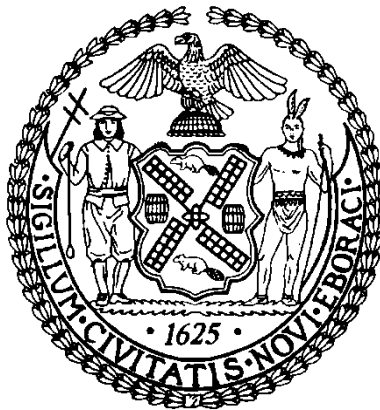


**CITY OF NEW YORK
OFFICE OF THE COMPTROLLER**

**John C. Liu
COMPTROLLER**

MANAGEMENT AUDIT

**Tina Kim
Deputy Comptroller for Audit**



**Audit Report on the
Department of Sanitation's
Automatic Vehicle Location Application**

ME11-093A

November 9, 2011



THE CITY OF NEW YORK
OFFICE OF THE COMPTROLLER
1 CENTRE STREET
NEW YORK, N.Y. 10007-2341

John C. Liu
COMPTROLLER

November 9, 2011

To the Residents of the City of New York:

My office has audited the Department of Sanitation (DSNY) to determine whether funds spent on the Automatic Vehicle Location (AVL) application were adequately supported and whether the application functioned as intended. We conduct these audits as a means of ensuring that City agencies are properly accounting for their expenditures and safeguarding and using their resources.

The audit found that DSNY did not maintain adequate documentation to support some of its AVL application expenditures, and made questionable payments totaling \$851,926. The audit also found that the application, when functioning, provides field supervisors with a tool that allows them to do their job more easily and efficiently. However, a number of issues limit the AVL application's usability on a day-to-day basis. Finally, DSNY lacked an adequate inventory system for its AVL devices and tablets.

The audit recommends, among other things, that DSNY: review and take all necessary action concerning the questionable payments totaling \$851,926; address the identified technical problems with the AVL devices and tablets; and develop written AVL inventory procedures.

The results of the audit have been discussed with DSNY officials, and their comments have been considered in preparing this report. Their complete written response is attached to this report.

If you have any questions concerning this report, please e-mail my audit bureau at audit@comptroller.nyc.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "JCL".

John C. Liu

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*The City of New York
Office of the Comptroller
Management Audit*

**Audit Report on the
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AUDIT REPORT IN BRIEF

This audit determined whether funds spent on the Department of Sanitation's (DSNY's) Automatic Vehicle Location (AVL) application were adequately supported and whether the application functioned as intended. On January 9, 2006, the Department of Information Technology and Telecommunications (DoITT) entered into a five-year, \$500 million contract with Northrop Grumman Information Technology, Inc. (Northrop Grumman) to design, construct, manage, and maintain a New York City Mobile Wireless Network (NYCWiN) for certain City agencies. Through various task and change orders, the contract was modified on April 20, 2007, to include DSNY's initial deployment of an AVL application, which is a computer-based system that uses a Global Positioning System (GPS) to identify vehicle locations on an electronic map.

Northrop Grumman installed AVL devices (each containing a GPS receiver, wireless modem, and processor) along with associated peripherals, including antennas and sensors, in 60 of DSNY's vehicles (collection trucks and supervisor passenger cars) primarily located in Queens East District 8 (QE8). Over the course of the contract, Northrop Grumman also delivered 26 mobile data terminals (tablets) to be mounted on docking stations in supervisor passenger cars. In addition to the 60 vehicles equipped with AVL devices, in December 2010, DoITT provided (from its own stock and free of charge) six AVL devices that were installed in salt spreaders in Queens West District 6. To assist in its AVL application, DSNY received project management and quality assurance services from Gartner, Inc. (Gartner) via a task order to an existing contract DSNY had with this vendor. In total, \$3,694,613 was spent in capital funds on the AVL application at DSNY—\$3,203,770 was spent by DSNY and \$490,843 by DoITT.

The scope of the audit was January 2006 through June 2011.

Audit Findings and Conclusions

DSNY did not maintain adequate documentation to support some of its AVL application expenditures. DSNY made questionable payments totaling \$851,926. DSNY made a questionable payment of \$499,534 to Gartner for project management and quality assurance

services. The supporting documentation for this payment raises questions about the appropriateness of the amount paid. In addition, the timesheets associated with many of Gartner's invoices were not approved by officials from DSNY in a timely manner. These issues illustrate the need for DSNY to strengthen its controls over payments to consultants. Furthermore, another questionable payment of \$352,392 was made to Northrop Grumman for operating manuals and training materials.

Based on audit tests and a survey we conducted, the application, when functioning, provides field supervisors with a tool that allows them to do their job more easily and efficiently. For example, the map screen feature helps the supervisors locate their crews' vehicles, monitor their crews' work, and coordinate refuse collection and snow removal efforts. However, a number of issues limit the AVL application's usability on a day-to-day basis. These issues include some inaccurate vehicle-position information on the map screens and tablets displaying the map screens sometimes not working properly or at all. In addition, several AVL features are not being used by most of the QE8 field supervisors, including vehicle diagnostics and custom reports. Finally, DSNY lacked an adequate inventory system for its AVL devices and tablets.

Audit Recommendations

Based on our findings, we make 14 recommendations, including that DSNY should:

- Review and take all necessary action concerning the questionable payment of \$499,534 to Gartner for project management and quality assurance services and the questionable payment of \$352,392 to Northrop Grumman for operating manuals and training materials.
- Improve its controls over payments made to consultants to ensure, among other things, that timesheets for consultants' work are approved in a timely manner.
- Address the identified technical problems with the AVL devices and tablets.
- Develop written AVL inventory procedures. In addition to the need to conduct annual inventory counts and to maintain a perpetual inventory system, the procedures should require that inventory records contain adequate asset identification information.

Agency Response

In their response, DSNY officials generally agreed in principle with 10 of the audit's recommendations, disagreed with one, and did not address the remaining three recommendations.

INTRODUCTION

Background

The Department of Sanitation (DSNY) is responsible for managing the City's solid waste and for developing long-range plans for handling refuse and recyclables. DSNY operates out of 59 district garages, using approximately 5,700 vehicles, including collection trucks, mechanical street sweepers, salt spreaders, front-end loaders, and supervisor passenger cars. To provide continuous real-time and historical information about the location and activities of these vehicles and to enhance the ability of supervisors and managers to direct the field fleet, DSNY piloted the Automatic Vehicle Location (AVL) application as part of a multi-agency initiative with the Department of Information Technology and Telecommunications (DoITT).

On January 9, 2006, DoITT entered into a five-year, \$500 million contract with Northrop Grumman Information Technology, Inc. (Northrop Grumman) to design, construct, manage, and maintain a New York City Mobile Wireless Network (NYCWiN) for certain City agencies, including the Police Department, the Department of Transportation, and the Department of Environmental Protection.¹ Through various task and change orders, the contract was subsequently modified on April 20, 2007, to include DSNY's initial deployment of an AVL application, which is a computer-based system that uses a Global Positioning System (GPS) to identify vehicle locations on an electronic map.

As a result of the contract, Northrop Grumman installed AVL devices (each containing a GPS receiver, wireless modem, and processor) along with associated peripherals, including antennas and sensors, in 60 of DSNY's vehicles (48 collection trucks and 12 supervisor passenger cars) primarily located in Queens East District 8 (QE8). In addition, Northrop Grumman, over the course of the contract, delivered 26 mobile data terminals (laptop computers or tablets)² to be mounted on docking stations in supervisor passenger cars. With the exception of the tablets, each AVL device and accessory was covered by a warranty from Northrop Grumman, which included the hardware, software, and firmware. The warranty continued throughout the term of the contract.

DSNY and DoITT worked with Northrop Grumman to design and implement the AVL application at QE8. This effort resulted in DSNY's QE8 being able to:

- Initially use existing wireless cellular service, which was ultimately transitioned to NYCWiN, to transmit QE8 vehicle location information to a remote location where vehicles could be monitored;

¹The scope period of the Northrop Grumman contract was originally January 9, 2006, through January 8, 2011. It was subsequently extended to June 11, 2011, with an additional \$60 million being added to the contract.

²The 26 tablets include 10 tablets that were initially delivered to DSNY, but whose use was discontinued when NYCWiN was constructed (because they were incompatible with this new network) and 16 NYCWiN-compatible tablets that were subsequently delivered.

- Interface the AVL application with DSNY’s Sanitation Control and Analysis Network to retrieve assigned-route information for the AVL-equipped vehicles;³
- Provide in real time (via the Internet) the ability to monitor, display, and report vehicle location, speed, and diagnostics data (e.g., oil, battery, and coolant information). Field supervisors (through the use of their tablets) can monitor vehicle data through a display known as the Graphic User Interface. Other specified users can also monitor AVL data through the use of their in-office computers;
- Have its field supervisors receive pop-up alerts when a vehicle leaves a garage late, arrives at a designated route, leaves a route, takes an extended lunch or break, or deviates from a geographical boundary; and
- Develop various custom reports⁴ to provide information about how the vehicles have been used.

