

3D GIS Implementation Using Esri's City Engine Software

Those of you who receive Esri flyers and announcements have probably noticed the amount of attention 3D GIS is getting. Over the last few years the emphasis on developing and utilizing 3D GIS has greatly intensified. After all, the ability to employ a 3D GIS for: (a) flood modeling, (b) visibility analysis of new developments, (c) line of sight analysis and (d) redevelopment scenarios is a tremendous asset. However, there are questions as to: (a) how long does it take, (b) how difficult is it and of course, (c) how much? Well, utilizing Esri's City Engine software and depending upon the Level of Detail (LOD) that is desired, developing a 3D GIS is not as difficult or expensive as one might think.

2D GIS Data Migration

The CEDRA Corporation is able to assist clients in preparing and migrating their 2D GIS data to the City Engine environment. It cannot be understated that a little preplanning goes a long way in mitigating the amount of post-processing or "cleaning" of data in City Engine. Having gone through this process, CEDRA staff is well versed in making sure that the 2D GIS data is in good condition for importing into City Engine.

3D Street Modeling

Once imported into City Engine, CEDRA can assist clients in applying the Complete Streets CGA Rule to create realistic and informative 3D streets. Using City Engine's interactive interface in conjunction with the Complete Streets' vast number of street parameters, planners can create various street designs quickly and easily.

Shown in Figure 1 is an example of how a street can be modeled having no median (left most image), a median with trees (center image) or a median with barrier, sidewalks and side street parking (right most image) by simply changing a few parameter settings. Other parameters that can be controlled include Stop Markings, Crosswalk Markings, Lane Width, Bus and HOV Lanes, Bike Lanes, Sidewalk Plantings, Sidewalk Benches, Sidewalk Lights, Parking Meters and much more.



Figure 1 - Various Street Designs using the Complete Street Rule

3D Building Modeling

One of City Engine’s powerful features is its ability to generate realistic 3D Buildings. Pre-defined City Engine building rules can be employed or custom-building rules developed and applied. Depending upon the client’s requirements, CEDRA staff will assist in developing and applying the appropriate rules to achieve the desired look. In creating the buildings, information such as building height, number of floors, roof type and so forth can be taken into account to render a realistic building image. The generation of the buildings is facilitated when this information is stored as attributes with the building footprints. The more building information stored in the database the more realistic building that can be generated upon import.

3D Terrain Modeling

In developing a 3D GIS, a Digital Elevation Model (DEM) or Digital Surface Model (DSM) can be incorporated. Using one of these terrain models a 3D GIS such as that shown in Figure 2 can be created. Examining the street in the low left corner of Figure 2, it can be seen how the road has a dip in it. This is because 3D street centerlines were created using a DSM. In so doing, the 3D GIS properly reflects the surface of the terrain. Note that if a client does not have a DEM or DSM, City Engine provides the ability to download one from within the City Engine software. Utilizing a DEM or DSM truly provides the ability to create a realistic 3D GIS.



Figure 2 - 3D GIS Incorporating a Digital Surface Model

The CEDRA Corporation

CEDRA has over thirty years of experience in developing, maintaining and marketing world-wide, mapping, engineering and GIS based software products for municipalities, tax assessors, industry, engineering firms, and others. Its professional services division offers database management, database building, data capture, asset inventory and management system development, application software development/customization and training services providing an efficient environment for implementing the company’s products. As a long time Esri authorized developer and reseller, CEDRA is extremely knowledgeable in the development, use, implementation and integration of Esri’s desktop and server based GIS software. In addition to providing City Engine implementation services, CEDRA has also assisted numerous municipalities in the implementation and deployment of ArcGIS Online and Survey123 for ArcGIS.



The CEDRA Corporation
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