Section 1
S1.1: Concepts of Rural Road Maintenance

SUMMARY

- Principles of LVRR maintenance
- Tasks of LVRR maintenance
- Types of Rural Road Maintenance
- Routine maintenance 1
- Routine maintenance 2

Importance of LVRR maintenance

All components of the rural road infrastructure, such as pavement surface, shoulders, earthworks, bridges and drainage structures, require maintenance to ensure that they continue to function as designed.

Tasks of Rural Road Maintenance

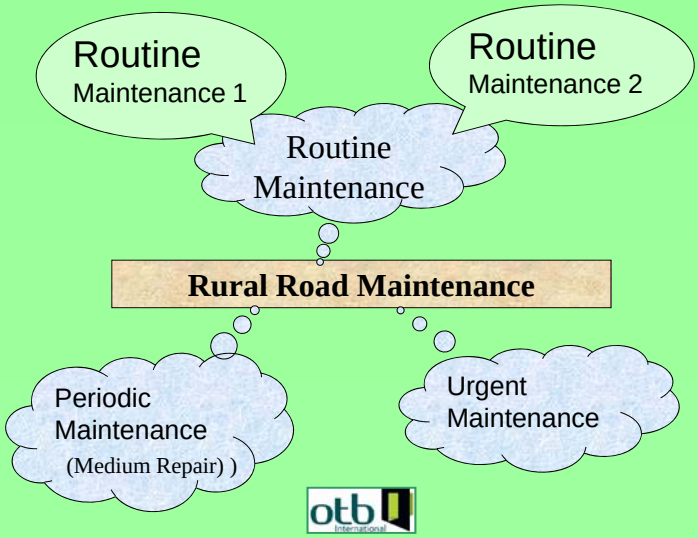
Non-maintained roads cause additional costs to the users and community in higher vehicle operating and transport costs, reduced safety and delayed or slower journeys. Government, community, commercial and individual efforts to bring development and services to the rural areas will be hampered by poor road maintenance, and investments will be placed at risk.

Key Types of Rural Road Maintenance

Routine maintenance (1 and 2) Remedying relatively minor defects on rural roads that occur on a frequent and sometimes recurring basis

Periodic maintenance: Comprises more expensive cyclic activities that are required on regular basis eg re-gravelling of unsealed roads on a 3-4 year cycle

