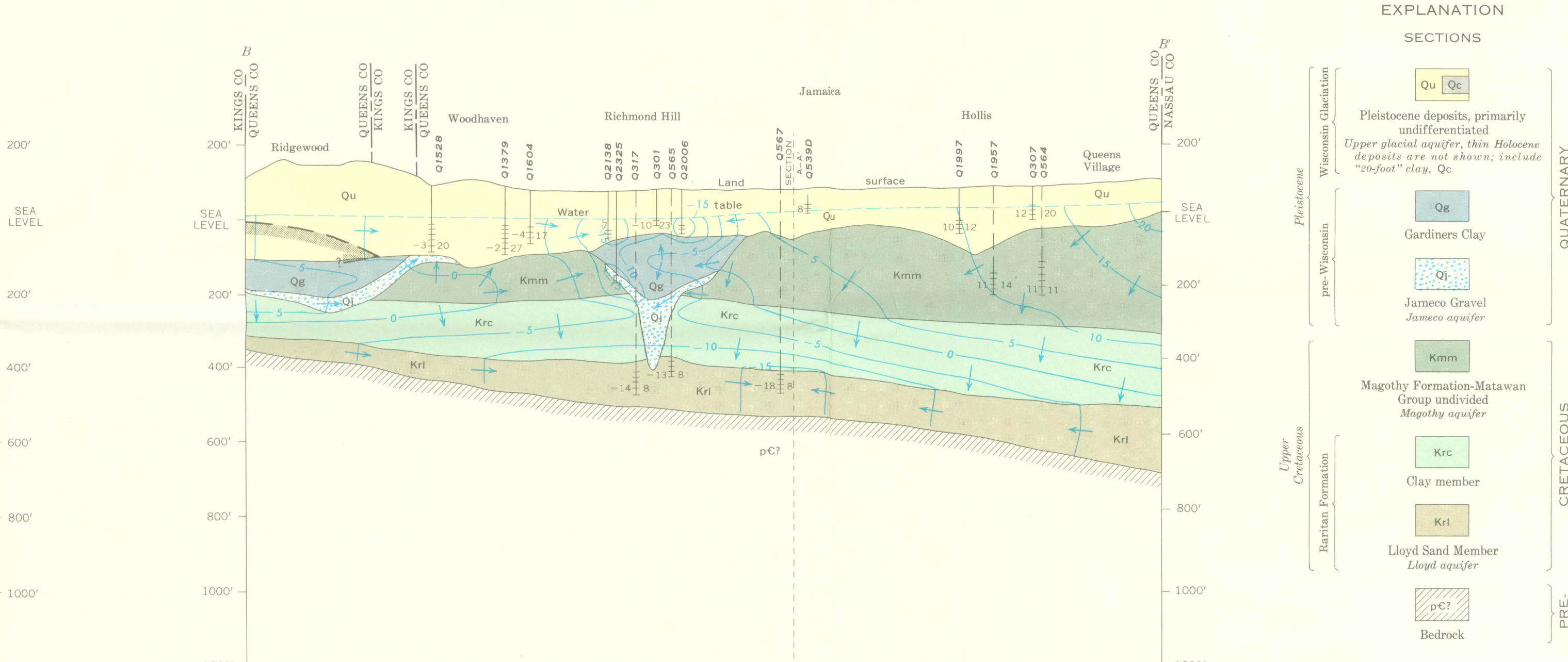
