

Policies and Procedures

WWW.ALLEGANCOUNTY.ORG/GIS

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Part I

Brand

— 1 —

Awards

1.1 THE GIS CHAMPION AWARD

1.1.1 GIS CHAMPION

An individual whose actions promote the use of GIS

GIS CHAMPION AWARD



Figure 1.1: Example GIS Champion Award

Background

Though Allegan County has had a formal GIS department for over 20 years, few people have learned to use it.

there is no formal recognition of individuals that promote GIS.

Statement of Problem

GIS is underutilized in Allegan County government. The county would benefit from more GIS use in its government. Currently

Analysis

The GIS Champion Award is a simple method of recognizing those that promote GIS in the county.

Past GIS Award Recipients

- Ian Hanes
- Karen
- Brian Redmon

GIS Champion Award Code

Part II

Methods

— 2 — Documentation

2.1 ABOUT DOCUMENTATION

2.1.1 HOW JALAPEÑO WORKS

PROBLEM AND ANALYSIS

Background

GIS Services has complicated and evolving workflows and uses everchanging technologies

- version control
- finding the documentation
- disseminating the documentation

Statement of Problem

GIS documentation has traditionally been done in different formats and stored in many different files and folders in the county network. This has resulted in problems with:

Analysis

The Jalapeño folder along with some open-source software provides a robust documentation tool for GIS documentation.

COLORS

Blues

HeaderBlueA _____
HeaderBlueB _____
HeaderBlueC _____
HeaderBlueD _____
HeaderBlueE _____

Golds

HeaderGoldA _____
HeaderGoldB _____
HeaderGoldC _____
HeaderGoldD _____
HeaderGoldE _____

Oranges

HeaderOrangeA _____
HeaderOrangeB _____
HeaderOrangeC _____
HeaderOrangeD _____
HeaderOrangeE _____

Greens

HeaderGreenA _____
HeaderGreenB _____
HeaderGreenC _____
HeaderGreenD _____

HeaderGreenE _____

Others

HyperlinkBlue1 _____
graphicOrange _____

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 <small>A</small> T <small>E</small> 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 .gls file. After the .gls 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 .gls file.

Rebuilding the glossary

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

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

*Note:

This command reads the .aux file and creates the .gls 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}`

Adding 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 .idxIn 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

Access the index from 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

— 3 —

Team Concept

3.1 TEAM STRUCTURE

3.1.1 PAIRED PROGRAMMING

A paragraph about pp from Joy Inc.

Part III

Service

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

The current Tax Forfeiture workflow is built on MapInfo software and MS Access and executed on a laptop pc. Both MapInfo and MS Access are no longer supported in county workflows. ESRI software can be used to rebuild the workflow. *Forfeiture Data Collector Application, (Forfeiture App)* must be recreated in the ESRI framework.

Analysis

Forfeiture App will facilitate: *Mobile data collection on a handheld device,:* (**Mobile Interface**) and an *in office workflow to complete data processing,* (**Pre and PostProcessing**)

Mobile Interface

- Synchronize with data in the office (online)
- Collect data and photos of forfeiture sites (offline)
- Synchronize the collected data with data in the office (online)

Pre & Post Processing

- Produce and print a form for each site visited with required data and images

DESIGN OVERVIEW

Forfeiture Parcels is used through the workflow

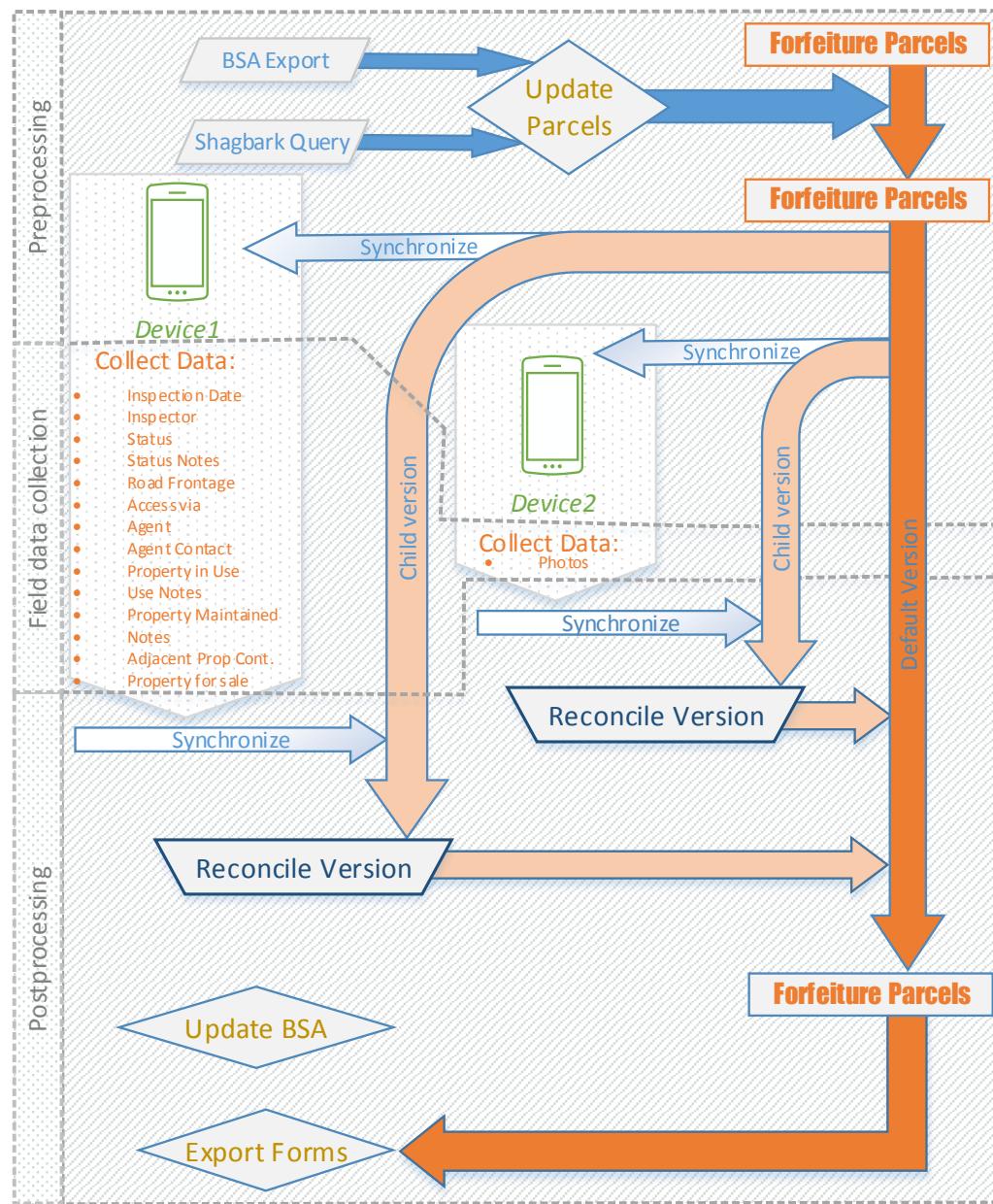


Figure 4.1: Project Design

Forfeiture App Summary

There are three parts to the daily routine:

1. Preprocessing (in the office):

- Export current forfeiture list from BSA
- Update Forfeiture Parcels with BSA export
- Update Forfeiture Parcels with contaminated sites information
- Synchronize Forfeiture Parcels to Mobile Interface

2. Field data collection with Mobile Interface:

- Aids in navigation
- Provides a Checklist of data points for each site
- Attaches photos for each site
- Save results for synchronization in post-processing

3. Post-processing (in the office)

- Synchronize data and images collected in Mobile Interface to Forfeiture Parcels
- Export form for each site
- Print form for each site
- Update BSA data

Technologies Used in The Forfeiture App

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 pre-processing.

ArcGIS Desktop

Tools are designed to preprocess and post-process 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 synchronizes 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 con-

figured to work offline (without an internet or cellular connection) by synchronizing before and after fieldwork. The user collects the necessary information on each forfeiture parcel in the field disconnected, and then uploads the changes when reconnected.

Enterprise Geodatabase

Live data from a publishing geodatabase (ACPub), running on SQL Server database server (acintsql01) provides access to Forfeiture Parcels

ArcGIS Portal

Forfeiture Parcels is served as a feature service (REST service) named TaxReversionParcels. A webmap on Portal, called the Forfeiture Field Map consumes the TaxReversionParcels exposing the data to editing. The Forfeiture Field Map is configured to work in the ArcGIS Collector App.

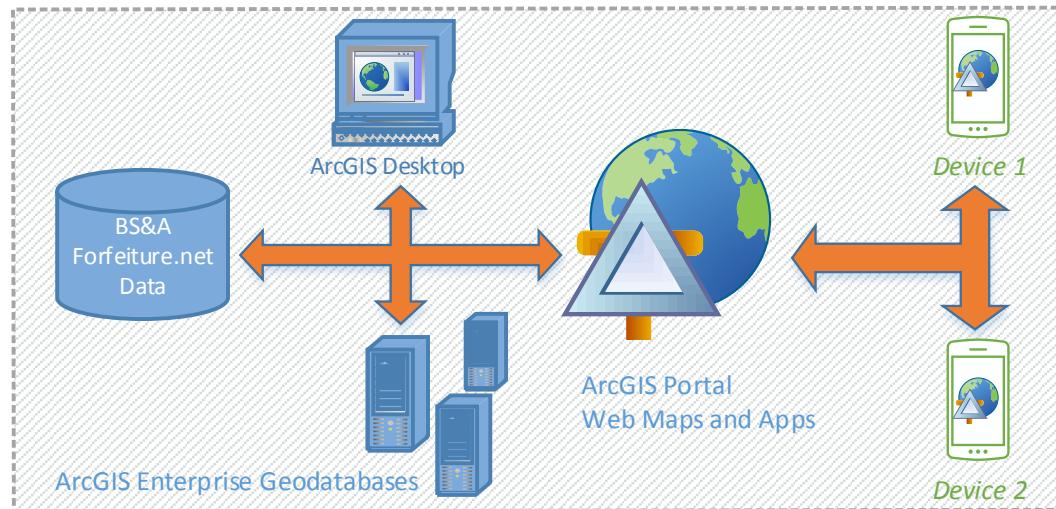


Figure 4.2: Technology Design

DATA DETAILS

The data is located in a geodatabase called ACPUB. ACPUB is on SQL Server AC-INTSQL01.

Forfeiture Parcels Data

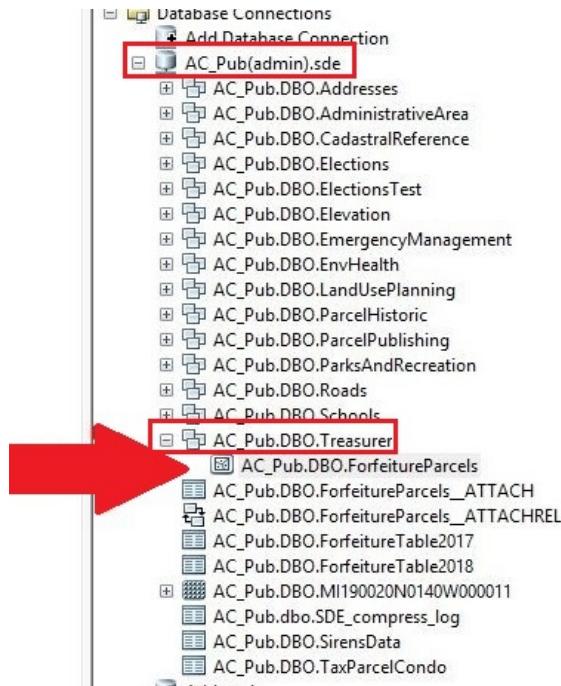


Figure 4.3: Live Data Location

Contamination Data

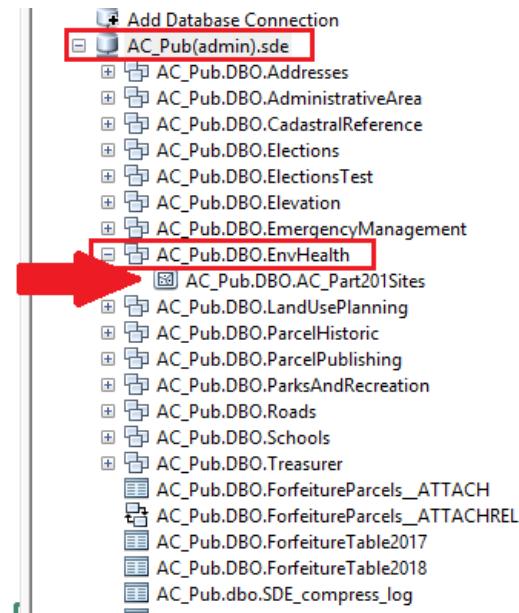


Figure 4.4: Contamination Feature Class

ForfeitureParcels Feature Class Details

Attribute Details			
Field Name	Field Alias	Entry Type	Note
PropertyNumber	Property Number	Prefilled	NA
Need2Print	Print Today	Dropdown	Yes or No
InspectionDate	Inspection Date	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
PictureComments	Picture Comments	Open Entry	50Char
PropertyInUse	Property In Use	Dropdown	Yes or No
UseNotes	Use Notes	Open Entry	120Char
PropertyMaintained	Property Maintained	Dropdown	Yes or No
PropMaintNotes	Property Maintained Notes	Open Entry	120Char
PropertyContaminated	Property Contaminated	Prefilled	Preprocessing
PropertyContaminatedNotes	PropertyContaminatedNotes	Prefilled	Preprocessing
AdjacentPropertyContaminated	Adjacent Property Contaminated	Prefilled	Preprocessing
AdjPropertyContaminatedNotes	Adj Property Contaminated Notes	Prefilled	Preprocessing
PropertyForSale	Property For Sale	Dropdown	Yes or No
GlobalID	GlobalID	NA	NA
PostedDate	Posted Date	Dropdown	Date
Posted	Posted	Prefilled	NA
InList	In List	Prefilled	Preprocessing
PostedInList	Posted In List	Prefilled	Preprocessing
Acres	Acres	Prefilled	NA
Class	Class	Prefilled	NA

Table 4.1: Dataset Details

Webmap Details

The Forfeiture Field Map is made up of a feature layer and a basemap.

Description

Add an in-depth description of the item.

Layers

- TaxReversionParcels
- World_Street_Map
- World_Street_Map

Access and Use Constraints

Add any special restrictions, disclaimers, terms and conditions, or limitations on using the item's content.

Figure 4.5: Web Map Details

Feature Layer Details

TaxReversionParcels has been configured for offline use.

Description

Add an in-depth description of the item.

Layers

Tax Reversion Parcels	Open In ▾	Service URL
-----------------------	---------------------------	-----------------------------

Access and Use Constraints

Add any special restrictions, disclaimers, terms and conditions, or limitations on using the item's content.

Figure 4.6: Feature 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](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's a navigation bar with links for ArcGIS, Pricing, Map, Scene, and Help, along with a sign-in button 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 are three buttons: 'Open in Map Viewer', 'Open in Scene Viewer', and 'Open in ArcGIS Desktop'. The main content area features a thumbnail map of a city area, a detailed description of the layer, and various metadata sections like 'Details', 'Owner', and 'Tags'.

Description

This layer is designed to support exporting small volumes of basemap tiles for offline use. The content of this layer is equivalent to World Street Map (with exceptions only in China and Korea at some levels of detail). This comprehensive street map includes highways, major roads, minor roads, one-way arrow indicators, railways, water features, cities, parks, landmarks, building footprints, and administrative boundaries, overlaid on shaded relief for added context. See [World Street Map](#) for more details..

The map service supporting this layer will enable you to export up to 150,000 tiles in a single request. For estimation purposes, this is large enough to support the export of:

- 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 ~1:36,000 (Level 14)
- Medium to large country (e.g. Continental United States) down to scale of ~1:288,000 (Level 11)

This layer is not intended to be used to display live map tiles for use in a web map or web mapping application. To display map tiles, please use [World Street Map](#).

Service Information for Developers

To export tiles for World Street Map (for Export), you must use the instance of the World_Street_Map service hosted on the tiledbasemaps.arcgis.com server referenced by this layer (see URL in Contents below), which has the ExportTiles operation enabled. This layer is intended to support export of basemap tiles for **offline use** in ArcGIS applications and other applications

Details

Source: [Map Service](#)
Size: 1 kb
★ ★ ★ ★ ★

Owner

Esri
Managed by:
 esri

Tags

World, Global, Europe, North America, United States, Southern Africa, Asia, South America, Australia, streets, street map, tile package, basemap, highways, roads, transportation, landmarks, parks, community, community basemap, map, AFA250_base, current, esri_basemap, general availability, export

Figure 4.7: Basemap Source Description

HARD COPY RECORD

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

ArcGIS Server

ADMINISTRATIVE MANUAL

Annual Setup

A new dataset for forfeiture parcels must be created each year.

The forfeiture information comes from BSA Forfeitures.net

Parcel geometry and other attributes comes from ACParcelsCombined

Update the Forfeiture Dataset

clear the features from the existing ForfeitureParcels dataset

- Use the Delete Feature Tools
- For Input Features:
 - Select AC_Pub.DBO.ForfeitureParcels

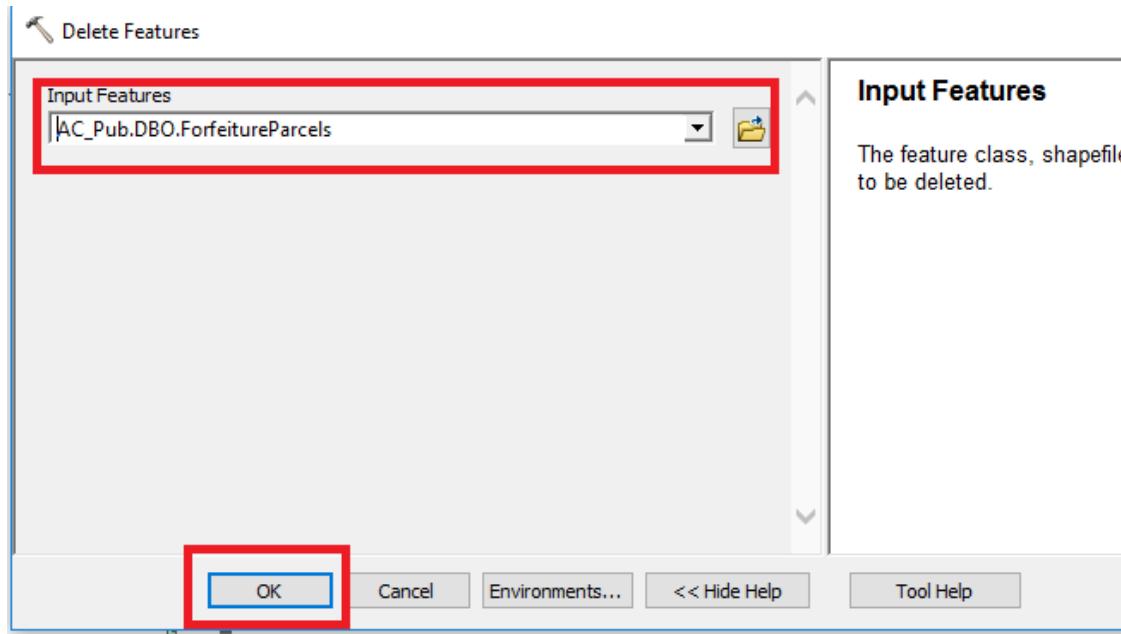


Figure 4.8: Delete Features

Press **OK**

Create a Table Query For the New Data

- File ⇒ Add Data ⇒ Add Query Layer
- Select your connection

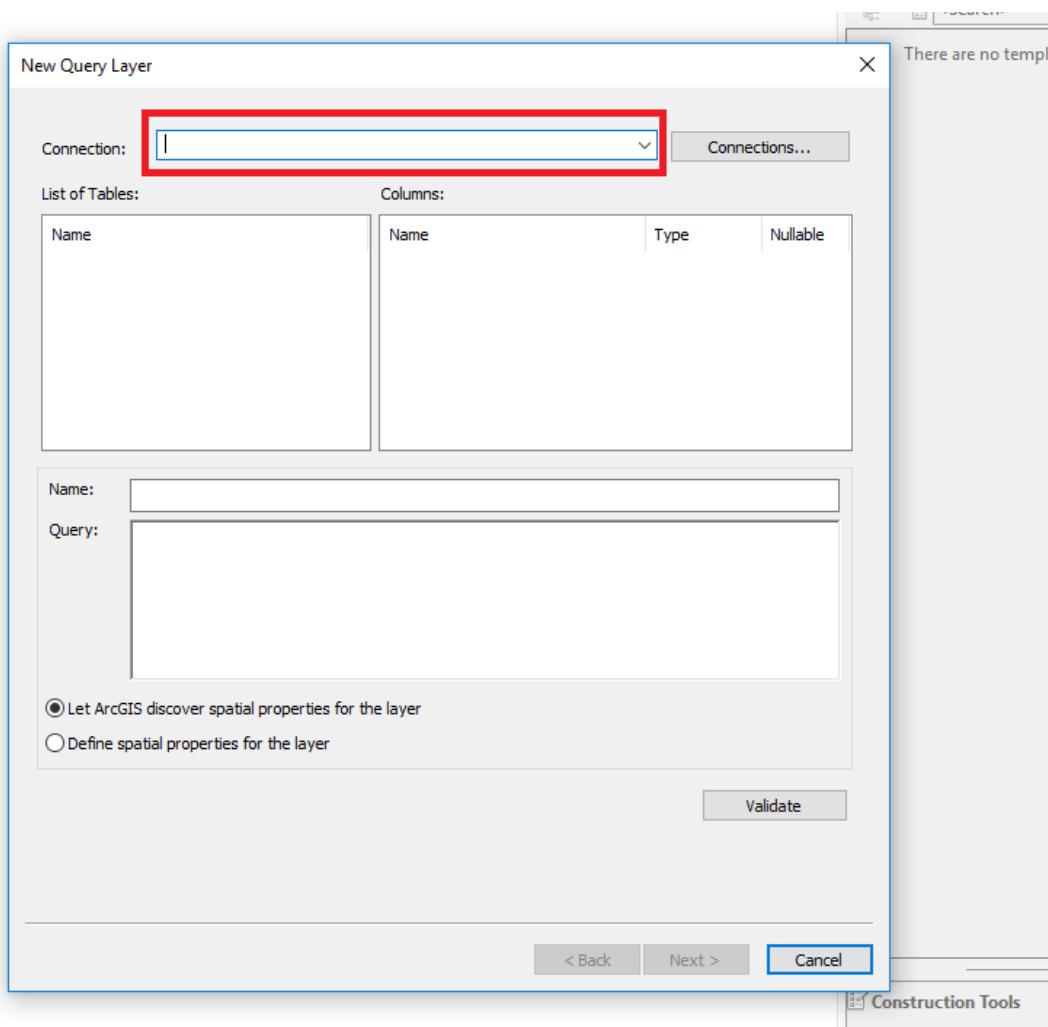


Figure 4.9: New Query Layer Dialog

Query Text:

```
SELECT [parcelnumber] FROM [D005ALLEGAN].[dbo].[Forfeitures]
WHERE forf_year = 2019
```

Details of the Query Layer

- Choose connection
- Name the query
- Enter SQL query

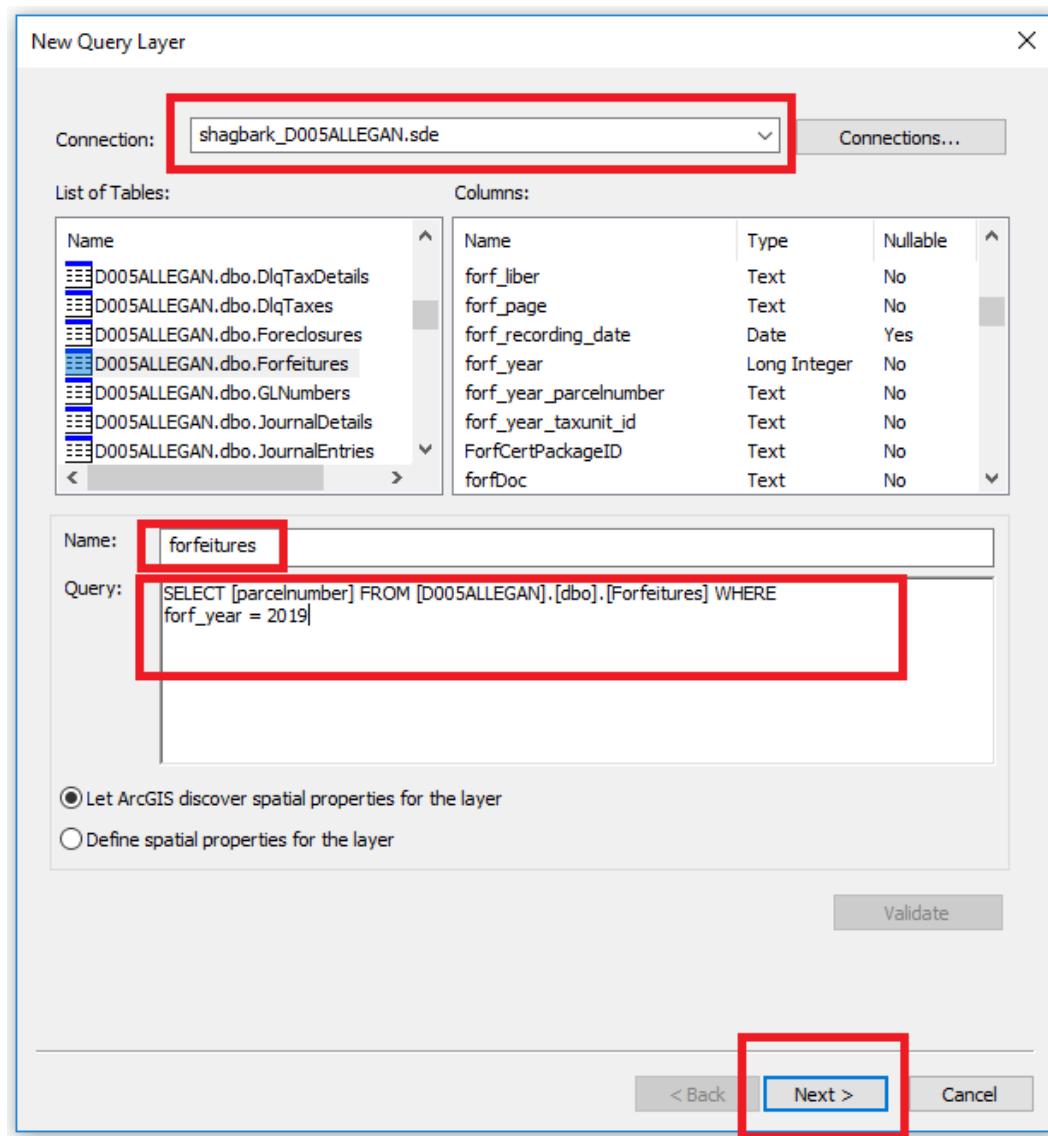


Figure 4.10: Forfeiture Query Layer Details

- Press **Next**

Select a Unique Identifier

➤ Press **Finish**

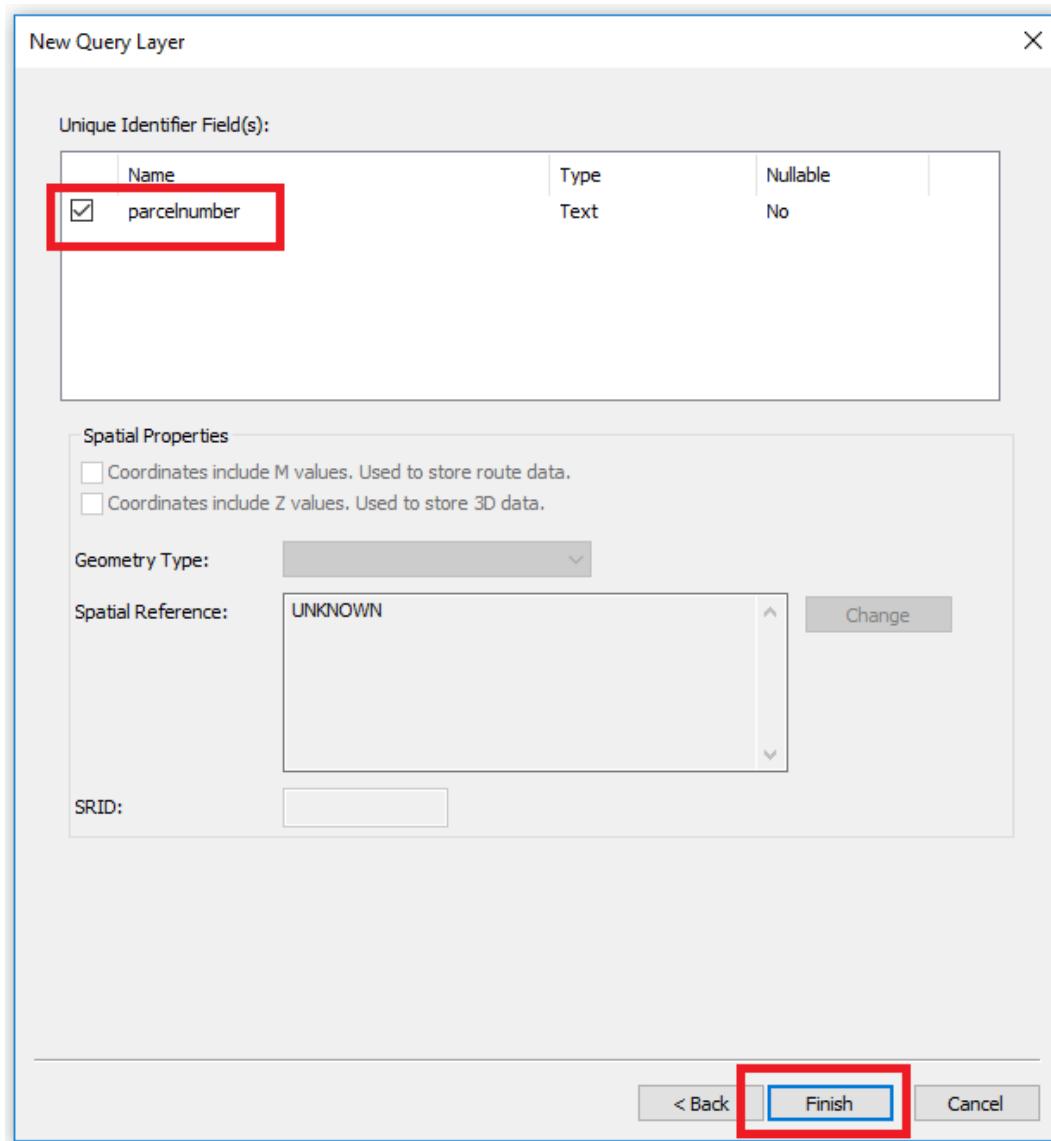


Figure 4.11: Query Layer Unique ID

Table is added to the map

The screenshot shows the ArcGIS Catalog interface. On the left, the 'Table Of Contents' pane displays a tree view of layers. A red box highlights the 'D005ALLEGAN' folder, which contains a table named 'D005ALLEGAN.DBO.forfeitures'. On the right, a 'Table' window is open, showing the contents of the 'D005ALLEGAN.DBO.forfeitures' table. The table has two columns: 'parcelnumber' and 'ESRI_OID'. The data consists of 836 rows of parcel numbers, each associated with a unique ID. The table window also includes navigation buttons and a status bar indicating '(0 out of 836 Selected)'.

