INFO-GIS: A CROSS PLATFORM INTEGRATED APPROACH FOR COMMUNITY PLANNERS

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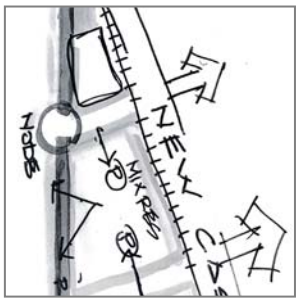
Abstract

In a world dominated by emerging technologies such as information management, traditional professions like planning and landscape architecture are undergoing fundamental transformation. With the availability of modern tools and extensive multi-format GIS data, community planners are continually faced with challenges of visualization and display of information across various media. This paper presents '*Info-GIS*', a cross-platform integrated approach to reference, analyze, and present community planning solutions by applying the concepts of information design to GIS-based data using compatible modern tools. Through a series of graphics and examples, the paper demonstrates how '*Info-GIS*' was successfully used to furnish a "Greenprint" Plan for St. Simons Island, Georgia. A further discussion involves an overview of ESRI software capabilities and its compatibility with Information Design tools for community planning purposes.

1. Introduction



Working in a planning and landscape architecture firm, I often get asked "*Would you be able to make this look better?*" or "*Can we put some more jazz or fancy stuff in this drawing to increase its appeal?*" and so on and so forth. What is really required to 'jazz' up a drawing or sketch? How can we really make a drawing speak (which was already finished to serve its intended purpose)? What is missing? Is it the color or the *fancier* fonts or is it the little graphical icons that add a cognitive quality and increased understanding to the drawing? Or is it all these missing ingredients enhancing the visual quality altogether? What platform will give justice to the content?

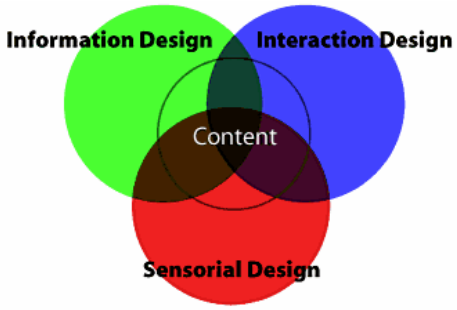
In an era of extensive (and often more than required) information, it is becoming increasingly important that information is designed to serve the intended audience in an efficient way concurrently improving its visual quality and completeness. Any technical or professional field that makes use of large amounts of data requires design of information (or *Information Design*) tailored to specific needs. While business figures, growth prediction tables, statistical charts, pie charts and graphs may serve as loose examples

of Information Design, GIS-based data and maps provide a challenging platform for applying the model of Information Design.

Community planning is one such discipline that makes use of substantial amount of data that is analyzed and evaluated at various levels. Applying GIS technology has revolutionized the planning process requiring designers to adopt and implement the technology using various available tools. According to Nathan Shedroff, noted 'experience' designer and an expert on Information Design, data is fairly worthless to most of us; to have informational value, it must be organized, transformed, and presented in a way that gives it meaning.

2. What is Information Design anyway?

Good question. While no one definition can encompass the meaning of the term, Luigi Canali De Rossi defines it as "*detailed planning of information that is to be provided to a particular audience to meet specific objectives.*" Although Information Design has evolved as a subset of graphic design, it lays down a structural model for design of the information in order to target a specific audience. According to Nathan Shedroff, "*Information Design addresses the organization and presentation of data: its transformation into valuable, meaningful information.*" In his article "*Information Design: A Unified Field Theory of Design*", he lists some of the important factors which form the basis or the model of Information Design as it applies to extensive amounts of data. These factors are broadly categorized as:



Nathan Shedroff's diagram explaining 'Information Design'

a. Organization
   i. Alphabets
   ii. Locations
   iii. Time
   iv. Continuums
   v. Numbers
   vi. Categories
   vii. Randomness
b. Metaphors
c. Goals and Messages
d. Clarity

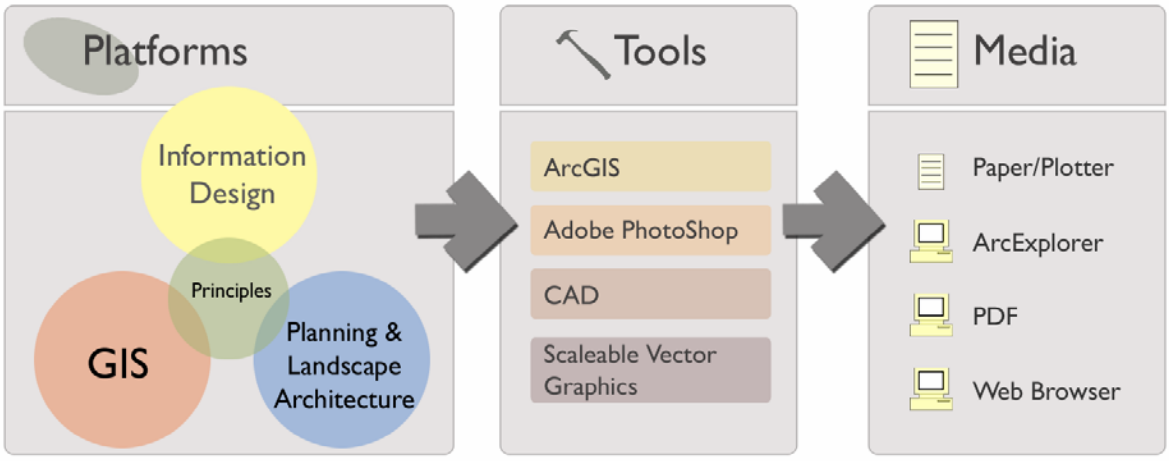
The list can be modified or cut short as applicable. Extensive, multi-format GIS-based data provide a challenging platform for applying this model of Information Design. In short, Info-GIS may be effectively used as a standard base for designing the mapped information.

