



Jefferson County, MO

Department of the County Assessor

GIS Presentation to MSPS – St. Louis Chapter

Presented by:

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Jefferson County, MO

Department of the County Assessor

1. History of Cadastral Mapping
2. GIS Implementation in Jefferson County
3. Ortho Imagery Use
4. Process of Mapping Deeds in GIS
5. Property Boundary Surveys vs. GIS Parcel Mapping
6. Other Uses of GIS



History of Cadastral Mapping



Cadastre - an official register of the quantity, value, and ownership of real estate used in apportioning taxes

Tax Map—A document or map for taxation purposes showing the location, quantity, dimensions, and other relevant information pertaining to a parcel of land subject to *ad valorem* taxes, commonly known as property taxes

History of Cadastral Mapping



Cadastral Parcel Mapping—The delineated identification of all real property parcels. The cadastral map is based upon the United States Public Land Survey System (PLSS). For cadastral parcel maps the position of the legal framework is derived from the PLSS, existing tax maps, and tax database property descriptions, recorded deeds, recorded surveys, and recorded subdivision plats.

2 CSR 90-65.030 (2)

History of Cadastral Mapping



Parcel—A single unit of real property which can be described by location and boundaries and for which there is a history of defined, legally recognized interests. Parcel boundaries are usually described in a conveyance document by aliquot part, metes and bounds, or by lot number in a recorded subdivision.

