



# The Desert Anomaly, Drylands Green Infrastructure

**Deborah Blea Hradek**  
**Sites Southwest**



# Low Impact Development (LID) Green Infrastructure Environmental Site Design





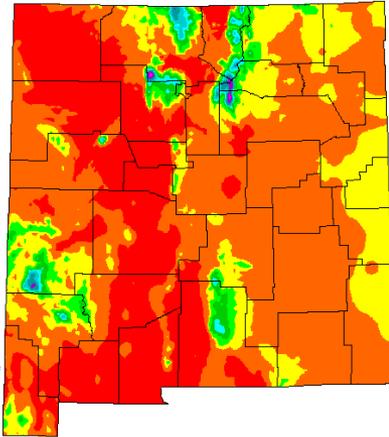
True sustainability can only be achieved by linking water with the environment, engineering and land use and fully integrating them.



### Average Annual Precipitation New Mexico



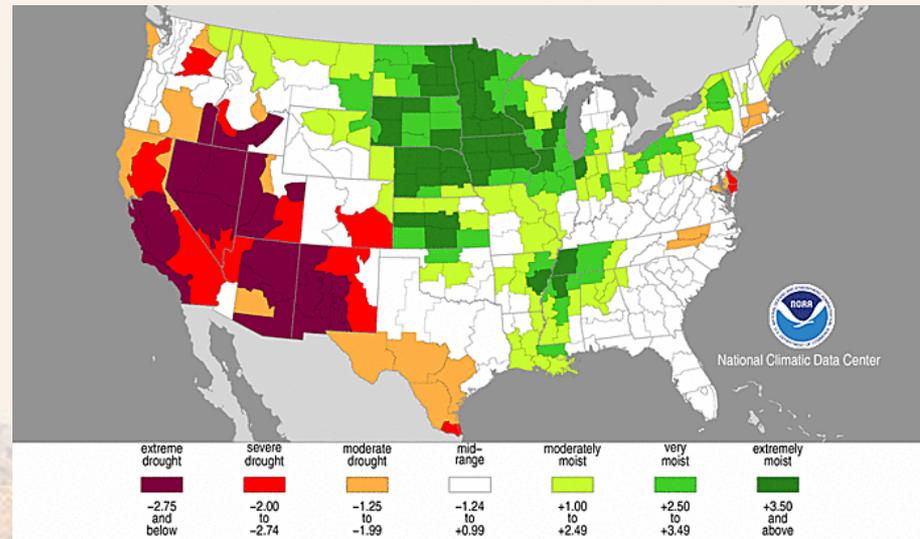
Period: 1961-1990



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

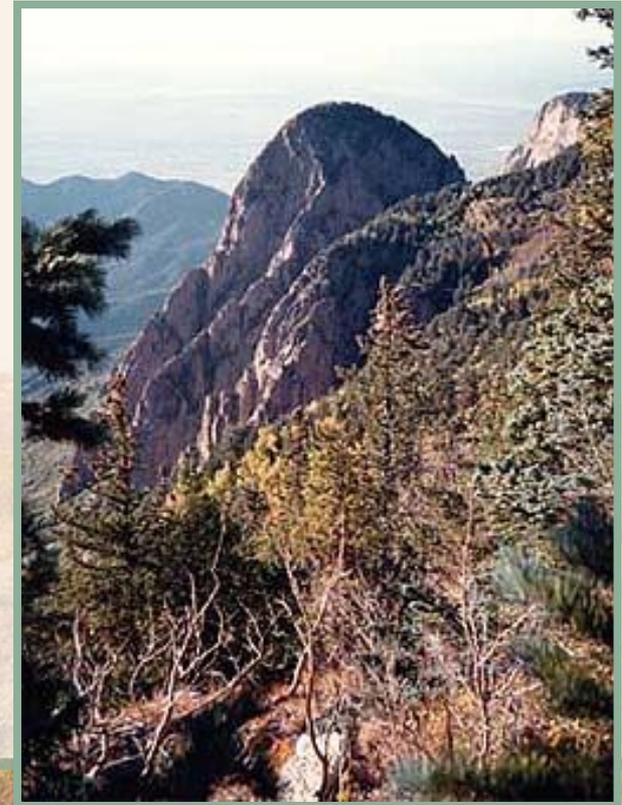






# Ecosystems: The Desert Southwest

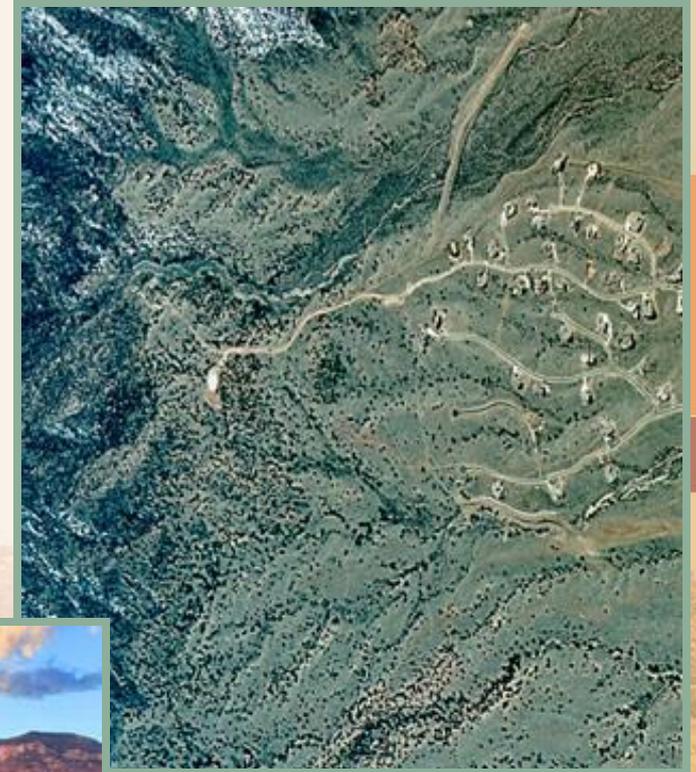
- **Mountains**
  - **Trees Predominate**
  - **Highly Organic Soils**





# Ecosystems: The Desert Southwest

- **Piñon Juniper Zone**
  - **Tree Densities are based on Drainageways**
  - **Grassland Savannah is Historically the Natural Condition**





# Ecosystems: Desert Southwest

- **Grasslands**
  - **Lower Story or no Trees**
  - **Grasses and Forbs**
  - **Arid: 6-8" Annual Precipitation**





# Ecosystems: The Desert Southwest

- **The Desert Floor**
  - Sandy Soils/Gravelly Surface
  - Evenly Distributed Xeric Trees
  - Lesser Density of Grasses





# Strategies

- **Whole Systems Approach**
- **Custom Design to Site**
- **Protecting and Recreating Natural Land Features**
- **Manage Storm Water as close to source possible**
- **Harvest and Maximize Storm Water**
- **Treat Stormwater as a Resource**
- **Reuse Materials**
- **Minimize imperviousness**
- **Installation and Maintenance**



# Whole Systems Approach, Beyond LID

- **Integrated Team Approach**
- **Integration of the Site with Neighborhood Culture and Economy**
- **Safety**
- **Dual Use Facilities**
- **Education / Interpretation**
- **Wildlife Connections**
- **Conserving Water!**



