

# Map Resources for Mineral Mine Inspectors and Operators



Virginia Department of Mines, Minerals and Energy  
Division of Geology and Mineral Resources  
Charlottesville, VA

# Outline

- Topographic maps
- Digital terrain models
- Geologic maps
- Examples of use

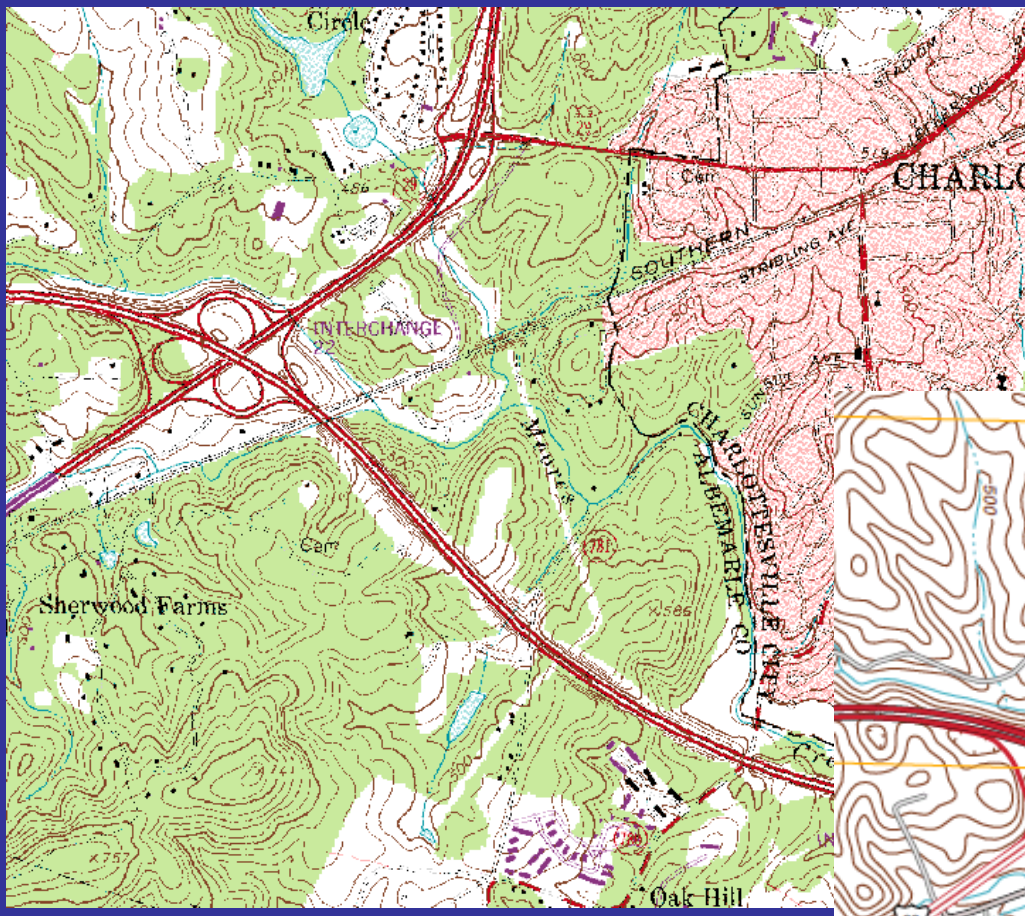
# USGS Topographic Series

- Paper maps available at scales 1:250,000 1:100,000; 1:50,000 (for some counties); and 1:24,000
- 1:24,000 maps are also available as digital raster graphics (DRGs) and GeoPDF maps [nationalmap.gov/ustopo](http://nationalmap.gov/ustopo)
- Historical topographic maps are available from DGMR and USGS [nationalmap.gov/historical](http://nationalmap.gov/historical)

