



**Andhra Pradesh State Rural Development Agency
Panchayati Raj Engineering Department
Government of Andhra Pradesh**



**DOCUMENT FOR OUTSOURCING OF
STATE QUALITY MONITORS
FOR PMGSY WORKS
(2014-15)**

August'2014

State Quality Coordinator, APSRRDA



Government of Andhra Pradesh

Office of the Chief Engineer PR, SQC Hyderabad

S.R.T.G.N. Bhavan, Errum-Mazil Colony, Hyderabad – 500 082

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Notice No: 1189/SQC/S5/SQM(OS)/2012

Dt. 17 .08.2014

REQUEST FOR PROPOSALS

APPOINTMENT OF A.P. STATE QUALITY MONITORS UNDER PMGSY PROGRAM

Andhra Pradesh State Panchayati Raj Engineering Department is executing works under PMGSY Program. A three-tier quality monitoring system is institutionalized for carrying out of quality monitoring of the works taken up under PMGSY program. Under 2nd tier quality monitoring, independent A.P. State Quality Monitors have to carry out periodic inspections of the works and report to State Quality Coordinator.

APSRDA intends to empanel the independent A.P. State Quality Monitors for the inspection of PMGSY works under 2nd tier quality monitoring in the A.P. State.

Chief Engineers/Superintending Engineers/Executive Engineers retired from the Government service who have adequate experience in design & construction of roads/highway & bridges and having thorough knowledge of Geo-technical/Transportation/Structural engineering and construction materials are interested to work as SQMs may submit their willingness to A.P. State Quality Coordinator at the above mentioned address on or before **15th Sept' 2014** in the prescribed form, available online in following User..

For the details visit sub-menu item "tenders" in the website pred.gov.in.

Sd/-xxx

State Quality Coordinator/APSRDA



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REQUEST FOR PROPOSALS

APPOINTMENT OF STATE QUALITY MONITORS UNDER PMGSY PROGRAM

Andhra Pradesh State Panchayati Raj Engineering Department is executing works under PMGSY Program. The MORD, GOI have institutionalized a three-tier quality monitoring system for carrying out of quality monitoring of the works taken up under PMGSY program. Under 2nd tier quality monitoring, independent **State Quality Monitors (SQMs)** have to carry out periodic inspection of the works and report to **State Quality Coordinator (SQC)** in the prescribed format.

GOI have sanctioned works in some of the districts of Andhra Pradesh under PMGSY program to provide all-weather road connectivity and proposals are under consideration for the sanction works in other districts.

APSRDA intends to empanel the independent **State Quality Monitors (SQMs)** for the inspection of PMGSY works in Andhra Pradesh State. The SQMs are required to inspect works as per the schedule assigned by the SQC and submit the inspection report thereon to the PIU concerned in prescribed format and upload the abstract of inspection online in "OMMAS" web site along with minimum of (10) photographs and submit a copy of the inspection report to the SQC. The performance evaluation of SQMs shall be done by a Committee appointed for the purpose.

The SQMs are entitled to travelling and other allowances in addition to honorarium per day as prescribed by the Government.

Chief Engineers/Superintending Engineers/Executive Engineer retired from the Government service who have adequate experience in design & construction of roads/highway & bridges and having thorough knowledge of Geo-technical/Transportation/Structural engineering and construction materials and are interested to work as SQMs may submit their willingness and details in the format as per Terms of Reference (which copy will be issued upon request) and send to State Quality Coordinator at the above mentioned address on or before 15th SEPT'2014.

The SQMs are required to proceed on tour for inspection to any part of Andhra Pradesh State as and when required. The frequency of the tours may be once or twice in a month.

Sd/-xxx
State Quality Coordinator/APSRDA

Signature of SQM Empanelled

State Quality Coordinator/APSRDA



**Terms of Reference (TOR)
for Quality Monitoring of road works by State Quality Monitors under Second
Tier of Quality Mechanism of PMGSY**

1.1 INTRODUCTION:

- 1.1.1** The Pradhan Mantri Gram Sadak Yojana (PMGSY) has program objective of providing all weather road connectivity to every unconnected habitation with a population of 500 and more. PMGSY is a cent percent centrally funded scheme with dedicated sources of funding.
- 1.1.2** The National Rural Roads Development Agency (NRRDA), under the Ministry of Rural Development, Government of India, is the Agency responsible for providing management and technical support to the program implementation. The Program is being implemented by the State Government of Andhra Pradesh with A.P. State Rural Road Development Agency (APSRRDA) as the implementing Agency.
- 1.1.3** Ensuring the quality of road works is responsibility of the State Governments who are implementing the program. A Three Tier Quality Management Mechanism is envisaged under PMGSY, the first tier is in-house quality control by the executing agency (PIU), **whereas, the second tier is independent quality monitoring at the State level.** The State Governments are responsible for these two tiers of the quality management structure. The first tier of Quality Management has the primary function of quality control through enforcement of technical standards; **the function of second tier is to monitor the quality and effectiveness of the enforcement process.**
This includes:
- i. Checks to ensure that the first tier is properly functional.**
 - ii. Independent quality tests to verify that the quality control system is achieving its intended objective.**
 - iii. Detection of systemic flaws in the quality control process and action to improved the process.**
 - iv. Independent monitoring of deterrent and punitive measures in respect of the first tier and the Contractor.**
- 1.1.4** While the State Government is making efforts to increase capacity, still because of substantial workload, augmentation of capacity by outsourcing the quality monitoring under the second tier of quality management mechanism is envisaged. As such, to assist the (State Rural Roads Development Agency) Andhra Pradesh, in achieving PMGSY objectives, the State Government of Andhra Pradesh proposes to engage individual Consultants for providing services of State Quality Monitors (SQMs) for independent monitoring of quality of road works as provided in PMGSY Program Guidelines and Operations Manual issued by National Rural Roads Development Agency, Ministry of Rural Development, Government of India.

1.2 THE INDIVIDUAL SQM CONSULTANT:

- 1.2.1** Qualified Civil Engineers as specified above and with adequate experience in the field of supervision of construction (including quality control) of road works is proposed to be empanelled. The individuals shall have thorough knowledge of "Specifications for Rural



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Roads issued by Ministry of Rural Development and published by Indian Roads Congress, August, 2004", "Quality Assurance Hand Book for Rural Roads Volume I and Volume II published by Ministry of Rural Development Govt. of India" and other relevant standards for rural roads.

1.2.2 Eligibility Criteria for Empanelment of State Quality Monitor (SQM)

- i. **Educational Qualification:** The candidate should be Graduate Civil Engineer from the recognized University or Institute. Preference to individuals holding a masters degree with specialization in Transportation/Geo-Technical / Structural Engineering.
- ii. **Age Limit:** Any individual who has not attained the age of 70 years would be empanelled.
- iii. **Experience:** The candidate should have an experience of at-least 10 years as Civil Engineer in various capacities. Out of experience of 10 years, he/she should have at-least 5 years experience in construction supervision or quality control of road projects including long span bridges.
- iv. If the candidate was working as State Quality Monitor/NQM under PMGSY but was ***discontinued on account of poor performance or conduct, shall not be eligible.***

1.2.3 The SQM Consultant will be engaged by the APSRRDA/Employer, for services based on Terms of Reference as concurred by APSRRDA. The SQM Consultant will be required to furnish the CVs including documentary proof of qualification and experience, their written consent and availability in the prescribed format at Appendix-I.

1.2.4 Procedure for Engaging SQM Consultant: The APSRRDA/Employer shall engage the SQM Consultants by -

- i. Issuing request for proposals inviting proposals and after Technical Evaluation by a three Member Committee constituted by the APSRRDA (model evaluation report enclosed at Appendix-II).
- ii. Final Selection will be on the basis of scores obtained by the individuals in the selection process as explained at Para 1.2.4(i) above.

1.3 IMPLEMENTATION ARRANGEMENTS:

1.3.1 The works will be clubbed into packages for execution at the first tier level in each district. The SQMs now empanelled will be assigned these packages as a unit for Quality Monitoring.

1.3.2 Arrangement for Testing: The State Quality Monitor now empanelled shall carry ordinary instruments, such as, measuring tapes and measuring scales etc required for inspection and general measurements of road works during the inspection. However, the tests for material and workmanship shall be carried out in the field laboratory established by the contractor. It would be possible to conduct all the tests prescribed in the TOR in the field laboratory of the contractor, however, it may not be possible to generally carry out some specific tests in the laboratory of the contractor, in such cases the testing would be performed in the district/regional/State level laboratories of the employer organization, laboratories of engineering institutes or institutes of technology as approved by the employer. The testing



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can also be carried out in the private laboratories provided they are accredited by the employer.

The employer shall be responsible for all expenses relating to testing and transportation of samples to the laboratory etc. The Employer shall also be responsible for ensuring that the SQM is provided full support for taking samples, transportation of samples to the laboratory and appropriate testing in presence of the PIU Staff. All the tests, whether performed in the field laboratory of the contractor or otherwise, shall be performed in presence of and under full supervision of the PIU Staff and the SQM shall be fully responsible for correctness of the test results.

1.3.3 The SQM shall also ensure that:

- i. the quality of work is monitored through making observations tests regarding each item and sub-item of work as prescribed under this TOR.
- ii. the observations about the quality are made through conduct of laboratory/field tests, hand-feel tests or by visual observations as per frequency as prescribed in this TOR and as per any revisions approved by APSRRDA.
- iii. all the observations are recorded, reported and substantiated through prescribed test results in the manner as prescribed by the employer.
- iv. the inspection and reporting by SQMs is factual, true and appropriate.
- v. an individual SQM shall not inspect the same work more than once at-least for six month period.
- vi. the Action Taken Reports on the observations of SQMs are scrutinized professionally and observations are communicated to the PIU and the Employer through State Quality Coordinator (SQC).
- vii. the inspection reports of SQM will be scrutinized/evaluated by a Performance Evaluation Committee constituted by APSRRDA as per guidelines of NRRDA at Appendix-III and any SQM scoring below the required percentage of marks, the services of such SQM will not be continued.
- viii. ***Any type of interactions/briefings with media is strictly prohibited.***

1.3.4 FACILITIES: The SQM shall make his own arrangements for travel, accommodation, transport etc., for which the expenditure incurred will be reimbursed as per the guidelines finalized by APSRRDA as explained in TOR under financial aspects.

1.4 WORK PROGRAM AND ITS REVISION:

- (a) **Duration of Consultancy Services:** The duration of consultancy services shall be initially for one year. The first, second, third and last quarter would mean the duration between date of commencement up to 90th day, from 91st day to 180th day, from 181st day to 270th day and from 270th day to date of completion of one year reckoned from date of commencement respectively.
- (b) **Original Work Program:** As per the guidelines, it is required to be ensured that each work, from its commencement to completion, is inspected at least at 3 stages in accordance with the provisions of this Terms of Reference. Based on requirement of

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inspections of each work depending upon its construction stage at the commencement of services and taking into account the expected stage of construction till the end of the period of services, the Employer will draw detailed month-wise work wise inspection program.

1.5 SCOPE OF WORK:

The broad Scope of Work of this consultancy service shall include:

- (a) Monitoring the quality of road works by the State Quality Monitors through structured inspection of works at three stages (as explained at Appendix-IV) from commencement to completion of the construction work and reporting the observations in formats prescribed by the employer. The number of inspection would depend on stage of work at which the services of State Quality Monitoring would commence and the period of such services. The reports of SQMs will be scrutinized by the Performance Evaluation Committee constituted by APSRRDA as explained in Para 1.3.3 (vii).
- (b) The PIUs would take action on the observations of SQMs and Action Taken Reports (ATRs) will be furnished to the SQC. The scope of SQM shall also include the verification of ATRs with reference to the observations of the earlier SQM inspections and due communication of results of scrutiny by the SQC.
- (c) Overseeing the adherence of guidelines to 1st tier Quality Mechanism.

1.6. Inspection of Works:

The State Quality Monitor (SQM) shall inspect every road work including CD works and all other related works at (3) stages as prescribed by the employer and detailed at Appendix-IV.

1.6.1 Mobile Phone Application :

Field Inspections shall be mandatorily done using the Mobile Phone Application for capturing the Geo-referred photographs of the work and upload the same in OMMAS along with the abstract of quality grading with the use of Mobile Phone Application. Details are available at Appendix –V.

1.7 **REPORTING AND SCRUTINY:** Based on prescribed method of observation mentioned in Scope of Work, an appropriate reporting format is developed by the Employer and is prescribed for use of SQMs. ***The Employer shall also be free to modify reporting format or methods of observations and reporting based on the requirements of the quality monitoring from time-to-time.*** Based on prescribed method of scrutiny of Action Taken Report (ATR) on the inspection report and observations of the SQM, an appropriate scrutiny format would be developed by the Employer in consultation with the Performance Evaluation Committee or NRRDA. The following reports shall be submitted:

- i. **Inception Report:** Within (3) weeks upon issue of letter to proceed with the work, the SQM shall submit an inception report. The report will be based on requirement of services, detailed work program as per Clause 1.4 (b) of the TOR and other related activities.

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- ii. **Inspection Report by SQM:** Immediately upon completion of inspection of work (including reasonable time required for testing of material, as determined by the Employer) but before leaving the head quarter/area of the PIU, the SQM/team of SQMs shall prepare inspection report in the prescribed format and submit a copy to the head of PIU. A copy of the inspection report shall also be submitted to State Quality Coordinator (SQC) within (3) working days upon completion of inspection. ***The inspection reports prepared by the SQMs will be the property of APSRRDA and SQMs if wishes may retain a copy of one such document. However the confidentiality shall be maintained as for the findings/remarks/observations made by the SQM in his inspection report.***
- iii. **Any type of interaction/briefings with media is strictly prohibited.**
- iv. **Scrutiny of Inspection Report of SQM and communication of observation by SQC:** The SQC shall check and scrutinize the inspection report of the SQM and prefers to make additional observations, these would be sent to the head of PIU with a copy to the SQM within (10) working days upon receipt of SQM inspection report by the SQC.

1.8 GENERAL GUIDELINES FOR SQMS

SQM will be given a program by the SQC every month for inspection of one or more districts atleast a fortnight before the month in which the SQM is suppose to inspect.

In each district the SQM would spend three to four days and will inspect two to three units of works assigned to him. The SQM is given an additional two days for to and fro journeys for each district.

1.8.1 FINANCIAL ASPECTS

The SQM will be allowed following claims:

A Journey by Road:

- i. SQMs may travel by road or by any public transport and will be reimbursed actual fare subject to production of self attested photocopy of the ticket.
- ii. If the SQM travels by a taxi, the reimbursement will be restricted to rail/bus fare as per entitlement subject to actual. The claim should be supported by a self attested bill/receipt for travel by taxi.
- iii. For travel by own car, claim will be refunded as in sub-para (ii) above.

B) Journey by Rail:

The SQMs are entitled to reimbursement of fares for journey performed by rail

- a) For CE cadre retired persons : Upto AC I Class
- b) For SE/EE cadre retired persons : Upto AC II Tier/AC Chair Car

Claims for reimbursement of fares shall be supported by the original and will be allowed by shortest route on through ticket basis.

C) Journey by Air: For CE cadre retired engineers only (subjected to the production of boarding pass.

D) Mileage Allowance:



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- i. A fixed mileage allowance of Rs. 500/- per journey to cater to the cost involved in the journey between residence to railway station/bus stand and back and journey in taluk district head quarter bus stand / railway station to Guest house and back.
- ii. PIU will generally arrange for the transport within the district and will provide all assistance to the SQM.
- iii. If project/Government vehicle is provided in taluk district head quarter, SQM is eligible to claim half of the fixed mileage allowance.
- iv. To claim fixed mileage allowance, the SQM is required to give certificate that no transport was provided by the PIU/APSRRDA for journey for which mileage allowance has been claimed.
- v. No allowance will be paid where project/government vehicle is provided.

E) Daily Allowance including lodging charges:

- i. Daily allowance for each day of absence from his head quarters will be paid at the prescribed rate from time to time by Government of Andhra Pradesh. The present rate is Rs.250/- per day. A day is counted for duty beyond 12 hours.
- ii. No daily allowance will be payable if absence from his head quarters is less than 6 hours and half daily allowance will be payable if absence from his head quarters is between 6 hours to 12 hours.
- iii. If SQM is provided for free board by APSRRDA/Project/State Government, half daily allowance will be paid.
- iv. If both boarding and lodging are provided at free of cost by APSRRDA/Project/State Government, 1/4th daily allowance will be paid.

F) Reporting Allowance:

The SQM would be allowed an incidental charges limited to a maximum of Rs. 500 for every trip within a district for activities connected with the inspection of work.

G) Honorarium:

The present rate of honorarium is fixed at Rs.2500 for retired as Superintending Engineer/Executive Engineer and Rs.3000/- for retired Chief Engineer per each day of inspection. It will be paid at prescribed rate from time to time subject to revision by APSRRDA.

Sd/-xxx
Principal Secretary to Govt.,

Sd/-xxx
Engineer-in-Chief (PR)

Sd/-xxxx
Chief Engineer/SQC

Signature of SQM Empanelled

State Quality Coordinator/APSRRDA



APPENDIX - I
Curriculum Vitae (CV) Format
(To be submitted with Proposal by the Candidate)
Project I.D. No..... SQM Consultancy under PMGSY

1	Proposed Position for this Project	:	
2	Name	:	
3	Date of Birth	:	
4	Nationality	:	
5	Personal Address	:	
	Telephone No.	:	
	Mobile No.	:	
	Fax No.	:	
	Email Address	:	
6	Education (<i>The years in which various qualifications were obtained must be stated</i>).	:	
7	Other Trainings	:	
8	Membership in Professional Bodies	:	
9	Organizations of Work Experience	:	
10	Employment Record: (<i>Starting with present position, list in reversed order every employment held and state the start and end dates of each employment.</i>) (<i>Clearly distinguish your "employer" as an employee of the firm from a "Agency" for whom you have worked as a consultant or an adviser.</i>)		
	From To	:	
	Employer		
	Position held and description of duties		
	From To	:	
	Employer		
	Position held and description of duties		
	From To	:	
	Employer		
	Position held and description of duties		
11	Detailed Tasks Assigned: (<i>In this column, list tasks one by one and support each task by project experience in the right hand side column.</i>) <i>Work undertaken that best illustrates capability to handle the task assigned (In this column, list project name, location, year, position held, i.e., Team Leader, etc. and exact duties rendered and time spent on each project.)</i>		

Note: Any testimonials enclosed shall be self attested.

