

21st Annual GIS/CAMA Technologies Conference Chattanooga Convention Center

GIS/CAMA • Chattanooga, TN



IAAO

URISA

March 6-9, 2017

Continuing Education (CE) Credit

Recertification Credit forms for CE credit can be collected from the Registration Desk on Thursday.

Housekeeping

The conference proceedings will be available approximately 8 weeks after the conference.



A Multiuse Approach to Using Street Level Imagery in Local Government

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Dakota County Assessors Office, Minnesota, USA
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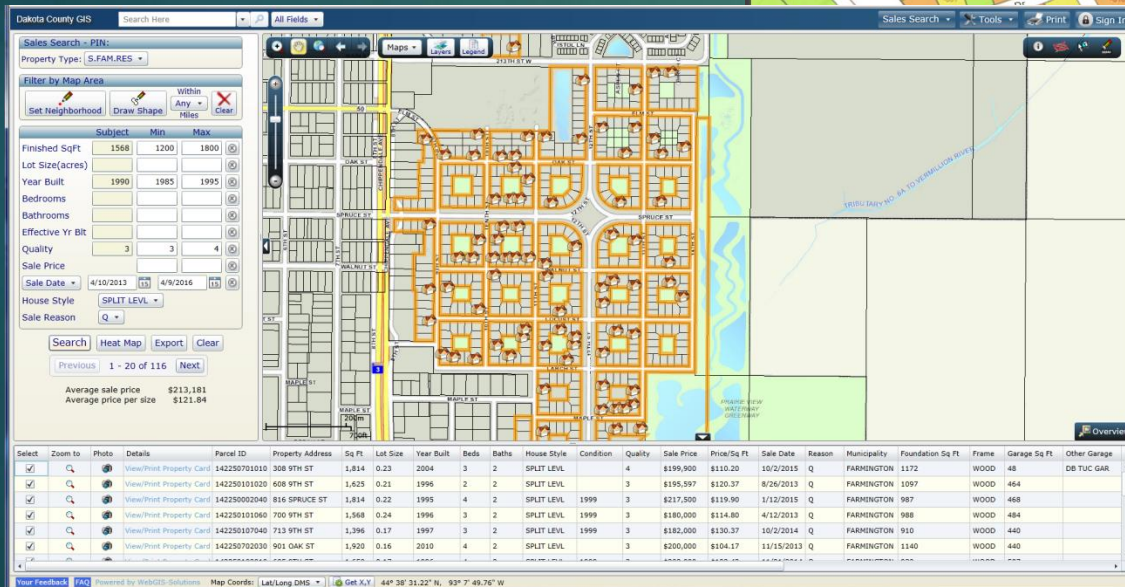
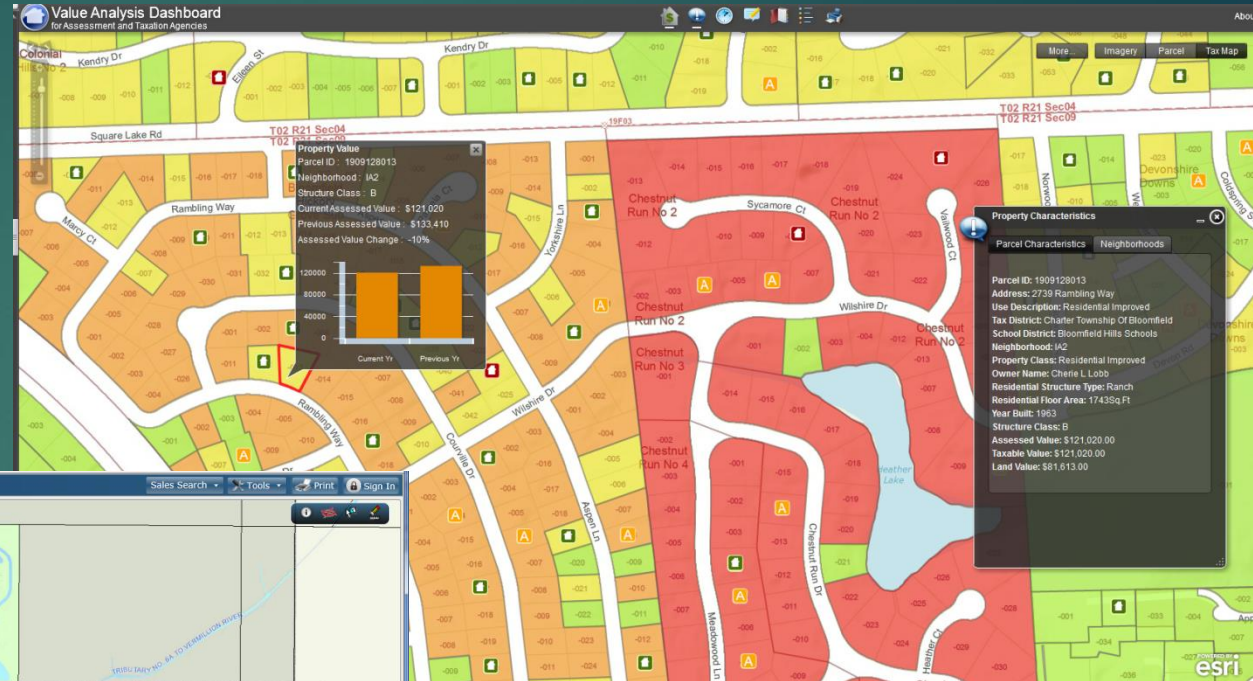
Overview

- ▶ Background
- ▶ What is Street Level Imagery?
- ▶ Why has it become so popular for Assessors?
- ▶ Some of the Caveats of using imagery instead of physical inspection.
- ▶ Dakota County Experience
- ▶ Other Potential Uses within the County
- ▶ Future uses and integrations with other software.

