

# Creating Maps Using MAPSHOW

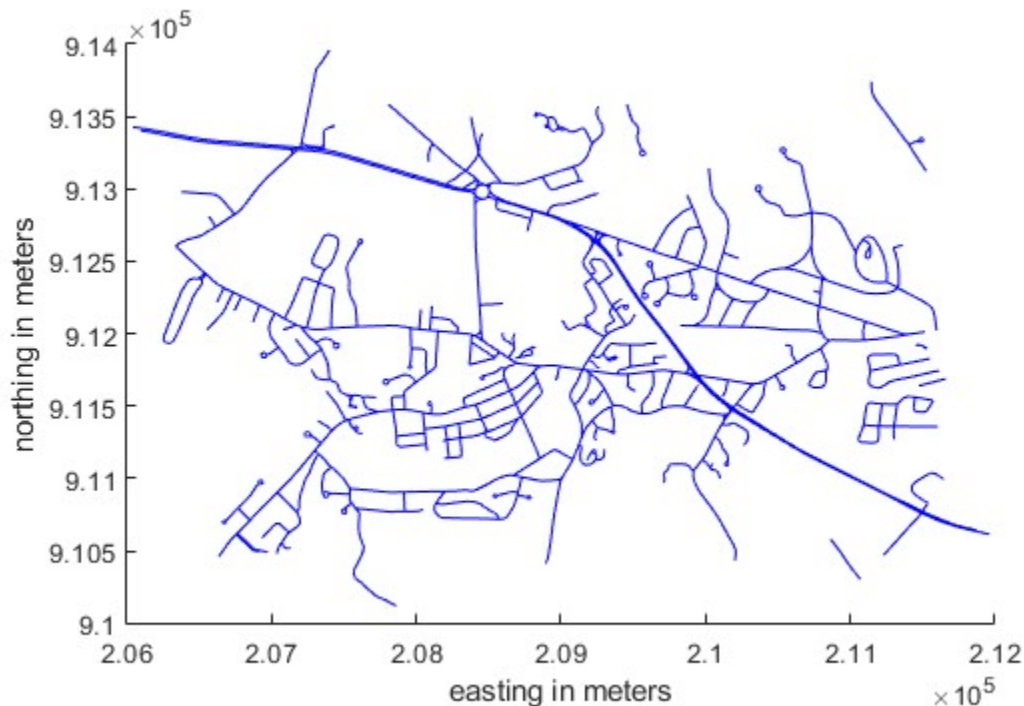
This example shows how to create a range of different maps using mapshow.

[Try it in MATLAB](#)

## Map 1: Concord Roads - A Geographic Data Structure

Display a geographic data structure array with lines representing roads. In the shapefile 'concord\_roads.shp', the road coordinates have been pre-projected to the Massachusetts Mainland State Plane system (in meters), so the shapefile is imported into a mapstruct (the variable 'roads').

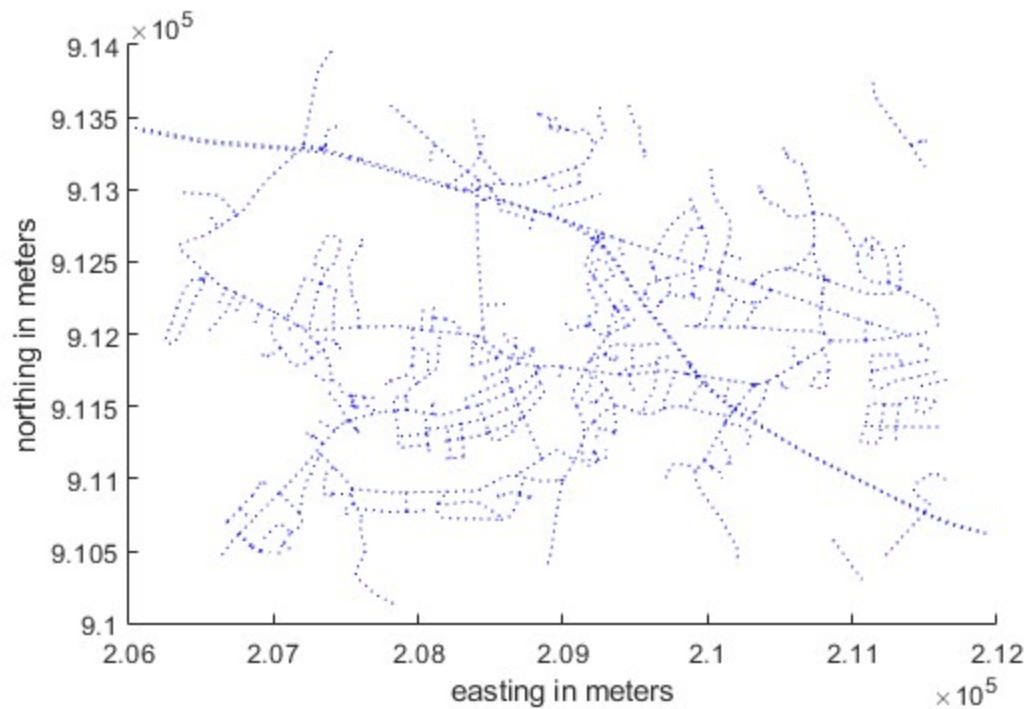
```
roads = shaperead('concord_roads.shp');  
figure  
mapshow(roads);  
xlabel('easting in meters')  
ylabel('northing in meters')
```



