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

1. Introduction: PMGSY Programme Guidelines Clause 15 provides that ensuring the quality of road works is responsibility of the State Governments, who are implementing the programme. To this end, all the works will be effectively supervised. A three tier quality control mechanism is put in place under the programme. 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.

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

(a) The SQC shall draw up programmes 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*

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).*

5. Grading of Works:

5.1. 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**.

5.2. 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 **Annexure2**.

5.3. 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.

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

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.

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 theSQM, 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 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.*

6.4. 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:

- Quality of Soil used in embankment or sub-grade (Soil Classification).
- Compaction of embankment or sub-grade.
- 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.

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.

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 coarse-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.

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 coarse 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 coarse 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 coarse aggregate, dry rolling followed by application of fine aggregates and to be continued with dry rolling. This operation is further followed by wet rolling. However, it has been observed that in many cases coarse 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 coarse and fine aggregates, the proportion of fine aggregates by volume of coarse 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 coarse aggregates. Appropriate allowance for crushing under the wheels of the roller may also be made depending on the aggregate impact value of the coarse 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 coarse aggregates and it should be seen that sufficient loose coarse aggregate should still remain balance after filling up the pit.

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

Test	***Frequency***
Gradation Test for each layer of WBM	*In Stage-II, at least 1 test for gradation of coarse aggregate and fine aggregate separately for each km (irrespective of the executed quantity).*
	In Stage-III, if gradation of Coarse aggregate and fine aggregate 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 case fine aggregates are crushable type.	*In Stage-II, at least 1 test for each km (irrespective of the executed quantity).*
	In Stage-III, if WBM of the stretch of road has not been monitored earlier, at least 1 test for each km
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 coarse 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 coarse 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.

(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.*

(c) 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.

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***
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.)	*1 per Km*
Quality of Prime Coat and Tack Coat with respect to quality of material and workmanship - Visual Observation - if work is ongoing.	*1 observation on the day of inspection*
In PMC/BM/MPM/Seal Coat, gradation Test for Coarse Aggregate (if the work in the item is ongoing)/visual observation in case of completed item of work	*In Stage- III, At least one test on the day of inspection.*
In PMC/BM/MPM/ Seal Coat, temperature of Binder at the time of mixing and laying (if the work in the item is ongoing)	*In Stage- III, at least one test on the day of inspection.*
In PMC/BM/MPM, thickness of compacted layer and Bitumen Extraction Test	*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.*
Surface Evenness using straight edge	*In Stage-III, in case, PMC is complete and if every km not monitored for quality, at least 2 test per km.*

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.

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 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 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 programme 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 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. '**U**nsatisfactory'.

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 'SRI' i.e. **S**atisfactory but **R**equiring **I**mprovement.

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

Item No.	Sub Item for Observation	Awardable Grades		
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
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 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.

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 | DD | MM | YY |

1.2. Name of State Quality Monitor:

1.3. District: Block:

1.4. Name of Road: From to

1.5. Package No.:

1.6. Length: ….Km Flexible Pavement, ...Km. CC/other Pavement ……...m, Total……..Km

1.7. Estimated Cost (As cleared by GOI): Rs. Lakh

1.8. Technical Sanction Cost: Rs. Lakh

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

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:……

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)

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

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.

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

3. QUALITY ARRANGEMENTS AND ATTENTION TO QUALITY - <u>For all stages of work</u>

Observations about Field Laboratory:

#	Whether Field laboratory Established **(Y/N)**	List the equipments available.	Whether adequate Equipments as per requirement of work are available and are being used. **(Y/N)**

Observations about Mandatory Tests - Detail out the quantities of various items of works and list the tests required. (Refer to abstract of QC Register Part-I)

#	**Item of Work Executed**	**Quantity**	**Name of Test**	**No. of Tests required**	**No. of Tests Conducted by PIU/Contractor**

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

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)

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)

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

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

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)

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 coarse aggregate	Whether adequate compaction is done. (Y/N)

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

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

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:

In case of PMC/BM/MPM/ Seal Coat

#	Location (RD)	Whether Coarse 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)	

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:

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)

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 obser-vation made.	Thickness		General quality of material is 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:

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

13. Road Furniture and Markings

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

Main Informatory Board Fixed:	Yes	No
Citizen Information Board Fixed:	Yes	No

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

Observations - Quality Road Furniture and Markings:

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):

14.2. Whether the work has been completed/is in progress as per work programme 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).

