This edition of the **3D Atlas of Ann Arbor** contains virtual reality models for the entire city of Ann Arbor that are geo-referenced to work with Google Earth® and rest in relation to the underlying terrain in that software. There is geometry for just under 25,000 structures and there are many textured models. The models run in real time and may all be loaded simultaneously (given good hardware) to have a view of the broad context of the entire city while navigating different elements of the virtual Ann Arbor. The user of this Atlas should have, at least, downloaded a free, current version of Google Earth® and have it running on his/her computer desktop. Then, all that is required to launch the models in Google Earth® is to click on the links to various .kmz files throughout the Atlas. Readers are shown static screen shots of the dynamic files so they can get a rough idea of what should come up. Please, however, do not assume that the static image says it all—think of it as a picture on a cereal box—as a mere indication of what is inside!

- All University of Michigan buildings are included
  - All buildings have roof textures
  - All buildings have basements so there is no “floating” of buildings
- All footprints of buildings outside the university and outside the DDA have been extruded to an arbitrary height and have been geo-referenced and set properly against terrain in Google Earth®
CREDITS: The third edition...

...the third edition...

Finally, thanks to reviewers for constructive comment, to many others who have observed the development of this project, and to my family: husband, William C. Arlinghaus, son, William E. Arlinghaus, and, daughter-in-law, Kari Suffel Arlinghaus. Their patience and kindness have been critical to the development of these materials.

Kari Suffel Arlinghaus is a graduate student working on a Master's degree in Landscape Architecture in the Taubman College of Architecture and Urban Planning at The University of Michigan in Ann Arbor. As an undergraduate at UM, he was a star of the university golf team and has three times (including the past two summers) been City of Ann Arbor Men's Champion. Wallop's photo shows him on his virtual golf course.

Pete Beier, Senior Researcher at the Virginia Tech Virtual Environments Collaboratory and author of the virtual maps of historic buildings in the Current files, and their immediate predecessors, was also involved in the production of the map files for the Current files and their immediate predecessors. His expertise was invaluable in the production of the maps, and his attention to detail ensured that the maps were accurate and up-to-date. His contributions were essential to the success of the project.

The author would like to acknowledge the many people who have contributed to the development of the 3D Atlas of Ann Arbor, third edition. Without this group, this atlas would not be possible in its present form.

Donald T. Uchman, Coordinator of Space Graphics, Space Information and Planning, Plant Extension--AEC, The University of Michigan, generously shared official University map files on locations and sizes of buildings.

Merle Johnson of the City of Ann Arbor ITS Department and Chandra Hurd (later Gochanour) of the City of Ann Arbor ITS Department were also instrumental in the production of the map files. Their expertise in GIS and their willingness to share their knowledge with the author were invaluable.

Scott Hoffman, Manager of the 3D Laboratory of the Duderstadt Center at The University of Michigan, offered expert advice on giving demonstrations on the large size display screens available in the 3D Laboratory. Without his help, this atlas would not be possible in its present form.

Tracy Davis (Ann Arbor News), Vivienne Armentrout (Ann Arbor Observer) and the Board of Directors of the local League of Women Voters (Shirley Axon, Judith Mich, and others) were also involved in the production of the map files. Their support and encouragement were essential to the success of the project.

Community Systems Foundation group: John Nystuen, Gwen Nystuen, Fred Goodman, Barton Burkhalter, Ann Larimore, and Matt Naud, City of Ann Arbor Environmental Coordinator.

Community Systems Foundation Annual Conference.

Eric Loxterman (Chair-City of Ann Arbor Planning Commission) and Vince Canaves (Chair-Allen Creek Watershed Group).

City of Ann Arbor Planning Commission.

Matthew Naud, City of Ann Arbor Environmental Coordinator.

Community Systems Foundation group: John Nystuen, Gwen Nystuen, Fred Goodman, Barton Burkhalter, Ann Larimore.

Board of Directors of the League of Women Voters (Shirley Axon, Judith Mich, and others).

Tracy Davis (Ann Arbor News), Vivienne Armentrout (Ann Arbor Observer).

Group including folks from the City and from the University.

Merry thanks to Prof. Michael Batty, Ph.D., Director of the 3D Laboratory in the University of Michigan, for his ongoing advice and support associated with various projects related to this area. The staff of the 3D Lab, Lars Schumann, Scott Harris, Brett Lyons, Eric Baskiw, and Geoffrey Hekel have been helpful in so many ways.

Peter Beier's remarkably clear and beautifully conceived concepts in Engineering 477 taught the author concepts in 3D modeling that transcended individual software packages making it feasible for her to leverage a wide range of existing software to follow paths of interest. His graduate student instructors, particularly Thana Chirapiwat and Bonnie Bao, graciously aided her in learning to master the intricacies of modeling both in high-end graphics packages and in underlying source code (C++) that later proved of great value in merging files created for the Google Earth® displays in this book.

