

## Section 3

### S3.1: 1 Norms for RR Maintenance

#### SUMMARY

- Nation-wide Norms for RR maintenance
- Practical norms uses



### S3.1: 1 Norms for RR Maintenance

#### Why norms?

- ❑ Norm of Routine Maintenance gives maintenance demand of a kilometer in a year for different types of rural road.
- ❑ Norm of Repairing Works Estimate gives demand of material, labor and machine to carry out each item of repairing construction works



## Nation-wide norms

**Norm**  
of routine maintenance  
Rural Road  
- 1996 -

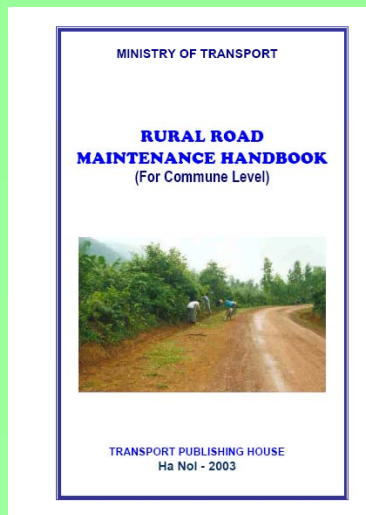
*Norm of Routine Maintenance Management - Rural Road Maintenance, Ministry of Transport, VN - 1996.*

**Norm**  
of Road routine maintenance  
-2001-

*Norm of Routine Road Maintenance 2001 by Ministry of Transport VN.*

**Norm**  
of repairing works estimate  
- 2000 -

*Norm for estimation of repairing works - 2000 by Minister of Construction, VN - Part II: Norm for estimation in bridge and road repair.*



Norm of common rural road maintenance items can be referred in ***Rural Road Maintenance Handbook***



S3.1: 1 Norms for RR Maintenance

# Practical use of norms

**maintenance demand of 1.6 km bituminous road**

No.	Descriptions	Unit	Stipulated quantity	Road length	Maintenance demand
<b>A Management works</b>					
1	Inspection, settlement of offences	Daywork	2	1.6	3.2
<b>B Traffic safety</b>					
2	Paint and repair guide posts and signs	Daywork	1	1.6	1.6
<b>C Subgrade &amp; drainage</b>					
3	Grass cutting	Daywork	3	1.6	4.8
4	Ditch cleaning in wet season	Daywork	2	1.6	3.2
5	Side drain clearing	m/daywork	500/16.67	1.6	800/26.67
6	Shoulder reshaping	m <sup>2</sup>	400/26.67	1.6	640/26.67
7	Drain excavating	m <sup>3</sup>	5/5	1.6	8/8
8	Embankment/ Shoulder replenishing	m <sup>3</sup>	5/2.5	1.6	8/4
9	Small landslide removal	m <sup>3</sup>	4/2	1.6	6.4/3.2
10	Clean tow section (if necessary)	Daywork	2	1.6	3.2



S3.1: 1 Norms for RR Maintenance

Sample of how to calculate unit price of a road maintenance item introduced in Rural Road Maintenance Handbook

1. Unit costs of some work items:

1.1. Pothole filling on gravel surface: Average depth of pothole is 10cm, calculated for 1m<sup>2</sup> of pothole.

Table 18

No	Consuming items	Unit	Quantity	Unit cost	Cost	Remark
1	Material					
	Gravel	m <sup>3</sup>	0.1428	120000	17136.00	
	Clay	m <sup>3</sup>	0.004	20000	80.00	
2	Coarse sand	m <sup>3</sup>	0.0102	54300	553.86	
	Labour grade 2,5/7	md	0.1429	11354.31	1622.5	Material unit price is depended on locality and time
Equipment						
3	Roller 8.5T	shift	0.012	266728.27	3200.74	
	Other equipment	%	5		160.04	
<b>Total</b>					<b>22753.14</b>	

Necessary material and machine for an unit of road maintenance item - This figure is taken from **norm of capital construction estimate**

Necessary daywork for an unit of road maintenance item - This figure conforms to labor **productivity from norm of rural road maintenance**

Labor and machine unit price conforms to Government Regulation



## Section 3

### S3.2: Cost estimating

#### SUMMARY

- The structure of cost estimating sheets and the steps to establish a cost estimate for rural road maintenance
- Cost estimate

