THE QUESTION OF ACCESS ROADS AND THE QUARRY INDUSTRY

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SUMMARY

As part of a comprehensive study of the local Quarry Industry, a detailed investigation of the existing conditions of the "Access Roads" which lead to the nation's quarries has been undertaken. The main areas requiring urgent attention are identified and recommendations for both short-term and long-term improvement are presented.

1.0 INTRODUCTION

The Quarry Industry today forms the foundation of a rapidly expanding Construction Sector. Quarry products such as boulders, crushed gravel, sand, pitrun gravel, porcellanite, plastering sand, oil sand, clay and fill are at present under great demand. There is a constant traffic in quarry products along all of our highways. They have as diverse destinations as the construction site of multi-storeyed buildings going up in Port-of-Spain and San-Fernando, the East-West Corridor Super Highway, the housing projects now mushrooming throughout the island or the more modest construction sites of the individual erecting a dwelling or a retaining wall.

Thousands of cubic metres of quarry material are being removed from quarry sites everyday. The first stage of this transportation process, the transport of material from the mining site to the point of entry on to the main paved highways, is possibly the most difficult and the most neglected. This section in the transport chain is the subject of this article, and has been designated an ACCESS ROAD. The author has not located this phrase in any authoritative classification but has found that it enjoys considerable usage within the agricultural sector. We therefore propose to adopt its usage in the context of the quarry industry.

ACCESS ROADS range from less than one kilometre in length in some cases to as much as five kilometres in others. It is the submission of the author that average transportation cost per cubic metre per kilometre along these ACCESS ROADS is several times higher than the relative average cost for paved highways. The added expense is eventually passed on to the purchaser and contributes to the current inflated cost of quarry products.

2.0 EXISTING CONDITIONS - THE PROBLEM

Transport along ACCESS ROADS during the dry season is difficult, dangerous and time-consuming, to say the least, while during the rainy season many of them become impassable and subject to rapid deterioration with the slightest downpour. The commonest reply that the author has elicited from truck drivers when questioned as to the most serious problem faced on ACCESS ROADS is "rain and flooding". But to see the problem as arising from uncontrolled water alone is to fail to appreciate not only the enormity but the many-faceted nature of the problem. The author suggests that in order to fully understand the true nature of the problem we must look much more carefully at prevailing conditions. The author sets out to identify and then moves on to discuss in brief several of the principal areas of interest.

2.1 Non-Design

We must begin by noting that ACCESS ROADS through forested areas were never in fact designed according to any known engineering procedure. They were merely laid down as occasion demanded or in many instances they evolved, if we could use the term, from simple animal tracks used by hunters, gardeners and woodcutters. At best they were agricultural roads with an overlay of broken rock and pitrun gravel taken from any nearby quarry. Compaction was achieved over a long period and mainly as a result of the traffic itself which over the years had cause to use it. The results of random site borings for ACCESS ROADS in North and Central Trinidad have revealed a pavement thickness of 10 to 20 cm of pitrun gravel from the Melajo or Guanapo deposits. Borings for ACCESS ROADS in South Trinidad have indicated similar pavement thicknesses of San-Fernando gravel from the Naparima Hills. In Tobago ACCESS ROADS have been constructed with similar pavement thicknesses of river gravel of volcanic origin, broken coral fragments or "rotten rock". Underneath this layer is to be found the virgin soil indigenous to the area.

In a few areas are to be found an underlying layer of yellow limestone boulders from the Central Range. These roadways usually constitute the stronger ACCESS ROADS. Today few ACCESS ROADS are paved with anything beyond a surfacing of pitrun gravel.

2.2 Drainage

One can safely say that, for all these ACCESS ROADS, drainage is poor or non-existent. In most cases there are no drains along these roads. Where roadways are at a slightly higher elevation than the surrounding lands there is some incidental drainage. Where this occurs, a natural water course might have developed either on both sides of the road or in certain instances only along one side. In some cases earthen drains have had to be cut to take away surface water. Invert (Vee) drains, curb and slipper drains or concrete box drains are seldom if ever to be found. Often the ACCESS ROADS pass along or across a river bed. It has been observed that the bridges which are to be found along these roads become dangerous or impassable during the flooding which may occur with the slightest downpour.

