STATE OF MARYLAND
Martin O'Malley, *Governor*

DEPARTMENT OF NATURAL RESOURCES
John R. Griffin, *Secretary*

MARYLAND GEOLOGICAL SURVEY
Jeffrey P. Halka, *Director*

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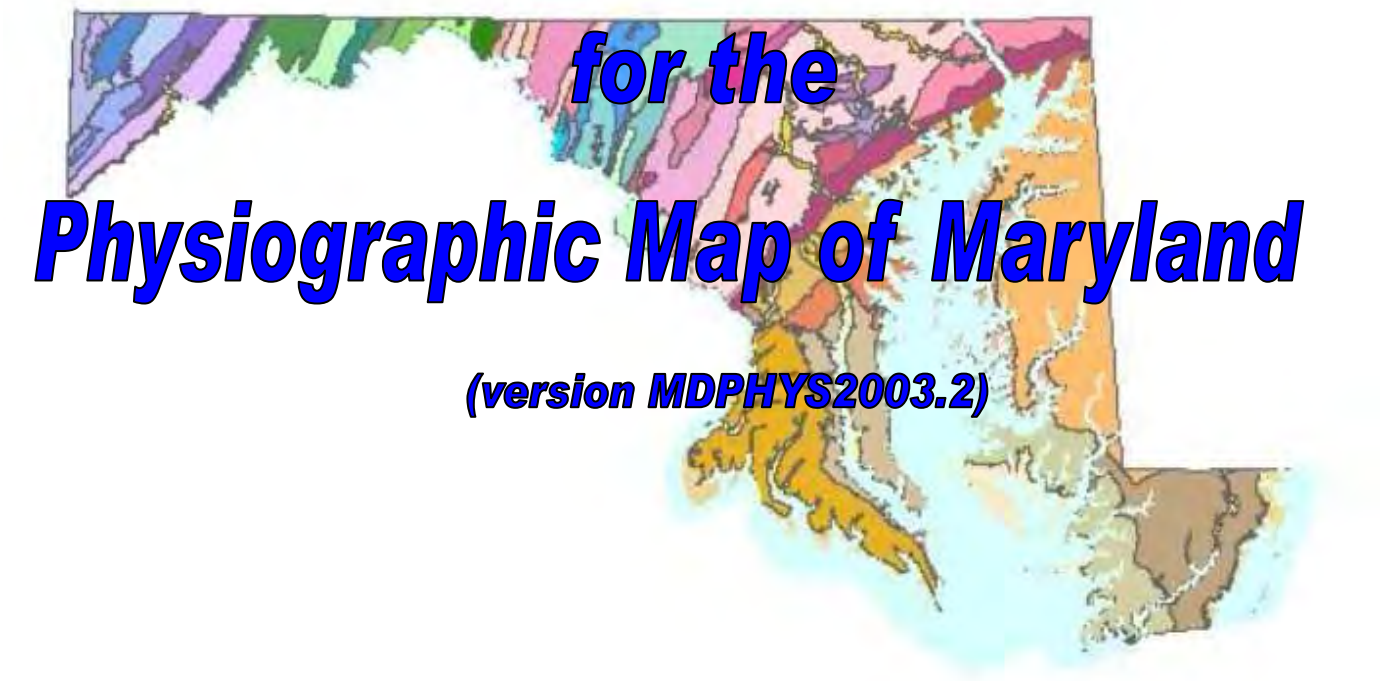
Explanatory Text for the Physiographic Map of Maryland



(version MDPHYS2003.2)

By
James P. Reger and Emery T. Cleaves

Maryland Geological Survey

2008

STATE OF MARYLAND

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Explanatory Text for the Physiographic Map of Maryland

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The Basics

Physiography is the study of landscapes and landforms. It is a field of study in which physical and historical geology, geomorphology, and physical geography overlap. In the sense used on the Physiographic Map of Maryland, physiography is essentially landscape, or terrain, description and classification. The most common classification scheme is hierarchical, whereby larger divisions contain smaller subdivisions of the landscape, and those subdivisions in turn consist of still smaller subdivisions, and so on. Building on the work of workers of decades ago, we have developed a descriptive, hierarchical classification of Maryland's terrain. The entire hierarchical scheme is summarized in Table 1. As used in Maryland, the basic unit for subdivision is the Province.

Table 1. Basis for Hierarchical Physiographic Subdivision of Maryland

(modified from Godfrey and Cleaves, 1991)

SUBDIVISION	BASIS	EXAMPLES
1. Realm	Magmatic differentiation, plate tectonics	Continental masses; ocean basins
2. Major Division	Plate tectonics on a continental or ocean basin scale	Appalachian Highlands
3. Province	Major structural geology unit; large-scale similarity of relief or topographic features	Appalachian Plateaus; Ridge and Valley; Blue Ridge; Piedmont Plateau; Atlantic Coastal Plain
4. Section	One geomorphic system usually dominant; intermediate structural geologic unit	Folded Appalachian Mountains; Great Valley; Northern Blue Ridge; Piedmont Uplands
5. Region	Tectonic individuality; common lithologic characteristics	Allegheny High Plateau; Bear Pond Mountains; Phoenix Domes; Harford Plateaus & Gorges; Delmarva Peninsula
6. District	Lithology influences deformation style and pattern; lithology/geomorphic process/landform delicately related	Allegheny Front; Oakland District; Spickler Plain; Bel Air Upland; Hampstead Upland
7. Area (approx. lower limit for 1:500,000 mapping)	Local lithology closely related to land unit; geomorphic processes directly related to lithology and landform	White Meadow Run Area; Harbaugh Valley; Soldiers Delight; Slate Ridge; Calvert Cliffs; Zekiah Swamp
8. Zone	One geomorphic process may dominate; limited relief and slope parameters	Flood plain; colluvial apron; high steep slope; low steep slope; wetland/swamp; terrace
9. Locale (approx lower limit for 1:24,000 mapping)	Very limited relief and slope parameters; lower limit for most quad-scale mapping	Individual sinkhole; debris slide; boulder field; meander reach
10. Compartment	Extremely limited parameters and very restricted controls	Convex shoulder slope; concave toe slope; water-dispersing slope; water-collecting slope; point bar
11. Feature		Rill, gully, pothole

In Maryland, the classification starts at the level of the Physiographic Province, which can be defined as a region in which all elements of the landscape are similar in geologic structure and gross lithologies and which has had a unified geomorphic history. Its features differ significantly from those of adjacent Provinces. Subdivisions of a Province are termed "Sections." Sections can be subdivided into Regions, Regions into Districts, and Districts into Areas. The Area is generally the smallest subdivision that can be depicted at a scale used for the physiographic map of Maryland (minimum 1:500,000). A much smaller scale physiographic map of Maryland is shown in Figure 1.

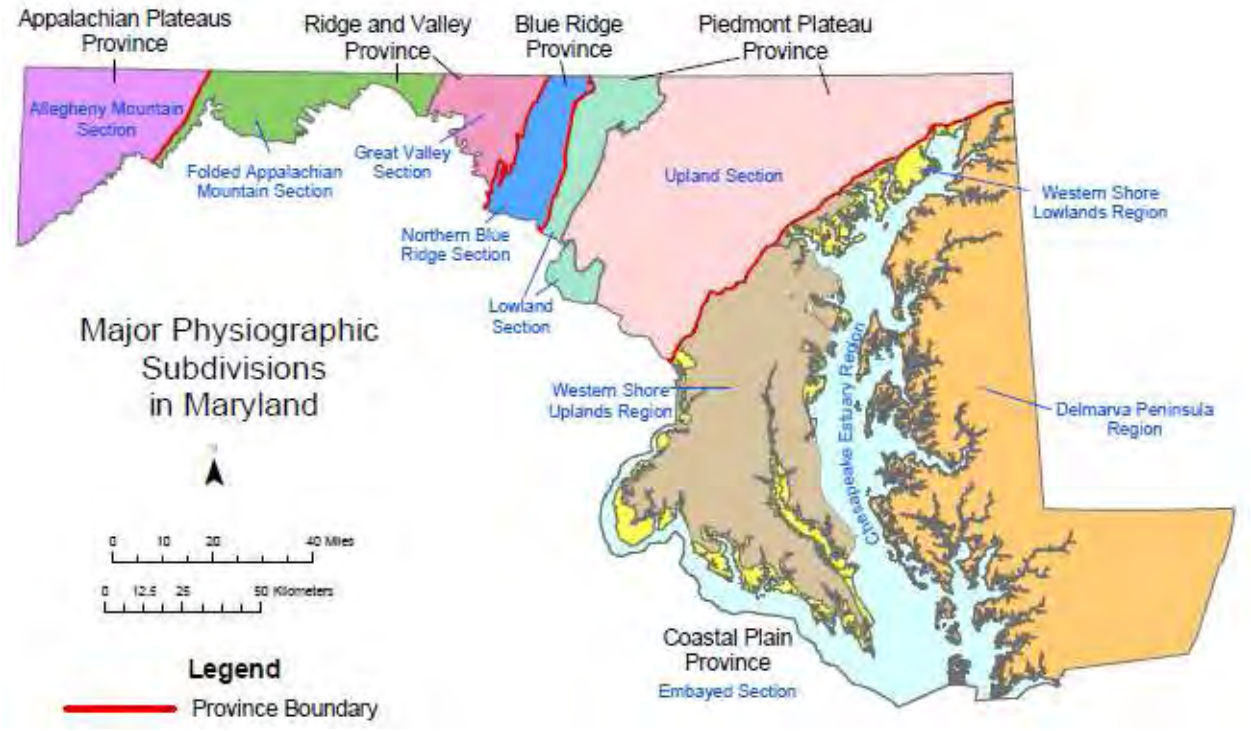

Figure 1. Generalized map of physiographic provinces and their subdivisions in Maryland.

Each Province, Section, Region, District, and Area has been assigned a six-digit number for identification. These numbers bear no significance per se, except that they help keep track of the hierarchical organization of the physiographic units and, in a general sense, the location within the state. Of the six digits, the first (reading from left to right) represents a Province, the second represents a Section, the third a Region, the fourth a District, and the last two an Area. This accommodates up to 9 Provinces, 9 Sections per Province, nine Regions per Section, and nine Districts per Region, but up to 99 Areas per District. For example, 100000 represents the Appalachian Plateaus Province, 110000 represents the Allegheny Mountains Section of that Province, 112000 the Allegheny High Plateau Region, 112400 the Oakland District, and 112401 the White Meadow Run Area of the Oakland District.

The numbering scheme arbitrarily moves from west to east, much as we read English from left to right. Thus, Province 100000 is in the westernmost part of the state, with Province 200000 lying adjacent and to the east, and so on – the numbers progressing to Province 500000 in the eastern part of the state.

Explanation of the 6-digit numbers

Of the six digits, the first (reading left to right) represents a Province, the second represents a Section, the third a Region, the fourth a District, and the last two an Area:

P00000 1st digit: Province (e.g., 300000 = Blue Ridge Province)
P**S**0000 2nd digit: Section (e.g., 310000 = Northern Section of the Blue Ridge Province)
PS**R**000 3rd digit: Region (e.g., 313000 = Middletown Valley Region)
PSR**D**00 4th digit: District (e.g., 313200 = Southern Middletown Valley District)
PSRD**AA** 5th & 6th: Area (e.g., 313201 = Catoctin Creek Gorge Area)

Two digits are assigned to Areas in order to allow for more than 9 Areas in a District. In the simplest scheme, an Area is part of a District; a District is part of a Region; a Region is part of a Section; and a Section is part of a Province.

At highest levels in the hierarchy (namely, Province and Section), each subdivision is made up entirely of smaller, next lower subdivisions. For example, a Province is subdivided completely into Sections, and a Section is subdivided completely into Regions. However, at the Region level and below, that need not be the case. For example, a District 224200 may contain an Area 224201, but that does not mean the Area occupies the entire District. Furthermore, the entire District is not required to equal the sum of all its Areas. It is also possible for a level in the hierarchy to be "skipped." For example, an Area may be identified within a Region for which there is no intermediate District.

In Maryland landforms, lithology, and geologic structure show a strong interdependence that is evident at each level of physiographic classification. The five physiographic provinces – ***Appalachian Plateaus*** (100000), ***Ridge and Valley*** (200000), ***Blue Ridge*** (300000), ***Piedmont*** (400000), and ***Atlantic Coastal Plain*** (500000) – are geologically and physiographically distinct from one another. A close examination of the landscape classification scheme in Maryland reveals what may seem like duplication or redundancy, in that a particular subdivision coincides with the next smaller subdivision. For example, if we ignore the Potomac River for a moment, the Allegheny Mountain Section (110000) in Western Maryland coincides with the Allegheny High Plateau Region (112000). Further east in the Hagerstown Valley, the Conococheague Creek District (223100) coincides with the Martinsburg Dissected Plain Region (223000), of which it is a subdivision. Why is that?

The reason is quite simple. Physiographic boundaries can extend beyond the state's borders. Of the examples mentioned here, both the Allegheny Mountain Section and the Martinsburg Dissected Plain Region extend into Pennsylvania and West Virginia. However, part of the Allegheny Mountain Section or the Martinsburg Dissected Plain Region in Pennsylvania or West Virginia may differ from the part in Maryland to the extent that further subdivision beyond Maryland's borders is warranted.

The Physiographic Provinces and Subdivisions

Appalachian Plateaus

In the Appalachian Plateaus Province, the bedrock consists mainly of gently folded shale, siltstone, and sandstone of Devonian to Permian age. The folding has resulted in broad elongated arches. The Appalachian Plateaus Province in Maryland consists of only one Section – the ***Allegheny Mountain Section*** (110000). (Other Sections are recognized in adjacent Pennsylvania and West Virginia.) In turn, the Allegheny Mountain Section in Maryland consists of two regions – the ***Allegheny High Plateau*** (112000) and the ***Chesapeake Gorges*** (111000). In the Allegheny Mountain Section, the Chesapeake Gorges Region coincides with the Potomac River Valley (***Upper Potomac Gorge District***, 111100), which tends to occupy a steep-sided gorge that is parallel to regional strike of the bedrock in places and transverse to strike in others. ***Districts*** within the Allegheny High Plateau Region, such as the ***Accident District*** (112600) reflect the lithology and geologic structure in their physiography. The Accident District is a breached anticline, with the valley floored by shales, siltstones, and thin sandstones of the Hampshire and Foreknobs Formations, and the flanking ridges underlain by sandstone and conglomerate of the Pottsville Formation. Districts may contain smaller subdivisions called ***Areas***. Areas, such as the ***White Meadow Run Area*** (112401), mimic the geology in their physiography; the Area is a long, narrow valley floored by Greenbrier Limestone.

Ridge and Valley Province

The Ridge and Valley Province (200000) contrasts greatly to the Appalachian Plateaus Province, as Cambrian to Mississippian age sedimentary rocks have been strongly folded and faulted.

The name Valley and Ridge Province is also widely used for this subdivision, but the physiographic map adopts Ridge and Valley for two main reasons. One reason is that the ridges are judged to be more dominant in the topography than are valleys. Possibly related is that ridges are much more often named physical features than are valleys. A second reason involves prior use. Although both names appear in the literature, "Ridge and Valley" was used in classic works on physiography and geomorphology (e.g., Fairbridge, 1968; Fenneman, 1938; Thornbury, 1965), as well as on a recent physiographic map of Pennsylvania (Sevon, 2000).

Sandstones, siltstones, shales, and limestones of Silurian to Mississippian age comprise the ***Folded Appalachian Mountain Section*** (210000). These have been folded and faulted, and subsequently differentially eroded, to form alternating ridges and valleys subparallel to the northeast-southwest regional strike. Relative spacing and width of ridges and valleys are related to wavelength and amplitude of folds and to attitude, thickness, and erosional resistance of individual lithologic units. As a result, the Folded Appalachian Mountain Section is subdivided into seven Regions that alternate between ridge-dominant and valley-dominant. Although ridges occur in all seven regions, with few exceptions those in the ridge-dominant regions are more numerous, reach higher elevations, and have greater local relief (i.e., ridge height) than those in the valley-dominant regions (Table 2).

The ***Great Valley Section*** (220000), unlike the Folded Appalachian Mountain Section, is a broad, gently rolling lowland underlain mainly by folded limestones of Cambrian and Ordovician age.

Blue Ridge Province

Immediately east of the Ridge and Valley Province lies the ***Blue Ridge Province*** (300000), which in Maryland is represented by the ***Northern Blue Ridge Section*** (310000). The Section is a large anticlinal fold whose limbs are underlain by Lower Cambrian quartzites (***Catoctin-South Mountain Region***, 312000) that form two prominent ridges (Catoctin Mountain and South Mountain). The valley between the ridges, ***Middletown Valley Region*** (313000) is floored by Pre-Cambrian gneiss and metamorphosed volcanic rock. The Potomac River (***Middle Potomac Gorge District***, 311100) cuts across the two Regions in steep-sided gorges through the ridge-forming Cambrian quartzites of South and Catoctin Mountains and a shallower gorge incised into the floor of the Middletown Valley Region.

Piedmont Plateau Province

Adjacent to the east side of the Blue Ridge is the ***Piedmont Plateau Province***, which lacks lithologies that, when weathered, produce topography like that of the Ridge and Valley or the Blue Ridge. Two Sections of unequal size comprise the Piedmont Plateau: a smaller, western Lowland Section and a larger eastern Upland Section.

The ***Piedmont Lowland Section*** (400000) consists of a valley with two Regions: the ***Mesozoic Lowland Region*** (41200) and the ***Limestone Lowland Region*** (41300). The Mesozoic Lowland is made up of two Districts – the ***Gettysburg Lowland*** (412100) and the ***Culpeper Lowland*** (412200) – underlain by red shales, siltstones, and thin sandstones bordered in places by limestone and quartz conglomerates of Triassic age. The ***Frederick Valley District*** (413100) of the Limestone Lowland Region is a carbonate valley of low relief, underlain by Cambro-Ordovician limestone, with more than 1,000 sinkholes. The Chesapeake Gorges Region in the Piedmont Plateau Province has parts of two major river systems – the Potomac and the Susquehanna – that flow southeasterly across the Province, transverse to the regional north and northeastern trend of the major lithologic units.

The ***Piedmont Upland Region*** (420000) ranges from a gently rolling upland of low relief to one of very rolling and hilly terrain, distinctive broad-bottomed valleys underlain by marble, and major streams incised into narrow, steep-sided valleys. Distinctive lithologies respond to weathering in different ways. For example, the ***Timonium Valley District*** (425200) of the ***Phoenix Domes Region*** (425000) is characterized by a broad-bottomed marble valley that has been formed by chemical weathering and fluvial erosion. These same processes have formed the distinctive broad-bottomed curvilinear marble valleys of the ***New Windsor Lowland District*** (423200) of the ***Wakefield Valley and Ridge Region*** (423000). Serpentinite underlies the distinctive ***Soldiers Delight Area*** (422305) and the ***Hunting Hill Area*** (422306). And thick, hard, ledge-making quartzites form the ***Sugarloaf Mountain Area*** (422401). Fluvial processes have eroded out narrow, steep-walled gorges, such as ***Lower Deer Creek Gorge Area*** (422101) and ***Upper Gunpowder Falls Gorge Area*** (422307). (More about gorges later.)

