Development Initiative for Northern Uganda - DINU

PREPARED FOR: UNITED NATIONS CAPITAL DEVELOPMENT FUND (UNCDF)

CONSULTING SERVICES: TECHNICAL ASSISTANCE TO THE DISTRICT LOCAL GOVERNMENTS OF ABIM, ADJUMANI, AMUDAT AND MOYO TO CARRY OUT REHABILITATION OF DISTRICT AND COMMUNITY ACCESS ROADS

Contract No. 016-01-2019

INCEPTION REPORT

APRIL 2019

SUBMITTED BY:

spea ENGINEERING group Atlantia

TB3 GLOBAL LIMITED

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DOCUMENT HISTORY

Document Title:	**Consulting Services: Technical Assistance to the District Local Governments of Abim, Adjumani, Amudat and Moyo to carry out Rehabilitation of District and Community Access Roads**		
Revision	**Description**	**Summary of revisions**	**Date issued**
00	Draft Inception Report	Draft 1	April 8th 2019
01	Inception Report	Draft 2	April 24th 2019
02	Inception Report	Final	April 29th 2019

LIST OF ACRONYMS

AADT	Average Annual Daily Traffic
BoQ	Bills of Quantities
CA	Contracting Authority
CAR	Community Access Road
DINU	Development Initiative for Northern Uganda
DLG(s)	District Local Government(s)
EDF	European Development Fund
EU	European Union
ESIA	Environmental and Social Impact Assessment
GDP	Gross Domestic Product
GoU	Government of Uganda
MELTC	Mount Elgon Labour Based Training Centre
MoLG	Ministry of Local Government
MoWT	Ministry of Works and Transport
NIP	National Indicative Programme
OPM	Office of Prime Minister
PPDA	Public Procurement and Disposal of Public Assets Authority
TA	Technical Assistance
ToR	Terms of Reference
UNCDF	United Nations Capital Development Fund

EXECUTIVE SUMMARY

The European Union through its 11th European Development Fund in collaboration with the Government of Uganda has launched the Development Initiative for Northern Uganda (DINU), an integrated development programme which aims at addressing the key development challenges in the Northern Uganda. One of the key development strategies is to enhance the transport infrastructure in northern Uganda. DINU will implement activities aimed at unlocking trade within the region, country, and with neighbouring countries through the improvement of transport infrastructures.

The European Union (EU) is funding the project through UNCDF. UNCDF has contracted SPEA ENGINEERING and TB3 GLOBAL LIMITED Joint Venture Consultants, to provide consulting services for Technical Assistance to the District Local Governments (DLGs) of Abim, Adjumani, Amudat and Moyo to carry out Rehabilitation of District and Community Access Roads.

The detailed assignment will involve review and update of the feasibility study report and preliminary designs, preparation of the detailed engineering designs, drawings, tender documents, and confidential cost estimates for the selected roads; and provide tender assistance during procurement of the civil works by the District Local Governments (DLGs)

The Consultant is expected to submit an Inception report within one (1) month of commencement of the assignment. The Consultant has carried out site visits to all the thirty-three (33) roads in the four districts and made some preliminary findings reported in the road condition assessment with major concerns being the rock outcrops, steep slopes, seasonal rivers, serious drainage considerations and insufficient water sources for road works. Consultative meetings were also held with District Local Government officials and majorly the issues of concern were the need for involvement of communities, sensitization; and social, environmental concerns.

This report is submitted to give an account of the consultant's preliminary findings of the assignment, the staff mobilization so far, the planed methodology of executing the design and tender phases as well as the anticipated risks and mitigation measures of the project

1 INTRODUCTION

The European Union under DINU project has contracted the services of SPEA/TB3 Global Ltd to undertake the detailed design of 33 Community Access and district road sections totaling to 405Kms in the four districts of Moyo, Adjumani, Abim and Amudat within Northern Uganda in an effort to consolidate stability in northern Uganda, eradicate poverty and under nutrition, and strengthen the foundation for sustainable development.

Following the feasibility study and identification of 33 District and community access roads (CAR) under study for open up and rehabilitation in the districts of Moyo, Adjumani, Abim and Amudat respectively, there was need to review and conduct a detailed design on the identified roads. This inception report therefore is the first output that aims at harmonizing our proposed approaches and methodology to use while executing this assignment as per the terms of contract.

1.1 PROJECT BACKGROUND

The Government of Uganda and EU Delegation have prepared the National Indicative Programme (NIP) for 11th EDF cooperation with Uganda for 2014 -2020. Within this program the proposed focal sectors of EU intervention were agreed as: (i) Food Security and Agriculture, (ii) Transport infrastructures, and (iii) Good Governance.

One of the activities related to the focal sector (ii) Transport Infrastructure, is the rehabilitation of the district community access roads within selected disadvantaged districts of the Northern Uganda, Technical Assistance support to the districts and capacity building in the road maintenance and road assets management. This area of intervention in the transport sector has been included, as one of the components, within the EU flagship programme for Northern Uganda referred to as "Development Initiative for Northern Uganda, the programme will focus on the sub regions of West Nile, Acholi, Lango, Teso and Karamoja with the aim of consolidating stability in Northern Uganda, eradicating poverty and under-nutrition and strengthening the foundations for sustainable and inclusive socio-economic development.

The United Nations Capital Development Fund (UNCDF) has been assigned to implement this component through a delegation agreement with the EU signed in December 2017.

The Transport Infrastructure component will involve the rehabilitation of district and community access roads, aimed at ensuring all weather accessibility to social economic activities within the targeted districts. A selection of the districts for the intervention was conducted during the identification phase and four districts were selected as: Abim, Adjumani, Amudat, and Moyo.

During the preparation stage of the component, the identification and selection of the priority roads to be rehabilitated within the selected districts, as well the feasibility and preliminary design were carried out. The project identification (Phase A) and the feasibility study and preliminary engineering design reports (Phase B) were completed.

The selected and prioritized district and community access road sections are 33 road sections totalling 405 km as indicated in ***Table 1*** to ***Table 4***.

In **Adjumani District** the following 11 road sections with a total length of 122.44 km were selected:

Table 1 Road Sections In Adjumani District

Ranking No	Road Name	Length (km)	Road Category	Road Class	Level of Service
1	Eleukwe-Ajujo	7.98	CAR	3	all-season full access
2	Ofua TC-Pakwinya	8.16	CAR	---	all-season full access
3	Kureku-Bira Via Fuda	9.27	District Road	1	all-season full access
4	Unna-Miniki	13.30	District Road	---	all-season full access
5	Mungula junction -Zoka	12.94	District Road	1	all-season full access
6	Pacara-Ogujebe	11.34	District Road	1	all-season full access
7	Adjugopi-Miniki	3.57	District Road	2	all-season full access
8	Adjugopi-Nyeu	24.49	District Road	1	all-season full access
9	Ayiri-Massa	5.71	CAR	---	all-season full access
10	Magburu P/S-Kobo landing site	9.46	CAR	3	all-season full access
11	Loa-liri loop	12.22	District Road	2	all-season full access

In **Moyo District** the following 12 road sections with a total length of 140.81 km were selected:

Table 2 Road Sections In Moyo District

Ranking No	Road Name	Length (km)	Road Category	Road Class	Level of Service
1	Laropi – Palorinya	18.55	District Road	2	all-season full access
2	Dongo – Morobi - Kotchi Boma	10.21	CAR	2	all-season full access
3	Mawa Rd - Orokombaa	3.18	CAR	2	all-season full access
4	Laropi – Paanjala	18.37	District Road	---	all-season full access
5	Obongi SS - Gango	8.24	CAR	2	all-season full access
6	Metu – Gbari	21.54	District Road	2	all-season full access
7	Amua – Abeso	18.68	District Road	2	all-season full access
8	Aluru – Palorinya	17.17	District Road	2	all-season full access
9	Metu-Ayaa	6.74	District Road	2	all-season full access
10	Celecelea -Lama- Gbalala	11.92	District Road	2	all-season full access .
11	Lomunga –Rupo	3.38	CAR	---	all-season full access
12	Opiro-Orokombaa	2.82	CAR	2	all-season full access

In **Abim District** the following 6 road sections with a total length of 92.91 km were selected:

Table 3 Road Sections In Abim District

Ranking No	Road Name	Length (km)	Road Category	Road Class	Level of Service
1	Alerek-Katabok-Lotuke	41.11	District Road	I	all-season full access
2	Abuk-Awach	16.13	District Road	I	all-season full access .

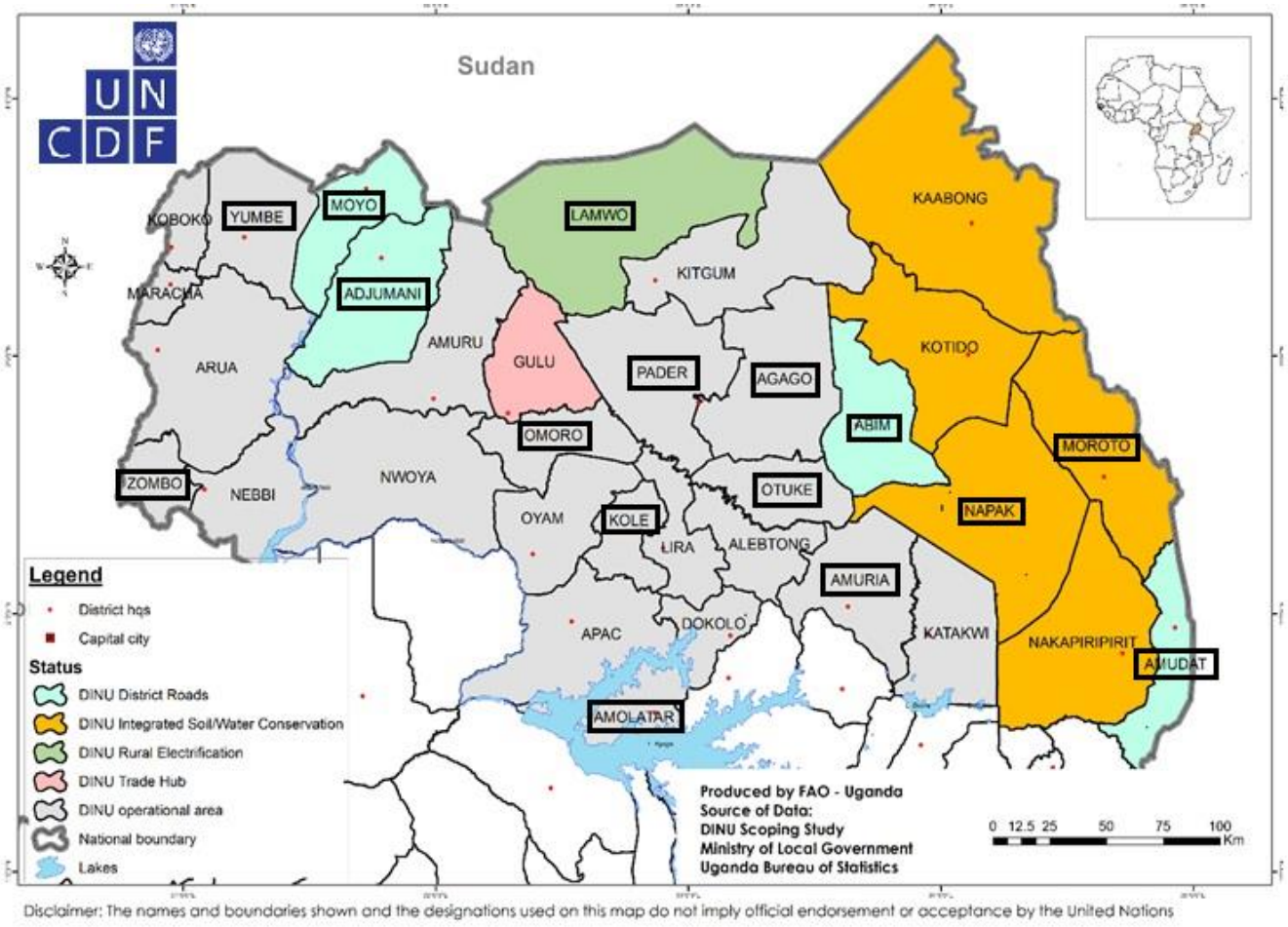
Ranking No	Road Name	Length (km)	Road Category	Road Class	Level of Service
3	Atunga-Koya	8.59	District Road	I	all-season full access
4	Adea-Nyarkidi	8.00	CAR	III	all-season full access
5	Aninata-Adwal	11.04	District Road	I	all-season full access
6	Alerek-Kathimongor-Kagrui	7.85	District Road	I	all-season full access

In **Amudat District** the following 4 road sections with a total length of 46.68 km were selected:

Table 4 Road Sections In Amudat District

Ranking No	Road Name	Length (km)	Road Category	Road Class	Level of Service
1	Uingeresa - Achorichor	9.32	District Road	I	all-season full access
2	Lopedot - Nakipom	6.98	District Road	I	all-season full access
3	Katawar - Katabok	15.40	District Road	I	all-season full access
4	Karita - Naporokocha-Moruajore	16.98	District Road	III	all-season full access

1.2 LOCATION MAP



1.3 PROJECT DETAILS

1	**Project Name**	Consulting Services: Technical Assistance to the District Local Governments of Abim, Adjumani, Amudat and Moyo to carry out Rehabilitation of District and Community Access Roads
2	**Location**	Abim, Adjumani, Amudat and Moyo
3	**Employer**	United Nations Capital Development Fund
4	**Financier**	European Union
5	**Consultant**	Spea Engineering (Leader) TB3 Global Limited (Partner) Joint Venture
6	**Date of Contract Signature**	20th February 2019
8	**Commencement date**	8th March 2019
9	**Contract Period**	12 Months
10	**Contract Amount**	USD 373,700

1.4 Objectives of Assignment

The overall objective of this assignment is to provide Technical Assistance (TA) to the District Local Governments of Moyo, Adjumani, Abim and Amudat in the review of the feasibility study report and preparation of detailed designs, and tender assistance for the District and Community access roads.

