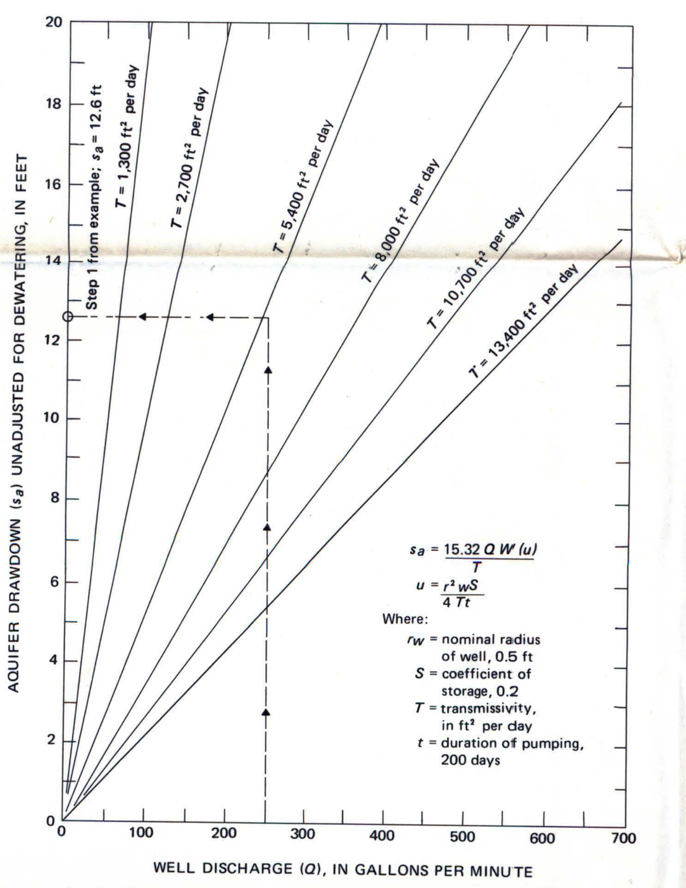
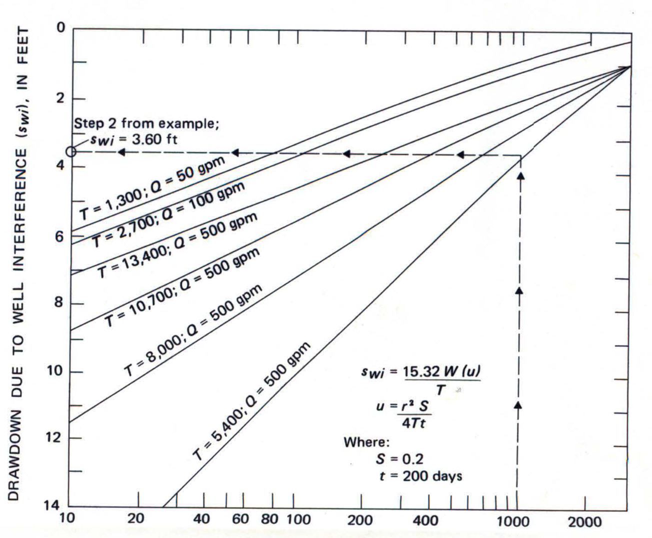
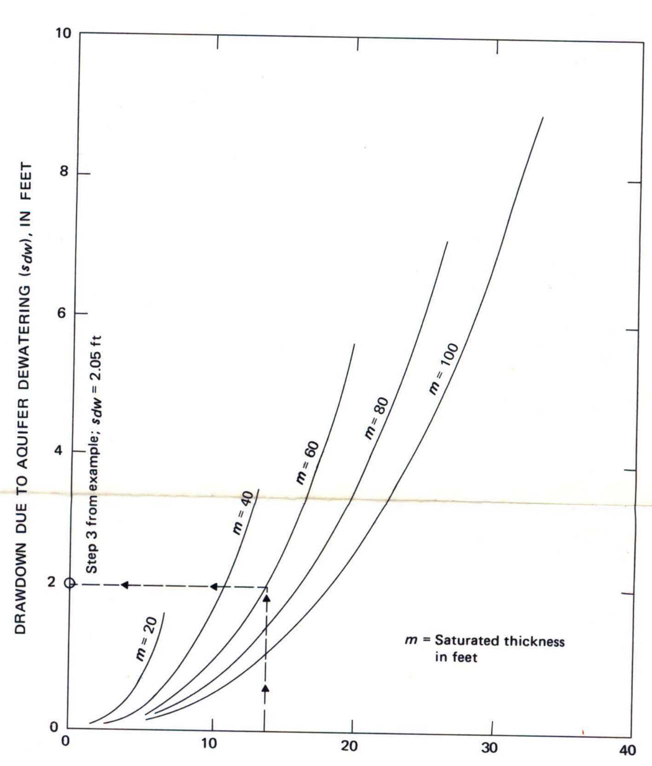


