PUBLIC PROCUREMENT AND DISPOSAL
OF PUBLIC ASSETS AUTHORITY
"Regulating for Results"

CONTRACT AUDIT IN REPSECT OF THE RESPECT OF THE CIVIL WORKS FOR RECONSTRUCTION OF MASAKA-MUTUKULA ROAD (89.5KM), REHABILITATION OF NYENDO-VILLA MARIA ROAD (11KM) AND UPGRADING OF ACCESS ROADS (7 KM) TO PAVED STANDARD

ENTITY: MINISTRY OF WORKS AND TRANSPORT

CONTRACTOR: CHONGQING INTERNATIONAL CONSTRUCTION CORPORATION (CICO)

PROCURMENT REF: UNRA/WRKS/2023-2024/00007

APRIL 2026

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Acronyms

BOQ	-	Bills of Quantities
ESA	-	Equivalent Standard Axle
FY	-	Financial Year
GCC	-	General Conditions of the Contract
MoWT	-	Ministry of Works and Transport
PPDA	-	Public Procurement and Disposal of Public Assets Authority
UGX	-	Uganda Shillings
USD	-	United States Dollars
VAT	-	Value Added Tax
UNRA	-	Uganda National Roads Authority

EXECUTIVE SUMMARY

The Authority received a complaint dated 2nd March 2026 in which it is alleged that there are anomalies in the ongoing works for the reconstruction of Masaka-Mutukula Road (89.5Km), rehabilitation of Nyendo-Villa Maria Road (11Km) and upgrading of 7Km access roads to Paved Standard.

Specifically, the complainant alleged as follows:

1. Under design of critical works that is likely to lead to premature failure of the road infrastructure;
2. Use of sub-standard materials sourced from unverified suppliers for civil works;
3. Execution of sub-standard works, characterised by under-compaction of base layers, inconsistencies between approved designs and field applications, weak laboratory test traceability, and early signs of cracking and drainage inefficiencies; and
4. Certification of payments that allegedly do not reflect the actual works undertaken on site.

In accordance with Section 8 (1) (j) (ii) of the PPDA Act, Cap. 205, the Authority instituted a contract audit into the matter and made the following findings.

The works commenced on 1st July 2024 with a scope that included earthworks construction, drainage works, including side drains, pipe culverts, and box culverts, and 1no. bridge, pavement construction including sub-base layer (mechanically modified), base course layer (CRR coarse type), asphalt concrete surfacing layer, ancillary road works and installation of road furniture including road signs, rumble strips and speed humps, construction of walkways, construction of parking lanes at the border in Mutukula, construction of a roadside station and implementation of Environmental, Social and Safety requirements during the project.

Key findings of the Authority

1. Significant Underestimation of BoQ Quantities: Critical items, including excavation, rockfill and drainage structures were significantly underestimated during the design phase. Consequently, some BoQ item quantities are already exhausted despite physical progress being only 18.23%, leading to irregular payments being made against the total contract sum without utilising documented contingencies.

2. Structurally Deficient Pavement Design: The original contract design produced a Structural Number (SN) of 3.46–4.05, which is structurally deficient for the required T9 traffic class threshold of 4.37. The Ministry's subsequently instructed "optimised" revised design (SN 4.1) remains structurally inadequate and critically omits a Dense Bitumen Macadam (DBM) or cemented base layer. This omission violates regional East African standards and exposes the pavement to severe risks of rutting, fatigue cracking, and premature failure.

3. Irregularities in Performance Security: The Contractor failed to submit an unconditional and irrevocable bank guarantee for the performance security as explicitly required by the signed corrigendum. Instead, the Employer allowed extended use of a Performance Securing Declaration without reducing the contract cost, undermining enforceability and exposing the Government to unjustified liabilities.

4. Defective Physical Works: Physical inspections revealed transverse and longitudinal cracking, as well as honeycombing, in already installed concrete box culverts. These defects compromise localised strength and create pathways for water, accelerating reinforcement corrosion.

5. Delayed Laboratory Equipment Mobilisation: By April 2026, the Contractor had delivered only 50% of the Engineer's required laboratory equipment, forcing tests to be conducted externally and causing project delays.

6. Overpayments: Quantity verifications revealed that UGX 663,600 was over-certified for payment regarding reinforced concrete pipe culverts in recent Interim Payment Certificates.

7. Statutory Environmental and Safety Non-Compliance: No annual environmental audit has been conducted since the contract signing in May 2024, directly contravening Regulation 12 (1) of the National Environment (Audit) Regulations, 2020. Furthermore, site workers were observed operating without critical Personal Protective Equipment (PPE), posing severe safety hazards.

Key Recommendations

To mitigate long-term liabilities, ensure value for money, and regularize the contract execution, the Authority recommends the following immediate actions:

1. Rectify Pavement Design: The Accounting Officer should immediately withdraw the structurally deficient "optimised" design. The Entity should adopt either the Engineer's Alternative Proposal (SN 5.4) or the ORN 31 (2022) standard (SN 5.1), both of which incorporate the necessary DBM binder layer and comply with regional durability standards for a 20-year lifespan.

2. Enforce Contractual Securities: The Contractor should be compelled to submit a valid, unconditional bank guarantee for the performance security in strict adherence to PCC 4.2 and the contract corrigendum.

3. Correct Defective Works: The Supervising Engineer should ensure the Contractor urgently remediates or reconstructs the defective concrete drainage structures (cracks and honeycombing) to prevent localised structural failure.

4. Financial Recoveries and Cost Control: The Accounting Officer should recover the identified overpayment of UGX 663,600 in subsequent payment certificates. Future design processes must be allocated sufficient review time to prevent severe BoQ quantity underestimations and irregular payment practices.

5. Statutory Compliance: The Accounting Officer should commission an immediate retroactive environmental audit to resolve the regulatory breach with NEMA. Additionally, enforce stringent site safety protocols to ensure all workers utilise appropriate PPE.

6. Mobilise Laboratory Resources: The Accounting Officer should enforce penalties for breach of contract if the Contractor fails to fully mobilise the remaining required laboratory equipment.

CHAPTER 1: INTRODUCTION

1.1 Background

The project road was conceptualised as a critical link to enhance trade and transport efficiency between the East African Community (EAC) countries of Uganda and Tanzania through Port of Dar-es-Salaam via the central Corridor.

Given the poor state of the project road, the East African Community, through funding from the African Development Bank contracted LEA International Ltd in Joint Venture with LEA Associates South Asia Pvt. Ltd to carry out a feasibility study and detailed engineering design for the rehabilitation of Masaka-Mutukula Road (89.5km).

To finance the implementation of the project, the Government of Uganda entered into a prefinancing contract with Chongqing International Construction Corporation (CICO) on 15th May 2024 for the reconstruction of the Masaka-Mutukula (89.5km), rehabilitation of the Nyendo-Villa Maria Road (11Km), and the upgrading of 7Km access roads to Paved Standard and the upgrade of 3.5km access road to Masaka Industrial Park at UGX 629,873,668,399 VAT inclusive. The contract period was 48 months with a defects liability period of 12 months.

The works commenced on 1st July 2024 and included earthworks construction; drainage works, including side drains, pipe culverts, and box culverts; 1no. bridge; pavement construction, including sub-base layer (mechanically modified), base course layer (CRR coarse type), and asphalt concrete surfacing layer; ancillary road works; installation of road furniture, including road signs, rumble strips, and speed humps; construction of walkways; construction of parking lanes at the border in Mutukula; construction of a roadside station; and implementation of Environmental, Social and Safety requirements during the project.

The Masaka-Kyotera-Mutukula road is 89.5km, passing through Masaka and Kyotera districts in the Central region of Uganda. The existing road is a Class II Paved Road with bituminous surface dressing, a carriageway width of 7m – 9m in trading areas and 7m in rural areas and 1.5m – 2m paved shoulders.

The project road is classified under Class A: International Truck Roads and is to be reconstructed to Design Class 1b Paved standard with a design speed of 110km/h, 100km/h and 50km/h depending on the terrain and area traversed by the road.

The road was generally designed with a 7.0m carriageway and 2.0m shoulders on both sides, hence a total width of 11.0m.

Figure 1 below shows the location of the project road.

