

GREENING THE BRONX WASH



The Drachman Institute
College of Architecture and Landscape Architecture
THE UNIVERSITY OF ARIZONA · TUCSON, ARIZONA

“There is an urgent need for an alternate basis for urban landscape form that is in tune with the growing awareness of, and concern for, the issues of energy, environment and natural resource conservation.”

Michael Hough

Prepared by The Drachman Institute:
Katie Gannon, MLA - Landscape Architecture Staff, The Drachman Institute

Prepared for:
Northwest Neighborhood Association, Tucson, Arizona

The work that provided the basis for this publication was supported by funding under Grant Number COPCAZ-05-667 with the U.S. Department of Housing and Urban Development, Office of University Partnerships. The author and publisher are solely responsible for the accuracy of the statements and interpretations contained in this publication. Such interpretations do not necessarily reflect the views of the Government.

November, 2007



The Drachman Institute
College of Architecture and Landscape Architecture
The University of Arizona
Corky Poster, Director
Marilyn Robinson, Associate Director

The Drachman Institute is the research and public service unit of the College of Architecture and Landscape Architecture at the University of Arizona, dedicated to the environmentally sensitive and resource-conscious development of neighborhoods and communities. The Drachman Institute dedicates its research and outreach activities to the proposition that housing is the building-block of neighborhoods, and neighborhoods are the building-blocks of communities.



The back-of-curb area is not conducive to pedestrian movement.

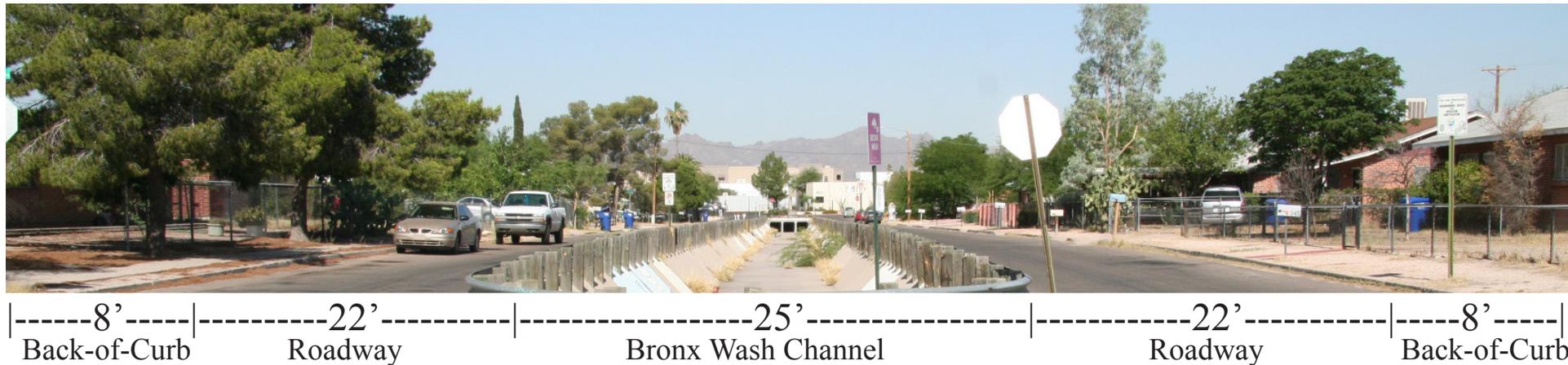


The harsh cement channel of the Bronx Wash dominates Linden Street.



The 85' right-of-way lacks any pedestrian facilities and is almost entirely covered by asphalt and cement.

LINDEN STREET RIGHT-OF-WAY



- All Linden Street lies within the 100 year flood plain, up to the curb.
- Addition of any obstructions will cause the flood plain to rise
- Bronx Wash watershed includes upstream neighborhoods of Jefferson Park, Feldmans, & El Cortez Heights. It flows downstream through Ocotillo-Oracle, Barrio Blue Moon and under the freeway to the Santa Cruz River.