2 CSR 90-65.030 (8)

History of Cadastral Mapping

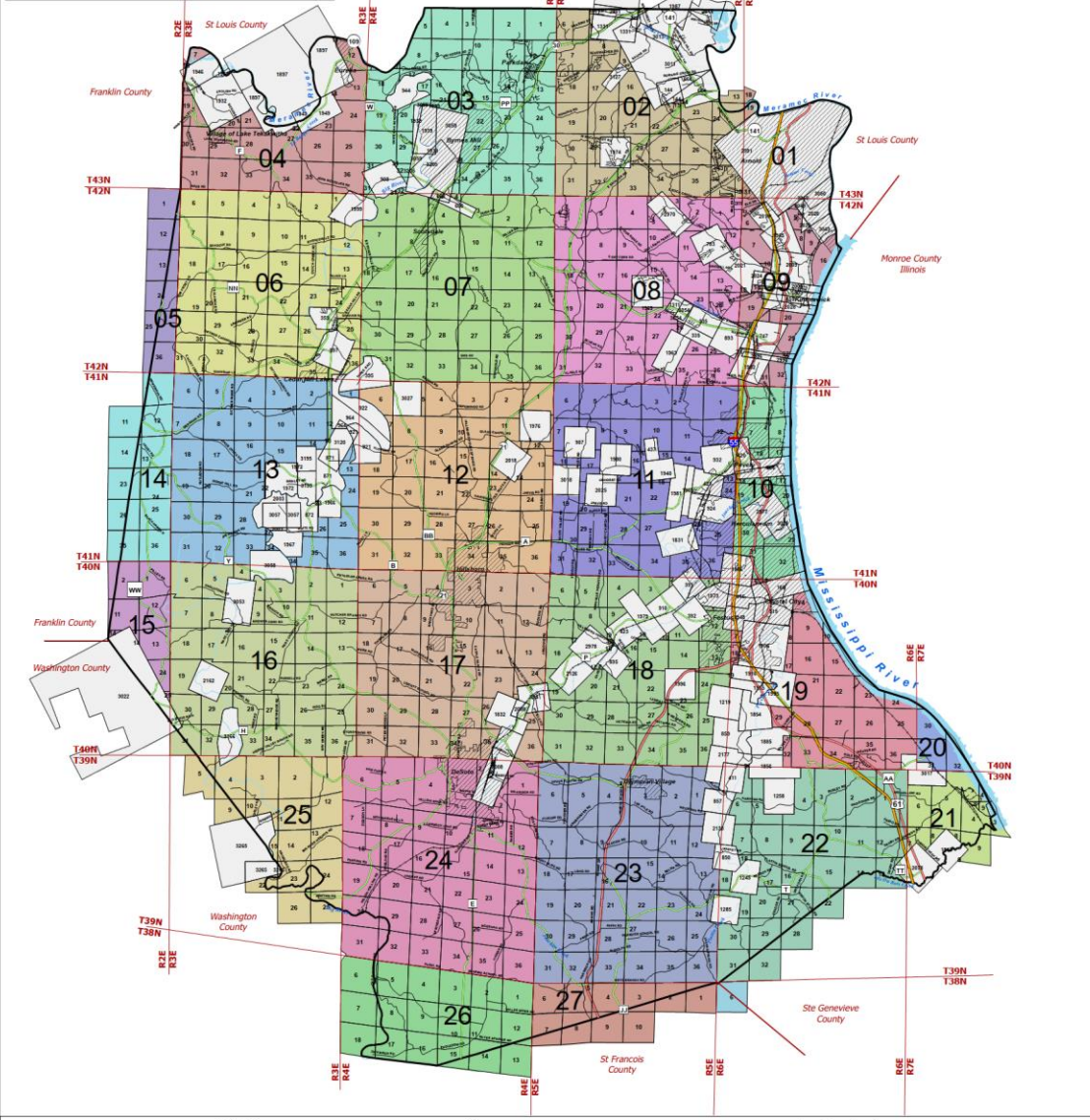


Digital Cadastral Parcel Mapping—Encompasses the concepts of automated mapping, graphic display and output, data analysis, and database management as pertains to cadastral parcel mapping. Digital cadastral parcel mapping systems consist of hardware, software, data, people, organizations, and institutional arrangements for collecting, storing, analyzing, and disseminating information about the location and areas of parcels and the United States Public Land Survey System.

2 CSR 90-65.030 (3)



Public Land Survey System (PLSS)



Jefferson County
Department of the County Assessor
Bob Boyer, Assessor

Map Title: **PLSS**

Print Date: 3/15/2023

CAUTION

This map is for tax purposes only. It is not intended nor sufficiently accurate to be used for conveyances. Any use other than for tax purposes shall be at the user's risk. The reproduction or copying of this map or any part thereof by any process is prohibited without the written permission of the Department of the County Assessor.

Pursuant to 2 CSR 90-65.080: "This Cadastral Map is for informational purposes only. It does not purport to represent a property boundary survey of the parcels shown and shall not be used for conveyances or the establishment of property boundaries." Authority: section 60-6.070, RSMo 2016.

Infrastructure

- Mammoth Rd — County Road
- UPRR Railroad — Railroads
- State Route 21 — State Road
- 100 — State Road
- 91 — US Highway

