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GIS Tools for Cemetery Management ESRI International Users Conference 2006



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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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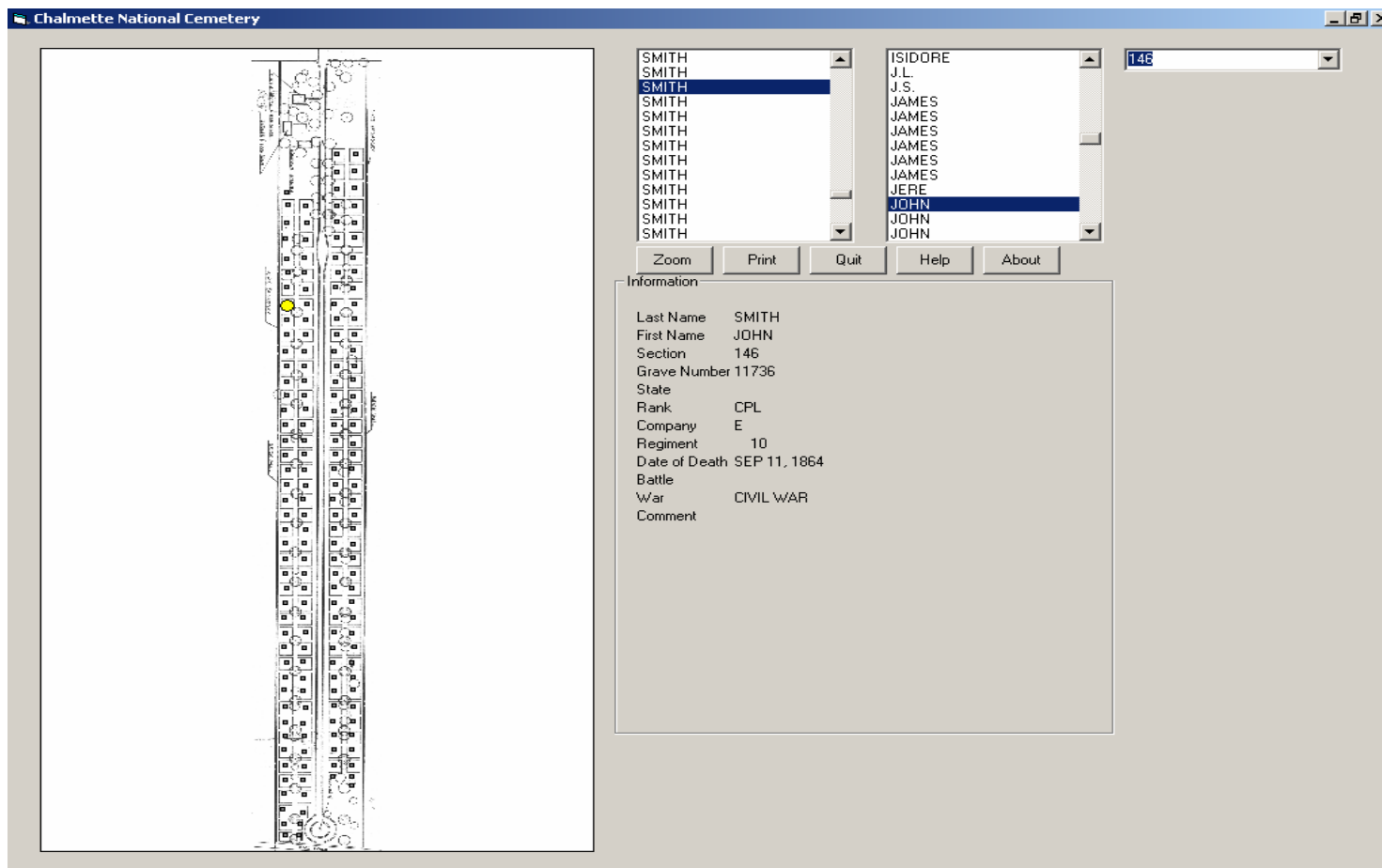
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Chalmette National Cemetery Application

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

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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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The screenshot displays two web browser windows. The left window shows the 'Gravesite Locator' application on the Department of Veterans Affairs website. The application includes a search form with fields for Last Name, First Name, Middle Name, Date of Birth, and Date of Death. The search criteria entered are: Last Name: Smith, First Name: John, Middle Name: (blank), Date of Birth: (blank), and Date of Death: 1862. The right window shows a map of Alexandria National Cemetery, VA, with labels for various sections (A, B, C, D), buildings (Lodge, Service Building, Office, Restrooms), and landmarks (Entrance Gate, Flag Pole, Rostum, Hooff Run). The map also indicates the location of the gravesite for John Smith in Section B, Site 3234.

