

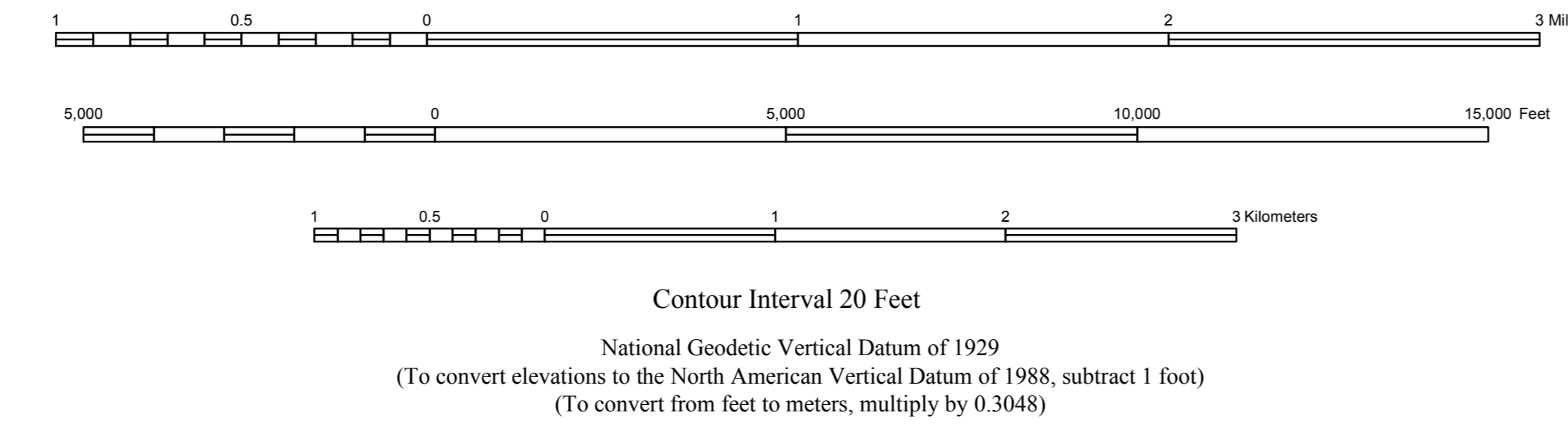
Description of Map Units

- Alluvium (Qal)**: Poorly sorted, unconsolidated, tan, reddish brown, to dark-gray mud, silt, sand, and pebbles, deposited within the channel of streams and on the flood plain adjacent to the streams. Thickness estimated at 1 to 3 (3 to 10 feet).
- Colluvium (Qc)**: Unconsolidated and unsorted sand, cobbles, and boulders that accumulate on the slopes below outcrops of the sandstone and quartzite units, and move slowly downslope under the influence of gravity. Two types were recognized in the Funkstown quadrangle. The first type is composed predominantly of angular boulders that overlie outcroppings of quartzites of the Weverton Formation on the flanks of South Mountain. This type of colluvium appears to be the direct result of the mechanical breakdown of the quartzite ledges. The thickness was not determined. The second type of colluvium is composed of reddish brown, rounded pebbles and cobbles of sandstone, quartzite, and vein quartz. This type of colluvium is present both at the western base of South Mountain, and as isolated patches overlying limestone bedrock in the Hagerstown Valley. The latter is far removed from the slopes of South Mountain and tends to be much more heavily weathered. The thickness of this type of colluvium ranges from a thin veneer less than 3 feet to more than 300 feet (1 to 100 m).
- Terrace deposits (Qt)**: 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 thick (0 to 3 m).
- Dibase dikes (Df)**: Dark gray, medium- to fine-grained diabase. Typically weathers to large, spherical boulders that exhibit a reddish brown patina. Diabase dikes range in thickness from 3 to 10 feet (1 to 3 m).
- Rockdale Run Formation (Or)**: Interbedded and cyclically bedded dolomite and limestone, cherty in the lower 400 feet (120 m). Limestone intervals consist of medium to light gray, ribbon and thrombolite to stromatolite lime mudstone to bankston. Locally, limestone layers are light gray oolitic and/or oolitic granestone. Dolomite parts of cycles varies from tan laminated to light gray to tan massive fractured with wavy dolomitic laminae. The relative proportion of the limestone to dolomite varies in section. In the lower 600 feet, limestone is typically thicker than dolomite. The progressively changes upward such that the upper 700 feet (215 m) is dominantly dolomite with little limestone within individual cycles. Forms very little topographic expression, many horizons are very poorly exposed. Thickness up to 2,500 feet (762 m).
- Stonewall Formation (Osm)**: The Stonewall Formation was mapped as three separate members. Two of these members have not been formally named.
 - Upper member (Osmu)**: Medium to medium dark gray, medium-bedded, ribbon and oolitic lime mudstone to packstone. Near the base of the member ribbon lime mudstone predominates. In the upper part, ribbon lime mudstone becomes interbedded with intervals of fine-grained lime granestone, and hummocky, thickly-laminated lime packstone and oolitic lime packstone to granestone. Locally thin, (< 1.0 m) algal thrombolites are present. This member commonly forms a persistent and mappable ridge and is frequently well-exposed. Thickness: 500 to 750 feet (150 to 215 m).
 - Middle member (Osmm)**: The lower part of the member is composed of massive, medium gray, algal lime boundstone with some layers up to 7 m thick. Grading upward into interbedded medium to dark gray algal thrombolites 1.5 to 2.0 m thick and medium gray, finely bedded to ribbon, 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 120 m).
 - Stufferston member (Osmst)**: Dark gray, argillaceous, thinly bedded to ribbon, lime mudstone with thin beds of flat-pebble lime granestone conglomerate and hummocky, discontinuous thin beds of laminated limestone. A single 10 foot (3 m) interval of massive, dark gray, thrombolite, 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: 230 to 295 feet (70 to 90 m).