Hydrography

- Rivers/Creeks

Boundaries

- Township and Range
- Municipalities
- Land Grants (Surveys)
- Sections

www.jeffco.mo.gov/assessor
jeffcoassessor@jeffco.mo.gov
426-767-6442

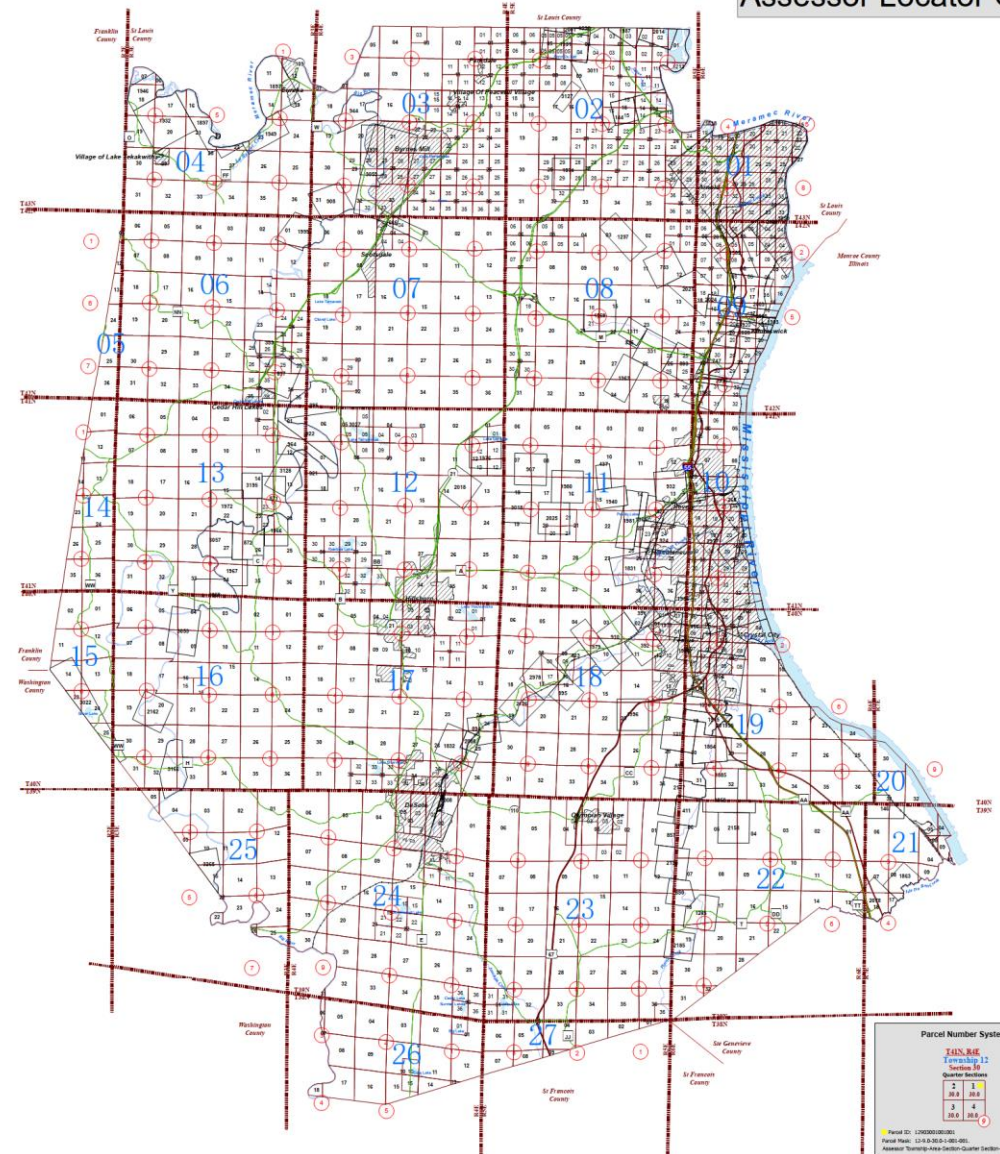
Data Source: Department of the County Assessor, Jefferson County GIS, Missouri Department of Agriculture

Scale: 1:96,000

Coordinates System: NAD 1983 State Plane MO East FIPS 2401 US Foot Projection, Transverse Mercator



Assessor Locator Grid



Jefferson County
 Department of the County Assessor
 Bob Boyer, Assessor
 Map Title: **Locator**
 Print Date: 3/20/2023

CAUTION
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 Pursuant to 2 CSR 90-65.080: "This Cadastral Map is for informational purposes only. It does not purport to represent a property boundary survey of the parcels shown and shall not be used for conveyances or the establishment of property boundaries." Authority: section 60.670, RSMo 2016.

Infrastructure

- City Street
- County Road
- Local Roads
- Festus Special
- Railroads
- State Route
- State Road
- US Highway
- Interstate
- River/Creeks
- Bodies

Boundaries / Land Survey System

- Township / Range
- Section, Quarter Section
- LandGrants (Surveys)
- Area
- Assessor's Township

Parcel Number System

TAJNS_RMK
 Township 12
 Section 36
 Quarter Sections

2	1
36.0	36.0
3	4
36.0	36.0

Parcel ID: 1-000001000001
 Parcel Area: 12.0-0.000-0.000-0.000
 Assessor: Township Area Section Quarter Section Block Parcel Extension

Data Source: Department of the County Assessor, Jefferson County 911, Missouri Dept. of Agriculture Land Survey

www.jeffersoncountyassessor.com
 jeffersoncountyassessor@jeffersoncounty.org
 536.793.5416

Scale: 1:96,000
 0 0.5 1 2 3 4 Miles

Coordinate System: NAD 1983 StatePlane MO East FIPS 5001 Feet US
 Projection: Transverse Mercator



Parcel Number System

T41N, R4E
Township 12
Section 30
Quarter Sections

2 30.0	1 ● 30.0
3 30.0	4 30.0

9

● Parcel ID: 12903001001001

Parcel Mask: 12-9.0-30.0-1-001-001.