Atlantic Coastal Plain Province

The ***Atlantic Coastal Plain Province*** (500000) is the most easterly Maryland Province. It consists of the ***Embayed Section*** (510000) of estuaries and embayments resulting from post-glacial sea-level rise that drowned the ancestral Susquehanna River and Potomac River downstream of the Fall Zone, thereby creating the modern Chesapeake Bay, and an emergent Continental Shelf, creating the barrier islands and coastal bays along the Atlantic shoreline. The ***Chesapeake Bay Estuary Region*** (513000) separates the ***Delmarva Peninsula Region*** (514000) from the ***Western Shore Uplands Region*** (511000) and the ***Western Shore Lowlands Region*** (512000).

The ***Chesapeake Bay Estuary Region*** (51300) consists of drowned river valleys of the Susquehanna and Potomac Rivers that resulted from the post-glacial sea-level rise. The ***Western Shore Uplands*** (511000) is a flat to rolling upland surface underlain by mostly unconsolidated sediments of Cretaceous to Holocene age. In places the terrain is moderately to thoroughly dissected, and erosion has produced numerous hillocks (***Prince Frederick Knobby Upland District***, 511600). Elsewhere, sands and gravels of Pliocene age underlie a relatively flat upland surface in which stream incision has formed steep-sided valleys (***Waldorf Upland Plain District***, 511500). The Western Shore Uplands Region is bounded by the ***Western Shore Lowlands Region*** (512000), which consists of fluvial and estuarine terraces, marshes, and drowned mouths of rivers draining into the Chesapeake Bay and Potomac estuary system.

A Special Note about Transverse River Gorges

Physiographic mapping in Maryland identified two major groups of gorges. The first is herein referred to as the ***Chesapeake Gorges***, and the second is referred to as the ***Gunpowder Gorges***. The reason for recognizing gorges as a separate entity is that they represent the major rivers

that flow basically from west to east (or northwest to southeast), thereby cutting across (that is, transverse to) the dominant northeast-southwest trend of the bedrock geology. Although these gorges and valleys are themselves continuous, they cut across a variety of physiographic provinces, sections, regions, or districts.

Chesapeake Gorges: Two major rivers, the Potomac and the Susquehanna, originate in the Appalachian Plateaus Province and flow across the Ridge and Valley, the Blue Ridge, the Piedmont, and into the Coastal Plain Province where they discharge into the Chesapeake Bay. Their general northwest-southeast trend cuts across the strike of the geologic formations in each Province. Where the rivers cross resistant rocks – for example, sandstones, quartzites, and non-carbonate metamorphic rocks – they usually flow in gorges characterized by very steep slopes and extensive cliffs. Where they cross rocks of less erosional resistance, such as carbonate rock, they flow in well-defined flood plains. In shales and greenstones (of the Blue Ridge Province), they may be incised into their valley floors.

In each Province, Section, Region, and District crossed by the rivers, the same name is used. For example, the name Potomac River is used throughout its length to indicate the continuity of the river feature. However, in one place the Potomac River may flow in a gorge (and the District named Potomac River Gorge District), or it may flow in an open flood plain (and the area named Potomac River Floodplain District).

Gunpowder Gorges: Aside from the Potomac and Susquehanna Rivers, the major streams of the Piedmont Upland Section are the Gunpowder Falls, Patapsco River, and Deer Creek. In the Piedmont Upland, these streams are incised into narrow, steep-sided valleys, which collectively are called the Gunpowder Gorges, named after Gunpowder Falls where the gorge-like appearance of their physiography is well displayed. They typically have a gorge-like appearance where they flow across non-carbonate rocks. Where the streams cross major carbonate units (usually marble), the streams occupy a well-defined flood plain and are not bounded by steep-sided slopes. In each region and district crossed by one of these streams the same name is used. For example, Gunpowder Falls flows across three Regions: Harford Plateaus and Gorges, Phoenix Domes, and Fall Zone. In each Region, the name Gunpowder Falls Area is used. In this way, the Area designates a distinctive physiographic feature, and the use of the same name indicates the continuity of the stream feature from Region to Region.

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Table 2. Summary of topography and geology of ridges in the Ridge & Valley Province.

Mountain or Ridge for each Region	Crest Elev. (ft.)	Height (ft.)	Geologic Structure	Formation & Lithology
CUMBERLAND RIDGES				
Fort Hill	1500-1600	850	anticline	Oriskany-Helderberg; ss, chert, ls
unnamed ridge west of Wills Mtn	1200-1540	600-700	homocline	Oriskany-Helderberg; ss, chert, ls
Haystack Mtn - Wills Mtn	1700-2000	700-950	anticline	Tuscarora ss; orthoquartzite
Shriver Ridge	1520	600-700	homocline	Oriskany; ss
McNamee Ridge	980	100-200	homocline	Mahantango Fm
Pine Ridge	1100	350-400	anticline	Mahantango Fm
unnamed series of knobs	1100-1300	300-350	homocline	Oriskany ss
Irons Mtn (north)	1540-1870	650-750	homocline	Oriskany ss
Evitts Mtn	1335-2315	900-1000	anticline	Tuscarora ss
Nicholas Ridge	1000-1580	500-800	anticline	Oriskany ss
Collier Ridge	1400-1450	750	anticline	Oriskany ss
Martin Mtn (south)	1300-1690	600-700	anticline	Oriskany ss
Bush Ridge - Martin Mtn (north)	1700-1970	600-800	anticline	Oriskany ss - Helderberg ls
Buck Ridge	1080	150	homocline	Bloomsburg - McKenzie Formations
Warrior Ridge	1360-1500	500-600	homocline	Oriskany ss - Helderberg ls
Warrior Mtn (north)	1500-2000	750-900	homocline	Oriskany ss - Helderberg ls
AVERAGE	1490	630		
TOWN CREEK VALLEY				
Walnut Ridge	900-960	200	syncline	Foreknobs Fm; sandstone mbr
Polish Mtn	1800	800-1000	syncline	Foreknobs Fm; ss & fine-grained cgl
Pine Ridge	1020	150	syncline	Foreknobs Fm; sandstone mbr
Stratford Ridge	800-970	270	anticline	Oriskany ss
Ragged Mtn	1700+	500	syncline	Foreknobs Fm; sandstone mbr
Divide Ridge	1040	200	anticline	Brallier; siltstone, sandstone
AVERAGE	1230	370		
TOWN HILL REGION				
Green Ridge	1250-1425	540-775	homocline	Foreknobs Fm; sandstone mbr
Piney Ridge	1180-1250	160-200	homocline	Foreknobs Fm; sandstone mbr
Town Hill	1650-2040	800-900	syncline	Rockwell & Purslane Fms; ss, cgl
AVERAGE	1470	560		
PAW PAW VALLEY				
Anthony Ridge	1185	300-380	homocline	Foreknobs Fm; ss
Sorrell Ridge	860-960	180-240	anticline	Brallier Fm; sandstone, siltstone
Big Ridge	1040-1080	150-250	homocline	Foreknobs Fm; sandstone member
AVERAGE	1050	250		

Mountain or Ridge for each Region	Crest Elev. (ft.)	Height (ft.)	Geologic Structure	Formation & Lithology
HANCOCK RIDGES				
Sideling Hill	1400-1600	700-750	syncline	Rockwell & Purslane Fms; ss, cgl
Long Ridge	800-860	200-250	homocline	Foreknobs Fm; sandstone member
Tonoloway Ridge	1000-1100	500-600	homocline	Oriskany ss
Roundtop Hill	1100-1300	600	syncline	Oriskany ss
Cove Ridge (Warm Spg Ridge)	740-940	150-300	homocline	Oriskany ss - Helderberg ls
unnamed ridge east of Cove Ridge	700-740	150-240	homocline	Mahantango Fm; massive sltst, fine ss
AVERAGE	1025	420		
LICKING CREEK VALLEY				
Timber Ridge	660-800	100-150	syncline	Hampshire Fm; sandstone
Orchard Ridge	720-740	80-120	homocline	Mahantango; massive sltst, fine ss
Coon Ridge	740-780	150-200	homocline	Mahantango; massive sltst, fine ss
AVERAGE	740	150		
BEAR POND MOUNTAINS				
Elbow Ridge	800-920	200-340	syncline	Elbow Ridge ss mbr, Helderberg Fm
Moore Knob	920	300-450	syncline	Oriskany ss
Bullskin Mtn	1550-2000	600-750	homocline	Tuscarora ss
Hearthstone Mtn	1700-2020	800-900	anticline	Tuscarora ss
Abe Mills Mtn	1200-1380	200-575	homocline	Tuscarora ss
Stone Quarry Ridge	800-850	800-900	homocline	Oriskany ss
Sword Mountain	1270-1530	520-650	homocline	Tuscarora ss
Gillians Knob	1400-1575	800-825	syncline	Tuscarora ss
Fairview Mtn	1400-1600	600-750	homocline	Tuscarora ss
Rickard Mtn	1300-1400	550-650	homocline	Tuscarora ss
Powell Mtn	1100-1550	550-800	homocline	Tuscarora ss
Johnson Mtn	1140	440	homocline	Tuscarora ss
AVERAGE	1310	600		

Key to Abbreviations:

cgl	conglomerate
ss	sandstone
slst	siltstone
sh	shale
ls	limestone
Fm	Formation
mbr	member

Number of Synclinal Ridges..... 11
Number of Anticlinal Ridges..... 14
Number of Homoclinal Ridges..... 26
Total number of ridges 51

NOTE: The mountains or ridges listed here are the dominant elongate (ridge-like) topographic features in the Ridge and Valley Province; named features that are isolated knobs along a ridge are not included in this list. For example, Breakneck Hill (1,872 ft.) is an isolated knob on Martin Mountain; it and unnamed knobs along Martin Mountain are not included here.

Hierarchical Subdivision of the Physiography of Maryland

100000. APPALACHIAN PLATEAUS PROVINCE
- **110000. Allegheny Mountain Section**
  - 111000. Chesapeake Gorges Region
    - 111100. Upper Potomac Gorge District
  - 112000. Allegheny High Plateau Region
    - 112100. Allegheny Front District
    - 112200. Frostburg District
      - 112201. Lower Savage Gorge Area
    - 112300. Avilton District
      - 112301. Upper Savage Gorge Area
    - 112400. Oakland District
      - 112401. White Meadow Run Area
      - 112402. Pleasant Valley Area
    - 112500. Grantsville District
      - 112501. The Glades Area
    - 112600. Accident District
    - 112700. Youghiogheny Highlands District
      - 112701. Youghiogheny Gorge Area
      - 112702. Cranesville Swamp Area

200000. RIDGE AND VALLEY PROVINCE
- **210000. Folded Appalachian Mountains Section**
  - 211000. Chesapeake Gorges Region
    - 211100. Upper Potomac Gorge District
  - 212000. Cumberland Ridges Region
  - 213000. Town Creek Valley Region
  - 214000. Town Hill Region
  - 215000. Paw Paw Valley Region
  - 216000. Hancock Ridges Region
  - 217000. Licking Creek Valley Region
  - 218000. Bear Pond Mountains Region
    - 218001. Blairs Valley Area
- **220000. Great Valley Section**
  - 221000. Chesapeake Gorges Region
    - 221100. Upper Potomac Floodplain District
  - 222000. Mercersburg Region
    - 222100. Clear Spring Foothills District
    - 222200. Spickler Plain District
  - 223000. Martinsburg Dissected Plain Region
    - 223100. Conococheague Creek District
  - 224000. Hagerstown Region
    - 224100. Charles Town District
    - 224200. Waynesboro District
      - 224201. Keedysville Area

300000. BLUE RIDGE PROVINCE
- **310000. Northern Blue Ridge Section**
  - 311000. Chesapeake Gorges Region
    - 311100. Middle Potomac Gorge District
  - 312000. Catoctin-South Mountain Region
    - 312001. Shookstown Bench Area
    - 312002. Harbaugh Valley Area
  - 313000. Middletown Valley Region
    - 313100. Upper Middletown Valley District
    - 313200. Lower Middletown Valley District
      - 313201. Catoctin Creek Gorge Area
  - 314000. Elk Ridge Region
    - 314100. Rohrersville Valley District

400000. PIEDMONT PLATEAU PROVINCE

410000. Piedmont Lowland Section

411000. Chesapeake Gorges Region

411100. Middle Potomac Floodplain District

412000. Mesozoic Lowland Region

412100. Gettysburg Lowland District

412200. Culpeper Lowland District

413000. Limestone Lowland Region

413100. Frederick Valley District

420000. Piedmont Upland Section

421000. Chesapeake Gorges Region

421100. Middle Potomac Gorge District

421200. Susquehanna Gorge District

422000. Harford Plateaus & Gorges Region

422100. Bel Air Upland District

422101. Lower Deer Creek Gorge Area

422200. Pimlico Upland District

422300. Hampstead Upland District

422301. Upper Deer Creek Gorge Area

422302. Rocks Ridge Area

422303. Slate Ridge Area

422304. Hydes Valley Area

422305. Upper Gunpowder Falls Gorge Area

422306. Caves Valley Area

422307. Soldiers Delight Area

422308. Upper Patapsco River Gorge Area

422309. Clarksville Marble Valley Area

422310. Hunting Hill Area

422400. Mt. Airy Upland District

422401. Sugarloaf Mountain Area

422402. Lilypons Area

422403. Laurel Hill Area

422500. Glenwood Upland District

422501. Patapsco River Gorge Area

423000. Wakefield Valley & Ridge Region

423100. Dug Hill Ridge District

423200. New Windsor Lowland District

423300. Unionville Upland District

424000. Silver Run Region

424001. Silver Run Valley Area

425000. Phoenix Domes Region

425100. Chattolanee Upland District

425101. Western Run Area

425102. Upper Gunpowder Falls Gorge Area

425200. Timonium Valley District

426000. Fall Zone Region

426100. Perry Hall Upland District

426101. Gunpowder Falls Gorge Area

426102. Patapsco Gorge Area

500000. ATLANTIC COASTAL PLAIN PROVINCE

510000. Embayed Section

511000. Western Shore Uplands Region
- 511100. Elk Neck Peninsula District
  - 511101. Grays Hill Area
- 511200. Middle River Lowland District
  - 511201. Lower Gunpowder River Area
- 511300. Glen Burnie Rolling Upland District
  - 511301. Lower Patapsco River Area
  - 511302. Upper Patuxent Valley Area
  - 511303. Anacostia Valley Area
- 511400. Crownsville Upland District
  - 511401. Middle Patuxent Valley Area
- 511500. Waldorf Upland Plain District
  - 511501. Piscataway Creek Area
  - 511502. Mattawoman Creek Area
  - 511503. Port Tobacco Creek Area
  - 511504. Zekiah-Gilbert Swamps Area
- 511600. Prince Frederick Knobby Upland District
  - 511601. Lower Patuxent Valley Area
  - 511602. Calvert Cliffs Area

512000. Western Shore Lowlands Region
- 512100. Aberdeen Estuaries and Lowlands District
- 512200. Annapolis Estuaries and Lowlands District
- 512300. Patuxent Estuary and Lowlands District
- 512400. St. Jerome's Neck Lowlands District
- 512500. Potomac Estuary and Lowlands District
  - 512501. Foggy Bottom Area
  - 512502. Indian Head Area

513000. Chesapeake Estuary Region

514000. Delmarva Peninsula Region
- 514100. Denton Plain District
  - 514401. Upper Choptank River Valley
- 514200. Salisbury Lowlands District
  - 514201. Upper Pocomoke River Area
- 514300. Princess Anne Lowland District
  - 514301. Lower Pocomoke River Area
  - 514302. Nanticoke River Area
- 514400. St. Michaels Lowland District
- 514500. Crisfield Islands and Marshes District
- 514600. Atlantic Bays and Barriers District
  - 514601. Berlin Scarp Area
  - 514602. Barrier Beaches Area
  - 514603. Coastal Bays and Marshes Area

600000. Atlantic Continental Margin Province *– not included on physiographic map. Subdivision is a possible future project*

Attribute Database
for the 149 Physiographic Subdivisions
in Maryland

James P. Reger and Emery T. Cleaves
Maryland Geological Survey
Baltimore, Maryland
2008

Note:

Due to the nature of the hierarchical classification,
only 117 of the 149 physiographic subdivisions
are individually identified on the map itself.
Refer to the preceding text for further explanation.

