

## MODULE 17

## RURAL ROAD MAINTENANCE PLANNING

### Objectives

After fulfilling Module 17, you will be able to:

- Understand the plan of rural road maintenance and know planning steps in rural road maintenance.
- Make a rural road maintenance plan by yourselves.
- Self- Assessment

### Requirement

The participants are required to have comprehended following modules:

- Module 4: "*Rural Road Defects and the Causes*"
- Module 5: "*Fund Mobilization and Rural Road Maintenance*"
- Module 7: "*Define priority in Rural Road Maintenance*"
- Module 10: "*Road Defects Survey and Maintenance Demands Determination*"
- Module 15: "*Usable Norms to Rural Road Maintenance*"
- Module 16: "*Rural Road Maintenance Cost Estimate*"

### Methodology

- The participants are introduced steps to establish a Rural Road Maintenance plan.
- The participants themselves are guided to produce commune road maintenance plans, use results of previous completed exercises.
- Self - Assessment

### Training Kit

- Rural Road Maintenance Handbook
- Module 17 "*Rural Road Maintenance Planning*"

### Studying Activities

1. Find out the structure of planning forms for road maintenance & data sources in a road maintenance plan.
2. Learn about planning procedures in road maintenance
3. Establish a plan of road maintenance
4. Self - assessment

## 1. Learn about a plan of rural road maintenance



*Study thoroughly* the example of annual rural road maintenance plan (Table 9 - pages 39/40 - Rural Road Maintenance Handbook), then write the answers to questions in following lines

*Question 1: Which documents and information that you need to make a road maintenance plan.*

Answers:

- .....
- .....
- .....
- .....
- .....
- .....
- .....
- .....
- .....

*Question 2: Which knowledge that you need to make a road maintenance plan.*

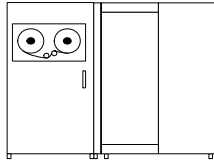
Answers:

- .....
- .....
- .....
- .....
- .....
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- .....
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- .....



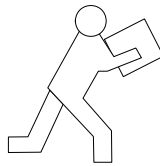
*Study carefully* procedure of road maintenance planning to checks the answers above

1



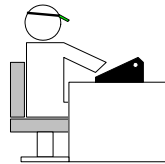
Make Road Inventory

2



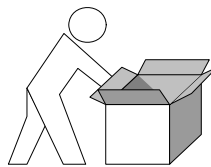
Road Defect Survey

3



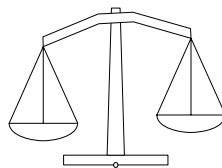
Define Road Maintenance demand and cost

4



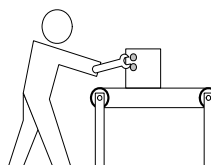
Fund mobilization planning

5



Define priority to balance fund

6



Finish road maintenance plan



**Study** the following example of road maintenance planning for a Commune Road Network

### 1. Road Inventory of Son Thuy 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 Xuan Thanh village	8.6	Earth Road	3.5	24	2	Laterite quarry / 0.6
2	ST02R3.5/5D6.0	Road to Mua Xuan village	6.0	Earth Road	3.5	18	3	Laterite quarry / 1.6
3	ST03R3.5/5D3.6	Road to Hiet village	3.6	Earth Road	3.5	8	0	Laterite quarry / 0.7

### 2. Road defects survey

(Data in the table below is assumed)

Table 8a - road defects quantity - site surveying results form								
Commune: Son Thuy						Road : Road to Xuan Thanh 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						<b>condition assessment</b>		<b>road defect quantity</b>
Road defect and sphere of influence						Quantity	Condition Assessment	
Chainage (km)	K0 - K2	K2 - K4	K4 - K6	K6 - K8	K 8 - K8 + 600			
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
<b>pavement</b>								
> 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
<b>bridge, culvert and other structures</b>								

