Feasibility Study On Upgrading Shwebo-Myitkyinar Road

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Abstract: *In developing country, transportation is the only made which would give maximum service to the public. Upgrading project is essential for the development of regions. Shwebo-Myitkyinar road is national highway project for connectivity between Shwebo town and Myitkyinar town and 168 miles long. By providing a better infrastructure facilities like easy and economical conveyance in developing regions, he overall social and economical development of region can be possible and upgrading. The upgrading project leads transportation sector development for developing country like Myanmar. Upgrading Shwebo-Myitkyinar becomes Government Schemes of regional development. Using available materials near upgrading road is the important factor to reduce initial investment. Maximum use of local resources tend to local employment and economy saving for construction cost as well as easy procedure and easy transportation. Shwebo-Myitkyinar road is half flat region and half mountainous region. The road near Myitkyinar region is plenty with local material to upgrade existing road. Shwebo region is flat region and there are no quarries to pave the existing road. Materials are transported from far away from the project area Feasibility study of upgrading Shwebo-Myitkyinar is the major project for boarder trading from middle part of Myanmar to China. The main objective of the study is to upgrade the existing road by using local material available near the road and to find out solution for the use of local material properties in construction of pavement layers.*

Key Words: *Transportation, Upgrading, Pavement, Material.*

1. INTRODUCTION:

The purpose of a pavement to upgrade is to carry the traffic over design life. The design life is concerned with pavement materials used in design .The adequate thickness is to ensure that traffic load are distributed over and area and subgrade are within the strength of the materials. The strength of materials is related the performance of the pavement over its extended life. The pavement deterioration is the action of pavement materials and traffic load passing over the pavement. The pavement will suffer structural deterioration under progressive traffic load .The materials of the pavement also suffer not only traffic but also environmental effects and nature of the subgrade materials. The materials in flexible pavement is very sensitive to pavement performance. In this study, the local available materials within the region is tested under specification and the properties of the aggregate materials are analyzed to design the upgrading structure. First, the subgrade materials are tested section by section and also the sub base, base materials. The availability of material is directly proportion to the feasibility of upgrading the existing road. The indicator of upgrading process may result from material properties and material availability for pavement design. Material characterization involves laboratory test on surface, base, sub base and subgrade materials.

2. METHODOLOGY:

The methodology adopted for upgrading Shwebo-Myitkyinar road has been limited to American Association of State Highway and Transportation Officials (AASHTO) 1993 design and the previous design of Road Note 31.

