# 1999 Oklahoma ARC User Conference


**September 16, 1999**
**Moore Norman Technology Center**
**Norman, Oklahoma**

# 1999 OKLAHOMA ARC USER CONFERENCE

SOUTH CENTRAL ARC USER GROUP
OKLAHOMA CHAPTER

September 16, 1999
Moore Norman Technology Center
Norman, Oklahoma

Greetings,

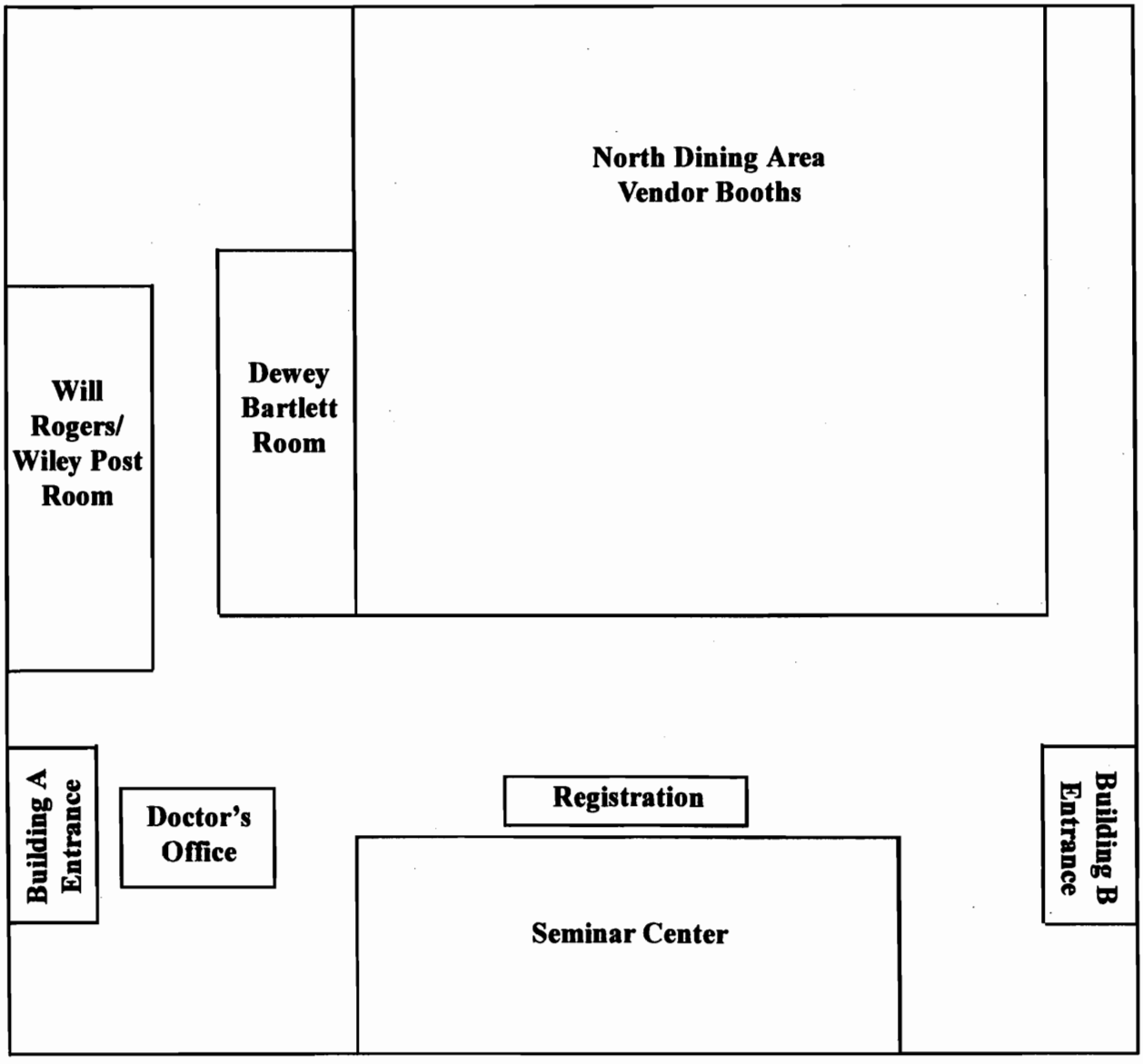
We are very pleased to welcome you to the third annual conference of the Oklahoma Chapter of the South Central ARC User Group and hope that you find the conference informative. This year the conference will include workshops presented by ESRI staff, user presentations, and vendor exhibits.