ID No.	PROVINCE	SECTION	REGION	DISTRICT	AREA	BOUNDARIES	LITHOLOGIES	GEOLOGIC STRUCTURE	LANDFORM DESCRIPTION	MAX. - MIN. ELEV. = RELIEF (ft.)	TYPICAL LOCAL RELIEF (ft.)	DRAINAGE PATTERN
100000	Appalachian Plateaus Province					Only the eastern boundary occurs in Maryland at the base of the Allegheny Front west of city of Cumberland; extends into W.Va. and Pa.	Paleozoic sandstone, shale, conglomerate, coal and limestone.	Subhorizontal to broad open folds.	Moderately to thoroughly dissected roughly horizontal sedimentary rock; elevations rise from west to east; topography varies with the Section.	3360 - 870 = 2490	Varies. On the order of 300-500 feet.	Dendritic
110000	Appalachian Plateaus Province	Allegheny Mountains Section				Only the eastern boundary occurs in Maryland at the base of the Allegheny Front west of city of Cumberland; extends into W.Va. and Pa.	Paleozoic sandstone, shale, conglomerate, coal and limestone.	Subhorizontal to broad open folds.	Wide ridges separated by broad valleys; plunge direction on broad folds produces topographic basins ("canoe"-shaped valleys).	3360 - 870 = 2490	Varies. On the order of 300-500 feet.	Dendritic
111000	Appalachian Plateaus Province	Allegheny Mountains Section	Chesapeake Gorges Region			Coincides with the Potomac River valley from the break in slope at the edge of the upland surface.	Paleozoic sandstone, shale, conglomerate, coal and limestone.	Subhorizontal to broad open folds.	Generally steep-sided gorge of the Potomac River; in some places parallel to regional geologic structure; in other places transverse to structure.	2800 - 870 = 1930	Varies with Section or Region	Varies with Section or Region.
111100	Appalachian Plateaus Province	Allegheny Mountains Section	Chesapeake Gorges Region	Upper Potomac Gorge District		Coincides with the Potomac River valley.	Paleozoic sandstone, shale, conglomerate, coal and limestone.	Subhorizontal to broad open folds.	Generally steep-sided gorge of the Potomac River; tends to parallel the regional strike of bedrock geologic structure; in its lower reach, transverse to strike.	2800 - 870 = 1930	On the order of 300-800 feet.	Dendritic
112000	Appalachian Plateaus Province	Allegheny Mountains Section	Allegheny High Plateau Region			Only the eastern boundary occurs in Maryland at the base of the Allegheny Front west of city of Cumberland; extends into W.Va. and Pa.	Middle to late Paleozoic sandstone, shale, conglomerate, coal, and limestone.	Low-amplitude, long-wavelength folds.	Erosion of the folds produces both synclinal and anticlinal valleys bounded by homoclinal ridges.	3360 - 1000 = 2360	On the order of 400-500 feet.	Dendritic

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112100	Appalachian Plateaus Province	Allegheny Mountains Section	Allegheny High Plateau Region	Allegheny Front District		West edge is top of escarpment (Dans Mtn-Piney Mtn) in the Pottsville sandstone; east edge is at base of escarpment, coinciding with the contact between the Hampshire Formation (shale) and the Foreknobs Formation (Pound Sandstone).	Sandstone, shale, siltstone, conglomerate, limestone (middle Devonian through lower Pennsylvanian)	Strata gently to steeply dipping to the west or northwest, marking the relatively sharply upturned limb of the	A moderately dissected cuesta-like escarpment possessing a crest of basal Pennsylvanian sandstone; about mid-slope there is a "step" or bench called the Fore Knobs that is underlain by basal Mississippian sandstone.	2900 - 1300 = 1600	Varies. On the order of 300-500 feet.	Parallel; some subdendritic
112200	Appalachian Plateaus Province	Allegheny Mountains Section	Allegheny High Plateau Region	Frostburg District		Crest of Backbone and Big Savage Mountains on west side; break in slope with Upper Potomac Gorge on the east side.	Sandstone, shale, siltstone, and coal of the Monongahela Formation in center of valley (core of syncline), flanked and underlain by largely clastic sedimentary rock of the Conemaugh and Allegheny Formations.	Broad, open syncline; generally low dips.	Moderately dissected upland synclinal valley; underlain by coal beds.	3360 - 1600 = 1760	Varies. On the order of 300-500 feet.	Dendritic
112201	Appalachian Plateaus Province	Allegheny Mountains Section	Allegheny High Plateau Region	Frostburg District	Lower Savage Gorge Area	Upper break in slope between upland and the steeper slopes of the gorge. Upstream boundary at Savage Dam; downstream boundary at the confluence with the Potomac River.	Sandstone, shale, siltstone, and coal of the Pottsville, Allegheny, and Conemaugh Formations.	Homoclinal, on west-dipping flank of the Upper Potomac - Georges Creek syncline.	Steep-sided V-shaped gorge with incised meanders, but little or no flood plain. Gorge is transverse to structural and lithologic strike.	2500 - 1000 = 1500	On the order of 500-800 feet.	Directional trellis

ID No.	PROVINCE	SECTION	REGION	DISTRICT	AREA	BOUNDARIES	LITHOLOGIES	GEOLOGIC STRUCTURE	LANDFORM DESCRIPTION	MAX. - MIN. ELEV. = RELIEF (ft.)	TYPICAL LOCAL RELIEF (ft.)	DRAINAGE PATTERN
112300	Appalachian Plateaus Province	Allegheny Mountains Section	Allegheny High Plateau Region	Avilton District		Crest of Big Savage Mtn and Backbone Mtn on the SE side; crest of Meadow Mtn on the NW. Southern termination is the divide between Crabtree Creek-Savage River drainage to the north and Black Run-Youghiogheny River drainage to the south.	Mainly shales and siltstones of the Greenland Gap Group and the Hampshire Formation.	Broad anticline (Deer Park Anticline). Same as the Oakland District.	Well-dissected anticlinal valley. Topography markedly steeper, more intricately dissected than that of the Oakland District	>2900 - 1000 = >1900	Varies. Mostly on the order of 350-500 feet; locally up to 1000 ft.	Directional trellis
112301	Appalachian Plateaus Province	Allegheny Mountains Section	Allegheny High Plateau Region	Avilton District	Upper Savage Gorge Area	Upper break in slope with the High Plateau; northern (Savage River) boundary at end of flat-bottomed valley; southern (Crabtree Creek) boundary at the upstream end of the watershed. Boundary with Lower Savage Gorge placed at Savage Dam.	Mainly shales and siltstones of the Foreknobs Formation for Savage River; shales of the Hampshire Formation for Crabtree Creek.	East-dipping limb of Deer Park Anticline.	Steep-sided V-shaped gorge with incised meanders, but little or no flood plain. Gorge is parallel to structural and lithologic strike. Includes co-linear Crabtree Creek.	2600 - 1500 = 900	On the order of 300-500 feet.	Directional trellis
112400	Appalachian Plateaus Province	Allegheny Mountains Section	Allegheny High Plateau Region	Oakland District		North: Savage-Youghiogheny divide. West: break in slope near crest of Meadow Mtn (contact between Mauch Chunk and Pottsville Forma-tions). East: mirror image of the western break in slope near crest of Backbone Mtn (Mauch Chunk-Pottsville contact).	Shales and siltstones of the Hampshire Formation in valley; sandstone conglomerate-ate (Pottsville) holds up ridges on either side.	Broad anticline (Deer Park Anticline). Same as the Avilton District.	Moderately dissected anticlinal valley. Topography markedly less rugged with gentler slopes than that of the Avilton and Accident Districts on either side.	3360 - 2465 = 895	Varies. On the order of 250-450 feet.	Weak directional trellis

ID No.	PROVINCE	SECTION	REGION	DISTRICT	AREA	BOUNDARIES	LITHOLOGIES	GEOLOGIC STRUCTURE	LANDFORM DESCRIPTION	MAX. - MIN. ELEV. = RELIEF (ft.)	TYPICAL LOCAL RELIEF (ft.)	DRAINAGE PATTERN
112401	Appalachian Plateaus Province	Allegheny Mountains Section	Allegheny High Plateau Region	Oakland District	White Meadow Run Area	Break in slope at the base of the overlying Mauch Chunk and at the top of the under-lying Purslane Sandstone.	Carbonate (limestones) and shales of the Greenbrier limestone	West limb of the Deer Park Anticline and east limb of Upper Youghiogheny Basin; homoclinal	Long, narrow strike valley floored by the Greenbrier Limestone.	2600 - 2400 = 200	On the order of 20-50 feet	Weak directional trellis
112402	Appalachian Plateaus Province	Allegheny Mountains Section	Allegheny High Plateau Region	Oakland District	Pleasant Valley Area	Eastern and western bound-aries at the break in slope between the valley floor and the foot-slopes of Hoop Pole Ridge on the west side; Little Mountain-Backbone Mtn on the east side.	Shales of the Scherr Formation in the main valley floor; sand-stones and siltstones of the Scherr and Foreknobs Forma-tions forming low hills within the valley.	Deer Park Anticline	Upland valley along the axis of a breached anticline; relatively flat to low, rolling hills within the valley.	2520 - 2380 = 140	On the order of 100 feet or less	Weak directional trellis
112500	Appalachian Plateaus Province	Allegheny Mountains Section	Allegheny High Plateau Region	Grantsville District		West edge: crest of Negro Mountain; east edge: crest of Meadow Mountain; terminates south-ward at Deep Creek Lake.	Sandstone, shale, siltstone, and coal of the Conemaugh Formation in center of valley, flanked largely by clastic sedimentary rock of the Allegheny and Pottsville Formations.	Broad, open syncline (Casselman Basin); generally low dips.	A broad synclinal valley underlain by Allegheny and Conemaugh Formations; markedly less dissected than adjacent Avilton District.	3030 - 2465 = 565	Varies. On the order of 250 feet.	Dendritic
112501	Appalachian Plateaus Province	Allegheny Mountains Section	Allegheny High Plateau Region	Grantsville District	The Glades Area	Contact between Pleistocene lake and peat deposits and the Conemaugh For-mation, coinciding with the 2700-foot elevation contours.	Pleistocene lake deposits and peat overlying Conemaugh strata	Nearly horizontal; part of broad, open syncline.	Poorly drained marshy area, marked as much by the presence of peat as by standing water.	2720 - 2680 = 40	5-20 feet	Deranged; reticulate
112600	Appalachian Plateaus Province	Allegheny Mountains Section	Allegheny High Plateau Region	Accident District		Crest of Negro Mtn on east side; crest of Winding Ridge and Elder Hill on west side.	Flanking ridges capped by sand-stone conglomerate (Pottsville) and valley floored by shales, siltstones, sand-stones (Hampshire and Foreknobs Formations).	Accident anticline	Breached anticline (anticlinal valley), more dissected that Grantsville District or Youghiogheny Highlands.	3060 - 2465 = 595	Varies. On the order of 300-500 feet.	Dendritic

ID No.	PROVINCE	SECTION	REGION	DISTRICT	AREA	BOUNDARIES	LITHOLOGIES	GEOLOGIC STRUCTURE	LANDFORM DESCRIPTION	MAX. - MIN. ELEV. = RELIEF (ft.)	TYPICAL LOCAL RELIEF (ft.)	DRAINAGE PATTERN
112700	Appalachian Plateaus Province	Allegheny Mountains Section	Allegheny High Plateau Region	Youghiogheny Highlands District		Winding Ridge on the northeast side, a series of smaller ridges (Roman Nose Ridge, Mt. Nebo, and unnamed ridges) on the southeast, and by Brushy Knobs on the west side in Preston County, WV.	Shales, siltstones, and sandstones (Mauch Chunk Fm.) and sandstones, shales, coals, and minor limestones (Pottsville, Allegheny, and Conemaugh Formations).	Broad, open Lower Youghiogheny Syncline; generally low dips.	Dissected plateau; virtually all the land surface is in slopes, typically >8 degrees and commonly >12 degrees. District is bisected into two unequal parts by the Youghiogheny River Gorge.	2960 - ~1450 = ~1510	Varies. On the order of 300-500 feet.	Dendritic; parallel in places.
112701	Appalachian Plateaus Province	Allegheny Mountains Section	Allegheny High Plateau Region	Youghiogheny Highlands District	Youghiogheny Gorge Area	Break in slope between the Highlands and the steep-sloped gorge; somewhat arbitrary or approximate in places.	Variable: red shales, siltstones, and sandstones in southern, upstream end; sandstones, coals and shales to the north.	Broad, open syncline; generally low dips.	Steep-sided, asymmetric V-shaped gorge, the east side being higher and steeper than the west side. Occupied by a reservoir down-stream of the town of Friendsville.	~2755 - 1450 = ~1305	Varies. On the order of 300-500 feet.	Sub-dendritic to trellis
112702	Appalachian Plateaus Province	Allegheny Mountains Section	Allegheny High Plateau Region	Youghiogheny Highlands District	Cranesville Swamp Area	Break in slope at the base of the surrounding uplands; or the maximum extent of wetlands.	Underlain primarily by the calcareous Greenbrier Formation.	Nearly horizontal; part of broad, open Briery Mountain Anticline.	A relic of the Ice Age, a sphagnum and boreal forest bog nestled in a highland frost pocket.	2560 - 2545 = 15	15	Deranged; reticular
200000	Ridge and Valley Province					Base of Allegheny Front on west side; base of South Mountain on east side. The Province extends across state boundaries into Pennsylvania, West Virginia, and Virginia.	Sandstones, siltstones, shales, and limestones of Paleozoic age.	Tight to overturned subparallel folds, generally striking northeast; thrust and high-angle reverse faults common.	An "accordion-like" topography com-posed of alternating, subparallel ridges and valleys resulting from differential erosion of various folded and faulted lithologies.	2165 - 275 = 1890	Undefined. Varies greatly from region to region.	Mainly trellis; also dendritic and rectangular; varies somewhat with region or district.

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210000	Ridge and Valley Province	Folded Appalachian Mountains Section				Base of Allegheny Front on west side; eastern boundary at base of foothills (Bear Pond Mtns.) at west edge of Hagerstown Valley.	Sandstones, siltstones, shales, and limestones of Silurian through Mississippian age.	Tight to overturned subparallel folds, generally striking northeast; thrust and high-angle reverse faults common.	Alternating, subparallel strike ridges and strike valleys, generally increase in elevation from east to west; relative spacing and width of ridges and valleys are related to wavelength and amplitude of folds, and to attitudes, thicknesses, and erosional resistance of the sedimentary units.	2165 - 480 = 1685	Highly variable, ranging locally from 300 to 900 feet.	Mainly trellis; some rectangular, some parallel on slopes.
211000	Ridge and Valley Province	Folded Appalachian Mountains Section	Chesapeake Gorges Region			Upper break in slope between upland and the steeper slopes of the river gorge. Upstream boundary at base of Allegheny Front; downstream boundary at contact between clastics of the Bear Pond Mtns and carbonates of the Hagerstown Valley.	Sandstones, siltstones, shales, and limestones of Silurian through Mississippian age.	Generally cuts across folded geologic structure, but in places is parallel to structure.	Varies between a steep-sided gorge and broader, shallower, but still steep-sided, valley with some flood plain development.	1100 - 360 = 740	Ranges from 400-800 feet in the west to 150-300 feet in the east.	(not applicable to a single gorge or valley)
211100	Ridge and Valley Province	Folded Appalachian Mountains Section	Chesapeake Gorges Region	Upper Potomac Gorge District		Base of Allegheny Front on west side; eastern foothills at west edge of Hagerstown Valley.	Sandstones, siltstones, shales, and limestones of Silurian through Mississippian age.	Generally cuts across folded geologic structure, but in places is parallel to structure.	Steep-sided gorge, most slopes >15 degrees, some >20 degrees; cliffs common; limited flood plain; incised meanders; several levels of discontin-uous terraces common. Gorge depth decreases downstream from 400-800 ft. to 150-250 ft.	1100 - 360 = 740	Variable, but decreasing downstream from 400-800 ft. at west end to 150-300 ft. at east end.	(not applicable to a single gorge or valley)

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212000	Ridge and Valley Province	Folded Appalachian Mountains Section	Cumberland Ridges Region			Allegheny Front on the west; break in slope, east side of Warrior Mtn, wrapping around the south end and along the eastern foot of Martin Mtn; generally corresponds to the contact between the Oriskany sandstone and Needmore and Marcellus shales.	Sandstones (Tuscarora and Oriskany) hold up the ridges; shales in valleys; limestones, siltstones on slopes.	Tight to overturned subparallel folds, generally striking northeast; thrust and high-angle reverse faults common.	Ridges seem to dominate over valleys. Well-dissected folded terrane with most of Region in slopes, generally >15 degrees. Most (9 of 11) ridges are anticlinal; 2 are homoclinal. Average ridge height 630 ft. Narrow valleys underlain by shales.	2165 - 800 = 1365	Variable; 300-800 ft.	Directional trellis
213000	Ridge and Valley Province	Folded Appalachian Mountains Section	Town Creek Valley Region			Base of Warrior and Martin Mtns (Oriskany sandstone) on west side; western base of Green Ridge on the east side; roughly corresponding to contact between Foreknobs Formation and the Mid-Devonian shales.	Predominantly shales and siltstones (Needmore, Marcellus, Mahantango, and Brallier Formations), with minor sandstones and limestones.	Anticlines and synclines of generally lower amplitude than those in the adjacent ridges regions.	Well-dissected, rolling to hilly region, but generally lacking high ridges--with most (except Polish Mtn) averaging less than half the height of those in other parts of the Ridge and Valley. Region lies in the rain shadow of the Allegheny Front.	~1785 -700 = ~1085	200-300 ft. except for vicinity of Polish Mtn.	Directional trellis
214000	Ridge and Valley Province	Folded Appalachian Mountains Section	Town Hill Region			Western foot of Green Ridge on west side; eastern foot of Town Hill on east side. Corresponds roughly to outcrop area of the Foreknobs, Hampshire, Rockwell, and Purslane Formations.	Sandstone, shale, siltstone, minor limestone. Purslane and Rockwell sandstone underlie crest of Town Hill, and the sandstones in the Foreknobs Formation underlie Green Ridge; red shales of the Hampshire Formation underlie the intervening valley.	Overall synclinal (Town Hill Syncline), with Town Hill being a synclinal ridge along the fold axis and Green Ridge a homoclinal ridge with east-dipping strata.	Comparatively narrow belt made up of two sandstone ridges with intervening shale valley. Well-dissected with most of land in slope. Slopes generally 15-20 degrees.	~2040 -700 = ~1340	Variable; 300-700 ft.	Directional trellis

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215000	Ridge and Valley Province	Folded Appalachian Mountains Section	Paw Paw Valley Region			Eastern foot of Town Hill on west side; western foot of Sideling Hill on east side. Roughly corresponds to outcrop area of the Brallier, Foreknobs, and Hampshire Formation (Middle to Upper Devonian).	Predominantly shales and siltstones with minor sandstones (Brallier, Foreknobs, and Hampshire Formations).	Anticlinal with small subsidiary synclines and anticlines. Two small ridges are homoclinal; one is anticlinal.	Valley-dominant; well-dissected with no prominent ridges. Three small ridges (Anthony, Sorrell and Big Ridge) average 250 ft in height. Most prominent physiographic feature is the Potomac River, which here exhibits large incised meanders.	~1080 -700 = ~380	200-300	Directional trellis
216000	Ridge and Valley Province	Folded Appalachian Mountains Section	Hancock Ridges Region			Base of Sideling Hill roughly along Sideling Hill Creek on west; base of east side of Cove Ridge on the east.	Sandstone, shale, siltstone, limestone.	Anticlinorium, but locally homoclinal with east dips.	Ridge-dominant; well-dissected with seven ridges of varying height.	1740 - 700 = 1040	400	Directional trellis
217000	Ridge and Valley Province	Folded Appalachian Mountains Section	Licking Creek Valley Region			Valley east of Cove Ridge on the west; break in slope east of Licking Creek at roughly the contact with Oriskany sandstone.	Interbedded shales, siltstones, and sandstones. Hampshire Formation underlies valley of Ditch Run; Brallier Formation underlies valley of Licking Creek.	West half of the Folz Anticlinorium: syncline-anticline-syncline, with fold axes occupied by Ditch Run, Elbow Ridge, and Licking Creek, respectively.	Alternating, strike-aligned, low hills and valleys. Ridge crests are the lowest of the Section, averaging 740 feet elevation and only 150 feet in height. Low ridges capped by sandstones of the Hampshire and the Mahantango Formations.	778 - 530 = 248	100-150	Sub-dendritic to weak directional trellis
218000	Ridge and Valley Province	Folded Appalachian Mountains Section	Bear Pond Mountains Region			Base of sandstone ridges east of Licking Creek on the west to the eastern footslopes of Powell and Fairview Mts. Fault-controlled sharp eastern boundary with the limestone-dominant Great Valley Section (or the Hagerstown Valley).	Interbedded sandstones, limestones, and shales of mainly lower Devonian to Silurian age.	East half of the Folz Anticlinorium; faulted folds; tighter folding than the Regions of the Ridge and Valley to the west. A thrust fault marks the transition between the Folded Appalachians on the west side and the Great Valley on the east side.	Ridge-dominant, differing from other ridge-dominant regions by its discontinuous ridges, plunging folds, reverse faults, and narrow, irregular valleys. Tuscarora Sandstone holds up seven of nine hills or ridges, and Oriskany Sandstone holds up two.	2020 - 480 = 1540	Highly variable ranging locally from <300 to >500 feet.	Sub-dendritic to weak directional trellis

