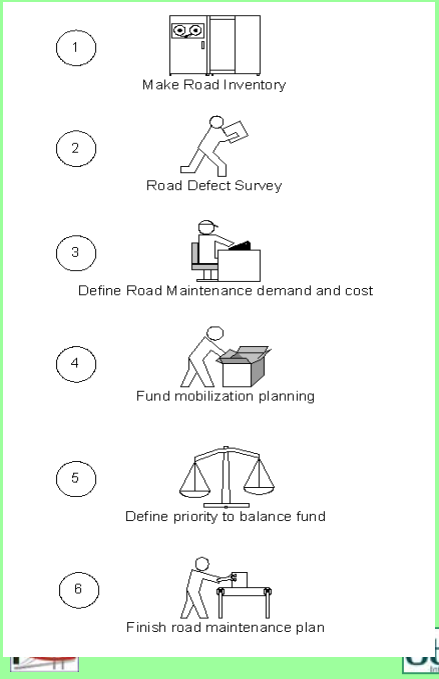
Section 4
S4.1: RR maintenance planning

SUMMARY

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



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?*

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								
Chainage (km)	K0 - K2	K2 - K4	K4 - K6	K6 - K8	K 8 - K8 + 600	Quantit-y	Condition Assessment	
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								

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

A

3. Define road maintenance quantity and cost (B)

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

3. Define road maintenance quantity and cost (C)

Items	Unit	Quant i-ty	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				0.00			0.00	
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

3. Define road maintenance quantity and cost (C)

C

Total						545.89	288.72	123.73

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	

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**

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 pot hole filling	141.30	178.78	409.21
5	10 cm deep pot hole 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

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

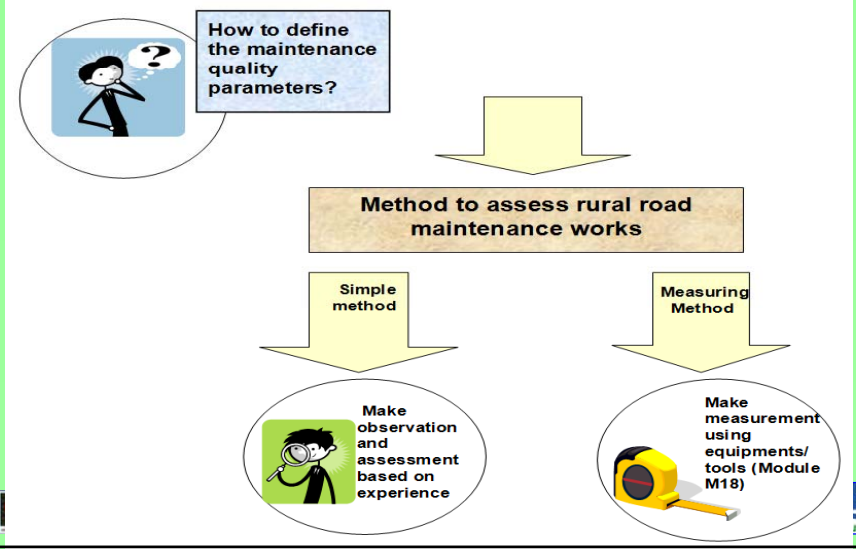
SUMMARY

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

Quality assessment criteria

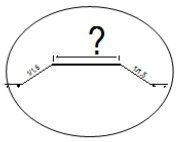
- Material quality criteria/parameters
- Geometric dimension parameters
- Density of compacted soil and pavement materials.
- Evenness of bitumen spraying and crushed stone spreading.

Quality assessment procedure



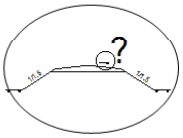
Length/width:
1. Formation
2. Pavement
3. Drain
4. Retaining wall
5. Foundation

.....



Length/width permitted tolerance:
1. It does not exceed tolerance of 10cm.
2. It does not exceed 5% respective dimensions of drains/ culverts...

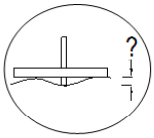
Cross fall
1. Pavement camber
2. Formation



Cross fall permitted tolerance
It does not exceed:
1. ± 0.5% for pavement
2. ± 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%

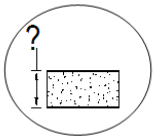
Roughness of pavement assessed by 3m straight edge



Roughness permitted tolerance:

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

Pavement thickness



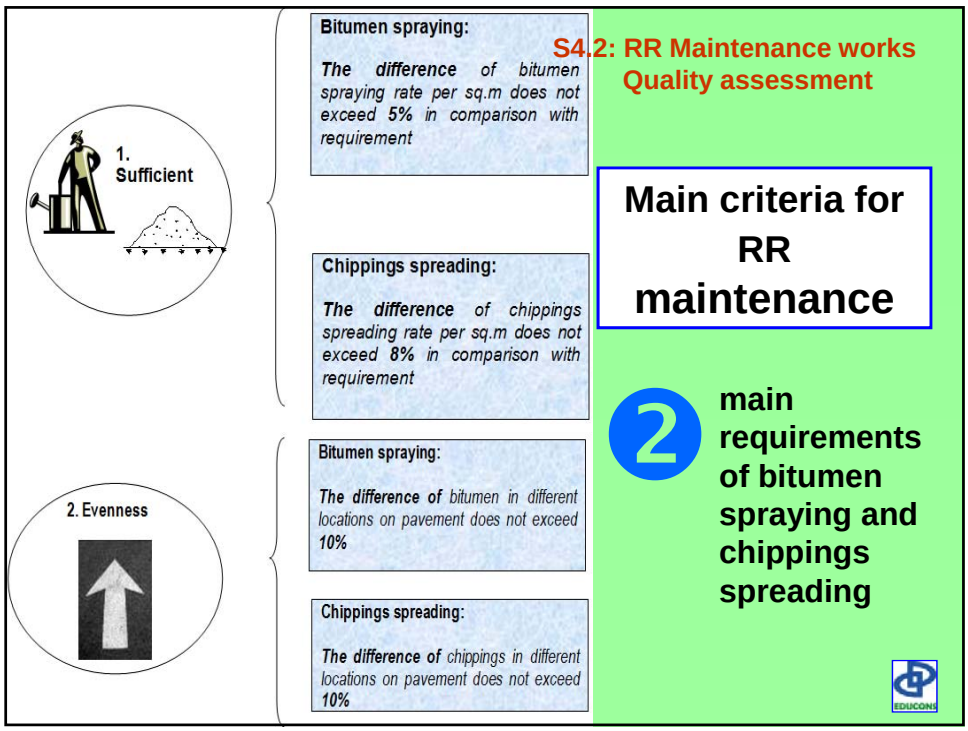
Pavement thickness permitted tolerance

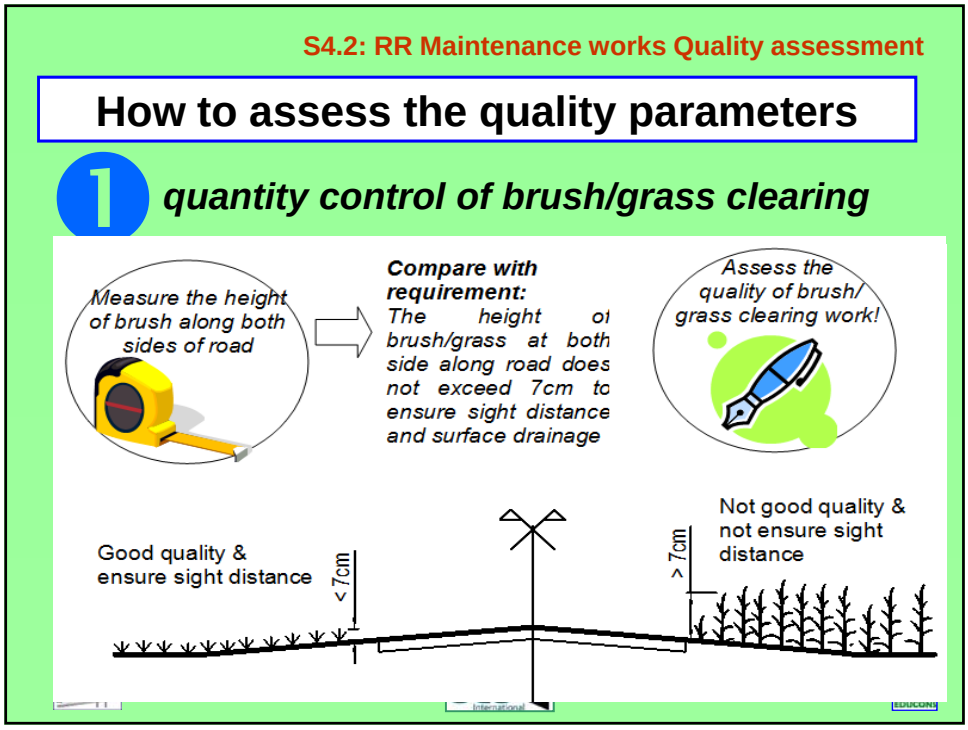
Maximum tolerance of pavement thickness is 10%

