

EMERALD (22 Ad 504)

Last revised: 7/15/2013

The following provides a brief explanation for the sources of the various data files.

XYZ point cloud, NED (bare earth):

SOURCE: United States Geological Survey, The National Map (Viewer & Download Platform), Formerly The National Elevation Dataset (NED).

ACCESS DATE: 2/19/2013.

DOWLOAD PROCEDURE: “A Description of Steps Taken to Generate Contour Maps From Bare Earth LiDAR and DEMs” (by R. P. Stephen Davis, Jr.; updated 1 May 2013). Available at http://rla.unc.edu/mmt/general/MMT_LiDAR_3.pdf

DATASET URL:

<http://viewer.nationalmap.gov/viewer/>

or

[http://rla.unc.edu/mmt/Data/Emerald/XYZ_Point_Cloud_NED_2013_\(bare_earth\).xlsx](http://rla.unc.edu/mmt/Data/Emerald/XYZ_Point_Cloud_NED_2013_(bare_earth).xlsx)

METADATA URL:

<http://viewer.nationalmap.gov/viewer/>

DEFAULT DATA/GRID UNITS: Projected in geographic coordinate system.

HORIZONTAL DATUM: NAD83, longitude and latitude (decimal degrees).

VERTICAL DATUM: NAVD88, measurement precision to 6 decimal places (meters).

GRID COORDINATES CONVERTED TO: Universal Transverse Mercator (UTM), Zone 15 North (meters).

DATA/GRID SIZE: 1000 x 1000 m.

BOUNDARIES OF DATA/GRID: North, 3501940 m; South, 3500940 m; East, 666730 m; West, 665730 m.

XYZ point cloud, total station:

SOURCE: Topographic mapping with Leica total stations, carried out by the Research Laboratories of Archaeology, University of North Carolina at Chapel Hill.

MAPPING DATE: 2/18/2013.

ACQUISITION PROCEDURE:

- Two geospatially controlled datums (GPS1 & GPS2) established with Topcon GR-3 Triple Constellation Receiver. Instrument uses satellite positioning technologies to accurately establish the coordinates of a given point.
- Recovered point data processed through the Online Positioning User Service (OPUS) and practical coordinate data received.
- Using a total station, the two datums were reconciled to each other to account for inherent error in the satellite positioning process as well as establish a properly scaled and oriented site grid.
- Topography of the site mapped with total stations, and additional datums established as needed. Total stations used were Leica models TCR307, TC407, and TS02plus.

DATASET URL:

[http://rla.unc.edu/mmt/Data/Emerald/XYZ Point Cloud Total Station 2013.xlsx](http://rla.unc.edu/mmt/Data/Emerald/XYZ_Point_Cloud_Total_Station_2013.xlsx)

DATA/GRID UNITS: Universal Transverse Mercator, Zone 15 North (meters).

SITE DATUMS: Permanent site grid datums were established with copper pipes mapped from the georeferenced GPS points.

Copper Pipe 3 (CP3):	Easting, 666312.15 m Northing, 3501463.601 m Elevation, 118.68 m
Copper Pipe 5 (CP5):	Easting, 666310.614 m Northing, 3501381.717 m Elevation, 118.095 m
Copper Pipe 11 (CP11):	Easting, 666191.299 m Northing, 3501495.939 m Elevation, 118.768 m

XYZ point cloud, combined total station & NED (bare earth):

SOURCE: Dataset is the spliced together combination of the two datasets described above (XYZ point cloud, NED [bare earth]; and XYZ point cloud, total station).

PROCEDURE: The methodology by which this dataset was created is detailed in “An Illustration of the Steps Used to Create Detailed Mound Site Maps by Combining LiDAR and Total Station Topographic Coverage” (by R. P. Stephen Davis, Jr., updated 28 Dec 2012). Available at http://rla.unc.edu/mmt/general/Feltus_Test_Results.pdf

DATASET URL:

[http://rla.unc.edu/mmt/Data/Emerald/XYZ Point Cloud Combined Total Station & NED 2013 \(bare earth\).xlsx](http://rla.unc.edu/mmt/Data/Emerald/XYZ_Point_Cloud_Combined_Total_Station_&_NED_2013_(bare_earth).xlsx)

DATA/GRID UNITS: Universal Transverse Mercator, Zone 15 North (meters).

DATA/GRID SIZE: 1000 x 1000 m.

BOUNDARIES OF DATA/GRID: North, 3501940 m; South, 3500940 m; East, 666730 m; West, 665730 m.

HORIZONTAL DATUM: NAD83, longitude and latitude (decimal degrees).

VERTICAL DATUM: NAVD88, measurement precision to 6 decimal places (meters).

Surfer grid (.grd) file (1000 x 1000 m, 2 m grid):

SOURCE: Data file is the output of the Surfer software gridding process applied to the combined dataset discussed in the previous section (XYZ point cloud, combined total station & NED [bare earth]).

PROCEDURE:

- Surfer 9 (Golden Software) used to transform point cloud data, in a standard XYZ coordinate format, into a proprietary .grd file.
- The Kriging gridding method was used to render the data with a grid line geometry spacing of 2 m, accounting for 501 grid lines in both the X and Y directions.
- Breaklines were inserted through “Advanced Options” in the gridding process. These linear sequences of XYZ data points from the overall point cloud define and pronounce ridgelines, inflections, edges, and other areas of abrupt elevation change.

DATE CREATED: 4/3/2013.

