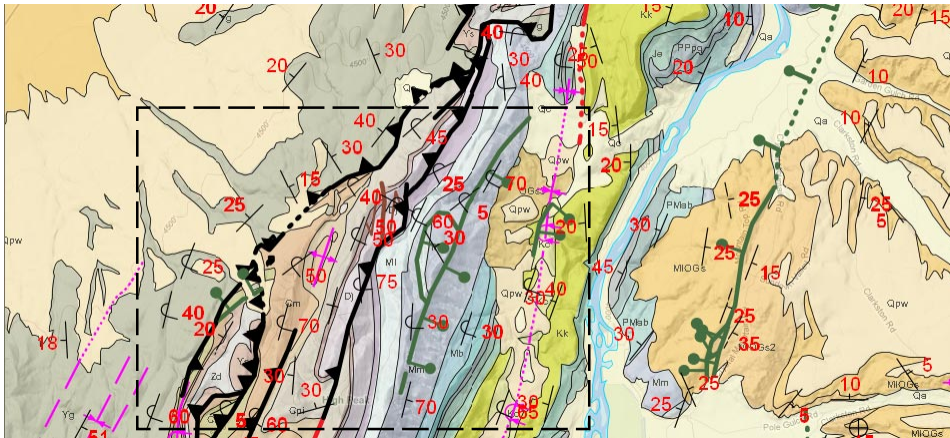# SVG Geometric Structure

Portion of Google Maps Geomashup of a Geologic Map Using 5 SVG Geometric Tilesets
http://www.microimages.com/geodata/rho/TownsendSVG_DT/TownsendSVGgroups2.htm

The illustration above shows a sample use of SVG Geometric Tilesets to depict various data layers for a geologic map. The individual SVG tileset layers are shown to the right for the boxed area. These layers include point symbols, simple and complex line styles, partially transparent polygon fills, and text labels. All tilesets were created in TNTmips using the Export Geometric Tileset process.

MicroImages' SVG geometric tilesets are an attractive and functional way to present styled and attributed vector map data on the web in Google Maps and Open Layers. SVG geometric tilesets use a tiled, multi-resolution form of the SVG file format for web vector graphics. You can use the Export Geometric Tileset process in TNTmips to render your styled vector points, lines, polygons, and text labels to SVG geometric tilesets that can be used in Google Maps and Open Layers geomashups along with standard (raster) web tilesets and KML geometric tilesets. SVG geometric tilesets load quickly at any zoom level because only a few tiles with a limited number of elements are needed for any particular view, and those tiles are in the SVG format, which is directly supported and displayed by your web browser.

Scalable Vector Graphics (SVG)

Scalable Vector Graphics is a format for two-dimensional vector graphics for use on the web. SVG files are XML-based text files that can define points, lines, closed shapes (polygons, circles, ellipses, rectangles), and Unicode text. All major modern web browsers include direct support for reading and rendering SVG graphics. These browsers automatically apply standard graphic effects such as anti-aliasing lines to produce a smooth, high-quality rendering in the browser window.

The Export Geometric Tileset process renders elements in the input vector object with their defined display styles into SVG form (see the Technical Guide entitled *Tilesets: Export Geometric Structures*). This procedure is able to reproduce in SVG the complex styles you have set up in TNTmips for vector points, lines, and polygon borders, varying transparency of polygon fills, and text from fixed or dynamic labels. Custom point symbols and lines created by TNT CartoScripts are even reproduced in SVG, as shown in the geologic map examples on this page. Because the SVG format maintains the vector format and styling of your map data, SVG geometric tilesets provide superior rendering of map data in comparison to standard (raster) web tilesets produced from the same map data. DataTip attributes from the source vector elements are also automatically transferred to the SVG files to provide pop-in info balloons and legends in geomashups.

