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Ministry of Road Transport & Highways
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No. RW/NH-12011/1/99-W/RJ

Dated: 20/6/2000

To

1. All the Chief Engineers of all State Governments/Union Territories.
Dealing with National Highways & Centrally sponsored schemes.
2. Director General Border Roads, Kashmir House, New Delhi.
3. Chairman, National Highway Authority of India, Maharani Bagh, New Delhi.

Subject: Standard Terms of Reference for engagement of consultants for detailed project
preparation for upgradation of National Highways to two lanes.

Sir,

Reference is invited to the interim guidelines for engagement of consultants for highway/bridge projects on National Highways circulated in Ministry's letter of even number dated 12th January 1990 and Ministry's subsequent circular on this subject including some modifications indicated in the latest circular No. RW/NH-34041/62/89-DO-II dated 28th August, 1998.

2. In this connection, Terms of Reference (TOR) for engagement of consultants for Detailed Project Preparation for upgradation of road to two lane National Highway standards has been framed and enclosed. As indicated in para 12 of the TOR, performance security in the form of bank guarantee is to be taken from the consultants @5% of the contract price at the time of commencement of the work to have proper performance from the consultants. Further, a list of services/equipments to be supplied by the consultants for official use of MOST/PWD officials is also given at Annex-II of the documents. However, the details of services and equipments will be project specific and will have to be indicated accordingly after taking the specific approval of DG(RD)&AS.

3. This standard document on terms of reference for engagement of consultants may be followed for all National Highway works. This circular may be brought to the notice of all concerned in your Department for compliance.

Yours faithfully,

(I.K. PANDEY)
Superintending Engineer (B)S&R
For Director General (Road Development & Additional Secretary.

Encl: a.a.

Copy to:

1. PS to Secretary (RT&H)/TS to DG(RD)&AS
2. All CEs at HQs.
3. All ROs and ELOs of MOST
4. Director, NITHE
5. Secretary, IRC.

**STANDARD TERMS OF REFERENCE
FOR
ENGAGEMENT OF CONSULTANTS FOR DETAILED
PROJECT PREPARATION FOR UPGRADATION OF NATIONAL HIGHWAYS TO TWO
LANES.**

**GOVERNMENT OF INDIA
MINISTRY OF ROAD TRANSPORT & HIGHWAYS**

JUNE 2000

**TERMS OF REFERENCE FOR ENGAGEMENT OF CONSULTANT FOR DETAILED
PROJECT PREPARATION FOR UPGRADATION OF NH-----
-----TO TWO LANE.**

There is a proposal to develop NH---as a two lane highway to NH standards. It is proposed to engage Consultants from the list of consultants empanelled by the Ministry of Road Transport & Highways for providing consulting services for carrying out detailed engineering for the project for technically sound and economically viable detailed engineering for the project for technically sound and economically viable detailed designs, drawings, estimates and tender documents for the project.

4. PROJECT INFORMATION:

National Highway No.—is deficient in many respect andrequires to be improved to 2 lane national highway. The map showing the National Highway is enclosed at Appendix-I.

5. OBJECTIVES:

Main objectives of the Study are as under:

- (i) To evolve sound proposals for widening the single lane/Intermediate lane existing road to two lane National Highway Standards including bridges, culverts, ROBs, bypasses etc.
- (ii) To carry out engineering, economic, environmental and social studies of the proposed road improvements.
- (iii) To carry out the detailed engineering design of the proposed road and bridge works, and prepare suitable number of bid packages* including cost estimates and other bid documents required for tendering as per MOST's Standard documents.

*Size of bid package (each covering about 30 to 50 km) will be decided by the employer on the basis of site conditions.