DATASET URL:

[http://rla.unc.edu/mmt/Data/Emerald/Surfer_grid_file,_2013_\(1000_x_1000_m,_2_m_grid\).grd](http://rla.unc.edu/mmt/Data/Emerald/Surfer_grid_file,_2013_(1000_x_1000_m,_2_m_grid).grd)

GRID SIZE: 1000 x 1000 m with a grid line geometry spacing of 2 m.

GRID UNITS: Universal Transverse Mercator, Zone 15 North (meters).

BOUNDARIES OF DATA/GRID: North, 3501940 m; South, 3500940 m; East, 666730 m; West, 665730 m.

ArcGIS/ArcMap document, all layers (1000 x 1000 m):

SOURCE: This file is a culmination of all the available layers that were made for the various maps of the given site. Layers produced in software ArcMap 10 from ArcGIS, Surfer 9, and/or DesignCAD 3D Max 21 are all juxtaposed on a single ArcMap document canvas.

ORIGINS OF LAYERS:

- *Shapefile, 50 cm Contours, 2013 (1000 x 1000 m):* Generated in Surfer 9 from the .grd file, this layer is a contour map (50 cm contour interval) of the topography of the same 1000 x 1000 m tile.
- *Relief Map, Vertical View, 2013 (1000 x 1000 m):* Generated in Surfer 9 from the aforementioned .grd file, this layer is a vertically viewed, shaded, topographic relief map of the 1000 x 1000 m area encompassing the site.
- *Reference Points:* Generated in ArcMap 10 through the “Add XY Data” process. This layer is simply a point plot of the Excel file that lists all the reference points and datums established at the site in an XYZ and Point ID format.
- *Cultural & Natural Features:* Digitized features included major roads, unimproved roads/paths, railroad tracks, bodies of water, watercourses, and relevant buildings.
 - Abovementioned features were first digitized using ArcMap 10 software from the ArcGIS suite. This was done in a cursory and stylized manner using basemap layers contextualized by a contour map overlay of the site.
 - Drawing was completed and all feature details were flushed out using DesignCAD 3D Max 21 software.
 - Line characteristics such as color, width, and style were finalized in Surfer 9.
 - Feature group was then imported back into ArcMap 10 and added as layer to the map.
- *Breaklines:* Originally created in the Surfer program and imported as a layer into ArcMap. Shows the location and shape of added breaklines, essentially XYZ point sequences used to pronounce linear segments of abrupt elevation change (e.g., road banks, cliffs, natural or artificial edges). For visualization purposes the layer shows the breaklines with black line segments connecting the individual points in a sequence.
- *Imagery Basemap:* A default satellite imagery layer accessed and added through ArcMap via the ArcGIS online basemap repository.

DATA FILE URL:

http://rla.unc.edu/mmt/Data/Emerald/ArcGIS_Map_All_Layers_2013_1000_x_1000m.zip

MAP PROJECTION: Universal Transverse Mercator, Zone 15 North (meters).

MAP SIZE: 1000 x 1000 m.

BOUNDARIES OF MAP: North, 3501940 m; South, 3500940 m; East, 666730 m; West, 665730 m.

HORIZONTAL DATUM: NAD83, longitude and latitude (decimal degrees).

VERTICAL DATUM: NAVD88, measurement precision to 6 decimal places (meters).

Surfer map file, all layers, (1000 x 1000 m) & (500 x 500 m):

SOURCE: This file contains all the layers that were made for the site maps. Layers produced in Surfer 9, ArcMap 10, and DesignCAD 3D Max 21 are all compiled in one Surfer map file.

ORIGINS OF LAYERS:

- *Contour Map, 50 cm Contour Interval:* Created in Surfer 9 from the .grd file, this layer is a contour map of the topography of the site landscape.
- *3D Surface Relief Map, Vertical View:* Another mapping extension of the .grd file, this layer is a vertically viewed, shaded, topographic relief map of the site area.
- *Reference Points:* Generated within the Surfer software, this layer was added to the map file a “Post Layer.” It visually plots established fixed points/datums off of an XYZ formatted point cloud spreadsheet.
- *Cultural & Natural Features:* Layer created by the same procedure described for the ArcGIS/ArcMap document (see above), except that once completed it was kept in Surfer and not imported back into ArcMap.
- *Breaklines:* Breakline sequences are first incorporated into the map file in the Surfer .grd file creation process after which they are visually added onto the principal map as a “Base Layer.” See breaklines descriptions in the previous two sections for further detail.

DATA FILE URL:

[1000 x 1000 m]

http://rla.unc.edu/mmt/Data/Emerald/Surfer_map_file_all_layers_2013_1000_x_1000_m.srf

[500 x 500 m]

http://rla.unc.edu/mmt/Data/Emerald/Surfer_map_file_all_layers_2013_500_x_500_m.srf

MAP PROJECTION: Universal Transverse Mercator, Zone 15 North (meters).

MAP SIZES: Two sizes are available; the original 1000 x 1000 m tile and a cropped 500 x 500 m variety, generated within Surfer 9 through the limits specification tab in “Map Properties.”

BOUNDARIES OF MAP (1000 x 1000 m): North, 3501940 m; South, 3500940 m; East, 666730 m; West, 665730 m.

BOUNDARIES OF MAP (500 x 500 m): North, 3501670 m; South, 3501170 m; East, 666480 m; West, 665980 m.

HORIZONTAL DATUM: NAD83, longitude and latitude (decimal degrees).

VERTICAL DATUM: NAVD88, measurement precision to 6 decimal places (meters).