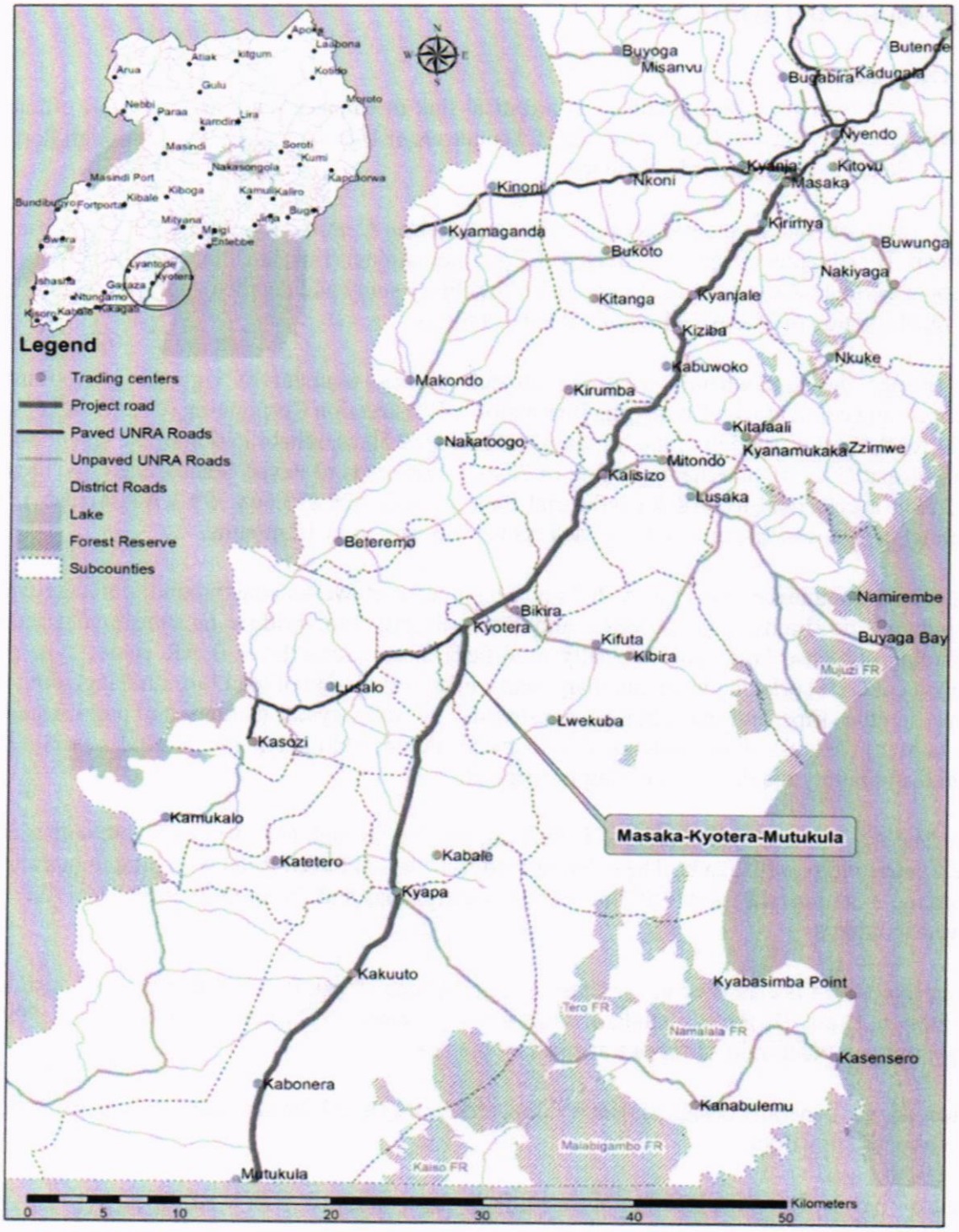


Figure 1: Project location map

1.2 Laws applicable

The applicable laws and legal framework were:

i. The Public Procurement and Disposal of Public Assets Act, Cap 205;
ii. The Public Procurement and Disposal of Public Assets Regulations, 2023; and

iii. The Public Procurement and Disposal of Public Assets Guidelines, 2024.

1.3 Scope of the Audit

The audit covered the contract implementation and management of the reconstruction of the Masaka-Mutukula Road (89.5Km), the rehabilitation of the Nyendo-Villa Maria Road (11Km), and the upgrading of 7Km access roads to Paved Standard.

Specifically, the scope included; assessing the effectiveness, efficiency, economy and equity during contract implementation.

1.4 Audit Methodology

In undertaking the audit, the Authority adopted the following methodology:

a) Review and analysis of the procurement action file. The records reviewed included the following:
   i. Bid invitation;
   ii. Solicitation document, addenda and related clarifications.
   iii. Record of issue and receipt of bids;
   iv. Record of bid opening;
   v. Bid submitted by Chongqing International Construction Corporation;
   vi. The evaluation report;
   vii. Negotiation meeting minutes;
   viii. Cabinet and Parliament of Uganda approvals;
   ix. Contracts Committee minutes;
   x. Signed contract;
   xi. Contract management reports;
   xii. Correspondences between the Entity and Contractor; and
   xiii. Interim Payment Certificates

b) Interviews were held with the individuals indicated in Table 1:

Table 1: Persons interviewed

S/No	Name	Position
	Ministry of Works and Transport	
1.	Eng. Janat Birungi	Contract Manager
2.	Eng. Patrick Ssonzi	Deputy Resident Engineer
3.	Eng. Ronald Olaki	Resident Engineer
	Chongqing International Construction Corporation	
1.	Mr. Solomon Agaba	Procurement Specialist
2.	Mr. Jiawei Mao	Project Manager/Authorised Representative

CHAPTER 2: SUMMARY OF FACTS

This chapter details the findings and recommendations pertinent to the contract audit in respect of the reconstruction of Masaka-Mutukula Road (89.5Km), rehabilitation of Nyendo-Villa Maria Road (11Km) and upgrading of 7Km access roads to Paved Standard.

2.1 Contract Summary

Under this section, the Authority provides a contract summary for the reconstruction of Masaka-Mutukula Road (89.5Km), rehabilitation of Nyendo-Villa Maria Road (11Km) and upgrading of 7Km access roads to Paved Standard. The contract summary is indicated in Table 1 below:

Table 2: Summary of contract details

Project Title	Civil works for the reconstruction of Masaka - Kyotera - Mutukula Road Project (89.5 Km) and rehabilitation of Nyendo - Villa Maria Road (11 Km) and upgrading of Access Roads (7 Km) to paved standard.
Project Scope	• Earthworks construction (both excavation and embankment), including G7 fills and an upper improved subgrade layer of G15 Quality material as shown on the drawings. • Drainage works including side drains, pipe culverts, box culverts and 1No. bridge. • Pavement construction including sub-base layer (mechanically modified), base course layer (CRR Course type), and asphalt concrete surfacing layer. • Ancillary road works and installation of road furniture, including road signs, rumble strips and speed humps. • Construction of walkways. • Construction of parking lanes at the border in Mutukula; and implementing the Environmental, Social and Safety requirements during the project implementation. • Construction of the Roadside Station (RSS).
Employer	Ministry of Works and Transport
Design Consultant	LEA International Ltd in Joint Venture with LEA Associates South Asia Pvt. Ltd
Project Manager/Engineer	Ministry of Works and Transport
Works Contractor	Chongqing International Construction Corporation (CICO)
Works Contract No	UNRA/WRKS/2023-2024/00007
Works Contract Date	15th May 2024
Works Contract Amount	UGX 629,873,668,399
Commencement Date	1st July 2024
Contract Period	48 months
Date for Completion (original)	30th June 2028

2.2 Summary of Facts

1. On 20th February 2023, the Cabinet noted a directive from H.E. the President of the Republic of Uganda to the Minister of Works and Transport to prioritize Mutukula – Masaka – Kyotera Road for construction during the FY 2023/24.

2. On 21st February 2023, a meeting was held between the Prime Minister and officials of UNRA, Ministry of Works and Transport and Ministry of Finance, Planning and Economic Development, in which the cashflow requirements for the maintenance of the national roads network and bridges and the emergency restoration of the infrastructure on the DUCAR network were discussed.

3. On 3rd March 2023, the Minister of Works and Transport in a letter to the Accounting Officer of the Entity stated that Chongqing International Construction Corporation had been granted a directive to execute the rehabilitation of Nebbi – Arua road but the firm was willing to swap with China Railway 18th Bureau which had been given a directive to execute the rehabilitation of Mutukula – Masaka – Kyotera Road. The Minister directed the Entity to fast track the procurement.

4. On 6th June 2023, Chongqing International Construction Corporation submitted an expression of interest to the Ministry of Finance, Planning and Economic Development to pre-finance the construction of Masaka – Mutukula Road (89.5km).

5. On 21st June 2023, the PS/ST in a letter to the Accounting Officer of the Entity indicated that the Entity should engage Chongqing International Construction Corporation to undertake the rehabilitation works under pre-financing for two years from the date of commencement of the works.

6. On 17th August 2023, the procurement for reconstruction of Masaka-Kyotera-Mutukula Road (89.5Km) and rehabilitation of Nyendo-Villa Maria Road (11Km) and Access Roads (7Km) to Paved Standard was initiated at an estimated cost of UGX 581,922,466,121.

7. On 17th August 2023, the Head, Procurement and Disposal Unit submitted the direct procurement method for approval of the Contracts Committee with the justification that it was as per a request from the Minister of Works and Transport to fast track the implementation of the project following the directive of H.E. the President of the Republic of Uganda. Chongqing International Construction Corporation was recommended as the provider.

