

## What We Do

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Allegan County GIS  
[www.allegancounty.org/gis](http://www.allegancounty.org/gis)

November 1, 2018

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# **Part I**

# **Brand**

# Chapter 1

## Awards

### 1.1 The GIS Champion Award

#### 1.1.1 GIS Champion Award Code

```
\documentclass[landscape]{article}
\usepackage{wallpaper}
\usepackage{niceframe}
\usepackage{xcolor}
\usepackage{ulem}
\usepackage{graphicx}
\usepackage{geometry}
%geometry{tmargin=.75cm,bmargin=.25cm,
%lmargin=.8cm,rmargin=.2cm}
\geometry{tmargin=.25in,bmargin=.25in,
  lmargin=.25in,rmargin=.25in}
\usepackage{multicol}
\setlength{\columnseprule}{0.4pt}
\columnwidth=0.3\textwidth

\begin{document}
\centering
\scalebox{2.9}{
\color{green!30!black!60}
\begin{minipage}{.33\textwidth}
\font\border=umrandb
\generalframe
{\border \char113} % up left
{\border \char109} % up
{\border \char112} % up right
{\border \char108} % left
{\border \char110} % right

```

```
{\border \char114} % lower left  
\border \char111} % bottom  
\border \char115} % lower right  
\centering  
\includegraphics[height=1.5cm]{GIS_Logo_better.jpg}  
  
\vspace{-8mm}  
  
\curlyframe[.9\columnwidth]{  
  
    \textcolor{green!10!black!90}{  
        {\small Allegan County GIS Services}  
        \vspace{.005in}  
  
        \textcolor{green!10!black!90}{  
            \tiny Recognizes}\\"  
        \%\\smallskip  
        \vspace{.005in}  
        \underline{\textcolor{green!30!black!60}{  
            \textcolor{green!30!black!60}{Brian Redmond}}}  
        \\  
        \%\\smallskip  
        \tiny Information Services Technician  
  
        \%\\smallskip  
        \textcolor{green!10!black!90}{  
            {  
            \\  
            \tiny for Excellence in  
            }  
            \%\\smallskip  
            \\  
            \textcolor{black}{\normalsize \textsc{Enabling  
                Employee Experiences}}  
            \\  
            \vspace{.1in}  
            \textcolor{green!10!black!90}{  
                {  
                \tiny on this day  
                \itshape September 21, 2018  
                }  
  
                \vspace{.1in}  
                {\color{green!10!black!90}  
                    \scalebox{.6}{
```

```
\begin{tabular}{ccc}
\cline{1-1}
\cline{3-3}
\\
Neil Besteman & & Bryan May \\
GIS Manager & & GIS Analyst \\
\end{tabular}

} % closes scalebox{.6} arg
} % closes blue!40!black
} % closes curlyframe arg
} % closes centering
\end{minipage}
} % closes scalebox{2.8} arg

\end{document}
```

## **Part II**

# **Methods**

# Chapter 2

## Documentation

### 2.1 About Documentation

#### 2.1.1 How Jalapeño Works

General Notes:

- jalapeno folder is a git package.  
<https://github.com/nbesteman/jalapeno>

- Project is coded with relative paths and jalapeno can be located anywhere.

Project file structure:

...\\jalapeno\\..	
folder	description
documentation	resources used in Jalapeño
processing	.tex documents and build folders
source	common image files

...\\jalapeno\\documentation\\..	
folder or file	description
moduleTemplates	.tex templates
packageDocs	L <small>A</small> T <small>E</small> X documentation
references	reference and appendix resources
unsorted	catch all for unsorted documentation
BookStructureMM.mm	A mindmap of jalapeno

...\\jalapeno\\processing\\..

folder or file	description
...Part	folders of book <i>parts</i>
build	L <sup>A</sup> T <sub>E</sub> X folder for .pdf output and temp files
build\referenceEntries.bib	entries that appear in references
commonTitle.tex	code for all title pages
fullCompile.sh	shell script to compile GISDocumentation.tex
GISDocumentation.tex	master document code
glossaryEntries.tex	entries that appear in glossary
indexEntries.tex	entries that appear in the index
preamble.tex	preamble code for all documents

**\*Note about referenceEntries.bib** Any reference entries built here can be cited in any .tex document in the project.

## Using the glossary

**Glossary requirements:** Glossary commands require a Perl interpreter. Activeperl is a free Perl interpreter and can be downloaded from:

<https://www.activestate.com/activeperl/downloads> (A typical installation adds Perl to your path). Compiling the glossary requires running the makeglossaries command either in a L<sup>A</sup>T<sub>E</sub>X IDE or in command line as described here. PDFLatex must be run first to create a .aux file that is used by makeglossaries to create an .glx file. After the .glx file is created, PDFLatex must be run again to insert the glossary at the \printglossaries location.

**Creating a new glossary entry** To create a new glossary entry: Add an entry to glossaryEntries.tex. Save it there and then use the makeglossaries command to recompile the .glx file.

**Rebuilding the glossary** To Recompile the .glx. In the (main document)build folder:

- Launch command prompt
- enter command: **makeglossaries GISDocumentation\***

**\*Note:** This command reads the .aux file and creates the .glx file. The .aux file is created by compiling with PDFLatex. If there is no .aux file the command will fail.

**Using glossary terms in a subdocument:** In the subdocument you must add code to input the glossaryEntries file. For example:

After the line:

```
\input{../../preamble}
```

Add the line:

```
\input{../../glossaryEntries}
```

**To use a glossary term in the subdocument:**

In place of the term, use code referencing the key (in the glossaryEntries file):

- `\gls{key}`

**To add the glossary to the subdocument:**

- Add the line `\makeglossaries` to the preamble of the subdocument.
- Add the line `\printglossaries` to the subdocument.
- Run `makeglossaries` in command line on the subdocument similar to how is described above.

## Using the bibliography(References)

**Bibliography requirements:** Compiling the bibliography requires running `bibtex` either in a L<sup>A</sup>T<sub>E</sub>X IDE or in command line as described here. PDFLatex must be run first to create a `.aux` file that is used by `bibtex` to create a `.bbl` file. After the `.bbl` file is created, PDFLatex must be run again to insert the bibliography at the `\bibliography` location.

For example, the command:`...\bibliography{referenceEntries}`  
...places the bibliography called `referenceEntries.bib` which must be in the same folder as the project `.aux` file.

**Creating a new bibliography entry** To **create a new bibliography entry:** Add an entry to `referenceEntries.bib`. Save it there and then use `bibtex` to recompile the `.bbl` file.

**Rebuilding the bibliography** To **Recompile the .bbl**. In the (main document)build folder:

- Launch command prompt
- enter command: **bibtex GISDocumentation**

**\*Note:** This command reads the `.aux` file and creates the `.bbl` file. The `.aux` file is created by compiling with PDFLatex. If there is no `.aux` file the command will fail.

**To cite a bibliography source in a subdocument:**

In the place that you want the citation:

- `\cite[pg.#]{key}`

**To add the bibliography to the subdocument:**

- Similar to adding to the master document but not documented here.

## Using the Index

**Index requirements:** Compiling the index requires running the makeindex command either in a L<sup>A</sup>T<sub>E</sub>X IDE or in command line as described here. PDFLatex must be run first to create a .aux file that is used by makeindex to create an .idx file. After the .idx file is created, PDFLatex must be run again to insert the index at the \printindex location.

**Creating a new index entry To create a new index entry:** Add an entry to indexEntries.tex. Save it there and then use the makeindex command to recompile the .idx file.

### Rebuilding the index

**To Recompile the .idx** In the (main document)build folder:

- Launch command prompt
- enter command: **makeindex GISDocumentation\***

**\*Note:** This command reads the .aux file and creates the .idx file. The .aux file is created by compiling with PDFLatex. If there is no .aux file the command will fail. Run PDFLatex first

**Using index terms in a subdocument:** In the subdocument you must add code to input the indexEntries file. For example:

After the line:

```
\input{../../preamble}
```

Add the line:

```
\input{../../indexEntries}
```

**To use a index term in the subdocument:**

In place of the term, use code referencing the key (in the indexEntries file):

- \index {key}

**To add the index to the subdocument:**

- Add the line \makeindex to the preamble of the subdocument.
- Add the line \printindex to the subdocument.
- Run makeindex in command line on the subdocument similar to how is described above.

## Using the Appendices

## 2.2 Document Storage Concepts

### 2.2.1 GIS File Standard

Folders inside the project folder

Lets talk about map projection

- archive
- build
- delivered
- documentation
- processing
- source

# **Chapter 3**

# **Team Concept**

## **3.1 Team Structure**

### **3.1.1 Paired Programming**

A paragraph about pp from Joy Inc.

# **Part III**

# **Service**

# Chapter 4

# Applications

## 4.1 Applications for Treasurer Dept.

### 4.1.1 Forfeiture Data Collection

#### Problem and Analysis

**Background** Treasurer department has an annual responsibility to properly document the tax forfeiture process. The LIS Department built an application in MS Access and MapInfo that consumed a daily export from BSA and was deployed to the field on a laptop. A digital camera was used for site photos and later imported into the laptop.

**Statement of Problem** Current Tax Forfeiture workflow is built on MapInfo software which has been replaced by ESRI software. The Forfeiture data collection application must be recreated in the ESRI framework.

**Analysis** Tax Forfeiture Application will facilitate:

- Mobile data collection on handheld device via Collector for ArcGIS configured with Allegan County GIS Portal (**device app**)
  - Device app will:
    - \* Synchronize with data in the office (online)
    - \* Navigate to forfeiture sites (offline)
    - \* Collect data and photos of forfeiture sites (offline)
    - \* Synchronize the collected data with data in the office (online)
- Daily form production and printing for each site visited with required data and images.

## Design

**Overview** This Application utilizes Treasurer Department data to document the forfeiture process. An enterprise GIS deployment enables offline data collection by up to two users.

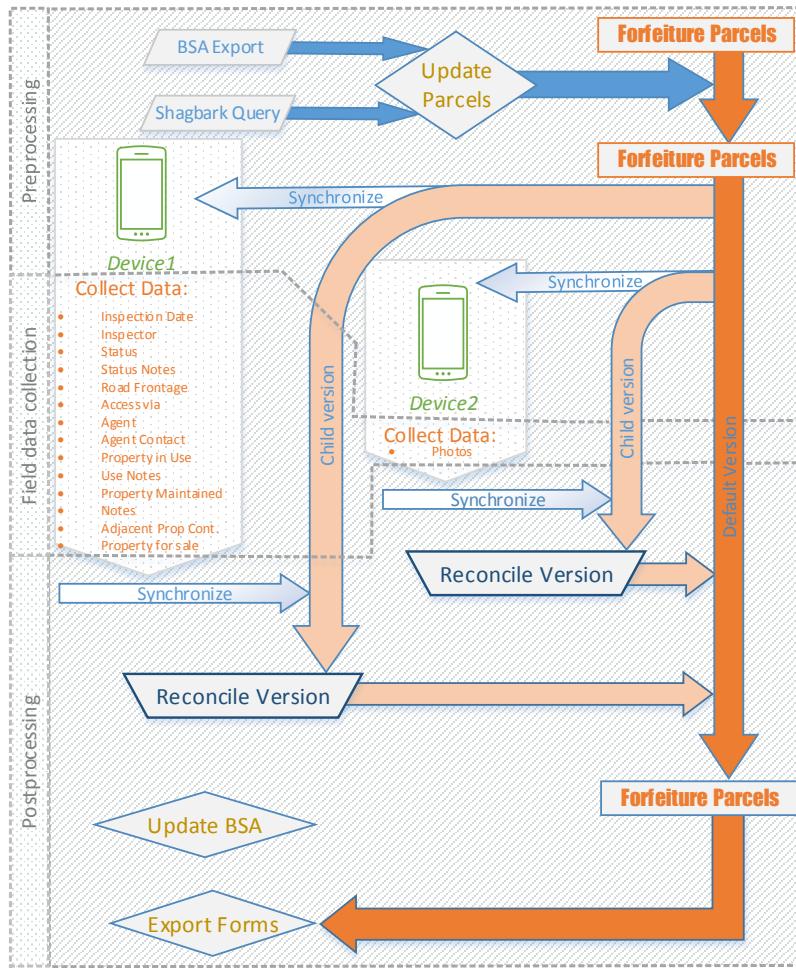


Figure 4.1: Project Design

There are three stages to daily workflow: Preprocessing, Field Collection, and Postprocessing. Forfeiture Parcels, is a map feature class that is processed in the office via the network and remotely via the internet.

### Workflow Summary

**Preprocessing** The data is updated to match the Treasures data in BSAforfeiture.net and check for intersections with known contamination sites. Data is then synchronized to two android mobile devices.

**Field data collection** The two mobile devices are used to collect info required, one for all the attributes, the other for photos.

**Postprocessing** The mobile devices are syncronized back to the network data and a form is exported for each site visited that day.

### Technologies Used

**BSA Data** Details of parcels in the forfeiture process are managed in BSA Delinquent Tax.net. The Treasurer office does a BSA export of the parcels in need of a site visit in the preprocessing.

**ArcGIS Desktop** Tools are designed to preprocess and postprocess forfeiture parcel data for fieldwork. The user will execute a preprocess script tool that prepares the data for field deployment. After fieldwork, a post process script tool syncronizes data from the fieldwork with the live data on the Allegan County network.

**ArcGIS Collector** A free mobile application developed and tested on Android is deployed to the field for data collection. The application is configured to work offline(without an internet or cellular connection) by syncronizing before and after fieldwork.

**ArcGIS Portal Webmaps and Apps** Live data from a publishing enterprise geodatabase(ACPub), running on SQL Server database server (acintsql01) is provided through a feature service (REST service) named TaxReversionParcels. A webmap called the Forfeiture Field Map consumes the TaxReversionParcels feature service, exposing the data to editing. The Forfeiture Field Map is configured to work in the ArcGIS Collector App. The app downloads the webmap, allowing the user to collect the necessary information on each forfeiture parcel in the field disconnected, and then to upload the changes when reconnected.