parcelnumber	ESRI_OID
01-007-012-00	1
01-008-005-00	2
01-016-031-10	3
01-019-001-13	4
01-019-005-97	5
01-025-017-00	6
01-026-020-00	7
01-030-014-10	8
01-030-019-00	9
01-031-031-00	10
01-034-009-00	11
01-034-014-10	12
01-034-055-00	13
01-034-067-00	14
01-034-087-00	15
01-034-108-00	16
01-035-015-00	17
01-035-020-20	18
01-035-030-00	19
01-035-044-00	20
01-035-044-10	21
01-120-004-00	22
01-120-010-00	23
01-120-031-00	24
01-120-032-00	25
01-220-010-00	26
01-250-001-00	27
01-300-004-00	28
01-320-020-00	29
01-320-021-00	30
01-370-016-00	31
01-740-009-00	32
02-001-012-31	33
02-003-018-00	34
02-005-004-20	35
02-007-025-00	36

Figure 4.12: Forfeiture Table Added

Add Parcels Layer to the Map

Add ACParcelsCombined to the map to provide parcel geometry and attributes

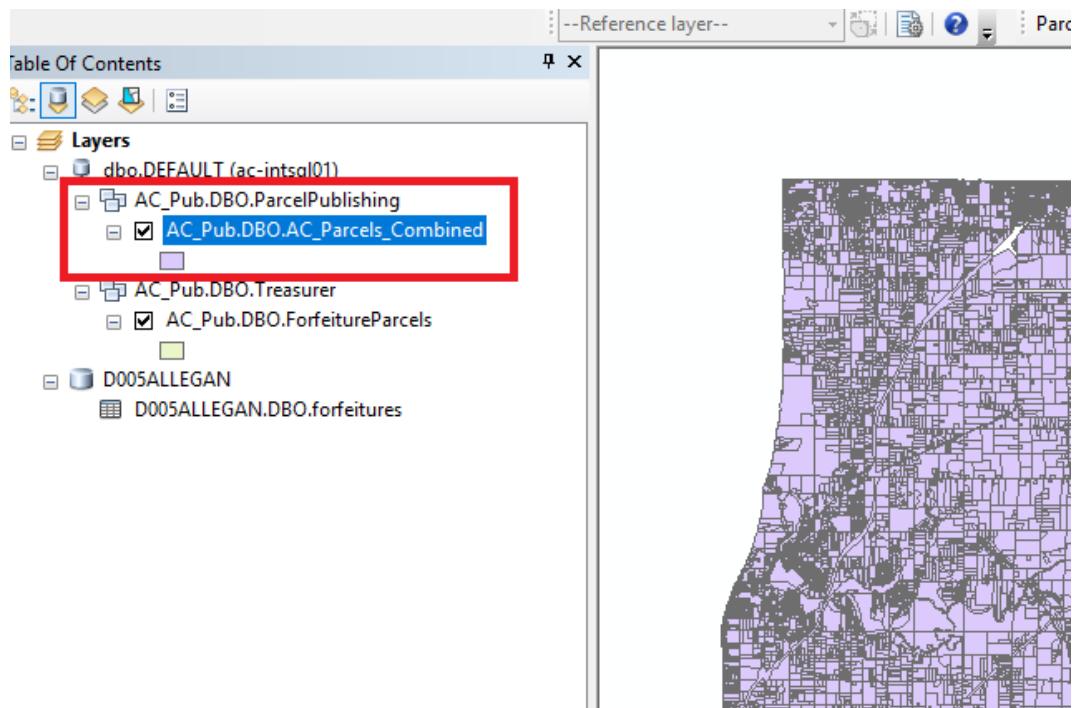


Figure 4.13: Parcels Layer Added

Create Join

Create new join to *ACParcelsCombined* of forfeitures on parcel numbers

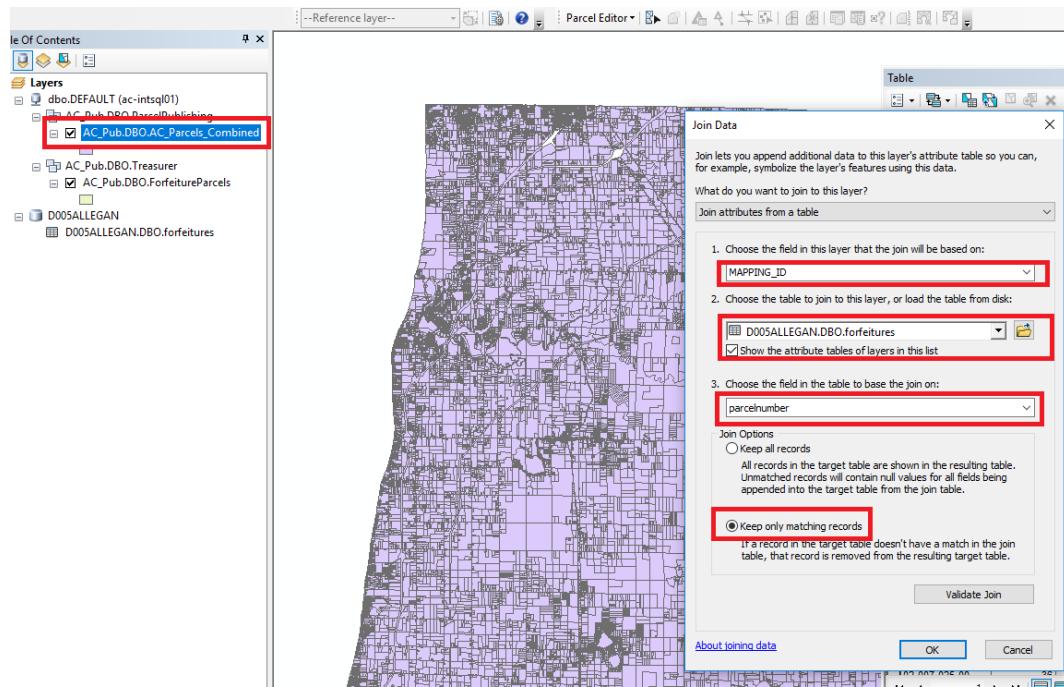


Figure 4.14: Join Parcels

Export Joined Features to a temp location

- Right click  on joined feature class in TOC and choose export

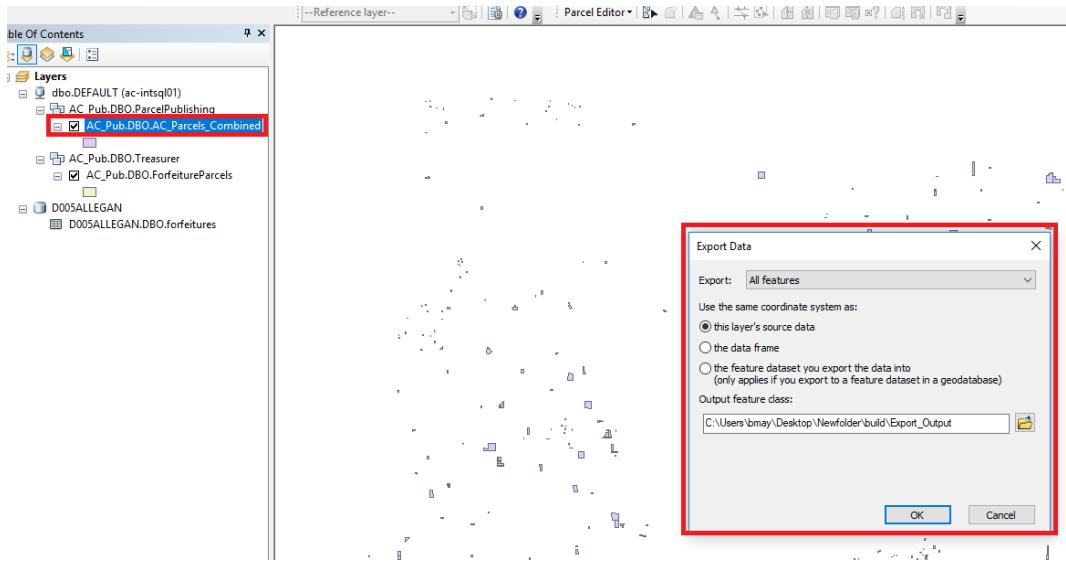


Figure 4.15: Export Joined Features

- choose location and press 

Load data from temp location to forfeitureParcels

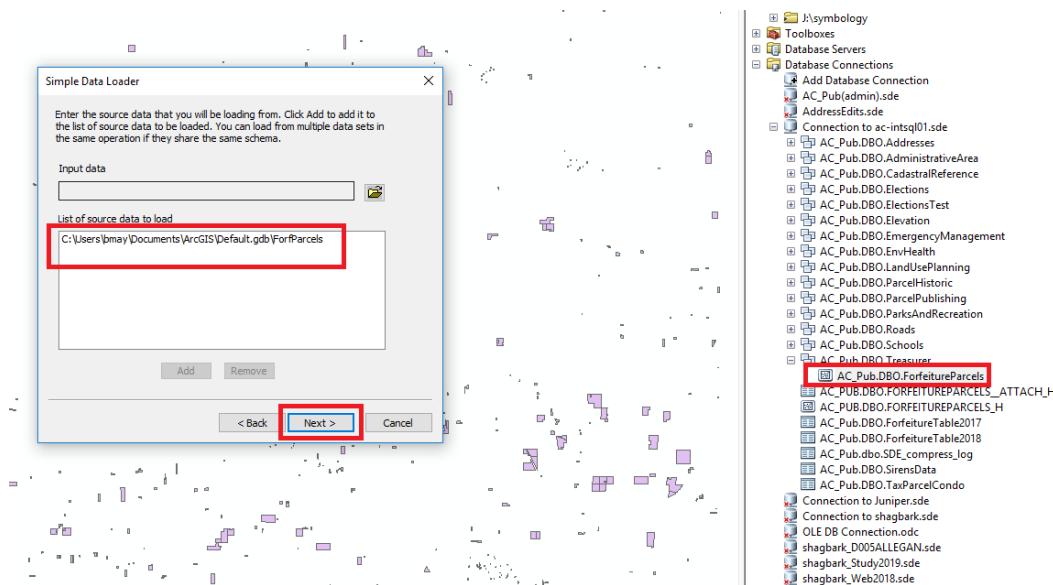


Figure 4.16: Load Data 1

push [Next]

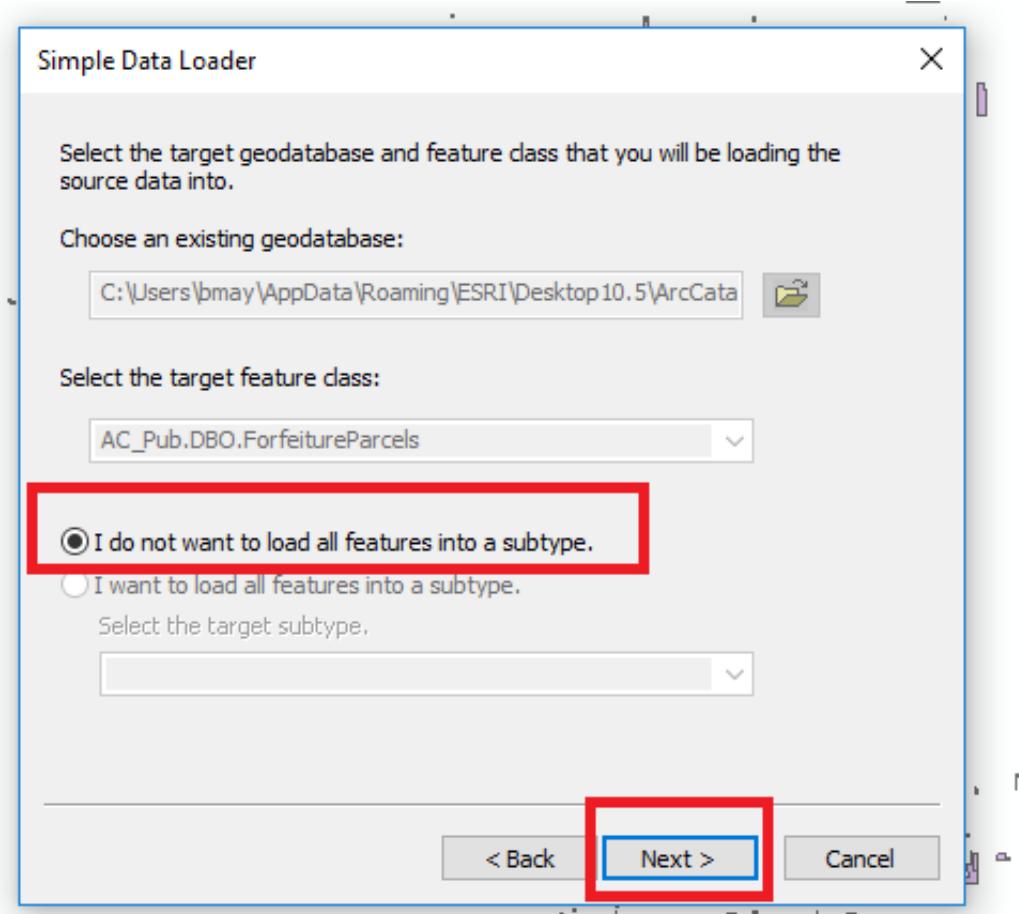


Figure 4.17: Load Data 2

Match these fields

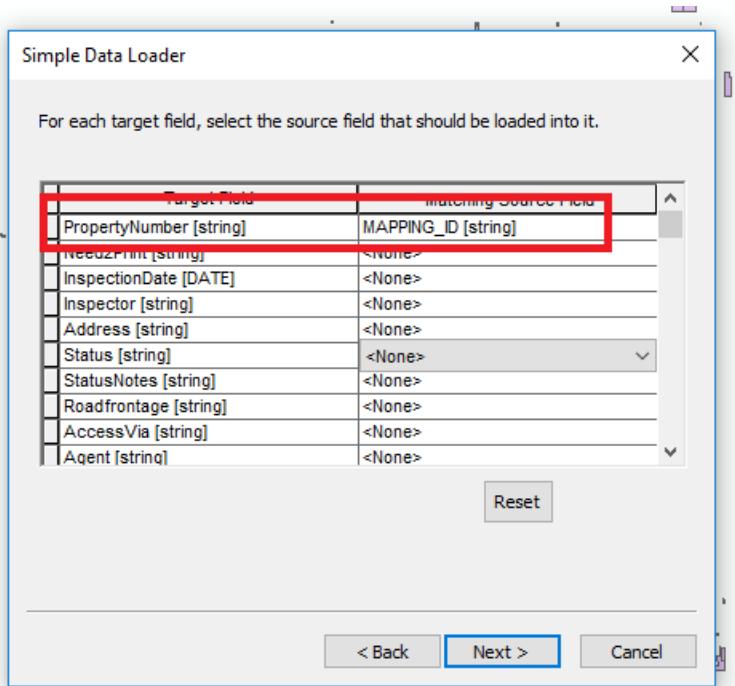


Figure 4.18: Match Fields 1

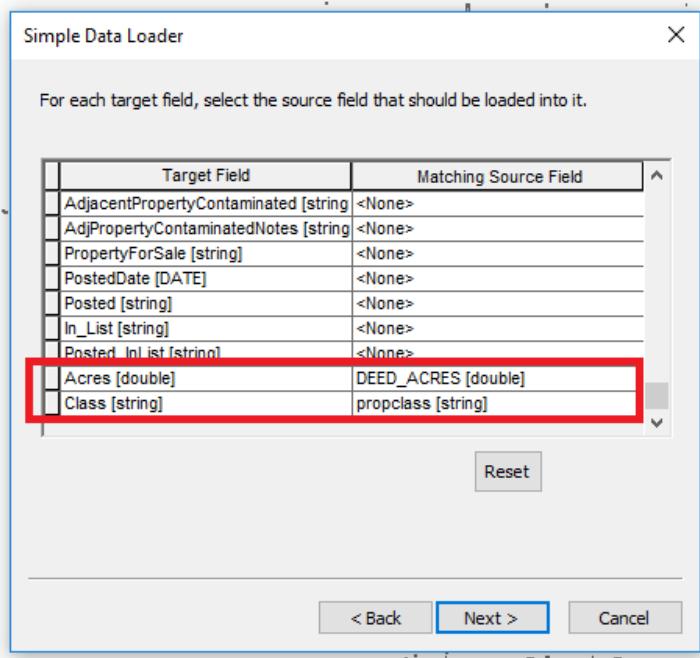


Figure 4.19: Match Fields 2

Push **Next**

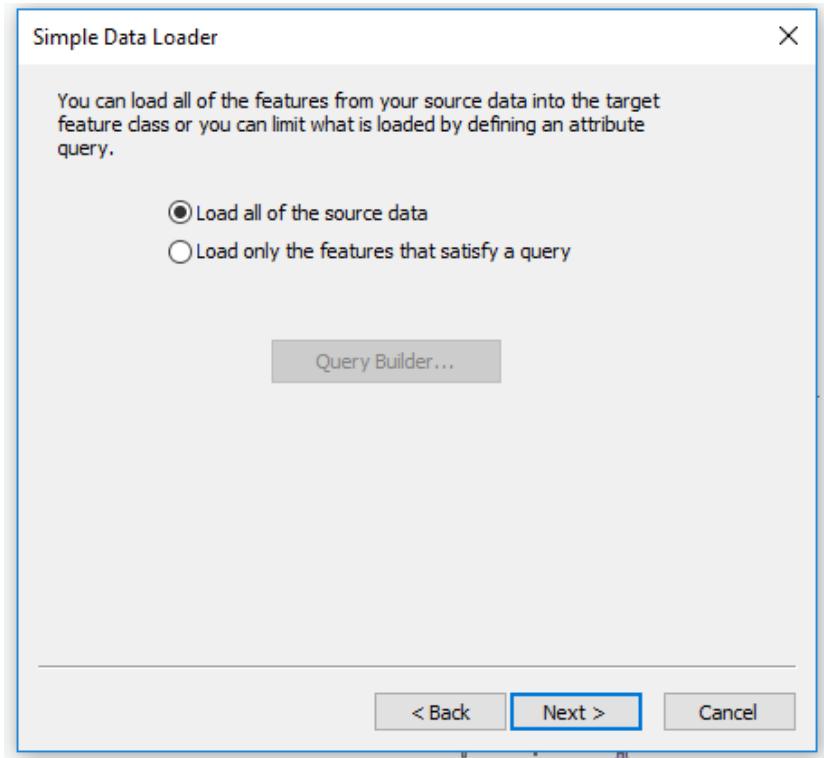


Figure 4.20: Load Data 3

Push **Finish**

Data Setup

Register as versioned and Add Global IDs

Right Click ➔ Manage ➔ Register as Versioned

and

Right Click ➔ Manage ➔ Add Global IDs

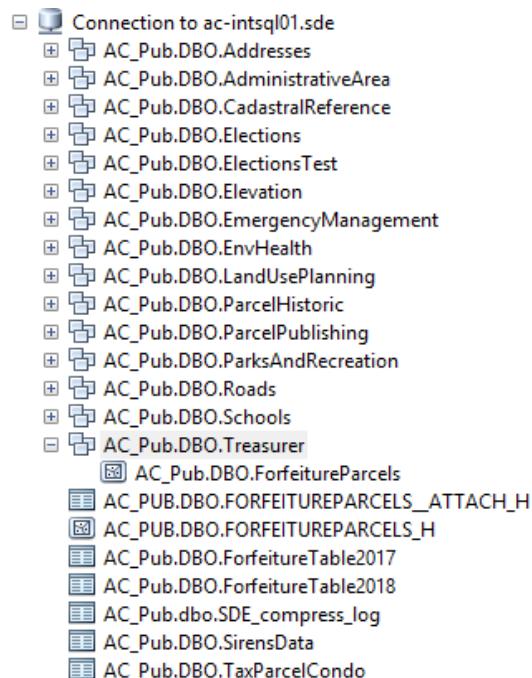


Figure 4.21: Setup Data

Create Attachments

Right Click Manage Add Attachments

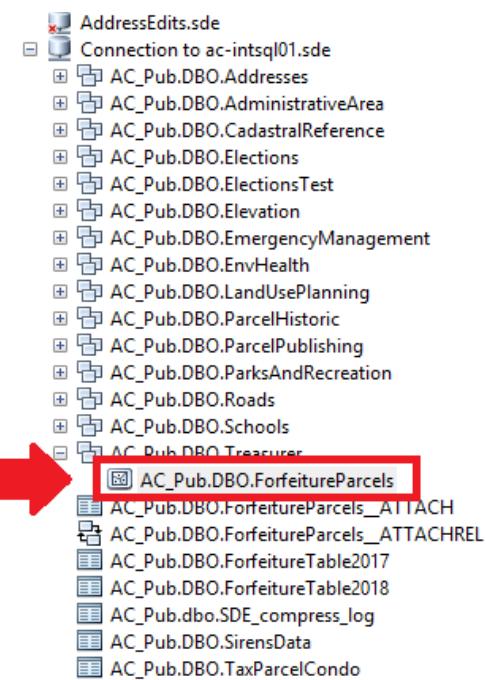


Figure 4.22: Create Attachments

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.

For any new users of the geoprocessing tools:

Use the create Database User tool

or

In Catalog ➔ Right click on ACpub ➔ Administration ➔ Add User

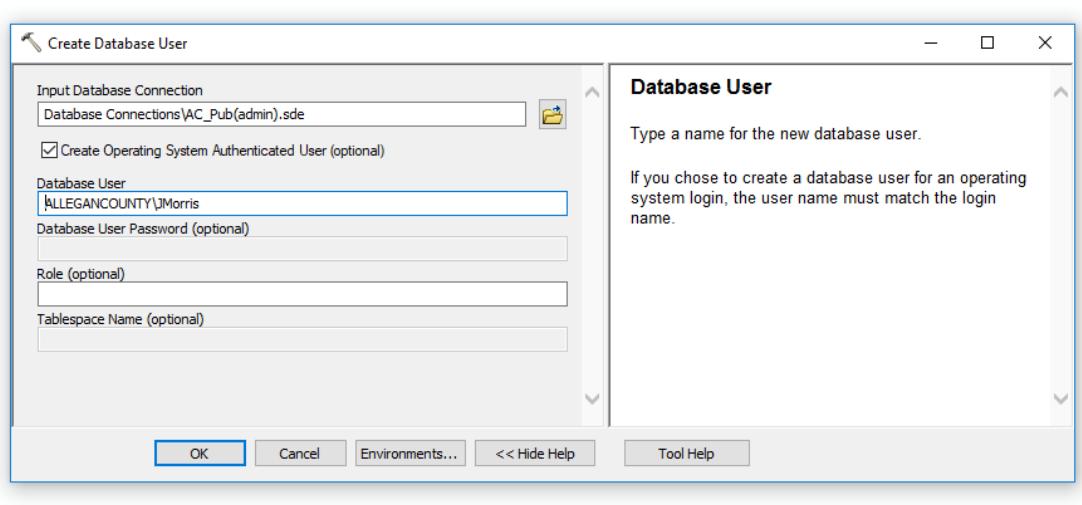


Figure 4.23: Add Db User

Add New User to Feature Dataset

In Catalog, right click on Treasurer Feature Data Set

Manage Privileges Add Type new user ok

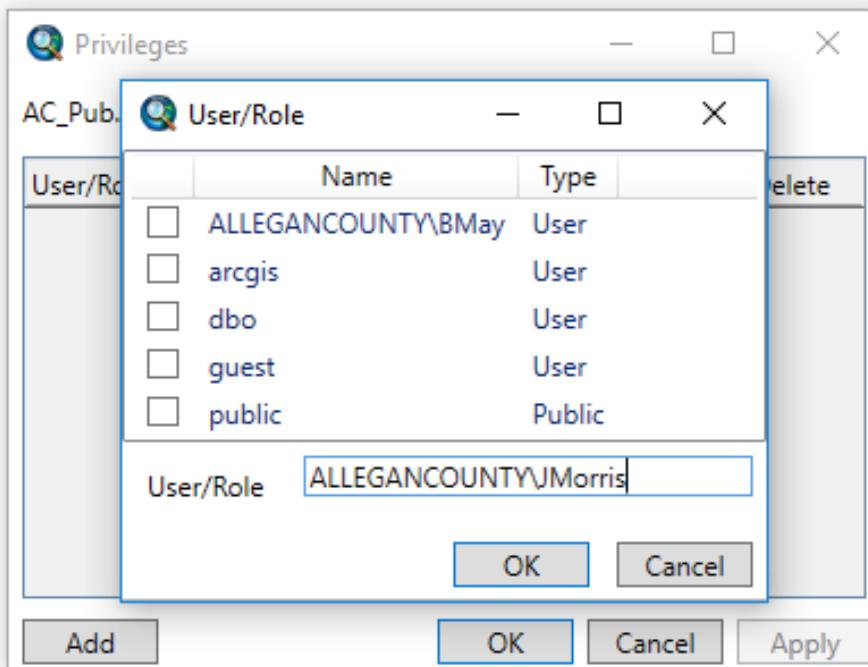


Figure 4.24: Add Feature Dataset User

Extend Privileges for New User

In Catalog ➔ right click on Treasurer FDS ➔ Manage ➔ Privileges ➔ check boxes

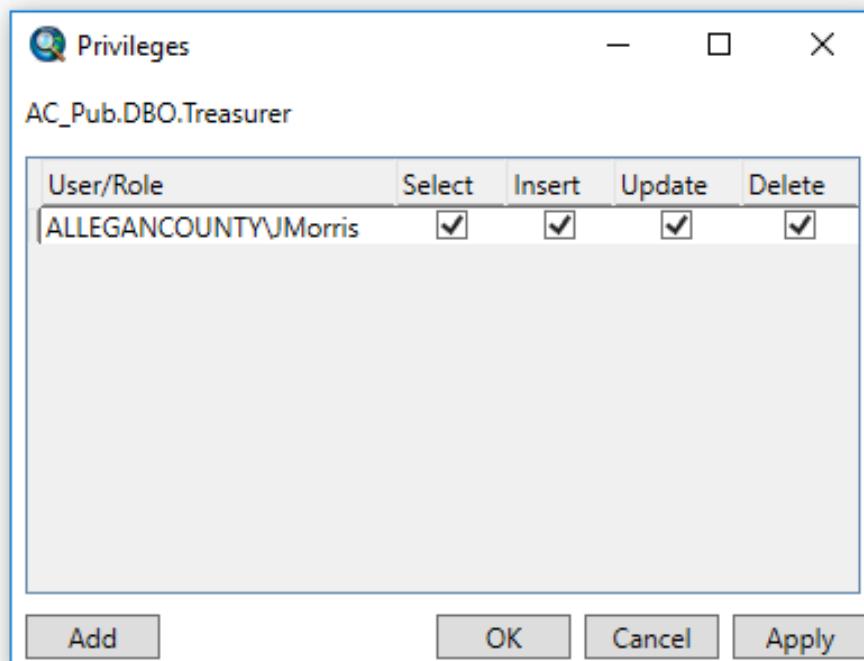


Figure 4.25: Extend Feature Dataset Privileges

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.