# **CASE STUDIES:**

**HIGH DESERT**

**HAHN ARROYO**

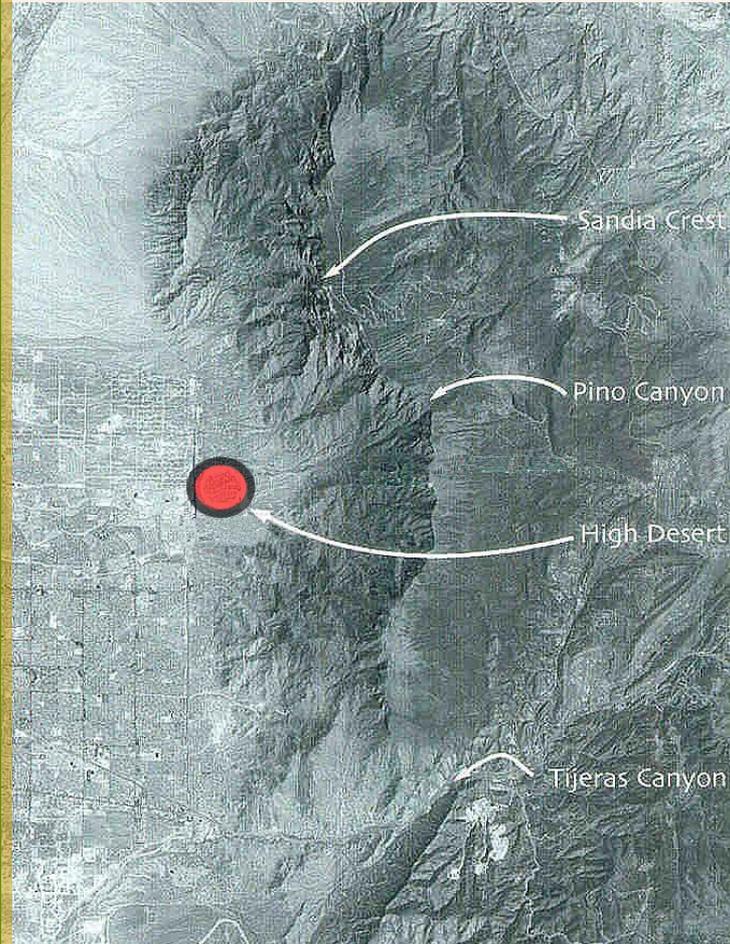
**BACHECHI OPEN SPACE**

**BLACK ARROYO MASTER PLAN**

**GREEN ROOF**



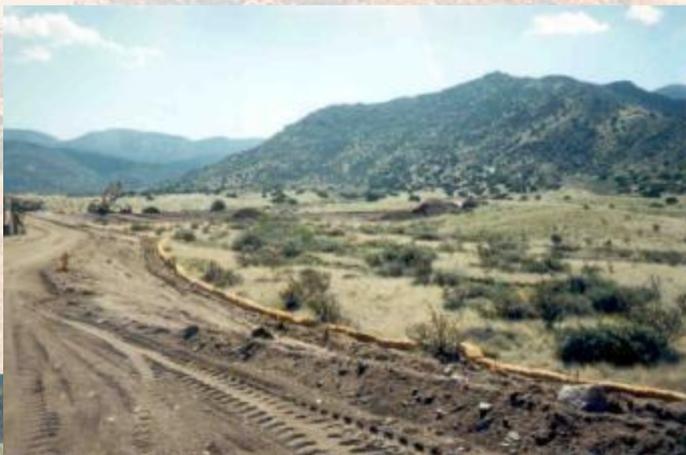
# High Desert



LID Techniques: Saving and Replanting Trees, Saving Soil, Saving Boulders, Harvesting Water, Natural Shapes for Water Conveyance, Education, Wildlife

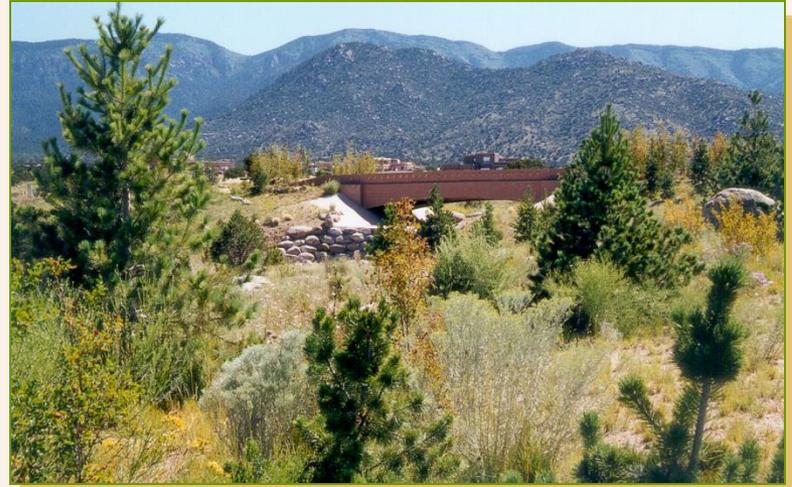


# Land Protection / Reuse of Materials





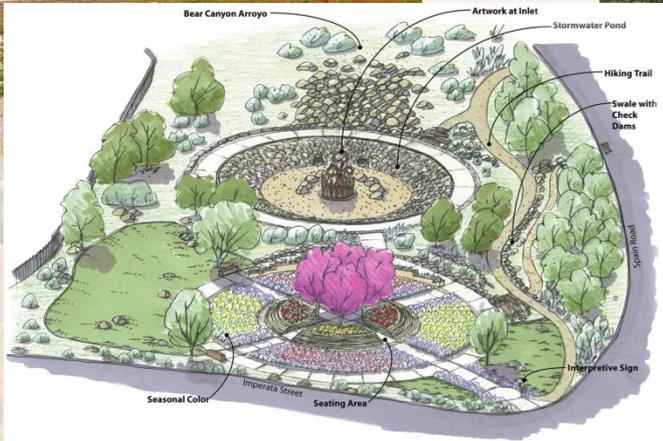
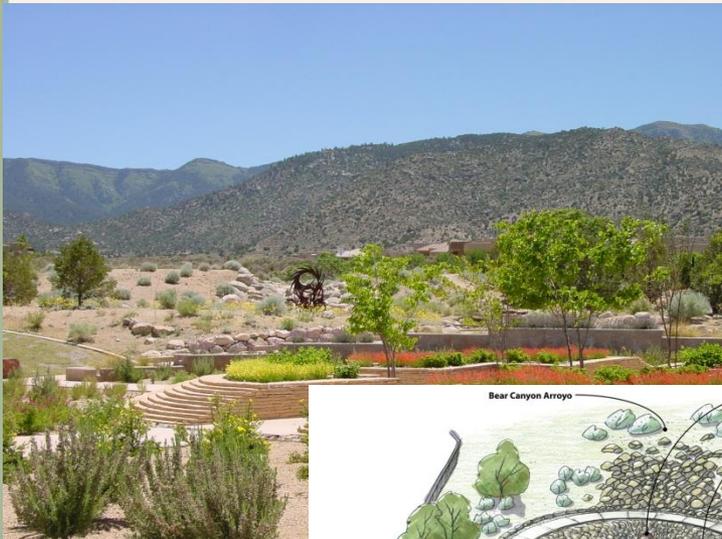
# Mimic Natural Stormwater Systems





