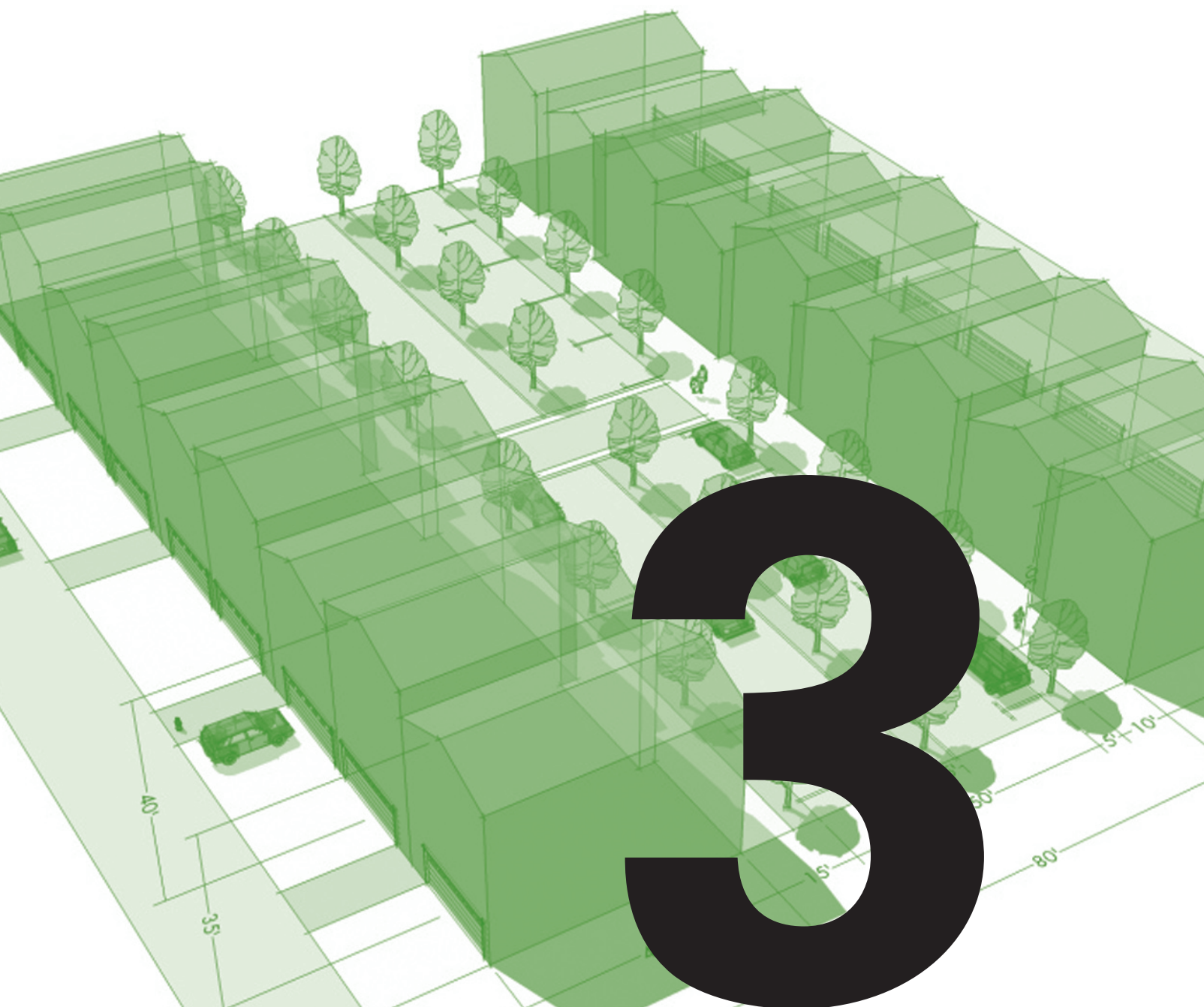# ZONING PRACTICE MARCH 2012

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New Tools for Zoning and Development Visualization

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Plans have almost always included figures and photos to explain recommendations and planning concepts, and now zoning ordinances, design guidelines, and other regulatory tools are starting to follow suit.

