Houston Plat Tracker puts the GIS in Land Development

Abstract: The Plat Tracker supports Houston's land development approval process. This home grown web-based system includes GIS research tools and a CAD to GIS automation process made possible by requiring an AutoCAD template on plat submittal. This allows for streamlined CAD to GIS conversion which was not possible before with GIS technicians. GIS enabling the plats also makes proposed land development viewable by citizens quicker and more easily than ever before. It allows automation of spatial intersection of other GIS data, which reduces human error and quickens the review process. GIS analysts, urban planners and managers should attend to learn how the 4th largest city built a GIS enabled land development system from the ground up. Also learn the technical, organizational and interpersonal struggles and successes that were realized!

Houston Plat Tracker (www.houstonplattracker.org) is a System created by the Planning & Development Department, City of Houston technical staff. Through the Plat Tracker, the Planning & Development Department and other agencies regulate land development in Houston and the extra territorial jurisdiction and review, investigate and promote land regulation policies for the changing demands to Houston's growth and quality of life. Development plats applications are reviewed by the Houston Planning Commission every two weeks

This in-house developed web-based system is a multi-faceted complex system, for which the GIS pieces add specific solutions. The Plat Tracker includes GIS solutions that improve the plat application and review process, which is all made possible by requiring a computer aided design (CAD) standard file. First a GIS Plat Verification service was created to allow the applicant to load a CAD file to verify placement in the parcel fabric before submittal. Second, a CAD to GIS automated process allows for streamlined CAD to GIS conversion which was not possible before. Processing the CAD files into GIS makes proposed land development viewable by citizens quicker and more easily than ever before via GIS online applications. It allows automation of spatial intersection of other GIS data, which reduces human error and quickens the plat application and review process.

Statement of the Problem:

- There is no standard development plat format for CAD across the surveying industry.
- AutoCAD layers were not entered into the GIS due to this lack of consistency and standards and due to staff limitations because it required manual data entry.
- Planning staff needed to verify if a CAD file was correctly geo-referenced or in the correct location in GIS before acceptance.
- Several geospatial attributes, such as city limit, city council, and taxing parcels were manually entered on the application by the applicant.

- Planning staff would use GIS for reference only in verifying the geospatial attributes. Much effort was taken to correct the data entered by the applicants.

The Response:

Planning staff developed a multi-layer CAD file template called a Registry Drawing (http://www.houstontx.gov/planning/docs_pdfs/RegistryTemplate-2013_H1.dwg) with instructions (http://www.houstontx.gov/planning/docs_pdfs/registry_instr.pdf) all downloadable from the Plat Tracker home page. The Plat Tracker requires this file when an applicant submits a development plat to the City.

To resolve the CAD geo-reference issues, GIS technical staff designed a secure web form (Exhibit A) as part of the Plat Tracker for input of the Registry Drawing file, the county and scale factor for verifying the GIS location of the proposed plat. A simple JavaScript map (Exhibit B) is used to render the proposed plat in the parcel land base or fabric; this rendering is the result of an ESRI ArcGIS service processing the CAD file and parameters on city servers.

GIS technical staff designed an automated process and program to convert the CAD Registry Drawing file into the GIS database to resolve the GIS issues. This is a 2 part process that first, imports the CAD layers into Geodatabase features, such as the boundary of the plat, lot lines and street annotation. The resulting GIS features are replicated to Enterprise GIS and consumable as a service in both desktop and web tools. The 2nd part intersects the boundary of the plat with over 33 GIS Enterprise features, such as city limit, city council, neighborhood, map grid, utility district, taxing parcels, etc., to populate a SQL table with the spatial components.

The planning staff set the process to run only after checking the Registry Drawing is correct and verifying its location in GIS. Due to logs in the database, the status of the CAD to GIS conversion can be seen in a report. Due to anywhere from 80-120 plat applications submitted per cycle, it takes time to process. They sit in a queue on the server and are processed sequentially, each one taking average of 10 minutes. After completion of this behind the scenes process, the GIS features are available online for the public to see and the GIS data is available for review by planning staff from within Plat Tracker (Exhibit C).

The Results:

The results are quite substantial. The Registry Drawing template allows for tremendous time saving gains that only GIS can provide. By pre-validating the location of the plat in GIS before the plat is submitted to the system, there is minimal delay caused by discrepancies in the CAD files between the City planners and the applicants. This increased the time plats can be approved by days. The incorrect CAD files could cause days of setback involving email correspondence and staff time. Since the cycle is set at 2 weeks intervals, this could be the difference between not getting funding for a land development project.

The GIS solution provided by the GIS technical team has enabled automation into GIS from the CAD file and saved manual effort normally done by a GIS technician. Before, the CAD files

were too varying to import into GIS in a reliable, standardized way. Because of the recession, the department had to lay off 2 GIS technicians that assisted with locating CAD files and preparing maps for Planning Commission. The CAD to GIS Automation replaces the need to replace those 2 GIS Technicians.