3. Info-GIS, a viable option for community planners?

When I think of GIS data, I imagine a series of lines, shapes and colored polygons usually delineated within some sort of a boundary. Textual tags in certain places (to identify key features) complete the idea of a mapped GIS-based data set. Although, the maps generated from this seemingly mundane data varies from macro to micro levels and the data distinguished by use of color, font, styles etc.

While GIS based data is gathered and utilized in the same way as any other technical field, the products of community planning exercises often tend to be cognitive representations of human evaluations. Somewhere during the final stages, the finite statistical data acquires a subjective quality coupled with emotional value that needs to be illustrated to convey the underlying meaning. Traditionally, to achieve this cognitive representation, various guiding principles and practices exist that form the spine of planning process. These include use of colors, symbols, arrows, pointers, shapes, line weights and line styles. These principles must be interpreted using modern tools for the planning process and produced on a variety of media.

Info-GIS addresses subjective design and metaphorical representation of GIS based information and hence may prove to be a feasible option for community planners. A *blend* of cross-platform design models of Information Design, GIS and Planning can be envisioned by making use of available tools represented on required media.

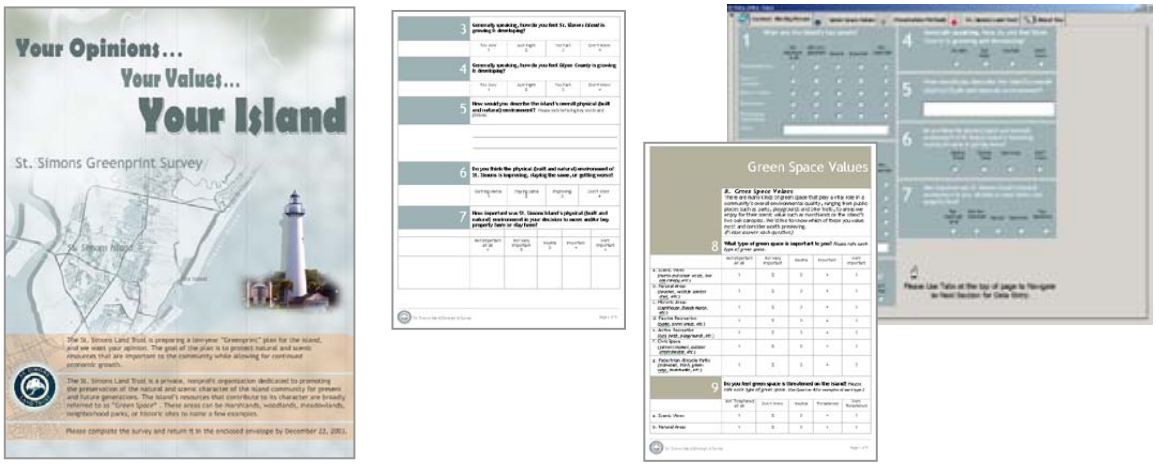


4. 'St. Simons Island Greenprint Plan', a case study

An ideal opportunity was commissioned to our office to practice and implement the concepts of Info-GIS in the form of preparing a "Greenprint Plan" or a *game plan* for St. Simons Island, Georgia, USA. PBS&J, in association with H. Randal Roark, AIA, FAICP prepared the "Greenprint Plan" to assist the St. Simons Land Trust (SSLT), a private, non-profit organization in carrying out its vision for the scenic St. Simons Island located near Brunswick (coastal Georgia).

The Greenprint Plan is a ten-year "strategic plan" prepared expressly for the St. Simons Land Trust's board, staff and council members, to follow and "help protect the Island's natural and scenic character." It is meant to assist the Land Trust in carrying out its vision to "provide a ten year conservation strategy for St. Simons Island."

Besides data collection and GIS mapping, the planning process included an island-wide survey of attitudes about a number of Greenspace issues. The survey, coupled with input from several workshops, served as a knowledge base. The workshops were conducted with an advisory committee, assembled by the St. Simons Land Trust, representing a broad cross-section of the island's residents and property owners. The results of the survey and workshops were further compiled in databases and scored for use in evaluating candidate sites as part of the conservation strategy.



Images showing the survey front page, inner sample pages and database form

4.1 Data

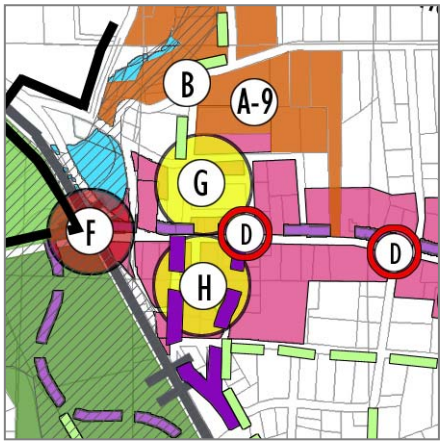
A variety of base data and imagery was collected from governmental and other sources for base mapping purposes as under:

Data Category	Data Type	Source
Aerial Imagery	Mr. SID format files	Glynn County GIS Dept.
Landcover	Satellite Imagery	GA State GIS Clearinghouse
Political Data	County boundary, City limits, parcel boundaries	Glynn County GIS Dept.
Demographic Data	Census Blocks, Census Tracts, Economic Development zones	ESRI Data Sets, USGS Census Data
Environmental Data	Wetlands, Marshes, Flood Plain, Marsh Hammocks, Water, River, Creeks, Lakes, Ponds	National Wetland Inventory, Glynn County GIS Dept., Georgia Department of Natural Resources
Existing Features	Parcels, Buildings, Tree Canopy Areas, Bridges, Airports	Glynn County GIS Dept.
Transportation	Road Network, Interstates, Road Classifications (arterial / collector, etc)	Glynn County GIS Dept.
Land Use & Zoning	Zoning Classifications	Glynn County GIS Dept.
Parks & Recreation	Active Parks, Passive Parks, Public Beach Access, Other Open Spaces	St. Simons Land Trust
Historic District	Historic Zoning Districts, Landmarks, National Register Sites, National Register Eligible Sites, SSLT owned property	St. Simons Land Trust

This data was referenced to create a variety of base maps for study of existing conditions. The following discussion explains the mapping process in further detail.