Gravesite Locator

search options

Last Name:

First Name:

Middle Name:

Month:

Date of Birth: /

Date of Death: /

Map of ALEXANDRIA NATIONAL CEMETERY, VA

1450 WILKES STREET ALEXANDRIA, VA 22314

(703)221-2183
(703)221-2185

ENTRANCE GATE

LODGE

SERVICE BUILDING

OFFICE

RESTROOMS

SECTION A

SECTION B

SECTION C

SECTION D

STONE WALL

HOOFF RUN

SMITH, JOHN

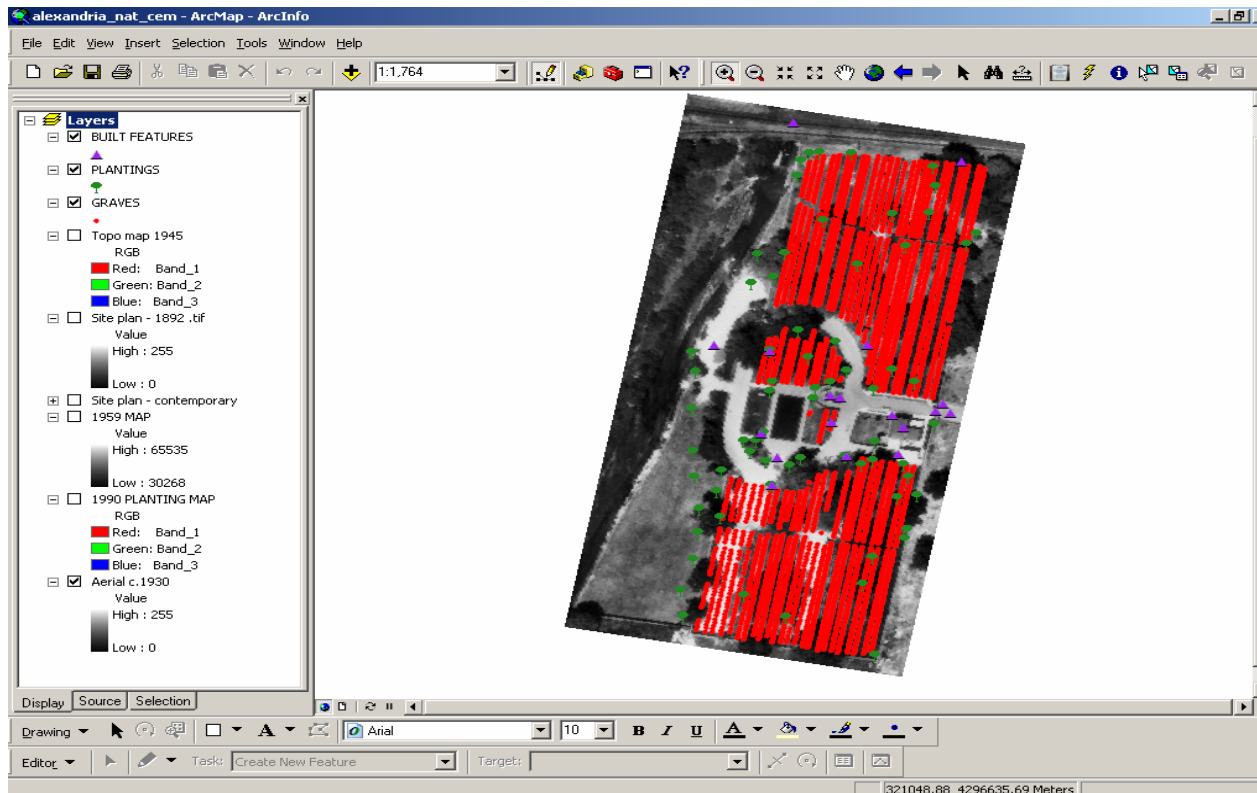
Section B Site 3234

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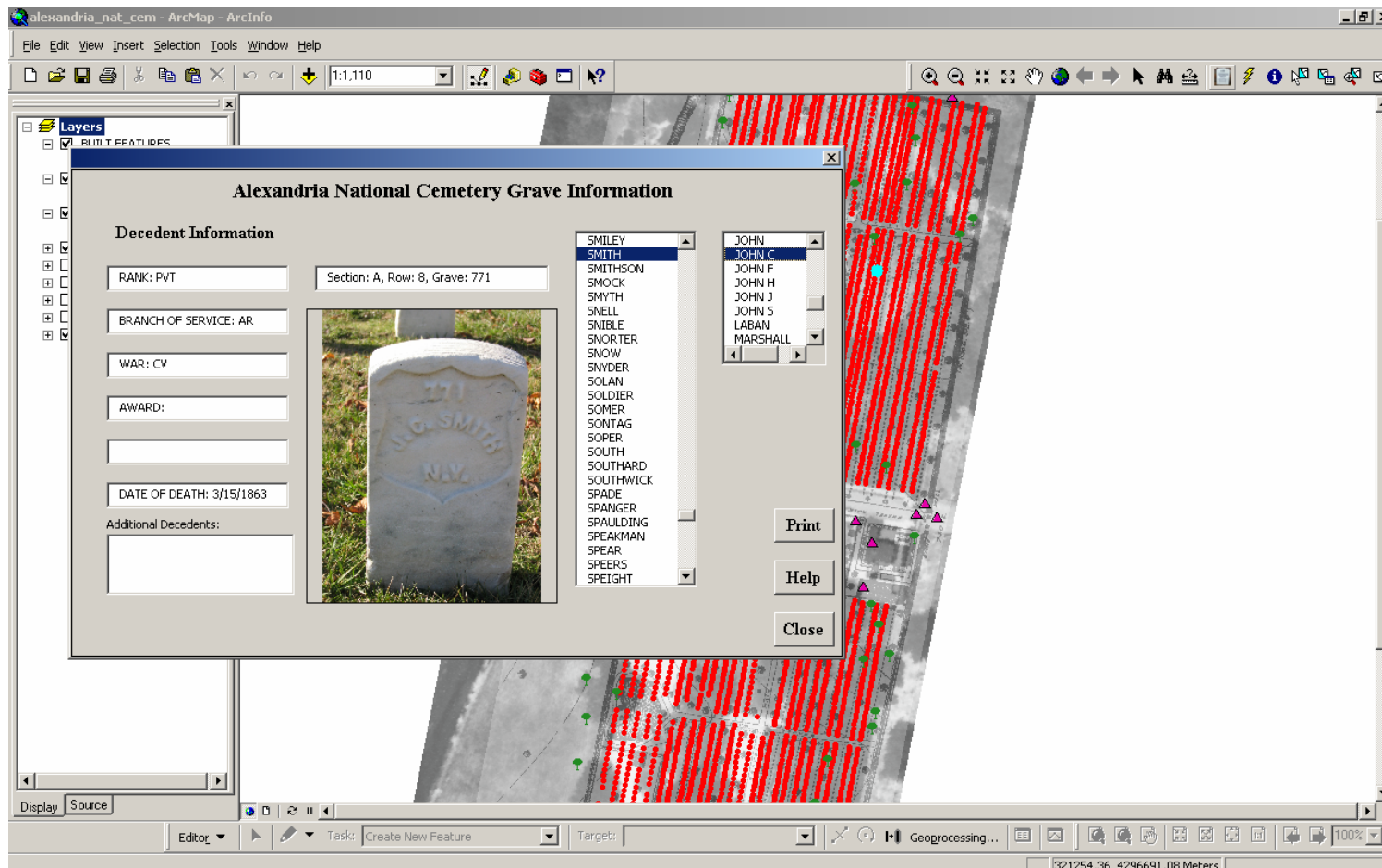
We developed an application for the Alexandria National Cemetery in ESRI ArcGIS 9.1 to provide the capability for:

- Editing data
- Adding data
- Flexible queries

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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.

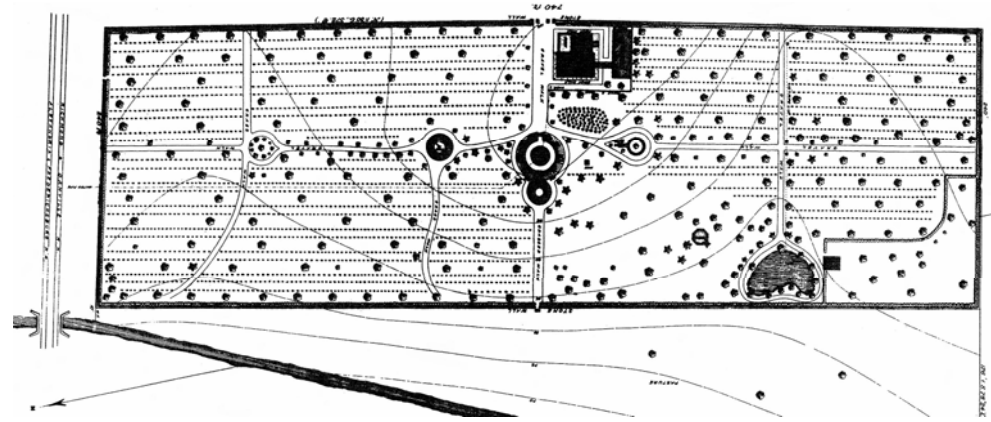
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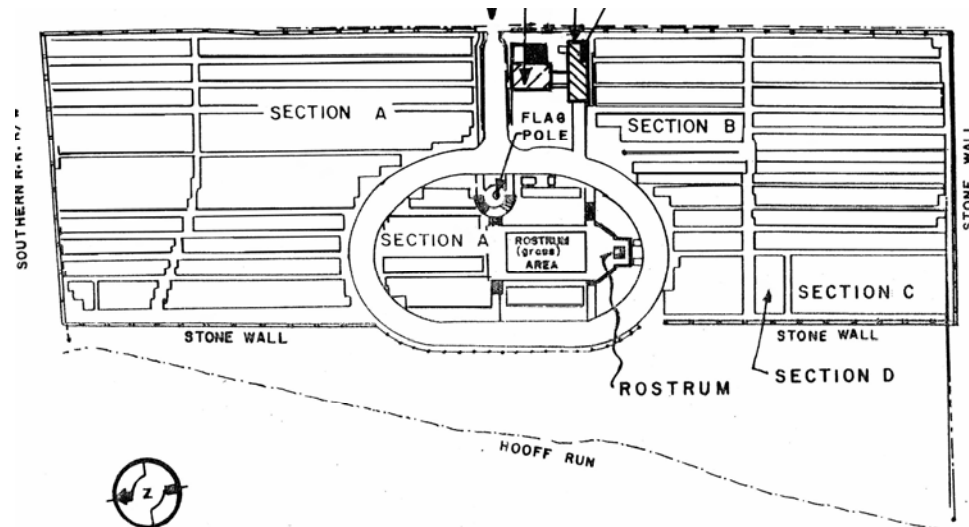
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Paper copies of maps, plans and an aerial photo of the cemetery were collected and scanned. The data included historic and contemporary maps.

