



GOVERNMENT OF ANDHRA PRADESH
(ANDHRA PRADESH ROAD DEVELOPMENT CORPORATION)

ANDHRA PRADESH ROAD SECTOR PROJECT
Feasibility Study, Design and Detailed Engineering

Detailed Project Report
UPGRADING OF PEDNA-NUZVID-VISSANNAPET ROAD

VOLUME – VII
Environmental Impact Assessment
And Environmental Management Plan

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Submitted to:
The Chief Engineer (R &B) CRN & Managing Director
A.P. Road Development Corporation,
5th floor, R&B complex, Mahavir Marg,
A.C. Guards, Hyderabad- 500 004
Andhra Pradesh, India.



Submitted by:
THE Louis Berger Group, Inc
Engineers.Planners.Scientists.Economists
B3-6, Sector-32,
Gurgaon 122 001, Haryana, India

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ABBREVIATIONS

SOS	Strategic Option Study
R&B	Road & Building Department
APRDC	A.P. Road Development Corporation
APRSP	Andhra Pradesh Road Sector Project
GOI	Government of India
GOAP	Government of Andhra Pradesh
SH	State Highway
MDR	Major District Road
ODR	Other District Road
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
DoF	Department of Forest
MoEF	Ministry of Environment and Forest
FHWA	Federal Highways Authority
CPCB	Central Pollution Control Board
IMD	India Meteorological Department
COI	Corridor of Impact
PIA	Project Influence Area
PD	Project District
ROW	Right of Way
AAQ	Ambient Air Quality
SPM	Suspended Particulate Matter
RPM	Respirable Particulate Matter
AADT	Annual Average Daily Traffic
PUC	Pollution under Control Certificate
ASI	Archaeological Survey of India.
NOC	No Objection Certificates
RH	Relative Humidity
PAP	Project Affected Person
RAP	Resettlement Action Plan
OMC	Optimum Moisture Content
CSC	Construction Supervision Consultant
EMU	Environment Management Unit
EO	Environment Officer

PIU
PU

Project Implementation Unit
Package Unit

EXECUTIVE SUMMARY

A.1 BACKGROUND

APRDC has planned to improve the State road network by providing better quality and safer roads to the users in sustainable manner with loan assistance from World Bank. Improved quality of roads, better institutional operation and management system of APRDC and safe roads are important features of the project component. In this connection RDC has selected 38 corridors (cumulative length of 2002 km) of high-density (traffic) roads through Strategic Option Study (SOS) to be developed in phased manner.

A.2 OBJECTIVES OF THE ASSIGNMENT

The main objective would be to alleviate the current unsafe and congested conditions of the road network connecting the villages and towns by providing better quality and safe roads to the users in a sustainable and environment friendly manner. Government of India, GoI through Ministry of Environment and Forest (MoEF) enforces **Environment (Protection) Rules, 1986** for environmental protection because of intervention of new projects or activities, or on expansion and modernization of existing projects or activity based on their environmental impacts.

A.3 SCOPE OF ENVIRONMENTAL ASSESSMENT (EA)

The environmental assessment scope includes screening and scoping, environmental assessment and environmental management plans for the individual project roads as required. The EA process also envisages to develop a comprehensive environmental management frame work for the entire project which will adopted as part of the corporate environmental policy for AP Road Development Corporation.

A.4 DESCRIPTION OF PROJECT ROAD

Pedna – Nuzvid – Vissannapet Road, the project road is a section of State Highway No. 46, located in Andhra Region of Andhra Pradesh. The Project road starts at Pedana bypass(assumed km 7/0) at Buntumilli road jn. and traverses through km 9/4 of SH 46 at Pedna in Krishna district and runs north west direction connecting Gudlavalleru, Gudivada, Hanumanjunction, Nuzvid and terminates at km 96/0 Before Vissannapet . Cumulative Length of PR is 83.6 km. The project road provides connectivity between Machilipatnam Port with NH-214A, NH-214, NH-5 & NH-221 and is widely used by interstate traffic.

A.5 KEY ENVIRONMENTAL LAWS AND REGULATIONS

Table 1 presents the environmental regulations and legislations relevant to AP state road project.

Table 1: Environmental Regulations and Legislations

SR. No	Act / Rules	Purpose	Applicable Yes/ No	Reason for Applicability	Authority
1	Environment Protection Act-1986	To protect and improve overall environment	Yes	As all environmental notifications, rules and schedules are issued under this act.	MoEF. GoI; DoE, State Gov. CPCB; SPCB
2	Environmental Impact Assessment Notification 4 th April, 2011	To provide environmental clearance to new development activities following environmental impact assessment	NO	This notification is NOT applicable to Project road, as this is an up-gradation existing state highway	MoEF. EIAA
3	Notification for use of fly ash	Reuse large quantity of fly ash discharged from thermal power plant to minimize land use for disposal	NO	No thermal plant within 100km reaches.	

SR. No	Act / Rules	Purpose	Applicable Yes/ No	Reason for Applicability	Authority
4	Coastal Regulation Zone(CRZ) Notification 1991 (2002)	Protection of fragile coastal belt	NO	Road is not located along coastal belt	
5	National Environment Appellate Authority Act (NEAA) 1997	Address Grievances regarding the process of environmental clearance.	Yes	Grievances if any will be dealt with, within this act.	NEAA
6	The Land Acquisition Act 1894 & 1989	Set out rule for acquisition. of land by government	Yes	This act will be applicable to as there will be acquisition of land for widening, geometric improvements and realignments.	Revenue Department State Government.
7	MoEF Circular on Marginal Land Acquisition and Bypasses 1999	Defining "marginal land" acquisition relating to the 1997 Notification	NO	Not applicable as per Environmental Impact Assessment Notification 14th Sep-2006	MoEF
8	The Forest (Conservation) Act 1927 The Forest (Conservation) Act. 1980 forest (conversion) Rules 1981	To check deforestation by restricting conversion of forested areas into non- forested areas	NO	NO forest area.	Forest Department, GoAP
9	MoEF circular (1998) on linear Plantation on roadside, canals and railway lines modifying the applicability of provisions of forest (Conversation) Act, to linear Plantation	Protection / planting roadside strip as avenue/strip plantations as these are declared protected forest areas.	NO	Roadside tree plantation in Andhra Pradesh does not come under the forest act.	MoEF
10	Wild Life Protection Act 1972	To protect wildlife through certain of National Parks and Sanctuaries	NO	This act is not applicable to as there are NO points of wildlife crossing along project corridor.	Chief Conservator Wildlife, Wildlife Wing, Forest Department, GoAP
11	Air (Prevention and Control of Pollution) Act, 1981	To control air pollution by & Transport controlling emission of air Department. Pollutants as per the prescribed standards.	Yes	This act will be applicable during construction; for obtaining NOC for establishment of hot mix plant, workers' camp, construction camp, etc.	SPCB
12	Water Prevention and Control of Pollution) Act1974	To control water pollution by controlling discharge of pollutants as per the prescribed standards	Yes	This act will be applicable during construction for (establishments of hot mix plant, construction camp, workers' camp, etc.	SPCB
13	Noise Pollution (Regulation and Control Act) 1990	The standards for noise for day and night have been promulgated by the MoEF for various land uses.	Yes	This act will be applicable as vehicular noise on project routes required to assess for future years and necessary protection measure need to be considered in design.	SPCB
14	Ancient Monuments and Archaeological Sites and Remains Act1958	Conservation of cultural and historical remains found in India	NO	This act not applicable as the project route is not close to any Ancient Monument, declared protected under the act.	Archaeological Dept Gol, Indian Heritage Society and Indian National Trust for Art and Culture Heritage (INTACH).

SR. No	Act / Rules	Purpose	Applicable Yes/ No	Reason for Applicability	Authority
15	Public Liability and Insurance Act 1991	Protection form hazardous materials and accidents.	Yes	Contractor need to stock hazardous material like diesel, Bitumen, Emulsions etc.	SPCB
16	Explosive Act 1984	Safe transportation, storage and use of explosive material	Yes	For transporting and storing diesel, bitumen etc.	Chief Controller of Explosives
17	Minor Mineral and concession Rules	For opening new quarry.	Yes	Regulate use of minor minerals like stone, soil, river sand etc.	District Collector
18	Central Motor Vehicle Act 1988 and Central Motor Vehicle Rules 1989	To check vehicular air and noise pollution.	Yes	This rule will be applicable to road users and construction Machinery.	Motor Vehicle Department
19	National Forest Policy 1952 National Forest Policy (Revised) 1988	To maintain ecological stability through preservation and restoration of biological diversity.	NO	This policy will not be applicable as NO eco sensitive feature exists along the project corridor.	Forest Department, Gol and GoAP
20	The Mining Act	The mining act has been notified for safe and sound mining activity.	Yes	The construction of project road will require aggregates. These will be procured through mining from riverbeds and quarries	Department of mining, GoAP

On the basis of data and information collected during field survey and discussion with local expert and visualise potential associated impact, consultant has categorised this project as **category-B**, which requires a lesser level of environmental investigation.

A.6 BASE LINE ENVIRONMENT

Data was collected from secondary sources for the macro-environmental setting like climate, physiography (Geology and slope), biological and socio-economic environment within Project Influence Area, PIU/ Project District, PD . First hand information have been collected to record the micro-environmental features within Corridor of Impact, CoI. Collection of first hand (Primary) information includes preparation of base maps, extrapolating environmental features on proposed road design, tree enumeration, location and measurement of socio-cultural features abutting project road.

A.7 STAKEHOLDER CONSULTATION

Consultative procedure, since the inception of the project, has been continued during pre-feasibility, feasibility, Environmental Assessment and Management Plan preparation stage. Considering the fact that involving local communities in the project planning is basis of the participatory planning, often suggestion and option given by the people improves technical and economic efficiency of the project and suggested improvements proposals (if adopted by the project) of the people also generates sense of ownership within communities thus eases implementation process.

A.8 INFORMATION DISSEMINATION

- While conducting tree enumeration and inventory of road side environmental features (**hot spots**), the consultant has also conducted information dissemination by one to one campaigning about proposed improvement,
- Potential project affected families were consulted to inform them about proposed road improvement program and possible environmental conflict such as tree cutting, relocation of hand pumps,
- Pictorial Methods were adopted to explain proposed improvement and possible environmental impacts in the concerned villages,

- Information dissemination through pumhlet / *Khadapatralu* among the villagers explaining proposed road improvement.