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:

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				
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	

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 Coarse 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	
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	

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

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: ……

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 & 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

#	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 Coarse 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 compaction of WBM	Hand-feel test - volumetric analysis.	In Stage- II or III, 1 per km	S/U
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

#	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 Coarse 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 work	By straight edge	2 per Km	S/U
			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

#	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 texture, Adequacy of setting of concrete, Joints, Edges etc.	Visual observation	In Stage- II or III	S/U
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

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			
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.

Annexure-4

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:

(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:

Photographs showing starting point of the road with signage

(b) **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 sprit 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.

(c) **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

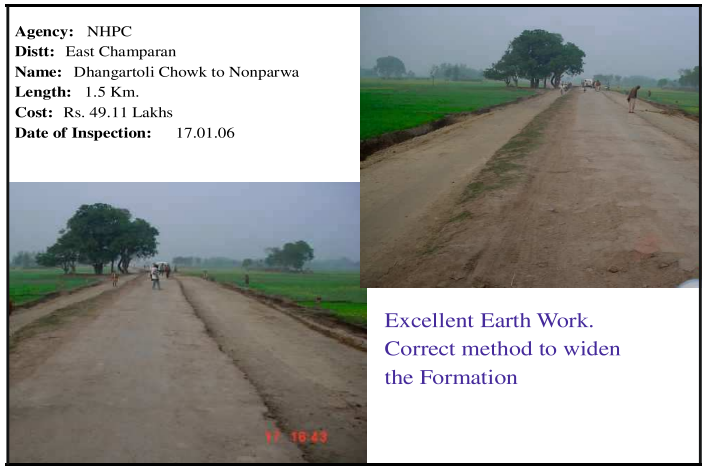
(d) **Flexible Pavement Components:** Guidelines for inspection by SQMs provide for taking appropriate observations pit in the pavement. The quality of earth work, GSB and WBM may be documented easily. The tests for gradation of material and compaction tests for earthwork/ sub grade may be photographed. 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 coarse 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 coarse aggregate may be photographed. Examples of such photographs are given below.

Photographs showing poor earth work in embankment

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



Agency: NHPC
Distt: East Champaran
Name: Dhangartoli Chowk to Nonparwa
Length: 1.5 Km.
Cost: Rs. 49.11 Lakhs
Date of Inspection: 17.01.06

Excellent Earth Work.
Correct method to widen the Formation

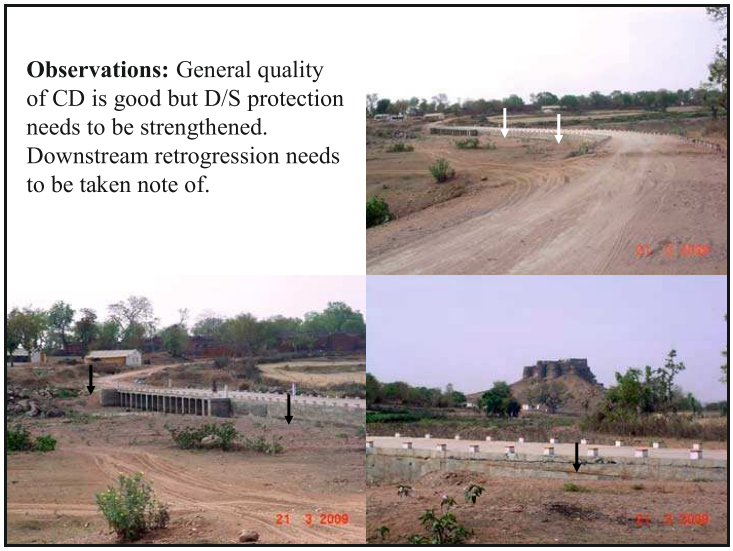
Photographs showing good earth work in embankment

Photographs showing plastic GSB and good WBM work

Photographs showing plastic Crushable aggregate used in WBM but good compaction

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

(e) **Rigid Pavement, CD Works and Drainage:** Joints, Riding quality, cracks or various other failures of rigid payment 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.



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

Photographs showing poor drainage.

(f) **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 SQ M would also upload these photographs on OMMAS website.

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