

What We Do

Allegan County GIS
www.allegancounty.org/gis

September 27, 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 ^A T _E 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^AT_EX 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^AT_EX 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^AT_EX 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.

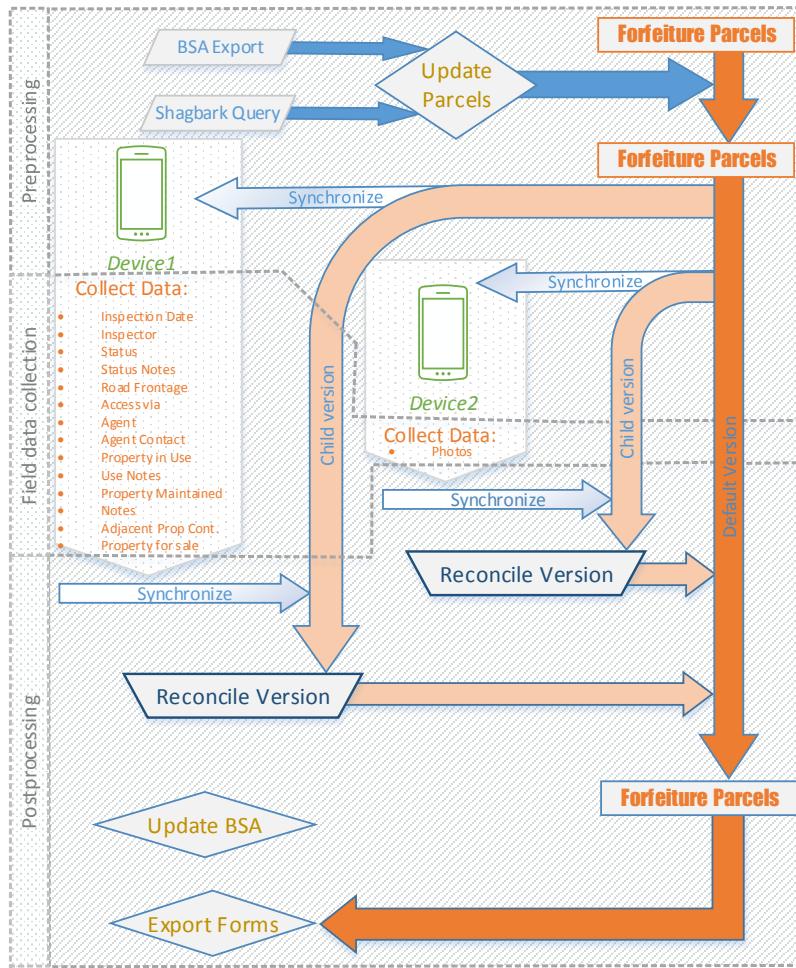


Figure 4.1: Project Design

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 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

- 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 ACPUB. ACPUB is a geodatabase on ACINTSQL01.

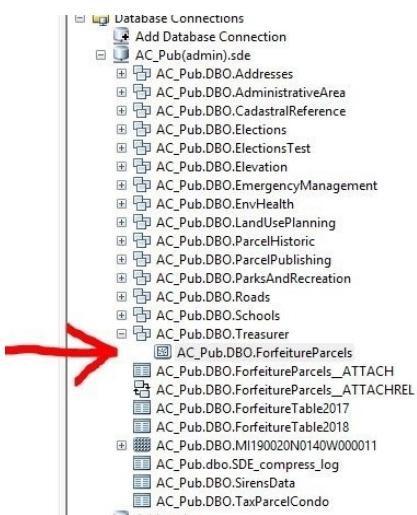


Figure 4.2: Live Data Location

Attribute List		
Field Name	Entry Type	Note
Property Number	Prefilled	NA
Inspection Date	Autofill or Dropdown	NA
Inspector	Dropdown	NA
Class	Prefilled	NA
Acres	Prefilled	NA
Address	Prefilled	NA
Status	Dropdown	NA
Status Notes	Open entry	120 Char limit
Road Frontage	Dropdown	Yes or No
Access via	Open entry	30 Char Limit
Agent	Open entry	30 Char Limit
Agent Contact	Open entry	30 Char Limit
Property in use	Dropdown	Yes or
Use Notes	Open entry	120 Char limit
Property Maintained	Dropdown	Yes or No
Notes	Dropdown	120 Char limit
Prop Contam	Dropdown	Yes or No
Notes	Open entry	120 Char limit
Adj Prop Contam	Dropdown	NA
Notes	Open entry	120 Char limit
Property for sale	Dropdown	Yes or No
Posted	Prefilled	in Pre and Postproc
InList	Prefilled	in Preproc
PostedInList	Prefilled	in Preproc
Print Today	Dropdown	Yes or No

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 4.3: Web Map Details

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

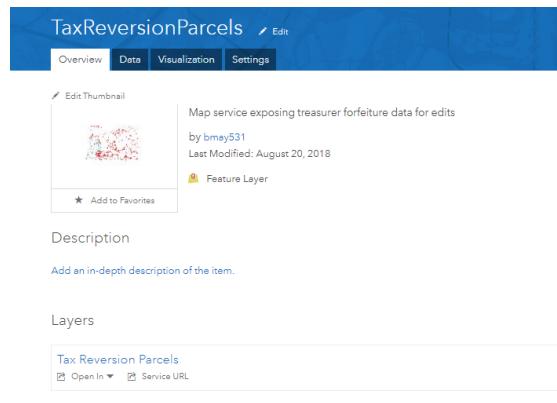


Figure 4.4: Layer Details

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)' service. At the top, there are navigation links for ArcGIS, Pricing, Map, Scene, and Help, along with a sign-in button and a search bar. Below the header, the service 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 contains several sections: 'Description', 'Service Information for Developers', and 'Tags'. The 'Description' section includes a map preview, a detailed description of the layer's content (highways, major roads, minor roads, one-way arrows, railways, water features, cities, parks, landmarks, building footprints, and administrative boundaries), and information about the map service's export capabilities (supporting up to 150,000 tiles). It also lists supported scales (e.g., Large city, Medium size state or province, Medium to large country) and provides a note that the layer is not intended for displaying live map tiles. The 'Service Information for Developers' section contains instructions for using the service and its URL. The 'Tags' section lists various geographical and thematic terms.