Table 8a - road defects quantity - site surveying results form								
Commune: Son Thuy						Road : Road to Mua Xuan village		
Road Length: 6.0 km				Road Code: ST02R3.5/5D6.0		Date: 16 - 3 - 2005		
Pavement Type: Earth Pavement Pavement/Road width: 3.5m/5.0m						<b>condition assessment</b>		<b>road defect quantity</b>
Road defect and sphere of influence						Quantity	Condition Assessment	
Location (km)	K0 - K1+500	K1+500 - K3	K3 - K4	K4-K5	K5 - K6			

Side Drain cleaning (m)	0	0	0	0	80	130 m	Bad	80 m
Drain excavation (m/m3)	50/16	0	0	0	0			16m3
Brush/Grass clearing (m2)	0	0	0	70	80	150 m2	Bad	150 m2
<b>pavement</b>								
> 5cm deep corrugation (m)/(m2)	0	0	0	0	0	0	Good	0
10 cm deep pothole (m2)	40	0	0	100	50	1.34 %	Fairly Good	190 m2
15 cm deep pothole (m2)	30	15	0	10	0			45 m2
Soft spot (m2)/(m3)	4/3.2	7/3.5	0	0	6/3.0			9.7 m3
<b>bridge, culvert and other structures</b>								

Table 8a - road defects quantity - site surveying results form								
Commune: Son Thuy					Road : Road to Hiet village			
Road Length: 3.6 km			Road Code: ST03R3.5/5D3.6			Date: 17 - 3 - 2005		
Pavement Type: Earth Pavement Pavement/Road width: 3.5m/5.0m						<b>condition assessment</b>		<b>road defect quantity</b>
Road defect and sphere of influence						Quantity	Condition Assessment	
Location (km)	K0 - K1	K1- K2	K2 - K3	K3- K3+600				
Side Drain cleaning (m)	0	80	98	0		238 m	Bad	178 m
Drain excavation (m/m3)	0	20/6.4	40/12.8	0				19.2m3
Brush/Grass clearing (m2)	18	32	40	40		130 m2	Bad	130 m2
<b>pavement</b>								
> 5cm deep corrugation (m)/(m2)	0	60/210	0	0		1.67 %	Bad	210
10 cm deep pothole (m2)	20	30	50	20		1.7 %	Fairly Good	120 m2
15 cm deep pothole (m2)	20	25	25	10				80 m2
Soft spot (m2)/(m3)	7/3.5	6/3.6	0	6/2.4				9.5 m3
<b>bridge, culvert and other structures</b>								

## 2. Define road maintenance quantity and cost

### Comprehensive table of road maintenance quantity

No.	Items	Unit	Road Maintenance Quantity
<b>I</b>	<b>Road bed and Drainage</b>		
1	Brush/ Grass clearing	m2	570
2	Side drain cleaning	m	963
3	Drain excavation	m3	60.8
<b>II</b>	<b>Pavement</b>		
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

*Unit price of road maintenance items*

Code.	Description	Unit	Quantity	Unit Price	Cost	Note
XR.65	<b><u>Side drain cleaning</u></b>	m	1			
	<i>Labor</i> class 3.5/7	daywork	0.035	12971	<b>454</b> 454	
BA.1733	<b><u>Side drain cleaning</u></b>	m3	1			
	<i>Labor</i> class 2.7/7	daywork	1.17	12099	<b>14,156</b> 14,156	
XR.66	<b><u>Brush/grass clearing</u></b>	m2	1			
	<i>Labor</i> class 3.5/7	daywork	0.022	12971	<b>285</b> 285	
XR.34.21	<b><u>Corrugation removing</u></b>	m2	1			
	<i>Material</i> Natural gravel	m3	0.14	35000	<b>4,900</b> 4,900	
	<i>Labor</i> class 3.7/7	daywork	0.035	13193	<b>462</b> 462	
	<i>Machine</i> 10T Roller	daywork	0.003	288922	<b>2,582</b> 867	
	5 m3 watering truck	daywork	0.005	343052	1,715	
XR.11.11	<b><u>10 cm deep pothole filling</u></b>	m2	1			
	<i>Material</i> Natural gravel	m3	0.145	35000	<b>5,075</b> 5,075	
	<i>Labor</i> class 4/7	daywork	0.238	13529	<b>3,220</b> 3,220	
	<i>Machine</i> 5 m3 watering truck	daywork	0.0007	343052	<b>240</b> 240	
XR.11.12	<b><u>15 cm deep pothole filling</u></b>	m2	1			
	<i>Material</i> Natural gravel	m3	0.217	35000	<b>7,595</b> 7,595	
	<i>Labor</i> class 4/7	daywork	0.238	13529	<b>4,884</b> 4,884	
	<i>Machine</i> 5 m3 watering truck	daywork	0.238	343052	<b>274</b> 274	
XR.45.30	<b><u>Soft spot treatment</u></b>	m3	1			
	<i>Material</i> Natural gravel	m3	1.4	35000	<b>49,000</b> 49,000	
	<i>Labor</i> class 3.7/7	daywork	0.85	13193	<b>11,214</b> 11,214	
	<i>Machine</i> 5 m3 watering truck	daywork	0.002	343052	<b>2,342</b> 686	
	Vibrating compactor	daywork	0.033	50170	1,656	

