

SO, YOU WANT TO DRILL A NEW WELL!

A Discussion of the Process of
Planning, Drilling, and Testing a
New Water Well



Decisions Have Consequences

A drilling project
can be looked at
as a series of
decisions

Unfortunately
most of the
decisions get
locked in place
as steel and
cement



Drilling Projects are Critical Path Projects

**KNOWING AND DOING
THE RIGHT THINGS IN THE RIGHT
ORDER IS IMPORTANT**

**YOUR MOM TAUGHT YOU CRITICAL
PATH THINKING WHEN YOU WERE
VERY YOUNG**

First Your Socks then shoes!



THE DRILLING PROJECT VERSION: MUCH MORE COMPLICATED

YOU NEED TO KNOW THINGS

YOU NEED TO THINK THROUGH THE WHOLE PROJECT

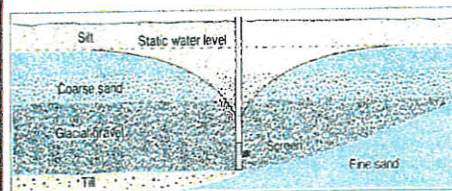


Figure 16.21. Cross section of well showing the thinning gravel deposit.



Time (min)	Discharge (m³/s)	Time (min)	Discharge (m³/s)
1	0.00	20	0.00
15	0.00	30	0.00
2	0.00	40	0.00
25	0.00	50	0.00
3	0.00	60	0.00
4	0.00	70	0.00
5	0.00	80	0.00
6	0.00	90	0.00
7	0.00	100	0.00
8	0.00	110	0.00
9	0.00	120	0.00
10	0.00	130	0.00
11	0.00	140	0.00
12	0.00	150	0.00
13	0.00	160	0.00
14	0.00	170	0.00
15	0.00	180	0.00

The coefficient of storage is also available from the velocity of the water in the well. The following equation is derived from Equation 16.1.

$$S = \frac{V}{V_0} \left(\frac{V_0}{V} - 1 \right) \quad (16.1)$$



The Primary Phases

- Planning the project (and funding it)
- Defining the actual work and selecting contractors
- Drilling the well
- Completion and development of the well
- Proper testing of the well
- Formal documentation of the project



Project Planning

- Define the needed production from the well
- Select the appropriate site for the well
- Preliminary design – drilling method, casing diameter(s), depth, likely completion method
- Assess availability of contractors to accomplish the work

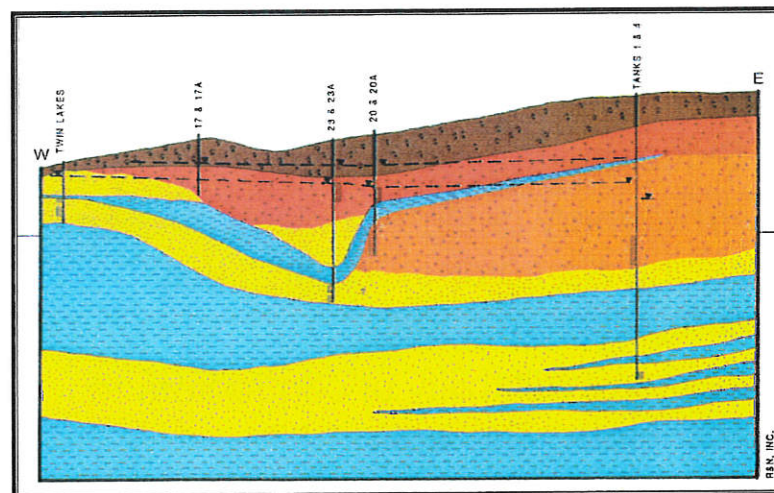


Specifications for the contract

- Technical Specifications
- A detailed description of the drillers job
- Definition of how things are measured and paid
- Contingency discussions for changes
- General Specifications (aka boiler plate contract documents)
- Requirements of contract
- Payment method and schedule
- Insurance and liability



IT IS A COMPLICATED WORLD
IN WHICH YOU WILL DELVE



ONCE YOU HAVE SPECIFIED THE JOB, YOU HAVE ALREADY MADE DECISIONS

Drilling Rig

Casing size

Max depth you can reach

Possible types of Completion

Maximum production

Pumping Equipment that can be used

Testing that can be done

- AT THE VERY LEAST BE AWARE THEY ARE MADE AND
- MAKE SURE YOU KNOW THESE DECISIONS HAVE CONSEQUENCES TO THE PROJECT

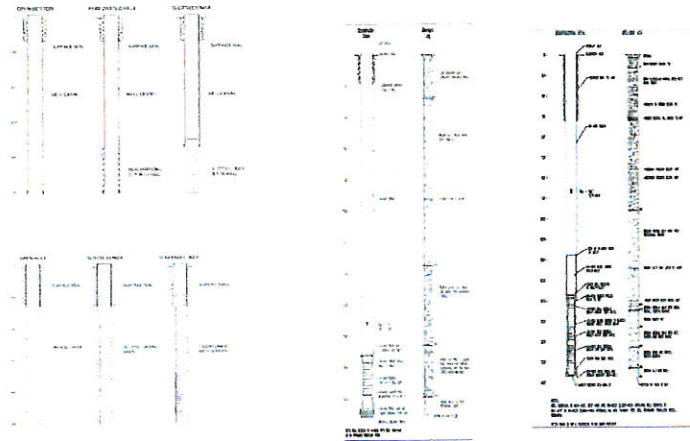


Drilling the hole – observing the geology

- The geology dictates all
- Observe the cuttings (Samples)
- Observe the rig response
- Observe the well response (water)
- Listen to those who know –drillers & consultants