8. On 18th August 2023, the Contracts Committee approved the direct procurement method with Chongqing International Construction Corporation as the recommended firm, the solicitation document and bid notice.

9. On 25th August 2023, the solicitation document was issued to Chongqing International Construction Corporation.

10. On 6th September 2023, a pre-bid meeting was held at the Entity's premises.

11. On 2nd October 2023, the pre-bid meeting minutes were issued to Chongqing International Construction Corporation.

12. On 21st September 2023, Addendum No. 1 was issued to Chongqing International Construction Corporation.

13. On 6th October 2023, Addendum No. 1 was issued to Chongqing International Construction Corporation.

14. On 10th October 2023, Addendum No.2 was issued to Chongqing International Construction Corporation.

15. On 13th October 2023, Addendum No. 3 was issued to Chongqing International Construction Corporation. The Addendum extended the deadline for submission of the bid from 16th October 2023 to 3rd November 2023.

16. On 30th October 2023, Clarification No. 1 was issued to Chongqing International Construction Corporation.

17. On 3rd November 2023, Chongqing International Construction Corporation submitted its bid.

18. On 3rd November 2023, the bid submitted by Chongqing International Construction Corporation was opened with a price read out of UGX 606,151,069,157.

19. On 27th November 2023, the Contracts Committee approved the Evaluation Committee comprised of
    i. Moses Ochole – Highway Specialist – User Department Representative
    ii. Lawrence Ojambo – Manager Road Rehabilitation – Technical Knowledge
    iii. Doreen Kahukya – Senior Procurement Officer – Procurement Knowledge

20. On 13th December 2023, evaluation was completed. The evaluation report recommended Chongqing International Construction Corporation for award of contract at a price of UGX 606,151,069,157 subject to negotiations.

21. On 20th December 2023, the CC approved the evaluation report and the negotiation team as follows:
    i. John Bosco Ssejemba – Director Road Infrastructure Projections
    ii. Mr. Henry Magwa Njuba – Head Works and Process Assurance
    iii. Eng. Alfred Ojik – Head Road Development
    iv. Eng. Charles Naita – Head Road Rehabilitation
    v. Eng. Moses Ochole – Highway Specialist
    vi. Barbara Rwobusheru – Senior Legal Officer, Contracts and Claims

23. On 27th December 2023, a NoBEB was displayed with an award price of UGX 629,873,668,399 inclusive of VAT.

24. On 29th January 2024, the Contracts Committee approved the negotiation report and draft contract.

25. On 26th February 2024, the Solicitor General cleared the draft contract for signature.

26. On 26th February 2024, UNRA issued Chongqing International Construction Corporation with a letter of notification of award and requested the bidder to submit a performance security within 28 days of the letter.

27. On 7th March 2024, Chongqing International Construction Corporation submitted a letter of acceptance of contract award.

28. On 15th May 2024, the contract for reconstruction of Masaka-Kyotera-Mutukula Road (89.5Km) and rehabilitation of Nyendo-Villa Maria Road (11Km) and Access Roads (7Km) to Paved Standard was signed between Uganda National Roads Authority and Chongqing International Construction Corporation at UGX 629,873,668,399 inclusive of VAT.

29. On 1st July 2024, the contract commenced with a completion period of 48 months expiring on 30th June 2028.

CHAPTER THREE: FINDINGS AND RECOMMENDATIONS

3.1 Delayed mobilisation of the Engineer's laboratory equipment

1. The Contractor established the Engineer's Laboratory at the Contractor's main camp, Kigenya, located at km 38+280 RHS along the Masaka-Kyotera-Mutukula project road.

2. The Contractor, on the 14th of November 2025, delivered a consignment of part of the Engineer's laboratory Equipment as provided in the contract, that were calibrated and are in use. *(Annex 1).*

3. The Authority, however, found that the consignment of laboratory equipment delivered and calibrated amounted to only 50% of the total of laboratory equipment provided in the contract.

4. The Authority further found that the lack of a fully functioning laboratory necessitated that some tests that were intended to be undertaken within the laboratory had to be undertaken at other laboratories, for example, in Entebbe, which can lead to delays in getting results as opposed to if the tests were being done within the confines of the project.

Recommendation

The Accounting Officer should ensure that the contractor fully mobilises all the required equipment as stated in the contract; otherwise, relevant penalties for breach of contract should be enforced.

3.2 Failure to submit a performance security

1. The Authority reviewed the signed contract and correspondence and noted that:
   i. PCC 4.2 of the contract signed on 15th May 2025 provided that a performance security amounting to 10% of the contract price in the form of an unconditional and irrevocable bank guarantee would be required.
   ii. The Contractor, in a letter dated 20th May 2024, cited an error in the Form of Agreement, which contradicts Clause 4.2 of the Particular Conditions of Contract, indicating that the contract cannot be effective.
   iii. The Accounting Officer responded to the Contractor in a letter dated 24th May 2024 and stated that a post-contract negotiation should be held to ascertain the costs for processing and maintaining the guarantee for six months.
   iv. The Contractor, in a letter dated 28th May 2024, responded clarifying that the Performance Securing Declaration came into play as a stopgap measure to enable both parties to progress expeditiously to commence the works. It further clarified that the performance security to be provided will cover the entire contract period, including the six months of the Performance Securing Declaration.

2. On 6th June 2024, a corrigendum to the contract was signed amending PCC 4.2 to provide that the performance security shall be a Performance Securing Declaration in the amount of 10% of the contract price, valid for six months from the date of receipt of the Letter of Notification of Award. Further, before the expiry of the Performance Securing Declaration, the Contractor shall be required to provide a performance security. The Performance Security shall be an

irrevocable and unconditional on-demand bank guarantee in the amount of 10% of the contract price, issued by a bank domiciled in Uganda, or a foreign bank secured along with the performance security, a declaration from a correspondent bank located in Uganda that it will honour the performance security on behalf of the issuing bank. The local correspondent bank should take on the liabilities and responsibilities of the foreign bank under the guarantee. The Performance Security shall cover the Contract Period from the date of receipt of the Notification of Award (time for completion and defects notification period).

3. The Contractor submitted a performance securing declaration on 30th April 2024, valid for a period of 6 months up to 30th October 2024. However, the Contractor submitted a request for the extension of the Performance Securing Declaration for another six months on 7th October 2024. The Employer reviewed the Contractor's request and granted an extension of 4 months for the Performance Securing Declaration on 4th November 2024.

4. Following the Employer's letter dated 1st March 2025 requesting the Contractor to renew the Performance Securing Declaration to cover the contract duration, including 12 months of defects liability period, the Contractor submitted the renewed Performance Securing Declaration, which covers the Contract duration, including 12 months of defects liability period, to the employer vide on 25th February 2025.

5. The Authority, however, found that it was irregular for the Employer to in the first instance, allow the extension of the Performance Securing Declaration by four months and then later request the Contractor to extend the Performance Securing Declaration to cover the contract duration, including 12 months of defects liability period and yet the signed corrigendum to the contract was explicit in its requirement that the Contractor must submit a performance security.

6. The Authority further found that although the requirement for submission of a performance security had been forcibly removed from the contract, there was no subsequent reduction in cost to reflect the removal of the requirement of submission of a performance security.

Implication
This undermined the enforceability of remedies in the event of non-performance, weakened the Employer's ability to recover losses, and compromised contract integrity. It also sets a precedent for bypassing explicit contract provisions, thereby eroding accountability and exposing the Government to unjustified liabilities.

Recommendation
The Contractor should be compelled to submit a valid performance security in accordance with PCC 4.2 of the signed contract and the corrigendum to the signed contract.

3.3 Underestimation of quantities in the Bills of Quantities

1. Although quantities in the Bills of Quantities (BoQs) are ordinarily prepared as estimates in admeasurement contracts, the audit established through review of project BoQs and inspection of executed road works, that quantities for several items, including clearing and grabbing, common excavation to spoil, rock fill, and drainage structures, were significantly underestimated at design stage as indicated in Tables 3 below.

Table 3: Underestimated items in the bills of quantities

Item	Description	Unit	Design Review Quantity	IPC No 10 Quantity	Variance (%)
22.01 (a) (iii)	Excavation in soft material exceeding 1.5m up to 3.0m	M^3	1,867	2,411.40	129.16
32.01 (g)	Relocation of existing solar street lights	No.	164	243	148.17
61.05 (a) (i)	Rockfill and boxes location	M^3	2,502.18	2837.55	113.40
61.07	Drilling of holes	M	724	749	103.45
61.26 (b)	Steel reinforcement in cast in situ (high-yield stress steel bars)	Tonne	64.21	83.32	129.76
64.01 (a) (i)	Class 15/20 in blinding box culverts	M^3	108.63	141	129.80
66.21	Synthetic fibre filter fabric for box culverts	M^3	4,702.11	5,092.90	108.31

2. This underestimation is attributable to deficiencies in the original design process, particularly:
   i. Inadequate geotechnical investigations of the road subgrade;
   ii. Insufficient survey data; and
   iii. Weaknesses in pavement and drainage design.

