

## ANC Report to Congress FY 08

### I. Introduction

For over 140 years, the Arlington National Cemetery (ANC) has proudly worked to fulfill its mission of honoring those who have served our nation. Since its establishment in 1864, ANC has interred or inurned the remains of approximately 300,000 persons across its 624 acres of land – and for the large majority of its 142 year history, all cemetery operations have been conducted manually. ANC's automation project is intended to bring the cemetery operations and management into the 21<sup>st</sup> century, keeping its vital historical records safe, making those records accessible, and making appropriate use of technology in line with government and industry best practices for cemetery management.

ANC's Total Cemetery Management System (TCMS) has been designed to meet those needs. TCMS is a modular database management system and information support system for all aspects of cemetery operations. This includes scheduling 25-30 funerals per day, maintaining detailed burial records on more than 300,000 decedents, and managing the gravesites across ANC's 624 acres of land. By developing individual components, ANC can ensure maximum reuse of processes and software, implement new services as funding is available, and allow for future expansion/enhancement – all in line with the President's Management Agenda. ANC has fully documented its business needs and the performance gap created by its current, inadequate IT systems. The current TCMS design and implementation schedule address the most pressing needs first, and allow for continued improvements through FY2010. In beginning this effort, it became clear that records management was a fundamental requirement for ANC. All of the (600,000-plus) historical records have now been captured electronically – including both burial records on individuals and the grave cards which provide detail on each individual gravesite. The next, critical step is to perform a quality check on all of this data. As can be imagined, manual record-keeping for more than a century has resulted in numerous discrepancies. Indeed, it is essential that ANC triple validate all burial information against the physical plot to ensure the accuracy of all information. ANC's plan to validate the burial records, grave cards, and actual headstones will ensure that the final data set is complete and accurate. This process is referred to triple validation and it is described below in more detail. This accurate data set will then become the foundation for fully automating cemetery operations – again, in line with government and industry best practices.

Besides the Interment Scheduling System, version 2 (ISSv2), the triple validation of ANC burial information is the single most important task that must be completed as soon as possible. Triple validation of ANC's data is the single task that will ensure the integrity and accuracy of the data that is provided to the public and used to make daily decisions. It will provide the foundation of data that all of the other applications will use.

#### A. Overall Plan for Automation

TCMS directly supports the ANC's vision and mission by enabling its administrative staff to perform their functions more efficiently and effectively, at lower costs per activity, and with greater capacity to handle increased numbers of customers. ANC's documented performance gap identifies the following needs:

- Transform to a customer service-centered organization that leverages the capabilities and improves coordination with its stakeholders/partners, including military honors teams, chaplains, family members, and funeral directors;
- Improve its ability to conduct/manage capacity planning, allowing ANC to accurately predict when it will be full;
- Improve its ability to share pertinent information electronically throughout the Cemetery, between schedulers and grounds crews;
- Improve notification/confirmation of scheduled funerals to funeral homes/families;
- Improve customer satisfaction by improving information/services available to visitors seeking individual grave locations;
- Increase efficiency/effectiveness of ANC processes while reducing costs; and



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- Reduce risks associated with manual data access/maintenance by automating all paper records and validating accuracy across the three primary sources.

In line with industry best practices, TCMS will allow scheduling and capacity planning based on precise, digitized cemetery maps that have been geo-referenced (to provide specific spatial data) to electronic interment/maintenance records.

ANC's plan for TCMS was refined following the TCMS Pilot, completed in 2005. TCMS components are planned as follows: scheduling (available in Q1FY07), data repository (FY08), headstone ordering (FY08), reservation/disinterment tracking database (FY08), web portal (FY08), geospatial information system (GIS) (FY09-10), automated work orders for headstones and grounds keeping (FY09), and full cemetery electronic document management (FY09). As stated earlier, the basis of all of these efforts is accurate data on ANC's burials and grounds. In order to achieve this, ANC must triple-validate the interment records. This requires validating the information on the grave card and burial record against the information on the headstone. In addition, the location of the headstone and size of the grave must be validated due to the inaccuracy of burial maps (FY 08).

ANC's vision for modernizing cemetery operations, as documented in ANC's modernization blueprint, calls for a collaborative, component-based approach to closing the performance gaps. To achieve the ANC's information management vision and goals, TCMS will be developed using a phased approach and a multi-tier architecture. This approach facilitates scalability and increases the life span of each product by shielding costly development efforts from business and technology changes. Although a multi-tier architecture requires additional design up front, it greatly offsets maintenance costs and overall costs by using re-usable code, which decreases the amount of code that needs to be written and maintained. Furthermore, the development of TCMS components have been strategically planned to address ANC's immediate needs, which includes collecting, managing, and distributing all interment data electronically, and validating the historical interment data.

A critical part of the overall TCMS effort has been to comprehensively plan the development and implementation of each component, while trying to minimize costs and maximize the returns. ANC has concentrated heavily on the requirements for TCMS components, their integration, timeline, and cost estimates. This work resulted in the decision to develop the Interment Scheduling System version 2 (ISSv2) in FY 05. In order to make this application function in the most efficient and effective way, ANC must now develop and implement three other components that directly integrate with ISSv2 and are key to utilizing the application's intended functionality. These three components are the TCMS Data Repository (TDR), Reservation/Disinterment Database (DB), and the Automated Headstone Ordering System (AHOS). Once these components are developed and released, ANC cemetery representatives will no longer need to:

- Manually search for decedents related to the current decedent scheduled to be buried
- Add historical records into ISS to bury a relative of someone already buried at ANC
- Manually look up reservations, or
- Re-enter all funeral data to order a headstone.