Lars Schumann offered wise suggestions concerning the display of the entire set of buildings. Not only did he initiate such suggestions but also followed through with the testing of their implementation. In addition he kept the author and others informed through his constant monitoring of the Google Earth® site of latest developments. Both he and Matthew Naud originally suggested to the author their interest in placing the existing 3D models into Google Earth®.

Scott Hoffman offered expert advice on giving demonstrations on the large size display screens available in the 3D Laboratory.

Without the group, this atlas would not be possible in its present form.

Kris Osawat, President of Community Systems Foundation, also helped to make the current work possible with his support of software. The importance of having Google SketchUp Pro® and Google Earth Pro® permitted the transition from GIS files to Google Earth Pro® and Google SketchUp Pro® files in a seamless manner using the GIS database to extract sets of buildings from data appearing in the First Edition.

Files generously supplied by IT folks, initially for the First Edition but which also play into the Second Edition:

Mark Johnson (City of Ann Arbor ITS Department and Chandra Hurd (later Gochanour) of the City of Ann Arbor Planning Department both contributed maps and data, the former was generous in sharing weekend and public maps from City of Ann Arbor files and the latter was helpful in sharing her expertise in analyzing city data and in checking selected files.

Current files, and their immediate predecessors, were also involved in this project. Their expertise was invaluable in the production of the maps, and their attention to detail ensured that the maps were accurate and up-to-date. Their contributions were essential to the success of the project.

Software and hardware used:

Google Earth Pro®

Google SketchUp Pro®

Adobe Photoshop®

Adobe ImageReady®

ESRI software: ArcInfo® GIS with Spatial Analysis® and 3D Analyst® (various editions)

Microsoft Office®

Windows XP®

Hewlett-Packard Pavilion® with Intel Pentium 4 Processor®

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Finally, thanks to reviewers for constructive comment, to many others who have observed the development of this project, and to my family: husband, William C. Arlinghaus, son, William E. Arlinghaus, and, daughter-in-law, Kari Suffel Arlinghaus. Their patience and kindness have been critical to the development of these materials.
Please note the following caution—while donations of digital material were all current at one time, there is a lag in creating materials from them. Regular updating of material continues.

To all of the individuals mentioned here, as well as to those mentioned in the 1st Edition, goes deep appreciation. Remaining errors are those of the editor and principal author alone.

...the first edition
In addition to those above, there are a number of individuals who were either important in the development or the use of the First Edition:

- Development—students from Prof. Beier's course, Engineering 477, Virtual Reality, Fall 2005, 2004, and 2003:
  - 2003: T. Kear, A. Lazzaro, P. Oppenheim, and A. Rosenblum

- Use—application employed by the Downtown Residential Taskforce:
  - Douglas S. Kelbaugh (Dean, Taubman College of Architecture and Urban Planning, The University of Michigan), Fred J. Beal (President, J. C. Beal Construction, Ann Arbor), Susan Pelkey (Executive Director, Downtown Development Authority), Karen Hart (Planning Director, City of Ann Arbor), Jean Carlberg (City Council), Wendy Woods (City Council), Steve Thorp (Chair, Planning Commission), Frances Todors (Mayor's Office), Robert Gilbert, and William G. Kelley. Their thoughtful comments have helped, in various ways, to shape selected images.
  - Brian Barrick and Peter Pollack, both of Pollack Designs, followed this work with interest, as did Ray Detter, DDA Citizens Advisory Committee.

The First Edition itself, is the best source of notation of other individuals who have participated in various ways over the past 6 years.

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INTRODUCTION: Focus on Transformations.

The First and Second Editions of the 3D Atlas of Ann Arbor captured seven years of work on this topic prior to June, 2007. While the earlier files in that work are important to understand the development of the project and also to track how technological and planning development did or did not mesh, the more recent files in it appear of greater interest to most. The file that contains a great deal of detail of a few blocks of downtown Ann Arbor, coupled with music to make points that were, at the time, difficult to capture otherwise, seem of particular interest (to display this file, one needs to have installed some browser free plug-in to interact with the virtual reality--Cortona is one option). That file is actually three linked files and it was designed to suggest possible flooding/ponding scenarios in the downtown using a sort of "theatrical" approach. It also incorporated links on buildings, in the spirit of suggesting directions for various emergency management applications. At the time, it was very difficult to create a model of the entire creek floodplain; hence, only a few blocks were shown.

The advent of good aerials of Ann Arbor in Google Earth®, in September of 2006, made it possible to overcome such difficulty. The earlier strategy of lifting a plane through modeled topography could now be employed on the existing terrain in Google Earth®. Terrain no longer needed to be modeled; previously, a Triangulated Irregular Network had been created from contour maps in GIS software and then imported to high-end graphics software. The resulting files were very large and precluded any possibility of showing a vast expanse of terrain. Still, Google Earth® did not become really useful until good aerials of Ann Arbor appeared already installed in Google Earth®. Then, the matter of pulling a plane through various elevations to simulate how contours fill with water became a strategy that could make some sense: one could at least have an aerial view of the urban context in which such filling was taking place. Beyond the general aerial context, showing considerable detail for the entire city, one might wish also to have 3D buildings modeled so that when one drives laterally through the city, the buildings appear upright and in fact might show, when coupled with the planes representing water, the elevation to which the water would reach on buildings.

