The Desert Anomaly,

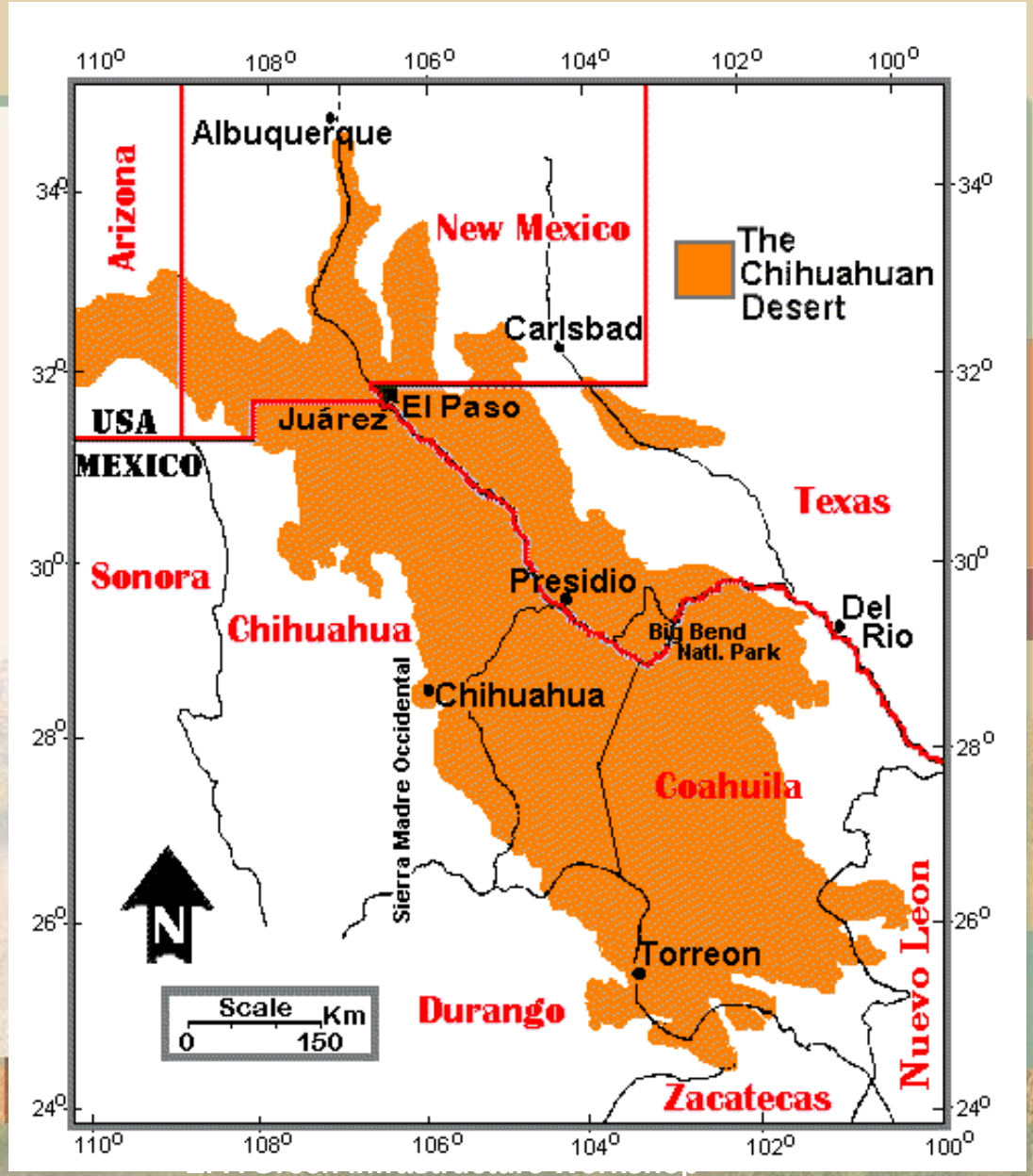
Drylands Green Infrastructure

George Radnovich, ASLA

Sites Southwest

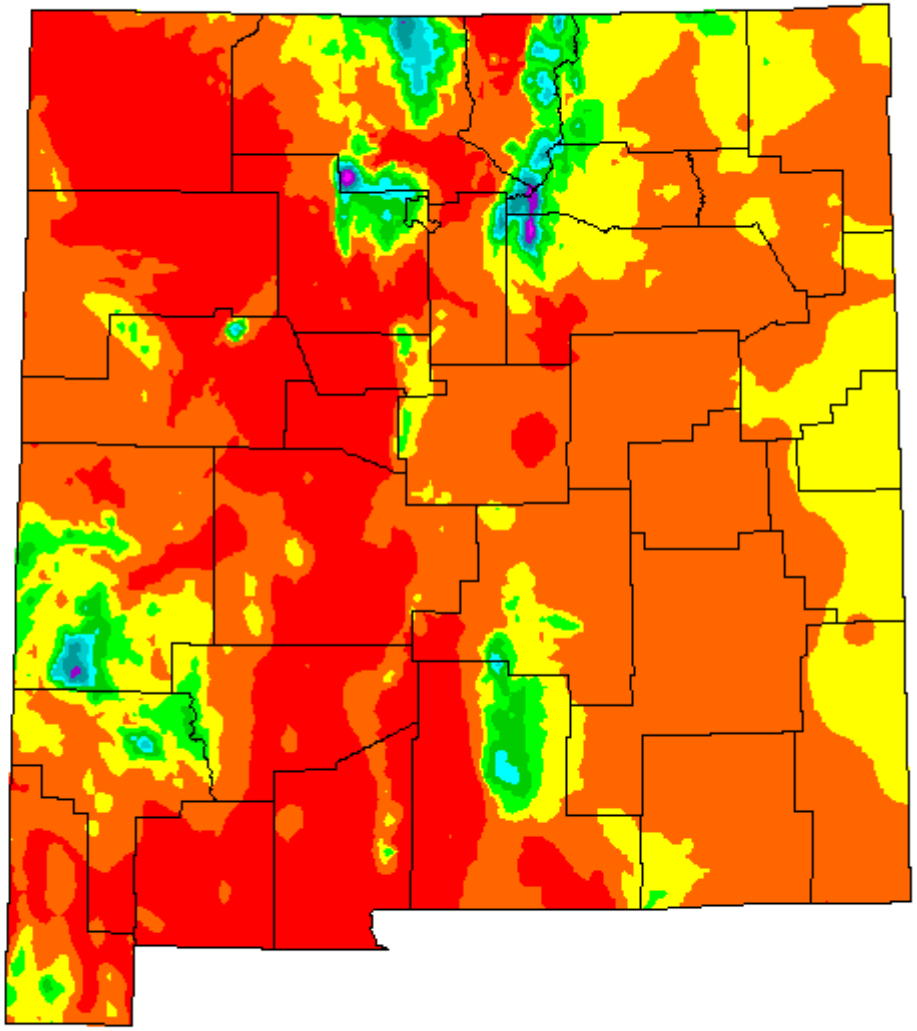
True sustainability can only be achieved by linking water use with it's environment, site engineering and land use.

Chihuahuan Desert



Average Annual Precipitation

New Mexico



Legend (in inches)

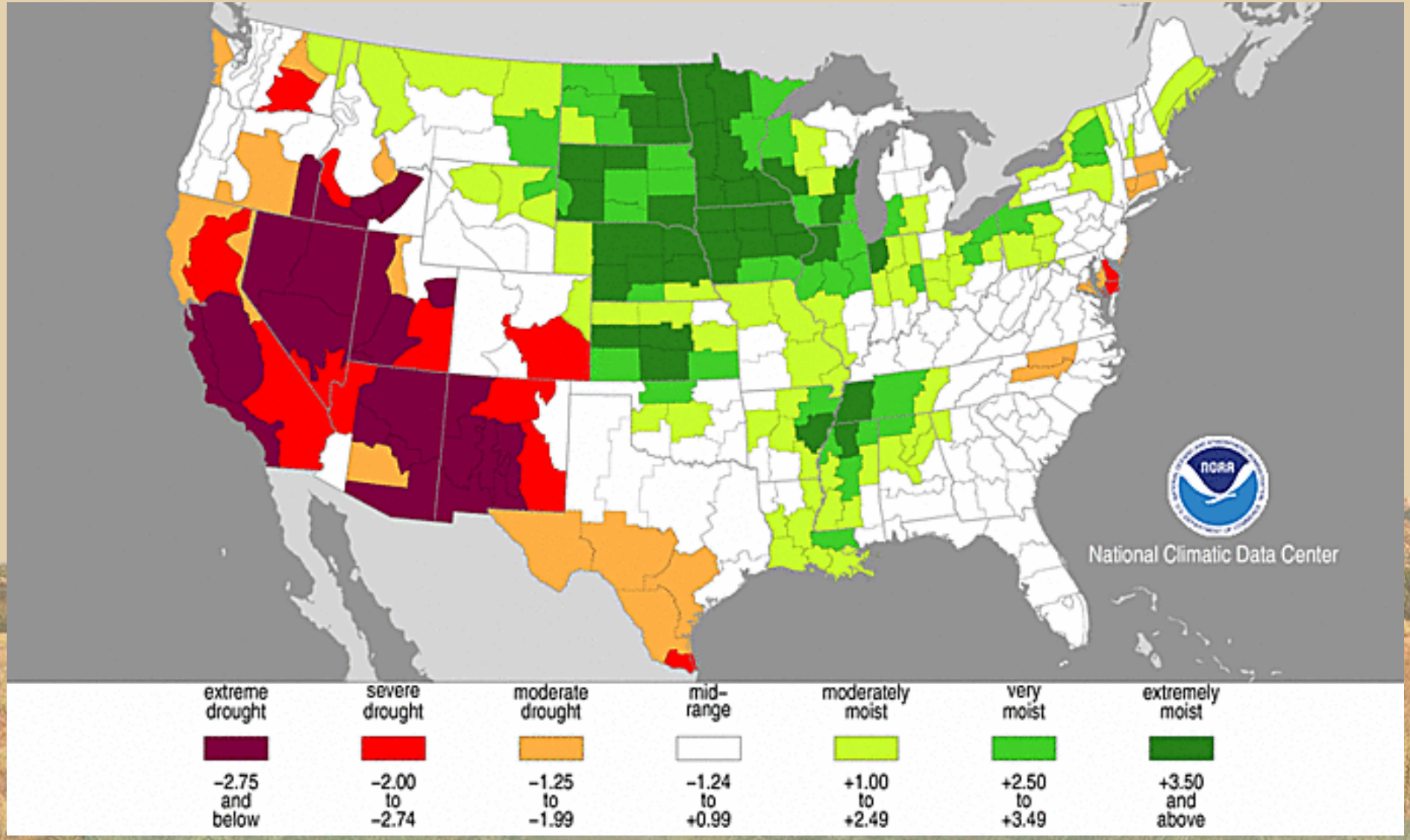
- Under 12
- 12 to 16
- 16 to 20
- 20 to 24
- 24 to 28
- 54 to 56
- 28 to 32
- 32 to 36
- 36 to 40
- 40 to 44
- Above 44