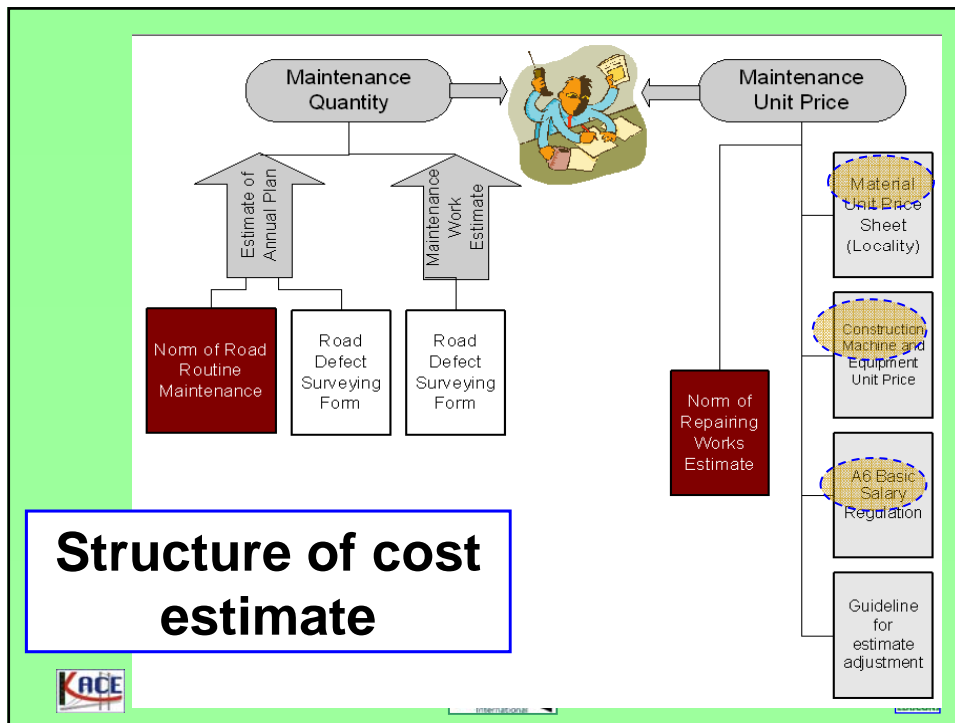


#### S3.2: Cost estimating

#### Maintenance Estimate of a rural road

- Estimate of Annual Maintenance Plan is made with maintenance demand that conforms to Norms of Routine Maintenance.
- Maintenance Estimate of a rural road is made with maintenance demand that is defined by road defects surveying





### S3.2: Cost estimating

## Sample of annual plan estimate

**maintenance demand of 1.6 km bituminous road**

No.	Descriptions	Unit	Stipulated quantity	Road length	Maintenance demand
<b>A</b>	<b>Management works</b>				
1	Inspection, settlement of offences	Daywork	2	1.6	3.2
<b>B</b>	<b>Traffic safety</b>				
2	Paint and repair guide posts and signs	Daywork	1	1.6	1.6
<b>C</b>	<b>Subgrade &amp; drainage</b>				
3	Grass cutting	Daywork	3	1.6	4.8
4	Ditch cleaning in wet season	Daywork	2	1.6	3.2
5	Side drain clearing	m/daywork	500/16.67	1.6	800/26.67
6	Shoulder reshaping	m <sup>2</sup>	400/26.67	1.6	640/26.67
7	Drain excavating	m <sup>3</sup>	5/5	1.6	8/8
8	Embankment/ Shoulder replenishing	m <sup>3</sup>	5/2.5	1.6	8/4
9	Small landslide removal	m <sup>3</sup>	4/2	1.6	6.4/3.2
10	Clean tow section (if necessary)	Daywork	2	1.6	3.2