The specific objective of the assignment is to review and update of the feasibility study report and preliminary designs, preparation of the detailed engineering designs, drawings, tender documents, and confidential cost estimates for the selected roads; and provide tender assistance during procurement of the civil works.

1.5 Scope of Services, Expected Output and Target Completion

Working under direct supervision of Client in close collaboration with the Ministry of Works and Transport (MoWT), Ministry of Local Government (MoLG) and the beneficiary District Local Governments (DLG's), the Consultancy firm will review and update the Feasibility Study Report and preliminary designs, prepare detailed engineering designs, drawings, tender documents, and confidential cost estimate for the selected roads; and provide tender assistance.

1.6 Phase A: Detailed Engineering Designs

The TA shall during this stage:

- Review and update the feasibility study and preliminary engineering design report;
- Based on (i), undertake detailed road condition surveys that will determine the required scope and scale of works and enable the roads to be designed to the required engineering standards. This includes review of the road geometry, bridge design, pavement design; and drainage design among others; this includes but not limited to geometric survey of the roads' routes, the surrounding areas up to 15 m on both sides and the catchment areas, also includes the geological survey that should be conducted by an accredited engineering laboratory.
- Investigate flooding or other factors causing full or partial closure of the road and determine the necessary remedial measures;
- Identify new, repairable or replacement of major drainage structures, bridges or concrete box culverts which will require hydraulic and/or structural design;
- Carry out an environmental, and social screening exercise jointly with the District Environmental Officer in close collaboration with MoWT Environmental and social Liaison Officers and in accordance with the District Road Works Manual of 2004;
- Investigate the unit costs of labor-based/mechanized works in the locality;
- Identify existing or new sources of gravel and the modalities and costs of extraction;
- Prepare A3 size strip maps to a scale of 1:1000, showing the location of the principal road works activities including but not limited to: horizontal plans of the existing situation and the proposed roads alignments, vertical profiles for the whole length of the roads, and detailed cross sections to show new and replacement pipe culverts; new or reinstated side drains, miter drains and scour checks; areas of cut or fill; partial or full gravelling; major drainage structures; any amendments to the vertical or horizontal alignment; and gravel pit locations;
- Undertake the hydraulic design of drainage structures serving catchments in excess of 15 sq. km;
- Assemble standard cross section and drainage structure details appropriate to the anticipated works;

- Prepare schedules of environmental mitigation measures including requirements relating to the opening and full or partial reinstatement of gravel pits;

1.7 PHASE B: TENDER ASSISTANCE

The TA shall during this stage:

- Prepare sets of tender documents, using standard formats as per MoWT General specifications; Letter of Invitation; Form of Tender; General Conditions of Contract; Special Conditions of Contract; Standard Specification for Labor-based/Mechanized Works; Special Specifications; Strip Maps; Standard Drawings; Contract Specific Drawings; and Bills of Quantities;
- Prepare an Engineer's estimate for the works contracts;
- Assist prepare clarifications to tenderers for the contracting authority to issue to tenderers;
- Attend and participate in pretender meetings;
- Attend and participate in the conduct of site visits organized by supervisor/contracting authority;
- Participate in bid opening;
- Participate in the evaluation of tenders; and
- Prepare contract agreements for signature of the contracting authority.

1.8 EXPECTED OUTPUTS

The expected outputs to be delivered, and when should they be completed is summarized in Table 5.

Table 5 Expected Outputs

Report	Due Dates (After start Date)
1. Inception Report	1 month
2. Monthly Progress Reports	Monthly by the 10th day of the following month
3. Engineering Design Report	6 months
a. Geotechnical Report	4 months
b. Environmental and Social Impact Assessment Report	4 months
c. Topographic and geological Survey Report	4 months
4. Tender Action	12 months
a. Pre-Bid Meeting Report	1 week after the pre-bid meeting.
b. TA's Revised Cost Estimate	Bid submission date
c. Bid Evaluation Report	2 weeks after bid submission
d. Negotiation Report	1 week after negotiations
e. Construction Contract	2 weeks after negotiations
f. Final Report and Presentation to Project Team – Summary of Accomplishments, Best Practices, Lessons Learned and Recommendations / Risk Management Measures for Implementation	At the signing of the works contract.

2 CONSULTANT'S MOBILIZATION STATUS

2.1 STAFF MOBILIZATION

The schedule of the Consultant's staff mobilization for the study is as indicated in ***Table 6***.

Table 6 Consultant's Team Of Experts On The Project

Position	Name	Status
Team Leader/ Senior Project Engineer	Pietro Zelante	Mobilized
Deputy Team Leader/Civil Engineer	Turihohabwe Alex	Mobilized
Materials /Pavement Engineer	Dennis Adrole	Mobilized
Land Surveyor	Tusiime Maureen (she replaces Waseni George)	Mobilized
Environmentalist	Karumuna Rollanda	Mobilized
Sociologist	Ainebyona Andrew	Mobilized
Hydraulic Expert	TBN	To be mobilized in May 2019
CAD Specialist	TBN	To be mobilized in May 2019
Tender Specialist	TBN	To be mobilized in May 2019
Quality Assurance	TBN	To be mobilized in May 2019

After the mobilization, the team started executing the proposed methodology as agreed upon by undertaking the data collection, review of the feasibility study and preliminary design report.

The specific staffing plan is given in ***Table 7***.

Table 7 Consultant's Specific staffing Plan

Position	Name	Man Months	M+1	M+2	M+3	M+4	M+5	M+6	M+7	M+8	M+9	M+10	M+11	M+12
Team Leader/ S P E	Pietro Zelante	7												
Deputy Team Leader/CE	Turihohabwe Alex	4												
Materials /Pavement Eng.	Dennis Adrole	6												
Land Surveyor	Tusiime Maureen	3												
Environmentalist	Karumuna Rollanda	3												
Sociologist	Ainebyona Andrew	3												
Hydraulic Expert	TBN	2												
CAD Specialist	TBN	3												
Tender Specialist	TBN	2												
Quality Assurance	TBN	3												
Total		**36**												

Full Time

Intermittent

2.2 EQUIPMENT MOBILIZATION

The following equipment have been provided by the Consultant for the project implementation:

- Fully equipped Office – The Consultant is presently using the offices in Kampala located at Plot 102, Sir Apollo Kaggwa road, Makerere - Kikoni.
- Hand Held GPS- The consultant also mobilized hand held GPS with Cameras, five 5 Montana Garmin 650 and five (5) Oregon 650.
- RTK Surveying machines 4no.
- Procurement of Auto Civil 3D licensed version.
- Four (4) Toyota Land Cruiser field vehicles in good condition.
- DCP/DPL Equipment
- Hand Held Measurement tools
- Safety Wear
- Road Safety Signage

2.3 DOCUMENT COLLECTION

The Consultant submitted to the Client a detailed list of documentation to be collected:

1. Adjumani district Five-Year District Development Plan 2015/2016-2019/2020;
2. Adjumani district Annual Work Plan July 2018/June 2019
3. Adjumani district Annual work plan July 2019/June 2020;
4. Adjumani District, Urban and Community Access Road Conditional and Traffic Data
5. Moyo District Five – Year District Development Plan 2015/2016-2019/2020;
6. Moyo Annual work plan July 2018/ June 2019;
7. Moyo Annual Work Plan July 2019/ June 2020;
8. Moyo District, Urban and Community Access Road Conditional and Traffic Data.
9. Abim district five Years District Development Plan 2015/2016-2019/2020;
10. Abim district Annual work plan July 2018/ June 2019;
11. Abim district Annual work plan July 2019/June 2020;
12. Abim District, Urban and Community Access Road Conditional and Traffic Data
13. Amudat district Development Plan 2015/2016-2019/2020;
14. Amudat district Annual Work Plan July 2018/June 2019;
15. Amudat district Annual Work Plan July 2019/ June 2020;
16. Amudat District, Urban and Community Access Road Conditional and Traffic Data.
17. Design Standards and Specifications for Low Volume traffic roads 2018
18. Geometric, Pavement, Drainage Design manuals 2004 & 2005
19. District and Community Access roads Design Manuals;
20. The Public Procurement and Disposal of Public Assets (PPDA) Act 2003 and Regulations, 2014.
21. Previous preliminary designs and Feasibility report of 33 roads;

i) Survey field data and reports,
ii) Hydrological data and reports,
iii) Geotechnical/Materials/Pavement data and reports,
iv) Horizontal - vertical -Cross sections drawings,
v) Environmental & Social Impact Assessment reports,
vi) Strip maps

22. Other documents of similar projects that have been carried out in the project districts;

Below the scheme of the documents received so far:

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+---01 - Road Design Manual
|       Volume 1 Geometric design manual.pdf
|       Volume 2 Drainage Design Manual.pdf
|       Volume 3 Part I Flexible Pavements Manual.pdf
|       Volume 3 Part II Rigid Pavements Manual.pdf
|       Volume 3 Part III Gravel Roads Manual.pdf
|       Volume 3 Part IV Pavement Rehabilitation Manual Cover.pdf
|       Volume 4 Bridge Design Manual.pdf
|
+---02 - District Roads Manuals
|       Vol 1 Man A - Planning (functional road classification n route numbering).pdf
|       Vol 1 Man B - Planning (ADRICS).pdf
|       Vol 1 Man C - Planning (RAMPS).pdf
|       Vol 1 Man E - Planning (GPS mapping).pdf
|       Vol 2 Man A1 - Contract Docs (Rehab, periodic maintenance and minor works).pdf
|       Vol 2 Man A2 - Tech specs (Rehab, periodic maintenance and minor works).pdf
|       Vol 2 Man A3 - BOQs.pdf
|       Vol 2 Man A4 - Unit rate analysis.pdf
|       Vol 3 Man A - Contract Mgt and Admin.pdf
|       Vol 3 Man B - Quarterly progress reports.pdf
|       Vol 4 Technical Man A - Tech manual.pdf
|       Vol 4 Technical Man B - Standard design manual.pdf
|       Vol 5 Man A - Policy Doc.pdf
|       Vol 5 Man B - Env. Guidelines.pdf
|       Vol 5 Man C - Gender Guidelines.pdf
|       Vol 5 Man D - HIVAIDS Guideines.pdf
|       Vol 5 Man E - OHWS Guidelines.pdf
|       Vol 5 Man G.- Guidelines for selection and prioritization.pdf
|
+---04 - Low Volumes Roads
|       Low Volume Roads - Bituminous Surfacing.pdf
|       Low Volume Roads - Earthworks and Pavement Layers.pdf
|       Volume V - Low Volume Sealed Roads.pdf
|
+---05 - Other MoWT specs
|       Road Maintenance Management Manual.pdf
|       Road Maintenance Specifications.pdf
|       Road Project Implementation Manual.pdf
|
+---06 - General Specifications for Roads and Bridges
|       New APPENDIX A.pdf
|       New APPENDIX B.pdf
|       New Series 1000.pdf
|       New Series 2000.pdf
|       New Series 3000.pdf
|       New Series 4000.pdf
|       New Series 5000.pdf
|       New Series 6000.pdf
|       New Series 7000.pdf
|
\---07 - Other institutions (international)
    +---01 - Massachusetts Department of Environmental Protection
    |       Unpaved Roads mannual.pdf
    |
    +---02 - SANRAL (South Africa)
    |       GDGChapter3.pdf
    |
    \---03 - Queensland (Australia)
            Road Planning and design Mannual.pdf
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3 SITE RECONNAISSANCE

The Consultant visited all road sections in the project Districts accompanied by the District Engineers and their team from 18th to 28th March, 2019. Start and end point of every road sections were identified in collaboration with District Engineers. Data and information about the current situation of the vertical and horizontal road alignments, cross sections, condition of drainage elements (side channels, pipe culverts, drifts, etc.), condition of the existing pavements, location of flood prone areas, etc. were captured and summarized as presented in chapter 4.

During the same period, the Consultant carried out consultations with some of the stakeholders in the Districts. Outcome of the meetings are summarized below. Minutes of the meeting are attached as **Annex 2-5** to this report.

3.1 ADJUMANI DISTRICT

The Consultant Team, OPM, UNCDF and MoWT Technical team, District Administrative, Technical and Political teams were part of this meeting that took place on 19th March, 2019. This meeting was aimed at involving the district team both political and technical in the procedure and launching the programme of the roads to be rehabilitated.