In addition to the improvements listed above, the workers in the Visitor Center will have a single source to locate decedent records.

Other activities and components that need to begin development as soon as possible are Phase I of the web portal (which allows each military Branch of Service to view their scheduled funerals, required resources, and electronically submit their resources for specific dates and times), and Phase I of the GIS component (pre-design phase), which will take approximately one year to complete and is required before the GIS component can be designed and developed.



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During ANC's market research, it was confirmed that industry best practice for cemetery management is using information systems that link the data from digitized cemetery maps that have been geo-referenced (to provide specific spatial data) to electronic interment records and maintenance records. Such systems allow cemeteries to easily identify reserved graves, view graves with maintenance contracts, and give information on the amount and location of available space as well as provide a dynamic link between grave attributes (mostly interment data) in a database and spatial data in a Geographic Information System (GIS). This is especially critical for ANC as its grounds are so very diverse in terms of gravesite size and spacing, and the need for capacity planning is great.

### ANC Processes that Drive the Automation Effort

One key aspect of cemetery operations is scheduling funeral services with families/funeral homes, chaplains and appropriate military honors teams. As each decedent qualifies for different types of honors and requires support from various military services, and ANC conducts approximately 25-30 funeral services every day, this scheduling has been very time- and paper-intensive. The Interment Scheduling System (ISS) has been designed to support this process. Developing and implementing the Initial ISS software revealed additional requirements (both process and technical), and so version 2 (ISSv2) has been developed. ISSv2 is currently being tested prior to full implementation at ANC.

A second key aspect of ANC operations is the assignment of each individual gravesite, either identifying a previously reserved gravesite, or selecting from the remaining available gravesites. Once the gravesite has been identified, grounds crews must physically inspect the site, ensuring that it still exists, is not already occupied, and can be reached by the funeral procession without interfering with the other (typically four) funeral services that are going on simultaneously. Because ANC's records have not yet been validated, errors do occur in gravesite selection; in rare cases, the grounds crews have opened an unmarked, presumably available grave only to find that it has already been used. More frequently, grounds crews will find that selected gravesites are marked with headstones of other decedents, or that the gravesite has been planted over with trees. In all of these cases, additional time is required while the grounds crews work with the ANC schedulers to assign a different gravesite.

Once a funeral has taken place, ANC staff must order the headstones. All headstones for government cemeteries must be ordered through a system operated by the Department of Veterans Affairs (VA). Since the ordering process involves re-entering all pertinent data into the VA system, the orders and the headstones themselves must be carefully checked for errors before they can be installed. ANC is planning to develop an automated interface between the ISS and the VA system. The small development effort needed to create the Automated Headstone Ordering System (AHOS) will result in a faster, more accurate method of ensuring accurate headstones are quickly placed at each new gravesite.

Grounds crews must report their progress on maintaining each of the gravesites. This includes updating their (paper) records on when the headstones have been installed and when sod has been placed. Once these activities are completed, the families are notified with the status.

All of these activities require a great amount of coordination, consultation, and record-keeping between the major divisions of ANC as well as the military services, families, funeral homes, and vendors. The TCMS has been designed to meet these needs, based on government and industry best practices.



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### 1. TCMS Component Overview

The following section describes the automation components that are required in order to support these critical processes. The components are:

- A. Interment Scheduling System (ISSv2)
- B. Triple Validation of Interment Data
- C. TCMS Data Repository (TDR)
- D. Reservation and Disinterment Database
- E. Automated Headstone Ordering System (AHOS)
- F. TCMS Web Portal
- G. Geographic Information System (GIS)
- H. Work Order Management Component
- I. Electronic Document Management System (EDMS)

**A. Interment Scheduling System (ISSv2)** – This component will provide the same functionality as the current ISS; however, it will provide ANC with a more stable and scalable foundation. ISSv2 will increase the accuracy of interment data by requiring and validating nearly every data field, limit the amount of free text to be entered, and follow a workflow, so time spent scheduling a funeral is minimized. This application will eliminate duplicate records, will reduce the time required to train new users, will expand reporting capabilities, and will improve accountability through audit logs. ISSv2 will utilize a Commercial Off-The Shelf (COTS) product that will be used as the base for the master calendar and will allow the application to send and receive emails with requests and responses to obtain permission to schedule a funeral with special conditions. Once the response is received, the application will either schedule the funeral as requested, schedule the funeral but deny the request, or remove the date and time reserved for a funeral because the request was time based and it was denied.

#### **Anticipated Development and Implementation of ISSv2**

ISSv2 is currently being tested and modified to fix any bugs found. The application was pre-released to ANC in a test environment to allow the primary users a chance to test the new application. The feedback from the representatives was invaluable because the development team was able to observe the primary users and receive information on the areas that were problematic. It also was beneficial to the users because they were able to gain a better understanding of how the new application will function and the changes to their daily process. Most users are excited about the release of the ISSv2. Due to the decision to delay the release of the application until the other key components (TDR, Reservation/Disinterment DB, and AHOS) are complete, ISSv2 is now anticipated to be released approximately four months after funding is secured for the other key components. Prior to the release of ISSv2 and the related components, extensive training sessions will be provided to all employees that will be using the application. These sessions will be provided by the development team and led by the team's professional trainer.