Figure 4.5: Basemap Source Description

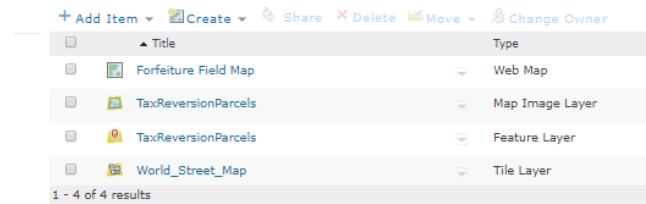


Figure 4.6: Portal Contents

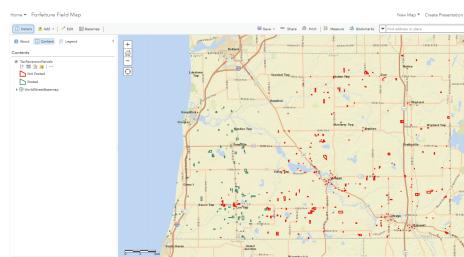


Figure 4.7: Field Map on PC

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



Figure 4.8: Download the App

Configure Collector

for Organization Website, Type:

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

then:

Press Continue

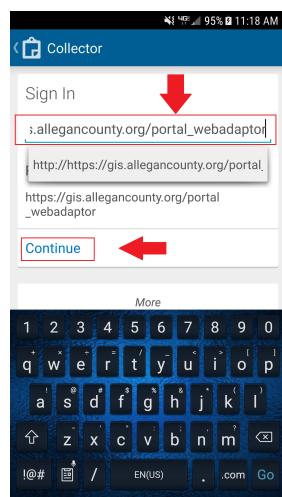


Figure 4.9: Collector Connection

Enter Credentials

then:

Press SIGN IN

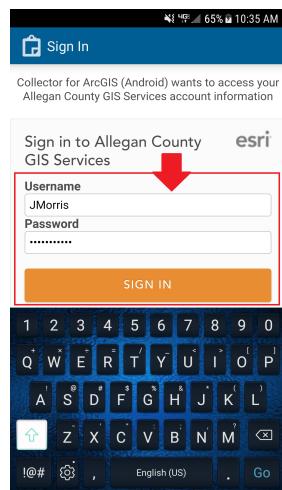


Figure 4.10: Enter Credentials

Download the Forfeiture Field Map

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

Press Download

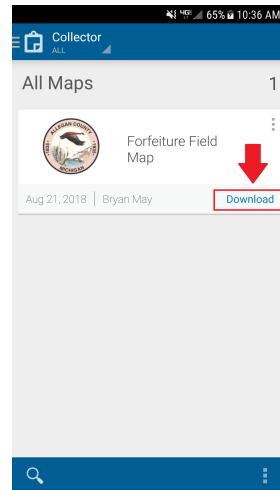


Figure 4.11: Collector Maps Menu

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.

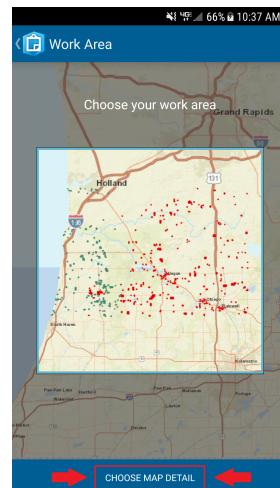


Figure 4.12: Choose Work Area (large)

Choose Map Detail

Zoom into the level of detail desired.

Press Download

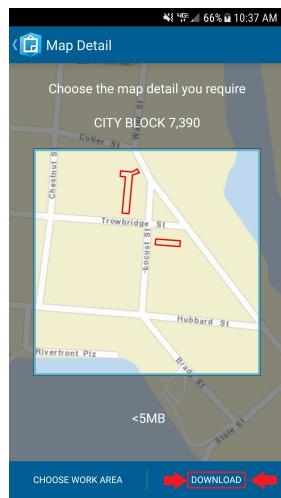


Figure 4.13: Choose Map Detail

This area is ready for field data collection.

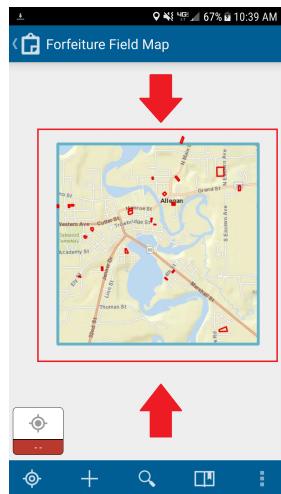


Figure 4.14: Map on Device

Open Camera Application Setup Details

Install Open Camera

- Available from the Google Play Store

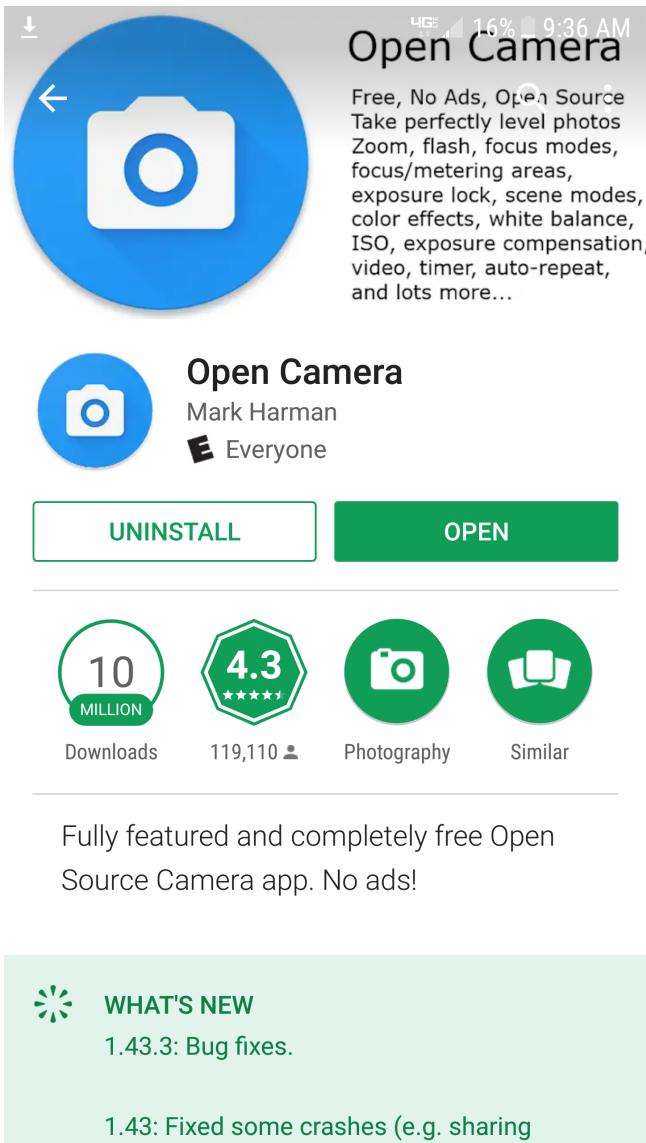


Figure 4.15: Open Camera from Google Play Store

Configure Open Camera

In the Open Camera Application:

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

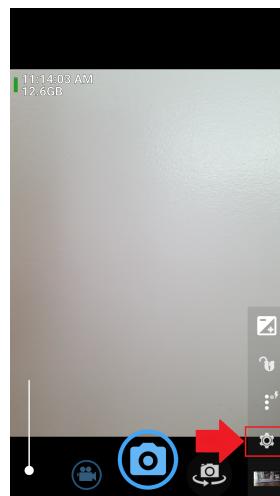


Figure 4.16: Find Settings Menu

Press the Photo Settings button

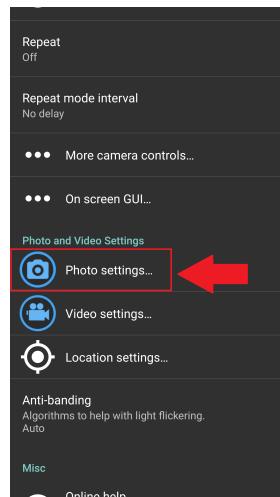


Figure 4.17: Setting Screen

Set Photo Resolution

In photo settings:

Press the Camera resolution button

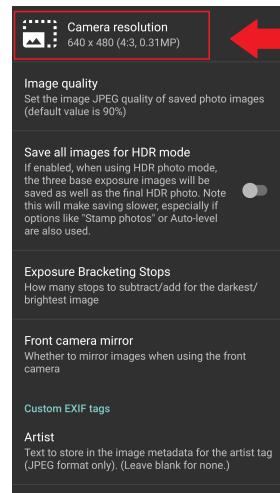


Figure 4.18: Photo Settings Menu

Select **640 x 480**

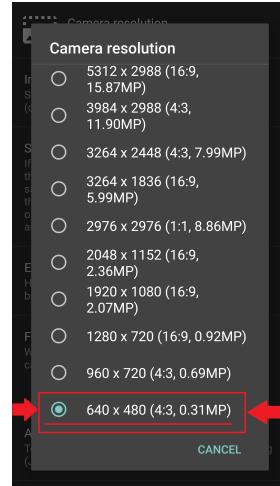


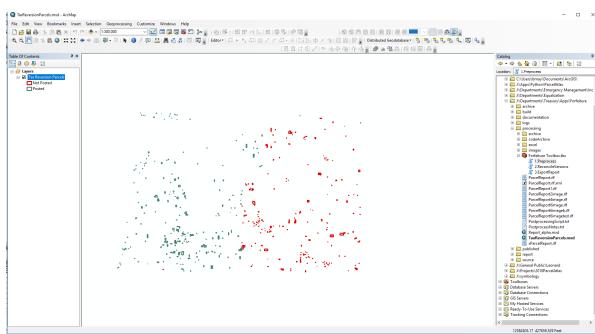
Figure 4.19: Camera Resolution Setting

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 4.20: Processing Tools

Open tool 1

Synchronize the Forfeiture Field Map

Note the date and time:

Press Sync

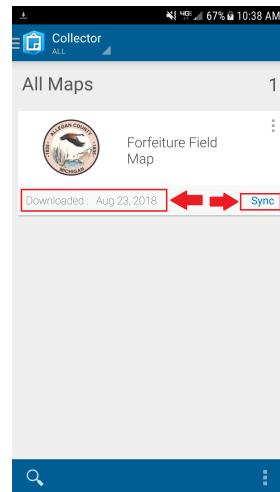


Figure 4.21: Map Downloaded

Note the date and time

Map is now synchronized

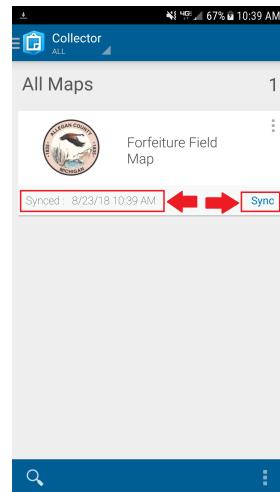


Figure 4.22: Map Synchronized

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. If the boxes are aut-fill, select from dropdown or typed.

Device 1 Field Operation Device one data collection interface, used to add data to all of the boxes

In the Forfeiture Field Map, for each site visited:

Select the desired parcel



Figure 4.23: Select Parcel

Push the edit button

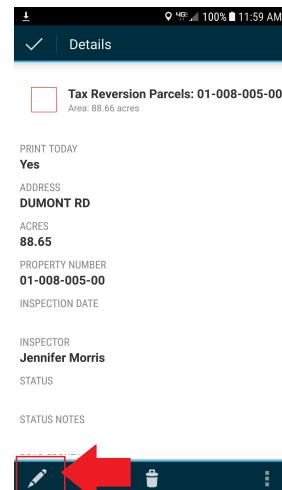


Figure 4.24: Parcel Details

Class prefilled Acres prefilled

Device 1 Field Operation Cont.

Select Yes for Print Today



Figure 4.25: Print Today Yes or No

Select Use Current or enter any date

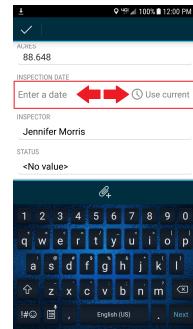


Figure 4.26: Enter Date

Select Inspector From Drop-down



Figure 4.27: Select Inspector

Device 1 Field Operation Cont.

Select Occupied or Not Occupied

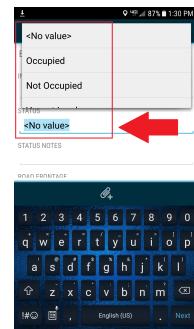


Figure 4.28: Status

Enter status notes up to 120 characters

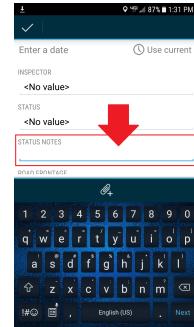


Figure 4.29: Status Notes

Select Yes or No for Road Frontage

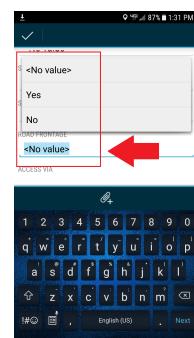


Figure 4.30: Road Frontage

Device 1 Field Operation
Cont. Enter road used for access

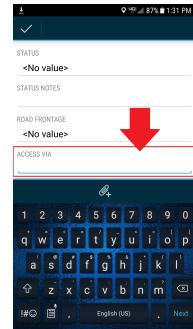


Figure 4.31: Access Via

Enter Agent Name

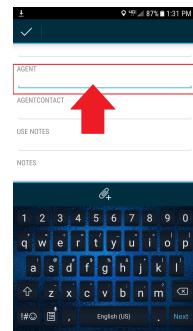


Figure 4.32: Agent

Enter Agent Contact Info

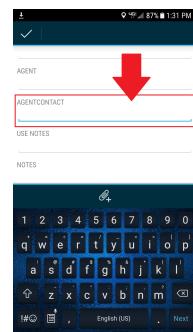


Figure 4.33: Agent Contact

Device 1 Field Operation Cont.

Enter Use Notes up to 120 characters

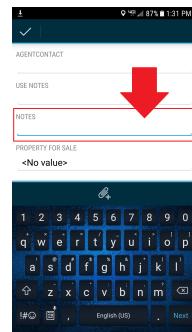


Figure 4.34: Use Notes

Enter Notes up to 120 characters

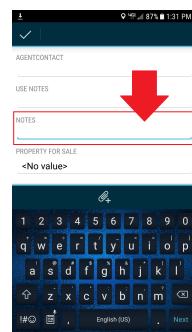


Figure 4.35: Notes

Enter property for sale yes or no

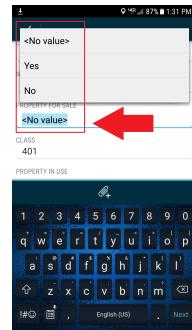


Figure 4.36: Property for Sale

Device 1 Field Operation Cont.

