THE UNITED REPUBLIC OF TANZANIA

NATIONAL AUDIT OFFICE

PERFORMANCE AUDIT ON THE CONSTRUCTION OF DAR ES SALAAM BUS RAPID TRANSIT (BRT) INFRASTRUCTURE- PHASE 2





A REPORT OF THE CONTROLLER AND AUDITOR GENERAL OF THE UNITED REPUBLIC OF TANZANIA

March, 2021

THE UNITED REPUBLIC OF TANZANIA

National Audit Office

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To provide high quality audit services that improves public sector performance, accountability, and transparency in the management of public resources

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We are an impartial public institution, offering audit services to our clients in unbiased manner

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We are professionals providing high quality audit services based on standards and best practices

Integrity

We observe and maintain high standards of ethical behaviour, rule of law and a strong sense of purpose

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We value, respect, and recognize interest of our stakeholders

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We work together as a team, interact professionally, and share knowledge, ideas, and experiences

PREFACE

Section 28 of the Public Audit Act No. 11 of 2008 authorizes the Controller and Auditor General to carry out Performance Audit (Value-for-Money Audit) for the purposes of establishing economy, efficiency and effectiveness of any expenditure or use of resources by Ministries, Departments, Agencies, Local Government Authorities, Public Authorities and other Bodies. The audit involves enquiring, examining, investigating and reporting, as deemed necessary under the circumstances.

Based on the above mandate, I have the honour to submit to Her Excellency, the President of United Republic of Tanzania, Hon. Samia Suluhu Hassan and through her to the Parliament of the United Republic of Tanzania, the Performance Audit on the Implementation of Construction of Dar es Salaam Bus Rapid Transit (BRT) Infrastructure- Phase 2.

The Report contains audit findings and recommendations aimed at improving the Project's implementation and subsequent operation and maintenance by TANROADS. TANROADS, being the auditee, was given the opportunity to scrutinize the report and comment thereon. I wish to acknowledge that discussions with TANROADS have throughout been useful and constructive.

After completion of the assignment, the office subjected the report to the critical review of Eng. Abdul Abeid Awadh, a registered Independent Consulting Engineer on the field of Management and Roads Technical Audits who came up with useful inputs on improving the output of this report.

This report has been prepared by four team members from NAOT namely, Eng. Andrew E. Kellei, Mr. Kulwa M. Kija, Eng. Denis A. Charle and Ms. Mujo S. Kasoga, under the supervision and guidance of Mr. Michael Malabeja - Chief External Auditor, Eng. James Pilly – Assistant Auditor General – Specialized Audit and Mr. Jasper Mero – Deputy Auditor General. I would like to thank my staff for their devotion and commitment in the preparation of this report.

I also extend my sincere thanks to TANROADS Office for their fruitful interactions with my Office during the course of the audit work.

Charles E. Kichere
Controller and Auditor General of the United Republic of Tanzania
March, 2021.

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LIST OF ABBREVIATIONS

ADB	African Development Bank
AGTF	African Growing Together Fund
APP	Annual Procurement Plan
BoQ	Bills of Quantity
BRT	Bus Rapid Transit
CBD	Central Business District
CBR	California Bearing Ratio
DART	Dar es Salaam Rapid Transit
DAWASA	Da es Salaam Water Sanitation Authority
DUCE	Dar es Salaam University College of Education
EC	Evaluation Committee
EMPs	Environmental Management Plans
ERB	Engineering Registration Board
ESIA	Environmental and Social Impact Assessment
GCC	General Conditions of Contract
GN	Government Notice
GoT	Government of Tanzania
GPN	General Procurement Notice
MLHS	Ministry of Lands and Human Settlement Development
MoFP	Ministry of Finance and Planning
MoWTC	Ministry of Works, Transport and Communication
NMT	Non-Motorized Traffic
PPA	Public Procurement Act
PPRA	Public Procurement Regulatory Authority
UCS	Unconfined Compressive Strength
RAP	Resettlement Action Plan
SCC	Special Conditions of Contract
SGR	Standard Gauge Railway
SS	Special Specification
TANESCO	Tanzania Electric Supply Company Limited
TANROADS	Tanzania National Roads Agency
TAZARA	Tanzania Zambia Railway Authority
TFV	Ten Percent Fineness Value
TRC	Tanzania Railway Corporation
TTCL	Tanzania Telecommunication Company Limited
TZS	Tanzanian Shillings
VETA	Vocational Education Training Authority

EXECUTIVE SUMMARY

A. BACKGROUND

The Dar es Salaam Bus Rapid Transit (BRT) Project-Phase 2 is implemented under two Lots. Lot 1 involves the construction of infrastructure that includes 20.3km of exclusive BRT lanes in the middle of mixed traffic lanes as well as facilities for Non-Motorized Transport (NMT) along Kilwa Road corridor, sections of Bandari road, Sokoine Drive and Kawawa Road. The project corridor traverses from Mbagala area in Temeke District to the Central Business District where it connects with Phase 1 of the BRT system at Kariakoo and Zanzibar ferries terminals. Lot 2 involves construction buildings including a main depot at Mbagala, 2 terminal and 5 feeder stations at various locations.

The project is expected to benefit an estimated population of at least 1.2 million representing about 25% of the Dar es Salaam City's population. Other beneficiaries include users of major city connecting arterial roads including Mandela and Nyerere Roads. Based on the appraisal report, key outcomes include improved accessibility to the larger populations of Dar es Salaam particularly Temeke Municipality, reduced travel time to public transport commuters, improved air quality to travellers and residents living close to the roadway, improved property values arising from reduced congestion.

The estimated total cost of the project net of taxes was USD 159.32 million (TZS 285.1 billion). The project was jointly financed by the African Development Bank (ADB) (61.1%), Africa Growing Together Fund (AGTF) (27.8%) and the Government of Tanzania (GoT) (11.1%). The project was scheduled to be implemented over a period of 4 years (2016-2020). However, due to delays in design and procurement phases, the contract completion date for Lot 1 is 5th May, 2022 and for Lot 2 is 28th February, 2021.

The main objective of the audit is to assess whether Tanzania National Roads Agency (TANROADS) managed the Construction of second phase BRT with due regards to time, cost and quality (in accordance with conditions of contracts, standards, and specification) in order to enhance traffic movement and eliminate bottlenecks to traffic flow to various centres of economic activities.

B. AUDIT FINDINGS

The audit findings cover both the Civil and Building works which encompass the following aspects: Planning, design and tender documentation; Procurement; Contract management; Construction stage; Financial management aspects; Quality control issues; and Human resources management.

B.1 DESIGN AND TENDER DOCUMENTATION ASPECTS

Final Design Review delayed for Seven Months for Lot 1

TANROADS did not ensure that execution of Consultancy Services Contract meets timeline for design of the project. This is because the design of the project was associated with delays of 80 days and partial site handover to the Consultant for the commencement of works.

Furthermore, TANROADS did not ensure that the Final Design Review Report meets the timelines. This is because there was a delay of seven months for the submission of the Final Design Review Report.

Final Detailed Design Report and Tender Documentation for Addendum No. 1 delayed for Eight Months.

Section 9 of the ToR for Addendum No.1 for the Additional services – Design of Overpass Bridge along Bandari - Gerezani Road required the Consultant to submit final design report three months after commencement of the assignment. Commencement was supposed to be 17th February, 2018 and so the final design review report was supposed to be before 18th May, 2018.

However, the review of correspondences files showed that, final design report was submitted on 17th January, 2019 with a delay of 8 months. The design report was expected to present Consultant's findings of the Engineering Design, and improvements made on the second Overpass Bridge and its approaches along Bandari – Gerezani Road in accordance with the Standard Gauge Railway (SGR) requirements of Raising level. Moreover, early submission of the Final Engineering Design Report and Bidding Document would have facilitated the inclusion of the Addendum in the Tender of contractor and Negotiation for the Construction of BRT Phase 2 LOT 1; Roadworks in time. The reason for delay of Addendum No. 1 was due to long discussion between Tanzania Railway Corporation (TRC) and

TANROADS on whether to remove the existing railways or maintaining its levels without affecting the design.

Lack of Detailed Master Plan resulted into Variation of TZS 28,047,114,893.02 (VAT exclusive) for Construction of Overpass Bridge along Bandari - Gerezani Road

According to Item 7 of TOR (Section 5.1- Design Review and Pre-Contract Services), the Consultant was supposed to review detailed engineering design reports including Design reports, maps, and drawings; verify the correctness of survey data on site and previous studies, if any; and update to the Detailed Engineering Design.

However, review of project correspondences showed that, there was no review of Feasibility studies for the BRT project which was conducted in 2005. As a result, while the tender preparation for Lot 1 was at advanced stage, there were design changes that were introduced at the Railway Overpass Bridge along Bandari Road that required raising levels for the Standard Gauge Railway (SGR). These changes affected approach road gradient and the merge into road and railway crossing to the Oil Depot area.

It was noted that, the introduction of another Overpass Bridge to south of the current Gerezani Bridge as solution to the negative impacts that would arise from SGR project became necessary. Consequently, part of Works for Bandari Road was omitted from the tender to allow redesigning of the second Overpass Bridge. As a result, this work was added to the original contract of Lot 1 as Addendum No. 1 amounting to TZS 28,047,114,893.02.

These changes that resulted into redesign of the second overpass Bridge was caused by lack of detailed city master plan for more than 10 years ahead from the time design was done.

Final Design Review delayed for eighty (80) days for Lot 2

According to Sub-Clause 8.3 of the Contract for Consultancy Services the Consultant was expected to submit final design review report four months after commencement of the assignment.

However, the review of Correspondences files showed that, final design Review reports were submitted on 12th October 2017 with a delay of 80 days. This was due to change of site since the site was partially compensated

during design period. Moreover, the Final Design Review Report was delayed due to delay of review of Draft Design Report by the Client and other stakeholder like DART, TRC and TAZAMA. The delay of Final Design Review Report attributed to delay of procurement of contractor and commencement of work as planned.

B.2 PROCUREMENT ASPECTS

Unsuccessful Bidders were not given Time to submit Claims

Section 60(14) of PPA 2011 (amended in 2016) requires the accounting officer to notify unsuccessful tenderers the name of the person to whom the contract is awarded and the contract amount within thirty days after the communication of award,

However, review of procurement correspondences showed that the letter of acceptance was sent to successful bidder (M/s Sinohydro Corporation Limited) on 19th November, 2018 and the contract was signed on 10th December, 2018 while the letters of notification to unsuccessful bidders were sent on 20th March, 2019, about four months later. Untimely communication with unsuccessful bidders could suggest that the procurement of contractor was not fully transparent and fair.

B.3 CONTRACT MANAGEMENT ASPECTS

TANROADS did not second Engineers to Consultants during Supervision work

TANROADS did not second its engineers to the project as provided in the Terms of Reference of the Consultancy Service Contract. The reason for secondment of staff was for them to gain experience and to acquire the knowledge on different aspect of the project management including all aspects of supervision of road works contract, contract works scheduling, use of relevant software, quality control of completed works, setting out and measurement, including preparation of as-built drawings and final reports. The audit noted that, there was no pay item for the counterpart staff training since it was left as a provision for the future need. In addition, due to scarcity of staff, TANROADS did not second any Engineer.

B.4 CONSTRUCTION STAGE ASPECTS

Slow Work Progress

According to the 18th Monthly Progress Report of December 2020, the works physical progress was 9% against 49% which was the planned progress reflecting a delay of 40%. Despite remainders from Client to the contractor to catch up with programme, the proactive actions have not been taken. The slow progress was attributed to additional works that resulted from design modification on the ongoing works; stoppage for investigation and addressing of quality issues; replacement of staff; covid-19 pandemic; and unwillingness of the contractor.

Quality Problems on the constructed BRT Lane Rigid Pavement

According to contract drawings and specifications, the rigid pavement to be used for BRT is 220 mm thick, with 3.75 metres wide lanes on C1 subbase and G15 improved subgrade. The audit noted that, the rigid pavement had transverse cracks between Ch. 6.480 – Ch. 8.910 on the LHS lane.

Investigation to identify the reason for the failure has been undertaken. Based on the investigation report, major causes for the defects in concrete pavement were linked to inadequate handling of concrete from the production at batch-plant to the workplace. From the production point the concrete was transported by tipper trucks then at the work place the concrete was carried by excavator to the paver plant for placing. Thus, this handling procedures led to segregation of concrete. Other reasons connected with failure, included contract did not adequately:

- Remove clay and organic contaminants from the sand used to produce concrete and this caused potholes both on the surface and within the concrete pavement.
- Handle materials and concrete from stockpiling to laying. This resulted into non-homogeneous concrete which advanced to cracking. The investigation pointed out the stockpiling of materials, the batching of coarse aggregate and the multiple handling of fresh concrete before placing as major causes.

The common uncontrolled full width and fill depth shrinkage crack found between the expansion joints is attributed to late cutting of the contraction joints.

Environmental Management Program did not comply with ESMP

It was noted that, only one environmental audit report was conducted, the report was developed in December 2020. Based on the specific conditions of the contract, environmental audit was supposed to be done after every six months, therefore about four reports were expected. Since only one the environmental audit was conducted the employer was limited from having information on environmental quality of the project, especially water pollution and control, air pollution, solid waste management and the safety issues such as accident control, etc.

Six frames for terminal shed were not constructed as per drawings at Kariakoo Terminal

A site visits at Kariakoo terminal found that six frames for terminal shed were not constructed as per drawings by replacing frame type A with B. As the result there was an overpayment of TZS 234,371,760. The audit did not see any Engineer's instruction for the change or modification. The deviation from the structural drawings was due to inadequate supervision and inspection by the consultant during construction and fixing of frames. Upon realising the overpayment, the consultant decided to recover the excess payment. According to IPC No. 8 which was issued on 22nd December, 2020 part of the overpayment on Frame Type A was deducted from this IPC, hence the remaining overpayment for frame Type A is **TZS 103,477,920.**

Columns for Kariakoo Terminal sheds were shorter than the design height

The audit observed that the columns at Kariakoo terminal sheds were shorter than the specified height on the designs and detailed drawings.

According to drawing No. T497-BRT2L2-KRK-TSA-ST-06 of terminal Shed for Frame Type A details, the columns are supposed to be of a cross section dimension of 200mm x 200mmx 52mm with height of 5,305 mm. However, the result of the joint measurement showed that the height of the columns was 3,700 mm which implies a difference of 1,605 mm reflecting an overpayment of TZS 91,138,320 for all six terminal sheds.

However, at the time of this audit, it was noted that TANROADS had started to recover the overpaid amount. According to IPC No. 8, which was issued on 22nd December, 2020, there was an adjustment on the payment to recoup part of the overpayment which was made on IPC No. 4 by the deduction of

TZS 83,430,816 out of **TZS 91,138,320**. This means that the amount remaining to be recouped was **TZS 7,707,704**.

Feeder stations lack service facilities for passengers

The audit observed that the feeder stations were without any provision of services facilities in their site layouts such as the public toilets and ticket booth for the users of the feeder stations. Among the four (4) feeder stations, Chang'ombe and Mtoni Feeder station had enough space to accommodate both Administration block and ticketing booth but for the Zakhiem and Mtoni Kijichi Feeder Stations were limited due to the small area for construction hence this could just accommodate ticketing booth.

B.5 TECHNICAL ASPECTS

Tests on materials, pavement layers and completed works

Stockpiled Gravel Materials did not meet specified Strength

The three point California Bearing Ratio test was conducted to determine the relationship between soil moisture, density and CBR values for the stockpiled materials. From the results it was indicated, the value of CBR swell was within the specified requirement of below 1%, however, CBR value at 95% after four days soaking was less than 25 which was a design requirement. The use of stockpiled materials with a CBR value of less than 25 would have impact on the strength of the subbase materials to withstand the load on the pavement.

Four Core Samples did not meet specified Unconfined Compressive Strength (UCS) for Stabilized Subbase

The audit also extracted core samples from constructed stabilized subbase for assessment of Unified Compressive Strength (UCS). According to special specifications, the UCS of individual cores shall not be less than 90% of the minimum value specified in Table 3802/2 of the Standard Specification for Road Works 2000 (i.e., not less than 0.9 MPa). However, 4 out of 20 tested samples had UCS results less than the minimum specified value of 0.9 MPa. According to interview with TANROADS official, the reason for failure of the tested sections was unauthorised use of the stabilised subbase by public traffic as observed during site visit, and long exposure of the stabilised layer without being covered for providing protection.

The Subbase had Low Field Compaction

According to Standard Specifications for Road Works 2000, the minimum field density for Subbase of cemented material (C1) is supposed to be 95% of BS-Heavy. It was found that, nine out of 23 tested points had field density test results on compaction below the minimum specified requirements (below 95% of compaction) as the failed compaction ranged from 83 to 94%.

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Reasons for failure of the tested sections were unauthorised use of the stabilised subbase by traffic as observed during site visit, and long exposure of the stabilised layer without being covered for protection. Failed sections are likely to lower the strength of the rigid pavement that may affect durability and performance of the pavement.

The Subbase had Low Field Compaction

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test results on compaction below the minimum specified requirements (below 95% of compaction) as the failed compaction ranged from 83 to 94%.

The reason for failure of the tested sections on field compaction was unauthorised use of the stabilised subbase by traffic as explained above.

B.6 FINANCIAL MANAGEMENT ASPECTS

The audit noted untimely payment of invoices of the supervising consultant. It was observed that most of delays were caused by the process of confirming and certifying the amount to be paid from Client to Ministry of Finance and Planning (MoFP) and from MoFP to financier, African Development Bank (AfDB). The delays of payments as of the time of audit were estimated to attract interest to be paid by the employer to a tune of USD 23,834.38.

VAT amounting to USD 30,929.95 not included in payment voucher in Lot 1

According to Clause 43.1 of the GCC, the Consultant was responsible for meeting all tax liabilities arising out of the contract. It was noted that the approved payment vouchers for supervising consultant's invoices numbers 11, 12 and 14 did not include VAT amount of USD 30,929.95 in PV 000004510, PV00000451, PV 000004709 and PV 000004710 which were issued by TANROADS. It was clear that donor components were VAT exclusive, but the VAT portion also had to be recognised to form VAT Payable as a portion to be paid by GOT. Other payment vouchers were approved with VAT included. This indicated that GOT portion to pay consultant BOTEK would be incorrect with a decrease of the mentioned amount.

Late submission of certified IPC No.1 by both Engineer and the Employer in Lot 1

Payment of contractor's IPC No.1 was delayed for 73 days. The contractor submitted the application and supporting documents on 21st December 2019 while supervising engineer submitted the certified IPC No.1 to TANROADS on 27th January 2020. Instead of spending 28 days as required by Clause 14.6.1 of the GCC, it took 36 days for the Engineer to certify the certificate. This affected the other 28 days for employer, who was left with only 20 days to finalize the payment to contractor whereby the due date for payment was on 15th February 2020. IPC No. 1 was paid on 29th April 2020 creating a delay of 73 days.

Thus, interest on Delayed Payment amounted to TZS 49,263,362.87 in Lot 2 as per Clause 14.8.1 of the GCC[1] state that if the contractor does not receive payment in accordance with Clause 14.7 the contractor shall be entitled to receive financing charges compounded monthly on the amount unpaid during the period of delay.

It was noted that, there were delays on payment of IPC No. 1, 2, 3, 4 and 5 to Lot 2 contractor's certified IPCs. Employer would be obliged to pay interest on delayed payment to a tune of TZS 49,263,362.87 as per auditor computation, which increase the project cost without any benefit or returns.

Furthermore, it was noted that the delay in paying the outstanding IPC No. 3 which was 78 days at the time of audit, was caused by the donor (AFDB) not paying on time. However, the cost will be borne by the GoT.

B.7 HUMAN RESOURCE MANAGEMENT ASPECTS

TANROADS did not ensure that the project was executed by staff with the right educational and Professional qualification. It was found that 16 out of 25 staff did not have evidence on professional registration. Likewise, the audit noted that, TANROADS did not ensure that foreign staff comply with immigration law of the country before being engaged in the project. This is because 7 out of 20 foreign staff did not have work permits.

Not all Key Staff had Education and Professional Qualification Higher or Equivalent to Staff mentioned in the Contract for Lot 2

On Lot 2 the audit noted that, the key staff who were listed in the signed contract were all replaced by other staff during execution of the project. On the other hand, it was found that, not all staff were registered by professional boards which are Engineers Registration Board (ERB), Architects and Quantity Surveyor Registration Board (AQRB).

C. CONCLUSIONS

The report concludes that, the project is not in the direction to attain the value for money. This is because, implementation of both lots (Lot 1– on

[1] Contract No. TRD/HQ/1009/2018/19

road works and Lot 2 on building works) was not adequate to achieve the expected completion time, cost, and quality as per terms and conditions of the contract. There are noted variations and time overrun. The main cause of all these is rooted in the inadequate supervision by the employer and delay to take prompt actions.

D. RECOMMENDATIONS TO TANROADS MANAGEMENT

TANROADS should:

1. In collaboration with DART strengthen controls of time management to ensure designs are carried out timely and all quality control review and approvals of the Draft Design Report are timely done;
2. Enhance multi-sectoral and inter-institutional collaboration during planning to ensure there is adequate integration to minimize the redesigns and additions of works;
3. Strengthen its contract Management mechanism to ensure that the project adhere to the approved schedule of Work, and Environmental Management Plan is implemented, and all Contractual Documents are properly documented;
4. Apply stringent measures to contractor for Lot 1, for all poor-quality work done by contractor;
5. Ensure that the contractor come out with plan to recover the lost time and redeem the slippage;
6. Deduct all liquidated damages caused by delays; should also, recover the overpayment to the consultant;
7. In collaboration with the Ministry of Finance, should strive to reduce time of cross-checking invoices in order to meet payment due dates; and ensure that outstanding invoices are paid to avoid interest on delayed payments in the remaining IPCs and Fee Notes;
8. Ensure that all tax liabilities arising out of the contract are paid; and should also deduct the amount which were overcharged on the identified Certificates;
9. Ensure that the Contractor rectifies failed sections to achieve the required minimum specifications prior to placing rigid pavement on stabilized subbase;
10. Ensure that, the stabilised subbase is protected to avoid a risk of traffic to use the stabilised subbase;

11. Ensure all foreign key staff supervising construction projects in the country have the right credentials and possess valid working permits. This includes liaising with TCU so as to settle challenges facing the applications of working permits by key staff; and
12. Ensure all key staff possess required educational qualifications, registration with local professional boards and possess valid practising license.

CHAPTER ONE
INTRODUCTION

1.1 Background

The Dar es Salaam Bus Rapid Transit (BRT) Project-Phase 2 is implemented under two Lots. Lot 1 involves the construction of infrastructure that includes 20.3km of exclusive BRT lanes in the middle of mixed traffic lanes as well as facilities for Non-Motorized Transport (NMT) along Kilwa Road corridor, sections of Bandari road, Sokoine Drive and Kawawa Road. The project corridor traverses from Mbagala area in Temeke District to the Central Business District where it connects with Phase 1 of the BRT system at Kariakoo and Zanzibar ferries terminals. Lot 2 involves construction buildings including a main depot at Mbagala, 2 terminal and 5 feeder stations at various locations.

The project is expected to benefit an estimated population of at least 1.2 million representing about 25% of the Dar es Salaam City's population. Other beneficiaries include users of major city connecting arterial roads including Mandela and Nyerere Roads. Based on the appraisal report[2], key outcomes include improved accessibility to the larger populations of Dar es Salaam particularly Temeke Municipality, reduced travel time to public transport commuters, improved air quality to travellers and residents living close to the roadway, improved property values arising from reduced congestion.

Other key outcomes include improved business environment for traders arising from improved accessibility, new market facilities and improved sanitation. The disadvantaged women, school children, handicapped and elderly are also poised to benefit from the new BRT system. At the time of project initiation, they could not manage to comfortably use the existing public transport especially during peak hours. Finally, employment was expected to be created during both the construction and the operations phases of the proposed BRT line.

The estimated total cost of the project net of taxes is USD 159.32 million (TZS 285.1 billion). The project is jointly financed by the African Development Bank (ADB) (61.1%), Africa Growing Together Fund (AGTF) (27.8%) and the Government of Tanzania (GoT) (11.1%). The project was expected to be

[2] Appraisal Report Tanzania Dar Es Salaam Bus Rapid Transit System Project- Phase 2 Appraisal Report, of year 2015

implemented over a period of 4 years (2016-2020)[3]. However, due to delays in design and procurement phases, the contract completion date for Lot 1 is 5th May, 2022 and for Lot 2 is 28th February, 2021

1.2 Project Features

In addition to the road infrastructures there were other features which include 29 bus stations, one bus depot at Mbagala-Rangitatu and two bus terminals at Mbagala-Rangitatu and Kariakoo-Gerezani. Moreover, two flyovers; one at Nyerere Road/Chang'ombe Road junction and second at Nelson Mandela/Kilwa road junction will be constructed. Non-Motorized Transport facilities and five feeder stations at Dar es Salaam University College of Education (DUCE), Mtoni Kwa Azizi Ali, Mbagala-Rangitatu, Zakhiem and Mtoni-Kijichi would also be provided. A pedestrian overpass bridge would be constructed at Mbagala area.

Alongside infrastructure development, feeders' stations for Phase 2 are also identified at Charambe and Kongowe, all being connected to Mbagala Rangitatu, Mtoni kwa Azizi Alli that connects North and South Tandika, Mtoni, Temeke and Buza while Kijichi Misheni connects Misheni, Kijichi and Mbagala Kuu. Another feeder route is the DUCE-Chang'ombe which connects Temeke, Kigamboni and Tandika area.

1.3 Design of the Audit

1.3.1 Overall Audit Objective

The main objective of the audit was to assess whether Tanzania National Roads Agency (TANROADS) managed the Construction of second phase BRT with due regards to time, cost and quality (in accordance with conditions of contract, standards, and specification) in order to enhance traffic movement and eliminate bottlenecks to traffic flow to various centres of economic activities.

This in general aims at reviewing and assessing the processes and the manner in which the project was planned, designed, and implemented and verify design standards used, specifications, construction quality and workmanship, physical status, and functionality of the selected projects.

[3] Appraisal Report Tanzania Dar Es Salaam Bus Rapid Transit System Project- Phase 2 Appraisal Report, of year 2015

1.3.2 Specific Audit objectives

The specific objectives were to verify whether: -

a) Planning and designing of the project were adequately done to facilitate achievement of project objectives;
b) Procurement and contracting process of contractors, consultant, goods, and services for the project were done in accordance with relevant procurement laws and regulations;
c) Forecasting, disbursement, and utilization of project funds was carried out in accordance with the financial guidelines;
d) Implementation of project was done efficiently so as to achieve the expected completion time, cost, and quality as per terms and conditions of the contract; and
e) Plans to address the risks associated with environment, safety, and social impact during the implementation were developed and adequately implemented in line with requirements of the Environmental Management Act and terms and conditions of the contract.

1.3.3 Assessment Process

The assessment was done using information from different sources including:

a) Relevant Design Standards, Manuals and Specifications;
b) Tender and Contract Documents for the sampled Projects;
c) Public Procurement (Amendment) Act, 2016 and Public Procurement (amendment), Regulations,2016;
d) Provisions and Clauses in the Contract Documents; and
e) Project Correspondence Files.

1.3.4 Audit Scope and Limitations

The auditees were Tanzania National Roads Agency (TANROADS), an Agency that was under the Ministry of Works, Transport, and Communications, which was the main implementer of the project and Dar es Salaam Rapid Transit Agency (DART) which was responsible for procurement of services for bus operator, fare collection and its systems as well as overseeing operations of BRT system. DART was involved in the procurement and supervision of the Consultancy Services for design of 42.9kms of Bus Rapid Transit System Phase 2 and 3 in Dar es Salaam City.

The broad focus areas in the audit included project formulation; appraisal; technical design; contract management; construction quality control; project

financing; physical and financial status; and supervision and monitoring mechanism.

Two components related to construction activities were audited. The components included civil works and consultancy services which were identified in Lots 1 and 2 namely:

Lot 1: Road works: on sections of Kilwa road, Gerezani road, Chang'ombe road, part of Kawawa road and part of Sokoine Drive (20.3 km) including two fly overs and bus stations along the road; and

Lot 2: Building works: one deports, two (2) terminals and five (5) feeder stations off roadway.

In general, the Audit covered activities spanning from project initiation and feasibility studies to the current stage of implementation. The Audit covered all activities and works implemented in the last five (5) financial years starting from 2016/17 to 2020/21, mainly because this was the period when TANROADS and DART embarked on the implementation of the project. The selected period enabled the Audit Team to assess all key aspects starting from the planning phase and progress made so far on its implementation.

1.3.5 Methods of Data Collection and Analysis

The Audit Team used three methods of data collection. These methods include document reviews, interviews, and physical verification of the completed works.

(i) Documents Review

The Audit Team reviewed relevant project documents to gain an understanding of the project and assess the adequacy of planning/needs assessment, execution, supervision and monitoring of the project. The requested and reviewed documents covered project initiation and feasibility study, design through procurement to contract administration. A list of documents reviewed is given as **Appendix 1.**

This was done so as to identify risks to performance, possible root causes for the performance problems to enable the Audit Team to come up with findings and recommendations for further improvement. The information gathered

through the reviewed documents were used to verify information obtained from interviews.

(ii) Physical Observations, Site Inspection, Measurements and Testing

The Audit Team visited the project sites to physically inspect and observe the actual work that has been done. Based on visual assessment of the quality of the executed works and materials used, the audit team determined whether the completed works were satisfactory in terms of the following quality-related indicators:

- Overall quality of workmanship,
- Overall quality of materials used,
- Overall quality of riding surface,
- Absence of defects, such as cracks, ruts, and localized potholes, and
- Camber and/or super-elevation.

Selected photographs taken during site inspection are shown in **Appendix 2.**

As part of site visits, the Audit Team also checked whether the executed works complied with specifications, drawings, Bills of Quantities (BoQs) and any conditions provided in the contract documents. This was done through carrying out both destructive and non-destructive tests on road works and constructed structures. Destructive tests involved Field Density, UCS coring Test, CBR test on the G25 Natural gravel and Ten per cent Fineness Value (TFV) both Dry and Wet on the stockpile Aggregates along the subject roads. Prior to conducting destructive tests, an approval was sought from TANROADS. In addition, reinstatement of the disturbed locations was done using materials of the same or superior quality.

(iii) Interviews

To capture a broad understanding of the project and identify the existing technical challenges, the Audit Team conducted interviews and thorough discussions with various officials of TANROADS, DART and the consultants of the projects (Lot 1 and Lot 2). The purpose of the interviews was to obtain additional information related to the project as well as clarify the information obtained from reviewed documents and physical observations.

1.4 Methods for Data Analysis

The collected information was analysed using both qualitative and quantitative methods in order to obtain facts and sufficient information regarding the overall performance of the BRT phase 2 project.

1.5 Entrance (Kick off) Meetings

The Audit conducted an entrance (kick off) meeting at TANROADS Headquarters in Dar es Salaam on 15th September 2020 from 10.00 am to 11.15 am. After self-introduction, the Chief External Auditor briefly presented the audit plan covering audit objectives, audit scope, Mandate of the Controller and Auditor General and methods of data collection and analysis.

1.6 Criterias Used During the Audit

The audit was conducted in accordance with Performance Auditing Guidelines issued by the International Organization of Supreme Audit Institutions (INTOSAI) and the Technical Audit Manual of the National Audit Office of Tanzania. The INTOSAI general auditing standards states that the audit and the Supreme Audit Institutions must be independent, possess required competence and exercise due care to provide a guide on execution and reporting of audit findings.

These standards guided the audit team to obtain sufficient and appropriate evidence to provide a reasonable basis for the findings and conclusions in line with the audit objectives.

1.7 Data Validation Process

Management of TANROADS and DART were given an opportunity to go through the draft audit report. Management confirmed the accuracy of the information presented in this report. TANROADS and DART responses on issued recommendations is presented in **Appendix 13 and Appendix 14** respectively.

1.8 Structure of the Report

In general, this report covers audit findings and recommendations in the executive summary; detailed audit methodology and procedures; detailed findings on project inception, design, tender process, and contract implementation; and detailed recommendations. The evidence substantiating the audit findings are presented in the Appendices.

The remaining chapters of this report cover the following:

- Chapter Two provides detailed system for management of road construction;
- Chapter Three presents audit findings on performance of constructed roads work (LOT-1);
- Chapter Four presents audit findings on performance of constructed building works (LOT-2); and
- Chapter Five provides conclusions and outlines audit recommendations that need to be implemented in order to improve the current situation on the ongoing BRT phase 2 project.

CHAPTER TWO
SYSTEM DESCRIPTION ON MANAGING ROAD WORKS IN TANZANIA

2.1 Introduction

This chapter provides information about key actors, legal and institutional set-up, and processes for management and administration of roads in Tanzania.

2.2 Responsibilities and Policy

2.2.1 Ministry of Work and Transport

MoWT has the responsibility for instituting the guiding systems and policies of road construction in the country. This includes activities such as formulation of policies, strategic planning, and formulation of standards as well as development of construction industry. The following objectives stipulate the government's intentions on the road construction sector to:[4]

- develop an efficient and self-sustaining road network that is capable of meeting the needs for construction, rehabilitation, and maintenance of civil works for trunk, regional, district and feeder roads network;
- ensure efficient and cost-effective performance of the construction industry that will guarantee value for money on constructed facilities in line with best practices; and
- improve co-ordination, collaboration and performance of the institutions supporting the development and performance of the construction industry.

2.2.2 Tanzania National Roads Agency (TANROADS)

TANROADS was a semi-autonomous road agency of the Ministry responsible for Works established by Executive Agencies Act No. 30 of 1997. The agency was responsible for the maintenance and development of the classified trunk and regional road networks. Under BRT Project Phase 2, TANROADS had the following specific roles:

- It was the executing Agency for the project;
- Procurement and management of the BRT infrastructure contracts;
- Coordinating day to day management of the project;
- Project supervision and monitoring implementation of the environmental and social management plans;
- Maintenance of the road infrastructure during operations; and

[4] Tanzania's Construction Industry Policy, 2003

- Procurement of works and consultancy services;

2.2.3 Dar Rapid Transit Agency (DART)

DART was established under the Executive Agencies Act on May 25, 2007. Under BRT Project Phase 2, DART was responsible for the following roles:

- Participation in Design Review and Modification for significant output of the project;
- Procurement of services bus operators (private), fare collection system and Intelligent Transportation Systems (ITS) as well as overseeing operations of the BRT system;
- Monitor the implementation of Resettlement Action Plan (RAP); and
- Overseeing BRT operations with the bus operators from the private sector.

Apart from the above-mentioned key stakeholders, the execution of the project involves other stakeholders as described hereunder:

2.2.4 Consultants

TANROADS and DART hired consultants who were responsible for preparing designs and for supervising the implementation of the Project. Both institutions are responsible in monitoring all tasks even when they are conducted by consultants. This means that they were also responsible for supervising and monitoring the work done by the consultants.

Consultants were engaged in all stages of implementation of the project from designing, preparation of the bidding documents as well as supervision of construction work serving the interest of clients. In that capacity they were expected to perform and ensure that the project would be executed within the time, cost and to required quality.

During the supervision phase their duties include monitoring of the contractor's activities on site, performing different tests to check the quality of the works. They were also expected to examine the contractor's claims and variations. In addition, they prepare progress reports and final accounts of the project. Moreover, consultants were also involved in intermediate and final site inspections.

The Consultant under DART was M/s KyongDong Engineering Co., Ltd. in association with M/s AMBICON Engineering Ltd. This consultant was responsible for preliminary works such as conducting feasibility studies, environmental impact assessment and preliminary designs.

As for TANROADS, this project was divided into 2 Lots. For Lot 1 which was for road works on sections of Kilwa road, Gerezani road, Chang'ombe road, part of Kawawa road and part of Sokoine Drive (20.3 km) including two fly overs and bus stations along the road, the consultant was M/S BOTEK Bosphorus Technical Consulting Corporation of Turkey in Association with M/S Apex Engineering Co. Ltd of Tanzania as sub-consultant.
For Lot 2 which was dealing with building works which include a deport, two (2) terminals and five (5) Feeder Stations off roadway), the consultant was M/S Inter – Consult of Tanzania.

