

Section 4

S4.1: RR maintenance planning

SUMMARY

- Plan of rural road maintenance and planning steps in rural road maintenance.
- Making rural road maintenance plan



1



Make Road Inventory

2



Road Defect Survey

3



Define Road Maintenance demand and cost

4



Fund mobilization planning

5



Define priority to balance fund

6



Finish road maintenance plan



S4.1: RR maintenance planning

RR maintenance plan procedure

- Which documents and information that you need to make a road maintenance plan?
- Which knowledge that you need to make a road maintenance plan?

S4.1: RR maintenance planning

1. Make road inventory

1. Road Inventory of AAA commune

road inventory form

No	Road Code	Road Name	Road Length (km)	Pavement Type	Pavement Width (m)	Number of <6m span culvers & bridges	Number of ≥6m span bridges	Distance of material transport (km)
1	ST01R3.5/5D8.6	Road to BBB village	8.6	Earth Road	3.5	24	2	Laterite quarry / 0.6
2	ST02R3.5/5D6.0	Road to CCC village	6.0	Earth Road	3.5	18	3	Laterite quarry / 1.6
3	ST03R3.5/5D3.6	Road to DDD village	3.6	Earth Road	3.5	8	0	Laterite quarry / 0.7



S4.1: RR maintenance planning

2. Carry out road defect survey

Commune: AAA						Road : Road to BBB village		
Road Length: 8.6 km			Road Code: ST01R3.5/5D8.6			Date: 15-3-2005		
Pavement Type: Earth Pavement - Road/Pavement width: 3.5m/5.0m						condition assessment		road defect quantity
Road defect and sphere of influence						Quantit-y	Condi-tion Asses-ment	
Chainage (km)	K0 - K2	K2 - K4	K4 - K6	K6 - K8	K8 - K8 + 600	Quantit-y	Condi-tion Asses-ment	road defect quantity
Side Drain cleaning (m)	125	50	80	300	150	785 m	Bad	705 m
Drain excavation (m/m3)	40/12.8	0	20/6.4	20/6.4	0			25.6m3
Brush/Grass clearing (m2)	60	50	20	120	40	290 m2	Bad	290 m2
pavement								
> 5cm deep corrugation (m)/(m2)	60/210	0	0	120/320	0	2%	Bad	530 m2
10 cm deep pothole (m2)	80	20	130	50	40	1.36 %	Fairly Good	320 m2
15 cm deep pothole (m2)	20	30	0	0	20			70 m2
Soft spot (m2)/(m3)	6/3.6	0	6/3.0	7/2.8	0			7.4
bridge, culvert and other structures								



S4.1: RR maintenance planning

3. Define road maintenance quantity and cost (A)

Comprehensive table of road maintenance quantity

No.	Items	Unit	Road Maintenance Quantity
I	Road bed and Drainage		
1	Brush/ Grass clearing	m2	570
2	Side drain cleaning	m	963
3	Drain excavation	m3	60.8
II	Pavement		
4	Corrugation removing	m2	740
5	10 cm deep pothole filling	m2	630
6	15 cm deep pothole filling	m2	195
7	Soft spot treatment	m3	26.6



S4.1: RR maintenance planning

3. Define road maintenance quantity and cost (B)

Code.	Description	Unit	Quantity	Unit Price	Cost	Note
XR.65	<u>Side drain cleaning</u>	m	1	\$	\$	
	<i>Labor</i> class 3.5/7	daywork	0.035	0.74	0.03	
BA.1733	<u>Side drain cleaning</u>	m3	1		0.00	
	<i>Labor</i> class 2.7/7	daywork	1.17	0.69	0.80	
XR.66	<u>Brush/grass clearing</u>	m2	1		0.00	
	<i>Labor</i> class 3.5/7	daywork	0.022	0.74	0.02	



3. Define road maintenance quantity and cost (C)

Items	Unit	Quantity	Unit Price \$			Cost \$		
			Material	Labor	Machine	Material	Labor	Machine
Road bed and Drainage								
Brush/ Grass clearing	m2	570		0.02			9.23	
Side drain cleaning	m	963		0.03			24.84	
Drain excavation	m3	60.8		0.80			48.90	
Pavement								
Corrugation removing	m2	630	0.29	0.18	0.01	181.66	115.26	8.59
10 cm deep pothole filling	m2	195	0.43	0.28	0.02	84.15	54.11	3.04
15 cm deep pothole filling	m2	740	0.28	0.03	0.15	206.02	19.43	108.56
Soft spot treatment	m3	26.6	2.78	0.64	0.13	74.06	16.95	3.54
Total						545.89	288.72	123.73



