



UGANDA CONTRACTS MONITORING COALITION (UCMC)

A SIMPLIFIED CITIZENS ROAD MONITORING TOOL FOR UGANDA

**PRODUCED BY
WORKS & TRANSPORT CLUSTER**

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About UCMC

The Uganda Contracts Monitoring Coalition (UCMC) is a non-partisan multi-stakeholders' initiative established to promote contract performance through promoting transparency, participatory approaches and accountability in the planning, procurement, implementation, monitoring and evaluation of Contracts for public works. UCMC is a voluntary, charitable and not for profit loose network. It is a part of an Africa-wide movement to promote transparency and accountability in the development and implementation of contracts.

UCMC is a loose network of civil society organizations, public and private sector actors, the media and other stakeholders that aspire to promote contract performance and value for money for the people of Uganda. The coalition is organized around seven clusters that represent thematic area priorities i.e. Education, Health, Works and Transport, Water and Environment, Agriculture, Energy and Extractives and ICT. The coalition is currently supported by the World Bank Institute (WBI).

Mission of UCMC

The mission of UCMC is "A transparent and accountability public procurement system transforming the quality of life of the majority Ugandans."

Objectives of UCMC

- 1. To create a multi-stakeholders' platform for members to share information, plan, and strategize together for joint advocacy on contract performance and service delivery.*
- 2. To build the capacity of member organizations of the Coalition in contracts monitoring through training and information sharing.*
- 3. To undertake monitoring of public service delivery contracts by applying a wide range of tools that involve the citizens and services users.*
- 4. To coordinate fundraising efforts and mobilize financial and other resources that enable members of the Coalition undertake contract monitoring activities.*

About Works & Transport Cluster

The Works & Transport Cluster is one of the six clusters of Uganda Monitoring Coalition (UCMC) that brings together different organisations with an interest in monitoring contracts in road construction, bridges and transport infrastructure projects with a broad objective of mitigating misuse of resources through empowering citizens to foster meaningful participation to ensure transparency, accountability and value for money for government and donor funded projects in Uganda. The Cluster is headed by Uganda Road Sector Support initiative (URSSI) and has other three members namely Uganda National Association of Building & Civil Engineering Contractors (UNABCEC), Youth Marshall Matrix International (YOMMINT), and Lake Albert Biodiversity Conservation Alert (LABCA),

1.0 Introduction

Efficient utilization of resources allocated to development is vital especially for a developing country like Uganda. Efficient procurement and management of government contracts is critical for quality of service delivery and achieving development objectives. However, inefficient and corrupt practices threaten achievement of the desired results. By introducing greater transparency and monitoring in the contracting process, citizens can dramatically reduce this burden. The award and implementation of contracts and concessions is critical to development. Poor choices about how contracts are awarded and implemented, and resources and revenues are spent can result in poor development outcomes. Civic engagement in procurement and contracting processes in Uganda has been sporadic or limited in scope and impact to date, reflecting constraints in opportunity and capacity.

However, there is growing recognition that monitoring of procurement processes can serve an effective oversight function in controlling fraud, waste and abuse in public contracting. This is especially important in Sectors that have the potential to shape a country's overall development goal, such as Transport Infrastructure. This monitoring Tool is therefore part of the efforts aimed at addressing the challenges by empowering communities with guiding questions for contractors, consultants, project supervisors and government agencies executing road construction and maintenance projects.

2.0 Background

The most serious problem facing the road sub sector in Uganda apart from inadequate financing is the technical and institutional challenges which include lack of adequate inspection and enforcement of road maintenance and construction standards. This is due in large part to lack of Ministries, departments and Agencies (MDAs) organizational capacity and the consultant's/supervisors and contractors' willingness to ensure strict adherence to project specifications and terms of agreement as spelt out in project contracts. This has often led to poor road construction practices and inadequate materials resulting in road surfaces of poor quality hence lack of value for money.

3.0 Methodology of developing this tool

This tool was developed using a combination of techniques which include literature review, consultations and engagement with different stakeholders in the road construction sector in Uganda. Relevant documents as well as other road monitoring tools were reviewed. This tool is however specifically tailored for Uganda's situation and is based on road development methods and strategies.

The works and transport cluster sought to produce a simple, easy to use tool that can be utilised by non technical persons to evaluate road project performance and identify potential problems which may require particular scrutiny by both the contractor and the client. Discussion meetings were held between Kampala Capital City Authority (KCCA), Uganda National Roads Authority (UNRA) and the cluster to gather perspectives on what they deemed appropriate about third party engagement. The purpose of these meetings was to introduce the idea of road monitoring to these relevant government departments. A big cache of literature was collected by all cluster members out of which relevant information was extracted and organised to come up with the first draft of the tool.