3. As a result, the BoQs did not accurately reflect the actual scope of works required, leading to substantial variances between the designed quantities and the implemented works.

4. Beyond technical inadequacies, the Authority notes that such systematic underestimation of quantities may also present a risk of deliberate understatement at the design stage, potentially pointing to collusion between the Engineer and the Contractor. This risk, if substantiated, undermines procurement integrity, creates room for inflated variations, and exposes the project to unjustified cost escalations. Additionally, under normal circumstances, it is expected that in an add measurement contract, measurement and payment are made against individual cost items in the BoQ. Whereas the audit acknowledges that there was an underestimation of quantities and no observed increase in the total contract sum, some quantities in the bills of quantities are exhausted but are being paid for without use of either the physical contingency or the provisional quantities provided. This implies that payments are unjustifiably made against the total contract sum and are no longer itemized, which the audit considers irregular, as there was no documentation on file to clear payments to be made against the total contract sum.

5. The Authority notes that the progress of works being only 18.23% by February 2026, while several BoQ items have already been exhausted, implies a high likelihood that certified quantities for payment will continue escalating beyond those already undertaken. This situation underscores the severity of the underestimation at design stage and raises concerns about the integrity of cost control under the contract. Without corrective measures, the project is exposed

to unjustified cost escalations, irregular payments, and significant risks of time and budget overruns.

Implication
Poor planning leads to delays in service delivery due to numerous design reviews and cost escalations as a result of variations of time-bound obligations and other admeasurement components of contracts.

Recommendation
Sufficient time and review should be given to the design process to minimise such variations and omissions.

3.4 Pavement Design

1. The Authority reviewed the procurement contract for the rehabilitation of Masaka-Kyotera-Mutukula Road (89.5Km,) rehabilitation of Nyendo-Villa Maria Road (11Km) and Access Roads (7Km) and noted that it was signed on 15th May 2024 between Uganda National Roads Authority and Chongqing International Construction Corporation at UGX 629,873,668,399 inclusive of VAT.

2. The contract was based on a pavement design which was approved on 10th July 2023, included in the solicitation document, which formed the basis of procurement, submitted bid and evaluation. The design was prepared by the Consultant (LEA Associates South Asia Pvt. Ltd) and comprised:
   i. Masaka–Mutukula Section: 50mm AC14 surfacing, 250mm CRR base, 200mm G45 sub-base, 250mm G15 subgrade.
   ii. Kyotera–Mutukula Section: 50mm AC14 surfacing, 200mm CRR base, 175mm G45 sub-base, 200mm G15 subgrade.

3.4.1 Design Review and Employer Approvals

1. The Employer instituted a review of the original contract designs. The review considered traffic surveys, subgrade investigations, and regional standards. The key findings included:
   i. The design traffic class based on traffic counts and loading was T9, beyond the scope of Uganda's Flexible Pavement Design Manual, requiring reference to international manuals.
   ii. The Structural Number (SN) of the original design was 3.46–4.05, below the required SN 4.37 for traffic class T9 and subgrade class S4.
   iii. Alternative pavement options were developed, including proposals by the Employer, the Contractor and the Consultant.

2. On 1st April 2025, the Employer approved the Final Design Review Report, adopting Option 3 (50mm AC14, 300mm CRR, 200mm G45, 200mm G15) for implementation, citing adequate structural capacity and least cost per km.

3. On 27th August 2025, the Employer further communicated an "optimised" pavement structure (65mm AC14, 225mm CRR, 225mm G45, 200mm G15), rejecting the Contractor's proposal

and justifying the decision on cost grounds (reducing additional cost from UGX 108 billion to UGX 30 billion). However, this optimised design produced an SN of 4.1, still below the required 4.37, though it produced 70 million ESAs, which was higher than the traffic loading of 46.5 million ESAs required for high traffic roads.

3.4.2 Design Review and Employer Approvals

1. The Authority reviewed the original pavement designs as contracted and the approved revised designs as provided to the Contractor and noted that they were significantly different, as indicated in Table 4 below:

Table 4: Differences between the original pavement design and the revised pavement design

Component	**Original Contract Design (Contracting)**	**Revised Ministry Design (Instructed)**	**Key Differences**
Surfacing Layer	50mm Asphalt Concrete (AC14)	65mm Asphalt Concrete (AC14)	Thickness increased by 15mm, but still AC14 (wearing course for normal traffic). No binder/base asphalt layer included.
Base Course	250mm Crushed Rock (CRR) – Masaka Section; 200mm CRR – Kyotera Section	225mm Crushed Rock (CRR)	Reduced thickness compared to Masaka section (−25mm), slightly increased compared to Kyotera section (+25mm).
Sub-base	200mm G45 mechanically modified (Masaka Section); 175mm G45 (Kyotera Section)	225mm G45 mechanically modified	Increased thickness (+25mm compared to Masaka; +50mm compared to Kyotera).
Subgrade	250mm G15 improved (Masaka Section); 200mm G15 improved (Kyotera Section)	200mm G15 improved	Reduced thickness compared to Masaka section (−50mm); same as Kyotera section.
Binder/Base Asphalt Layer	None included	None included	Both designs omit a Dense Bitumen Macadam (DBM) or cemented base layer, which is recommended in regional standards for T9 traffic.
Structural Number (SN)	3.46–4.05 (below required 4.37)	3.3–4.1 (still below the required 4.37)	The revised design marginally improves bearing capacity but remains structurally deficient.

2. From the above, the Authority found that:
   i. The original contract design was structurally deficient (SN below 4.37) implying inadequate traffic surveys and loading.
   ii. The approved revised design attempted to adjust thicknesses (increasing surfacing and sub-base, reducing base and subgrade), but the overall SN 4.1 remained below the required threshold of 4.37.
   iii. The structural capacity of the approved revised design checked using the South African Mechanistic Design Method (SAMDM) gave 70 million ESAs which was higher than the traffic loading of 46.5 million ESAs required for high traffic roads.
   iv. Critically, both designs omitted a binder/base asphalt layer (DBM or cemented base), which is a standard requirement in regional standards (Kenya, Tanzania, Ethiopia, ORN 31, TRH4) which were adopted during the design review.
   v. The revised design, therefore, did not resolve the fundamental deficiency and exposed the project to risks of rutting, fatigue cracking, pothole formation, and increased maintenance costs.

3.4.3 Contractor's Obligations

1. On 9th May 2025, the Contractor formally objected to the revised designs, stating that:
   i. The revised design produced an SN of 3.3–4.1, below the required 4.37.
   ii. Increased CRR quantities would disrupt quarry production and sequencing of works, delaying progress.
   iii. Payment milestones under GCC Subclause 14.7 would be unattainable, constraining cash flow.
   iv. Benchmarking against regional pavements (Katonga Bridge, Mbarara–Kabale–Katuna) showed that all included DBM binder layers, unlike the Employer's revised design.

2. The Contractor submitted a Value Engineering Proposal (40mm AC14 + 60mm AC20 + 225mm CRR + 225mm G45 + 200mm G15), achieving SN 4.6 and aligning with regional manuals. The proposal promised accelerated completion, lower maintenance costs, and improved efficiency.

3.4.4 Comparative Analysis

1. The Authority reviewed the original designs, the revised designs and the Value Engineering Proposal by the Contractor and found as indicated in Table 5 below:

Table 5: Differences between the original pavement design, the revised pavement design and the Contractor's Value Engineering Proposal

Option	**Description**	**SN Value**	**Meets Required SN (≥4.37)?**	**Observations**
Contract (Consultant)	Original design	3.46–4.05	✗	Structurally deficient

Option	Description	SN Value	Meets Required SN (≥4.37)?	Observations
Ministry's Approved	50mm AC14, 300mm CRR, 200mm G45, 200mm G15	4.15	✗	Structurally deficient
Ministry's Instructed	65mm AC14, 225mm CRR, 225mm G45, 200mm G15	4.1	✗	Structurally deficient
In-house Review (Ministry)	40mm AC14, 60mm DBM, 200mm CRR, 200mm G45, 200mm G15	4.37	✓	Meets minimum requirement
Contractor's Value Engineering	40mm AC14, 60mm DBM, 225mm CRR, 225mm G45, 200mm G15	4.6	✓	Adequate; limited regional performance data
Engineer's Alternative	50mm AC14, 100mm DBM30, 200mm CRR, 250mm G45, 200mm G15	5.4	✓	Strongest option
ORN 31 (2022)	50mm AC14, 125mm DBM40, 200mm CRR, 250mm G45	5.1	✓	Based on long-term regional performance

2. From the above, the Authority found that:
   i. The Ministry's instructed design (65mm AC14) is structurally inadequate, omits critical binder layers, and exposed the project to risks of premature failure, increased maintenance, and safety hazards.
   ii. The Contractor's objections were technically valid and legally framed under GCC clauses, shifting liability to the Employer if the deficient design is enforced.
   iii. Comparative analysis shows that the Engineer's alternative proposal (SN 5.4) and the ORN 2022 pavement (SN 5.1) are the most robust, aligning with regional standards and ensuring durability, while the Contractor's Value Engineering Proposal (SN 4.6) was also robust enough to meet the design requirements.
   iv. The Entity's revised design priorities short-term cost savings but undermines long-term performance and value for money.