We wish to sincerely thank the ESRI San Antonio Office for the many contributions they have made to this conference: the staff, equipment and prizes for the user presentations and posters. The regional group also provided support for our third state conference. We would like to recognize two people whose guidance was invaluable to the organization of this conference: Scott MacKelvie and Jann Hook. We especially thank the corporations who support this event.

Look forward to next year's Oklahoma ARC User Conference.

Sincerely,
The Steering Committee
Stefanie Cannon
Jun Gao
Joyce Green
Rory Hodgson
Mike Kapka
George Nordahl
Kate Seney

# Map of Moore Norman Technology Center



# 1999 Oklahoma ARC User Conference

## AGENDA

| | | | |
|---|---|---|---|
| 8:00 | **Registration** opens with Vendors Exhibits | | |
| 8:30 - 8:40 | **Welcome** Seminar Center | | |
| 9:00 - 11:30 | **Doctor's Office** - North Dining Area | | |
| | **ESRI Session I**<br>**Seminar Center** | **ESRI Session II**<br>**Will Rogers/Wiley**<br>**Post Room** | **User Presentations**<br>**Dewey Bartlett**<br>**Room** |
| 9:00 - 9:50 | Introduction to Arc/Info 8<br>- ArcCatalog<br>- ArcMap<br>- ArcToolbox | Visualization with ArcView 3D Analyst | Mike Sexton - Oklahoma Department of Commerce<br>David Wilkerson - GISEDGE, Inc. |
| 9:50 - 10:10 | **Break** - North Dining Area | Salary Surveys can be turned in | |
| 10:10 - 11:00 | Overview of Arc/Info 8 Geodatabase | Introduction to ArcView 3.2 & Geocoding | Bobbie Borchardt - City of Oklahoma City<br>Ray Hardy - Oklahoma Water Resources Board |
| 11:00 - 11:30 | **Poster Presentation** | | |
| 11:00 - 12:30 | **Lunch** - North Dining Area | | |
| 12:45 | **Voting on posters closes** | Ballots due at Registration Table | |
| 12:45 - 1:45 | **Keynote Speaker** - Curt Wilkinson, ESRI | Seminar Center | |
| 2:00 - 3:30 | **Doctor's Office Open** - North Dining Area | | |
| | **ESRI Session 1**<br>**Seminar Center** | **ESRI Session II**<br>**Will Rogers/Wiley**<br>**Post Room** | **User Presentations**<br>**Dewey Bartlett**<br>**Room** |
| 2:00 - 2:50 | Introduction to ArcSDE | Making, Printing & Publishing Quality Maps with ArcView | Chris Hill - University of Oklahoma<br>Jennifer Foshee - SDS, Inc. |
| 2:50 - 3:10 | **Break** - North Dining Area | | |
| 3:10 - 4:00 | Editing & Digitizing with ArcView | GIS on the Net<br>- ArcIMS<br>- ArcView IMS<br>- Map Objects IMS | |
| 4:05 - 4:15 | **Closing** - Seminar Center | Conference Survey Due | Awards and Door Prizes |

# Keynote Speaker

Curt Wilkinson
ArcInfo Project Manager
Environmental Systems Research Institute, Inc. (ESRI)

Curt Wilkinson joined ESRI 3 years ago as the Product Manager for ArcInfo. He has been a part of the ArcInfo 8 team since its beginning. Prior to his work at ESRI, he has worked in consulting and research on GIS, statistics, ecology, hydrology, oceanography, fisheries and forestry projects. He has extensive experience in simulation and modeling, GIS programming, and general analysis.