Approximately three months after ISSv2 is released, ANC will begin collecting requirements to update ISSv2 to expand the scheduling functionality to include the thousands of wreath laying ceremonies that ANC schedules each year and conducts on a daily basis. The scheduling of the wreath laying ceremonies was just recently handed over to ANC from the Military District of Washington (MDW). ANC is currently using their stand alone Access Database application to schedule these ceremonies. Integrating the scheduling of these ceremonies with the scheduling of funerals will be extremely beneficial to both ANC and the military Branches of Service, because often times the same military resources support both funerals and wreath laying ceremonies.



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This will make tracking the resources required faster and efficient, as well as provide real-time updates to the funerals schedule, since funerals always take precedence.

**B. Triple Validation of Interment Data** – As previously stated, ANC must validate the burial records, grave cards, and burial maps against the actual physical plot, or triple validate all interment data. This will be a complex activity to complete and will require validating that the information on the grave card and burial record matches the actual information on the headstone. In addition, the actual location of the headstone and size of the grave must be validated due to the inaccuracy of the burial maps. Although the exact method to complete triple validation is still being finalized, several activities have been identified/validated by two GIS experts that must be completed in order to successfully complete this task:

1. Creating baseline maps that will be drawn using the ortho-photography and existing cemetery maps as references. The plots would be drawn directly over the ortho-photographs using a set of rules that will be defined as to how the plots are to be delineated. Since older sections of the cemetery are not arranged in a linear or systematic manner, and neither examination of the ortho-photography nor direct observation will yield the dimensions of a grave with any precision greater than the described approach, the baseline map must be created by hand.
2. Developing a small GIS application that will utilize the drawn baseline maps to identify every grave and establish a geo-spatial point for each that will be linked to the corresponding interment record by using a unique identifier.
3. Once the application has been developed, a contractor will go out to the field, locate a headstone and select it in the application, then take a digital photo of the front and back of each headstone. The photos will be linked to that specific geo-spatial point and the headstone section and number will be entered into the application.
4. Then ANC will be able to enter the data from each headstone into the interment database to validate if it matches the information listed on the grave card and burial record. This will allow ANC to triple validate the burial record and grave card against the actual physical plot.
5. To appreciate the complexity of this task, it is important to understand that the burial maps are all hand drawn. They utilize information that was created over a hundred years ago, and at least 23 sections have no uniformity for grave sizes. Therefore in order to identify the actual burial plot associated with each head stone, each polygon will need to be established by drawing grid lines within the GIS software, which will delineate the area of each grave plot. Once the polygon has been established, the GIS will provide the actual area of each plot.
6. Since some headstones are not visible on the ortho-photography, due to obstructions such as foliage from trees, it will be necessary to manually establish a geo-spatial point for all obstructed headstones.
7. Originally it was assumed that the burial maps could be digitized and stretched across the ortho-photography. However since this method was tested during the TCMS pilot project, it was discovered that the accuracy of the plot was on average +/- 2 feet. This inaccuracy is not acceptable for ANC's purposes. The discrepancies are due to the inaccuracy of the drawings as well as ground shifts over time.
8. The physical validation of each headstone is important because in several instances, ANC has looked up a grave on a burial map and discovered that the actual headstone placement does not match the burial map. For example, ANC has found instances where the map shows grave 7 starting on the next row, but the actual physical headstone is located to the right of grave 6 in the same row.

### **Anticipated Start and Completion of the Triple Validation Task**

Since this task will be resource intensive, ANC will validate the recommended method described above, to ensure it will meet all of ANC's needs in the most efficient and effective manner. Once the method is validated, it is anticipated to take approximately



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one year to complete. In the upcoming months, ANC will release a Request for Quotes (RFQ) soliciting bids from GIS companies to validate this method, which will involve developing a base map and small GIS application required to complete this task. Once funding is secured, a vendor will be selected and the task will begin shortly thereafter. The team that will be used to enter the data off of the images of the headstones will likely be the same team that was used to enter the data from grave cards and burial records.

**C. TCMS Data Repository (TDR)** will provide a paperless electronic repository for information on persons interred/ined at ANC (e.g., personal and location information). It will also support an automated information retrieval mechanism that will serve not only ANC administration personnel, but the family and friends of loved ones buried at the cemetery, as well as the public at large looking for grave sites. The TDR will take approximately three months to develop and implement. Once complete, ANC employees will be able to use it to answer visitors or congressional questions. The data available has been double validated (information on the burial record was compared to the information on the corresponding grave card). It is anticipated that this information will be accessible through kiosks and the ANC web portal (see section F below) approximately one year later, once it has been triple validated (double validated data from the burial records and grave cards, will be compared to the actual headstone). This database component will replace the WYSE system (an obscure database previously used to capture burial record information in the Visitor Center to search for interment location requests), paper burial records, and microfiche files used by the ANC support staff in the Visitor's Center and the Administrative Division.

### **Anticipated Development and Implementation of the TDR**

The data that will comprise the TDR will undergo double validation upon the completion of ISSv2. The anticipated implementation of the TDR is approximately three months after funding is secured.

**D. Reservation and Disinterment Database** is an important component of TCMS because, prior to 1962, a service member could make a reservation to be buried in a specific plot at ANC. ANC needs to ensure that its site maps accurately depict reserved graves, so they are not assigned to other decedents or obstructed by trees or shrubs. In addition to capacity planning, the Reservation database will greatly improve the efficiency and accuracy of scheduling a funeral for a decedent who made a reservation. Today ANC cemetery representatives must check paper files stored in the Kardex file system for standing reservations. During the Interment Scheduling Business Process Analysis (BPA), it was discovered that this process is cumbersome and is not always followed, which at times causes problems for ANC. For example, on the day of the ceremony, the family arrives knowing that their father is supposed to be buried in Section x at grave number x. However when they called to make the arrangements, the reservation was never mentioned, and if the cemetery representative does not check for the standing reservation or if the paper record has been misfiled or lost, another section and grave number will be selected. If this occurs, it may require ANC to open another grave minutes prior to the funeral service.