**Forfeiture Mobile Data Collection App in Action**

Three parts of the daily routine:

1. Preprocessing (in the office):

- Export current forfeiture list from BSA
- Update webmap layers with results from BSA export
- Update webmap layers with results of an intersect routine with contaminated sites
- Synchronize from webmap layers to field collection devices (**device app**)

2. Field data collection with device app:

- Navigation to forfeiture sites is aided by users location shown in map
- A Checklist of data points about the site
- Attach photos to the site
- Save results for synchronization in post-processing

3. Post-processing (in the office)

- Synchronize data and images collected in device app to webmap layers

## Data Details

**Location** The data is located in AC PUB. AC PUB is a geodatabase on ACINTSQL01.

### Forfeiture Parcels Data

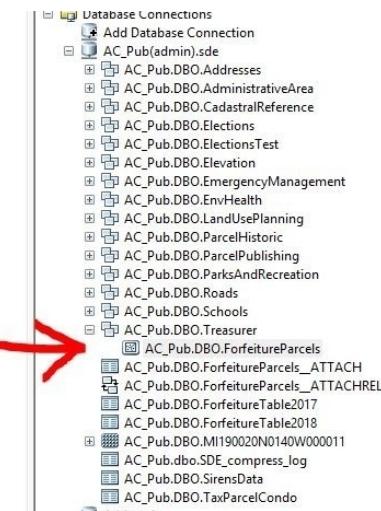


Figure 4.2: Live Data Location

### Contamination Data

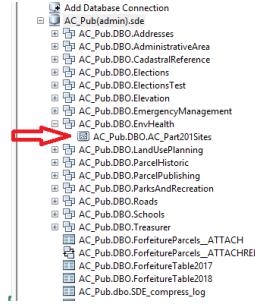


Figure 4.3: Contamination Feature Class

Attribute List			
Field Name	Field Alias	Entry Type	Note
PropertyNumber	Property Number	Prefilled	NA
Need2Print	Print Today	Dropdown	Yes or No
InspectionDate	InspectionDate	Autofill or Dropdown	NA
Inspector	Inspector	Dropdown	NA
Address	Address	Prefilled	NA
Status	Status	Dropdown	NA
StatusNotes	Status Notes	Open Entry	120Char
Roadfrontage	Road Frontage	Dropdown	Yes or No
AccessVia	Access via	Open Entry	30Char
Agent	Agent	Open Entry	30Char
AgentContact	Agent Contact	Open Entry	30Char
UseNotes	Use Notes	Open Entry	120Char
PropMaintNotes	Property Maintained Notes	Open Entry	120Char
PropertyForSale	Property for sale	Dropdown	Yes or No
Posted	Posted	Prefilled	NA
InList	In List	Prefilled	in Preproc
PostedInList	PostedInList	Prefilled	in Preproc
Acres	Acres	Prefilled	NA
Class	Class	Prefilled	NA
PropertyInUse	Property In Use	Dropdown	Yes or No
PropertyMaintained	Property Maintained	Dropdown	Yes or No
PropertyContaminated	Property Contaminated	Prefilled	in Preproc
Notes	Notes	Open Entry	120Char
AdjacentPropertyContaminated	Adjacent Property Contaminated	Prefilled	in Preproc
PropertyContaminatedNotes	PropertyContaminatedNotes	Prefilled	in Preproc
AdjPropertyContaminatedNotes	AdjPropertyContaminatedNotes	Prefilled	in Preproc
PictureComments	Picture1Comments	Open Entry	50Char
PostedDate	PostedDate	Dropdown	Date

Table 4.1: Dataset Details

**ForfeitureParcels Feature Class**

**Webmap Details** The Forfeiture Field Map can be accessed on PC through the Allegan County GIS Portal. The map is made up of a basemap and a feature layer.

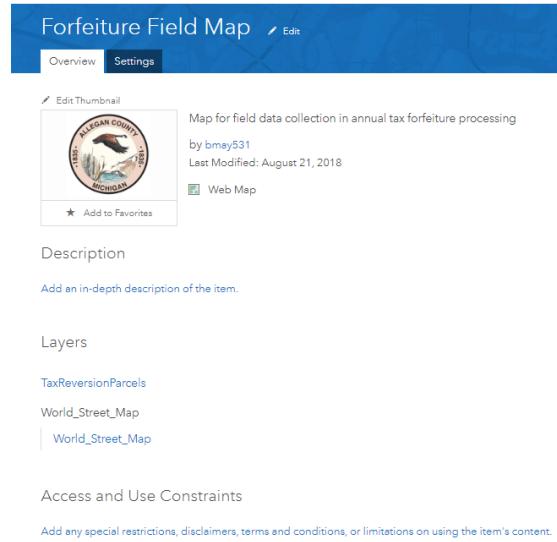


Figure 4.4: Web Map Details

**Feature Layer Details** The webmap consists of a basemap and a feature layer, TaxReversionParcels. TaxReversionParcels has been configured for offline use.

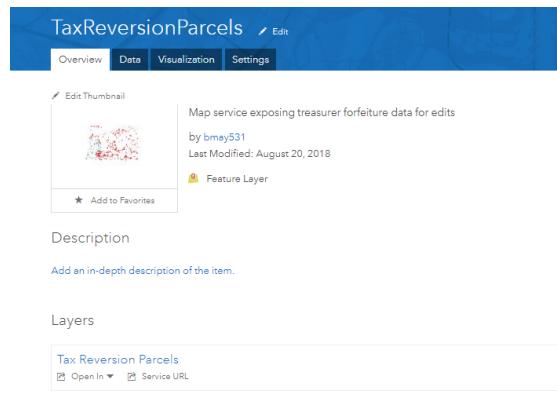


Figure 4.5: Layer Details

**Basemap Details** A tiled basemap service is used. The infoserv user credentials are used for sharing. The url for the shared service is:

```
https://tiledbasemaps.arcgis.com/arcgis/rest/
services/World_Street_Map/MapServer
```

The screenshot shows the ArcGIS Online interface for the 'World Street Map (for Export)' layer. At the top, there are navigation links: ArcGIS, Pricing, Map, Scene, Help, Sign In, and a search bar. Below the header, the title 'World Street Map (for Export)' is displayed with a 'Overview' tab selected. To the right of the title, there are three buttons: 'Open in Map Viewer', 'Open in Scene Viewer', and 'Open in ArcGIS Desktop'. The main content area features a thumbnail image of a map showing major roads and highways. Below the thumbnail, the text reads: 'This layer presents highway-level data for the world and street-level data for many areas around the world. This layer is designed to support export of basemap tiles for offline use. ArcGIS Online Subscription required.' It also indicates the layer was created on Oct 15, 2013, updated on Aug 15, 2018, and has a view count of 39,772. There are two buttons below this: '@Authoritative' and 'Subscriber'. The 'Description' section provides details about the layer's purpose and export capabilities, mentioning it supports exporting up to 150,000 tiles at once. It lists three levels of detail: Large city (e.g. San Francisco) down to full level of detail at ~1:1,000 scale (Level 19), Medium size state or province (e.g. Colorado) down to scale of ~1:34,000 (Level 14), and Medium to large country (e.g. Continental United States) down to scale of ~1:288,000 (Level 11). The 'Service Information for Developers' section contains instructions for exporting tiles from the service. The 'Owner' section shows the layer is managed by 'esri'. The 'Tags' section lists various geographical and thematic tags such as World, Global, Europe, North America, United States, Southern Africa, Asia, South America, Australia, Oceania, Canada, Mexico, basemap, highways, roads, transportation, landmarks, parks, community, community basemap, map, AFAZ30\_base, current, esri\_basemap, general availability, export.

Figure 4.6: Basemap Source Description

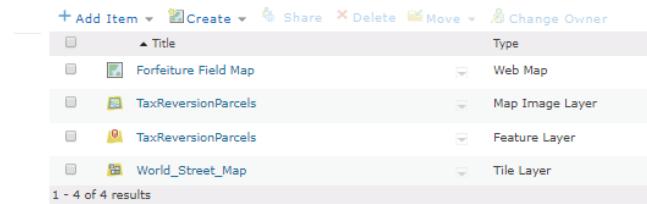


Figure 4.7: Portal Contents

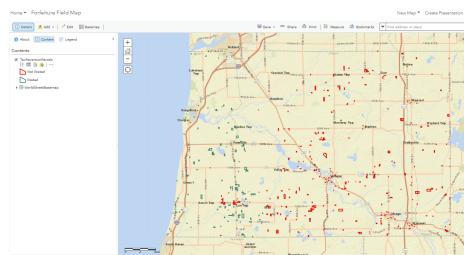


Figure 4.8: Field Map on PC

unplaced images

**Hard Copy Record**

screenshots: arcmap map arcmap tools portal screenshots sql server mgt screen shots phone screenshots

**ArcGIS Server**

xx

**User Manual****Administrative Tasks****Annual Setup**

**Setup Users in ArcGIS** Users that will run Pre and Post processing scripts must be created and given privileges on ACPub Treasurer Feature Data Set.

**Setup Users in Portal for ArcGIS** Users that will use the Collector for ArcGIS must have profiles added to and managed in the Allegan County GIS Portal site.

**Schema Change Procedure****Form Edits Procedure**

### Collection Device Setup

#### Collector Application Setup Details

##### Install Collector for ArcGIS

- Available from the Google Play Store



[READ MORE](#)

Figure 4.9: Download the App

## Configure Collector

for Organization Website, Type:

`https://gis.allegancounty.org/  
portal_webadaptor`

then:

Press Continue

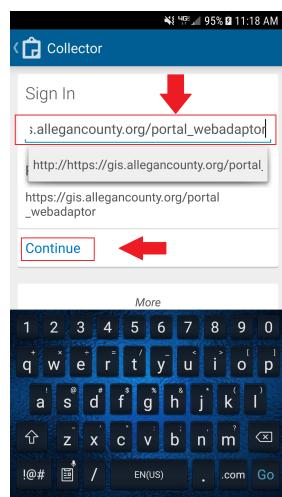


Figure 4.10: Collector Connection

Enter Credentials

then:

Press SIGN IN

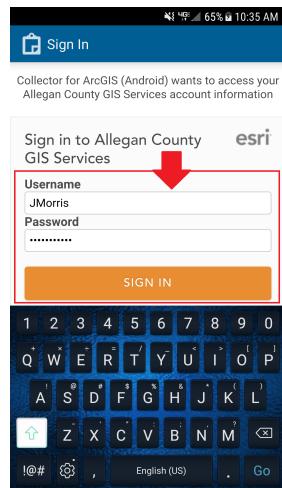


Figure 4.11: Enter Credentials

### Download the Forfeiture Field Map

There are 3 different versions of the map

- Forfeiture Field Map
- Forfeiture Field Map For Photos
- Forfeiture Field Map For Attributes

The Download option indicates it is not on the device but is available for offline use.

Choose a Map

Press Download

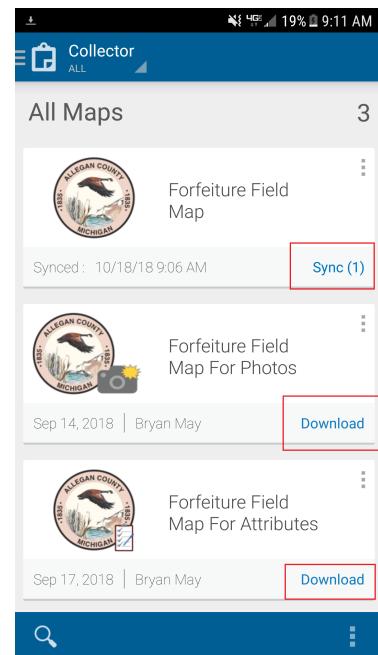


Figure 4.12: Collector Maps Menu

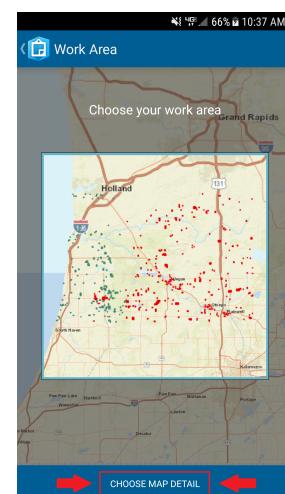


Figure 4.13: Choose Work Area (large)

**Specify work area to download** and press map detail  
Note that a larger area takes longer to download but the basemap only needs to be downloaded once.

### Choose Map Detail

Zoom into the level of detail desired.

Press Download

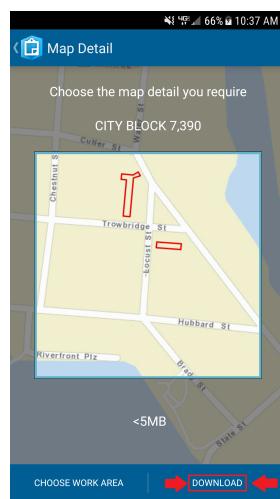


Figure 4.14: Choose Map Detail

This area is ready for field data collection.

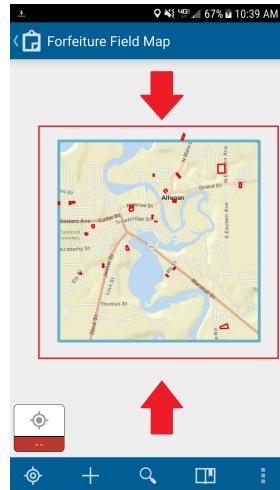


Figure 4.15: Map on Device

### Open Camera Application Setup Details

#### Install Open Camera

- Available from the Google Play Store

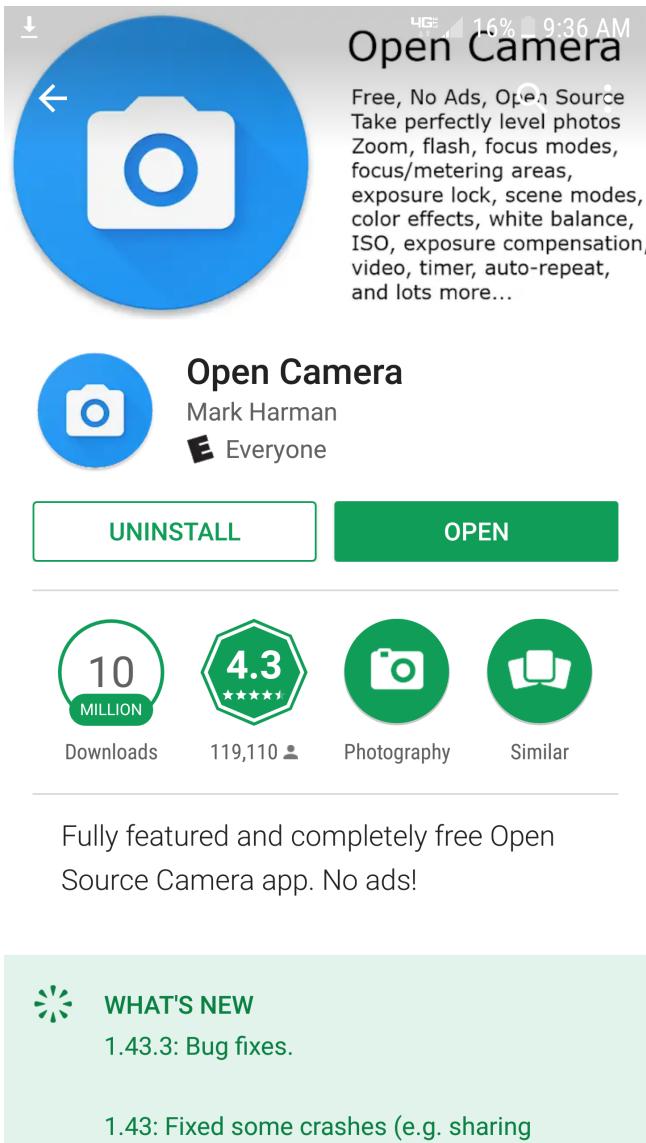


Figure 4.16: Open Camera from Google Play Store

### Configure Open Camera

In the Open Camera Application:

Press the gear shaped **Settings** button to go into the settings menu

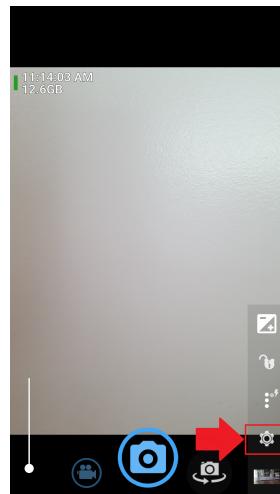


Figure 4.17: Find Settings Menu

---

Press the Photo Settings button

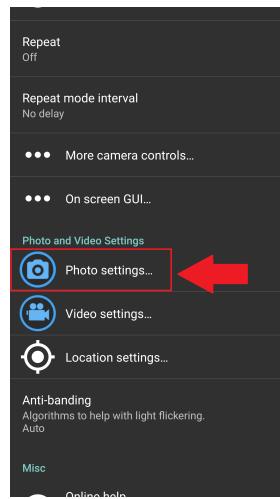


Figure 4.18: Setting Screen

### Set Photo Resolution

In photo settings:

Press the Camera resolution button

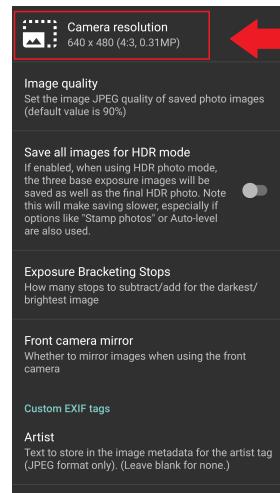


Figure 4.19: Photo Settings Menu

Select **640 x 480**

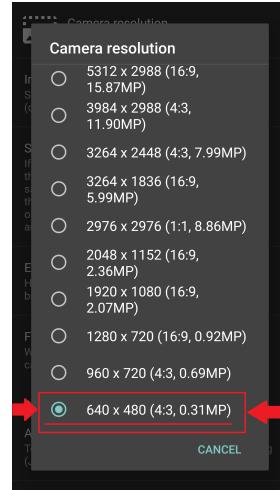


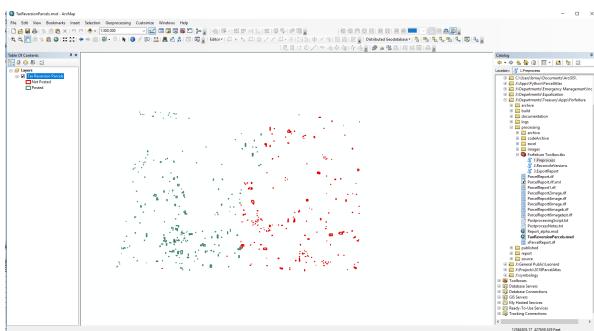
Figure 4.20: Camera Resolution Setting

### Daily Preprocessing Routine

**Execute Preprocessing Script** A tool in ArcGIS that:

- Exports current forfeiture list from BSA
- Updates webmap layers with results from BSA export

In Catalog:



Open the toolbox

Figure 4.21: Processing Tools

Open tool 1

### Synchronize the Forfeiture Field Map

Note the date and time:

Press Sync

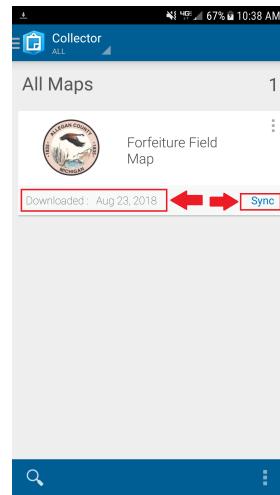


Figure 4.22: Map Downloaded

---

Note the date and time:

Map is synchronized

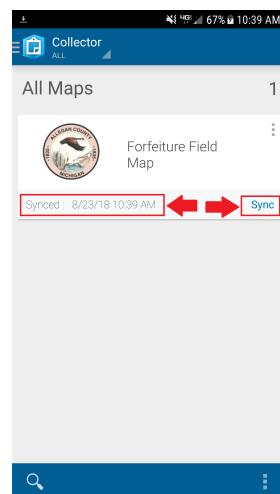


Figure 4.23: Map Synchronized

**Forfeiture Data Collection****Forfeiture Parcels Data Details**

Attributes are of four entry types:

- prefilled
- autofill
- dropdown
- text box

For each site visited, select the desired parcel, push the edit button and collect attributes.

### Device 1 Field Operation

#### Select a parcel



Figure 4.24: Select Parcel

Push the edit button

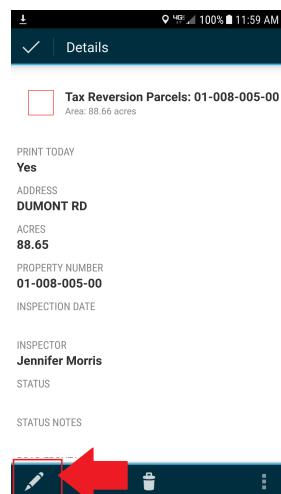


Figure 4.25: Parcel Details

**Device 1 Field Operation Cont.**  
**Select Yes for Print Today**

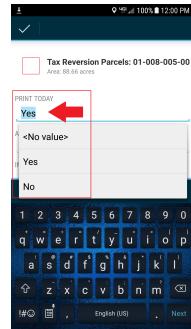


Figure 4.26: Print Today Yes or No

Select Use Current or enter any date

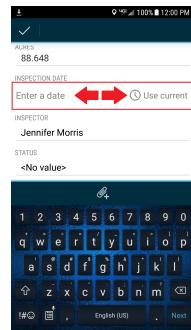


Figure 4.27: Enter Date

Select Inspector From Drop-down

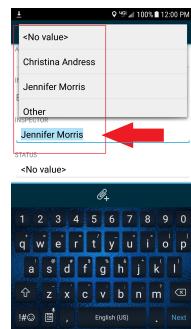


Figure 4.28: Select Inspector

**Device 1 Field Operation Cont.**  
Select Occupied or Not Occupied

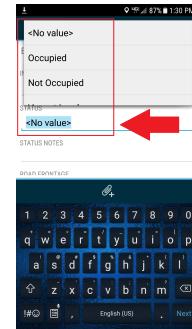


Figure 4.29: Status

Enter status notes up to 120 characters

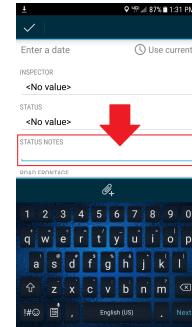


Figure 4.30: Status Notes

Select Yes or No for Road Frontage

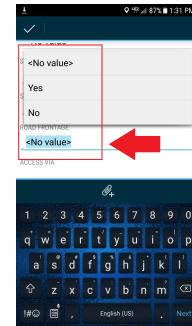


Figure 4.31: Road Frontage

**Device 1 Field Operation Cont.**

Enter road used for access

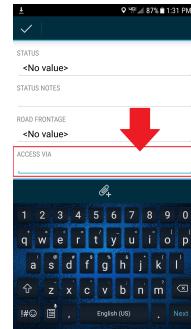


Figure 4.32: Access Via

Enter Agent Name

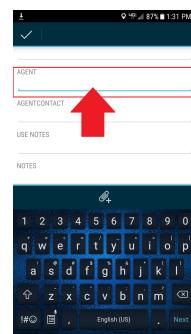


Figure 4.33: Agent

Enter Agent Contact Info

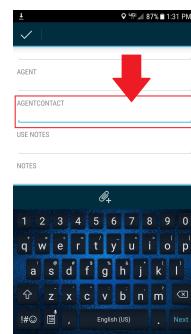


Figure 4.34: Agent Contact

**Device 1 Field Operation Cont.**  
Enter Use Notes up to 120 characters

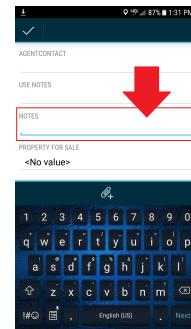


Figure 4.35: Use Notes

Enter Notes up to 120 characters

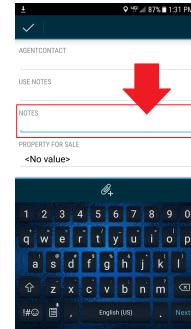


Figure 4.36: Notes

Enter property for sale yes or no

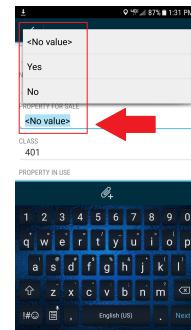


Figure 4.37: Property for Sale

**Device 1 Field Operation Cont.**  
**Property in Use Yes or No**

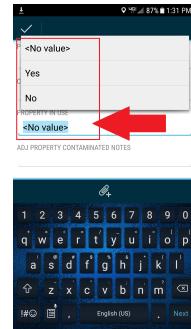


Figure 4.38: Property in Use

**Placeholder**

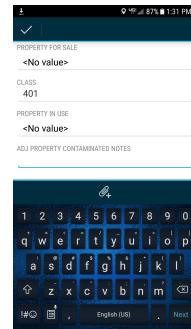


Figure 4.39: Placeholder

**prefilled**

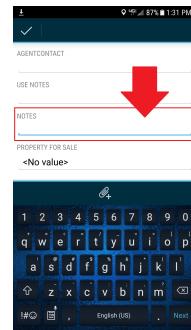


Figure 4.40: Property Contaminated

**Device 1 Field Operation Cont.**  
Enter notes up to 120 characters

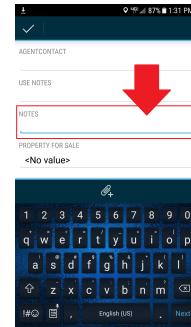


Figure 4.41: Notes up to 120 characters

Adjacent Property Contaminated prefilled

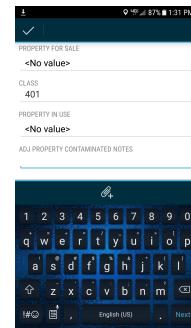


Figure 4.42: Adjacent Property Contaminated

Property Contaminated notes prefilled

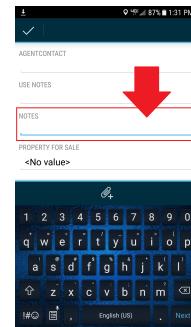


Figure 4.43: Property Contaminated

**Device 1 Field Operation Cont.**  
**Property Maintained Yes or No**

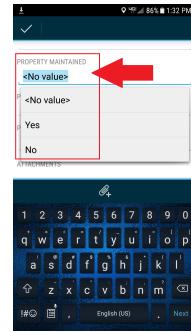


Figure 4.44: Property Maintained

**Picture Comments up to 120 characters**

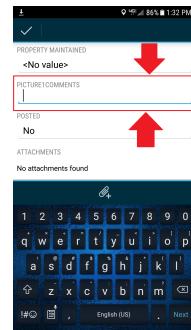


Figure 4.45: Picture Comments

**Placeholder**

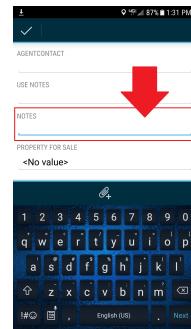


Figure 4.46: Placeholder

### Device 2 Field Operation

A photo or photos can be added from the Open Camera Application.

Select a parcel from the map



Push Attachment Button

---

Figure 4.47: Select Parcel

Select Gallery

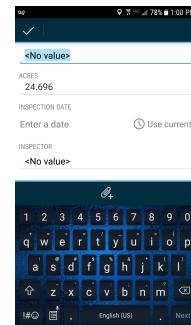


Figure 4.48: Push Attachment Button

---

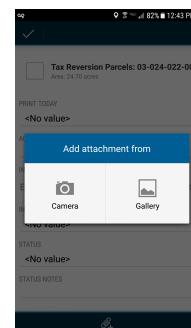


Figure 4.49: Add Attachment From Gallery

**Device 2 Field Operation Cont.**

Navigate to the Open Camera Folder

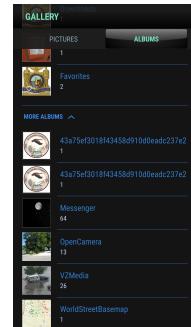


Figure 4.50: Open Camera Folder

---

From within the Open Camera Folder, Select the appropriate image

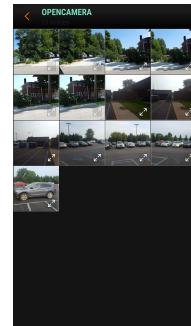


Figure 4.51: In the Open Camera Folder

---

Press the check button to save the image to the parcel

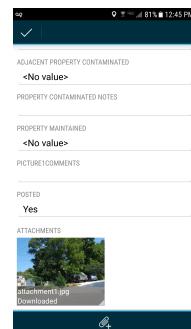


Figure 4.52: Image in the App

**Daily Postprocessing Routine** Back at the office

**Synchronize Webmap** In Collector for ArcGIS, push the sync button on the Forfeiture Field Map

**Execute Postprocessing Script** A tool in ArcGIS that:

- Reconciles geodatabase versions
- Generates forms for each site visited

**Software****ESRI Licensed Products**

**ArcDesktop** Users of this application need a license to ArcGIS Standard level.

**Enterprise ArcGIS Deployment** This app uses ArcGIS Server and ArcGIS Portal.

**Collector for ArcGIS** Developed and tested on Android(7.0). Collector is available at the Google Play Store.

**Other Software**

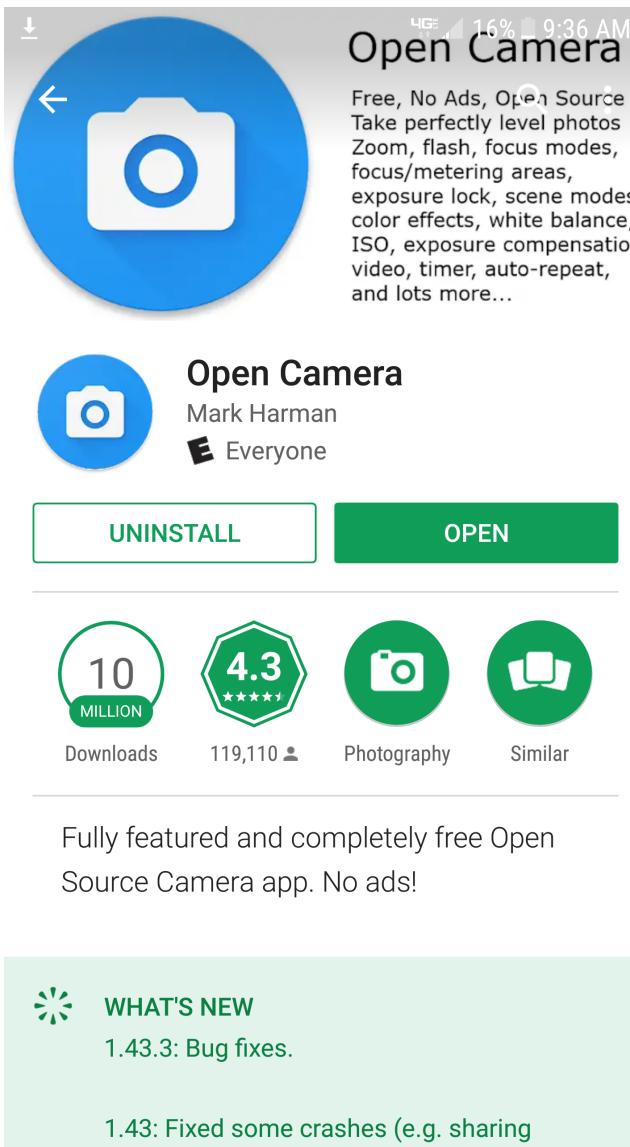


Figure 4.53: Open Camera from Google Play Store

# Chapter 5

## Tools

### 5.1 Core Data

#### 5.1.1 Control Points

Maintaining Cadastral Control Points

Steps

```
Identify position of new control point
Place Target Point
Update Target Point attributes to associated fabric point OID
Push move point button
Zoom to Control point
Open maintain control point tool
Select control Point
edit button
copy x and y value from
identify tool x and y of points
update button
```

