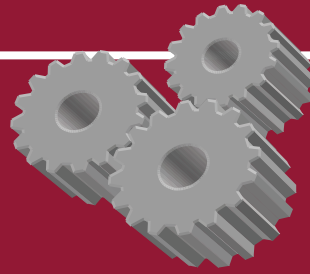


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The SLEngineer



September 2007

Volume 1
Issue 3

Engineering for the Universe Inside the Metaverse



Etopia

an
**Eco-Friendly
Sustainable
Village**

GIS MEETS SL



**Integrating GIS
Data with the SL
Client**

**Engineering Builds in
the Metaverse**

**Civil Engineering Train-
ing in Venufalat**

**September is National
Preparedness Month in
the US**

Prepare for the Unexpected by Taking Action Now

Every year, hundreds of natural disasters—ranging from blizzards and wildfires to hurricanes, tornadoes and flooding—wreak havoc on families, homes and entire communities across America. Often times, people are reminded to take action to prepare before these events happen, but sometimes they occur without warning. Our lives can be changed in an instant by a number of different emergencies, and we are constantly reminded of this each time we watch the news.

Yet, too many Americans have not taken steps to prepare. There are simple steps each of us can take to prepare before an emergency happens. Emergencies will happen, but taking action now can help us minimize the impact they will have on our lives.

That's why this September, National Preparedness Month, is all about helping individuals, families, businesses, and communities to take action! September is an ideal time for individuals and families to update their emergency supply kits and family emergency plans and to become better informed about different threats and local emergency plans. Many things can change over the course of a year, and it is imperative that the entire family have the most up-to-date emergency contact information and a family emergency plan as they head back to school and work. It's about talking to your families and figuring out what you should do if an emergency happens in your community. Where will we meet? What emergency supplies will we need and where should we keep them?

This nationwide effort is to encourage individuals and families to take simple steps to prepare for emergencies in their homes, businesses, and schools. Throughout September, the U.S. Department of Homeland Security will work with a wide variety of organizations to highlight the importance of emergency preparedness and promote individual involvement through events and activities across the nation, such as first aid trainings, town hall meetings, and much more.

Free preparedness resources are just a click away at www.ready.gov or www.listo.gov. The site has information about the simple steps you can take to prepare and provides templates such as a Family Emergency Plan and an Emergency Supply Checklist. There are also special sections for kids, ages 8-12, (Ready Kids) and small- to medium-sized businesses (Ready Business).

This September, The U.S. Department of Homeland Security is highlighting the importance of emergency preparedness nationally. And we're acting on the local level as well.

—U.S. Department of Homeland Security



CIVIL ENGINEERING TRAINING BY GATEWAY

On August 1, 2007, Wisconsin-based Gateway Technical College opened a virtual training site in Second Life offering civil engineering-related course work to complement the school's real life, full-service campuses located in the following cities in Wisconsin: Kenosha, Racine, Elkhorn, and Burlington. The school has taken advantage of the potential within Second Life to pack a lot of information into a small site and provide classes to people across the world.

Visitors to the site, located at Venufalat 201.214.96, will find an instructional video that explains how to use the site. At this time, the school is offering classes in the following subjects:

- Civil Engineering Materials
- Introduction to Autocad
- Introduction to Excel
- Civil Engineering Structural Mechanics

- Principles of Electrical Engineering
- Digital Electronics
- Telecommunications

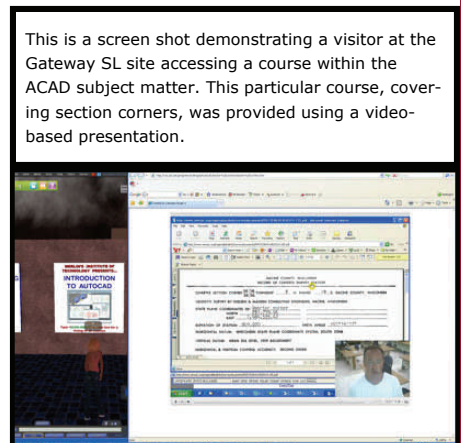
By typing in the chat line a specific phrase unique for each of those subjects, a listing is displayed for all classes available within that subject group. For example, below are a few of the classes offered within the Civil Engineering Materials subject:

- 3 Phase Diagrams
- Moisture Content
- Unit Weight
- Density
- Dry Unit Weight
- Saturated Unit Weight
- Degree of Saturation

To access these specific courses, the visitor types in the code for that specific class

in the chat line, and a book pops up with a link to the Web site hosting the course. Each course is unique with some offered through interactive, animated slides and some displayed with video-based presentations.

