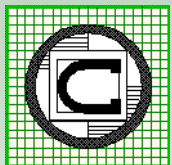


A Simplified Approach to Implementing GIS

Nick Tonias, P.E.



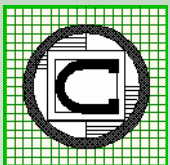
The CEDRA Corporation

22nd Annual OKSCAUG Conference 2019

The CEDRA Corporation

- 1985 The CEDRA Corporation is established.
- 1987 CEDRA begins a long standing relationship with Esri.
- 1993 CEDRA becomes an authorized Esri Business Partner and Developer.

CEDRA offers engineering/GIS solutions in the form of **software** and **services** to governmental agencies, engineering consultants, tax assessors, oil companies and various utility enterprises.

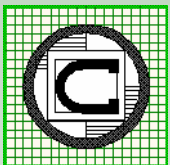


Implementing a GIS



“If this going to be difficult, I’m gonna be a bit stubborn”

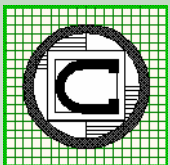
Proper Attitude and Commitment goes a long way in ensuring a successful implementation



Implementation Approach

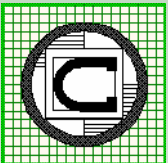
“What’s the Plan”

1. Assess Hardware, Software, Data
2. GIS Database Design
3. GIS Database Development
4. GIS Viewer Development
5. GIS Deployment
6. Application Development
7. Application Deployment
8. Maintenance



Step I

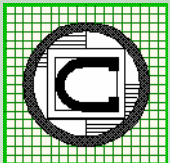
Assess Hardware, Software, Data



Assess Hardware, Software, Data

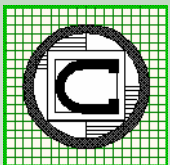
“A good carpenter makes use of the tools in their toolbox”

Step 1 is to figure out exactly what tools are available and what is missing



Assess Hardware, Software, Data (cont'd)

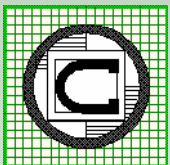
- ◆ Type of Esri Software used (ArcGIS 10.x, ArcGIS Pro, ArcGIS Server, etc.)
- ◆ License Level (Basic, Standard, Advanced)
- ◆ Number of Licenses
- ◆ Utilization of ArcGIS Online
- ◆ Utilization of Collector, Survey 123
- ◆ Utilization of GPS Technology
- ◆ Hardware available for GIS Implementation