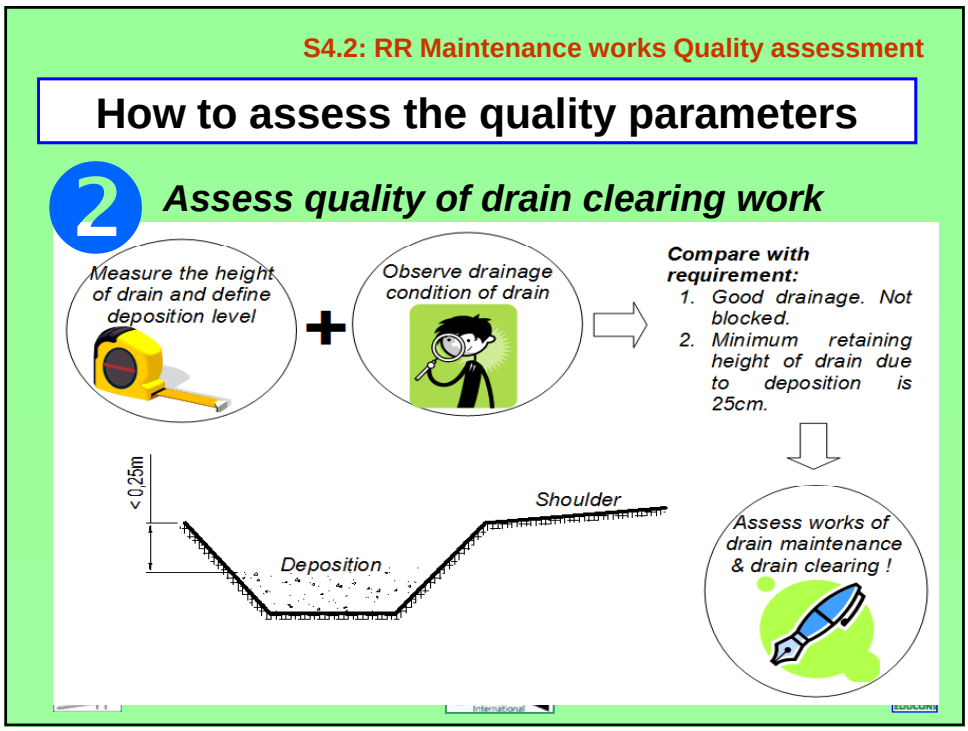
*For example, the finished pavement thickness should be from (20 - 20*10/100) = 18cm to (20 + 20*10/100) = 22cm for required pavement thickness of 20cm*

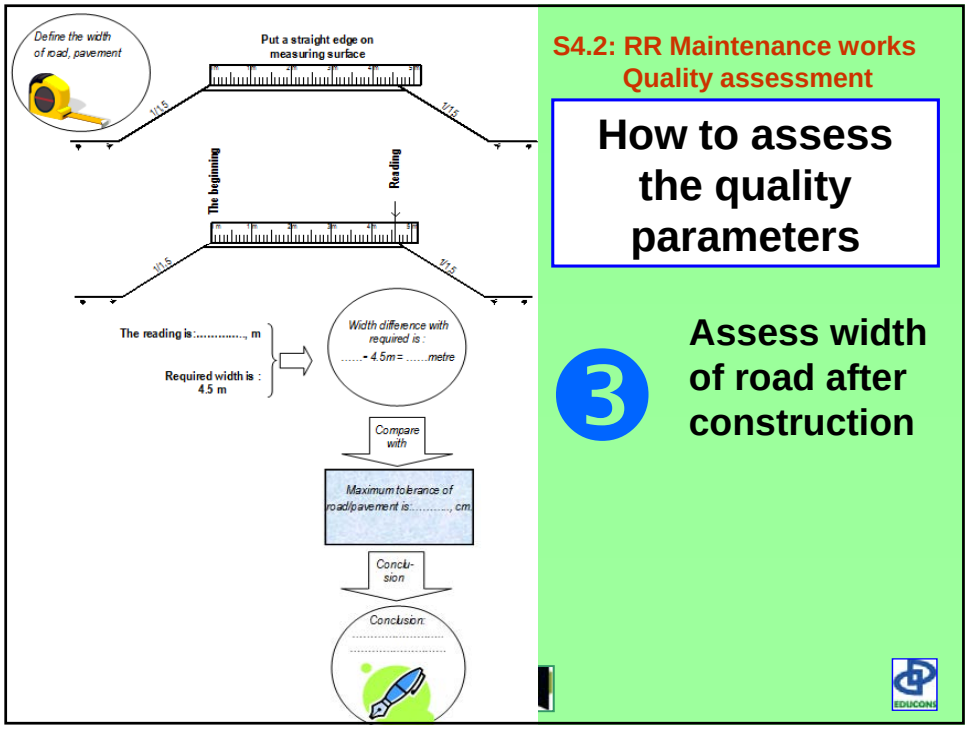
Main criteria for RR maintenance

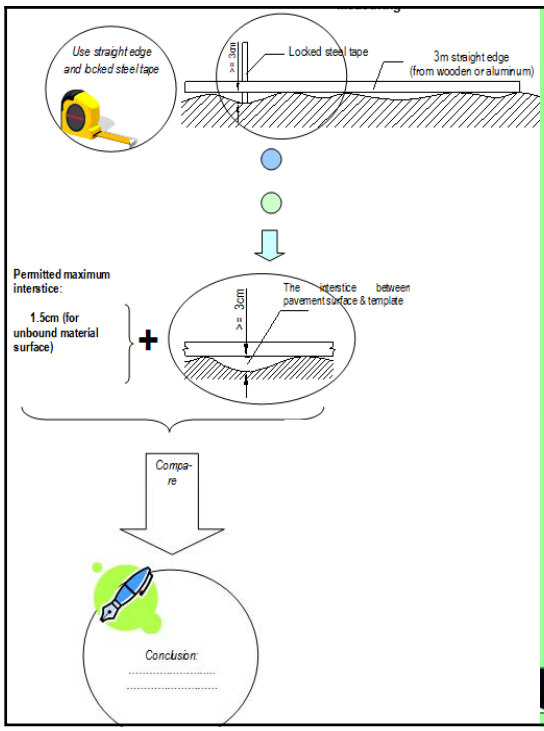
1 ***Criteria for geometric dimension assessment***


S4.2: RR Maintenance works Quality assessment
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%
Main criteria for RR maintenance
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
Measure the height of brush along both sides of road
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!
Good quality & ensure sight distance
< 7cm
> 7cm
Not good quality & not ensure sight distance


S4.2: RR Maintenance works Quality assessment
How to assess the quality parameters
2
Assess quality of drain clearing work
Measure the height of drain and define deposition level
Observe drainage condition of drain
Compare with requirement:
1. Good drainage. Not blocked.
2. Minimum retaining height of drain due to deposition is 25cm.
< 0,25m
Shoulder
Deposition
Assess works of drain maintenance & drain clearing !

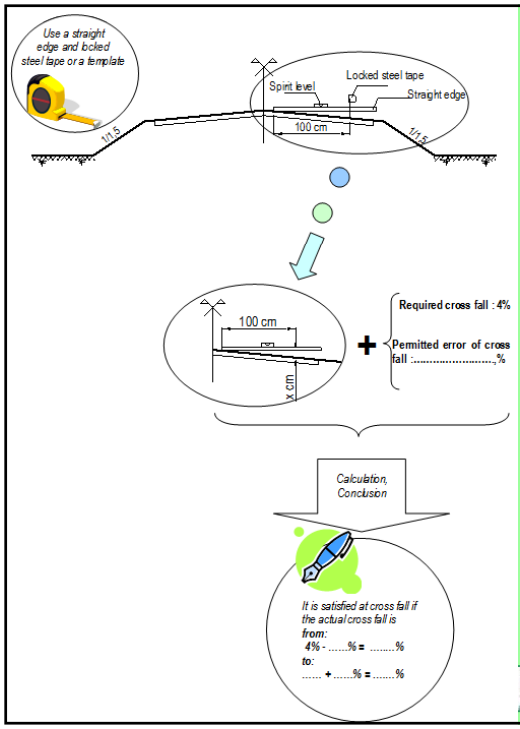

Define the width of road, pavement
Put a straight edge on measuring surface
1/1.5
1/1.5
The beginning
Reading
1/1.5
1/1.5
The reading is:....., m
Required width is : 4.5 m
Width difference with required is : .....- 4.5m = ...metre
Compare with
Maximum tolerance of road/pavement is:....., cm.
Conclu-sion
Conclusion:
S4.2: RR Maintenance works Quality assessment
How to assess the quality parameters
3
Assess width of road after construction



S4.2: RR Maintenance works Quality assessment

How to assess the quality parameters

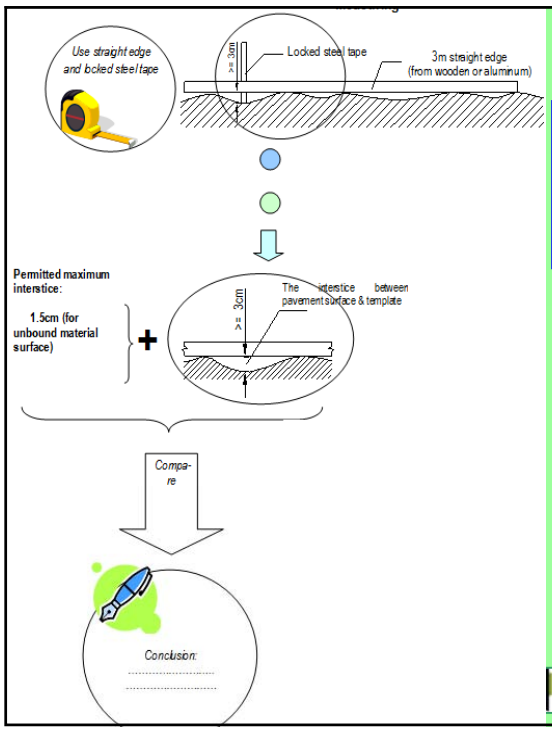
4 **Assess *pavement roughness* (corrugation level)**