The cluster then took another step of developing clearly defined and justified selection criteria of the most relevant information thereby reducing on the vast information to a much more manageable level. Reflection and lesson learning meetings were held to determine how the final tool would look like. The final draft was thereafter agreed upon by the cluster and shared with the wider coalition and other relevant stakeholders for possible comments and observations.

4.0 Why the tool was developed

Road construction is a highly technical venture that requires a lot of resources. The government of Uganda has identified the transport sector as one of the most critical sectors which needs special attention in terms of resource allocation because it can spur economic development in other sectors through a spiral effect.

As a result of a deliberate policy to prioritize the sector government is undertaking several road projects ranging from major to medium and small reconstruction, development and maintenance. All these projects require attention and involvement of citizens to ascertain and ensure value for money in the entire process of contract execution and management.

The tool is meant to be used by persons who may not necessarily possess technical expertise in road engineering and civil works. It is intended to guide the user in seeking answers to simple basic questions. The tool is therefore purposely developed to help the monitor get conversant with common terms of road construction so as to ask the right questions to the right persons in charge of the project. The technical aspects of the civil works and engineering procedures have deliberately been left out so as to make it as user friendly as possible.

Although the tool is not scientific, when administered appropriately it should be able to guide the monitor to arrive at valuable conclusions from which he/she can be able to make necessary recommendations to both the contractor and the client to rectify identified problems and challenges. The other purpose of this tool is to demystify road construction among the Ugandan population thereby making communities and citizens become part and parcel of governance and accountability schema by actively getting involved and participating in a field that was hitherto exclusive and closed to structured public scrutiny.

It is meant to create a genuine surveillance society in Uganda and UCMC expects that this tool will go a long way in helping government and Ugandans in general to have the benefit of better road projects that are worth the monies spent.

The tool is intended to be used on both gravel/earth and paved road projects, although some questions may not be applicable for gravel road contracts. It is incumbent upon the road monitor to fully understand the questions so as not to ask inappropriate questions which may not relate with the project being monitored.

5.0 What is monitoring?

Monitoring is active involvement in the implementation of a project, which entails:

- *Watching the implementation with the main objective of the project in mind;*
- *Comparing the plan and standards with the actual accomplishments;*
- *Checking particular aspects of the project in its various stages; and*
- *Recommending remedial actions, if necessary.*

There are generally two (2) principal aspects to contract monitoring. The first "entails regular reviews of progress" and the second "entails looking at whether the contractor is achieving predetermined milestones effectively." Road monitoring must be done on site but with prior arrangement and liaison with the project client, the Contractor and other relevant project staff. Unannounced and surprise visits are greatly discouraged as they may not yield any helpful results due to the fact that the project staff may refuse to be interviewed without prior notice. Surprise visits to the site can only be made to make observations and even then, the monitor must be ready to make a follow up with a face-to-face interview to get the facts right.

6.0 Basic things the Monitors should generally look out for:

- ✓ *Quality and quantity of work output*
- ✓ *Completion of work according to schedule*
- ✓ *Work being done according to contract price*
- ✓ *Work being done according to normal industry practices*
- ✓ *Construction being done with value for money in mind*

7.0 The people to talk to on site:

- *The contractor*
- *Project Manager*
- *Site Engineer*
- *Consultants*
- *Equipment operators*
- *Casual labourers*
- *Communities around the area*

NOTE: Any visit to a road site should be carefully planned for the monitoring to be successful.

8.0 THE MONITORING PROCESS

Pre-Monitoring Activities

- 1.** *The road monitor must gather adequate information and review of project documents such as plans and specifications of the project, program of work, construction schedule, contract agreement, and general project status project reports and other pertinent documents.*
- 2.** *The road monitor should work in close coordination with the client (project owner) or responsible government agency such as UNRA, Local Governments etc.*
- 3.** *The road monitor should make prior preparation of a monitoring tool kit and equipment like camera, measuring tape, record book, etc.*

The road monitor should be able to discuss findings with the project client, contractor/supervisor and must not rush to make findings public through the media. Disseminating information to the media should be done as a last resort when constructive engagement has failed or if they have deliberately declined to address the concerns raised by the monitor

9.0 Post Monitoring Activities

1. The road monitor must make presentation of initial findings on the project especially if there are problems that need immediate actions.
2. The road monitor should make recommendations and suggest solutions to resolve problems, if any.

