IOS based geodatabase collection for coal mining sites

Nick Schaer, WVDEP
Why IOS (and Android)

- WVDEP has an IOS contract.
- IOS is version constant operating system.
- Android and IOS are fully supported.
- Windows Mobile is no longer supported.
Various GIS/GPS Apps Spring 13
GPS Accuracy within IOS

- The IOS Mask
- Antenna Issues
- aGPS
- External vs Internal
External GPS on iOS

GPS Cable – Lightning Connector

Connect your existing external GPS to iPad 4 or iPhone 5 devices.

This cable enables connection of iOS devices to various industry-leading GPS receivers via a standard DB9 – 9-pin connector. The cable is compatible with all iOS apps, including the MapOut and Compass apps that are standard on all iOS devices. The cable is 60 cm long and uses a male DB-9 connector and supports data transfer rates up to 115.2 kbps and requires iOS 5.0 or above.

The solution to completely plug-and-play ready to be licensed and certified under the MFI program by Apple and works with all of the leading high-accuracy GPS/GNSS receivers that use the NMEA 0183 protocol.
GPS Cable NMEA Link

Data

Enter Text to Send:

- Text Received:

```
21,00,067,,17,16,255,*7A
$GPGSV,4,2,14,02,00,206,,11,32,354,,
27,00,028,,04,07,219,*79
$GPSPV,4,3,14,10,00,251,,09,00,323,,
15,00,019,,01,59,353,*73
$GPSPV,4,4,14,24,00,187,,32,51,102,,
........*72
$GLGSV,3,1,12,67,00,026,,66,00,302,,
69,00,090,,68,00,069,*67
$GLGSV,3,2,12,79,07,158,,73,38,042,,
71,50,206,,74,03,005,*69
$GLGSV,3,3,12,85,15,330,,72,12,249,,
82,00,101,,84,00,000,*60
$GNSSA,M,1,,........,,0,0,0,0,0,0,0,*2
```

Pause
Trimble R1 and Bad Elf 3300

R1 GNSS Receiver

- Built-in antenna
- External antenna port
- Status LEDs
- Control button
- USB port
  - Charging
  - FW upgrades
GeoTagged Photos for Data Collection

- External memory storage (DCIM).
- Automatic Cloud Dump.
- GPS must be turned on and linked to camera (Settings/Privacy).
- Most smart phones come from the factory fully “on”.

Geotagged Photos

- Transfer to computer via e-mail or cord – iPad listed as drive in Windows Explorer
- Data saved in Exif of the jpg
- It can be viewed or extracted
  - Date taken
  - Size and resolution
  - Camera information
  - Latitude/Longitude
  - Altitude (mean height above sea level or elevation)
Geo Tagging locations in iOS Photos
Geotagged Photos

- View photos on map in ArcMap (Citrix) using ArcToolbox – GeoTagged Photos To Points

- Watermark multiple photos with latitude/longitude, title, project, etc. using GPS Photo-link

- GPS Photolink
Importance of PDF and GeoPDF

- USGS standard file format
- PDF easily deployed to IOS
- Easily created in Word, Power Point and ArcGIS
PDF Forms

DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF SPECIAL RECLAMATION
CONSTRUCTION INSPECTION REPORT

- Critical?

Click Here to Validate Form

TYPE OF REPORT
- UNDER CONTRACT
- WARRANTY
- FINAL CONSTRUCTION

INSPECTION DATE
(Ex: 11/15/2023)
TIME IN
TIME OUT
(Ex: 13:00)

WEATHER CONDITIONS

SOIL CONDITIONS

PURCHASE ORDER #
WORK DIR #

PROJECT SUPERVISOR
PERSON CONTACTED
PERSONNEL ON SITE
EQUIPMENT ON SITE

WORK IN PROGRESS

PERFORMANCE STANDARDS BEING MET?
- YES
- NO

WATER QUALITY CONTROLS?
- YES
- NO

GENERAL WORKMANSHIP?
- COMPLIANT
- NON-COMPLIANT

APPROXIMATELY
- PERCENT (%) OF BACKFILLING COMPLETED

APPROXIMATELY
- ACRES OF REGRADING COMPLETED

APPROXIMATELY
- ACRES OF REVEGETATION PROCESSES COMPLETED

COMMENTS

INSPECTOR

(Please enter your email address)

Instructions:
1) Fill out the Inspection form
2) Click the “Validate” button to verify the data on the form. We will not be able to import your Inspection if data is missing.
3) Please email your report to dep.anhmsr@wv.gov. Attach this PDF file to the email (you can attach multiple inspections).
4) You will receive a confirmation email.
### DAILY PROJECT REPORT
DEPARTMENT OF ENVIRONMENTAL PROTECTION
ABANDONED MINE LANDS AND RECLAMATION

**Instructions:**
1. Fill out the form.
2. * indicates required fields.
3. Please email your report to dep.anmlair@wv.gov. Attach this PDF file to the email (you can attach multiple inspections).
4. You will receive a confirmation email.