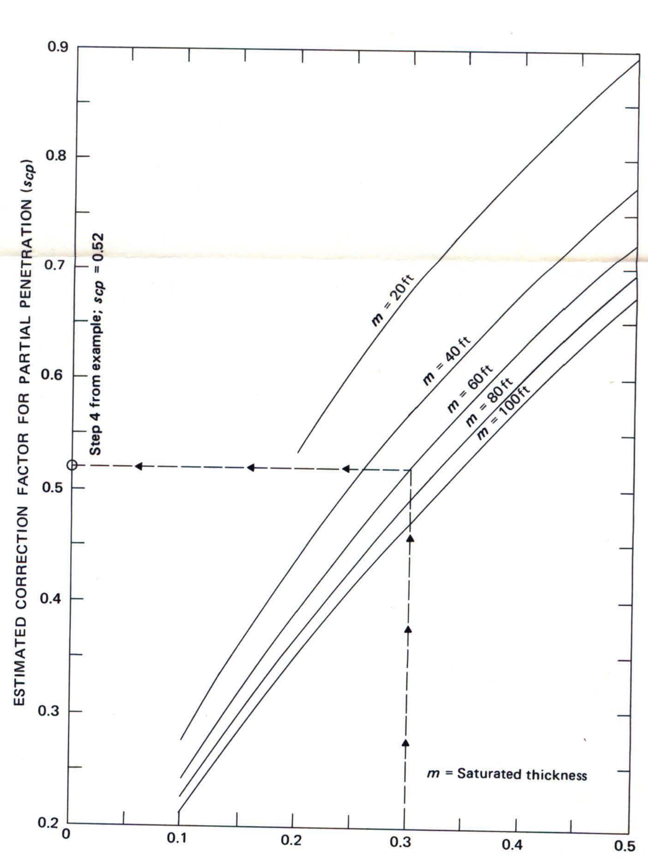
A. RELATION OF WELL DISCHARGE TO DRAWDOWN IN AQUIFER AT WELL



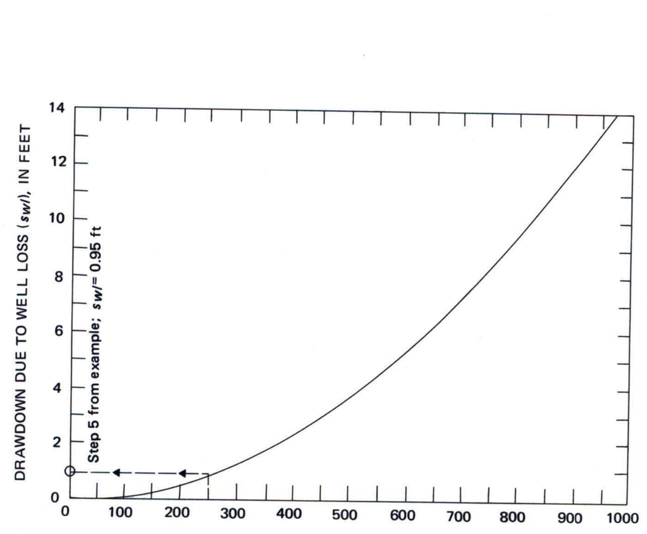
B. RELATION OF DISTANCE FROM PUMPED WELL TO DRAWDOWN DUE TO WELL INTERFERENCE



C. RELATION OF AQUIFER DRAWDOWN TO ADJUSTMENT FOR DEWATERING



D. RELATION OF FRACTIONAL PENETRATION TO ESTIMATED CORRECTION FOR PARTIAL PENETRATION



E. RELATION OF WELL DISCHARGE TO WELL LOSS

ESTIMATING WELL YIELD

(Modified from Rosenshein and others, 1968)

An estimate of the well yield that may be possible at a specified site can be obtained by using the graphs associated with the equation below. The drawdown available for development at the site can be obtained from the accompanying map. In appraising the possible yield of a well, the maximum allowable drawdown should be limited to the saturated thickness at the well available above the screen.

