

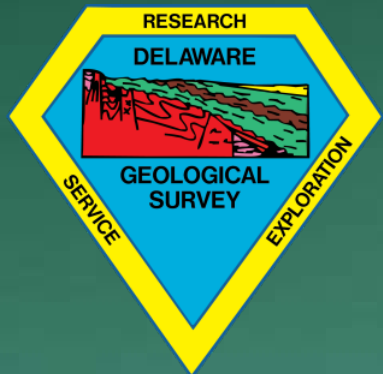
# Geologic Field Mapping in Delaware – Paper Maps to ESRI Collector App

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GIS Specialist/Cartographer

Delaware Geological Survey

University of Delaware





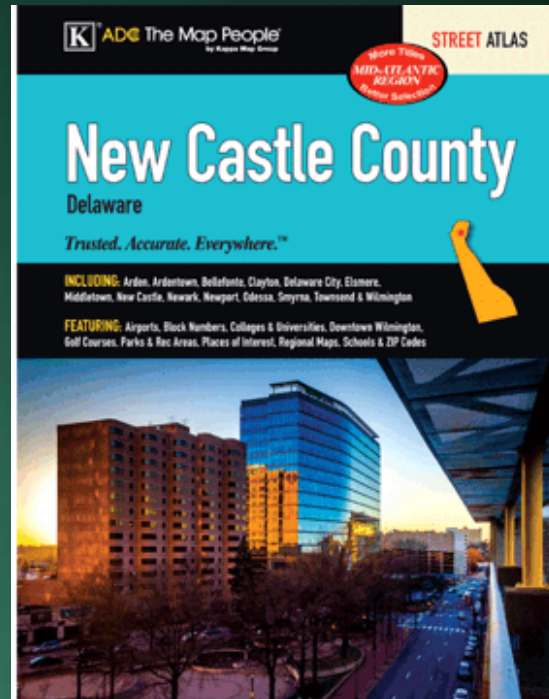
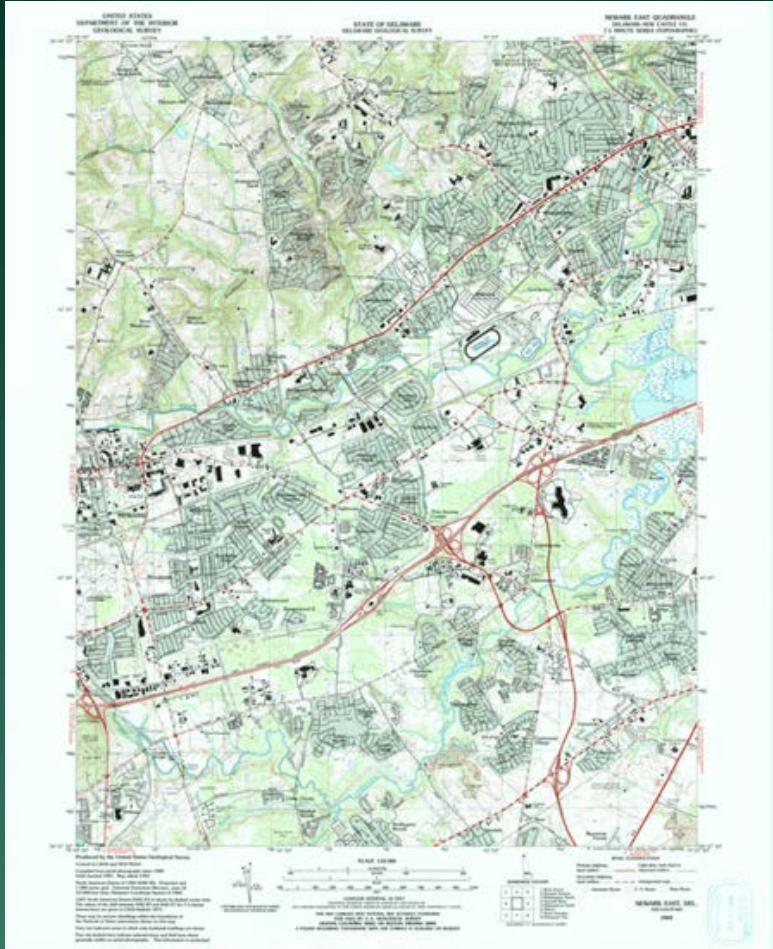
# Field work – drilling, hand augering





# Field maps – paper (1980s'-2007)

- USGS topographic maps
- ADC map books
- Aerial photography





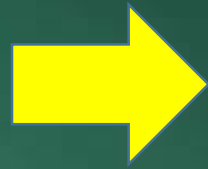
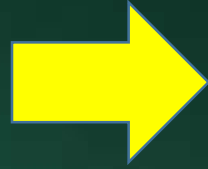
# Field maps – paper (2008-2015)