Period: 1961-1990

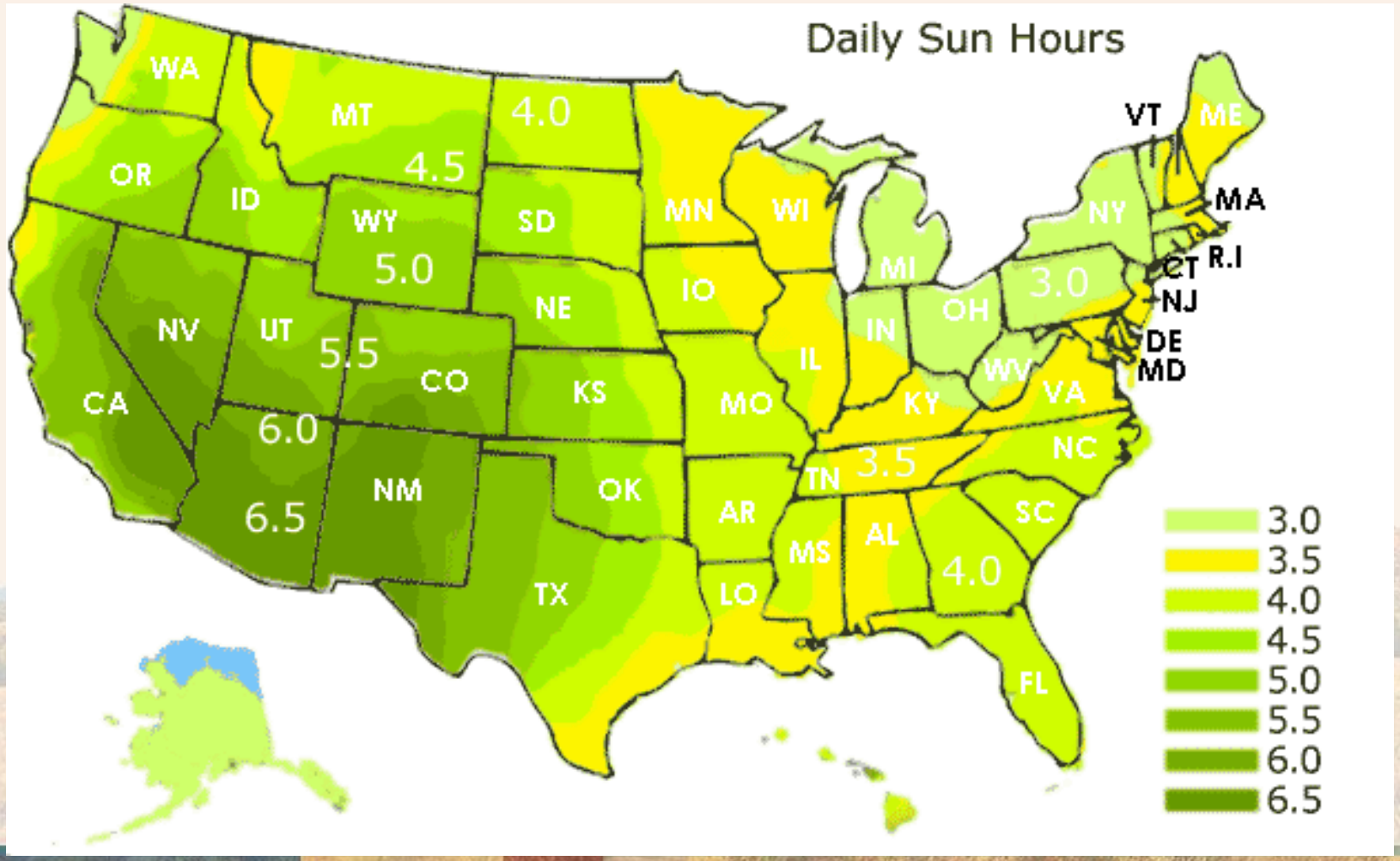
This map is a plot of 1961-1990 annual average precipitation contours from NOAA Cooperative stations and (where appropriate) USDA-NRCS SNOTEL stations. Christopher Daly used the PRISM model to generate the gridded estimates from which this map was derived; the modeled grid was approximately 4x4 km latitude/longitude, and was resampled to 2x2 km using a Gaussian filter. Mapping was performed by Jenny Weisburg. Funding was provided by USDA-NRCS National Water and Climate Center.

12/7/97

Drought June 2014

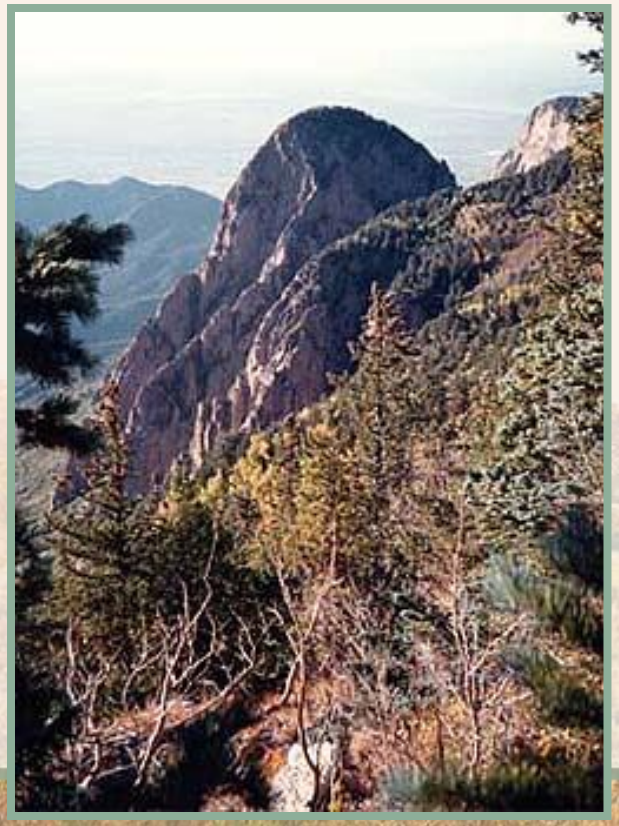


Solar Radiation



The High Desert

- Mountains
  - Trees Predominate
  - Highly Organic Soils



The High Desert

- Piñon Juniper Zone
  - Tree Densities are based on Location of Water
  - Grassland Savannah is Historically the Natural Condition

The High Desert

- High Desert Grasslands
  - Few Trees, mostly in Arroyos
  - Dryland Forbs and Grasses Prevail

The High Desert

- Rivers/Valleys
  - Riparian Softwood Forests
  - Sedimentary/Clayey Soils

The Desert Lowlands

- Sandy Soils/Gravely Surface
- Evenly Distributed Xeric Trees
- Lesser Density of Grasses

Concepts that Shape Our Projects

- Landscape Protection
- Natural Systems as the Model
- Green Infrastructure and Water Harvesting
- Locate Parks near Population & Commercial Centers / Drainageways

Concepts that Shape Our Projects

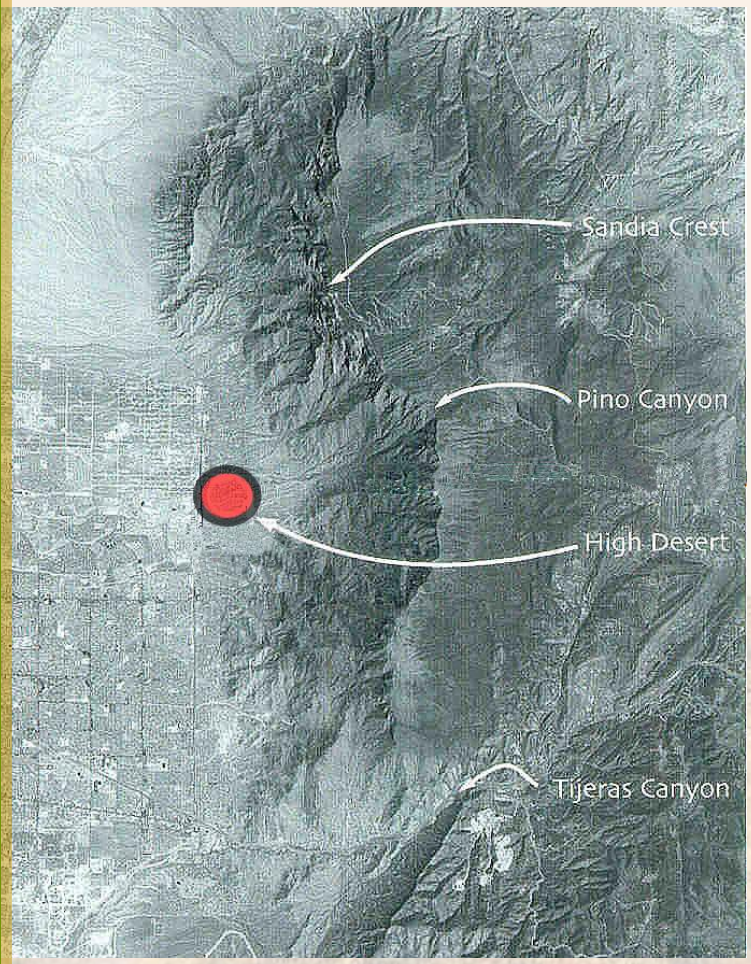
- Use Permeable Pavements/Structural Soils
- Improve Stormwater Quality (bioswales, ponds)
- Improve Linkages to Other Land Uses and improve the Economic Development Potential of Projects

CASE STUDIES:

HIGH DESERT COMMUNITY
HAHN ARROYO
BACHECHI OPEN SPACE
BLACK ARROYO MASTER PLAN
NM COURT OF APPEALS

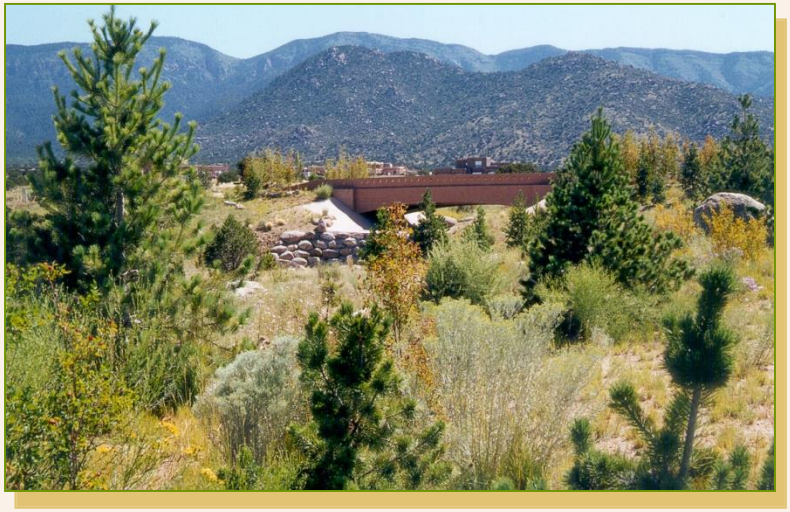
High Desert

TRAMWAY
ACADEMY
SPAIN
CIBOLA NATIONAL FOREST
THE HIGH DESERT COMMUNITY
N


Sandia Crest
Pino Canyon
High Desert
Tijeras Canyon

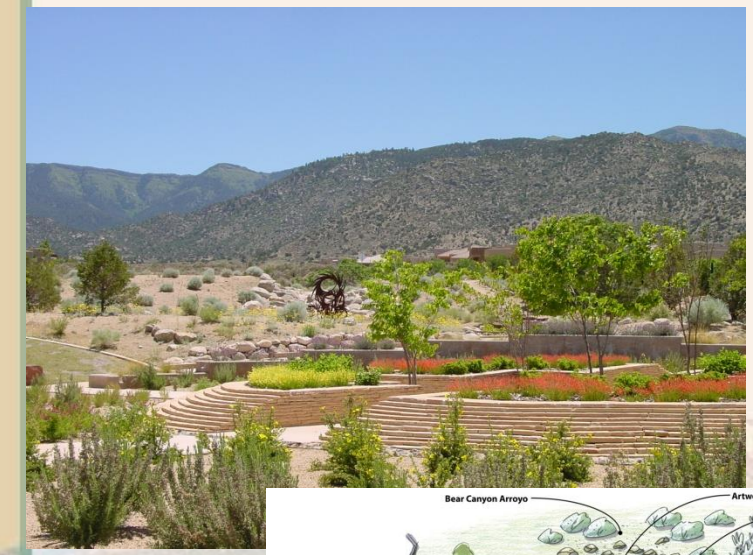
Land Protection / Reuse of Materials

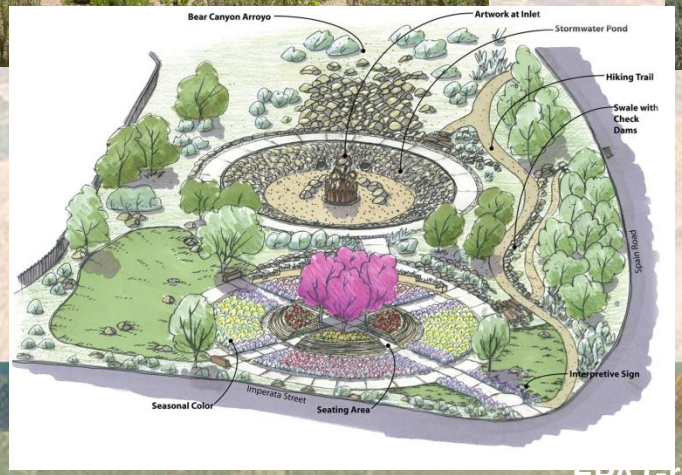
Mimic Natural Stormwater Systems



Water Harvesting

- **Collection Ponds**





Water Harvesting

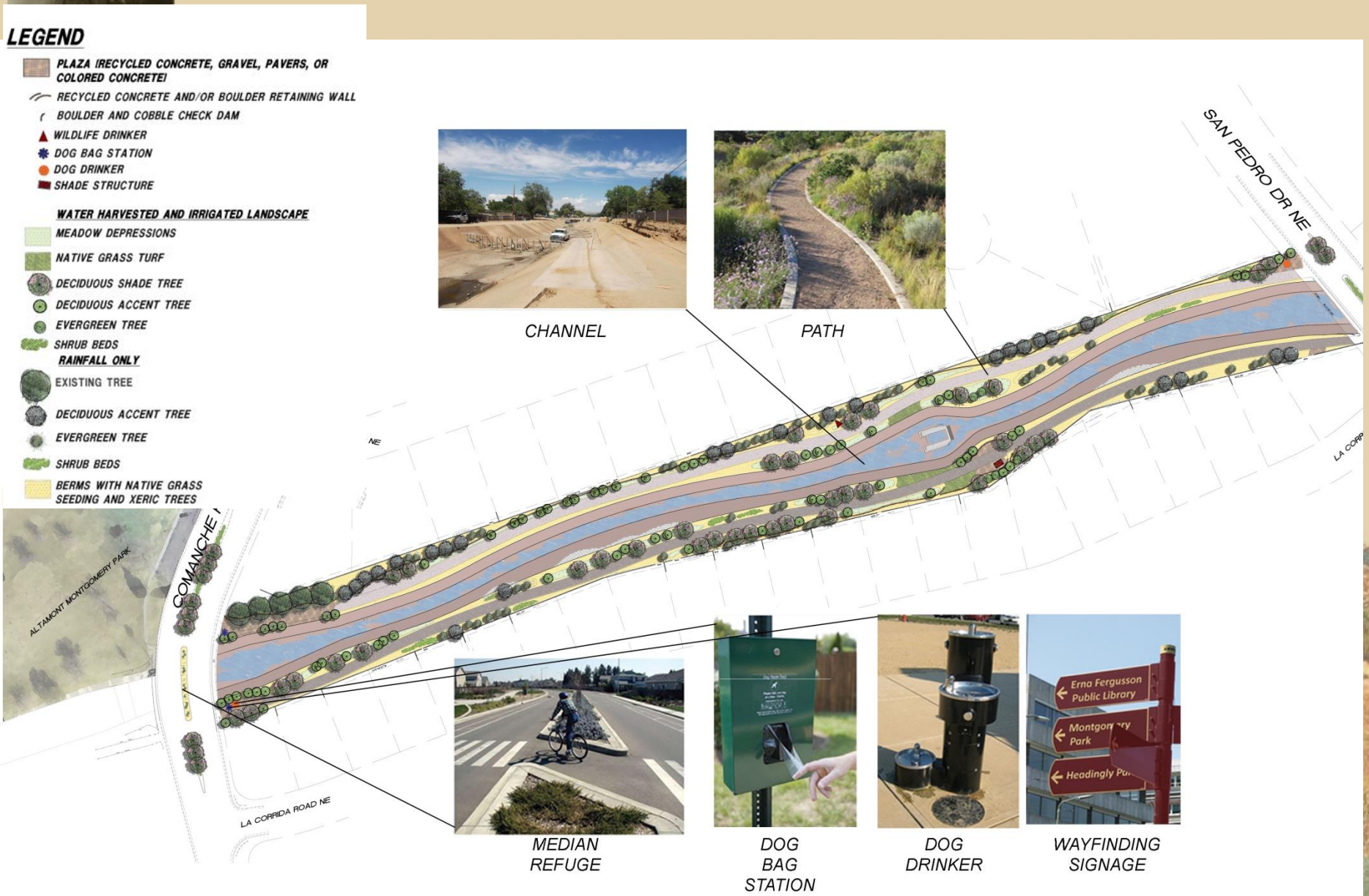
- Conveyances

Hahn Arroyo

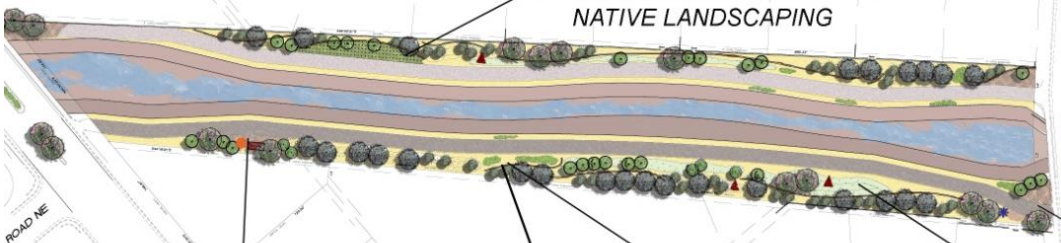
© 2010 Google
© 2010 Europa Technologies
©2009 Google
Imagery Date: Nov 24, 2009
35°08'48.11" N 106°32'08.77" W elev 5593 ft
Eye alt 8026 ft

Natural Stormwater Systems as the "Model"

Hahn Arroyo


LEGEND
PLAZA (RECYCLED CONCRETE, GRAVEL, PAVERS, OR COLORED CONCRETE)
RECYCLED CONCRETE AND/OR BOULDER RETAINING WALL
BOULDER AND COBBLE CHECK DAM
WILDLIFE DRINKER
DOG BAG STATION
DOG DRINKER
SHADE STRUCTURE
WATER HARVESTED AND IRRIGATED LANDSCAPE
MEADOW DEPRESSIONS
NATIVE GRASS TURF
DECIDUOUS SHADE TREE
DECIDUOUS ACCENT TREE
EVERGREEN TREE
SHRUB BEDS
RAINFALL ONLY
EXISTING TREE
DECIDUOUS ACCENT TREE
EVERGREEN TREE
SHRUB BEDS
BERMS WITH NATIVE GRASS SEEDING AND XERIC TREES
SAN PEDRO DR NE
CHANNEL
PATH
ALTAMONT MONTGOMERY PARK
COMANCHE
LA CORRIDA ROAD NE
MEDIAN REFUGE
DOG BAG STATION
DOG DRINKER
WAYFINDING SIGNAGE
Erna Fergusson Public Library

NATIVE LANDSCAPING



ENTRY PLAZA

LEGEND

- PLAZA (RECYCLED CONCRETE, GRAVEL, PAVERS, OR COLORED CONCRETE)
- RECYCLED CONCRETE AND/OR BOULDER RETAINING WALL
- BOULDER AND COBBLE CHECK DAM
- WILDLIFE DRINKER
- DOG BAG STATION
- DOG DRINKER
- SHADE STRUCTURE

