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GIS Tools for Cemetery Management ESRI International Users Conference 2006

James Stein

NPS Cultural Resources GIS



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Too often, because of the historic nature of cemeteries, knowledge of burials and marker conservation is documented in paper forms and the experiences of individual caretakers. Taking these historic texts and maps and combining them with GPS surveys and digital photography into a GIS allows for better management and long term planning.



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Why map cemeteries?

Reasons for mapping cemeteries include:

- Cultural resource conservation
- Maintenance of markers and monuments
- Facilities and grounds management
- Records management
- Interment planning
- Locating existing interments



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The capability for both staff and visitors to find the location of, and information about, existing burials is probably the most important priority when discussing the development of a GIS application for a cemetery. As with any project assessing the needs of the client during project planning is important.



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The Historic American Landscape Survey/Cultural Resources GIS (HALS/CRGIS), in cooperation with the Department of Veterans Affairs National Cemetery Administration, has been developing GIS tools to use in the documentation and management of national cemeteries. Fourteen of these cemeteries are adjacent to, and managed by, NPS units. In the past we have developed locator applications for Poplar Grove National Cemetery, located at the Petersburg National Military Park, and Chalmette National Cemetery, located at the Chalmette National Military Park.



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Poplar Grove National Cemetery Application

- Developed in ESRI MapObjects in 2000
- Stand alone application with no editing capability

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Section VI Grave 1333 Company: B

Rank: Branch: Infantry

Regiment: 52nd New York Date of Death: August 31, 1864

The screenshot shows a software application window titled 'Poplar Grove Cemetery'. The window has a menu bar with 'Zoom', 'Full Size', 'Print', 'Pan', 'Done', 'About', and 'Help'. The main area displays a map of the cemetery with various blocks labeled. A search list on the right shows names, with 'John' selected. Below the map, there is a dropdown menu for 'New York'. At the bottom, there is a photograph of a gravestone for 'JNO. SMITH'.

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Chalmette National Cemetery Application

- Developed in ESRI MapObjects in 2001
- Stand alone application with no editing capability

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Chalmette National Cemetery

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J.S.
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146

Zoom Print Quit Help About

Information

Last Name SMITH
First Name JOHN
Section 146
Grave Number 11736
State
Rank CPL
Company E
Regiment 10
Date of Death SEP 11, 1864
Battle
War CIVIL WAR
Comment

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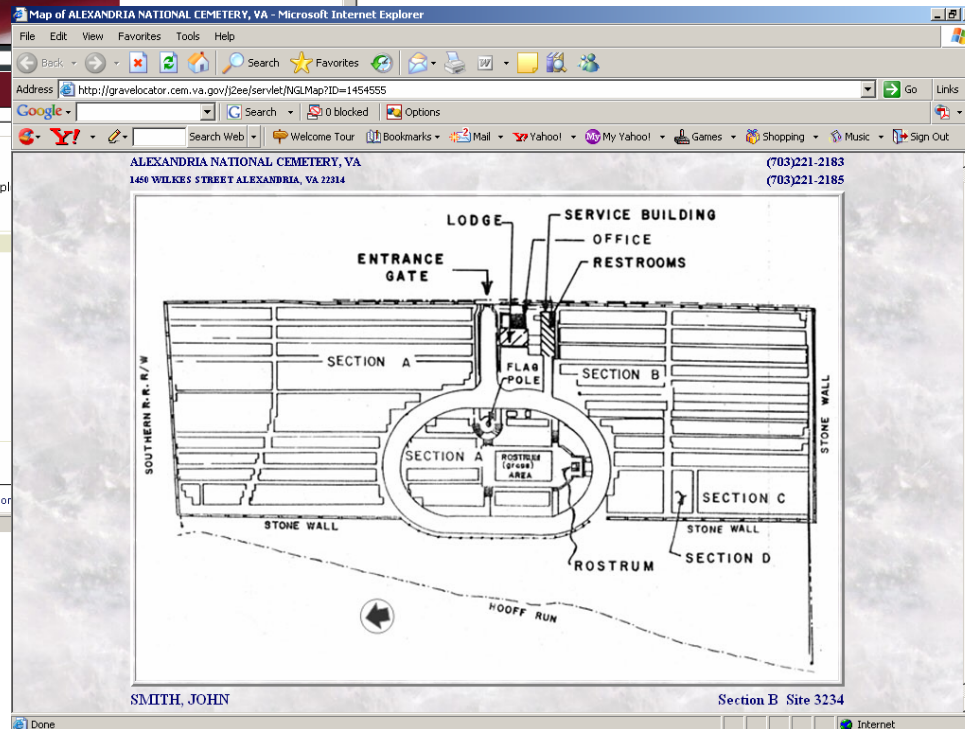
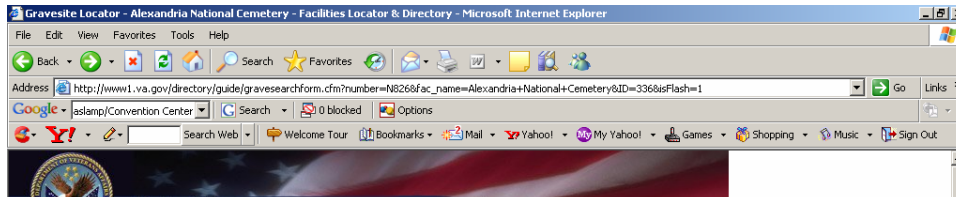


In June, 2006 CRGIS delivered a GIS application to the Senior Historian at the Department of Veterans Affairs National Cemetery Administration for the Alexandria National Cemetery located in Alexandria, VA