S4.1: RR maintenance planning

3. Define road maintenance quantity and cost (C)



Total						545.89	288.72	123.73
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Direct Cost								
VL = \$545.89							\$545.89	
NC = \$288.72 x 3.36 =							\$970.10	
M = \$123.73 x 1.4 =							\$173.22	
T = VL + NC + M =							\$1,689.21	
Overhead cost								
C = 5.3 % x T =							\$89.53	
Maintenance Cost								
Z = T + C =							\$1,778.74	
Management Cost								
K = 1% x Z =							\$17.79	
Total cost: Z + K							\$1,796.53	

S4.1: RR maintenance planning

4. Fund mobilization planning

(Vietnam sample)

Funding resources	Calculation	Mobilized funds \$
Commune Budget	Deduct 5% from total budget \$60,000	300
District Budget	Support \$200	200
Monetary community contribution	\$1 household/ 1year -150 household	150
Compulsory Labor	1 daywork/1year/person - 300 people - 1 daywork value =\$1	300
Transport business fee	\$5VND/1household/1year - 18 household	90
Business/Production Agent contribution	\$25 VND/1Agent/1year - 8 agents	200
Total		\$1,240



International



5. Define priority and balance funds

No.	Maintenance Activities	Maintenance Cost (Direct Cost) \$	Total Cost \$	Accumulative Cost \$
1	Side drain cleaning	24.84	41.65	41.65
2	Drain excavating	48.90	81.99	123.64
3	Soft spot treatment	94.54	106.79	230.43
4	15 cm deep pothole filling	141.30	178.78	409.21
5	10 cm deep pothole filling	305.51	385.40	794.61
6	Brush/Grass clearing	9.23	15.48	810.09
7	Corrugation/rut removing	334.01	350.30	1,160.38



International



5. Define priority and balance funds

(Vietnam sample)

No	Road Code	Road Name	Traffic Volume (Daily PCU)	Corrugation removing quantity	Cost	Accumulative Cost
1	ST01R3.5/5D8.6	A	150	530	\$250.89	250.89
2	ST03R3.5/5D3.6	B	95	210	Left to carry out later	
3	ST02R3.5/5D6.0	C	80	0		



6. Road maintenance plan and estimated implementing models

No.	Maintenance Activities	Cost \$	Estimated Implementing Model
1	Side drain cleaning	41.65	Compulsory Labor
2	Drain excavating	81.99	
3	Soft spot treatment	106.79	Force Account
4	15 cm deep pothole filling	178.78	
5	10 cm deep pothole filling	385.40	
6	Brush/Grass clearing	15.48	Compulsory Labour
7	Corrugation/rut removing - road ST01R3.5/5D8.6	250.89	Force Account
Total		1,060.98	



Section 2

S4.2: RR Maintenance works Quality assessment

SUMMARY

- Assessment criteria
- Procedure
- Practical issues: Tools, calculation ...



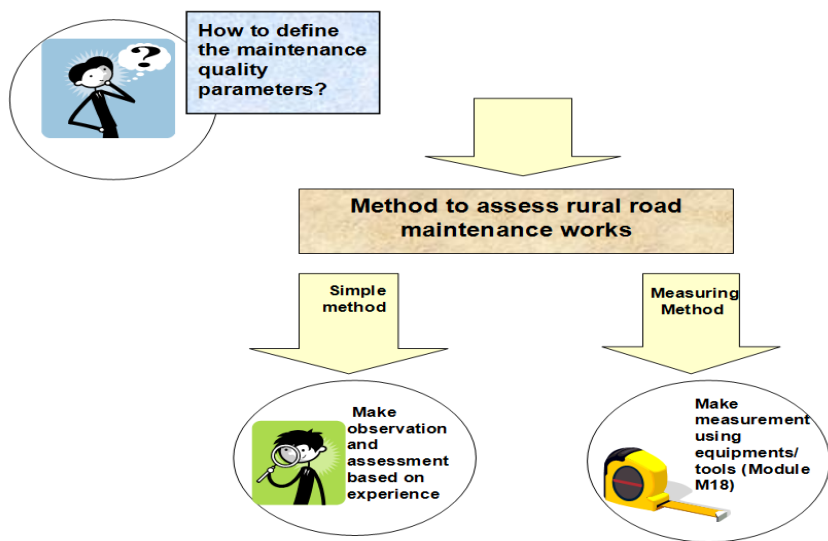
S4.2: RR Maintenance works Quality assessment

Quality assessment criteria

- ❑ Material quality criteria/parameters
- ❑ Geometric dimension parameters
- ❑ Density of compacted soil and pavement materials.
- ❑ Evenness of bitumen spraying and crushed stone spreading.