In Portal go to My Organization

The screenshot shows the 'My Organization' page of the Allegan County GIS Services portal. At the top, there's a navigation bar with links like Home, Gallery, Map, Scene, Groups, My Content, and My Organization. Below that is a search bar. The main content area has a blue header with the portal's logo and name. It displays a table of current members:

Name	Username	Last Login	Level	Role	Action
Bryan May	bmay531	Nov 2, 2018	2	Administrator	[Edit]
Christina Andress	CAndress	Sep 19, 2018	2	Administrator	[Edit]
Jennifer Morris	JMorris	Oct 18, 2018	2	Administrator	[Edit]
Neil Besteman	nbesteman	Oct 29, 2018	2	Administrator	[Edit]
Paula Reed	preed6	Feb 7, 2017	1	Viewer	[Edit]

To the right of the table is a sidebar titled 'Membership' with the following information:

- Members per level:
 - 1 of 30
 - 2 of 5
- Total Members: 5 of 35
- Find...
- The most viewed items
- The last items added
- Groups
- The organization's registered apps

Figure 4.26: Portal Add User 1

Add Members to Portal

Push add members  built in member

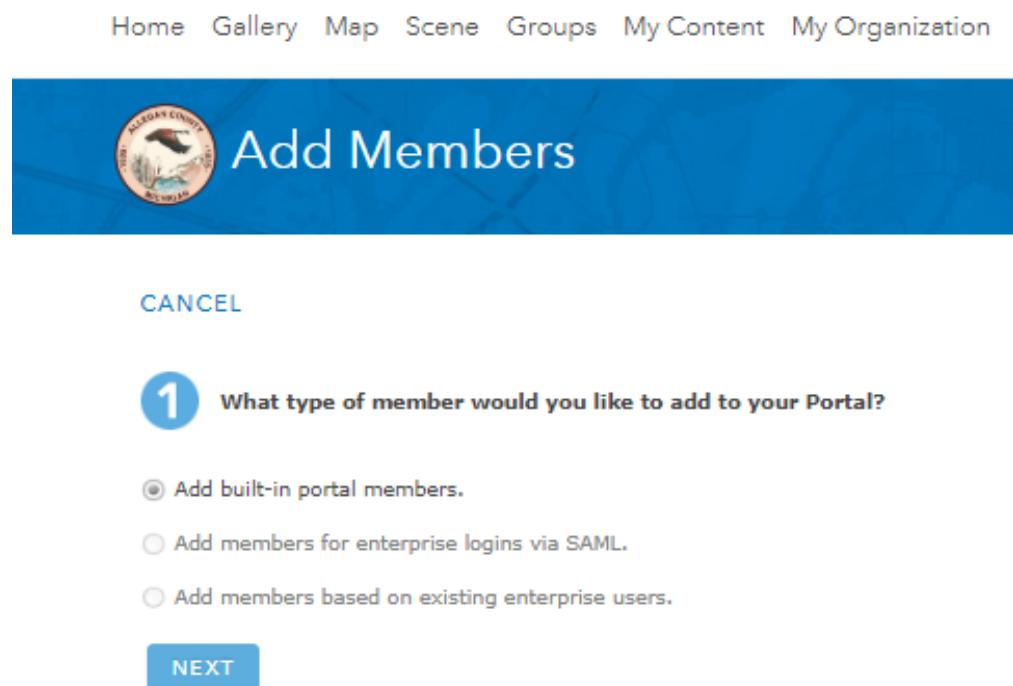


Figure 4.27: Portal Add User 2

Enter required info

The screenshot shows a web-based application titled "Add Members". At the top left is the Allegan County GIS Services logo. To its right, the title "Add Members" is displayed in large white font on a blue header bar. Below the header, there is a "CANCEL" link on the left. A large blue circular icon containing the number "2" is positioned on the left side of the main content area. The main content area contains instructions: "Create new Allegan County GIS Services logins one at a time or in batch from a file. Select any role for the member to be a part of. You must inform the member of their user name and password. If you do not have an email address for a particular user, use the administrator's email address." A red error message "Password may not be less than 8 characters." is visible above the password input field. There are two tabs at the top of the form: "One at a time" (selected) and "From a file". The form fields include: Email (input field), First Name (input field), Last Name (input field), Username (input field), Password (input field), Level (radio buttons 1 and 2, with 2 selected), and Role (dropdown menu set to "Publisher"). At the bottom are three buttons: "BACK", "ADD ANOTHER" (highlighted in green), and "REVIEW ADDITIONS".

Figure 4.28: Portal Add User 3

Manage Treasurer Group

In Portal ➔ Go to groups ➔ Invite new user to the group

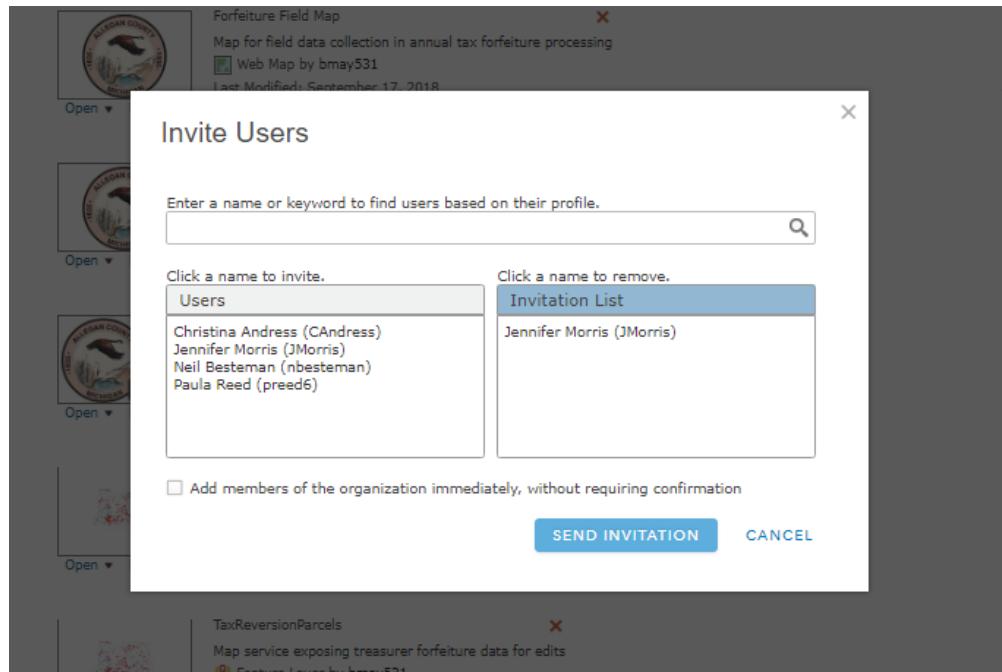


Figure 4.29: Portal Add User 4

Share Content To The Group

Any content used by the group needs to be shared to the group

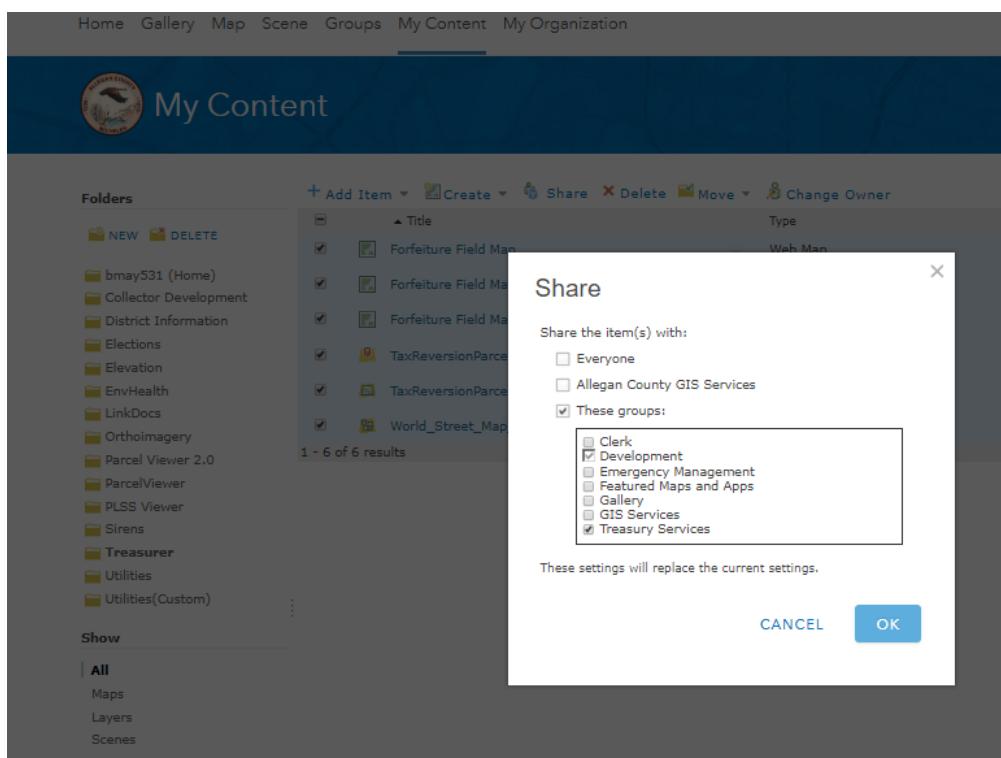


Figure 4.30: Portal AddUser 5

Schema Change Procedure

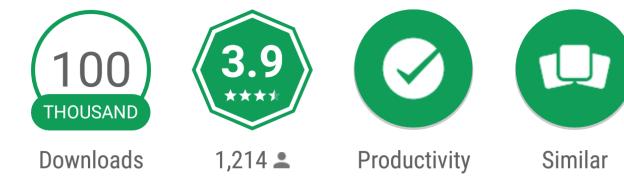
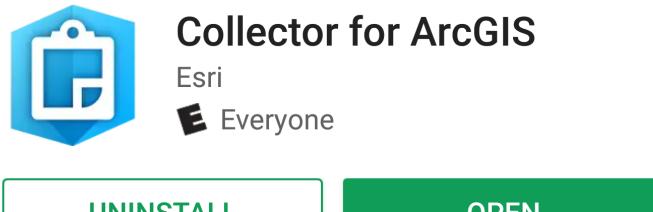
Form Edits Procedure

USER MANUAL

Collection Device Setup

Install Collector for ArcGIS

- Available from the Google Play Store



Accurate Data Collection Made Easy



WHAT'S NEW

- Various bug fixes and improvements

[READ MORE](#)

Figure 4.31: Download the App

Configure Collector

for Organization Website, Type:

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

Press [Continue] ↗

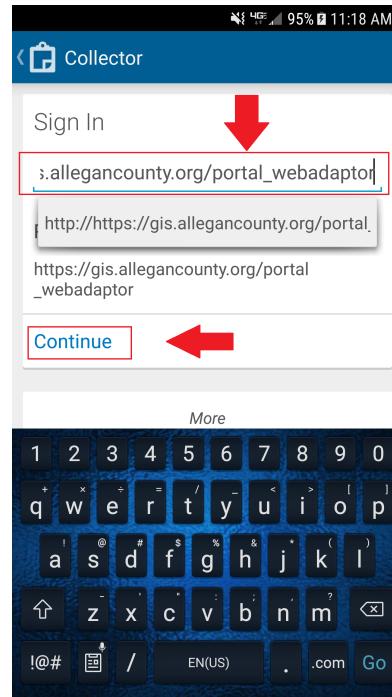


Figure 4.32: Collector Connection

Enter Credentials

Press [SIGN IN] ↗

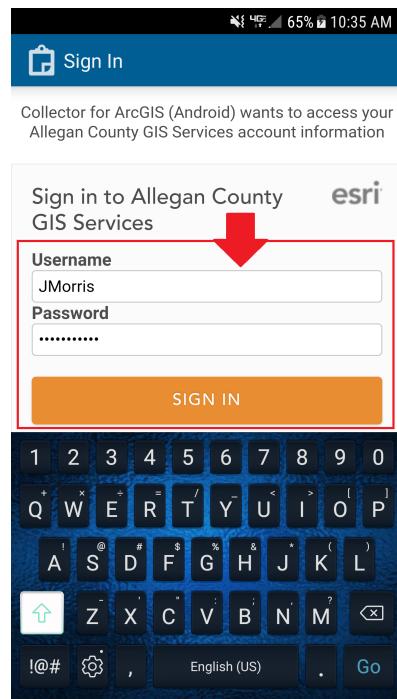


Figure 4.33: Enter Credentials

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

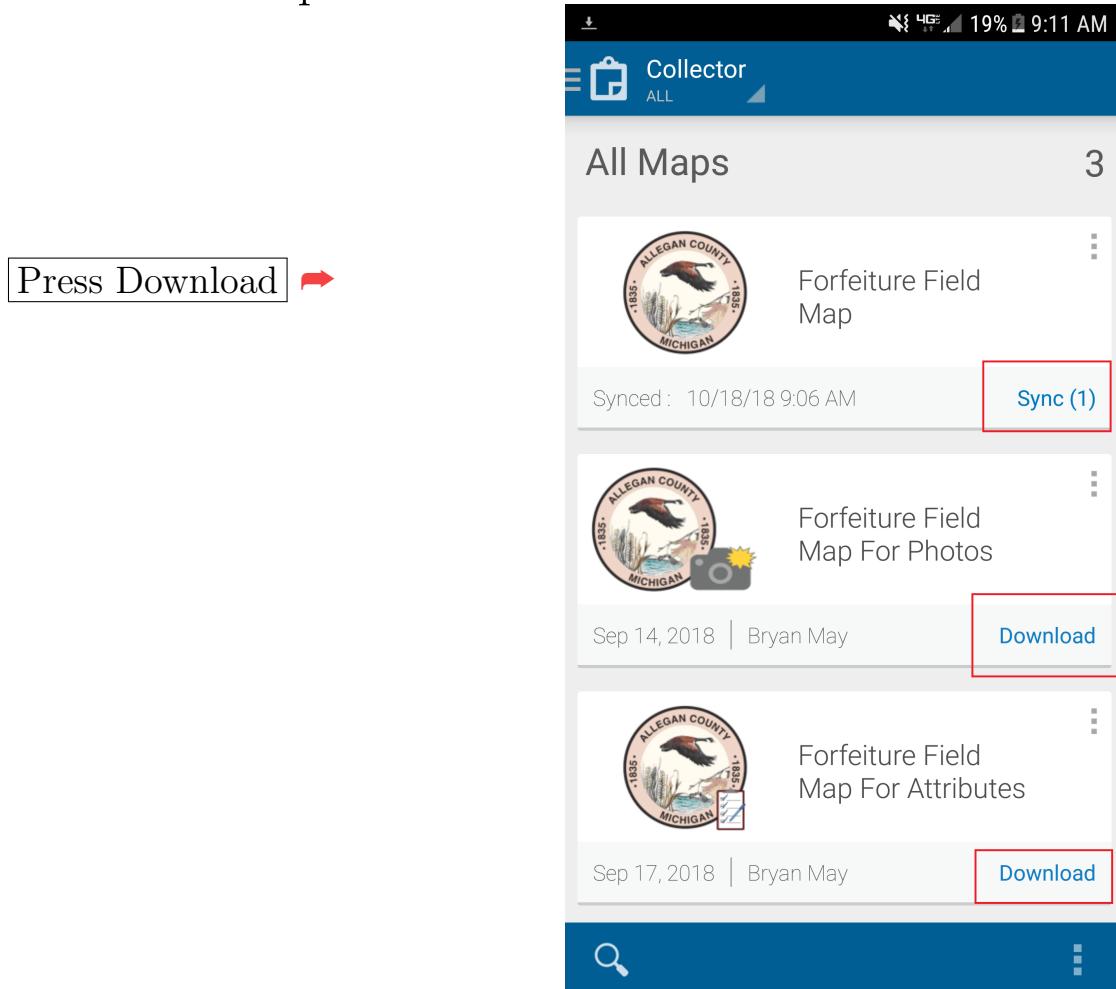


Figure 4.34: Collector Maps Menu

Specify work area

Choose Map Detail 

Note that a larger area takes longer to download but the basemap only needs to be downloaded once

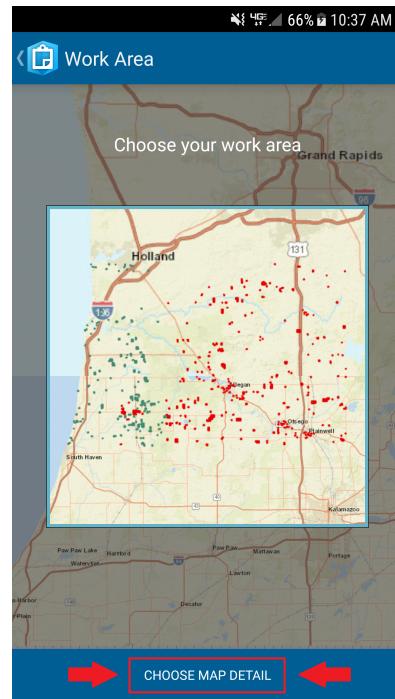


Figure 4.35: Choose Work Area (large)

Choose Map Detail

Zoom into the level of detail desired.

Press **Download** ➡

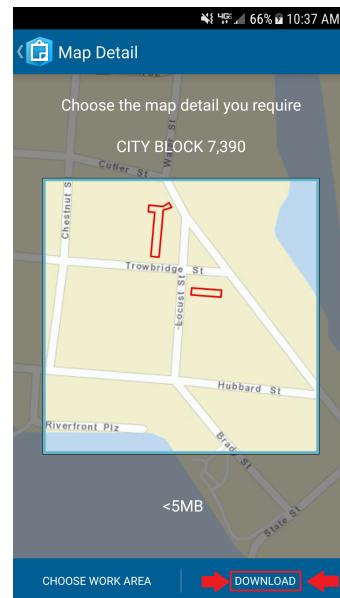


Figure 4.36: Choose Map Detail

This area is ready for field data collection ➡

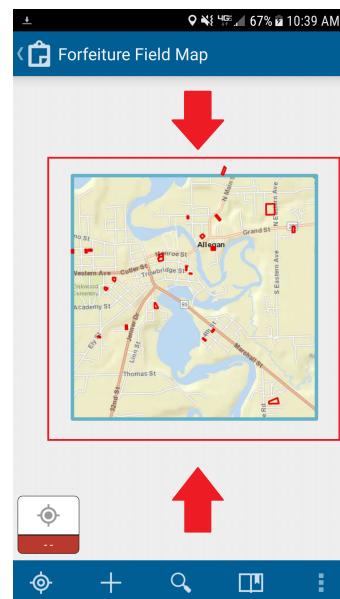


Figure 4.37: Map on Device

Open Camera Application Setup Details

Install Open Camera

- Available from the Google Play Store

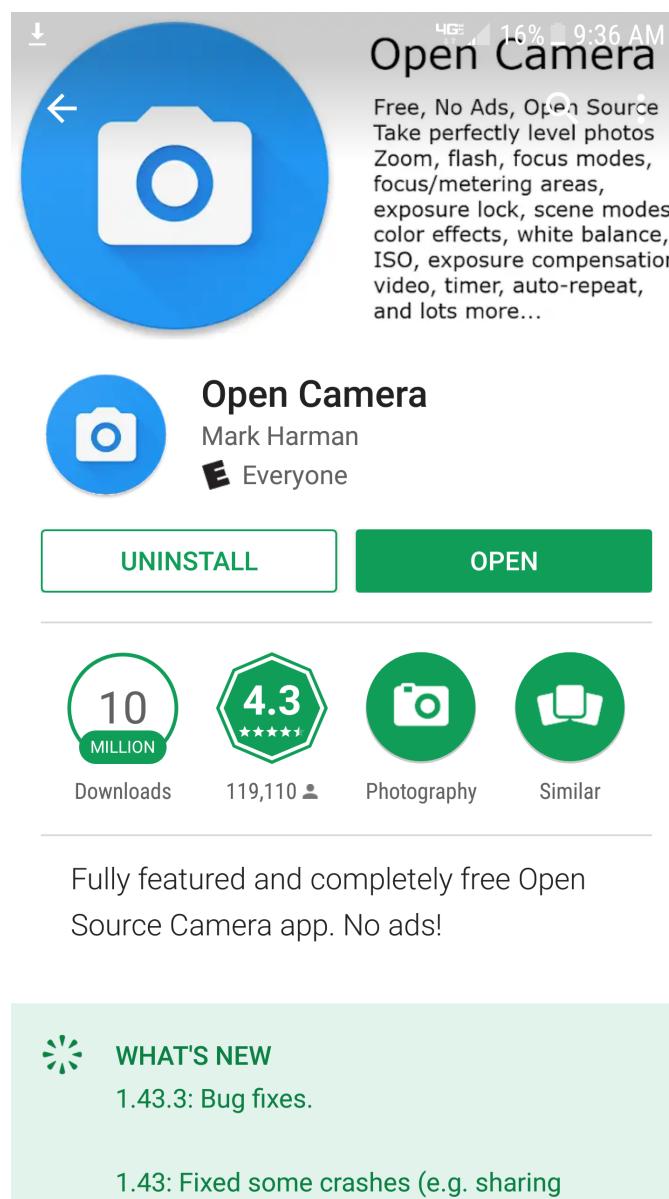


Figure 4.38: Open Camera from Google Play Store

Configure Open Camera

In the Open Camera App:

Settings 

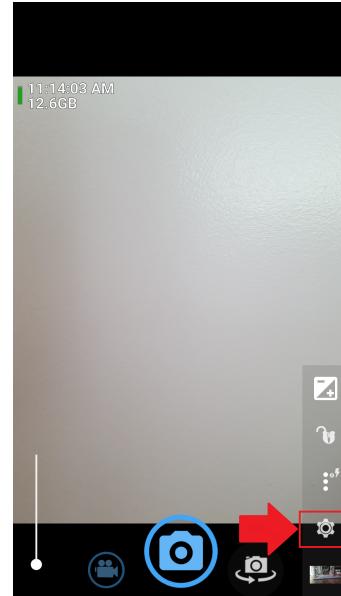


Figure 4.39: Find Settings Menu

Photo Settings 

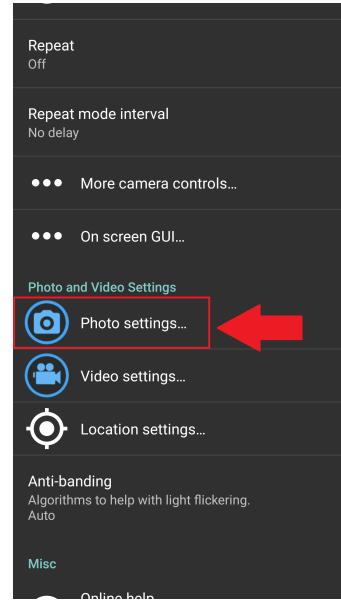


Figure 4.40: Setting Screen

Set Photo Resolution

In the Open Camera App:(cont.)

Camera Resolution ➔

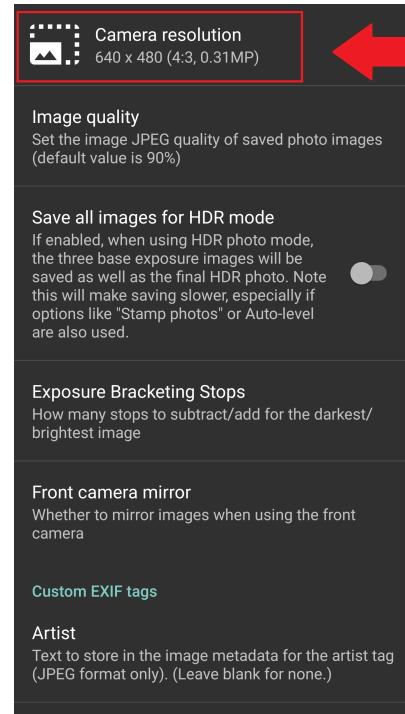


Figure 4.41: Photo Settings Menu

640 x 480 ➔

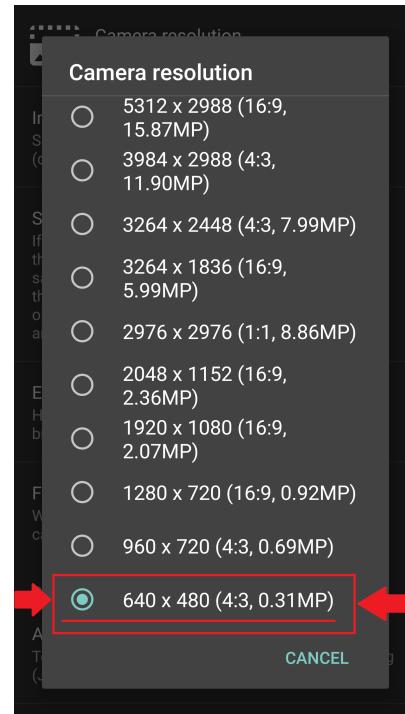


Figure 4.42: Camera Resolution Setting

Preprocessing Routine

Each day the data must be prepared by executing the tool:

1. Preprocess

What the tool does:

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

To use the preprocess tool:

In the Catalog window, navigate to:

J:\Departments\Treasury\Apps\Forfeiture\processing\ForfeitureToolbox.tbx

Open the toolbox ➡

1.Preprocess ➡

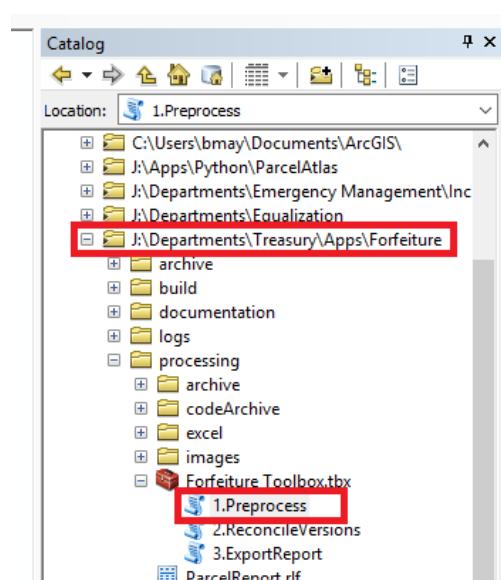


Figure 4.43: Processing Tools

Synchronize the Forfeiture Field Map

Note the date and time

Sync ➔

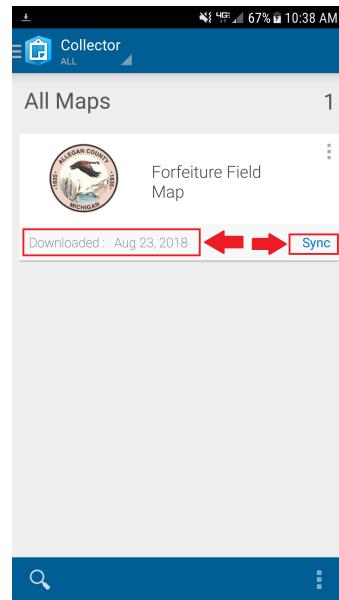


Figure 4.44: Map Downloaded

Note the date and time

Map is synchronized ➔

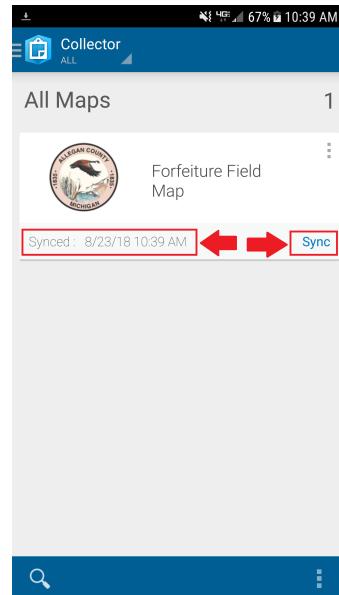


Figure 4.45: Map Synchronized

Field Data Collection

Data Entry Details

Attributes are of four entry types:

- Prefilled (in preprocessing)
- Autofill
- Dropdown
- Text box

Mobile Device Summary

For each site visited,

- Select the desired parcel
- Push the edit button
- Collect attributes or photos

Device 1 Field Operation

Select a Parcel ➔

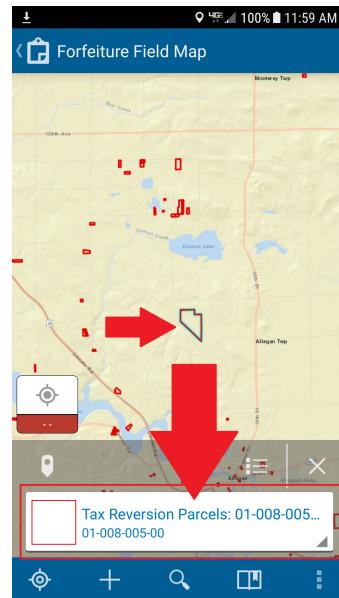


Figure 4.46: Select a Parcel

Edit ➔

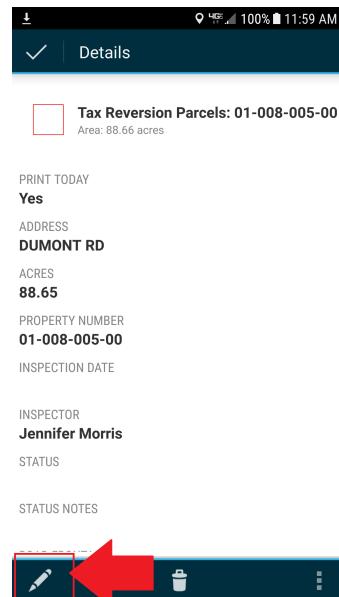


Figure 4.47: Push Edit

Device 1 Field Operation

(cont.)