NOTE:

The Road monitor should be able to describe the performance of the project and must adopt a rating (parameters) based on concrete evidence as to whether there is need for urgent action (Raising the Red Flag) or the findings do not point to serious performance weaknesses

High Risk – Which means that grave flaws have been identified that need urgent serious attention

Medium Risk – The project is progressing or has been completed with some encounters not so immense but at the same time not so trivial to ignore

Low Risk – The Monitor Project may have challenges which may not fundamentally affect the quality of the road during or after completion.

MONITORING REPORT FORMAT

Project Title	What is the whole road project about e.g. “upgrading of Mukono-Kyetume-Katosi Road” , re-graveling Maddu-Sembabule Road” etc
Location	Name the location of the project clearly indicating the route of the road by mentioning the villages, trading centres, towns etc for the entire road route
Appropriation/Project Cost	How much will the project cost?
Source of Fund	What is the source of funds for the project?
Implementing Agency (Project Client)	Who is the “owner” of the project e.g. UNRA, KCCA, Local Government etc.
Contractor:	What is the name of the company undertaking the project?
Date of Inspection:	The date when actual monitoring took place must be indicated for authenticity purposes

Road Monitor Team Composition:	Mention all the team members of the monitoring team
Findings/Observations	<p>During monitoring work, what is the actual accomplishment or status of the project in terms of quantity and quality? Is the programmed quantity already done? Are the plan and specifications of the project followed?</p> <p>What are your observations?</p> <p>What % of physical works has been accomplished against planned?</p> <p>What % of payments has been made against contract amount?</p> <p>Any variations and additional works?</p> <p>Based on your findings and observations, what do you recommend in order to address or resolve deviations, problems or issues in the project, if any?</p>
Recommendations and suggestions	What does the Monitor propose based on the findings? What actions should be undertaken to remedy or rectify anomalies unearthed during the monitoring?
Brief description/background of the project	Provide brief information about the project, how it was conceived, its relevancy, expected impact and significance on the community and any other relevant information such as its history and future prospects for the community after its completion.
Status of the Project	How is the project progressing? What percentage of the project is complete? Is the contractor likely to meet the deadline stipulated in the Project schedule?
Report prepared by	Provide the names of people involved duly signed by those who monitored and prepared the report

THE ROAD MONITORING TOOL

QUESTION	COMMENT/CLARIFICATION
QUESTIONS FOR THE SUPERVISING ENGINEER/CONSULTANT	
What is the name of the Client/Project Owner	The client is the government agency that is responsible for contracting out the project
Who is the contractor?	The contractor is responsible for ensuring that the road is constructed in accordance with the specification and other aspects of the contract, including compliance with all applicable regulations. If part of the work is sub-contracted, the main contractor is still responsible. Sub-contracting is normally only permitted with the express approval of the client. Sub-contracting should always be transparent.
Is there a board displaying key details of the project?	For construction contracts, and major maintenance works, the contract requires the erection of a board displaying material project information including: a) Name (and summary scope, and direction) of the project; b) Client name; c) Funding source; d) Consultant's name; e) Contractor's name; f) Value of contract; g) Start date of contract programme; and h) Planned completion date of contracted programme.
Who is in charge of the site?	If this is not obvious to an onlooker, it is probably not clear to those working on the site. Someone has to be responsible, and seen to be in charge.
Is the contractor local or foreign?	Depending on the magnitude of the project, major projects are usually undertaken by foreign companies while local contractors are engaged in medium and small projects.
Document the types of Works being contracted. -Major Works -Medium Works -Small Works	Major works encompass projects over and above 50km , Medium works are projects of less than 50km while small works are projects of less than 10km. (It should be noted that projects in urban areas can be considered major or medium even when they are 10 km or even below)
Who is funding this project?	Government and development partners such as World Bank,

	European Union etc. normally provide funds for most road projects. Sometimes both government and a development partner can co-fund a project.
What is the programme of works?	This forms part of the contract, and is an important point of reference in progress project meetings. This question seeks to Find out whether the contractor is behind schedule in which case the engineer can instruct him to deploy more resources in order to increase project execution sped.
Date of commencement of project and expected date of completion.	Provide the date when the contractor started actual work
Expected date of completion of Project	Provide the date when the contractor expects to complete the project
Does the project have a Supervising Consultant Engineer (SE)	Any road construction project without a supervisor is likely to be compromised. The consultant must be a well-qualified person (company) with high ethical and managerial standards who will ensure that all the project details are followed to the letter.
Does the supervising engineer have authority on site?	No-one apart from the supervising engineer should be allowed to give instructions on site. His/her guidance should be respected. The supervising engineer is supposed to provide oversight and ensure compliance, and should be allowed the discretion, with accountability, to make professional judgements throughout the project cycle
How often does the Supervising Consultant Engineer (SE) visit the site? Is he/she readily available	In situations where the supervisor is away from the site for long periods, many things can go wrong in his absence. The supervisor's absence and appearance should at the same time not be predictable by the project staff lest they "do good work" when he is around and the opposite when he is away.
Is the location of the work site well defined?	The contractor is responsible for securing the site and controlling access to it. This should be clearly visible.
Does the contractor have equipment that meets the requirements for the construction of the road in terms of cost, condition, distance coverage etc?	Depending on the scope and magnitude of the project, the monitor should be able to assess the equipment on site to determine whether they are adequate and appropriate to execute the project.