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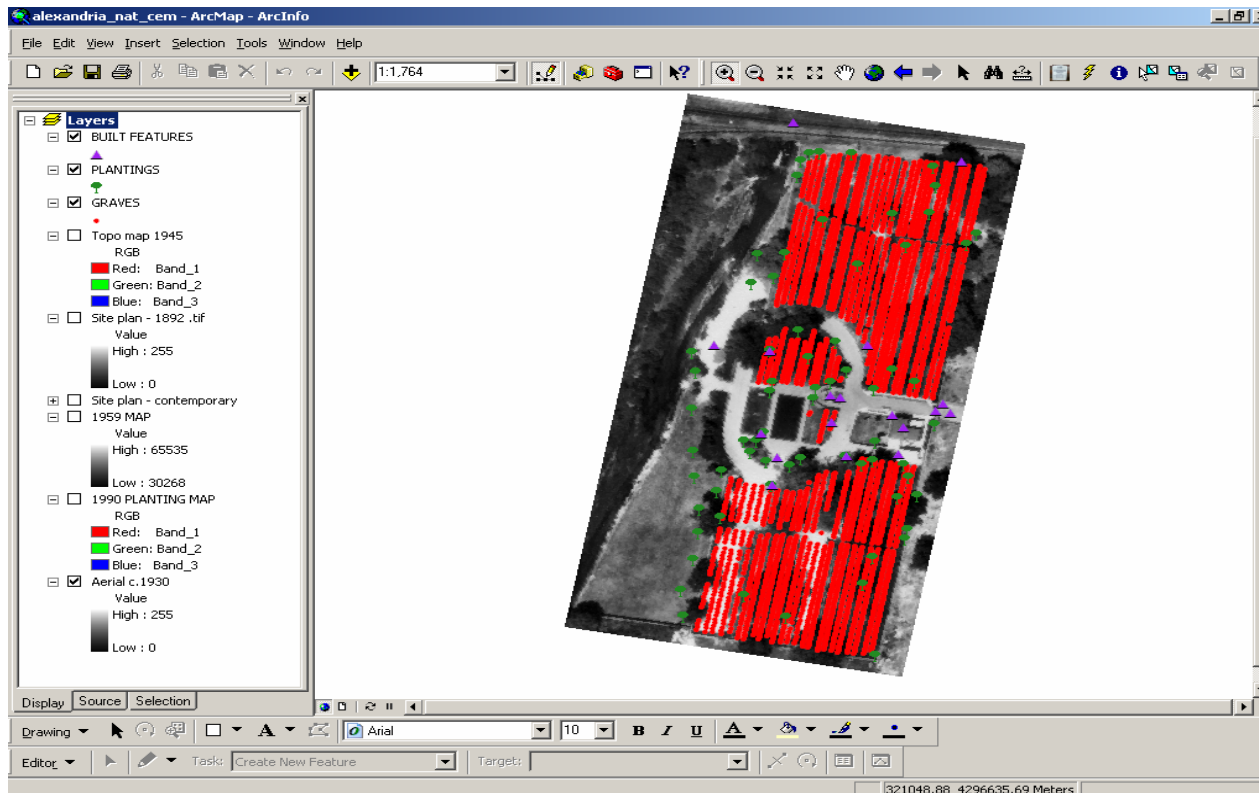


A gravesite locator application for Alexandria National Cemetery, available on the website of the Department of Veterans Affairs, gives some generalized information about the deceased and the grave location.

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We developed an application for the Alexandria National Cemetery in ESRI ArcGIS 9.1 to provide the capability for:

- Editing data
- Adding data
- Flexible queries

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The screenshot shows the ArcMap interface with a map of a cemetery. A pop-up window titled "Alexandria National Cemetery Grave Information" is open, displaying the following details:

- Decedent Information:**
 - RANK: PVT
 - Section: A, Row: 8, Grave: 771
 - BRANCH OF SERVICE: AR
 - WAR: CV
 - AWARD:
 - DATE OF DEATH: 3/15/1863
 - Additional Decedents:
- Photograph:** A photo of a white granite grave marker for "J. G. SMITH N.Y." with a blue outline.
- Name Lists:**
 - Left list: SMILEY, SMITH, SMITHSON, SMOCK, SMYTH, SNELL, SNORTER, SNOW, SNYDER, SOLAN, SOLDIER, SOMER, SONTAG, SOPER, SOUTH, SOUTHARD, SOUTHWICK, SPADE, SPANGER, SPALDING, SPEAKMAN, SPEAR, SPEERS, SPEIGHT.
 - Right list: JOHN, JOHN C, JOHN F, JOHN H, JOHN J, JOHN S, LABAN, MARSHALL.
- Buttons:** Print, Help, Close.

The map in the background shows a grid of red lines representing grave plots, with a specific plot highlighted in blue and marked with a cyan triangle. The status bar at the bottom indicates coordinates: 321254.36 4296691.08 Meters.

Additionally a VBA application was developed to provide a simplified search of the existing interments with the results displayed along with a photograph of the grave marker and the location of the grave highlighted on the map.