Through the use of the ISSv2 and the Reservation database, the ANC cemetery representative will no longer have to check for reservations. Once the cemetery representative enters the name and social security number, service number, or branch of service of the decedent into ISSv2, it will automatically search the Reservation database for an existing record with a match. If a standing reservation is found, the cemetery representative will verify if it is the correct decedent and select the reservation and link it to the decedent. If the decedent is eligible, the reservation will be accepted and marked as filled. The filled reservation will update the gravesite utilization report and the site maps (once GIS is implemented). By automating the



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reservation search, it will improve efficiency by eliminating manual searching and ensure the process is followed. This will allow ANC to accurately identify the number of standing reservations that still remain, so the site maps can be validated and accurately updated to determine the number of gravesites that are unassigned.

The Disinterment database will allow ANC to easily track the disinterments at ANC without storing paper files and allowing for easy updating of site maps and grave site utilization reports (once the GIS component is implemented). In addition, the information provided by the Visitor Center or obtained online or at a kiosk by visitors will accurately display that the decedent was disinterred on a certain date and list their new location (if approved by the family).

### Anticipated Development and Implementation of the Reservation/Disinterment Database

All paper reservation and disinterment records have been scanned. The data will be entered and the database will then be created and integrated to function directly with ISSv2. The data entry of these records should begin soon. The data entry and database development will take approximately 2 months. This work will begin after the development of ISSv2 is complete and funding is secured.

- E. Automated Headstone Ordering System (AHOS)** will be used to capture specific headstone data that was not collected during the scheduling process. The ANC cemetery representative will locate a record in ISSv2 and add the remaining headstone specific data to the record using AHOS. The interface between AHOS and ISSv2 will be seamless to the user. In order to submit the request to the VA's Automated Management Application System (AMAS), funeral scheduling data is required. Therefore, AHOS will pull all required data fields from the burial database and send the request directly to AMAS for processing. The data transfer mechanism is still unknown at this time, but will likely utilize web services such as XML.

### Anticipated Development and Implementation of AHOS

Once the development of ISSv2 is complete, ANC will meet with the VA to discuss the application requirements. This process had previously begun in FY 05, so the information that was collected at that time will be reviewed, validated, and updated accordingly. Development and testing of AHOS is anticipated to take 3 months, once requirements are finalized between the VA and ANC and funding is secured.

- F. TCMS Web Portal** will enable ANC to provide accurate, real-time information via electronic medium to its customers and stakeholders. The web portal will greatly improve communication with the military Branches of Service and allow customers to get more information quickly about loved ones or specific inquiries. It will also provide a platform for customer feedback and input (tying it to the Customer Survey/Satisfaction Program). Due to funding limitations and time required to triple validate interment data, it is planned that the web portal will be developed in two phases. The first phase of the web portal will improve government-to-government interaction by providing the military branches of service easy access to view all of their scheduled funerals and other ceremonies in a secure environment. It will also provide a mechanism for each Branch to submit blocks on resources (e.g., Army band is not available on July 20, 2006) as well as view the status of the ANC approval of each block. Once a block has been approved by ANC, it will update the resources available for scheduling interments and notify the Branch of the approval.

The second phase of the portal will transform ANC into a Customer Service-centered facility, by allowing its customers (family members of decedents, florists, the general public, etc.) the ability to look up information on the web. This includes getting detailed walking directions to graves, running queries on historical data (e.g., how many WWII



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veterans are buried), and viewing video of ceremonies at ANC. Thousands of school groups and veteran organizations lay wreaths at ANC each year. Since ANC already has the ability to tape these ceremonies, ANC will provide the groups with a link to view the ceremony live and archive them for a specific period of time, so students/members who were unable to attend can watch the ceremony as well.

### Anticipated Development and Implementation of TCMS Web Portal

The anticipated time to design, develop, and implement Phase I of the web portal is five months. Phase II will be developed and implemented once the triple validation is completed. This will allow the public to look up decedents and get grave locations. It is likely that the video archive and streaming capabilities will be launched at that time too. This is anticipated to take three months to complete. Directions to individual graves will not be available until after the GIS component is complete.

**G. Geographic Information System (GIS)** will link data collected from other TCMS components to identify specific locations of individual and reserved graves, show maintenance contracts for every grave, provide information on the amount and location of free space, as well as provide a dynamic link between grave attributes in the interment database and spatial data in the GIS. This component will simplify several activities throughout the Cemetery. For example, the GIS component will greatly assist engineers in selecting burial locations and scheduling grounds maintenance and land development activities. Currently, ANC engineers must call the interment office to look up a grave card for a specific plot. Once the GIS is complete, ANC engineers will be able to view a specific section and quickly identify occupied versus unoccupied graves. Although the information about a specific grave will be obtainable via ISSv2, each grave will have to be looked up individually, whereas the GIS application will quickly provide specific information about a grave just by placing the mouse cursor over the grave.

