

NEW WATER MANAGEMENT STRATEGIES FOR OUTDATED CONVENTIONAL INFRASTRUCTURE DESIGNS

INTRODUCTION:

In the last century water management practices for water supplies and waste water disposal have changed very little in the form of philosophy or approach in design. In summary centralized filtration and treatment systems procured water from locally available sources be it surface or underground aquifers, polished it to drinking water standards, and through pressurized piping systems provided “running” water at the consumer end.

At the other end used and “dirty” water was channeled into larger low pressure piping systems and channeled either as a direct discharge, or to treatment facilities to “clean” the water before it was discharged. For the most part the systems were hidden underground or located in remote areas of the community, and the average consumer knew little of the dynamics or structure. As long as water flowed when the faucet was turned on and the “toilet flushed”, life was good, and there was no need to fix something that is not broken.

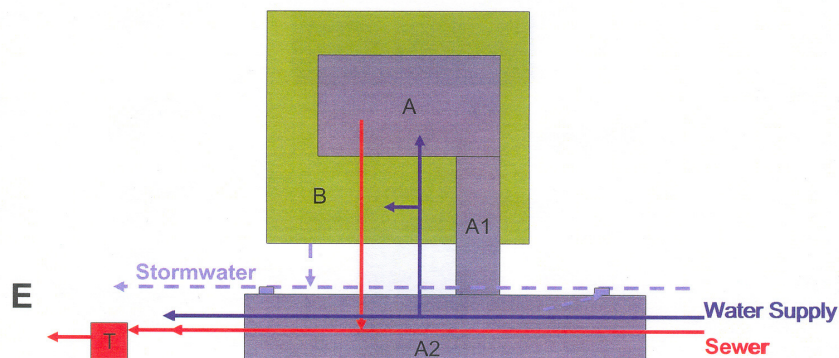
Population increases, migration shifts to live in “sunny” desert environments, drought, and higher volume and quality demands have provided supply pressures on existing water supplies. In many locations supply shortages are reaching a critical level. On the waste water side - pollution, environmental degradation, treatment costs, increased discharge regulations, and public awareness have increased pressures on improving the disposal of waste water.

Traditional systems are indeed broken and need to be fixed.

CONVENTIONAL DESIGN

While physical buildings and surrounding areas have an infinite variation in form, size, occupancy and function; in terms of water management all community structural developments can be summarized in the following diagram of Fig. 1.

Fig. A – Conventional Infrastructure For Water Management



Any development whether it is a single family house, a high rise building, a shopping mall or sports complex must have access by a driveway (A1) from the street (A2). The erected structure on the development lot (A) along with the traditionally impervious surfaces of (A1) and (A2) form a water shedding surface.

Structures (A) are often surrounded by variable sizes and designs of landscape areas (B) for functional and aesthetic purposes. Landscape areas (B) may be small landscape gardens, small turf areas or large athletic fields on specific developments. Although absorptive landscape areas can traditionally absorb some of the water from rain events, the current practices of using traditional soils with a compacted clay content combined with code driven surface slopes of 1% or larger cause rain water simply to shed to low points of the property. Thereby to manage the overall cumulative storm events shed by (A), (A1), (A2), and (B), the common wisdom is to construct a curb and gutter system at street level. These systems, though mathematically functional on the initial design plans are frequently overwhelmed by real life storm events due to plugged debris at catch basin openings, sediment accumulations in the transfer pipes, or downstream cumulative back-up. The net result is temporary flooding events.

Even historically dry desert climates as in Dubai, UAE are not immune from these events.

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A flooded Springs compound after overnight showers in Dubai. Residents in adjoining communities said clogged drains aggravated the waterlogging. Kelly Crane/Gulf News

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Though intended for storm water relocation, conventional “curb and gutter” designs are also by nature street litter and pollution drains. Litter, animal droppings, automobile wash water, engine drippings, eroded soil etc. are simply intentionally or naturally washed away into the storm drain system to be dumped (or occasionally treated) somewhere downstream into larger bodies of water (rivers, bays, oceans).

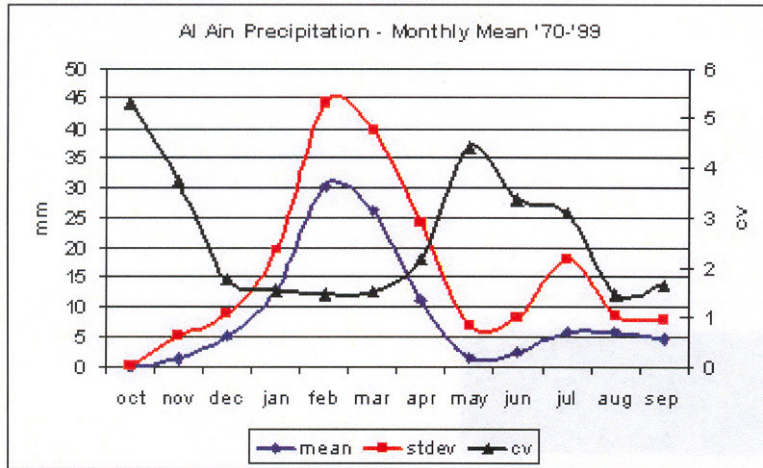


Fig. 2 – EPIC Infrastructure For Water Management