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Certification (Please follow exactly the following format. Omission will be seen as noncompliance).

I, the undersigned, certify that to the best of my knowledge and belief, this Biodata correctly describes my qualifications, my experience, and myself. I understand that any willful misstatement described herein may lead to my disqualification or dismissal, if engaged.

I have been employed by (name of the firm) continuously for the last (6) months as regular full time staff (indicate yes or no in the following boxes):

Yes	No
------------	-----------

Signature with Name and Date :



APPENDIX - II

EVALUATION FORMAT FOR SELECTION OF SQMs



EVALUATION FORMAT FOR SELECTION OF SQMs

S. No.	Name of the applicant	Cadre Retired			Qualification		Field Experience				Age		Others		Total Marks
		EE	SE	CE	BE/ B.Tech /AMIE	ME/ M.Tech	Road Construction	Bridge Construction	QC Experience		Upto 65 years	65-70 years	Publications	Membership in professional bodies	
									QC on roads	QC on Bridges					
1	2	3a	3b	3c	4a	4b	5a	5b	5c	5d	6a	6b	7a	7b	8

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Note:

	Weightage	
	Max.	Individual
<u>Cadre Retired</u>		
EE	15	5
SE		10
CE		15
<u>Qualification</u>		
BE/B.Tech /AMIE	15	5
ME/M.Tech		15
<u>Field Experience</u>		
Road Construction	50	25
Bridge Construction		15
QC on roads		5
QC on Bridges		5
<u>Age</u>		
Upto 65 years	10	10
65-70 years		5
<u>Others</u>		
Publications	10	7
Membership in professional bodies		3
Total	100	

Minimum weightage required for selection as SQM is 60

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APPENDIX III

Guide lines for Performance Evaluation of the State Quality Monitors

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Guide lines for Performance Evaluation of the State Quality Monitors

1. Background: The PMGSY Guidelines *inter alia* envisage that ensuring the quality of the road works is the responsibility of the State Governments, who are implementing the Program. Accordingly, a three-tier Quality Control mechanism is stipulated of which the State Governments are responsible for the first two tiers of the Quality Control Structure. At the Second tier of the Quality Control structure, periodic inspections of works should be carried out by Quality Control Units, set up / engaged by the State Government, independent of the Executive Engineers / PIUs. These officers / Agencies (called as State Quality Monitors) are expected to carry out regular inspections and also get samples of material used tested in laboratories of the State Government as well as, in certain cases, independent laboratories, say those of the State Technical Agencies.

As stipulated in the para 11.5.1 of Operations Manual the function of the 2nd tier of independent quality management is to improve the quality and effectiveness of the enforcement process. This includes

- (i) Checks to ensure that the 1st tier is properly functional
- (ii) Independent quality tests to verify that the quality control system is achieving its intended objective
- (iii) Detection of systemic flaws in the quality control process and action to improve the process
- (iv) Independent supervision of deterrent and punitive measures in respect of the 1st tier and the Contractor

Further, in order to be able to take an independent, impartial and dispassionate view of quality control, it is essential that the 2nd tier should have no stake in the outcome. In other words it should have nothing to do with the day-to-day or supervisory management or administration of contracts so that issues of legal action against the contractor, disciplinary proceeding against PIU officials, accountability to audit etc. do not colour its judgment or actions. Under the second tier of quality mechanism, detailed guidelines for monitoring of quality of the road works have also been prescribed by NRRDA. The method of inspection of works, making observations and reporting has been standardized with a view to minimize subjectivity in reporting. As per the guidelines, the SQM also has to upload the abstracts of the quality grading for each item of work along with requisite number of digital photographs in OMMAS.

With a view to ensure clear understanding of the SQM Guidelines, NRRDA had also organized a number of training-cum-orientation programs for SQC and selected SQMs of all States. During these

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programs, the States were advised to assess the training needs of their SQMs and impart them training through the SQMs trained in these training-cum-orientation programs.

2. Performance Review: As above, the Second tier of quality mechanism is an important aspect of PMGSY and the performance of State Quality Monitors is critical for the program, therefore, the performance of State Quality Monitors needs to be evaluated by the concerned SRRDAs on regular basis. Assessment in respect of the following aspects is required to be covered during the performance evaluation:

- a. Whether the SQM has carried out inspection as per the guidelines prescribed under the 2nd tier;
- b. Whether there is any lack of application of mind by SQM in recording observations;
- c. Whether there is a tendency to avoid desirable technical observations;
- d. Whether the SQM has left inspection format incomplete without any reason;
- e. Whether the SQM has filled up formats mechanically without appropriate testing or observations in a professional manner.
- f. Whether the SQM has uploaded the quality grading abstracts and the requisite number of photographs in OMMAS

3. Independent Committee: The review of reports of SQMs shall be carried out by an independent Performance Evaluation Committee constituted by concerned State Government. The Evaluation Committee may consist of the following:

- | | | | |
|----|---|---|----------|
| a. | Two members of STAs/ PTA of the concerned State | – | Member |
| b. | One Retired Engineer not below the level of CE | – | Member |
| c. | SQC | - | Convener |

If State desires, one NQM could also be nominated by NRRDA. The performance evaluation of SQMs shall be based on review of 5-10% of the inspection reports or number, say 10, whichever is more, for inspection conducted in last one year just preceding the month of review.

4. System for Performance Evaluation of the State Quality Monitors

The evaluation of every item and sub-item of inspection shall be carried out and the observations of the performance evaluator shall be quantified in terms of marks. Item and sub-item wise maximum marks shall be as per enclosed marking format (Evaluation Sheet). The marks obtained shall be filled up by the evaluator in the prescribed column. Based on the provision of specific item or sub-item of work, total maximum marks will not remain same in all cases and will vary depending upon the stage of the road work at

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which SQM has visited. Therefore, instead of absolute totals, a percentage will be taken for the evaluation.

Marking Methodology for Performance Evaluation of SQMs:

Marking shall be done in the following manner given below. For easy understanding, guidelines for Quality Monitoring under Second Tier of Quality Mechanism including formats are attached for ready reference.

4.1 Setting out and Working Drawing: The SQM is required to make observations on the basis of establishment of bench mark and center line and availability of drawings. Maximum marks would be 4 as detailed in performance evaluation sheet.

4.2 Site Clearance and grubbing: The SQM is required to make observations on the basis of site clearance and use of salvageable material. Maximum marks would be 2 as detailed in performance evaluation sheet.

4.3 Observations on Quality Arrangements: The observations of SQM on establishment of field laboratory, availability of equipments and use of equipments may be evaluated. For these items 3 marks are prescribed.

The observation regarding mandatory tests, QC Register may be evaluated for these items 2 marks are prescribed.

The results are required to be compared with the test results by the PIU in QC Register. It should be seen whether the SQM has made efforts to verify these results and 1 mark is prescribed for this item.

4.4 Observations on Geometrics: In case of ongoing/ completed works, the SQM is supposed to measure the width of road way and carriage way, super elevation and extra widening at curves at a defined chainage and is required to offer the comments about the adequacy for which 6 marks are prescribed.

4.5 Observation on Quality of Items of Work: The SQM is required to make observations on the basis of hand feel tests or detailed test in respect of all the items of construction. He is required to get test pits dug to facilitate observations. Sub-item wise marking will be done in the following manner:

- (i) **Earth work:** Maximum marks 10. The marking will depend on the quality of observations made by SQM in case of three sub-items detailed in performance evaluation sheet for item 5A or four sub-items for item 5B.
- (ii) **Sub-Base:** Maximum marks 10. The marking will depend on the quality of observations made by SQM in case of four sub-items detailed in performance evaluation sheet.
- (iii) **Base Course:** Maximum marks 10. The marking will depend on the quality of

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observations made by SQM in case of five sub-items detailed in performance evaluation sheet.

- (iv) **Bituminous Course:** Maximum marks 10 for Bituminous Courses.. In case of on-going works, grading of aggregate, binder and temperatures are to be observed by SQM. In case of completed work, the thickness and surface evenness is to be observed by SQM.
- (v) The marking will depend on the quality of observations made by SQM as detailed in performance evaluation sheet.
- (vi) **Shoulders:** Maximum marks 5. The marking will depend on the quality of observations made by SQM in case of three sub-items detailed in performance evaluation sheet.
- (vii) **CD Works:** Maximum marks 8. The SQM has to see adequacy of CDs and its quality. The marking will depend on the quality of observations by SQM with respect to location, type and quality of CDs.
- (viii) **Side Drains and Catch Water Drains:** Maximum marks 4. The SQM has to see adequacy of drains and its quality. The marking will depend on the quality of observations made by SQM.
- (ix) **CC Pavement and Drains:** Maximum marks 10. The SQM has to see the quality of CC pavement / semi-rigid pavements etc. and drains including their integration with CDs. The marking will depend on the quality of observations by SQM as detailed in performance evaluation sheet.
- (x) **Road Furniture and Markings:** Maximum mark 5. The SQM has to see the fixing of furniture and the quality. The marking will depend on the quality of observations by SQM.

4.6 Inspection of roads under Maintenance: The State may also depute SQMs to access maintenance activities being carried out in the completed road works. The SQM is expected to clearly point out the defects noticed in road during his inspection and shall also report the current Pavement Condition Index (PCI) of the road as per the methodology contained in Annexure-14.7 of Operational Manual or by use of appropriate equipment.

4.7 Special Conditions:

- a. **Marking in case of Contradictory Remarks:** If SQM has made such a remark in any item which is contradictory to remarks made in earlier part of the report, zero mark will be awarded in the item or sub-item where this remark has been given. Zero mark will also be awarded for that item or sub-item for which the earlier observations have been later contradicted.
- b. **Marks for not recording any observations:** If the SQM has not recorded any observations without giving reasons, Zero mark shall be awarded in that particular item/sub-item.

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- c. **Marks in case of Incorrect Grading:** If observations made for any item does not commensurate to the grading awarded to that item, zero mark would be awarded to the corresponding item as given in clause 3.2 above.
- d. **Marking in case of wrong Overall grading:** If the calculation of overall grading in the hard copy of the SQM report is not as per guidelines, it would be a fair indicator of the care and sincerity of SQM. No marking would be done in such a case and word “wrong overall grading” would be written on evaluation sheet.

4.8 Performance Ratings and Summarization:

Performance rating of the SQM would depend on the average of marks obtained in all the evaluated reports. The summary sheet shall be filled up by the evaluator on the basis of average of observations in all the evaluated reports.

Annexure-I

Performance Evaluation Sheet

Name of SQM (if name coding not done):

Code of SQM:

Name of Work:

Work Ongoing or Complete:

District:

Date of SQM visit:

#	Item	Sub Item	Stage of Work	Max. Marks	Marks wherever Applicable	Marks Obtained
1	Setting out and working Drawing	Bench Mark and Centre line	All Stages	1		
		Availability of working drawing	All Stages	3		
		Total		4		
2	Site clearance and grubbing	Site Clearance and Grubbing	Stage I	1		
		Re-use of Salvageable	Stage I	1		

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		Material				
		Total		2		
3	Quality Arrangements	Field Lab	All Stages	3		
		No. of mandatory Test as per prescribed Frequency	All Stages	2		
		Maintenance QC Registers	All Stages	1		
		Total		6		
4	Geometrics	Road way and width	2 per km in every inspection	1		
		Carriageway width	2 per km in every inspection	1		
		Camber	2 per km	2		
		Super-elevation & Extra Widening at Curves	1 curve in each km	2		
		Total		6		

	Item	Sub Item	Stage of Work	Max. Marks	Marks wherever Applicable	Marks Obtained
5A	Earthwork and Sub-Grade in Embankment/Cutting	Quality of material for embankment /sub-grade	In State-1, 1 per km/ In Stage-II or III, 1 per km	1		
		Compaction	In Stage-1, 2 per km / In Stage-II or III, 2 per km.	6		
		Side slope and Profile	2 per km in Stage III	2		
		Total		10		

		Stability and Workmanship of Cut Slopes	Stage 1 and II, at 2 critical location with maximum	2		
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		height of cutting in each km			
		Adequacy of Slope Protection	All Stages – in general	1	
5B	Earthwork in Cutting in Hilly/Rolling Terrain	Upon completion of formation cutting, dressing, traffic worthiness	All Stage II/III, at 2 critical locations with maximum height of cutting in each km	2	
		Longitudinal Gradient	Stage II/III, 1 critical and fairly representative stretch of 200m on each	5	
		Total		10	
		Grain Size	In Stage-II or III, 1 per Km	2	
		Plasticity	In Stage –II or III, 1 per km	2	
6	Sub-base	Compaction	In Grade-II or III, 1 per Km	4	
		Total Thickness of Layers	2 per km	2	
		Total		10	

Item	Sub Item	Stage of Work	Max. Marks	Marks wherever Applicable	Marks Obtained
	Grain Size of Course Aggregate	In State-II or III, 1 per Km	2		
	Test for Liquid Limit and Plasticity Index in case fine aggregates are	In State-II or III, 1 per km	2		

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7	Base Course- Water Bound Macadam	crushable type I				
		Volumetric Analysis for assessment of Compaction of WBM	In State-II or III, 1 per Km.	2		
		Surface Evenness using straight edge	In completed WBM 2 tests per km	1		
		Thickness of every layer of WBM	2 per km	3		
		Total		10		
8	Bituminous Layer – Premix Carpet (PMC/surface Dressing SD)	Level C/Cleanliness of WBM surface prior to application of bituminous	1 per Km	1		
		Quality of Prime Coat Track Coal with respect of quality of material and	1 observation on the day of inspection	1		
		Gradation Test for Course Aggregate (if the work in the item is)	1 test on the day of inspection	2		
		Grade of bitumen and temperature at the time of mixing and laying (if the)	1 test on the day of inspection	2		
		Bitumen Extraction Test if PMC is complete	1 test per Km	1		
		Thickness of Layer	2 per Km	2		
		Surface evaluation in case of completed BT Work	2 per Km	1		
		Total		10		

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#	Item	Sub Item	Stage of Work	Max. Marks	Marks wherever Applicable	Marks Obtained
9	Shoulders	Quality of Material	In State-II or III, 1 per km	1		
		Degree of Compaction	In State-II or III, 1 per km	2		
		Thickness of layer	In State-II or III, 1 per km.	2		
		Total		5		
10	Cross Drainage works causeways of all spans and Culverts	Quality of Material Concrete, Stone/Brick, Masonry, Hume pipes including size etc.	All Stages	4		
		Quality of workmanship such as positioning of pipes, wing walls, cushion over H pipes etc.	All Stages	4		
		Total		8		
11	Side Drain and Catch Water Drain	General quality of Side Drains/Catch Water Drains and their integration with CDS	All Stages	4		
		Total		4		
12	CC/Semi Road Pavement & Associated Pukka Drains	Quality of Material, Concrete, Stone/Concrete Block Pavement etc.	In Stage – II, or III, 1 per 100m Length of Pavement	2		
		Strength of CC in Concrete Pavement/Concrete Block Pavement	In Stage-II, or III, 1 per 100m Length of Pavement	2		
		Quality of workmanship – Wearing surface texture. Adequacy of setting of concrete, joins, Edges etc.	In Stage-I or III	3		
			In Stage-II or			

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		Thickness of layer	III, 1 per 100m Length of pavement	3		
		Total		10		

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#	Item	Sub Item	Stage of Work	Max. Marks	Marks wherever Applicable
13	Road Furniture and Markings	Citizen information Board main information Board, Quality and whether fixed during construction	Stage 1	2	
		Logo Boards, 200m stones and km stones, quality and whether fixed after completion	Stage III	2	
		Whether the information in boards is given in local language	State I & III	1	
		Total		5	
14	Entry in OMMAS	Whether inspection has been entered in OMMAS by SQM	All	10	
	Number of photographs uploaded on OMMAS and Quality inference available through them	Whether i10 photographs per inspection are uploaded by SQM	All	2	
		Whether loaded photographs reflect the quality of works inspected by SQM properly	All	4	
		Whether observations of SQM are commensurate to quality of works seen in photographs.	All	4	
		Total		20	

Signature of Evaluator:

Marks obtained to marks applicable =%

Name of Evaluator:

Date:

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Summary Performance of SQM

(To be filled by Evaluator)

Name of SQM *(If name coding not done):*

SQM Code:

Period for which evaluation done:

1. Whether inspections performed generally as per guidelines:

Yes	No
-----	----

2. General observation about application of mind in recording observations: (Correlation in observations and grading)

Item	Observations
Quality Arrangement	
Quality of Work	
(a) Earth Work	
(b) Sub-base	
(c) Base-Course	
(d) Bituminous Course	
(e) CD/Drainage/CC Pavement etc.	
(f) Furniture and Signage	

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3. Whether SQM has left portions of inspection format blank without recording any reasons:

Yes	No
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4. Whether tendency to avoid desirable technical noticed:

Yes	No
-----	----

5. Whether SQM has made contradictory remarks:

Yes	No
-----	----

6. Whether SQM could provide guidance to the PIU through his observations:

Yes	No
-----	----

7. Whether the SQM has reported the maintenance aspect of completed road works in the comprehensive manner:

Yes	No
-----	----

8. Average % Marks:

	%
--	---

Signature:

Name of Evaluator:

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Annexure-III

Performance of SQM (Evaluated to Three Categories)

(to be prepared by SRRDA)

SQM Securing Mark less than 50% (To be discontinued)			SQM Securing Mark between 50% to 75% (May be continued but placed under observation)			SQM Securing Mark grater than 75% would be continued		
Name of SQM	Code	% of Marks (averag e of all reports)	Name of SQM	Code	% of Marks (averag e of all reports)	Name of SQM	Code	% of Marks (averag e of all reports)

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APPENDIX -IV

Pradhan Mantri Gram Sadak Yojana –

Comprehensive Guidelines for Quality Monitoring under the Second Tier

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Pradhan Mantri Gram Sadak Yojana - Comprehensive Guidelines for Quality Monitoring under the Second Tier

1. Introduction: PMGSY Program Guidelines Clause 15 provides that ensuring the quality of road works is responsibility of the State Governments, who are implementing the program. To this end, all the works will be effectively supervised. A three tier quality control mechanism is put in place under the program. The States are responsible for the first two tiers of quality control structure. Under the second tier of the structure, periodic inspections are required to be carried out through independent State Quality Monitors. As per para 11.5.7 of PMGSY Operations Manual, the SQC is required to ensure that each work is inspected at least at three stages. The State Governments were expected to issue guidelines in this regard. However, it was observed over the years that in many States, the second tier of this mechanism has not been made fully operational. Therefore, it was felt that in view of structured and uniform monitoring of quality at second tier, detailed technical guidelines should be developed and prescribed. Accordingly, the first set of guidelines was issued vide letter of even number dated 17th September, 2009.