S3.2: Cost estimating

## Sample of Unit Price Calculation Sheets

*Table 2: Unit Price Calculation Sheets of some road maintenance items*

Code	Descriptions	Unit	Quantity	Unit Price	Cost	Note
XR.33.41	<b>Crack sealing, bitumen ratio is 2.5kg/m<sup>2</sup></b>	sqm	1			
	<i>Materials</i>				<b>9,719</b>	
	1 x 2 crushed stone	cu.m	0.015	101000	1,515	
	0.015-1 chippings	cu.m	0.015	110000	1,650	
	Bitumen	kg	2.675	2450	6,554	
	<i>Labour</i>				<b>514</b>	
	Class 4/7	daywork	0.038	13529	514	
	<i>Construction Machine</i>				<b>1,358</b>	
	8.5 tons roller	daywork	0.003	252823	758	
	Bitumen heating tank	daywork	0.005	120000	600	



S3.2: Cost estimating

**Estimate of  
1.6 km  
bituminous  
road repair**

ID	Description	Unit	Qty	Unit price			Amount			
				Material	Labor	Machinery	Material	Labor	Machinery	
<b>A Management works</b>										
1	Inspection, settlement of offences	daywork	3.2		10,000			32,000		
<b>B Traffic safety</b>										
2	Paint and repair guide posts and signs	daywork	1.6		10,000			16,000		
<b>C Sub-grade &amp; drainage</b>										
3	Grass cutting	daywork	4.8		10,000			48,000		
4	Ditch cleaning in wet season	daywork	3.2		10,000			32,000		
5	Side drain clearing	m	800		10,000			8,000,000		
6	Shoulder reshaping	sq.m	640		10,000			6,400,000		
7	Drain excavating	cu.m	8		10,000			80,000		
8	Embankment/ Shoulder replenishing	cu.m	8		10,000			80,000		
9	Small landslide removal	cu.m	6.4		10,000			64,000		
10	Clean tow section (if necessary)	daywork	3.2		10,000			32,000		
<b>D Pavement</b>										
11	Pothole filling	sq.m	32	34,844	2,814		1,115,013	90,049		
12	Corrugation grading	sq.m	96	9,719	514	1,358	933,000	49,354	130,413	
13	Materials refilling	cu.m	3.2	135,390	12,533		433,248	40,107		
<b>E Soft spot repair</b>										
14	Pavement watering	daywork	1.6		10,000			16,000		
15	Culvert & bridge (less than 10m span)	daywork	1.6		10,000			16,000		
<b>Total</b>							<b>2,481,261</b>	<b>14,995,510</b>	<b>130,413</b>	

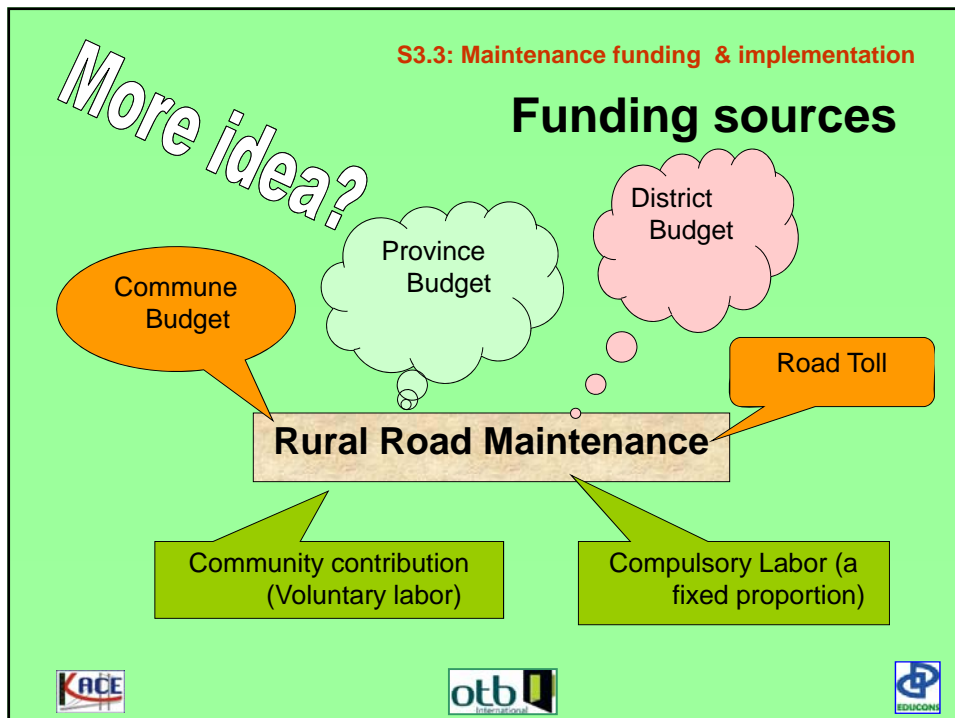


## Section 3

### S3.3: Maintenance funding & implementation

#### SUMMARY

- Funding sources for Rural Road Maintenance; how to choose and mobilize funding resources.
- Plans to mobilize funding resources
- Models of maintenance implementation



