

Rajendra



## Terms of Reference



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Melung Rural Municipality  
**Office of the Municipal Executives**

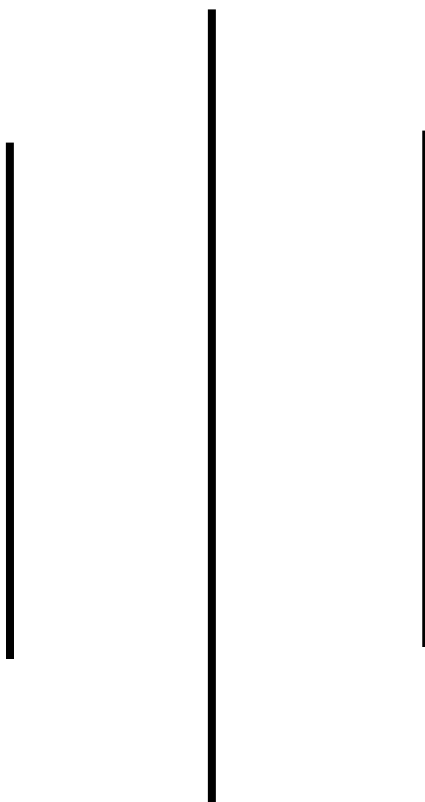
Bhedpu, Dolakha

3 No. Province, Nepal

**Terms of Reference**

**For**

**Detail Engineering Survey and Design of Rural Municipality's  
important Roads**



August, 2018



## 1. Background

Melung Rural Municipality invites sealed bids from eligible bidders for the Detail Engineering Survey and Design of Rural Municipality's important Roads listed below:

Name of roads and Locations

Contract No.	Name of Road	Location	Survey Length (Km)
3-2075/76	Melung Marga	Jor Pipal to Mangsire Khola	16.00
4-2075/76	Kakling Buddha Chok Marga	Mane danda to Dhande Khola	14.90
5-2075/76	Bhyakure Devi Marga	Bhyakure to Charange	6.00
6-2075/76	Satyaswor Marga	Simte to Thaldanda	5.60
7-2075/76	Lamatar Marga	Chautara Pakha to Baguwa	7.00
8-2075/76	Golegaun Marga	Rato Pati to Koiralabot	6.50
9-2075/76	Birauta Marga	Pauwa to Tinpipe	7.00

## 2. Objectives and Scope of work

The objective of the consulting services is to conduct a Detailed Engineering Survey of the proposed road, prepare Detailed Design and Cost Estimate for the construction of the road with appropriate packaging. The consultant is required to perform the following jobs.

- Detailed engineering survey of the alignment, and its corridor
- Conduct hydrological studies for cross drainage works and fixing of embankment height
- Design the road details in cooperation with Technical Section, Melung Rural Municipality
- Prepare working drawings
- Prepare quantity & cost estimates with analysis of rates
- Prepare survey and design reports
- Final layout survey

## 3. Execution of Consulting Services

### 3.1 General

Track opening in all of above roads have been completed and vehicles are plying on them. Therefore, there is no need of feasibility study and alignment selection. Although, in some section of the roads, grade is very high and in such places the alignment of road may be needed



to realign. The main objective of this survey works is to improve the geometric standard of existing earthen roads with longitudinal and cross drainage.

The consultant shall carry out the necessary field works along the road alignment. The team personnel to be mobilized for field work and schedule of field work should be included in the proposal. The centre line should be set out with proper establishment of Bench-Marks. The consultant shall then carry out further survey works necessary for detailed design of the road. The consultant shall be responsible for the analysis and interpretation of the data.

### **3.2 Working Team**

The working team for field and office works should necessarily consist of the following key personnel together with adequate supporting manpower.