4.2 Information Design for effective map communication

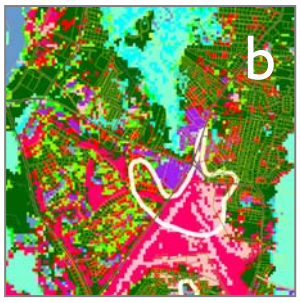
They say, 'A picture is worth thousand words'…



What good is a map that doesn't speak for itself? Why do we need descriptive legends to explain what is mapped? GIS maps are packets of specific information delivered to targeted audience. The implied meaning changes with the type of information displayed. In such a scenario, how important is it for the maps to have been designed for effective communication?

Extremely. A visually pleasing, attractive and informative map can convey the implied meaning far better than mundane diagrams (Sometimes avoiding a wordy explanation or legend). Although ArcMap provides numerous choices of line types, color and symbols, the real challenge lies in choosing the right symbol or color for effective communication.

The Greenprint Plan for St. Simons Island was a blend of base GIS data, community survey and sites scored based on a number of issues and opportunities. To initiate the planning process, base maps were created from data collected as per 4.1 above. These maps initiated the thought process for the planning team and as the project evolved, key elements and features of the island were identified. The study area limits, deliverable size and corresponding map scale were selected to maintain visual consistency throughout the process. A simple format was preferred in order to render justice to the graphic-intensive information displayed by the maps.



Every base map had its own importance and conveyed significantly varied information for analysis. Some base maps and their representation experiments (and challenges) are noted as follows:

a. Aerial Base map
   - Parcel lines needed contrasting color and hence white was chosen for visual clarity

b. Landcover map
   - Parcel lines shown in a contrasting 'yellow' for clarity
   - The attribute table of the Satellite Landcover map was originally based on wetlands classification key. The colors were further enhanced and derived using their real-world context. For example 'Pale blue' was used for ocean whereas 'Mossy green' was used for Marshes and so on.
   - The legend was updated using the colors' RGB values derived using Graphical editing software

c. Wetland and Deepwater Habitats
   - Original National Wetlands Inventory (NWI) data and the default color ramp was modified to suit real-world context of elements

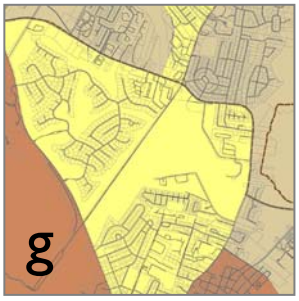
- Marshes were colored darker or lighter based on whether they were evergreen or seasonal
- Different types of water bodies were given distinct colors based on description

d. Zoning
- Standard LBCS color key was applied to zones
- Color RGB values obtained from Adobe PhotoShop

e. Transportation Network
- Significant roadways and highways were rendered with heavier line weights
- Major intersections were identified with iconic representations and with appropriate size

f. Parks & Recreation
- Active and passive parks were depicted with shades of green
- A green line connected with circles was used to portray 'Tree canopies' along the island

g. Census map
- Contrasting colors were used to identify census blocks and tracts
- Development activities were identified by circular markers

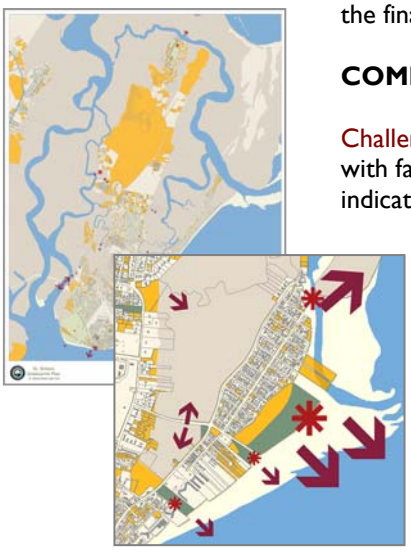


Apt graphical representation of factual information was thus accomplished by making use of applicable colors, styles, symbols and line weights.

4.3 Info-GIS for cognitive data

Concurrently, during the course of the project, we came across a sizeable number of characteristics and phrases that were required to be mapped and that we could not quantify. The structural model that information design provides (Section 2) proved functional in achieving cognitive mapping of such data in addition to base information.

A few examples of how 'Info-GIS' was successfully implemented to furnish the final (and crucial) pieces of the Greenprint Plan are as under:



COMPOSITE MAP

Challenge: A community wide survey revealed favorite places and locations with favorite views from the island. The marker chosen needed to be indicative of significance as well as denote direction of view.

Solution: An '→' (arrow) symbol was chosen to depict visual direction and its varying size depicted majority results for that view.

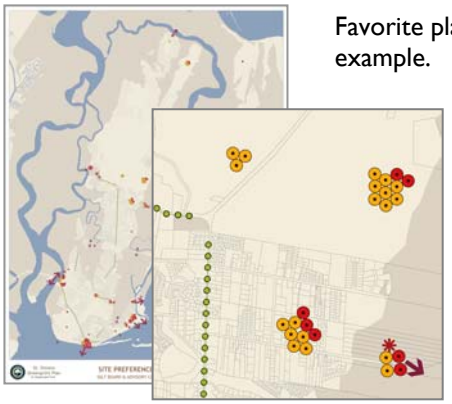
Challenge: Favorite places were required to be mapped based on the survey results. Again, the marker chosen needed to be easily identifiable and would depict popularity.

Solution: An '*' (asterisk) symbol was used with varying size corresponding to its majority.

Challenge: Candidate sites were to be depicted on the same map for client acquisitions.

Solution: Contrasting 'ochre yellow' color was chosen and applied to the parcel data obtained by subtracting parcels without buildings identified as candidates.