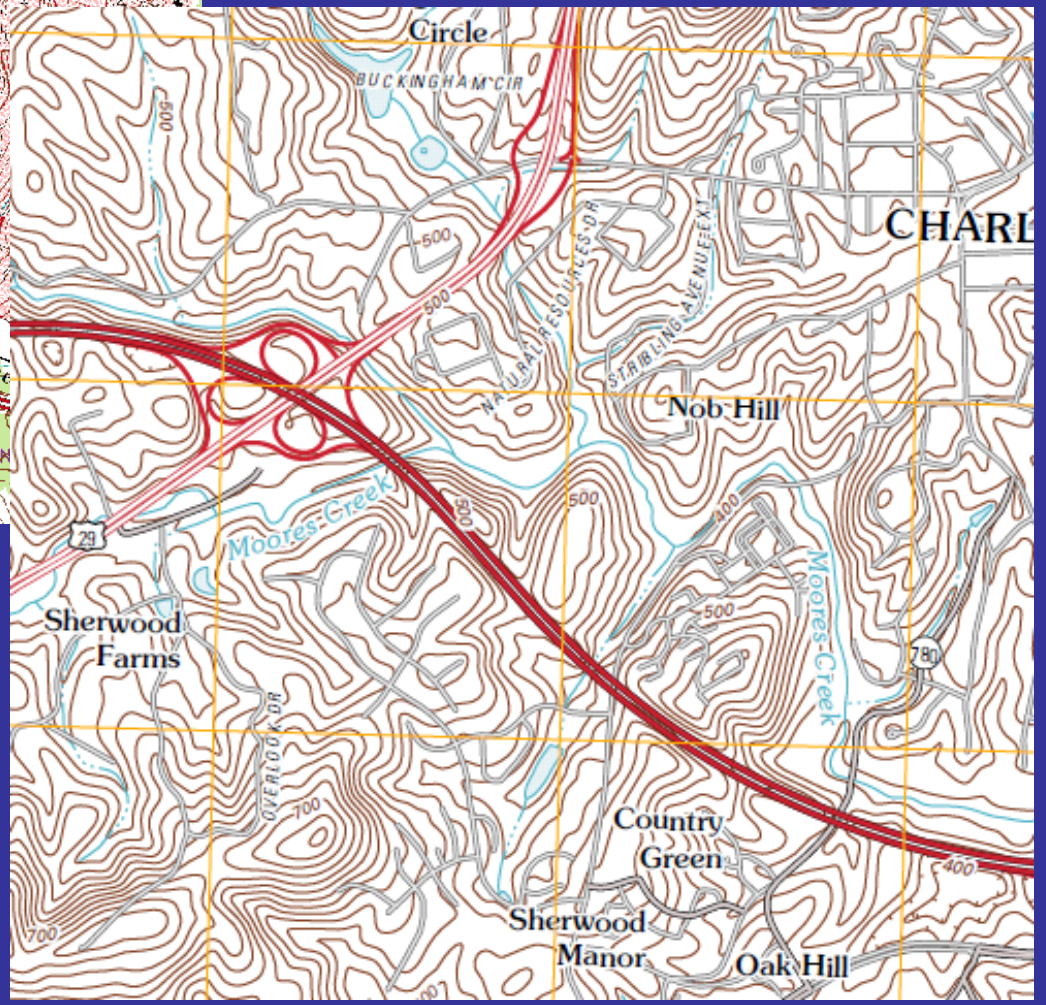
# University 15-minute quadrangle - 1935



Charlottesville West  
7.5-minute DRG



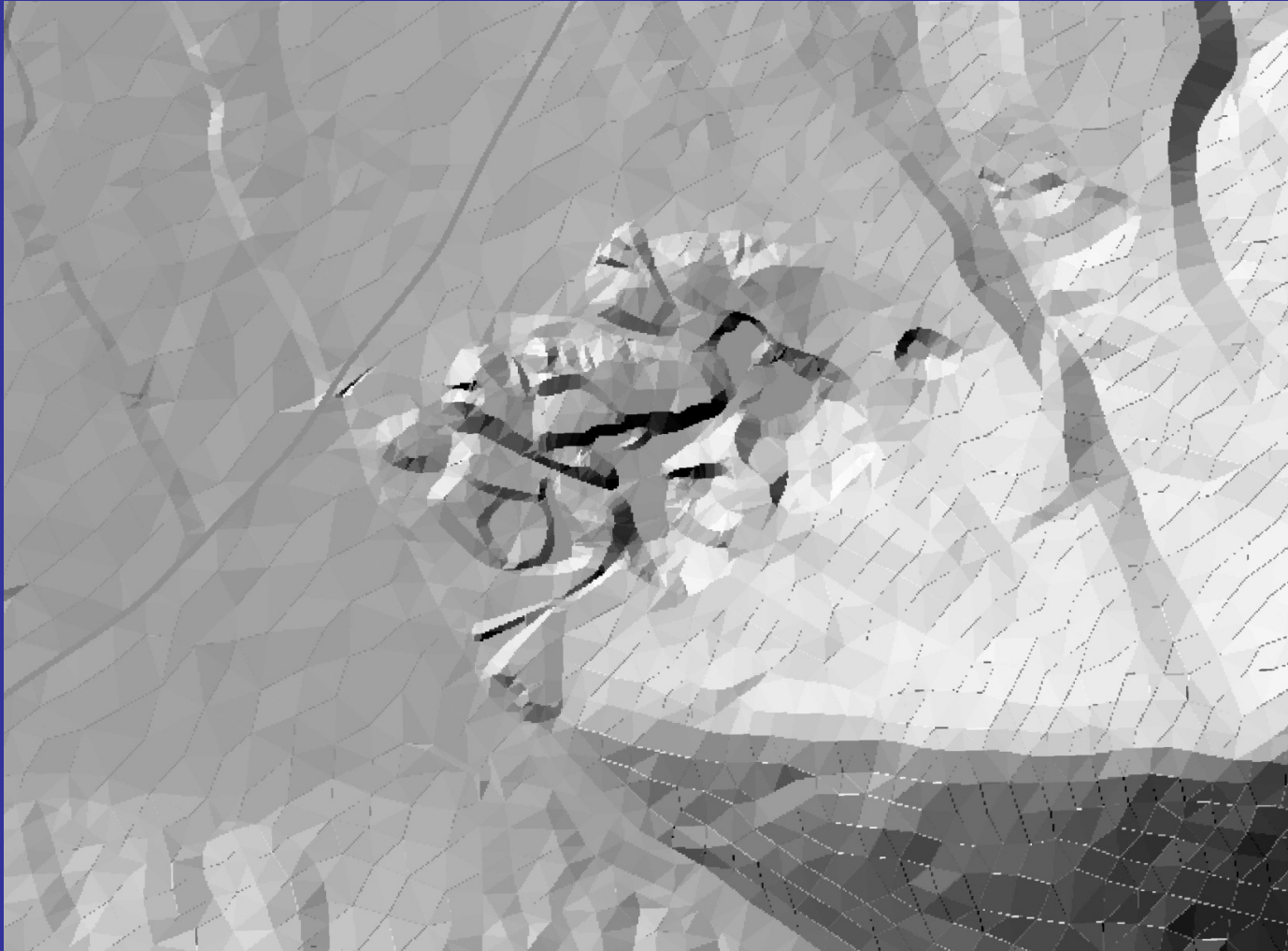
Charlottesville West  
7.5-minute topographic