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
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<tr>
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<td>13/01/2014</td>
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<tr>
<td>Period Covered*</td>
<td>11/30/2014</td>
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<tr>
<td>To*</td>
<td>12/01/2014</td>
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<td>Weather Conditions*</td>
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<tr>
<td>Soil and Other Tests*</td>
<td></td>
</tr>
</tbody>
</table>

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**Comment:**
- PDF Forms
- Adobe Reader
- AirDrop
- Share with people nearby. If you don’t see them, have them turn on AirDrop in Control Center on iOS, or go to AirDrop in Finder on a Mac.
Geo PDF Files
Data Driven Page

- Use Arc Map Extension to derive 7.5 Minute Topographic for all WV
Active Mining Permits and a GeoMine DDP
How create a GeoPDF (From GeoMine) In ArcGIS
Avenza PDF Maps
Map Menu

- Belle
- Blue Sulphur LIDAR
- Burning Springs Mystery Sites
- Burning Springs Time Travel
- Hurricane
- Kanawha City
- Malden Salt 1938
- Milton
- OG_Photomap_Barboursville
- Old Farm LIDAR
- Petroleum
- Sovine 1938
- Tumaco, Colombia, Ecuador 1:250,000
Getting PDF Files into your device

1. From Avenza Map Store
2. Itunes file sharing
3. Dropbox
4. Direct link to server
5. email
Avenza Store

- USGS Topo maps available for the continental US.
I Tunes file download
WVDEP Server Download Sites

- Master Quad Map
  - [http://tagis.dep.wv.gov/maps/quad_index.pdf](http://tagis.dep.wv.gov/maps/quad_index.pdf)
- WV Active Program Topo
- WV AML Program
- WV Oil and Gas Program Topo
- WV Oil and Gas Program Ortho
  - [http://tagis.dep.wv.gov/maps/OGPhotoMaps/](http://tagis.dep.wv.gov/maps/OGPhotoMaps/)
For ESRI UC Go To

- http://tagis.dep.wv.gov/maps/DMRP

ermitMaps/Training/ESRI%20UC%20

2015/
Copy and paste HTML location
Collecting Placemark points on Map
Points and Photo
Placemark data entry

Close  Placemark

TITLE
Down From Pit
7/7/15, 12:19 PM

INFORMATION
Icon
Description
Not Set
Photos
Location
38.25732, -81.61785

ATTRIBUTES
Placemarks
Parent Layer/Schema

Photos

Down From Pit
Down From Pit (1)
Down From Pit (2)
Down From Pit (3)
PDF Maps Tools
Avenza PDF Maps

• AML Demo
Avenza PDF Maps

- AML Demo
GeoJot+
Professional Enterprise Data Collection System
GeoMine AMLIS Structure

- Forms can be quickly made and distributed.
AMLIS GeoMine structure on and in Beech Hill Three Mile Creek
Other Major Cloud based GIS Apps

1. AutoCAD 360
   - Autodesk

2. Terrago Edge
   - Terrago

3. Collector for ArcGIS
   - ESRI

4. TerraFlex
   - Trimble
GeoMine data on the fly

GeoMine PDF

GeoJot+

Same Same 1893
Just last week
Basic Exif data

Latitude: N 38° 15' 28.78"
Longitude: W 81° 37' 10.29"
Accuracy: +/- 33 ft
Altitude: 1154 ft
Direction: 56° NE
Date / Time: 7/7/15 12:02 PM

Latitude: N 38° 15' 27.47"
Longitude: W 81° 37' 05.26"
Accuracy: +/- 16 ft
Altitude: 1080 ft
Direction: 239° SW
Date / Time: 7/9/15 1:30 PM
A picture is worth more than a thousand words now.
Technical Innovation and Professional Services

Min Kim and the rest of the TIPS Mobile Computing team. Jessica Perkins and Kelli Williams at the WVDEP.