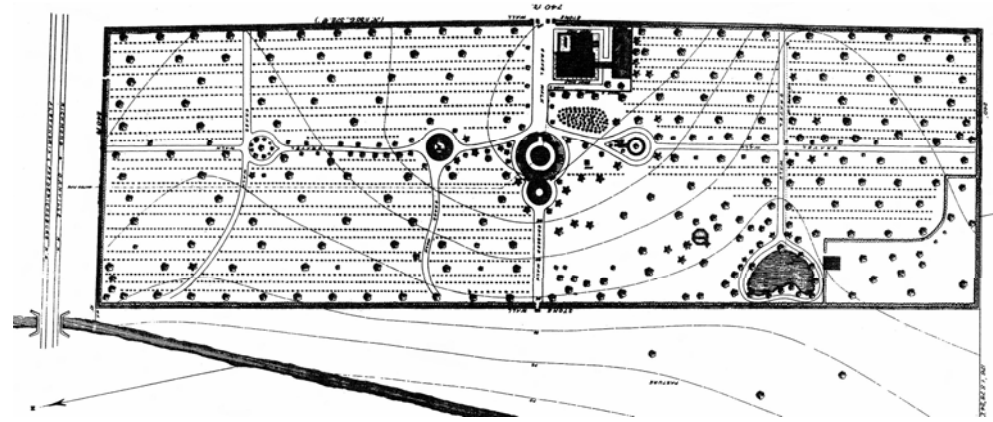
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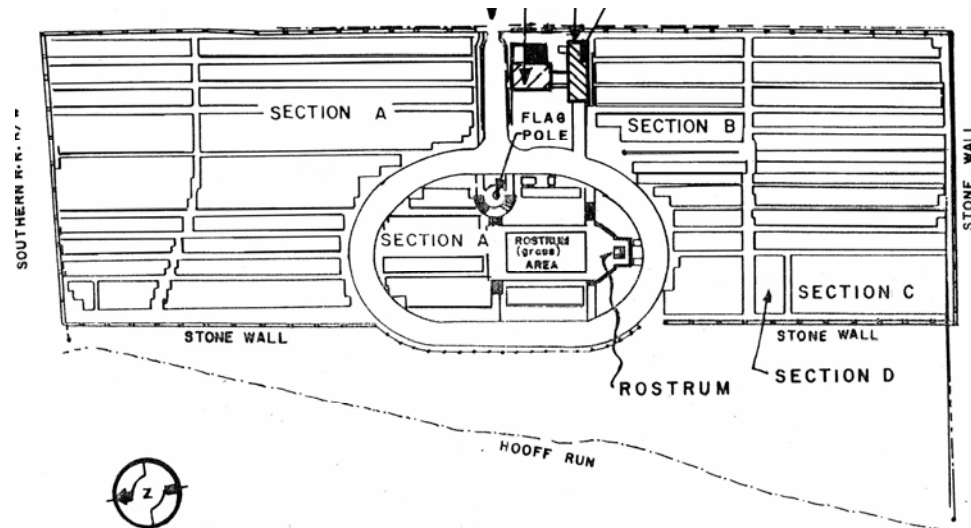
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Paper copies of maps, plans and an aerial photo of the cemetery were collected and scanned. The data included historic and contemporary maps.

It was unknown how many generations from the original these maps were, and thus the inaccuracy from distortion was unknown. The cost of accessing originals should, if possible, be built into the project budget.