In view of ensuring further uniformity in reporting and better monitoring of the performance of second tier of quality monitoring, it has now been decided to prescribe detailed guidelines and reporting formats for this tier. It has also been decided that observations of SQMs should be placed on PMGSY website so that these are available for viewing not only by the stakeholders in the PMGSY but also to the citizen at large. Under the Second Tier of Quality Monitoring, henceforth, the following guidelines, reporting methodology and process of performance evaluation shall be adopted by the States.

2. Organizing the Inspections under the Second Tier of QM: As per provisions of Para 11.5 of Operations Manual, the second tier of quality management will function from the State Rural Road Development Agencies (SRRDA) and would be headed by the State Quality Coordinator (SQC). This tier would also be effectively supervised by Chief Executive Officer (CEO), and Engineer-in-Chief / Chief Engineer PMGSY of SRRDAs.

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The SQC shall take the following action for organizing inspections under this tier:

- (a) The SQC shall draw up programs for inspection by SQMs in such a way that every work is inspected at least three times. The first two inspections of every work should be carried out during the execution of work spaced at least three months apart and the last inspection should be carried out on the completion of work or at the finishing stage but in no case later than one month after completion of work.
- (b) The schedule should generally be drawn up monthly specifying the block and the road work so as to ensure systematic coverage.
- (c) The SQC shall ensure inspection of road works by the SQMs strictly as per provisions of these guidelines. The SQMs shall carry out inspections as per these guidelines and additional guidelines, if any, issued by the State. The observations shall be recorded and reported by the SQMs in manner and the formats prescribed here under.

3. Stages of Inspection: The State Quality Monitor (SQM) shall inspect every road work including CD works and all other related works at 3 stages as prescribed. In case of road work involving earthwork in cutting or/and embankment, construction of sub-grade and construction of flexible/semi-rigid/rigid pavement, the stages of inspection shall be:

- **Stage-I:** When the work has been started and generally earthwork in embankment and/or cutting is in progress,
- **Stage-II:** When the pavement work in base-course is in progress
- **Stage-III:** When the work is nearing completion i.e. the stage when the bituminous surface work is in progress or just upon completion.

However, in case of road work involving only formation cutting and related protection works or CD works, construction of only rigid pavement or only other type of pavement or any individual CD work or bridge work etc, three stages of inspection for each work would be prescribed by the SQC.

4. Inspection of Works by SQM:

- 4.1.** The quality monitoring in the Second Tier is expected to be relatively closer than the monitoring at the Third Tier, therefore, the inspection of SQM shall be more thorough covering all aspects of construction.
- 4.2.** At the time of inspection of SQM, the PIU shall provide basic information about the work in **Format 1 Part I** (*the States may require*

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more information and accordingly, the format may be modified under intimation to NRRDA).

4.3. Item-wise requirements for monitoring the quality of road works by State Quality Monitors are given in subsequent paragraphs. Accordingly, the SQM shall monitor the quality through observations and record his observations in **Format 1 Part II** (*the States may require more information and accordingly, the format may be modified under intimation to NRRDA*).

2 Grading of Works:

(ix) Upon inspection of PMGSY work, the quality of every item and sub-item of work would be evaluated by the SQM on the basis of methods of observations prescribed in **Annexure 2**. The grading of work would be done with an intention to quantify the observations showing level of **satisfaction in relation to prescribed specifications** of the work/item under observation. The grading would be recorded in every item and abstracted at appropriate space provided in **Format 1 Part II**.

(x) The objective of the grading is to indicate to the PIU that whether the material or workmanship is acceptable, or unacceptable. If the item is unacceptable, the improvement could be done by either replacement of the entire material/portion of work or by rectification in workmanship or material. Therefore, based on the type of item and method of observation, each item/ sub-item of work would be graded in any of the categories indicated as '**Satisfactory (S)**', '**Satisfactory Requiring Improvement (SRI)**' or '**Unsatisfactory (U)**' as prescribed in **Annexure 2**.

(xi) Based on grading, the PIU shall take action for rectification of defect, therefore, it is very important to record the defect as well as the suggestive method by which the rectification could be done. The SQM shall record, in the space provided in Part II observation sheet, **the grade as well as clear and express reasons for grading the item of work as 'SRI' or 'U' along with his suggestions for improvement**. The reasons and suggestions shall be recorded clearly in such a way that there are no ambiguities or contradictions with observations in other items.

3 Observations by SQMs: The detailed method of making observations and grading of item/sub-item of works is given in paragraphs below.

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6.1. Setting Out and Working Drawing: For systematic execution of work, appropriate setting out and availability of proper working drawing is to be ensured by PIU. The SQM is required to see as to whether,

appropriate setting out as required for the item of work ongoing at the time of inspection of SQM is in place or not. The following aspects need to be seen:

(a) Bench Marks: As per specifications, the contractor is required to establish at least 4 reference bench marks per kilometer as also at or near all CD works. The levels of these reference bench marks are required to be approved by the engineer. The SQM is required to see as to whether, these bench marks exist and up-to-dated records of bench marks including approved adjustment have been maintained.

(b) Center Line: Center line of the carriageway is required to be accurately established by the contractor and referenced through marker pegs and chainage board appropriately placed at defined intervals. The SQM shall check these markings.

(c) Working Drawing: At every work site, clear working drawing having pre-commencement levels and levels of various items of work to be achieved after completion is required to be made available to the contractor. The SQM is expected to check the working drawing in reference to the level of execution at the time of inspection.

Frequency: *At all stages of inspection, the SQM shall check the above aspects and record his observations.*

Grading: *If the PIU has not established Bench Marks or Center Line or not provided proper Working Drawing, 'U' grade would be awarded. If the above items have been carried out partially, 'SRI' grade would be awarded, otherwise, if all the items have been properly executed, 'S' grade would be awarded.*

6.2. Site Clearance and Grubbing: As per specifications, clearing and grubbing is required to be performed by the PIU. The SQM is expected to see as to whether clearance and grubbing as provided in the DPR is being carried out and disposal of material as provided in the specifications is being done. In case of up-gradation, scarifying the existing work may be involved. The SQM is required to see that scarifying activity is carried out as per specifications and proper provision for reuse of the salvageable material has been made.

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Frequency: *In Stage-I of inspection, the SQM shall check the above aspect and record his observations. In case, the above item is partly executed after first stage inspection of the SQM, the observations in the subsequent stages would be made by the SQM.*

Grading: *If the PIU has carried out clearing and grubbing properly and has appropriately reused the salvageable material, 'S' grade would be awarded. If the above items have been carried out partially, 'SRI' grade would be awarded,*

otherwise, if the above items have not been properly executed, 'U' grade would be awarded.

6.3. Quality Control Arrangements and Attention to Quality: As per the contract, the contractor is required to establish the field laboratory for conducting mandatory quality control tests for material and workmanship. The SQM is expected to check whether the requisite equipments for the testing of various item(s) of works ongoing at the time of inspection are there in the laboratory or not. This is also required to be seen that whether equipments are being used to actually testing material and workmanship and clear observations on this aspect are to be recorded.

SQM is required to list out various items of works and quantities executed. Based on the prescription about mandatory tests, the SQM shall also list out various tests and their numbers for each item of work executed by the PIU. It is mandatory to maintain the Quality Control Register Part-I & II. In case of ongoing works the SQM is expected to see, as to whether, appropriate entries in the abstract of Quality Control Register have been made, whether, test results for all the items of work executed upto the time of inspection are available in the Quality Control Register Part-I. In Quality Control Register Part-II it is required to be seen that whether record of non-conformance is being maintained and whether appropriate non-conformance report have been issued.

Frequency: *At all stages of inspection, the SQM shall check the above aspects and record his observations.*

Grading: *If field laboratory with sufficient equipments has been established and equipments are being used, record of tests is properly maintained and*

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monitored through Quality Control Register Part I and II, all the tests as per prescribed frequency have been carried out 'S' grade would be awarded. If, any of the above items have been partly attended 'SRI' grade would be awarded and if, any of these items have not been attended by PIU 'U' grade would be awarded.

- 3. Geometrics:** Under this item, the observations about road land width, road way width, carriage way width are required to be made and reported at various stages of construction at selected RDs. Geometrical features such as camber, super elevation, horizontal curves, requisite transition curves and extra widening are required to be provided right from the levels of the sub-grade up to construction of bituminous layer. However, the observations about these geometric elements shall be recorded by the SQMs in each stage of inspection.

If, it is felt that the provisions about camber, super-elevation, extra widening etc. has not been made in DPR but are required as per field conditions, in such cases, clear observations should be made in the space provided under 'General Observations' at the end of reporting format.

Frequency: *At all stages of inspection, the SQM shall check the above aspect at a frequency of 2 per km except for super-elevation and extra widening at curves, which would be checked on at least 1 curve in each km and record his observations.*

Grading: *If the all the items of geometrics have been executed properly as provided in DPR 'S' grade would be awarded otherwise 'U' grade would be awarded.*

- 6.5. Earthwork:** The road may be in either cutting or in embankment or there may be a combination of cutting and embankment in the same road. The observations about the quality are to be made for all the above types of works.

(a) Earthwork in Embankment and Sub-grade: For embankments and sub-grade, the following parameters are critical to quality of material and workmanship:

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- (a) Quality of Soil used in embankment or sub-grade (Soil Classification)
- (b) Compaction of embankment or sub-grade.
- (c) Side slopes and profile upon completion.

The SQM would be required to ascertain conformance of above parameters with the specifications. Appropriate hand-feel test for soil classification and test for field density at various levels of embankment are expected while the work is ongoing. These observations can also be made by digging appropriate pit in cases where embankment has been completed and the work of sub-base and base-course is ongoing. The SQM is expected to make the above observations while the work in this item is ongoing. If, execution of this item has been completed and somehow the sufficient observations had not been made during the execution of this item, the SQM shall make observations about this item by digging pit after completion of embankment.

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Frequency: The SQM shall perform the tests as given below:

Test	Frequency
Visual Classification of Soil	In Stage-I, at least 1 test for earthwork in each km (irrespective of the executed quantity).
	In Stage-II or III, if earthwork of the stretch of road has not been monitored earlier, at least 1 test for earthwork in each km
Degree of Compaction	In Stage-I, minimum 2 tests for each km length or part thereof (irrespective of the executed quantity).
	In Stage-II or III, if earthwork of the stretch of road has not been monitored earlier, minimum 2 tests for each km length or part thereof (irrespective of the executed quantity).
Side Slopes, Profile	2 per km in Stage-III.

Grading: Material – If suitable soil has been used, ‘S’ grade would be awarded otherwise ‘U’ grade would be awarded. **Compaction** – If degree of compaction is within the prescribed limits ‘S’ grade would be awarded otherwise ‘U’ grade would be awarded. **Side Slopes** – In case work is nearing completion or has been completed and if side slopes and profile is as per provisions ‘S’ grade would be awarded otherwise ‘U’ grade would be awarded.

(b) Earthwork in Cutting: The roads in hilly areas and rolling terrain may have earthwork in cutting. The following parameters are critical to quality of earthwork in cutting:

- Longitudinal gradient and
- Slopes of cutting and stability.
- Adequacy of slope protection
- In case of only formation cutting, dressing and traffic worthiness of completed formation.

The SQM is expected to make clear observations on the basis of actual recording of levels in the stretches fairly representative of the overall quality.

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Frequency: The SQM shall record observations as given below:

Test	Frequency
Stability and workmanship of Slope of Cuttings	At all stages of inspection in case of work of formation cutting – At least two critical locations with maximum height in each kilometer stretch of road (irrespective of the executed quantity).
	In case of hill road having formation cutting and pavement work, the above observation would be made at those stages of inspection when formation cutting work is ongoing.
Adequacy of slope protection	In general, SQM shall check and record.
If formation cutting is complete, dressing and traffic worthiness of formation	At Stage-III - At least two critical locations with maximum height in each kilometer stretch of road (irrespective of the executed quantity).
Recording of Longitudinal Levels	At all stages of inspection in case of work of formation cutting – In a critical and fairly representative stretch of 200 meters in each kilometer (irrespective of the executed quantity).
	In case of hill road having formation cutting and pavement work, the above observation would be made at those stages of inspection when formation cutting work is ongoing.

Grading: If the **longitudinal gradient and slope of cutting** is as per provisions having adequate stability, 'S' grade would be awarded, if improvement is possible with respect to slope and stability of cuts, 'SRI' grade would be awarded otherwise 'U' grade would be awarded.

6.6. Sub Base Course and Shoulders: Specifications provide for course-graded granular sub-base for rural roads. Recently, gravel sub-base has also been allowed. For monitoring the quality of GSB, the following quality parameters are critical:

- The conformance of the material to grading requirements and also to ensure that soil fraction passing through 75 micron sieve is not more than the prescribed percentage.
- Plasticity characteristics of the fraction passing through 425 micron sieve are well within the prescribed limits.
- Compaction.
- Thickness of compacted layer.

The SQM is expected to carry out actual field tests for all the above items for samples fairly representative of overall quality of the item.

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Frequency: The SQM shall record observations as given below:

Test	Frequency
Gradation Test	In Stage-II, at least 1 test for each km (irrespective of the executed quantity).
	In Stage-III, if gradation of GSB of the stretch of road has not been monitored earlier, at least 1 test for each km
Test for Liquid Limit and Plasticity Index	In Stage-II, at least 1 test for each km (irrespective of the executed quantity).
	In Stage-III, if GSB of the stretch of road has not been monitored earlier, at least 1 test for each km
Degree of Compaction	In Stage-II, minimum 1 test for each km length or part thereof (irrespective of the executed quantity).
	In Stage-III, if GSB of the stretch of road has not been monitored earlier, minimum 1 test for each km length or part thereof (irrespective of the executed quantity).
Thickness of compacted layer	In Stage-II or III, in case, GSB is complete and if every km not monitored for quality, at least 2 test per km.

Grading for GSB: Material – If suitable GSB material has been used, ‘S’ grade would be awarded otherwise ‘U’ grade would be awarded. **Compaction and Thickness of Layer** – If degree of compaction is within the prescribed limits and thickness of the layer is as provided in DPR, ‘S’ grade would be awarded otherwise ‘U’ grade would be awarded.

6.7. Base Course: In rural roads, generally sub-base of Water Bound Macadam is being constructed. In WBM layer, the following items are critical to quality:

- Gradation of course aggregates.
- Gradation of fine aggregates (filler material and binding material).
- Quantity of fine aggregates.
- Adequacy of compaction.
- Surface evenness.
- Thickness of compacted layer.

To ensure the conformance of course or fine aggregate to gradation requirements, SQM is expected to carry out sieve analysis. In case crushable aggregate has been used as filler material, the plasticity characteristics are critical; therefore, SQM is expected to test PI and LL. There is prescribed method under the specifications for spreading the course aggregate, dry rolling followed by application of fine aggregates and to be continued with dry rolling. This operation is further followed

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by wet rolling. However, it has been observed that in many cases course aggregates and fine aggregates are haphazardly mixed and

spread without any control over the quantity of fine aggregates etc and rolled unsystematically. There is an urgent need to check this practice of substandard construction of WBM. While the work of WBM is ongoing, the SQM is expected to check the process of construction meticulously and report. In case WBM has been completed, it is still possible to fairly judge the levels of compaction. To ascertain that prescribed dry rolling and wet rolling has been carried out for achieving appropriate compaction, it is necessary to carry out volumetric analysis by excavating pit of specific size. The material in each layer of WBM is required to be carefully taken out of the pit and after necessary screening to separate out course and fine aggregates, the proportion of fine aggregates by volume of course aggregates should be calculated. If proper dry rolling and wet rolling is done, the WBM would appear solid compacted and the percentage of fine aggregates would generally not be more than 25% of volume of course aggregates. Appropriate allowance for crushing under the wheels of the roller may also be made depending on the aggregate impact value of the course aggregates. If volume of fine aggregate is more, it is obvious that specified rolling has not been carried out. To confirm the levels of compaction, the pit should be re-filled with only the course aggregates and it should be seen that sufficient loose course aggregate should still remain balance after filling up the pit.

Frequency: *The SQM shall record observations as given below:*

Test	Frequency
<i>Gradation Test for each layer of WBM</i>	<i>In Stage-II, at least 1 test for gradation of course aggregate and fine aggregate separately for each km (irrespective of the executed quantity).</i>
	<i>In Stage-III, if gradation of Course aggregate and fine aggregate of the stretch of road has not been monitored earlier, at least 1 test for each km</i>
<i>Test for Liquid Limit and Plasticity Index in case fine aggregates are crushable type.</i>	<i>In Stage-II, at least 1 test for each km (irrespective of the executed quantity).</i>
	<i>In Stage-III, if WBM of the stretch of road has not been monitored earlier, at least 1 test for each km</i>

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Volumetric Analysis for assessment of compaction of WBM	In Stage-II or III, in case, WBM is complete and if every km not monitored for quality, at least one test per km.
Surface Evenness using straight edge	In Stage-II or III, in case, WBM is complete and if every km not monitored for quality, at least 2 test per km.
Thickness of compacted layer	In Stage-II or III, in case, WBM is complete and if every km not monitored for quality, at least 2 test per km.

Grading for WBM: Material – If material of course aggregate and fine aggregate confirms to grading requirements and in case of use of crushable aggregate, it confirms to plasticity requirements, 'S' grade would be awarded otherwise 'U' grade would be awarded.