# Water Harvesting

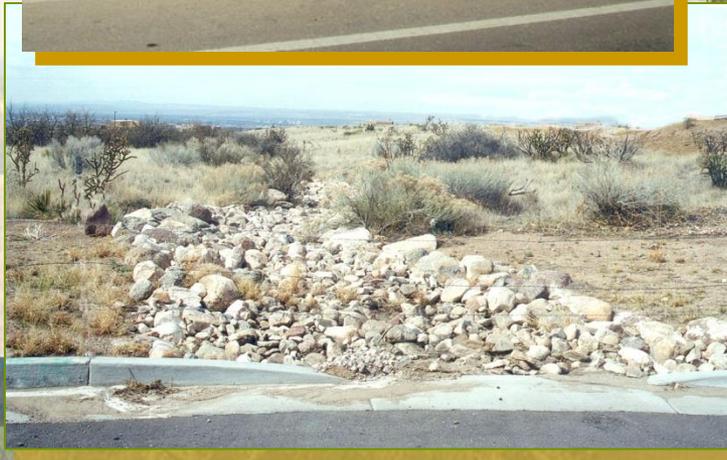
- Collection Ponds





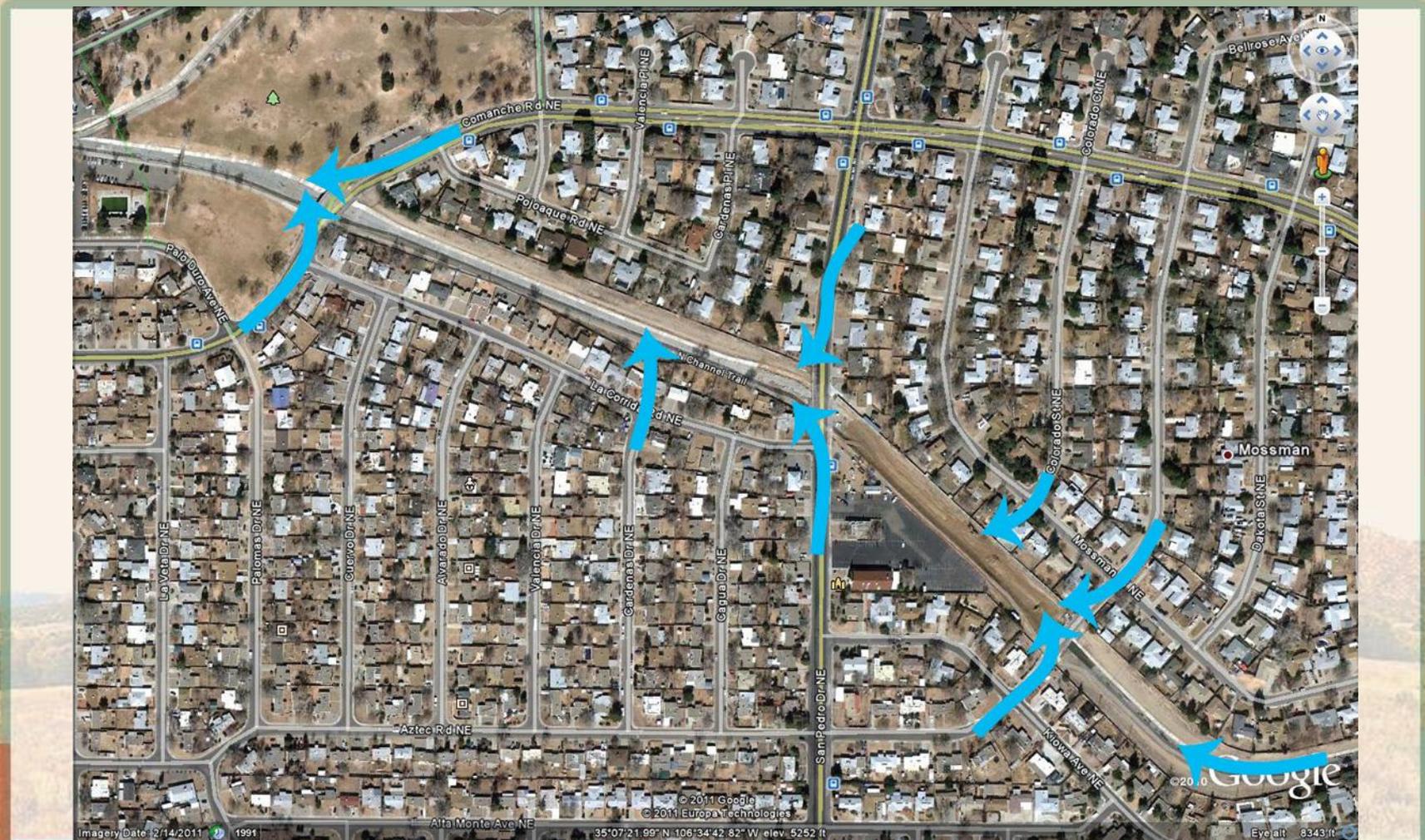
# Water Harvesting

- **Conveyances**





# Hahn Arroyo: Natural Stormwater Systems as the “Model”



LID Techniques: Cisterns, Hike/Bike Trails, Recycled Concrete and Recycled Glass Pavement, Education



# Hahn Arroyo

## LEGEND

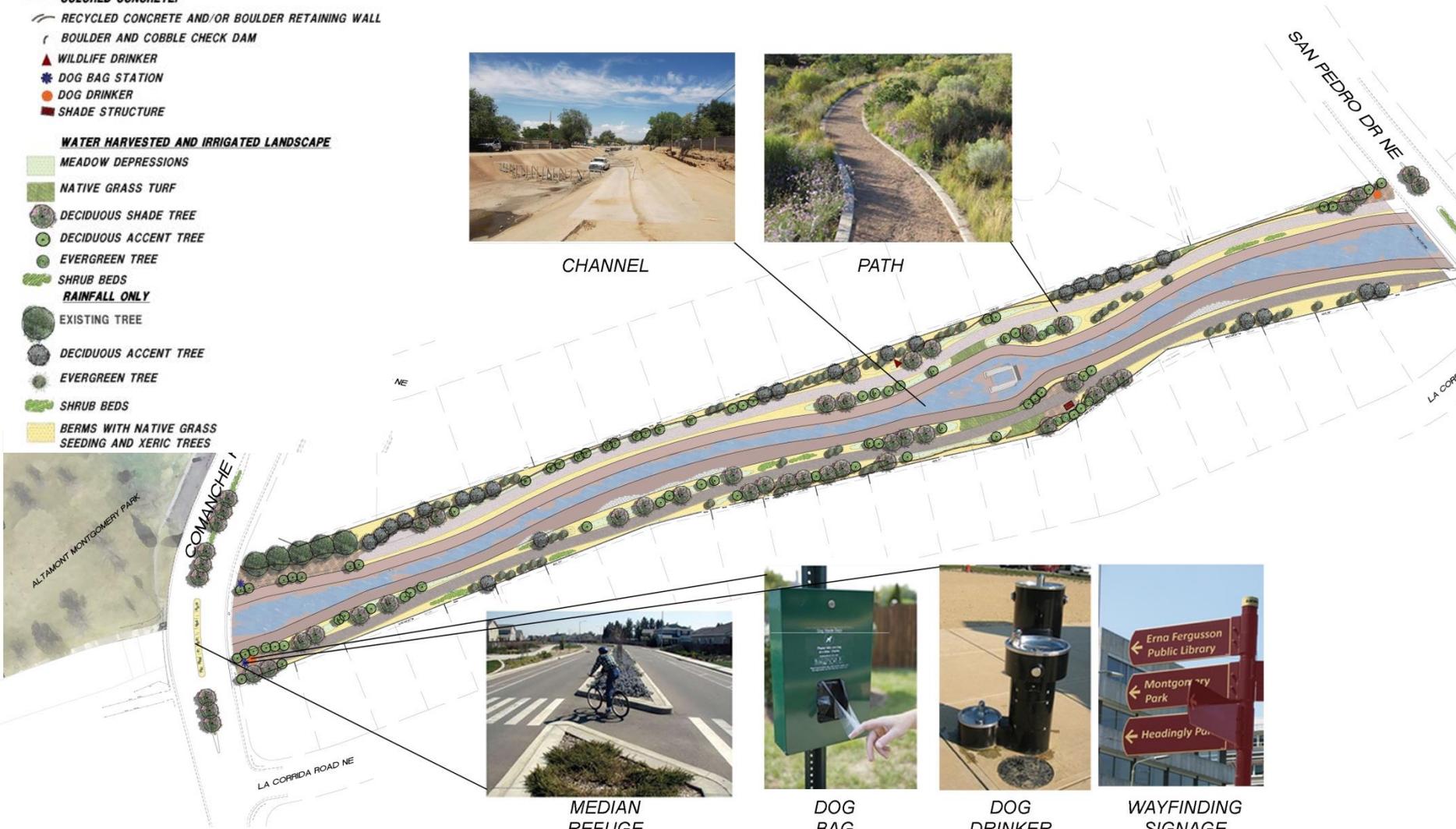
-  PLAZA (RECYCLED CONCRETE, GRAVEL, PAVERS, OR COLORED CONCRETE)
-  RECYCLED CONCRETE AND/OR BOULDER RETAINING WALL
-  BOULDER AND COBBLE CHECK DAM
-  WILDLIFE DRINKER
-  DOG BAG STATION
-  DOG DRINKER
-  SHADE STRUCTURE
  