### Maintenance Estimating Sheet

No.	Items	Unit	Quantity	Unit Price			Cost		
				Material	Labor	Machine	Material	Labor	Machine
<b>I Road bed and Drainage</b>									
1	Brush/ Grass clearing	m2	570		285			162,450	
2	Side drain cleaning	m	963		454			437,202	
3	Drain excavation	m3	60.8		14,156			860,685	
<b>II Mặt đường</b>									
4	Corrugation removing	m2	630	5,075	3,220	240	3,197,250	2,028,600	151,200
5	10 cm deep pothole filling	m2	195	7,595	4,884	274	1,481,025	952,380	53,430
6	15 cm deep pothole filling	m2	740	4,900	462	2,582	3,626,000	341,880	1,910,680
7	Soft spot treatment	m3	26.6	49,000	11,214	2,342	1,303,400	298,292	62,297
<b>Total</b>							<b>9,607,675</b>	<b>5,081,489</b>	<b>2,177,607</b>

Direct Cost

$$VL = 9,607,675 \quad 9,607,675$$

$$NC = 5,081,489 \times 3.36 = \quad 17,073,803$$

$$M = 2,177,607 \times 1.4 = \quad 3,048,650$$

$$T = VL + NC + M = 9,607,675 + 17,073,803 + 3,048,650 = \quad 29,730,128$$

Overhead cost

$$C = 5.3 \% \times T = 29,730,128 \times 5.3 \% = \quad 1,575,697$$

Maintenance Cost

$$Z = T + C = 29,730,128 + 1,575,697 = \quad 31,305,825$$

Management Cost

$$K = 1\% \times Z = 31,305,823 \times 1\% \quad 313,058$$

$$\text{Total cost: } Z + K \quad 31,618,883$$

### 3. Fund mobilization and maintenance organization models

The table below expresses results of fund mobilization and maintenance organization models (assumed data)

Funding resources	Calculation	Mobilized funds (VND)
- Commune Budget	Deduct 5% from total budget of 100,000,000 VND	5,000,000
- District Budget	Support 200,000 VND/1km/1year	3,640,000
- Monetary community contribution	10,000 ®/1 household/ 1year -150 household	1,500,000
- Compulsory Labor	1 daywork/1year/person - 300 people - 1 daywork value =10,000 VND	3,000,000
- Transport business fee	100,000VND/1household/1year - 18 household	1,800,000
- Business/Production Agent contribution	500000 VND/1Agent/1year - 8 agents	4,000,000
<b>Total</b>		<b>18,940,000</b>

#### 4. Define priority and balance funds

Maintenance activities in the following table are expressed in priority order (read Module M7 to understand priority defining result)

No.	Maintenance Activities	Maintenance Cost (Direct Cost)	Total Cost	Accumulative Cost
1	Side drain cleaning	437,202	733,013	733,013
2	Drain excavating	860,685	1,443,024	2,176,037
3	Soft spot treatment	1,663,990	1,879,471	4,055,508
4	15 cm deep pothole filling	2,486,835	3,146,560	7,202,068
5	10 cm deep pothole filling	5,377,050	6,783,085	13,985,153
6	Brush/Grass clearing	162,450	272,364	14,257,517
7	Corrugation removing	5,878,560	6,165,243	20,422,760

Remarks: Remained money after finishing activity 6 based on the table above is  $18\,940\,000^{\circ} - 14\,257\,517 = 4\,682\,483^{\circ}$ . It is not enough to carry activity 7 of all Commune roads.