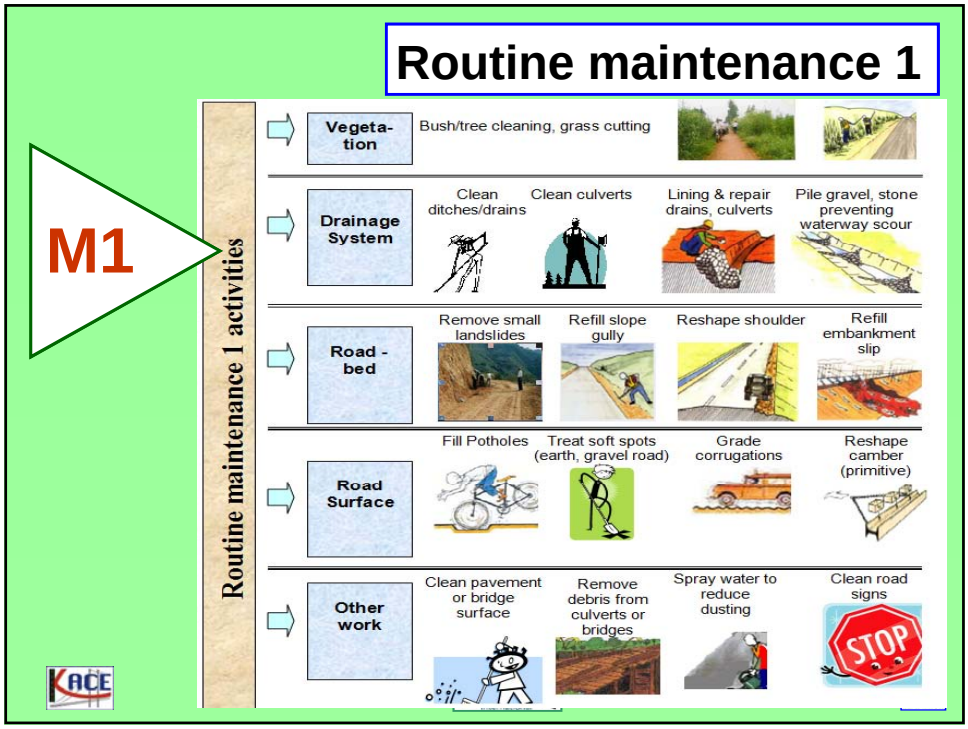
Types of Rural Road Maintenance

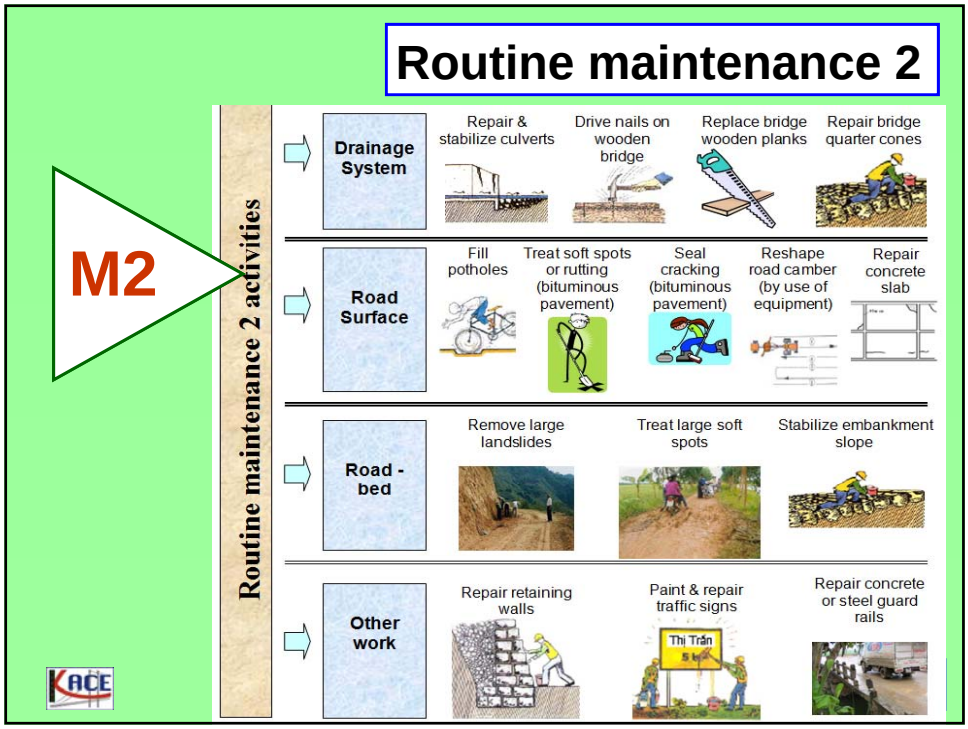


Routine Maintenance

Routine 1 Maintenance items that require only unskilled labour and simple hand tools for example grass cutting, bush clearing, and ditch cleaning. These items can be carried out using compulsory or voluntary labour.

Routine 2. Items requiring material, equipment and specialized skills such as pothole patching, or mechanical grading. They require certain additional resources and specialized skills.


Routine maintenance 1
M1
Routine maintenance 1 activities
Vegeta-tion
Bush/tree cleaning, grass cutting
Drainage System
Clean ditches/drains
Clean culverts
Lining & repair drains, culverts
Pile gravel, stone preventing waterway scour
Road - bed
Remove small landslides
Refill slope gully
Reshape shoulder
Refill embankment slip
Road Surface
Fill Potholes
Treat soft spots (earth, gravel road)
Grade corrugations
Reshape camber (primitive)
Other work
Clean pavement or bridge surface
Remove debris from culverts or bridges
Spray water to reduce dusting
Clean road signs
STOP


Routine maintenance 2
M2
Routine maintenance 2 activities
Drainage System
Repair & stabilize culverts
Drive nails on wooden bridge
Replace bridge wooden planks
Repair bridge quarter cones
Road Surface
Fill potholes
Treat soft spots or rutting (bituminous pavement)
Seal cracking (bituminous pavement)
Reshape road camber (by use of equipment)
Repair concrete slab
Road - bed
Remove large landslides
Treat large soft spots
Stabilize embankment slope
Other work
Repair retaining walls
Paint & repair traffic signs
Thị Trấn
Repair concrete or steel guard rails

NOTE

- There are two types of Routine Maintenance: Routine Maintenance 1 & Routine Maintenance 2
- Undertaking Routine Maintenance does not require high cost and yields extensive benefits, maintains the road quality and extends road service life.

Discussion

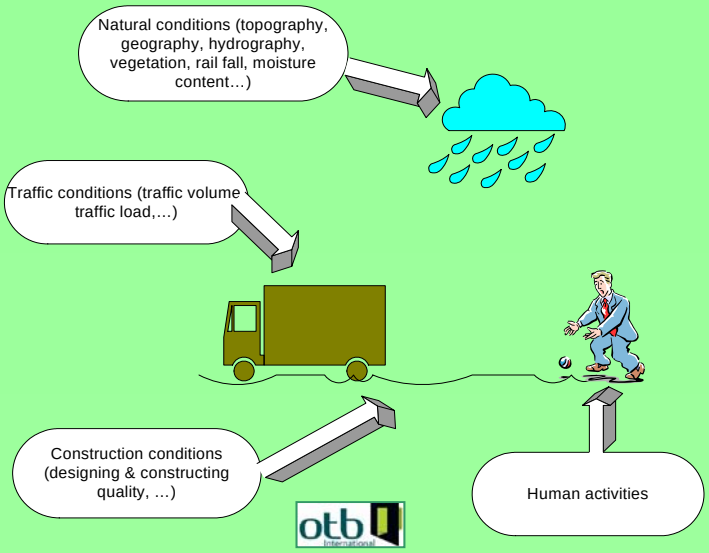
Routine 1 and Routine 2 - are these valid definitions in the Cambodian environment ?

Section 1
S1.2: Rural Road Defects and Causes

SUMMARY

- Types of defects of road structures, bridges, culverts in Rural Road Network.
- Causes of Rural Road defects and
- Appropriate maintenance activities

Causes of Rural Road defects



Defect identification & Appropriate routine maintenance

Defect identification:
Excessive vegetation growth on road shoulders eliminates the normal vision

1

Appropriate routine maintenance:

Routine maintenance 1

Defect identification & Appropriate routine maintenance

Defect identification:.....
.....