## Funding sources

- ❑ If local leaders and each community, company and organization pay more attention to, there will be ENOUGH MONEY for Rural Road Maintenance.
- ❑ With your local funding mobilization and necessary maintenance activities, you can CHOOSE the appropriate model to implement road maintenance



## Comprehension of models for Rural Road Maintenance implementation

- ❑ Large contractors (SOE or Private)
- ❑ Small contractors (Private)
- ❑ Force account (District or commune road maintenance groups)
- ❑ Community group.
- ❑ Length person or Family contract
- ❑ Compulsory/Voluntary labour





**S3.3: Maintenance funding & implementation**

**A proposal of fund mobilization of commune**

Commune.....	District.....	Province.....
Funding estimated for road maintenance	Calculating method	Total Amount
1. <i>Funds from Province</i>	.....	.....
2. <i>District Budget</i>	.....	.....
3. <i>Commune Budget</i>	.....	.....
4. <i>Local community's contribution</i>	.....	.....
5. ....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....
<b>Total:</b>		



**S3.3: Maintenance funding & implementation**

**Appropriate road maintenance implementation model**

Models of road maintenance implementation	Your <i>Commune's</i> Fund	Possible use e.g. <i>Commune A</i>
1. <i>Large Contractor</i>	.....	.....
2. <i>Small Contractor</i>	.....	.....
3. <i>Fund Administrator</i>	.....	.....
4. <i>Local Community</i>	.....	.....
5. <i>Length person/family contract</i>	.....	.....
6. <i>Compulsory/ Voluntary Labor</i>	.....	.....



S3.3: Maintenance funding & implementation

Group discussion: Maintenance procedures in practice

why?

?

?

Format for group presentation:



# មេរៀនទី ៣

## Session 3

១។ បទដ្ឋានសំរាប់ការថែទាំផ្លូវ ជនបទ

Norms for RR Maintenance

២។ ការវាយតម្លៃសំរាប់ ថ្លៃ

Cost Estimating

៣។ ការរៀបចំថវិកា និងការអនុវត្តន៍ការថែទាំផ្លូវ

Maintenance Funding and Implementation



# ១។ បទដ្ឋានសំរាប់ថែទាំផ្លូវ ជនបទ

## Norms for RR Maintenance

សង្ខេប

- បទដ្ឋានដែលប្រើទូទាំងប្រទេសសំរាប់ការថែទាំផ្លូវជនបទ
- ការប្រើប្រាស់បទដ្ឋានដែលងាយស្រួល



# ហេតុអ្វីត្រូវ ការបទដ្ឋាន? Why norms?

- ❑ តម្រូវការថែទាំផ្លូវជនបទក្នុង១តម ក្នុង១ឆ្នាំ សំរាប់ប្រភេទផ្លូវផ្ទះ ង
- បទដ្ឋានសំរាប់ការថែទាំផ្លូវប្រចាំ (Norm of Routine Maintenance)
- ❑ តម្រូវការសំភារ” ពលកម្ម និងគ្រឿងយន្តសំរាប់ការងារជួសជុលតាមផ្នែក ភ្នំម្លូ កត្តា នប្រភេទការងារជួសជុលមួយ ឬ
- បទដ្ឋានសំរាប់ ទ្រន់សំរាប់ការងារជួសជុល (Norm of Repairing Work Estimate)



# ឪទាហរណ៍ បទដ្ឋានថែទាំផ្លូវ

Norm  
of routine maintenance  
Rural Road  
- 1996-

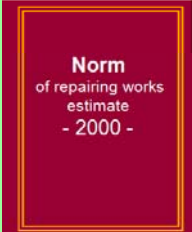
បទដ្ឋានថែទាំប្រចាំ ផ្លូវជនបទ ឧទាហរណ៍ ១៩៩៦”  
\_ការងារ និងបរិមាណ ថែទាំប្រចាំ ផ្លូវជនបទ  
\_ការងារពលកម្ម