In Google Earth® one has simultaneously a browser, a 3D navigational tool, and more. Thus, it is important to attempt to capture all of the previous 3D Atlas work within the Google Earth® context and it was to that task that the Second Edition of the 3D Atlas of Ann Arbor was devoted. This third edition greatly expands the base of buildings with textures, including many on the campus of The University of Michigan. Indeed, in this volume, one can view the buildings of the university in the context of 3D models of all of Ann Arbor. Thus, the entire city is modeled. The models in this book also appear in the Google 3D Warehouse: in the Google Picks section, under Featured Modelers (Arlinghaus is "Archimedes" in the 3D Warehouse world) as well as in the "Cities in Development" section and in the "Help Model a City" section. In the latter, readers are invited to put textures on existing models in order to create a larger virtual Ann Arbor. The hope is also that readers of this book will consider participation in that effort, as well! The reader of this book will need to download a free version of Google Earth® in order to understand the content. It is highly recommended that the reader do so right now, before proceeding with the remainder of the work.

As Google Earth® and Google SketchUp® have both broadened and facilitated the technological 3D modeling scene, deeper reflection on the pair in an academic context is interesting, as well. When thinking of making models, one might think only of making them in Google SketchUp®. There, numerous tutorials walk the user through the intricacies of making highly detailed, realistic models of buildings, furniture, or whatever else one might imagine. As long as the models are only for
Google SketchUp®, the enthusiastic user tends to get more and more involved in making "accurate" representations of objects. When these models are also to be uploaded into Google Earth®, and viewed at a variety of geographical scales, perhaps in conjunction with many other models, a host of other issues enters the picture. Now, both the worlds of art and of mathematics enter -- at the theoretical level. From the standpoint of art, realism may not be as important in the Google Earth® setting as is "impressionism"--create the correct impression of the building and use very few textures, keeping file size small. As Renoir painted a red hat in detail on the woman in "Sur la Terrace," while leaving the background vague, the careful modeler may focus on a block M on a golf course clubhouse chimney seen from a busy street rather than on "accurate" textures of all sides. The recognition of the building in Google Earth® comes from selecting features that people relate to and recognize quickly: that is the art in moving across the Google interface from SketchUp® to Earth®. Indeed, it is that interface itself, or transformation from one software package to another, that is of critical importance to successful modeling. Perhaps it is not surprising that the 3D modeling environment came to recognize that fact, much as 20th century mathematics came, in the last half of that century, to focus on the transformations themselves rather than on acquisition of knowledge about the objects linked by those transformations. The Google SketchUp®/Earth® pairing, and the associated transformation it represents, is a bold step in moving forward: now, the focus in the virtual world, as well as in the mathematical world, is on transformations.

Sandra Lach Arlinghaus,
June 1, 2007, Ann Arbor, MI.

Link to Google Earth®.

Copyright, 2007. All rights reserved. Institute of Mathematical Geography.
The previous edition (2nd) of the 3D Atlas of Ann Arbor offered detailed listings of plates of the Downtown Development Authority (DDA) and only listed buildings of The University of Michigan as a context within which to view various blocks of the DDA. In this edition, we reverse that strategy and offer a detailed set of plates showing university buildings. They are presented within the broader context of the textured and non-textured DDA as well as the 24,000+ buildings outside the DDA and UM. Thus, the entire city comes alive as a 3D model. Interested individuals and groups might pick up on the Google 3D Warehouse to finish putting textures on the city: all the geometry is available, free to download from the Google 3D Warehouse, in Google Picks, "Help Model A City." Download photos from Picasa as they become available and put them on the existing geometry; this exercise is a great way to learn to model buildings and it helps an existing municipality: truly a win-win situation that Google has created!

Another important feature of this 3rd edition of the 3D Atlas of Ann Arbor is that all models are georeferenced. Earlier models show detail with fidelity equivalent to that shown here, but most of them are not properly georeferenced with respect to latitude and longitude on the surface of the earth-sphere. Models that are not so referenced may have interesting applications of various sorts. When evaluation of models comes into play, however, as it does in most municipal applications, then it is necessary to have some absolute standard against which to test model location. Current 3d modeling software is so easy to use that anyone with a spare hour or two can use free software to build a realistic-looking city model that runs in real-time. Thus, for example, a planning commissioner using a 3d model to consider a proposed project must know where that project lies in relation to the streets and to other buildings. Streets created as part of the modeling process itself are insufficient for use as such a standard. It is far too easy for an unscrupulous petitioner to manipulate boundaries to suit his or her own project needs. Aerials compiled by government agencies offer an independent and absolute referencing system and when these aerials are cast as 3d models themselves, then they can be used in conjunction with 3d models placed upon them, to show a complete, verifiable, and replicable picture.

This crucial capability is the capability offered in the linkage of Google SketchUp® to Google Earth® and it is the capability employed throughout this atlas for models of buildings, landscapes, and other objects in the city of Ann Arbor, Michigan.