More information about Gateway Technical College can be found at: <http://www.gtc.edu>



Modeling Sustainability in Second Life



With all the publicity surrounding the social and business aspects of Second Life, the 3-D modeling capabilities of the software are often never discussed. However, planning and design professionals who, after reading stories about its many virtual wonders, may initially enter SL out of curiosity, soon realize the potential of the software to enhance their real life work.

WilliamTheWise Goodman is one such individual. With a background in biology and environmental planning, he saw the potential in Second Life to construct a representation of a sustainable community. His sim, Etopia, was initially developed to serve as a location of a film about a future city that is completely sustainable. "However, as soon as I got into it, I realized that this was my chance to showcase all the sustainable development things I have been working on for the past 30 years and put them all in one place," said Goodman. "I also

thought it would make for a cool place for people to visit, live, and work in."

This sense of place, a feature that all planners strive for in their real life community developments, is felt throughout Etopia. From its pedestrian boulevard in the center of the business district to its community housing and gathering places, Etopia welcomes visitors

into a relaxing and well-thought out village.

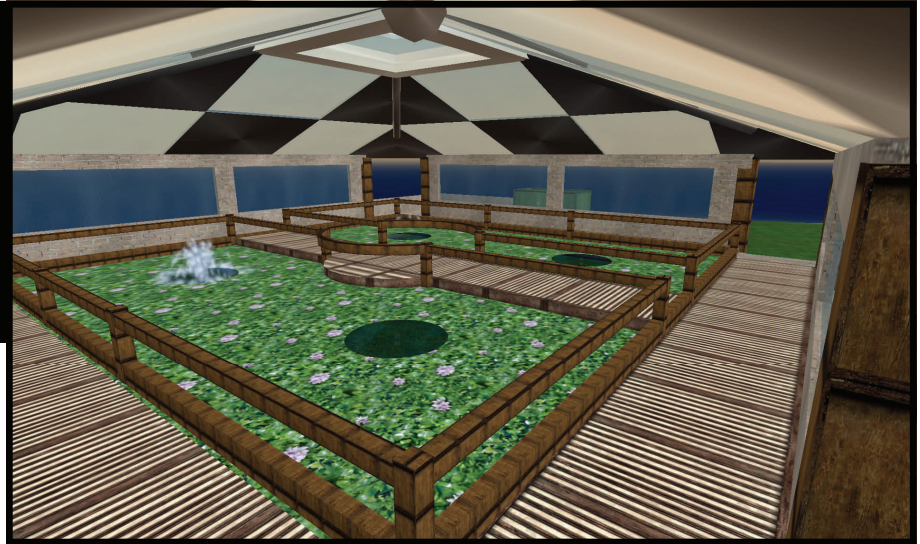
Officially opened on Earth Day, April 22, 2007, Etopia offers a downtown with a cohesive, welcoming, mixed-use design where people can rent space for their businesses or offices or living space. Typically the units are rented by those who have an interest in sustainable development

or environmental work. "The entire island has the type of theme that the people who come here are usually open to or very supportive of," said Goodman.

"SL gives professionals like myself the ability to take an imaginary or a real location and show how it could be modified for a fraction of the cost."

-WilliamTheWise Goodman

A wastewater treatment plant has been constructed on Etopia to demonstrate the use of aqua-cultural treatment of wastewater. "Bacteria and the water hyacinths pull out most of the toxins," said Goodman. More stages of treatment have yet to be constructed.



Some of the business tenants include Handmade Tees, Earthshots, Lightworks, Ties R Us, International House of Style, Ivy Lane, Handmade Furniture, Shine Designs, Maxi's Place Organic Coffee House, and the offices of Prim Chemistry Designs, Dorothy Oyen Building, Badwolf Multi-Media Design, Hippyjim Starbrook Scripting, the Green Islands Project, and Fishace Ecological Engineering.

The island also offers residential housing in the Bayview Cohousing Community—a group of 22 attractive, multiple-family dwelling units surrounding a central courtyard with a community garden and community house nearby.