The aim of the site visits was to assess the conditions of the roads and suggest preliminary remedial measures. It also involved collecting some data to guide inception report for findings for road conditions. It was carried out for 11 road sections with a total of 122.44km.

Issues that were mentioned include:

- Involvement of Local Content
- Training at MELTC for District Local Team
- Delayed start of the project
- Cases of compensation
- Issues of material availability (gravel, water)
- Issues of borrow pits (protection, access, use for water catchments)
- Sensitization of communities on project and different requirements
- Participatory character for all stakeholders
- Timely submission of reports and checks
- Contractor to be procured by the Local District team
- Auditing to be done routinely by different teams
- Issues of weather patterns
- Inclusion of maintenance cost in the work plans and budgets
- Project should be aimed at Environmental protection
- Gender balance in different fields

Solutions suggested:

- Construction of boreholes, valley tanks for water source
- Catch water drains
- Use of relief drains
- Tree planting along the road reserves for the community
- Geotechnical knowledge (look for an intersecting point)
- Changing alignment.

3.2 MOYO DISTRICT

The Consultant Team, OPM, UNCDF and MoWT Technical team, District Administrative, Technical and Political teams were part of this meeting that took place on 20th March, 2019. This meeting was aimed at involving the district team both political and technical in the procedure and launching of the roads to be rehabilitated.

The aim of the site visits was to know the conditions of the roads and suggest approach measures. It also involved collecting some data to guide inception report for findings for road conditions. It was carried out for 12 road sections with a total of 140.81 km.

Issues that were mentioned include:

- Involvement of local content
- Training at MELTC for district local team
- Delayed start of the project
- Flooding, accidents, deaths, limited mobility
- Cases of compensation
- Issues of material availability (gravel, water)
- Issues of borrow pits (protection, access)
- Sensitization of communities on project and different requirements
- Participatory character for all stakeholders
- Timely submission of reports and checks
- Contractor to be procured by the Local District team
- Auditing to be done routinely by different teams
- Issues of weather patterns
- Inclusion of maintenance cost in the work plans and budgets
- Project should be aimed at Environmental protection
- Vices such as rape, theft, alcoholism, drug abuse, Gender-based violence

Solutions suggested:

- Construction of boreholes, valley tanks for water source
- Catch water drains

- Changing alignment
- Use of concrete instead of rock blasting
- Sensitizing
- Training skilled, semi-skilled labour
- Team work
- Tree planting along the road reserves for the community
- Geotechnical knowledge (look for an intersecting point)
- Changing alignment
- Gravity flow schemes

3.3 ABIM DISTRICT

The Consultant Team, OPM, UNCDF and MoWT technical team, district administrative, technical and political teams were part of this meeting that took place on 26th March, 2019. This meeting was aimed at involving the district team both political and technical in the procedure and launching of the roads to be rehabilitated.

The aim of the site visits was to know the conditions of the roads and suggest approach measures. It also involved collecting some data to guide inception report for findings for road conditions. It was carried out for 6 road sections of 92.91km.

Issues that were mentioned include:

- Involvement of local content
- Training at MELTC for district local team
- Delayed start of the project
- Flooding, accidents, deaths, limited mobility
- Cases of compensation
- Issues of material availability (gravel, water)
- Issues of borrow pits (protection, access)
- Sensitization of communities on project and different requirements
- Participatory character for all stakeholders
- Timely submission of reports and checks
- Contractor to be procured by the Local District team
- Auditing to be done routinely by different teams
- Issues of weather patterns
- Inclusion of maintenance cost in the workplans and budgets
- Project should be aimed at environmental protection
- Issue of different projects ongoing, this project and the valley dam construction

Solutions suggested:

- Construction of boreholes, valley tanks for water source
- Catch water drains
- Use of concrete instead of rock blasting
- Sensitizing
- Training skilled, semi-skilled labor
- Team work
- Tree planting along the road reserves for the community
- Geotechnical knowledge (look for an intersecting point)
- Changing alignment

3.4 AMUDAT DISTRICT

The Consultant Team, OPM, UNCDF and MoWT Technical team, District Administrative, Technical and Political teams were part of this meeting that took place on 27TH March, 2019. This meeting was aimed at involving the district team both local and technical in the procedure and launching of the roads to be rehabilitated.

The aim of the site visits was to know the conditions of the roads and suggest approach measures. It also involved collecting some data to guide inception report for findings for road conditions. It was carried out for 4 road sections with a total of 46.68km.

Issues that were mentioned include:

- Involvement of local content
- Training at MELTC for district local team
- Delayed start of the project
- Flooding, accidents, deaths, limited mobility
- Cases of compensation
- Issues of material availability (gravel, water)
- Issues of borrow pits (protection, access)
- Sensitization of communities on project and different requirements
- Participatory character for all stakeholders
- Timely submission of reports and checks
- Contractor to be procured by the Local District team
- Auditing to be done routinely by different teams
- Issues of weather patterns
- Inclusion of maintenance cost in the work plans and budgets
- Project should be aimed at environmental protection

Solutions suggested:

- Construction of boreholes, valley tanks for water source
- Catch water drains
- Sensitizing
- Training skilled, semi-skilled labor
- Team work
- Tree planting along the road reserves for the community
- Geotechnical knowledge (look for an intersecting point)
- Changing alignment

4 INITIAL FINDINGS

4.1 ADJUMANI DISTRICT

Table 8 Preliminary Findings and Challenges for Adjumani district

Unna-Miniki Road (13.3km): This road begins from Unna, via Unna Market and Trading Centre and ends at Miniki. Out of 13.3 km, 12 km is motor-able with a width of ranging from 2.0m-7.5m and the rest is a foot path. Detailed design of the road will hence connect Unna and Miniki 100%. Otherwise it serves Unna P/S,Unna T/Centre and market. Road also crosses Miniya stream at 8km (3*900 via culvert crossing) **Challenges** • Rock outcrops (km 3-6), km 7.2-8.1, km 9-9.2, along the road corridor; and • No drainage structures at most catch basins. **Proposed solutions** • Rock blasting required; and • Design for drainage structures.	 *Figure 1: Rockout crops along road corridor*  *Figure 2:Eroded road section(impassable)*
Adjugopi-Nyeu Road (24.49km): This road begins from Olia, via Onigo Trading Centre and ends at Nyeu. It passes through Pachara and Dzaipi Sub-Counties. The 24.49km road is all through motor-able with widths ranging from 4.5-7.5m. The road serves a number of facilities including Miniki P/S, Elema H/Centre, Elema P/S. **Challenges** • Rock outcrops(km 0-2, km 7.8-7.9) all along the road corridor; • Broken and silted culverts; • Damaged river crossing (Culverts and slab) at river Asisi; • Low lying section (km 14-20.9)-flood prone along river Nile banks; and • Under-designed Culvert crossings (between km 14-23). **Proposed solutions** • Rock blasting; • Design for drainage structures; and • Raise road profile during geometric design.	 *Figure 3: Stream crossing without headwalls*  *Figure 4: Road surface*

Adjugopi-Miniki Road(3.57km): This road begins from Ringa village and ends and ends in Miniki, traversing Dzaipi sub-county. **Challenges** • Iradji stream crossing-2*1500mm steel culverts, narrow (4.5m)-at km 2.0; and • Seasonal swamp (km 3.0). **Proposed solutions** • Design for drainage structures; and • Raise road profile during geometric design.	 *Figure 5:Borrow pit along the road*
Pacara-Ogujebe road (11.34km); This road starts from Eleukwe and ends in Ogujebe. It is a District road of 12 km with a road width of 6m including shoulders. It is earth surfaced with fair side drains. It has a vented drift as a major drainage structure which is in a bad condition and requires replacement **Challenges** • Damaged Robibire seasonal stream crossing (km 3.1); and • Flood zone (km 7.05-7.15). Raise road and design for BC crossing. **Proposed solutions** • Design for drainage structures; • River training both up and downstream; and • Consider shifting alignment.	 *Figure 6: Damaged stream crossing at Robibire stream*
Eleukwe-Ajujo Road (7.9km); This road starts from Eleukwe and ends in Ajujo. It has no major drainage structure; the road is still in a fair condition. It traverses Pacara Sub County. **Challenges** • Road under construction-challenge to Surveyors with picking levels which may change as road works are ongoing.	
Kureku-Bira via Fuda road (9.27km); This road starts from Kureku and ends in Bira via Fuda. It traverses Ofua and Pakele sub counties. **Challenges** • No drainage structures along the road; and • Rock outcrops (km 4.6) within the road corridor. **Proposed solutions** • Design for drainage structures; and • Rock blasting.	 *Figure 7: Rock outcrops along the road*

Ofua T.C-Pakwinya road (8.16km); This road starts from Guruguru and ends in Pakwinya. It has a single span suspended concrete bridge as a major drainage structure which is in a fair condition. The road is in a poor condition. It traverses Ofua Sub County.

Challenges

- Narrow road-1-2.5m width at (km 2-4.5);
- Gulley erosion (km 2.8-3.1);
- Corrugations;
- Seasonal Stream without a drainage structure at km 4.6; and
- Heavily eroded approach. Impassable road section.

Proposed solutions

- Widen road during design;
- Design for drainage structures;
- Consider alignment diversion; and
- River training.

Figure 8: Eroded Stream approach(km 4.6)

Loa-Liri loop road (12.2km); This road starts from Loa and in Liri. The road is generally in a fair condition. It traverses Ukusijoni and Itirikwa Sub Counties.

Challenges.

- Rock outcrop sections within the road corridor (km 1.6-2.4, km 3.3, km 3.7, km 7.3, km 7.6, and km 9.7.

Proposed solutions

- Rock blasting.

Figure 9: Rock outcrops along the road(km 1.6-2.4)

Magburu P/S-Kobo Landing site (9.46km); This road starts from Magburu and ends in Kobo. It has a vented drift as a major drainage structure which is in a poor condition. The road is in a poor condition. It traverses Ciforo Sub County.

Challenges

- Rock outcrops (km 0.8, km3.6, and km7.5);
- 300m long swamp (towards river Nile);
- Broken culverts; and
- Rocky surfaces.

Proposed solutions

- Rock blasting;
- Design of drainage structures; and
- Align rocky surfaces with concrete.

Figure 10: Rock outcrops along the road and broken & exposed culverts

Mungula Junction- Zoka Road (12.94km); This road starts from Orungwa and ends in Zoka. The road has two major drainage structures which include two reinforced concrete bridges at Itirikwa river and a wide stream (8m wide) traverses Itirikwa Sub-County.

Preliminary Environmental Issues envisaged in Adjumani	• Blasting of rock boulders along the roads to be rehabilitated will lead to flying stones which are threat to both workers and the general public. • Loss of biodiversity especially flora species along the road widening areas. • Road construction equipment and vehicles will generate dust, a health nuisance to the public. • Vehicular emissions for instance carbon monoxide whilst equipment and vehicles are running. • Animal kills particularly small rodents as well as accidental knock down of domesticated stray animals. • Change of land use. • Destruction of flora biodiversity will result into loss of habitats especially for birds. • Microclimate modifications as a result of increased vegetation clearing and gaseous emissions. • Vibration impacts – running of equipment like compactors will result vibrational impacts to the public. • Impacts accruing from exhuming corpses from the graves. • Issues relating to land wrangles. • Potential occurrences of accidents due to vehicular movements. • Generation of noise beyond the permissible levels. • Social vices arising from workers' camps. Soil and water contamination accruing from fuel/oil leakage.