- Conococheague Formation (Oco)**: 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 762 m).
 - Upper member (Ocu)**: Interbedded, medium to light gray ribbon lime mudstone that weathers to flaggy to platy beds, and argaceous granstones exhibiting elongate and flat-pebble conglomerates. Locally, thin past 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).
 - Middle member (Ocm)**: Predominantly cyclically bedded, medium to dark-gray, thrombolite limestone and gray, ribbon and laminated limestone, and tan laminated dolomite. Thrombolites range in thickness from 3 to 6 feet (1 to 2 m) within thrombolite intervals no less than 1 foot (0.3 m) within the ribbon intervals. Several dark-gray, oolitic intervals present in the upper part of this member. Thickness ranges from 1,500 to 1,800 feet (460 to 550 m).
 - Big Spring Station member (Ocb)**: Tan massive dolomite interbedded with tan to light-gray laminated dolomite, unit 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, intralaminar, quartzitic sandstone approximately 3 feet (1 m) in thickness. Member becomes interbedded with gray dolomite thrombolite beds near the top. Thickness ranges from 200 to 300 feet (60 to 90 m).
- Elbrook Formation (Ec)**: Lower part of the formation is very poorly exposed and contains interbedded tan, thin- to thick-bedded limestone and dolomite, which frequently weather blue, but are interbedded with medium-bedded, dark-gray limestone. Middle part of the formation contains cyclic, dark-gray limestone and dolomite limestone. The upper part of the formation, and making up its greatest thickness, is cyclically bedded, gray thrombolite limestone and ribbon to laminated limestone and dolomite. Thickness ranges from 2,200 to 2,500 feet (670 to 760 m).
- Waynesboro Formation (Ow)**: Interbedded and cyclically bedded carbonates and clastics. Specifically, gray limestone and tan dolomite interbedded with a variety of clastic rocks including: red and green siltstone, shale, and red-brown, green-gray, white, and tan, fine-grained sandstone at the top and bottom. Divided into three members by Brezinski (1992).
 - Upper member (Owu)**: Predominantly buff-weathering, medium- to dark-gray, dolomite, dolomitic limestone, and limestone. The Tomstown Formation was divided into four members by Brezinski (1992). These are, in ascending order, the Bolivar Heights, Fort Duncan, Benevola, and Dargan Members. The total thickness of the formation is 1,300 to 1,300 feet (360 to 400 m).
 - Dargan Member (Owd)**: Interbedded and cyclically dolomite and limestone. Cycles consist of alternations of dark-gray, botryoidal dolomite and medium- to dark-gray, oolitic, lime granstone, or dark-gray dolomite or limestone and tan, laminated, silt dolomite. Thickness is approximately 700 feet (215 m).
 - Benevola Member (Owb)**: Light-gray to white, massive to poorly bedded, highly fractured, sugary dolomite. The Benevola Member varies from white to very light gray, both on fresh and weathered surfaces and has a sugary appearance. Bedding is rarely evident within the Benevola Member, except within polished slabs where fine sheets of cross-bedding are common. Thickness is 100 to 150 feet (30 to 45 m).
 - Fort Duncan Member (Owdm)**: Medium to dark-gray, thick-bedded, mottled dolomite with white, void-filling, sparry dolomite. Weathered surface characterized by irregular anastomosing network of slotting algal. Layers of the white, sparry dolomite, 0.5 to 1.5 inches wide, fill voids that are continuous in beds for up to several yards (several meters). The white, void-filling dolomite contrasts the darker mottled dolomite. Thickness ranges from 200 to 250 feet (60 to 75 m).