- I. Highway/ transport engineer
- II. Engineering geologist
- III. Civil engineer
- IV. Hydrologist
- V. Senior Surveyor

### **3.3 Engineering Details**

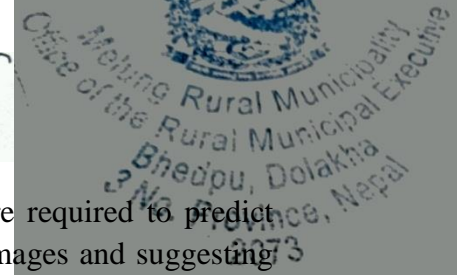
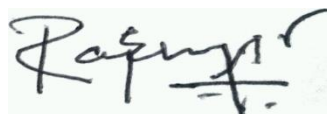
#### **3.3.1 Horizontal and Vertical Alignment of the Road**

The horizontal alignment of the road center line should be determined within the survey strip of proposed corridor of the optimum alignment between control points specified as a result of the engineering investigation. Where road track exists, efforts should be made to adjust the alignment so as to match the original road track wherever possible. Longitudinal sections should be taken at 10-25 m interval along the alignment and for cross- section, 2-5 m interval across the alignment from the center line depending upon the nature of the terrain, road curves. Beginning of curves, end of curves and then critical points as required should be fully defined relative to the station of the intersection points.

The vertical alignment should be determined with detailed calculation of earthwork quantities. Vertical curves should be properly designed. Earth work should be broken down in normal earthwork, E/W in side drain etc giving the quantity of E/W in per Km. Chainage-wise classification of soil is absolutely necessary.

Survey, Design and preparation of estimate shall be done as per "**Nepal Rural Road standard-2013**" published by DoLIDAR; "**Technical Guidelines on Planning, Design and Construction of Rural Roads-2005**" and "**Environmental and Social Management Framework-2004**" published by DoLIDAR.

#### **3.3.2 Consideration of environmental protection**



While designing the horizontal and vertical alignment, the consultant are required to predict damages to the environment and attempt to mitigate or minimize such damages and suggesting appropriate measures in design.

### 3.3.3 Liaison with engineer in- charge

The consultants are required to maintain close liaison with the engineer incharge. The consultant should coordinate with the engineer in-charge prior to commencement of detailed survey. Draft design proposals for alignment, earthwork and pavement design and other technical aspects of the design shall be discussed with the Engineer in-charge for approval prior to proceeding with the detailed design and drawings.


### 3.3.4 Engineering Drawings

The consultant will prepare the following plans and working drawings on suitable reproducible materials using the format and title sheets as required by the engineer in-charge.

- Map of district demarcation showing the location of the road.
- Map showing complete alignment with kilometer, names of area, land use, markets, grid lines, villages, VDC, municipality, name of natural drainage, obligatory pointsetc.
- Location map showing linkage of the road with surrounding road network.
- Map showing survey and design status of the complete road, intersection points (IP), Bench Marks (BM) and other reference points.
- Plan, profile (longitudinal section) and cross-section in the following scales

Plan	1:1000
Profile Horizontal	1:1000
Profile Vertical	1:100
Cross Sections	1:100

- Plans and profile of the road should contain details of geometry viz. horizontal alignment with coordinate of IP, deflection angle, IP to IP distance, curve data, chainage of IP etc, Index of IP, BM, KM posts etc, names of rural municipality, district, forest, land use pattern, cross-drainage structure, retaining walls required or as instructed by the engineer in-charge.
- Reference charts of all intersection points (IP), bench marks (BM) and other reference points.
- Resource map showing the location of proposed quarry sites for the locally available construction materials like sub-base material, gravel, sand, stone, chips,etc.
- Standard drawings of mentioned cross drainage structures, retaining/breast wall, side drain (lined/unlined), typical cross section of the road according to type of soil viz. HR, SR, BMS, passing zone (if provided), hairpin bend (if provided), etc.
- The consultant shall provide all above mentioned documents in both hard and soft copies.



- k) The consultant shall consult with the local peoples and submit the minutes of meetings and attach supporting photographs too.

### **3.3.5 Engineering Design Calculation**

All engineering design must be shown with calculation. The format should be described properly declaring the meaning and source of variable constants and multiplication factors should be referenced and justified.