Compaction, Surface evenness and Thickness of Layer – If by volumetric analysis, the proportion of fine aggregates to course aggregates is within the prescribed limits, the compaction of WBM layer is proper, thickness of the layer is as provided in DPR and surface evenness is within the prescribed limits, 'S' grade would be awarded otherwise 'U' grade would be awarded.

If during construction the process of construction of WBM with appropriate dry-rolling and wet-rolling is not being properly observed, the quality would be graded 'U' irrespective of any other observations or grading for this item.

6.8. Bituminous Construction: Generally under PMGSY, the work of 20 mm pre-mix carpet followed by pre-mix/liquid seal coat is taken up over primed and tack coated WBM base-course. In some cases, construction of bituminous macadam or modified penetration macadam is also taken up. Mix-seal surfacing is also being constructed in some parts of the country. The requirements of quality monitoring for various components of the bituminous construction are given below:

(a) Preparation of Surface for Bituminous Construction: It is extremely important to properly brush off loose material and fine aggregates generally available on the surface of WBM, however, it has been observed that cleaning of WBM surfaces does not receive proper attention of the staff of PIU. The SQM is expected to check this aspect meticulously. Even in cases where the bituminous construction has been completed, it is possible to fairly assess this aspect by carefully removing the bituminous layer and observing the availability of loose material between the WBM layer and bituminous layer.

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(b) Priming Coat and Tack Coat: Application of priming coat over the non-bituminous base-course by slow setting emulsion is prescribed in the Specifications. Application of tack coat by rapid setting emulsion or even by viscosity grade straight-run bitumen is also prescribed. Application of adequate quantities of bituminous material is to be ensured for both of these items and can be checked by conducting simple tests of the rate of spread. In addition, a uniform unbroken spread of emulsion/straight-run bitumen has to be ensured for both the above items and can only be ensured through its application by mechanical spraying rather than spray by a perforated cane. Quality of emulsion with respect to proportion of water and bituminous material is critical in application of prime coat. The temperature at the time of

application of straight-run bitumen is critical to the quality of tack coat. The SQM is expected to make clear observations about these aspects.

Frequency: *If the work of prime coat and tack coat is ongoing, the SQM shall carry out one test for rate of spread of binder. If the work in bituminous surface has been completed, the SQM shall carry out assessment of level of cleaning by removing bituminous layer at least at one spot in every 500 meters of the road.*

Grading: *If the inspection is carried out during the execution of the above items, the quality grading of 'S' would be given if surface of base-course has been properly cleaned and priming coat or tack coat using prescribed emulsion/ viscosity grade bitumen in prescribed quality and quantity has been laid. Otherwise 'U' grade would be given. In case, the work is complete and upon removal of the bituminous layer if loose material is observed between the WBM layer and bituminous layer, 'U' grade would be given.*

(d) 20 mm Thick Pre-mix Carpet/BM/MSS and Seal Coat: The following are critical to quality of bituminous layers:

- Gradation of aggregate
- Quantity of Binder
- Mixing and laying temperature
- Compacted thickness
- Surface Evenness

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The above aspects can be easily monitored when the work in this item is ongoing. While the work is ongoing, the assessment of quantity of binder may be made easily, however, when the work is complete, the SQM shall carry out bitumen extraction test and while interpreting the results, possible presence of binder used for tack coat should be appropriately accounted for.

Frequency: *The SQM shall record observations as given below:*

Test	Frequency
<i>Level of cleanliness of WBM surface prior to application of bituminous layer. (if work is ongoing observe the surface. If BT layer laid, assess by carefully removing the BT layer.)</i>	<i>1 per Km</i>
<i>Quality of Prime Coat and Tack Coat with respect to quality of material and workmanship - Visual Observation - if work is ongoing.</i>	<i>1 observation on the day of inspection</i>
<i>In PMC/BM/MPM/Seal Coat, gradation Test for Course Aggregate (if the work in the item is ongoing)/visual observation in case of completed item of work</i>	<i>In Stage- III, At least one test on the day of inspection.</i>
<i>In PMC/BM/MPM/ Seal Coat, temperature of Binder at the time of mixing and laying (if the work in the item is ongoing)</i>	<i>In Stage- III, at least one test on the day of inspection.</i>
<i>In PMC/BM/MPM, thickness of compacted layer and Bitumen Extraction Test</i>	<i>In Stage-III, in case, PMC is complete and if every km not monitored for quality, at least 1 test per km for Bitumen extraction and 2 tests per km for thickness of layer.</i>
<i>Surface Evenness using straight edge</i>	<i>In Stage-III, in case, PMC is complete and if every km not monitored for quality, at least 2 test per km.</i>

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Grading: Grade 'S' would be given if the relevant item confirms to prescribed values. Otherwise, 'U' grade would be given.

6.9. Shoulders: For shoulders, appropriate material, as provided in the DPR, is to be used and construction of the shoulder has to take place simultaneously with construction of other layers of pavements. For monitoring the quality of shoulders the following quality parameters are critical:

- Quality of material.
- Compaction.
- Thickness of compacted layer.
- Simultaneous construction and compaction of shoulder with other layers of pavement.

The SQM is expected to carry out actual field tests for all the above items for samples fairly representative of overall quality of the item.

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Frequency: The SQM shall record observations as given below:

Test	Frequency
Quality of Material	In Stage-II, at least 1 test for each km (irrespective of the executed quantity).
	In Stage-III, if quality of material of the stretch of road has not been monitored earlier, at least 1 test for each km
Degree of Compaction	In Stage-II, minimum 1 test for each km length or part thereof (irrespective of the executed quantity).
	In Stage-III, if shoulder of the stretch of road has not been monitored earlier, minimum 1 test for each km length or part thereof (irrespective of the executed quantity).
Thickness of compacted layer	In Stage-II or III, in case, shoulder is complete and if every km not monitored for quality, at least 2 test per km.

Grading for Shoulder: Material – If material as provided in the DPR has been used, ‘S’ grade would be awarded otherwise ‘U’ grade would be awarded.

Compaction, Thickness of layer and Simultaneous Construction with Sub-base and Base Course – If degree of compaction is within the prescribed limits and thickness of the layer is as provided in DPR and shoulder is being constructed, simultaneously with sub-base or base course, ‘S’ grade would be awarded otherwise ‘U’ grade would be awarded.

6.10. Cross Drainage Works: There are a variety of CD works, taken up under PMGSY. Quality monitoring requirements for some common types of CD works are given below:

(a) Hume Pipe Culverts and Vented Cause-way: The following aspects are critical for quality of hume pipe culverts:

- Adequacy of provision for face/main walls, wings and return walls has been made as per site conditions (whether these walls provided with appropriate design in appropriate length etc).
- Quality of material and workmanship of face/main walls, wing and return walls.
- Quality of hume-pipes
- Adequacy of cushion over hume-pipes.
- In case of vented cause-ways, quality and workmanship of surfacing over vented cause-way (generally, CC Pavement is constructed and quality monitoring as covered under CC Pavement would apply to this item also).

While the work is ongoing the SQM shall check all the above aspects and report. In case of completed hume-pipe culverts also the above aspects can be checked and reported. In case of cause-ways, it is

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important to check, as to whether; main walls have been appropriately keyed on the banks of the drain taking them well beyond HFL to avoid out-flanking in high floods. The SQM shall make observations on all the above aspects during his inspection and report.

(b) Simply Supported Slab Culvert or Cement Concrete Box Culverts: Quality monitoring aspects for such works would be decided on case-to-case basis.

Grading: *If quality of material and workmanship is as per provisions grade 'S' would be given. Otherwise 'U' would be given.*

6.11. Side Drains and Catch Water Drains: For ensuring appropriate surface drainage, provision of side drains and if required, catch water drains followed by integration of these drains to across drain is critical. In case of hill roads, provision of side drains along with catch-pits of appropriate size at appropriate locations followed by provision of appropriate cross drainage work is critical. The SQM at all stages of inspection is expected to make clear observations about the aspects given above. He should clearly mention the adequacy of the size of the side drain and shall observe clearly, whether, the longitudinal gradient of the side drains is adequate for ensuring disposal of water.

Grading: *If quality of material and workmanship is as per provisions grade 'S' would be given. Otherwise 'U' would be given.*

6.12. Cement Concrete/ Semi Rigid Pavement and Associated Pucca Side Drains: In case of cement concrete and other semi rigid pavements, the following are critical to quality:

- Quality of cement concrete
- Workmanship of cement concrete
- Joints
- Thickness
- Size and Shape of associated pucca side drains and their adequacy
- Quality and Workmanship of material used in pucca side drains
- Longitudinal levels of pucca side drains, their integration to

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- cross drains or appropriateness of the provisions for disposal.
- Cross drainage works

While the work is ongoing, the SQM is expected to verify all the above items, however, while the work is complete, measurements about the thickness of CC Pavement, Surface conditions such as cracking etc may visually be seen, the register of cube test may be verified and based on visual observations, comments on quality of material and workmanship may be made. The aspects of size and shape of associated pucca side drains and their adequacy, Quality and Workmanship of material used in pucca side drains and Longitudinal levels of pucca side drains, their integration to cross drains or appropriateness of the provisions for disposal may be observed and recorded even if the work is complete. The SQM shall make observations about the above aspects during his inspection and report.

Grading: *If quality of material and workmanship is as per provisions grade 'S' would be given. Otherwise 'U' would be given.*

6.13. Road Furniture and Markings: Under Pradhan Mantri Gram Sadak Yojana, every work is to be provided with Citizen Information Board and main board even before the actual grounding of the work. Logo boards and other road furniture are to be provided at appropriate time. The SQM shall check, as to whether, all Informatory Boards, as prescribed under the program have been provided on the site and report. The SQM shall also check and report the quality of material and workmanship of road furniture and markings.

Grading: *If quality of material and workmanship is as per provisions grade 'S' would be given. Otherwise 'U' would be given.*

6.14. Observations on action regarding issues mentioned in earlier inspection reports of SQMs or National Quality Monitors (NQMs):

If the work being inspected by the SQM was earlier inspected by other SQM/NQM, the SQM shall make item and sub-item wise observations on the action by the PIU regarding issues mentioned in reports of earlier inspections by SQMs or NQMs and record these observations in the relevant item of work. In case, the SQM is verifying the Action Taken Report of PIU on the observations of NQM, the SQM shall make

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his observations about verification in the separate sheet.

7. Sub-item/Item wise Grading and Overall Grading of Work: The sub-item wise grading of every item of work would be entered in the table at para 16 of Reporting Format 1 Part II and the item grading would be the lowest of the grading of sub-items within that item. The overall Item Grading would be calculated in the following manner.

If, any of the items in item no. 5, 6, 7 and 8 are graded as 'U', overall grading of the work shall be 'U' i.e. 'Unsatisfactory'.

If, all the items given in above four items are 'S' but grading in any of other items is 'U' or 'RI', the overall grading of work shall be 'S-RI' i.e. Satisfactory but Requiring Improvement.

If grading of all items is 'S', the overall grading of work shall be 'S' i.e. 'Satisfactory'.

Item No.	Sub Item for Observation	Awardable Grades		
		S	SRI	U
Item No 1	Setting Out and Working Drawing	S	SRI	U
Item No 2	Site Clearance and Grubbing	S	SRI	U
Item No 3	Quality Arrangements	S	SRI	U
Item No 4	Geometrics	S		U
Item No 5 A	Earth Work and Sub-grade in Embankment/ Cutting	S		U
Item No 5 B	Earth Work in Cutting in Hilly/ Rolling Terrain	S		U
Item No 6	Sub-Base	S		U
Item No 7	Base Course – Water Bound Macadam	S		U
Item No 8	Bituminous Layer – Premix Carpet (PMC)/ Surface Dressing (SD)	S		U
Item No 9	Shoulders	S	SRI	U
Item No 10	Cross Drainage Works – Causeways of all spans and Culverts upto 6 m. span.	S	SRI	U
Item No 11	Side Drain and Catch Water Drain	S	SRI	U
Item No 12	CC/ Semi Rigid Pavements and Associated Pukka Drains	S		U

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Item No 13	Road Furniture and Markings	S		U
Overall Grading (Web Generated)		S	SRI	U

8. Digital Records of Inspections: Under the second tier of quality monitoring the State Quality Monitor and the PIU shall also ensure digital photography of the observations on quality of material and workmanship of the road in each inspection. The photography shall be arranged by the PIU and photographs shall be taken as per Guidelines for Digital Photography given at **Annexure 4**. It would be ensured by the PIU that the quality of digital photographs should be good and display the issues pertaining to quality of material and workmanship. Hard copy and soft copy of digital photographs would be attached by the SQM with the report. For every inspection maximum 10 selected photographs shall also be uploaded on OMMAS website.

9. Reporting of SQM observations on OMMAS Website: The abstract of observations of SQM and maximum 10 digital photographs for each inspection shall compulsorily be entered in OMMAS website as per guidelines given in **Annexure 3**. The SQM would be required to make mandatory online entry of the item grading. The website would automatically generate the overall grading and also enable the States, PIUs and the NRRDA to carry out the further analysis of SQM reports. To enable the SQM to make online entry, he/she would be given the log-in and the password for data entry limited to items given in Para 7 above. The inspection of SQM shall not be considered valid unless the abstract of observations are entered on website in the prescribed manner.

10. Submission of Hardcopy of Reports by SQM: The SQM is expected to fill up the majority of observations in the prescribed formats during the inspection itself, however, in some items, in which the test results may take some time, the observations may be filled up latest by the next day. Immediately upon completion of the inspection but in all cases before the SQM leaves the district where he/she has performed inspection, he/she shall deliver the inspection report to the concerned PIU and send a copy to SQC or other authorities as may be prescribed by the State.

11. Action on SQM Observations and Grade Improvement: Upon receipt of

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the inspection reports and observations of SQM, the PIU shall initiate action (if required) for rectification of defects (if any) pointed out in the observations. This shall be ensured by the PIU that an Action Taken Report (ATR) is furnished to the SQC within 30 days of inspection. The SQC shall scrutinize the ATRs with reference to the observations of SQM in the inspection report. The SQC shall make his observations on the ATRs and communicate them to PIU for necessary action. The process of verification of Action Taken Reports in the second tier would be carried out in the following manner:

- (a) Every work is to be inspected thrice during its execution, therefore, if there are any adverse observations about quality, the PIU is required to rectify and report to SQC, however, the physical verification of the action taken should be done in the next inspection.
- (b) Quality grading of work in the last inspection of SQM would be considered and effect of earlier quality grading would not be taken into account subject to condition that if in earlier inspections, the work has been graded as 'SRI' or 'U' and the action for rectification is taken by the PIU followed by verification of action taken report by the SQM.
- (c) If work is observed 'Unsatisfactory' upon completion, the State would not be able to accept the work and the PIU would be required to carry out rectification and get the work re-inspected.

In view of the above, the improvement in quality grades awarded under second tier of quality mechanism would not be required.

12. Selection and Performance Evaluation of State Quality Monitors: It is important to structure the Independent Quality Monitoring in such a way that actual field realities are brought out, however, it is more important to ensure that the independent monitors is correct and they are carry out inspections properly and report truthfully. Therefore, the State would evolve appropriate mechanism for selection and periodic review of performance of State Quality Monitors. States may develop appropriate systems in this regard taking guidance from process of selection and performance evaluation of National Quality Monitors under the third tier of quality monitoring.

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Annexure 1
Format 1- Part I

Format for information to SQM for Inspection of PMGSY Work
PART I- Work Information (To be filled-up by PIU)

Work is Ongoing Completed

GENERAL:

1.1. Date of Inspection:

1.2. Name of State Quality Monitor:

1.3. District: Block:

1.4. Name of Road:

1.5. Package No.:

1.6. Length:Km Flexible Pavement,Km. CC/other Pavementm. =
Total.....Km

1.7. Estimated Cost (As cleared by GOI):

1.8. Technical Sanction Cost:

1.9. The Work is a Case of: New connectivity Up gradation

1.10. Terrain Plain Rolling Hilly

1.11. Date of Start of the Work:

1.12. Stipulated Date of Completion:

1.13. Actual Date of Completion (if work completed):

2. PHYSICAL PROGRESS: (In case of On going works only) Construction Program and Physical Progress:

Item	Completed percentage of Item	Dates for completion	Start Date	Completion Date	Delay in Months
Earth Work		Due			
		Actual			
CD Works		Due			
		Actual			
Sub base i/c Shoulders		Due			
		Actual			
Base Course (Non Bitu.)		Due			
		Actual			

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Base /Wearing Course(Bitu.)		Due			
		Actual			
CC Pavement		Due			
		Actual			
Signage etc		Due			
		Actual			

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3. QUALITY CONTROL:

3.1. Location of Field Laboratory:

3.2. Quality Control Register Part-I is maintained by:

3.3. Quality Control Register Part-II is maintained by:

4. INSPECTIONS BY NQM, SQM or SENIOR OFFICERS AND ACTION TAKEN:

Inspection by NQMs, SQMs and senior (i.e. SE or CE) departmental officers and action taken statement:

Date of Visit	Inspected By	Observations	Action Taken by PIU with Date

Name and Signature of the Head of PIU, Date:.....

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Format 1- Part II

Report of State Quality Monitor (SQM)
PART II- Observations of SQM for Ongoing/Completed Work

(To be filled-up by SQM, use additional sheets, if required.)

Stage of Work: I II III

1. SETTING OUT AND WORKING DRAWING: For all stages of work

#	Whether Bench marks @ 4 per km established (Y/N)	Exact Locations of the Bench Marks	Whether Center Line of Carriage Way accurately established and referenced with Marker Pegs and Chainage Boards (Y/N)	Whether properly prepared Working Drawing for the work under progress is available (Y/N)

<p>Grading: Grade: S <input type="checkbox"/> SRI <input type="checkbox"/> U <input type="checkbox"/> If this item is graded SRI/U, write clear reasons and suggestions for improvement:</p>

2. SITE CLEARANCE AND GRUBBING: For Stage I of Work

#	Whether Clearing and Grubbing being done as per DPR and Material obtained is being disposed off properly (Y/N)	Whether the material available from scarifying existing work or clearing operations can be salvaged and reused (Y/N)	Name the reusable material obtainable from clearance or scarification and indicate approximate quantity and its re-use by the PIU.