2

S1.2: Rural Road Defects and Causes

Defect identification & Appropriate routine maintenance

3

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S1.2: Rural Road Defects and Causes

Defect identification & Appropriate routine maintenance

4

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S1.2: Rural Road Defects and Causes

Defect identification & Appropriate routine maintenance

5

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S1.2: Rural Road Defects and Causes

Defect identification & Appropriate routine maintenance

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Defect identification & Appropriate routine maintenance

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Defect identification & Appropriate routine maintenance

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Defect identification & Appropriate routine maintenance

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Defect identification & Appropriate routine maintenance

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Defect identification & Appropriate routine maintenance

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Defect identification & Appropriate routine maintenance

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Key Notes

- **Water is an enemy of road - Don't let water stagnate on the road surface or road shoulders.**

- **It is important to keep the designed shape of the road**

Defects summary

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14
15

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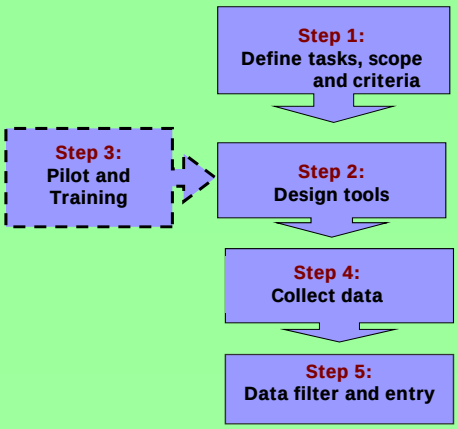
Section 1
S1.3: Road Defect Survey and Maintenance Demand Determination

SUMMARY

- LVRR survey procedure
- Qualitative and quantitative assessment criteria
- Routine tools and devices for survey
- Collect data at the field
- LVRR survey forms

RR survey procedure



RR assessment criteria

Two types of RR assessment criteria:

- Qualitative criteria used for quality assessment of RR condition (Good, bad…)
- Quantitative criteria: used for defining number, size, weight (m,m2, m3, kg…) needed for identifying volume of maintenance works and/or estimating maintenance cost

RR assessment criteria

- Qualitative criteria sample

Table 1: quality assessment criteria for an earth road

Criteria	Unit	Good	Fair	Bad	Very bad
1. Cross fall	percent	4 - 6	2 - 4	1 - 2	<1
2. Pothole area	% of surface area	0	≤ 3.5	> 3.5 and ≤10	>10
3. Corrugation	Height of corrugation (cm)	None	≤ 3 cm	>3 cm & ≤5cm and total length of corrugation greater than 20% of road length	>5 cm and total length of corrugation greater than 20% of road length

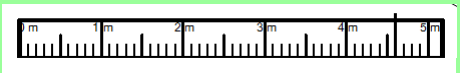
RR assessment criteria

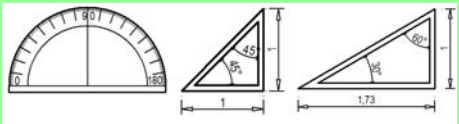
- Quantitative criteria sample

For Earth Road

- *The area - m^2 - of pavement need to be cleared*
- *The area - m^2 - of rutting & corrugation*
- *The area - m^2 and average depth (m) of pothole*
- *The volume - m^3 - of soft spot*

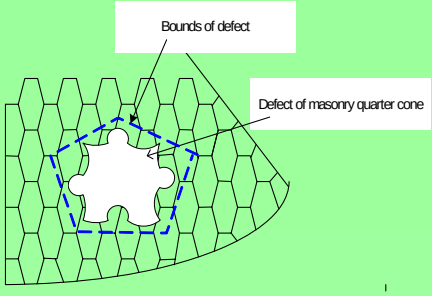
Tools and devices for survey





How to identify and measure the defects?

- **Defect zone should be converted to equivalent simple shape to define maintenance demand**



LVRR defect survey forms

- Four main forms can be used for LVRR condition/defects survey:
  1. For pavement defects
  2. for shoulder, side drain & embankment defects
  3. for bridge, culvert, retaining wall... Defects
  4. Defect quantity - field survey result form

LVRR defect survey forms

Assessment criteria for Pavement defects

- Items 7, 8, 9 are exclusive for concrete pavement

1	Pavement clearing (length/area) -m/m2-
2	Corrugation (depth/area) -cm/m2-
3	Rutting (depth/area) - cm/m2-
4	Pothole (average depth/area) - cm/m2-
5	Soft spot (volume/area) - m3/m2-
6	Cracking, raveling, fretting (area) - m2
7	Numbers of concrete slab need to be replaced - slab -
8	Concrete pavement cracking (area) - m2 -
9	Crack, joint damage (length) - m -

S1.3: Road Defect Survey

LVRR defect survey forms

Form 1: survey pavement defects

DF090.02 **ROAD DEFECT SURVEYING FORM** **Form1: Pavement Defects**

Province:.....	District:.....	Commune:.....	Starting Time:.....	Finishing time:.....	Page:
Road Code:.....	Road name:.....	From:..... To.....	Surveyor Name:.....	Date:.....	.....

