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Project Planning and Data Dictionary Design: Keys to Successful GPS Data Collection

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NPS Historical Documentation Programs

Cultural Resources GIS

George Wright Society Conference on Parks, Protected Areas & Cultural Sites

New Orleans, LA

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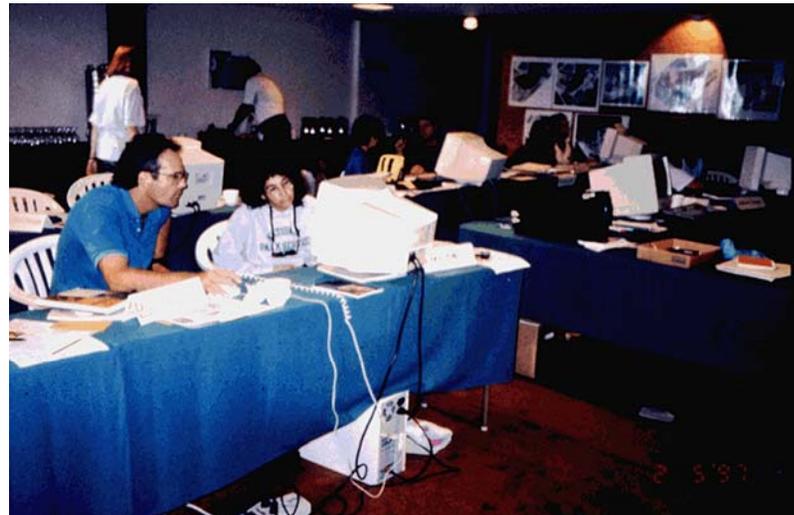
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Four Steps in Project Development

- Decide on the purpose of the survey
- Write a project description
- Decide on level of accuracy
- Determine what information is already available

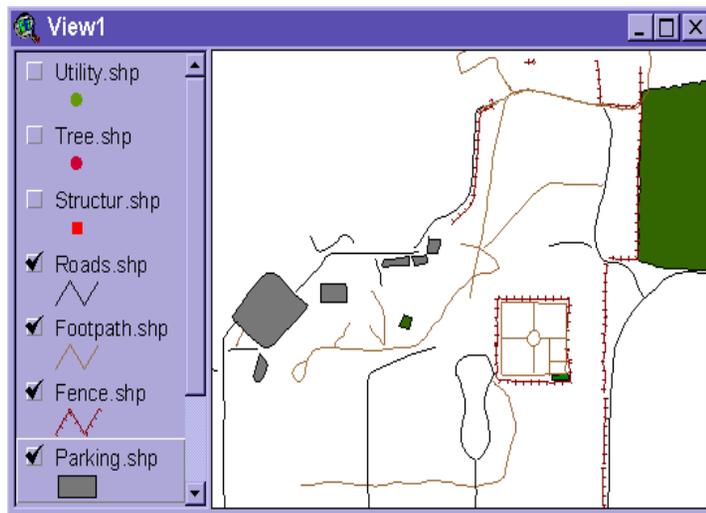


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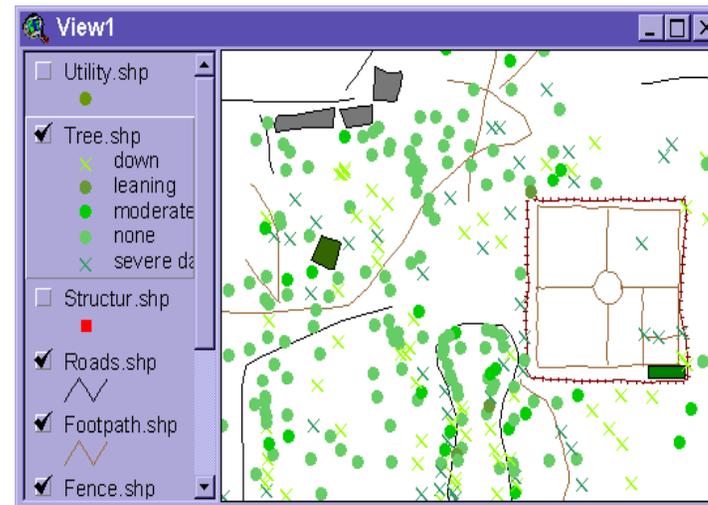
Purpose of the Survey

