Foreword by the Auditor General

In my capacity as the Auditor-General of Kenya, I am pleased to publish and publicize this performance audit report that examines the implementation of the Integrated Urban Surveillance System for Nairobi Metropolitan Area by the State Department for Housing and Urban Development under the Ministry of Transport, Infrastructure, Housing and Urban Development. My Office carried out the audit under the Public Audit Act, 2015. Section 229 (6) of the Constitution and Section 36 of the Public Audit Act, 2015 gives me the mandate to conduct Performance Audits and report to Parliament on the effectiveness in the use of public funds.

Performance Audits together with Financial and Continuous Audits form the three-pillar audit assurance framework that I have established to give focus to the varied and wide scope of audit work done by my Office. The framework is intended to give assurance to stakeholders that public resources are not only correctly disbursed, recorded and accounted for but that they also have positive impacts on the lives of all Kenyans. The overriding goal of our performance audits is to promote delivery to Kenyans of public services of outstanding quality.

I have submitted the original copy of the report to the Speaker of the National Assembly to table in Parliament in accordance with Article 229 (7) of the Constitution. In addition, I have remitted copies of the report to the Cabinet Secretary for Ministry of Transport, Infrastructure, Housing and Urban Development and to the Principal Secretary at the National Treasury. I wish to express my appreciation for the cooperation and assistance afforded to the audit team by the State Department for Housing and Urban Development.

FCPA. EDWARD R.O. OUKO, CBS
AUDITOR-GENERAL

20th February, 2017
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<tr>
<td>BoQ</td>
<td>Bills of Quantities</td>
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<tr>
<td>CBD</td>
<td>Central Business District (commercial and business center of a city)</td>
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<td>CCTV</td>
<td>Closed Circuit Television</td>
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<td>GOK</td>
<td>Government of Kenya</td>
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<td>INTOSAI</td>
<td>International Organization of Supreme Audit Institutions</td>
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<td>ITMS</td>
<td>Intelligent Traffic Management System</td>
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<td>IUSS</td>
<td>Integrated Urban Surveillance System</td>
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<td>MoNMED</td>
<td>Ministry of Nairobi Metropolitan Development</td>
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<tr>
<td>NaMSIP</td>
<td>Nairobi Metropolitan Services Improvement Project</td>
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<tr>
<td>NCC</td>
<td>Nairobi City Council</td>
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<td>OAG – K</td>
<td>Office of the Auditor General - Kenya</td>
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<tr>
<td>VPNR</td>
<td>Vehicle Plate Number Recognition</td>
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EXECUTIVE SUMMARY

Background to the Audit

1. Nairobi, the capital city of Kenya, has over the years experienced increased insecurity, crime and heavy traffic congestion within its Central Business District (CBD). On 14th September 2012, the Government awarded M/S Nanjing Les Information Technology Ltd from China the contract for supply, installation, testing and commissioning of an Integrated Urban Surveillance System (IUSS) for Nairobi City Business District (CBD) vide contract no. MONMED 39/2011 - 2012 at Kshs.437,405,895.36. The initial IUSS contract price was later revised to Kshs.463,960,697.00 to cater for variation on switches and associated accessories at a cost of Kshs.20,299,024.00 and Kshs.6,255,778.00 for road repairs.

2. The IUSS project was aimed at improving security and enhancing traffic flow by installing surveillance cameras and an intelligent traffic management system within extended Nairobi's CBD. The project was financed through the then Directorate of Metropolitan Development, of the Ministry of Lands, Housing and Urban Development and implemented through an inter-governmental committee. In May 2016, following executive order No. 1 of 2016, the directorate was moved to the State Department for Housing and Urban Development under the Ministry of Transport, Infrastructure, Housing and Urban Development. The audit was conducted between the months of October 2014 to April 2015.

Objective of the Audit

3. The audit assessed the implementation and administration of the Integrated Urban Surveillance System (IUSS) project. The specific audit objective was to assess whether implementation of the IUSS project was done in accordance with the contract specifications. The audit also assessed the administration of the IUSS project after its installation.

Scope of the Audit

4. The focus of the audit was on the activities of the Directorate of Nairobi Metropolitan in the implementation of the Integrated Urban Surveillance System (IUSS) from November 2012, when the contract was awarded, to April 2015 the end of the audit. The audit examined the installation and administration of the integrated surveillance system in Nairobi's Central Business District.

Audit Assessment Criteria

5. We expected the Nairobi Metropolitan Development to have implemented IUSS project within planned time-frames and work scope and that the administration of the project is done with due care to attain the desired goals. Therefore, the performance of the Nairobi Metropolitan Development was assessed in accordance to the IUSS contract document MONMED/39/2011-2012, which outlines how the supply, installation, testing and commissioning of the IUSS should be carried out and key deliverables of the project on specific strategic objectives as outlined in the Metropolitan Department 2008-2012 strategic plan and key result areas outlined in the Nairobi Metric 2030.

Summary of our Findings

1. IUSS Project was not implemented in accordance with contract specifications

There was delayed completion of the project

6. According to the contract documents, the initial completion date for the IUSS project was 5 June, 2013. However, by 27 February, 2013, the contractor had not executed any works on site despite instructions from the Directorate of Metropolitan Development. Based on the contractor’s request the Ministry gave two extensions, one for 12 weeks which set the new completion date to 5 September, 2013 and a second one for 10 weeks which set the completion date to 14 November, 2013. This brought the total revised contract period to eleven months from the original contract period. In spite of these extensions, the Ministry’s twelfth progress report, records that the project was considered completed, five months later in April 2014.

7. Among the causes found for IUSS project implementation delay were:
   a) Difficulty in gaining access to project sites: The Directorate experienced delays in getting permission from building owners for camera installation and power access. This resulted in the project time being extended by nine weeks.
   b) Difficulty in importing project equipment: As contracted the Directorate was to obtain all import permits or licenses required for any part of the plant or works in reasonable time. The contractor requested the Directorate to facilitate processing of the Import Declaration Form, which the Directorate declined since the contracted
company was not registered in Kenya.

c) **Communication barrier:** The contracted day to day language of communication was English. However, the contractor had only one member of his project implementation team who could understand English. This led to slow progress of project works and hindered smooth implementation of the project. The Directorate was concerned that the interpreter might not have been relaying the exact message to the technical team. Further, in the absence of the interpreter, no communication could take place hence project works and approval of designs were often delayed.

d) **IUSS project designs approvals were being made in China:** The contractors' team based in Nairobi was not properly constituted and there was no technical officer who could make final decisions especially on approval of project designs. Hence all project design issues delayed as they had to be referred to the contractors head office in China which resulted in the project time being extended for two weeks.

e) **Incompatible switches:** The core sites of the existing unified communication switches in the Government Common Core Network (GCCCN) were found to be incompatible with the IUSS system and could not support IUSS camera scalability. As such there was need to seek contract variation authority and procure new switches at Kshs. 20,299,024.00 since this was not provided for in the projects bills of quantities. This caused a delay in testing and configuration of the system as the switches were to be imported and resulted in the project time being extended by another two weeks.

f) **Poor condition of cables and pipes in junctions:** Wiring the traffic signal poles was done in PVC armored cables installed in 450mm deep cable trenches. To effectively do this the contractor had to test old cables and trace ducts already existing along the junctions identified. The contractor cited poor condition of cables and pipes in junctions which delayed their progress and resulted in the project time being extended by an additional one week.

g) **Restriction of working hours for installation of poles and traffic lights:** During implementation of the project, the contractor received instructions to install poles and traffic lights during the night. This was to avoid traffic congestion in the junctions as cranes were used to install cantilever poles and to ensure traffic flow was not interrupted. This resulted in the project time being extended by two weeks.

**Some project components were not installed as contracted**

8. At the time of the audit in April 2015, the audit team found that some project items were not yet installed as initially contracted. The contractor was to install:

a) 40 surveillance cameras in 28 locations within the extended CBD but instead 40 surveillance cameras were installed in 24 locations;

b) 47 Vehicle Number Plate Recognition (VNPR) Cameras in 21 locations yet 52 VNPR cameras had been installed in 16 locations

**Items of the contract pending installation**

9. The Ministry's twelfth IUSS progress report reflected that the project was 100% completed by April 2014. However, one year later in April 2015, the audit found the following items totaling to Kshs 17,223,731.00 had not yet been installed in the IUSS:

a) The contractor was to provide fault detection equipment at every junction capable of reporting faults to the central control station at a cost of Kshs 2,204,067.00. At the time of the audit, the system was only capable of detecting total power loss at the junctions but not faults related to individual components making monitoring of faults difficult from the control room, and

b) The contractor was also to provide and install 2.5m by 1.5m information boards at twelve locations to be identified outside the CBD and connect each of them to the control center at a cost of Kshs 15,019,664.00. At the time of audit, the Directorate of Metropolitan Development explained that this was not installed due to lack of fiber optic connectivity to the identified locations.

**Installed IUSS's surveillance cameras were not performing as intended**

10. IUSS contract deliverables included design and renovation of two control rooms (main and redundant) at a total cost of Kshs 55,105,230.00 and installation and mounting of the surveillance cameras at Kshs 82,318,955.00. The control rooms were to be designed to be able to view and control all the surveillance cameras, controlling an unlimited number of screens.
The audit team visited both the main and redundant control rooms and noted that:

a) The redundant control room had been installed and supplied as specified in the contract. The redundant control room was functional and the team was able to physically verify the forty surveillance cameras that had been installed in twenty four different locations.

b) The project’s bill of quantities reflected that as contracted the IUSS was to include thirty one Pan, Tilt and Zoom (PTZ) surveillance cameras at a cost of Kshs. 7,660,777.20. The PTZ cameras could be tilted and zoomed continuously at 360 degree rotation for better surveillance. However the audit observed that of the forty cameras installed only twenty nine were PTZ cameras with the remaining eleven being static cameras which limited the systems surveillance functions.

c) The monitoring station was to be able to view and control all cameras from a single station, controlling an unlimited number of screens. However, only thirty two (80%) of the forty cameras had features performing as expected and were completely accessible from the control room. Eight cameras (20%) were not accessible from the redundant control room. The reasons for the inaccessibility were majorly due to power losses, deliberate switching off of the cameras - sometimes erroneously by security guards and fiber cuts due to ongoing constructions along the fiber routes. Further, six of the eight cameras not accessible were found to have had a downtime that had lasted over thirty days (had not been functional). The reason for the downtime in one of the sites was unknown as the contractor was yet to gain access to the site.

d) The IUSS contract specified that the surveillance cameras were to operate day and night to ensure consistent security and safety. However, the audit noted that the visibility of most of the cameras even after zooming at night was obscured especially in poorly lit areas. The mounting height for the cameras that were on top of buildings was also too high with some positioned as high as 124 meters above ground level in a bid to cover a larger radius. The obscured visibility of the cameras greatly hampered the quality of video feeds obtained at night as they were unusable for key observation tasks such as object identification and people recognition. The cameras required the use of enhanced video processing software which was not included in the IUSS.

e) The IUSS contract specified that the data storage capacity for the system should be up to thirty days at 12 Frames per Second (FPS). An audit review revealed that the IUSS security surveillance component in the redundant control room was storing data for only nine days at 25 Frames per Second after which the oldest video files were then overwritten. The contractor explained that for security surveillance data to be stored for thirty days as contracted, the IUSS system would have to be re-configured to record at 12 Frames per Second (FPS). Given that the system storage capacity is fixed, the contractor chose to shorten the period surveillance video can be stored to ensure better quality of stored video.

f) The IUSS’s video system was to be capable of ensuring that video integrity is maintained from the source to display or storage device regardless of the number of times it has been transmitted over the network or copied. The audit visit to the main control room revealed inconsistency in data storage. Data stored from some cameras dated as far back as October 2014 with intermittence in availability. However, data availability from 18 March 2015 was consistent with the trend observed in the redundant control room. In addition, one camera was playing older feed from a different surveillance camera instead of its own recorded feed.

