

“Highway Maintenance”

Tushar Saxena*, Satish Kumar**

*M. Tech. (Pursuing) Department of Civil Engineering, Rama University, Kanpur

** Department of Civil Engineering, Rama University, Kanpur

ABSTRACT

A well-constructed road that's designed for a selected class would wish minimum maintenance. the character and extent of maintenance required would depend upon the degree of decay of the pavement, the foremost common road characteristic wont to assess this being the 'roughness'.

It is typically determined that the deterioration of a road is mirrored by its roughness over time beneath traffic. As roughness will increase, the road user prices rise.

Date of Submission: 20-08-2020

Date of Acceptance: 06-09-2020

I. INTRODUCTION

In order to arrange for road maintenance desires, it's necessary to stay an entire set of "as built" plans and records of all maintenance operations and observations. The as designed arrange ought to contain the following:

- (a). Complete job index
- (b). Complete history of project from strategy planning stage to construction
- (c). Photographic records
- (d). actual location and observations of any unstable conditions in relevance the road location
- (e). actual location of culverts and alternative evacuation options
- (f). Wet areas which will have needed further excavation and replacement with additional appropriate ballast formation materials
- (g). All major changes created to the initial arrange

Probably the foremost valuable tool for any maintenance program is that the information and skill gained by people playacting the upkeep. each effort ought to be created to retain competent, knowledgeable, and veteran people in these positions not solely from the point of view of instituting and death penalty an honest maintenance program, except for future road designing desires in addition.

In deciding on an applicable level of maintenance for a selected road or road phase, thought should incline to the number and sort of auto use and physiographic and environmental condition variables which can impact evacuation structures. A helpful guide to the categories and frequency of maintenance activities applicable for a given road. Various levels/degrees of maintenance operations are:

(i) Routine maintenance, which incorporates that of evacuation facilities.

(ii) Periodic maintenance/Patch repair

(iii) Special repairs/relaying/overlay provision

MORTH has planned to divide the upkeep programme for national and state highways into 3 levels – one, 2 and 3.

Level one represents the very best level of comfort and safety.

Level a pair of signifies the amount to that the road deteriorated when 2 years of service before any maintenance is enforced.

Level three represents the minimum level required to supply an affordable level of safety.

II. MAINTENANCE OF EARTH ROADS:

Since earth roads kind a serious share of rural roads, their effective maintenance is of nice importance. smart maintenance will preserve the weather and geometries and prolong their life.

The primary maintenance operation consists of maintaining the crosswise. Earth roads square measure identified to cause dirt nuisance in dry weather/summer; they're broken by rutting, largely longitudinal, attributable to the abrasion caused by traffic. they're conjointly broken by significant rains, which can cause crosswise rutting.

In the case of low-traffic rural roads, the routine/periodical maintenance of adding earth and rolling to bring the crosswise to the designed form is also done manually.

For alternative kinds of earth roads, a motor critic and a tangle with iron plates or angle irons square measure used for shaping the crosswise.

Dust nuisance is controlled by sprinkling water or employing a dirt palliative.

2.1 Maintenance of Gravel/Moorum Roads:

The maintenance operations square measure much kind of like those for earth roads – filling lost material, grading, dragging and addition of gravel, at the side of adequate rolling.

Re-gravelling is also done by adding a pair of 5-75 metric linear unit loose thickness of gravel once in 2 to five years, relying upon traffic conditions and also the periodic maintenance, additionally to environmental factors.

2.2 Maintenance of Water-bound Macadam Roads:

Un-surfaced water-bound macadam is extremely ordinarily employed in India.

The following defects arise attributable to the deterioration of a WBM surface:

Mixed traffic conditions have adverse effects, inflicting the road to be unclean in summer and slushy in monsoon.

(a) Rutting:

Ruts square measure repaired by scarifying and removing loose stones, filling with metal – part salvaged and part recent, adding screenings and gravel, and rolling with wetness. A 6 metric linear unit sand layer is wet.

(b) Pot-Holes:

Pot-holes square measure fashioned attributable to poor quality stones and native failure of subgrade. Patch repairs square measure done to fill the pot-holes in a very rectangular form with metal in a very manner kind of like the repair of ruts.

(c) Corrugations:

Corrugations lead to a wavy surface and cause discomfort. a range of things like inadequate and defective rolling, vibrations started by the gas tyres of vehicles and shock absorbers and conjointly those started by braking action contribute to the formation of corrugations. The excessive blindage material, if any, collected on the surface, ought to be removed by dragging and/or brooming.

(d) Ravelling:

Ravelling may be prevented to some extent by bright with an honest binder material and watering.

(e) Edge Damage: Since edge injury is caused by loss of shoulder support, repair ought to be done promptly.

Periodic renewals of WBM surface is needed, ideally once in 3-6 years.

