



HMIS News

Highway Management Information System Unit, Planning Branch, DOR

www.dorhmis.gov.np

M.R.C.U

Maintenance and Rehabilitation Coordination Unit has started distributing the DOR Department Policy Document regarding guideline on the use of surface dressing and premix surfacing.

The document contains the approved department policy for the use of surface dressing and premix surfacing on National Highways and Feeder Roads. The document highlights the advantage and disadvantages of surface dressing and asphalt / macadam premix as well as economic comparison of equivalent pavement designs.

(Contd. on Page No. 6)

BRIDGE UNIT

Workshop and Training on "Inspection and Maintenance of Special Bridges"

Introduction:

Bridges are integral part of a road network. It is needless to mention that maintenance of bridges is very important to keep the road network with uninterrupted traffic flow. Bridge Unit/DoR with the assistance from JICA has successfully organized one day workshop and three days training on "*Inspection and Maintenance of Special (Cable Stayed, Suspension and long span) Bridges*". The special bridges are the bridges with main span longer than 100m. At present Cable stayed Bridge at Karnali River along Mahendra Rajmarg, three suspension bridges at Trisuli River (Mugling), Marsyangdi River, and Bheri River along with balanced cantilever bridge of Seti River are categorized as special bridges. Among these bridges, Karnali Bridge was completed in 1993 and no principal inspection was carried for 6 years. Similarly other suspension bridges are also not inspected on regular basis. On the request of DoR to JICA for providing technical assistance in training of inspection and maintenance of Cable Stayed Bridges, Mr. T. Ito from Honshu-Sikhoku Bridge Authority of Japan arrived at DoR on 5th April as a short-term JICA expert. His responsibility was to prepare an inspection and maintenance manual of Karnali Bridge and provide training to DoR technicians and private sectors.

(Contd. on Page No.2)

S.M.D

Routine Maintenance in Strategic Road Network General

As per Department of Roads (DoR) definition roads in Nepal are classified in four major groups, namely National Highway, Feeder Road, District Road and Urban Road. From national point of view national highways and feeder roads are strategically more important in comparison to the others and hence the network consisting of national highways and feeder roads is called Strategic Network. DoR is basically responsible for the development and maintenance of total strategic network all over the kingdom. Continuous efforts are being made within the department to establish a sustainable maintenance management system and to carry out all maintenance activities in a planned way. This is one of the main policy options in DoR's strategy. After struggling for many years, DoR has been successful to establish its own indigenous routine maintenance procedure, which is now being implemented in all Strengthened Maintenance Divisions (SMD) of DoR.

(Contd. on Page No.3)

B.U.M.P

Bridge Upgrading and Maintenance Project (B.U.M.P) conducted the mid term review workshop from 13-14 January 2000 at Biratnagar. This workshop was organized jointly by DFID and BUMP. The workshop was inaugurated by Director General of DoR Mr. Ananda Prasad Khanal.

The Bridge Upgrading and Maintenance Project (BUMP), is jointly funded by His Majesty's Government of Nepal and the British Government in the context of the DFID technical co-operation programme in Nepal. The main objective of the project is, "**To ensure a year round use of two key roads (Biratnagar - Rangeli and Narayanghat - Butwal) and in doing so, improve bridge sector skills**". The project has been designed with four specific outputs, which are as follows:

☞ Project bridges designed and constructed to specified

standards.

- ☞ Deferred maintenance of selected bridges completed.
- ☞ Certain skills for bridge construction and maintenance developed among DoR, consultants and contractors, and
- ☞ Support provided to DoR- Bridge Unit to establish procedures, standards and norms.

This Mid- term review workshop was conducted to assess the progress on project deliverables to date and make recommendations for the remaining phase of the project. The specific workshop objectives were as follows:

- ⇒ To present and discuss findings of the above mentioned project's outputs and assess progress towards the achievement of project's purpose.
- ⇒ Conduct an achievement ranking exercise for each of the four outputs and the purpose in accordance with DFID guidelines.
- ⇒ Create and inventory of concerns and lessons learnt from the past.
- ⇒ Check the validity and the relevance of key assumptions and make revisions.
- ⇒ Identify issues to be considered for the remaining phase of the project, and share experiences/ lessons to inform DoR policy makers.
- ⇒ Refine the log frame, if necessary.

The workshop was participated by DG of DoR, all four DDGs of Planning, Foreign Aid, Maintenance and Design Branches, Regional Director (Central Region), Biratnagar Division Engineer, Project Manager of BUMP along with other engineering staffs, Bettina Demby, Engineering Adviser of DFID, Donal Couper, Deputy Head of DFID.