Assessor Township-Area-Section-Quarter Section-Block-Parcel-Extension



Jefferson County, MO

Department of the County Assessor

GIS Implementation in Jefferson County



GIS Implementation in Jefferson County



■ 1995: GIS New to County Government

- Assessor created a new position: GIS Coordinator
- First steps: research and gather information from other counties, entities and attend seminars
- Worked closely with ESRI sales/technical staff

Resulted in:

- CAD System purchase to convert mylar maps in-house
- ESRI software and hardware purchase to create GIS

■ 1996-2002: Migration of Mylar Maps and First GIS Data

- Digitized 871 maps in-house
- Converted mylar maps to GIS and began using it to analyze data
- Other departments began requesting GIS data
- Mappers trained on editing tax parcels in GIS software (ArcMap)

GIS Implementation in Jefferson County



- **2002-2005: GIS Interest and Use Continued to Grow**
 - First digital ortho-rectified imagery was purchased (about 1 meter resolution) flown in 2003
 - Goal was to quality control GIS data with the use of the imagery
 - Slow process as no funds were available to hire additional employees and GIS data requests were increasing
 - Done as time allowed
 - Custom work for taxpayers and private sector continued to grow and became too much for one person, discontinued custom work
 - Planning and Zoning hired a planner with some knowledge of GIS, both offices worked independently of each other, but took some burden off the Assessor's office

GIS Implementation in Jefferson County



- **2005-2010: 1st Imagery flight purchased from Eagleview and GIS Use Growing**
 - 2008 Color Imagery at 10-inch resolution allowed us to improve the quality of our GIS feature layers – quality control was done when time allowed
 - Data requests and daily management of data continued to be priority
 - GIS was departmentally fragmented due to software/hardware limitations (concerns with editing data and accessing data)
 - Elections Department Grant Offer – Game Changer! Recommended going to an Enterprise GIS
 - Created a database driven by SQL (SDE) – allowed for multiple editors and easier access to GIS by all departments

GIS Implementation in Jefferson County



■ 2011-2017

- Contract with Eagleview and public entity participation allows for imagery on a 2 year cycle
- Enterprise GIS managed in house by the GIS Coordinator
- Web apps – cut down on phone calls and in office traffic by more than half
- Over 400 county employees are using internal GIS Viewers daily
- Property Viewer on website continued to increase viewers

■ Total Cost from Inception to the Enterprise GIS (2010):

- **\$150,000 +/-** (outsourcing at the time was estimated at \$500,000+)

GIS Implementation History



■ 2018 - Current

- Property Viewer on Website - averages 84,000 hits daily
- Parcel Quality Control Project – quality controlled some areas of the county (2019-2021) that also included the remapping of the PLSS with more up-to-date data and ROW for public works
- 2022 – 3-inch resolution imagery flown
- More web apps maintained on website and internal web applications created to help employees perform responsibilities more efficiently, for example, Sales Viewer shows market value and sales in area to help real estate respond to thousands of phone calls
- GIS capabilities have drastically changed in recent years and the hope is that we are able to keep current and learn these new processes to keep our data accurate, inventive, and accessible