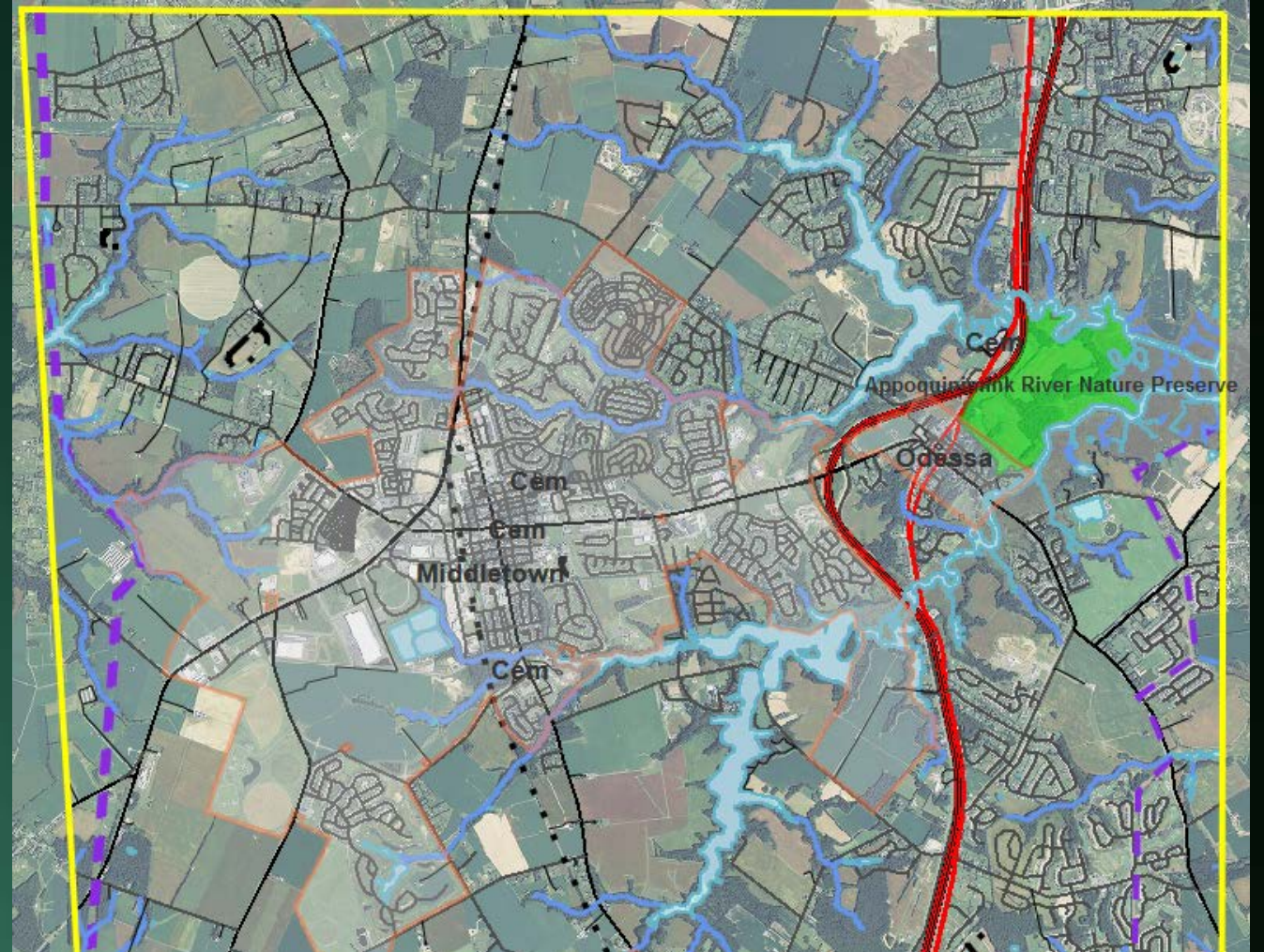


# Field maps – mobile

Paper copies



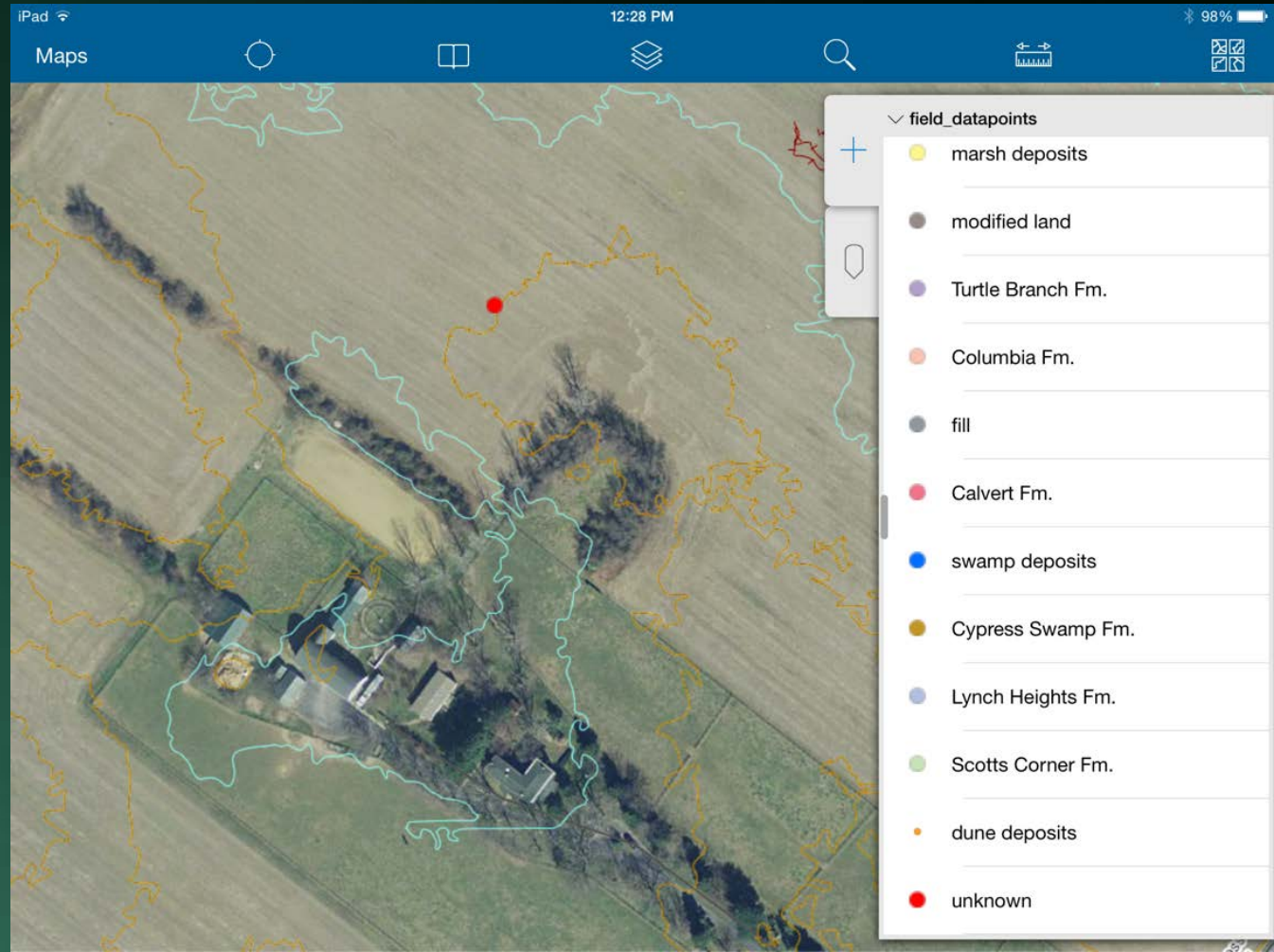
Mobile device





# ESRI Collector App

- Collect and update GIS data in the field using a tablet or smartphone
- Attach photos to features
- Data and photos are stored in the cloud
- User can collect data offline



# ESRI Collector App – Create Maps

- Prepare data in ArcGIS for Desktop (ArcCatalog/ArcMap)

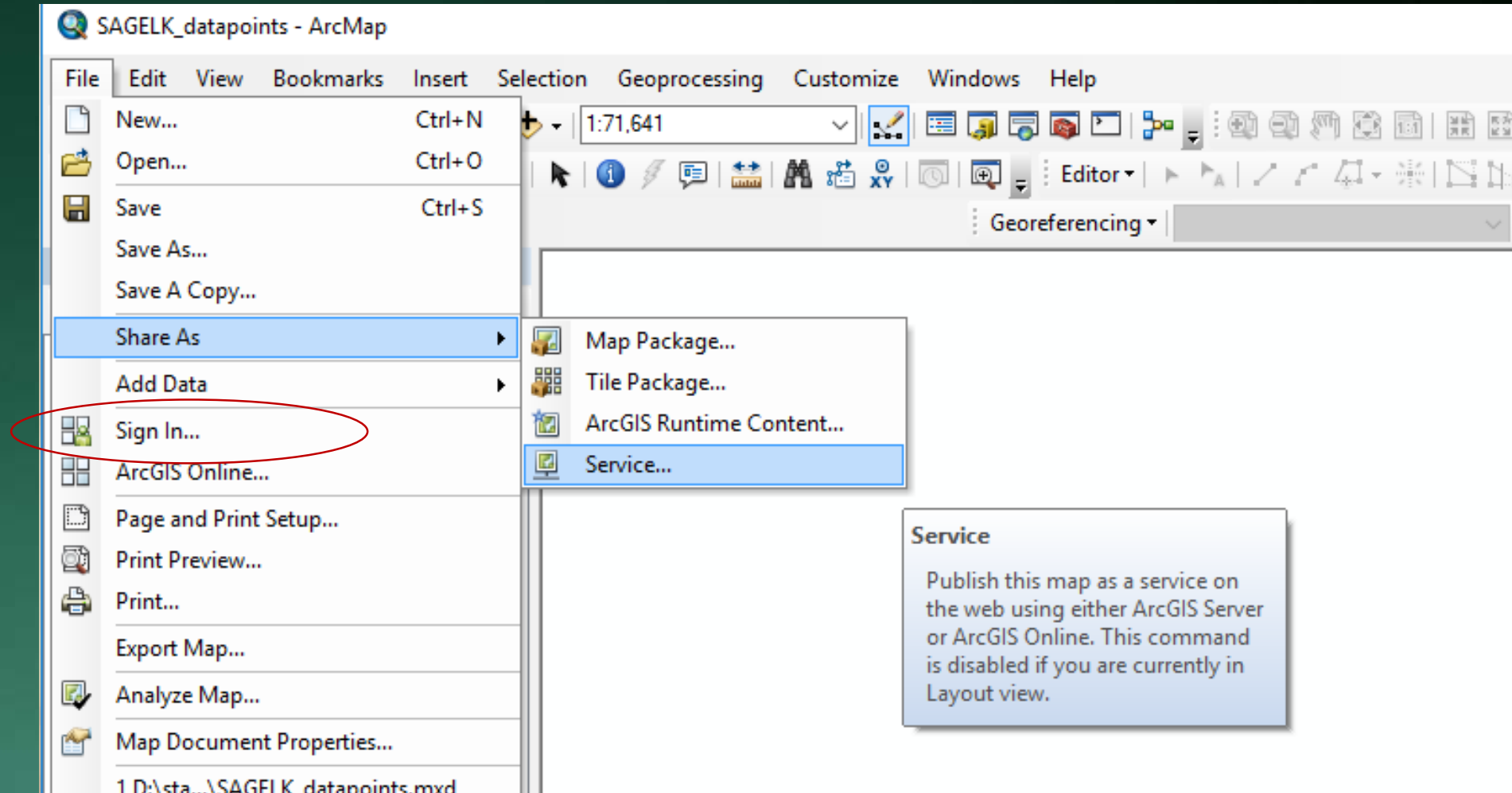
The screenshot displays the ArcMap interface for a project named 'SAGELK\_datapoints'. The main map area is currently blank. On the left, the 'Table of Contents' panel shows a layer named 'fieldwork\_sagelk' with a legend containing several categories: '<all other values> surf\_unit', 'Qcl', 'Qlh', 'Kml', 'Ktht', 'Tvt', 'Qm', 'Qsw', and 'U'. At the bottom, a 'Table' window is open, showing the data structure for the 'fieldwork\_sagelk' layer. The table has the following columns:

OBJECTID*	SHAPE*	DGSID	LOCALID	PROJECT	surf_unit	ALTITUDE	DEPTH	Quad	comment	Data_Type
-----------	--------	-------	---------	---------	-----------	----------	-------	------	---------	-----------



# ESRI Collector App – Create Maps

- Publish data from desktop to ArcGIS Online





All Maps

Search maps

All On Device

10 maps



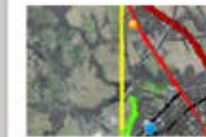
MIDCEC field map (online)

3/31/15 | Lillian Wang



tmck practice map feb2016

11/29/16 | Lillian Wang



SMYBBH field map (online)

6/1/16 | Lillian Wang



SMYBBH field map (offline)

Downloaded 9/3/15



Functional Classification of Delaware Roads

4/2/15 | Josh Thomas



MIDCEC field map (offline)

3/25/15 | Lillian Wang



SAGELK field map (offline)

8/29/16 | Lillian Wang



SAGELK field map (online)

8/30/16 | Lillian Wang



SMYBBH field map (offline)

6/1/16 | Lillian Wang



statemap\_quads\_mappe d

10/26/16 | Lillian Wang



# All Maps

All

On Device



MIDCEC field map  
(offline)

Synced 5/1/15, 10:44 AM





# SAGELK\_fieldwork\_datapoints Edit

- Overview**
- Data
- Visualization
- Usage
- Settings

Edit Thumbnail

★ Add to Favorites

field maps for STATEMAP project in St Georges-Elkton quadrangles

Edit

by [lillian@udel.edu](mailto:lillian@udel.edu)

Last Modified: August 29, 2016

Feature Layer (Hosted)

## Description

Edit

Add an in-depth description of the item.

## Layers

[fieldwork\\_sagelk](#)

Open In
 Export To
 Disable Attachments
 Service URL

## Access and Use Constraints

Edit

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

Open in Map Viewer ▼

Open in Scene Viewer

Open in ArcGIS for Desktop

Publish ▼

Export Data ▼

Export to Shapefile

Export to CSV file

Export to FGDB

Export to GeoJSON

Export to Feature Collection

## Details

★★★★★ 0 ratings

Source: [Feature Service](#)

Created: August 29, 2016

Size: 240 KB

Shared with: [DGS-STATEMAP](#)



Cancel



Update

- Cancel Done
- surf\_unit
- Turtle Branch Fm.
- Columbia Fm.
- fill
- Calvert Fm.
- swamp deposits
- Cypress Swamp Fm.
- Lynch Heights Fm.
- Scotts Corner Fm.
- dune deposits
- unknown ✓
- Vincentown Fm.
- Carolina Bay deposits
- Beaverdam Fm.

**Location**  
 Lat: 39.477861° Long: -75.692014°

Location >

Record\_By >

Project >

Northing >

Easting >

Altitude >

Quad >

Depth >

Notes >

Notes2 >

County >

Otcrp\_Type >

surf\_unit >  
**unknown**

Date >



Cancel



Update

Done Attachments

Add

Take Photo or Video

Choose From Library

Location  
39.477861° Long: -75.692014°

unknown	>
Date	>



# Collector – customizing the map

HOME ▾ MIDCEC field map (online) NEW MAP CREATE PRESENTATION Lillian ▾

Details Add ▾ Edit Basemap Save ▾ Share Print Directions Measure Bookmarks

About Content Legend

Contents

- field datapoints ▾
- railroad ▾
- trails pathways ▾
- mf lines ▾
- mf area ▾
- bd public lands ▾
- nhd swampmarsh ▾
- nhd area ▾
- nhd line ▾
- bd river ▾
- Outdoor Recreation ▾
- MIDCEC fieldmap ▾
- DE Imagery 2012 ▾

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Esri Report Abuse

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# Collector – customizing the map

The screenshot displays the ArcMap software interface. The title bar reads "SAGELK\_roads\_contours\_offlinemap - ArcMap". The menu bar includes File, Edit, View, Bookmarks, Insert, Selection, Geoprocessing, Customize, Windows, and Help. The File menu is open, showing options like New..., Open..., Save, and Share As. The "Share As" option is selected, and its sub-menu is open, with "Tile Package..." highlighted. A tooltip for "Tile Package" is displayed over the map, explaining that it creates a cache of tiles for use as a basemap in ArcGIS Runtime applications. The map itself shows a topographic view with roads, contours, and labels like "Executive Dr", "State Hwy 896", and "Delaware".

File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help

New... Ctrl+N  
Open... Ctrl+O  
Save Ctrl+S  
Save As...  
Save A Copy...  
Share As  
Add Data  
Sign Out - lillian@udel.edu  
ArcGIS Online...  
Page and Print Setup...  
Print Preview...  
Print...  
Export Map...  
Analyze Map...  
Map Document Properties...