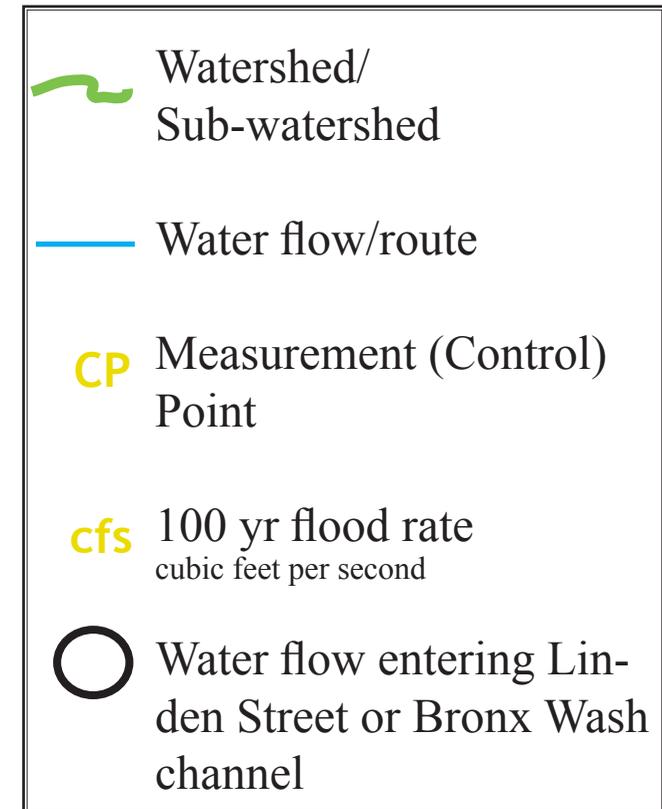
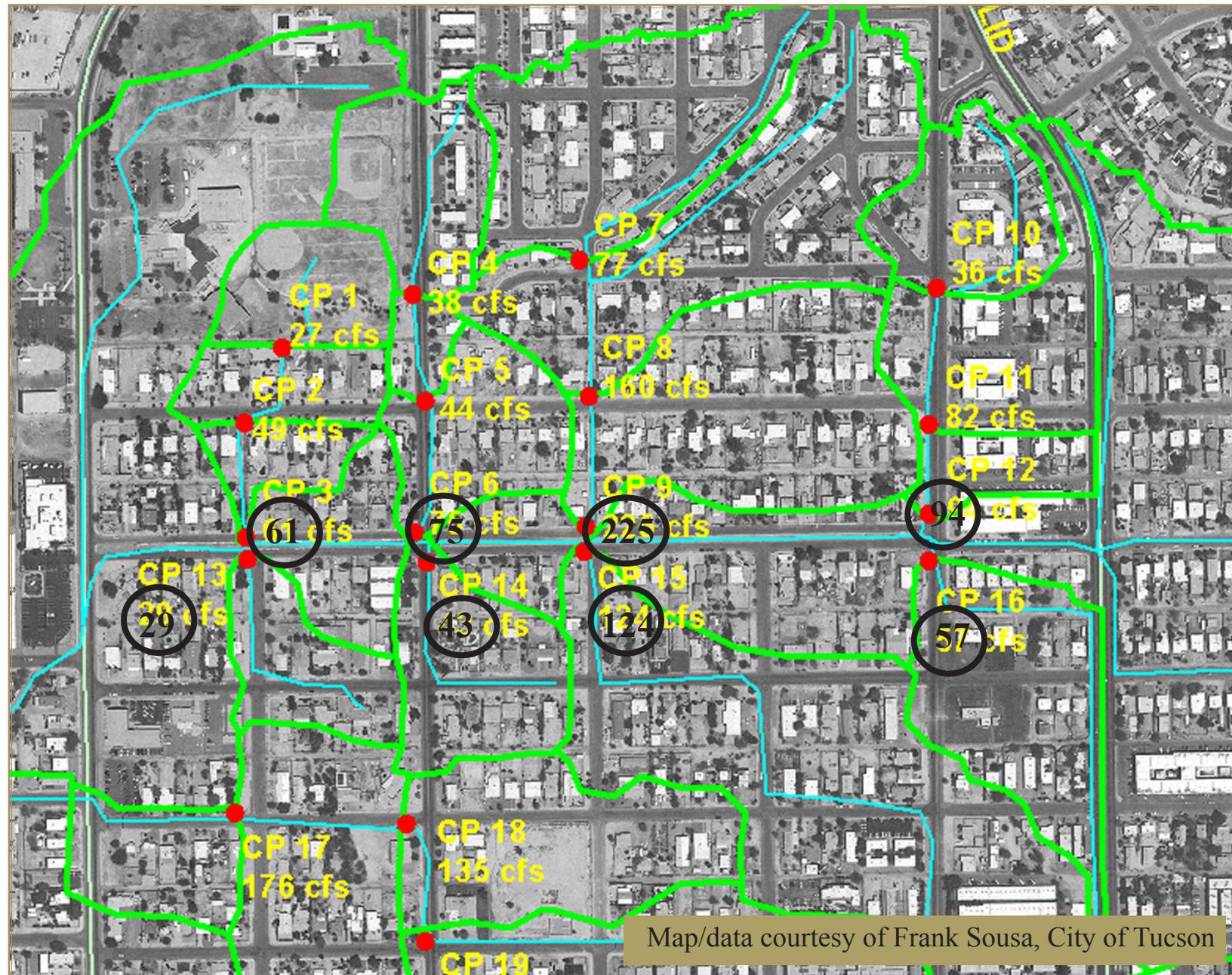
PROJECT GOAL