4. SCOPE OF THE CONSULTANCY SERVICES:

The scope of the consultancy service is to:

- (i) Collect inventory data and to do condition survey road, bridge, culverts, ROBs etc. as per IRC SP:19 as per the enclosed proformae (Appendix II a, b. c. d. e. f) and prepare inventory in the computerized format using Microsoft access. Suggested formats enclosed at Sheet 1-3 (append to appendix-II)
- (ii) Prepare strip plan showing the existing road land width, utility services (both above and below ground level), trees, electric poles, telephone poles, water pipe line, sewage line, bridges culverts, junctions, adjoining land use, encroachment etc.
- (iii) Collect socio-economic data for state and project area.
- (iv) Identify homogeneous section for traffic.
- (v) Conduct 7 days traffic (volume count)survey at one location in each homogeneous section. However, traffic survey shall be conducted at an interval of not more than 50 kms within a homogeneous section.
- (vi) Conduct axle load survey at a suitable location in each homogeneous section on random sample basis and work out number of equivalent axle load and vehicle damage factor for one day (except holiday).
- (vii) Do additional survey at each turning movement at major inter section as per IRC SP : 19.
- (viii) Gather information on accidents showing type of accident, frequencies and to identify accident prone locations/sections.

- (ix) Conduct origin and destination survey for one day at each by pass location as per IRC: 102-1988.
- (x) Determine vehicle-wise growth rates based on socio-economic data and available past traffic data and also estimate annual growth of traffic.
- (xi) Digging test pits at least 1 m below the underside of the lowest pavement layer or rock level, whichever is less wherever pavement condition changes or at 2 km. Intervals whichever is less. Conduct soil tests e.g. gradation test (IS 2720 part IV), liquid limit, plastic limit, atterberg limit, field density, moisture contents, shrinkage limit test (if required), deleterious constituents as per relevant IRC Standard.
- (xii) Investigation of design of high embankments based on Ministry's Circular No. NH VI-50(21)/79 dated 25.1.1980 and or IRC:75-1979.
- (xiii) Identification of borrow areas as per IRC:10, 1961 and determine soil properties.
- (xiv) Conduct representative CBR test on the existing sub-grade as per IRC 37-1984.
- (xv) Carry out road deflection tests by Bankelman beam method (IRC:81-1997).
- (xvi) Collect information about hydrology e.g. catchment characteristics, rainfall stream channel characteristics, design discharge, linear waterway scour depth etc. for all cross drainage works and bridges. For bridges the project preparation work shall comply with IRC Special publication No. 54 "Project Preparation Manual For Bridges".
- (xvii) Do drainage studies indicating general drainage pattern, HFL, water level, seepage, flow etc. and Prepare drainage designs as per IRC guidelines.
- (xviii) Do investigation for naturally occurring materials and to identify suitable quarries for these materials.
- (xix) Conduct tests for determining physical strength characteristics of aggregate material as per relevant IRC standard.
- (xx) Measurement of pavement roughness by using Bump integrator.
- (xxi) Trial pits should be dug at each culvert location as per IRC SP:13.
- (xxii) Carry out geo-technical investigation and sub surface exploration at the proposed location of bridges (generally one boring may be done at each abutment and also at piers as per IRC:78.
- (xxiii) Carry out topographic survey i.e. with total station method and establish one B.M. in each km.
- (xxiv) Suitable study of alternative for by passes and other re-alignments and suggest suitable alignment based on merit/demerits of alternatives.
- (xxv) Prepare alignment plan, longitudinal and cross sections (The consultant shall prepare complete plan showing improvement proposals Horizontal control points, bench marks and reference points shall be established as required and indicated on the drawings).
- (xxvi) Prepare land plan and re-location plan based on proposed design.
- (xxvii) Identify level crossing which require upgradation or construction of R.O.B. on the basis of no. of closures, period of closure and expected traffic.
- (xxviii) Identification of suitable location for lay bye, truck parking places.
- (xxix) Carry out environment, rehabilitation and resettlement studies as per guidelines of MOEF and IRC:SP:19(revised).
- (xxx) Prepare Detailed Design and Working Drawings.