WATER HARVESTED AND IRRIGATED LANDSCAPE

- MEADOW DEPRESSIONS
- NATIVE GRASS TURF
- DECIDUOUS SHADE TREE
- DECIDUOUS ACCENT TREE
- EVERGREEN TREE
- SHRUB BEDS

RAINFALL ONLY

- EXISTING TREE
- DECIDUOUS ACCENT TREE
- EVERGREEN TREE
- SHRUB BEDS
- BERMS WITH NATIVE GRASS SEEDING AND XERIC TREES

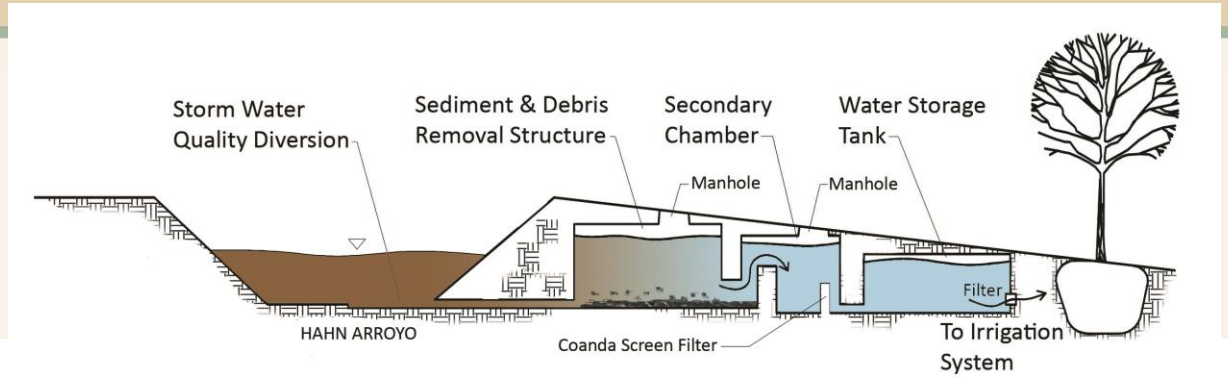
RECYCLED CONCRETE PAVERS

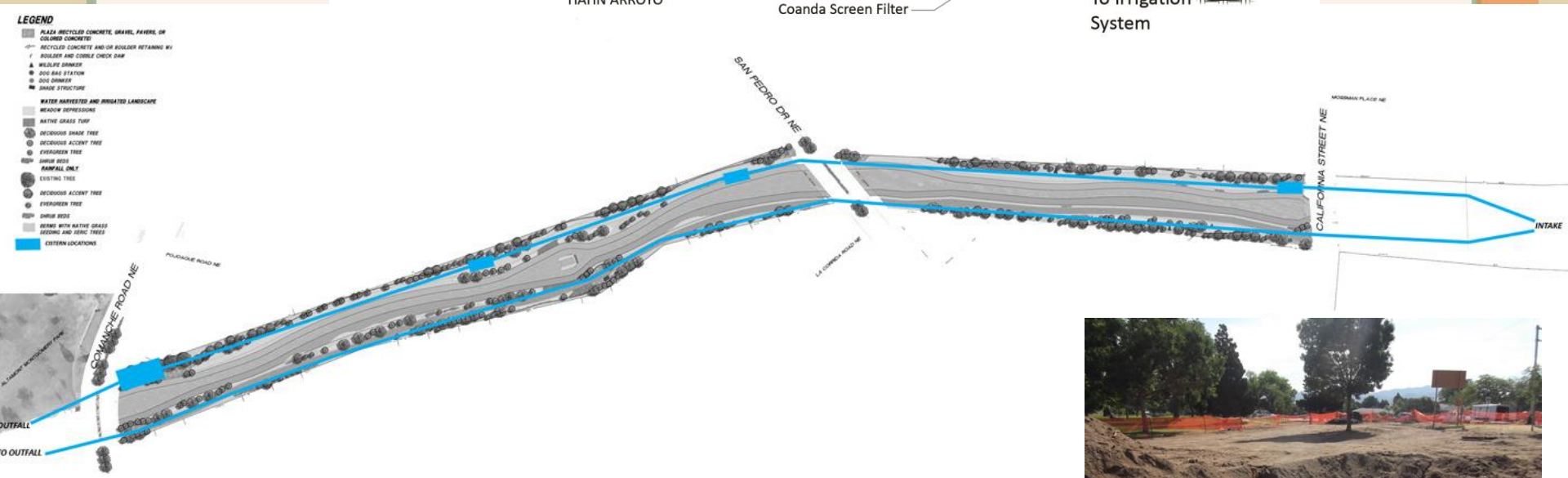
RECYCLED CONCRETE WALL

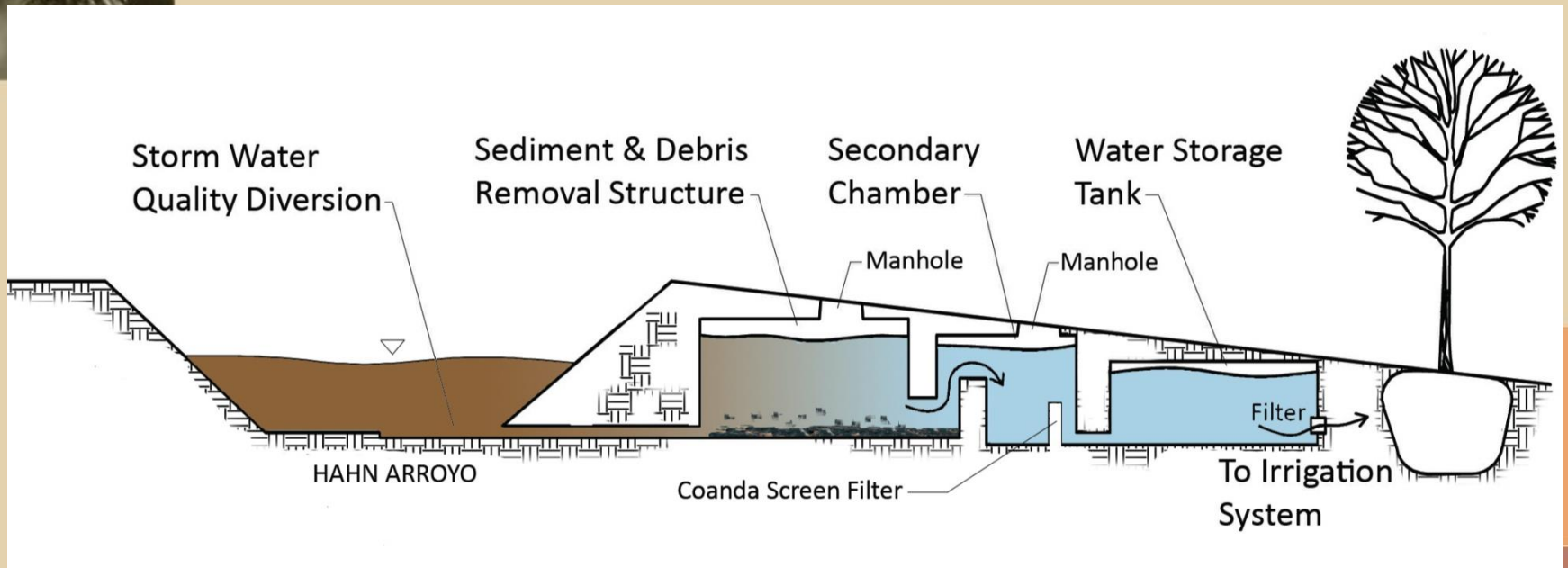
RECYCLED CONCRETE WALL

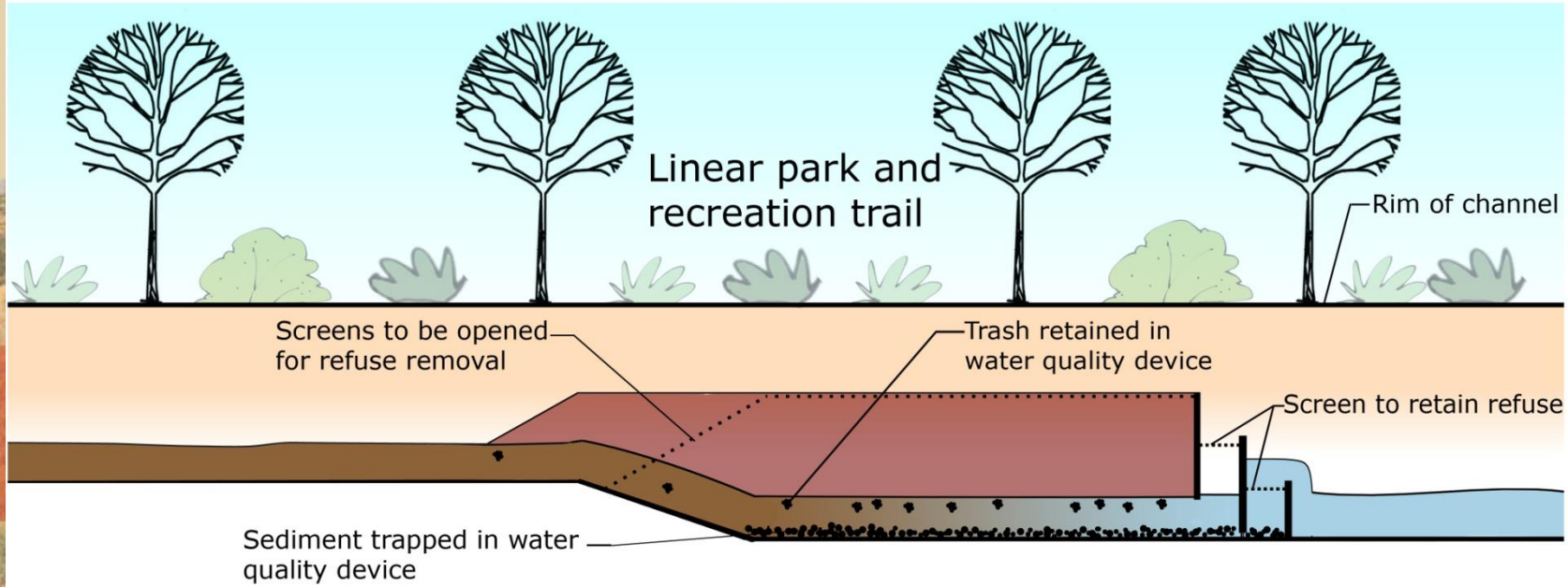
WILDFLOWER MEADOW

Use of Cisterns






Storm Water
Quality Diversion
Sediment & Debris
Removal Structure
Secondary
Chamber
Water Storage
Tank
Manhole
Manhole
Filter
HAHN ARROYO
Coanda Screen Filter
To Irrigation
System