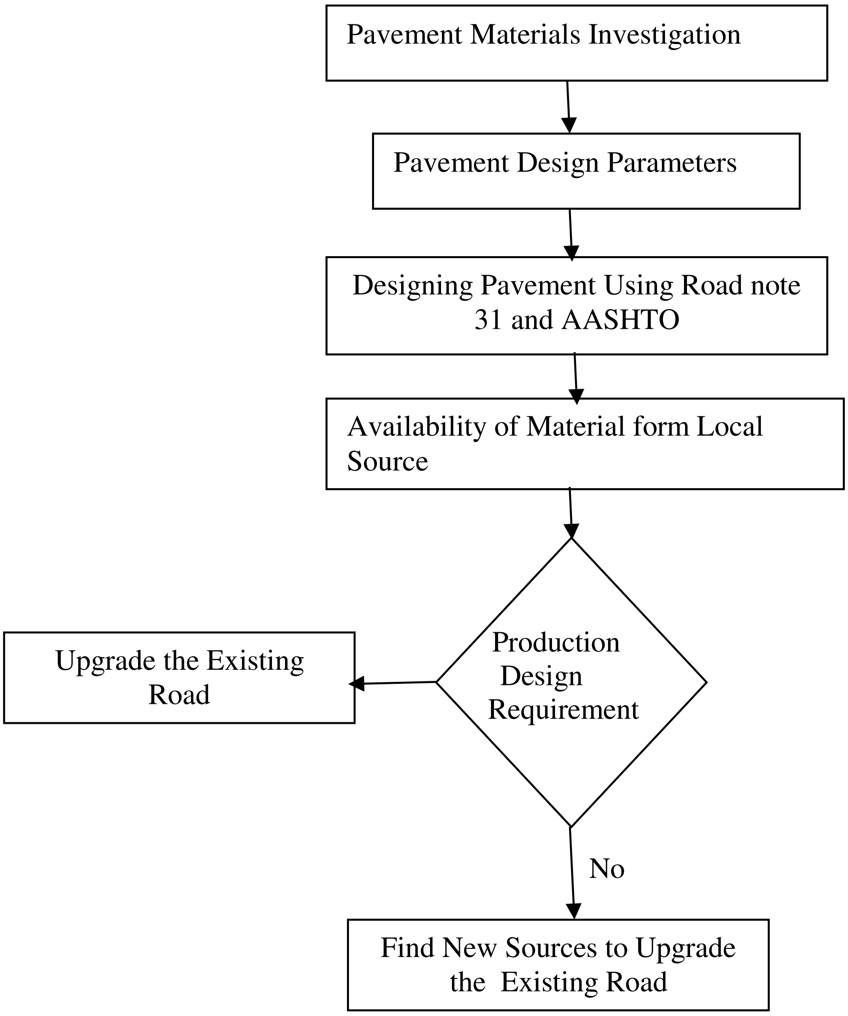

Fig 1.Analysis Procedure

Analysis: *Pavement materials and investigation*

In pavement design for economy, using locally available materials are the most considerable factor in reducing initial investment of a developing country. The section of materials for sub base and base layer are important in pavement design. The CBR values equal to or more than 30 are designated selected materials. Shwebo-Myitkyinar road is passed through by many streams and rivers. Naturally occurring river shingles are important source for sub base or base course in the construction of flexible pavement in the existing road to upgrade. When correctly applied on much more, heavily trafficked roads has been successful. CBR values of selected materials are directly related to thickness of pavement layers.

3. SUBGRADE MATERIALS:

The investigation of subgrade soils and characteristics of soil in the existing road are done in laboratory and classified as unified soil classification system (USCS). The selected materials are tested under AASHTO specification .The common soil type in the upgrading Shwebo-Myitkyinar are ML, CL, GP, SP and SM. Fined grained soil ML, CL and SM are mostly found in total miles. The mixture of above soils are considered for economy on job site.

Table 1.Subgrade soils investigation

Sr .No	Soil Type	Soaked CBR
1	CL	5
2	ML	10
3	SC	5
4	SM	8
5	SP	8
6	GP	6

4. SUB BASE CBR:

Although Shwebo-Myitkyinar region is half of mountainous and half flat region, the quarries are far away from the upgrading road .In this study ,the sources near the existing road is applied .The region is plenty with streams and rivers so river shingles are used for subbase layers mixed with natural soil. The most soils are taken most existence miles of the present road.

Table 2.Subbase Layer CBR

Sr .No	Soil Type	Mixture percent	Soaked CBR
1	CL	60:40	≤30
2	ML	70:30	≤30
3	SM	70:30	≤30

Base CBR

The base layer is with crush rocks which are taken from available quarries .The sections are parted 20 miles section to section for economical feasibility to upgrade the existing Shwebo-Myitkyinarroad. The crush rock CBR are tested in laboratory and CBR varies from quarry to quarry depend on their nature and texture.