4.2 MOYO DISTRICT

Table 9 Preliminary Findings and Challenges for Moyo district

Opiro-Orokombaa road (2.82km); This road starts from Opiro and ends in Ramogi. The road surface is in a bad condition as well as the drainage system and it traverses Moyo Sub county. **Challenges** • Km 0.48-Ebihwa stream-No drainage structure; • Km 0.6-seasonal Stream (7m wide)-No drainage structure; • Seasonal streams at km 1.6, km2.1 and km 2.3; No drainage structures; and • Rock outcrops at km 2.35. **Proposed solutions** • Design for drainage structures; and • Rock blasting.	 *Figure 11: Ebihwa seasonal Stream without drainage structure(km 0.48)*
Mawa Road-Orokombaa (3.18km); This road starts from Ramoji and ends in Chilichili. The road surface is in a bad condition as well as the drainage system and it traverses Moyo Sub county. **Challenges** • Seasonal streams at km 1.2 and km 1.5-No drainage structure; • Seasonal stream at 1.8km (8m wide).3*1200mm metallic culverts, structure damaged; and • Rock outcrops at km 1.6. **Proposed solutions** • Design for drainage structures; and • Rock blasting.	 *Figure 12: Damaged stream crossing(km 1.8)*
Celecelea-Lama-Gbalala road (11.92km); This road starts from Celecelea and ends in Gbalala. The road surface is still in a poor condition and it traverses Moyo and Laropi Subcounties. **Challenges;** • Seasonal stream (km7.3); 4*900 steel culverts, exposed and not working; • Seasonal stream (km9.2); 2*900mm steel culverts, damaged; and • Rocky surfaces along and within the road corridor (km 8.5-9.3, and km 9.5-11.1), abnormally steep slopes (10%-30%) along the same section. **Proposed solutions** • Design for drainage structures; • Rock blasting; and • Consider alignment diversion.	 *Figure 13: Rocky surface and steep slope*

Metu- Gbari Road (21.54km); This road starts from Metu and ends in Gbari. The road surface is still in a fair condition and it traverses Pacara, Metu Sub County. **Challenges;** • Iyro seasonal stream (1.7km); 2*1200mm metalic culverts, Narrow drainage structure; • Seasonal streams at 6.9km, 7.5km, 8.6km, and 18.2km. No drainage structures; and • 20.5km, Seasonal stream, no drain structure. **Proposed solutions** • Design drainage structures; and • River training;	 *Figure 14: Seasonal stream without drainage structure*
Amua- Abeso road (18.68km); This road starts from Amua and ends in Abeso. The road surface is still in a fair condition and it traverses Metu Sub county. **Challenges** • Rock outcrops kms(0.6, 3.6, 4.8-4.9, 5.8-6.1); • Lecu stream (km 6.4), no drainage structure; • Seasonal stream (km 7.6), no drainage structure; **Proposed solutions** • Rock blasting; and • Design for drainage structures**;**	 *Figure 15: Lecu stream, no drainage structure(km 6.4)*
Metu Ayaa road (6.74km); This road starts from Metu and ends in Ayaa. The road is still in a bad condition as well as the drainage system and it traverses Metu Sub County. **Challenges:** • Rocky surface kms (1.6-1.9, 2.5-3.6); and • Seasonal Stream (km 5.9), no drain structure. **Proposed solutions** • Align rocky surfaces with concrete; and • Design for drainage structures.	 *Figure 16: Rock outcrops along the road corridor*
Laropi-Panjara road (18.37km); This road starts from Laropi and ends in Paanjala. The road surface is still in a fair condition and it traverses Laropi, Dufile Sub counties. **Challenges;** • Seasonal streams kms (6.7, 7.0, and 16.7), no drainage structures. • Rock outcrops (km 9.6). **Proposed solutions** • Design for drainage structures; and • Rock blasting.	 *Figure 17: Damaged culverts*

Laropi-Parolinya road (18.55km); This road starts from Laropi and ends in Palorinya. It has Amua bridge which is broken as a major drainage structure.

Challenges;

- Seasonal stream(km 1.9), no drainage structure;
- Damaged Seasonal stream crossing (km 2.4) (5x1200 cp culverts);
- Structurally failed Amua bridge (km 5.0); and
- Rocky surface (kms 9.7-10.2).

Proposed solutions

- Design for drainage structures; and
- Align rocky surfaces with concrete.

Figure 18: Structurally failed Amua bridge(km 5.0)

Dongo-Morobi-Kotchi Boma road (10.21km); This road starts from Dongo and ends in Boma. The road surface is in a poor condition and it traverses Itula Sub county.

Comments

- First 8km has been graveled by UNHCR. In a solely good state.

Challenges

- No drain crossings along the last 2km (km 8-10); and
- Kochi seasonal stream(10km), no drain structure.

Proposed solutions

- Carry out quality control tests (km 0-8).
- Design for drainage structures

Figure 19: Kochi stream(km 10); no drainage structure

Aluru-Palorinya road (17.17km); This road starts from Aluru and ends in Palirinya. The road is still in a poor condition and it traverses Moyo, Itula Sub counties.

Challenges

- Rock outcrops kms (4.1, 4.3, 8.4-8.7, 9.3-11.5, 12.1).
- Rocky surfaces kms (6.8-7.4, and 12.5-14.8), with steep slopes (10%-23%).
- Seasonal streams(12.9 and 13.9), no drainage structures

Proposed solutions

- Rock blasting
- Align rocky surfaces with concrete;
- Alignment diversion; and
- Design for drainage structures.

Figure 20: Rocky surface and steep slope(km 13.5)

<table>
<tr>
<td><u>Lomunga-Rupo Road (3.38km);</u> This road starts from Lomunga and ends in Rupo. it has a poor drainage system and the road surface is in a poor condition and it traverses Gimara Sub county.

Challenges

• No drainage crossings
• Poor graveling material.
Proposed solutions
• Design for drainage structures
• Carry out quality control tests</td>
<td> 
Figure 21: Poor Graveling Material</td>
</tr>
<tr>
<td><u>Obongi SS-Gango road (8.24km);</u> This road starts from Obongi and ends in Gango. The road surface is in a poor condition as well as the drainage system and it traverses Aliba Sub county.

Challenges

• No culvert crossing at any section.
<u>Proposed solutions</u>
• Design for drainage structures.</td>
<td> 
Figure 22: Road Surface</td>
</tr>
<tr>
<td><u>Preliminary Environmental Issues envisaged in Moyo</u></td>
<td>• Blasting of rock boulders along the roads to be rehabilitated will lead to flying stones which are threat to both workers and the general public.
• Loss of biodiversity especially flora species along the road widening areas.
• Road construction equipment and vehicles will generate dust, a health nuisance to the public.
• Vehicular emissions for instance carbon monoxide whilst equipment and vehicles are running.
• Animal kills particularly small rodents as well as accidental knock down of domesticated stray animals.
• Change of land use.
• Destruction of flora biodiversity will result into loss of habitats especially for birds.
• Microclimate modifications as a result of increased vegetation clearing and gaseous emissions.
• Vibration impacts – running of equipment like compactors will result vibrational impacts to the public.
• Impacts accruing from exhuming corpses from the graves.
• Issues relating to land wrangles.
• Potential occurrences of accidents due to vehicular movements.
• Generation of noise beyond the permissible levels.

Social vices arising from workers' camps.</td>
</tr>
</table>

4.3 ABIM DISTRICT

Table 10 Preliminary Findings and Challenges for Abimi district

Alerek-Katabok-Lotuke (41.1km): It stretches from Lotuke to Alerek both ends linking to a trunk road with a carriage width of 5m. It links to more than five villages with four sub counties that is Lotuke, Magamaga, Morulem and Alerek. It provides access to Health Centres, Schools, Markets and production fields. **Challenges** • Vented drift(km 3.6), fairly functional; • Km 7.1; Road section edges a valley dam embankment; • Seasonal stream (km11.0), 1*600mm cp crossing, silted and inadequate; and • Rocky surfaces along the road corridor kms (11.5, 18.4-18.5, 24.4, and 33.4). **Proposed solutions** • Design for drainage structures; • Alignment diversion; and • Align rocky surfaces with concrete.	 *Figure 23: silted vented drift(km 3.6)*  *Figure 24: Rugied road surface*
Abuk-Awach road (16.13km): It is both an earth and gravel surfaced district road 16.7 km long linking Abuk village to Agago district. It serves Awach Sub County people and provides access to Health centers, Schools and markets. **Challenges** • Seasonal streams kms(3.3, 7.3, and 15.5); inadequate drain crossings; • Seasonal swamps kms (7.8-8.2, 15.2-15.45, 15.9-16.3); • Section km (12.8-16.13), Road impassable due to heavy gulley erosion; and • Km 16.1; 11m wide structurally failed RC bridge with one span. **Proposed solutions** • Redesign for drainage structures; and • Raise road profile in geometry design.	 *Figure 25: Structurally failed bridge(km16.1)*

Atunga-Koya road (8.59km); It is both an Earth and gravel surfaced road 8.0 km long linking Koya to Atunga village. It serves Magamaga Sub County and provides access to Health Centres, Schools, and Markets and production fields.

Challenges;

- Gulley erosion along road (km 0.0-0.4);
- Exposed and broken 600mm cp culverts (km 5.5, and 5.7);
- Rock outcrops (km3.2); and
- Road section 2 does not end at a junction. Design up to 8km as planned by UNCDF.

Proposed solutions

- Raise the road profile
- Rock blasting; and
- Redesign of drainage structures.

Figure 26: Exposed and broken culverts(km 5.5)

Adea-Nyarkidi road (8km): It is a 7.8 km long earth surfaced Community Access Road 3m width within Morulem Sub

county providing access to Health Centres, schools and markets.

Challenges

- Rocky surface kms (1.1, 1.8), rock outcrops at kms (1.4, 1.8, and 2.3-2.5);
- Seasonal stream (km1.6), no drainage structure; and
- No drainage crossings through entire road section.

Proposed solutions

- Align rocky surfaces with concrete;
- Rock blasting; and
- Design of drainage structures.

Figure 27: Rock outcrops along road corridor

Aninata-Adwal road (11.04km): It is a 12km long earth surfaced district road linking Aninata to Adwal with a 5m width carriage. It serves Alerek, Morulem, Magamaga and Lotuke Sub-Counties and provides access to Health Centres, Schools, markets and production fields.

Challenges;

- Seasonal stream (km 0.8), 2x900mm cp, functional but no headwalls; and
- Swamp (km 8.1-8.4).

Proposed solutions

- Design for drainage structures; and
- Raise road section during geometric design.

Figure 28: seasonal Stream crossing with no headwalls (km 0.8)

<table>
<tr>
<td><u>Alerek-Kathimongor-Kagrui (7.85km):</u> It is a 7.8 km long earth surfaced district road stretching from Alerek (at Trunk road) to Kathimogor covering two villages with a carriage width of 5m. It covers one sub county, providing access to Health Centres, Schools, Markets and production fields.

Challenges

• Broken 600mm cp culvert crossings at kms (7.3, 7.4, and 7.5);
• Kms 7.3-7.5; Low lying area (flood zone)
Proposed solutions
• Redesign of drainage structures; and
• Raise road section during geometric design.</td>
<td> 
Figure 29: Broken culvert crossing (km 7.4)</td>
</tr>
<tr>
<td><u>Preliminary Environmental Issues envisaged in Abim</u></td>
<td>• Blasting of rock boulders along the roads to be rehabilitated will lead to flying stones which are threat to both workers and the general public.
• Loss of biodiversity especially flora species along the road widening areas.
• Road construction equipment and vehicles will generate dust, a health nuisance to the public.
• Vehicular emissions for instance carbon monoxide whilst equipment and vehicles are running.
• Animal kills particularly small rodents as well as accidental knock down of domesticated stray animals.
• Destruction of flora biodiversity will result into loss of habitats especially for birds.
• Vibration impacts – running of equipment like compactors will result vibrational impacts to the public.
• Issues relating to land wrangles.
• Potential occurrences of accidents due to vehicular movements.
• Generation of noise beyond the permissible levels.
• Social vices arising from workers' camps.

Soil and water contamination accruing from fuel/oil leakage.</td>
</tr>
</table>

4.4 AMUDAT DISTRICT

Table 11 Preliminary Findings and Challenges for Amudati district

Uingeresa-Achorichor (9.32km); It is a gravel district road 11 km long, 4m wide, and fair in road features. It covers two sub-counties: Loroo and Amudat; It links to a trunk road (Mbale-Nakapiripirit-Moroto). **Challenges** • Rock outcrops (km 0.9), rocky surface at kms (3.1, 3.9-4). • Gulley erosion at kms (2.2-2.3, 3.5-3.8.5 and 1-6.2). • Lomeripus swamp(km 7.2-7.4); and • Lomeripus seasonal stream (km 7.3), **Proposed solutions** • Rock blasting; • Raise road surface during geometry; and • Redesign drainage structures.	 *Figure 30: Gulley erosion along the road carriage way*
Lopedot-Nakipom (6.98km): It is an Earth surfaced district road 8km long, 4.5 m wide. It links Loroo and Amudat Sub-Counties. **Challenges;** • Gulley erosion along the road kms (0.9-1, 2.3-3.2); • Lopedot seasonal stream (km 4.4), no drainage structures; • Seasonal stream(km 5.4), no drainage structure; and • Lokokor twin stream(km 6.4k, no drainage structure; **Proposed solutions** • Raise road profile during geometry design; • Design of drainage structures; and • River training.	 *Figure 31: Gulley erosion along the road carriageway*  *Figure 32: seasonal Stream; no drainage structure*
Katawar-Katabok (15.4km): It is a gravel district road 15 km long, 3.5m wide and fair in all road features. It's within Amudat sub county. Several water crossing points require 600mm and 900mm culvert structures **Challenges;** • Flood basin kms (4.58-4.63), no drainage structure; • Swamp at kms (5.45-5.55); • Broken 600mm cp culverts; and • Katabong stream (km 15.0), vented drift, disintegrated aggregate and silted vents. **Proposed solutions** • Raise road profile during geometry design; • Design for drainage structures; and • River training.	 *Figure 33: seasonal stream with no drainage structure*

Karita-Naporokocha-Moruajore(16.98km): It is a district road 16.98km long linking Karita and Amudat Sub-Counties to Namalu subcounty in Nakapiripirit district. Several water crossing points require 600mm and 900mm culvert crossing structures **Challenges;** • Drift (km 0.1), fairly functioning. • Rock outcrops (km 1.6, and km 2.5). • Chepenyiny seasonal river with a damaged vented drift (km 12.3). **Proposed solutions** • Redesign for drainage structures; • Rock blasting; and • River training.	 *Figure 34: Silted and broken drift(km 12.3)*
Preliminary Environmental Issues envisaged Amudat	• Loss of biodiversity especially flora species along the road widening areas. • Road construction equipment and vehicles will generate dust, a health nuisance to the public. • Vehicular emissions for instance carbon monoxide whilst equipment and vehicles are running. • Animal kills particularly small rodents as well as accidental knock down of domesticated stray animals. • Change of land use. • Destruction of flora biodiversity will result into loss of habitats especially for birds. • Microclimate modifications as a result of increased vegetation clearing and gaseous emissions. • Vibration impacts – running of equipment like compactors will result vibrational impacts to the public. • Issues relating to land wrangles. • Potential occurrences of accidents due to vehicular movements. • Generation of noise beyond the permissible levels. • Social vices arising from workers' camps. Soil and water contamination accruing from fuel/oil leakage.