<p>Is there evidence of records being kept?</p>	<p>A feature of a well ran site is where there are good record keeping practices. For instance when a truck arrives, someone records its time of arrival, and the source of the load. When asphalt is being laid, someone needs to be recording the asphalt temperature, and so on. If appropriate, ask to see what records are being kept, and that will reveal what controls are in place.</p>
<p>Is the contractor using materials from approved sources?</p>	<p>The properties of materials used in the road and related kerbs and drainage works is defined in the technical specification, which forms part of the contract. The engineer should be requiring the contractor to keep good records to demonstrate that all materials used come from sources that have been tested and approved. Further testing (of quality) and measurement (of quantity) then takes place on site after elements of the work have been completed. The contractor tests and the supervising engineer checks.</p>
<p>Who in the contractor's team is responsible for materials testing and quality control?</p>	<p>If there is a quality problem about any aspect of the works, then the supervising engineer needs to know the person responsible. The contractor should never ask the supervising engineer to check on quality until the contractor's own quality manager is satisfied. He then issues a "Request for Inspection" – asking the engineer to check and sign off a particular aspect of the work for payment.</p>
<p>Has the contractor defined their method statements for key activities?</p>	<p>Method statements, which form part of the contract, are prepared by the contractor to show how they will undertake the work safely and effectively. Without such a method statement to refer to, it is more difficult to monitor performance.</p>
<p>Does the supervising engineer keep the site records, including "Requests for Inspection", accident reports, and minutes of progress meetings?</p>	<p>The contractor and the supervising engineer should both be keeping detailed records of what has and has not been approved. Issues arising should be documented in weekly progress meetings, which should be minuted and filed.</p>
<p>Does the contractor keep the site safe? Does the contractor have in place health and safety measures?</p>	<p>The contractor should protect his own staff, and the public, from risks related to undertaking the works.</p>
<p>How does physical progress compare with financial progress?</p>	<p>Physical progress should be visually monitored with a simple linear chart. This can be weighted between activities to arrive at an approximate "% physical progress". Financial progress is measured through Interim Payment Certificates issued by the supervising engineer when parts of the work have been approved for payment.</p>

<p>Does the Contractor have appropriate and adequate equipment?</p>	<p>Most site activities require more than one item of equipment working together [A roller cannot for instance ordinarily compact effectively unless there is also a water bowser – a grader can spread material, but cannot compact it, and so on]. In extreme cases, there is no work going on due to lack of equipment.</p>
<p>Does the contractor have the manpower to undertake this project in a timely manner?</p>	<p>Some Contractors often provide convincing evidence at prequalification stage indicating that they have technical, financial and managerial capacity to handle projects. This may turn out not to be the case when actual implementation commences</p>
<p>What is the contractors' previous experience as well as financial capability?</p>	<p>Contractors who exhibit long term experience are likely to be more reliable than those who are new entrants in the construction business. The monitor needs to find out about whether the contractor has a track record of handling projects of similar nature.</p>
<p>What are the working conditions like? Are there first Aid arrangements/HIV/AIDS Counselling?</p>	<p>Both the Labour Laws the road contracts require safe and hygienic working conditions for staff and operators. This includes the provision where appropriate of Personal Protective Equipment such as reflective vests, site boots, hard hats etc.</p>
<p>Are there Toilet facilities on site?</p>	<p>Workers spend long hours on site. It is imperative that places of convenience are provided. They must be within reasonable distance within the project site and should be of acceptable standards for the dignity of the workers.</p>
<p>How do you relate with community around the site?</p>	<p>It is important that the project personnel relate well with the community for possible support and buy-in by the community.</p>
<p>How does the community access information on the project?</p>	<p>Ask to know whether the contractor and the client bother to convey any information about the project to the community. There should be deliberate efforts by the contractor and the client to provide up-to-date information about the project in a formal, simplified and adequate manner for the community to become part and parcel of the project</p>
<p>How did the surrounding community get to know about this project?</p>	<p>The monitor should inquire whether information about the project was freely given to the community and how this information was given out.</p>

