MODULE 12 MANTENANCE TECHNIQUES - THE ROUTINE MANTENANCE 1

Objectives

After fulfilling Module 12, you will be able to:

- Understand procedures and techniques in implementing the Routine Maintenance 1.
- Realize wrong/right steps in each maintenance technique
- Self- Assessment

Requirement

The participants are required to have comprehended following modules:

- Module 1: "*Local Road Network"*
- Module 2: "*The Concepts of Rural Road Maintenance"*
- Module 4: "*Rural Road Defects and the Causes"*
- Module 11: " *Rural Road Maintenance Materials"*

Methodology

- The participants are introduced procedures and techniques in implementing the Routine Maintenance 1.
- The participants review some maintenance techniques, distinguish the wrong/right steps in these maintenance techniques.
- Self-Assessment

Training Kit

- Rural Road Maintenance Handbook
- Module 12 *"Maintenance Techniques- The Routine Maintenance 1"*

1. Learn about procedures & techniques to carry out road routine maintenance1 activities
2. Realize the right/wrong steps in procedure of some activities of Rural Road Maintenance - the Routine Maintenance 1
3. Self - assessment

1. Procedure and techniques of routine maintenance 1 activities

☞ Read "Rural Road Maintenance Handbook", page 71 to know about *routine maintenance 1 - activity 1 - control vegetation: bush/tree clearing & grass cutting and disposal*. Tick (✓) in blank to make right selection .

brush/tree clearing, grass cutting and disposal

To ensure appropriate sight distance for traffic safety and good drainage.

Yes	
No	

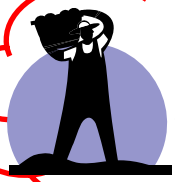
Not necessary to clear brush of more than 7cm in height

Yes	
No	

Manual.

Not uproot, cut grass to 2 cm height to prevent erosion

Yes	
No	



Disposal in authorized place.

Do not burn near forest !

Yes	
No	

It is not routine work. It is carried out every 3 years.

Yes	
No	

☞ Read "Rural Road Maintenance Handbook", page 72 and 75 to know about *routine maintenance 1 - activities 2 and 5 - culvert, side drain clearing*. Tick (✔) into blanks to make selection .

clearing culvets, side drain

For good drainage, avoiding water stagnation on surface or water penetration to sub-grade resulting in road damages

Yes	
No	

Remove debris/silt from side ditch

Yes	
No	

Clearing debris/silt inside culvert, at inlet and outlet

Put trash-rake at inlet

Yes	
No	

Disposal in appropriate place.

Do not let them be washed back into culverts, drains.

Yes	
No	

It is carried out only before and after rainy season.

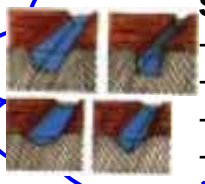
Yes	
No	

Read "Rural Road Maintenance Handbook", page 73 & 74 to know about maintenance activities of drains repairing. *Add more information* in blanks (.....) and *tick* (✔) to *make selection*.

renew & repair side drain

Yes	
No	

For good drainage, anti-erosion at high slope side drain.



Side drain shapes:
- trapezium
- .....
- .....
- .....

Types of drain paving:
- Rip rap
- .....
- .....
- .....

Yes	
No	

The works should be checked and carried out regularly.

note

Water is the main enemy of road. Water pond must be shed from the road as soon as possible by any means. Sufficient drainage should be checked, provided.
Costly anti-erosion building and lining to side drain should be carefully considered to apply only to appropriate drain sections.

Read "Rural Road Maintenance Handbook", page to know about routine maintenance 1 - activity 4 - repair damaged drain. Tick (✔) in the blank to make selection .

drain stabilization, anti-erosion

To reduce water velocity and avoid erosion, especially in steep drain in mountain area.