ID No.	PROVINCE	SECTION	REGION	DISTRICT	AREA	BOUNDARIES	LITHOLOGIES	GEOLOGIC STRUCTURE	LANDFORM DESCRIPTION	MAX. - MIN. ELEV. = RELIEF (ft.)	TYPICAL LOCAL RELIEF (ft.)	DRAINAGE PATTERN
218001	Ridge and Valley Province	Folded Appalachian Mountains Section	Bear Pond Mountains Region		Blairs Valley Area	Break in slope with surrounding hills, roughly coinciding with the outcrop area of Martinsburg Shale.	Shale and siltstone (Martinsburg Formation of Ordovician age).	South-plunging anticline	Breached anticline (anticlinal valley) exposing Martinsburg Shale in valley floor and surrounding footslopes, with the steeper (15-20 degrees) upper sideslopes underlain by Martinsburg and Juniata Formations.	800 - 680 = 120	100-120 ft. within the Area, but 300-400 ft., including surrounding ridges.	Directional trellis
220000	Ridge and Valley Province	The Great Valley Section				Base of foothills of Folded Appalachians (Powell and Fairview Mountains) on the west to the Blue Ridge Province (foot of South Mountain and Elk Ridge) on the east.	Mostly limestones and dolomites, some pure, some cherty; shale (Martinsburg Fm) along Conococheague Creek and the western edge of the Great Valley; and sandstone, chiefly of the Waynesboro Formation in the eastern part of the valley.	Massanutten Synclinorium: strongly folded and faulted; mainly thrust faults and high-angle reverse faults; most are strike faults, some are transverse or oblique to strike; overturned beds common.	A broad, gently rolling lowland developed on carbonate rocks of Cambrian and Ordovician age; contains both bare and covered karst, characterized by pinnacle karst, sinkholes, caves and significant sub-surface drainage.	900 - 280 = 620	Up to 100-140 feet in places, but commonly 40-60 feet	Dendritic and karst
22100	Ridge and Valley Province	The Great Valley Section	Chesapeake Gorges Region			Upper break in slope between upland and the steeper slopes of the river gorge.	In the Great Valley, mostly carbonates with subordinate shales and sandstones; mainly of Cambrian-Ordovician age.	Massanutten Synclinorium: strongly folded and faulted. (Same as the Great Valley as a whole.)	The Potomac River crosses relatively non-resistant carbonates and occupies a well-defined, but narrow flood plain flanked by bluffs 80-120 ft. high. Incised meanders and discontinuous terraces 100 ft. above river level are common.	500 - 280 = 220	80-120 feet common throughout the Great Valley.	(not applicable to a single gorge or valley)

ID No.	PROVINCE	SECTION	REGION	DISTRICT	AREA	BOUNDARIES	LITHOLOGIES	GEOLOGIC STRUCTURE	LANDFORM DESCRIPTION	MAX. - MIN. ELEV. = RELIEF (ft.)	TYPICAL LOCAL RELIEF (ft.)	DRAINAGE PATTERN
221100	Ridge and Valley Province	The Great Valley Section	Chesapeake Gorges Region	Upper Potomac Floodplain District		Upper break in slope between upland and the steeper slopes of the river gorge.	Mostly carbonates, with subordinate shales and sandstones.	Overall, the course of the Potomac River crosses the folds of the Massanutten Synclinorium, but it alternates between transverse and parallel to structure.	The Potomac River crosses relatively non-resistant carbonates and occupies a well-defined, but narrow flood plain flanked by bluffs 80 to 120 ft. high. Incised meanders and dis-continuous terraces 100 ft. above river level are common.	500 - 280 = 220	80-120 feet common throughout the Great Valley.	(not applicable to a single gorge or valley)
222000	Ridge and Valley Province	The Great Valley Section	Mercersburg Region			Break in slope at foot of Fairview and Powell Mountains on the west, roughly corresponding to the North Mountain Fault; contact with shale belt at Conococheague Creek on the east.	Colluvium-covered shale in western-most part. Limestones, shaley limestones, calcareous shales, dolomitic limestone, and cherty dolomite over most of Region.	Tightly folded, but generally synclinal on west side, and a faulted syncline-anticline couplet on east side.	Gently sloping colluvium-covered footslopes of Fairview and Powell Mountains merge with the rolling floor of the Hagerstown Valley. Limestone outcrops common throughout.	880 - 480 = 400	Variable; mostly 70-120 ft.	Dendritic and karst
222100	Ridge and Valley Province	The Great Valley Section	Mercersburg Region	Clear Spring Foothills District		Break in slope at foot of Fairview and Powell Mountains on the west, roughly corresponding to the North Mountain Fault; eastern boundary marked by the contact between Conococheague Limestone and limestones of the Beekmantown Group.	Shale (Martinsburg Formation, some Juniata Formation) in a narrow belt along lower slopes of the Bear Pond Mountains to the west; otherwise mostly limestones of the Elbrook and Conococheague Formations.	Fairly tightly folded, but overall an asymmetric syncline, with the town of Clear Spring lying on or near the fold axis.	Transitional between the steep ridges of the Bear Pond Mtns to the west and the limestone valley to the east, as topography grades from fairly gentle slopes covered by colluvial fans and aprons to rolling floor of limestone valley.	880 - 480 = 400	80-100; 200 in places	Dendritic and karst

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222200	Ridge and Valley Province	The Great Valley Section	Mercersburg Region	Spickler Plain District		On west side, the geologic contact between the Conococheague Limestone of the Clear Spring District and the Beekmantown Group of the Spickler Plain; on the east side, the geologic contact with the Martinsburg Formation at Conococheague Creek.	Pure, dolomitic, argillaceous, and cherty limestones and dolomite of the Beekmantown Group, St. Paul Group, and Chambersburg Limestone; some Conococheague Limestone. Contains a narrow outcrop belt of Martinsburg Shale.	Folded, faulted; St. Paul Syncline on west side places a band of Martinsburg Shale in vertical beds, so that shale holds up a ridge at St. Paul Church. East boundary is the Charlton Anticline, in fault contact with the St. Paul Syncline.	Plain of moderate relief, less than in adjacent Districts. Some karst features, but not abundant, except in the belt of Chambersburg Limestone on the east side. Limestone outcrops (pinnacle karst) common to abundant; residuum of variable thickness.	600 - 500 = 100	60-80	Dendritic and karst
223000	Ridge and Valley Province	The Great Valley Section	Martinsburg Dissected Plain Region			Contact with the limestones on either side of the shale belt.	Fissile shale, with interbeds of siltstone, graywacke, and sandstone.	Center of the Massanutten Synclinorium.	Distinctive dissected plain and incised meandering streams developed on shale.	565 - 350 = 215	100	Dendritic to angulate
223100	Ridge and Valley Province	The Great Valley Section	Martinsburg Dissected Plain Region	Conococheague Creek District		West and east sides of the outcrop belt of the Martinsburg Formation, corresponding to the meander belt of Conococheague Creek.	Fissile shale, with inter-beds of siltstone, graywacke, and sandstone.	Conococheague Syncline, roughly the center of the Massanutten Synclinorium.	In Maryland, this District coincides with the Martinsburg Dissected Plain Region, a dissected plain underlain mostly by shale and occupied by the incised meander belt of Conococheague Ck.	565 - 350 = 215	100	Dendritic to angulate
224000	Ridge and Valley Province	The Great Valley Section	Hagerstown Region			Contact with the main outcrop belt of the Martinsburg Formation on the west side; break in slope at base of South Mountain on the east side.	Mainly limestones, argillaceous lime-stones, cherty lime-stones, dolomites, and minor thin, inter-bedded shales of the Tomstown, Waynes-boro, Elbrook, and Conococheague Formations, and the Beekmantown and St. Paul Groups.	Folded with several thrust faults and oblique dip-slip faults; constitutes the eastern third of the Massanutten Synclinorium.	Gently rolling terrain consisting of two Districts: the Charlestown District, a gently rolling karst landscape, and the Waynesboro District, a dissected rolling plain with low NNE-oriented ridges. Extends into Pennsylvania and into Virginia.	900 - 380 = 520	60	Dendritic to angulate

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224100	Ridge and Valley Province	The Great Valley Section	Hagerstown Region	Charles Town District		Contact with the main outcrop belt of the Martinsburg Formation on the west side; contact with the first major outcrop belt of the Elbrook Limestone on the east side.	Mainly limestones, argillaceous limestones, cherty limestones, dolomite, and minor thin, interbedded shales of the Conococheague, Beekmantown, and St. Paul carbonates.	Folded and faulted; overturned beds common; part of the Massanutten Synclinorium.	Broad, open, gently rolling karst plain underlain by limestones and dolomites (Beekmantown and Conococheague limestones). Pinnacle karst and sinkholes are fairly common. Limestone outcrops common to abundant; residuum of variable thickness.	720 - 400 = 320	60	Dendritic to angulate
224200	Ridge and Valley Province	The Great Valley Section	Hagerstown Region	Waynesboro District		The Conococheague-Elbrook contact on the west; the break in slope at the base of South Mountain on the east.	Limestone, dolomite (Tomstown); sandstone, siltstone, shale (Waynesboro); shaly limestone, calcareous shale (Elbrook).	Folded and faulted; overturned beds common; easternmost part of the Massanutten Synclinorium.	A dissected rolling plain with low NNE-oriented ridges that are due to relatively resistant beds within the Elbrook Lime-stone, the Tomstown Formation, and upper part of Waynesboro Formation. Thick colluvial cover adja-cent to South Mtn.	900 - 380 = 520	80-100	Dendritic to angulate
224201	Ridge and Valley Province	The Great Valley Section	Hagerstown Region	Waynesboro District	Keedysville Area	On west: base of low ridges (Toms-town & Waynesboro Fm contact). East: base of South Mtn (Antietam Fm contact). North: arbitrary; where valley narrows greatly and is covered by colluvium. South: arbitrary; foot of hills (Antietam & Weverton Fms).	Thick-bedded to massive limestone and dolomite (Tomstown Formation of Cambrian age).	Asymmetrically folded, showing some overturning to the west; easternmost part of the Massanutten Syncline.	Broad plain between a series of low ridges (Waynesboro District) on the west and the base of South Mountain on the east. Sinkholes and caves fairly common. Eastern side is covered in many places by mountain wash and colluvium from South Mountain.	800 - 380 = 420	100	Subdendritic to angulate

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300000	Blue Ridge Province					Extends from southern Pennsylvania to northern George; in Maryland, western boundary is at foot of western flank of South Mountain-Elk Ridge; eastern boundary is foot of eastern flank of Catoctin Mountain at the Triassic Border Fault.	Variety of meta-igneous and metasedimentary rocks, dominated in Maryland by quartzites and metabasalts.	Overturned, north-plunging South Mountain Anticlinorium, in which South Mtn. and Catoctin Mtn. form the limbs; numerous faults include the Triassic Border Fault on the east side and a transverse fault separating Elk Ridge from South Mtn. of the west.	In Maryland, the Province consists of two prominent ridges separated in the southern half by the rolling to hilly Middletown Valley.	2140 - 200 = 1940	Varies greatly. Central Middletown Valley 100-250 ft.; South Mountain and Catoctin Mountain 700-1000 ft.	Dendritic, with some parallel and angulate.
310000	Blue Ridge Province	Northern Blue Ridge Section				Western boundary is the foot of the west side of South Mountain, with an offset to the west side of Elk Ridge; eastern boundary is the foot of the east side of Catoctin Mountain, which coincides with the Triassic Border Fault.	Ridge-forming quartzites, associ-ated sandstones, siltstones, gray-wackes, and shales (Antietam, Harpers, Weverton and Loudoun Fms) on east and west sides; granitic and gneissic rocks, metarhyolite, and metabasalt in the core.	Large, overturned, north-plunging anticline/ anticlinorium in which South Mountain and Catoctin Mountain form the limbs (South Mountain Anticlinorium).	Consists of two prominent ridges (South and Catoctin Mountains) that merge northeast-ward into a single hilly to mountainous area. In the southern part of the Section in Maryland, a central valley (Middletown Valley) occurs along the fold axis.	2140 - 200 = 1940	Varies greatly. Central Middletown Valley 100-250 ft.; South Mountain and Catoctin Mountain 700-1000 ft.	Dendritic, with some parallel and angulate.
311000	Blue Ridge Province	Northern Blue Ridge Section	Chesapeake Gorges Region			Segment of the Potomac River Gorge from the Section boundary at Elk Ridge about one mile west of the confluence with the Shenandoah River to the eastern boundary at Point of Rocks on Catoctin Mountain.	Quartzite, sandstone, siltstone, graywacke, phyllite, shale, gneiss.	Anticlinorium overturned to the west	Generally a steep-sided gorge with very limited flood plain development.	500 - 200 = 300	100-150	(not applicable to a single gorge or valley)

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311100	Blue Ridge Province	Northern Blue Ridge Section	Chesapeake Gorges Region	Middle Potomac Gorge District		Segment of the Potomac River Gorge from the Section boundary at Elk Ridge about one mile west of the confluence with the Shenandoah River to the eastern boundary at Point of Rocks on Catoctin Mountain.	Quartzite, sandstone, siltstone, graywacke, phyllite, shale, gneiss.	Anticlinorium overturned to the west	Steep-sided gorge in quartzite at Elk Ridge and South Mtn; riffles where Potomac flows over steeply dipping resistant beds; river incised >100 ft with narrow, discontinuous flood plain across granitic Middletown and Pleasant (Rohrersville) Valleys.	500 - 200 = 300	100-150	(not applicable to a single gorge or valley)
312000	Blue Ridge Province	Northern Blue Ridge Section	Catoctin-South Mountain Region			Western boundary at foot of west side of South Mtn, offset to include Elk Ridge; eastern boundary along the Triassic Border Fault near foot of east side of Catoctin Mtn; boundary with Middletown Valley is break in slope at foot of the two ridges.	Quartzite, sandstone, siltstone, graywacke, phyllite, shale.	Large, north-plunging anticline overturned to the west; several major faults.	Two prominent, north-trending ridges (South and Catoctin Mountains) that merge northeast-ward into a single hilly to mountainous area.	2140 - 600 = 1540	700-1000	Dendritic and parallel, some angulate
312001	Blue Ridge Province	Northern Blue Ridge Section	Catoctin-South Mountain Region		Shookstown Bench Area	Breaks in slope at roughly the 400- and 520-foot contours at southern end, and the 520- to 640-foot contours to the north. These are fault traces of en echelon normal faults, where footwalls are on west side of fault trace.	Shale/phyllite, sandstone (mainly Harpers Formation with minor Antietam Formation).	Essentially homoclinal, dipping east, as the easternmost part of the South Mountain Anticlinorium, bounded by two east-dipping en echelon normal faults.	A pronounced bench, or "step," along the eastern foot of Catoctin Mountain from Point of Rocks to Shookstown, west of Frederick. In the vicinity of Shookstown and Braddock Heights, two benches are present.	690 - 390 = 300	80-120	Parallel

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312002	Blue Ridge Province	Northern Blue Ridge Section	Catoctin-South Mountain Region		Harbaugh Valley Area	Break in slope between the valley and surrounding hills; roughly 1080-foot contour in southern end to 820-foot contour in northern.	Mainly the Catoctin metabasalt, with a long narrow body of metarhyolite (similar to that of the Middletown Valley).	Approximate axial position of South Mountain Anticlinorium.	An intermontane valley in the hilly upland approximately along the axis of the Blue Ridge Province.	1080 - 820 = 260	60-160 ft. (local relief greater in north end of valley than in south end)	Subdendritic
313000	Blue Ridge Province	Northern Blue Ridge Section	Middletown Valley Region			Break in slope at the base of South Mtn on the west side and Catoctin Mtn on the east side. Northern boundary transitional with the Catoctin-South Mountain Region; arbitrarily drawn along the divide between south- and north-flowing drainage.	Mainly metarhyolite and gneiss in south-ern part, with increasing metabasalt in the northern part.	Exposed part of the core of the South Mountain Anticlinorium.	A moderately rolling to hilly valley along the axis of the Blue Ridge between South Mtn and Catoctin Mtn. The valley rises in elevation northward from the Potomac River, gradually merging with the South Mtn and Catoctin Mtn highland.	1770 - 300 = 1470	200-300 ft. in the northern part; 120-150 ft. in the southern part.	Parallel in northern part; more dendritic in southern part; some angulate throughout.
313100	Blue Ridge Province	Northern Blue Ridge Section	Middletown Valley Region	Upper Middletown Valley District		Foot of South Mtn on west, Catoctin Mtn on east. Northern boundary arbitrarily drawn on the north-south drainage divide. Southern boundary arbitrarily along a line separating parallel drainage in the north from more dendritic drainage in the south.	Mainly metabasalt, subsidiary metarhyolite (Catoctin Formation).	Core of the South Mountain Anticlinorium.	Generally low, elongate hills aligned north-south impart a parallel drainage pattern.	1770 - 780 = 990	200-300	Parallel; some angulate.