Norm  
of Road routine  
maintenance  
-2001-

បទដ្ឋានថែទាំប្រចាំ ឧទាហរណ៍ ២០០១”  
\_ការងារ និងបរិមាណ ថែទាំប្រចាំផ្លូវ, ស្ពាន, លូ  
\_ការងារពលកម្ម, គ្រឿងចក្រ



# ឪទាហរណ៍ បទដ្ឋានថែទាំផ្លូវ



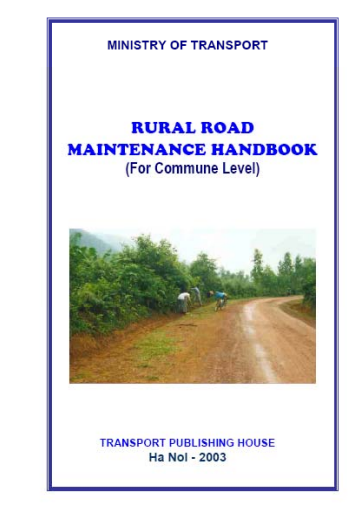
បទដ្ឋានសំរាប់ប្រភេទការងារជួសជុល ឧទាហរណ៍ ២០០០ ប្រាក់  
- តម្រូវការប្រភេទការងារជួសជុល ពលកម្ម គ្រឿងចក្រ  
សំរាប់ប្រភេទការងារជួសជុលមួយ



ត្រូវ កត់ត្រា នប្រភេទការងារជួសជុលមួយ  
គួរ មធ្យមប្រតិបត្តិសំរាប់ប្រភេទ ១ ម ២ ២២២



# ឪទាហរណ៍ បទដ្ឋានថែទាំផ្លូវ



សៀវភៅកូនថែទាំផ្លូវឯនបទ  
បទដ្ឋាន នការងារទូទៅក្នុងការថែទាំផ្លូវឯនបទ



# ការប្រើប្រាស់ទូទៅ នបទដ្ឋាន

No.	Descriptions	Unit	Stipulated quantity	Road length	Maintenance demand
<b>A Management works</b>					
1	Inspection and settlement of offences	Daywork	2	1.6	3.2
<b>B Traffic safety</b>					
2	Paint and repair guide posts and signs	Daywork	1	1.6	1.6
<b>C Subgrade &amp; drainage</b>					
3	Grass cutting	Daywork	3	1.6	4.8
4	Ditch cleaning in wet season	Daywork	2	1.6	3.2
5	Side drain clearing	m/daywork	500/16.67	1.6	800/26.67
6	Shoulder reshaping	m <sup>2</sup>	400/26.67	1.6	640/26.67
7	Drain excavating	m <sup>3</sup>	5/5	1.6	8/8
8	Embankment/ Shoulder replenishing	m <sup>3</sup>	5/2.5	1.6	8/4
9	Small landslide removal	m <sup>3</sup>	4/2	1.6	6.4/3.2
10	Clean tow section (if necessary)	Daywork	2	1.6	3.2



បទដ្ឋានគណនា  
តួ ម្ភៃ កតាសំរាប់  
សកម្មភាពថែ  
ទាំផ្លូវមួយចំនួន

## 1. Unit costs of some work items:

1.1. Pothole filling on gravel surface: Average depth of pothole is 10cm, calculated for 1m<sup>2</sup> of pothole.

Table 18

No	Consuming items	Unit	Quantity	Unit cost	Cost	Remark
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Necessary material and machine for an unit of road maintenance item - This figure is taken from **norm of capital construction estimate**

Necessary daywork for an unit of road maintenance item - This figure conforms to labor **productivity from norm of rural road maintenance**

Labor and machine unit price conforms to Government Regulation



## ២។ ការវាយតម្លៃសំណង់ ម

### Cost estimating

#### សង្ខេប

- រចនាសម្ព័ន្ធនៃការវាយតម្លៃសំណង់ ម= និងជំហានក្នុងការវាយតម្លៃសំណង់ មសំរាប់ការថែទាំផ្ទះជនបទ
- ការវាយតម្លៃសំណង់ ម=

