

# Developing, Operating & Maintaining a GIS Database of City Assets

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APRIL 21, 2021

**□ IDENTIFY ASSETS**

**□ BUILDING A GEODATABASE**

**□ DATA COLLECTION**

**□ MANAGEMENT**

**□ COST**

# IDENTIFY ASSETS

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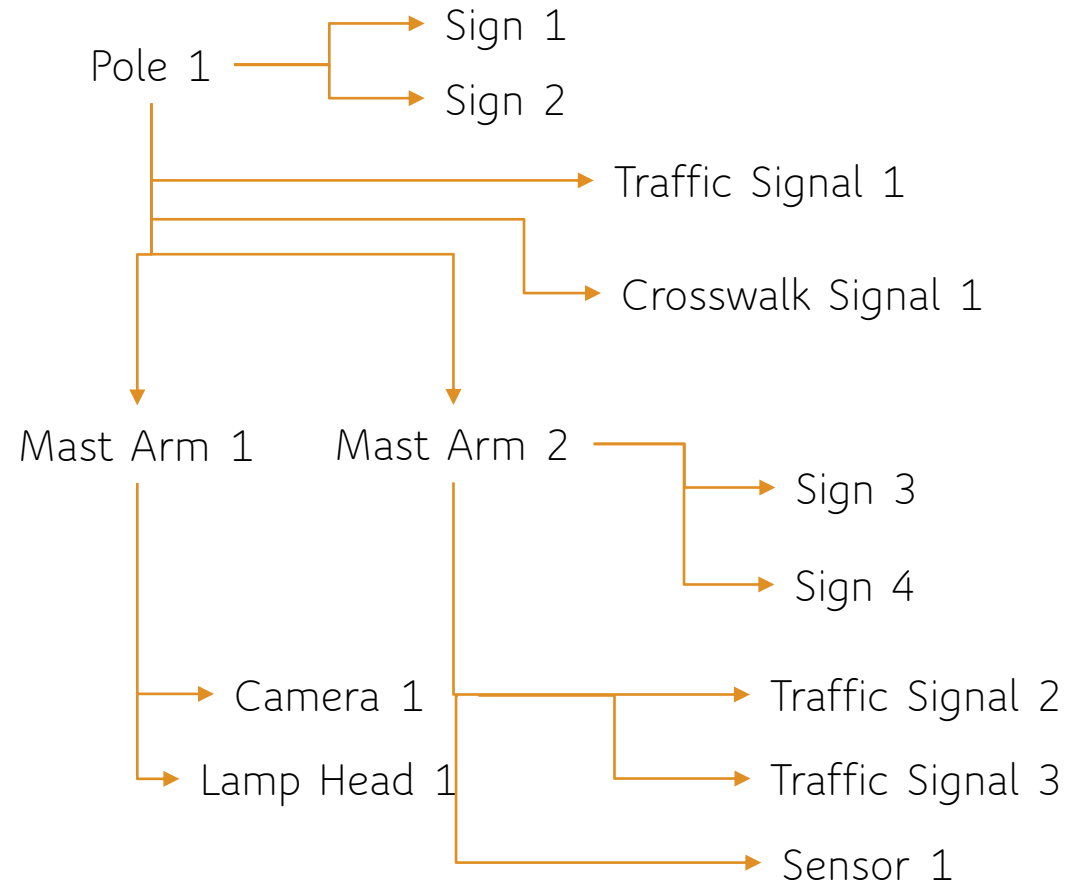
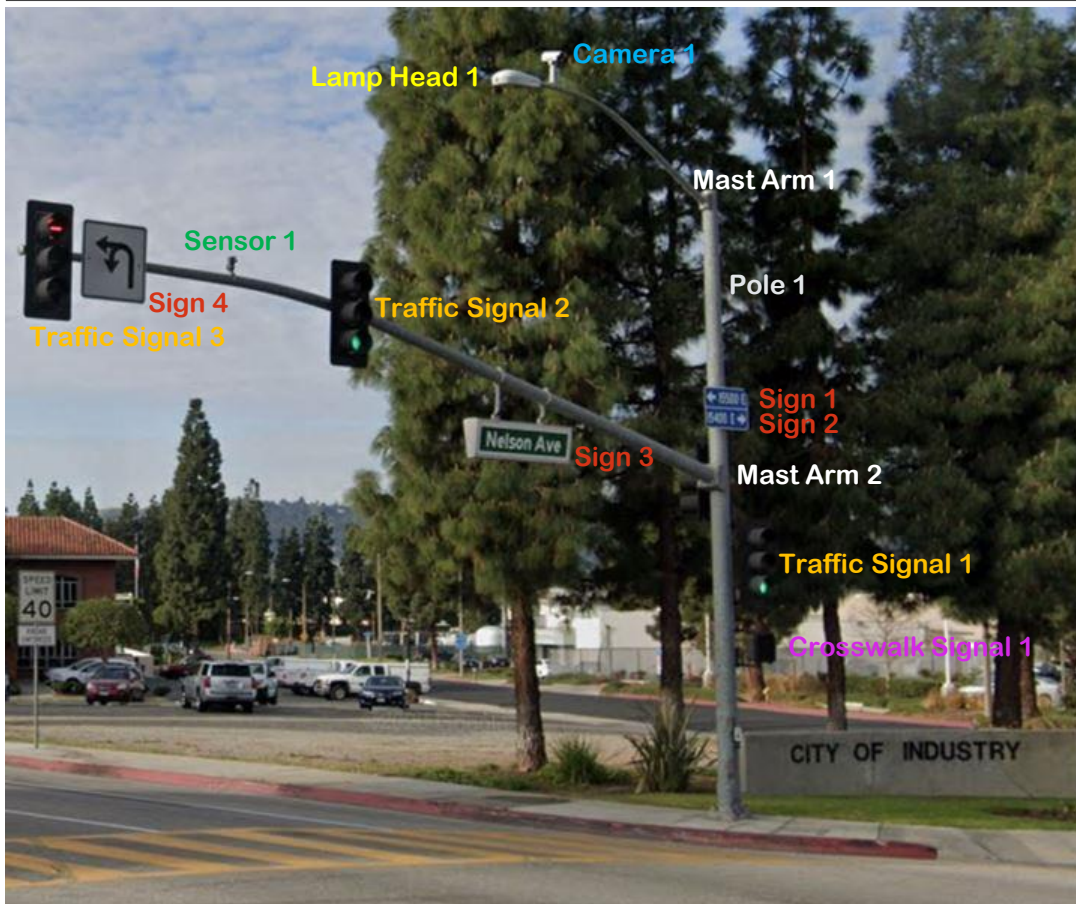
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The purpose of asset identification is to know exactly what the City is responsible for managing.

