



4. Images I Can (Easily) Use¹

Aerial Photos (Orthophotos / DOQ / DOQQ) and Scanned Topo Sheets – (quadrangles / DRGs) (last updated May 2006)

What is a DOQ?

A *digital orthophoto quadrangle* (DOQ) is a computer-generated image of an aerial photograph. A DOQ is an aerial photo that has been *orthorectified*--altered so that it has the geometric properties of a map. This means that image displacement caused by terrain relief and camera tilts has been removed (and therefore, a user can measure distances accurately on a DOQ). The DOQ is 1:12,000-scale, 1-meter pixel resolution, and *quarter-quadrangle* centered (which is why they are sometimes referred to as DOQQs).

DOQs can be used independently as georegistered photographic maps and they can be combined with other information resources using a geographic information system (GIS). An orthophoto may serve as a base map onto which other map information may be overlain.

The standard DOQs from the U.S. Geological Survey (USGS) are cast on the Universal Transverse Mercator projection. These orthophotos are either black-and-white (gray-scale) or color-infrared images which cover 3.75 minutes of latitude by 3.75 minutes of longitude. Thus, four such photos can be combined, or mosaicked, to cover the area represented by a standard USGS 7.5-minute, 1:24,000-scale topographic map.

DOQ accuracy is reported in accordance with the Federal Geographic Data Committee's (FGDC) (<http://www.fgdc.gov/>) "National Standard for Spatial Data Accuracy." The digital image should be accompanied by a metadata file that complies with the FGDC's "Content Standards for Digital Geospatial Metadata." DOQ's also meet National Map Accuracy Standards (<http://geography.usgs.gov/standards/>).

What is a DRG?

A *digital raster graphic* (DRG) is a digitally scanned color image of a U.S. Geological Survey (USGS) standard series topographic map, often including all map "collar" information (anything outside the map boundary or neatline). *Note: if the file does not include the collar, it will be termed a "decollared" DRG.*

DRGs are useful as backdrops onto which other digital data can be overlaid.

To be consistent with other USGS digital data, the image inside the map neatline is georeferenced to the surface of the earth and fit to the Universal Transverse Mercator (UTM) map projection. Therefore, it will not always be consistent with the projection listed in the credit note (usually the text on the bottom-left corner of the image collar). In most cases, the datum of the source map is preserved in the DRG. That is, if a map is published on the 1927 North American Datum, the DRG is also on this datum.

The horizontal positional accuracy and datum of the DRG matches the accuracy and datum of the source map. The source maps are scanned at a minimum resolution of 250 dots per inch. The USGS is producing DRGs of the 1:250,000, 1:100,000, and 1:24,000-scale topographic map series. The distributed 1:24,000-scale DRG at 250 dpi will have a ground sample distance of 2.4 meters (8 feet). The digital image should be accompanied by a metadata file that complies with the FGDC's "Content Standards for Digital Geospatial Metadata." DRG's also meet National Map Accuracy Standards (<http://geography.usgs.gov/standards/>).

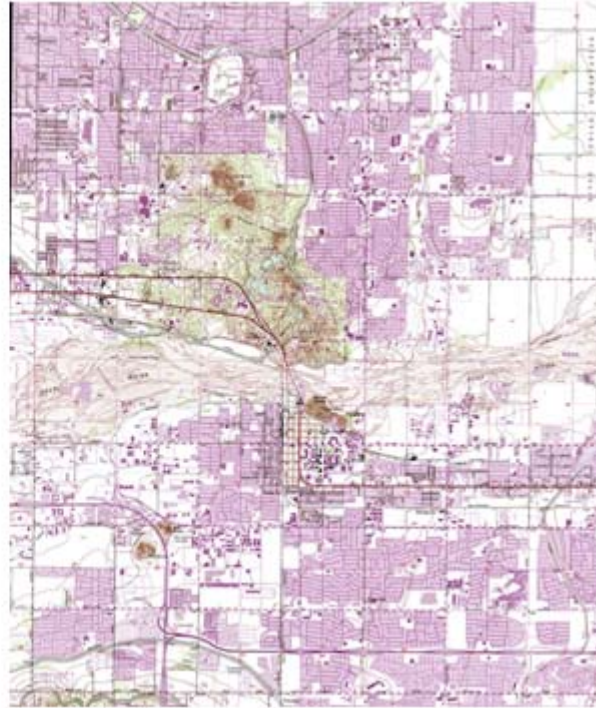
¹ The text for this document was borrowed and adapted from USGS fact sheets which can be found at <http://geography.usgs.gov/digitalbackyard/doqbkcyd.html> and <http://geography.usgs.gov/digitalbackyard/drgbkyd.html>



DOQ and DRG Example (portions taken from the Tempe, Arizona Quadrangle)



DOQQ



DRG

Metadata (a.k.a. data about data!)

No matter where you obtain your DOQ or DRG, be sure to **always** also obtain *metadata*, or data that is used to describe the datasets you download. The digital image should be accompanied by a metadata file that complies with the Federal Geographic Data Center's (FGDC) (<http://www.fgdc.gov/>) "Content Standards for Digital Geospatial Metadata" (<http://www.fgdc.gov/metadata/csdgm/>).

The USGS has an excellent introductory document about metadata entitled "Metadata in Plain Language" (<http://geology.usgs.gov/tools/metadata/tools/doc/ctc/>).

How to Obtain DOQs and DRGs

Common DOQs and DRGs can be obtained in native format, in GeoTIFF format (most common), and in some cases in JPEG format (with an associated World File which contains the georeferencing information). A GeoTIFF is a relatively new TIFF image storage format that incorporates georeferencing information in the header. Georeferencing allows the file to be used in a GIS. The file size range is between 5 to 15 megabytes.

Viewing and Downloading from TerraServer-USA

DOQs and DRGs can be viewed online through TerraServer-USA (<http://terraserver-usa.com/>). Rather than getting an entire DOQ or DRG, each download is limited to the land area depicted on your computer screen (and thus, spatial resolution will be finer if you are more zoomed in). The format is a jpeg (.jpg), and can be used in a GIS if you also download the associated World File (using an identical file name, with the extension .jgw). You can learn more about this in the "Using TerraServer-USA" fact sheet.



Ordering from the USGS

You can purchase DOQs and DRGs from USGS. The USGS distributes uncompressed DOQs and DRGs on Compact Disc-Recordable (CD-R). Either Geotiff or native format can be specified. For information on ordering DOQs and/or DRGs on CD-R, contact any USGS Earth Science Information Center (<http://ask.usgs.gov/>) or call 1-888-ASK-USGS, toll free. You may also order on-line from the USGS Earth Explorer Website (<http://earthexplorer.usgs.gov>). DOQ and DRG orders are filled on demand, and any combination of quadrangles can be ordered. For price and ordering information, see the USGS order form, available online at the USGS Store (<http://store.usgs.gov/>)

Downloading from state-based archives

The National States Geographic Information Council (NSGIC) (<http://www.nsgic.org/>) has links to councils from individual states where you will find information on state and local data sets, often including imagery archives.

For example, in Arizona, you can download DOQs and DRGs from the Arizona Regional Image Archive (<http://aria.arizona.edu/>).