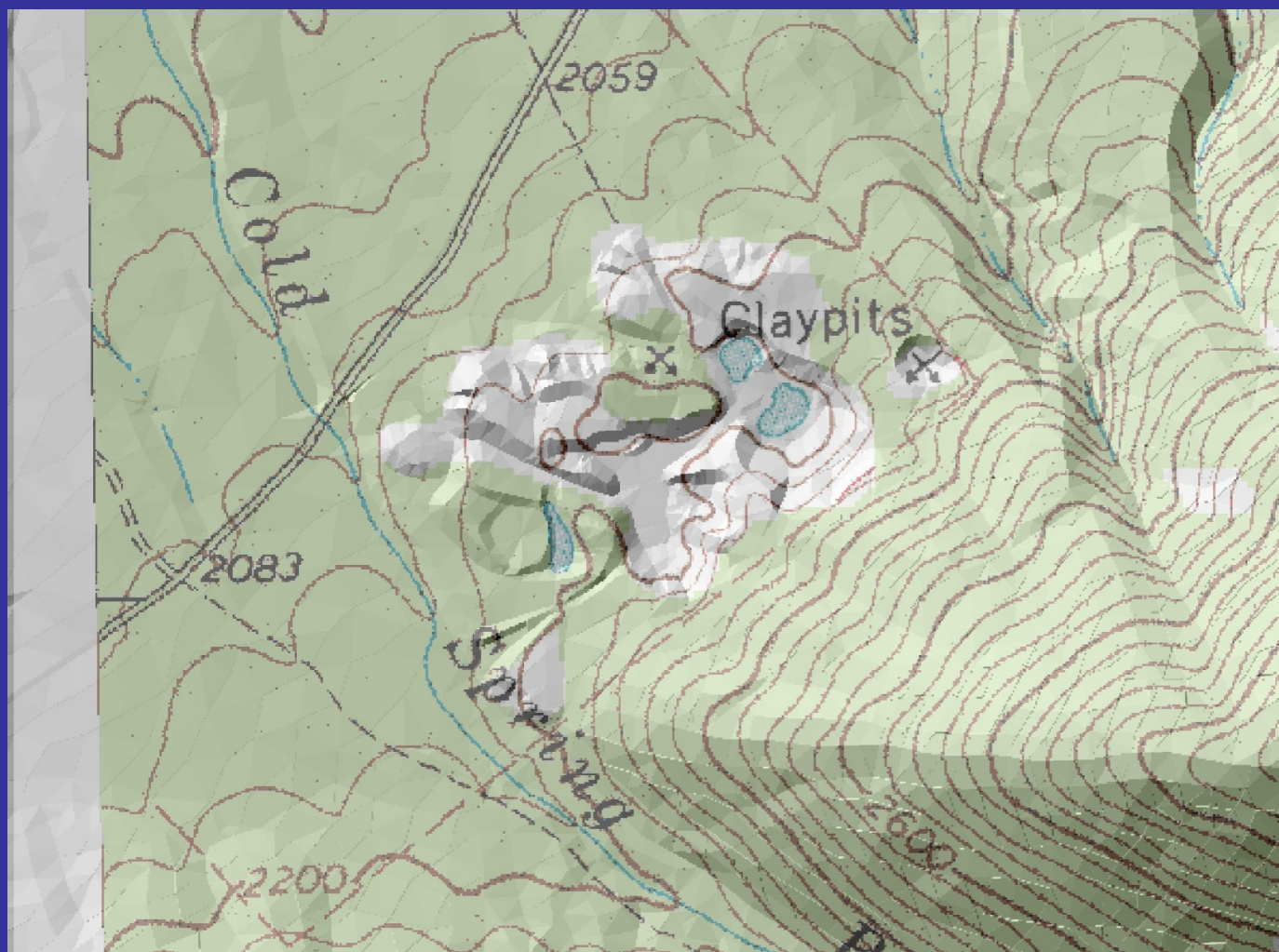
# Digital Terrain Models

- 10-meter resolution available nationwide
- 1 to 3-meter DTMs can be derived from elevation control points on Virginia Base Mapping Program (VBMP) orthophotographs
- Sub-meter LIDAR is available (or soon will be) for parts of eastern Virginia and parts of Shenandoah Valley