## Map 2: Concord Roads with Custom LineStyle

Display the roads shape and change the LineStyle.

```
figure  
mapshow('concord_roads.shp','LineStyle',':');  
xlabel('easting in meters')  
ylabel('northing in meters')
```



### Map 3: Concord Roads with SymbolSpec

Display the roads shape, and render using a SymbolSpec.

To learn about the `concord_roads.shp` dataset, read its associated `concord_roads.txt` metadata file which describes the attributes.

```
type concord_roads.txt
```

A shapefile data set for roads in part of Concord, Massachusetts, USA comprising the following files:

concord\_roads.dbf  
concord\_roads.shp  
concord\_roads.shx

#### Source

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Office of Geographic and Environmental Information (MassGIS),  
Commonwealth of Massachusetts Executive Office of Environmental Affairs  
(<http://www.state.ma.us/mgis/>)

#### Coordinate system/projection

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All data distributed by MassGIS are registered to the NAD83 datum,  
Massachusetts State Plane Mainland Zone coordinate system. Units are in  
meters.

#### Data set construction

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This data set was constructed by concatenating Massachusetts Highway  
Department road shapefiles for the Maynard and Concord USGS Quadrangles,  
from compressed files mrd97.exe and mrd104.exe.

Features were selected with bounding boxes intersecting the following  
box:

[206500 (min easting) 910500 (min northing)  
211500 (max easting) 913500 (max northing)]

The following attributes were retained:

'STREETNAME', 'RT\_NUMBER', 'CLASS', 'ADMIN\_TYPE', 'LENGTH'

Attributes 'CLASS' and 'ADMIN\_TYPE' contain numerical codes defined by  
MassGIS as follows:

#### Road classes (from file mrdac.dbf)

-----

CLASS 1 Limited access highway  
CLASS 2 Multi-lane highway, not limited access  
CLASS 3 Other numbered route  
CLASS 4 Major road - collector  
CLASS 5 Minor street or road  
CLASS 6 Minor street or road  
CLASS 7 Highway ramp

#### Road admin types (from file mrdac.dbf)

-----

ADMIN\_TYPE 0 Local road  
ADMIN\_TYPE 1 Interstate  
ADMIN\_TYPE 2 U.S. Federal

ADMIN\_TYPE 3 State

Construction date

-----

November 17, 2003.

Query the attributes in this roads file.

```
roads = shaperead('concord_roads.shp')
```

roads =

609x1 struct array with fields:

Geometry  
BoundingBox  
X  
Y  
STREETNAME  
RT\_NUMBER  
CLASS  
ADMIN\_TYPE  
LENGTH

Find out how many roads fall in each CLASS.

```
histcounts([roads.CLASS], 'BinLimits', [1 7], 'BinMethod', 'integer')
```

ans =

0 14 93 26 395 81 0

Find out how many roads fall in each ADMIN\_TYPE.

```
histcounts([roads.ADMIN_TYPE], 'BinLimits', [0 3], 'BinMethod', 'integer')
```

ans =

502 0 0 107

Notice that there are no roads in this file that are CLASS 1 or 7, and the roads are either ADMIN\_TYPE 0 or 3.

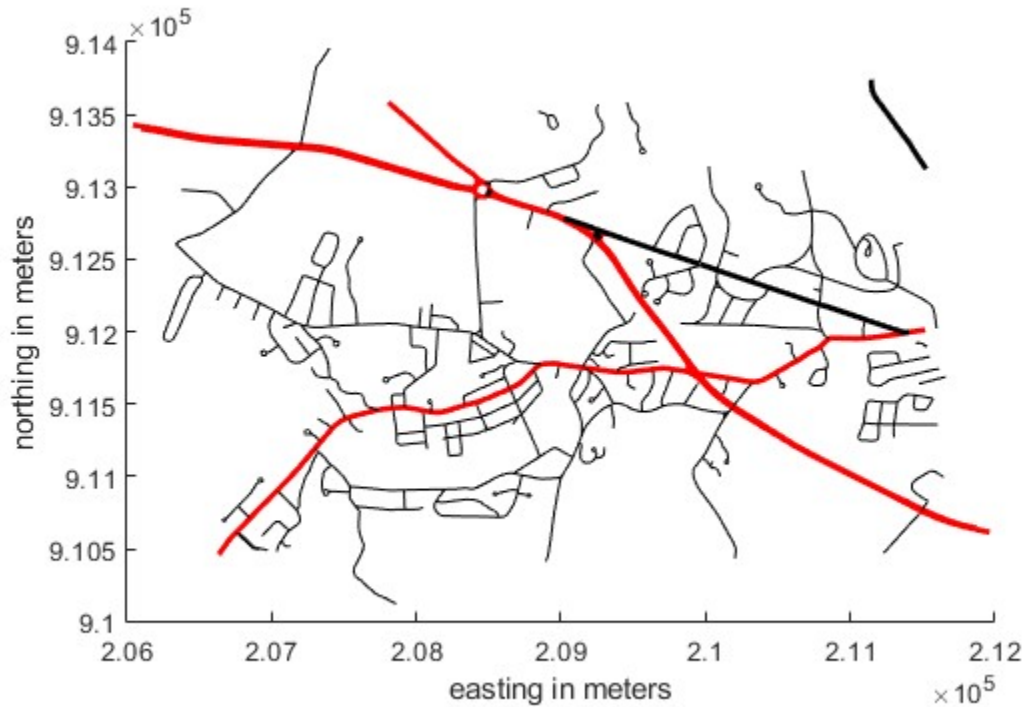
Create a SymbolSpec to:

- Color local roads (ADMIN\_TYPE=0) black.
- Color state roads (ADMIN\_TYPE=3) red.
- Hide very minor roads (CLASS=6).
- Set major or larger roads (CLASS=1-4) with a LineWidth of 2.0.

```

roadspec = makesymbolspec('Line',...
    {'ADMIN_TYPE',0, 'Color','black'}, ...
    {'ADMIN_TYPE',3, 'Color','red'},...
    {'CLASS',6, 'Visible','off'},...
    {'CLASS',[1 4], 'LineWidth',2});
figure
mapshow('concord_roads.shp','SymbolSpec',roadspec);
xlabel('easting in meters')
ylabel('northing in meters')

```



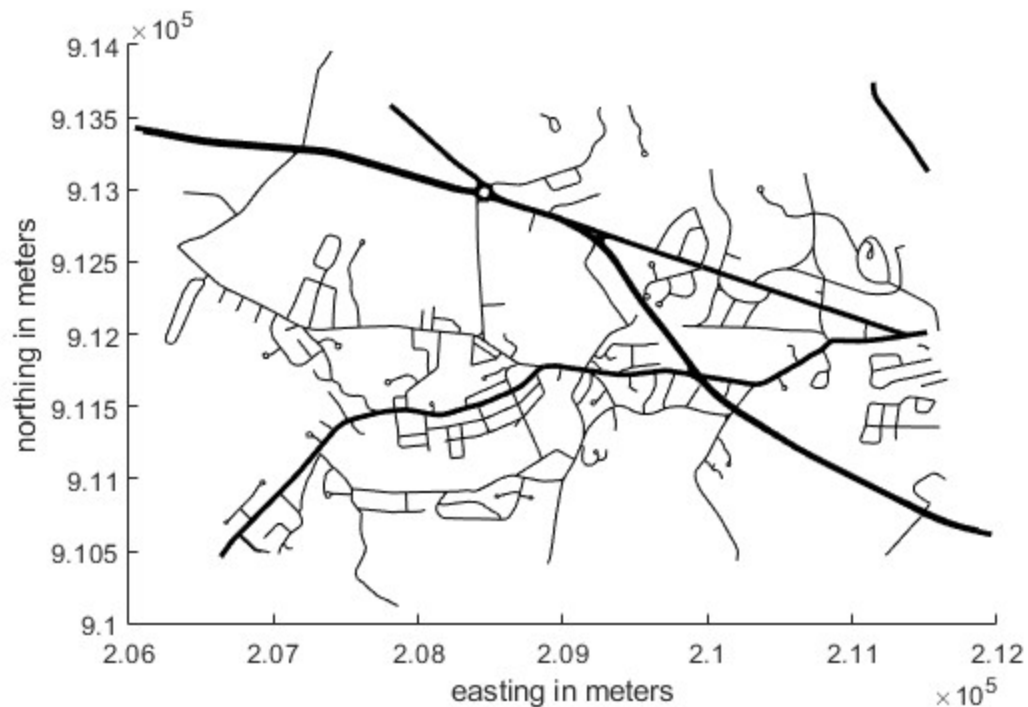
#### Map 4: Concord Roads, Override SymbolSpec