GIS in the Assessors Office

CAMA

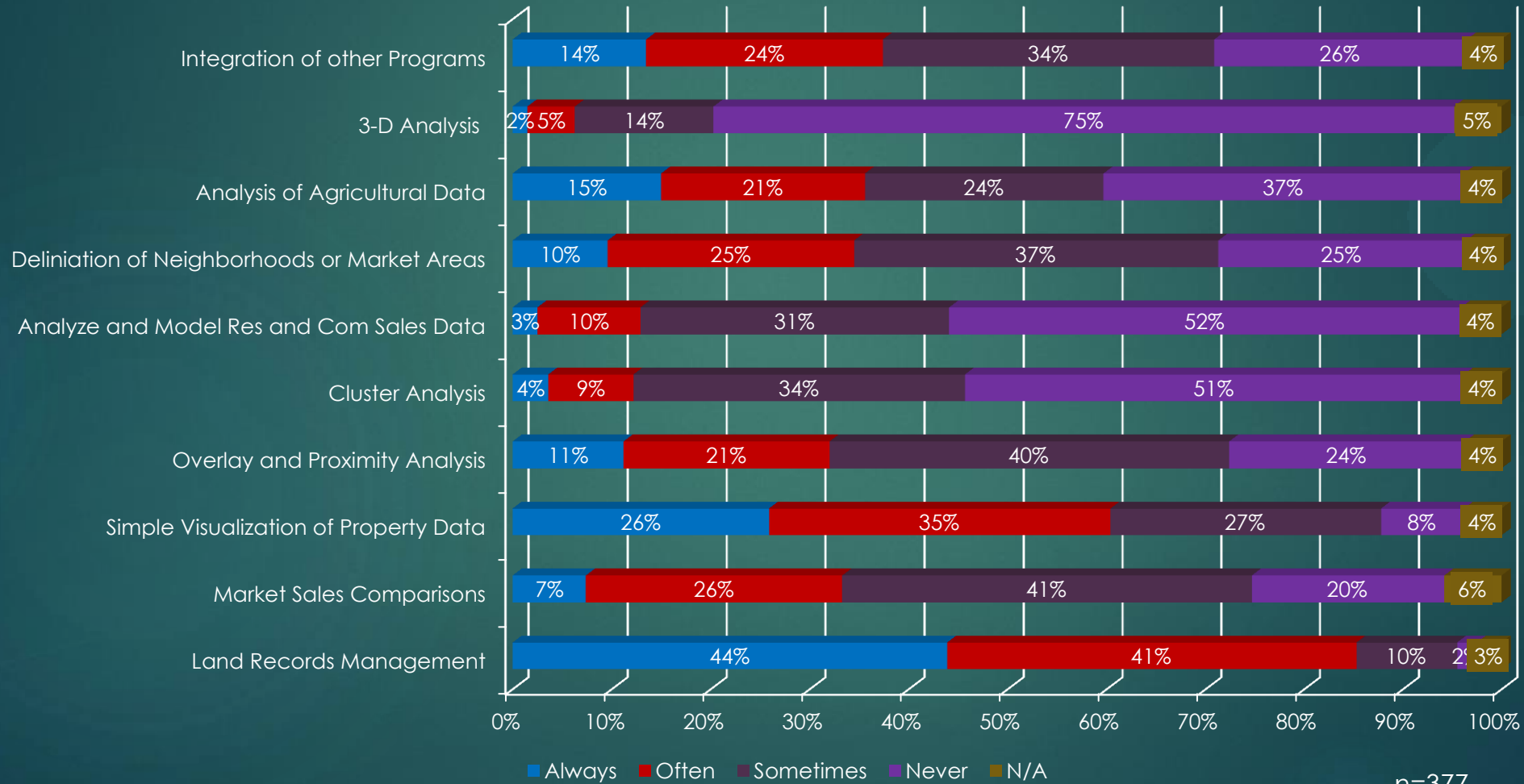
- Tabular data management
- Sales analysis
- Valuation approaches
- Equity analysis
- Administrative



GIS

- Spatial data management
- Visualization of property characteristics
- Spatial Analysis and modeling of Sales
- Clustering of sales, permits, other
- Spatial equity analysis
 - Ratios, PRD, PRB, COD, etc

Results - Defined uses of GIS Technology in Property Assessment



n=377

Other Listed Uses

- ▶ Field data collection
- ▶ LIDAR
- ▶ Aerial, oblique aerial, and street level imagery
- ▶ Open source uses
- ▶ Public tax-payer information sites
- ▶ Splits/combines
- ▶ Web applications



101015001010 019 2016 BISCHKE PROPERTIES LLC RA Com-RA Com #301904 In Progress

2750 LEXINGTON AVE

Parcel Information

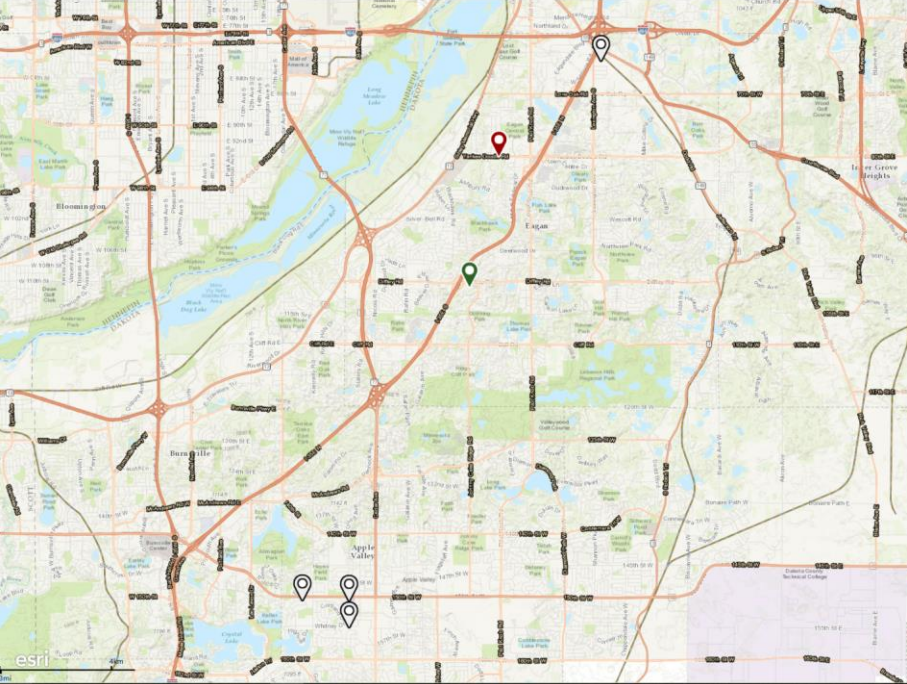
Overview Values Parcel

Owner	BISCHKE	Total EMV Prev Year	LUC*	1000	Road R
Common Name		Total EMV Historic	Class	OBS	Wa
Reason for Change*	RA: REASSMT	EMV Land	Multiclass		T
Value Method	4: Income Approx	EMV Bldg	Total Cards	1	Road P
Land Value Estimate		EMV Total	Neighborhood*	10CIN000: EAGAN	W
Bldg Value Estimate		Cost Land	Checkback Flag		
Total Value Estimate		Cost Bldg	Checkback Year		
Open Appeal		Cost Total	Bypass Flag		
		Income Total	Appr Responsibility		