Alexandria Cemetery plan 1892

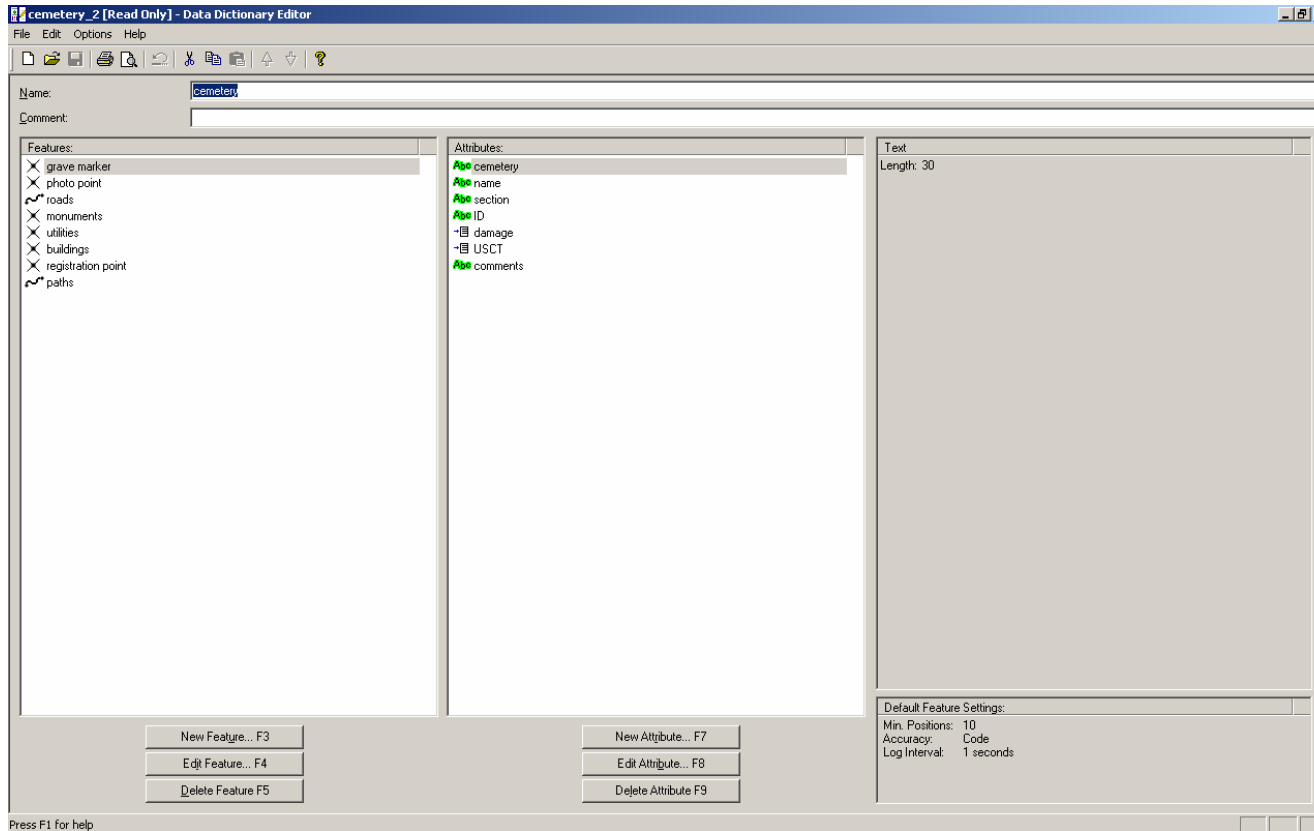


Alexandria Cemetery plan 2004

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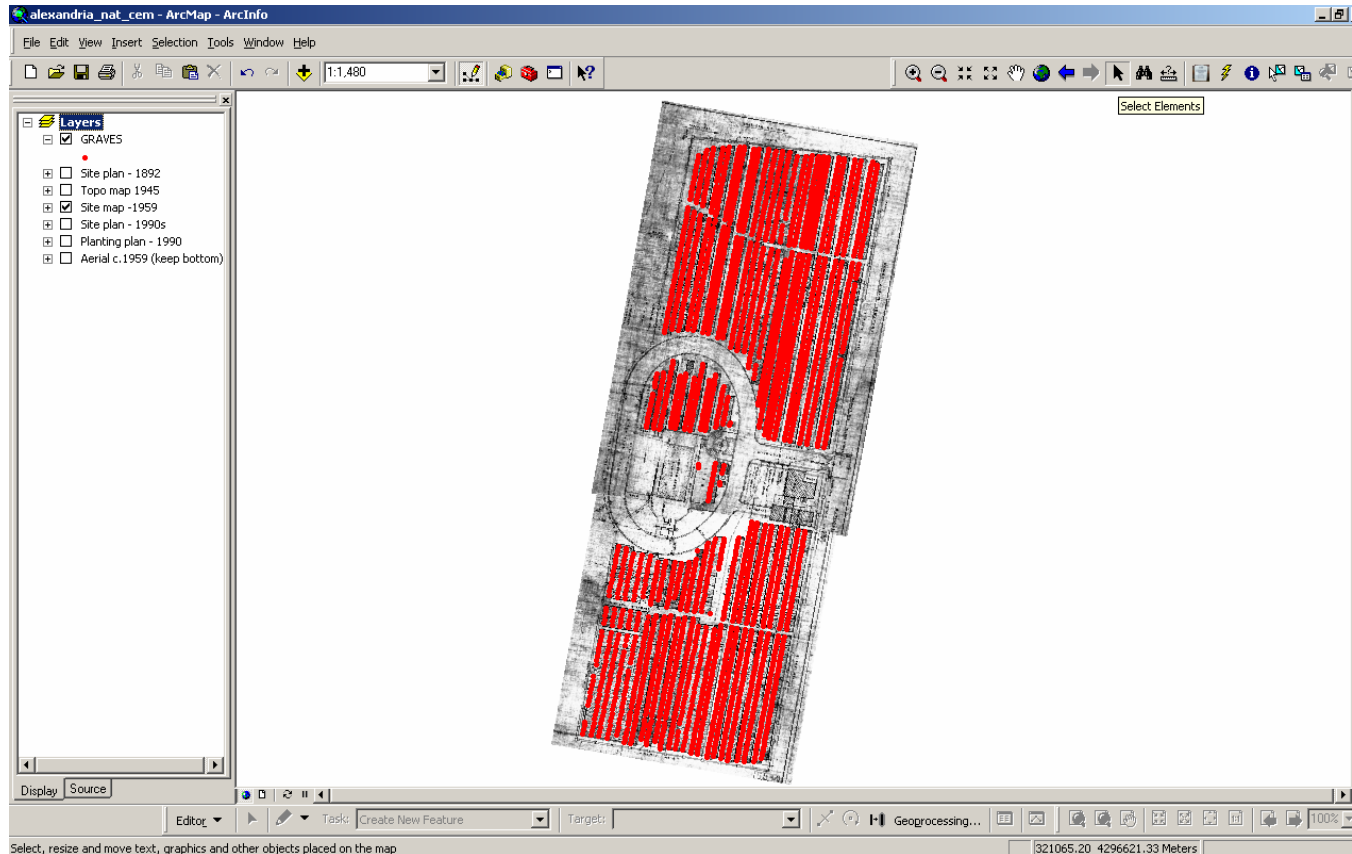


Points were located on the scanned maps and those points were GPSed on the ground and post processed. These points were then used to georeference the maps.

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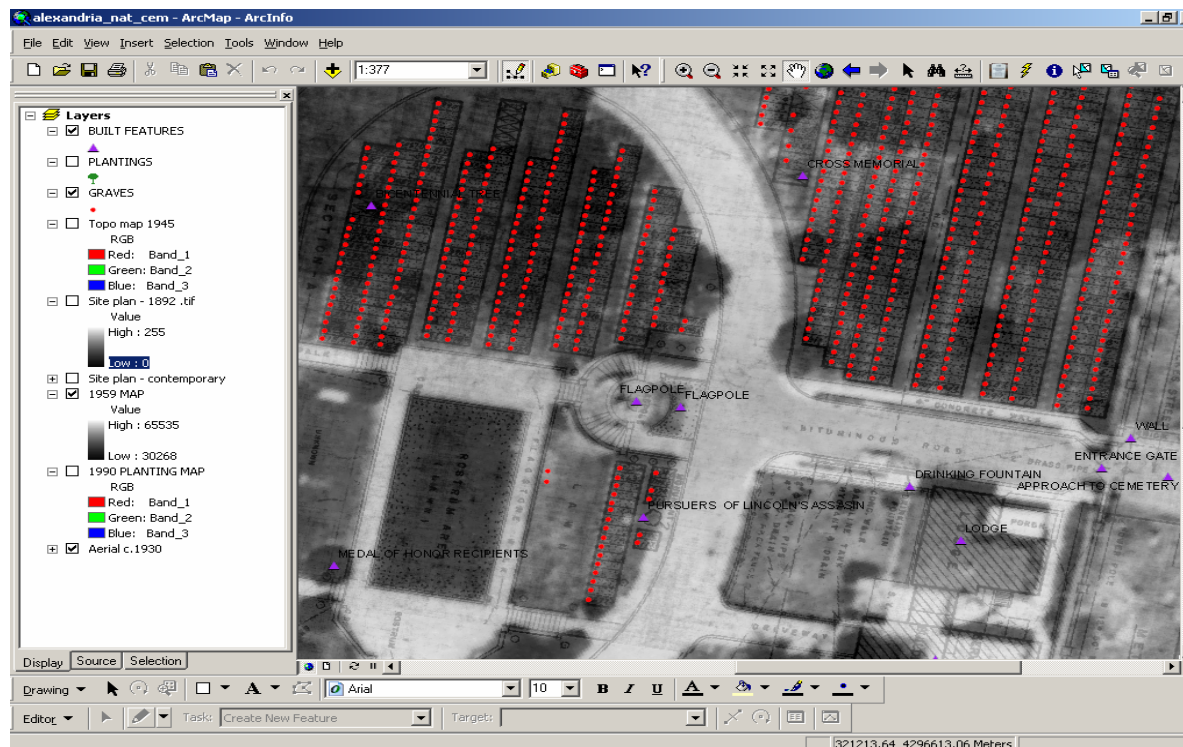