Override a graphics property of the SymbolSpec.

```

roadspec = makesymbolspec('Line',...
    {'ADMIN_TYPE',0, 'Color','black'}, ...
    {'ADMIN_TYPE',3, 'Color','red'},...
    {'CLASS',6, 'Visible','off'},...
    {'CLASS',[1 4], 'LineWidth',2});
figure
mapshow('concord_roads.shp','SymbolSpec',roadspec,'Color','black');
xlabel('easting in meters')
ylabel('northing in meters')

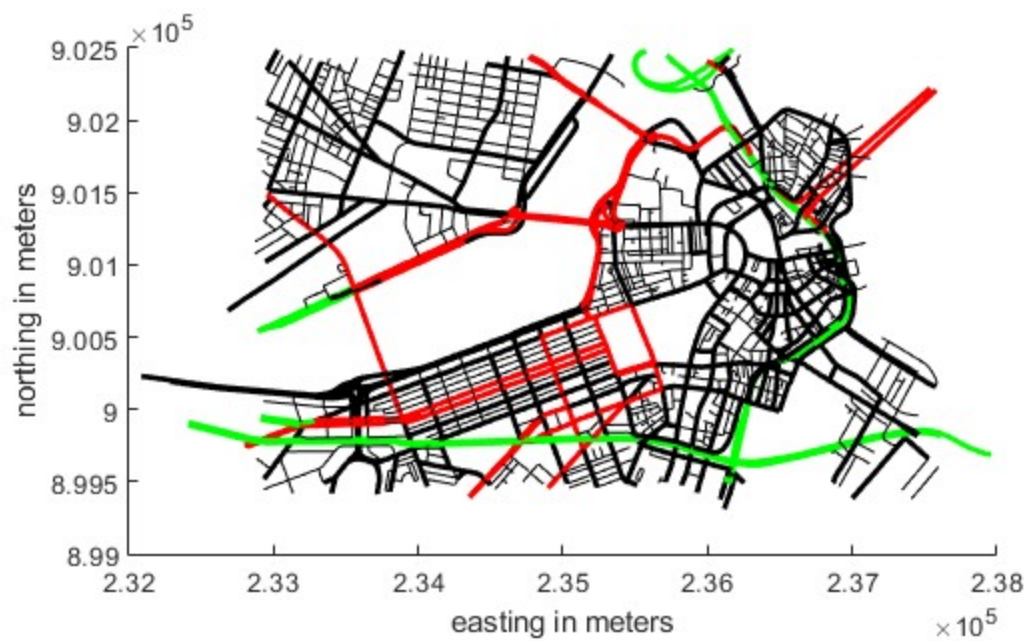
```



### Map 5: Boston Roads with SymbolSpec, Override Defaults

Override default property of the SymbolSpec.

```
roadspec = makesymbolspec('Line',...
    {'Default', 'Color','green'}, ...
    {'ADMIN_TYPE',0, 'Color','black'}, ...
    {'ADMIN_TYPE',3, 'Color','red'},...
    {'CLASS',6, 'Visible','off'},...
    {'CLASS',[1 4], 'LineWidth',2});
figure
mapshow('boston_roads.shp','SymbolSpec',roadspec);
xlabel('easting in meters')
ylabel('northing in meters')
```



### Map 6: GeoTIFF Image of Boston

Display the Boston GeoTIFF image; includes material (c) GeoEye™, all rights reserved.

```
figure
mapshow boston.tif
axis image manual off
```



Read Boston placenames in order to overlay on top of the GeoTIFF image.

```
S = shaperead('boston_placenames.shp');
```

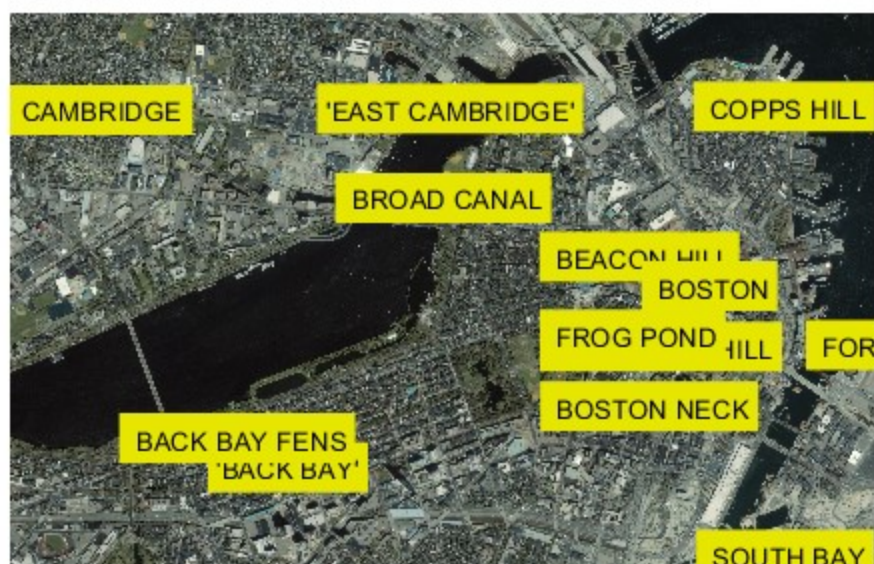
The projection in the GeoTIFF file is in units of survey feet. The point coordinates in the shapefile are in meters. Therefore, we need to convert the placename coordinates from meters to survey feet in order to overlay the points on the image.

```
surveyFeetPerMeter = unitsratio('sf', 'meter');  
for k = 1:numel(S)  
    S(k).X = surveyFeetPerMeter * S(k).X;  
    S(k).Y = surveyFeetPerMeter * S(k).Y;  
end
```

Display the placenames.

```
text([S.X], [S.Y], {S.NAME}, 'Color', [0 0 0], ...  
    'BackgroundColor',[0.9 0.9 0], 'Clipping','on');
```





Zoom in on a selected region.

