CRETACEOUS FORMATIONS IN THE CHESAPEAKE AND DELAWARE CANAL

Geology by
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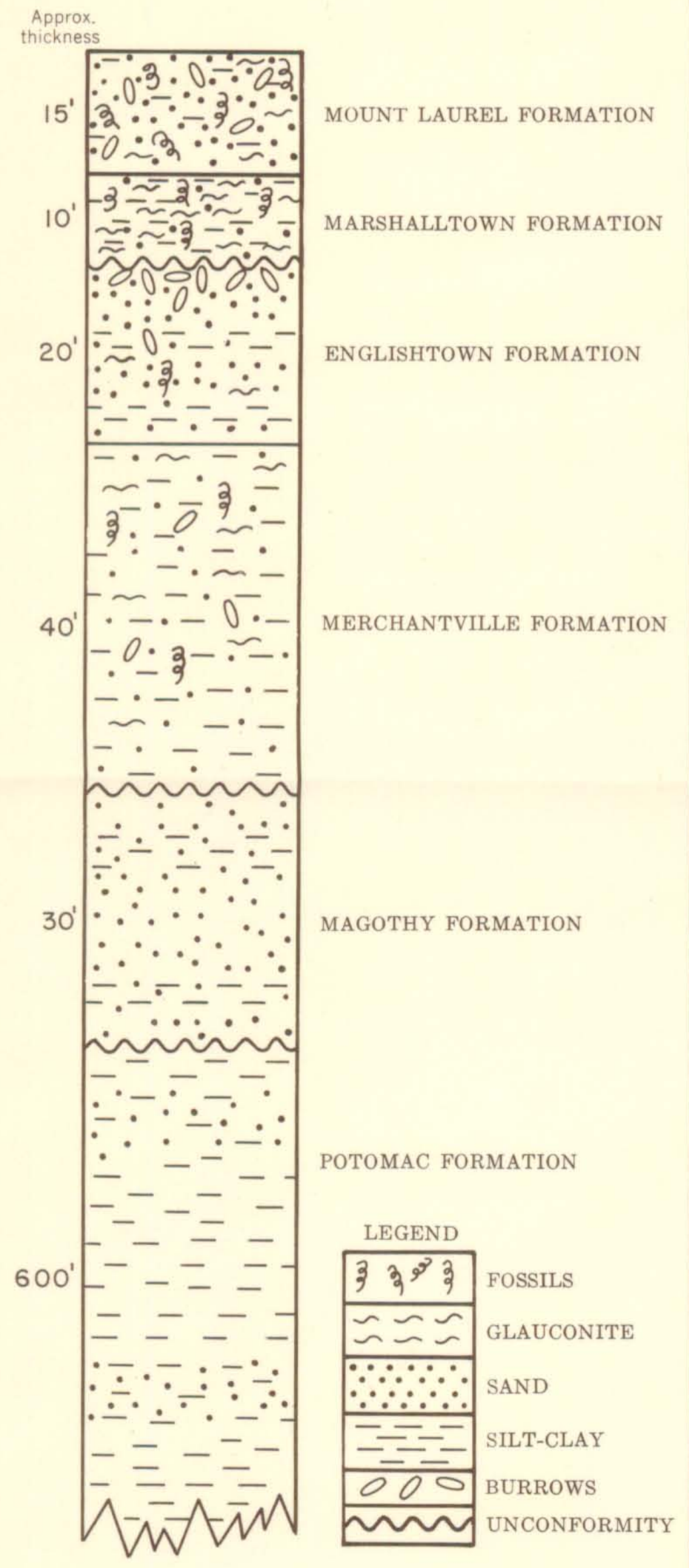

DISCUSSION

Geologic History

The oldest Coastal Plain unit in Delaware, the Potomac Formation, was deposited on ancient crystalline rocks of the Basement Complex from the latter part of Early Cretaceous time into Late Cretaceous time. Streams transported clays and sands from the Appalachians in the northwest and sediments were deposited probably in a deltaic environment in this part of Delaware.

The overlying white sands and lignitic black silts of the Magothy Formation are separated from the Potomac Formation by an unconformity. The Magothy indicates the transition from older nonmarine sediments to the later marine deposits. Another small unconformity separates the Magothy from the overlying marine Upper Cretaceous rocks. Magothy sediments were deposited in a shoreline environment containing elements of strand line, barrier island, and lagoonal conditions.