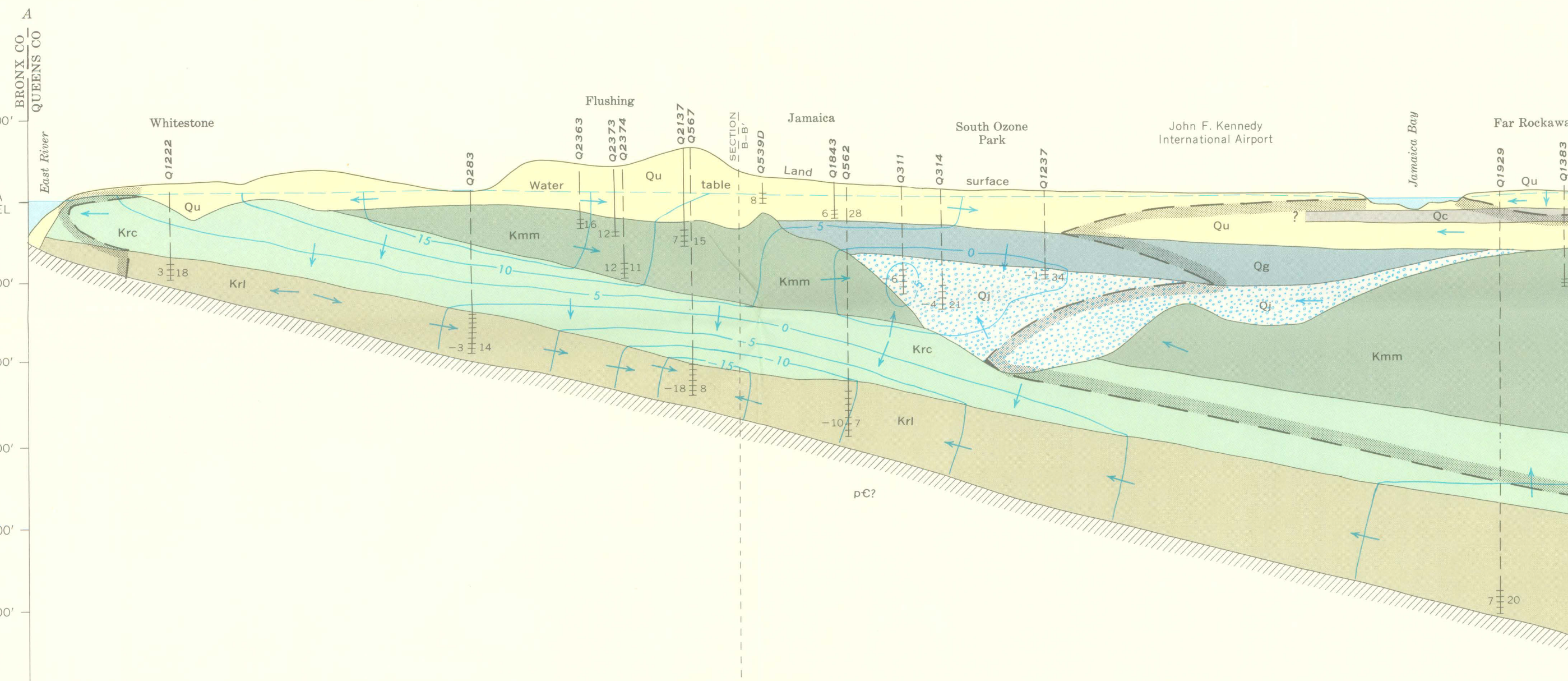
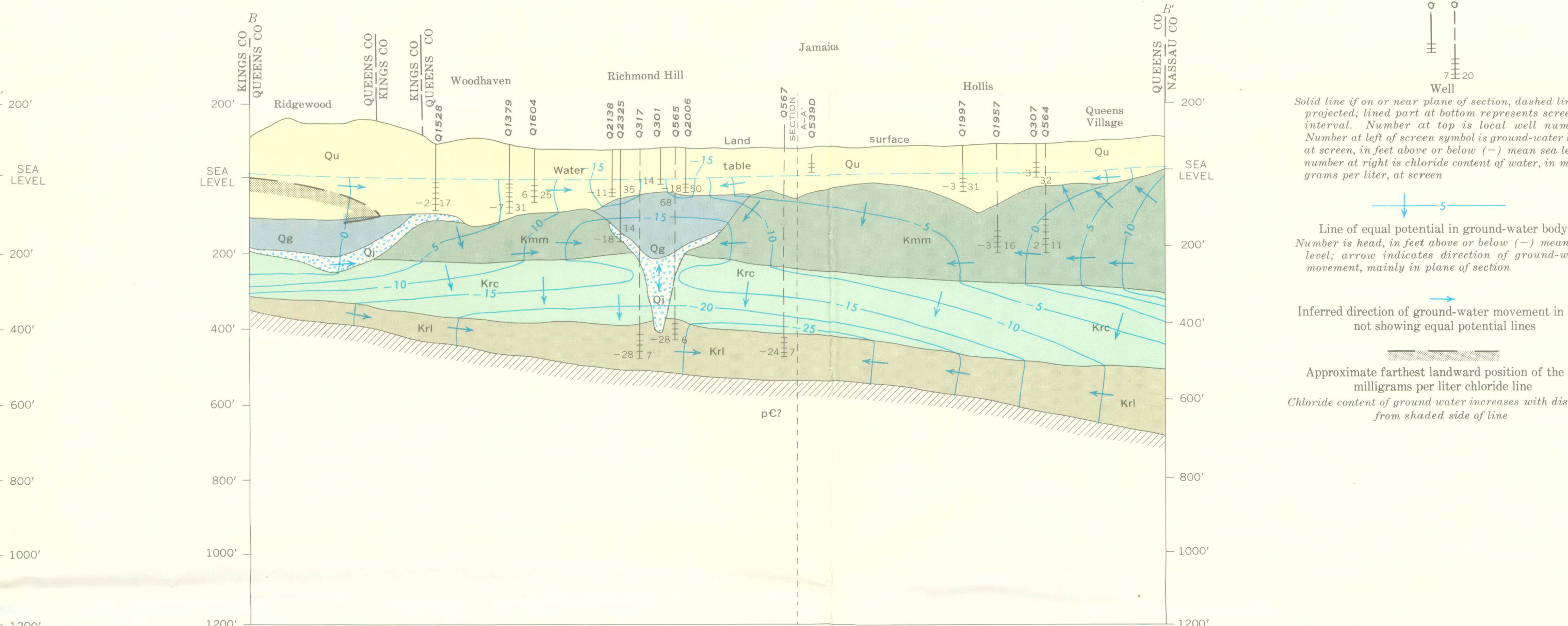
