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ROAD MAINTENANCE AS A SAFETY MEASURE TO MOTOR VEHICLES IN NIGERIA: MECHANICAL ENGINEERS' PERSPECTIVE

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ABSTRACT

The maintenance of a road involvers the upkeep of the road and its related features such as ditches, culverts, bridges, shoulders, verges etc. in a condition close to its initial or desired condition. The sole purpose of road maintenance is to keep the road whether new or old in a safe and satisfactory condition for all traffic at all time. The paper further discusses the role of civil engineers in road maintenance and the role of mechanical engineers in motor vehicles maintenance. It is thus concluded that road maintenance in Nigeria roads brings safety to lives of both human and vehicles. By so doing, it helps to lower the cost of operating vehicles on the road. The mechanical engineers basically advised that road maintenance is an option for long term vehicles operations on Nigerian roads.

Keywords: Road networks, Maintenance, Safety, Mechanical Engineers, motor vehicles.

1. INTRODUCTION

A good network of well-maintained roads brings along with it increased prosperity. It aids development by facilitating and improving access of people to jobs; education, health care and other social services. A road transport system that is effective and efficient lowers input prices, hence production cost and carloads to greater economic well-being.

According to mechanical engineers advice, road maintenance reduces the cost of vehicles maintenance in Nigerian roads. They went further to say that the passengers on road, the vehicles and users are safe directly or indirectly if the roads are highly maintained.

In considering the safety of road, some of the common factors include the following:

- The design and construction standards of the roads.
- The type and state of the surface and drainage system of the road.
- The provision of the road furniture, such as traffic sign; guard rails, kilometre posts etc.
- The control of vehicular and pedestrian traffic on the road and
- The existence of pavement markings, street lights, road bend signs etc.

Road networks are by nature spread over a wide geographical area and their condition is changing continuously as a result of the effects of traffic, climates and the environment.

To keep safe the road networks, then engineers especially civil and mechanical are involved such as the civil engineers are deeply involved in the design and construction standards of the roads state/type of surface and drainage systems etc, while the mechanical engineers plays the roles of the advising on the control of vehicular movement and pedestrial traffic on the roads as well as the road bend signs/traffic signs etc on the effective and efficient movement on Nigerian roads. Thus, mechanical engineers are seen to be safe guards to vehicle users on the roads.

However, for the purpose of brevity of this paper, we shall discuss the following concepts of maintenance, road maintenance, safety, mechanical engineering, engineering Operations in road maintenance, classification of road maintenance, purpose of road maintenance and impacts of road maintenance on safety and finally, problems of road maintenance.

Conceptual Discourse:

We shall have a conceptual discourse on the following concepts:

a) **Maintenance**

Maintenance in this context of road, refers to the upkeep of the road and its related features such as ditches, culverts, bridges, shoulders, verges etc, in a condition close to its initial or desired condition.

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The purpose of maintenance is to keep a road, whether new or old in a safe and satisfactory condition for all traffic at all time.

b) **Road Maintenance**

The term ‘‘road maintenance’’ comprises several engineering operations depending on climates; traffic and design standards in order to preserve the road. Road maintenance is the safe keeping of the entire road and its related features such as bridges, surfaces, ditches, culverts, verges etc. by so doing, the life of the road will not only be prolonged but also the day when reconstruction becomes inevitable will be postponed.

In addition; road maintenance helps to reduce the cost of operating vehicles on the road.

c) **Safety**

The concept “Safety” according to Hornby (2001) means being secured, protected, uninjured, out of danger and not involving risk. Some others say safety means to be free from danger or risk while on job.

According to International Labour Organization (ILO-1984), safety is a means to preserve the occurrence of accidents and to increase productivity. This involves the elimination of hazards that are open to employee and the production line.

Another school of thought opines that safety is the state of being safe, the state of not being dangerous, the ability to keep or make something safe.

d) **Mechanical Engineering/Engineers**

This involves the production; transmission and use of mechanical power. Mechanical engineers design; operate and test all kinds of machines. They develop and build engines,that produce power from steam, gasoline; nuclear fuels and other sources of energy.