A sequence of varied marine sedimentary rocks was deposited essentially continuously from upper Cretaceous to at least Middle Eocene time. The oldest Cretaceous sediments above the Magothy form the Matawan Group, consisting of the Merchantville, Englishtown, and Marshalltown Formations. The Englishtown Formation was formerly called Wenonah and the Marshalltown was included in the area mapped as Mount Laurel Formation. (Spoljaric and Jordan, 1966). The area mapped previously as Redbank is probably weathered Marshalltown and Mount Laurel Formation. None of these units persist very far into the subsurface, so the Matawan is assigned formational status at depth a few miles south of the C. & D. Canal. The Merchantville and Marshalltown sediments were probably deposited in fairly shallow, open marine, perhaps embayed areas as evidenced by the glauconite content and fossils. However, lithology and fosssils indicate that the Englishtown represents a shoreline environment in which sea level was dropping.

In Delaware the name Mount Laurel Formation is synonymous with the name Monmouth used in Maryland and New Jersey. Lithology and fossils indicate a slight regression of the sea during Mount Laurel time.

The Paleocene-to-Eocene Age Rancocas Formation is found in the southeastern part of the Canal area of Delaware. There is no obvious unconformity between Late Cretaceous and Early Tertiary Age sediments. The high glauconite content of the Rancocas Formation indicates open shelf conditions. The area previously mapped as unit B (Spoljaric and Jordan, 1966) is included within the Rancocas Formation because sufficient criteria for a separate unit were not found in the field investigations.

Much later, during Pleistocene time, the advance and retreat of the continental glaciers brought about changes in sea level and in the streams draining into Delaware. The Pleistocene Columbia Formation, consisting mostly of coarse sand and gravel, was deposited on the stream-channeled surface of the truncated Cretaceous and Tertiary beds. In the Canal area a major north-south "channel" can be seen in the St. Georges area and a lesser one near Summit Bridge, shown by thickness contours (isopachs).

Earth Resources

Ground water, principally from the Columbia, Magothy, and Potomac Formations in this area, is an important earth resource. The same Pleistocene channels useful for sand and gravel production are good aquifers. By constructing geologic maps, locations of aquifers are illustrated and intelligent planning of ground-water use can be made. Ground water is Delaware's most important mineral resource.

Potomac clays have been, and still are, being used for brick manufacture. Recent tests by the U. S. Bureau of Mines and the Delaware Geological Survey indicate the general suitability of this formation for bricks and other clay products (Pickett, 1970). Holocene clays near the Delaware River appear to be promising for lightweight aggregate.

Sand and gravel pits, mostly located on the eastern Pleistocene "channel," are an important natural resources industry in the C. & D. Canal area. Potential thick gravel deposits are indicated by the heavy Quaternary thickness contours.

Greensand (glauconite) from the Rancocas Mt. Laurel and Marshalltown Formations has been used in the past as fertilizer because it is a source of potash. In New Jersey glauconite is used in water softening.

Fossils

The C. & D. Canal is one of the most prolific fossil locations in the Atlantic Coastal Plain. Most of the outcrops on the beaches below the riprap are fossiliferous but exposed only at low tide. Usually amateur collecting is done in the spoil piles, particularly on the north side between Summit Bridge and St. Georges. Biggs Farm, (now under new ownership) located one mile east of South St. Georges, is a famous locality for at least 150 species of molluscs and other fossils.