1 ...\SAGELK\_roads\_contours\_offl...  
2 D:\st...\SAGELK\_online\_map.mxd  
3 D:\sta...\SAGELK\_datapoints.mxd  
4 D:\Temp\testing.mxd  
5 ...\deos\_station\_de\_rec\_flood\_l...  
6 D:\st...\deos\_station\_de\_rec.mxd  
7 D:\story\_map...\jainur.india.mxd

1:9,028  
100%  
Snapping  
Editor  
Georeferencing sagelk12

Map Package...  
Tile Package...  
ArcGIS Runtime Co...  
Service...


**Tile Package**  
Create a tile package from the current map zipped up into one convenient file, and either upload it to ArcGIS Online or save it to disk. A tile package contains a cache of tiles that you can use as a basemap in ArcGIS Runtime applications.

Executive Dr  
Lake Dr  
Yoon UT  
State Hwy 896  
State Hwy 896  
Delaware  
Technology Dr  
Driveway






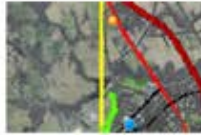






















# Collector – customizing the map

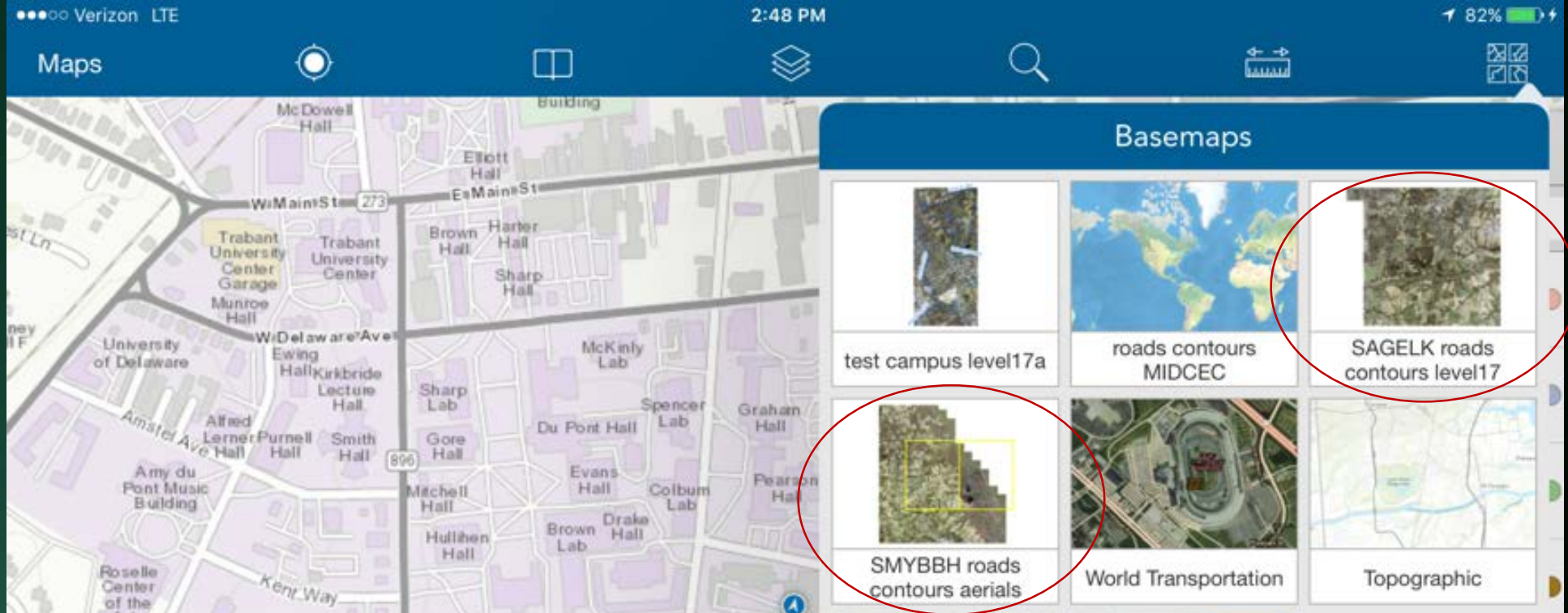
Verizon LTE 11:21 AM 18%

All Maps  Search maps

All On Device 10 maps

 <p>MIDCEC field map (online)</p> <p>3/31/15   Lillian Wang </p>	 <p>tmck practice map feb2016</p> <p>11/29/16   Lillian Wang  </p>	 <p>SMYBBH field map (online)</p> <p>6/1/16   Lillian Wang </p>
<p>On Device</p>  <p>SMYBBH field map (offline)</p> <p>Downloaded 9/3/15  </p>	 <p>Mobility Land Access</p> <p>Functional Classification of Delaware Roads</p> <p>4/2/15   Josh Thomas </p>	 <p>MIDCEC field map (offline)</p> <p>3/25/15   Lillian Wang  </p>
 <p>SAGELK field map (offline)</p> <p>8/29/16   Lillian Wang  </p>	 <p>SAGELK field map (online)</p> <p>8/30/16   Lillian Wang </p>	 <p>SMYBBH field map (offline)</p> <p>6/1/16   Lillian Wang  </p>
 <p>statemap_quads_mappe d</p> <p>10/26/16   Lillian Wang  </p>		


















## File Sharing

The apps listed below can transfer documents between your iPad and this computer.