4.5 REVIEW OF PRELIMINARY ROAD DESIGN

During the Kick-off meeting (14th March 2019) the Client gave to the Consultant a copy of the Preliminary Design and the Feasibility Study. These documentations have been provided in soft copy, on a USB flash-drive.

Document List

```
+---01-Amudat
|   +---Volume III_Amudat
|   +---Volume II_Amudat
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```
|   |   +---01-Uingereza-Acholichor
|   |   +---02-Lopedot-Nakipom
|   |   +---03-Katawar-Katabok
|   |   \---04-Karita-Naborokocho-Moruajore
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|       |   +---DESIGN
|       |   \---STRIPMAPS
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|       |   \---STRIPMAPS
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|   +---DESIGN
|   \---STRIPMAPS
+---11-Lomunga-Rupo
|   +---DESIGN
|   \---STRIPMAPS
\---12-Opiro-Orokombaa
    +---DESIGN
    \---STRIPMAPS
```

5 REVIEW OF THE METHODOLOGY: PHASE 1-PREPARE DETAILED ENGINEERING DESIGN

5.1 INTRODUCTION

The Consultant will follow the following general approach for the preparation of the detailed design engineering:

- Revision of the field surveys carried out for the Feasibility study and preliminary design and
- identification of the sections/areas/aspects to be completed. Main surveys to be completed are:
- Visual survey – to review, complete and update the information of the existing maps;
- Topographic survey – to complete the existing topographic data at specific sections and water flows;
- Geotechnical survey – to complete the existing identification of soil along the road sections and borrow areas;
- Traffic survey – to update traffic data at some specific road sections (if it is necessary);
- Environmental and social survey – to update the existing data (if it is necessary).
- Revision and update of Strip maps
- Carry out the hydrologic and hydraulic studies;
- Design of lateral and cross road drainage elements;
- Design of structures and bridges (bamboo structures and bridges will be considered for some road sections in Moyo District);
- Review and update the preliminary road alignment design
- Upgrading of the environmental and social impact assessment (EISA);
- Preparation of Technical Specifications;
- Preparation of Bills of Quantities and detailed cost estimates (labor-based technologies will be considered where appropriate)

5.2 TRAFFIC STUDIES AND FORECAST

Traffic data is the foundation of highway transportation planning and is used in making numerous decisions. Thus, availability of accurate traffic data is a pre-requisite to any feasibility study. Traffic data is normally analysed in three forms, namely;

- Traffic volume
- Origin and Destination surveys (to be considered during the detailed field surveys)
- Road accidents

The traffic study outcome will then be compared with that of the preliminary design before application of the results for the pavement design.

5.2.1 Traffic Volume

Historical data available from the preliminary design report will be reviewed by the Consultant. Consistency and depth of the data will be assessed in comparison to the basic data requirements for highway development planning as defined in the guidelines for economic evaluation of road projects (MOLG Procedural Guide to Economic Road Feasibility Study). The Consultant will also review traffic data from other national roads having similar functions in order to determine the present pattern of vehicle classification and growth by vehicle class.

Additional traffic counts will be planned in collaboration with MOLG for the purpose of comparison of current traffic data with the data collected during the preliminary design phase. The number and location of count stations on each road will remain the same as for the earlier study. Traffic counts will be carried out for seven days. It is proposed that the counting hours be 12 hours (0600 to 1800) for five days and 18 hour for two days including one week end day and one weekday. Significant fluctuations as a result of abnormal activities such as market days or festivals will be noted and treated accordingly in the data analysis.

5.2.2 Traffic Forecasting

This activity will involve assessing the interrelationship of the project roads with other national roads and other transport modes network and its role in the national economy. The Consultant shall review past and present traffic data. The type, volume and composition of existing traffic shall be determined by analysing existing traffic statistical data and conducting traffic counts. The Consultant will identify, describe and quantify existing and potential traffic generating factors in the immediate areas served by the roads, future regional and local needs and fostering economic and social development in the transport corridor.

Traffic data collected as above will be analysed as detailed below:

From the traffic counts and other traffic data collected above, the consultant will forecast the traffic volumes and equivalent standard axles over the design period. The forecast for traffic volumes will possibly include evaluations on:

- current annual average daily traffic (AADT)
- diverted traffic
- generated traffic
- induced traffic

The Consultant shall determine appropriate detailed growth rates per category of vehicles (i.e. light, medium and high) using appropriate methods acceptable by the Client and provide for each identified category detailed annual traffic forecast for a period of ten years after the completion of the road and more general projections of future traffic forecast for the following ten (10) years.

One of the three levels of forecasts will be selected for use in the final evaluation of the project and shall use the other two levels in the sensitivity analysis. The reasons for selection of any of the three levels will be explained in the report.

In developing the final traffic forecasts, the Consultant will give particular attention to the future mix of vehicles in the traffic population, due attention will also be given to potential changes in vehicle sizes and types that may arise when improvements are made in the conditions of the road.

The traffic study outcome will then be compared with that of the preliminary design before application of the results for pavement design.

5.3 GEOTECHNICAL SURVEY

According to the TOR, the specific objective of the assignment is review and update of the feasibility study report and preliminary designs, preparation of the detailed engineering designs, drawings, tender documents, and confidential cost estimates for the selected roads; and provision of tender assistance during procurement of the civil works.

In addition, it was stated that the following areas should be considered:

- Review and update the feasibility study and preliminary engineering design report
- Pavement design
- Geotechnical Investigations
- Investigate flooding or other factors causing full or partial closure of the road and determine the necessary remedial measures
- Identify existing or new sources of gravel and the modalities and costs of extraction

The TOR further stated that the Geotechnical Report shall present:

- The soil conditions and characteristics of the site.
- Field test results: the geology of the area and field investigations: drilling bore holes, standard penetration tests, undisturbed samples, determination of ground water results.
- Laboratory tests: sieve analysis, Atterberg limits, moisture content, shear strength, specific gravity, consolidation, chlorides, sulphates, PH values, CBR, etc.

The Consultants pavement/materials design methodology has therefore been aligned to provide all the necessary information for successful implementation of the assignment.

5.3.1 Pavement Design Methodology Proposal (Gravel Vs Low-cost seal)

Two main different pavement solutions are proposed to be suitable for every road section: one is considering gravel wearing coarse, and another adding a low cost seal such as Otta seal, sand seal, slurry seal, or surface dressing to the gravel road.

Reference materials to be used during the pavement design and data collection include (but not limited to):

- Ministry of Works And Transport Road Design Manuals, 2010;
- Ministry of Works, Housing and Communications - General Specifications for Road and Bridge Works 2005;
- Ministry of Works, Housing and Communications - District Road Works Manuals 2002
- Ministry of works and Transport, General Specification for Low Volume Roads Series 3000lvr - Earthworks and Pavement Layers, 2017;
- Ministry of works and Transport, General Specification for Low Volume Sealed Roads Series 4000lvr - Bituminous Surfacing, 2017;

- TRL Overseas road notes 2003;
- British Standards Institution. British Standards 5930:1981 Code of Practice for Site Investigations, London 1981;

5.3.2 Geotechnical/Materials Survey Plan

The main investigation plan will consist on the following:

- Alignment Test Pits with logging and soils sampling. The investigation will entail the excavation of test pits, logging and sampling along the existing road to establish the nature of the in-situ materials and characterizing the suitability of the existing road bed material.
- Dynamic Cone Penetration (DCP) Testing. DCP tests will generally be carried out at 1000m or 2000m intervals alternately at centre, left and right side of the road in homogeneous areas. The DCP test results will be used to estimate the thicknesses of the pavement components by analyzing the variations in the penetration resistance of the various layers with depth, primarily caused by variation in the material strength, type, dry density and moisture conditions. Where further depth investigations are required, DPL tests will be carried out as a possible option.
- Laboratory testing of soils and materials: Typical tests to be carried out include:
    - In-situ moisture content. BS 1377: Part 2: 1990
    - Compaction (Proctor and modified). BS 1377: Part 4: 1990
    - Particle size distribution (Wet sieving). BS 1377: Part 2: 1990
    - Liquid Limit, Plastic Limit and Plasticity Index. BS 1377: Part 2: 1990
    - Linear Shrinkage. BS 1377: Part 2: 1990
    - 3-point CBR (4 days soaking). BS 1377: Part 4: 1990
    - Sand and Aggregate tests (BS 812: 1989)
    - Bridge site/Swamp investigations (Test pits, DCP/DPL/Strength tests)

Materials investigations and testing. During the field investigations different sources of construction material will be identified, sampled and analyzed. The fieldwork and testing teams will be guided and supervised by the Materials Engineer.

The design report will also include a section that describes the geology/soils of the project areas that the roads traverse. It will also provide information on the earthquake zoning, topography, general climate and vegetation as informatively as possible.

The overall output of the materials and geotechnical surveys will be to come up with a proposed pavement design, and provide parameters for the consideration of existing local construction materials for the road project wherever applicable.

5.4 TOPOGRAPHIC SURVEY

Guided by the existing topographic maps from the preliminary surveys, a new topographic survey for each selected road shall be carried out. It is envisaged that pairs of inter-visible benchmarks are already established at the start of each road, at 10 Km intervals; and at major junctions especially of interconnecting road networks to be surveyed. The existing coordinates shall be cross checked before use as horizontal control of the survey.

The detailed topographical survey will be carried out using dual frequency GPS receivers; model CHC 91+ (Base+Rover). The real time kinematic (RTK) observation mode will be used to expedite the surveys. Appropriate GPS traverses shall be run to pick (map) all the road details. The whole survey shall be done in UTM, WGS84 36N coordinate (grid) system.

To accurately depict the longitudinal profile and the existing horizontal alignment, the road centre-lines will be generally picked at 25 m interval for the straight sections and at shorter intervals of 10-15 m to depict the varying formations. Cross sections will be generally picked at 25.0 m interval and additional road sections will be picked at the road curves. The topographic survey shall be carried out in a corridor of 30 meters, 15 metres each side of the existing centerline. Sufficient spot elevations will be picked to accurately depict the topography of the area.

During the survey, detailed concentration shall be given to the following road and drainage structures and natural features:

- Culverts (with their types, and sizes indicated)
- Bridges (detailed topographic surveys to be carried out at minor and major bridge structures locations)
- Drains
- Streams/rivers
- Rocky areas (outcrops)
- Flood areas (for proposed culverts)
- Gulley areas (Gullies/ erosion areas)
- Swamps
- Sandy areas
- identified locations for construction of retaining walls

To define the vertical datum of each road section, the average geoidal undulations (with respect to EGM2008) for to each road shall be computed. These will be used to correct the WGS84 GPS ellipsoidal heights of the start (reference) benchmarks of the respective road sections to their equivalent EGM 2008 heights as the vertical datum. The benchmarks shall be re-observed to affirm their heights and shall be used as vertical controls for the surveys. The team shall carry out some differential levelling of some sections of the roads as shall be deemed important by the Design Engineers depending on their observations and proposals.

Route topographical maps will be then processed for every road. Civil 3D CAD software will be used to draw the map features, analyse the digital elevation surface, and to produce maps at 0.5m contour interval.

The survey is proposed to be carried out by four (4) survey teams with each team surveying a road at a time. It is envisaged that the survey shall be carried out in each district at a time such that the design team goes on with their work as surveys are continued.

5.5 HYDROLOGY AND HYDRAULICS STUDY

The data collected during the hydrological and drainage studies will be used for the designs in accordance with guidelines from the MOWT Drainage Design Manual (2010).

a) Hydraulic Design Parameters

- Derivation of design flow values from available hydrologic data using an appropriate rainfall – runoff model,
- Estimation of design flows.

b) Hydraulic Designs

- Determination of sizes and shapes of culverts and channels,
- Selection of type of lining material;
- Investigating the need for special hydraulic design, eg. Erosion control measures.

5.5.1 Assessment of Drainage Structures

a) General Drainage of the Project Areas

- Details of existing drainage systems;
- Existing drainage problems which would be aggravated or can be relieved by the proposed works;
- High water levels or floods experienced along the route, including flooding from major watercourses, based on information from officials, appropriate agencies, residents etc;
- Possible locations of proposed outfalls and turnouts along the roads;
- Existing details and cross sections of possible receiving channels and major overland flow routes;
- Adequacy and conditions of existing watercourses to act as receiving systems, and whether they will require improvement;
- Details of low-lying areas having no surface outlet.

The above information will be obtained from site investigation and from the Data Contact Sources.

b) A Study of the Existing Culverts

The performance of existing culverts will be assessed on the basis of information from inspections and interviews with residents, road maintenance staff and other relevant sources.

The following information will be recorded where relevant.