III. MAINTENANCE OF BITUMINOUS ROADS:

In addition to straightforward causes like traffic, weather and ingress of water for the deterioration of earth, gravel and WBM roads, loss of volatiles, reaction of the binder material and

inadequacy of the specification and construction standards conjointly may be the explanations for distress and disintegration of Bituminous pavements. Depending upon the degree of decay of the route facility, the character of the upkeep operations for Bituminous pavements might be:

(a) Patch Repair:

This consists of mend of pot-holes and localised failures, and will be up to regarding twenty five per cent of the expanse annually. For mend, sand intermixture, open-grade intermixture, dense-graded intermixture, or penetration mend is also adopted.

(b) Surface Treatment:

The aim of surface treatment renewal of the surface course once patch repair becomes uneconomical; it's going to also be to enhance skid resistance once the surface is tired badly. normal specifications for tack coat, prime coat and seal coat, together with surface dressing/premix carpet ought to be used.

(c) Resurfacing:

This is concerned once the pavement has deteriorated badly. once the pavement is of inadequate thickness, AN 'overlay' of adequate thickness ought to be designed and provided.

A brief description of the defects, symptoms, probable causes, and attainable treatment is given within the Table ten.3, extracted from "IRC; 82-1982: 'Code of follow for maintenance of Bituminous surfaces', Indian Roads Congress, New Delhi, 1982": Defects, Symptoms, Causes and Treatment of Defects in Bituminous Surfacing's.

IV. MAINTENANCE OF CONCRETE PAVEMENTS:

A cement concrete pavement desires little maintenance if it's well-designed and properly created. In fact, this can be thought of to be the foremost vital advantage that offsets the high initial price. However, defects square measure seemingly to occur thanks to ingress of water, particularly through ill-maintained joints and cracks, inadequate pavement thickness and poor craftsmanship.

Cracks:

Appearance of cracks, which can be shrinkage cracks or deformation cracks thanks to temperature changes.

Cracks that seem within the corner and edge regions square measure known as 'structural cracks' as they're thanks to the excessive stresses caused by wheel hundreds. They indicate inadequacy of the pavement thickness and may be viewed seriously and treated otherwise.

Hair cracks don't seem to be harmful, however medium and wide cracks enable water to run through and cause progressive loss of subgrade support. Such cracks ought to be stuffed up with

low-viscosity epoxy grout, when clean up the cracks of mud. compressed gas is employed for effective clean up. the fabric is flat-top up with sand or fine combination chips to forestall the disturbance of the fabric beneath traffic.

Joints:

Joint maintenance consists of replenishing lost sealing material, removal of deteriorated joint filler, and introduction of contemporary filler material. The sealing material is then poured to AN excess height of regarding three millimetres and sand wet for it to be compressed by the traffic to the extent of the pavement surface.

Patch Repair of Slabs:

Sealing, spalling, depressions and irregularities will occur in a very block domestically. Immediate mend of such defective slabs will arrest any deterioration.

Premix Bituminous materials square measure unremarkably used for this purpose; however, they are doing not offer a satisfactory result. the simplest materials square measure synthetic resin mortars and concrete for such patch repair work. the edges of the block to be patched are cut, created vertical, and contemporary concrete is arranged and tamped; the square measure as are typically fabricated from regular geometrical shapes like rectangles.

Mud-Pumping:

When water gets collected within the subgrade, serious shaft hundreds cause ejection of mud through joints, cracks and edges. This development is usually called mud-pumping and processing. once this can be discovered, defective joints and wide cracks ought to be refilled and sealed.

To prevent any injury and repeat, grouting of the block is finished through holes trained in it; the grout is of cement mortar (1:3.5 mix) or of Bituminous material (the latter is most popular since it's effective in filling the void areas between the block and therefore the subgrade), and raising the block to the specified level. This method is named mud-jacking and is popularly employed in advanced countries.

Restoration of Anti-Skid Surface:

When the surface becomes sleek and slippery, anti-skid surface is fixed by cutting grooves by shaping machines or by grinding machines.

Crack Repair:

A mend mixture of epoxy mortar is stuffed and compacted when break off the world and

cleanup it totally by mistreatment compressed gas. this can be adequate only if the crack depth isn't over third of the depth of the block.

However, once the crack extends virtually to the complete depth of the block, cross-stitching with inclined tie-bars or stapling with U-bars is also adopted; the previous is shown schematically.

V. MAINTENANCE MANAGEMENT SYSTEM (MMS):

In view of the many steps and factors concerned within the maintenance operations of highways, systems approach is taken into account fascinating to evolve an economical maintenance programme for any route network.

'Pavement Management System' has been developed to facilitate optimum resource allocation for maintenance.

The elements during this are:

1. Basic road information bank
2. Pavement performance model
3. choice of maintenance levels
4. Evolving priorities for maintenance (renewal and overlay) for a given budget.

Several organisations have developed their own MMS packages and enforced them in their several countries.