

`import arcpy`

**An intro to Python and
the ArcMap Python Library**

Casey Thomas – cpthomas@gmail.com

python

programming language

open source

high-level

inspired by Monty Python

Guido van Rossum



http://en.wikipedia.org/wiki/File:Guido_van_Rossum.jpg

programming

tell the computer what to do

text that gets interpreted as instructions

simple data processing scripts

software, such as ArcMap

open source

free, generally

anyone can view, edit and use

github.com – code repositories

ArcGIS is the opposite of this

high-level

many layers between language and cpu

simple syntax

.py

```
#sample script
```

```
import sys
```

```
x = 4
```

```
y = 5
```

```
z = x + y
```

```
print z
```

```
>>> 9
```

.py

```
# a more complicated sample script
```

```
import base64
from PIL import Image
from io import BytesIO
```

```
data = "DJHKDFEmn343n\\DHFDFH8348382323"
```

```
print "decoding image"
im = Image.open(BytesIO(base64.b64decode(data)))
```

```
print "saving image"
im.save('test.jpg', 'JPEG')
```


running .py

IDE:

IDLE, PythonWin

Interpreter:

```
>>> print "hello, world"  
>>> "hello, world"
```

why python?

easy to learn

easy to read

free

powerful

why python?

lots of tools and libraries:

spreadsheets, csv (csvkit)

databases (pyodbc)

images (pil)

web (request, django)

science, engineering (scipy)

math (matplotlib)

**ArcMap +
python =
arcpy**

```
import arcpy
```

what can arcpy do?

geoprocessing

map editing

field calculations

automation

you don't even need to open ArcMap!

geoprocessing

toolbox tools are exposed through arcpy 

model builder will generate code

for example, intersect roads and streams

```
import arcpy
from arcpy import env

env.workspace = "c:/data/data.gdb"

in = ["roads", "streams"]
out = "stream_crossings"

arcpy.Intersect_analysis(in,out)
```

map editing

update labels and symbology

fix and add layers

export pdfs and images

```
import arcpy
```

```
mxd = arcpy.mapping.MapDocument("C:\Project.mxd")
```

```
arcpy.mapping.ExportToJPEG(mxd, "C:\Project.jpg")
```

```
del mxd
```

field calculations

```
!FieldName!.replace("One","1")
```

Pre-logic Script Code

```
def density(pop,area):  
    return pop/area
```

PopDensity =

```
density(!Sum_pop!, !Area!)
```


automation

need to make lots of similar maps?

need to update maps on a regular basis?

need to geoprocess hundreds of layers?

write a script. seriously.