A.9 ANALYSIS OF ALTERNATIVES

At four locations, Kavtaram (km18/500 to km20/500), Gudlavalleru (km22/0 to km23/600) , Gudivada (km 35/200 to km 37/500) and Nuzvid (km79/500 to 83/500), the existing alignment, passes through congested areas. All four sections were investigated for bypass provision based on detailed reconnaissance surveys carried out along the project road. The information and proposals summarized below:

Pedna Village: As suggested by client already identified alignment from Bantumilli road to project road is included as Pedna bypass. The start (jn. with Bantumilli) Chainage of bypass is assumed as km 7.0 and end point of bypass is meeting the project road at existing km 9/4.

Kavutharam: Around one km length, from km 19/500 to km 20/500, project road passes through very congested areas of Kavatharam village. There are five sharp curves/ bends along the alignment. The railway track (Rajahmundry – Machalipatnam line) runs, on south of the village, parallel to the project road at around 800m distance south of the Kavatharam village. Hence village is getting extended towards south side and there is hardly any open space through which bypass alignment can be proposed. In such scenario, the only alternative available is to take the alignment on northern side of village. The existing project road, constraints on south side and proposed bypass alignment on north side of town is discussed in detail in Feasibility Report. It is concluded that bypass alignment is proposed on RHS (north side) of existing road at Kavatharam village.

Gudlavalleru: Around 1.0 km length, from km 22/000 to km 23/000, project road passes through congested area of Gudlavalleru town. The geometric along the existing alignment are acceptable and one bridge over Palleru Canal is under construction (as part of Headwork's, by Irrigation and CAD Department). Once bridge is opened for traffic movement would be smooth. The ROW in this stretch varied from 25.0m to 32.0m and presently the existing road, in the main town, is having 12m wide carriageway. However, between km 23/700 to km 24/300, two private buildings on LHS and two government buildings on RHS need to be acquired for improvement of geometric. Hence, it is proposed to improve the geometrics with the available roadland width and provide lined drains within the built-up area of Gudlavalleru town.

Gudivada: Around 2.3 km length of the project road section from km 35/200 to 37/500, road traverses through the congested area. There is a four lane portion existing from Km 35/200 to Km 36/900 and the remaining part from Km 36/900 to 37/500 is of two lane. There is no much congestion observed on this four lane / two lane portions. The geometrics are straight and acceptable in these portions. In such scenario, **bypass at this portion of Gudivada town is not essential.**

Nuzvid: Around 3.0 km length, from km 80/500 to 83/500, road traverses through the big and congested town of Nuzvid and there are three sharp curves /bends along the alignment. Because of too much congestion and sharp / blind curves, local administration has earmarked around 2km of the project road through town, for one-way movement and for reverse direction, one town road is being used. Through town portion, owing to ROW restriction and abutting commercial/ residential structures, improvement of geometric is not at all advisable. In such scenario, bypass at Nuzvid is very much essential.

A.10 POTENTIAL IMPACT

Table 2 below presents the general environmental impacts expected due to the proposed upgradation of the project road. Impacts have been assessed based on the first hand information collected from the screening & scoping of environmental attributes. The quanta of all the impacts on Natural Environment are analyzed in detail.

Table 2: General Impacts on Natural Environment

Project Activity	Planning and Design Phase	Pre-construction Phase		Construction Phase					Road Operation	Indirect effects of operation or Induced development
		Removal of Structures	Removal of trees and vegetation	Earth works including quarrying	Laying of pavement	Vehicle & Machine operation & maintenance	Asphalt & crusher plants	Sanitation & Waste (labour campus)		
Air		Dust generation during dismantling	Reduced buffering of air and noise pollution, Hotter, drier microclimate	Dust generation	Asphalt odour	Noise, dust, pollution	Noise, soot, odour, dust, pollution	Odour / smoke	Noise, dust, pollution	other pollution
Land	Loss of productive Land	Generation of debris	Erosion and loss of top soil	Erosion and loss of top soil		Contamination by fuel and lubricants Compaction	Contamination Compaction of soil	Contamination from wastes	Spill from accidents Deposition of lead	Change in cropping pattern
Water	Loss of water sources	Siltation due to loose earth	Siltation due to loose earth	Alteration of drainage Break in continuity of ditches Siltation, Stagnant water pools in quarries.	Reduction of ground water recharge area	Contamination by fuel and lubricants	Contamination by asphalt leakage or fuel	Contamination from wastes Overuse	Spill Contamination by fuel, lubricants and washing of vehicles	Increased contamination of ground water
Noise		Noise Pollution	Noise Pollution due to machinery	Noise Pollution		Noise pollution	Noise Pollution		Noise Pollution	Noise pollution
Flora		Loss of Biomass		Lowered productivity Loss of ground for vegetation		Removal of vegetation	Lower productivity Use as fuel wood	Felling trees for fuel	Impact of pollution on vegetation Lowered productivity Toxicity of vegetation.	
Fauna			Disturbance Habitat loss	Disturbance		Disturbance	Disturbance	Poaching	Collision with traffic	Distorted habitat

A.11 AVOIDANCE, MITIGATION & ENHANCEMENT

Prevention or avoidance of impact is better than mitigation of impact. Hence avoidance and reduction of adverse impacts approaches were adopted during the design stage through continued interaction between the design and environmental teams. This is reflected in the designs of the horizontal & vertical alignment, cross sections adopted, construction methods and construction materials. In-depth site investigations have been carried out so that sensitive environmental resources are effectively avoided, leading to the environmentally best-fit alignment option. As a result many of the trees, cultural properties, water bodies etc. have been avoided at the design stage itself, as presented in Table 3 below.

Table 3: Environmental features saved through Avoidance measure at design stage

Environmental Features	Potential Impact	Under Direct Impact	Saved through alignment design
Trees (nos.)	2580	1957	623
Surface Water source	32	6	26
Ground Water source	15	4	11
Schools and Hospitals	28	1	27
Sensitive Cultural Properties	72	10	62
Bus Shelters	30	10	20

A.12 ENVIRONMENTAL MANAGEMENT PLAN

Environmental Management Plan (EMP) deals with the implementation procedure of the guidelines and measures recommended to avoid, minimize and mitigate environmental impacts of the project. It also includes management of measures suggested for enhancement of the environmental quality along the highways.

The institutional arrangement made under project will look into the implementation of project as well as EMP and the various legal settings applicable to the project are briefly stated in chapter 3.

The avoidance, mitigation & enhancement measures for protection of the environment along highways have been discussed in detail in previous chapter. Although the social environmental impacts, its mitigation and management is an essential component of the EMP, this chapter excludes it for the purpose of clarity and procedural requirements. Social environmental elements have been separately dealt in separate volume namely, Resettlement and Rehabilitation Action Plan (RAP).

A.13 OBJECTIVE OF EMP

The EMP is a plan of action for mitigation / management / avoidance of the negative impacts of the project and enhancement of the project corridor. For each measure to be taken, its location, timeframe, implementation and overseeing / supervision responsibilities are listed. These components of the EMP have been given in Chapter 9 which explains the environmental issues and the avoidance/ mitigation/ minimization or enhancement measures adopted and/or to be adopted during different phases of the project. It also provide the references for the suggested measures, responsible agency for its implementation/ management as well as its timeframe.

A.14 COST ESTIMATES FOR ENVIRONMENTAL MANAGEMENT

Mitigation measures proposed in the EMP will be implemented by the Contractor. The works to be undertaken by the Contractor have been quantified and the quantities included in the respective BOQ items such as earth works, slope protection, noise barriers, road safety features, and shrub plantation.

Provisional quantities have also been included for additional measures that may be identified during construction and for silt fencing which will depend on the Contractors work methods and site locations. Items and quantities have also been included for enhancement measures.

More general environmental management measures to be followed by the contractor have been included in the specifications and this EMP. These cannot be quantified and are to be included in the contract rates. A total of **Rs. 71,26,420/-** has been allocated for the environmental management for the Project road.

A.15 ORGANIZATIONAL FRAMEWORK

The proposed project will be implemented by APRDC through its Environmental Management Unit (EMU). The EMU comprises of officers from Department of Forest, GoAP, and other environmental Engineers. The EMU will be coordinating with the field level implementing agencies

such as Engineer (Supervision Consultant), Contractor and field level APSHP officials. Role and responsibilities of important officials is detailed in chapter 9.

ORGANISATIONAL FRAMEWORK OF PIU - APRSP

(Supervision and Monitoring of EMP)

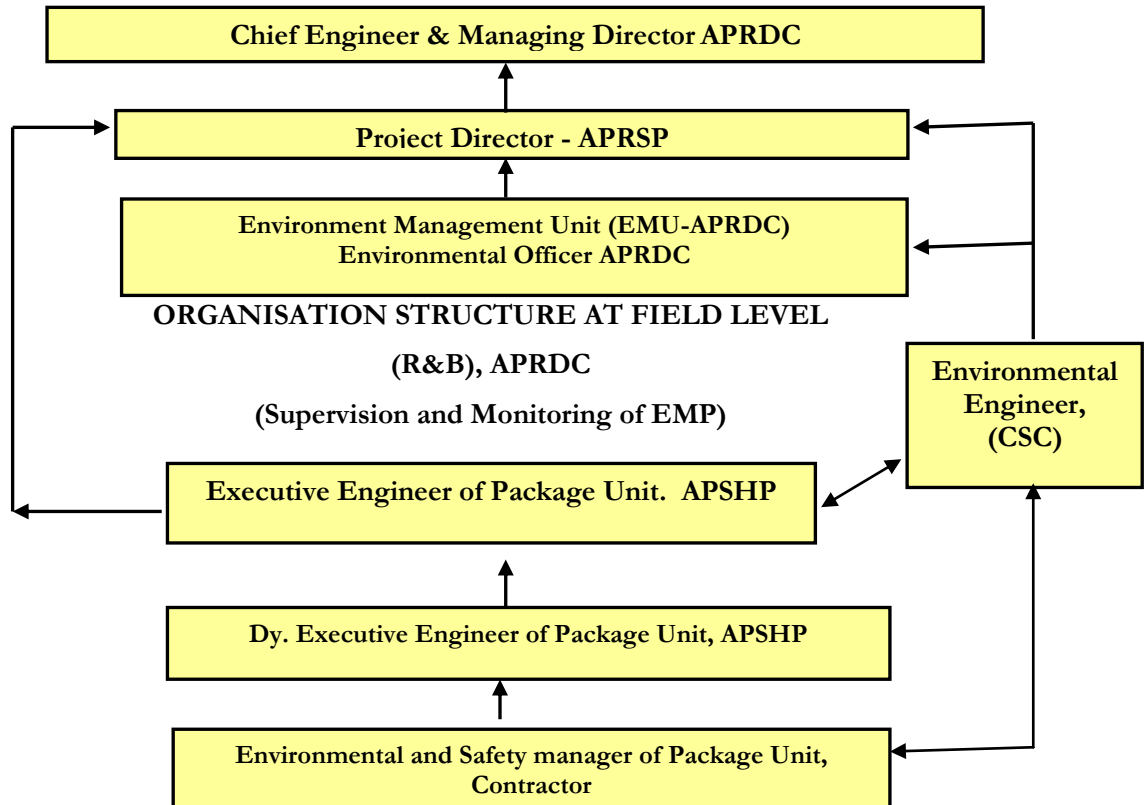


Fig. 1: Organization Framework

CHAPTER - 1: INTRODUCTION

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CHAPTER 1: INTRODUCTION

1.1 BACKGROUND

Andhra Pradesh is a progressive state with a population of 76 millions. Around 75% of the total population is living in the rural areas. Improving infrastructure facilities will promote agricultural and industrial growth in the state. The Road Policy (2005-15) also aims at providing an efficient, safe and environmentally sustainable road network in the state. In order to improve the quality of the corridors, Road and Building Department (RBD) of Government of Andhra Pradesh (GoAP) has entrusted the responsibility of maintenance and improvement of key State roads (core network) to Andhra Pradesh Road Development Corporation (APRDC¹).