 - Bolivar Heights Member (Owbh)**: The Bolivar Heights Member is characterized by three stratigraphically stacked lithologies. The basal lithology is a tan, vuggy dolomite that is in contact with the underlying Arizant Formation. This dolomite ranges from 10 to 40 feet (3 to 12 m) in thickness, and is rarely exposed. Overlying the basal dolomite is an interval 40 to 50 feet (12 to 15 m) thick, comprised of very light gray, shored, laminated, dolomite marble (Keokyleville marble bed). Above the Keokyleville marble bed, the Bolivar Heights Member consists of about 200 feet (60 m) of thin- to medium-bedded, dark-gray, ribbon, burrow-mottled, lime mudstone that weathers light gray in color. The number and density of burrows vary among beds, with very little burrowing in some layers and an anastomosing network of burrows in others. Thickness is 200 to 250 feet (60 to 75 m).
- CHILLHOWEE GROUP (Och)**
 - Antietam Formation (Oca)**: Dark green-gray, highly cleaved, silty, phylitic shale and siltstone interbedded with white, *Scolithus*-burrowed, fine-grained sandstone in the lower part of the formation. These lower strata grade upward into medium-bedded, white, biturbidated and cross-bedded, fine- to medium-grained sandstone in the middle of the formation. The uppermost strata of the formation consist of light- to medium-gray, cross-bedded, granular conglomerate. Although exposure of the formation is very rare, mapping of the Antietam Formation is facilitated by the upper sandstone-conglomerate interval, which forms a ridge somewhat lower in altitude than the Weverton Formation, but considerably higher than the Wayneboro ridges. Thickness ranges from 500 to 800 feet (150 to 245 m).
 - Harpers Formation (Ochh)**: Predominantly dark green-gray, highly cleaved, phylitic shale and siltstone with lesser amounts of metasandstones and impure gray quartzites. Shale and siltstone are dark green-gray, dark brown-gray to medium gray in color and weather tan. Cleavage typically obscures bedding. Locally traceable metasandstones (Chm) are commonly thin (10 to 15 feet or 3 to 5 m), dark green-gray, fine- to medium grained, highly argillaceous, and contain *Scolithus* burrows, especially near top of formation. Quartzites are light to medium gray, coarse grained to conglomeratic, cross-bedded and commonly less than 10 m (30 feet) in thickness. Owing to intense intraformational folding, determining the thickness of the formation was impossible. Estimates range from 1,500 to 3,000 feet (450 to 900 m).
- Weverton Formation (Owe)**: Primarily light-gray to gray quartzite, conglomerate, and metagraywacke with interbeds of dark-gray to black phylitic quartzites. Shale and siltstone are dark green-gray, dark brown-gray to medium gray in color and weather tan. Cleavage typically obscures bedding. Locally traceable metasandstones (Chm) are characteristic of this member, although they are only locally common. Thickness ranges from 150 to 200 feet (45 to 60 m).
- Owens Creek Member (Owec)**: Dark, to very dark gray, very coarse grained to conglomeratic, cross-bedded graywacke. Although commonly cross-bedded, the very coarse grained nature of this unit makes recognition of cross-bedding difficult. Large (1 to 5 cm) white and pink quartz pebbles are characteristic of this member, although they are only locally common. Thickness ranges from 150 to 200 feet (45 to 60 m).
- Buzzard Knob Member (Owbk)**: The lowest member of the formation consists of two ledge-forming quartzites, which are often difficult to discern. The lower ledge consists of light- to medium-gray, medium-bedded quartzite with dark-gray argillaceous layers up to 4 cm thick, separating the quartzite beds. Cross-bedding within individual quartzite strata is pervasive and is commonly accentuated by purplish or yellow-gold bands, demarcating the individual cross-bedded foresets. The upper ledge-forming quartzite is composed of medium- to thick-bedded, very light green-gray, shaly quartzite. Cross-bedding is much less common than in the lower ledge. This member is the main ridge-forming unit of the Maryland Blue Ridge. Thickness ranges from 125 to 175 feet (40 to 50 m).