iasWorld Field Mobile

Task List 0 of 6 selected



RA Res-RA Res	011171001070 019 2016	252 COUNTY ROAD 42	01RES023:LONGRIDGE	In Progress	
NC/CB Res-NC/CB Res	011170901030 019 2016	68 COUNTY ROAD 42	01RES023:LONGRIDGE	Not Started	
RA Res-RA Res	011170712140 019 2016	803 NEWELL DR	01RES023:LONGRIDGE	In Progress	
RA Com-RA Com	102050001060 019 2016	1650 DIFFLEY RD	10CIN000:EAGAN NONSPECIFIC	Ready to Upload	
RA Com-RA Com	101015001010 019 2016	2750 LEXINGTON AVE	10CIN000:EAGAN NONSPECIFIC	Not Started	
NC/CB Com-NC/CB Com	101637501010 019 2016	1665 YANKEE DOODLE RD	10CIN000:EAGAN NONSPECIFIC	Errors	

Background

- ▶ Street Level imagery and interactive “movie” maps have been around for more than 35 years.
- ▶ Create geometrically correct spherical panoramic images for measuring purposes along with accurate georeferencing.

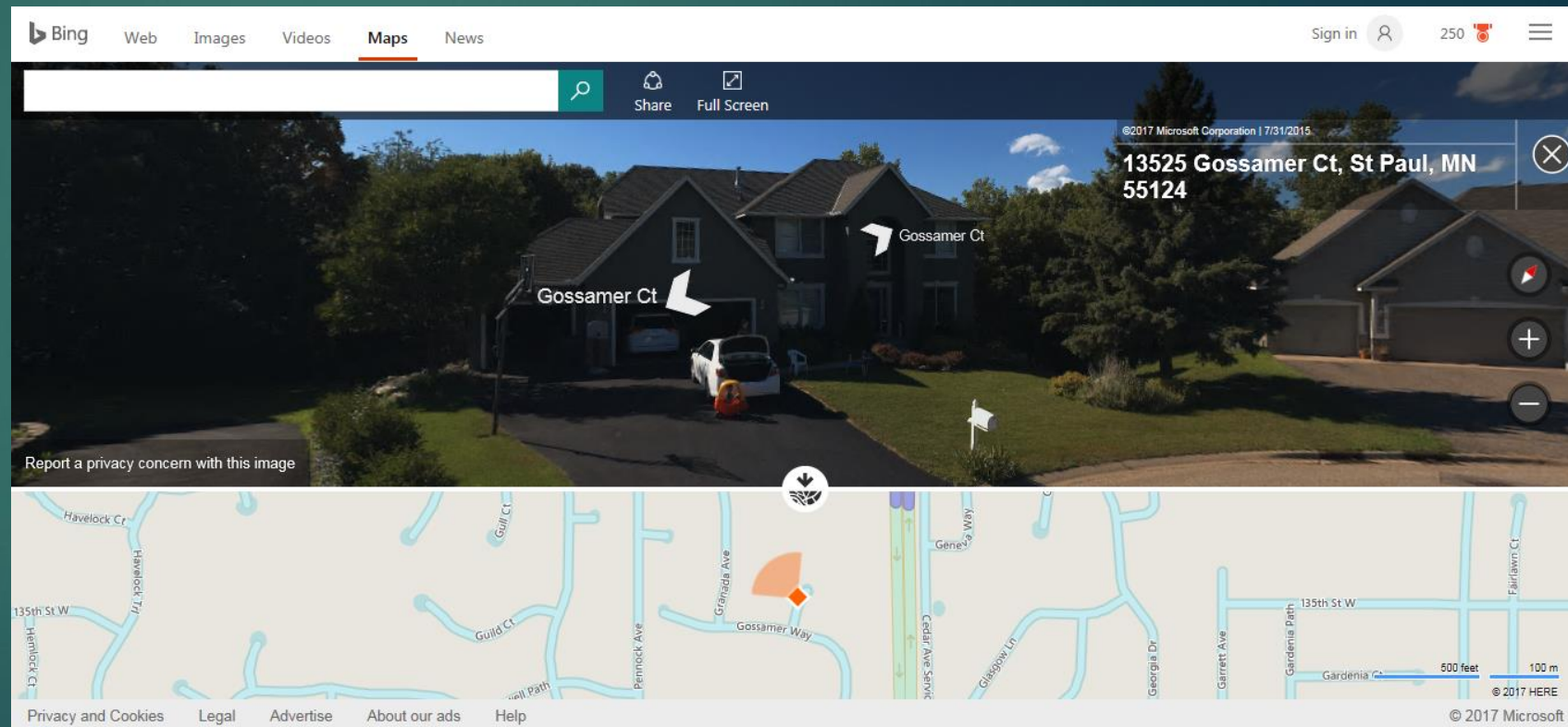


Aspen Movie Map camera vehicle,
ca. 1978
Credit: MIT Architecture Machine
Group



Many Sources of Street Imagery

- ▶ Google Street View
- ▶ Bing Maps Streetside
- ▶ Cyclomedia
- ▶ ILookAbout
- ▶ Tyler Technologies
- ▶ Several Others