APRDC has planned to improve the State road network by providing better quality and safer roads to the users in sustainable manner with loan assistance from World Bank. Improved quality of roads, better institutional operation and management system of APRDC and safe roads are important features of the project component. In this connection RDC has selected 38 corridors (cumulative length of 2002 km) of high-density (traffic) roads through Strategic Option Study (SOS) to be developed in phased manner.

The screening and scoping exercise has been carried out as a part of the feasibility study and to list out the priority roads in the state. The environmental assessment and analysis has been documented in this report.

1.2 THE PROJECT

1.2.1 Project Description

Feasibility study was carried out on 38 roads (cumulative length 2002 km) selected through Strategic Option Study of 10,040km of key road network of state roads. Considering the economic, social and environmental criteria, 21 roads are selected for implementation in two phases, eight in phase I and thirteen roads in phase II. Further these phase I corridors have been agreed for implementation in two years. Four corridors each in year-1 and year-2 of Phase-I.

Corridors selected for implementation in Phase–I, year-1 are

1. Kandi-Shadnagar (65.60 Km)
2. Chittoor-Puttur (60.80 Km)
3. Kurnool-Devanakonda (60.60 km)
4. Mydukuru – Jammalamadugu (41 Km)

Corridors selected for implementation in Phase–I, year-2 are

5. Pedna-Nuzvid-Vissannapeta

6. Kakinada-Rajahmundry
7. Jagityal-Peddapalli

The present report on Environmental Impact Assessment (EIA) deals with the environmental analysis of Pedna-Nuzvid-Vissannapeta Road in accordance with the World Bank's guidelines on Environmental Assessment. Figure 1.1 Index Map showing location & elevation of Pedna-Nuzvid-Vissannapeta Road.

¹ GoAP is in the process of operationalizing RDC as per RDC act to manage core network assigned to APRDC (about 10,000km of roads).

1.2.2 Objectives of the Assignment

The main objective would be to alleviate the current unsafe and congested conditions of the road network connecting the villages and towns by providing better quality and safe roads to the users in a sustainable and environment friendly manner. Government of India (GoI) through Ministry of Environment and Forest (MoEF) enforces **Environment (Protection) Rules, 1986** for environmental protection because of intervention of new projects or activities, or on expansion and modernization of existing projects or activity based on their environmental impacts.

The report in hand is prepared in accordance with the World Bank's operational policies² guidelines on Environmental Assessment and to meet the statutory requirement of Ministry of Environmental and Forest (MoEF), State Pollution Control Board, State Forest Department, etc. The objectives of this study are stated below:

- To present to decision makers a clear assessment of potential impact associated with the proposed project intervention,
- To apply a methodology which assesses and predict potential impacts and provides a) the means for impact prevention and mitigation, b) the enhancement of project benefits, and c) the minimization of long-term impacts;
- To provide a specific forum in which consultation is systematically undertaken in a manner that allows stakeholders to have direct input to the environmental management process.
- To assess the analysis of alternatives to bring environmental considerations into the upstream stages of development planning as well as the later stage of site selection, design and implementation, and
- To recommend the environmental management Measures to reduce adverse impacts.

In order to achieve these objectives, detailed surveys and other studies have been carried out along the project roads to identify Valued Ecosystem Components (VEC) and corridor specific significant environmental issues (SEI). For investigation/monitoring purpose the study area has been defined as under.

- **Corridor of Impact, CoI:** is the 20m wide strip on either side, beyond Right of Way, RoW.
- **Project Influence Area, PIA:** is the 10km area on either side along the alignment.
- **Project District, PD:** is/are the district/districts through which project road is passing.

1.2.3 Scope of Environmental Analysis (EA)

The environmental assessment scope includes screening and scoping, environmental assessment and environmental management plans for the individual project roads as required. The EA process also envisages to develop a comprehensive environmental management frame work for the entire project which will adopted as part of the corporate environmental policy for AP Road Development Corporation.

Environmental Screening and Scoping

Environmental screening exercise of the project roads were undertaken to facilitate inputs on environmental considerations, apart from social, economic, and traffic & transport considerations in selection of project roads out of 2056kms of roads, identified

² Applicable safeguards instruments are prepared based on Bank guidelines like environmental assessment (O.P. 4.01), Natural Habitat(O.P. 4.04), Forests(O.P. 4.06), Involuntary Resettlement(O.P.4.10) and Indigenous Peoples(O.P. 4.12)

through strategic options study. Further, this report also provides scoping inputs in determining the major environmental issues and defines the scope of work for conducting environmental assessment. As per the recommendation of the Environmental Screening report, detailed Environmental Assessment has been carried out for the project roads. The scoping exercise defines geographical Boundaries for the project roads for impact assessment as well as defining the project influence area to assess the impacts due to project activities.

Environmental Impact Assessment (EIA)

The EA for selected project roads includes establishing environmental baseline in the study area, identify the range of environmental impacts, specify the measures to avoid, minimize, and mitigate negative impacts and maximize positive impacts and integrate possible environmental enhancement measures. The proposed measures will be formulated in the form of an environmental management plan with necessary budget and institutional roles for effective implementation. The EMPs for individual projects and integration of the same in to project implementation agreements, including construction contract documents.

Environmental Management Framework

An Environmental Management Framework will be designed for the implementation of the project. The environmental management framework shall consists of over all framework which will be developed as a guidance document providing environmental planning and design criteria for the current as well as future project roads, generic environmental management measures, institutional mechanism for implementation, capacity building and training process, and resource material for RDC to function adequately to mainstream the environmental management.

1.2.4 Project Benefits

The implementation of the project will have the following direct benefits:

- (i) Improved quality of life for the population in the project area. Economic boost to the local population by facilitate easy transportation of materials and having better connectivity for the commercial centres.
- (ii) Provides employment facility for the local population.

1.2.5 Structure of the Report

Chapter-2: Project Description, a brief description of the project corridor is envisaged focusing on various proposed improvements of corridor with a mention on right of way, roadway improvements, cross drainage structures, community facilities, traffic projections etc.

Chapter-3: Environment Regulatory Framework presents the legal and administrative framework of World Bank, Government of India and Government of Andhra Pradesh. This section underlines various clearances involved for the project corridor at the State level and at the Central level.

Chapter-4 Baseline Environmental Status, the existing environmental conditions along the corridor was ascertained by conducting a recognizance survey along with collection of secondary information pertaining to the corridor. Primary data for various environmental parameters was generated using suitable monitoring devises. The methodology was strictly adhered to the Central Pollution Control Board's stipulated guidelines.

Chapter-5 Public Consultation was carried out in order to know the reactions of local population and the project affected people, PAP. Meetings were held with the stake holders

to record their views on the impacts caused and the suggested remedies to be adopted for the proposed project corridor.

Chapter-6 Analysis of Alternatives was carried out during feasibility study, covered in Environmental Screening and Scoping report, and the approved alternative is discussed in detail in this chapter.

Chapter-7 Environmental Impacts, likely impacts caused on various environmental and social parameters by the various activities proposed for the project corridor was recorded in this chapter.

Chapter-8 Mitigation & Enhancement Measures, various mitigation & enhancement measures were suggested for the impacts caused due to various activities.

Chapter-9 Based on potential impact and proposed mitigation measure Environmental Management Plan, is prepared. Organizational framework for execution and monitoring of EMP is also prepared along with cost estimate for Environment management.