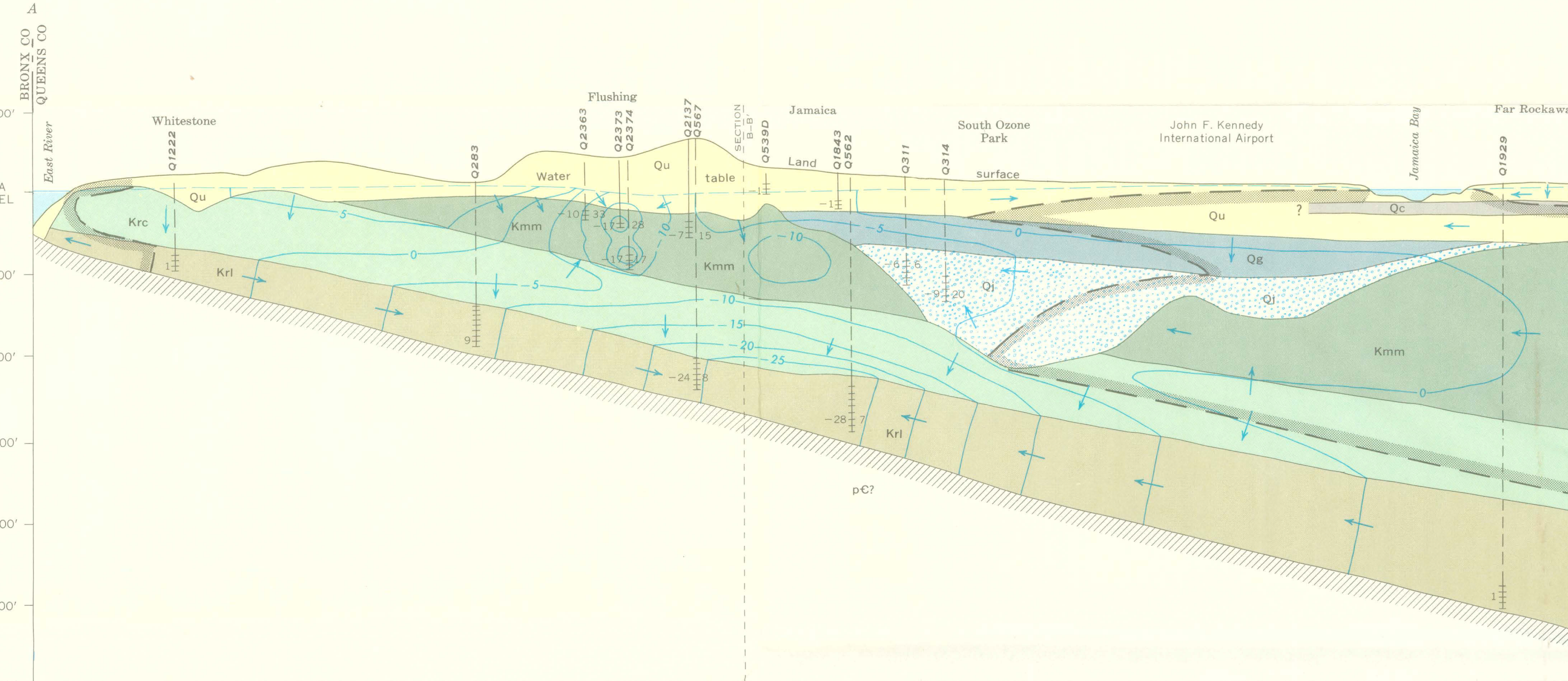