- Facilities
- Electrical Utilities
- Water Utilities
- Right of Way

May be a difficult task. Many assets can be broken down into many more individual assets or assets can be managed by multiple organizations who share a common asset.

# IDENTIFY ASSETS



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- Given the complexities of identifying assets and how they work together, organizations must find an effective way find a way to organize and store this information.
- Geographic Information Systems (GIS) can be used as a tool to locate, specify, and maintain City assets.
- A geodatabase can be used to store spatial data to query, edit, and can be used to define the relationship between data.

# BUILDING A GEODATABASE

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## ESRI's ArcGIS Desktop License

The following software is included in the ArcGIS Desktop suite:

- ArcMap - used as a workspace to create map products, print maps, share maps and services.
- ArcCatalog - enables users to store GIS datasets, geodatabases, feature services, tables, geoprocessing tools, and view them in a tree view.
- ArcGIS Pro - An enhanced, "all-around" version of ArcMap and ArcCatalog that enables users to easily maintain and share data. Supports 3D and 4D data as well.



# BUILDING A GEODATABASE

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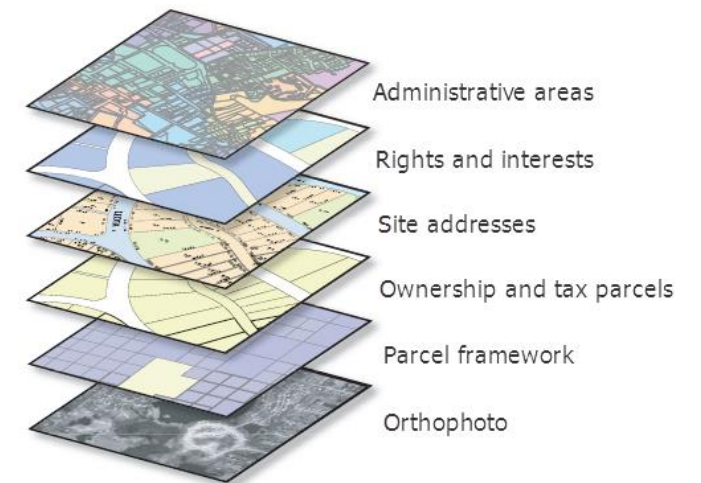
- Building a geodatabase starts with thematic layers.
- Thematic layers have a common data theme for a particular application or information requirement.
- When identifying thematic layers, visualize each theme in terms of its visual representation on a map and its expected use in GIS.

What type of data will I be storing?

What map projection will be used?

Will there be use of tables for feature subtypes?

Will relationships be defined between data?



*The Geodatabase: Modeling and Managing Spatial Data.*  
[www.esri.com/news/arcnews/winter0809/articles/the-geodatabase.html](http://www.esri.com/news/arcnews/winter0809/articles/the-geodatabase.html)

# BUILDING A GEODATABASE

Types of geodatabases:

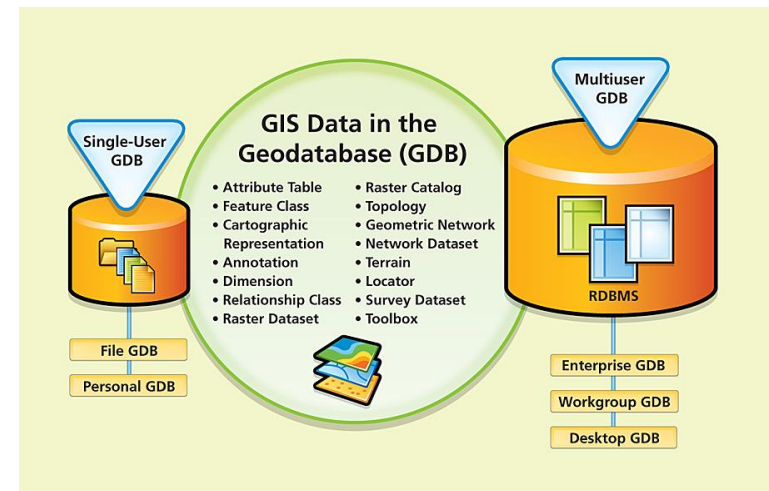
- Single User Geodatabase:

File – stored in a folder on a local machine. Default size is 1 TB, can be increased to 256 TB.

Personal – Microsoft Access database, maximum size is 2 GB.

- Multiuser Geodatabase:

Enterprise – for large scale GIS, used with ArcGIS Enterprise and a relational database (RDBMS) such as Microsoft SQL Server, Oracle, or PostgreSQL.



The Geodatabase: Modeling and Managing Spatial Data.  
[www.esri.com/news/arcnews/winter0809/articles/the-geodatabase.html](http://www.esri.com/news/arcnews/winter0809/articles/the-geodatabase.html)

# BUILDING A GEODATABASE

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- Once the geodatabase is created, feature layers must be created to import into the geodatabase.
- Feature layers are point (manhole), line (water drain), or polygon (parcel) geographic layers which are overlaid on basemaps. Sometimes only having the location of an asset is not enough. Custom attribute information can be associated to these layers to provide information about a feature.
- Attribute information is stored in tabular form in which fields and records can be added. A schema defines how the fields are displayed. This includes aliases, field length, field type, domains, and unique value designation.

# BUILDING A GEODATABASE

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When adding fields to a feature layer for asset inventory, management, and maintenance, keep in mind the components of asset management:

- Identification - A unique designation for each asset. This can simply be a number or an alphanumeric value. This will be used to easily identify each asset within the geodatabase.
- Condition - A value that represents the current condition of the asset at the time of inspection. This can be "Excellent", "Good", "Bad", or a percent value.
- Specification - This is usually recorded in multiple fields. For example, "Manufacturer", "Model", "Serial Number".
- Maintenance - A value that records the maintenance cycle of the asset or the last time the asset was serviced.