Chainage	Km / m	0	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
Summary	Pavement/Shoulder width (m):.....																					
	Pavement type:.....																					
pavement	1 Pavement clearing (length/area) -m/m2-																					
	2 Corrugation (depth/area) -cm/m2-																					
	3 Rutting (depth/area) - cm/m2-																					
	4 Pothole (average depth/area) - cm/m2-																					
	5 Soft spot (volume/area) - m3/m2-																					
	6 Cracking, raveling, fretting (area) - m2																					
	7 Numbers of concrete slab need to be replaced - slab -																					
	8 Concrete pavement cracking (area) - m2 -																					
	9 Crack, joint damage (length) - m -																					

**Items 7, 8, 9 are exclusive for concrete pavement*

LVRR defect survey forms

Assessment criteria for shoulder, side drain & embankment defects

1	Shoulder reshaping (m/m^2)
2	Grass cutting on shoulder (m/m^2)
3	Brush clearing on road side (m^2)
4	Side drain clearing (m)
5	Additional excavation of side drain (m)
6	Minor landslide removing (m^3)
7	Embankment/ slope refilling (m^3)
8	Side post/ traffic sign clearing (unit)

LVRR defect survey forms

Form 2: For shoulder, side drain & embankment defects

RT2 Project — ROAD DEFECTS SURVEYING FORM — Form 2: For shoulder, side drain & embankment defects

Province:.....	District:.....	Commune:.....	Starting Time:.....	Finishing time:.....
Road Code:.....	Road name:.....	From:..... To.....	Surveyor Name:.....	Date:.....

Page: .....

Location: Km / m — 0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000

Summary: Pavement/Shoulder width (m):..... Pavement type:.....

shoulder - road bed - side drain

1	Shoulder reshaping (m/m^2)
2	Grass cutting on shoulder (m/m^2)
3	Brush clearing on road side (m^2)
4	Side drain clearing (m)
5	Additional excavation of side drain (m)
6	Minor landslide removing (m^3)
7	Embankment/ slope refilling (m^3)
8	Side post/ traffic sign clearing (unit)

LVRR defect survey forms

Assessment criteria for bridge, culvert, retaining wall... defects

bridge - culvert - other structures	1	Clean debris on bridge surface (m^2)
	2	Replace bridge wooden plank (m^3)
	3	Replace bridge wooden nails (unit)
	4	Repair abutment(c,i)
	5	Remove concrete, masonry (m^3)
	6	Soil excavation (m^3)
	7	Replace concrete (m^3)
	8	Replace masonry (m^3)

LVRR defect survey forms

Form 3: For bridge, culvert , retaining wall... defects

RT2 Project — **ROAD DEFECTS SURVEYING FORM** — **Form 3: For bridge, culvert , retaining wall... defects**

Province:.....	District:.....	Commune:.....	Starting Time:.....	Finishing time:.....	Page: .....
Road Code:.....	Road name:.....	From:..... To.....	Surveyor Name:.....	Date:.....	

			0	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
Location		Km																					
		m																					
Summary	Pavement/Shoulder width (m):.....																						
	Pavement type:.....																						
bridge - culvert - other structures	1	Clean debris on bridge surface (m^2)																					
	2	Replace bridge wooden plank (m^3)																					
	3	Replace bridge wooden nails (unit)																					
	4	Repair abutment(c,i)																					
	5	Remove concrete, masonry (m^3)																					
	6	Soil excavation (m^3)																					
	7	Replace concrete (m^3)																					
	8	Replace masonry (m^3)																					

LVRR defect survey forms

Form 4: Defect quantity - field survey result form

Table 6 - defect quantity - field survey result form

Commune:..... Road : .....

Lenght: ..... km | Road code: ..... | Date: .....

Pavement: Macadam - Pavement width/Road width:3.5m/5m

Type and location of defects						condition assessment *		defect quantity**
Location (km) or landmark	K0 - K0+500	K0+ 500 - K1				Assessment parameter	Rating	
road bed - shoulder - side drain								
Side drain clearing (m)	130	80				210 (m)	Bad	210 m
Side drain excavation (m/m3)	20/6.4	0				20 (m2)	Bad	6.4 m³
Vegetation clearing (m2)	30	42				72 (m2)	Bad	72 m²
.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....
pavement								
Cross fall (%)/(m)	2/120	1.5/300				1.5-2 (%)	Bad	
Corrugation (5cm>h>3cm) (m)/(m²)	0	0						
Corrugation (h>5cm) (m)/(m²)	200/700	140/490				34%***	Very bad	1190 m²
Pothole (Hth>12 cm) (m²)	80	60				5.4%****	Bad	140 m²
Soft spots (m²)/(m³)	20/14	30/18						50m²/ 52 m³
.....	.....	.....	.....	.....	.....	.....	.....	.....
bridge, culvert and other structures								
Dirt/debris on bridge surface(m2)	0	5						5 m²
Replace bridge nails (unit)		30						30 c.i
Soil excavation for culvert outlet (m3)	3							1.9
Soil refilling for culvert outlet (m3)	3							3 m³
Culvert outlet masonry (m3)	4							4 m³
.....	.....	.....						.....

S1.3: Road Defect Survey

Discussion

How to organize LVRR defect survey?

How to collect data at the field? (how to identify and measure the defects)?

How to fill the survey forms?