S4.2: RR Maintenance works Quality assessment

How to assess the quality parameters

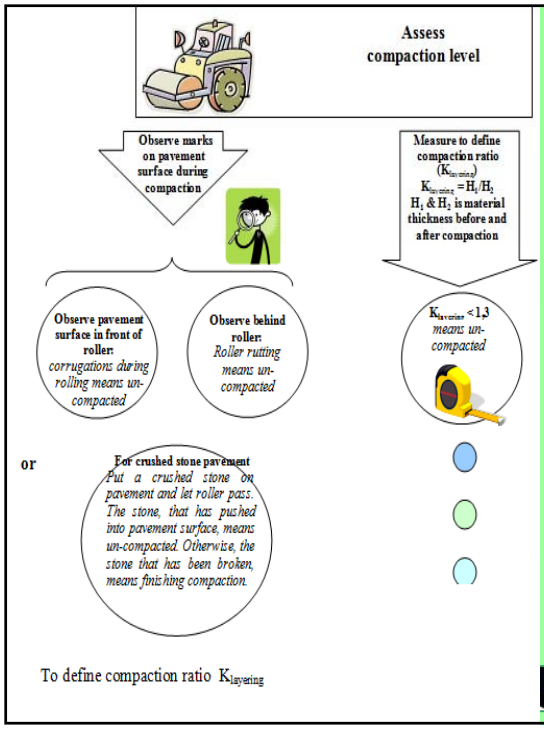
5 Cross fall (road camber) measuring



S4.2: RR Maintenance works Quality assessment

How to assess the quality parameters

6 Assess *pavement roughness* (corrugation level)

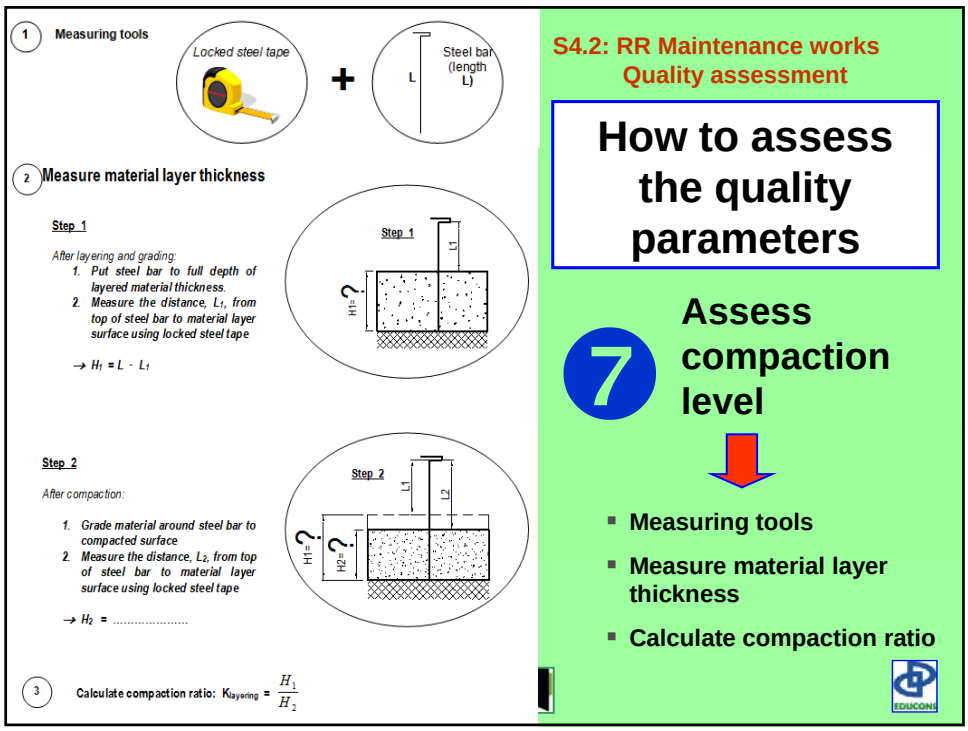


S4.2: RR Maintenance works Quality assessment

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:**

Which activities

S4.3: Community Supervision and Audit

- Control road condition, report to road management unit or local leader on road defects
- Control & propagandize the implementation of decree-law for transport structures protection
- Control Plan & progress to carry out Road Maintenance Plan (annually and for each structures)

Supervision & Audit Work includes:

- Check road maintenance estimating
- Control material quantity, material quality, implementing procedure & technique of road maintenance activities
- Check completed road maintenance works
- Check qualification of completed road maintenance works
- Prepare reports and present the report on actual rural road maintenance implementation of locality

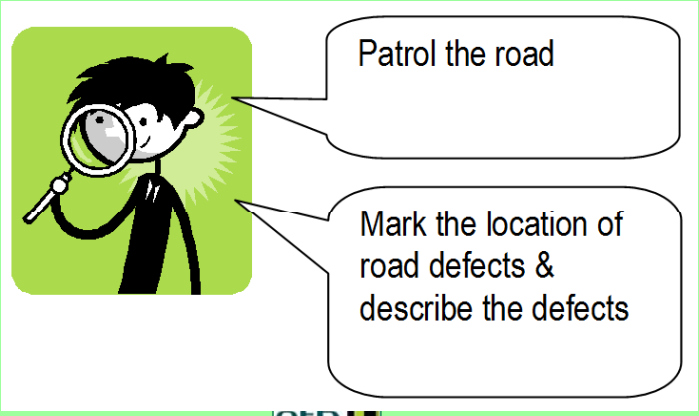
S4.3: Community Supervision and Audit

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?

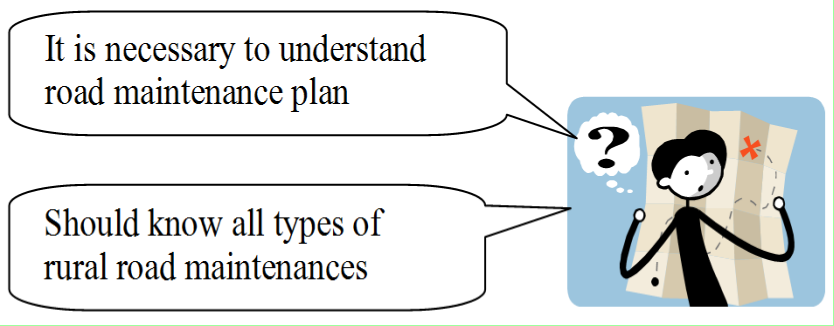
1. Control road conditions, recognise road defects, then report to road management unit or local authorities



S4.3: Community Supervision and Audit

What “supervision and Audit” people do?

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



What “supervision and Audit” people do?

4. Check road maintenance estimating

Checking estimate means

Correct quantity?

Correct Unit Price?

Correct methodology?

S4.3: Community Supervision and Audit

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

How is quantity?

How is quality?

It can be handed over? - Community Supervision Minute?

You will know how to measure finished works quantity & to assess quality

It is necessary to have format of Community Supervision Minute

S4.3: Community Supervision and Audit

What “supervision and Audit” people do?

7. Prepare and submit report

☞ the contents of report on Rural Road Maintenance Supervision & Audit

- Existing road conditions
- Actual situation of conforming to Decree - Law No?
- Rural Road Maintenance Estimating & Plan
- Carry out road maintenance plan - quantity - quality

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

ផ្នែកទី ៤

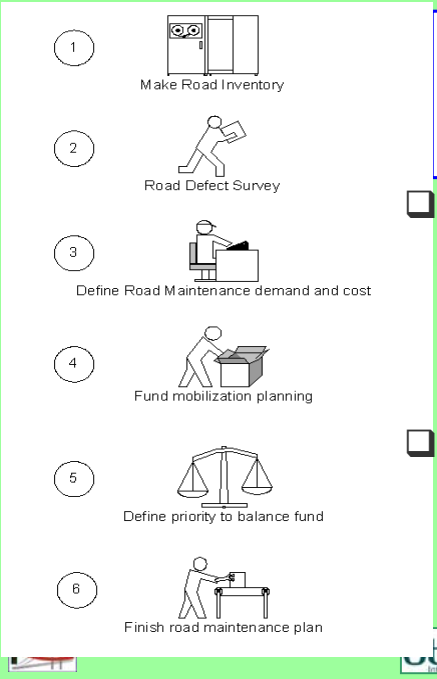
S4.1: គំរោងការនៃការថែទាំផ្លូវជនបទ

សេចក្តីសង្ខេប

- គំរោងការ និង ដំណាក់កាលនៃផែនការនៃការថែទាំផ្លូវជនបទ
- ការធ្វើគំរោងនៃការថែទាំផ្លូវជនបទ

S4.1: RR maintenance planning

គោលការសំខាន់ក្នុងការធ្វើគំរោង សំរាប់ការងារថែទាំផ្លូវជនបទ



- ☐ *តើផែនការលើឯកសារនិង ព័ត៌មាន អ្វីខ្លះ ដែលអ្នកត្រូវការ ដើម្បី ធ្វើគំរោង សំរាប់ការងារ ថែទាំ ផ្លូវជនបទ ?*
- ☐ *តើផែនការលើចំណេះដឹងអ្វីខ្លះ ដែល អ្នកត្រូវការដើម្បី ធ្វើគំរោង សំរាប់ ការងារថែទាំផ្លូវជនបទ ?*