Yes	
No	

Anti-erosion types:
- Scour check by wooden stake.
- Scour check by stone pile.
- Drain, building & lining

Yes	
No	

Scour check by wooden stake:

Drive wooden stakes on drain surface in long section

Yes	
No	

Scour check by stone pile:

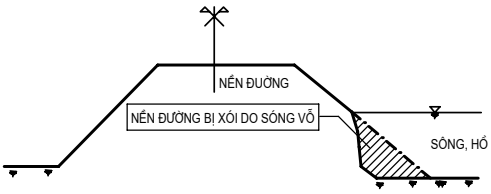
Pave rock/stone on drain surface in long section

Yes	
No	

It is carried out only when deep erosion happened .

Yes	
No	

Erosion usually occurs when embankment toe along river and/or lake is caved in by waves.
Read "Rural Road Maintenance Handbook", page 78 to know maintenance activities. Fill missing information into following figure:



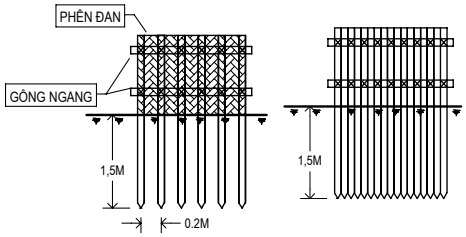
repair erosion at embankment toe

1). **Prepare filling materials:** use ……. or …… (be cut into pieces by spade).

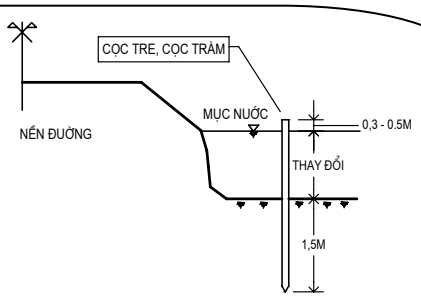
Sand must be packed in plastic sack if used

2). **Prepare piles:** use bamboo or cajuput piles with 7-10cm diameters

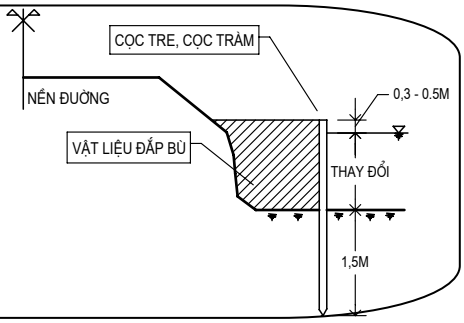
- The length of piles will be appropriate to drive to ….. metres depth.
- Pile interval is ….. cm, and it is smaller with strong flow
- Neohouzeaua/bamboo wattle should be prepared to place behind piles



3). **Drive piles:** Piles are driven into appropriate depth and pile tops should be at from..... cm to ……..cm above normal water level.
Piles are driven firmly in straight line by hand using wooden rammer.



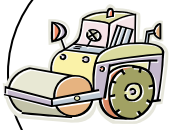
4). **Backfill soil:** Prepared soil is backfill behind driven piles after placing neohouzeanua/ bamboo wattle to level of pile top that is above normal water level from ..... cm to ……..cm.



Read "Rural Road Maintenance Handbook", pages 85,86 to know procedure of pothole filling - activity 16. *Fill into blank in following figure* to complete the procedure.