The layout of the information below is influenced by the submission form for the Campus Competition conducted by the Google 3D Warehouse. A team of students participated in that competition; participation was led by Arlinghaus as Faculty Advisor with support from Lars Schumann in the 3D Laboratory of the Duderstadt Center of The University of Michigan. The participating "department" of the university was the School of Natural Resources and Environment. The heart of that entry and of this Atlas is the set of individual building files for the campus of The University of Michigan in Ann Arbor that work, together with existing context files, to create a virtual Ann Arbor. A number of files are heavily textured. We have chosen to group textured files so they are evident, and also, to select buildings and groups of buildings that are relatively well-known. Thus, we include the buildings of the "Diag," the central campus quadrangle, adjacent well-known buildings and blocks, as well as buildings on the south campus such as the Crisler Arena (basketball stadium), Yost Ice Arena (ice hockey stadium), and Michigan Stadium (football stadium, also known as "The Big House"). Some of the files have more than buildings. Thus, the file for the Diag contains vegetation in relation to the aerial -- the trees on the Diag serve to define that space almost as much as do the buildings on its perimeter. Lauren Leigh Hoffman is a Master's of Landscape Architecture student in the School of Natural Resources and Environment (SNRE) with special interest in trees. She created the Dana Building (home of SNRE) and Diag files and shares her expertise on trees with all of us. Farther south, the file for the clubhouse of The University of Michigan golf course contains not only the clubhouse but also
flagsticks modeled in SketchUp for each of the 18 holes. Andrew Walton created these files and took charge of pin placements for this event. He also shares his thorough knowledge of this course in his hole-by-hole commentary and tour. Currently, Walton is a Master's of Urban Planning student, but as an undergraduate was a star of The University of Michigan golf team and also winner of the citywide City of Ann Arbor Men's Golf Championship. Hoffman aided with her insight on golf course vegetation and was in charge of tree placements on the course. Juan Sergio Ponce de Leon is a student in the Program in the Environment in the College of Literature, Science, and the Arts. He combines his interest in the natural and built environments with his long-time family interest in linking environmental concern to real-estate development as he/they continue to explore new frontiers. Generally, students were encouraged to incorporate the new software experience into the realms of academic endeavor they already knew: to make a win-win situation in mastery of software, comfort-level in dealing with new software, and sharing their own expertise with others. The interactive linkage between Google SketchUp® and Google Earth® mirrored this interdisciplinary context.

Indeed, the collaboration of Walton and Hoffman, in creating the actual, virtual University of Michigan golf course, suggests possible future directions for municipalities not only to preserve golf courses as fine sports venues but also as environmental laboratories for best practices in managing various features in the local urban or rural landscape. Thus, a water hazard on the course, might double as a model for retention or detention pond management for a local planning department: from the mowing of grasses at varying lengths around the pond to manage rate of sheet flow runoff, to the use of aeriation equipment in the pond, to the management of invasive pond plants, and so forth. The "rough" areas of the course might serve as a laboratory for planners to study different styles of grasses that do well locally and to see how they actually look when planted and maintained professionally. The fairways and greens could offer a chance to study the variety of indigenous grasses available that can offer residents a "cut" look to their front lawns when well-cared for in a sensitive manner. The steep slopes of the course might offer local officials a chance to study erosion control over time. And, of course, the wooded areas, when planted with a mixture of trees, could serve as a model for woodland preservation independent of local disease prevalence. Interesting environmental management ideas, such as rainwater gardens, might create new golfing hazards. Even a low, flat clubhouse might have a roof suited to a "green" planting strategy. Virtual remodeling of an existing course could offer a municipality an opportunity to visualize how small changes in tree selection, water hazard management, and so forth, carried out over time, could reap large rewards for the entire community--for the sports community as well as for the broader planning and environmental communities. Municipal authorities might study such change over time as they reflect on local ordinance changes. These are all exciting directions that the virtual world can offer for envisioning a better tomorrow: golf courses are large tracts of landscaped area that can serve not only as recreational opportunity for local citizens but also as an outdoor laboratory for them to study as they manage their own property and for municipal authorities and policy makers to study as they reflect on environmental management strategy and its implementation at the local level.

The models are grouped, for ease in reference, by category. Click on a building name or suitable link in the left-hand column to see a static image of the model, shown alone and only in the flat context of an aerial. Click on the .kmz file on the right to launch that model in Google Earth® (the .skp files open in Google SketchUp®). Load multiple kmz files to build the campus yourself!