To test the functionality TCMS would provide ANC, the TCMS Pilot project was conducted in January 2005. The pilot project using data from 300 graves was successful in validating the need for record/data validation, and demonstrating how GIS technology can significantly improve the daily coordination necessary to operate while improving the overall efficiency throughout the Cemetery. Since cost estimates from the GIS Pilot were much higher than ANC expected, ANC contracted the GIS Planning Firm (who also provided the original GIS Business Process Analysis (BPA) for ANC in 2002) to assess the GIS Pilot and its ability to meet ANC's needs, as well as provide a full GIS implementation plan with cost estimates. This assessment began in mid-August 2005 and therefore the results were not available for the FY 07 budget submission. In mid December 2005, the GIS Pilot Assessment and TCMS Implementation Plan were delivered to ANC. The final assessment validated the benefits that ANC would receive from implementing GIS, and provided a detailed cost estimate that will assist ANC in understanding the cost elements required to develop and implement an effective GIS at ANC.

### Anticipated Development and Implementation of the GIS Component

ANC will release an RFQ to obtain quotes to develop the GIS component. Once the funds are secured and a vendor is selected development of Phase I (pre-design phase) will begin. The GIS will be developed in three phases and is anticipated to take three years to develop, test, and implement fully. Upon completion of Phase II, a near fully functional TCMS will be released for use. Following the completion of Phase III, TCMS will be fully functional.

**H. Work Order Management Component** will be a custom built application but is expected to utilize the Skelta.NET COTS product as the foundation. The work order management system will be used to track the history and current status of every



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gravesite, automate work order management for services to headstones (date set, cleaned, repaired, etc) while improving productivity due to increased accountability. This system will greatly improve the coordination that occurs between the interment division and engineering department to schedule maintenance activities (e.g., mowing the lawn, cleaning headstones, opening graves) around the funerals and ceremonies already scheduled. It will update the master calendar, so everyone is aware of all scheduled activities. The work order management system will integrate with TCMS' GIS web component, so all work order information can be easily and quickly updated and obtained on every grave site.

### Anticipated Development and Implementation of the Work Order Management Component

This component is estimated to take six months to design, develop, and implement. Development is anticipated to begin during the development of Phase II of the GIS component, if funding is secured.

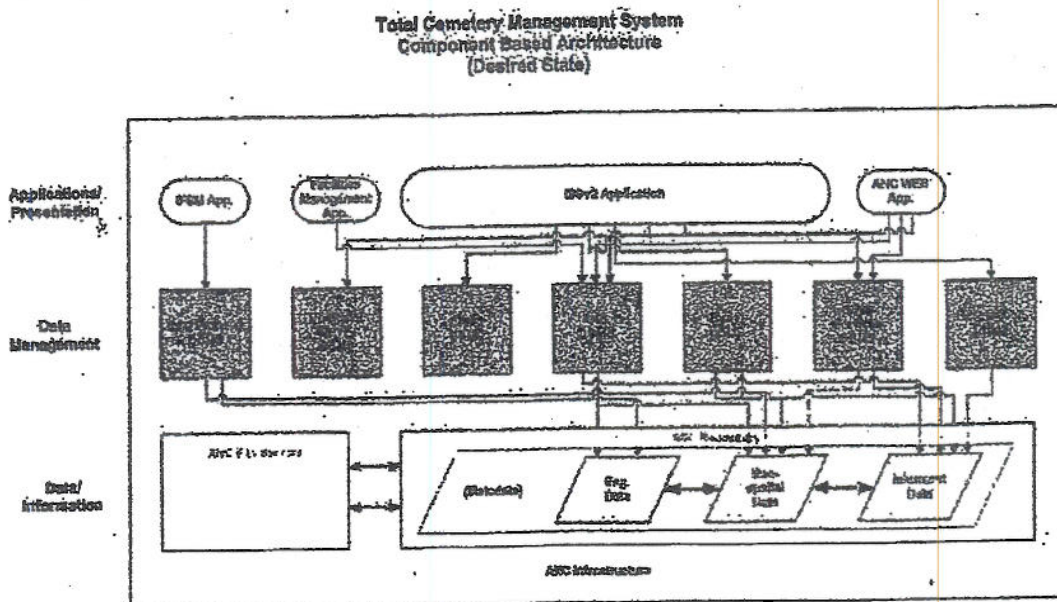
I. Electronic Document Management System (EDMS) component will be the final TCMS component developed and will provide ANC with the necessary functionality to no longer require storage of paper records. EDMS will encompass all inquiries, letters, eligibility questions, veteran's service records, paper burial or grave card data, death certificates, and provide a central repository for mail and other correspondence.

### Anticipated Development and Implementation of EDMS

It is anticipated to take seven months to design, develop, test, and implement the EDMS. Before developing the application, ANC will document all EDMS functional requirements and conduct a study on the best approach to closing this performance gap. ANC will work with the Office of Personnel Management (OPM), the managing partner of the e-Records Management e-Gov Initiative, to devise the best solution to meet ANC's needs.

### Diagram of Components

The following graphic provides a notional view of the TCMS components and how they will interrelate with one another and other ANC systems once TCMS has been totally implemented.





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### **B. Overall Plan for Infrastructure, Office Automation, and Telecommunications (IOAT), which includes Facility Security Enhancements**