A GIS layer containing points representing the individual graves in each row was generated and, using the grave and block numbers as an 'address', the map was geocoded

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Because of distortion in the paper copies of the maps the graves and ancillary features were referenced to these maps and not the GPS data; which was only used to georeference the maps.

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Attributes of GRAVES							
GRAVE_ROW	GRAVE_SECT	GRAVE_NUMB	FIRST_MID	sec_row_nu	DEC1_FIRST	DEC1_MIDD	DEC1_LAST
6	A	552	DAVID C	Section: A, Row: 6, Grave: 552	DAVID	C	SMITH
7	A	632	JAMES C	Section: A, Row: 7, Grave: 632	JAMES	C	SMITH
8	A	771	JOHN C	Section: A, Row: 8, Grave: 771	JOHN	C	SMITH
9	A	816-5	ALBERT	Section: A, Row: 9, Grave: 816-5	ALBERT		SMITH
9	A	816-96	GEORGE	Section: A, Row: 9, Grave: 816-96	GEORGE		SMITH
10	A	904	JOHN	Section: A, Row: 10, Grave: 904	JOHN		SMITH
11	A	904-26	JOHN S	Section: A, Row: 11, Grave: 904-26	JOHN	S	SMITH
11	A	940	WILLIAM H	Section: A, Row: 11, Grave: 940	WILLIAM	H	SMITH
13	A	964	HENRY	Section: A, Row: 13, Grave: 964	HENRY		SMITH
13	A	981-5	DENMARK	Section: A, Row: 13, Grave: 981-5	DENMARK		SMITH
9	A	816-86	DANIEL	Section: A, Row: 9, Grave: 816-86	DANIEL		SMITH
13	A	973	HUGH	Section: A, Row: 13, Grave: 973	HUGH		SMITH
16	A	1283	DAVID E	Section: A, Row: 16, Grave: 1283	DAVID	E	SMITH
17	A	1356	JAMES W	Section: A, Row: 17, Grave: 1356	JAMES	W	SMITH
17	A	1365	EDWARD	Section: A, Row: 17, Grave: 1365	EDWARD		SMITH
17	A	1409	JOHN J	Section: A, Row: 17, Grave: 1409	JOHN	J	SMITH
18	A	1454	EDWARD J	Section: A, Row: 18, Grave: 1454	EDWARD	J	SMITH
18	A	1507	GEORGE D	Section: A, Row: 18, Grave: 1507	GEORGE	D	SMITH
19	A	1580	OLIVER G	Section: A, Row: 19, Grave: 1580	OLIVER	G	SMITH
19	A	1589	ISAJAH	Section: A, Row: 19, Grave: 1589	ISAJAH		SMITH
19	A	1633	NICHOLAS	Section: A, Row: 19, Grave: 1633	NICHOLAS		SMITH
25	A	2225	HARVEY	Section: A, Row: 25, Grave: 2225	HARVEY		SMITH
25	A	2260	MARSHALL	Section: A, Row: 25, Grave: 2260	MARSHALL		SMITH
25	A	2265-4	JOHN	Section: A, Row: 25, Grave: 2265-4	JOHN		SMITH
25	A	2273	DANIEL G	Section: A, Row: 25, Grave: 2273	DANIEL	G	SMITH
1	B	2286	THOMAS	Section: B, Row: 1, Grave: 2286	THOMAS		SMITH
1	B	2321	JOHN S	Section: B, Row: 1, Grave: 2321	JOHN	S	SMITH
1	B	2333	E W	Section: B, Row: 1, Grave: 2333	E	W	SMITH
3	B	2480	ALLEN E	Section: B, Row: 3, Grave: 2480	ALLEN	E	SMITH
5	B	2665	ISAAC	Section: B, Row: 5, Grave: 2665	ISAAC		SMITH
5	B	2675	JOHN	Section: B, Row: 5, Grave: 2675	JOHN		SMITH
6	B	2786	JAMES	Section: B, Row: 6, Grave: 2786	JAMES		SMITH
6	B	2806	JAMES	Section: B, Row: 6, Grave: 2806	JAMES		SMITH
8	B	2957	MICHAEL K	Section: B, Row: 8, Grave: 2957	MICHAEL	K	SMITH
8	B	3021	STEPHEN	Section: B, Row: 8, Grave: 3021	STEPHEN		SMITH
9	B	3115	JOHN F	Section: B, Row: 9, Grave: 3115	JOHN	F	SMITH
10	B	3165	JOHN H	Section: B, Row: 10, Grave: 3165	JOHN	H	SMITH
10	B	3162-1	THEODORE R	Section: B, Row: 10, Grave: 3162-1	THEODORE	R	SMITH
13	B	3234	JOHN	Section: B, Row: 13, Grave: 3234	JOHN		SMITH
13	B	3251	NELSON	Section: B, Row: 13, Grave: 3251	NELSON		SMITH
15	B	3407	HENRY	Section: B, Row: 15, Grave: 3407	HENRY		SMITH
15	B	3419	JAMES	Section: B, Row: 15, Grave: 3419	JAMES		SMITH

Record: 3297 Show: All Selected Records (0 out of 4085 Selected.) Options

A database of burials was attached to the GIS Layer


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Photos of the graves were taken and the file name was added to the database to enable us to reference and display the image. Taking the photos of the markers was one of the most time consuming tasks of the project, issues such as weather and sun angle were the major delays in obtaining the photos.