IUSS’s Intelligent Traffic Management System was not functioning as intended

11. The IUSS contract included installation of an Intelligent Traffic Management and Surveillance system (ITMS) at Kshs 17,224,684.00. The ITMS was to give surveillance information along roads that improve traffic conditions and relay information from open stretches and major intersections to assist with real time monitoring of accidents and incidents to allow faster response by the emergency service. The audit team conducted a field verification exercise on 11 March 2015 on seven sampled junctions but was unable to verify components inside the ITMS as the Directorate did not provide access to the cabinets or a technician to accompany the team:

a) The ITMS was to be equipped with a traffic signal controller with a clock module. The traffic signal controller for the pedestrians was to include red - green flashing signals with 1 Hz and 2 Hz flashing clock that counts down the time for them to cross. The audit team found that pedestrian light signal heads with count down timer aspects had been installed in all the junctions. In some junctions,
the contractor utilized existing pedestrian lights which did not have the countdown timer aspects. Among the seven sampled junctions, six pedestrian light signal heads had malfunctioned; one had been knocked down, some did not have countdown timer aspects and others had red - green flashing signals flashing the wrong colour.

b) The contractor was also to install galvanized steel traffic signal poles complete with brackets and hinged doors in addition to connector holes and cable entry holes. The audit found that the poles had been installed in the sampled junctions. However most of these poles were missing top covers and manhole covers. The single arm, double arm and triple arm poles were correctly installed, but some did not have top covers and all of them did not have arm covers; and

c) In a bid to improve the flow of traffic into and out of the CBD, the Nairobi county government redesigned a section of roads in the CBD to ease congestion. Due to this, one junction which had two VNPRs was removed. The audit inspection of the system on 27 March 2015 revealed that out of the 50 VNPR cameras which were still in place, 31 cameras were accessible and operating well while a total of 19 cameras in seven different junctions were inaccessible. The causes of inaccessibility of the cameras included fiber cuts, junction controller inaccessible, power loss at the junctions and ongoing constructions.

The IUSS project was not taken over as stipulated in the contract

12. Completed IUSS project works were to be taken over by the Directorate of Metropolitan Development when they have passed the tests on completion and a taking over certificate has been issued or deemed to have been issued. In addition sub-clause 29.3 of the IUSS contract clearly stipulated that no parts of the works was to be used unless a taking over certificate had been issued in respect thereof. However, as at the time of the audit, we found that the IUSS project had been used for over one year yet no takeover certificate had been issued.

The contractor took long to repair IUSS project defects noted

13. Sub-Clause 30.9 of the IUSS contract document required the contractor to make good any defect in or damage to any part of the works which may appear or occur during the defects liability period as soon as practicable and at his own cost. The IUSS project's defect liability period begun on 15 April 2014 and was to run for one year. The audit found that the contractor delayed in making good project defects noted which negatively affected the operations of the IUSS. For instance by 31 October 2014, six months after commencement of the defects liability period, the Directorate of Metropolitan Development complained that despite several reminders to the contractor that more than half of the VNPR and surveillance cameras installed were not working, the contractor had still not made good the defects. This meant that no useful video feed were recorded from VPNR and surveillance cameras not working during these months.

II There was inadequate administration of the IUSS Project

14. During implementation of the IUSS project an inter-governmental committee that drew officers from the then Ministry of Public Works, Nairobi City Council and the Ministry of Nairobi Metropolitan Development consisting of eight key officers was responsible for the day to day activities of the project. Implementation funds were drawn from the development funds of the then Ministry of Nairobi Metropolitan. The audit found there was no comprehensive plan on how to tackle the project after its installation. This affected the project's stewardship and accountability as explained below which resulted to inadequate administration of the IUSS project activities on various crucial aspects.

Unclear legislative roles and responsibilities of the completed IUSS project

15. There was no documented policy clearly stipulating how the project would be administered after its completion:

a) The Directorate's IUSS project in Nairobi, as contracted was initially to be completed by 5 June 2013. The audit noted that the performance contract between the Cabinet Secretary Ministry of Interior and Coordination of National Government and H.E. the President of Kenya from July 2013 to June 2014 also included installation of CCTV cameras in Nairobi. The audit was concerned that the sites and number of CCTV cameras quoted to be installed by the Ministry of Interior and Coordination of National Government at a cost of Kshs 437 million were similar to those already installed by the Directorate's IUSS project earlier.
b) On 13 February 2014, cabinet gave instructions that the IUSS project implemented by the Directorate of Metropolitan Development be transferred to the Ministry of Interior and Coordination of National Government once it is commissioned. The Ministry of Lands, Housing and Urban Development prepared the IUSS handing over report on 23 April 2014 and requested the Ministry of Interior and Coordination of National Government to take over the project together with an unpaid balance of Kshs 161,626,869.30. However by then the IUSS project had not yet been commissioned. By April 2015, there was still no communication from the Ministry of Interior and National Coordination accepting the IUSS handover.

c) Delays in assigning legislative stewardship of the IUSS project had an impact on the ease of gaining additional resources to ensure sufficient storage capability for recorded feeds in the control rooms. This is because the IUSS system is designed to store data capacity up to 30 days at 12FPS. After the maximum storage limit is reached, the units automatically overwrite previously recorded data starting with the oldest unless data has been identified to be retained for security purposes.

d) The IUSS project lacked a legal framework to ensure enforcement of legislation in regard to traffic and security. The Directorate of Metropolitan Development recorded numerous challenges faced on enforcing breaches such as vandalism of the IUSS infrastructure and knocking down of installed poles by motorists against the IUSS infrastructure. The Directorate lacked the mandate to take evidence to court or enforce breaches of traffic rules noted since these problems fall under the mandate of the county government and internal security.

The IUSS contract was not paid for repair works done
16. On 4 April 2014, the Governor of the Nairobi County requested the Ministry of Lands, Housing and Urban Development to instruct the contractor for the tender of the IUSS project to repair traffic signals and cameras along two roundabouts in Nairobi’s CBD area. The Nairobi County committed to refunding the cost of repairs amounting to Kshs 6,255,778.00. The contractor made the repairs as instructed. However, the audit found that by April 2015, the contractor had not yet been paid.

17. In addition it was not evident how the Ministry had accounted for the Kshs 6,255,778.00. The amount was included as a liability in April 2014 IUSS project’s handing over report to the Ministry of Interior and Coordination of National Government as part of the revised contract sum. However the IUSS August project progress report by the Ministry of Lands, Housing and Urban Development did not reflect this amount. Hence it was unclear whether the amount was received from the Nairobi City County and why the contractor had not been paid one year later.

No framework was developed for the maintenance of the completed IUSS project
18. The IUSS project was to be maintained by the contractor till the end of the project defect liability period after which its maintenance reverted back to the owner yet there was:

a) Lack of clear accountability for maintenance of the IUSS: The IUSS’s project defect liability period for surveillance systems component expired on 15 April 2015 yet by then the legislative ownership of the project remained unresolved. Hence it was not clear who would be accountable for ensuring the IUSS is adequately maintained.

b) Competence was not developed on maintenance of the IUSS: IUSS contract deliverables costs included training of four technical officers and eight operators for one month on a similar system at Kshs 10,098,600.00. The training was aimed at enabling the staff become familiar with the principle, operations and maintenance of the IUSS:

i. 39 operations and maintenance staff drawn from different Government departments were trained locally between March and April 2014, for only two days each instead of a month. The training done was on the overview of the IUSS, CCTV subsystem, ITMS, VNPR Subsystem and Information Board.

ii. As contracted four technical operators were to be trained in China on how to maintain the IUSS. However the audit found that
instead five senior staffs attended factory inspections in China and were trained in the IUSS system for one day only, the other days were used to inspect project items being delivered to Kenya. Since adequate competencies had not yet been developed locally for the maintenance of the IUSS system installed there was over reliance on the contractor's foreign staff to maintain the system.

**Personnel trained on the IUSS projects were underutilized**

19. The National Police staff trained on the operations of the IUSS were not yet deployed to operate the IUSS control room, in spite of repeated requests from Ministry of Lands, Housing and Urban Development one year after being trained. This greatly hampered the operations of the IUSS control room especially on detection and the procedures to be followed on any suspicious activities noted.

**Project works were at times paid for without being verified**

20. Review of IUSS project documents revealed that at times project items were paid for without ascertaining the works certified as done. For instance the audit found overpayments for project works amounting to Ksh. 16,485,584 which were recovered in later payments.

**There was inadequate governance and management of the IUSS control room operations**

21. An audit verification exercise revealed that IUSS’s redundant control room was being used for active monitoring of crime and traffic while the main control room was acting as a backup with no personnel deployed. Review of the IT Governance of the IUSS control rooms on 27 March 2015 and 1 April 2015 (redundant and main control room respectively) revealed that:

a) **There was no Succession Planning:** One year after the IUSS project had been completed, all technical issues were still being handled by the contractor. In addition, the language in the IUSS video analysis server in the IUSS main control room was in Chinese language and only the contractor could operate it. It had also not yet been clearly defined who will be responsible for operations in the IUSS control room and management of data.

b) **IUSS main control room did not have proper IT general controls:** The IUSS main control, server room had a wooden floor which was not fireproof, hence it could quickly spiral out of control in case of a fire breakout. In addition, the main control room had poor physical security, the access door was made of glass which can easily be broken into and the windows did not have grills to prevent access from outside. The room had also not been cleaned or dusted for over 3 months which could negatively affect the performance of the IUSS equipment. It was further observed that both control rooms did not have explicit nonsmoking signs.

**c) There were no checks and controls being done for account logon events:** This increased the possibility of unauthorized activity going undetected, causing denial of service attacks on the server or launching of malicious code on the server by unauthorized users.

d) **IUSS system alarm and events were not configured:** The IUSS had not been configured to generate and store system events which may result in added costs in fault resolution.

**Conclusions**

22. Some aspects of the Integrated Urban Surveillance System were not carried out as contracted neither was the project administered effectively. Themes of noncompliance with contract agreement surfaces repeatedly which will definitely hinder Kenyans from benefitting from the intended objective of investing over Kshs 460 million in the IUSS project. The project delayed in being completed, adequate planning was not done before its implementation that resulted to delays, project alterations, and unclear roles and responsibilities, and contract variations. The contractor delayed in repairing project defects that had occurred during the defect liability, critical items as the VPNF and surveillance cameras installed were not working. In addition, there was inconsistency in storage of data with frequent intermittence in availability which meant that the IUSS could not provide reliable information when needed. These instances pointed to non-compliance with the contract agreement.