Ortho Imagery Use



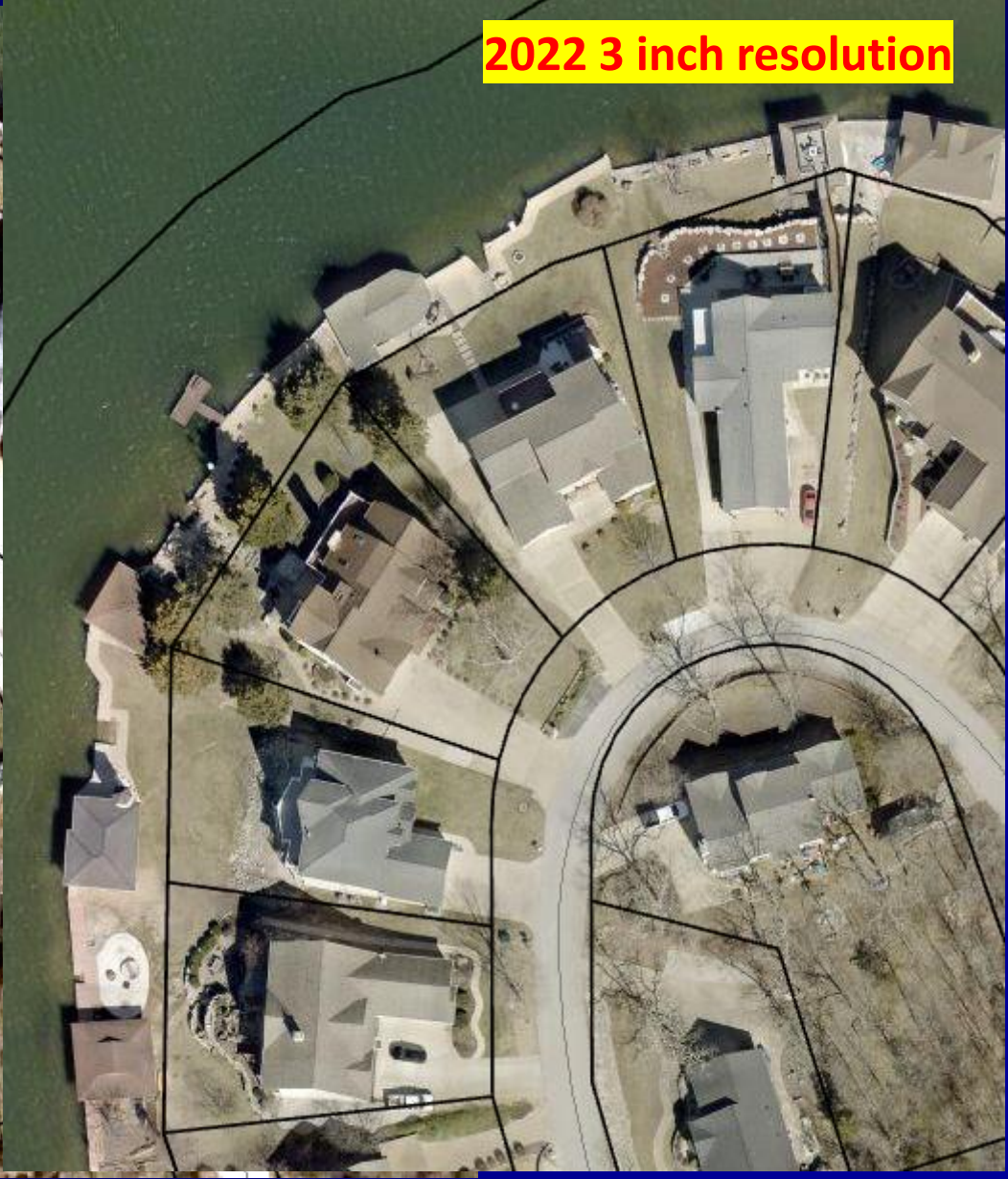
- **2003: First color digital ortho-rectified imagery**
 - 1 meter resolution – maps were digitized in without any aerial basemap, this was the first imagery we were able to incorporate
 - 2004-2007 same resolution
- **Eagleview (Pictometry): 2008 First Flight**
 - 10-inch resolution was a big change from previous orthophotos
 - Able to perform quality control of tax parcels with high level of accuracy when time allowed
 - Flown every 2 years since (except 2012 and 2016)
 - Created a Mr. Sid Mosaic for better incorporation into software platforms
- **2022 Flight – 3-inch resolution**
 - Full county coverage of 3-inch resolution