# BUILDING A GEODATABASE

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Preparing feature layers for data collection:

Enable Editor Tracking - Makes a log within the feature layer's attributes of who edited data and when. Each time an edit is made, the last editor's information is added to the record.

Enable Attachments - Allows editors to add images, PDFs, text documents to a record in a feature layer.

# BUILDING A GEODATABASE

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## Geodatabase Tables:

Geodatabase tables can be used to store records that relate to an asset layer but, do not contain location-based fields such as coordinates.

- Inspections
- Asset Subcomponents
- Billing Records
- Attachments (PDFs, Images, Text Documents)

# BUILDING A GEODATABASE

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## Geodatabase Relationship Classes:

- Relationship classes manage the association between records in a feature layer or table and objects in another.
- Feature layers and tables can be related with all cardinalities: one-to-one, one-to-many, and many-to-many.

Parcels feature class

Shape	ID	PIN	Area	Addr	Code
	1	334-1626-001	7,342	341 Cherry Ct.	SFR
	2	334-1626-002	8,020	343 Cherry Ct.	UND
	3	334-1626-003	10,031	345 Cherry Ct.	SFR
	4	334-1626-004	9,254	347 Cherry Ct.	SFR
	5	334-1626-005	8,856	348 Cherry Ct.	UND
	6	334-1626-006	9,975	346 Cherry Ct.	SFR
	7	334-1626-007	8,230	344 Cherry Ct.	SFR
	8	334-1626-008	8,645	342 Cherry Ct.	SFR

Related ownership table

PIN	Owner	Acq.Date	Assessed
334-1626-001	G. Hall	1995/10/20	\$115,500.00
334-1626-002	H. L. Holmes	1993/10/06	\$24,375.00
334-1626-003	W. Rodgers	1980/09/24	\$175,500.00
334-1626-004	J. Williamson	1974/09/20	\$135,750.00
334-1626-005	P. Goodman	1966/06/06	\$30,350.00
334-1626-006	K. Staley	1942/10/24	\$120,750.00
334-1626-007	J. Dormandy	1996/01/27	\$110,650.00
334-1626-008	S. Gooley	2000/05/31	\$145,750.00

# BUILDING A GEODATABASE

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## Fields for Relationship Classes:

Add Global IDs - The Add Global IDs tool creates a "GlobalID" field and generates a unique identifier for each record within the feature layer. Added to the parent feature layer in a relationship class.

Add Global Unique Identifier (GUID) field - the child feature layer or table should contain a GUID field. The GlobalID from the parent layer will be referenced in this field to make the relationship between the two feature layers.



# DATA COLLECTION

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# DATA COLLECTION

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ESRI's ArcGIS Enterprise or ArcGIS Online License

Field Data Collection Apps:

- ArcGIS Survey 123 – Form-based application used to gather data. Mobile or Desktop
- ArcGIS Field Maps – Mobile application used to capture data in the field, perform inspections, take notes, and share data from the field.
- Quick Capture – Mobile app that allows for quick field observations from a moving vehicle.

\*At least Field Worker user level is required for users to edit feature services in the mobile field data collection apps.

# DATA COLLECTION

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## Feature Services:

Feature layers must be published from ArcGIS Desktop to ArcGIS Enterprise Portal or ArcGIS Online as a feature service to be used in field data collection applications.

A feature service allows feature layers to be shared over the internet with symbology, query capabilities, and edit capabilities.