Commencing the workshop, DG of DoR, requested participants to freely present their views, opinions and experiences in order to assist the project to focus its inputs and enable it achieve the project purpose within the stipulated timeframe. During the workshop, Bettina Demby, Engineering Adviser of DFID, presented an overview of the project's structure, major activities and the principles in the use of logical frameworks. Mr. Bharat Patel, Project Manager/ BUMP then presented a brief overview of the project's operational approaches. He also presented some of the key findings of the baseline survey undertaken in villages and communities located along the Rangeli to Biratnagar road corridor. This survey was carried out by No-Frills Consultants, with the support of WSP International in May to July 1999. It forms part of the BUMP's Beneficiary Study initiated with the intention of identifying the possible social and economic impacts the project bridges would have on targeted communities and how some of the immediate project benefits resulting from the construction phase could be equitable distributed within the locality.

The main conclusion drawn from this workshop were as follows:

- ◆ The project as a whole was rated as successful and progresses to date satisfactory.
- ◆ The need for active involvement of advisory group to strengthen the co-operation, co-ordination, and communication between DoR and BUMP project was emphasised.
- ◆ Cooperation from the contractors is inadequate on one of the bridge site.

- ◆ It was also felt that in a formal setting (DoR and project) the process tends to be slow in attaining a strategic direction on the institutionalisation process. The advisory group has been mandated to come up with certain strategies by the 15th of March 2000.
- ◆ All the participants did find that the project is taking the right direction and is making good progress given the external constraints it operates under.

(Contd. from Page No.1)

One Day Workshop at Kathmandu

One day workshop was organized at Department of Water Induced Disaster Prevention (DWIDP) seminar hall at Pulchowk on 19th May (6th Jestha). The purpose of the workshop was to discuss the various policy issues regarding inspection and maintenance of special bridges among senior engineers of DoR and construction industry namely consultants and contractors. Director General Mr. A. P. Khanal inaugurated the workshop followed by short speeches by Joint Secretary of Ministry of Physical Planning and Works Mr. D. P. Rimal, representative of JICA Nepal, Federation of Contractors Association of Nepal (CAN), Society of Consulting Architectural and Engineering Firms (SCAEF). The objective of the workshop was presented by Bridge Unit Chief Mr. K. P. Wagley. Deputy Director General (Design) Mr. K. P. Pokharel welcomed the participants and vote of thanks was presented by Deputy Director General (Foreign Co-operation) Mr. M. G. Maleku.

The opening session was followed by the presentation session. At first the bridge management system of Nepal and inspection and maintenance of bridges was presented by Mr. K. P. Wagley, Chief of Bridge Unit. JICA short-term expert Mr. T. Ito presented various aspects of inspection and maintenance of cable stayed and suspension bridges. There were many questions and comments raised by the participants about the inspection and maintenance of special bridges. Mr. R. C. Amatya (Project Chief, Baitadi-Darchula Road Project) presented various technical aspects of Karnali Bridge and problems faced during design and construction. The presentation session was followed by group discussion session. Participants were divided into four groups and each group was assigned to analyze the various issues and recommend the possible solutions. Altogether 63 person attended the workshop including DG, DDGs, RDs, SDEs, Consultants and Contractors.

Three Days Training at Kathmandu and Karnali Bridge

The main purpose of the training was to introduce the inspection and maintenance methodology of the special bridges to engineers and overseers. In total 27 participants attended the training. There were 5 engineers from consultants and 4 engineers from the contractors association. One engineer and one overseer from each regional directorate of DoR were requested to be nominated for this training. All the engineers from Bridge Unit/DoR and RSSDU/DoR also participated in the training.

At first, one day theoretical training was organized at Blue Star Hotel with the purpose of introducing the concept of bridge management system and to describe the contents of the draft document for the inspection and maintenance manual of special bridges. Bridge Unit Chief Mr. K. P. Wagley presented the bridge management system of Nepal and rating system used in the inspection of bridges. JICA

short-term expert Mr. T. Ito presented the various technical issues of the inspection and maintenance of cable stayed and suspension bridges. Mr. R. C. Amatya (Project Chief, Baitadi-Darchula Road Project) presented about various technical aspects of Karnali Bridge and problems faced during design and construction period.

In 24th May (11th Jestha) the participants were invited to travel to Nepalgunj for practical training at Karnali Bridge. Due to road blockade, the team was able to reach Nepalgunj only next day. Inspection practice was carried out from the early morning of 26th May (13th Jestha) at Karnali Bridge. The participants were divided in three groups. The first group comprised of 11 members going towards the tower. Other two groups were formed to inspect substructures and deck respectively. All participants were provided with the principal inspection forms and necessary safety equipment and other equipment like crack scale and binocular. All the participants took part very actively during practice inspection procedure. The report of the inspection is being compiled at Bridge Unit. The main recommendation of need of painting various parts of the bridges has to be considered immediately.