The result of this poor or neglected drainage factor is a roadway that is covered in water during flooding of nearby rivers or which collects water on its surface after the slightest shower. Large "pot holes" are the logical condition as the water destroys any

stability that may once have existed in the surface of the roadway. Erosion by uncontrolled flood waters results in drastic and continuous deterioration of the surface as well as of the underlying layer.

2.3 Narrow One-Lane Roadways

ACCESS ROADS are usually very narrow and are often only able to accommodate single lane traffic. Vehicles approaching from opposite directions must wait or reverse to some point where the width of the unpaved shoulder permits two vehicles to pass abreast. Overtaking is often impossible and therefore the traffic is severely impeded by animal drawn carts, wheel tractors and many types of slower traffic. This situation inhibits driving and causes considerable delays in transport time and consequently the number of possible trips per day that could be made by any one trucker.

2.4 Structural Strength

We have said before that ACCESS ROADS were never designed according to any code of engineering practice. They have therefore evolved with road gradients as well as vertical and horizontal curves that themselves make traffic movement dangerous as well as irksome. Highway geometry has not been an input for consideration where ACCESS ROADS are concerned, and has played little or no part in the development of this, as we shall see, very important portion of our roadway system. Initially they were hewn from the hillside or won over from the swamps and the forest and primarily only with the thought of human and animal traffic, possibly a bull cart, or a loaded donkey. Today both the demands of forest work and those of the agricultural sector, have ushered in a new era in which the animals have given way to heavier and larger machines. These have now introduced increased traffic, greater loads and new types of wheel stresses. These roads, initially meant only for the feet of animals and those of man, had now to take the metal grinding of firstly the animal drawn carts and later on the tractor and track excavators.

Little or no new structural changes have ever been effected. Today these same roads must permit movement of the now familiar Long Trailers transporting tractors and other heavy equipment. Wide vehicles like the D9 Tractor and the devastating wheel loads of the 26 cubic yard Dumper Trucks are the latest to carry on the assault. The consequence is accelerated deterioration and collapse.

2.5 Maintenance

Maintenance is very poor if and when it does exist. It is very infrequent, inadequate and often incomplete. Sporadic cutting of the grass growing along the roadway is often all that is ever done. Overhanging trees are seldom cut, and broken branches remain strewn along the roadway until they are finally pulverised by the traffic or are pushed along by subsequent flood waters or by the traffic itself. This neglect of maintenance is not surprising when viewed against the backdrop of the existing generally poor maintenance programme which is to be observed with respect to our high grade or principal highways.

2.6 Turnabout

All the quarries, without exception, have very poor turnabout facilities. This results in undue delay and damage to vehicles. Much truck sticking occurs on the quarry site itself. Trucks simply do not have enough roadway or turnabout, and incoming trucks often obstruct and are themselves obstructed by the outgoing traffic. The general layout does not usually facilitate stockpiling and loading of material. Both these exercises obstruct the free flow and often they cannot be carried out simultaneously. Plant management and layout leave much to be desired.

2.6 Bridges

This area requires special and separate consideration. We note that most ACCESS ROADS criss-cross several rivers, streams and gulleys and this situation applies both in Trinidad and Tobago. We must therefore expect to find that ACCESS ROADS often include several bridges. Moreover, as we have said before, the road surfaces themselves were never designed or constructed to carry the present wheel loads far less the volume of traffic which they must now accommodate. One would therefore hardly expect that the bridges along these roads would be able to cope with these new demands. The condition of the bridges presents serious difficulties and dangers. Many of them have at some time before collapsed and have since been patched and kept in a state of precarious use. Occassionally they are covered by flood waters which make them impassable.

So much for the bridges, but there is a great deal to say about the countless crossings where bridges should in fact have been constructed. Many are badly in need of maintenance and replacement of rotted wooden members. Steel members have become so rusted and in need of cleaning, painting or replacement that safe passage over

them cannot be guaranteed. Bridges have been known to collapse under the load of tractors on their way to quarries. It would appear that relevant authorities are not aware that these bridges are expected to sustain the most severe loading conditions.