All images by Houseal Lavigne Associates

Supporting illustrations, sketches, and photos integrated into these documents can show standards that the text describes, and development visualization can show what our codes strive to foster. Even if you are not a "graphics" person, it is still important to know what today's tools are capable of and build an appreciation for the inclusion of graphics to improve the usefulness of documents that have traditionally been text based.

Technological innovations have changed how documents are prepared, printed, packaged, and distributed. In the past these documents would sit on book-shelves in the back offices of city hall or be served online through a static website as pure text, stripped of maps and graphics. As our tools, software, and the web evolve, so must our practices, codes, and ordinances. The increased transparency in government and the availability of digital documents has broadened the audience of potential users and readers, and expectations of easy access and user friendliness are at an all-time high. However, in light of all the technological advances in graphics and visualization, and the increased document accessibility and awareness, many communities and planning professionals struggle with how best to appropriately and effectively utilize these new tools to create better, more user-friendly codes, guidelines, and ordinances.

This article highlights the software and techniques that can provide the imagery to enhance zoning ordinances, explain zoning changes, and highlight the development potential of key sites. It reviews common and attainable software tools, including Google SketchUp, Google Earth, Pictometry, and Adobe Photoshop, and explains how each program can be used independently or together to enrich documents and improve land-use and development regulations.
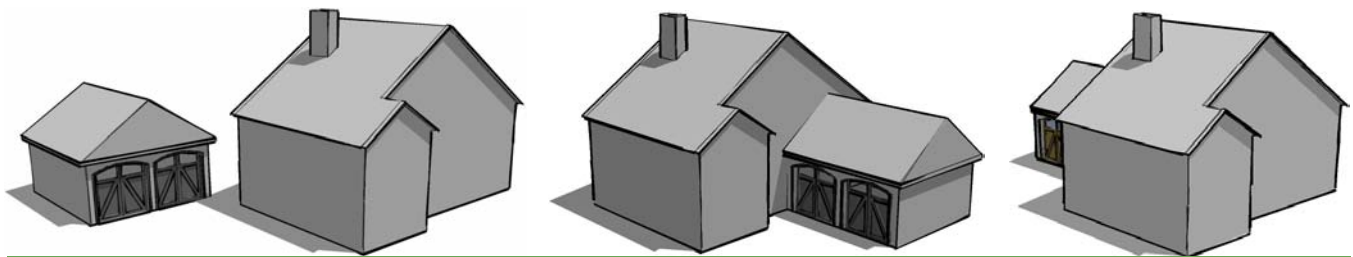
➔ Communities can use simple SketchUp drawings to illustrate design and development alternatives, such as permissible configurations for garages or alternatives for site development.

THE TOOLS

While no article could cover the full breadth of software and tools available, there is a small collection of programs that have emerged as the most common tools for the profession. Each of the tools and their applicability to creating development regulations is outlined on the following pages. Although not all the tools summarized are new, all have been recently upgraded or expanded, adding features that improve their usefulness in assisting with development regulation and visualization.

Google SketchUp

Google SketchUp has become firmly established in the planning toolbox primarily because of its cost and the fact that it is being taught and promoted in most planning programs. SketchUp was created by @Last Software in 2000 as a general purpose three-dimensional (3-D) modeling program that sought to simplify 3-D design and development. In 2006 @Last Software and SketchUp were purchased by Google, which now distributes the software at http://sketchup .google.com.

There are two types of SketchUp available: a free version for home and personal use and a professional version. For those unfamiliar with the program, the free version provides an opportunity to learn the software and become familiar with drawing in three dimensions. The professional version expands the software's exporting abilities allowing for better integration with other software, including AutoCAD.

SketchUp is easy to use and can quickly generate simple, dimensioned diagrams that can illustrate basic zoning requirements. More experienced users can create detailed models that can visualize new development and create scenes that portray activity, character, and excitement.

SketchUp has a number of features that make modeling fast and easy, including its ability to reuse and repurpose elements from drawing to drawing. By creating "components," SketchUp allows users to create reusable elements within individual drawings or between drawings. SketchUp's 3-D Warehouse (http://sketchup.google .com/3dwarehouse), which allows users to retrieve models that have been created and shared by others, is full of elements to add detail and interest to a model, including buildings, trees, people, cars, and other objects.

SketchUp also has the ability to create styles for line types, backgrounds, shadows, and other elements, making it easy for a city or private firm to maintain a consistent look and feel among drawings and illustrations.