# Cold Spring Clay Deposit



# Cold Spring Clay Deposit





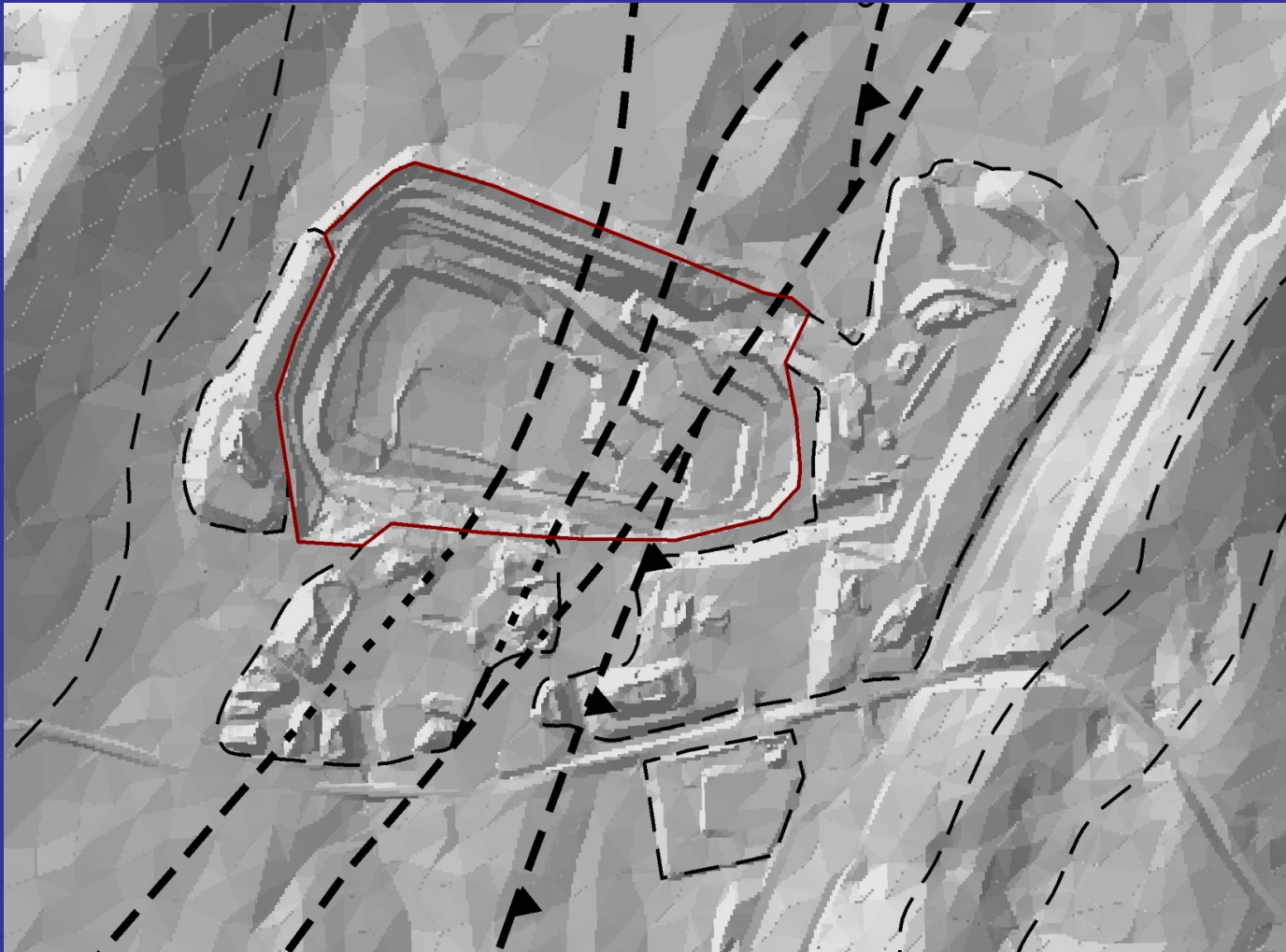
# Frazier Quarry – Limestone



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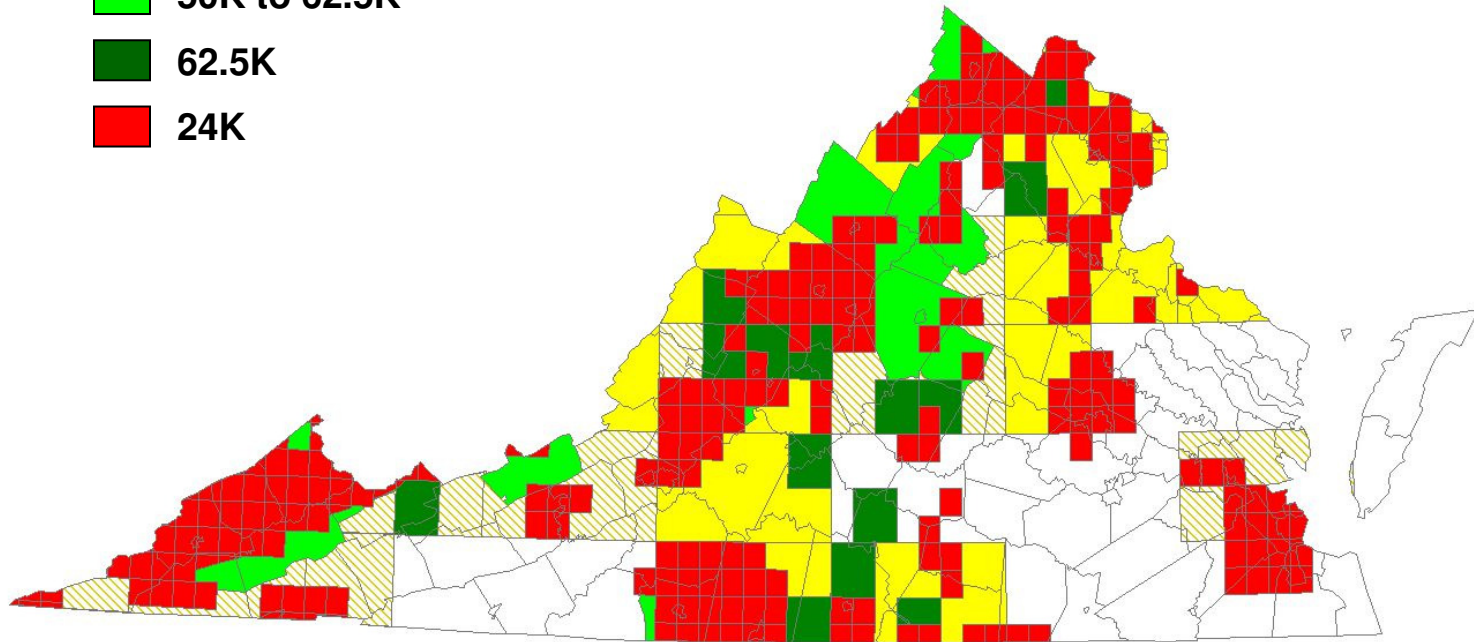
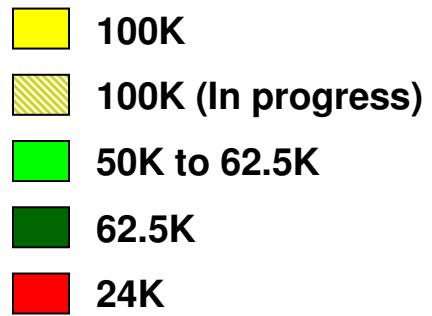