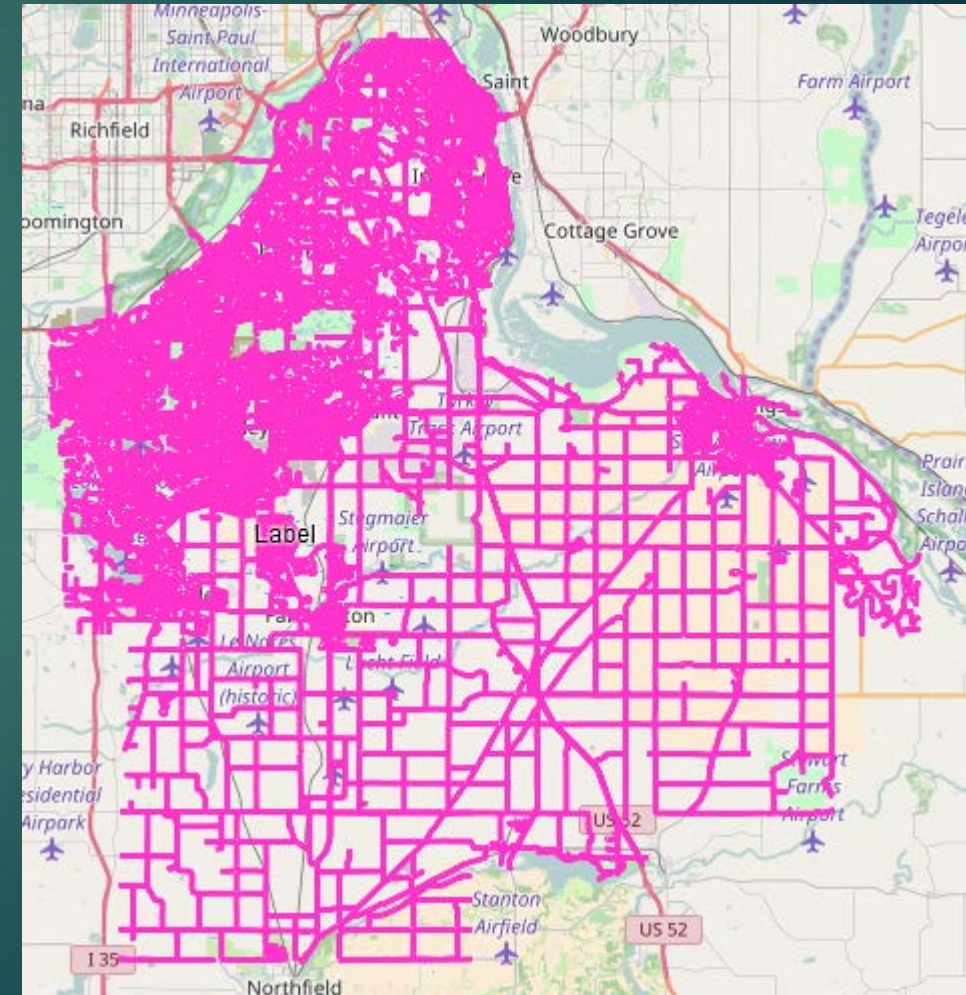
Technology used in Street Level Imagery

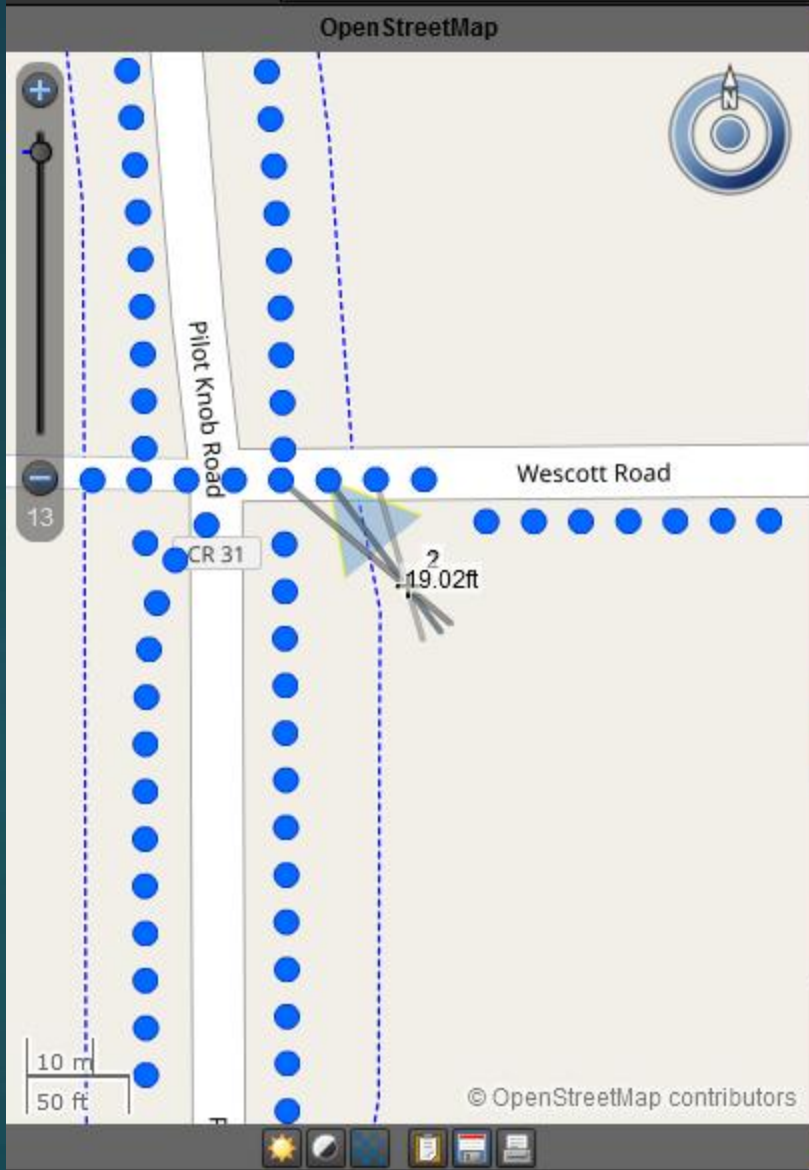
- ▶ Georeferenced Images based on Ortho, Oblique or LiDaR data
- ▶ Georeferenced Pixels – Triangulate images (multiple images to determine accurate Location)
 - ▶ Proprietary algorithms that calculate this and are able to stitch images together.
- ▶ Most have the ability to work in ESRI

