Using Custom Editor Tools to Maintain Complex Databases

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Abstract

Chicago's data infrastructure has evolved to a complex model of layers, tables and relationships. This session highlights custom tools created to maintain buildings, zoning and utilities data while sheltering the editor from the complexities of referential integrity. The tools maintain many tables simultaneously and streamline the speed and quality of data editing.

Introduction

Since the inception of GIS at the City of Chicago in 1998, data layers at the City of Chicago have expanded from a few base layers digitized from aerial photographs to over 250 feature classes serving all the major departments. Although many of layers are essentially static with updates applied only as needed, some of the most important ones are continually edited and tightly integrated with stand-alone tables to form complicated data models. Complete data model diagrams for each of the systems discussed are included in the appendices.

Even under the best conditions, maintaining data for a city of 3 million people encompassing more than 200 square miles is challenging. In an environment where data is complex and editors are limited and frequently change, it is necessary to find ways to increase efficiency and ensure accuracy. The City has developed suites of editing tools for the different departments. Three of the major toolsets are described in this paper. All include basic functions such as creating a unique feature id number and ensuring that update information (User ID and date) is automatically populated. But each one of them also contains unique features designed to meet each department's specific needs. We will focus on these features rather than try to give a comprehensive listing of all toolsets' functions.

Building Editing Tools

Out of more than 790,000 total footprints, Chicago has more than 467,000 addressed building footprints. Because each building may have multiple addresses, the addresses are stored in a separate property address table. Furthermore, in the data model, the buildings are tightly coupled with the parcels on which they lay and with which they frequently share an address (also stored on the property address table.) This relationship is stored in a building/parcel cross reference table which is heavily used by non-GIS business systems that require identifying the parcel for a specific building.

The building editing tools enable an editor to easily maintain the integrity of the relationships between the parcel feature class, building feature class, property address table as well as the building/parcel cross reference table.

In addition the building editing tools also allow the user to update the building use information. The building use information is stored in a separate table, as one building can have multiple uses.

Zoning Editing Tools

The Zoning department maintains a layer of over 10,000 zoning boundary polygons, which must adhere to topology rules of "no overlaps" and "no-gaps". The Zoning editing tools allow a user with minimal ArcMap experience to create zoning boundary polygons with no topology errors. The polygons created with the tools are perfectly aligned with base map data such as street and parcel boundaries. Furthermore, the geographic data is integrated with the City Zoning Case Management System.

Bureau of Electricity Editing Tools

The Bureau of Electricity (BOE), a bureau within the City's Streets and Sanitation Department, is in the process of converting its paper atlas maps of streetlights to GIS. The project is staffed in-house with a limited number of editors, so efficiency is of utmost importance. The main BOE tools allow a user to quickly produce multiple streetlamp poles as well as the circuit segments connecting them. There are also import tools which allow CAD data gathered by outside contractors with GPS to be appended to the GIS feature classes.

I Building Edit Tools

Fig .1: Building footprints

The heart of the Building Edit Tools Suite is the 'Edit Building Attribute' module. After a new building footprint is created, the 'Edit Building Attribute' GUI is automatically invoked.
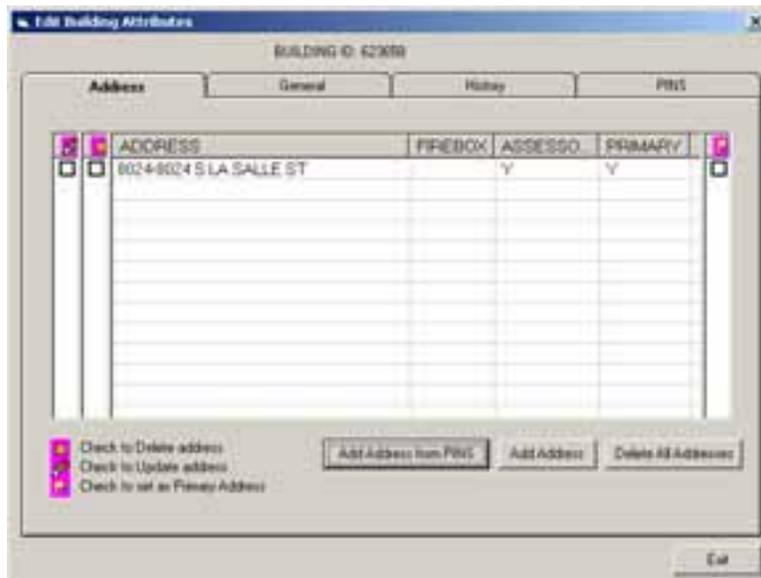
Fig .2: Edit Building Attribute Tool

The most important attribute for a building is the address, which is populated in the 'Address' tab. The vast majority of Chicago buildings are residential buildings lying on a single parcel where the address of the building and parcel are exactly the same. The tools exploit this relationship and allow the user to quickly associate an address to a new building without having to type it.

The user clicks the 'Add Address From PINS' button. The following window pops up displaying all parcels that the building footprint intersects (Figure 3) as well as their addresses.

