



# Guideline for preparation of Detailed Project Report (Road and Bridge Projects)

Department of Roads  
Ministry of Works and Human Settlement  
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## FOREWORD

The Department of Roads is pleased to bring out the Guideline for the preparation of Detailed Project Report (Road and Bridge Projects). Good planning ensures a good outcome. Likewise, a good DPR shall smoothly guide the project to success without much hassle. The need for DPR before actual construction of roads has been expressed by all stakeholders in many different forums. Therefore, it is of utmost importance that there is a guideline that guides the preparation of DPR so that the DPRs that are prepared are uniform and maintain a certain level of standard.

This document briefly describes what a DPR is and when it is required. It also highlights the different type of activities that needs to be carried out in preparing a DPR and the required contents of a DPR. In addition, it gives general information on who should be preparing the DPR, the technical requisites as well as how long it should take to prepare a DPR. The document has been developed based on the experiences of the Department in preparing DPRs and carrying out other activities under the DPR in the recent few years. This guideline may need to be revised as and when situation demands.

The Department hopes that this guideline will be of benefit to all sectors constructing and maintaining road and will encourage proper and detailed planning in the construction sector.

A handwritten signature in blue ink, consisting of stylized, overlapping loops and lines.

(Tenzin)

Director General

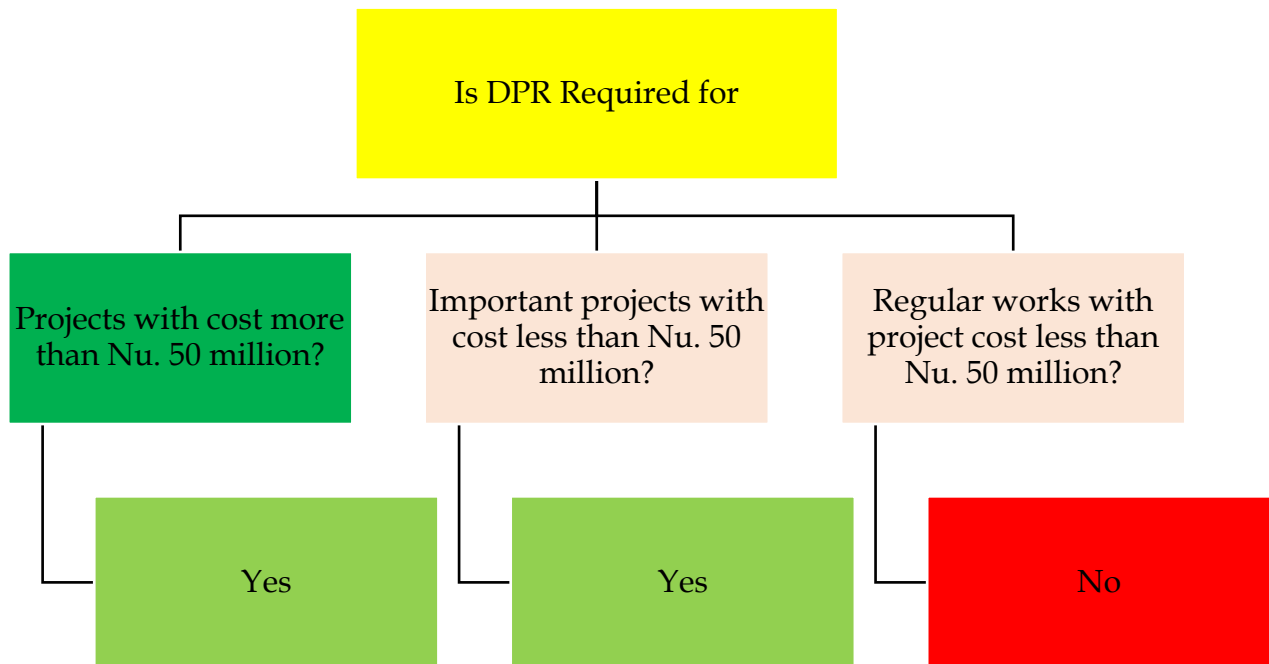
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## 1. DEFINITION

As per the resolution of the 10th Engineers, Architects and Planners' conference, DPR must be prepared for all projects whose project cost exceeds Nu. 50 million as well as other important projects even if their project cost is lesser than Nu. 50 million.