23. In addition it was doubtful if taxpayers will get the anticipated value for money from training Government personnel on how to operate and maintain the system at a cost of over Kshs 10 million. This is because the National police who have the responsibility of handling security and traffic had not yet deployed trained staff to operate the control rooms. The IUSS still heavily depends on the contractor to handle technical
aspects since required competencies were not developed and critical aspects of the system were still in the Chinese language. Legislative responsibility for the ownership and maintenance of the system was further still in doubt which is likely to have an impact on maintenance of the project and enforcement of legislation in regard to traffic and security. In addition the Ministry of Interior and National Coordination had launched a similar IUSS project in Nairobi’s CBD at a cost of over Kshs 437 Million at the same sites that Directorate of Metropolitan Development had already installed surveillance cameras. This raises concerns on risk of duplication of resources at the taxpayers’ expense.

24. The Integrated Urban Surveillance System has glaring weaknesses that if not set right immediately can compromise the integrity of Nairobi CBD’s security and traffic management systems and result into further financial burden to taxpayers. The Directorate of Metropolitan Development is aware of the existence and scope of the challenges faced in the IUSS and are willing to solve the problem but do not have the capacity or mandate to do so after its installation.

Recommendations

25. In view of the findings and conclusions of the audit by the Auditor - General, has proposed the following recommendations for implementation by the State Department for Housing and Urban Development, under the Ministry of Transport, Infrastructure, Housing and Urban Development.

I. To ensure that the IUSS project is operated effectively to serve the needs of Kenyans

i. Complete implementation of all Integrated Urban Surveillance System (IUSS) project items as specified in the bills of quantities within the remaining contract sum of Kshs 90,657,100.00 to ensure that the project operates as intended. This will ensure that IUSS components that had not yet been installed as contracted are implemented.

ii. Carry out tests on all completed IUSS project works and ensure that the contractor makes good on any defective or damaged works in line with the contract to ensure the project runs as intended.

iii. Make arrangements to issue a takeover certificate to the contractor, commission and hand over the IUSS project as resolved by the cabinet. This will ensure that the IUSS project is operated and maintained by Government departments who have the mandate to conduct security and traffic activities in the country.

iv. Discuss with cabinet about the launch of Ministry of Interior and Coordination of National Government’s launch of a similar IUSS project in Nairobi’s CBD at Kshs 437 Million to clarify concerns since the same number of surveillance cameras were to be installed in exactly the same sites already installed by the Directorate of Metropolitan’s IUSS project. This will avoid duplication of resources at the taxpayers’ expense. In addition it will be difficult to operate the same cameras at different control rooms.

v. Collaborate with all stakeholders involved to ensure that persons that had been trained in the operations and maintenance of the Integrated Urban Surveillance System are deployed to undertake their various roles. This will ensure smooth running of the implemented projects and value for money to Kenyan taxpayers for the funds spent on training.

vi. Put in place best practice in IT governance and management that consists of the leadership, organizational structures and processes that ensure that the system extends and sustains the overall IUSS intended strategies and objectives.

II. To ensure similar projects are implemented efficiently and effectively in future

i. Put in place comprehensive plans, policies and frameworks during planning to tackle key aspects of interagency projects during and after implementation. These should address issues like project ownership, handling and ownership of information generated from the system, roles and responsibilities, funding and maintenance.

ii. Collaborate with various stakeholders to enhance awareness of the benefits of the project and get the consent and permission of owners of buildings or properties where sites are to be installed during the project planning stages.

iii. Assist and inform the contractor in ascertaining the nature and extent of any laws, regulations, orders or bylaws and customs in the country.

iv. Ensuring that the contractors’ implementation team have adequate technical competency and are able to
efficiently communicate in the country's official language to facilitate faster decision making and avoid slow progress of project works.

v. Ensure project bill of quantities are comprehensively designed after conducting preliminary surveys to ensure that comparability of items quoted with structures and systems already in place to avoid project variations and including items that might not be considered necessary once implementation begins.

vi. Clearly document, test and certify all process of the implementation to ensure clarity between all stakeholders on project timelines.

vii. Collaborate with all stakeholders involved in the project implementation to ensure that roles and responsibilities of the various intergovernmental agencies are clearly spelt out in relation to:

- Clarity over who is responsible for maintenance of the various aspects of the project after the defects and liability period is over.

- Enforcement of legislation in regard to traffic and security with clear policies on how incidents and accidents are handled.

- Storage of backup surveillance tapes with clear policies detailing allowed period of storage and chain of custody.
CHAPTER 1

Background of the Audit

Introduction

1.01 This report contains findings and other relevant details of a performance audit conducted by the Office of the Auditor General on the implementation of the Integrated Urban Surveillance System (I USS) by the then Directorate of Metropolitan Development of the Ministry of Lands, Housing and Urban Development. In May 2016, following executive order No. 1 of 2016, the directorate was moved to the State Department for Housing and Urban Development under the Ministry of Transport, Infrastructure, Housing and Urban Development. The audit was conducted between the months of October 2014 to April 2015.

Background on the Integrated Urban Surveillance System

1.02 Nairobi the capital city of Kenya, has the strategic advantage of being Kenya’s national center for education, commerce, transport and regional and local economy that contributes to over 60% of the National GDP. However since independence, Nairobi has experienced increased insecurity, crime and heavy traffic congestion within its Central Business District (CBD). The CBD refers to the commercial and business center of a city. The IUSS is one of Kenya Vision 2030’s flagship projects aimed at improving security and enhancing traffic flow within Nairobi Metropolitan Region and is fully funded by the Government of Kenya. On 14 September 2012, M/s Nanjing Les Information Technology Ltd was awarded the contract to supply, install, test and commission an integrated surveillance system for Nairobi’s CBD. The contract was signed on 20 November 2012. The project commenced on 6 December 2012 and was to be completed by 5 June 2013 at Kshs. 437,405,895.40.

Motivation for the Audit

1.03 The Auditor General authorized the audit after having considered that the Government had committed Kshs.437 million which was 13% of Directorate of Metropolitan Development’s 2012/13 development allocation to install the IUSS pilot project in Nairobi’s CBD. Despite this huge budgetary allocation, by March 2015, there were still increasing levels of insecurity and heavy traffic congestion within Nairobi’s CBD. An audit on the implementation of the IUSS would provide valuable information to Parliament, the Executive, its managers and other stakeholders during implementations of similar projects in other regions to ensure taxpayers get value for the money invested.

CHAPTER 2

Design of the Audit

Objective of the Audit

2.01 The objective of the audit was to assess whether the Directorate of Metropolitan Development of the Ministry of Lands, Housing and Urban Development had implemented the Integrated Urban Surveillance System (IUSS) project in accordance with the contract specifications. Besides this the audit was also to verify the administration of the IUSS project by the Directorate of Metropolitan Development.

Scope of the Audit

2.02 The focus of the audit was on the activities of the Directorate of Nairobi Metropolitan in the implementation of the Integrated Urban Surveillance System (IUSS) from November 2012, when the contract was awarded, to April 2015 the end of the audit. The audit examined the installation and administration of the integrated surveillance system in Nairobi’s Central Business District.

Audit Assessment Criteria

2.03 We expected the Nairobi Metropolitan Development to have implemented IUSS project within planned time-frames and work scope and that the administration of the project is done with due care to attain the desired goals. Therefore, the performance of the Nairobi Metropolitan Development was assessed in accordance to the IUSScontractdocumentMONMED/39/2011-2012, which outlines how the supply, installation, testing and commissioning of the IUSS should be carried out and key deliverables of the project on specific strategic objectives as outlined in the Metropolitan Department 2008-2012 strategic plan and key result areas outlined in the Nairobi Metro 2030.

Methods Used to Gather Information

2.04 We conducted the audit in accordance with performance audit guidelines by International Auditing Standard of Supreme Audit Institutions (INTOSAI) and audit policies and procedures established by the Office of the Auditor General Kenya (OAG –K).
CHAPTER 3

Description of the audit area

Institutional Framework for the Integrated Urban Surveillance System project

3.01 The Integrated Urban Surveillance System (IUSS) project for Nairobi Metropolitan Area is implemented by the Metropolitan Development Directorate. At the time of award of the IUSS contract in 2012, the directorate was known as the Ministry of Nairobi Metropolitan Development which was established through Presidential Circular No. 1 of May 2008. In May 2014, following the inauguration of a new government in accordance with 2010 Constitution of Kenya, the Ministry was put as a directorate under the Ministry of Lands, Housing and Urban Development through Executive Order No. 2/2014. The mandate of the directorate includes formulating, coordinating and administering policies in respect to the Nairobi Metropolitan region.

Objectives of the IUSS project

3.02 The Metropolitan Development Directorate in line with the country’s development blueprint, Kenya Vision 2030 developed a strategy document called Metro 2030. The IUSS project aimed towards achievement of the Kenya Vision 2030 and Nairobi Metro 2030. Metro 2030 strategy aims to enhance mobility and connectivity through effective transportation by reducing travel times and costs, improving connectivity and accessibility and enhancing transport safety and security. Metro 2030’s Key Result Area 6 in support of the ongoing police reform initiatives, aimed at ensuring a safe and secure Nairobi Metropolitan Region through:

a) Phased implementation of an Integrated Close Circuit Television System for the Nairobi Metropolitan Region with its pilot phase focused on the Central Business District areas, identified crime hotspots, major arteries and intersections as well as identified critical areas such as industrial areas.

b) Develop and operationalize integrated emergency services control room including capacity building for all relevant agencies and officers.

3.03 As stated in the contract, the integrated system was aimed at allowing for the deployment of multiple monitoring stations that are able to view and control all cameras at a single station to monitor and control traffic at the control room and also monitor criminal activities at Kenya police’s general control room. A total of 42 surveillance cameras were to be installed at various locations covering Nairobi Central Business District, Community area, Gikomba, Muthurwa, Kirinyaga road and environs. The traffic management system was to cover the junctions along Uhuru highway, from Lusaka roundabout to Westlands and the existing signalized junctions within the CBD.

Description of IUSS Project Works

3.04 The IUSS was an Intelligent Video Platform based on a dedicated internet protocol infrastructure which should allow for viewing of any camera from any viewing station without any limitations. The works to be executed under the two key components were:

a) Surveillance Cameras; included installation of 42 surveillance cameras and linking them to control centers, one located at the Nairobi County Police headquarters at Millimani and the other located at City Hall Annex.

b) The Traffic Management System; included installation of new traffic signal controllers on 22 junctions and linking them to the control centers. The traffic management system was also to include installation of Vehicle Number Plate Recognition (VNPR) cameras and Information Boards at selected locations within Nairobi’s CBD.