SITE PREFERENCES / PRIORITY MAP

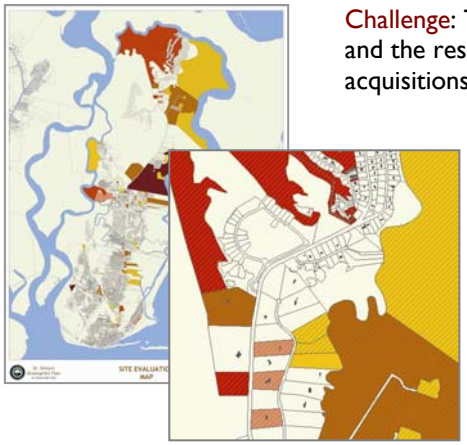


Favorite places and favorite views were mapped as per the previous example.

Challenge: Preferred site votes obtained from the SSLT Board members and Advisory Committee members were required to be mapped.

Solution: Two solutions were furnished – one with varying size of two push-pins pointing at one site in either direction with number of votes written on them and the other with clusters of 'circle' markers with two colors for either committee.

SITE SCORES MAP

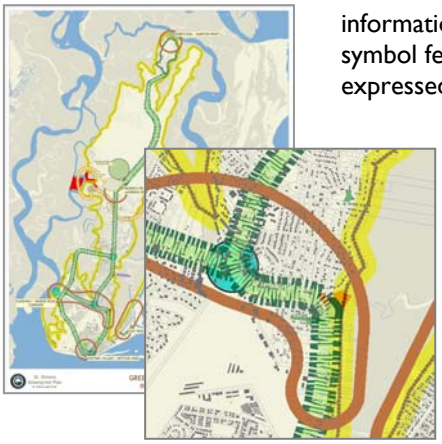


Challenge: The candidate sites were scored based on a number of criteria and the results needed to be mapped to help identify priority in acquisitions.

Solution: The scored sites were categorized in 7 groups, namely, score 0-9, score 7-12, score 13-18, score 19-24, score 25-30, score 31-36 and score 36 and above. This scoring allowed maximum diversity of scored information. Each of the categories was colored based on higher to lower scores with shades of red ('maroon' shade for highest and 'salmon' for the lowest score). The color ramp allowed easy identification of the scores from the map.

GREENPRINT INITIATIVES MAP

Challenge: Being one of the critical deliverables of the planning exercise, the 'Greenprint Plan Initiatives' was an extremely significant map. This map combined the results of finite GIS data along with results of the planning exercise and site scores. The map also furnished 4 priority catalyst projects, which were further rendered with extensive detail. The mapped



information needed meticulous evaluation of line types, weights, point and symbol features. Cognitive results of planning exercise needed to be expressed aptly for submitting to the client.

Solution: Various 'corridors' of development identified in the planning process were depicted with a line type chosen with a close resemblance to the one traditionally used. The varying thickness depicts importance of the corridor to a set of sites. A 'Conservation Roadway Improvement Plan' was identified with a circular marker and its opacity reduced to allow visibility. The proposed grouped sites were expressed with a 'rubber-band' type polygon, again, derived from traditional techniques. The marsh edge was exquisitely identified with a contrasting line type.

During the planning process, we came across a sizeable number of keywords that were linguistic in nature and had contextual as well as emotional value. These were mapped based upon the structural model provided by the platform of Information Design (Section 2). Use of metaphorical icons, categorization of sites, scores, and similar elements of a map proved efficient in conveying the implied meaning. The following table illustrates the various components of mapped data as derived from the Information Design model.

Mapped Information	**Information Design Model**			
	Organization/ Categories	**Metaphors**	**Goals + Messages**	**Clarity**
- Site Preferences Map - Composite Map - Site Evaluation Map - Greenprint Plan Initiatives	a. Categories of Sites b. Groups of Scored Sites c. Categories in Legend	a. Significant or Anchor  b. Interesting or Focal (View)  c. Corridor/ Linkage/ Grouping  d. Protected  e. Strong or Weak 	a. Variety of maps for specific information b. Maps presented on different media	a. Clear Format b. Concise Legend c. Contrasting Colors

The following discussion lists some of the techniques to achieve custom line types, shapes and symbols in order successfully implement Info-GIS.

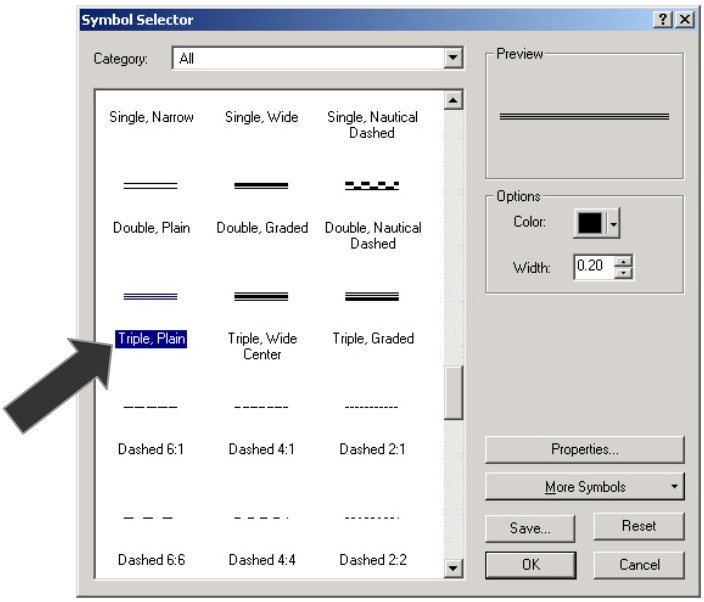
5. Customizing ArcMap for practicing Info-GIS

User-friendliness and customizing potential of ArcMap makes it an extremely useful tool for practicing Info-GIS. Version 8.X has tremendous advantages over version 3.X in terms of available and customizable line types, styles, fonts and marker symbols. These can be further stored in a user-defined style file for applying it to all relevant data thereby maintaining consistency with all the maps. The styles files can also be modified, added or deleted by accessing the style manager.