## **5.2 ESRI Tools**

### **5.2.1 COGO Tools in ArcGIS**

TEXT

## 5.3 GIS Administration

### 5.3.1 New Connections in ArcCatalog

#### Connect ArcGIS to a SQL Server Database

In Catalog:

Double click on add database connection

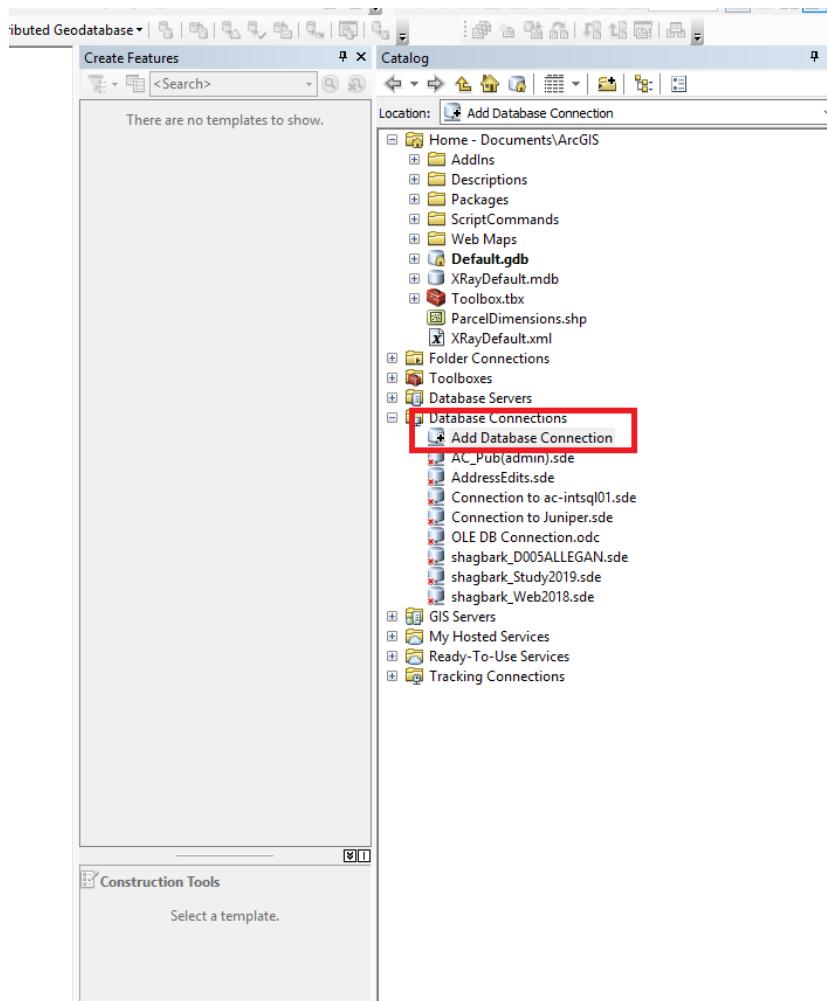


Figure 5.1: Catalog Add Db Connection

## New Connection Dialog

Enter into the tool

- Select Database Platform
- Enter Instance Name
- Enter user name and password
- Check Save user name and password
- Select Database in dropdown

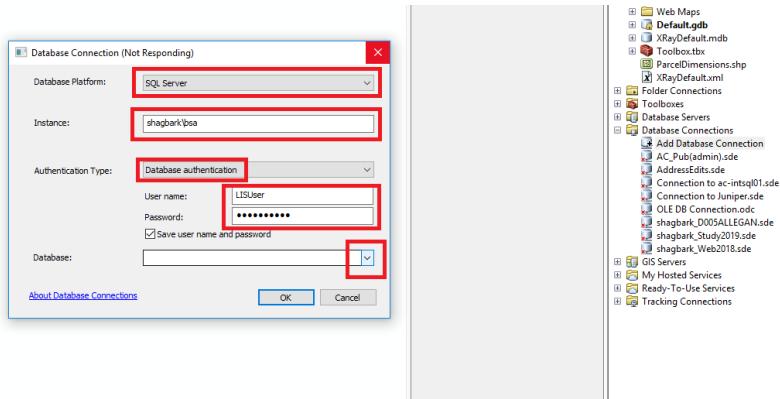


Figure 5.2: Catalog Add Database Connection

### 5.3.2 Create Query in ArcGIS to SQL Database

#### Add Query Layer

##### In ArcMap:

Open the New Query Layer Dialog

Go to ⇒ File ⇒ Add Data ⇒ Add Query Layer In the connection dropdown select your connection

##### NOTE

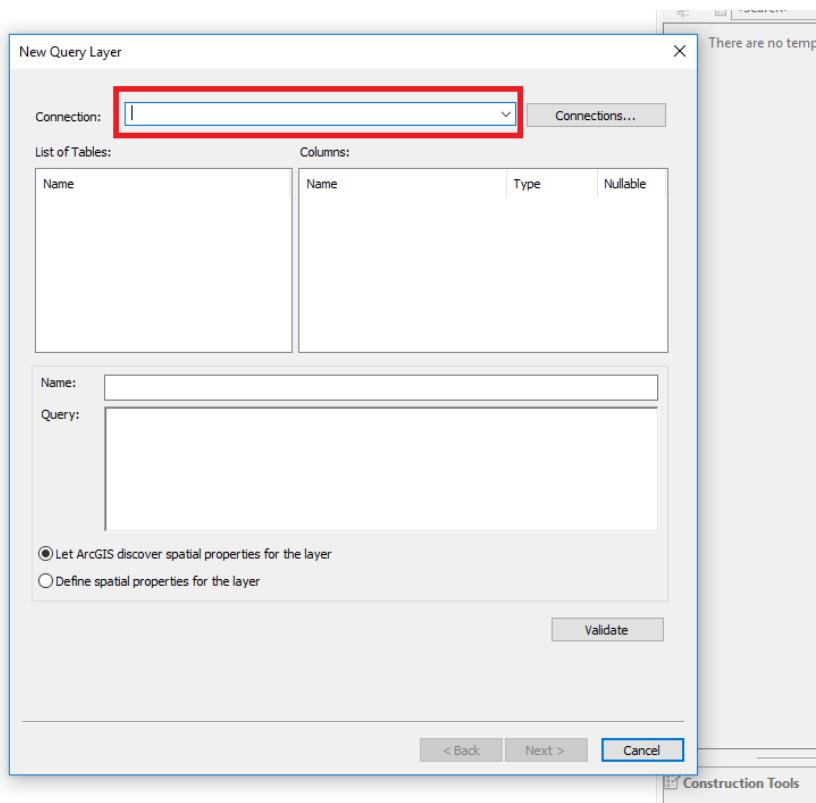


Figure 5.3: New Query Layer Dialog

## Details of the Query Layer

### Enter into the tool

- Choose connection
- Name the query
- Enter SQL query
- Press Next

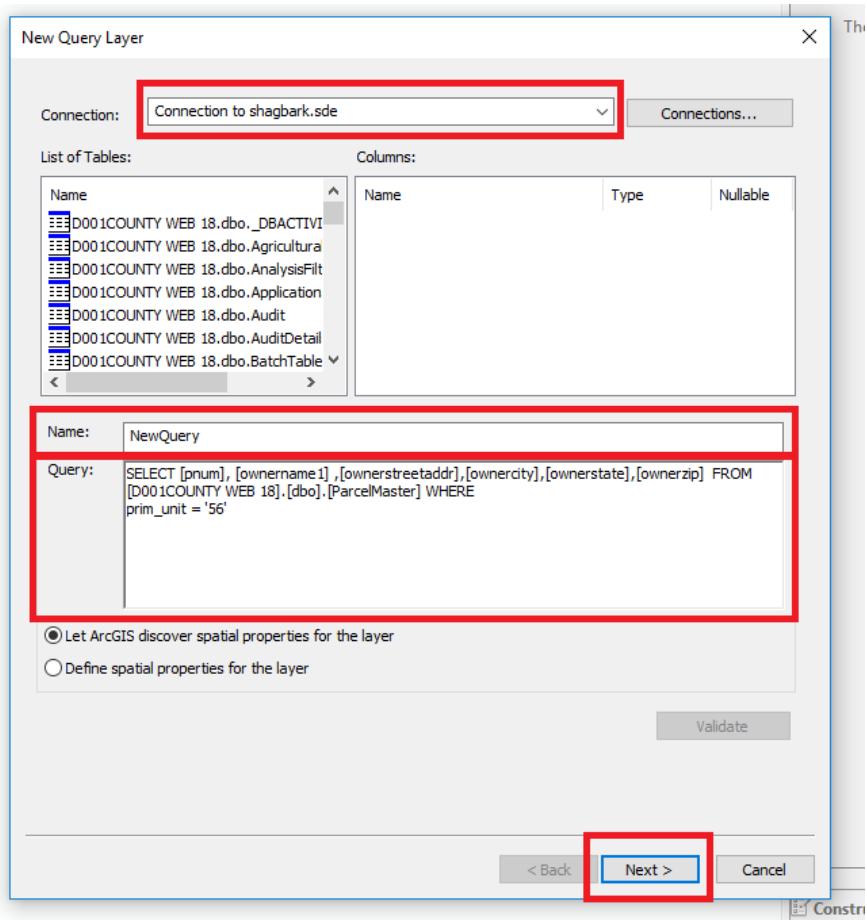


Figure 5.4: Query Layer Dialog Filled

## More Details of the Query Layer

Enter into the tool

- Select unique identifier field
- Click Finish

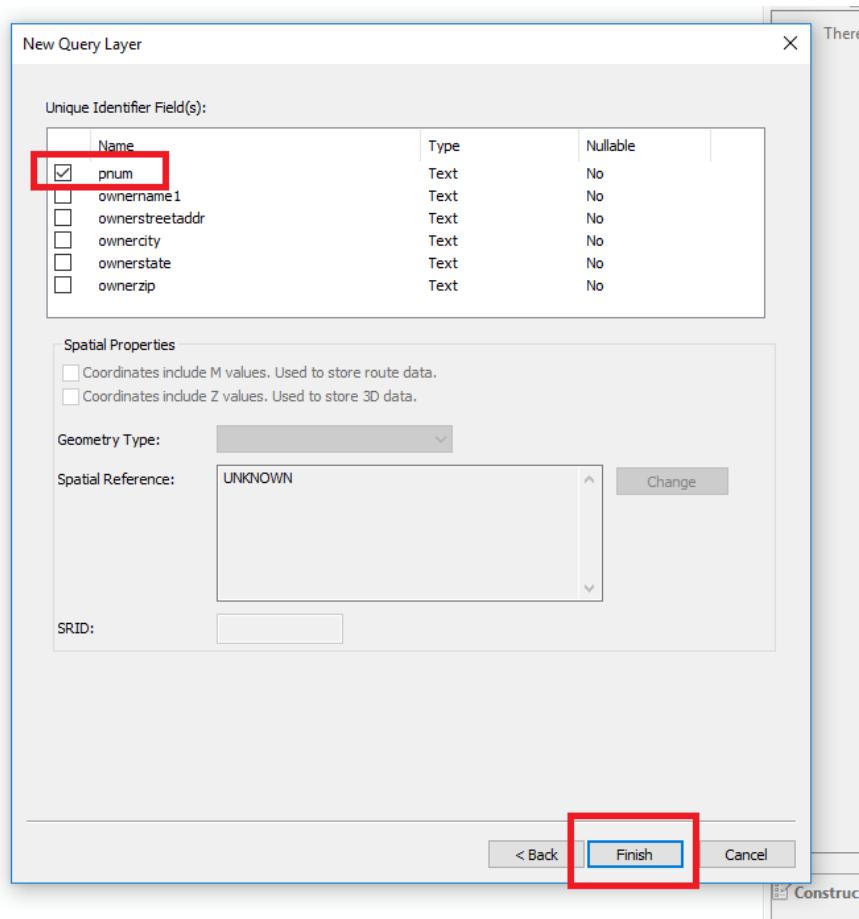


Figure 5.5: Select Unique Identifier

## Open Results Table

The screenshot shows the ArcGIS Pro interface with the 'D001COUNTY WEB 18.DBO.NewQuery' table selected in the Table Of Contents pane. The table has 1666 rows and 9 columns: ID, ownername1, ownerstreetaddr, ownercity, ownerstate, ownerzip, and ESRI\_OID. The data includes various property records such as 'WAGNER LORNA & ERIC', 'GUNN LAKE COMMUNITY CHURCH', and 'CITY OF WAYLAND'. The 'ownername1' column contains names like 'BREWER SUZANNE M', 'DUBAY DOUGLAS & JULIE', and 'LATHROD THEODORE W & JUDITH'. The 'ownerstreetaddr' column includes addresses like '7521 13TH AVE', '1220 WEST M-179', and '103 S MAIN ST'. The 'ownercity' column shows cities like 'WAYLAND', 'SEATTLE', and 'WAYLAND'. The 'ownerstate' column shows states like 'MI', 'WA', and 'MI'. The 'ownerzip' column shows zip codes like '49348', '98109', and '49348'. The 'ESRI\_OID' column shows unique identifiers like '1', '2', and '3'. The bottom status bar indicates '(0 out of 1666 Selected)'.