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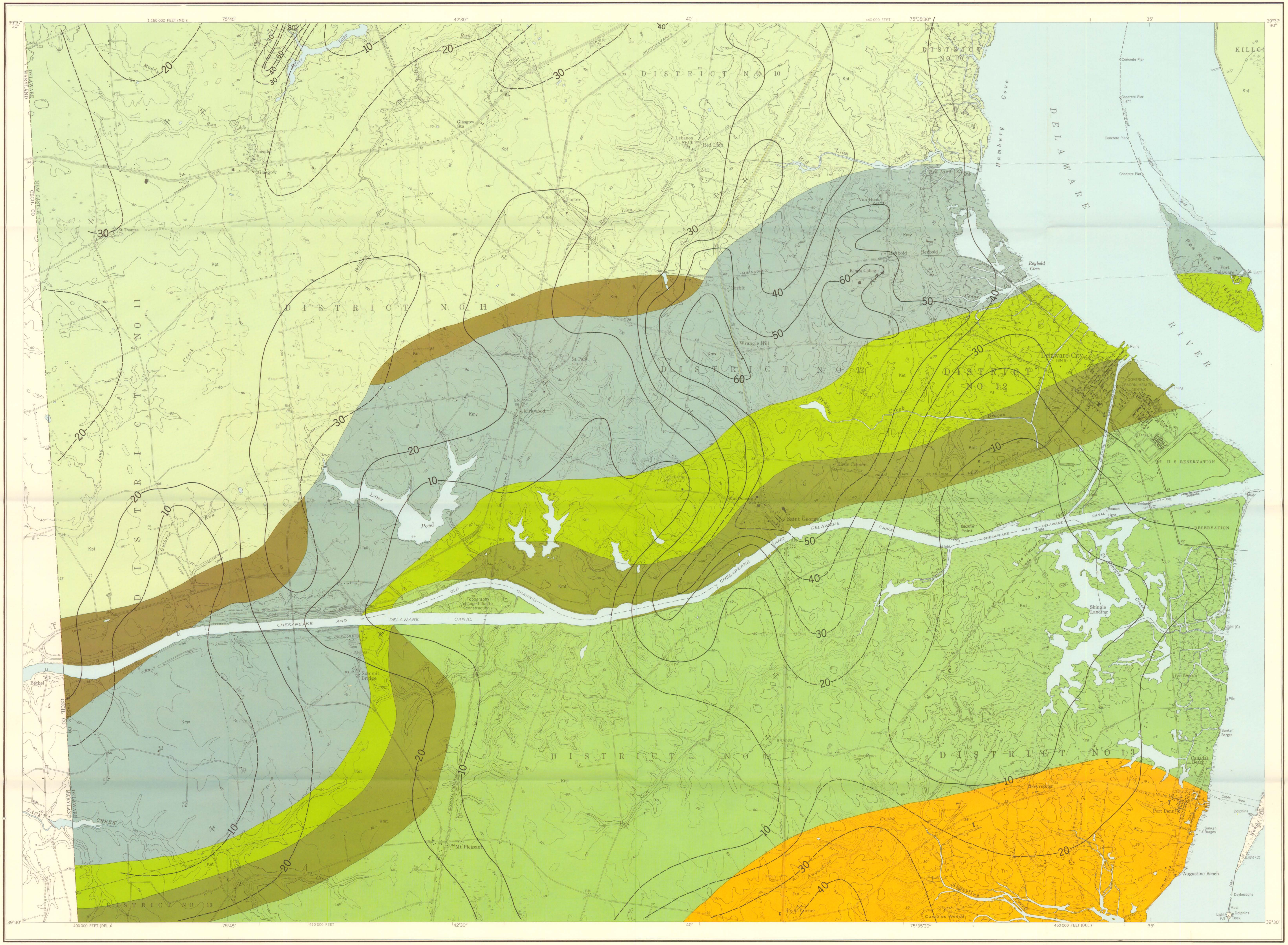
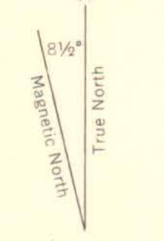
GEOLOGY OF THE CHESAPEAKE AND DELAWARE CANAL AREA
GEOLOGIC MAP SERIES, NO. 1



Base maps-USGS Topographic Division, Elkton, St. Georges, Delaware City Quadrangles. Map modified by D.G.S. in R.R. Bridge area to show new ship channel. Therefore, many topographic contours are meaningless in that area.



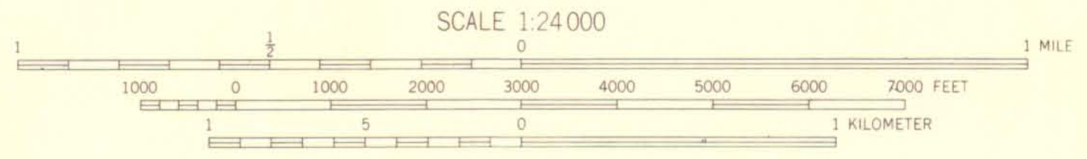
Approximate mean Declination, 1953

GEOLOGY OF THE CHESAPEAKE AND DELAWARE CANAL AREA, DELAWARE

by
Thomas E. Pickett

1970

SCALE 1:24 000



CONTOUR INTERVALS 10 AND 20 FEET

QUADRANGLE LOCATION

NOTE

Fluvial Pleistocene (Columbia Fm.) and Holocene gravels, sands, and clays overlie older units almost everywhere and are shown by thickness contours (isopach).