Summary

The workshop and training on the "*Inspection and Maintenance of Special Bridges*" were conducted successfully with the assistance of JICA/Nepal. The active participation from private sectors of the construction industry was very notable. Although the first major inspection of Karnali Bridge did not show immediate maintenance needs, all participants realized the importance of timely inspection and reporting of bridges. The inspection and maintenance manual of cable stayed bridges is submitted by JICA short-term expert Mr. T. Ito. Bridge Unit is going to compile a combined inspection and maintenance manual for special bridges applicable for cable stayed and suspension bridges.

Acknowledgement

Bridge Unit would like to thank Director General Mr. A. P. Khanal, DDGs Mr. K. P. Pokharel, Mr. M. G. Maleku for their kind supports for making the workshop and training a success. Bridge Unit would also like to acknowledge the financial assistance of JICA Nepal for conducting workshop and Training on Inspection and Maintenance of Special Bridges.

(Contd. from Page No. 1)

What is Routine Maintenance?

DOR policy document 'Definition of Maintenance and Maintenance Activities' clearly spells out the meaning of Routine Maintenance in Nepalese context which is as follows: "**Maintenance required continually on every road because of environmental degradation, whatever it's engineering characteristics or traffic volume is Routine Maintenance.**"

Execution of Routine maintenance work:

Before

Till few years back, routine maintenance works in divisions were generally carried out in an adhoc basis. Estimate for routine maintenance activities was prepared according to budget allocation and the works were carried out either by the departmental gang or by contract depending on the situation and as required at the site. And lots of money was spent on unproductive labours, supervisors and watchmen.

Now

After having several feeds backs from various work experiences, DoR adopted the lengthworker system of executing the routine maintenance works in all SMD divisions. Norms for employing lengthworker in different types of roads and terrain have been developed. Works to be carried out by the lengthworker are identified. Thus under this system three important components of routine maintenance i.e. the work, the working area and responsibility of Lengthworker have been clearly defined. Lengthworkers and supervisors are employed in all SMD divisions according to norms and under the fixed terms and conditions. These lengthworkers and supervisors carry out all routine maintenance activities under the guidance of site overseer and engineer.

Lengthworkers System

Lengthworker: He/ She is a worker who carries out the routine maintenance works in defined section of road. Generally lengthworker is selected from the same or surrounding locality where the routine maintenance work has to be done.

Work area: Fixed kilometers. (1 Lengthworker per 3 Km in hill paved road, 1 L/W per 5 Km in plain paved road and 1 L/W in 1 Km in urban paved road)

Work: Maintenance activities under Routine Maintenance are as follows;

On road Maintenance:

- Cleaning the road surface.
- Grass cutting
- Drain clearing
- Re-shaping of earthen drain (Ditch)
- Clearing of minor landslides
- Maintenance of shoulder
- Cleaning of furniture
- Cleaning of bridges and culverts

Roadside support Maintenance:

- Cleaning of off-road
- Maintenance of roadside support structure

Tools: Every Length worker gets jacket, helmet (where necessary), boots, raincoat, shovel, pick, sickle, axe, wheelbarrow, and other necessary tools to carry out the routine maintenance work.

Supervisor: Supervisor keeps the daily records of all length workers under him/ her. He / She reports to the site overseer regarding all activities being done and to be carried out immediately. Generally one supervisor covers 15 to 18 Km of road in hill and 20 Km in plain.

Lengthworker' Training: Every year each division road office conducts one day lengthworker's training where division chief, engineers and overseers deliver the lectures on routine maintenance activities in a simple language. Practical demonstration will be carried out to make familiar all lengthworkers with important activities. This is the occasion where lengthworkers and supervisors interact with overseers, engineers and division chief and provide their feedback for the betterment of the system.

Mode of Employment: Till now lengthworkers in most divisions are employed on daily wage basis. But in view of promoting the participatory approach of road maintenance in local level it is encouraged to employ the lengthworkers on contract basis. In some divisions this system has already been

applied successfully and these divisions are employing lengthworkers on one- man contract system. Sample contract form and conditions of contract have been developed and being used successfully in those divisions.

