FIGURE 11.1 Components of total hydraulic head, elevation head $h_e$, and pressure head $h_p$, controlling flow in a sandstone layer.
FIGURE 11.2 Relation of flowlines to equipotential lines in a small drainage basin: (A) view of upland area; (B) cross-sectional view of basin. (All units in feet.)
FIGURE 11.3 Darcy apparatus.
Figure 3.11  Typical hydraulic conductivity–matric potential curves for a sandy and a clayey soil.
Conceptual Model of Water Dynamics

- Ground water pumping
- Irrigation
- Crop transpiration
- Precipitation
- Riparian transpiration
- Evaporation
- LFCC gain
- Drain
- Low Flow Conveyance Channel
- Rio Grande flow and seepage
- Rio Grande
- Ground water gains
- Ground water losses
Monitoring Network

- 7 transects over ~50 miles
- ~175 monitoring wells
- 25 surface-water-level gauges
- ~70 transducers taking hourly water level readings
Monitoring Transect Cross Section

Socorro Main Canal
LFCC
Rio Grande
Groundwater Levels Rise in Winter

Cross Sectional Time series data at Highway 380 (San Antonio)
Groundwater Levels Rise in Winter
ESC-E03 - Water Level Diurnal Fluctuations

![Graph showing water level diurnal fluctuations for ESC-E03, with dates from 29-May-03 to 05-Jun-03 and groundwater elevation range from 4606.4 to 4607.2. The graph compares data for E03A and E03B.]
San Acacia Transect Hydrograph for the September 2003 Flood Event

<table>
<thead>
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<th>Date</th>
<th>Water Elevation (ft)</th>
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- River Stage
- Closest Wells
- Intermediate Well
- Furthest Wells
Highway 380 Transect: September 2003
Calculated Vertical Gradients

River Stage

Downward Flow

Upward Flow

A/B Well Gradient

A/C Well Gradient

B/C Well Gradient
Aquifer Testing
0.5 miles north of Highway 380 in San Antonio
Time-drawdown of nested well W07A,B,C

Elapsed Time (min)

Drawdown (ft)

Legend
- Well 0-20 feet
- Well 40-50 feet
- Well 80-90 feet

Clay Layer

LFCC Rio Grande
FIGURE 11.15 Bar graph showing streamflow depletion due to pumping wells G and H. (Modified from GeoTrans Newsletter, Woburn Toxic Trial, GeoTrans, Herndon, VA, June 1987, pp. 1-3.)
FIGURE 11.19 Schematic diagram showing horizontal radial flow to a pumping well completed in a confined aquifer.
FIGURE 11.20 Outline of the capture zone of a well in a uniform flow field.
FIGURE 11.21 Computed capture zone of the well in Example 11.4.
Basalt formations that compose the Eastern Snake River Aquifer, Idaho
Discharge of the Eastern Snake River Plain aquifer from basalt cliffs above the Snake River gorge
Karstic limestone along the Yangtse River in the Three Gorges region, China