**you don't even
need to open
ArcMap!**

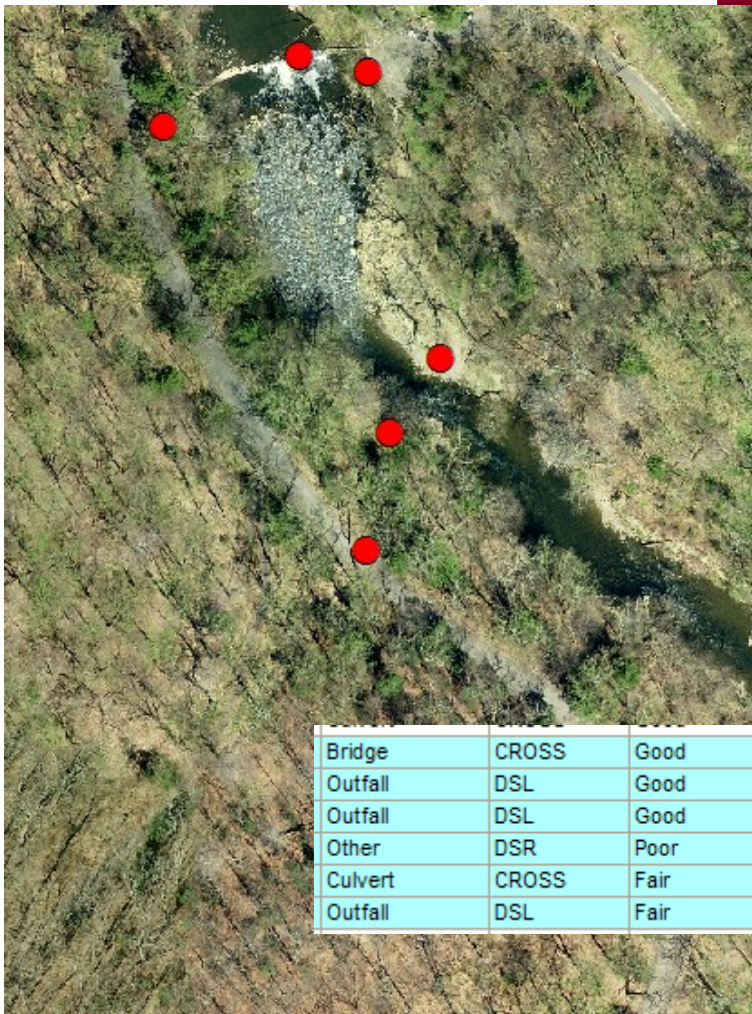
double-click yoursript.py

However, if you must

write your own toolbox tool

**or run code from the command line
(Geoprocessing > Python)**

examples



Infrastructure ID: WSbri298

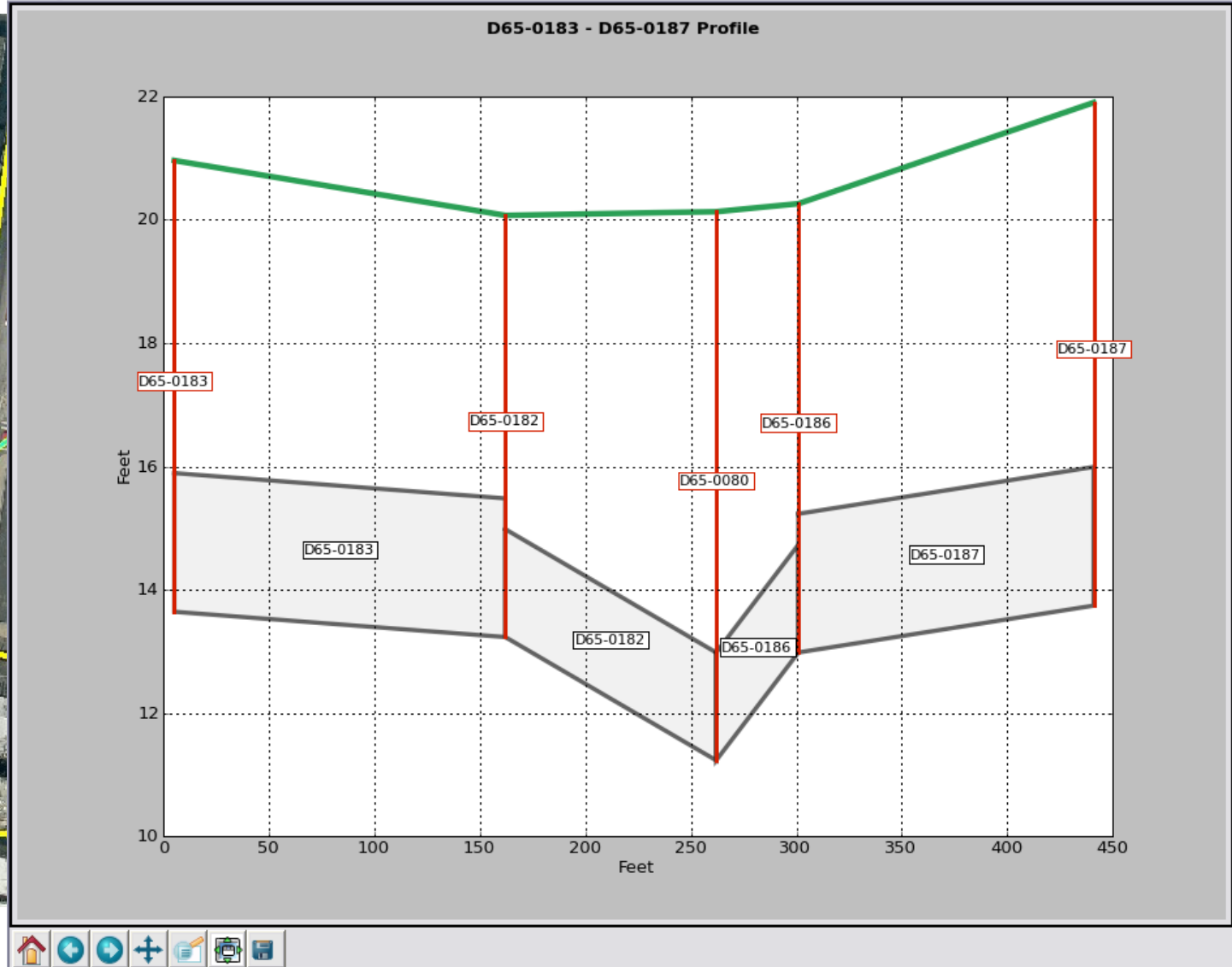
Bridge



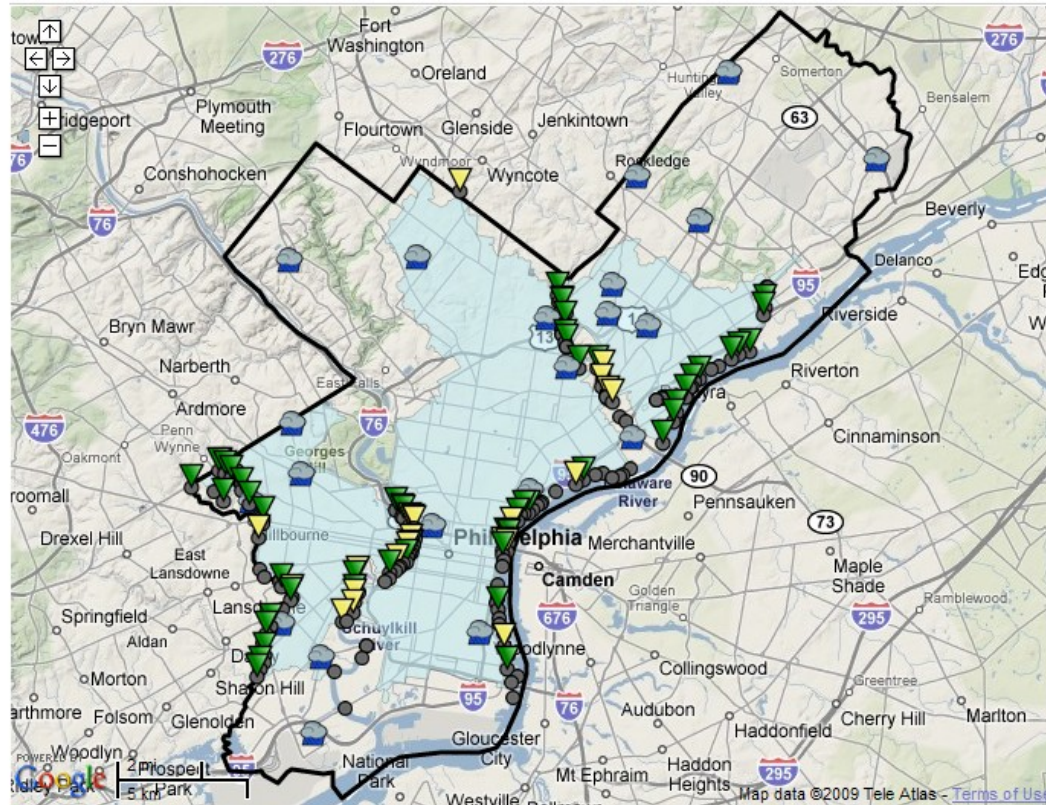