Fig .3: List of parcels the building footprint lies on

The user has the option of excluding any parcels which might be intersected due to small accuracies in placement of parcels or the building footprint. When the 'Add Address from PINS' button is clicked, the address for the parcel is associated to the building in the property address table (Figure 4).   Any addresses for parcels that lie on the same street are aggregated to create an address range. In addition an entry to the parcel/building cross reference table is added.

Fig .4: Newly added consolidated address for footprint

In case the parcel address is not correct, the user has the option of inputting the address manually using the 'Add Address' button. A simple address input window is displayed (Figure 5).
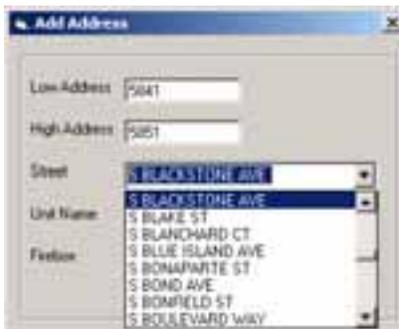
Fig .5: Manual Address Entry window

The dropdown has all valid street names. This list is read from a street names table at startup time and stored in memory for display that is faster than using a Geodatabase domain table. If the Address values do not lie within the valid range for the selected street, the user is prompted to enter another value. Also if the user selects a street which does not lie within a 660 foot buffer of the building centroid, a warning message is displayed.

Other building attributes are edited in the 'General' tab (Figure 6). Default values are set and drop-down list boxes allow the user to select only valid options. The 'Extract Harris Data' button populates fields with results from a query to a table storing vendor supplied building data.   All building data is updated together in the SDE database when the 'Save' button is clicked. Consolidating the updates is more efficient than the field by field updates that are used by the out-of-the-box attribute edit tool. Another drawback of the out-of-the-box tool is the considerable

time to display the contents of a dropdown with numerous values, as in the case of street names.
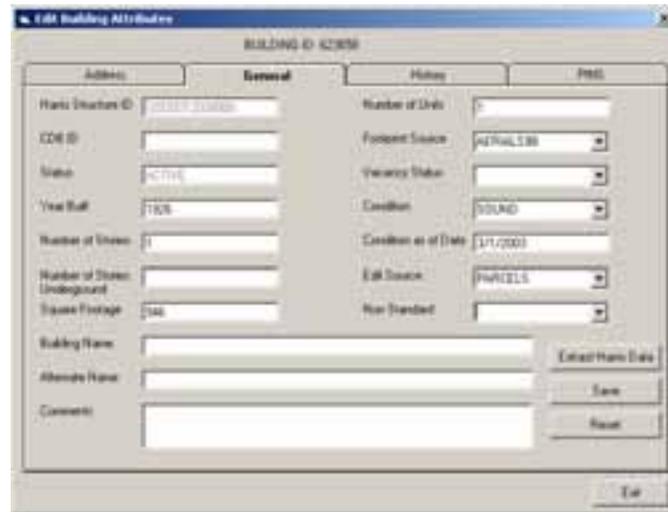
Fig .6: General Tab of the Edit attribute tool

The 'History' tab displays update dates. The 'PINS' tab displays the list of the PINS that the building footprint lies on. Both the History and PINS tabs are for display only.

Other tools in the Building Edit Tools suite include modules for associating building uses to a building and moving footprints for demolished buildings (and their associated table entries) to a separate set of feature class and tables. There is also a Split building tool. This tool allows the user to split a footprint into multiple footprints by merely clicking at the points where the split needs to occur. The building use records of the parent footprint are replicated for all the child footprints.

II Zoning Tools
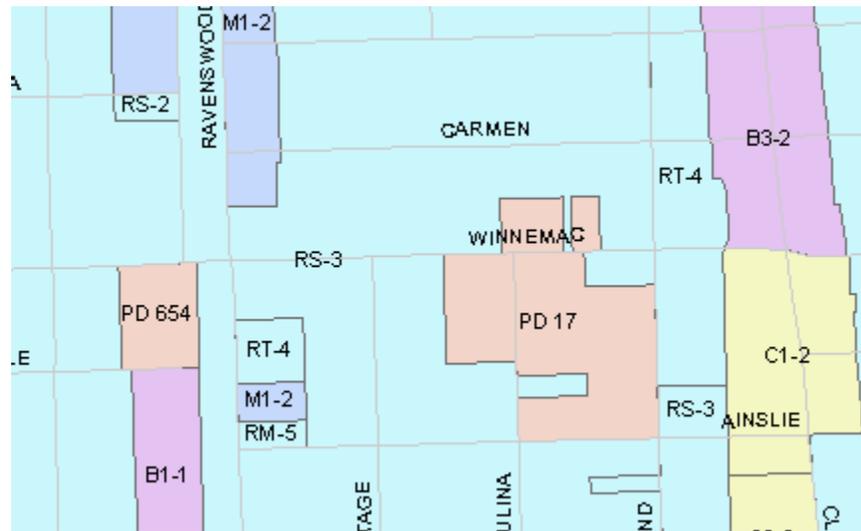
Fig .7: Zoning Map

The City of Chicago converted their zoning map data to GIS in 2002. The original data model consisted of a single 'zoning' feature class. Users made boundary changes 'free hand', using the ArcMap 'trace' tool to ensure coincidence with other existing boundaries.   Due to frequent turnover, editors were often inexperienced with complex ArcMap editing procedures and drew boundaries that created gaps or overlaps in the polygons.   There was no mechanism for creating proposed zoning boundary changes or for tracking the history of zoning changes. Once a change was done, there was no record of what the previous zoning value was.