2008 Imagery 10 inch resolution



2022 3 inch resolution

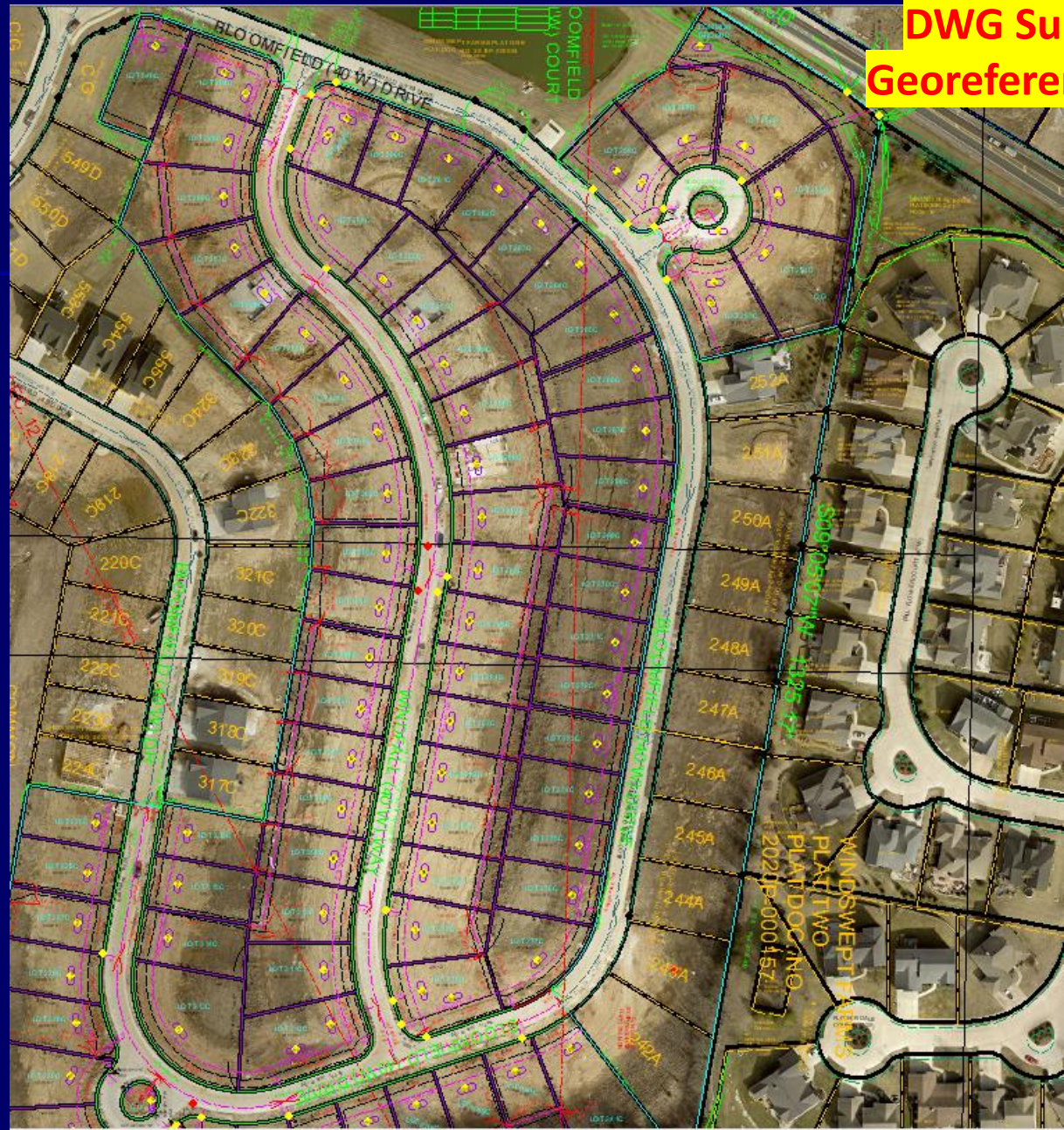


Mapping Deeds in GIS



- **Receive deeds from Recorder of Deeds**
 - Map out legal descriptions in ESRI or Deed Check
 - Deed Check – Print out mapped legal and attach to property card
 - Make changes in GIS
 - Update Devnet (CAMA system)
- **Subdivision Plats**
 - Most surveyors send us the DWG file to incorporate into GIS for more accurate activation
 - Some subs pop right into location; others we georeferenced using GIS tools to place in correct location, great Georeferencing tools are available
 - DWG files help to maintain accurate GIS data