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#	Based on executed quantities whether all mandatory tests conducted.	Whether QC Register Part I maintained as per provisions.	Whether QC Register Part II maintained and test results monitored as per provisions.
	Yes Partly No	Yes Partly No	Yes Partly No

Grading: Grade: S SRI U If this item is graded SRI/U, write clear reasons and suggestions for improvement:

4. GEOMETRICS: The SQM should take at-least two measurements in 1 Km length and if it is found that the roadway and carriageway is inadequate SQM may take more observations:

Observations –Road way width, Carriage way and Camber.

Ref. RD	Roadway Width (m)	Carriage way Width (m)	Camber in %	Ref. RD	Roadway Width (m)	Carriage way Width (m)	Camber in %

Observations – Super-elevation and Extra Widening at curves.

Ref. RD	Super Elevation	Extra Widening provided (Y/N)	Ref. RD	Super Elevation	Extra Widening provided (Y/N)

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Grade:	S	U	If this item is graded U, write clear reasons and suggestions for improvement:

OBSERVATIONS REGARDING THE QUALITY OF ITEMS OF

WORK: 5. Earthwork:

Observations –Quality of Material for Embankment/ Sub-grade:

#	Location (RD)	On Visual Classification identify the Group Symbol and write	Quality of material is acceptable. (Y/N)

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Grade: S U If this item is graded U, write clear reasons and suggestions for improvement:

Observation – Workmanship for Embankment and Sub-grade Construction:

#	Location (RD)	MDD kN/m ³ (As per record)	Field Moisture Content	Degree of Compaction		
				Field Density kN/m ³	Dry Density kN/m ³	Compaction adequate. (Y/N)

Grade: S U If this item is graded U, write clear reasons and suggestions for improvement:

Observation – Side slopes and profile:

#	Location (RD)	Whether Side Slopes Satisfactory (Y/N)	Whether profile is Satisfactory (Y/N)

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Observations - Earth work in Hilly/Rolling terrain or high Embankments:

#	Location (RD)	Cut Slopes & Profile, whether appears to be stable. (Y/N)	Adequate slope protection works executed. (Y/N)	Formation is properly dressed and traffic worthy. (Y/N)

Observations – Longitudinal Gradient in case of road in hilly/rolling terrain:

Ref. Between RD...& RD...	Longitudinal Gradient	S/U	Ref. Between RD...& RD...	Longitudinal Gradient	S/U

<p>Grade: <input type="checkbox"/> S <input type="checkbox"/> U <input type="checkbox"/> If this item is graded U, write clear reasons and suggestions for improvement:</p>
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6. Sub-Base:

Observations - Quality of Material and Workmanship:

#	Location (RD)	Confirms to Grading. (Y/N)	Suitable from plasticity angle. (Y/N)	Whether compaction is adequate. (Y/N)	Observed Thickness of Layer (in mm)	Prescribed Thickness provided (Y/N)

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Grade: S U If this item is graded U, write clear reasons and suggestions for improvement:

7. Base Course:

Observations- Quality of Material and Workmanship of WBM:

#	Location (RD)	Thickness of each layer of WBM (mm)	Thickness is adequate. (Y/N)	Aggregate confirms to Grading (Y/N)	Filler material is non-plastic to desired extent. (Y/N)	Volume of filler material percent of course aggregate	Whether adequate compaction is done. (Y/N)

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Observations - Surface evenness: Surface evenness in about 200 m critical representative length of completed WBM:

Grade:	<input type="checkbox"/> S	<input type="checkbox"/> U	If this item is graded U, write clear reasons and suggestions for improvement:
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8. Bituminous Course: Premix Carpet/Surface Dressing/ BM/ MPM etc including Seal Coat: Observations - Quality of Material and Workmanship of BT Layer (in case of ongoing works):

Observations about level of cleanliness of WBM surface prior to application of bituminous layer. (if work is ongoing observe the surface. If BT layer laid, assess by carefully removing the BT layer.):

Observations about Quality of Prime Coat and Tack Coat with respect to quality of material and workmanship - Visual Observation - if work is ongoing:

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In case of PMC/BM/MPM/ Seal Coat

#	Location (RD)	Whether Course Aggregate confirms to grading. (Y/N)	Whether the binder is of approved grade. (Y/N)	Write Mixing Temperature and whether it is in permissible limits. (Y/N)	Write Laying Temperature and whether it is in permissible limits. (Y/N)

Grade: S U If this item is graded U, write clear reasons and suggestions for improvement:

Observations - Workmanship of BT layer PMC/BM/MPM (in case of completed works):

#	Location (RD)	Thickness		Whether surface evenness is within acceptable limits. (Y/N)
		Thickness in mm	Whether thickness is adequate. (Y/N)	

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Grade: S U If this item is graded U, write clear reasons and suggestions for improvement:

9. Observations - Quality of Shoulders:

#	RD of observation	Thickness of layer in mm	Whether quality of the material is acceptable. (Y/N)	Whether quality of compaction workmanship is acceptable.(Y/N)	Whether Shoulders being constructed simultaneously with sub-base and base course (Y/N)

10. Cross Drainage Works: Observations - Quality of CDs:

#	RD at which CD is located	Type of CD	Whether quality of the material is acceptable. (Y/N)	Whether quality of workmanship is acceptable. (Y/N)

Grade: S SRI U If this item is graded SRI/U, write clear reasons and suggestions for improvement:

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11. Side Drains and Catch water Drains: Observations:

#	Reference of RDs where side drain constructed.	RD at which observation made.	Whether general quality of the side drains/ catch-water drains is acceptable. (Y/N)	Whether side drains are integrated to cross drains. (Y/N)

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Grade: S SRI U If this item is graded SRI/U, write clear reasons and suggestions for improvement:

12. CC/ Semi-Rigid (SR) Pavements and Associated Pucca Side Drains:

#	Reference of RDs, CC/SR Pavements provided.	RD at which observation made.	Thickness		General quality material acceptable. (Y/N)	General quality of workmanship acceptable(Y/N)
			Thickness in mm	Acceptable (Y/N)		

Comments about adequacy of face/main walls, wings and retaining walls:

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Grade:	<input type="checkbox"/> S	<input type="checkbox"/> U	If this item is graded U, write clear reasons and suggestions for improvement:
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13. Road Furniture and Markings

Observations - Item No. 14 a: Quality Road Furniture and Markings:

Main Informatory Board Fixed:	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Citizen Information Board Fixed:	<input type="checkbox"/> Yes	<input type="checkbox"/> No

Grade:	<input type="checkbox"/> S	<input type="checkbox"/> U	If this item is graded U, write clear reasons and suggestions for improvement:
---------------	----------------------------	----------------------------	--

Observations - Quality Road Furniture and Markings:

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13.1.1. Logo Boards Fixed:	Yes	No
13.1.2. 200m. Stones fixed:	Yes	No
13.1.3. 1 Km. Stone fixed:	Yes	No
13.1.4. Guard Stones fixed on Curves:	Yes	No
13.1.5. Mandatory and Cautionary Signage	Yes	No

Grade: S U If this item is graded U, write clear reasons and suggestions for improvement:

14. General Observations of SQM, (including the observations made during the interaction with PIU staff and Contractor's/ Consultant's Engineers):

14.1. Observations about deficiency in project preparation (Give detailed observations about deficiencies in general and items which have been left but are required as per site conditions):

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Whether the work has been completed/is in progress as per work program or the delay has occurred. If delay has occurred, whether the liquidated damages have been withhold or recovered:

14.3. Whether the work has been completed within the sanctioned cost, if not, what is the action taken by the PIU (*in case of complete works*):

14.4. Observations about the action taken by the PIU on the observations of inspecting officers including SQMs and NQMs. (Clearly offer comments about the action taken on the observations of Departmental Officers, State Quality Monitors and National Quality Monitors).

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14.5. Comments about difference in observations made by NQMs/SQMs in earlier inspections (the NQM shall study the earlier inspection reports of NQMs / SQMs, if any and offer his clear comments about the differences in observations, if any).

15. Other observations, if any:

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16. **Quality Grading of items and sub-items of work:** The grading of every sub-item and item of work is given below.

#	Sub Item for Observation	Stage of Work	Awardable Grades	Awarded Grades
1	2	3	4	5
Item 1 – Setting Out and Working Drawing				
a	Bench Mark and Centre Line	All Stages	S/SRI/U	
b	Availability of Working Drawing	All Stages	S/SRI/U	
Item Grade			S/SRI/U	
Item 2 – Site Clearance and Grubbing				
a	Site Clearance and Grubbing	Stage-I	S/SRI/U	
b	Re-use of Salvageable Material	Stage-I	S/SRI/U	
Item Grade			S/SRI/U	
Item 3 - Quality Arrangements				
a	Quality Arrangements	All Stages	S/SRI/U	
b	Number of Mandatory Tests as per prescribed frequency	All Stages	S/SRI/U	
c	Maintenance of QC Registers	All Stages	S/SRI/U	
Item Grade			S/SRI/U	
Item 4 – Geometrics				
a	Road way width	2 per Km in every inspection	S/U	
b	Carriageway width	2 per Km in every inspection	S/U	
c	Camber	2 per km	S/U	
d	Super-elevation & Extra Widening at Curves	1 curve in each km	S/U	
Item Grade			S/U	
Item 5A - Earth Work and Sub-grade in Embankment/ Cutting				

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a	Quality of Material for Embankment/ Sub-grade	In Stage-I, 1 per km/ In Stage- II or III, 1 per km	S/U	
b	Compaction	In Stage-I, 2 per km/ In Stage- II or III, 2 per km	S/U	
c	Side Slopes and Profile	2 per km in Stage III	S/U	

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Item 5B - Earth Work in Cutting in Hilly/ Rolling Terrain

a	Stability and Workmanship of Cut Slopes	Stage I and II, at 2 critical locations with maximum height of cutting in each km	S/U	
b	Adequacy of Slope Protection	All Stages - In general	S/U	
c	Upon completion of formation cutting, dressing, traffic worthiness	At Stage III, at 2 critical locations with maximum height of cutting in each km	S/U	
d	Longitudinal Gradient	Stage II/III - 1 critical and fairly representative stretch of 200m in each Km	S/U	
Item Grade			S/U	

Item 6 - Sub-Base

	Quality of Material			
a	Grain Size	In Stage- II or III, 1 per km	S/U	
b	Plasticity		S/U	
c	Compaction	In Stage- II or III, 1 per km	S/U	
d	Total Thickness of Layer	2 per Km	S/U	
Item Grade			S/U	

Item 7 - Base Course – Water Bound Macadam

a	Grain Size of Course Aggregate	In Stage- II or III, 1 per km	S/U	
b	Test for Liquid Limit and Plasticity Index in case fine aggregates are crushable type		S/U	
c	Volumetric Analysis for assessment of compaction of WBM	In Stage- II or III, 1 per km	S/U	

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d	Surface Evenness using straight edge	In completed WBM 2 tests per km	S/U	
e	Thickness of every layer of WBM.	2 per Km	S/U	
Item Grade			S/U	

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**Andhra Pradesh State Rural Road Development Agency****Item 8 - Bituminous Layer – Premix Carpet (PMC)/ Surface Dressing (SD)**

a	Level of cleanliness of WBM surface prior to application of bituminous layer	1 per Km	S/U	
b	Quality of Prime Coat/ Tack Coat with respect to quality of material and workmanship	1 observation on the day of inspection	S/U	
c	Gradation Test for Course Aggregate (if the work in the item is ongoing)/visual observation in case of completed item of work	1 test on the day of inspection	S/U	
d	Grade of bitumen and temperature at the time of mixing and laying (if the work in the item is ongoing)	1 test on the day of inspection	S/U	
e	Bitumen Extraction Test if PMC is complete	1 test per Km	S/U	
f	Thickness of layer	2 per Km	S/U	
g	Surface Evenness in case of completed BT work	2 per Km	S/U	
Item Grade			S/U	

Item 9 – Shoulders

a	Quality of material for shoulders	In Stage- II or III, 1 test per Km	S/SRI/U	
b	Degree of compaction	In Stage- II or III, 1 test per Km	S/SRI/U	
c	Thickness of layer	In Stage- II or III, 2 tests per km	S/SRI/U	
Item Grade			S/SRI/U	

Item 10 - Cross Drainage Works – Causeways of all spans and Culverts upto 6 m. span.

a	Quality of Material – Concrete, Stone/ brick masonry, Hume pipes including size etc.	All Stages	S/SRI/U	
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b	Quality of Workmanship such as positioning of pipes, wing walls, cushion over H Pipes etc.	All Stages	S/SRI/U	
Item Grade			S/SRI/U	
Item 11 - Side Drain and Catch Water Drain				
a	General quality of Side Drains/ Catch Water Drains and their integration with CDs.	All Stages	S/SRI/U	
Item Grade			S/SRI/U	
Item 12 - CC/ Semi Rigid Pavements and Associated Pukka Drains				
a	Quality of Material – Concrete, Stone/ Concrete Block Pavement etc.	In Stage- II or III, 1 per 100 m. Length of Pavement	S/U	
b	Strength of CC in Concrete Pavement/ Concrete Block Pavement	In Stage- II or III, 1 per 100 m. Length of Pavement	S/U	
c	Quality of Workmanship – Wearing surface texture, Adequacy of setting of concrete, Joints, Edges etc.	In Stage- II or III	S/U	
d	Thickness of Layer	In Stage- II or III, 1 per 100 m. Length of Pavement	S/U	
Item Grade			S/U	
Item 13 - Road Furniture and Markings				
a	Citizen Information Board, Main Informatory Board, Quality and whether fixed during construction.	Stage-I	S/U	
b	Logo boards, 200 m stones and Km stones, quality and whether fixed after completion.	Stage-III	S/U	

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c	Whether the information in boards is given in local language.	Stage-I and III	S/U	
Item Grade			S/U	

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17. **Overall Grading of Work:** The overall grading calculated on the basis of item and sub-item wise grading is given below:

Item No.	Sub Item for Observation	Awarded Grade
Item No 1	Setting Out and Working Drawing	
Item No 2	Site Clearance and Grubbing	
Item No 3	Quality Arrangements	
Item No 4	Geometrics	
Item No 5 A	Earth Work and Sub-grade in Embankment/ Cutting	
Item No 5 B	Earth Work in Cutting in Hilly/ Rolling Terrain	
Item No 6	Sub-Base	
Item No 7	Base Course – Water Bound Macadam	
Item No 8	Bituminous Layer – Premix Carpet (PMC)/ Surface Dressing (SD)	
Item No 9	Shoulders	
Item No 10	Cross Drainage Works – Causeways of all spans and Culverts upto 6 m. span.	
Item No 11	Side Drain and Catch Water Drain	
Item No 12	CC/ Semi Rigid Pavements and Associated Pukka Drains	
Item No 13	Road Furniture and Markings	
Overall Grading		

Signature:

Name:

Date:

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Annexure 2

Statement Showing Sub-Item and Item wise Observations to be made, their Method, Frequency and Awardable Quality Grade

#	Sub Item for Observation	Method of Observation	Frequency	Grades
1	2	3	4	5
Item 1 – Setting Out and Working Drawing				
a	Bench Mark and Centre Line	Visual	All Stages	S/SRI/U
b	Availability of Working Drawing	Visual	All Stages	S/SRI/U
Item Grade				S/SRI/U
Item 2 – Site Clearance and Grubbing				
a	Site Clearance and Grubbing	Visual	Stage-I	S/SRI/U
b	Re-use of Salvageable Material	Visual	Stage-I	S/SRI/U
Item Grade				S/SRI/U
Item 3 - Quality Arrangements				
a	Quality Arrangements	Visual	All Stages	S/SRI/U
b	Number of Mandatory Tests as per prescribed frequency	Examination of Record	All Stages	S/SRI/U
c	Maintenance of QC Registers	Verification of QC Register I and II	All Stages	S/SRI/U
Item Grade				S/SRI/U
Item 4 – Geometrics				
a	Road way width	Measurements	2 per Km in every inspection	S/U
b	Carriageway width	Measurements	2 per Km in every inspection	S/U
c	Camber	Measurement	2 per km	S/U
d	Super-elevation &			

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	Extra Widening at Curves	Measurement	1 curve in each km	S/U
Item Grade				S/U
Item 5A - Earth Work and Sub-grade in Embankment/ Cutting				
a	Quality of Material for Embankment/ Sub-grade	Visual Classification of Soils	In Stage-I, 1 per km/ In Stage- II or III, 1 per km	S/U
b	Compaction	Field Density Test by sand replacement/core-cutter method.	In Stage-I, 2 per km/ In Stage- II or III, 2 per km	S/U
c	Side Slopes and Profile	Measurement	2 per km in Stage III	S/U

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#	Sub Item for Observation	Method of Observation	Frequency	Grades
1	2	3	4	5
Item 5B - Earth Work in Cutting in Hilly/ Rolling Terrain				
a	Stability and Workmanship of Cut Slopes	Visual Observation	Stage I and II, at 2 critical locations with maximum height of cutting in each km	S/U
b	Adequacy of Slope Protection	Visual Observation	All Stages - In general	S/U
c	Upon completion of formation cutting, dressing, traffic worthiness	Visual Observation	At Stage III, at 2 critical locations with maximum height of cutting in each km	S/U
d	Longitudinal Gradient	Measurements	Stage II/III - 1 critical and fairly representative stretch of 200m in each Km	S/U
Item Grade				S/U
Item 6 - Sub-Base				
Quality of Material				
a	Grain Size	Gradation Test	In Stage- II or III, 1 per km	S/U
b	Plasticity	Test of LL, PI / Hand-feel test of ball making with moisture content		S/U
c	Compaction	Field Density Test by sand replacement/ core cutter method.	In Stage- II or III, 1 per km	S/U
d	Total Thickness of Layer	Measurement by taking pit for full layer thickness	2 per Km	S/U
Item Grade				S/U
Item 7 - Base Course – Water Bound Macadam				
a	Grain Size of Course Aggregate	Gradation Test	In Stage- II or III, 1 per km	S/U
b	Test for Liquid Limit and Plasticity Index in case fine aggregates are crushable type	Test of LL, PI / Hand-feel test of ball making with moisture content		S/U
c	Volumetric Analysis for assessment of	Hand-feel test -	In Stage- II or III, 1 per	S/U

