DPR
Template for PMGSY-III

A. Chapters **Page Nos.**

B. Proforma **Page Nos.**

C. List of figures

{Insert list of figures used in this report}

D. Annexure

{Insert list of Annexure provided in this report}

1. Introduction

1.1 Objectives of Pradhan Mantri Gram Sadak Yojana (PMGSY)

- Pradhan Mantri Gram Sadak Yojana (PMGSY) was launched on 25thDecember, 2000 as a 100% Centrally Sponsored Scheme with the objective to provide All-Weather road connectivity to the eligible unconnected habitations as per Core-Network with a population of 500 persons (as per 2001 Census) and above in plain areas. In respect of 'Special Category States' (North-East, Sikkim, Himachal Pradesh, Jammu & Kashmir and Uttarakhand), the Desert areas, the Tribal (Schedule V) areas and 88 Selected Tribal and Backward districts as identified by the Ministry of Home Affairs/Planning Commission, the population criteria to connect eligible unconnected habitations as per Core-Network was of 250 persons and above (Census 2001). In critical Left Wing Extremism affected blocks (as identified by MHA), additional relaxation has been given to connect habitations with population 100+. The Scheme has also an element of upgradation (to prescribed standards) of existing rural roads in districts where all the eligible habitations of the designated population size have been provided all weather road connectivity, though it is not central to the Programme.

- PMGSY-II was launched in 2013 to allow consolidation of 50,000 km of existing rural roads network in the country on sharing basis between the Centre and the State / UT on 60:40 for plain areas and 90:10 for North-Eastern States and hill areas under PMGSY-II. The length proposed under PMGSY-II was linked to about 20-25% of such upgradation target under PMGSY-I.

PMGSY-III :

The PMGSY envisages consolidation of the existing Rural Road Network by upgradation of existing Through Routes and Major Rural Links that connect habitations to

i. Gramin Agricultural Markets (GrAMs)
ii. Higher Secondary Schools
iii. Hospitals

PMGSY-III will include such linkages.

PMGSY-III programme focus on Up-gradation of existing Through Routes and Major Rural Links based on priority giving importance to critical facilities like the rural markets and education & health facilities. This programme provides connectivity, easy access and faster movement from the habitations to Mandis, Agricultural Markets, other farmer related enterprises, higher secondary schools, colleges, hospitals etc in order to improve the quality life of rural populous. This is a 5 years programme from 2019-20.

1.2 All Weather Road

An all-weather road is one which is negotiable during all weathers, with some permitted interruptions. Essentially this means that at cross-drainage structures, the duration of overflow or interruption at one stretch shall not exceed 12 hours for ODRs and 24 hours for VRs in hilly terrain, and 3 days in the case of roads in plain terrain. The total period of interruption during the year should not exceed 10 days for ODRs and 15 days for VRs.

1.3 Core Network & District Rural Road Plan

PMGSY-I programme is based on the Core Network. The Core Network is the network of all the Rural Roads that are necessary to provide basic access to all the Habitations. A Core Network is extracted out of the total Network mentioned in the DRRP and consists of existing roads as well as the roads required to be constructed to the unconnected Habitations.

The DRRP is a road network in a district, showing the entire existing road network with updated surface conditions, the habitations of various population size and roads proposed for connecting the habitations from another connected habitations/ all-weather roads in an economic and efficient way in terms of cost and utility. It is also known as the Master Plan for Rural Roads for the district. The Census data of 2011 is being used for PMGSY-II and PMGSY-III as well. Under PMGSY II and PMGSY-III, District Rural Road Plan is the basis for selection of roads. The DRRP comprises of Through routes and Link routes. Under PMGSY-II and PMGSY-III, the DRRP includes identification of candidate roads among the existing Through routes (TRs) and Link Routes (LRs) based on utility value per unit road length of candidate road. The candidate roads are to be selected based on the ranking generated by the Trace Maps using Q-GIS software.

The Sub-project road {Insert start of road} to {Insert end of road}, is a Through Route/Major Rural Link (MRL) / link road with Code {Insert CUCPL code} in {Insert name of block} block of {Insert name of district} District. This road connects the habitations of {Insert villages along the road} with populations of {Insert respective population} respectively. Also, the habitations namely (insert indirectly benefitted habitations with population) are located within 3 Km/5 Km path distance. Thus this through road/Major Rural Link/link road serves the total population of {Insert total population served}.

Sl.No.	Habitation benefited	Population benefited		Chainage	
		Directly	Indirectly	From	To

{Insert any other description of the project road like table containing habitations served directly to be included here}

1.4 Geography

{Insert a description of the location and geographic features of the area and adjoining land here.}

1.5 Climatic Condition

{Insert a description of the climatic condition of the area here.}

1.6 The Sub-Project Road

The road passes through plain/rolling/hilly terrain {Delete terrain not applicable}.

{Insert a brief description of the geometry of the road, description of whether there are temples, schools, mosques etc., along the alignment, existing cross drainage structures, existing utilities like electric & telephone poles and water lines along the existing road}

{Insert description of the discussion with the stakeholders and dwellers regarding donation of land}

District:	{Insert name of district}
Block:	{Insert name of block}
Road Name:	{Insert name of road}
Road Code:	{Insert CUCPL code}
Package No:	{Insert package number}
Road Length:	{Insert length of road} Km
Start Point:	{Insert specific latitude and longitude coordinates plus a description in words}. Further if the road starts from MDR/SH/NH, the carriageway width and existing surface (Concrete/BM/DBM/BC) of the MDR/SH/NH needs to be indicated.
End Point:	{Insert specific latitude and longitude coordinates plus a description in words}

Age of the proposed road: (Insert date of completion of the road if available)
Existing surface details of proposed road:
Pavement Condition Index (PCI) of the proposed road:

If existing PMGSY road is proposed partly or fully for upgradation/reconstruction, the following details need to be updated in the DPR.

Category of road sanctioned under PMGSY	: New Connectivity / Upgradation
Year and Batch of sanction	:
Name of the road as per sanction	:
T route/L route no. as per sanction	:
Sanctioned length	: Km
Sanctioned cost	: Rs. lakhs
Date of completion as per OMMAS	:
PCI of the PMGSY road	:

This road is proposed for Up-gradation/Riding quality Improvement.

The road is proposed for both Up-gradation and Riding Quality Improvement.

Upgradation is proposed for the chainage from ----- to -----	–	Km
Riding Quality Improvement for the chainage from ----- to -----	–	Km
Total length	–	Km

2. Planning and Basic Design Consideration

2.1 Key maps

Figure-1Road Map of India and State

(Insert road map of India and State)

Figure-2 District Map

(Insert District Map)

Figure-3 {Insert relevant portion of the Block Map showing project road and all existing connectivity like District/block HQ, new townships, National and State highway network, mandis, GrAMs, Ruban Growth Cluster, hospitals, colleges, Higher Secondary schools, High school, Bus Stand etc at 1:50,000 scale. Example is given in the next page.}

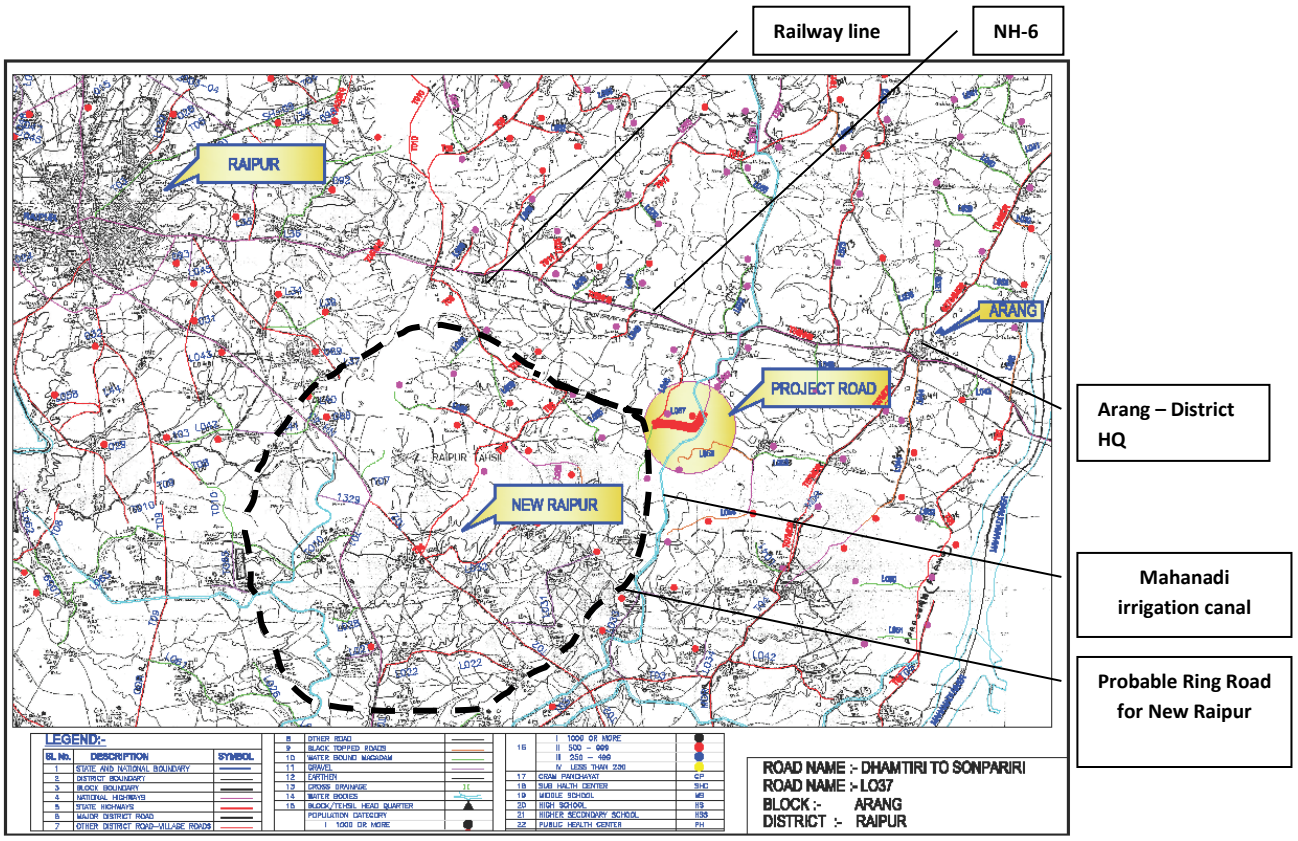


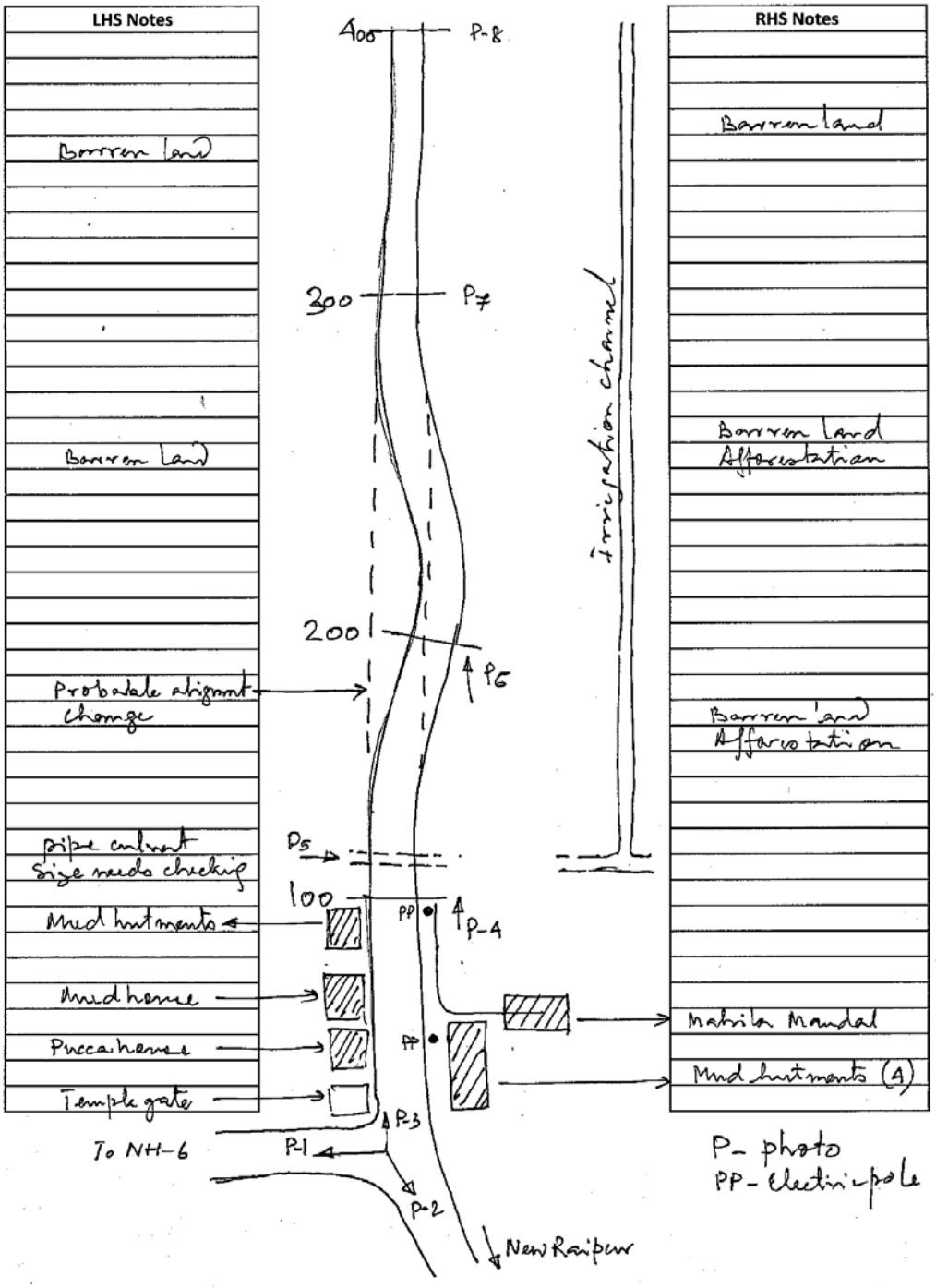
Figure-3 Section of Block Maps showing all existing connectivity like District/block HQ, new townships, National and State highway network, Mandis, GrAMs, Ruban Growth Cluster, hospitals, colleges, Higher Secondary schools, High school, Bus Stand etc.

2.2 Preliminary alignment investigation

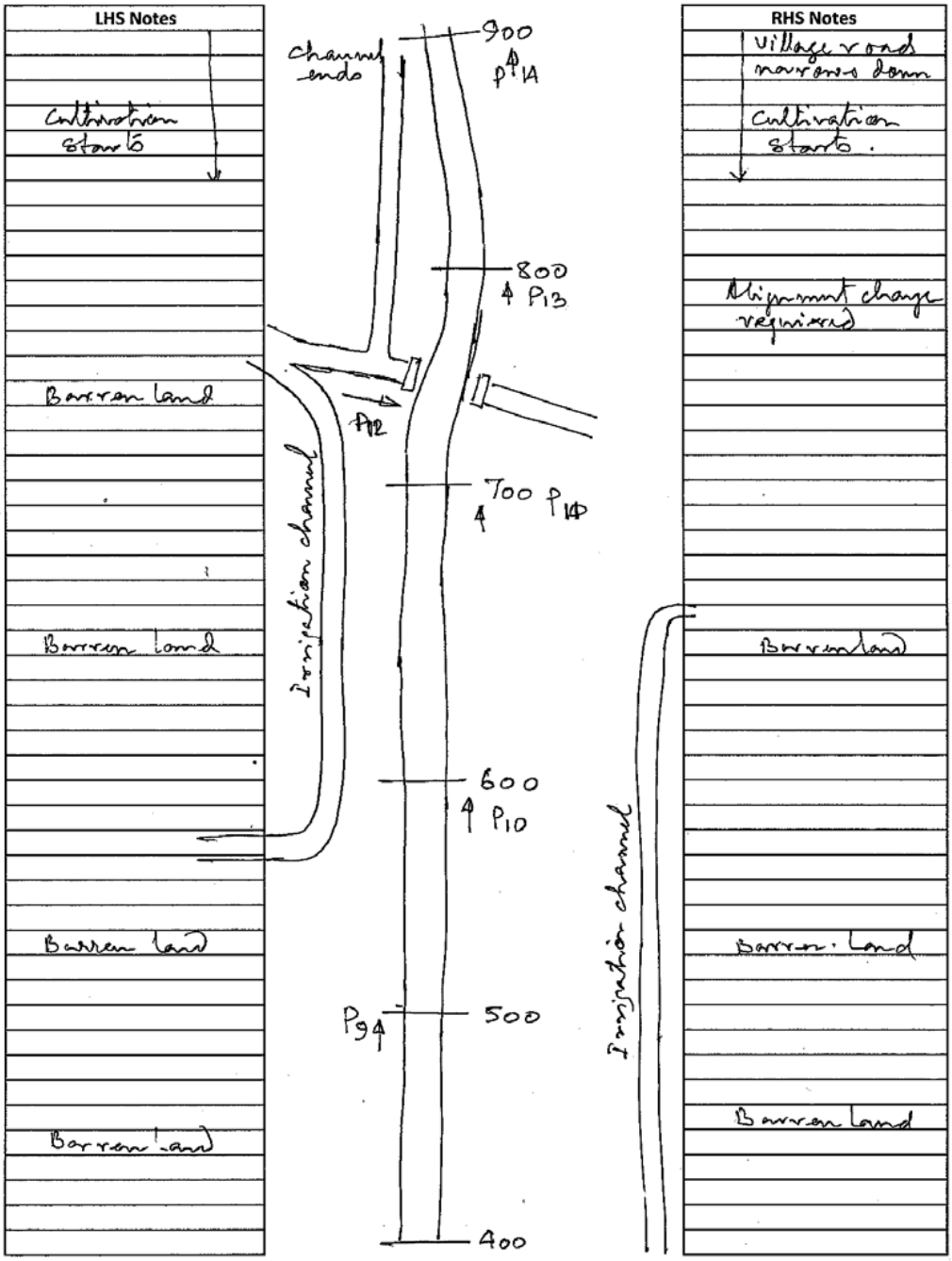
{Insert a strip plan as indicated for the road under study. Width of track or road at some important points (location of identified facilities) should also be included. It should also indicate locations of utilities, electric poles etc. and other environment and safety hazard. Safety sample attached shows the methodology for preparation of the strip plan. Follow similar standard.}