***AddMenu script adds a new menu to the menu bar with subchoices. The subchoices will be labeled with the theme names for the view and toggle the theme visibility on/off when the subchoice is selected.***



```
'AddMenu
'Add this script to the update property on the
'   save button.  Any update property will work.

theViewGUI = av.getActiveGUI
theMenuBar = theViewGUI.GetMenuBar
theMenu = theMenuBar.FindByLabel("Display")
    If ((theMenu = Nil).Not) then
      theMenuBar.Remove(theMenu)
    End
menuIndex = theMenuBar.GetControls.Count -2
theMenu = theMenuBar.New(menuIndex)
theMenu.setLabel("Display")
theThemeList = av.GetActiveDoc.GetThemes
  For each thm in theThemeList
    theChoice = theMenu.New(-1)
      If (thm.IsVisible) then
        theChoice.SetLabel(thm.GetName++"On")
      Else
        theChoice.SetLabel(thm.GetName++"Off")
      End
    theChoice.SetClick("ThemeToggle")
  End
'av.getActiveDoc.SetTOCWidth(0)


  'ThemeToggle
  theString = self.GetLabel
  theView = av.getActiveDoc
  theString = theString.BasicTrim("","On")
  theString = theString.BasicTrim("","Off")
  theString = theString.BasicTrim("","")
  theTheme = theView.findTheme(theString)
     If (theTheme.IsVisible)then
       theTheme.SetVisible(False)
     Else
       theTheme.SetVisible(True)
     End
```

# Session Descriptions

| | | |
|---|---|---|
| 9:00 - 9:50 | *Seminar Center* | **Introduction to Arc/Info 8** An overview of Arc/Info 8.0 that will include features of ArcCatalog, ArcMap and ArcToolbox. ArcCatalog helps you browse and work with large geographic data collections. ArcMap lets you display data, solve problems, and communicate solutions. ArcToolbox constructs jobs that can be run locally or on a remote geoprocessing server. |
| 9:00 - 9:50 | *Will Rogers/ Wiley Post Room* | **Visualization with ArcView 3D Analyst** An introduction to ArcView 3D Analyst that is geared toward its new or potential users. This session provides an overview of the extension's capablities. Topics include surface modeling, three-dimensional shapes, and three-dimensional visualization. |
| 9:00 - 9:50 | *Dewey Bartlett Room* | **Capital Improvement Planning & GIS in Oklahoma -**<br>Mike Sexton, Oklahoma Department of Commerce<br>**Intelligent Routing Made Easy -**<br>David Wilkerson, GISEDGE, Inc.<br>See User Abstracts for Detailed Description of Session |
| 10:10 - 11:00 | *Seminar Center* | **Overview of Arc/Info 8 Geodatabase** Have you been inundated with terms like object-oriented, geometric network, and relationship class? Are you wondering what these are, exactly? ArcInfo 8 introduces a new geographic data model and a new all-relational geographic database hosted in ArcSDE. |
| 10:10 -11:00 | *Will Rogers/ Wiley Post Room* | **Introduction to ArcView 3.2 & Geocoding** This session introduces new features of ArcView 3.2 as well as functions for geocoding in ArcView. It covers the concepts of geocoding and architecture in the software program. Strategies for address matching and getting the best geocoding results will be presented. Attendees will learn how to do basic geocoding customization. |
| 10:10 - 11:00 | *Dewey Bartlett Room* | **GIS and Disaster Management: Oklahoma City's Response to a Deadly F5 Tornado, May 3, 1999 -**<br>Bobbie Borchardt, City of Oklahoma City<br>**Location and Ownership Assessment of Groundwater Wells after the Bridge Creek Tornado -**<br>Ray Hardy, Oklahoma Water Resources Board<br>See User Abstracts for Detailed Description of Session |
| 2:00 - 2:50 | *Seminar Center* | **Introduction to ArcSDE** An introduction to the concepts of ArcSDE and a high-level overview of how it works, why it is useful, and how it can be used with the various ESRI client software. Included will be a discussion of which platforms and RDBMSs are supported, as well as how the software is packaged. This workshop is intended for those with little or no knowledge of SDE. |
| 2:00 - 2:50 | *Will Rogers/ Wiley Post Room* | **Making, Printing & Publishing Quality Maps with ArcView** This session will detail techniques available in ArcView for creating common cartographic effects including a tour of new cartographic functionality available in ArcView 3.2. This session will also discuss techniques for creating high-quality printouts in ArcView. |
| 2:00 - 2:50 | *Dewey Bartlett Room* | **Delineation of the Red River Boundary Using Geographic Information Systems -**<br>Chris Hill, University of Oklahoma<br>**Parcel Analyst -**<br>Jennifer Foshee, SDS, Inc.<br>See User Abstracts for Detailed Description of Session |
| 3:10 - 4:00 | *Seminar Center* | **Editing & Digitizing with ArcView** Provides a general overview of the shapefile editing and digitizing functionality in ArcView. Learn how to use ArcView software's editing tools to update and create features as well as how to edit the attributes. A demonstration of how to perform heads-up shapefile editing on screen will be given. |
| 3:10 - 4:00 | *Will Rogers/ Wiley Post Room* | **GIS on the NET** Different GIS software applications including ArcView Internet Map Server, Map Objects Internet Map Server and the newest ESRI Internet map-server application, ArcIMS will be discussed. An overview of each of the IMS products will be given. |