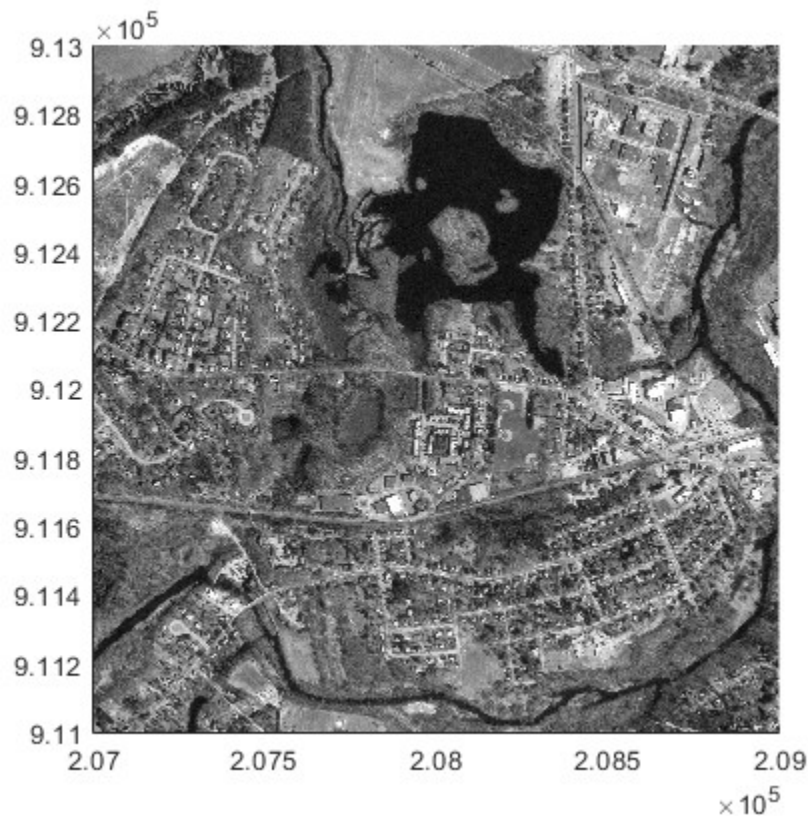
```
xlim([ 772007, 775582])
ylim([2954572, 2956535])
```



## Map 7: Pond with Islands over Orthophoto Backdrop

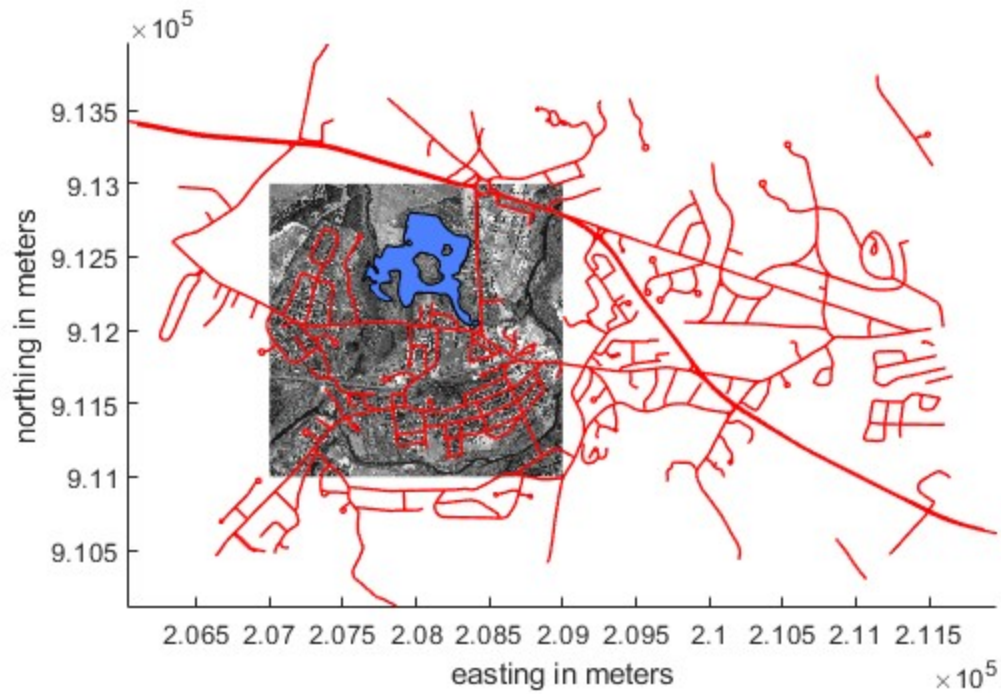
Display a pond with three large islands (feature 14 in the concord\_hydro\_area shapefile). Note that islands are visible in the orthophoto through three "holes" in the pond polygon. Display roads in the same figure.

```
[ortho, cmap] = imread('concord_ortho_w.tif');  
R = worldfileread('concord_ortho_w.tfw', 'planar', size(ortho));  
figure  
mapshow(ortho, cmap, R)
```