# Stuart M Perry Quarry – Limestone



# Geologic Maps

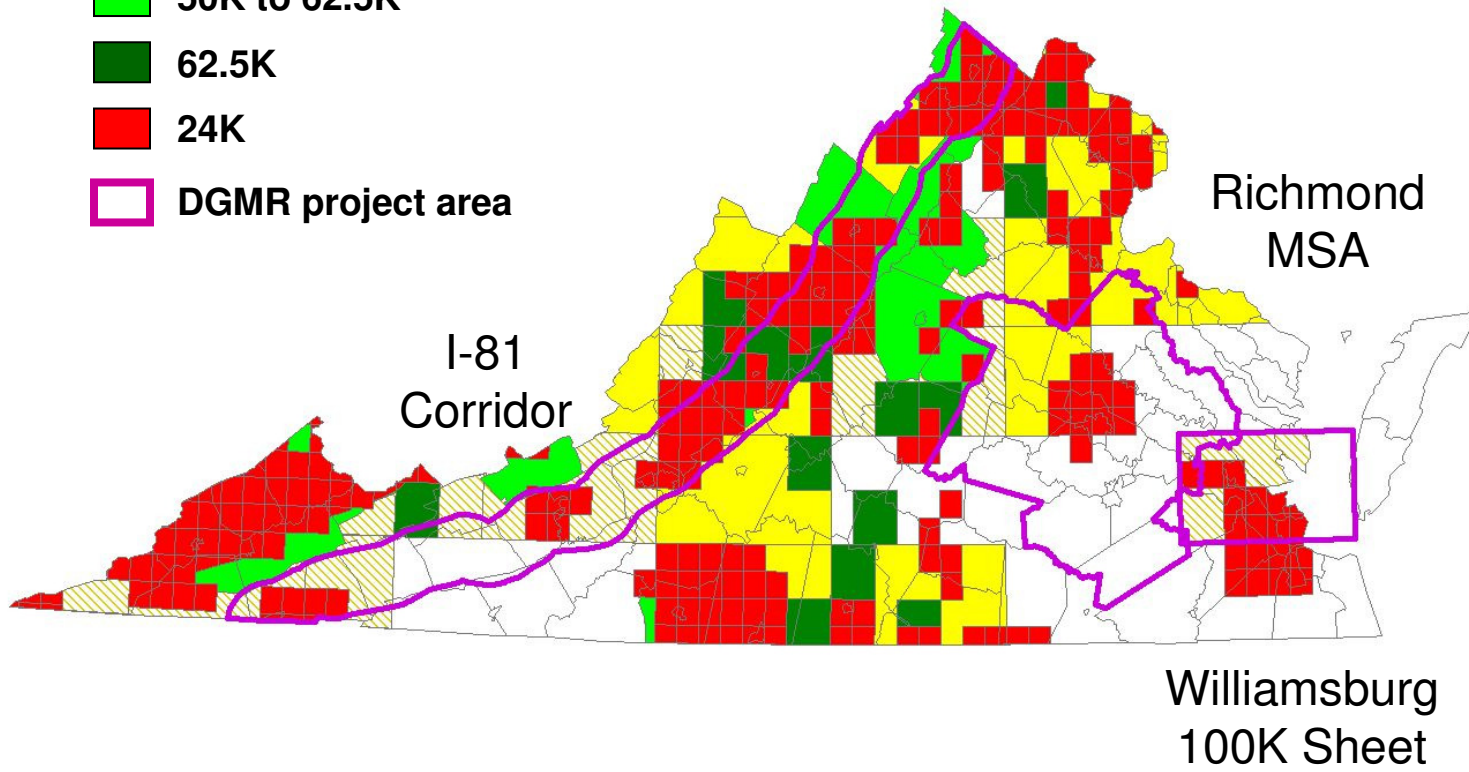
- 1:500,000 map of Virginia
- 1:250,000 maps for Coastal Plain and Valley and Ridge
- 1:100,000 to 1:50,000 maps for 50% of state
- 1:24,000 for ~25% of state

