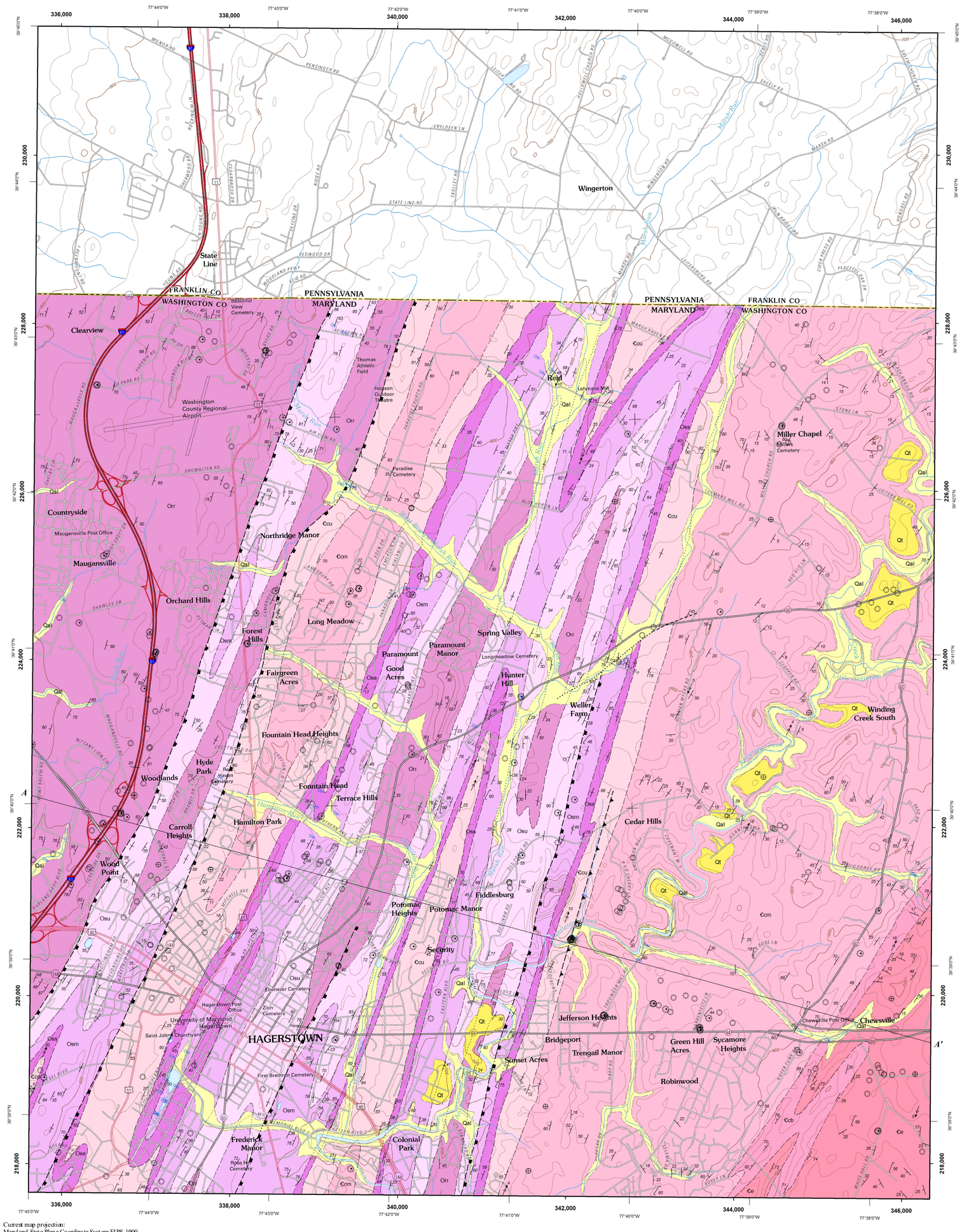


Current map projection:
Maryland State Plane Coordinate System FIPS 1900
(Projection: Lambert Conformal Conic, 1980 geodetic reference system)
(Horizontal Datum: North American Datum 1983)

MD State Plane 2,000-meter grid ticks and coordinates shown in black
Geographic coordinates (latitude-longitude)
Shown near corners and 1.0' intervals (in black)

U.S. Geological Survey (USGS) US Topo digital 7.5-minute Series
Hagerstown, MD-PA quadrangle, 2011
Hydrography derived from USGS National Hydrography Dataset, 2009
Topography generated from 1/3 arc-second National Elevation Dataset, 2000
Transportation from TeleAtlas Multinet Dataset, 2006-2010
Map published 2011 as a geoPDF document by USGS US TOPO,
conforms to US TOPO Product Standard 0.5.10