មេរៀនទី ១

១.១: ទស្សនៈទាននៃការថែទាំផ្លូវជនបទ

(Concepts of Rural Road Maintenance)

បទសង្ខេប

- គោលការណ៍ទាំងឡាយនៃការថែទាំផ្លូវជនបទ
- កិច្ចការនៃការថែទាំផ្លូវជនបទ
- របៀបនៃការថែទាំផ្លូវជនបទ
- ការថែទាំប្រចាំប្រភេទទី ១
- ការថែទាំប្រចាំប្រភេទទី ២

សារៈសំខាន់នៃការថែទាំផ្លូវជនបទ

(Importance of LVRR maintenance)

គ្រប់សមាសភាពនៃហេដ្ឋារចនាសម្ព័ន្ធផ្លូវជនបទ ដូចជាកំរាលផ្លូវ ចិញ្ចើមផ្លូវ ដីលើក (ដីចាក់បំពេញ) រចនាសម្ព័ន្ធស្ពាន និងប្រព័ន្ធដោះទឹក តម្រូវអោយមានការថែទាំ ដើម្បីធានាថាពួកវានៅតែដំណើរការដូចកាលគ្រោងប្លង់ពីដំបូង ។

កិច្ចការនៃការថែទាំផ្លូវជនបទ

ផ្លូវដែលមិនមានការថែទាំ បានបង្កើនតម្លៃបន្ថែមទៅអោយអ្នកប្រើប្រាស់ និងសហគមន៍ ក្នុងការប្រឹងប្រែងបញ្ជារយានយន្ត និងតម្លៃដឹកជញ្ជូន, កាត់បន្ថយសុវត្ថិភាព និងពន្យារពេល ឬពន្យឺតដំណើរ ។

កិច្ចប្រឹងប្រែង ទាំងឡាយរបស់រដ្ឋាភិបាល សហគមន៍ អ្នកជំនួញ និងបុគ្គលដើម្បីនាំមកនូវ ការអភិវឌ្ឍន៍ និងផ្តល់សេវាទៅតំបន់ជនបទ នឹងត្រូវបានរារាំងដោយ ភាពកង្វះខាតនៃការថែទាំផ្លូវ ហើយការវិនិយោគទាំងឡាយនឹងស្ថិតក្នុងសភាពគ្រោះថ្នាក់ ។

លក្ខណះគន្លឹះនៃការថែទាំផ្លូវជនបទ

(Key Types of Rural Road Maintenance)

ការថែទាំប្រចាំ (ប្រភេទទី ១ និងទី ២) គឺជាការកែកុនកំហូចផ្លូវជនបទដែលតែងតែកើតឡើង និងកើតឡើងវិញជាញឹកញាប់ ។

ការថែទាំខួប គឺជាការថែទាំដែលមានការចំណាយថវិកាច្រើន ហើយដែលទាមទារអោយធ្វើក្នុងរយៈពេលកំនត់ទៀងទាត់ ឧទាហរណ៍ ការក្រាលគ្រួសឡើងវិញក្នុងរយៈពេល ៣ ទៅ ៤ ឆ្នាំម្តង សំរាប់ផ្លូវកំរាលគ្រួស ។

ប្រភេទនៃការថែទាំផ្លូវជនបទ

(Types of Rural Road Maintenance)

ការថែទាំប្រចាំ ប្រភេទទី ១

ការថែទាំប្រចាំ ប្រភេទទី ២

ការថែទាំប្រចាំ

ការថែទាំផ្លូវជនបទ

ការថែទាំខួប (ការជួសជុលមធ្យម)

ការថែទាំ ឬ ជួសជុលធ្ងន់

ការថែទាំប្រចាំ

Routine 1: Maintenance items that require only unskilled labour and simple hand tools for example grass cutting, bush clearing, and ditch cleaning. These items can be carried out using compulsory or voluntary labour.

Routine 2: Items requiring material, equipment and specialized skills such as pothole patching, or mechanical grading. They require certain additional resources and specialized skills.

Routine maintenance 1

M1

Routine maintenance 1 activities

Vegeta-tion
- Bush/tree cleaning, grass cutting


Drainage System
- Clean ditches/drains
- Clean culverts
- Lining & repair drains, culverts
- Pile gravel, stone preventing waterway scour




Road - bed
- Remove small landslides
- Refill slope gully
- Reshape shoulder
- Refill embankment slip




Road Surface
- Fill Potholes
- Treat soft spots (earth, gravel road)
- Grade corrugations
- Reshape camber (primitive)




Other work
- Clean pavement or bridge surface
- Remove debris from culverts or bridges
- Spray water to reduce dusting
- Clean road signs




Routine maintenance 2

M2

Routine maintenance 2 activities

Drainage System
- Repair & stabilize culverts
- Drive nails on wooden bridge
- Replace bridge wooden planks
- Repair bridge quarter cones




Road Surface
- Fill potholes
- Treat soft spots or rutting (bituminous pavement)
- Seal cracking (bituminous pavement)
- Reshape road camber (by use of equipment)
- Repair concrete slab





Road - bed
- Remove large landslides
- Treat large soft spots
- Stabilize embankment slope



Other work
- Repair retaining walls
- Paint & repair traffic signs
- Repair concrete or steel guard rails


NOTE

- There are two types of Routine Maintenance: Routine Maintenance 1 & Routine Maintenance 2.
- Undertaking Routine Maintenance does not require high cost and yields extensive benefits, maintains the road quality and extends road service life.

ចំនុចពិភាក្សា (Discussion)

តើការថែទាំប្រចាំប្រភេទទី ១ និងប្រភេទទី ២

មានការកំណត់ និងអនុវត្តន៍នៅកម្ពុជាដែរ ឬទេ?