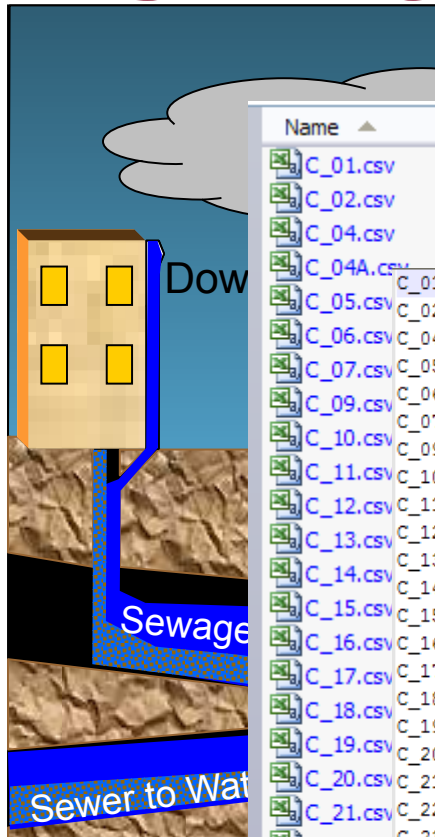
Condition	Material	Dimension (ft)	Length (ft)	Location
Good	Concrete	5.0 x 8.0	25.0	Paper Mill Rd near Golf Rd, Springfield

examples

74 Figure 1



example



Data last updated: 05/04/09 04:15 AM

Zoom to a river/creek: Darby/Cobbs

Search for your address:
(Example: 1101 Market St, Philadelphia, PA)