S4.1: RR maintenance planning

១, ធ្វើឯកសារកំណត់លក្ខណៈផ្លូវ៖

1. Road Inventory of AAA commune

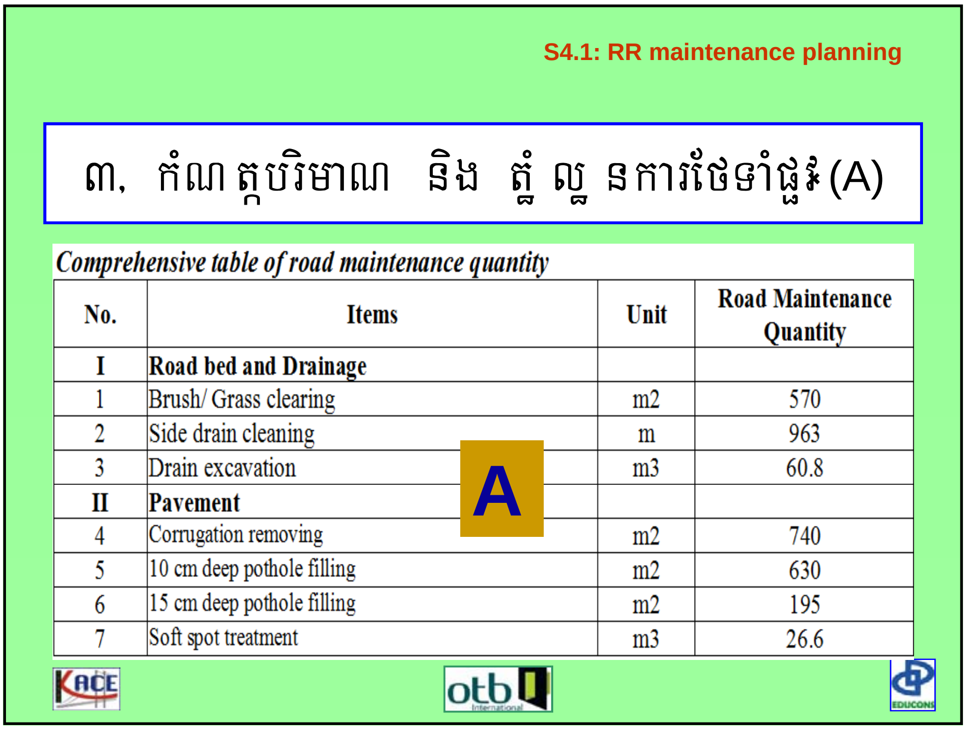
road inventory form

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

២, ធ្វើការអង្កេតលក្ខណៈខូចខាតរបស់ផ្លូវ៖

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								
Chainage (km)	K0 - K2	K2 - K4	K4 - K6	K6 - K8	K 8 - K8 + 600	Quantit-y	Condition Assessment	
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								



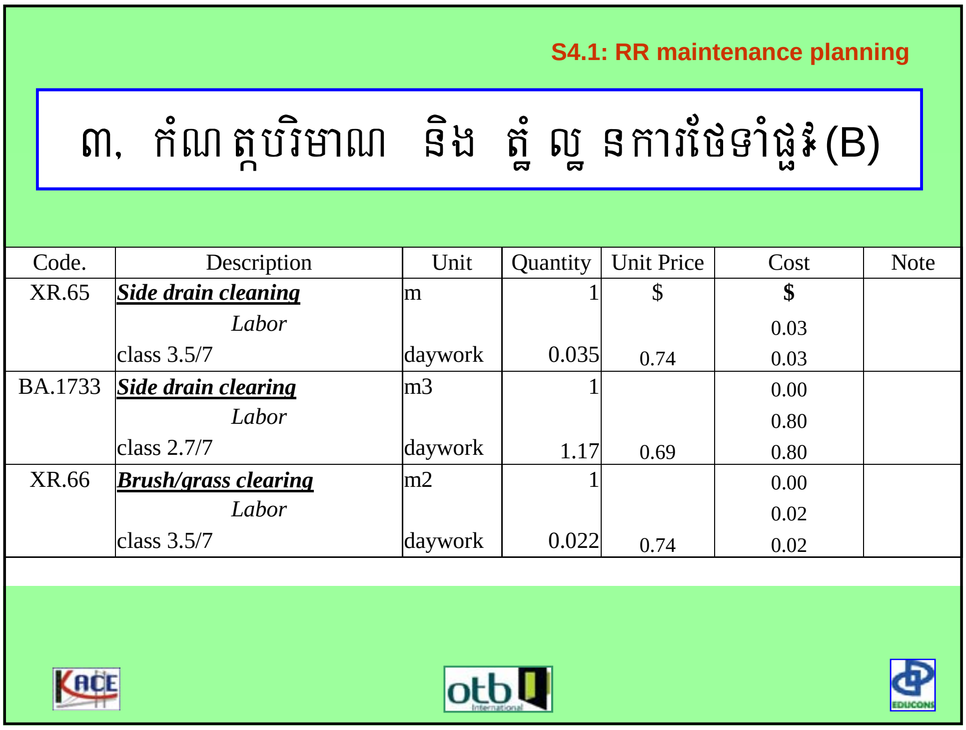
S4.1: RR maintenance planning

៣. កំណត់បរិមាណ និង តម្លៃនៃការថែទាំផ្លូវ (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

A



S4.1: RR maintenance planning

៣. កំណត់បរិមាណ និង តម្លៃនៃការថែទាំផ្លូវ (B)

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

៣. កំណត្តបរិមាណ និង ត្លំ ល្ល នការថែទាំផ្លូវ (C)

Items	Unit	Quant i-ty	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				0.00			0.00	
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

៣. កំណត្តបរិមាណ និង ត្លំ ល្ល នការថែទាំផ្លូវ (C)

C

Total					545.89	288.72	123.73

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

៤, វិធានការក្នុងការប្រមូលថវិការសំរាប់ការងារថែទាំផ្លូវ៖

(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**

៥,កំណត់កលកីណ្ហ អទិភាព និង តុល្លភាពនៃ ថវិការ

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

S4.1: RR maintenance planning

៥,កំណត់លក្ខណៈ អទិភាព និង តុល្លភាព នៃ ថវិការ

(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		

S4.1: RR maintenance planning

៦,គំរោងការថែទាំផ្លូវ និង ការគ្រានត្តំលក់ងការអនុវត្ត គំរោង តាមការបែងចែក ប្រភេទការងារ

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	

ផ្នែកទី៤

S4.2: គុណភាពការងារកិច្ចការថែទាំផ្លូវជនបទ

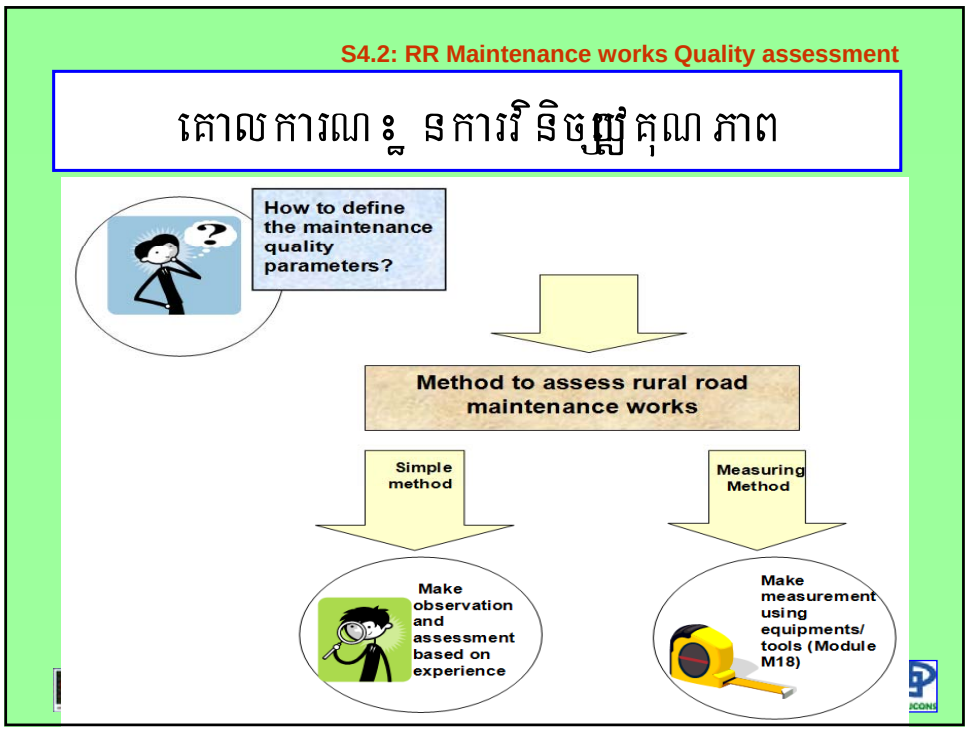
សេចក្តីសង្ខេប

- លក្ខណៈវិនិច្ឆ័យការវាយតម្លៃ
- ទម្រង់ការ
- ចំនុចការអនុវត្ត ឧបករណ៍ ការគណនា ...

S4.2: RR Maintenance works Quality assessment

លក្ខណៈវិនិច្ឆ័យគុណភាព

- ☐ វិនិច្ឆ័យគុណភាពសំភារៈសំណង់
- ☐ ទំហំតាមលក្ខណៈធរណីមាត្រសាស្ត្រ
- ☐ ដង់ស៊ីតេរបស់ដីបង្ហាប់ និង សំភារៈសំរាប់ធ្វើស្រទាប់ផ្លូវបន្ត
- ☐ ភាពមិនស្មើសាច់នៃការស្រោចកៅស៊ូ និងរោចកំទេចថ្ម



S4.2: RR Maintenance works Quality assessment

គោលការណ៍នៃការវិនិច្ឆ័យគុណភាព

How to define the maintenance quality parameters?