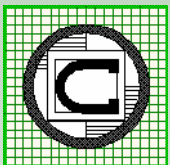
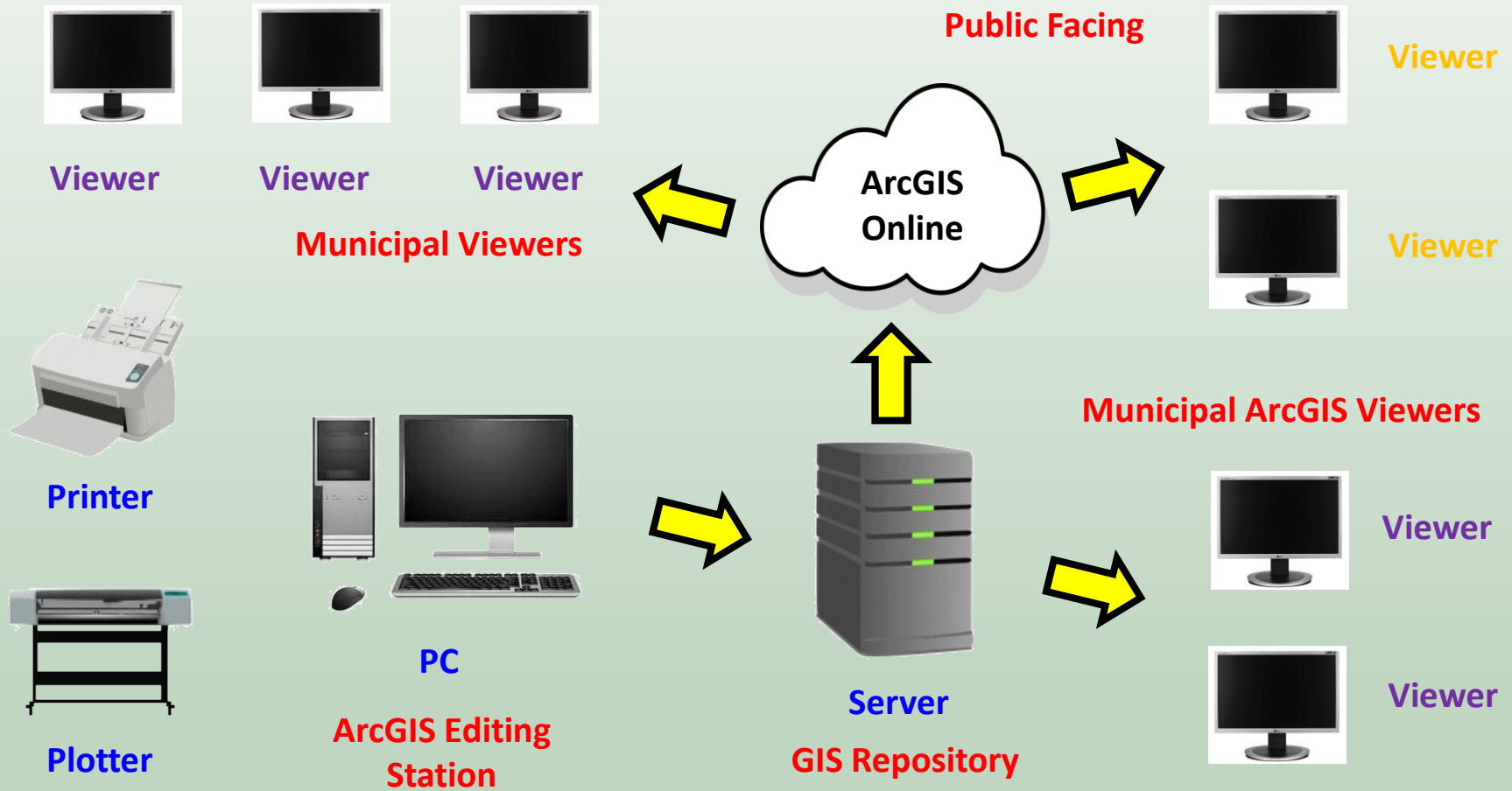
Assess Hardware, Software, Data (cont'd)

Minimum Requirements

- ◆ ArcGIS (Basic)
- ◆ ArcGIS Online (Creator)
- ◆ 64 bit PC (the more powerful, the better)
- ◆ Printer(s) for reports and maps:
Letter, Legal, Tabloid, D-size, E-size

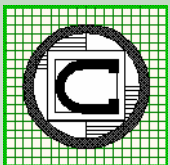


Assess Hardware, Software, Data (cont'd)



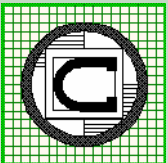
Assessment of Existing Records

- ◆ Identify Departments to be considered in the GIS Development
- ◆ Availability of Aerial Photography & other Digital Information
- ◆ Department by Department Review
- ◆ Availability of Existing Plans (paper, digital, microfilm, etc.)
- ◆ Magnitude of Data (# drawings, # projects, hydrants, manholes, etc.)
- ◆ Condition of Existing Records (good, fair, poor)
- ◆ Existing Data Conversion Methodology to be used (COGO, Scanning, GPS, Combination)



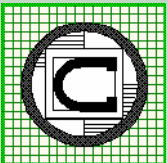
Step 2

GIS Database Design



GIS Database Design

- ◆ Two Options for a database design:
 - Custom
 - Local Government Information Mode (LGIM)
- ◆ A Custom database design can be tailored to carry the data of most interest to the municipality.
- ◆ The LGIM is a very detailed and extensive database design for integrated multi-department use.
- ◆ For many municipalities the LGIM is much more extensive than what is required. As such, a custom database design is a preferred approach.