<table>
<thead>
<tr>
<th>Building Information</th>
<th>Associated URL</th>
<th>Google SketchUp® file</th>
<th>Google Earth® file</th>
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<tbody>
<tr>
<td>CENTRAL CAMPUS, THE UNIVERSITY OF MICHIGAN</td>
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<tr>
<td>Angell Hall.</td>
<td><a href="http://www.si.umich.edu/umarch/bldgs/angell/index.html">http://www.si.umich.edu/umarch/bldgs/angell/index.html</a></td>
<td>skp</td>
<td>kmz</td>
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<tr>
<td>Building</td>
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<tr>
<td>Angell Hall</td>
<td>Dominates the view of the central campus from State Street. The stately columns often serve as a landmark to characterize the university; 435 S. State St, Ann Arbor, MI 48109-1003.</td>
<td><a href="http://www-personal.umich.edu/~copyrght/3dAtlas3/atlas.html">http://www-personal.umich.edu/~copyrght/3dAtlas3/atlas.html</a></td>
<td></td>
</tr>
<tr>
<td>Mason Hall</td>
<td>This building is part of the Angell Hall Complex and is best when viewed with the files for Angell Hall, Tisch Hall, and Haven Hall. 432 S. State Street, Ann Arbor, MI, 48109-1329</td>
<td><a href="http://bentley.umich.edu/bhl/BentleyMap/HTML/Text/OldMason.intro.html">http://bentley.umich.edu/bhl/BentleyMap/HTML/Text/OldMason.intro.html</a></td>
<td></td>
</tr>
<tr>
<td>Tisch Hall</td>
<td>Building in the Angell Hall Complex that fills in between older buildings. This file is best viewed in conjunction with the files for Angell Hall, Mason Hall, and Haven Hall. 435 S. State St., Ann Arbor, MI 48109-1003</td>
<td><a href="http://www.umich.edu/~urecord/9697/Jan07_97/artcl02.htm">http://www.umich.edu/~urecord/9697/Jan07_97/artcl02.htm</a></td>
<td></td>
</tr>
<tr>
<td>Haven Hall</td>
<td>This building is part of the Angell Hall Complex and is best when viewed in</td>
<td><a href="http://www.aec.bf.umich.edu/projects/MasonHaven/photos.html">http://www.aec.bf.umich.edu/projects/MasonHaven/photos.html</a></td>
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</tbody>
</table>
conjunction with files for Angell Hall, Mason Hall, and Tisch Hall. 505 South State Street
Ann Arbor, MI 48109-1045

**Hatcher Library, North.** The Hatcher Library is often called simply the "Graduate Library." It is composed of two connected parts: the north part is substantially older than the south part. 920 North University, Ann Arbor, MI 48109-1205

**Hatcher Library, South.** The Hatcher Library is often called simply the "Graduate Library." It is composed of two connected parts: the north part is substantially older than the south part. 920 North University, Ann Arbor, MI 48109-1205

**Shapiro Library.** The Shapiro Undergraduate Library is often called the "UGLI"--not for

http://www.lib.umich.edu/grad/

http://uuis.umich.edu/cic/buildingproject/index.cfm?buildingid=139

http://www-personal.umich.edu/~copyrght/3dAtlas3/atlas.html
<table>
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<tr>
<th>Location</th>
<th>Description</th>
<th>URL</th>
<th>File Formats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Museum of Art</td>
<td>Changing exhibits have delighted and educated generations of Michigan students and their families as well as the larger Ann Arbor and midwestern community, and beyond. 525 S. State St., Ann Arbor, MI 48109</td>
<td><a href="http://www.umma.umich.edu/">http://www.umma.umich.edu/</a></td>
<td>skp, kmz</td>
</tr>
<tr>
<td>Tappan Hall</td>
<td>This building at the south edge of the &quot;Diag&quot; is named for the first president of the university.</td>
<td><a href="http://www.umich.edu/pres/history/markers/tappan.html">http://www.umich.edu/pres/history/markers/tappan.html</a></td>
<td>skp, kmz</td>
</tr>
<tr>
<td>President's House</td>
<td>This campus home for the sitting President of The University of Michigan, currently Mary Sue Coleman, sits at the southern edge of the &quot;Diag&quot; on South University. The northern edge</td>
<td><a href="http://umhistory.org/history/publications/memories/">http://umhistory.org/history/publications/memories/</a></td>
<td>skp, kmz</td>
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</table>
of the "Diag" lies on North University and the eastern edge lies along bot President's House, South University Ave., Ann Arbor, MI 48109

<table>
<thead>
<tr>
<th><strong>Clements Library.</strong> Located on the South edge of the Diag, this building houses a wide variety of rare and unusual book collections. 909 S. University, Ann Arbor, MI 48109</th>
</tr>
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<tbody>
<tr>
<td><a href="http://www.clements.umich.edu/">http://www.clements.umich.edu/</a></td>
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<td>skp</td>
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</table>

