

Green Projects Entry
World Birding Center (o)

Section 1 - Project Overview Information Part 1

Project name: World Birding Center (o)
Project owner: Texas Parks & Wildlife
Project address: 2800 S. Bentsen Palm Drive (FM 2062)
Mission, TX 78572

Section 2 - Project Overview Information Part 2

Project completion date: 1/2004 (*m/y*) *format*
Project Site: Previously Developed
Project type: Interpretative center
Project site context/setting: Rural
Other Building description: New
Lot size: 6.00 acres
Building gross floor area: 13000 ft²
BOMA floor area method used?: yes
Number of permanent occupants: 15
Number of visitors: 185
Occupants (hours/week/occupant): 40
Visitors (hours/week/visitor): 2
Total project cost: \$3,500,000

Section 3 - Project Overview General Description

General description: The Lower Rio Grande Valley of Texas is one of the richest bird habitats in the world. However, over the past century suburban and agricultural developments along with river diversions have so severely impacted the landscape that only 5% of the native Tamaulipan Thorn Scrub habitat currently remains.

Through a joint effort between Texas Parks and Wildlife and the local communities the World Birding Center is established to "significantly increase the appreciation, understanding and conservation of birds, and wildlife habitat...". Many of the sites seek to repair or re-establish the rich natural landscape. In all cases the architecture is to learn from the regional vernacular, respond to the harsh climate, and minimize disturbance of existing habitat.

The WBC headquarters site was selected to form such a gateway out of disturbed land that was cleared for agricultural purposes some 30 years ago. This land is adjacent to more than 1700 acres of remnant native habitat that is being reclaimed and established as a habitat preserve. The goal of the facility is to create an accessible interface between the developed rural landscape and the habitat preserve for the residents of South Texas and visitors from around the world.

Section 4 - Top Ten Measures

Top Ten Measure 1: Sustainable Design Intent & Innovation

Key environmental aspects: Our design and construction theme was to "do more with less."

Through the process of "right sizing", the buildings originally programmed for approximately 20,000 square feet were reduced to 13,000. A roughly 35% first cost savings along with materials, energy and maintenance savings.

Structural Arch Panels enclose the maximum space with the least material using 48% less steel by weight as compared to traditional steel framing.

The flooded habitat demonstration garden exhibits the characteristics of the natural flooded Resaca environment and is the focal point of the design. All landscape planting is strictly limited to native plants of this exact eco-region. Land surrounding the buildings is being restored to their native state and will exhibit various stages of restoration.

A 47,000-gallon rainwater system is utilized for irrigation and wildlife through. A series of rainwater guzzlers, natural pools, and water seeps provides the much needed water for birds and butterflies. Water efficient fixtures and waterless urinals minimize potable water use.

High efficiency, variable speed mechanical equipment is utilized to cool interior spaces. On demand hot water heaters supply hot water. High efficiency lighting combines with shielded exterior lighting protecting this important night sky and migration flyway. Low-level red light full cut off path lights minimize habitat impacts at exterior gardens.

Top Ten Measure 2: Regional/Community Design & Connectivity

Regional/Community Design: The buildings are designed to fit their environmental and cultural context. The forms, systems and materials relate to the agricultural vernacular, which dominates the valley's architectural landscape. Local farmers traditionally cluster buildings to create a tree-shaded oasis for their homes. These oases punctuate the valley landscapes typically at the edges of the farmer's fields near the road. The Visitors Center at Bentsen seeks to create a garden oasis in a similar manner. Buildings cluster to create controllable shady/garden space while orienting themselves to shield summer sun.

The World Birding Center was created through a unique collaboration of Texas Parks and Wildlife and local community partners. The network of nature centers is the result of a 3-year process where local citizens created the vision for the network of centers.

The center connects to the hike and bike trail linking the surrounding neighborhoods. Private vehicle access to the preservation area has been removed. A large shade arbor shelters visitors waiting for the electric trams that will provide access to the preserve.

In addition to providing protective habitat exhibits gardens, the visitors center will provide for both school group activities and large community events. A small café is provided overlooking wildlife guzzlers as a gathering spot for local birders. A multi-use meeting space is provided for both WBC and community use.

Use other transport options:

Parking spaces per person:

Top Ten Measure 3: Land Use & Site Ecology

Site ecology:

The headquarters for the World Birding Center (WBC) is located in the Texas Rio Grande Valley. The selection was made through an exhaustive planning process, which included land specialist, architects, planners, biologist, birding specialist, and local community partners.

The land chosen falls within an area that was once covered with ancient Resacas (or river oxbows). A prime motivation of the site selection is the restoration of a native landscape.