## Geologic Map Coverage in Virginia

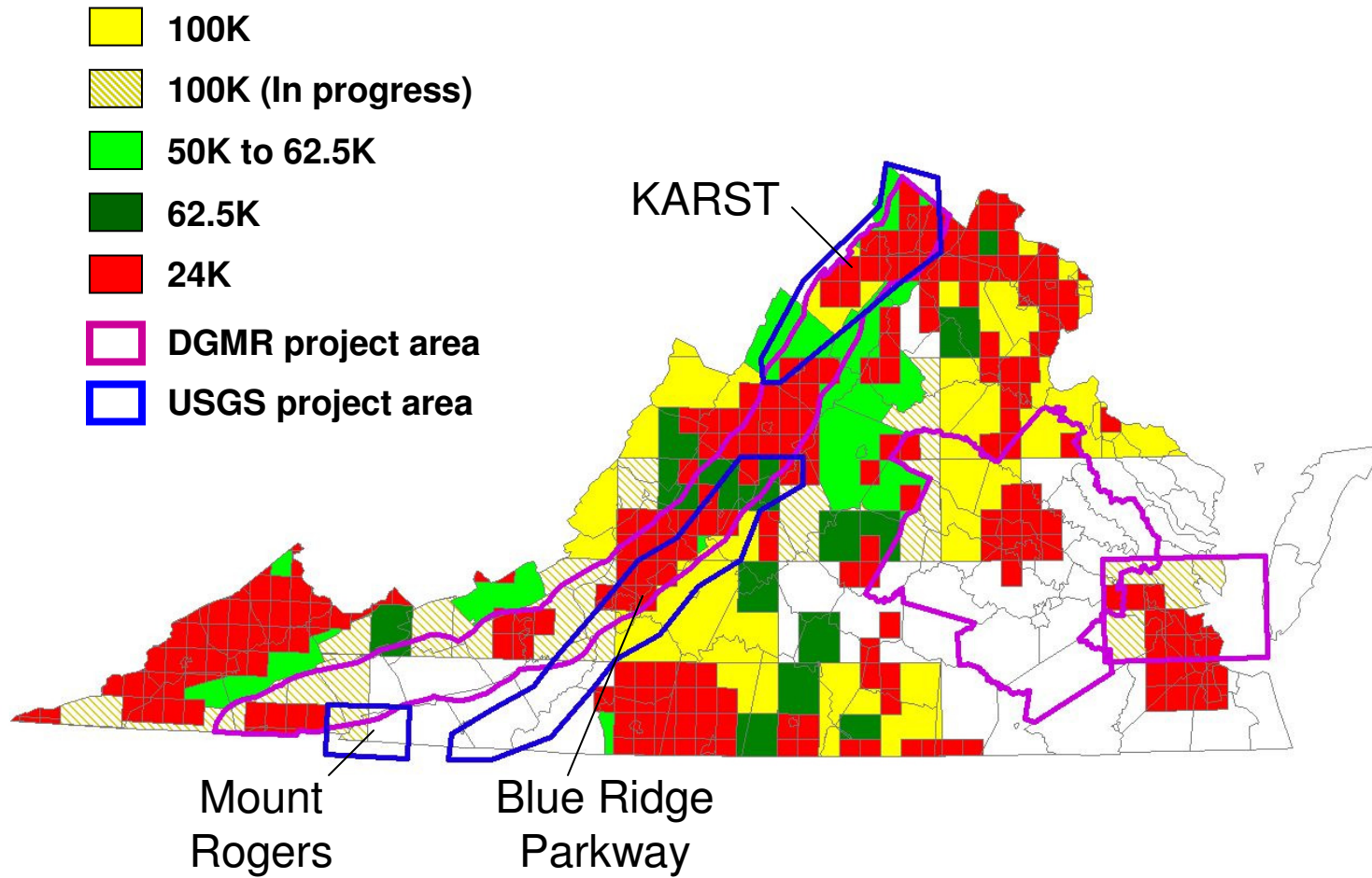


# Geologic Map Coverage in Virginia

- 100K
- 100K (In progress)
- 50K to 62.5K
- 62.5K
- 24K
- DGMR project area



## Geologic Map Coverage in Virginia





# Topographic maps and DTMs are used in mineral mining

- Analyze pre-mining site conditions
- Assess the accuracy of mine permit maps
- Estimate volume of stockpiles and reservoirs
- Analyze bedrock structural features
- Evaluate reclamation plans and results