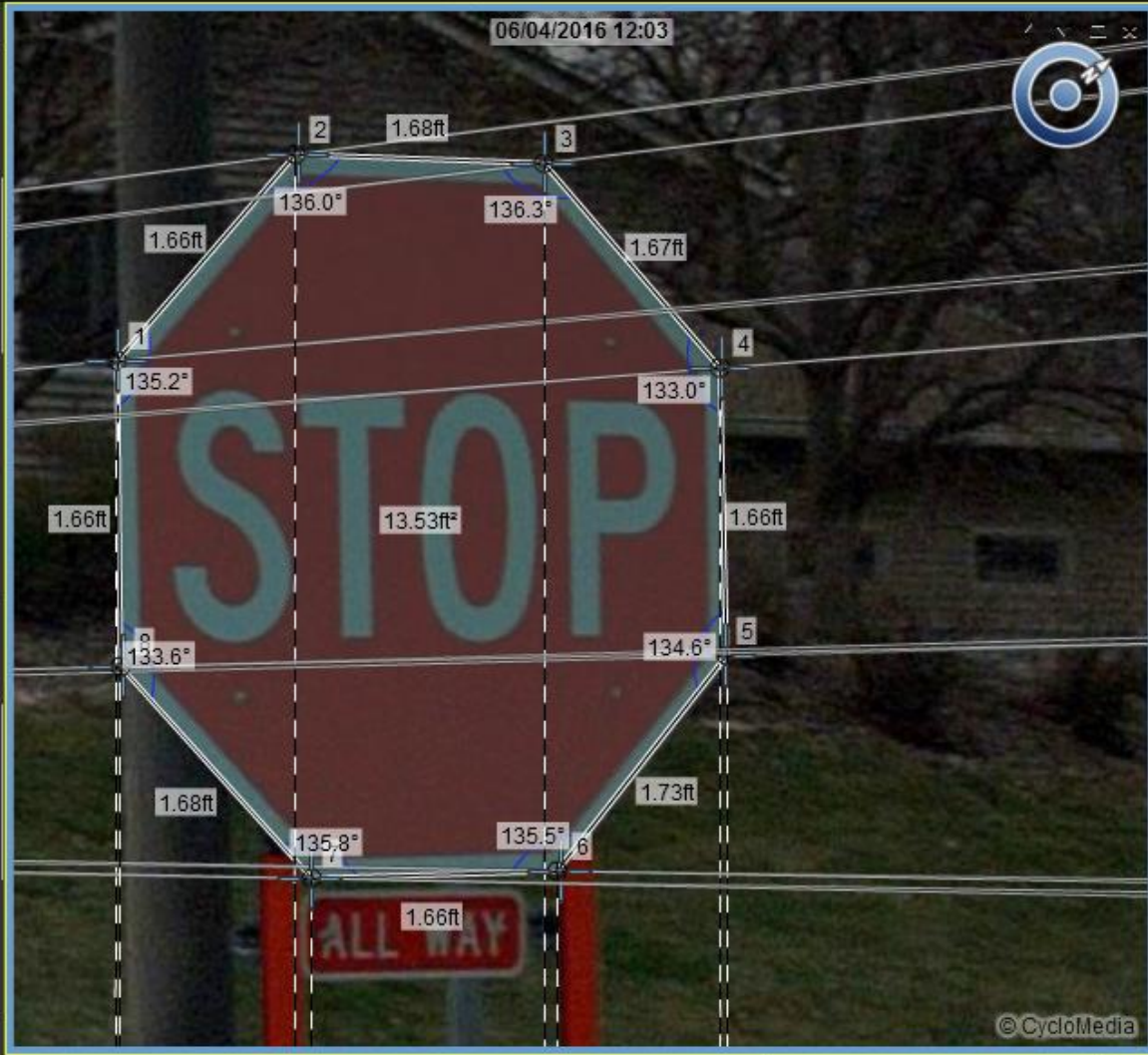
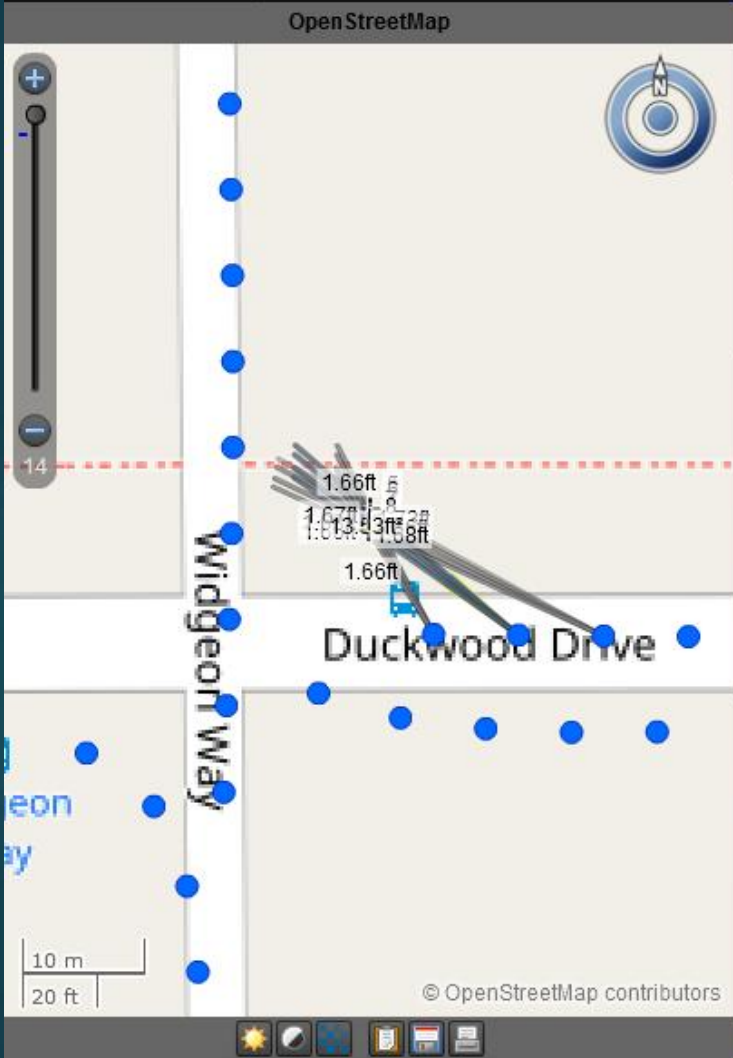


Data Collection of Street Level Imagery

- ▶ Street Level imagery is the use of images at the ground level
- ▶ Various types of Sensors are used...
 - ▶ Captured with using 2 to 5 cameras with varying resolution
 - ▶ High accuracy georeferencing.
 - ▶ Automatic metadata recording.







File Edit Options Help

Selected measurement details:

Description: Stop Sign

Extrusion[ft]: 0

Height:

Perimeter[ft]: 13.39 (σ=0.25)

Area[ft²]: 13.53 (σ=0.40)

Matches:

Reliability: ●

Measurement points:

Nr	σ(x,y,z)[ft]	#	●	🔍	📏	🗑️
2	0.15,0.15,0.05	3	●	🔍	📏	🗑️
3	0.15,0.16,0.05	3	●	🔍	📏	🗑️
4	0.15,0.17,0.05	3	●	🔍	📏	🗑️
5	0.15,0.18,0.05	2	●	🔍	📏	🗑️
6	0.15,0.16,0.05	3	●	🔍	📏	🗑️
7	0.15,0.15,0.04	3	●	🔍	📏	🗑️
8	0.15,0.15,0.04	3	●	🔍	📏	🗑️

Open Close

Default Tools







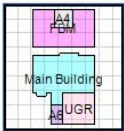
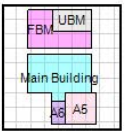
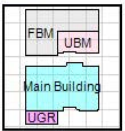
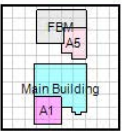
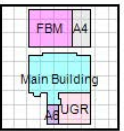
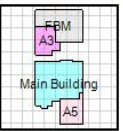
Popularity for Assessors

- ▶ Street level imagery has many uses in local government.
- ▶ Assessors utilize street level imagery as a way to visualize the property and compare to other like properties.
 - ▶ Used in the form of interactive imagery or static imagery.
 - ▶ Can be used for measurement or looking at quality grades or conditions.