Print Today ➔

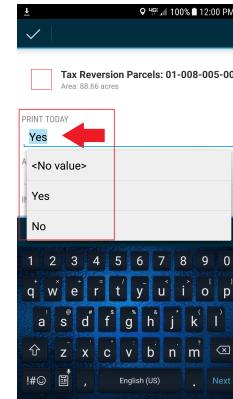


Figure 4.48: Yes or No

Date ➔

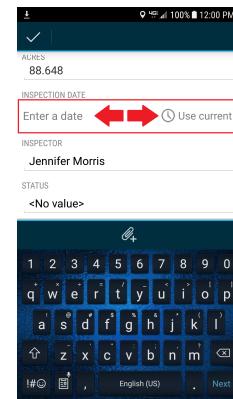


Figure 4.49: Enter Date

Inspector ➔



Figure 4.50: Select Inspector

Device 1 Field Operation

(cont.)

Status ↗

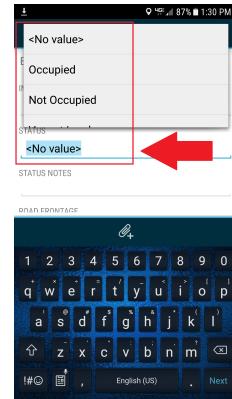


Figure 4.51: Occupied or Not

Status Notes ↗

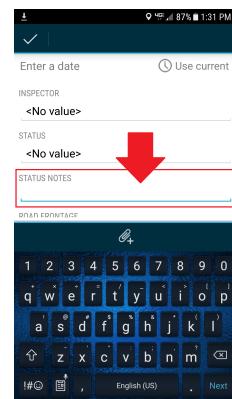


Figure 4.52: Enter Text

Road Frontage ↗

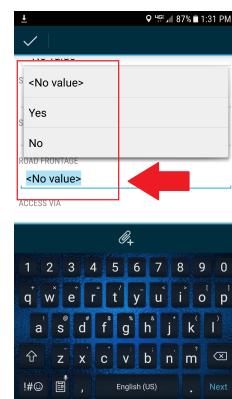


Figure 4.53: Yes or No

Device 1 Field Operation

(cont.)

Access Via 

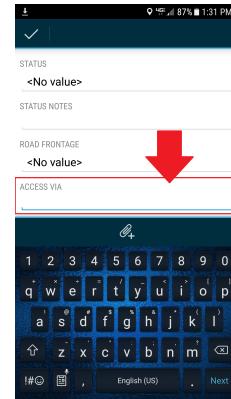


Figure 4.54: Enter Text

Agent 

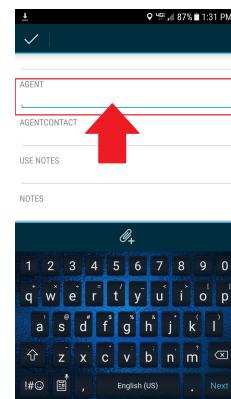


Figure 4.55: Enter Text

Agent Contact Info 

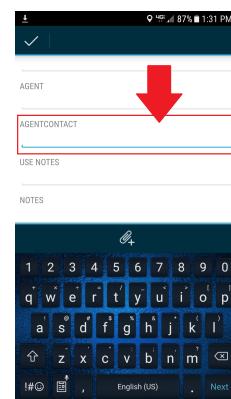


Figure 4.56: Enter Text

Device 1 Field Operation

(cont.)

Property in Use 

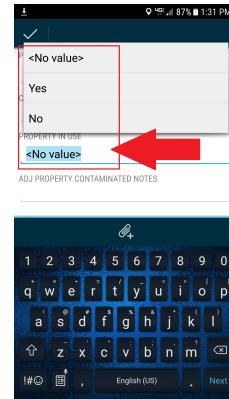


Figure 4.57: Yes or No

Use Notes 

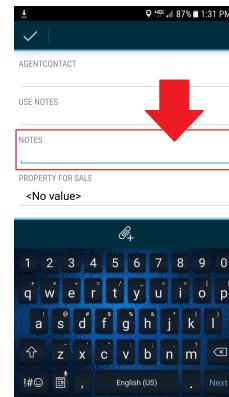


Figure 4.58: Enter Text

Property Maintained 

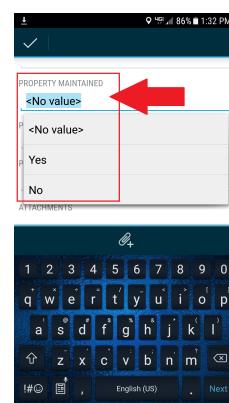


Figure 4.59: Yes or No

Device 1 Field Operation

(cont.)

Maintenance Notes

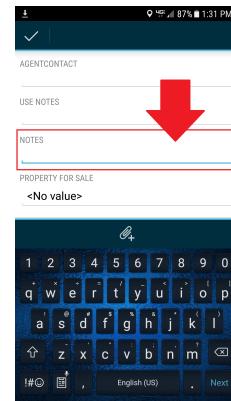


Figure 4.60: Enter Text

Property Contaminated

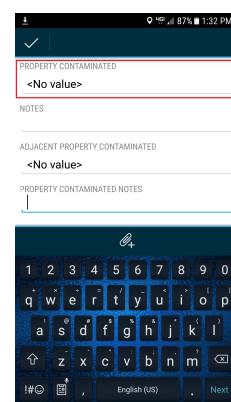


Figure 4.61: Prefilled

Property Contaminated Notes

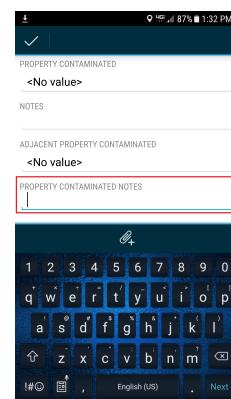


Figure 4.62: Enter Text

Device 1 Field Operation

(cont.)

Forfeiture Posted 

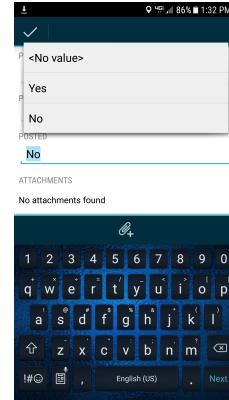


Figure 4.63: Yes or No

Adjacent Property Contaminated 

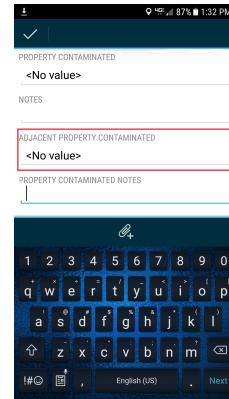


Figure 4.64: Prefilled

Adjacent Property Contaminated Notes 

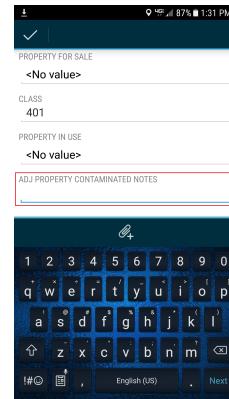


Figure 4.65: Prefilled

Device 1 Field Operation

(cont.)



Figure 4.66: Yes or No

Device 2 Field Operation

Select a Parcel 



Figure 4.67: Select Parcel

Attachment 

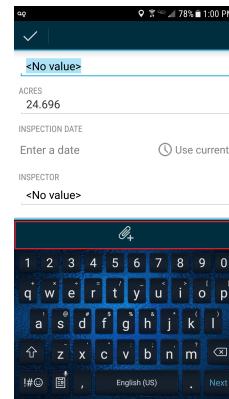


Figure 4.68: Add Attachment

Gallery 

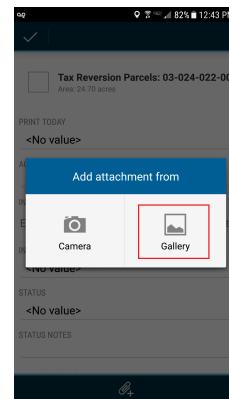


Figure 4.69: From Gallery

Device 2 Field Operation

(cont.)

Open Camera Folder 

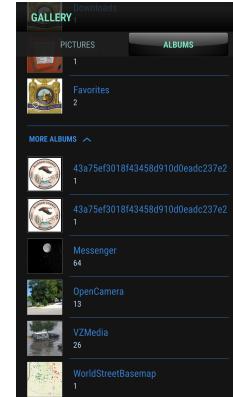


Figure 4.70: Camera Folder

Select Image 

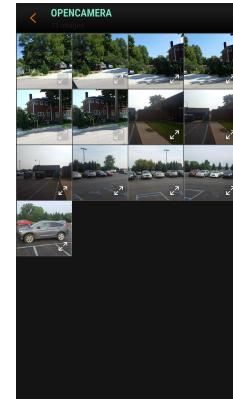


Figure 4.71: Select Image

Attach Image 

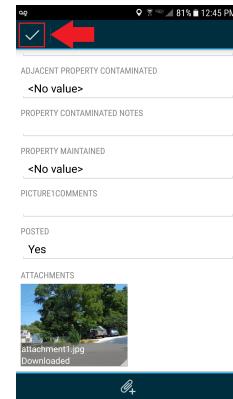


Figure 4.72: Push Check Mark

DAILY POSTPROCESSING ROUTINE

Synchronize Data

Any devices that were used for field data collection must be synchronized with the network production data.

Synchronize the Field Collection Devices

So, if two devices were used:

On Device 1:

Sync Attributes 

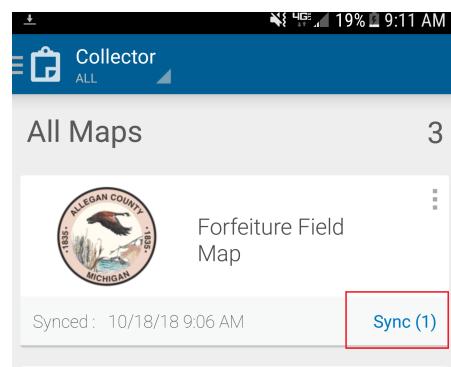


Figure 4.73: Sync

On Device 2:

Sync Photos 

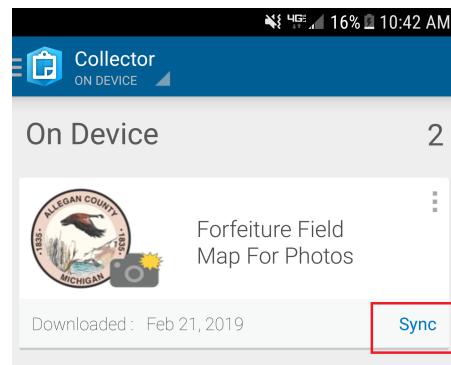


Figure 4.74: Sync Photos

Reconcile Versions and Print Report

Each device that is synchronized corresponds to a version within the geodatabase.

The versions must be reconciled with the tool:

2. Reconcile Versions and Compress

Reconcile

2. Reconcile Versions and Compress ➔

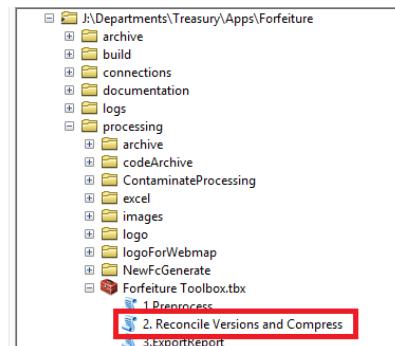


Figure 4.75: Double Click

Reconcile Versions and Print Report (cont.)

Inspection reports are generated by running the tool:

3. Export Report

Print Reports

3. Export Report 

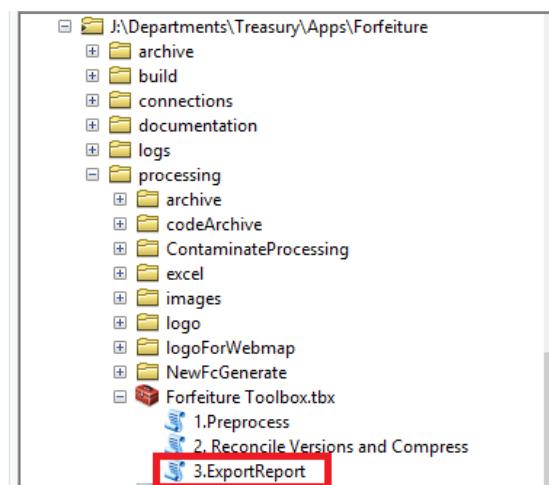


Figure 4.76: Double Click

SOFTWARE

ESRI Licensed Products

ArcDesktop

(Users need a license to ArcGIS Standard level)

Enterprise ArcGIS Deployment

(This app uses ArcGIS Server and ArcGIS Portal)

Collector for ArcGIS

ArcGIS Collector is available at the Google Play Store.

(Developed and tested on Android(7.0))

Other Software

Open Camera for Android

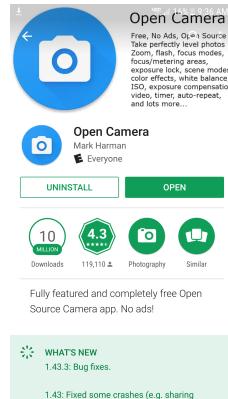


Figure 4.77: Open Camera from Google Play Store

5

Tools

5.1 BSA SUPPORT

5.1.1 ADDING A LAYER TO THE BSA GIS

TOOL SUMMARY

Background

B S And A features a GIS toolset that requires data layers to be added to map documents for visualization.

B S AND A is used within Equalization and by local assessors throughout the county.

Why the Tool is Needed

B S And A Users often ask ACGIS for data and assistance in using the data.

Who the Tool is For

User knowledge of B S And A.

B S And A installed.

GIS data source files on the local machine.

Takeaway

With the necessary data files, any B S And A user can add layers to a map within B S And A GIS

ADD AN IMAGERY LAYER

Step 1: Edit GIS Settings

In **Program Setup** ⇒ Select **GIS Settings...**

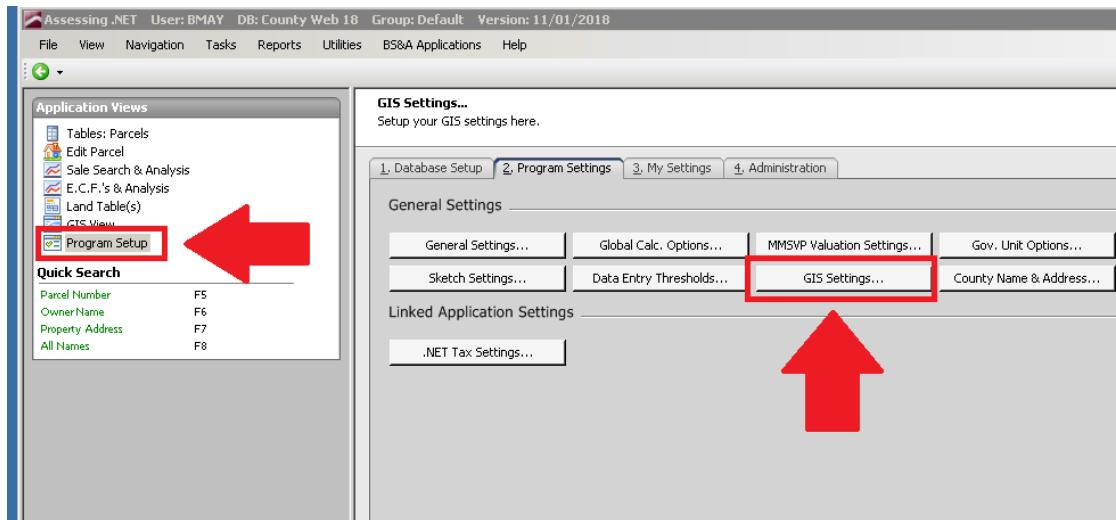


Figure 5.1: BSA Program Setup

Step 2: Select Map To Edit

In **GIS Settings** ⇒ **Map Collections** ⇒

Double click on the map that you want to add a layer to

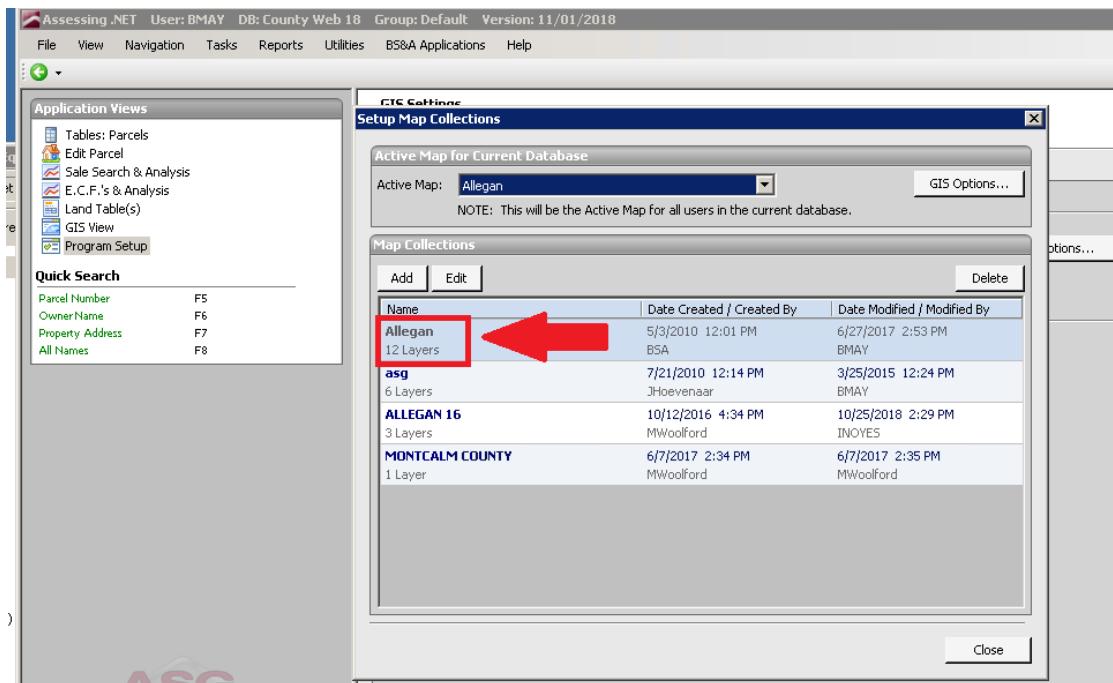


Figure 5.2: GIS Setup

Step 3: Add Layer

Setup Layers ⇒ **Add**

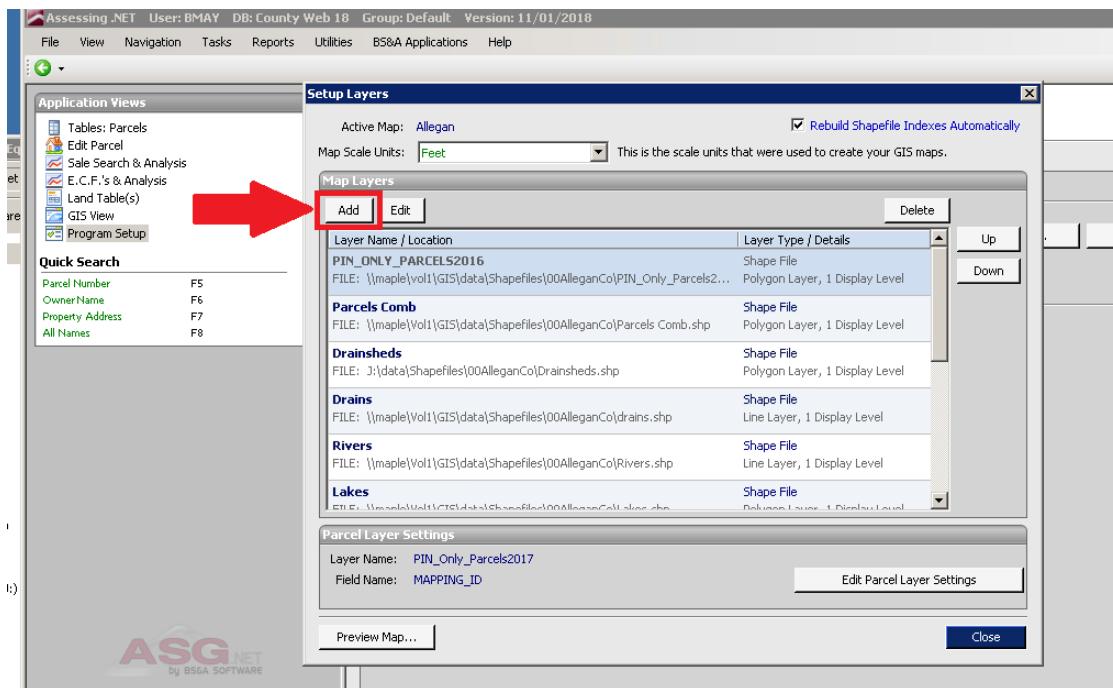


Figure 5.3: Layers Setup

Step 4: Select Layer Type

Setup Layers ⇒ **Image** ⇒ **OK**

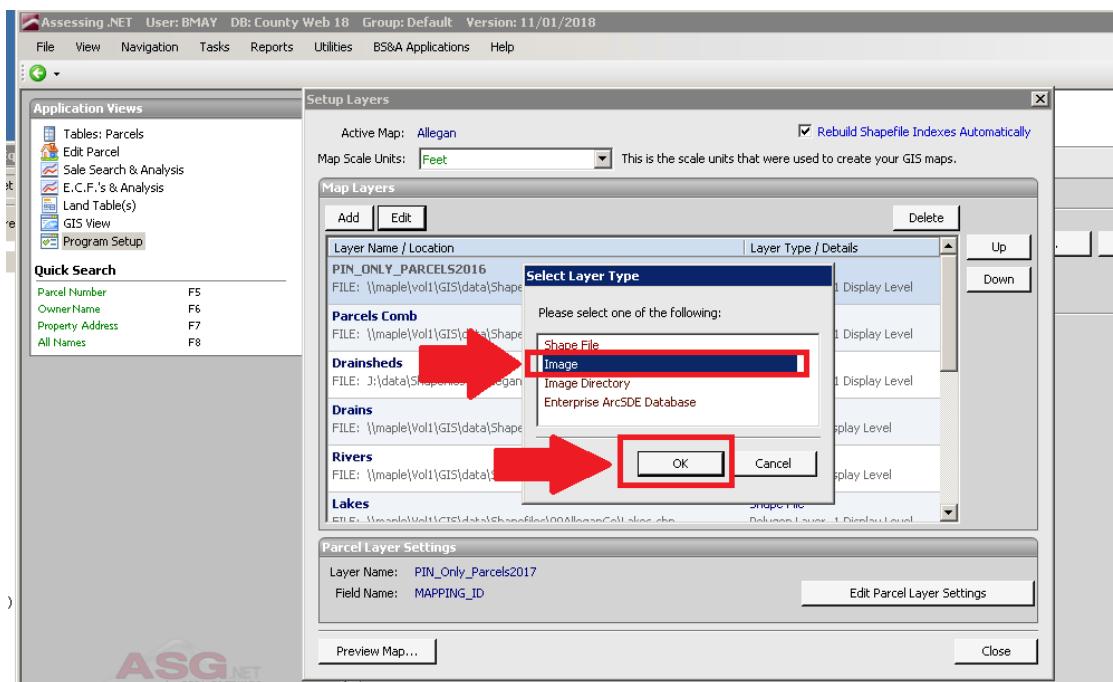


Figure 5.4: Select Layer Type

Step 5: Add Layer From Local Drive

Navigate to Image File \Rightarrow Open

*image files are often file type .sid

*layer files are often file type .shp

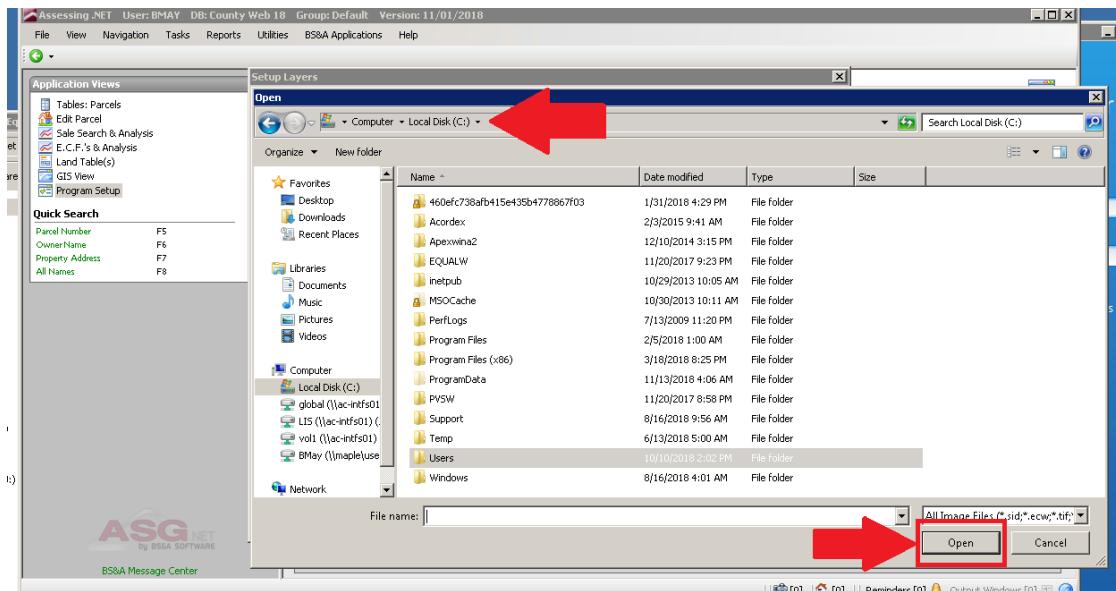


Figure 5.5: Add Layer From Drive

The new image should now be in the map

5.2 CORE DATA

5.2.1 CONTROL POINTS

MAINTAINING CADASTRAL CONTROL POINTS

Install the Fabric Point Move to Feature Addin

⇒ Push the Configure Button

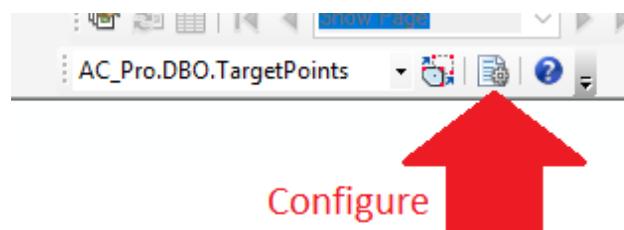


Figure 5.6: Fabric Point Move to Feature Addin

Configure Addin

- Set Reference Feature Layer to TargetPoints
- Use point to point matching
- Use point layer field: PointID

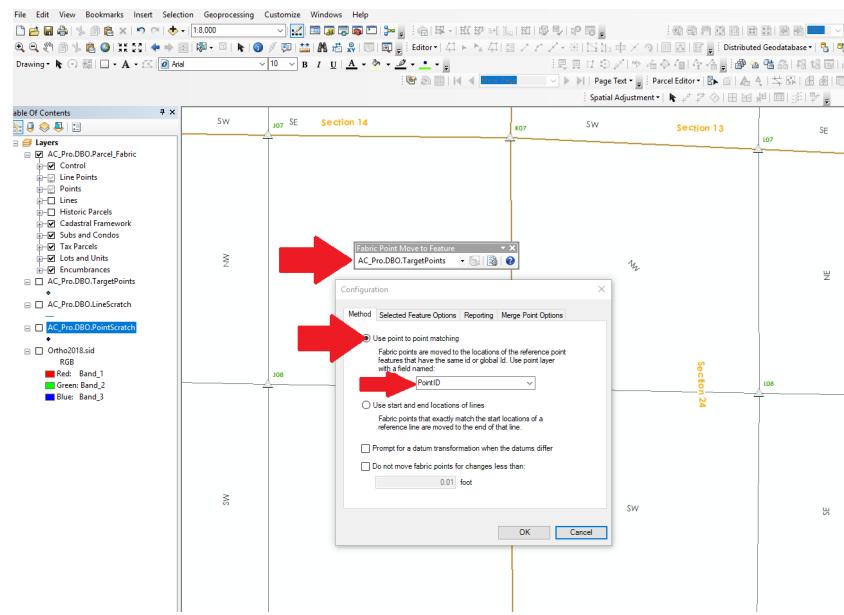


Figure 5.7: Addin Configuration Method

2

Configure Fabric Point Move to Feature addin Selected Feature Options

Move Fabric Points of the Selected Parcels

Push OK

FabricPointMoveToFeatureConfigSelectedFeatures.png

3

Identify position of new control point

Select TargetPoints in Create Features Templates

Create Target Point at location for new Control Point

createTargetPoint.png

4

Use Identify tool to find ObjectId of Control Point that is to be moved

Select the Target point PointID of the point its moving to

Edit Target Point pointID attribute to match associated fabric control point OID

updateTargetPointPointID.png

4.5

Push move point button

moveControlPoint.png

5

Open maintain control point tool

Select control Point

push edit button

maintainControlPointTool.png

6

Use Identify Tool to View X and Y vals for the point

copy x and y value from point(attribute window) to Control (maintain control tool)

push update

Save Edits

transferCoordinates.png

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

5.3 CORE DATA SCHEMA

PROBLEM AND ANALYSIS

Background

Allegan County GIS Services builds and maintains the geographic dataset used in workflows in and out of county government.

Equalization and GIS Services. Data is shared with EH, EQ, Dispatch and the public.