STATUS OF CORE PROJECTS

Department of Roads has classified some of the important road projects as core projects. These projects have been given lot of emphasis due to its importance. Out of these projects most of the road projects

are road linking the inaccessible district headquarters. Some of the projects like Surkhet - Jumla, Baitadi - Darchula, Chinchu - Jajarkot, Sanfebagar - Mangalsen have been included in RMDP new construction component. Due to this it is expected that these projects will be completed in a stipulated time .The completion of the other projects funded by HMG totally depends upon the budget available from the government. The under constructed core project's status is depicted in the following table.

S.No	Name of the Project	Date of Start	Expected Date of completion	Estimated Length (Km)	Constructed length (Km)
1.	Surkhet - Jumla Road	2048/49	2059/60	210	103
2.	Baitadi - Darchula Road	2041/42	N/A	126	95
3.	Salyan - Musikot Road	2048/49	N/A	106	43
4.	Gaighat - Diktel Road	2051/52	N/A	131	15
5.	Phidim - Taplejung Road	2039/40	2055/56	87	87
6.	Banepa- Sindhuli - Bardibas Road	2053/54	2060/61	159	59
7.	22 bridges in Kohalpur - Mahakali Highway	2052/53	2056/57	-	-
8.	Bardibas-Jaleshwore Dhanusadham Road	2052/53	2055/56	58	58
9.	Khimiti - Manthali - Ramechap Road	2053/54	N/A	N/A	17.5
10.	Surkhet - Ranimatta - Dailekh Road	2050/51	N/A	67	67
11.	Chinchu - Jajarkot Road	2048/49	N/A	107	68
12.	Basantapur - Chainpur - Khadbari Road	2051/52	N/A	96	37
13.	Dumre - Beshi sahar Road	2050/51	2056/57	42.8	42.8
14.	Katari - Okhaldhunga Road	2050/51	2057/58	NA	42
15.	Khodpe - Bajhang Road	2038/39	2058/59	110	69
16.	Baglung -Beni - Jomsom Road	2051/52	NA	60	22
17.	Sanfebagar Mangalsen Road	2052/53	NA	NA	26
18.	Phidim -Taplejung Road	2039/40	NA	85	82
19.	Hile - Bhojpur Road	NA	NA	NA	25

R.S.S.D.U

DG of DoR Mr. Ananda Prasad Khanal and Bindu Samsher Rana visited Japan on 29 March 2000 to participate in the program of interaction between DoR and consultant regarding the Sec IV Nepalthok - Dhulikhel Phase 2.

Road Sector Skill Development Unit has managed the training opportunities to the following staff of the department.

In Country Training:

- Professional Course on Management and Development (March 09-April 19, 2000), Nepal Administrative Staff College, Jawalakhel**
Engr. Mr. Amulya Das Shrestha
Engr. Mr. Deepak K.C.
- Local Development (March 14 -April 24, 2000), Nepal Administrative Staff College, Jawalakhel**
Engr. Mr. Pramen Prasad Shrestha
- Advanced Course Training (17 April-16 May, 2000), DPTC,Pulchowk**
Engr. Mr.Sakil Manandhar
- Advanced Course on Management & Development (02 May-13 June, 2000), Nepal Administrative Staff College**
Mr. Ramesh Prasad Rijal
Mr. Narendra Man Patrabansh
Mr. Kiran Lal Joshi
Mr. Ram Ayodhya Prasad

Out Country Training:

- International Conference on Bridge Management (16-19 April, 2000), United Kingdom.**
Mr. Keshav Prasad Pokharel, DDG
- Executives Road Safety Course (08-19 May, 2000), Sweden**
Mr. Suresh Raj Dali, SDE

DEVELOPMENT OF ROADS IN NEPAL

The construction of the roads in Nepal has been steady since 1974/75. At the end of 1997/98 the total road constructed in our country was 13223 Km according to road statistics published in 1998. This year alone road department has constructed about 468 km of road totaling the length of road 13709km. The following table will show clear picture of the road development in our country since 1974/75.

Fiscal Year	Black topped (Km)	Gravel (Km)	Earthen (Km)	Total (Km)
1974/75	1575	516	1182	3173
1975/76	1579	310	1555	3444
1976/77	1751	556	1829	4136
1977/78	1851	593	2151	4595
1978/79	1916	685	2090	4691
1979/80	2044	564	2332	4940
1980/81	2167	703	2151	5021
1981/82	2322	719	2229	5270
1982/83	2484	830	2232	5546
1983/84	2645	815	2257	5717
1984/85	2724	918	2283	5925
1985/86	2757	946	2336	6039
1986/87	2794	1180	2332	6306
1987/88	2822	1348	2441	6611
1988/89	2837	1477	2297	6611
1989/90	2899	1621	2516	7036
1990/91	3083	2181	3064	8328
1991/92	3164	2243	3444	8851
1992/93	3227	2333	3733	9293
1993/94	3398	2356	3910	9664
1994/95	3533	2662	4529	10724
1995/96	3609	2867	4761	11237
1996/97	3655	3011	5048	11714
1997/98	4080	3489	5654	13223
1998/99	4148	3710	5851	13709