SVG Geometric Tilesets

The SVG geometric tilesets created by TNTmips use SVG files with geometric elements but otherwise conform to the structure of Google Maps standard web tilesets containing raster data. Each tileset is created for a specified range of numeric Google Maps zoom levels, with a subdirectory for each zoom level (see the TechGuide entitled *Tilesets: Google*

SVG Geometric Tileset Layers in Geologic Map Geomashup (over Google Terrain)
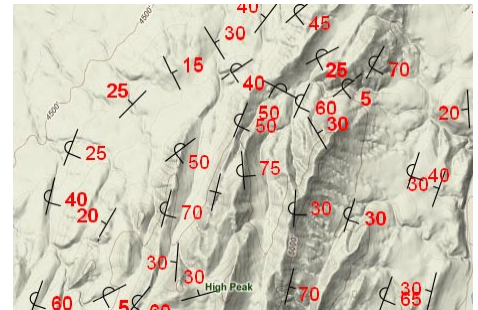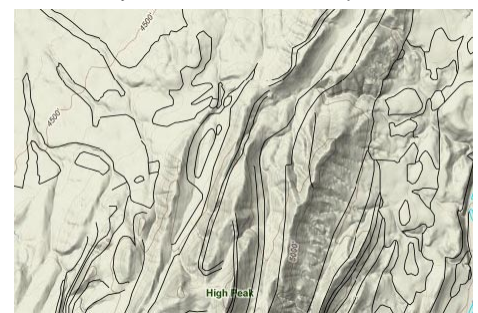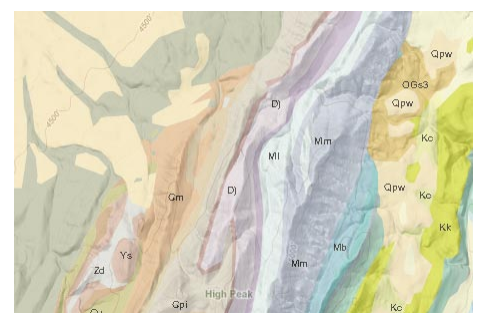

Strike/Dip point symbols from CartoScript
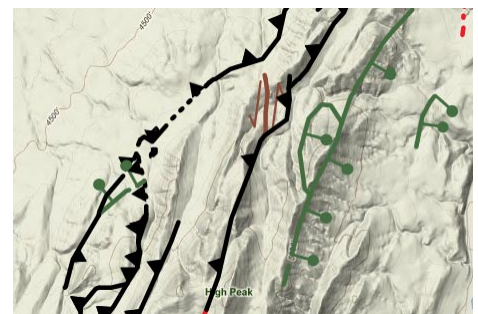
Fault line symbols from CartoScript

Fold line symbols from CartoScript

Contact lines

Rock unit polygons and label text

(over)

Maps Structure). Each zoom level directory contains a tiled set of SVG files with tile boundaries matching the fixed Google Maps global grid in the Spherical Web Mercator projection. SVG tile files are organized in tile row subdirectories and named by their tile column. Geometric elements are stored in each SVG tile using a compact local coordinate system. In a geomashup in your browser, a MicroImages JavaScript library uses the tile row and tile column numbers to load the tiles in their correct positions in Google Maps or Open Layers to provide a seamless display of your map data.

The Export Geometric Tileset process independently renders the SVG tiles at each zoom level from the source vector object starting with the maximum zoom level. Lines and polygon borders in the source vector are progressively simplified (thinned) prior to creating each successive lower zoom level to provide levels of detail appropriate for each zoom level. Each SVG geometric tileset is created with a TileSet Definition (TSD) file that describes its contents. A sample HTML/JavaScript file that loads the tileset in Google Maps is also produced to allow immediate viewing of the tileset in your browser.

Choice of Tile Sizes
The standard size for tiles to be used in Google Maps and Open Layers is 256 by 256 pixels. But the Export Geometric Tileset process allows you to create SVG tilesets with larger tile sizes, such as 512 by 512 or 1024 by 1024 pixels. For tilesets containing relatively simple geometric data, using a larger tile size reduces the number of tiles that the browser has to manage in a particular view and thus may result in faster and more efficient display of the tileset. However, MicroImages does not recommend using a larger tile size for complex geometric data, as the larger-sized tile files may require longer download and loading times.