ID	ownername1	ownerstreetaddr	ownercity	ownerstate	ownerzip	ESRI_OID
56-004-001-00	WAGNER LORNA & ERIC	7521 13TH AVE	WAYLAND	MI	49348	1
56-004-001-10	GUNN LAKE COMMUNITY CHURCH	1220 WEST M-179	WAYLAND	MI	49348	2
56-004-002-00	WAYLAND UNION SCHOOLS	850 E SUPERIOR ST	WAYLAND	MI	49348	3
56-004-003-00	CITY OF WAYLAND	103 S MAIN ST	WAYLAND	MI	49348	4
56-005-001-00	CITY OF WAYLAND	103 S MAIN ST	WAYLAND	MI	49348	5
56-005-002-00	GRAND RAPIDS LAND LLC	104 S MICHIGAN DR	LOVELAND	OH	45131	6
56-005-002-10	ELLIOTT BAY HEALTHCARE REALTY II	617 EASTLAKE AVE E	SEATTLE	WA	98109	7
56-005-002-20	CITY OF WAYLAND	103 S MAIN ST	WAYLAND	MI	49348	8
56-005-002-30	RPAIRIAN PROPERTIES LLC	879 E SUPERIOR ST	WAYLAND	MI	49348	9
56-005-002-40	RPAIRIAN PROPERTIES LLC	879 E SUPERIOR ST STE A	WAYLAND	MI	49348	10
56-005-002-50	CITY OF WAYLAND	235 S MAIN ST	WAYLAND	MI	49348	11
56-005-003-00	CITY OF WAYLAND	103 S MAIN ST	WAYLAND	MI	49348	12
56-005-004-00	LATHROD THEODORE W & JUDITH	845 E SUPERIOR ST	WAYLAND	MI	49348	13
56-005-005-00	BREWER SUZANNE M	843 E SUPERIOR ST	WAYLAND	MI	49348	14
56-005-006-00	DUBAY DOUGLAS & JULIE & MELISSA K	841 E SUPERIOR ST	WAYLAND	MI	49348	15
56-005-006-10	ADY DOUGLAS & JULIE	104 MARLO LN	WAYLAND	MI	49348	16
56-005-006-20	DUBAY DOUGLAS	102 MARLO LN	WAYLAND	MI	49348	17
56-005-007-00	CONNOR MOLLY	815 EAST SUPERIOR	WAYLAND	MI	49348	18
56-005-007-10	BENNETT JILL & CARRON BIANCA	2514 BRIDGEPORT LN	GRAND RAPIDS	MI	49508	19
56-005-008-00	VELVET DUSTY & RANDI	107 MARLO LN	WAYLAND	MI	49348	20
56-005-008-10	LEIBSEN KRISTEN S	103 MARLO LN	WAYLAND	MI	49348	21
56-005-008-20	WAYLAND CHRISTIAN REF CHURCH	303 E ELM STREET	WAYLAND	MI	49348	22
56-005-009-00	CITY OF WAYLAND	103 S MAIN ST	WAYLAND	MI	49348	23
56-005-010-00	FINANCIAL & HEALTHCARE PROPERTY LTD	8181 WORTHINGTON ROAD	WEIRTON	WV	43082	24
56-005-010-10	CITY OF WAYLAND	103 S MAIN ST	WAYLAND	MI	49348	25
56-005-011-00	FERGUSON ROBERT K	5770 VENTURE PARK	KALAMAZOO	MI	49009	26
56-005-012-00	REDSTONE LAND DEVELOPMENT LLC	3330 GRAND RIDGE DR NE	GRAND RAPIDS	MI	49525	27
56-005-012-10	VANDEVERORD JOHN C & NANCY L	542 FOREST ST	WAYLAND	MI	49348	28
56-005-012-20	LAND II LLC	2645 24TH AVE	HUDSONVILLE	MI	49428	29
56-005-013-00	GRANT CO	137 12TH AVE	SHELBURNE	MI	49344	30
56-005-014-00	OPPERMAN JOHN C	125 OAK ST	WAYLAND	MI	49348	31
56-005-015-00	REDSTONE LAND DEVELOPMENT LLC	3330 GRAND RIDGE DR NE	GRAND RAPIDS	MI	49525	32
56-005-016-00	WALKER MICHAEL	131 OAK ST	WAYLAND	MI	49348	33
56-005-017-00	GRANT CO & MCGEELEN	177 12TH AVE	WAYLAND	MI	49348	34
56-005-018-00	GUTTERFIZZ JR & O'DOWD CHRISTINA	118 OAK ST	WAYLAND	MI	49348	35
56-005-019-00	MICHIGAN STATE POLICE #56	544 N MAIN ST	WAYLAND	MI	49348	36
56-005-020-00	WILLIAMS TERESA A	540 N MAIN ST	WAYLAND	MI	49348	37
56-005-021-00	KEME HOLDINGS LLC	304 108TH ST	CALEDONIA	MI	49316	38
56-005-022-00	SLOAN JOHN L & AMY L	329 WILLOW RUN DR	WAYLAND	MI	49348	39

Figure 5.6: Query Results Table

Verify the Query by Looking at the Table

### 5.3.3 Enterprise Geodatabase Maintenance

#### Enterprise Geodatabase Compression Routine

**Disconnect All Users** Stop the GIS Server to disconnect it. Note

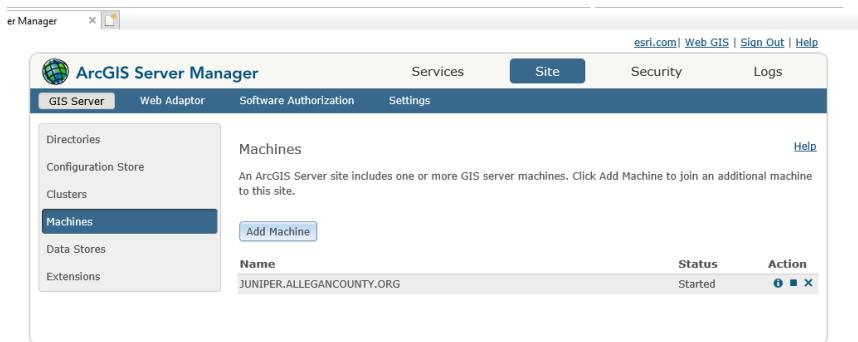


Figure 5.7: Stop ArcGIS Server

### Note Note

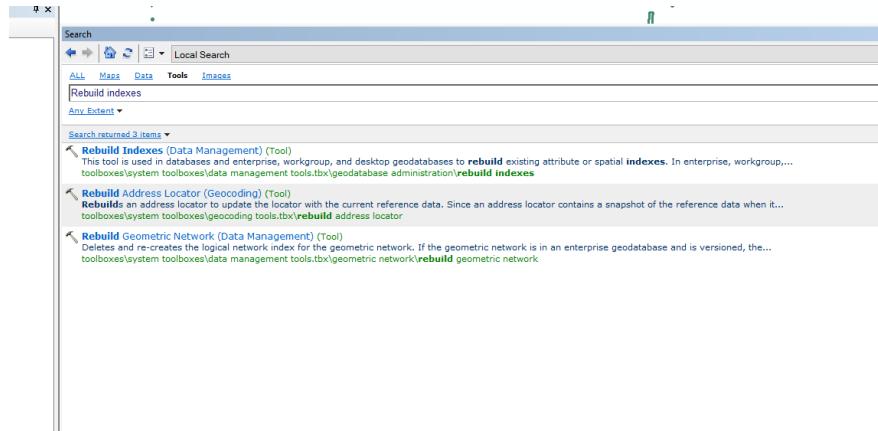


Figure 5.8: Find Rebuild Indexes Tool

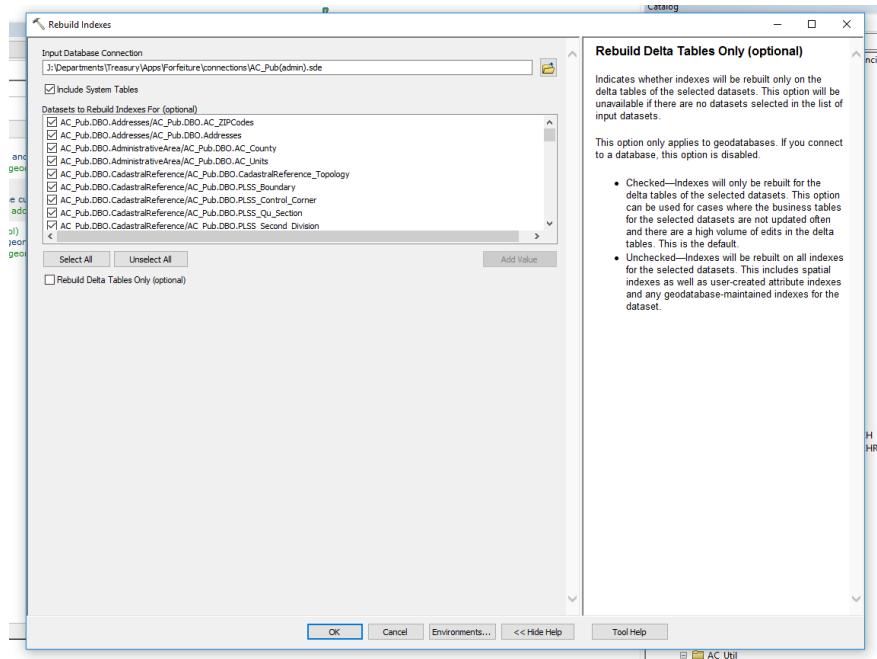
**Rebuild Indexes** Execute the geoprocessing tool Note