2.2.5 Contractors

TANROADS procured two contractors, one for each Lot, who were responsible for the actual construction of the infrastructure (roads and buildings). For Lot 1 the contractor was M/S Sinohydro Corporation Ltd from China and Lot 2 the contractor was M/S China Civil Engineering Construction Corporation (CCECC) also from Chin. Both contractors perform their duties under the supervision of the consultants mentioned in 2.2.4 above.

2.2.6 Utility Bodies

These are entities responsible for provision of public utilities, including Dar es Salaam Water Supply and Sanitation Authority (DAWASA) which was responsible for water supply and wastewater disposal; TANESCO which was responsible for generation and supply of electricity; and TTCL which deals with telephone services. Since the Project was executed in urban areas, utilities needed to be relocated to give way to the infrastructure. Arrangements for relocation must be done prior to contractors' mobilization at site to avoid construction delays.

2.2.7 Ministry of Lands and Human Settlement Development (MLHSD)

MLHSD was responsible for communicating with landowners when there was a need for relocating them. The ministry normally collaborates with the relevant Local Government Authorities.

2.2.8 Regulatory Authorities

Regulatory Authorities are government bodies that regulate and monitor professional conduct and ethics of people and services providers. They include; Contractors Registration Board (CRB), that authenticate and monitor professional conduct of the contractors; Engineers Registration Board (ERB), that regulates the engineers and engineering consulting firms and keep an eye on their professional ethics and conduct.

2.2.9 Financiers

Financiers provide funds for implementation of the project. For BRT phase 2, apart from the Government of Tanzania (GoT) others were the African Development Bank (AfDB) and African Growing Together Fund (AGTF). The most important issue on project financing was the timeliness of approvals and disbursement of funds to the beneficiaries since delays may affect the project delivery.

2.3 Operational System

TANROADS enters into two Performance Agreements each financial year: one with the Roads Fund Board for the provision of road maintenance and the other agreement with the Ministry of Works and Transport for the provision of project management services for road development projects funded by GoT and other financiers/donor agencies. Graph of the system set up is shown in Figure 2.1.

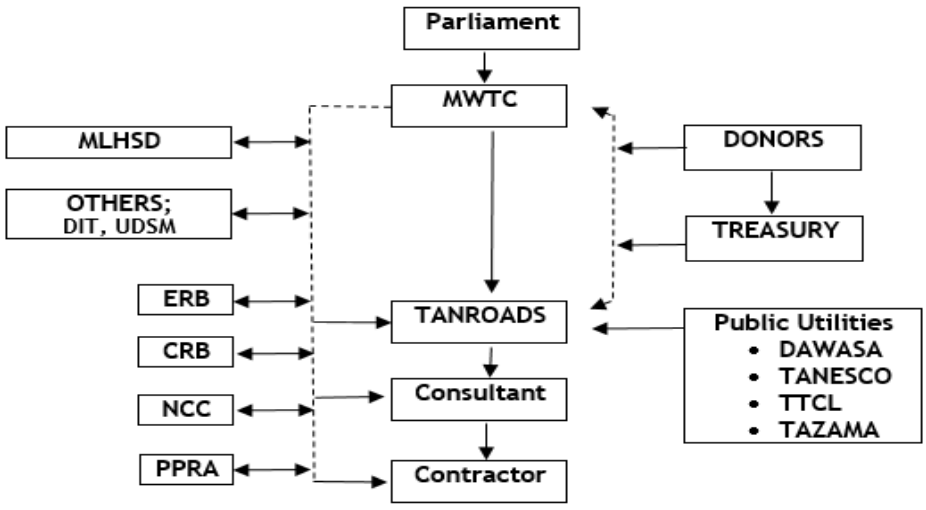


Figure 2.1: Systems Graph showing relationship between different actors

Likewise, the implementation of the project involved different stages as described in the Figure 2.2 below, from the project planning to the final stage of construction for both BRT Phase II Lot 1 and Lot 2 projects.

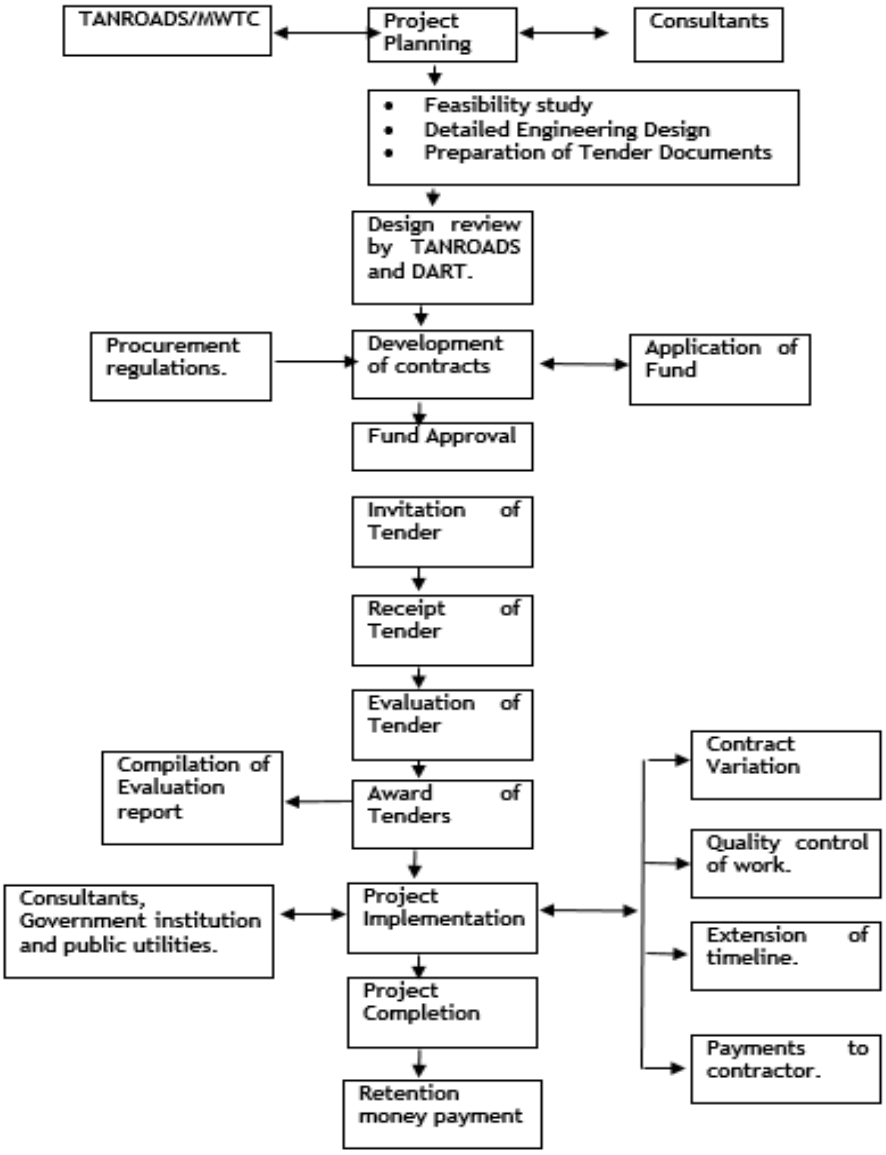


Figure 2.2: Project Implementation System for BRT Phase II Project.

2.4 Budget and Sources of Funds for TANROADS

Table 2.1: TANROADS Budget 2016/17-20/21

	FY 2015/16	FY 2016/17	FY 2017/18	FY 2018/19	FY 2019/20	FY 2020/21
Source of Income	**Approved Budget (TZS Mio)**	**Approved Budget (TZS Mio)**	**Approved Budget (TZS Mio)**	**Approved Budget (TZS Mio)**	**Approved Budget (TZS Mio)**	**Approved Budget (TZS Mio)**
Roads Fund - Maintenance	541,300	519,900	573,080	567,625	524,104	572,604.616
Roads Funds 10% - Development	45,640	42,960	43,860	43,112	41,499	37,759.403
MoWTC – Funds for Development	187,100	1,222,110	582,020	599,018	304,485	462,043.578
MoWTC – Funds for Airports	-	-	100,000	113,310	39,231	60,061.980
Donor Funding (Developments)	85,000	344,800	545,580	335,628	241,859	293,835.898
Donor Funding (Airports)	-	-	76,368	100,000	62,192	31,147.319
Personal Emolument (PE)	15,910	16,290	14,380	14,910	15,583	16,880.798
Total Income	**874,950**	**2,146,060**	**1,935,288**	**1,773,603**	**1,228,953**	**1,474,333.592**

Source: TANROADS Approved Budgets for 2016/17 to 2020/21

CHAPTER THREE
AUDIT FINDINGS ON PERFORMANCE OF ROADWORKS (LOT-1)

3.1 Introduction

This chapter presents detailed audit findings and recommendations on the road works, more details on the Project information are as shown in Appendix 8, 9 and 10. The findings are structured under the following major project management cycle aspects: project inception, planning, design, and tender documentation; procurement process; contract administration; cost and time management; and quality matters.

3.2 Overall Observation

Delay in Commencement by 26 momths

The review of project documents revealed that tenders for construction of BRT Phase 2 infrastructure project were scheduled to be invited from contractors by **July 2016** and works to commence in **January 2017**. Construction period was estimated to be **24 months.** However, project commencement was delayed and started on **1st March, 2019**.

According to financing plan of **USD 159,320,563** the timeframe for the project was expected to be from 27th April, 2016 to 31st December, 2020. Since the project commencement was delayed it means the loan would have been closed before the project completion.

Likewise, the procurement of Consultants was planned to be accomplished in 6 months, but the actual procurement process took 14 months from January 2016 to February 2017; and that of Contractors took 10 months from February 2017 compared to 6 months planned earlier.

According to TANROADS, the following were explained to be the reasons for delay:

i. Delays in Approvals by TANROADS' Tender Board
   Evaluation and approval of Technical proposals for Consultancy services took 85 days compared to optimum period of 30 days. This was caused by incapacity (inadequate staffing) and reduction of the frequency of Tender Board meetings.

ii. Delays in Issuance of "No Objection"

AfDB issued a 'No-Objection' to draft Contracts for Consultancy Services for Lot 1 and 2 on 9th and 21st February, respectively. According to the Rules of Procedure for Procurement of Goods and Works, duration of No-Objection is supposed to takes 14 days; however, this took 71 and 83 days respectively after TANROADS submission.

iii. Delays in design reviews

According to indicative timeframe, pre-contract services such as preparation of bidding documents and preliminary design were set for 3 months from April 2016. However, actual completion was February 2018 being 20 Months delay compared to the planned milestone. The reason was delayed procurement of the Consultants and the complexity of the assignment.

iv. Delay in obtaining of the Government Notice (GN) for VAT exemption. The GN for Lot 2 was issued on 15th February 2019 which was six months after the contract was signed in August 2018. The order to commence could not be issued to the Contractor before publication of the GN. Since the contract was VAT exempted, the contractor could not obtain tax exemption for equipment and material necessary for the works before publication of the GN.

The following section contains the finding for each contract involved in the project.

3.3 Consultancy Services for Design of 42.9KMS of Bus Rapid Transit System Phase 2 & 3 in Dar es Salaam City (under DART)

3.3.1 Consultant delayed the work for Four Years

The team reviewed contract No. DART/C01/2011 - Consulting Services for design of 42.9KMS of Bus Rapid Transit System Phase 2 and 3 in Dar es Salaam City between Dar Rapid Transit Agency and M/S KyongDong Engineering Co. LTD in Association with Ambicon (T) Ltd.

The contract was signed on 25th February, 2011, commenced after 28 days and was expected to be executed for a period of twelve months. The contract was supposed to expire by 25th March, 2012.

On 25th January, 2012, the consultant requested for an extension of time for two months which was granted by DART. Thus, the contract was contract

duration was extended to end of April 2012 and all reports as indicated in the contract, were expected to be submitted according to the revised work programme. However, the consultant did not complete the assignment as agreed. The deviation from agreed timeline is shown in **Table 3.1**

Table 3.1: Report Submission Timelines and extent of delay

Report	Timelines	Expected date	Actual date	Delay (weeks)
Inception	4 weeks after signing the contract	25th March, 2011	16th May, 2011	7
Interim	16 weeks after submission of Inception report	25th July, 2011	17th November, 2011	15
Draft	12 weeks after submission of Interim report	25th October, 2011	07th May, 2012	16
Final Draft	12 weeks after submission of Draft report	25th January, 2012	12th November, 2014	146
Final and Tender Documents	6 weeks after submission of the draft final report	07th March, 2012	15th April 2016	214

Source: Correspondence files.

Based on Table 3.1 the delivery of the final design and tender documents was delayed for more than four years. The delay significantly affected the project commencement and the financing plan.

3.3.2 The consultant advice for a design and construction of the flexible pavement on both the BRT lanes and mixed traffic lanes was not followed

According to Engineering Design Report (Final Report January, 2015) the consultant recommended on the choice of flexible pavement to both BRT lanes and mixed traffic lanes. The rigid pavement was recommended for locations where vehicles slow down such as at bus stations, terminals, and depots. However, TANROADS/ DART opted for a rigid pavement. Based on the consultants, the following reasons were used as justification for recommending a flexible pavement over the rigid pavement:

Cost Considerations
Maintenance of Portland cement concrete roads was minimal; however, defects appear very shortly after construction due to ingress of water to the subgrade, through cracks and joints. High temperatures may also cause excessive expansion of concrete slabs which may result in uneven surface profiles.

Capital cost of providing flexible pavement for Traffic Load Classes TLC 50 was **TZS** 74,200/m^2 (estimates of 2012), for 30 years design period the maintenance cost of flexible pavement would be **TZS 142,555 /m^2** and rigid pavement was **TZS 203,230 /m^2** respectively.

Environmental Aspects
Rigid pavement operation was quite noisy due to vehicle tyres running over transverse joints. Flexible pavements were smoother in operations.

Commonality
Most contractors in the country were conversant or used to the flexible pavement, and hence installation and maintenance works can be carried out rapidly at competitive prices.

Maintenance Aspects
The rigid pavement was very cumbersome when it came to maintaining a defective section, a broken slab would require a considerable period for curing before being put into use.

The city is quite demanding in provision of underground services which would require opening up of pavement by then and again, for which a flexible pavement would be more suitable.

Cost of Vehicle Operation
Vehicle operating costs are linked to road roughness. Rigid pavement was rougher than bituminous roads which meant that the rigid pavement would impose higher operation costs on vehicles.

Road Safety
A heavily trafficked rigid pavement would soon be polished smooth and become hazardous during wet condition especially on steep slopes.

However, given all reasons and recommendation from the Consultant the employer decided to go for a rigid pavement. The audit did not see the documented reasons for this decision.

3.4 Consultancy Services for Design Review and Construction Supervision of the Dar es Salaam Bus Rapid System (BRT) –Phase 2; Lot 1: Road works (20.3 KM) including two flyovers and Bus Stations along the Road

3.4.1 Project Inception and Planning Stage

Project inception and planning for this supervision services contract was administered well. The Supervising Consultant was engaged early before commencement of works and a review of the designs was done before commencement of the project as per requirements of the terms of reference (TOR)[5]. In addition, availability of funds for the project was guaranteed from the onset of the project. This was in line to Sub Regulation 75(1) of PPR of 2013 (as amended in 2016) which requires the procuring entities to ensure that funds are allocated or committed before commencing procurement proceedings.

3.4.2 Preparation of Terms of Reference (TOR) and Request for Proposals (RFP)

The TOR were prepared by the **TANROADS** and included in the Request for Proposal (RFP). The RFP prepared was based on the Standard Request for Proposals ("SRFP") issued by the African Development Bank, in May, 2013. The TOR were detailed and contained required aspects for a supervising consultant.

3.4.3 Procurement Stage

The procurement of the consultant was initiated by invitation for Expression of Interest (EOI) which was advertised in the "*The Guardian"* Newspapers of 28th December, 2015 and the African Development Bank Website on 18th December, 2015. At the time of submission deadline, 26 firms submitted EOI documents and minutes of EOI opening were prepared and signed. An evaluation committee (EC) consisting of three specialists was formed and

[5]Consultancy Services for Design Review and Construction Supervision of The Dar Es Salaam Bus Rapid Transit System (BRT) - Phase 2; Lot 1: Road Works (20.3 Km) Including Two Flyovers And 29 Bus Stations Along Kilwa Road (From CBD-Kariakoo To Mbagala).

members of the EC signed covenant forms. After evaluations, six firms were shortlisted.

The audit reviewed tender documents and found out that, the Request for Proposal (RFP) documents were sent out to the shortlisted firms on 28th April, 2016 and deadline of submission of proposals was on 31st May, 2016 at 10:00 hours local time.

The Audit team also reviewed Tender Board's approvals of technical proposal evaluation report; invitation for financial proposal opening, minutes of financial proposal opening; request for review and approval on combined technical and financial proposals; and award recommendation.

3.4.4 Contract Management of Consultancy Services

i. TANROADS did not second Engineers to Consultants during Supervision work

Clause 5.2 (xxiv) of Terms of Reference (TOR) for the consultancy services required the Consultant to organize and undertake on the job training for qualified counterpart engineers. It was envisaged that TANROADS would second at least two (2) engineers to the Consultant during supervision of the works.

Likewise, Clause 7.2 (c) on the services and facilities to be provided, the Consultant was responsible to ensure that, his supervision staff provide organized training and instructions to counterpart personnel assigned to the project, monitor their performance, and submit a quarterly progress report on each individual.

On other hand, the audit noted that, there was no item in the BoQ for the counterpart staff training since it was left as a provision for future needs. However, due to scarcity of staff, TANROADS did not second any Engineer.

The audit was of the view that TANROADS engineers would need to acquire the knowledge on different aspect of the project management. This includes all aspects of supervision of road works contract, contract works scheduling, use of relevant software, quality control of completed works, setting out and measurement, including preparation of as-built drawings and final reports.

ii. The Consultant did not prepare and submit Project Supervision Manual

Review of the Contract for Consultancy Services for design review and construction supervision of BRT Phase 2 noted that Clause 5.2 (xxii) of Terms of Reference (TOR) for the Consultancy works required the Consultant to prepare a Supervision Manual, which would have laid out procedures to be followed during the execution of the works.

Upon request of the Supervision Manual, it was revealed that, the draft document prepared. Based on review of the prepared manual, it was noted that, it was not detailed in describing on how the supervision was to be implemented. According to interview with TANROADS Officials, the Consultant was instructed to improve the supervision manual, however, until the finalization of this audit, the supervision manual was not ready. Availability of the Supervision Manual would have guided the supervision and used for on-job training of the TANROADS Staff and any visiting students during the implementation of the works contract.

iii. Final Design Review Report delayed for Seven Months

According to Sub-Clause 8.3 of the Contract for Consultancy Services of Phase 2, Lot 1 project, the Consultant was expected to submit final design review report four months after commencement of the assignment. Commencement was supposed to be 27th March, 2017 and so the final design review report was supposed to be submitted by 27th July, 2017.

However, review of Correspondence Files showed that, the final design report was submitted on 27th February, 2018 which was a delay of 215 days.

The design report was expected to present Consultant's findings of the design review, and improvements made to the design. Also, early submission of the Final Design Review Report and Bidding Document would have facilitated the procurement of a contractor in time. This is as shown in **Table 3.2 below**.

The delay was accompanied by the introduction of Addendum No. 1 (Design of second Railway Overpass Bridge along Gerezani Bandari road) at the middle of design review which was also intended to be included in the Final Design Review Report and bidding documents.

Table 3.2: Submission dates of required reports and other information

Document	Expected submission date	Actual submission date	Delays (Days)
Inception Report	27-Apr-2017	27-Apr-2017	NA
Draft Design Review Report	27-May-2017	7-Jun-2017	11
Final Design Review Report and Bidding Document	27-Jul-2017	27-Feb-2018	215
Construction stage			
Inception Report (1 month after work commencement)	6 -Jun-2019	15-Jul-2019	40

Source: Inception report, Draft & Final Design Review Report

iv. Final Detailed Design Report and Tender Documentation for Addendum No. 1 delayed for Eight Months

Section 9 of the ToR for Addendum No.1 for the Additional services - Design of Overpass Bridge along Bandari - Gerezani Road required the Consultant to submit final design report three (3) months after commencement of the assignment. Commencement was supposed to be 17th February, 2018 and so the final design review report was supposed to be before 18th May, 2018.

However, the review of correspondences files showed that, final design report was submitted on 17th January, 2019 with a delay of 8 months.

The design report was expected to present Consultant's findings of the Engineering Design, and improvements made on the second Overpass Bridge and its approaches along Bandari – Gerezani Road in accordance with the Standard Gauge Railway (SGR) requirements of raising level. Also, early submission of the Final Engineering Design Report and Bidding Document would have facilitated the inclusion of the Addendum in the tender of contractor and negotiation for the Construction of BRT Phase 2 LOT 1; Road Works in time. This is as shown in **Table 3.3**.

The reason for delay of Addendum No. 1 was due to long discussion between Tanzania Railway Corporation (TRC) and TANROADS on whether to remove the existing railways or maintaining its levels without affecting the design.

Table 3.3: Submission dates of required reports and other information for Addendum No. 1

Name of document	Expected submission date	Actual submission date	Delays (Days)
a) Draft Final Report	23-Mar-2018	14-May-2018	53
b) Final Detailed Design Report and Tender Documents.	18-May-2018	17-Jan-2019	244

Source: Inception report, Draft & Final Design Review Report for Addendum No. 1.

v. Lack of Detailed City Master Planning resulted into Variation of TZS 28,047,114,893.02 (VAT exclusive) for Construction of Overpass Bridge along Bandari - Gerezani Road

According to Item 7 of TOR (Section 5.1- Design Review and Pre-Contract Services), the Consultant was supposed to review detailed engineering design reports including design reports, maps, and drawings; verify the correctness of survey data on site and previous studies, if any; and update the Detailed Engineering Design.

However, review of project correspondences showed that, there was no review of feasibility studies for the BRT project which was conducted in 2005. As a result, while the tender process for Lot 1 was at advanced stage, there were design changes that were introduced at the Railway Overpass Bridge (RoB) along Bandari Road that required raising levels for the Standard Gauge Railway (SGR). These changes affected approach road gradient and the merge into road and railway crossing to the oil depot area.

It was noted that, the introduction of another overpass bridge to south of the current Gerezani Bridge as solution to the negative impacts that would arise from SGR project became necessary; consequently, part of Works for Bandari Road was omitted from the tender to allow redesigning of the second overpass bridge. As a result, this work was added to the original contract of Lot 1 as Addendum No. 1 amounting to TZS **28,047,114,893.02.**

These changes that resulted into redesign of the second overpass Bridge were caused by lack of detailed city master planning for 10 years from the time design was done.

3.4.5 Construction Stage

(i) Remedy on delayed submission of Monthly Progress Reports

According to Item 8.9 of the Terms of Reference (TOR), the Supervising Consultant was supposed to prepare progress reports every month for the duration of the contract. The reports were to reach the Client not later than 15 days after the end of the month being reported on.

Review of the progress reports revealed that, the Supervising Consultant did not fully comply with the requirements on timely and complete submission of progress reports as stated in the Contract as there were delays that ranged from 1 day to 37 days. Delay in submitting the progress reports timely denied the Employer to get the status of the on-going project as well as making timely decision in order to address issues which were likely to negatively affect smooth implementation of the project. This is as shown in **Table 3.4.**

Table 3.4: Timeliness in Submission of the Monthly Progress Reports

Progress Report number	Month being reported	Contract Submission Date	Actual Submission date	Delay (Days)	Remarks	Liquidated damages (USD)
1	May-19	15/06/2019	10/06/2019	0	Timely submitted	-
2	Jun-19	15/07/2019	16/07/2019	1	Delayed	2,434.65
3	Jul-19	15/08/2019	16/08/2019	1	Delayed	2,434.65
4	Aug-19	15/09/2019	01/10/2019	16	Delayed	38,954.40
5	Sep-19	15/10/2019	07/11/2019	23	Delayed	55,996.95
6	Oct-19	15/11/2019	29/11/2019	14	Delayed	34,085.10
7	Nov-19	15/12/2019	21/01/2020	37	Delayed	90,082.05
8	Dec-19	15/01/2020	27/01/2020	12	Delayed	29,215.80
9	Jan-20	15/02/2020	02/03/2020	16	Delayed	38,954.40
10	Feb-20	15/03/2020	20/03/2020	5	Delayed	12,173.25

Progress Report number	Month being reported	Contract Submission Date	Actual Submission date	Delay (Days)	Remarks	Liquidated damages (USD)
11	Mar-20	15/04/2020	14/04/2020	0	Timely submitted	-
12	Apr-20	15/05/2020	08/05/2020	0	Timely submitted	-
13	May-20	15/06/2020	10/06/2020	0	Timely submitted	-
14	Jun-20	15/07/2020	08/07/2020	0	Timely submitted	-
15	Jul-20	15/08/2020	11/08/2020	0	Timely submitted	-
16	Aug-20	15/09/2020	16/09/2020	1	Delayed	2,434.65
17	Sep-20	15/10/2020	16/10/2020	1	Delayed	2,434.65
18	Oct-20	15/11/2020	12/11/2020	0	Timely submitted	-
19	Nov-20	15/12/2020	15/12/2020	0	Timely submitted	-
Total						**309,200.55**

Source: Monthly Progress Reports (2019-2020)

From Table 3.4, it is shown that, 11 out of 19 monthly progress reports were not timely submitted to the employer.

According to Item 8.9 of the TOR, failure to submit reports whether at intermediate stages or overall, on the specified time periods was expected to result to imposition of liquidated damages equal to 1/1000th of the value of the Consultant's contract for the relevant Phase payable per day of delay up to a maximum of 15% of the Consultant's Contract Price.

The audit team established that the Employer did not charge liquidated damages on delayed submission amounting to **USD 309,200.55** which is equivalent to **TZS 704,281,552.76**. A detailed breakdown of liquidated damages which were not charged is given in **Table 3.4** above.

3.4.6 Financial Management

(i) Unpaid liquidated damage of USD 52,951.80

Review of submitted reports of Design Review Report for Phase 2 indicated that there were late submissions of 11 days for Draft Final Design Review Report and 215 Days for Final Design Review Report which makes a total of 226 delayed days.

It was noted that employer approved and paid more than 20 certificates as per the amount of consultant invoice without charging/deducting the liquidated damages of **USD 52,951.80** which is equivalent to **TZS 120,610,962.45** caused by delays in submitting the reports.

This was contrary to item 8.9 in Appendix A of the Contract[6] and denied the Government right to be compensated.

(ii) Payment of USD 300,645 was made to Consultant without Insurance Cover

It was noted that insurance cover against risk was submitted by consultant on 20th February, 2019 with submission letter with reference number Ref. No.TZ/3210/EG/70. However, prior to submission of the insurance cover, four (4) payments had already been made which were, IPC1 to IPC3 with the total amount of USD 233,145 (VAT exclusive)[7] and IPC 4 with the amount of USD 67,500 (VAT exclusive) as 50% of addendum No.1 payment.

Making payments without insurance cover is contrary to GCC 24.1 and SCC 12 which required insurance coverage against the risk to be submitted prior to commencing the services for a third-party liability insurance with a minimum coverage of TZS 10 million and professional liability insurance with a minimum coverage equal to the value of the contract. This posed risk of loss of government money in case of any failure of the consultant.

[6] Consultancy Service between TANROADS and Ms Botek Bosphorus Technical Consulting Corporation of Turkey in Association with M/s Apex Engineering Co. Ltd of Tanzania (As sub Consultant)

[7] as indicated in SCC 20 as payment during design review phase for the instalments of 20%, 50% and 30% of the total price of design review phase

(iii) Late Payment to consultant imposes Interest Penalties of USD 23,834.38

According to Clause 46.1 of GCC, if the client delays payments beyond fifteen days after due date stated, interest is supposed to be paid to the consultant on any amount due, but not paid on such due date for each day of delay at annual rate stated in the SCC which is the BOT overall Time Deposit interest rate on three months category prevailing on the due date of payment.

During the time of audit, on 20th October 2020 it was noted that several invoices from the consultant were paid late, and some had not been paid as of date of audit. It was noted that most of delays are caused by the process of confirming and certifying the amount to be paid from TANROADS to MoFP and from MoFP to financier. These delays of payment will cost the employer interest penalty of USD 23,834.38 which is equivalent to **TZS 54,288,759.05** if claimed by consultant as shown on the Table 3.5 below.

Table 3.5: Employer Interest Penalty for late Payment to M/s Botek

Invoice No.	AFDB Amount (USD)	AGTF Amount (USD)	Delay Days (AFDB)	AFDB Interest Amount (USD)	Delay Days AGTF	AGTF Interest Amount (USD)
Invoice No.1	31,469.68	14,620.32	35	362.42	36	173.18
Invoice No.2	79,274.80	35,950.20	36	745.92	65	610.76
Invoice No.3	47,564.88	21,570.12	98	1,074.03	98	487.06
Invoice No.4	46,345.00	21,060.00	0	-	2	9.12
Invoice No.5	46,399.00	21,060.00	18	168.41	24	101.92
Invoice No.7	24,534.36	11,144.64	31	141.69	37	76.82
Invoice No.8	18,725.64	8,491.86	136	535.85	167	298.39
Invoice No.9	21,289.78	9,655.57	89	398.68	102	207.23
Invoice No.10	32,712.75	14,835.75	54	320.39	67	180.28
Invoice No.11	37,291.87	16,912.33	159	771.64	159	349.95
Invoice No.12	38,695.81	17,549.00	130	654.65	130	296.89
Invoice No.13	39,353.40	17,858.10	44	376.20	44	170.71
Invoice No.14	42,207.42	19,140.00	261	1,943.67	261	881.40
Invoice No.15	40,071.05	18,173.55	43	304.49	43	138.09
Invoice No.16	35,793.76	17,563.73	199	1,163.09	199	570.72
Invoice No.17	103,191.40	46,796.10	179	3,016.13	179	1,367.78
Invoice No.18	50,655.32	22,971.60	171	1,502.21	171	681.24
Invoice No.20	45,885.37	20,808.48	141	1,187.61	141	538.57
Invoice No.21	45,955.62	20,840.34	107	815.05	107	369.62
Invoice No.22	41,911.48	19,006.37	79	579.65	79	262.87
Total				**16,061.78**		**7,772.60**

Source: Auditors' computation

(iv) Overcharge of USD 4,315.84 noted in IPC No.23

According to the SCC 20 of contract, payments should be made on monthly basis for undertaken assignments described in the Terms of Reference covering fees for approved personnel and approved reimbursables.

Review of IPC No. 23 noted that, the approved amount not yet paid, under PV 000005235 of AFDB was USD 53,998.66 and under PV 000005236 of AGTF was USD 24,487.76. These two amounts indicated in these PVs were higher than the certified amounts by USD 2,969.3 for AFDB certificate and USD 1,346.54 for AGTF certificate.

It was noted that, the increase happened because the Accountant processed payments based on the invoiced amounts instead of the certified amounts. This signifies lack of attention by the accountants and non-compliance to the existing internal control system of TANROADS. The control requires that payment be done based on the certified amount. Overpayments constitutes nugatory expenditure.

(v) VAT amounting to USD 30,929.95 not included in payment Voucher

According to Clause 43.1 of the GCC the consultant, sub-consultant, and experts were responsible for meeting all tax liabilities arising out of the contract.

It was noted that the approved Payment vouchers for IPC Numbers 11, 12 and 14 did not include VAT amount of USD 30,929.95 in PV 000004510, PV00000451, PV 000004709 and PV 000004710 which were issued by TANROADS. It's clear that donor components are VAT exclusive, but the VAT portion also has to be recognised to form VAT Payable as a portion to be paid by GoT. Other payment vouchers were approved with VAT included. This indicate that GoT portion to pay consultant BOTEK will be incorrect with a decrease of the mentioned amount.

3.4.7 Human Resources Management

i. Two Supervising Staffs were working without working permit

According to Non-Citizens (Employment Regulations) Act No. 1 of 2015, a non-citizen was not supposed to engage in any occupation for reward, profit or

non-profit unless he/she has a valid work permit that allows that person to engage in the occupation specified in the valid working permits. The audit team visited consultant's office (Botek) on 31st December, 2020 and reviewed Working Permits Class C (Company Employees) to establish the validity of work permits for staffs supervising the project. **The review of the working permits showed that, there were key staff who were working** in the project with expired working permits. Details of the staff are as shown in Table 3.6 hereunder.

Table 3.6: Working Permits for Key Staff of Consultant (Botek)

S/N	Position	Nationality	Expiry date of working permit	Auditors' comments
1	Resident Engineer	Indian	-	Working permit not yet granted. He mobilized on 16th February, 2020. Available at the project
2	Highway Engineer	Turkish	9th January, 2022	Valid. Available at the project
3	Materials Engineer	-	-	The position was vacant. The consultant was still searching for replacement followed resignation of material engineer.
4	Structural Engineer	Kenyan	21st June, 2020	Available at the project
5	Topographic Surveyor	Tanzanian	N/A	Available at the project
6	Quantity Surveyor	Tanzanian	N/A	Available at the project

Source: Consultant's key staff working permits collected during visit to Consultant on 31th December, 2020.

From **Table 3.6**, it is shown that, four out of six key staff positions were foreigners and one of them holding a position of Resident Engineer did not have a working permit; One key staff did not have a valid working permit (Structural Engineer) as it has expired, and one key staff had a valid working permit (Highway Engineer).

The reason for Resident Engineer not having a working permit was failure to submit university transcript and secondary school education certificates to

Tanzania Commission for University (TCU). Failure to submit the requested documents to TCU by Resident Engineer was caused by lack of access of the institutions from his country due to Covid-19 Pandemic.

Failure to have working permit by the Resident Engineer was likely to have impact on the implementation of the project as the Resident Engineer may not have access to some social services in the country such as opening bank account and medical services while supervising the project.

ii. Practising licenses issued by Engineering Registration Board for three foreign key staff at Consultant (Botek) were expired

Section 6.1 of the Consultancy Service Contract requires the consultant to provide qualified key staff to fulfil the objectives of the services in the supervision of the project. However, review of the educational qualification and professional registration showed that the key staff met minimum required qualification for the supervision of the project as shown in **Table 3.7** hereunder.

Table 3.7: Summary of education qualification of Consultant's key staff

S/N	Name of key staff	Position	Education qualification	Professional boards registration	Auditor s' comments
1	Sabyassachi Kar	Resident Engineer	Bachelor's Degree in civil engineering	Valid from 30th April 2020 to 31st December, 2020	The license had expired
2	Umit Giris	Highway Engineer	Master of Science in Civil Engineering	In progress	He had not yet got the practising license up to the moment of this audit
3	Dr. Francis Momanyi	Structural Engineer	PhD in Civil Engineering	Valid from 20th August, 2020 to 31st December, 2020	The license had expired

S/N	Name of key staff	Position	Education qualification	Professional boards registration	Auditor s' comments
4	Simon Kabwebwe	Topographic Surveyor	Advanced Diploma in Land Surveying	Registered by Institute of Surveyors in Tanzania.	Meets minimum required qualification
5	Emmanuel Dotto	Quantity Surveyor	Advanced Diploma in Building Economics	Had been registered by AQRB as a quantity surveyor	Meets minimum required qualification

Source: Data collected from Consultant (2020)

From **Table 3.7**, it is shown that, key staff had required education qualification, experience, and professional registration with their respective boards for supervision of the project. However, for the three foreign key staff, the practising licenses issued by ERB had expired.

3.5 Construction of Dar es Salaam Bus Rapid Transit Infrastructure – Phase 2; Lot 1: Road works (20.3 km) including two flyovers and 29 Bus stations along Kilwa Road (From CBD - Kariakoo to Mbagala)

3.5.1 Project Inception and Planning

The Audit Team observed the following weaknesses in project inception and planning for works contract;

According to the project feasibility studies, there was single feasibility study report that was prepared for all six phases of the BRT project. This Project is only on the second phase of the project. However, the Audit Team was not provided with a copy of the feasibility study report. Based on the officials at DART, the report was misplaced during the time when the office was shifted to other premises. This implies that documentation and record keeping at DART was inadequate.