Other areas of the sim are dedicated as gathering places including a protected beach area with Miguel—the whale, a sandbar, and an inflatable Greenpeace boat that can be used by any visitor for close-up whale

watching. The Bayview Amphitheater, located next to the beach, offers seating for presentations. There is also a forest area with a drum circle and areas for meditation. Goodman hosts regular events such as music festivals, educational classes and tours, and gatherings for island residents. He recently hired an event manager to further expand the island's offerings. "We are looking at making a self-guided tour with voice," Goodman said. He has also established a group in SL—Etopia Environmental Eco-Village—to help support his efforts and events.

The environmental theme of the island is enhanced with supporting infrastructure such as a solar PV farm, large MW wind turbines, and a biological wastewater treatment plant facility. Transportation features on the island also support the concept of sustainable, renewable energy. There are no roads for vehicles; instead, walking, biking, and the use of public



A gondola, cable ride takes visitors from the downtown and housing areas to the top of the mountain. A train carries visitor around the island, stopping at several stations along the way.



For those interested in participating in a sustainable community, the Bayview Cohousing Community offers 22 apartment units for rent.

marketing and Webmasters to get their attention.”

Overall, Goodman believes that the capabilities of SL offer a unique and low-cost opportunity for environmental professionals to create representations of their

transit are encouraged. “The gondola and the train are the two main modes of transportation since we do not allow flying, and there are no cars here,” said Goodman.

The train operates on a schedule stopping at several stations throughout the sim. There is even a digital clock showing the anticipated arrival time similar to that found in a real life subway system. A similar clock is found at the gondola ride which takes a visitor from the downtown and housing area on a cable ride to the top of the mountain.

There are also hiking and biking trails that wind throughout the sim leading from the beach, through the forest and downtown, and into the mountain area.

Goodman also realized that Second Life offers innovative marketing opportunities for real life companies. He is working on bringing in real life companies interested in sustainable design and creating a marketing presence in SL. “Like a renewable energy company,” said Goodman. “I first wanted to have a finished place to show them, and now I am beginning to contact their

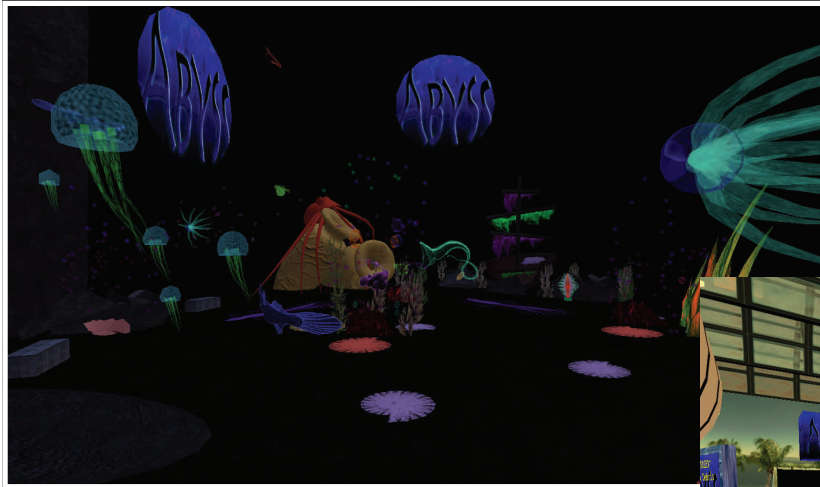
ideas and plans. “What is really missing in real life are examples of how we could restructure our communities or build new ones that were done completely on a sustainable model,” said Goodman. “SL gives professionals like myself the ability to take an imaginary or a real location and show how it could be modified for a fraction of the cost. It is the same reason architects use this to show clients what their home or office could look like.”