Property in Use Yes or No

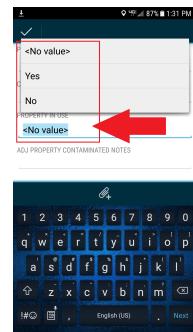


Figure 4.37: Property in Use

Adjacent Property Contaminated Notes up to 120 characters

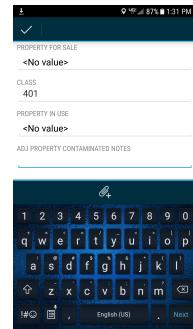


Figure 4.38: Adjacent Property Contaminated Notes

Property Contaminated yes or no prefilled

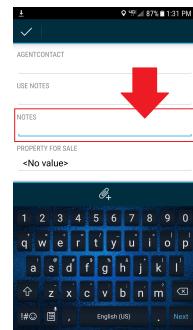


Figure 4.39: Property Contaminated

Device 1 Field Operation Cont.

Enter notes up to 120 characters

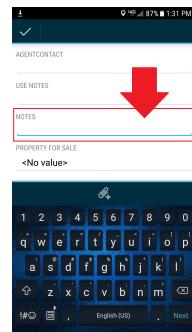


Figure 4.40: Notes up to 120 characters

Adjacent Property Contaminated yes or no pre-filled

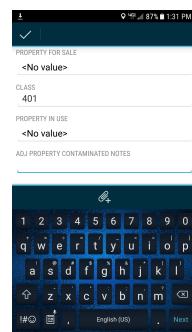


Figure 4.41: Adjacent Property Contaminated

Enter Property Contaminated notes up to 120 characters

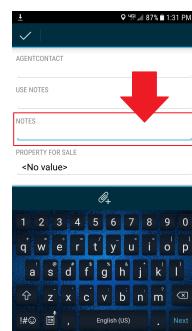


Figure 4.42: Property Contaminated

Device 1 Field Operation Cont.

Property Maintained Yes or No

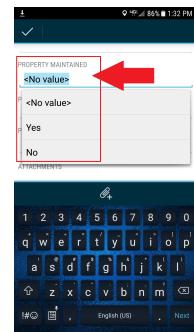


Figure 4.43: Property Maintained

Picture Comments up to 120 characters

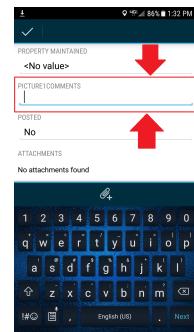


Figure 4.44: Picture Comments

Placeholder

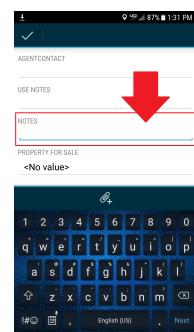


Figure 4.45: Placeholder

Device 2 Field Operation In the Forfeiture Field Map, for each site visited, a photo or photos can be added from the Open Camera Application.

Select a parcel from the map



Figure 4.46: Select Parcel

Push Attachment Button

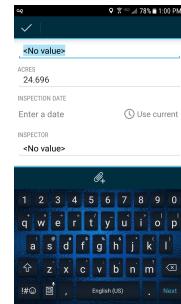


Figure 4.47: Push Attachment Button

Select Gallery

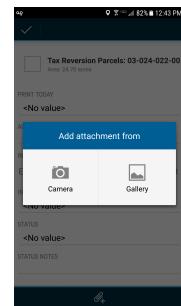


Figure 4.48: Add Attachment From Gallery

Device 2 Field Operation Cont.

Navigate to the Open Camera Folder

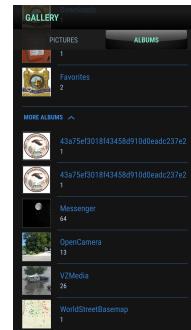


Figure 4.49: Open Camera Folder

From within the Open Camera Folder, Select the appropriate image

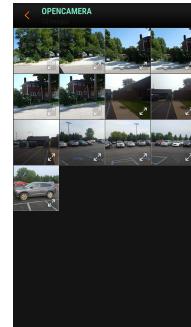


Figure 4.50: In the Open Camera Folder

Press the check button to save the image to the parcel

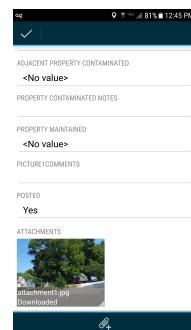


Figure 4.51: Image in the App

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

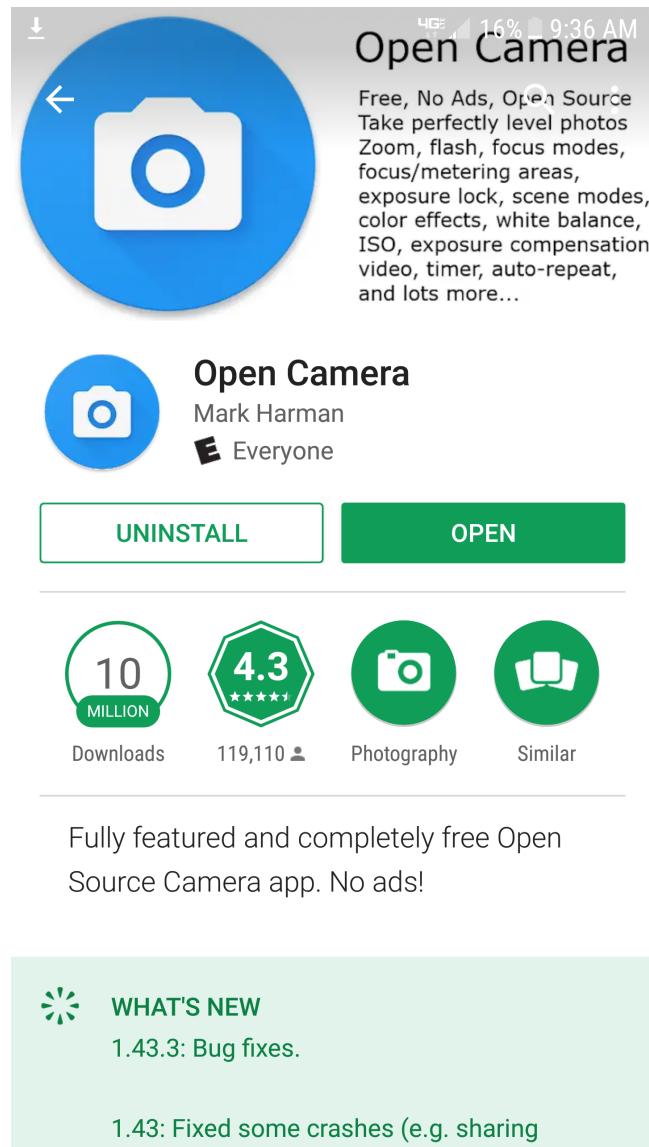


Figure 4.52: Open Camera from Google Play Store

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 Enterprise Geodatabase Maintenance