Google Earth

Google Earth is a virtual globe that allows its users to view aerial imagery from all over the world. Developed by Keyhole, Inc., it was

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acquired by Google in 2004, which now distributes the software at http://earth.google .com. Like SketchUp, Google Earth offers free and professional versions. The free version's functions allow users to "fly" around the globe, download aerial images, view 3-D buildings and terrain, and perform basic measurements, including area and distance. Google Earth Pro extends the capability of the software by allowing higher-resolution image exports (4,800 pixels compared to 1,000 pixels), the ability to import GIS data, and in some areas, access to parcel and tax information. Recent improvements to Google Earth include access to historical imagery, the ability to place 3-D models created in SketchUp into Google Earth, and the ability

to control the location of the sun by date and time of day.

Pictometry

In 2005 Bing Maps (formerly known as Virtual Earth and Windows Live Local) started offering oblique-angle, bird's-eye imagery of cities and towns. These photographs are provided by the Rochester-based company Pictometry, which crisscrosses the skies in low-flying airplanes to capture images of Earth at different angles. While the usefulness of Pictometry photos on Bing Maps is mostly limited to seeing unique perspectives of Earth, software developed and provided by Pictometry significantly extends the functionality and usefulness of these images. As Pictometry captures its photographs, each pixel of the images is georeferenced in three dimensions—latitude, longitude, and altitude. With Pictometry Online, Pictometry Field Study, or its plug-ins for ArcGIS and AutoCAD, end users are able to measure area, bearing, distance, height, elevation, and slope/pitch of anything visible in the image.

Adobe Photoshop

Adobe Photoshop is a raster image editing program that has been around for more than 20 years. Although there is little competition for Photoshop, Adobe continues to make improvements and add enhancements, releasing a new version about every 18 months. Adobe Photoshop CS5 was released in 2010 and added several new features that assist in creating and altering images and graphics that support the needs of our profession. As it relates to codes, ordinances, design and development guidelines, and development visualization, Photoshop provides a powerful tool to quickly generate alternative outcomes and desired ends. Existing conditions can be "altered" by deleting or removing undesirable elements or adding missing and desired features and details. Photoshop can also be used to manipulate 3-D images generated in SketchUp and aerial imagery from Google Earth and Pictometry.

Internet Imagery

As we enrich our documents with images of desired and undesired elements, we are sometimes without the image we want or need to use. While using your own photographs is always the recommended first option, the Internet can be a valuable resource for finding images we cannot capture ourselves.

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The photo management and sharing website Flickr (www.flickr.com) allows users to easily upload full-resolution images and to tag those photos with keywords and places. Many photographers on Flickr have made their images available through Creative Commons licensing (http://creativecommons.org). Other websites, such as iStockphoto.com and shutterstock.com, provide large libraries of stock photos tagged with keywords that can be purchased for a small price.

SketchUp Plug-Ins

SketchUp's default output can be best described as line drawings that simulate pen and ink or pencil and paper. While this may be acceptable for supporting illustrations of codes and ordinances, its inability to render photorealistic images for visualization projects can sometimes fail to capture

a potential development's true essence. However, other companies have developed plug-ins or add-ons that expand SketchUp's functionality.

For example, plug-ins like Maxwell Render or V-Ray allow users to assign materials to their models, add light sources and atmospheric conditions, and place cameras to render and capture photorealistic scenes. Although higher-end dedicated 3-D programs like Autodesk's 3ds Max and Maya are capable of the same output, SketchUp-integrated plug-ins have a smaller learning curve for those already familiar with the software.

⊙ Planners can also use SketchUp to create detailed drawings for development visualization.

APPLICATION OF THE TOOLS

Next we turn to an exploration of how these new tools can be used independently or together to enrich and improve development regulations and visualization processes.

SketchUp

SketchUp is the perfect tool for creating simple illustrations to support a zoning ordinance. Using its dimensioning tool, a user can create a basic illustration of minimum and maximum setbacks and height and define the "building envelope" for any lot.

The Village of Prairie Grove, Illinois, is a small, growing community located about 30 miles northwest of Chicago. In 2005 a 1,500-acre annexation and development proposal prompted the village to adopt design and development guidelines covering architecture, materials, building placement and ori-

entation, and the design of the right-of-way. Our firm created SketchUp illustrations to add interest to the guidelines and illustrate various recommendations.