Use with Comp Grids

Comparable Sales Analysis for TAX YEAR - 2016

Subject Parcel	Comparable-1	Comparable-2	Comparable-3	Comparable-4	Comparable-5
Parcel ID: 017320005210	012050203030	015765102040	017320005200	017320001030	011990302150
Card / Set#: 1 / 1	CompSheet Form: 1047187	1048126	1047332	1037349	1047636
Salekey:			<input type="checkbox"/> User Selected Comps		
					
					
Address: 5707 125TH ST W City: APPLE VALLEY	Address: 4938 UPPER 148TH CT City: APPLE VALLEY	Address: 12660 EVELETH PATH City: APPLE VALLEY	Address: 5721 125TH ST W City: APPLE VALLEY	Address: 5878 125TH ST W City: APPLE VALLEY	Address: 14569 ELYSIUM PL City: APPLE VALLEY
Model: 101	101	101	101	101	101
NBHD Group: 124	124	124	124	124	124
Neighborhood: 01RES019	01RES019	01RES019	01RES019	01RES019	01RES019
Total Acres: .25	.27	.37	.25	.27	.2

County Home Mobile | Feedback | Help

Dakota
COUNTY

ELYSIUM
Enter Parcel ID, House #, or Street address

Information Search



Street Aerial Bird's Eye Print

Legend

Property Information

Parcel ID: 01-19903-02-150
14569 ELYSIUM PL
APPLE VALLEY MN 55124

- Property Details
- Comparable Properties
- Subdivision Plat
- Tax Statement
- Tax Payment Stub
- Tax Facts

Tax Information

Building Information

0 50 100ft

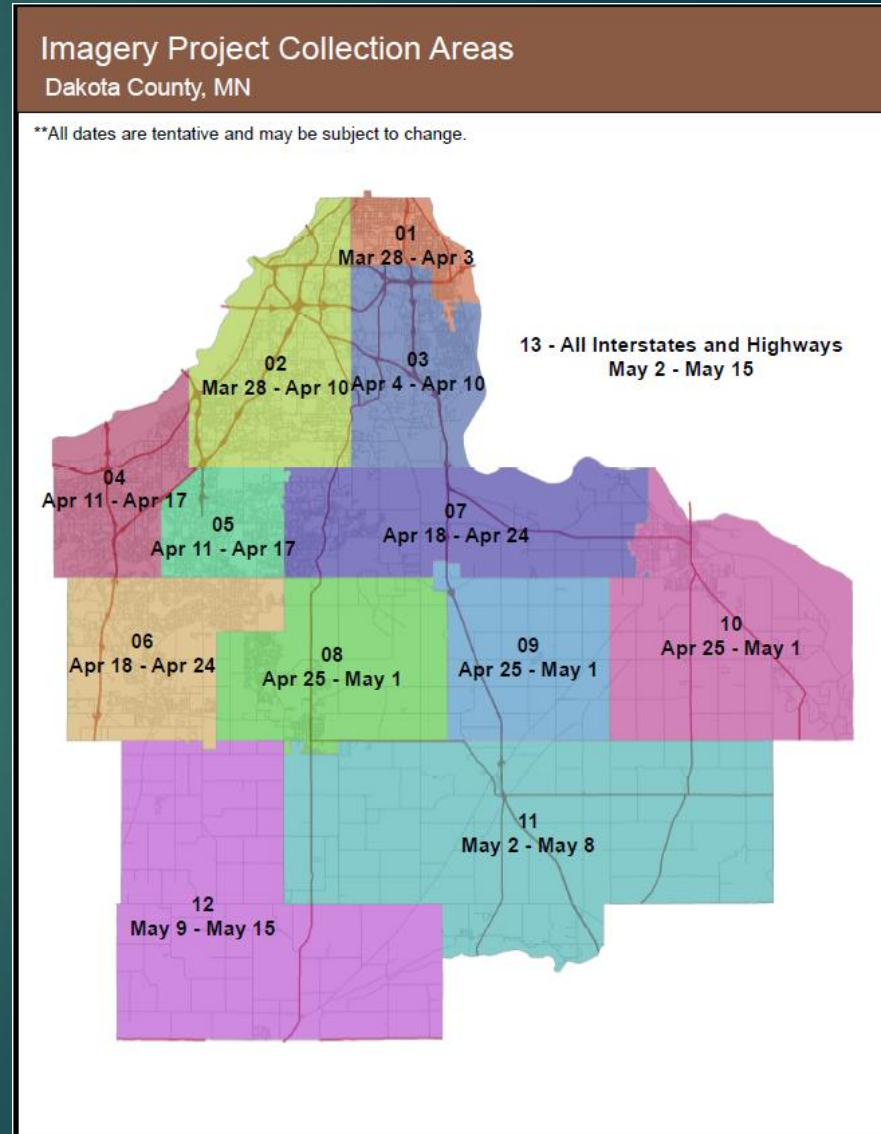
Caveats of Street Level Imagery Use

- ▶ Only a snapshot in time
- ▶ View Angles
- ▶ Inaccuracies with measurement
- ▶ Only the front view of properties.
 - ▶ Thus may need to supplement with other forms of Imagery (i.e., oblique aerial, aerial or other image sources such as Google street view, Bing, etc)
- ▶ Bad Images and captures
 - ▶ People
 - ▶ Interesting events