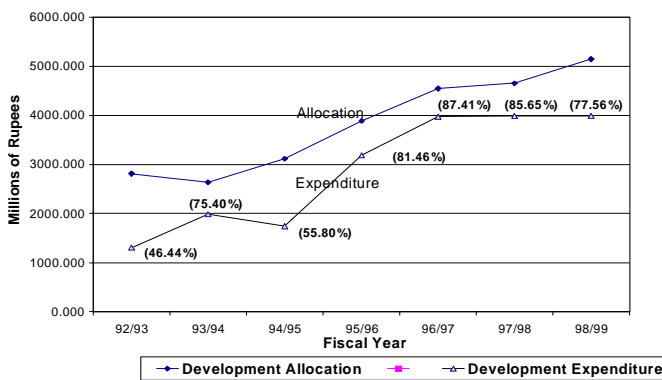
Source: MEU annual report 2056

From the above data it is imperative that the development of the road in our country is steady. So the drastic change in the construction of road cannot be obtained due to budgetary and other technical constraints.

The construction of road is generally hampered by the budget constraints. In some cases, technical problems create the lag in road construction. Also the allocated budget could not be utilized in the road construction due to several unseen factors. The trend of the Department's allocated budget and its expenditure on the road construction from Fiscal year 92/93 till 98/99 is shown in the following table. According to this table it is clear that the allocated budget had not been fully used.

F/Y	Budget Allocated NRs ('000)	Expenditure NRs ('000)	% of Expenditure
92/93	2809.195	1304.500	46.44
93/94	2633.665	1985.801	75.40
94/95	3115.100	1738.294	55.80
95/96	3887.108	3182.041	81.86
96/97	4540.601	3969.131	87.41
97/98	4646.323	3979.370	85.65
98/99	5138.526	3985.467	77.56

Allocation / Expenditure on Roads



Source: MEU / DoR

ESTABLISHMENT OF PROJECT OFFICE OF RMDP (REHABILITATION COMPONENT)

The project office for Rehabilitation Component of RMDP has been established within Department of Roads Camp at Butwal. All project positions have been fulfilled. The consultant for construction supervision of this component has been selected and agreement with M/S WSP International in association with GEOCE Consultants was signed on 21st April 2000. The consultants have started their services. The supervision consultants will be based in Tansen. They have already mobilised to site.

All three contracts of the component have been awarded. The contract for Rehabilitation of Tansen Syangja (contract No RMDP/ICB/TS-01) has been awarded to M/s CCECC and Sharma and Co. J/V for contract sum of about NRs 185 Million. Contract for upgrading of Lumbini Taulihawa (contract No RMDP/ICB/LT-02) has been awarded to M/s Lama and Tundi J/V for contract sum of NRs. 26 million. Rehabilitation of Harthok - Tamghas (contract No RMDP/ICB/HT-03) has been awarded to M/s SIETCO for Contract sum of NRs 162 Million. The Rehabilitation of Tansen - Syangja and Harthok - Tamghas will be completed in two year and upgrading of Lumbini Taulihawa will be completed in one-year time. The total project cost of this component is about NRs. 500 million.

The contractors have started mobilising to construction site. During this fiscal year the contractors will mainly concentrate on the maintenance of the project roads.

CONSTRUCTION OF BHAKTAPUR DIVISION ROAD OFFICE'S BUILDING

The Central Region (2) Division Road Office No., Bhaktapur is still running in the building hired by the division in Sallagari, Bhaktapur. The commencement of the office building construction for this Division Road Office was done by Central Regional No. 2 Director Mr. Shyam Prasad Adhikari by laying the foundation stone on 25 May 2000.

The construction of this office building became possible due to the financial support of Swiss Development Corporation (SDC) under Strengthen Maintenance Division (SMD) Program. This building is constructed on 54,760 sq. ft. of land at Chakrapani Chowk, Bhaktapur. This land was provided by Katunje Village Development Committee, Ward No.1.

The total area of the office is 180 square meters. The estimated cost of this building is approximately 1.68 million rupees out of which 1.35 million rupees will be financed by SDC.

LEGAL AND COMPENSATION SECTION OF DOR.