GIS Database Design (cont'd)

Sample Custom Database Design

- ◆ File GeoDatabase Based
- ◆ Datasets and Feature Classes
- ◆ Tailored for Municipal Requirements
- ◆ Great Flexibility in Design of Datasets and Feature Classes
- ◆ Attribute names can be longer than 10 characters
- ◆ Supports Domains & Subtypes

File
GeoDatabase →

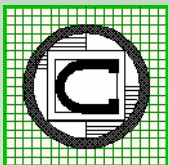
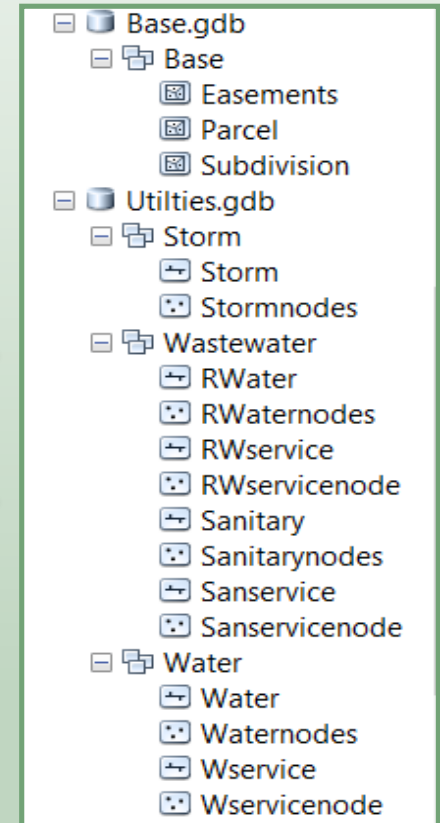
File
GeoDatabase →

Feature Dataset →

Feature
Class →

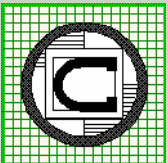
Feature Dataset →

Feature
Class →



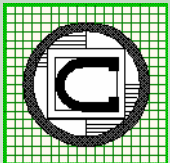
Step 3

GIS Database Development



GIS Database Development

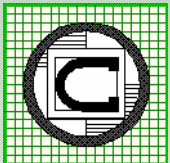
- ◆ Conversion of existing record data into a File Geodatabase
- ◆ In-house or Outsourced conversion
- ◆ If Outsourced, compare lump sum versus per feature pricing
- ◆ Identify priority of data layers to be converted (parcels, street centerlines, easements, waste water, water, storm water, electric, storm shelters, etc.)
- ◆ Months to Years to complete initial build followed by a maintenance program to keep the GIS database current