Reported magnetic north declination (center of Hagerstown quadrangle): 10.6° W
Estimated magnetic north declination (center of Hagerstown quadrangle): 10.61° W, changing by 0.01° W per year.)
To determine current magnetic declination see: http://www.ngdc.noaa.gov/geomag/declination.shtml)

Cultural features shown from USGS Geographic Names Information System
(GNIS) database, 2010

Geologic and Karst Features Map of the Hagerstown Quadrangle, Washington County, Maryland

By
David K. Brezinski
2013

Adjoining 7.5-minute quadrangles
(Hagerstown quadrangle shaded)

1	2	3
4		5
6	7	8

1 Williamson
2 Greencastle
3 Waynesboro
4 Mason Dixon
5 Smithsburg
6 Williamsport
7 Funkstown
8 Keedysville

Quadrangle Location

Scale 1:24 000

1 ½ 0 1 MILE

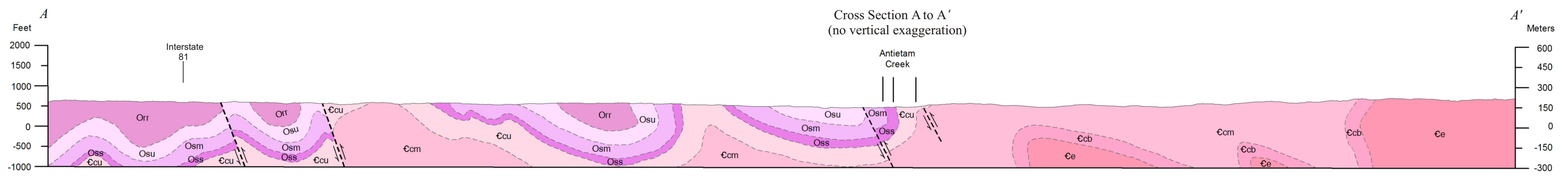
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0.5 0 1 KILOMETERS

Contour Interval 20 Feet
National Geodetic Vertical Datum of 1929
(To convert elevations to North American Vertical Datum of 1988, subtract 1 foot)
(To convert from feet to meters, multiply by 0.3048)

GN
(State Plane Grid North)

Cross Section A to A′
(no vertical exaggeration)



STATE OF MARYLAND
Martin O'Malley
Governor

Anthony G. Brown
Lieutenant Governor

MARYLAND

DEPARTMENT OF NATURAL RESOURCES
Joseph P. Gill
Secretary

Frank W. Dawson
Deputy Secretary

MARYLAND GEOLOGICAL SURVEY
Jeffrey Halka
Director

MARYLAND DEPARTMENT OF NATURAL RESOURCES

DESCRIPTION OF MAP UNITS

Quaternary

Qal — **Alluvium**
Poorly sorted, unconsolidated, tan, reddish brown, to dark gray mud, silt, sand, and pebbles. Deposited within the channels of streams and on the flood plain adjacent to the streams. Thickness estimated at 3 to 10 feet (1 to 3 m).

Qt — **Terrace deposits**
Reddish brown to brown, sandy and clayey mixture of rounded pebbles to cobbles of sandstone, vein quartz, and quartzite. Present along elevated areas above Antietam Creek. Thickness ranges from a thin veneer to more than 10 feet (0 to 3 m).

Ordovician

Orr — **Rockdale Run Formation**
Interbedded and cyclic limestone and dolomite, cherty in the lower 400 feet (120 m). Limestone intervals consist of medium to light gray, ribbony and thrombolitic to stromatolitic, lime mudstone to boundstone. Locally, limestone layers are light gray oolitic packstone to oolitic grainstone. Dolomite parts of cycles vary from tan, laminated, to light gray to tan, massive, fractured with wispy dolomitic laminae. The relative proportion of the limestone to dolomite varies upsection. In the lower 600 feet (180 m), limestone is typically thicker than dolomite. This progressively changes upsection so that the upper 700 feet (215 m) is dominantly dolomitic with little limestone within individual cycles. Forms very little topographic expression; many horizons are very poorly exposed. Thickness is up to 2,500 feet (760 m).

Stonehenge Formation
The Stonehenge Formation was subdivided into three separate members. Only the lowest, the Stoufferstown Member, is named the other two are informal.

Osu — **Upper member**
Medium to medium dark gray, medium-bedded, ribbony and oolitic, lime mudstone to packstone. Near the base of the member ribbony lime mudstone predominates. Upsection, medium gray, ribbony lime mudstone becomes interbedded with intervals of flat-pebble lime grainstone, and hummocky, thickly laminated lime packstone and oolitic lime packstone to grainstone. Locally, thin (< 3.0 feet, 0.9 m), algal thrombolites are present. This member commonly forms a persistent and mappable ridge and is frequently well-exposed. Thickness is 500 to 750 feet (150 to 215 m).