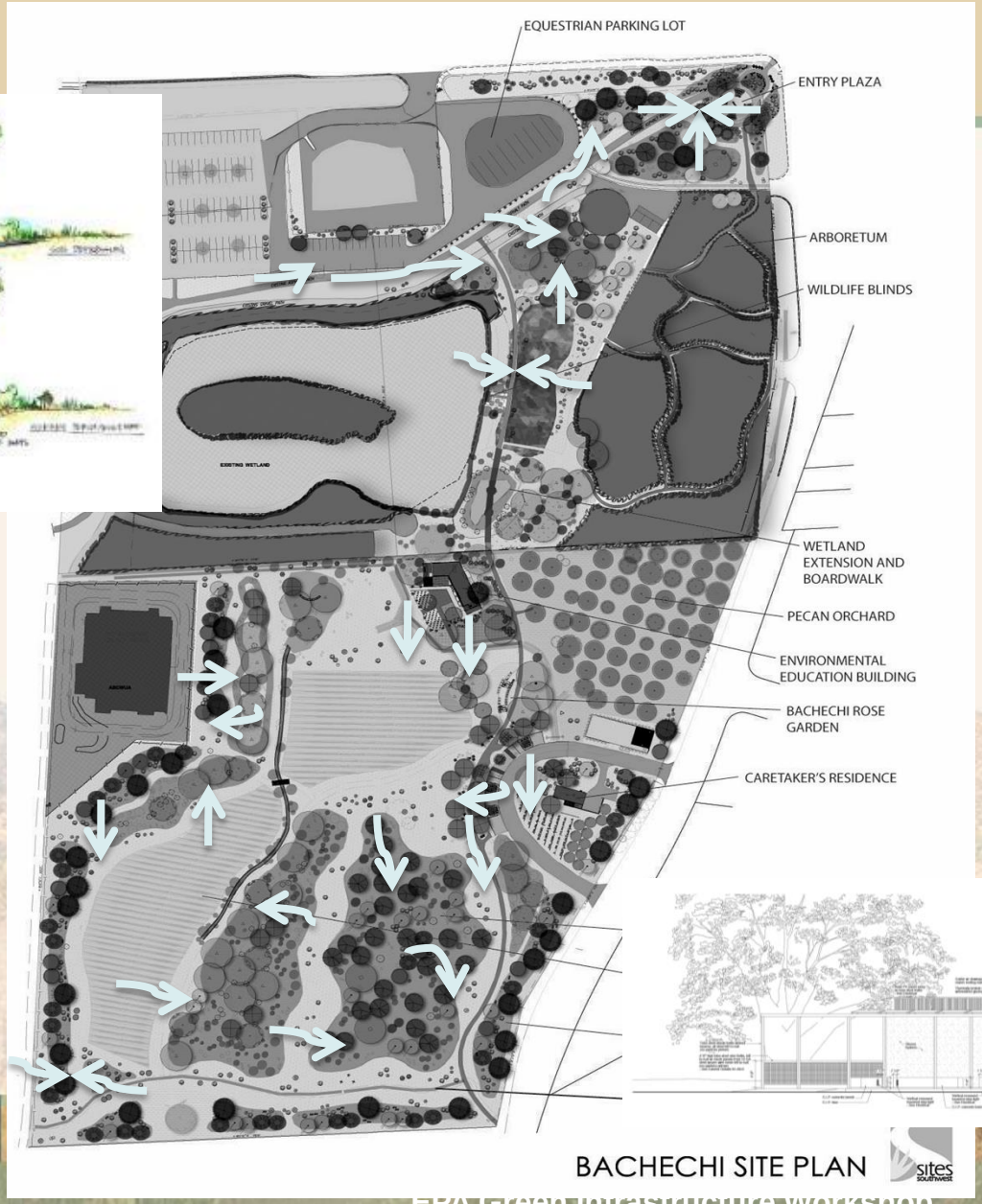

Linear park and
recreation trail
Rim of channel
Screens to be opened
for refuse removal
Trash retained in
water quality device
Screen to retain refuse
Sediment trapped in water
quality device

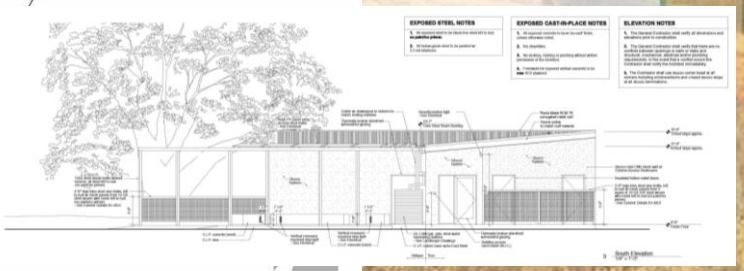
Hahn Arroyo Rehabilitation

Bachechi Open Space Pre-Construction

Bachechi Open Space Master Plan

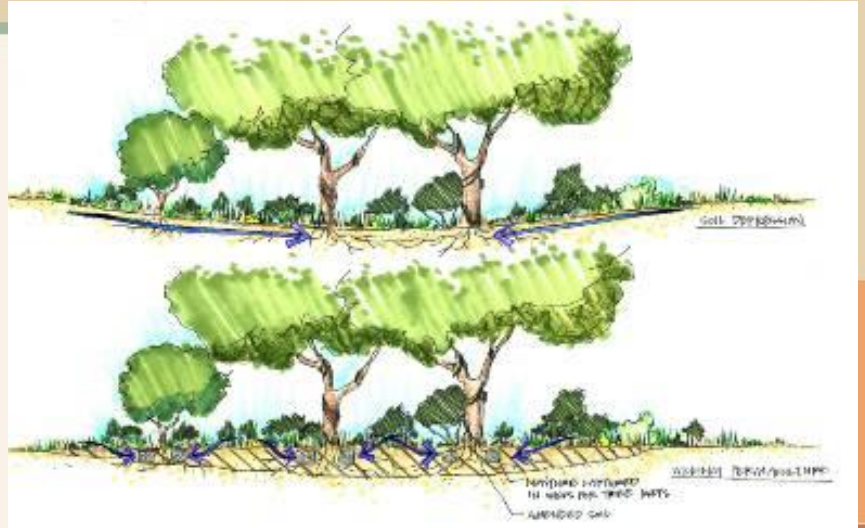
Water Collection / Drainage



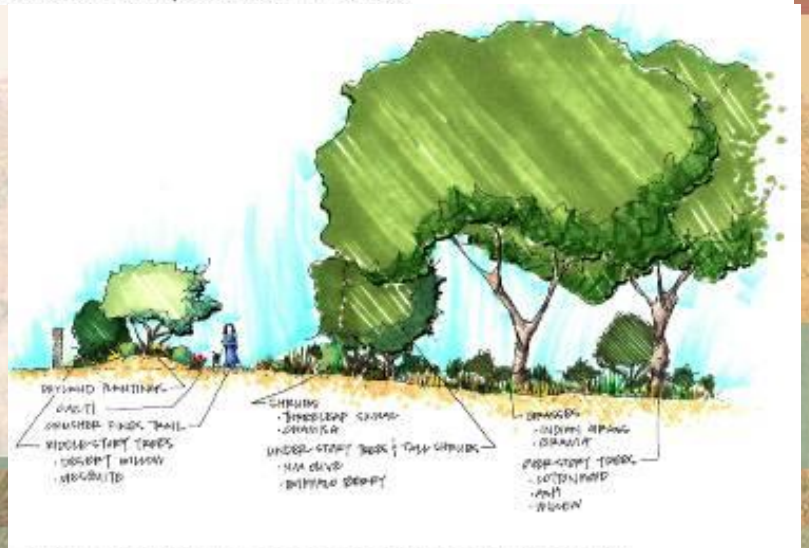


Landscapes and Forests

- Bosque Depressions
  - Pole Plantings
  - Site Water Harvesting
  - Wicking Systems