មេរៀនទី ១

១.២: កំហូចផ្លូវជនបទ និងមូលហេតុ

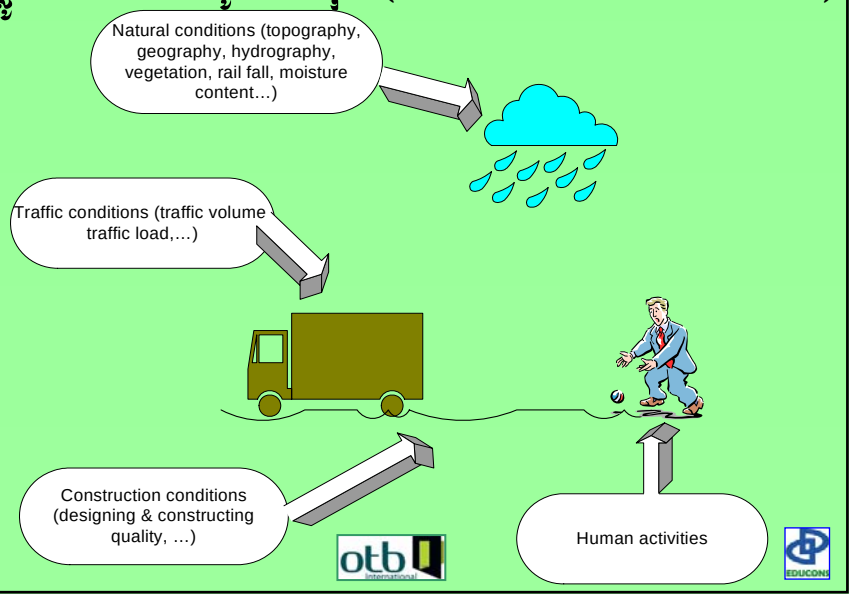
(Rural Road Defects and Causes)

បទសង្ខេប

- ប្រភេទនៃភាពខូចនៃគ្រឿងបង្គុំផ្លូវ ស្ពាន លូ នៅក្នុងបណ្តាញផ្លូវជនបទ ។
- មូលហេតុនៃកំហូចផ្លូវជនបទ និង
- សកម្មភាពជួសជុលដែលសមស្រប ។

S1.2: Rural Road Defects and Causes

កំហូចផ្លូវជនបទ និងមូលហេតុ (Rural Road Defects and Causes)



Natural conditions (topography, geography, hydrography, vegetation, rail fall, moisture content...)

Traffic conditions (traffic volume traffic load,...)

Construction conditions (designing & constructing quality, ...)

Human activities

Defect identification & Appropriate routine maintenance

Defect identification:
Excessive vegetation growth on road shoulders eliminates the normal vision

1

Appropriate routine maintenance:

Routine maintenance 1

Defect identification & Appropriate routine maintenance

Defect identification:.....
.....

2

S1.2: Rural Road Defects and Causes

Defect identification & Appropriate routine maintenance

3

.....

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S1.2: Rural Road Defects and Causes

Defect identification & Appropriate routine maintenance

4

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S1.2: Rural Road Defects and Causes

Defect identification & Appropriate routine maintenance

5

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S1.2: Rural Road Defects and Causes

Defect identification & Appropriate routine maintenance

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Defect identification & Appropriate routine maintenance

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Defect identification & Appropriate routine maintenance

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Defect identification & Appropriate routine maintenance

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Defect identification & Appropriate routine maintenance

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Defect identification & Appropriate routine maintenance

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Defect identification & Appropriate routine maintenance

15

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Key Notes

- Water is an enemy of road - Don't let water stagnate on the road surface or road shoulders.

- It is important to keep the designed shape of the road

Defects summary

1
2
3
4
5
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13
14
15

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Defects summary

Defect 1 – Vegetation growth excessive on road shoulders, structures or affecting drainage system, visibility and safety for traffic and people.

Defect 2 – Side or turn-out drains silted or blocked by debris.

Defect 3 – Water ponds on road or side of road because side or turn-out drains have not been provided or side or turn-out drains are damaged.

Defect 4 – Drains damaged or eroded.

Defect 5 – Debris or silt in or close to culvert outlet.

Defect 6 – Slip on embankment.

Defect 7 – Erosion on fill or cut slope.

Defect 8 – Embankment toe scoured by waterway.

Defect 9 – Minor landslide on to the road.

Defects summary

Defect 10 – Debris or waste on road surface.

Defect 11 – Dirt or debris on bridge surface, bridge drains are blocked.

Defect 12 – Debris, logs or timbers blocked the channel under bridge or on causeway.

Defect 13 – Dry and dusty surface.

Defect 14 – Road furniture: Traffic signs are dirty or covered by vegetation .

Defect 15 – Potholes (earth/gravel/stone macadam /brick road).

Defect 16 – Soft spots or local depression on gravel or stone macadam road.

Defect 17 –Road surface corrugated – unpaved road.