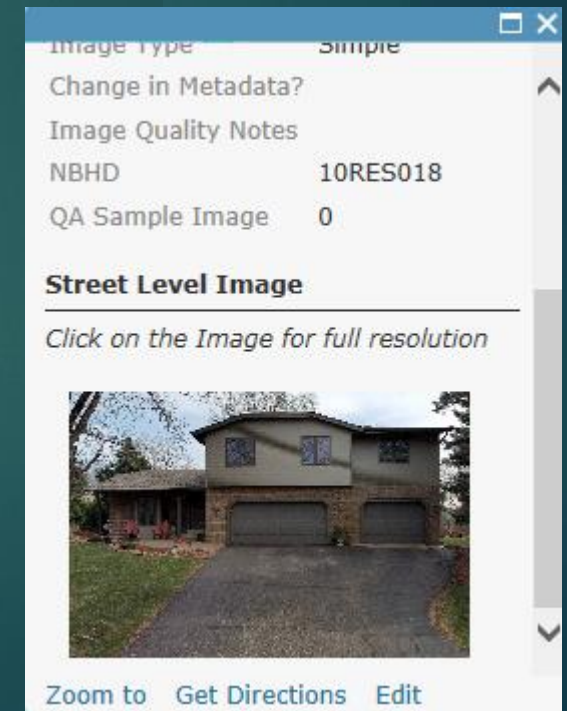
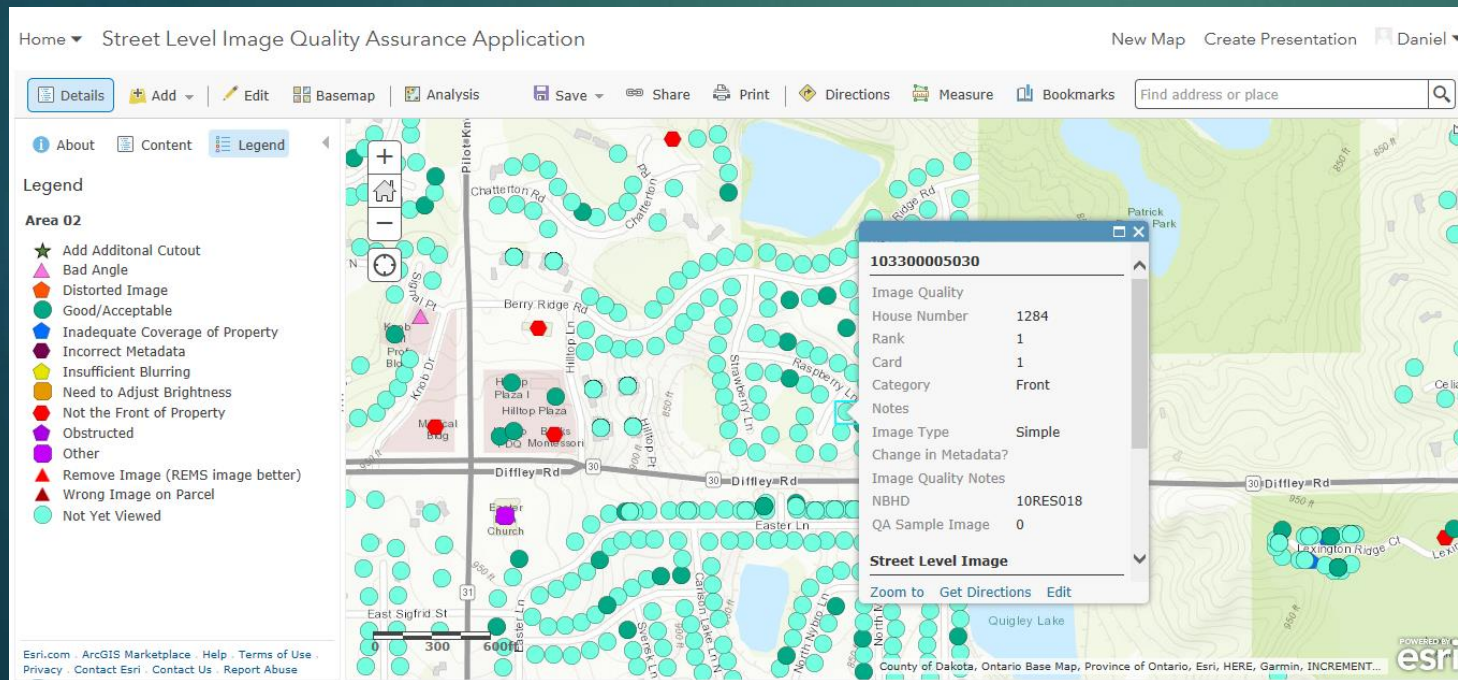
Dakota County Experience with Street Level Imagery

- ▶ Looking for a cost effective way to upgrade images in a timely manner.
- ▶ Put out an RFP in December 2015
- ▶ Met with Vendors in Jan 2016
- ▶ Data Collection Started in March 2016 and ended in May.
- ▶ Took 2-4 months for processing of images
 - ▶ Blurring of people and license plates



Dakota County Experience

- ▶ We also asked for Street Level Cutouts for property record cards and comp grids.
 - ▶ Vendor was able to use software to programmatically clip out images from the interactive imagery.
 - ▶ Had strict requirements due to the fact that the imagery was going to be on public website. Created QA Application



Future of Street Level Imagery

- ▶ Higher Resolution
- ▶ Enhancing Automated Feature Recognition
 - ▶ Efficient face and license plate blurring.
 - ▶ Automating processes for cut-out generation.
 - ▶ Improve feature extraction (stop signs)
- ▶ Expand and enhance software options for working with imagery.
- ▶ Spherical Panoramic Imagery to Integrate with CAMA Systems.
 - ▶ Seamless Interaction with Data and Images.

Other Uses of Street Level Imagery

- ▶ Asset Management

- ▶ Inventory street signs, stop lights, street lights, utilities, trees, Fire Hydrants and other city or county owed assets.

- ▶ Street Maintenance

- ▶ Finding potholes, bridge maintenance, etc

- ▶ 3D Modeling

- ▶ Disaster Response and Recovery

- ▶ Before/After



Future Integration with other systems

- ▶ Linked to other Programs
- ▶ Full Integration with other CAMA Systems
- ▶ Desktop Review Methodologies.

File Edit View Favorites Tools Help

iasWorld
a tyler appraisal & tax solution

Dakota, MN - Prod 7.2.3.011 Daniel Fasteen | Role Admin

Dashboard Maintain Activity Center **Property Records** Inquire Field Manager Analyze Admin

RE/MH PP Sales Advanced Lists Map Search SQL Query

Profile
Property Tax Indicators
Owner
Values
Sales/Transfer History
Property Transfer
Land
Building Summary
Residential
Commercial
CIA Income
Sketch
Other Bldgs & Yard
Permits
Low Land
Property Desc
Mailing
Map
Pictometry
Photos
Documents

PARID: 22-11996-02-110
NBHD: 22RES004
FASTEEN|DANIEL & ANGELA

04/25/2011 12 of 27 Select Date

Record Navigator

© 2017 Pictometry

Dakota, MN - Test 7.1.0.115 Data Refresh 03/11/2016 - Microsoft Internet Explorer provided by Dakota County Government