Baseline Inventory



- Many types of features
- Few attributes

Application Survey



- Limited types of features
- Many attributes

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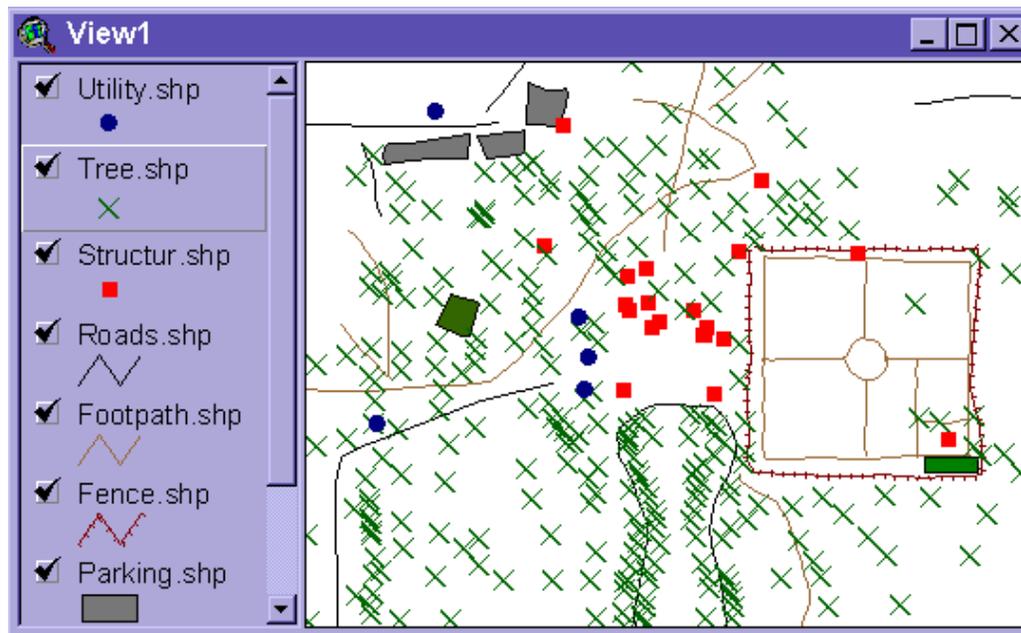
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Purpose of the Survey

- Most GPS projects are combination surveys
- Data dictionary can describe many features, yet capture detailed attributes



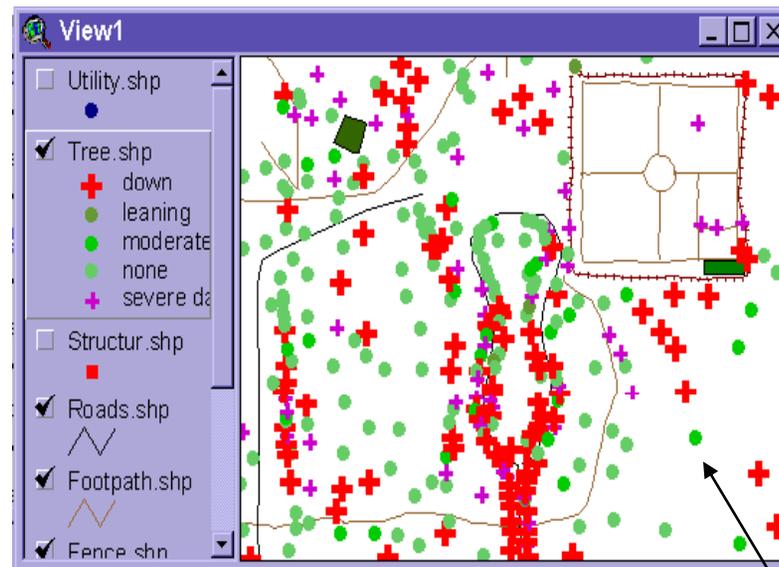
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Project Description and Research Questions

- A project description explains the purpose of the project and outlines research questions
- Focuses survey efforts on collection of required features and attributes



Example Research Questions

What is the extent of storm damage to the cultural landscape at the Hermitage historic site?

