Education Course Submission

Speaker:
Eric Gilbey, RLA, ASLA
Landscape Architecture Industry Specialist
Nemetschek North America
7150 Riverwood Drive
Columbia, Maryland 21046 USA
Ph. 410-290-5114 x658
Fax 410-290-8050
Email egilbey@vectorworks.net

Speaker Bio:
Eric Gilbey, RLA, ASLA, APLD Assoc. is a Landscape Architecture Industry Specialist for Nemetschek North America, where he utilizes his professional experience and CAD skills to assist in the development, marketing and sales of Vectorworks Landmark. Eric received an AAS degree in Landscape Contracting and Construction and a BS degree in Landscape Architecture from the Ohio State University. He is currently serving as the secretary with both the ASLA Maryland Chapter's executive committee and the DC.MD.VA APLD Chapter Board. Eric's unique experience as a practicing landscape architect and user of various CAD programs allows him to help landscape architects and designers develop "best practices" including sustainable site design and site information modeling.

Presentation Title:
Creating Sustainable Sites Using Computer Aided Design (CAD)

Learning Objectives:
In this 2 hour presentation, attendees are expected to:

- Learn how GIS (Geographic Information System) file integration and Digital Terrain Modeling (DTM) within Computer Aided Design (CAD) can assist in Site Selection, the first benchmark within the Sustainable Sites Initiative™.*
- Recognize the collaborative needs of the Pre-Design Assessment and Planning benchmark within the Sustainable Sites Initiative™* and how to approach the Integrated Design Team with file exchange expectations.
- Understanding the 4 Site Design Sections (5 Areas of Focus) as proposed by the Sustainable Sites Initiative™*.
- Learn how site specific and intelligent features such as Informative Polygons; 3D Models, Hybrid Plant Data Objects; Plant Databases, Solar Animations, Custom Reports, and many others can be essential tools in meeting the objectives of a sustainable site.

*Source: The Sustainable Sites Initiative Guidelines and Performance Benchmarks – 2009

Session Description:

Creating Sustainable Sites Using Computer Aided Design (CAD)

The demand for sustainable sites has been growing in popularity and necessity. We can recall how, as children, we were taught to manage our resources better. We would like to pass that valuable advice on to our children and future generations, so that the resources to which we are accustomed can be appreciated for years to come. Many may recognize that the necessity to live sustainably is not new. It is time to reexamine age-old methods of site stewardship as possible solutions for today, as our resources are limited.

So how can we reapply the old ideals of sustainability, and the newly recommended 'Site Design Sections' by the Sustainable Sites Initiative (SITES), to our current methods of computer aided design? These do not have to be separate processes in and out of CAD applications, making the whole effort more costly and clunky.

Many landscape architects and landscape designers reserve the process of computer aided design to the design development and construction document stages of a project. However, with the integration of Digital Terrain Modeling and GIS files into the CAD process, the ability to analyze and conceptualize a proposed site encourages the utilization of CAD much earlier. Thus, the transition from start to finish can be made and in some cases, within the same program.

This presentation will highlight the tools offered by general and site design specific CAD programs. Because of these tools, sustainable design functions such as erosion control, runoff calculations, cut and fill calculations, existing/proposed plant tracking, native plant selections, and sun/shade analysis can be accomplished.

Course Outline:

I. **Introduction:** What is Important to Consider in **Site Selection?**
   a. GIS File Integration into CAD files
      i. Soils, Wetlands, Existing Resources, Transportation, etc.
   b. Site Selection Prerequisites and Credits
      i. Locating and importing GIS files into CAD to:
         1. Preserving prime farmland
         2. Protecting floodplains
         3. Protecting Wetlands
         4. Preserving Threatened/Endangered Species/Habitats
         5. Encouraging development in Brownfields/Greyfields; Existing communities; Non-motorized transportation areas
      ii. Utilizing GIS in CAD for Site Selection makes future base file creation easy.

II. Pre-design Assessment & Planning
   a. CAD does not necessarily constrain the exploration of opportunities for site sustainability
      i. Integrate site development process
      ii. Engage users and other stakeholders in site design
   b. The use of CAD applications that have various import/export formats will help as the Integrated Design Team collaborates.