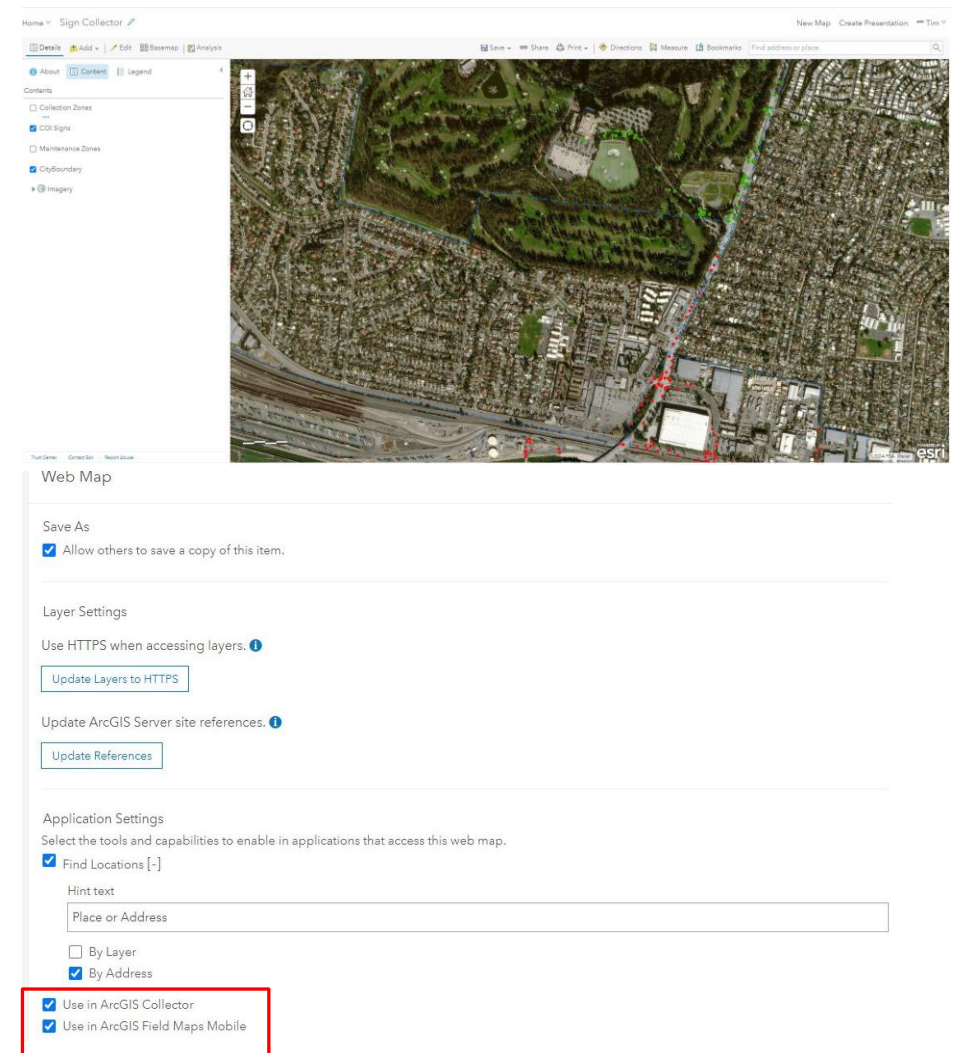
- Can be added to web maps and web applications.
- Edit and query privileges can be changed so only the users designated as Editors or Field Crew can change geographic or attribute information.
- Feature layer views can be created to display only the fields that the City wants to share publicly.

# DATA COLLECTION

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## Webmaps:

- Once a feature service is published to ArcGIS Enterprise Portal or ArcGIS Online, the feature service must be added to a webmap that is shared with field data collection applications.
- The webmap is where the visualization for the mobile collection app is dictated. For example, fields can be hidden, edit privileges can be turned off for certain fields, the visible scale limit can be set.
- A new webmap is created in the ArcGIS Enterprise Portal or ArcGIS Online.
- If a webmap is not used for data collection, turn off the “Use in ArcGIS Collector” and “Use in ArcGIS Field Maps Mobile” options. These options can be turned on or off in the webmap settings.