<table>
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<tr>
<th><strong>West Hall.</strong> This building at the southeast corner of the &quot;Diag&quot; serves as a portal (through its arched passageway) to the commercial strip along South University Avenue just to the east. 1085 S. University Ave., Ann Arbor, MI 48109-1107</th>
</tr>
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<tbody>
<tr>
<td><a href="http://uuis.umich.edu/cic/buildingproject/index.cfm?buildingid=163">http://uuis.umich.edu/cic/buildingproject/index.cfm?buildingid=163</a></td>
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<td>skp</td>
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<tr>
<th><strong>Randall Laboratory.</strong> Located on the east side of the &quot;Diag.&quot; 450 Church Street, Ann Arbor, MI 48109-1040</th>
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<tbody>
<tr>
<td><a href="http://uuis.umich.edu/cic/buildingproject/index.cfm?buildingid=133">http://uuis.umich.edu/cic/buildingproject/index.cfm?buildingid=133</a></td>
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<tr>
<td>skp</td>
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<tr>
<td><strong>Dana Building.</strong></td>
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<tr>
<td><strong>Diag Trees.</strong></td>
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<tr>
<td><strong>Chemistry Building.</strong></td>
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<td><strong>Kraus Natural Science Building.</strong></td>
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<tr>
<td>Building Name</td>
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<tr>
<td>C. C. Little Building</td>
</tr>
<tr>
<td>Dennison Building</td>
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<tr>
<td>Pharmacy College</td>
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<tr>
<td>East Hall</td>
</tr>
<tr>
<td>Location</td>
</tr>
<tr>
<td>-------------------------</td>
</tr>
<tr>
<td>530 Church Street, Ann Arbor, MI 48109-1043</td>
</tr>
<tr>
<td>Michigan League, Conference center just to the north of the Diag. Often it is called &quot;The League.&quot; 911 N. University Ann Arbor, MI 48109-1265</td>
</tr>
<tr>
<td>Hill Auditorium, This centrally-located auditorium is located just to the north of the Diag. It serves not only as the principal theater for the university but also as a venue for special university events such as graduation ceremonies. 825 N.University. Ann Arbor,MI 48109</td>
</tr>
<tr>
<td>Burton Memorial Tower, Carillon tower with clock is a highly visible landmark on central campus and</td>
</tr>
</tbody>
</table>
also for the entire city of Ann Arbor. 881 North University, Ann Arbor, MI 48109-1270

Modern Language Building. As its name suggests, this building serves as home to several departments concerned with modern languages. Often, however, it is referred to as MLB. Burton Tower sits between this building and Hill Auditorium. 812 East Washington, Ann Arbor, MI 48109-1275

Alumni Center. This building is the heart of the Alumni Association of The University of Michigan. This Association is the largest such in the world. 200 Fletcher Street, Ann Arbor, MI 48109

Horace H. Rackham Building. Rackham is the School of Graduate Studies whose administrative
hurdles many have successfully cleared. The building also serves the entire community with its amphitheater and auditorium. 915 E. Washington Ann Arbor, MI 48109-1070

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</thead>
<tbody>
<tr>
<td>This building on Central Campus is modeled and textured. It serves as the anchor building for the broader region of nearby buildings also found in this file. 109 Zina Pitcher Place, Ann Arbor, MI 48109-2200</td>
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</tbody>
</table>

<table>
<thead>
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</thead>
<tbody>
<tr>
<td>This former Central Campus building is modeled and textured (2007 has seen its destruction--the photo textures indicate the beginnings of such). It serves as the anchor building (as a memorial to its grandeur) for the broader region of nearby buildings. 105</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>S. State St., Ann Arbor, MI 48109-1285</strong></td>
<td><strong>Literature, Science, and the Arts Building.</strong> This salmon-colored post World War II brick building has served as the seat of the university’s liberal arts college. Often, it is simply referred to as &quot;LS&amp;A.&quot; It is an anchor. 500 S. State Street, Ann Arbor, MI 48109</td>
<td><strong><a href="http://uuis.umich.edu/cic/buildingproject/index.cfm?buildingid=87">http://uuis.umich.edu/cic/buildingproject/index.cfm?buildingid=87</a></strong></td>
<td><strong>skp</strong></td>
</tr>
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</tr>
<tr>
<td><strong>South Quad. Model by Juan Sergio Ponce de Leon.</strong> This single building serves as a complement to the larger file above. South Quad is a residence hall near the Michigan Union. Many freshmen have lived there, including Mr. Ponce de Leon when he was a freshman.</td>
<td><strong><a href="http://uuis.umich.edu/cic/buildingproject/index.cfm?BuildingID=141">http://uuis.umich.edu/cic/buildingproject/index.cfm?BuildingID=141</a></strong></td>
<td><strong>skp</strong></td>
<td><strong>kmz</strong></td>
</tr>
<tr>
<td><strong>University Hospitals.</strong> This Central Campus hospital building is modeled and textured. It serves as the anchor building for the broader</td>
<td><strong><a href="http://uuis.umich.edu/cic/buildingproject/index.cfm?BuildingID=158">http://uuis.umich.edu/cic/buildingproject/index.cfm?BuildingID=158</a></strong></td>
<td><strong>skp</strong></td>
<td><strong>kmz</strong></td>
</tr>
<tr>
<td>Building Name</td>
<td>URL</td>
<td>Format 1</td>
<td>Format 2</td>
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<tr>
<td>Power Center for the Performing Arts</td>
<td><a href="http://uuis.umich.edu/cic/buildingproject/index.cfm?BuildingID=132">Link</a></td>
<td>skp</td>
<td>kmz</td>
</tr>
<tr>
<td>School of Social Work</td>
<td><a href="http://uuis.umich.edu/cic/buildingproject/index.cfm?BuildingID=138">Link</a></td>
<td>skp</td>
<td>kmz</td>
</tr>
<tr>
<td>Francois-Xavier Bagnoud Building</td>
<td><a href="http://uuis.umich.edu/cic/buildingproject/index.cfm?buildingid=17">Link</a></td>
<td>skp</td>
<td>kmz</td>
</tr>
</tbody>
</table>
part of North Campus is modeled and textured. It serves as the anchor building for the broader region of nearby buildings also found in this file. 1320 Beal, Ann Arbor, MI 48109-2140