The management and storage of AVL application data is handled by Northrop Grumman in a central data center. Technical assistance is available through Northrop Grumman’s Network Operations Center. DSNY received project management and quality assurance services for its AVL application from Gartner, Inc. (Gartner) via a task order to an existing contract DSNY had with this vendor.

In addition to the 60 vehicles equipped with AVL devices that were part of the Northrop Grumman contract, in December 2010, DoITT provided (from its own stock and free of charge) six AVL devices that were installed in salt spreaders in Queens West District 6. According to DSNY officials, due to a lack of funding, the AVL application was not expanded to DSNY’s extended fleet of vehicles as had been originally planned. DSNY officials recently informed us that they are once again considering an expansion of the AVL application to their entire fleet.

A total of \$3,694,613 was spent in capital funds on the AVL application at DSNY—\$3,203,770 was spent by DSNY and \$490,843 by DoITT. (The Appendix shows the scope of work and cost associated with each AVL-related work order of the Northrop Grumman and Gartner contracts and the portions funded by DSNY and DoITT.)

Objectives

The objectives of the audit were to determine whether funds spent on the AVL application were adequately supported and whether the application functioned as intended.

³A route equates to the area (made up of multiple blocks) a single collection truck is assigned.

⁴These reports include, for example, Vehicle Recap Reports, which present information on a vehicle’s stops for its crew’s lunches and breaks, and the times a vehicle left from and returned to the garage, and Alerts Reports, which present information that a vehicle’s crew is taking too long of a break or that a vehicle has left its assigned geographical area.

Scope and Methodology Statement

We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient and appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives. This audit was conducted in accordance with the audit responsibilities of the City Comptroller as set forth in Chapter 5, §93, of the City Charter.

The scope of this audit was January 2006 through June 2011. Please refer to the Detailed Scope and Methodology at the end of this report for a discussion of the specific procedures followed and the tests conducted during this audit.

Discussion of Audit Results

The matters covered in this report were discussed with DSNY officials during and at the conclusion of this audit. A preliminary draft report was sent to DSNY officials on August 19, 2011, and was discussed at an exit conference held on September 27, 2011. On October 11, 2011, we submitted a draft report to DSNY officials with a request for comments. We received a written response from DSNY officials on October 25, 2011. In their response, DSNY officials generally agreed in principle with 10 of the audit's 14 recommendations and disagreed with one concerning the questionable payment of \$352,392 to Northrop Grumman for updated operating manuals and training materials. DSNY did not address the remaining three recommendations concerning: the filing of contracts and related amendments with the Comptroller's Office for registration; addressing the identified technical problems with the AVL devices and tablets; and periodically conducting AVL user surveys.

The full text of the DSNY response is included as an addendum to this report.

FINDINGS AND RECOMMENDATIONS

DSNY did not maintain adequate documentation to support some of its AVL application expenditures. DSNY made questionable payments totaling \$851,926. DSNY made a questionable payment of \$499,534 to Gartner for project management and quality assurance services. The supporting documentation for this payment raises questions about the appropriateness of the amount paid and illustrates the need for DSNY to strengthen its controls over payments to consultants. Furthermore, another questionable payment of \$352,392 was made to Northrop Grumman for operating manuals and training materials.

Based on audit tests and a survey we conducted, the application, when functioning, provides field supervisors with a tool that allows them to do their job more easily and efficiently. For example, the map screen feature helps the supervisors locate their crews' vehicles, monitor their crews' work, and coordinate refuse collection and snow removal efforts. However, a number of issues limit the AVL application's usability on a day-to-day basis. These issues include some inaccurate vehicle-position information on the map screens and tablets displaying the map screens sometimes not working properly or at all. In addition, several AVL features are not being used by most of the QE8 field supervisors, including vehicle diagnostics and custom reports. Finally, DSNY lacked an adequate inventory system for its AVL devices and tablets.

During the exit conference, DSNY officials emphasized that the AVL initiative was a pilot program and that the audit findings should be viewed in this context. They stated that the AVL application was designed and tested with the intention of expanding it to DSNY's extended fleet of vehicles. DSNY officials also stated that after the agency chose not to expand use of the AVL application due to a lack of funding, they decided to try to get some benefit out of the existing AVL equipment rather than discontinue use of the application altogether. DSNY acknowledged that because of the decision not to expand use of the application, it did not refine its AVL policies and procedures or develop plans for AVL training.

While we recognize that the decision not to expand use of the AVL application Citywide reduced the significance of concerns about the technical functioning of the application, we believe that this decision should have had no impact on DSNY's payment and inventory controls relative to the application. Furthermore, because DSNY has currently decided to continue to use the existing AVL equipment, the agency should ensure that it is working properly.

Questionable Payment Totaling \$499,534 Made to Gartner for AVL Project Management and Quality Assurance Services

Of the \$1,222,500 that DSNY spent for AVL project management and quality assurance services, \$499,534 (41 percent) appeared questionable because the expenditures lacked adequate supporting documentation that would indicate that Gartner provided the services that it was paid to perform.

On January 12, 2007, DSNY entered into a contract with Gartner to help DSNY modernize its Sanitation Control and Analysis Network. However, through Task Order #23556-008B, the contract was modified to include 3,000 hours of project management and 1,500 hours

of technical services to be provided during three AVL implementation phases at a not-to-exceed total cost of \$1,222,500.⁵ The three phases included: the Early Development phase (Phase 0)—to test devices in six vehicles in QE8; the Initial Deployment phase (Phase 1)—to roll out the application to the 60 vehicles in QE8; and the Citywide Production Roll-Out phase (Phase 2)—to bring the AVL functionality to approximately 3,000 DSNY vehicles.

The costs, objectives, and work steps outlined in the AVL Task Order for each of the three phases did not match the 38 invoices and associated timesheets for DSNY’s AVL-related payments to Gartner. A senior DSNY official stated that costs could be shifted between phases. However, the Task Order does not have a provision allowing for the shifting of costs between phases, and DSNY did not provide any evidence that this cost shifting had been approved.

The invoices and the associated timesheets indicate that Gartner performed the services it was expected to perform for Phases 0 and 1 and, thus, the amounts paid for these phases appear to be legitimate. Nevertheless, the supporting documentation raises questions about the appropriateness of the amount paid for Phase 2, which illustrates the need for DSNY to strengthen its controls over payments to consultants. One of the six objectives outlined in the Task Order for Phase 2 was to “roll-out functionality to remaining DSNY vehicles (approximately 3,000).” However, as of June 16, 2011, which was the date of the last AVL device inventory list provided to us by DSNY, only 64 vehicles had been equipped with AVL devices. We are questioning the \$499,534 paid to Gartner during Phase 2 as follows:

- The description of work indicated on each of nine invoices (totaling \$328,320) of the 38 invoices (totaling \$1,233,208)⁶ states that services were performed by various project managers for the development of the Sanitation Management and Resource Tracking (SMART) system—a system unrelated to the AVL application and part of another task order. A senior DSNY official stated that rather than billing each task order separately as required by the contract, Gartner combined the billing of several task orders, including the one pertaining to the AVL application, on each of the nine invoices. As a result, the DSNY official asked Gartner to confirm the portion of each of the nine invoices that related to the AVL application via handwritten and signed notes. Because these notes were written specifically for us in response to our inquiries—and were not present when payments were made—and because the description of work indicated on the timesheets associated with the nine invoices do not refer at all to the AVL application, the payment totaling \$328,320 appears questionable.
- Although one invoice (totaling \$171,214) of the 38 invoices refers to the AVL Task Order, the description of work on the invoice refers to the development of application documentation for the Technology Against Graffiti system—a system unrelated to the

⁵The initial contract between DSNY and Gartner totaled \$4,859,019. However, through various task orders, the contract was modified to an amount totaling \$9,954,357 and was extended through April 30, 2012.

⁶DSNY provided documentation from the City’s Financial Management System indicating that only \$1,222,500 in capital funds was spent for AVL project management and quality assurance services relating to the AVL Task Order, claiming that the additional \$10,708 in these invoices was paid under a different task order.

AVL application and part of another task order. A senior DSNY official stated that this work was applied to Phase 2 of the AVL Task Order. However, after our inquiries as to whether this work was legitimately related to the AVL application, senior DSNY officials stated that the payment was inadvertently charged to the wrong capital project and would be corrected.