Table 3. Base layer CBR

Sr.No	Road Section	Quarry Name	CBR
1	0-20	Bonatthaung	65
2	20-40	Male	65
3	40-60	Male	65
4	60-80	86⁄7	50
5	80-100	Mazar	60
6	100-120	115 miles	60
7	120-140	135 miles	75
8	140-168	Nansiaung	75

Pavement Design Parameters:

Table 4.Pavement Design Parameters

No	Pavement Design Parameters	
1	Initial Daily Traffic Volume	ADT
2	Annual growth rate	
3	CBR value of all materials	
4	Equivalent standard Axles Load	ESAL
5	Reliability	R
6	Serviceability Index	
7	Lane Distribution	
8	Structural Number	SN

5. RESULTS:

Table 5.Comparison of pavement design by Road Note 31 and AASHTO

Road Note 31 for Subgrade type S2	*AASHTO* Base CBR 50	*AASHTO* Base CBR 60	*AASHTO* Base CBR 65	*AASHTO* Base CBR 75
Surface 3 in (75mm)	3 in(75 mm)	3 in(75 mm)	3 in(75 mm)	3 in(75 mm)
Base layer 7 in (175 mm)	9 in (228mm)	8.3 in(212mm)	8 in(205mm)	7.7 in (203mm)
Subbase layer 7 in (175 mm)	12 in(300mm)	12 in(300mm)	12 in(300mm)	12 in(300mm)
Capping layer 12 in (300 mm)				

Table 6.Comparison of pavement design by Road Note 31 and AASHTO

Road Note 31 for Subgrade type S3	*AASHTO* Base CBR 50	*AASHTO* Base CBR 60	*AASHTO* Base CBR 65	*AASHTO* Base CBR 75
Surface 3 in (75mm)	3 in(75 mm)	3 in(75 mm)	3 in(75 mm)	3 in(75 mm)
Base layer 7 in (175 mm)	9 in (228mm)	8.3 in(212mm)	8 in(205mm)	7.7 in (203mm)
Subbase layer 9 in (175 mm)	7.27 in(185mm)	7.27 in(185mm)	7.27 in(185mm)	7.27 in(185mm)
Capping layer 12 in (300 mm)				

Table 7. Comparison of pavement design by Road Note 31 and AASHTO

Road Note 31 for Subgrade type S4	*AASHTO* Base CBR 50	*AASHTO* Base CBR 60	*AASHTO* Base CBR 65	*AASHTO* Base CBR 75
Surface 3 in (75mm)	3 in(75 mm)	3 in(75 mm)	3 in(75 mm)	3 in(75 mm)
Base layer 7 in (175 mm)	9 in (228mm)	8.3 in(212mm)	8 in(205mm)	7.7 in (203mm)
Subbase layer 6 in (150 mm)	4.5 in(120mm)	4.5 in(120mm)	4.5 in(120mm)	4.5 in(120mm)

Tables show the differences in layer thickness and design differences according to material properties. The difference is a slightly change with CBR of each layer .For upgrading road design ,the CBR of all layer is essential and material quality is also important factor.

Table 8.Cost comparison between Road Note 31 and AASHTO for the selected design

Cost	*Road Note* 31	*AASHTO*
Asphalt Surface 3 in	Kyats	kyats
	2.299×10^{10}	2.299×10^{10}
Base layer	6.244×10^{9}	7.7×10^{10}
Sub base layer	1.07×10^{9}	1.7×10^{10}

From table (8), it is shown that AASHTO pavement design standard gave the higher cost than Road Note 31. The sub base layer' cost is reduced because the river shingles and natural soils commonly found in the upgrading region.

Table 9. Comparison of required crush rock and production crush rock

No.	Road Note 31	AASHTO	Production Rate
	Suds	Suds	Suds
1.	84083	127197	150 or 100 suds per day

This table is shown that the requirement of base layer and me design is selected from AASHTO standard. The availability of base layer crush rock is enough for the upgrading.

6. CONCLUSION:

Feasibility study is carried out before upgrading the existing road. The materials used in the project is tested to ensure uses in the present. Availability of materials reduce transportation cost higher. Two method of designing flexible pavement layer thickness. Thickness is a big role in determining the cost to upgrade the existing road. No standard design may cause to total pavement structure defects early before reached the design period.

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