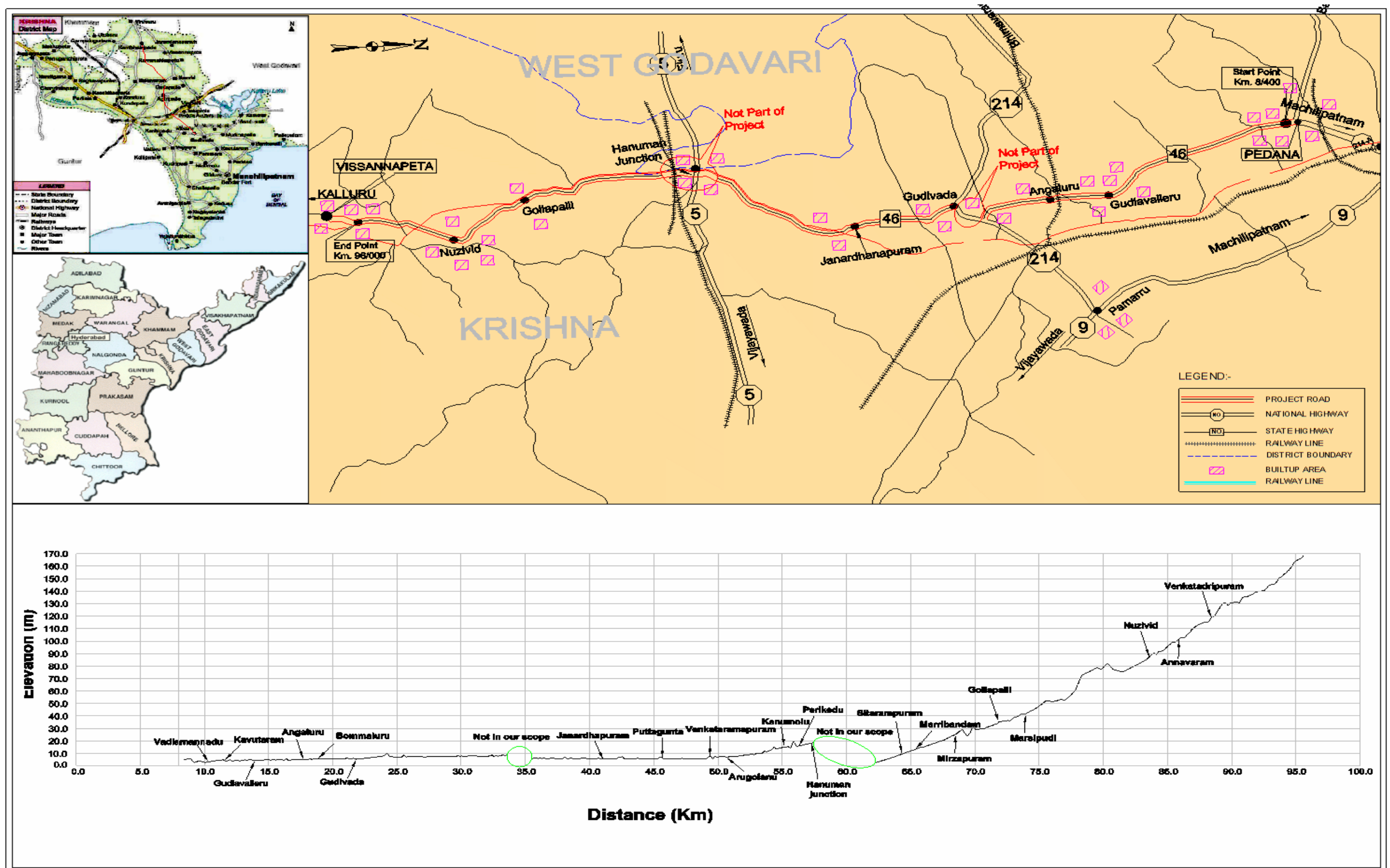


Fig. 1.1: Index Map showing Location and Elevation of Project Road

CHAPTER - 2: DESCRIPTION OF THE PROJECT

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CHAPTER - 2: DESCRIPTION OF THE PROJECT

2.1.1 GENERAL

Pedna – Nuzvid – Vissannapet Road, the project road is a section of State Highway No. 46, located in Andhra Region of Andhra Pradesh. The Project road starts at Pedna bypass (assumed km 7/0) at Buntumilli road jn.and traverse through km 9/400 of SH-46 at Pedna town in Krishna district and runs north west direction connecting Kavutaram, Gudlavalleru, Gudivada, Hanuman junction, Nuzivid and terminates at km 96/0 Before Vissannapet . Cummlative Design Length of PR is 83.6 km. The project road provides connectivity between Machilipatnam Port with NH214A, NH214, NH5 & NH221 and is widely used by interstate traffic. The location map of the project road is shown in Fig: 2.1

The latitude and longitude of Pedna & Vissannapet are (15o 50’ N, 81o 30’ E) and (16o 30’N, 81o 10’ E) respectively.

Topographic survey sheets of Survey of India (Scale 1:50,000) No:65C/12, 65D/9, 65D/13, 65D/14, 65D/15, 65D/16 and 65H/3 encompass the project road.

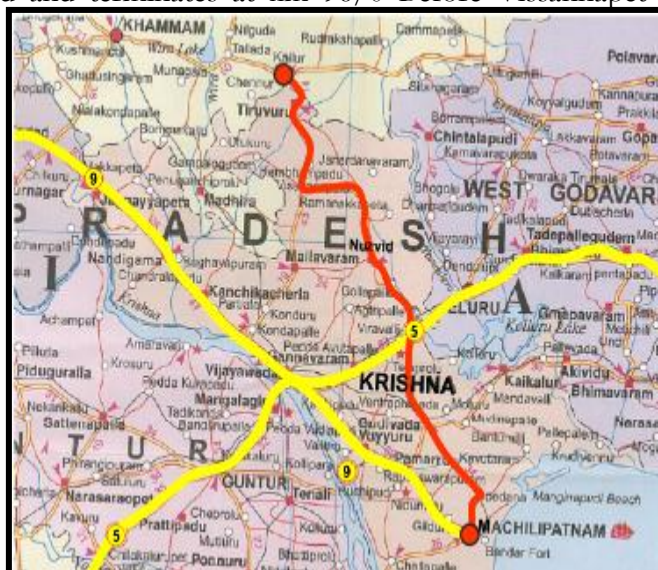


Fig: 2.1: Location map of Pedna-Nuzvid-Vissannapet Road

The chainage for the entire project road starts from Pedna and increases towards Vissannapet end. The PR is divided into three homogeneous sections based on present traffic trend and is summarized in Table 2.1 below:

Table 2.1: list of Homogeneous Sections

Section ID	Project Road Section	Existing Chainage	Length (km)
PNV-01	Pedna - Gudivada	km 9/4- 33/7	24.3
PNV-02	Gudivada – Hanuman Junction	km 35/2 - 59/0	23.8
PNV-03	Hanuman Junction - Vissannapet	km 62/2 – 96/0	33.8
Total Length of the Project Road			81.9

2.2 PRESENT CHARACTERISTICS

2.3.1 Right of Way (ROW)

Width of ROW is not uniform along the project road. The information on ROW, at every point of change or minimum at 200m interval is compiled and the following table gives the distribution of length of Project road and %age length with respect to ROW width.

Table 2.2: Distribution of Road width

Width of Existing ROW					Total Length
<16m	16m – 20m	20m – 25m	25m – 30m	> 30m	
4.4	1.4	5.8	21.2	49.1	81.9
5%	2%	7%	26%	60%	100%

It has been found that ROW along the project road is sufficient for improvement of geometric, if any, and for upgrading of the road to 2-lane standard.

The above mentioned data has been compiled from the data provided by APRDC and for 41.0km length of the project road, no ROW data could be obtained from APRDC.

2.3.2 Traffic Scenario

The vehicle-wise average daily traffic (ADT) figures were estimated by classified count survey. Table 2.3 presents a summary of the vehicle-wise AADT on the project road, for each homogenous section.

Table 2.3: AADT along Homogeneous sections of Pedna – Nuzvid – Vissannapet Road

Sec	Description	FAST MOVING VEHICLES											SLOW MOVING VEHICLES			
		2 W	3 W	Car/ Jeep/ Taxi	Bus		LCV	Truck			Agri. Tractor		Cycle	Rick- shaw	Animal Drawn	
					Mini	Full		2-X	M-X	Articu- -lated	With Trailer	No Trailer			Bullock Cart	Horse Drawn
Factor		0.5	1	1	1.5	3	1.5	3	3	4.5	4.5	1.5	0.5	1.5	6	6
PV-01	AADT	378	1876	905	7	239	185	169	35	3	76	7	926	63	21	0
	PCU	189	1876	905	10.5	717	277.5	507	105	13.5	342	10.5	463	94.5	126	0
	%	3%	33%	16%	0%	13%	5%	9%	2%	0%	6%	0%	8%	2%	2%	0%
	Total PCU	4953											683.5			
	Total PCU	5637														
PV-02	AADT	559	2707	1402	34	207	241	635	320	45	193	49	2070	206	24	0
	PCU	280	2707	1402	51	621	362	1905	960	203	869	74	1035	309	144	0
	%	3%	25%	13%	0%	6%	3%	17%	9%	2%	8%	1%	9%	3%	1%	0%
	Total PCU	9432											1488			
	Total PCU	10920														
PV-03	AADT	1001	2266	1354	86	135	249	763	372	153	311	73	1626	193	11	0
	PCU	501	2266	1354	129	405	374	2289	1116	689	1400	110	813	290	66	0
	%	4%	19%	11%	1%	3%	3%	19%	9%	6%	12%	1%	7%	2%	1%	0%
	Total PCU	10631											1168.5			
	Total PCU	11799														

Based on the base year traffic as presented above, traffic projections have been done to derive the traffic demand at horizon years which are important inputs in proposing the improvement options. Based on the traffic projections and capacity analysis it is concluded to upgrade the existing facility to 2-lane configuration.

2.3.3 Road Width

The carriageway width / roadway width of the project road is not uniform. The following table gives the distribution of length of Project road and %age length with respect to carriageway width (Single lane, Intermediate Lane, Double Lane, Double lane with Paved Shoulder)

Table 2.4: Length Distribution of Road Width

Type of Carriageway Configuration and Length					Total Length
SL	IL	2L	2L(PS)	4L	
-	51.5	26.8	1.9	1.7	81.9
-	63%	33%	2%	2%	100%

From the Road Inventory it can be summarised that major portion 63% of the PR is intermediate lane posing difficulties/threat in passing and overtaking the traffic. The width of earth shoulder, in case of two lane road, varies from 1.5m to 2.0m against the standard width of 2.5m.

2.3.4 Land Use and Roadside Environments

The Project road starts at km 9/4 after Pedna in Krishna district and runs north west direction connecting Gudlavalleru, Gudivada, Hanumanjunction, Nuzvid and terminates at km 96/0 Before Vissannapet . Cumulative Length of PR is 82.1 km. The following table indicates the distribution of length of Project road and %age Length in terms of land use and roadside environments.

Table 2.5: Summary of Land Use

Land Use pattern						Total Length
Urban Built-up	Rural Built-up	Agricultural	Barren	Forrest	Industrial	
12.9	17.85	47.4	2.5	-	1.25	81.9
15.8%	21.8%	57.9%	3.1%	-	1.5%	100%

2.3.5 Villages and Urban-Built Up Sections

Around 62% length of the project road passes through non-builtup area; remaining 38% length traverses through inhabited area. There are a number of villages and settlements located along the project road is tabulated below

Table 2.6: Inhabitation along the Project Road

Segment No.	Project Road Section	Length (km)	No. of villages
1	Pedna – Gudivada (9/400 to 33/700)	24.3	11
2	Gudivada – Hanuman Junction (35/200 to 59/000)	23.8	8
3	Hanuman Junction – Vissannapet (62/200 to 96/000)	33.8	13

Along the project road section there are four major built up sections namely Kavutaram, Gudlavalleru, Gudivada, Hanuman junction and Nuzvid which need a special attention while finalizing the cross-section and improvement to geometric if any.

2.3 PROPOSED IMPROVEMENTS

2.3.1 Proposed CW Configuration and Cross Sections

The existing PV road is proposed to be upgraded to 2 lane and 2 lane paved shoulder configuration, the details of which are presented below:

Table 2.7 Section wise Proposed Improvements

Sl. No	Section Name	Chainage		Length (km)	Upgrading Proposal
		From	To		
1	Pedana - Hanuman Junction	7/000 35/200	33/750 58/920	50.470	2 Lane +PS
2	Hanuman Junction - Vissannapet	62/250	95/460	33.210	2 Lane + PS

2.3.6 Identification of Realignment and Bypass Provisions

At four locations, Pedna Village (km 7/000 to km 9/500) Kavtaram (km18/500 to km20/500) and Gudlavalleru (km22/0 to km23/600) and Gudivada (km 35/200 to km 37/500) and Nuzvid (km79/500 to 83/500), the existing alignment, passes through congested areas. All four sections were investigated for bypass provision based on detailed reconnaissance surveys carried out along the project road. The information and proposals summarized below:

Pedna Village: As suggested by client already identified alignment from Bantumilli road to project road is included as Pedna bypass. The start (jn. with Bantumilli) Chainage of bypass is assumed as km 7.0 and end point of bypass is meeting the project road at existing km 9/4.