In 2005 a major upgrade in the Zoning system was implemented including a new data model, development of a 'Zoning Case Management System' integrated with the GIS data, and new tools to edit and display the data. The new zoning data model includes a 'proposed' status, so that a zoning change can first be stored as a 'proposed zoning change' and then changed to an 'active' zoning polygon after the change is approved. It also includes an 'archive' feature class with 'retired' zoning polygons and an audit trail table which tracks the history of all the archived polygons.

The 'Create Proposed Zoning Polygon' tool allows the user to create a polygon for a Proposed Zoning change. Simultaneously the tool extracts all the parcels that lie within the newly created polygon. These parcel records are then inserted in the Case management system. This enables non-GIS users to query the zoning classification for a parcel.

Using this tool the user can create a new polygon exactly coincident with existing zoning lines, lot lines, alley lines or street lines. The user does not have to worry about snapping; the only user responsibility is to select the correct line work and trace the selected lines.
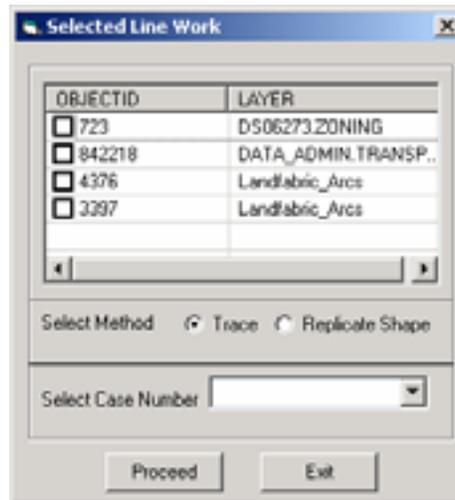
Fig .8: Create New Zoning polygon tool

The selected line work is displayed in the list (Figure 8). The user can check a selected line and remove it from the map selection. Also the user must select a Case Number from the dropdown. The Zoning Case number relates the polygon to a Zoning Case Management record. The user does not need to do any data entry as the values for the Zoning classification are read from the Case Management system. The user cannot edit the values for the zoning classification.

Fig .9: Polygon Attributes read from Case Management system

When the user is drawing the sketch, the tool will automatically detect the intersection point between the selected traced lines, if they do not already intersect (Figure 10).
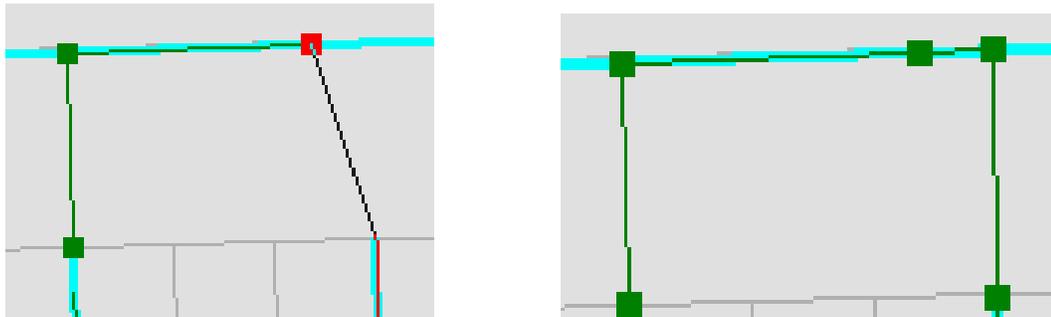
Fig .10: Automatic generation of intersection point

Also if the tool detects a Zoning line (within a 3 feet buffer) along the traced path, and finds that that zoning line is not part of the selection, a warning message is displayed.