DWG Subdivision Georeferenced in GIS



Using COGO tools in GIS to Map Out Legals - Traverse

Traverse

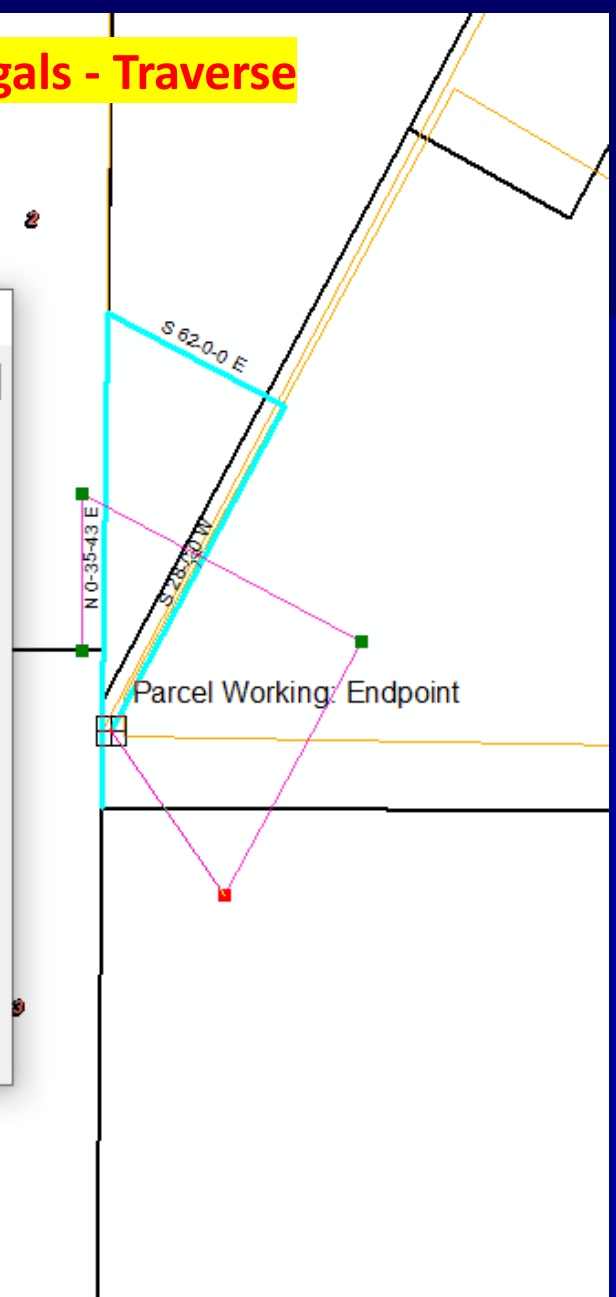
Template... QC

Direction-Distance Direction: S28.40w Distance: 275 Add

#	Description
1	Straight Direction: N 0.35 E Distance: 150
2	Straight Direction: S 62.00 E Distance: 300
3	Straight Direction: S 28.40 W Distance: 275

Start: 806901.217, 930027.267 Edit... Closed Loop Adjust..

End: Edit... Closure... Finish





Jefferson County, MO

Department of the County Assessor

Property
Boundary
Surveys vs. GIS
Parcel Mapping



Property Boundary Surveys vs. GIS Parcel Mapping



2 CSR 90-65.080 Disclaimer

PURPOSE: This rule describes the disclaimer to be included with any digital or hard copy map produced from a digital cadastral parcel mapping system.

A digital cadastral parcel map provides graphic representation and access to cadastral information, but it does not purport to represent the results of a property boundary survey of each parcel shown. It is not intended for property boundary determination of individual parcels, nor be used in lieu of a property boundary survey by a licensed professional land surveyor. Therefore, prominent display of the following disclaimer, or equivalent wording, shall be on any digital or hard copy map that displays cadastral parcel data.

Property Boundary Surveys vs. GIS Parcel Mapping



Pursuant to 2 CSR 90-65.080: "This Cadastral Map is for informational purposes only. It does not purport to represent a property boundary survey of the parcels shown and shall not be used for conveyances or the establishment of property boundaries." Authority: section 60.670, RSMo 2016.

This application was created to provide users free access to the Assessor's real estate information including property boundaries, ownership information, physical property information, tax entities, and other related information that the Assessor utilizes for taxing purposes only. Please review the User Agreement below for detailed information.

The information is up-to-date as of the date provided in the property popup window under the heading "Data Current as Of:".

CAUTION: This Data comes from many diverse sources; is actively being worked on by Assessor; is subject to constant change; and may not be complete; accurate or up-to-date. All Data is provided "as is" with all faults. The Data is intended only to depict approximate locations.

User Agreement

The Data provided within is without warranty of any kind. The entire risk as to the results and access of the Data is assumed by the User. Assessor does not warrant that the Data will meet the requirements of the User or that the operation of the Data will be error free, or that Data defects will be corrected. The entire risk as to the quality and usefulness of the Data and the entire risk arising out of the use or performance of this Data and documentation rests with User. In no event shall Assessor, or anyone else involved in the creation, production or delivery of this Data, be liable for any damages whatsoever whether in contract or in tort, including but not limited to lost profits, lost savings, lost data, business interruption, computer failure or malfunction, or other pecuniary loss or any direct, indirect or incidental damages or other economic consequential damages, or for any claim or demand against User by any other party, arising out of the use or inability to use this Data, even if Assessor, or anyone else involved in the creation, production or delivery of the Data, has been advised of the possibility of such damages.