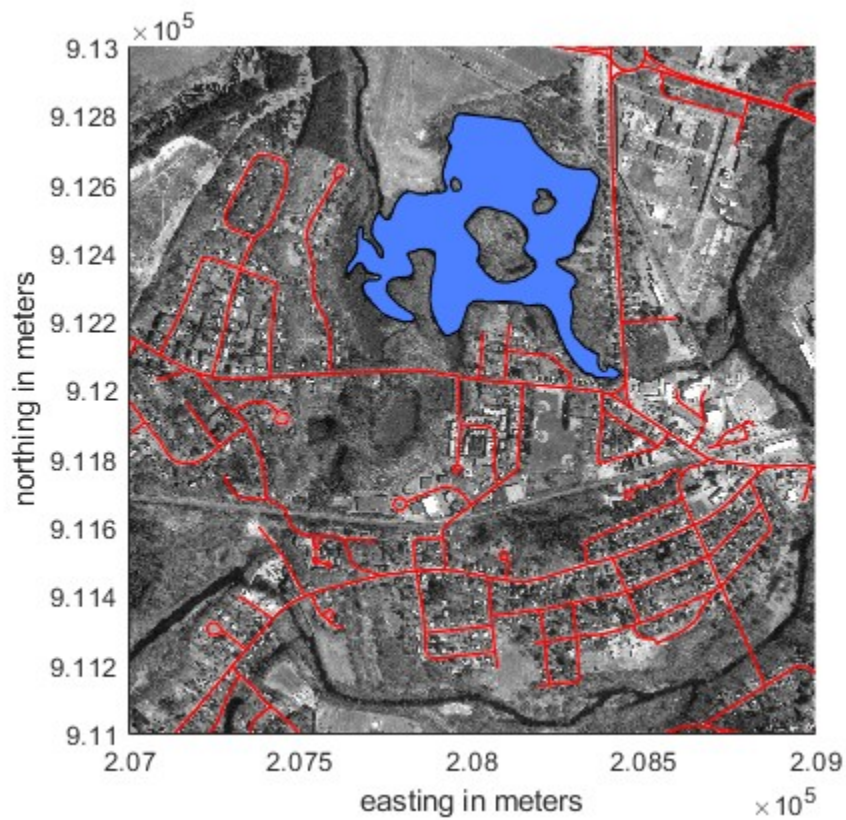
Save map limits used for image

```
xLimits = xlim;  
yLimits = ylim;  
pond = shaperead('concord_hydro_area.shp', 'RecordNumbers', 14);  
hold on  
mapshow(pond, 'FaceColor', [0.3 0.5 1], 'EdgeColor', 'black')  
mapshow('concord_roads.shp', 'Color', 'red', 'LineWidth', 1);  
xlabel('easting in meters')  
ylabel('northing in meters')
```