When the user finishes drawing the sketch, a polygon with a status of 'proposed' lying 'on top' of the 'active' polygons is created (Figures 11/12).
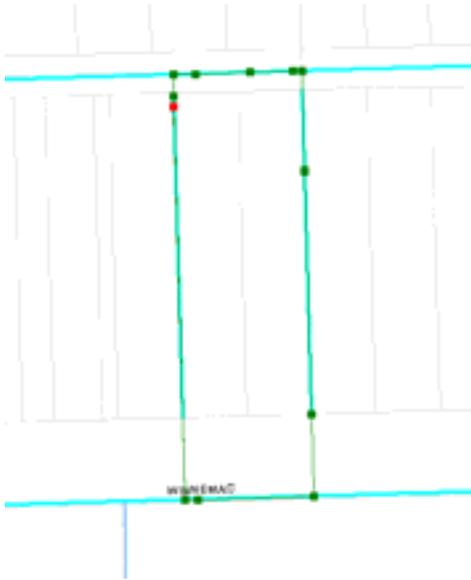
Fig .11: New polygon sketch
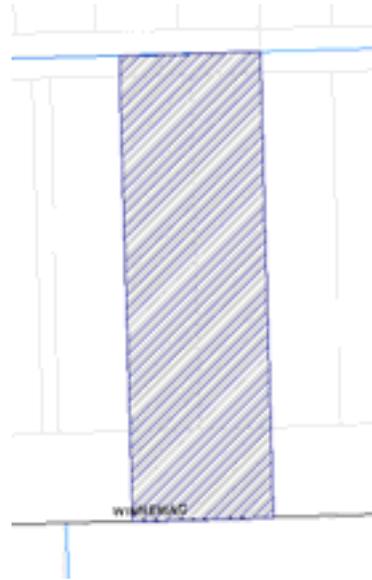
Fig .12: New overlapping 'Proposed' polygon

After a zoning change is approved by the City Council, the status of the case is updated in the Zoning Case Management System to Approved. Once it is 'Approved', the zoning administrator ensures that the 'Proposed' GIS polygon is accurately drawn and then sets the status to 'Released' in Case Management system. Only then can the 'Proposed' status of the GIS zoning polygon be updated to 'Active'. This way all the edits that are made to the GIS layer are verified for their legality. The 'Change Zoning Status' tool displays a window with all Zoning Cases which have been approved (Figure 13).
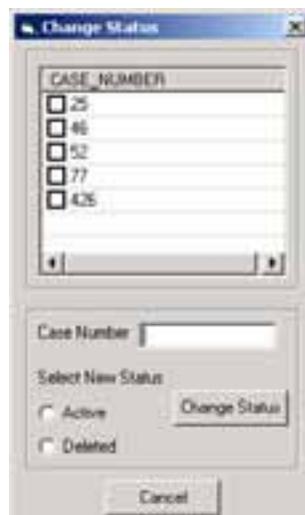
Fig .13: Change Status tool

When the user changes the status to 'Active', the 'Proposed' polygon is intersected with the underlying polygons. The clipped underlying polygons are

copied to 'Archive' feature class and replaced in the zoning feature class by the proposed polygon. Attributes of the underlying polygons remain intact when they are transferred to the 'Archive'. Before the status is changed to 'Active', the tool matches the GIS attributes of that polygon with that in the Case Management system (based on the Case ID). If the attributes do not match, the user is prompted so that the attributes can be matched automatically. Thus the combination of these two tools allows for a very tight synchronization between the Case Management system and the GIS layer.
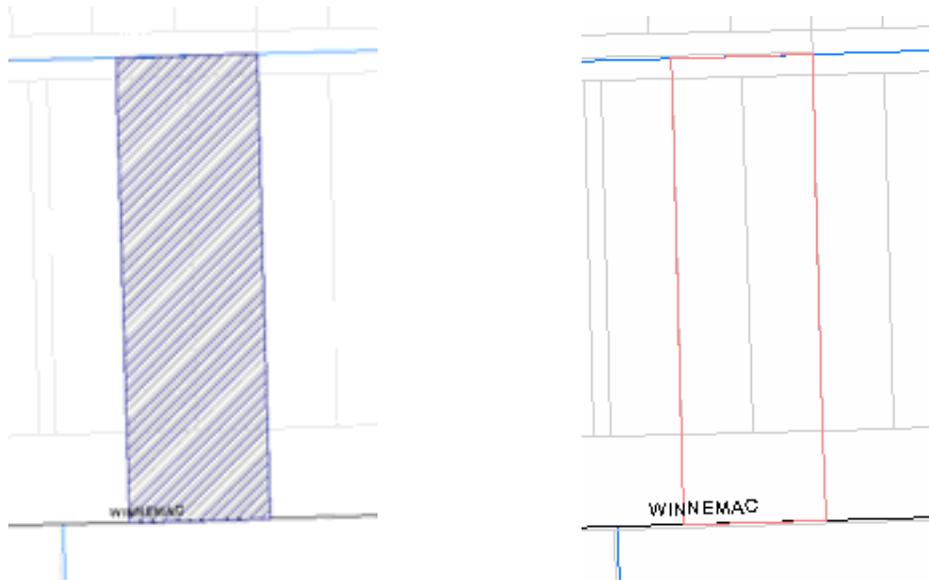
Fig .14: Changing 'Proposed' polygon to 'Active'

Rows inserted into the 'Zoning Audit Trail' table record the 'lineage' of the polygons – that is which polygons are replaced by which polygons. This tree of polygon history can then be used to reconstruct the zoning classification of any location at any given period in time with the 'View History Tool' (Figure 15).