Statement of Problem

Geographic data must be both maintained and shared. Data is maintained by

Analysis

Here is where analysis of this problem goes

DESIGN

Overview

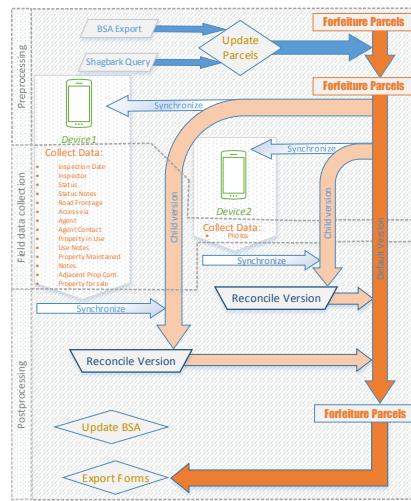


Figure 5.8: Project Design

5.3.1 PRODUCTION DATA AC PRO

DOMAINS

Directory Location

Managed at this location:

This PC > LIS (\ac-intfs01) (J:) > Apps > Python > LayerUpdates > AC_ProDevelopment > domains			
	Name	Date modified	Type
	domainTables	1/22/2019 11:48 AM	File folder
	DomainMaintenance.txt	1/22/2019 10:14 AM	Text Document
	MasterStreetNamesDev.xlsx	1/16/2018 4:57 PM	Microsoft Excel
	ProDomainsDev.xlsx	1/22/2019 11:23 AM	Microsoft Excel
	README.txt	12/18/2017 8:37 AM	Text Document
	roadTYPE.txt	12/29/2017 1:27 PM	Text Document

Figure 5.9: Directory Location of Workspace

Domain Documentation

This is where...
⇒ Push the Configure Button

5.4 ESRI TOOLS

5.4.1 COGO Tools in ArcGIS

TEXT

5.5 GIS ADMINISTRATION

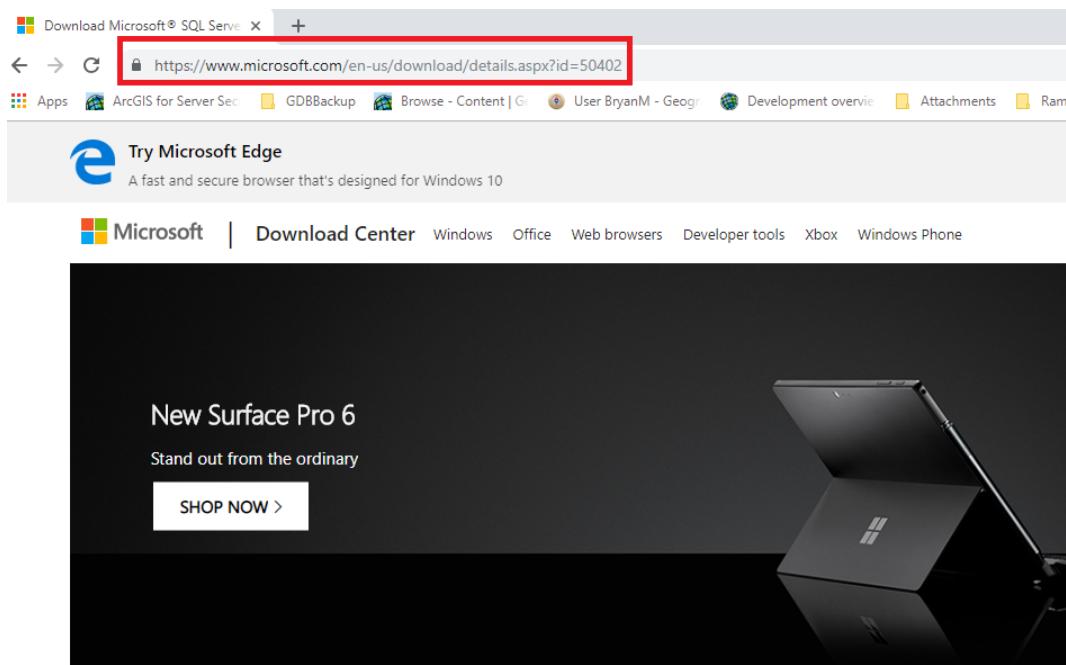
5.5.1 NEW CONNECTIONS IN ARCCATALOG

INSTALL SQL SERVER ON CLIENT MACHINE

On client machine:

For any machine to connect to the Enterprise Geodatabase, SQL Server Native Client must be installed locally.

Search for sql server native client download on the internet



Microsoft® SQL Server® 2012 Native Client - QFE

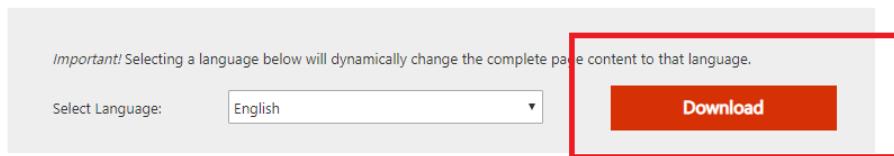
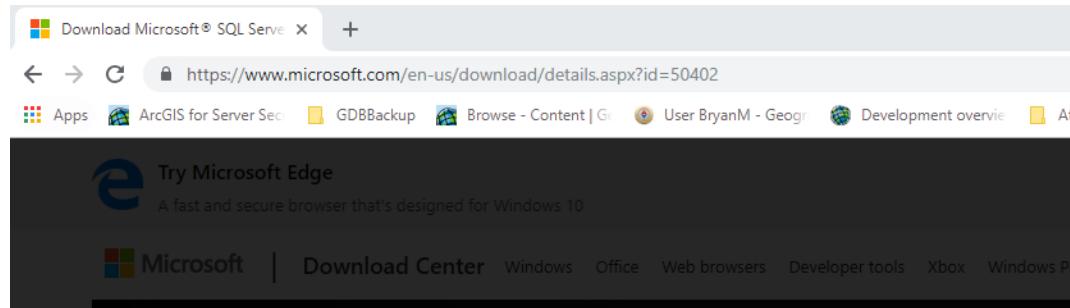


Figure 5.10: SQL Server Client Search

Select appropriate Version

Decide whether to get the 32bit or 64bit version



Choose the download you want

File Name	Size
ENU\x64\sqlIncli.msi	For 64bit OS 4.8 MB
ENU\x86\sqlIncli.msi	For 32 bit OS 3.0 MB

Figure 5.11: SQL Server Client Search Choose

Download and Install

CONNECT ARCGIS TO A SQL SERVER DATABASE

In Catalog:

Double click on add database connection

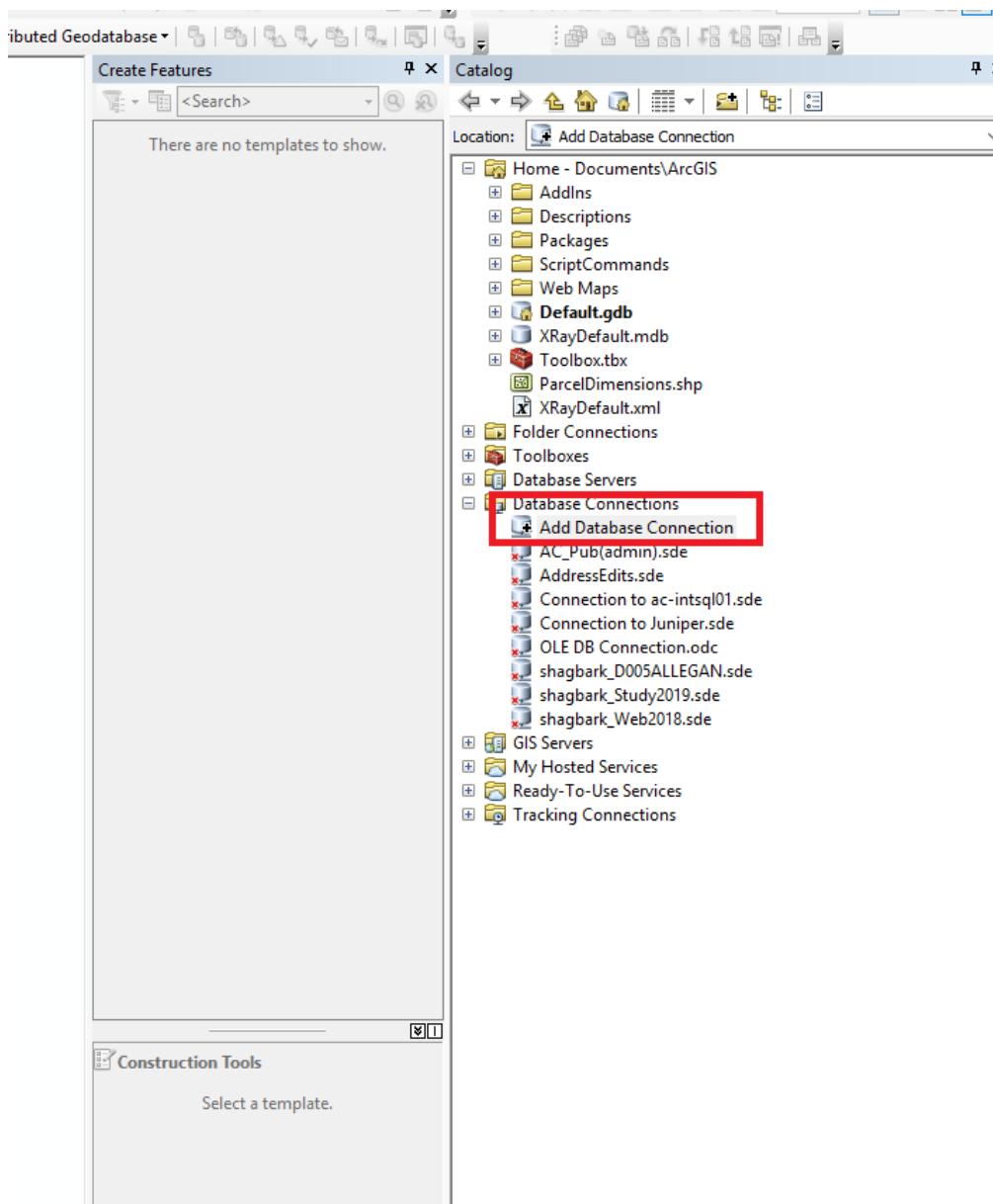


Figure 5.12: Catalog Add Db Connection

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

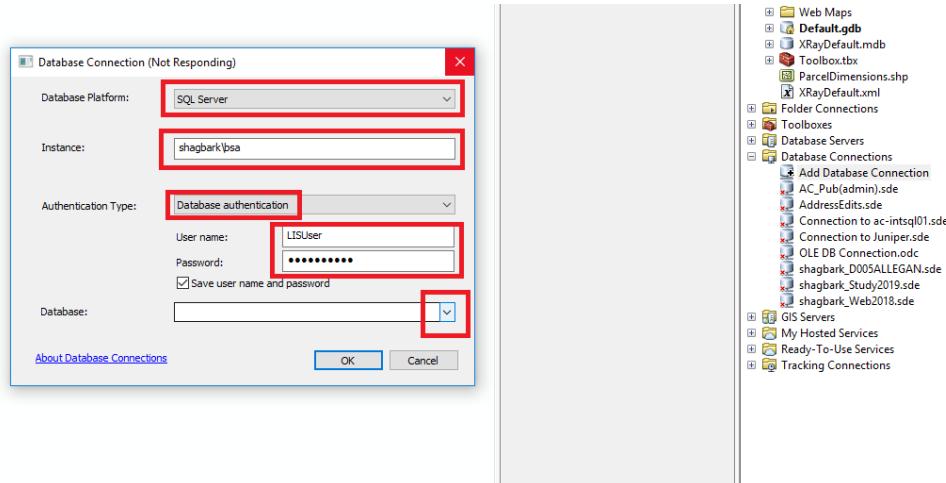


Figure 5.13: Catalog Add Database Connection

5.5.2 CREATE QUERY IN ArcGIS TO SQL DATABASE

ADD QUERY LAYER

In ArcMap:

Open the New Query Layer Dialog

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

NOTE

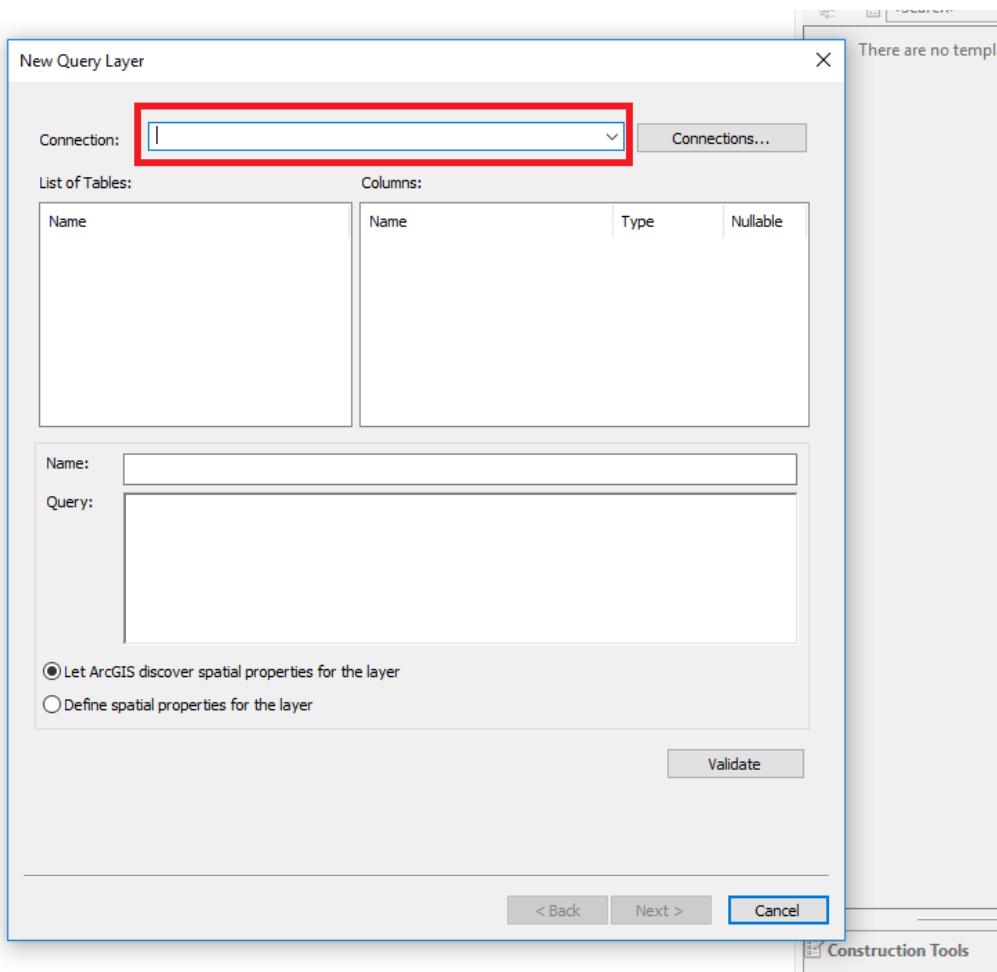


Figure 5.14: New Query Layer Dialog

DETAILS OF THE QUERY LAYER

Enter into the tool

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

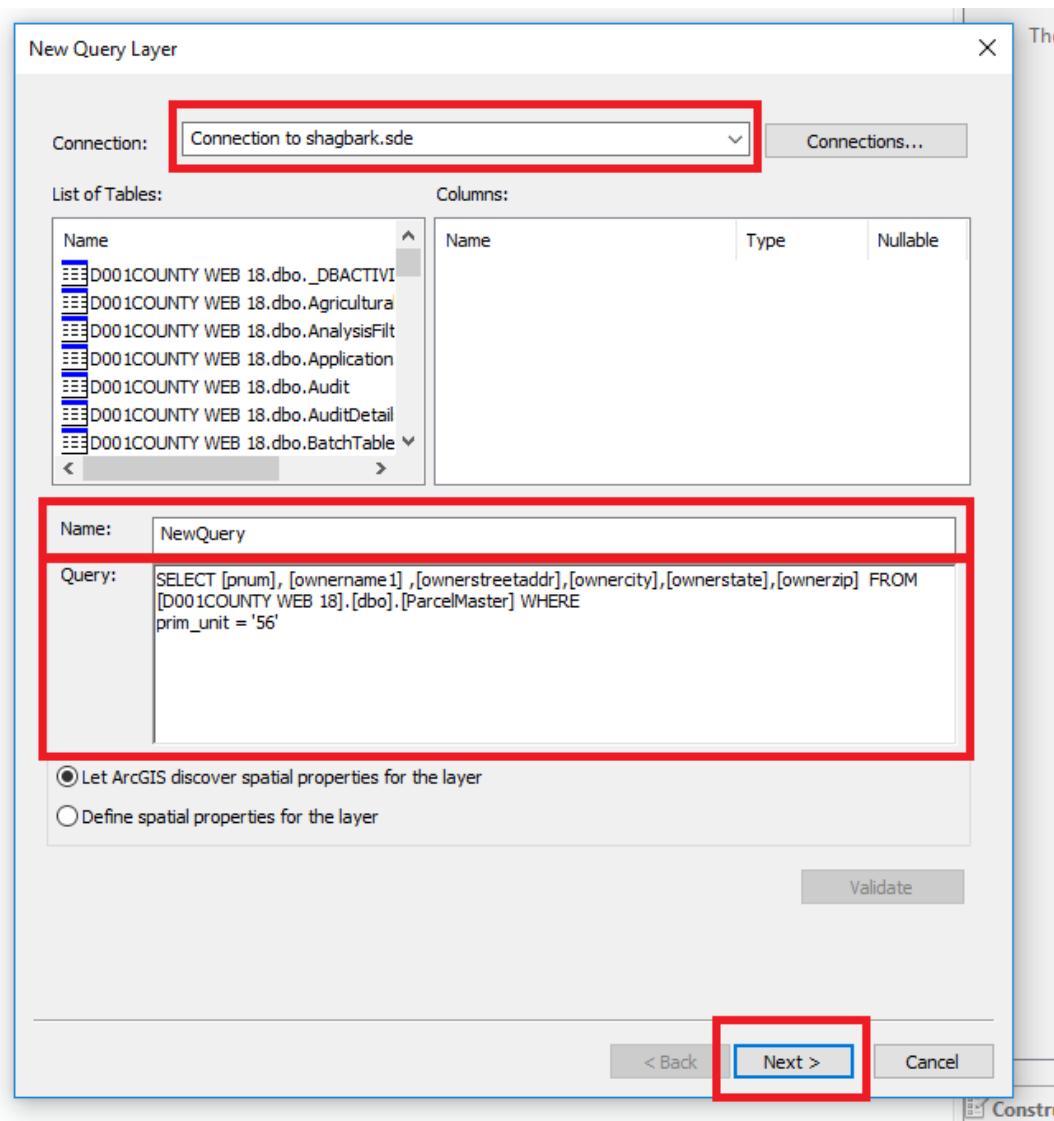


Figure 5.15: Query Layer Dialog Filled

MORE DETAILS OF THE QUERY LAYER

Enter into the tool

- Select unique identifier field
- Click Finish

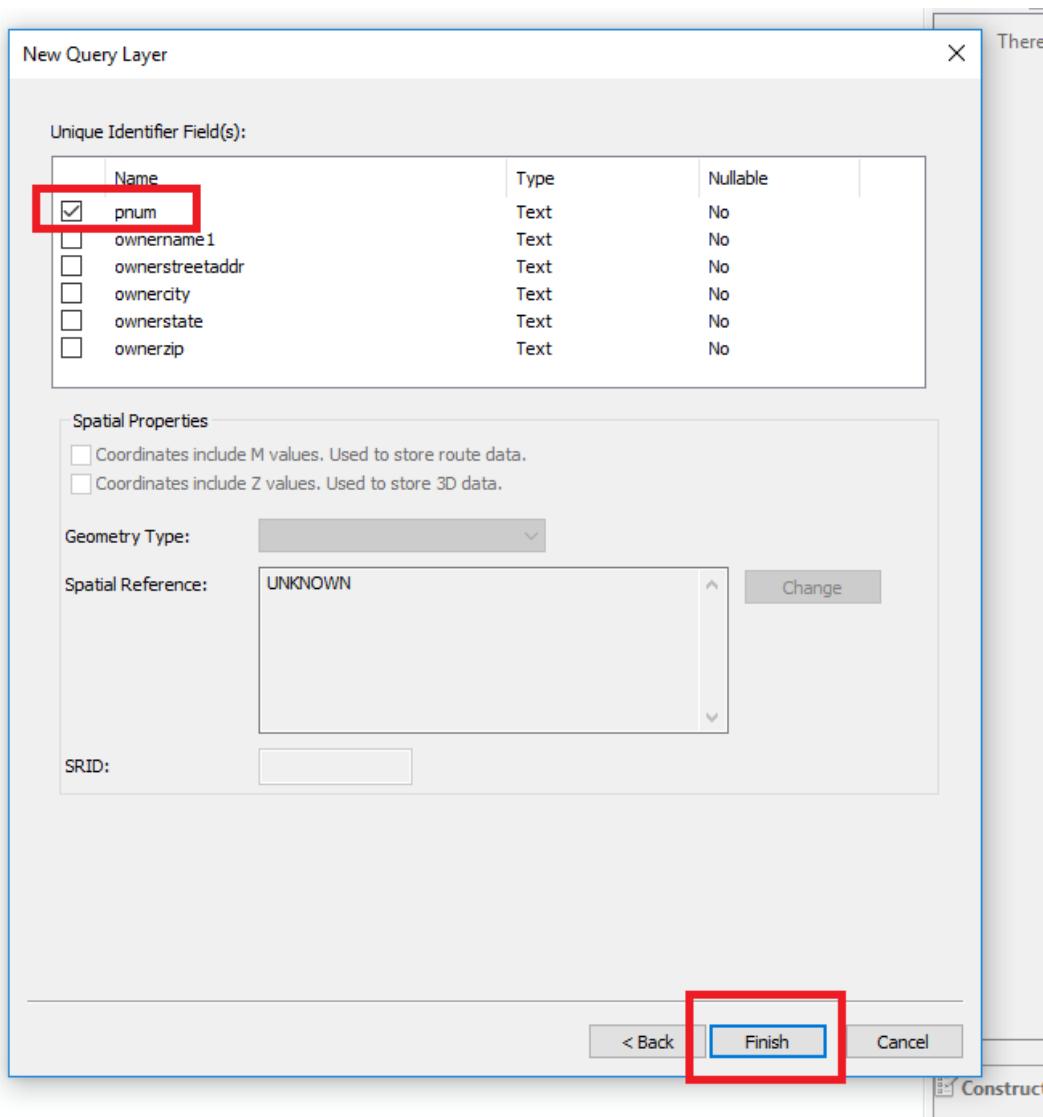


Figure 5.16: Select Unique Identifier

OPEN RESULTS TABLE

Verify the Query by Looking at the Table

The screenshot shows the ArcGIS Pro interface with the 'Table of Contents' pane open. Inside the 'Layers' folder, the 'D001COUNTY WEB 18.DBO.NewQuery' table is selected, indicated by a red box. The main workspace displays the contents of this table.

pnum	ownername1	ownerstreetaddr	ownercity	ownerstate	ownerzip	ESRI_OID
56-004-001-00	WAGNER LONNIE J & EMMA	792 135TH AVE	WAYLAND	MI	49348	1
56-004-001-10	GUN LAKE COMMUNITY CHURCH	12200 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	MAAS WAYLAND LLC	103 S MAIN ST	LOWELL	MI	49331	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	RIPARIAN PROPERTIES LLC	879 E SUPERIOR ST	WAYLAND	MI	49348	9
56-005-002-40	RIPARIAN PROPERTIES LLC	879 E SUPERIOR ST STE A	WAYLAND	MI	49348	10
56-005-002-41	VIC VENTURES WAYLAND LLC	235 140TH AVE	WAYLAND	MI	49348	11
56-005-003-00	CITY OF WAYLAND	103 S MAIN ST	WAYLAND	MI	49348	12
56-005-004-00	LATHEUP DOUG W & JUDITH	844 E SUPERIOR ST	WAYLAND	MI	49348	13
56-005-004-01	BREWER SUZANNE M	844 E SUPERIOR ST	WAYLAND	MI	49348	14
56-005-005-00	STORA ROZERICK M & MELISSA K	844 E SUPERIOR ST	WAYLAND	MI	49348	15
56-005-005-10	ARY DOUGLAS & JULIE	104 MARLO LN	WAYLAND	MI	49348	16
56-005-005-20	DUBAY DOUGLAS	102 MARLO LN	WAYLAND	MI	49348	17
56-005-007-00	CONHOR MOLLY	815 E EAST SUPERIOR	WAYLAND	MI	49348	18
56-005-007-10	BENNETT JILL & CARRON BIANCE	2514 BRIDGEPORT LN	GRAND RAPIDS	MI	49508	19
56-005-007-20	VILLELLA MATTHEW	101 MARLO LN	WAYLAND	MI	49348	20
56-005-007-21	JENSEN KRISTEN S	103 MARLO LN	WAYLAND	MI	49348	21
56-005-009-00	WAYLAND CHRISTIAN REF CHURCH	303 E ELM STREET	WAYLAND	MI	49348	22
56-005-009-01	CITY OF WAYLAND	103 S MAIN ST	WAYLAND	MI	49348	23
56-005-010-00	FINANCING VI HEALTHCARE PROPERTY LLC	8181 WORTHINGTON ROAD	WESTERVILLE	OH	43082	24
56-005-011-00	CITY OF WAYLAND	103 S MAIN ST	WAYLAND	MI	49348	25
56-005-011-20	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	VANDEROORD JOHN C & NANCY L	542 FOREST ST	WAYLAND	MI	49348	28
56-005-013-00	L AND M LLC	2645 24TH AVE	HUDSONVILLE	MI	49426	29
56-005-013-10	JESTER LLC	137 124TH AVE	SHELBYVILLE	MI	49344	30
56-005-014-00	OPPERMAN JOHN C	125 OAK ST	WAYLAND	MI	49348	31
56-005-015-00	REDSTONE LAHN 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	FLUIT MARK & MARVELLEN	137 OAK ST	WAYLAND	MI	49348	34
56-005-018-00	GUTTEREZ SAUL & ORTIZ CHRISTINA	119 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	KEMP 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 5.17: Query Results Table

5.5.3 ENTERPRISE GEODATABASE MAINTENANCE

ENTERPRISE GEODATABASE COMPRESSION ROUTINE

Disconnect All Users

To disconnect the GIS Server, stop all services

- In ArcGIS Server Manager ⇒ Site ⇒ GIS Server ⇒ Machines ⇒ Stop all Services

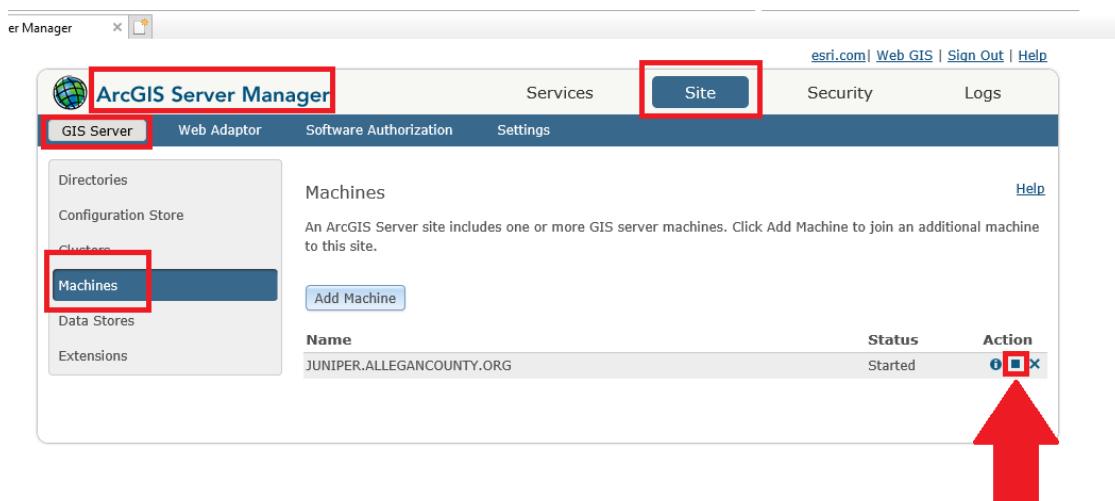


Figure 5.18: Stop ArcGIS Server

Use the Search tool to find the Rebuild Indexes Tool

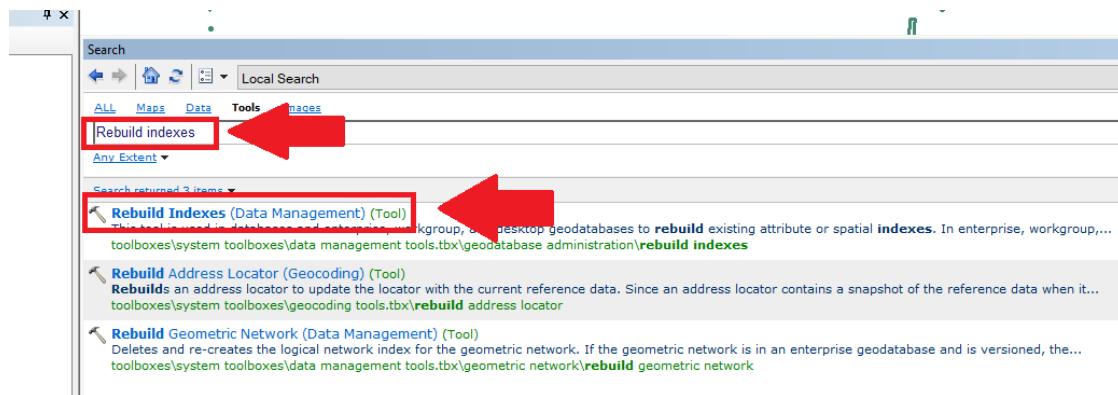


Figure 5.19: Find Rebuild Indexes Tool

Rebuild Indexes

Select Connection ⇒ Include System Tables ⇒ Select All ⇒ Press OK

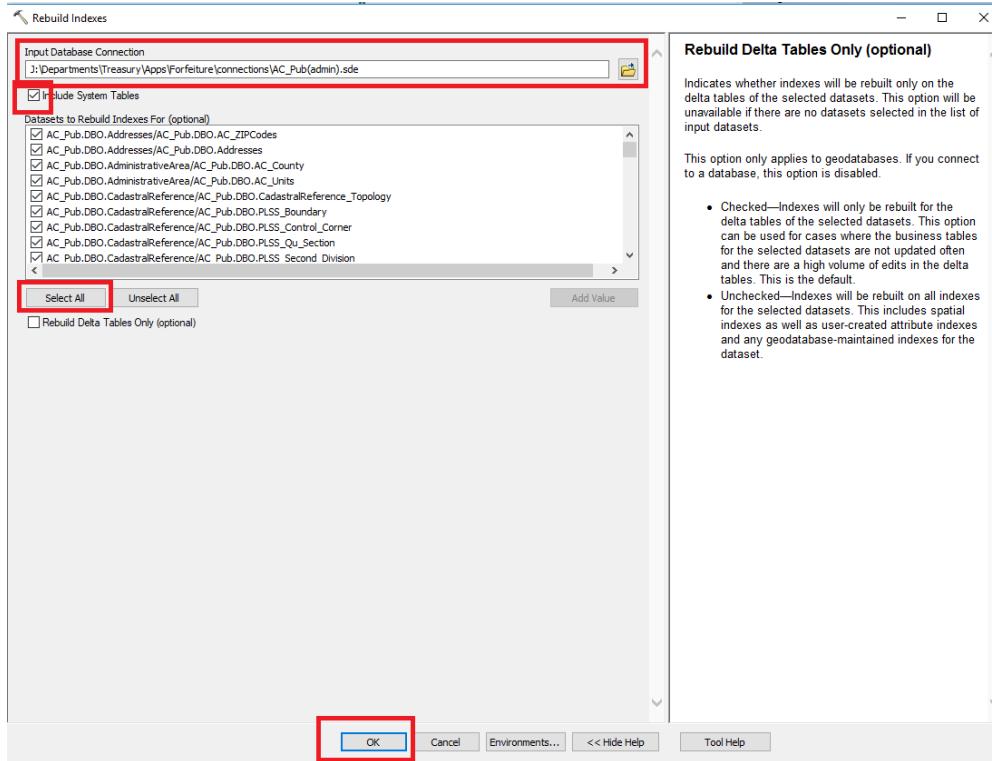


Figure 5.20: Rebuild Indexes Tool Operation

Recalculate Statistics

In the Analyze Datasets Tool:

Select Connection ⇒ Include System Tables ⇒ Select All ⇒ Press OK

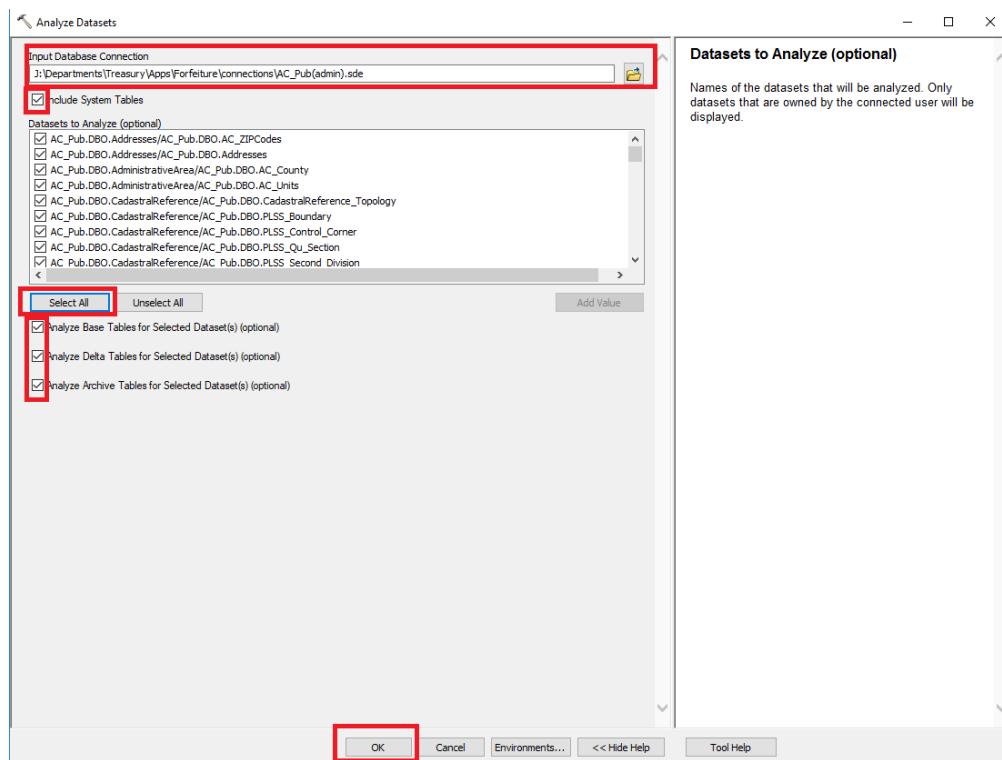


Figure 5.21: Recalculate Statistics

Compress

Select Connection ⇒ Press OK

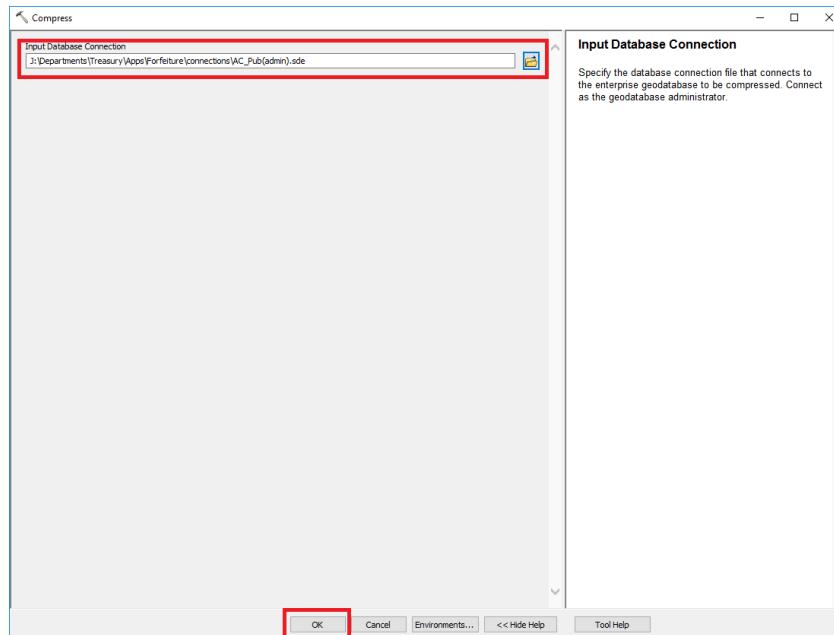


Figure 5.22: Compress

Rebuild Indexes Again

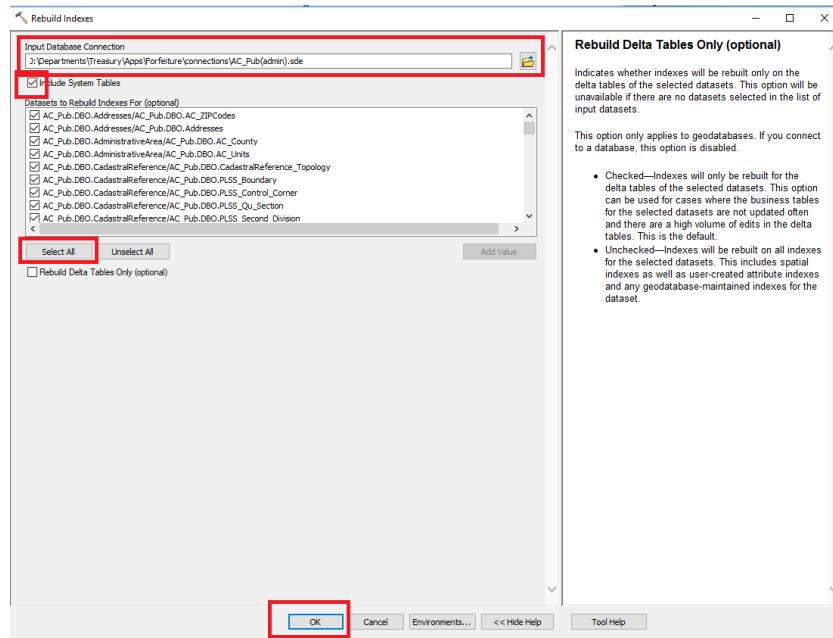


Figure 5.23: Rebuild Indexes Tool Operation

Recalculate Statistics Again

In the Analyze Datasets Tool:

Select Connection ⇒ Include System Tables ⇒ Select All ⇒ Press OK

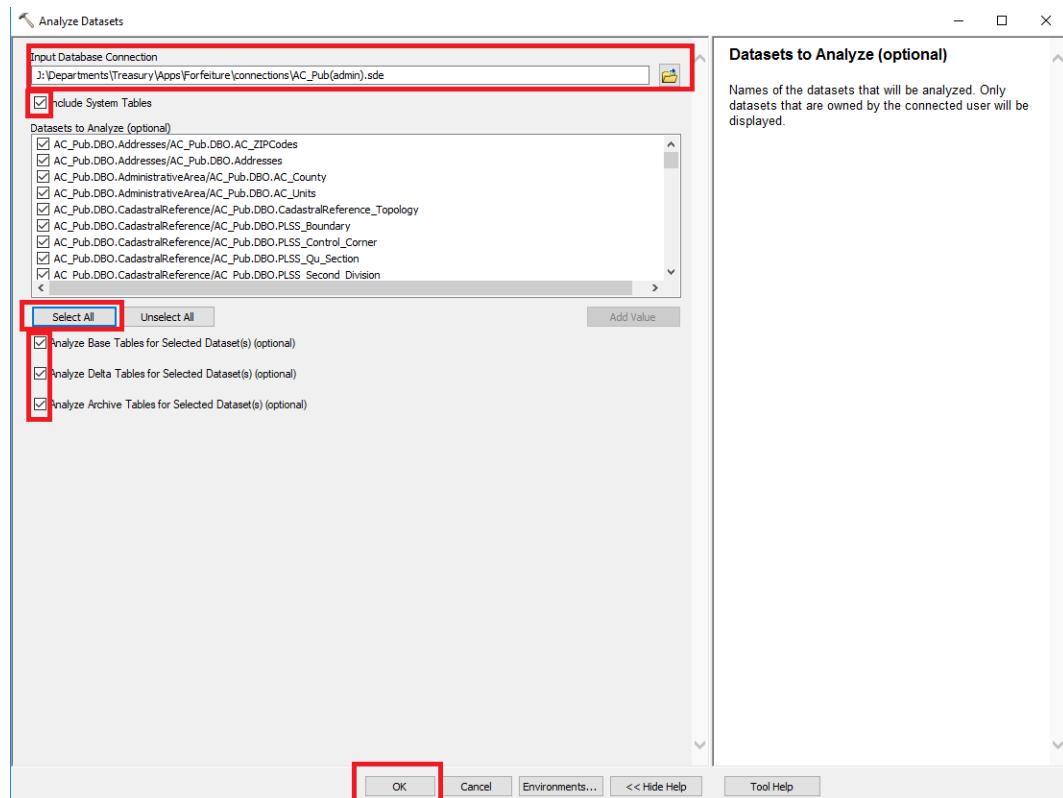


Figure 5.24: Recalculate Statistics

5.5.4 MANAGING MAP SERVICES

TO STOP ARCGIS SERVER

Launch ArcGIS Server Manager

Site ⇒ GIS Server ⇒ Machines ⇒ Stop the Server

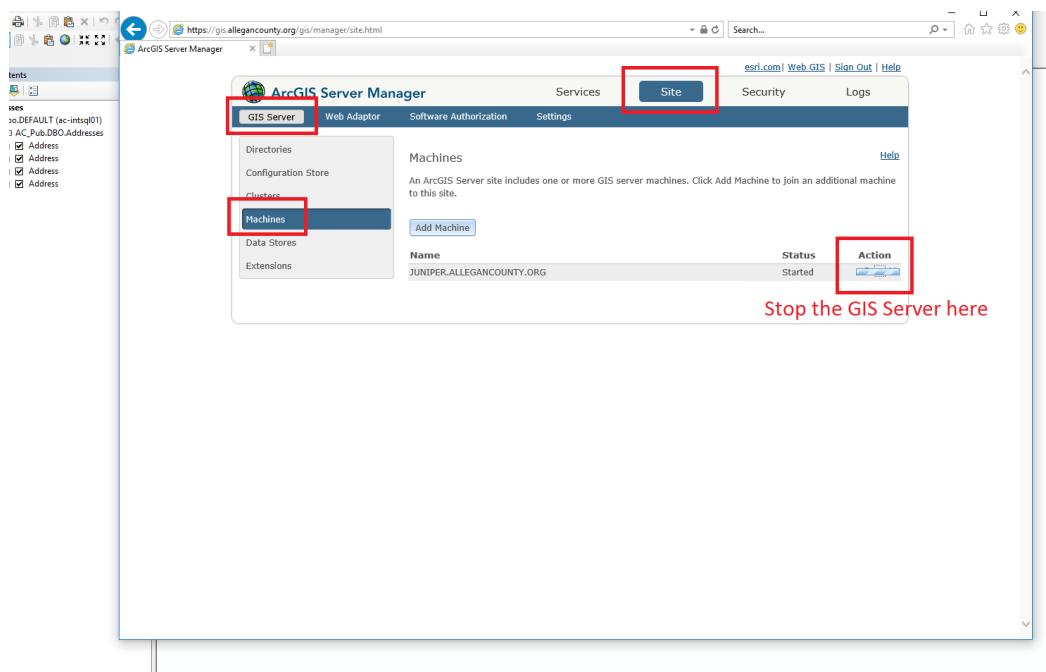


Figure 5.25: Stop the GIS Server

FIXING DAMAGED SERVICES

Error:

Service is currently being configured by another administrative operation

Remedy:

This tech support article applies:

<https://support.esri.com/en/technical-article/000015549>

There are at least 2 ways to fix:

- Use the ArcGIS Server Account Utility
- Remove Lock Files

Use the ArcGIS Server Account Utility

Access the GIS Server

To Log in to Juniper

windows R ⇒ mstsc

⇒ juniper

Use personal network credentials

On the GIS Server (Juniper)

In Windows Search, find:

Configure ArcGIS Server Account Utility

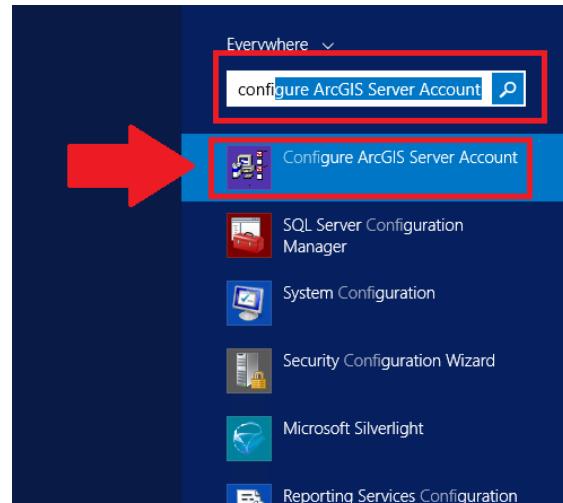


Figure 5.26: ArcGIS Server Account Utility

Use credentials:

PW: @lleganGxxxxxx

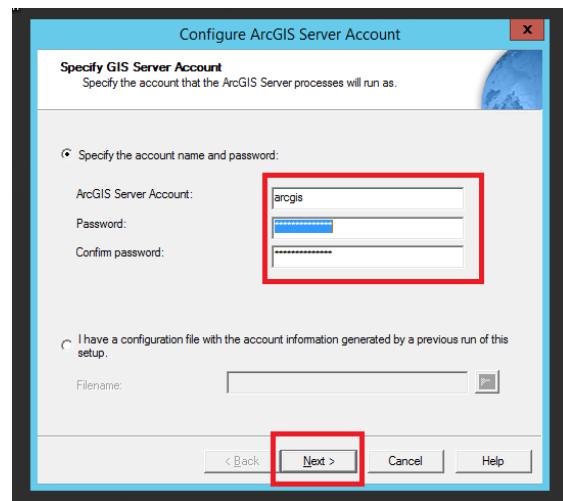


Figure 5.27: Account Utility Login

In the utility, paste these paths:

C:\arcgisserver\directories
C:\arcgisserver\config-store
C:\arcgisserver\logs

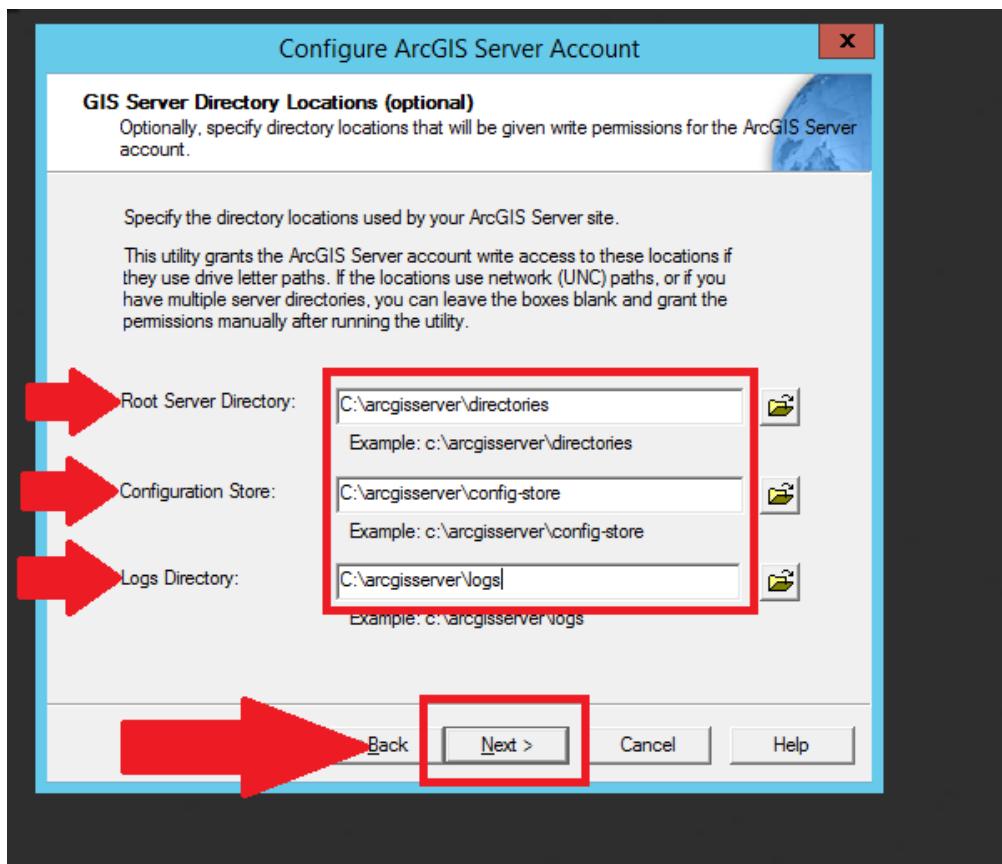


Figure 5.28: GIS Directory Locations Filled

Push Next

Select option **Do not export Configuration File**

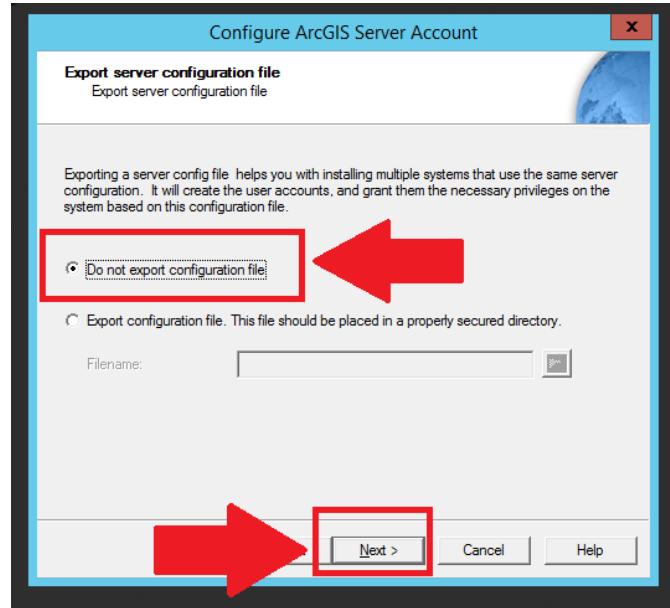


Figure 5.29: Do not Export Config File

Push Next

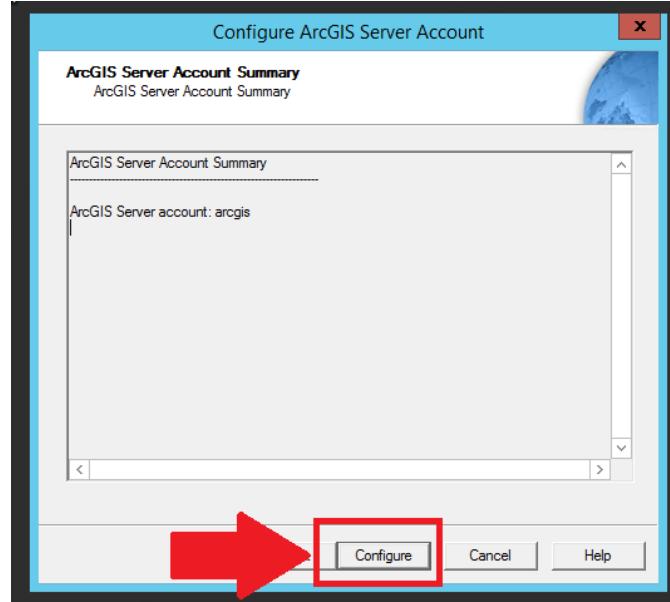


Figure 5.30: Configure Account

Push Configure

While the tool runs, open the service manager

In Windows Search, find: **Service Manager**

Launch **Service Manager**

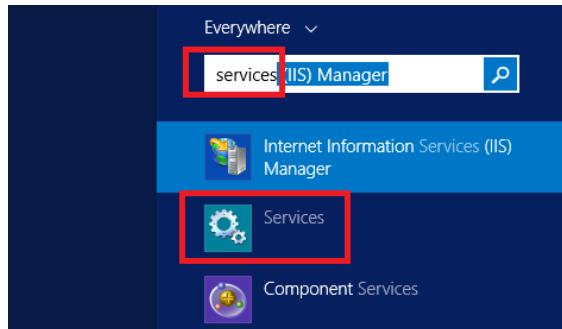


Figure 5.31: Search For Service Manager

When the tool completes, **Press Finish**

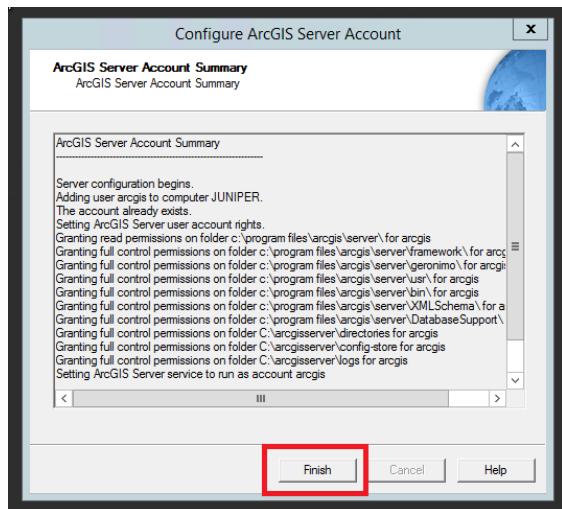


Figure 5.32: Finish On Configure

Services Manager

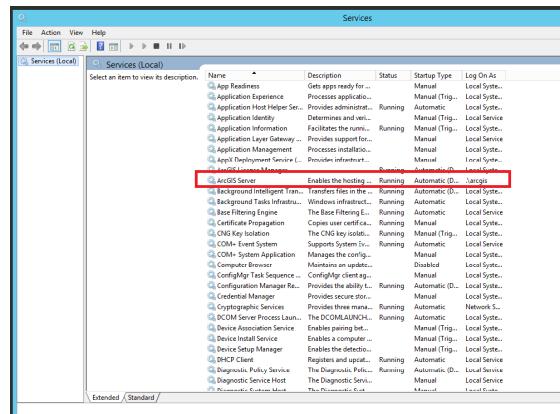


Figure 5.33: Open Services Manager

In services, select the ArcGIS Server service and restart the service. (Randy had to do this)

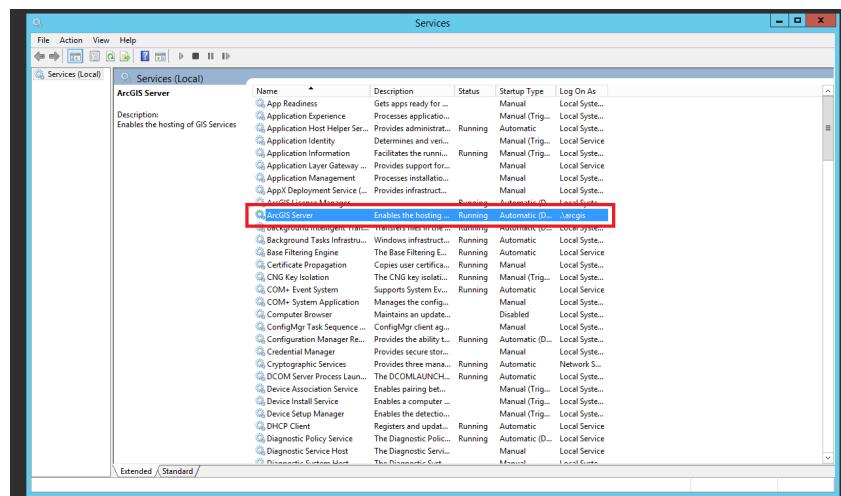


Figure 5.34: arcGis Service In Services Manager

Quick and dirty fix

When a service get hung up in som admin process, you may get an error like:

Error:

Service is currently being configured by another administrative operation

Removing Lock Files

This may work, here is a blog about it

<https://community.esri.com/thread/103710> Network location for an example service

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

Suggested 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.

mapservices would not stop so I try this:

<https://support.esri.com/en/technical-article/000012685>

Check permission levels for the arcGIS account ArcGisServerPermissions.PNG

If necessary, add the arcgis user to the permissions on the folders ArcGisServer-PermissionsAddUser.PNG

5.5.5 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.

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 or 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.