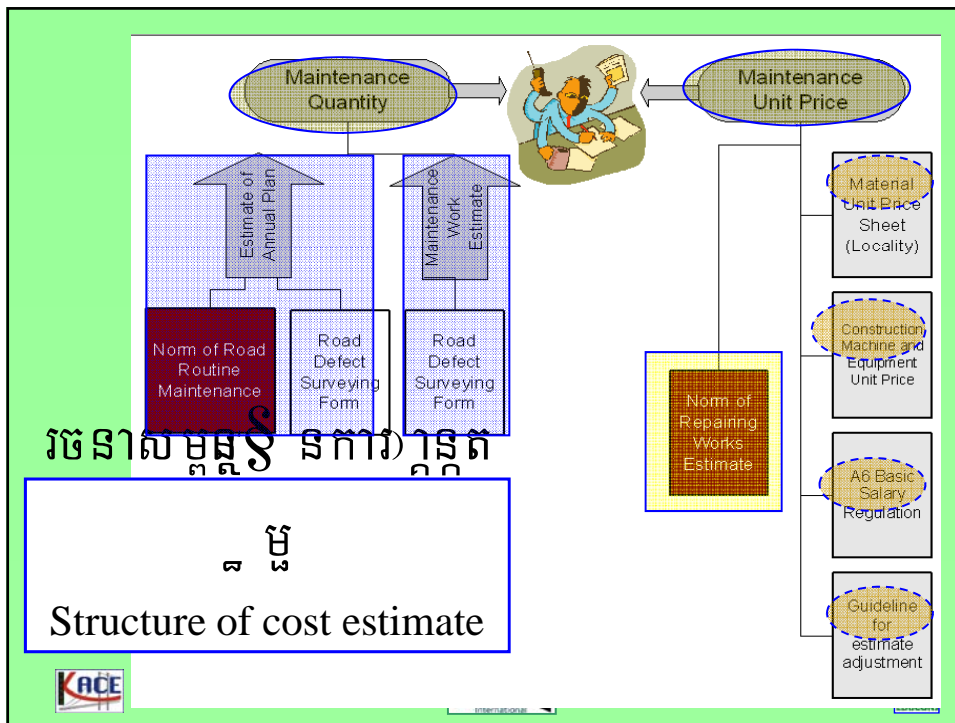


២។ការវាយតម្លៃសំណង់ ម

### ការវាយតម្លៃសំណង់ ការថែទាំផ្ទះ ជនបទ

- ការវាយតម្លៃសំណង់ផែនការថែទាំប្រចាំឆ្នាំ ← តម្រូវការថែទាំដែលអនុលោមតាមបទដ្ឋានថែទាំប្រចាំ
- ការវាយតម្លៃសំណង់ការងារថែទាំផ្ទះជនបទ ← តម្រូវការថែទាំដែលកំណត់ដោយការច្នៃ សិក្សាអង្កេតផ្ទះ





**២១ ការប៉ាន់ស្មានថវិកា**

**តម្លៃ ថវិកាសម្រាប់ការថែទាំប្រព័ន្ធរថាស**

**maintenance demand of 1.6 km bituminous road**

No.	ការងារថែទាំ	Unit	Stipulated quantity	Road length	តម្លៃការថែទាំ
<b>A</b>	<b>Management works</b>				
1	Inspection, settlement of offences	Daywork	2	1.6	3.2
<b>B</b>	<b>Traffic safety</b>				
2	Paint and repair guide posts and signs	Daywork	1	1.6	1.6
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8	Embankment/ Shoulder replenishing	m3	5/2.5	1.6	8/4
9	Small landslide removal	m3	4/2	1.6	6.4/3.2
10	Clean tow section (if necessary)	Daywork	2	1.6	3.2