HISTORY

Zoning ID =60354
Zone Class =B4-2

Zoning ID	Replaced Zoning ID	Replaced Zone Class	Replacement Date
60354	632	RT-4	7/6/2005
60354	60318	M1-2	7/6/2005
60318	24	RT-4	6/23/2005
60318	839	M1-2	6/23/2005

Fig .15: Report generated by the View history tool

III BOE Tools

Fig .16: BOE Circuit Map

The BOE suite of editing tools includes nearly 50 modules for editing street light poles, circuits and traffic controllers, creating atlas maps and maintaining administrative tables. The task of digitizing Chicago's 175,000 street lights, 59,200 alley lights and 2,700 signalized intersections is monumental. To add them one by one would be a tedious job; however, streetlights are not placed randomly. They are installed at regular intervals along a street or alley and usually are the same model. Therefore, tools can be designed to generate multiple features. There are two tools which are copiously used for digitizing the data. One generates a string of poles in one direction along a street or in along an alley. The other generates a Pole/ Hole/ TTap at the user clicked point on the map.

In each of the tools, when ever a point feature is created, an address for the feature is calculated using reverse geocoding.

The 'Add Pole Series' tool enables the user to draw poles along a Curb or Alley line (Figure 17).

Fig .17: Create Poles tool

Based on the user input on the 'Create Poles' window, the tool will generate Poles at an offset distance of 2 feet from the Curb or snap the Poles to the Alley. A Light (related table) is also added to each Pole if the user checks the Add Light option and selects a Luminaire Code.

When the 'Create Poles' button is clicked, the user clicks on the location where the first and last poles are to be created. The distance between the two user-clicked points is divided by the number of Poles that need to be drawn. Thus the Poles are placed equidistantly. The curbs layer is a line feature class, so the tool cannot easily distinguish 'street' side from the 'sidewalk' side. Hence the user is prompted to indicate (in the 'Proceed' window, Figure 18) which side of the curb line the pole is to be created.

Fig .18: Pole Placement (relative to the Curb line) dialog box

The 'Connect' tool allows users to continue a circuit from an already existing point feature. This tool is truly multi-functional. It enables the user to connect two already existing features, Controller to Node or Node to Node. It also allows the user to add a new Node (Pole, Hole and T-Tap) beginning from an already existing Node or Controller. The new Node is added at an offset of 2 feet from the Curb line.
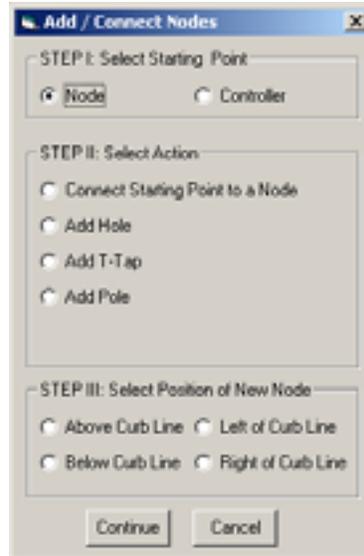
Fig .19: Connect Tool

The user selects the starting point and then selects an action. If the user chooses to add a Pole, then the user is provided with an option to add a light. In case the user is adding a new point feature (Hole, Pole, TTap), the user must select the 2 feet offset placement option for the node. The user then clicks Continue and clicks on the already existing starting point feature on the map. A red marker appears at this point to indicate the starting point. The user can now click anywhere on the map. A new feature is created (based on the user input in Fig. 19) at the user-clicked point on the map. A circuit segment is drawn between the two point features. The user can add multiple point features to the map in this manner. This tool offers the advantage that the nodes can be placed at random distances instead of them being equidistant.

Another set of tools that are very widely used are the 'Import' tools. These tools allow the user to import data from CAD files into the GIS data model. BOE has a contractor which does field work regularly to gather circuit information using GPS. The contractor captures all this information in 'dgn' file format.

The 'Import Point' tool will import the point features from the CAD layer into the BOE featureclasses. The point features that are imported are holes, poles and controllers. The information about the point features is saved in CSV (comma separated values) format. The CSV file is in the following format.

Column	Value
Number	ID
Northing	Y coordinate
Easting	X coordinate
Elevation	Z level
Description	Point Type (Hole/Pole/Controller)
Date of Survey	Survey Date
Date Installed	Installation Date
BOE Work Order Number	Work order associated with the ward
Piggy back	Indicates whether the pole has a piggy back
Traffic related	Indicates whether the pole is traffic related
Controller	Indicates whether the Power Pole has a controller
PhotoCell	Indicates whether the Controller has a photocell
Housing Type	Controller housing type (Square Steel, Round Aluminum, Square Aluminum)
Housing Condition	Controller housing condition (Good, Fair, Repair)

The Description value is matched with values in the lookup tables. If a match is found, the point is created in GIS feature classes. When the user clicks on the tool, a windows dialog box for file selection appears. The user then navigates to the CSV file and selects that file. The import process is triggered. When the process is completed a summary is generated (Figure 20).

