

## Case Study - Tucson Water Dept. Eastside Service Center

### A. Project Specifications

#### 1. Project Summary

- a. Location: 10445 E Golf Links (at Houghton Rd)
- b. Client: City of Tucson Water Department
- c. Design Firm: aba Architects with consultants:
  - i. Urban Engineering, Civil Engineers
  - ii. Structural Concepts, Structural Engineers
  - iii. ARC Studios, Landscape Architects - Eric Barrett  
ARC/CWA studios  
T: 520-882-9655  
C: 520-240-1248
  - iv. Kelly Wright Associates, Mechanical/Plumbing Engineers
  - v. Monrad Engineering, Electrical Engineers
  - vi. Architectural Fusion, LEED Consultant
  - vii. Project Contact: Jim Meskan, Tucson Water Project Manager  
[Jim.Meskan@tucsonaz.gov](mailto:Jim.Meskan@tucsonaz.gov) 837-2194
- d. Project Description: Construct satellite facility for eastside Metering & Maintenance staff, housed in a 15,925 SF Office/Shop Building with an on-site 6,975 SF Warehouse.

#### 2. Project Type: Municipal New Building Construction & Site Development

- a. Design Features:
  - i. Rainwater Harvesting Cisterns: Twelve (12) rainwater collection cisterns line the south elevations of both buildings (down slope side of the roof) for irrigating new native plant landscaping:
    1. Total water capacity storage of cisterns: 40,176 gallons
    2. Potential annual rainwater yield from roof surfaces: 157,648 gallons (based on average historical rainfall data)
  - ii. Non-disturbance: Landscape set-aside: 7.86 acres of naturally vegetated land preserved as Natural Undisturbed Open Space (NUOS) for perpetuity, by recorded plat.
  - iii. Site Location: The TW Satellite concept provides an office & support facility in the in the Water Service Areas that field staff actually work in, on a daily basis:
    1. Conserving fuel for sixty (60) field staff service vehicles & five (5) heavy construction vehicles
    2. Reducing vehicle-sourced air emissions

#### 3. What are project goals – stakeholder preferences and/or regulatory goals?

- a. This project was designed to meet the following regulatory requirements or mandates:
  - i. Stormwater Runoff: Properly placed drainage basins that minimize disturbance to the natural topography
  - ii. Resource Protection:

1. Native Plant preservation
2. Open Space set aside
- iii. Landscaping with native and/or drought tolerant planting
- iv. COT Mandate for all new COT Facilities: [minimum LEED Silver Certification level](#)

b. This project was designed to meet the following stakeholder preferences:

i. Water Conservation:

1. Landscaping irrigation system:

- a. [Rainwater harvesting system \(see A.2.a.iii above\)](#)
- b. [On-site depressed water harvesting](#)
- c. [“Real Time” smart irrigation controllers monitor local weather data to adjust watering times and duration](#)

2. Building plumbing:

- a. [Low-flow toilets, faucets & showerheads](#)
- b. [Waterless urinals](#)

3. Mechanical system gray water:

- a. [Evap cooler “waste” water is piped to landscape irrigation system](#)

ii. Energy Savings:

1. Siting of building structures:

- a. [Maximize natural lighting](#)
- b. [Minimize solar heat gain](#)

2. Optimized energy performance mechanical systems

3. 75% of interior spaces receive daylight using:

- a. [Skylights & exterior clearstory windows at warehouse](#)
- b. [Skylights, exterior clearstory windows & translucent overhead door panels at maintenance shop](#)
- c. [Open office plan with volume ceiling](#)
- d. [Interior clearstory windows on south walls of two enclosed training rooms](#)
- e. [Interior floor to ceiling glass storefront walls on the north walls of three enclosed offices & a third enclosed training room](#)

4. Reduced fossil fuel consumption:

- a. [Satellite facility concept \(see A.2.a.i above\)](#)
- b. [Designated hybrid vehicle parking adjacent to main entrance of office/shop building](#)

iii. Urban Heat Island Mitigation:

1. [Siting of building structures & placement of canopy trees will shade 50% of vehicle use area during summer solstice peak heating hours.](#)
2. [Solar reflective roofing](#)

iv. Education:

1. Tucson Water is planning on creating materials/information highlighting the sustainability elements for distribution via:
  - a. [Brochures and/or bill mailing inserts](#)

- b. [The Tucson Water website](#)
  - 2. The twelve rain water collection cisterns lining the south elevations of both buildings are visible from both major roadways:
    - a. [Establishing their placement as an architectural enhancement to the building design](#)
    - b. [Promoting a new community aesthetic](#)
- v. Recycled materials reused in new construction products including:
  - 1. [Wall insulation at both buildings](#)
  - 2. [Tectum panel ceiling system at office building](#)
- vi. Recycling of construction waste

## **B. Cost & Jobs Analysis**

- 1. Estimated cost: (Total Project Budget) [\\$7,968,621](#)
- 2. Actual cost:
  - Planning & Design: (aba Architects) [\\$794,425](#)
  - Construction: (Lang Wyatt Construction) [\\$5,952,540](#)
  - Annual Maintenance: By COT FM, funded by TW operations budget
- 3. LID/GI Costs Compared to Conventional?
  - No specific breakdown available but within budget estimated & allocated, which was based on comparables to conventional construction & development.

## **C. Performance Measures**

- 1. Constructability Acceptable: [Yes](#)
- 2. Stakeholder Expectations Met:
  - Although only fully occupied since mid February, 2012; all of the stakeholder preferences (see A.3.b above) have been realized, except the following:
    - a. [\(A.3.b.ii.2\) Optimized energy performance energy systems have been designed, specified and installed but performance measurements require a full year's occupancy.](#)
    - b. [\(A.3.b.iii.1\) Buildings have been sited & canopy trees placed appropriately, but the newly planted trees have yet to mature.](#)
    - c. [\(A.3.b.iv.1\) Tucson Water has just begun developing their educational program and has yet to make it available to the community.](#)

## **D. Project Recognition:**

- 1. LEED certification level is still being assessed:
  - a. [COT Mandate for minimum Silver certification level is certain to be met](#)
  - b. [Gold level certification is pending final assessment](#)
- 2. Awards Received:
  - a. [US EPA's "Designed to Earn the ENERGY STAR" certified-](#)

Final ENERGY STAR designation pending measurement of superior energy performance after one year

- b. Annual Star Builders (manufacturer of custom designed metal building systems) Conference, Master Builder category awards for:
  - i. "Best of Government"
  - ii. "Best of Pacific Southwest"

#### **E. Lessons Learned:**

1. What aspects of the project are you proud of?
  - a. The water conservation achievements are especially important to Tucson Water as part of the City Department/Utility's mission statement to manage this precious resource wisely. As an example for the community, the rainwater harvesting system is a particularly visible example of this goal. I am particularly impressed with the efforts of the Architects and Landscape Architect to integrate the cistern placement into the street façades as an aesthetic enhancement.
  - b. The interior spaces of the buildings are generously illuminated by natural daylight, through the designers' deft use of skylights, interior & exterior clearstories, and interior & exterior glass storefronts. The architectural designer's use of vertical fins & overhangs to control direct sun at the floor to volume ceiling height glass walls on the north side of the office building is worthy of note as well.
2. What would you do differently?
  - a. I would have spent more time considering & finding funding for incorporating solar collector energy generation into the project. At the time in 2007 that preliminary design started, solar energy technology was considered too expensive and the collectors themselves considered an unattractive architectural feature by most of the public.
3. Any other noteworthy aspects of the project?
  - a. The Eastside Service Center is the first of the four TW satellite facilities to be built new. The north, central & west satellites were all retro-fits of existing facilities and as such are compromised in some small and/or significant ways, both in functionality and sustainability aspects. The Eastside was the Dept's chance to "do it right", as both a fully functioning facility and an example to the community of green/low impact development. Mission accomplished.