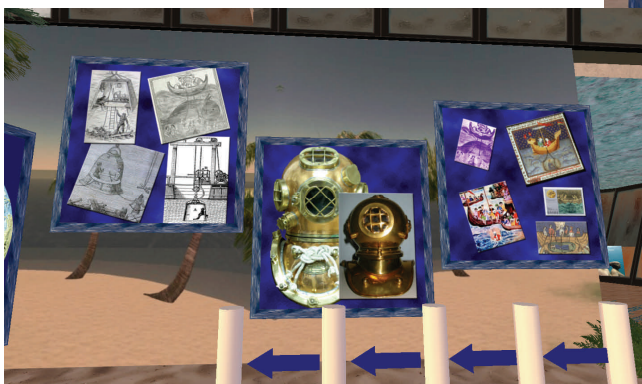
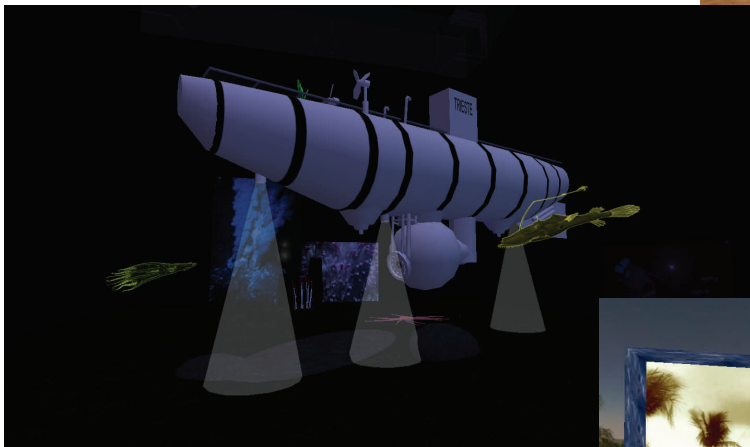
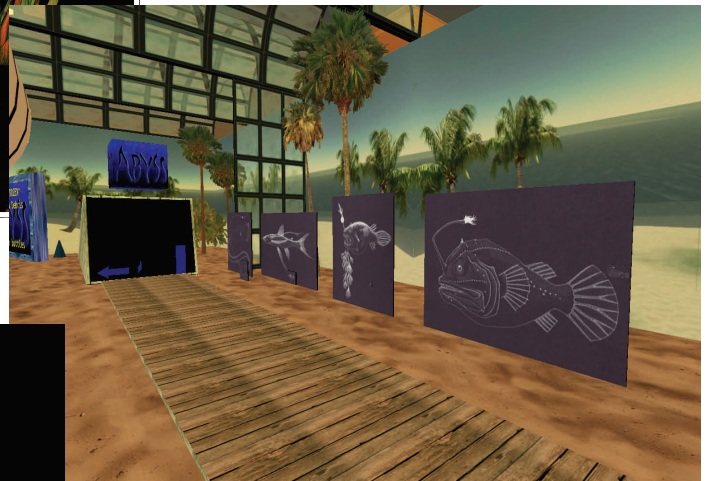
Several buildings are available in the mixed-use, downtown area of Etopia for rent by SL and real life businesses interested in promoting sustainable design.

ENGINEERING-RELATED BUILDS IN SECOND LIFE

In this issue we are profiling photos of the Abyss exhibit—an amazing virtual representation of ocean exploration. This exhibit, located at the Blekinge Sculpture Park, was only available from July 14, 2007, to August 31, 2007.



Although this exhibit is no longer available, the information within the Abyss Group in Second Life indicates that a new version of the exhibit is in the works and may be available in September. So if any of you could not make it to this exhibit, you might want to keep an eye out for the announcement of a future Abyss exhibit.



THE ABYSS

The Real World in Second Life



Imagine you are at home waiting for your road to be plowed. When is that city plow truck going to my street, you wonder? Not patient to sit and worry when you have to leave for work within the next thirty minutes, you go online and visit the virtual 3-D representation of your city that has been set up. There you can see all of the city's fleet driving around as they plow roads. You notice that crews have finished all of the roads lying south of yours, and the fleet is now within two blocks of your house. Sure enough as the truck begins to move down the virtual road in front of your virtual house, you hear the truck moving snow down the road outside of your real life home.

Today with the technological advances in geographic positioning and geographic information systems (GPS and GIS), modeling software, and 3-D worlds such as

Second Life (SL), this scenario is closer to becoming a reality than some may realize. The first step in getting it up and running is to take the available real life data and map it into a 3-D world such as Second Life. Some people, like Darb Dabney of Second Life, have already started this process by building in SL a virtual representation of the Downtown Berkeley BART station in California, which he calls Berkurodam. Berkurodam, a 1/3.048-scale model of the real site, can be toured at Gualala 200,29,57.