PrjImportPoints

Number of Poles Added= 21
Number of Holes Added= 8
Number of Lights Added= 19
Number of Controllers Added= 2
Number of Power Source Added= 2

OK
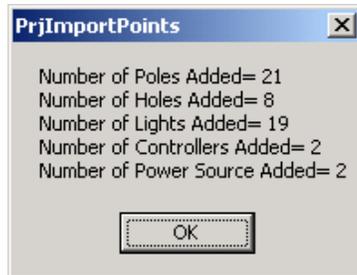
Fig .20: Summary of Import Point Tool

The 'Import Segment' tool allows the user to import the circuit segments. The conduits in the DGN file are categorized as "UNDERGROUND_LIGHTINGA" and "UNDERGROUND_LIGHTINGB". This is very crucial as it helps identify all the segments that belong to one circuit group. Before using this tool, it is imperative that the point features have already been imported. This is because during the segment import process, the segments are extended to the point features in GIS. One of the drawbacks of CAD is that the segment is drawn to the outer circumference of the point symbol and not to the point itself. This is represented in the figure below (Figure 21).

Pole

Conduit line
NOTE: It is not extended
to Node in CAD

CAD segments   GIS Segments
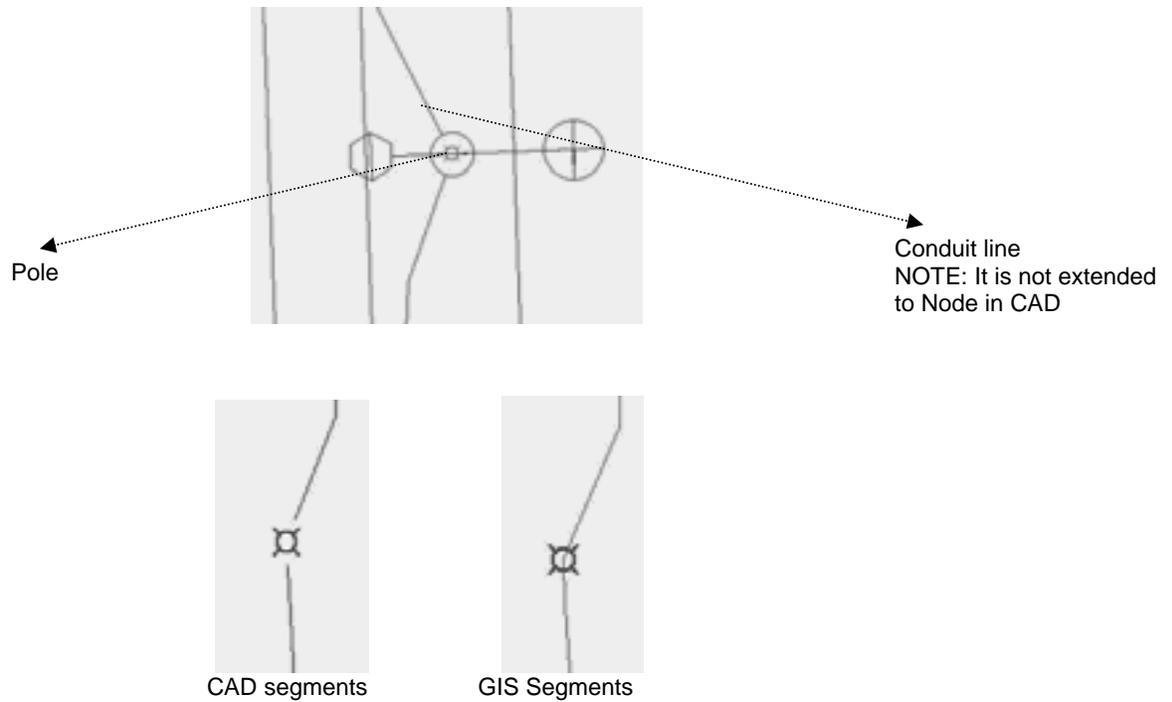
Fig .21: Import CAD segments

Therefore if the segments were imported as is, the end points of the segments would not coincide with the point features. Therefore during the import process, the segments are extended to the nearest (within a 5 feet buffer) point feature.

If a point feature is not found within the buffer, the user is notified. The user can then abort the import process or continue to import the segments. The user can then investigate the imported segments. A summary is generated at the end of the process to indicate the successful completion of the process (Figure 22).

PrjImportSegments

Number of Circuit Segments Added= 20

OK
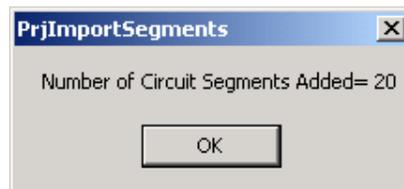
Fig .22: Summary of Import Segment tool

After the basic configuration of circuits has been drawn, other tools can be used to modify the attributes, reshape segments, move nodes and delete nodes. Also supporting features such as controllers and powers sources can be added.

IV Technical Implementation

The editing of the zoning, building and BOE data is performed on a dedicated SDE 9.1/Oracle 8i server.

All the tools work in a multi-versioned environment. All the feature layers and tables must be registered with the geodatabase and versioned.

To avoid conflicts between versions, the versions are posted and reconciled very frequently. Also wherever possible, the users work in designated non-overlapping areas.

The versions are 'protected'. All editing tools perform a check to ensure that the selected version owner is the same as the SDE login user id.