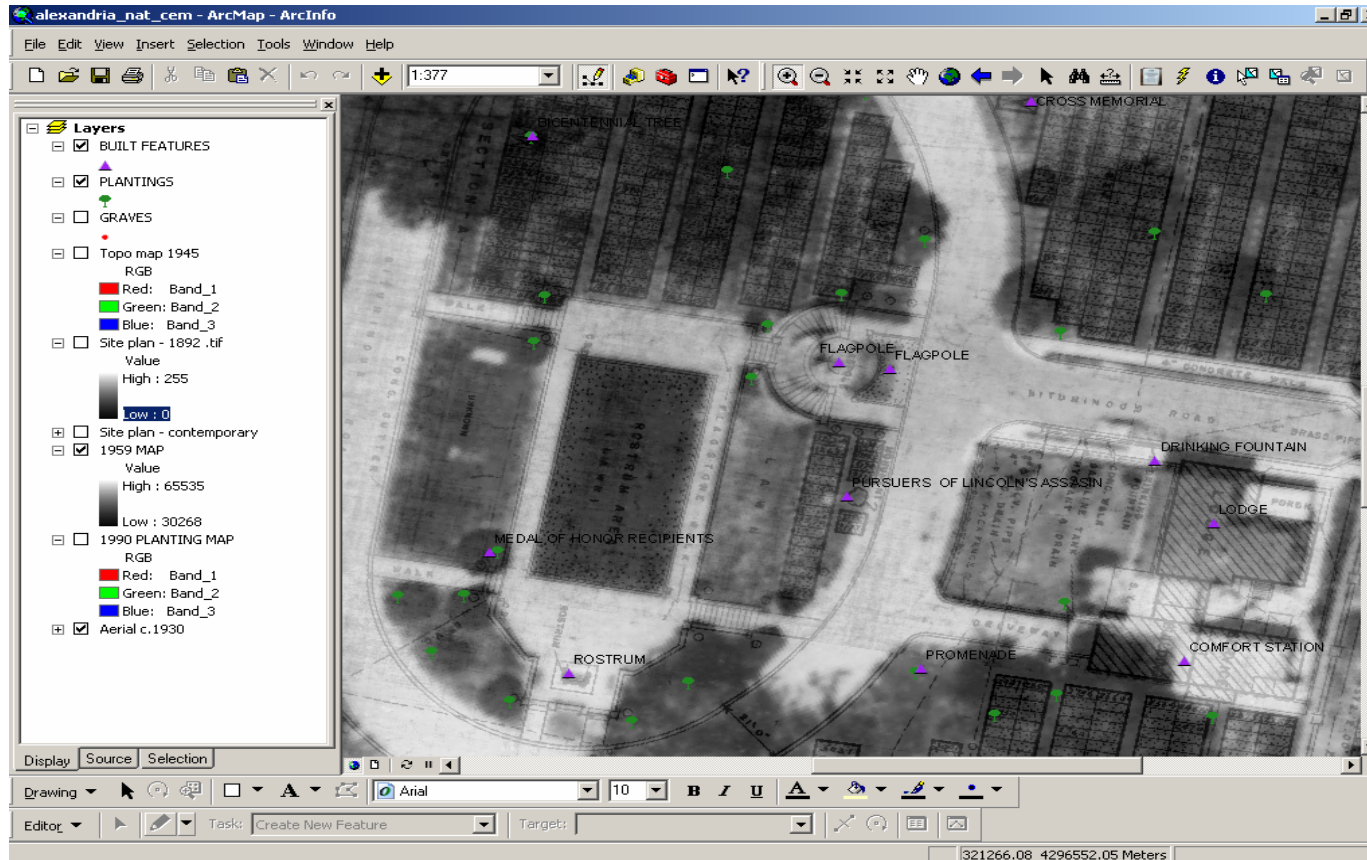
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10	A	904	JOHN	Section: A, Row: 10, Grave: 904	JOHN		SMTH		
11	A	904-26					SMTH		
11	A	940					SMTH		
13	A	964					SMTH		
13	A	981-5					SMTH		
9	A	816-86					SMTH		
13	A	973					SMTH		
16	A	1283					SMTH		
17	A	1356					SMTH		
17	A	1365					SMTH		
17	A	1409					SMTH		
18	A	1454					SMTH		
18	A	1507					SMTH		
19	A	1560					SMTH		
19	A	1569					SMTH		
19	A	1633					SMTH		
25	A	2225					SMTH		
25	A	2260					SMTH		
25	A	2265-4					SMTH		
25	A	2273					SMTH		
1	B	2286					SMTH		
1	B	2321					SMTH		
1	B	2333					SMTH		
3	B	2480					SMTH		
5	B	2665					SMTH		
5	B	2675					SMTH		
6	B	2786					SMTH		
6	B	2806					SMTH		
8	B	2957					SMTH		
8	B	3021					SMTH		
9	B	3115					SMTH		
10	B	3185					SMTH		
10	B	3162-1					SMTH		
13	B	3234					SMTH		
13	B	3251					SMTH		
15	B	3407					SMTH		
15	B	3419					SMTH		



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Additional information was identified by the historian as helpful in the cultural resource management of the cemetery. This included built and landscape features.