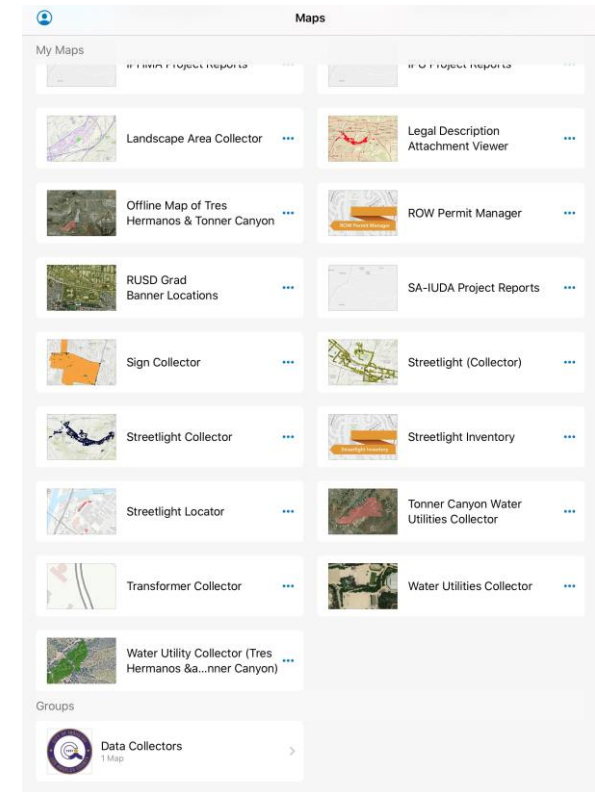
# DATA COLLECTION

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## Mobile Data Collection Apps:

All webmaps in ESRI Enterprise Portal or ArcGIS Online that are shared with a mobile collection application will populate in the application, on the mobile device.

Webmaps can be shared with groups created in the City's ArcGIS Enterprise Portal or ArcGIS Online Organization. Group members will see the webmaps only shared with their group.



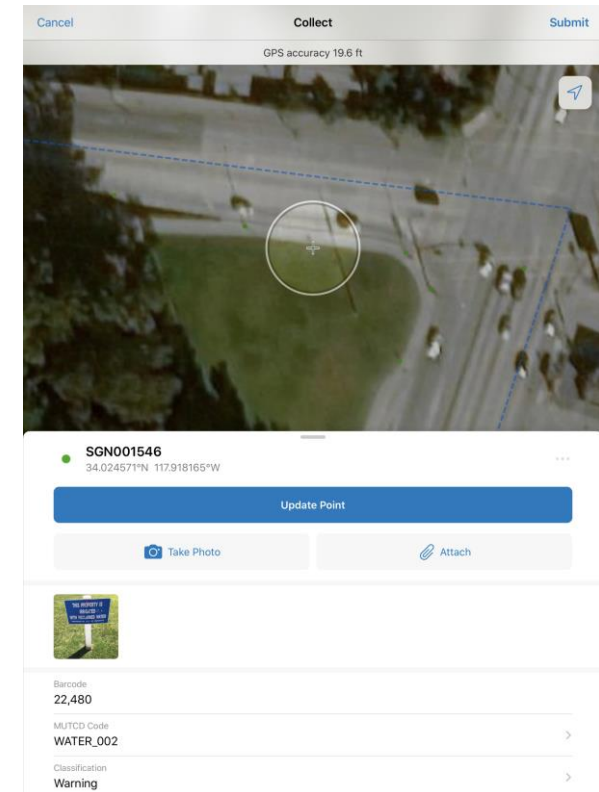
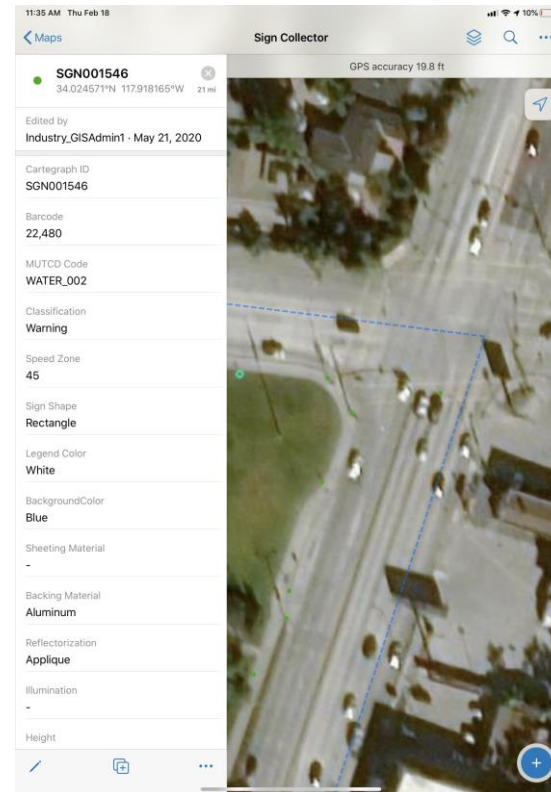
# DATA COLLECTION

## Mobile Data Collection Apps:

Depending on the capabilities specified in publishing process or in the feature service settings, Field Crews can add, edit attributes, edit location, or delete features on the map.