Improve the walkability of Linden Street through simultaneous enhancement to pedestrian (and automobile) safety, 1) increased infiltration of run-off, 2) creation of a continuous street tree system along a five-block section of Linden Street, and 3) improve both automobile and pedestrian safety.

- Convert Linden Street to one-way traffic on each side of channel.
- Reduce Linden Street width by 2 feet on each side of the channel.
Currently roadways are 22'-wide, with two-way traffic, and on-street parking.
Proposed width is 20'-wide, with one-way traffic, and on-street parking.
- Create a 2'-wide armored infiltration strip adjacent to the channel where surface flows on street permit.
- Plant the infiltration strip with vertical trees, forming a hazard delineation along the channel edge, simultaneously increasing infiltration capacity, creating shade and improving appearance of the street.
- Tree plantings create strong visual hazard delineation where intersecting and dead-end streets meet the Bronx Wash channel.



BRONX WASH WATERSHED FLOW DATA



CONCEPT PLAN



Proposed Sustainable Urban Drainage (SUD's) improvements, Linden Street at the Bronx Wash, Northwest Neighborhood



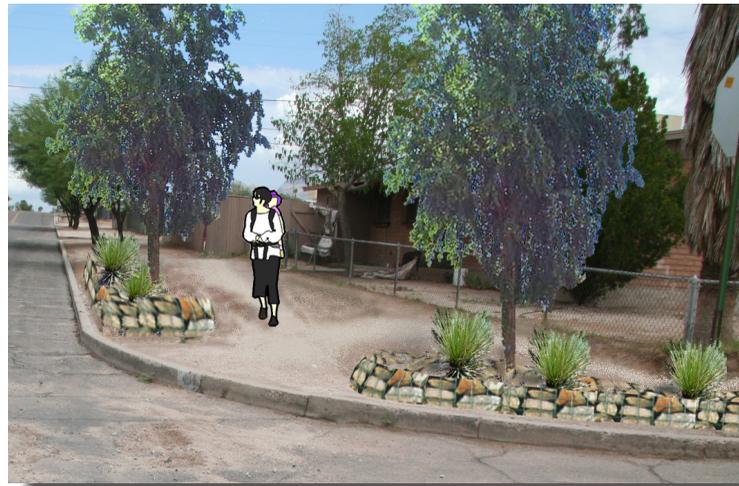
Infiltration Basins



Large capacity, vegetated basins, double as inviting neighborhood spaces.