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	compaction of WBM	volumetric analysis.	km	
d	Surface Evenness using straight edge	Straight Edge	In completed WBM 2 tests per km	S/U
e	Thickness of every layer of WBM.	Actual Measurement by taking pit	2 per Km	S/U
Item Grade				S/U

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#	Sub Item for Observation	Method of Observation	Frequency	Grades
1	2	3	4	5
Item 8 - Bituminous Layer – Premix Carpet (PMC)/ Surface Dressing (SD)				
a	Level of cleanliness of WBM surface prior to application of bituminous layer	Visual Observation - if work is ongoing observe the surface. If BT layer laid assess by carefully removing the BT layer	1 per Km	S/U
b	Quality of Prime Coat/ Tack Coat with respect to quality of material and workmanship	Visual Observation - if work is ongoing.	1 observation on the day of inspection	S/U
c	Gradation Test for Course Aggregate (if the work in the item is ongoing)/visual observation in case of completed item of work	Grain Size Analysis (Gradation Test).	1 test on the day of inspection	S/U
d	Grade of bitumen and temperature at the time of mixing and laying (if the work in the item is ongoing)	Measurement of temperature by thermometer.	1 test on the day of inspection	S/U
e	Bitumen Extraction Test if PMC is complete	Bitumen Extraction Test	1 test per Km	S/U
f	Thickness of layer	Measurement by taking pit	2 per Km	S/U
g	Surface Evenness in case of completed BT	By straight edge	2 per Km	S/U

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	work			
Item Grade				S/U
Item 9 – Shoulders				
a	Quality of material for shoulders	Visual Observation	In Stage- II or III, 1 test per Km	S/SRI/U
b	Degree of compaction	Field Density Test by sand replacement/core-cutter method.	In Stage- II or III, 1 test per Km	S/SRI/U
c	Thickness of layer	Measurement	In Stage- II or III, 2 tests per km	S/SRI/U
Item Grade				S/SRI/U
Item 10 - Cross Drainage Works – Causeways of all spans and Culverts upto 6 m. span.				
a	Quality of Material – Concrete, Stone/ brick masonry, Hume pipes including size etc.	Visual observation (for CC verify cube test results from records)	All Stages	S/SRI/U

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	Sub Item for Observation	Method of Observation	Frequency	Grades
1	2	3	4	5
b	Quality of Workmanship such as positioning of pipes, wing walls, cushion over H Pipes etc.	Visual observation	All Stages	S/SRI/U
Item Grade				S/SRI/U
Item 11 - Side Drain and Catch Water Drain				
	General quality of Side Drains/ Catch Water Drains and their integration with CDs.	Visual observation	All Stages	S/SRI/U
Item Grade				S/SRI/U
Item 12 - CC/ Semi Rigid Pavements and Associated Pukka Drains				
a	Quality of Material – Concrete, Stone/ Concrete Block Pavement etc.	Visual Observation	In Stage- II or III, 1 per 100 m. Length of Pavement	S/U
b	Strength of CC in Concrete Pavement/ Concrete Block Pavement	Strength using appropriate rebound hammers/ verification of cube test results from test records.	In Stage- II or III, 1 per 100 m. Length of Pavement	S/U
c	Quality of Workmanship – Wearing surface	Visual observation	In Stage- II or III	S/U

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	texture, Adequacy of setting of concrete, Joints, Edges etc.			
d	Thickness of Layer	Measurements	In Stage- II or III, 1 per 100 m. Length of Pavement	S/U
Item Grade				S/U
Item 13 - Road Furniture and Markings				
a	Citizen Information Board, Main Informatory Board, Quality and whether fixed during construction.	Visual observation	Stage-I	S/U
b	Logo boards, 200 m stones and Km stones, quality and whether fixed after completion.	Visual observation	Stage-III	S/U
c	Whether the information in boards is given in local language.	Visual observation	Stage-I and III	S/U
Item Grade				S/U

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Annexure 3

**Guidelines for Uploading of Abstract of Observations of SQMs on
OMMAS Website**

1. All the State Quality Monitors would be given dedicated User ID and Password.
2. After logging in to the website, the SQM would select the work from the database and enter date of inspection etc. and the following table would appear:

Item No.	Sub Item for Observation	Grades			
		S	SRI	U	NA
Item No 1	Setting Out and Working Drawing	S	SRI	U	NA
Item No 2	Site Clearance and Grubbing	S	SRI	U	NA
Item No 3	Quality Arrangements	S	SRI	U	NA
Item No 4	Geometrics	S		U	NA
Item No 5 A	Earth Work and Sub-grade in Embankment/ Cutting	S		U	NA
Item No 5 B	Earth Work in Cutting in Hilly/ Rolling Terrain	S		U	NA
Item No 6	Sub-Base	S		U	NA
Item No 7	Base Course – Water Bound Macadam	S		U	NA
Item No 8	Bituminous Layer – Premix Carpet (PMC)/ Surface Dressing (SD)	S		U	NA
Item No 9	Shoulders	S	SRI	U	NA
Item No 10	Cross Drainage Works – Causeways of all spans and Culverts upto 6 m. span.	S	SRI	U	NA
Item No 11	Side Drain and Catch Water Drain	S	SRI	U	NA
Item No 12	CC/ Semi Rigid Pavements and Associated Pukka Drains	S		U	NA
Item No 13	Road Furniture and Markings	S		U	NA
Overall Grading (Web Generated)		S	SRI	U	

3. Based on the stage of inspection and the items inspected, the SQM shall select any of the gradings out of awardable grades, otherwise, select the option NA and the web would generate overall grading.
4. On the same page, option for uploading digital photographs would appear and the SQM shall upload maximum 10 digital photographs for each inspection.

Detailed user manual will be circulated separately.

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**Guidelines for Digital Photography of Observations
by State Quality Monitors
under Pradhan Mantri Gram Sadak Yojana**

It has been felt that if the technical observations about quality of road work are substantiated through photographs, it not only helps in better understanding of the quality issues at the field level but it also helps in documenting good practices and lapses. Therefore, it has been decided that as far as possible, the observations made by State Quality Monitors (SQMs) regarding various items and sub-items of rural road construction should be documented through digital photography and included in the report of the SQM. The following guidelines should be strictly followed for digital photography and reporting.

- 1. Role of SQC and PIU:** It would be the responsibility of the PIU to arrange for appropriate digital photography of observations on quality of material and workmanship of the road work by the SQMs. The SQM would be responsible for giving appropriate directions for the photography of critical observations during the inspection. The photographs should be of fair quality and the print on plain paper. In case of any difficulty, the SQM would contact the SQC and it would be responsibility of SQC to ensure that proper arrangements in this regard are made by the PIU.
- 2. Work Item/Component-wise Photography:** The purpose of the photography should be to document good practices as well as defects or deficiencies with a view to provide proper understanding of the quality issue at the field level. The SQM would be free to ensure photographs of the components as per his choice, however, with a view to have systematic and structured documentation, the following procedure may be followed:

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- (a) **Starting Point of the Road:** First of all, the photograph of the starting point showing signage such as informatory board, Citizen Information Board and other signage could be taken. It would also be appropriate to take photographs of the roads with actual traffic and road users. Examples of such photographs are given below:
- (b)



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Photographs showing starting point of the road with signage

(a) **Geometrics:** The photography for documenting the geometrics may be done in the following manner:

- ◆ Road way or carriage way width measured with tape may be photographed.
- ◆ The observation on super-elevation or camber could be measured by spreading tape and using spirit level and may be photographed.
- ◆ In case of roads in rolling or hilly terrain, longitudinal gradients and slopes of cutting can be assessed visually and by other measure and can be photographed.

Examples of such photographs are given below





Photographs showing measurements of carriage way width, camber and super-elevation.

- (b) **Quality Arrangements:** Field laboratory and its equipments can be appropriately photographed. Examples of such photographs are given below.

Photographs showing a field and a mobile laboratory

- (c) **Flexible Pavement Components:** Guidelines for

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inspection by SQMs provide for taking appropriate observations pit in the pavement. The quality of earth work, GSB and WBM may be documented easily. The tests for gradation of material and compaction tests for earthwork/ sub grade may be photographed. There may be many ways to show the deficiencies in construction of embankment or hill cutting etc.

The quality of GSB material or fillers particularly with reference to plasticity may be easily documented. The volumetric analysis showing proportions of coarse and fine aggregates and grading of course aggregate can be photographed. An appropriate instrument such as 6” long measuring scale etc may be placed appropriately over the pit or stacked material and photograph may be taken. For showing adequately of compaction of WBM or GSB, pit filled up with course aggregate may be photographed. Examples of such photographs are given below.



Photographs showing poor earth work in embankment

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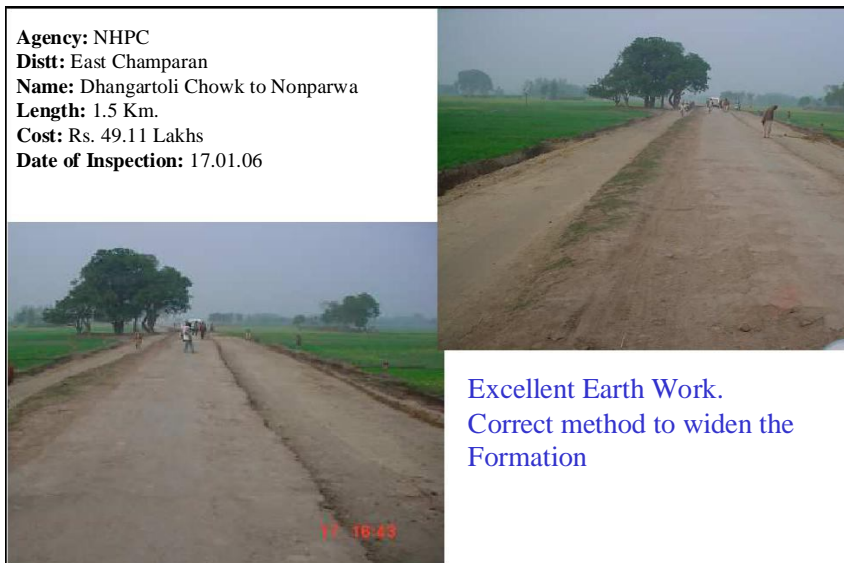


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Observations:
Results of little effort by spade. Earth work not compacted at all, only superficial dressing done on slopes.

Photographs showing poor earth work in embankment



Excellent Earth Work.
Correct method to widen the Formation

Photographs showing good earth work in embankment



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Photographs showing plastic GSB and good WBM wor

Photographs showing plastic Crushable aggregate used in WBM but good compaction



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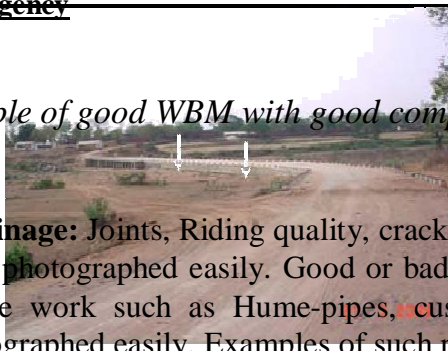
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Photographs showing poor WBM and example of good WBM with good compaction

- (a) **Rigid Pavement, CD Works and Drainage:** Joints, Riding quality, cracks or various other failures of rigid pavement can be photographed easily. Good or bad features of various components of cross drainage work such as Hume-pipes, cushion, slab, abutments, approaches etc can be photographed easily. Examples of such photographs are given below.



Observations: General quality of CD is good but D/S protection needs to be strengthened. Downstream retrogression needs to be taken note of.



Photographs showing good vented- causeway but requiring attention in respect to downstream protection.



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Photographs showing poor drainage.

- (a) **Protection Works:** In case of roads in hilly and rolling terrain, protection of road furniture is an important element. Appropriate photographs may be taken. In case of roads in plain areas also sometimes protection work is carried out in cases of high embankments or presence of water body just by the side of the road, appropriate photographs may be taken.

2. Reporting: After taking photographs, the PIU is required to get appropriate hard as well as soft copies and handover to the SQM for recording in the report. The SQM would be expected to attach photographs with the report with analysis in appropriate item of the prescribed format. The SQM would also upload these photographs on OMMAS website.

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APPENDIX -V

MOBILE PHONE APPLICATION

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2.1. Mobile based Solution

To enable the monitors in providing the grading details right from the site of inspection through customized mobile application which will be stored in the OMMAS database as well as the photos taken during the inspection from the site will be geo-tagged. The inspection to be done through the mobile as per the existing multiple question formats and generation of reports through the OMMAS portal.

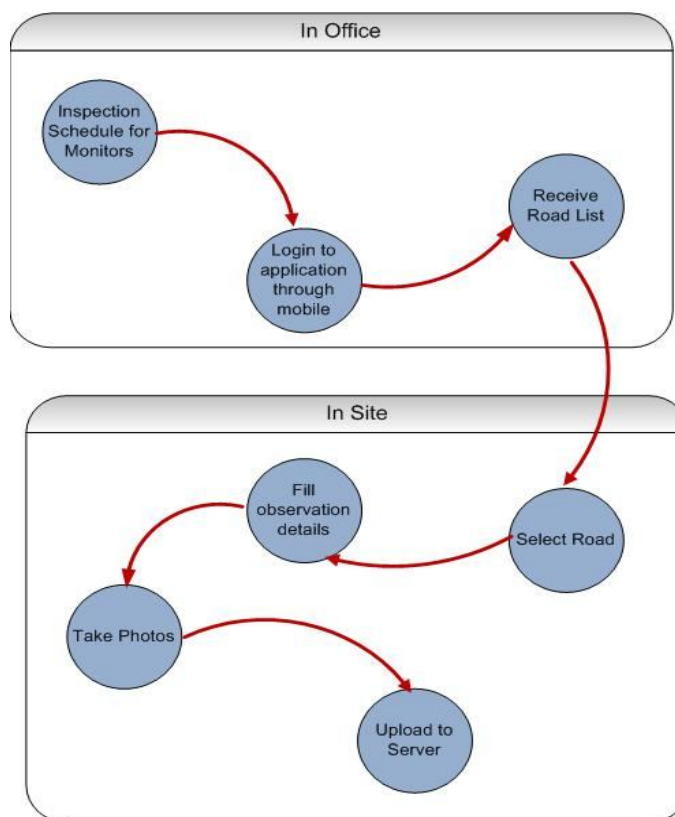


Fig 2.1

The solution will be based on Smart phones on Android platform and will interface with OMMAS through web service to access the inspection schedule details and to upload the observation as well as photos from the mobile.

The features and benefits envisaged are as follows.

Features

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- Capture alphanumeric data
- Capture pictures from the field
- Every entry is tagged with geo-codes and timestamps
- Works on regular mobile phone, no special equipment needs be carried to the field
- Every photo is tagged to the GRIMMS

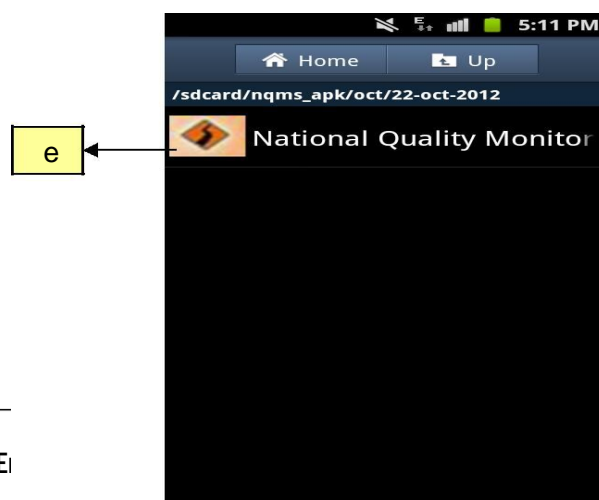
Benefits

- Automated process of data capture and inspection
- Data is captured on the field
- Data is uploaded onto central server in real-time
- No end of the day work
- No errors in copying paper based data to computer
- Geo-location information further validates the time and place of the quality inspection
- No manual errors for co-relating the pictures to inspection site

2.2. Installation Steps

For installing the mobile-based quality monitoring system on your mobile, follow the steps given below.

- Open web application using mobile browser. Log in to web application with your credentials.
- Click on the mobile icon.
- Download file “National Quality Monitors System.apk”.
- Go to the directory where the “National Quality Monitors System.apk” is downloaded.
- Click on National Quality Monitors System icon (Fig 2.2.1).



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Fig 2.2.1

f. Click on Install button (Fig 2.2.2).