1/5

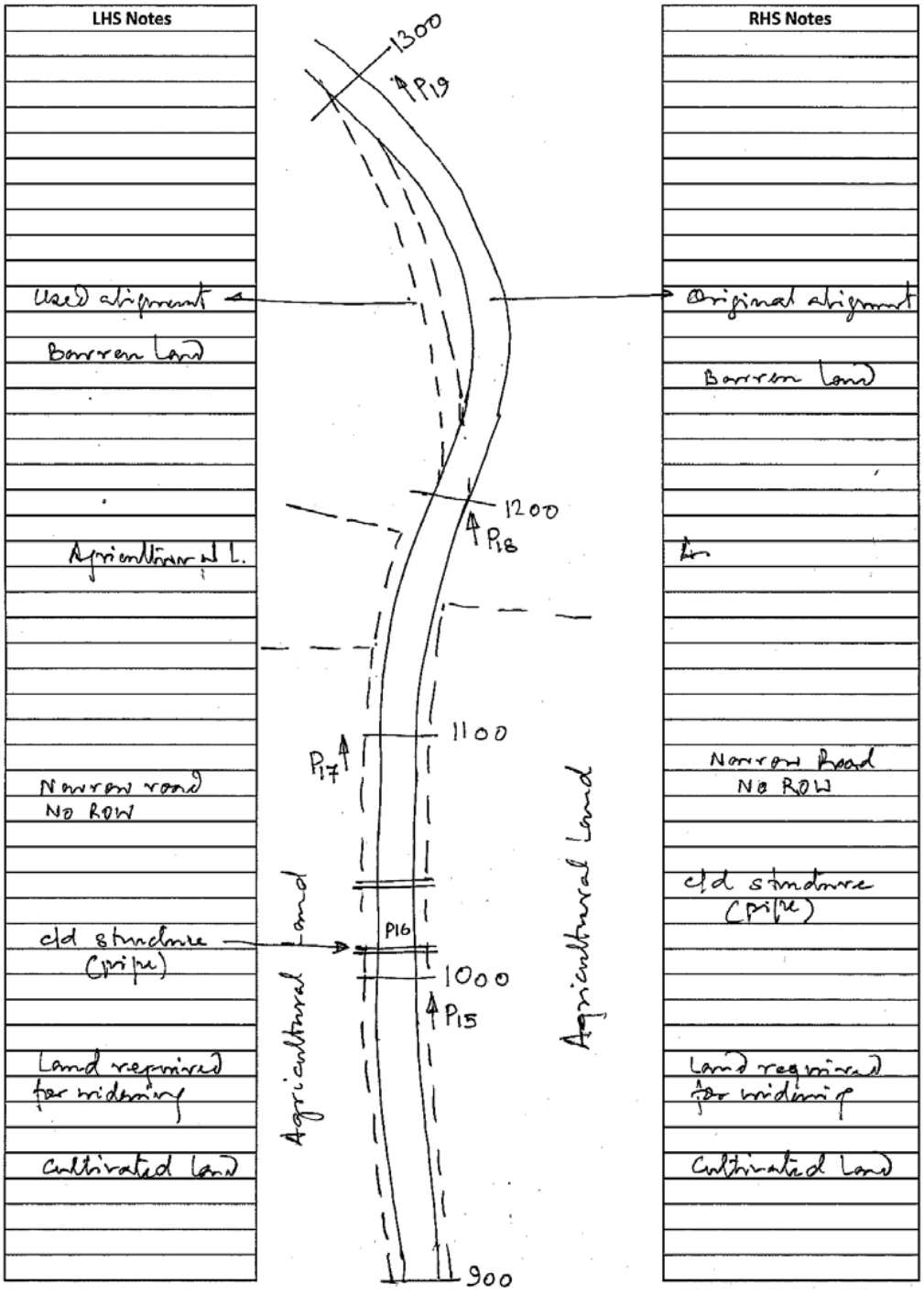
Name of the road	Dhamtia to Sonpuri
Block	Aarang
District	Raipur
State	Chattisgarh
Date	13/10/09 9.15am
Staff	BJ/SL/MJ



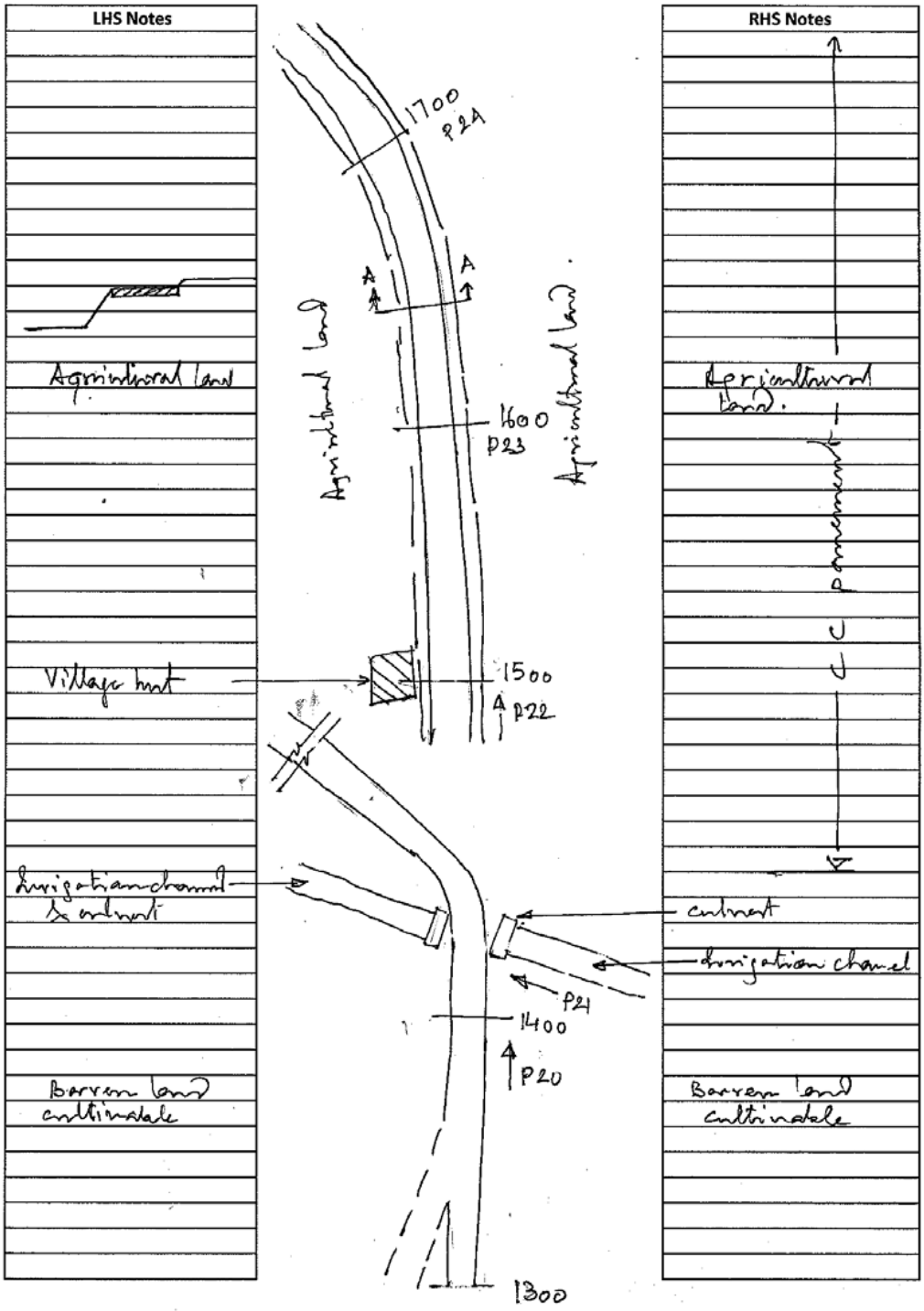
2/5


LHS Notes
RHS Notes
Village roads
Cultivation starts
Alignment change required
Barren land
Irrigation channel
900
800
700
600
500
400
P14A
P13
P12
P14
P10
P9

3/5


LHS Notes
RHS Notes
1300
P19
Used alignment
Original alignment
Barren Land
Barren Land
1200
P18
Agricultural L.
1100
P17
Narrow road
No ROW
Narrow Road
No ROW
c/d structure
(pipe)
c/d structure
(pipe)
P16
1000
P15
Agricultural Land
Agricultural Land
Land required
for widening
Land required
for widening
Cultivated Land
Cultivated Land
900

4/5


LHS Notes
RHS Notes
1700
P24
A
A
Agricultural land
Agricultural land
1600
P23
Agricultural land.
Village hut
1500
P22
Irrigation channel
culvert
irrigation channel
P21
1400
P20
Barren land
cultivatable
Barren land
cultivatable
1300

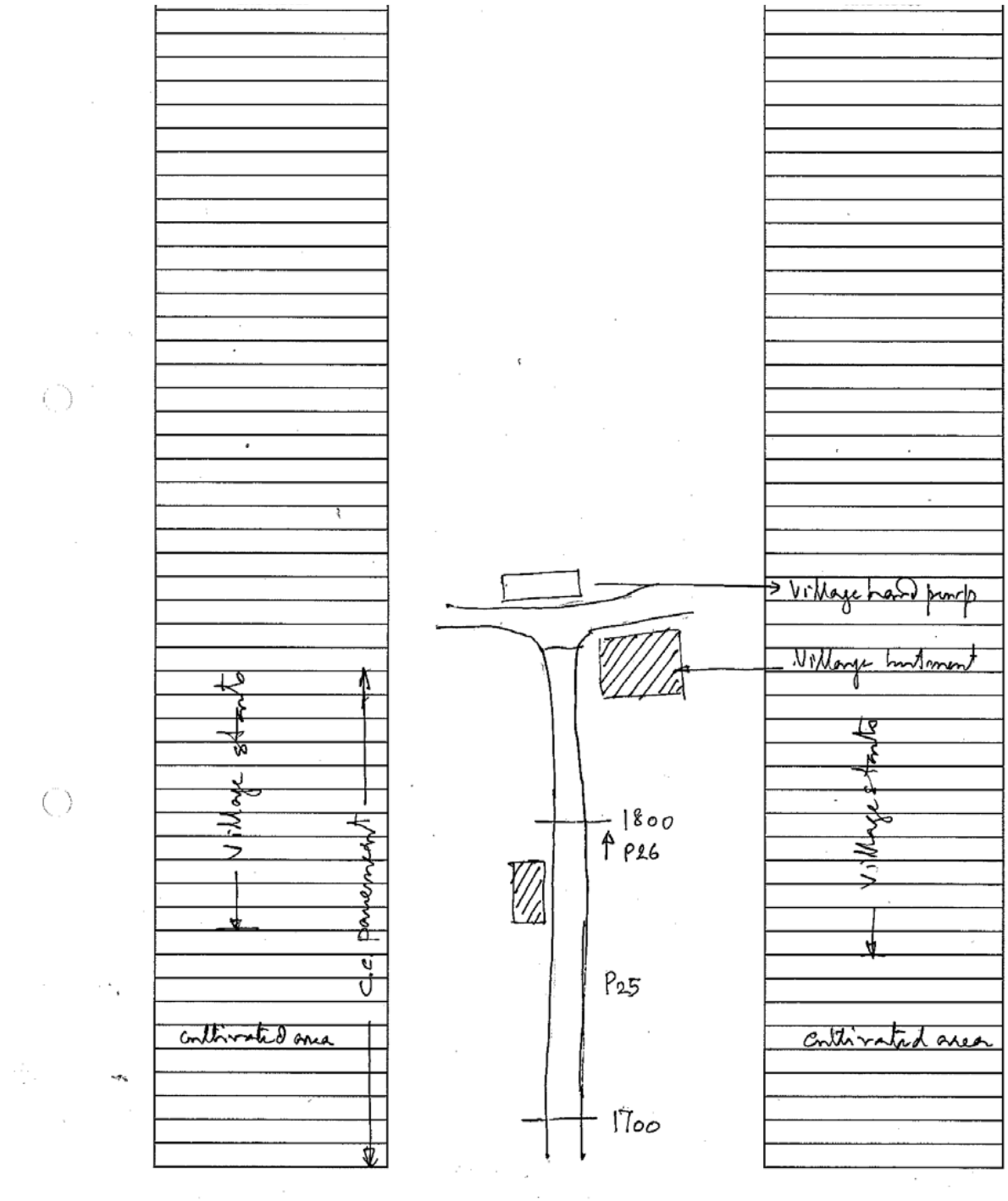


Figure-4 Strip plan showing land and alignment details

2.3 Site Photographs

{Insert the ***geo-tagged*** photographs taken at every 100m interval and/or at important changes in features. Sample attached shows the photographic representation of the alignment. A description of the features such as Utilities, Land Utilization, CD structures, Markets, GrAMS, Rurban Growth Clusters, Mandi, Godowns, Educational / Health and Religious Institutions, Bus Stand, Administrative Centres of Block and Panchayat, Bank / Fuel Station should be clearly spelt out.}

1		Chainage 0.00km One arm of the tee-intersection facing NH-6
2		Chainage 0.00km One arm of the tee-intersection facing New Raipur.
3		Chainage 0.00km Starting point of the alignment. The road is made of moorum. The initial section is a small village with mud and permanent housing.
4		Chainage 0.100km The existing moorum road is wide and has sufficient ROW. On the right hand side is the raised platform for cattle shelter during monsoon.
5		Chainage 0.200km Moorum alignment with c/d structure in front and deviation in alignment.

6		Chainage 0.225km Pipe culvert provided along canal forming a cross drainage structure. This is a very temporary measure with no side walls and broken edges.
7		Chainage 0.300km Flat and plain moorum road with wide ROW. Canal on RHS.
8		Chainage 0.400km Flat and plain moorum road with wide ROW. Canal on RHS.
9		Chainage 0.500km Flat and plain moorum road with wide ROW. Canal on RHS.
10		Chainage 0.600km Flat and plain moorum road with wide ROW. Canal on both sides of the alignment.

11		Chainage 0.700km Straight moorum alignment with culvert ahead.
12		Culvert at chainage 0.750km C/d structure with head wall but broken canal edge.
13		Chainage 0.800km Road alignment with canal on left edge with width narrowing substantially. Agricultural fields start on both sides.
14		Chainage 0.900km Narrow road alignment with agricultural fields on both sides.
15		Chainage 1.000km Canal on both edges stops. The ROW narrows substantially. The surface condition deteriorates because of paddy field water.

16		C/d at Chainage 1.025km Sample of c/d pipes across the alignment.
17		Chainage 1.100km The ROW narrows substantially. The surface condition deteriorates because of paddy field water.
18		Chainage 1.200km The ROW widens with agricultural fields ending on both sides. The alignment follows the general gradient
19		Chainage 1.300km The moorum road starts again into winding paths to the village.
20		Chainage 1.400km Hutment near the village.

21		C/d structure where the road crosses the canal and enters the village.
22		Chainage 1.500km The road enters the village over cc pavement but no shoulders on either side.
23		Chainage 1.600km CC pavement upto the village with agricultural field on both sides.
24		Chainage 1.700km CC pavement upto the village with agricultural field on both sides.
25		Village start

26		Chainage 1.800km End of the alignment at a village water hand pump.

2.4 Road Design Brief

{Insert a tabular format (sample attached) giving the design issues and solutions to be used in finalizing the drawings, provision of CD structures, land acquisition issues, drainage issues, etc., approx. distance from existing centre line will be of use and have to be clearly spelt out in this table.}

Table 2.1 Road Design Brief (example attached)

Sl.	Location	Issue	Design Solutions	Deficiency in view of road safety and remedies proposed
1	*Ch. 0.00km*	*The proposed road is connecting New Raipur and Arang the block HQ. The road starts with a Tee intersection. While New Raipur gets developed there will be substantial traffic using this road.* *Electricity poles are located along the alignment.*	*The intersection needs to be developed properly for safety.* *The electricity poles need to be relocated.*	
2	*Ch.0.100 to 0.300 km*	*The section has a pipe laid across the road without any head wall or foundation. This is for the water from the irrigation channels for cross flow. This causes soil erosion in the channel.* *Because of the pipe the alignment has been adjusted in skew.*	*Proper cross drainage structure to be provided.* *The road has to be realigned.*	
3	*Ch. 0.700 to 0.900 km*	*Because of the skew in channel alignment the road has been skewed.* *The channel walls have eroded due to flow of water.*	*The alignment has to be readjusted.* *The channel walls need to be protected from erosion.*	
4	*Ch. 0.900 to 1.200 km*	*Due to agricultural cultivation the road has only the c/w and no shoulders.*	*Land acquisition/donation will be required to provide for c/w and shoulder. It also needs to be raised to avoid water logging.*	
5	*Ch. 1.200 to 1.300 km*	*The foot track is different from the actual vehicle path provided.*	*Curve needs to be properly designed.*	
7	*Ch. 1.400km*	*The culvert provided skews the alignment.*	*The culvert has to be redesigned so that proper geometry can be provided to the alignment.*	
8	*Ch. 1.400 to 1.860 km*	*The cc pavement does not have any shoulder. This is very risky for vehicles crossing each other.*	*Proper shoulder to be provided on either side.* *It is necessary for the designers to assess the feasibility of the provision*	

		The road ends at the village and crosses the major irrigation canal on the other side of the village. The road width inside the village is not adequate for vehicular traffic.	*of bypass from ch. 1.500km as desired by the villagers*	

2.5 Transect Walk Summary

{Insert a tabular format (sample attached) giving the summary of the transect walk and giving the issues identified and solutions proposed by the affected communities.}

Table 2.2 Transect Walk Summary (example attached)

Chainage	Existing Land Width*	Additional Land Required		Type of Loss		Village	Remarks/Suggestions
		LHS	RHS	LHS	RHS		
0+000	10					**DHAMANI**	
0+095	8	2.30	2.30				
0+233	5	2.50	2.50				Centre line has to be shifted by 6 mtrs towards LHS
0+238	5.10	2.40	2.50				Cross drain proposed
0+405	6.10	2.50	2.50				Cross drain proposed
0+845	5	2.5	2.5			**SONPARY**	Cross drain proposed, side wall to be provided on LHS
0+926	5	2.5	2.5				Shift in centre line by 1.5 mtr towards RHS to avoid affect on canal
0+949	8.5	1	2		Agricultural land		Wall ends on LHS
0+987	5	3	2	Agricultural land	Agricultural land		
1+011	4.5	3	3	Agricultural land	Agricultural land		
1+042	4.5	3	3	Agricultural land	Agricultural land		
1+102	5.90	2.70	2.70				Cross drain proposed
1+109	6	2	2	Agricultural land	Agricultural land		
1+132	8	2		Agricultural land			
1+144	8	1.50					Cross drain proposed
1+246	8	1.50					Cross drain proposed
1+273	5	2	2				Alignment has to be straightened up
1+319	5.50	2.30	2.30				Cross drain proposed
1+409	5.50	2.30	2.30				Cross drain proposed
1+516	5.20	3.30	3.30				No change in existing cross drain
1+522	4.40	2.50	2.50				Existing CC road starts
1+794	4.40	2.50	2.50				Cross drain proposed
1+863	4.40	2.50	2.50				End point

{Insert the information of all the people present for Transect walk, their Nos., representation of Minority community, women participants etc., also document all the elected representative and

other government officials. Also cover the topics discussed including impact on vegetation, soil and water, local community, land owners to be affected etc. Details of compliance with the guidelines issued by the Ministry for the transect walk. Attach Transect walk report as Annexure-1}

1. Total No. of People present for the Transect walk :
   Male : , Female: , Total :
2. Demographic information where the Walk was conducted :
3. No. of Govt. Employees present :
4. No. of participants from Minority community :
   SC: , ST: , Women :
5. No. of SHG members participated :
6. Enclose a separate sheet with Names, Designation (if Govt. Employee, or Elected Representative, SHG members) and Signatures of participants of transect walk

2.6 Checklist

{Tick the relevant box}

Transect walk done		Yes ☐	No ☐
Photographs of Transect walk attached	(10 Nos.)	Yes ☐	No ☐
Transect walk summary table included		Yes ☐	No ☐
Minutes of Transect walk attached		Yes ☐	No ☐
Geo-tagged Photographs at 100 m intervals taken		Yes ☐	No ☐
Major changes in alignment perceived		Yes ☐	No ☐
Design brief provided		Yes ☐	No ☐
Photographs of Grama Sabha attached		Yes ☐	No ☐

3. Topographic Survey

3.1 General

Topographic survey true to ground realties have been done using {Delete method not used: precision instruments like Total Stations and Auto Levels, and bringing out data in digital form (x,y,z format) for developing Digital Terrain Model (DTM) or plane table survey and using dumpy level for Levelling}.