- WATER HARVESTED AND IRRIGATED LANDSCAPE**
-  MEADOW DEPRESSIONS
-  NATIVE 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



CHANNEL



PATH



MEDIAN REFUGE



DOG BAG STATION



DOG DRINKER



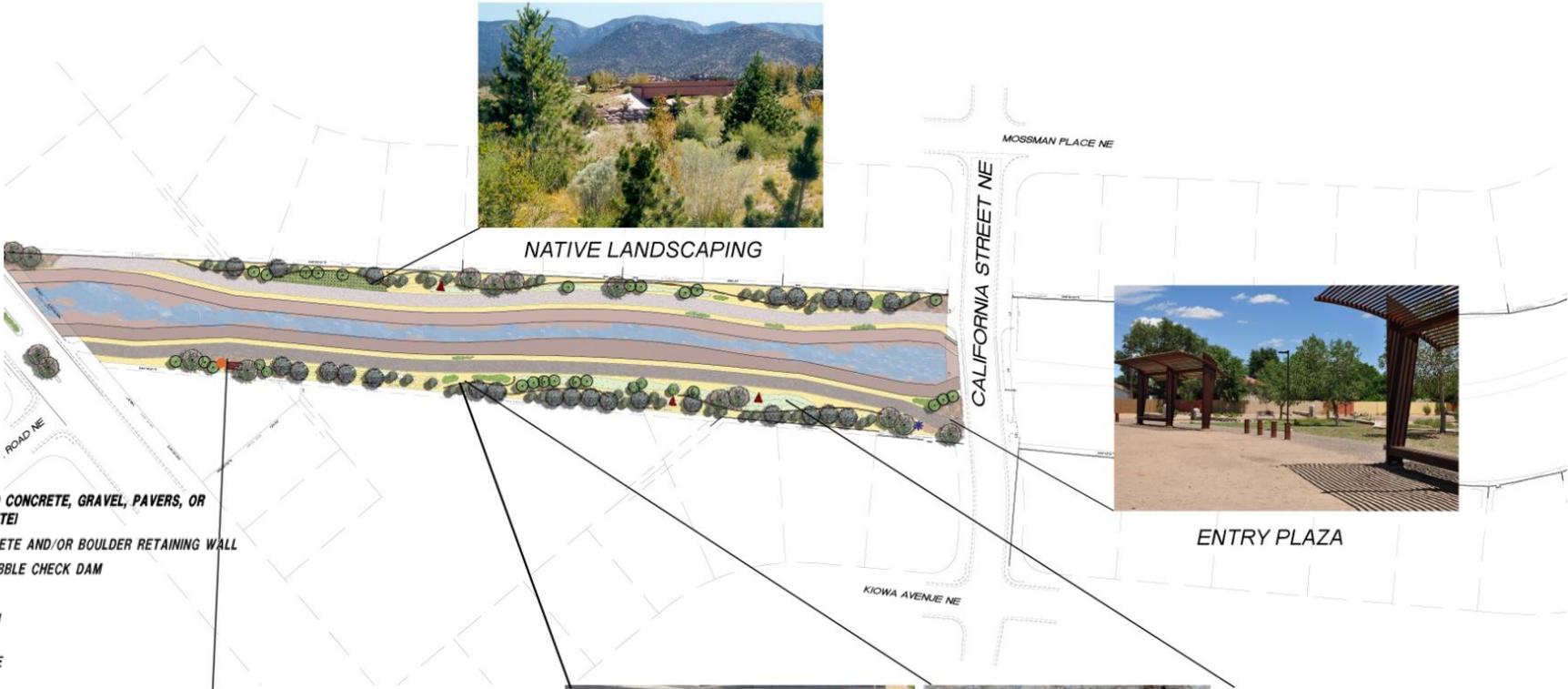
WAYFINDING SIGNAGE



NATIVE LANDSCAPING



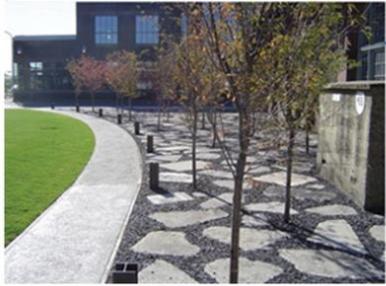
ENTRY PLAZA



**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
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  - SHRUB BEDS
  - BERMS WITH NATIVE GRASS SEEDING AND XERIC TREES