In integrating GIS and SL tools, Dabney said, "Using spatial technology (ESRI ArcGIS/ArcInfo and Leica

Geosystems ERDAS Imagine) and graphics tools (Adobe Illustrator and Photoshop), it is possible to precisely control the scale of georeferenced maps and imagery to guide construction using the tools integrated in the

"Immersive 3-D improves the use of GIS data, simply and profoundly, by enabling users to go into the map and walk around"

—Darb Dabney

Second Life client. Custom map images, rather than GIS data are imported.”

Although Berkurodam is best toured as a tiny avatar, 60 cm tall, you can visit and tour with your camera controls. Dabney said, “Berkurodam’s important difference is that one can descend an escalator or three stairwells, enter the station mezzanine, view the bike storage area, poke around the ticket machine, pass through the turnstile, and take the stairs down to the platform and see a train. When you can go inside buildings and look through a window, or traverse multiple levels of an underground structure, then you know you’re not in a globe like Google Earth any more.”

This ability to virtually traverse an area before having ever gone there in real life can be a benefit for those planning to travel to an area with which they are unfamiliar. Eventually real time data, such as train schedules, could be posted at a site like this. Also, virtual trains could arrive and depart in synchronization with the real trains at that station.

According to Dabney, the challenge of using GIS data directly with the SL client is that the basic geometry of GIS points, lines, and polygons does not work well with the data model that is used in SL. So if one were to import SL data into a GIS, the SL primitive 3-D objects or prims would be transcribed into the GIS as points. “These points would have extremely rich attributes,” said Dabney. “These attributes hold the prim’s parameters as numbers and objects, including type (box), position (x,y,z), size (x’,y’,z’), orientation (roll, pitch, azimuth), distortion (twist, taper, start-end extent), and possibly 3D-form (expressed as 2D U-V map), and for every face a texture (24- or 32-bit raster image objects). That way it’s easy in principle to export SL prims to GIS.”

The problem in directly importing GIS data into SL is that Havok Physics 1 within the SL region simulator does not recognize the

sequence in which primitive objects are linked, an ability that is necessary to define a line or curve. Without lines as a primitive feature in the SL world, Dabney did not see any method to import GIS line features, much less polygon boundaries or vertex-defined areas into SL at this time. “Instead,” Dabney said, “solving this problem amounts to coming up with some combination of analytical expressions for a real life feature; one takes a real life process and finds the equations and coefficients that fit. The process is more difficult than just tracing (the GIS lines and polygon approach), but when finished, offers benefits. Just as an equation has more predictive value than raw real life observations, the SL prim expression of a real life building lets Havok Physics know when your avatar is bouncing into a wall, or to compute object collisions and reflections all at 40 Hertz, providing the physics that makes the immersive 3-D world seem far more real.”

Even with these obstacles there is a benefit to modeling real life space in SL. “Immersive 3-D improves the use of GIS data, simply and profoundly, by enabling users to go into the map and walk around,” said Dabney. “It transcends previous techniques for presenting GIS data (paper and interactive 2D maps and 2-1/2D globes) by

In order to tour the virtual representation of the underground station at Berkurodam, visitors will either have to rely on camera skills or become a “tiny” avatar.



The Story of a Build

Buying land and creating a build can be time-consuming and even confusing to newer residents of Second Life (SL). There are classes on basic land ownership and building offered every day in SL, but sometimes just hearing the story of how another person moved through the entire process can be helpful. Darb Dabney's creation of Berkurodam is a good example of what types of challenges may arise and how they can be overcome.

Dabney entered Second Life in October of 2006. Once he decided to start building, he began looking for the right parcel, checking out neighborhoods and other builds in the area. Once land was purchased, he decided to start with pre-fabricated buildings and settle for just terraforming and landscaping his land. Eventually Dabney said, "I grew more ambitious and learned how to customize the houses and build structures and build things that took some learning. That transformed how I saw everything as I went around SL. I started to understand a bit more about how what I was seeing had been built and appreciated some of the detailed steps might have been involved in building them."

After this, Dabney came up with the idea of building Berkurodam. "Familiar with Google Earth and MS Virtual Earth, I saw that getting beyond those would involve an accurate, multilevel underground structure. Obviously my parcel wasn't as big as I needed to build much real life (RL) world, and as soon as I started measuring the sorts of structures I wanted, I realized that with a geographic information system (GIS), I could build at any scale that I desired. To prove value of SL and immersive 3-D versus globe models, I had to enter and explore an architected underground space. The smallest avatars that I could find were the Tinys, all about 60 cm tall, about 1/3 my height, so I realized that I could not scale down my structure below 1/3 and still walk around inside it, so I settled on (1 foot = 0.1 meter) or 1:3.048 scale.