Jur: 019 ID: 14-22500-11-020 Tax Year: 2016

Residential Comparables

Sketch

Ownership

Owner Name 1 ACKERSON|MARLIN JOHN
Owner Name 2 HUYNH|JANH T
Address 1 509 11TH ST
Address 2
Address 3 FARMINGTON MN 55024

Record 1 of 1

Values

Review Code 1:Cost Approach
Cost Value 164,500
Market Value 196,360
Income Value 0
Override Value

Record 1 of 1

Property Profile

Situs Address 509 11TH ST
Taxing District 1402
Nbhd 14RES001
LUC 0100
Class DA
Deed Acres

Record 1 of 1
Records 1 - 3 of 12

Pictometry

04/22/2014 1 of 21 Select Date

© 2016 Pictometry

Appraised Value History

#	Tax Year	Roll Type	LUC	Class	Total Appraised	Total Assessed
1	2016	RP	0100	DA	0	0
2	2015	RP	0100	DA	0	0
3	2014	RP	0100	DA	0	0
4	2013	RP	0100	DA	0	0
5	2012	RP	0100	DA	0	0

Records 1 - 5 of 11

Permits

#	Date	#	Status	Purpose	Amount
0 Records					

Land Details

#	L#	Type	Code	SF	Acres	Units	Infl Code	Influ %	Value
1	1	G.OVERRIDE VALUE	1:GROSS	0	0	1.00			51,000

Records 1 - 1 of 1

Improvements

#	Card	Yrbit	Effyr	Style	Grade	CDU	Area	RCN	RCN/SF	% Good	ADJ/RCLND	Value
1	1	1996	1998	S	03	AV	1,744	92.700	53.15	91		138,700

Records 1 - 1 of 1

Out Buildings and Yard Items

#	Card	Yrbit	Code	Area	Units	Grade	RCN	Rate	% Good	RCNLD
1	1	1996	1501-MEDIUM DECK	1	1	C	2,380	2,380	100	2,400
2	1	1996	1602-ASP GD DRIVE	1	1	C	2,400	2,400	100	2,400

Records 1 - 2 of 2

Taxes

#	Eff Yr	Type	Proj/Auth	Cycle	Taxes	Adjustments	Payments	Total
1	2016	RP	010200	1NAH	484.28	0.00	0.00	484.28
2	2016	RP	021920	1NAH	646.23	0.00	0.00	646.23

Records 1 - 2 of 160

Integration with other Programs

The screenshot displays a GIS application interface with three main sections:

- Property Details Panel (Left):**
 - Parcel ID: 346280103090
 - Owner: ERIC & LORI SNYDER
 - Address: 3585 UPPER 148TH ST W
 - City/State/Zip: ROSEMOUNT MN 55068-4256
 - Municipality: ROSEMOUNT
 - Primary Use: Residential
 - Homestead: FULL HOMESTEAD
- Street View Panel (Top Left):** Shows a street-level view of the property at Upper 148th St W, Rosemount, Minnesota.
- Main Map Panel (Right):** Aerial view of the property with parcel boundaries. Labels include "UPPER 148TH ST W", "CHIPPENDALE PARK", and "CHIPPENDALE AVE".

Integration with other programs

The screenshot displays a GIS application interface with several key components:

- Top Navigation Bar:** Includes buttons for 'Identify', 'Details', 'Map', 'Street View', and 'Map Layers'. A search bar is also present.
- Property Information Panel (Left):**
 - Address: 346280103090
 - Owner: ERIC & LORI SNYDER
 - Parcel ID: 34
 - Status: A1
 - Owner Address: 35 S*
 - City/State/Zip: R1 55
 - Municipality: R1
 - Primary Use: R1
 - Use 2, 3, 4: (Empty)
 - Homestead: FL
- Map (Center-Left):** Shows a street grid with 'Upper 179th Street West' and 'Upper 148th St W' highlighted. A blue line indicates a measurement path.
- Street View Image (Center-Right):** A photograph of a two-story house with a stone and brick facade, a two-car garage, and a front porch. Address markers '11521' and '11522' are visible on the driveway.
- Measurement Tool (Right):** A sidebar window titled 'Selected measurement details' showing:
 - Description: Measurement
 - Height: 15.47 (a=0.21)
 - Length: 15.47
 - Matches: Three small thumbnail images of the house.
 - Measurement points table:

Nr	Order	X	Y	Z	Color	Icon
1	1	0.19	0.45	0.00	3	[Icon]
2	1	0.10	0.40	0.07	3	[Icon]

Integration with other Programs

The screenshot displays a web-based GIS application for Dakota County. The main interface includes a navigation menu with 'Identify', 'Details', and 'Map' tabs. The 'Details' tab is active, showing a sidebar with property information for parcel 221199506060 at 6345 UPPER 179TH ST W. The main map area shows an aerial view of the property, with a Pictometry viewer window overlaid on the right. The Pictometry viewer shows a detailed aerial image of the house, with a date of 03/16/2015 and a zoom level of 1 of 3. The viewer also includes a compass and navigation controls.

Property Details:

Parcel ID	221199506060
Status	ACTIVE
Owner	DANIEL & TINA EVANSON
Owner Address	6345 UPPER 179TH ST
City/State/Zip	LAKEVILLE MN 55044
Municipality	LAKEVILLE
Primary Use	Residential
Use 2	

Map Navigation:

- Quick Search
- Identify
- Street View
- Pictometry
- Map Layers
- Print

Pictometry Viewer:

- URL: gis.co.dakota.mn.us/pictometry/pub/pviewer/default.aspx?Lat=44.68940
- Date: 03/16/2015
- Zoom: 1 of 3
- Year: (2015)
- © 2016 Pictometry

Share your GIS innovations and success stories!

The editorial board of the *GIS for Assessment Professionals* book is looking for practitioners to share their GIS case studies. What do we mean by case studies?

We are looking for specific examples of how GIS was used to solve:

- an assessment or valuation problem,
- or made your office operations more efficient,
- or made information sharing easier for your jurisdiction,
- or improved the outcomes of your assessment duties.

Tell us your story and contribute to information sharing of the latest uses of GIS in the assessment industry.

Please send a brief description of 2 or 3 paragraphs and any exhibits or diagrams you wish to share of your GIS case study by March 1st to cusack@iaao.org. Your submission will be forwarded for consideration to the *GIS for Assessment Professionals* book editorial board.

If you have any questions, contact Margie Cusack, Research Manager at cusack@iaao.org.



Assessment Leadership
Beyond All Limits

IAAO LAS VEGAS

ANNUAL CONFERENCE
& Exhibition

September 24-27
2017