Roads in the table below are expressed in priority order of road importance. (Read Module M7 again to understand the priority order of road importance)

No	Road Code	Road Name	Traffic Volume (Daily PCU)	Corrugation removing quantity	Cost	Accumulative Cost
1	ST01R3.5/5D8.6	Road to Xuan Thanh Commune	150	530	4,415,647	<b>4,415,647</b>
2	ST03R3.5/5D3.6	Road to Hiet Commune	95	210	Left to carry out later	
3	ST02R3.5/5D6.0	Road to Mua Xuan Commune	80	0		

#### 5. Road maintenance plan and estimated implementing models

Look at the table below that presents Road Maintenance Plan and Corresponding Estimated Implementing Models

No.	Maintenance Activities	Cost	Estimated Implementing Model
1	Side drain cleaning	733,013	Compulsory Labor
2	Drain excavating	1,443,024	
3	Soft spot treatment	1,879,471	
4	15 cm deep pothole filling	3,146,560	Force Account
5	10 cm deep pothole filling	6,783,085	
6	Brush/Grass clearing	272,364	Compulsory Labor
7	Corrugation removing - road ST01R3.5/5D8.6	4,415,647	Force Account
Total		18,673,164	

Remarks: The plan is established with total cost of 18,673,164 VND, and balanced with mobilized fund of 18,940,000 VND





*Practice* road maintenance planning based on your actual commune condition - *Fill* necessary data in the following tables

**1. Commune Road Inventory**

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								
2								
3								

**3. Road defects survey**

Table 8a - road defects quantity - site surveying results form								
Commune:						Road :		
Road Length: km			Road Code:			Date:		
Pavement Type: .....- Pavement/Road width: .....						<b>condition assessment</b>		<b>road defect quantity</b>
Road defect and sphere of influence						Quantit -y	Condi on Assess ment	
Location (km)								
<b>pavement</b>								
<b>bridge, culvert and other structures</b>								

Table 8a - road defects quantity - site surveying results form								
Commune:						Road :		
Road Length: km			Road Code:			Date:		
Pavement Type: .....- Pavement/Road width: .....						<b>condition assessment</b>		<b>road defect quantity</b>
Road defect and sphere of influence						Quantit -y	Condi on Assess ment	
Location (km)								

pavement							
bridge, culvert and other structures							

Table 8a - road defects quantity - site surveying results form								
Commune:					Road :			
Road Length: km			Road Code:		Date:			
Pavement Type: .....- Pavement/Road width: .....					<b>condition assessment</b>		<b>road defect quantity</b>	
Road defect and sphere of influence					Quantit	Condi		
Location (km)					-y	on	Assess	ment
pavement								
bridge, culvert and other structures								

**6. Define maintenance quantity and cost**

Combine maintenance quantity in the tables above and fill in the following table:

No.	Items	Unit	Maintenance Quantity
<b>I</b>	<b>Road bed and Location</b>		
<b>II</b>	<b>Pavement</b>		
<b>II</b>	<b>Bridge, Culvert, and other Structures</b>		

Finish the Unit Price of following calculations & supplement other necessary Unit Price calculations