Within the organization of the DoR, the Legal and Compensation Section has been established under the Administrative Branch. This section is headed by legal officer, gazzeted third class. The major responsibilities of this section are

- ◆ To give legal advice and to coordinate with road offices of different districts regarding rule and regulation.
- ◆ To take necessary steps to revise the existing rules and regulations related to road construction works.
- ◆ To look after the cases regarding the right of way problem of the roads and other cases of DoR.
- ◆ To help in demarcation of the right of way of Highway, Feeder and District roads.

In fiscal year 2056/57, the total legal cases faced by the department were 194, which are as follows;

Right of way cases:

In this year alone 172 out of 194 cases were regarding right of way. The main reason behind these cases was due to dubious statement of Highway (Construction and Management) Act 2021 and Public Road Act 2031. Most of these cases are regarding the distance between 25 yard and 25 meters

Road Office (Camps) cases:

Most of the road offices in different districts have constructed the office in the area, whose land compensation has not yet been given to the exact landowner. So department must take control of these lands by giving the compensation to the landowner.

Contract cases:

There were around 13 cases regarding the contracts. To minimize the legal arbitration regarding contract, the dispute settlement clause in contract document should be made according to the Nepal Arbitration Act 2056. Major legal provisions of this Act depend upon the UN Convention on Model Law of Commission for International Trade Law (UNCITRAL).

(Contd. from Page No. 1)

The main conclusions drawn from this document are as follows:

- ◆ In the past different approaches to road pavement construction have been adopted in Nepal. Therefore Department has formulated a policy on the use of bituminous surface dressing and asphalt/ macadam premix surfacing for road pavements in order to introduce a unified approach that promotes cost effectiveness with the maximum use of local resources all over the country.
- ◆ Surface dressing in conjunction with a crushed stone base has a lower capital cost and is better suited to Nepal conditions for Feeder and National Highway with traffic levels up to 1,250 AADT. Where maintenance capacity is limited, surface dressing can

also prove more cost effective than premix up to an AADT of 2000.

- ◆ It is present DOR policy to use surface dressing for the periodic maintenance of bituminous roads. This policy is now extended by generally adopting surface dressing on a crushed stone base for road pavements having traffic levels between AADT 150 and AADT 2,000.
- ◆ Premix surfacing should be used for all pavements with an AADT above 2,000. They may also prove cost effective for pavements with an AADT above 1,250 and for road rehabilitation and reconstruction. However, it is most important that sound maintenance policies are implemented if the full Vehicle Operating Cost (VOC) benefits of this higher cost material are to be realized.

To provide a basis for this guideline an economic analysis was undertaken among three sets of pavement designs taken from TRL Overseas Road Note 31. One design set incorporated a surface dressing and the other two, premix surfacing. Each design set comprised three ranges of sub-grade strength. The construction cost, pavement design and sub-grade strength for each set of design is given below.

During economic analysis Net Present Value (NPV) of total transport costs over 15 years was calculated. Some assumptions were made for this calculation. From this analysis, it was found that the traffic threshold at which a surface dressed pavement produces higher total transport costs than a premix-surfaced pavement is around 1250 AADT.

Surface dressing on granular base and sub-base

Premix Wearing Course on granular base and sub-base

Premix Wearing Course and Base Course on granular Sub-base

Traffic Loading 6-10 Million ESA Sub-grade CBR 2%



Surface dressing
225 mm Granular Base
225 mm Granular Sub-base
400 mm selected Fill

Cost / km = 6,679,000



50 mm Premix Wearing Course
200 mm Granular Base
225 mm Granular Sub-base
400 mm selected Fill

Cost / km = 7,462,000



100 mm Premix Wearing / Base Course
200 mm Granular Base
200 mm Granular Sub-base
375 mm selected Fill

Cost / km = 9,544,000

Traffic Loading 6-10 Million ESA Sub-grade



Surface dressing
225 mm Granular Base
250 mm Granular Sub-base
100 mm selected Fill

Cost / km = 6,125,000



50 mm Premix Wearing Course
200 mm Granular Base
225 mm Granular Sub-base
100 mm selected Fill

Cost / km = 6,996,000



100 mm Premix Wearing / Base Course
200 mm Granular Base
250 mm Granular Sub-base

Cost / km = 9,029,000

Traffic Loading 6-10 Million ESA Sub-grade CBR 15% to 29 %



Surface dressing
225 mm Granular Base
225 mm Granular sub-base
400 mm selected Fill

Cost / km = 5,298,000



50 mm Premix Wearing Course
200 mm Granular Base
175 mm Granular Sub-base

Cost / km = 6,019,000



100 mm Premix Wearing / Base Course
200 mm Granular Base
100 mm Granular Sub-base

Cost / km = 7,603,000

MRCU has printed the Maintenance Manual. This manual is very useful for the site engineers and overseers. It contains simple ideas and methods for the recurrent maintenance of the roads. The unit has started distributing the manuals to engineers and overseers of the department of road. So if you have not yet grab it, please contact MRCU office in Babarmahal.