# Abstracts of User Presentations

## CAPITAL IMPROVEMENT PLANNING AND GIS IN OKLAHOMA

**Mike Sexton, Oklahoma Department of Commerce**
**Anna Lee, City of Woodward**
**Sarah Willis, Grand Gateway Economic Development Cooperative**

In 1992, the Oklahoma Legislature presented the Oklahoma Department of Commerce (ODOC) with the task of providing it with an annual statewide capital improvement plan (CIP) based on regional CIP's from across the state. With the help of several groups across the state, ODOC developed a GIS application called GeoCIP© to standardize the process of inventorying & mapping community capital assets. GeoCIP© has evolved into an ArcView® GIS process that assists in the creation of detailed community asset maps and databases. This provides communities who do not have accurate records of their assets, who have never really done capital improvement planning or who want to use a more standardized method of data collection the opportunity to assess the condition of their community assets and plan for improvement needs in the future.

## INTELLIGENT ROUTING MADE EASY

**David Wilkerson, GIS Applications Manager**
**GISEDGE, Inc. and The Analysis Network**

ArcLogistics Route is a complete out-of-the-box solution for complex vehicle routing and scheduling problems. ArcLogistics Route is used to determine which vehicle should serve each customer location and the best stop sequence to accommodate customers time windows while minimizing expensive travel time. Select your service area from the included high-quality street database of the United States and start finding accurate customer locations and building realistic routes the day you load ArcLogistics Route.

Tailoring ArcLogistics Route to your organization's needs with driver/vehicle specialties, operating costs, and custom reports is wizard driven and efficient. GDT Dynamap/2000 Street Database is included with the package and it may be refreshed annually or semiannually. You can also connect to popular databases through the Open Database Connectivity (ODBC) standard and directly to SAP R/3. Using Seagate Crystal Reports, ArcLogistics Route generates high quality route summary reports, stop vicinity and route overview maps, street-level directions, and driver manifests.

## GIS AND DISASTER MANAGEMENT: OKLAHOMA CITY'S RESPONSE TO A DEADLY F5 TORNADO - MAY 3, 1999

**Bobbie Borchardt, Business Systems Manager**
**City of Oklahoma City**

1. Tracking a Killer - Preparation for the Storm
   Projecting the storm's path and warning the public of the potential danger.
2. Search and Rescue - Marshall law, lock down and containment
   GIS data and maps help coordinate field operations.
3. Damage Assessment
   A picture tells a story that a thousand words cannot begin to describe.
4. Debris Removal and Cleanup
   Environmental concerns - sorting through the rubble for disposal.
5. Recovery and Rebuilding
   Revitalizing the urban forest with information and public education.

## LOCATION AND OWNERSHIP ASSSESSMENT OF GROUNDWATER WELLS AFTER THE BRIDGE CREEK TORNADO

**Ray H. Hardy**
**Oklahoma Water Resources Board**

The community of Bridge Creek was one of the most heavily damaged by the May 3rd tornadoes. Amidst the damage in the rural community were more than 100 individual wells that supplied residents with fresh drinking water. A simple GIS was constructed to determine the location and ownership of water wells in Bridge Creek.