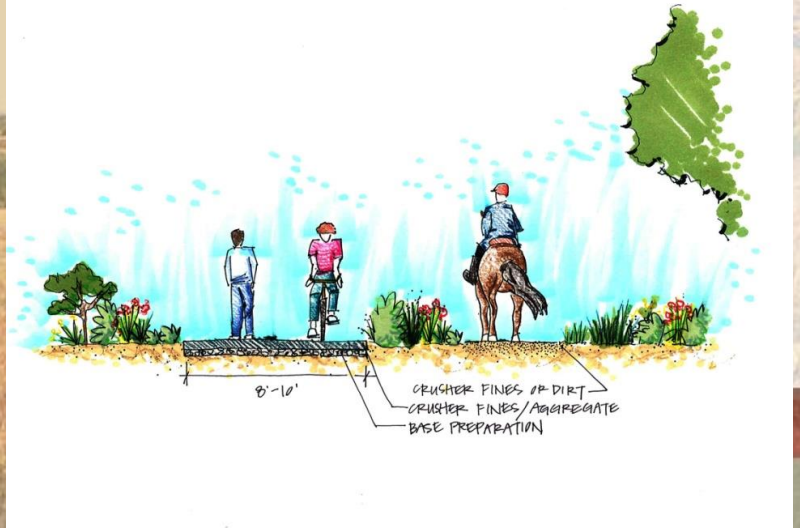


SOIL DEPRESSION/WICKING SYSTEM

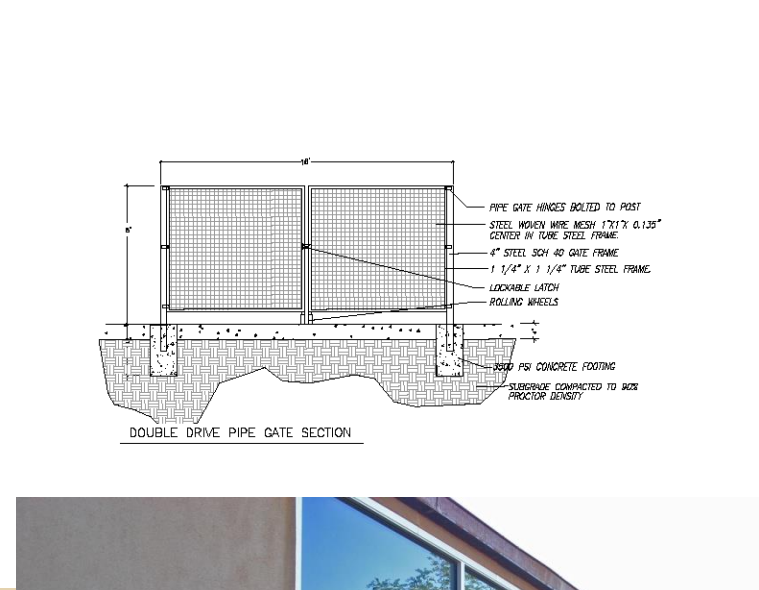


DRYLAND BERM AND SOIL DEPRESSION SECTION

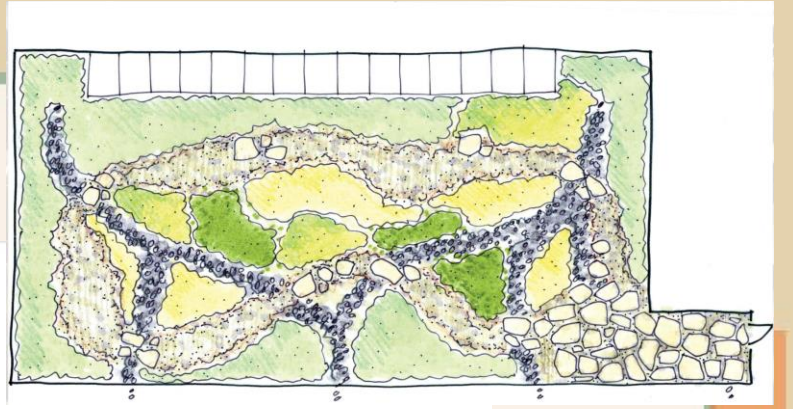
Permeable Paving and Trails

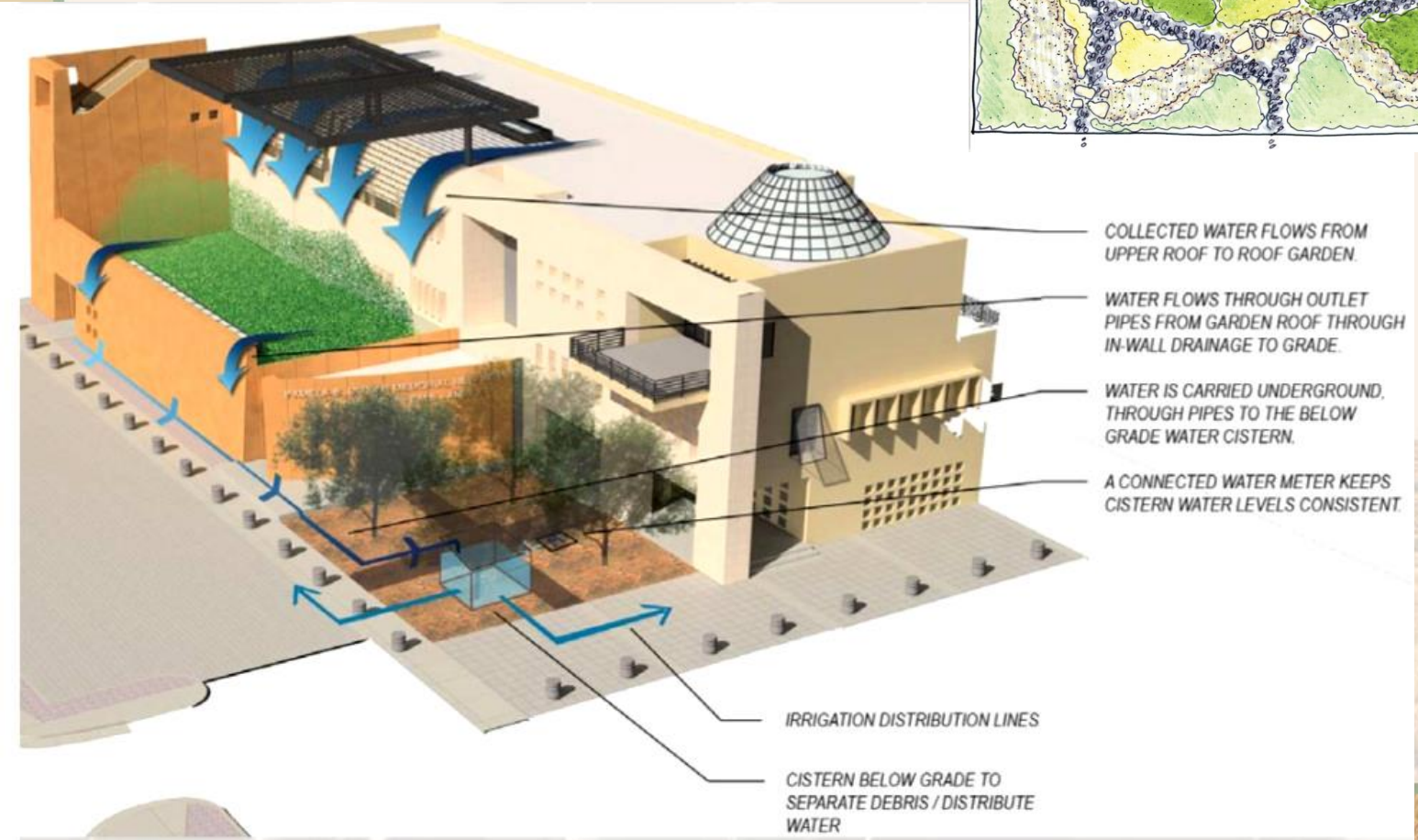


Reuse


18'
8'
PIPE GATE HINGES BOLTED TO POST
STEEL WOVEN WIRE MESH 1"X1"X 0.135" CENTER IN TUBE STEEL FRAME.
4" STEEL SCH 40 GATE FRAME
1 1/4" X 1 1/4" TUBE STEEL FRAME.
LOCKABLE LATCH
ROLLING WHEELS
3000 PSI CONCRETE FOOTING
SUBGRADE COMPACTED TO 90% PROCTOR DENSITY
DOUBLE DRIVE PIPE GATE SECTION