GEOLOGIC AGE		GEOLOGIC UNIT	HYDROGEOLOGIC UNIT	APPROXIMATE THICKNESS, IN FEET	APPROXIMATE ALTITUDE OF UPPER SURFACE, IN FEET ABOVE OR BELOW MEAN SEA LEVEL	HYDROLOGIC PROPERTIES	CHARACTER OF DEPOSITS <sup>1</sup>		
SYSTEM	SERIES								
QUATERNARY	Holocene	Shore and salt-marsh deposits and artificial fill	Upper	0-50	(1)	Beach sand and gravel and dune sand, tan to white, black, brown, and gray bay-bottom deposits of clay and silt; artificial fill. Beach and dune deposits are mostly stratified and well sorted. Fill includes earth and rocks, concrete fragments, ashes, rubbish, and hydraulic fill.	Beach and dune deposits in the southern part of the county contain saturated permeable zones and thin lenses of fresh water underlain by salty ground water. In other parts of the county, Holocene deposits are mostly unsorted water-table. Clay and silt deposits prevent or retard salt water from invading the underlying strata in shore areas.		
		Till deposits (terminal and ground moraine)		0-150	(1)	Ground and terminal-moraine deposits of clay, silt, sand, gravel, and boulders mostly unsorted and unsorted. Rock and mineral components are similar to those in outwash deposits. (See below.)	Generally poorly permeable; sandy lenses in saturated fill yield small amounts of water to wells. The ground-moraine deposits are mostly above the water table, but locally they confine water in underlying strata.		
		Lake deposits*	glacial	0-80†	20 to 30	Clay, silt, and fine sand, grayish-brown and light to chocolate-brown; commonly contain peat, possibly deposited in glacial lakes. Penetrated by dunes in the Flushing Meadows area between College Point and Whitestone and between Jamaica and Hollis; otherwise, extent is largely unknown.	Poorly permeable; confine water in underlying sand and gravel deposits.		
	Pleistocene	Wisconsin (Glaciation upper Pleistocene deposits) Harbor Hill (and Rockaway) drift			0-150	(1)	Stratified fine to coarse sand and silt; to large pebbles, brown, gray, and grayish-green; commonly contains quartz and various crystalline and sedimentary rocks. Commonly includes chemically unstable accessory minerals, such as biotite, chlorite, hornblende, zircon, and feldspar.	Generally highly permeable; constitute an intensively developed water-table aquifer south of the Harbor Hill Terminal Moraine, yield as much as 1,500 gpm (gallons per minute) to wells.	
		Shanghaun (Glaciation lower Pleistocene deposits)			0-150		Clay, silt, and sand, grayish-green; commonly contains fossil diatoms and marine shells; usually unsorted and overlain by outwash deposits; contains fine particles of various rocks and mineral fragments similar to those in the "20-foot" clay. (See above.)	Poorly permeable; probably confines water in the underlying deposits in the southernmost part of the county.	
		UNCONFORMITY	Gardiners Clay	Gardiners Clay	0-150	-40 to -200	Marine clay and silt and scattered beds of fine to coarse sand and fine gravel, grayish-green; frequently contains fossil shells and diatoms and rock and mineral fragments similar to those in the "20-foot" clay. (See above.)	Poorly permeable; confines water in the underlying Jameco Gravel and Cretaceous strata in the southeastern and southern parts of the county.	
	CRETACEOUS	Upper Cretaceous	UNCONFORMITY	Jameco aquifer	Jameco aquifer	0-250	-100 to -240	Sand, fine to very coarse, and small- to large-pebble gravel, mostly dark-brown; includes scattered beds of clay and silt. Sand and larger pebbles are fragments of crystalline and sedimentary rocks. Percentage of fine materials in this unit increases southward. Contains relatively unstable accessory minerals, such as those found in outwash deposits. (See above.)	Generally highly permeable. Water in the aquifer is confined by the overlying Gardiners Clay in southern Queens County, except in parts of the Woodhaven-Ozone Park area. Wells tapping Jameco deposits have yielded as much as 1,600 gpm.
			UNCONFORMITY	Magothy Formation-Matawan Group undifferentiated	Magothy aquifer	0-500	40 to -450	Quartzose sand beds, commonly containing much interstitial clay and silt with interbedded clay, silty clay, and sandy clay. Sand beds are generally grayish-white, light gray, and reddish gray; clay is generally grayish white, light to dark gray, pink, and red. Coarse sand and gravel interbedded with lenses and layers of clay commonly occur in the base 50 to 100 feet. Lignite, pyrite, and limonite and hematite concretions are common throughout; other accessory minerals are chemically stable types, such as muscovite, rutile, and garnet.	An intensively pumped aquifer; water occurs under conditions ranging from locally unconfined in the uppermost part to well confined in the lower part; confining layers include clay and silt beds and the overlying Gardiners Clay. Sand and gravel beds range from moderately to highly permeable, depending on the amounts of interstitial clay and silt; clayey sand and silty sand beds range from poorly to moderately permeable. Yields as much as 1,500 gpm are obtained from the coarse, best sorted beds.
		Lower Cretaceous	UNCONFORMITY	Raritan clay	Raritan clay	0-200	30 to -650	Clay, silty clay, and clayey fine sand, light to dark gray, brownish-red, red, pink, and grayish-white. Beds and lenses of lignite, pyrite, and sand are common, and thin beds of gravel occur locally. Accessory minerals are of chemically stable types, such as those in the Magothy aquifer. (See above.)	Poorly permeable; confines water in the underlying Lloyd Sand Member. (See above.)
			UNCONFORMITY	Lloyd Sand Member	Lloyd aquifer	0-300	-90 to -800	Quartzose sand, fine to coarse, and small- to medium-pebble gravel, commonly containing much grayish-white, light gray, and yellowish interstitial clay and silt. Interbedded clay and clayey and silty sand are common; clay is grayish white, light to dark gray, pink, and red. Lignite and pyrite occur widely throughout. Other accessory minerals are the same as those in the Magothy aquifer. (See above.)	A well-confined aquifer that is not highly developed in the county. Wells tapping Lloyd aquifer commonly yield less than 1,000 gpm. Development of the aquifer is regulated and limited because large withdrawals tend to induce salt-water intrusion.
PRECAMBRIAN	Not known	Bedrock	Bedrock*		15 to -1,100	Schists and gneisses with granitic and pegmatitic intrusions. Beds of marble occur below the East River at the west border of the county. The uppermost surface of the rocks is commonly weathered and forms a zone of decomposed rock fragments and residual clay, as much as 70 feet thick, grading downward to unweathered rock.	Poor to fair aquifer; yields small to moderate quantities of water from fractures and solution planes in the upper part.		