C_35, No overflow in the past 24 hours, 5/4/2009 4:25:00, '39.97974409921, -75.26470420689, 1, CCHL, C, UC, 72nd St and Sherwood Rd,
C_36, No data, 5/4/2009 7:01:08, 39.98036236906, -75.25928428615, 0, CCHL, C, UC, Brentwood Rd and Woodbine Ave

7 Line Ave and Haveford Ave,
by Line Ave and Haveford Ave,

dsdowne Ave and Haverford Ave,

St and Cobbs Creek Pkwy,
:

lthby Ave and Cobbs Creek Pkwy,
Creek Pkwy and 60th St,
rington Ave and 60th St,

;
obs Creek Pkwy and 67th St,
obs Creek Pkwy and 70th St,
St
and Ave and Woodland Ave,
;
mont St, R
kens Ave and Elmwood Ave,
y Line Ave,

rington Rd and Brockton Rd,
dcrest Ave and West End Dr,

examples



The image shows a screenshot of the EveryBlock Philadelphia website. The header features the 'EveryBlock' logo with a green grid icon and a green map of Philadelphia, followed by the word 'Philadelphia'. Below the header is a search bar with the placeholder text 'e.g., 1 Penn Square, 19102, Manayunk' and an orange 'Search' button. The main content area is divided into four columns, each with a title and a description. The first column is titled 'Follow your favorite places' and describes picking a neighborhood, block, or ZIP. The second column is titled 'Learn what's happening' and describes reading nearby news. The third column is titled 'Share with neighbors' and describes starting a discussion. The fourth column is titled 'Your block gets better' and describes exchanging ideas and solving problems. The background of the main content area features a dark city skyline with various icons: a yellow flag, a blue flag, a newspaper with 'EXTRA! EXTRA!' text, a blue ribbon with a '#1' star, and a blue trash can.

EveryBlock Philadelphia

e.g., 1 Penn Square, 19102, Manayunk **Search**

HOW IT WORKS

Follow your favorite places
Pick a neighborhood, block or ZIP — or create a personalized area. Sign up for one or many.

Learn what's happening
Read nearby news from hundreds of sources. Get updates via e-mail or your custom homepage.

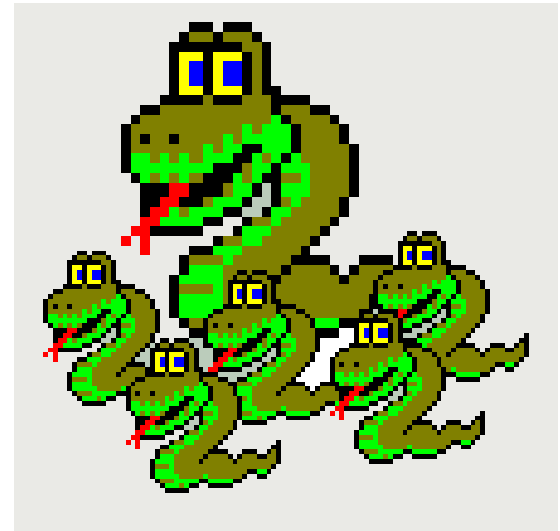
Share with neighbors
Start a discussion, share an announcement, ask your neighbors a question, or answer one of theirs.

Your block gets better
Exchange ideas. Gain recognition. Solve problems. Be a better neighbor.

ok, let's code!

<http://training.esri.com>

Using Python in ArcGIS Desktop



<http://training.esri.com/gateway/index.cfm?fa=catalog.webCourseDetail&courseid=1868>

open source mapping/GIS

QGIS - <http://www.qgis.org/>

GRASS - <http://grass.fbk.eu/>

OpenStreetMap - <http://www.openstreetmap.org/>

OSGeo - <http://www.osgeo.org/>

python resources

Homepage – <http://www.python.org>

Dive Into Python -<http://www.diveintopython.net/>

**Python Cookbook -
<http://code.activestate.com/recipes/langs/python>**