2.8 Landslides and Retaining Walls

Landslides have always plagued our rural roads, partly because of little or poor drainage and partly because of unstable cuts and a natural proneness of the land in certain areas to landsliding. This has made many ACCESS ROADS both in Trinidad and in Tobago impassable after a heavy downpour.

Remedial work would involve road realignment in many cases and the construction of retaining walls. Both of them, it is anticipated would be very costly but such costs must be seen as an integral part of upgrading and strengthening of the entire system of ACCESS ROADS to our quarries.

3.0 OWNERSHIP, JURISDICTION AND RESPONSIBILITY

ACCESS ROADS, as we have said before, are generally rural in location. They may be part of state lands or they may be on private lands. Sometimes the same ACCESS ROAD may traverse both state and private lands. This brings us to the question of jurisdiction and responsibility for construction and maintenance.

In Trinidad and Tobago there are two separate public authorities bearing responsibility and control for roadways and attendant facilities such as bridges, drainage and road reserves. These are Central and Local Government, the latter including Municipal, Borough and County Councils. However, although personnel might be different, funding is from one source - Central Coffers. Taxpayers money through budget allocations constitutes the only source of funds for road building, since Local Government no longer has the power to raise money for this purpose.

This question of jurisdiction and responsibility depends partly on location and partly on current official classification. As said before, whilst the term "ACCESS ROADS" has much currency among agriculturalists, politicians and persons involved in the quarry industry, it has not found its way into the recent classification of highways made under the recent Highways Act of 1970 contained in the Highways Order of 1975.

Here highways are classified under the following heading and then listed:

(a) Main Roads
(b) Special Roads
(c) Secondary Roads
(d) Local Roads
(e) Streets
(f) Development Roads.

The classification "Development Road" is defined as:

(a) A trace, trail or Crown Trace constructed for the purpose of agricultural or other development;
and
(b) is classified as such by Order made under this Act.

This is the one most likely to contain such of the ACCESS ROADS as have actually been listed. Many have escaped cataloguing and thus the problem of pinpointing where responsibility lies for construction and maintenance of ACCESS ROADS is compounded.

It is useful at this point therefore, to trace the historical development of jurisdiction in relation to highways. The Roads Ordinance (now replaced by the Highways Act 1970) in Section 4, provided that all public roads were vested in the Crown. "Public Road" was defined as Land dedicated to the public use whether expressly, implicity, by user or by Proclamation. Streets within Boroughs were excluded. Section 5 (i) of the Ordinance provided that the Director of Works and Hydraulics (an office now abolished and replaced by the designated Minister) was responsible for care and repair of all public roads other than "local roads" within the district of the then extant Local Road Boards.

Section 6 of the Ordinance provided that the provisions of the Ordinance with respect to public roads were to be applicable to tracks, traces and byeways which could be directed to be maintained in good order. (As a result of this provision the old legal regime was more likely to embrace ACCESS ROADS than the Highways Act).

In 1952 the County Councils Ordinance abolished the Local Road Boards and provided for the newly established County Councils to take over all the functions of the Local Road Boards. These Local Road Boards had had the facility of levying on road users within their districts to finance their operations.

The recently enacted Highways Act has provided a new regime with respect to roads or highways which is the generic term used. The scheme of the Act is:

(i) Classifications;
and (ii) Allocation of area of responsibility to the relevant "highway authority".

The Act provides that the Minister (at present the Minister of Works, Transport and Communications) is the Highway Authority for Main Roads, Special Roads and Secondary Roads while the Municipal Council is the Highway Authority for all Streets and Development Roads, whether these are maintainable at public expense or not.

It is the submission of the author that because of the present importance of the quarry industry, the cost of repair and construction of all ACCESS ROADS and their appurtenances can only be effectively handled and financed by the Central Government, regardless of whether the ACCESS ROAD passes through private or state lands. This submission is appropriate and relevant whether the future will see the quarry industry preserve its present mixed economy ownership i.e. one of state and private ownership or whether the Government will opt for nationalization of all quarries as part of its general strategy of development of this sector of the Economy.