SketchUp also has the ability to create detailed drawings, making it an effective development visualization tool. The images above were created to visualize a recommendation to convert an unfinished development site into a public plaza until such time that development may be feasible. Graphics prepared for the assignment include several perspectives of a detailed SketchUp depicting site elements such as outdoor dining, active open space, and improved circulation.

Pictometry

The real power of Pictometry images is the geographic information they contain. With Pictometry's measuring tools, you can document the existing built form (an important first step in developing a form-based code) and build an accurate 3-D model with properly scaled buildings and structures.

How accurate are the measurements from Pictometry? In a recent assignment for Westfield, an international shopping mall operator, we created a cross section for a distance of 1,000 linear feet—from a highway interchange to the location of new pylon sign being proposed by Westfield. Between the highway interchange and the sign were power lines, pole signs from other businesses, traffic signals, and a fairly significant change in grade, all affecting the sign's visibility and line-of-sight from the interchange. Our exhibit, based solely on measurements obtained from Pictometry, illustrated that the proposed sign would be slightly visible above all of the existing structures and signage and helped to demonstrate the justifiable need for a variance to permit the height of the proposed new sign.

Photoshop + Pictometry

Pictometry images opened in Photoshop have no georeferenced information; however, they still provide an excellent resource to quickly visualize development.

In the Chicago suburb of Mundelein, Illinois, the state has acquired land for a future highway and is waiting for funding for construction and additional land acquisition in adjacent communities. Over the last 10 years new development has grown adjacent to the fallow right-of-way. In order to illustrate what the future highway corridor

⊙ These images show how Pictometry images were combined using Photoshop to illustrate a new highway in Mundelein, Illinois.

➔ Pictometry images can also be combined using Photoshop to show the potential for repairing a discontinuous street wall, as in this example from Downers Grove, Illinois.

will look like, we used Photoshop to scale and merge two Pictometry images: an existing oblique angle image of the area and a recently constructed highway segment 20 miles south.

This technique is equally effective in urban areas. In another community, our goal was to show how the fabric of a downtown that had been weakened by auto-oriented development could be repaired through strategic infill. We used Photoshop to blend and scale a Pictometry image of a desired development into an existing Pictometry image of downtown. Photoshop also allowed us to clone the parking areas in the rear and sidewalks in the front to create the desired character.

SketchUp + Google Earth + Pictometry
SketchUp closely integrates with Google Earth imagery, allowing you to retrieve an aerial photograph that can be traced to create a 3-D model of a place or area. The resolution of the import image is defined by a fixed import window. This can be problematic if you are trying to accurately trace existing conditions of a large area brought into SketchUp with a single import. When you import an aerial image of a large geographic area, important details are not always clearly discernable, including building footprints, sidewalks, parking areas, and other features. To overcome this, you can simply

zoom into sections of your desired area and import smaller, higher resolution pieces that SketchUp will place in its proper geographic location, allowing you to "stitch" together multiple images.

Combined with detailed measuring ability of Pictometry, SketchUp can deliver a quick massing model of an area. This can be used to serve as a simple reference drawing for notes and recommendations, or as a contextual model for development visualization.

CONCLUSION

It is important to note that the programs, tools, and techniques I covered in this article are not the definitive list. Software companies will continue developing software, and cutting-edge firms and ingenious planners will continue to find new ways to create better documents.

Take for instance City Engine. Developed by Procedural in Switzerland and recently acquired by Esri, City Engine is a software application for the design, planning, and modeling of cities and urban environments in 3-D. City Engine allows professional users to quickly generate 3-D cities from existing 2-D GIS data; do conceptual design in 3-D, based on GIS data and procedural rules; and efficiently model virtual 3-D urban environments for simulation and entertainment. City Engine users can "grow streets" based on different parameters (i.e., curvilinear, block, organic) and create blocks that can be subdivided and "developed" based on a set of rules for setback, lot size, building height, and several other parameters.