The also develop and build a wide variety of machines that use power including air-conditioning /heating, and ventilation equipment, automobiles, machine tools, and industrial processing equipment. Mechanical engineers are involved in every phase of the development of a machine, from the construction of an experimental model to the installation of the finished machine and the training of the workers who will use it.

Mechanical Engineers work in many industries such as power generation, public utilities, transportation and all types of manufacturing. Many Mechanical engineers concentrate on research and development because new types of machinery are continually in demand. Mechanical engineers are involved in almost every other branch of engineering whenever a new or improved machine, device or piece of equipment is required.

Engineering Operations In Road Maintenance

Engineering Operations in road maintenance include among others the following:

a. The control of vegetation adjacent to the road.
b. Cleaning of ditches; culverts and turn-outs.
c. Re-installation of shoulders and/ verges.
d. Removal of corrugations of earth roads by grading.
e. Filling of pot holes and patching of cracks.
f. Bituminous surface-dressing or seals for pave roads.
g. Re-gravelling of earth roads and cutting of side drains.
h. Replacement of damaged roads furniture, such as traffic signs.
i. Repairs of structural members e.g. expansion joints.
j. Repainting of pavement markings.

Mechanical Engineers’ Perspective

Mechanical engineers are eyes to the vehicle users on the road. They both involve in repairing the vehicles used on the roads. More so, they also involve in saving users of the roads especially vehicles drivers on the right counseling on how to use the vehicles on the road, thereby giving some road safety tips including the usage of vehicles engine oil or fuel in right quality and right quality always on the road to avoid accident.

Mechanical engineers on the other hand, counsel the government and others on the relevance of road maintenance which will reduce the cost of mechanical repairs of the vehicles (ie keep the vehicle on long term usage without spoils) as well as secures lives on the road without accidents.

2. CLASSIFICATION OF ROAD MAINTENANCE

The best known functional classification of roads maintenance operations are:

1) **Routine Maintenance**

This kind of maintenance on road take place from time to time on the approval of the appropriate authority and as to be done by civil engineers.

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2) **Periodic Maintenance**

This is a form of road maintenance that is usually done in period usually every two- five years road maintenance.

3) **Special Maintenance**

This category of road maintenance is being accomplished on special request on special areas which are overdue for maintenance. It is approved by the authority on special request or demand by the users.

Purpose Of Road Maintenance

The purpose of road maintenance is a follows:-

- It reduces the rate of road deterioration.
- It lowers the cost of operating.
- It keeps the road open on a continuous basis for users.
- It also includes the process of enhancing the environment of the road itself including the immediate surroundings.
- It improves safety of vehicles and heavy duty equipment.
- It avoids and reduces the high rate occurrences of road accidents.
- It fast-tracks easy and smooth transportation system within the economy and equally promotes economic activities.

Impacts Of Road Maintenance On Road Safety

Under normal circumstance, a well-maintained road promotes safety, while inadequately maintained road may contribute to road accidents particularly for users who are not familiar with current positions of the roads. Evidence abound however to show that even on a number of newly-built roads of high design standards, a lot of frequent accidents still occur. Having said that any way, let us look at the impacts of road maintenance on road safety as explained below:

a) Vegetation Control

If the vegetation adjacent to a road way is overgrown, there are chances that the effective width of the road will be reduced particularly where the road has no verge or shoulder, and sight distances will be impaired. The effect of these on safety will be grave depending on the type and function of the roads. For example, on a single carriage way rural road with high traffic of heavy goods vehicles overtaking by drivers of light vehicle can be very hazardous if sight distances are not adequate.

b) Drainage

A road is as good as the quality of its drainage system. Even when a road surface is free-draining, but the side ditches and tunnels are blocked or full of debris, flooding may result and where a culvert is not functioning properly, excess run-off may lead to serious wash-out and road wash closures. The situation becomes grave in raining weather at nights, for unsuspecting drivers.

c) Shoulders and verges:

Worn out or badly eroded shoulders pose serious danger to the road itself and users where temporary stops or detours have to be made.

d) Corrugations on earth roads:

Apart from discomfort, corrugations on the roads can lead to serious accidents most especially when speeds are excessive, as vehicles may veer off the road into ditches or embankment stopes. Added to this of course is the effect of wear and tear of the vehicle, as a result of repeated vibrations.

e) Potholes and Cracks:

The tendency exists for many motorists to try and avoid potholes when perceived early. Quite often than not, the attempt at dodging the potholes may lead to collision between oncoming vehicles or even lone accidents like somersaulting. And where potholes are not patched early they become deeper, wider and where unsuspecting drivers run into them serious accident may occur, coupled with possible severe damage to the vehicles.

f) Re-gravelling of earth roads:

When the surface of an earth road is worn out, travel times become higher and journeys are tiresome and frustrating. This may lead to desperation and possible accidents.

g) Resealing Of Paved Roads:

When the surfacing of paved roads become overdue for resealing, such roads pose a lot of danger to road user because quite often than not a lot of defects occur and constitute potential black spots. The road maintenance work therefore reseals the paved roads, then accidents are mostly reduced.

h) Maintenance of roads furniture:

Damaged roads furniture like guard-rails may constitute obstacles on the road and can lead to accidents. The same is true of defected signs or kilometer post, because in an attempt to read a road sign or search for one a motorist may lose concentration on the road thereby causing accidents to others and even getting involved in a lone accident.

i) Bridge Repairs:

Damaged structures members such as expansion joints, kerbs and railings pose serious threat to motorist. Precisely, the road maintenance on bridges prevent accidents.

j) Pavement Marking:

Faded markings on the road constitute hazard instead of promoting road safety.

The impact of road maintenance on safety in urban areas is very striking because of social environmental factors. Maintenance tasks are more demanding and more difficult to execute. Perennial flooding of streets, willful contravention of building and highway regulations, bad social habits and poor disposal of refuse are some issues impeding effective maintenance of roads in urban areas and consequently, low levels of safety.

3. PROBLEMS OF ROAD MAINTENANCE

Constraints in the way of effective maintenance of roads include among others the following.

a. Lack of funds: Government always allocated low budget for road maintenance primarily because of low priority accorded to maintenance efforts.
b. Lack of Qualified Personnel: Qualified personnel at all levels are not readily available and the few that are trained are difficult to retain because maintenance is seen as a “thankless job” and non-glamorous.
c. Logistics: Maintenance operations are generally small and widely scattered, making them difficult to organize.
d. Non-availability of Materials: Provision of fuel, spare parts and road materials are often in short supply, or are difficult to come by.
e. General Apathy: There is the erroneous belief that once a road is built, the road should stake of itself. Government are more interested in building new roads instead of maintaining effectively what has been built.
f. Over Loading of Vehicles: It is well known that the magnitude of the axle loads of heavily goods vehicles are generally far above what the roads are designed for, most especially the heavy duty trailers as well as carrying heavy loads which overweighs the strength of the road.

4. CONCLUSION AND RECOMMENDATIONS

In our discourse so far, road maintenance as a safety measure to motor vehicles: Mechanical engineers’ perspective has done exhaustively that road maintenance in Nigerian roads brings safety to lives of both human and vehicle’s long time usage. In order to further enhance higher level of road safety through road maintenance activities, it is necessary that the impact of road maintenance measures discussed should be kept, then engineers must be personally involved in all control test associated with road construction works.

Mechanical engineers too should not relent in advising the vehicles users to properly put their vehicles in good order as worthy of operating on the road. Again, mechanical engineers should maintain standard quality in repairing such road operating vehicles (that is replacing any engine spare parts with quality maintenance efforts at all times).

Government should also allocate and provide sufficient funds for road maintenance while steps are taken to enforce financial accountability and cost accounting. The training of all personnel, both senior and junior engaged in road maintenance should be intensified. The general public need to be awakened to the importance of road maintenance. Road maintenance is a case of sustainable development as well as a catalyst for national development.

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