Which area received the most damage, and which species of tree?

What will be the cost of clean up to the historic landscape?

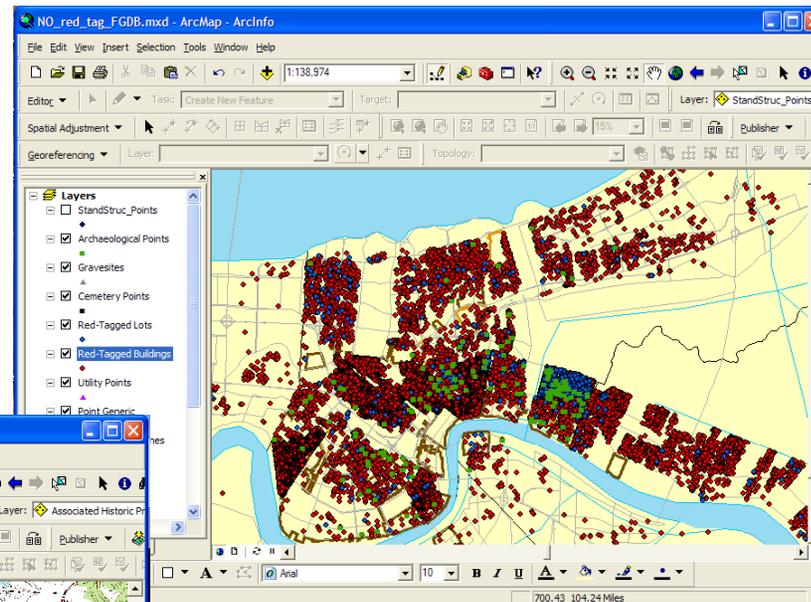
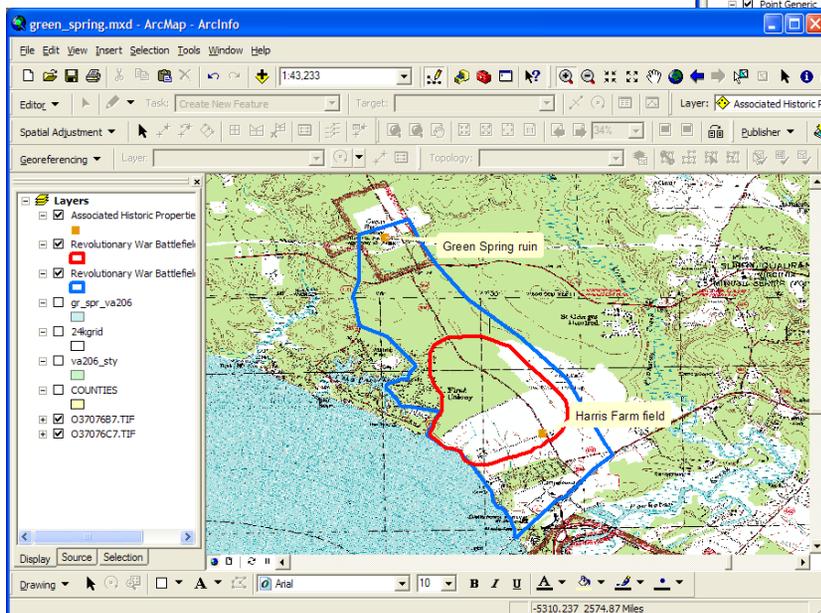
Target area for
maintenance

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Level of Accuracy

- Purpose of the survey determines the level of accuracy required
- Smaller scale data may resolve your research questions