Kavutharam: Around one km length, from km 19/500 to km 20/500, project road passes through very congested areas of Kavatharam village. There are five sharp curves/ bends along the alignment. The railway track (Rajahmundry – Machalipatnam line) runs, on south of the village, parallel to the project road at around 800m distance south of the Kavatharam village. Hence village is getting extended towards south side and there is hardly any open space through which bypass alignment can be proposed. In such scenario, the only alternative available is to take the alignment on northern side of village. The existing project road, constraints on south side and proposed bypass alignment on north side of town is discussed in detail in Feasibility Report. It is concluded that bypass alignment is proposed on RHS (north side) of existing road at Kavatharam village.

Gudlalleru: Around 1.0 km length, from km 22/000 to km 23/000, project road passes through congested area of Gudlalleru town. The geometric along the existing alignment are acceptable and one bridge over Palleru Canal is under construction (as part of Headwork's, by Irrigation and CAD Department). Once bridge is opened for traffic movement would be smooth. The ROW in this stretch varied from 25.0m to 32.0m and presently the existing road, in the main town, is having 12m wide carriageway. However, between km 23/700 to km 24/300, two private buildings on LHS and two government buildings on RHS need to be acquired for improvement of geometric. Hence, it is proposed to improve the geometrics with the available road land width and provide lined drains within the built-up area of Gudlalleru town.

Gudivada: Around 2.3 km length of the project road section from km 35/200 to 37/500, road traverses through the congested area. There is a four lane portion existing from Km 35/200 to Km 36/900 and the remaining part from Km 36/900 to 37/500 is of two lane. There is no much congestion observed on this four lane / two lane portions. The geometrics are straight and acceptable in these portions. In such scenario, **bypass at this portion of Gudivada town is not essential.**

Nuzvid: Around 3.0 km length, from km 80/500 to 83/500, road traverses through the big and congested town of Nuzvid and there are three sharp curves /bends along the alignment. Because of too much congestion and sharp / blind curves, local administration has earmarked around 2km of the project road through town, for one-way movement and for reverse direction, one town road is being used. Through town portion, owing to ROW restriction and abutting commercial/ residential structures, improvement of geometric is not at all advisable. In such scenario, bypass at Nuzvid is very much essential.

Consultants have explored the possibility of bypass on left ((west) and right (east) of the town. The take-off and merging points for both alternatives are broadly kept same discussed in feasibility report. Based on the preliminary examination, it has been found that new alignment on RHS (east side of Nuzvid town) would be the most suitable alignment for bypass at Nuzvid

2.4 CULVERTS AND BRIDGES

2.4.1 Surface and Longitudinal Drainage

The road surface drainage is rather inefficient and inadequate because the road passes through plain to hilly terrain, with flat gradients and flat cross profile and inadequate super elevation at curves. The road side drains are provided in built-up area, but for want of maintenance they are damaged and choked. The longitudinal drains would be provided all along the project road.

2.4.2 Inventory of Cross Drainage Structures

The Bridge and culvert inventory was carried out from January to April 2007 and information has been collected in the format recommended by IRC. The detailed information on all the structural components, HFL, LWL dimensions of all the components, linear water way, vertical clearances, drainage spouts, handrails etc. are all given in the tabular form, and submitted in the Feasibility Report. The inventory also contains the recommendations whether the bridge is to be retained/repaired/or dismantled. There are 127 culverts and 23 bridges on the project road. A summary of cross-drainage structures are given in Table 2.8.

Table 2.8: Summary of Existing Bridges and Cross-Drainage Structures

Road Name	Design Length (km)	No of Culverts (Length <6m)				No. of Bridges		
		Pipe	Slab	Others*	Total	Minor	Major	Total
Pedana – Nuzvid - Vissannapet	83.680	42	52	33	127	21	2	23

Others : Includes Arch or Cut Stone or Mix/extended type*

Superstructure

All slab culverts are of Reinforced Cement Concrete (RCC). Arch culverts are made of stone masonry and the superstructure is made of cut-stone slab. Some slab culverts show spalling of concrete, mostly at the ends of the slabs.

Sub-structure

Abutments, wing walls of slab culverts and Head walls of Hume pipe / Arch culverts are in stone Masonry.

Parapet wall

Parapet walls of most of the culverts are partially or fully damaged and will require repair. Quite a few culverts do not have the parapet wall.

2.4.3 Upgrading Proposals for Culverts

The existing culverts are either proposed for widening or reconstruction based on the criteria given below:

A) Reconstruction proposed if

- Condition of culvert is poor
- Existing culvert is Arch/stone slab widened with slab for 2 lane
- All pipe culverts which are less than 0.9m dia.
- Culverts falling under horizontal geometric improvements
- Slab culverts whose condition is good, but falling under vertical geometric improvements.

B) Widening of Culvert proposed if

- Slab culvert in good condition and waterway is adequate
- Pipe culverts having pipe dia 0.9m and above and structurally good with adequate cushion.

Based on the criteria specified above, major decisions for proposal of CD structures/Culverts are as follows:

- Priority is given for pipe culverts in view of economy and ease of construction.
- Pipe culverts of dia 0.9 to 1.2 m are provided depending upon hydrological requirements.
- Box culverts of standard sizes are adopted for larger water way.
- Box culvert of size 1.0 X 1.0m, 1.5 X 1.5m and slab culverts are adopted for small waterway where pipe culverts could not be provided due to lack of cushion.

- Hydrological inadequate culverts, in good condition, shall warrant augmentation by putting additional culvert nearby.
- All new / widened culverts shall be constructed for 12.0 m width
- Pipe culverts shall conform to IS category NP4.

Based on above criteria, following proposals have been finalized and are tabulated in Table 2.9.

Table 2.9: Summary of Proposals for Culverts

	Ex. type	Recon.			New			Widen			Retain			Total
		Pipe	Slab	Box	Pipe	Slab	Box	Pipe	Slab	Box	Pipe	Slab	Box	
PNV-01 km 7/000 to km 33/750	Arch	-	8	10	-	-	-	-	3		-	-	-	21
	Slab	-	1	3	-	-	-	-	1	-	-	-	-	5
	Pipe	6	-	2	-	-	-	4	-	-	1	-	-	13
	Bypass / Realign	-	-	-	8	4	-	-	-	-	-	-	-	12
	Total	6	9	15	8	4	-	4	4	-	1	-	-	51
PNV-02 km 35/200 to km 58/920	Arch	-	1	-	-	-	-	-	2	-	-	-	-	3
	Slab	-	9	4	-	1	-	-	4	-	-	1	-	19
	Pipe	3	-	7	-	-	-	-	-	-	-	-	-	10
	Bypass / Realign	-	-	-	1	1	1	-	-	-	-	-	-	3
	Total	3	10	11	1	2	1	-	6	-	-	1	-	35
PNV-03 km 62/200 to km 95/460	Arch	-	4	-	-	-	-	-	5	-	-	-	-	9
	Slab	1	14	9	-	-	-	-	4	-	-	-	-	28
	Pipe	2	3	11	-	-	-	2	-	-	1	-	-	19
	Bypass / Realign	-	-	-	4	-	-	-	-	-	-	-	-	4
	Total	3	21	20	4	-	-	2	9		1	-	-	60
													TOTAL	146

2.4.4 Condition Surveys and Inspections of Bridges

The information obtained from the condition survey and inspection has been used to identify the bridges which can be retained after carrying out minor repairs or which are to be replaced due to being narrow, in poor structural condition, submersible or having poor road geometry.

The spalling of concrete at the soffit of deck slab and exposed reinforcement was noted in a number of bridges. No cracks were observed in RCC deck slab. There are several bridges, which have been provided with solid parapets over the bridges, which are deficient. The quality of construction of the RCC slab appears to be fair.

All the existing bridges suffer from lack of regular maintenance. The extent and effect of long-term neglect and the nature and extent of necessary repair / rehabilitation works vary from bridge to bridge. Lack of regular inspection and timely maintenance has resulted in deterioration of different components of bridges.

Upon collection of detailed information on existing bridges, based on following general criteria have been adopted for finalization of bridge proposals.

1. All new proposed bridges shall be constructed of 12.0 m width with or without footpath.
2. All bridges having old Random Rubble Stone & Brick Masonry, sub structure / foundation shall be dismantled and reconstructed new.
3. Major bridge with carriageway width equal to or more than 7.0 m in good condition shall be retained with minor repair works.
4. All submersible bridges and causeway, irrespective of their condition, shall be replaced with high level bridge.
5. Bridges with inadequate waterway shall be reconstructed to meet the required waterway as per hydrological data analysis.
6. All minor bridges need reconstruction shall be constructed at existing axis /location, if alignment suits and ROW are available.