In addition to the ANC Automation Project, ANC has also been working to upgrade and modernize its IT infrastructure. This investment provides the infrastructure, office automation, and telecommunications (IOAT) as well as physical security support necessary to perform and protect ANC's daily activities. The large majority of IT dollars spent from 2002-2005 were used to establish a network infrastructure at ANC to replace the two separate networks (Army and VA) that were accessed via a dial-up modem connected to Ft. Myer's network. Due to DOD funds that became available after September 11, 2001 to improve physical security, ANC laid fiber throughout the Cemetery to connect cameras at strategic locations. Later, ANC used this fiber to establish a single network that was supported by a Transparent LAN Service (TLS) circuit that provides a 100Mbps Ethernet connection. ANC has also established a network/server room, which is manned during business hours Monday-Friday by a network administrator and a help desk technician (two Full-Time Equivalents). ANC also greatly improved its telecommunication system, which used to support only three in-coming calls and now supports twenty simultaneous calls and provides a roll-over function, so no calls are dropped. Since ANC receives nearly all funeral requests via the phone and overall calls to the Interment branch averages 200 calls a day, this was a much needed upgrade. During FY05 and FY 06, ANC has worked to standardize, modernize, and adequately secure its IT infrastructure. The upgrades to IT infrastructure will reduce costs, add services, improve reliability, provide for growth supported by proven technology, and integrate with the Internet Protocol (IP) communications architecture. Other major network/infrastructure improvements include:

- Network and telecommunications upgrades – These upgrades include fiber cabling from the Service Complex, the Administration Building, the Lee House, Security Office, and Superintendent's Quarters.
- Event data screens – Event data screens installed in ANC conference rooms replaced the current manual schedule board. The data screens receive data feeds from the ANC scheduler system and broadcast information pertaining to upcoming events. The data screens will be used to inform family members about information pertaining to funerals (including schedule, instructions, and other frequently asked questions). In addition, event data screens in the Visitors Center are used to assist tourists who wish to learn more about historical aspects of ANC.
- Procurement of HP network printers/plotters
- Dell computer upgrades

The majority of the costs for the IT infrastructure modernization and enhancements have already been funded. The bulk of the costs in the out years are to support the two FTEs that manage the ANC network, to maintain the telephone service and support, and to maintain the fiber and cameras that allow ANC (security guards and other select people) to ensure that no suspicious activity is occurring in several locations throughout the cemetery. The camera system can also provide additional support to the Secret Service when the President or other high ranking officials are on ANC grounds.

### **II. Cost and Timeline Information**

#### **A. Total Dollars Spent from inception in FY 2000 to Date, Estimated Dollars to Fully Develop TCMS, and Planned Activities**

As described earlier, ANC's plan for TCMS was refined following the TCMS Pilot, completed in 2005. TCMS components are planned as follows:

- Scheduling (available in Q1FY07)
- Triple validation of burial data (FY08)



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- Data repository (FY08)
- Headstone ordering (FY08)
- Reservation/disinterment tracking database (FY08)
- Web portal (FY08)
- Geospatial information system (GIS) (FY09-10)
- Automated work orders for headstones and grounds keeping (FY09)
- Full cemetery electronic document management (FY09)

The following table identifies funding spent to date, (\$ 000's) and planned future expenses through FY2015. All figures include both Acquisition and Operations and Maintenance.

	FY06 & Prior	FY07	FY 08	FY 09	FY 10	FY 11	FY 12	FY 13	FY 14	FY 15
TCMS	\$3,717	\$0	\$1,085	\$800	\$1,425	*	*	*	*	*
IOAT	\$2,654	\$546	\$750	\$790	\$800	\$850	\$900	\$950	\$960	\$980

\*TCMS Maintenance cost estimates are not yet available. Total O&M costs for both TCMS and IOAT are anticipated to be approximately 1M per year. A more accurate O&M cost estimate will be developed as the TCMS development project draws to conclusion

**B. Projects Funded to Date (FY 00 to FY 06)**

<b>Network &amp; Telecomm Enhancements</b>	Fiber, Cable, & Wiring
	Telephone System
	Network Infrastructure Improvements
	Computer Upgrades
	Data Screens and Video Control System
	Disaster Recovery Plan and Infrastructure to support ISS and future TCMS applications
	Uninterruptible Power Supply (UPS) for phone system and servers
<b>Network &amp; Telecomm O&amp;M</b>	Network Support
	Network/Infrastructure O&M
	Fiber, Cameras, Video Display O&M
<b>Web Migration</b>	From Army to ANC
<b>Real Property Application</b>	Loading real property information into the Army's Integrated Facilities System (IFS).
<b>Customer Satisfaction Automation</b>	Customer/Visitor Survey Study
	Customer/Visitor Survey Implementation
<b>IOAT Security</b>	Network Security
	DoD Information Technology Security Certification and Accreditation Program (DITSCAP) Compliance/Security Program
<b>Enterprise Architecture &amp; Planning</b>	Business Process Reviews/Assessments
	Network Design Plan
	Web Migration Plan
	Program Management & CIO Support
<b>Interment Scheduling System</b>	Develop ISS
	ISS O&M



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	ISS Backup-Box
	Develop ISSv2
<b>GIS</b>	GIS Feasibility Study
	GIS/TCMS Pilot
	Ortho-photograph
	TCMS/GIS Pilot Assessment and GIS Alternatives
<b>Records Management</b>	Prototype Data Migration for Interment Records
	Scanning and data entry for all paper burial records
	Scanning and data entry for all paper grave cards

The following appendices provide additional detail from ANC project planning efforts:

Appendix A: TCMS Performance Gap Summary

Appendix B. Market Research Into Alternative Solutions

Appendix C. Supporting the President's Management Agenda (PMA)



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### Appendix A: TCMS Performance Gap Summary

On an average day at ANC, there are between 25 and 30 funerals conducted within four of its 70 sections and seven columbariums. Therefore, it is critical that ANC workers (cemetery representatives, engineers, and grounds crew) know where each funeral is located, so that a specific route or section can be selected for each funeral procession, each honor team (that may include a caisson or gun salutes, which have limited routes that they can take to reach specific locations), each grounds crew that must open specific graves, each maintenance activity, and each ceremony that may be taking place. In order to coordinate all of these activities, ANC currently relies on over 30 manually distributed daily funeral schedules and over one hundred paper maps. The grounds and maintenance crews must get a copy of the daily funeral schedule, then reference paper engineering maps to locate the specific site of each funeral before planning what activities can or need to be completed, when, and where. If any changes are made to the daily schedule, it must be manually redistributed throughout the cemetery and to the military Branches of Service.