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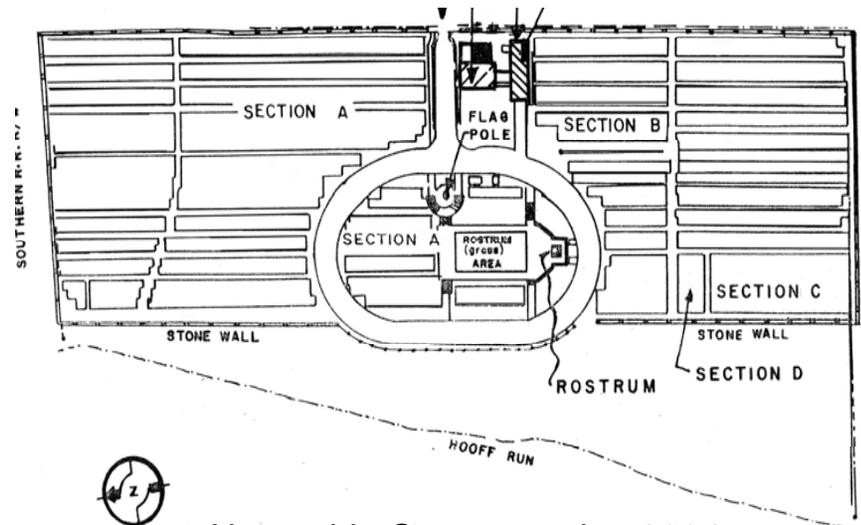
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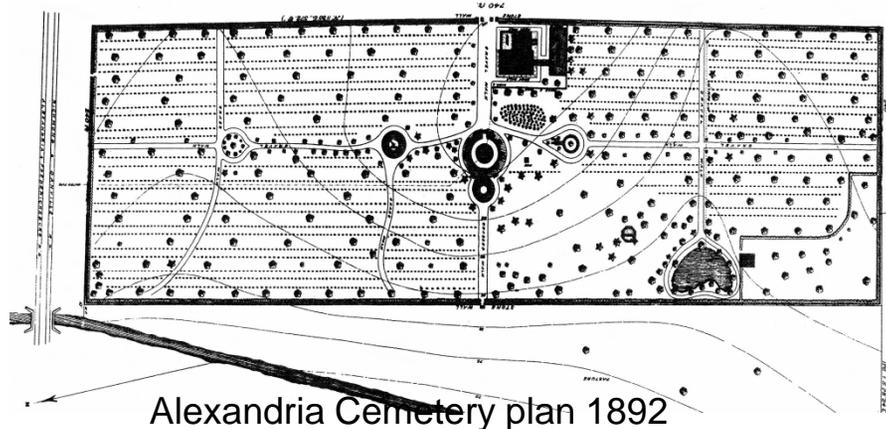
Available Information

- Geographic information is available from many sources
- Digital base data may already exist for your study area
- Prime sources include the Census Bureau and USGS

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Alexandria Cemetery plan 2004



Alexandria Cemetery plan 1892



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Data Dictionary

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- A data dictionary is a list of features to map
- Serves as a guide to surveyors in the field and focuses the survey
- Data dictionaries consist of features and their attributes

Capturing too much data can result in complex maps which are difficult to read

Capturing too little data can result in incomplete maps and faulty analysis



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Building the Data Dictionary

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- Build the data dictionary in Pathfinder Office
- Replicate in a GeoDatabase structure
- Build the GeoDatabase through GPS Analyst extension in ArcGIS and convert into a data dictionary
- Build the data dictionary in Pathfinder Office and convert into a GeoDatabase through GPS Analyst extension in ArcGIS
- Use other software packages; such as CartoPac, etc
- Custom forms for phone and tablet applications

The screenshot shows the ArcCatalog interface with a metadata table for a Personal Geodatabase Table. The table has three columns: OBJECTID, Location_ID, and Cultural_Resource_ID. The data is as follows:

OBJECTID*	Location_ID	Cultural_Resource_ID
15720	{D447780B-34A9-4474-BB25-4853E96B773C}	{F19E6F4A-4AA6-4da3-8A78-793D83789B41}
15721	{4B818C10-9823-4c08-AFCF-E68BFD4DD642}	{36FAF0EC-C25F-482b-9617-995BD868117F}
15722	{134EBA13-9CCD-4c97-B12D-D46E9351A923}	{6BDE2051-209E-4f61-8081-B3052868BEA4}
15723	{0E1CF9F1-3274-4489-8498-FEB2A83FE47E}	{DC7D2CAD-3217-402b-92EB-A81A9D5817CE}
15724	{34880F01-BC2C-4c72-8737-F5162E9FA20}	{5834E83D-C0CB-48eb-90DE-13598A6BF37E}
15725	{1CA3946A-68D6-4f86-AF38-030F2828074A}	{9EE16D79-E8E6-45b7-AD55-9D32277FC89E}
15726	{36840957-7D22-4cb6-AB20-39D070B90399}	{C8F46B1E-0296-43ea-9919-99F9B1C616A2}
15727	{D5824F8E-EAD6-4a46-BFF2-FCAC838C282}	{DB814FC8-0A66-40c3-AAAC-15209FCB7E3}
15728	{AF5D866B-EAD6-4073-A457-1270C8884115}	{58A426C8-02D0-4a59-A420-848C5FB7E055}
15729	{2628F5DA-1B83-4240-938D-510F1755417C}	{E4668061-7497-484b-9916-0A890F233498}
15730	{E10ADF5D-CA1E-4462-9471-CEC8523E7EC4}	{F1135288-8907-4801-82B9-D8710716980C}
15731	{F5566595-6311-4a93-934C-FE513191AA8E}	{BE3F0978-3C8D-4d5e-8535-CC09C321A1}
15732	{20493AFD-D75B-469f-AA8D-9ECA36C1C843}	{1BC28887-A979-456a-80D2-8204C3F4E6DA}
15733	{8136D963-FF4A-4585-AED3-2CF73588E7CA}	{B186AF8F-0F44-418c-988D-89CA938878F4}
15734	{B9A98AAB-0F61-4fac-BFF7-2E25D094358A}	{4A0E6840-A814-40bb-A117-DC79D0C0421D}
15735	{CF11D10D-6323-4166-9257-17AB481F8FA5}	{C899464A-1E75-44f9-B27D-554E2C0B0A3}
15736	{AD2E6C75-B3FC-47a3-9A7F-16555789172D}	{192A478A-2E56-4cd0-BF8E-EC9D86D7F3CD}
15737	{4485A258-26F7-4e47-A071-1E73C0AFC67F}	{88A02E44-D8EC-4932-89E7-BCA3755CF681}
15738	{FDA8BF5D-2900-4f92-AC8C-2F338FF59D76}	{3C967E05-F847-4530-BA9F-8B1C9C3902D2}
15739	{D544526B-6435-4209-AD12-679AE23AC6D8}	{6519E3C4-3DAB-485f-A489-9F24CB7302}
15740	{4A6497DD-72EF-4f45-850F-9D153AE18628}	{2624C80F-3F05-401f-865C-1B348311A88E}
15741	{93F8FED8-E90F-4f37-BF1E-8658B6FA5DA}	{52559F1C-3605-44d5-B111-317513879F8D}
15742	{B6834577-5FC2-4d19-9E01-4DBF3ACB7DC0}	{00F99737-BC7B-46b5-A713-E5EC3D8B7729}
14743	{11A8B317C-C8AC-4281-80AE-55FD03376FC9}	{87ECCAD7-CE8A-486A-8638-388E88711481}



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Data Dictionary

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Three steps in developing a data dictionary:

- Identify features to be observed and mapped
- Determine attributes for each feature
- Test the data dictionary