**KACE**      **otb**      **EDUCONS**



## តំរូវឡើង នៃការពិនិត្យការខូចខាត

*Table 8a - road defect quantity - site surveying results form*

Commune: An Son		Road Code: AS01R3.5/5D2.2				Road : An Son - An Lac		
Road length: 2.2 km		Date: 12 - 3 - 2005						
Pavement Type: Colluvial Gravel - Road/Pavement Width: 3.5m/5.0m						Condition assessment		defects quantity
Road Defects and Sphere of Influence								
Location	K0 - K0+500	K0+ 500 - K1	K1 - K1+500	K1+500 2	K2 - K2+200	Value	Condi- tion Asses- sment	
Drain cleaning (m)	130	80	0	28	50	315	Bad	288 m
Drain excavation (m/m3)	20/6.4	0	0	0	15/4.8			11.2 m3
Clearing brush/grass(m2)	0	0	30	42	0	72	Bad	72 m2
<i>crushed stone pavement (cm)</i>								
Reshape & refilling (m3)	0	0	1.05	2.1	0			3.15 m3
10 cm deep pothole (m2)	40	32	0	0	0			72 m2
12 cm deep pothole (m2)	0	0	55	65	0			120 m2
Soft spot (m2)/(m3)	3/1.9	0	0	0	0	2.53 %	Fairly Good	1.9
<i>bridge, culvert and other structures</i>								



## តំរូវឡើង នៃការគណនាតម្លៃ ម្សៅ ក្រា

**Table 2: Unit Price Calculation Sheets of some road maintenance items**

Code	Descriptions	Unit	Quantity	Unit Price	Cost	Note
XR.33.41	<u>Crack sealing, bitumen ratio is 2.5kg/m2</u>	sqm	1			
	<i>Materials</i>				<b>9,719</b>	
	1 x 2 crushed stone	cu.m	0.015	101000	1,515	
	0.015-1 chippings	cu.m	0.015	110000	1,650	
	Bitumen	kg	2.675	2450	6,554	
	<i>Labour</i>				<b>514</b>	
	Class 4/7	daywork	0.038	13529	514	
	<i>Construction Machine</i>				<b>1,358</b>	
	8.5 tons roller	daywork	0.003	252823	758	
	Bitumen heating tank	daywork	0.005	120000	600	



ការប្រតិបត្តិការ  
ការថែទាំ

ID	Description	Unit	Qty	Unit price			Amount		
				Material	Labor	Machinery	Material	Labor	Machinery
<b>A Management works</b>									
1	Inspection, settlement of offences	daywork	3.2		10,000			32,000	
<b>B Traffic safety</b>									
2	Paint and repair guide posts and signs	daywork	1.6		10,000			16,000	
<b>C Sub-grade &amp; drainage</b>									
3	Grass cutting	daywork	4.8		10,000			48,000	
4	Ditch cleaning in wet season	daywork	3.2		10,000			32,000	
5	Side drain clearing	m	800		10,000			8,000,000	
6	Shoulder reshaping	sq.m	640		10,000			6,400,000	
7	Drain excavating	cu.m	8		10,000			80,000	
8	Embankment/ Shoulder replenishing	cu.m	8		10,000			80,000	
9	Small landslide removal	cu.m	6.4		10,000			64,000	
10	Clean tow section (if necessary)	daywork	3.2		10,000			32,000	
<b>D Pavement</b>									
11	Pothole filling	sq.m	32	34,844	2,814		1,115,013	90,049	
12	Corrugation grading	sq.m	96	9,719	514	1,358	933,000	49,354	130,413
13	Materials refilling	cu.m	3.2	135,390	12,533		433,248	40,107	
<b>E Soft spot repair</b>									
14	Pavement watering	daywork	1.6		10,000			16,000	
15	Culvert & bridge (less than 10m span)	daywork	1.6		10,000			16,000	
<b>Total</b>							<b>2,481,261</b>	<b>14,995,510</b>	<b>130,413</b>



ការពិភាក្សា ១  
Discussion

នីតិវិធីក្នុងការកំណត់តម្លៃ មធ្យមថែទាំផ្លូវនៅកម្ពុជា?

Cambodian procedures for maintenance costing ?