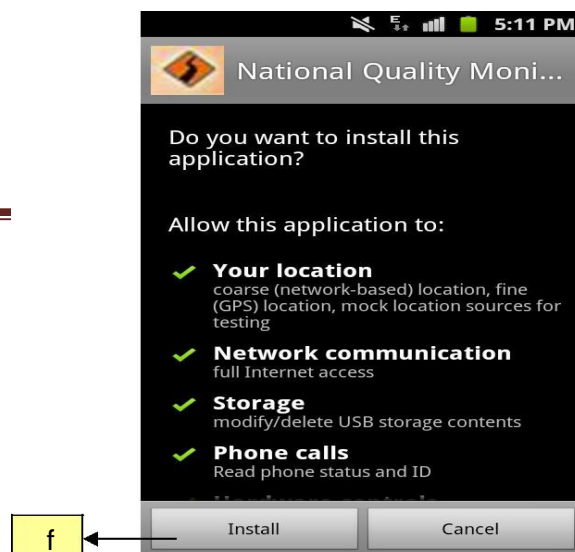


Fig 2.2.2

g. You can see the progress bar for installation; wait till operation is in progress (Fig 2.2.3)

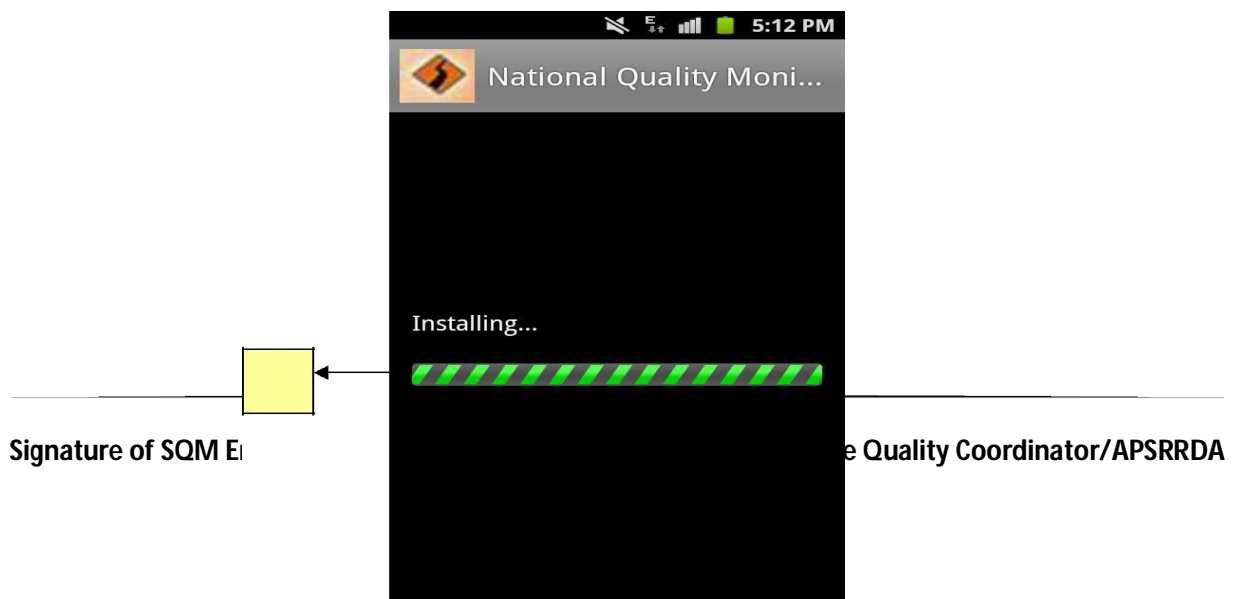




Fig 2.2.3

h. After getting message as “Application installed”, you can open the application using “Open” button (Fig 2.2.4).

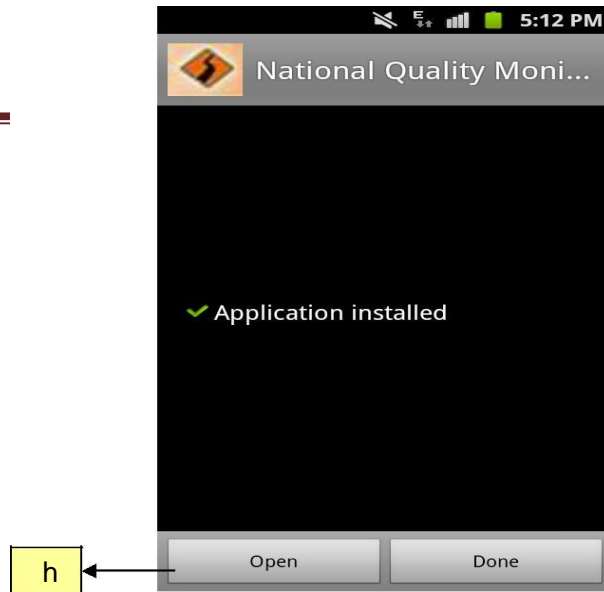
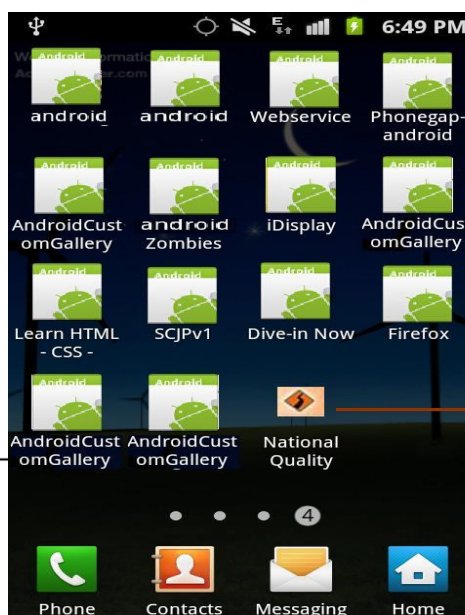


Fig 2.2.4

i. For using the application, click on the National Quality Monitors System icon located on the home screen of your mobile, which would take you to the home screen of mobile-based quality monitoring system.



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Fig 2.2.5

2.3. Login

First click on the National Quality Monitors System icon located on the home screen of your mobile, which would take you to the home screen of mobile-based quality monitoring system.

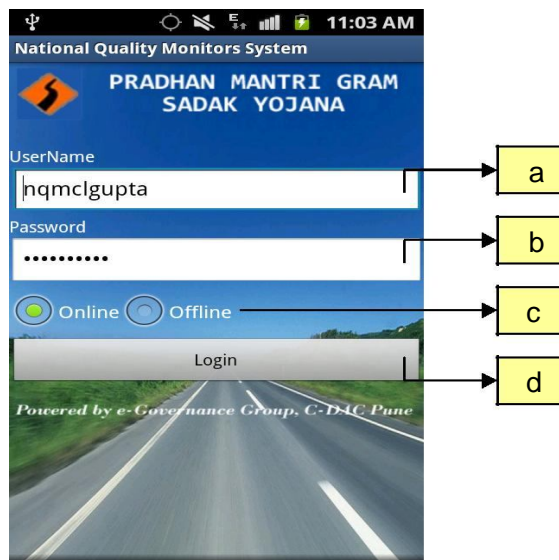


Fig. 2.3.1

This screen allows user to login into application. To login, please follow these instructions. Refer Fig. 2.3.1

- Type in your User name. The User name is case sensitive i.e., nqm is not same as NQM or NqM or nqM.
- Type in your Password. The Password is also case sensitive.
- Select the mode in which you want to login i.e. online/offline. Default mode is Online.
- Click on Login button, which would take you to the Main Menu.

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2.3.1 Online Mode

First time user needs to login using online mode, which binds the application to user with particular schedule. Using online mode user can download the assigned schedule in the presence of Internet connectivity.

2.3.2 Offline Mode

After downloading schedule, user can login using offline mode. This mode works in absence of Internet connectivity.

2.4. Main Menu

This section covers operational flow under online as well as offline mode. The offline mode contains no menu options for downloading schedule and submitting inspections details to server. For other options, operational flow is same as in online mode.



Fig. 2.4.1

After logging in the application, choose one of the three options displayed in Fig 2.4.1 as per the requirement.

- 2.4.1 Basic Mode
- 2.4.2 Standard Mode
- 2.4.3 Unplanned Mode
- 2.4.4 Reset Mode

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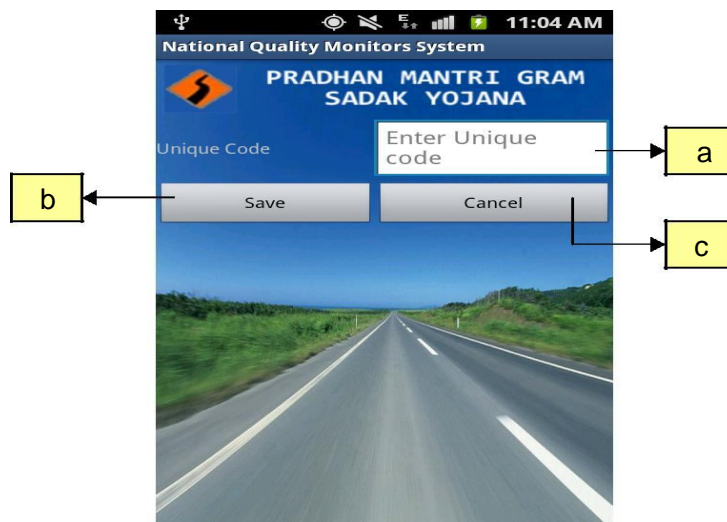
2.4.1 Basic Mode

This mode provides a facility for user to capture photos of road to be inspected and upload them to server using the mobile application. This mode can be operated using five menu options displayed in following Fig 2.4.1.1



Fig. 2.4.1.1

2.4.1.1 New Entry



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Fig 2.4.1.2

This screen provides facility to link the application to particular road. As unique codes provided in the schedule for each road, user needs to enter unique code to bind the application with road being inspected.

- Enter unique code in text box for the road being inspected.
- To save the entered unique code, click on save button.
- To go back to previous menu without saving the unique code, click on the cancel button.

2.4.1.2 Take Photos

The menu options under “Take Photos” are available to user only after entering new unique number through new entry menu.

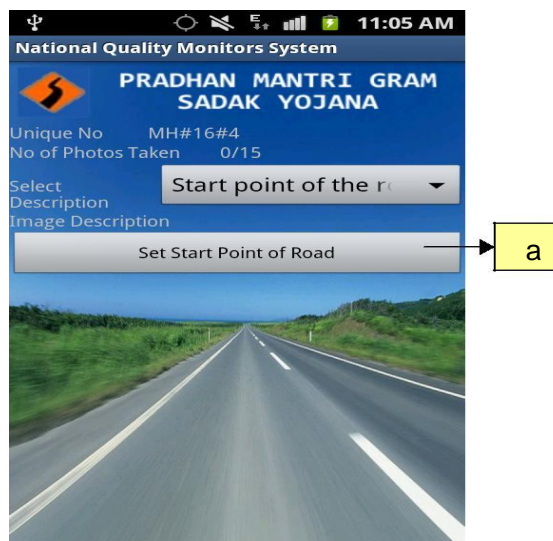


Fig. 2.4.1.3

Before taking photos for the road being inspected, user needs to set start and end points of the road. Setting start and end points of the road is optional. At any instance of inspection, user can set start and end points of road.

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- a. To set start point of the road, choose description as “Start point of the road” from dropdown and click on “Set Start Point of Road” button as shown in Fig. 2.4.1.3.
- b. To set end point of the road, choose description as “End point of the road” from dropdown and click on “Set End Point of Road” button as shown in Fig. 2.4.1.4.

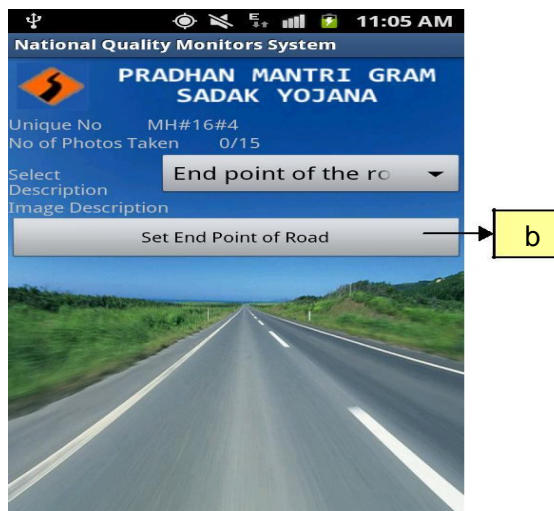


Fig. 2.4.1.4

Using the menu options in Fig 2.4.1.5 user can enter/choose the photo description and take photos. Image description is mandatory for each photo. User needs to take minimum 10 and maximum 15 photos for a road.



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Fig 2.4.1.5

- c. Choose appropriate description from the dropdown, it will appear in the “Image Description” text box. If you want to edit and update it, click on “Image Description” text box it will provide you key pad to type and edit the description.
- d. Click on take Photo button.
- e. Capture photo using photo-capturing screen (not shown here).
- f. To save captured photo, click on “Save” button as shown in Fig 2.4.1.6.
- g. To cancel captured photo, click on “Discard” button as shown in Fig 2.4.1.6.
- h. To cancel whole activity of taking photos, click on “Cancel button”.

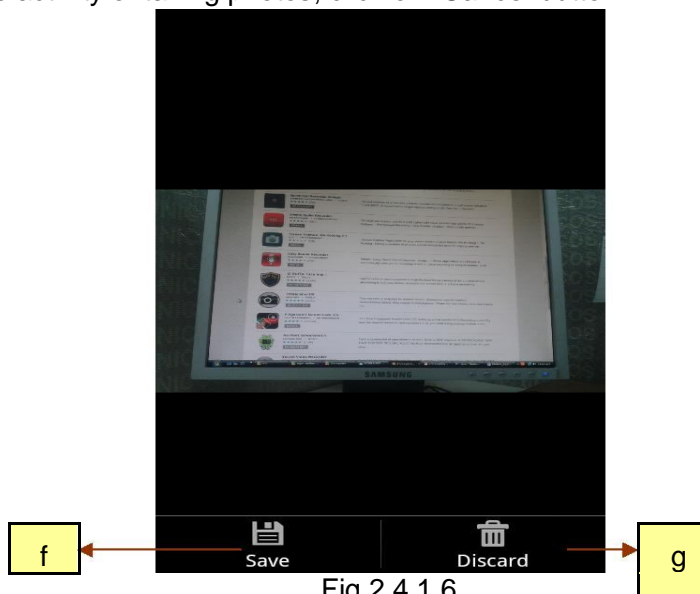


Fig 2.4.1.6

2.4.1.3 Finalize

Using “Finalize” button in menu in Fig 2.4.1.1, user can finalize the road for submission. Minimum 10 photos are mandatory for finalization of the road. After finalizing only user can submit the details for the inspected road.

2.4.1.4 Submit



b

Fig 2.4.1.7

Using this menu option user can submit inspection details to the server. Screen provides information about number of remaining photos to be checked as well as number of remaining photos to be uploaded.

- a. Choose "Unique No." of the inspected road from the dropdown.
- b. Check minimum and maximum 10 photos, which you want to upload.
- c. Click on "Submit" button to upload captured photos to server.
- d. To cancel the submit operation, click on "Cancel" button.

User will get confirmation of uploaded details in the form of audio message.

2.4.1.5 Logoff

To exit from the application, click on "Logoff" button in menu in Fig 2.4.1.1

2.4.2 Standard Mode

~~This mode provides a facility for user not only to capture photos but also fill observations of the road to be inspected. User can upload the details to server using the mobile application. This mode can be operated using five menu options displayed in Fig 2.4.2.1~~

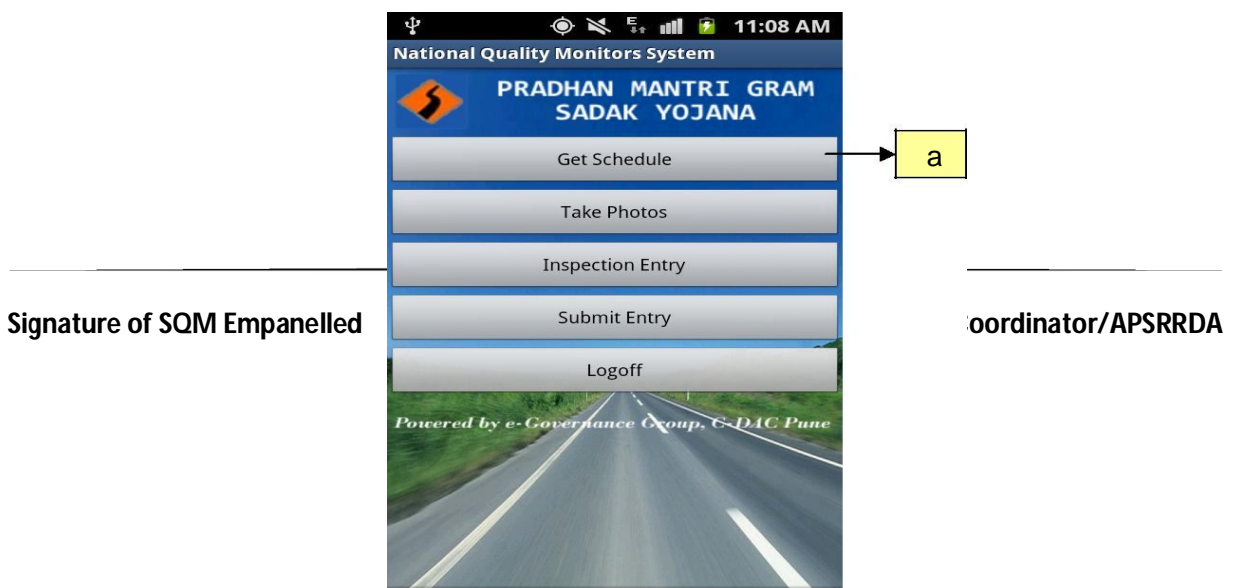




Fig.2.4.2.1

2.4.2.1 Get Schedule

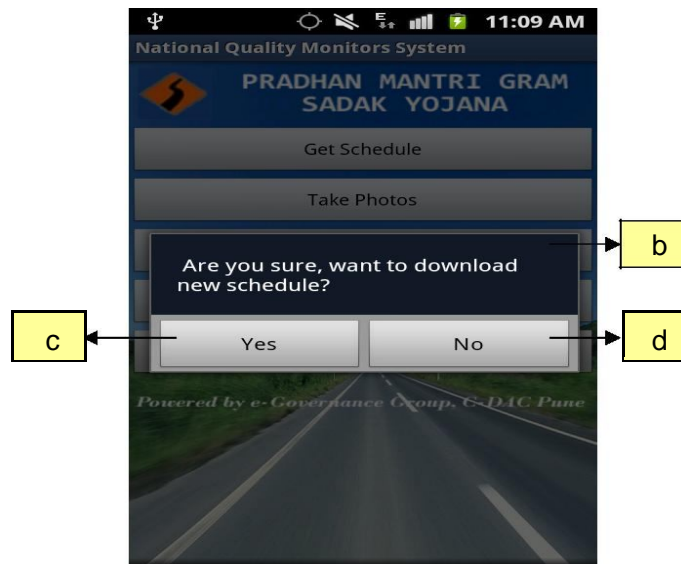


Fig 2.4.2.2

To download the assigned schedule for current month, user can make use of this menu option.

-
- Click on “Get Schedule” button in menu in Fig 2.4.2.1.
 - On click of “Get Schedule” button application will ask for confirmation.
 - Click on “Yes” to download the new schedule.
 - Click on “No” to cancel the activity of Get Schedule.

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2.4.2.2 Take Photos

The menu options under “Take Photos” are available to user only after downloading the schedule.