RECYCLED CONCRETE PAVERS



RECYCLED CONCRETE WALL



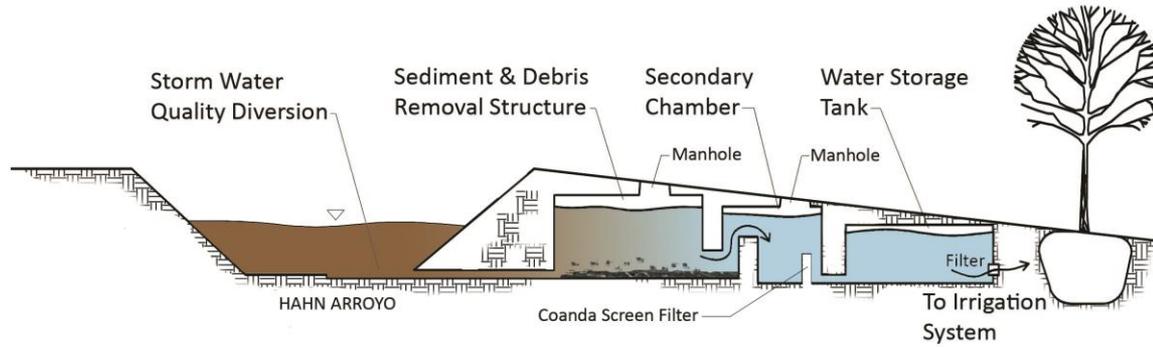
RECYCLED CONCRETE WALL



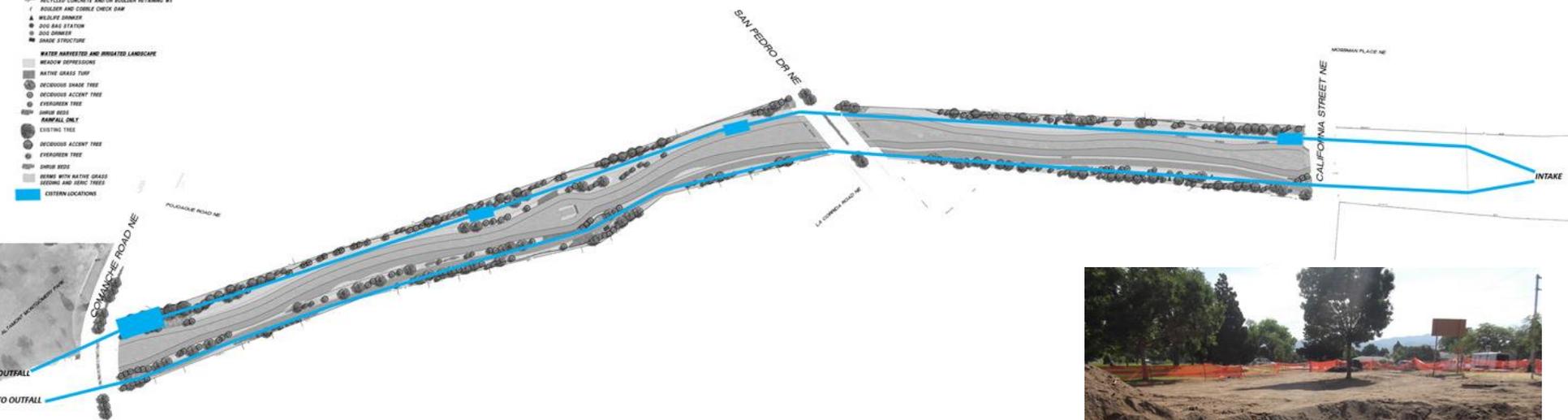
WILDFLOWER MEADOW

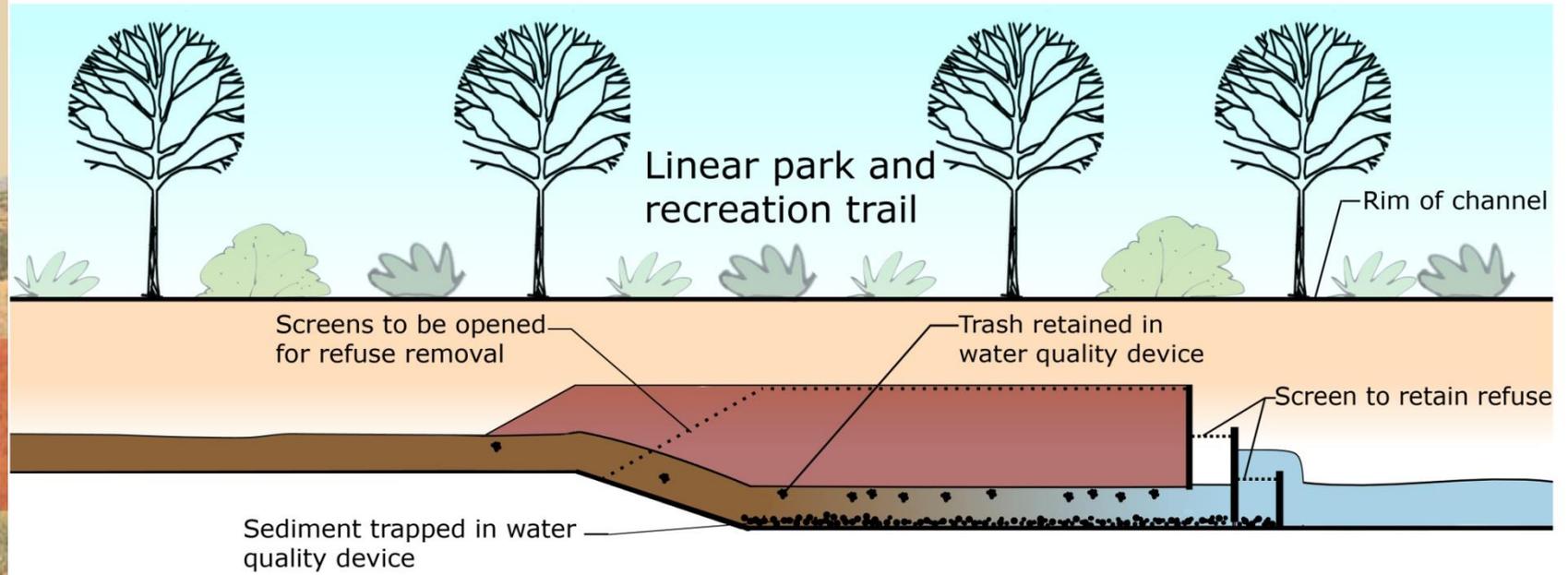
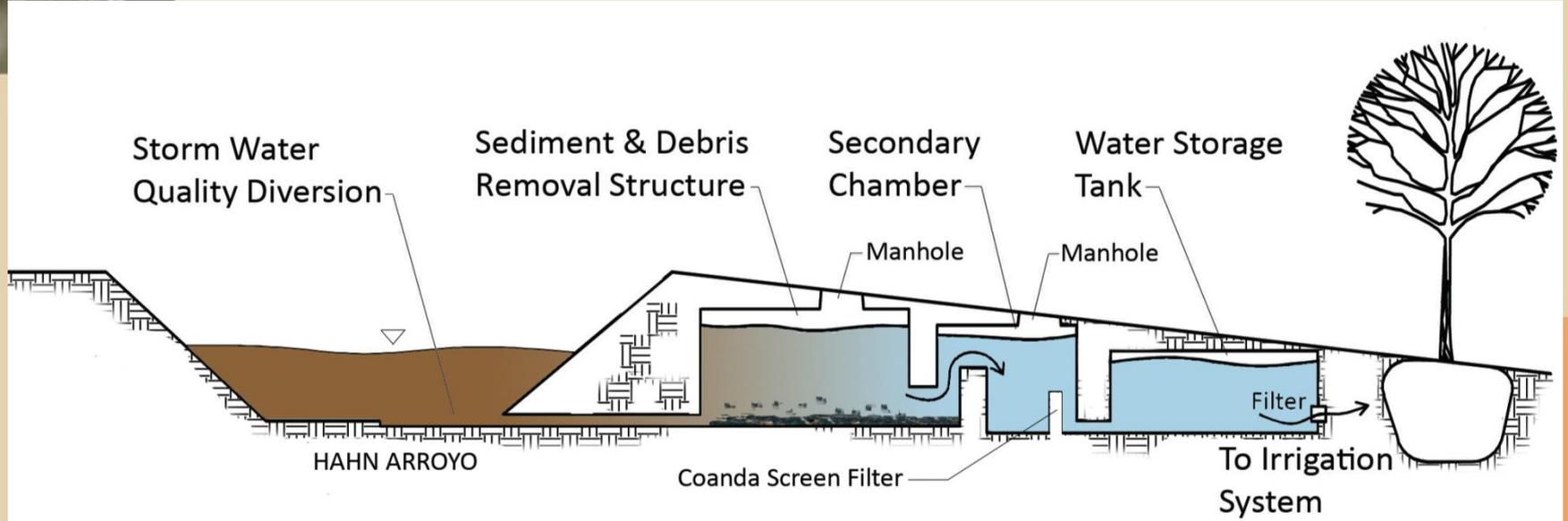


# Use of Cisterns



- LEGEND**
- PLAZA RECYCLED CONCRETE, GRAVEL, PAVES, OR COLORED CONCRETE
  - RECYCLED CONCRETE AND/OR BOLLER RETAINING WALL
  - BOLLER AND CONCRETE CHECK DAM
  - ▲ WELLSPE DRINKER
  - DOG BAG STATION
  - DOG DRINKER
  - SHADE STRUCTURE
- WATER HARVESTED AND IRRIGATED LANDSCAPE**
- WELLSPE DEPRESSIONS
  - NATIVE GRASS TUMP
  - DECAIDOUS SHADY TREE
  - DECAIDOUS ACCENT TREE
  - EVERGREEN TREE
  - SHADY BIRD
  - RAINFALL ONLY
  - EXISTING TREE
  - DECAIDOUS ACCENT TREE
  - EVERGREEN TREE
  - SHADY BIRD
  - BIRD WITH NATIVE GRASS SEEDING AND SERIC TREES
  - EXISTING LOCATIONS