#### **F. Additional Information**

1. Images: Please see following pages 5, 6, 7 & 8 of 10.



Main Entrance to Office/Shop Building



South Façade of Office/Shop Building



North Façade of Office/Shop Building



Open Office Interior at Office/Shop Building



Office Corridor with interior glass storefront wall



Shop Interior of Office/Shop Building



South Façade of Warehouse



Warehouse Interior

2. Graphics:

**City of Tucson Water Eastside Satellite Center**  
Tucson, Arizona

**SOUTH ENTRY VIEW**

- \* RAIN WATER COLLECTION
- \* SHADE TRELLIS
- \* DESERT OASIS
- \* RECYCLED STEEL COMPONENTS

**SUSTAINABLE DESIGN ELEMENTS**

**Daylighting:** offsets 10.57% energy usage  
**Siting:** maximizes natural lighting, minimize solar heat gain  
**Rainwater Harvesting:** via rooftop gutters to cisterns  
**Xeriscaping:** eliminates need for potable water for irrigation  
**Heat-Island Reduction:** solar reflective roofing

**Energy Cost/Square Foot: \$0.99**  
**Building/Space Type:** Office, Operations and Warehouse  
**Total Square Footage of Building: 20,041**

**KEY RESULTS**

**Energy Use Intensity (EUI) = 128 kBtu/sf/yr**  
**Percent CO<sub>2</sub> Reduction = 29%**  
**ENERGY STAR Design Rating = 76**  
**Energy Savings = 1,049,172 kBtu**  
**CO<sub>2</sub> Savings = 55 metric tons CO<sub>2</sub>/yr**

**INTERIOR VIEW**

- \* NATURAL LIGHT TO ALL OFFICES, INCLUDING SKY LIGHTS
- \* VIEWS TO OUTSIDE
- \* EXPOSED STRUCTURE
- \* VISIBLE MECHANICAL SYSTEMS

**NORTH WINDOW WALL**

- \* SHADE FINS
- \* NO WEST FACING GLASS
- \* WATER EFFICIENT LANDSCAPING
- \* GLASS WALL FOR DIFFUSE NORTH LIGHT



520.881.4512  
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DESIGNED  
TO EARN THE  
ENERGY STAR

The estimated energy performance for this design meets US EPA criteria. The building will be eligible for ENERGY STAR after maintaining superior performance for one year.

Project board prepared for the ENERGY STAR Exhibit at the May 2011 American Institute of Architects National Convention, per request and invitation of the US Environmental Protection Agency.

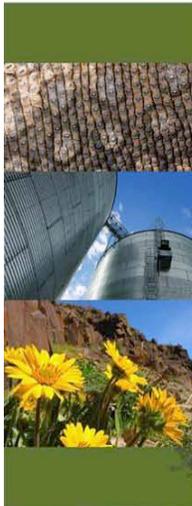


**SOUTH ENTRY VIEW**

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- DESERT OASIS
- RECYCLE STEEL COMPONENTS

The Tucson Water Department East Side Satellite Facility has been registered as a LEED project. The target is a silver certification which requires 33-38 out of 69 possible points.

The six categories of LEED for which points are awarded are: Sustainable Sites, Water Efficiency, Energy & Atmosphere, Materials & Resources, Indoor Environmental Quality and Innovation & Design Process.



The site and buildings include other special features:

- Compact development foot print
- Bicycle Storage and Changing Rooms
- Light Pollution Reduction
- Preservation of existing landscaping
- Water Efficient Landscaping, with No Irrigation after one year (see water harvesting tanks)
- Innovative Wastewater Technologies
- 30% Reduction in Water Use
- Optimized Energy Performance for Mechanical Systems
- Diversion of 50% of Construction Waste from Land Fill
- Using materials with a recycled content of at least 10%
- Using regional materials (10%) to save transportation energy
- Using Low Emitting Materials for: Adhesives & sealants; Paints & Coating; Carpet Systems
- 75% of spaces have access to Daylight
- Providing individual control of Lighting
- Providing individual control of Thermal Comfort
- Educating Users and Visitors



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- VIEWS TO OUTSIDE
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- SHADE FINIS
- NO WEST FACING GLASS
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- GLASS WALL FOR DIFFUSE NORTH LIGHT

**aba** Architecture . Interiors . Planning PC, AIA  
**architects** 1001 North Alvernon Way Ste 175 Tucson, Arizona 85711

Project board prepared for exhibit at the COT Parks & Recreation Dept hosted Green Tour Event at Reid Park Zoo, August 2007.