Jack Boucher HABS



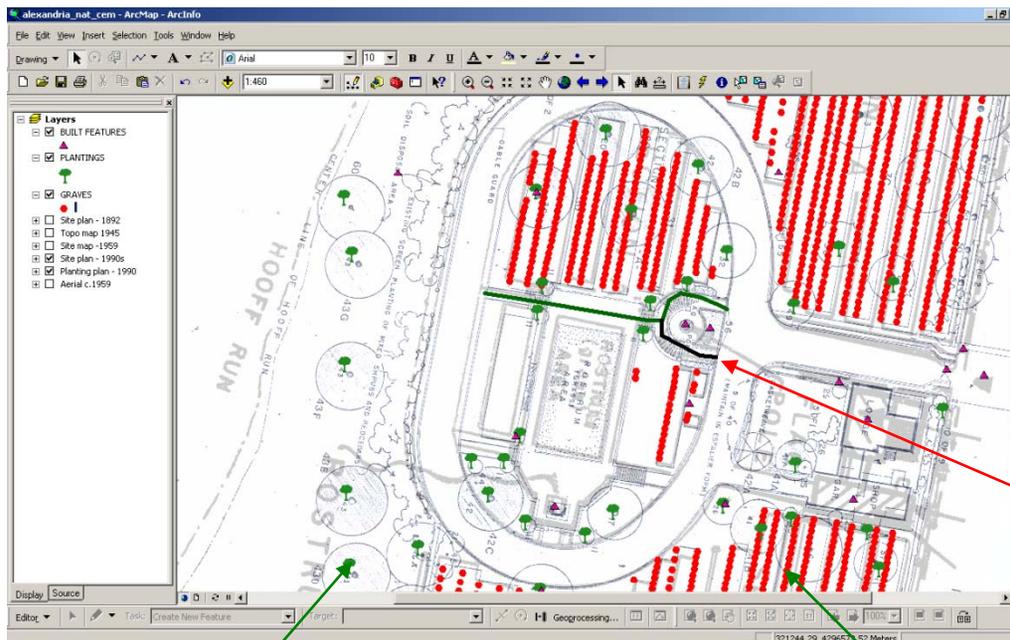
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Identify Features to Map

- **Target features** are specific to the application
- **Reference features** provide context and quality control

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Paths are the reference

Trees are the target

Grave markers are the target



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Identify Features to Map

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Tree

Grave Markers

Path



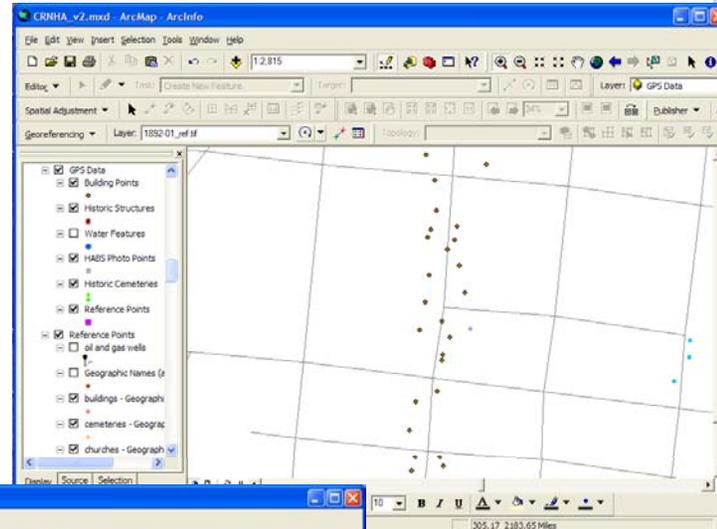
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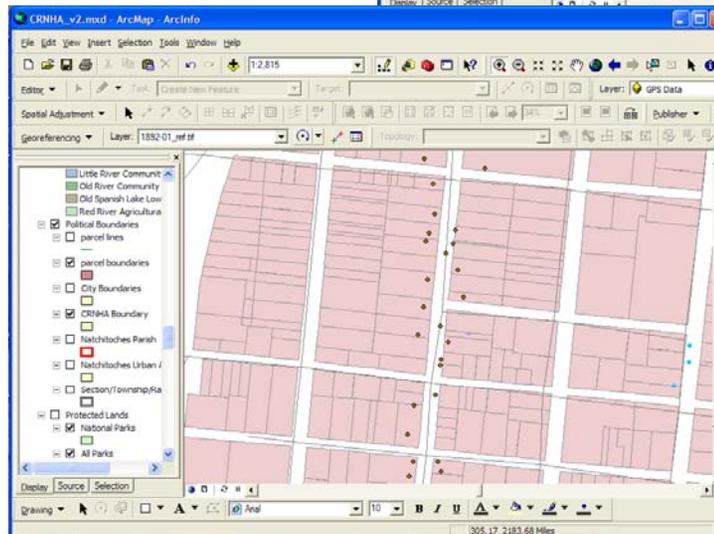
Identify Features to Map