Retention Devices



Corner structural devices retain soils and surface flow in reinforced basins.



Infiltration Strips



Two-foot wide, rock-armored strips along the edge of Linden Street, adjacent to the Bronx Wash channel allow light surface flows to infiltrated into the ground.



Put large useless and unsightly areas to multiple good uses; retention basins with lush vegetation and benches become amenities for the community rather than eyesores and heat sinks.

INFILTRATION BASINS



Linden Street at 6th Avenue, looking east



Southeast corner of Linden and 6th Avenue after multi-use infiltration basin.



Small basin and shaded sitting wall, with neighborhood signage/art at Linden Street & 1st Ave., looking southeast.





CORNER RETENTION DEVICES

- Retain precious desert topsoil, capture run-off, support extensive street tree system.
- Maximize rain fall as a resource to keep, rather than a hazard directed away at every opportunity.
- Constructed retention devices prevent erosion, attenuate peak flow, & support lush vegetation.



Erosion and soil loss, Linden Street at 1st Ave.

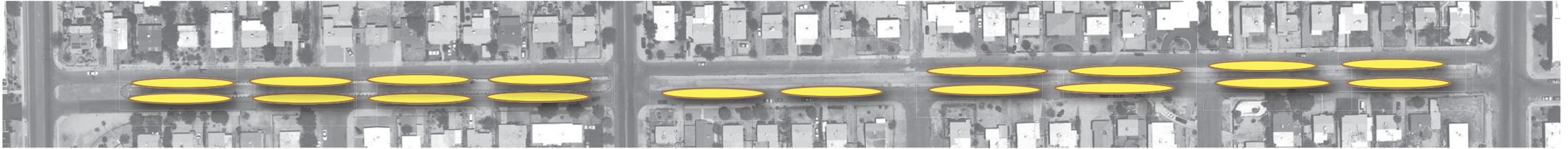


4th Avenue at Linden Street, SW corner



Dunbar Spring, Tucson, lush drainage basins

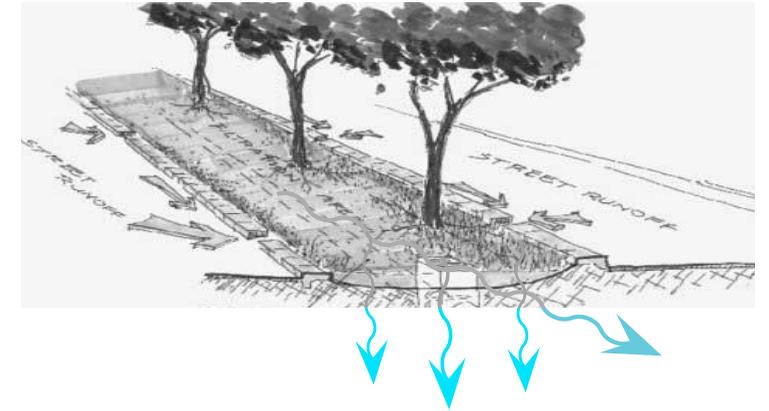




INFILTRATION STRIPS



The proposed infiltration strip is a 2-foot strip of rock-clad earth, with narrow vegetation that canopies over the channel. Located between along the roadway adjacent to the channel, the strip captures and infiltrates the majority of surface flow from low-flow events. High flow events will spill flow along the roadway and spill into the channel as before.



Looking west down Linden Street (near 1st Ave.).
FEMA 100-year flow rate along this strip Linden is less than 94 cfs.