Enterprise Geodatabase Compression Routine

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

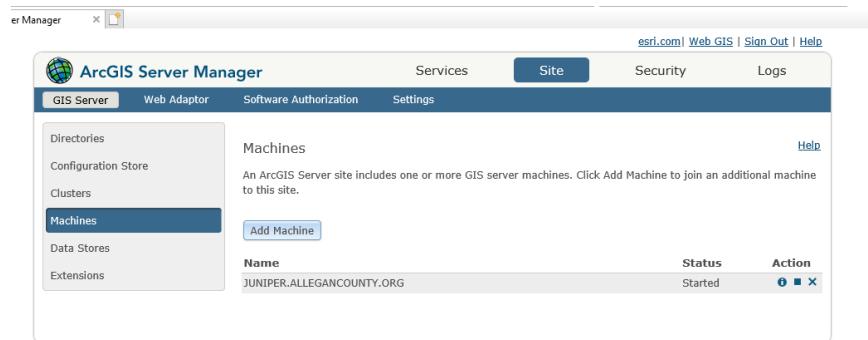


Figure 5.1: Stop ArcGIS Server

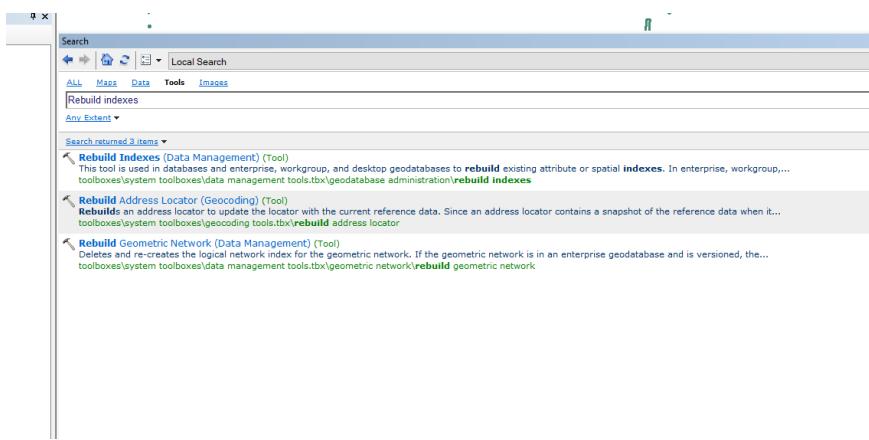
Note

Figure 5.2: Find Rebuild Indexes Tool

Rebuild Indexes Execute the geoprocessing tool Note

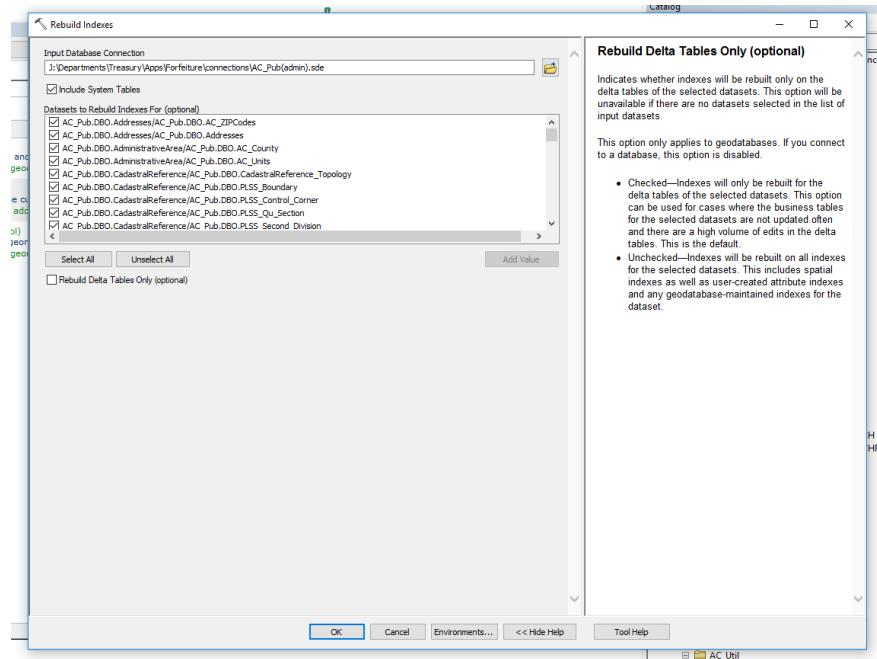


Figure 5.3: Rebuild Indexes Tool Operation

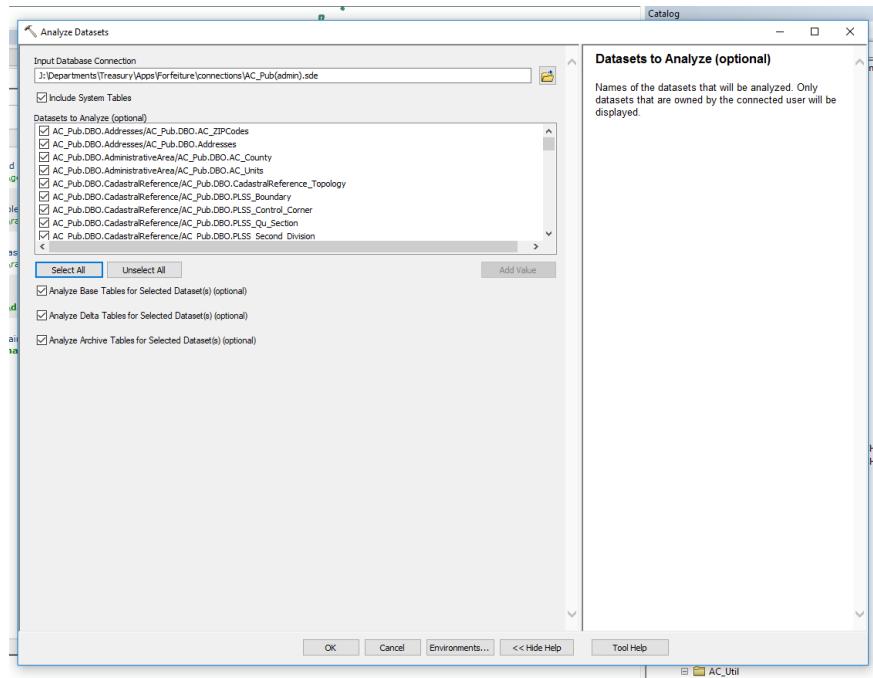
Recalculate Statistics Note Note

Figure 5.4: Recalculate Statistics