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

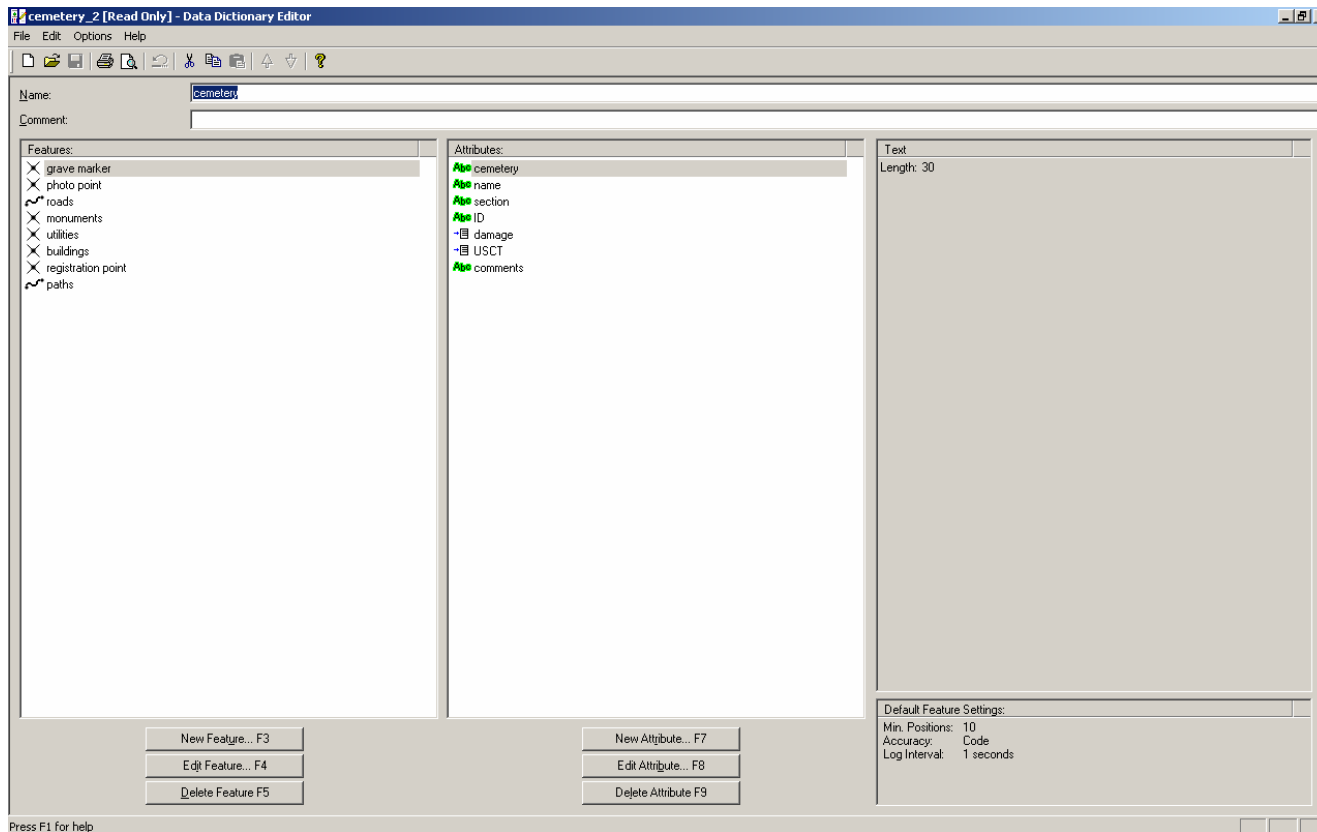


Alexandria Cemetery plan 2004

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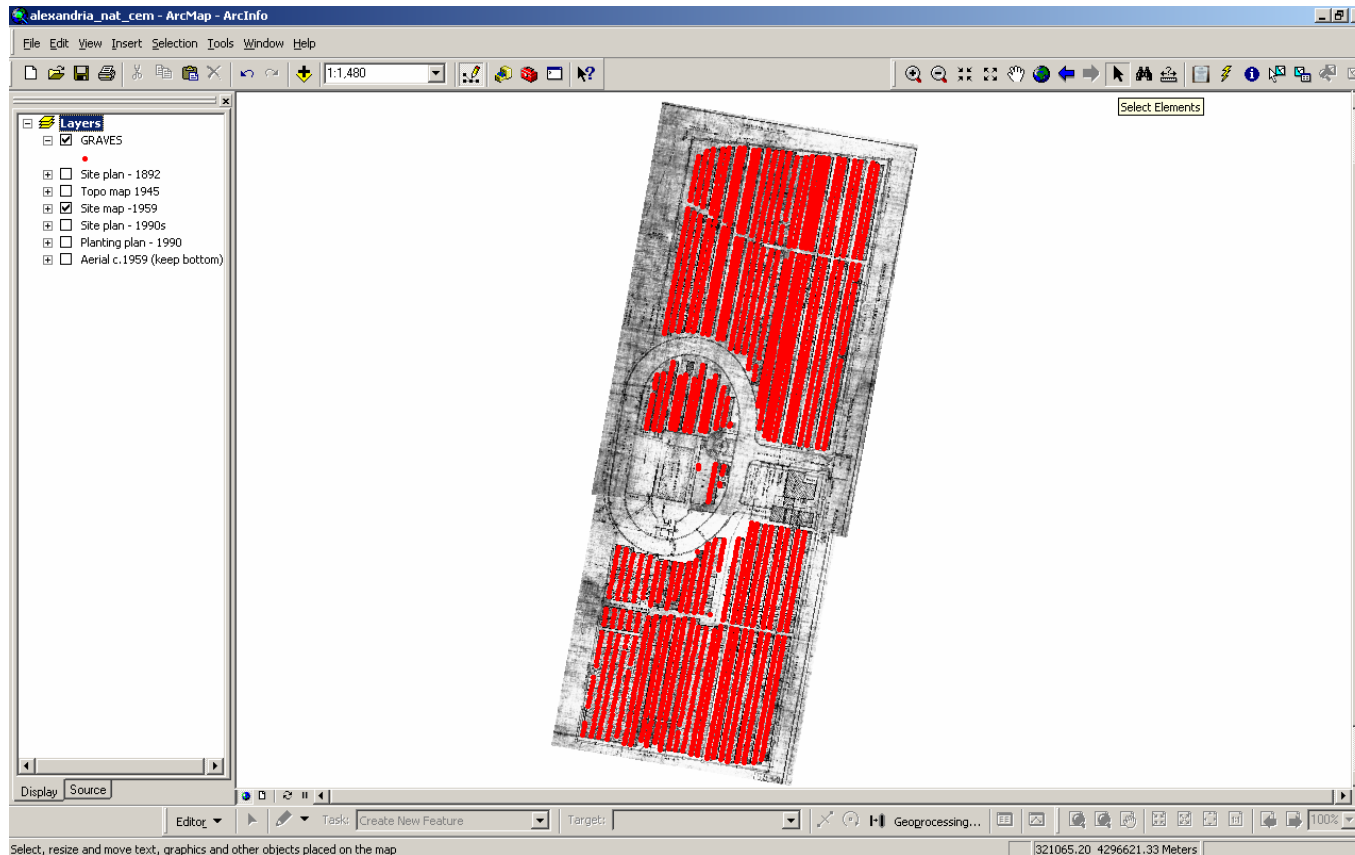