## 2. WHEN DO WE REQUIRE DPR



Construction of new national highways, permanent bridges, bridges requiring detailed geotechnical studies, major slope protection works and other road and bridge works that are first of their kind (introducing new construction technology to the country) are considered important projects for the purpose of preparation of DPR.

## 3. ACTIVITIES REQUIRED TO BE CARRIED OUT IN PREPARING A DPR FOR ROAD OR BRIDGE WORK

### 3.1 Feasibility Study

A feasibility study has to be carried out for any new construction whether it be for a road or a bridge. They are done mainly to see the feasibility of the project and also, to choose the best option for the construction. A feasibility study generally involves desktop studies, map studies and reconnaissance surveys on the ground. They need to be done as per the Manual for Feasibility Study. After the study, a relevant report needs to be produced.

### 3.2 Environment Impact Assessment (EIA) including Socio-economic Analysis

Before carrying out any project, it is very important to know the environmental impact of the project. In addition, it is also very important to know the socio-economic impacts of

the project. Therefore, either a detailed EIA which includes a socio-economic analysis or a preliminary environmental assessment (Initial Environmental Examination, IEE) and a socio-economic assessment must be carried out based on the size of the project and the requirement of the National Environment Commission of Bhutan (NEC) to provide Environmental Clearance. If a full-fledged EIA is carried out, it should be done as per the Environmental Assessment Guideline for Roads and Highways, 2012 by following due procedures of the NEC.

### **3.3 Geotechnical Study**

A geotechnical study shall also be done during the planning of any project to identify and avoid problematic unstable areas as well as to plan mitigation measures for the expected geotechnical instabilities. The extent of the study shall be decided by the size of the projects as well as the condition of the project location.

### **3.4 Survey and Design**

Detailed design and drawing are the most important document in the DPR. Just as the DPR is the blueprint for the entire project, detailed design and drawings are the blueprint for the structures to be constructed. For the detailed design and drawing of a road, a detailed topographical survey to the utmost accuracy along with a proper soil test for CBR and thorough traffic analysis must be done.

Using information from the site visits and the survey data detailed design of road geometry must be carried out. The designed geometry must be safe, comfortable, durable and have the most benefit to the users as well as to the nearby communities. The geometric designs should also include the locations and design drawings of walls and cross drainages. Similarly, using the traffic analysis, site visit findings and the CBR data, a durable pavement with adequate design life should be designed.

After the design is completed, relevant drawings and reports must be produced.

### **3.5 Bill of Quantities (BoQ) and Cost Estimate**

As the DPR is also used for securing funds, it is of utmost importance that a detailed BoQ and estimate are prepared. This must be done in reference to the design drawings by using realistic and relevant market rates and adequate rate analysis.

### **3.6 Project Execution Plan**

One main purpose of the DPR is to guide the project execution. Therefore, it is a must that an adequate project execution plan must be prepared. For the execution plan, a detailed analysis of the work scope of the project must be carried out to decide on how the project will be implemented. The implementation plan shall include all the details starting from the project execution mode (contractual or departmental), the number of packages and the contract durations. It should also include a project implementation timeline that specifies by when the works should be tendered out when the works should start on the ground, how much progress should be made in consecutive months and a

fund utilization plan for the project. The implementation plan shall also identify the requirement of project implementation units.

In addition, the execution plan should also identify all risks to the timely project implementation (delays caused by tendering process, contractual problems, reasons beyond control, etc.) and suggest mitigation plans as well as a way forwards if incase such cases occur so that the overall project can be implemented on time.

#### **4. CONTENTS TO BE INCLUDED IN A DPR**

Following is the list of content/chapters that need to incorporated into the DPR:

##### **4.1 Introduction**

The introduction of the DPR must lay out the project background, objectives, scope of the work and map images. It should highlight the possible benefits of the project and also the rationale behind preparing the DPR.