- To design a highway in all respect including geometric design, design of pavement high embankment, junctions, culverts and bridges etc.
- To design rehabilitation improvement repair measures of existing structures, if any.
- To recommend suitable design requirement and specifications requirements for entire reach including bridges and other structures and the approach roads.
- Detailed drawings, good for construction, shall be prepared to international standards, using CAD. It will contain all details required for execution of the project.

- (xxxi) Prepare Bill of Quantities and estimates on current S.O.R. (based on Ministry's Data Book
- (xxxii) Conduct economic analysis and sensitivity tests for the project.

5. QUALITY ASSURANCE PLAN:

The Consultant should have to ensure quality assurance in his work. All his work should be checked by a quality assurance team, which will be different from the team for the project. The consultant should submit the quality assurance plan and his team to the Ministry/PWD for approval at the time of submission of inception report.

6. SEQUENCING OF PROJECT PREPARATION:

Project preparation activities will be split into stages as brought out below. Each stage will cover a set of activities and shall be followed with a detailed report in respect of each stage. Time schedule in respect of all such stages will be as indicated. Consultant shall be required to complete, to the satisfaction of the client all the different stages of study within the time frame indicated in the schedule of submission.

The stages are:

Stage I:

Inception Report

A comprehensive inception report of the following:

- (i) Survey and Investigation methodology.
- (ii) Approach for traffic studies.
- (iii) Project engineering.
- (iv) Cost benefit and economic analysis
- (v) Schedule of works indicating various activities
- (vi) Schedule of payment
- (vii) Quality assurance plan and team

Stage II:

Preliminary Report containing

- (i) Strip Plan
- (ii) Alignment plan showing proposals for realignment etc.
- (iii) Need/Justification for any bypass and requirement of additional land
- (iv) Need/justification for replacement of level crossing by ROB
- (v) Siting of new bridges if any as also the type of bridges proposed to be provided also give GAD of bridges.
- (vi) Hydraulic data for major and minor bridges.
- (vii) Road inventory and pavement condition assessment survey in the prescribed computer based format.
- (viii) Type of pavement proposed.

- (ix) An indicative proposal for widening

In nutshell this preliminary report shall contain information/proposals which need approval of client for enabling further detailed project preparation.

Stage III:

DETAILED PROJECT REPORT

Volume I

- Executive Summary
- Project description
- Traffic studies
- Sub soil investigation
- Investigation for materials
- Road junction and intersection design
- Toll plaza layouts and detailed drainings
- Land Acquisition/Resettlement plans
- Any other drawings considered relevant

7. SERVICES AND FACILITIES TO BE PROVIDED BY THE GOVT.

The Govt. shall not provide any services and/or facilities to the appointed consultant during the feasibility studies and detailed engineering. The consultants will have to arrange for all facilities/services required to carry out the assigned work on this project at their cost. The financial proposal shall cost. The financial proposal shall have break-ups. However, introductory/recommendation letters shall be provided to the consultants on request for obtaining desired services and facilities from concerned authorities for which the consultants shall make payments to the concerned authorities directly. Toposheet of restricted areas if required will be arranged by the client.

8. MAN MONTH REQUIREMENT:

It is anticipated that consultants will propose suitable staffing inputs for key personnel. For this purpose the man month given below may be treated as broad reference and different man months could be proposed by the consultants with suitable justification based on their services and equivalent quality inputs.

A. KEY PERSONNEL

	Man Months (for 100 Km)
Senior Highway Engineer cum team leader	12
Highway engineer	3
Pavement design engineer	3
Material cum Geo-tech./foundation engg.	3
Bridge Engineer	6(4-6)
Senior survey expert	6

B. SPECIALIST

Traffic Engineer	2
Transport Economist	1.5
Hydrologist cum drainage Engineer	1.5
Environment and RR	1
Tender document Specialist	1
	40

C. OTHER PERSONNEL (As per requirement assessed by the consultants Supported with details)

NOTE: Minimum qualification of Key personnel/Specialist should be as per the Annexure-I.

9. REPORTS

The consultants shall furnish to the client the following report and documents. All reports and documents shall be in English.