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313200	Blue Ridge Province	Northern Blue Ridge Section	Middletown Valley Region	Lower Middletown Valley District		Foot of South Mtn on west, Catoctin Mtn on east. Northern boundary arbitrarily along a line separating parallel drainage in the north from more dendritic drainage in the south. Southern boundary in Maryland is placed at Middle Potomac Gorge.	Mainly granodiorite and biotite granite gneiss (Precambrian basement).	Core of the South Mountain Anticlinorium.	Moderately rolling valley floor; overall, has a bowl-shaped transverse profile, punctuated by incised valley of Catoctin Creek.	1250 - 300 = 950	120-150	Dendritic; some angulate.
313201	Blue Ridge Province	Northern Blue Ridge Section	Middletown Valley Region	Lower Middletown Valley District	Catoctin Creek Gorge Area	Upper break in slope between floor of Middletown Valley and top of gorge; downstream end at the Potomac River; upstream end arbitrarily where Catoctin Creek is incised into the valley floor to no greater degree than other nearby streams.	Granodiorite and biotite granite gneiss (Precambrian basement). Sand and silt alluvium in flood plain of gorge.	Core of the South Mountain Anticlinorium.	Lower part of Catoctin Creek, entrenched into a steep-sided gorge cut into alluvium and bedrock. Meanders fairly common with local flood plain development, giving rise to alternating cross-sectional asymmetry. Alluvium thickens downstream.	700 - 220 = 480	100-140	(not applicable to a single gorge or valley)
314000	Blue Ridge Province	Northern Blue Ridge Section	Elk Ridge Region			Lower break in slope at the base of the ridges with surrounding valley floors. Much of the boundary coincides with fault traces.	Mainly quartzite (Weverton Quartzite) beneath the crest of Elk Ridge; mainly sandstone (Antietam Formation) underlying the knobby ridgeline of Red Hill. (Rohrersville Valley District described separately.)	Fault-repeated section of South Mountain Anticlinorium. West to east: Red Hill Anticline, Hawk Hill Syncline, Elk Ridge Anticline, Rohrersville Fault, and South Mountain Fault.	A ridge complex of Elk Ridge and Red Hill, plus a small valley (here, named the Rohrersville Valley District) separating Elk Ridge from South Mountain. In Virginia, Elk Ridge becomes the dominant western ridge of the Blue Ridge Province.	1500 - 300 = 1200	500-900 in the ridges on west side of Region; 100-150 in valley on east side of Region.	Dendritic, some parallel

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314100	Blue Ridge Province	Northern Blue Ridge Section	Elk Ridge Region	Rohrersville Valley District		Base of Elk Ridge on the west, coinciding with gneiss-quartzite contact. On the east, boundary is a fault between the Harpers and Weverton Formations at base of South Mtn. Northern boundary is a fault with the Tomstown dolomite.	Primarily gneiss (Grenville basement) and Catoctin metabasalt; some phyllite (Harpers Formation); cross-cutting mafic dikes common.	Overturned anticline, detached from the main part of the South Mountain Anticlinorium by faulting.	A breached anticlinal valley eroded into Precambrian gneiss, which is deeply weathered, and flanked mainly by quartzite ridges on either side.	800 - 300 = 500	150-300, higher in the south where valley floor downcut by Israel Creek.	Dendritic, some parallel
400000	Piedmont Plateau Province					Triassic Border Fault at eastern foot of Catoctin Mountain (Blue Ridge Province) on west side; eastern limit of the Fall Zone Region on the east side.	Limestone, sandstone, shale, limestone, conglomerate, and quartz conglomerate in the Lowland Section; gneiss, schist, phyllite, marble, metagabbro and other metamorphic rocks in the Upland Section.	Polydeformed (several episodes of folding, faulting, and regional metamorphism-ism. Geologic structure, including foliation, cleavage, and jointing, play important roles in weathering and erosion and in landscape development at the regional level and smaller.	Mostly a broadly undulating to rolling topography underlain by metamorphic rocks and whose relief is increased locally by low knobs or ridges and valleys. On the west are lowlands developed either on Mesozoic clastics or early Paleozoic carbonates.	1280 - 0 = 1280	Varies greatly Region by Region.	Variably dendritic or subdendritic; angulate in places. (Rock structure especially influences drainage pattern in low-order tributaries.)
410000	Piedmont Plateau Province	Piedmont Lowland Section				West boundary is base of Catoctin Mtn; east boundary is base of slope rising to crystalline rocks of the Piedmont Upland. North of LeGore the lowland-upland transition occurs at a ridge underlain by quartz conglomerate of the New Oxford Formation.	Limestones and dolomites (early Paleozoic); red sandstone, siltstone, shale, and conglomerate (early Mesozoic).	Two distinct types of structural settings: grabens or half-grabens (structural basins) and over-turned syncline.	A valley consisting of both a limestone valley and parts of two Mesozoic rift basins.	600 - 180 = 420	Varies between districts, but generally 50-75 feet.	Varies among Districts: dendritic to subdendritic in Gettysburg Dist.; parallel to trellis in Culpeper Dist.; dendritic and karst in Frederick Valley.

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411000	Piedmont Plateau Province	Piedmont Lowland Section	Chesapeake Gorges Region			Western upstream boundary near Point of Rocks at eastern foot of Catoctin Mountain; eastern boundary corresponds to the boundary between Piedmont Lowland and Upland Sections.	Alluvium, including sandstone or quartzite cobbles; bedrock mainly Mesozoic sandstones, siltstones, shales, and limestone conglomerate.	Course of the Potomac runs both parallel and transverse to the graben structure of the Culpeper Basin	The Chesapeake Gorges are two major river gorges occupied by the Potomac and Susquehanna Rivers, both originating in the Appalachian Plateaus Province. In the Piedmont Lowland, the Potomac occupies a well-defined flood plain.	260 - 180 = 80	60	(not applicable to a single gorge or valley)
411100	Piedmont Plateau Province	Piedmont Lowland Section	Chesapeake Gorges Region	Middle Potomac Floodplain District		Western upstream boundary near Point of Rocks at eastern foot of Catoctin Mountain; eastern boundary corresponds to the boundary between Piedmont Lowland and Upland Sections.	Alluvium, including sandstone or quartzite cobbles; bedrock mainly Mesozoic sandstones, siltstones, shales, and limestone conglomerate.	Course of the Potomac runs both parallel and transverse to the graben structure of the Culpeper Basin	The Potomac River occupies a narrow flood plain, but has not developed a meandering stream habit. Several cobble-veneered bedrock islands occupy much of the channel.	260 - 180 = 80	60	(not applicable to a single gorge or valley)
412000	Piedmont Plateau Province	Piedmont Lowland Section	Mesozoic Lowland Region			West boundary is base of Catoctin Mtn; east boundary is base of slope rising to crystalline rocks of the Piedmont Upland. North of LeGore the lowland-upland transition occurs at a ridge underlain by quartz conglomerate of the New Oxford Formation.	Terrigenous red shales, siltstones, sandstones, and quartz and limestone conglomerate, much of which is con-cealed by mountain wash from Catoctin Mountain. Diabase dikes and sills form a number of low ridges in the landscape.	A series of half grabens, parts of two of which occur in Maryland; bounded by normal faults on west side, but little or no displacement on east side; bedrock strata dip west or northwest toward the main normal faulting.	Relatively flat to gently rolling lowland; distinctive red soils; diabase dikes form low ridges. Districts correspond to two Triassic rift basins--the Gettysburg Basin, extending into Pennsylvania, and the Culpeper Basin, extending into Virginia.	600 - 250 = 350	<100	Parallel on east slopes of Blue Ridge, joining strike-oriented master stream to appear as trellis.

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412100	Piedmont Plateau Province	Piedmont Lowland Section	Mesozoic Lowland Region	Gettysburg Lowland District		West boundary is base of Catoctin Mtn; east boundary is foot of slope rising to crystalline rocks of the Piedmont Upland. North of LeGore the lowland-upland transition occurs at a ridge underlain by quartz conglomerate of the New Oxford Fm.	Terrigenous red shales, siltstones, and thin sandstones, with a belt of quartz and limestone conglomerate, much of which is concealed by mountain wash from Catoctin Mountain. Diabase dikes and sills form narrow ridges and hills.	A half graben (the Gettysburg Basin) bounded by normal faults on the west side, but little or no vertical displacement on the east side; rock layers generally dip to the west or northwest toward the main normal faulting.	Relatively flat to gently rolling surface; distinctive red soils; diabase dikes form low ridges. The District is the physiographic, structural, and lithologic equivalent of the Culpeper Lowland District. Sinkholes common in limestone conglomerate.	600 - 250 = 350	80-100	Subdendritic
412200	Piedmont Plateau Province	Piedmont Lowland Section	Mesozoic Lowland Region	Culpeper Lowland District		West boundary is Triassic Border Fault near foot of Catoctin Mtn; east boundary is at a base of ridge of metasiltstone and phyllite (Araby Fm); northeast boundary is at base of slope from lowland to the metamorphic rocks of the Piedmont Upland.	Terrigenous red shales, siltstones, and thin sandstones, with a belt of quartz and limestone con-glomerate, much of which is concealed by mountain wash from Catoctin Mtn. Diabase dikes and sills form narrow ridges and hills.	A half graben (the Culpeper Basin) bounded by normal faults on the west side, but little or no vertical displacement on the east side; rock layers generally dip to the west or northwest toward the main normal faulting.	Relatively flat to gently rolling surface; distinctive red soils; diabase dikes form low ridges. The District is the physiographic, structural, and lithologic equivalent of the Gettysburg Lowland District.	460 - 260 = 200	60-80	Parallel on east slopes of Blue Ridge, joining strike-oriented master stream to appear as trellis.
413000	Piedmont Plateau Province	Piedmont Lowland Section	Limestone Lowland Region			Bordered by redbeds of the Mesozoic Lowland on the west, and low-grade metamorphic rocks of the Piedmont Upland on the east. A small section extends to the foot of Catoctin Mtn west of Frederick, separating the Gettysburg and Culpeper Lowlands.	Mainly limestones and dolomites of Late Cambrian - Early Ordovician age (Frederick and Grove Formations).	Overturned syncline	A series of carbonate valleys of low relief in Pennsylvania, Maryland, and Virginia. Only one such valley, the Frederick Valley, is recognized in Maryland's part of the Region.	450 - 240 = 210	40	Dendritic and karst

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413100	Piedmont Plateau Province	Piedmont Lowland Section	Limestone Lowland Region	Frederick Valley District		Bordered by redbeds of the Mesozoic Lowland on the west, and low-grade metamorphic rocks of the Piedmont Upland on the east. A small section extends to the foot of Catoctin Mtn west of Frederick, separating the Gettysburg and Culpeper Lowlands.	Mainly limestones and dolomites of Late Cambrian - Early Ordovician age (Frederick and Grove Formations).	Overturned syncline	A carbonate valley of low relief, punctuated with more than 1,000 sinkholes, but very few limestone caves.	450 - 240 = 210	40	Dendritic and karst
420000	Piedmont Plateau Province	Piedmont Upland Section				Western boundary at base of topographic rise at contact of sedimentary rocks of the Piedmont Lowland and metamorphic rocks of the Piedmont Upland. Eastern boundary at the Fall Line, the easternmost extent of metamorphic rocks.	Metasedimentary and metaigneous rocks, with degree of metamorphism decreasing from east to west. Granites, granodiorites, gneisses, schists, phyllites, marbles, metagabbros, and other metamorphic rocks of Precambrian to early Paleozoic age.	Polydeformed, showing several episodes of folding and faulting. Geo-logic structure, including foliation, cleavage, and jointing, play important roles in weathering and erosion and in landscape development at the regional and smaller level.	A gently rolling terrain of low relief to very hilly topography, distinctive broad-bottomed valleys underlain by marble, and major streams incised into narrow, steep-sided valleys.	1280 - 0 = 1280	Variable, 50-100 to 200-300 ft.	Predominantly dendritic; some structural control in places.
421000	Piedmont Plateau Province	Piedmont Upland Section	Chesapeake Gorges Region			Western boundary at contact between sedimentary rocks of the Piedmont Lowland and metamorphic rocks of the Piedmont Upland.	Schists, phyllites, quartz diorite, various mafic rocks.	River crosses polydeformed metamorphic terrane; foliation, schistosity, etc. dominant over any original bedding.	The Chesapeake Gorges are two major river gorges occupied by the Potomac and Susquehanna Rivers, both originating in the Appalachian Plateaus Province. In the Piedmont Lowland, the Potomac occupies a well-defined flood plain.	350 -<5 = ~350	120-200	(not applicable to a single gorge or valley)

ID No.	PROVINCE	SECTION	REGION	DISTRICT	AREA	BOUNDARIES	LITHOLOGIES	GEOLOGIC STRUCTURE	LANDFORM DESCRIPTION	MAX. - MIN. ELEV. = RELIEF (ft.)	TYPICAL LOCAL RELIEF (ft.)	DRAINAGE PATTERN
421100	Piedmont Plateau Province	Piedmont Upland Section	Chesapeake Gorges Region	Middle Potomac Gorge District		Western upstream boundary at contact between Lower and Upper Piedmont Sections; eastern boundary corresponds to west edge of the Fall Zone.	More phyllitic on west side, more schistose on the east, with schists becoming coarser eastward. Also quartz veins, and other metamorphic rocks.	River crosses polydeformed metamorphic terrane; strongly foliated and many sheered.	The Potomac flows in a steep-sided gorge, with only local flood plain or occasional low terraces reflecting previous erosion and deposition; numerous bedrock islands common, with increasing rapids and falls downstream (Great Falls of the Potomac).	300 - 25 = 275	120-150	(not applicable to a single gorge or valley)
421200	Piedmont Plateau Province	Piedmont Upland Section	Chesapeake Gorges Region	Susquehanna Gorge District		Sharp break in slope of Piedmont Upland on east and west sides of the gorge; extends northwest into Pennsylvania; southern termination at the Fall Line.	Metagabbro, ultramafics, granodiorite, gneiss.	River crosses polydeformed metamorphic terrane; strongly foliated and many sheered.	The Susquehanna crosses the Piedmont Upland in a spectacular gorge marked by rapids, bedrock islands, and very steep (>25 degrees) to vertical valley walls. Conowingo Dam at U.S. 1 forms a large reservoir, which has flooded the upper part of the Gorge.	350 - 20 = 275	250	(not applicable to a single gorge or valley)
422000	Piedmont Plateau Province	Piedmont Upland Section	Harford Plateaus and Gorges Region			Contact with Mesozoic redbeds on the SW and NW; Frederick Valley carbonates on much of the west side; contrasting lithologies of the Wakefield Valley and Ridge Region forms part of the west boundary; eastern boundary at the Fall Zone.	A variety of metamorphic rocks, including schists, phyllites, quartzites, metagraywackes, gneisses, and granitic rocks, metagabbros, ultramafics, and marbles.	Polydeformed, showing several episodes of folding and faulting. Effects of geologic structure, including foliation, cleavage, and jointing seen in subdivisions at District and Area levels.	A gently rolling upland to moderately hilly in areas; distinctive landscape. Districts and Areas reflect contrasting lithologic and/or structural imprint (e.g., broad-bottomed marble valleys, expanses of nearly flat upland, and gneiss domes.)	1280 - 0 = 1280	Variable, 50-100 ft.	Dendritic

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422100	Piedmont Plateau Province	Piedmont Upland Section	Harford Plateaus and Gorges Region	Bel Air Upland District		East boundary is the Fall Zone; on the west, the boundary with the Hampstead Upland marks a distinct change in lithology (mainly schists) and topography (much more rolling to hilly). District ends to the south at Gunpowder Falls Gorge.	Metamorphosed intrusives: meta-gabbro, ultramafics, and gneiss. Corresponds to the Bel Air Belt and the Cecil County Volcanic Complex, as depicted on geologic maps.	Moderately to strongly deformed; all rocks foliated, many sheared. Preservation of original igneous textures and compositions range from very poor to very good.	An upland charac-terized by gently rolling to flat surfaces, except for an area in western Cecil County that is noticeably more dissected and hilly because of its proximity to the Susquehanna River and Octoraro Creek.	480 - 0 = 480	40-150 (less on upland; more in the valleys)	Dendritic with angular imprint in places.
422101	Piedmont Plateau Province	Piedmont Upland Section	Harford Plateaus and Gorges Region	Bel Air Upland District	Lower Deer Creek Gorge Area	Western boundary at the Hampstead Upland District, corresponding to changes in topo-graphy and lithology; eastern boundary at the Susquehanna Gorge District.	Predominantly equigranular mafic and ultramafic rock, with subordinate felsic gneiss and schists.	Moderately to strongly deformed; all rocks foliated, many sheared.	Steep-sided (>20 degrees) gorge; little or no flood plain.	400 - 0 = 400	150-200	(not applicable to a single gorge or valley)
422200	Piedmont Plateau Province	Piedmont Upland Section	Harford Plateaus and Gorges Region	Pimlico Upland District		Surrounded on east and west by schists of the Hampstead Upland District, on the north by the quartzite surrounding the Phoenix Domes Region, and on the southeast by the Fall Zone; terminates to the south at the Patapsco River.	Predominantly equigranular mafic and ultramafic rock, with subordinate felsic gneiss and schists.	Moderately to strongly deformed; all rocks foliated, many sheared. Preservation of original igneous textures and compositions range from very poor to very good.	An upland characterized by a gently rolling to flat surface, quite similar to that of the Bel Air District, except the eastern part of the area is incised by the valleys of Gwynns Falls and Jones Falls.	~525 - ~125 = 400 (due to inclusion of the valley of Jones Falls)	50-200 (less on upland; more in the valleys)	Radial

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422300	Piedmont Plateau Province	Piedmont Upland Section	Harford Plateaus and Gorges Region	Hampstead Upland District		Extends NE-SW along regional strike into Pa. and Va.; northwestern boundary at base of Dug Hill; south-western boundary drawn along a rough dividing line between the schist-dominant Hampstead Upland and the phyllite-dominant Mount Airy Upland.	Coarse-grained quartz schists (Loch Raven Schist) and fine- to medium-grained mafic schists (Piney Run, Pleasant Grove, and Prettyboy Formations). Lesser amounts of metagraywacke, boulder gneiss, metaconglomerate and isolated ultramafic bodies.	Moderately to strongly deformed; all rocks foliated, many sheared. Preservation of original lithologic textures and compositions range from very poor to very good. Faults common; often refolded.	Rolling to hilly uplands interrupted by steep-walled gorges. Differential weathering of adjacent, contrasting lithologies produces distinctive ridges, hills, barrens, and valleys. Streams may have short segments of narrow, steep-sided valleys.	1110 - 190 = 920	100-150	Dendritic with angular imprint in places, especially associated with first- and second-order tributaries
422301	Piedmont Plateau Province	Piedmont Upland Section	Harford Plateaus and Gorges Region	Hampstead Upland District	Upper Deer Creek Gorge Area	Upper break in slope with Hampstead Upland; the gorge extends upstream into Pa.; downstream boundary coincides with the eastern limit of the Hampstead Upland District.	Coarse-grained quartz schists and fine- to medium-grained mafic schists; also quartzites, metagraywackes, boulder gneiss, and metaconglomerates (Glenarm Group).	The upper reaches of Deer Creek cut across regional structure, in which the bedrock is moderately to strongly deformed and metamorphosed; all rocks are foliated, many are sheared.	A narrow, steep-sided gorge; flood plain narrow to absent; side slopes generally >12-15 degrees, often >20 degrees.	760 - 180 = 580	120-200	(not applicable to a single gorge or valley)
422302	Piedmont Plateau Province	Piedmont Upland Section	Harford Plateaus and Gorges Region	Hampstead Upland District	Rocks Ridge Area	Boundary placed at the base of steep slopes around Rocks Ridge.	Schistose quartz pebble metaconglomerate interbedded with micaceous quartzite.	Highly deformed; bedding and bedding schistosity are essentially vertical.	Prominent ridge underlain by the Rocks Metaconglomerate. The Area is separated into two parts by Deer Creek Gorge.	700 - 380 = 320	200+	(Not applicable, as the Area is a single ridge bisected by a water gap. At the District-level, this Area is part of a dendritic pattern.)
422303	Piedmont Plateau Province	Piedmont Upland Section	Harford Plateaus and Gorges Region	Hampstead Upland District	Slate Ridge Area	Break in slope at base of Slate Ridge, coinciding roughly with the 350 to 500 ft. elevation (lower in south, higher in north).	The ridge consists of a core of blue-black slate having a crys-tallinity approaching phyllite; flanked by metaconglomerate.	Occupies the axial position of a syn-cline; subvertical slaty cleavage.	Prominent NE-trending ridge underlain by the Peach Bottom Slate and the Cardiff Metaconglomerate.	700 - 360 = 340	200+	Not applicable; Slate Ridge is essentially an interfluve between dendritic drainages.