Quality assessment procedure



Length/width:

- Formation
- Pavement
- Drain
- Retaining wall
- Foundation

.....

Cross fall

- Pavement camber
- Formation

Roughness of pavement assessed by 3m straight edge

Pavement thickness

Length/width permitted tolerance:

- It does not exceed tolerance of 10cm.
- It does not exceed 5% respective dimensions of drains/ culverts...

Cross fall permitted tolerance
It does not exceed:

- ± 0.5% for pavement
- ± 0.5% for shoulder

For example, the finished cross fall should be from $(4 - 0.5) = 3.5\%$ to $(4+0.5) = 4.5\%$ for required cross fall of 4%

Roughness permitted tolerance:

Interstice between the straight edge and pavement does not exceed mm depended on type of pavement

Pavement thickness permitted tolerance

Maximum tolerance of pavement thickness is 10%

*For example, the finished pavement thickness should be from $(20 - 20*10/100) = 18cm$ to $(20 + 20*10/100) = 22cm$ for required pavement thickness of 20cm*

S4.2: RR Maintenance works Quality assessment

Main criteria for RR maintenance

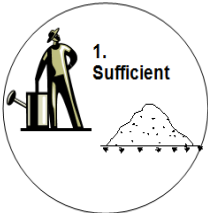
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Criteria for geometric dimension assessment

S4.2: RR Maintenance works Quality assessment

Main criteria for RR maintenance

1. Sufficient



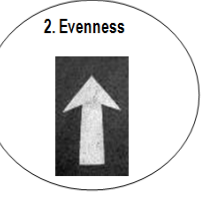
Bitumen spraying:

The difference of bitumen spraying rate per sq.m does not exceed 5% in comparison with requirement

Chippings spreading:

The difference of chippings spreading rate per sq.m does not exceed 8% in comparison with requirement

2. Evenness




Bitumen spraying:

The difference of bitumen in different locations on pavement does not exceed 10%

Chippings spreading:

The difference of chippings in different locations on pavement does not exceed 10%

2 main requirements of bitumen spraying and chippings spreading



S4.2: RR Maintenance works Quality assessment


How to assess the quality parameters

1 quantity control of brush/grass clearing


Compare with requirement:

The height of brush/grass at both side along road does not exceed 7cm to ensure sight distance and surface drainage

Assess the quality of brush/grass clearing work!