pothole on pavement

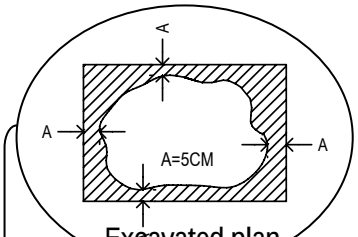
Bituminous pavement



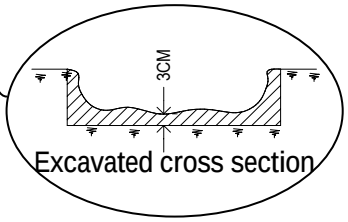
Routine Maintenance 2

Unpaved pavement

Routine Maintenance 1

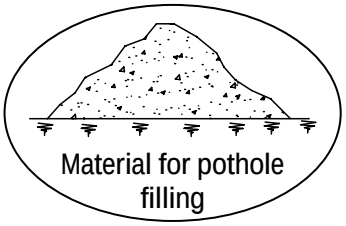


Excavated plan



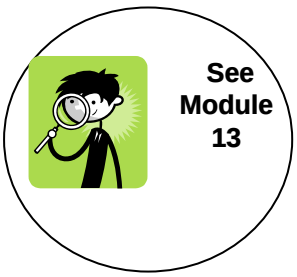
Excavated cross section

Step 1:
Localize and excavate.
……
……
……
……



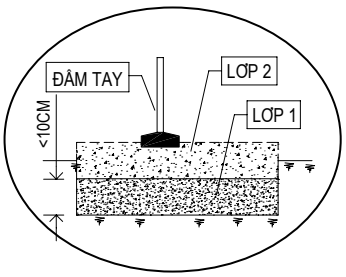
Material for pothole filling

Step 2:
Prepare material for pothole filling
Use the same material with existing pavement

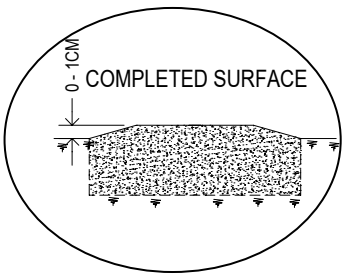


See Module 13

Step 3:
Layer & compact
- The thickness of a layer is not more than ……cm
- Compact using ……..



Step 4:
Finish surface
- To ensure even surface.
- Level of completed surface should be 1cm higher than existing pavement (to prevent second compaction)



Read "Rural Road Maintenance Handbook", pages 7 to know procedure of soft spot repairing - activity 17. *Fill into blank in following figure* to complete the procedure.

soft spot and local settlement

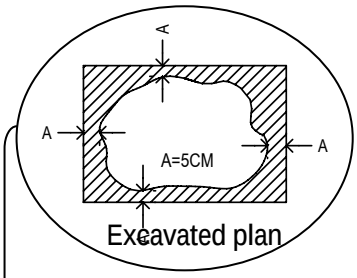
Common reason is water affects to make road subgrade weaker

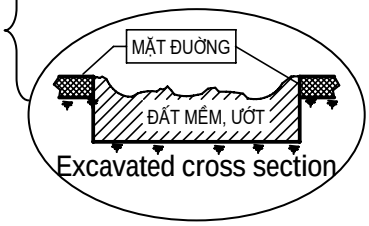
Study on water effect to find out the water source & solution

……
……
……
……

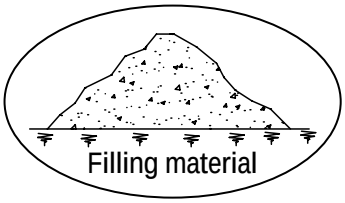
Treatment procedure

Step 1:
Localize and excavate all soft soil to hard soil layer.
……
……
……

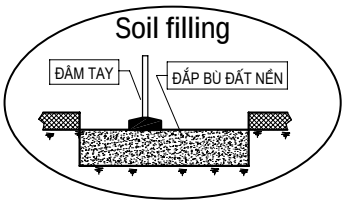




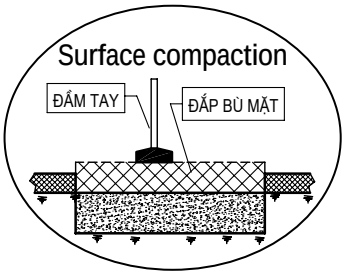
Step 2:
Prepare material for backfilling
- Soil: use the same soil with existing material
- Stone: ……..



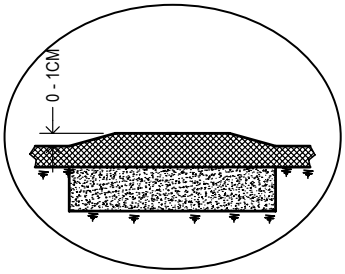
Step 3:
Layer and compact soil
- Layer thickness is not excess than .....cm
- Compact each layer using……
- ……..



Step 4:
Layer and compact pavement using gravel/crushed stone
- Layer thickness is not excess than .....cm
- Compact each layer using……
- ……..