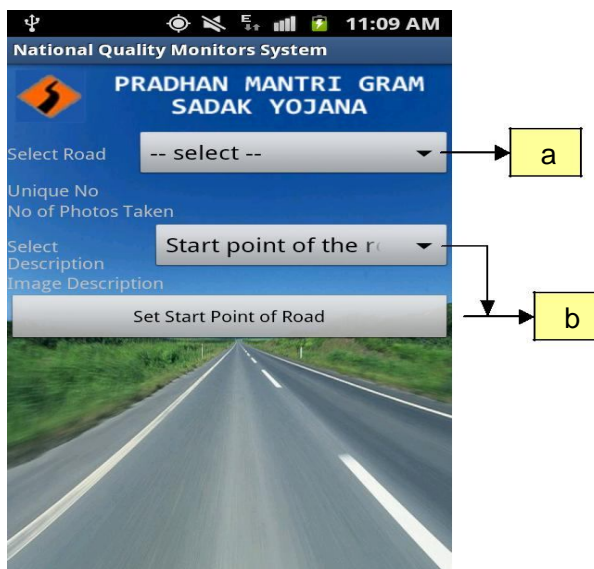


Fig. 2.4.2.3

Before taking photos for the road being inspected, user needs to set start and end points of the road. Setting start and end points of the road is optional. At any instance of inspection, user can set start and end points of road.

- a. Choose road being inspected from the dropdown.
- b. To set start point of the road, choose description as “Start point of the road” from dropdown and click on “Set Start Point of Road” button as shown in Fig. 2.4.2.3.
- c. To set end point of the road, choose description as “End point of the road” from dropdown and click on “Set End Point of Road” button as shown in Fig. 2.4.2.4.

Fig. 2.4.2.4

Using the menu options in Fig 2.4.2.5 user can enter/choose the photo description and take photos. Image description is mandatory for each photo. User needs to take minimum 10 and

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maximum 15 photos for a road.

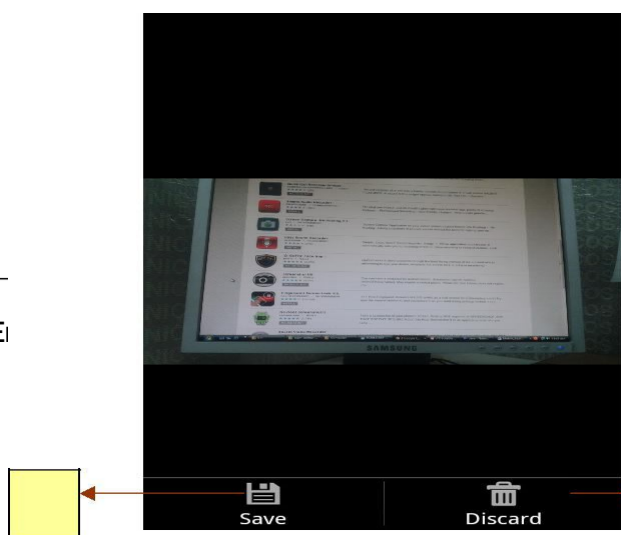


Fig 2.4.2.5

- d. Choose appropriate description from the dropdown, it will appear in “Image Description “ text box. If you want to edit and update it, click on “Image Description” text box it will provide you key pad to type and edit the description.
- e. Click on “Take Photo” button.
- f. Capture photo using photo-capturing screen (not shown here).
- g. To save captured photo, click on “Save” button as shown in Fig 2.4.2.6.
- h. To cancel captured photo, click on “Discard” button as shown in Fig 2.4.2.6.
- i. To cancel whole activity of taking photos, click on “Cancel” button.

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g

h

Fig 2.4.2.6

2.4.2.3 Inspection Entry

Using “Inspection Entry” button in menu in Fig 2.4.2.1 user can fill the observations of inspected road. After filling the observations, user can click on “Save” button with user’s confirmation.

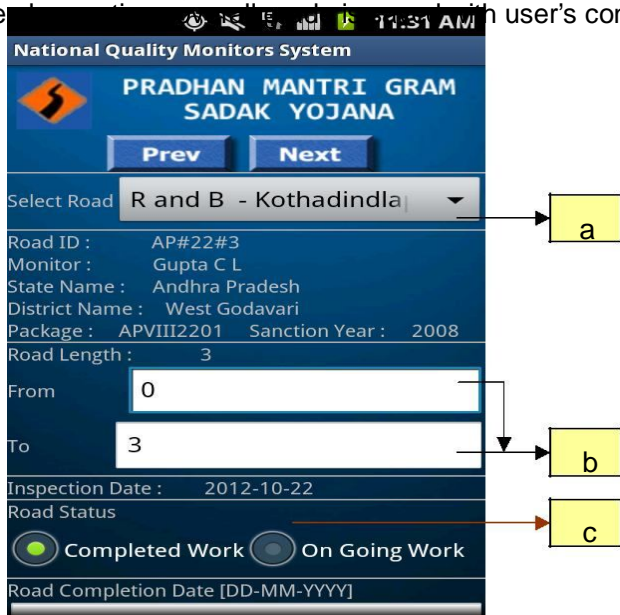


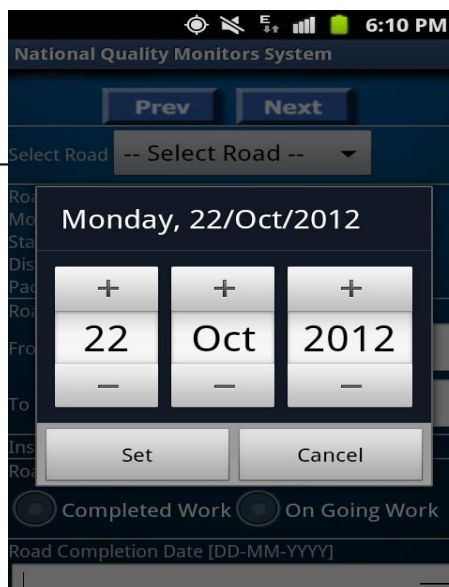
Fig. 2.4.2.7

- a. First of all, choose the road from dropdown list to fill the observations. On selection of road, screen will be auto-populated with respective road details.
- b. From and To road lengths will be auto-populated in text boxes, if user wants to edit those, he can edit and update.

-
- c. Choose appropriate “Road Status” by checking the radio button. On check of radio button respective grade parameters will be shown to user on respective screens.
 - d. On double click of “Road Completion date”, date picker will appear to choose the completion date. Choose appropriate date. (Fig 2.4.2.8)

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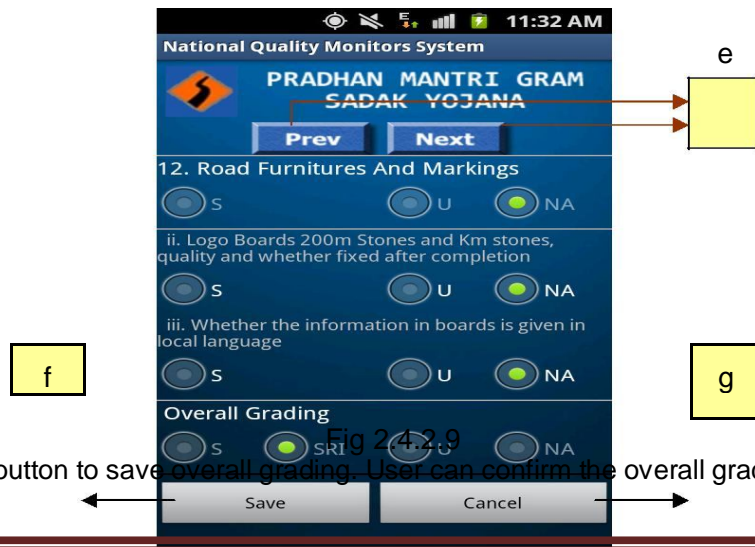




d

Fig. 2.4.2.8

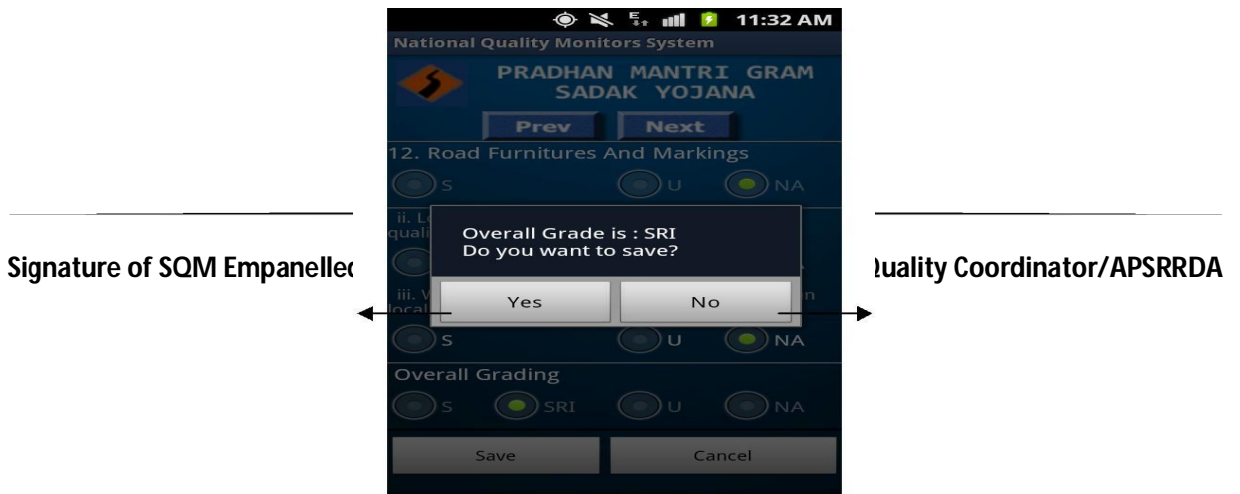
- e. Click on “Next” button in upper side of screen to fill grading parameters as per the observations. “Prev” & “Next” button will navigate the user through all grading parameters and finally shows the calculated “Overall Grading” as shown in Fig 2.4.2.9.



- f. Click on “Save” button to save overall grading. User can confirm the overall grade as shown in Fig 2.4.2.9

2.4.2.10.

- g. To cancel the whole activity of Inspection Entry, click on “Cancel” button.





h

i

Fig. 2.4.2.10



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- h. To save grades for items and sub-items click on “Yes”.
- i. To cancel save operation of grades for items and sub-items click on “No”.

2.4.2.4 Submit Entry

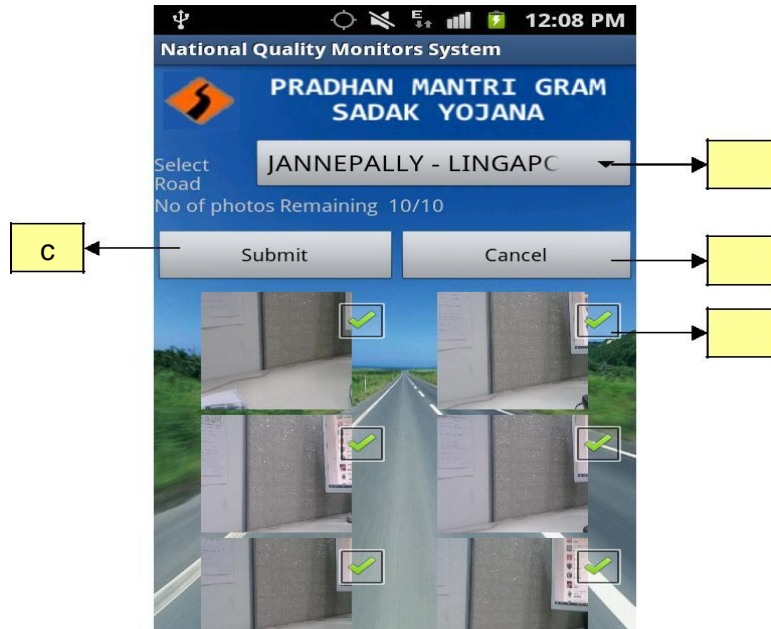


Fig 2.4.2.11

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- Choose inspected road from the dropdown.
 - Check minimum and maximum 10 photos, which you want to upload.
 - Click on “Submit” button to upload the inspection details.
 - To cancel the activity of submit, click on “Cancel” button.
- User will get confirmation of uploaded details in the form of audio message.

2.4.2.5 Logoff

To exit from the application, click on “Logoff” button in menu in Fig 2.4.2.1

2.4.3 Unplanned Mode

Unplanned mode will work same as the Basic Mode, but gives facility for user to submit details of unplanned scheduled road. This mode can be operated using five menu options as displayed in Fig 2.4.3.1.

The operational differences in “Unplanned” & “Basic” mode are in two of the menu options i.e. Generate Id & Submit. Other menu options will operate same as the Basic mode.



Fig. 2.4.3.1

Using this menu option user can submit inspection details to the server. Screen provides information about number of remaining photos to be checked as well as number of remaining photos to be uploaded.

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2.4.3.1 Generate Id



Fig 2.4.3.2

This screen provides facility to link the application to particular id. As the schedule will be unplanned, unique code will not be available at the time of inspection. So user needs to provide some id for inspection. On click of “Generate Id” button, application will generate a particular dummy id for road being inspected. User can take photographs for respective road without scheduling it, but before submission user should schedule the respective road and enter the unique code provided in web application for submitting the inspection details.

2.4.3.2 Take Photos

This option will follow same operational steps as in Basic Mode.

2.4.3.3 Finalize

This option will follow same operational steps as in Basic Mode.



2.4.3.4 Submit



Fig 2.4.3.3

Using this menu option user can submit inspection details to the server. Screen provides information about number of remaining photos to be checked as well as number of remaining photos to be uploaded. This option differs from “Basic Mode” in choosing the generated id.

- Choose appropriate “Generated Id” for the inspected road from the dropdown.
- Enter “Unique No.” of the inspected road in the text box.
- Check minimum and maximum 10 photos, which you want to upload.
- Click on “Submit” button to upload the photos.
- To cancel the activity of submit, click on “Cancel” button.

User will get confirmation of uploaded details in the form of audio message.

2.4.3.5 Logoff

To exit from the application, click on “Logoff” button in menu in Fig 2.4.3.1



2.4.4 Reset Mode

This mode gives facility to clean up the unused data in application. To clean up unused data, click on the “Reset Mode” button in Main Menu (Fig. 2.4.1).



Fig. 2.4.4.1

- a. On click of “Reset Mode” button, application will ask for credentials to clean up unused data (Fig. 2.4.4.1).
- b. Enter Password.
- c. Click on “Reset”, to clean up unused data.
- d. Click on “Cancel”, to exit the activity of clean up.



2.5. Error Messages

This section explains the errors and warnings with corrective action to be taken by the user.

Sr. No.	Error/Warning Message	Reason	Corrective Action
1	Server Error Occurred, Please try again	Server is inaccessible	Report to concern office.
2	Service Not available, Please try again	a. Server is inaccessible b. Internet is disconnected	Check Internet connectivity in your mobile. If disconnected, go to settings & connect it. Otherwise report to concern office
3	Please Enter UserName and Password	UserName & Password field is empty	Fill UserName & Password, click on Login
4	UserName or Password incorrect, Try again	Wrong user name or password	Confirm user name, password & try again
5	Please Enter Unique No	Unique No text box is empty	Enter valid unique no. & try again
6	Unique No. can not contain special characters, try again	Unique No. contains special characters e.g. !, @, \$, etc.	Don't enter special characters in unique No. other than "#"
7	Please First Finalize old Entry	Previous entry is not finalized	Finalize previous inspection entry & try again
8	Unique No incorrect, Please Check Unique No	Entered unique no. is not valid	Verify once & enter valid unique no.
9	Please Generate Id, and try again	New Id is not generated for respective inspection	Click on Generate Id button & try again
10	Please Enter Unique No First, and try again	Unique no. is not provided for respective inspection	Go to New Entry screen, enter unique no. & try again
11	Please Enter Image Description, and try again	Image Description field is empty	Select/enter Image Description & try again
12	Image Description should be less than 200 characters	Image Description field contains more than 200 characters	Cut down the Image description to length of maximum 200 characters
13	Image Description can not contain special characters, and try again	Image Description field contains special characters e.g. !, @, & etc.	Remove the special characters from Image Description & try again
14	Please wait for current location, try again after few minute	GPS value is not set through mobile device	Wait for some time to get GPS value, confirm once & try again
15	Maximum no. of photos already taken	Exceeded limit for maximum number of photos (15)	Already captured 15 photos for respective inspection so don't go again for capturing.
16	Point not set, try again after few minute	Start or End Point is not set, GPS value is unavailable	Wait for some time to get GPS value, confirm once & try again



Sr. No.	Error/Warning Message	Reason	Corrective Action
17	No schedule available for this month	Schedule is not assigned or ended for current month	After assignment of schedule only, user can proceed
18	Error! Schedule not downloaded, Please Try again	Connection error in downloading schedule	Check internet connection availability & try again
19	Please Select Road	Road in dropdown is not selected	Select road & try again
20	Start Point Already Set	User trying to save start point which is already set	Proceed with take photos activity
21	End Point Already Set	User trying to save end point which is already set	Proceed with take photos activity
22	Road Length should be in Digits	Entered road length is non-numeric	Enter road length in digits & try again
23	To Road Length Should Not Be Greater Than Road Length	Entered To Road Length is greater than Road Length	Enter valid To Road Length & try again
24	Form Road Length Should be Less Than To Road Length	Entered From Road Length is greater than To Road Length	Enter valid From Road Length & try again
25	Please Select Road Completion Date	Road Completion Date is empty	Select Road Completion Date & try again
26	Please Select At least One Grade Item	None of the grade items is selected	Select grade at least a item from grade item list & try again
27	Please select 10 images	10 images are not selected before submit	Confirm once that 10 images are selected & try again
28	Record already uploaded	The observation you are trying to submit, is already submitted to the server	Confirm using reports on web & proceed with another observation
29	Inspection End, you can not upload any record	You are trying to upload the observation for which, schedule is already ended	You can not upload the respective observation, contact with corresponding officials
30	Application Database Error Occurred, Please try again	Some error occurred in local database of mobile device	Contact with corresponding officials
31	Please Select Generated Id	Generated Id field is empty	Select valid Generated Id & try again
32	Unique Id required	Unique Id field is empty	Select valid Unique Id & try again
33	Please enter valid unique id	Entered Unique Id is not valid	Select valid Unique Id & try again