EXPLANATION

Trn

RANCOCAS FORMATION
Green and gray, fine to medium quartzose silty glauconitic sand. Frequently weathered forming ironstones.

Kml

MOUNT LAUREL FORMATION
Gray to greenish red-brown, glauconitic, fine to medium quartz sand with some silt. Extensively burrowed. Over 100 species of mollusks. Upper red sand has been called Redbank Formation, but appears to be, in part, a weathering product of Mt. Laurel, and in part weathered Columbia Fm (?).

Kmt

MARSHALLTOWN FORMATION
Dark greenish gray, massive, highly glauconitic, very silty fine sand. Abundant EXOGYRA PONDEROSA.

Ket

ENGLISHTOWN FORMATION
Light gray and rust brown, well sorted, micaceous, sparingly glauconitic, often "fluffy", fine sand with thin inter. bedded layers of dark gray silty sand. Abundant nodulose burrows of CALLIANASSA, particularly in upper sands.

Kmv

MERCHANTVILLE FORMATION
Dark gray to dark blue, micaceous, glauconitic sandy silt and silty fine sand; very sticky when wet. PLACENTICERAS PLACENTA, small siderite nodules, burrows by benthic organisms.

Km

MAGOTHY FORMATION
White and buff, frequently sugary, clean quartz sand with beds of gray and black clayey silt containing much lignite, pyrite-filled limy clay concretions, and sulfate blooms. Formation discontinuous along strike in subcrop.

Kpt

POTOMAC FORMATION
Variegated red, gray, purple, yellow and white, frequently lignitic silts and clays containing interbedded white, gray, and rust-brown quartz sands and some gravel. Individual beds usually laterally restricted.

PALEOCENE EOCENE
TERTIARY
(MONMOUTH)
(MATAWAN)
UPPER CRETACEOUS
CRETACEOUS
LOWER CRETACEOUS

SYMBOLS

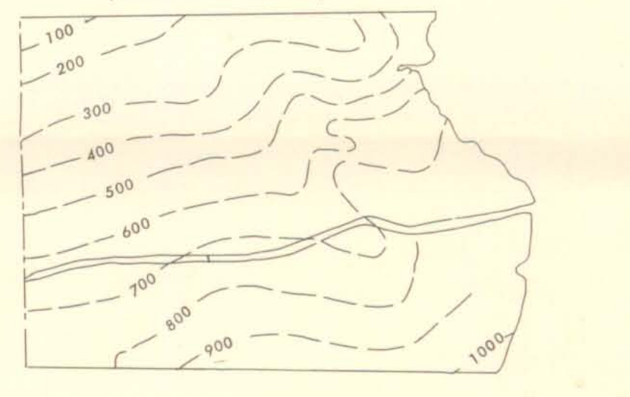
—30—
Quaternary isopach contour (Revised from Spoljaric, (1967). Dashed where inferred. Thickness in feet.

⚒ Sand, gravel or clay pit

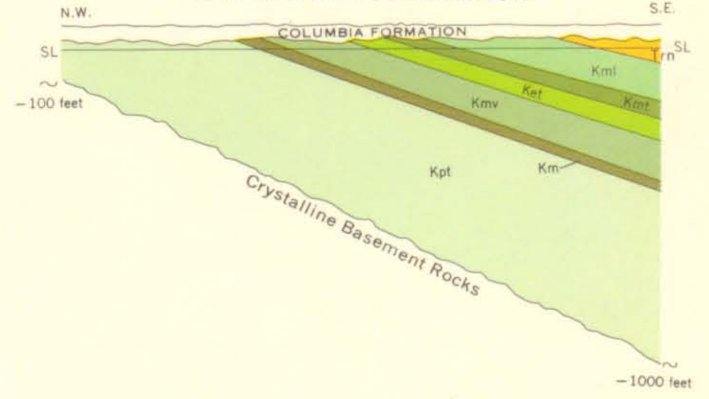
Approximate concealed geologic contact

Wetlands (Holocene marsh)

BASEMENT ELEVATION
(feet below sea level)



SCHEMATIC CROSS-SECTION



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