Property Boundary Surveys vs. GIS Parcel Mapping



- GIS Parcel Lines are **NOT** the actual location of property boundaries. They are an approximation based on the recorded deed or plat for that particular parcel, for reference only.

Property Boundary Surveys vs. GIS Parcel Mapping



- Surveyors calculate property boundaries based on record legal descriptions and established monuments and survey control.
- Mappers calculate the record parcel boundaries based on metes and bounds legal descriptions, lot/block descriptions, or lots on a record subdivision plat. The polygons are then matched to lines of possession or existing boundaries in the parcel map.

Property Boundary Surveys vs. GIS Parcel Mapping



- The accuracy standards for a property boundary survey are much more precise than GIS parcel mapping.

Property Boundary Surveys vs. GIS Parcel Mapping



20 CSR 2030-16.040 Accuracy Standards for Property Boundary Surveys

(2) Precision Requirements for Urban Property.

- a) The uncertainty due to random errors of any dimension of direction or distance shown on the plat shall not exceed fifty parts per million (50 ppm) or one-tenth of a foot (0.10') for distances less than two thousand feet (2,000') at the sixty-eight percent (68%) confidence level (one (1) sigma).
- b) The positional uncertainty of any coordinates shown on the plat relative to the control that is held fixed, shall not exceed fifty parts per million (50 ppm) or one tenth of a foot (0.10') for distances less than two thousand feet (2,000') at the sixty-eight percent (68%) confidence level (one (1) sigma).

(3) Precision Requirements for Rural Property.

- a) The uncertainty due to random errors of any dimension of direction or distance shown on the plat shall not exceed one hundred parts per million (100 ppm) or one tenth of a foot (0.10') for distances less than one thousand feet (1,000') at the sixty-eight percent (68%) confidence level (one (1) sigma).
- b) The positional uncertainty of any coordinates shown on the plat relative to the control that is held fixed, shall not exceed one hundred parts per million (100 ppm) or one tenth of a foot (0.10') for distances less

Property Boundary Surveys vs. GIS Parcel Mapping



2 CSR 90-65.070 Accuracy Standard

PURPOSE: This rule prescribes the accuracy reporting requirements for digital cadastral parcel mapping.

(1) Accuracy reporting for digital cadastral parcel maps shall be made in accordance with Missouri Mapping Standards (MMS) of 10 CSR 30-6.010 to 10 CSR 30-6.030*, or the Federal Geographic Data Committee's National Standard for Spatial Data Accuracy (NSSDA).

(2) If accuracy reporting is not provided using MMS, NSSDA, or other recognized standards, information shall be provided that enables users to evaluate how the data fits the requirements of their application. This information may include descriptions of the source material from which the Public Land Survey System (PLSS) and cadastral parcels were digitally constructed, accuracy of ground surveys associated with PLSS and cadastral parcel digital construction, and quality control procedures used in the production process.

**now 20 CSR 2030-20.010 to 20 CSR 2030-20.030*

Property Boundary Surveys vs. GIS Parcel Mapping



20 CSR 2030-20.020 Map Accuracy Standards

PURPOSE: This rule prescribes minimum acceptable mapping standards.

(1) Horizontal Accuracy.

- (A) Class I. The root mean square (rms) error of a map product shall be less than 0.01 of one inch (1") on the map or in the case of a metric map, 0.025 of one centimeter (1 cm) on the map.

EXAMPLE (Customary Units)

Limiting rms

Scale Value in Feet

1" = 20' 0.2'

1" = 50' 0.5'

1" = 100' 1.0'

1" = 200' 2.0'

1" = 400' 4.0'

1" = 1000' 10.0'

1" = 2000' 20.0'

Other Uses of GIS



- Data Repository
 - Property Boundary Control
 - Project Data (Photos, field notes, etc.)
- Utility Data (as-builts for sewers, gas, water & communications)
- Subsurface Utility Mapping
- Terrain Modeling
 - Lidar
- Aerial Imagery
 - Obliques
 - Street View Data



Jefferson County

Department of the County Assessor

Questions

Thank you for
attending!