Points were located on the scanned maps and those points were GPSed on the ground and post processed. These points were then used to georeference the maps.

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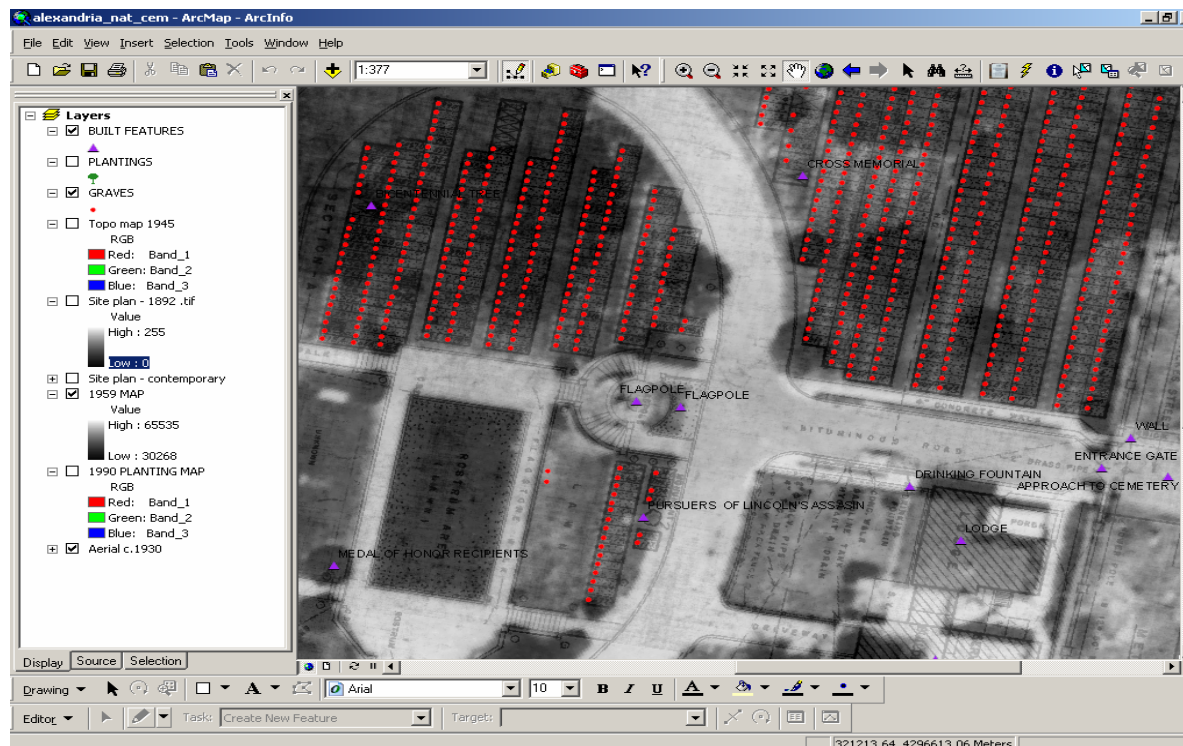


A GIS layer containing points representing the individual graves in each row was generated and, using the grave and block numbers as an 'address', the map was geocoded

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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_MID0	DEC1_LAST	DE
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	1560	OLIVER G	Section: A, Row: 19, Grave: 1560	OLIVER	G	SMITH	
19	A	1569	ISALAH	Section: A, Row: 19, Grave: 1569	ISALAH		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	

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.