In addition to these Phase 2 issues, the timesheets associated with the 28 invoices for Phases 0 and 1 were approved by officials from DSNY's Bureau of Information Technology between four months and two years after the work had actually been performed. (There is no evidence indicating when Gartner submitted the timesheets to DSNY for approval.) Because timesheets were the primary supporting documentation for many of the payments made to Gartner for its AVL-related work, they should have been approved in a more timely manner.

Recommendations

DSNY should:

1. Investigate the questionable payment totaling \$328,320 associated with Phase 2 of the AVL Task Order that lacked adequate supporting documentation indicating that Gartner provided the services it was paid to perform, and recover any amounts deemed to be unjustified.

DSNY Response: DSNY officials agreed and stated: "DSNY has further investigated the 'questionable' payments of \$328,320 and has concluded the payments totaling \$328,320 were paid for services rendered by Gartner, however, they were not in payment for services involving Phase 2 of Task Order #23556-008B. ...

"... DSNY is currently preparing a Capital Budget adjustment for submission to the Comptroller to align the charges with the accomplished PMQA [Project Management and Quality Assurance] work. ... DSNY will not seek recovery of funds paid to Gartner. In the next several weeks we anticipate having the expenditures realigned to Task Order #23556-008D, [which relates to the SMART project]. Once completed this will remove all non-Phase 2 related payments.

"DSNY agrees the unused portion of Task Order #23556-008B should not have been used to finance other projects because it does not specifically allow for the shifting of hours/funds. ... Noting your objection to this practice DSNY will make the necessary adjustment."

2. Ensure that the adjustment is made to move the payment totaling \$171,214 from the AVL application capital project identification line to the proper line.

DSNY Response: DSNY officials agreed and stated: "Invoice #761890 [totaling \$171,214], dated 4/29/10 has already been realigned to Task Order #23556-008E, the NTI [New Technology Initiative] Legacy Application Replacement Project. ..."

3. Improve its controls over payments made to consultants to ensure that (a) prior to making payment, the supporting invoices and timesheets reflect the actual work

stipulated in the contract and related task orders; (b) costs are not shifted between phases unless there is a provision in the contract allowing for this to occur and any necessary approvals are obtained and documented; and (c) timesheets for consultants' work are approved in a timely manner.

DSNY Response: DSNY officials agreed and stated: "DSNY will further improve control over consultant payments. Specifically invoices and timesheets will reflect clearly the work performed relates to a specific contract or Task Order. Also, the Department will not shift hours between Phases as recommended. In addition, time sheets, when used to support invoices, will be thoroughly reviewed and approved in a timely manner in support of relevant payments. DSNY will review existing procedural requirements and if necessary prepare an internal order reemphasizing these points as well as comply with City Comptroller Directive 30, and other relevant City government protocols. ..."

"... Currently, Gartner submits all time sheets, on other DSNY projects it is engaged in on a weekly basis and invoices the Department within 30 days of each month work."

Questionable Operating Manual and Training Material Expenditures

We question one of the payments made by DSNY to Northrop Grumman totaling \$352,392 for updated operating manuals and training materials. Order #44 (dated May 21, 2009) instructed Northrop Grumman to update these documents to reflect any new capabilities of the AVL application. Because DSNY did not provide us with any operating manuals or training materials published after the date of the order, we were unable to verify that DSNY, in fact, received updated documents. Instead, the copies provided by DSNY appeared to only support the payment made to Northrop Grumman totaling \$272,200 for the receipt of the initial operating manuals and training materials pertaining to Task Order #3 (dated April 20, 2007).

An additional concern is that Order #44 had not been filed with the Comptroller's Office for registration as required by §2-12 of the City's Procurement Policy Board (PPB) Rules and §93 and §328 of the City Charter. PPB Rules require that "all contracts, agreements, contract changes, change orders, amendments, modifications, [and] contract time extensions ... shall be presented to the Comptroller's Office for registration." The City Charter states that "no contract or agreement ... shall be implemented until ... the Comptroller has registered it." Failure to file contracts for registration hinders the City's ability to effectively track expenditures and to ensure that monies are available to pay contractors upon the satisfactory completion of contract work.

Recommendations

DSNY should:

4. Review its questionable payment of \$352,392 to Northrop Grumman for updated operating manuals and training materials, and recover any amounts deemed to be unjustified.

DSNY Response: DSNY officials disagreed and stated: "Based on further discussions with DoITT, it has been determined that the \$352,392 was not a payment for updating manuals

and training materials; it was a milestone payment. The deliverables were related to the fixed price integration and testing of DSNY Phase 1 AVL in QE8 onto NYCWiN AVL. The \$352,392 stated in the Order was a milestone payment for the fixed fee price for the overall task scope.

“The payment was due upon delivery of CDRLs [Contract Data Requirements List] ... which appear to be updated training materials and manuals. However, the contract work reflected in the milestone payment was not limited to the updated materials – indeed; the updated materials were a very small share of the work underlying the milestone payment [emphasis in original].”

Auditor Comment: Although DSNY states that the \$352,392 was a milestone payment, it acknowledges that the payment was due upon delivery of updated operating manuals and training materials. Further, DSNY’s contention that these updated documents were a “very small share of the work” is contradicted by the fact that, as stated in the order itself, this payment represents 55 percent of the cost of the overall task item.

Order #44 (dated May 21, 2009) also instructed Northrop Grumman to update the documents to reflect any new capabilities of the AVL application. Throughout the audit, we gave DSNY several opportunities to provide us with updated documents published after the date of the order. However, none were provided. In the absence of evidence that DSNY received updated operating manuals and training materials, we reiterate our recommendation that DSNY should review the payment of \$352,392 to Northrop Grumman for these documents and obtain appropriate recoupment.

5. Ensure that all of its contracts, agreements, change orders, and amendments are filed and registered with the Comptroller’s Office in accordance with PPB Rules and the City Charter.

DSNY Response: DSNY officials did not address the recommendation but stated: “Based upon conversations with DoITT it was confirmed that the service with respect to Order #44 complies with the provisions under the NYCWiN contract, Article 6, whereby DoITT can issue orders, which are separate from change orders. Order #44 simply notifies the INTEGRATOR [Northrop Grumman] to fulfill the Order in accordance with its terms and the NYCWiN Agreement.”

Auditor Comment: DSNY cites Article 6 of the NYCWiN contract as a justification for classifying Order #44 as an “order” rather than as a “change order” (that would need to be registered). However, Article 17 of the contract states that whenever any modifications or written amendments to the existing contract are made, change orders are to be issued that contain the signatures of the appropriate parties. Based on the language contained in Order #44, it is evident that it is a modification of the existing contract and, therefore, should have been classified as a change order.

PPB Rule §2-12 requires that contract changes and change orders be presented to the Comptroller’s Office for registration. Bypassing City regulations weakens the City’s internal controls for funding capital projects by reducing transparency regarding a project’s scope of work and its cost. Accordingly, we reaffirm this recommendation.

Issues with the AVL Application

Based on our observations of AVL functionality, the results of our survey of 10 of the 13 supervisors in QE8, including field and garage supervisors and the District Superintendent, and a review of relevant DSNY documentation, the application, when functioning, provides field supervisors with a tool that allows them to do their job more easily and efficiently. For example, the map screen feature helps the supervisors locate their crews' vehicles, monitor their crews' work, and coordinate refuse collection and snow removal efforts. However, problems exist in the technical functioning of the AVL devices and tablets.

Vehicles Often Do Not Track

The location of vehicles as displayed on the AVL application map screen often did not match their actual physical location. The following are some examples:

- QE8 supervisors stated on 67 (27 percent) of the 249 Daily GPS Tablet Recap reports⁷ completed between October 2010 and April 2011 that at least one or more of the vehicles that they physically observed in operation were not being tracked by the AVL application. On a December 3, 2010, Daily GPS Tablet Recap report, one supervisor even noted, “No trucks tracking! Some have not tracked since July!”
- Seven of the 10 supervisors we surveyed stated that the problem of some AVL-equipped vehicles not being properly tracked by the AVL application occurs at least once a week. Three of these seven supervisors responded that this issue happens every day, with one noting that “one or two trucks daily” are not tracking.
- We observed four vehicles on their collection routes in QE8 during the 6 a.m. to 2 p.m. shift—one on March 31, 2011, one on May 5, 2011, and two on May 10, 2011—that, according to the AVL application, were inactive during those times.

In addition, tracking issues were not resolved in a timely manner. Summary data in the AVL application as of April 28, 2011, showed that six vehicles had not displayed any activity for periods of time ranging from one to six months. A DSNY official informed us that the main problem (broken AVL antennas) for three of the vehicles had been fixed and that the other three vehicles should be fixed shortly.