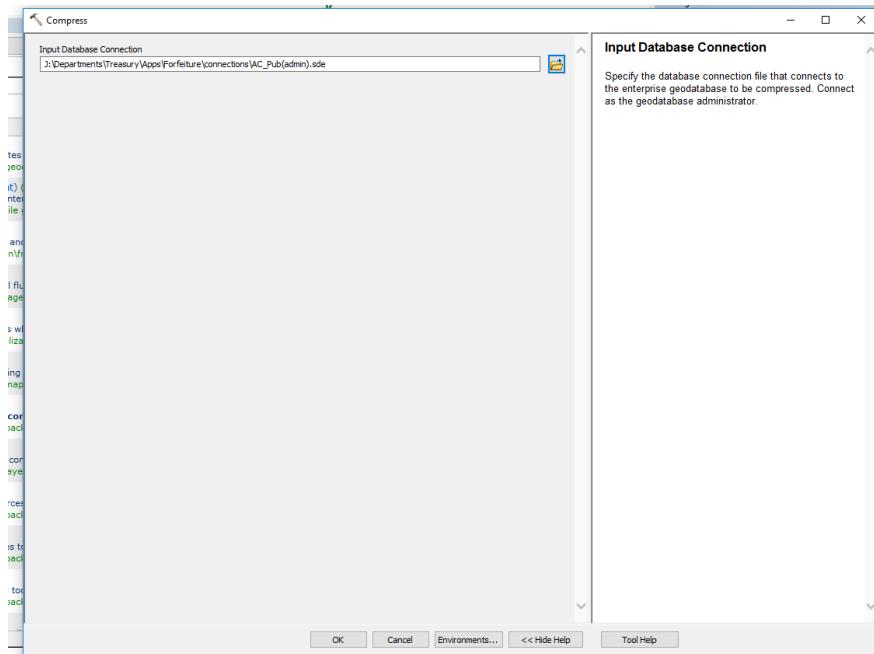


Figure 5.5: Compress

Compress Note

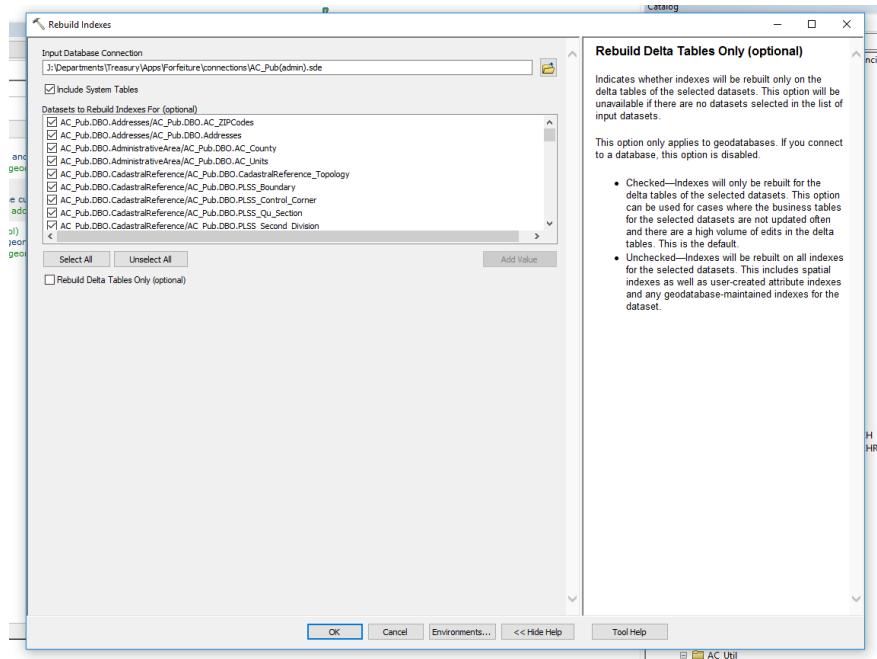
Rebuild Indexes Execute the geoprocessing tool Note

Figure 5.6: Rebuild Indexes Tool Operation

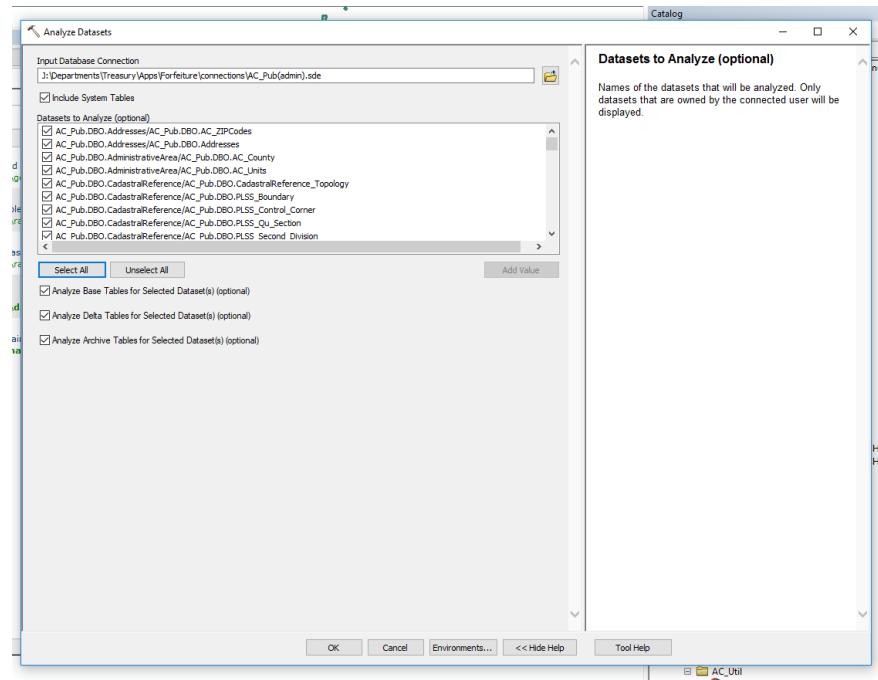
Recalculate Statistics Note Note

Figure 5.7: Recalculate Statistics

5.3.2 Managing Map Services

To stop ArcGIS Server

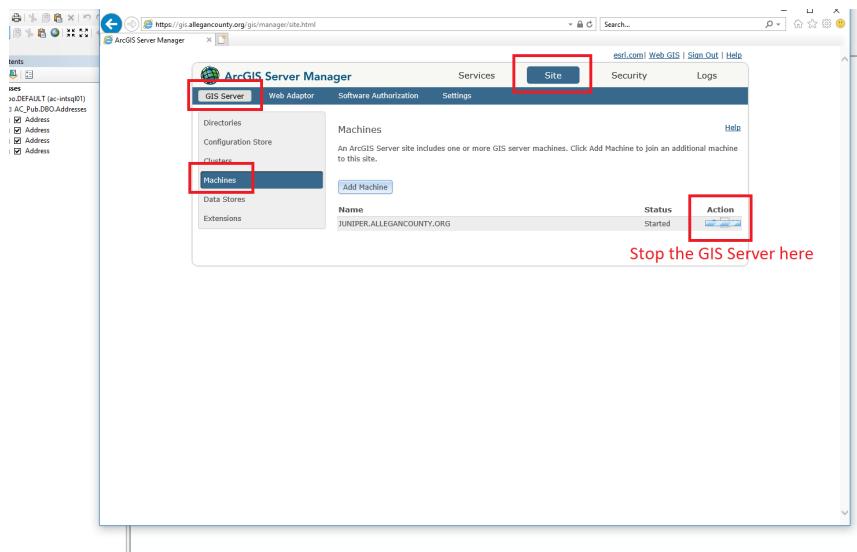


Figure 5.8: Stop the GIS Server

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.