Osm — **Middle member**
The lower part of the middle member is composed of massive, medium gray, algal lime boundstone with some layers up to 25 feet (7 m) thick. Grades upsection into interbedded medium to dark gray algal thrombolites 5 to 7 feet (1.5 to 2.0 m) thick and medium gray, thinly bedded to ribbony, locally fossiliferous, lime wackestone to lime packstone. Several thin, tan dolomite beds occur near the middle of the unit. Thickness: 300 to 400 feet (90 to 100 m).

Oss — **Stoufferstown Member**
Dark gray, argillaceous, thinly bedded to ribbony, lime mudstone with thin beds of flat-pebble lime grainstone conglomerate and hummocky, discontinuous, thin beds of laminated limestone. A single, 10-foot (3 m) interval of massive, dark gray, thrombolitic, algal boundstone occurs approximately 30 feet (10 m) above the base of the member. This member weathers into thin, brown and orange chips, which litter overlying soil. Forms a low, discontinuous ridge. Thickness varies from 230 to 295 feet (70 to 90 m).

Cambrian

Conococheague Formation
Interbedded gray limestone and tan dolomite cycles. Subdivided and mapped as three members, two of which are informal. Total thickness is from 2,000 to 2,500 feet (610 to 760 m).

Ꞓcu — **Upper member**
Interbedded medium to light gray, ribbony, lime mudstone that weathers to flaggy to platy beds, and arenaceous grainstone exhibiting edgewise and flat-pebble conglomerates. Locally, thin, pastel blue and pink marble strata are developed. Black or gray chert fragments and brown-weathering quartz sandstone cobbles are frequently abundant in overlying soil. Thickness: 650 to 750 feet (200 to 230 m).

Ꞓcm — **Middle member**
Predominantly cyclically bedded, medium to dark gray, thrombolitic limestone and gray, ribbony and laminated limestone and tan, laminated dolomite. Thrombolites range in thickness from 3 to 6 feet (1 to 2 m) within thrombolitic intervals to less than 1 foot (0.3 m) within the ribbony intervals. Several dark gray, oolitic intervals are present in the upper part of this member. Thickness ranges from 1,500 to 1,800 feet (460 to 550 m).

Ꞓcb — **Big Spring Station Member**
Tan, massive dolomite interbedded with tan to light gray, laminated dolomite; unit is characterized by dark brown weathering. At the type section on the western side of the Hagerstown Valley, this member is characterized by interbeds of light gray, cross-bedded, calcareous, intraclastic, quartzarenitic sandstone approximately 3 feet (1 m) in thickness. Member becomes interbedded with gray, dolomitic thrombolite beds near the top. Thickness ranges from 200 to 300 feet (60 to 90 m).

Ꞓe — **Elbrook Formation**
Lower part of the formation is very poorly exposed and contains interbedded tan, thin- to thick-bedded limestone and dolomite, which frequently weather shaly, and are intercalated with medium-bedded, dark gray limestone. Middle part of the formation contains cyclic, dark gray limestone and dolomitic limestone. The upper part of the formation, and making up its greatest thickness, is cyclically bedded, gray, thrombolitic limestone and ribbony to laminated limestone and dolomite. Thickness ranges from 2,200 to 2,500 feet (670 to 760 m).

Explanation of Map Symbols

A — A′ Cross section line

Contacts
Geologic contacts; approximately located dotted where concealed

Faults
High angle reverse fault rectangles on upthrown side)
Thrust fault sawteeth on upthrown block
Fault concealed

Planar Features
Inclined bedding strike and degree of dip shown
Vertical bedding strike shown
Horizontal bedding
Overturned bedding strike and degree of dip shown
Inclined cleavage strike and degree of dip shown
Vertical cleavage strike shown
Inclined joint strike and degree of dip shown
Vertical joint strike shown

Folds
Minor syncline bearing and degree of plunge shown
Minor anticline bearing and degree of plunge shown

Karst Features
Spring
Closed depression
Sinkhole

Base Map Symbols

Transportation
Primary route, class 1 (divided, lanes separated)
Primary route, class 1 (undivided)
Secondary route, class 2
Light duty road or street, class 3

Topography
Topographic index contour (100- ft interval)
Topographic intermediate contour (20-ft interval)

Hydrography
Stream
Water body (eg. lakes, ponds, rivers)

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Geologic field mapping conducted in 2009-2011. The geologic map was compiled in digital form by Robert Conkwright of the Maryland Geological Survey.

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