The in-house standards, work procedures and quality plan has to be prepared with reference to IRC: SP 48-1984, IRC:73-1980, IRC: SP 19-2001, IRC: SP 20-2002, IRC: SP 13-2004 (in respect of surveys for rivers/streams) and current international practices to be followed during the above survey.

3.2 Traversing

The traverse consists of a series of straight lines with their lengths and intermediates angles measured very carefully. In difficult terrain, the alignment may have to be negotiated through a series of short chords, preferably, the traverse should be done with a Theodolite with Electronic Distance Measurement (EDM) and all angles measured with double reversal method. Global Positioning System (GPS) is also very useful and appropriate for preliminary survey. The GPS will give locations in coordinates all the necessary points on the traverse. GPS is very fast and reasonably accurate for preliminary system and computer friendly for data transfer. Control pillars in cement concrete should be fixed at suitable interval (ranging from 500 m to 2 kms) to have control on accuracy. It also helps in repeating the survey, if required, within the control pillars.

Traverse is to be done preferably by total station having angular measurement accuracy of ± 1 sec.

{Insert a brief methodology of traverse survey}

3.3 Levelling

{Insert a brief methodology of levelling survey, accuracy adopted, nearest Benchmark etc.}

3.4 Cross Section & Detailing

Cross sections are to be taken at 30 m interval and at closer interval 5 m to 10 m as per radius of curves in curved portion of the existing road. All physical features of the road are to be recorded.

{Cross section is to be taken at every 30m interval. In case of any major variation in the long section cross sections are to be taken irrespective of the 30m interval. The cross section details are to be taken for a further distance of half the formation width beyond the bottom edge of the shoulders on either side of the road.}

3.5 Data Processing

All data from topographic survey recorded by total station are to be downloaded and final alignment, plan, profiles are to be prepared and presented in AutoCAD Format.

3.6 To facilitate the Levelling work, Benchmarks, either temporary or permanent, should be established at intervals of 250 to 500 metres with proper marking, painting as per code. The levels should be connected to GTS datum.

{Insert List of permanent reference Permanent Benchmarks and TBMs including northing, easting and levels}

Sl No	Description	Location of BM/TBM	Levels	Latitude	Longitude

3.7 Checklist

{Tick the relevant box}

BM/TBM with northing-easting given	Yes ☐	No ☐
Traverse survey carried out	Yes ☐	No ☐
Cross section and detailing carried out	Yes ☐	No ☐
L section details attached with the Part II of the DPR	Yes ☐	No ☐

4. Soil and Materials Survey

4.1 General

The soil and material investigations are to be done following the guidelines of IRC: SP: 20-2002 and IRC: SP: 72-2015 and other relevant codes. The potential sources of borrow areas for soil and quarry sites are to be identified.

4.2 Soil sample collection and Testing

Soil samples are to be collected along and around the road alignment at three (3) locations per km, from the adjoining borrow areas, as well as one sample is to be collected from the existing road. Soil Classification tests like grain size analysis and Atterberg's limit are to be conducted for all the samples collected. Standard Proctor test and the corresponding 4 day soaked CBR test are to be conducted either for a minimum of one test per km for soil samples of same group (based on the average of 3 test values is required) or more tests due to variation of soil type. The following tests are to be conducted as detailed below:

- Grain size analysis as per IS : 2720 (Part 4) – 1985
- Atterberg's limit as per IS : 2720 (Part 5) – 1985
- Standard Proctor density test as per IS : 2720 (Part 7) – 1980
- 4 day soaked CBR test as per IS : 2720 (Part 16) – 1987

{The IRC Rural Roads Manual SP: 20- 2002 contain instructions on Soil Survey and materials for the road projects. Supplementary guidance on these subjects is given in Annexure 5.1 of PMGSY Operations Manual. The identification of the soil type in the field and the quick determination of its properties, including CBR are the basic requirement for an economical pavement design. The grain-size (wet sieve) analysis leading to the soil classification is a simple test and must be carried out to have an idea of the CBR value with a reasonable level of accuracy; the nomograph given in Annexure 5.2 of Operations Manual can be used. A simple procedure for estimating CBR value of subgrade soil on the basis of soil properties suggested in IRC SP:72-2015 (Appendix B of IRC:SP:72) can be used. Further, the Dynamic Cone Penetrometer (DCP) can also be used for rapid in situ strength evaluation of subgrade. When the alternative of carrying out DCP tests is adopted, salient details provided in Appendix C of IRC:SP:72:2015, which relates to strength of the subgrade in terms of CBR at in-situ moisture and density. This would minimize the need for CBR determination in lab. The determination of CBR by a rigorous CBR apparatus on a large number of samples may not be possible unless properly planned, and hence the nomograph given in Annexure 5.2 of Operations Manual/IRC SP: 72-2015 may be used.}
{Insert the details of soil tests indicating Gradation, LL, PL, PI, OMC, MDD and CBR for sub-grade soil as Annexure-2. If carted earth is proposed for Embankment construction, sub-grade improvement or shoulders, the test results of such carted materials needs to be attached}.

4.3 Analysis of Test Results

The laboratory soaked CBR value ranges from ……..% to ……..% {Insert range}. The soil laboratory test results are summarized in Table 4.1 {Insert the summary of soil test results in table 4.1}

Table 4.1 CBR values for different stretches

Sl.No.	Section	CBR (%)	MDD	Optimum Moisture Content (OMC)

4.4 Coarse and Fine Aggregates

Information regarding the source of materials such as aggregate, sand and M.Sand is to be gathered. The stone aggregates shall be procured from {Insert name of quarry} whereas the locally available sand shall be used. The source and the lead distance from the quarry to project site will be finalized in discussion with the PIU. The aggregates and sand where available and acceptable shall be used for bituminous work, concrete works, other pavement works.

Figure -5 Quarry Map {Insert the quarry map}

4.5 Sub-soil investigation for CDs/Minor bridges

{Insert a brief write-up on methodology and location of sub-soil investigation, codes followed and brief results thereof. Detailed bore logs, test results should be given at the end of the report}

4.6 Checklist

{Tick the relevant box}

Borrow pit suitable	Yes ☐	No ☐
Sub-grade soil investigation for existing ground	Yes ☐	No ☐
Investigation for Coarse/Fine Aggregate	Yes ☐	No ☐
Quarry map	Yes ☐	No ☐
Sub-soil investigation for CD/Minor Bridge works	Yes ☐	No ☐

5. Traffic Survey

5.1 General

{In addition to traffic counts on the project road, traffic counts must be taken on already completed or similar type of PMGSY road in the vicinity of the project road to provide a realistic count.} In the present scenario of upgradation of roads, 3 days, 24 hr traffic volume count is to be conducted on the proposed road and also already completed or similar type of PMGSY road in the vicinity of the project road. The Classified Volume Count survey is to be carried out in accordance with the requirements of the TOR and relevant codes (IRC:9-1972, IRC: SP: 19-2001, IRC: SP: 20-2002, IRC: SP: 72-2015). The surveys are to be carried out by trained enumerators manually under the monitoring of Engineering Supervisor. {Insert description of traffic count locations. Explain why nearby road is similar to expected post construction situation of the project road. Insert map showing project road and similar road and locations of traffic counts.}

5.2 Traffic Data and Analysis

The traffic count is classified into different vehicle category as given below:

- Motorized vehicle comprising of light commercial vehicle, medium commercial vehicle, heavy commercial vehicle, trucks, buses, agricultural tractors with trailers, car, jeep, van, two wheelers etc.
- Non- motorized vehicles comprising of cycle, rickshaw, cycle van, animal drawn vehicle etc.

The number of laden and un-laden commercial vehicles is to be recorded during the traffic counts. Traffic volume count for this project road is done during {insert season} season. The seasonal variation {insert seasonal variation} is based on local enquiry.

Average of 3 day traffic data is presented in Table 5.1.

Table 5.1 Average Daily Traffic at {Insert location} (both ways) {the table is to be repeated for the number of locations surveyed. This must include counts taken on the similar road.}

Sl. No.	Type of Vehicle	Day-1	Day-2	Day-3	Average
1	Car, Jeep, Van				
2	Auto Rickshaw				
3	Scooters / Motorbikes				
4	Bus / Minibus				
5	Trucks				
6	Tractors with trailer				
7	Tractor without trailer				
8	Cycles				
9	Cycle Rickshaw / Hand Cart				
10	Horse cart / Bullock Cart				
11	Pedestrian				
	Total commercial vehicle per day (cvpd)				
	Total motorised vehicle per day				
	Total non-motorised vehicle per day				

5.3 Traffic Growth Rate and forecast

{"Read – Delete": Depending on the case or combination of cases, the designers should select the location of traffic counts and apply different growth scenarios. In all cases as described in 5.2 above, except for (a), the designers will be required to provide more detail, e.g., explain reasons (e.g., traffic coming from …side road at …chainage etc), specify homogenous sections etc. Insert a proper assessment of the possible traffic growth (normal, generated and diverted) taking care of mining or other economic activities that might generate traffic. The PIU/Consultants should exercise good judgment to properly estimate future traffic specially taking care of diverted and generated traffic. The PIU/Consultants may, in case no data is available, use similar studies to estimate growth trend. Growth rates shall be shown separately for different types of vehicle where there are specific generators of traffic (eg mining activities). Where there are no specific generators of traffic growth, the PIU/consultants may adopt an average annual growth rate of 6% over the design life as set out in IRC: SP 72-2015.}

Table 5.2 Average Annual Daily Traffic at {Insert location} (both ways) {this table will be repeated for each homogeneous section of the road.}

Sl. No.	Type of Vehicle	ADT	AADT	Growth Rate
1	Car, Jeep, Van			
2	Auto Rickshaw			
3	Scooters / Motorbikes			
4	Bus / Minibus			
5	Trucks			
6	Tractors with trailers			
7	Tractors without trailers			
8	Cycles			
9	Cycle Rickshaw / Hand Cart			
10	Horse cart / Bullock Cart			
11	Pedestrian			
Total commercial vehicle per day (cvpd)				
Total motorised vehicle per day				
Total non-motorised vehicle per day				

Independent traffic survey details shall be attached where the projected traffic is more than 1 MSA duly certified by the STA. Further, Axle load survey should be carried out on such proposed roads which are to be designed for projected traffic of 2 MSA or more and carriageway width of 5.5 m. The geo-tagged photographs and videography for the peak hour traffic should be attached with the DPR to justify the traffic plying on the proposed road.

{Tick the relevant box}

a) Traffic volume and mix do not vary along the road ☐
b) Traffic volume and mix vary along the road ☐
c) Traffic volume and mix will vary along the road in the future ☐
d) There is a potential for through traffic using the road ☐
e) % of loaded vehicles ☐
f) Third Party traffic count attached (Projected Traffic > 1 MSA) ☐
g) Axle load test conducted (2 MSA or more and 5.50 m) ☐

6. Hydrological Survey

6.1 General

Hydrological survey is necessary for each cross drainage structures with exact locations for design of adequate and safe Cross Drainage Structures so that the rain water can pass as per natural slope. The hydrological and hydraulic studies are to be conducted in accordance with IRC: SP: 13-2004 and IRC: 5-2015. Hydrological survey of the proposed road is based on the following observations:

- Rainfall Data
- Catchment Area
- Time of Concentration
- Existing Cross Drainage Structures

6.2 Rainfall Data

Rainfall Data as applicable for the project road is to be collected with maximum rainfall occurring in the months of {insert months}.

6.3 Catchment Area

The Catchment area is to be calculated by gathering local information and topographical survey data (insert Catchment area calculation with levels/Topo sheet).

6.4 Time of Concentration

Time of concentration (tc) in hours is to be calculated from the formula of $(0.87 \times L^3/H)^{0.385}$, where L is distance from the critical point to the structure site in km and H is the difference in elevation between the critical point and the structure site in metres (insert calculations).

6.5 Existing Cross Drainage Structures

There are {Insert the number of CD structures} number of cross drainage structures along the existing project road as listed below:

{Insert the data in the table below}

Table-6.1 List and condition of existing CD structures

Sl.	**Chainage (km)**	**Description of Existing Structure**			
		Type	**Span/ Dia. (m)**	**Condition**	**Repair/Reconstruction required**

7. Adopted Geometric Design Standards

7.1 General

The geometric design standards for this project confirm to PMGSY guidelines and the guidelines as stated in IRC-SP 20:2002. Recommended design standards vis-à-vis the standards followed for this road are described below. {PIU/Consultants shall review these guidelines with respect to the Expert Committee recommendations to review Standards, Specifications and Design of Rural Roads issued vide letter no. Lr.#P-17035/1/2007-Tech dated 13th October, 2010 shall be followed. Copy of circular is available under circular head of www.pmgsy.nic.in }

7.2 Terrain

The classification of terrain is selected from plain/rolling/hilly/steep classification for which following criteria will be applicable. {Delete cases not applicable or highlight the applicable one}

Terrain classification	Cross slope of the country	
Plain	0-10%	More than 1 in 10
Rolling	10-25%	1 in 10 to 1 in 4
Mountainous	25-60%	1 in 4 to 1 in 1.67
Steep	Greater than 60%	Less than 1 in 1.67

7.3 Design Speed

The proposed design speed along this project road will be selected from the following table: {Delete cases not applicable or highlight the applicable one}

Road classification	Plain terrain		Rolling terrain		Mountainous terrain		Steep terrain	
	Ruling	Min.	Ruling	Min.	Ruling	Min.	Ruling	Min.
Rural Roads (ODR)	65	50	50	40	30	25	25	20
Rural Roads (VR)	50	40	40	35	25	20	25	20

7.4 Right of Way (ROW) {Delete cases not applicable or highlight the applicable one}

The requirement of ROW for this road is as follows (as specified in IRC-SP 20:2002):

Road classification	Plain and Rolling Terrain				Mountainous and Steep Terrain			
	Open Area		Built-up Area		Open Area		Built-up Area	
	Normal	Range	Normal	Range	Normal	Exceptional	Normal	Exceptional
Rural roads (ODR and VR), (m)	15	15-25	15	15-20	12	12	12	9

7.5 Roadway Width

Roadway width proposed for this road is given below: {Delete cases not applicable or highlight the applicable one}

Carriageway (m)	Roadway Width (m)		
	Plain and Rolling	Mountainous and Steep	
		Desired	Minimum
3.75	7.50	6.00	4.75
5.50	9.00	7.50	7.00

7.6 Carriageway Width {Delete cases not applicable or highlight the applicable one}

The proposed width of carriageway for this project road shall be 3.75m/5.5m/7m. {Carriageway width may be restricted to 3.0m, where traffic intensity is less than 100 motorized vehicles per day and where the traffic is not likely to increase due to situation, like dead end, low habitation and difficult terrain condition.}

7.7 Shoulders {Delete cases not applicable or highlight the applicable one}

It is proposed to have ---- m wide shoulder as the case may be on both sides of which at least 1.00 m is hard shoulder with well compacted unscreened gravel.

Shoulder width will be one half of the difference between the roadway width and carriageway width. The earthen / hard shoulder can be proposed as per the site requirements.

7.8 Roadway width at cross-drainage structures {Delete cases not applicable or highlight the applicable one}

The roadway width at culvert locations for this road shall be {7.5 m / 9 m in plain terrain and 6.0 m / 7.5 m in mountainous terrain}. Roadway width at bridges will be {7.50 m in through routes and 6 m in link routes in plain areas and 6 m (including parapet and drain) in through and Link routes in hilly areas as per Expert committee recommendations}.

7.9 Sight Distance

The safe stopping sight distance is applicable in the geometric design. The sight distance values for this road as per IRC recommendations are presented below:

Design Speed (km/hr)	Safe Stopping Sight Distance (m)
20	20
30	30
40	45
50	60

7.10 Radius of Horizontal Curve

According to IRC recommendations/standards, the minimum radius of horizontal curve for this project road is given below:

Terrain Category	Radius of Horizontal Curve (m)	
	Ruling Minimum	Absolute Minimum
Plain	90	60
Mountainous	30	20
Steep	20	14

To minimize extra land arrangement, minimum radius to be used is 20 m and design speed in these curves are also restricted to 20 km/hr.

7.11 Camber & Super elevation {Delete cases not applicable or highlight the applicable one}

A camber to be adopted on this road section is given below. The maximum super elevation is ---- (insert the percentage adopted) for this project road.

Surface type	Camber (%)	
	Low rainfall (Annual rainfall <1000mm)	High rainfall (Annual rainfall >1000mm)
Earth road	4.0 (1 in 25)	5.0 (1 in 20)
WBM Gravel road	3.5 (1 in 28.5)	4.0 (1 in 25)
Thin bituminous road	3.0 (1 in 33.33)	3.5 (1 in 28.57)
Rigid Pavement	2.0 (in in 50)	2.5 (1 in 40)

7.12 Vertical Alignment

The present road is in plain / hilly terrain and vertical alignment has been designed well within ruling gradient. (Longitudinal gradients should be as per the Expert Committee recommendations to review Standards, Specifications and Design of Rural Roads issued vide letter no. Lr.#P-17035/1/2007-Tech dated 13th October, 2010 shall be followed. Copy of circular is available under circular head of www.pmgsy.nic.in
{Minimum gradient of 0.3% for drainage purpose is to be considered for designing the vertical alignment of this road. Vertical curves are not required when grade change is less than 1%, however a minimum vertical curve is provided to avoid vertical kink.}

7.13 Vertical Curves

For satisfactory appearance, the minimum length of vertical curve for different design speed is given in IRC-SP 20:2002 and Expert committee recommendations of PMGSY roads to be referred. Vertical curves are to be designed to provide the visibility at least corresponding to the safe stopping sight distance. Valley curves to be designed for headlight sight distance.