5.5.6 MANAGING GEODATABASE VERSIONS

VERSION QUERIES

SQL Queries

Four queries of SDEversions, SDEstates, sdestatelineages, and SDEcompresslog

```
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

Remove orphaned 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 two

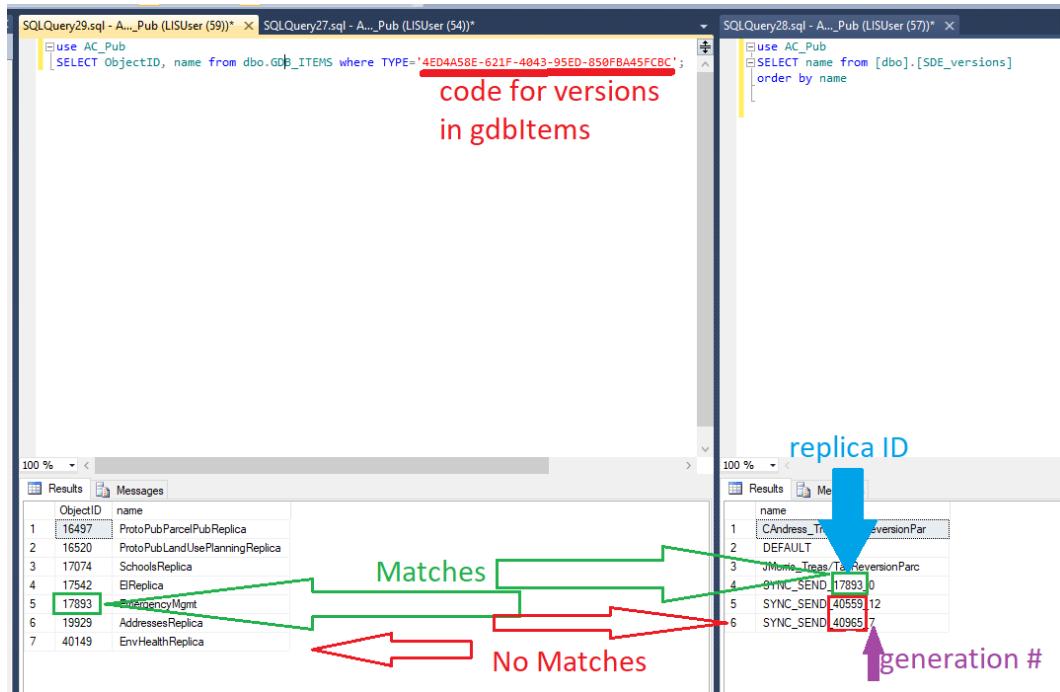


Figure 5.35: Find Orphan Versions

that have no match in step one.

Orphaned versions can be removed by name in ArcGIS

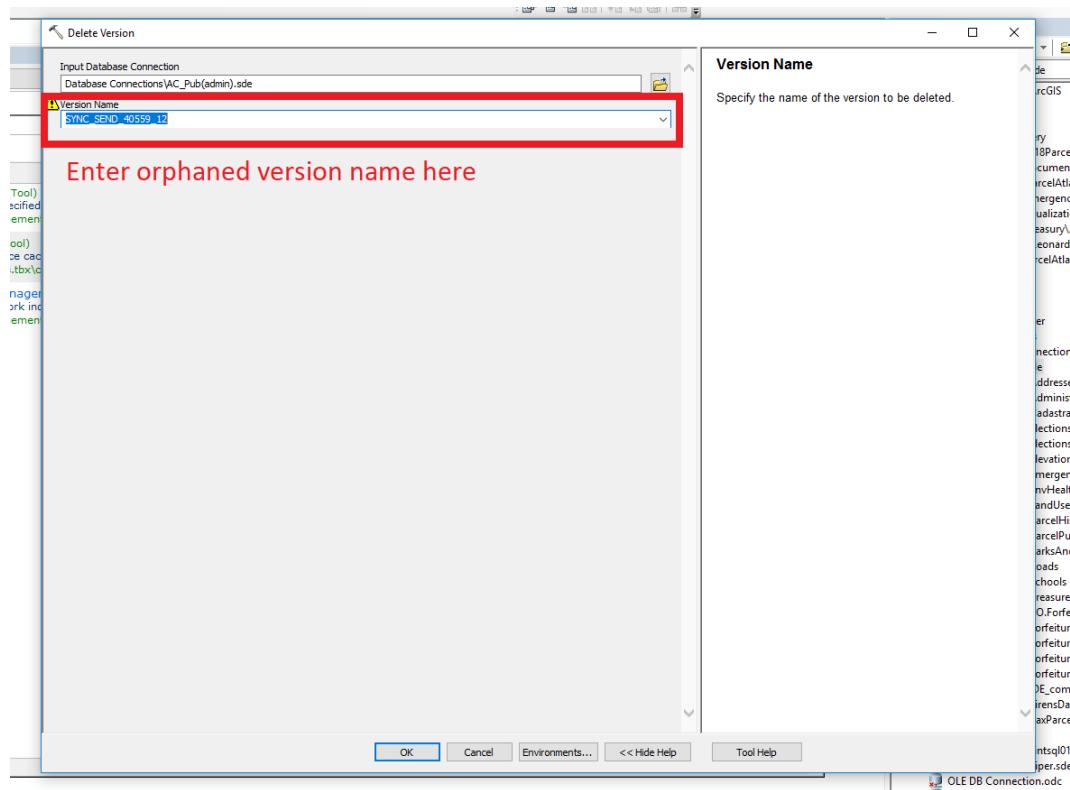


Figure 5.36: Delete Orphan Versions

5.5.7 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\\\" + 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
```

5.6 LATEX PACKAGES USED BY AC GIS

5.6.1 COMMON ERRORS

Source:

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

If you have every compiled a LATEX 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 LATEX document and suggestions for what is probably going on and how to debug your document.

THE FORM OF AN ERROR

There are two forms of errors: LATEX errors and TEX 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.

LATEX ERRORS

The general form of an error in LATEX 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 LATEX found the error).

TEX ERRORS

Errors may also have the following form:

```
! <error message>
```

These errors are formatted differently because they are error messages that came from **T_EX** instead of **L^AT_EX**. After the error, you will still find the line that the error occurred in and the text of the error.

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.

UNDERFULL

The following error results when a line does not extend the width of the page, something **L^AT_EX** 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.

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^AT_EX** 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.

REFERENCES

The following warnings occur when references are changed when L^AT_EX 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.

BEGINNING AND ENDING 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.

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.

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.

MISSING BEGIN DOCUMENT

This error is self-explanatory:

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

ERRORS USUALLY CAUSED BY BAD SPELLING

UNKNOWN CONTROL SEQUENCE

This error results when you use a command (something that starts with a `\`) that is not recognized by L^AT_EX:

```
! 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.

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.

BAD FILE NAME

This error results when you have mistyped the command `latex` or do not have L^AT_EX 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^AT_EX is correctly installed on your computer.

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.

FATAL ERRORS

RUNAWAY ARGUMENT

This error happens when a paragraph ends before a command's argument is done (i.e., L^AT_EX 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 `\bftext` to make bold text in more than one paragraph.

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

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.

EMERGENCY STOP

This error happens when L^AT_EX 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.

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.

GRAPHICS ERRORS

TOO MANY UNPROCESSED FLOATS

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

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

\LaTeX 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.

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 \LaTeX will not recognize it as a graphic file.

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`.

MATH ERRORS

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).

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.

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.

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.

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.

TABULAR ENVIRONMENT ERRORS

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 $\backslash\&$ to make a $\&$.

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.

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.

ERRORS WITH LISTS

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.

TOO DEEPLY NESTED

This error occurs when there are too many lists for L^AT_EX to handle:

```
! LaTeX Error: Too deeply nested
```

L^AT_EX 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.

MISCELLANEOUS ERRORS

ONLY USED IN THE PREAMBLE

This error occurs when you place a command in the body of a L^AT_EX 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.

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^AT_EX is just trying to make sure that everything looks nice.

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.

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.

5.6.2 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

5.6.3 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]{

TEXTTTTTTTTTTTTTTTTTT

}

\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}
\hspace{-8mm}

\end{document}
```

5.6.4 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

5.6.5 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.

5.6.6 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

5.6.7 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

5.7 LATEX TEMPLATES

5.7.1 LATEX SECTION TEMPLATE

```
\begin{document}
%
\section{SECTION NAME}
%
\subimport{THIS SECTION/}{SOMESubsection.tex}
\subimport{THIS SECTION/}{SOMESubsection.tex}
% etc...
%
\end{document}
```

5.7.2 LATEX SUBSECTION TEMPLATE

```
%  
%  
%  
%-----  
%      To Do:  
%  
%  
%  
%-----  
%  
% OPTIONAL PREAMBLE FOR LOCAL COMPILE %  
%  
\def\titlename{SubsectionTemplate}  
\def\authorName{Allegan County GIS Services}  
\def\pdfTitle{SubsectionTemplate}  
\def\pdfSubject{GIS Tools} %  
\def\pdfKeywords{latex,documentation}  
%  
\input{../../preamble/subSectionPreamble.tex}  
%-----  
%-----  
%\begin{document}% document begins  
%  
%-----  
%
```

```
\noindent Text  
Text Text Text Text Text Text Text Text Text Text Text Text Text  
%  
\end{adjmulticols}  
%  
\clearpage  
%  
%\subsubsection{SUBSUBSECTION HEADING}  
%  
% Single Figure  
%  
%\begin{figure}[h!]  
%\centering  
% \includegraphics[width=1\textwidth]{ProjectDesign}  
%\vspace{-2in}  
%  
%\caption{Design}  
\end{figure}  
%  
\clearpage  
%  
%\paragraph{Summary}  
%  
\noindent Text  
Text Text Text Text Text Text Text Text Text Text Text Text Text  
Text Text Text Text Text Text Text Text Text Text Text Text Text  
Text Text Text Text Text Text Text Text Text Text Text Text Text  
Text Text Text Text Text Text Text Text Text Text Text Text Text  
Text Text Text Text Text Text Text Text Text Text Text Text Text  
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Text Text Text Text Text Text Text Text Text Text Text Text Text  
Text Text Text Text Text Text Text Text Text Text Text Text Text  
Text Text Text Text Text Text Text Text Text Text Text Text Text  
Text Text Text Text Text Text Text Text Text Text Text Text Text  
  
\clearpage  
%  
%\paragraph{PAR HEADING}  
%  
\begin{adjmulticols}{2}{\innerMar}{\outerMar}  
%  
\subparagraph{SUBPAR HEADING}  
%  
\noindent Text Text Text Text Text Text Text Text Text Text
```

```
Text  
Text Text Text Text Text Text Text Text Text Text Text Text Text Text Text  
Text Text Text Text Text Text Text Text Text Text Text Text Text Text Text  
Text Text Text Text Text Text Text Text Text Text Text Text Text Text Text  
Text Text Text Text Text Text Text Text Text Text Text Text Text Text Text  
Text Text Text Text Text Text Text Text Text Text Text Text Text Text Text  
%  
\paragraph{PAR HEADING}  
\noindent Text  
Text Text Text Text Text Text Text Text Text Text Text Text Text Text Text  
Text Text Text Text Text Text Text Text Text Text Text Text Text Text Text  
Text Text Text Text Text Text Text Text Text Text Text Text Text Text Text  
%  
\subparagraph{SUBPAR HEADING}  
\noindent Text  
Text Text Text Text Text Text Text Text Text Text Text Text Text Text Text  
Text Text Text Text Text Text Text Text Text Text Text Text Text Text Text  
Text Text Text Text Text Text Text Text Text Text Text Text Text Text Text  
%  
\subparagraph{SUBPAR HEADING}  
\noindent Text  
Text Text Text Text Text Text Text Text Text Text Text Text Text Text Text  
Text Text Text Text Text Text Text Text Text Text Text Text Text Text Text  
%  
\subparagraph{SUBPAR HEADING}  
\noindent Text  
Text Text Text Text Text Text Text Text Text Text Text Text Text Text Text  
Text Text Text Text Text Text Text Text Text Text Text Text Text Text Text  
%  
\end{adjmulticols}  
%  
% Single Figure  
%  
\begin{figure}[H]  
\centering  
% \includegraphics[width=1\textwidth]{IMAGE}  
\vspace{-.2in}  
%  
\caption{IMAGE NAME}  
\end{figure}  
\clearpage
```

5.8 PDF TOOLS USED BY AC GIS

5.8.1 PDF OPTIMIZER

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

paragraphPython(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()
```

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](#).

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
```

5.9 QGIS Tools

5.9.1 QGIS AZIMUTH AND DISTANCE PLUGIN

TOOL SUMMARY

The Azimuth and Distance Plugin can be added to QGIS to provide COGO functionality.

Background

QGIS is an opensource GIS that provides additional tools through Plugin architecture.

Why the Tool is Needed

QGIS does not have a COGO toolset built in.

Who the Tool is For

A user with QGIS installed locally and the ability to make a basic map.

Takeaways

The Azimuth and Distance Plugin provides the COGO functionality in QGIS.

The Plugin can be installed following these steps.

AZIMUTH AND DISTANCE PLUGIN INSTALLATION

Install the Plugin

Plugins (1) ⇒ Topography Group

Select the Azimuth and Distance Plugin (2)

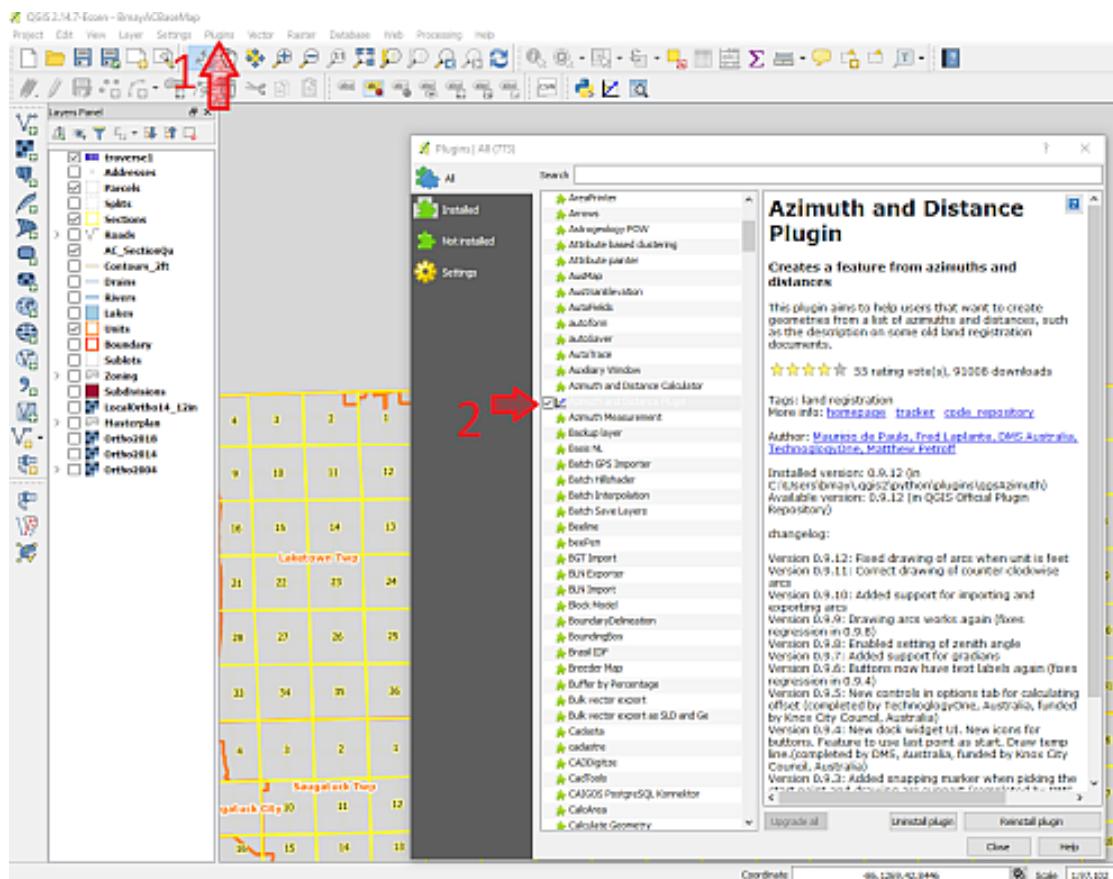


Figure 5.37: Launch Plugin

Azimuth and Distance Plugin Tool is Added to Toolbar



Figure 5.38: COGO Icon

5.9.2 COGO Tools in QGIS

TOOL SUMMARY

Transfers of real property typically involve a Metes and Bounds description:

Commencing at Southeast corner of Section 1, Town 2 North, Range 11 West, Martin Township, Allegan County, Michigan; thence North 88 degrees 32 minutes 05 seconds West 1338.44 feet along the south line of said section to the point of beginning; thence North 01 degrees 27 minutes 55 seconds East 388 feet; thence South 88 degrees 32 minutes 05 seconds East 584 feet, more or less, to the centerline of the Gun River; thence southerly along said centerline to the south section line; thence West along said section line to the point of beginning.

Figure 5.39: Description From Deed

Background

In GIS, *Coordinate Geometry* or **COGO** tools convert written descriptions of real property into digital map features.

Users in several county departments use COGO tools in their regular workflow.

The COGO tools in ArcGIS require an advanced license.

Who the Tool is For

A user with QGIS installed locally and the ability to make a basic map.

Why the Tool is Needed

A tool is needed to convert between written descriptions of real property and digital map data.

Takeaways

QGIS is an open source GIS without a built in COGO toolset.

The Azimuth and Distance Plugin provides the COGO functionality in QGIS.

Following are instructions for using QGIS for COGO

To use COGO tools in QGIS, follow these steps

Step 1: Launch and Configure the Azimuth and Distance Plugin

*Plugin installation is covered in a separate document.



Figure 5.40: COGO Icon

*This tool draws in a temporary layer or in an active map layer.

Select **traverse1** as active layer in the tool.

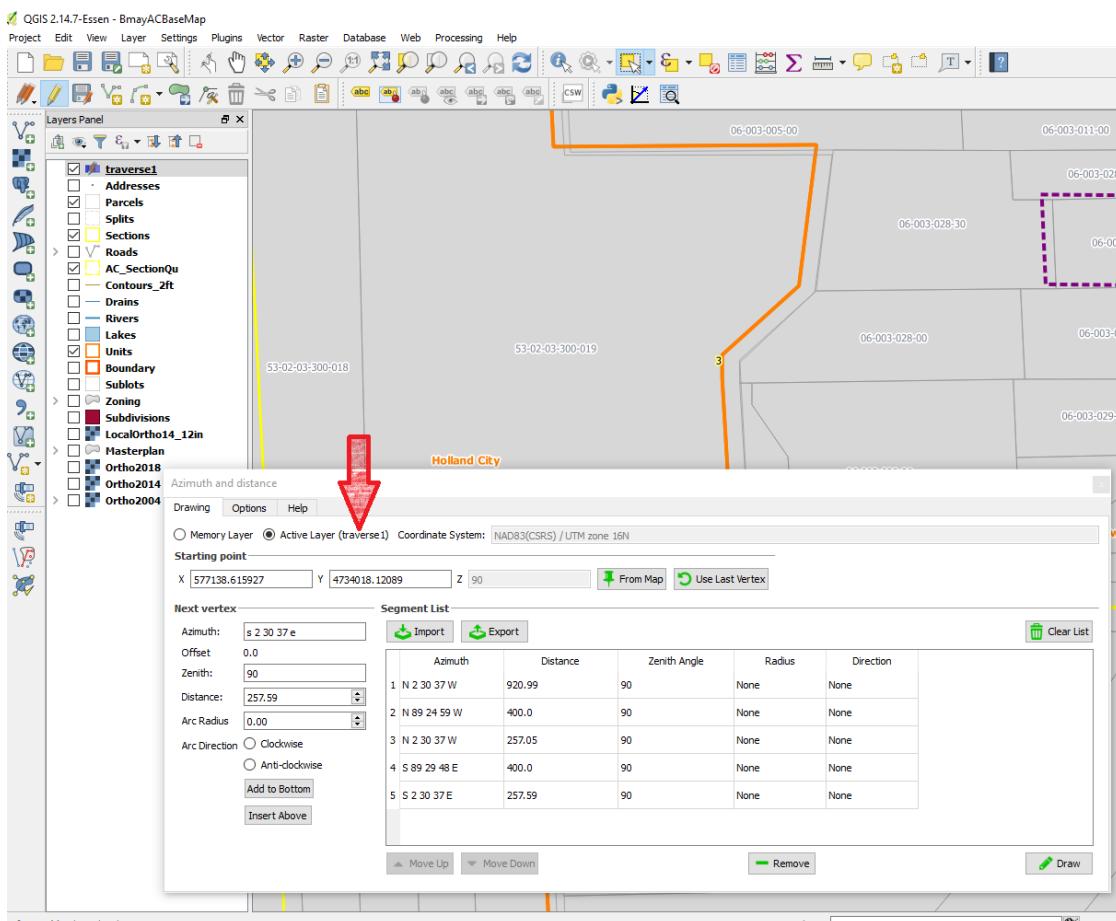


Figure 5.41: Check Active Layer

Configure Options in Plugin

On the **Options** Tab: Select these radio buttons;

- **Boundary**
- **Bearing**
- **Feet**
- **Degree**

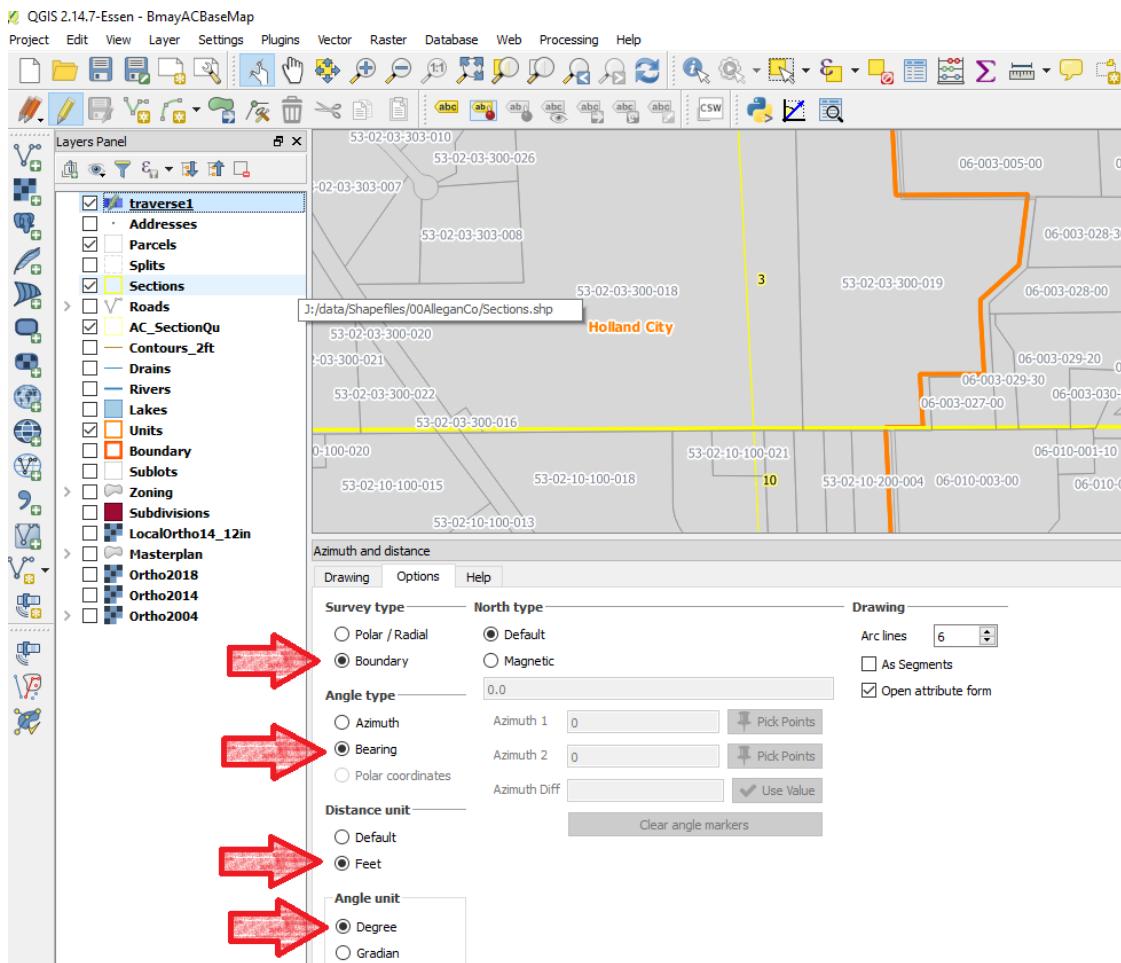


Figure 5.42: Plugin Options

Step 2: Activate traverse layer in map

*For a map layer to be editable, it must be activated in the Layers Panel.

(If necessary) left click the layer **traverse1** in Layer Panel to activate it.

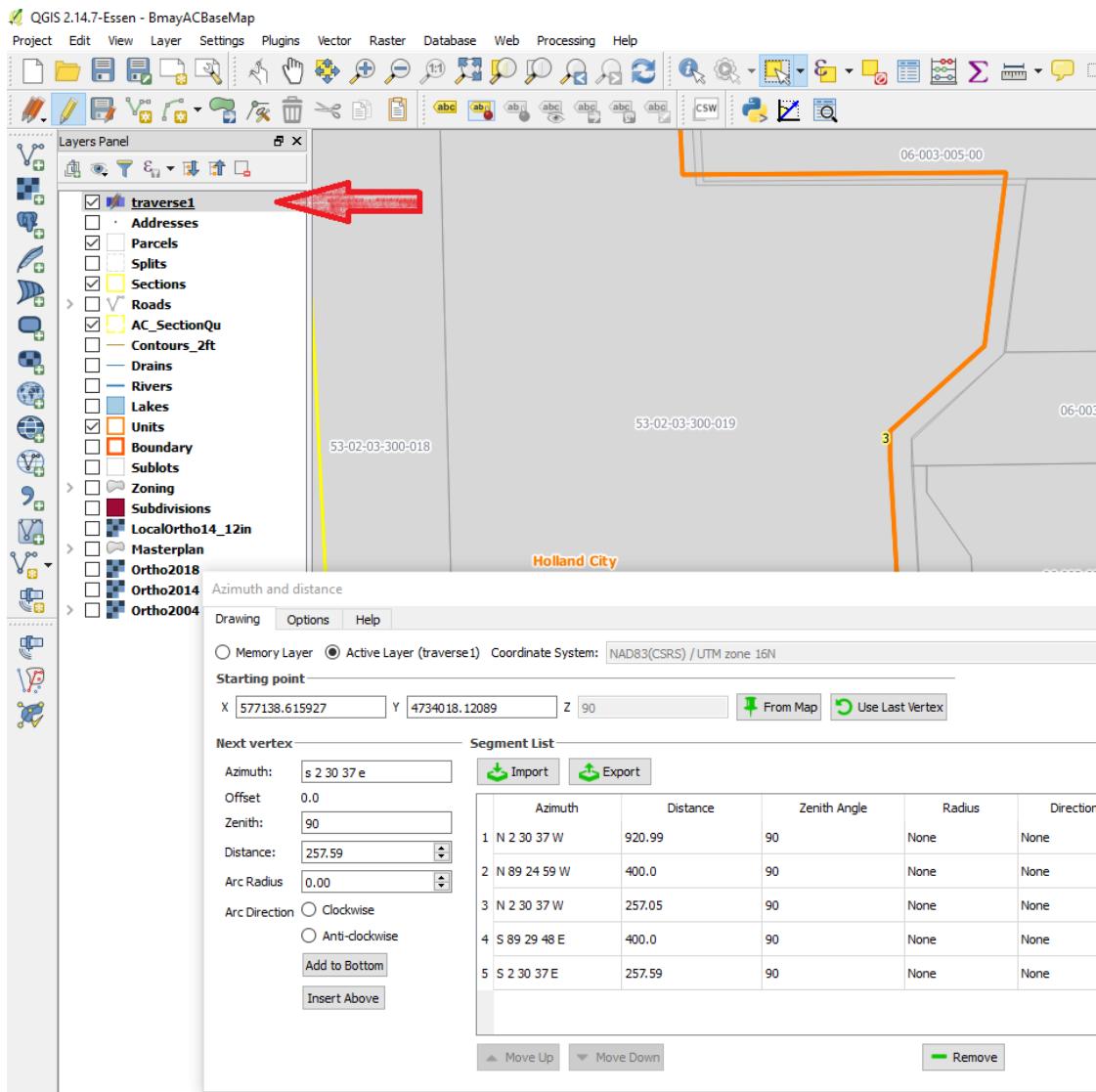


Figure 5.43: activate layer

Step 3: Locate the Point of Commencement

To get to the Point of Commencement,

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

- Use Reference Layers such as Units, Sections, Quarter Sections, and Parcels.

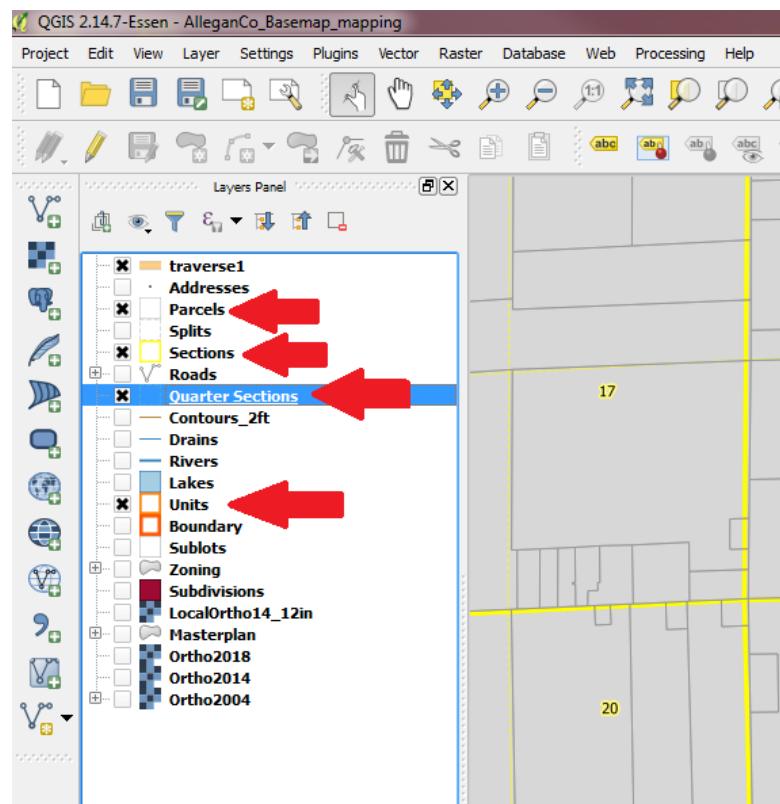


Figure 5.44: Select Reference Layers

- Use the Measuring Tool

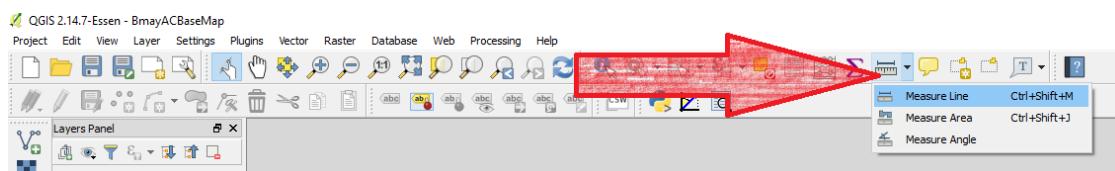


Figure 5.45: Measuring Tool

- Search by Parcel Number (Search Layers Plugin)



Figure 5.46: Search Layer Icon

- Draw COGO lines (Step 4)

Step 4: Draw a Line With Azimuth and Distance

Commencing at Southeast corner of Section 1, Town 2 North, Range 11 West, Martin Township, Allegan County, Michigan; thence North 88 degrees 32 minutes 05 seconds West 1338.44 feet along the south line of said section to the point of beginning; thence North 01 degrees 27 minutes 55 seconds East 388 feet; thence South 88 degrees 32 minutes 05 seconds East 584 feet, more or less, to the centerline of the Gun River; thence southerly along said centerline to the south section line; thence West along said section line to the point of beginning.