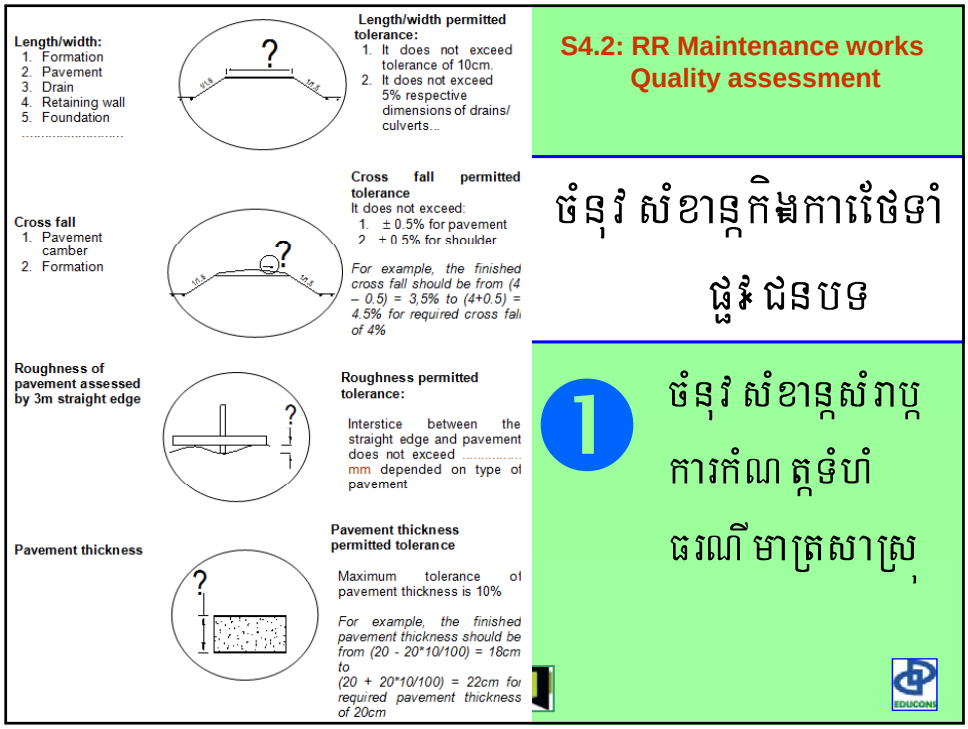
Method to assess rural road maintenance works

Simple method

Make observation and assessment based on experience

Measuring Method

Make measurement using equipments/ tools (Module M18)



S4.2: RR Maintenance works Quality assessment

ចំនុចសំខាន់ក្នុងការថែទាំផ្លូវជនបទ

① ចំនុចសំខាន់សំរាប់ការកំណត់ទំហំធរណីមាត្រសាស្រ្ត

Length/width:
1. Formation
2. Pavement
3. Drain
4. Retaining wall
5. Foundation

…………………………

Length/width permitted tolerance:
1. It does not exceed tolerance of 10cm.
2. It does not exceed 5% respective dimensions of drains/ culverts...

Cross fall
1. Pavement camber
2. Formation

Cross fall permitted tolerance

It does not exceed:
1. ± 0.5% for pavement
2. ± 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 of pavement assessed by 3m straight edge

Roughness permitted tolerance:

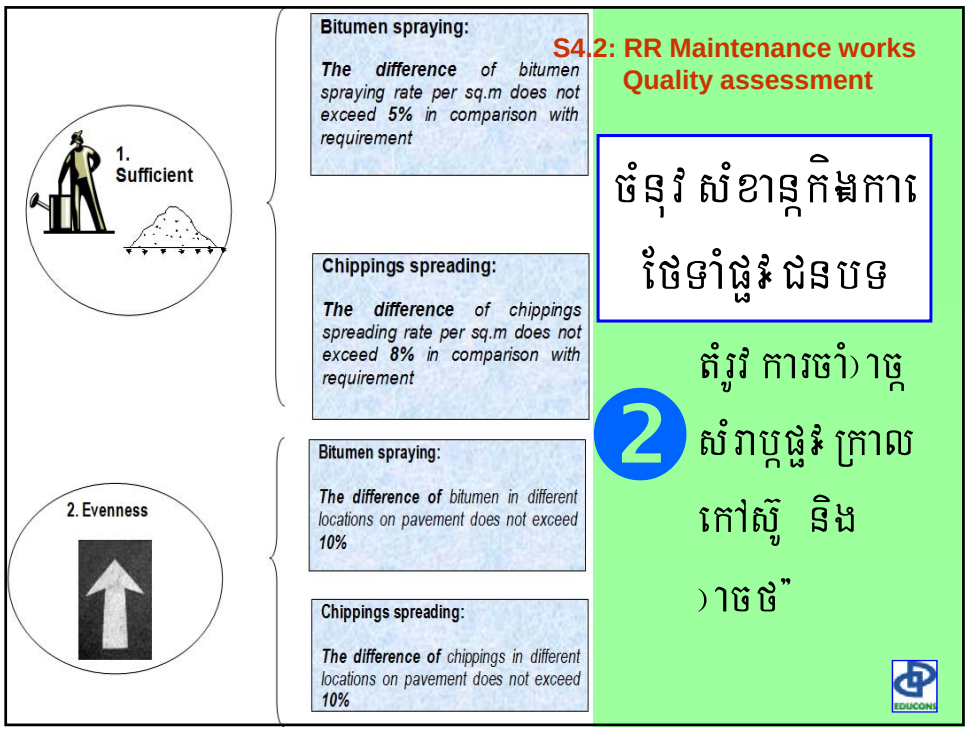
Interstice between the straight edge and pavement does not exceed …………… mm depended on type of pavement

Pavement thickness

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

ចំនុចសំខាន់ក្នុងការថែទាំផ្លូវជនបទ

2 តំរូវការចាំបាច់ សំរាប់ផ្លូវក្រាលកៅស៊ូ និងបាចថ្ម

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*

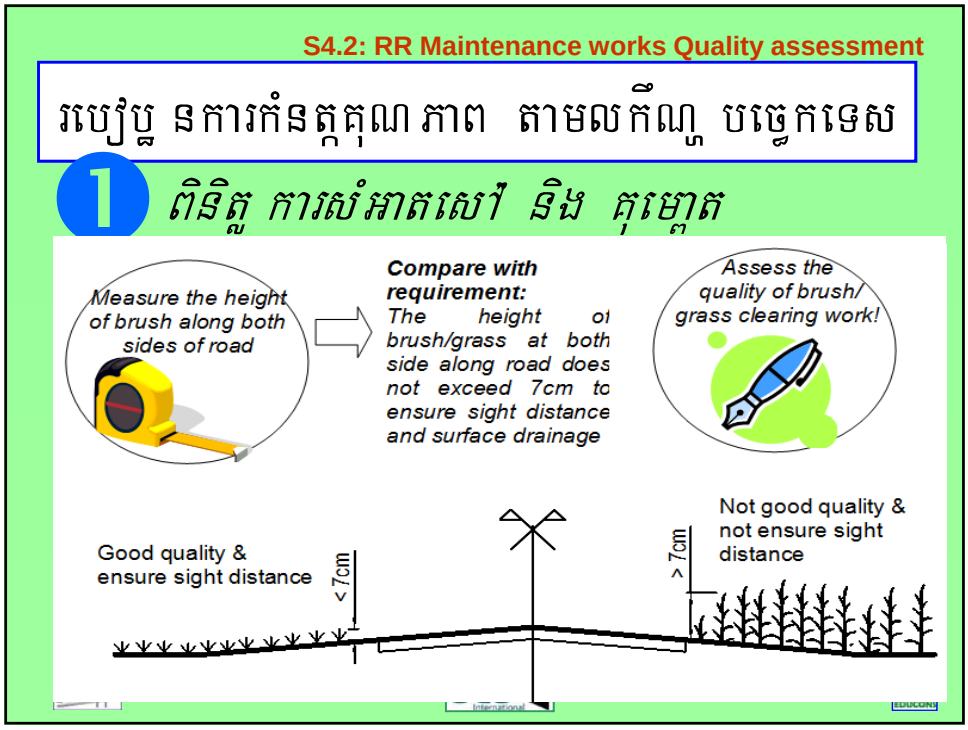
2. Evenness

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%



S4.2: RR Maintenance works Quality assessment

របៀបនៃការកំនត់គុណភាព តាមលក្ខណៈបច្ចេកទេស

1 *ពិនិត្យ ការសំអាតស្មៅ និង គុម្ពោត*

Measure the height of brush along both sides of road

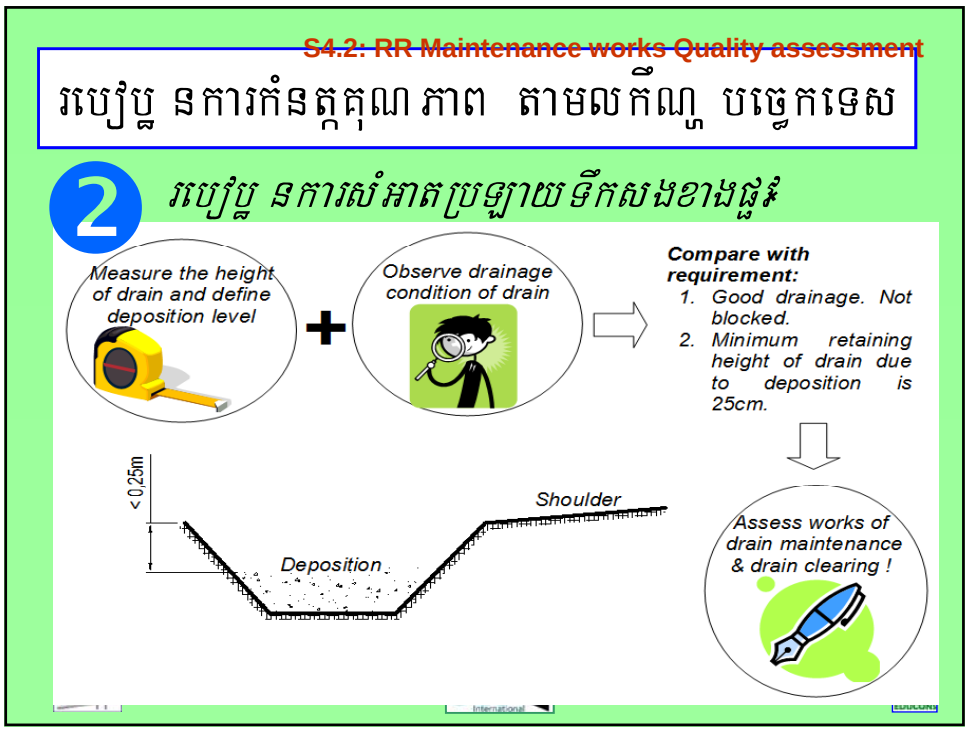
Compare with requirement:

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!