7.14 Side slope

Side slope for this proposed road where embankment height is less than 3.0m is given in the table below. {Delete cases not applicable or highlight the applicable one}

Condition	Slope (H:V)
Embankment in silty/sandy/gravel soil	2:1
Embankment in clay or clayey silt or inundated condition	2.5:1 to 3:1
Cutting in silty/sandy/gravelly soil	1:1 to 0.5:1
Cutting in disintegrated rock or conglomerate	0.5:1 to 0.25:1
Cutting in soft rock like shale	0.25:1 to 0.125:1
Cutting in medium rock like sandstone, phyllite	0.083:1 to 0.0625:1
Cutting in hard rock like quartzite, granite	Near vertical

7.15 Extra Widening of Pavement:

The Extra Widening of Pavement at Curve as is given below:

Radius of Curve (m)	**Upto 20**	**21 - 60**	**61 - 100**	**101 - 300**	**Above 300**
Extra Widening for 3.75 m wide single lane carriageway (m)	0.9	0.6	Nil	Nil	Nil
Extra Widening for 5.5 m wide intermediate lane carriageway (m)	1.25	1.0	0.8	0.5	Nil

8. Alignment Design

8.1 General

The basic aim of highway design is to identify technically sound, environment-friendly and economically feasible highway alignment. The most appropriate alignment is to be proposed considering the effect of climate change and past history of natural disasters in the area. The selection of the alignment is to be made after economic, social and environmental analysis, the details of the same is presented in succeeding chapters. The ensuing sections deals with obligatory points, which control highway alignment, design of cross-section, highway geometric design & methodology, design of miscellaneous items.

The main components included in the highway design are:

- Cross-sectional elements
- Embankment
- Horizontal alignment
- Vertical profile
- Junctions and/or Interchanges
- Road furniture
- Miscellaneous items

i. The road alignment is to be planned considering following aspects: {Delete those points which are not applicable}.
ii. Finalization of road alignment, their design and construction methodology based upon the recommendations of the geologist, geotechnical engineer, hydrologist, soil conservation experts contained in their reports
iii. Alignment of the road on sun facing side of the hill
iv. Efforts to avoid series of hair-pin bends on steep slopes
v. Staggering the location of the hair-pin bends so that they are not aligned one above the other
vi. Ensuring safe horizontal and vertical distance from river banks and the water level
vii. Avoidance of hill cutting in the form of huge vertical cuts and adoption of benching for mitigating slope instability
viii. Adoption of the balance and cut and fill methodology where possible
ix. Study of the roads already constructed in the immediate vicinity to better understand the behaviour of the hill slopes along the roads
x. Excavation of bore holes at major change in pavement condition or in deflection readings (for up-gradation works), or at 2 km intervals, whichever is lesser
xi. Excavation as required where major changes in soil condition or change in strata is observed
xii. Testing of samples from the bore holes to determine suitability of various materials for use in widening of existing embankments or in new pavement structure
xiii. In case of hill roads, identification of the dumping sites in the DPR so as to use them for developing parks, playground, parking area etc.
xiv. Consultation with the local public on the hazards occurring in the area in the past
xv. Study of possible alternate alignments

8.2 Horizontal alignment

{Insert a table (example given below) on the physical features of the existing alignment and possible geometric improvement required}

Table 8.1 – Features of Horizontal Alignment (Example)

Chainage		**Length**	**Description**	**Reason for deviation from existing alignment (if necessary)**
From (km)	**To (km)**	**(km)**		

Checklist

{Tick the relevant box}

a) Centre line of the existing and proposed horizontal alignment coincide ☐

b) Centre line of the existing and proposed horizontal alignment deviate at certain sections ☐

{Where the proposed horizontal alignment deviates from the centreline of the existing alignment, and where the clearance of the proposed horizontal alignment from existing roadside features (eg houses, temples, ponds, etc) is very tight, the horizontal alignment plan shall be drawn at large scale in the drawing set.}

{Insert a schematic diagram showing linear offsets from existing alignment as example attached}

Chainage in Km	LHS	Existing alignment	RHS	Chainage shift (m)	Approximate land required (m)
2.20				2.20	
2.10					
2.00					
1.90					
1.80					
1.70				1.65	
1.60					
1.50				1.43	
1.40					
1.30					
1.20					
1.10					
1.00				0.97	
0.90					
0.80					
0.70					
0.60					
0.50				0.46	
0.40					
0.30					
0.20					
0.10					
0.00				0.00	

Figure 8.1 Schematic diagram showing location and offsets from existing alignment

{Insert a table (example given below) on the various horizontal geometric improvement carried out and their details}

Table 8.2 – Horizontal Curve details
(Example)

Curve No.	IP Chainage	Radius	Ls	Speed	S.E. %	Deflection Angle			Lc	L_{total}	Hand of Curve
		(m)	(m)	(Kmph)		D	M	S	(m)	(m)	

8.3 Vertical alignment

{Insert a table (example given below) on the various vertical geometric improvement carried out and their details}

Table 8.3 – Vertical Curve Details (Example)

Sl. NO.	Chainage (m)	Level of pvi	Length of curve	Type of curve	Grade in (%)	Grade out (%)	Grade difference (%)	Chainage		Level	
								St. of Curve	End of Curve	St. of Curve	End of Curve
1											
2											
3											

8.4 Design of Junctions

The proposed alignment intersects cross roads and forms junctions. The locations of junctions are given below:

{Insert location of important junctions, type and any major intersections improvement proposed.}

Table 8.4 – List intersections, type and proposed modifications

Sl.	Type of intersection	Location (km)	Exiting condition	Proposed modification

9. Pavement Design

9.1 General

Considering the sub grade strength, projected traffic and the design life, the pavement design for low volume PMGSY roads is to be carried out as per guidelines of IRC: SP: 72 – 2015, IRC SP:77-2008 "Design of Gravel Road", IRC SP:62-2014 "Cement Concrete roads" and IRC:37-2018 "Guidelines for Design of Flexible Pavement for roads having higher category of traffic. In built up area for hygienic and safety reasons, C.C. pavement to be provided with a hard shoulder and drain appropriate line drain. Drainage plan needs to be attached with the DPR.

{For roads to be upgraded}

Careful assessment of the existing pavement condition is conducted with following test procedures undertaken:

i. Pavement roughness measurement using bump integrator (or alternative calibrated instrument) and measurement of rutting, cracking and ravelling
ii. Measurement of road deflections utilizing the Benkelman Beam Deflection Test
iii. CBR tests at sufficient intervals to indicate extent and severity of the problem when pavements are too distressed to give meaningful deflection results
iv. Survey for assessment of the surface, sub-surface and roadside drainage condition of the road section
v. Detailed subsurface investigations for all the road sections where there has been subgrade failure
vi. Overlay thickness clause2.2.3 of IRC SP72:2015 should be referred.

9.2 Pavement Design Approach

9.2.1 Design Life

A design life of 10 years is to be considered for the purpose of pavement design of flexible and granular pavements. In respect of Rigid pavement, a design life of 20 years is to be considered for the purpose of pavement design.

9.2.2 Design Traffic

The average annual daily traffic (AADT) for the opening year as well as the total commercial vehicle per day (CVPD) is to be presented in Table 5.2. {Insert the Traffic Census Fields Data Sheet – Annexure-3}.

9.2.3 Determination of ESAL applications

Only commercial vehicles with a gross laden weight of 3 tons or more are to be considered. The design traffic was considered in terms of cumulative number of standard axles to be carried during the design life of the road. The numbers of commercial vehicles of different axle loads are converted to number of standard axle repetitions by a multiplier called the Vehicle Damage Factor (VDF). An indicative VDF value is to be considered as the traffic volume of rural road does not warrant axle load survey.

For calculating the VDF, the following categories of vehicles was considered as suggested in paragraph 3.4.4 of IRC: SP: 72 – 2015.

- Laden Heavy / Medium Commercial Vehicles
- Un-laden / Partially loaded Heavy / Medium Commercial Vehicles
- Over Loaded Heavy / Medium Commercial Vehicles

Indicative VDF values considered 10% of laden MCV and 10% laden HCV as overloaded & given below:

Vehicle type	**Laden**	**Un-laden /Partially laden**
HCV	2.86	0.31
MCV	0.34	0.02

Lane distribution factor (L) for Single lane road = 1.0

Cumulative ESAL application = To x 4811 x L,

where To = ESAL application per day.

The Cumulative ESAL application for the project road as per paragraph 3.5 of IRC: SP: 72 – 2015 is presented in Annexure-4 {Insert Annexure-4}

9.2.4 Subgrade CBR

The sub grade CBR range of {Insert CBR % range} is to be considered and the traffic falls in the {Insert traffic classification} category.

9.3 Design Alternatives

{Insert design alternatives like flexible vs. rigid pavement and paved vs. normal shoulders, new technologies}

Design alternatives to be considered {tick the applicable box}

Chainage		Design alternatives considered						Specify design alternative selected	Justification
		Pavement		Shoulder					
From	To	Flexible	Rigid	Earthen full width	Hard Full width	Hard shoulder 1.00 m each side	Soil stabilization and use of locally available marginal materials.		
		☐	☐	☐	☐	☐	☐		

9.4 Pavement composition

i. Flexible Pavement

ii. The designed pavement thickness and composition is to be calculated by referring Figure 4 (Pavement design catalogue) of IRC: SP: 72 – 2015. The ratio between heavy commercial vehicles and medium commercial vehicles as given in Chapter 5 should be maintained as far as possible.
The pavement layers provided are given below:

Layers	Items	Thickness required as per design	Existing crust available (mm)	Thickness provided for pavement	Thickness of Pavement in Widening portion
Top	Premix Carpet with Seal	{Insert	{Insert	{Insert	{Insert

Layer/Surface course	Coat/ SDBC/BC /Surface dressing	thickness} mm	thickness} mm	thickness} mm	thickness} mm
Bituminous layer	BM/DBM/BC	{Insert thickness} mm	{Insert thickness} mm	{Insert thickness} mm	{Insert thickness} mm
Base Layer	WBM Grading III & WBM Grading II /WMM	{Insert thickness} mm	{Insert thickness} mm	{Insert thickness} mm	{Insert thickness} mm
Sub – Base Layer	Granular Sub-base	{Insert thickness} mm	{Insert thickness} mm	{Insert thickness} mm	{Insert thickness} mm
Total thickness		{Insert thickness} mm	{Insert thickness} mm	{Insert thickness} mm	{Insert thickness} mm

Top layer of WBM/WMM is to be treated with bituminous surface. {If the pavement thickness varies over the entire length of the road section a table showing different thickness adopted should be given.}

iii. Rigid Pavement

{Insert cc pavement design wherever provided, if not delete}

Layers	Items	Existing crust available if any	Proposed thickness
Top Layer/Surface course	M30 concrete	{Insert thickness} mm	{Insert thickness} mm
Base Layer	DLC/WMM/WBM	{Insert thickness} mm	{Insert thickness} mm
Sub – Base Layer	Granular Sub-base	{Insert thickness} mm	{Insert thickness} mm
Total thickness		{Insert thickness} mm	{Insert thickness} mm

{If new technologies proposed, the pavement thickness needs to be specified}

9.5 Embankment Design

{Insert embankment design for high embankments (above 6m) especially at bridge approaches. Related soil investigations need to be done for borrow earth and existing ground. If the embankment height is more than 1 m, Highest Flood level should be indicated in the drawing.

For low-lying road sections subject to flooding, the road embankment should be raised so that subgrade level has a free board of about one meter above the highest recorded level or designated criterion. For the design of high embankments including bridge approaches where appropriate, IRC: 75-2015 should be followed as minimum standard}

10. Design of Cross Drainage Works

10.1 General

On the basis of hydrological survey, {Insert number of new cross drainage works} new cross drainage structures are recommended for the project road as listed below. {PIUs/Consultants shall review with respect to the Expert Committee recommendations to review Standards, Specifications and Design of Rural Roads issued vide letter no. Lr.#P-17035/1/2007-Tech dated 13th October, 2010 shall be followed. Copy of circular is available under circular head of www.pmgsy.nic.in}.

10.2 Hydrological Design

{All existing cross drainage structures shall be assessed for sufficiency in width and strength and their capability of taking modern day wheel loadings. If required, tests to assess residual concrete strength, reinforcement cover sufficiency, reinforcement corrosion, soil properties should be undertaken. Based on this, decision for reconstruction, strengthening should be taken.} The existing structures in poor condition that are proposed for replacement as listed at Table 10.2 below. Agricultural conduits, which basically act as balancers, have also been provided as listed at table 10.2 below.

10.3 Design Feature

Design Standards for culverts is to be prepared based on standard codes and guidelines of IRC: SP: 20: 2002 and similar type of ongoing projects. General features of the designed cross drainage structures are given below:

1. For Hume Pipe Culvert, minimum road width has been taken as {xx} m,

Width of culvert: {xx} m with parapet.

Width of Bridge: {xx} m with parapet.

10.4 Justification for retaining / widening and replacement of culverts

{Insert the design considerations developed after the transect walk}

10.5 Hydraulic calculation for Culvert

The design discharge is to be calculated by the rational method considering peak runoff from catchment using the formula,

Q = 0.028 x P x A x Ic

Where P = Coefficient of Run Off for the catchments characteristics, A = Catchments Area in Hectares & Ic = Rainfall Intensity

i. Small bridge- site length of which exceeds 15 m to be jointly visited by STA & SE or CE & SE. Design – as per IRC: SP: 20-2002 & IRC: SP:13-2004 and relevant latest IRC Codes for Bridges.
ii. Causeways and submersible bridges – Design to be done as per IRC: SP: 20-2002 and SP-82:2008 (Submersible Causeways would not be allowed under PMGSY-III except in some unique Geography).

{Insert detailed hydraulic calculation of all replaced and proposed new culverts and attached as Annexure-5 of this DPR}.

{Insert list of CD works proposed / upgraded, type, location, span / dia in a tabular form. This should connect to the decisions taken during transect walk}

Table 10.2 Proposed Culverts

Sl. No.	**Chainage**	**Type of Culvert**	**Span/dia**
1			
2			
3			
4			
5			

11. Protective Works & Drainage

11.1 General- Explore the new technologies for protection work to reduce the cost of protection works for example Gabion wall, use of Geo-Synthetic materials, etc.

{Insert necessary description of the terrain and drainage condition along the road under study}

11.2 Road side drain

As the insufficient drainage of surface water leads to rapid damage of road, road side drain as shown in drawing volume is to be provided particularly on the location of habitation areas. Sketch for a standard roadside drain should be made available. Table 11.1 gives the chainage-wise drain works proposed.

Table 11.1 List of Pucca side Drains

Sl. No.	Chainage	Drains		Comments
		LHS	RHS	
1				
2				
3				
4				
5				

11.3 Protective Works

Necessary protection works consisting of closed {Insert type of piling} piling and {Insert ballah suggested} ballah piling have been provided near pond and water bodies falling within the proposed alignment. Table 11.2 gives the chainage-wise protection works adopted.

{Insert list of protection works proposed/upgraded, type, and location in a tabular form. This should connect to the decisions taken during transect walk}

Table 11.2 List of protective works

Sl. No.	Chainage	Type of protective works		Comments
		LHS	RHS	
1				
2				
3				
4				
5				

12. Land Requirement

12.1 General

The existing road is _____ {description of the road surface as may be the case}. Thus the project road is a upgradation. The existing Right of Way (ROW) is varying from {…..} m to {……} m. {Insert information on ROW available}

12.2 Proposed ROW

The width of carriageway is to be considered as 3.75 m / 5.5 m in accordance with the IRC-SP 20: 2002. The total roadway width is limited to 7.5 m/9 m. The proposed ROW generally varies from 12 m – 15 m depending upon the embankment height and the proposed ROW is even less than 10 m in some stretches of habitation area and in areas having tree plantation.

12.3 Additional Land

Local administration and local panchayat need to apprise the villagers about requirement of minor areas in places for development of the road. Villagers are generally highly enthusiastic during site visits for selection of the road. Table 12.1 provides the chainage-wise additional land required.

{Insert a table showing the additional land required for developing the PMGSY road – PMGSY does not provide land acquisition cost}

Table 12.1 – Additional land requirements

Sl No	Chainage	Available land width in m	Additional width required in m	Measures proposed to obtain additional land

13. Utility shifting/relocation

13.1 Existing utilities

{Insert list of existing utilities that require relocation along the project road with chainage details in a tabular form. This should connect to the decisions taken during transect walk. The existing utilities must be shown on the drawings. Utilities to be relocated must be highlighted and the new location shown on the drawings}

13.2 {Insert list of departments responsible for utility shifting}

13.3 {Insert rules pertaining to shifting of utilities}

13.4 {Provide an estimate with breakdown of costs for relocation of utilities}

Table 13.1 Estimated Cost for Relocation of Utilities

Sl. No.	Utility Type	Qty	Estimated Rate	Estimated Cost
1	{For example, power poles}			
2				
3				
Etc.				
			Estimated Total Cost	

14. Safety in Planning, Design and Construction (embedding of safety measures in the DPR)

{This DPR may be subjected to a road safety audit by an independent expert, Road Safety Auditor. The recommendations of the road safety audit as approved by PIU shall be incorporated in the final DPR. Guidelines to be followed during planning, design and execution are given briefly in subsequent paragraphs. A checklist for road safety measures is given at 14.19; this has to be completed. Road safety audit at DPR stage is required for roads of length more than 5 Km}

Safety Guidelines for Planning (Section 2 of DPR) and Design of Alignment (Section 8 of DPR)

14.1 Planning

Road safety starts from planning stage itself. A road hierarchy system of network planning has been one of the important tools used for road network and land use planning. Basic approach is for defining each roadway in terms of its main functions (of accessibility and mobility) and appropriate design criteria. Rural road comprise other District Roads and Village Roads for which geometric design standards are given in IRC Codes. These roads basically serve the accessibility function. Normally a rural road should not join or intersect a National Highway or even a State Highway. It should join a major district road for better network efficiency and more importantly for better safety.

Following points should be kept into consideration for safe design of alignment and profile:

(i) Road should be designed with characteristics of self-explaining, consistent, 'forgiving', and for safe use of all categories of users, and with consideration of human factors.

(ii) Ruling standards of geometric design be adopted, with largest practical radius and sight distance.

(iii) Sharp bends/ 90° turn should be avoided and improved if present on existing roads or tracks. These are hazardous locations and need to be eliminated even if, it requires acquisition of land. The requirement and locations be identified during transect walk and field surveys. The state should make provisions for the acquisition of land at critical locations. In cases where it is not feasible/ impossible then speed management measures should be planned and provided.