A team of seven geologists, hydrologists, and engineers worked to assess the damage area. Each team was equipped with a GPS unit, aerial photograph and inspection sheet to record the well condition and location. Located wells were flagged for visibility, and GPS locations were identified with a Trimble Pro-XR unit to produce a GIS layer of well locations.

The Grady County Tax Assessors Office provided a hardcopy of land parcel ownership information. The maps were scanned by quarter section and then imported into ArcInfo. Each image was registered and then rectified to the corners of each quarter section of the Digital Atlas of Oklahoma. Georeferenced images were placed in a mosaic over the digital orthophoto quadrangle, and then overlaid with well location points.

Water Board staff located and inspected 116 water wells. Affected well points were matched to a landowner parcel and dwelling visible in the orthophoto. Landowners were matched to a database printout file of contact addresses. Each landowner was then contacted and advised of the necessity to plug wells in order to prevent contamination of the underlying aquifer.

# DELINEATION OF THE RED RIVER BOUNDARY USING GEOGRAPHIC INFORMATION SYSTEMS

**Chris Hill**
**University of Oklahoma**

The Red River has been a disputed boundary dating back to the Mexican rule over Texas and the Indian Territory of Oklahoma. The problem experienced in the Red River valley is the difficult task of monitoring the river's shifting path as it moves along the basin. As the river winds down the Red River valley, the riverbanks move and shift with the dynamic movement of the water. The goal of this project is to model the shifting river boundary over time and produce a method for delineating a true boundary based on the model results. The study area is located in Jackson county, Oklahoma. This area has been selected because it represents a large part of southwestern Oklahoma, where the Red River dispute is a major issue.

Using Geographic Information Systems (GIS), the project intends to analyze the spatial shifts of the river boundary. The information for analysis comes from old aerial photos and topographic maps of Jackson County. The image sources were scanned into the computer and put into Arc/INFO™ GIS. In all, there are seven layers representing the following years: 1941, 1950, 1957, 1964, 1978, 1984, and 1994. Analysis of the different layers will be accomplished by creating polygon representations of land ownership. The results of this process will be used to determine state ownership of each part of the Red River basin over time.

This research can have many positive effects at the state level and beyond. The physical concept of any water body make it a good border, however, a river's dynamic properties often overwhelm the simplistic theory of a river boundary. Results from this research can help influence river boundary problems across the nation and around the globe.

# PARCEL ANALYST

**Jennifer Foshee, Midsouth Regional Manager**
**SDS, Inc.**

Parcel Analyst is an easy to use application that combines parcel and other map data with associated nongraphic data such as property, sales and assessment data. It was developed using Visual Basic and ESRI's Map Objects. Parcel Analyst provides the tools necessary for performing simple and advanced queries, statistical analysis, and reports. Simple queries are customizable by the user and might consist of searches on such things as parcel number, owner, address, subdivision, deeds, or any other common search fields you use frequently. Advanced queries allow you to simultaneously analyze any of the fields in the database and to use the results of the searches to derive sales ratios and other customized analysis. Once the parcel or group of parcels is identified from the database search, the text data and parcel maps may be viewed on the screen, printed to hard copy, or used to generate reports. Through the use of thematic shading of map data and graphs, you can visually review the analysis results to quickly see the number of occurring results, the influence location has on the results, and the range of the values derived from the analysis. Parcel Analyst provides overlay capabilities, so that soils, flood planes, etc. can be overlayed with the parcel data and reports can be generated. Parcel Analyst can be used in a variety of situations, and can be easily customized to meet your individual needs. For example, with a few easy steps, Parcel Analyst can be converted from a statistical analysis tool to a simple public counter query system.

# The CEDRA-AVcad Upgrade Plus Package Delivers ArcView® GIS Editing Tools

Looking forward to upgrading to *ArcView® GIS Version 3.2* ?

Do you want *ArcView® GIS* to provide you with more editing tools ?

Then take advantage of CEDRA's **AVcad Upgrade Plus** package.