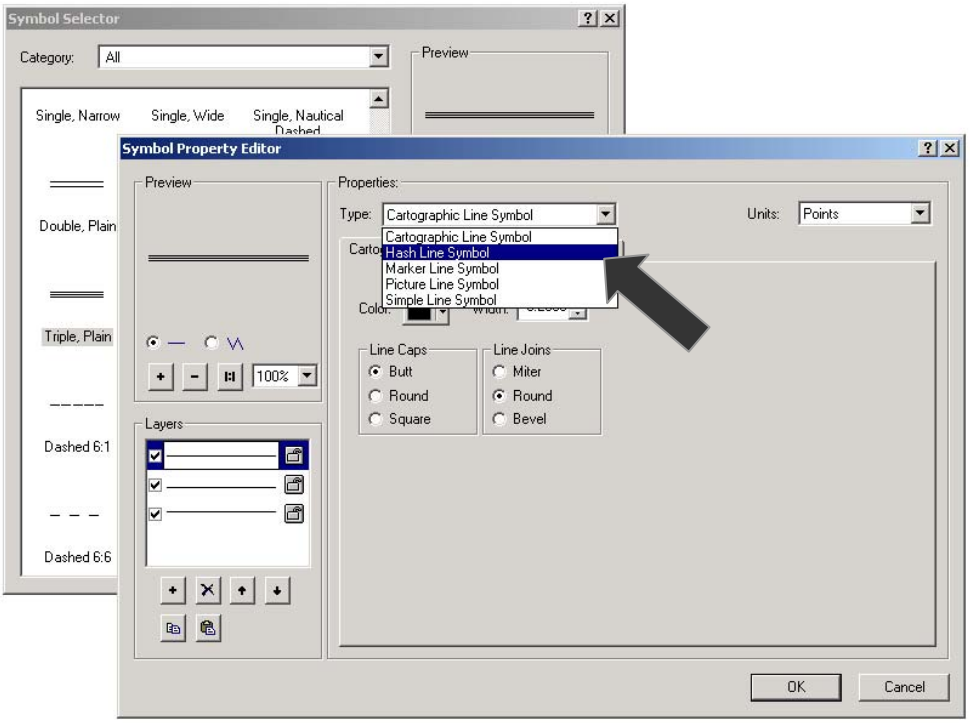
Some of the key elements of the maps prepared for the St. Simons Greenprint Plan project were derived by customizing a line's properties as under:

7a. Line style to portray 'Corridor'

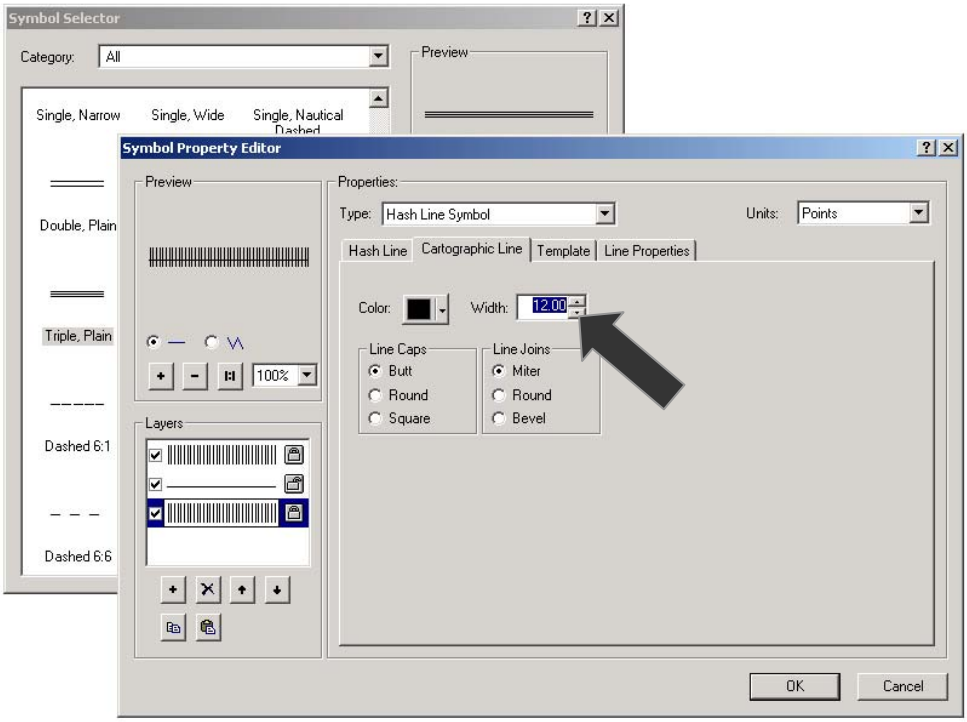
Step 1: Create a new shapefile with the required corridor delineation. The line style that ArcMap applies will usually be a plain single line with some intial color. Click on the line type in order to change the symbol. In the 'Symbol Selector' dialog, choose a simple 'Triple Plain' line type from the available line types.



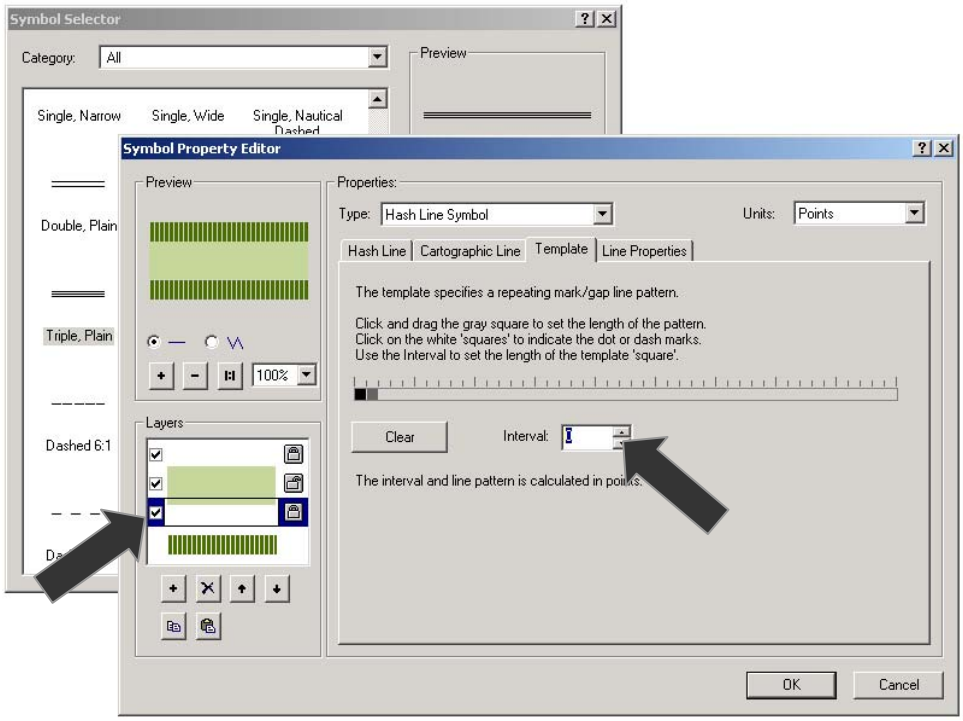
Step 2: Click on 'Properties' and change the line type to 'Hash Line Symbol'.