Figure 5.47: Description From Deed

On the Drawing Tab:

- Azimuth (bearing): Enter Bearing in format: *N 88 32 05 W*
- Offset: Set to *0*
- Zenith: Set to *90*
- Distance: Enter Feet Distance in numbers only *1338.44*

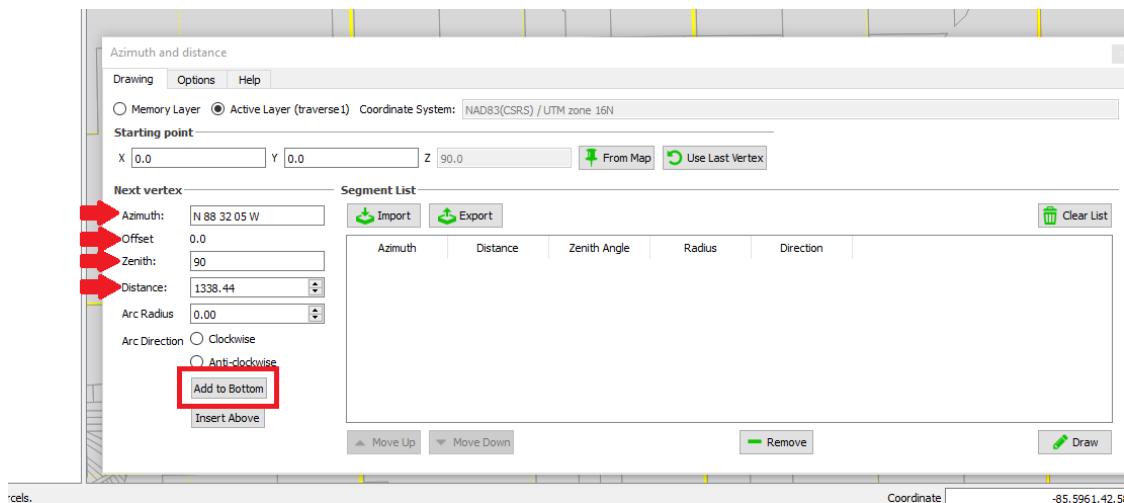


Figure 5.48: Entering Bounds

Push Add to Bottom

Line is added to the list

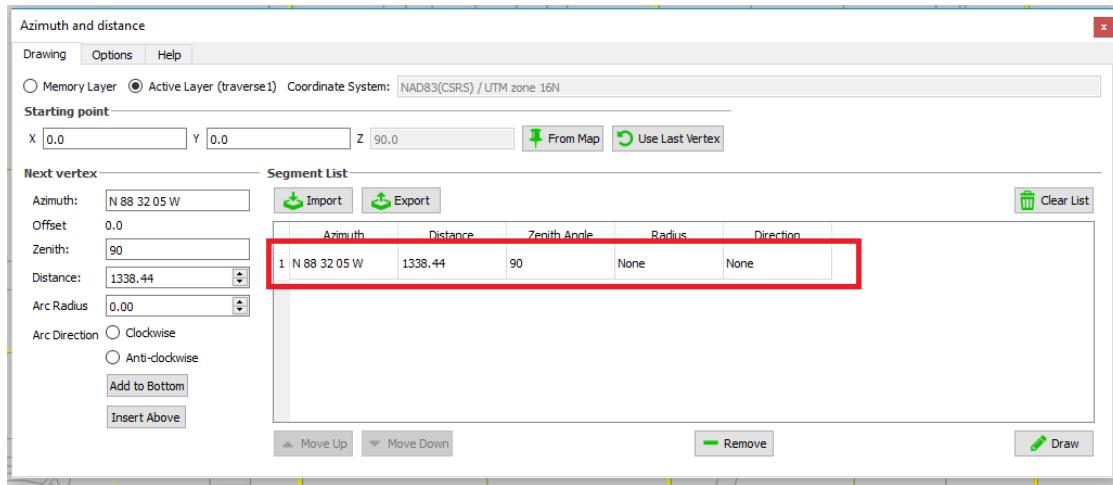


Figure 5.49: Line Added

Add as many bounds as you can from the description

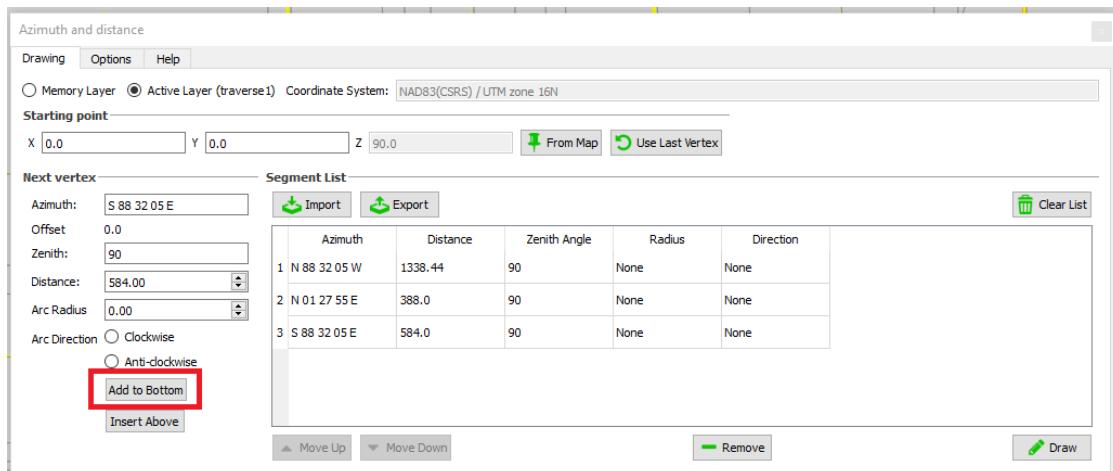


Figure 5.50: Three Lines Added

Choose A Point to Start Drawing From

Push the **From Map** button.

*Decide which layer to reference for a starting point. Align cursor with desired starting point and click.

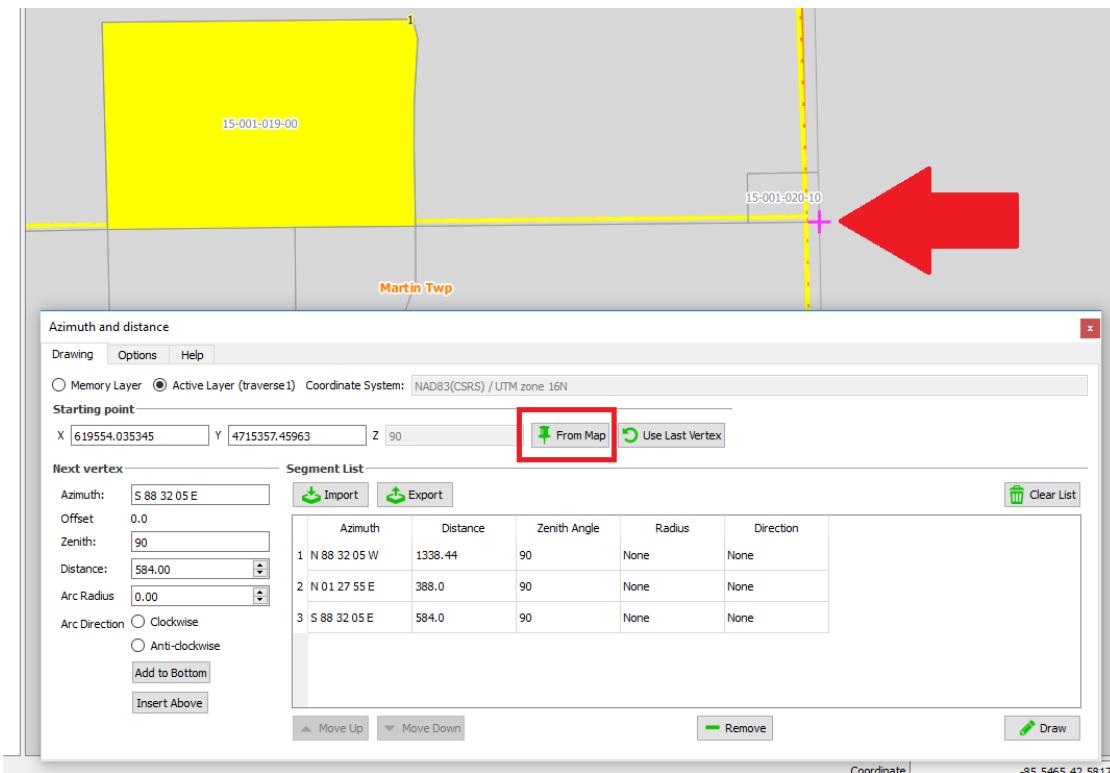


Figure 5.51: From Map

Draw the Segments So Far

- Push **Draw**
- Enter Attributes for the polyline to be created
- Press **OK**

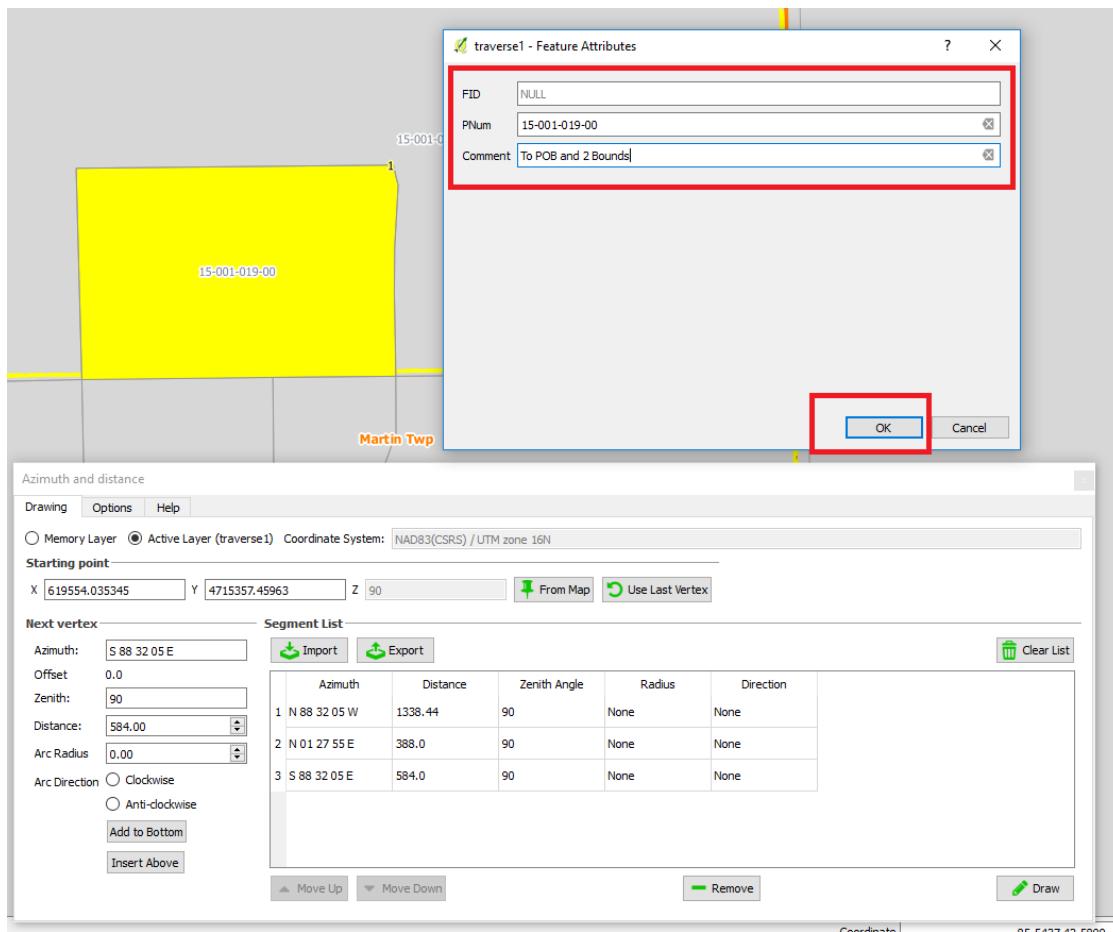


Figure 5.52: Enter Attributes

Use the sketch to identify the parcel

In this case, turn on ortho photo to verify the remaining bounds.

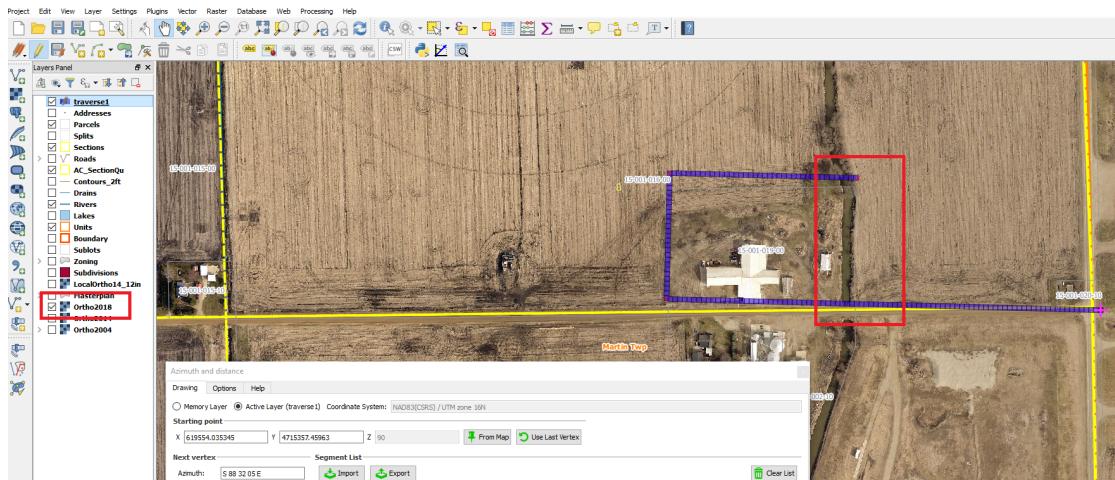


Figure 5.53: Verify Remaining Bounds

(optionally) Save Input for Later Use

If you want to save the segments for later use, press **Export**.

Name it and select a save location.

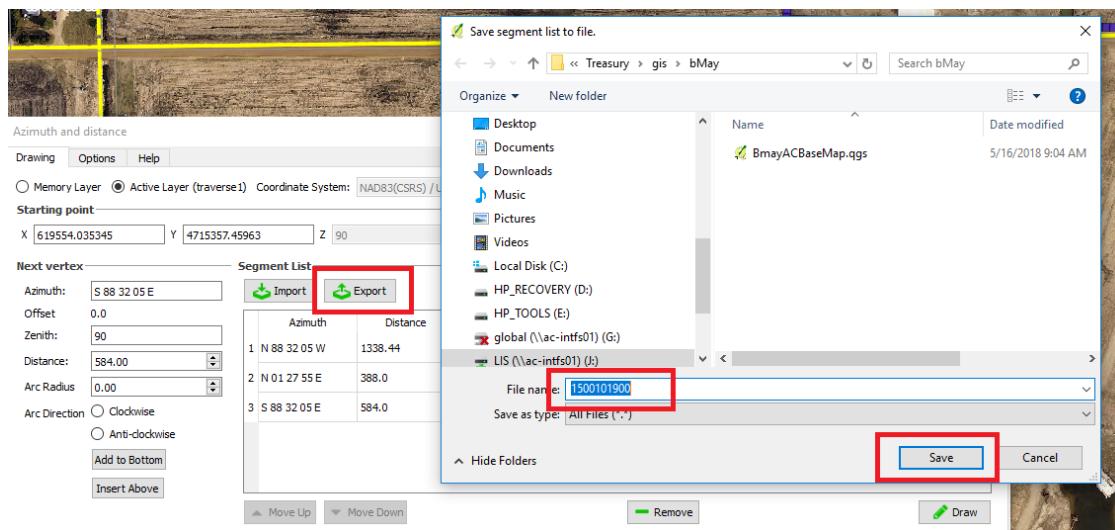


Figure 5.54: Save Segment List

Verify Attributes

Right click on **Traverse1** in the Layers Panel

and select **open attribute table**.

The attributes you entered should be in the table.

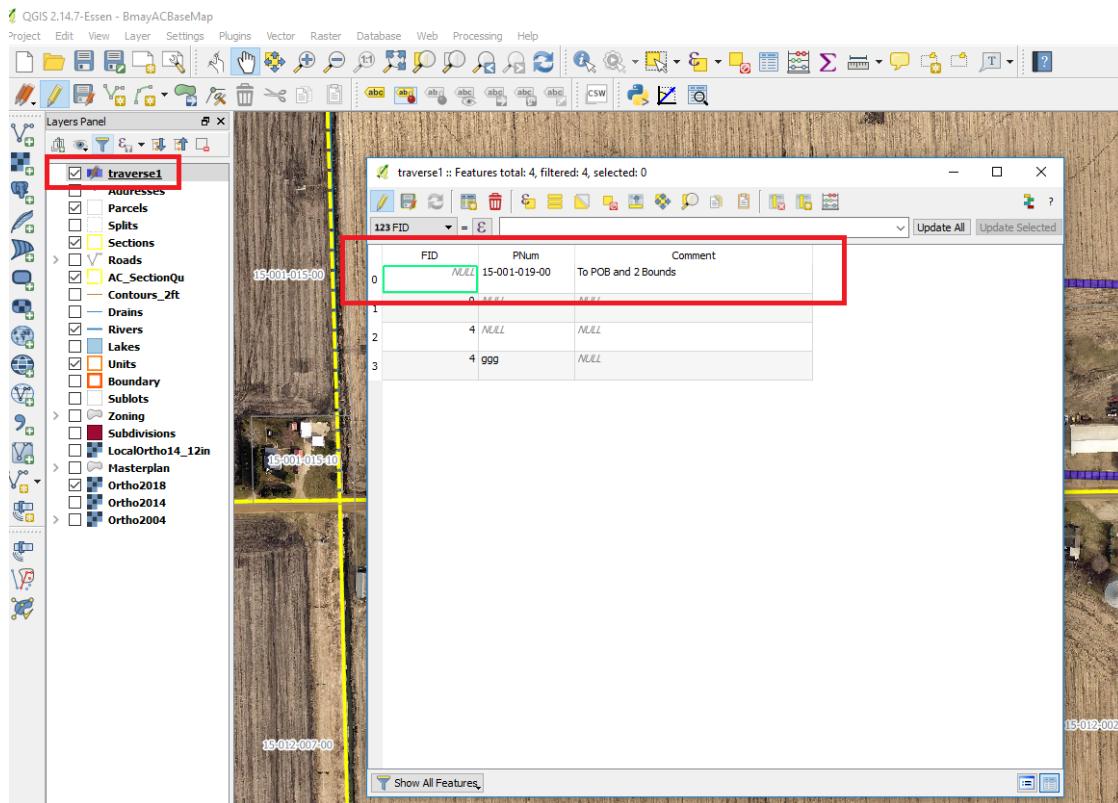


Figure 5.55: Segments In Table

5.9.3 SEARCH LAYERS PLUGIN

TOOL SUMMARY

QGIS has some tools built in and others can be added via the Plugin architecture.

Background

QGIS is an open source GIS and search by feature attributes is needed.

Who the Tool is For

QGIS users that require a search by attributes tool.

Why the Tool is Needed

QGIS users need a tool to search for features by attribute.

Takeaway

The Search Layers Plugin can be added to any installation of QGIS.

PLUGIN SETUP

Install Search Layers Plugin

- To install: Plugins ⇒ Search Layers Plugin ⇒ Install

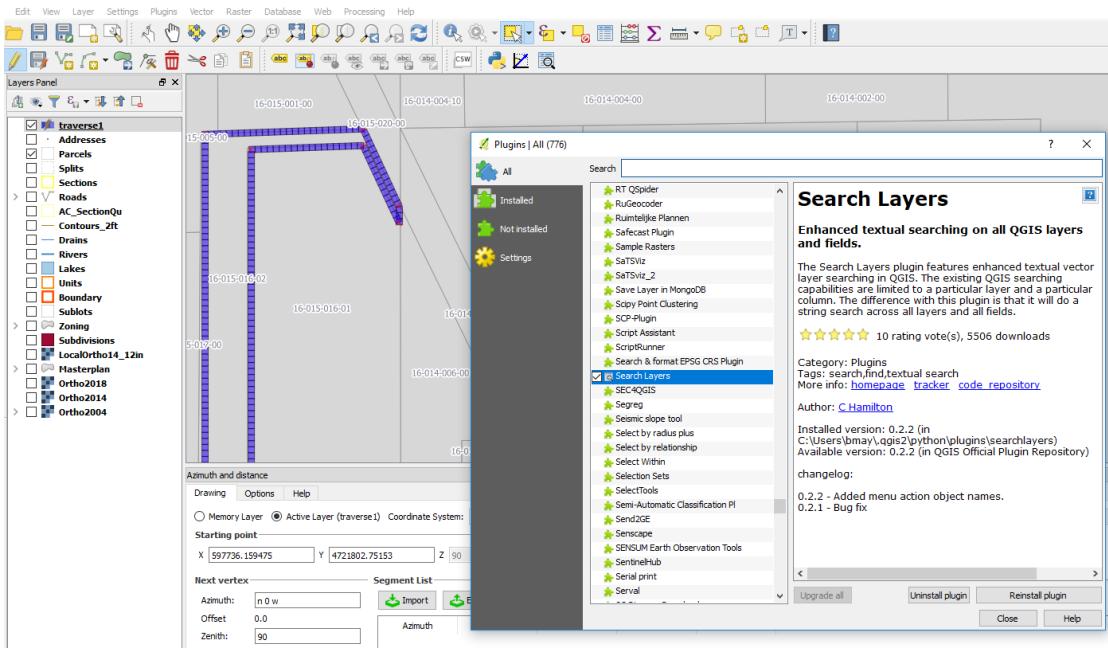


Figure 5.56: Search Layers Plugin

Search Layers Plugin Tool is Added to the Toolbar



Figure 5.57: Search Layer Icon

USING THE PLUGIN

Enter Parcel Search Data

In The Search Layers Plugin:

- Enter **parcel number** (with dashes) into *Search String*
- Select **Parcels** in *Search Layers*
- Select **PARCELID** in *Search Fields*
- Select **=** in *Comparison*

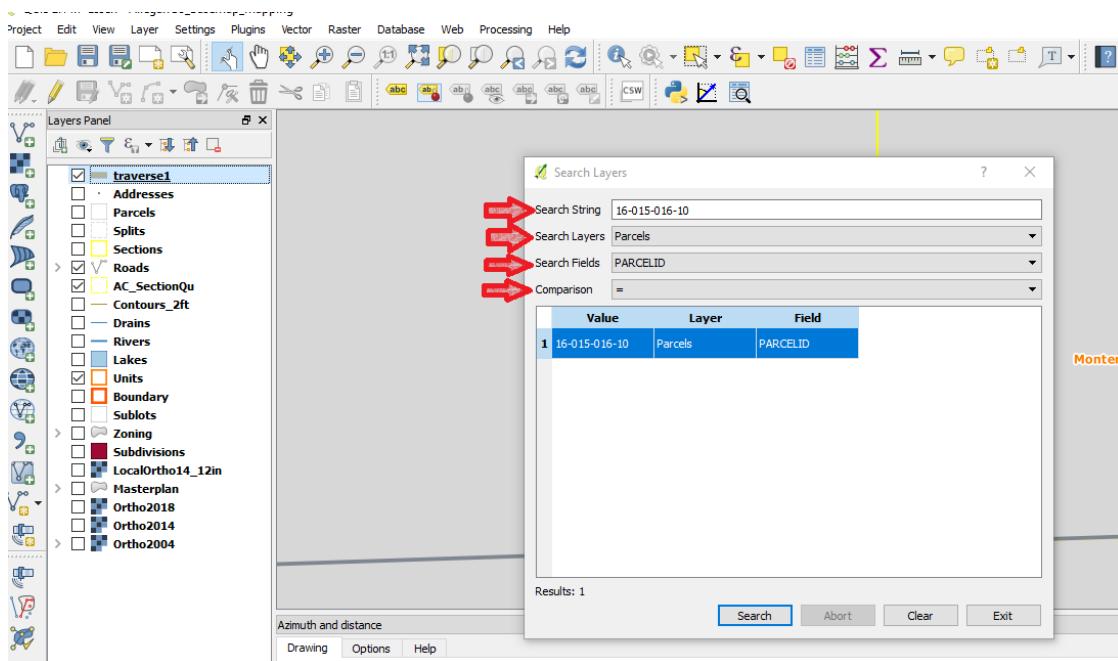


Figure 5.58: Search Layers Setup

- click on result in table

Screen zooms into the selection

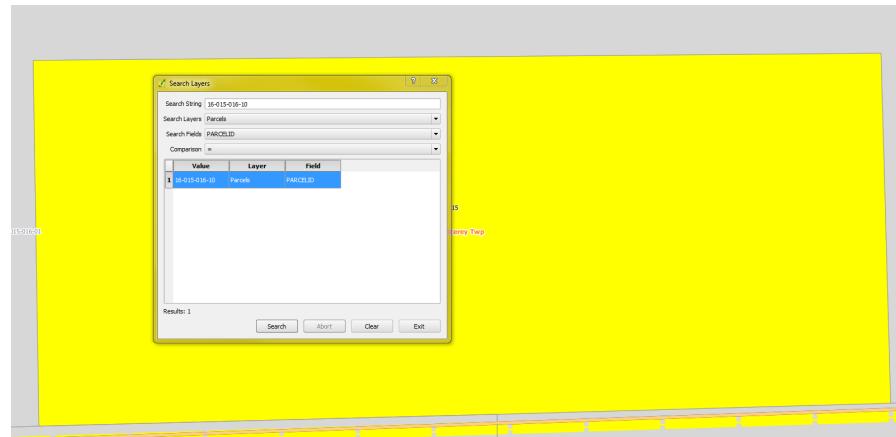


Figure 5.59: Search Results

Zoom out far enough to find a reference point

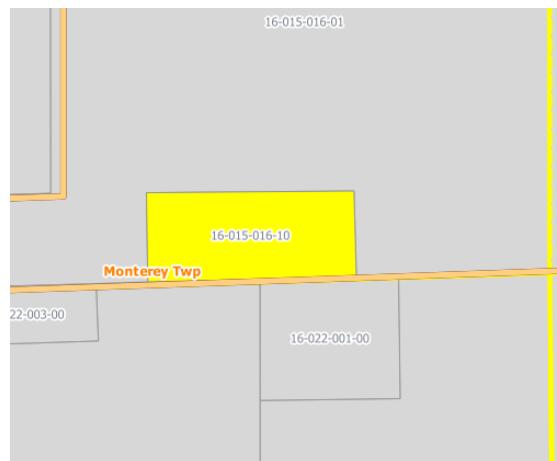


Figure 5.60: Search Results Zoomed Out

Part IV

Resources

Geography 101

SURVEYS AND PLANS

NORTHING AND EASTING

HOW TO USE NORTHING AND EASTING

Using a spreadsheet to convert the dimensions

To use Northing and Easting from survey plans: In a spreadsheet, adjust the data to be relative to the 1st point

So if a survey gives you:

Pt	Northing	Easting
1	995.9952	9766.6
2	994.3049	9112
3	989.234	7150
4	1194.3099	9114
5	1193.266	8710.2059
6	1193.0954	8644.2016
...
32	1617.7856	8827.4296

Table 1: Survey Plan Northing and Easting

Calculate Relative North and Relative Easting of the points to Point 1 by subtracting the point 1 values from each of the other points.

Use formulas:

	A	B	C	D	E
1	Pt	Northing	Easting	Relative NS	Relative EW
2	1	995.9952	9766.6	0	0
3	2	994.3049	9112	=B3-B\$2	=C3-C\$2
4	3	989.234	7150	=B4-B\$2	=C4-C\$2
...
6	32	1617.7856	8827.4296	=B9-B\$2	=C9-C\$2

Table 2: Survey Plan Northing and Easting

Giving you:

	A	B	C	D	E
1	Pt	Northing	Easting	Relative NS	Relative EW
2	1	995.9952	9766.6	0	0
3	2	994.3049	9112	-1.6903	-654.6
4	3	989.234	7150	-6.7612	-2616.6
...
6	32	1617.7856	8827.4296	621.7904	-939.1704

Table 3: Relative Northing and Easting

So to place pt 32:

From pt 1:

Use distances 621.7904' N and 939.1704'W

A PRIMER ON COORDINATE SYSTEMS COMMONLY USED IN MICHIGAN

[Document Link](#)

ESRI Information

ESRI PRODUCT DOCUMENTATION

FUNCIONALITY MATRICES

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

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