By situating the Center within the transition area between distributed land and the native habitat we have an opportunity interpret the story of a lost habitat.

The flooded habitat demonstration garden area, exhibits the characteristics of the natural flooded Resaca environment. This garden area is designed to support wildlife. Dense vegetation will provide cover for birds and screen pedestrian activity. A stringent all native plant criteria were used in the design. Site collected rainwater is utilized for irrigation.

A series of rainwater guzzlers, natural pools, and water seeps provide the much needed water for birds and butterflies. Plants within the courtyard areas are designed to provide attractive habitats where flora and the related fauna change throughout gardens. Land surrounding the buildings is being restored to their native state and will exhibit various stages of restoration.

Top Ten Measure 4: Bioclimatic Design

Bioclimatic design: The structures orient east/west parallel with the canal. Deep porches facing south, east, and west block summer sun. Exterior trellis shade windows from direct solar gain.

Self-supporting Arch Panel structures enclose large vented attic space using 48% less material than traditional steel framing. The large vented attic space buffers much of the interior space, drawing from continuous vents at the eaves and end gables.

Local clay block walls provide thermal mass slowing heat gain during the high gain periods, releasing heat to the night sky. Behind this mass wall is a deep airspace and radiant barrier to repel additional heat gain before it reaches the insulated wall cavity. South facing walls are fully shaded at buildings A&C.

Exterior light pollution is a major problem in coastal bird habitat and flyways. Exterior parking and path lighting are hooded to shield light leakage to the night sky. Path lights at habitat garden are low-level red lights to minimize nighttime habitat disturbance and glare on human eyes.

Extensive use of brick paved porches allows for shaded external circulation, gathering, and connections to the garden spaces. This reduces first cost and energy use when compared to climate controlled interior circulation.

Top Ten Measure 5: Light & Air

Light & Air:

A primary goal of the design was to create connections to the land from all occupied spaces. The narrow footprint maximizes daylighting, and views. Deep porches replace interior corridors, connecting occupants to the landscape and reduce interior climate controlled space. High-Performance vision glass relates the building occupant to the courtyards and northern vistas. WBC staff workspaces occupy perimeter space with views / ventilation control for each.

Glass above 7 feet high is lightly tinted to allow more visible light transmittance for better daylight penetration allowing light deeper into the building. Glass at eye level allows a balance of clear view and higher shading coefficients for better thermal performance. Glass below 30 inches has the highest solar exposure and therefore the highest shading coefficient to repel excess heat gain. Dual opacity interior shades have a higher light transmittance on the shades upper portion for deeper daylight transmittance while cutting glare at working eye levels. Each of the buildings meets the USGBC-LEED criteria for daylight spaces and views.

Locally low maintenance and low VOC materials and finishes are used throughout.

Percent of building area that is daylit: 95%
Percent of building that can be ventilated or cooled with operable windows :

Top Ten Measure 6: Water Cycle

Water Cycle:

The extended visitors center site includes a 60-acre field cleared 30 years ago. This was fertile river delta habitat. Levee construction now prevents the periodic flooding which once naturally irrigated the land. A primary goal of the project was to restore and exhibit this native habitat.

In this simple design, interior space is minimized to save material and energy however metal roof area is maximized over exterior walkways and porches to collect as much water as possible. 18 water tanks collect and store more than 47,000 gallons of water on the site. The tank capacity was carefully calculated to maximize capacity without creating an over-capacity balancing use with economics.

Captured rainwater provides for the minimal establishment period needs of the all-native landscape. It also serves to mimic periodic natural flooding for the Resaca habitat.

Captured rainwater is further utilized for rainwater guzzlers, natural pools, and water seeps each designed to meet the differing needs of specific migratory wildlife, bird, and butterfly species. Water efficient plumbing fixtures and waterless urinals are utilized throughout the facility. Wastewater from exterior drinking fountains is visibly returned to the landscape drawing attention to the connections between human use and the needs of the land.

Precipitation managed on site: 24%
Total water used indoors: 115200 gal/yr
Total water used outdoors: 104000 gal/yr
Percent of total water from reclaimed sources: 47%

Percent wastewater reused on-site: 0%
 Calculated annual potable water use: 16.9 gal/sf/yr

Top Ten Measure 7: Energy Flows & Energy Future

Energy description:

The simple approach to energy performance started with "right sizing" the buildings. Through careful evaluation and creative space sharing the building square footage was reduced by 35% from the original program. Outdoor porches and walkways replace more than 4,000 square feet of circulation and overflow spaces.