(iv) Visibility is an important requirement for safety on roads especially in hills. Therefore it is necessary that prescribed sight distance (related to speed) is available to permit drivers enough time and distance to control their vehicles and avoid accidents. In order to ensure prescribed sight distance, it may be necessary to have additional right of way. Additional land may also be acquired at locations of deep cut, high fills and unstable or landslide prone areas. Where this is not feasible, traffic calming measures as per IRC: 99-2018 need to be planned and provided.

(v) The roads in hilly terrain should avoid hairpin bends or kept to minimum and should be located on stable and flat ground. In unavoidable circumstances, Hair-pin Bends may be designed as Circular Curves with Transitions or as Compound Circular curves as prescribed in Hill Roads Manual. The widening required should be achieved towards hill side.

Fig. 14.1: Photographs showing Typical Hairpin Bends

(vi) Extra widening must be provided at sharp horizontal curves to facilitate safe passage of vehicles. Blind curves and hairpin bends should be made 2-lanes for improving safety.

(vii) Designing vertical profile compatible with natural topography for optimum and balanced cut-fill quantities hence generating less spoil.

(viii) Keeping finished road level and fill slopes higher than the high flood level (HFL). While designing the roads, provision be made for grade compensation at curves, vertical and lateral clearances and co-ordination of horizontal and vertical alignments.

(ix) Besides other drawings, the DPR would necessarily include drawings for

(a) Horizontal Alignment and Longitudinal Vertical Profile,
(b) Cross-section at required interval along the alignment within ROW, Typical Cross-Sections with details of pavement structure,
(c) Detailed Drawings of intersections layout with traffic signs, pavement markings and speed management measures,
(d) Detailed Working Drawings for individual Culverts and Cross-Drainage Structures,
(e) Detailed Working Drawings for individual Bridges, Tunnels, subways and Structures.
(f) Detailed Drawings showing each traffic sign with its type and location, pavement markings of edge lines and pedestrian crossings at required locations.
(g) Drawing showing location and layout of bus bays, if required and to be provided.
(h) Detailed drawings showing safety measures (traffic signs, markings, delineators or other special treatment) for sharp/ blind curves if part of alignment

14.2 Take off point of rural roads from higher category road needs to be carefully planned with well-designed intersection. Following points be kept into consideration for the selection and design of takeoff point:

(i) Take off should be perpendicular to higher category road. In any case, the angle should not be less than 70^0'
(ii) It should preferably be at flat ground level (zero grade).
(iii) In cases where existing cart tracks meet the higher category roads at some angle (not perpendicular) then intersection layout should be modified to the 'right angle' intersection and extra land, if required should be made available (acquired).
(iv) The intersection should be designed as 'priority' intersection.
(v) The intersection should have prescribed sight distance for users of the main road as well as for the rural road. Obstructions like tree branches and/or other objects are to be removed.
(vi) Intersections should be designed for safe crossing by vulnerable road users (VRUs). Provision of pavement markings, as per IRC: 35 should be ensured.

(vii) Suggestive layout of Priority Intersections is given in Fig. 14.2, below for guidance. Besides well designed layout, the intersection must be provided with required and correct traffic signs, pavement markings and speed management measures as per relevant IRC codes.
(Note: It would be desirable for NRIDA to prepare a separate document on "Type Design for Intersections on Rural Roads" for design and layout of intersection.)

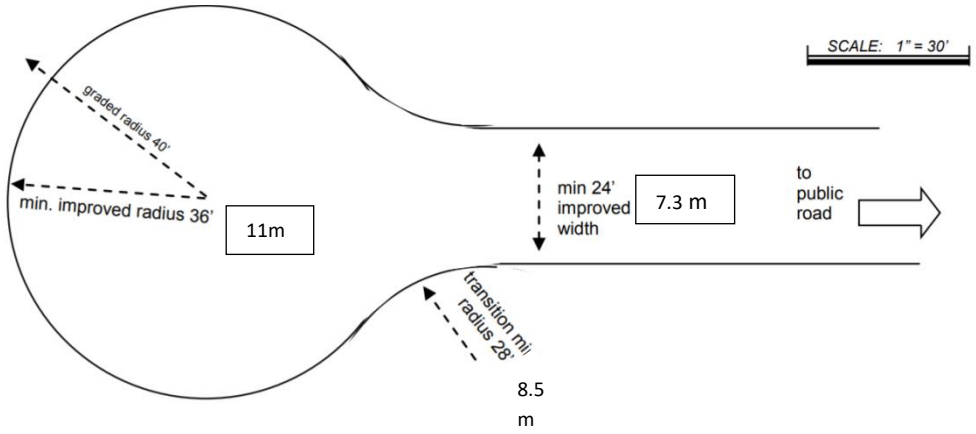
Fig. 14.2: Suggestive Layout of Priority Intersection

(Insert figures from ADB Manual on Rural Road Safety)

(viii) NRIDA Guidelines recommends provision of speed humps at junction of rural road with higher order roads, near Schools/ Anganwadi Centers / Health Centers and entry points of habitation. Its design should be as prescribed in IRC: 99-2018.

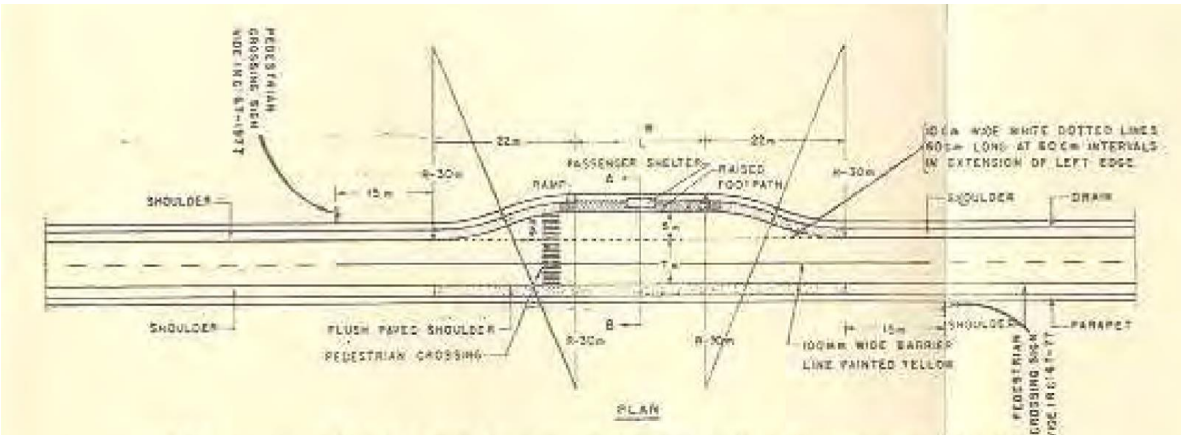
14.3 The other (dead) end of rural road should be taken, a little beyond the habitation so that there is space for turning of vehicles especially buses ambulances and fire tenders. A suggestive layout is shown in Fig.14.3, for guidance, which is based on US practice. It may be suitably modified as per site conditions.

Fig. 14.3: Suggestive Layout for Space for Turning of Vehicles at the End of Rural Road



14.4 In cases, where public transport buses ply on the main road then they may be providing facilities for villagers as well. Therefore provision of bus bays be part of development of rural road. Also if there is possibility or planning for public transport buses to start plying (with the improvement of rural road), then bus bays must be provided for efficient and safe movement on rural roads. Its location and layout should be based on IRC: 80 – 1981 'Type Design for Pick up Bus Stop on Rural (ie. Non – Urban) Highways'. Bus bays should be provided for both direction of travel and located about 300m but not less than 60m on the farther side of intersection such that bus commuters cross the main road (for going to and from village) at the back of stopped bus. Typical layout is given in Fig, 14.4, for guidance.

Fig. 14.4: Typical Layout for Bus Bays



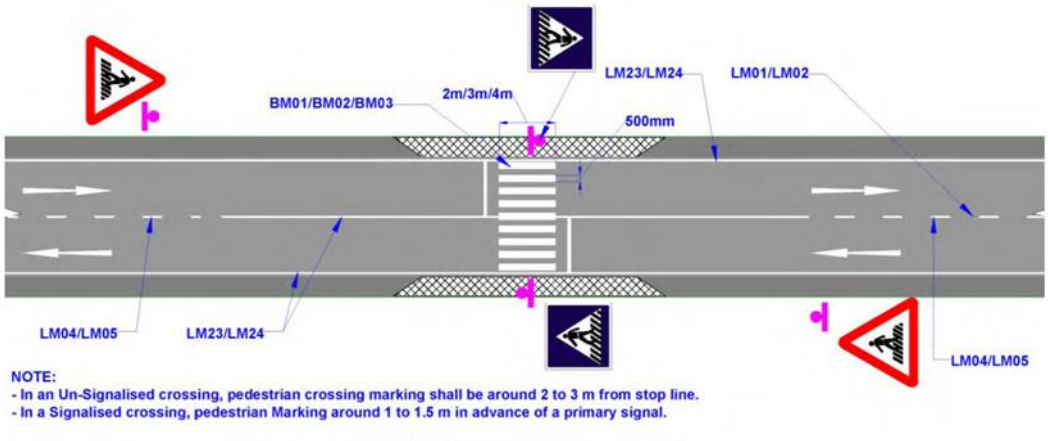
(Note: This should be replaced with a figure showing modified layout for a single lane/intermediate lane width of rural road.)

14.5 Facilities for Vulnerable Road Users (VRUs) such as pedestrians and cyclist should be crucial part of safe design of rural roads. If separate provision for their movement is not made, then they would use and share same road space as by motorized vehicles which could be dangerous for them. Rural Roads Manual prescribes 3.75 m width of carriageway and 7.5 m width for roadway. Therefore, width of 1.875 m should be available on both sides for shoulders. This width meets the requirement of minimum width of 1.8 m, prescribed for pedestrian movements, by IRC: 103- 2012. Maintaining this width with well compacted gravel (non soft soil) material would greatly facilitate pedestrian movement especially for school going children. The photographs in Fig. 14.5, should give a fair idea for well provided and maintained facility for pedestrians to walk. This would be useful for movement for cyclists.

Fig. 14.5: Photographs showing well maintained shoulders for pedestrians to Walk

Safe facilities for pedestrians should include crossing facility by way of zebra pavement marking. This should be provided at intersection and at bus bays and at other need based locations which are most used and preferred by pedestrians to cross the road. Fig.14.6. shows illustrative Pedestrian crossing Markings.

Fig. 14.6: Pedestrian crossing Markings on Rural Roads.



(Note: Need to be replaced with modified drawing for single-lane/intermediate lane width.)

14.6 Traffic Signs: Traffic signs and pavement markings are effective and essential tools for safety on rural roads and should be integral part in DPR. The important points to be kept into consideration are:

(i) The material, shape, size, configuration and placement of traffic signs must conform to the standard prescribed in IRC: 67 – 2012. If any non-standard and wrong sign exists on the road, it must be replaced by correct and standard sign.

(ii) Section 6.7 of IRC: 67 – 2012 provides guidance on the types of retro- reflective sheeting. For rural roads, Class B, Type IV sheeting by IRC 67 – 2012 may be used for better conspicuity especially in night time use.

(iii) GI pipes or rectangular hollow section as support post, should be used for sign support.

(iv) Signs should be so placed that that their bottom edge should not be less than 2 m above the kerb.

(v) If the meaning of the sign is required to be made more explicit, then a rectangular definition plate may be provided, placed below the sign as prescribed in Section 13 of IRC: 67 – 2012.

(vi) The general size of the sign should be 600 mm unless prescribed otherwise for some signs, in IRC: 67 – 2012.

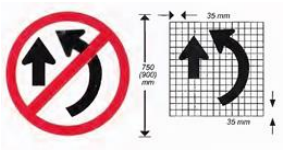
(vii) Over head signs on rural roads are not required to be provided, they being single lane with low speeds.

(viii) The traffic signs prescribed by IRC 67 – 2012 , 'Code of Practice for Road Signs' which can be commonly used for rural roads are given below:

(a) Mandatory/ Regulatory Signs

Stop Sign

Maximum Speed Limit

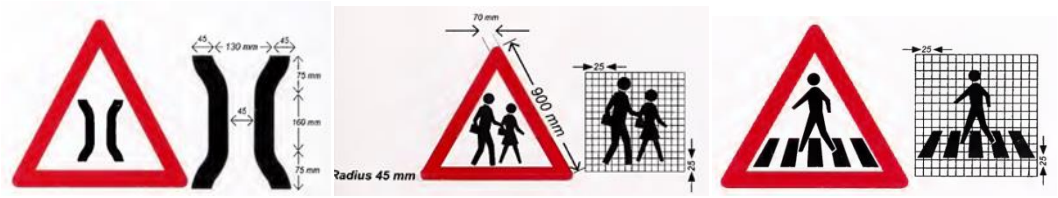


Overtaking Prohibited

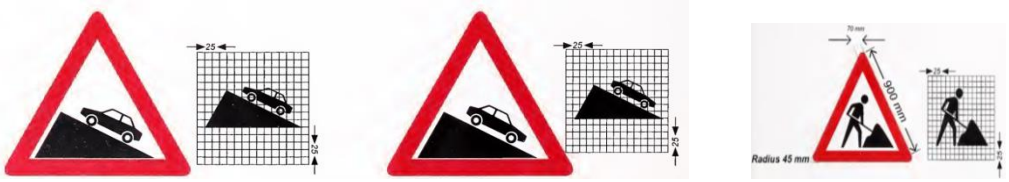
Yield Sign

(b) Cautionary/ Warning Signs

Left Hand Curve Right Hand Curve Right Hairpin Bend Left Hairpin Bend



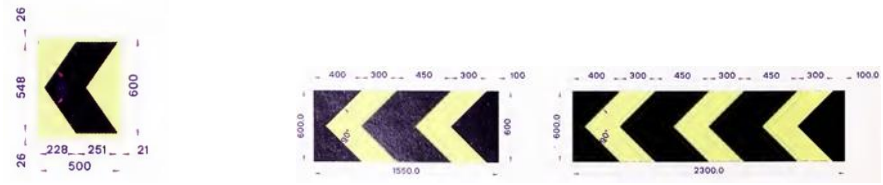
Narrow Bridge Ahead School Ahead Pedestrian Crossing



Steep Ascent Steep Descent Men at Work

Speed Hump Rumble Strips Cattle Crossing

Hazard Marker (Left) Hazard Marker (Right)



Single Chevron Double Chevron Triple Chevron

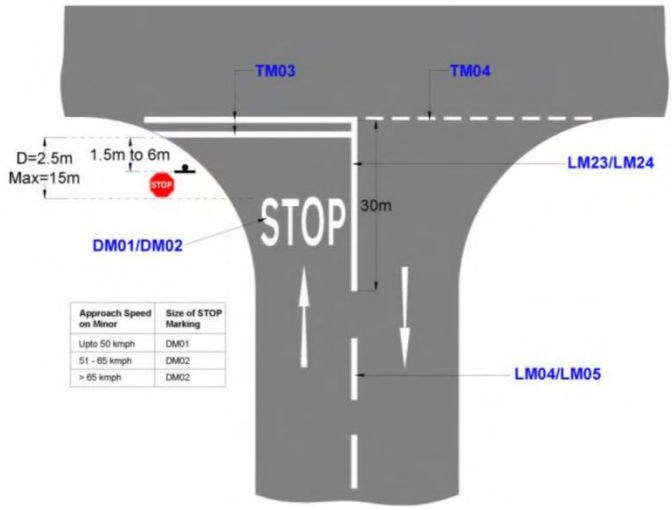
(c) Information Sign– The color pattern shall be white background with black border, letters and arrows

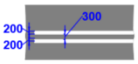
14.7 Rural Roads shall be provided with pavement markings as per material (thermoplastic paints with glass beads) and pattern, prescribed by IRC: 35- 2015, 'Code of Practice for Road Markings. Essential ones are, edge line markings, STOP line and pedestrian crossing:

(a) Edge Line Markings

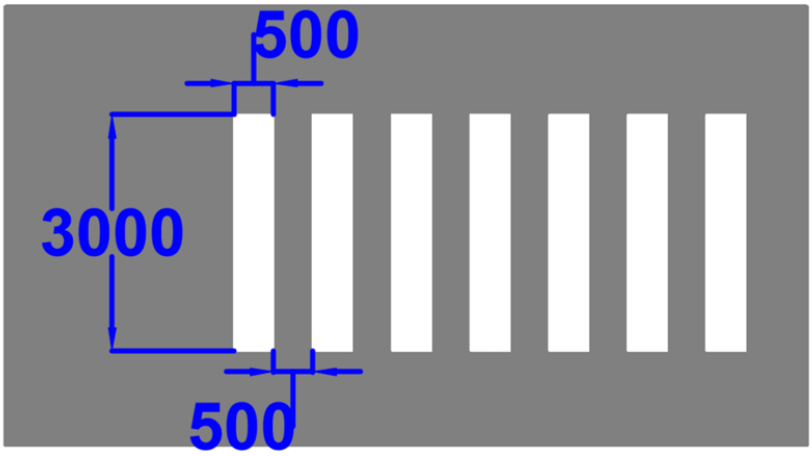
LM23	Continuous	NA	NA	100	White	

(b) STOP Line



TM03	Continuous (Two Lines separated by 300mm apart)	Two Solid Line	Each Solid Line of 200mm	White	

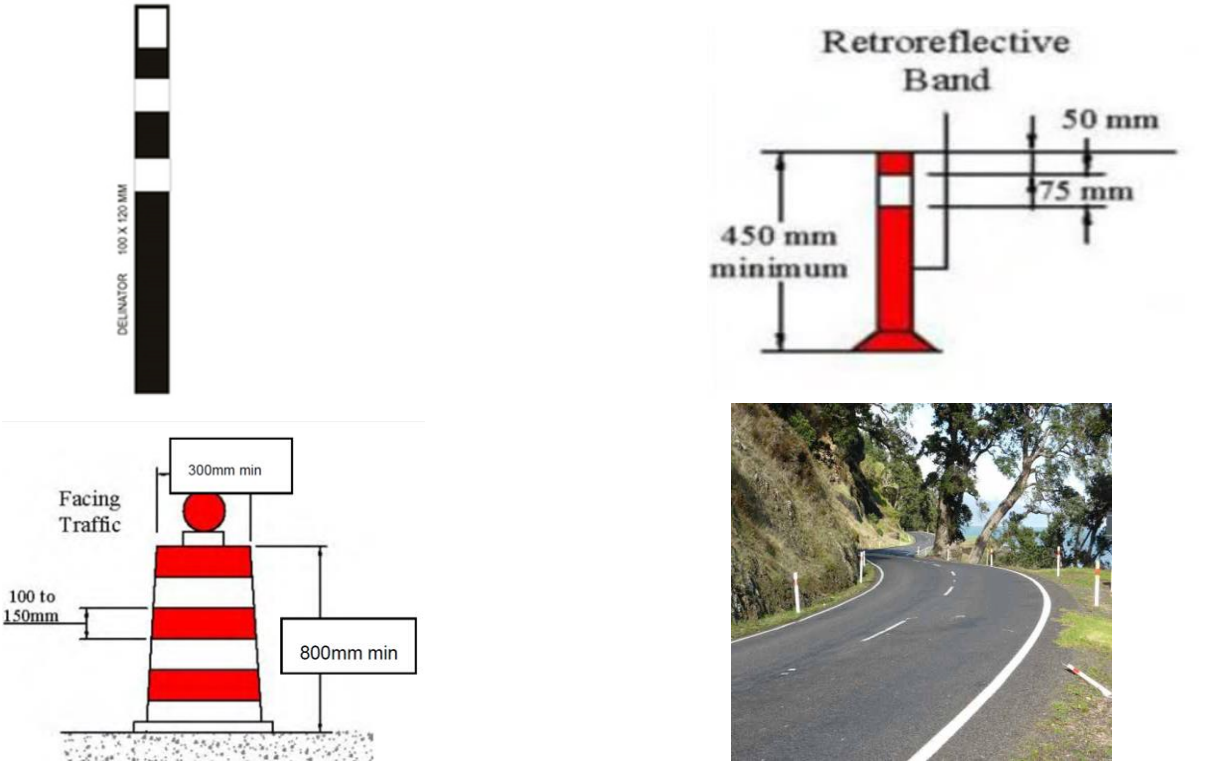
(c) Pedestrian Crossing Markings



14.8 Delineators: Rural roads especially in hilly terrain for travel in night time become much safer if they are properly delineated. IRC: 79 – 2019, 'Recommended Practice for Road Delineators', prescribes guidance on road delineators. But, care needs to be taken that they are only of plastic material with reflectors, instead of materials such as metal, concrete, timber or cut

stone since they may pose safety hazard for out of control vehicles. They can be rectangular, circular or plastic drums as shown in Fig.14.7.