Measure the height of brush along both sides of road

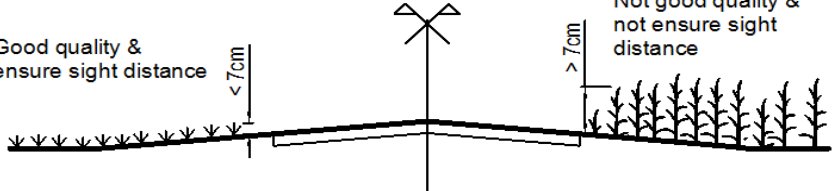


Good quality & ensure sight distance

< 7cm

Not good quality & not ensure sight distance

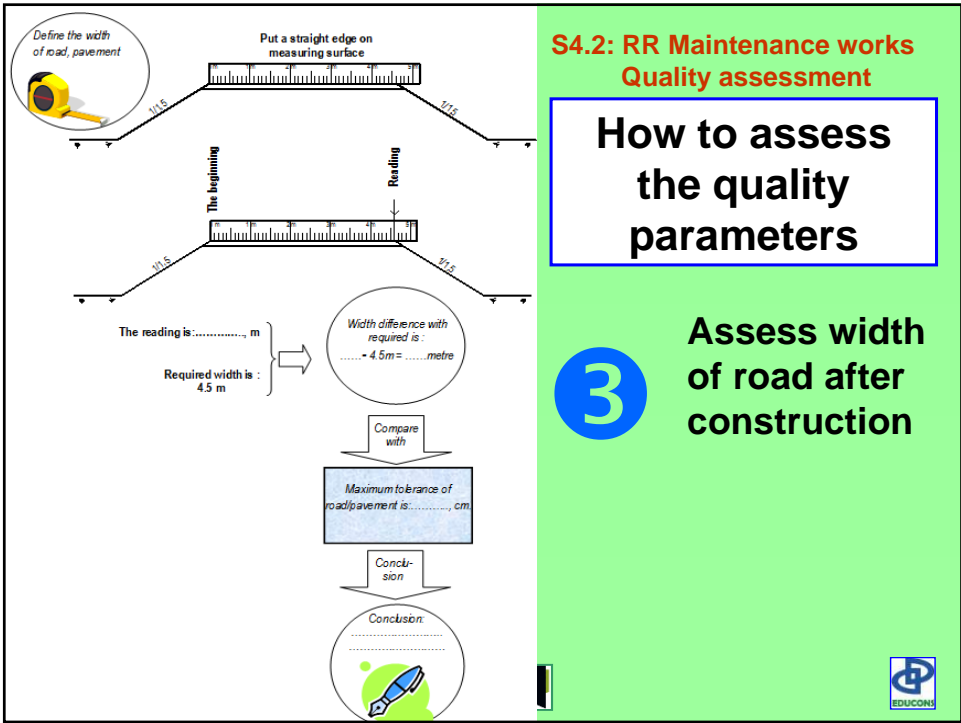
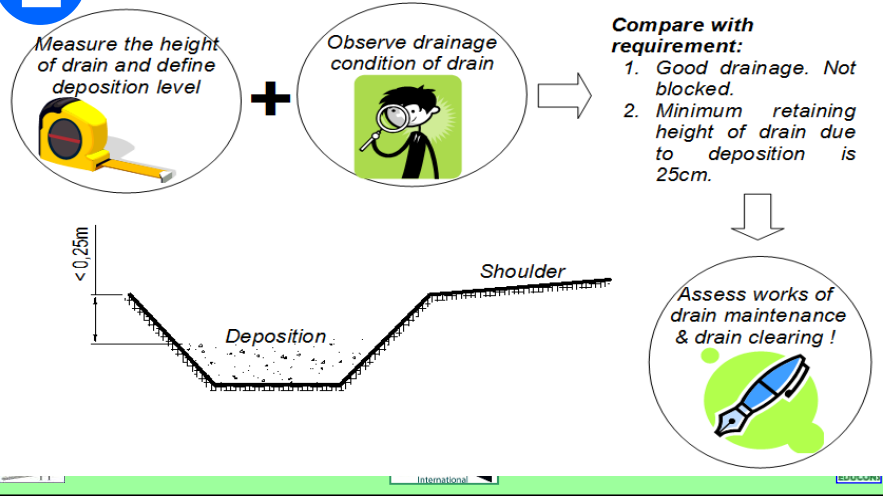
> 7cm



S4.2: RR Maintenance works Quality assessment

How to assess the quality parameters

2 Assess quality of drain clearing work



S4.2: RR Maintenance works Quality assessment

How to assess the quality parameters

3 Assess width of road after construction



Use straight edge and locked steel tape

Locked steel tape

3m straight edge (from wooden or aluminum)

Permitted maximum interstice:
1.5cm (for unbound material surface)

The interstice between pavement surface & template

Compare

Conclusion:

S4.2: RR Maintenance works
Quality assessment

How to assess the quality parameters

4 Assess pavement roughness (corrugation level)

Use a straight edge and locked steel tape or a template

Spirit level

Locked steel tape

Straight edge

100 cm

Required cross fall : 4%

Permitted error of cross fall%

Calculation, Conclusion

Conclusion:

It is satisfied at cross fall if the actual cross fall is

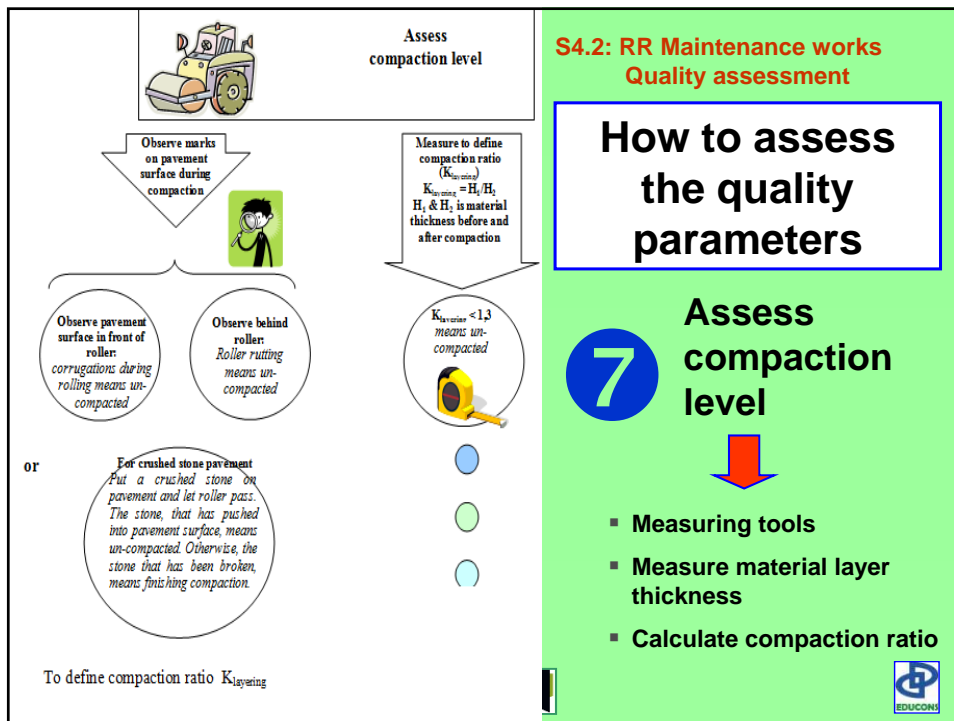
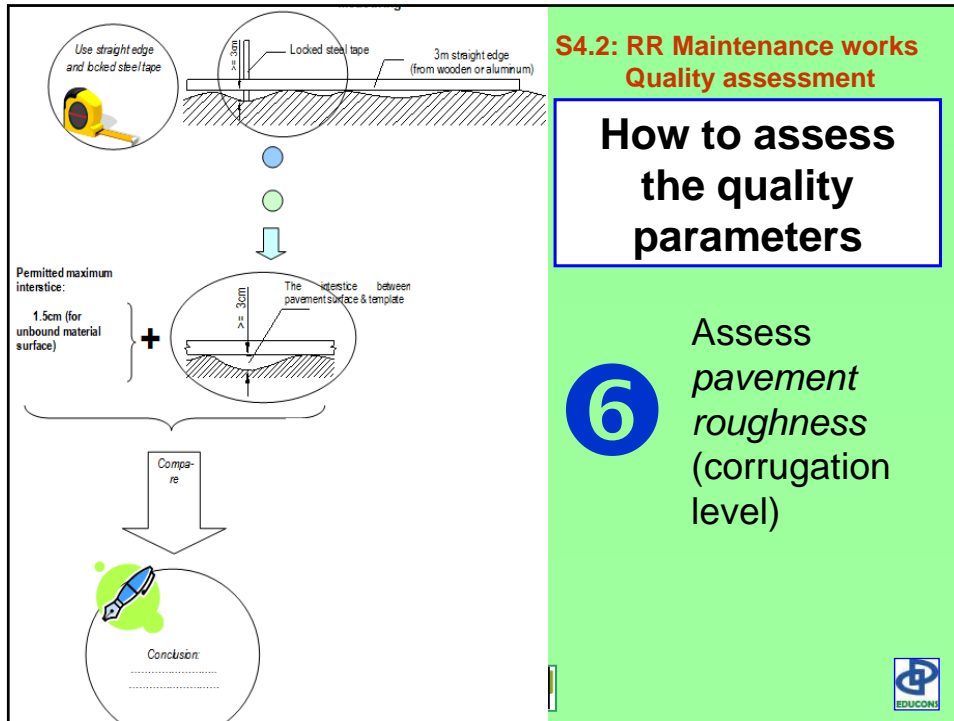
from: 4%% =%

to:% +% =%

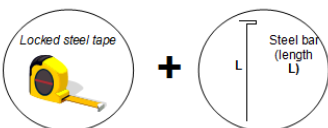
S4.2: RR Maintenance works
Quality assessment

How to assess the quality parameters

5 Cross fall (road camber) measuring



1 Measuring tools

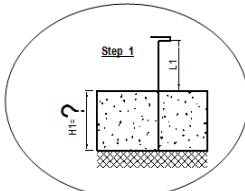


2 Measure material layer thickness

Step 1
After layering and grading:

- Put steel bar to full depth of layered material thickness.
- Measure the distance, L_1 , from top of steel bar to material layer surface using locked steel tape

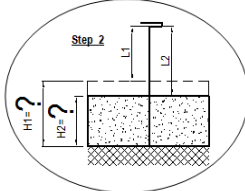
→ $H_1 = L - L_1$



Step 2
After compaction:

- Grade material around steel bar to compacted surface
- Measure the distance, L_2 , from top of steel bar to material layer surface using locked steel tape

→ $H_2 = \dots\dots\dots$



3 Calculate compaction ratio: $K_{\text{layering}} = \frac{H_1}{H_2}$

S4.2: RR Maintenance works Quality assessment


How to assess the quality parameters

7

Assess compaction level

↓

- Measuring tools
- Measure material layer thickness
- Calculate compaction ratio



Section 2

S4.3: Community Supervision and Audit

SUMMARY

- Community role in Rural Road Maintenance supervision and audit.
- Grasp the contents of community Rural Road Maintenance supervision and audit
- Practical issues



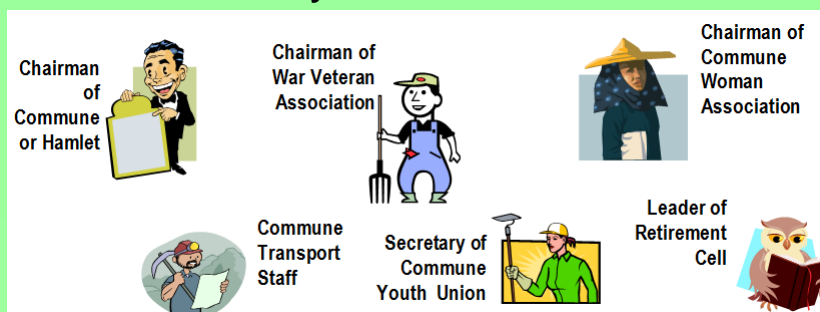
The role of Community Supervision & Audit for Rural Road Maintenance

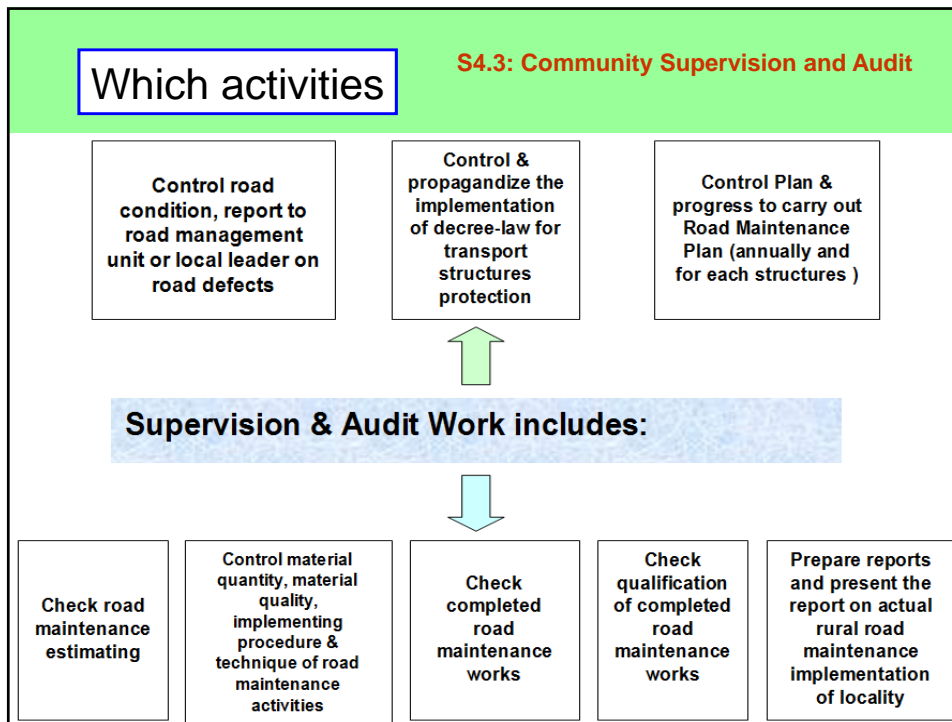
- ❑ RR Network affects to all activities and to the Community's life
- ❑ RR Maintenance funds can be mobilized from many sources that include labour & monetary contributions of people
- ❑ There is no professional staff for RR Supervision & Audit
- ❑ Absence of Supervision & Audit results in low quality of road maintenance, bad road conditions and waste of money






Who?