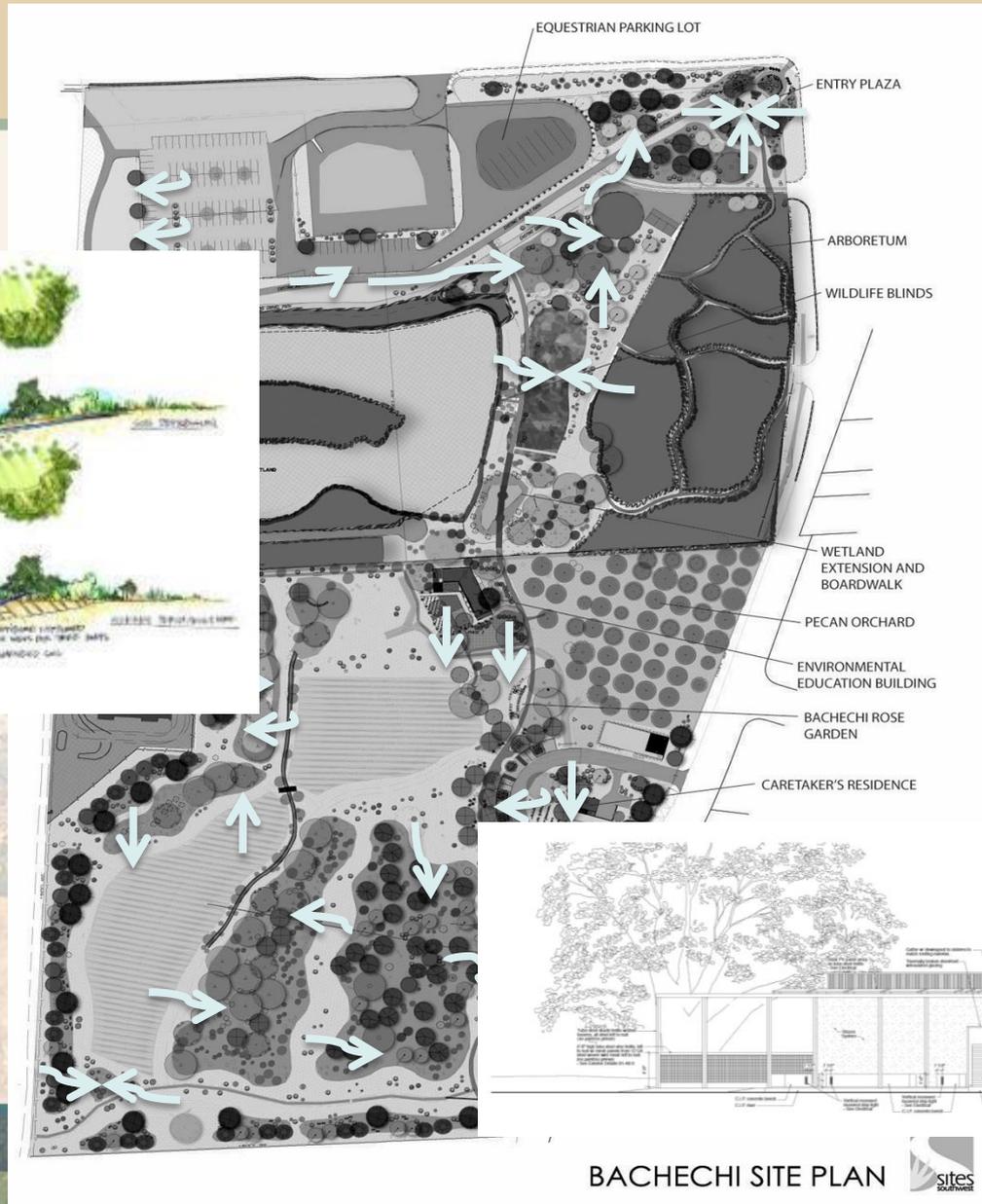
# Bachechi Open Space



LID Techniques: Maximize Acequia (Ditch) Water, Building Cisterns & Solar, Water Harvesting, Permeable Pavement, Net Zero Approach, Education



# Water Harvesting Concepts



- EXPOSED STEEL NOTES**
1. All exposed steel to be painted to match existing steel.
  2. All exposed steel to be painted to match existing steel.

- EXPOSED CAST-IN-PLACE NOTES**
1. All exposed concrete to be finished with a smooth finish.
  2. All exposed concrete to be finished with a smooth finish.

- ELEVATION NOTES**
1. The elevation shown shall verify all elevations and levels of the site.
  2. The elevation shown shall verify all elevations and levels of the site.

BACHECHI SITE PLAN

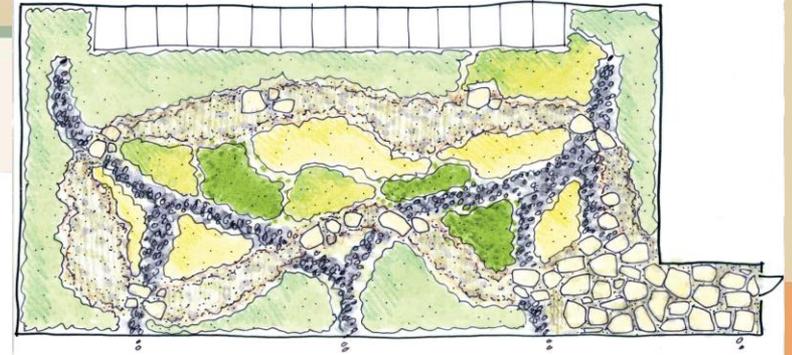






# Vegetative (Green) Roofs

- **NM Court of Appeals**



COLLECTED WATER FLOWS FROM UPPER ROOF TO ROOF GARDEN.

WATER FLOWS THROUGH OUTLET PIPES FROM GARDEN ROOF THROUGH IN-WALL DRAINAGE TO GRADE.

WATER IS CARRIED UNDERGROUND, THROUGH PIPES TO THE BELOW GRADE WATER CISTERN.

A CONNECTED WATER METER KEEPS CISTERN WATER LEVELS CONSISTENT.







# Details

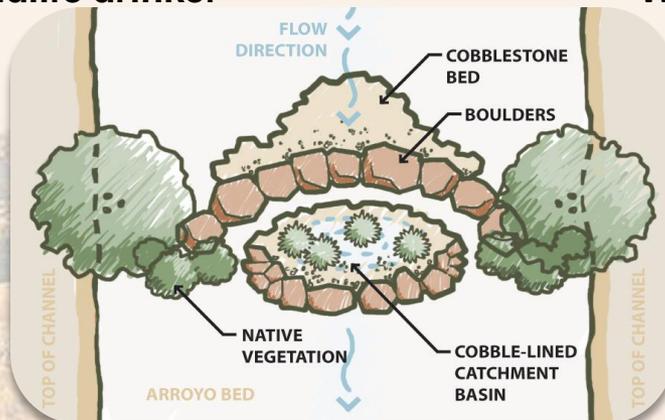
- Water harvesting and wildlife enhancement