## **4. Report**

The consultants shall submit hard and softcopies of the reports required as follows;

Draft report – 2 (Two) copies

Final report – 4 (Four) copies

The format of the reports should be as prescribed in this TOR (ANNEX I). However, the consultant must take prior approval of the outline of report from the engineer in-charge.

## **5. Time Schedule**

The consultant shall commence the work within one week from the date of signing agreement. The reports shall be submitted to the office as under

Draft report- within forty five (45) days from the date of signing agreement

Final report- within ten (10) days of receipt of office comments on the drafts report.

## **6. Use of Computer**

Consultants are encouraged to use computers and appropriate software. But the software to be used in the engineering design works must be approved in advance by the engineer in- charge. Further, prepared reports should contain adequate information on methodology adopted in the program, summarized flow diagram, description of formula used in the program, data required for input and the results obtained in output etc. The consultant should submit the soft copy of data alignment of the total output of the works.

## **7. Mode of Payment**

20% of contract amount payment shall be made upon submission of field report and data.

50% of contract amount payment shall be made upon submission of draft report.

30% of contract amount payment shall be made upon submission of final report incorporating all the comments from Technical Section and Rural Municipal Executives.

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## ANNEXES



## **ANNEX I REPORT FORMAT (CONTENTS)**

### **ACKNOWLEDGEMENT**

### **SYNOPSIS**

### **SALIENT FEATURES (See ANNEX II)**

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- 1.1. Introduction
- 1.2. Geomorphology & geology
- 1.3. Hydrology & Metrology

#### **2. GEOMETRIC DESIGN STANDARDS**

- 2.1. Road classification, traffic and loading (According to Nepal Rural Road standard, 2013)
- 2.2. Design speed
- 2.3. Horizontal curves
  - 2.3.1. Minimum radius of curve
  - 2.3.2. Super elevation
  - 2.3.3. Transit curves
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- 2.4. Vertical curves
- 2.5. Minimum radius
- 2.6. Gradient
- 2.7. Sight distance
- 2.8. Lateral and vertical clearance





2.9. Right of way

2.10. Traffic Sign posts

### **3. ALIGNMENT SURVEY**

3.1. Survey procedure

3.2. Alignment description

3.3. Benchmarks and other reference points

3.4. Materials survey

### **4. DESIGN**

4.1. Horizontal alignment

4.2. Vertical alignment

4.3. Cross-section design

4.4. Drainage

4.5. Pavement design

4.6. Culverts and minor bridge design

4.7. Retaining structure

4.8. Road side development

4.9. Measure for environment protection

4.10. Bio engineering measures.

### **5. QUANTITY SURVEY AND COST ESTIMATE**

5.1. Project costs

5.2. Summary of cost

5.3. Cost of site clearance

5.4. Cost of earth work

5.5. Cost of cross drainage works

5.7. Details of measurement



5.8. Bill of Quantity and tender documents

5.9. Quantity estimate of material & equipment

5.10. Manpower estimate

5.11. Analysis of rates

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5.13. Availability of manpower