Base from U.S. Geological Survey, Brooklyn, Harlem, Hempstead, and Oyster Bay



CONDITIONS IN THE GROUND-WATER RESERVOIR IN 1961



CONDITIONS IN THE GROUND-WATER RESERVOIR IN 1968

SURFICIAL GEOLOGIC MAP, GEOHYDROLOGIC SECTIONS, AND TABLE SHOWING GEOLOGIC AND HYDROGEOLOGIC UNITS, QUEENS COUNTY, LONG ISLAND, NEW YORK



**EXPLANATION**

**SECTIONS**

- Qu Qc Pleistocene deposits, primarily undifferentiated
- Qm Upper Pleistocene deposits, primarily "20-foot" clay, Qc
- Qm Gardiners Clay
- Qm Jameco Gravel
- Qm Jameco aquifer
- Krc Magothy Formation-Matawan Group undifferentiated
- Krc Magothy aquifer
- Krc Clay member
- Krc Lloyd Sand Member
- Krc Lloyd aquifer
- pC Bedrock

**Wells**

Solid line if on or near plane of section, dashed line if projected; lined part at bottom represents screened interval. Number at top of screen symbol is ground-water head at screen, in feet above or below (-) mean sea level; number at right is chloride content of water, in milligrams per liter, at screen.

Line of equal potential in ground-water body

Number in hand, in feet above or below (-) mean sea level; arrow indicates direction of ground-water movement, mainly in plane of section

Inferred direction of ground-water movement in area not showing equal potential lines

Approximate farthest landward position of the 40 milligrams per liter chloride line

Chloride content of ground water increases with distance from shaded side of line

VERTICAL EXAGGERATION X 20

VERTICAL EXAGGERATION X 20

INTERNAL GEOLOGICAL SURVEY, WASHINGTON, D.C., 1961-1965