3.5.2 Design and Tender Documentation Stage

The design was completed before commencement of the project and construction commenced on 6th May, 2019 and at this time the Supervising Consultant namely Botek Bosphorus Technical Consulting Corporation in

association with Apex Engineering Co. Ltd had been appointed to carry out design review[8].

3.5.3 Procurement Stage

The Audit Team observed the following weaknesses in procurement process:

i. Unsuccessful bidders were not given Time to submit Complaints

Section 60(3) of PPA 2011 (amended in 2016) requires the Accounting Officer to issue a notice of intention to award the contract to all tenderers who participated in the tender in question giving them seven days within which to submit complaints thereof, if any. However, review of procurement correspondences did not show evidence whether all bidders were notified.

ii. Delay of Four Months to notify Unsuccessful Bidders

Section 60(14) of PPA 2011 (amended in 2016) requires the accounting officer within thirty days after the communication of award, to notify unsuccessful tenderers the name of the person to whom the contract is awarded and the contract amount.

However, review of procurement correspondences showed that, letter of acceptance was sent to successful bidder (M/s Sinohydro Corporation Limited) on 19th November, 2018 and the contract was signed on 10th December, 2018 while the letters of notification to unsuccessful bidders were sent on 20th March, 2019, about four months later.

Delay in communication with unsuccessful bidders could suggest that the procurement of contractor was not fully transparent, and fair.

3.5.4 Construction Stage

i. The Contractor delayed on submitting the Performance Guarantee for 63 Days

In accordance with Clause 4.2.2 of the GCC for the contract[9], the contractor was required to submit the Performance Guarantee to the Employer within 28

[8] Monthly Progress Report Number 17 for September, 2020.

[9] Construction of Dar es Salaam Bus Rapid Transit Infrastructure; Phase 2; Lot 1: Road Work (20.3 KM) including Two Flyover and 29 Bus Station along Kilwa Road (from CBD-Kariakoo to Mbagala)

days after receiving the Letter of Acceptance and submit a copy of the same to the Engineer.

It was observed that the Letter of Acceptance to the contractor was sent on 19th November, 2018 and the Performance Guarantee was supposed to be delivered to the Employer not later than 17th December 2018 (within 28 days). However, it was submitted to the Employer on 17th February 2019 (almost two months later).

The delay in the submission of Performance Guarantee to the employer led to delay in commencement of the work. This is because, the required precedence Condition was not fulfilled according to Clause 8.1.1 of the GCC.

ii. Slow Work Progress by the Contractor

According to the 18th Monthly Progress Report of December 2020, the contractor's physical progress was 9% against 49% which was the planned progress, leading to a slippage of 40%. Review of correspondence files and minutes of monthly progress review meeting showed reminders from the Employer regarding the slow progress.

According to the review of correspondence files, contractor's slow progress was caused by unwillingness of the contractor; Covid-19 Pandemic; stoppage for addressing and investigation of quality issues; design modification and replacement of staff.

The additional works covered design modification of bus stations, flyover, and intersection due to change of road alignment. It was necessary to change the road alignments because design modification at bus station resulted to additional of overpassing lane and elongation of the length from the previous design.

Furthermore, review of minutes of high level meeting of 1st December, 2020 showed that contractor's slow work progress was due to inexperienced Contractor's personnel. This is because most engineers and technicians at site were not conversant with complexity of such urban construction project.

It was further noted that the contractor raised a claim for Extension of time for 300 days citing relocation of utilities, extension of geotechnical investigation, relocation, and compensation issues as reasons.

iii. Quality Problems on the constructed BRT Lane Rigid Pavement

According to contract drawings and specifications, the rigid pavement is required to be 220mm thick, with 3.5 metres wide lanes on C1 subbase and G15 improved subgrade.

The audit noted that concrete pavement works were restarted on 13th June 2020, after a three month of a break due to the corona pandemic disease. About one month later on 10th July 2020, some transverse cracks were found on BRT lane rigid pavement at Ch.8+800, left hand side.

Subsequently on 13th July 2020, more concrete panels on the Left Hand Side which were freshly laid, hardly one month back were found with distresses. On 14th and 15th July 2020, TANROADS representatives visited the site and had a joint site inspection on the premature distress of concrete panels and core was taken across the cracked panel at Ch.6.830, left hand side.

Furthermore, based on GCC Clause 7.4.3[10], it was agreed to conduct further investigation to identify the reason for the failure. Hence since 13th July 2020, the construction of concrete pavement was suspended for further investigation.

C-Labs (TZ) Material Lab was appointed as an independent laboratory to perform the investigation. The investigation started with a kick-off meeting, C-Labs (TZ) carried out investigation of materials, plant area, laboratories, concrete pavement underlying layers of BRT lane. Non-destructive tests were done namely Re-bound hammer test and Pulse velocity test while destructive test was carried out by taking cores from the affected concrete panels to verify the constituent materials.

From the review of the investigation report on the premature cracking of rigid pavement, showed that the major causes for the defects in concrete pavement were as follows:

[10] The Engineer may, under GC clause 13 [Variation and Adjustment], vary the location or details of specified test or instruct the Contractor to carry out additional tests. If these varied of additional test show the tested plant, material or workmanship is not accordance with the contract, the cost of carrying out this variation shall be borne by the contractor, notwithstanding other provisional of the contract.

- Clay and organic contaminants in the sand were not removed satisfactory and this caused large number of potholes both on the surface and within the concrete pavement.

- Handling of materials and concrete from stockpiling to laying was not proper and actually was contrary to Employers Requirements. This resulted into non-homogeneous concrete which advanced to cracking. The investigation pointed out the stockpiling of materials, the batching of coarse aggregate and the multiple handling of fresh concrete before placing as major causes that have to be addressed.

- The common uncontrolled full width and fill depth shrinkage crack found between the expansion joints through which the investigation attributed late cutting of the contraction joints.

Further, the consultant reported that anomalies were attributed to insufficient site supervision by the consultant[11] from the handling and storing of the materials and casting of concrete.

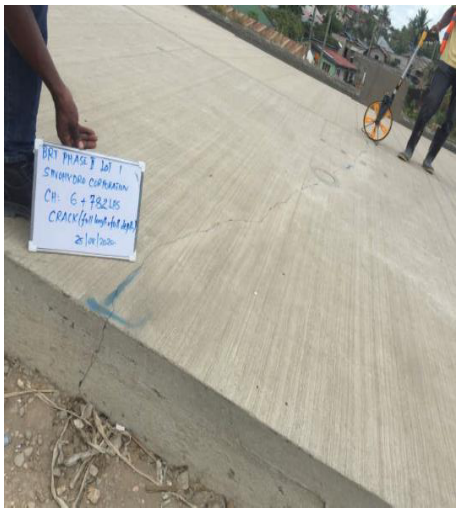
The entire chain from preparation of concrete to construction needs intense and clear supervision for the delivery of required quality of work. Also, the distresses were caused by unsatisfactory workmanship of the contractor from preparation of materials, batching and casting of the rigid pavement as shown in the photo below. This resulted to organic impurities, concrete segregation which negatively affected the concrete pavement strength.

Also, the distresses occurred due to double handling of concrete from the production at batch-plant to the workplace for placing. From the production point the concrete was transported by tipper trucks then at the work place the concrete was carried by excavator to the paver plant for placing. Thus, this handling procedures led to segregation of concrete.

[11] Consultant staffing: Two (2) work inspectors and three Trainee Engineers which are available at site.

Photo 3.1: Different defects on the concrete of the Rigid Pavement of the BRT Lane.

Potholes/Pop outs appearing on all sections



Transverse and Longitudinal cracks (not shown). Photo from Ch.6.780

Honey Combing. Photo from Ch.5.125

Edge Break.

Laitance/Crazing seen at Ch. 4.94

Foreign Matters

Source: C-Labs Investigation Report.

iv. Unsatisfactory quality control system and sieving process of the stockpiled aggregates

Section 3902A of the SS of the contract (material for concrete) (e) aggregate, requires that the fine aggregate i.e., natural sand is supposed to be composed of clean, hard, durable, uncoated grains, free from lumps or flaky particles, organic matter, loam, or other deleterious substances.

However, during site inspection which was carried out on 30th October 2020 the Audit found that the sieving system (sieve trucks) had large apertures that could allow passage of lumps of clay. Thus, the sieve truck was unsatisfactory since the truck on which the sieve was mounted on the top of the trailer for the sand to pass and fall in the truck as shown in the photo 3.2 below lack uniformity of apertures.

The Audit also noted that the Engineer's supervision and inspection on the quality control and workmanship was not adequately conducted, hence allowed the sieve truck to operate which resulted to defective rigid pavement

Photo 3.2: The sieve truck for Natural sand and C1 material at contractor's camp as seen on 30th October, 2020.

Sieve truck for natural sand as seen on contractor's camp site.

Sieve truck for C1 materials as seen on contractor's camp site.

v. Stockpile materials were not properly stored

Section 3902A of the SS (material for concrete) (k) handling, measuring, and batching materials for concrete requires stockpiles to be built up in layers of not more than 3 feet in thickness. Each layer was supposed to be completely in place before beginning the next layer which should not be allowed to cone[12] down over the next lower layer. Under no circumstances will the coning of stockpile be permitted.

During site inspection which was carried out jointly by the audit team, Engineer's officials, and the Contractor's representatives, it was observed that the stockpile materials (coarse and fine aggregates, natural gravels) were stored separately in coning system, which was contrary to the requirements of the SS, as shown in the Photo 3.3 below.

[12] A cone is a shape with a circular base and smooth curved sides ending in a point at the top.

Photo 3.3: The Stockpile of Materials in Coning at Contractor's Camp

Coarse aggregate stockpiles, Photo taken by auditor on 30th October, 2020

Sand Stockpile, Photo taken by auditor on 30th October, 2020

The coning system was not the suitable way of storing the material for construction since it resulted to segregation of material i.e., the bigger particles would settle down due to the side slope leaving the fine particles at the top thus, this will affect the aggregate gradation during mixing for the concrete production.

vi. Dispute Board Members were not appointed

Part A of the Specific Conditions of Contract and Sub-Clause 20.2.1 of the GCC (Dispute Board), require the appointment of Dispute Board Members within 56 days after the commencement date or as agreed by both parties. The Consultant vide letter with Ref. No: TZ/3210/SHC/2019/EK/062 dated on 26th August, 2019 reminded the employer on prompt action of appointment of Dispute Board Members.

However, there was no evidence to show that the Dispute Board Member were appointed as required in the GCC. From the interview conducted with TANROADS officials, the employer did not see the importance of the Dispute Board, based on the experience got from the implementation of BRT Phase 1, the approach of having the dispute board did not function well. Currently, rely on ad hock Dispute Board which sit occasionally unless there is any dispute from both parties. Lack of permanent dispute board according to Specific Conditions of Contract would lead more risks in future if the disputes between parties arises. The dispute board would not be in position to decide accordingly

because they were not involved from the beginning and did not take regular visits to the site from the beginning of the project.

vii. Environmental Management Program did not comply with ESMP
Section 1.2 of the Environmental and Social Management Plan (ESMP) requires periodic environmental audit of the project in order to identify any deficiencies in environmental performance and advise measures to address these issues. The environmental management program required audits to be conducted after every six months.

Also, Section 1.2 of the ESMP required the Consultant to prepare monthly environmental report which should summarize issues carried over from the previous report to show whether these have been resolved or were going on and new issues arising.

Only one environmental audit report dated December 2020 was availed to the auditors. Lack of environmental audit for the previous duration limited the employer from having information on environmental quality of the project, especially water pollution and control, air pollution, solid waste management and the safety issues such as accident control, etc.

3.5.5 Financial Management

i. Late submission of certified IPC No.1 by both Engineer and the Employer
Clause 14.6.1 of the GCC requires the Engineer within 28 days after receiving a statement and supporting documents to deliver to the employer and to the contractor an Interim Payment Certificate which shall state the amount which the supervising engineer fairly determines to be due.

Also, Clause 14.7.1(b) of the GCC states limitation of number of days for payment, whereby the maximum number of 56 days for IPC payment by employer counts from the day after the engineer received the statement and supporting document from the contractor.

However, it was noted that for the IPC No.1 the contractor submitted the statement and supporting documents on 21st December 2019 while supervising engineer submitted the certified IPC No.1 to TANROADS on 27th January 2020. Instead of spending 28 days as required from Clause 14.6.1 of the GCC, it took 36 days for the Engineer to certify the certificate. This affected the other 28

days for employer, who was left with only 20 days to finalize the payment processes. The due date for payment was 15th February 2020 but IPC No. 1 was paid on 29th April 2020 i.e., delayed for 73 days.

ii. Interest on Delayed Payments amounting to TZS 30.3 Million

In accordance to clauses 14.7 and 14.8.1 of the contract of road works Lot 1, contractor shall be entitled to receive financing charges compounded monthly on the amount not paid timely. The audit noted that payments for Interim Payment Certificate No.1 and 2 were delayed for 73 days and 33 days consecutively as of the date of audit 19th October, 2020. The interests due as a result of the delays are shown on table No.3.8

Table 3.8: Computed Interest Amount

IPC No.	Delayed Days	Interest Amount		
		USD Amount	TZS Amount	Total Amount in TZS
1	73	3,504.68	14,526,890.32	22,509,674.19
2	33	430.27	6,817,913.	7,797,962.14
			TOTAL	**30,307,636.33**

Source: Auditor computation; Exchange rate used 2,277.75

iii. Miscalculation by the Engineer increased the interest by TZS 13,143,232.97

According to Clause 14.7.1 (b) of the GCC, limitation of number of days for payment; whereby the maximum number of 56 days for IPC payment by both Engineer and Employer counts from the day after the engineer received the statement and supporting document of payment request from the contractor.

However, while reviewing the IPC No.1 it was noted that, the Engineer calculated the delay interest by starting to count days after IPC Certification which is contrary to the requirement of Clause 14.7.1.

In addition, based on Clause 14.8.2 of the GCC the financing charges shall be calculated at the annual rate of 3% points above the discount rate of the central bank in the country of the currency of payment or if not available the interbank offered rate and shall be paid in such currency. However, it was noted that, the engineer used the interest rate which differ from the requirement of the contract for both TZS amount and USD amounts.

It was noted that engineer used the BOT discount rate of 7% applicable for domestic transaction for both currencies (for USD and TZS) without adding 3% for local currency amount. Moreover, the BOT did not have the discount rate for USD, however, the engineer did not use the interbank rate but instead used the discount rate for domestic currency.

This discrepancy led to the overcharge of TZS 13,143,232.97 as interest amount for IPC No.1 that will affect IPC 2 paid amount. Table 3.9 shows the interest amount variances.

Table 3.9: Interest Amount Analysis (IPC 1)

Currency	Amount Delayed	Delayed Days	Wrong Charged Interest Amount	Correct Computed Interest Amount	Variance (TZS)
TZS	716,998,466	73	7,130,580	14,526,890.32	(7,396,310.32)
USD	1,259,134.61	73	12,522.15	3,504.68	20,539,543.29
				Total	13,143,232.97

Source: Engineer and Auditor computation based reviewed IPCs; Exchange rate used 2,277.75

3.5.6 Human Resources Management

i. Two staffs were working without settling working permits

According to Non-Citizens (Employment Regulations) Act No. 1 of 2015, a non-citizen was not supposed to engage in any occupation for reward, profit or non-profit unless he/she has a valid work permit that allows that person to engage in the occupation specified in the valid working permits.

The audit team visited contractor's office (M/S Sinohydro Corporation Ltd) on 31st December, 2020 and reviewed working permits of employees to establish their validity. The review of the working permits showed that, there were key staff who were working in the project with their working permits not well settled. Details of the staff are as shown in Table 3.**10** hereunder.

Table 3.10: Working Permits of Chinese Nationality Staff at M/S Sinohydro Corporation Ltd

Position	Expiry date of working permit	Auditors' comments
Project Manager	3rd March, 2021	Valid
Contract Manager	16th May, 2021	Valid. The staff was on leave by the time of audit.
Work/Site Manager	19th August, 2021	Valid
QA Manager/Chief Engineer	23rd April, 2022	Valid. He was on leave by the time of audit.
Highway Engineer	15th April, 2021	Valid. He was on leave by the time of audit.
Structural/Bridge Engineer	21st July, 2022	Valid
Soils/Materials Engineer	8th April, 2021	Valid
Workshop Manager	-	Work Permit was under application process. The staff was on leave by the time of audit.
Electrical Engineer	22nd August 2021	Valid
Land Surveyor	-	Work Permit was under application process. The staff was on leave by the time of audit
Environmental and Social Manager	30th September, 2021	Valid

Source: Working Permits collected during visit to Contractor (2020)

From **Table 3.10**, it is shown that, out of the 11 foreign key staff, six key staff had valid working permits and are on site, three key staff had valid working permits but are on leave, and two key staff had no working permits. The auditors were informed that, for the two key staff who had no working permits, the working permits are under application process and the staff are on leave.

ii. Nine replacement Key Staff of Sinohydro Corporation did not have required Qualifications

The works contract required the contractor to have qualified staff for the execution of the project. Review of the signed works contract, MPRs and correspondences showed that with the exception of the project manager all other key staff who were not qualified and the listed staff in the signed works contract were replaced by other staff during the execution of the project.

The audit team reviewed education qualifications and professional registration of the replacing key staff and found that not all key staff were registered by

professional board which is Engineers Registration Board (ERB). This is as shown in **Table 3.11.**

Table 3.11: Education Qualification and Professional Registration of Key Staff in the Project

Position	Education qualification	Professional qualification	Auditor's comment
Project Manager	Bachelor's Degree in civil engineering	Registration is valid up to 31st October, 2021	Meet minimum qualification requirements
Contract Manager	Bachelor of Water Conservancy and Hydropower Engineering	No details on local professional registration board submitted. There is a certificate of Project Management Professional	Did not meet minimum qualification requirements
Work/Site Manager	Bachelor of Architecture Engineering	No details on local professional registration board submitted	Did not meet minimum qualification requirements
QA Manager/Chief Engineer	Bachelor's degree of Civil Building Engineering	Registration is valid from 31st July, 2020 to 25th June, 2021	Meet minimum qualification requirements
Highway Engineer	Bachelor of Hydrolic Engineering	Registration is valid from 20th May, 2020 to 22nd January, 2021	Meet minimum qualification requirements
Structural/Bridge Engineer	Bachelor's Degree in civil engineering	No details on local professional registration board submitted	Did not meet minimum qualification requirements
Soils/Materials Engineer	Bachelor of Material Engineering	No details on local professional registration board submitted	Did not meet minimum qualification requirements
Workshop Manager	Bachelor Degree in Mechanical Engineering	No details on local professional registration board submitted	Did not meet minimum qualification requirements
Electrical Engineer	Bachelor's Degree in electrical engineering	No details on local professional registration board submitted	Did not meet minimum qualification requirements
Land Surveyor	Bachelor's degree in Survey Engineering	No details on local professional registration board submitted	Did not meet minimum qualification requirements

Position	Education qualification	Professional qualification	Auditor's comment
Health Security, Safety, Social and Environmental	Bachelor of Science Degree in Municipal and Industrial Services Engineering	No details on local professional registration board submitted	Did not meet minimum qualification requirements
Environmental and Social Manager	Bachelor Degree in Environment Engineering	No details on local professional registration board submitted	Did not meet minimum qualification requirements

Source: Submitted CVs, Certificates and Professional Boards Registration

From **Table 3.11,** it is shown that, 11 out of 12 key staff are foreigners and one key staff is a local key staff. For 11 key staff who are foreigners, three key staff had valid professional registration, eight key staff had no details on registration with local professional registration boards. Also, for a local key staff, there are no submitted details regarding registration with professional registration board.

Lack of registration with local professional boards denies assurance to the government that the project is being implemented by professionals and guarantee the quality of the executed works.

3.5.7 Quality of Works and Materials

i. Concrete structures

As part of the audit the concrete retaining wall at Gerezani Bandari Road, a reinforced concrete box culvert and sections of rigid pavement were sampled in the project and subjected to non-destructive tests using Schmidt Hammer to independently to check their quality and whether they met the specifications. The results of field tests conducted are as shown in **Table 3.12.**

Table 3.12: Results of Non Destructive Field Tests

Section	Chainage	Required Level of Quality (N/mm2)	Test results (Measured strength) (N/mm2)	Deviation (N/mm2)	Auditors' Comments
Retaining Wall Gerezani Bandari Road	0+500 to 0+700	30	34	+4	Passed
Wingwall Box Culvert Kilwa Road	6+070	30	36	+6	Passed
Headwall Box Culvert Kilwa Road	6+070	30	32	+2	Passed
Rigid Pavement Kilwa Road Section	6+250 – 6+975	30	32	+2	Passed
Rigid Pavement Kizuiani Section	8+650 – 8+900	30	32	+2	Passed

***Source**: Test results as per site inspection conducted on 6th November, 2020.*

From **Table 3.12**, it is shown that all sampled points in the respective concrete structures that were subjected to Schmidt hammer tests had Compressive Strength of ranging between 32 to 36 N/mm2 (MPa). This implies that they are of the required strength. More details on the tests on concrete structures are as shown in **Appendix 4-Table 1**.

ii. Sub-base material

The audit team collected three samples from stockpiled material at the site camp that was used for sub-base stabilization and conducted a California Bearing Ratio (CBR) test and Soil Classification test. The details of the conducted tests are as provided in the following sections.

(a) Stockpiled Gravel Materials did not meet specified Strength

According to Standards Specifications for Road Works 2000[13], CBR value for sub-base materials for wet or moderate climatic zones is supposed to have a minimum value of 25 after 4 days soaking.

The three point California Bearing Ratio test was conducted to determine the relationship between soil moisture, density and CBR values for the stockpiled materials. CBR test results (BS Heavy) are as summarized in Table 3.13.

Table 3.13: Summary of CBR Test Results for stockpiled Soil

Sample number	Optimum Moisture Content (OMC)-%	Maximum Dry Density (MDD)-kg/m3	CBR value	CBR Swell (%)	Percentage of Compaction (%)
1	8.8	2130	18	0.20	95%
2	9.0	2088	15	0.13	
3	8.5	2100	18	0.04	

Source: Laboratory Test Results (December, 2020)

From **Table 3.13**, it is shown that, the CBR value at 95% for each of the tested sample 1, 2 and 3 are 18, 15 and 18 respectively. From the results it is indicated, the value of CBR swell was within the specified requirements of below 1%, however, CBR value at 95% after four days soaking was less than 25. More details on the tests on CBR are as shown in **Appendix 4-Table 1** and **3**.

The use of gravel material with a CBR value of less than 25 will have impact on the strength of the sub-base layer to withstand the load on the pavement.

(b) Soil Classification Tests

The audit team collected three gravel samples from stockpiled materials which was used for subbase stabilization and one sand sample used for construction of concrete structures including rigid pavement for soil classification test. The classification test was conducted for assessing the suitability of the stockpiled materials for the mentioned applications.

[13] Table 3702/5 Requirements for Subbase Layers of G25 Materials

The test involved Sieve analysis and Atterberg Limit tests. The test results for both stockpiled gravel and sand materials are as described in the following sub-sections.

i. Sub-base Material

The materials used for sub-base stabilization gave results as shown in Table 3.14 hereunder.

Table 3.14: Soil Classification based on AASHTO Classification System

Soil composition	Percentage (%)	Soil Group	Frequency	Grading Modulus	AASHTO Recommendations[14]
Gravel	47	A-2-6	3	1.66 to 1.75	General rating of the soil as a subgrade is Excellent to Good.
Sand	18				
Silty & Clay fines	26				

Source: Field Test Results (2020)

From **Table 3.14**, it is shown that, the classification of the soil of A-2-6. According to AASHTO Soil Classification System, the general rating of the soil as a subgrade is excellent to good, however, the CBR value is less than 25 as explained earlier.

iii. Sand Materials

The audit team collected three samples from stockpiled sand materials that is used for concrete structures including rigid Pavement and conducted Soil Classification test. The details of the conducted tests are as provided in the following sections.

(c) Classification of sand materials

Test on sand materials used for concrete structures gave results as shown in Table 3.15 hereunder.

[14] https://tc3.transportation.org/wp-content/uploads/AT-TC3CN025-18-T1-JA02.pdf

Table 3.15: Results of Stockpiled Sand Materials

Sand composition	Percentage (%)	Requirements[15] (%)	Auditors' comments
Gravel	7.6	Not specified	
Sand	91	80-100	Meets requirements
Fines	1	0-10	Meets requirements

Source: Field Test Results (2020)

From **Table 3.15**, it is shown that, the sand used for the concrete has met the minimum specified requirements hence it can be used for concrete works. More details on the tests on soil classification are as shown in **Appendix 4-Table 7.**

iv. Aggregates

The audit team collected three samples of aggregates used for concrete structures including rigid pavement from a stockpile for testing Relative Density, Water Absorption, Ten Percent Fines Value (TFV), Aggregates Impact Value (AIV) and Aggregates Crushing Value (ACV). The test results are as shown in Table 3.16.

Table 3.16: Test Results for Aggregates

Test	Required value	Results		Auditors' comments
		Sample 1	Sample 2	
Water absorption (%)[16]	Less than or equal to 1% by mass (≤ 1.0% by mass)	0.17	0.26	Water absorption for both samples meet requirements
Ten Percent Fines Value-TFV (kN)[17]	Greater than 110	127	90	Sample 1 has met requirements while sample 2 had failed.
Aggregates Crushing Value-ACV (%)[18]	Less than or equal to 30	24	23	ACV for both samples meet requirements

[15] https//civiljungle.com/sand for concrete.
[16] Special Specification for the Project, Table 4202/2
[17] Special Specification for the Project, Table 4202/2
[18] https://theconstructor.org/practical-guide/aggregate-crushing-value/2245/

Test	Required value	Results		Auditors' comments
		Sample 1	Sample 2	
Aggregates Impact Value-AIV (%)[19]	Less than or equal to 30	8.0	9.0	AIV for both samples meet requirements

Source: Field Test Results (2020)

From **Table 3.16**, it is shown that sample 2 did not meet the requirement as the value of TFV was less than 110kN. More details on the tests on aggregates are as shown in **Appendix 4-Table 6.**

The failure of the sample 2 implies that the materials is not uniform to all parts of the stockpile.

v. Four Core Samples did not meet specified Unconfined Compressive Strength (UCS) for Stabilized Subbase

The audit extracted cores of constructed stabilized sub-base for assessment of Unified Compressive Strength (UCS). According to special specifications for LOT I, the UCS of individual cores shall not be less than 90% of the minimum value specified in Table 3802/2 of the Standard Specification for Road Works 2000 (i.e., not less than 0.9 MPa) as shown in **Appendix 4.** UCS test results for cored samples are presented in Tables 3.17.

Table 3.17: Summary of Unconfined Compressive Strength Field Tests Results

Sample number	Chainage	Offset	Required Level of Quality (MPa)	Test results (Measured strength) (MPa)	Deviation (MPa)	Auditors' Comment
1	0+050	Centreline	0.9	1.7	+0.8	Passed
2	0+100	RHS	0.9	0.7	-0.2	Failed
3	0+400	LHS	0.9	1.4	+0.5	Passed
4	0+550	Centreline	0.9	0.7	-0.2	Failed
5	0+700	RHS	0.9	0.8	-0.1	Failed
6	1+000	LHS	0.9	3.6	+2.7	Passed
7	1+150	RHS	0.9	1.6	+0.7	Passed
8	1+300	Centreline	0.9	1.0	+0.1	Passed

[19] Laboratory Testing Manual (2000)-CML

Sample number	Chainage	Offset	Required Level of Quality (MPa)	Test results (Measured strength) (MPa)	Deviation (MPa)	Auditors' Comment
9	1+725	LHS	0.9	1.9	+1.0	Passed
10	1+875	Centreline	0.9	0.9	0.0	Passed
11	2+450	RHS	0.9	2.9	+2.0	Passed
12	2+550	LHS	0.9	0.7	-0.2	Failed
13	6+975	Centreline	0.9	1.0	+0.1	Passed
14	7+075	LHS	0.9	1.0	+0.1	Passed
15	7+625	RHS	0.9	1.3	+0.4	Passed
16	8+300	Centreline	0.9	1.0	+0.1	Passed
17	8+350	LHS	0.9	1.2	+0.3	Passed
18	10+675	RHS	0.9	2.6	+1.7	Passed
19	10+875	Centreline	0.9	1.8	+0.9	Passed
20	11+125	LHS	0.9	1.3	+0.4	Passed
	Average			**1.4**		

***Source**: Test results as per site inspection conducted in November, 2020.*

From **Table 3.17**, 4 out of 20 tested samples had UCS results less than the minimum specified value of 0.9 MPa. More details on the tests on UCS are as shown in **Appendix 4-Table 4.**

According to the interview with TANROADS Officials, the reasons for failure of the tested sections were unauthorised use of the stabilised sub-base by traffic as observed during site visit, and long exposure of the stabilised layer without being covered for protection. Failed sections were likely to influence the performance of road by lowering the strength of the rigid pavement; this in turn may affect durability of the road.

vi. The Subbase had Low Field Compaction

According to Standard Specifications for Road Works 2000, the minimum field density for sub-base of cemented material (C1) is supposed to be 95% of BS-Heavy. The audit team conducted field density test of C1 pavement layer by sand replacement method to determine whether the specified compaction was achieved or not. However, not all tested sections passed. Details of the test results for field density test are as shown in **Table 3.18** hereunder.

Table 3.18: Test Results for Field Density Test

Test No.	Chainage	Offset	Max Dry Density (Mg/M3)	Optimum Moisture Content (%)	Percentage Compaction (%)	Auditors' Comment
1	0+050	Centreline	2.130	8.8	100	Passed
2	0+100	LHS	2.130	8.8	98	Passed
3	0+400	RHS	2.130	8.8	94	Failed
4	0+550	LHS	2.130	8.8	103	Passed
5	0+700	RHS	2.130	8.8	92	Failed
6	1+000	LHS	2.130	8.8	83	Failed
7	1+150	LHS	2.130	8.8	91	Failed
8	1+300	RHS	2.130	8.8	85	Failed
9	1+725	LHS	2.130	8.8	100	Passed
10	1+875	RHS	2.130	8.8	94	Failed
11	2+450	RHS	2.130	8.8	98	Passed
12	2+550	LHS	2.130	8.8	95	Passed
13	6+975	RHS	2.130	8.8	94	Failed
14	7+075	LHS	2.130	8.8	102	Passed
15	7+325	RHS	2.130	8.8	101	Passed
16	7+475	LHS	2.130	8.8	91	Failed
17	7+625	LHS	2.130	8.8	99	Passed
18	8+300	RHS	2.130	8.8	93	Failed
19	8+350	LHS	2.130	8.8	98	Passed
20	8+400	RHS	2.130	8.8	110	Passed
21	10+675	RHS	2.130	8.8	98	Passed
22	10+875	LHS	2.130	8.8	100	Passed
23	10+975	RHS	2.130	8.8	101	Passed

Source: Field Test Results (2020)

From **Table 3.18**, it is shown that, 9 out of 23 tested points had field density test results on compaction below the minimum specified requirements (below 95% of compaction) as the failed compaction ranged from 83 to 94%. More details on the tests on Field Density are as shown in Appendix 4-Table 5.

According to the interview with TANROADS Officials, the reason for failure of the tested sections was unauthorised use of the stabilised subbase by traffic as explained in (v) above.

CHAPTER FOUR
AUDIT FINDINGS ON PERFORMANCE OF BUILDING WORKS (LOT-2)

4.1 Introduction

This chapter presents detailed audit findings on the Building works which include building of one deport, two (2) terminals and five (5) feeder Stations off roadway, more project information are as shown in Appendix 11 and 12. The findings are structured under the following major project management cycle aspects: project inception, planning, design, and tender documentation; procurement process; contract administration; cost and time management; and Quality matters were administered.

4.2 Construction of Dar es Salaam Bus Rapid System (BRT) Infrastructure – Phase 2; Lot 2: Buildings

4.2.1 Construction Stage

i. The agreement signing date was missing in the agreement document

Although the contract was signed, the agreement section of the contract which was also supposed to be signed independently was not signed. Further, the section, for filling signature date and month was left blank. The other documents forming part of the contract and contained in the contract are the letter of acceptance, the letter of bid, the addenda, the Particular Conditions, the General Conditions, the specifications; the drawings; the completed schedules and the priced Bills of Quantities.

ii. Delay due to partial hand over of Mbagala site

Areas occupied by M/s Manish, UDA yard and his neighbours (32,608 sqm-28.4%) were not timely handed over to the contractor and this delayed the commencement of construction of bus stations and parking lots.

The work was planned to start on 1st August, 2019 and to be finished on 26th February, 2020. However, the actual work started on 23rd February 2020 at the time the work was expected to be finished.

The reason for delay was land disputes that was to be resolved before hand over of site to the contractor.

iii. Six frames for terminal shed were not constructed as per drawings at Kariakoo Terminal

A site visit at Kariakoo Terminal found that six frames for terminal shed were not constructed as per drawings whereby Frame Type A was replaced with Type B. Both Item number 7 in the BOQ and the drawings required type A frame to be constructed.

The audit noted that, the Frame Type B was positioned at 6000 mm centre to centre of the steel column, which was the position for Frame Type A . Thus, the Frame Type A was omitted on the construction, as shown in Photo 4.1 below.

The deviation from the structural drawings was due to inadequate supervision and inspection by the consultant during construction and fixing of frames and during production of the frame types as observed at contractor's site.

Likewise, review of measurement sheet of IPC No.4 which was issued on 5th May, 2020 noted that the measured works at Kariakoo Terminal included the terminal shed as presented in the structural drawings and BOQ. However, the measurement sheets showed existence of frame type A which was contrary to the actual works and so the payments were certified for the work which was not performed. Table 4.1 below shows an extract from BOQ of the omitted structures.

Table 4.1 Omitted structure in relation to the BOQ

Item	Description	Unit	Qty	Rate	Amount (TZS)
A	Steel beam, H-section size 150x150x23mm, 5440mm long weighing 23kg per linear metre holed ten times for M16 bolt.	No	7	1,626,560	11,385,920
B	Steel beam, H-section size 150x150x23mm, 1400mm long weighing 23kg per linear metre holed eight times for M16 bolt.	No	14	418,600	5,860,400
C	Steel rafter, H-section size 150x150x23mm, 5035mm long weighing 23kg per linear metre curved irrespective of radius holed	No	12	1,505,470	18,065,640

Item	Description	Unit	Qty	Rate	Amount (TZS)
	four times for M16 bolt one end welded to and including 150x150x8mm thick mild steel plate with four holes for M16 bolt.				
D	Steel truss member, H-section size 150x150x23mm, 2105mm long weighing 23kg per linear metre one end welded to and including 150x150x8mm thick mild steel plate with four holes for M16 bolt, other end welded with 2 Nos 75x75x6mm, 150mm long mild steel triangular supports holed twice for M16 bolt.	No	6	625,000	3,750,000
Total for one Terminal Shed					**39,061,960**
Total for six Terminal Sheds					**234,371,760**

Source: Construction Drawings

According to IPC No. 8 which was issued on 22nd December, 2020 part of the overpayment on Frame Type A was deducted from this IPC, hence the remaining overpayment for frame Type A is **TZS 103,477,920.**

Photo 4.1: Frame type B constructed at Kariakoo Terminal sheds taken on 20th October, 2020.

Kariakoo Terminal Shed Frame Type B

Column Break and Change in Cross-section

iv. Columns for Kariakoo Terminal Sheds were shorter than the Design Height

The audit observed that the columns at Kariakoo terminal sheds were shorter than the specified height on the designs and detailed drawings.

According to drawing No. T497-BRT2L2-KRK-TSA-ST-06 of terminal Shed for Frame Type A details, the columns were supposed to bear a cross section dimension of (200x200x52) mm with the height of 5,305 mm long. However, the result of the joint measurement showed that the height of the columns is 3,700 mm which implies a difference of 1,605 mm.