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422304	Piedmont Plateau Province	Piedmont Upland Section	Harford Plateaus and Gorges Region	Hampstead Upland District	Hydes Valley Area	The break in slope between the marble valley floor and the surrounding slopes that rise to the upland surface; closely coincides with the 360-foot elevation contour.	Hydes Valley Marble of the Loch Raven Schist: mainly metadolomite and interlayered calcite marble.	Syncline	A marble valley underlain by the Hydes Marble Member of the Loch Raven Schist. Alluvial/colluvial fans border the valley; weathering of the marble has produced a thick dolomite sand residuum, which contains both pinnacles and corestones.	400 - 300 = 100	100	Dendritic
422305	Piedmont Plateau Province	Piedmont Upland Section	Harford Plateaus and Gorges Region	Hampstead Upland District	Upper Gunpowder Falls Gorge Area	Upper break in slope with the Hampstead Uplands; upstream boundary at contact with the Dug Hill District; downstream boundary at contact with the Phoenix Domes Region. A segment of the gorge also occurs between the Phoenix and Texas Domes.	Mainly coarse-grained quartz schists and fine- to medium-grained mafic schists; also metagraywackes and quartzites of the Glenarm Group (formerly known as the Wissahickon Formation).	The Gunpowder Falls Gorge cuts across regional geological structure, in which the bedrock is moderately to strongly deformed and metamorphosed; all rocks are foliated, many are sheared.	For most of its length, Gunpowder Falls has eroded a narrow, steep-walled valley into the underlying bedrock. Occasional rapids and a restricted flood plain are common. Sideslopes usually >12 degrees and may exceed 20 degrees.	800 - 240 = 560	160-320	(not applicable to a single gorge or valley)
422306	Piedmont Plateau Province	Piedmont Upland Section	Harford Plateaus and Gorges Region	Hampstead Upland District	Caves Valley Area	The break in slope between the marble valley floor and the surrounding slopes that rise to the upland surface; closely coincides with the 500-foot elevation contour.	Cockeysville Marble: mainly metadolomite and interlayered calcite marble.	Anticline (the Caves Anticline)	A marble valley surrounded by low hills underlain by Loch Raven Schist. Alluvial/colluvial fans border the valley. Thick dolomite sand residuum. Marble pinnacles and corestones common.	520 - 420 = 100	100	Subdendritic

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422307	Piedmont Plateau Province	Piedmont Upland Section	Harford Plateaus and Gorges Region	Hampstead Upland District	Soldiers Delight Area	Coincides with the contact between serpentinite and the surrounding schists and gneisses.	Serpentinite, a metavolcanic rock made up largely of the mineral serpentine.	Foliation suggests synclinal structure; bounded by thrust fault on east and south sides.	An upland area of generally low relief and underlain by serpentinite; thin, nutrient-poor, droughty soil results in a distinctive "barrens" vegetation.	700 - 440 = 260	50-100	Radial locally; dendritic regionally
422308	Piedmont Plateau Province	Piedmont Upland Section	Harford Plateaus and Gorges Region	Hampstead Upland District	Upper Patapsco River Gorge Area	Upper break in slope with Hampstead Upland; West Branch becomes gorge-like at the boundary with Dug Hill District; South Branch becomes gorge-like at west edge of Glenwood Upland District; downstream boundary placed at contact with the Fall Zone.	Mainly coarse-grained quartz schists and fine- to medium-grained mafic schists; also quartzites and metagraywackes (Glenarm Group).	The upper reaches of the Patapsco River cut across regional structure, in which the bedrock is moderately to strongly deformed and metamorphosed; all rocks are foliated, many are sheared.	Relatively narrow, steep-sided gorge of the Patapsco River upstream of the Fall Zone, including the West and South Branches; side-slopes usually >12 degrees and in places >20 degrees. Rapids widespread throughout; flood plain narrow to absent.	860 - 190 = 670	200-300	(not applicable to a single gorge or valley)
422309	Piedmont Plateau Province	Piedmont Upland Section	Harford Plateaus and Gorges Region	Hampstead Upland District	Clarksville Marble Valleys Area	Lower break in slope roughly coinciding with the contact between the marble underlying these valleys and the schists, quartzites, and gneisses in the surrounding associated gneiss domes and the Hampstead Upland District.	Cockeysville Marble: mainly metadolomite and interlayered calc-silicate rocks (calc-schist).	Generally flanking or rimming gneiss domes (Woodstock, Mayfield, and Clarksville Domes), but faulted out in places.	Several small marble valleys around the west and south sides of the Woodstock, Mayfield, and Clarksville Gneiss Domes; these valleys are surrounded by gentle slopes and rolling terrain that blend imperceptibly with the rest of the Hampstead Upland.	420 - 350 = 70	70	Dendritic

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422310	Piedmont Plateau Province	Piedmont Upland Section	Harford Plateaus and Gorges Region	Hampstead Upland District	Hunting Hill Area	Coincides with the contact between serpentinite and other ultramafic rocks with the surrounding country rock.	Ultramafic, most commonly serpen-tinite derived from the metamorphism of dunite; also rodingite dikes.	An igneous pluton, subsequently metamorphosed and further intruded by dikes.	The largest of several mafic and ultramafic bodies in the southern part of the Hampstead Upland; the Area stands out because it is less dissected and has broader, gentler slopes than the surrounding upland.	500 - 260 = 240	60-80	An interfluve area within a larger dendritic pattern.
422400	Piedmont Plateau Province	Piedmont Upland Section	Harford Plateaus and Gorges Region	Mt. Airy Upland District		Boundary with Hampstead Upland on NE is Dug Hill, on SE by Gillis Falls and Great Seneca Creek; on west, contact with Frederick Valley; on south, the Potomac River; on north, contact with Gettysburg Lowland or Wakefield Valley and Ridge.	Phyllite and silty to sandy phyllite, both with thin layers and lenses of quartzite and very fine-grained schist (Urbana Formation, Ijamsville Formation, Marburg Schist, and some Prettyboy Schist). Regional lithologic grain strikes NNE to NE.	Polydeformed; all rocks foliated, some sheared. Prominent jointing strikes east-west. Major stream segments are parallel to subparallel to both the jointing and the lithologic grain.	Rolling upland; herringbone texture due to interaction of thin siltstones and quartzites with stream reaches controlled by joints oblique to bedrock strike; streams often incised (e.g., Bennett, Little Bennett, Bush, Linganore, and Israel Creeks).	~1280 - 300 = 980	100-150	Dendritic - subdendritic
422401	Piedmont Plateau Province	Piedmont Upland Section	Harford Plateaus and Gorges Region	Mt. Airy Upland District	Sugarloaf Mountain Area	Break in slope between Sugarloaf Mountain and the surrounding terrain, corresponding to the contact between the quartzite and the phyllite.	Thick, hard, ledge-making quartzites in upper and lower parts of the Sugarloaf Mountain Quartzite, separated by interbedded softer sericitic quartzite and slaty beds.	Anticline is currently the prevailing interpretation. (Interpreted many years ago to be a syncline, overturned to the NW.)	A prominent, isolated hill (a monadnock).	~1280 - 300 = 980	700-800	Radial

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422402	Piedmont Plateau Province	Piedmont Upland Section	Harford Plateaus and Gorges Region	Mt. Airy Upland District	Lilypons Area	Break in slope at the base of ridges: on the east side, roughly coincides with the Martic Line (thrust fault); on west side, roughly coincides with contact between the Araby Formation (in the ridges) and the Frederick Limestone (Frederick Valley).	Sandstone and quartzitic siltstone (Araby Fm.) in ridges; limestone (Frederick Fm.) in medial valley.	Anticlines and synclines asymmetric to the west.	NNE-trending strike ridges made up of relatively resistant rock and valley of relatively non-resistant rock along the southwest side of the Mt. Airy Upland. Compare with Laurel Hill Area.	525 - 325 = 200	100-150	Angulate (some streams cut across ridge, and others flow parallel to ridge).
422403	Piedmont Plateau Province	Piedmont Upland Section	Harford Plateaus and Gorges Region	Mt. Airy Upland District	Laurel Hill Area	Break in slope at western and eastern bases of the pair of ridges: on east, roughly follows the Martic Line (thrust fault); on west, roughly coincides with contact between the Araby (in ridges) with the Frederick Limestone (Frederick Valley).	Quartzitic siltstone and shale (Araby Fm.); phyllitic slate (Araby) and limestone (Frederick Limestone).	Poly-deformed, mainly anticlines and synclines asymmetric to the west; rocks strongly foliated, but less deformed than crystalline rocks in the eastern Piedmont.	A pair of NNE-trending ridges (relatively resistant rock) along the northwest side of the Mt. Airy Upland that are separated by a valley (relatively non-resistant rock. Compare with Lilypons Area.	~530 - 400 = ~130	~130	Angulate (some streams cut across ridge, and others flow parallel to ridge).
422500	Piedmont Plateau Province	Piedmont Upland Section	Harford Plateaus and Gorges Region	Glenwood Upland District		Boundary closely follows the contact between the boulder gneiss of the Glenwood District and the surrounding schists of the Hampstead Upland District.	Fine- to medium-grained gneiss, deceptively granite-like in appearance; contains cobble to granule-size clasts and slabs of schist, metagraywacke, micaceous quartzite, fine-grained gneiss, and vein quartz.	Bedrock cleavage is roughly vertical. The Patapsco River flows transverse to regional structure and lithology.	A rolling upland of low relief underlain by a felsic gneiss (Sykesville Fm.). Corestones and pinnacles common in the saprolite, and corestones litter many fields. The degree of dissection is significantly less than in the adjacent District.	580 - 295 = 285	100	Dendritic

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422501	Piedmont Plateau Province	Piedmont Upland Section	Harford Plateaus and Gorges Region	Glenwood Upland District	Upper Patapsco River Gorge Area	Upper break in slope with adjacent Glenwood Upland District; upstream and downstream boundaries coincide with those of the Glenwood Upland; upstream the gorge-like nature of the valley ends at the western limit of the Glenwood Upland District.	Fine- to medium-grained gneiss, deceptively granite-like in appearance; contains cobble to granule-size clasts and slabs of schist, metagraywacke, micaceous quartzite, fine-grained gneiss, and vein quartz.	The Patapsco River flows transverse to regional structure and lithology.	A relatively narrow, steep-sided gorge that marks the beginning of the gorge-like character of the valley of the South Branch Patapsco River; side slopes are commonly >12 degrees and in places >20 degrees; flood plain is narrow to non-existent.	540 - 300 = 240	200	(not applicable to a single gorge or valley)
423000	Piedmont Plateau Province	Piedmont Upland Section	Wakefield Valley & Ridge Region			Mainly lithologic and structural, coinciding with contact between package of metabasalt, phyllite, and marble with other lithologies of surrounding Regions and Districts.	Metarhyolite (Libertytown), massive to schistose or phyllitic metabasalt (Sams Creek), phyllitic quartzites, and narrow bands of marble (Wakefield).	Polydeformed: folded, refolded, and faulted.	A topographically and structurally complex terrane underlain by polydeformed metarhyolite, phyllitic metabasalt and quartzite, and bands of marble; subdivided into three Districts based on differing lithologic and structural imprints on topography.	1035 - 390 = 645	100	Dendritic to subdendritic; some angulate
423100	Piedmont Plateau Province	Piedmont Upland Section	Wakefield Valley & Ridge Region	Dug Hill Ridge District		On the east, the break in slope between the parallel ridges of the Dug Hill Ridge District and the schists of the Hampstead Upland District; on the west, phyllites of the Silver Run Region.	Phyllite, phyllitic metabasalt, quartzite layers and phyllitic quartzite, calcareous phyllite, and marble lenses of the Sams Creek and Marburg Formations.	Syncline	Characterized by a series of northeast-trending ridges and valleys, the most prominent being Dug Hill Ridge. Strath terraces occur along the northwestern side from Bachman Mills to the Maryland-Pennsylvania border.	1035 - 660 = 375	100-250	Angulate (some streams cut across ridge, and others flow parallel to ridge).

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423200	Piedmont Plateau Province	Piedmont Upland Section	Wakefield Valley & Ridge Region	New Windsor Lowland District		Coincides with contact between package of metabasalt, phyllite, and marble with other lithologies of surrounding Regions and Districts.	Marble units are intercalated with metabasalt and phyllite lithologies, which upon weathering have resulted in distinctive curvilinear and linear valleys and ridges.	Polydeformed; tightly folded; thrust faulted in places. In the vicinity of Tyrone and Mayberry (NW sector of District), topographic linearity results from fault blocks of quartz conglomerate and shale.	A series of curvilinear, broad-bottomed marble valleys, of which Priestland and Wakefield Valleys are the largest. Sinkholes common in marble valleys.	770 - 525 = 245	50-100	Subdendritic to angulate
423300	Piedmont Plateau Province	Piedmont Upland Section	Wakefield Valley & Ridge Region	Unionville Upland District		East boundary with Mt. Airy Upland District closely coincides with Hyattstown Fault; rest of boundary encloses a package of metabasalt, phyllite, schist, and marble.	Phyllites, phyllitic metabasalt, phyllitic quartzite, and thin beds and lenses of marble.	Polydeformed; tightly folded; thrust faulted in places; part of the Linganore Nappe. but in a more convoluted, less continuous exposures than in the New Windsor Lowland District.	Lithologic grain and weathering impart a NE linearity of subdued upland ridges. Marble layers are thin, and their weathering does not produce the distinctive marble valleys that occur in the New Windsor Lowland and Timonium Valley Districts.	660 - 390 = 270	100	Dendritic
424000	Piedmont Plateau Province	Piedmont Upland Section	Silver Run Region			Mesozoic red beds on west; metabasalt and marble on the east; arbitrary southern boundary along a line separating phyllitic rocks to the north from mixed phyllitic rocks and limestones to the south (exception: Silver Run Valley Area.	Quartzite, conglomerate, phyllite, schist (Marburg and Urbana Formations); limestone in Silver Run Valley Area.	Polydeformed with a number of faults oriented along regional strike. Foliation generally striking northeast, with a major set of cross joints striking northwest.	Rolling upland NW of Silver Run; dissected upland S and E of Silver Run. Quartzite and conglomerate beds in phyllitic rocks underlie NE-trending ridges; stream incision along NW-trending joints. Parts of Big Pipe Creek and Deep Run have cut gorges.	1120 - 460 = 660	100-200; 250 ft. in places	Dendritic

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424001	Piedmont Plateau Province	Piedmont Upland Section	Silver Run Region		Silver Run Valley Area	Break in slope between strath terrace and upland surface of the Silver Run Region, roughly coincides with the 590- to 600-foot elevation contour on both sides of the valley.	Mainly limestone (Silver Run Limestone)	Polydeformed. The valley of Silver Run is parallel to subparallel to both the dominant jointing and the litho-logic grain (foliation). Two parallel faults also bound much of the valley on each side, suggesting fault control over valley position.	A broad, open valley; strath terraces on NW side, similar to valleys of the Timonium Valley District. Chemical weathering of limestone results in the distinctive valley form.	650 - 460 = 190	100-190	Subdendritic
425000	Piedmont Plateau Province	Piedmont Upland Section	Phoenix Domes Region			Topographic break that coincides with a lithologic contact between the schists of the Hampstead Upland and either the marble, the quartzite, or the gneiss of the Phoenix Domes Region.	Baltimore Gneiss, Setters Formation (quartzite, schist), Cockeysville Marble, and minor Loch Raven Schist, each occupying its own topographic and physiographic position.	Baltimore-Washington Anticlinorium is the regional structure, with the various gneiss domes aligned on one or the other secondary anticlinal axes.	Four gneiss domes (Phoenix, Texas, Chattolanee, and Towson Domes) comprise gently rolling uplands underlain by Baltimore Gneiss, surrounded and separated by broad marble valleys; a steep slope (Setters Formation) separates upland from lowland.	620 - 180 = 440	Variable, 50-100 (less on uplands, more in valleys)	Dendritic, subdendritic, and angulate
425100	Piedmont Plateau Province	Piedmont Upland Section	Phoenix Domes Region	Chattolanee Upland District		Topographic break that coincides with a lithologic contact between the schists of the Hampstead Upland and either the marble, the quartzite, or the gneiss of the Phoenix Domes Region.	Gneiss makes up the bulk of these uplands; surrounded by a steeply dipping quartzite and schist (Baltimore Gneiss and Setters Formation, respectively).	Anticlines. Phoenix Dome is associated with one; Texas, Towson, and Chattolanee Domes lie along the axis of another -- all part of the Baltimore-Washington Anticlinorium.	Four interconnected, gently rolling to subdued hilly dome-like uplands underlain mainly by Baltimore Gneiss, each more or less surrounded by steep (>15 degrees) slopes typically underlain by the Setters Formation (quartzite, schist).	620 - 180 = 440	50-150	Subdendritic to angulate

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425101	Piedmont Plateau Province	Piedmont Upland Section	Phoenix Domes Region	Chattolanee Upland District	Western Run Area	Break in slope between the marble valleys and the surrounding gneiss of the Phoenix Dome.	Loch Raven Schist (basal "Wissahickon") in central ridge; Cockeysville Marble in surrounding valleys	Synclinal flexure within an anticlinal dome.	Located in the Phoenix Dome, an outlier of Loch Raven Schist rests on Cockeysville Marble, creating a ridge surrounded by a marble valley. Along the ridge, relief ranges from 100 to 200 feet.	610 - 180 = 430	50-150	Subdendritic to angulate
425102	Piedmont Plateau Province	Piedmont Upland Section	Phoenix Domes Region	Chattolanee Upland District	Upper Gunpowder Falls Gorge Area	Break in slope at the top of the gorge; upstream and down-stream boundaries coincide with the gneiss and/or quartzite of the three gneiss domes.	Mainly gneiss, with subordinate quartzite and schist.	Anticlinal (secondary fold within Baltimore-Washington Anticlinorium).	A steep-walled narrow gorge in three unequal segments: the major one where the Gunpowder Falls crosses the Phoenix Dome and two much shorter segments where the river crosses the north ends of the Texas and the Towson Domes.	550 - 250 = 300	250 more or less	(not applicable to a single gorge or valley)
425200	Piedmont Plateau Province	Piedmont Upland Section	Phoenix Domes Region	Timonium Valley District		Breaks in slope with the surrounding quartzite and/or gneiss of the gneiss domes; boundary generally coincides with the contact between the Cockeysville Marble and the Loch Raven Schist (or the Baltimore Gneiss, where the Loch Raven is absent).	Marble (Cockeysville Marble).	Uncertain; variable. In general, steeply dipping to nearly vertical limbs between anticlinal axes of the gneiss domes and the synclines associated with the outlying Loch Raven Schist of the Hampstead Upland.	A broad flat-bottomed valley underlain by Cockeysville Marble. Where the marble outcrop becomes narrow, the valley disappears. Chemi-cal weathering of the marble produces a distinctive dolomite sand and numerous pinnacles and residual boulders.	560 - 160 = 400	60-100	Dendritic to subdendritic; some karst