Wildlife drinker



Wildlife drinker



“Zuni bowl” water harvesting

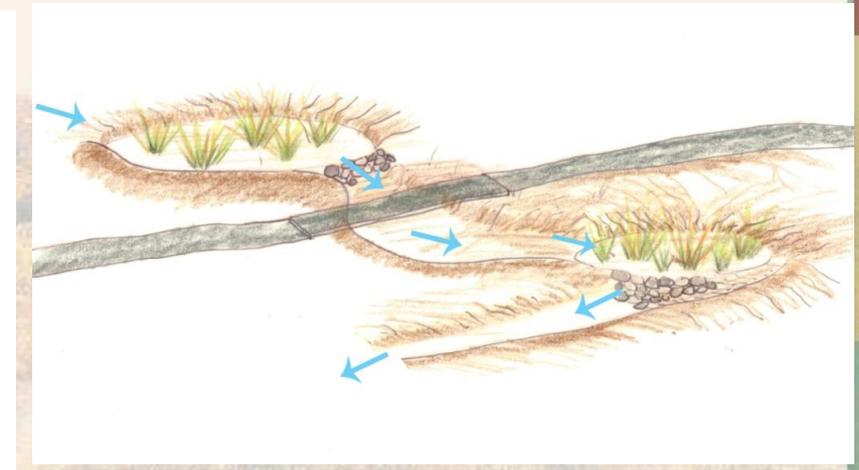
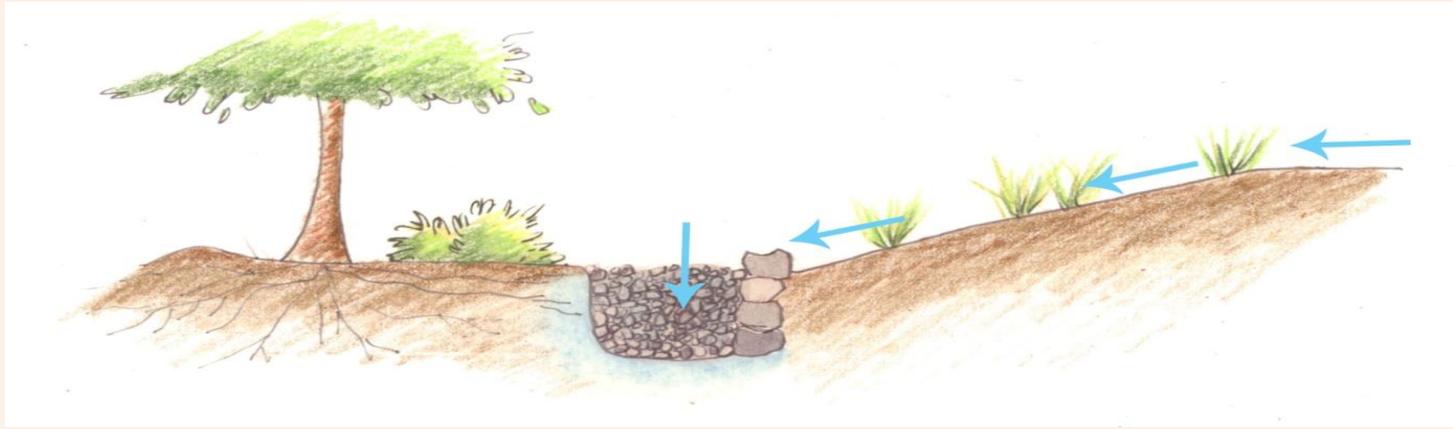