According to the BOQ a column of **5305 mm** long was to be supplied at **TZS 3,586,180** which is equivalent to **TZS 676,000** per linear metre. This means the missing **1605 mm** is equivalent to **TZS 1,084,980** per single column which was **TZS 15,189,720** per single terminal shed. The total overpayment for all six terminal sheds is **TZS 91,138,320**.

During the factual clearance, between NAO and TANROADS, it was noted that TANROADS started to recover the overpaid amount. Based on paid IPC No. 8 which was issued on 22nd December, 2020 there was an adjustment on the payment to recoup part of the overpayment made on IPC No. 4. The deducted amount was **TZS 83,430,816** out of **TZS 91,138,320**. This means that the amount remaining to be recouped is **TZS 7,707,704**.

v. Feeder stations lack service facilities for passengers

The audit observed that the feeder stations were without any provision of services facilities in their site layouts such as the public toilets for the users of the feeder stations. Among the four (4) feeder stations, Chang'ombe and Mtoni Feeder station had enough space to accommodate both Administration block and ticketing booth but for the Zakhiem and Mtoni Kijichi Feeder Stations were limited due to the small area for construction hence this could just accommodate ticketing booth.

These would facilitate comfort of the passengers while using the feeder stations. Furthermore, this would be used as a source of income for the operator. In addition, the ticketing booth would have facilitated smooth movement of the passengers in the stations and avoid delay during the time

passengers enter the bus since they scan their tickets at the door of the bus as experienced in BRT Phase 1.

vi. Overdesign and Inconsistency in the design of the feeder stations and terminal sheds foundation

Designs and structural drawings of the feeder stations and terminal sheds for both Kariakoo terminal and Mbagala Depot issued for construction and signed on 12th August, 2019, showed that the foundation plan layouts of the stations and terminal shed had reinforced concrete (RC) retaining walls around the station.

Likewise, during site visual inspection held by the Audit team and the Employer representatives on 20th October, 2020 it was observed that the terminal sheds and feeder stations had RC walls. However, the LOT 1 bus stations foundation were constructed using structural blocks. Since the bus stations, feeder stations and terminal sheds save the same purpose, and the conditions are the same. This was considered to be an overdesign and may not be cost effective since using RC foundation walls layout is more expensive compared to the block work Foundation as used in the Bus stations.

4.2.2 Financial Management

i. Interest on Delayed Payment amounting to TZS 49,263,362.87

Clause 14.8.1 of the GCC[20] states that, if the Contractor does not receive payment in accordance with Clause 14.7 the Contractor shall be entitled to receive financing charges compounded monthly on the amount unpaid during the period of delay.

It was noted that there were delays in payment IPC No. 1, 2, 3, 4 and 5 to M/s China Civil Engineering Construction Corporation which, if claimed by the contractor, the Employer will incur a cost of interest payment of TZS 49,263,362.87 as per auditors computation which will increase the cost of project without any benefit or returns from the additional cost.

Furthermore, it was noted that the delay on payment of IPC No.3 for 78 days at the time of audit was caused by the donor (AfDB) not paying on time. However, the cost will be borne by the GoT.

[20] Contract No. TRD/HQ/1009/2018/19

Table 4.2: Interest Penalties due to delayed Payments to M/s China Civil Engineering Construction Company

IPC	Principal Amount TZS	Delay Days	Principal Amount USD	Delay Days	Total Interest Amount (TZS)
IPC1	183,936,028.42	83	325,991.88	83	7,507,197.90
IPC2	333,877,123.61	104	591,734.16	104	13,576,616.73
IPC3	243,518,094.00	78	431,608.22	78	10,196,264.92
Outstanding IPC3	7,160,329.62	180	12,671.95	180	332,681.94
IPC 4	405,751,809.78	111	719,118.47	111	11,467,972.33
IPC 5	408,041,954.24	36	723,177.32	36	6,182,629.04
Total Interest Amount					**49,263,362.87**

Source: Interim Payment Certificates (IPCs)

i. Interest penalty miscalculation by the Engineer for IPCs No.1 to 3

This was noted in the review of IPC No.3 of China Civil Engineering on interest payment calculation. The Engineer used the interest rate which differ with the requirement of the contract for TZS amount and USD amount contrary to GCC 14.8.2, which stated that the financing charges shall be calculated at the annual rate of three percent points above the discount rate of the central bank in the country of the currency of payment or if not available the interbank offered rate and shall be paid in such currency.

It was noted that Engineer used wrong BOT interest rate which was the negotiated lending rate instead of discount rate. The interest rate used was 13.51% which stated by Engineer as BOT rates for April-July 2020 whereas the published discount interest rate in April was 7% while May-July 2020 was 5% for domestic currency.

Moreover, the 13.51% plus 3% was used for both TZS amount and USD amount thus increasing the interest amount. And since the BOT did not have the discount rate for USD, the Engineer did not use the interbank rate but instead used the discount rate for domestic currency. These discrepancies led to the overcharge of TZS 47,891,795.51 which were certified in IPC No.5.

Moreover, it was noted that interest amount certified in IPC No.3, which was an accumulation of the interest payment for IPC No.1 was overcharged by TZS 32,101,963.71.

Similarly, it was noted that, the interest amount certified in IPC No.4 was TZS 68,494,111.36, which was an interest amount for IPC No.2. Analysis of variances are shown in **Table 4.3** below.

Table 4.3: Miscalculation of interest penalty

IPC No.	Engineer Computation (Amounts in TZS)		Total TZS (A)	Auditors Computation (Amounts in TZS)		Total TZS (B)	Total Variance (TZS) (A-B)
	USD Portion	TZS Portion		USD Portion	TZS Portion		
1	32,354,171	7,254,990	39,609,162	3,325,242	4,181,956	7,507,198	32,101,964
2	65,656,990	16,413,738	82,070,728	3,928,105	9,648,512	13,576,617	68,494,111
3	45,960,498	12,460,245	58,420,742	747,142	9,781,805	10,528,947	47,891,796
							148,487,871

***Source**: Engineer and Auditor computation based on reviewed IPCs; Exchange rate used 2256.94*

These errors will lead to overpaying the contractor.

4.2.3 Human Resources Management Aspects

i. Four Key staff were working without settling Working Permits

The audit team visited contractor's office on 31st December, 2020 and reviewed Working Permits Class C (Company Employees) to establish their validity for individual key staff in the project. Review of the working permits showed that, there were key staff who were working in the project with expired working permits. Details of the staff are as shown in **Table 4.4** hereunder.

Table 4.4: Status of Working Permits of Key Staff of M/s China Civil Engineering Construction Corporation (CCECC)

S/N	Position	Nationality	Expiry date of working permit	Auditors' comments
1	Project Manager	Chinese	13th December, 2020	Working permit was not valid. He was available at the project
2	Quality Control Manager	Chinese	29th November, 2020	Working permit was not valid. He was available at the project
3	Structure Engineer	Chinese	10th May, 2020	Working permit was not valid. He was not at the project (travelled)
4	Materials Engineer	Chinese	29th November, 2020	Working permit was not valid. He was not at the project (travelled)
5	Equipment Engineer	Chinese	23rd May,2021	Valid. He was not at the project (travelled)
6	Land Surveyor	Chinese	16th May,2021	Valid. Available
7	Quantity Surveyor	Tanzanian	N/A	Available
8	Assistant Q.A Engineer	Tanzanian	N/A	Available

Source: Working Permits collected during visit to Contractor (2020)

Based on Table 4.4, 3 out of 6 foreign experts were at site and only one of them had a valid work permit. Likewise, remaining 3 foreign staff had travelled and only one of them had valid work permit.

ii. Not all Key Staff had Education and Professional Qualification Higher or Equivalent Staff in Signed Contract

The works contract required the contractor to have qualified key staff for the execution of the project. Further, the contract required that, in case there was replacement of key staff, the new key staff should have equivalent or higher qualification.

Review of Monthly Progress Reports and Project Correspondences showed that, key staff who were listed in the signed contract were all replaced by other staff during execution of the project.

The audit team reviewed education qualifications and professional registration of the new key staff to assess whether they had all credentials required for the execution of the project and found that, not all new key staff were registered by professional boards which was Engineers Registration Board (ERB), Architects and Quantity Surveyor Registration Board (AQRB). This is as shown in **Table 4.5**.

Table 4.5: Assessment of Education Qualification and Professional Boards Registration of Key Staff of the Contractor CCECC

S/N	Name of the key staff	Position	Education qualifications	Professional Boards registration	Auditors' comments
1	Zhu Kai Kai	Project Manager	Bachelor Degree in Civil Engineering	He has n**o ERB registration**	Did not meet minimum qualification requirements
2	Huang Zhao Ming	Quality Control Manager	Bachelor Degree in Civil Engineering	No details **on registration**	Did not meet minimum qualification requirements
3	Wang Lao Yu	Structure Engineer	No details on education qualification. He has submitted CV only	No details **on registration**	Did not meet minimum qualification requirements
4	Li Wen Rui	Materials Engineer	Bachelor Degree	No details **on registration**	Did not meet minimum qualification requirements
5	Shi Meng Jie	Equipment Engineer	Bachelor Degree in Material Engineering	No details **on registration**	Did not meet minimum qualification requirements
6	Shen Shuai Jie	Land Surveyor	Bachelor Degree	No details **on registration**	Did not meet minimum qualification requirements
7	Deodath Faustine	Quantity Surveyor	Bachelor of Science in Building Economics	The registration with AQRB is in the process	Did not meet requirements
8	Florian K. Joseph	Assistant Q.A Engineer	Bachelor Degree in Civil Engineering	Practising License expired in 31st	Meet minimum qualification requirements and renewal needed.

				December, 2019	

Source: Education Qualification, Professional Boards Registration Details, CVs

From **Table 4.5**, it is shown that, all six foreign key staff did not have satisfactory minimum qualifications. One foreign staff submitted Curriculum Vitae (CV) only without certificates on education and professional qualification. Hence there is no assurance on whether he fits for the position.

For the two local key staff, one key staff (Engineer) met the minimum requirements, however, his practising license expired on 3rd December, 2020, while other key staff had the required education qualification, but the professional registration was still in the process.

Failure to have adequate qualification (education and professional registration) does not provide adequate assurance for a key staff to fit the position. This has impact on the quality of work to be performed by respective key staff.

4.3 Consultancy Services for Design review and Construction Supervision of the Dar es Salaam Bus Rapid System (BRT) –Phase 2; Lot 2: Building Works-one deport two terminals and three feeder stations off roadway

4.3.1 Design Stage

i. The Contract for the Consultant expire before completion of works

Section nine (9) of Terms of Reference (Appendix A) required that, Commencement of supervision services was subject to signing of the works contract and was expected to terminate when the final inspection of the works at the completion of Defects Liability Period and the Consultant has fulfilled all his obligations under the Contract.

However, Sub-Clause 14.1 of General Conditions of Contract and Special Conditions of Contract required the contract to expire at the end of 27 months i.e., 3 months for Design Review/Pre-Contract Services and 24 months for Construction supervision followed by 12 months Defect Liability Period after commencement. Sub-Clause 13.1 of General Conditions of Contract and

Special Conditions of Contract required the Consultant to begin carrying out the services not later than thirty days (30) after contract signing.

According to Consultancy Service Contract, the contract was signed on 25th February, 2017 thus the commencement date was 24th March, 2017. Twenty-seven (27) months after commencement (makes it 24th June, 2019 and 12 months of Defects Liability Period makes it 24th June, 2020. This means the Contract expired on 24th June 2020.

Based on the facts stated above, the Contract for Consultancy Services for design review and construction supervision has expired.

Thus, the Contract expired because there was a delay. This delay occurred during design period. The delay was for 80 days, and it was due to the fact that the Final Design Review Report was not submitted. The design review delayed because the site was not fully handled to the Consultant.

ii. Final Design Review Report delayed for eighty (80) days

According to Sub-Clause 8.3 of the Contract for Consultancy Services the Consultant was supposed to submit final design review report four months after commencement of the assignment. The design report was expected to present Consultant's findings of his design review, and improvements made to the design. Commencement was expected to be 24th March, 2017 and so the final design review report was to be submitted before 24th July, 2017.

However, the review of Correspondences files showed that, final design reports were submitted on 12th October, 2017 with a delay of 80 days. This was due to change of site location, the decision to change the site location was reached because compensation problems, which could not be solved until the commencement of the construction. Furthermore, the Final Design Review Report delayed since the review of Draft Design Report was not address timely by the Client and other stakeholder like DART, TRC and TAZAMA. The delay of Final Design Review Report led to the delay of procurement of contractor and commencement of work.

iii. Inception report for Construction and Supervision stage was missing

Sub-Clause 8.3 of the Contract for Consultancy Services also required the Consultant to submit inception report to TANROADS one month after commencement of works contract.

The report was expected to cover the following issues: review of Contractor's mobilization; Work methods and Work plan; Setting out guidelines for Administering; Monitoring and Evaluating the project progress; and Mode of cooperation with TANROADS, the financier and any other organization(s).

However, TANROADS did not present the inception report for audit verification. Interviewed official of TANROADS showed that the report was misplaced during office shifting from Airtel tower to Julius Nyerere International Conventional Centre.

4.3.2 Construction Stage

i. TANROADS did not second Engineers to Consultants during Supervision work

Based on reviewed project files, the audit noted that, TANROADS did not second at least two (2) Engineers to the Consultant for on the job training to gain experience on project supervision skill. It was further noted that, TANROADS did not put this item in BoQ for the counterpart staff training. This is contrary to the Section 5.2 (xxiv) of Terms of Reference (TOR) for the Consultancy works which requires the Consultant to organize and undertake on the job training for qualified counterpart engineers.

Because of this, TANROADS Engineers did not benefit from the planned training which was expected to include all aspects of supervision of road works contract. Based on interview with TANROADS official, the office was understaffed and there was not available engineer free for the on-the-job training attachment.

ii. The Consultant did not prepare and submit Project Supervision Manual

Review of the Contract for Consultancy Services for design review and construction supervision of second phase of the Dar es Salaam Bus Rapid Transit System, noted that Section 5.2 (xxii) of Terms of Reference (TOR) for the

Consultancy works required the Consultant to prepare a Supervision Manual, which would have laid out procedures to be followed during the execution of the works.

Upon request of the Supervision Manual from project Engineers, the audit team was not availed were told the document was not prepared and submitted to TANROADS. Availability of the Supervision Manual would facilitate supervision and served as a basis for on-job training of the TANROADS Staff and any visiting students during the implementation of the works contract.

4.3.3 Financial Management

i. Interest on Delayed Payment amounting to TZS 9,866,709.99

According to Clause 46.1 of the GCC, if the client had delayed payments beyond 15 days after the due date stated, interest is supposed to be paid to the consultant on any amount due but, not paid on, such due date for each day of delay at the rate stated in SCC.

It was noted that payments to M/s Inter consult payments were delayed in several invoices which would attract an interest of TZS 9,866,709.99 if claimed by consultant. Interest accrued from invoice 9 to 18, which were yet to be paid at the time of audit, would keep on increasing the cost of the project unnecessarily with no benefit to the employer.

Table 4.6: Interest penalties due to delayed payments to M/s Inter-Consult

Invoice	Amount Certified (TZS)	Delayed days	Interest Amount (TZS)
Invoice No.2	61,235,000	103	1,764,375.89
Invoice No.3	36,141,000	38	330,774.28
Invoice No.6	126,850,000	103	1,368,894.69
Invoice No.7	32,745,000	66	378,016.58
Invoice No.8	36,875,000	39	183,346.75
Invoice No.9	36,875,000	246	1,288,551.37
Invoice No.10	36,875,000	202	1,059,721.75
Invoice No.11	36,875,000	153	787,727.31
Invoice No.12	36,875,000	153	787,727.31
Invoice No.13	41,418,000	120	734,503.56
Invoice No.14	42,078,800	91	510,985.82
Invoice No.15	43,070,000	62	376,371.00

Invoice	Amount Certified (TZS)	Delayed days	Interest Amount (TZS)
Invoice No.16	43,070,000	36	218,538.00
TOTAL			**9,866,709.99**

Source: Correspondences

It was noted that the delays were caused by Ministry of Finance and Planning, TANROADS and AfDB through corresponding letters which shows submission dates of certified certificate to the AfDB and these cases were noted on seven invoices as shown in Table 4.7 below; -

Table 4.7: Interest charges due to late payment of invoices

Invoice	Delay by TANROADS (Days)	Delay by MoFP (Days)	Delay by AFDB (Days)	Amount TZS	Interest Amount TZS	Delay Situation
No.2	-	-	121	61,235,000	1,764,375.89	TANROAD through Letter TRD/D/HQ/11/235/02/10 submited payment request to ADB on 9th August, 2017 through MoFP, which forwarded the letter on 15/08/2017 to AfDB whereby the due date was on 2/9/2017 but payment was made on 14th December, 2017 and cause delay of 121 days.
No.6	12	92	15	102,125,000	1,368,894.69	TANROADS through Letter TRD/D/HQ/11/235/02/VOL.1/21 submitted payment request to AfDB on 19/11/2019 through MoFP, which forwarded the letter on 3/2/2020 to AFDB whereby the due date was on 8/11/2019 and payment was made on 19/2/2020
No.7	-	66	3	26,362,500	378,016.58	TANROADS through Letter TRD/D/HQ/11/235/02/VOL.1/21 submit payment request to AfDB on 19/11/2019 through MoFP, which forwarded the letter

Invoice	Delay by TANROADS (Days)	Delay by MoFP (Days)	Delay by AFDB (Days)	Amount TZS	Interest Amount TZS	Delay Situation
						on 3/2/2020 to AfDB whereby the due date was on 15/12/2019 and payment was made on 19/2/2020
No.8	-	39	21	29,687,500	183,346.75	TANROADS through Letter TRD/D/HQ/11/235/02/VOL.1/24 submitted payment request to ADB on 28th November, 2019 through MoFP whereby due date was on 20/1/2020 but MoFP forwarded the letter on 7/2/2020 to AfDB but AFDB pay on 28/2/2020
No.9	-	67	190	37,831,250	1,299,027.40	TANROADS through Letter TRD/D/HQ/11/235/02/VOL.1/24 submitted payment request to AfDB on 7th February, 2020 through MoFP whereby due date was on 16/2/2020 but MoFP forwarded the letter on 14/4/2020 to AfDB but payment was not made yet
No.10	-	67	190	36,875,000	1,070,214.04	TANROADS through Letter TRD/D/HQ/11/235/02/VOL.1/24 submit payment request to AfDB on 7th February 2020 through MoFP whereby due date was on 31/3/2020 but MoFP forwarded the letter on 14/4/2020 to AFDB but payment was not made yet
No.11 & 12	-	37	167	73,750,000	1,596,048.80	TANROADS through Letter TRD/D/HQ/11/235/02/VOL.1/30 submit payment request to AfDB on 31st March 2020 through MoFP whereby due date was on 19/5/2020 but MoFP forwarded the letter on 7/5/2020 to AFDB but payment was not made yet
					7,659,924.15	

Source: Payment Correspondences

ii. Expired insurance cover

It was noted that the existing insurance against risk had expired on 28th March 2019 while the contract was still being implemented which is contrary to clause 24.1 of the contract. Despite the fact that TANROADS reminded the consultant to submit insurance cover vide letter dated 25th January 2019, this was not done as of date of audit. This implies that in case of any negligent act, error or risk related to designs, drawings, or any advice of M/s Inter-Consult Ltd that may be proven inadequate may affect project implementation and cause loss to the employer in terms of time and cost.

4.3.4 Human Resources Management

i. Availability of the key staff of the Consultants.

The audit team visited consultant's office (Inter-Consult) on 31st December, 2020 to establish status of availability of individual key staff at the project. The audit found that all five key staff who are local were at available and working at site.

Assessment of the Qualification and Professional Registration

According to the signed Consultancy Service Contract, the Consultant is supposed to have qualified key staff for providing the consultancy service.

Furthermore, the Consultancy Service Contract required that, in case there is a replacement of key staff, a new key staff should have equivalent or higher qualification to the replaced key staff to fill the vacant.

The audit found that, there was a replacement of only one key staff (Service Engineer). The credentials of the replacement were found to be adequate. The details of key staff of the Consultant are as shown in Table 4.8 hereunder.

Table 4.8: Assessment of Consultant's Key Staff for Supervision of the Project

S/N	Name of key staff	Position	Education qualification	Professional boards registration	Auditor's comment
1	Arch. Beno W. Matata	Project Manager	Advanced Diploma in Architecture and Graduate	Registered by AQRB as a Professional Architect.	Qualified during bidding process & evaluation

S/N	Name of key staff	Position	Education qualification	Professional boards registration	Auditor's comment
			Diploma in Architecture.		
2	Dismas Meela	Structural/ Civil Engineer	Bachelor of Science in Civil Engineering.	Registered by ERB as a Professional Engineer.	Qualified during bidding process & evaluation
3	Gibson Godwishes	Architect	Bachelor of Architecture	Registered by AQRB as a Professional Architect	Qualified during bidding process & evaluation
4	Brightson Njau	Service Engineer	Bachelor of Science Degree in Engineering	Registered by ERB as a Consulting Engineer specialised in Mechanical Engineering. Practising License was valid up to 31st December, 2022.	He replaced Raphael Ngeve
5	Baraka Mathew	Quantity Surveyor	Bachelor of Building Economics.	Registered by AQRB as a Quantity Surveyor.	Qualified during bidding process & evaluation

Source: Education Qualification, CVs and Professional Registration details

From **Table 4.8**, it is shown that, replacement of one key staff considered the aspects of education qualifications, experience, and registration with professional boards.

CHAPTER FIVE
CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents detailed audit Conclusion and Recommendations

5.2 Overall Conclusion

Effective management of construction project to attain Value for Money has been the challenge in this country. The most challenging part has been the inadequate control of important parameters which contribute to good project performance. In most cases, the weakness is in the following aspects, Inflation of quantities in the Bills of Quantities, variations with no justification, time overrun, under or overdesign.

This report presents the finding of the audit conducted on ongoing project of construction of BRT Phase 2. The report concludes that, the project is not in the direction to attain the value for money. This is because, implementation of both lots (Lot 1– on road works and Lot 2 on building works) was not adequate to achieve the expected completion time, cost, and quality as per terms and conditions of the contract. There are noted variations and time overrun. The main cause of all these is rooted in the inadequate supervision by the employer and delay to take prompt actions.

5.3 Specific Conclusions

5.3.1 Project Inception and Planning

TANROADS did not ensure that the design of the projects correlates with the Dar es Salaam Master Plan. This was because there was no evidence showing that design of the project considered the Dar es Salaam city master plan which resulted into additional works through two Addenda with value of USD 709,375.00

5.3.2 Design and Tender Documentation

DART did not ensure that execution of Consultancy Services Contract meets timeline for design of the project. This was because the design of the project

was associated with delays of 80 days and partial site handover to the Contractor for the commencement of works.

5.3.3 Contract Management

TANROADS did not ensure that execution of the project adhere to the Terms of Reference of the Consultancy Service Contract. Non secondment of Engineers to the Consultant from which they could gain experience during supervision of roadworks was among the issues observed.

Further more, TANROADS did not ensure that the Final Design Review Report meets the timelines. There was a delay of 215 days for the submission of the Final Design Review Report.

5.3.4 Construction Stage

TANROADS did not ensure that the execution of the project adhere to the conditions of the Consultancy Service Contract. The following were notable cases:-
Non-application of the liquidated damages due to delayed submission of reports;

(i) Delay of submission of the Performance Guarantee after signing the Contract
(ii) Absence of a Dispute Board
(iii) Late payment of contractor and consultants dues.

Further, there was lack of integration between TANROADS, DART and other stakeholder to address design modifications and the design of second Railway Overpass Bridge. Because of lack of integration, the project suffered introduction of addendum with major additional of work. This affected the progress of the work.

TANROADS did not ensure that the project it executed with proper quality control of work. The case of distresses on the Rigid Pavement which was caused

by inappropriate concrete material handling and presence of lumps of clay within the mass concrete.

Further more, TANROADS did not ensure inspection on the completed and measured works. The variations on the Kariakoo Terminal Shed Frames and columns resulted to overpayment of TZS 103,477,920.00 to the contractor.

5.3.5 Technical Aspects

The stockpiled materials for C1 did not meet the required strength, since the CBR results showed that three samples were below 25 CBR value as the required value for C1 materials.

Likewise, the uncovered C1 pavement layer did not meet the required minimum specification. This was because four core samples of C1 pavement layer did not meet the requied UCS value i.e., 0.9 mpa also nine point along the uncovered C1 section did not meet the required degree of compaction.

5.3.6 Human Resource Management

TANROADS did not assure that the project was executed by staff who were qualified, since 16 out of 25 staff did not have evidences on professional registration.

Likewise, TANROADS did not ensure that foreign staff comply with immigration law of the country before being engaged in the project. This was because 7 out of 20 foreign staff did not have work permits.

5.4 Recommendations to TANROADS Management

The audit findings and conclusions have pointed out several weaknesses on the ongoing BRT phase 2 project. Areas for further improvement have been identified for ensuring that Value for Money is achieved on this project. The suggested recommendations aim to realise the 3Es namely; Economy, Efficiency and Effectiveness in the use of the public resources while the BRT phase 2 project is being implemented. The recommendations are specifically addressed to the Management of the Tanzania National Roads Agency (TANROADS) because it is the key implementer of the project.

5.4.1 Planning, Design and Tender Documentation

TANROADS should:

a) Ensure that both designs and design reviews are carried out timely and also ensure that the process for site hand over to the Contractor is managed well and timely to minimize any inconveniences;
b) Improve its documentation and record keeping system; so that key documents can be readily found;
c) In collaboration with DART strengthen controls of time management to ensure designs are carried out timely and all quality review and approvals of the Draft Design Report are timely done; and
d) Ensure that they maintain consistency in design of stations to avoid overdesign in the future BRT Phases.

5.4.2 Contract Management

TANROADS should:

a) Apply stringent measures to contractor for Lot 1, for all poor-quality work done by contractor; it should ensure that the contractor come out with plan to recover the lost time and redeem the slippage;
b) Ensure, the feasibility studies and the Master Plan for the future BRT Phases are reviewed thoroughly in collaboration with other stakeholders in the BRT corridors;
c) Strengthen its contract Management mechanism to ensure that the project adhere to the approved schedule of Work, and environmental Management Plan is implemented, and all Contractual Documents are properly documented; and
d) Comply with the TOR on seconding Engineers for the on-job training attachment to the consultants. This will enhance capacity building among TANROADS Engineers.

5.4.3 Construction Stage

TANROADS should:

a) Impose the liquidated damages as appropriate to all delays and correct all figures in approved Payment Vouchers to avoid any overpayment to consultant;
b) Direct the Consultant to submit the necessary reports on time;
c) Ensure that all tax liabilities arising out of the contract are paid; and should also deduct the amount which were overcharged on the identified Certificates;
d) Recover the overpaid amount for the columns at Kariakoo terminal; and
e) Consider providing, Feeder stations with common services facilities not only in the future BRT phases but also at BRT phase 2 before the project is completed.

5.4.4 Financial Management

TANROADS should:
a) Improve its review process of the Payment Voucher and correct the approved Payment Vouchers figure to avoid any overpayment to consultant.
b) Ensure it timely request fund to the Ministry of Finance and closely make follow-up to the Ministry of Finance and Planning to ensure it expedite payment approval processes in order to avoid loss of public money attributed to interest charges on delayed payments; and
d) Ensure that the certified certificate is timely submitted within days specified in the contract.

5.4.5 Human Resource Management

TANROADS should:

a) Ensure all foreign key staff supervising construction projects in the country have the right credentials and possess valid working permits. This includes liaising with other relevant institutions such as TCU so as to settle challenges facing the applications of working permits by key staff;
b) Improve its system of handling foreign expatriate; that, all key staff supervising projects possess valid practising license; and
c) Ensure that, all key staff possess required qualifications and are registered with local professional boards. Involve TCU in assessing qualifications of the foreign key staff prior to approving the key staff.

5.4.6 Technical Asepcts

TANROADS should:

a) Enhance its monitoring systems to ensure contractor and consultant comply with all contractual obligations, also ensure that, the stabilised subbase is protected to avoid a risk of traffic to use the stabilised subbase;
b) Ensure that the contractor rectifies all failed sections of the built road which did not achieve the required minimum specifications prior to placing rigid pavement on stabilized subbase; and
c) Instruct the contractor to stops using the natural sand sieve truck and instruct to adapt a new technology of sieving machine with adequate control;
d) Ensure that, storing of stockpile material conforms with the requirement of the special specifications, and enhance site inspection and supervision on the stockpile material; and
e) Ensure that both Contractor and Consultant Develop an implementable plan to mitigate the slippage progress.

APPENDICES

Appendix 1: List of Documents reviewed

1. Design Standards, Manuals and Specifications
2. Tender Documents
3. Public Procurement (Amendment) Act, 2016 and Public Procurement (amendment), Regulations 2016
4. Approved Budget
5. Annual Procurement Plan (APP)
6. General Procurement Notice (GPN)
7. Design Reports (Road Inventory and Road Condition Survey Reports, Materials Investigation Reports, Traffic Survey Reports)
8. Engineer's Estimates
9. Designs Reports
10. Design calculations
11. Complete Tender Documents including Specifications, Drawings and BOQs
12. Procurement records / documents
13. Minutes of Tender Board
14. Approved Annual Procurement Plan
15. Tender Adverts
16. Tender and Quotation Documents
17. Records / minutes of Tender opening
18. Tender Evaluation Reports
19. Power of Attorney
20. Signed Contract documents
21. Signed Complete Contract Documents (Agreement, Letter of Acceptance, Contractor's Bid, SCC, GCC, General Specifications, Special Specifications, Drawings, BOQ, pre-contract negotiations)
22. Performance securities and insurance covers
23. Advance Payment Guarantees
24. Contract and Updated / Revised Programmes of Work
25. Minutes of Site Possession
26. Quality of project programme (schedule of work)
27. Adherence to project programme
28. Qualifications of contractor's site organization and staff
29. Qualifications of supervising site staff
30. Quality of Quality Assurance Programme
31. Quality of Environmental Management Plans (EMPs)

32. Management of contractual documents
33. Site Instructions
34. Minutes of Site Meetings
35. Progress Reports
36. Measurement Sheets and Site Inspection Reports
37. Material Testing Records
38. List of Claims
39. Variation Orders
40. Project (Correspondence) Files
41. Determination of claims
42. Approval of claims
43. Certificates (Interim Payment Certificates, Take-over certificate (Substantial Completion Certificate and Final Completion Certificate)

Appendix 2: Selected Photos during Site Inspection

Photo No. 1: Bus Station foundation work

Photo No. 2: Completed Bus foundation work Type 5 at Oil Com Bus station.

Photo No. 3: Coring test on C1 Pavement

Photo No. 4: Field Density test on C1

Photo No. 5: Sampling process for material test

Photo No. 6: Rebound hammer test on the box culvert at 6+000.

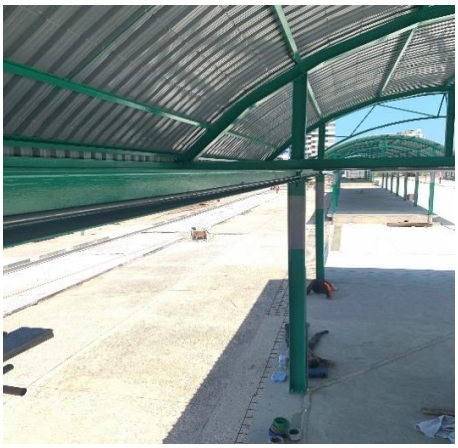
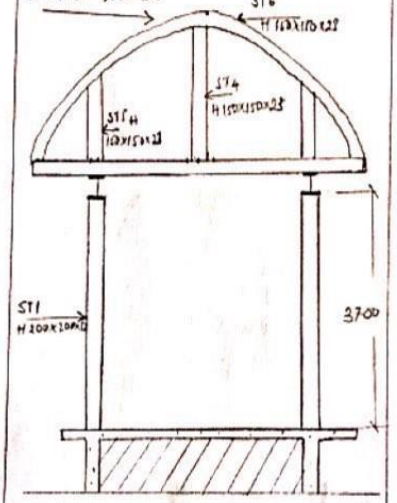


Photo No. 7: Consultants material laboratory.

Photo No. 8: Kariakoo Terminal Sheds.

Appendix 3: Measurement Sheet during Site Inspection.

Audit Assignment Title: BRT PHASE II LOT 2 PROJECT
Name of the audited agency / Organisation: TANROADS
Contract Name: BRT PHASE 2 LOT 2

S/No	Bill Item No.	Measurements / Calculations	Output
		FRAME TYPE B.  TERMINAL SHED FRAME 7Nos	ST1 COLUMN H 200X200X52 Length: 3700m.

Signed by for the audited agency

Name: ABUBAKAR NKONKOLO

Signature: AMy

Designation: Ass. STRUCTURAL ENG.

Date: 20/10/2020

Signed by the Auditor

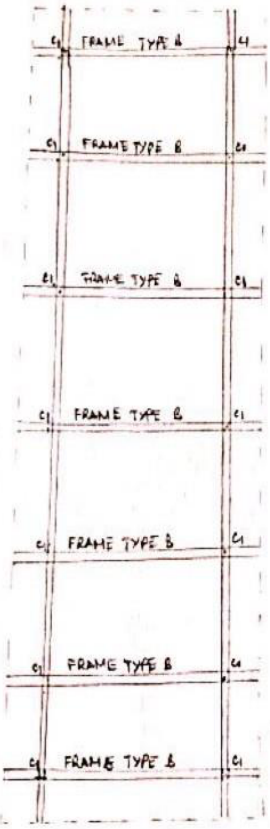
Name: KULWA KIJA

Signature:

Designation: P. AUDITOR

Date: 20/10/2020

Audit Assignment Title: TECHNICAL AUDIT ON BRT PHASE 2 LOT 2
Name of the audited agency / Organisation: TANROAD HQ
Contract Name: BRT PHASE 2 LOT 2

S/No	Bill Item No.	Measurements / Calculations	Output
		 TERMINAL BEAM AND FRAME PLAN,	FRAME TYPE B 7Nos,

Signed by for the audited agency

Name: ABUBAKAR NGONGOLO

Signature:

Designation: Ass. STRUCTURAL Engr

Date: 20/10/2020

Signed by the Auditor

Name: KULWA KIZA

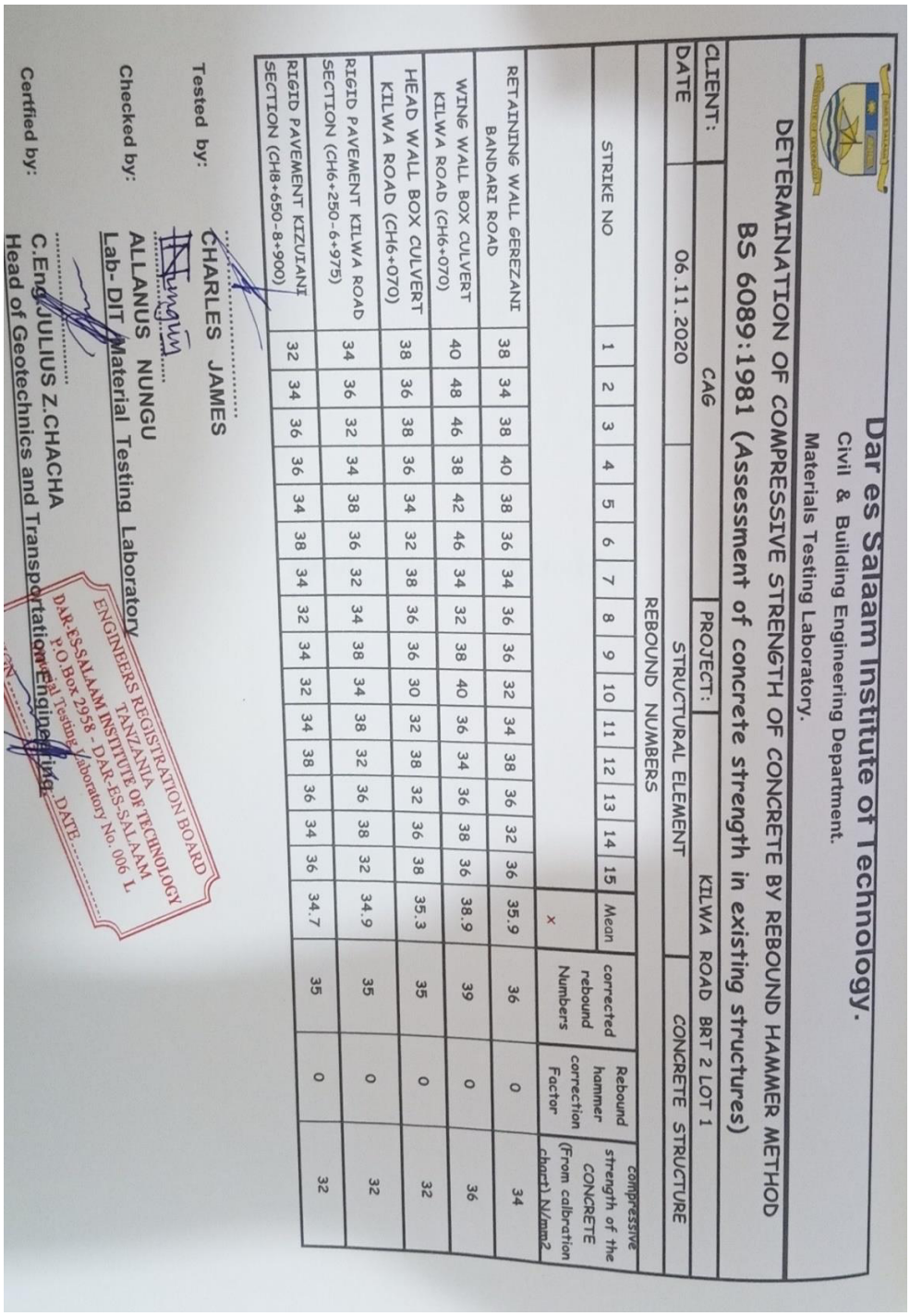
Signature:

Designation: P. AUDITOR

Date: 20/10/2021

Appendix 4: Test Results

Table 1: Non-Destructive Concrete Test Results



Dar es Salaam Institute of Technology.