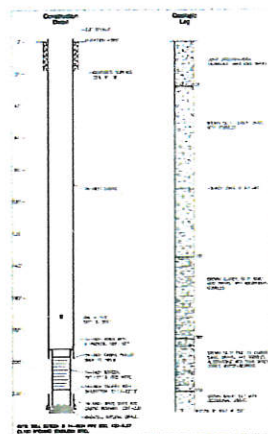


Assessing the design options

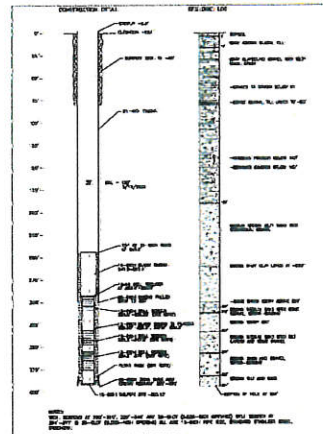


Completing the well

Direct Screen design

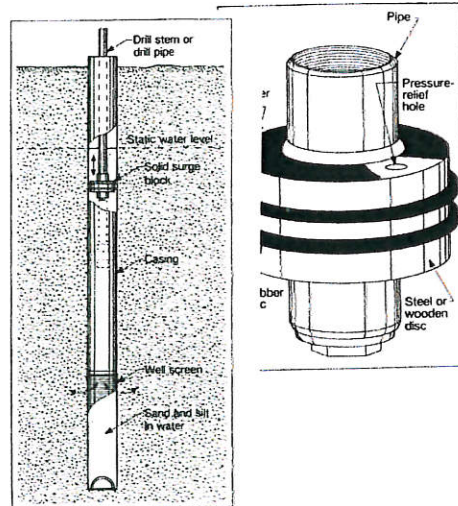


Gravel-pack Design



Development of the Well – important!

- Development has many methods
- Surging, air-lift, jetting, chemicals
- Surging is most common in our area for larger production wells



Testing the Well

**WELL TESTING IS NOT ABOUT
WATER
IT IS ABOUT INFORMATION**

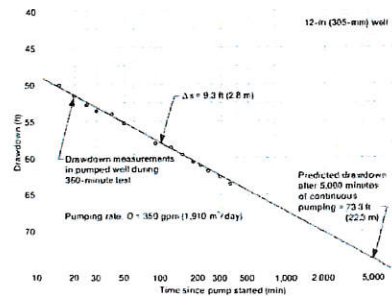
YOU MUST BE ABLE TO
PROJECT THE LONG-TERM
WELL PERFORMANCE

ONLY PROPER PROCEDURES
AND ACCURATE DATA CAN
DO THAT

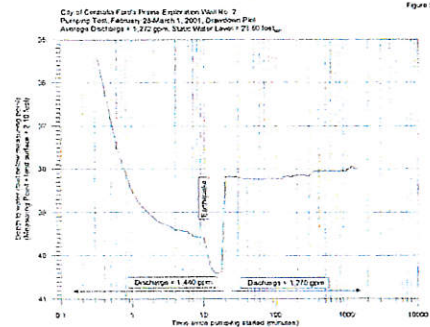


TEST DATA TELL THE TALE

Normal Drawdown Curve

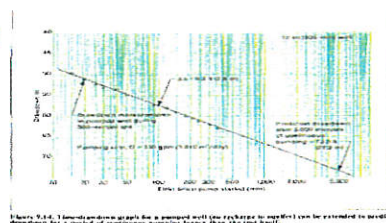


Earthquake During Test



Interpretation of Test Data

- DOES THE DRAWDOWN HOLD ITS PATTERN?
- IS THE DRAWDOWN LESS THAN WOULD BE EXPECTED? (INDICATION OF POSITIVE BOUNDARY)
- IS DRAWDOWN MORE THAN EXPECTED? (NEGATIVE BOUNDARY)
- WAS RECOVERY FULL?
- TIMELY?



Rating the Well's Production

- Available drawdown
- Practical design drawdown
- Specific Capacity of well
- Transmissivity of aquifer
- Long-term well capability



Project Documentation (for posterity)

- Keep records of key decisions and their rationale'
- Include both graphics and text to describe what is
- Include basic data where appropriate (test data, lab reports of water quality)
- Clearly state well operation recommendations

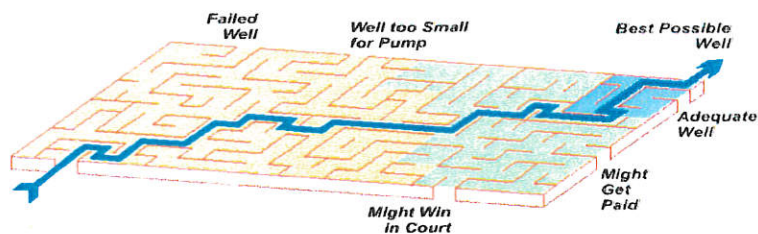


REGULATORY NEEDS & DEFINITION OF PROPERTY AND WELL

- Provide information needed to:
- Demonstrate siting compliance
- Meet regulatory submittal needs
- Support Wellhead protection Planning
- Meet Health Department Requirements



GOOD DECISIONS MAKE GOOD WELLS THE WORLD IS WET - LIFE IS SWEET



BEST POSSIBLE WELL
BEST POSSIBLE OUTCOME
MOST EFFECTIVE NEW SOURCE



CONTACT INFORMATION



- THANK YOU FOR THE OPPORTUNITY TO ADDRESS THE THURSTON COUNTY PURVEYORS GROUP



- **QUESTIONS?**
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