##### **4.2 Feasibility Study**

The chapter on feasibility study shall be included in the DPR, only if an actual feasibility study has been carried out for the project. This chapter, in brief, must describe the methodology adopted to study the feasibility of the project and the findings of the feasibility study. For roads, this chapter should also highlight the available alignment options, the selected route and the rationale behind the selection of the route. As a detailed explanation, the report of the feasibility study should be attached as an annexure to the DPR.

##### **4.3 Environment Impact Assessment (EIA) including Socio-economic Analysis**

This chapter is mandatory for all types of DPR. In the case where a detailed EIA is not done, this chapter must describe all the possible positive and negative socio-economic and environmental impacts of implementing the project.

Where the EIA has been done, this chapter must briefly describe the methodology adopted for the environmental and socio-economic studies such as the types of data collected and the timeline of the study. It should also briefly highlight the possible positive and negative impacts of the project on the environment and on the nearby communities. The mitigation measures for the negative impacts should also be briefly highlighted in this chapter. In addition, the EIA report should also be attached to the DPR as an annexure.

##### **4.4 Geotechnical Study**

This chapter in the DPR must describe the existing geotechnical state of the project location and the locations where the geotechnical failures are expected. A summary of the mitigation measures for the projected failures should also be listed in this chapter. If a full-fledged Geotechnical Investigation is done, the geotechnical report should also be attached to the annexure.

#### **4.5 Design and Drawing**

This chapter of the DPR must highlight the type and methodology of the survey conducted, the type of soil tests carried out and the assumptions for the traffic analysis. Then the methodology of the geometric design and the pavement design shall also be mentioned. The standards adopted as well as the assumptions made during the design shall be highlighted in this section. Finally, all the produced design drawings and reports shall be attached as an annexure to the DPR.

#### **4.6 Technical Specification (TS)**

The TS is one very important guiding document during project execution as well as monitoring of projects during the implementation time. Thus, this chapter in the DPR must specify the version of the TS applicable for the project. The full TS shall be attached as an annexure.

#### **4.7 Bill of Quantities (BoQ) and Cost Estimate**

This chapter of the DPR must highlight a brief summary of the BoQ and the cost estimates. Further, write-ups on the BoQ, the rate analysis and the assumptions made for the cost estimate shall be included in this chapter. The detailed BoQ and Cost Estimate shall be an annexure to the DPR.

#### **4.8 Project Execution Plan**

This chapter of the DPR must specify the detailed project execution plan. They include the project execution mode, the contract package size, the contract duration, the project implementation timeline, the budget utilization plans and also the requirements to execute the project such as project implementation units. It should also include risks to the timely project implementation and mitigation and the way forwards to complete the project on time.

#### **4.9 Conclusion and Recommendations**

The DPR shall be concluded with the overall summary of the project and relevant recommendations and the points that should be kept in mind during the execution shall be included in this section.

#### **4.10 Annexure**

The DPR must have the annexures that were mentioned above.

### **5. SUMMARY OF DPR CONTENTS FOR VARIOUS TYPE OF PROJECTS**

All kind of project doesn't need to include every content mentioned in section 5. They may be included as per requirement. The following is a checklist of requirements in a DPR for various projects:

## 5.1 New Road Construction

- ✓ Introduction
- ✓ Feasibility Study
- ✓ Environment and Social Impact Assessment
- ✓ Geotechnical Study
- ✓ Design and Drawings
- ✓ Technical Specifications
- ✓ BoQ and Cost Estimates
- ✓ Project Execution Plan
- ✓ Conclusion
- ✓ Annexures- Feasibility Report, EIA Report\*, Geotechnical investigation Report\*, Design Drawings and Reports, Technical Specifications, BoQ and Cost Estimates.

\*EIA Report and Geotechnical Investigation Report shall be only attached to the annexure if a full-fledged study has been done. The requirement of full-fledged study is depended on the project size and the project location.

## 5.2 Road Improvement through Widening

- ✓ Introduction
- x Feasibility Study
- ✓ Environment and Social Impact Assessment
- ✓ Geotechnical Study
- ✓ Design and Drawings
- ✓ Technical Specifications
- ✓ BoQ and Cost Estimates
- ✓ Project Execution Plan
- ✓ Conclusion
- ✓ Annexures- Geotechnical investigation Report\*, Design Drawings and Reports, Technical Specifications, BoQ and Cost Estimates.