Good quality & ensure sight distance

Not good quality & not ensure sight distance



S4.2: RR Maintenance works Quality assessment

របៀបនៃការកំនត់គុណភាព តាមលក្ខណ៍បច្ចេកទេស

2 *របៀបនៃការសំអាតប្រឡាយទឹកសងខាងផ្លូវ*

Measure the height of drain and define deposition level

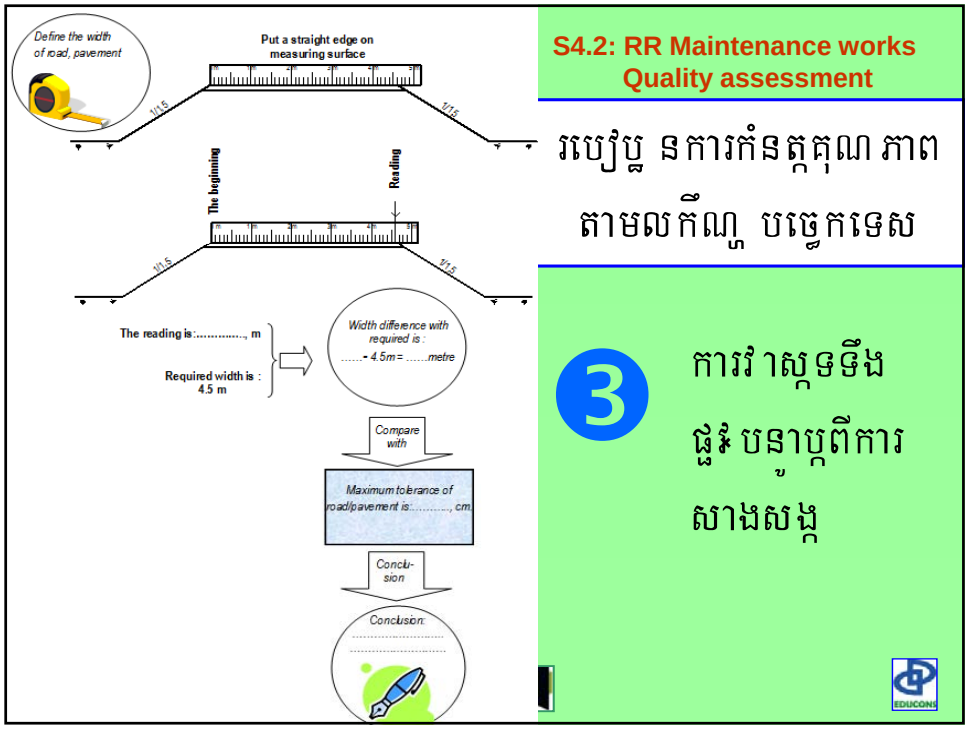
\+

Observe drainage condition of drain

Compare with requirement:

1. *Good drainage. Not blocked.*
2. *Minimum retaining height of drain due to deposition is 25cm.*

Assess works of drain maintenance & drain clearing !



S4.2: RR Maintenance works Quality assessment

របៀបនៃការកំនត់គុណភាព តាមលក្ខណ៍បច្ចេកទេស

3 ការវាស់ទទឹងផ្លូវបន្ទាប់ពីការសាងសង់

Define the width of road, pavement

Put a straight edge on measuring surface

The reading is:............., m

Required width is : 4.5 m

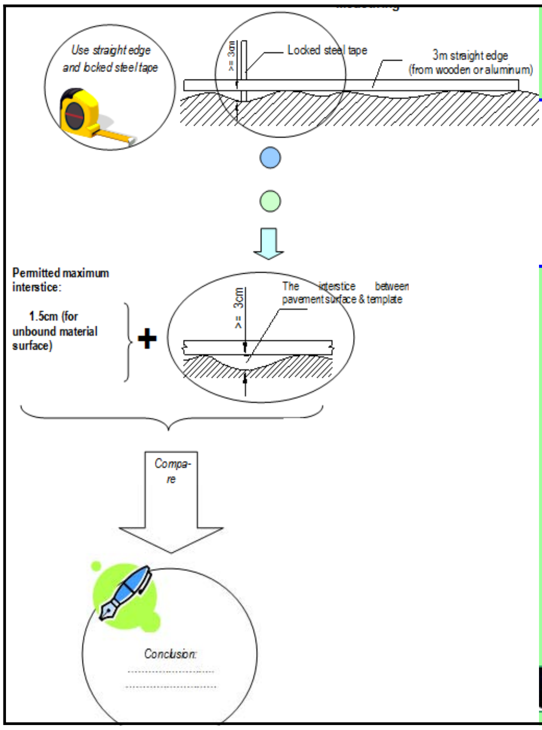
Width difference with required is :
......- 4.5m = ...metre

Compare with

Maximum tolerance of road/pavement is:..........., cm.

Conclu-sion

Conclusion:
....
....

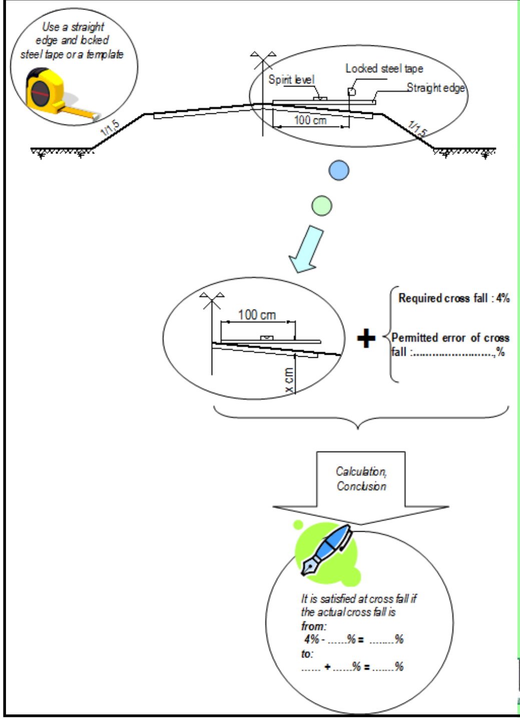


S4.2: RR Maintenance works Quality assessment

របៀបនៃការកំនត់គុណភាព តាមលក្ខណ្ឌបច្ចេកទេស

4 របៀបវាស់ភាពប្រែប្រួលនៃផ្ទៃផ្លូវក្រាល

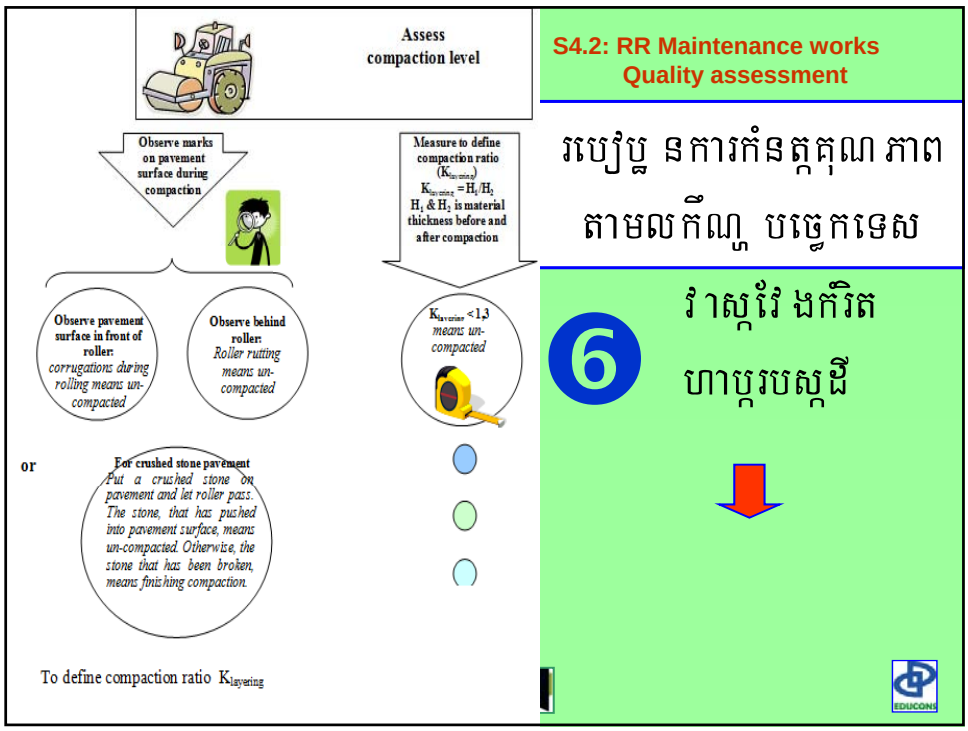
(ផ្ទៃទឹករលក)



S4.2: RR Maintenance works Quality assessment

របៀបនៃការកំនត់គុណភាព តាមលក្ខណ្ឌបច្ចេកទេស

5 ការវាស់វែងជំរាលនៃតួផ្លូវ



S4.2: RR Maintenance works
Quality assessment

របៀបនៃការកំណត់គុណភាព តាមលក្ខណៈបច្ចេកទេស

6 វាស់វែងកំរិតហាប់របស់ដី

Assess compaction level

Observe marks on pavement surface during compaction

Observe pavement surface in front of roller: *corrugations during rolling means un-compacted*

