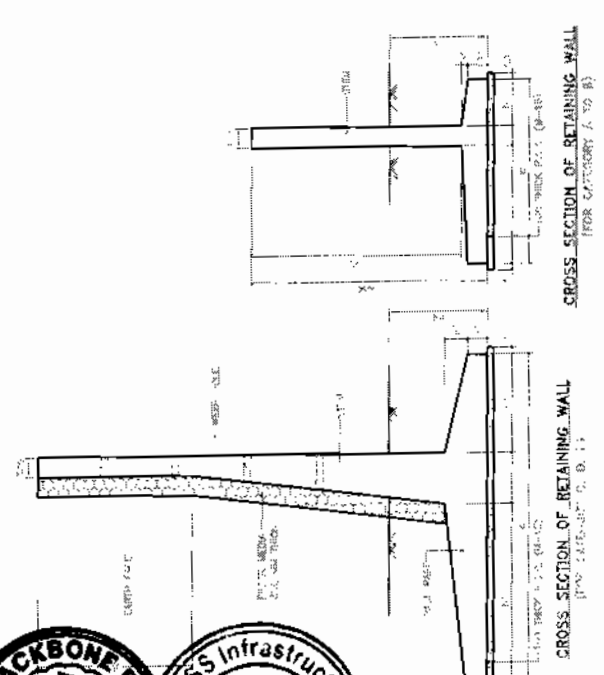
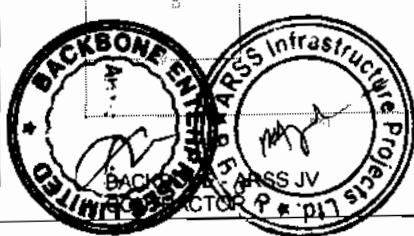
CONSULTING ENGINEERS GROUP LTD.  
 E-12/2/2017 Odisha Highway Project  
 Tel: 91-674-250099, 2527186, 2520256  
 Fax: 2521334, e-mail: cep@cegroup.com

Project: Consultancy Services for Feasibility Study and Detailed Project Preparation of Phase-I Roads for Orissa State Road Project Under World Bank Assistance

DIMENSION & REINFORCEMENT DETAIL OF SLAB & ABUTMENT  
 TYPICAL WIDENING FOR EXISTING SLAB CULVERTS

Volume IV: Page 191

Chief Engineer  
 World Bank Projects, Orissa  
 World EMPLOYER Projects  
 Do the E.I.C (Civil) Orissa,  
 Bhubaneswar:

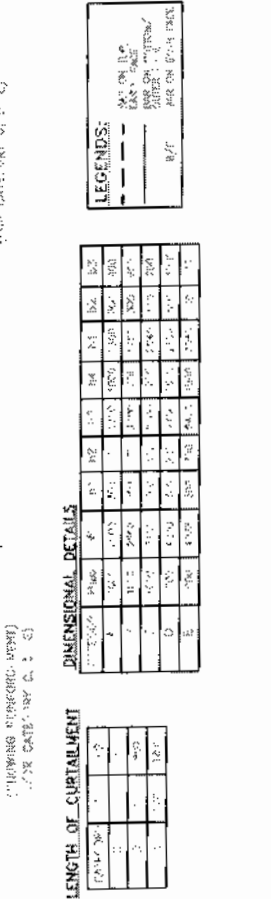
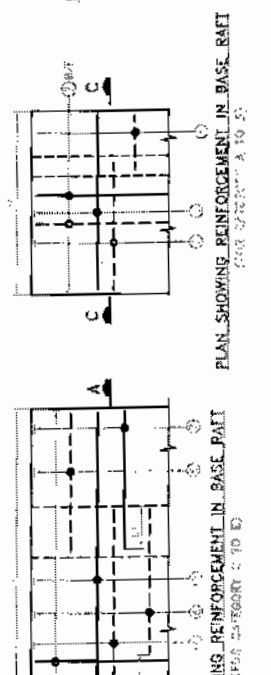


**NOTES**

1. ALL DIMENSIONS ARE IN MM & SHALL BE IN ACCORDANCE WITH THE IS CODES.
2. ALL DIMENSIONS ARE TO FACE UNLESS SPECIFICALLY MENTIONED OTHERWISE.
3. ALL DIMENSIONS ARE TO FACE UNLESS SPECIFICALLY MENTIONED OTHERWISE.
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9. ALL DIMENSIONS ARE TO FACE UNLESS SPECIFICALLY MENTIONED OTHERWISE.
10. ALL DIMENSIONS ARE TO FACE UNLESS SPECIFICALLY MENTIONED OTHERWISE.

**REFERENCE DRAWING:-**

IS 456-2000 (REVIS 2010)



**REINFORCEMENT DETAILS**

NO.	REINFORCEMENT	DESCRIPTION
1	[Symbol]	10mm dia. vertical bars @ 200mm c/c
2	[Symbol]	10mm dia. horizontal bars @ 200mm c/c
3	[Symbol]	10mm dia. diagonal bars @ 45°
4	[Symbol]	10mm dia. stirrups @ 100mm c/c

**REINFORCEMENT DETAILS**

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4	[Symbol]	10mm dia. stirrups @ 100mm c/c



**GOVERNMENT OF ORISSA**  
**WORKS DEPARTMENT**

**CIVIL WORKS CONTRACT**

[ PACKAGE No. OSRP-CW-ICB-Y1-P03 ]

**For**

***Widening & Strengthening of existing carriageway to 2-lane road from  
Berhampur to Taptapani  
(Km. 0/0 to 41/0 of SH – 17)***

***under  
Orissa State Roads Project***

between

**Chief Engineer, World Bank Projects, Orissa  
on behalf of  
Orissa Works Department, Government of Orissa**

and

**BACKBONE – ARSS JV  
Plot No. 38, SECTOR – A, Zone – D  
Mancheswar Industrial Estate, Mancheswar, Bhubaneswar – 751010 [INDIA]**

**[ VOLUME – V : SCHEDULES ]  
Agreement Value: Rs. 81,97,23,707**

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

**Dated: 5<sup>th</sup> September, 2008**

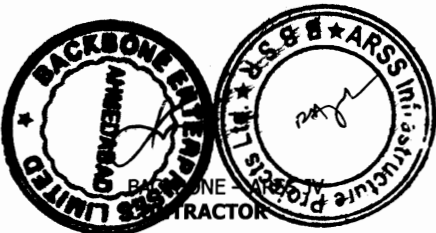


**CONTENTS of CONTRACT**

<b>Volume – I</b>	:	Letter of Acceptance, Letter Bid and addenda
<b>Volume – II</b>	:	Particular Conditions and the General Conditions;
<b>Volume – III</b>	:	Specifications
<b>Volume – IV</b>	:	Drawings
<b>Volume – V</b>	:	Completed Schedules,

**CONTENTS of VOLUME V**

<b>Sl.</b>	<b>Description</b>	<b>Page No.</b>
1	Grand Summary of Price Schedule	1
2	Daywork Summary	2
3	Price Schedule	3 – 49



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

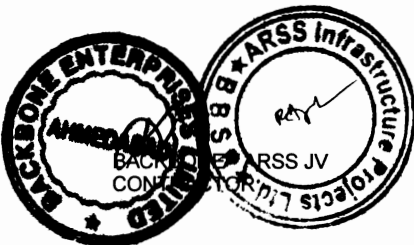
## Grand Summary of Price Schedule

Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taptapani (0/0 km to 41/0 km of SH-17 )- ICB Package OSRP-CW-ICB-Y1-03

Contract No.: Agreement No. 2 of 2008 - 09

General Summary	Page	Amount
BILL NO.1 : SITE CLEARANCE	3	11,944,077.00
BILL NO.2 : EARTH WORKS	5	94,679,606.00
BILL NO.3 : SUB-BASE AND BASE COURSES	7	161,668,920.00
BILL NO.4 : BITUMINOUS COURSES	8	265,325,285.00
BILL NO.5 : CULVERTS AND UNDERPASSES	9	92,564,623.00
BILL NO.6 : BRIDGES	13	26,481,997.00
BILL NO.7 : RETAINING WALL, DRAINAGE AND PROTECTIVE WORKS	21	109,715,758.00
BILL NO.8 : MISCELLANEOUS ITEMS	24	39,949,565.00
BILL NO.9 : MAINTENANCE, REPAIR AND REHABILITATION	30	8,280,600.00
BILL NO.10 : ENVIRONMENTAL MITIGATION MEASURES	31	23,177,587.10
BILL NO.11 : PROVISIONAL ITEMS	40	32,413,175.00
Subtotal of Bills	(A)	<b>866,201,193.10</b>
Total for Daywork (Provisional Sum)	(B)	5,366,580.00
Specified Provisional Sums included in subtotal of bills	(C)	450000.00
Total of Bills Plus Provisional Sums (A + B + C)	(D)	<b>872,017,773.10</b>
Add Provisional Sum for Contingency Allowance	(E)	0.00
Bid Price (D + E)	(F)	<b>872,017,773.10</b>
Less Discount @6% on the tendered Amount (A+B) (6% Discount shall be effected in each work bill)	(G)	52,294,066.39
Final Bid Price (F-G)	(H)	819,723,706.71
	Say	<b>819,723,707.00</b>

**Rupees Eighty One Crores Ninety Seven Lakhs Twenty Three Thousand Seven Hundred Seven Only**



**Chief Engineer**  
 Chief Engineer  
 Work Bank Projects  
 O/o the E.L.C.(Civil) Orissa  
 Bhubaneswar:

## Daywork Summary

Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taptapani (0/0 km to 41/0 km of SH-17 )  
- ICB Package OSRP-CW-ICB-Y1-03

Contract No.: Agreement No. 2 of 2008 - 09

	<i>Amount (Rs.)</i>	<i>% Foreign</i>
1. Total for Daywork: Labour	205,800.00	NIL
2. Total for Daywork: Materials	4,081,500.00	NIL
3. Total for Daywork: Contractor's Equipment	1,079,280.00	NIL

**Total for Daywork (Provisional Sum) 5,366,580.00**

(carried forward to Bid Summary, p.1 )

## Summary of Specified Provisional Sum

	<i>Amount (Rs.)</i>	<i>% Foreign</i>
Providing and maintaining wireless communication system comprising of mobile Trans-receiver suitable for mounting on four wheeler with micro phone assembly including antenna, speaker etc. (10 sets), base trans-receiver with all accessories (3 sets) and hand-held radio sets (10 sets) including necessary statutory approval for obtaining the frequency to operate the wireless system.	350,000.00	
Providing and maintaining passenger ambassador car of 1400 CC capacity (for 600 vehicle day)	100,000.00	

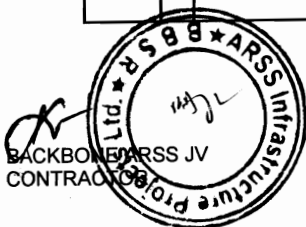
**Total for Specified Provisional Sum 450,000.00**

(carried forward to Bid Summary, p.1 )



Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taptapani (0/0 km to 41/0 km of SH-17)-ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks )

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
1.01	<b>BILL NO.1 : SITE CLEARANCE</b> Cleaning and Grubbing for road land complete as per Technical Specification Clause 201 and as per the direction of Engineer-in-charge.	Hectare	69.00	28366.00 Rupees Twenty Eight Thousand Three Hundred Sixty Six Only	1,957,254.00 Rupees Nineteen Lakhs Fifty Seven Thousand Two Hundred Fifty Four Only
1.02	Dismantling Structures and Pavement including disposal of resulting material and/or salvaging useful materials complete as per Technical Specification Clause 202, 2809 and as per the direction of Engineer-in-charge.				
	a) Brick/ Stone Structures of dry or in lime/cement mortar	Cum	618.00	192.00 Rupees One Hundred Ninety Two Only	118,656.00 Rupees One Lakh Eighteen Thousand Six Hundred Fifty Six Only
	b) Concrete/Reinforced Concrete/ Prestressed Concrete structures including cleaning straightening & cutting of bars and separating them out from RCC/PSC.				
	For Slab Culverts & Box Culverts and Bridges				
	i) P.C.C.	Cum	1223.00	241.00 Rupees Two Hundred Forty One Only	294,743.00 Rupees Two Lakhs Ninety Four Thousand Seven Hundred Forty Three Only
	ii) R.C.C.	Cum	839.00	369.00 Rupees Three Hundred Sixty Nine Only	309,591.00 Rupees Three Lakhs Nine Thousand Five Hundred Ninety One Only
	c) Dismantling of all type of Pavement course	Cum	41891.00	219.00 Rupees Two Hundred Nineteen Only	9,174,129.00 Rupees Nine One Lakhs Seventy Four Thousand One Hundred Twenty Nine Only
	d) Hume pipe	Lm	680.00	48.00 Rupees Forty Eight Only	32,640.00 Rupees Thirty Two Thousand Six Hundred Forty Only

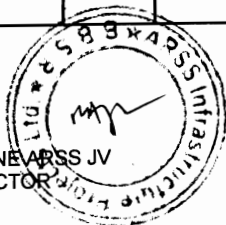


Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taptapani (0/0 km to 41/0 km of SH-17)-ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks )

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
	e) Kerb	Lm	60.00	Rupees Nine Only	540.00 Rupees Five Hundred Forty Only
	f) Dry Stone Pitching	Cum	60.00	Rupees One Hundred Sixty Six Only	9,960.00 Rupees Nine Thousand Nine Hundred Sixty Only
	g) RCC Railing	Lm	132.00	Rupees Thirty Only	3,960.00 Rupees Three Thousand Nine Hundred Sixty Only
	h) Expansion joint	Lm	68.00	1668.00 Rupees One Thousand Six Hundred Sixty Eight Only	113,424.00 Rupees One Lakh Thirteen Thousand Four Hundred Twenty Four Only
	i) Wearing Coat				
	a) Bituminous Concrete	Sqm	204.00	45.00 Rupees Forty Five Only	9,180.00 Rupees Nine Thousand One Hundred Eighty Only
1.03	Rebate towards salvage value of scarified/dismantled material for each type of item				
	a) Steel	MT	10.00	-5000.00 Minus Rupees Five Thousand Only	(50,000.00) Minus Rupees Fifty Thousand Only
	b) Aggregate	Cum	100.00	-200.00 Minus Rupees Two Hundred Only	(20,000.00) Minus Rupees Twenty Thousand Only
	c) Concrete	Cum	100.00	-100.00 Minus Rupees One Hundred Only	(10,000.00) Minus Rupees Ten Thousand Only
<b>Total for Bill No. 1 Carried forward to Summary</b>					<b>11,944,077.00</b> Rupees One Crore Nineteen Lakhs Forty Four Thousand Seventy Seven Only



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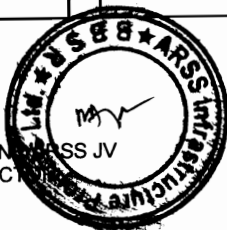
Chief Engineer  
 Chief Engineer  
 World Bank Projects  
 O/o the E.M.C (Civil) Orissa  
 Bhubaneswar.

Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taptapani (0/0 km to 41/0 km of SH-17)-ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks )

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
2.01	<b>BILL NO.2 : EARTH WORKS</b> Roadway excavation including removal of unsuitable soil necessary for construction of roadway complete as per Technical Specification Clause 301 and as per the direction of Engineer-in-charge.				
	a) All kinds of soil	Cum	438208.00	47.00 Rupees Forty Seven Only	20,595,776.00 Rupees Two Crores Five Lakhs Ninety Five Thousand Seven Hundred Seventy Six Only
	b) softrock (blasting not required) (LS)	Cum	4494.00	57.00 Rupees Fifty Seven Only	256,158.00 Rupees Two Lakhs Fifty Six Thousand One Hundred Fifty Eight Only
	c) Hard rock (blasting required) (LS)	Cum	5742.00	250.00 Rupees Two Hundred Fifty Only	1,435,500.00 Rupees Fourteen Lakhs Thirty Five Thousand Five Hundred Only
	d) Hard rock (blasting not required) (LS)	Cum	1000.00	60.00 Rupees Sixty Only	60,000.00 Rupees Sixty Thousand Only
2.02	Construction of embankment with approved material from approved borrow areas complete as per drawing and Technical Specification Clause 305 and as per the direction of Engineer-in-charge.	Cum	100705.00	125.00 Rupees One Hundred Twenty Five Only	12,588,125.00 Rupees One Crore Twenty Five Lakhs Eighty Eight Thousand One Hundred Twenty Five Only
2.03	Construction of subgrade and earthen shoulder with approved material as per drawing complete and Technical Specification Clause 305 and as per the direction of Engineer-in-charge.	Cum	337999.00	160.00 Rupees One Hundred Sixty Only	54,079,840.00 Rupees Five Crores Forty Lakhs Seventy Nine Thousand Eight Hundred Forty Only



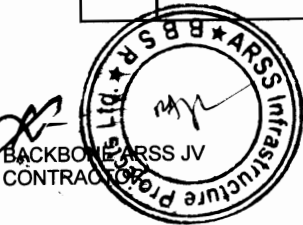
BACKBONE ENTERPRISES  
 CONTRACTORS



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

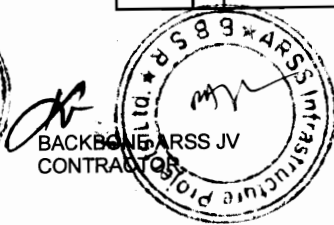
Contract Name: Widening and Strengthening of Existing Camiageway to 2 lane from Berhampur - Taptapani (0/0 km to 41/0 km of SH-17 ) - ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks )

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
2.04	Construction of embankment and subgrade 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 Engineer-in-charge.	Cum	43821.00	86.00 Rupees Eighty Six Only	3,768,606.00 Rupees Thirty Seven Lakhs Sixty Eight Thousand Six Hundred Six Only
2.05	Loosening and recompacting the existing subgrade in all kinds of soil upto a depth of 300mm/500mm to meet the requirement of table 300-2 complete as per Technical Specification Clause 305 and as per the direction of Engineer-in-charge.	Cum	35375.00	45.00 Rupees Forty Five Only	1,591,875.00 Rupees Fifteen Lakhs Ninety 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 Engineer-in-charge.	Cum	1620.00	150.00 Rupees One Hundred Fifty Only	243,000.00 Rupees Two Lakhs Forty Three 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 Engineer-in-charge.	Sqm	20242.00	3.00 Rupees Three Only	60,726.00 Rupees Sixty Thousand Seven Hundred Twenty Six Only
<b>Total for Bill No. 2 Carried forward to Summary</b>					<b>94,679,606.00</b>
<b>Rupees Nine Crores Forty Six Lakhs Seventy Nine Thousand Six Hundred Six Only</b>					



Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taptapani (0/0 km to 41/0 km of SH-17 )-ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks )

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
3.01	<b>BILL NO.3 : SUB-BASE AND BASE COURSES</b> Construction of Granular Sub-base course by providing the materials i.e. naturally occurring morrum , gravel , sand or combination thereof conforming to Gr-I of Table 400-2 complete as per Technical Specification clause 401 and as per the direction of Engineer-in-charge.	Cum	130540.00	360.00 Rupees Three Hundred Sixty Only	46,994,400.00 Rupees Four Crores Sixty Nine Lakhs Ninety Four Thousand Four Hundred Only
3.02	Construction of wet mix macadam complete as per Technical Specification clause 406 and as per the direction of Engineer-in-charge.				
	a) for Base	Cum	104421.00	1000.00 Rupees One Thousand Only	104,421,000.00 Rupees Ten Crores Forty Four Lakhs Twenty One Thousand Only
	b) for Profile Corrective Course	Cum	9494.00	1080.00 Rupees One Thousand Eighty Only	10,253,520.00 Rupees One Crore Two Lakhs Fifty Three Thousand Five Hundred Twenty Only
<b>Total for Bill No. 3 Carried forward to Summary</b>					<b>161,668,920.00</b>
				<b>Rupees Sixteen Crores Sixteen Lakhs Sixty Eight Thousand Nine Hundred Twenty Only</b>	



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Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taptapani (0/0 km to 41/0 km of SH-17 )-ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks )

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
4.01	<b>BILL NO.4 : BITUMINOUS COURSES</b> Providing bituminous Primer coat over granular surface complete all as per Technical specification clause 502 and as per the direction of Engineer-in-charge.	Sqm	401244.00	24.00 Rupees Twenty Four Only	9,629,856.00 Rupees Ninety Six Lakhs Twenty Nine Thousand Eight Hundred Fifty Six Only
4.02	Providing Tack coat complete as per Technical Specification clause 503 and as per the direction of Engineer-in-charge.				
	a) Granular surface treated with primer	Sqm	401244.00	9.00 Rupees Nine Only	3,611,196.00 Rupees Thirty Six Lakhs Eleven Thousand One Hundred Ninety Six Only
	b) over normal bituminous surface	Sqm	401244.00	10.00 Rupees Ten Only	4,012,440.00 Rupees Forty Lakhs Twelve Thousand Four Hundred Forty Only
4.03	Providing Dense Bituminous Macadam course complete as per Technical Specification Clause 507 and as per the direction of Engineer-in-charge.	Cum	27802.00	5000.00 Rupees Five Thousand Only	139,010,000.00 Rupees Thirteen Crores Ninety Lakhs Ten Thousand Only
4.04	Providing Bituminous Concrete wearing course using CRMB-55 complete as per Technical Specification Clause 509 & 521 and as per the direction of Engineer-in-charge.	Cum	16050.00	6757.00 Rupees Six Thousand Seven Hundred Fifty Seven Only	108,449,850.00 Rupees Ten Crores Eighty Four Lakhs Forty Nine Thousand Eight Hundred Fifty 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-in-charge.	Sqm	5513.00	111.00 Rupees One Hundred Eleven Only	611,943.00 Rupees Six Lakhs Eleven Thousand Nine Hundred Forty Three Only
<b>Total for Bill No.4 Carried forward to Summary</b>					<b>265,325,285.00</b>
<b>Rupees Twenty Six Crores Fifty Three Lakhs Twenty Five Thousand Two Hundred Eighty Five Only</b>					



BACKBONE ENTERPRISES LIMITED  
 ANKERDAM, ORISSA  
 CONTRACT NO. ARSS JV



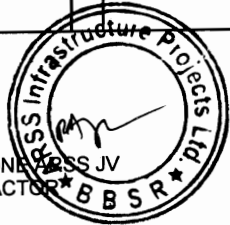
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 Chief Engineer  
 World Bank Projects  
 World Bank Projects, Orissa  
 O/o the Chief Engineer (Civil) Orissa  
 Bhubaneswar

Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taptapani (0/0 km to 41/0 km of SH-17 )-ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE ( Works Items & Dayworks )**