The summary of bridge proposals with respect to the existing status is as given below:

Table 2.10: Details of Existing Bridges and Proposal

Existing/(Design Chainage)	Bridge No	Existing Span arrangement (m)	Proposed Span(m)	Proposal
10+524/(10.520)	B1	7Span x 4.70m	7X4.7	Widening
14+900/(14.900)	B2	3Span x 9.60m	1X29.0	Reconstruction
-(22.677)	B3	2 x 22.35	2X22.35	Retained
-(22.741)	B4	1 x 22.35	1X22.35	Retained
27+300(27.423)	B5	(5row x 1.2 m dia)+ 3.00Arch	3 X 10.4	Reconstruction
31+900/32+100	B6	2 Span x 5.50m	2 X 6.4	Reconstruction
36+900/36+900	B7	6 Span x 7.85m (Skew)	6X7.9	New 2-lane bridge
39+600/(39.570)	B8	2 Span x 7.50m (Skew)	1X17.0	Reconstruction
41+150/(41.130)	B9	2 Span x 3.85m	2X3.9	Widening
43+550/(43.500)	B10	1 Span x 5.6m	1X17.0	Reconstruction
44+430/(44.388)	B11	15 span x 3.80m	3X19.0	Reconstruction
45+000/(45.020)	B12	20 Span x 3.825m	4X19.0	Reconstruction
46+700/(46.700)	B13	7 Span x 4.40m	7X4.5	Widening
47+000/(47.023)	B14	10 Span x 5.45m Arch	6 X 10.4	Reconstruction
48+700/(48.670)	B15	10 Span x 3.75m	2X19.0	Reconstruction
51+000/(50+860)	B16	5 Span x 6.60m	5X6.6	Retained
57+500/(57.330)	B17	1 Span x 18.40m (Arch)	1 X 21.5	Reconstruction
69+800/(69.850)	B18	10 Span x 4.30m Arch	2X21.5	Reconstruction
71+800/(71.823)	B19	1 Span x 5.70m	1X5.7	Widening
83+415	B20	3 Span x 4.60m	-	Bypassed
87+180/(86+545)	B21	2 Span x 3.60m	1 X 10.4	Reconstruction
90+300/(89.630)	B22	3 Span x 4.00m	3X4.0	Widening
91+030/(90.355)	B23	5 Span x 3.70m	2X10.4	Reconstruction
91+570/(90.884)	B24	3 Span x 3.20m	1 X 10.4	Reconstruction

ERL – Existing Road Level; BL – Bed Level; FRL – Finished Road Level

2.4.5 Formation Width of New Culverts and Bridges

The formation width of new bridges has been considered as follows in the feasibility studies-

- For Two lane -12.0 m
- For Four lane – 2 x 10.25 m

2.4.6 Sighting of Bridge and its approaches

In order to avoid land acquisition problem, it is assumed to dismantle the existing dilapidated culverts/bridges and construct the new high level bridges at the same location except in cases where it is not possible due to improvement in horizontal geometry. A temporary diversion road shall be constructed during the construction of new culverts/bridges.

A) Length and Span Arrangement

The overall length of the proposed culverts/bridges is kept higher the existing length based on the discharge and other criteria.

B) Type of Superstructure

The following types of super-structure have been assumed while working out the cost of bridges for feasibility studies-

- RCC solid slabs for spans up to 10.0m.
- RCC T-beam girder type super-structure has been assumed for spans varying from 10.0m to 25.0m in straight bridges.

C) Type of Substructure

The substructure consists of abutments and piers.

- **Abutments**

Plain Cement Concrete (PCC) solid wall type abutments have been assumed for heights up-to 12.0m and counterfort type abutments have been assumed for larger heights for calculating the cost of sub-structure for feasibility studies.

- **Piers**

Plain Cement Concrete (PCC) Piers are proposed for multi span bridges. A combination of rectangular and circular sections has been proposed for the piers.

D) Type of Foundations

Open type foundations are provided for all the bridges.

2.5 IDENTIFICATION OF BORROW AREAS

Extensive survey was conducted to identify borrow areas for locating suitable soil/soil aggregates mixes to be used in the construction of embankment and sub-grade. Efforts were made to locate borrow areas near the project road to avoid long haulage of the materials. Similarly, detailed survey was carried out to identify stone metal quarries of hard stone for use in Granular Sub-base (GSB), Wet Mix Macadam (WMM), bituminous and cement concrete works.

The following conclusions have been made based on the exploration of potential borrow sources:

- Construction materials are available with in an economical lead;

- Construction materials can be obtained/exploited without any hassles during the implementation of the project;
- The soil/crushed stone aggregates/ sand etc are exhibiting higher strength properties than recommended.
- To procure good quality crushed stone aggregate in large quantity, the contractor is required to install his own crushing plant thus enhancing the quality of the materials; and
- Two locations of borrow areas have been identified and tested for soil to be used in embankment, shoulder and subgrade construction.
- Out of two locations LL, (PI <12), dry density and (CBR > 12) two falls within the permissible limits as per MoST Specifications.

2.6 ROAD SAFETY REVIEW

Road safety audit is a formal procedure for assessing accident potential and safety performance in the provision of new road schemes, the improvement and the rehabilitation of existing roads and in the maintenance of existing roads. The road safety Audit is an important aspect of the project preparation. It is carried out at every stage of the project preparation. i.e. Feasibility Stage and Detailed Project Report Stage to ensure that the safety is not compromised at any stage. The basic aim for road safety audit is to identify areas of major concern, including black spots and accident-prone stretches on individual project roads and to propose measure to be taken for improving the engineering design with respect to road safety aspects.

Consultants have carried out a detailed reconnaissance along the project roads and identified areas of major concern, including black spots and accident-prone stretches on each project road. Based on critical analysis of accident-prone stretches, the observed main causes for accidents are as list below:

1. Inadequate width, of shoulders, varies from 1.0m to 1.5m, which is not sufficient for parking of disabled vehicles and space for emergency stops for vehicles away from the carriageway.
2. Majority of horizontal curves are not provided with transition curve and do not have sufficient setback distance and safe stopping distance.
3. The vertical alignment of project roads traverses through plain to hilly terrain and do not have sufficient safe stopping distance and compatibility between horizontal and vertical alignment is missing.
4. Lack of segregation of traffic in both direction and lack of access control in built-up area
5. Non-provision of acceleration and deceleration lanes and intersection / junction.

Consultants approached respective Police Station for providing the accident data. Police people were reluctant to part with the information on accident data. However, the reasons of the accidents were discussed with them to have a better understanding of the problem. The locations where two or more accidents have occurred in a year have been thoroughly analyzed / studied, by the Consultants, from the technical and engineering aspect. The Table 2.23 contains the deficient geometric locations along the Project Road:

Table 2.11: Deficient Geometric Location from Safety Aspects

Locations (km)	Deficiency
25.500-25.800, 27.300-27.900, 31.100-31.200, 32.700-33.000, 35.000-35.200, 35.400-35.700, 43.300-43.700, 45.500-45.900, 54.700-55.100, 55.600-56.200, 56.600-56.200, 57.400-57.600, 69.000-69.300, 69.400-69.800, 85.400-85.600, 89.800-90.000, 92.400-92.700	Sharp Horizontal curve without transition and inadequate setback distance; broken back curves, reverse curve with no gap between end of one curve and beginning of other curve.
10.200-10.600, 27.300-27.500, 43.200-45.300, 50.700-51.000, 57.000-57.500, 69.500-69.900, 83.400-83.600, 90.300-90.700	Vertical curves /Alignment
33+700, 35+200,35+600,82+150,82+500	Major Junctions, need proper design as per traffic demand
7+500 – 9+600, 18+800 – 22+000, 78+650 – 83+550	Pedna, Kavutram, Nuzvid built-up

The data given in the Table reveals that the horizontal and vertical geometric is quite deficient and major concern for the safety of the commuters. Where the parameters of horizontal geometric are in acceptable range, the vertical profile is very much undulated due to causeways and submersible bridges. At built-up locations, there is no provision of railing or fencing to separate the movement of pedestrians and vehicles. No intersection has any segregated islands. All along the project road, there is no bus and truck lay-bye.

Following measures have been taken up for improve the traffic safety:

1. Geometric Design Aspects
2. Design of Intersections
3. Traffic Control and Road Safety Features
4. Roadside facilities
5. Traffic Calming

A) Geometric Design Aspects

All geometric design elements have been carried out as per Design standards stipulated for Project in consonance with IRC codal provisions. Comprehensive design standards, which link individual design elements to best estimates of actual speed have been utilised. The objective is that drivers must not be presented with the unexpected. The emphasis has been given on maintaining continuity or giving adequate warning where it could not be made.

Following realignment locations have been identified to improve the horizontal geometrics of the project road.

Table 2.12 Realignment sections.

Realignment Locations		Length (m)	Remarks
From	To		
7+000	9+400	2400	Pedna Bypass
18+850	22+000	3150	Kavutram Bypass
25+550	25+850	300	Realignment
27+350	27+700	350	Realignment
32+700	33+080	380	Realignment
43+300	43+650	350	Realignment
54+750	55+.050	300	Realignment
56+650	57+200	550	Realignment
69+200	69+770	570	Realignment
78+700	83+500	4800	Nuzvid Bypass

92+400	92+700	300	Realignment
Total(m)		13450	

Following embankment raising locations have been identified to improve the vertical geometrics and submergence locations along the project road.

Table 2.13 Embankment raising locations.

Chainage		Length (km)	Pavement Condition	Improvement
From	To			
43.6	45.0	1.4	Submergence area	Raise the profile
47.0	47.2	0.2	Submergence area	Raise the profile
57.0	57.3	0.3	Submergence area	Raise the profile
84.2	84.4	0.2	Submergence area	Raise the profile
Total Length (km)		2.1		

Adequate measures have been taken so that the raising if any in settlement areas should be minimum possible and in no case exceed 0.5m.

The design speed has been kept quite consistent, and speed difference between two consecutive curves is not exceeded. All horizontal curves are designed for 100kmph or 80kmph or the lowest one is 65kmph, as detailed in table 2.14 below:

Table 2.14: Summary of Proposed Horizontal Alignment

Chainage		Total No of Curves	Radius of Curve (m)						Design speed (kmph)			
From	To		<150	>150-200	>200-400	>400-800	>800-2000	>2000	50	65	80	100
7+000	33+750	48	1	2	13	6	4	22	1	2	13	32
35+200	58+920	51	4	1	9	13	5	19	4	1	9	37
62+250	95+460	69	0	2	9	15	14	29	0	2	9	58
Total		168	5	5	31	34	23	70	5	5	31	127

All horizontal curves have been designed with proper transition curves and super-elevation runoff. All vertical curves have been design for minimum stopping sight distance. Due care has been taken to avoid the raising of profile at urban/builtup locations and in any case the raising has been restricted to 0.5m.

In built-up areas, the cross-section 1 and 3 (provision of drain and footpath) has been adopted to segregate the local pedestrians from through motorised traffic.

B) Design of Intersections

Accident data reveals number of accidents at intersection account for almost 30 -40% of all reported road accidents in India. During the detailed design proposal, all major and minor junctions have been studied thoroughly with respect to traffic volume and geometric. The important minor junctions leading to villages and major settlements have been identified and proper junction layouts (including road markings and traffic signs) have been applied as per IRC-SP: 41-1994. Design of major junctions has been carried out based on peak hour traffic data. List of major and minor junctions is given below:

Table 2.15: Summary of Proposed Minor and Major Junctions

Sl. No.	Chainage	Type/Width	Road Leads to.	Type of intersection
1.	7/000	BT /2L	NH214A	T
2.	9/600	BT /2L	SH46	Y
3.	18/800	BT /2L	Kavutharam bypass start	Y
4.	22/000	BT /2L	Kavutharam bypass end	Y
5.	22/750	BT /2L	Mudinepalli	T
6.	33/700	BT /2L	NH-214 Junction	T
7.	35/200	BT / 4L	NH-214 Junction	T
8.	35/600	BT / 4L	Vijayawada	T
9.	45/060	BT /2L	Gannavaram	T
10.	78 /600	BT /2L	Nuzividu bypass start	Y
11.	83 /550	BT /2L	Nuzividu bypass end	Y

C) Traffic Control and Road Safety Features

Traffic control devices and road safety features, comprising of following, plays a key role in influencing driver behaviour, orientation and information:

- Traffic Signs
- Road Markings
- Delineators
- Road lighting
- Crash Barrier

(i) Traffic Signs

Traffic signs are divided into three broad categories; Warning signs, Regulatory signs and informatory signs. Warning sign play a crucial role in terms of road safety, in giving advance information about hazards ahead. Typical examples of warning signs are Curve ahead, Pedestrian crossings, gap in median etc. Regulatory/ Mandatory signs regulates the side road or through traffic in order to have a safe movement. STOP, speed limit, NO parking etc, are some of the regulatory traffic signs. Informatory signs are provided to give information and guidance about the facilities available to the road users. Village sign boards, Fuel stations, Hospitals etc are some of the information sign boards.