How often do you meet with the community?	The contractor and the client must endeavour to appraise the community about the project by explaining, on a regular basis, the progress of the project.
At what stage of project life cycle was the community involved in the project?	The monitor should ask to know at what point the community was “let in” about the project: - On conception - On inception - At pre-contract - Post construction
Are locations along the site easily identifiable in terms of their distance (known as “Chainage” in English) from the start?	The sign board should have defined the “direction” of the site, and distances along the site should be clearly marked, in order to make it easier to manage the site in an accountable manner.
Do the dimensions of the road match approved road design?	If access to the site is permitted, it is a simple matter to check the width of the carriageway up to the shoulders or kerbs, walkways etc.
Were there any land acquisitions for this project?	Many road projects in Uganda face the challenge of land acquisition which often delays implementation. If applicable inquire whether, all affected persons were fully compensated
Does the contractor have Performance Security?	The client must have a guarantee that the contractor will deliver the project in accordance with the contract specification, failure of which the performance bond provided to the contractor by the Bank or an insurance company is forfeited in favour of the client
Is the project on schedule?	Is the project moving according to plan? Is it behind or ahead of schedule and what is the explanation in either case?
Are project workers insured	Construction sites are highly risky areas particularly for workers. In case of injury or death, will the company be able to compensate the victim?
Is the contractor putting in place measures to prevent or minimise air and water pollution?	During construction, water and air pollution are likely to occur. Has the contractor put in place measures to mitigate air and water pollution? Does the contractor for instance pour water regularly on the initial road work sections to reduce dust?

<p>Does the Contractor prepare progress reports? If Yes, what is the frequency of progress reporting, monthly/Quarterly?</p>	<p>To keep track of the progress of works the contractor is required to keep records of the progress of the project. The Monitor should request to have a look at the progress reports to find out whether information in the reports corresponds with the actual work on the ground.</p>
<p>Does the contractor have an Environmental and Social Management Plan? Was the EIA carried out?</p>	<p>Uganda's National Environment Act, Cap. 153, Section 2 require that a road project exceeding 50km is categorized as 'major' infrastructure development" thus requires a developer to conduct an Environment Impact Assessment before carrying out major interventions on roads that traverse scenic, wooded or mountainous areas as indeed the investments that cause significant displacements of households and destruction of property requiring a resettlement.</p>
<p>How are disputes amongst workers resolved on site?</p>	<p>Construction workers especially casual labourers tend to have many disagreements that if not addressed can generate into fights, injuries and in extreme cases, death. Is there a mechanism to address disagreements as well as handling grievances for project staff?</p>
<p>Are communities within the project area conversant with basic project information</p>	<p>Communities along the project area are important stakeholders whose buy-in and support is very vital for the project delivery and sustainability. It is important that the communities are informed about basic information for them to be able to own the project and support it.</p>
<p>Are you aware about fuel pilferage (theft) on this project?</p>	<p>Communities are usually aware when theft of materials such as fuel, cement and other materials are stolen and who is responsible</p>
<p>How will the community ensure security of road furniture</p>	<p>This question is consciously alert the community that they are responsible for proper usage of the road including ensuring security road signs and other fixtures.</p>
<p>Is the constructed roadway free from landslides and mudslides?</p>	<p>Landslides and mudslides can cut off an entire road network thus paralysing transport on that particular road. The Monitor should inquire whether the road route is prone to landslides in which case the contractor should adequately forestall their occurrence along the road route.</p>
<p>Are stones clean, hard, durable and of good shape and size?</p>	<p>Unscrupulous contractors use cheap and poor materials to defraud the client and reduce on their costs. The monitor should look at materials such as stones and aggregates to find out whether they are of good quality without soil and other unnecessary substances.</p>
<p>Were guard Rails put in strategic spots to prevent accidents?</p>	<p>Guardrails should avoid accidents by preventing vehicles driving off the pavement and hitting other vehicles or objects. Subsequently guardrails and barriers are designed in a way that they reduce the harm for drivers and occupants of the vehicles</p>