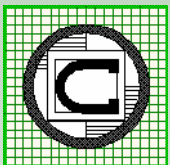
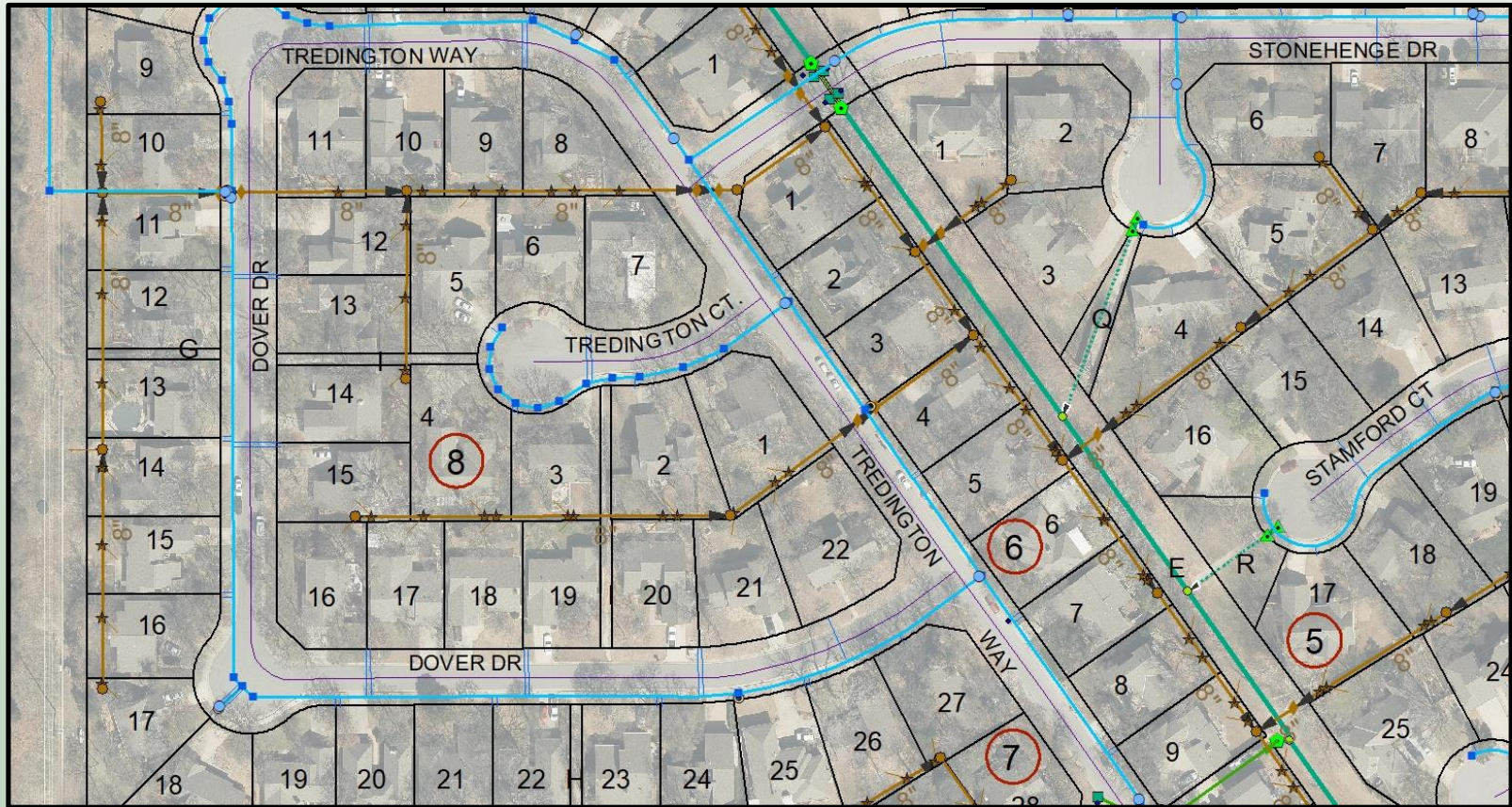
GIS Database Development (cont'd)

Converting Existing Record Information into a GIS

- The Desired Level of Accuracy (LOA) will control the method that is used
 - > 3'
 - 1' - 3'
 - < 1'
- Coordinate Geometry (COGO) transcription
- Heads-up Digitization
- Supplement with GPS information (valves, hydrants, manholes, inlets, etc.)
- Scanning Existing Drawings hyperlinked to GIS features
- Utilization of Survey 123 and/or Collector

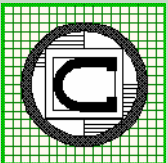


GIS Database Development (cont'd)



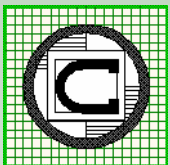
Step 4

GIS Viewer Development



GIS Viewer Development

- ◆ Need an application for users to interact with the GIS database
- ◆ Two Options:
 - Custom developed, or
 - ArcGIS Online with Web App Builder
- ◆ Custom developed is time consuming and expensive. Typical custom application written in JavaScript using Esri's JavaScript API.
- ◆ ArcGIS Online with Web App Builder easy, powerful and requires configuration rather than actual development work.
- ◆ Design specific viewers based upon data (Parcels, Utilities, etc.)