All critical locations were identified after the proposed geometric improvements along the project road and cross roads, where warning, Regulatory and Informatory signs are required.

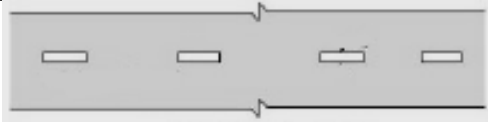

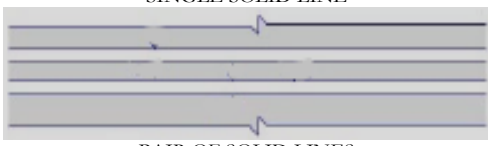

Traffic signs have been designed to convey clear and unambiguous messages to road users so that they can be understood quickly and easily. IRC-67:1977, code for Practice of Road Sign, has been followed for finalization of sign installation. On unkerbed roads segments, the extreme edge of the sign would be 2 to 3m from the edge of the carriageway. On kerbed roads it is proposed as not less than 60cm away from the edge of the kerb.

(ii) Road Markings

Road markings play a very important role in guiding the driver and providing him /her with the information necessary to negotiate conflict points on the road network. It is given a high priority for improving safety. IRC-35: 1997, Code of Practice for Road Markings, provides the recommended practice for use of road markings. Road markings are lines, words and Symbols attached to the carriageway or adjacent to the carriageway, for controlling, warning, guiding and informing the users. Yellow, white and black colours are the standard colours used for marking. Road marking are classified as longitudinal marking, marking at intersections, marking at hazardous locations, marking

for parking, word messages. The longitudinal marking proposed along the project road as given below:

Table 2.16: Longitudinal Markings Proposed for the Project Road

Type of line	Figure	Description
Broken line	 SINGLE BROKEN LINE	Broken lines are permissive in character and may be crossed with discretion, if traffic permits.
Solid lines	 SINGLE SOLID LINE	Solid lines are restrictive in character and indicate that crossing is not permitted except for entry or exit from a side road.
Double solid lines	 PAIR OF SOLID LINES	Double solid lines indicate maximum restrictions and are not to be crossed except in emergent usage.
Combination of broken and solid lines	 COMBINATION OF BROKEN & SOLID LINES	In a combination of broken and solid lines, a solid line may be crossed, with discretion, if the broken line is nearer to the direction of travel. Vehicle from the opposite directions are not permitted to cross the solid line.

Thermoplastic road markings have been proposed considering their long-lasting effect.

(iii) Delineators

The delineators are most likely to be effective on dangerous bends, on approaches to intersections and on embankments. Though all horizontal curves are design to the IRC standards, delineators have been proposed for additional guidance and information to the commuter at curves (Radius less than 1000m). Locations along the high embankment have also been provided with delineators. Delineators with reflectorized panels have been considered.

(iv) Road lighting

Night-time accidents in urban areas can be substantially reduced by the implementation of adequate street lighting. The stretches of the project road traversing through the built-up/urban areas are proposed with adequate lighting. Road lighting has also been proposed at all major junctions. One/ Two/ Three arm bracket Sodium vapour lamps have been considered

(v) Crash Barrier

In addition to the adequate provisions of roadway width and roadside design, crash barrier/guard rails have been proposed to be installed along the roadway edge on either side based on the sections of the project road having:

- At all the bridge approaches
- Embankment with >3 m height
- Horizontal curves with deflection angle >30 degrees and Radius <=240.

For the embankments upto 3 m height, reasonably flatter side slope of 1 vertical: 3 horizontal or more would enable erring vehicles to return to the traffic stream.

D) Roadside Facilities

Sl.No	Description	Location		Remarks
		LHS	RHS	
7	Bus Bay		28000	
8	Bus Bay	28050		
9	Bus Bay	31200		
10	Bus Bay		31300	
11	Bus Shelter	35200		
12	Bus Shelter		35600	
13	Bus Shelter	37400		
14	Bus Shelter		38000	
15	Bus Bay	39900		
16	Bus Bay		41050	
17	Bus Bay	50750		
18	Bus Bay		51000	
19	Bus Shelter	55550		
20	Bus Shelter		55750	
21	Bus Shelter	64700		
22	Bus Shelter		64800	
23	Bus Bay	68600		
24	Bus Bay		68.80	
25	Bus Bay	72600		
26	Bus Bay		72700	
27	Bus Bay	75300		
28	Bus Bay		75400	
29	Bus Shelter	85800		
30	Bus Shelter		85900	

E) Traffic Calming

Speed is arguably a factor in every accident. Lower speeds reduce both the likelihood of the accident happening and the severity, if it does occur. Speed reduction benefits have received much attention in recent years and an international review of speed and accidents concluded that, on an average, each **5km reduction in speed would result in a 22% reduction in fatal accidents.**(1 mile leads to 7%)

Traffic calming measures need to be applied in a formal structured manner. All features should only be constructed where approach speeds are such that all road users can perceive the calming feature and traverse it safely. They should not be used in isolation but as part of a strategy covering a stretch of road or an area. Accordingly following two types of Traffic calming measures, i.e Speed humps and rumble strips have been proposed along the project road.

- Road Humps
- Rumble Strips

(i) Road Humps

Road Humps or Speed breakers are formed by providing a rounded hump of 3.7m width (17m radius) and 100mm height for the preferred advisory crossing speed of 25kph for general traffic as per the **IRC: 99–1988**. The basic material for construction is bituminous concrete formed to required shape. Road humps have been proposed on minor roads at junctions /intersections with major roads, School and Hospital zones. Proper signboards and markings are provided to advise the drivers in advance of the situation. Road humps are extended across carriageway up to the edge of paved shoulder. Proper signboards and marking are proposed to advise the drivers in advance of the Road humps.

(ii) Rumble Strips

Rumble Strips are formed by a sequence of transverse strips laid across a carriageway with maximum permitted height of 20mm. These rumble devices produce audible and vibratory effects to alert drivers to take greater care and do not normally reduce traffic speeds in themselves. The typical design details of rumble strips proposed are transverse strips of Pre-mix bituminous concrete 500mm wide and overall thickness 20mm laid across a carriageway up to the end of paved shoulder. There will be 6 such transverse strips spaced at 0.5 m c/c. Rumble strips are proposed at:

- Sharp curves with radius less than 170m.
- Transition zones (speed limit zones).
- Village/built-up approaches.
- Sensitive receptors (Schools and hospitals)

Proper signboards and marking are proposed to caution the drivers in advance of the situation.

2.7 ROAD CONSTRUCTION STANDARDS, NORMS AND GUIDELINES

Following the road construction standards and norms and management procedure has been adopted to keep the standards and guidelines maintained by the Indian Roads Congress (IRC):

- i) Guidelines for Environmental Impact Assessment of Highway Projects, IRC: 104- 1988.
- ii) Recommended Practice for Treatment of Embankment slopes for erosion control, IRC: 36-1974.
- iii) Recommended Practice for Borrow pits for Road Embankment for Road manual operation, IRC: 10-1961.
- iv) Highway Safety Code, IRC, special publication no. 44.
- v) Guidelines on Bulk Bitumen Transportation and Storage Equipment, IRC, special publication 39.
- vi) Recommended Practice for Tools Equipment and Appliances for Concrete Pavement Construction, IRC: 43-1972.
- vii) Recommended Practice for use and Upkeep of Equipment, Tools and Appliances for Bituminous Pavement Construction, IRC: 72-1978. Road Accident Forms A-1 and 4, IRC: 33-1982.
- viii) The factories act 1956 for hygiene and safety requirements of construction workers.
- ix) Other relevant codes of BIS and National Building Codes.

CHAPTER - 3: ENVIRONMENT REGULATORY FRAMEWORK

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CHAPTER-3: ENVIRONMENT REGULATORY FRAMEWORK

3.1 APPLICABLE REGULATIONS

The chapter presents a review of the existing institutions and legislations relevant to the project at the National and State level. The various statutory clearances from various state and central government authorities and the institutional and legal frameworks are discussed in the following paragraphs.

3.1.1 Legal Framework

The Government of India has laid out various policy guidelines, acts and regulations pertaining to environment. The Environment (Protection) Act, 1986 provides umbrella legislation for the protection of environment. As per this Act, the responsibility to administer the legislation has been jointly entrusted to the Ministry of Environment and Forests (MoEF) and the Central Pollution Control Board (CPCB)/Andhra Pradesh State Pollution Control Board (APSPCB) in the present context. More details on the legal framework of Government of India and State Government regulations and clearance procedures are envisaged in the following paragraphs.

3.1.2 Key Environmental Laws and Regulations

Table 3.1 presents the environmental regulations and legislations relevant to AP state road project.