# Geologic maps in mineral mining

- Exploration and site assessments
- Estimates of resources/reserves
- Mine operations planning
- Improve efficiency and safety of mining
- Make decisions on future development
- Reduce off-site impacts

# GEOLOGIC MAP OF THE FRANKS MILL AREA AUGUSTA COUNTY, VIRGINIA

Modified from Rader (1967) by Matthew J. Heller

2010

## MAP UNITS

### UNCONSOLIDATED SEDIMENT

- Qal Alluvial channel and flood plain deposits
- Qt Terrace deposits

### INTRUSIVE ROCKS

- Jd Tholeiitic or alkalic dikes

### SEDIMENTARY ROCKS

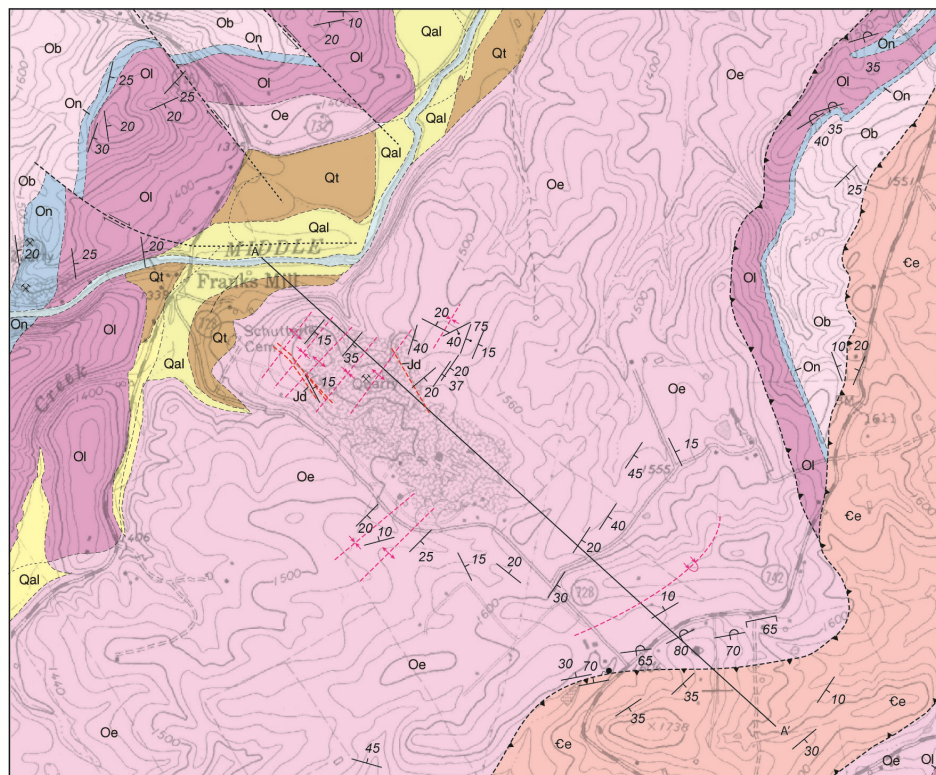
- Oe Edinburg Formation - dark-gray to black limestone and calcareous shale
- Ol Lincolnshire Limestone - gray to dark-gray limestone with black chert
- On New Market Limestone - light-gray limestone, thick-bedded to massive
- Ob Beckmantown Formation - light-gray to gray dolomite and limestone, thick-bedded
- Ce Elbrook Formation - light-gray to gray dolomite and argillaceous limestone, thin- to thick bedded

### MAP SYMBOLS

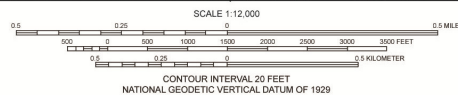
- Contacts
- Fault Contacts
- Reverse - sawteeth on upthrown block
- Strike-slip - arrows show relative motion
- Folds - arrows showing direction of plunge and dip of beds where appropriate
- Anticline
- Syncline
- Overturned Syncline
- Geologic Observations
- Strike and dip of inclined beds
- Strike and dip of overturned beds
- Mineral Resources
- Mine or quarry
- Abandoned mine or quarry
- Water Resources
- Spring - line indicates direction of flow

### SOURCE USED IN MAP COMPILATION

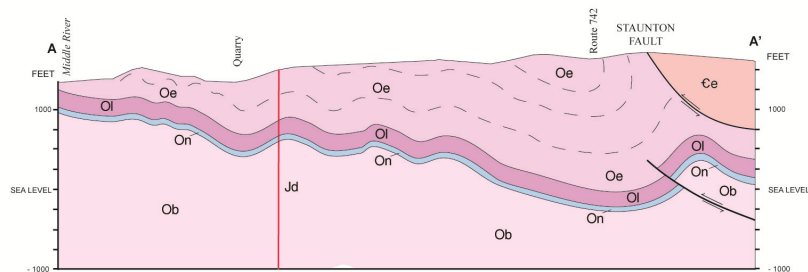
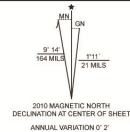
Rader, E.K., 1967, Geologic map of the Staunton, Churchville, Greenville, and Stuarts Draft quadrangles, Virginia, Division of Mineral Resources Report of Investigations 12, 1:24,000-scale geologic map.