GIS Viewer Development (cont'd)

- ◆ Basic Functionality to include in a GIS Viewer:

 - Identify

 - Basemap Gallery

 - Layer List

 - Legend

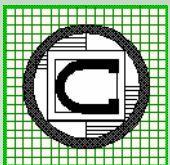
 - Bookmarks

 - Predefined Queries

 - Measure

 - Printing

 - Address Location



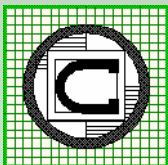
GIS Viewer Development (cont'd)

ArcGIS Online - Parcel Viewer Example

The screenshot displays the ArcGIS Online Parcel Viewer interface. The map shows a residential area with various parcels, each labeled with a unique parcel ID (e.g., 4696-12-649-1150). A specific parcel, 2200 IVY GLENN CT, is highlighted in cyan. A pop-up information window is open over this parcel, displaying the following details:

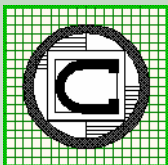
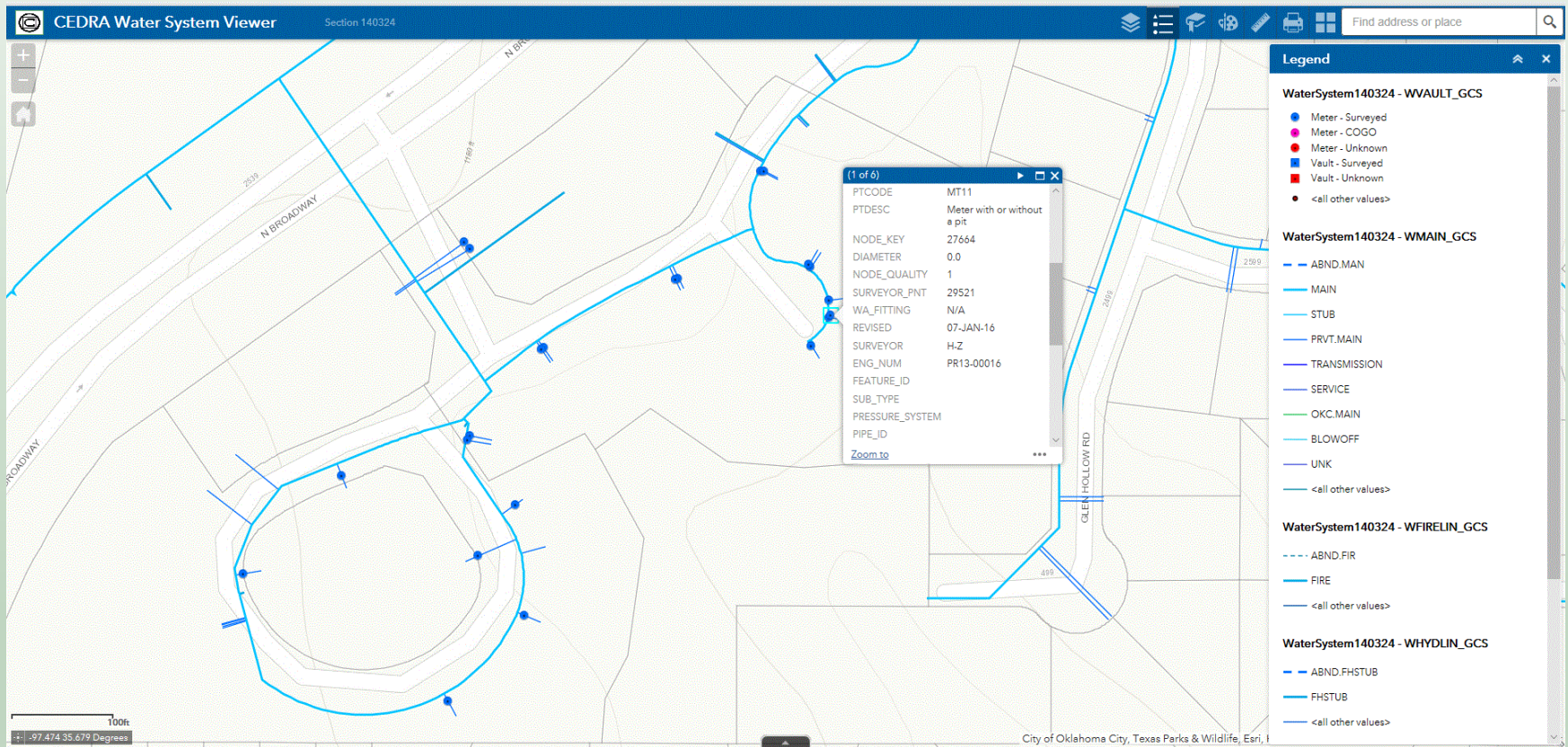
PARCEL_ADD	2200 IVY GLENN CT
HOUSENO	2,200
ST_DIR	
ST_NAME	IVY GLENN
ST_TYPE	CT
TILENO	140,324
PARCID	0
ORIG_SOURCE	CNTY
ORIG_DATE	7/31/1997, 8:00 PM
LOTNUM	13
BLOCKNUM	4
ASMAP	4696
ASBOOK	12
ASADDN	649
ASPROP	1290
Zoom to	...