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426000	Piedmont Plateau Province	Piedmont Upland Section	Fall Zone Region			Eastern boundary: a line connecting the SE limits of crystalline rocks; minor inliers of crystalline rocks are excluded. Western boundary: a line connecting the NW limits of pre-Holocene sediments, but minor outliers of sediments are excluded.	Mixed metamorphics, with metagabbro and ultramafics dominant NE of Baltimore; metagabbro and granitic rocks more common SW of Baltimore; unconsolidated (mainly Cretaceous) sands, gravels, silts and clays unconformably overlie crystalline bedrock.	SE-dipping unconformity between crystalline bedrock and overlying, SE-thickening wedge of Coastal Plain sediments. Bedrock foliation itself is synclinal (Perry Hall Syncline) NE of Baltimore; seems to be more homoclinal (NW dip) SW of Baltimore.	Transition between crystalline Piedmont and unconsolidated Coastal Plain; many hilltops are capped by Cretaceous gravels and sediments that thicken to SE; rivers flow across the Region in steep-walled valleys incised into crystalline rock.	520 - 80 = 440	60-120	Dendritic
426100	Piedmont Plateau Province	Piedmont Upland Section	Fall Zone Region	Perry Hall Upland District		Eastern boundary: a line connecting the SE limits of crystalline rocks; minor inliers of crystalline rocks are excluded. Western boundary: a line connecting the NW limits of pre-Holocene sediments, but minor outliers of sediments are excluded.	Mixed metamorphics, with metagabbro and ultramafics dominant NE of Baltimore; metagabbro and granitic rocks more common SW of Baltimore; unconsolidated (mainly Cretaceous) sands, gravels, silts and clays unconformably overlie crystalline bedrock.	SE-dipping unconformity between crystalline bedrock and overlying, SE-thickening wedge of Coastal Plain sediments. Bedrock foliation itself is synclinal (Perry Hall Syncline) NE of Baltimore; seems to be more homoclinal (NW dip) SW of Baltimore.	Transition between crystalline Piedmont and unconsolidated Coastal Plain; many hilltops are capped by Cretaceous gravels and sediments that thicken to SE; rivers flow across the Region in steep-walled valleys incised into crystalline rock.	520 - 80 = 440	60-120	Dendritic
426101	Piedmont Plateau Province	Piedmont Upland Section	Fall Zone Region	Perry Hall Upland District	Gunpowder Falls Gorge Area	Upstream and downstream ends coincide with the limits of the Fall Zone Region (or Perry Hall Upland District).	Perry Hall Gneiss and Bradshaw Layered Amphibolite; Cretaceous sands of the Patuxent Formation increase in downstream direction.	The key structure is the unconformity between unconsolidated sediments of the Coastal Plain and crystalline bedrock of the Piedmont; underlying crystalline rock is synclinal.	The Gunpowder Falls is incised into bedrock in a steep-sided valley; sideslopes commonly >12 degrees and in places >20 degrees; boulder-strewn channel; the flood plain, where present, is narrow.	300 - 20 = 280	120-160	Dendritic

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426102	Piedmont Plateau Province	Piedmont Upland Section	Fall Zone Region	Perry Hall Upland District	Patapsco River Gorge Area	Upstream and downstream ends coincide with the limits of the Fall Zone Region (or Perry Hall Upland District).	Mainly mafic rocks of the Baltimore Gabbro Complex, with lesser amounts of quartz diorite and other granitic rocks. Some Coastal Plain sands and clays in downstream reaches.	The key structure is the unconformity between unconsolidated sediments of the Coastal Plain and crystalline bedrock of the Piedmont; underlying crystalline rock is homoclinal, with NW dip to foliation.	The Patapsco River is incised into bedrock in a steep-sided valley; sideslopes commonly >12 degrees and in places >20 degrees; boulder-strewn channel; the flood plain, where present, is narrow; rapids are common.	300 - 20 = 280	160-200	(not applicable to a single gorge or valley)
500000	Atlantic Coastal Plain Province					West boundary is the eastern edge of the Fall Zone where easternmost contact with crystalline bedrock occurs; east boundary is sea level--i.e., shorelines of the major estuaries and the Atlantic.	Mostly unconsolidated sand, gravel, silt, and clay of both terrigenous and marine origin. Organic-rich in places, including lignitized wood; iron- and silica-cemented in places.	An eastward-thickening clastic wedge of gently southeast-dipping sediments overlying crystalline basement rocks. Flexures and faults occur in the sediments.	A seaward sloping plain extending from Cape Cod to the southern tip of Florida. In Maryland, consists of a fairly flat to moderately rolling upland and an even flatter lowland.	365 - 0 = 365	Highly variable; <5 to >100	Mostly dendritic
510000	Atlantic Coastal Plain Province	Embayed Section				The Coastal Plain Province in Maryland is part of the Embayed Section. The Embayed Section extends from Cape Cod, MA south to Pamlico Sound and Cape Hatteras, NC; and from the Atlantic shoreline inland to the Fall Zone.	Mostly unconsolidated sand, gravel, silt, and clay of both terrigenous and marine origin. Organic-rich in places, including lignitized wood; iron- and silica-cemented in places.	An eastward-thickening clastic wedge of gently southeast-dipping sediments overlying crystalline basement rocks. Flexures and faults occur in the sediments.	Characterized by estuaries and embayments attributed to the drowning of river mouths and formation of barrier islands associated with post-glacial sea-level rise. Terrain is fairly flat to moderately rolling; upland bounded by flat lowlands.	365 - 0 = 365	Highly variable; <5 to >100	Mostly dendritic

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511000	Atlantic Coastal Plain Province	Embayed Section	Western Shore Uplands Region			The Fall Zone marks the inland boundary. Toward the Chesapeake Bay and Potomac River, the boundary is the base of the usually prominent slope transition to the Western Shore Lowlands (roughly at an elevation of 40 feet).	Mostly unconsolidated sand, gravel, silt, and clay of both terrigenous and marine origin. Organic-rich in places, including lignitized wood; iron- and silica-cemented in places.	An eastward-thickening clastic wedge of gently southeast-dipping sediments overlying crystalline basement rocks. Flexures and faults occur in the sediments.	A flat to rolling upland surface underlain by Cretaceous to Pliocene sediments. Markedly higher elevations and greater relief than the Eastern Shore. Fluvial and estuarine terraces flank the major drainages, most notably the Patuxent River.	365 - 0 = 365	Variable, 40-100	Dendritic
511100	Atlantic Coastal Plain Province	Embayed Section	Western Shore Uplands Region	Elk Neck Peninsula District		Bounded on the west by the Northeast River, on the east mostly by the Elk River; and on the north by the Fall Zone. From the head of the Elk River at Elkton to the Delaware State Line, the boundary follows the Cretaceous-Tertiary boundary.	Mostly Potomac Group (Cretaceous) quartzose sand, sandy gravel, silt, and clay, locally micaceous.	Essentially flat-lying to gently southeast-dipping sedimentary beds.	With elevations exceeding 200 feet, the peninsula is a prominent feature dividing the drowned mouths of the Northeast and Elk Rivers. Cliffs with multiple slumps and landslides characterize several miles along the NW shoreline above Turkey Point.	285 - 0 = 285	100-200	Dendritic and parallel (Spine of peninsula is a sharp drainage divide between Chesapeake Bay and Elk River.)
511101	Atlantic Coastal Plain Province	Embayed Section	Western Shore Uplands Region	Elk Neck Peninsula District	Grays Hill Area	Base of the slopes around Grays Hill coincides with the contact between metagabbro and Coastal Plain sediments; sits on boundary between Elk Neck Peninsula and the Denton Plain Districts, arbitrarily included with Elk Neck Peninsula District.	Metagabbro and serpentinite (relationship to the Baltimore Metagabbro Complex not known).	Undetermined	An erosional inlier of the Piedmont, surrounded by Coastal Plain sediments; Grays Hills is one of three such hills to protrude through the sediment cover near Elkton (also see nearby Iron Hill and Chestnut Hill in Delaware).	268 - ~105 = ~165	150	Radial

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511200	Atlantic Coastal Plain Province	Embayed Section	Western Shore Uplands Region	Middle River Lowland District		Extends northeast to the vicinity of the Bush River and southwest to Baltimore Harbor (Middle Branch Patapsco River). Abuts the Fall Zone on the northwest side and the Aberdeen Lowland District at about the 40- to 50-foot elevation on the southeast.	Mainly quartzitic sands, gravels, silts, and clays, often micaceous, of the Potomac Group (Cretaceous).	Essentially flat-lying to gently southeast-dipping sedimentary beds.	A narrow (1-5 miles), gently rolling to nearly flat transition between the Fall Zone Region and the Aberdeen Lowlands District. The District is segmented by the drowned mouths and associated estuarine deposits of the Gunpowder, Bird, and Back.	40 - 0 = 40	10-20	Dendritic
511201	Atlantic Coastal Plain Province	Embayed Section	Western Shore Uplands Region	Middle River Lowland District	Lower Gunpowder River Area	Upper break in slope with the surrounding Middle River Lowland District.	Mainly quartzitic sands, gravels, silts, and clays, often micaceous (Potomac Group).	Essentially flat-lying sedimentary beds, cross-bedded in places.	Between the Fall Zone and the Chesapeake Bay, the Gunpowder River flows in a broad, largely drowned valley of low relief.	40 - 0 = 40	10-20	Dendritic, but flooded mouth (estuary); also artificially altered.
511300	Atlantic Coastal Plain Province	Embayed Section	Western Shore Uplands Region	Glen Burnie Rolling Upland District		Patapsco R. on the north; Fall Zone on the west; and just shy of the Potomac R. on the south. A topographically subtle eastern boundary follows the contact between the Potomac Group sediments of this District and the younger sediments of the Crownsville District.	Mainly quartzitic sands, gravels, silts, and clays, often micaceous (Potomac Group).	Essentially flat-lying to gently southeast-dipping sedimentary beds.	An undulating upland with slopes typically <8 degrees, transitional between the Waldorf Upland Plain and the Prince Frederick Knobby Upland.	365 - 0 = 365	60-100	Dendritic
511301	Atlantic Coastal Plain Province	Embayed Section	Western Shore Uplands Region	Glen Burnie Rolling Upland District	Lower Patapsco River Area	Upper break in slope with the surrounding Glen Burnie Rolling Upland District.	Quaternary alluvium consisting mainly of quartzitic sands, gravels, silts, and clays.	Essentially flat-lying sedimentary beds, cross-bedded in places.	Between the Fall Zone and the Chesapeake Bay, the Patapsco River flows in a broad, largely drowned valley of low relief.	150 - 0 = 150	40-60	Dendritic; altered greatly by mining sand and gravel.

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511302	Atlantic Coastal Plain Province	Embayed Section	Western Shore Uplands Region	Glen Burnie Rolling Upland District	Upper Patuxent Valley Area	This Area was terminated upstream at the Fall Zone. Downstream termination arbitrarily picked at boundary between Glen Burnie Rolling Upland and Crownsville Upland.	Quaternary alluvium consisting mainly of quartzitic sands, gravels, silts, and clays.	Essentially flat-lying to gently southeast dipping sedimentary beds, cross-bedded in places.	In this Area, the Patuxent on the south and the Little Patuxent on the north flow in well-defined flood plains and exhibit numerous and convoluted meanders. (Note: similar to the Middle Patuxent Valley Area, Crownsville Upland District.)	160 - 60 = 100	10-40	Mostly reticulate
511303	Atlantic Coastal Plain Province	Embayed Section	Western Shore Uplands Region	Glen Burnie Rolling Upland District	Anacostia Valley Area	From the Potomac River upstream to an arbitrary termination at about the 100-foot elevation at Beltsville. In the District of Columbia, the western boundary is the contact with fluvial terraces of the Foggy Bottom Area.	Post-Potomac Group quartzitic sands, gravels, silts, and clays, often micaceous.	Essentially flat-lying to gently southeast-dipping sedimentary beds.	A pronounced valley cut into the upland surface of Southern Maryland; includes Quaternary alluvium and Tertiary terraces adjacent to the main channel.	100 - ~5 = <100	20-40 feet within the valley as delineated; often >100 ft. relief relative to the proximate Glen Burnie Upland.	Dendritic
511400	Atlantic Coastal Plain Province	Embayed Section	Western Shore Uplands Region	Crownsville Upland District		On west and north, boundary follows the contact between Potomac Group sediments of the Glen Burnie Rolling Upland and younger sediments of the Crownsville Upland; on east, follows base of scarp at the Annapolis Lowlands and Estuaries District.	Argillaceous, micaceous, glauconitic fine-grained sands and silts (Monmouth, Matawan, Magothy, Nanjemoy, Aquia, and Brightseat Formations).	Essentially flat-lying to gently southeast-dipping sedimentary beds.	An undulating upland, fairly similar in appearance to, but somewhat more dissected than the Glen Burnie Rolling Upland District.	~200 - 0 = ~200	60-100	Dendritic

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511401	Atlantic Coastal Plain Province	Embayed Section	Western Shore Uplands Region	Crownsville Upland District	Middle Patuxent Valley Area	Extends to edge of the Crownsville Upland on northern (upstream) end; southern boundary (downstream) drawn where the Patuxent River encounters sediments of the Chesapeake Group in the Prince Frederick Knobby Upland.	Quaternary alluvium and Tertiary terraces consisting mainly of quartzitic sands, gravels, silts, and clays; may include reworked argilla-ceous, glauconitic, or micaceous sands and silts.	Essentially flat-lying to gently southeast-dipping sedimentary beds.	Near the boundary between the Glen Burnie Rolling Upland and the Crownsville Upland, the Patuxent and Little Patuxent join to flow in a single valley, exhibiting a broad, well-defined flood plain and intense meandering.	60 - 10 = 50	~10-50	Mixed reticulate and trellis. Trellis because of relatively short and straight low-order tributaries flowing into the main channel at nearly right angles.
511500	Atlantic Coastal Plain Province	Embayed Section	Western Shore Uplands Region	Waldorf Upland Plain District		Western and southern boundary with Potomac Estuary & Lowlands is the base of a pronounced scarp; lithologic and topo-graphic change marks northern and eastern boundaries with Glen Burnie Rolling Upland and Prince Frederick Knobby Upland.	Mainly sands and gravels of early to late Pliocene age (e.g., the Brandywine Formation, also known in Maryland as Upland Gravels, and the Park Hall Formation).	Essentially flat-lying to gently southeast-dipping sedimentary beds.	A relatively flat upland surface comprised of alluvial plains and fluvial-estuarine terraces that occupy the higher elevations of Southern Maryland. Stream incision creates steep-sided valleys. Much of the upland soils contain a fragipan.	~300 - 60 = ~240	20-100	Dendritic
511501	Atlantic Coastal Plain Province	Embayed Section	Western Shore Uplands Region	Waldorf Upland Plain District	Piscataway Creek Area	Valley sides: the bases of side-slopes that rise to meet the Waldorf Upland. Upstream: at a marked narrowing of the valley floor and a lessening of side-slope steepness. Downstream: at open water of the mouth of Piscataway Creek.	Sands, muds, and organics.	Essentially flat-lying to gently southeast-dipping sedimentary beds.	The inland extension of the drowned mouth of Piscataway Creek above tidewater; valley is typically sediment-choked; much of the flood plain is marshy; valley sides are generally blanketed by fluvial-estuarine terraces.	165 - 15 = 150	40-80	Mixed reticulate, dendritic

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511502	Atlantic Coastal Plain Province	Embayed Section	Western Shore Uplands Region	Waldorf Upland Plain District	Mattawoman Creek Area	Valley sides: the bases of side-slopes that rise to meet the Waldorf Upland. Upstream: at a marked narrowing of the valley floor and a lessening of side-slope steepness. Downstream: at open water of the mouth of Mattawoman Creek.	Sands, muds, and organics.	Essentially flat-lying to gently southeast-dipping sedimentary beds.	The inland extension of the drowned mouth of Mattawoman Creek above tidewater; valley is typically sediment-choked; much of the flood plain is marshy; valley sides are generally blanketed by fluvial-estuarine terraces.	165 - 10 = 155	40-80	Mixed reticulate, dendritic
511503	Atlantic Coastal Plain Province	Embayed Section	Western Shore Uplands Region	Waldorf Upland Plain District	Port Tobacco Creek Area	Valley sides: the bases of side-slopes that rise to meet the Waldorf Upland. Upstream: at a marked narrowing of the valley floor and a lessening of side-slope steepness. Downstream: at open water of the mouth of the Port Tobacco River.	Sands, muds, and organics.	Essentially flat-lying to gently southeast-dipping sedimentary beds.	The inland extension of the drowned mouth of Port Tobacco River above tidewater; valley is typically sediment-choked; much of the flood plain is marshy; valley sides are generally blanketed by fluvial-estuarine terraces.	160 - 0 = 160	20-40	Mixed reticulate, dendritic
511504	Atlantic Coastal Plain Province	Embayed Section	Western Shore Uplands Region	Waldorf Upland Plain District	Zekiah-Gilbert Swamps Area	Valley sides: bases of slopes that rise to the Waldorf Upland. Upstream: at a marked narrowing of the valley floor and a lessening of side-slope steepness. Downstream: at Allens Fresh, where valley bottoms meet a large tidal marsh and open water.	Unconsolidated organic-rich sand, silt, clay, and gravel.	Essentially flat-lying to gently southeast-dipping sedimentary beds.	The inland extension of the drowned mouth of the Wicomico River via Zekiah Swamp and Gilbert Swamp; valley is typically sediment-choked, marshy, and densely vegetated; valley sides are generally blanketed by fluvial-estuarine terraces.	140 - 10 = 130	10-30	Reticulate to deranged.