Tablets and AVL Devices Often Do Not Work

Technical problems with the tablets limit the ability of the supervisors to monitor the collection trucks. Eight of the 10 supervisors we surveyed responded that the tablets did not work at all at least once a week. QE8 supervisors reported on 125 (50 percent) of the 249 Daily GPS Tablet Recap reports in our sample that for their entire shifts they were unable to use the

⁷These are reports that are submitted by supervisors to the District Superintendent to indicate any problems encountered with the tablets in their vehicles.

tablets in their vehicles to access the AVL application and monitor the trucks. The supervisors reported that this happened because the tablets were unable to receive power through the vehicles' docking stations, to connect to the Internet, or to access the AVL map screen. In addition, for nine of the Daily GPS Tablet Recap reports, the supervisors reported that even though they were able to access the AVL application, they experienced problems, such as the map screen being unresponsive to commands (i.e., freezing) or the screen going blank.

In addition, the AVL devices required many repairs. Twenty-seven of the 70 AVL-equipped vehicles reported in the GPS/AVL Service Log between September 17, 2008, and April 12, 2011, were serviced for some type of AVL-related repair on at least three occasions.

Many AVL Application Features Rarely Used

While the AVL application provides a number of good capabilities, the application contains many features that are rarely used by QE8 supervisors. For each of 11 of the 24 application features listed on our survey questionnaire, between 60 and 100 percent of the supervisors indicated that they never used them.⁸ All of the supervisors responded that they never use the oil pressure and battery voltage information features, with one noting that there was "no need for mechanical information." In addition, six of the 10 supervisors responded that they never use the Vehicle Recap Report feature, nine responded that they never use the Department of Transportation (DOT) camera feature (which provides both still and live images from DOT cameras located throughout the City), and six responded that the feature indicating whether the tail gate is open or closed was not useful.

Based on the survey results, the infrequent use of many of the AVL application features raises questions about whether the supervisors have been adequately trained in their use. It also raises questions as to whether the features were really needed by supervisors to effectively monitor work crews and the vehicles to which the crews have been assigned.

DSNY Response: "... It should be emphasized however that certain aspects of the application were not intended for use by all personnel interacting with the system. ...

"... For example, the oil pressure, battery voltage, and tailgate open/closed information features were not used by the supervisors interviewed or surveyed. The diagnostic feature was not designed for their use; it was designed to be used by headquarter staff solely in the Bureau of Motor Equipment. ..."

Auditor Comment: DSNY argues that certain aspects of the AVL application were only intended for certain personnel. However, the agency provided little, if any, evidence that the intended personnel utilized these features. For example, DSNY states in its response that the vehicle diagnostic features were designed solely for staff in the Bureau of Motor Equipment. However, to date, we have not been provided with any documentary evidence that diagnostic data has been gathered and analyzed by this bureau.

⁸We identified the 24 features listed in our survey questionnaire from a review of the *DSNY Operator Manual Using GPS/AVL System* dated July 25, 2008.

DSNY Response: "...We also wish to point out the extensive training which occurred. All QE08 Supervisors assigned to that location at the beginning of the Pilot received in class training at Northrop Grumman headquarters; new supervisors going into QE08 were given training at the DSNY training facility. In addition, all QE08 Supervisors were given daily assistance and in house training continually. An additional Supervisor was assigned to work in the District along with those regularly assigned to provide in depth 'in house assistance and training.' The claim of inadequate training for supervisors is simply incorrect. ..."

Auditor Comment: We acknowledge that DSNY provided training during the initial implementation of the AVL application. However, the infrequent use of many of the AVL application features raises questions about whether there has been adequate ongoing training in the use of these features. At the exit conference, DSNY officials stated that many of the current field and garage supervisors at QE8 had not been trained in the use of the AVL application because they were not assigned to this district during the application's initial implementation. In fact, seven of the 10 supervisors we surveyed responded that they had never been provided with any training manuals on the use of the AVL application. To be effective, training must be continuous.

Furthermore, nine of the 10 supervisors responded that, on a daily basis, the application generates excessive pop-up alerts informing them, for example, that a collection truck has left a garage late, has arrived at a designated route, or has left a route. One supervisor noted that it is a "distraction while driving having all these alerts pop up at us." Another noted that "sometimes you can get 50-70 alerts in a day. At the end of the day to clear these alerts you must delete them one by one otherwise you can't log out. Deleting them one at a time is time consuming."

DSNY Response: "...With respect to excessive pop-up alerts, the Department has been aware of this concern and requested Northrop Grumman to provide an administrative function that will enable alteration of hard coded parameters fixed by [the] contractor. ..."

Finally, some of the supervisors surveyed indicated that they believed the application should have been designed with a feature that would allow them to view their own cars on the map screen at the same time that they view the collection trucks. This would help the supervisors determine where they are in relation to the trucks.

Recommendations

If DSNY continues the current use of the AVL application, it should:

6. Address the identified technical problems with the AVL devices and tablets.

DSNY Response: DSNY officials did not address the recommendation but stated: "During the evaluation phase of the AVL pilot program, DSNY identified opportunities to further strengthen and enhance program operations. If the program is expanded, the Department will reassess these considerations along with those offered by the auditors."

Auditor Comment: We are pleased that if the AVL application is expanded, DSNY officials will reassess the technical problems identified in the audit regarding the AVL devices and tablets. However, DSNY’s response did not discuss whether it will address the technical problems identified in the audit concerning the existing devices and tablets.

7. Periodically conduct AVL user surveys to obtain feedback on whether the AVL application is operating as intended and is helping supervisors monitor the work of their crews.

DSNY Response: DSNY officials did not address the recommendation but stated: “ ... DSNY has identified some of the less imperative features and held interviews with Pilot Program users who clearly identified features that were not preferable or routinely used. ...”

Auditor Comment: We acknowledge that DSNY received feedback on the AVL application during its initial implementation. However, DSNY has not provided us with any documentary evidence indicating that it has obtained any feedback from the users of the AVL application since its initial implementation.

Inadequate Inventory System for DSNY’s AVL Equipment

DSNY lacked an adequate inventory system for its AVL devices and tablets. DSNY did not have a perpetual inventory system, as required by the Department of Investigation’s *Standards for Inventory Control and Management*, to ensure that AVL inventory lists were maintained and updated promptly upon the receipt or relinquishment of any of its AVL assets. In addition, DSNY does not have written inventory procedures for its AVL equipment to ensure that inventory counts are conducted and reconciled to inventory records on an annual basis as required by Comptroller’s Directive #30. Although DSNY was eventually able to account for all of its AVL devices and all but one of its tablets, weak inventory controls increase the risk that AVL assets could be misappropriated or disposed of improperly.

Inadequate Inventory Controls over AVL Devices

DSNY (on February 4, 2011) and DoITT (on March 21, 2011) provided inventory lists showing the DSNY vehicles that were equipped with AVL devices. Although both inventory lists reported that a total of 66 vehicles were equipped with AVL devices, the DSNY vehicle identification numbers for 23 of the 66 vehicles did not match.⁹

In addition, DSNY’s inventory list was incomplete and lacked inventory data required by Comptroller’s Directive #30. The DSNY list did not include the Northrop Grumman asset tag identification numbers or the location of the AVL devices in the vehicles. Furthermore, the device installation dates were not recorded for 15 of the vehicles.

⁹Forty-three DSNY vehicle identification numbers were consistently reported on both inventory lists. However, 23 vehicle identification numbers on the DoITT inventory list were not on the DSNY list, and 23 vehicle identification numbers on the DSNY inventory list were not on the DoITT list.

A senior DSNY official told us that Northrop Grumman had (at no cost) recently replaced and upgraded the AVL devices in many of the DSNY vehicles. The official added that some of the Northrop Grumman asset tag identification numbers reported on the DoITT list might correspond to the original devices and not to the newly upgraded ones. The DSNY official further stated that DSNY tracked its AVL-equipped vehicles by the DSNY vehicle identification number and not by the Northrop Grumman asset tag identification number; this was because DSNY had not received a record from Northrop Grumman of the asset tag identification numbers associated with the AVL devices that it had installed.

Eventually, through a collaborative effort with DoITT and Northrop Grumman, DSNY provided us with an updated inventory list on April 19, 2011. The new list identified 64 DSNY vehicles—not 66—as being equipped with AVL devices. This new list showed the Northrop Grumman asset tag identification number for each AVL device. However, the list still lacked pertinent data, including the locations in the vehicles where the AVL devices had been installed and the installation dates.

Concerning two of the 66 AVL devices installed by Northrop Grumman that were no longer in vehicles as of April 19, 2011, DSNY provided evidence that one vehicle had been destroyed in a fire and that another vehicle had its original AVL device removed during a period in which the vehicle was out of service and did not receive the new NYCWiN-compatible AVL device. As a result, this vehicle has functioned without an AVL device since December 2009. Had DSNY maintained a perpetual inventory system, it would have been more evident that this vehicle was still lacking a device. DSNY acknowledged that the vehicle should have received a new AVL device.