The interface includes a top navigation bar with the title 'Parcel Viewer' and 'Section 140324', a search bar for 'Esri World Geocoder', and a bottom status bar showing coordinates and the Esri logo.



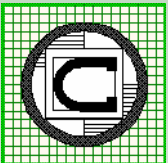
GIS Viewer Development (cont'd)

ArcGIS Online - Water System Viewer Example



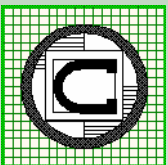
Step 5

GIS Deployment



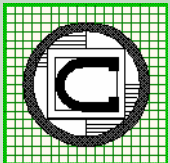
GIS Deployment

- ◆ Use ArcGIS Online to create groups and users.
- ◆ Make the GIS Viewer(s) available:
 - Internal Use
 - Public Facing
- ◆ The GIS Viewer is launched by entering a URL or by clicking on a link on a web page.
- ◆ Using ArcGIS Online eliminates the need for the municipality to install an ArcGIS Server environment.



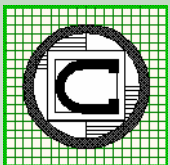
Step 6

Application Development



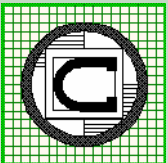
Application Development

- ◆ Consult ArcGIS Solutions: <https://solutions.arcgis.com/>
- ◆ Decide which applications are desired and their priority:
Field apps *Editing apps* *Map Book* *Specialized apps*
- ◆ Publish the services that will be consumed by the app:
Feature *Image*
- ◆ Download and configure the app to consume the appropriate services.
- ◆ Test the application.
- ◆ Prepare documentation.



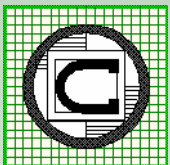
Step 7

Application Deployment



Application Deployment

- ◆ Make the application available to the appropriate users. This is accomplished by providing a URL address. Alternatively, the URL can be embedded in a web page for easy access.
- ◆ Determine if an application is to be kept internal or made accessible by the public.
- ◆ Provide training on use of the application.