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		
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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					SMITH		
11	A	940					SMITH		
13	A	984					SMITH		
13	A	981-5					SMITH		
9	A	816-96					SMITH		
13	A	973					SMITH		
16	A	1283					SMITH		
17	A	1356					SMITH		
17	A	1365					SMITH		
17	A	1409					SMITH		
18	A	1454					SMITH		
18	A	1507					SMITH		
19	A	1560					SMITH		
19	A	1569					SMITH		
19	A	1633					SMITH		
25	A	2225					SMITH		
25	A	2260					SMITH		
25	A	2265-4					SMITH		
25	A	2273					SMITH		
1	B	2286					SMITH		
1	B	2321					SMITH		
1	B	2333					SMITH		
3	B	2480					SMITH		
5	B	2665					SMITH		
5	B	2675					SMITH		
6	B	2786					SMITH		
6	B	2806					SMITH		
8	B	2957					SMITH		
8	B	3021					SMITH		
9	B	3115					SMITH		
10	B	3185					SMITH		
10	B	3162-1					SMITH		
13	B	3234					SMITH		
13	B	3251					SMITH		
15	B	3407					SMITH		
15	B	3419					SMITH		

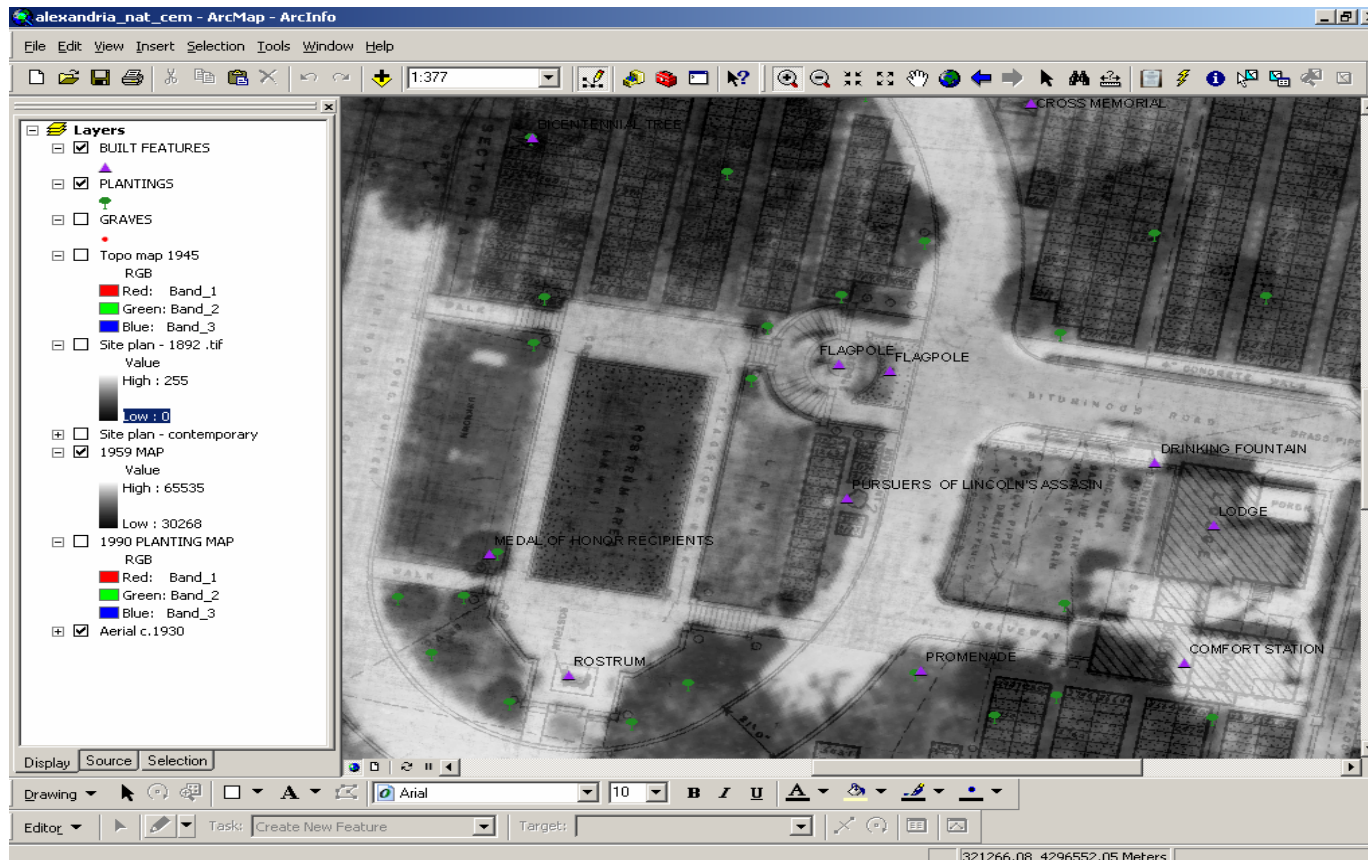
Record: 3297 Show: All



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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