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Superintendents Lodge
Ca. 1920



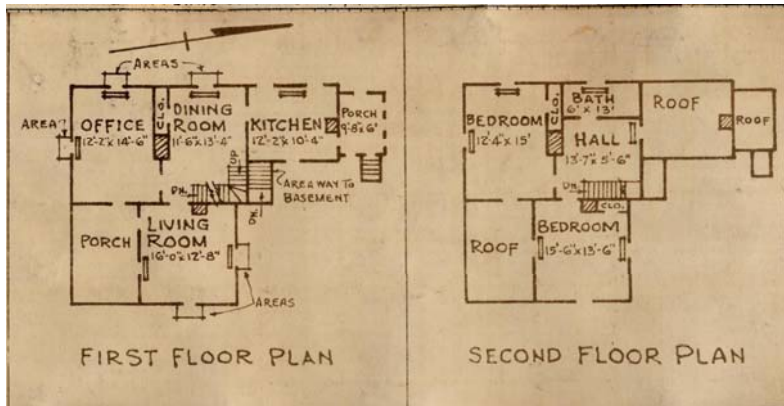
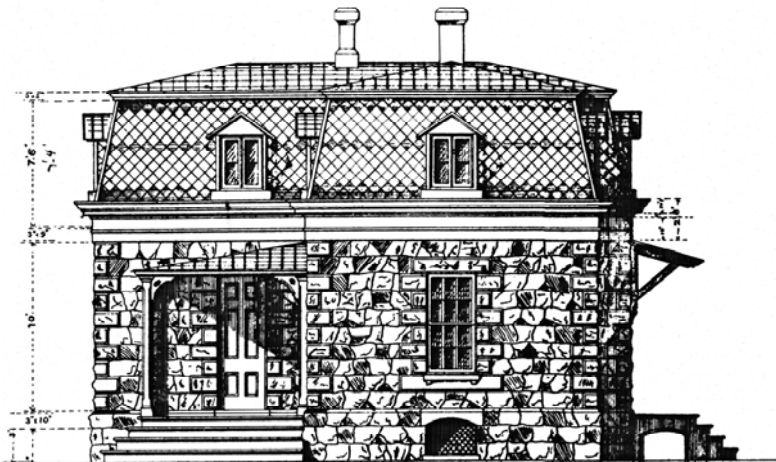
Superintendents
Lodge 2005

Ancillary data such as historic and contemporary photos and...

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DESIGN FOR SUPERINTENDENTS LODGE. NATIONAL CEMETERIES.



SPECIFICATIONS
FOR
SUPERINTENDENTS' STONE LODGES
FOR
NATIONAL CEMETERIES.

MASONRY.

The building to be of good rubble masonry laid in mortar, to conform in every respect to dimensions shown on plans. The mortar used to contain one-third (1/3) as much cement as lime; the whole mixed with a due proportion of sharp sand, to make good work.

Foundation of exterior walls to be capped with a bell-course of cut stone six (6) inches thick, to project five (5) inches from face of wall, and to have four (4) inches chamfer.

Outside door and window-sills of first story, together with arca steps under rear porch, to be of cut stone, either granite or sandstone; all outside sills to have at least two (2) inches wash.

CELLAR.

Cellar under the entire building to be six (6) feet four (4) inches in the clear. The walls to commence six (6) inches below the floor, and to be twenty-eight (28) inches thick to the level of the first-story floor, three (3) feet above the ground. Flooring of cellar to be concreted with gravel and cement six (6) inches thick; if gravel cannot be obtained, fire broken stone to be used instead. Before laying this flooring, the cellar to be thoroughly under-drained with three (3) inch pipe.

Cellar partition walls to have communicating doors. An outside door, leading into area under rear porch, to be provided for.

The ground around the entire building, after its completion, to be so graded that the water will flow from it in all directions.

FACINGS.

The facings to project three (3) inches, and the window and door-facings two (2) inches, from the line of the wall.

CHIMNEYS.

The fire-places and chimneys, each with two flues, properly gargetted, scraped, and with thimbles with flanges and plates for stove-pipes, to be as shown on drawing; to commence six (6) inches below cellar floor, to be carried above the roof and capped. The topping out to be of good red brick laid in white mortar. Also provide for a flue in cellar chimney-stack.

FIRE-PLACES.

Fire-places to be used, and hearths laid with good red brick, and fitted with suitable grates.

MATCH-WORK.

The brick-work will be of first-quality hard-burned brick, laid in first-quality lime and sharp sand mortar.

PLASTERING.

All partitions, walls, and ceilings to be plastered with two (2) coats of best-quality lime, sharp sand and hair mortar, and hard finished. The wood and plaster partitions in second story to be plastered three-fourths (3/4) of an inch thick on both sides of the wood-work in such a manner as to form a solid partition three (3) inches thick.