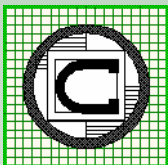


Application Deployment (cont'd)

Example of how an application can be embedded in a web page

Clicking on
Zoning
Map
directs the
user to a
URL
containing
the app

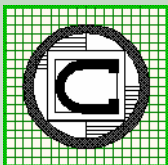
The screenshot shows the Edmond city website with a navigation menu. A red arrow points to the 'Zoning Map' link in the 'Zoning' section of the sidebar. The main content area displays the 'Zoning' page, including an overview and services section. The URL in the address bar is <http://edmondok.com/1478/Zoning>.



Available ArcGIS Solutions

ArcGIS Solutions – Additional Maps and Apps of Interest a Municipality

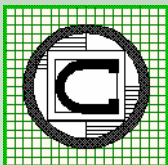
CCTV Manager	Use CCTV Manager to view CCTV condition data and associated videos and photos.
Watering Violations	Enables field crews to log water conservation violations on a smartphone or tablet.
Lead Service Management	Enables an organization to inform the public and internal stakeholders about the status of lead in service lines.
Water Service Request	Enables customers and the public to report issues with water, sewer, or storm water infrastructure.
Water Restrictions	Informs the public about watering restrictions, permitted water uses, and allowed watering times by service area zone.
Water Leak Investigator	Enables field staff to record the location and details of leaks.
Valve Exercising	Enables utilities to capture valve exercising data on a smartphone or tablet.
Utility Isolation Trace	Enables a utility to deploy a web application informing staff which valves to close to isolate a main break and what customers and assets will be affected.



Available ArcGIS Solutions

ArcGIS Solutions – Additional Maps and Apps of Interest a Municipality

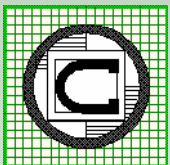
Stormwater Construction Site Violation	Enables field staff to record construction site storm water violations.
Sewer Service Lookup	Helps the public determine if a utility's services are available at location.
Manhole Inspection	Enables field staff to inspection manholes using a smartphone or tablet.
Outage Viewer	A self service website for customers to look up water service outages at locations.
Proposed Water Design	Enables users to rapidly lay out a proposed water network.
Main Break Notification	Provides real time notifications and alerts of main breaks.
Leak Logger Analysis	Provides tools to plan the placement of leak listening devices, manage device collected data, and perform notifications for an identified leak.
Illicit Discharge Trace	Enables utilities to find potential sources of storm water pollution by identifying upstream business customers.



Available ArcGIS Solutions

ArcGIS Solutions – Additional Maps and Apps of Interest a Municipality

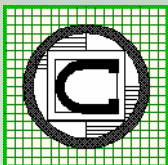
Hydrant Maintenance Inspection	Enables utilities to use a smartphone or tablet to perform fire hydrant inspections.
Drinking Water Advisory	Enables utilities to communicate with the public about drinking water alerts and advisories.
Backflow Inspection	Enables field crews to inspect backflow prevention devices.
Map Change Request	Enables staff to log discrepancies between a utility's maps and reality in the field.
Capital Improvement Plan	Capital Improvement Plan can be used by the general public and other interested parties to review projects included in the Capital Improvement Plan.
Capital Project Review	Capital Project Review can be used by plan review staff to examine proposed



Available ArcGIS Solutions

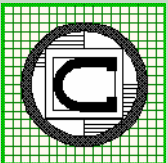
ArcGIS Solutions – Additional Maps and Apps of Interest a Municipality

Capital Improvement Planning	Estimate the costs of capital improvement projects and share results with organization.
Capital Project Reports	Capital Project Reports can be used by project leads to communicate the schedule, cost, and quality of active capital projects to executives.
Capital Project Dashboard	Capital Project Dashboard can be used by public works executives to monitor the status of active capital projects in their community.
Capital Project Locator	Capital Project Locator can be used by the general public and other interested parties to review the status of capital projects under construction in their community.
Capital Project Plans	Capital Project Plans can be used by project leads to organize new capital project plans and revise project information during the planning process.
Adopta	Adopta can be used by government agencies and other organizations to engage the public in the maintenance of natural and man-made assets.