**For only $199**, in addition to the *ArcView®* Version 3.2 upgrade fee, the **CEDRA-AVcad Upgrade Plus** package offers over 100 Cogo commands, a robust on-line help system and sample exercises for:

*geometry creation / editing, deed transcription,*

*least squares, crandall, compass, transit rule adjustments,*

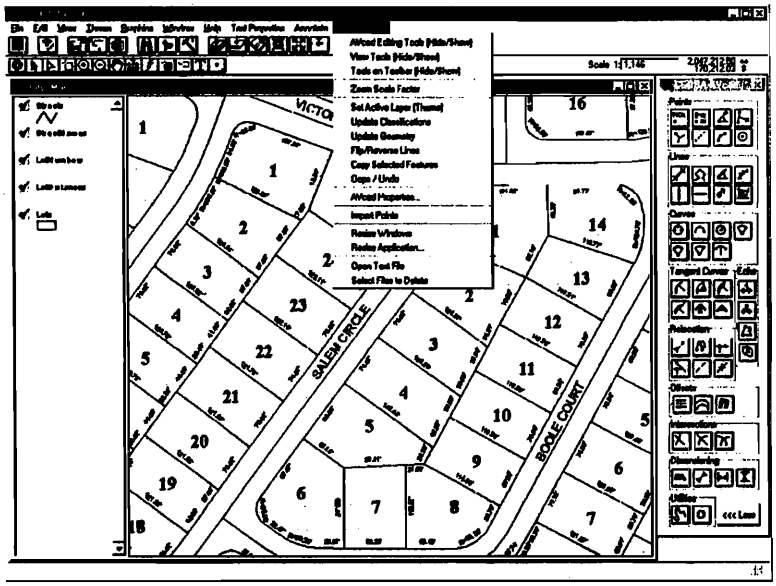
*data import and capture, annotation,*

*point snapping across all visible themes,*

*tracing, mapping, surveying operations,*

*buffer creation, and much more, all*

*in feet, meters and latitudes-longitudes.*




**Point and Polygon Importing**
- ❑ Support of 28 ASCII File formats for mass importing of Points and Polygons.

**Point Creation**
- ❑ Via keyboard entry of coordinates.
- ❑ From a point with a direction and distance.
- ❑ From a point turning an angle off a direction and with a specified distance.
- ❑ Along a line or curve with plus and offsets.
- ❑ At endpoints/vertices of lines and/or curves.
- ❑ Projecting points on lines and/or curves.
- ❑ Division of a group of lines and/or curves into equal parts creating points.
- ❑ Location of the center of a curve.

**Line Creation**
- ❑ Two-point lines, polylines and polygons with point snapping across all visible themes.
- ❑ From a point with a direction and distance.
- ❑ From a point turning an angle off a direction and with a specified distance.
- ❑ Horizontal and vertical lines.
- ❑ Ticks at a user-specified length and spacing.
- ❑ Tangent to a curve at any point on the curve.

**Curve and Non-Tangent Curve Creation**
- ❑ Circle with center and radius or through 3 points.
- ❑ Arc through 3 points or given center, start point, and *(a) arc length, (b) endpoint,* or *(c) central angle.*
- ❑ Arc tangent to two lines and with a radius.
- ❑ Arc tangent to two lines passing through a point.
- ❑ Arc tangent to a line or curve given its PC, radius and *(a) arc length, (b) central angle, (c) chord length,* or *(d) chord direction and length.*

**Buffers, Offset Elements and Polygons**
- ❑ Lines or curves offset to a line or curve element.
- ❑ Line/curve elements offset to a string of features.
- ❑ Buffer polygon about a string of features.
- ❑ Polygons by transcribing deed information.

**Transformation**
- ❑ Translate, rotate and/or scale selected features.

**Intersections**
- ❑ Intersect *(a) lines with lines, curves, polylines and/or polygons,* or *(b) curves with curves.*

**Editing / Relocation**
- ❑ Move a line/curve endpoint to a new location.
- ❑ Move a line/curve endpoint a given distance.
- ❑ Specify the length/arc length of a line/curve.
- ❑ Extend a group of lines to their intersections with another line/curve.
- ❑ Break a line or curve, cutout a line or curve, flip or reverse the direction of a group of lines.