\*Geotechnical Investigation Report shall be only attached to the annexure if a full-fledged study has been done. The requirement of full-fledged study is depended on the size and the project type.

### 5.3 Road Improvement through Pavement

- ✓ Introduction
- x Feasibility Study
- ✓ Environment and Social Impact Assessment\*\*
- x Geotechnical Study
- ✓ Design and Drawings\*
- ✓ Technical Specifications
- ✓ BoQ and Cost Estimates
- ✓ Project Execution Plan
- ✓ Conclusion
- ✓ Annexures- Design Drawings and Reports, Technical Specifications, BoQ and Cost Estimates.

\*For alignment design drawings are not required, hence a detailed topographical survey is not required.

\*\* EIA as per the project requirement, (Not Mandatory)

### 5.4 Construction of Bridge

- ✓ Introduction
- ✓ Feasibility Study
- ✓ Environment and Social Impact Assessment \*\*
- ✓ Geotechnical Study
- ✓ Design and Drawings
- ✓ Technical Specifications
- ✓ BoQ and Cost Estimates
- ✓ Project Execution Plan
- ✓ Conclusion
- ✓ Annexures- Feasibility Report, Geotechnical investigation Report\*, Design Drawings and Reports, Technical Specifications, BoQ and Cost Estimates.

\*While preliminary geotechnical investigation is required for all bridges, the detailed study is required for only major bridges

\*\* EIA as per the project requirement, (Not Mandatory)

## **6. WHO MAKES THE DPR**

The DPR includes different types of studies based on the work scope, the project site as well as the project size. Therefore, a DPR preparation must involve an adequate team. The preparation of the DPR for road or bridge development should be led by a Team Leader who is a full-fledged Engineer. The Team Leader can be anyone related to the project in some way or another. He/She may be a Site Engineer or a Design Engineer or a Construction Engineer or a Geotech Engineer or a Bridge Engineer who is involved in the project.

For the DPR the feasibility study needs to be done by a team of Design Engineer, Geotech Engineer, Surveyors, Site Engineers, Bridge Engineer and relevant officials from the forest department and the local government.

As for the Environmental Studies, if a detailed EIA is required by the nature of the project, then it must be carried out by an Environmental Specialist. If only an IEE is required, then it can be carried out by a relevant Engineer.

The geotechnical study needs to be carried out by a full-fledged Geotechnical Engineer if a detailed study is required. Otherwise, it can also be carried out by a relevant Engineer who has some experience in slope studies.

The topographical survey for the DPR must be carried out by an actual Surveyor. In the case of bridges, the survey can also be carried out by Engineers.

Then the field test especially the CBR test must be carried out by the Material Engineer or by an experienced Lab Technician.

The Road Designer is responsible for carrying out road geometry and pavement design and preparing relevant drawings and reports to guide the estimation as well as construction. Similarly, it is the Bridge Designer who carries out the bridge design and prepares relevant drawings and reports including Bar Bending Schedules.

With the designs and drawings completed, the BoQ and estimate for the project should be prepared. The preparation of estimates shall be done in collaboration between the relevant Site Engineers and Construction Engineers supported by the relevant Design Engineer and Engineer leading the preparation of the DPR.

The project execution plan must be prepared by the particular Team Leader of the DPR preparation team with support from the Site Engineer and Construction Engineer.

Finally, the DPR needs to be presented to the Departmental Coordination Committee and endorsed by the committee.

## **7. HOW LONG DOES IT TAKE TO PREPARE A DPR**

Preparation of a DPR involves a couple of different activities and these activities differ according to the type of project and the project size. Therefore, there is a no one for all formula that can calculate the time required for preparing a DPR. However, with few

DPRs being made in recent years, there is a rough idea of how long each activity in preparing a DPR takes. The table below gives a general idea and this table shall be used to determine the time required to prepare a DPR.