Civil & Building Engineering Department.

Materials Testing Laboratory.

DETERMINATION OF COMPRESSIVE STRENGTH OF CONCRETE BY REBOUND HAMMER METHOD

BS 6089:1981 (Assessment of concrete strength in existing structures)

CLIENT: CAG | PROJECT: KILWA ROAD BRT 2 LOT 1

DATE 06.11.2020 | STRUCTURAL ELEMENT CONCRETE STRUCTURE

STRIKE NO	REBOUND NUMBERS															Mean x	corrected rebound Numbers	Rebound hammer correction Factor	compressive strength of the CONCRETE (From calbration chart) N/mm2
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15				
RETAINING WALL GEREZANI BANDARI ROAD	38	34	38	40	38	36	34	36	36	32	34	38	36	32	36	35.9	36	0	34
WING WALL BOX CULVERT KILWA ROAD (CH6+070)	40	48	46	38	42	46	34	32	38	40	36	34	36	38	36	38.9	39	0	36
HEAD WALL BOX CULVERT KILWA ROAD (CH6+070)	38	36	38	36	34	32	38	36	36	30	32	38	32	36	38	35.3	35	0	32
RIGID PAVEMENT KILWA ROAD SECTION (CH6+250-6+975)	34	36	32	34	38	36	32	34	38	34	38	32	36	38	32	34.9	35	0	32
RIGID PAVEMENT KIZUIANI SECTION (CH8+650-8+900)	32	34	36	36	34	38	34	32	34	32	34	38	36	34	36	34.7	35	0	32

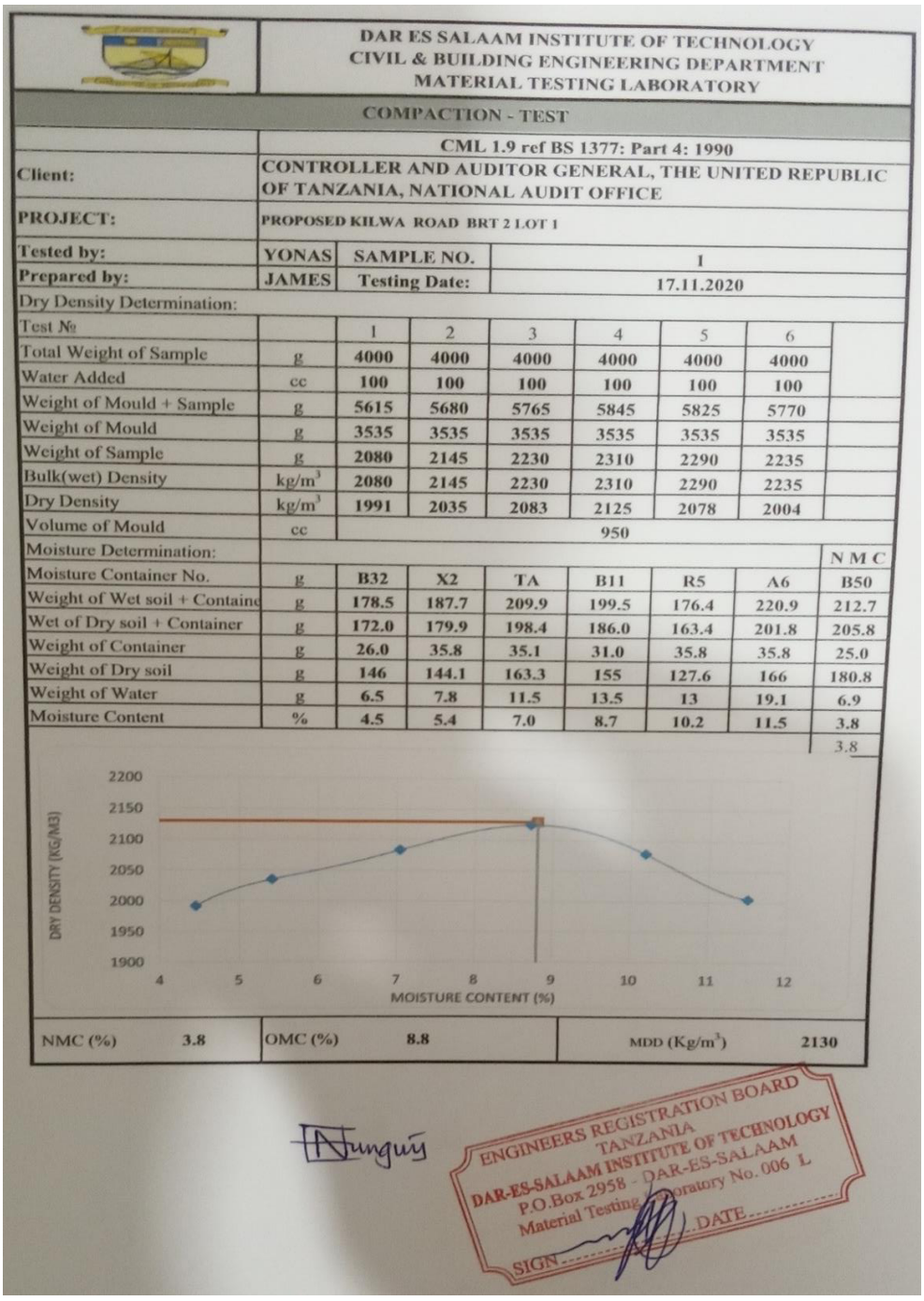
Tested by: CHARLES JAMES

Checked by: ALLANUS NUNGU
Lab- DIT Material Testing Laboratory

Certified by: C.Eng JULIUS Z.CHACHA
Head of Geotechnics and Transportation Engineering

ENGINEERS REGISTRATION BOARD
TANZANIA INSTITUTE OF TECHNOLOGY
P.O.Box 2958 - DAR-ES-SALAAM
Material Testing Laboratory No. 006 L
DAR-ES-SALAAM INSTITUTE OF TECHNOLOGY
P.O. Box 2958 - DAR-ES-SALAAM
Material Testing Laboratory No. 006 L
DATE

Table 2: Determination of Optimum Moisture Content (OMC) and Maximum Dry Density (MDD) of Gravel Stockpiled Material



DAR ES SALAAM INSTITUTE OF TECHNOLOGY
CIVIL & BUILDING ENGINEERING DEPARTMENT
MATERIAL TESTING LABORATORY

COMPACTION - TEST

CML 1.9 ref BS 1377: Part 4: 1990

Client:	CONTROLLER AND AUDITOR GENERAL, THE UNITED REPUBLIC OF TANZANIA, NATIONAL AUDIT OFFICE							
PROJECT:	PROPOSED KILWA ROAD BRT 2 LOT 1							
Tested by:	YONAS	SAMPLE NO.	I					
Prepared by:	JAMES	Testing Date:	17.11.2020					
Dry Density Determination:								
Test №		1	2	3	4	5	6	
Total Weight of Sample	g	4000	4000	4000	4000	4000	4000	
Water Added	cc	100	100	100	100	100	100	
Weight of Mould + Sample	g	5615	5680	5765	5845	5825	5770	
Weight of Mould	g	3535	3535	3535	3535	3535	3535	
Weight of Sample	g	2080	2145	2230	2310	2290	2235	
Bulk(wet) Density	kg/m^3	2080	2145	2230	2310	2290	2235	
Dry Density	kg/m^3	1991	2035	2083	2125	2078	2004	
Volume of Mould	cc	950						
Moisture Determination:								N M C
Moisture Container No.	g	B32	X2	TA	B11	R5	A6	B50
Weight of Wet soil + Containe	g	178.5	187.7	209.9	199.5	176.4	220.9	212.7
Wet of Dry soil + Container	g	172.0	179.9	198.4	186.0	163.4	201.8	205.8
Weight of Container	g	26.0	35.8	35.1	31.0	35.8	35.8	25.0
Weight of Dry soil	g	146	144.1	163.3	155	127.6	166	180.8
Weight of Water	g	6.5	7.8	11.5	13.5	13	19.1	6.9
Moisture Content	%	4.5	5.4	7.0	8.7	10.2	11.5	3.8

3.8

NMC (%)	3.8	OMC (%)	8.8	MDD (Kg/m^3)	2130

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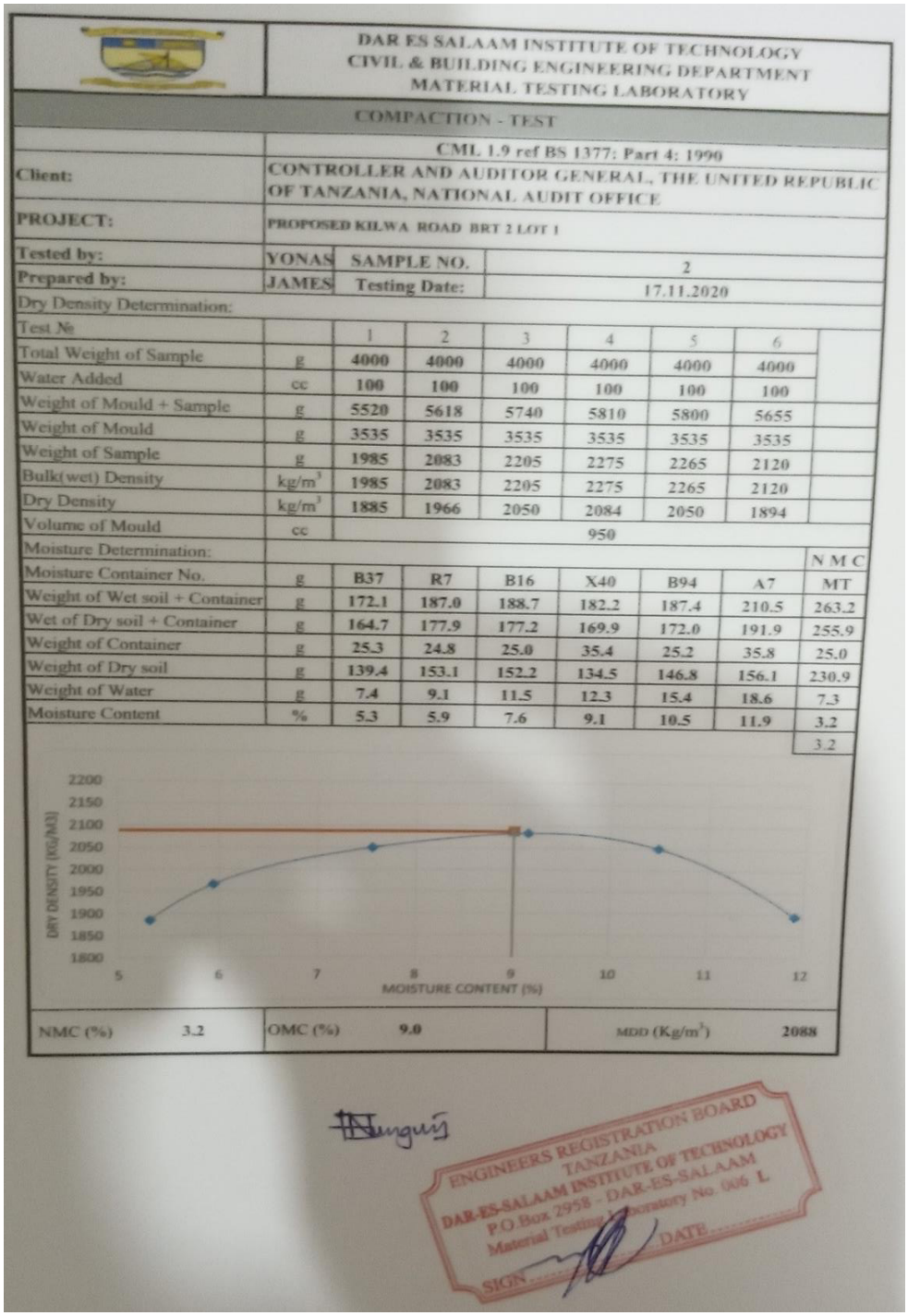

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COMPACTION - TEST

CML 1.9 ref BS 1377: Part 4: 1990

Client:	CONTROLLER AND AUDITOR GENERAL, THE UNITED REPUBLIC OF TANZANIA, NATIONAL AUDIT OFFICE							
PROJECT:	PROPOSED KILWA ROAD BRT 2 LOT 1							
Tested by:	YONAS	SAMPLE NO.	2					
Prepared by:	JAMES	Testing Date:	17.11.2020					
Dry Density Determination:								
Test №		1	2	3	4	5	6	
Total Weight of Sample	g	4000	4000	4000	4000	4000	4000	
Water Added	cc	100	100	100	100	100	100	
Weight of Mould + Sample	g	5520	5618	5740	5810	5800	5655	
Weight of Mould	g	3535	3535	3535	3535	3535	3535	
Weight of Sample	g	1985	2083	2205	2275	2265	2120	
Bulk(wet) Density	kg/m³	1985	2083	2205	2275	2265	2120	
Dry Density	kg/m³	1885	1966	2050	2084	2050	1894	
Volume of Mould	cc	950						
Moisture Determination:								N M C
Moisture Container No.	g	B37	R7	B16	X40	B94	A7	MT
Weight of Wet soil + Container	g	172.1	187.0	188.7	182.2	187.4	210.5	263.2
Wet of Dry soil + Container	g	164.7	177.9	177.2	169.9	172.0	191.9	255.9
Weight of Container	g	25.3	24.8	25.0	35.4	25.2	35.8	25.0
Weight of Dry soil	g	139.4	153.1	152.2	134.5	146.8	156.1	230.9
Weight of Water	g	7.4	9.1	11.5	12.3	15.4	18.6	7.3
Moisture Content	%	5.3	5.9	7.6	9.1	10.5	11.9	3.2
								3.2

NMC (%)	3.2	OMC (%)	9.0	MDD (Kg/m³)	2088

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CIVIL & BUILDING ENGINEERING DEPARTMENT
MATERIAL TESTING LABORATORY

COMPACTION - TEST

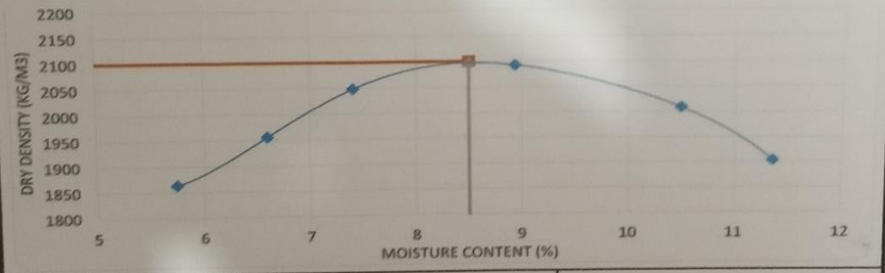
CML 1.9 ref BS 1377: Part 4: 1990

Client:	**CONTROLLER AND AUDITOR GENERAL, THE UNITED REPUBLIC OF TANZANIA, NATIONAL AUDIT OFFICE**		
PROJECT:	**PROPOSED KILWA ROAD BRT 2 LOT 1**		
Tested by:	**YONAS**	**SAMPLE NO.**	**3**
Prepared by:	**JAMES**	**Testing Date:**	**17.11.2020**

Dry Density Determination:

Test №		1	2	3	4	5	6
Total Weight of Sample	g	4000	4000	4000	4000	4000	4000
Water Added	cc	100	100	100	100	100	100
Weight of Mould + Sample	g	5505	5620	5735	5815	5755	5655
Weight of Mould	g	3535	3535	3535	3535	3535	3535
Weight of Sample	g	1970	2085	2200	2280	2220	2120
Bulk(wet) Density	kg/m^3	1970	2085	2200	2280	2220	2120
Dry Density	kg/m^3	1863	1956	2048	2093	2009	1904
Volume of Mould	cc	950					

Moisture Determination:								NMC
Moisture Container No.	g	B12	B10	B26	X13	R4	B35	TC
Weight of Wet soil + Contai	g	189.2	200.3	182.7	182.4	229.6	185.3	171.0
Wet of Dry soil + Container	g	180.5	189.8	171.9	170.3	211.2	169.0	166.5
Weight of Container	g	29.0	30.6	26.1	34.9	35.9	25.5	25.1
Weight of Dry soil	g	151.5	159.2	145.8	135.4	175.3	143.5	141.4
Weight of Water	g	8.7	10.5	10.8	12.1	18.4	16.3	4.5
Moisture Content	%	5.7	6.6	7.4	8.9	10.5	11.4	3.2
								3.2



NMC (%)	3.2	OMC (%)	8.5	MDD (Kg/m^3)	2100

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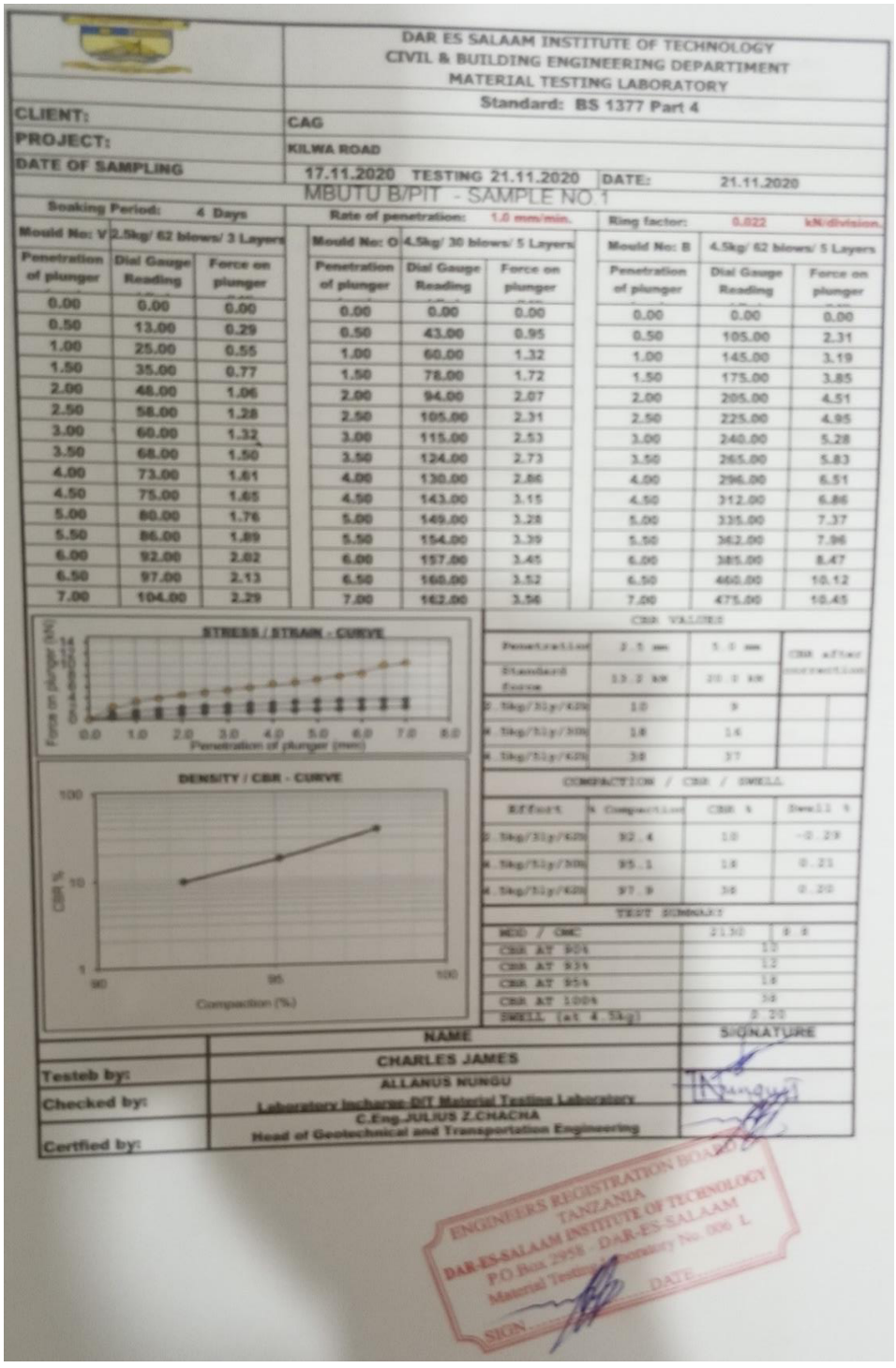
Table 3: California Bearing Ratio Results



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MATERIAL TESTING LABORATORY

Standard: BS 1377 Part 4

CLIENT: CAG
PROJECT: KILWA ROAD
DATE OF SAMPLING: 17.11.2020 TESTING 21.11.2020 DATE: 21.11.2020

MBUTU B/PIT - SAMPLE NO 1

Soaking Period: 4 Days | Rate of penetration: 1.0 mm/min. | Ring factor: 0.022 kN/division

Mould No: V	2.5kg/ 62 blows/ 3 Layers		Mould No: O	4.5kg/ 30 blows/ 5 Layers		Mould No: B	4.5kg/ 62 blows/ 5 Layers	
Penetration of plunger	Dial Gauge Reading	Force on plunger	Penetration of plunger	Dial Gauge Reading	Force on plunger	Penetration of plunger	Dial Gauge Reading	Force on plunger
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.50	13.00	0.29	0.50	43.00	0.95	0.50	105.00	2.31
1.00	25.00	0.55	1.00	60.00	1.32	1.00	145.00	3.19
1.50	35.00	0.77	1.50	78.00	1.72	1.50	175.00	3.85
2.00	48.00	1.06	2.00	94.00	2.07	2.00	205.00	4.51
2.50	58.00	1.28	2.50	105.00	2.31	2.50	225.00	4.95
3.00	60.00	1.32	3.00	115.00	2.53	3.00	240.00	5.28
3.50	68.00	1.50	3.50	124.00	2.73	3.50	265.00	5.83
4.00	73.00	1.61	4.00	130.00	2.86	4.00	296.00	6.51
4.50	75.00	1.65	4.50	143.00	3.15	4.50	312.00	6.86
5.00	80.00	1.76	5.00	149.00	3.28	5.00	335.00	7.37
5.50	86.00	1.89	5.50	154.00	3.39	5.50	362.00	7.96
6.00	92.00	2.02	6.00	157.00	3.45	6.00	385.00	8.47
6.50	97.00	2.13	6.50	160.00	3.52	6.50	460.00	10.12
7.00	104.00	2.29	7.00	162.00	3.56	7.00	475.00	10.45

STRESS / STRAIN - CURVE

Force on plunger (kN)

Penetration of plunger (mm)

CBR VALUES

Penetration	2.5 mm	5.0 mm	CBR after soaking
Standard force	13.2 kN	20.0 kN	
2.5kg/3Lyr/42D	10	9	
4.5kg/5Lyr/30D	18	16	
4.5kg/5Lyr/42D	38	37	

DENSITY / CBR - CURVE

CBR %

Compaction (%)

COMPACTION / CBR / SWELL

Effort	% Compaction	CBR %	Swell %
2.5kg/3Lyr/42D	92.4	10	-0.29
4.5kg/5Lyr/30D	95.1	18	0.21
4.5kg/5Lyr/42D	97.9	38	0.20

TEST SUMMARY

MDD / OMC	21.50	9.6
CBR AT 90%	10	
CBR AT 93%	12	
CBR AT 95%	18	
CBR AT 100%	38	
SWELL (at 4.5kg)	0.20	

	NAME	SIGNATURE
Testeb by:	CHARLES JAMES	
Checked by:	ALLANUS NUNGU Laboratory Incharge-DIT Material Testing Laboratory	
Certfied by:	C.Eng.JULIUS Z.CHACHA Head of Geotechnical and Transportation Engineering	

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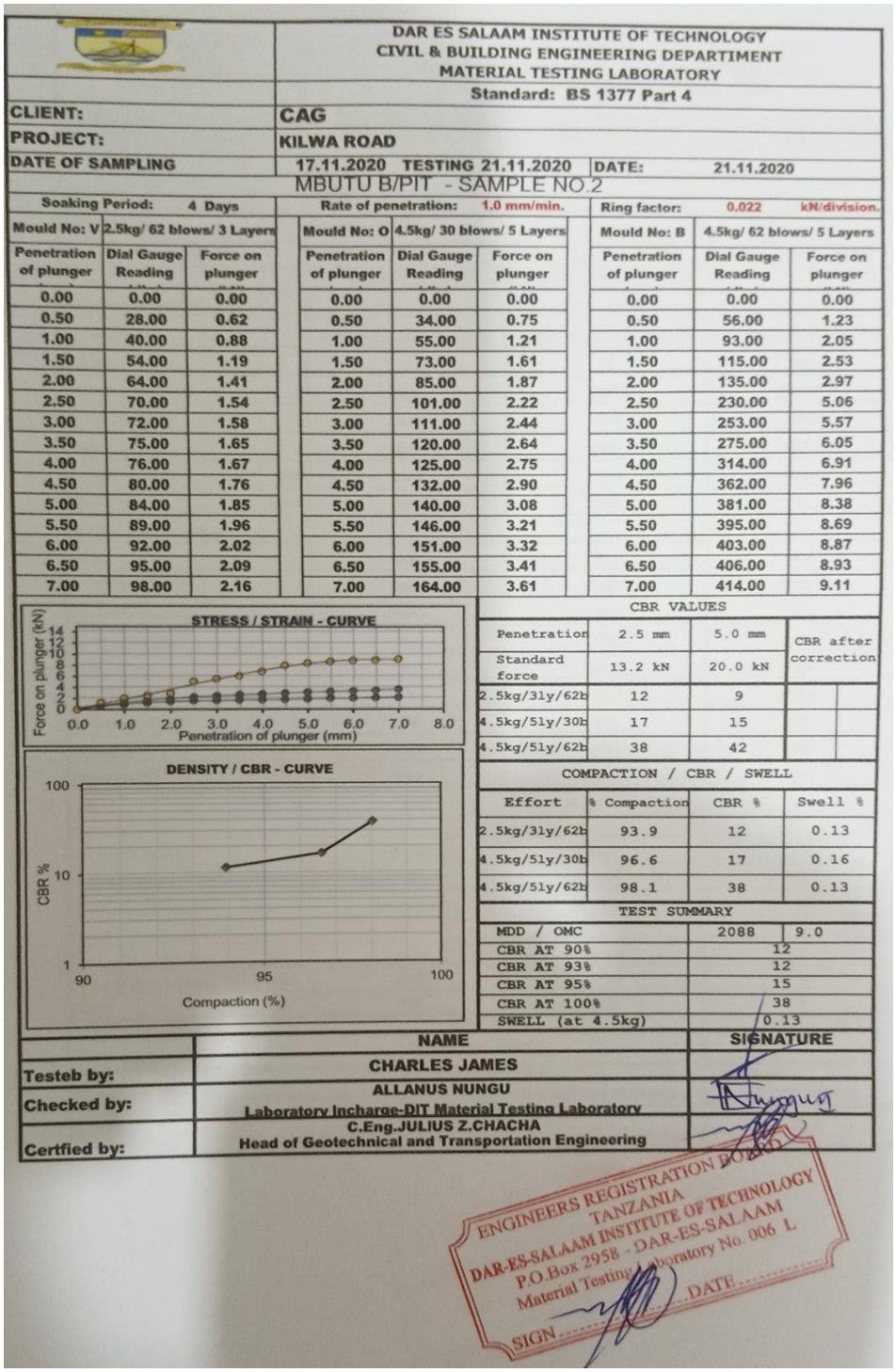

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CIVIL & BUILDING ENGINEERING DEPARTIMENT
MATERIAL TESTING LABORATORY

Standard: BS 1377 Part 4

CLIENT: CAG

PROJECT: KILWA ROAD

DATE OF SAMPLING: 17.11.2020 TESTING 21.11.2020 DATE: 21.11.2020

MBUTU B/PIT - SAMPLE NO.2

Soaking Period: 4 Days | Rate of penetration: 1.0 mm/min. | Ring factor: 0.022 kN/division.

Mould No: V 2.5kg/ 62 blows/ 3 Layers			Mould No: O 4.5kg/ 30 blows/ 5 Layers			Mould No: B 4.5kg/ 62 blows/ 5 Layers		
Penetration of plunger	Dial Gauge Reading	Force on plunger	Penetration of plunger	Dial Gauge Reading	Force on plunger	Penetration of plunger	Dial Gauge Reading	Force on plunger
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.50	28.00	0.62	0.50	34.00	0.75	0.50	56.00	1.23
1.00	40.00	0.88	1.00	55.00	1.21	1.00	93.00	2.05
1.50	54.00	1.19	1.50	73.00	1.61	1.50	115.00	2.53
2.00	64.00	1.41	2.00	85.00	1.87	2.00	135.00	2.97
2.50	70.00	1.54	2.50	101.00	2.22	2.50	230.00	5.06
3.00	72.00	1.58	3.00	111.00	2.44	3.00	253.00	5.57
3.50	75.00	1.65	3.50	120.00	2.64	3.50	275.00	6.05
4.00	76.00	1.67	4.00	125.00	2.75	4.00	314.00	6.91
4.50	80.00	1.76	4.50	132.00	2.90	4.50	362.00	7.96
5.00	84.00	1.85	5.00	140.00	3.08	5.00	381.00	8.38
5.50	89.00	1.96	5.50	146.00	3.21	5.50	395.00	8.69
6.00	92.00	2.02	6.00	151.00	3.32	6.00	403.00	8.87
6.50	95.00	2.09	6.50	155.00	3.41	6.50	406.00	8.93
7.00	98.00	2.16	7.00	164.00	3.61	7.00	414.00	9.11

CBR VALUES

Penetration	2.5 mm	5.0 mm	CBR after correction
Standard force	13.2 kN	20.0 kN	
2.5kg/3ly/62b	12	9	
4.5kg/5ly/30b	17	15	
4.5kg/5ly/62b	38	42	

COMPACTION / CBR / SWELL

Effort	% Compaction	CBR %	Swell %
2.5kg/3ly/62b	93.9	12	0.13
4.5kg/5ly/30b	96.6	17	0.16
4.5kg/5ly/62b	98.1	38	0.13

TEST SUMMARY

MDD / OMC	2088	9.0
CBR AT 90%	12	
CBR AT 93%	12	
CBR AT 95%	15	
CBR AT 100%	38	
SWELL (at 4.5kg)	0.13	

	NAME	SIGNATURE
Testeb by:	CHARLES JAMES	
Checked by:	ALLANUS NUNGU Laboratory Incharge-DIT Material Testing Laboratory	
Certfied by:	C.Eng.JULIUS Z.CHACHA Head of Geotechnical and Transportation Engineering	

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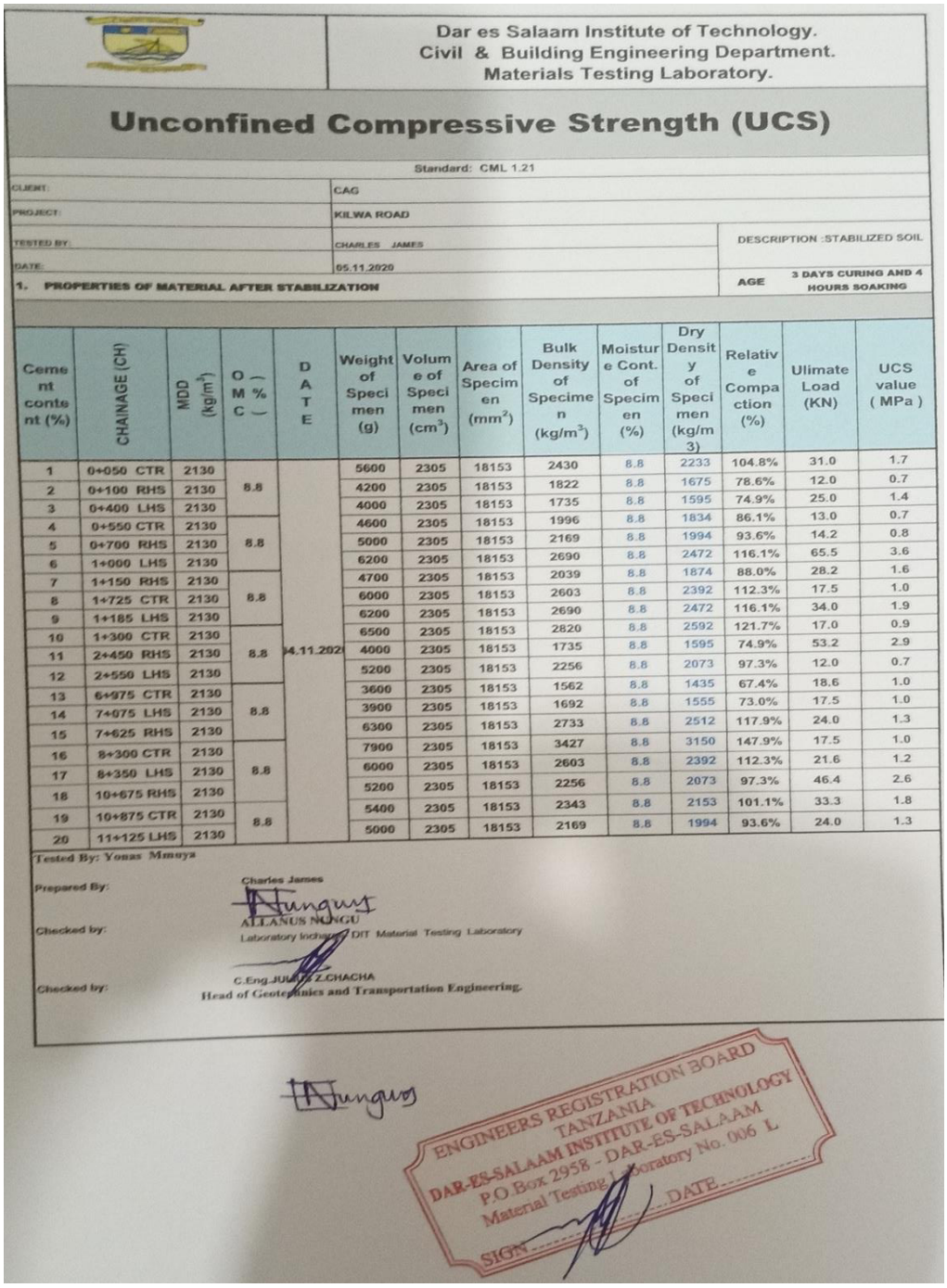
Table 4: Unconfined Compressive Strength (UCS) of Core Samples



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Civil & Building Engineering Department.
Materials Testing Laboratory.