SVG tilesets with larger tile sizes are stored using a shifted zoom level numbering system. Consider a tileset with tile size 512 by 512 pixels displayed at Google Maps zoom level 14. A tile of that size covers the same area as 4 standard-size Google Maps tiles. But that is the same map area that is covered by a standard-sized tile at zoom level 13. So the larger tiles for level 14 (for example) are rendered with the detail required for that zoom level, but the tiles are named and stored using the directory and tile numbering scheme for zoom level 13. Thus if you created the tileset with a requested zoom level range of 9 to 14, the resulting tileset has zoom level directories numbered 8 to 13 containing the larger tiles. The TSD file created with the tileset (and any geomashup file created from it) records the actual size of the tiles in the tileset. When the tileset is displayed in a web browser, the MicroImages JavaScript library uses this specified tile size to set a zoom level shift, so that in the example above the tiles stored in each zoom level directory (e.g. 13) are actually displayed at the next higher zoom level (14).

Use Tile Margins to Control Tile-Edge Artifacts
In the Export Geometric Tileset process, the field labeled "*Outer tile margin in pixels to handle symbols rendered near edge*" lets you increase the actual size of the SVG tiles and the rendering area for the vector data written into the tiles. The JavaScript code for displaying the tiles in the geomashup clips the rendering of these elements along the boundaries of the 256 x 256 Google Maps tile areas. If the tileset you are making includes large point symbols, you should set the tile margin width to be as large as the point symbols so that the symbols are not truncated at tile boundaries

A complex point symbol for a TNT vector object (right) and its representation in an SVG geometric tileset (below). The associated point location (symbol origin) is close to the bottom of the windmill symbol. The gray box in the illustration below indicates the nominal area of a single tile at Google Maps zoom level 13. To accommodate rendering these large symbols near tile edges, the SVG tiles were created with overlapping 40-pixel outer margins. The tower points near the
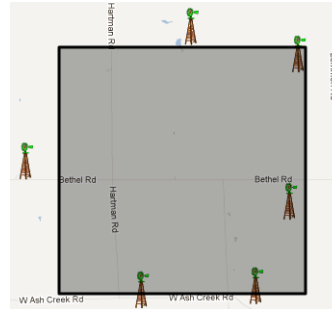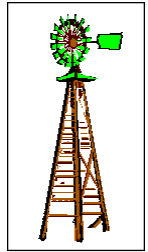
top and bottom edges of the tile are actually duplicated in the overlapping tile margin areas. Each of the symbols for these edge points is rendered partially in one tile and partially in the adjacent tile, with the rendering being clipped exactly at the nominal tile boundary. Thus complete point symbols appear to extend across the tile edges.

(see illustration above). If the tileset you are making includes polygons with borders, you should set the width of the tile margins to be equal to the width (in screen pixels) that you have set for the polygon borders in the parent vector object. This setting will prevent artificial polygon borders from appearing along the edges of tiles when the tileset is displayed in the web browser.

SVG and SVGZ Tilesets
In the Export Geometric Tileset process you can choose to create geometric tilesets using the SVGZ format, the compressed form of SVG files. Using the SVGZ option produces tiles with smaller stored size, which in theory should result in faster download times than the equivalent SVG tiles. However, many web servers are configured to automatically compress any file with a text-based format (including SVG), so your regular SVG tiles may be delivered in a compressed form already and may not need to be pre-compressed using the SVGZ format option.

SVG Geometric Tilesets in Geomashups
You can use SVG geometric tilesets as overlays in Google Maps and Open Layers geomashups you create in the Assemble Geomashup process. There you can set which base maps to use, set zoom level ranges, and choose one or more overlays. To add an SVG geometric tileset as an overlay, on the Overlays tabbed panel press the *Add Remote Tileset or KML* button (for a tileset posted on the web) or the Add Overlay button (for a tileset on a local drive). Then simply choose the TSD file for the SVG geometric tileset just as you would for a standard (raster) web tileset. You can use SVG geometric tilesets as overlays along with your standard web tilesets and KML geometric tilesets. You can set a transparency level (0 to 100%) for an SVG geometric tileset, which is particularly useful when the tileset includes opaque polygon fills and you want to enable underlying base maps or overlays to show through the SVG overlay.

Add Remote Tileset or KML   Add Overlay
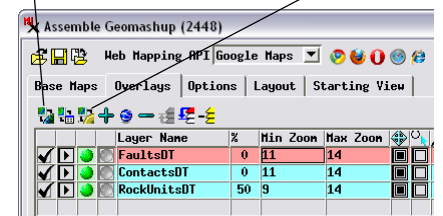
Add SVG geometric tilesets as geomashup overlays using the Add Remote Tileset or Add Overlay icon buttons.