SDE is compressed at regular intervals to maintain the speed and efficiency during the editing process. It is optimum to compress SDE to state 0.

Conclusion

All of the tools and data models described above have been specifically designed for the needs of City of Chicago departments. However, the ideas behind them can be adapted by other organizations with similar needs and transformed into useful tools with some creative ArcObjects programming.

- Maintaining integrity of related tables (All).
- Expedited assignment of addresses to buildings by relating them to parcels (Buildings).
- Integration with non-GIS business systems (Zoning tools).
- Enforced alignment with base map data (Zoning tools).
- Enforced adherence to topology rules (Zoning tools).
- Audit trails showing history of polygon boundaries (Zoning tools).
- 'Batch' generation of similar features (BOE Tools).
- Automatic 'best placement' of features based on user input (BOE Tools).
- Importing CAD data collected by outside consultants (BOE Tools).

Appendix A

Building Data Model

Buildings & Parcels

Appendix B

Zoning Data Model

ZONING Logical Model

Case_Properties

PK,FK1	Case_Number	NUMERIC(10,0)
PK	Case_Property_Seq_Num	NUMERIC(10,0)
	Primary_PIN	VARCHAR(10)
	L_Addr	NUMERIC(10,0)
	H_Addr	NUMERIC(10,0)
	Pre_Dir	VARCHAR(1)
	St_Name	VARCHAR(50)
	St_Type	VARCHAR(5)
	Owner_Participant	NUMERIC(10,0)
	Ownership_Title_Year	CHAR(4)
	Previous_Rezoning_Flag	NUMERIC(10,0)
	Previous_Zoning_Ordinance_Num	VARCHAR(10)
	Previous_Zoning_Ordinance_Date	DATETIME
	Current_Use	VARCHAR(4000)
FK3	Zone_Type	SHORT
FK4	Zone_Class	VARCHAR(10)
	PD_Prefix	CHAR(10)
	PD_Num	SHORT
FK2	Ward	VARCHAR(2)
FK6	Community_Area	VARCHAR(2)
FK5	Planning_District	VARCHAR(2)
	Map_Number	VARCHAR(20)
	Create_UserID	VARCHAR(10)
	Create_Date	DATETIME
	Update_UserID	VARCHAR(10)
	Update_Date	DATETIME

REF_WARD_CODE

PK	Ward_Number	SHORT
	Ward	VARCHAR(2)

REF_ZONING_TYPE

PK	Zone_Type	SHORT
	Zone_Type_Description	CHAR(15)

CASE_PARTICIPANTS

PK	Case_Participant_Sequence	NUMERIC(10,0)
FK1	Participant_ID	NUMERIC(10,0)
FK2	Case_Number	NUMERIC(10,0)
	Case_Participant_Type	CHAR(10)

Cases

PK	Case_Number	NUMERIC(10,0)
FK3	Case_Source	VARCHAR(2)
FK4	Case_Type	VARCHAR(2)
FK6	Case_Status	VARCHAR(2)
	Case_Status_Date	DATETIME
	File_Number	NUMERIC(10,0)
	File_Date	DATETIME
FK1	Zone_Type	SHORT
FK2	Zone_Class	VARCHAR(10)
FK5	PD_Prefix	VARCHAR(10)
	PD_Num	SHORT
	Rezoning_Reason	VARCHAR(4000)
	Proposed_Use	VARCHAR(4000)
	Legal_Description	VARCHAR(4000)
	Ordinance_Number	VARCHAR(11)
	Ordinance_Date	DATETIME
	Journal_Page	VARCHAR(10)
	Introduction_Date	DATETIME
	Notes	VARCHAR(4000)
	Image_URL_1	CHAR(255)
	Image_URL_2	CHAR(255)
	Create_UserId	CHAR(10)
	Create_Date	DATETIME
	Update_Userid	DATETIME
	Update_Date	DATETIME
	GIS_Status	VARCHAR(8)

REF_CASE_SOURCE

PK	Case_Source_Code	VARCHAR(2)
	Case_Source_Description	VARCHAR(25)

REF_CASE_TYPE

PK	Case_Type_Code	VARCHAR(2)
	Case_Type_Description	VARCHAR(25)

Releases

PK	Zoning_Release_Num	CHAR(10)
	Zoning_Release_Date	CHAR(10)

REF_ZONING_CLASS

PK	Zone_Class	VARCHAR(10)
	Zone_Type	NUMERIC(2,0)

REF_PD_PREFIX

PK	PD_Prefix	VARCHAR(10)

Withdrawn

PK	Zoning_ID	LONG
	ObjectID	LONG
	Case_Number	LONG
	Zone_Type	SHORT
	Zone_Class	CHAR(10)
	Create_Date	DATETIME
	Create_UID	CHAR(15)
	Edit_Date	DATETIME
	Edit_UID	CHAR(15)
	PD_Prefix	CHAR(10)
	PD_Num	SHORT
	Comments	CHAR(255)
	Ordinance_Num	CHAR(5)
	Ordinance_Date	DATETIME
	Zoning_Release_Num	CHAR(10)
	SHAPE.AREA	DOUBLE
	SHAPE.LENGTH	DOUBLE