### Apps

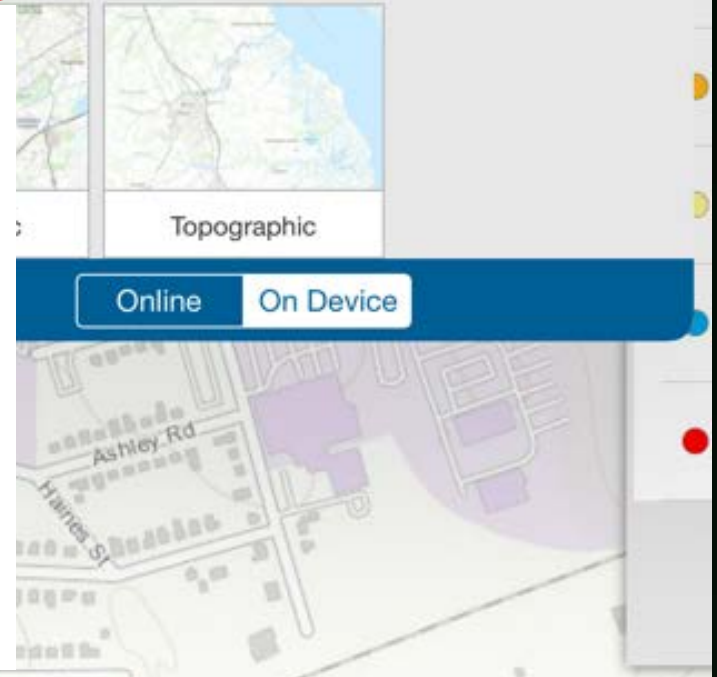
-  Bad Elf GPS
-  Collector
-  Keynote
-  Pages

### Collector Documents

 Basemaps	3/9/2014 10:26 PM	463.1 MB
 offline_aHR0cDovL3d3dy5hcmNnaXMuY29t	3/4/2014 12:55 PM	4 KB
 offliner_aHR0cDovL2Fnc3BvcnRhbHNzbC5lL3pL...	3/8/2014 9:40 PM	4 KB
 offliner_aHR0cDovL3d3dy5hcmNnaXMuY29t	3/8/2014 10:45 PM	4 KB
 speedy32_aHR0cDovL3d3dy5hcmNnaXMuY29t	3/10/2014 2:26 PM	12 KB
 user_offline_E4867DBF-9123-448B-B546-585FDE9...	3/4/2014 12:55 PM	zero KB
 user_offliner_09542D37-87F4-4895-93B1-9B3B237...	3/8/2014 10:44 PM	zero KB
 user_offliner_CB85CFEE-3319-4CD2-A3AD-DA649...	3/7/2014 11:30 AM	zero KB
 user_speedy32_634010EA-A099-465A-A92E-8A8E...	3/9/2014 10:26 PM	368 KB

Add...

Save to...



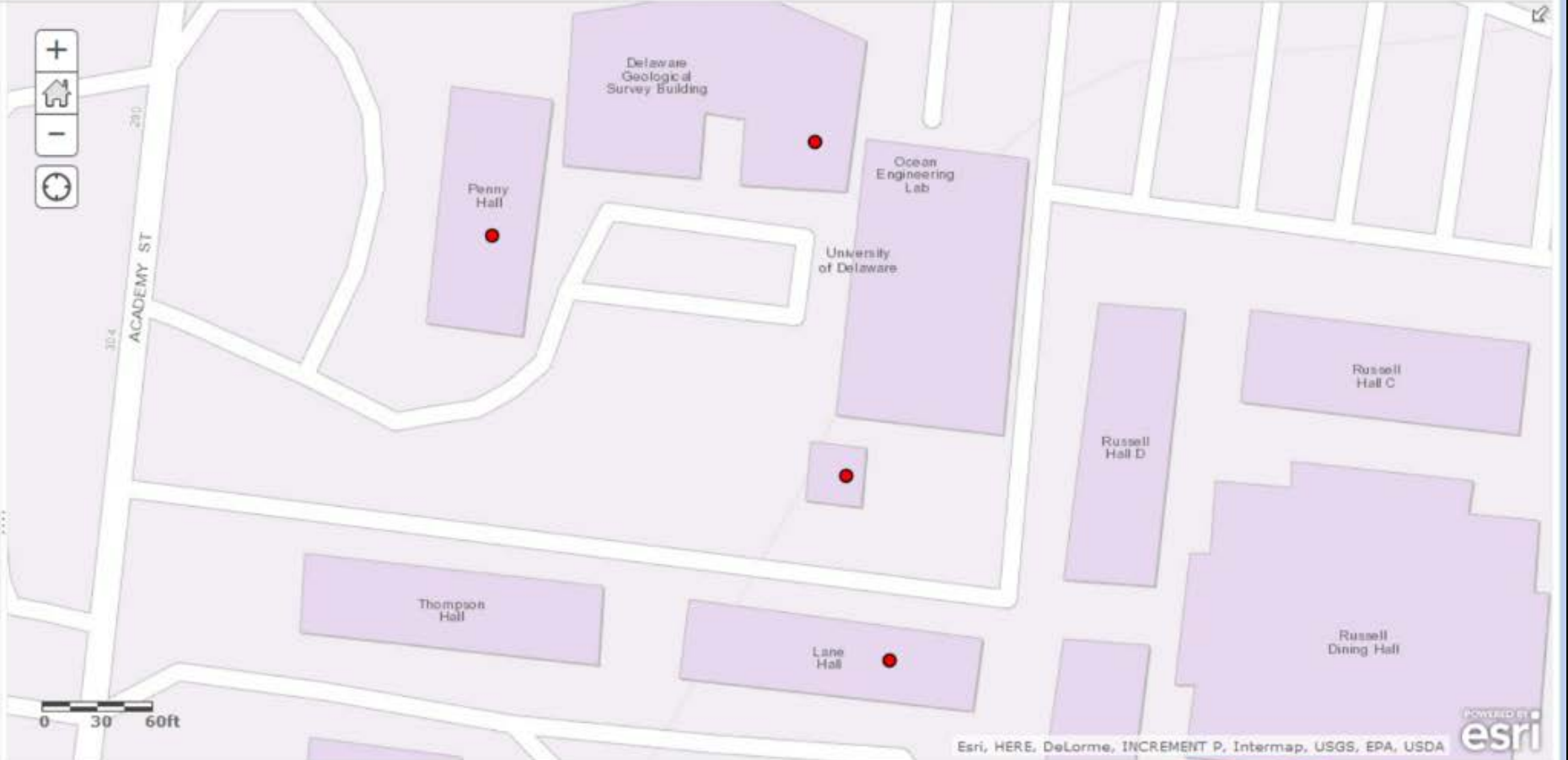
Details Add ▾ Edit Basemap Analysis Save ▾ Share Print Directions Measure Bookmarks Find address or place