Fig. 14.7: Road Delineators



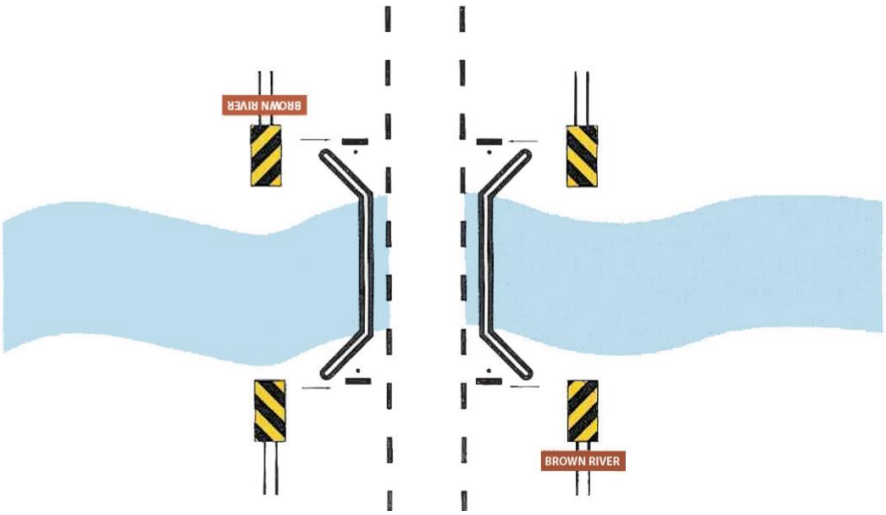
14.9 Crash barriers may be provided at hazardous locations such as, where height of embankment is more than 3 m, on approaches to bridges (Fig. 14.8) as prescribed in IRC:119 - 2015, 'Guidelines for Traffic Safety Barriers. They should also be fitted with reflective markers for enhancing night time visibility. It is important to provide suitable end treatment for such type of barrier for safety. The ends of this barrier must either be embedded into ground by tapering down or these must be embedded into the rigid parapet wall of a culvert or specially prepared rigid parapet for the purpose of embedding.

Fig, 14.8: Crash Barriers on approaches to Bridges

14.10 Road Studs: Provision of road studs to supplement longitudinal/ transverse reflectorised pavement markings greatly improves visibility in night time and in inclement weather. They should be provided as per Section 5 of IRC: 35 – 2015.

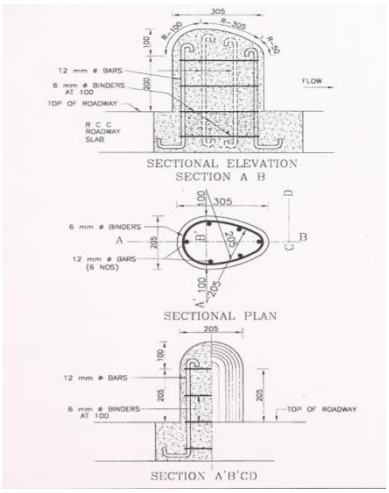
14.11 Hazard markers should be provided at all pipe culvert headwalls (Fig. 14.9), at each end of all box culverts, river crossing causeways and similar CD structures and at any discontinuity in the shoulder.

Fig. 14.9: Hazard Markers at Narrow Culvert



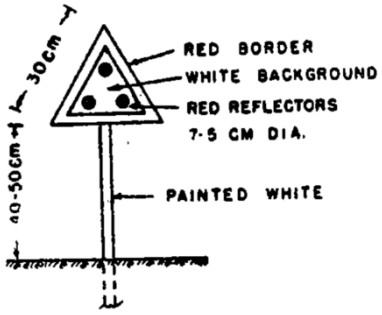
14.12 At submersible bridges and causeways, guard/ guide posts (Fig. 14.10) be provided as recommended in IRC: SP: 82 – 2008, 'Guidelines for Design of Causeways and Submersible Bridges'

Fig.14.10: Guard Posts as recommended by IRC: SP: 82 – 20



14.13 The DPR shall provide for identification/ marking of objects (as prescribed in IRC: 35 –2015; painting of the objects such as guard rails, guard stones or trees, with white paint, up to a height of 1.25 m above the road level with 300 m band with black paint in the middle of 1.25 m height to enhance visibility. It should also provide that all objects located within 2.4m from shoulder shall be painted. In addition to the object markings, (Fig. 14.11) as provided in IRC: 79 – 2019, shall be placed in front objects to enhance visibility. The height of object marker shall be at least 1.2 m above the traffic lane.

Fig. 14.11: Object Markers as per IRC: 79 – 1981



14.14 Ramps should be provided where field paths and cattle crossings intersect the road.

14.15 Sharp, blind curves are highly hazardous locations and must be eliminated even if, it requires acquisition of land. In cases, where acquiring of extra land is somewhat impossible, then following measures should be adopted:

(i) The carriage way should be widened to two lanes at the bend

(ii) Traffic Signs for 'Overtaking prohibited', 'Speed Limit' and 'Compulsory Horn' should be provided at both ends of the curve. Instead of placing them on separate support poles, they should be placed on single post as shown in Fig.14.12. Chevron sign should also be provided at the bend.

(iii) Reflective delineators or Chevron signs (Fig. 14,13) should be provided on the both sides of approaches and on the bend as specified in IRC: 79 - 2010,

(iv) Double chevron signs at the apex of curve be provided, for both direction of travel

Fig. 14.12: Placement of Regulatory Signs on Single Support Post

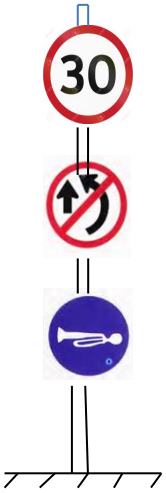


Fig. 14.13: Chevron Signs at Sharp Bend

(v) Some low cost measures of delineating the sharp curves can be provided as shown in Fig.14.14. The photograph on the left shows number of bamboo sticks tied together and painted in alternate colors of red and yellow. The photograph on the right shows an earth mound created with tress/ shrubs planted. These measures would help in delineation of sharp bend.

Fig. 14.14: Suggestive Low Cost Measures for Delineating at Sharp Bend

14.16 Rumble strips/ markings also should be provided on approaches to schools if they exist on rural roads.

14.17 The rural road entering/ passing through villages poses a serious challenge especially in Indian situation where rural roads are generally used by villagers, as the back yard of their homes. They sometimes even cook food on road besides using for their

livestock. The design and safety measures/treatment will have to be site specific. Some of the design features are given here which are expected to enhance safe use of road:

(i) The stretch within the village should be treated as 20kmph zone. For some villages, it may be 15kmph zones. Therefore speed limit signs are to be installed on approaches along with gradual transitional reduced speed limit signs. Rural Roads Manual prescribes design speed for rural roads as 50 km/h (ruling) and 40kmph (minimum) in plain terrain and still lower in mountainous terrain.

(ii) 'Village Gateways' as per IRC:99 Guidelines on Traffic Clamming Measures may be provided.

(iii) Pre Cast Interlocking Concrete Blocks (Fig. 14.15) as prescribed by IRC; SP 63-2004, 'Guidelines for Interlocking Concrete Block Pavement' and in 'Grameen Sampark' 2007 edition by NRIDA or Stone (granite) brick paving (if available at economic cost) can be used in the village stretch, instead of traditional bituminous one. It would help in speed reduction, avoid surface damage in rains, provide least life cycle cost due to low maintenance and give longer service life.

Fig. 14.15: Interlocking Concrete Blocks for Road Paving at Villages

(iv) Concrete drains with covers should be provided in the village stretch. The level of drains with covers should be at the same level as the pavement but drainage system should provide for storm water and household drainage going into these drains. They should have self-cleansing gradient and taken to the nearest natural drain. Covers should be removable for ease of cleaning and maintenance.

14.18 Guidelines for Safety During Construction

Safety in Work Zones during Construction: There could be two situations in construction of rural roads. One could be green field i.e. construction of all together, a new link road. The other could be on existing cart track/ alignment. Rural Roads Manual suggests that generally, most new roads will also have to follow the existing cart tracks and other such existing alignments. This implies that there is movement of vehicles on the road. Therefore, the situation requires careful Work Zone Traffic Management Plan (WZTMP) in work zones. The Guidelines given in IRC SP: 55–2014 – Guidelines on Traffic Management in Work Zones' should be adopted. These are contractual requirements as these are also part of MoRD specifications for Rural Roads.

(a) Construction of rural roads may comprise mostly construction of road stretch and construction of cross drainage structure. Fig. 14.16 shows the layout of signs for road construction and 14.17 shows layout for construction of cross drainage structure.

Fig. 14.16: Typical Layout for Signs in Road Work Zone

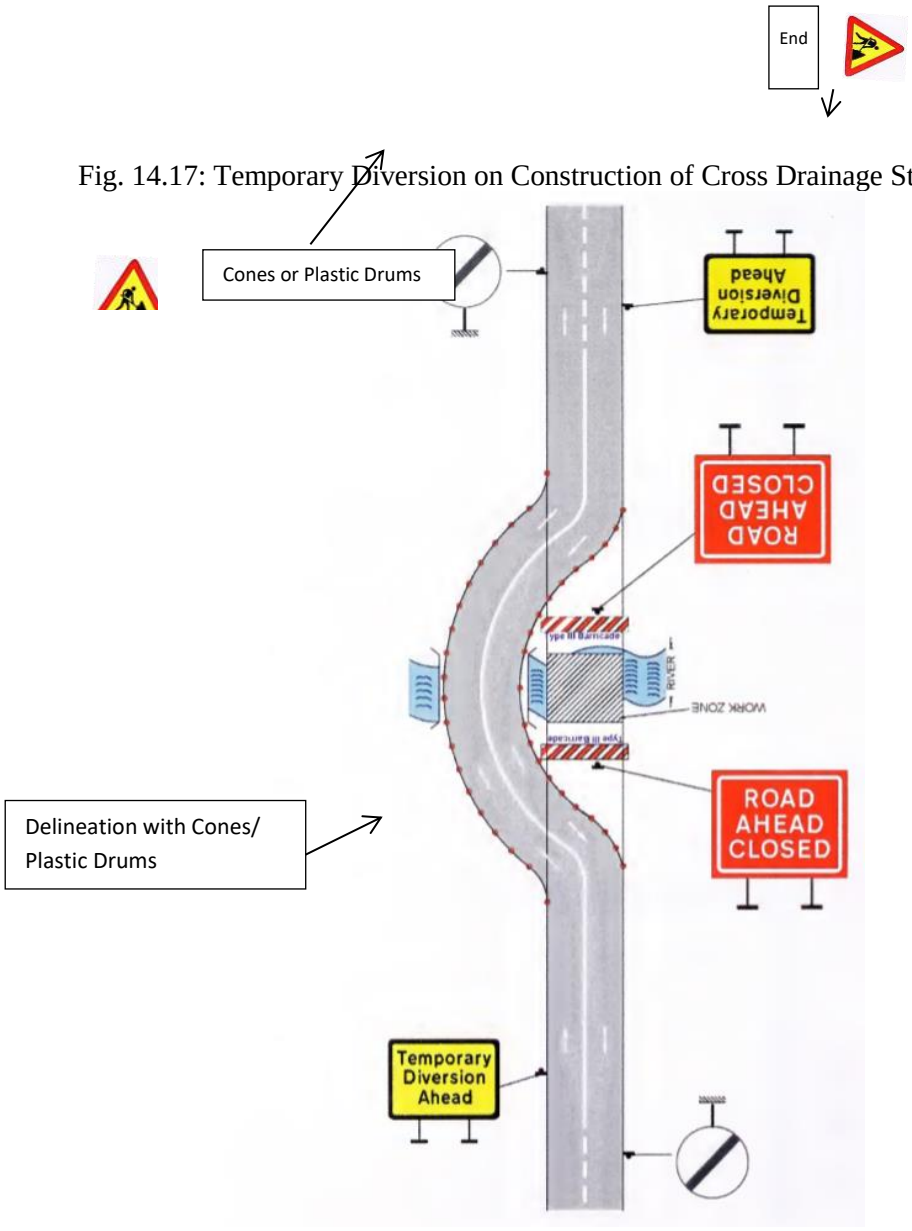


Fig. 14.17: Temporary Diversion on Construction of Cross Drainage Structure

(b) Table 14.1 gives the section-wise details of temporary traffic control measures to be adopted.

{Provide details in table 14.1 showing section/ chainage where temporary traffic control measures will be required and type of control like diversion etc.}

Table 14.1: Details of temporary traffic control measures to be adopted

Serial No.	Name of Road	Chainage (km)	Temporary traffic control measures to be adopted

14.19 Checklist for Road Safety Measures (to be completed)

S. No.	Check List Item	Yes	No	Justification/ Reason, if answer is "No"
1.	Has the road been planned as per the concept of hierarchical road network			
2.	Is the road taking off from MDR and not SH or NH			
3.	Has the transect walk realistically assessed the availability of land, identified hazardous locations and possible countermeasures acceptable to local people			
4.	Is the roadway width of 7.5 m in plain and 6.0 m in hills is available on selected alignment without any encumbrance such as hand pumps and electric poles installed by other Departments of the Government.			
5.	Does DPR include following: (a) Horizontal Alignment and Longitudinal Vertical Profile, (b) Cross-section at required interval along the alignment within ROW, Typical Cross-Sections with details of pavement structure, (c) Detailed Drawings of intersections layout with traffic signs, pavement markings and speed management measures, (d) Detailed Working Drawings for individual Culverts and Cross-Drainage Structures, (e) Detailed Working Drawings for individual Bridges, Tunnels, Subways and Structures. (f) Detailed Drawing showing each traffic sign with its type and location, pavement markings of edge lines and pedestrian crossings at required locations. (g) Drawing showing location and layout of bus bays, if required and to be provided. (h) Detailed drawings showing safety measures (traffic signs, markings, delineators or other special treatment) for sharp/ blind curves if part of alignment			
6.	Is the alignment on raised ground level for better drainage and side slopes not steeper than 2:1.			

7.	Is the take off point at right angle or nearly right angle with main road and at level ground			
8.	Has the takeoff intersection been well designed and provided with Stop Line markings and signs provided.			
9.	Does the road end provide space for turning of vehicles especially buses and emergency vehicles.			
10.	Has the intersection been provided with speed management measures on the rural road as per IRC:99-2018.			
11.	Has the road the provision for well compacted shoulders for movement of VRUs.			
12.	Has bus bays been planned and provided as per guideline of IRC: 80 – 1981 if there exists or planned bus operations.			
13.	Have the traffic signs been provided with Class B, Type IV retro reflective sheeting, at required locations and configurations as prescribed by IRC 67 – 2012 and each sign is shown in alignment plan.			
14.	Has the road been provided with pavement markings of edge lines, pedestrian markings at required locations and stop line with thermo plastic paints as prescribed in IRC: 35 – 2015			
15.	Has the road been provided with delineation where embankment height is more than 1.5 m and at sharp bends			
16.	Has the road been provided with delineators of plastic material with reflectors, at required locations so that road alignment and width is clearly visible during night use.			
17.	Have the crash barriers been provided at locations where the height of embankment is more than 3 m, approaches to bridges.			
18.	Have the crash barriers been provided with safe end treatment and or embedment in bridge/ culverts railings.			
19.	Have the hazard marker signs been provided correctly at each end of all box culverts, river crossing causeways and similar CD structures and at any discontinuity in the shoulder.			
20.	Have guard/ guide posts provided at submersible bridges and causeways.			

21.	Have the objects within roadway width removed or provided with identification/ marking with white paint.			
22.	Have ramps been provided where field paths and cattle crossings intersect the road			
23.	Have sharp/ blind curves been improved and or provided with the safety treatment.			
24.	Have the road studs been provided along pavement markings to enhance night time visibility.			
25.	Have the appropriate speed management measure as per IRC: 99-2018 been provided at the intersection, approaches to schools (if exist) and other required locations needing speed reduction.			
26.	Do rumble strips provisions include painting and advance warning signs.			
27.	Does DPR include safety measures in the approaches to villages and within village as per IRC: 99-2018.			
28.	Does DPR include Work Zone Temporary Traffic Management Plan and provides for signs and delineations as prescribed in IRC SP 55 – 2015.			

15. Specification

15.1 General

The "Specification for Rural Roads" published by IRC on behalf of the Ministry of Rural Development, Govt. of India has been followed.

15.2 Construction Equipment

a. Construction by manual means and simple tools has been considered for the project as per the guideline of NRIDA. For handling of bulk materials like spreading of aggregates in sub-base & base courses by mix-in-place method, use of motor grader & tractor-towed rotavator has been allowed in line with the schedule of rate for PMGSY work. Compaction of all items shall be done by ordinary smooth wheeled roller if the thickness of the compacted layer does not exceed 100 mm. It is also considered that, hot mix plant of medium type & capacity with separate dryer arrangement for aggregate shall be used for bituminous surfacing work that can be easily shifted. A self-propelled or towed bitumen pressure sprayer shall be used for spraying the materials in narrow strips with a pressure hand sprayer. Now the vibratory rollers are also being used for rapid progress.

b. For structural works, concrete shall be mixed in a mechanical mixer fitted with water measuring device.

c. The excavation shall be done manually or mechanically using suitable medium size excavators.