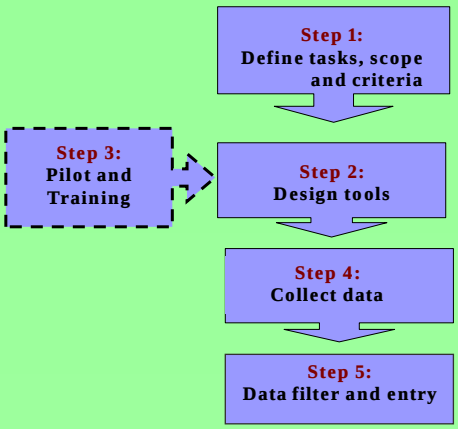
Defect 18 – Road surface does not drain to the edge of the road

Section 1
S1.3: Road Defect Survey and Maintenance Demand Determination

SUMMARY

- LVRR survey procedure
- Qualitative and quantitative assessment criteria
- Routine tools and devices for survey
- Collect data at the field
- LVRR survey forms

RR survey procedure



RR assessment criteria

Two types of RR assessment criteria:

- **Qualitative criteria used for quality assessment of RR condition (Good, bad…).**
- **Quantitative criteria: used for defining number, size, weight (m, m^2, m^3, kg…) needed for identifying volume of maintenance works and/or estimating maintenance cost.**

RR assessment criteria

- **Qualitative criteria sample**

Table 1: quality assessment criteria for an earth road

Criteria	Unit	Good	Fair	Bad	Very bad
1. Cross fall	percent	4 - 6	2 - 4	1 - 2	<1
2. Pothole area	% of surface area	0	≤ 3.5	> 3.5 and ≤10	>10
3. Corrugation	Height of corrugation (cm)	None	≤ 3 cm	>3 cm & ≤5cm and total length of corrugation greater than 20% of road length	>5 cm and total length of corrugation greater than 20% of road length

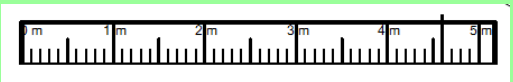
RR assessment criteria

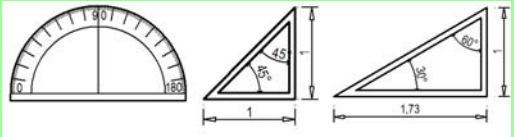
- Quantitative criteria sample

For Earth Road

- *The area - m^2 - of pavement need to be cleared*
- *The area - m^2 - of rutting & corrugation*
- *The area - m^2 and average depth (m) of pothole*
- *The volume - m^3 - of soft spot*

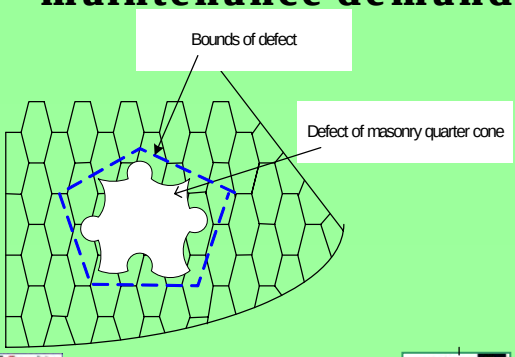
Tools and devices for survey





How to identify and measure the defects?

- Defect zone should be converted to equivalent simple shape to define maintenance demand.



LVRR defect survey forms

- Four main forms can be used for LVRR condition/defects survey:
  1. For pavement defects
  2. For shoulder, side drain & embankment defects
  3. For bridge, culvert, retaining wall... Defects
  4. Defect quantity - field survey result form

LVRR defect survey forms

Assessment criteria for Pavement defects

- **Items 7, 8, 9 are exclusive for concrete pavement**

1	Pavement clearing (length/area) -m/m2-
2	Corrugation (depth/area) -cm/m2-
3	Rutting (depth/area) - cm/m2-
4	Pothole (average depth/area) - cm/m2-
5	Soft spot (volume/area) - m3/m2-
6	Cracking, raveling, fretting (area) - m2
7	Numbers of concrete slab need to be replaced - slab -
8	Concrete pavement cracking (area) - m2 -
9	Crack, joint damage (length) - m -

LVRR defect survey forms

Form 1: survey pavement defects

DF090.02 **ROAD DEFECT SURVEYING FORM** **Form1: Pavement Defects**

Province:.....	District:.....	Commune:.....	Starting Time:.....	Finishing time:.....	Page: .....
Road Code:.....	Road name:.....	From:..... To.....	Surveyor Name:.....	Date:.....	

Chainage	Km / m	0	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
Summary	Pavement/Shoulder width (m):.....																					
	Pavement type:.....																					
Pavement	1 Pavement clearing (length/area) -m/m2-																					
	2 Corrugation (depth/area) -cm/m2-																					
	3 Rutting (depth/area) - cm/m2-																					
	4 Pothole (average depth/area) - cm/m2-																					
	5 Soft spot (volume/area) - m3/m2-																					
	6 Cracking, raveling, fretting (area) - m2																					
	7 Numbers of concrete slab need to be replaced - slab -																					
	8 Concrete pavement cracking (area) - m2 -																					
	9 Crack, joint damage (length) - m -																					

**Items 7, 8, 9 are exclusive for concrete pavement*

LVRR defect survey forms

Assessment criteria for shoulder, side drain & embankment defects

1	Shoulder reshaping (m/m^2)
2	Grass cutting on shoulder (m/m^2)
3	Brush clearing on road side (m^2)
4	Side drain clearing (m)
5	Additional excavation of side drain (m)
6	Minor landslide removing (m^3)
7	Embankment/ slope refilling (m^3)
8	Side post/ traffic sign clearing (unit)

LVRR defect survey forms

Form 2: For shoulder, side drain & embankment defects

RT2 Project — **ROAD DEFECTS SURVEYING FORM** — **Form 2: For shoulder, side drain & embankment defects**

Province:.....	District:.....	Commune:.....	Starting Time:.....	Finishing time:.....	Page:
Road Code:.....	Road name:.....	From:..... To.....	Surveyor Name:.....	Date:.....	.....