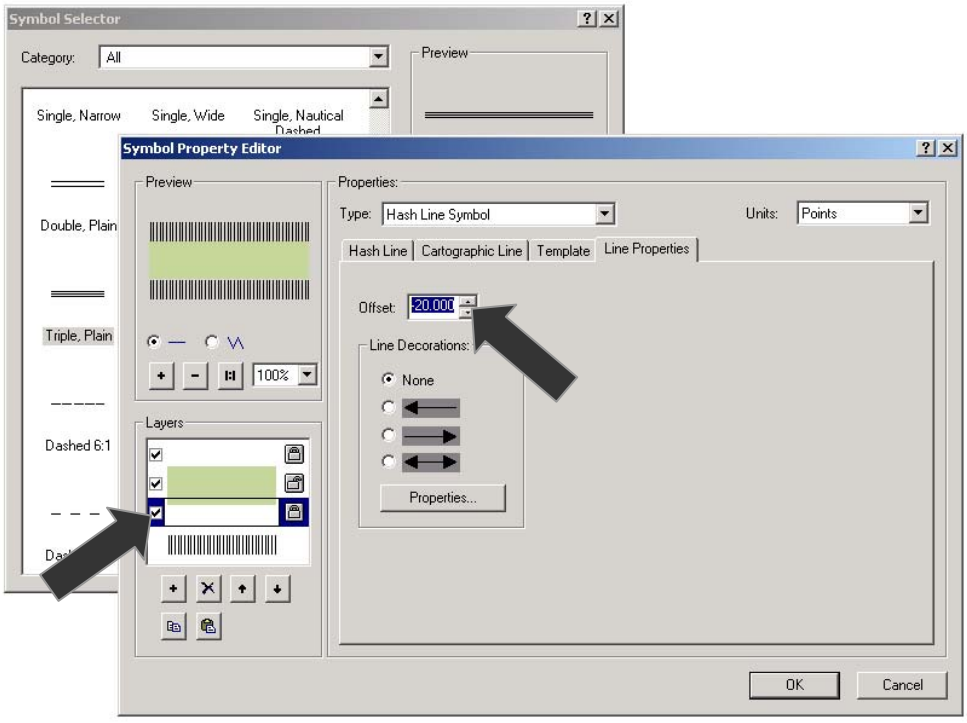
Step 3: Changing the line type to 'Hash Line Symbol' will make all 3 parts of the line available for editing. Change the width of the 1st and 3rd part to 12.



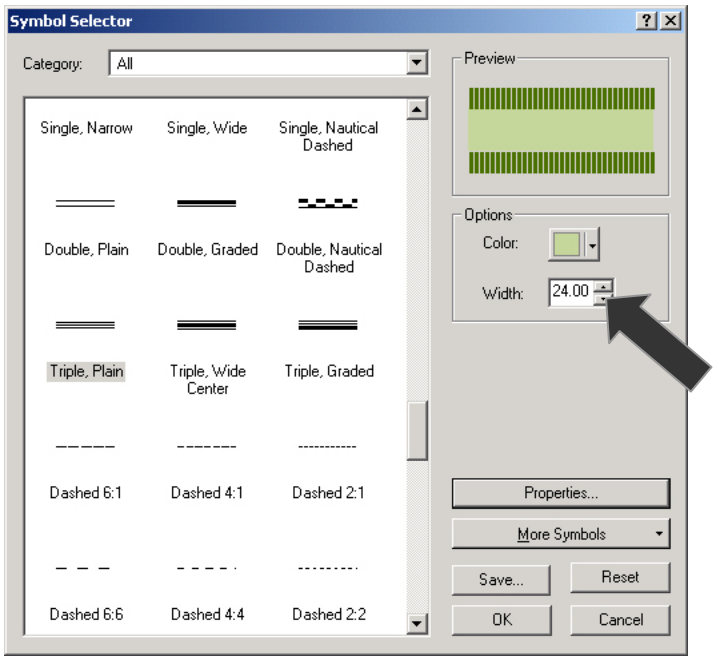
Step 4: Click on the middle part and change its width to 24.00 and color to 'Medium Olivenite.' Increase the offset of the top and bottom lines to 20 and color to 'Fir Green'.



Step 6: Click on 'Template' tab and change the intervals of the top and bottom line to '0' and click 'OK'.