The narrow floor plate promotes effective daylighting, and views. The buildings are oriented on an east/west axis allowing efficient solar control. Deep porches facing south, east, and west block summer sun. Exterior trellis and exterior louvers shade windows from direct solar gain. Thermal mass walls slow heat gain, releasing heat to the night sky. Behind this mass wall is a deep airspace and radiant barrier to repel additional heat gain before it reaches the insulated wall cavity. Note that the Envelope is 11% better than the code requirement per State Energy Code, via Comcheck Envelope Compliance.

The reflective metal roof and radiant barrier shield a high volume vented attic space over most of the building buffering the highly insulated interiors from the Texas sun. High performance thermal glazing varies in light transmittance from high to low maximizing effective daylighting and views while minimizing unwanted heat gain. The average SEER rating of 16 is 60% greater than base code requirement (SEER = 10), and meets the code requirement per State Energy Code, via Comcheck Mechanical Compliance.

High efficiency compact fluorescent fixtures were used extensively. Multi-use and exhibit spaces utilize light sensing dimming controls. Occupancy sensors shut down lighting in workspaces, restrooms, and support areas when not in use. High efficiency SEER 16 to 17 variable speed mechanical units provide lower velocity air through even distribution fabric ducts. User controlled dual opacity interior shades minimize glare while maximizing deep daylight penetration. The lighting wattage is 11% better than the code requirement per State Energy Code, via Comcheck Lighting Compliance.

Operating hours for the facilities correspond with daytime periods. Individualized buildings are accessed from the exterior and function to allow for the utilization of portions of the facilities without impacting the other areas.

The narrow floor plate allows 95% of the spaces to have effective daylighting. Additional lighting during the day is rarely necessary outside of the exhibit space.

No energy modeling was performed.

| Performance Rating | Percent total energy savings | |
|--------------------------------|------------------------------|-------------|
| | Base Case | Design Case |
| EPA | | |
| HERS | | |
| Total energy (Btu/sf/yr) | | |
| Electricity (Btu/sf/yr) | | |
| Natural gas (Btu/sf/yr) | | |
| Other: (Btu/sf/yr) | | |
| Heating (Btu/sf/yr) | | |
| Cooling (Btu/sf/yr) | | |
| Cooling capacity (sf/ton) | | 148.258 |
| Lighting load connected (W/sf) | | 2.465 |

| | |
|-------------------------------------|-------|
| Lighting load after controls (W/sf) | |
| Plug load (W/sf) | 2.054 |

| | |
|--------------------------------|--------|
| Peak electricity demand (W/sf) | 49.292 |
|--------------------------------|--------|

| | |
|--|---|
| Percent on-site renewable energy (%) | 0 |
| Percent grid-supplied renewable energy (%) | 0 |

Supplemental Narrative

Top Ten Measure 8: Materials & Construction

Materials description: There were several criteria placed on material selection for this project.

Prime among them was the utilization of local and regionally manufactured materials. One example of such is the local low fired brick pavers and the highly durable locally produced clay block. These materials have the added benefit of low maintenance, low embodied energy and are appropriate to the local vernacular and climate.

Efficiency of material use is also a major consideration. Through the creative application of structural steel architectural panels, large simple spans could be achieved with a minimum amount of steel. In addition to utilizing a highly recycled and recyclable materials, the Arch Panels required 48% less steel by weight than traditional truss systems. This reduced raw material needed along with saving the embodied energy in the product while also producing first cost savings which were applied to the landscape and rainwater system.

Salvaged cypress was used for siding under covered porches to add the warmth and quality of wood to some of the public spaces eliminating the need for newly harvested timber. This material exhibits characteristic of decay resistance and durability appropriate to it's exterior use.

Top Ten Measure 9: Long Life, Loose Fit

Long life, loose fit: Highly efficient self-supporting Arch Panel shells provide long life, low maintenance, 48% material savings, and significant first cost reductions. Individual arch panels can be replaced independently without disturbance to the system. Upgrading to stainless steel screws (the typical first point of failure) increases roof panel life. Light colored reflective roofing cuts heat gain and energy loads.

The steel structure is galvanized to increase service life and reduce finish maintenance. All structural elements are bolted together allowing for ease of replacement, expansion, or future reuse. This approach also prevents breaking the galvanized finish as seen with typical field welded connections.

Interior spaces are free of intermediate structural supports providing open flexible spaces. Common workspaces provide flexibility of office space. The multi-use and exhibit spaces utilize movable partitions and have no interior partition walls.

The design seeks to minimize redundancies in interior finishes lowering first cost and finish maintenance throughout. Sealed concrete floors, brick pavers, clay block, and decay resistant salvaged cypress walls provide long life, low maintenance surfaces.

Exterior circulation, large open-air porches, breezeways, and shady vine covered arbors reduce interior space, energy, finishes, and maintenance. Porches at the café, multi-use, and exhibit spaces provide sheltered overflow spaces for expanded use.