- All features must be either a point, a line, or a polygon
- Decision depends on the use of the data and the scale at which it will be displayed

Buildings as points



Buildings as areas



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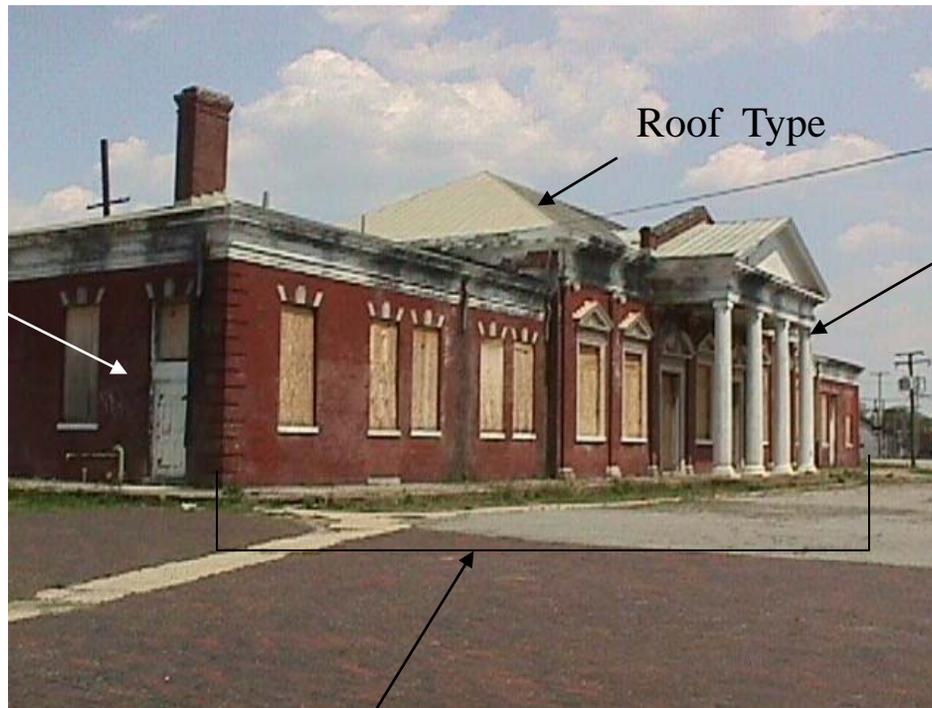


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Identify the Attributes to Record

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Construction Material

Roof Type

Column
type

Architectural Style

ID Number

Construction Dates

Name of Structure



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Identify Attributes to Record

- Use only attributes that are recognizable in the field; are observable
- Limit attributes to those addressing the research questions
- Avoid over reliance on “good, fair, poor” values
- Be sure values are distinct from each other
- Make sure surveyors are familiar with the resources being mapped
- Always have a unique GPS ID number for every target feature

<i>Name</i>	<i>Period</i>	<i>Status</i>
EDUCATION	modern	standing
ADMINISTRATION	modern	standing
MAINTENANCE BUILDING	modern	standing
WPA BARN	modern	standing
SMOKEHOUSE NW	historic	standing
SMOKEHOUSE SW	historic	standing
SMOKEHOUSE SE	historic	standing
SMOKEHOUSE NE	historic	standing
HERMITAGE	historic	standing
HERMITAGE CORNER	historic	standing
HERMITAGE CORNER	historic	standing
HERMITAGE CORNER	historic	standing



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Determine Attribute Formats to Use

Attribute Formats

- Menu
- Pick lists
- Radio buttons
- images
- Numeric
- Text
- Date (auto generated)
- Time (auto generated)