Figure 5.9: Rebuild Indexes Tool Operation

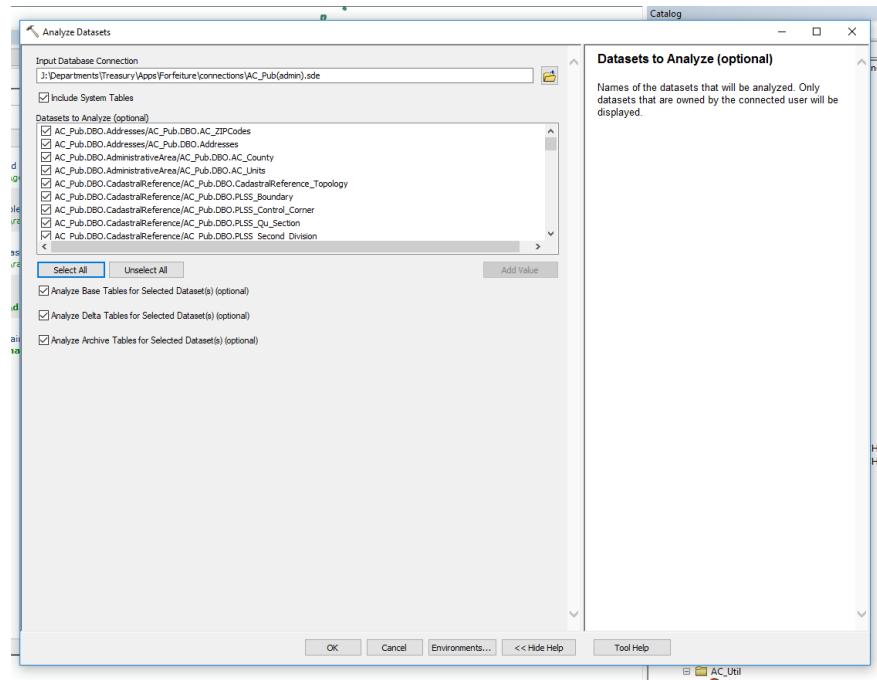
**Recalculate Statistics Note Note**

Figure 5.10: Recalculate Statistics

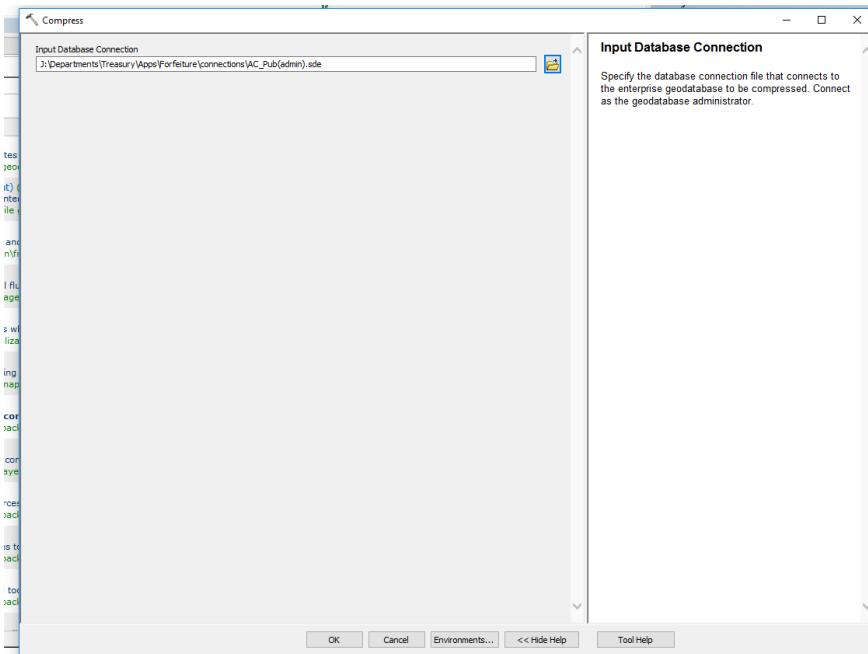


Figure 5.11: Compress

**Compress Note**

### Rebuild Indexes Execute the geoprocessing tool Note

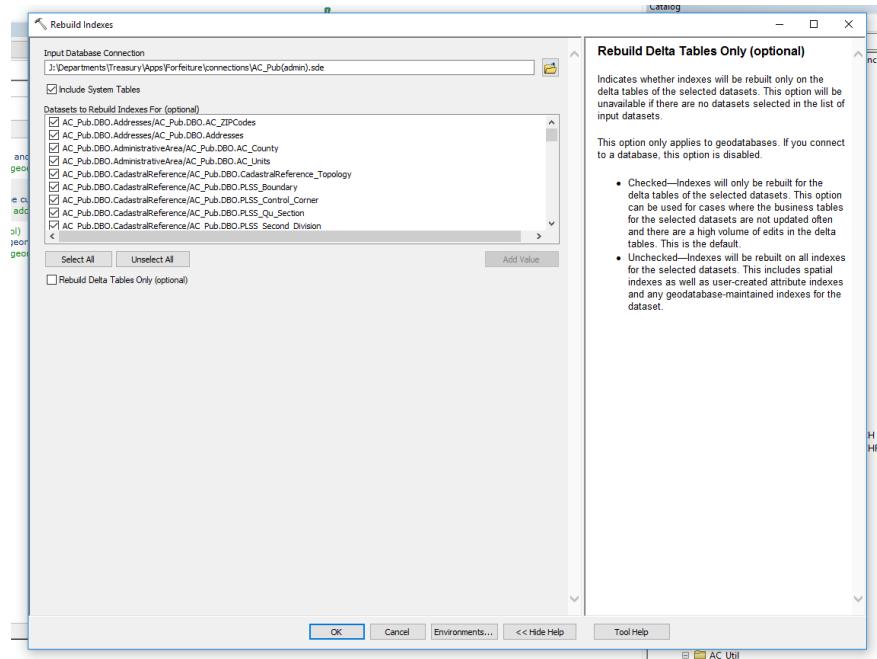


Figure 5.12: Rebuild Indexes Tool Operation

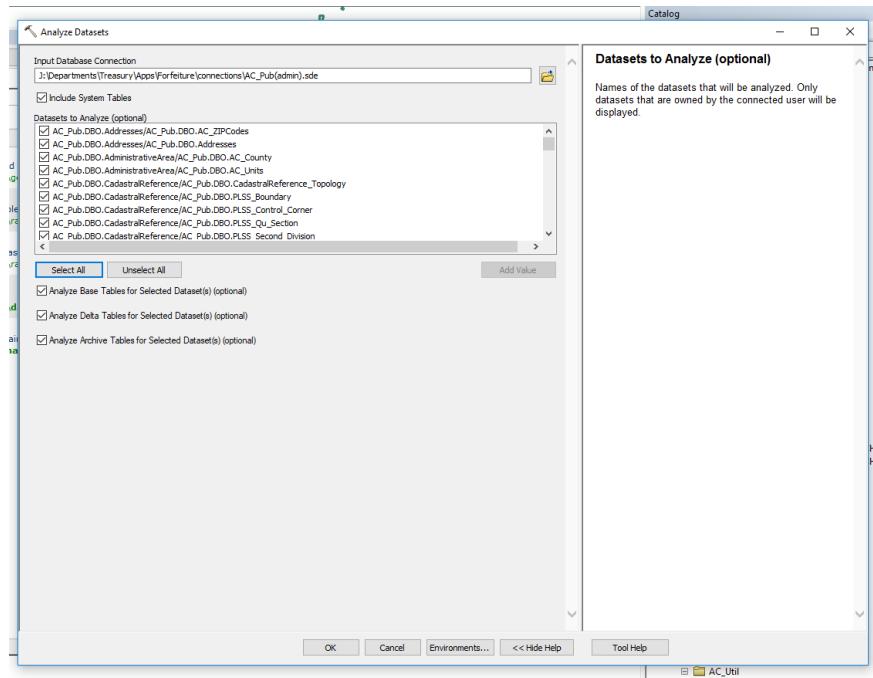
**Recalculate Statistics Note Note**

Figure 5.13: Recalculate Statistics

### 5.3.4 Managing Map Services

#### To stop ArcGIS Server

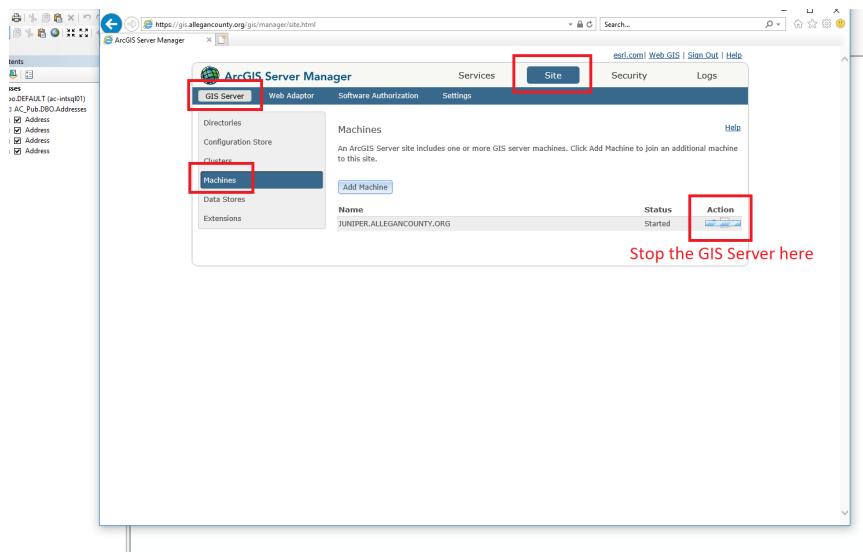


Figure 5.14: Stop the GIS Server

**Launch ArcGIS Server Manager**

## Fixing Damaged Services

### Removing Lock Files

A blog about it <https://community.esri.com/thread/103710>

```
on juniper
C:\arcgisserver\config-store\services\ParcelViewer2\
PV2Adresses.MapServer\startup\JUNIPER.ALLEGANCOUNTY.ORG
```

This method works.

Steps:

- 1)stop arcgis server services.
- 2)delete the lock files(\*.glock and \*.rlock ) in arcgisserver\config-store.
- 3) restart arcgis server service.

4)stop the pending stopping service and then start it.

### 5.3.5 Managing Geodatabase Replicas

#### Adding A New Feature Class To A Replica

Source: <https://support.esri.com/en/technical-article/000010345>

##### Summary

Currently, there is no out-of-the-box tool to add a feature class to an existing replica. With ArcGIS Desktop, one must either recreate the replica or if the workflow allows, replicate the new feature class as a separate replica.

A feature class or table can only be added to an existing replica (without recreating the replica) using ArcObjects code.

##### Steps:

The steps below outline how to recreate the replica using the Register Existing Data option in Desktop. These steps can be applied to both one-way and two-way replicas.

Synchronize the changes between parent and child replica geodatabases using the existing replica so that the data is identical in each database, then Unregister the replica in both geodatabases. For two-way replicas, ensure that changes are synchronized in both directions and there are no outstanding edits before unregistering the replica. Create/import the new feature class into the parent geodatabase, and add the GlobalID. Register the newly added data as versioned. Copy and paste the new feature class to the child geodatabase using ArcCatalog. Note: that the GlobalIDs must have already been added to the feature class.

For two-way replica or one-way full model, register the newly added data in child geodatabase as versioned. Using the parent geodatabase, add all the data that is to be replicated to a map in ArcMap. Click the 'Create Replica' tool on the Distributed Geodatabase toolbar. Select 'One way replica' or 'Two way replica' and click Next. Select 'Register existing data only'. Select the child geodatabase and specify a replica name. Click Next and click Finish. A new replica is created that includes the new data.

### 5.3.6 Managing Geodatabase Versions

## Version Queries

### SQL Queries

Four queries of SDEversions, SDEstates, sdestatelineages, and SDEcompress-log

```
use AC_Pub
select name, owner, version_id, state_id, parent_name
, parent_owner from
[AC_Pub].[dbo].[SDE_versions]
select * from [AC_Pub].[dbo].[SDE_states] order by state_id
select * from [AC_Pub].[dbo].[sde_state_lineages] order
by lineage_name,
lineage_id
select TOP(5) * from [AC_Pub].[dbo].[SDE_compress_log] order by
compress_end DESC
```

Query of SDEversions and SDEstates

```
use AC_Pub
SELECT v.version_id,v.creation_time,v.creation_time,
s.state_id, s.creation_time
FROM SDE_versions v
INNER JOIN SDE_states s ON v.state_id = s.state_id
```

## Finding Orphaned Versions

### ID and delete orphaned geodatabase versions

Follow the procedure: [Link to source](#)

Use SQL Server Management Studio to execute two queries and compare the results.

#### Step 1:

Execute the query:

```
use AC_Pub
SELECT ObjectID, name from dbo.GDB_ITEMS where
TYPE='4ED4A58E-621F-4043-95ED-850FBA45FCBC';
```

#### Step 2:

Execute the query:

```
use AC_Pub
SELECT name from [dbo].[SDE_versions]
order by name
```

Compare the tables

This graphic summarizes elements of the queries. Note the items from step

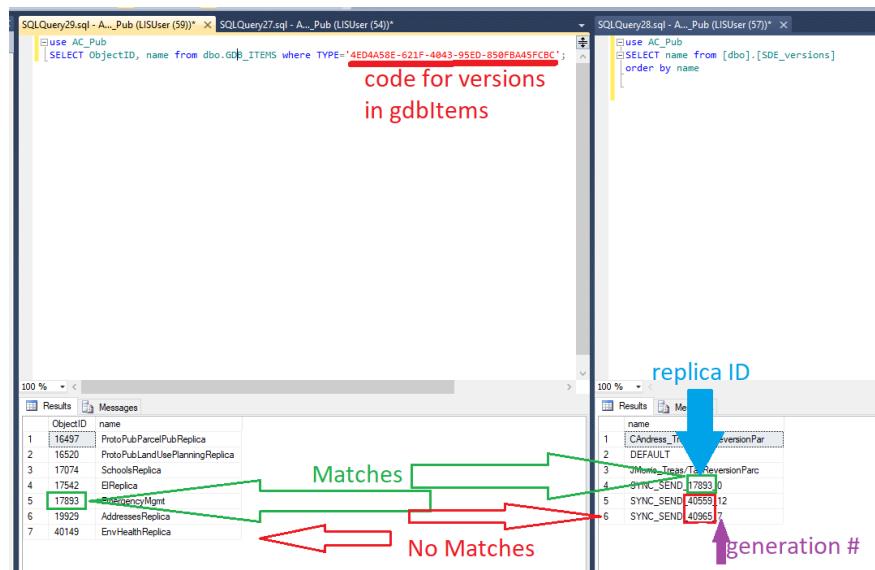


Figure 5.15: Find Orphan Versions

two that have no match in step one.

Orphaned versions can be removed by name in ArcGIS

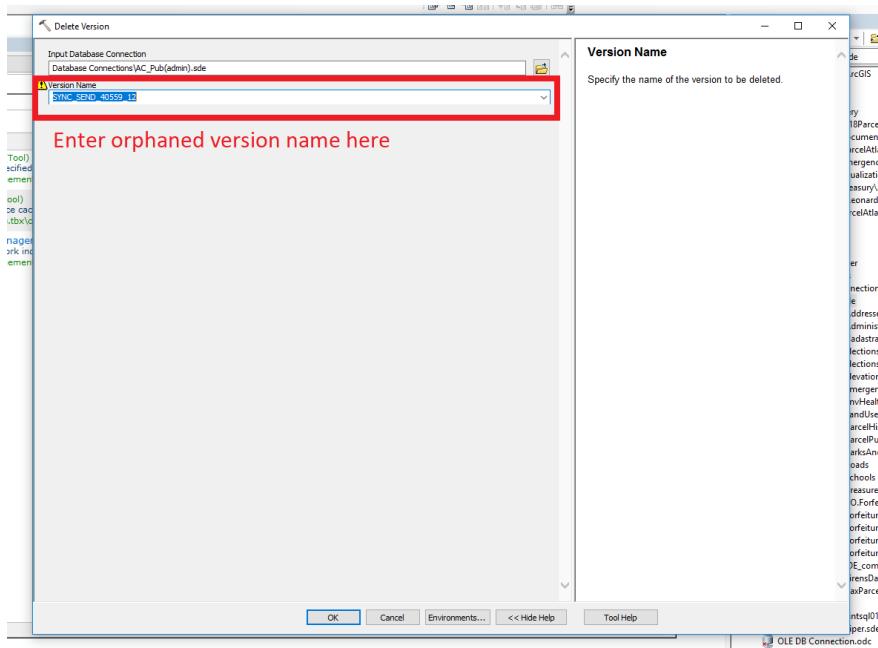


Figure 5.16: Delete Orphan Versions

### 5.3.7 MXD Management

#### Find/Replace Text Object

##### Python Code

Python Code for finding and replacing a text object in a ArcGIS .mxd file. A snippet of this code may be found in the LayerUpdates/Zoning/processing folder. It is used to edit the .mxd files located there.

```
import arcpy
from arcpy import env

env.workspace = r"J:\Apps\Python\LayerUpdates\zoning\processing"
for mxdname in arcpy.ListFiles("*.mxd"):
    print mxdname
    mxd = arcpy.mapping.MapDocument(r"J:\Apps\Python\LayerUpdates\zoning\processing\\"
        for elm in arcpy.mapping.ListLayoutElements(mxd, "TEXT_ELEMENT"):
            if elm.text.startswith('As ammended'):
                elm.text = elm.text.replace('As ammended', 'As amended')
                print elm.text
    mxd.save()
del mxd
```

## 5.4 L<sup>A</sup>T<sub>E</sub>X Packages used by AC GIS

Source:

<https://www.ocf.berkeley.edu/~latex/files/commonerrors.tex>

# Chapter 6

## Common Errors

If you have every compiled a L<sup>A</sup>T<sub>E</sub>X document, chances are high you have received a few error messages. Sometimes they come from something as stupid and as easy to fix as forgetting a parenthesis or forgetting to end an environment. There are also a lot more cases where you have no idea what you have done wrong and it takes you a long time to find or even understand your error.

The purpose of this is to explain some of the common errors that may happen when compiling a L<sup>A</sup>T<sub>E</sub>X document and suggestions for what is probably going on and how to debug your document.

### 6.1 The Form of an Error

There are two forms of errors: L<sup>A</sup>T<sub>E</sub>X errors and T<sub>E</sub>X errors. In both types of errors, the part after the error message will tell you where the error occurred. An example:

```
1.15 <offending text>
```

The 1.15 tells you what line the error occurred on and the text will tell you the text that caused the error.

#### 6.1.1 L<sup>A</sup>T<sub>E</sub>X Errors

The general form of an error in L<sup>A</sup>T<sub>E</sub>X is shown below:

```
! LaTeX error: <error message>
```

```
See the LaTeX manual or LaTeX Companion for  
explanation.
```

```
Type H <return> for immediate help.
```

```
...
```

The ! lets you know that the error has occurred. The error message will tell you what type of error you have committed. After the ellipses, you will find the line at which the error occurred and the text that caused the error (or at least the text where L<sup>A</sup>T<sub>E</sub>X found the error).

### 6.1.2 T<sub>E</sub>X Errors

Errors may also have the following form:

```
! <error message>
```

These errors are formatted differently because they are error messages that came from T<sub>E</sub>X instead of L<sup>A</sup>T<sub>E</sub>X. After the error, you will still find the line that the error occurred in and the text of the error.

## 6.2 Warnings

There are some error messages that are just warnings and will not stop or change the compilation of the document. Chances are you have seen them many times.

### 6.2.1 Underfull

The following error results when a line does not extend the width of the page, something L<sup>A</sup>T<sub>E</sub>X always tries to accomplish:

```
Underfull \hbox (badness 10000) in paragraph at lines
104--107
```

This error message is just a warning and is not something to worry about. For the most part, when a line does not span the width of the page, it is because you have written something that you want to only cover part of the page.

### 6.2.2 Overfull

The following error results when a line extends beyond the width of the page:

```
Overfull \hbox (16.04988pt too wide) in paragraph at
lines 30--31 [] [] \OT1/cmtt/m/n/12 I'm trying to put
way too much text into a line in my document.
```

Usually this error comes from when you are using the `verbatim` package because it will not move to the next line if your text does not go to the next line. The easiest way to fix this is to find the place in your document where this is occurring and change the text so that it fits to the page.

This error will still show up if the text is still on the page but outside of the width of text that L<sup>A</sup>T<sub>E</sub>X has set. In this case, you are welcome to fix things so that the error does not show up or you can leave the text as it is.

### 6.2.3 References

The following warnings occur when references are changed when L<sup>A</sup>T<sub>E</sub>X was compiled:

```
LaTeX Warning: Label(s) may have changed. Rerun to get
cross-references right.
```

```
LaTeX Warning: There were undefined references.
```

```
LaTeX Warning: Reference ‘name’ on page 1 undefined on
input line 15.
```

The way to fix these errors is to recompile the document again to correct the page numbers. Sometimes it is necessary to recompile the document twice to fix this error. You also may have defined a reference wrong, so you should check to make sure your label is correct.

## 6.3 Beginning and Ending

### 6.3.1 Begin Ended by End

This type of error occurs when each environment is not correctly started and ended. When you are missing an `\end` command, the following error will show up:

```
! LaTeX Error: \begin{enumerate} on input line 23
ended by \end{document}.
```

To fix this, you need to end the environment mentioned in the error with the appropriate command.

When you are missing a `\begin` command, the following will appear:

```
! LaTeX Error: \begin{document} ended by
\end{itemize}.
```

To fix this, you basically do the same thing as before, correctly beginning the environment mentioned in the error with the appropriate command.

### 6.3.2 End Occurred Inside a Group

The following error message will show up at the end of compiling a file if an environment is begun that is not ended:

```
(\end occurred inside a group at level <n>)
```

To fix this error, make sure you end the environment that was begun. The previous error is more helpful in finding the `\begin` statement.

### 6.3.3 Ended by End of Line

The following error will occur when you try to place a command inside a section heading:

```
! LaTeX Error: \verb ended by end of line.
```

See the LaTeX manual or LaTeX Companion for explanation.

Type H <return> for immediate help.

...

There will be many errors of the same type for this mistake. In order to find where you put the command, look in the output file and find the last heading that shows up.

### 6.3.4 Missing Begin Document

This error is self-explanatory:

```
! LaTeX Error: Missing \begin{document}
```

## 6.4 Errors Usually Caused by Bad Spelling

### 6.4.1 Unknown Control Sequence

This error results when you use a command (something that starts with a \) that is not recognized by L<sup>A</sup>T<sub>E</sub>X:

```
! Undefined control sequence.
```

Usually this error results from spelling a command incorrectly. Go to the line that is indicated by the error and fix the command.