With attachments enabled, Field Crews can take pictures in the field and upload images to the feature service.

All edits and uploads are near instant.



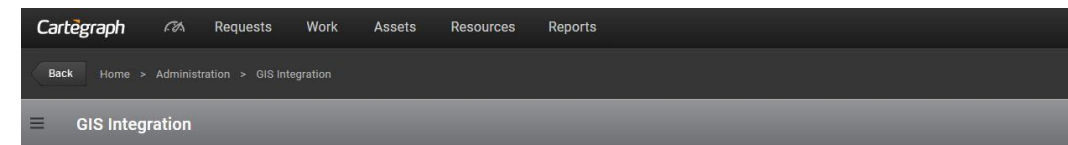
# MANAGEMENT

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# MANAGEMENT

## Asset Management System:

- Cartegraph or CityWorks. There are many more asset management systems that are similar.
- Can be easily integrated with ESRI ArcGIS Enterprise Portal or ArcGIS Online via feature services. A Creator license is required to utilize the GIS integration tools within these systems.
- Allow for GIS integration with City 311 systems (See Click Fix).
- Custom ESRI basemaps can be integrated with asset management system.
- Custom attribute fields can be created within asset management systems.
- Allow for two-way data replication. The location, attribute data, and images for each record can be synchronized between the two systems.
- Some are designed to be hosted on the City's servers and some are web-based software that are hosted by the service provider.



Associations							Create +	
<input type="checkbox"/>	Inacti...	Server Name	Feature Service	Feature Class Layer	Cartegraph Recordset	Last Stat...	Last Sync En	<input type="checkbox"/>
<input type="checkbox"/>	<input type="radio"/>	City of Industry ArcGI...	ADARamps	ADA Ramps	ADA Ramps	Success	2/17/2021 9:55	
<input type="checkbox"/>	<input type="radio"/>	City of Industry ArcGI...	BusStops	Bus Stops	Bus Stops	Success	2/17/2021 9:56	
<input type="checkbox"/>	<input type="radio"/>	City of Industry ArcGI...	ElectricalGenerators	Electrical Generators	Electrical Generators	Success	2/17/2021 9:56	



COST

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# COST

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## ArcGIS Enterprise - approx. \$27,500/year

Includes ArcGIS Desktop licenses w/ some extensions, ArcGIS Server, Portal for ArcGIS, and ArcGIS Online licenses.

## ArcGIS Online Licenses

Creator - \$500/yr - Includes Essential App Bundle, Field Apps Bundle, Office Apps Bundle, 500 credits

Viewer - \$100/ yr - Includes Essential App Bundle

Field Worker - \$350/yr - Includes Essential App Bundle, Field Apps Bundle, 250 credits

Editor - \$200/yr - Includes Essential App Bundle, Field Apps Bundle, 250 credits

GIS Professional Basic - \$700/yr - Includes ArcGIS Pro Basic, Essential App Bundle, Field Apps Bundle, Office Apps Bundle, 500 credits

GIS Professional Standard - \$2,750/yr - Includes ArcGIS Pro Standard, Essential App Bundle, Field Apps Bundle, Office Apps Bundle, 500 credits

GIS Professional Advanced - \$3,800/yr - Includes ArcGIS Pro Advanced, Essential App Bundle, Field Apps Bundle, Office Apps Bundle, 500 credits

# COST

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Cartegraph OMS - approx. \$10,500 - Standard Platform

Advanced Assets Extension - approx. \$1,700

User Tools Extension - approx. \$1,100

SeeClickFix extension - approx. \$5,100

100 Cartegraph Users - approx. \$19,200

# QUESTIONS

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# CONTACT

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