Grow-out nursery



# Details

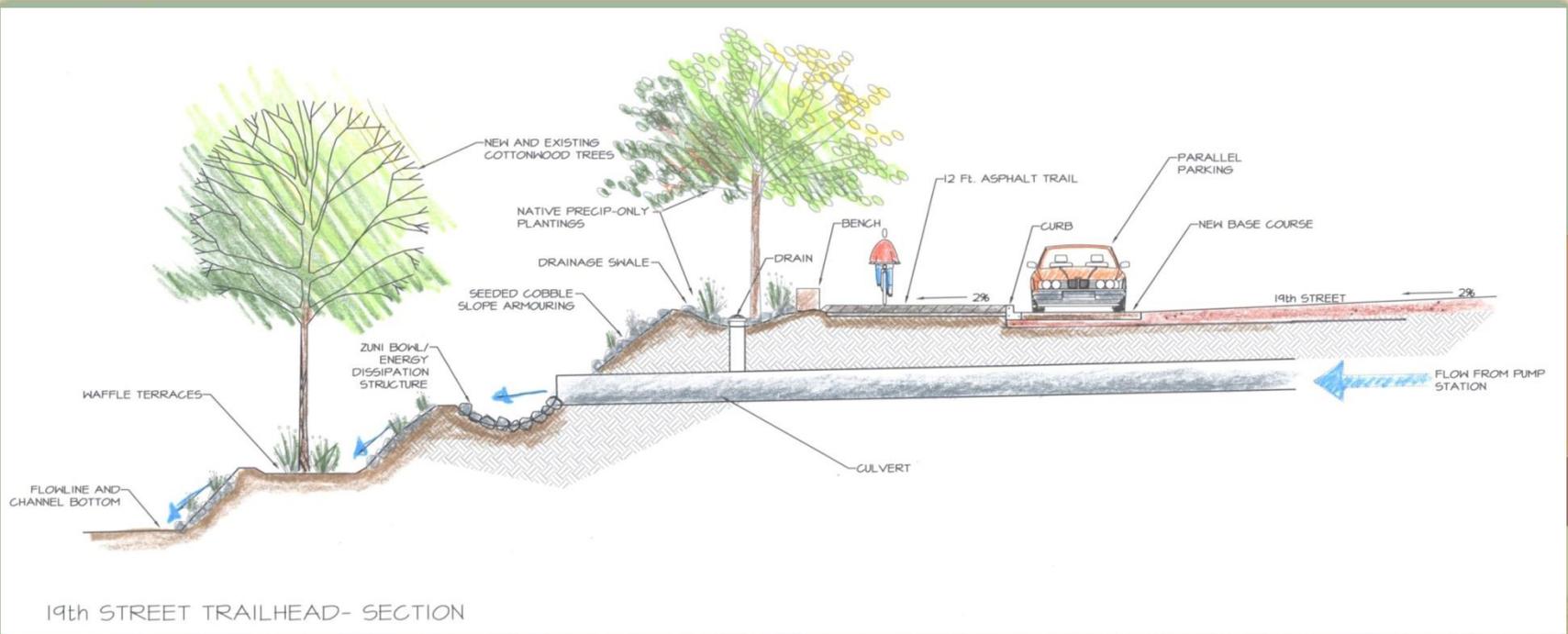
- Water harvesting





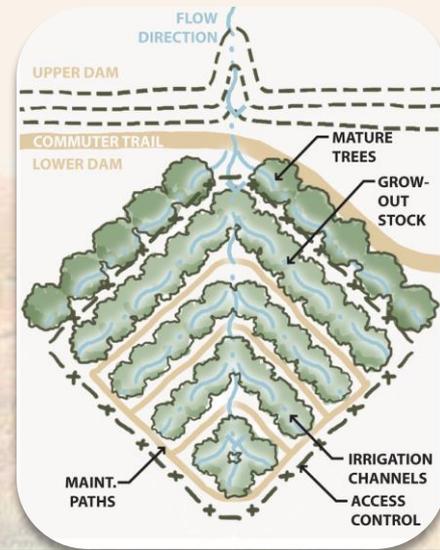
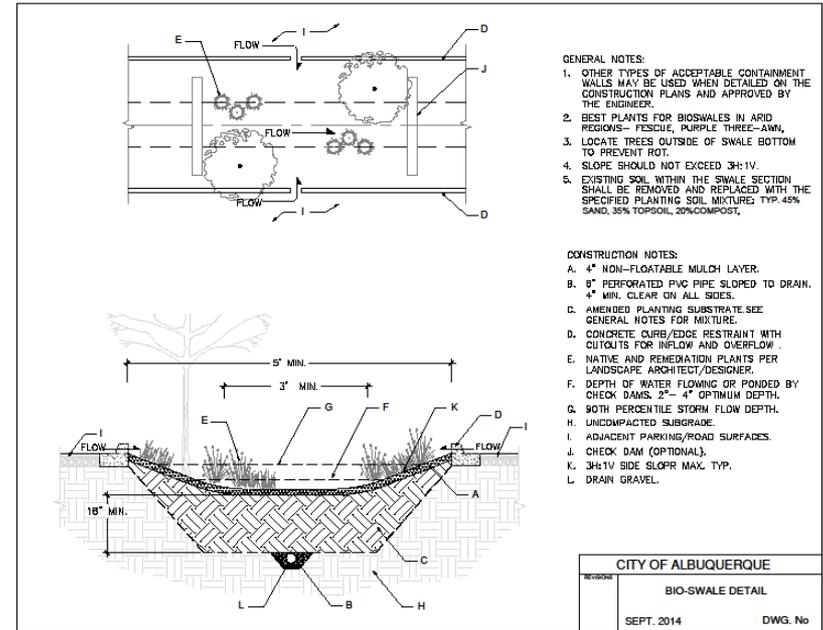
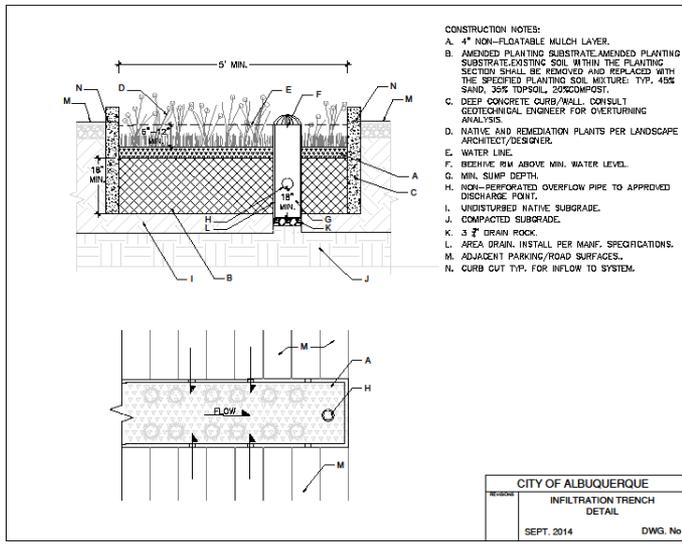
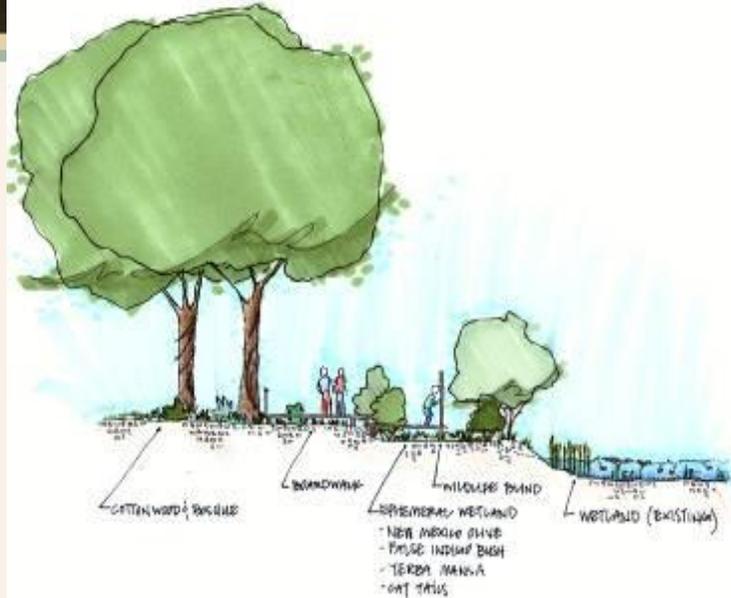


# LID Details



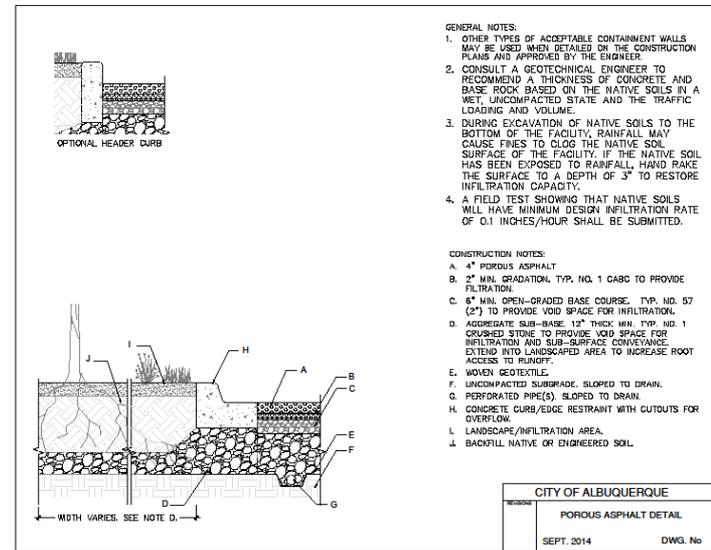
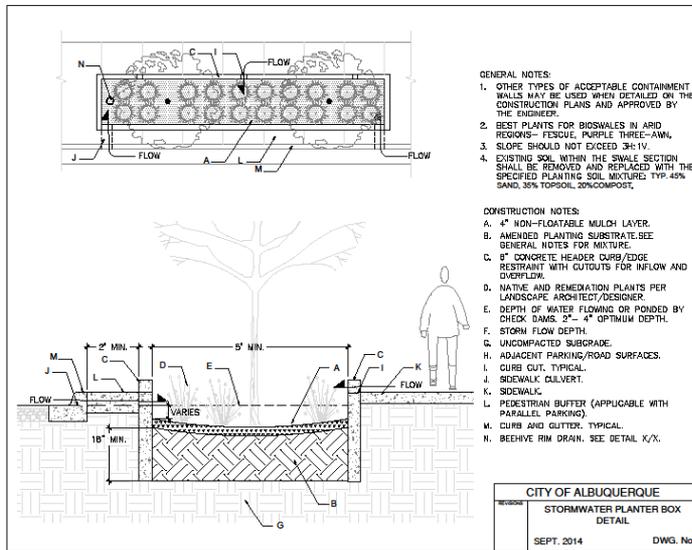
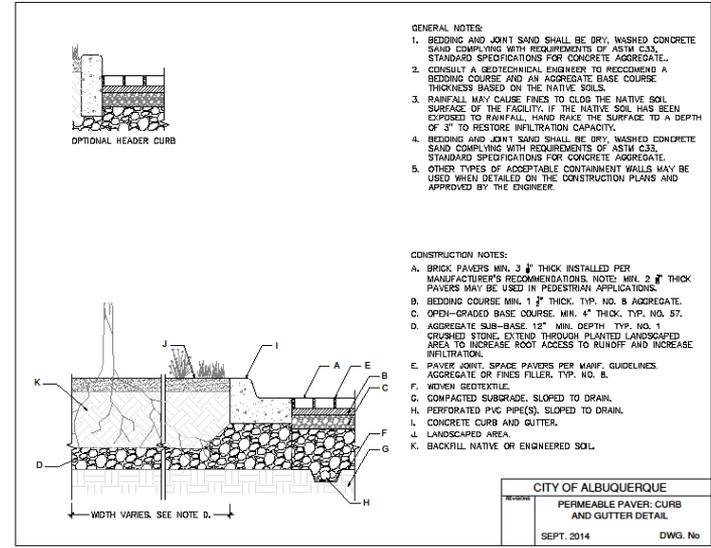
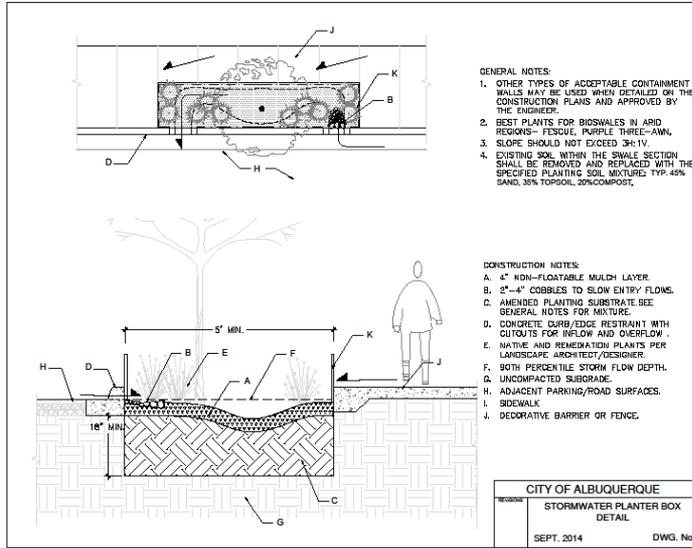


# LID Details





# LID Details





***We do not inherit the land from our ancestors,  
we borrow it from our children***

**.....Native American Proverb**