	hitting it. Guardrails are usually composed of a number of galvanised steel items.
Were Traffic Signs put in Place?	The most important aspect of traffic signs is that they should be visible under most circumstances. Sometimes traffic signs are removed illegally or were not placed on the correct position. In these cases the traffic signs need either to be replaced or its position corrected.
Were Street Lights put in place (for urban and peri-urban roads)	Roads in busy urban areas are supposed to have street lights. The Monitor should inquire whether street lights are to be put in place
Does the road have shoulders?	<p>The shoulder has three functions:</p> <ul style="list-style-type: none"> • Providing side support to the road pavement • Providing space to the traffic in case of emergencies • Draining water from the carriageway to the roadside ditch <p>The usual defects of shoulders are: Obstructions on shoulders, Shoulder higher than carriageway, erosion of shoulder, Shoulder far lower than carriageway, Weak surface, it cannot be used by Non-motorised transport</p>
Are there Typical functional damages on the road such as; -Roughness - Rutting -Shoulder deterioration -Edge breaks -Cracking	The kind of structural damages depend mainly on the material composition of the pavement. Typical pavements are made of gravel, asphalt and concrete. However all these materials have one damage in common- Potholes? Potholes are not only a sign of structural damages but eventually will effectively reduce the width of the pavement and thus reduce the potential traffic flow of the road. Beside road shoulders deterioration, edge breaks have proved to be a common preliminary feature of road failure in Uganda
Were functional drainages put in place	The purpose of the Drainage System is to rapidly collect and conduct rain and ground water away from the carriageway. Water can cause widespread damage to the road by weakening the pavement structure. The drainage system is therefore a very important component of the road. An open storm-water drainage system consists of ditches & drains, culverts, drifts and causeways.
Are there road markings?	Markings are usually painted lines and symbols to inform the road users about alignment of the road and traffic rules.

MONITORING QUESTIONS FOR COMMUNITY AROUND THE SITE

QUESTION	RESPONSE
How do you relate to the contractor and his/her employees?	
How do you benefit from this project?	
What do you know about this project?	
What is the source of your information?	
How trustworthy are the workers at the site?	
What are your expectations from this project?	

MONITORING QUESTIONS FOR PROJECT WORKERS & CASUAL LABOURERS

QUESTION	RESPONSE
Do you have a legal contract with your employer?	
Are you allowed a lunch break?	
What are the official working hours?	
Are you provided with lunch on site?	
Are your wages paid on time?	
Are you paid overtime for time worked beyond the official working hours?	

<p>Are you provided with medical facilities on site?</p>	
<p>Have you been asked to do something you think is wrong? What was it?</p>	
<p>What are the four good things you can say about the contractor/project? 1. 2. 3. 4.</p>	
<p>What are the four things you are not comfortable with about the contractor/project? 1. 2. 3. 4.</p>	
<p>How far away from site do you live?</p>	
<p>Are you provided with HIV/AIDS information on site?</p>	
<p>Are you provided with safety gear?</p>	
<p>Do you hold meetings with the contractor or site engineer?</p>	
<p>Are your grievances handled satisfactorily?</p>	
<p>Are you satisfied with progress of work on site?</p>	
<p>Do you have any grievances; if so how are they being handled</p>	

EXPLANATORY NOTES

Road Construction Preparation Stage

During the grubbing phase, or preparation phase, a temporary road is often constructed to facilitate equipment access, logging equipment movement, and delivery of construction materials, such as hard stone, gravel, borrow material etc. This is often the case when construction activities are under way at several locations. If temporary roads are constructed, they are often built at the top of the construction width and are usually nothing more than a bull dozer trail.

Road construction Equipment

The method and equipment used in road construction is an important economic and design factor in road location and subsequent design. A road to be built by an operator whose only equipment is a bulldozer requires a different design from a road to be built by a contractor equipped with hydraulic excavator, scrapers, and bulldozer etc. There are common road construction equipment and their suitability differ for the different phases of road construction. A bulldozer can be used in all phases of road construction from excavation and drainage installation to final grading while the front end loader performs well in soft material.

Bulldozers are an efficient and economical pieces of equipment for road construction where roads can be full benched and excavated material can be side cast and wasted. It should be noted, however, that side cast material is not compacted. Excavators are becoming more and more common in road construction. Because of their excellent placement control of excavated material, they are ideal machines for construction under difficult conditions.

Construction Progress

- *Contractor should keep construction time (exposure of unprotected surfaces) as short as possible.*
- *Contractor should plan construction activities for the dry season. Construction activities during heavy or extended rainfall should be halted.*
- *Contractor should install drainage facilities right away. Once started, drainage installation should continue until completed.*

Side cast /Waste Material/ soil

Side cast or wasted material cannot remain stable on side slopes. Excavated material has to be end hauled to a safe disposal area. This requires dump trucks and excavators or shovels for loading and hauling.