Restore map limits to match image

```
xlim(xLimits)
ylim(yLimits)
```

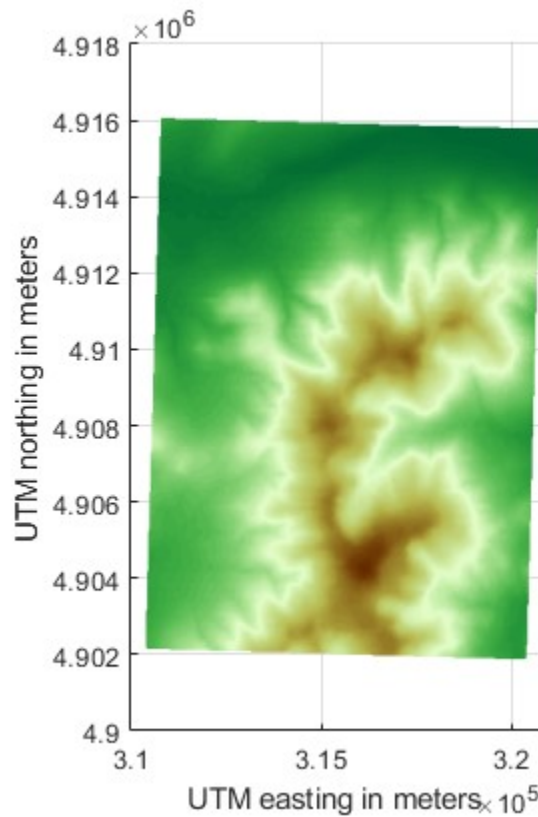




## Map 8: Mount Washington SDTS Digital Elevation Model

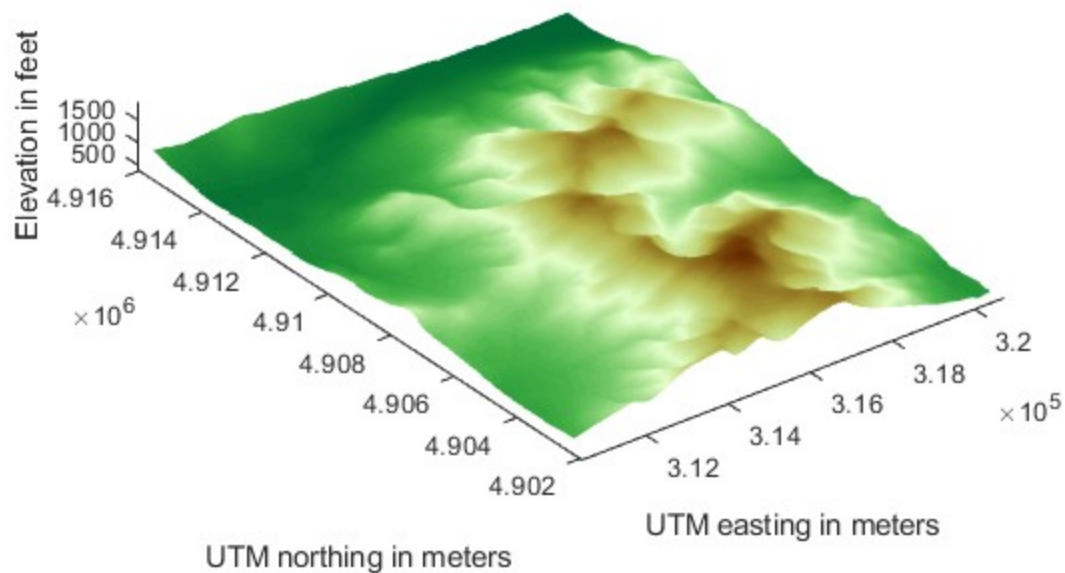
View the Mount Washington terrain data as a mesh. The data grid is georeferenced to Universal Transverse Mercator (UTM) zone 19.

```
figure
h = mapshow('9129CATD.ddf','DisplayType','mesh');
Z = h.ZData;
demcmap(Z)
xlabel('UTM easting in meters')
ylabel('UTM northing in meters')
```



View the Mount Washington terrain data as a 3-D surface. Use the default 3-D view, which shows how the range looks from the southwest.

```
figure
mapshow('9129CATD.ddf');
demcmap(Z)
view(3);
axis equal;
xlabel('UTM easting in meters')
ylabel('UTM northing in meters')
zlabel('Elevation in feet')
```



### Map 9: Mount Washington and Mount Dartmouth on One Map with Contours

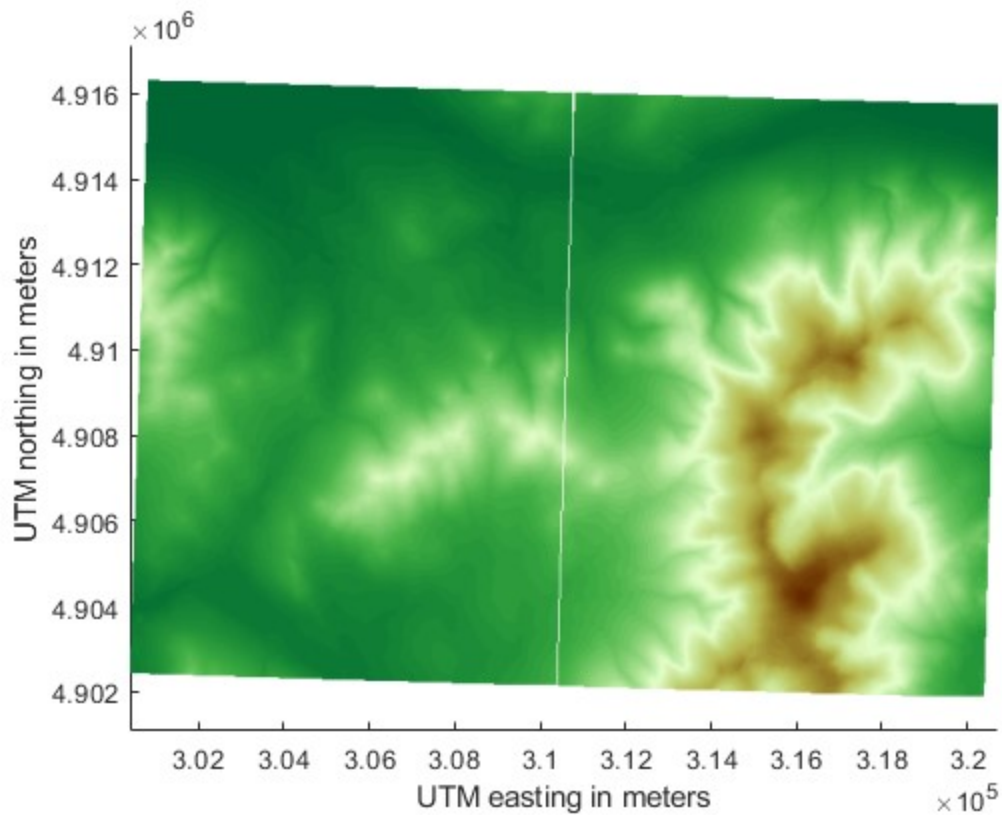
Display the grid and contour lines of Mount Washington and Mount Dartmouth.