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511600	Atlantic Coastal Plain Province	Embayed Section	Western Shore Uplands Region	Prince Frederick Knobby Upland District		North boundary with Crownsville Upland is contact between Cretaceous sediments on the north and Tertiary sediments on the south. West boundary with Waldorf Upland is the Potomac-Patuxent drainage divide; District abuts Chesapeake Bay on the east.	Sands, silts, clays, marls, gravels; cemented in places (formations of the Chesapeake Group).	Essentially flat-lying to gently southeast-dipping sedimentary beds.	Moderately to well-dissected upland with numerous hillocks, in large part occupying interfluve between Patuxent and Chesapeake watersheds. Stands in stark contrast to the gently rolling Glen Burnie surface and the relatively flat Waldorf surface.	265 - 0 = 265	100-130	Dendritic
511601	Atlantic Coastal Plain Province	Embayed Section	Western Shore Uplands Region	Prince Frederick Knobby Upland District	Lower Patuxent Valley Area	Extends downstream from the boundary between the Crownsville Upland and the Prince Frederick Knobby Upland. Southern boundary at the downstream extent of freely meandering reach where the river's width increases from 500-1000 ft. to 4,000-5,000 ft.	Sand, silt, clay, gravels; cemented in places.	Essentially flat-lying to gently southeast-dipping sedimentary beds.	Downstream of the confluence with Western Branch, the valley and channel of the Patuxent markedly widen and include several broad, shallow "bays" (e.g., Jug Bay) alternating with fringing marshes and a markedly constricted but meandering channel.	165 - 20 = 145	50-70	Mixed reticulate and trellis. Trellis because of relatively short and straight low-order tributaries flowing into the main channel at nearly right angles.
511602	Atlantic Coastal Plain Province	Embayed Section	Western Shore Uplands Region	Prince Frederick Knobby Upland District	Calvert Cliffs Area	Northern boundary is at the start of high cliffs south of Chesapeake Beach. Inland (western) boundary is at major break in slope at top of cliff. Southern boundary where cliffs disappear north of Drum Point.	Fairly fine-grained sand, sandy clay, clayey sand, silty clay, clayey silt, marl, diatomaceous earth, some shell beds; locally indurated to calcareous sandstone; highly fossiliferous.	Very gently southeast-dipping sedimentary beds.	High cliffs and an eroding shoreline made up of mainly Miocene marine strata. Cliff retreat is primarily by mass wasting. With exceptions at Long Beach and Cove Point, there is little or no beach along nearly the entire length of the cliffs.	140 - 0 = 140	100	(Not applicable)

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512000	Atlantic Coastal Plain Province	Embayed Section	Western Shore Lowlands Region			Inland boundary is a break at the base of slopes, scarps, or cliffs at elevations of 40-50 ft. Shoreline marks the outer boundary. For drowned tributaries, coves, etc., the boundary is drawn from points of land on either side of those features.	Generally quartzose sand, silt, clay, and gravel. Gravels may be quartz, quartzitic, or lithic (e.g., granitic rocks from the Piedmont).	Essentially flat-lying sedimentary beds.	A series of low (generally below 50-ft. elevation) fluvial and estuarine terraces, beaches, and drowned river mouths that fringe the Western Shore Uplands; the Region extends some distance up the valleys of the Potomac and Patuxent Rivers.	200 - 0 = 200	20-60	Dendritic; estuarine (drowned coastline)
512100	Atlantic Coastal Plain Province	Embayed Section	Western Shore Lowlands Region	Aberdeen Estuaries and Lowlands District		District about 2 mi. wide at northern boundary with Fall Zone near the Susquehanna and Northeast Rivers; about 8 mi. wide at southern boundary with Middle River Lowland, where boundary is the break between two low terraces at ~40-50 ft. elevation.	Fine to medium sand, often micaceous, and gravel; lesser amounts of silt and clay (mostly Kent Island Fm., formerly Talbot Fm.); gabbro and granite boulders (to 8 ft.) occur near Stump Point and Mill Creek south and east of Perryville.	Essentially flat-lying sedimentary beds.	A relatively featureless lowland (mostly <50 ft elevation) along the NW shore of Chesapeake Bay. The District has a very irregular coastline indented by the flooded mouths of several rivers (Bush, Bird, Middle, Back, etc.).	~100 - 0 = ~100	20-60	Dendritic (estuarine)
512200	Atlantic Coastal Plain Province	Embayed Section	Western Shore Lowlands Region	Annapolis Estuaries and Lowlands District		Bounded on the landward side by a scarp rising from about 40 ft. elevation to the adjacent uplands. South of Deale it abruptly narrows, terminating at Chesapeake Beach at the boundary with the Calvert Cliffs Area.	Mostly fine to medium sand, often micaceous, and gravel; lesser amounts of silt and clay (mostly Kent Island Fm., formerly Talbot Fm.).	Essentially flat-lying sedimentary beds.	A relatively featureless lowland (mostly <50 ft elevation) along the west-central shore of Chesapeake Bay; it has a less irregular coastline than Aberdeen Lowland due to narrower mouths of the Magothy, Severn, South, Rhode, and West Rivers.	65 - 0 = 65	10-30	Dendritic (estuarine)

ID No.	PROVINCE	SECTION	REGION	DISTRICT	AREA	BOUNDARIES	LITHOLOGIES	GEOLOGIC STRUCTURE	LANDFORM DESCRIPTION	MAX. - MIN. ELEV. = RELIEF (ft.)	TYPICAL LOCAL RELIEF (ft.)	DRAINAGE PATTERN
512300	Atlantic Coastal Plain Province	Embayed Section	Western Shore Lowlands Region	Patuxent Estuary and Lowlands District		Uplands boundary is a break in slope between highest terrace (Chicamuxen Church Fm.) and the upland (Park Hall Fm.); upstream boundary where river width suddenly increases several-fold; downstream boundary drawn from Drum Pt. to Fishing Pt.	Mix of fluvial, estuarine and marginal marine sands, silts, and clays; some fine to medium pebbles.	Essentially flat-lying sedimentary beds.	Broad (4-5 miles) flat-bottomed valley flanked by fluvial-estuarine terraces; main river channel approaches 2 miles in width, reflecting the estuarine nature of this reach of the Patuxent River.	80 - 0 = 80	20-60	Dendritic (estuarine)
512400	Atlantic Coastal Plain Province	Embayed Section	Western Shore Lowlands Region	St. Jerome's Neck Lowland District		From Fishing Point south to the vicinity of Ridge, the boundary follows the base of the scarp rising to the upland. South from Ridge, a common boundary with the Potomac Estuary and Lowlands District forms the drainage divide south to Point Lookout.	Mix of fluvial, estuarine and marginal marine sands, silts, and clays; some fine to medium pebbles.	Essentially flat-lying sedimentary beds.	A very gently sloping, terraced lowland of Pleistocene estuarine deposits. Three of the four terraces recognized in the Patuxent Estuary & Lowlands District are present here. Maximum elevation decreases southward from about 40 to 20 feet.	65 - 0 = 65	20-60	Dendritic
512500	Atlantic Coastal Plain Province	Embayed Section	Western Shore Lowlands Region	Potomac Estuary and Lowlands District		Upstream boundary is the eastern edge of the Fall Zone. The inland boundary follows the base of the scarp between lowland and upland and extends up tributary valleys to a point where the flat-bottomed, sediment-choked valleys drastically narrow.	Mix of fluvial, estuarine and marginal marine sands, silts, and clays; some fine to medium pebbles.	Essentially flat-lying sedimentary beds.	The Potomac River and its terraced lowlands and estuaries extend from the Fall Zone to Point Lookout. Drowned rivers include Piscataway, Mattawoman, Nanjemoy, Port Tobacco, Wicomico and St. Marys Rivers and St. Clements and Breton Bays.	100 - 0 = 100	60-80	Dendritic (estuarine)

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512501	Atlantic Coastal Plain Province	Embayed Section	Western Shore Lowlands Region	Potomac Estuary and Lowlands District	Foggy Bottom Area	West: rim of Rock Creek valley. North: base of scarp rising to upland at roughly the 105-ft. elevation (closely follows Florida Ave.). East: rim of the Anacostia River valley. South boundary with Potomac River is the 30-ft elevation.	In the natural state, gravel, sand, silt, and clay with organic matter in places. Much of the Area is artificial fill.	Essentially flat-lying sedimentary beds.	This low-relief surface consisting of low terraces, alluvium, and artificial fill rises from about 30 ft. near the Potomac to more than 100 ft. on the north side. Much of the southern part of the Area had originally been poorly drained and swampy.	~100 - <20 = ~80	20-60	Dendritic (altered greatly man)
512502	Atlantic Coastal Plain Province	Embayed Section	Western Shore Lowlands Region	Potomac Estuary and Lowlands District	Indian Head Area	The boundary is both geologic and topographic, following the contact of the low-land sediments with the Park Hall Formation and corresponding to a major break in slope at about the 50-foot contour.	Silty fine-grained sand and fine to medium sand and clay interbedded with medium- to coarse-grained sand and pebbles, cobbles, and boulders.	Essentially flat-lying sedimentary beds.	An isolated exposure, or inlier, of upland sediments (Park Hall Fm.) rising above the surrounding younger lowland deposits; probably an erosional remnant from the Waldorf Upland Plain.	100 - 0 = 100	60-80	Dendritic
513000	Atlantic Coastal Plain Province	Embayed Section	Chesapeake Estuary Region			The boundary generally follows the shoreline of the "mainland" on both sides of the Bay; where islands and drowned river mouths occur, the boundary is arbi-trarily adjusted to exclude most islands, drowned river mouths, and sounds from this Region.	Unconsolidated sands, silts, and clays on the Bay bottom.	No appreciable structure, although parts of the present Bay may reflect faults in the subsurface.	The drowned valley of an ancestral Susquehanna River system; consists of the body of water known as Chesapeake Bay and the sediments and features on the Bay bottom; excludes most islands, flooded estuary mouths, and other marginal water bodies.	0	0	Dendritic (estuarine)

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514000	Atlantic Coastal Plain Province	Embayed Section	Delmarva Peninsula Region			Northern boundary in Maryland is the Elk River; extends east and south into Delaware and Virginia, respectively; remaining boundaries are the Atlantic shoreline on the southeast and the Chesapeake Estuary Region on the west.	Unconsolidated sands, silts, clays, pebbles and cobbles.	Essentially flat-lying sedimentary beds.	A large peninsula extending south of the Elk River and separating Chesapeake Bay and Delaware Bay-Atlantic drainages; has grown by southward accretion during the Neogene. Consists of an axial "upland" bordered by a series of lowlands.	>100 - 0 = >100	Variable; 20-50 in north, 0-15 in south	Dendritic, with some reticulate in marshes.
514100	Atlantic Coastal Plain Province	Embayed Section	Delmarva Peninsula Region	Denton Plain District		Break in slope between upland surface and fringing escarpment slope at approximately the 40- to 50-foot elevation; scarp very clear to fairly subtle, height about 20-25 feet.	Reddish to orange-brown sand, with some gravels (mainly Pensauken Formation, with increasing Beaverdam Formation in the southern part).	Essentially flat-lying sedimentary beds.	An upland surface of very low relief that occupies an axial position along the Delmarva Peninsula, thus forming the poorly defined drainage divide between the Chesapeake Bay and Delaware Bay.	>100 - 0 = >100	20-50	Dendritic
514101	Atlantic Coastal Plain Province	Embayed Section	Delmarva Peninsula Region	Denton Plain District	Upper Choptank River Area	Downstream boundary arbitrarily drawn where the Choptank valley narrows from 3-4 miles to about 1 mile in width; upstream termination arbitrarily at the town of Denton.	Alluvium (sand, silt, clay).	Essentially flat-lying sedimentary beds.	That part of the Choptank River valley that extends inland into the Denton Plain upstream of the more clearly estuarine part of the Choptank River.	25 - 5 = 20	10	(Not applicable to a single valley or channel; overall dendritic in the region)
514200	Atlantic Coastal Plain Province	Embayed Section	Delmarva Peninsula Region	Salisbury Plain District		Subtle scarp at the 80-ft contour with the Denton Plain on the north side; subtle break in slope at 20- to 30-ft contour at Princess Anne Lowland on the west side; break in slope (the Berlin Scarp) on the east side at about the 40-ft contour.	Tan to light-gray, pale yellow to brown medium sand; massive to crossbedded quartzose sand, especially west of the Pocomoke River; includes thin beds of organic matter; occasional boulders. Marine sand, silt, and clay east of the Pocomoke River.	Essentially flat-lying sedimentary beds.	Broad lowland plain, little modified by erosion, with widespread aeolian sand sheets and low-amplitude sand dunes, fluvial sands, and marine back-barrier and lagoon muds.	>80 - 15 = ~65	5-10	Dendritic

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514201	Atlantic Coastal Plain Province	Embayed Section	Delmarva Peninsula Region	Salisbury Plain District	Upper Pocomoke River Area	The flood plain and associated swamps of the Pocomoke River within the Salisbury Plain District.	Dark brown to black organic debris and local peat, mixed with mud composed of fine sand, silt, and clay; sand mainly quartz and feldspar.	Essentially flat-lying sedimentary beds.	Largely swamp and marsh occupying the flood plain of the upper reaches of the Pocomoke River within the Salisbury Plain.	35 - 15 = 20	0-5	Dendritic; reticulate
514300	Atlantic Coastal Plain Province	Embayed Section	Delmarva Peninsula Region	Princess Anne Lowland District		Southwest coast of the Delmarva Peninsula south of the Choptank River, bounded by Crisfield Islands and Marshes on the west and the Salisbury Plain on the east. Corresponds to outcrop area of the Kent Island Fm south of the Choptank River.	Brown to yellowish-brown interbedded sand, gravelly sand, silt, and bouldery gravel; largely the estuarine facies of the Kent Island Fm.	Essentially flat-lying sedimentary beds.	A lowland plain of very low relief (0 to 5 feet), little altered by erosion; similar to the St. Michaels Lowland District.	30 - 0 = 30	0-5	Dendritic
514301	Atlantic Coastal Plain Province	Embayed Section	Delmarva Peninsula Region	Princess Anne Lowland District	Lower Pocomoke River Area	The flood plain and associated swamps of the Pocomoke River within the Princess Anne Lowland.	Dark brown to black organic debris and local peat, mixed with mud composed of fine sand, silt, and clay; sand mainly quartz and feldspar.	Essentially flat-lying sedimentary beds. Some beds bioturbated.	Largely swamp and marsh occupying the flood plain of the lower reaches of the Pocomoke River within the Princess Anne Lowland.	15 - 0 = 15	0-5	Dendritic; reticulate
514302	Atlantic Coastal Plain Province	Embayed Section	Delmarva Peninsula Region	Princess Anne Lowland District	Nanticoke River Area	The flood plain and associated marshland of the Nanticoke River on west edge of the Princess Anne Lowland; bordered by Salisbury Plain on the east; extends northward to the Denton Plain, being arbitrarily terminated near the Maryland-Delaware border.	Dark brown to black organic debris and local peat, mixed with mud composed of fine sand, silt, and clay; sand mainly quartz and feldspar.	Essentially flat-lying sedimentary beds. Some beds bioturbated.	Largely swamp and marsh occupying the flood plain of the Nanticoke River within the Princess Anne Lowland.	15 - 0 = 15	0-5	Dendritic; reticulate

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514400	Atlantic Coastal Plain Province	Embayed Section	Delmarva Peninsula Region	St. Michaels Lowland District		Boundary with Denton Upland Plain marked by distinct rise in elevation along a scarp to the Denton Plain. Corresponds to outcrop area of the Kent Island Formation north of the Choptank River.	Brown to yellowish-brown interbedded sand, gravelly sand, silt, and bouldery gravel. Lithologically is more similar to the Princess Anne Lowland District than to the Crisfield Islands and Marshes District.	Essentially flat-lying sedimentary beds. Some beds bioturbated.	Coastal lowland of very low relief, including salt marshes and a low estuarine terrace along the west-central shore of the Delmarva Peninsula north of the Choptank River.	80 - 0 = 80	20-40	Reticulate or anastomosing; dendritic
514500	Atlantic Coastal Plain Province	Embayed Section	Delmarva Peninsula Region	Crisfield Islands and Marshes District		Coastal marshes and marshy islands along the southwest shore of the Delmarva Peninsula south of the Choptank River. Boundary with Princess Anne Lowland is delineated by presence or absence of tidal marshes.	Dark gray, black, or greenish-gray silty clay to clayey fine sand, carbonaceous clay, and some layers of herbaceous peat.	Essentially flat-lying sedimentary beds. Some beds bioturbated.	Discontinuous coastal salt marshes and low islands of various sizes and shapes along the southwest shore of the Delmarva Peninsula.	15 - 0 = 15	5	Reticulate or anastomosing; dendritic
514600	Atlantic Coastal Plain Province	Embayed Section	Delmarva Peninsula Region	Atlantic Bays and Barriers District		Western boundary is the upper break in slope at contact with the Salisbury Low-land District; eastern boundary is mean sea level at the shore-line of the Atlantic Ocean. District extends north and south beyond state borders.	Sand, silt, clay.	Essentially flat-lying sedimentary beds. Some beds bioturbated.	The barrier island system of Fenwick and Assateague Islands, which includes barrier islands, back-barrier bays and lagoons (Coastal Bays), fringing salt marsh, and tidal inlets.	40 - 0 = 40	10-20	Generally dendritic

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514601	Atlantic Coastal Plain Province	Embayed Section	Delmarva Peninsula Region	Atlantic Bays and Barriers District	Berlin Scarp Area	Top of scarp at about 40 ft. elevation on west is boundary with Salisbury Plain; bottom of scarp at 15 ft. is boundary with the Coastal Bays & Barriers District; southern boundary at Va. border; northern boundary indistinct and arbitrary.	Light-colored sand east of Berlin at elevations of 35-40 ft., gravelly in places; also a thin light-gray to dark-gray silty to clayey sand or sandy silt west of the sand facies; corresponds to outcrop belt of the Ironshire Formation.	Essentially flat-lying sedimentary beds.	A generally distinct topographic drop marks the transition between the Salisbury Plain and the lowlands adjacent to the Coastal Bays; is most clearly expressed to the south, becoming hummocky and indistinct north of the town of Berlin and U.S. 50.	40 - 15 = 25	10-20	Parallel to dendritic.
514602	Atlantic Coastal Plain Province	Embayed Section	Delmarva Peninsula Region	Atlantic Bays and Barriers District	Barrier Beaches Area	Extends north and south beyond the state borders; west boundary marks the general transition between dune ridge on the east and fringing marsh of the Coastal Bays and Marshes Area; eastern boundary is the Atlantic Ocean.	Almost exclusively medium to coarse quartz sand; various heavy minerals common (e.g., rutile, ilmenite, zircon, tourmaline, magnetite).	Cross-bedded sand in beach dunes; seaward-dipping planar laminations (very thin beds) on beach; oscillation ripples possible.	Coincident with the sand dunes and beaches of the barrier islands (Fenwick and Assateague). Part of a series of barrier beaches / barrier islands from New Jersey to Georgia.	20 - 0 = 20	10-20	Generally none
514603	Atlantic Coastal Plain Province	Embayed Section	Delmarva Peninsula Region	Atlantic Bays and Barriers District	Coastal Bays and Marshes Area	Break in slope at base of the Berlin Scarp on the west side to the western base of sand dunes of the Barrier Beaches Area; corresponds to change from tidal marsh and bays to "dry" land, as indicated by the presence-absence of salt marsh vegetation.	Fine sand, silt, clay; abundant organic matter common.	Graded planar bedding common, with cut-and-fill structures caused by erosion-deposition cycles of migrating tidal channels.	Back-barrier bays or lagoons and fringing salt marshes; greatly influenced by tides.	20 - 0 = 20	5-10	Dendritic to anastomosing