The graphs permit an approximate evaluation of the factors to which most of the observed drawdown in a pumping well is generally attributed. The aquifer drawdown in graph *A* was computed by using a pumping period of 200 days without recharge and should provide a reasonable estimate of drawdown for continuous withdrawal. Drawdown at various distances from the pumped well at rates other than that given in graph *B* can be obtained by the method shown in the example, step 2 (stated below).

For a specified well discharge (Q)

$s_{total} = (s_a + s_{wi} + s_b + s_{dw}) / s_{cp} + s_{wl}$, where:

s_{total} is the estimated drawdown to be anticipated in a well for a specified discharge and aquifer transmissivity;

s_a is an increment of drawdown in a proposed well for a specified discharge and aquifer transmissivity—taken from graph *A*;

s_{wi} is the estimated drawdown due to other wells pumping – taken from graph *B*;

s_b is the estimated drawdown due to boundary effects – may be obtained from graph *B* as the drawdown for twice the measured distance from well site to the aquifer boundary (zero transmissivity line);

s_{dw} is the estimated drawdown due to aquifer dewatering for a specified saturated thickness (pl. 2) – taken from graph *C*;

s_{cp} is the estimated correction factor for partial penetration for a specified saturated thickness – taken from graph *D*;

s_{wl} is the estimated drawdown at the specified discharge due to well loss – taken from graph *E*;

Example – Supply well is needed at site where aquifer transmissivity (T) is 5,400 ft² per day. From plate 2 the saturated thickness is about 60 feet. Yield desired is 250 gpm and proposed screen length is 18 feet. Screen is to be set in lower part of aquifer. Proposed site of new well is about 1,000 feet from existing well discharging 150 gpm; aquifer transmissivity is the same.

$s_{total} = (s_a + s_{wi} + s_b + s_{dw}) / s_{cp} + s_{wl}$

Step 1: From graph *A* (follow arrows) for a discharge of 250 gpm and T = 5,400 ft² per day, s_a is 12.6 feet.

Step 2: From graph *B* at 1,000 feet from existing pumping well for a T = 5,400 ft² per day and a well discharge (Q) of 500 gpm, s_{wi} is 3.60 feet.

Drawdown at any distance is directly proportional to the pumping rate (Q).

In graph *B*, s_{wi} is proportional to Q; actual discharge of existing well is 150 gpm;

s_{wi} = 150 gpm/500 gpm x 3.60 feet = 0.3 x 3.60 feet = 1.08 feet.

Because the new well is not near a boundary, s_b is 0;

Step 3: From graph *C* (follow arrows) for $s_a + s_{wi} + s_b$ of 13.68 feet and saturated thickness of 60 feet, s_{dw} is 2.05 feet.

Step 4: To determine s_{cp} an estimate of fractional penetration is needed.

Fractional penetration (graph *D*) = $\frac{18 \text{ feet}}{60 \text{ feet}}$ = 0.30.

From graph *D* for a fractional penetration of 0.30 and a saturated thickness of 60 feet, s_{cp} is 0.52.