- Location and type of structure;
- Estimated age;
- Dimension of waterway (normal to flow);
- High water levels upstream and downstream;
- Debris problems;
- Relief flow over roadway;
- Downstream controls affecting flow at culvert/ bridge

- Excessive erosion;
- Relevant history of structure, such as past channel deepening, degradation;
- Estimated adequacy of culvert/bridge;
- Other relevant details including special inlets, outlets, and erosion control structures;
- Photographs of relevant features.

The studies and analysis carried out above will be used for the determination of the following:

- Types and combinations of the drainage elements of the Project;
- Locations of the drainage elements of the Project Road;
- Sizes and types of Culverts;
- Channel alignment and profile;
- Outlet and inlet locations;
- Drainage layouts;
- Distribution and management of surface runoff;
- Integration and compatibility of proposed designs with other elements of the larger drainage system;

5.5.2 Design of Road Drainage Elements

On the basis of a topographic survey and the hydrological studies proper structural dimensioning of side drains, pipes and culverts will be carried out. The Consultant, however, does not suggest adopting pipes smaller than 600 mm diameter because of maintenance requirements. The design of the new culverts and other drainage elements will be carried out according to the Road Design Manual – Volume 2: Drainage Design from the MoWT and Technical Manual; Volume 4; Manual A.

Side drain protection against scouring using scour checks, stone pitching and concrete lining will be designed according to the provisions of the Technical Manual.

5.6 STRUCTURES AND BRIDGES

Design of new bridges, based on the result of the field investigations and hydrological and hydraulic studies, will be carried out following the Road Design Manual - Volume 4: Bridge Design from the MoWT (2010).

The results that will be obtained from the hydrological studies will be used for the following:

- Establish optimum hydraulic opening
- Configuration of the bridges
- Articulation of the bridges

5.6.1 Design Standards

MOWT Bridge Design Manual (2010)

Other Standards:

Design Bridge to BS5400

Loading to BD37/01 (Department of Transport UK).

Design the bridge for full HA loading and check for 45 Units type HB Loading.

Bamboo for Reinforced Concrete IS 6874:2008

Temperature range	:	$+8^0$ to $+51^0$
Wind force	:	
Mean hourly wind speeds	:	45m/s (160km/h) bridges located up to 160km inland
Horizontal earthquake force	:	8% of total dead Load. Free Board 1.0m
Design period for flood	:	25 years, check for sensitivity 50 years.

5.6.2 Types of Structure

Superstructure: Steel composite and concrete structure are being considered at this stage. A firm decision will be made when more data is made available.

Substructure: Conventional reinforced concrete structure will be adopted for the abutment. The structure will consist of abutment wall and two cantilevered wing walls.

Foundation: The design of the foundation will be based on the results that will be obtained for the substrata investigation.

5.6.3 Materials

Concrete Grades

The following grades of concrete will be used in the design of the bridge:

- Foundation, piers, walls and abutments : C30/20
- Blinding : C15/20 (fcu =15 N/mm)
- Mass fill : C15/20

Minimum Concrete Cover

The concrete covers that will be used in the design will be the greater of the bar diameter (or the equivalent diameter of bundled bars) plus 5 mm of the following:

Element:	Minimum Cover (mm)
Foundation Bases	75 mm
Abutments	50 mm

Reinforcement

Hot rolled reinforcement to BS 449 will be specified with the following properties:

Table 12 Hot Rolled Reinforcement To BS 449

Type	f_y (N/mm^2)	E (kN/mm^2)
High Yield – Type 2 Deformed Bar	460	200

5.6.4 Loading

General

Loadings will be in accordance with UK Department of Transport Standard BD 37/01

Live loads that will be adopted for the design of Superstructure

A carriageway width between profile barriers of 10 metres has been assumed at this stage of the design, which will result in 2 notional design lanes and walkways.

The live load will be HA loading in accordance with BD 37/01 and checked against 45 units of HB.

Dead Loading

Dead loading consists of parts of the structure, which are structural elements and excludes superimposed materials such as surfacing and profile barriers. Density of concrete will be taken as 25 kN/m^3

Superimposed Dead Loading (SDL)

SDL is the weight of all materials, which are non-structural elements forming permanent loads on the structure, such as surfacing and profile barriers.

Wind Loading

Wind loading will be derived using the wind intensity map of Uganda.

Temperature Loading

The coefficient of expansion of concrete will be taken as 12 x 10^{-6} per °C. And 7 x 10-6 per °C when limestone aggregates are used.

The following effective bridge temperatures will be used: - 36 0C

Temperature (120-year return period)

Seismic Loading

Seismic analysis will be undertaken if investigations find it necessary, using an equivalent lateral force equal to 8% of the total dead load. The connections between the bridge span and the abutments/pier will be designed both longitudinally and transversely to resist this force. Due to the large size of the abutments in the longitudinal direction, loads will be considered in the transverse direction of the substructure elements only. This is because the simultaneous effect of 30% of the seismic load in the longitude direction is negligible.

5.6.5 Substructure Design

The abutment wall, the wing walls, and the foundation slab forms a system which prevents movement in the walls.

The design of the bridge abutments and wing walls is in accordance with the UK DoT Standard BD 30/87 – Backfilled Retaining Walls and Bridge Abutments and BD 28/87 – Early Thermal Cracking of Concrete. The design will also consider earthquake loading with seismic earth pressure coefficients derived from the Mononobe Okabe equations. The design of the base and stem of the walls will be based on at rest earth pressures. Stability checks will be made for overturning, sliding and bearing pressures under active and passive earth pressures.

The soil pressures behind the walls will be considered to be at rest. The soil's angle of internal friction and the unit weight of the backfill will be taken from soils report.

The factors of safety against overturning and sliding to be used are as follows:

- In Service Loads 2.0
- Seismic Loads 1.5

Design Checking

The design checking of the structure will be based on checking procedures similar to the ones described in the UK DoT Standard BD 2/89 for Category II design checks.

Construction and Erection Proposals

The following construction and erection proposals will be assumed in the design:

- Backfilling and compaction of the fill material behind the abutments shall be carried out first, followed by the construction of the bridge deck.
- The Contractor shall provide a method statement and details of his construction and erection proposals for handling, transporting, erecting as propping securely in position of the superstructure.

5.6.6 Superstructure

Methods of Structural Analysis proposed for Superstructure is using STAAD III Pro, PROCOM and LUSAS.

5.7 Road Alignment Design

Preliminary road alignment design will be reviewed and upgraded where necessary using tridimensional-based software (Civil 3D CAD software).

The geometrical design parameters to be considered for the alignment design will comply with the Road Design Manual – Volume 1: Road Design from the MoWT and Technical Manual; Volume 4; Manual A.

The design of the road section alignments will take into account the analysis about the project area related to the geotechnical, hydrological, environmental, and social aspects, among others.

Where the preliminary geometric design does not conform to the design standards, re-alignment and/or alternative routes will be surveyed and the sections re-designed to ensure that they conform to the standards.

Horizontal alignment design will try to fit as much as possible the existing road alignment and to be within the existing road reserve.

5.8 Road Retaining Structures

Detailed design will make design considerations for retaining walls at side cut locations of some road sections in Moyo District. The design will consider the most economical of the following retaining wall types:

- Dry masonry
- Gabions
- Stone Masonry

- Reinforced concrete.

5.9 Detailed Rain Water Systems

The consultant will explore the possibilities of harvesting excess runoff instead of allowing the water to cause erosion and discharge of water into main streams. This can be one by designing drains to channeling rain water run-off from the roadside drains/ culvert without storage facilities into storage facilities such as exhausted borrow pits or into farm land. Based on the fact that, roads have a large surface that can collect large amounts of rainwater that is not directly 'absorbed' by the road and runs off the road and this can be collected. In the rainy season, roads can become completely inaccessible and turn into small rivers as evidenced during the design mission. This water can be used for direct or in-situ recharges of cultivated plots by careful design of trench and soil bund systems leading to the cultivated.

5.10 Cost and Quantity Estimates

The Consultant will prepare the detailed construction quantities and cost estimates for the road design selected based on the drawings prepared and market unit prices of the area.

According to the information obtained from Districts and the MoWT a mix of labour-based methods and equipment-based technologies (mechanized) are to be considered for the preparation of the cost estimates based on the usual construction works that can be implemented considering those methods:

- Labour based works for activities such as side clearing, culvert installation, side drains, etc.
- Equipment based works for activities such as earth works, gravelling, and Otta sealing.

Bill of Quantities (BoQ) will be based on the item descriptions in the General Specifications of Roads and Bridges of Ministry of Works and Transport (2005). Unit prices will be obtained from actual prices of materials, equipment and human resources. A contingency reserve of 5% is considered in all cost estimates.

5.11 Technical Specifications

Construction specifications for all the works defined on the drawings will be prepared. The specifications will contain a statement setting forth the general scope of work, followed by a description of the various classes of work, under appropriate sections and headings.

The quality control requirements will be described in detail, including identifying standards or codes that are to apply. The "General Specifications of Roads and Bridges" (2005) will be the main base document that will be used for quality control requirements.

5.12 Drawings

Drawings to be adopted for the designs will be from the Technical Manual B: Volume 4 of Ministry of Works, Housing and Communications.

For cross culverts, concrete sorround to be considered for all proposed new culverts.

Typical drawings for scour checks, gabion protection works, catch water drains, mitre drains, drifts and vented drifts will be included.

5.13 Environmental Impact Assessment

The environment impact assessment will focus on the following approach:

- Desk Study
- Determination of baseline conditions
- Water quality studies/assessment
- Soil Sampling
- Air Quality Testing
- Soil Analysis
- Public hearings
- Identification of Mammals and Birds
- Flora Assays
- Impact Identification and Analysis
- Determining Impact Significance
- Development of an Environmental Monitoring Plan
- Report writing

Impact parameters that will be considered for the scale will included the following descriptors:

- ✓ Duration
- ✓ Extent
- ✓ Magnitude
- ✓ Irreversibility

The following criteria for determining impact significance will be followed.

Table 13 Criteria For Determining Impact Significance

Impact scale	**Descriptors**	
Severe	a.	Irreversible, wide spread, covering local, regional and global indirect influence area.
	b.	Will lead to high mortality of important endangered species on site and off site.
	c.	Exceeds limits set by environmental standards both national and international.
	d.	Major contribution to known global environmental problem with tangible effects.
	e.	Causing widespread nuisance both onsite and offsite.
	f.	Leading to the release of hazardous wastes which lethal effects in the environment.
	g.	Permanent loss of livelihoods for entire community.
	h.	Leaves permanent and irreparable scars on the landscape.
Moderate	a.	Noticeable effects on the environment which are reversible over the long term

Impact scale	Descriptors	
	b.	Localized degradation of resources restricting potential for further usage
	c.	Limited effects on locally or globally endangered species with no long term effects on their reproduction and migratory behaviors.
	d.	Increased pollution of water bodies in the short term but drops with time
	e.	Noise and air pollution above maximum levels accepted in the environment.
	f.	Disruption of livelihoods in the short term but no long term effects.
	g.	Leads to a repairable scar on the landscape but reparable over time
Minor	a.	Noticeable effect on the environment, but returning naturally to original state in the medium term.
	b.	Minimum degradation of resources but does not does not constrain future use
	c.	Disruption of the behavior of threatened/endangered species but returns to normal in the short term.
	d.	Release of periodic particulate matter that is circulated in the short term
	e.	Intermittent noise nuisance
	f.	Changes in water and air quality levels not above maximum acceptable limits.
Negligible	a.	No noticeable or limited local effect on the biophysical environment that rapidly returns to its original state.
	b.	Unlikely to lead to any changes in ambient air and water quality.
	c.	Unlikely to affect resources in any noticeable way.
	d.	No anticipated effect on livelihoods
	e.	Will not change the landscape in any way.

Determining significance of environmental impacts will include the following, as illustrated within the **Table 14** for determining impact significance below:

- Assigning environmental value;
- Assigning magnitude of impact;
- Assigning significance; and
- Cumulative effects;

Table 14 Determining Impact Significance

	Magnitude of impact (degree of change)

		No change	Negligible	Minor	Moderate	Major
Environmental value (Sensitivity)	**Very high**	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large
	High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
	Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
	Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
	Negligible	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

Source: Adapted from the UK Design Manual; Volume 11 Environmental Assessment

5.14 Social Impact Assessment

The Social impact assessment will employ the following approaches during the implementation of the survey;

5.14.1 Review of existing information

Document/literature review is an ongoing process. Preliminary results of the literature review have highly informed the development process of inception report highlighting key areas of interest to be considered during the detailed design. Some of the documents to be reviewed include feasibility report, ESIA guidelines among others;

5.14.2 Onsite Visits

It is important for site visits to be done during data collection to identify the existing feature covering social economic, environment and cultural issues for consideration during construction stage suggest ways of handling them to avoid disruption of the project. These features may include structures, people's gardens, trees and burial sites that may be within areas where the road is passing. Preliminary site visits have been done on the project roads and a number of features has been identified for consideration on some of the roads in Moyo and Adjumani and will be considered during consultations with district, sub-county and Village level consultations. Site visits will be conducted concurrently with social surveys using a questionnaire with people along the roads. During site visits the consultant will be keen on the following structures that may be affected by road construction under the project in all the districts.