Conduits

They are also known as culverts. They are usually installed along the original stream bed. The laying of the conduit/culvert must begin at the downstream end of the conduit line. The size of the reinforced concrete pipe culvert should accommodate the volume of water run-off in the area. The culvert should be installed with minimum covering of 300mm or deeper. All joints should be applied with mortar. Headwall, catch basin and concrete apron should be constructed at the culvert inlet and outlet respectively. The culvert must be installed with a gentle slope descending from inlet to outlet for smooth flowing of water. The culvert should extend to the full width of the roadway.

Importance of Construction Techniques

Proper construction equipment and techniques are critically important for minimizing erosion from roads during and after the construction. There are clear indications that approximately 80 percent of the total accumulated erosion over the life of the road occurs within the first year after construction. Of that, most of it is directly linked to the construction phase.

DESCRIPTION OF KEY TERMS

Asphalt (Bitumen)- *This is a sticky, black and highly viscous liquid or semi-solid form of petroleum. It may be found in natural deposits or may be a refined product; it is a substance classed as a pitch. The primary use of asphalt/bitumen is used as the glue or binder mixed with aggregate particles to create asphalt concrete.*

Bulldozer: *A bulldozer is a crawler (continuous tracked tractor) equipped with a substantial metal plate (known as a blade) used to push large quantities of soil, sand, rubble, or other such material during construction or conversion work and typically equipped at the rear with a claw-like device (known as a ripper) to loosen densely-compacted materials. The term "bulldozer" is often used erroneously to mean any heavy equipment (sometimes a loader and sometimes an excavator), but precisely, the term refers only to a tractor (usually tracked) fitted with a dozer blade. A bulldozer can be used in all phases of road construction from excavation and drainage installation to final grading.*

Clearing and grubbing: *Preparing the road right-of-way or construction area by removing bush trees, tree stumps and roots.*

Client- *The party for which service is rendered, the institution/agency using the services of the contractor*

Contractor- *A contractor is employed by the client and, is responsible for providing all of the material, labour, equipment and services necessary for the execution of the project.*

Culvert- *This is a structure that allows water to flow under a road, railroad, trail, or similar obstruction. Typically embedded so as to be surrounded by soil, a culvert may be made from a pipe, reinforced concrete or other material. A structure that carries water above land is known as an aqueduct. Culverts come in many sizes and shapes include round, elliptical, flat-bottomed, pear-shaped, and box-like constructions. Culverts may be made of concrete, galvanized steel, aluminium, or plastic, typically high density polyethylene.*

Drainage channel – *Also known as Drains, this is an essential feature on a road that provides an efficient and direct run off of water from the carriage way or road bed. Drainage channel can be visible or underground (covered)*

Earth road/Dirt Road - *They take on different characteristics according to the soils and geology where they pass, and may be sandy, stony, rocky or have a bare earth surface, which could be extremely muddy and slippery when wet, and baked hard when dry. They are likely to become impassable after rain. Compared to a gravel road, a dirt road is not usually graded regularly to produce an enhanced surface to encourage rainwater to drain off the road, and drainage ditches at the sides may be absent.*

Gabions: *These are wire mesh baskets which are filled with durable rocks and used as protection walls and flood control systems and installed at designated locations*

Grader- *Also commonly referred to as a road grader, a blade, a maintainer, or a motor grader, is a construction machine with a long blade used to create a flat surface during the grading process. Graders are commonly used in the construction and maintenance of dirt roads and gravel roads. In the construction of paved roads they are used to prepare the base to create a wide flat surface for the asphalt to be placed on*

Gravel road- *A type of unpaved road surfaced with gravel that has been brought to the site from a quarry or stream bed.*

Gravel- Road: A type of unpaved road surfaced with gravel (unconsolidated rock fragments) that has been brought to the site from a quarry. They may be referred to as 'dirt roads, but that term is used more for unimproved roads with no surface material added.

Guard Rails- Sometimes referred to as guide rail or railing, is a system designed to keep people or vehicles from (in most cases unintentionally) straying into dangerous or off-limits areas.

Hydraulic Excavator: Excavators are heavy construction equipment consisting of a boom, stick, bucket and cab on a rotating platform (known as the "house"). The house sits atop an undercarriage with tracks or wheels. All movement and functions of a hydraulic excavator are accomplished through the use of hydraulic fluid, with hydraulic cylinders and hydraulic motors. Excavators are also called diggers, mechanical shovels, or 360-degree excavators (sometimes abbreviated simply to 360). Excavators come in a wide variety of sizes. The smaller ones are called mini or compact excavators.