Among parcels available at my chosen site, there were a few nasty advertisements and random small parcels placed nearby. I tracked down the owners and made my best effort at negotiating a sale or trade. In that process, I met some really beautiful avatars and most were also rather nice. There was even a tiny plot that had been abandoned and that Linden Lab sold to me. I made seven transactions to consolidate the parcel for

Berkurodam. All this effort made me appreciate that my neighbors were from all over the world: Australia, New Zealand, Japan, Germany, Switzerland, even San Francisco and Palo Alto." At this point, Dabney spent time researching the integration of SL and GIS. He read news stories, talked with colleagues, and made projections of the RL city where he works onto 256-square-meter tiles to estimate the complexity (and costs of) a move to a full-scale virtual model of the city.

Then Dabney began the actual construction of Berkurodam in SL. "I made RL site measurements and shot RL texture photos. I made many visits with a (four-foot-circumference) measuring wheel and made detailed floor plan maps on the spot, because I did not have access to any CAD drawings. At this stage, because I was really concerned about how to model the underground building accurately, I would visit the site during lunch and work on modeling it for some hours before going to sleep. After awhile, I had the weird experience that I would look at a structure and actively decompose what I saw in the architecture into combinations of primitive shapes. This sort of thinking might be common to architects who design structures, but it was very new for me, approaching this from the GIS side of things. I had been spending my 2100h to 0000h, three hours a night, working on the build for so many nights that my sense of building was leaking over into my daytime hours. Essentially, the SL virtual world was pressing against my RL world."

As his build has evolved, Dabney said, "I had learned a few techniques that helped me to mitigate certain aspects of my outside constructions. But the shift in my perspective was that my effort was just about my Berkurodam project, and how that build helps me create products useful in teaching and presenting the immersive 3-D concept to the GIS, local agency engineering, and local government communities. I'm almost out of resources for the parcel, primitive-wise, and must replace existing objects with more efficient ones in order to add new objects. The working reality for Berkurodam is that it provides a sound stage for making downtown Berkeley machinima, and a set for many static shots that prove the state of the GIS-in-SL concept."

Even more information and descriptions of Dabney's building process can be found on his blog at <http://blog.secondlifegis.com/>.

allowing the full walk-through experience that has been available in CADD renderings for about 15 years. It even goes beyond that by allowing multiple simultaneous users to experience the environment, see each other, and interact among themselves.”

As for the future of GIS and SL integration, Dabney is definitely moving towards the day when entire real life cities will have virtual simulations of the real life terrain, structures, landscaping, and infrastructure. He said, “I seek to learn the most economical means of building a unified spatial environment for local government operations and shared public use (letting property owners refine their own homes and gardens and set public access to that space).

Think of any service your city or county provides, and perhaps 80% of these services could be tracked in near-real time in a virtual model. That sort of model could be a single, shared-enterprise, spatial-information context of choice, a few years from now.”



The entrance to the underground station is located in the round structure located near the center of the site.

GIS Resources in SL

There are two primary geographic information system (GIS) groups that have been established in Second Life (SL). One is the GIS Users Group (GISUG), set up by Neo Prinz and open to GIS users, programmers, developers, managers, educators, and businesses interested in Second Life and real life geographic information systems. This group meets at the Open MLS office on Sede di Marte. Group notices are sent out with meeting details.

The second group, Second Spatial the Metaversal GIS Interchange Association (M-GIS IA) was founded by Darb Dabney for the purpose of connecting GIS data with its 1:1 scale Metaverse equivalent. Its members spend time in-world exploring ways to efficiently translate real life (RL) digital map data into usefully accurate and acceptably aesthetic models in SL. This group is supported by a Web site at <http://secondlifegis.com>.

Dabney also recommends joining the RL Architects in SL group, founded by Keystone Bouchard. This group is open to RL architects, architectural students, urban planners, developers, or anyone with an interest in how Second Life can be used as a professional or educational tool.

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Know what's below. Call before you dig.

Anyone can terraform anytime in Second Life, but before you do in real life, remember to call 811 to request the location of underground utility lines.

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