15.3 Construction Methods

15.3.1 Preparation for Earthwork

After setting out existing ground shall be scarified to a minimum depth of 150 mm and levelled manually and compacted with ordinary roller to receive the first layer of earthwork. In filling area, existing embankment will be generally widened on both sides as per the alignment plan. Continuous horizontal bench, each at least 300 mm wide, shall be cut on the existing slopes for bonding with the fresh embankment/ sub grade material as per Cl 301.7 of MoRD specifications for Rural Roads.

15.3.2 Embankment work

Material from borrow pits will be used for embankment construction as well as the approved material deposited at site from roadway cutting and excavation of drain & foundation may be used. Layer of the earth shall be laid in not more than 25 cm (loose) thick layers & compacted each layer of the soil up to 30 cm below the sub grade level at OMC to meet 97% of Standard Proctor Density.

Material for embankment and sub-grade shall satisfy the requirements of Table 300-1 and 300-2 as per the MoRD Specification for Rural Roads (First revision) published by IRC in 2014.

15.3.3 Sub-grade

Material from borrow pits will be used for construction of top 30 cm as sub-grade. Soil in these sections should be quite good for road construction. Top 30 cm upto the sub grade level and shoulder at OMC to meet 100 % of Standard Proctor Density by proper control of moisture and by required compaction with a smooth wheeled roller.

15.3.4 Sub-base

Sub base material in the form of stone aggregates and sand as available in the area to be used in sub-base layer. {Insert the details of GSB test results indicating Gradation, LL, PL, PI, OMC, MDD and CBR as Annexure-6).

15.3.5 Base

Stone aggregates will be used in base course. 63 mm to 45 mm size (Grading 2) aggregate has been proposed for the bottom layer and 53 mm to 22.4 mm (Grading 3) size has been proposed for the top layer. In respect of WMM layer stone aggregate grading as per table 400.12 of MoRD Specifications for Rural Roads (First Revision) has been proposed for base layer.

15.3.6 Shoulder

Earthen/Unscreened gravel shoulder shall be constructed in layers and compacted to 100% of Proctor Density. First layer of shoulder shall be laid after the sub–base layer is laid. Thereafter Gravel/earth layer shall be laid with base layer of pavement and compacted.

15.3.7 A structural bituminous layer BM/DBM/SDBC/BC etc.

15.3.7 Wearing course / Surfacing

Slow setting bitumen emulsion will be applied as primer on water bound layer. Emulsion shall be sprayed on surface with pressure distributor. Rapid setting bituminous emulsion shall be used for Tack coat. To ensure proper quantity of Emulsion for primer and Tack Coat Engineer in-charge will check the length of spreading for one drum of Emulsion as per carriageway width.

Premixed carpet and mixed with equivalent viscosity grade bitumen shall be laid as surfacing course. 6 mm thick Seal (Type A or Type B) coat is considered for sealing of the premixed carpet.

15.3.9 Structural Works

Following grades of concrete are proposed for Structural works and comply with MORD and IRC specifications:

- Concrete in superstructure of slab culvert – M-{Insert grade} (RCC)
- Concrete in abutment cap, dirt wall of slab culverts – M-{Insert grade} (PCC / RCC)
- Concrete or Brick / Masonry work in abutment, return wall, headwall - M-{Insert grade} (PCC / RCC)
- Concrete below abutment, return wall, headwall – M-{Insert grade} (PCC / RCC)

{Insert any other new specification adopted like Alternate materials for Sub base, Base, (WMM/CTB etc), hard shoulders and rigid pavement.}

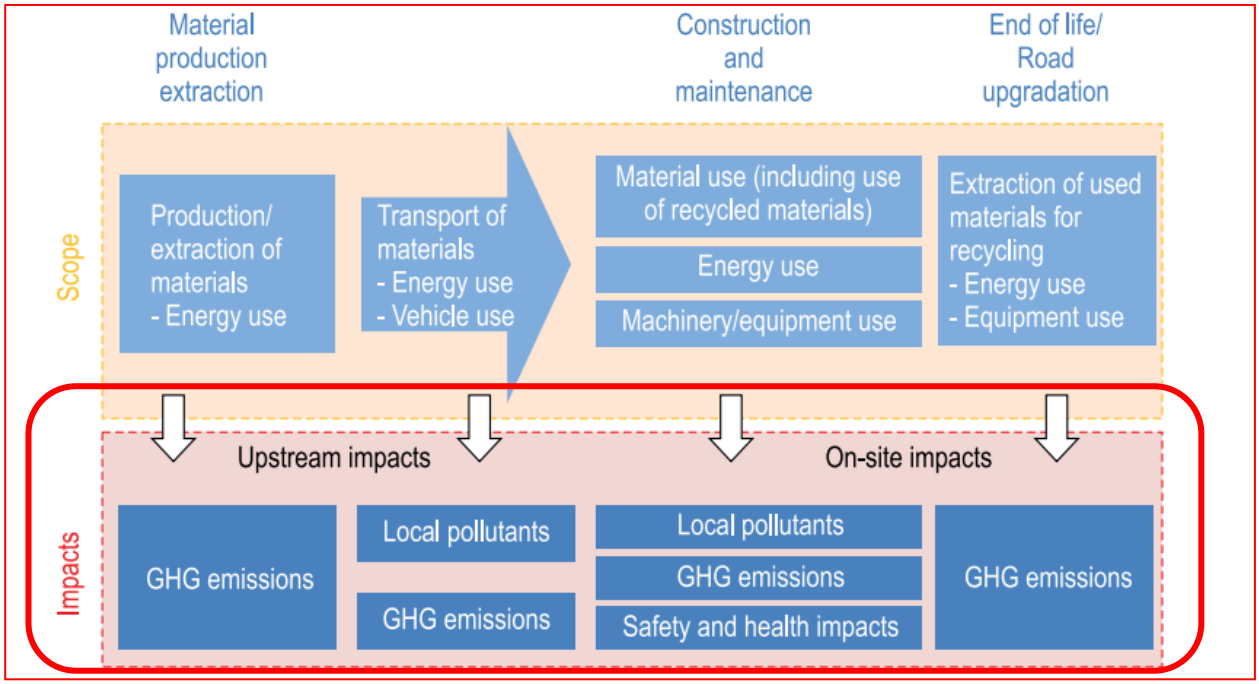
16. Environmental Issues

16.1 Impact of the project

Environmental analysis (EA) is a key part of the planning process for a new road. It presents the opportunity to look at alternative proposals, discuss the Positive and negative impacts of a given project, look at ways to mitigate negative impacts and plan for funding for those mitigation measures, incorporate the ideas and thoughts of local citizens impacted by the project, avoid delays once the project is under construction, and come up with an optimized, improved plan for the project. The environmental analysis for the proposed road is thus presented.

{Describe the impact of the proposed road on surrounding environment and ecology; this shall cover all the different components shown in the fig 17.1.}

Figure 17.1 Impact of the road



Considering the results of environmental analysis, a Carbon Emission Reduction Plan is to be prepared. This plan consists of decisions made and steps taken to reduce carbon footprints resulting from the construction and maintenance activities.

{Consultants should specify in this plan ways to enhance the environmental aspects of the project whichever proposed. This shall include measures such as roadside landscaping and tree planting, greening of the cut slopes and other relevant stabilizing/preservation measures for the road adjoining areas. All possible steps taken to minimize the adverse environmental effects of the project, both during construction works and subsequently in road maintenance and operations should be well documented in this plan to maximum possible details.}

16.2 Calculation of CO_2 equivalent savings in GHG emissions

{Calculate CO_2 equivalent for Green House Gas emissions for various construction and maintenance activities for the proposed road. A sample template for the same can be referred from the study conducted by TERI for NRIDA. (The environmental specialist from the DPR preparation

team should monitor and appropriate the calculations considering specificity of the proposed road or bridge as may the case. The conversion factors provided in the study by TERI can be directly used wherever necessary). It should contain detailed analysis of two cases; Carbon emission calculation for case one where road would have been constructed using conventional technology without modifying any process parameter and other where the actual process is followed using new material / technology under the category of green technology.}

16.3 Calculation of material and energy consumption for the project

{It should include detailed calculation for estimated material and energy usage during the construction as well as for maintenance activities. These calculations would help in arriving at numbers for savings in energy as well as materials wherever applicable. These numbers should be presented at the end of this section. This should contain a sub-section where savings in aggregates and other natural resources, if any should be recorded and savings achieved in GHG emission equivalent. The chapter shall contain a separate section on calculations on savings achieved for aggregates by different means adopted, which may include design modification or use of locally available/marginal materials etc.}

{References For Calculations:

Material Consumption

For Construction		
Material	Unit	Quantity Proposed to be used
Coarse aggregate	Tonnes	
Fine aggregate	Tonnes	
Soil	Tonnes	
RCC	Tonnes	
Cement	Tonnes	
Brick	Tonnes	
Reinforcement	Tonnes	
Bitumen/cationic bitumen emulsion	Tonnes	
Diesel	Litres	
Timber	Tonnes	
Kerosene	Litres	
For Maintenance		
a. Routine Maintenance		
Coarse aggregate	Tonnes	
Fine aggregate	Tonnes	
Bitumen/cationic bitumen emulsion	Tonnes	
Cement	Tonnes	
Soil	Tonnes	
Diesel	Litres	
Timber	Tonnes	
Kerosene	Litres	
b. Periodic Maintenance		
Bitumen	Litres	
Coarse aggregate	Tonnes	
Diesel	Litres	

Conversion Factors for construction materials

Material Used	**Embodied Energy Coefficient (MJ/kg)**	**Embodied Carbon Coefficient (kg CO2/kg)**
Coarse aggregate	0.083	0.005
Fine aggregate	0.083	0.005
Soil	0.450	0.024
Cement	5.500	0.950
Brick	3.000	0.240
Reinforcement	20.100	1.460
Bitumen/cationic bitumen emulsion	51.000	0.550
Diesel	35.800	3.222
Timber	30.800	1.800
Kerosene	36.108	2.898

Energy consumption for transportation of construction materials

Material		**Source of procurement/ purchase**	**Distance from the work sight**	**Energy consumption for transport per trip**	**Total number of trips**	**Total Energy consumption for transport**
Aggregate for WBM Gr II & WBM Gr III						
Bitumen	Bitumen					
	Bitumen Emulsion					
Brick						
Cement						
Crushed stone cum Aggregate including Gr III						
GSB						
Hume Pipes	RCC Pipe NP3 (600 mm Dia)					
	RCC Pipe NP3 (1000 mm Dia)					
	RCC Pipe NP4 (1000 mm Dia)					

	RCC Pipe NP4 (1200 mm Dia)					
Moorum						
Sand	Coarse Sand					
	Fine sand					
Steel Reinforcement						
Stone Boulders						
Stone Chips						
Stone Metal Gr I						
WMM						
Diesel						
Timber						
Kerosene						

16.4 Compliance with the Environmental Codes of Practice

{It shall include detailed discussion on compliance with the environmental and social safeguards, environmental codes of practice, environmental management plan published by NRIDA/World Bank/Asian Development Bank. Wherever this is not complied with the above, due justification should be provided for the same.}

16.5 Alignment

The proposed road has planned to be designed considering the impact on environment. Proposed road alignment follows existing pathway to the maximum extent so that huge land acquisition is not necessary for construction of the project road. Proposed road, when completed, will be an addition to the aesthetics of this rural area.

16.6 Environmental Sensitive Area (National Park, Wild Life Sanctuary, Protected /Reserve Forest, Wet land etc.)

The alignment will be finalized avoiding the environmental sensitive area such as National Park, Wild Life Sanctuary, Protected /Reserve Forest, Wet land etc. It is also necessary to maintain the minimum distance of 500 m of the project road from environmental sensitive area.

16.7 Construction Camp

Construction camps will be established away from forest area/water body. The minimum facilities such as water supply, sanitation, storm water drainage, solid waste management and first aid box will be provided during the construction period of the project. Necessary provision

for rehabilitation or restoration after the completion of construction phase will be done.

16.8 Permit / Clearance required prior to commencing of civil work

- No objection Certificate- This will be taken by PIU from SPCB.
- Forest Department- If the project road is passing through forest land and acquisition of the same is involved and it will be taken by PIU from Forest Department
- Consent to establish (CFE) and Consent to Operate (CFO) - This is required for Plant Hot Mix Plant, WMM Plant, Batching Plant required for the project and the same will be taken by the Contractor from SPCB.
- Lease from Mines & Geology- This will be taken by the Contractor for new Stone Quarry required for the project.

16.9 Borrow area

The filling soil will have to be procured from borrow pit. Borrow area will be so excavated that the lands can reused as agricultural field. The depth of borrow pit shall not exceed 450 mm (150 mm top soil included). The top soil shall be stripped and stacked and shall be spread back on the land. As far as possible the borrow pits shall not be dug close to the road embankment. The Redevelopment of borrow area will be done before closure of the same and it will be as per agreement between landowner and the Contractor.

16.10 Erosion Control

Turfing of the embankment slopes and earthen shoulder to prevent erosion of slopes of the embankment, rain cuts and erosion of shoulder is being suggested.

16.11 Drainage

Suitable cross drainage structures have been provided on the basis of hydrological survey of the area. So, there will be no obstruction to the natural drainage of the area. Road side drainage is also duly considered in a manner so that surface water is led to the low points and is drained through the CD structures.

16.12 Use of Material

Cut back bitumen is not proposed in the project to avoid contamination with Kerosene. Bitumen emulsion is proposed for primer coat and tack coat.

{Insert details of actual environmental issues and their location and what treatments are proposed to mitigate them like reinstatement of borrow areas, erosion control, filling of ponds, vegetation and tree removal, forest areas, wildlife, antiquities, historic and religious sites, etc.

Use of fly ash, local materials such as river shingle and boulders, fallen rocks, slope wastes, landslide debris etc., for embankment, stabilization of sub-grade and sub base, modified bitumen in road construction, use of geo-textile in pavement and associated works and other innovative and cost effective usage of material should be explained wherever possible/applicable.}

17. New Technology/Green Technology

{While preparing DPRs the identification of technology to be used need to be made in consultation with State Technical Agency (STA). A brief description on adoption of new technology/ green technology has been given in the subsequent para which needs to be referred to}

In order to promote cost-effective, locally relevant, 'Green' and fast construction technologies in the construction of rural roads, using New materials / Waste materials / Locally available materials, NRIDA has issued 'Guidelines on Technology Initiatives', in May 2013. The States have been asked to propose at least 10% of the length of annual proposals using any of the new technologies, for which specifications of Indian Roads Congress (IRC) are already available and an additional length of 5% of annual proposals with any of the new technologies for which specifications of Indian Roads Congress are not available, including materials accredited by IRC.

The states need to follow the above guidelines while submitting the proposals under PMGSY. The details of some of the materials/ technologies for which IRC specifications are available and for which specifications are not available are given below:

Technologies with IRC Specifications

- Lime stabilization
- Cement stabilization
- Bitumen stabilization
- Use of Fly Ash/Pond Ash
- Lime fly ash stabilized Bases
- Use of fly ash in cement for concrete structures.
- Roller Compacted Concrete Pavements
- Cold Mix Technology
- Waste Plastic Utilization
- Bio Engineering Measures

Technologies with No IRC Specifications

- Locally available /Marginal materials, Brick aggregates etc.
- Blast furnace Slag/ Steel Slag /Zinc Slag
- Jute / Coir Geo-textiles
- Rice husk, Baggage
- IRC Accredited materials like RBI 81, Terrazyme, Powercem, Zycosil, RoadCem etc.
- Quarry Waste Materials
- Slope Stabilization, Bamboo Piling etc.
- Cell Filled Concrete, Panelled Concrete

Justification for selection of technology

{The chapter should include a comparative analysis of the adopted technology and conventional technology. The selection of the technology shall be justified over the available choices of other technologies. This should cover different parameters like cost of the technology, ease of the execution, speed of execution, etc.}

Check list for Adoption of New Technology/Green Technology

	Remarks
1 Usage of local materials	
Whether local and marginal materials are proposed for usage in sub base, base layers and in construction of support structures. Please elaborate	
2. Soil and pavement stabilization	
2.1 What are the soil stabilization measures proposed for poor sub grade and side slopes and in poor drainage areas	
2.2 In case of non-availability of good GSB / base course material what is the alternate option proposed	
2.3 Have sub base and/or base course stabilization measures proposed	
3. Pavement surfacing	
3.1Whether cold emulsion is being proposed in the surface paving	
3.2 Is Warm Mix Asphalt(WMA) proposed in the pavement	
4. New Materials & Green Technology	
4.1 Please list out all the new materials and green technology being proposed in the DPR	
4.2 What provision has been kept for carbon sink for offsetting carbon emissions	
5. Carbon Emission Reduction Plan	
5.1 Has Carbon Emission Reduction Plan been attached?	
5.2 Does this Plan cover the three 'R's, namely, Reduce, Recycle and Reinvent	

18. Climate Resiliency

{ It is expected that all road infrastructure that is planned, designed, constructed and maintained is sustainable not only economically, socially and environmentally but also resilient to changes in climate over a long term and same should be incorporated in this chapter.}

Climate resilient infrastructure endures the impacts of climate related events. Changes in the climate involve changes in temperature, precipitation, melting of glaciers, storm activity, river flow, wind speeds and much more. Road infrastructure being totally exposed to the vagaries of nature is highly vulnerable to the impacts of climate change, the adverse effects of which apart from the physical damage to the road network can affect a country's economy.

Climate change impacts the road infrastructure in various ways: high precipitation and flooding increases the risk of rendering the drainage system inadequate resulting in damage to the road drainage structures, scouring of bridge foundations, breaching of road embankments, submergence of road sections, landslides, rock falls and erosion resulting in disruption of traffic, road closure for indefinite period and weakening of pavement; and exposure of areas along the river basins to flooding causing frequent closure of the roads. Floods may lead rivers to change their course, thus rendering previously safe roads at risk of being flooded.