Basemap, modified U.S. Geological Survey DRG 1986, Staunton Quadrangle, Virginia

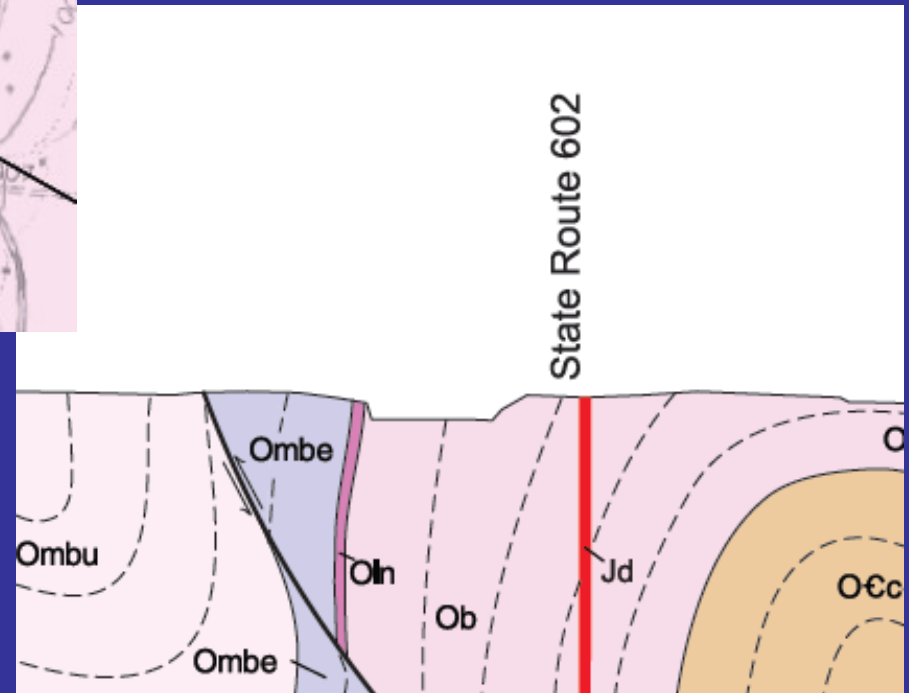
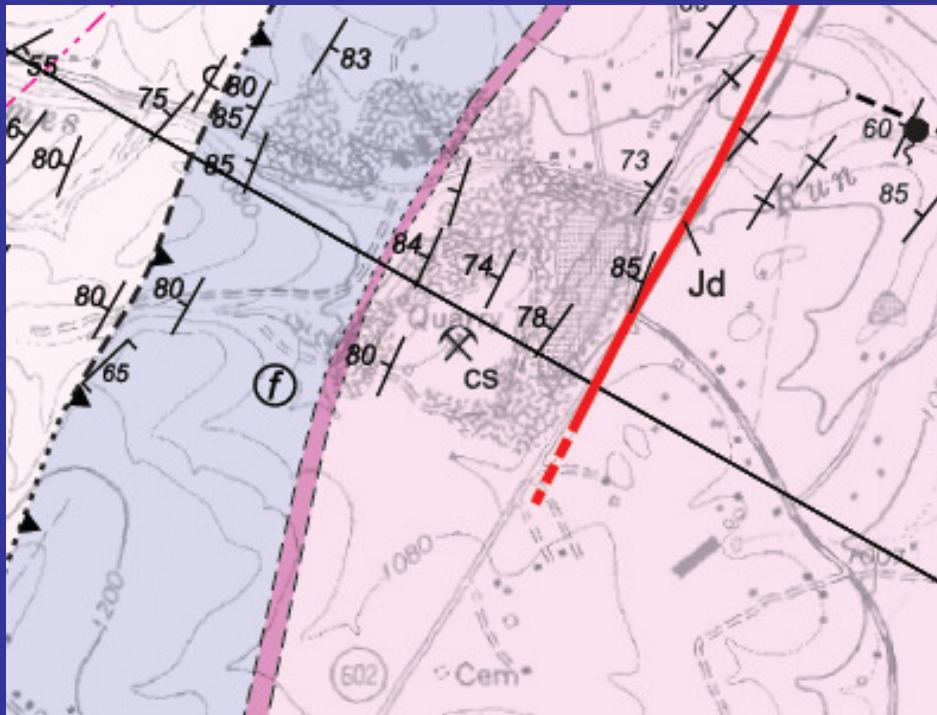


Digital Cartography by Matthew J. Heller



Interpretive cross-sections:  
1. No vertical exaggeration  
2. Subsurface structures interpreted from surface measurements

# Vulcan Quarry - Elkton



# Shenandoah Stone – Augusta County