5.3.3 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.

5.3.4 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

ObjectID	name
16497	ProtoPub.ParcelPubReplica
16520	ProtoPub.LandUsePlanningReplica
17074	SchoolsReplica
17542	ElReplica
17893	EmergencyMgmt
19929	AddressesReplica
40149	EnvHealthReplica

name
DEFAULT
C:\ndress_1\temp\versionPar
3
4
5
6

Figure 5.9: Find Orphan Versions

two that have no match in step one.

Orphaned versions can be removed by name in ArcGIS

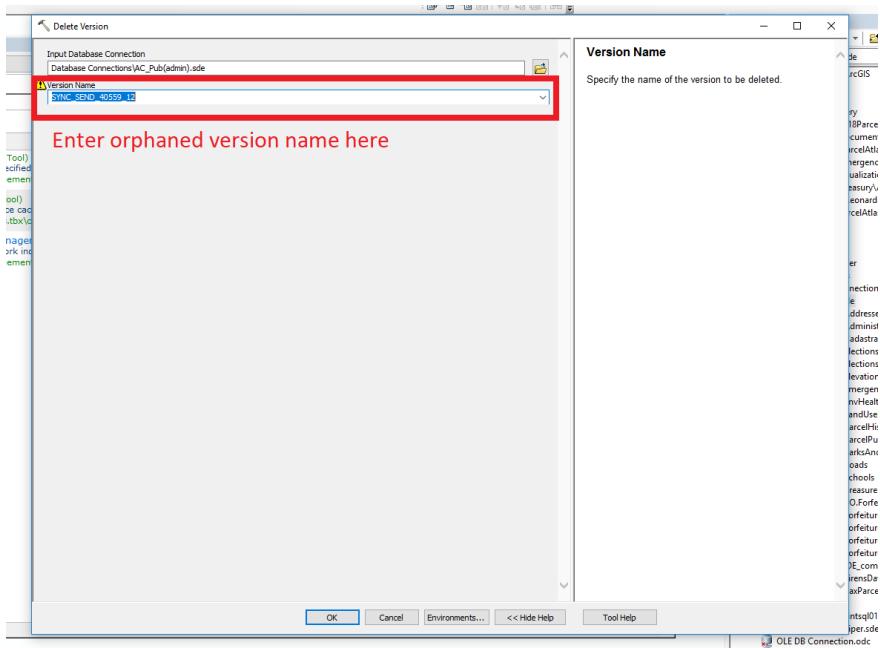


Figure 5.10: Delete Orphan Versions

5.3.5 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\" + mxdname)
    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^AT_EX Packages used by AC GIS

5.4.1 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

5.4.2 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}
```

5.4.3 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

5.4.4 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{\\"{}{}}`

i.e. `\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

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.

5.4.5 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

5.4.6 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

5.4.7 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

5.5 LATEX Templates

5.5.1 LATEX 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}
```

5.5.2 LATEX 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

5.6 PDF Tools used by AC GIS

5.6.1 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

5.6.2 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()
```

5.6.3 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](#).

5.6.4 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
```

5.7 QGIS Tools

5.7.1 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.).