Step 5:
Finish surface
- To ensure even surface.
- Level of completed surface should be 1cm higher than existing pavement (to prevent second compaction)



☞ *Read by yourself* the remaining contents of section 5.6 - sub-section 1 - from page71 to page 91 to know procedure of other activities of routine maintenance 1. *Summary* the procedure in following boxes.

6 Eroded embankment refilling

1.....
2.....
3.....
4.....
5.....

7 Repair erosion on fill or cut slope

1.....
2.....
3.....
4.....

10 Reshape and refill shoulder

1.....
2.....
3.....

11 Clean pavement surface

1.....
2.....

12 Clean bridge surface and clear bridge drain

1.....
2.....

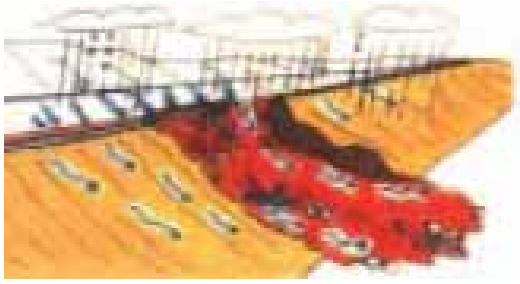
13 Clear the flow under bridge (opening)	1..... 2.....
14 Spray water on pavement	1..... 2.....
15 Clean traffic signs	1..... 2.....
18 Remove corrugation	1..... 2.....
19 Reshape road camber	1..... 2..... 3.....

n o t e

Maintenance activities should be carried out in accordance with known methods and procedures to ensure work quality

2. Realize right/wrong steps in working procedure of some main activities of Routine Maintenance 1

Bad compaction could result in embankment slip in rainy reason.
Read "Rural Road Maintenance Handbook", page 76 to know procedures of refilling embankment slip
Mark (X) beside wrong techniques in the left column and *connect* remaining correct techniques to the right pictures in the right column



a). Trim embankment to correct slope, plant grass on slope surface.

X b). It is the best to use slide soil for refilling.

c). Remove the slip using spades and dispose the waste materials to permitted place.

d). Reshape slope surface using grader

e). Clean out wet or loose materials. Drain away any standing water.

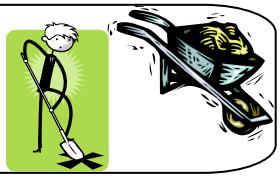
f). Water refilling soil to wet before compaction

g). Drain away underground water (if any).

h). Refilling embankment slip in submerged area should not be carried out until dry season

i). Refill and compact soil by layers from embankment toe with a 30 cm thickness

refill erosion on embankment slope

1 

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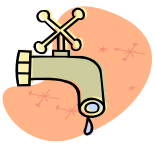
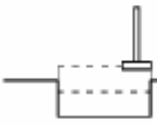
3 

4 

5 

Fill or cut slope erosion due to rain
Read "Rural Road Maintenance Handbook", page 76 to know the procedures of refill slope gully
Mark (X) beside wrong techniques in the left column and *connect* remaining correct techniques to the orders in the right column

a). Plant or turf grass on repaired surface.

X b). It is the best to use sand for refilling

c). Cut the gully into a wedge shape with straight edges and flat bottom which is easy for working on. If there are many gullies next to each other, combine all them into one repair.

d). Refill by layer from bottom using the same soil of embankment, compact by the refilled layers using hand hammer.

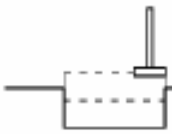
e). Compact using heavy roller.

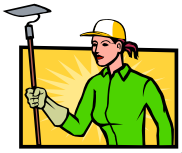
f). Trim slope surface by spades.

g). Should let erosion be continuously developed until partial embankment slip, then start repairing

refill slope gully

1 

2 

3 

4 

Kiem tra - Danh gia Assessment

1. Fill in following lines the procedure of repairing embankment toe erosion along river due to crushing wave

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.....

.....

.....

.....

.....

.....

.....

.....

Good | Not good

2. Fill in following lines the procedure and requirements of pothole filling on gravel pavement.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Good | Not good