**Generic Functionality**
- ❑ Button selection for specifying *(a) Azimuths, (b) Bearings, or (c) Cartesian directions.*
- ❑ Display distance, angle, deflection and/or area of *(a) a feature* or *(b) from snapped point picks.*
- ❑ Undo or Oops an operation.
- ❑ Copy features, with or without including their attributes, into other themes.
- ❑ Auto-search or trace to *(a) select features, (b) create polygons,* or *(c) create offset elements.*
- ❑ Delete in mass a group of selected features.
- ❑ Mass annotation of a group of features' length, direction, or length and direction in azimuth or bearing form (radius & arc length for curves).

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# Exhibitors

**Analytical Surveys, Inc.**

**CEDRA Corporation**

**Computer Graphics Center**

**Durham & Associates, Inc.**

**Environmental Systems Research Institute, Inc.**

**GISEDGE, Inc.**

**M.J. Harden Associates**

**Merrick & Company**

**Midwest Architects & Engineers Supply**

**R&S Digital Services**

**SDS, Inc.**

**Topographic Mapping Company**

# Abstracts of Poster Presentations

## AGGLOMERATION OF DATA GEOCODED BY ZIP CODE FOR CHOROPLETH MAPPING AT A COUNTY LEVEL

**Gregory A. Plumb, Associate Professor**
**Department of Cartography and Geography**
**East Central University**

The concept of relational databases has enabled thematic maps to be constructed from data sets not orginally intended for geographic use. Databases of mailing addresses are classic examples.

Such thematic databases contain zip codes that are mapped using a relational join with geographically encoded zipcodes (e.g. ArcView shape files). The resulting level of detail is often excessive and somewhat ambiguous for choropleth mapping. Counties are better suited as the enumeration unit for regional and national maps.

This poster presentation provides a flow diagram showing the steps necessary to construct a county-level choropleth map from thematic data originating as zip codes. Implementation of this technique is demonstrated with maps of East Central University alumni.

## STRUCTURE HEIGHT LIMITATION ZONE FOR MAX WESTHEIMER AIRPORT

**Scott Woodruff, GIS Analyst**
**City of Norman**

Max Westheimer Airport is located approximately 2 miles Northwest of downtown Norman, Oklahoma. As the City of Norman grows around the airport location, there is a greater chance that new structures may impede flight paths or endanger pilots. Earlier this year, Norman City Council passed an ordinance regulating the heights of structures built within a certain distance of the airport as described below:

"*Any construction or alteration of greater height than an imaginary surface extending outward and upward . . . at a slope of 100 to 1 for a horizontal distance of 20,000 feet from the nearest point of the nearest runway of each airport . . . with at least one runway more than 3,200 feet.*"

City of Norman building officials must consider this limitation when issuing construction permits. The process of determining the maximum height for each new construction site is both tedious and time consuming.

An ArcInfo coverage was created using ESRI ArcView, ArcInfo, and GRID that provides a maximum construction height value for the area surrounding Max Westheimer Airport. This value indicates the maximum height a structure can reach without exceeding City of Norman ordinances.

A 20,000' buffer was created around the airport runways and this area was converted to a grid composed of 100' x 100' cells. Each grid cell was assigned a value for "distance from airport" by performing a spatial join between the grid and airport layers. A "cell elevation" value was also assigned to each grid cell using a 2' contour elevation layer. These values were used to calculate the maximum construction height for each cell using the following formula: (Cell Distance from Airport/100) + Airport Elevation) - Cell Elevation). Boundaries between cells of equal value were dissolved to create the final polygon coverage of maximum construction height. City of Norman permitting agents can easily query this coverage to determine whether or not proposed construction or alterations will exceed height limitations.

## OKLAHOMA ELECTION BOARD PROJECT

**Azhar Mahmood[1] and Scott McKinney[2]**
**Geo Info Systems**

This poster shows some typical maps produced through this project for the Oklahoma State Election Board on a county-by-county basis. The goal of this project is to develop a database through which the County Election Boards (CEBs) could assign their voters based on their addresses, to a precinct and school district. We have used TIGER '95 data to create our base maps for each county. From these base maps, precinct and school district boundaries were digitized using data and source maps received from CEBs and the Oklahoma State Department of Education, respectively.