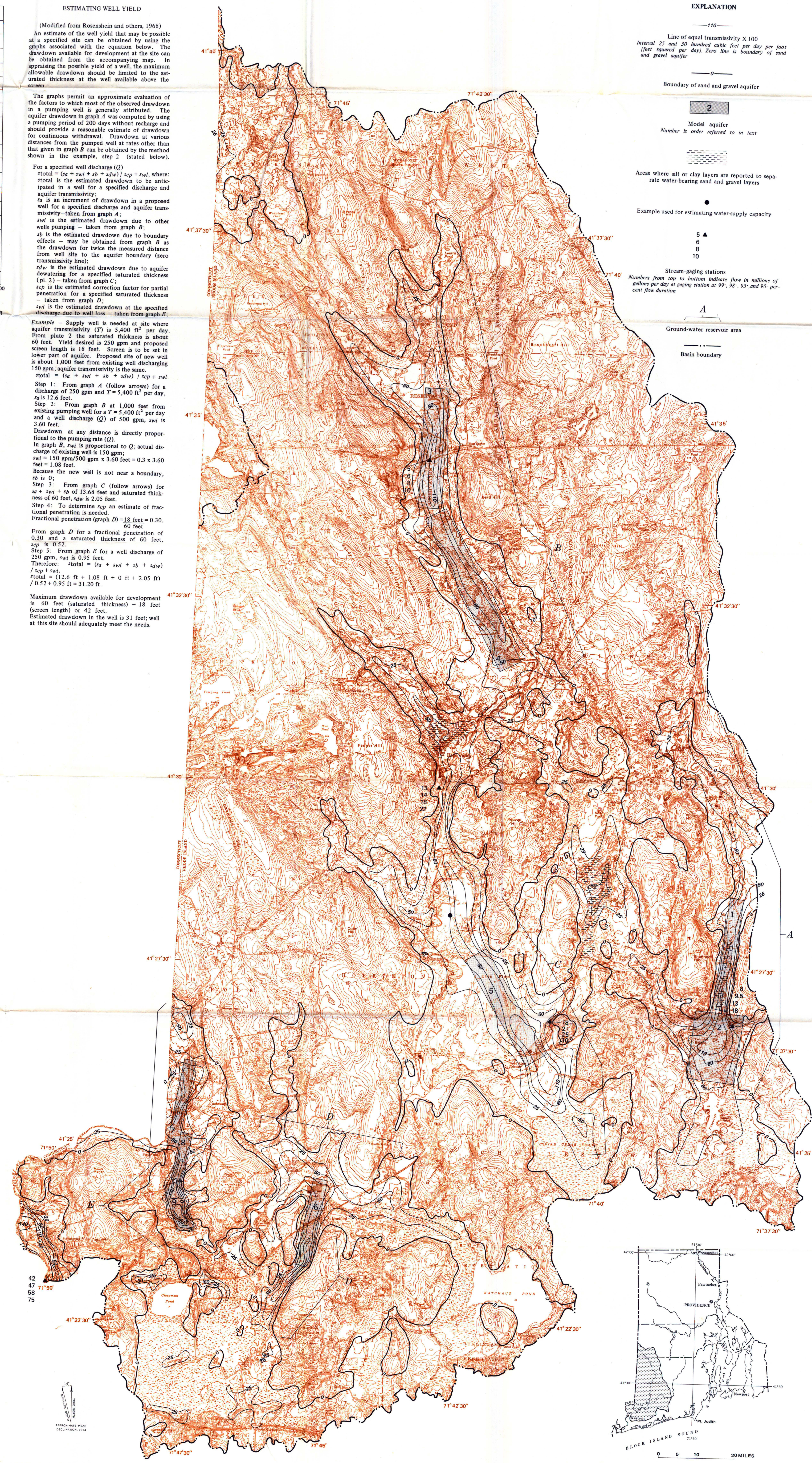
Step 5: From graph *E* for a well discharge of 250 gpm, s_{wl} is 0.95 feet.

Therefore: $s_{total} = (s_a + s_{wi} + s_b + s_{dw}) / s_{cp} + s_{wl}$,

s_{total} = (12.6 ft + 1.08 ft + 0 ft + 2.05 ft) / 0.52 + 0.95 ft = 31.20 ft.

Maximum drawdown available for development is 60 feet (saturated thickness) – 18 feet (screen length) or 42 feet.

Estimated drawdown in the well is 31 feet; well at this site should adequately meet the needs.



INDEX MAP OF RHODE ISLAND

Base from U. S. Geological Survey 1:24,000
Ashaway, Watch Hill, Carolina, Voluntown,
Hope Valley, 1942–53; Coventry Center,
Slocum, 1941–55; Kingston, 1942–57;
and Oneco, 1943–53

SCALE 1:48 000

1 ½ 0 1 2 3 MILES

1 .5 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL

TRANSMISSIVITY OF THE SAND AND GRAVEL AQUIFER IN THE LOWER PAWCATUCK RIVER BASIN, RHODE ISLAND, AND GRAPHS FOR ESTIMATING WELL YIELD

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