- In areas without sidewalks, pedestrians may walk on shoulders
- In the event of an emergency or breakdown, a motorist can pull into the hard shoulder to get out of the flow of traffic and obtain an element of safety

Kerbs- This is the edge where a raised pavement/sidewalk/footpath, or road shoulder/hard shoulder meets an unraised part of the road. Kerbs may fulfil any or several of a number of functions. They separate the road from the roadside, discouraging drivers from parking or driving on sidewalks and lawns. They also provide structural support to the pavement edge.

Paved road - A road with a hard smooth surface of bitumen or tar

Pavement- The Road Pavement (Base) is the portion of the road located directly above the sub-grade, and beneath any wearing surface. In urban areas it is often bordered by kerb & channel, and in rural areas by road shoulders. It is typically constructed from compacted imported material such as crushed rock. It is that portion of a road designed for the support of, and to form the running surface for, vehicular traffic. - The portion of the road, excluding shoulders, placed above the design sub-grade level for the support of, and to form a running surface for vehicular traffic

Performance Security- A surety bond issued by an insurance company or a bank to guarantee satisfactory completion of a project by a contractor.

Project Design: Project- Sequence of tasks in road construction, planned from beginning to end; bounded by time, resources, & required results with defined outcome delivered according to design.

Road design – it is a civil engineering discipline that involves the planning, design, construction, operation, and maintenance of roads, bridges, and tunnels to ensure safe and effective transportation of people and goods.

Road development- This entails construction of a road where none existed before. It can also imply fundamental changes on an existing road from a lower class to a vitally improved one

Road reconstruction-This involves the removal and replacing of the old road structure including the sub base and the surface. Reconstruction occurs when maintenance is no longer relevant or tenable and the lifespan of the road is overdue. The reconstructed road is almost as good as a new road.

Road rutting- A rut is a depression or groove worn into a road by the travel of wheels of vehicles. Ruts can be formed by wear, or they can form through the deformation of the asphalt concrete pavement or sub base material. Rut-like depressions can be formed on gravel roads by the erosion from flowing water.

Road Shoulder - A shoulder is a reserved area by the side of a road or motorway. Generally it is kept clear of motor vehicle traffic. Shoulders have multiple uses, including:

Road upgrading- This involves reconstruction of a road thereby improving its standard from a lower class to a higher one. It can be from an earth road to a paved one. It can also involve widening and improving on its other features

Roller - A road roller (sometimes called a roller-compactor, or just roller) is a compactor type engineering vehicle used to compact soil, gravel, concrete, or asphalt in the construction of roads and foundations. In construction, there are three main types of compactor: the plate compactor, the "Jumping Jack" and the road roller. The roller type compactors are used for compacting crushed rock as the base layer underneath concrete or stone foundations or slabs. The plate compactor (vibratory rammer) has a large vibrating base plate and is suited for creating a level grade, while the jumping jack compactor has a smaller foot. The jumping jack type is mainly used to compact the backfill in narrow trenches

- Shoulders move water away from the road before it can infiltrate into the road's sub-base, thus increasing the life expectancy of the road surface.
- Shoulders provide structural support of the road
- Shoulders, especially paved or hard shoulders provide additional space should a motorist need to take evasive action or need to recover control of their vehicle before a run-off-road collision occurs.

Sub-base: is the layer of aggregate material laid on the underneath on which the base course layer is located. It may be omitted when there will be only foot traffic on the pavement, but it is necessary for surfaces used by vehicles. Sub-base is often the main load-bearing layer of the pavement. Its role is to spread the load evenly over the sub-grade. The materials used may be either unbound granular, or cement-bound. The quality of sub-base is very important for the useful life of the road. The thickness of sub-base can range from 75-100 mm for garden paths through 100-150 mm for driveways and public footpaths, to 150-225 mm for heavy used roads, and more for highways.

Traffic Sign – or road signs are signs erected at the side of or above roads to give instructions or provide information to road users.

Water Bowser - A bowser is a generic name for a tanker of various kinds. The term bowser is used by water companies in the United Kingdom to refer to mobile water tanks deployed to distribute or sprinkle water on specific spots or areas within the project

Wheel loader- A loader (bucket loader, front loader, front-end loader, pay loader, scoop, shovel, skip loader, or wheel loader) is a heavy equipment machine used in construction and sidewalk maintenance to move aside or load materials such as asphalt, demolition debris, dirt, gravel, rock, sand, etc. into or onto another type of machinery (such as a dump truck, conveyor belt, feed-hopper, or just from one site to another).

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