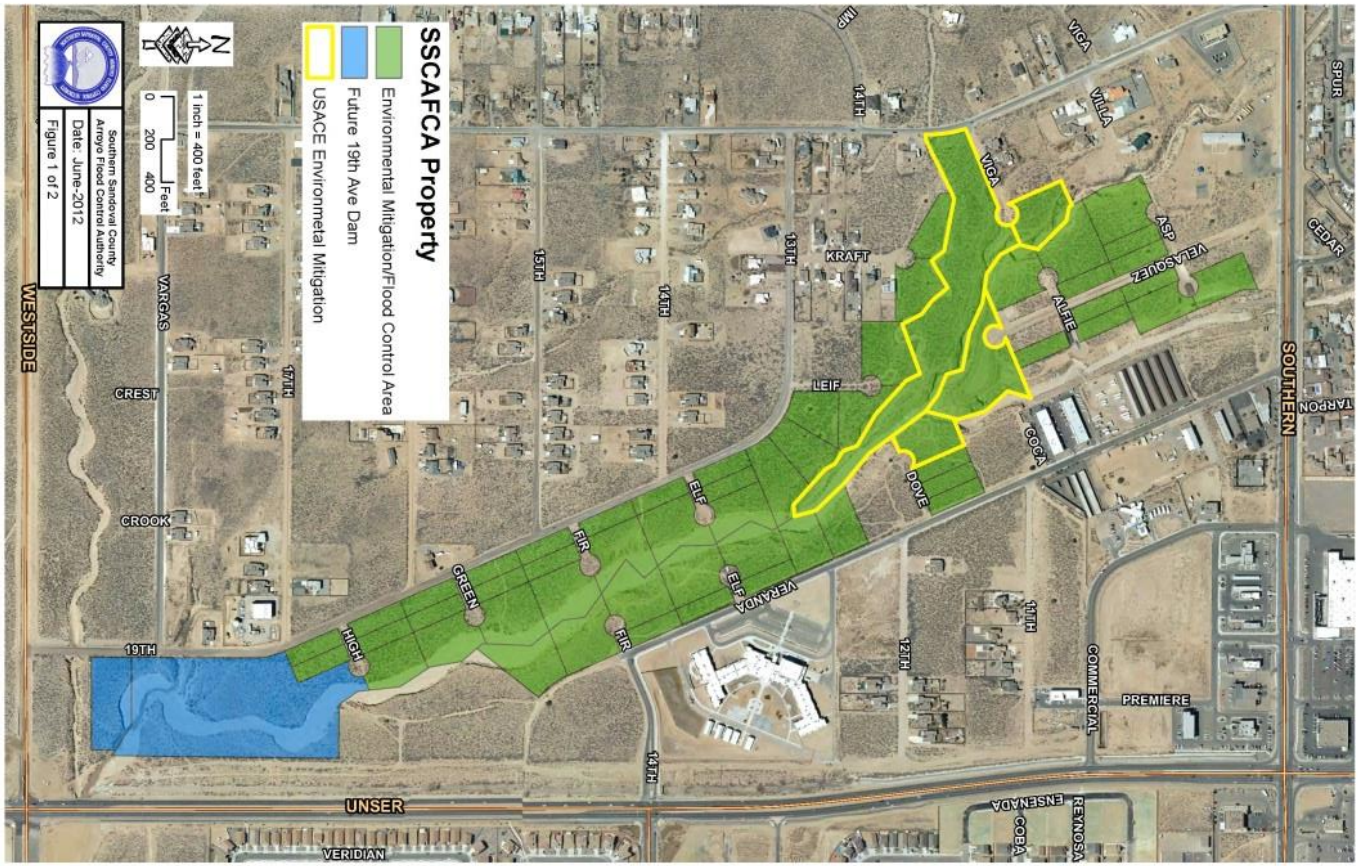
NM Court of Appeals, ca. 2008



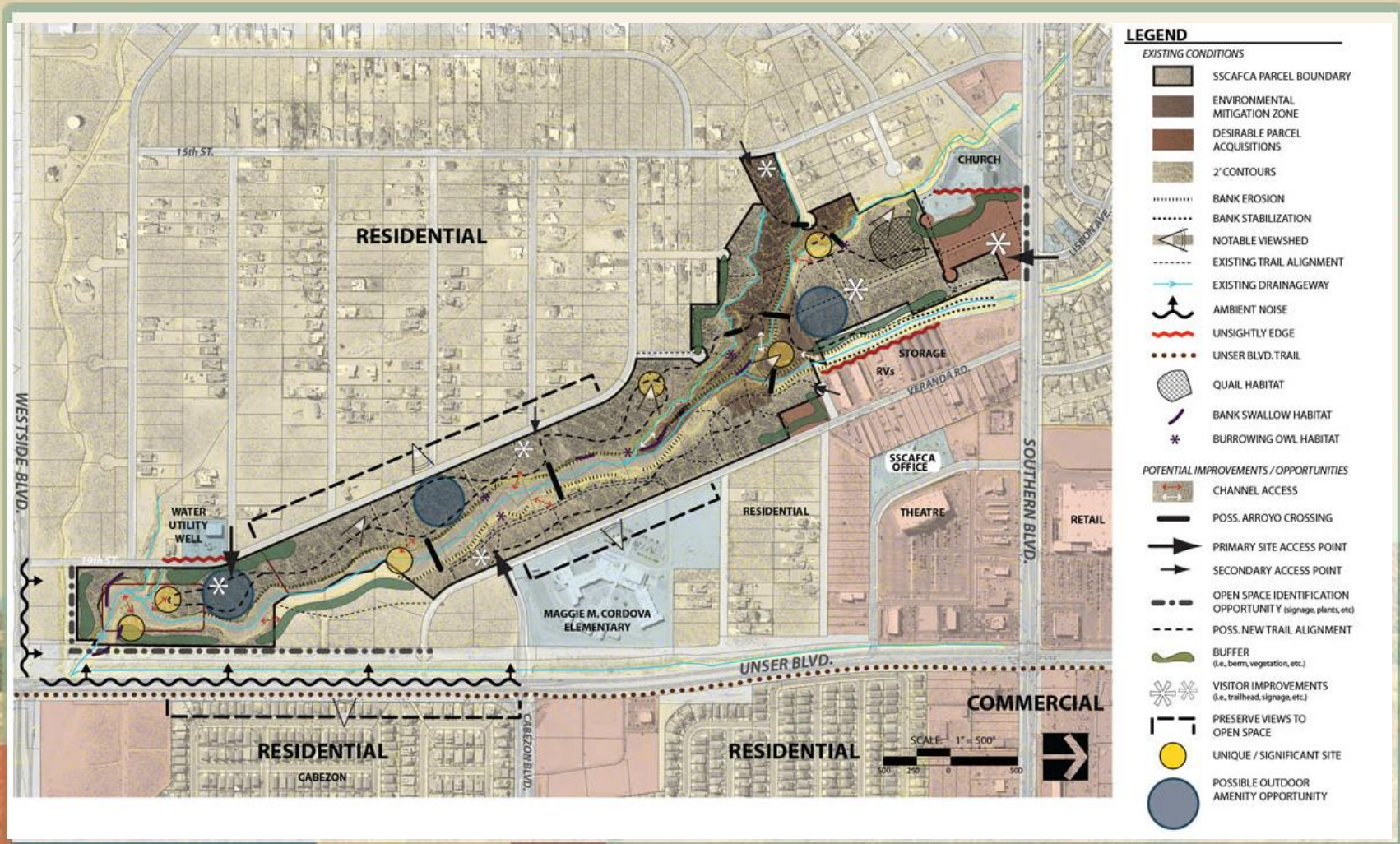


COURT OF APPEALS
PAMELA B. MINZNER LAW CENTER

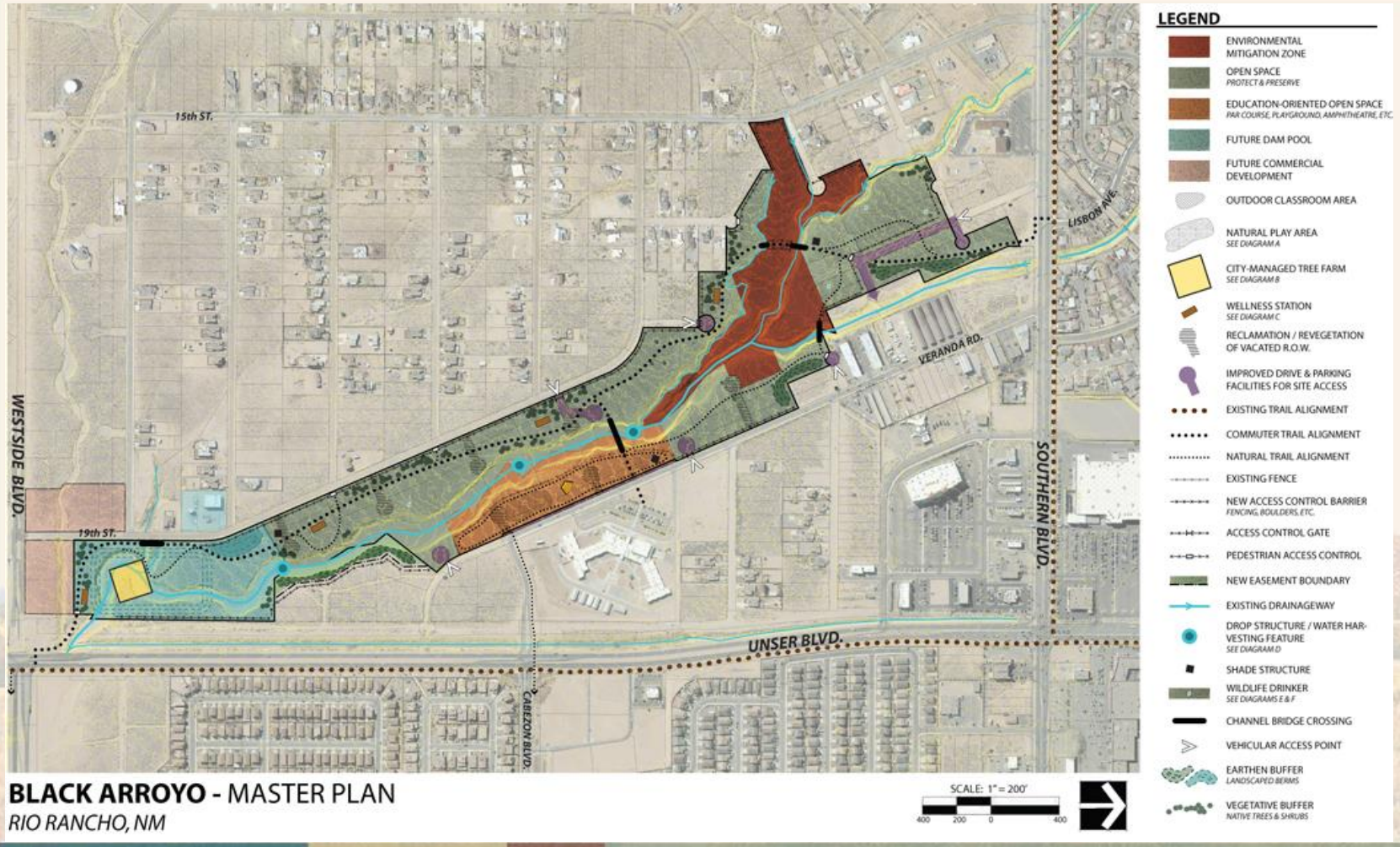
Black Arroyo Open Space



Opportunities & Constraints



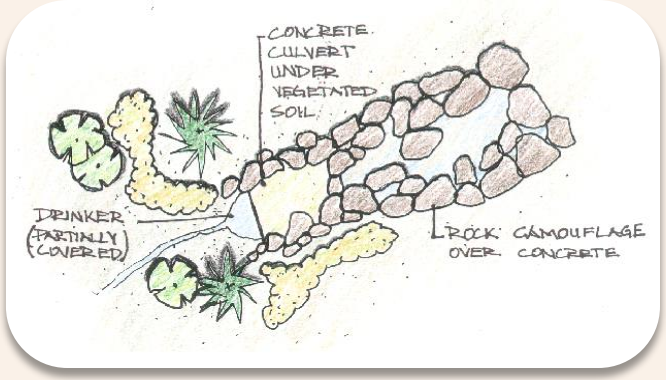
The Master Plan



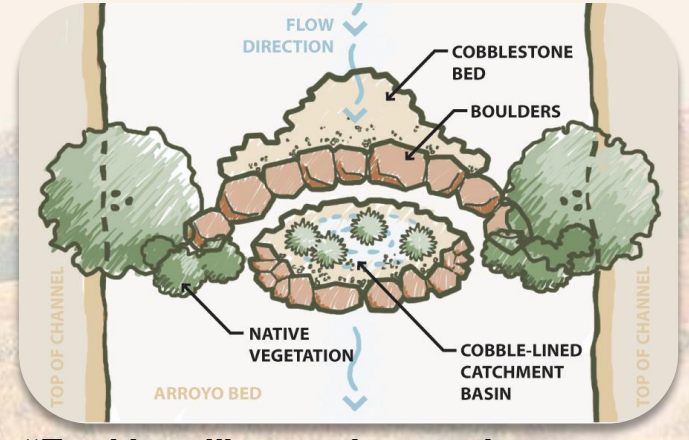
Black Arroyo Open Space Draft Master Plan