3.05 The IUSS contract deliverables as detailed in the project document were:

a) Design approval of main/redundant control room

b) Siting of surveillance camera locations

c) Siting of VNPR camera locations

d) Siting of traffic signal poles and controller locations

e) Inspection of Government Common Core Network

f) Ducting and associated civil works to connect camera and traffic signal locations to the control centers

g) Camera and traffic signal pole design, approval and fabrication

h) Design and renovation of main and redundant control rooms
i) Installation of traffic signal controllers, signal heads and countdown timers

j) Power supply construction to traffic signals and camera locations

k) Laying of fiber optic cables to connect various traffic signal and camera locations

l) Factory inspection

m) Training of technical officers in China

n) Shipping

o) Cameras installation

p) Equipment installation and integration and

q) Testing and commissioning

The contractor and making appropriate recommendations to the Engineer

c) Maintaining site records, measurement of works, preparation of monthly and quarterly progress reports

d) Testing and inspection of all materials for the works to ensure that the contractor complies with all aspects of the specifications for materials and workmanship

e) Advising the Engineer on the need for special inspections or testing other than those proposed in the specifications

f) Arranging monthly site meetings and other extra ordinary meetings as instructed by the Engineer and as need arises

g) Any other actions that are in line with the above for the proper management and execution of the works

h) Timely transmission to the Engineer on all the above

Composition of the IUSS project implementation team

3.06 The IUSS project implementation team consisted of an eight inter - governmental committee that drew officers from the then Ministry of Public Works, Nairobi City Council and the Metropolitan directorate. The team was as shown in the diagram below:

Figure 1: IUSS Project Team Composition

![Diagram of project team composition]

Source: Metropolitan Directorate

Roles and responsibilities of key officers in the IUSS implementation team

3.07 The duties of the project implementation team included:

a) Carrying out day to day supervision of the works and general administration of the contract

b) Examining and evaluating proposals from

3.08 The secretary of the metropolitan development facilitates release of projected cash flow for the IUSS project and also timely approvals requested to facilitate expeditious implementation of project activities. The secretary is assisted by directors, also depicted in the organogram, whose roles include:

a) Metropolitan planning and development
   - metropolitan planning, urban design & architecture, environment, development
control and metro GIS.

b) **Corporate affairs** – metropolitan branding & promotion, strategic communications.

c) **Social infrastructure department** – housing, education, health, heritage, culture and sports.

d) **Infrastructure, transport & utilities** – metropolitan transport, water & sewerage, energy and ICT.

e) **Metro safety & security department** - Fire & rescue, ambulance services and policing.

f) **Metropolitan investment department** – business development and public-private partnerships.

3.09 These departments are complimented with an ICT unit, central planning and monitoring unit, internal audit and finance and administration. Metropolitan development also signed a performance contract between themselves and senior principal superintending engineer (transport), to among others; assist the ministry in developing a Nairobi traffic management study report and an integrated urban surveillance system.

**Sources of funding for the Integrated Urban Surveillance System Project**

3.10 The Metropolitan Development Directorate derives funds for its operations from the Government of Kenya budgetary provisions, development partners and public private partnerships. The IUSS project was wholly funded by the Government of Kenya. The directorate used US$ 5,197,622 equivalent to Kshs. 437,405,895.36 of its GOK allocated development funds for the supply, installation, testing and commissioning of the Integrated Urban Surveillance System as tabulated below. By February 2015, Kshs 346,748,792.44 had been paid to the contractor out of the contracted amount of Kshs 437,405,895.36

**Table 1: IUSS Schedule of Requirements and Prices**

<table>
<thead>
<tr>
<th>No</th>
<th>Item Description</th>
<th>Quantity</th>
<th>Unit Price (USD)</th>
<th>Installation period</th>
<th>Total Price (USD $)</th>
<th>Total Price in Kshs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>General</td>
<td>1</td>
<td>367,221.59</td>
<td>/</td>
<td>367,221.59</td>
<td>30,903,534.00</td>
</tr>
<tr>
<td>2</td>
<td>Cameras and camera mounting</td>
<td>1</td>
<td>978,182.54</td>
<td>2.5 months</td>
<td>978,182.54</td>
<td>82,318,955.00</td>
</tr>
<tr>
<td>3</td>
<td>Control Rooms</td>
<td>1</td>
<td>654,806.35</td>
<td>2 months</td>
<td>654,806.35</td>
<td>55,105,230.00</td>
</tr>
<tr>
<td>4</td>
<td>Traffic Management</td>
<td>1</td>
<td>1,699,692.08</td>
<td>2.5 months</td>
<td>2,046,517.47</td>
<td>17,224,684.00</td>
</tr>
<tr>
<td>5</td>
<td>Provisional sum</td>
<td>1</td>
<td>1,091,666.67</td>
<td>/</td>
<td>1,091,666.67</td>
<td>91,869,212.00</td>
</tr>
<tr>
<td>6</td>
<td>2 year spare parts</td>
<td>1</td>
<td>59,226.98</td>
<td>/</td>
<td>59,226.98</td>
<td>4,984,280.36</td>
</tr>
</tbody>
</table>

|     | Total Price                  |          |                  | Total Price         | 5,197,622.00        | 437,405,895.36    |

**Source: IUSS Contract Agreement** (Conversion rate used was 1$ =kshs. 84.155)
CHAPTER 4

Findings of the Audit

4.01 The audit found that the Integrated Urban Surveillance System (IUSS) project was not implemented in accordance with the contract document specifications and there was inadequate administration of the IUSS project. The findings are detailed below.

IUSS project was not implemented in accordance with contract specifications

4.02 On 14 September 2012, the Ministry awarded M/s Nanjing Les Information Technology Ltd from China the contract for supply, installation, testing and commissioning of an Integrated Urban Surveillance System for the Nairobi Metropolitan area - Nairobi City Business District (CBD) vide contract No. MONMED 39/2011 - 2012 for a contract price of Kshs. 437,405,895.36. The contract price was later revised to Kshs. 463,960,697.00 to cater for variation on switches and associated accessories at a cost of Kshs. 20,299,024.00 and Kshs 6,255,778.00 for road repairs. This variation was 6% which was within the allowable set limit by the Government Procurement regulations. However various aspects of the IUSS project were not implemented in accordance with the contract specifications as detailed below.

There was delayed completion of the IUSS project

4.03 The IUSS contract was signed on 20 November 2012 for a period of 6 months. The project commenced on 6 December 2012 and was initially to be completed after six months on 5 June 2013. However by 27 February 2013, the contractor had not executed any works on site. The Ministry then gave the contractor two extensions for a total period of eleven months based on requests from the contractor. The first extension was for 12 weeks which set the new completion date to 5 September 2013 and the second was for 10 weeks which set the completion date to 14 November 2013. Despite these extensions, according to the Ministry's twelfth progress report, the project was considered completed in April 2014. At the close of the audit in April 2015, IUSS's VNPR, Surveillance cameras and control rooms were under the 12 months defects liability and warranty period while the Intelligent Traffic Management System (ITMS), had not yet been fully completed. Among the causes found for IUSS project implementation delay were:

a) Difficulty in gaining access to sites: The surveillance cameras were to be installed in identified locations in Nairobi's Central Business District areas, crime hotspots, major arteries and intersections as well as critical areas like bus stations. Identification and gaining of access to the specific buildings where the cameras were to be installed was the responsibility of the Directorate of Metropolitan Development. The directorate was to grant the contractor access and possession of the site within a reasonable time. However, the directorate experienced difficulties in getting permission from owners of the buildings to install surveillance cameras and use their power meter supplies which resulted in the project time being extended by nine weeks.

b) Difficulty in importing IUSS equipment: As contracted, the Directorate of Metropolitan Development was to obtain all import permits or licenses required for any part of the plant or works within a reasonable time with regard to the time for delivery of the plant and completion of the works. An audit review of the IUSS project documents indicated that there was delay in importation of required project equipment. This was due to the Directorate declining to facilitate processing of the contractor's Import Declaration Form (IDF) as the contracted company was not registered in Kenya.

c) Communication barrier: The contracted day-to-day language of communication was English hence the contractor was required to employ one or more competent representatives fluent in the English language to superintend the carrying out of works on site. The project contractor employed sixteen Chinese Nationals who had technical backgrounds in the software and hardware required for the IUSS project implementation. However, only one of the sixteen Chinese employed could communicate in English language and was in the country intermittently. Review of the IUSS project documents and interviews conducted indicated that the Metropolitan Development Directorate raised their concerns on the language barrier communication a number of times yet it remained unresolved. The Directorate was concerned that the interpreter might not have been relaying the exact message to the technical team. Further, in instances where the
interpreter was absent, no communication could take place hence project works and approval of designs were often delayed. This led to slow progress of project works and hindered smooth implementation of the project.

d) IUSS project designs approvals were being made in China: Audit review of project documents further indicated that the contractors’ team based in Nairobi was not properly constituted as there was no technical officer who could make final decisions especially on approval of designs. Hence, all project design issues were referred to the contractors head office in China. This led to project delay time of another two weeks.

e) Incompatible switches: The contractor was to connect the IUSS cameras on the Government Common Core Network (GCCN). However, the existing unified communication switches in the GCCN core sites were incompatible with the IUSS system and could not support camera scalability. The system had to be tested and configured which caused a delay. The contractor also delayed in submitting the quotations for the switches since they had to be imported. Project works further delayed as the Directorate sought for contract variation authority to procure new switches at Kshs 20,299,024.00 since they were not provided for in the project’s bills of quantities. All this resulted in the time being extended by an additional two weeks.

f) Poor condition of cables and pipes in junctions: To effectively wire the traffic signal poles in 450mm deep cable trenches as required, the contractor had to test old cables and trace ducts already existing along identified junctions. However, existing cables and pipes in identified junctions were in poor condition which delayed the contractor’s progress and project time was again extended by one week.

g) Restriction of working hours: The audit found that during implementation of the IUSS project, the contractor received instructions from Nairobi County to only install poles during the night and not to move to another junction until they completed a previous one. This was to avoid traffic congestion in the junctions as cranes were used to install cantilever poles and to ensure traffic flow was not interrupted. This resulted in the project time being extended by another two weeks. 

IUSS contract Items found not installed

4.04 The Ministry of Lands, Housing and Urban Development’s 14 April 2014 progress report on the IUSS project indicated that 100% of contracted works had been completed. However, one year later in April 2015, the audit team found that some items in the contract were not yet installed. Components found not yet installed included:

a) Item 4.10 of the IUSS contract required the contractor to install fault detection equipment at every junction at a total cost of Kshs. 2,204,066.58. The fault detection equipment was to be capable of detecting burnt out bulbs, faulty relays and power loss at the junctions. The equipment was also to be capable of reporting the faults detected to the central control station. At the time of the audit, the IUSS system was only capable of detecting total power loss at the junctions but not faults related to individual components. This made monitoring of faults from the control room difficult.

b) Item 4.13 of the IUSS contract also required the contractor to provide and install 2.5m by 1.5m information boards in twelve locations to be identified outside Nairobi’s CBD and connect each of them to the control center, at a cost of Kshs. 15,019,663.80. According to the Directorate of Metropolitan Development, the information boards were not installed due to lack of fiber optic connectivity to the identified locations. Without the information boards, traffic trends were not being displayed to provide motorists with information on alternative routes when approaching Nairobi’s CBD for more efficient traffic management.