The cost of widening these ACCESS ROADS or the cost of properly constructing and surfacing them coupled with the cost of construction of a proper drainage system and the erection of sufficiently strong two-lane bridges capable of supporting the wheel loads created by the new 26 cubic yard Dumper Trucks are separately and collectively a prohibitive prospect to the individual quarry owners. Any of these single items may be enough to make quarry operation unviable. It should be clear to all that ACCESS ROADS, even if they are not to be asphalted, must be structurally sound and stable engineering-wise. The author suggests that for this reason the state should control and assume jurisdiction since it would best be able to direct the necessary controls and enforce safe design specifications and even statutory requirements to protect the lives of persons who earn a living from this industry and are constantly being exposed to its risks with little or no recourse or protection. Moreover the number of river and gully crossings and the long spans would immediately reduce, if not rule out, the economics of further exploitation of a quarry deposit by private owners or operators, should they have to bear the cost of new bridges.

4.0 CONSEQUENCE OF THE PRESENT STATE OF ACCESS ROADS

The most frequent problem plaguing transport contractors at present is breakdown of vehicles caused by broken springs, broken drive shafts, blown out tyres and other malfunctions. These problems are compounded by the difficulties of effecting repairs due to the state of the ACCESS ROADS. Again, the transport contractor is plagued by frequent overturning of loaded trucks, the consequent loss of vehicles or the prohibitively high cost of salvage, wrecking and repairs. We must note that, because of the high risk to the truck and the driver, as well as the already-listed difficulties, travel along these roadways is extremely slow.

The additional cost of trucking attributable to delay must be added to the high cost of repairs, and the rapid general devaluing of vehicles using these ACCESS ROADS must be absorbed by the transport contractor who in turn passes it on to the customer. The consequence is that a cubic metre of aggregate which at the quarry site may cost $20.00 (as a result of state intervention and statutory restriction) may cost the customer as much as $40.00 or $45.00 on a site less than ten miles away from the quarry deposit.

5.0 OBSERVATION AND RECOMMENDATION

At this juncture, if the quarry industry is to develop in phase with and is not to impede national development in general and that of the construction sector in particular, we must undertake a serious review of the present state of our ACCESS ROADS and set about creating a strategy for dealing at a national level with the problem. With this in mind it is submitted that a national survey and appraisal of all existing ACCESS ROADS serving the quarry industry is urgently needed. This should first identify all ACCESS ROADS, attempting a classification based on volume of traffic, anticipated wheel loads and ascribing some form of grading in importance to the particular roadway. This would lead to a type of priority listing viz-a-viz reconstruction and repairs. After this exercise has been completed and evaluated it should be clearly pointed out which of the ACCESS ROADS needs immediate attention.

Generally all these ACCESS ROADS need widening, but based upon the preliminary study presented in this paper, a realistic assessment would show which could be widened to accommodate two-lane traffic or which although widened could be retained as for basically single-lane traffic.

An immediate programme for the straightening of dangerous corners should be undertaken but of primary and urgent importance is the question of upgrading surfaces and improving pavement stability by increasing pavement thickness together with improved compaction. At this point a drainage programme cannot be over-stressed. It may be too costly to construct concrete box drains throughout the length of the roads but, along with widening, properly constructed earthen drains with concrete underground cylinders at drain crossings would go a long way. Serious research is needed into the construction and maintenance of our rural roads in general and of our unpaved and heavily loaded ACCESS ROADS in particular. Special attention should be paid to the study of the use of individual local aggregates in road building. Many of these roads immediately require scarrifying and laying down of a proper subgrade and base course.

While these structural complements are necessary our engineers must begin to use scientific design criteria for constructing new ACCESS ROADS as well as improving existing ones. These must include suitable subgrade and sub-base materials, optimum pavement thickness, the use of grading curves for aggregates used in pavement construction, as well as the use of Portland cement, pozzolanic material, bitumen and asphaltic additions to achieve greater strength, surface durability, impermeability and surface durability.