- | | | |
|-------|--------------------|----------|
| (i) | Inception report | 6 copies |
| (ii) | Preliminary Report | 6 copies |
| (iii) | Draft DPR | 6 copies |
| (iv) | Final DPR | 6 copies |
| (iv) | Contract documents | 6 copies |

10. SCHEDULE OF SERVICES:

- | | | |
|----|--|----------------------------------|
| 1. | Submission of inception report | =1 month from the date of start |
| 2. | Submission of Preliminary Report | =4 month from the date of start |
| 3. | Submission of draft D.P.R. | =9 month from the date of start. |
| 4. | Submission of final DPR including document/drawings etc. | =12 month from the date of start |

Project specific services, equipment are also to be supplied by the consultants (as per the appendix-II)if specified in the TOR depending on the requirement with the approval of DG(RD).

11. PAYMENT SCHEDULE

Payment schedule for the work will be as follows:

- | | | |
|-----|-------------------------------|------------------------------|
| (i) | Submittal of inception report | 10% of the total bid amount. |
|-----|-------------------------------|------------------------------|

(ii) Submittal of Preliminary report	15% -do-
(iii) Approval of Preliminary Report	15% -do-
(iv) Submission of Draft DPT	50% -do-
(v) Approval of DPR	20% -do-

Any under prepared, incomplete/inadequate or part submittal shall be deemed as invalid submittal. The adequacy of the submittal shall be determined at the sole discretion of the client. Client will, generally accord approval with in 4 to 6 weeks of submission of PRELIMINARY/FINAL REPORT.

12. PERFORMANCE SECURITY.

Within 21 days of the letter of acceptance, the consultant shall deliver to the employer a performance security in the form of bank guarantee for an amount equivalent to 50% of the contract price. The bank guarantee will be released at the time of final payment to the consultant.

13. RESPONSIBILITY FOR ACCURACY OF PROJECT PROPOSALS

The consultants shall be responsible for accuracy of all the data used in project preparation and the designs/drawings and estimates prepared by him as part of the project. Permanent location marks adequate for identification during execution shall be kept at the site at the cost of consultant. He shall indemnify the client against any inaccuracies in the work which might surface out at the time of ground implementation of the project including staking out and for this purpose, he shall furnish bank guarantee for an amount to the extent of 10% of the total consultancy fees to be received by him. In such cases, the consultant is responsible to correct the drawings including any re-surveys/investigations (including correcting the layout etc.) as required. The bank guarantee shall be valid for a period of 3 years from the date of submission of the final DPR. The bank guarantee of 5% of the bid amount will be furnished at the time of signing of the agreement and 5% of the total bid amount at the time of submission of final DPR. The final installment of 20% of the fees shall be released only on receipt of this bank guarantee.

MINIMUM QUALIFICATION OF KEY PERSONNEL

1. SENIOR HIGHWAY ENGINEER CUM TEAM LEADER

This is the senior most position and the expert engaged will function as Team Leader and will be responsible for the entire project preparation activities including timely completion. The expert is expected to contribute significantly by his knowledge and experience to tone-up the quality of proposed project preparation activity. The expert will undertake frequent project site visits and shall guide, supervise, co-ordinate and monitor the work of other experts. The candidate should have a proven record of supervising, organizing and managing of project preparation and construction of Highway projects. This position requires a senior Highway Engineer who shall be at least a graduate in Civil Engineering with at least 20 years of professional highway engineering experience

2. HIGHWAY ENGINEER

The Engineer will be a graduate in Civil Engineering with at least 15 years of professional highway engineering experience of handling project preparation and construction of Highway projects (preferably National Highway projects) in India or similar developing countries including on project preparation/construction of major Highway/Bridge projects.