Some IUSS project components were not installed as contracted

4.05 At the time of the audit in April 2015, some IUSS project items were not installed as initially contracted. The Ministry did not avail any documents on how the variations in scope of works observed were authorized. The variances reduced the objective of the IUSS project aimed at increasing security and enhancing traffic management systems as tabulated below.
Table 2: IUSS Project works as at April 2015

<table>
<thead>
<tr>
<th>Description</th>
<th>No. as per contract</th>
<th>No. Audit found Installed</th>
<th>Variance</th>
<th>Reason for variance</th>
<th>Effect of the variance observed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surveillance Camera's</td>
<td>40 in 28 locations</td>
<td>40 in 24 locations</td>
<td>4 locations</td>
<td>Building owners reluctant to have the cameras installed on initially planned sites</td>
<td>Failure to install surveillance cameras in the 4 hot spots identified by the police as being crime hot spots reduces the safety and security in these locations</td>
</tr>
<tr>
<td>Vehicle Number Plate Recognition</td>
<td>47 in 21 locations.</td>
<td>52 in 16 locations.</td>
<td>5 locations</td>
<td>No explanation provided</td>
<td>Failure to install VPNR's in the five locations means that the IUSS cameras cannot capture vehicle numbers to check for stolen vehicles and those that do not have the compulsory documents required by Government</td>
</tr>
</tbody>
</table>

Source: OAG analysis of project documents

Installed IUSS’s surveillance cameras were not performing as intended

4.06 The IUSS contract included design and renovation of main and redundant control rooms and installation and mounting of surveillance cameras at a total cost of Kshs 55,105,230.00 and Kshs 82,318,955.00 respectively. The control rooms were to be designed to be able to view and control all cameras, controlling an unlimited number of screens. The audit team visited both the main and redundant control rooms. The audit visit to the redundant control room on 27 March 2015 revealed that most of the items in the control room had been installed and supplied as specified. The redundant control room was functional with feed streaming in from the various on - street equipment. The audit team physically verified the forty surveillance cameras that had been installed in 24 different locations. However, the audit team observed:

a) That only twenty nine of the forty surveillance cameras installed were Pan, Tilt and Zoom (PTZ) cameras with the remaining eleven being static cameras. The project's bill of quantities reflected that as contracted the IUSS was to have thirty one PTZ surveillance cameras at a cost of Kshs. 7,660,777.20. The PTZ cameras could be tilted and zoomed continuously at 360 degree rotation. Having less PTZ cameras than that quoted in the IUSS contract limited the systems surveillance functions since the static cameras cannot be rotated as the PTZ ones for better surveillance.

b) That only thirty two (80%) of the forty cameras were completely accessible from the control room with all features performing as expected. Eight cameras were not accessible from the redundant control room. Further, six of these eight cameras had a downtime that had lasted for over 30 days. Interviews carried out with the officers in charge revealed that the reasons for the inaccessibility were majorly due to power losses, deliberate switching off of the cameras - sometimes erroneously by security guards and fiber cuts due to ongoing constructions along the fiber routes. In one of the sites, the reason for the downtime was unknown as the contractor was yet to gain access to the site. The accessibility and performance of the cameras is illustrated in the below:
that were on top of buildings was too high. Some cameras were positioned as high as 124 meters above ground level in a bid to cover a larger radius. This greatly hampered the quality of video feeds obtained at night as they were unusable for key observation tasks like object identification and people recognition. It also required the use of enhanced video processing software currently not included in the system.

d) The IUSS contract’s description of works had specified that the system’s data storage capacity should be up to thirty days at 12 Frames per Second (FPS). Frame rate is an important aspect of video quality; a higher frame rate means better video quality but more storage space. An audit review of the system in the redundant control room revealed that the IUSS security surveillance component was storing data for only nine days at 25 Frames per Second after which the oldest video files were then overwritten while the traffic surveillance component was storing data for sixty days. The contractor explained that for security surveillance data to be stored for thirty days as contracted, the IUSS system would have to be re-configured to record at 12 Frames per Second (FPS). Given that the system storage capacity is fixed, the contractor chose to shorten the period surveillance video can be stored to ensure better quality of stored video.

e) To ensure that the IUSS video integrity is maintained from the source to display or storage device regardless of the number of times it has been transmitted over the network or copied, the IUSS’s video system was to be capable of providing end to end authentication. The system’s general software configuration was also to have at minimum, user configuration elements that allow operators to save live or recorded videos and ability to review archived video. In addition long term archived video should be archived off the recorder storage to a longer term protected storage device reserved for specific event videos saved as files. The audit visit to the main control room on 1 April 2015 revealed that there was inconsistency in storage of data. Some of the data stored from some cameras dated as far back as October 2014 with intermittence in availability. Data availability from 18 March 2015 was however
consistent with the trend observed in the redundant control room. Further interaction with the system revealed that one camera was playing older feed from a different surveillance camera instead of its own recorded feed.

The IUSS's Intelligent Traffic Management System was not functioning as intended

4.07 IUSS contract included installation of an Intelligent Traffic Management and Surveillance system (ITMS) at Kshs 17, 224,684.00. The ITMS was to enable traffic monitoring and provide data to reconfigure traffic signals. The ITMS was to give surveillance information along roads that improve traffic conditions and relay information from open stretches and major intersections to assist with real time monitoring of accidents and incidents to allow faster response by the emergency service. The ITMS was to include installation of new traffic signal controllers on 22 junctions and linking them to the control centers, installation of 47 Vehicle Number Plate Recognition (VNPR) cameras in 21 locations and Information Boards at selected locations within the CBD. Review of IUSS documents and physical verification by the audit team revealed that the contractor installed 52 VNPR cameras in 16 locations. The team conducted a field verification exercise on 11 March 2015 on seven sampled junctions and found that:

a) The ITMS was to include a traffic signal controller supplied in a sturdy cabinet complete with a secure locking system and a non-fused power socket that should receive voltage even when the controller has been isolated from the mains. The audit found that the cabinets housing the traffic signal controller set and the junction uninterrupted power supply (UPS) had been installed and well secured.

b) To be capable of operating automatically and unattended, the traffic controller system was to be installed with a seven day automatic switching routine together with public holiday lists. The audit found that 300mm traffic signal heads and signal arrow heads had been supplied and installed in all the junctions and were operating well. However, the audit team did not verify the components inside as the client did not provide access to the cabinets or a technician to accompany the audit team.

c) To enable wireless coordination with neighboring controllers and also allow for manual intervention when abnormal traffic conditions are obtained on the roads the IUSS's traffic signal controller was to be equipped with a clock module that can be set to the right time by means of a daily synchronization pulse. The audit team found that pedestrian light signal heads with count down timer aspects had been installed in all the junctions. In some junctions, the contractor utilized existing pedestrian lights which did not have the countdown timer aspects. Among the seven sampled junctions, six pedestrian light signal heads had malfunctioned as indicated in the Table 3 below;

<table>
<thead>
<tr>
<th>Junction</th>
<th>Malfunction Pedestrian lights</th>
<th>No. Pedestrian lights</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kenyatta avenue outbound</td>
<td>Knocked down</td>
<td>1</td>
</tr>
<tr>
<td>towards community</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No count down timer aspects</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Off while supposed to be green</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Not counting down while supposed to be</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>red</td>
<td></td>
</tr>
<tr>
<td>Uhuru highway outbound</td>
<td>Off while supposed to be red but counting down</td>
<td>1</td>
</tr>
<tr>
<td>towards Haile Selassie</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Koinange outbound towards</td>
<td>Not counting down</td>
<td>1</td>
</tr>
<tr>
<td>Cardinal Otunga</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kenyatta Avenue inbound</td>
<td>Off while supposed to be green</td>
<td>1</td>
</tr>
<tr>
<td>Muindi Mbingu</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Source: OAG-K Analysis**

d) The contractor was also to install galvanized steel traffic signal poles complete with
brackets and hinged doors in addition to connector holes and cable entry holes. The audit found that the poles had been installed in the sampled junctions. However most of these poles were missing top covers and manhole covers. The single arm, double arm and triple arm poles were correctly installed, but some did not have top covers and all of them did not have arm covers.

e) The IUSS’s vehicle number plate recognition (VPNPR) space was to be designed to enable the surveillance cameras instantly capture and recognize number plates and automatically feed the information into a database to check for vehicles that do not have appropriate road tax, insurance or other compulsory documents stored electronically and also look out for stolen vehicle registrations and assist in parking management. The audit found that the VNPR cabinets had also been installed and secured. However, the audit team was not able to verify the components as the cabinets were locked.

4.08 An audit inspection of the IUSS system revealed in a bid to improve the flow of traffic into and out of the CBD. The Nairobi county government redesigns a section of roads in the CBD to ease congestion. Due to this, one junction (Moi Avenue/Muranga Rd/ Moktar Dadah) which had 2 VNPRs was removed. The audit inspection of the system on 27 March 2015 revealed that out of the 50 VNPR cameras which were still in place, 31 cameras were accessible and operating well while a total of 19 cameras in 7 different junctions were inaccessible. The causes of inaccessibility of the cameras are as shown below:

**Table 4: VNPR Camera Accessibility**

<table>
<thead>
<tr>
<th>Cause</th>
<th>No. of Cameras Affected</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Fiber cuts</td>
<td>3</td>
<td>15.79%</td>
</tr>
<tr>
<td>2. Junction controller</td>
<td></td>
<td></td>
</tr>
<tr>
<td>inaccessible</td>
<td>5</td>
<td>26.32%</td>
</tr>
<tr>
<td>3. Power loss at the</td>
<td></td>
<td></td>
</tr>
<tr>
<td>junctions</td>
<td>5</td>
<td>26.32%</td>
</tr>
<tr>
<td>4. Ongoing construction</td>
<td>6</td>
<td>31.58%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>19</td>
<td></td>
</tr>
</tbody>
</table>

**Source: OAG - K Analysis**

**The contractor took long to repair project defects noted**

4.09 Sub-Clause 30.9 of the IUSS contract document required the contractor to make good any defect in or damage to any part of the works which may appear or occur during the defects liability period as soon as practicable and at his own cost. The IUSS project's defect liability period began on 15 April 2014 and was to run for one year. The audit found that the contractor delayed in making good project defects noted which negatively affected the IUSS operations. For instance, by 31 October 2014, six months after commencement of the defects liability period, the Directorate of Metropolitan Development complained that despite several reminders to the contractor that more than half of the VNPR and surveillance cameras installed were not working, the contractor had still not made good the defects. This meant that for the same period running, no useful feed was recorded from these cameras.

**There was inadequate administration of the IUSS Project**

4.10 During implementation of the IUSS project an inter - governmental committee that drew officers from the then Ministry of Public works, Nairobi City Council and the Ministry of Nairobi Metropolitan Development consisting of eight key officers were responsible for the day to day running of the project. Implementation funds were drawn from the development funds of the then Ministry of Nairobi Metropolitan. The audit found that there was inadequate administration of the IUSS project over various crucial aspects as explained below.