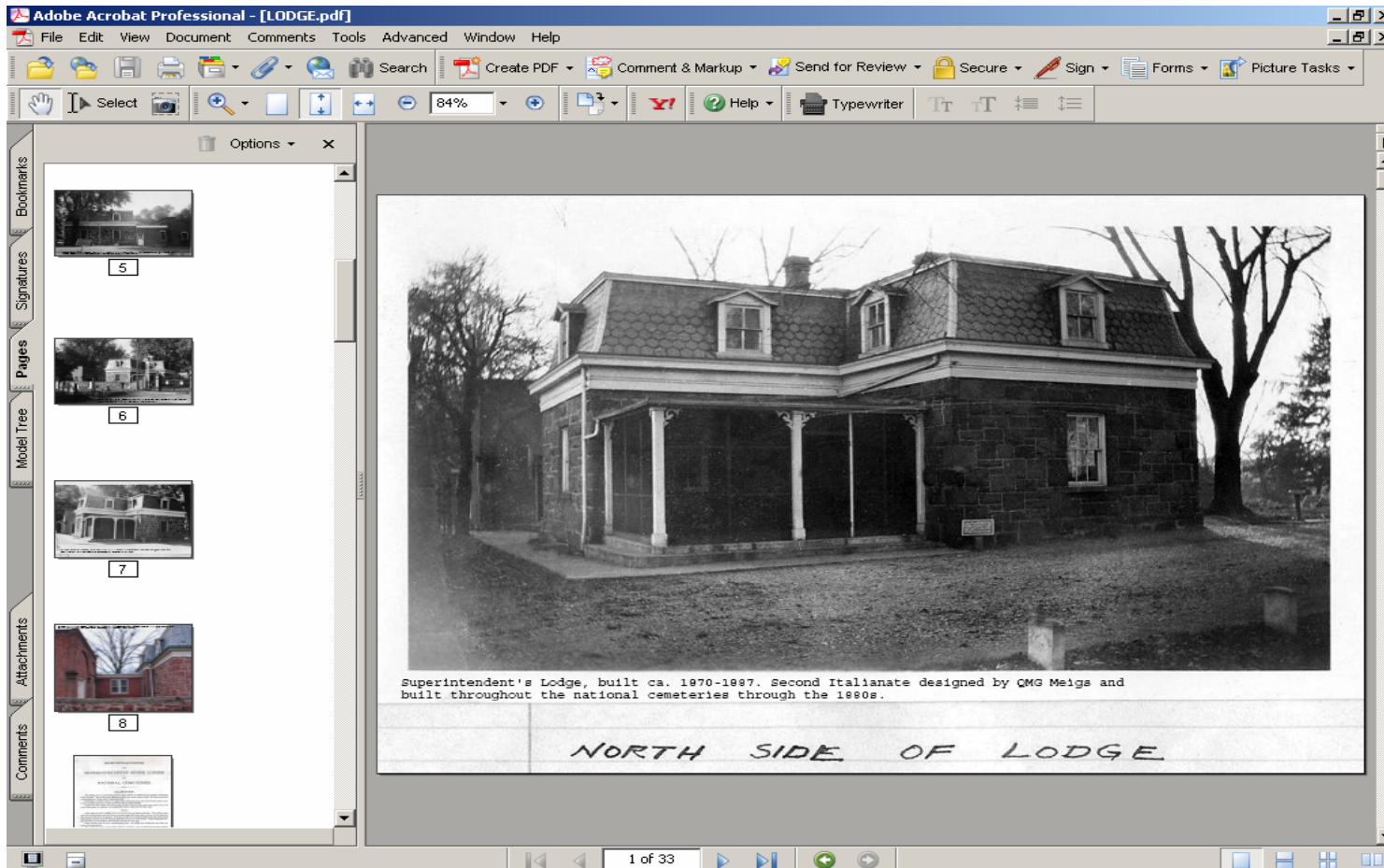
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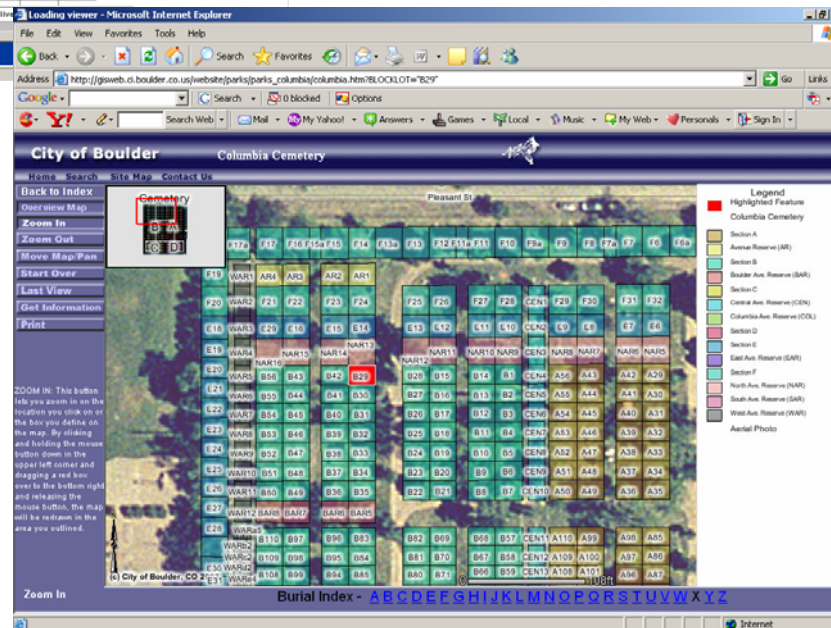
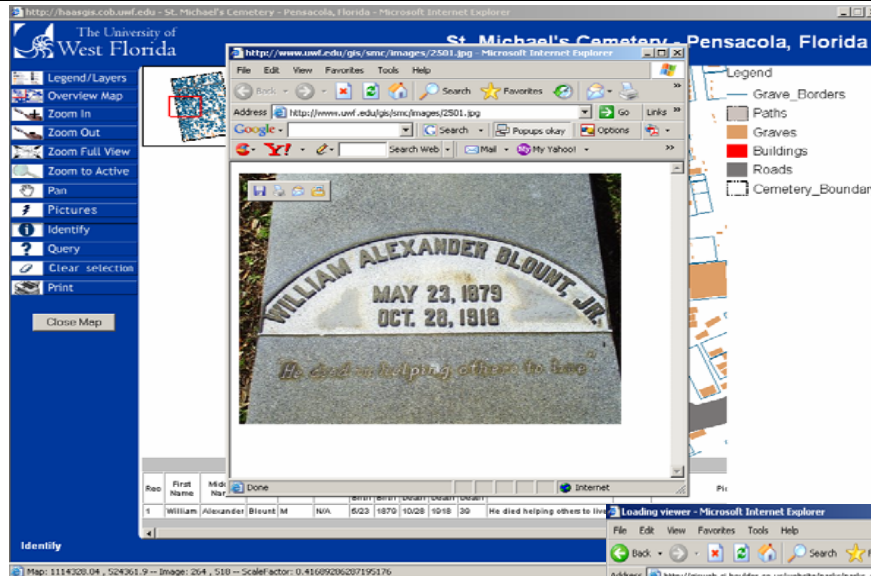


Were combined into Adobe Acrobat document and hyperlinked to the appropriate point in the GIS.

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Cemetery locator applications, especially in ESRI ArcIMS format, are available. In addition cemetery management tools are available commercially. But these applications do not address historic and cultural resources in addition to the grave markers.

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To preserve the unique historic nature of cemeteries we must be willing to address the needs of each individual landscape and adapt the application to meet these needs.