- **Water harvesting and wildlife enhancement**

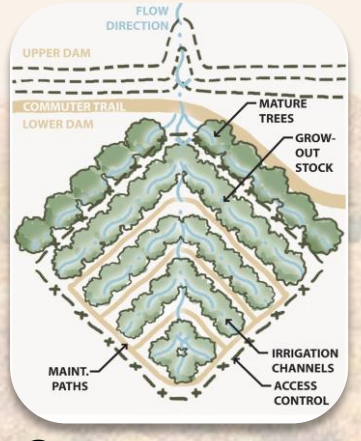
Wildlife drinker



Wildlife drinker

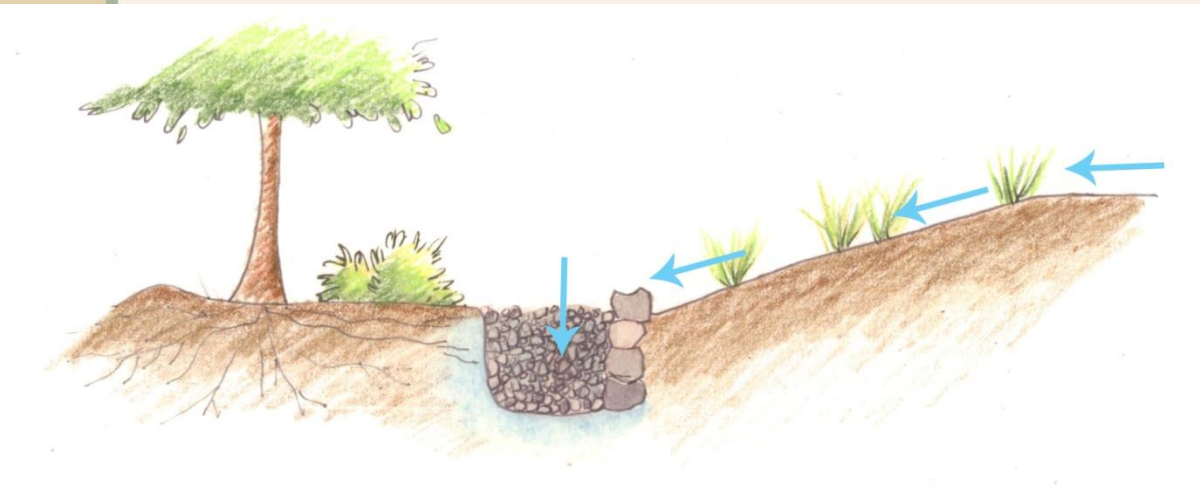


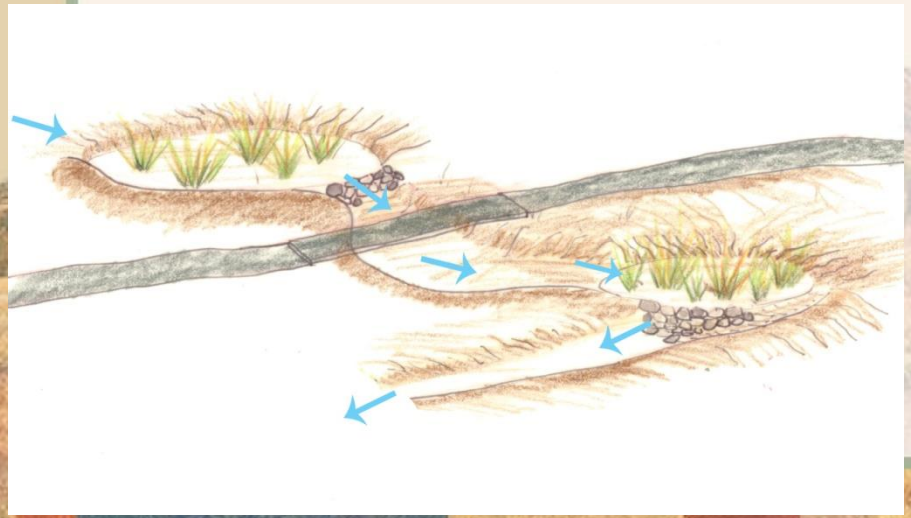
"Zuni bowl" water harvesting

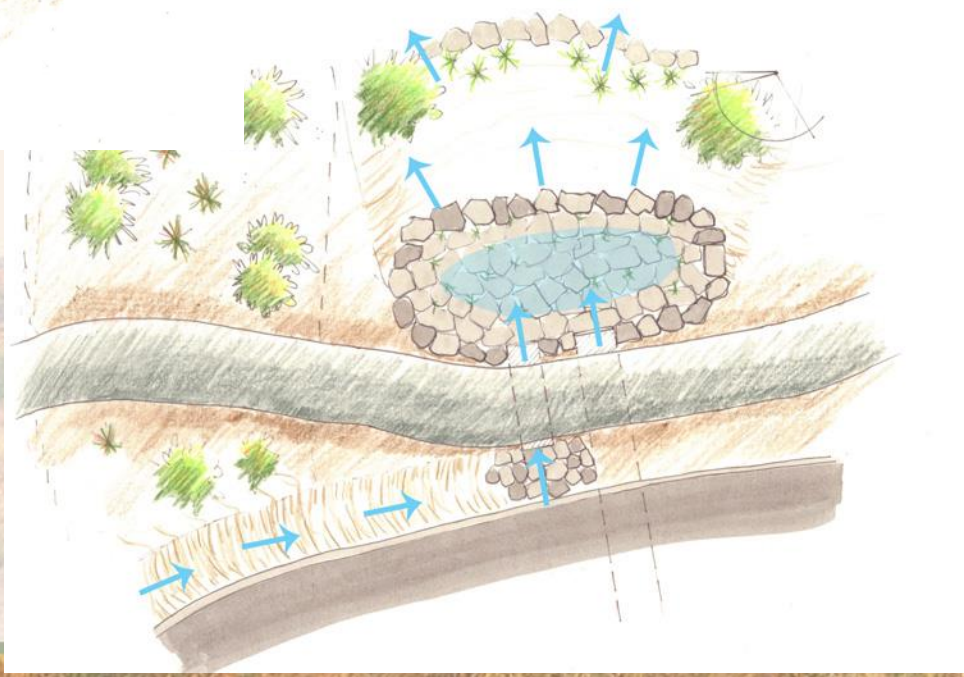


Grow-out nursery

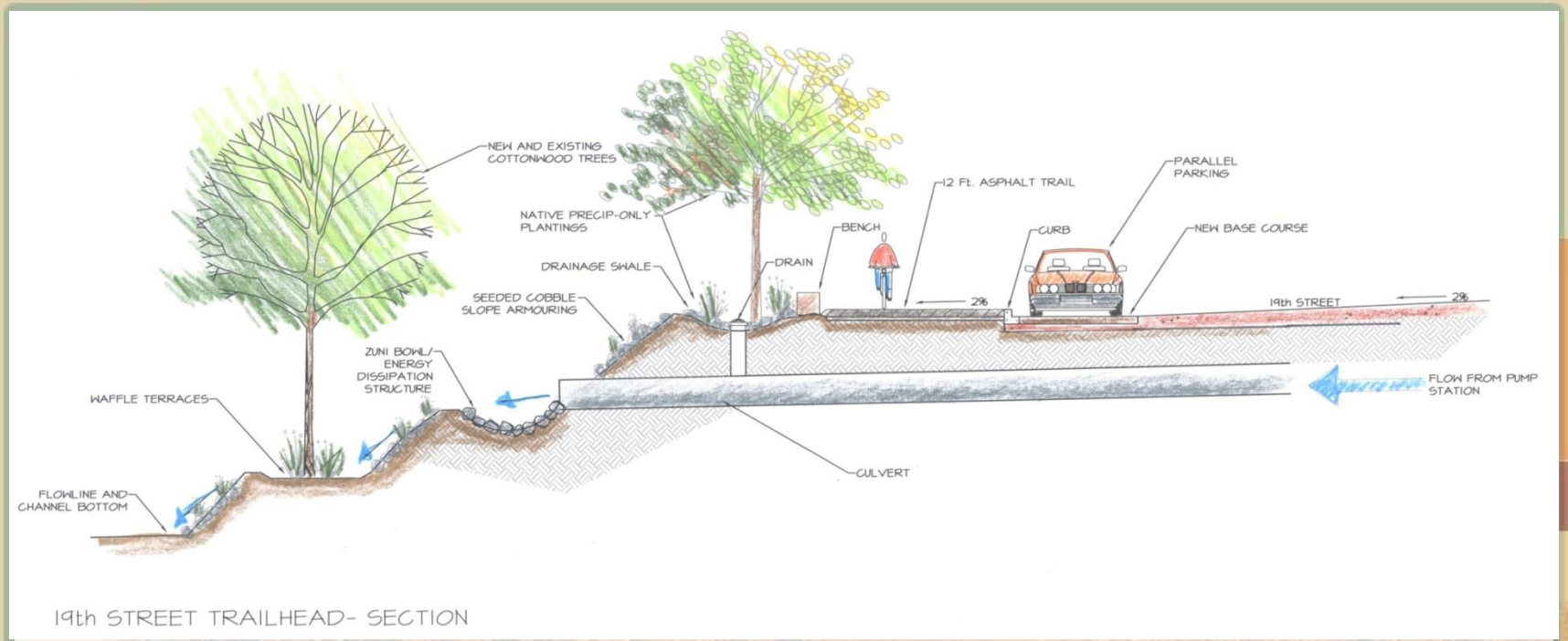
Water Harvesting

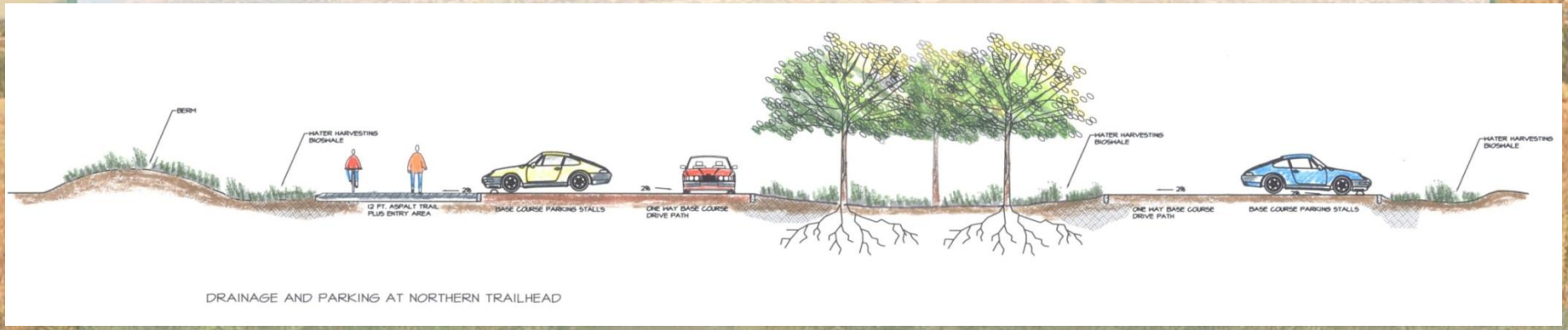






Trail Sections





Issues

- Maintenance – Landscape/Engineering
- Needed Research
  - LID and Bioswales for Arid Lands are Different
  - We Need Shallow Wick and Reservoir Standards
- Urban vs. Rural/Naturalistic Approach
- Costs

THANK YOU!