Table 3.1: Environmental Regulations and Legislations

SR. No	Act / Rules	Purpose	Applicable Yes/ No	Reason for Applicability	Authority
1	Environment Protection Act-1986	To protect and improve overall environment	Yes	As all environmental notifications, rules and schedules are issued under this act.	MoEF. Gol; DoE, State Gov. CPCB; SPCB
2	Environmental Impact Assessment Notification 4 th April 2011	To provide environmental clearance to new development activities following environmental impact assessment	NO	This notification is NOT applicable to Project road, as this is an up-gradation of existing state highway	MoEF. EIAA
3	Notification for use of fly ash	Reuse large quantity of fly ash discharged from thermal power plant to minimize land use for disposal	NO	No thermal plant within 100km reaches.	
4	Coastal Regulation Zone(CRZ) Notification 1991 (2002)	Protection of fragile coastal belt	NO	Road is not located along coastal belt	
5	National Environment Appellate Authority Act (NEAA) 1997	Address Grievances regarding the process of environmental clearance.	Yes	Grievances if any will be dealt with, within this act.	NEAA
6	The Land Acquisition Act 1894 & 1989	Set out rule for acquisition. of land by government	Yes	This act will be applicable to as there will be acquisition of land for widening, geometric improvements and realignments.	Revenue Department State Government.
7	MoEF Circular on Marginal Land Acquisition and Bypasses 1999	Defining “marginal land’ acquisition relating to the 1997 Notification	NO	Not applicable as per Environmental Impact Assessment Notification 14th Sep-2006	MoEF

SR. No	Act / Rules	Purpose	Applicable Yes/ No	Reason for Applicability	Authority
8	The Forest (Conservation) Act 1927 The Forest (Conservation) Act. 1980 forest (conversion) Rules 1981	To check deforestation by restricting conversion of forested areas into non- forested areas	NO	NO forest area.	Forest Department, GoAP
9	MoEF circular (1998) on linear Plantation on roadside, canals and railway lines modifying the applicability of provisions of forest (Conversation) Act, to linear Plantation	Protection / planting roadside strip as avenue/strip plantations as these are declared protected forest areas.	NO	Roadside tree plantation in Andhra Pradesh does not come under the forest act.	MoEF
10	Wild Life Protection Act 1972	To protect wildlife through certain of National Parks and Sanctuaries	NO	This act is not applicable to as there are NO points of wildlife crossing along project corridor.	Chief Conservator Wildlife, Wildlife Wing, Forest Department, GoAP
11	Air (Prevention and Control of Pollution) Act, 1981	To control air pollution by & Transport controlling emission of air Department. Pollutants as per the prescribed standards.	Yes	This act will be applicable during construction; for obtaining NOC for establishment of hot mix plant, workers' camp, construction camp, etc.	SPCB
12	Water Prevention and Control of Pollution) Act1974	To control water pollution by controlling discharge of pollutants as per the prescribed standards	Yes	This act will be applicable during construction for (establishments of hot mix plant, construction camp, workers' camp, etc.	SPCB
13	Noise Pollution (Regulation and Control Act) 1990	The standards for noise for day and night have been promulgated by the MoEF for various land uses.	Yes	This act will be applicable as vehicular noise on project routes required to assess for future years and necessary protection measure need to be considered in design.	SPCB
14	Ancient Monuments and Archaeological Sites and Remains Act1958	Conservation of cultural and historical remains found in India	NO	This act not applicable as the project route is not close to any Ancient Monument, declared protected under the act.	Archaeological Dept Gol, Indian Heritage Society and Indian National Trust for Art and Culture Heritage (INTACH).
15	Public Liability and Insurance Act 1991	Protection form hazardous materials and accidents.	Yes	Contractor need to stock hazardous material like diesel, Bitumen, Emulsions etc.	SPCB

SR. No	Act / Rules	Purpose	Applicable Yes/ No	Reason for Applicability	Authority
16	Explosive Act 1984	Safe transportation, storage and use of explosive material	Yes	For transporting and storing diesel, bitumen etc.	Chief Controller of Explosives
17	Minor Mineral and concession Rules	For opening new quarry.	Yes	Regulate use of minor minerals like stone, soil, river sand etc.	District Collector
18	Central Motor Vehicle Act 1988 and Central Motor Vehicle Rules 1989	To check vehicular air and noise pollution.	Yes	This rule will be applicable to road users and construction Machinery.	Motor Vehicle Department
19	National Forest Policy 1952 National Forest Policy (Revised) 1988	To maintain ecological stability through preservation and restoration of biological diversity.	NO	This policy will not be applicable as NO eco sensitive feature exists along the project corridor.	Forest Department, Gol and GoAP
20	The Mining Act	The mining act has been notified for safe and sound mining activity.	Yes	The construction of project road will require aggregates. These will be procured through mining from riverbeds and quarries	Department of mining, GoAP

3.1.3 Environmental Requirements of the State

Unlike other states, in A.P. the road side plantation within the right of way comes under the authority of R&B Department. But for felling and transportation of Trees, permission has to be taken from forest department at DFO level, under A.P. WALTA Act 2002.

Andhra Pradesh Water, Land Trees Act, (WALTA) 2002

The Act came into force on April 19, 2002 with an objective **“to promote water conservation, and tree cover and regulate the exploitation and use of ground and surface water for protection and conservation of water sources, land and environment and matters, connected therewith or incidental thereto”**.

SR. No	Act / Rules	Purpose	Applicable Yes/ No	Reason for Applicability	Authority
1	WALTA Act 2002	To promote water conservation, and tree cover	Yes	Tree cutting and transit permission is required from forest department.	Forest Department.

3.1.4 Other Legislation Applicable to Road Construction Projects

Environmental issues during road construction stage generally involve equity, safety and public health issues. The road construction agencies require complying with laws of the land, which include *inter alia*, the following:

- ✚ **Workmen's Compensation Act 1923** (the Act provides for compensation in case of injury by accident arising out of and during the course of employment);
- ✚ **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);
- ✚ **Employees PF and Miscellaneous Provision Act 1952** (the Act provides for monthly contributions by the employer plus workers);
- ✚ **Maternity Benefit Act, 1951** (the Act provides for leave and some other benefits to women employees in case of confinement or miscarriage, etc.);

- ✚ **Contact Labor (Regulation and Abolition) Act, 1970** (the Act provides for certain welfare measures to be provided by the contractor to contract labour);
- ✚ **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);
- ✚ **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);
- ✚ **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);
- ✚ **Payment of Bonus Act, 1965** (the Act provides for payments of annual bonus subject to a minimum of 83.3% of wages and maximum of 20% of wages);
- ✚ **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);
- ✚ **Industrial Employment (Standing Orders) Act; 1946** (the Act provides for laying down rules governing the conditions of employment);
- ✚ **Trade Unions Act, 1926** (the Act lays down the procedure for registration of trade unions of workers and employers. The trade unions registered under the Act have been given certain immunities from civil and criminal liabilities);
- ✚ **Child Labour (Prohibition and Regulation) A; 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);
- ✚ **Inter-State Migrant Workmen's (Regulation of Employment and Conditions of Service) Act, 1979** (the inter-state migrant workers, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, traveling expenses from home to the establishment and back, etc.);
- ✚ **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; 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 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 and rendering information-regarding accidents or dangerous occurrences to designated authorities);
- ✚ **Hazardous Wastes (Management and Handling) Rules, 1989;**
- ✚ **Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996.**

3.1.5 World Bank Environmental Requirements

The various environmental requirements of World Bank, GoI for the project roads are described below.

(i) Applicability of various WB safe guard Policies

The World Bank has ten safeguard policies; the details and applicability of the safe guard policies to the Project road are provided in the **Table 3.2**.

Environmental requirements of the World Bank are specified in detail in its Operational Policy (OP) 4.01 and other related Operation Policies. In instances in which the procedural and regulatory

requirements differ, the more stringent applies. The World Bank environmental requirements are based on a three-part classification system.

- *Category A* - requires a full Environmental Assessment (EA).
- *Category B* - projects require a lesser level of environmental investigation.
- *Category C* - projects require no environmental analysis.

On the basis of data and information collected during field survey and discussion with local expert and visualise potential associated impact, consultant has categorised this project as **category-B**, which requires a lesser level of environmental investigation.

Table 3.2: Applicability of WB Safe Guard Policies

WB Safe Guard Policy	Subject Category	Triggered Or Not	Reason For Its Applicability	Mitigation Measures	Documentation
OP 4.01	Environmental Assessment	Triggered	Umbrella policy	All necessary mitigation measures incorporated.	EIA & EMP.
OP 4.04	Natural Habitats	Not Triggered	Eco-sensitive-Forestry and wildlife related issues	Not Applicable	Not Applicable
OP 4.36	Forestry	Not Triggered	No forest land.	Not Applicable	Not Applicable
OP 4.09	Pest Management	Not Triggered	Not Applicable	Not Applicable	Not Applicable
OP 4.30	Involuntary Resettlement	Not Triggered	Road widening will lead to loss of livelihoods, loss of land and Buildings etc	Not Applicable	Not Applicable
OP 4.20	Indigenous people	Not Triggered	No separate Indigenous people development Plan is required for the Project.	Not Applicable	Not Applicable
OP 4.11 (draft)	Cultural Property	Not Triggered	A number of temples, shrines, churches etc are located adjacent to road ROW. But NO declared cultural property exists.	Not Applicable	Not Applicable

3.1.6 Summary of Clearance Requirements

The summary table showing time requirements for agency responsible for obtaining clearance, and a stage at which clearance will be required is given below:

Sl. No.	Type of Clearance	Applicability	Project Stage	Responsibility	Time Required
1	Environmental Clearance from MoEF/SIAA	Not Applicable	Not Applicable	Not Applicable	Not Applicable
2	Forest Clearance for land diversion	Not Applicable	Not Applicable	Not Applicable	Not Applicable
3	Tree felling permission	For roadside tree cutting	Pre construction	APRDC	15 days
4	NOC and consents under Air, Water & Environment Act and noise rules from SPCB	For establishment of construction camp.	Construction stage (Prior to initiation of any work)	The Contractor	2-3 Months
5	NOC and consents under Air, Water & Environment Act and noise rules from SPCB	For operating construction plant, crusher, batching plant etc.	Construction stage (Prior to initiation of any work)	The Contractor	1-2 Months
6	Explosive License from Chief Controller of Explosives,	For storing fuel oil, lubricants, diesel etc. at construction camp	Construction stage (Prior to initiation of any work)	The Contractor	2-3 Months
7	Permission for storage of hazardous chemical from CPCB	Manufacture storage and Import of Hazardous Chemical	Construction stage (Prior to initiation of any work)	The Contractor	2-3 Months
8	Quarry Lease Deed and Quarry License from State Department of Mines and Geology	Quarry operation (for new quarry)	Construction stage (Prior to initiation of any work)	The Contractor	2-3 Months
9	Permission for extraction of ground water for use in road construction activities from State Ground Water board	Extraction of ground water	Construction stage (Prior to initiation of any work)	The Contractor	2-3 Months

Sl. No.	Type of Clearance	Applicability	Project Stage	Responsibility	Time Required
10	Permission for use of water for construction purpose from irrigation department	Use of surface water for construction	Construction stage (Prior to initiation of any work)	The Contractor	2-3 Months
11	Labor license from labor commissioner office	Engagement of Labor	Construction stage (Prior to initiation of any work)	The Contractor	2-3 Months

As mentioned in above table pre -construction regulatory clearance is required for tree felling and forest land acquisition from forest department. In Andhra Pradesh tree-felling permission is obtained from forest department under WALTA Act 2002. For this project, the designated officer is Divisional Forest Officer, Krishna. An application along with list of trees has already been processed and submitted to concern officials.