REF_PLANNING_DISTRICT

PK	District	VARCHAR(2)
	Name	CHAR(15)

Participants

PK	Participant_ID	NUMERIC(10,0)
	Participant_Type	VARCHAR(10)
	Participant_Org_name	VARCHAR(255)
	Participant_Last_Name	VARCHAR(100)
	Participant_First_Name	VARCHAR(100)
	Participant_Address	VARCHAR(100)
	Participant_City	VARCHAR(50)
	Participant_State	VARCHAR(2)
	Participant_Zip	VARCHAR(5)
	Participant_Zip4	VARCHAR(4)
	Participant_Phone	VARCHAR(10)
	Participant_Email	VARCHAR(50)
	Participant_Fein	VARCHAR(10)
	Participant_CDB_ID	VARCHAR(12)
	Create_UserId	VARCHAR(10)
	Create_Date	DATETIME
	Update_UserId	VARCHAR(10)
	Update_Date	DATETIME

REF_ZONING_CLASS_CONV

PK	Zone_Class_ID	NUMERIC(10,0)
	Zone_Type	NUMERIC(2,0)
	Zone_Class	VARCHAR(10)
	Zone_Old_Class	VARCHAR(10)

REF_COMMUNITY_AREA

PK	Area_Number	VARCHAR(2)
	Community	VARCHAR(80)

Zoning_Audit_Trail

PK,FK1	New_Zoning_ID	LONG
PK,FK2	Replaced_Zoning_ID	LONG
	Replacement_Date	DATETIME

Zoning (GIS)

PK	Zoning_ID	LONG
	ObjectID	LONG
FK4	CASE_TYPE	VARCHAR(2)
FK1	Case_Number	NUMERIC(10,0)
FK6	Zone_Type	SHORT
	OLD_ZONE_CLASS	CHAR(10)
	Edit_Status	CHAR(8)
	Create_Date (renamed)	DATETIME
	Create_UID	CHAR(15)
	Edit_Date (renamed)	DATETIME
	Edit_UID	CHAR(15)
FK5	PD_Prefix	CHAR(10)
	PD_Num	SHORT
	Comments	CHAR(255)
	Ordinance_Num	VARCHAR(11)
	Ordinance_Date	DATETIME
FK2	Zoning_Release_Num	CHAR(10)
	SHAPE.AREA	DOUBLE
	SHAPE.LENGTH	DOUBLE
	------ TO DELETE ------	
	PMD_NUM (DELETE)	SHORT
	SD_NUM (DELETE)	CHAR(5)
	CBD (DELETE)	CHAR(1)
	IND_CORRIDOR_NUM (DELETE)	LONG

REF_CASE_STATUS_CODE

PK	Case_Status_Code	VARCHAR(2)
	Case_Status_Description	VARCHAR(25)

Case_Activity

PK,FK1	Case_Number	NUMERIC(10,0)
PK	Case_Activity_Seq_Num	NUMERIC(10,0)
	Case_Activity_Date	DATETIME
FK3	Activity_Type	NUMERIC(10,0)
FK2	Case_Status	VARCHAR(2)
	Case_Activity_Attachment	CHAR(255)
	Case_Activity_Comments	VARCHAR(4000)
	Create_UserId	CHAR(10)
	Create_Date	DATETIME
	Update_UserId	CHAR(10)
	Update_Date	DATETIME

Zoning_Archive (GIS)

|		
PK	Zoning_ID	LONG
	ObjectID	LONG
	Case_Number	LONG
	Zone_Type	SHORT
	Zone_Class	CHAR(10)
	Create_Date	DATETIME
	Create_UID	CHAR(15)
	Edit_Date	DATETIME
	Edit_UID	CHAR(15)
	PD_Prefix	CHAR(10)
	PD_Num	SHORT
	Comments	CHAR(255)
	Ordinance_Num	CHAR(5)
	Ordinance_Date	DATETIME
	Zoning_Release_Num	CHAR(10)
	SHAPE.AREA	DOUBLE
	SHAPE.LENGTH	DOUBLE

REF_ACTIVITY_TYPE_CODE

PK	Activity_Type_Code	SHORT
	Activity_Type_Description	VARCHAR(25)

Ref_Case_Source

Code	Description
A	Aldermanic
C	Constituent
D	Department
I	Internal

Case_Type_Code

Code	Description
AM	Amendment
A1	Amendment Type 1
A	Appeal
S	Special Use
Z	Variance
MC	Map Correction

Case_Status_Code

Code	Description
A	Approved
D	Denied
DF	Deferred
P	Pending
U	Unassigned
W	Withdrawn
R	Released

Activity_Type_Code

Code	Description
1	Aldermanic Review
2	Case Status Change
3	City Council
4	Continuance
5	ZBA
6	Zoning Committee
7	Clerk file Application

Appendix C

BOE Data Model

Chicago Bureau of Electricity
Physical Geodatabase Model
Phase 1 Edition

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