### 6.4.2 Environment Undefined

This error results when you begin an environment with a \begin command that is not recognized:

```
! LaTeX Error: Environment verbatim undefined.
```

Usually you have just spelled your environment incorrectly, so you just need to fix it.

### 6.4.3 Bad File Name

This error results when you have mistyped the command `latex` or do not have L<sup>A</sup>T<sub>E</sub>X installed on your computer:

**Bad command or file name**

To fix this, correctly spell the command to compile your file or make sure that L<sup>A</sup>T<sub>E</sub>X is correctly installed on your computer.

#### 6.4.4 Cannot Find File Name

This error occurs when you try to compile a file that the computer cannot find:

```
! I can't find file 'sample'.
<*> sample
```

Please type another input file name:

To fix this error, make sure you have spelled the file name correctly. You also may be in the wrong directory to compile the file, so check to make sure you are in the same directory as your file.

### 6.5 Fatal Errors

#### 6.5.1 Runaway Argument

This error happens when a paragraph ends before a command's argument is done (i.e., L<sup>A</sup>T<sub>E</sub>X thinks that there is a missing }):

Runaway argument?

To fix this, you should use a different command to accomplish what you are trying to do. An example of this is to use `\bfseries` instead of `\bfseries` to make bold text in more than one paragraph.

This error can also be caused by a missing mandatory argument to a command.

#### 6.5.2 Just an \*

This error normally occurs when you do not end your document with `\end{document}`:

\*

If you are prompted to enter something in, it is best to enter

`\end{document}`

and hope it works. Be sure to end your document with the appropriate command.

### 6.5.3 Emergency Stop

This error happens when L<sup>A</sup>T<sub>E</sub>X will stop trying to compile your document due to a serious error:

```
! Emergency stop.
```

To fix this error, you will need to figure out what caused it to stop compiling. Chances are you forgot to end your document with `\end{document}`, but there might also be another reason for the emergency stop.

### 6.5.4 Please Type a Command or Say End

This error happens when your file has ended prematurely:

```
(Please type a command or say '\end')
```

The best way to deal with this type of error is to type

```
\end
```

or

```
\end{document}
```

in the case that the absence of that command caused the error. Usually if you have ended your document correctly, the error will result from a missing } or forgetting to end a verbatim environment.

## 6.6 Graphics Errors

### 6.6.1 Too Many Unprocessed Floats

This error occurs when figures or tables (i.e., floats) have not been typeset:

```
! LaTeX Error: Too many unprocessed floats.
```

L<sup>A</sup>T<sub>E</sub>X can only have so many floats waiting to be typeset. In order to fix this error, make sure that you are placing your floats where you want them (with a [h] option) and not wanting too many on one page in sequence. Using the command `\clearpage` can be very useful in distributing floats correctly.

### 6.6.2 Unknown Graphics Extension

The following error occurs when you try to use a type of graphic that is not supported by the type of file that you are producing:

```
! LaTeX Error: Unknown graphics extension: .gif
```

In order to fix this error, you should change your graphics to the types that are supported by the type of file you are outputting or you will need to include the correct package to deal with that type of graphic. Sometimes you may have named the graphic poorly so that L<sup>A</sup>T<sub>E</sub>X will not recognize it as a graphic file.

### 6.6.3 Division by Zero

The following error occurs when the height of a graphic object is zero:

```
! Package graphics Error: Division by 0.
```

This is usually caused when you rotate an object with zero depth so that its height becomes zero. The best way to fix this is to use the keyword `totalheight` instead of `height`.

## 6.7 Math Errors

### 6.7.1 Display Math Should End With \$\$

This error occurs when the displaymath or equation mode is ended incorrectly:

```
! Display math should end with $$
```

To fix this error, make sure that you end the displaymath or equation mode correctly (ending them with a \$ is not acceptable).

### 6.7.2 Bad Math Environment Delimiter

This error occurs when you do not have your delimiters correct in math mode:

```
! LaTeX Error: Bad math environment delimiter.
```

Usually this occurs when you forget to match a right delimiter with every left delimiter. This error may also happen when you forget to end an array.

### 6.7.3 Missing Right

This error occurs when you have a missing right parenthesis:

```
! Extra \right.
```

To fix this, you either need to add a `\right` command or you need to end an array.

### 6.7.4 Missing Delimiter

This error message occurs when a delimiter is missing:

```
! Missing delimiter (. inserted).
```

To fix this error, you need to make sure that you have a right delimiter for every left delimiter. If you do not want a right delimiter matching a left delimiter, you need to use “.” to not have an error message show up.

### 6.7.5 Missing \$ Inserted

The following error occurs when you try to use a character that can only be used in math mode, like \_ or ^:

```
! Missing $ inserted
```

To fix this error, make sure you change the character to what it should be in text mode.

## 6.8 Tabular Environment Errors

### 6.8.1 Misplaced Alignment Tab Character &

This error occurs when you use & and when you are not in a tabular environment:

```
Misplaced alignment tab character &
```

To fix this error, you need to use \& to make a &.

### 6.8.2 Extra Alignment Tab

This error occurs when you use too many tabs for the number of columns in a table:

```
! Extra alignment tab has been changed to \cr
```

The result of this error is that a new row is formed where the extra tab was. You should go back and fix your table so that the correct number of items in each row would show up.

### 6.8.3 Argument Has an Extra }

These errors happen when an incorrect number of arguments to a tabular environment have been specified:

```
! Argument of \cline has an extra }.
```

```
! Argument of \multicolumn has an extra }.
```

To fix this error, make sure your arguments to the tabular environment are correct.

## 6.9 Errors With Lists

### 6.9.1 Missing Item

This error occurs when there is plain text in an environment that takes items:

```
! LaTeX Error: Something's wrong--perhaps a missing
\item.
```

To fix this error, make sure the plain text is changed into an item.

### 6.9.2 Too Deeply Nested

This error occurs when there are too many lists for L<sup>A</sup>T<sub>E</sub>X to handle:

**! LaTeX Error: Too deeply nested**

L<sup>A</sup>T<sub>E</sub>X can only handle four levels of one type of list and six levels of different types of lists. To fix this, you need to use less levels of lists or define your own list environment.

## 6.10 Miscellaneous Errors

### 6.10.1 Only Used in the Preamble

This error occurs when you place a command in the body of a L<sup>A</sup>T<sub>E</sub>X document that should be placed in the preamble:

**! LaTeX Error: Can be used only in the preamble.**

To fix this error, just move the command to the preamble.

### 6.10.2 There Is No Line/Page Here to End

This error occurs when you incorrectly use the commands that make a new line or a new page:

**! LaTeX Error: There's a no line here to end.**

You may just leave the command that is making a new line in place or you can take it out. Here, L<sup>A</sup>T<sub>E</sub>X is just trying to make sure that everything looks nice.

### 6.10.3 Command Already Defined

This error occurs when you try to define a command that already exists:

**! LaTeX Error: Command ... already defined.**

To fix this, you need to define your command differently.

### 6.10.4 Missing Number

This error is made when a number is expected as an argument and one is not provided:

**! Missing number, treated as zero.**

To fix this error, you need to find where a number is expected so that you can provide the correct one.

### 6.10.5 float Package

#### usepackage

text

#### Simple Use

text

#### Options

text

Add optional arguments to the usepackage line:

Useful options:

- **OPTION NAME**  
OPTION NOTE
- **OPTION NAME**  
OPTION NOTE

#### Use with options

text

#### Commands

### 6.10.6 Graphics Examples and Notes

## CurlyFrame Example

```
\documentclass[landscape]{article}
\usepackage{wallpaper}
\usepackage{niceframe}
\usepackage{xcolor}
\usepackage{ulem}
\usepackage{graphicx}
\usepackage{geometry}
\geometry{tmargin=.75cm,bmargin=.25cm,lmargin=.8cm,rmargin=.2cm}
\usepackage{multicol}

\begin{document}

\curlyframe[.9\columnwidth]{

TEXTTTTTTTTTTTTTTTT

}

\end{document}
```

## RectFrame Example

```
\documentclass[landscape]{article}
\usepackage{wallpaper}
\usepackage{niceframe}
\usepackage{xcolor}
\usepackage{ulem}
\usepackage{graphicx}
\usepackage{geometry}
\geometry{tmargin=.75cm,bmargin=.25cm,lmargin=.8cm,rmargin=.2cm}
\usepackage{multicol}

\begin{document}
\begin{minipage}{.33\textwidth}
\centering
\scalebox{3}{\color{green!30!black!60}
\font\border=umrandb
\generalframe
{\border \char113} % up left
{\border \char109} % up
{\border \char112} % up right

```

```
{\border \char108} % left
{\border \char110} % right
{\border \char114} % lower left
{\border \char111} % bottom
{\border \char115} % lower right
{\centering
\includegraphics[height=1.25cm]{GIS_Logo_better.jpg}}
\end{minipage}
%\vspace{-8mm}

\end{document}
```

### 6.10.7 graphicx Package

#### **usepackage**

text

#### **Simple Use**

text

#### **Options**

text

Add optional arguments to the usepackage line:

Useful options:

- **OPTION NAME**  
OPTION NOTE
- **OPTION NAME**  
OPTION NOTE

#### **Use with options**

text

#### **Commands**

### 6.10.8 hyperref Package

#### **Introduction**

Official hyperref package documentation

Notes:

- Add the *hyperref package* to the preamble **last** [2]
- To use Tex in a pdf bookmark: use

\texorpdfstring{\\"{}{}}

ie. \paragraph{Sample Text\texorpdfstring{\\"{}{}}}

Creates a new line without an error.

\usepackage[options]{hyperref}

## Simple Use

Use `\href{URL}{DESCRIPTION}` to add a link with description

`\href{https://www.latex-tutorial.com}{Website with tutorials}`  
produces:

[Website with tutorials](https://www.latex-tutorial.com)

## Options

Add optional arguments to the `usepackage` line:

Useful options:

- **pdftex**

enables other options like breaklines

- **breaklinks**

allow links to be broken across several lines

eg. <https://lists.gnu.org/archive/html/emacs-orgmode/2013-06/msg00776.html>

- **colorlinks**

Colors the text of links and anchors.(default is false)

- **linkcolor**

Color for normal internal links(default is red).

- **anchorcolor**

Color for anchor text.

- **citecolor**

Color for bibliographic citations in text.

- **urlcolor**

Color for linked URLs

## Use with options

```
\usepackage[breaklinks,colorlinks,citecolor=blue,
urlcolor=green]{hyperref}
```

## Commands

`\href{URL}{text}` Makes text a link to URL.

To put a file path in text:

eg:

[Official hyperref package documentation](#)

(documentation Pt.4 pg.15)

\href [options]{URL}{text}

Options:

- absolute

```
\href{C:/AC/jalapeno/documentation/packageDocs/hyperref2017.pdf}
    {Official hyperref doc}
```

- relative **Note: relative path must be from final pdf location**

```
\href{../../../../documentation/packageDocs/hyperref2017.pdf}
    {Official hyperref package doc}
```

\*This path works from main document

```
\href{../../../documentation/packageDocs/hyperref2017.pdf}
    {Official hyperref package documentation}
```

\*This path works from subsection document

\hyperref [label]{text}

Makes text a link to where \ref{label} would point.

\hypertarget{name}{text}

Sets an anchor on text with the label name.

\hyperlink{name}{text}

Makes text a link that takes you to the anchor labeled name.

\*Pair with \hypertarget.

\phantomsection

Used in conjunction with

\addcontentsline

to make the correct link in the Table of Contents.

### 6.10.9 import Package

#### usepackage

text

#### Simple Use

text

#### Options

text

Add optional arguments to the usepackage line:

Useful options:

- **OPTION NAME**  
OPTION NOTE
- **OPTION NAME**  
OPTION NOTE

#### Use with options

text

#### Commands

### 6.10.10 standalone Package

#### Introduction

[Link to official standalone documentation](#)

*standalone* provides a **package** and a **class**

- The *standalone package* is used for:

- Main documents that will input or import sub documents.
- For example:

```
\usepackage[subpreambles=false]{standalone}
```

\* Ignores preambles of imported sub documents [3, pg.4]

- the *standalone class*:

- Is a document class
- Provides standalone / subdocument switches and options
- For example:

```
\documentclass[class=article]{standalone}
```

\* behaves as an article when standalone

\* makes document available for import into a master document

#### Simple Use

- The *standalone package*

- In the main document:

```
\documentclass[openany]{book}
```

```
\preamble...
```

```
\usepackage{standalone}
```

- the *standalone class*:

- In any subdocument:

```
\documentclass[class=article]{standalone}
```

```
\preamble...
```

## Options

- The *standalone* package
  - **subpreamble**
    - \* default value of subpreambles is *false*
- the *standalone* class:
  - **crop**
  - **titlepage**
  - **twoside**
    - \* Makes pagination style match book
    - \* default value is *false*
  - **multi**
    - \* `multi=true|false`
    - \* `multi={<environment name>, ...}`
  - **float**

## Use with options

- the *standalone* package:
  - `\usepackage[subpreambles=false]{standalone}`
- the *standalone* class:
  - `\documentclass[class=article , crop=false, titlepage, twoside, multi={itemize, figure, verbatim}, float=false]{standalone}`

## Commands

### 6.10.11 **wrapfig** Package

#### **usepackage**

text

#### **Simple Use**

text

#### **Options**

text

Add optional arguments to the usepackage line:

Useful options:

- **OPTION NAME**  
OPTION NOTE
- **OPTION NAME**  
OPTION NOTE

#### **Use with options**

text

#### **Commands**

## 6.11 L<sup>A</sup>T<sub>E</sub>X Templates

### 6.11.1 L<sup>A</sup>T<sub>E</sub>X Section Template

```
%\documentclass[class=report , crop=false, multi={itemize, figure}, float=false]{standalone}%Exp
%\documentclass[class=book , crop=false]{standalone}

\input{../../../../../preamble}

\def\titlename{Section Template}

\title{\input{../../../../commonTitle}} % closing brace for title

\begin{document}% Document Begins

\input{../../../../commonFront} % provides standalone options

\section{SECTION NAME HERE}

\subimport{RELATIVE PATH TO NEW Section/}{NEW SUBSECTION Subsection.tex}

%eg.
%\subimport{latexTemplatesSection/}{subsectionTemplateSubsection.tex}
% etc...

\end{document}
```

### 6.11.2 L<sup>A</sup>T<sub>E</sub>X Subsection Template

```
\documentclass[class=book , crop=false]{standalone}

\input{../../../../../preamble}

\def\titlename{Subsection Template}

\title{\input{../../../../commonTitle}} % closing brace for title

\begin{document}% Document Begins

\input{../../../../commonFront} % provides standalone options

% NEW INFO GOs HERE.
\subsection{Subsection Template}
```

\medskip

## **6.12 PDF Tools used by AC GIS**

### 6.12.1 Introduction

**Purpose and Summary** **Workflow Purpose:** Optimization of a large number of pdf docs.

**Workflow Summary:** Uses Python to create a list of .pdf docs in a folder and creates a batch file to optimize the pdfs in the list to another location. The batch process calls ghost script for the optimization.