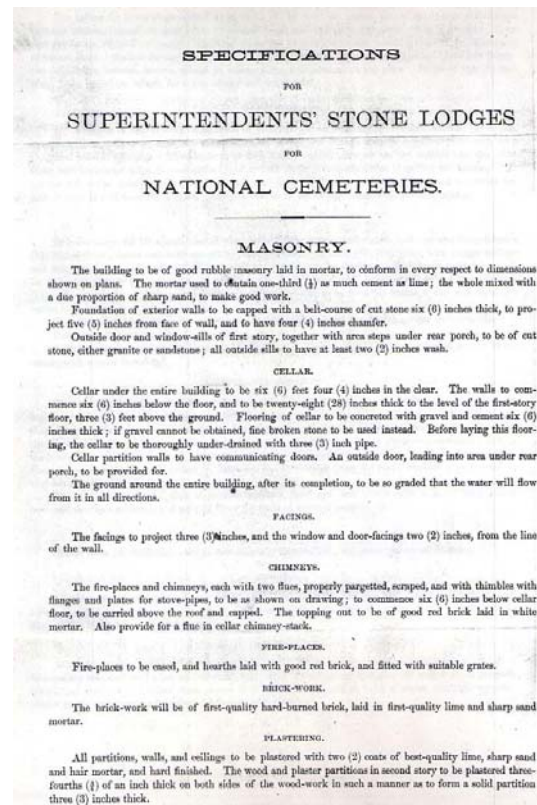
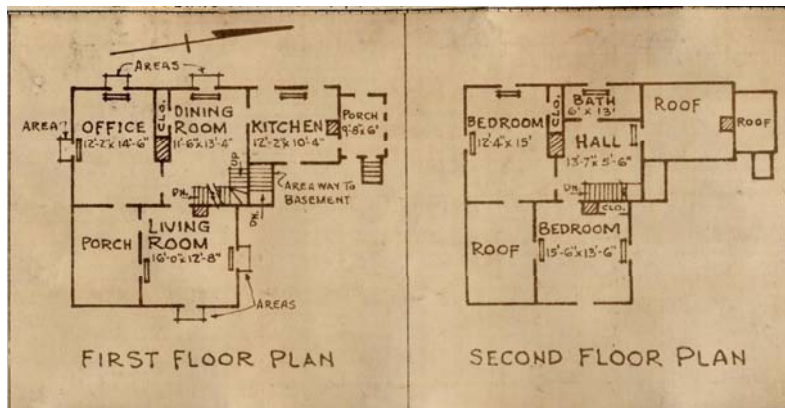
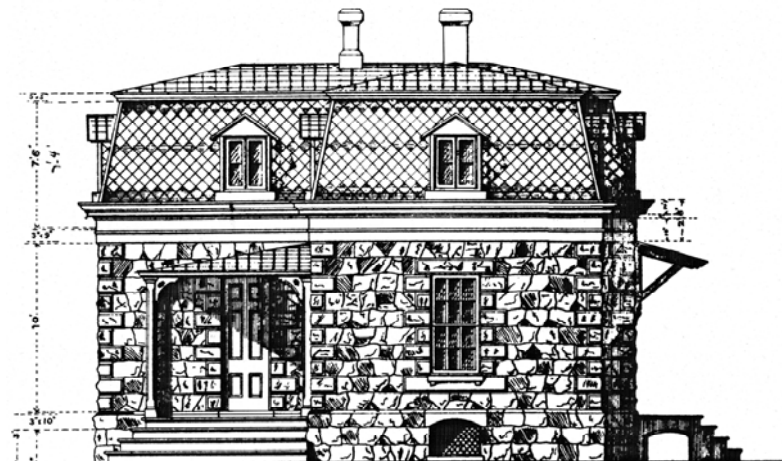
Superintendents
Lodge 2005

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

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DESIGN FOR SUPERINTENDENTS LODGE. NATIONAL CEMETERIES.



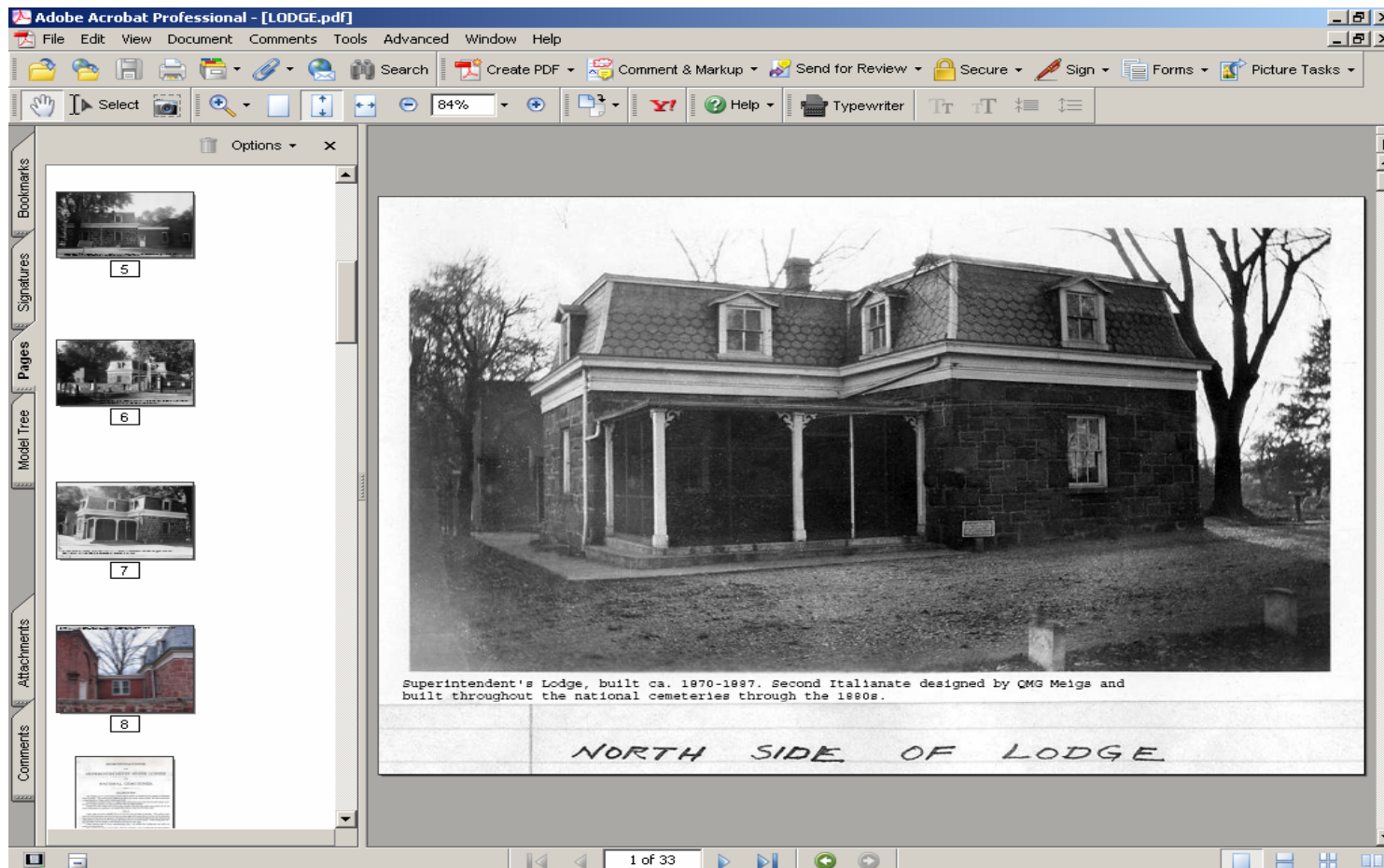
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...documents