Observe behind roller: *Roller rutting means un-compacted*

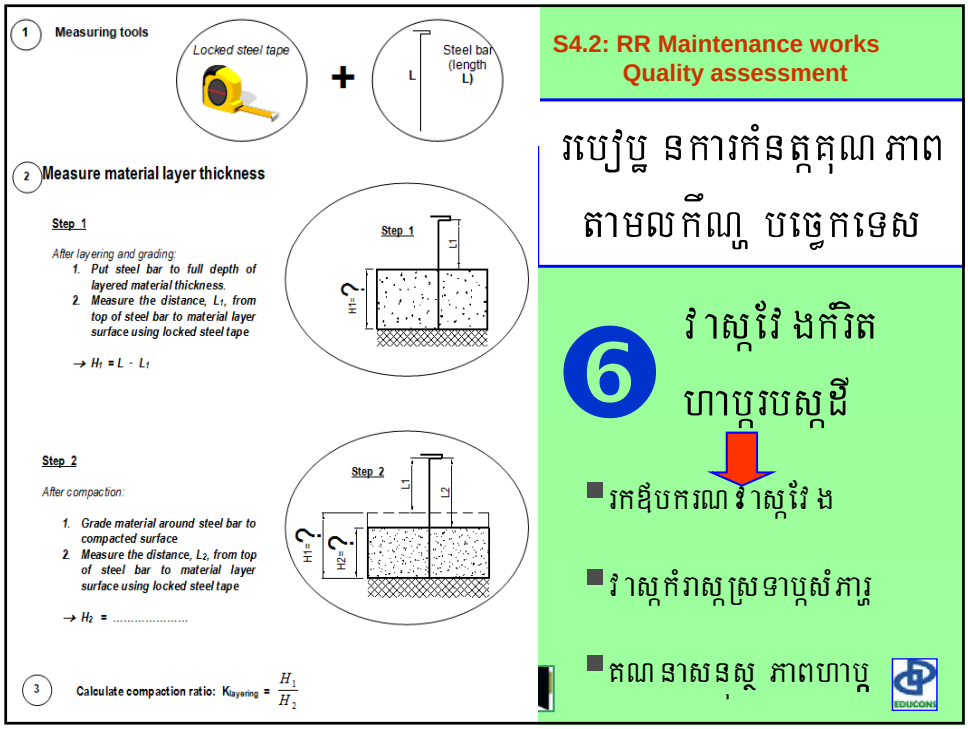
or

For crushed stone pavement *Put a crushed stone on pavement and let roller pass. The stone, that has pushed into pavement surface, means un-compacted. Otherwise, the stone that has been broken, means finishing compaction.*

Measure to define compaction ratio ($K_{layering}$)
$K_{layering} = H_1/H_2$
H_1 & H_2 is material thickness before and after compaction

$K_{layering} < 1{,}3$ *means un-compacted*

To define compaction ratio $K_{layering}$



S4.2: RR Maintenance works
Quality assessment

របៀបនៃការកំណត់គុណភាព តាមលក្ខណៈបច្ចេកទេស

6 វាស់វែងកំរិតហាប់របស់ដី

- រកឧបករណ៍វាស់វែង
- វាស់កំរាស់ស្រទាប់សំភារៈ
- គណនាសន្ទស្សន៍ភាពហាប់

① **Measuring tools**

Locked steel tape + Steel bar (length L)

② **Measure material layer thickness**

Step 1

After layering and grading:

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

→ $H_1 = L - L_1$

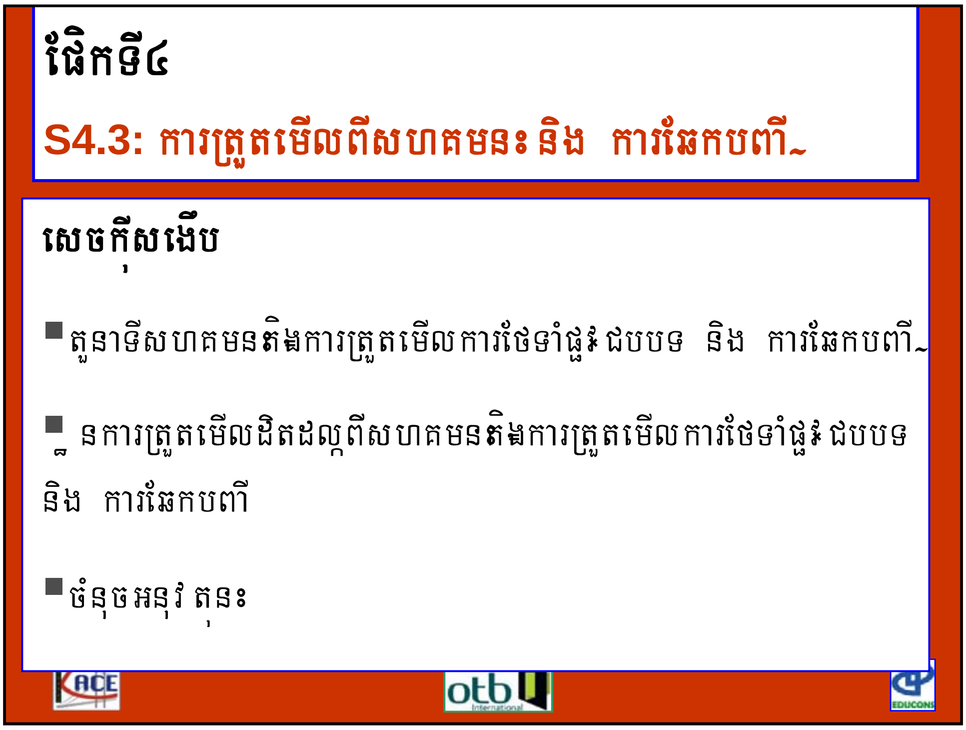
Step 2

After compaction:

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

→ H_2 = ...

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

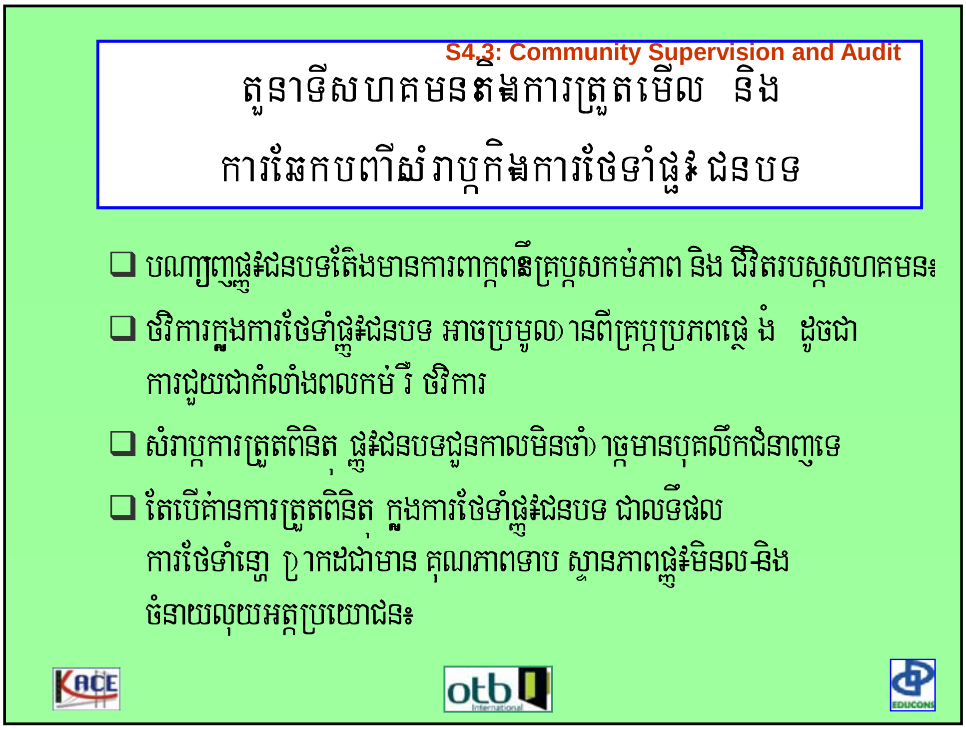


ផ្នែកទី៤

S4.3: ការត្រួតមើលពីសហគមន៍ និង ការឆែកបញ្ជី

សេចក្តីសង្ខេប

- តួនាទីសហគមន៍ក្នុងការត្រួតមើលការថែទាំផ្លូវជនបទ និង ការឆែកបញ្ជី
- នការត្រួតមើលដិតដល់ពីសហគមន៍ក្នុងការត្រួតមើលការថែទាំផ្លូវជនបទ និង ការឆែកបញ្ជី
- ចំនុចអនុវត្តន៍



S4.3: Community Supervision and Audit

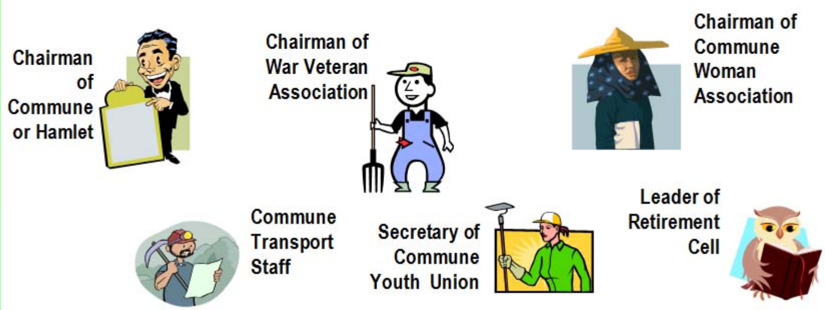
តួនាទីសហគមន៍ក្នុងការត្រួតមើល និង ការឆែកបញ្ជីសំរាប់ក្នុងការថែទាំផ្លូវជនបទ

- ☐ បណ្តាញផ្លូវជនបទតែងមានការពាក់ព័ន្ធគ្រប់សកម្មភាព និង ជីវិតរបស់សហគមន៍
- ☐ ថវិការក្នុងការថែទាំផ្លូវជនបទ អាចប្រមូលបានពីគ្រប់ប្រភពផ្សេងៗ ដូចជា ការជួយជាកំលាំងពលកម្ម រឺ ថវិការ
- ☐ សំរាប់ការត្រួតពិនិត្យ ផ្លូវជនបទជួនកាលមិនចាំបាច់មានបុគ្គលិកជំនាញទេ
- ☐ តែបើគ្មានការត្រួតពិនិត្យ ក្នុងការថែទាំផ្លូវជនបទ ជាលទ្ធផល ការថែទាំនោះ ប្រាកដជាមាន គុណភាពទាប ស្ថានភាពផ្លូវមិនល្អ និង ចំនាយលុយអត់ប្រយោជន៍

តើនរណាខ្លះ ?