**Share your views on this
PL ATFORM**

High Strength Concrete in Nepal – How and Why?

By Er.Saroj Bhattarai, M.Sc (Struct.& Highway)

As in other sectors of construction, cement concrete is extensively used in road structures such as bridges and culverts in Nepal. Despite the popularity of cement concrete, there have been very few attempts to achieve improved quality of this material in our country. As an example, most of the time the grade of concrete used for bridge construction is limited to M20 – M25, whereas, concrete with grade M40 – M45 is very common in developed and developing countries. With careful selection of material and admixture the grade of concrete has gone as high as M150 (150 N/mm²). Then the burning question: why are we adhering to the quality of concrete that is considered as plum concrete in other parts of the world?

Until now we blame our poor workmanship and non-mechanized process of production of concrete. Some people even claim that the aggregate available in our country is not suitable for HSC (High Strength Concrete). For the same reason we hesitate to use any admixture in concrete. Since very little experiments with the admixtures are done in our context, people look at these substances with suspicion. It's now time to reshape our concept on these matters.

With the advent of different admixtures it is now possible to produce higher strength concrete even in our site conditions without much difficulties. One of such admixtures is High Range Water Reducing admixture (HRWR) or "Superplasticizer" as popularly called. This type of admixture is widely used around the world since late sixties for production of HSC. Until now no adverse effect has been reported by use of this admixture.

Superplasticizer itself does not increase the strength of cement or any other ingredient of concrete, neither it changes any other properties of the ingredients. The main action of superplasticizer is to deflocculate the cement particles. Its long molecules wrap themselves around the cement particles and give them a negative charge. So the cement particles repel each other, thus creating lubricating action and substantially improving the workability of the mix. This action lasts for 30 to 60 minutes, which is sufficient for placing and compacting the concrete. After sometime the molecules of superplasticizer absorb themselves into the cement particles and become inert. Thus the fundamental approach is to reduce water content in the mix without reducing its workability. And as we know, the strength of concrete is an inverse function of water/cement ratio. In recent experiments carried out by the author, it was possible to reduce water content by 21% without reducing the workability (in terms of slump). The increase in 28 days strength thus achieved was up to 79%! (Figure 1). The superplasticized concrete cured for a long period in water with high concentration of acid and sulfate showed better performance than the normal concrete. Which means superplasticized concrete is more durable, probably due to better compaction and less permeability.

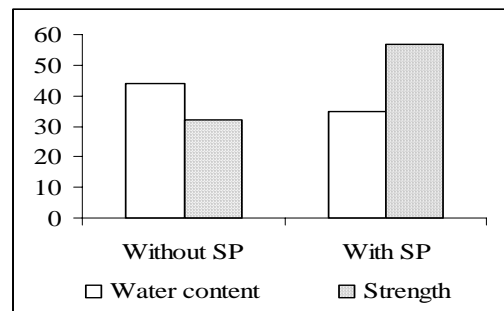


Figure 1

Superplasticizers showed more pronounced effect on natural rounded aggregate and the highest strength was obtained by using river gravel.

There are, of course, some nuances in using admixtures. For better results a designed mix is preferred although nominal mix is also acceptable for a range of M30 – M 40 concrete. A careful supervision, particularly control on amount of water and cement is necessary. Before determining the appropriate dosage of superplasticizer, several trial mixes are needed. Since the moisture content of the aggregate at site may vary it is crucial to find out the required water for different stages of its dampness. This is a matter of experience, but we have to start it somewhere.

Why would we need HSC? What are the benefits? Of course, HSC costs more. But it is not wise to consider the unit production cost of concrete. Our prime concern is to go for the pre stressed RCC bridges, which require concrete with minimum grade of M35 (as suggested by IS codes). The higher, the better. Thus the benefits come from reduced number of intermediate piers and foundations in a long bridge. In normal RCC the sections of the elements can be reduced. Since the strength is gained quickly in HSC, the formwork can be removed earlier. All these factors contribute towards reduced overall project cost. The benefits vary depending on the type and size of the projects. Returning to our burning question: lack of confidence is the reason that keeps us from going forward. Gaining experience and confidence on using modern technology will be the biggest benefit each time in each project. We may lose at the beginning but will invariably gain in the long run.