Finally, as you begin to include and introduce graphics and illustrations to improve the effectiveness and user friendliness of your products, remember that everything conveyed in this article is only a tool or a technique and that supporting graphics should be used appropriately. Knowing when to use an illustration is as equally important as how to do an illustration.
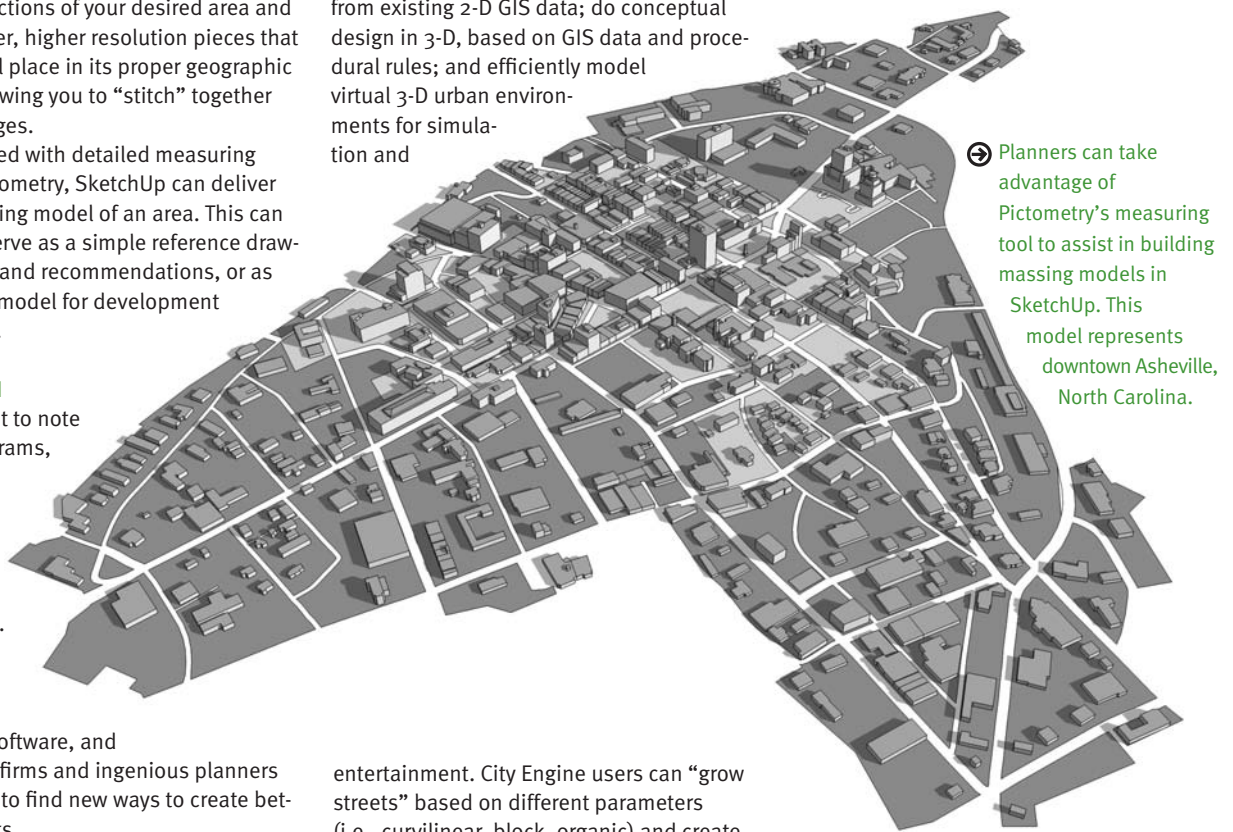
➔ Planners can take advantage of Pictometry's measuring tool to assist in building massing models in SketchUp. This model represents downtown Asheville, North Carolina.

RESOURCES

- Google SketchUp
  http://sketchup.google.com

- Google Earth
  http://earth.google.com

- Adobe Photoshop
  www.adobe.com/products/photoshop

- Pictometry
  www.pictometry.com

- Pictomtetry Online
  http://pol.pictometry.com

- V-Ray
  http://chaosgroup.com

- City Engine
  www.esri.com/software/cityengine

- 3D Warehouse
  http://sketchup.google.com/3dwarehouse

The cover depicts a Google SketchUp model created to illustrate design guidelines for the main street of a town center development. © Houseal Lavigne Associates

IS YOUR COMMUNITY MAKING THE MOST OF NEW VISUALIZATION TOOLS?

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