Based on the three inventory lists, we determined that there were a total of 89 different vehicles—not 66—that had been equipped at some point with AVL devices. As a result of our questions about the 89 vehicles, DSNY created and, on June 16, 2011, provided a fourth inventory list that identified two additional vehicles that had not been on any of the prior lists, bringing the total number of vehicles that had been equipped at some point with an AVL device to 91. The list showed that some of the vehicles had been condemned and that the AVL devices in these vehicles had been transferred to other vehicles. The fact that it took four inventory lists before we were able to determine which vehicles were equipped with AVL devices and which vehicles no longer had the devices further illustrates the need for DSNY to maintain a perpetual inventory system.

The AVL devices were installed in the vehicles in various places depending on the vehicle type. DSNY officials informed us that, until our request to inventory the devices, they had not known exactly where the devices were located in the vehicles. (DSNY had to contact Northrop Grumman to obtain information on the various locations of the AVL devices.) Eventually, as a result of the Northrop Grumman information and considerable searching by DSNY mechanics, the AVL devices were located on the 28 vehicles we checked. In order to comply with Comptroller's Directive #30 by conducting annual inventory counts and reconciling the counts to inventory records, it is essential that DSNY officials are aware of the locations of the AVL devices in the vehicles.

Inadequate Inventory Controls over Tablets

On May 12, 2011, we requested that DoITT and DSNY provide us with inventory data on the tablets that have been delivered to DSNY by Northrop Grumman to serve as mobile data terminals by which supervisors could monitor the locations of AVL-equipped DSNY vehicles. Although we received an inventory list from DoITT on May 23, 2011, we did not receive the DSNY list until June 16, 2011. The delay in DSNY providing us with a tablet inventory list leads us to question whether DSNY had such a list to begin with or whether one was created specifically for us as a result of our request.

A senior DSNY official stated that DSNY was unable to reconcile its tablet inventory list to the DoITT list. On its list, DoITT indicated that Northrop Grumman had delivered 16 tablets to DSNY, while DSNY reported on its list that it had received 26 tablets.

The DSNY tablet list was incomplete in that the Northrop Grumman asset tag identification numbers were not recorded for 13 of the 26 tablets. A senior DSNY official told us that the agency uses its own asset tag identification numbers to track its tablets for inventory purposes and not the Northrop Grumman asset tag identification numbers, which is why these numbers were not recorded for the 13 tablets. However, the DSNY asset tag identification numbers were also not recorded for four of these 13 tablets.

DSNY was eventually able to account for all but one of the 26 tablets identified on its list. The missing tablet was one of four reportedly returned to Northrop Grumman. DSNY did not have any documentation, such as a receipt, to support the return of these tablets. In response to our inquiry, a DSNY official obtained an email from Northrop Grumman confirming that it had received three of the four tablets and had returned them to the manufacturer. However, after checking the inventory in its warehouse, the DSNY official informed us that Northrop Grumman was unable to locate the remaining tablet or to verify that it had been returned to the manufacturer.

As required by Comptroller's Directive #30, DSNY needs to conduct annual inventories of its AVL devices and tablets, which includes locating and accounting for the items purchased. In addition, a perpetual inventory system, as required by the Department of Investigation's *Standards for Inventory Control and Management*, needs to be maintained to ensure that AVL inventory lists are promptly updated upon the receipt or relinquishment of its AVL assets.

DSNY Response: "The Agency maintains records of all the equipment acquired for this project. During the course of the audit, DSNY provided the audit team with several inventory listings and spreadsheet analyses of the movement of the equipment as it was acquired, installed and/or removed from our control. We were able to account for all devices involved in the Pilot Program. ..."

Auditor Comment: Although DSNY claims that AVL inventory records were adequately maintained, the documentation indicates otherwise. With respect to the AVL devices, DSNY provided four inventory lists over a period of four months before we were able to determine which vehicles were equipped with the devices and which vehicles no longer had the devices. With respect to the tablets, it took DSNY one month to provide us with

a tablet inventory list. Furthermore, the inventory lists for both the AVL devices and tablets were incomplete and lacked certain asset identification and location data required by Comptroller's Directive #30. Finally, although DSNY officials state in their response that they were able to account for all devices involved in the Pilot Program, DSNY was not able to account for one of the 26 tablets identified on its tablet inventory list.

Recommendations

DSNY should:

8. Conduct annual inventory counts of its AVL assets and reconcile the results to its inventory records.

DSNY Response: DSNY officials agreed and stated: "... As an enhancement to our current process of periodic inventory, we will implement your recommendation #8 of conducting an annual inventory count and performing the necessary reconciliations. ..."

9. Maintain a perpetual inventory system to ensure that AVL inventory lists are updated promptly upon the receipt or relinquishment of any of its AVL assets.

DSNY Response: DSNY officials agreed and stated: "... we ... [will] update our process to address the issues mentioned. ... considering the ongoing use of these assets, they will be entered into the DSNY Bureau of Information and Technology perpetual inventory system."

10. Develop written AVL inventory procedures. In addition to the need to conduct annual inventory counts and to maintain a perpetual inventory system, the procedures should require that inventory records contain specific information (e.g., type of asset, identifying asset tag number, and location of asset) outlined in Comptroller's Directive #30 and the Department of Investigation's *Standards for Inventory Control and Management*.

DSNY Response: DSNY officials agreed and stated: "... we [will] develop written AVL inventory procedures and update our process to address the issues mentioned. ..."

11. Maintain receipts for any assets transferred from one bureau or division within the agency to another, returned to a vendor, or relinquished. The receipts should include the signatures of both the person delivering the items and the person receiving the items.

DSNY Response: "DSNY agrees with this recommendation and will implement it moving forward."

12. Contact Northrop Grumman to ensure that it installs a NYCWiN-compatible AVL device in the vehicle noted above that still requires this device.

DSNY Response: "DSNY agrees with this recommendation and has since resolved the matter. Truck number 25CZ-121 has been equipped with a NYCWiN compatible AVL device."

Other Matter

GPS-Enabled Verizon Mobile Phones May Be a Less Expensive Alternative to AVL Devices

During the audit, DSNY officials told us that due to the December 2010 blizzard, the agency had decided to provide its vehicle operators with the ability to communicate with their supervisors via GPS-enabled Verizon mobile phones during snowstorms or other emergencies. In addition, via Verizon's Field Force Manager Web-based application, the locations of the vehicles equipped with these phones can be displayed and reported on a map screen for management to monitor. According to DSNY, as of May 12, 2011, a total of 2,425 vehicles throughout its 59 districts had been equipped with these phones, which are enclosed in cases and bolted to the center consoles of the vehicles.

Although Verizon issued all of the phones free of charge, DSNY paid \$322,501 to have them installed in its vehicles. In addition, we estimate that the air time and Web-based application costs will total approximately \$1.16 million per year.¹⁰ The cost associated with equipping DSNY vehicles with these phones throughout the City appears to be much less expensive than equipping them with AVL devices. However, based upon interviews with QE8 and Queens East District 10 (QE10) field supervisors and the survey we administered, there are some issues with these phones of which DSNY should be aware.

The supervisors informed us that workers have the ability to tamper with the phones to suspend the signal transmitting function and thereby disable the communication and GPS-monitoring features. Workers can also access the Internet, including social networking Web sites, and receive photographs from private mobile phones. In addition, according to a QE10 supervisor, the phone cases often become loose. According to some field supervisors, workers often do not hear the phones ringing due to the high volume of noise emanating from their vehicles. Furthermore, field supervisors told us that they could not access the Field Force Manager application from their vehicles, which significantly reduces the value of this feature.

DSNY officials informed us that they have improved the fastening of the phones to the cases and have taken steps to prevent these phones from connecting to the Internet and from receiving photographs from private mobile phones. However, the officials stated that they are still unable to prevent workers from suspending the phones' signal transmitting function. They also informed us that tablets are being distributed to field supervisors to allow them to access the Field Force Manager application.

During the exit conference, DSNY officials emphasized that the distribution of the 2,425 phones throughout its 59 districts was a roll-out that recently occurred (it began in January 2011 and was completed by May 2011). They further stated that glitches were to be expected as the introduction of the phones took place and the phones were integrated and utilized. Officials

¹⁰We multiplied the \$20 per phone monthly air-time cost and the \$19.99 per phone monthly Web-based application cost by 2,425 phones to arrive at a per-month cost. Next, we multiplied the per-month cost by 12 to arrive at the per-year cost.

further stated that many of the phone issues cited, such as the phone cases becoming loose and workers accessing the Internet, were discovered by DSNY as the roll-out was progressing and were subsequently rectified in a timely manner.

Recommendations

DSNY should:

13. Review the concerns raised by field supervisors relating to the GPS-enabled mobile phones installed in many DSNY vehicles.