**Unclear legislative roles and responsibilities of the completed IUSS project**

4.11 As reported earlier, the IUSS project was initially to be completed by 5 June 2013 but its completion was delayed until April 2014. However, there was no document or policy clearly stipulating how the project would be administered after its completion. This resulted to lack of clarity in legislative ownership and administration of the IUSS project and the audit found that:

a) On 13 February 2014, the Office of the President vide OP/CAS.58/4A gave instructions that the IUSS project implemented by the Directorate of Metropolitan Development, be transferred from the Ministry of Lands, Housing and Urban
Development to the Ministry of Interior and Coordination of National Government once it is commissioned. This directive was based on a resolution to that effect by the third cabinet meeting held on 13 February 2014. The Ministry of Lands, Housing and Urban Development prepared the IUSS handing over report on 23 April 2014 and requested the Ministry of Interior and Coordination of National Government to take over the project together with an unpaid balance of Kshs 161,626,869.30 vide letter reference MONMED 39/2011-2012/147. However, by then, the IUSS project had not yet been commissioned as directed by cabinet. According to the Directorate, one year later by April 2015, there was still no communication from the Ministry of Interior and National Coordination accepting the handover of IUSS. Hence, the IUSS project activities and operations still lies with the Directorate of Metropolitan Development. This has resulted to unclear legislative roles and responsibility of the IUSS project since the directorate’s mandate entails formulating, coordinating and administering policies which does not include operating traffic and security activities.

b) Delays in assigning legislative ownership of the IUSS project will have an impact on the ease of gaining additional resources to ensure sufficient storage capability for recorded feeds in the control rooms. This is because the IUSS system is designed to store data capacity for up to 30 days at 12FPS. However, interviews conducted the Directorate of Metropolitan Development staff revealed that after the maximum storage limit is reached, the units automatically overwrite previously recorded data starting with the oldest unless data has been identified to be retained for security purposes. Archiving of the records thereafter is not done as the system automatically overwrites older feeds to create space due to storage constraints.

c) The IUSS project lacked a legal framework to ensure enforcement of legislation in regard to traffic and security. In their project briefs, the Directorate of Metropolitan Development faced challenges on the IUSS project such as vandalism of the infrastructure, knocking down of poles by motorists, lack of legal framework to allow evidence in court and poor enforcement of traffic rules since these problems fall in the mandate of the County government and internal security jurisdictions.

**No accountability and local competency developed for maintenance of the IUSS**

4.12 Effective maintenance of the IUSS project is crucial given the significant amount of taxpayers funds used in the project and the key role the system can play in enhancing the country’s security and traffic systems if properly used. The IUSS project was to be maintained by the contractor until the end of the defect liability period after which its maintenance reverted back to the owner. However, by April 2015, the legislative ownership of the IUSS project was still unresolved. In addition no competencies had been developed locally for maintenance of the IUSS project as contracted:

a) The IUSS’s project defect liability period for surveillance systems component expired on 15 April 2015 yet by then the legislative ownership of the project remained unresolved. Hence it was not clear who would be accountable for ensuring the IUSS is adequately maintained.

b) The IUSS contract costs included training of four technical officers and eight operators for one month on a similar system at a cost of Kshs 10, 098,600.00. The training was aimed at enabling the twelve staff become familiar with the principle, operations and maintenance of the IUSS. It was expected that after the training, the trainees would correctly and independently operate the IUSS and make site level maintenance:

i. As contracted four technical operators were to be trained in China on how to maintain the IUSS. However the audit found that instead five senior staff attended factory inspections in China and were trained on the IUSS system for one day only, the other days were used to inspect project items being delivered to Kenya. Since adequate competencies had not yet been developed locally for the maintenance of the IUSS system installed, there was over reliance on the contractor’s foreign staff to maintain the system.

ii. Thirty nine operations and maintenance staff drawn from different departments between March
and April 2014 were trained. The training done was on the overview of IUSS, CCTV subsystem, Integrated Traffic Management Subsystem, VNPR Subsystem and Information Board. However, the training was for only two days each instead of a month.

The IUSS project was not taken over as stipulated in the contract agreement

4.13 The IUSS contract allows the project to be taken over in parts as they are completed. Further as stated in sub-clause 29.1 of the IUSS contract “project works shall be taken over by the employer (Directorate of Metropolitan Development) when they have been completed in accordance with the contract, except in minor respects which do not affect the use of the works for the intended purpose, have passed the tests on completion and a taking over certificate has been issued or deemed to have been issued.

4.14 In addition, sub-clause 29.3 of the IUSS contract clearly stipulates that the employer shall not use any parts of the works unless a taking over certificate has been issued in respect thereof. At the close of the audit, in April 2015, the VNPR, Surveillance cameras and the two control rooms were considered complete and accepted. Hence, since 15 April 2014, they were under the 12 months defects liability and warranty period. The audit found that the IUSS project’s VNPR, Surveillance cameras and the two control rooms had been used for over a year yet no takeover certificate had been issued.

4.15 Eighteen of the twenty junctions under the Intelligent Traffic Management System (ITMS) had been inspected on 21 August 2014. Defects were noted in the ITMS and the acceptance data sheets were not signed. By April 2015, the defects liability and warranty period for ITMS component had not commenced since the contractor had not resolved the defected issues noted. Therefore, for both the ITMS and surveillance system, there is a risk of additional costs being incurred.

Personnel trained on the IUSS projects were underutilized

4.16 46% of the personnel trained were from the National Police as reflected in the table below since the IUSS project was aimed at improving security and traffic management which is often done by the police. Review of project documents and audit meetings held with the Directorate staff indicated that trained staff from other Government agencies had been deployed to operate the IUSS. However, the National Police had not yet deployed their trained staff one year later, in spite of repeated requests from Ministry of Land, Housing and Urban Development. This greatly hampered operations at the IUSS control room especially on detection of any suspicious activities and the procedures to be followed thereof since the police were considered experts in security issues among the other trained staff.

Table 5: Intergovernmental staff trained in operating the IUSS

<table>
<thead>
<tr>
<th>No.</th>
<th>Department</th>
<th>No. of Officers</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ministry of Land, Housing and Urban Development</td>
<td>7</td>
<td>18%</td>
</tr>
<tr>
<td>2</td>
<td>Nairobi County Government</td>
<td>12</td>
<td>30%</td>
</tr>
<tr>
<td>3</td>
<td>National Police</td>
<td>18</td>
<td>46%</td>
</tr>
<tr>
<td>4</td>
<td>ICT Authority</td>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td>5</td>
<td>Telkom</td>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>39</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Source: OAG review of IUSS project documents

There was inadequate governance and management of the IUSS control room operations

4.17 Best practice in IT governance and management consists of the leadership, organizational structures and processes that ensure that the enterprise’s IT extends and sustains the overall enterprise’s strategy and objectives. An audit verification exercise revealed that both IUSS main and redundant control rooms had been fully installed as contracted. The redundant control room was being used for active monitoring of crime and traffic while the main control room was acting as a backup with no personnel deployed. Review of IT Governance in the IUSS control rooms on 27 March 2015 and 1 April 2015 (redundant and main control room respectively) revealed the following:

a) There was no Succession Planning: A visit to the control rooms revealed that it was not clearly defined who will be responsible for operations in the IUSS control room and management of data among the Nairobi County, National police and Nairobi Metropolitan Development at the end of the defects liability period. As at 1 April 2015, the language in the video analysis server in the main control room was still in
the Chinese language and therefore only the contractor could operate it. In addition, on 15 April 2015, one year after the IUSS project was completed all technical issues were still being handled by the contractor. This posed a risk of over-reliance on the contractor even after his exit.

b) IUSS main control room did not have proper IT general controls: Review of general controls assessed areas where there was inherent exposure on control room operations such as security access cards, logging visitor access, state of fire and smoke detection systems, CCTV surveillance and availability & use of temperature and humidity monitoring equipment. A visit to the main control room revealed that it was housed in a room that had concrete walls all round and a concrete ceiling. However, the server room had a wooden floor which is not certified as fireproof. In case of a fire breakout, the presence of combustible material meant that it could quickly spiral out of control. Furthermore, the lack of explicit nonsmoking signs in and around both control rooms might lead to complacency. The control room had not been cleaned or dusted for over 3 months which could affect the performance of the equipment. Further, there was poor physical security observed in the main control room. The access door to the control room was made of glass which can be broken into easily and the windows did not have grills to prevent access from outside.

c) There were no checks and controls being done for account logon events: A visit to the main control room revealed that no log audits are done for all account login events (both failures and successes) the system has three users namely 'ADMIN', 'SYSTEM' and 'USER1'. Failure to monitor the systems users increases the possibility of unauthorized activity going undetected, causing denial of service attacks on the server or launching of malicious code on the server by unauthorized users.

d) No configuration of system alarm and events: Best practice on IT systems dictates that system audit logs should be configured to capture, generate and store all alarms and failure reports. A visit to the control rooms revealed that the system had not been configured to generate and store system events including alarms, video loss, motion loss, server failures and power losses. Therefore, there was no proactive problem management undertaken by control room operators and maintenance staff to look for potential areas of failure in their IT infrastructure before they occur. As at the time of the audit, they were only carrying out reactive problem management where they act on problems only after they have occurred. For instance, checking fiber connection after communication loss and seeking service level agreement with building owners after facing difficulty in gaining access. Lack of proactive problem management may result in added costs in terms of the time and resources in fault resolution.

The IUSS contractor was not paid for repair works done

4.18 On 4 April 2014, the Governor of Nairobi County requested the Ministry of Lands, Housing and Urban Development to instruct the contractor for the tender of the IUSS project to repair traffic signals and cameras along two roundabouts in Nairobi’s CBD area. The Nairobi City County committed to refunding the cost of repairs amounting to Kshs 6,255,778.00. The contractor made the repairs as instructed. However, the audit found that by April 2015, the contractor had not yet been paid. In addition it was not evident how the Ministry had accounted for the Kshs 6,255,778.00. The amount was included as a liability in April 2014 IUSS project’s hacing over report to the Ministry of Interior and coordination of National Government as part of the revised contract sum. However the IUSS August project progress report by the Ministry of Lands, Housing and Urban Development did not reflect this amount. Hence it was unclear whether the amount was received from the Nairobi City County and why the contractor had not been paid one year later.

IUSS project items overpaid and reversed in later payments

4.19 By February 2015, Kshs 346,748,792.45 had been paid to the contractor out of the original contract amount of Kshs 437,405,895.36 as tabulated below. Sub-clause 33.2 of the IUSS contract required that, payment shall be made to the Engineer in respect of the progress of the works accompanied by such evidence of the value of the work done as the Engineer may require. The audit however found that a review of Directorate of Metropolitan Development documents revealed that at times project works were being paid for without ascertaining work
done. For instance some items had been paid for in certificates 1 to 3 without ascertaining the works certified as done, which led to an overpayment of approximately Kshs. 16,485,584 that had to be recovered in Certificate No. four as detailed in Appendix 1 of this report.

<table>
<thead>
<tr>
<th>Year</th>
<th>Date</th>
<th>Certificate Number</th>
<th>Amount Kshs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012/13</td>
<td>28/12/2012</td>
<td>1</td>
<td>43,740,589.54</td>
</tr>
<tr>
<td>2013/14</td>
<td>4/10/2013</td>
<td>2</td>
<td>73,826,910.95</td>
</tr>
<tr>
<td>2013/14</td>
<td>30/10/2013</td>
<td>2</td>
<td>40,250,000.00</td>
</tr>
<tr>
<td>2013/14</td>
<td>3/12/2013</td>
<td>3</td>
<td>80,000,000.00</td>
</tr>
<tr>
<td>2013/14</td>
<td>7/3/2014</td>
<td>3</td>
<td>65,004,309.25</td>
</tr>
<tr>
<td>2014/15</td>
<td>8/12/2014</td>
<td>4</td>
<td>43,926,982.70</td>
</tr>
<tr>
<td>Total paid</td>
<td></td>
<td></td>
<td>346,748,792.44</td>
</tr>
<tr>
<td>Contract Price</td>
<td></td>
<td></td>
<td>437,405,895.36</td>
</tr>
<tr>
<td>Unpaid Balance</td>
<td></td>
<td></td>
<td>90,657,102.92</td>
</tr>
</tbody>
</table>

Source: OAG Analysis of IUSS Payment Vouchers

Risk of duplication of resources
CHAPTER 5
Conclusions

5.01 Some aspects of the Integrated Urban Surveillance System were not carried out as contracted neither was the project administered effectively. Themes of noncompliance with contract agreement surfaces repeatedly which will definitely hinder Kenyans from benefiting from the intended objective of investing over Kshs 460 million in the IUSS project. The project delayed in being completed, adequate planning was not done before its implementation that resulted to delays, project alterations, and unclear roles and responsibilities, and contract variations. The contractor delayed in repairing project defects that had occurred during the defect liability, critical items as the VPNP and surveillance cameras installed were not working. In addition, there was inconsistency in storage of data with frequent intermittence in availability which meant that the IUSS could not provide reliable information when needed. These instances pointed to non-compliance with the contract agreement.