Table 15 Summary Of Expected Structures To Be Affected By The Project

Type of Building/Structure

Permanent Structures	Semi-Permanent Structures
Commercial	Residential
Residential	Kitchen/stores
School Blocks	Other Properties
Churches	Pit latrines
Mosque	Gardens
Type of Building/Structure	
Shades	Paved /Concrete yards
Kiosks	Gates
Barbed wire fences	Septic Tanks
Chain link	Boundary /retaining walls
Local Hedges	Water Tanks
Earth Graves	Others
Cemented Graves	

5.14.3 PUBLIC STAKEHOLDER CONSULTATION

Comprehensive consultations will be done with all the stakeholders involved in the project. This will help the consultant to identify positive and negative impacts that may come up as a result of the project. It will also help to enhance the positive impacts and suggest mitigation measures for negative impacts on the other hand.

These consultations will be conducted in form of individual key informants, focus group discussions, and radio talk shows among others. It is important to note that some Chief Administrative Officers (Adjumani) have already indicated that he will facilitate talk shows to reach out to the people along these roads for more awareness. The consultant will lobby for CAO's of other districts of Moyo, Abim and Adjumani to do the same. Consultations will be conducted at three levels at district, Sub-county and Village level as summarized in ***Table 16***.

Table 16 **Summary Of Categories Of Stakeholders To Be Consulted**

Level	Category of participants	Method of consultation
District level	CAO's, District environment officers, Community development officers, Secretary for works, Labour officer, District engineer, Representative from DHO's office, district production officer RDC's office, Agriculture officers, Gender officer, CBOs among others.	This will be organized by the CAO in each district and facilitated by the consultant.
Sub-county Level	Sub-county Chiefs, Parish chief, Assistant Community Development officer, health in charges at the sub-county level, Local council III,	This will be organized by Sub-county chief from the sub-counties and parishes where these roads are passing. It is expected that 6 of these meetings will be conducted in

	Secretary for works and CBOs at the sub-county level.	Adjumani and Moyo and 4 in Abim and Amudat respectively.
Village level	Chairman LCI,religious leaders, identified individuals whose properties are likely to be affected by the construction and opinion leaders	This will be organized by the chairman LCI and a total of 33 such meetings will be conducted one on each road.

5.14.3 CONSULTATIONS ON HIV/AIDS CONCERNS

To address concerns of HIV/AIDS and the likely impacts of the project, the consultant will work closely with the District HIV/AIDS focal person and other potential stakeholders in the District involved in HIV/AIDS issues for consultations. Consultations will take place at two levels i.e. at the District level with NGOs which are well established in the District and are involved in HIV/AIDS activities to discuss the likely impact of the project on issues concerning HIV/AIDS and together will come up with mitigation measures to be considered at construction phase. Four (4) meetings of this nature will be conducted with one (1) meeting per District for this purpose.

The second level meeting will be with CBOs and other organizations involved in HIV/AIDS activities at the sub-county and parish level. CBOs which are well established in the community will be mobilized and a group discussion will be conducted at the sub-county level and these will be mobilized by the sub-county chiefs together with Assistant Community Development Officers at the sub-county level and project impacts and mitigation measures at that level concerning HIV/AIDS concerns will be discussed and incorporated. Also at the sub-county level in charges of health centers and religious leaders will part of the group and will be consulted for the same purpose. Eight (8) meetings of this category will be conducted with two (2) being held meetings per District

Finally, arrangement and cost for this service will be provided for in the Environmental and Social Monitoring Plan for continuous HIV/AIDS awareness campaign during the construction phase.

5.14.4 CONSULTATIONS ON GENDER CONCERNS

To address gender concerns in the project Districts, the consultant together with the District gender focal person will identify NGOs, CBOs and other agencies in the District and sub-county level that are involved in gender mainstreaming interventions and will be consulted on project impacts concern gender issues and impact and mitigation measures will be outlined and suggested measures for intervention during construction phase will be documented for consideration. A total of eight (8) meetings will be organized and conducted, i.e., two (2) meetings per district.

5.14.5 FOCUS GROUP DISCUSSIONS

During the assessment the study team will conduct Focus Group Discussions with community members along each of the 33 roads, one per road, to obtain qualitative information related to social economic and environmental issues. Qualitative research will be undertaken to compliment the quantitative data collection and to gain contextual understanding of the social economic environment and get a deeper meaning of

observed daily practices along the roads. This will consider gender concerns in selecting participants. The discussions will include the origins and movements of the local population, the life of the population along the road, opportunities, administrative and hierarchical systems within the community, land ownership, and social concerns in relation to the proposed development.

5.14.6 SOCIAL SURVEYS USING A QUESTIONNAIRE

A questionnaire covering all social, economic, religious, political and cultural issues the study team intends to cover during the assessment will be designed before going to the field. This method also will help the study team to identify perceptions of the communities on the existing challenges and expected benefits from rehabilitation of the roads under the project. Overall 300 community members will be purposively selected and interviewed for this purpose.

5.14.7 RADIO TALK SHOWS

In an effort to enhance awareness campaign in the districts under the project radio talk shows will be conducted. These talk shows will be organized by the District Administrative Officers and will jointly be conducted by the consultant. The tasks of the CAO and consultant will include:

- Identify and booking of radio station slots for the interactive shows and announcements
- Identify and coordinate the interactive talk shows. Other experts can be incorporated.
- While the role of the consultant will be to develop talking points for the show and
- Together with other district technical persons identified to participate in the show.

5.14.8 DATA MANAGEMENT AND ANALYSIS

Both qualitative and quantitative data will be collected. Qualitative data will be processed and analyzed using content and themes based on the study objectives. All field notes will be transcribed in English to form texts for each objective for analysis. A review of all transcripts to delineate aspects directly relevant to the study objectives will be done. An analysis plan will be prepared for all the interviews/discussions conducted using the key quotations, insights, and explanations from the transcripts.

5.14.9 TENDER DOCUMENTS

The Consultant will draft the tender documents, using standard formats as per General Specification for Road and Bridge Works of Ministry of Works and Transport (2005); Public Procurement and Disposal of Public Assets Authority (PPDA) Standard documents; Standard Specification for Labor-based/Mechanized Works; Special Specifications; Strip Maps; Standard Drawings; Contract Specific Drawings; and Bills of Quantities.

6 REVIEW OF THE METHODOLOGY: PHASE 2 - TENDER ASSISTANCE

The Consultant will follow-up the following general approach for the tender assistance phase in accordance with the Public Procurement and Disposal of Public Assets Authority (PPDA) Standard forms of contract agreement:

- Preparation of tender documents;
- Assisting the Procuring Entities/Contracting Authorities to prepare the clarifications to the tenderers
- Attending and participating in the meetings for the tenderers
- Attending and participating in the conduct of site visits;
- Participation in the bid opening;
- Participation on the evaluation of the offers;
- Preparation of contract agreements for signature by the contracting authority.

6.1 PREPARATION OF TENDER DOCUMENTS

The Consultant will offer assistance to the Procuring Entities/Contracting Authorities in preparation of the final the tender documents for each specific procurement/ road section.

6.2 CLARIFICATIONS TO THE TENDERERS

The Consultant will analyze and answer all administrative and technical questions received from the tenderers within the period set for clarifications. All received quest ions will be clarified in close consultation with UNCDF and the MoWT.

6.3 MEETINGS AND SITE VISITS

At the outset of the tender phase the Consultant, in collaboration with the UNCDF and the MoWT, will organize and conduct a one-morning meeting in Kampala to present main aspects of the road rehabilitation project to the tenderers. Administrative and technical aspects will be presented.

A 1-day site visit to every district will be also organized to visit the road sections to be rehabilitated and present the main aspects to be considered for the construction works phase. District engineers will accompany us during these visits.

6.4 BID OPENING

The Consultant will assist the District Local Governments in the organization and conduct the bid opening session through:

- Reception of offers;
- Assistance to the tendering committee participants during the bid opening session,

6.5 EVALUATION OF THE OFFER

The Consultant will assist the District Local Governments on the evaluation of the offers submitted. The Consultant will carry out the following tasks:

- Checking that the offers contain all documents requested;

- Revision of administrative documents;
- Assessment of the technical propositions;
- Evaluation of the financial offers;
- Suggestion to the District Local Governments the score of the offers and ranking of tenderers.

6.6 PREPARATION OF CONTRACT AGREEMENTS

After tender awarding the contract will be prepared by the Consultant using the Public Procurement and Disposal of Public Assets Authority (PPDA) Standard forms of contract agreement.

7 DOCUMENTS REVIEWED

7.1 FEASIBILITY STUDY AND PRELIMINARY ENGINEERING DESIGN REPORTS OF 33 ROADS

The following reports were reviewed

- Survey field data and reports,
- Hydrological data and reports,
- Geotechnical/Materials/Pavement data and reports,
- Horizontal - vertical -Cross sections drawings,
- Environmental & Social Impact Assessment reports,
- Strip maps

7.2 FINDINGS OF THE REVIEW OF PRELIMINARY ENGINEERING DESIGNS

7.2.1 Geometric Design

The preliminary design maintained the existing vertical alignment for every road section in order to reduce the necessary earthworks. Therefore, during the detailed design, the vertical alignment designed will be reviewed in accordance with the alignment standards for District Roads to ensure compliance and cost implications will be established for appropriate decision-making purposes. For example, the vertical grade in the preliminary design for road section Celecelea – Lama – Gbalala at Ch 8+800 is 20.05% and at Ch 9+000 is 16.93% which is way above the absolute maximum vertical grade of 15% at the design speed of 30km/h. The sections are rocky. This presents challenges of route realignment and/ or blasting for the new road may be required to meet design standards.

7.2.2 Drainage

Mitre Drains

The preliminary design considered mitre drains every 200m. This will be reviewed during the detailed design phase so that mitre drain spacings will be based on the longitudinal road gradient (%) as per the requirements of the Technical Manual Volume 4 Manual A, Table 1-B5.

Cross Drainage

The preliminary design considered existing culverts in good condition to be cleaned and extended to accommodate the new road width. Only existing culverts in poor condition and culverts for newly identified locations will have 900mm diameter culverts installed. Detailed design will have to evaluate the financial implications of replacing all culverts on the road and encasing them in concrete.

Catchwater Drains

In hilly/rolling terrain, some sections may require catchwater drains to be provided where excessive run-off is expected above the roadway and/or alongside cuts and in full cuts. Preliminary design report did not reflect the requirements for such drains.

Rock Fill

Rock embankments were considered in several flooding areas close to the Nile river of Laropi-Paanjala and Laropi-Palorinja road sections in order to allow water to easily cross from one side of the road to the other without affecting the road.

The road sections where rock embankments were proposed during the preliminary design are the following:

Table 17 Sections Where Rock Embankments Were Proposed

Road Name	Rock embankment	Length (m)
Laropi-Palorinja	1+700 – 5+400 8+000 – 8+700 10+400 – 11+600 15+100 – 15+600	3,700 700 1,200 500
	Total	6,100
Laropi-Paanjala	4+100 – 7+100 11+800 – 12+300 14+900 – 17+500	3,000 500 2,600
	Total	6,100

The rock fill design will be reviewed with the view of lowering the cost per kilometre of the above two roads. This requires geotechnical investigations at the locations.

7.2.3 Earthworks

Preliminary design recommended rock embankment (above) but design of the earthworks has not been included. Detailed design will cover this accordingly, if required.

7.2.4 Materials Testing and Quality Control

A review of the feasibility study report and preliminary designs was made. Below is a summary of the findings/comments:

- The specifications for blinding and CRR bedding materials were not indicated in the drawings;
- The properties of the filler/drainage layer adjacent to concrete structures is not well specified in the drawings;
- Type of concrete finish for the structures was not specified in the drawings;
- Typical cross section drawings for areas of cut and fill were not included;
- Typical cross sections for low-cost sealing technology were not included;
- Provision of utility ducts in trading centres was not considered in the designs;
- Insufficient detail of materials investigation for proposed bridge sites were noted;
- Tests for sand sources and quarry sites appear to be insufficient, yet low-cost sealing technology is now being proposed as an option.

7.2.5 Pavement Design

Rigid Pavement: Steep Sections

Preliminary design considered 200mm thick reinforced concrete slab construction for road sections with gradients higher than 10% in order to make the sections motorable during the raining periods. No pavement

design report for the concrete pavement was available for review. This proposal will be reviewed. The road sections identified with the high gradients are in Moyo District and are listed below:

- Metu – Gbari road
- Amua – Abeso road
- Aluru – Palorinya road
- Metu – Ayaa road
- Celecelea – Lama – Gbalala road.

Rigid Pavement: Rock Outcrop Sections

Preliminary design did not make considerations for areas with rock outcrops. Detailed design will consider reinforced concrete over rocky areas instead of graveling or Otta seals.

7.2.6 Bridges

Existing bridges that are in a bad condition are considered to be demolished and rebuilt. New bridges are also considered if necessary.

No reinforced concrete bridges are considered in the feasibility study and preliminary design of any of the road sections of Amudat district.

Bridges sites were identified during the feasibility studies and preliminary design of several road sections in the following locations.