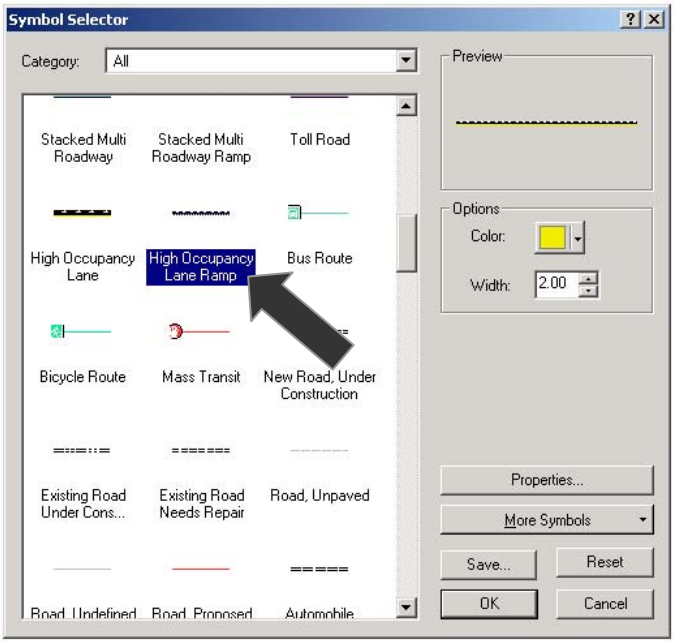


Step 7: The custom 'Corridor' symbol can thus be achieved and its width can be changed as per the visual requirement.

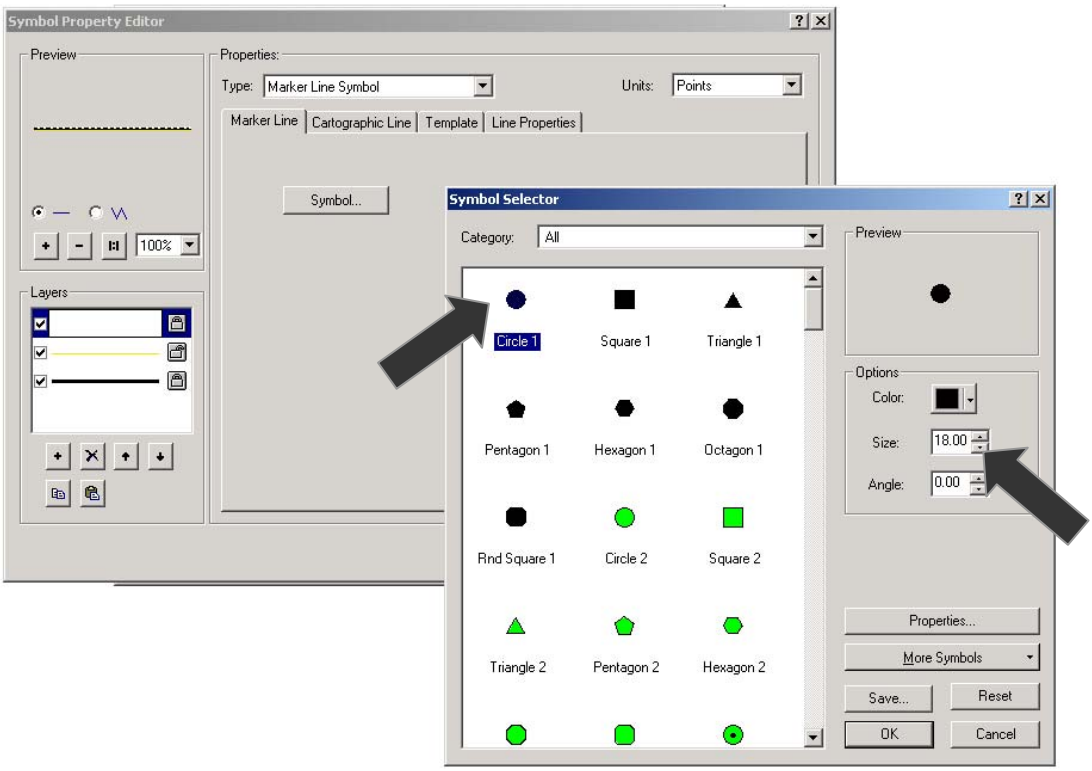


7b. Line style to illustrate 'Marsh Edge'

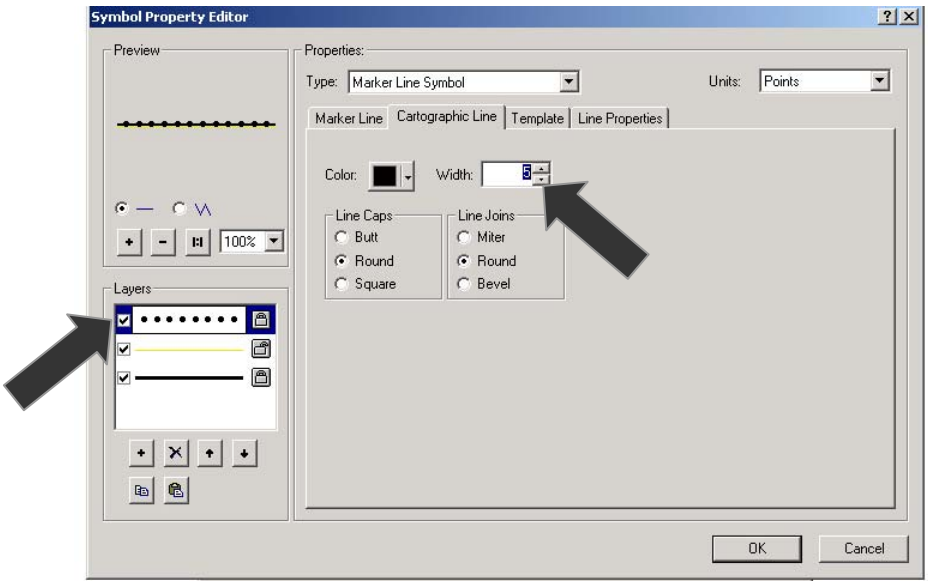
Step 1: Choose any line type which has 3 components. In this example, 'High Occupancy Lane Ramp' type of line is selected.
Click on 'Properties'.