The CAD to GIS conversion promotes transparency to the public. Before, there was no easy way to notify constituents of proposed land development projects in their neighborhoods. They had to read Agenda spreadsheets and documents online, searching for the correct address or subdivision references on location and relying on the manually entered spatial attributes, such as user entered City council or Neighborhood.

Now, they can enter an address or zoom to their location using a GIS viewer, such as MyCity Houston at http://mycity.houstontx.gov/public and turn on proposed and approved plats as a layer in GIS (Exhibit D). They can turn on and off labels and annotation to get more or less information about the plat. This functionality has never been available before and we have barely begun to leverage the benefit this provides the citizens and competing applicants.

The GIS solution of CAD to GIS conversion has saved manual effort normally done by the applicant. The applicant no longer has to enter the spatial attributes of a proposed plat or CAD file. This saves the applicants on average 10 minutes to several hours, depending on the research needed to find the multiple location details about a plat. This is now done by the system.

Planning staff do not have to correct those spatial attributes entered manually by the applicant. Because manual data entry can increase human error, city staff would have to re-type several attributes or perform additional research to correct the wrong spatial attributes. This took additional time, because the reviewer had to pull up GIS tools and eye ball where the plat would be to gage what the various spatial attributes should be. Since the system populates the data, now all the planning staff has to do is confirm the spatial attributes that were processed by the CAD to GIS automation (Exhibit C). Furthermore, because the GIS layers are created, planning staff can consume the same plat layers used for the public in MyCity Houston in their own GIS Desktop tool. Time spend eye balling the location of a plat, digitizing or geo-referencing a CAD boundary is now saved.

Key Participants:

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Exhibits:

Exhibit A: Input Form

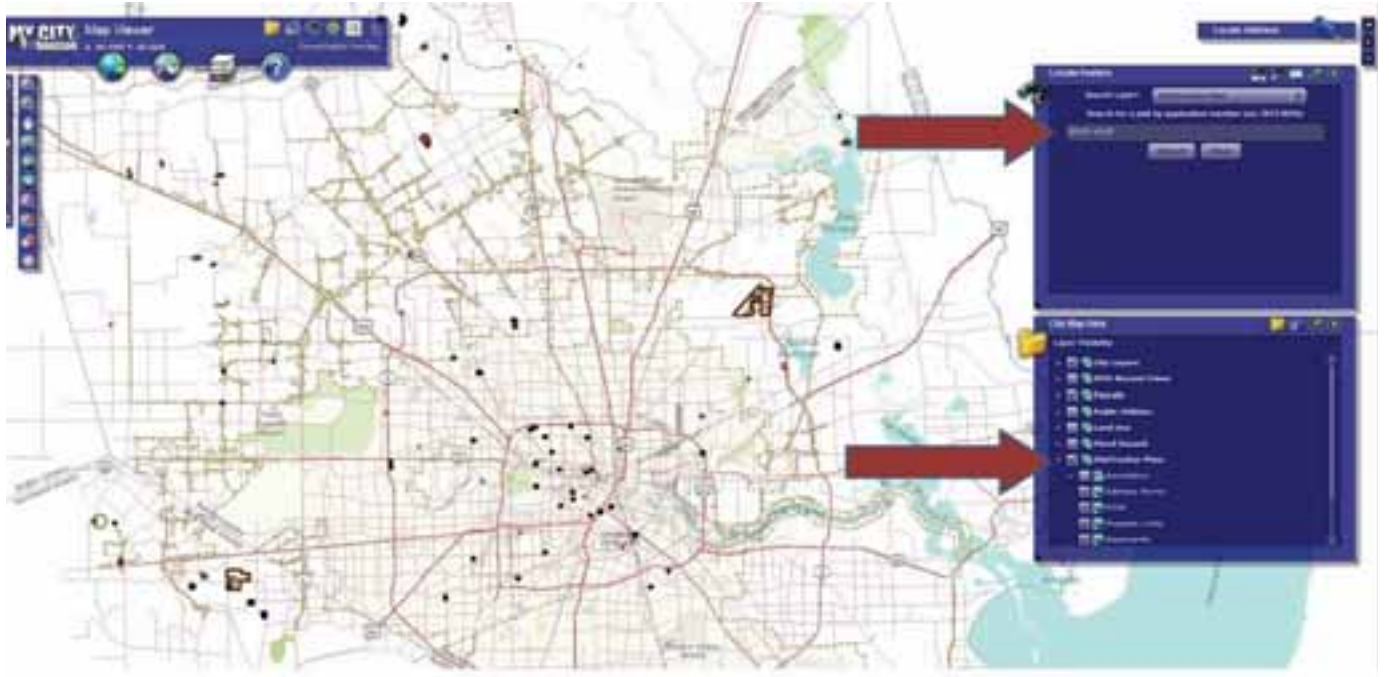**Exhibit B: Plat Verification Map**

Exhibit C: GIS Attributes in green system generated

Exhibit D: MyCity Houston with Plat Layers visible