Table 18 Bridges Sites Identified During Feasibility Study

District	Road Name	Bridge Type (Proposed/Existing)	Location of bridges
Abim	Abuk – Awach	Reinforced concrete	CH 16+000
Adjumani	Ofua TC-Pakwinya	Reinforced concrete	CH 2+980
	Mungula junction-Zoka	Reinforced concrete Reinforced concrete Reinforced concrete	CH 1+990 CH 5+800 CH 7+585
Moyo	Laropi-Palorinja	Reinforced concrete	CH 12+970
	Dongo – Morobi - Kotchi Boma	Reinforced concrete	CH 10+209
	Mawa Rd-Orokombaa	Reinforced concrete Reinforced concrete	CH 2+200 CH 2+578
	Amua – Abeso	Reinforced concrete	CH 15+500
	Metu – Gbari	Reinforced concrete	CH 18+700

However, condition assessment carried out during the preliminary design reports is not detailed. The report covered structure type, condition (G=Good, F=Fair, P=Poor, B=Bad), length, width and number of spans. Therefore, a detailed technical study shall be carried out to design new reinforced concrete and bamboo bridges during this phase of the project.

7.2.7 Road Retaining Structures

Review of cross section drawings revealed the need for consideration of retaining walls at side cut locations of some road sections in Moyo District.

7.2.8 Drawings

Typical drawings for scour checks, gabion protection works, catch water drains, mitre drains, drifts and vented drifts have been omitted in the preliminary designs.

The typical cross-section and side drain drawings provided for road section Uingereza – Acholichor road in Amudat do not conform to that for the District Class I Roads as per the Technical Manual, Volume 4, Manual A. The preliminary design considered 6m wide carriageway and 2m wide shoulders on either side. The Manual considers 6m wide carriageway. The preliminary design provides for V-drains but the Manual recommends trapezoidal side drains.

Plans and Profiles scale used for the preliminary design drawings vary from drawing to drawing instead of the standard 1:2000 and 1:200 respectively.

8 CONSULTANT'S PROGRESS AND WORKPLAN

8.1 CONSULTANT'S PROGRESS

The Consultant has carried out the following activities;

- Project kick-off meeting
- Mobilization of staff
- Consultative meetings with project district stakeholders and field visual surveys
- Preparation and submission of the draft Inception Report

8.2 PROJECT IMPLEMENTATION SCHEDULE

The consultancy contract provides for twelve (12) months (M) duration for the detailed engineering design and tender assistance.

8.2.1 Reporting Schedule

The reporting schedule is presented below:

- Inception Report (M+1)
- Detailed Engineering Design Report (M+6)
- Tender Documents (M+6)
- Tender Assistance (M+7 to 12)

For each deliverable the TA suggest the following submission schedule:

- +0 Draft submission (soft copy)
- +5 days comments by Client
- +10 Interim submission by TA (soft copy & hard copy)
- +15 days Presentation

8.2.2 Inception Report

One (1) original and three (3) hard copies including four (4) soft copies will be submitted not later than one (1) month from the date of commencement of services. This report shall briefly describe:

- The mobilization and establishment status of the TA,
- The specific staffing plan,
- The updated work plan the TA proposes to follow in carrying out the assignment, based on the TA's initial findings,
- Details of any constraints or inputs required from the employer and such remarks as are deemed appropriate
- Comments on the identification, feasibility study, and preliminary engineering design report and design approach.

8.2.3 Engineering Design Report

One (1) original and three (3) hard copies including four (4) soft copies will be submitted not later than six (6) months from the date of commencement of services. This should contain detailed engineering designs, pavement designs, geometric designs, drainage designs, drawings, bills of quantities, specifications, prioritization and scoping of works, completion schedule, scope/prioritization of the rehabilitation works in reference to the MoWT District Road Manuals and General Specifications, confidential cost estimate, time frame for the works execution and road rehabilitation program for each district

This report will also contain the final bidding documents with complete drawings in A1 as well as reduced to A3 size.

8.2.4 Geotechnical Report

One (1) original and three (3) hard copies including four (4) soft copies will be submitted not later than four (4) months from the date of commencement of services. This report shall present:

- The soil conditions and characteristics of the site.
- Field test results: the geology of the area and field investigations: test pits, DCP Tests
- Tests, undisturbed samples, determination of ground water results.
- Laboratory tests: sieve analysis, Atterberg limits, moisture content, shear strength, specific gravity, consolidation, chlorides, sulphates, PH values, CBR, sand and aggregate tests etc.

8.2.5 Environmental and Social Impact Assessment Report

One (1) original and three (3) hard copies including four (4) soft copies will be submitted not later than four (4) months from the date of commencement of services. This report shall present:

- The effect of the project investment on the environment and recommend appropriate solutions to forestall any disagreeable effects resulting from the investment.
- The positive and negative impacts of the project.
- Environmental Management Plan to mitigate adverse environmental effects that that project may have.
- Community's role in the project in so far as the project influences their lives, especially for women, children and the elderly, and quantify the benefits which would accrue to them during and after the construction of the project.
- Approval from the National Environmental Management Authority

8.2.6 Topographic Survey Report

One (1) original and three (3) hard copies including four (4) soft copies will be submitted not later than four (4) months from the date of commencement of services. This report will include:

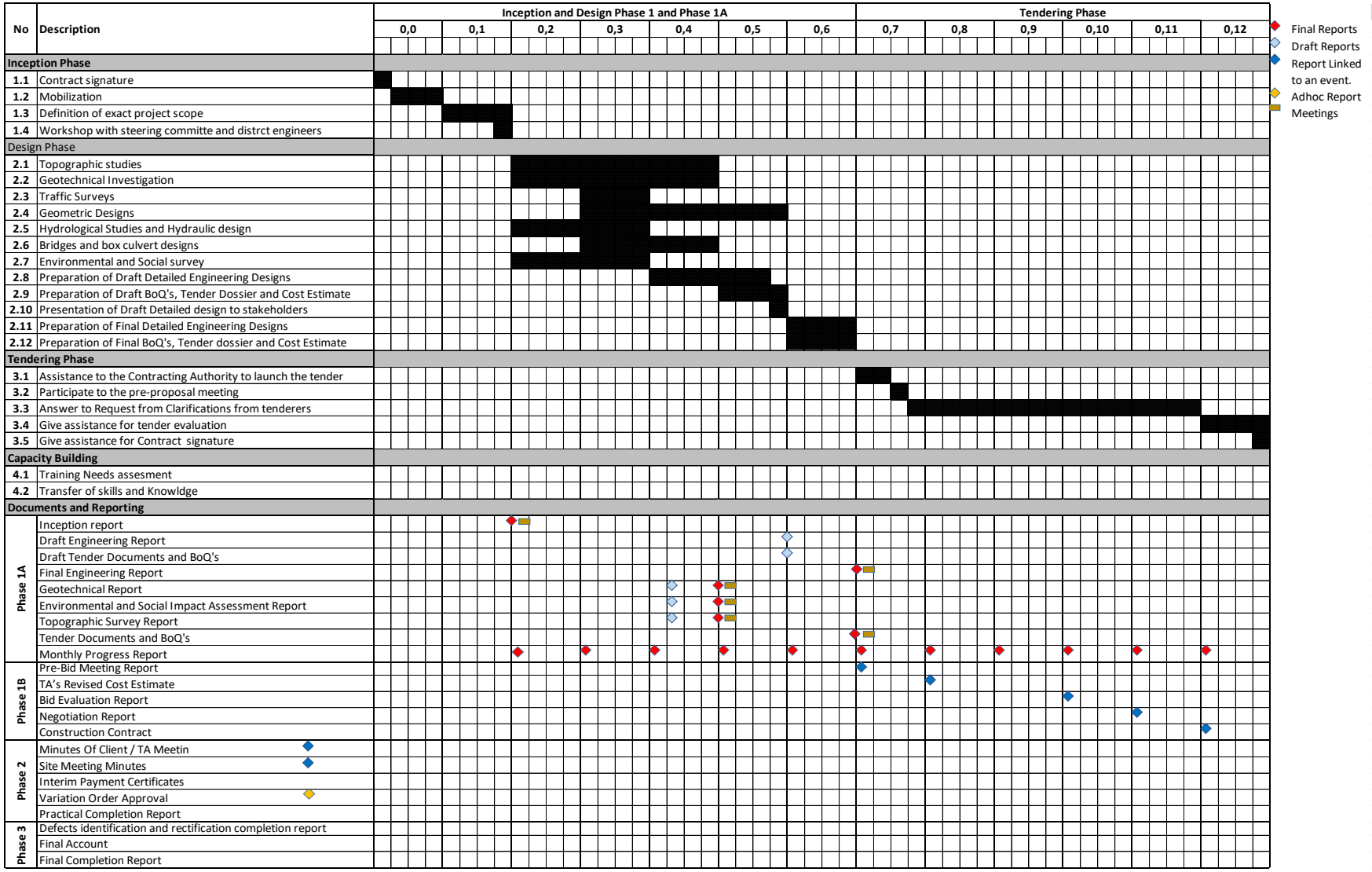
- Existing horizontal and vertical alignments.
- Culverts (with their types, and sizes indicated)
- Bridges (detailed topographic surveys e carried out at minor and major bridge structures locations)

- Drains
- Streams/rivers
- Rocky areas (outcrops)
- Flood areas (for proposed culverts)
- Gulley areas (Gullies/ erosion areas)
- Swamps
- Sandy areas, and
- Identified locations for construction of retaining walls.

8.2.7 Work Plan

The work to be performed by the consultant shall follow guidelines given in the TOR. The Consultant's proposed work plan is shown in the following figure.

Table 19 Work Plan



8.3 EXIT STRATEGIES OF THE PROJECT

A number of project sustainability has been considered for this Road infrastructure development project in four project districts which include;

- A number of district technical team that include district engineers, Environmental officers and District community development officers have been identified for trainings at MELTAC and different trainings are already taking place for different categories of district technical staff for the sustainability of the project.
- Community Road User committees have been formed and there is need for continuous sensitization on their roles and responsibilities during the design and construction of these roads for ownership after construction and handover of the roads.
- District Local Governments will directly be handling all the procurement processes for the contractors and directly supervise the implementation of the project.
- The will include the maintenance of these roads into the district budgets.

8.4 PROJECT RISKS

Table 20 Project Risks

Item No.	Type of Risk	Description of the Risk	Affected Project Segment	Severity of Risk	Mitigation Measures
1.	Procurement malpractice	Interference with procurement processes in the Districts as Local Election period approaches	Budget, Schedule, Quality	Very Severe	Involvement of the Consultant, Ministry and Project Coordination office during the critical procurement stage of Bid- Evaluation
2.	Delayed Approvals	Delay in approval for the Consultant's Reports and Invoices, etc.	Budget, Schedule	Very Severe	Continuous engagement with approving authorities through meetings and reminders to ensure timely approvals and payments
3.	Obstructions to Site Accessibility where re-alignment is recommended outside the road prism	Local authorities/ comm unities not allowing timely access to some areas of the project site	Budget, Schedule	Very Severe	Local authorities to engage the locals at the earliest possible. From planning through implementation to conclusion of the project.

Item No.	Type of Risk	Description of the Risk	Affected Project Segment	Severity of Risk	Mitigation Measures
4.	Unawareness of the local project's beneficiaries	Local communities might not adequately be informed about the project	Budget, Schedule	Very severe	An aggressive public information campaign and inform the public about the project and its resulting economic and social benefits. Engage the locals from the planning through implementation upto conclusion of the project.
5.	Errors or omissions in quantities of the works contract	Underestimation/overestimation of quantities	Budget	Very severe	Additional competent staff will be engaged by the consultant
6.	Escalation of cost of works	Inflation in prices of materials	Budget, Schedule	Very Severe	Works should be let out soon after the design phase. Adequate and reasonable price contingencies should be incorporated in the works BoQ.
7.	Severe water scarcity	Failure to get water within reasonable distance from work sites	Quality and schedule	Very Severe	Rain water harvesting during implementation period
8.	Non responsiveness of certain bids	There are many ongoing projects of similar nature at the same time	Quality and schedule	Very Severe	

9 CONCLUSIONS AND RECOMMENDATIONS

9.1 CONCLUSIONS

- The Consultant will proceed to prepare detailed engineering designs, Environmental and Social studies for the project according to the comments from the Client after the inception report.
- Social sustainability; The Consultant shall form community committees and train them about health and safety issues, after which the committees shall continuously sensitize local people about the same cause even after project completion.

9.2 RECOMMENDATIONS

- Project Sustainability; The Consultant recommends that after the design and implementation of the project roads, the respective District Local Governments should budget for periodic maintenance of the roads so that they can atleast serve the design life.
- Tree planting; The Consultant recommends plantation of trees along the project roads for environmental conservation. This should be executed by the Local communities in collaboration with the District Local Government Officials.

LIST OF ANNEXES

Annex 2: Minutes For Kick Off Meeting Adjumani District.

Annex 3: Minutes For Kick Off Meeting For Moyo District

Annex 4: Minutes For Kick Off Meeting In Abim District

Annex 5: Minutes For Kick Off Meeting For Amudat District

Annex 6: Minutes of Inception Report Presentation

Annex 7: Comments On The Inception Report And Responses From The Consultant.