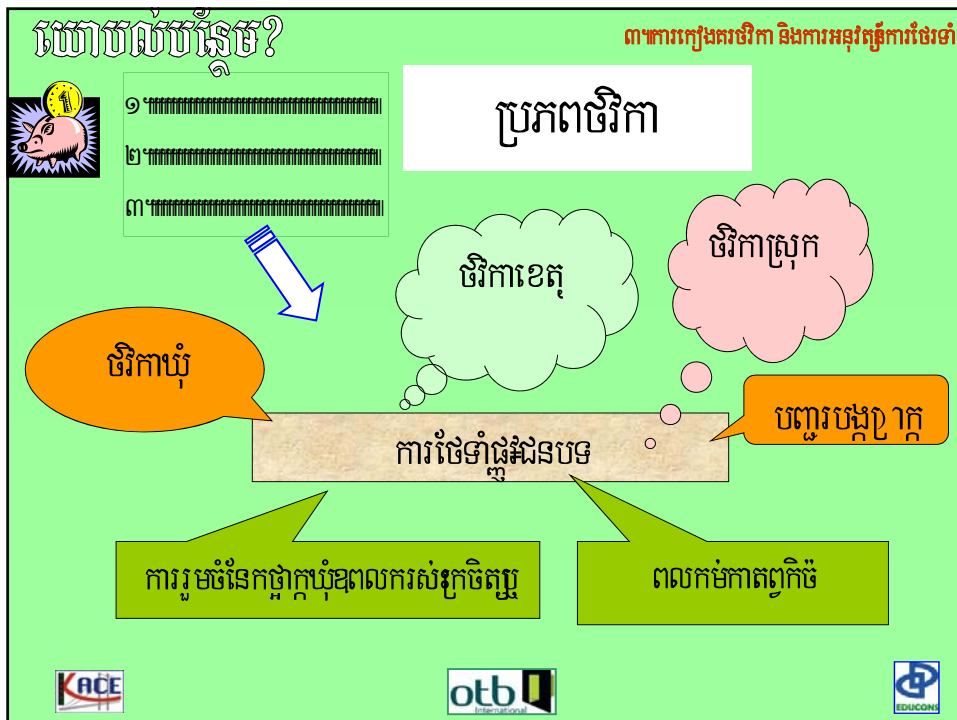


# ៣។ ការកែលម្អគម្រោង និងការអនុវត្ត

## Maintenance funding & Implementation

### សង្ខេប

- ប្រភពថវិកាសំរាប់ថែទាំផ្ទះសំបែង-របៀបច្រើនរើស និងកែលម្អប្រភពថវិកា
- ម៉ូដែល នៃការអនុវត្តការថែទាំ
- ផែនការកែលម្អប្រភពថវិកា



# ប្រភពថវិកា

- ប្រសិនបើផែនការប្រកបដោយប្រសិទ្ធភាព នឹងមានថវិកាគ្រប់គ្រាន់សំរាប់ការថែទាំផ្លូវជនបទ?
- ជាមួយនឹងការរៀនសូត្រថវិកាក្នុងមូលដ្ឋាន យើងអាចជ្រើសរើសម្តងដែលសមស្របដើម្បីអនុវត្តការថែទាំផ្លូវ



## ម្តងដែលសំរាប់ការអនុវត្តការថែទាំផ្លូវជនបទ Models for Rural Road Maintenance implementation

- ក្រុមហ៊ុនម្តៅការធំ (SOE or Private)
- ក្រុមហ៊ុនម្តៅការតូច (Private)
- Force account (ក្រុមថែទាំប្រចាំឃុំ ស្រុកឬ
- ក្រុមសហគមន៍
- Length person or Family contract
- ពលករសំរាប់ការថែទាំផ្លូវ



## សំណើ នៃការក្រុងគរថវិកា របស់ឃុំ

Commune.....District.....Province.....	Calculating method	Total Amount
Funding estimated for road maintenance		
1. <i>Funds from Province</i>	.....	.....
2. <i>District Budget</i>	.....	.....
3. <i>Commune Budget</i>	.....	.....
4. <i>Local community's contribution</i>	.....	.....
5. ....	.....	.....
.....	.....	.....
.....	.....	.....
<b>Total:</b>	.....	.....



## មូលដ្ឋានសម្របសម្រួល នៃការអនុវត្តការងារថែទាំផ្លូវ

Models of road maintenance implementation	Your <i>Commune's</i> Fund	Possible use e.g. <i>Commune A</i>
1. <i>Large Contractor</i>	.....	.....
2. <i>Small Contractor</i>	.....	.....
3. <i>Fund Administrator</i>	.....	.....
4. <i>Local Community</i>	.....	.....
5. <i>Length person/family contract</i>	.....	.....
6. <i>Compulsory/ Voluntary Labor</i>	.....	.....



# សូមអរគុណ