In the view of above, to ensure increased resilience and environmental sustainability of the rural road various climate resilient measures are proposed for this roads project. List of all such measures is as follow:

{Enlist the measures proposed for building-in climate resiliency in the road}

Annex- I

Check List of DPR incorporating Climate Resilience

1. **Availability in the DPR of following documents /studies undertaken**

	Yes/No	**Remarks**
1.1 Topographical, geological and geomorphologic maps		
1.2 Geotechnical studies		
1.3 Hydrological studies		
1.4 Hazard data base and inventory, susceptibility and hazard zoning maps, as available		
1.5 Any information available pertaining to the site		

2. Road Geometrics

	Remarks
2.1 Gradients	
2.2 Curves, hair pin bends, etc	
2.3 Hair pin bends – gradient, radius and location – whether staggered and availability of adequate width along with stable and gentle hill slope	
2.4 Road Alignment – alternate alignments considered and whether the selected alignment is sun facing, avoids steep hill cutting, located sufficiently away from river bank and adequately raised to avoid inundation by river flood	
2.5 Whether the proposed alignment crosses steep channels subjected to debris flow	

3. Terrain

	Remarks
3.1 plain, rolling, mountainous or steep	
3.2 topographical constraints such as cliffs, ravines and gorges	
3.3 dip of the rock, joints and fractures	

4. Slope

	Remarks
4.1 profile as identified from the natural and artificial slopes such as mule tracks and footpaths, terracing for agriculture/horticulture	
4.2 slope stability and location of earlier landslides	

4.3 whether the slopes are wet	
4.4 possibility of avalanches and snow drifts	

5. Soil Characteristics

Soil- type, depths and tendency to erode of the strata, geology of the area

6. Drainage characteristics (whether existing protection works adequate or need enhancement)

	Remarks
6.1 Surface	
6.1.1 Side drains- type, size and whether lined	
6.2 Sub-surface	
6.2.1 Catch water / intercepting drains – whether required and provided with justifications	
6.3 Susceptibility to flooding and if so, flood levels and river training provision incorporated	

7. Land use of water shed/catchment area

	Remarks
7.1 River/stream characteristics	
7.1.1 whether meandering or straight	
a. banks erodible or non-erodible	
b. river bed soil classification	
c. discharge and velocity of the flow	

7.1.2 recorded maximum flood discharge and HFL at proposed site	
7.2 Catchment Area characteristics	
7.2.1 slope of the catchment area	
7.2.2 Vegetation cover – extent and type	
7.3 Land use within the catchment area (at present and expected in future)	

8. Climatic Conditions

8.1 Temperature	
8.2 Rainfall	
8.3 Snowfall	
8.4 Fog conditions	
8.5 Exposure to Sun	
8.6 Unusual weather conditions such as cloudburst/ flash floods	

9. Design and Construction

	Remarks
9.1 Whether huge vertical cuts avoided, benching adopted and quantity of earthwork accordingly taken in BOQ	
9.2 Whether the quantity of earthwork in excavation has been considered by keeping the cut face of the hill slope as per the soil classification shown in the cross-sections	
9.3 Has the choice of manual/mechanized cutting factored in the terrain condition (briefly comment)	

9.4 Whether the item taken for excavation in rock specifies, 'blasting prohibited', and rate for the item accordingly taken in BOQ	
9.5 Whether provision kept in the BOQ for use of useful excavated material in the project itself	
9.6 What efforts made to balance cut and fill methodology	
9.7 Location of dumping sites and proposed development of these sites as playground/park /parking area, etc. (Payment for the quantity of excavated material actually dumped at site to be made based upon initial and final levels of the dumping site)	
9.8 Whether the size and type of support structures provided are adequate and are justified with proper documentation, site conditions, etc.	
9.10 Have the intensity, duration and frequency of rainstorms/cloudbursts occurring as a result of climate change considered in the design of robust slope stabilization measures and assessing provisions related to drainage	
9.11 Has the capacity of cross drainages fixed based upon the size of the catchment area, its characteristics and the rainfall pattern and due allowance made for possible blockages	
9.12 Have the CDs been proposed at natural drainage crossings and not allowed water to continue beyond them thereby overloading the side drains, etc.	
9.13 What efforts have been made to provide precast culverts/side drains and of standardized sections	
9.14 In case a culvert location has likely diversion potential due to huge debris flow what provisions have been kept to accommodate overtopping without	

washing out the structure or diverting flow down the road	
9.15 Is there a possibility of some of the Nallahs / Gullies widening and deepening as a result of higher intensity and frequency of rainfall? If so, what provisions have been kept to mitigate this problem	
9.16 Have provisions been made for scour checks in side drains if the slope exceeds 4%	
9.17 In case of soft hill profile has the height of vertical face of side drain increased to function as a toe wall	
9.18 Have the hair pin bends been provided with CDs both on the lower and upper arms along with provision of escape drain on the upper arm	
9.19 Is there provision for bio engineering measures with or without civil engineering measures at locations expecting shallow seated slope failure	
9.20 Is provision kept for covering (stabilizing) cut and fill slopes with vegetation, to minimize surface instability problems as well as minimize surface erosion	
9.21 How is the pavement proposed to be made durable in reaches passing through saturated soils/ black cotton soils or such poor soils, areas subjected to flooding, etc.	

10. Likely foundation strata for major structures

11. Detailed Field Investigations carried out

	Remarks
11.1 Geotechnical, subsurface and drainage investigations	
11.2 Diagnostic assessment of the landslides and their likely significance	
11.3 For flood risk assessment the source of flood water, the route it follows and the assets likely to be affected	

12. Any other information

19. Analysis of Rates

19.1 General

Rates for various item of works of the project have been derived from the "Schedule of Rates {Insert year of publish} for Road works, Culvert works & Carriage etc. {Insert name of RRDA} and "Addendum & Corrigendum to Schedule of Rates" effective from {Insert date}. However in general the basic rates of material have been taken from {Insert document from which the rates were taken}. The rates of different items have been worked out inclusive of all labour charges, hire charges of Tools & Plants, Machineries and all other cost estimates for the item of work, overhead and contractor's profit @ 12.5% and 1% cess on these. In respect of Long Span Bridges, the overhead and contractor's profit should be at the rate of 20%. Further, the GST should not be included in the individual items and it should be included @ 12% of total project cost separately in the abstract estimate.

19.2 Basic Rate of Material

The basic rates for stone materials & river bed materials have been taken from {Insert document from which the rates were taken}.

For bituminous materials, basic rate at (location) for equivalent viscosity grade bitumen and for emulsion the basic rate of (location) has been considered as suggested in from {Insert document from which the rates were taken}.

Basic rate of other materials like coarse & fine sand, cement are as per the latest from {Insert document from which the rates were taken}.

Basic rate of steel materials at Sub-divisional / Block office has been considered in analysis after adding cost of carriage, loading & unloading.

19.3 Lead for Materials

For stone aggregates and sand, lead from source to work site is calculated from the district map and block level map of DRRP and finalizing the same in discussion with PIU. The supply of different materials to worksite is by road. Lead for bituminous & steel materials are similarly obtained using SOR. The PIU should certify that the leads of materials used in the DPR are shortest and economical.

{Insert the analysis of rates for which rates are not provided in the SOR}.

20. Cost Estimate

20.1 General

Cost Estimate of project is to be arrived on the following basis

- Selection of Items of work
- Estimation of item wise quantities
- Analysis of Rates

20.2 Estimation of Quantities

All the relevant road and structure work Items will be identified as per survey, design and drawings. Major item of works considered are given below:

- Site clearance, dismantling and earthwork
- Pavement works (GSB, WBM / WMM, Bituminous layers)
- Cross drainage structure works
- Drainage and protective works
- Utility relocation
- Road safety and furniture
- Maintenance works

Quantity of earthwork is to be derived from the proposed cross section drawings. Volume of cut and fill is to be obtained directly using the design package software. Quantity derived from software is to be manually verified. The details are to be provided chainage wise cut and fill area and their volume as Annexure 3. The soil obtained from roadway excavation shall be used for construction of embankment and shall be paid as per specification no. 301 of MoRD Specification for Rural Roads. All other quantities will be computed from the drawings of finished road, miscellaneous drawings & drawings of CD Structures.

{Insert Table of cut and fill volume as Annexure-7}

20.3 Abstract of Cost

Unit rates to be derived by using the "Schedule of Rates for Road Works, Culvert works and Carriage etc. {Insert name of SRRDA}". The abstract of Cost estimate is given in the Table below. {Insert the details of cost in Format F6 & Format F7}.

20.4 Maintenance

Cost of Annual Maintenance for five years after completion of project, cost of 6th year renewal coat and cost of further five years annual maintenance after the completion of 6th year renewal coat are to be estimated as per the PMGSY-III Guidelines. Different activities of ordinary repairs are to be done as and when required. (While preparing cost estimate for routine maintenance, periodic maintenance, Chapter 14 of Operations Manual may be referred).

{Insert total Cost of 5 year Routine Maintenance Works, 6^{th} year renewal coat and further 5 years annual maintenance cost after completion of 6^{th} year renewal coat in Format F6}.

21. Construction Program

21.1 General

Assuming that the Construction of the Batch {Insert Batch No.}, road will start from {Insert possible construction date}. This is a *high/low/medium rainfall area (*Strike which is not applicable) and rainy season extends from _____ to _____. However, the construction program is based for a total working period of 12 months, considering the program set out by MoRD. It is anticipated that some activity like collection of materials, CD works etc. will continue in monsoon period also.

21.2 Realistic duration

{Insert a reasonably realistic duration of the contract}

PROFORMA-B

PRADHAN MANTRI GRAM SADAK YOJANA
PACKAGE SUMMARY

Package Number:
District:
State:

Sl.No	Name of Block	Name of road		Type of Proposal	Proposed length (in km)			Cost of Pavement	Cost of CD works	Others	Total Estimated cost (Rs)		Average Cost per km (Rs)	
		From	To	*N/U/ IRQP	BT	CC	Total	Rs.	Rs	Rs	Const	Maint.	Const	Maint.

Prepared by: Signature
Name:
Designation

Checked by: Signature
Name:

Scrutinized by: Signature
Name:

Technical scrutiny done by Signature
Name:

Coordinator STA Signature
Name:

PRADHAN MANTRI GRAM SADAK YOJANA (PMGSY)

Format for Consolidated Report of the STA

On the Project Proposals under PMGSY.

1. State: Phase: Year:
2. Names of the Members of the STA involved in the Technical Scrutiny.
3. Whether Pre-DPR meeting was held with SRRDA and DPIUs.
4. Summary of the Project Proposals scrutinized indicating district wise and road wise details of length and cost. The summary includes the No. of Packages and total value.
5. Whether schedule for scrutiny was fixed in advance (give details) and difficulty in adhering to schedule.
6. Actual scrutiny process and time taken for scrutiny (Please indicate the dates).
7. Interaction of the Engineers of the Executing Agencies with the STAs.
8. Major deficiencies observed during scrutiny with details.
9. Reliability of data obtained through investigations and used in the design/ estimation.
10. Compliance of the provisions/ instructions given in the guidelines/ circulars/ operations manual/ IRC codes etc. in the preparation of DPRs including Environmental/RR/ Road safety aspects etc.
11. Levels of response from the Senior Engineers of the Executing Agencies for the suggestions given by the STAs for revision/ modifications in the DPRs.
12. If DPRs outsourced, perceived level of competence of outsourced consultants and suggestions.
13. Overall comments and impressions of the STAs, if any, on the process of the preparation of DPRs and their technical scrutiny.

Signature and

Name of the Coordinator STA

Format F1

PRADHAN MANTRI GRAM SADAK YOJANA
SUMMARY SHEET

Type of Proposal	No. of Roads	Total Length of Roads (Km)	Nos. of new CD Structures	Estimated cost (Rs in Lakhs)			
				Pavement from F-2 A	CD Structure form Format F-2 B	Others	Total

FORMAT F-2A

PRADHAN MANTRI GRAM SADAK YOJANA (PMGSY)
ROADS PROPOSED IN PMGSY FOR RURAL CONNECTIVITY (PAVEMENTS LAYERS)

District:_____ Block: _____Package No._____

Sl.no	Name of road	New Construction (N)/ Associated Through route (A)/ Upgradation (U)			Road length (km)	Existing surface type	Details of thickness and cost of Pavement Layers (Rs. In Lacs)													Total Cost of Pavement Rs. Lakhs
		N	A	U			Details	Clearing/ Grubbing	Earth work	Subgrade preparation	Sub base(GSB)	WBM G2	WBM G3	WMM	Brick on Edge	Prime & Tack Coat	BM / DB M/ BC	Surface Course (MSS/Surface dressing / SDBC/ OGPC)	CC	
							Thickness (MM)													
							Cost (Rs) in Lakhs													
							Thickness (MM)													
							Cost (Rs) in Lakhs													
							Thickness (MM)													
							Cost (Rs) in Lakhs													

FORMAT F-2B

PRADHAN MANTRI GRAM SADAK YOJANA (PMGSY)
ROADS PROPOSED IN PMGSY FOR RURAL CONNECTIVITY (CROSS DRAINAGE STRUCTURES)

District :_____ Block _____ Package No._____

Name of Roads	Road Length (in km)	Existing CD Structure Type						Details of Proposed CD Structure by type						Total Cost of Pavement	Total cost of Road
		Hume Pipe Culvert		RCC/ Arch Culvert		Minor Bridge		Hume Pipe Culvert		RCC/ Box Culvert		Minor Bridge		Total Cost of Proposed CD Structure	
		No	Dia	No	Length	No	Length	No	Dia	No	Length	No	Length		

Junior Engineer Assistant Engineer Executive Engineer.

FORMAT F-3A

Details of typical cross section of existing pavement

[Details to be provided by the State]

FORMAT 3-B

Details of proposed typical Cross Sections

[Details to be provided by the State]

Format F-5

FORMAT F-4

PRADHAN MANTRI GRAM SADAK YOJANA (PMGSY)
DETAILS OF EXISTING ROADS (FOR UPGRADATION)

PACKAGE NO._____
DISTRICT: _____

BLOCK(S):_____

Sl.No.	Name of the Road	Road Length (in km)	Road connecting to *	Facilities accessed (Use A/B/C/D)**	Traffic per day***		Existing Road Details								
					Total Motorised	Total LCV/Truck/Bus Agricultural Tractor/Trailer	Land Width (m)	Road Width (m)	Embankment		WBM Layer		Bituminous Layer		
									Height (m)	Width (m)	Width (m)	Thickness (mm)	Type****	Width (m)	Thickness (mm)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

*Road Connecting to NH/SH/MDR/ODR/VR
**Use A = Market, B = Education facilities, C = Health Centre and D = Combination of previous
***Where actual figure is not available, Estimated figure may be included
****Type BM/MSS/DMC

FORMAT F-5

PRADHAN MANTRI GRAM SADAK YOJANA (PMGSY)
Association of Routes

Package No	Primary Network		Associated Through Route (ATR)/ MRL	PCI	Age	Whether proposed for Upgradation (U) or Renewal	Other Non-Conformance Subsidiary to the ATR	Whether includes in Package Y/N	Habitation served with Population
	No.	Habitations Served (with Pop.)							

FORMAT F-6

PRADHAN MANTRI GRAM SADAK YOJANA (PMGSY)
COST ESTIMATE FOR ROADS CONSTRUCTION

Package No. _____
District:_____

Road From: _____
Length of the Road (km):

Block: _____

Sl. No.	Description of Item	No.	L (m)	B (m)	D/H (m)	Quantity	Unit	Rate (Rs)	Amount (Rs)
1	2	3	4	5	6	7	8	9	10

FORMAT F-7

PRADHAN MANTRI GRAM SADAK YOJANA (PMGSY)
COST ESTIMATE FOR ROADS CONSTRUCTION OF CROSS DRAINAGE WORKS

Package No._____
District: _____

Road From: _____
Type of cross Drainage Works : _____

Block: _____

Sl. No.	Description of Item	No.	L (m)	B (m)	D (m)	Quantity	Unit	Rate (Rs)	Amount (Rs)
1	2	3	4	5	6	7	8	9	10

PRADHAN MANTRI GRAM SADAK YOJANA (PMGSY)
RATE ANALYSIS

FORMAT F-8

State: **District:** **Package No.:**

Road from_____ to_____

Material	Source	Lead(in Km)
Stone		
Bituminous		
Cement		
Hume Pipes		
Any Other		

Analysis Of Rates:

Sl. No.	Sl No. as per MoRD SDB for Rural Roads	Description	Units	Qty.	Rate (Rs)	Amount (Rs)
	A. Construction Activities					
				Total		
	B. Maintenance Activities(Year wise)					
				Total		

Note:

1. Rate Analysis shall cover all the items such as Site Clearance, Earth Work, Drainage, Granular Sub Base, & Surface Course, CD works, Traffic Signs, PMGSY Board & Logo& Maintenance activities
2. Where local material is used at site and the specifications & rate analysis are not found in BOS &SDB, for Rural Roads ,the analysis &nomenclature of the item can be suitably used based on other standards such as PWD Schedule or Rate or assessment based on field observation.
3. Completed items rates including lead for carriage of materials should be shown

FORMAT F-9A

PRADHAN MANTRI GRAM SADAK YOJANA (PMGSY)

CERTIFICATE OF GROUND VERIFICATION FROM EXECUTIVE ENGINEER / HEAD PIU

1. a) Certified that the Land width for the Road is available and that no additional land is required; or
   b) Certified that land width for the Road is likely to be available as certified by the Panchayats.
2. a) Certified that no forest land is involved along the entire road way; or
   b) Certified that the case for permission under Forest conservation Act has been moved to the Forest Department on (Date).
3. Certified that the DPR has been checked at site by

AE EE SE

On date .....

(DPR wise summary in Format F9-B)

Executive Engineer,

Head of PIU.

FORMAT F-9B

LIST OF DPRS VERIFIED ON GROUND:

#	DPRs seen on ground by	DPR Nos	% of total number
1	AE		
2	EE		
3	SE		

Head of PIU

Community Consultation Checklist – Engineering

Question	Yes	No	N/a
1. Are there any flood prone areas on the road?			
If yes:			
1.1 Are locations specified and inspected?			
1.2. Is high flood level specified for each stretch?			
1.3 Are locations specified and inspected?			
2. Are there any locations on the road where irrigations ducts need to be provided?			
If yes:			
2.1 Are locations specified and inspected?			
3. Can the road be used as a shortcut by through traffic?			
4. Does the road lead to any quarries, mining areas, brick kilns, logging areas, tourist attractions etc.?			
5. Are there plans to build new schools, hospitals, temples etc			
6. Is there potential for double connectivity?			
If yes on any of 3-6:			
6.1 Is information on location, size and nature of additional traffic generators and specific routes obtained?			
7. Is there a need for deviations from existing track?			
If yes:			
7.1 Were the proposals for deviation shown on site and explained to the community?			
7.2 Is the land availability checked?			
7.3 If there is a need for donation, were the owners consulted regarding their agreement to donate the land?			
8. Is there a need for speed breakers?			
If yes:			
8.1 Is location and rational for speed breakers identified?			
8.2 Is rationale verified and checked on site?			
8.3 Are alternative or additional locations discussed?			
9. Are all existing intersections checked with the community on site?			
9.1 Is the use of intersecting roads identified (e.g. school children, farm machinery, etc)?			
10. Are proposed culvert locations verified with the community?			
10.1 Is there a need for additional culverts?			
10.2 If yes, are locations identified?			

For DPR consultant	For PIU	For PIC