## **6. CONCLUSIONS**

1.4. General conclusions

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## **7. DISCUSSIONS**

## **8. QUALITY ASSURANCE PLAN**

## **9. RCOMMENDATIONS**

## **10. REFERENCES**

## **11. APPENDICES**

## **12. TEAM DETAILS/USED EQUIPMENTS/SOFTWARES/SPREADSHEETS etc.**



## **ANNEX II SUMMARY OF SALIENT FEATURES**

### **1. NAME OF PROJECT**

### **2. LOCATION**

2.1. Geographical location

2.2. Geographical features

2.3. Terrain

2.4. Climate

2.5. Geology

### **3. CLASSIFICATION OF ROAD**

3.1 Classification

3.2 Surface

### **4. ALIGNMENT SURVEYED**

### **5. CROSS-SECTION**

5.1. Right of way

5.2. Formation width

5.3. Carriage way width

5.4. Shoulder width

5.5. Side drain shape and size

### **6. STRUCTURE**

6.1. Side Drains

6.1.1. Earthen (Unlined) Size & length

6.1.2. Dry Stone Drain Size & length

6.1.3. Cement Masonry Drain Size & length

6.1.4. Catch Drain Size & length

6.2. Culverts



6.2.1. Slab culverts Number and span

6.2.2. Pipe culvert Diameter and number

6.3. Bridge

6.3.1. Minor bridge Number and span

6.4. Retaining structures

6.4.1. Gabion walls Height range, thickness range and total length

6.4.2. Stone masonry Height range, thickness range and total length

6.4.3. Dry stone masonry Height range, thickness range and total length

## **7. VOLUME OF CONSTRUCTION**

7.1. Earth work Cutting and filling

## **8. PROJECT COST**

8.1. Net cost Total cost & rate per km.

8.2. Gross cost Total cost & rate per km.

## **9. PROJECT COST SUMMARY (See format in ANNEX III)**

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## ANNEX III PROJECT COST SUMMARY FORMAT

S.N	Major Headings	Unit	Quantity	Cost in NRs	Remarks
1	Construction cost				
	a) Earth work				
	i. Cutting	m3			
	ii. Filling	m3			
	b) Retaining structure (Dry, Gabion, Cement masonry)	m3			
	c) Drain & cross drain				
	i. Culvert	No.			
	ii. Cause way	No.			
	iii. Unlined drain	Rm.			
	iv. Dry stone drain	Rm.			
	v. Lined drain	Rm.			
	vi. Bridge with name & span				
	d) Environmental management cost as per EMAP.	Km			
	e) Equipment & spare parts	LS			
	f) Insurance cost				
	g) Quality assurance cost	LS			
	h) Project implementation supporting logistic cost	PS			
	i) Provisional sum for additional material testing				
	Sub Total				
	Value Added Tax @13%				
	<b>Grand Total</b>				

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**ANNEX IV FORMAT FOR SOCIAL AND ENVIRONMENTAL ACTION PLAN**

Date:

Name of Road:

Section:

S.N	Chainage	Location	Issues/Problems/ Difficulties	Mitigation measures recommended	Remarks
1	0+000				



## ANNEX V FINANCIAL PROPOSAL FOR DETAILED SURVEY AND DESIGN WORKS

Seal in separate Envelope

### Melung Rural Municipality Office of the Municipal Executives

Bhedpu, Dolakha  
3 No. Province, Nepal

#### Financial Proposal for Detailed Engineering Survey & Design works.

Name of Project:

F/Y: 2075/76

S.N	Description	Unit	Quantity	Rate (NRs)		Amount	Remarks
				In Figures	In Words		
1	Detailed Survey, Design and Cost Estimates with appropriate slicing in each road packages	Km					
	Sub- Total						
	Value Added Tax (@13%)						
	Grand Total						

Name of Firm:

Address:

Name of Authorized Person:

Authorized Sign and Seal of Firm

Date:

#### Activities covered by survey works are (but not limited to):

- Fixing of road alignment by setting out intersection point (IP) and intermediate points.
- Establishment of Bench Marks (BM) and other reference points.
- Taking Longitudinal section (LS) and cross section (CS) for LS 10-25 m depending upon the terrain and 2-5 m interval across the alignment from the centerline.
- Taking environmental details of the road corridor for EMAP.
- Conducting Chain Survey.

#### Activities covered by design works are (but not limited to):

- Calculate and plot the reduced ground level of longitudinal and cross section.
- Design the most economical road profile by balancing the volume of cut and fill to the nearest.
- Design horizontal and vertical curves.
- As per the engineering design, prepare the drawings of road's plan indicating the coordinate of IPs and profile (Longitudinal)



- Prepare the road's typical cross section with the pavement details.
- Design of appropriate road side structures.
- Prepare the drawings for above road side structures.
- Prepare locality map & resource map.
- Prepare Bill of Quantities
- Prepare Rate Analysis
- Prepare Cost estimate.
- Prepare the abstract of cost, Material and labor schedules.
- Prepare Quality assurance plan.
- Prepare Environment Management Action Plan (EMAP)
- Prepare project report by including the documents (design, drawings, BOQs, cost estimates and other) prepared for road.