Code	Descriptions	Unit	Quantity	Unit Price	Cost	Note
XR.65	<b><u>Side drain cleaning</u></b>	m	1			
	<i>Labor</i> class 3.5/7	daywork	0.035	12971	<b>454</b> 454	
BA.1733	<b><u>Drain excavating</u></b>	m3	1			
	<i>Labor</i> class 2.7/7	daywork	1.17	12099	<b>14,156</b> 14,156	
XR.66	<b><u>Brush/Grass clearing</u></b>	m2	1			
	<i>Labor</i> class 3.5/7	daywork	0.022	12971	<b>285</b> 285	
XR.34.21	<b><u>Corrugation removing</u></b>	m2	1			
	<i>Material</i> Natural gravel	m3	0.14	.....	.....	
	<i>Labor</i> class 3.7/7	daywork	0.035	13193	<b>462</b> 462	
	<i>Machine</i> 10 ton roller	daywork	0.003	288922	<b>2,582</b> 867	
	5 m3 watering truck	daywork	0.005	343052	1,715	
XR.11.11	<b><u>10 cm deep pothole filling</u></b>	m2	1			
	<i>Material</i> Natural gravel	m3	0.145	.....	.....	
	<i>Labor</i> class 4/7	daywork	0.003	13529	<b>3,220</b> 3,220	
	<i>Machinery</i> 5 m3 watering truck	daywork	0.003	343052	<b>240</b> 240	
XR.11.12	<b><u>15 cm deep pothole filling</u></b>	m2	1			
	<i>Material</i> Natural gravel	m3	0.217	.....	.....	
	<i>Labor</i> class 4/7	daywork	0.361	13529	<b>4,884</b> 4,884	
	<i>Machinery</i> 5 m3 watering truck	daywork	0.0008	343052	<b>274</b> 274	
XR.45.30	<b><u>Soft spot treatment</u></b>	m3	1			
	<i>Material</i> Natural gravel	m3	1.4	.....	.....	
	<i>Labor</i> class 3.7/7	daywork	0.85	13193	<b>11,214</b> 11,214	
	<i>Machinery</i> 5 m3 watering truck	daywork	0.002	343052	<b>2,342</b> 686	
	Vibrating compactor	daywork	0.033	50170	1,656	

*Maintenance estimating sheet*

No.	Items	Unit	Quantity	Unit Price			Cost		
				Material	Labor	Machine	Material	Labor	Machine
<b>I</b>	<b>Road bed and Drainage</b>								
1									
2									
3									
<b>II</b>	<b>Pavement</b>								
<b>III</b>	<b>Bridge, Culvert, and other Structures</b>								

Direct Cost

VL =

NC =

M =

T = VL + NC + M =

Overhead Cost

C = 5.3 % x T =

Maintenance Cost

Z = T + C =

Management Cost

K = 1% x Z

Total Cost: Z + K

**7. Fund Mobilization and Maintenance Organization Models**

*Fill the results of fund mobilization in the table below*

Funding Sources	Calculation	Mobilized Fund
<b>Total</b>		

**8. Define priority and balance funding sources**

*Fill in the table below the maintenance activities in priority order*

No.	Maintenance Activity	Maintenance Cost (Direct cost)	Total cost	Accumulative Cost
1				
2				
3				
4				
5				
6				
7				

Remarks: .....

*Fill in the table below maintenance activities in priority order of road importance*

No.	Road Code	Road Name	Traffic Volume (Daily PCU)	Maintenance Quantity	Cost	Accumulative Cost

**9. Maintenance Plan and Estimated Implementing Models**

*Fill in the table below the maintenance activities and corresponding estimated implementing models*

No.	Maintenance Activities	Cost	Estimated Implementing Models
Total Cost			

Remarks: .....



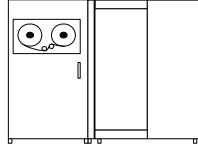
note

*It is necessary to have comprehensive, such as road inventory, defect survey, estimating... to establish a road maintenance plan.*

**Kiểm tra - Danh gia** **Assessment**

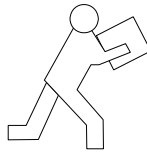
1. Fill in the blanks below to finish planning procedures in road maintenance

1



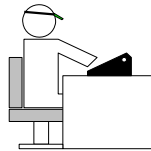
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2



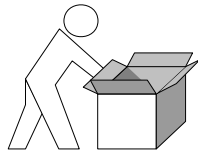
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3



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4



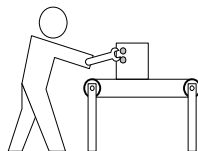
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5



.....

6



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Good

Not good