The image shows two overlapping dialog boxes from a software application. The 'New Attribute Type' dialog on the left has a 'Type' section with radio buttons for 'Menu', 'Numeric', 'Text', 'Date', 'Time', 'File Name', and 'Separator'. The 'Menu' option is selected. The 'New Menu Attribute' dialog on the right has fields for 'Attribute Name' (containing 'Surface') and 'Comment' (containing 'Road surface'). Below these is a table for 'Menu Attribute Values' with columns for 'Name', 'User Code 1', and 'User Code 2'. The table contains two rows: 'Paved' and 'Unpaved'. A third dialog box, 'New Attribute Value - Menu Item', is open in front of the 'New Menu Attribute' dialog, with an 'Attribute Value' field containing 'Other'. At the bottom of the 'New Menu Attribute' dialog, there are sections for 'Field' and 'On creation'/'On update' with radio buttons for 'Normal', 'Required', and 'Not Permitted'.

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Determine Attribute Formats to Use

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- Menu Attributes
 - Standardize choices
 - Reduce errors
 - Easy to query
 - Not flexible
 - Must be well thought out

- Text Attributes
 - Very Flexible
 - Responsive to unanticipated conditions
 - Difficult to query
 - More typos

<i>Gps</i>	<i>Circumference</i>	<i>Species</i>	<i>Damage</i>
T11	12.00	TULIP	down
T18	12.00	TULIP	down
T12	1.00	TULIP	none
T13	1.00	TULIP	none
T51	10.00	TULIP	down
T53	12.00	TULIP	severe damage
T14	13.00	TULIP	severe damage
T17	11.00	TULIP	severe damage
149	1.00	TULIP POPLAR	none
200	1.90	TULIP POPLAR	leaning
R023	16.00	TULIP POPLAR	down
H573	7.80	TULIP POPLAR	none
R017	1.00	TULIP POPLAR	none
206	1.50	TULIP POPLAR	down
209	1.25	TULIP POPLAR	none
R029	1.67	TULIP POPLAR	none



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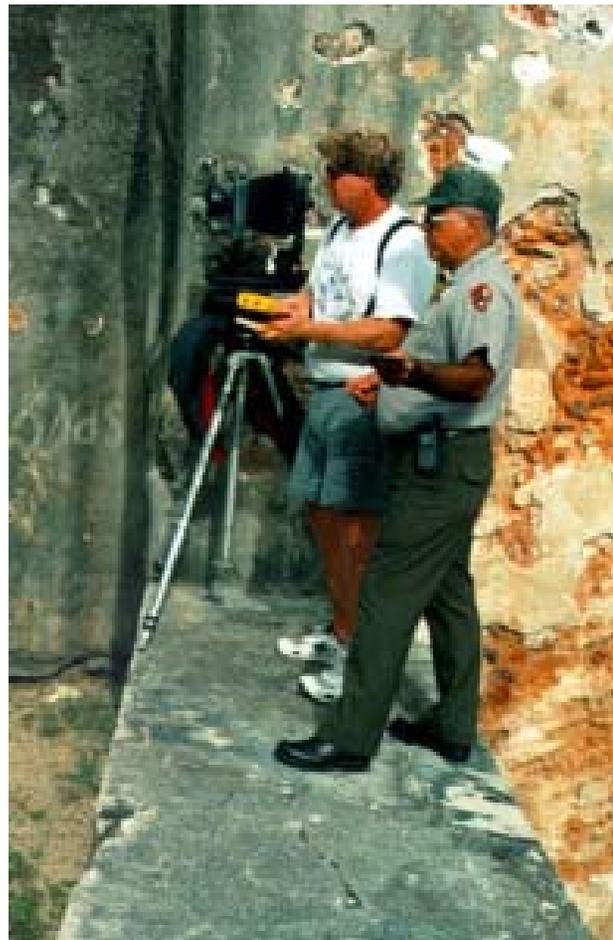
Test the Data Dictionary

Expect to revise

- Add/Subtract features
- Add/Subtract attributes
- Add/Subtract attribute values

Refine the Data Dictionary

- Extraneous to essential
- Subjective to objective
- Vague to operational definitions



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