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
5.01	<b>BILL NO.5 : CULVERTS AND UNDERPASSES</b> Earthwork in excavation of foundation for structures complete as per drawing and technical specifications clause 304 including all leads and lifts and as per the direction of Engineer-in-charge.	Cum	9084.00	50.00	454,200.00
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 Engineer-in-charge.	Cum	2319.00	Rupees Fifty Only 181.00	Rupees Four Lakhs Fifty Four Thousand Two Hundred Only 419,739.00
5.03	Providing and filling behind abutment, wing wall and return wall etc. and below pipe bed in layers not exceeding 150mm thick including All leads and lifts complete as per drawings, direction of the Engineer and Technical specification clause 304 and as per the direction of Engineer-in-charge.	Cum	3734.00	Rupees One Hundred Eighty One Only 500.00	Rupees Four Lakhs Nineteen Thousand Seven Hundred Thirty Nine Only 1,867,000.00
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 Engineer-in-charge.	Cum	1946.00	Rupees Five Hundred Only 1200.00	Rupees Eighteen Lakhs Sixty Seven Thousand Only 2,335,200.00
5.05	Cement Concrete M-15 grade in leveling course etc. including centering and shuttering all complete as per Drawings and Technical Specification Sections 1500 and 1700 and as per the direction of Engineer-in-charge.	Cum	2222.00	Rupees One Thousand Two Hundred Only 3141.00	Rupees Twenty Three Lakhs Thirty Five Thousand Two Hundred Only 6,979,302.00
				Rupees Three Thousand One Hundred Forty One Only	Rupees Sixty Nine Lakhs Seventy Nine Thousand Three Hundred Two Only



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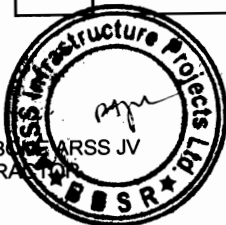
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 Chief Engineer  
 World Bank Projects  
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Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taptapani (0/0 km to 41/0 km of SH-17 )-ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE ( Works Items & Dayworks )**

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
5.06	Cement Concrete M-15 grade in substructure & headwall including centering and shuttering all complete as per Drawings and Technical Specification Sections 1500, 1700, 2200 and as per the direction of Engineer-in-charge.	Cum	1550.00	3300.00	5,115,000.00
5.07	Reinforced cement concrete in all types of culverts as per drawing and technical specification Section 1500, 1700 & 2200 and as per the direction of Engineer-in-charge. a) M-20 grade	Cum	6036.00	4179.00 Rupees Four Thousand One Hundred Seventy Nine Only	Rupees Fifty One Lakhs Fifteen Thousand Only 25,224,444.00
	b) M-25 grade	Cum	22.00	4540.00 Rupees Four Thousand Five Hundred Forty Only	99,880.00 Rupees Ninety Nine Thousand Eight Hundred Eighty 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 2704 and as per the direction of Engineer-in-charge.	Cum	1426.00	6483.00	9,244,758.00
5.09	HYSD(TMT) bar reinforcement complete as per drawing and technical specifications clause 1600 and as per the direction of Engineer-in-charge.	MT	406.00	40000.00 Rupees Six Thousand Four Hundred Eighty Three Only	Rupees Ninety Two Lakhs Forty Four Thousand Seven Hundred Fifty Eight Only 16,240,000.00
				Rupees Forty Thousand Only	Rupees One Crore Sixty Two Lakhs Forty Thousand Only



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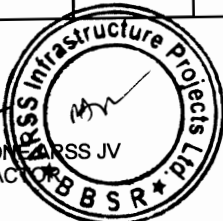


Chief Engineer  
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Odisha  
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Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taplapani (0/0 km to 4/10 km of SH-17)-ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks )

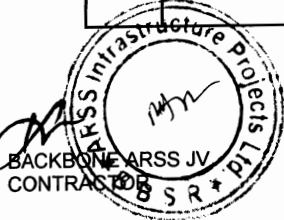
Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
5.10	Providing laying and joining NP-4(I.S 458) hume pipes for culverts complete as per drawing Tech. Specification section 2900 and IRC special publication no.13 and as per the direction of Engineer in-charge. a) 1m dia. hume pipe in single row	Lm	850.00	3868.00 Rupees Three Thousand Eight Hundred Sixty Eight Only	3,287,800.00 Rupees Thirty Two Lakhs Eighty Seven Thousand Eight Hundred Only
	b) 1m dia. hume pipe in double row	Lm	583.00	7500.00 Rupees Seven Thousand Five Hundred Only	4,372,500.00 Rupees Forty Three Lakhs Seventy Two Thousand Five Hundred Only
5.11	Providing and laying filter material underneath stone pitching in slopes complete as per drawings and technical specification section 2504, 2509, 2510 and as per the direction of Engineer-in-charge.	Cum	1070.00	1200.00	1,284,000.00
5.12	Providing and laying Stone Pitching on embankment slopes complete as per drawing and technical specification Clause 2504.	Cum	2020.00	Rupees One Thousand Two Hundred Only 700.00	Rupees Twelve Lakhs Eighty Four Thousand Only 1,414,000.00
5.13	Providing rubble stone flooring in Cement mortar (1 Cement:3 Sand) and joints complete as per Drawing and Technical Specification Section 1400, 2504 and as per the direction of Engineer-in-charge. 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 Engineer-in-charge.	Cum	1449.00	Rupees Seven Hundred Only 2750.00	Rupees Fourteen Lakhs Fourteen Thousand Only 3,984,750.00
5.14		Nos	6365.00	96.00 Rupees Ninety Six Only	611,040.00 Rupees Six Lakhs Eleven Thousand Forty Only

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Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taptapani (0/0 km to 41/0 km of SH-17)-ICB Package OSRP-CW/ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks )

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
5.15	Supplying, fitting and fixing in position true to line and level tar paper bearings conforming to IRC-83 (para-II) section IX complete with all accessories as per drawings and technical specification clause 2011, IS 1398 and as per the direction of Engineer-in-charge.	Sqm	84.00	100.00	8,400.00
5.16	Supplying and fixing Asphaltic Plug expansion joints complete as per Drawing and as per IRC: SP : 69-2005 and as per the direction of Engineer-in-charge.	Lm	1704.00	Rupees One Hundred Only	Rupees Eight Thousand Four Hundred Only 2,641,200.00
5.17	Reinforced cement concrete railing complete as per Drawing and Technical Specification Section 2700 (Including cost of Reinforcement) and as per the direction of Engineer-in-charge.	Lm	1396.00	Rupees One Thousand Five Hundred Fifty Only	Rupees Twenty Six Lakhs Forty One Thousand Two Hundred Only 1,745,000.00
5.18	Bituminous wearing course 56mm thick comprising 50mm thick asphaltic concrete in a single layer over Bituminous mastic course 6mm thick with a prime coat complete as per Drawing and Technical Specification Section 2700, Clause 512 and as per the direction of Engineer-in-charge.	Sqm	6963.00	Rupees One Thousand Two Hundred Fifty Only	Rupees Seventeen Lakhs Forty Five Thousand Only 5,222,250.00
5.19	Synthetic enamel painting of culvert no. and span arrangement as per IRC - 7 - 1971 and as per the direction of Engineer-in-charge.	No.	236.00	Rupees Seven Hundred Fifty Only	Rupees Fifty Two Lakhs Twenty Two Thousand Two Hundred Fifty Only 14,160.00
<b>Total for Bill No.5 Carried forward to Summary</b>					Rupees Fourteen Thousand One Hundred Sixty Only <b>92,564,623.00</b>
				<b>Rupees Nine Crores Twenty Five Lakhs Sixty Four Thousand Six Hundred Twenty Three Only</b>	



Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taptapani (0/0 km to 41/0 km of SH-17 )-ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE ( Works Items & Dayworks )**

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
6.01	<b>BILL NO.6 : BRIDGES</b> Earthwork in excavation of foundation for structures complete as per drawing and technical specification clause 304 including all leads & lift and as per the direction of Engineer-in-charge.	Cum	2219.00	40.00	88,760.00
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 including all leads & lifts as per Technical specification Clause 304 and as per the direction of Engineer-in-charge.	Cum	2742.00	400.00	Rupees Eighty Eight Thousand Seven Hundred Sixty Only 1,096,800.00
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 Engineer-in-charge.	Cum	187.00	1200.00	224,400.00 Rupees Ten Lakhs Ninety Six Thousand Eight Hundred Only
6.04	Cement concrete M-15 grade in leveling course etc including centering and shuttering all complete as per drawing and Technical specification Section 1500 and 1700 and as per the direction of Engineer-in-charge.	Cum	102.00	3141.00	320,382.00 Rupees Two Lakhs Twenty Four Thousand Four Hundred Only Rupees Three Lakhs Twenty Thousand Three Hundred Eighty Two Only



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 CONTRACT NO. OSRP-CW-ICB-Y1-03



Chief Engineer  
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Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taptapani (0/0 km to 4/10 km of SH-17 )-ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks )

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
6.05	Cement concrete M-15 grade 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 Engineer-in-charge.	Cum	593.00	3450.00	2,045,850.00
6.06	Reinforced cement concrete in foundation complete as per drawing & Technical specification sections 1500, 1700, 2100, 2200 and as per the direction of Engineer-in-charge.				Rupees Twenty Lakhs Forty Five Thousand Eight Hundred Fifty Only
	a) M-20 Grade	Cum	130.00	4000.00	520,000.00
	b) M-35 Grade	Cum	385.00	4500.00	1,732,500.00
6.07	Reinforced cement concrete in substructure complete as per drawing & Technical specification sections 1500, 1700, 2200 and as per the direction of Engineer-in-charge.				Rupees Seventeen Lakhs Thirty Two Thousand Five Hundred Only
	a) M-20 Grade	Cum	158.00	4100.00	647,800.00
	b) M-30 Grade	Cum	259.00	4600.00	1,191,400.00
	c) M-35 Grade	Cum	0.30	4800.00	1,440.00

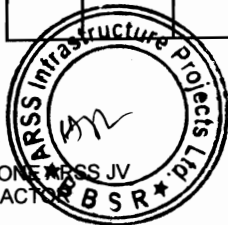


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 Bhubaneswar, Orissa  
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Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taptapani (0/0 km to 41/0 km of SH-17 )-ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks )

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
6.08	Reinforced cement concrete in super structure complete as per drawing and Technical specification section 1500, 1700, 2300 and as per the direction of Engineer-in-charge. a) M-25 grade	Cum	425.00	4848.00 Rupees Four Thousand Eight Hundred Forty Eight Only	2,060,400.00 Rupees Twenty Lakhs Sixty Thousand Four Hundred Only
	b) M-30 grade	Cum	262.00	5030.00 Rupees Five Thousand Thirty Only	1,317,860.00 Rupees Thirteen Lakhs Seventeen Thousand Eight Hundred Sixty Only
6.09	Reinforced cement concrete railing complete as per drawing and Technical specification section 2703 and as per the direction of Engineer-in-charge.	Lm	31.00	1200.00	37,200.00
6.10	Bored cast-in-situ M-35 grade RCC Pile etc. complete as per drawing and technical specification clause 1100, 1700 and as per the direction of Engineer-in-charge.	Lm	323.00	Rupees One Thousand Two Hundred Only 8900.00	Rupees Thirty Seven Thousand Two Hundred Only 2,874,700.00
				Rupees Eight Thousand Nine Hundred Only	Rupees Twenty Eight Lakhs Seventy Four Thousand Seven Hundred Only

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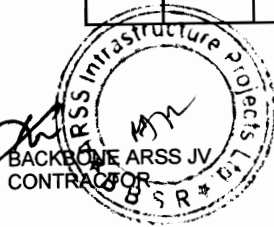


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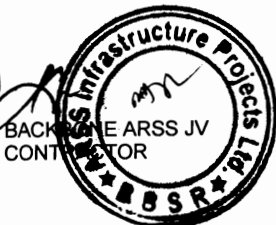
Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taptapani (0/0 km to 41/0 km of SH-17) - ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks )

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
6.11	HYSD(TMT)bar reinforcement complete as per drawing and technical specifications clause 1600 and as per the direction of Engineer-in-charge. a) in foundation	MT	84.00	40000.00 Rupees Forty Thousand Only	3,360,000.00 Rupees Thirty Three Lakhs Sixty Thousand Only
	b) in substructure	MT	39.00	40000.00 Rupees Forty Thousand Only	1,560,000.00 Rupees Fifteen Lakhs Sixty Thousand Only
	c) in superstructure	MT	76.00	40000.00 Rupees Forty Thousand Only	3,040,000.00 Rupees Thirty Lakhs Forty Thousand Only
6.12	Providing and fixing specified bearings complete as per Drawing and technical specification 2000 and as per the direction of Engineer-in-charge.				
	a) Elastomeric bearing	Cucm	50000.00	2.00 Rupees Two Only	100,000.00 Rupees One Lakh Only
	b) Tar paper bearing	Sqm	73.00	100.00 Rupees One Hundred Only	7,300.00 Rupees Seven Thousand Three Hundred Only



Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taptapani (0/0 km to 4/10 km of SH-17) - ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** (Works Items & Dayworks)

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
6.13	Reinforced cement concrete M-30 grade for approach slabs complete as per Drawing and Technical specification section 1500, 1600, 1700, 2700 and as per the direction of Engineer-in-charge.	Cum	107.00	6500.00	695,500.00
6.14	Bituminous wearing course 56mm thick comprising 50mm thick asphaltic Concrete in a single layer over Bituminous mastic course 6 mm thick with a prime Coat Complete as per drawing and Technical Specification Section 509 & 2700 and as per the direction of Engineer-in-charge.	Sqm	1374.00	Rupees Six Thousand Five Hundred Only 750.00	Rupees Six Lakhs Ninety Five Thousand Five Hundred Only 1,030,500.00
6.15	Providing and fixing Drainage Spouts Complete as per drawing and Technical Specification Clause 2705 and as per the direction of Engineer-in-charge	No	30.00	Rupees Seven Hundred Fifty Only 750.00	Rupees Ten Lakhs Thirty Thousand Five Hundred Only 22,500.00
6.16	Providing and laying Stone pitching in slopes complete as per drawing and Technical Specification Section 2500 and as per the direction of Engineer-in-charge.	Cum	435.00	Rupees Seven Hundred Fifty Only 841.00	Rupees Twenty Two Thousand Five Hundred Only 365,835.00
6.17	Providing as laying fitter material underneath Stone pitching in slopes Complete as per drawing and Technical Specification clause 2504 and as per the direction of Engineer-in-charge.	Cum	198.00	1200.00	Rupees Three Lakhs Sixty Five Thousand Eight Hundred Thirty Five Only 237,600.00
				Rupees One Thousand Two Hundred Only	Rupees Two Lakhs Thirty Seven Thousand Six Hundred Only



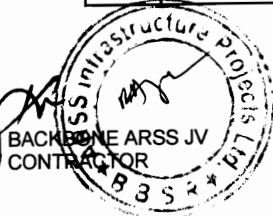
Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taptapani (0/0 km to 41/0 km of SH-17) - ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks )

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
6.18	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 Engineer-in-charge.	Nos	504.00	100.00	50,400.00
6.19	Providing rubble Stone flooring in Cement mortar (1Cement:3 sand) and joints Complete as per drawing and Technical Specification Section 1400 and 2500 and as per the direction of Engineer-in-charge.	Cum	40.00	Rupees One Hundred Only 700.00	Rupees Fifty Thousand Four Hundred Only 28,000.00
6.20	Supplying as fixing the following types of expansion joints Complete as per Drawing and as per IRC: SP : 69-2005 and as per the direction of Engineer-in-charge. a) Asphaltic plug	Lm	55.00	Rupees Seven Hundred Only 1550.00	Rupees Twenty Eight Thousand Only 85,250.00
	b) Compression seal type of expansion joint.	Lm	24.00	Rupees One Thousand Five Hundred Fifty Only 12000.00	Rupees Eighty Five Thousand Two Hundred Fifty Only 288,000.00
6.21	Synthetic enamel painting of culvert no. and span arrangement as per IRC - 7 - 1971 and as per the direction of Engineer-in-charge.	No.	20.00	Rupees Twelve Thousand Only 60.00	Rupees Two Lakhs Eighty Eight Thousand Only 1,200.00
				Rupees Sixty Only	Rupees One Thousand Two Hundred Only



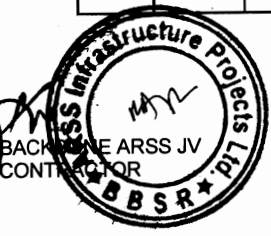
Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taptapani (0/0 km to 41/0 km of SH-17)-ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks )

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
6.22	Carrying and Confirmatory bores up to required depth at locations of bridges as directed be 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 Engineer-in-charge. a) In all types of soil (except rock) i) depth from 10m to 20m	Lm	60.00	600.00 Rupees Six Hundred Only	36,000.00 Rupees Thirty Six Thousand Only
6.23	Providing and painting of flood gauge on substructure is fall height and 500mm width and as per the direction of Engineer-in-charge.	Lm	45.00	911.00 Rupees Nine Hundred Eleven Only	40,995.00 Rupees Forty Thousand Nine Hundred Ninety Five Only
6.24	Providing and laying 150mm dia. HDPE Service pipe as per drawing and as per the direction of Engineer-in-charge.	Lm	510.00	330.00 Rupees Three Hundred Thirty Only	168,300.00 Rupees One Lakh Sixty Eight Thousand Three Hundred Only
6.25	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 Engineer-in-charge.	Cum	1341.00	132.00 Rupees One Hundred Thirty Two Only	177,012.00 Rupees One Lakh Seventy Seven Thousand Twelve Only



Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Tapapani (0/0 km to 41/0 km of SH-17)-ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks )

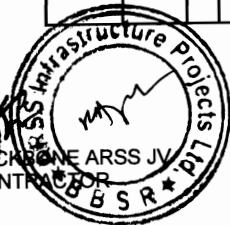
Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
6.26	PCC in flooring as per Drawing & Technical Specification section 1700, 2500 and as per the direction of Engineer-in-charge.				
	a) M-15	Cum	93.00	3141.00 Rupees Three Thousand One Hundred Forty One Only	292,113.00 Rupees Two Lakhs Ninety Two Thousand One Hundred Thirteen Only
	b) M-20	Cum	31.00	4000.00 Rupees Four Thousand Only	124,000.00 Rupees One Lakh Twenty Four Thousand Only
6.27	Reinforced cement concrete crash barrier including cost of steel and its fabrication to bridge structures as per the approved drawing and Technical Specification clause 809, and section 1500, 1600, 1700 and as per the direction of Engineer-in-charge .	Lm	255.00	2400.00	612,000.00
<b>Total for Bill No.6 Carried forward to Summary</b>					<b>26,481,997.00</b>
				<b>Rupees Two Crores Sixty Four Lakhs Eighty One Thousand Nine Hundred Ninety Seven Only</b>	



Chief Engineer  
 World Bank Projects  
 Odisha  
 Bhubaneswar

Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Tapapani (0/0 km to 41/0 km of SH-17)-ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks )

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
7.01	<b>BILL NO.7 : RETAINING WALL, DRAINAGE AND PROTECTIVE WORKS</b>				
	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 Engineer-in-charge.	Cum	1663.00	40.00	66,520.00
(b)	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 including all leads & lifts as per Technical specification Clause 305 and as per the direction of Engineer-in-charge.	Cum	1196.00	Rupees Forty Only	Rupees Sixty Six Thousand Five Hundred Twenty Only 478,400.00
(c)	Filter media behind wall complete as per drawing and Technical Specification Clauses 2504 and as per the direction of Engineer-in-charge.	Cum	2112.00	Rupees Four Hundred Only	Rupees Four Lakhs Seventy Eight Thousand Four Hundred Only 2,534,400.00
(d)	Plain cement concrete M -15 in foundation leveling course etc. including centering and shuttering all complete as per drawing and Technical Clauses 1500, 1700 and as per the direction of Engineer-in-charge.	Cum	139.00	Rupees One Thousand Two Hundred Only	Rupees Twenty Five Lakhs Thirty Four Thousand Four Hundred Only 444,800.00
				Rupees Three Thousand Two Hundred Only	Rupees Four Lakhs Forty Four Thousand Eight Hundred Only



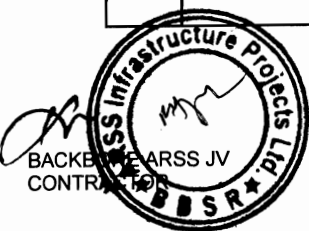
Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Tapapani (0/0 km to 4/10 km of SH-17 )-ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks)

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
(e)	Cement concrete M -20 for reinforced concrete in foundation including centering and shuttering all complete as per drawing and Technical Clauses 1500, 1700, 2100 and as per the direction of Engineer-in-charge.	Cum	964.00	4179.00	4,028,556.00
(f)	Providing steel reinforcement HYSD(TMT) for retaining wall complete as per drawing and Technical Specification Clause 1600 and as per the direction of Engineer-in-charge.	MT	58.00	40000.00	Rupees Forty Lakhs Twenty Eight Thousand Five Hundred Fifty Six Only 2,320,000.00
(g)	Providing guard post complete as per drawings and Technical specifications section 806 and as per the direction of Engineer-in-charge.	No.	440.00	354.00	Rupees Twenty Three Lakhs Twenty Thousand Only 155,760.00
(h)	Providing weep holes in retaining wall complete as per drawing and Technical Specification Clause 2706 and as per the direction of Engineer-in-charge.	No.	880.00	100.00	Rupees One Lakh Fifty Five Thousand Seven Hundred Sixty Only 88,000.00
7.02	Providing and laying stone pitching on embankment slopes as per drawing and Technical Specification Clause 2504 and as per the direction of Engineer-in-charge.	Cum	738.00	750.00	Rupees Eighty Eight Thousand Only 553,500.00
					Rupees Five Lakhs Fifty Three Thousand Five Hundred Only

BACKBONE INFRASTRUCTURE PROJECTS  
 BACKBONE INFRASTRUCTURE PROJECTS JV  
 CONTRACTOR  
 OSRP

Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taptapani (0/0 km to 41/0 km of SH-17)-ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks )

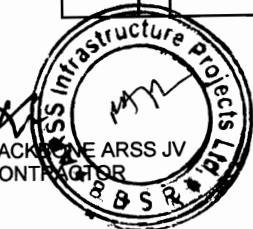
Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
7.03	Providing and laying filter material underneath stone pitching on embankment slopes as per drawing and Technical Specification Clause 2504 and as per the direction of Engineer-in-charge.	Cum	369.00	1200.00	442,800.00
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 Engineer-in-charge.	Sqm	160058.00	19.00	Rupees Four Lakhs Forty Two Thousand Eight Hundred Only 3,041,102.00
7.05	Constructing lined surface drains/ sub surface drains to the required lines and grades as per drawing and Technical Specification section 1500,1600, 1700, 2100 and as per the direction of Engineer-in-charge.	Lm	22980.00	3760.00	Rupees Thirty Lakhs Forty One Thousand One Hundred Two Only 86,404,800.00
7.06	Constructing box type drains to the required lines and grades including cost of steel and its fabrication as per drawing and technical specification section 1500, 1600, 1700, 2100 and as per the direction of Engineer-in-charge.	Lm	1120.00	8176.00	Rupees Eight Crores Sixty Four Lakhs Four Thousand Eight Hundred Only 9,157,120.00
<b>Total for Bill No.7 Carried forward to Summary</b>					Rupees Ninety One Lakhs Fifty Seven Thousand One Hundred Twenty Only 109,715,758.00
					<b>Rupees Ten Crores Ninety Seven Lakhs Fifteen Thousand Seven Hundred Fifty Eight Only</b>





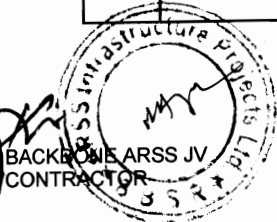
Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taplapani (0/0 km to 41/0 km of SH-17) - ICB Package OSRP-CW/ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks )

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
8.01	<b>BILL NO-8 : MISCELLANEOUS ITEMS.</b> Providing and laying plain cement concrete kerb as per drawing and Technical Specifications Clauses 408, section 1500,1700 and as per the direction of Engineer-in-charge	Lm	336.00	200.00	67,200.00
8.02	Providing service ducts with 150mm dia GI pipes over concrete base of M-15 under existing and proposed carriageways including cutting of trenches through existing roadway and reinstatement of the same as per design and specification and as per the direction of Engineer-in-charge.	Lm	378.00	1670.00	Rupees Sixty Seven Thousand Two Hundred Only 631,260.00
8.03	Providing and fixing RCC boundary posts complete as per drawing and Technical Specification Clause 806 and as per the direction of Engineer-in-charge.	No	449.00	281.00	Rupees One Thousand Six Hundred Seventy Only 126,169.00
8.04	Providing and fixing RCC/PCC hectometer, Kilometer and 5th kilometer stones complete as per Technical Specification Clause 804 and as per the direction of Engineer-in-charge.				Rupees One Lakh Twenty Six Thousand One Hundred Sixty Nine Only
	a) No of (200) Hectometer Stone	No	164.00	300.00	Rupees Forty Nine Thousand Two Hundred Only 49,200.00
	b) No of Kilometer stone	No	32.00	1200.00	Rupees Thirty Eight Thousand Four Hundred Only 38,400.00
	c) No. of 5th Kilometer Stone	No	9.00	1884.00	Rupees Sixteen Thousand Nine Hundred Fifty Six Only 16,956.00



Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taptapani (0/0 km to 4/0 km of SH-17 )- ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks )

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
8.05	Constructing footpath/ paved separator at toll plaza, passenger platform / paved part of medians and islands complete as per drawing and Technical Specifications Clause 409 and 407 and as per the direction of Engineer-in-charge.	Sqm	3693.00	2500.00	9,232,500.00
8.06	Providing passenger shelters for Bus Bays as per drawing and Technical Specifications Section 1500, 1600, 1700, 2100, 2200, 2300 and as per the direction of Engineer-in-charge.	No	26.00	180000.00	Rupees Ninety Two Lakhs Thirty Two Thousand Five Hundred Only 4,680,000.00
8.07	Construction of temporary diversion including Cross drainage works where necessary and maintenance thereof including traffic control and safety complete as per Technical Specification Clause 112 and as per the direction of Engineer-in-charge.	Lm	5160.00	Rupees One Lakh Eighty Thousand Only 1600.00	Rupees Forty Six Lakhs Eighty Thousand Only 8,256,000.00
8.08	Pavement marking with hot applies thermoplastic paints conforming to ASTM D86 / BS 3262-Part as per drawing and Technical specifications Clause 803.4 and as per the direction of Engineer-in-charge.				
	a) Lane line / Edge marking	sqm	11746.00	600.00	7,047,600.00 Rupees Seventy Lakhs Forty Seven Thousand Six Hundred Only
	b) Directional arrows and lettering etc.	No	192.00	46.00	8,832.00 Rupees Eight Thousand Eight Hundred Thirty Two Only



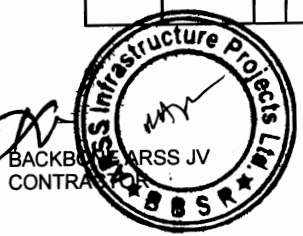
Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taptepani (0/0 km to 41/0 km of SH-17) - ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks )

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
8.09	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 and as per the direction of Engineer-in-charge.				
(a)	Informatory Signs				
	(i) Facility Information (800 x 600)mm	No	10.00	3168.00 Rupees Three Thousand One Hundred Sixty Eight Only	31,680.00 Rupees Thirty One Thousand Six Hundred Eighty Only
	(ii) Direction Signs (1200 x 700 mm)	No	2.00	9329.00 Rupees Nine Thousand Three Hundred Twenty Nine Only	18,658.00 Rupees Eighteen Thousand Six Hundred Fifty Eight Only
	(iii) Advance Direction (size 1800 x 1200mm) ,	No	1.00	9584.00 Rupees Nine Thousand Five Hundred Eighty Four Only	9,584.00 Rupees Nine Thousand Five Hundred Eighty Four Only
	(iv) Re-Assurance Sign (1800 X 1200 mm) ,	No	1.00	9584.00 Rupees Nine Thousand Five Hundred Eighty Four Only	9,584.00 Rupees Nine Thousand Five Hundred Eighty Four Only
	(v) Destination Sign (1500 X 900 mm) ,	No	2.00	7384.00 Rupees Seven Thousand Three Hundred Eighty Four Only	14,768.00 Rupees Fourteen Thousand Seven Hundred Sixty Eight Only
	(vi) Place Identification (1500 X 900 mm) ,	No	1.00	7384.00 Rupees Seven Thousand Three Hundred Eighty Four Only	7,384.00 Rupees Seven Thousand Three Hundred Eighty Four Only
	(vii) Route Marker Sign (450mm x 600mm)	No	4.00	3301.00 Rupees Three Thousand Three Hundred One Only	13,204.00 Rupees Thirteen Thousand Two Hundred Four Only
	(viii) Other Informatory Signs (2100mm x 1500mm)	No	2.00	9584.00 Rupees Nine Thousand Five Hundred Eighty Four Only	19,168.00 Rupees Nineteen Thousand One Hundred Sixty Eight Only

BACKBONE ARSS JV  
 CONTRACTOR

Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taptapani (0/0 km to 41/0 km of SH-17) - ICB Package OSRP-CW/ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks )

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
(b)	CAUTIONARY SIGNS triangular 900mm side	No	20.00	3930.00 Rupees Three Thousand Nine Hundred Thirty Only	78,600.00 Rupees Seventy Eight Thousand Six Hundred Only
(c)	MANDATORY SIGNS				
	(i) Circular 600mm dia	No	70.00	3354.00 Rupees Three Thousand Three Hundred Fifty Four Only	234,780.00 Rupees Two Lakhs Thirty Four Thousand Seven Hundred Eighty Only
	(ii) Octagon 900 mm height	No	85.00	6453.00 Rupees Six Thousand Four Hundred Fifty Three Only	548,505.00 Rupees Five Lakhs Forty Eight Thousand Five Hundred Five Only
	(iii) Triangular 900 mm side	No	121.00	3929.00 Rupees Three Thousand Nine Hundred Twenty Nine Only	475,409.00 Rupees Four Lakhs Seventy Five Thousand Four Hundred Nine Only
8.10	Providing & fixing retro - reflectorised road delineators complete as per drawing , Technical specifications clause 805 and as per the direction of Engineer-in-charge.				
	( I ) Roadway delineator	No	391.00	866.00 Rupees Eight Hundred Sixty Six Only	338,606.00 Rupees Three Lakhs Thirty Eight Thousand Six Hundred Six Only
	( ii ) Hazard Marker	No	16.00	866.00 Rupees Eight Hundred Sixty Six Only	13,856.00 Rupees Thirteen Thousand Eight Hundred Fifty Six Only
	( iii ) Object Marker	No	26.00	866.00 Rupees Eight Hundred Sixty Six Only	22,516.00 Rupees Twenty Two Thousand Five Hundred Sixteen Only



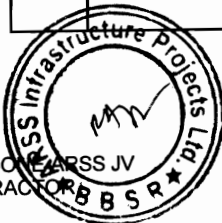
BACKBENCHERS JV  
 CONTRACTOR

World Bank Projects  
 World Bank Projects  
 EMPLOYER  
 O/o the E. I. C (Civil) Orissa  
 Bhubaneswar

Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Tapapani (0/0 km to 41/0 km of SH-17)-ICB Package OSRP-CW/ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks)

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
8.11	Providing and fixing RCC Guard post with reflective paint marking on the top 25mm width band complete including end anchorage as per drawing and Technical Specifications Clause 806 and as per the direction of Engineer-in-charge.	No.	949.00	354.00	335,946.00
8.12	Supply of colour recorded photographs negative and two colour prints there-from mounted in album and also in digital form in CD as per Technical Specifications Clause 125 As per requirements and as per the direction of Engineer-in-charge.	No	500.00	10.00	Rupees Three Lakhs Thirty Five Thousand Nine Hundred Forty Six Only 5,000.00
8.13	Supply of additional prints of coloured photographs referred to above as per Technical Specifications Clause 125 As per requirements and as per the direction of Engineer-in-charge.	No	800.00	Rupees Ten Only 10.00	Rupees Five Thousand Only 8,000.00
8.14	Supply of colour video coverage in CD form during construction as per Technical Specifications Clause 126 As per requirement and as per the direction of Engineer-in-charge.	set	2.00	Rupees Ten Only 5000.00	Rupees Eight Thousand Only 10,000.00
8.15	Providing rumble strips for complete carriageway width at required places as per drawing and as per the direction of Engineer-in-charge.	No.	12.00	Rupees Five Thousand Only 5800.00	Rupees Ten Thousand Only 69,600.00
8.16	Providing road hump complete at required places as per drawing and as per the direction of Engineer-in-charge.	No.	39.00	15000.00	Rupees Sixty Nine Thousand Six Hundred Only 585,000.00
				Rupees Fifteen Thousand Only	Rupees Five Lakhs Eighty Five Thousand Only

BACKBONE INFRASTRUCTURE PROJECTS JV  
 CONTRACTOR



Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Tapapani (0/0 km to 41/0 km of SH-17)-ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks )

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
8.17	Providing toll plaza as per drawing and technical specification and as per the direction of Engineer-in-charge.	No.	1.00	1290000.00 Rupees Twelve Lakhs Ninety Thousand Only	1,290,000.00 Rupees Twelve Lakhs Ninety Thousand Only
8.18	Providing utility duct across the road in specified locations as per the schedule mentioned in drawing and as per the direction of Engineer-in-charge.	Lm	600.00	9426.00 Rupees Nine Thousand Four Hundred Twenty Six Only	5,655,600.00 Rupees Fifty Six Lakhs Fifty Five Thousand Six Hundred Only
<b>Total for Bill No.8 Carried forward to Summary</b>					<b>39,949,565.00</b> Rupees Three Crores Ninety Nine Lakhs Forty Nine Thousand Five Hundred Sixty Five Only



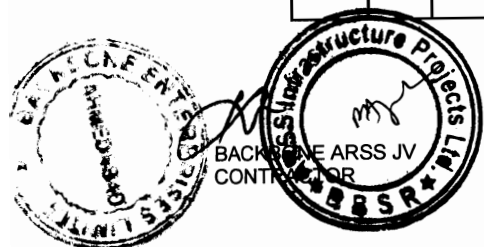
BACKBONE ENTERPRISES JV  
 CONTRACTOR



Chief Engineer,  
 World Bank Projects  
 EMPLOYER  
 O/o the E.T.C (Civil) Orissa  
 Bhubaneswar:

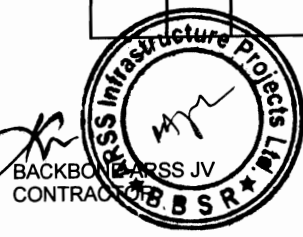
Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taptapani (0/0 km to 41/0 km of SH-17) - ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** (Works Items & Dayworks)