The final product maps for each county (CEB) include the following:

1. County Map: It represents the precinct boundaries, the school district boundaries, and the Vo-tech districts within the county.

2. Township-Range-Section (TRS) Locator Guide for the County: TRS maps for each township within a county with school district and precinct boundaries, and geo-location records for each section broken down to qtr-qtrs. where required.

3. Street Guide Work Maps by Precinct for the County: Individual precinct maps with updated CEB street-guide records (database) for each precinct in the county. Each street has an assignment based on an address range, a school district, and a precinct.

[1] GIS Specialist, GIS Department, University of Oklahoma, 1818 W. Lindsey, Suite A-105, Norman, OK 73069, Tel. (405) 325-3131, Fax (405) 579-5985, e-mail: azmahmood@ou.edu
[2] GIS Specialist, GIS Department, University of Oklahoma, 1818 W. Lindsey, Suite A-105, Norman, OK 73069, Tel. (405) 325-3131, Fax (405) 579-5985, e-mail: smckinney@ou.edu

Software and Hardware used: ESRI's ArcInfo 7.2.1, ESRI's ArcView 3.1, Microsoft Access, Windows NT 4.0, Pentium PCs, HP 755cm Design Jet, EPSON Stylus 1520 Printer.

## STATEWIDE GROUNDWATER VULNERABILITY MAP OF OKLAHOMA

**Ray H. Hardy and Noel I. Osborn**
**Oklahoma Water Resources Board**

The Oklahoma Water Resources Board developed a statewide map showing the relative vulnerability of groundwater in 30 hydrogeologic basins. Vulnerability was computed with the DRASTIC index method, developed by the U.S. Environmental Protection Agency (EPA). DRASTIC considers seven hydrogeologic factors: ***D***epth to water, net ***R***echarge, ***A***quifer media, ***S***oil media, ***T***opography (slope), ***I***mpact of the vadose zone media, and hydraulic ***C***onductivity of the aquifer. The method assumes that the contaminant is introduced at the ground surface, flushed into the groundwater by precipitation, and has the mobility of water.

Each hydrogeologic basin was evaluated with ArcView GIS. Seven hydrogeologic factors, and one DRASTIC index was calculated for each basin. Based on the DRASTIC indices, the hydrogeologic basins were classified in five groups of relative vulnerability: very low, low, moderate, high, and very high. The vulnerability map shows the relative vulnerability of the hydrogeologic basins. The alluvium and terrace deposits are most susceptible to contamination. The vulnerability map can assist in the implementation of groundwater management strategies to prevent degradation of groundwater quality.

## THE BENEFIT OF DIGITAL ORTHO PHOTOGRAPHY IN GIS

**Shellie Rudd**
**Oklahoma Conservation Commission**

Imagery has frequently been used in conjunction with Geographic Information Systems (GIS) in order to add real world meaning to the projects in which the imagery is displayed. This added benefit, however, could prove to be not only difficult for the average GIS user but also costly. Now, thanks to the efforts of the State GIS Council, the added value of imagery can be obtained fairly simply and inexpensively using digital ortho photography. Covering the majority of the State of Oklahoma, these photos can be easily downloaded from an FTP site and used in almost any GIS project to enhance its meaning and usefulness.

This poster will show the various ways in which ortho photography can be used in ESRI Products such as ArcView and its numerous extensions, specifically 3D Analyst. By combining the ortho photos with state or county level data such as streams, highways, or digital raster graphs (DRG), a whole new dimension can be added to any GIS project with little difficulty.

# Land **Information** Solutions

**GPS Surveying**
Airborne GPS
Utility Inventory
Precise Geodetic Networks

**Digital Photogrammetry**
Digital Terrain Modeling (DTM)
Topologic Planimetry
Change Detection/May Updating

**Digital Orthophotography**
HighRes Film Scanning
Raster/Vector Integration

**Source Automation**
Cadastral Mapping/COGO
Utility Network Automation

**GIS Applications**
Engineering/Utility Applications
ArcIMF/Internet Applications

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# NOTES

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