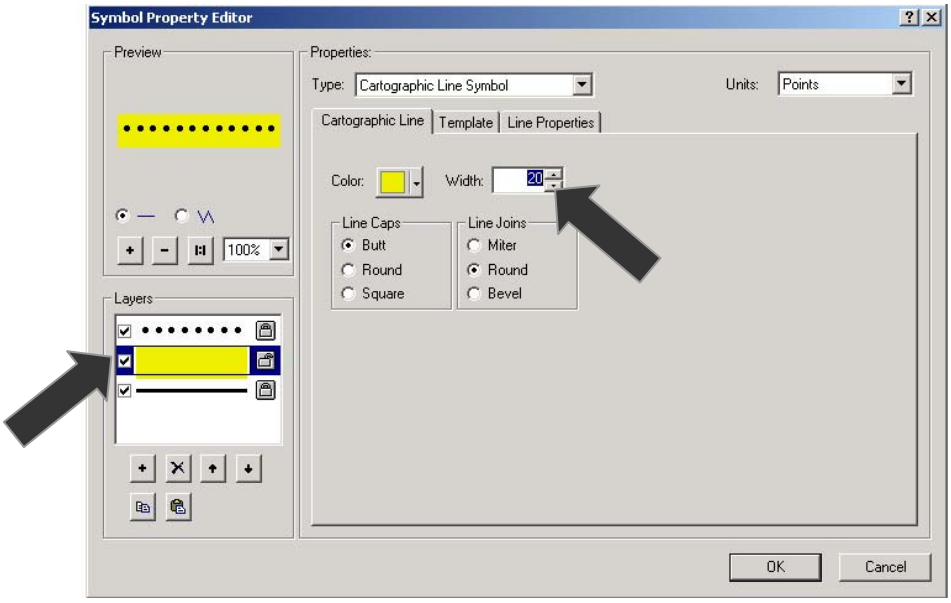
Step 2: Verify that the type of line is 'Marker Line Symbol' and click on 'Symbol' button. Choose a 'Circle' Symbol, change width to 18 and click 'OK'.



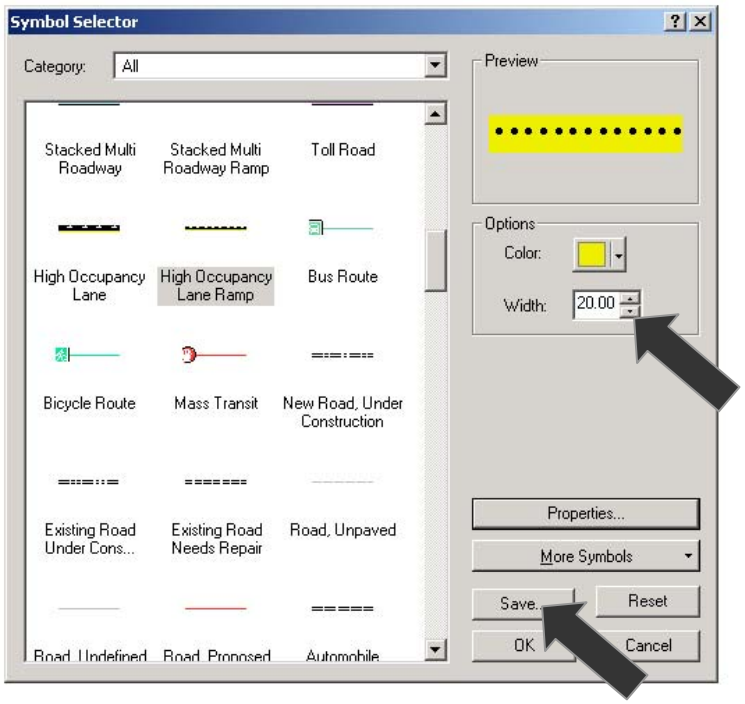
Step 3: Click on 'Cartographic Line' tab and change the width of the circle to '5' and click OK.



Step 4: Click on the middle portion of the line type under 'Layers' and change it's color to 'Golden Yellow '. Increase the line width to 20. Click 'OK'.



Step 5: ArcMap thus allows editing the properties of any line type to tailor it as required. The width of this custom line type can be changed to suit the scale of the map. Furthermore, this custom line type can be saved as a *.lyr file or the symbol can be saved in a custom 'Style' file for it's use with other maps.



6. ArcGIS Software – its compatibility with other Information Design tools

Compatible software is thus necessary to achieve desired visual effects and apply appropriate colors. Understanding ArcMap's compatibility with other Information Design tools is important to apply the concepts of Info-GIS. A short list of compatible tools (for planning-oriented projects) include:

Tools	Use
Adobe PhotoShop ®	Color hues, their RGB values from real pictures and comparisons. Conversion of exported map EPS format into JPG for delivery
Adobe Acrobat ®	Conversion of ArcMap documents into PDF for delivery, easy viewing with zoom-in and zoom-out as required
Scalable Vector Graphics (SVG)	ArcMap documents exported into SVG format can be viewed on the Internet via SVG reader. SVG format retains the scale and features at its original quality being a vector format document
Macromedia ® Fontographer	Custom shapes and characters can be created for use with ArcGIS group layer or style file

Besides these, the maps created with ArcGIS can be exported to a variety of format (EPS, JPG, PNG, etc) for various needs. The file sizes and display format can be controlled based on file size, clarity and display needs.

7. Info-GIS for today's planning practices

GIS data and the applications of GIS-based mapping are growing everyday. The fundamental difference in using GIS mapping with community planning is that the final product, although based on finite geo-referenced data, has emotional and contextual value. Often the final products of the exercise have no geographical coordinates or finite shape. In such a scenario, effective graphical language of maps and appropriate cartographic representation of cognitive characteristics can positively influence the implied meaning and increase comprehension on part of the audience.

Traditional methods and techniques in community planning provide effective graphic language to convey the implied meaning. These combined with the structural model supplied by the science of Information Design can help dramatically enhance the visual quality of GIS maps, thereby rendering them more useful. ArcGIS software provides the functionality to amalgamate the principles and structural models of the various platforms that community planners utilize. The enhanced communication between

the maps and the audience has proved extremely beneficial for comprehension of mapped information.

There are still, however, many hurdles to successfully achieve Info-GIS. Information design provides only one model for efficient display of mapped data. Being an extensive as well as subjective medium, it may or may not entirely apply in case of every planning exercise. Use of Info-GIS is completely discretionary and the final product may vary with the designer, although it still provides a fundamental basis for mapping the outcome of GIS-based community planning processes.

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