S4.3: Community Supervision and Audit

- ☐ អ្នកត្រួតពិនិត្យ ក្នុងសហគមន៍មិនមែនមានន័យថា ជាប្រជាជនទាំងអស់ដែលរស់នៅ ក្នុងឃុំ សុទ្ធតែ មានការពាក់ព័ន្ធនោះ ទេ
- ☐ ប្រធានអ្នកត្រួតពិនិត្យ ក្នុងសហគមន៍ជាមនុស្ស ដែលមានសមត្ថភាព និង ជាទីទុកចិត្តពី ប្រជាជន ទាំងអស់ ដែលរស់នៅ ក្នុងឃុំ និង ជាតំណាងឃុំ ។ ពួកគេទាំងនោះ អាចជា៖



សកម្មភាពអ្វីខ្លះ

S4.3: Community Supervision and Audit

Control road condition, report to road management unit or local leader on road defects

Control & propagandize the implementation of decree-law for transport structures protection

Control Plan & progress to carry out Road Maintenance Plan (annually and for each structures)

↑

Supervision & Audit Work includes:

↓

Check road maintenance estimating

Control material quantity, material quality, implementing procedure & technique of road maintenance activities

Check completed road maintenance works

Check qualification of completed road maintenance works

Prepare reports and present the report on actual rural road maintenance implementation of locality

S4.3: Community Supervision and Audit

តើ ប្រជាជនត្រូវធ្វើអ្វីក្នុងការត្រួតពិនិត្យ និង ផ្ទៀងផ្ទាត់?

១,ត្រួតពិនិត្យ ស្ថានភាពផ្លូវ, សិក្សាអោយច្បាស់អំពី លក្ខណៈ កំហូចផ្លូវ , បន្ទាប់មកធ្វើរបាយការណ៍ ទៅផ្នែកគ្រប់គ្រងផ្លូវ រឺក៏រដ្ឋអំណាចមូលដ្ឋាន

២,ត្រួតពិនិត្យ និង ចរាចរណ៍ដំណើរការអនុវត្តន៍ច្បាប់ការពាររចនាសម្ព័ន្ធ នៃការដឹកជញ្ជូន

៣,តាមដានផែនការ និង ដំណើរការវិវត្តន៍ការងារក្នុងពេលដំណើរការ នៃគំរោងការថែទាំផ្លូវ

៤, ត្រួតពិនិត្យ ការបានត្តុំ ល្អ នៃការថែទាំផ្លូវ

៥,ត្រួតពិនិត្យ បរិមាណសំភារៈ សំណង់,គុណភាពសំភារៈ សំណង់,ដំណើរ ការអនុវត្តន៍និង បច្ចេកទេស នៃការថែទាំផ្លូវ

៦,ត្រួតពិនិត្យ ពេលបញ្ចប់ការងារថែទាំផ្លូវ

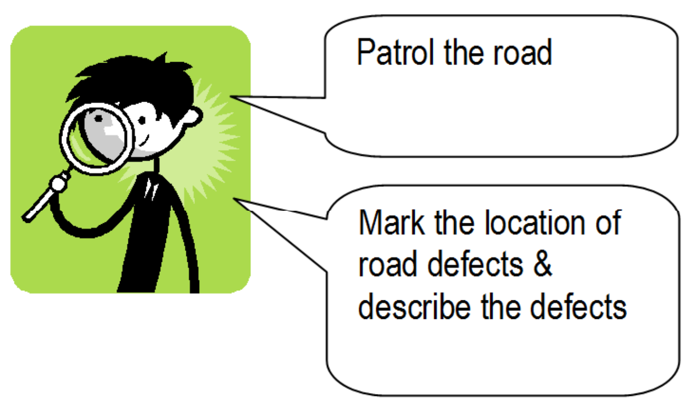
៧, រៀបចំ និង ប្រគល់របាយការណ៍ដើម្បីទទួលការអនុម័ត

S4.3: Community Supervision and Audit

តើ ប្រជាជនត្រូវធ្វើអ្វីក្នុងការត្រួតពិនិត្យ និង ផ្ទៀងផ្ទាត់ ?

១,ត្រួតពិនិត្យ ស្ថានភាពផ្លូវ , សិក្សាអោយច្បាស់អំពី លក្ខណៈ កំហូចផ្លូវ ,

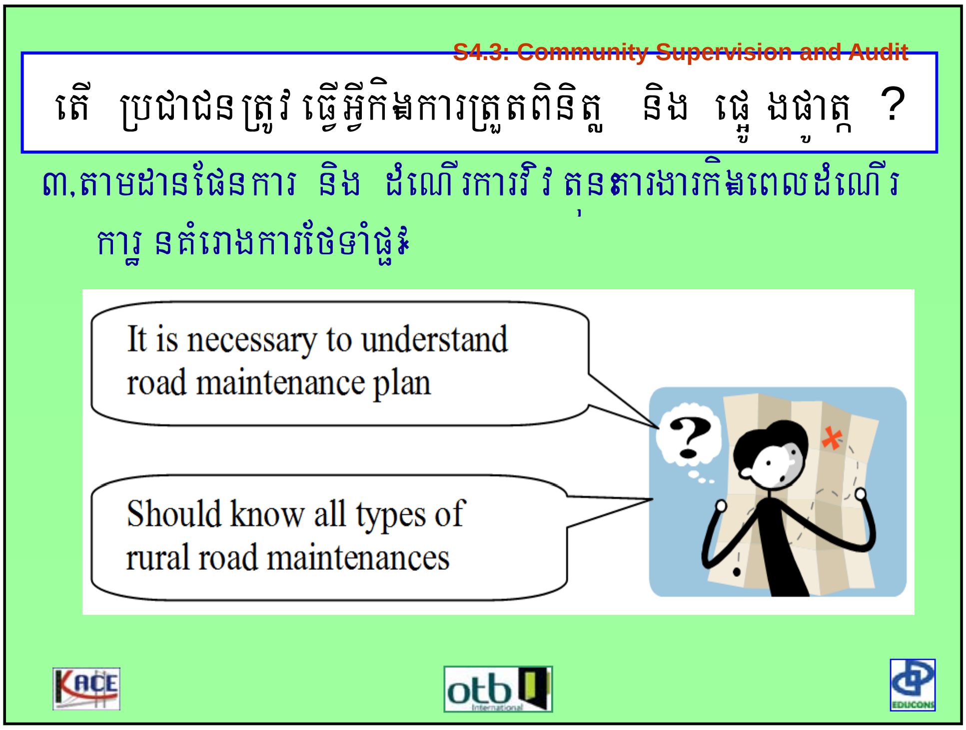
បន្ទាប់មកធ្វើរបាយការណ៍ ទៅផ្នែកគ្រប់គ្រងផ្លូវ រឺក៏រដ្ឋអំណាចមូលដ្ឋាន



S4.3: Community Supervision and Audit

តើ ប្រជាជនត្រូវធ្វើអ្វីក្នុងការត្រួតពិនិត្យ និង ផ្ទៀងផ្ទាត់ ?

២.ត្រួតពិនិត្យ និង ចរាចរណ៍ៈ ដំណើរការអនុវត្តន៍ច្បាប់ការពាររចនាសម្ព័ន្ធនៃការដឹកជញ្ជូន



S4.3: Community Supervision and Audit

តើ ប្រជាជនត្រូវធ្វើអ្វីក្នុងការត្រួតពិនិត្យ និង ផ្ទៀងផ្ទាត់ ?

៣.តាមដានផែនការ និង ដំណើរការវិវត្តន៍ការងារក្នុងពេលដំណើរការនៃគំរោងការថែទាំផ្លូវ៖

តើ ប្រជាជនត្រូវធ្វើអ្វីក្នុងការត្រួតពិនិត្យ និង ផ្ទៀងផ្ទាត់ ?

៤. ត្រួតពិនិត្យការប៉ាន់តម្លៃនៃការថែទាំផ្លូវ

Checking estimate means

Correct quantity?

Correct Unit Price?

Correct methodology?

តើ ប្រជាជនត្រូវធ្វើអ្វីក្នុងការត្រួតពិនិត្យ និង ផ្ទៀងផ្ទាត់ ?

៥. ត្រួតពិនិត្យបរិមាណសម្ភារៈសំណង់, គុណភាពសម្ភារៈសំណង់, ដំណើរការអនុវត្តន៍ និង បច្ចេកទេសនៃការថែទាំផ្លូវ

Sufficient material quantity?

Good material quality?

Correct implementation?

S4.3: Community Supervision and Audit

តើ ប្រជាជនត្រូវធ្វើអ្វីកិច្ចការត្រួតពិនិត្យ និង ផ្ទៀងផ្ទាត់ ?

៦.ត្រួតពិនិត្យ ពេលបញ្ចប់ការងារថែទាំផ្លូវ

How is quantity?

How is quality?

It can be handed over?
- Community
Supervision Minute?

You will know how to measure finished works quantity & to assess quality

It is necessary to have format of Community Supervision Minute

---

S4.3: Community Supervision and Audit

តើ ប្រជាជនត្រូវធ្វើអ្វីកិច្ចការត្រួតពិនិត្យ និង ផ្ទៀងផ្ទាត់ ?

៧. រៀបចំ និង ប្រគល់របាយការណ៍ដើម្បីទទួលការអនុម័ត

☞ the contents of report on Rural Road Maintenance Supervision & Audit

- Existing road conditions
- Actual situation of conforming to Decree - Law No?
- Rural Road Maintenance Estimating & Plan
- Carry out road maintenance plan - quantity - quality

S3.3: Maintenance funding & implementation

ពិភាក្សាជាក្រុម៖ ចំនុចល្អនៃការថែទាំ

ពិភាក្សាជាក្រុម៖ ថវិការសំរាប់ការថែទាំ,
ផែនការ,ការអនុវត្តន៍ ការត្រួតពិនិត្យ , ការផ្ទៀងផ្ទាត់។

សូមក្រុមនិមួយៗ លើកចំនុចល្អដែលទាក់ទងនិង
ប្រសិទ្ធភាពនៃការ ថែទាំផ្លូវ និង សភាពជាក់ស្តែង
របស់ផ្លូវ ជនបទនៅប្រទេសកម្ពុជា