4. PAVEMENT DESIGN ENGINEER

The design engineer requires thorough knowledge and understanding of 'best practices' in the field of design, construction and maintenance of flexible type of pavements including latest codal stipulations and specifications. The expert will undertake frequent project site visits and is expected to contribute significantly by guiding and supervising the technical staff engaged in investigation, pavement design etc. to ensure most cost-effective and viable pavement structure design for the entire project. He will be responsible for pavement investigation and design. The candidate should be a graduate in Civil Engineering with higher qualifications and specialization in a pavement design/maintenance related field. He should have minimum 15 years of professional experience of pavement design and pavement maintenance related field and should have handled independently at least four pavement design works.

5. HYDROLOGIST CUM DRAINAGE ENGINEER

The candidate should have relevant Masters degree or equivalent with minimum 15 years experience of which at least 10 years should be on hydrological studies. Experience of 2 years in highway and bridge projects is essential. The person should be fully familiar with the acceptable study methods, 'best practices' and must have experience of successfully using various methods in different situations. Experience in determining flood levels, discharges, model study, preparing schemes for proper cross drainage and determining the regime/waterway width for highway projects is essential. Experience in designing and road drainage system is also essential.

6. BRIDGE ENGINEER

The position requires an engineer, preferably with a Masters degree or equivalent in structural/bridge engineering, with minimum 15 years experience out of which at least 10 years on design and construction of bridges and structures. The candidate must have capability to design bridges with various alternative materials and structural arrangements, he should have designed at least two major bridges (200 m length). Experience in designing and implementing bridge rehabilitation is required. The candidate must have the experience of planning & monitoring geotechnical and hydraulic investigations for the bridges and interpreting the findings thereof.

7. TRAFFIC ENGINEER

The position requires a graduate civil engineer preferably with high qualification in Traffic Engineering with at least 15 years of professional experience including at least 5 years on projects of similar nature in developed/developing countries. The candidate must have wide experience of traffic survey, traffic forecast, Junction design and road safety.

8. MATERIAL ENGINEER-CUM GEOTECHNICAL ENGINEER:

This position requires an Engineer who should be graduate in civil engineering or science with at least 15 years professional engineering experience including 5 years in supervising sub soil investigations for roads and bridges and testing and evaluation of highway construction materials used in modern highway construction techniques. The candidate must be thoroughly familiar with all the standard laboratory testing procedures adopted in case of highway projects of similar nature in developing countries with international financing.

9. SENIOR SURVEY EXPERT:

This position is of specialist nature and the expert is expected to have thorough understanding of modern computer based methods of surveying like total stations, use of satellite imagery, digital terrain model etc. as being practices in project preparation of modern highway construction. The candidate is expected to contribute significantly by guiding/supervising the surveyors improving the quality of survey works for achieving maximum possible accuracy without any gap in survey based details. The candidate should at least be qualified Surveyor. He should have minimum, 15 years professional experience including at least 5 years in highway related projects of comparable nature each in developed and developing countries. He should have experience of training other Surveyors.

10. ENVIRONMENTALIST:

The environmentalist is expected to undertake all activities related with environmental clearance for the projects under the guidelines of the MOEF, Govt. of India etc. He should be thoroughly familiar with various environmental issues/factors related to highway projects required to be assessed and analyzed for screening and to undertake best mitigation measures to the satisfaction of MOEF, Govt. of India. The candidate for this position should be a graduate in environmental/civil engineering or any other equivalent relevant qualification. He should have at least 15 years of professional experience as environmentalist of which at least 3 years in similar highway projects.

11. TRANSPORT ECONO MIST:

The candidate should have graduate qualification in Economics/Transportation Engineering/Management. He should have 15 years experience. The candidate should be familiar with Indian condition/developing countries. He should have demonstrated capacity of analyzing highway improvement projects like bypasses, alignment, service roads by using M.O.S.T./or other proving models like HDM-III etc. The candidate must be familiar with the modern method of traffic survey and analysis including knowledge of different methods of traffic forecasting.

12. TENDER DOCUMENT SPECIALIST:

The candidate should have graduate qualification preferably in Civil Engineering. He should have at least 15 years experience in preparation of tender documents etc. He should also be well versed with legal matters of the tender.