3. The Authority conducted a comparative analysis of the approved revised design issued to the Contractor and the design requirements provided for in the manuals from East African countries and the East African Community, as the Ugandan Flexible Pavement Design Manual does not provide for traffic class T9. From this comparative analysis, the following observations were made:

   i. Kenya Road Design Manual (RDM 3.4, 2025)

a) For high-traffic trunk roads (Class 2 mobility roads), the manual requires a two-course asphalt surfacing comprising a wearing course and a binder course (Dense Bitumen Macadam or Asphalt Base).
b) The Ministry's revised design (65mm AC14, 225mm CRR, 225mm G45, 200mm G15) omits the binder/base asphalt layer, leaving the granular base directly exposed to traffic stresses, which is inconsistent with Kenyan standards.

ii. Tanzania Pavement Design Manual (1999)
a) Requires a DBM binder layer beneath asphalt surfacing for trunk roads carrying heavy traffic.
b) The Ministry's revised design does not comply, as it relies solely on increased granular thickness without a binder layer.

iii. Ethiopia Pavement Design Manual (2013)
a) Specifies asphalt surfacing with a binder course above the granular base for roads with traffic loading equivalent to T9.
b) Again, the Ministry's revised design omits this critical binder layer.

iv. South Africa TRH4 (1996)
a) Recommends cemented or bituminous base layers below asphalt surfacing for high-volume roads.
b) The Ministry's revised design does not meet this requirement.

v. East African Standard (DEAS 1206:2024)
a) Class 2 mobility roads (national highways) are intended to provide high levels of safety and efficiency for large traffic volumes.
b) Pavement structures must be designed for durability and reduced maintenance interventions.
c) The Ministry's revised design, with an SN of 4.1 (below the required 4.37), does not meet the durability expectations for Class 2 mobility roads under EAC standards.

Table 6: Comparative Analysis of the approved revised design and East African Standards

Standard / Design	**Surfacing**	**Binder/Base Layer**	**Base Course**	**Sub-base**	**Subgrade**	**Structural Adequacy**
Ministry Revised Design (Uganda)	65mm AC14	None	225mm CRR	225mm G45	200mm G15	SN 4.1 (✗ below 4.37)
Kenya RDM 3.4 (2025)	50–60mm AC	100–125mm DBM	200–250mm CRR	200–250mm G45	Improved subgrade	✓ Requires binder layer
Tanzania Manual (1999)	50–60mm AC	DBM binder layer	200–250mm CRR	200–250mm G45	Improved subgrade	✓ Requires binder layer
Ethiopia Manual (2013)	50–60mm AC	Asphalt binder course	200–250mm CRR	200–250mm G45	Improved subgrade	✓ Requires

Standard / Design	Surfacing	Binder/Base Layer	Base Course	Sub-base	Subgrade	Structural Adequacy
						binder layer
TRH4 (South Africa)	50mm AC	Cemented/bituminous base	200–250mm CRR	200–250mm G45	Improved subgrade	✓ Requires binder layer
DEAS 1206 (2024)	AC surfacing	Binder/base required	Granular base	Granular sub-base	Subgrade S4	✓ Class 2 mobility roads must meet durability

4. The comparative analysis demonstrates that the Ministry's revised pavement design (SN 4.1) is structurally inadequate and non-compliant with regional and East African Community standards for T9 traffic and Class 2 mobility roads. All referenced manuals (Kenya, Tanzania, Ethiopia, TRH4, and DEAS 1206) require a binder/base asphalt layer (DBM or cemented base) beneath asphalt surfacing for high-traffic trunk roads.

5. During an interview, the Employer's Representative and Contract Manager, Eng. Janat Birungi stated that, in her opinion, the Employer's "optimised" pavement structure (65mm AC14, 225mm CRR, 225mm G45, 200mm G15) that the Contractor was instructed to execute was sufficient as it produced 70 million ESAs which was higher than the traffic loading of 46.5 million ESAs required for high traffic roads. She further mentioned that a change in design would necessitate an increase in cost which she said was not necessary as it would lead an unjustified over-design of the road with no additional benefit.

6. The Authority observed that the Employer's "optimised" pavement structure (65mm AC14, 225mm CRR, 225mm G45, 200mm G15) that the Contractor was instructed to execute did indeed produce 70 million ESAs which was higher than the traffic loading of 46.5 million ESAs required but omitted a binder/base asphalt layer (DBM or cemented base) beneath asphalt surfacing as required by all referenced manuals (Kenya, Tanzania, Ethiopia, TRH4, and DEAS 1206) reviewed. The binder/base asphalt layer (such as Dense Bituminous Macadam - DBM) or cemented base (Cement Treated Base - CTB) serves as the structural backbone of high-traffic roads, designed to withstand heavy, repeated loading that the thin, smooth surface layer cannot handle alone. By omitting this layer, the revised design exposes the pavement to premature failure, rutting, fatigue cracking, pothole formation, and increased maintenance costs, undermining value for money.

3.4.5 Conclusion on pavement design

From the Authority's review, the following conclusions are drawn:

1. The original contract design was structurally deficient, with an SN of 3.46–4.05, below the required 4.37 for traffic class T9 and subgrade class S4.

2. The Employer's approved design (Option 3, April 2025) and the Employer's optimised design (August 2025) marginally improved thicknesses but still produced SN values of 4.15 and 4.1 respectively, both below the required threshold.
3. The structural capacity check using SAMDM (70 million ESAs) was misleading, as the revised design omitted a binder/base asphalt layer, exposing the pavement to rutting, fatigue cracking, and premature failure.
4. The Contractor's objections were technically valid and legally framed under GCC clauses. The Contractor's Value Engineering Proposal (SN 4.6) introduced a binder asphalt layer and aligned with regional practice, offering accelerated completion and lower maintenance costs.
5. Comparative analysis shows that the Engineer's Alternative Proposal (SN 5.4) and the ORN 31 (2022) pavement design (SN 5.1) are the most robust, aligning with regional standards and ensuring durability.
6. The Ministry's revised design prioritised short-term cost savings but undermined long-term performance, statutory compliance, and value for money.
7. Regional manuals (Kenya RDM 3.4, Tanzania 1999, Ethiopia 2013, TRH4 South Africa, and DEAS 1206:2024) all require a binder/base asphalt layer beneath asphalt surfacing for Class 2 mobility roads and T9 traffic. The Ministry's revised design is therefore non-compliant with regional and EAC standards.

3.4.6 Recommendations on Pavement Design

1. The Accounting Officer should withdraw the revised "optimised" design issued to the Contractor as its adoption would expose the project to premature failure, rutting, fatigue cracking, pothole formation, and increased maintenance costs.
2. The Accounting Officer should adopt either the Engineer's Alternative Proposal or ORN 31 (2022) Pavement Design, as the Engineer's Alternative Proposal achieves SN 5.4, incorporates DBM binder, and ensures compliance with regional standards, while the ORN 31 (2022) pavement achieves SN 5.1, validated by long-term TRL performance data, ensuring a 20-year design life. Both options guarantee structural adequacy, durability, and value for money, safeguarding the strategic importance of the Masaka–Mutukula corridor.
3. Strengthen Design Review Processes
   i. Future procurements should incorporate designs that meet minimum structural requirements before initiation.
   ii. Internal design reviews must ensure compliance with regional and EAC standards, thereby avoiding costly post-contract modifications and disputes.
   iii. Harmonisation with the Draft East African Standard (DEAS 1206:2024) should be prioritised to ensure consistency across the region.

3.5 Quality of Work

The quality of work was assessed in two ways. Firstly, the quality control and assurance procedures of the contractor and Engineer were reviewed for compliance with the Quality Management Plan (QMP). Test results were found on file. Secondly, the audit undertook its own assessment and noted the following:

3.5.1 Non-destructive tests

Using a digital Schmidt hammer, the audit team conducted tests on two randomly selected culvert walls to check whether they met the specified strength requirements. The results the tests are presented in Table 7 below:

Table 7: Box culvert compressive strength test results

Structure	Element	Test Result (Mpa)	Specification (Mpa)	Remark
Box culvert at 39+866	Culvert wall	37.1	30	Compliant
Box culvert at 49+219	Culvert wall	41.9[1]	30	Compliant

Audit noted that the concrete results for the sampled culvert walls meet the specified strength requirements.