DSNY Response: DSNY officials agreed and stated: “The GPS enabled mobile phone system was just being rolled out during the audit period. We were actively engaged in testing and de-bugging the program. DSNY ... [has] already taken precautionary measures to decrease if not eliminate misuse, by introducing a Verizon Mobile Web Block which will prevent any type of web browsing on the telephone. Moreover, DSNY has also blocked the ... message service which will eliminate improper text and photo messaging.

“Further, the mobile unit housing brackets have been fortified with rivets to improve their reliability. DSNY has obtained a repair contract with a vendor to address broken units. ...

“ ... Field personnel are completing daily inspections to identify loose, malfunctioning units.

“ ... DSNY has installed lock boxes to prevent powering off of the telephone. Reliability has not been 100% successful. ...

“ ... The airplane mode feature cannot be locked out and Verizon has no immediate plans to rework the unit to disable this feature or to alert on its use.

“DSNY has approached Verizon on multiple occasions to introduce ways to prevent [the] user from suspending the GPS signal transmission. DSNY has also asked for the introduction of alerting and reporting of units not tracking to help us identify and address those units more quickly.

“ ... Tablets have been installed and are in use in 158 Officer [supervisor] vehicles at this time.”

14. Periodically conduct user surveys on the GPS-enabled mobile phones to obtain feedback on whether they are operating as intended.

DSNY Response: DSNY officials agreed and stated: “ ... the Department is actively involved with Verizon to ensure that system operations meet our needs. In fact DSNY has a team of Supervisors assigned to the GPS telephone installation and Field Force Manager application training. Those Supervisors provide regular feedback to all stakeholders. In addition DSNY Managers routinely make inquiries to obtain feedback from field personnel of all ranks. In this regard, a User Committee has been formed to bring together headquarter and field users to discuss procedures, problems, needs, future use etc.”

DETAILED SCOPE AND METHODOLOGY

We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient and appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives. This audit was conducted in accordance with the audit responsibilities of the City Comptroller as set forth in Chapter 5, §93, of the City Charter.

The scope of this audit was January 2006 through June 2011.

To obtain an understanding of DSNY's AVL application and relevant regulations, we reviewed:

- NYCWiN Agreement between DoITT and Northrop Grumman dated January 9, 2006,
- Various work orders modifying the NYCWiN Agreement, including: Task Order #3, *AVL System for DSNY*; Change Order #6, *DSNY Initial Deployment*; and Order #44, *Migration of DSNY AVL to NYCWiN*,
- Certificate to Proceed (CP) request totaling \$1,981,269 submitted by DoITT to the Office of Management and Budget (OMB) to deploy a vehicle pilot for the AVL application in DSNY's QE8 using NYCWiN,
- CP request totaling \$1,222,500 submitted by DSNY to OMB for project management and quality assurance services to be provided by Gartner for the AVL application,
- Task Order #23556-008B modifying an existing agreement between DSNY and Gartner, *DSNY SCAN Project Monitoring/Quality Assurance/Project Management/Mentoring Services Amendment*,
- Various operating manuals on the AVL application prepared by Northrop Grumman, including *DSNY Supervisor/Operator Manual* and *DSNY Operator Manual Using GPS/AVL System*,
- Report prepared by Gartner on the AVL application presented to DoITT and DSNY, *AVL Project White Paper*,
- City Comptroller's Directive #1, *Principles of Internal Control*, as well as Directive #1's required Agency Financial Integrity Statement and Checklist, completed by DSNY for Calendar Year 2009,
- City Comptroller's Directive #30, *Capital Assets*, and
- Department of Investigation's *Standards for Inventory Control and Management*.

We interviewed DSNY officials who have been involved with the implementation of the AVL application, including officials in the Operations Management Division, the Bureau of Cleaning and Collection, the Bureau of Information Technology, the Bureau of Motor Equipment, the Planning and Budget Division, the Queens East Borough office, and QE8.

To gain an understanding of Northrop Grumman's responsibilities in relation to the AVL application at DSNY, we visited its Network Operations Center and its central data center and interviewed various Northrop Grumman officials, including the Director of NYCWiN, the AVL

Project Manager, and the AVL Engineer. While at the central data center, we observed the six servers that store and manage AVL application data for all City agencies that use this application. We also interviewed DoITT officials to obtain an understanding of their involvement with Northrop Grumman and DSNY regarding the AVL application. Finally, to obtain an understanding of how QE8 field supervisors use the AVL application to perform their day-to-day duties, we accompanied two supervisors in the field to observe them using the tablets to monitor the locations of their crews' collection trucks.

Reliability of AVL Application Data

We compared two DSNY inventory lists (one provided on February 4, 2011, that identified the vehicles equipped with AVL devices, and a second provided on June 16, 2011, that identified the AVL tablets) to two DoITT inventory lists (one provided on March 21, 2011, that identified the DSNY vehicles in which Northrop Grumman had installed AVL devices, and a second provided on May 23, 2011, that identified the tablets delivered to DSNY) to determine the extent to which the information on the DoITT and DSNY lists matched.

On three days, we recorded the AVL application information on the vehicles displayed on the map screen and compared it to AVL summary report data.

On May 5 and 10, 2011, we followed a total of 35 AVL-equipped vehicles (31 collection trucks and four supervisor passenger cars) in QE8 during parts of the 6 a.m. to 2 p.m. shift and the 4 p.m. to midnight shift. Our purpose was to determine whether the location of each of the vehicles was properly displayed on the AVL application map screen, which we had access to on a laptop computer.

We reviewed DSNY's Daily Performance Records (DS350s) for six randomly selected days out of 74 collection days during the three-month period of October 1, 2010, through December 31, 2010, to identify each AVL-equipped vehicle that was in operation during each of the six days.¹¹ We compared the AVL-equipped vehicles that were in operation according to the DS350s to AVL summary report data.

On seven days, we recorded the AVL-equipped vehicles that were parked at QE8 and determined whether these vehicles were reported in AVL summary data as not having been in operation on those occasions.

Inventory of AVL Devices and Tablets at DSNY

On an unannounced basis (on March 21, 2011; April 26, 2011; May 6, 11, and 13, 2011; and June 3 and 13, 2011), we inventoried, with the assistance of DSNY mechanics, AVL devices in 28 judgmentally selected vehicles,¹² which was 44 percent of the 64 AVL-equipped vehicles

¹¹A DS350 contains detailed information on each collection truck that was in operation on a given day.

¹²Since we did not want to interrupt the flow of operations, our judgmental basis for inventory selection was to choose vehicles that were parked and not in operation on any one of seven selected days.

on DSNY's April 19, 2011, inventory list.¹³ The vehicles included 15 collection trucks and five supervisor passenger cars located in QE8, six salt spreaders located in Queens West District 6, one collection truck located in Queens East District 12, and one supervisor car located in Manhattan District 1.

In addition, we inventoried the 26 tablets identified on DSNY's inventory list provided on June 16, 2011. Of the 26 tablets, one tablet was reported on the list as having been stolen and four were reported on the list as having been returned to Northrop Grumman. We reviewed the Unusual Occurrence Report and the New York City Police Department's Complaint Report on the stolen tablet and requested supporting documentation on the four tablets returned to Northrop Grumman.

Review of Reported Issues Encountered with the AVL Application at DSNY

We reviewed the 249 Daily GPS Tablet Recap reports on file for the period of October 2010 through April 2011. These forms are submitted daily by QE8 field supervisors to the District Superintendent to report any problems with the tablets.

In addition, we reviewed the GPS/AVL Service Log from QE8 for the period of September 17, 2008, through April 12, 2011, and noted any maintenance, repair, installation, or upgrading of an AVL device or tablet that was performed by an outside vendor. We compared the GPS/AVL Service Log to the DoITT and DSNY inventory lists to determine whether all AVL-device installations reported on the log actually took place. In addition, we determined whether any of the tablets and vehicles reported on the GPS/AVL Service Log were repaired on three or more occasions during this period.

We also requested, through DoITT, the Northrop Grumman AVL application server logs for the six-month period of November 2010 through April 2011 to determine whether there had been any reports of the AVL application at DSNY not working properly, particularly during rainstorms or snowstorms. However, we were not provided with the logs because we were told by a senior DoITT official that they contain sensitive AVL application data on all City agencies that use this application and not just on DSNY. According to this official, the data could not be separated specifically for DSNY.

Verification of Funding Spent on the AVL Application at DSNY

We compared the prices and descriptions of the AVL application work performed at DSNY according to Northrop Grumman and Gartner invoices to the prices and statements of work outlined in the corresponding work orders: Task Order #3, Change Order #6, Order #44, and Task Order #23556-008B. We determined whether the invoice amounts were consistent with the amounts paid for this work according to the City's Financial Management System.