**Bursley Residential Hall.** This residence hall on the steep part of North Campus is modeled and textured. It serves as the anchor building for the broader region of nearby buildings also found in this file. 1931 Duffield, Ann Arbor, MI 48109-2080

[Bursley Residential Hall](http://uuis.umich.edu/cic/buildingproject/index.cfm?BuildingID=24)  

**Duderstadt Center.** This building on North Campus, home to the 3D Laboratory, is modeled and textured. It serves as the anchor building for the broader region of nearby buildings also found in this file. 2281 Bonisteel, Ann Arbor, MI 48109-2094

[Duderstadt Center](http://uuis.umich.edu/cic/buildingproject/index.cfm?BuildingID=181)  

**Northwood IV apartments.** These rustic

[Northwood IV apartments](http://uuis.umich.edu/cic/buildingproject/index.cfm?BuildingID=125)
North Campus apartments fit nicely into the surrounding wooded areas. They serve as the anchor buildings for the broader region of nearby buildings also found in this file. 2364 Bishop, Ann Arbor, MI 48109

<table>
<thead>
<tr>
<th>SOUTH CAMPUS, THE UNIVERSITY OF MICHIGAN</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Crisler Arena.</strong> Stadium that is home to the Michigan (Basketball) Wolverines. This large arena also serves as host to other events that require such an indoor space. 333 E. Stadium Blvd., Ann Arbor, MI, 48109-4423</td>
</tr>
<tr>
<td><strong>Michigan Stadium:</strong> &quot;The Big House.&quot; Michigan Stadium (Memorial Stadium) is the home of the Michigan (Football) Wolverines. On occasion, it is also used as a venue for outdoor events. Often, graduation ceremonies are held here. This</td>
</tr>
</tbody>
</table>
past November, it was used to hold a memorial service to 1201 S. Main Street, Ann Arbor, MI 48109

Yost Ice Arena. Model by Juan Sergio Ponce de Leon. The Yost Ice Arena is home to the University of Michigan Hockey Team. 1000 S. State Street, Ann Arbor, MI 48109

University of Michigan Golf Course and Clubhouse. Model by Andrew Walton. Open the .kmz file in Google Earth and get tips from a champion on how to play the course!

University of Michigan Golf Course, vegetation. Model by Lauren Leigh Hoffman.

Schembechler Hall. This colorful (UM colors are "Maize and Blue") South Campus building is named for the late Bo
Schembechler. It serves as the anchor building for the broader region of nearby buildings also found in this file. 1200 South State, Ann Arbor, MI 48109-2203

### CAMPUS TOURS

**Campus Tours.** Use placemarks to get a view of what is available in this set. Then, use the placemarks, in conjunction with the georeferenced 3D buildings as an aid in knowing building names.

### DOWNTOWN DEVELOPMENT AUTHORITY (DDA)

<table>
<thead>
<tr>
<th>Context: Main and Huron Streets, NE. County Building</th>
<th><a href="http://www.imagenet.org/">http://www.imagenet.org/</a></th>
<th>skp</th>
<th>kmz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Context: Main and Huron Streets, NW. Mixed residential and office use. Northwest corner of Main and Huron Streets. 101 North Main Street, Ann Arbor, MI 48104</td>
<td><a href="http://www.imagenet.org/">http://www.imagenet.org/</a></td>
<td>skp</td>
<td>kmz</td>
</tr>
<tr>
<td>Context: Huron</td>
<td><a href="http://www.imagenet.org/">http://www.imagenet.org/</a></td>
<td>skp</td>
<td>kmz</td>
</tr>
<tr>
<td><strong>Context</strong></td>
<td><strong>Description</strong></td>
<td><strong>Links</strong></td>
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</tr>
<tr>
<td>Main and Fifth Streets, NE.</td>
<td>City Hall block 100 N. Fifth Ave, Ann Arbor, MI 48107</td>
<td><img src="http://www.imagenet.org/skp" alt="http://www.imagenet.org/skp" /> <img src="http://www.imagenet.org/kmz" alt="http://www.imagenet.org/kmz" /></td>
<td></td>
</tr>
<tr>
<td>Main and Huron Streets, SE.</td>
<td>Block to the south and east of the intersection of Main and Huron Streets.</td>
<td><img src="http://www.imagenet.org/skp" alt="http://www.imagenet.org/skp" /> <img src="http://www.imagenet.org/kmz" alt="http://www.imagenet.org/kmz" /></td>
<td></td>
</tr>
<tr>
<td>Main and Liberty Streets, NE.</td>
<td>Textured buildings located on a block 2 blocks south of the intersection of Main and Huron Streets, and one block to the east of that intersection.</td>
<td><img src="http://www.imagenet.org/skp" alt="http://www.imagenet.org/skp" /> <img src="http://www.imagenet.org/kmz" alt="http://www.imagenet.org/kmz" /></td>
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<tr>
<td>Location</td>
<td>Description</td>
<td>Image Format</td>
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<tr>
<td>South of the intersection of Main and Huron Streets, and one block to the west of that intersection.</td>
<td>Textured buildings located on a block 3 blocks south of the intersection of Main and Huron Streets, and one block to the east of that intersection. Mulch in planter is photo of actual mulch from one of the planters. Trees are maintained by the Dean Fund.</td>
<td><a href="http://www.imagenet.org/">http://www.imagenet.org/</a></td>
<td>skp</td>
</tr>
</tbody>
</table>