5.02 In addition it was doubtful if taxpayers will get the anticipated value for money from training Government personnel on how to operate and maintain the system at a cost of over Kshs 10 million. This is because the National police who have the responsibility of handling security and traffic had not yet deployed trained staff to operate the control rooms. The IUSS still heavily depends on the contractor to handle technical aspects since required competencies were not developed and critical aspects of the system were still in the Chinese language. Legislative responsibility for the ownership and maintenance of the system was further still in doubt which is likely to have an impact on maintenance of the project and enforcement of legislation in regard to traffic and security. In addition the Ministry of Interior and National Coordination had launched a similar IUSS project in Nairobi’s CBD at a cost of over Kshs 437 Million at the same sites that Directorate of Metropolitan Development had already installed surveillance cameras. This raises concerns on risk of duplication of resources at the taxpayers’ expense.

5.03 The Integrated Urban Surveillance System has glaring weaknesses that if not set right immediately can compromise the integrity of Nairobi CBD’s security and traffic management systems and result into further financial burden to taxpayers. The Directorate of Metropolitan Development is aware of the existence and scope of the challenges faced in the IUSS and are willing to solve the problem but do not have the capacity or mandate to do so after its installation.

CHAPTER 6
Recommendations

6.01 In view of the findings and conclusions of the audit by the Auditor - General, has proposed the following recommendations for implementation by the State Department for Housing and Urban Development, under the Ministry of Transport, Infrastructure, Housing and Urban Development.

i. To ensure that the IUSS project is operated effectively to serve the needs of Kenyans

   i. Complete implementation of all Integrated Urban Surveillance System (IUSS) project items as specified in the bills of quantities within the remaining contract sum of Kshs 90,657,100.00 to ensure that the project operates as intended. This will ensure that IUSS components that had not yet been installed as contracted are implemented.

   ii. Carry out tests on all completed IUSS project works and ensure that the contractor makes good on any defective or damaged works in line with the contract to ensure the project runs as intended.

   iii. Make arrangements to issue a takeover certificate to the contractor, commission and hand over the IUSS project as resolved by the cabinet. This will ensure that the IUSS project is operated and maintained by Government departments who have the mandate to conduct security and traffic activities in the country.

   iv. Discuss with cabinet about the launch of Ministry of Interior and Coordination of National Government’s launch of a similar IUSS project in Nairobi’s CBD at Kshs 437 Million to clarify concerns since the same number of surveillance cameras were to be installed in exactly the same sites already installed by the Directorate of Metropolitan’s IUSS project. This will avoid duplication of resources at the taxpayers’ expense. In addition it will be difficult to operate the same cameras at different control rooms.

   v. Collaborate with all stakeholders involved to ensure that persons that had been trained in the operations and maintenance of the Integrated Urban Surveillance System are deployed to undertake their various roles. This will ensure smooth running of the implemented projects and value for money to Kenyan taxpayers for the funds spent on training.
vi. Put in place best practice in IT governance and management that consists of the leadership, organizational structures and processes that ensure that the system extends and sustains the overall ITSS intended strategies and objectives.

II. **To ensure similar projects are implemented efficiently and effectively in future**

i. Put in place comprehensive plans, policies and frameworks during planning to tackle key aspects of interagency projects during and after implementation. These should address issues like project ownership, handling and ownership of information generated from the system, roles and responsibilities, funding and maintenance.

ii. Collaborate with various stakeholders to enhance awareness of the benefits of the project and get the consent and permission of owners of buildings or properties where sites are to be installed during the project planning stages.

iii. Assist and inform the contractor in ascertaining the nature and extent of any laws, regulations, orders or bylaws and customs in the country.

iv. Ensuring that the contractors’ implementation team have adequate technical competency and are able to efficiently communicate in the country’s official language to facilitate faster decision making and avoid slow progress of project works.

v. Ensure project bill of quantities are comprehensively designed after conducting preliminary surveys to ensure that comparability of items quoted with structures and systems already in place to avoid project variations and including items that might not be considered necessary once implementation begins.

vi. Clearly document, test and certify all process of the implementation to ensure clarity between all stakeholders on project timelines.

vii. Collaborate with all stakeholders involved in the project implementation to ensure that roles and responsibilities of the various intergovernmental agencies are clearly spelt out in relation to:

- Clarity over who is responsible for maintenance of the various aspects of the project after the defects and liability period is over.
- Enforcement of legislation in regard to traffic and security with clear policies on how incidents and accidents are handled.
- Storage of backup surveillance tapes with clear policies detailing allowed period of storage and chain of custody.
## APPENDICES

### Appendix 1: Overpayments in Certificate No. 1 to 3 Reversed in Certificate No. 4

<table>
<thead>
<tr>
<th>Item</th>
<th>Description Of Works</th>
<th>Quantity</th>
<th>Rate (USD)</th>
<th>Total (USD)</th>
<th>Quantity</th>
<th>Amount (USD)</th>
<th>Quantity</th>
<th>Amount (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.01</td>
<td>Pan-Tilt-Zoom (PTZ) Day/Night; Outdoor Vandal-</td>
<td>31</td>
<td>2,936.51</td>
<td>91,031.75</td>
<td>31</td>
<td>91,031.75</td>
<td>2</td>
<td>5,873</td>
</tr>
<tr>
<td></td>
<td>Proof Housing 36x Zoom</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.02</td>
<td>Wall/Pole Mounting Arm for PTZ</td>
<td>31</td>
<td>412.70</td>
<td>12,793.65</td>
<td>11</td>
<td>4,539.70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.03</td>
<td>Power Supply Unit for PTZ</td>
<td>31</td>
<td>63.49</td>
<td>1,968.25</td>
<td>31</td>
<td>1,968.19</td>
<td>2</td>
<td>126.98</td>
</tr>
<tr>
<td>2.08</td>
<td>Side Pole Mounting Bracket</td>
<td>41</td>
<td>1,904.76</td>
<td>78,095.24</td>
<td>1904.76</td>
<td>78,095.24</td>
<td>21</td>
<td>39,999.96</td>
</tr>
<tr>
<td>2.13</td>
<td>Lay and interconnect fibre optic cable from GCCN</td>
<td>30,000</td>
<td>1.27</td>
<td>38,095.24</td>
<td>30,000</td>
<td>38,095.24</td>
<td>13,938</td>
<td>17,701.26</td>
</tr>
<tr>
<td></td>
<td>to camera location using 8 core cable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.14</td>
<td>Ditto 2.13 but using 4 core cable</td>
<td>8,000</td>
<td>0.95</td>
<td>7,619.05</td>
<td>8000</td>
<td>7,619.05</td>
<td>2,859</td>
<td>2,716.05</td>
</tr>
<tr>
<td>2.15</td>
<td>Ditto 2.13 but using 8 core cable</td>
<td>4,000</td>
<td>1.27</td>
<td>5,079.37</td>
<td>4000</td>
<td>5,079.37</td>
<td>4,000</td>
<td>5,080</td>
</tr>
<tr>
<td>4.05</td>
<td>Supply system management printer</td>
<td>2</td>
<td>571.43</td>
<td>1,142.86</td>
<td>2</td>
<td>1,142.86</td>
<td>2</td>
<td>1,142.86</td>
</tr>
<tr>
<td>4.08</td>
<td>Supply routers that will be compatible with the IP</td>
<td>24</td>
<td>7,945.11</td>
<td>190,682.55</td>
<td>45%</td>
<td>85,807.15</td>
<td>4</td>
<td>31,780.44</td>
</tr>
<tr>
<td></td>
<td>cameras installed at junctions.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.13</td>
<td>Provide and install a 2.5M x 1.5M information</td>
<td>12</td>
<td>14,873.02</td>
<td>178,476.19</td>
<td>45%</td>
<td>80,314</td>
<td>45%</td>
<td>80,314.29</td>
</tr>
<tr>
<td></td>
<td>board connected to the control Centre</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>Qty</td>
<td>Unit</td>
<td>Price</td>
<td>Rate</td>
<td>Total</td>
<td>1.425</td>
<td>3.049.50</td>
</tr>
<tr>
<td>---</td>
<td>------------------------------------------------------------------------------</td>
<td>------</td>
<td>------</td>
<td>--------</td>
<td>-------</td>
<td>---------</td>
<td>-------</td>
<td>----------</td>
</tr>
<tr>
<td>4.22</td>
<td>Supply and fix 1.5mm x 12 core single strand armoured cable</td>
<td>3,300</td>
<td></td>
<td>2.14</td>
<td>7,071.43</td>
<td>3000</td>
<td>3,182.14</td>
<td>1,425</td>
</tr>
<tr>
<td>4.29</td>
<td>Excavate in any material for, provide materials and construct 600mm by 600mm by 500mm deep duct chambers as per specifications and as directed by the Engineer. Rate to include provision of lockable cover</td>
<td>50</td>
<td></td>
<td>158.73</td>
<td>7,936.51</td>
<td>22.5</td>
<td>3,571.43</td>
<td>22.5</td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL USD</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL KSH (1USD=84.155Ksh)</strong></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>
## Appendix 2: Management Comments on the Findings of the Audit