¹³Two of the 66 AVL devices installed by Northrop Grumman were no longer in vehicles as of April 19, 2011. One vehicle had been destroyed in a fire, and one AVL device had been removed from a vehicle that was out of service for more than a year. Because this vehicle was out of service during the NYCWiN migration, it did not receive a NYCWiN-compatible AVL device.

Survey of QE8 Supervisors

We developed a three-part survey regarding the AVL application and administered it on May 13 and 18, 2011, to 10 of the 13 supervisors in QE8, including field and garage supervisors and the District Superintendent.¹⁴ The first part, which consisted of a table listing 24 features of the AVL application, instructed the supervisors to indicate how often they used each of the features during a five-day work week and whether they considered them to be useful. The second part, which consisted of a table listing 12 problems that might be encountered with the AVL application, instructed the supervisors to indicate the extent to which they encountered any of these problems. The third part of the survey contained a series of eight questions requiring written responses concerning the strengths and weaknesses of the AVL application. Our purpose was to obtain the supervisors' views on whether the AVL application works properly and whether it is an effective tool in helping DSNY management to perform its personnel monitoring duties.

The results of our various samples, while not projected to their respective populations, provided a reasonable basis for us to determine whether the AVL application at DSNY functions as intended.

¹⁴The survey was not administered to three of the 13 supervisors—one was new to QE8 and had never used the AVL application and two were not working during the days the survey was administered.

Portions of Northrop Grumman and Gartner Contracts
Funded by DSNY and DoITT for the AVL Application

| Scope of Work | Cost | Portion Funded by DSNY | Portion Funded by DoITT |
|---|---------------------|------------------------|-------------------------|
| Task Order #3 Northrop Grumman | | | |
| AVL Mobilization | \$ 272,199 | | |
| Completion of Vehicle Installation | \$ 340,249 | | |
| Submittal of Supervisor/Operator Manual | \$ 68,050 | | |
| Submittal of System Administrator Manual | \$ 68,050 | | |
| Submittal of Supervisor/Operator Training Materials | \$ 68,050 | | |
| Submittal of System Administrator Training Materials | \$ 68,050 | | |
| Completion of Enhanced Class 2 AVL Back Office Application Customization | \$ 272,199 | | |
| Completion of AVL Acceptance Testing | \$ 68,050 | | |
| Completion of AVL Task Order | \$ 136,100 | | |
| <i>Subtotal Task Order #3</i> | \$ 1,360,997 | \$ 1,020,748 | \$ 340,249 |
| Change Order #6 Northrop Grumman | | | |
| <i>Subtotal Change Order #6: Completion of Supervisor Mobile Access Portal Upgrades</i> | \$ 378,733 | \$ 378,733 | \$ 0 |
| Order #44 Northrop Grumman | | | |
| Fixed Price Integration and Tests of DSNY Phase 1 AVL in QE8 onto NYCWiN AVL | \$ 640,713 | | |
| NYCWiN Mobile Data Terminals | \$ 91,670 | | |
| <i>Subtotal Order #44</i> | \$ 732,383 | \$ 581,789 | \$ 150,594 |
| Total Northrop Grumman Contract for DSNY AVL | \$ 2,472,113 | \$ 1,981,270 | \$ 490,843 |
| Task Order #23556-008B Gartner | | | |
| Total Gartner Contract for Project Management and Quality Assurance Services for AVL | \$ 1,222,500 | \$ 1,222,500 | \$ 0 |
| Grand Total | \$ 3,694,613 | \$ 3,203,770 | \$ 490,843 |



sanitation

ADDENDUM
(Page 1 of 7)

JOHN J. DOHERTY
Commissioner
125 Worth Street, Room 720
New York, NY 10013

October 25, 2011

The Honorable Tina Kim
Deputy Comptroller for Audit
Office of the Comptroller
1 Centre Street, Room # 1100
New York, NY 10007

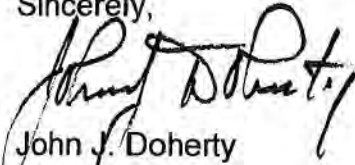
Re: Audit Report on the Department of Sanitation's Automatic Vehicle Location Application (ME11-093A) dated October 11, 2011.

Dear Deputy Comptroller Kim,

We wish to thank you for the opportunity to review and comment on the findings and 14 recommendations contained in the recent Audit Report on the Department of Sanitation's Queens East District 8 Pilot Program for an Automatic Vehicle Location Application. We trust that our comments will be seriously considered by your office and reflected in the final audit report.

Thank you.

Sincerely,


John J. Doherty
Commissioner

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DON'T LITTER

Recommendation 1: DSNY should investigate questionable payments totaling \$328,320 associated with Phase 2 of the AVL Task Order that lacked adequate supporting documentation indicating that Gartner provided the services it was paid to perform, and recover any amounts deemed unjustified.

DSNY Response

DSNY has further investigated the "questionable" payments of \$328,320 and has concluded the payments totaling \$328,320 were paid for services rendered by Gartner, however, they were not in payment for services involving Phase 2 of task Order: 23556-008B.

As stated in your findings, Gartner has entered into a contract with DSNY to help modernize its Sanitation Control and Analysis Network and is involved in many different aspects of this project. As requested in recommendation 2, DSNY is currently preparing a Capital Budget adjustment for submission to the Comptroller to align the charges with the accomplished PMQA work totaling \$328,534. DSNY will not seek recovery of funds paid to Gartner. In the next several weeks we anticipate having the expenditures realigned to Task Order 23556-008D. Once completed this will remove all non-Phase 2 related payments.

DSNY agrees the unused portion of Task Order 23556-008B should not have been used to finance other projects because it does not specifically allow for the shifting of hours/funds. However the "parent contract" 23556-00A does allow for the shifting of hours between phases. As written in Task Order B the total estimated fees included in Task Order A are increased by this amendment to account for Program Management and Quality Assurance (PMQA) Services for NYC DSNY AVL Project. Noting your objection to this practice DSNY will make the necessary adjustment.

Recommendation 2: DSNY should ensure that the adjustment is accomplished to move the payment totaling \$171,214 from the AVL application capital project identification line to the proper line.

DSNY Response

Invoice #761890, dated 4/29/10 has already been realigned to Task Order 23556-008E, the NTI Legacy Application Replacement Project.

In the chart below see the breakdown of funds spent, totaling \$499,534, as they relate to specific invoices. Gartner provided services to DSNY totaling \$499,534 using funds from Phase 2 of Task Order 23556-008B

| Gartner Invoice No. | Total Invoice Amount | Revised Breakdown by Task Order | | |
|------------------------|-------------------------|------------------------------------|----------------|---|
| | | 23556-008D (ECM) | 23556- 008B | 23556-008E NTI LEGACY APPLICATION REPLACEMENT PROJECT |
| 761890 | \$ 171,213.75 | \$ - | \$ - | \$ 171,213.75 |
| 749979 | \$ 262,726.25 | \$ 32,640.00 | \$ - | |
| 749980 | \$ 325,153.25 | \$ 40,320.00 | \$ - | |
| 754683 | \$ 263,742.50 | \$ 34,560.00 | \$ - | |
| 754684 | \$ 218,297.00 | \$ 32,640.00 | \$ - | |
| 756110 | \$ 263,801.25 | \$ 40,320.00 | \$ - | |

| | | | | |
|--------|---------------|---------------|------|---------------|
| 758354 | \$ 241,667.75 | \$ 36,480.00 | \$ - | |
| 758355 | \$ 203,003.75 | \$ 28,800.00 | \$ - | |
| 761553 | \$ 220,432.50 | \$ 46,080.00 | \$ - | |
| 763018 | \$ 160,185.00 | \$ 36,480.00 | \$ - | |
| | | \$ 328,320.00 | | \$ 171,213.75 |

Total Removal from Task Order B: \$ 499,533.75

Recommendation 3: DSNY should improve its control over payments made to consultants to ensure that:

- a) Prior to making payment the supporting invoices and time sheets reflect actual work stipulated in the contract and related Task Orders.**
- b) Costs are not shifted between phases unless there is a provision in the contract allowing for this to occur and any necessary approvals are obtained and documented.**
- c) Time sheets for consultants' work are approved in a timely manner.**

DSNY Response

DSNY will further improve control of over consultant payments. Specifically invoices and time sheets will reflect clearly the work performed relates to a specific contract or Task Order. Also, the Department will not shift hours between Phases as recommended. In addition, time sheets, when used to support invoices, will be thoroughly reviewed and approved in a timely manner in support of relevant payments. DSNY will review existing procedural requirements and if necessary prepare an internal order reemphasizing these points as well as comply with City Comptroller Directive 30, and other relevant City government protocols.

Moreover, DSNY has further questioned Gartner regarding the late approval of time sheets and has been advised of the following actions:

All Gartner consultants (and RCC subcontractors) prepared time sheets for its AVL/GPS PMQA work on a weekly basis. However, Gartner did not submit these time sheets directly to DSNY until its staff reviewed the hours and obtained signatures from each consultant.