DRAINAGE SYSTEMS

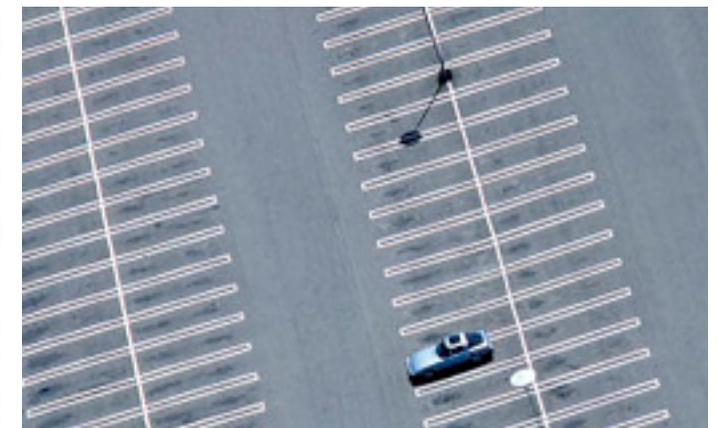
Principles of Sustainable Urban Drainage Systems (SUDS)

- Attenuate flow
- Reduce peak flow and increase duration of flow event
- Divide into sub-catchment, layer management strategies
- Manage drainage close to source