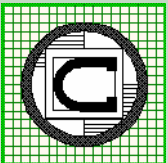
Step 8

Maintenance



Maintenance

- ◆ The value of a GIS is directly tied to how current it is.
- ◆ Updates to the GIS need to be made continuously (daily, weekly, monthly).
- ◆ As with the underlying GIS data, the applications will also need to be maintained.
- ◆ Maintenance can be performed in-house or out-sourced.



Maintenance - Inhouse

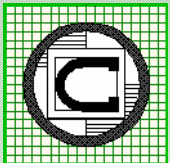
- ◆ Dedicated staff who are trained and interested in updating the GIS.
- ◆ Work in a temporary environment, when the updates are complete then update the GIS repository.
- ◆ QA/QC procedures to validate the data.



Negative Attitude



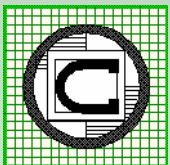
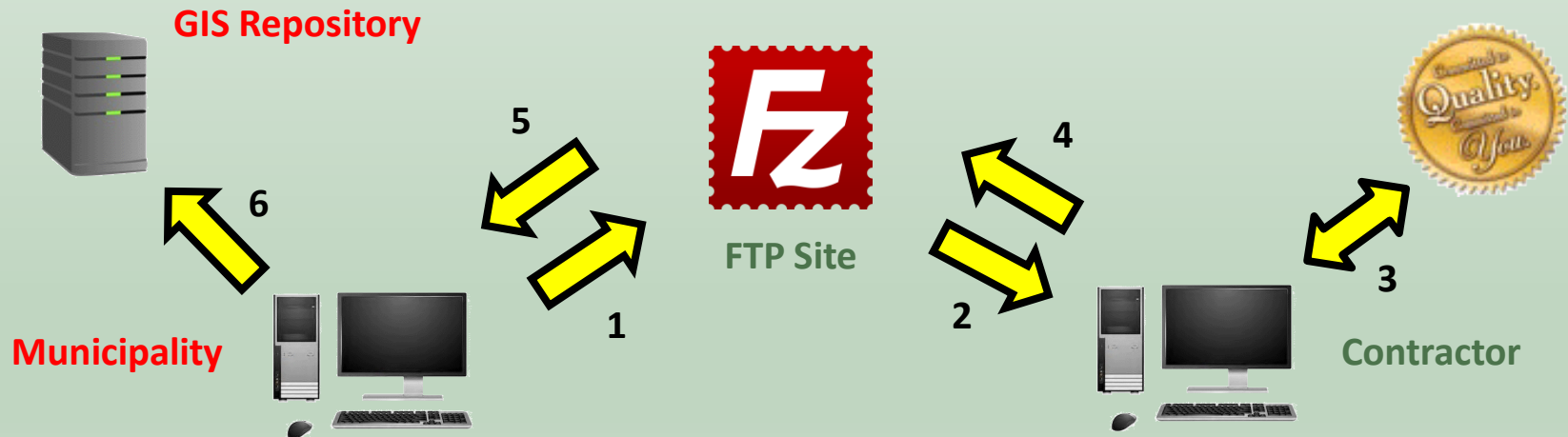
Positive Attitude



Maintenance - Outsourced

- ◆ Same as with inhouse maintenance with the addition of:
- ◆ Develop a means of transferring data between client and contractor such as a secure FTP site.
- ◆ Develop a regular schedule for submission and delivery of data.

Flow of Data



Thank you!

Questions And Answers