In August 2008, Gartner submitted signed time sheets and draft invoice language for the AVL project to DSNY for the months of May 2007-May 2008. The draft invoice language included a summary of major tasks/deliverables completed by Gartner in each month. In most cases, the total hours billed were approved however, there were minor discrepancies noted in selected time sheets (e.g., time in/out did not match total hours listed on the time sheets, time required for lunch not included). Gartner submitted revised and signed time sheets to DSNY with formal invoices for this period in July 2009.

Similarly, in September 2009, Gartner submitted signed time sheets and draft invoice language to DSNY for the months of June 2008 - August 2009. Subsequently, Gartner submitted revised and signed time sheets to DSNY with all invoices for this second period in October 2009.

Currently, Gartner submits all time sheets, on other DSNY projects it is engaged in on a weekly basis and invoices the Department within 30 days of each month worked.

Recommendation 4: DSNY should review its questionable payment of \$352,392 to Northrop Grumman for updated Operating Manuals and Training Materials, and recover any amounts deemed to be unjustified.

DSNY Response

Based on further discussions with DoITT, it has been determined that the \$352,392 was not a payment for updating manuals and training materials; it was a milestone payment. The deliverables were related to the fixed price integration and testing of DSNY Phase 1 AVL in QE8 District onto NYCWIN AVL. The \$352,392 stated in the Order was a milestone payment for the fixed fee price for the overall task scope.

The payment was due upon delivery of CDRLs numbered DSNY AVL 0002-R1 thru DSNY AVL 0005-R1, which appear to be updated training materials and manuals. However, the contract work reflected in the milestone payment was not limited to the updated materials – indeed, the updated materials were a very small share of the work underlying the milestone payment.

Recommendation 5: Ensure that all of its contracts, agreements, change orders and amendments are filed and registered with the Comptroller's Office in accordance with PPB Rules and the City Charter:

DSNY Response

Based upon conversations with DoITT it was confirmed that the service with respect to Order 44 comply with the provisions under the NYCWIN contract, Article 6, whereby DoITT can issue orders, which are separate from change orders. Order 44 simply notifies the INTEGRATOR to fulfill the Order in accordance with its terms and the NYCWIN Agreement.

Recommendation 6 - 7: If DSNY continues the current use of the AVL application, it should:

6) Address the identified technical problems with AVL devices and tablets

DSNY Response

During the evaluation phase of the AVL pilot program, DSNY identified opportunities to further strengthen and enhance program operations. If the program is expanded, the Department will reassess these considerations along with those offered by the auditors.

7) Periodically conduct AVL user surveys to obtain feedback on whether the AVL applications is operating as intended and is helping supervisors to monitor the work of their crews.

DSNY Response

As with any new application, such conditions are part of the field testing and resolution phase of program acceptance. It should be emphasized however that certain aspects of the application were not intended for use by all personnel interacting with the system. Moreover, DSNY has identified some of the less imperative

features and held interviews with Pilot Program users who clearly identified features that were not preferable or routinely used.

For example, the oil pressure, battery voltage, and tailgate open/closed information features were not used by the Supervisors interviewed or surveyed. The diagnostic feature was not designed for their use; it was designed to be used by headquarter staff solely in the Bureau of Motor Equipment.

Also, the Vehicle Recap Report was only used by certain Supervisors. This report was designed so the user could get a summary of the actions of a selected unit when necessary. There is no demand to use this function on a regular basis; we included it in our design of the application as a tool to establish a complete history of the shifts activities.

In conversations with DoITT, the Department has learned that the Transportation traffic camera feature was part of the mapping capabilities which could be made available to DSNY based upon future needs and shift operations.

We also wish to point out the extensive training which occurred. All QE08 Supervisors assigned to that location at the beginning of the Pilot received in class training at Northrop Grumman headquarters; new Supervisors going into QE08 were given training at the DSNY training facility. In addition, all QE08 Supervisors were given daily assistance and in house training continually. An additional Supervisor was assigned to work in the District along with those regularly assigned to provide in depth "in house assistance and training". The claim of inadequate training for Supervisors is simply incorrect.

With respect to excessive pop-up alerts, the Department has been aware of this concern and requested Northrop Grumman to provide an administrative function that will enable alteration of hard coded parameters fixed by contractor. Indeed the GPS-enable Verizon phones have already been altered to eliminate some alerts being generated.

The newer GPS product does allow Supervisors to view their own passenger vehicle, in real time, on the tablet they display the GPS application's map on.

Recommendation 8: DSNY should conduct annual inventory counts of its AVL assets and reconcile the results to its inventory records. See below recommendation 10.

Recommendation 9: DSNY should maintain a perpetual inventory system to ensure that AVL inventory lists are updated promptly upon receipt or relinquishment of any of its AVL assets. See below recommendation 10.

Recommendation 10: DSNY should develop written AVL inventory procedures. In addition to the need to conduct annual inventory counts and to maintain a perpetual inventory system, the procedures should also require that inventory records contain specific information (e.g., type of asset, identifying asset tag number, and location of asset) outlined in Comptroller's Directive # 30 and the Department of Investigation's *Standards for Inventory Control and Management*.

DSNY Response

The Agency maintains records of all the equipment acquired for this project. During the course of the audit, DSNY provided the audit team with several inventory listings and spreadsheet analyses of the movement of the equipment as it was acquired, installed and or removed from our control. We were able to account for all devices involved in the Pilot Program.

With regard to the Identification Tags, we took the additional step to affix our own bar code tags to make tracking easier in addition to tracking systems of others involved with the assets.

As an enhancement to our current process of periodic inventory, we will implement your recommendation # 8 of conducting an annual inventory count and performing the necessary reconciliations. Furthermore, we develop written AVL Inventory procedures and update our process to address the issues mentioned in recommendations # 9 and # 10.

Lastly, considering the ongoing use of these assets, they will be entered into the DSNY Bureau of Information and Technology perpetual inventory system

Recommendation 11: DSNY should maintain receipts for any assets transferred from one bureau or division within the Agency to another, returned to the vendor, or relinquished. The receipts should include signatures of both the person delivering the items and the person receiving the items.

DSNY Response

DSNY agrees with this recommendation and will implement it moving forward.

Recommendation 12: DSNY should contact Northrop Grumman to ensure that it installs a NYCWiN - compatible AVL device in the vehicle noted that still requires this device.

DSNY Response

DSNY agrees with this recommendation and has since resolved the matter. Truck number 25CZ-121 has been equipped with a NYCWiN compatible AVL device.

Recommendation 13: DSNY should review concerns raised by field Supervisors related to GPS - enabled mobile phones installed in many DSNY vehicles.

DSNY Response

The GPS enabled mobile phone system was just being rolled out during the audit period. We were actively engaged in testing and de-bugging the program.

DSNY was already aware of the concerns voiced by the Supervisors the audit team, and have already taken precautionary measures to decrease if not eliminate misuse, by introducing a Verizon Mobile Web Block which will prevent any type of web browsing on the telephone. Moreover, DSNY has also blocked the SMS and MMS (single and multiple message service) which will eliminate improper text and photo messaging.

Further, the mobile unit housing brackets have been fortified with rivets to improve their reliability. DSNY has obtained a repair contract with a vendor to address broken units. DSNY through discussions with the application developer Xora has eliminated unnecessary FFM features such as jobs, locations and time sheets on the units to decrease misuse or unintended use. We are not using these features currently.

DSNY has installed lock boxes to prevent powering off of the telephone. Reliability has not been 100% successful.

The E911 feature use has been eliminated with the introduction of a lock out code which disables the E911 setting.

The airplane mode feature can not be locked out and Verizon has no immediate plans to rework the unit to disable this feature or to alert on its use.

DSNY has approached Verizon on multiple occasions to introduce ways to prevent user from suspending the GPS signal transmission. DSNY has also asked for the introduction of alerting and reporting of units not tracking to help us identify and address those units more quickly.

Field personnel are completing daily inspections to identify loose, malfunctioning units.

Tablets have been installed and are in use in 158 Officer vehicles at this time.

Recommendation 14: DSNY should periodically conduct user surveys on GPS-enabled mobile phones to obtain feedback on whether they are operating as intended.

DSNY Response

As mentioned in response to recommendation 13, the Department is actively involved with Verizon to ensure that system operations meet our needs. In fact DSNY has a team of Supervisors assigned to the GPS telephone installation and Field Force Manager application training. Those Supervisors provide regular feedback to all stakeholders. In addition DSNY Managers routinely make inquiries to obtain feedback from field personnel of all ranks. In this regard, a User Committee has been formed to bring together headquarter and field users to discuss procedures, problems, needs, future use etc.