Table 1: Guide for fixing duration for preparing DPR for Road Activities

SN	Activity		Duration Required	Unit	Remarks
<b>1</b>	<b>Feasibility Study</b>				
Is a Feasibility Study Required?	Yes		$27 + (TL/3) + 0.2(TL/3)$	Days	Usually required for New Road Construction
	No		0	Day	
<p><b>Note:</b></p> <p>a) 27 days includes 5 days for map studies, 10 days for mobilization for feasibility, 5 days for moving to and from site and 7 days for report preparation</p> <p>b) TL= Sum of lengths of all proposed road alignment options in Km</p> <p>c) Assumed an average of 3 Km coverage per day during site visit based on past experiences</p> <p>d) 20% has been added for weather consideration during site visit</p>					
<b>2</b>	<b>Mobilization for Detailed Study</b>				
Mobilization Period			20	Days	Mobilization is required to coordinate necessary equipment as well as labors and other staffs
<b>3</b>	<b>Environmental Studies</b>				
Is a detailed EIA required?	Yes		13	Months	
	No		10	Days	An IEE shall be prepared by an engineer who visits the site
<p><b>Note:</b></p> <p>e) 13 months have been provided to prepare an EIA since the EIA needs to capture all 4 seasons and a month for document preparation</p>					
<b>4</b>	<b>Geotechnical Studies</b>				
Is a detailed Geotech Study Required?	Yes		$(30+10(u-1)) +30$	Days	Usually required if permanent landslide area falls on the proposed alignment
	No		10	Days	A brief Geotech study and report by an engineer who visited the site
<p><b>Note:</b></p> <p>f) u = No. of unstable areas</p> <p>g) 30 days for collecting samples and carrying out tests for one slide areas and additional 10 days for every additional slide has been assumed for calculating time required</p> <p>h) 30 additional days are provided for analysis, recommendation and report preparation</p> <p>i) Usually for geotechnical assessment, a time frame cannot be fixed since the assessment depends highly on the magnitude of the landslide. However, in case of preparing DPR for road works, the geotechnical works can be done simultaneously with other works. As for individual geotechnical project, the duration should be fixed based on expertise of a geotechnical engineer.</p>					

5 Topographical Survey				
Is topographical survey required	Yes	$12+L/0.3t+0.2(L/0.3t)$	Days	For new constructions and road improvement through widening
	No	0	Days	For road improvement through pavement
<p><b>Note:</b>  j) 12 days include 5 days for moving to and from site and 7 days for data fine tuning  k) L= length of the road in Km  l) t= No. of survey team  m) As per past experience, the rate of carrying out has been kept at 300m or 0.3 Km per day by one survey team</p>				
6 Detailed Geometric Design				
Is Road Geometry Design Required	Yes	$L/D+S+L/0.5D$	Days	For new constructions and road improvement through widening
	No	0	Days	For road improvement through pavement
<p><b>Note:</b>  n) L= Length of the road in Km  o) D= No of Designers involved  p) For Preliminary Design a rate of designing 1 Km per day by 1 designer has been given i.e., L/D  q) S= Days for design site verification and it shall be L/3 for new construction assuming 3 Kms can be covered in 1 day and L/6 for road widening assuming 6 Km verification can be done at site in a day  r) For Redesign and drawing and report generation after site verification, it has been given a rate of designing 0.5 Km per day by 1 designer i.e., L/0.5D</p>				
7 Pavement Design				
Is Pavement Design Required		16 or P+2	Days	Whichever is more
<p><b>Note:</b>  s) two activities need to be carried out for pavement design (traffic analysis and sample testing) and they can be carried out simultaneously so the duration should be the longer of the two activities  t) 16 days is assumed with 14 days for traffic count and 2 days for analysis and design  u) P = duration for sample testing and P = 4, 8, 12, 16..... days for road length ranges of 0-3, 3- 6, 6-9, 9-12, .....km respectively</p>				
8 Cost Estimation				
Cost Estimation including rate analysis		$14*C$	Days	
<p><b>Note:</b>  v) C = no of contract packages  w) Estimating for one contract package requires 2 weeks</p>				
9 Project Execution Plan				
Project Execution Plan		10	Days	

<b>10</b>	<b>Final Report Preparation</b>			
Report Preparation		10	Days	

### 7.1 New Road Construction

For new road construction, almost all activities that need to be included in a DPR are mandatory. However, some of the activities can be overlapped. Therefore, the required duration for the preparation of DPR for a new road construction project shall be the longest duration of the following options with a guide in Table 1:

<p><b><u>Option 1</u></b></p> <p>Duration = Feasibility Study + Mobilization + Environmental Studies + Cost Estimation + Project Execution Plan + Final Report Preparation</p> <p><b><u>Option 2</u></b></p> <p>Duration = Feasibility Study + Mobilization + Geotechnical Studies + Cost Estimation + Project Execution Plan + Final Report Preparation</p> <p><b><u>Option 3</u></b></p> <p>Duration = Feasibility Study + Mobilization + Topographical Survey + Detailed Geometric Design + Cost Estimation + Project Execution Plan+ Final Report Preparation</p>
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### 7.2 Road Improvement through Widening

Usually, existing roads are improved through widening. Thus, a feasibility study is not necessary for this type of activity. Apart from that, all other studies are required. Their extent may differ due to site or due to project size. Thus, to prepare DPR for a project of such nature, the longest duration of the following options with guidance from Table 1 shall be given as the duration:

<p><b><u>Option 1</u></b></p> <p>Duration = Mobilization + Environmental Studies + Cost Estimation + Project Execution Plan + Final Report Preparation</p> <p><b><u>Option 2</u></b></p> <p>Duration = Mobilization + Geotechnical Studies + Cost Estimation + Project Execution Plan + Final Report Preparation</p> <p><b><u>Option 3</u></b></p> <p>Duration = Mobilization + Topographical Survey + Detailed Geometric Design + Cost Estimation + Project Execution Plan+ Final Report Preparation</p>
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### 7.3 Road Improvement through Pavement

For road projects which focus only on pavement strengthening, activities such as feasibility studies, geotechnical studies, topographical surveys and geometric design are generally not required. Hence, the duration for preparing DPR for such a project shall be the longest of the following options with guidance from Table 1:

#### Option 1

Duration = Mobilization + Environmental Studies + Cost Estimation + Project Execution Plan + Final Report Preparation

#### Option 2

Duration = Mobilization + Pavement Design + Cost Estimation + Project Execution Plan + Final Report Preparation

### 7.4 Bridge Construction

For Bridge Construction, the studies that are required to be carried out remain the same, starting from Feasibility Study to Project Execution Plan and Final Report Preparation. However, the time period required for each study will differ. The optimum way to calculate the duration required for the preparation of DPR for bridge construction is as per the formula given below with the help of Table 2.

Duration = Feasibility study + Environmental Studies + Geotechnical Studies + Detailed Bridge Design + Cost Estimation + Project Execution Plan + Final Report Preparation

Table 2: Guide for fixing duration for preparing DPR for Bridge Construction

SN	Activity		Duration Required	Unit	Remarks
<b>1</b>	<b>Feasibility Study</b>				
	Feasibility Study		20	Days	
<b>Note:</b> a) 5 days for moving to and from site, 2 days for bridge location finalization, 5 days for verification, 4 days for survey and 4 days for final verification					
<b>2</b>	<b>Environmental Studies</b>				
	Environmental Studies		10	Days	An IEE shall be prepared by the engineer who visits the site
<b>3</b>	<b>Geotechnical Studies</b>				
	Is a detailed Geotech Study Required?	Yes	$15+(30+15(B-1)) +20$	Days	Usually required if the bridge is major or the site is not sturdy
		No	0	Days	

**Note:**

b) 15 days for mobilization

c) B = No. of bridges for which boreholes have to be made

d) 30 days for drilling boreholes, sampling and testing for one bridge and additional 15 days for every additional bridge for which boreholes need to be drilled

e) 20 additional days are provided for analysis, recommendation and report preparation

**4 Detailed Bridge Design**

Bridge Design		90* B/D	Days	
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**Note:**

f) B= No of bridges to be designed

g) 90 days for designing 1

h) D= No of Designers

**5 Cost Estimation**

Cost Estimation including rate analysis		20	Days	
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**6 Project Execution Plan**

Project Execution Plan		10	Days	
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**7 Final Report Preparation**

Report Preparation		10	Days	
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