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
9.01	<b>BILL NO.9 MAINTENANCE, REPAIR AND REHABILITATION</b> Carrying out all such as pothole repairs, shoulders making up, jungle clearance, crack sealing etc. routine maintenance of Highway as per Technical Specifications Section 3000 and as per direction of the Engineer-in-charge.	Km-month	576.00	1650.00	950,400.00
9.02	Carrying out surface treatment and any necessary patching to the existing bituminous carriageway surfacing with 2 coat surface dressing as per Technical Specification Section 3000 & Clause 510 and as per direction of the Engineer-in-charge.	Sqm	50000.00	Rupees One Thousand Six Hundred Fifty Only 68.00	Rupees Nine Lakhs Fifty Thousand Four Hundred Only 3,400,000.00
9.03	Epoxy bonding of new concrete to old concrete for jacketing as per Technical Specification clause 2805 and as per the direction of Engineer-in-charge.	Sqm	366.00	9200.00	3,367,200.00
9.04	Jacketing to the existing structure in M-20 grade concrete as per technical specification section 1500, 1700, 2200 and as per direction of the Engineer-in-charge.	Cum	68.00	4200.00	285,600.00
9.05	Providing and laying Cement concrete wearing coat M-30 grade complete as per technical specification section 2700 and as per direction of the Engineer-in-charge.	Cum	38.00	7300.00	277,400.00
<b>Total for Bill No.9 Carried forward to Summary</b>					<b>8,280,600.00</b>
				<b>Rupees Eighty Two Lakhs Eighty Thousand Six Hundred Only</b>	



Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taptapani (0/0 km to 41/0 km of SH-17) - ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks )

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
10.01	<b>BILL NO.10 ENVIRONMENTAL MITIGATION MEASURES</b> 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,07,09,10,12and technical specifications clause 304 including all leads and lifts and as per the direction of Engineer-in-charge.	cum	3294.31	40.00	131,772.40
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,05,05-A,07,09,10,12 direction of the Engineer and Technical specification clause 304 and as per the direction of Engineer-in-charge.	cum	579.53	150.00	Rupees One Lakh Thirty One Thousand Seven Hundred Seventy Two And Forty Paise Only 86,929.50
10.03	Providing & making K.B. Brick masonry work in 1:3 cement mortar in sub-structure complete as per the drawing as per drawing no.OSRP/CEG/SH/ENV/06,07 and Technical Specifications 1300 and as per the direction of Engineer-in-charge.	cum	303.72	Rupees One Hundred Fifty Only 2500.00	Rupees Eighty Six Thousand Nine Hundred Twenty Nine And Fifty Paise Only 759,300.00
				Rupees Two Thousand Five Hundred Only	Rupees Seven Lakhs Fifty Nine Thousand Three Hundred Only

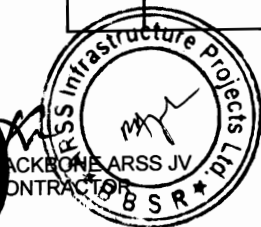


Client Engineer  
 World Bank Projects, Orissa  
 World Bank Project  
 EMPLOYER  
 O/o the E.I.C (Civil) Orissa  
 Bhubaneswar:



Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taptapani (0/0 km to 4/0 km of SH-17) - ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks )

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
10.04	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 Engineer-in-charge.	cum	273.07	3000.00	819,210.00
10.05	Providing & laying in position plain cement concrete M 20 grade (in kerbs) as per drawing no. OSRP/CEG/SH/ENV/01-A,01-B,01-C and Technical Specifications Clause 408 and section 1700 and as per the direction of Engineer-in-charge.	Cum	2320.00	Rupees Three Thousand Only 176.00	Rupees Eight Lakhs Nineteen Thousand Two Hundred Ten Only 408,320.00
10.06	Providing & laying in position Cement Concrete M-20 grade over stone masonry, levelling course etc. including centering and shuttering all complete as per Drawing no. OSRP/CEG/SH/ENV/03/09/10 and Technical Specification Sections 1500 and 1700 and as per the direction of Engineer-in-charge.	cum	2233.74	Rupees One Hundred Seventy Six Only 3571.00	Rupees Four Lakhs Eight Thousand Three Hundred Twenty Only 7,976,685.54
10.07	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 Engineer-in-charge.	Nos	2001.00	Rupees Three Thousand Five Hundred Seventy One Only 100.00	Rupees Seventy Nine Lakhs Seventy Six Thousand Six Hundred Eighty Five And Fifty Four Paise Only 200,100.00
				Rupees One Hundred Only	Rupees Two Lakhs Thousand One Hundred Only



Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taptapani (0/0 km to 41/0 km of SH-17)-ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks )

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
10.08	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,05,05-A,06,07,10 & Technical specification sections 1700, 2100 & 2200 and as per the direction of Engineer-in-charge.	cum	389.89	3881.00	1,513,163.09
10.09	Providing & laying in position Reinforced cement concrete in superstructure complete as per drawing no.OSRP/CEG/SH/ENV/04-A,B,05 & Technical specification sections 1500, 1700 & 2300 and as per the direction of Engineer-in-charge.	cum	290.82	4037.00	Rupees Three Thousand Eight Hundred Eighty One Only 1,174,040.34
10.10	HYSD 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 Engineer-in-charge.	MT	27.23	40000.00	Rupees Four Thousand Thirty Seven Only 1,089,200.00
10.11	Painting two coats with synthetic enamel paint on new concrete surface as per drawing no.OSRP/CEG/SH/ENV/01-A,B,C and technical specification on building items and as per the direction of Engineer-in-charge.	Sqm	464.00	60.00	Rupees Forty Thousand Only 27,840.00 Rupees Twenty Seven Thousand Eight Hundred Forty Only



BACKBONE ENTERPRISES JV  
 CONTRACTOR



Chief Engineer  
 World Bank Projects  
 Odisha  
 EMPLOYER  
 O/o the E.T.C (Civil) Orissa  
 Bhubaneswar

Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taplapani (0/0 km to 41/0 km of SH-17)-ICB Package OSRP-CW/ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks )

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
10.12	Supplying and fixing of M.S.GRILL at junctions including cost of painting as per drawing no.OSRP/CEG/SH/ENV/01-B as per technical specifications on building items and as per the direction of Engineer-in-charge.	kg	8932.00	49.00 Rupees Forty Nine Only	437,668.00 Rupees Four Lakhs Thirty Seven Thousand Six Hundred Sixty Eight Only
10.13	Supplying and fixing of M.S grill gate for sensitive receptors complete as per Drawing no.OSRP/CEG/SH/ENV/05-A as per technical specifications for building items and as per the direction of Engineer-in-charge.	kg	4682.54	42.00 Rupees Forty Two Only	196,666.68 Rupees One Lakh Ninety Six Thousand Six Hundred Sixty Six And Sixty Eight Paise Only
10.14	Supplying and fixing of 50X50X6 mm angle post, split 70 mm at the bottom end and galvanised, to be fixed vertically in position in concrete (cost of concrete to be paid separately) and holes drilled in it, at a spacing of 1500mm c/c as per drawing OSRP/CEG/SH/ENV/04-B,C,D and 05 and as per the direction of Engineer-in-charge.	kg	3280.18	45.00 Rupees Forty Five Only	147,608.10 Rupees One Lakh Forty Seven Thousand Six Hundred Eight And Ten Paise Only
10.15	Providing and fixing pedestrian guard rail (Footpath barrier) for interception as per drawing no. OSRP/CEG/FB technical specification cl no. 808 and as per the direction of Engineer-in-charge..	Lm	50.00	3035.00 Rupees Three Thousand Thirty Five Only	151,750.00 Rupees One Lakh Fifty One Thousand Seven Hundred Fifty Only

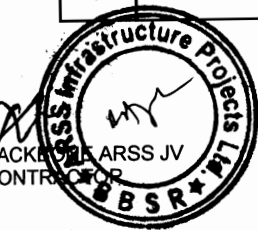


BACKBONE ARSS JV  
CONTRACTOR

Engineer  
World Bank Projects, Orissa  
World Bank Projects  
EMPLOYER  
O/o the E.I.C (Civil) Orissa  
Bhubaneswar.

Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taptapani (0/0 km to 41/0 km of SH-17)-ICB Package OSRP-CW/ICB-Y1-03  
**PRICE SCHEDULE ( Works Items & Dayworks )**

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
10.16	Providing and fixing of G.I wire of 4mm dia @ 100 gms/m including cost of material , labour all complete as per drawing no. OSRP/CEG/SH/ENV/04-B,C and 05 and as per the direction of Engineer-in-charge.	kg	6210.00	60.00 Rupees Sixty Only	372,600.00 Rupees Three Lakhs Seventy Two Thousand Six Hundred Only
10.17	Providing and fixing in position 'Tree Guard', including cost of all materials, labour, fabrication & painting with approved synthetic enamel paint using 25mm X50mmX13 G welded mesh, as per drawing no.OSRP/CEG/SH/ENV/08 and as per the direction of Engineer-in-charge.	Nos	766.00	1050.00 Rupees One Thousand Fifty Only	804,300.00 Rupees Eight Lakhs Four Thousand Three Hundred Only
10.18	Providing & planting tree species as per the schedule attached and maintaining the same upto 3 years and as per the direction of Engineer-in-charge..	Nos	674.00	123.00 Rupees One Hundred Twenty Three Only	82,902.00 Rupees Eighty Two Thousand Nine Hundred Two Only
10.19	Providing 100mm dia PVC pipe for soak pit as per Drawing no. OSRP/CEG/SH/ENV/07 and as per the direction of Engineer-in-charge.	Lm	460.00	65.00 Rupees Sixty Five Only	29,900.00 Rupees Twenty Nine Thousand Nine Hundred Only
10.20	Laying of 20mtrs long 20mm PVC pipe with all fittings and tap point in position for stand post including digging of pipe line and connecting the mains supply with ferrule.as per Drawing no. OSRP/CEG/SH/ENV/07 and as per the direction of Engineer-in-charge.	Lm	80.00	1650.00 Rupees One Thousand Six Hundred Fifty Only	132,000.00 Rupees One Lakh Thirty Two Thousand Only

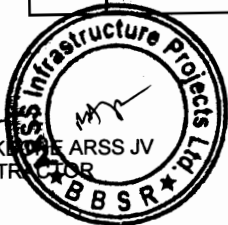


Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Tapatapani (0/0 km to 41/0 km of SH-17)-ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** (Works Items & Dayworks)

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
10.21	Providing & laying in position of PCC M15 for fixing of PVC pipe from platform to soak pit below G.L with a base and cover as per Technical specification cl. 1500, 1700, 2100 as per Drawing no. OSRP/CEG/SH/ENV/07 and as per the direction of Engineer-in-charge.	Cum	28.04	3300.00 Rupees Three Thousand Three Hundred Only	92,532.00 Rupees Ninety Two Thousand Five Hundred Thirty Two Only
10.22	Providing and laying of boulder apron with HG Boulders at spilling locations as per technical specification Cl.2506 and as per Drawing no. OSRP/CEG/SH/ENV/10 and as per the direction of Engineer-in-charge.	Cum	129.60	840.00 Rupees Eight Hundred Forty Only	108,864.00 Rupees One Lakh Eight Thousand Eight Hundred Sixty Four Only
10.23	Constructing course rubble hard granite stone masonry in CM1:3 (at bathing ghat) as per technical specification cl. No.1400,2200 as per Drawing No.OSRP/CEG/SH/ENV/09 and as per the direction of Engineer-in-charge.	Cum	681.50	3148.00 Rupees Three Thousand One Hundred Forty Eight Only	2,145,362.00 Rupees Twenty One Lakhs Forty Five Thousand Three Hundred Sixty Two Only
10.24	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 Engineer-in-charge.	Cum	810.41	1350.00 Rupees One Thousand Three Hundred Fifty Only	1,094,053.50 Rupees Ten Lakhs Ninety Four Thousand Fifty Three And Fifty Paise Only



BACK TO THE ARSS JV  
 CONTRACTOR



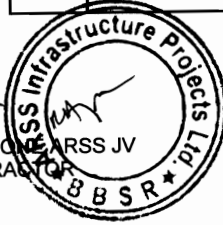
Chief Engineer  
 World Bank Projects, Orissa  
 World Bank Projects  
 O/o the E.I.C (Civil) Orissa.  
 R. Subbarao

Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Tapapani (0/0 km to 4/0 km of SH-17)-ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks )

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
10.25	Providing and laying 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 Engineer-in-charge.	Cum	1620.81	731.00 Rupees Seven Hundred Thirty One Only	1,184,812.11 Rupees Eleven Lakhs Eighty Four Thousand Eight Hundred Twelve And Eleven Paise Only
10.26	Providing Cement plastering 12mm with punning 1:3 for platform as per technical specification cl.1300& 2200 & as per Drawing No.OSRP/CEG/SH/ENV/01-A,B,C,04-A,B,C,D,05,05-A,06,07 and as per the direction of Engineer-in-charge.	Sqm	2849.06	64.00	182,339.84
10.27	Providing and making site enhancement by planting of two trees at tube well and water stand post as per Drawing no. OSRP/CEG/SH/ENV/07 and as per the direction of Engineer-in-charge.	No	92.00	75.00	6,900.00 Rupees One Lakh Eighty Two Thousand Three Hundred Thirty Nine And Eighty Four Paise Only
10.28	Planting at junction as per drawing no. OSRP/CEG/SH/ENV/01-A,01-B,01-C and as per the direction of Engineer-in-charge.	No	20300.00	Rupees Seventy Five Only 22.00	Rupees Six Thousand Nine Hundred Only 446,600.00
10.29	Providing and fixing fixed flower vase as per drawing no. OSRP/CEG/SH/ENV/04-A and as per the direction of Engineer-in-charge.	No	252.00	110.00	27,720.00 Rupees Four Lakhs Forty Six Thousand Six Hundred Only Rupees Twenty Seven Thousand Seven Hundred Twenty Only



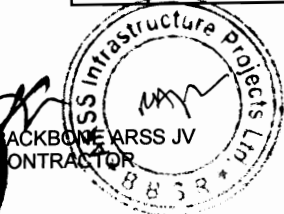
BACKBONE  
CONTRACTOR



Chief Engineer,  
World Bank Project, Orissa  
EMPLOYER  
To the E.I.C (Civil) Orissa  
Bhubaneswar:

Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taptapani (0/0 km to 41/0 km of SH-17)-ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks )

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
10.30	Planting of shrubs & trees at 2.5m spacing including digging of pits manure as per drawing no. OSRP/CEG/SH/ENV/04-A, B, C, D, 05 and as per the direction of Engineer-in-charge.	No	480.00	55.00	26,400.00
10.31	Planting of shrubs on both sides of approach road at 30cm interval with digging of pits,30/30/30cm manuring insecticides and pesticides as per drawing no. OSRP/CEG/SH/ENV/04-A,B,C,D,05 and as per the direction of Engineer-in-charge.	No	840.00	22.00	Rupees Twenty Six Thousand Four Hundred Only 18,480.00
10.32	Planting of climbers at 50cm interval from plant to plant inside the compound near boundary wall and interception wall with digging of pits 30/30/30cm manuring, watering etc for 1yr as per drawing no. OSRP/CEG/SH/ENV/04-A,B,C,D,05 and as per the direction of Engineer-in-charge.	No	420.00	24.00	Rupees Eighteen Thousand Four Hundred Eighty Only 10,080.00
10.33	Construction of approach road with GSB and murrum topping well mixed and compacted as hard shoulder as per technical specification CI.400-2 drawing no. OSRP/CEG/SH/ENV/04-A,B,C,D,05 and as per the direction of Engineer-in-charge.	Lm	115.20	390.00	Rupees Ten Thousand Eighty Only 44,928.00
10.34	Providing Cement paint two coats to the walls as per drawing no. OSRP/CEG/SH/ENV/04-A,B,C,D,05 and as per the direction of Engineer-in-charge.	Sqm	315.00	12.00	Rupees Forty Four Thousand Nine Hundred Twenty Eight Only 3,780.00
				Rupees Twelve Only	Rupees Three Thousand Seven Hundred Eighty Only



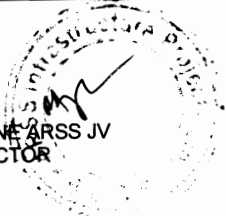
Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taptapani (0/0 km to 41/0 km of SH-17) - ICB Package OSRP-CW-ICB-Y1-03

**PRICE SCHEDULE ( Works Items & Dayworks )**

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
10.35	Maintenance of haulage road for 4 occurrences through out the construction period as per technical specification cl.no.3002 and as per the direction of Engineer-in-charge.	Lm	14080.00	60.00	844,800.00
10.36	Providing and making site enhancement Plantation including maintenance with specified enclosed in schedule and as per the direction of Engineer-in-charge.	No	31680.00	11.00	Rupees Eight Lakhs Forty Four Thousand Eight Hundred Only
10.37	Cost of RCC Garbage collection bins centers at commercial locations and as per the direction of Engineer-in-charge.	No	30.00	Rupees Eleven Only	348,480.00
				1650.00	Rupees Three Lakhs Forty Eight Thousand Four Hundred Eighty Only
					49,500.00
				Rupees One Thousand Six Hundred Fifty Only	Rupees Forty Nine Thousand Five Hundred Only
					<b>23,177,587.10</b>
	<b>Total for Bill No.10 Carried forward to Summary</b>				
					<b>Rupees Two Crores Thirty One Lakhs Seventy Seven Thousand Five Hundred Eighty Seven And Ten Paise Only</b>



BACKBONE ARSS JV  
CONTRACTOR



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



Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taplapani (0/0 km to 41/0 km of SH-17)-ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks)

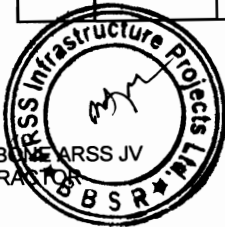
Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
11.01	<b>BILL NO. - 11 : PROVISIONAL ITEMS</b> Cutting of trees including cutting of trunks, branches and removal of stumps including stacking of serviceable material within a lead of 1000 metres and earthing in the depression/pit				
	a) Girth From 300mm to 600mm	No	400.00	Rupees Eighty Four Only	33,600.00 Rupees Thirty Three Thousand Six Hundred Only
	b) Girth From 600mm to 900mm	No	275.00	171.00 Rupees One Hundred Seventy One Only	47,025.00 Rupees Forty Seven Thousand Twenty Five Only
	c) Girth From 900mm to 1800mm	No	150.00	302.00 Rupees Three Hundred Two Only	45,300.00 Rupees Forty Five Thousand Three Hundred Only
	d) Girth From 1800mm to Above	No	90.00	546.00 Rupees Five Hundred Forty Six Only	49,140.00 Rupees Forty Nine Thousand One Hundred Forty Only
11.02	A) Plantation of trees	No	9150.00	27.00 Rupees Twenty Seven Only	247,050.00 Rupees Two Lakhs Forty Seven Thousand Fifty Only
	B) Planting of plants & shrubs in median/ verges	Lm	25000.00	13.00 Rupees Thirteen Only	325,000.00 Rupees Three Lakhs Twenty Five Thousand Only
11.03	Boring for soil investigation including conducting necessary tests and preparation of report, as per direction of the Engineer and Technical Specification Clause 2400.	Lm	300.00	420.00 Rupees Four Hundred Twenty Only	126,000.00 Rupees One Lakh Twenty Six Thousand Only



Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taptapani (0/0 km to 41/0 km of SH-17) - ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks )

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
11.04	Co-ordination for Shifting of Utilities as per Technical Specification Clause 110.	Km	41.00	2100.00 Rupees Two Thousand One Hundred Only	86,100.00 Rupees Eighty Six Thousand One Hundred Only
11.05	Construction of building (plinth area 9 sq m.) and installation of weigh bridge including arrangement for electric supply, all electrical items like lights, exhaust fans, sockets, receptacles and complete wiring with necessary earthing etc. complete as directed by Engineer.	No	2.00	45000.00	90,000.00
11.06	Providing and fixing Pedestrian guard rails in 2m and 1m modules including painting with approved paint complete as per drawing and Technical Specification Clause 803, 1008, 1300 & 1700	Lm	10000.00	2897.00 Rupees Forty Five Thousand Only	28,970,000.00 Rupees Two Crores Eighty Nine Lakhs Seventy Thousand Only

BACKBENCH  
 CONTRACTOR  
 ARSS JV  
 BSR



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

Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taptapani (0/0 km to 41/0 km of SH-17)-ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** (Works Items & Dayworks)

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
11.07	Conducting drilling a perfectly vertical bore hole of specified dia and depth through consolidated & unconsolidated rock with down the hole with own hammer drilling rigs or combination drilling rigs as required to suit the site condition as per Eng-in-Charge and including tools, plants and consumables etc., for lowering of 125mm dia PVC/CI pipes for housing fitted with socket and with or without well screen as per the necessity for soft, medium, hard and boulder formation (CI/PVC) casing pipes if prevent to collapse of over burden is to be provide by the contractor including lowering and withdrawing after completion of the tube well 125/100mm dia bore.as per drawing no.OSRP/CEG/SH/ENV/07.	Mtr	1260.00	Rupees Four Hundred Only	504,000.00 Rupees Five Lakhs Four Thousand Only
	0 to 30mtr.	Mtr	1260.00	Rupees Four Hundred Only	504,000.00 Rupees Five Lakhs Four Thousand Only
	31Mtr to 60mtr.	Mtr	630.00	Rupees Four Hundred Only	252,000.00 Rupees Two Lakhs Fifty Two Thousand Only
	60mtr. To 75mtr	Mtr	1260.00	Rupees Thirty Nine Only	49,140.00 Rupees Forty Nine Thousand One Hundred Forty Only
11.08	Providing labour for lowering the following size of PVC or GI pipes or without strainers as per necessity and fitted and fixed including cutting and threading the pipe as may be necessity and supplying all jointing materials extra socket (Gi or PVC of heavy quality) T&P etc, complete and keeping the top of the casing pipe threaded including plugging the tube well to prevent the entry of foreign matter from above.90 to 60mtr and above.as per drawing no.OSRP/CEG/SH/ENV/07.	Mtr			



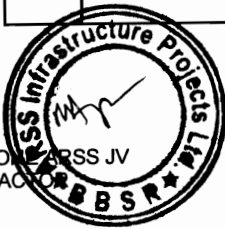
BACKBONE ENTERPRISES JV  
CONTRACTOR



Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Tapapani (0/0 km to 4/10 km of SH-17)-ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks )

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
11.09	Cleaning & developing the tube wells with Compressor supplied by the contractor continuously worked till clear and the quota discharge is obtained from the tubewells including supply and use of necessary equipment and labour as per direction of Eng-in-charge.	Each	42.00	220.00	9,240.00
	Providing labour for fixing of 1m ll hand pump	Each	42.00	Rupees Two Hundred Twenty Only 110.00	Rupees Nine Thousand Two Hundred Forty Only 4,620.00
	Supplying 125mm PVC pipe	RM	1260.00	Rupees One Hundred Ten Only 550.00	Rupees Four Thousand Six Hundred Twenty Only 693,000.00
	Supplying 1m ll hand pump	Each	42.00	Rupees Five Hundred Fifty Only 5500.00	Rupees Six Lakhs Ninety Three Thousand Only 231,000.00
	Supplying 32mm GI riser pipe	Each	336.00	Rupees Five Thousand Five Hundred Only 385.00	Rupees Two Lakhs Thirty One Thousand Only 129,360.00
11.10	Conducting enumeration of trees jointly by forest, revenue, private individual, PIU and contractors representatives with blazing/15/15cm removal of blazed bark, encircling the cut end with approved paint digit hammering of the property hammer and marking hammer impression.	Nos	200.00	88.00	17,600.00
<b>Total for Bill No.11 Carried forward to Summary</b>					Rupees Seventeen Thousand Six Hundred Only <b>32,413,175.00</b>