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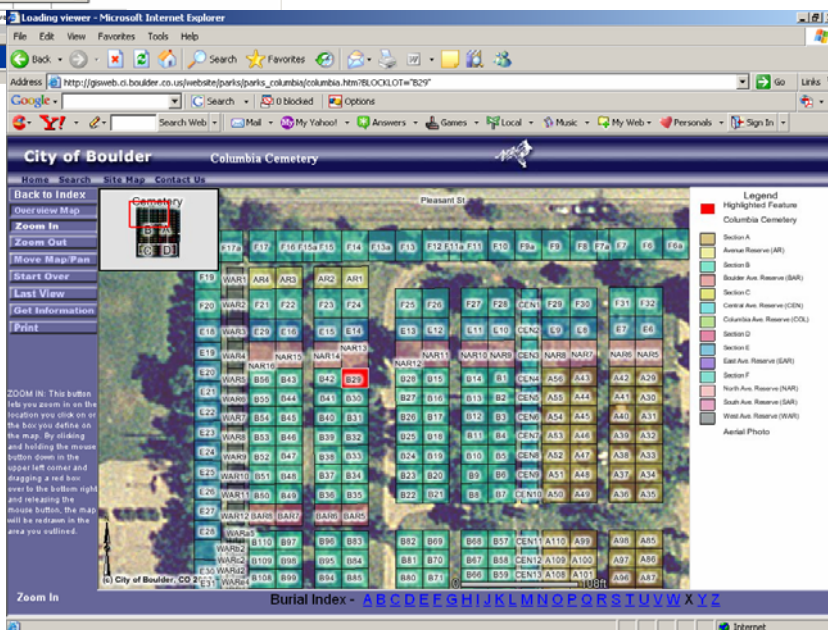
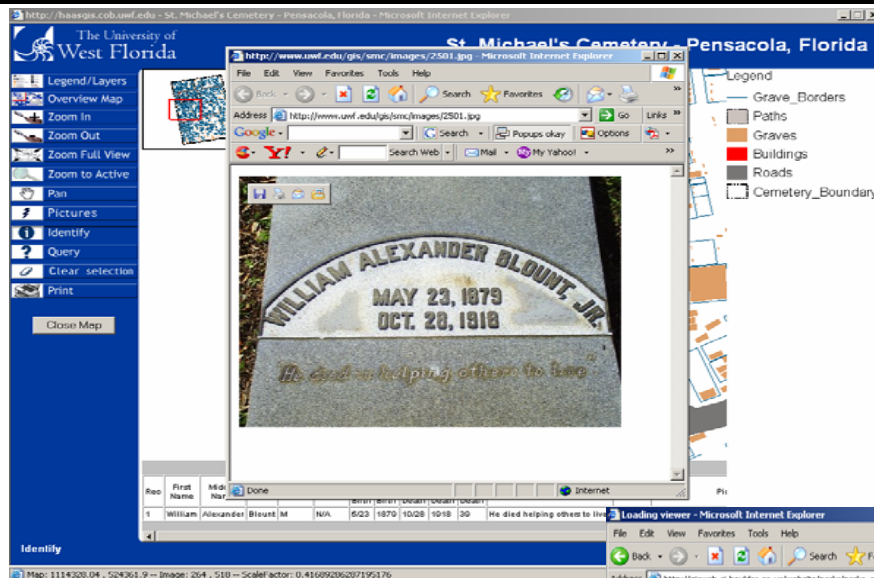


Were combined into Adobe Acrobat document and hyperlinked to the appropriate point in the GIS.

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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.