III. Site Design Sections

- **a. Water**
  - i. Prerequisites and credits
  - ii. Reducing potable water use for landscape irrigation
    1. Plant data and database: Choosing best plant based on water needs factors
    2. Worksheets: Water budget calculations
    3. Worksheets: Irrigation Calculattions
    4. Roof area tools: Calculating captured rainwater
  - iii. Protect/restore riparian, wetland and shoreline buffers
    1. Informative polygons for proposed planting masses or land cover
    2. Data reported to worksheets, including plant list or surface cover charts.
    3. Fully editable polygons provide ability to change shapes and report areas
  - iv. Manage Stormwater on-site
    1. Digital terrain models help to provide 3D base and informative too.
    2. Site modifiers of DTMs allow us to test our own ideas in holding stormwater on-site.
    3. Cut/Fill calculations help to verify grade gains and losses allowing users the chance to minimize soil movement.
    4. 3D representation helps visualize grade changes: retention pond example
- **b. Soils**
  - i. Credits
    1. Informative polygons (landscape areas) assist in labeling elements and reporting data to schedules; helpful in generating vegetation and soil protection zones (VSPZ)
    2. Addition of plant data and distribution rates help quantify plants for restoring plants to disturbed areas.
    3. Offsets and Boundary type tools allow for quick minimum distances and setback delineation
    4. Digital Terrain Models (DTM), can be utilized for the site's slope analysis and erodability concerns
- **c. Vegetation**
  - i. Credits
  - ii. Control known invasive plants; use non-invasive plants
    1. Plant Databases within CAD applications
       a. Link to regional invasive plant data
       b. Customizing plant database for invasive plants and control measures
  - iii. Preserve/restore appropriate plant biomass on site
    1. CAD tools such as Record Formats and Attributes provide ability to place added data on objects, such as biomass data on plants and plant masses
  - iv. Use native plants
    1. Plant databases should recognize native plants and help sort to pick the best choices for particular sites
    2. Plant massings or informative polygons can house information such as existing plant communities for recognition of native plants to be preserved.
  - v. Use vegetation to minimize building heating/cooling requirements
    1. Plant object tools/settings can help make practical use of plant locations

2. Solar studies, including solar animations help analyze affect of vegetation placement to ensure proper shading is occurring for energy efficient cooling of buildings.

vi. Reduce urban heat island effects
1. Callouts and multileaders are examples of labeling conventions to help place additional information to objects, such as plants and materials that have specific purposes in sustainable design, such reflective surface materials and plants shading pavement surfaces and parking areas.
2. Similarly, record formats and attributes, etc can help "Tag" objects to then be reported when material lists need to call out their sustainable features.

d. Material Selection

i. Prerequisites and credits
ii. Maintenance of existing structures and surfaces:
1. Importing of images, world referenced images, as well as other file types, make quick work of cataloging existing structures and surfaces for reuse
2. Informative polygons help to calculate and report area for these objects
iii. Reuse salvaged materials and plants
1. Record formats and attributes are examples of how reuse and recycle information can be added to objects and features in our site design…the ability to report always makes this added step worthwhile.

e. Human Health and Well Being

i. Credits
1. Protect/maintain unique/cultural/historic places
a. Integrating GIS into CAD examples (culture and historic shapefiles)
2. Provide for optimum site accessibility/safety/wayfinding
a. CAD tools like a grade calculator can help determine and design with ADA accessibility in mind
b. DTMs and 3D models and Walkthroughs can help set up realistic views to verify user safety on site and clear views into and from spaces can be less intimidating and ensure safety
c. DTMs and Visual Influence zones help to realize when positive or negative views become a concern because of elevation changes
3. Reduce Light pollution
a. Photometric Study tools quantify footcandles, while Light Objects represent emitted light to ensure placement of light does not adversely affect users or neighbors.

IV. Acknowledgements

Course Synopsis:

CAD programs in general have the ability to extract data from simple geometry, such as lines and polygons. However, with the right software tools site design professionals are able to create, model and present within their CAD applications, as well as analyze, report, and select materials more appropriately. The intuitive processes mentioned in this session will address the 'Site Design Sections', such as soils, hydrology, vegetation, materials and human well being, as proposed in the latest Sustainable Sites Initiative Guidelines and Performance Benchmarks – 2009