Location	Km / m	0	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
Summary	Pavement/Shoulder width (m):.....																					
	Pavement type:.....																					
shoulder - road bed - side drain	1 Shoulder reshaping (m/m^2)																					
	2 Grass cutting on shoulder (m/m^2)																					
	3 Brush clearing on road side (m^2)																					
	4 Side drain clearing (m)																					
	5 Additional excavation of side drain (m)																					
	6 Minor landslide removing (m^3)																					
	7 Embankment/ slope refilling (m^3)																					
	8 Side post/ traffic sign clearing (unit)																					

LVRR defect survey forms

Assessment criteria for bridge, culvert, retaining wall... defects

bridge - culvert - other structures	1	Clean debris on bridge surface (m^2)
	2	Replace bridge wooden plank (m^3)
	3	Replace bridge wooden nails (unit)
	4	Repair abutment(c,i)
	5	Remove concrete, masonry (m^3)
	6	Soil excavation (m^3)
	7	Replace concrete (m^3)
	8	Replace masonry (m^3)

LVRR defect survey forms

Form 3: For bridge, culvert, retaining wall... defects

RT2 Project — ROAD DEFECTS SURVEYING FORM — Form 3: For bridge, culvert , retaining wall... defects

Province:.....	District:.....	Commune:.....	Starting Time:.....	Finishing time:.....	Page:
Road Code:.....	Road name:.....	From:..... To.....	Surveyor Name:.....	Date:.....	.....

Location	Km / m	0	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
Annual Survey	Pavement/Shoulder width (m):.....																					
	Pavement type:.....																					
bridge - culvert - other structures	1 Clean debris on bridge surface (m^2)																					
	2 Replace bridge wooden plank (m^3)																					
	3 Replace bridge wooden nails (unit)																					
	4 Repair abutment(c,i)																					
	5 Remove concrete, masonry (m^3)																					
	6 Soil excavation (m^3)																					
	7 Replace concrete (m^3)																					
	8 Replace masonry (m^3)																					

LVRR defect survey forms

Form 4: Defect quantity - field survey result form

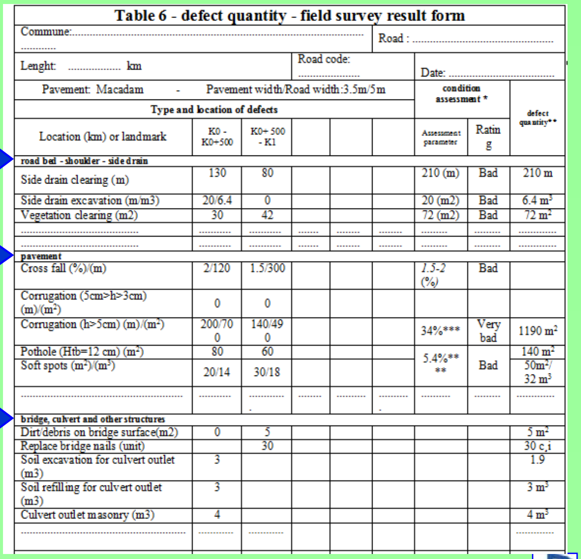


Table 6 - defect quantity - field survey result form

Commune:..					Road :			
Lenght: .... km			Road code:			Date:		
Pavement: Macadam - Pavement width/Road width:3.5m/5m						condition assessment *		defect quantity**
Type and location of defects								
Location (km) or landmark	K0 - K0+500	K0+ 500 - K1				Assessment parameter	Rating	
road bed - shoulder - side drain								
Side drain clearing (m)	130	80				210 (m)	Bad	210 m
Side drain excavation (m/m3)	20/6.4	0				20 (m2)	Bad	6.4 m³
Vegetation clearing (m2)	30	42				72 (m2)	Bad	72 m²
....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....
pavement								
Cross fall (%)/(m)	2/120	1.5/300				*1.5-2 (%)*	Bad	
Corrugation (5cm>h>3cm) (m)/(m²)	0	0						
Corrugation (h>5cm) (m)/(m²)	200/700	140/490				34%***	Very bad	1190 m²
Pothole (Htb=12 cm) (m²)	80	60				5.4%****	Bad	140 m²
Soft spots (m²)/(m³)	20/14	30/18						50m²/ 32 m³
....	....	....	....	....	....	....	....	....
bridge, culvert and other structures								
Dirt/debris on bridge surface(m2)	0	5						5 m²
Replace bridge nails (unit)		30						30 c,i
Soil excavation for culvert outlet (m3)	3							1.9
Soil refilling for culvert outlet (m3)	3							3 m³
Culvert outlet masonry (m3)	4							4 m³
....	....	....						....

ចំនុចពិភាក្សា (Discussion)

តើយើងត្រូវរៀបចំធ្វើអង្កេតកំហូចនៃផ្លូវជនបទយ៉ាងដូចម្តេច?

How to organize LVRR defect survey?

តើយើងត្រូវធ្វើការប្រមូលទិន្នន័យនៅលើដងផ្លូវយ៉ាងដូចម្តេច?

(តើត្រូវការសំគាល់ និង វាស់វែងកំហូចរបស់ផ្លូវយ៉ាងដូចម្តេច?)

How to collect data at the field? (How to identify and measure the defects?)

តើយើងត្រូវបំពេញទម្រង់នៃការធ្វើអង្កេតយ៉ាងដូចម្តេច?

How to fill the survey forms?