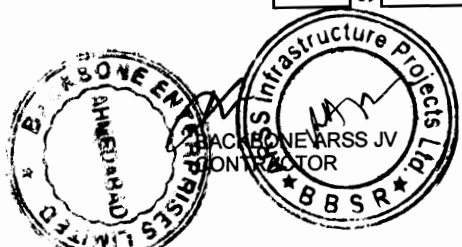
Rupees Three Crores Twenty Four Lakhs Thirteen Thousand One Hundred Seventy Five Only



BACKBONE ENGINEERS JV  
 CONTRACTOR

Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Behampur - Taptapani (0/0 km to 41/0 km of SH-17) - ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks )

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
<b>Schedule of Daywork Rates: 1. Labour</b>					
D101	Labour	Day	400.00	Rupees Seventy Only	28,000.00 Rupees Twenty Eight Thousand Only
D102	Mason	Day	50.00	Rupees One Hundred Fifty Only	7,500.00 Rupees Seven Thousand Five Hundred Only
D103	Carpenter	Day	20.00	Rupees One Hundred Fifty Only	3,000.00 Rupees Three Thousand Only
D104	Steelworker Erector	Day	70.00	Rupees One Hundred Fifty Only	10,500.00 Rupees Ten Thousand Five Hundred Only
D105	Driver for vehicle up to 10 tons	Day	50.00	Rupees One Hundred Fifty Only	7,500.00 Rupees Seven Thousand Five Hundred Only
D106	Operator for excavator, dragline, shovel or crane	Day	50.00	200.00	10,000.00 Rupees Ten Thousand Only
D107	Operator for tractor with dozer blade or ripper	Day	50.00	200.00	10,000.00 Rupees Ten Thousand Only
D108	Operator grader	Day	50.00	200.00	10,000.00 Rupees Ten Thousand Only
D109	Operator in other construction equipment	Day	50.00	200.00	10,000.00 Rupees Ten Thousand Only
D110	Chowkidars for watch & ward	Day	500.00	150.00	75,000.00 Rupees Seventy Five Thousand Only
				<b>Total</b>	<b>171,500.00</b>
D111	Allow 20% (Twenty Percent) of Subtotal for Contractor's overhead, profit, etc., in accordance with paragraph 3 (b) above			<b>Rupees One Lakh Seventy One Thousand Five Hundred Only</b>	<b>34,300.00</b> Rupees Thirty Four Thousand Three Hundred Only
				<b>Total</b>	<b>205,800.00</b> Rupees Two Lakhs Five Thousand Eight Hundred Only



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

Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taplapani (0/0 km to 41/0 km of SH-17)-ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks )

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
<b>Schedule of Daywork Rates: 2. Materials</b>					
D201	Cement, ordinary Portland or equivalent in bags conforming to IS:269:1989 and IS 455:1989	Per Mt	20.00	4800.00 Rupees Four Thousand Eight Hundred Only	96,000.00 Rupees Ninety Six Thousand Only
D202	HYSD reinforcing bars upto 25 mm dia conforming to IS:1786:1989	Per Mt	5.00	38000.00 Rupees Thirty Eight Thousand Only	190,000.00 Rupees One Lakh Ninety Thousand Only
D203	Bricks of class designation 75 as per IS:1077:1992	Per 1000 Nos	500.00	2000.00 Rupees Two Thousand Only	1,000,000.00 Rupees Ten Lakhs Only
D204	Anti Corrosive Bituminous paint	Per Lit	10.00	150.00 Rupees One Hundred Fifty Only	1,500.00 Rupees One Thousand Five Hundred Only
D205	Enamel Paint of any shade & colour (IS:2932-1964 & IS 137-1975)	Per Lit	10.00	150.00 Rupees One Hundred Fifty Only	1,500.00 Rupees One Thousand Five Hundred Only
D206	Coarse Sand as per IS 1542	Per Cum	50.00	150.00 Rupees One Hundred Fifty Only	7,500.00 Rupees Seven Thousand Five Hundred Only
D207	R.R. Stone for masonry	Per Cum	50.00	2000.00 Rupees Two Thousand Only	100,000.00 Rupees One Lakh Only
D208	Crusher broken stone aggregates up to 25 mm nominal size	Per Cum	50.00	900.00 Rupees Nine Hundred Only	45,000.00 Rupees Forty Five Thousand Only

BACKBONE JV  
 CONTRACTOR

Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taptapani (0/0 km to 41/0 km of SH-17 )-ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks )

Item 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	850.00 Rupees Eight Hundred Fifty Only	42,500.00 Rupees Forty Two Thousand Five Hundred Only
D210	Portable water at site	Per 1000 ltr	5000.00	500.00 Rupees Five Hundred Only	2,500,000.00 Rupees Twenty Five Lakhs Only
<b>Total</b>				<b>3,984,000.00</b>	<b>3,984,000.00</b>
D211	Allow 2.447% ( Two point Four-Four-Seven Percent) of Subtotal for Contractor's overhead, profit, etc., in accordance with paragraph 3 (b) above			Rupees Thirty Nine Lakhs Eighty Four Thousand Only	97,500.00 Rupees Ninety Seven Thousand Five Hundred Only
<b>Total</b>				<b>4,081,500.00</b>	<b>4,081,500.00</b>

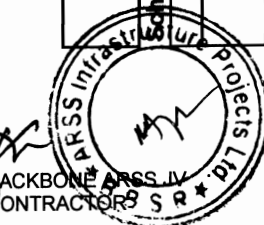
Rupees Forty Lakhs Eighty One Thousand Five Hundred Only



Chief Engineer  
 Chief Engineer  
 World Bank Projects  
 O/o the E. F. C. (Civil) Orissa  
 Bhubaneswar

Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Tapapani (00 km to 41/0 km of SH-17) - ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** ( Works Items & Dayworks)

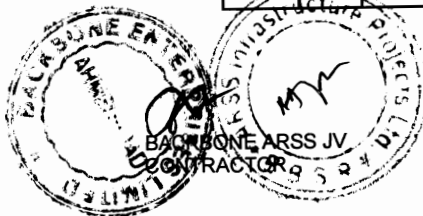
Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
<b>Schedule of Daywork Rates: 2. Contractor's Equipment</b>					
D301	Excavator, face shovel, or dragging:				
D301.1	Up to and including 1 m3	Hour	50.00	Rupees One Thousand Only	50,000.00 Rupees Fifty Thousand Only
D301.2	Over 1 m 3 to 2 m 3	Hour	30.00	Rupees One Thousand Five Hundred Only	45,000.00 Rupees Forty Five Thousand Only
D301.3	Over 2 m 3	Hour	10.00	Rupees Two Thousand Five Hundred Only	25,000.00 Rupees Twenty Five Thousand Only
D302	Tractor, including bull or angle dozer:				
D302.1	Up to and including 150 kW	Hour	50.00	Rupees Two Thousand Five Hundred Only	125,000.00 Rupees One Lakh Twenty Five Thousand Only
D302.2	Over 150 kW to 200 kW	Hour	30.00	Rupees Three Thousand Only	90,000.00 Rupees Ninety Thousand Only
D302.3	Over 200 kW to 250 kW	Hour	10.00	Rupees Three Thousand Only	30,000.00 Rupees Thirty Thousand Only
D303	Tractor with ripper:				
D303.1	Up to and including 200 kW	Hour	30.00	Rupees Three Thousand Only	90,000.00 Rupees Ninety Thousand Only
D303.2	Over 200 kW to 250 kW	Hour	10.00	Rupees Three Thousand Only	30,000.00 Rupees Thirty Thousand Only
D304	Motor grader	Hour	40.00	Rupees Two Thousand Only	80,000.00 Rupees Eighty Thousand Only
D305	Crane- 5 tonne	Hour	40.00	Rupees Eight Hundred Only	32,000.00 Rupees Thirty Two Thousand Only





Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Tapatapani (0/0 km to 41/0 km of SH-17)-ICB Package OSRP-CW-ICB-Y1-03  
**PRICE SCHEDULE** (Works Items & Dayworks)

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
D306	Diesel Road Roller, or Vibratory Compactor upto 10 t	Hour	40.00	1000.00 Rupees One Thousand Only	40,000.00 Rupees Forty Thousand Only
D307	Trucks, or Truck tipper, or Truck with mounted water tank or truck with crane for removal of accidental vehicles.	Hour	100.00	1500.00 Rupees One Thousand Five Hundred Only	150,000.00 Rupees One Lakh Fifty Thousand Only
D308	Tractor with trolley, or tractor with water tanker trailer, tractor with ripper Tractor with hydraulic scraper (a) upto 25 HP (b) For 25-40 HP	Hour	40.00 30.00	500.00 600.00 Rupees Five Hundred Only Rupees Six Hundred Only	20,000.00 18,000.00 Rupees Twenty Thousand Only Rupees Eighteen Thousand Only
D309	Bitumen mixture (10-14 Cft.) C.C	Hour	20.00	800.00 Rupees Eight Hundred Only	16,000.00 Rupees Sixteen Thousand Only
D310	Water pumping sets mounted on trolley (diesel driven)with inlet & outlet pipes. a) Sets up to 10 HP b) Sets 11 to 20 HP c) Sets above 20 HP	Hour	10.00 10.00 10.00	75.00 120.00 200.00 Rupees Seventy Five Only Rupees One Hundred Twenty Only Rupees Two Hundred Only	750.00 1,200.00 2,000.00 Rupees Seven Hundred Fifty Only Rupees One Thousand Two Hundred Only Rupees Two Thousand Only



Contract Name: Widening and Strengthening of Existing Carriageway to 2 lane from Berhampur - Taptapani (0/0 km to 41/0 km of SH-17) - ICB Package OSRP-CW/ICB-Y1-03  
**PRICE SCHEDULE ( Works Items & Dayworks )**

Item No	Description	Unit	Quantity	Rate in Figure and Words	Amount in Figure and Words
D311	Generator sets mounted on trolley				
	a) Sets upto 5 Kva	Hour	10.00	Rupees One Hundred Twenty Five Only	1,250.00 Rupees One Thousand Two Hundred Fifty Only
	b) Sets 5-15 Kva	Hour	10.00	Rupees Two Hundred Fifty Only	2,500.00 Rupees Two Thousand Five Hundred Only
D312	Mobile Crane / Power winch	Hour	10.00	Rupees Five Hundred Only	5,000.00 Rupees Five Thousand Only
D313	Bull Dozer 100/110 Hp	Hour	10.00	Rupees Three Thousand Only	30,000.00 Rupees Thirty Thousand Only
D314	Plate compactors	Hour	10.00	No Rate (Rupees Nil only)	0.00 (Rupees Nil only)
D315	Jack hammers for dismantling	Hour	10.00	Rupees Twenty Only	200.00 Rupees Two Hundred Only
D316	Utility Vehicles	Hour	10.00	Rupees Four Hundred Fifty Only	4,500.00 Rupees Four Thousand Five Hundred Only
D317	Mini Hot Mix Plant (5TPH)	Hour	10.00	Rupees One Thousand One Hundred Only	11,000.00 Rupees Eleven Thousand Only
<b>Total</b>					<b>899,400.00</b>
D318	Allow 20% (Twenty percent) of Subtotal for Contractor's overhead, profit, etc., in accordance with paragraph 3 (b) above			Rupees Eight Lakhs Ninety Nine Thousand Four Hundred Only	179,880.00 Rupees One Lakh Seventy Nine Thousand Eight Hundred Eighty Only
<b>Total</b>					<b>1,079,280.00</b>

Rupees Ten Lakhs Seventy Nine Thousand Two Hundred Eighty Only



BACKBONE ENTERPRISES LIMITED  
 Bhubaneswar, Odisha  
 Director

Chief Engineer  
 World Bank Project  
 E.I.C (Civil) Orissa  
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