<table>
<thead>
<tr>
<th>AUDIT FINDING</th>
<th>MANAGEMENT RESPONSE</th>
<th>AUDITORS COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IUSS project was not implemented in accordance with contract specifications</strong></td>
<td>IUSS contract was signed on 20 November, 2012 for a period of 6 months. The project commenced on 6 December 2012 and was initially to be completed on 5 June, 2013. At the time of the audit, in April 2015 IUSS’s VNP, Surveillance cameras and control rooms were under the 12 months defect liability and warranty period while the Intelligent Traffic Management System had not yet being fully completed.</td>
<td>Our observations remain as reported.</td>
</tr>
<tr>
<td><strong>There was delayed completion of the IUSS project</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>IUSS contract items found not installed:</strong></td>
<td>Item 4.10 of the IUSS contract required the contractor to install fault detection equipment at every junction at a total cost of Kshs. 2,204,066.58. At the time of the audit, the IUSS system was only capable of detecting total power loss at the junctions but not faults related to individual components. This made monitoring of faults from the control room difficult.</td>
<td>The faulty detection software was fully installed.</td>
</tr>
<tr>
<td></td>
<td>Item 4.13 of the IUSS contract also required the contractor to provide and install 2.5m by 1.5m information boards in twelve locations at a cost of Kshs. 15,019,663.80. According to the Directorate of Metropolitan Development the information boards were not installed due to lack of fiber optic connectivity to the identified locations. Without the information boards’ traffic trends were not being displayed to provide motorists with information on alternative routes when approaching Nairobi’s CBD for more efficient traffic management.</td>
<td>This had not been installed as at the time of audit. The audit team will assess if these have since been installed and working during follow-up phase of the audit.</td>
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<td></td>
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<td>Our observations remain as reported given that the objectives of the information boards to give traffic trends were not being displayed to provide motorists with information on alternative routes when approaching Nairobi’s CBD for more efficient traffic management.</td>
</tr>
<tr>
<td>AUDIT FINDING</td>
<td>MANAGEMENT RESPONSE</td>
<td>AUDITORS COMMENTS</td>
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<tr>
<td>------------------------------------------------------------------------------</td>
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<tr>
<td>Some IUSS Project components were not installed as contracted</td>
<td>Two Junctions were each being controlled by one controller;</td>
<td>The team finds the explanations satisfactory.</td>
</tr>
<tr>
<td>Installation of Traffic signal controllers in 20 Junctions instead of 22 Junctions.</td>
<td>Moi Avenue/Kenyatta and Moi Avenue/ Cabral</td>
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<td></td>
<td>City Hall Way/Moi Avenue and Mama Ngina/Moi Avenue</td>
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<tr>
<td>Installation of Vehicle Number Plate Recognition in 16 Locations instead of 21 Locations.</td>
<td>Some locations like those listed below have more than one VNPR Camera</td>
<td>The issue was on location, the five junctions still have no cameras therefore our observations remain as reported.</td>
</tr>
<tr>
<td></td>
<td>Kenyatta Avenue/Uhuru Highway</td>
<td></td>
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<td></td>
<td>University Way/Uhuru Highway</td>
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<td></td>
<td>Westlands/Uhuru Highway</td>
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<td></td>
<td>Uhuru Highway/HailleSelasie</td>
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<td></td>
<td>Kenyatta Avenue/Muindi Mbingu Street</td>
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<td></td>
<td>The 16 locations are junctions and some have more than one camera on more than one direction e.g. Kenyatta Avenue/Uhuru Highway has cameras on both the Kenyatta Avenue outbound and inbound direction.</td>
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</tr>
<tr>
<td>That of the forty surveillance cameras installed only twenty nine were Pan, Tilt and Zoom (PTZ) cameras with the remaining eleven being static cameras.</td>
<td>29 PTZ Cameras were installed instead of 31 as indicated in the BoQ Owners of the earlier sited locations declined to grant permission. i.e NSSF Building because of the cleaning machine Ufundi Cooperative Building</td>
<td>The two locations still remain without surveillance. Our observations remain as reported.</td>
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<td>Quality of IUSS video feeds obtained at night were unusable for key observation tasks like object identification and people recognition and required the use of enhanced video processing software currently not included in the system</td>
<td>- Being a pilot project, the standard Video Management System Software was used and not the enhanced version of it.</td>
<td>The IUSS contract specified that the surveillance cameras were to operate day and night to ensure consistent security and safety. Our observations remain as reported.</td>
</tr>
<tr>
<td>The IUSS Security surveillance component was storing data for only nine days- The IUSS contract’s description of works had specified that the system’s data storage capacity should be up to thirty days at 12 Frames per Second (FPS). An audit review of the system in the redundant control room revealed that the IUSS security surveillance component was storing data for only nine days at 25 Frames per Second after which the oldest video files were then overwritten while the traffic surveillance component was storing data for sixty days.</td>
<td></td>
<td>Our observations remain as reported</td>
</tr>
<tr>
<td>There was inconsistency in storage of data in the IUSS:</td>
<td>There was inconsistency in storage of data in the IUSS. The databases inconsistencies were discovered to be system error and were rectified</td>
<td>The audit team will assess if these have since been corrected and working during follow-up phase of the audit</td>
</tr>
<tr>
<td>Audit Team did not verify the components inside the controllers as client didn’t provide access to the cabinets or a technician to accompany the Audit team.</td>
<td>The Traffic controllers are available for inspection.</td>
<td>Our observations remain as reported. The audit team will assess if these have since been installed and working during follow-up phase of the audit.</td>
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<td>Malfunctioning pedestrian lights signal.</td>
<td>Pedestrian poles had been knocked down by motorists. The pedestrian light signals had minor defects which required routine maintenance.</td>
<td>Our observations remain as reported.</td>
</tr>
<tr>
<td>Most poles installed in the sampled junctions were missing top covers and manhole covers.</td>
<td>This was as a result of vandalism</td>
<td>Our observations remain as reported.</td>
</tr>
<tr>
<td>The VNPR cabinets had been installed and secured. However verification of VNPR cabinet components was not done as the cabinets were locked</td>
<td>The VNPR controller cabinets are available for inspection.</td>
<td>Our observations remain as reported. The audit team will assess if these have since been installed and working during follow-up phase of the audit.</td>
</tr>
<tr>
<td>VNPR Cameras of the 50 installed were accessible and operating well while 19 in 7 different junctions were inaccessible.</td>
<td>This was as a result of Fiber cuts, power breakdowns and knocking down of poles by Motorists</td>
<td>Our observations remain as reported. The audit team will assess maintenance measures adopted during follow-up phase of the audit.</td>
</tr>
<tr>
<td>The audit found that the contractor delayed in making good project defects noted which negatively affected the IUSS operations. For instance six months after commencement of the defects liability period by 31 December 2014 more than half of the VNPR and Surveillance cameras installed were not yet working and the contractor had not made good the defects.</td>
<td></td>
<td>Our observations remain as reported.</td>
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<tr>
<td>The Contractor took long to repair project defects noted</td>
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<td>There was inadequate administration of the IUSS Project</td>
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<tr>
<td>Inadequate administration of the IUSS Project</td>
<td>The audit found that there were inadequate administration of the IUSS project over various crucial aspects</td>
<td>The project was adequately administered since officers from various government bodies were part of the project implementation committee</td>
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<tr>
<td>There was no accountability for IUSS maintenance after the defects liability period</td>
<td>According to Metro 2030 strategy, Metropolitan was to have a Metropolitan Policing unit, thus the basis of the IUSS project. After the Ministry was dissolved the different stakeholders are to agree on who to continue maintaining the system.</td>
<td>Our observations remain as reported. In addition, the audit notes that no official memorandum of understanding between the County and the ministry on management of the project was provided.</td>
</tr>
</tbody>
</table>
| There was no local competency developed for maintenance of the IUSS | Training of operators and maintenance staff:  
  i. officers trained in China were five and the training lasted for two weeks during which factory inspection also took place.  
  ii. The Directorate of Nairobi Metropolitan Development facilitated and locally trained thirty nine operators and maintenance staff drawn from different departments  
  iii. The local trainings have been facilitated by the contractor and not the client  
  iv. Between March and April 2014 thirty nine operations and maintenance officers were taken through on class training.  
  v. Subsequent on job trainings have taken place the whole defects liability period | Our observations remain as reported. The IUSS project was to be maintained by the contractor till the end of the defect liability period after which its maintenance reverted back to the owner. By 15 April 2015, one year after the IUSS project was completed; all technical issues were still being handled by the contractor. This posed a risk of over-reliance on the contractor even after his exit.  
  The audit still takes issue with the level of training and competency developed to handle the project after the contractor’s exit. Furthermore, the contractor was still on site as at 4th August 2016. These would be two years after the completion of the project, raising further concerns on the exact undertakings of the contractor and at whose cost this is. |
|---|---|---|
| Despite using the VNPR, Surveillance Cameras and control rooms for over a year no takeover certificate had been issued | The certificate has been ready for issuance once the contractor requests | Our observations remain as reported. As stated in sub-clause 29.1 of the IUSS contract “project works shall be taken over by the employer (Directorate of Metropolitan Development) when they have been completed in accordance with the contract, except in minor respects which do not affect the use of the works for the intended purpose, have passed the tests on completion and a taking over certificate has been issued or deemed to have been issued.  
  Audit maintains that the employer should take over the project unless there are any issues hindering/pending this which should be explained by the employer.” |
<table>
<thead>
<tr>
<th>Issue</th>
<th>Resolution</th>
<th>Follow-up</th>
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<tbody>
<tr>
<td>There was inadequate governance and management of the operations at IUSS control rooms</td>
<td>It had not been clearly defined who is responsible for operations in the IUSS control room and management of its data. The stakeholders were to agree.</td>
<td>Our observations remain as reported.</td>
</tr>
<tr>
<td>i. No succession planning</td>
<td></td>
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<tr>
<td>ii. It had not been clearly defined who is responsible for operations in the IUSS control room and management of its data</td>
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</tr>
<tr>
<td>Video analysis server language still in Chinese</td>
<td>It was rectified</td>
<td>Our observations remain as reported. The audit team will assess measures adopted during follow-up phase of the audit.</td>
</tr>
<tr>
<td>All technical issues were still being handled by the contractor</td>
<td>The contractor was still on site and had not handed over the project</td>
<td>Our observations remain as reported. Audit maintains that the employer should take over the project unless there are any issues hindering/pending this which should be explained by the employer.</td>
</tr>
<tr>
<td>IUSS main control room did not have proper general controls</td>
<td>The listed features were not part of the contract. The users will be advised on their importance.</td>
<td>Our observations remain as reported. Given the sensitive nature of the video recordings and equipment at the main control room, IT governance still requires that the user accounts be only for authorized individual personnel. Even if it is the administrator, this can still be complete with passwords. Any account logon changes would easily be traceable.</td>
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<tr>
<td>There were no checks and controls being done for IUSS account logon events at the main control room.</td>
<td>There were no operations at the main control room thus accounts could not be created for non existence users except for the administrator and general user. Accounts are usually associated with individual users. At the Redundant control room where operations are taking place, users have individual accounts and passwords.</td>
<td>This is subject to audit verification upon availing of officers to accompany auditors.</td>
</tr>
<tr>
<td>Issue</td>
<td>Description</td>
<td>Observations</td>
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<tr>
<td>----------------------------------------------------------------------</td>
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<tr>
<td>No configuration of system alarm and events</td>
<td>The system supports the features for crucial systems events and logs which were reconfigured. But due to limited system resources/storage, memory, not all events could be configured for they could over burden the system hence slowing its functionality. Also having each system component event generating alarms has high overhead incurred monitoring</td>
<td>Our observations remain as reported. The audit team will assess measures adopted during follow-up phase of the audit.</td>
</tr>
<tr>
<td>The IUSS contractor was not paid for repair works done</td>
<td>The Nairobi City County committed to pay but has not yet paid</td>
<td>Our observations remain as reported. The audit team will assess whether payment was done during follow-up phase of the audit.</td>
</tr>
<tr>
<td>IUSS project items overpaid and reversed in later payments.</td>
<td>Interim payments are not exact but final payments are subject to exact measurements.</td>
<td>Our observations remain as reported. The audit team will assess final payments done during follow-up phase of the audit.</td>
</tr>
<tr>
<td>Duplication of project by the Ministry of Interior and coordination of National Government</td>
<td>There was no duplication of the project, Ministry of Interior and Coordination of National Government was represented in the IUSS.</td>
<td></td>
</tr>
</tbody>
</table>
CONTACTS

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