(The view shared in this platform is particularly of the author only.)



Do You Know

❖ According to MEU annual report 2056, the total road constructed by road department in fiscal year 2055/56 is 468 Km.

❖ According to the Red Book, the total budget for the road sector in the fiscal year 2057/58 is 5,32,76,60,000, out of which 5,14,42,85,000 is development budget and 18,33,75,000 is general budget.

❖ In DROAD 6, the pavement data and the traffic data up to year 2000 has been entered. So if somebody needs data from year 1994 to 2000, please contact HMIS unit.

Presentation on
Feasibility Study
of
Kathmandu - Naubise Alternate Road

The traffic management problem in Thankot has become cumbersome since last five years due to high traffic incoming and outgoing flow from the valley to different places of the country. Considering the needs of the alternate road, JICA study team is carrying out the feasibility study of Kathmandu- Naubise Alternate Road. The presentation program of progress report of this study was held on June 16, 2000 in DoR conference hall. DG of DoR along with DDGs and other engineering staffs of the department took part in this program.

The presentation was started by the welcome speech from Project Manager Bindu Samsner Rana. It was followed by the general information of this project from JICA study team leader Mr. Tatsuya Masuzawa.

The major issues addressed during the presentation program were

- ☞ Future traffic demand.
- ☞ Design standard
- ☞ Alternative routes
- ☞ EIA study

Before doing the actual site works, the study team has reviewed the development plan of previous study. Previously PIP (Priority Investment Plan), Road unit of DoR and FRIP had also done the study of this alternate alignment. All of these three studies had shown that the short tunnel option is comparatively feasible.

The JICA study team initially carried out seven days traffic count survey on Thankot and Kalanki point. It has also carried out vehicle speed survey from Kalanki to Dharke in the existing road. From these data they have forecast the traffic demand for year 2010 and 2020. The study team has standardized this alternate road as Japanese classification Type 3 Class 3 (National Highway Rural and Mountainous Area). For the sake of designing bridge, the study team had reviewed Japanese standard, AASHTO 1977 and IRC code. The team has also designed the typical tunnel section, which is more efficient in terms of low cutting and high stability.

This team has prepared extensively the hazard map, slope gradient map, land use map in GIS (Geographical Information System). During the field trip, the study team has found out total of 138 alternates. The study team has divided this whole road into 6 sections and they have developed possible alternate alignment in each section. The divided sections are as follows;

- Section A- (Ring Road Connection)
5 initial alternative alignments.
- Section B - (Ramkot Valley)
3 initial alternative alignments
- Section C - (Pass Crossing)
4 initial alternative alignments (1 long & 1 short tunnel Option)
- Section D- (Chattre Deurali Mountain Approach)
4 initial alternative alignments
- Section E - (Mahesh Khola Plain)
2 initial alternative alignments
- Section F- (Dharke Connection)
3 initial alternative alignments

From these alternatives they have found the total length of the road as follows with different options:

Long Tunnel - Avg. 24.6 km
Short Tunnel - Avg. 25.3 km
Open (North) - Avg. 28.1 km
Open (South) Avg. 29.6 km

After finding out the possible alternates routes in each section, the route which has high Construction/ Maintenance cost and Land Acquisition cost were eliminated.

The study team has also done some of Environment Impact Assessment works. It has concentrated in Official EIA procedure in Nepal and scoping and ToR Preparation on EIA of the project.

At the end of this presentation program, the question answer program was also held. The queries put on by the participants were answered. It was also notified at the end of the program by the team leader of JICA study team that selection of the optimum route from these alternates will be notified in the next interim report on August 2000. So it is expected that the feasible route will be known at that date.

Address for correspondence:

The HMIS Unit

Planning Branch Tel. : 262693, Ext.147 Fax. : 255746

Email: hmis@htp.com.np

Web site: <http://www.dorhmis.gov.np>

HMIS would like to thank to the colleagues Mr. Prakash Upadhyaya, Babu Ram Ranabhat, Shakil Manandhar, Bina and Rajendra Thapa of Planning Branch for compilation and production of this HMIS newsletter.

UNIVERSITY OF ENGINEERING AND TECHNOLOGY

This newsletter is being produced for the dissemination of information of activities related to Highway Engineering and its development in the country and abroad. Highway Management Information System (HMIS) welcomes any article, news, events, suggestions related to Highway Engineering development.

Planning Branch

HMIS Unit

Chief Advisor : Deepak Bahadur Thapa, DDG
Advisor : Sushila Dali

Editor1: Pramen P Shrestha, Engineer
Editor2: Ghana Shyam Gautam, Engineer