3.5.2 Field Test Results

During the field inspection, the audit team carried out field density tests on the crushed stone base CRS course type at Km 25+600 LHS. The results obtained are summarised in Table 8 below.

Table 8: Field Density Test Results

Location	MDD	OMC	FMC	Dry density	Compaction (%)	Specification	Remarks
25+600 LHS	2.175	8.8	4.8	2.132	101.4	98%	Okay

Results for the base comply with the compaction requirements.

3.5.3 Physical inspection of works undertaken

The contractor was active on the Masaka – Mutukula road but had not commenced any physical works on the Nyendo – Villa Maria Road. The works on-going included road bed preparation, drainage structures works and clearing.

The Authority undertook a joint inspection of the works on 1st April 2026 with the Engineer and Contractor as indicated in Tables 9 and 10 below:

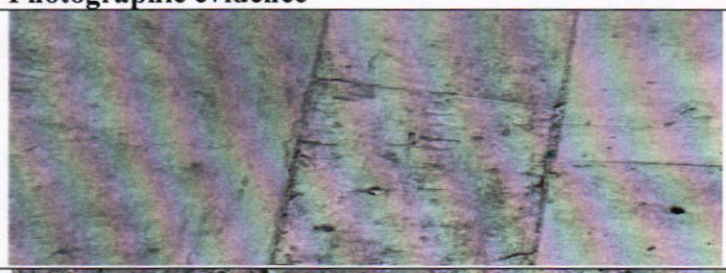
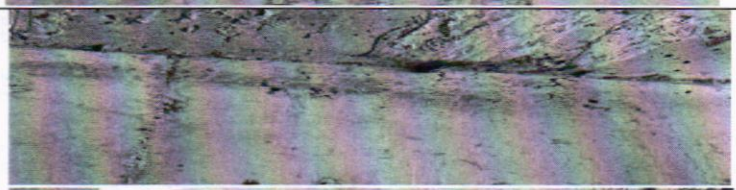
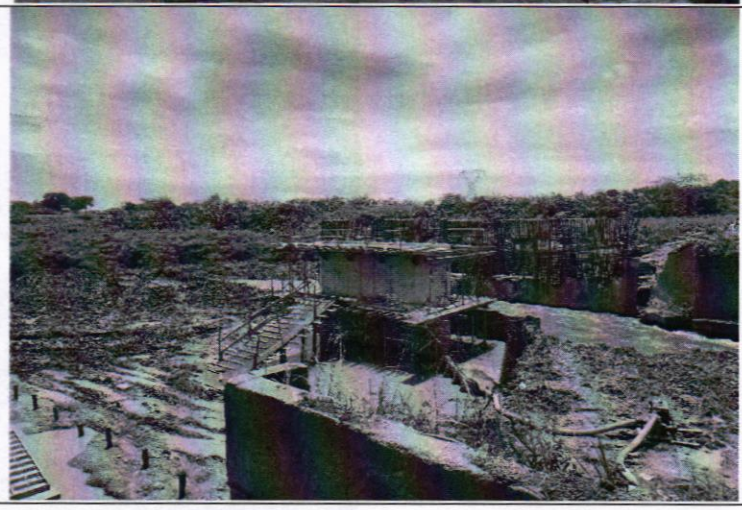
[1] The compressive strength was significantly higher than the required most likely as the test was conducted on the top slab that supports direct, dynamic traffic loads, along with significant earth fill pressure.

Table 9: Physical Inspection of road surface works

S/No	Observation	Photographic Evidence
1	Test sections of the base had been laid in 200m sections under trial that had not yet been approved. Km 25+	
2	On-going treatment of permanent swamp at Km 18+	
3	Construction of the sub-base by PNR Services Ltd between Km 55+000 and KM 60+000	

The drainage works along the project include a bridge (Bukora bridge), box culverts, cross culverts of various diameters, concrete-lined drains and stone pitching, among other interventions.

Table 10: Physical Inspection of culvert and bridge works

S/No	Observation	Photographic evidence
1.	Cracks in box culverts already installed (transverse cracks running through the walls, longitudinal cracks)	
2.	Honey combing in box culverts	 
3.	Ongoing works at Bukora Bridge	

Implications

- Transverse and longitudinal cracks running through the culvert walls provide direct pathways for water and deleterious chemicals to penetrate the concrete core.
- The presence of honeycombing indicates inadequate vibration and poor consolidation of the concrete during pouring. These voids severely reduce the localized strength of the culvert walls and leave the reinforcement grid directly exposed to environmental elements, accelerating corrosion.

Recommendation
The Engineer should ensure that the Contractor urgently addresses the defects noted in some of the concrete structures.

3.6 Payments to the Contractor

3.6.1 Quantity Verification
During the inspection, measurements were undertaken and the CAD software outputs interrogated against the design on 1st April 2026, and compared to the certified payments in IPCs 8, 9 and 10. The results are presented in Table 11 below:

Table 11: Quantity Verification

Bill Item	Description	Unit	Rate (UGX)	BoQ Qty	Qty certified	Audit qty	Remarks
18.01	Provide a qualified safety officer	Months		48	20	20	Okay (MPR 23 and field inspection)
18.02 B (b)	Maintenance of sexual health and first aid clinic	Months		248	20	20	Okay (MPR 23 and field inspection)
22.03 a	Reinforced concrete pipe Culverts on class A bedding	M					
ii	900mm diameter		486,000	250			
	Km 6+705	m			19	19.2	Okay
	Km 21+095	m			17	17.6	Okay
	Km42+904				17	16.8	97,200 overpaid
	Km57+169.5				12	11.6	194,400 overpaid
	Km 8+591				17	17.3	Okay
	Km15+464				20	20.2	Okay
	Km25+375				19	19.1	Okay
iii	1200 mm diameter	m	620,000	50			Okay
	Km 1+600				5	14.1	Okay
	Km 6+752				17	17.6	Okay
	Km 19+730				36	35.4	372,000 overpaid
	Km 43+246				36	36.8	Okay
	Km71+125.6				12	12.1	Okay

Bill Item	Description	Unit	Rate (UGX)	BoQ Qty	Qty certified	Audit qty	Remarks
31.01 (a)	Clearing and grubbing	ha	1,021,015	208.0	183.69	183.69	Okay (CAD output)
(bi)	Removal of topsoil and stockpiling for re-use	m3	3,195	208,000	600,352.8	600,352.8	Okay (CAD output)
36.01(a)	Common excavation to spoil	m3	4,350	222,000	1,050,398.6	1,050,398.6	Okay (CAD output)
(bi)	Swamps wetlands to spoil	m3	5,300	60,900	407,990.7	407,990.7	Okay (CAD output)
36.02 d1	Fill using Rock fill to swamp	m^3	28,000	66,880	286,688	286,688	Ok (CAD output)
64.01(a)	Class 15/40 in blinding and other unreinforced concrete	m3	334,090	2,057			
	Km 50+264				7.466	7.51	Okay
	Km 34+468				5.30	5.32	Okay
	Km 40+243				9.261	9.11	Okay
	Km 5+525				3.531	3.48	Okay
	Km 15+870				6.80	6.9	Okay
	Km 18+810				3.885	4.1	Okay
64.01 (b)	Class 25/20 in reinforced concrete (New box culverts)	m3	486,520	2,081			
	Km 50+264				103.98	104.1	Okay
	Km 34+468				74.093	75.3	Okay
	Km 40+243				125.514	126.1	Okay
	Km 5+525				52.146	54.2	Okay
	Km 15+870				95.0	96.3	Okay
	Km 18+810				57.4	58.1	Okay
	Total						UGX 663,600

Implication
UGX 663,600 was certified for payment over and above the actual quantities executed.

Recommendation
The Accounting Officer should ensure that the overpayment of UGX 663,600 is recovered in the subsequent payments.

3.7 Implementation of Environmental, Social, Health and Safety (ESHS) safeguards

3.7.1 Employer's Nominated Service Provider
The Authority noted that Item 18.02A(a) of the bills of quantities made a provision for the Employer's Nominated Service Provider for the provision of HIV/AIDS programme and gender sensitisation awareness and monitoring.

The Employer nominated Upper Nile Conservation Initiative (UNCI) as a fully nominated service provider whose responsibility is to carry out HIV/AIDS alleviation activities for the project.

The audit noted that Upper Nile Conservation Initiative prepared detailed monthly reports on the implementation of HIV/AIDS and gender sensitisation in accordance with the requirements of the contract.

3.5.2 Environmental Audits
Regulation 12 (1) of the National Environment (Audit) Regulations, 2020 provides that environmental compliance audits must be undertaken for projects listed in Schedule 3 of the Regulations, which includes construction works, infrastructure projects and other activities with potential environmental impacts.

Regulation 12 (3) of the National Environment (Audit) Regulations, 2020 provides for that the environmental compliance audit referred to in Regulation 12 (1) shall be undertaken annually, unless otherwise required by the National Environment Management Authority (NEMA).