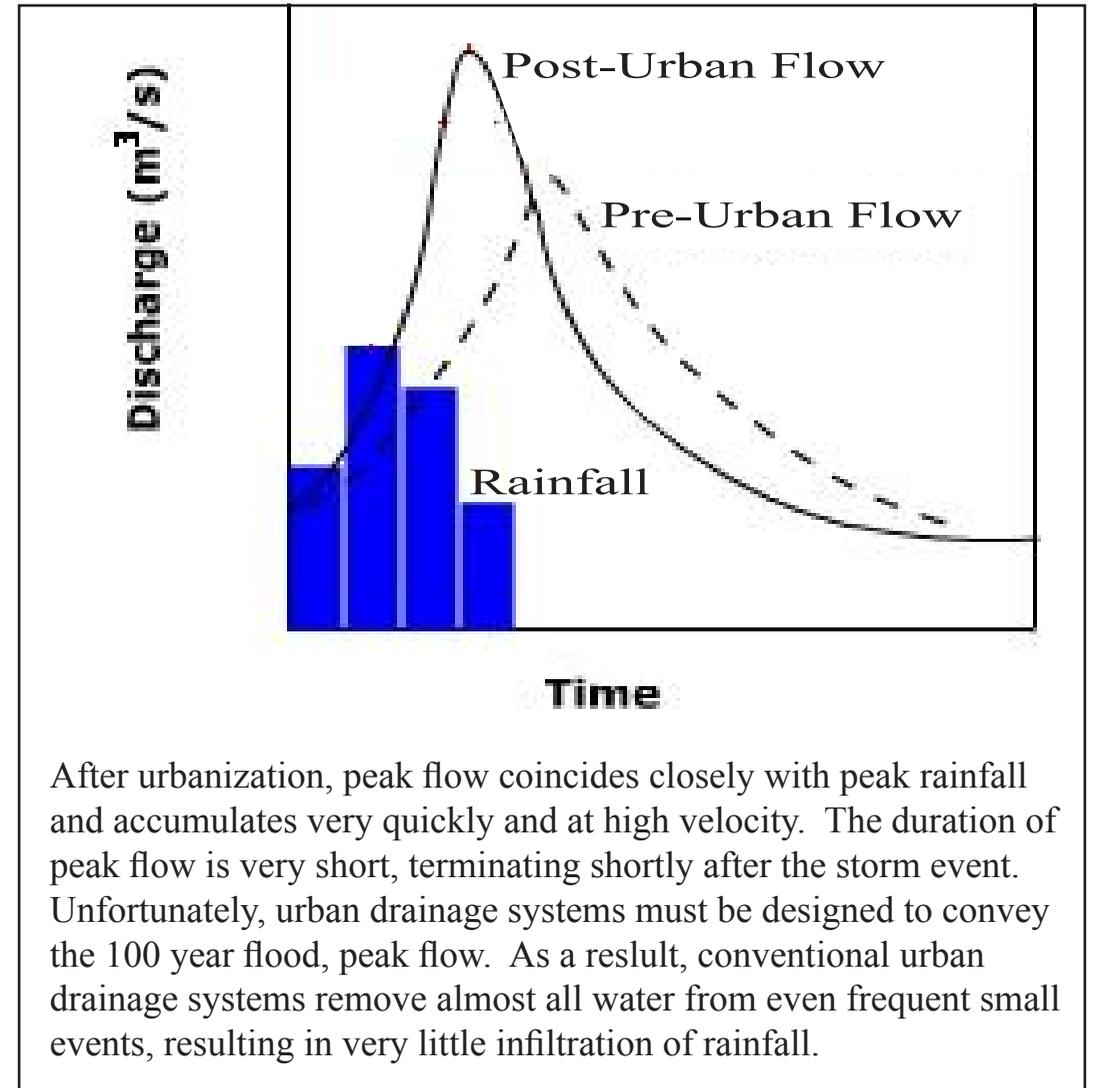
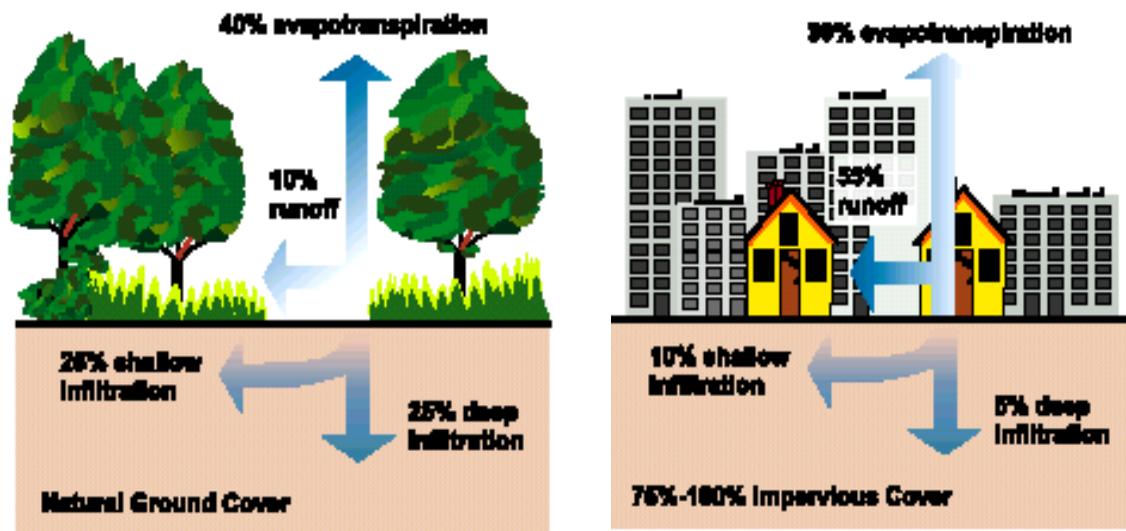
Conventional Engineered Drainage Systems

- Are straight, cement-lined
- Increase speed & volume of water flow
- Destroy critical habitat
- Exacerbate flooding & erosion downstream
- Eliminate infiltration/recharge opportunities



URBANIZATION & DRAINAGE

The natural hydrologic process is an essential life process that filters, infiltrates and conserves rainwater. Riparian systems are integral to the hydrologic process.



After urbanization, peak flow coincides closely with peak rainfall and accumulates very quickly and at high velocity. The duration of peak flow is very short, terminating shortly after the storm event. Unfortunately, urban drainage systems must be designed to convey the 100 year flood, peak flow. As a result, conventional urban drainage systems remove almost all water from even frequent small events, resulting in very little infiltration of rainfall.



Riparian Systems

- Provide habitat, for both humans and wildlife
- Support richness/diversity of species
- Provide critical hydrological functions: filtration, infiltration, conveyance
- Reduce urban heat island effect
- Improve quality of life