Unconfined Compressive Strength (UCS)

Standard: CML 1.21

CLIENT: CAG
PROJECT: KILWA ROAD
TESTED BY: CHARLES JAMES — DESCRIPTION :STABILIZED SOIL
DATE: 05.11.2020 — AGE 3 DAYS CURING AND 4 HOURS SOAKING

1. PROPERTIES OF MATERIAL AFTER STABILIZATION

Cement content (%)	CHAINAGE (CH)	MDD (kg/m³)	O M C (—)	DATE	Weight of Specimen (g)	Volume of Specimen (cm³)	Area of Specimen (mm²)	Bulk Density of Specimen (kg/m³)	Moisture Cont. of Specimen (%)	Dry Density of Specimen (kg/m3)	Relative Compaction (%)	Ulimate Load (KN)	UCS value (MPa)
1	0+050 CTR	2130	8.8		5600	2305	18153	2430	8.8	2233	104.8%	31.0	1.7
2	0+100 RHS	2130			4200	2305	18153	1822	8.8	1675	78.6%	12.0	0.7
3	0+400 LHS	2130			4000	2305	18153	1735	8.8	1595	74.9%	25.0	1.4
4	0+550 CTR	2130	8.8		4600	2305	18153	1996	8.8	1834	86.1%	13.0	0.7
5	0+700 RHS	2130			5000	2305	18153	2169	8.8	1994	93.6%	14.2	0.8
6	1+000 LHS	2130			6200	2305	18153	2690	8.8	2472	116.1%	65.5	3.6
7	1+150 RHS	2130	8.8		4700	2305	18153	2039	8.8	1874	88.0%	28.2	1.6
8	1+725 CTR	2130			6000	2305	18153	2603	8.8	2392	112.3%	17.5	1.0
9	1+185 LHS	2130			6200	2305	18153	2690	8.8	2472	116.1%	34.0	1.9
10	1+300 CTR	2130	8.8		6500	2305	18153	2820	8.8	2592	121.7%	17.0	0.9
11	2+450 RHS	2130		4.11.202	4000	2305	18153	1735	8.8	1595	74.9%	53.2	2.9
12	2+550 LHS	2130			5200	2305	18153	2256	8.8	2073	97.3%	12.0	0.7
13	6+975 CTR	2130	8.8		3600	2305	18153	1562	8.8	1435	67.4%	18.6	1.0
14	7+075 LHS	2130			3900	2305	18153	1692	8.8	1555	73.0%	17.5	1.0
15	7+625 RHS	2130			6300	2305	18153	2733	8.8	2512	117.9%	24.0	1.3
16	8+300 CTR	2130	8.8		7900	2305	18153	3427	8.8	3150	147.9%	17.5	1.0
17	8+350 LHS	2130			6000	2305	18153	2603	8.8	2392	112.3%	21.6	1.2
18	10+675 RHS	2130			5200	2305	18153	2256	8.8	2073	97.3%	46.4	2.6
19	10+875 CTR	2130	8.8		5400	2305	18153	2343	8.8	2153	101.1%	33.3	1.8
20	11+125 LHS	2130			5000	2305	18153	2169	8.8	1994	93.6%	24.0	1.3

Tested By: Yonas Mmuya

Prepared By: Charles James

Checked by: ALLANUS NONGU
Laboratory Incharge DIT Material Testing Laboratory

Checked by: C.Eng.JULIUS Z.CHACHA
Head of Geotechnics and Transportation Engineering.

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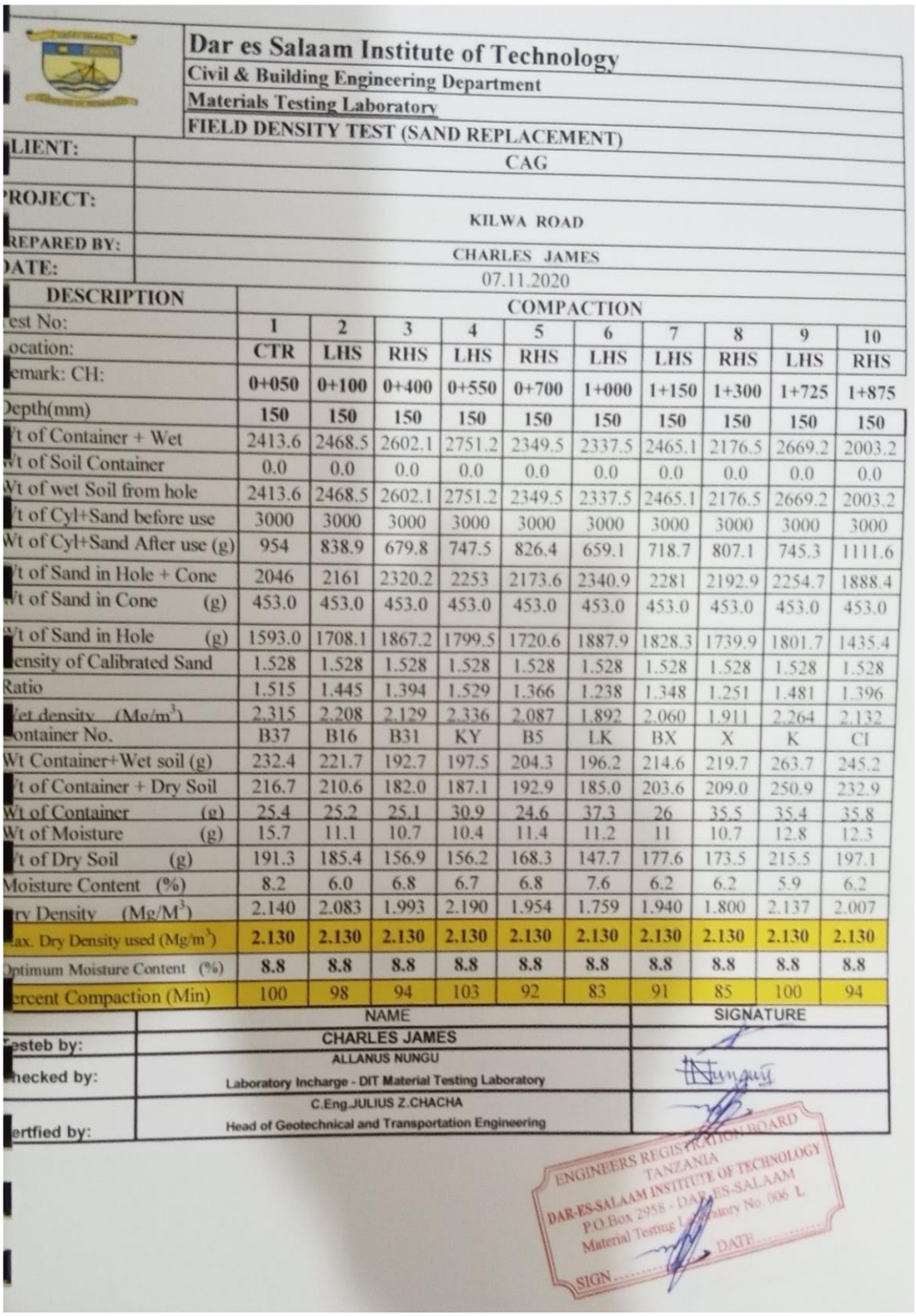
Table 5: Field Density Test Using Sand Replacement



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Civil & Building Engineering Department
Materials Testing Laboratory
FIELD DENSITY TEST (SAND REPLACEMENT)

CLIENT:	CAG
PROJECT:	KILWA ROAD
PREPARED BY:	CHARLES JAMES
DATE:	07.11.2020

DESCRIPTION	COMPACTION									
Test No:	1	2	3	4	5	6	7	8	9	10
Location:	CTR	LHS	RHS	LHS	RHS	LHS	LHS	RHS	LHS	RHS
Remark: CH:	0+050	0+100	0+400	0+550	0+700	1+000	1+150	1+300	1+725	1+875
Depth(mm)	150	150	150	150	150	150	150	150	150	150
Wt of Container + Wet	2413.6	2468.5	2602.1	2751.2	2349.5	2337.5	2465.1	2176.5	2669.2	2003.2
Wt of Soil Container	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wt of wet Soil from hole	2413.6	2468.5	2602.1	2751.2	2349.5	2337.5	2465.1	2176.5	2669.2	2003.2
Wt of Cyl+Sand before use	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
Wt of Cyl+Sand After use (g)	954	838.9	679.8	747.5	826.4	659.1	718.7	807.1	745.3	1111.6
Wt of Sand in Hole + Cone	2046	2161	2320.2	2253	2173.6	2340.9	2281	2192.9	2254.7	1888.4
Wt of Sand in Cone (g)	453.0	453.0	453.0	453.0	453.0	453.0	453.0	453.0	453.0	453.0
Wt of Sand in Hole (g)	1593.0	1708.1	1867.2	1799.5	1720.6	1887.9	1828.3	1739.9	1801.7	1435.4
Density of Calibrated Sand	1.528	1.528	1.528	1.528	1.528	1.528	1.528	1.528	1.528	1.528
Ratio	1.515	1.445	1.394	1.529	1.366	1.238	1.348	1.251	1.481	1.396
Wet density (Mg/m^3)	2.315	2.208	2.129	2.336	2.087	1.892	2.060	1.911	2.264	2.132
Container No.	B37	B16	B31	KY	B5	LK	BX	X	K	CI
Wt Container+Wet soil (g)	232.4	221.7	192.7	197.5	204.3	196.2	214.6	219.7	263.7	245.2
Wt of Container + Dry Soil	216.7	210.6	182.0	187.1	192.9	185.0	203.6	209.0	250.9	232.9
Wt of Container (g)	25.4	25.2	25.1	30.9	24.6	37.3	26	35.5	35.4	35.8
Wt of Moisture (g)	15.7	11.1	10.7	10.4	11.4	11.2	11	10.7	12.8	12.3
Wt of Dry Soil (g)	191.3	185.4	156.9	156.2	168.3	147.7	177.6	173.5	215.5	197.1
Moisture Content (%)	8.2	6.0	6.8	6.7	6.8	7.6	6.2	6.2	5.9	6.2
Dry Density (Mg/M^3)	2.140	2.083	1.993	2.190	1.954	1.759	1.940	1.800	2.137	2.007
Max. Dry Density used (Mg/m^3)	2.130	2.130	2.130	2.130	2.130	2.130	2.130	2.130	2.130	2.130
Optimum Moisture Content (%)	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8
Percent Compaction (Min)	100	98	94	103	92	83	91	85	100	94

	NAME	SIGNATURE
Tested by:	CHARLES JAMES	
Checked by:	ALLANUS NUNGU Laboratory Incharge - DIT Material Testing Laboratory	
Certified by:	C.Eng.JULIUS Z.CHACHA Head of Geotechnical and Transportation Engineering	

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DATE
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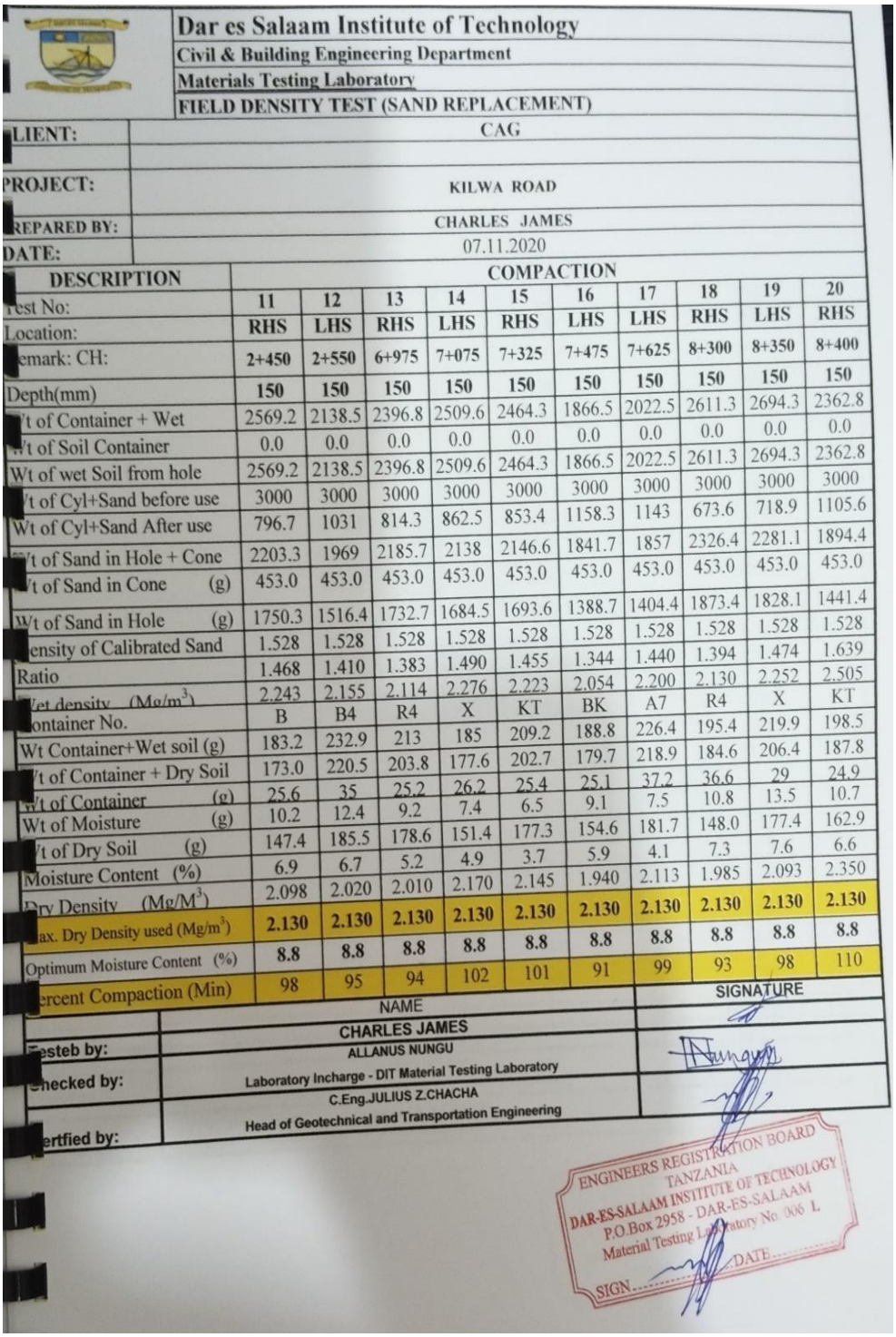

Dar es Salaam Institute of Technology
Civil & Building Engineering Department
Materials Testing Laboratory
FIELD DENSITY TEST (SAND REPLACEMENT)

CLIENT: CAG
PROJECT: KILWA ROAD
PREPARED BY: CHARLES JAMES
DATE: 07.11.2020

DESCRIPTION	COMPACTION									
Test No:	11	12	13	14	15	16	17	18	19	20
Location:	RHS	LHS	RHS	LHS	RHS	LHS	LHS	RHS	LHS	RHS
Remark: CH:	2+450	2+550	6+975	7+075	7+325	7+475	7+625	8+300	8+350	8+400
Depth(mm)	150	150	150	150	150	150	150	150	150	150
Wt of Container + Wet	2569.2	2138.5	2396.8	2509.6	2464.3	1866.5	2022.5	2611.3	2694.3	2362.8
Wt of Soil Container	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wt of wet Soil from hole	2569.2	2138.5	2396.8	2509.6	2464.3	1866.5	2022.5	2611.3	2694.3	2362.8
Wt of Cyl+Sand before use	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
Wt of Cyl+Sand After use	796.7	1031	814.3	862.5	853.4	1158.3	1143	673.6	718.9	1105.6
Wt of Sand in Hole + Cone	2203.3	1969	2185.7	2138	2146.6	1841.7	1857	2326.4	2281.1	1894.4
Wt of Sand in Cone (g)	453.0	453.0	453.0	453.0	453.0	453.0	453.0	453.0	453.0	453.0
Wt of Sand in Hole (g)	1750.3	1516.4	1732.7	1684.5	1693.6	1388.7	1404.4	1873.4	1828.1	1441.4
Density of Calibrated Sand	1.528	1.528	1.528	1.528	1.528	1.528	1.528	1.528	1.528	1.528
Ratio	1.468	1.410	1.383	1.490	1.455	1.344	1.440	1.394	1.474	1.639
Wet density (Mg/m^3)	2.243	2.155	2.114	2.276	2.223	2.054	2.200	2.130	2.252	2.505
Container No.	B	B4	R4	X	KT	BK	A7	R4	X	KT
Wt Container+Wet soil (g)	183.2	232.9	213	185	209.2	188.8	226.4	195.4	219.9	198.5
Wt of Container + Dry Soil	173.0	220.5	203.8	177.6	202.7	179.7	218.9	184.6	206.4	187.8
Wt of Container (g)	25.6	35	25.2	26.2	25.4	25.1	37.2	36.6	29	24.9
Wt of Moisture (g)	10.2	12.4	9.2	7.4	6.5	9.1	7.5	10.8	13.5	10.7
Wt of Dry Soil (g)	147.4	185.5	178.6	151.4	177.3	154.6	181.7	148.0	177.4	162.9
Moisture Content (%)	6.9	6.7	5.2	4.9	3.7	5.9	4.1	7.3	7.6	6.6
Dry Density (Mg/M^3)	2.098	2.020	2.010	2.170	2.145	1.940	2.113	1.985	2.093	2.350
Max. Dry Density used (Mg/m^3)	2.130	2.130	2.130	2.130	2.130	2.130	2.130	2.130	2.130	2.130
Optimum Moisture Content (%)	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8
Percent Compaction (Min)	98	95	94	102	101	91	99	93	98	110

	NAME	SIGNATURE
Tested by:	CHARLES JAMES	
Checked by:	ALLANUS NUNGU Laboratory Incharge - DIT Material Testing Laboratory	
Certfied by:	C.Eng.JULIUS Z.CHACHA Head of Geotechnical and Transportation Engineering	

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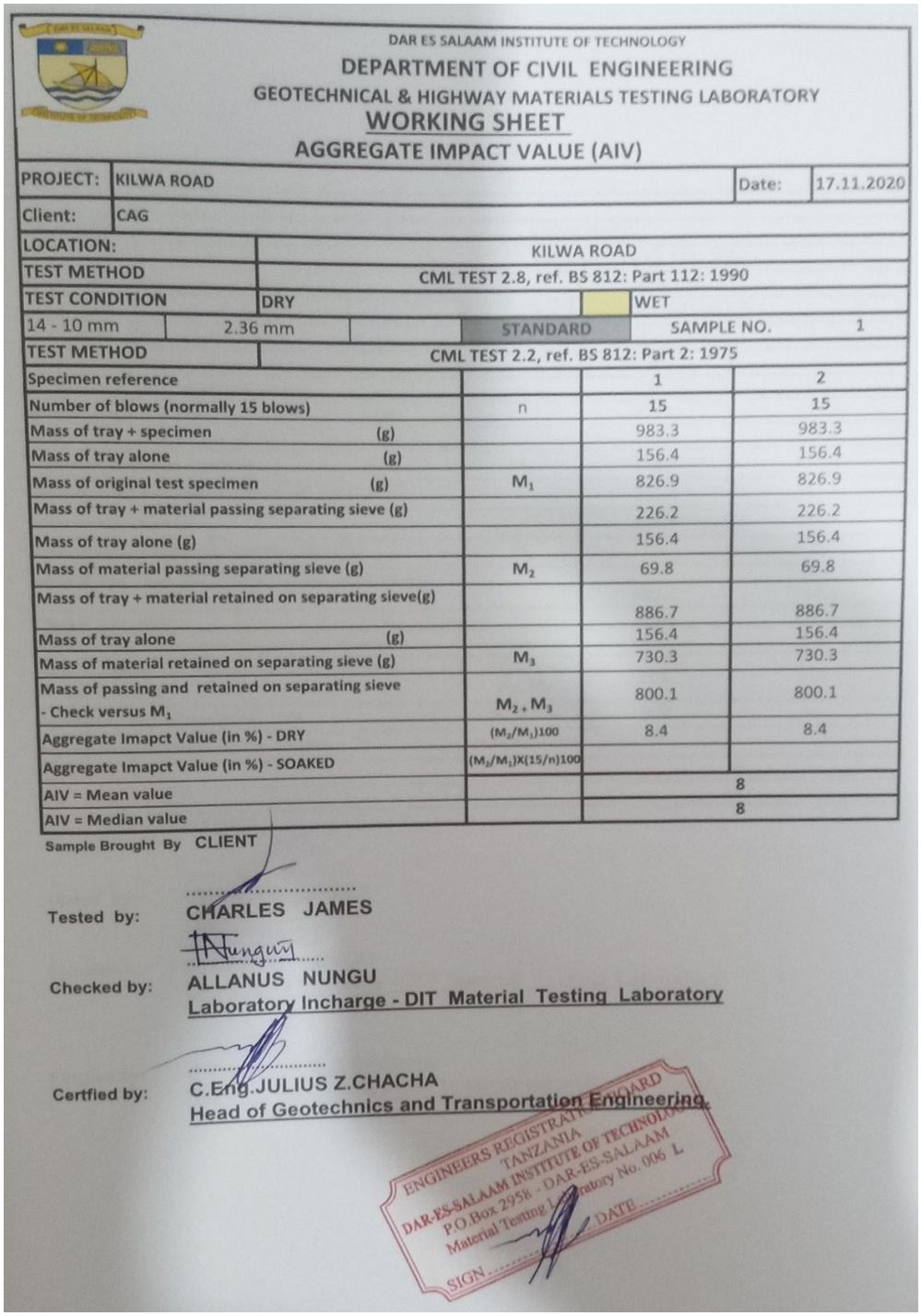
Table 6: Aggregate Tests



DAR ES SALAAM INSTITUTE OF TECHNOLOGY
DEPARTMENT OF CIVIL ENGINEERING
GEOTECHNICAL & HIGHWAY MATERIALS TESTING LABORATORY
WORKING SHEET
AGGREGATE IMPACT VALUE (AIV)

PROJECT:	KILWA ROAD	Date:	17.11.2020
Client:	CAG		
LOCATION:	KILWA ROAD		
TEST METHOD	CML TEST 2.8, ref. BS 812: Part 112: 1990		
TEST CONDITION	DRY	WET	
14 - 10 mm	2.36 mm	STANDARD	SAMPLE NO. 1
TEST METHOD	CML TEST 2.2, ref. BS 812: Part 2: 1975		

		1	2
Specimen reference		1	2
Number of blows (normally 15 blows)	n	15	15
Mass of tray + specimen (g)		983.3	983.3
Mass of tray alone (g)		156.4	156.4
Mass of original test specimen (g)	M_1	826.9	826.9
Mass of tray + material passing separating sieve (g)		226.2	226.2
Mass of tray alone (g)		156.4	156.4
Mass of material passing separating sieve (g)	M_2	69.8	69.8
Mass of tray + material retained on separating sieve(g)		886.7	886.7
Mass of tray alone (g)		156.4	156.4
Mass of material retained on separating sieve (g)	M_3	730.3	730.3
Mass of passing and retained on separating sieve - Check versus M_1	$M_2 + M_3$	800.1	800.1
Aggregate Imapct Value (in %) - DRY	$(M_2/M_1)100$	8.4	8.4
Aggregate Imapct Value (in %) - SOAKED	$(M_2/M_1)X(15/n)100$		
AIV = Mean value		8	
AIV = Median value		8	

Sample Brought By CLIENT

Tested by: CHARLES JAMES

Checked by: ALLANUS NUNGU
Laboratory Incharge - DIT Material Testing Laboratory

Certfied by: C.Eng.JULIUS Z.CHACHA
Head of Geotechnics and Transportation Engineering

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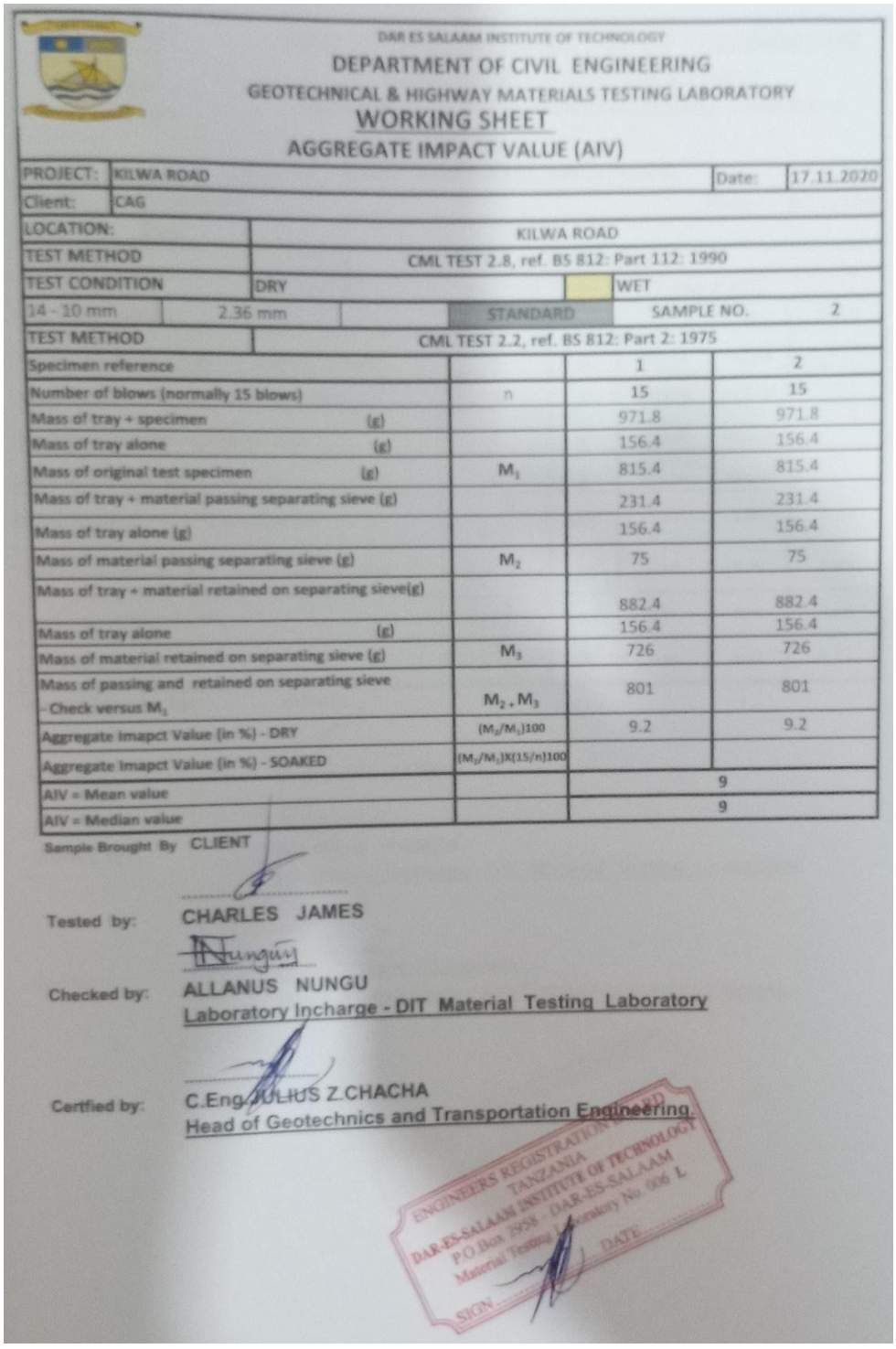

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DEPARTMENT OF CIVIL ENGINEERING

GEOTECHNICAL & HIGHWAY MATERIALS TESTING LABORATORY

WORKING SHEET

AGGREGATE IMPACT VALUE (AIV)

PROJECT:	KILWA ROAD	Date:	17.11.2020
Client:	CAG		
LOCATION:	KILWA ROAD		
TEST METHOD	CML TEST 2.8, ref. BS 812: Part 112: 1990		
TEST CONDITION	DRY	WET	
14 - 10 mm	2.36 mm	STANDARD	SAMPLE NO. 2
TEST METHOD	CML TEST 2.2, ref. BS 812: Part 2: 1975		

Specimen reference		1	2
Number of blows (normally 15 blows)	n	15	15
Mass of tray + specimen (g)		971.8	971.8
Mass of tray alone (g)		156.4	156.4
Mass of original test specimen (g)	M_1	815.4	815.4
Mass of tray + material passing separating sieve (g)		231.4	231.4
Mass of tray alone (g)		156.4	156.4
Mass of material passing separating sieve (g)	M_2	75	75
Mass of tray + material retained on separating sieve(g)		882.4	882.4
Mass of tray alone (g)		156.4	156.4
Mass of material retained on separating sieve (g)	M_3	726	726
Mass of passing and retained on separating sieve - Check versus M_1	$M_2 + M_3$	801	801
Aggregate Imapct Value (in %) - DRY	$(M_2/M_1)100$	9.2	9.2
Aggregate Imapct Value (in %) - SOAKED	$(M_2/M_1)X(15/n)100$		
AIV = Mean value		9	
AIV = Median value		9	

Sample Brought By CLIENT

Tested by: CHARLES JAMES

Checked by: ALLANUS NUNGU
Laboratory Incharge - DIT Material Testing Laboratory

Certfied by: C.Eng. JULIUS Z.CHACHA
Head of Geotechnics and Transportation Engineering

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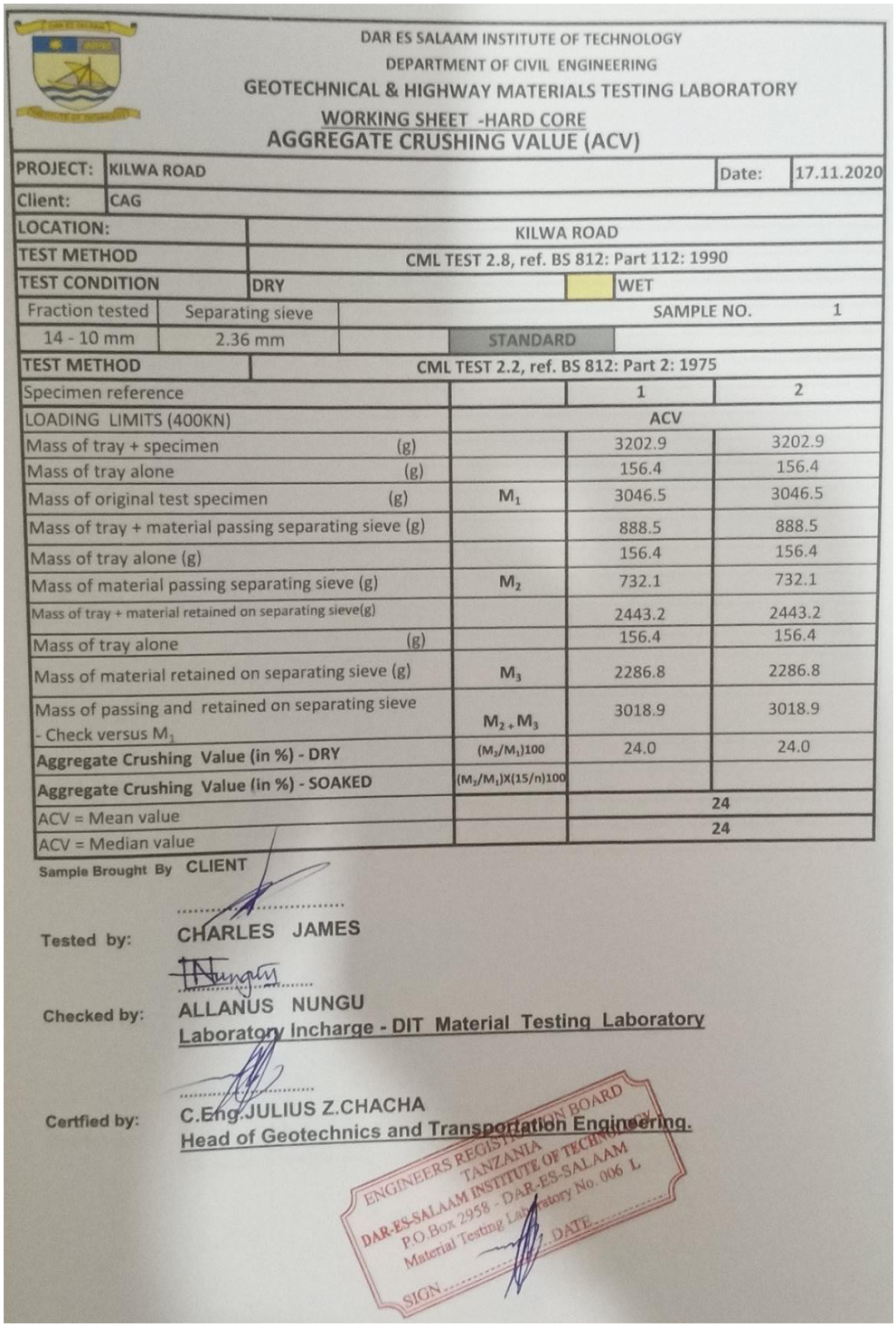

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DEPARTMENT OF CIVIL ENGINEERING
GEOTECHNICAL & HIGHWAY MATERIALS TESTING LABORATORY
WORKING SHEET -HARD CORE
AGGREGATE CRUSHING VALUE (ACV)

PROJECT:	KILWA ROAD		Date:	17.11.2020
Client:	CAG			
LOCATION:	KILWA ROAD			
TEST METHOD	CML TEST 2.8, ref. BS 812: Part 112: 1990			
TEST CONDITION	DRY		WET	
Fraction tested	Separating sieve		SAMPLE NO.	1
14 - 10 mm	2.36 mm	STANDARD		
TEST METHOD	CML TEST 2.2, ref. BS 812: Part 2: 1975			
Specimen reference			1	2
LOADING LIMITS (400KN)			ACV	
Mass of tray + specimen (g)			3202.9	3202.9
Mass of tray alone (g)			156.4	156.4
Mass of original test specimen (g)		M_1	3046.5	3046.5
Mass of tray + material passing separating sieve (g)			888.5	888.5
Mass of tray alone (g)			156.4	156.4
Mass of material passing separating sieve (g)		M_2	732.1	732.1
Mass of tray + material retained on separating sieve(g)			2443.2	2443.2
Mass of tray alone (g)			156.4	156.4
Mass of material retained on separating sieve (g)		M_3	2286.8	2286.8
Mass of passing and retained on separating sieve - Check versus M_1		$M_2 + M_3$	3018.9	3018.9
Aggregate Crushing Value (in %) - DRY		$(M_2/M_1)100$	24.0	24.0
Aggregate Crushing Value (in %) - SOAKED		$(M_2/M_1)X(15/n)100$		
ACV = Mean value			24	
ACV = Median value			24	

Sample Brought By CLIENT

Tested by: CHARLES JAMES

Checked by: ALLANUS NUNGU
Laboratory Incharge - DIT Material Testing Laboratory

Certfied by: C.Eng.JULIUS Z.CHACHA
Head of Geotechnics and Transportation Engineering.