The Authority reviewed the project documents and noted that despite signing of the contract on 15th May 2024, an environmental audit had not been conducted by the time of the audit in April 2026 in contravention of Regulations 12 (1) and 12 (3) of the National Environment (Audit) Regulations, 2020.

Implication
This oversight exposed the project to significant regulatory risks, including potential sanctions, statutory fines, or the suspension of works by NEMA.

Recommendation
The Accounting Officer should ensure that an immediate retroactive audit is commissioned to regularize the project's environmental standing in accordance with Regulation 12 (1) of the National Environment (Audit) Regulations, 2020.

3.7.3 Use of PPEs by the Contractor's Employees
During the audit inspection, it was observed that some of the contractor's staff were not using PPEs in the course of execution of the works. Workers, especially steel fixers, were not wearing gloves. This exposes them to injury from the steel in the form of scratches, which may cause tetanus and may culminate in loss of life.

A worker in the steelworks without gloves

Implication
Failure to use the requisite PPE on site exposes workers to the risk of serious body injury in the event of an accident.

Recommendation
The Accounting Officer should put in place measures to ensure that all the contractor's employees are provided with appropriate PPE and their use is enforced at all times in the course of execution of the works.

Annex 1: Laboratory Equipment

No	Description	Contract Qty	Qty supplied/ received	Qty missing	% Received
1.	Stainless steel mixing bowl, 300x250mm	10	0	10	0%
2.	Metal Thermometer,0-100 ^0C	1	0	1	0%
3.	Metal Thermometer,0-240 ^0C	6	0	6	0%
4.	Magnet Holder for Dial Indicator	2	0	2	0%
5.	Battery Filler	1	0	1	0%
6.	Rectangular mixing pans, 600mm square	10	0	10	0%
7.	Riffle Box with 15mm slot width with 3 metal containers	2	0	2	0%
8.	Wheelbarrows	2	2	0	100%
9.	Stainless Steel Mixing Bowl, 220mm x110mm	10	0	10	0%
10.	Glass marking pencils	10	0	10	0%
11.	Round Aluminum Pan,300mm x50mm	5	0	5	0%
12.	Square Tin Pan,500mm x350mm	15	0	15	0%
13.	Straight Edge,300mm	1	0	1	0%
14.	Ounce Tin Sample Boxes, dozen.	3	3	0	100%
15.	Riffle Box with 15mm slot width with 3 metal containers	2	0	2	0%
16.	Stainless Steel Laboratory Oven, 100 liters	2	2	0	100%
17.	Stainless Steel Laboratory Oven, 240 liters	2	2	0	100%
18.	Hot Plate, 6" Square	3	0	3	0%
19.	Burner Gas	1	0	1	0%
20.	Heavy Duty Solution Balance, 20 kg Capacity± 1g	2	0	2	0%
21.	8-12 kg Capacity Electronic Balance, ± 0.1g- (10kg provided)	1	1	0	100%
22.	5-8 kg Capacity Electronic Balance, ± 0.1g (6kg provided)	1	1	0	100%
23.	200-300g Capacity Electronic Balance ± 0.1g (520g provided)	1	1	0	100%
24.	Buoyancy Balance, 6 kg x 0.1g (30 kg provided)	2	2	0	100%
25.	Hydraulic Sample Ejector	1	1	0	100%
26.	Soil Mortar	1	0	1	0%
27.	Soil Pestle	1	0	1	0%
28.	Paraffin Warmer (2 qts)	1	1	0	100%
29.	Sealing Paraffin (50 lbs)	1	0	1	0%
30.	Cone Mould and Tamping	1	1	0	100%

No	Description	Contract Qty	Qty supplied/ received	Qty missing	% Received
	Rod, set				
31.	Density Basket	1	1	0	100%
32.	Complete Liquid Limit Set (Casagrande)	2	2	0	100%
33.	Plastic Limit Set Complete	2	2	0	100%
34.	Pocket Penetrometer	1	0	1	0%
35.	Shrinkage Troughs	1	1	0	100%
36.	Shrinkage Limit Device Complete (with adequate quality of mercury)	2	2	0	100%
37.	Flakiness Gauge	2	0	2	0%
38.	Sodium/Magnesium Sulphate salt, kg	30	0	30	0%
39.	Los Angelos Abrasion Machine complete with all accessories	1	1	0	100%
40.	Organic Impurities Test complete set	1	0	1	0%
41.	Aggregates Crushing Value complete set	1	1	0	100%
42.	Aggregate Impact Value Device complete	1	1	0	100%
43.	Aluminum trays (0.45 x 0.2 x 0.03m)	10	0	10	0%
44.	Pycnometer Top and Jar	1	0	1	0%
45.	Specific Gravity bottles, 100ml	4	0	4	0%
46.	Specific Gravity Bottles, 220-250 ml	3	0	3	0%
47.	Proctor Rammer (2.5 kg)	3	0	3	0%
48.	Proctor Mould (1 liter	6	0	6	0%
49.	Heavy Rammer (4.5 kg)	5	0	5	0%
50.	Ounce Moisture Content Cans, 50 ml	30	0	30	0%
51.	Dozens of straight Edges, 12"	2	0	2	0%
52.	12" Ruler Knife	6	0	6	0%
53.	Vacuum Air Cleaner	2	0	2	0%
54.	Complete set of CBR moulds	36	26	10	72%
55.	Swell Gauges	12	12	0	100%
56.	25mm Steel Chisel	4	0	4	0%
57.	Large Sand Scoop	4	4	0	100%
58.	Peg	10	0	10	0%
59.	Density Pack	4	4	0	100%
60.	Mixing Trowel	4	0	4	0%
61.	Rubber Mallet	4	0	4	0%
62.	Field Density Plate	4	4	0	100%

No	Description	Contract Qty	Qty supplied/ received	Qty missing	% Received
63.	Sampling Spoon	4	4	0	100%
64.	Sand Density Apparatus, complete with Plastic jugs set	4	4	0	100%
65.	Plastic Jugs and one gallon field cans	4	4	0	100%
66.	Steel Hammer,1 kg	4	4	0	100%
67.	Cylindrical Container for Sand Calibration, H=152, Dia=152	1	0	1	0%
68.	Troxler or similar nuclear density testing apparatus complete with safety equipment	2	0	2	0%
69.	Concrete measure 1/2 (cu.ft)- cylinder provided	1	1	0	100%
70.	Slump Cone, set	4	0	4	0%
71.	Tamping Rod	4	0	4	0%
72.	Straight Edge	4	0	4	0%
73.	Folding Rule, 3m	2	0	2	0%
74.	Cubic Moulds, 150 x 150 x 150	36	0	36	0%
75.	2000Kn.Capacity Testing Machine	1	1	0	100%
76.	Guard for above Tester, Set	1	1	0	100%
77.	Cubic Specimen Capping Set	1	0	1	0%
78.	Concrete Curing bottle, with Thermometer	6	0	6	0%
79.	Cyclap Concrete Capping Compound-100 lbs	2	2	0	100%
80.	Concrete test Hammer (Schmidt Hammer or equivalent)	1	0	1	0%
81.	Complete Relative Density Set 220/50/1 ph A.C. (0.1 and 0.5 cu.ft)	1	1	0	100%
82.	Mixing Pan, 24 x 24 x 3" Deep	1	0	1	0%
83.	Portable Platform Scale	1	0	1	0%
84.	Straight Edge	1	0	1	0%
85.	Hoist, minimum lifting capacity, 125 kg	1	0	1	0%
86.	Quality of Water Test, complete Set	1	1	0	100%
87.	1 Qt Sample Can	24	0	24	0%
88.	1 Qt Small Mouth Can- (moisture tins provided)	24	0	24	0%
89.	Hubbard-Carmick Specific	6	6	0	100%

No	Description	Contract Qty	Qty supplied/ received	Qty missing	% Received
	Gravity Testing Bottles				
90.	Sand Equivalent Test Set	1	1	0	100%
91.	Sand Equivalent Stock Solution 1 kg Bottle	10	10	0	100%
92.	Hydrometer, ASTM 151 H	1	1	0	100%
93.	Stopwatch 30 min,1/5 sec	4	0	4	0%
94.	Beaker Glass, 250ml	1	0	1	0%
95.	Graduated Cylinder,100ml	6	0	6	0%
96.	High Speed Stirrer	1	1	0	100%
97.	Dispersing Agent, Kg	3	0	3	0%
98.	CBR Loading Machine, electrical	1	1	0	100%
99.	Heavy Compaction Rammer (4.5 Kg)	5	0	5	0%
100.	CBR Mould with all accessories	5	0	5	0%
101.	Slotted Surcharge Weight	2	2	0	100%
102.	Surcharge Weight	24	24	0	100%
103.	Filter Screen	2	0	2	0%
104.	Trimming Knife, 6" Blade	2	0	2	0%
105.	Plastic Graduated Cylinder, 100 ml	4	0	4	0%
106.	Plastic Graduated Cylinder, 200 ml	4	0	4	0%
107.	Plastic Graduated Cylinder, 1000 ml	4	0	4	0%
108.	Wash Bottle	10	0	10	0%
109.	Small Sand Scoop	4	4	0	100%
110.	Flexible Spatula 6" Blade 1" wide	4	0	4	0%
111.	Sample Extruder	2	2	1	100%
112.	Collar, Detachable	3	3	0	100%
113.	Tripod	9	9	0	100%
114.	Spacer Disc	6	6	0	100%
115.	Swell plates	9	9	0	100%
116.	Bitumen Penetrometer (Automatic and Hand Operated) (all hand operated)	1	1	0	100%
117.	Needles-Stainless steel or brass Grade 440c	12	12	0	100%
118.	Containers-Metal or glass cylindrical flat bottom (tin boxes) 90 ml capacity				
119.	Water Bath	1	0	1	0%
120.	Transfer dish for container	1	0	1	0%
121.	Thermometers for water bath	1	0	1	0%