If the new schedule is not redistributed properly, the impact is felt throughout the Cemetery. For instance, the interment branch provides a copy of the daily schedule to the information technology group so the information can be manually posted to ANC's website two or three days in advance. If a change is made to the daily schedule (e.g. a funeral is cancelled), the IT group must be notified immediately so they can change or remove the information on the website. If this does not occur, friends and relatives of the decedent may come to ANC to attend a funeral service that is scheduled for a different day. When the friends and family arrive at ANC, they are advised by the security guards, who have the updated funeral schedule, and are directed to only allow people with ANC passes or who are attending a funeral that day to proceed to the Administration building. Since the service is not listed on their daily schedule, security must call the interment office to inquire about that specific funeral. The friends and family are then directed past the guards and into the Administration Office to speak with an ANC cemetery representative, who must explain the mistake that was made. Although this does not occur often, it is a great embarrassment to ANC when it does occur.

The situation described above impacts multiple parties at ANC, but it does not compare to the four times per year (on average) that an entire family and funeral home come to ANC on an unscheduled day. Usually when this occurs, the funeral home has incorrectly listed the service date and then misinforms the family. Regardless of where the fault lies, ANC must make a quick decision whether it is possible to perform the service, and if so how, when, and where. Depending on the number of family and friends attending the service, the burden on ANC resources can quickly become an issue. There are only four family rooms and one easily accessible chapel, so if five funerals are already scheduled that day, ANC must find somewhere for the procession to wait. Meanwhile, the interment branch must work with the other branches to assemble an honor team and military chaplain. If successful in gathering the necessary resources, the interment branch looks to see if a grave has already been assigned for that decedent and if it's accessible to be opened without imposing on the scheduled services. If a grave has not been assigned or is not accessible at that time, ANC must locate another space (if it is even possible to accommodate another service that day).

Since the current way of doing business is mostly manual, complex, redundant, and inefficient, ANC decided it had to find a way to automate the process. In the spring of 2000, ANC contracted for a number of business process reviews to determine the cost and feasibility of automating the administrative functions of the cemetery. ANC also conducted extensive market research into processes and technologies in use at other government and private cemeteries. Unlike other cemeteries that were reviewed during on-going market research, ANC conducts approximately 8 times the number of funerals (8800) per year and must coordinate with military resources for the vast majority of those services. In addition, ANC conducts hundreds of wreath laying ceremonies and hosts over 4 million visitors a year. This added complexity requires ANC to use a master calendar that tracks all events (ceremonies and funeral services) and all resources (internal, e.g.,



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cemetery representatives, grounds crew, and available gravesites, and external, e.g., military honor teams, chaplains, and chapels).

ANC also realized that its 140-plus years of operations had created errors in its data records – errors that had been introduced through all of the manual record-keeping processes. For instance, each grave has three sets of data: a grave card that describes who is buried and their exact location, a burial record that provides all the information on the person who is buried there, and the actual headstone that marks the physical plot of the grave and names the decedents that lie beneath. Since the burial maps that show each plot and grave number are all hand drawn and go back over a hundred years, ANC has found several discrepancies on actual grave locations. For example, the actual grave card and burial record showed a decedent in Section 60 grave 6. So when ANC went to locate the grave by using the burial map, Section 60 grave 6 was in a different location than the actual physical location of the headstone marked Section 60 grave 6. There are numerous examples of discrepancies that exist between the burial maps, the physical location of headstones, and the burial records/grave cards.

The cemetery management system described in this report will provide a solution to ANC's performance gaps, which were identified in ANC's Information Management Strategy. This strategy, along with extensive market research, and the Total Cemetery Management System (TCMS) Pilot project in 2005 set forth the planning and development of the TCMS, designed to fill performance gaps related to:

- Transforming ANC to a more customer service-centered organization that better leverages the capabilities of, and improves coordination among, its stakeholders and partners;
- Improving its ability to conduct and manage capacity planning;
- Improving its ability to share pertinent information electronically throughout the Cemetery;
- Improving notification and confirmation of scheduled funerals to funeral homes and families;
- Increasing the information and services available to its customers (family members and visitors);
- Improving customer satisfaction;
- Increasing the efficiency and effectiveness of ANC processes while reducing costs; and
- Reducing the risks associated with the manual data access and maintenance processes.



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### Appendix B. Market Research into Alternative Solutions

ANC conducted extensive research into possible alternative solutions. In-depth coordination with representatives of the Department of Veterans Affairs (VA) revealed that VA systems would not meet ANC's needs. This is primarily due to the high activity levels and complex coordination required at ANC compared to most VA cemeteries. In ANC's quest to find viable alternatives to automate management of the Cemetery, it has discovered several civilian cemeteries across the world facing similar challenges. In fact, ANC has learned that an automated cemetery management system that uses GIS is an industry best practice. Below are several examples of cemeteries across the globe that uses information systems and GIS technology to improve cemetery management:

#### Spring Grove Cemetery in Cincinnati, OH -

Developed a cemetery management system that included

- Scanning over 250,000 paper documents and maps and linking them to the appropriate burial information in an Oracle database;
- Performed additional data entry to add burial information from the scanned images of the index cards and lot books to the existing database; and
- Digitized and coded all maps in ERSI Arc Info. Additional information was captured from AutoCAD files, paper maps, and lot diagram books to include in the Oracle database.