**requirements** Opensource software:

- ghostscript
- python 2.7 and a Python IDE
- A text editor

### 6.12.2 Python(2.7)

**Note:** The output of this script is bdoc.txt, Save as a .bat to execute the optimize.

**Script that creates a batch file**

```
import os, sys

project = os.path.dirname(os.path.dirname(__file__))
processing = os.path.join(project, 'processing')
#source = os.path.join(project, 'source')
build = os.path.join(project, 'build')
sourcepdf = os.path.join(build, '20180716')

inString1 = "gswin32 -sDEVICE=pdfwrite -dCompatibilityLevel=1.4
-dPDFSETTINGS=/ebook -dNOPAUSE -dQUIET -dBATCH
-sOutputFile=J:\\\\Projects\\\\2018ParcelAtlas\\\\build\\\\optimized\\\\"

inString2 = " J:\\\\Projects\\\\2018ParcelAtlas\\\\build\\\\20180716\\\\"

batchdoc = os.path.join(processing, "bDoc.txt")

# Main
#####
if __name__ == "__main__":
    list1 = os.listdir(sourcepdf)
    l = open(batchdoc, 'w')
    for i in list1:
```

```
newi = i[1:]
print newi
t = inString1 + newi + inString2 + i + "\n"
print t
l.write(t)

l.close()
```

### 6.12.3 ghostscript

**About** ghostscript is used for the optimization. ghostscript is an interpreter for the PostScript language and for PDF [1].

**Licensing** ghostscript is available opensource under AGPL conditions. more information can be found [here](#).

**Download** ghostscript can be downloladed [here](#).

### 6.12.4 Windows batch files

A line from the batch file looks like:

```
gswin32 -sDEVICE=pdfwrite -dCompatibilityLevel=1.4
-dPDFSETTINGS=/ebook -dNOPAUSE -dQUIET -dBATCH
-sOutputFile=J:\Project\2018ParcelAtlas\build\optimized\
02-001-001-00.pdf J:\Projects\2018ParcelAtlas\build\20180716
\_02-001-001-00.pdf
```

## 6.13 QGIS Tools

### 6.13.1 Using COGO Tools in QGIS

#### Set up the Azimuth and Distance Plugin (Azd Plugin).

In the Plugins drop down(1), under the topography group select the **Azd Plugin(2)**(see fig.).

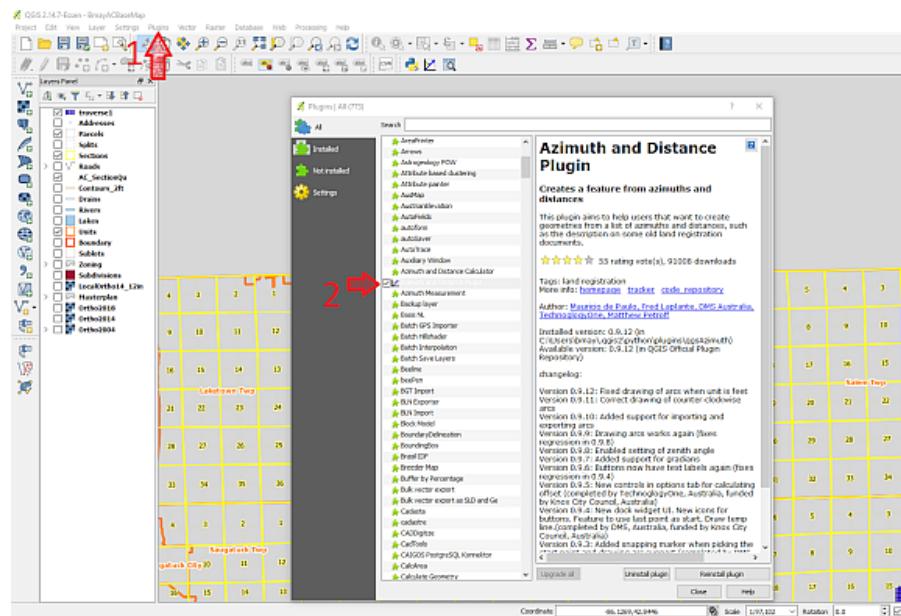


Figure 6.1: launch plugin

Note here which layer is active (see fig.).

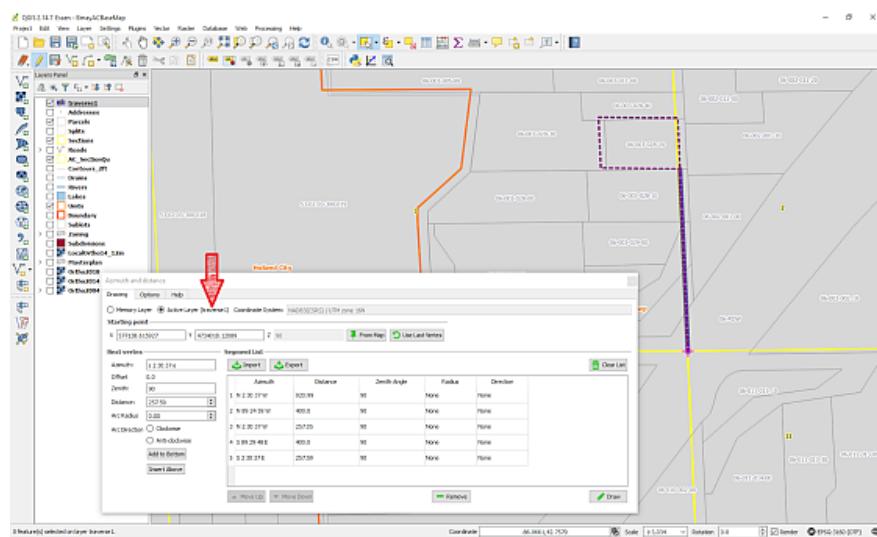


Figure 6.2: check active layer

If necessary, left click the layer ***traverse 1*** in Layer Panel to activate it(see fig.).

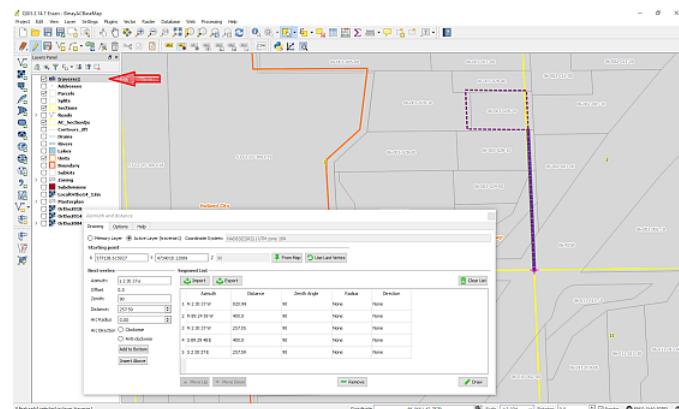


Figure 6.3: activate layer

**Configure Options** On Options Tab: Select Boundary, Bearing, Feet, and Degree radio buttons.

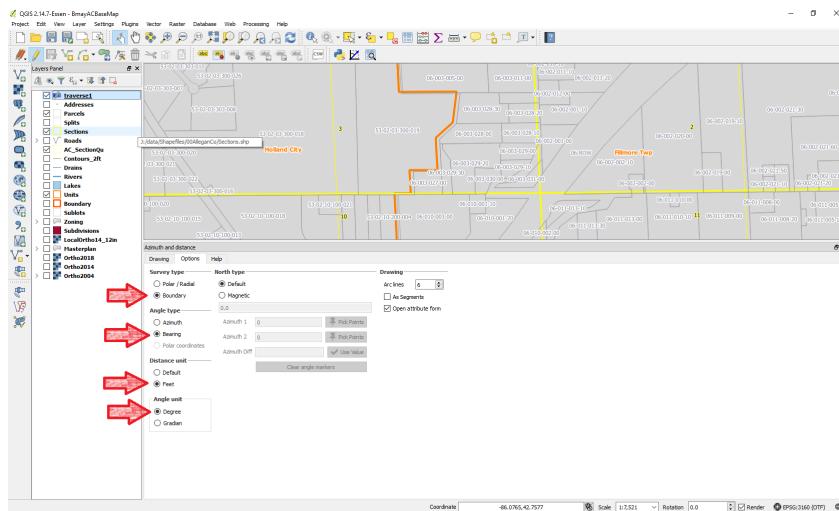


Figure 6.4: Plugin Options

**Using the tool** Boundary descriptions are entered into the Drawing Tab. Azimuth (bearing) and Distance are the important boxes (Set Offset = 0 and Zenith = 90 and ignore)(see below).

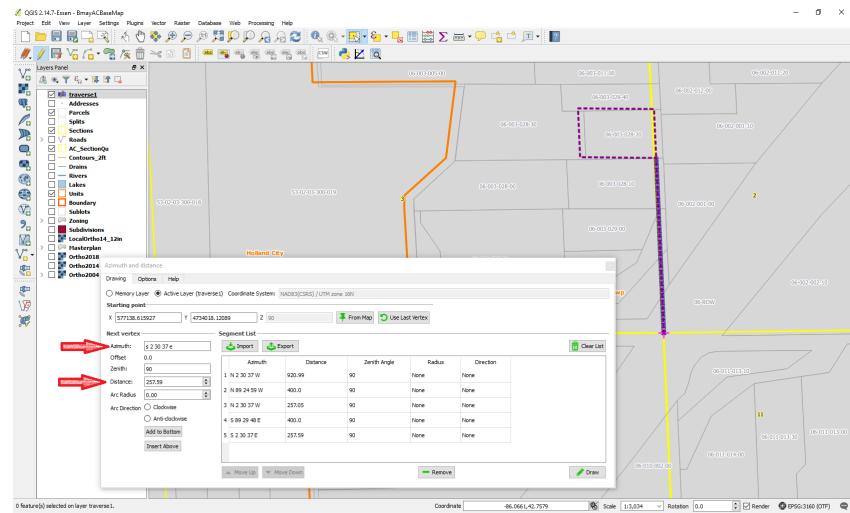


Figure 6.5: Entering Bounds

### Configure editing environment

Use Settings Dropdown and Snapping Options to enable snapping to Sections, Quarter Sections, and or Parcels if desired (see fig.).

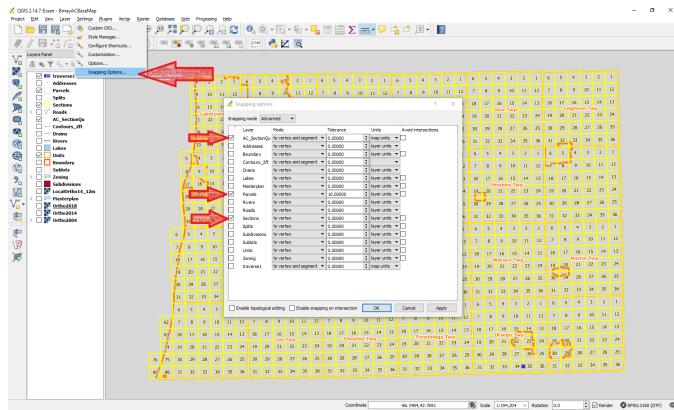


Figure 6.6: Configure editing environment

## **Locate Point of Commencement**

To get to the Point of Commencement,

Use **any combination** of the following methods:

- Using Reference Layer
- Using Measuring Tool
- Search by Parcel Number (Search Layers Plugin)
- Draw COGO lines (Azd Plugin)(as described earlier)

**Using Reference Layer** Use reference layers; Units, AC\_SectionsQu, Sections, and Parcels. Toggle layers on and off in Layers Panel and zoom in and out with mouse wheel.

**Using Measuring Tool** Use the measuring tool, make sure to set units to feet. To exit current measurement right click (see fig.).

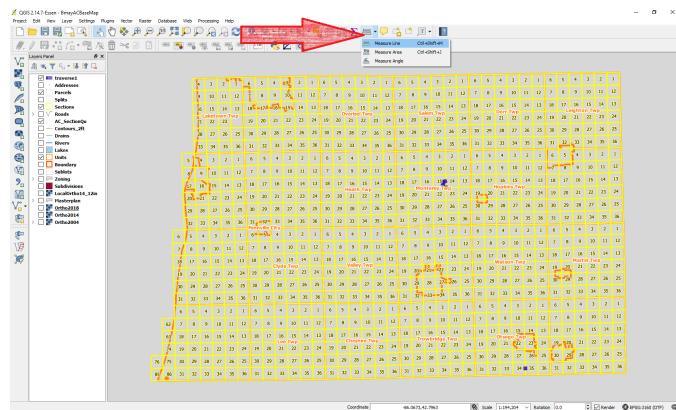


Figure 6.7: Measuring Tool

### Search by Parcel Number (Search Layers Plugin.)

To Launch Search Layers Plugin:  
 In Plugins dropdown:  
 Enable the **Search Layers** Plugin. (see fig.)

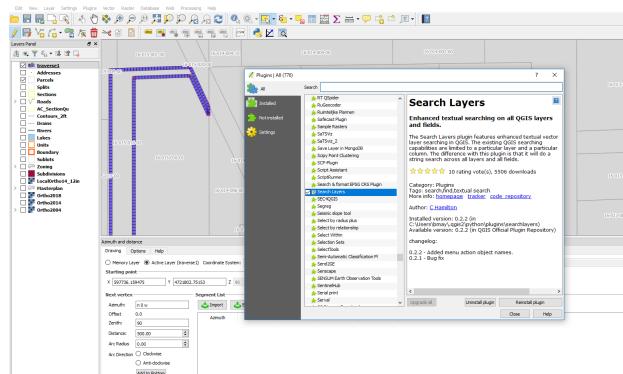


Figure 6.8: Search Layers Plugin

Enter parcel number (with dashes), Set layers, and set search field.(see fig.)

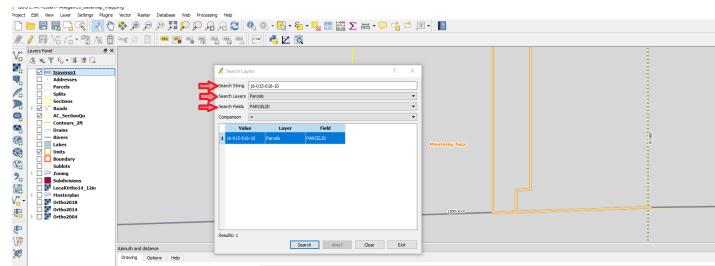


Figure 6.9: Search Layers Setup

# **Part IV**

# **Resources**

# Appendices

## A.1 Geography 101

Foundations of geography

### A.1.1 A Primer on Coordinate Systems Commonly Used in Michigan

[A Primer on Coordinate Systems Commonly Used in Michigan](#)

## B.2 ESRI Resources

Product Documentation

### B.2.1 Functionality Matrices

arcgis 10.5 Enterprise Functionality Matrix [Document](#) [Link](#)  
arcmap 10.5 Functionality Matrix [Document](#) [Link](#)

# Bibliography

- [1] Artiflex, *ghostscript.com*, 2018. 95
- [2] na, *The hyperref package*, CTAN, na ed., na na. 84
- [3] Martin Scharrer, *The standalone package*, CTAN, 1.3a ed., 03 2018. 88

# Glossary

**IDE** Integrated Development Environment. 80

**map projection** Representing a sphere on a flat surface. 11, 80

**sample** an example. 80

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