Geologic Map of the Funkstown Quadrangle, Washington County, Maryland

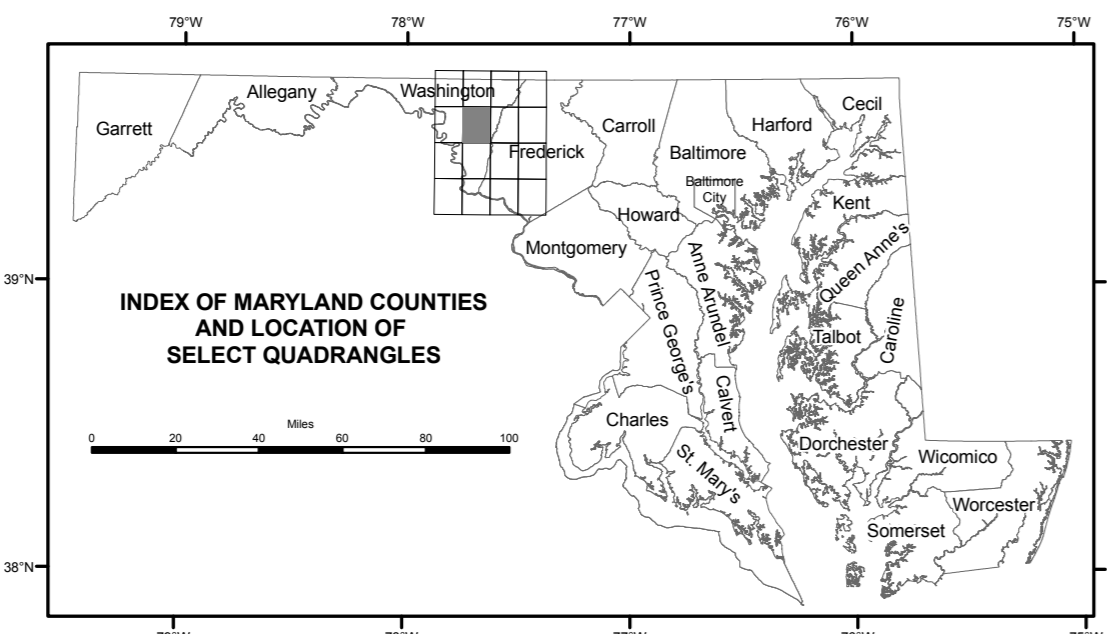
By David K. Brezinski and Stephen C. Bell 2009

Scale 1:24,000



Current map projection: Maryland State Plane Coordinate System 1987... U.S. Geological Survey (USGS) 7.5-minute Series (Topographic) Funkstown quadrangle 1953 (photorevised 1985)...

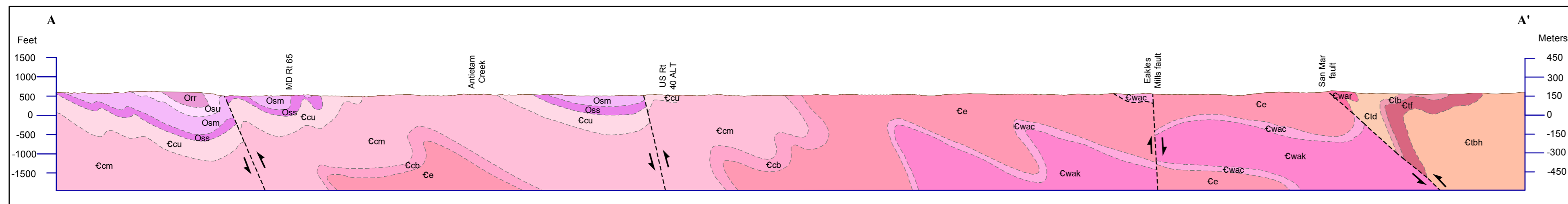
Table with 3 columns: Mason and Dixon, Hagerstown, Smithsburg; Williamsport, Funkstown, Myersville; Shepherdsport, Keokyleville, Middletown; Charles Town, Harpers Ferry, Point of Rocks.



Supplemental Information Use Constraints: These data represent the results of data collection processing for a specific Department of Natural Resources...

Acknowledgments: This map was funded in part by the Maryland State Highway Administration. Geologic field mapping conducted in 1990, 1991, and 2007 through 2008...

Schematic Cross Section A-A' (no vertical exaggeration)



Explanation of Map Symbols. Geologic Symbols: Planar Features (Bedding, Joints, Cleavage), Linear Features (Folds), Base Map Symbols (Topographic, Hydrographic, Cultural, Transportation).