No	Description	Contract Qty	Qty supplied/ received	Qty missing	% Received
122.	Stop watch or electric timer	1	1	0	100%
123.	Heater-Oven or Hot Plate	1	0	1	0%
124.	Bench Mixer,15 lt Capacity	1	1	0	100%
125.	Stirring Rod	2	0	2	0%
126.	Automatic Marshall compaction machine with hammer and pedestal	1	1	0	100%
127.	Marshall compaction moulds complete (as required filter paper for moulds	12	12	0	100%
128.	Automatic compression Machine with flow and stability gauges	1	1	0	100%
129.	Sample Ejecting Device	1	0	1	0%
130.	Stability Mould	1	1	0	100%
131.	Thermostatically controlled Standard Water Bath to 60 deg C	1	0	1	0%
132.	Refusal compaction equipment BS 594 (Vibratory Hammer)	1	1	0	100%
133.	Gyratory Compaction equipment full set including spares	1	1	0	100%
134.	0.5 ltr Sample Can	12	0	12	0%
135.	0.5 ltr Small Mouth Can	12	0	12	0%
136.	Penetrometer with 5 needles	1	0	1	0%
137.	Softening point devices including heating	1	1	0	100%
138.	Bitumen extraction machine (SMM type)	1	0	1	0%
139.	Beakers for above	6	0	6	0%
140.	Extractors	2	0	2	0%
141.	Cartridge for Extractors	100	0	100	0%
142.	Bi metal Thermometer (0- 300 ^{0}C) 100 and 300 mm (only 300mm provided)	2	1	1	50%
143.	Electrical Thermometer (0- 300 ^{0}C)	2	0	2	0%
144.	0.1m core drilling machine with 12 core drills- (one core bit provided)	1	0	1	0%
145.	Kinematic Viscometer (Complete)	1	1	0	100%
146.	Thermometers	2	2	0	100%
147.	Water Bath (Thermostatically) Viscosity bath	1	1	0	100%
148.	Timer	1	0	1	0%
149.	Scales				
150.	Weights Set	1	1	0	100%

No	Description	Contract Qty	Qty supplied/ received	Qty missing	% Received
151.	Glass Graduate- 200- or 250-ml capacity-1000ml provided				
152.	Vicat Apparatus	1	0	1	0%
153.	Flakiness Sieves	1	1	0	100%
154.	Dynamic Cone Penetrometer (DCP)	1	1	0	100%
155.	Spare DCP Set - Penetrometer Shaft and Hammer	1	0	1	0%
156.	Heavy Duty DCP Set (Capable of 5m depth)	1	1	0	100%
157.	Spare Cone (additional Cones to be supplied as required)	40	0	40	0%
158.	Electric or petrol engine powered light duty penetrometer on mobile	1	1	0	100%
159.	Piezometer	1	0	1	0%
160.	Cictran DCP 3.0 software package for DCP	1	0	1	0%
161.	Settlement gauges	4	4	0	100%
162.	Timing Device	2	0	2	0%
163.	2" Sample Splitter	1	0	1	0%
164.	Laboratory Thermometer	20	0	20	0%
165.	Amoured Thermometer	6	0	6	0%
166.	Pair- Asbestos Gloves	10	0	10	0%
167.	Pair-Rubber Gloves	10	0	10	0%
168.	Trowel, Triangular blade	1	0	1	0%
169.	Deep Cement Pans, 18" * 18" * 3"	2	0	2	0%
170.	Concrete test Hammer	2	1	1	50%
171.	Chloride, Alkalinity and Water Hardness, Set	1	1	0	100%
172.	Extra 200,000 Ib 12" Capacity Gauge	1	0	1	0%
173.	Gas or Kerosene - 3 Burner Stove	1	0	1	0%
174.	Pocket Calculators, Scientific	3	0	3	0%
175.	Pocket Type Thermometers 25-125 F', Set	12	0	12	0%
176.	200mm lid	2	2	0	100%
177.	200mm receiver	2	2	0	100%
178.	300mm lid	2	2	0	100%
179.	300mm receiver	2	2	0	100%
180.	Sieve, 75mm, 300mm dia	2	2	0	100%
181.	Sieve, 63mm, 300mm dia	2	2	0	100%
182.	Sieve, 50mm, 300mm dia	2	2	0	100%

No	Description	Contract Qty	Qty supplied/ received	Qty missing	% Received
183.	Sieve, 37.5mm, 300mm dia	2	2	0	100%
184.	Sieve, 28mm, 300mm diam.	2	2	0	100%
185.	Sieve, 20mm, 300mm diam.	2	2	0	100%
186.	Sieve, 14mm, 300mm diam.	2	2	0	100%
187.	Sieve, 10mm, 300mm diam.	2	2	0	100%
188.	Sieve, 6.3mm, 300mm dia.	2	2	0	100%
189.	Sieve, 5mm, 300mm diam.	2	2	0	100%
190.	Sieve, 4mm, 300mm diam.	2	2	0	100%
191.	Sieve, 3.35mm, 300mm dia	2	2	0	100%
192.	Sieve, 2.36mm, 300mm dia	2	2	0	100%
193.	Sieve, 2.0mm, 200mm dia	2	2	0	100%
194.	Sieve, 1.18mm, 200mm dia	2	2	0	100%
195.	Sieve, 1mm, 200mm dia	2	2	0	100%
196.	Sieve, 0.600mm, 200mm dia	2	2	0	100%
197.	Sieve, 0.425mm, 200mm dia	2	2	0	100%
198.	Sieve, 0.300mm, 200mm dia	2	2	0	100%
199.	Sieve, 0.212mm, 200mm dia	2	2	0	100%
200.	Sieve, 0.150mm, 200mm dia	2	2	0	100%
201.	Sieve, 0.075mm, 200mm dia	2	2	0	100%
202.	Sieve, 0.063mm, 200mm dia	2	2	0	100%
203.	Mechanic Sieve Shaker	1	1	0	100%
204.	English Ruler	2	0	2	0%
205.	Metric Ruler	2	0	2	0%
206.	Large logbook	2	2	0	100%
207.	Pencil Sharpener	2	2	0	100%
208.	6" Protractor	2	0	2	0%
209.	Claw Hammer	2	2	0	100%
210.	Hammer for Pull up Nails	2	0	2	0%
211.	Dish Glass	3	0	3	0%
212.	6" * 6" Ground Plate Glass	3	0	3	0%
213.	Assorted Screwdrivers (Set)	2	0	2	0%
214.	Fire Extinguisher (Dry Type)	6	6	0	100%
215.	Flashlight and Battery (Good Quality)	6	0	6	0%
216.	15" Clip Board	6	6	0	100%
217.	Cross-Section Paper Pad	6	0	6	0%
218.	Table Brush	6	6	0	100%
219.	10cm Coring Machine with set of extra bits	1	1	0	100%
220.	Vacuum Pump	2	2	0	100%
221.	vacuum Pycnometers	12	2	10	17%
222.	Plastic Tubing for Vacuum Line, meter	-	-		
223.	Laboratory Tongs	3	3	0	100%
224.	Vernier Caliper	2	2	0	100%
225.	Brass or Copper Brush	3	0	3	0%
226.	Nailbrush (hard bristle)	3	0	0	100%

No	Description	Contract Qty	Qty supplied/ received	Qty missing	% Received
227.	Point Brush 20-50mm	3	3	0	100%
228.	Point Brush 5-10mm	1	1	0	100%
229.	Trolley	1	0	1	0%
230.	Refuse Bin	3	0	3	0%
231.	Rain Gauge	1	0	1	0%
232.	Shovel	3	3	0	100%
233.	Spade	3	3	0	100%
234.	Steel Hammer, 2 kg	3	3	1	100%
235.	Water Still	1	1	0	100%
236.	Rapid Moisture Apparatus, Set	1	1	0	100%
	Mobile Weighbridge	2	0	2	0%