- ❑ **"Community Supervision & Audit" does not mean all people in Commune involved in supervising & auditing.**
- ❑ **Board of Community Supervision & Audit are Qualified & credible people that are representative of commune. They can be:**





- S4.3: Community Supervision and Audit**
- What “supervision and Audit” people do?
1. Control road conditions, recognize road defects, then report to road management unit or local authorities
 2. Control & circulate the implementation of decree-law for transport structures protection
 3. Control the Plan & the Progress to carry out Road Maintenance Plan
 4. Check road maintenance estimating
 5. Control material quantity, material quality, implementing procedures & techniques of road maintenance
 6. Check completed road maintenance works
 7. Prepare and submit report
- 



What “supervision and Audit” people do?

1. Control road conditions, recognise road defects, then report to road management unit or local authorities



Patrol the road

Mark the location of road defects & describe the defects



What “supervision and Audit” people do?

3. Control Plan & Progress to carry out Road Maintenance Plan


It is necessary to understand road maintenance plan

Should know all types of rural road maintenances



What “supervision and Audit” people do?

4. Check road maintenance estimating




Checking estimate means

- Correct quantity?
- Correct Unit Price?
- Correct methodology?



What “supervision and Audit” people do?

5. Control material quantity, material quality, implementing procedures & techniques of road maintenance

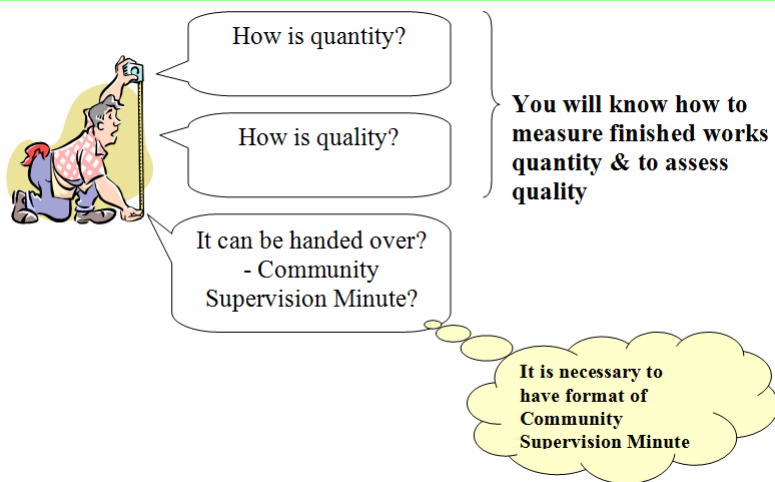


- Sufficient material quantity?
- Good material quality?
- Correct implementation?



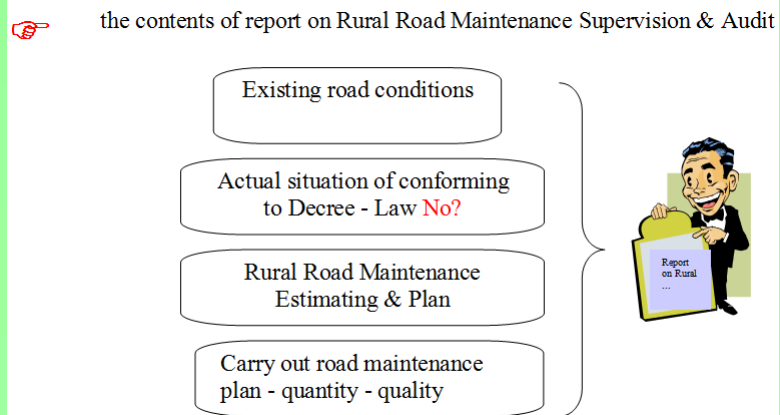
What “supervision and Audit” people do?

6. Check completed road maintenance works



What “supervision and Audit” people do?

7. Prepare and submit report



Group discussion: Maintenance Challenges

Group Discussion : Maintenance funding, planning, implementation, supervision, audit.

Each Group to raise key challenges in improving effective maintenance in the Cambodian rural environment