About Content Legend

Contents

datapts dgs

Topographic



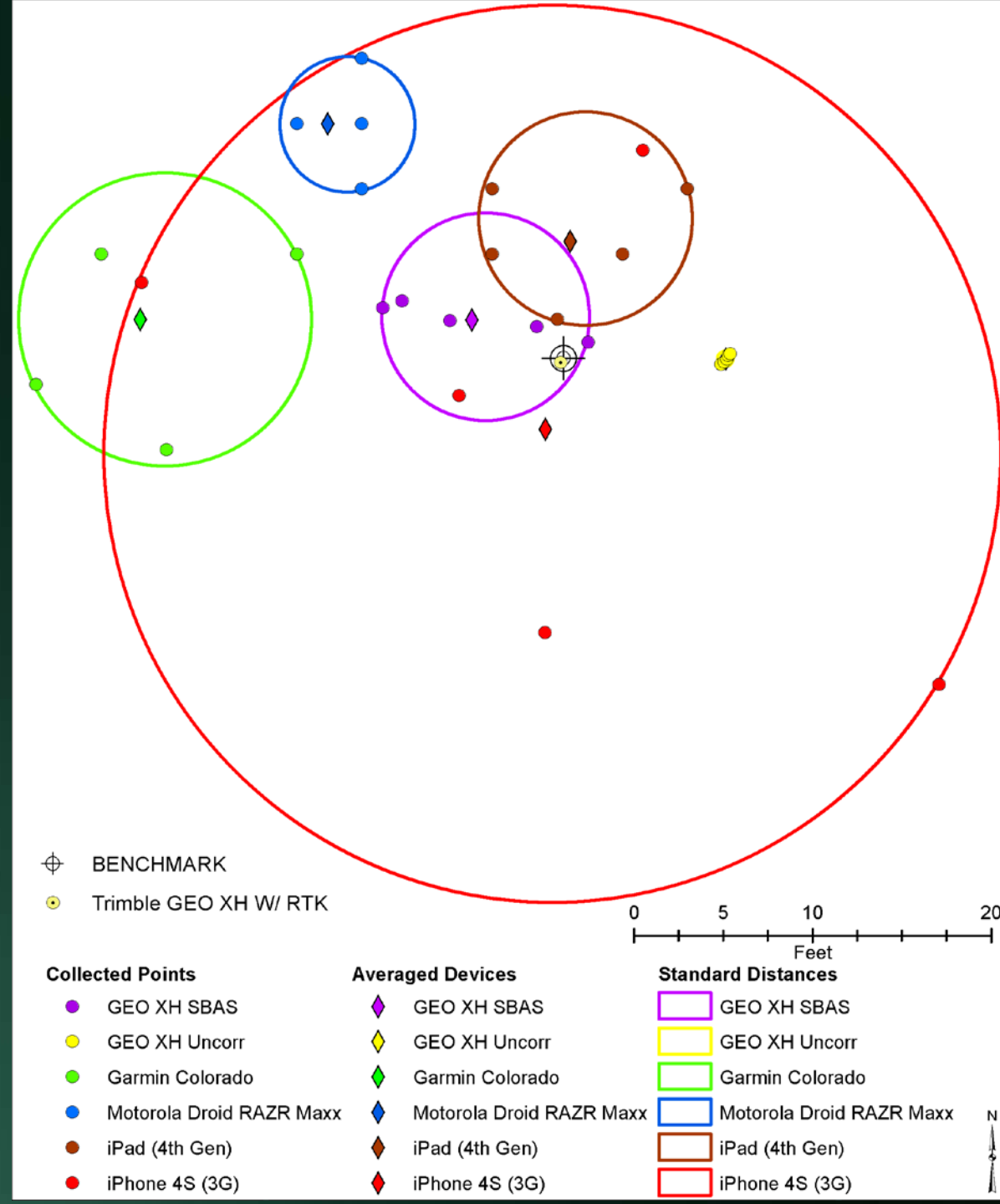
datapts dgs (4 features, 0 selected)

OBJECTID	DGSID	notes	created_user	created_date	last_edited_user	last_edited_date	CreationDate	Creator	EditDate	Editor
1	Pt1	DGS garage					May 17, 2016	lillian@udel.edu	May 17, 2016	lillian@udel.edu
2	Pt2	DGS annex					May 17, 2016	lillian@udel.edu	May 17, 2016	lillian@udel.edu
3	Pt3	Penny Hall					May 17, 2016	lillian@udel.edu	May 17, 2016	lillian@udel.edu
4	Pt4	Lane hall, enabled track edits					May 17, 2016	lillian@udel.edu	May 17, 2016	lillian@udel.edu