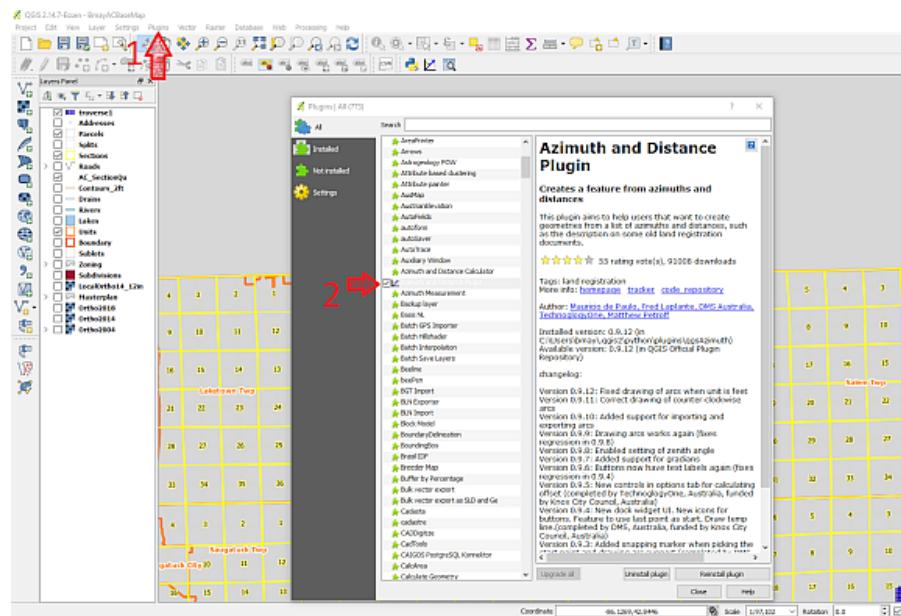


Figure 5.11: launch plugin

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

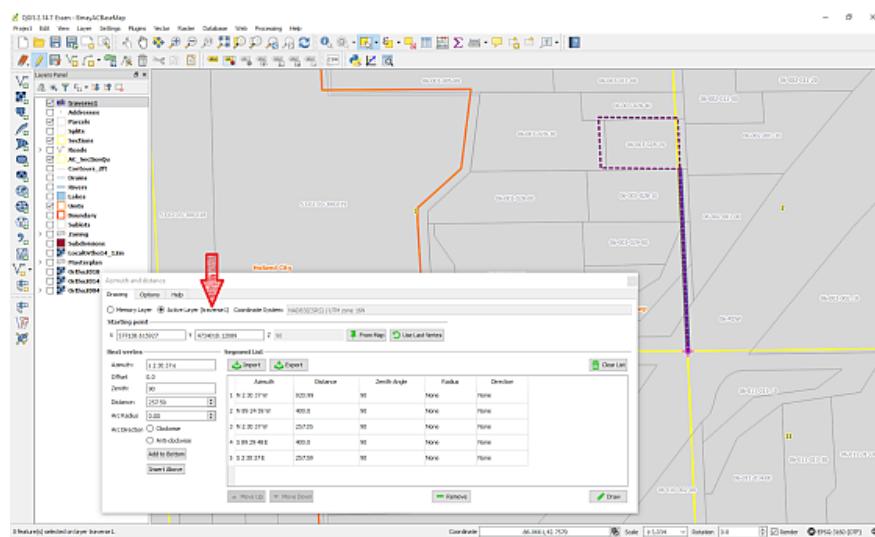


Figure 5.12: check active layer

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

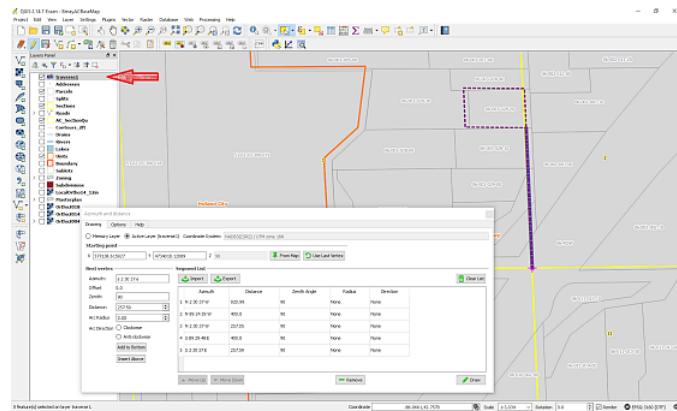


Figure 5.13: activate layer

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

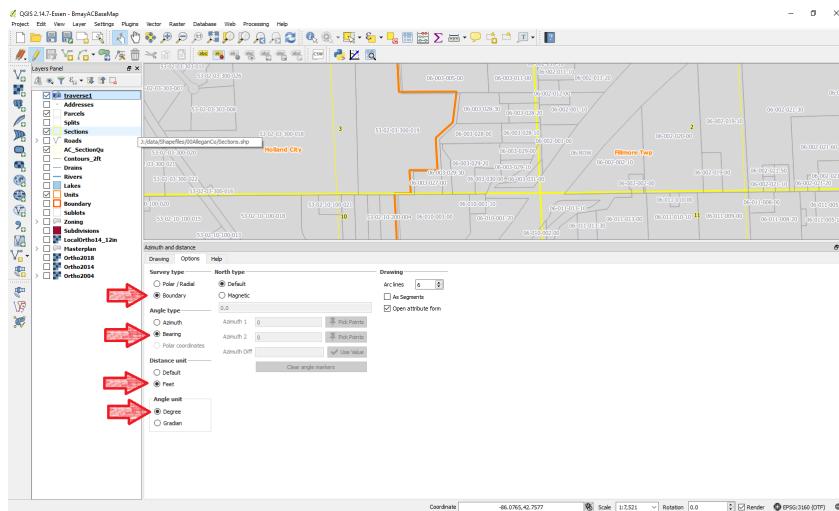


Figure 5.14: Plugin Options

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).

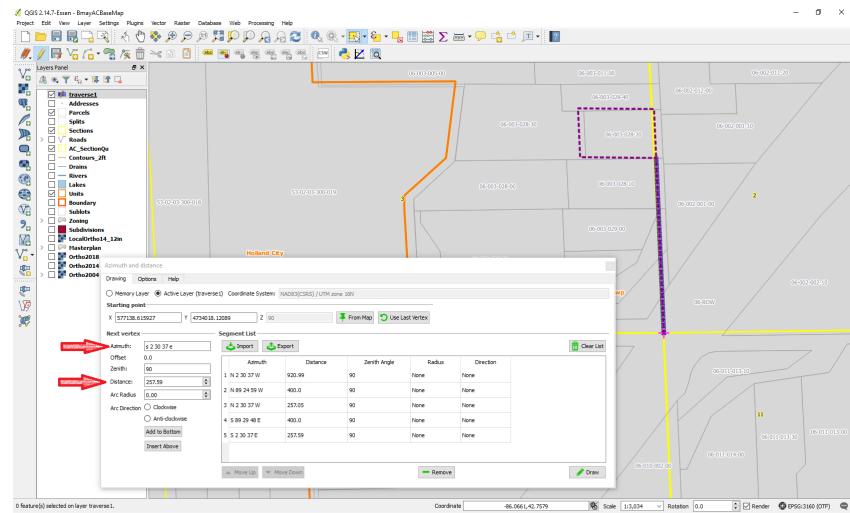


Figure 5.15: Entering Bounds

Configure editing environment

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

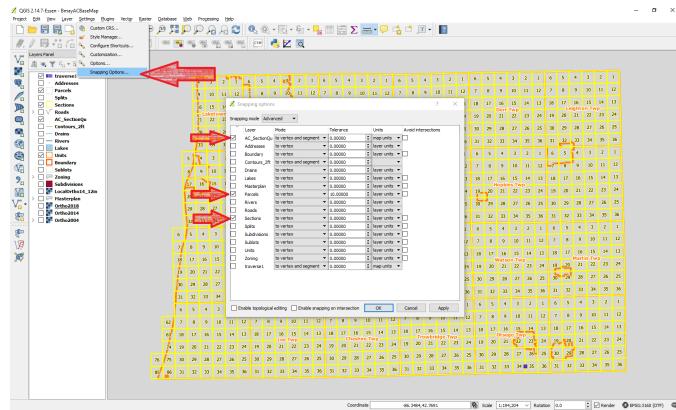


Figure 5.16: Configure editing environment

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.).

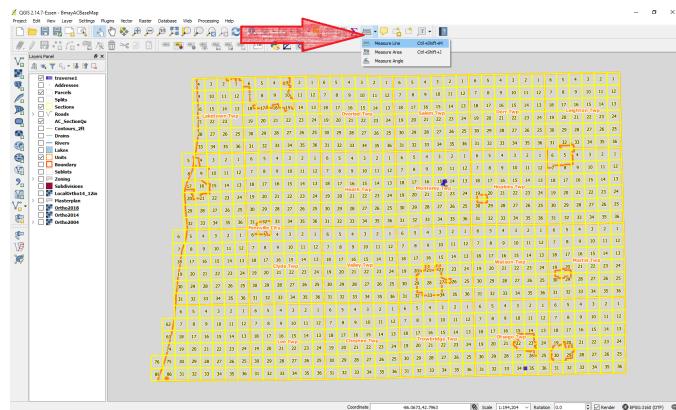


Figure 5.17: Measuring Tool

Search by Parcel Number (Search Layers Plugin.)

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

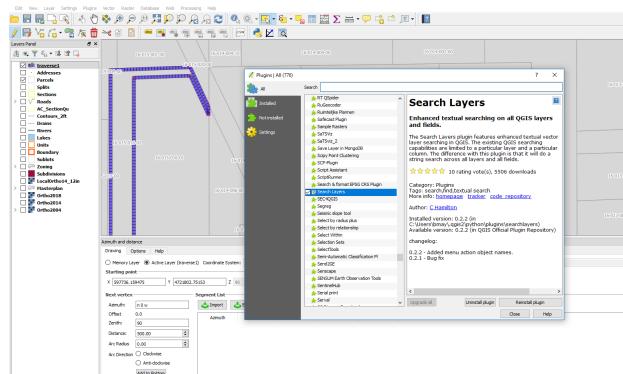


Figure 5.18: Search Layers Plugin

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

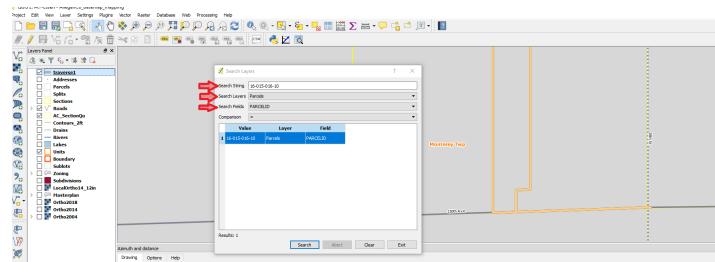


Figure 5.19: Search Layers Setup

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](#)

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