Today, Spring Grove Cemetery has the ability to:

- Easily update cemetery maps;
- Query the Oracle database for interment information and show the location of the grave(s) of interest for every interment in the Cemetery;
- Click on the map to retrieve interment information; and
- View scanned images of all lot diagram books and statistic cards.

ANC has been in communication with Spring Grove Cemetery and has collected a lot of helpful information on their cemetery management system, cost estimating formulas, lessons learned, major problems, and success stories.

St. Louis Cemetery, LA -- A two-phased documentation and conservation project was developed by the University of Pennsylvania's Graduate School of Fine Arts Departments of Historic Preservation and Landscape Architecture with Tulane University's School of Architecture/Preservation Studies in conjunction with Save our Cemeteries, Inc. and the Roman Catholic Church of the Archdiocese of New Orleans to "save" this cemetery. This project utilized digital technology to link archival maps, images, and text with current field survey information in a robust database, coupled with Geographic Information System (GIS) mapping to provide descriptive and analytical tools for communication, decision-making, and management. Today, these results are used by professionals and community members to make decisions and guide the conservation efforts funded by "Save America's Treasures" grant program.

Utah History Research Center - Archives & History -- Provides small grants to Utah cemeteries to convert sexton records to files/maps stored in electronic databases and geographic information systems (GIS) to help them manage their cemeteries. The data they gather is then submitted to the Utah State Historical Society for inclusion in the Burials and Cemeteries Database, which is available to the public to query.

Cemetery of Muhos, Finland - Similar to ANC, this cemetery dates back to 1865 and was looking for a way to:



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- Improve cemetery services through implementation of a land information management solution;
- Use GPS technology to survey exact gravesites, and locate empty, reserved, and occupied sites; and
- Reduce mistakes associated with poor documentation capabilities.

Today, Muhos is using a dynamic link between grave attributes in a Progress 9 database and spatial data in the GeoMedia GIS to accurately maintain centuries of cemetery records and respond to present-day information requests.

In addition to the specific examples listed above, ANC has found several small collegiate and 4-H projects that are helping small town or city cemeteries develop a GIS and integrate the interment data from county records. Furthermore, the GIS software suite, ESRI, selected for the TCMS's GIS component, is recognized as the world-wide leader in GIS software, and was used by all but one of the cemetery management systems described above.



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### Appendix C. Supporting the President's Management Agenda (PMA)

Components of the TCMS Program will enable the ANC to provide accurate, real-time information via electronic medium to its customers and stakeholders. The TCMS Program envisions the ability to let customers search for burial locations on the web or through kiosks on the Cemetery grounds, and print out directions (e.g. from the ANC entrance to the plot) through two of its components (GIS and Records Management System), as well as Web Portal). The TCMS program falls under the following classifications:

- **Government to Citizen** (customer and visitor information),
- **Government to Government** (e.g. VA, Armed Forces providing military honors to funerals),
- **Government to Business** (e.g. florists and other vendors), and
- **Internal Efficiency and Effectiveness** (e.g. record quality, information retrieval speed).
- **ANC's IT Investment planning and management process life-cycle includes ensuring the use of existing e-government solutions where possible and the full compliance of the Clinger-Cohen Act (CCA), privacy and security regulations, and the support of the President's Management Agenda (PMA).**

More specifically, the following PMA Guiding Principles are driving ANC's development of TCMS:

- **Create a citizen-centered, results-oriented, and market-based government.** ANC developed a strategic Information Management Strategy that specifically cites its vision for the TCMS Program, as transforming it to a Customer Service-centered, unified information system that leverages its best capabilities as well as those of its stakeholders and partners. Performance measures have been developed to track the progress and benefits of the program and ensure the results of the TCMS are managed and achieved. Five studies have been conducted to solicit and incorporate industry comments and recommendations, and to ensure all possible alternatives available in the market have been considered.
- **Identify and manage corporate measures of success.** The TCMS program is a major investment for ANC and, as such, has associated performance/financial goals and measures and a program management strategy and plan for accomplishing them.
- **Simplify and unify redundant activities, both within and across agencies.** Since the current operations of the ANC involve manual, paper-based processes (including two separate paper-based systems for cataloging burial plot locations and buried individuals' personal information), the TCMS will unify and simplify activities. For example, the TCMS Data Repository and GIS components of the program will unify and cross-reference the two current paper files, and simplify record retrieval in terms of manpower and time. The ANC is working with the VA so that any redundant activities performed by both agencies can be identified and eliminated.
- **Develop strategic partnerships to perform business with State, local and other Federal agencies; non-profit organizations; and private industry as appropriate.** ANC has been in conversations with other Federal agencies and private industry for over three years to assess commonalities, available technologies, and best practices both in the information technology and burial management arenas. In recent months, ANC has worked with Geospatial One-Stop (GOS) to ensure no pre-existing GIS application is available that ANC could use and to learn how to take advantage of their GOS portal. ANC will post information about their currently available ortho-photographs and future spatial data as well as a link that will allow visitors to find gravesites (once complete). ANC also hopes to find partners to share the cost of obtaining spatial data updates with anyone that has similar needs by using the GOS Marketplace.
- **In addition, ANC is working with the military Branches of Service to improve daily communication concerning funerals, ceremonies, and available resources.** The coordination that is necessary between the military Branches of Service and ANC, to successfully perform 25-30 funerals a day will be greatly simplified and improved through the TCMS Web Portal.



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