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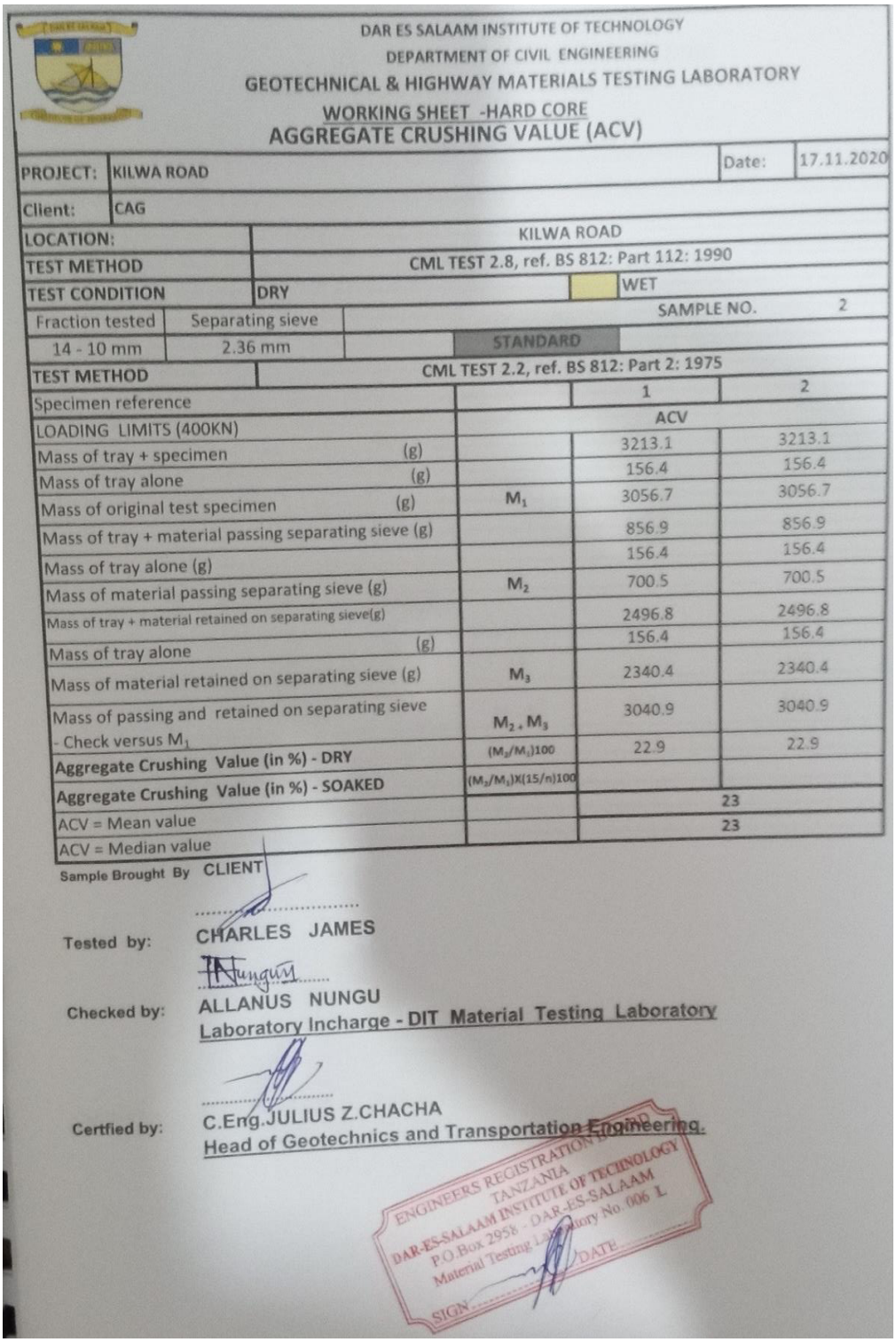

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DEPARTMENT OF CIVIL ENGINEERING
GEOTECHNICAL & HIGHWAY MATERIALS TESTING LABORATORY
WORKING SHEET -HARD CORE
AGGREGATE CRUSHING VALUE (ACV)

PROJECT:	KILWA ROAD	Date:	17.11.2020
Client:	CAG		
LOCATION:	KILWA ROAD		
TEST METHOD	CML TEST 2.8, ref. BS 812: Part 112: 1990		
TEST CONDITION	DRY	WET	
Fraction tested	Separating sieve	SAMPLE NO.	2
14 - 10 mm	2.36 mm	STANDARD	
TEST METHOD	CML TEST 2.2, ref. BS 812: Part 2: 1975		

Specimen reference		1	2
LOADING LIMITS (400KN)		ACV	
Mass of tray + specimen (g)		3213.1	3213.1
Mass of tray alone (g)		156.4	156.4
Mass of original test specimen (g)	M_1	3056.7	3056.7
Mass of tray + material passing separating sieve (g)		856.9	856.9
Mass of tray alone (g)		156.4	156.4
Mass of material passing separating sieve (g)	M_2	700.5	700.5
Mass of tray + material retained on separating sieve(g)		2496.8	2496.8
Mass of tray alone (g)		156.4	156.4
Mass of material retained on separating sieve (g)	M_3	2340.4	2340.4
Mass of passing and retained on separating sieve - Check versus M_1	$M_2 + M_3$	3040.9	3040.9
Aggregate Crushing Value (in %) - DRY	$(M_2/M_1)100$	22.9	22.9
Aggregate Crushing Value (in %) - SOAKED	$(M_2/M_1)X(15/n)100$		
ACV = Mean value		23	
ACV = Median value		23	

Sample Brought By CLIENT

Tested by: CHARLES JAMES

Checked by: ALLANUS NUNGU
Laboratory Incharge - DIT Material Testing Laboratory

Certfied by: C.Eng.JULIUS Z.CHACHA
Head of Geotechnics and Transportation Engineering.

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Material Testing Laboratory No. 006 L
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DAR ES SALAAM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

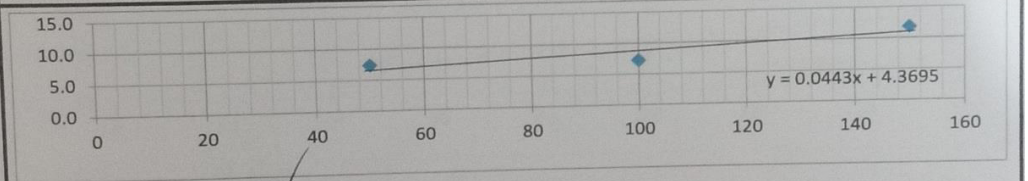
GEOTECHNICAL & HIGHWAY MATERIALS TESTING LABORATORY

WORKING SHEET

Ten Percent Fines Value (TFV) - 10% FACT

Client:	CAG	DATE:
Project:	KILWA ROAD	17.11.2020

TEST METHOD	CML TEST 2.7, ref. BS 812: Part 111: 1990			
Fraction tested	Separating sieve	SAMPLE NO.		1
14 - 10 mm	2.36 mm	STANDARD		
TEST METHOD	CML TEST 2.2, ref. BS 812: Part 2: 1975			
Specimen reference		1	2	3
Applied Force	F (kN)	50	100	150
Mass of tray + test specimen (g)		3460.4	3355.5	3344.2
Mass of tray alone (g)		264.7	264.7	264.7
Mass of original test specimen (g)	M_1	3195.7	3090.8	3079.5
Mass of tray + material passing separating sieve (g)		334.8	487.3	628.4
Mass of tray alone (g)		264.7	264.7	264.7
Mass of material passing separating sieve (g)	M_2	235.9	222.6	363.7
Mass of tray + material retained on separating sieve(g)		3375.3	3132.7	2974.2
Mass of tray alone (g)		264.7	264.7	264.7
Mass of material retained on separating sieve (g)	M_3	3110.6	2868	2709.5
Mass of passing and retained on separating sieve - Check versus M_1	$M_{2+}M_3$	3346.5	3090.6	3073.2
Percentage Fines (in %)	$(M_2/M_1)100$	7.4	7.2	11.8
ACV (for F= 400kN)	%	x	x	x
10% Fines Value (From Chart) kN	F(kN)	127		



Sample Brought By: CLIENT

Tested by: CHARLES JAMES

Checked by: ALLANUS NUNGU
Laboratory Incharge - DIT Material Testing Laboratory

Certfied by: C.Eng.JULIUS Z.CHACHA
Head of Geotechnics and Transportation Engineering.

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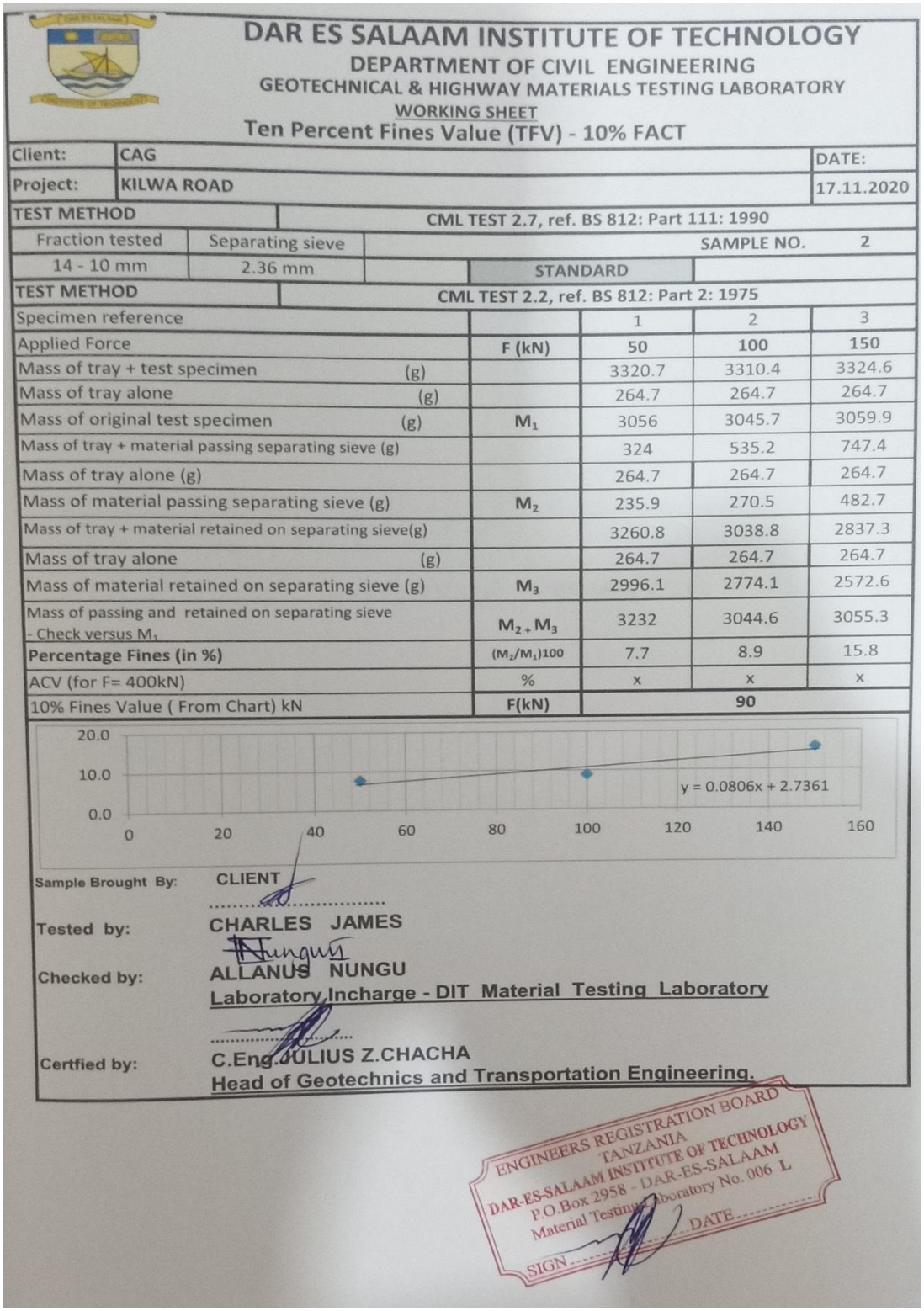

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DEPARTMENT OF CIVIL ENGINEERING

GEOTECHNICAL & HIGHWAY MATERIALS TESTING LABORATORY

WORKING SHEET

Ten Percent Fines Value (TFV) - 10% FACT

Client:	CAG	DATE:
Project:	KILWA ROAD	17.11.2020

TEST METHOD	CML TEST 2.7, ref. BS 812: Part 111: 1990			
Fraction tested	Separating sieve		SAMPLE NO.	2
14 - 10 mm	2.36 mm		STANDARD	
TEST METHOD	CML TEST 2.2, ref. BS 812: Part 2: 1975			

Specimen reference		1	2	3
Applied Force	F (kN)	50	100	150
Mass of tray + test specimen (g)		3320.7	3310.4	3324.6
Mass of tray alone (g)		264.7	264.7	264.7
Mass of original test specimen (g)	M_1	3056	3045.7	3059.9
Mass of tray + material passing separating sieve (g)		324	535.2	747.4
Mass of tray alone (g)		264.7	264.7	264.7
Mass of material passing separating sieve (g)	M_2	235.9	270.5	482.7
Mass of tray + material retained on separating sieve(g)		3260.8	3038.8	2837.3
Mass of tray alone (g)		264.7	264.7	264.7
Mass of material retained on separating sieve (g)	M_3	2996.1	2774.1	2572.6
Mass of passing and retained on separating sieve - Check versus M_1	M_2+M_3	3232	3044.6	3055.3
Percentage Fines (in %)	$(M_2/M_1)100$	7.7	8.9	15.8
ACV (for F= 400kN)	%	x	x	x
10% Fines Value (From Chart) kN	F(kN)	90		

Sample Brought By: CLIENT

Tested by: CHARLES JAMES

Checked by: ALLANUS NUNGU
Laboratory Incharge - DIT Material Testing Laboratory

Certfied by: C.Eng.JULIUS Z.CHACHA
Head of Geotechnics and Transportation Engineering.

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Table 7: Soil Classification Test

Sieve Analysis Test Results

Dar es Salaam Institute of Technology.
Civil & Building Engineering Department.
Materials Testing Laboratory.

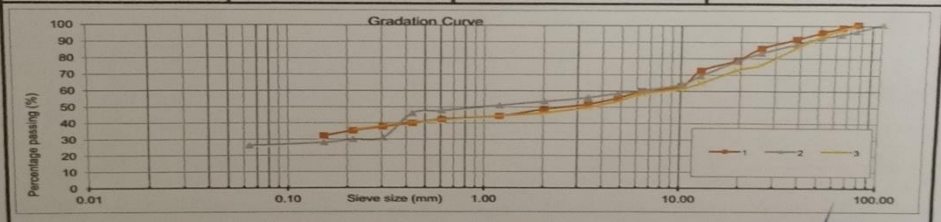
CLIENT:	CAG
PROJECT:	KILWA ROAD
DATE:	11.11.2020

GRAIN SIZE DISTRIBUTION

GRAVEL MATERIALS B/PIT MATERIALS	LHS	RHS	CTR
	1	2	3
Sieve Size:(mm)			
100		100	
75		96	
63	100	94	
50	98	92	100
37.5	95	88	97
25	91	83	93
19	86	78	86
12.5	78	69	75
10	72	63	72
6.3	62	60	64
4.75	59	58	61
3.35	55	55	58
2.00	51	53	53
1.18	48	50	49
0.600	44	47	46
0.425	42	45	44
0.300	39	30	42
0.212	37	29	40
0.150	35	27	38
0.063	32	26	35

CLASSIFICATION

USCS	A-2-6	A-2-6	A-2-6
% Gravels	49	47	47
% Sand	20	27	18
% Fines	32	26	35
LL (%)	34	34	34
PL (%)	16	14	14
PI (%)	18	20	20
Grading Modulus: GM = (300-P2.00mm-P0.425mm-P0.075mm)/100	1.73	1.75	1.66
Grading Coefficient: GC =((%<28mm-%<0.425mm)×(%<5mm))/100	29.5	21.1	30.2



TECHNICAL TEAM:	NAME	SIGNATURE
Testeb by:	CHARLES JAMES	
Checked by:	ALLANUS NUNGU Senior Instructor-DIT Material Testing Laboratory	
Certfied by:	C.Eng.JULIUS Z.CHACHA Head of Geotechnical and Transportation Engineering	

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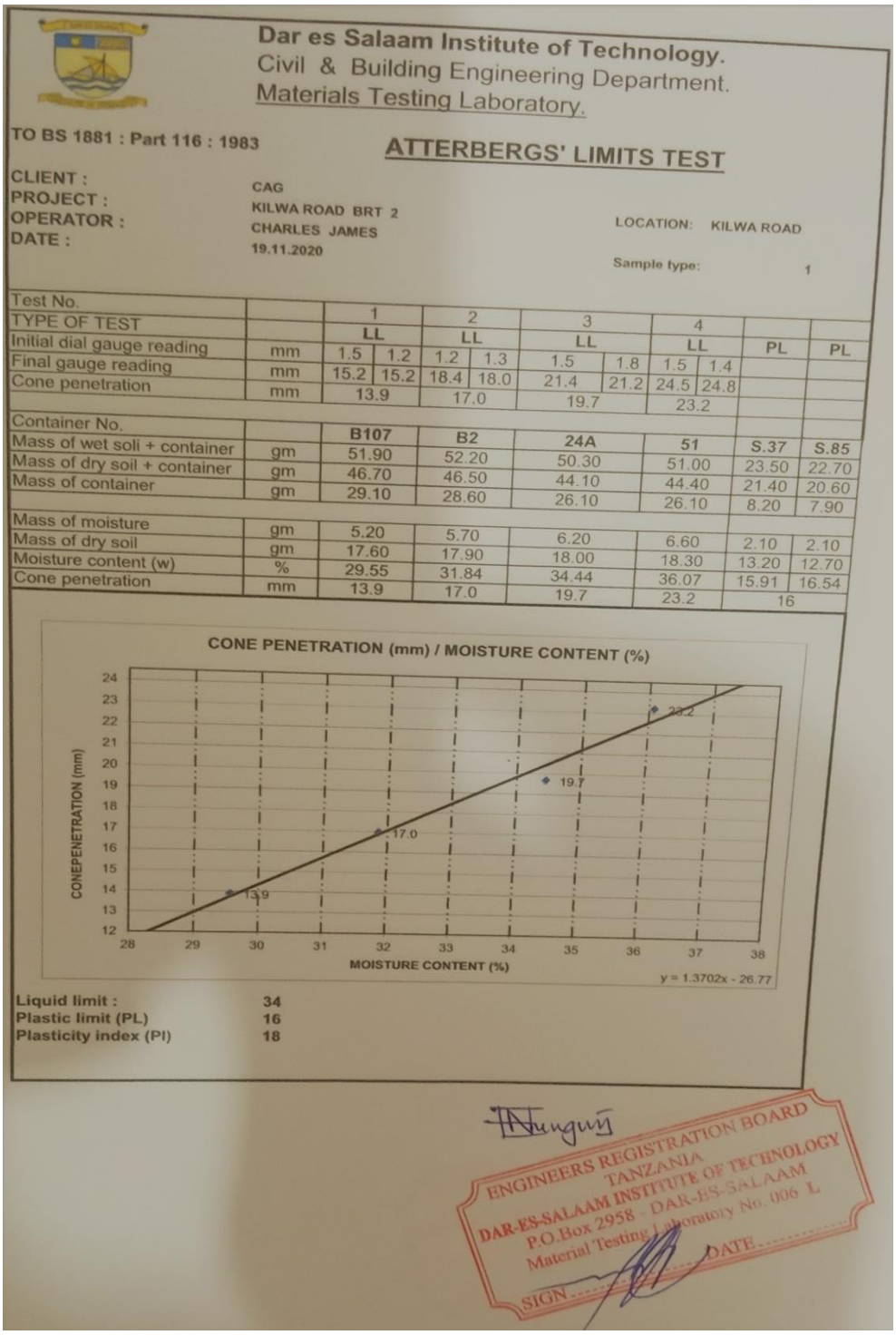
Atterburg Limits Tests for Gravel Stockpiled Materials



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Civil & Building Engineering Department.
Materials Testing Laboratory.

TO BS 1881 : Part 116 : 1983

ATTERBERGS' LIMITS TEST

CLIENT : CAG
PROJECT : KILWA ROAD BRT 2
OPERATOR : CHARLES JAMES
DATE : 19.11.2020
LOCATION: KILWA ROAD
Sample type: 1

Test No.		1		2		3		4			
TYPE OF TEST		LL		LL		LL		LL		PL	PL
Initial dial gauge reading	mm	1.5	1.2	1.2	1.3	1.5	1.8	1.5	1.4		
Final gauge reading	mm	15.2	15.2	18.4	18.0	21.4	21.2	24.5	24.8		
Cone penetration	mm	13.9		17.0		19.7		23.2			
Container No.		B107		B2		24A		51		S.37	S.85
Mass of wet soil + container	gm	51.90		52.20		50.30		51.00		23.50	22.70
Mass of dry soil + container	gm	46.70		46.50		44.10		44.40		21.40	20.60
Mass of container	gm	29.10		28.60		26.10		26.10		8.20	7.90
Mass of moisture	gm	5.20		5.70		6.20		6.60		2.10	2.10
Mass of dry soil	gm	17.60		17.90		18.00		18.30		13.20	12.70
Moisture content (w)	%	29.55		31.84		34.44		36.07		15.91	16.54
Cone penetration	mm	13.9		17.0		19.7		23.2		16	

Liquid limit : 34
Plastic limit (PL) 16
Plasticity index (PI) 18

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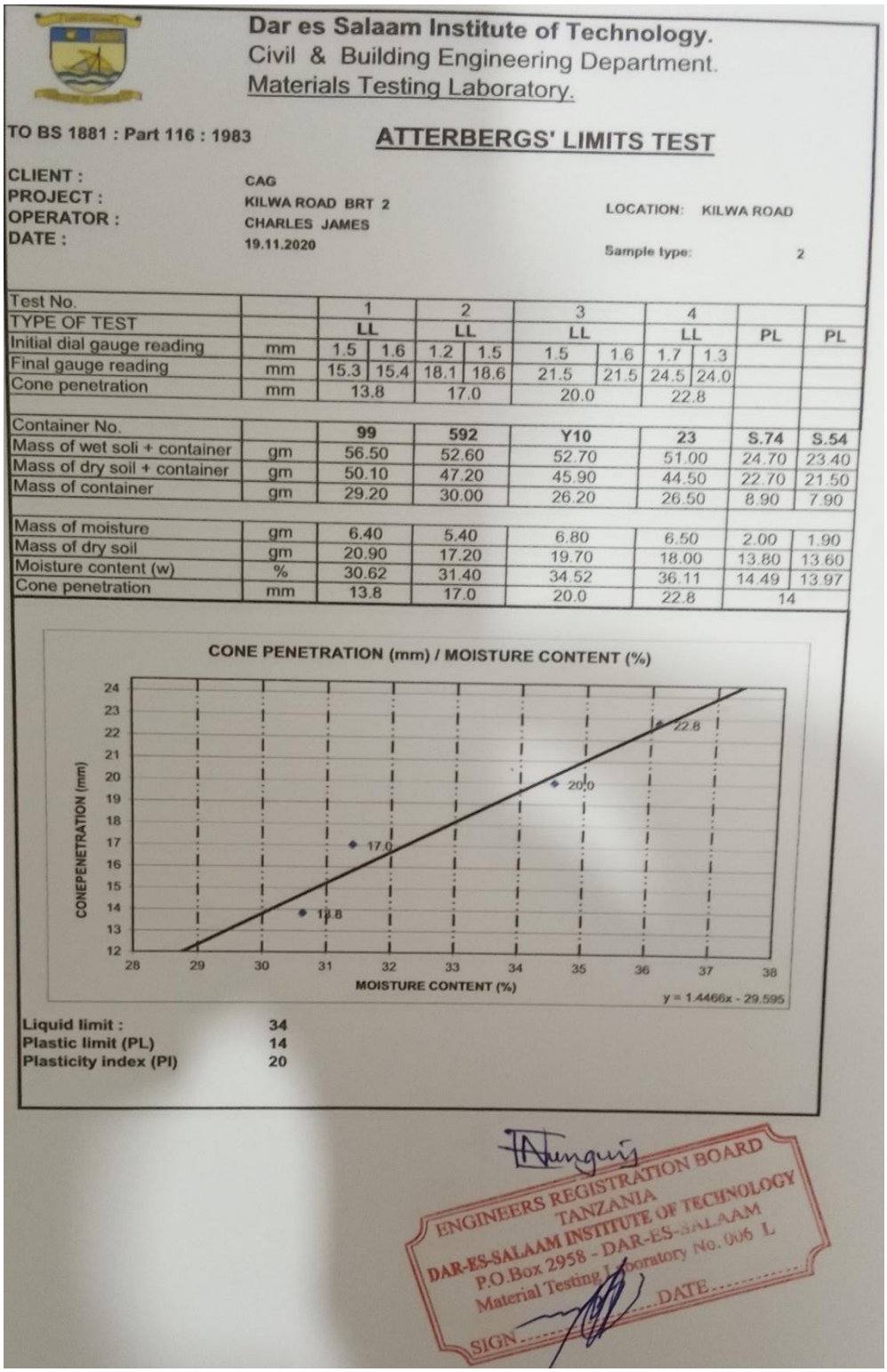

Dar es Salaam Institute of Technology.
Civil & Building Engineering Department.
Materials Testing Laboratory.

TO BS 1881 : Part 116 : 1983

ATTERBERGS' LIMITS TEST

CLIENT : CAG
PROJECT : KILWA ROAD BRT 2
OPERATOR : CHARLES JAMES
DATE : 19.11.2020
LOCATION: KILWA ROAD
Sample type: 2

Test No.		1		2		3		4			
TYPE OF TEST		LL		LL		LL		LL		PL	PL
Initial dial gauge reading	mm	1.5	1.6	1.2	1.5	1.5	1.6	1.7	1.3		
Final gauge reading	mm	15.3	15.4	18.1	18.6	21.5	21.5	24.5	24.0		
Cone penetration	mm	13.8		17.0		20.0		22.8			
Container No.		99		592		Y10		23		S.74	S.54
Mass of wet soil + container	gm	56.50		52.60		52.70		51.00		24.70	23.40
Mass of dry soil + container	gm	50.10		47.20		45.90		44.50		22.70	21.50
Mass of container	gm	29.20		30.00		26.20		26.50		8.90	7.90
Mass of moisture	gm	6.40		5.40		6.80		6.50		2.00	1.90
Mass of dry soil	gm	20.90		17.20		19.70		18.00		13.80	13.60
Moisture content (w)	%	30.62		31.40		34.52		36.11		14.49	13.97
Cone penetration	mm	13.8		17.0		20.0		22.8		14	

Liquid limit : 34
Plastic limit (PL) 14
Plasticity index (PI) 20

ENGINEERS REGISTRATION BOARD
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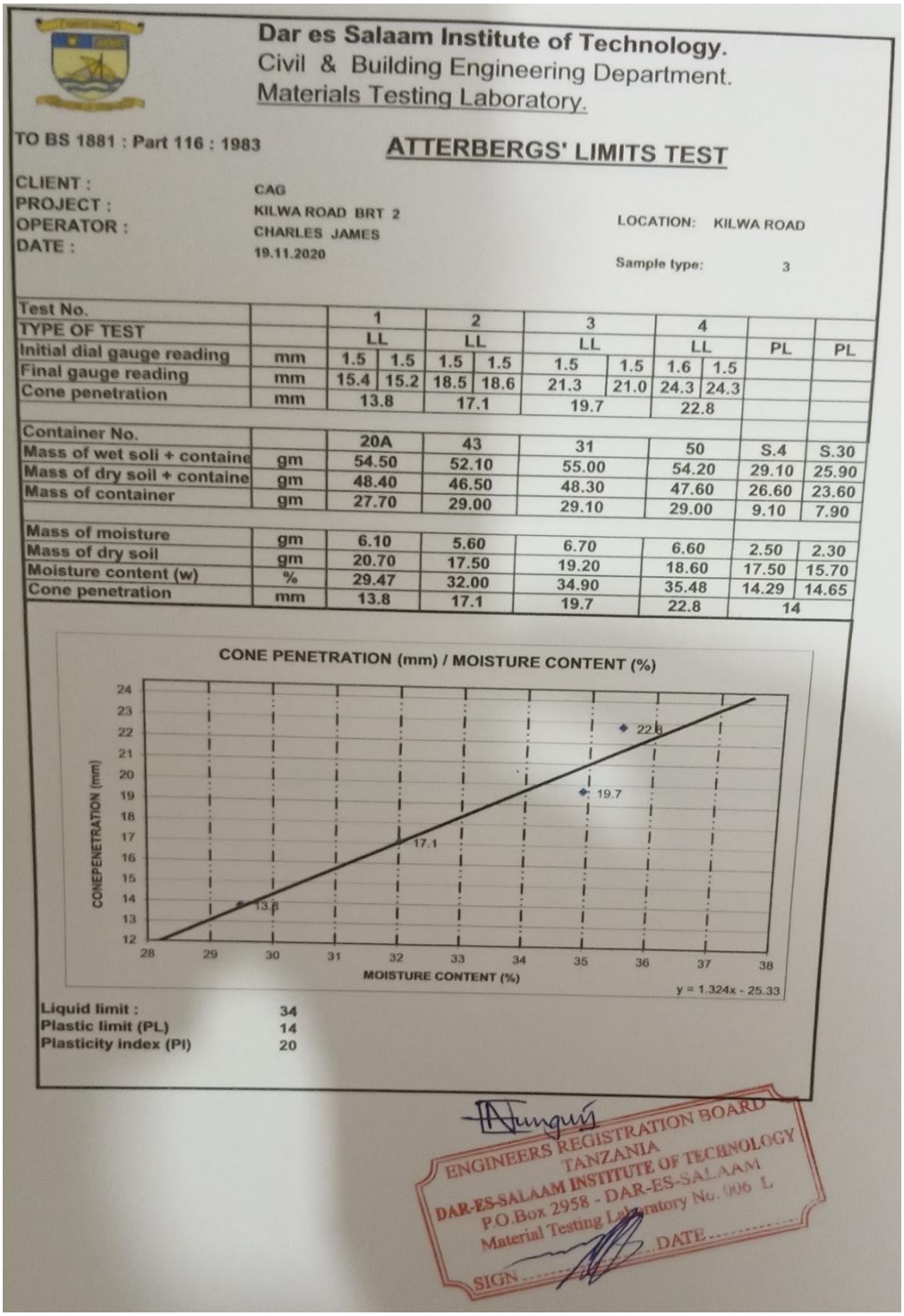
P.O.Box 2958 - DAR-ES-SALAAM
Material Testing Laboratory No. 006 L
SIGN ..... DATE .....



Dar es Salaam Institute of Technology.
Civil & Building Engineering Department.
Materials Testing Laboratory.

TO BS 1881 : Part 116 : 1983

ATTERBERGS' LIMITS TEST

CLIENT : CAG
PROJECT : KILWA ROAD BRT 2
OPERATOR : CHARLES JAMES
DATE : 19.11.2020
LOCATION: KILWA ROAD
Sample type: 3

Test No.		1		2		3		4			
TYPE OF TEST		LL		LL		LL		LL		PL	PL
Initial dial gauge reading	mm	1.5	1.5	1.5	1.5	1.5	1.5	1.6	1.5		
Final gauge reading	mm	15.4	15.2	18.5	18.6	21.3	21.0	24.3	24.3		
Cone penetration	mm	13.8		17.1		19.7		22.8			
Container No.		20A		43		31		50		S.4	S.30
Mass of wet soil + containe	gm	54.50		52.10		55.00		54.20		29.10	25.90
Mass of dry soil + containe	gm	48.40		46.50		48.30		47.60		26.60	23.60
Mass of container	gm	27.70		29.00		29.10		29.00		9.10	7.90
Mass of moisture	gm	6.10		5.60		6.70		6.60		2.50	2.30
Mass of dry soil	gm	20.70		17.50		19.20		18.60		17.50	15.70
Moisture content (w)	%	29.47		32.00		34.90		35.48		14.29	14.65
Cone penetration	mm	13.8		17.1		19.7		22.8		14	

Liquid limit : 34
Plastic limit (PL) 14
Plasticity index (PI) 20

ENGINEERS REGISTRATION BOARD TANZANIA
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Material Testing Laboratory No. 006 L
DATE
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Table 3802/2 of the Standard Specification for Road Works 2000

TABLE 3802/2
REQUIREMENTS FOR MATERIALS IN CEMENTED LAYERS. CML TEST METHODS.

Material properties *CML Tests*	**Material class**		
	C2	**C1**	**CM**
After stabilisation:			
Minimum UCS (Mpa) *CML1.21)* ***1)***	2	1	0.5
Plasticity index (%) *CML1.2 and 1.3* ***2)***	Maximum 8		
Before stabilisation: ***3)***			
CBR (%) soaked at 95% MDD of BS-Heavy (%) *CML1.11*	Minimum 30	Minimum 20	(no requirement)
Plasticity index (%) *CML1.2 and 1.3* ***2)***	Maximum 20	Maximum 25	Maximum 35
Aggregate strength TFV_{dry} *CML2.7*	Minimum 50 kN	(no requirement)	(no requirement)
Grading modulus, GM *CML1.7*	Minimum 1.5	Minimum 1.2	(no requirement)
Max. particle size *CML1.7*	2/3 of compacted layer thickness		

1) The unconfined compression strength (UCS) shall be measured after 7 days curing and 4 days soaking in accordance with laboratory test CML 1.21

2) It is emphasised that the Atterberg limits shall be measured according to the CML test methods 1.2 1.3 and 1.4. These methods follow British Standard (BS) procedures and utilise BS equipment. Other laboratory test procedures and equipment do not give comparable results and shall not be used unless proper correlation to CML/BS has been carried out to the satisfaction of the Engineer.

3) The content of organic matter should preferably not exceed 0.5%, 1% and 2% for C2, C1 and CM materials respectively.

Appendix 5: Proposed Mitigation Measures for the Potential Negative Environmental Impact Assessment

S/N	Potential Negative Impact	Mitigation measures
1.	Disturbance, particularly land scarring at borrow sites or source of construction materials (sand aggregates, stones) Immediate impact of borrow areas/sites is land scarring in the course of sourcing materials	Borrow pits may be used as water sources for livestock. Borrow pit banks will be made with gentle slopes to avoid abrupt vertical falls of animals and children just in case they are used as swimming places. Rehabilitate or reinstate of borrow areas using part of charges for purchasing construction materials
2.	Ground and surface water contamination through leaching of contaminated soil both during construction and operation phases of the BRT project	Not refuelling construction equipment will not be permitted within 100m of the water sources. Dripping pan shall be used while servicing the construction equipment Withdraw from work all construction equipment dripping oil and lubricants until the leakages are sealed
3.	Air quality in excavation and demolition area, in the circulation area of vehicles and other equipment used at construction area. Re-suspension of dust may occur during cleaning, demolitions, formation of pavement base and sub base, paving and circulation of vehicle in non-paved roads (developed within relatively long term under dry weather conditions)	Water sprinkling to reduce the dust at construction site Use of dust mask to operators and those working on dusty areas Use of goggles for all operators Speed of vehicles hauling construction materials will be reduced and the construction materials will be covered with tarpaulins.
4.	Poor disposal of solid and liquid waste	Biodegradable material wastes such as food leftovers, cardboards, papers will be collected and disposed-off along with other city wastes in the required disposal site.