Read the terrain data files.

```
[Z_W, R_W] = arcgridread('MtWashington-ft.grd');
[Z_D, R_D] = arcgridread('MountDartmouth-ft.grd');
```

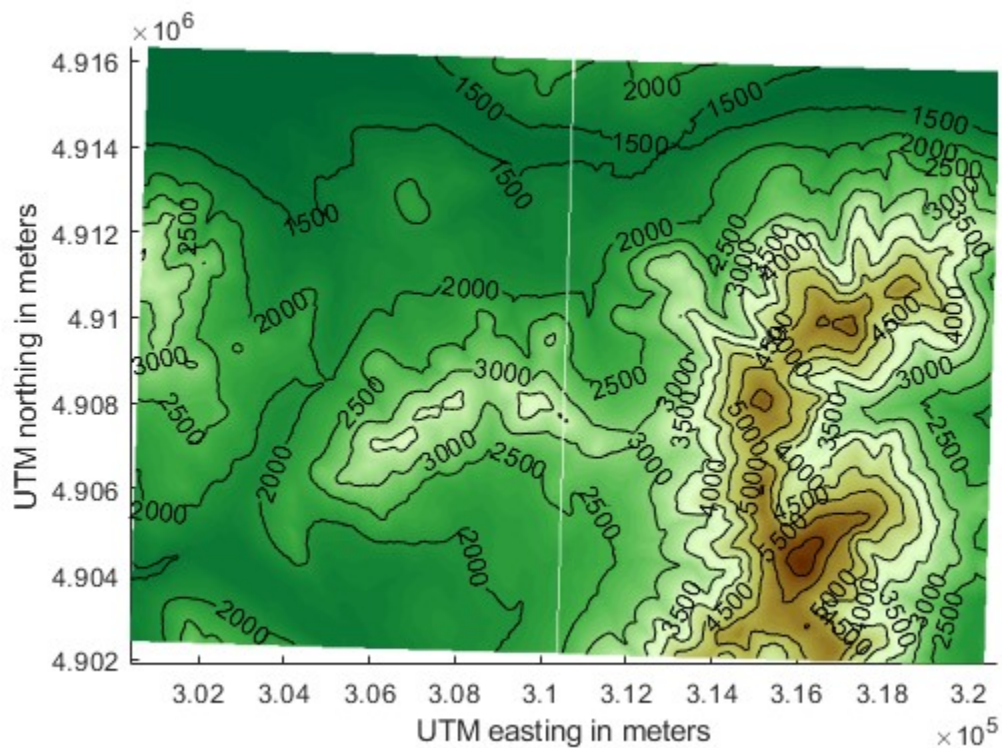
Display the terrain data as a surface in the  $z == 0$  plane, so that overlying contour lines and labels will be visible.

```
figure
hold on
mapshow(zeros(size(Z_W)),R_W,'CData',Z_W,'DisplayType','surface')
mapshow(zeros(size(Z_D)),R_D,'CData',Z_D,'DisplayType','surface')
demcmap(Z_W)
xlabel('UTM easting in meters')
ylabel('UTM northing in meters')
axis equal
```



Overlay black contour lines and labels.

```
cw = mapshow(Z_W, R_W, 'DisplayType', 'contour', ...
    'LineColor', 'black', 'ShowText', 'on');
cD = mapshow(Z_D, R_D, 'DisplayType', 'contour', ...
    'LineColor', 'black', 'ShowText', 'on');
```



## Credits

boston\_roads.shp, concord\_roads.shp, concord\_hydro\_line.shp, concord\_hydro\_area.shp, concord\_ortho\_e.tif:

Office of Geographic and Environmental Information (MassGIS),  
Commonwealth of Massachusetts Executive Office of Environmental Affairs  
<http://www.state.ma.us/mgis>

boston.tif

Copyright GeoEye  
Includes material copyrighted by GeoEye, all rights reserved.  
(GeoEye was merged into the DigitalGlobe corporation January 29th, 2013.)

For more information, run:

```
>> type boston.txt
```

9129CATD.ddf (and supporting files):

United States Geological Survey (USGS) 7.5-minute Digital Elevation Model (DEM) in Spatial Data Transfer Standard (SDTS) format for the Mt. Washington quadrangle, with elevation in meters.  
<http://edc.usgs.gov/products/elevation/dem.html>

For more information, run:

```
>> type 9129.txt
```

MtWashington-ft.grd, MountDartmouth-ft.grd:

MtWashington-ft.grd is the same DEM as 9129CATD.ddf, but converted to Arc ASCII Grid format with elevation in feet.

MountDartmouth-ft.grd is an adjacent DEM, also converted to Arc ASCII Grid with elevation in feet.

For more information, run:

```
>> type MtWashington-ft.txt
>> type MountDartmouth-ft.txt
```

## See Also

[geoshow](#) | [makesymbolspec](#) | [mapshow](#) | [shaperead](#)

**How useful was this information?**

☐ ☐ ☐ ☐ ☐

