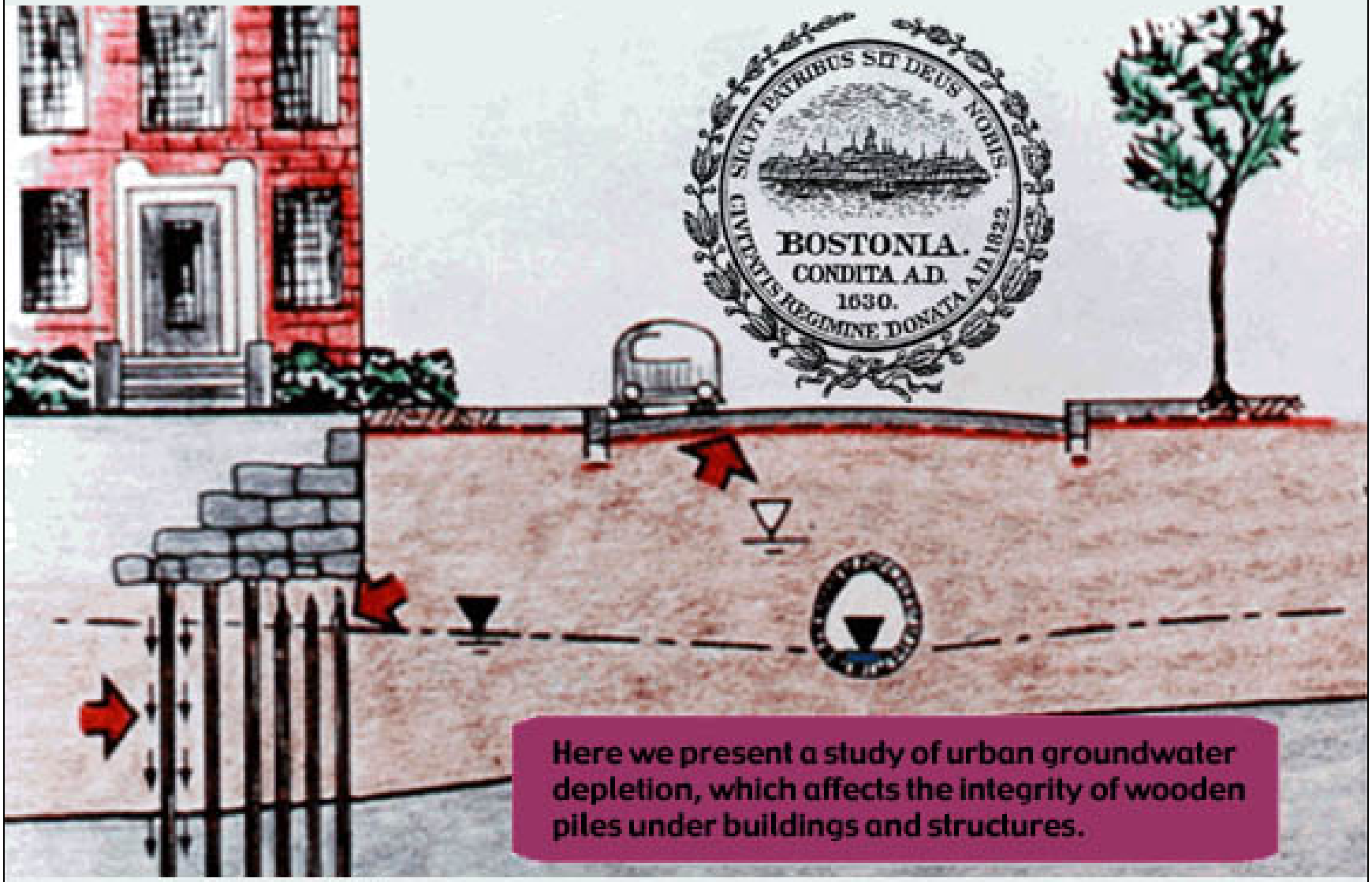
Boston Groundwater Trust



Here we present a study of urban groundwater depletion, which affects the integrity of wooden piles under buildings and structures.

Image courtesy Haley & Aldrich

BOSTON’S GROUNDWATER PROBLEM

THE PROBLEM

Boston has the highest percentage of filled land of any major city in the U.S. Buildings constructed on this land must generally be supported on pilings; until the 1930's, these pilings were almost all wood. Wood pilings will last indefinitely if kept wet, but rot if groundwater levels drop. Because of many infrastructure changes over the years, those levels have dropped, leading to foundation failures.

HOW WIDESPREAD?

- Foundation problems because of lowered groundwater levels have been identified in Fenway, Chinatown, Beacon Hill, Back Bay, and South End
- Potential problems have been cited in the North End and the Fort Point Channel area
- There have been indications of problems in East Boston
- Areas of the central Boston waterfront may be vulnerable

COST OF REPAIRS

- The standard repair for a building suffering wood piling failure is to underpin the structure, replacing the rotted sections of piling with concrete wrapped steel.
- The cost for one typical South End rowhouse can exceed $250,000.
- Larger structures have cost over $1,000,000 to underpin.
- This does not factor in the cost of disruption.
- Insurance generally does not cover the cost.

CITY RESPONSE

- Founded Boston Groundwater Trust to monitor problem
- Increased Trust's operating funds
- Required new projects in affected area to monitor groundwater levels during construction and turn wells over for monitoring by Trust
- Established city policy that groundwater levels are not to be reduced and built implementation of this into project review process

COMMONWEALTH RESPONSE

- Provided $1,600,000 to install groundwater observation wells in the affected area
- Designated Deputy Secretary of Commonwealth Development as prime contact for issue
- Convened joint city-state working group

WHERE ARE THE WELLS?

- We are currently monitoring 461 wells located in Back Bay, Fenway, South End, Bay Village, Chinatown, and Beacon Hill
- We will be adding about 350 additional wells in those neighborhoods plus Bulfinch Triangle, North End Waterfront, Downtown Waterfront, Fort Point Channel, and East Boston

WHAT WE LEARNED

- Groundwater levels throughout the area studied are lower than natural level
- Lowest levels appear to be concentrated in identifiable areas
- Groundwater levels do not change substantially because of weather
- A small number of well readings can change dramatically in very short periods of time

WELL READINGS
AS OF MARCH 2005

- 23% low risk (elevation above 7’ bcb)
- 40% marginal risk (elevation 5’-7’ bcb)
- 37% high risk (elevation below 5’ bcb)

Approximately 8% of the wells have very low readings, below 3’bcb

STATE AGENCIES POTENTIALLY CAUSING LOWERED GROUNDWATER LEVELS

- MBTA – Low levels observed along Southwest Corridor and near Green Line tunnels on Boylston Street and Huntington Avenue
- DCR – Consistently low groundwater levels observed near Storrow Drive underpass
- MTA – Potential piling problems have been identified in the press near the Big Dig and Sumner and Callahan Tunnels

WHAT THE LEGISLATURE CAN DO

- Create a structure to formalize the city-state cooperative relationship
- Assure that state agencies repair any infrastructure that may be lowering groundwater levels
- Pass legislation that would prohibit property owners, utilities, or agencies from lowering groundwater levels in affected areas

TO FIND MORE INFORMATION

Visit the Boston Groundwater Trust website, www.bostongroundwater.org, to find:

- Observation well locations
- Groundwater level readings for each well over time
- More details on the problem
- BGwT comments on specific projects