S/N	Potential Negative Impact	Mitigation measures
		Plastics, metal straps, reinforcing bars, unused timber crates, steel cable pieces and pipes. will be collected and transported to the recycling centres within the city premises. Wastewater will be collected in toilets and drained to join other waste water to the Municipal sewer and /or septic tanks and disposed-off through a sea outfall
5.	Soil erosion is likely to occur from increased run-off due to clearance of vegetation, hard surfacing and channelling of floodwater.	Soil control measures on the slopes such as re-vegetation with flat growing grass particularly with local species
6.	Increase in traffic level to surrounding area (congestion)	Allow only essential traffic to the construction site during traffic peak hours Material hauling to site and vice versa will be carried out during the night/off peak periods Alternative finished materials such as ready-made concrete products, pre-cast element or pre-assembled materials can be delivered
7.	Noise pollution	Provide ear protective devices (ear muffs and ear plugs) to workers exposed to noise of the order above **85 dB (A)** Others include supply of coveralls, overalls, hardhats, goggles, and dust masks.
8.	Increased breeding sites for mosquitoes and other disease vectors	Vegetation around borrow pits should be kept low to allow water agitation by wind
9.	Increased number of road accidents and reduced safety of children	Strategically place warning road signs for drivers Provide safe and dedicated access to pedestrians
10.	Reduced access for local communities	Set aside alternative detour/route to avoid misunderstanding with those on emergency trip

S/N	Potential Negative Impact	Mitigation measures
11.	Increased risk to construction/ project personnel	Control unwanted visitors from entering the construction site Sensitization and training of the surrounding communities Constant surveillance for security to ensure no uninvited guest in the construction area Proper O&HS training programmes should be done

Appendix 6: Key issues in the design concept

S/N	Item	Description
	Roadway Design Concept	BRT lane, Mixed Traffic lane, Sidewalk, Cyclist lane into roadway as well as design of BRT infrastructure such as Station, Terminal, Depot and Feeder Station.
	Pavement Design (Selection of Pavement Type)	Cost Considerations Maintenance of Portland cement concrete roads was minimal; however, defects do appear very shortly after construction due to ingress of water to the subgrade, thus through cracks and joints. High temperatures may also cause excessive expansion of concrete slabs which may result in uneven surface profiles. Total maintenance cost is **TZS 15,000/m^2.** Capital cost of providing flexible pavement for TLC 50 traffic (50mm asphalt concrete AC20, 200mm base course DMB40, 250mm stabilized sub base grade CM and 150mm improved subgrade CBR 15% where existing subgrade was weaker than 15%) was **TZS 74,200/m^2** the estimates, (2012)
	Total capital and maintenance cost, 30 years	Flexible pavement was; **TZS 142,555 /m^2** Rigid pavement was **TZS 203,230 /m^2**
	Environmental Aspects	Rigid pavement operation was quite noisy due to vehicle tyres running over transverse joints. Flexible pavements were smoother in operations.
	Commonality	Most contractors in the country were at home with the flexible pavement, and hence installation and maintenance works can be carried out rapidly at competitive prices
	Maintenance Aspects	The rigid pavement was very cumbersome when it came to maintaining a defective section, a broken slab would require a considerable period for curing before being put into use.

S/N	Item	Description
		The city was quite demanding in provision of underground services which would require opening up of pavement now and again, for which a flexible pavement would be more suitable.
	Cost of Vehicle Operation	Vehicle operating costs were linked to road roughness (measured in terms of IRI). Rigid pavement was rougher than bituminous roads which mean that the rigid pavement would impose higher operation costs on vehicles.
	Road Safety	A heavily traffic rigid pavement would soon be polished smooth and become hazardous during wet condition especially on steep slopes.
	Conclusion and choice	Flexible pavement had been recommended to BRT lanes and mixed traffic lanes as well. However rigid pavement had been adopted at locations where vehicles slow down such as at bus stations, terminals and depots.

Appendix 7: Terms of Reference and Deliverables of the Consultant

Issue	Details	Output/ Deliverables
Design review and Pre-contract Services (5.1: Appendix A: Description of services)	Reviewing detailed engineering design including design reports, drawings, verify correctness of survey data on site and previous studies if any and perform the updates to the detailed Engineering Design and ESIA including EMP and recommending and carrying out any needed modifications to ensure technical soundness prior to project implementation.	Design review report Drawings ESIA Report EMP Report
	Update of construction cost (Engineer's Estimates)	BOQ
	Updating the Bidding Documents in accordance with AfDB's Rules and Procedures for Procurement of Goods and Works whilst ensuring that, all environmental, social, gender and road safety mitigation measures are adequately addressed in the Bidding Documents.	Bidding documents
	Review Resettlement Action Plan (RAP) for adequacy of the availability of sites for construction works including relocation of affected services	Resettlement Action Plan
	Prepare and update confidential Cost estimates for the entire work based on reviewed/modified design	Confidential Cost Estimates
	Assist in Bid Evaluation Process	Evaluated Bidders
Construction and Supervision (5.2)	Review the design and contract documents and advice client	
	Carry out reasonable design modification that may become necessary during construction	
	Identify and mark all utilities and assist the client in the removal/relocating (where necessary)	
	Check and establish that the contractor mobilizes and supplies to the contract all plant, equipment and machinery that have been committed in the tender	

Issue	Details	Output/ Deliverables
	Take necessary measure and provide appropriate advice to the client to enable the construction contract be completed in a timely and cost-effective manner	
	Review and approve the submitted contractor's method statement	
	Foresee possible problems and advice the client appropriately	
	Liaise with the respective authorities to ensure that assessment and compensation of properties including temporary structures and fences as it may apply; existing within the construction zone is done before the contractor is given possession of site	
	Identify and locate all beacons and benchmarks to enable the contractor set out and construct the works and hand over to the contractor before commencement of the works	
	Inspect, test and approve all materials	
	Keep updated all records	
	Prepare consolidated monthly reports on physical and financial status	Monthly reports Site meeting minutes
	Supervise implementation of ESMI mitigation measures	ESMI Mitigation
	Prepare control charts for the main activities and a project master schedule	Control chart
	Measure quantities of works satisfactorily carried out and certify monthly payment certificate	
	Record, examine and evaluate all contractors claims and submit timely recommendations	
	Prepare a supervision Manual which lay out procedures to be followed during the execution of works	Supervision Manual
	Maintain a site diary	
	Organize and undertake on the job training for qualified counterpart engineers	On job training report

Issue	Details	Output/ Deliverables
	Keep site register for works, materials, equipment, weather conditions etc.	Site Registers
Reporting in design stage	Inception report one month after commencement of the Consultancy contract	Inception Report
	Draft Design Review Report shall present the Consultants findings of his design review and shall point out deficiencies or necessary improvements Two months	Draft Design Review Report
	Four months after commencement of the assignment the Consultant shall present Final Design Review Report	Final Design Review Report and Bidding Document
Reporting in construction stage	One month after commencement Inception report showing status of Contractors mobilization, work methods and work plans, setting out guidelines for administering M&E project progress, mode of cooperation	Inception Report
	Monthly Progress reports assignment	Draft Design Review Report
	Four Months after commencement of the assignment	Final Design Review report
	15 days after every end of the month being reported on	Monthly progress reports
	15th day of the first month of the following quarter	Quarterly report
Duration of Assignment	Stage 1: Design review/ Pre-contract services	3 Months
	Stage 2: Construction Supervision	24 Months
	Stage 3: Defects Liability Period	12 Months

Appendix 8: Project Information for Consultancy services for Design of 42.9kM of Bus Rapid Transit System Phase 2 and 3 in Dar es Salaam city

Tender Number	:	AE/053/2009-2010/C/05
Procurement Method	:	International Competitive Bidding
Procurement Period	:	2009/10
Contract Number	:	DART/CO1/2011
Contract Name	:	Consultancy Services for Design of 42.9KMS of Bus Rapid Transit System Phase 2 & 3 in Dar es Salaam City
Employer	:	Chief Executive of DAR RAPID TRANSIT AGENCY
Consultant	:	M/s KyongDong Engineering Co., Ltd. in association with M/s AMBICON Engineering Ltd.
Contract Signing Date	:	25th February, 2011
Commencement Date	:	24th March, 2011
Contract Period	:	12 Months
Original Completion Date	:	24th March, 2012
Revised Completion Date		28th February, 2015
Time Delayed	:	35 Months
Original Contract Price	:	USD 1,188,550 + USD 213,939 VAT
Revised Contract Price		

Source: Contract documents and Progress Reports.

Appendix 9: Project Information for Consultancy services for Design Review and Construction Supervision of the BRT Phase 2; Lot 1: Road works (20.3kM)

Tender Number:	:	AE/001/2015-16/HQ/C/25.
Procurement Method:	:	International Competitive Bidding
Contract Number:	:	TRD/HQ/1038/2016/17
Employer:	:	Tanzania National Roads Agency (TANROADS)
Consultant:	:	M/S BOTEK Bosphorus Technical Consulting Corporation of Turkey in Association with M/S Apex Engineering Co. Ltd of Tanzania (As sub-consultant)
Contract Name	:	Consultancy Services for Design Review and Construction Supervision of the Dar Es Salaam Bus Rapid Transit System (Brt) - Phase 2; Lot 1: Road Works (20.3 Km) Including two Flyovers and 29 Bus Stations along Kilwa Road (From CBD-Kariakoo to Mbagala)
Source of Funding:	:	African Development Bank (AfDB) and The African Growing Together Fund (AGTF).
Contract Signing Date:	:	25th February,2017
Commencement Date:	:	27th March, 2017
Contract Period:	:	42 Months
Time Elapsed (November, 2020):	:	45 Months
Original Completion Date:	:	24th August, 2020
Revised Completion Date:	:	NA
Original Contract Price:	:	USD 2,434,650.00 (Tax Inclusive)
Revised Contract Price:		USD 3,144,025.00
Variation		29.14%[21]
Implementation Status (November 2020)	:	

Source: Contract documents and Progress Reports.

[21] The variation is due to the Addendum No. 1 of USD 135,000 and Addendum No. 2 of USD 574,375.00

Appendix 10: Project Information for Construction of Dar es Salaam BRT Infrastructures Phase 2; Lot 1: Road works (20.3kM)

Tender Number	:	AE/001/2017-18/DSM/W/98
Procurement Period	:	April 2018 to 19th-Nov-2018
Contract Number:	:	TRD/HQ/1047/2018/19
Contract Name:	:	Construction of Dar es Salaam Bus Rapid Transit Infrastructure – Phase 2; Lot 1: Road works (20.3 km) including two flyovers and 29 Bus stations along Kilwa Road (From CBD-Kariakoo to Mbagala)
Funding:	:	African Development Bank (AfDB) and African Growing Together Fund (AGTF)
Employer:	:	Tanzania National Roads Agency (TANROADS)
Contractor	:	M/S Sinohydro Corporation Ltd
Supervising Consultant	:	M/S BOTEK Bosphorus Technical Consulting Corporation of Turkey in association with M/S Apex Engineering Co. Ltd of Tanzania.
Letter of Acceptance Date:	:	1st November, 2018
Contract Signing Date:	:	10th December,2018
Commencement Date:	:	6th May, 2019
Contract Period:	:	1095 Days
Time Elapsed (September, 2020):	:	514 Days
Original Completion Date:	:	30-Nov-2021
Revised Completion Date:		5-May-2022
Original Contract Price:	:	TZS 189,433,784,506.45 (Tax Inclusive)
Revised[22] Contract Price:	:	TZS 217,480,899,399.47 (Tax Inclusive)
Defects Liability Period (DLP)	:	1 year for roadworks 3 years for flyovers 5 years for solar lighting system
Amount paid in percentage of contract sum	:	8.65%
Completion Work progress in percentage (Up to end of September 2020)	:	9% (Based on work program at this milestone the progress was supposed to at 49%

Source: Contract documents and Progress Reports.

[22] The revision of contract price was based on the addendum Number one

Appendix 11: Project Information for Consultancy services for Design Review and Construction Supervision of the BRT Phase 2; Lot 2: Buildings

Contract Number:	:	TRD/HQ/1039/2016/17
Contract Name:	:	Consultancy Services for Design review and Construction Supervision of the Dar es Salaam Bus Rapid System (BRT) – Lot 2
Funding:	:	AfDB, AGTF and GoT
Employer:	:	Tanzania National Roads Agency (TANROADS)
Consultant:	:	M/S Inter - Consult
Contract Signing Date:	:	25th February,2017
Commencement Date:	:	24th March, 2017
Contract Period:	:	27 Months
Time Elapsed (October, 2020):	:	40 Months
Original Completion Date:	:	24th June 2019
Revised Completion Date:	:	
Original Contract Price:	:	TZS. 950,078,500.00 (Tax Inclusive)
Defects Liability Period (DLP)	:	12 Months

Source: Contract documents and Progress Reports.

Appendix 12: Project Information for Construction of Dar es Salaam BRT Infrastructures Phase 2; Lot 2: Buildings

Contract Number:	:	TRD/HQ/1009/2018/19
Contract Name:	:	Construction of Dar es Salaam Bus Rapid System (BRT) Infrastructure – Phase 2; Lot 2: Buildings – Mbagala Deport, Terminals and Feeder Stations
Funding:	:	African Development Bank (AfDB)
Employer:	:	Tanzania National Roads Agency (TANROADS)
Contractor	:	M/S China Civil Engineering Construction Corporation (CCECC)
Supervising Consultant	:	M/S Inter-Consult Ltd
Letter of Acceptance Date:	:	9th August, 2018
Contract Signing Date:	:	13th August,2018
Commencement Date:	:	1st March 2019
Contract Period:	:	730 Days Including Mobilization
Time Elapsed (October, 2020):	:	580 Days (79.5% Completion time)
Remaining Days	:	58 Days (as of 30th December, 2020)
Original Completion Date:	:	28th February, 2021
Revised Completion Date:	:	28th February, 2021
Original Contract Price:	:	TZS. 44,816,647,192.00 (Tax Exclusive) Payment being 80% USD, 20% TZS, Change Rate 1USD=2,256.94 TZS VAT=TZS 8,066,996,494.00
Defects Liability Period (DLP)	:	365 Days

Source: Contract documents and Progress Reports.

Appendix 13: Responses from Tanzania National Roads Agency (TANROADS)

No	Recommendation	Comments of the TANROADS	Planned actions	Implementation Timelines
1.	Planning, Design and Tender Documentation			
	3.3 Consultancy Services for Design of 42.9KMS of Bus Rapid Transit System Phase 2 & 3 in Dar es Salaam City (under DART) - Contract No. DART/C01/2011 3.3.1 Consultant delayed the work for 214 weeks TANROADS should ensure that, designs period is carried out timely and site is handed over to the Contractor timely and fully to avoid any inconveniences.	The audit recommendation is noted. The design as indicated in the Audit Report was managed by DART Agency, the owner of BRT infrastructure.	TANROADS will liaise with DART to ensure that designs and design modifications are carried out timely	Ongoing
	3.4.4 Contract Management of Consultancy Services iii. Final Design Review delayed for 215 Days TANROADS should review the Draft Design Report timely with other stakeholders (DART).	TANROADS reviews Draft Design Reports timely. Isolated cases of delays occur for reasons, e.g., in this case as acknowledged in the Audit Report, *"the delay was caused by additional services (Design of second Railway Overpass Bridge along Gerezani Bandari road)"*, which had to be implemented due to introduction of SGR underpass, which did not consider existing TANROADS original designs.	Maintain compliance	Ongoing
	4.3 Consultancy Services for Design review and Construction Supervision of the Dar es Salaam Bus Rapid System (BRT) –Phase 2; Lot	TANROADS always endeavours timely handover of sites for designs / construction. However, there	Maintain compliance	Ongoing

No	Recommendation	Comments of the TANROADS	Planned actions	Implementation Timelines
	2: Building Works-one deport two terminals and three feeder stations off roadway 4.3.1 Design Stage *"….. the Contract expired due to the delay encountered during design period of 80 days for the completion of the Final Design Review Report and also, this was attributed by partial site handover to the Contractor that made a delay of six (6) months for the work commencement."* TANROADS should timely handover the site to ease the Design process.	were land acquisition disputes under Mbagala Terminal site.		
	3.5.1 Project Inception and Planning *"However, the Audit Team was not provided with a copy of the feasibility study report. Based on the officials at DART, the report was mislocated/misplaced during the time when the office was shifted to other premises. This implies that documentation and record keeping at DART was inadequate."* TANROADS should ensure proper documentation and well record keeping system	Feasibility study report was carried out under Dar es Salaam City Council in 2005. The report was handed over to DART for custody and implementation. TANROADS has a good record keeping system. TANROADS has introduced an electronic documentation management system (EDMS). Therefore, the project documents and information will be readily available whenever required.	Maintain compliance TANROADS will advise DART on the Audit recommendation on proper documentation and record keeping system.	Ongoing
2. Contract Management				

No	Recommendation	Comments of the TANROADS	Planned actions	Implementation Timelines
	3.4.4 Contract Management of Consultancy Services i. TANROADS did not second Engineers to Consultants during Supervision work TANROADS should ensure they comply with the TOR on seconding Engineers before the completion of works.	Provision for secondment of counterpart staff to project is put in place so that the Consultant can be able to train them in case the Government decides to second them. TANROADS could not second counterpart staff to the project due to budget constraints and shortage of staff. However, 8 Nos Trainee Engineers (4 female & 4 Male) have been seconded to the project, i.e., 3 Nos from TANROADS, 3 Nos from DART 1 No from AQRB and 1 No from ERB.	Maintain compliance	Ongoing
	Contract Management of Consultancy Services V Lack of Review of Feasibility Studies resulted into Variation of TZS 28,047,114,893.02 (VAT exclusive) for Construction of Overpass Bridge along Bandari - Gerezani Road *"…. changes that resulted into redesign of the second overpass Bridge was caused by lack of review of the feasibility studies as*	Development of the second railway overpass bridge has been introduced under BRT project after constraints resulting from requirement of the new SGR project in 2018. Therefore, the variation has no direct relation with lack of review of feasibility study carried out in 2014.	Maintain compliance	Ongoing

No	Recommendation	Comments of the TANROADS	Planned actions	Implementation Timelines
	more than 10 years had passed from when the feasibility studies were conducted to when design was done". TANROADS should ensure, the feasibility studies for the future BRT Phases are reviewed thoroughly in collaboration with other associates in the BRT corridors.			
	5.3.3 Contract Management *"……. TANROADS did not ensure that the Final Design Review Report meets the timelines. …… because there was a delay of 215 day for the submission of the Final Design Review Report.* TANROADS should ensure that they enhance contract management to comply with the Contract conditions and assurance of the Project.	TANROADS manages Contracts in compliance with the Contract Conditions. TANROADS reviews Draft Design Reports timely. In this case as acknowledged in the Audit Report, *"the delay was caused by additional services (Design of second Railway Overpass Bridge along Gerezani Bandari road)"*, which had to be implemented due to introduction of new SGR project.	Maintain compliance	Ongoing
	TANROADS should ensure they comply with the TOR on seconding Engineers before the completion of works.	See our response on item 2(a) above		
3.	Construction Stage			
	3.4.5 Construction Stage	Auditor's recommendation is noted.	Delays will be evaluated, and	By 30th June 2021

No	Recommendation	Comments of the TANROADS	Planned actions	Implementation Timelines
	Remedy on delayed submission of Monthly Progress Reports TANROADS should recover the liquidated damage amount in the future certificates and ensure that the Consultant submits the progress report on time.		appropriate actions implemented	
	3.4.5 Construction Stage Slow Work Progress by the Contractor TANROADS should make strategic plans with both Contractor and Consultant that analyses the mitigation measures to encounter the slippage progress.	TANROADS has taken some actions including the following: high-level management meeting in December 2020 and required the Contractor to improve its performance Replacement of the Contractor's Project Manager as well as Contract Manager and Materials Engineer due to poor performance. Contractor has submitted a recovery plan, which is now under review	Engineer is currently assessing Contractor's entitlement for time extension due to additional works under Addendum No. 1 and design modifications.	End of March 2021
	Construction Stage (ii) Slow Work Progress by the Contractor	The audit recommendation is noted.	The Engineer is currently making assessment of the effect of the additional works	End of March 2021

No	Recommendation	Comments of the TANROADS	Planned actions	Implementation Timelines
	TANROADS should grant an extension of time for the additional works from the Addendum No. 1.		through Addendum No. 1 as well as design modifications that were carried out immediately after commencement of works. Upon receipt of Engineer's recommendations, TANROADS, in collaboration with AfDB, will decide accordingly	
	3.4.5 Construction Stage iii. Occurrence of Distress on Premature BRT Lane Rigid Pavement between 6+480 – 8+910 LHS TANROADS should ensure that, Consultant prepares a mitigation measures on how to rectify the distresses on the Rigid pavements and supervise its implementation.	Exact locations for the noted defects were identified and the Contractor was instructed, since last December 2020, to demolish and reconstruct the defective rigid pavement at own cost. The Contractor has started remedial work under close supervision of the Consultant.	TANROADS will continue making close follow up to ensure compliance.	Ongoing
	3.4.5 Construction Stage	The audit team was informed of initiatives that have been taken to deter recurrence of the noted distresses on rigid pavement. Such	The Contractor procured a special equipment to wash/clean sand	Implemented

No	Recommendation	Comments of the TANROADS	Planned actions	Implementation Timelines
	iv Unsatisfactory Quality control system and Sieving mechanism of the Stockpiled Aggregates TANROADS should ensure that, the contractor stops immediately using the natural sand sieve truck and instruct to adapt a new technology of sieving machine with adequate control.	measures include importation of sand-washing machine and the fourth bin for concrete batching plant, which are now functional.	from deleterious materials as part of his strategy to mitigate the premature distress in the rigid pavement experienced back in July 2020.	
	3.4.5 Construction Stage v. Stockpile Materials were not properly stored in Coning System TANROADS should ensure that, the storing of stockpile material conforms with the requirement of the special specifications. This is possible because the contractor's camp has enough space for storing materials; and TANROADS should enhance site inspection and supervision on the stockpile material.	Audit recommendation is noted	Maintain regular visits to site and inspect all aspects of works	Ongoing
	Construction Stage vi. Dispute Board Members were not appointed	Based on the past experience in other projects, and in order to safeguard the best interest of the Government (value for money) we do not consider that formation of DB is urgently required now.	The DB will be formed when need arises.	Ongoing

No	Recommendation	Comments of the TANROADS	Planned actions	Implementation Timelines
	TANROADS should ensure they comply with the Sub-Clause 20.2.1 of the GCC, to avoid any difficulties when disputes arise.			
	Construction Stage vii. Environmental Management Program was not audited TANROADS should instruct Consultant to conduct environmental audit on the Environmental and Social Management Plan (ESMP).	Environmental and Social Management Plan (ESMP) is audited and reports have been shared with Auditors.	Inspections/audits are conducted quarterly.	Ongoing
	4.2. Construction of Dar es Salaam Bus Rapid System (BRT) Infrastructure – Phase 2; Lot 2: Buildings 4.2.1. Construction Stage. Partial hand over of Mbagala site due to land disputes (Six months delay to January 2020) DART should ensure that they settle all land disputes and compensation to avoid further delay.	Auditor's recommendation is noted.	TANROADS will liaise with DART	Before end of March 2021
	4.2. Construction of Dar es Salaam Bus Rapid System (BRT) Infrastructure – Phase 2; Lot 2: Buildings	TANROADS is keen in ensuring that legitimate amounts are paid to the works, supplies and services.	TANROADS to continue reminding	Ongoing

No	Recommendation	Comments of the TANROADS	Planned actions	Implementation Timelines
	4.2.1. Construction Stage. iv. Columns for Kariakoo Terminal sheds were shorter than the design height and so overpayment of TZS 91,138,320 TANROADS should; enhance the supervision and inspection of measured works and ensure the overpaid costs is recovered on the future IPCs. This includes the overpaid cost of TZS 91,138,320.	Design of the steel frame was revised and issued to Contractor in September 2019. However, at the time of preparing the IPC, appropriate rates for the revised steel frames were not yet established. Therefore, the Consultant applied the original rates under the Contract for this item. Ultimately, appropriate rates for the redesigned steel frame were established and applied in IPC No. 8; hence, the overpaid amount was corrected; a copy of the same has been shared with Auditors. TANROADS will evaluate and see if there is any remaining calculation errors.	Consultants of their obligation at site and make regular visits to site.	
	4.2. Construction of Dar es Salaam Bus Rapid System (BRT) Infrastructure – Phase 2; Lot 2: Buildings 4.2.1. Construction Stage. Feeder stations lack service facilities for Passengers	Audit recommendation is noted.	Provision of toilets and ticketing booths at Feeder Stations is being considered and the outcome will be communicated in due course.	Ongoing

No	Recommendation	Comments of the TANROADS	Planned actions	Implementation Timelines
	TANROADS should consider providing, Feeder stations with common services facilities not only in the future but also before the service of the BRT Phase 2 begins.			
	4.2. Construction of Dar es Salaam Bus Rapid System (BRT) Infrastructure – Phase 2; Lot 2: Buildings 4.2.1. Construction Stage. Overdesign and Inconsistency in the design of the Feeder stations and Terminal Sheds foundation TANROADS should ensure that they maintain consistency in Design of stations to avoid overdesign in the future BRT Phases.	Design issues are well managed by TANROADS to ensure that the structures are fit for purpose, sustainable and cost effective. The foundation for feeder stations adopts design philosophy in public structures susceptible to damage by external forces such as automobiles coupled with durability requirement.	Continuous consideration of all design parameters during the design	Ongoing
4.	Financial Management			
	Financial Management *TANROADS management is advised to follow the terms of the contract by deducting liquidated damages caused by delays in submitting the design review reports.*	The Audit recommendation is noted	Review causes of delay and act accordingly	Before end of April 2021
	Financial Management	The audit recommendation is noted.	Maintain compliance	Ongoing

No	Recommendation	Comments of the TANROADS	Planned actions	Implementation Timelines
	Expired Insurance Cover *TANROADS management is advised contract to make sure insurance covers are submitted on time as per clauses to avoid any project risks in future.*			
	Financial Management Increased Cost of Interest Penalties caused by Late Payments by TZS 9,866,709.99 *TANROADS Management in collaboration with Ministry of Finance is advised to reduce time of cross-checking invoices in order to meet due dates and make sure that outstanding invoices are paid to avoid interest penalty on the remaining payments*	TANROADS will continue to review and submit invoices and IPCs timely to MOWT	Maintain compliance	Ongoing
	Financial Management (iv) Overcharge of USD 4,315.84 noted as difference between the Certified Amount and the Approved PV Amount in IPC No.23 *"Review of IPC No.23 noted that, the approved Amount not yet paid, under PV 000005235 of AFDB was USD 53,998.66 and PV 000005236 of AGTF was USD 24,487.76. These two amounts indicated in these PV are higher than the certified amount by USD*	Audit recommendation is noted.	The overpaid amount will be recovered in the subsequent IPC.	Immediately in the next Payment certificate

No	Recommendation	Comments of the TANROADS	Planned actions	Implementation Timelines
	2,969.3 for AFDB certificate and USD 1,346.54 for AGTF certificate. *TANROADS should correct the approved Payment Voucher figure to avoid any overpayment to consultant.*			
	3.4.6 Financial Management VAT amounting to USD 30,929.95 not included in payment Voucher TANROADS Management should Ensure that all tax liabilities arising out of the contract are paid and Correct by adding the difference of VAT amount in the future IPCs.	The Audit recommendation has been taken on board by introducing the New PV.NO.00032672 which added all VAT amount not Included in Previous PVs. The VAT amount has been verified by MOF team and funds were released and paid in March 2021.	closed	
	Financial Management Late submission of certified IPC No.1 by the Engineer TANROADS Management should make sure Engineer submit the certified certificate within days specified in the contract.	The audit recommendation is noted.	TANROADS will ensure that the Engineer certifies payments within the duration specified under the Contract as required.	Ongoing
	Financial Management	The audit recommendation is noted.	Maintain compliance	Ongoing

No	Recommendation	Comments of the TANROADS	Planned actions	Implementation Timelines
	Iii. Miscalculation of Interest by an Engineer increased by TZS 13,143,232.97 *TANROADS should cross check correctness of engineer computations and ensure accurate figure of interest payable before payment.*	TANROADS will re-check and verify calculation on interest rates applied to local portion		
	Financial Management Delay in payment of IPC with interest payable amount of TZS 215,070,334.89. *AFDB Bank should pay the requested amount on time to avoid additional costs of interest penalty to TANROADS.*	The audit recommendation is noted.	The matter will be reviewed jointly with AfDB	Before end of April 2021
	4.3.3. Financial Management ii. Expired Insurance Cover *TANROADS Management should ensure that projects risks are insured in accordance with GCC Clause 24.1*	Normally, TANROADS observes compliance of all contract clauses	Maintain compliance	Ongoing
5.	Technical Aspects			
	3.5.7 Test Results on Roads Construction TANROADS should ensure materials in the stockpile have adequate strength to fit for use in road works. This includes conducting	Audit recommendation is noted However, Normally, TANROADS observes compliance to	Maintain compliance	Ongoing

No	Recommendation	Comments of the TANROADS	Planned actions	Implementation Timelines
	more tests to assess the suitability of the stockpiled materials before further use.	specifications to guarantee quality assurance.		
	3.5.7 Test Results on Roads Construction *v. Four Core Samples did not meet specified Unconfined Compressive Strength (UCS) for Stabilized Subbase* TANROADS should ensure that, it protects the stabilised subbase so as to avoid a risk of traffic to use the stabilised subbase and rectifies failed sections and achieve the required minimum specifications prior to placing rigid pavement on stabilized subbase.	Obligation to protect completed works lies with the Contractor. Deterioration of the noted subbase layers at some sections was caused by prolonged exposure to weather and trespassing traffic. Prolongation exposure was caused by noted distress to the rigid pavement. However, TANROADS instructed the Consultant to provide the status of sections noted by NAO Auditors to have deteriorated subbase. Consultant apprised to have rejected the deteriorated subbase; the Contractor is making necessary rectifications	Maintain compliance	Ongoing
6.	Human Resource Management.			
	Human Resources Management Aspects TANROADS should Ensure all key staff have adequate educational qualifications and professional registration; and Involve TCU in assessing qualifications of the foreign key	Involvement of TCU has been introduced recently. Therefore, new requests will be subjected to this requirement.	TANROADS will ensure that assessment of each key staff is done in line with the new	Ongoing

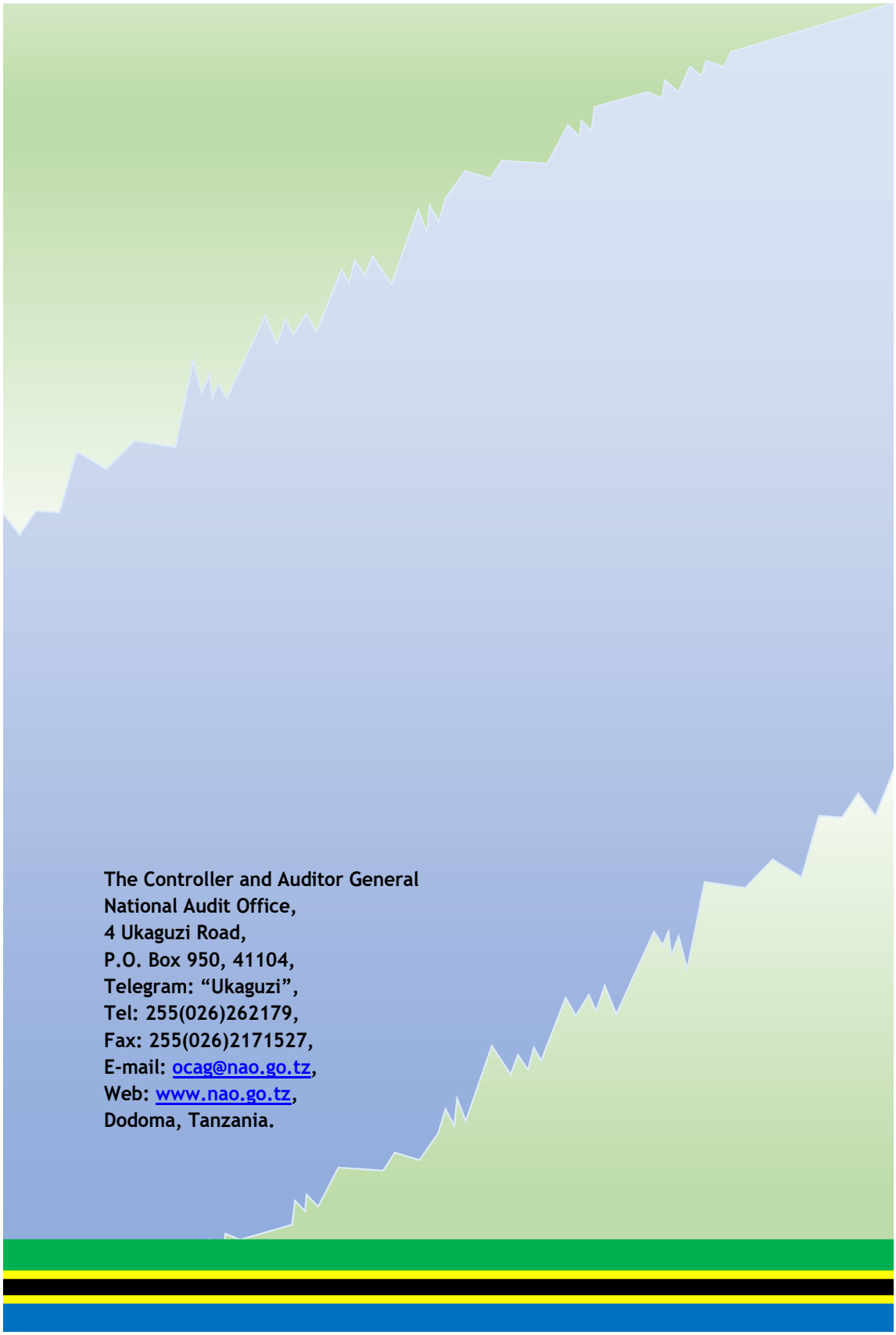
No	Recommendation	Comments of the TANROADS	Planned actions	Implementation Timelines
	staff to prior approving the key staff in the project.		requirement involving TCU	
	Human Resources Management TANROADS should ensure all foreign key staff supervising construction projects in the country possess valid working permits. This includes liaising with TCU so as to settle challenges facing the applications of working permits by key staff.	The audit recommendation is noted. Delay in issuance of Work Permit to the Resident Engineer (RE) by relevant authority was beyond control of TANROADS. However, the RE resident permit was eventually issued in January 2021.	TANROADS will follow up with other responsible Government authorities to ensure that the working permits are issued timely	Ongoing
	Human Resources Management TANROADS should ensure that, all key staff supervising projects possess valid practising license.	The audit recommendation is noted.	Maintain compliance	Ongoing
	3.5.6 Human Resources Management TANROADS should ensure all foreign key staff working in construction projects in the country possess valid working permits.	The audit recommendation is noted.	Maintain compliance	Ongoing
	3.5.6 Human Resources Management The Management of TANROADS should ensure that, all key staff possess required qualifications and registration with local professional boards.	The audit recommendation is noted.	Maintain compliance	Ongoing

No	Recommendation	Comments of the TANROADS	Planned actions	Implementation Timelines
	3.5.6 Human Resources Management TANROADS should ensure all foreign key staff working in construction projects in the country possess working permits and are available at the project.	The audit recommendation is noted.	Maintain compliance	Ongoing

Appendix 14: Responses from Dar Rapid Transit (DART)

General Comment DART strengthening is being done since its establishment by recruiting new qualified staff in relevant fields.			
Recommendation	**Comments by DART**	**Planned actions**	**Implementation Timelines**
DART should strengthen its controls on Planning, Design and Tender Documentation to ensure that are carried out timely and all quality review and approvals of the Draft Plans, Designs and Tender Documentations Report are timely done	DART Agency has taken a number of initiative Improvement and strengthen the capacity of DART staff skills and professionalism for planning ang control of quality or the design, construction and operations of BRT and the process is continuous. 1. Organization structure of DART Agency have been recently reviewed and approved by the government as an effort to strengthening its functions and responsibilities. 2. DART have built its own capacity since 2016 to date by recruiting a number of professional's staff to ensure that planning, design, and review of tender and design documents are done properly and timely, as follows; i. Engineers - 9 ii. Legal officers -4 iii. Procurement officers - 3 iv. Environmental officers- 1 v. Social safeguard officers-2 vi. Land acquisition officers (Valuers)- 1 vii. Human resources officers -4	Training and capacity building workshops are budget and executed annually.	On going

	3. The Agency has enrolled 5 SEAP trainees to assist the agency with site work inspections. 4. DART have secured funding from World Bank and African Development bank to support capacity building and training of DART technical staff on BRT planning and operation management matters. Some staff received training from cities like Bogota and Brussel. 5. Under the AFDB funding the Agency brought in international experts for three week capacity building training to its technical staff on BRT planning and operation matters. 6. The Agency has contracted the Transaction Advisor (TA) for the purpose of giving technical expertise and advise on procurement of bus operators for BRT phases. 7. The Agency through consultant M/s Logit Company from Brazil reviewed the transport demand and updated the BRT service plan for DART and trained its Technical staff on Public Transport modelling in 2018. 8. The Agency has recruited the Bus Operations Expert who is working with DART in areas of Bus Operations. **9.** The Agency has engaged Management Support Consultant M/s LEA Associated from India to provide the Agency with Technical Experts to assist in the BRT Planning, Design and Operation matters.		



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