Top Ten Measure 10: Collective Wisdom & Feedback Loops

Collective Wisdom & Feedback Loops: The design was the result of an extensive long term collaboration between the owner, planners, the design team and the community. The establishment of the World Birding Center services as a model for how other communities can partner together forming a regional coalition for both resource protection and economic development.

Through a series of interpretive workshops and site visits with birding and ecological resource specialist the team was able to learn important lessons about habitat protection and restoration. This collaboration and added knowledge was put to use by the designers in creating habitat friendly facilities that feature wildlife attractors as a major element in the facilities design.

Many critical lessons were learned from developing designs for these unique structures. The structural shell system is supported by buttressed concrete columns in one building and by a bolted steel pipe column system in the other two buildings. While the steel had a high-recycled content and material weight advantage we found that the fly ash concrete system resisted the roofs thrust loads more efficiently with less construction complexity.

Custom aluminum exterior louvers were originally designed for exposed gable ends. We found that standard mechanical louvers can serve as effective light louvers blocking out direct solar gain while allowing effective indirect lighting inside at a fraction of the cost.

Section 5 - Project Economics

Finance: The project is the result of a unique partnership between Texas Parks and Wildlife (TPW) and the local communities of the Rio Grande Valley. Planning for the World Birding Center (WBC) network and Visitors Centers for three of the 9 sites was funded by the state. The local communities have created a multi-municipal entity to oversee the system providing additional funding, preservation sites, land for support amenities, operational support, and promotion.

The WBC is serving as an economic stimulus attracting visitors to the Rio Grande Valley while creating a dynamic where land preservation has economic value apart from agricultural and development value. In creating this sort of new economic value the WBC will continue to grow over time.

Cost and payback analysis: The design concept called for simplification of the building structures in order to preserve financial resources for the native habitat gardens and rainwater collection system. This was accomplished first by building square footage reductions as mentioned previously. Additionally, the steel structural arch panel system created efficiency savings in structural steel material, erection, and roofing cost. Overall this reduction resulted in a \$240,000 (approximate) savings over traditional steel structure and roofing alternatives.

The rainwater collection system cost \$107,000 for 18 tanks. This design solution was a balance between optimizing the collection of hot water, the cost of the tanks and the need to

maintain a sustainable tank level given the required use in a low rainfall year. In all, the rainwater collection system is capable of offsetting the use of approximately 104,000 gallons of well water annually.

Section 6 - Process and Results

PreDesign: The pre-design included an exhaustive planning effort and ecological site analysis. First to identify the appropriate mix of sites, then to inventory natural resources in addition to development impacts, and finally to plan for restoration and protection of the key resources. Additional lands had to be procured in order to buffer, protect, and expand on the prime resource areas targeted in the plan. In several cases like the headquarters site, land was donated through extensive negotiations with local owners.

As a result of this process new facility development was able to take place on previously disturbed land outside of the primary preservation areas. Existing site impacts within the preserve areas could then be removed and mitigated. The long term environmental and economic benefits of this are immeasurable.

Design: Our first step in the design process was to work with the owner on their program in an effort to "right size" the building. Through this process the building square footage was reduced by 35% resulting in approximately 1.4 Million first cost savings along with decreased operational and maintenance cost proportionate to the reduction. The structures are simply designed to contribute the necessary amenities in support of experiencing the landscape.

Construction Process: Construction Management at Risk

Operations/maintenance: By Owner

Commissioning: N/A

**Measurement & verification/
post-occupancy evaluation:** N/A

Rating System Name: N/A

Version:

Rating Date:

Score or rating level:

Credits:

Sections 7: Visuals

Exhibit A

WorldBirdCen_site.jpg



Image has been scaled down. Click it to view actual size...

Description: Site Plan

Exhibit B

WorldBirdCen_elevations.jpg



Image has been scaled down. Click it to view actual size...

Description:

Elevations

Exhibit C

WorldBirdCen_06.jpg



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Description:

Exterior Walkway / Porch

Exhibit D

WorldBirdCen_08.jpg



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Description:

Trellis between habitats

Exhibit E

WorldBirdCen_09.jpg



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Description:

Birder Cafe

Exhibit F

WorldBirdCen_11.jpg



Image has been scaled down. Click it to view actual size...

Description:

Exterior view of Birder Cafe

Exhibit G

WorldBirdCen_12.jpg



Image has been scaled down. Click it to view actual size...

Description:

View across canal

Exhibit H

WorldBirdCen_13.jpg



Image has been scaled down. Click it to view actual size...

Description:

View of Water Storage Tank