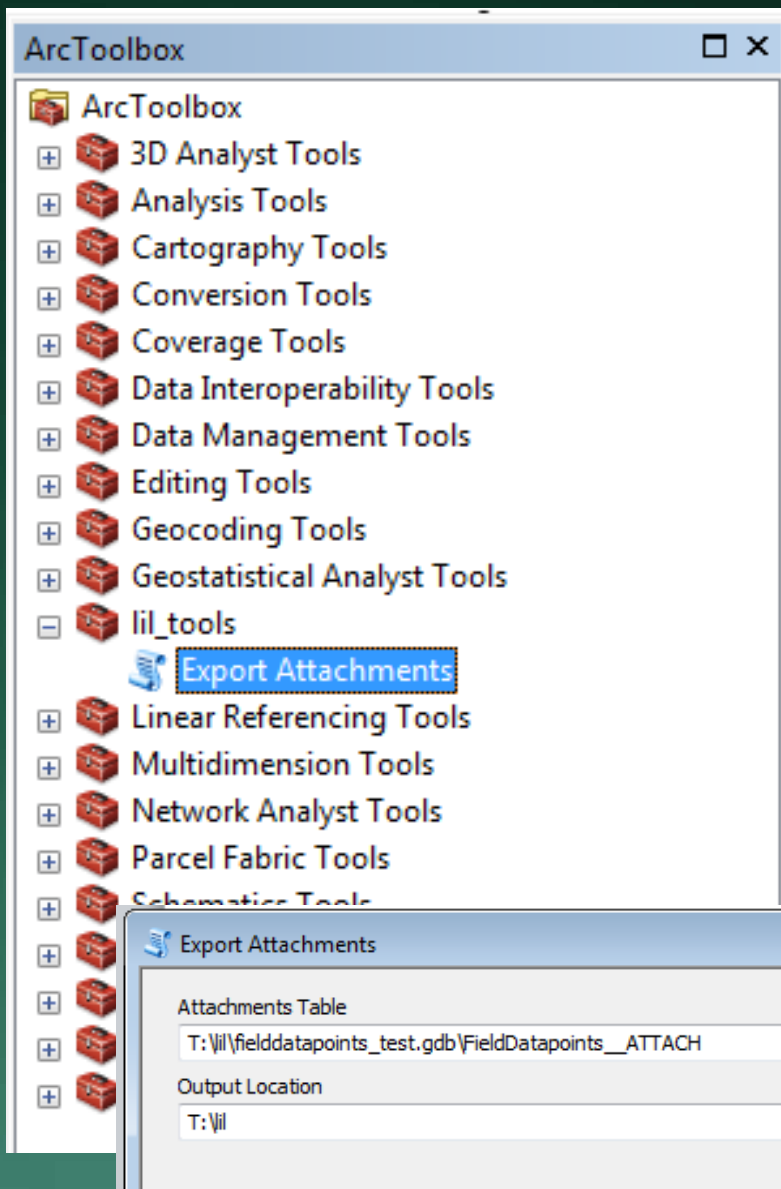
# Location Accuracy

- Accuracy will be as good as the device can get
- Informal testing showed iPad (iOS) was most accurate low-grade unit
- Increased accuracy is possible by connecting a GPS to the device (requires special connector)



# Batch export attachments from a feature class

<http://support.esri.com/em/knowledgebase/techarticles/detail/41763>

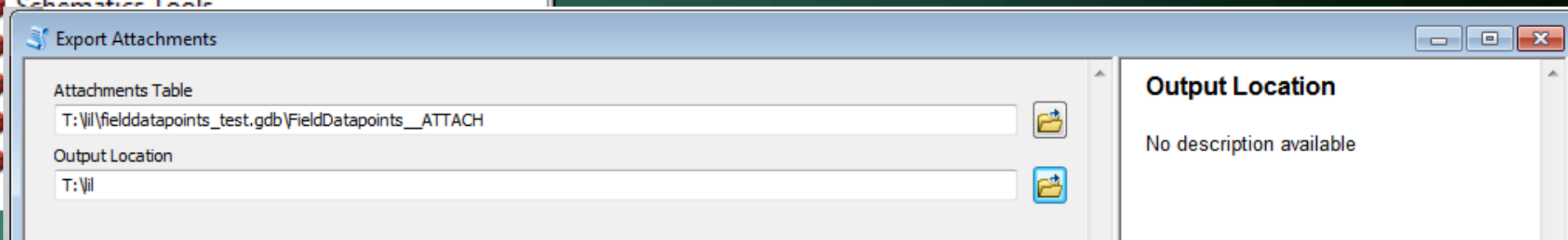


```
import arcpy
from arcpy import da
import os
```

```
inTable = arcpy.GetParameterAsText(0)
fileLocation = arcpy.GetParameterAsText(1)
```

```
with da.SearchCursor(inTable, ['DATA', 'ATT_NAME', 'ATTACHMENTID'])
as cursor:
```

```
    for item in cursor:
        attachment = item[0]
        filename = "ATT" + str(item[2]) + "_"
        filename = filename + str(item[1])
        open(fileLocation + os.sep + filename,
'wb').write(attachment.tobytes())
    del item
    del filename
    del filename
    del attachment
```





# Summary (general)

- Create data on desktop
- Publish data from desktop to AGOL and create map
- View map and collect data in Collector App
- Download map to device to collect data offline
- Download feature layer from AGOL back to desktop

# Summary (customize maps)

- Create domains to customize pull-down menu
- Tile package file for large datasets
- Side-load tile package files to device (base maps)
- Enable track editing
- Location accuracy (iPad had best accuracy)
- Batch export attachments to desktop with Python script