**Context:** Main and Liberty Streets, SE.

**Context:** Main and Liberty Streets, SW.
by the Dean Fund.

**Context: DDA Minus Textured Blocks.** Simple extruded footprints with correct heights (from City of Ann Arbor Planning Department) for the remainder of buildings in the DDA. Heights supplied by the Planning Department.

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**ANN ARBOR, OUTSIDE THE DDA AND THE UNIVERSITY OF MICHIGAN**

**Context: General Ann Arbor 3dscape.** Most Ann Arbor buildings outside the DDA and UM. File exported to .kmz from ArcMap. Lines up with terrain in Google Earth. Building height set arbitrarily to 2 stories for all buildings. 2D building footprints made by Environmental Coordination Services.

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From the [Google 3D Warehouse](http://www.imagenet.org/): Google Picks--"Cities in Development"; "Help Model A City"; "Featured Modelers" (the collections of "Archimedes").

---

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REFERENCES

The references that were cited in the First and Second Editions continue to be useful and are cited, again, here. In addition, the centered list below sets forth selected references and citations particular to the Third Edition.

- **Google 3D Warehouse**: Google Picks--Cities in Development; Help Model A City; Featured Modelers (the collections of "Archimedes").
- Google "Best Practices" document, "Modeling A City".
- The 3D Laboratory in the Duderstadt Center of The University of Michigan for their advice on modeling in general and for their encouragement and support for this team in particular. Dr. Klaus-Peter Beier, Director; Lars Schumann, Manager; Steffen Heise, 3D Lab.
- Thanks for base GIS files: Donald T. Uchman, Drafting Intermediate Supervisor, Space Information, The University of Michigan
- Matthew Naud, Environmental Coordinator, City of Ann Arbor; Wendy Rampson, City of Ann Arbor.
- File for Angell Hall incorporates a "dome" SketchUp file based on one found in the 3D Warehouse. The original file is by "pat": http://sketchup.google.com/3dwarehouse/details?mid=d9df666120fee38c7fb260589c24fde63&prevstart=12
- File for Diag contains SketchUp trees based on ones found in the 3D Warehouse. The original files are from Google Picks, Collections...the"Trees" collection: http://sketchup.google.com/3dwarehouse/cldetails?mid=a7b9f69d31356fbef96dfde99ac0e896, primarily by "Surreal 3D" and "Google Guy."
- File for Football Stadium incorporates a blimp based on one found in the 3D Warehouse. The original file is by "Surreal 3D": http://sketchup.google.com/3dwarehouse/details?mid=c29682940165845a7c81e315a70337ac&prevstart=0
- Files for Football field and crowd modified from originals found at: http://www-vrl.umich.edu/VRML/Field2.JPG and http://www-vrl.umich.edu/VRML/crowd.JPG
- The music files appear on the link on the kmz file for the President's House: http://bentley.umich.edu/bhl/exhibits/umosu/umsongs.htm

Second Edition, of particular note:

- Prof. Klaus-Peter Beier (Director 3D Laboratory, Duderstadt Center), Lecture Notes, Engineering 477 (Virtual Reality), The University of Michigan, Ann Arbor.
- University College London, Centre for Advanced Spatial Analysis, Prof. Michael Batty, Director
- Colorado Springs: Centre for Advanced Spatial Analysis, Prof. Michael Batty, Director
- Google Earth®, online help

First Edition:


- Chirapiwat, Thana. 2001. "Visualization of Geographic Information using VRML".


Disaster Research, December, 2003. GIS and Hazards. [http://hazards.lsu.edu](http://hazards.lsu.edu)


- NASA WorldWind: http://worldwind.arc.nasa.gov/


• "Shed Loads" broadcast on BBC World from 17-23rd Sept 2005


• SimCity, [http://www.simcity.com/](http://www.simcity.com/)


• *University of Michigan Record*, November 17, 2003. "Grant funds disaster simulation training: Center will prepare emergency workers for attacks." Jared Wadley, byline.


• Virtual London:  [http://www.casa.ucl.ac.uk/research/virtuallondon.htm](http://www.casa.ucl.ac.uk/research/virtuallondon.htm)


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