TRES RIOS

RECREATIONAL MASTER PLAN

6.9.2008

UPDATE-FINAL

"You cannot step twice into the same river; for other waters are continually flowing in."

-Heraclitus

TRES RIOS

U.S. Army Corps of Engineers

engineering and environmental design

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INTRODUCTION

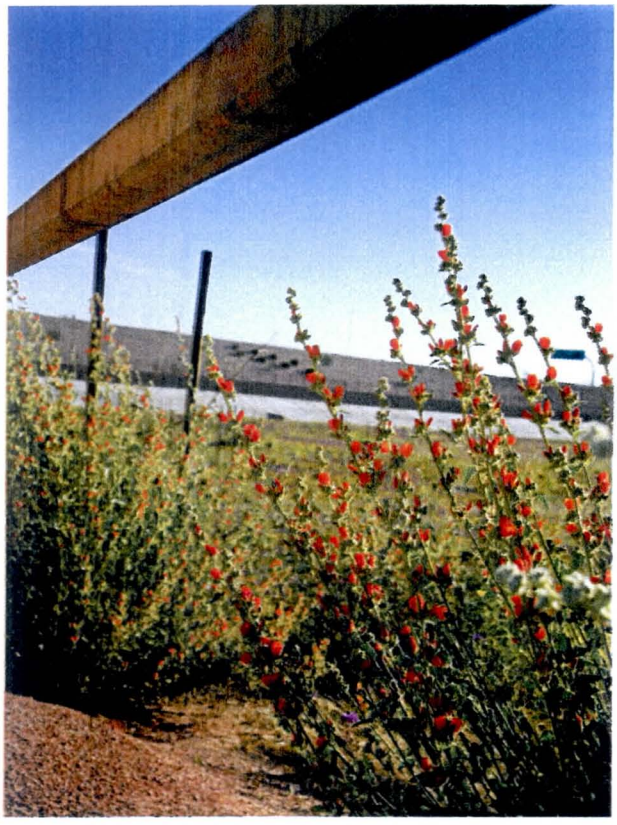
The United States Army Corps of Engineers and the Multi-City Subregional Operating Group (SROG), consisting of the cities of Phoenix, Glendale, Mesa, Scottsdale and Tempe, have entered into a contract for a Feasibility Study of an environmental restoration project known as Tres Rios. The project is at the confluence of the Salt, Gila, and Agua Fria Rivers. These rivers are virtually dry and have suffered an almost total loss of habitat as a result of early 20th century reclamation projects. This diverse southwest habitat is a critical and diminishing resource in Arizona. Constructed wetlands, using local sources of water, will be used to rehabilitate desert riparian habitats in the riverbed throughout the metropolitan area, while allowing for periodic flood flows.

Tres Rios is approximately nine miles west of downtown Phoenix. The upstream boundary of the study area is located at 87th Avenue, just upstream of where the City of Phoenix operates a wastewater treatment plant. The study area extends along the Salt River, west from the treatment plant for approximately seven miles through the confluence of both the Gila and Agua Fria Rivers. The Buckeye Irrigation Company diversion canal serves as the end location of the study area.

The City of Phoenix completed a recreation feasibility study in 2001; because of the changing design of the Tres Rios expansion project it was determined that an update to the existing study was needed. This report serves as that update.

The programmed improvements within the Tres Rios project include the design and development of both Flow Regulating Wetlands (FRW) and Overbank Wetlands (OBW). These improvements are all a part of the Tres Rios Environmental Restoration Project Phase II (project) at the Salt and Gila Rivers west of Phoenix, Arizona. This restoration project is jointly funded by the USACE and the SROG with the City of Phoenix (City) acting as the local non-Federal sponsor on behalf of its SROG partners. The plans and designs developed as part of this federal project have been completed by the Damon S. William and Associates (DSWA) design team in association with, WGA, Inc., and the URS Corporation. These design efforts have gone through a series of reviews by the City and the USACE. From these reviews it was determined that planning for future recreational elements in the Tres Rios project was necessary. The City determined that accommodating for these future public recreational and educational uses would be a prudent task to undertake prior to the finalization of the project plans, thus allowing recreational opportunities to be planned for in the design. The City hired an on-call consultant, J2 Engineering and Environmental Design, LLC (J2) to serve as its recreational review team lead, based on their involvement in the Rio Salado Habitat Restoration Area and that projects diverse public recreational and educational design components.

While this document specifically targeted the master planning of recreation components between 91st Avenue and 115th Avenue this document should not be considered all inclusive of



the multitude of recreational opportunities that a river corridor presents.. This project will eventually have direct linkages and connections with other upstream and downstream environmental rehabilitation efforts, such as the Rio Salado Oeste project, El Rio project, and the Pee-Posh project. As these other projects begin to come on board in the future the same analysis and input will need to be gathered and formulated to ensure that recreational opportunities are integrated into those projects and the river corridor that originally served as the connection corridor is re-established and reconnected. The intent is that this document in conjunction with existing built projects will act as a baseline and catalyst for future development.

Project History

The Tres Rios study area is located in Maricopa County, Arizona and consists of portions of the Salt and Gila Rivers extending from 83rd Avenue downstream to the confluence with the Agua Fria River. The total project area is approximately 5,600 acres (9.2 miles long and one mile wide). The USACE investigated the Tres Rios area for the potential to improve fish and wildlife habitat values and diversity for threatened and endangered species, as well as to provide flood damage reduction, recreational opportunities, and the incidental benefits associated with water quality and supply. In addition, the Tres Rios area was examined for opportunities to rehabilitate critical riparian and wetland habitats that may have been lost in the region due to water resources development, such as diversion of water for irrigation, etc., in the Phoenix metropolitan area. The results and conclusions from the initial reconnaissance phase were presented in the *Tres Rios, Arizona Reconnaissance Report*, USACE, in April, 1997.

Following this reconnaissance phase, a feasibility study was performed to analyze the information and findings. The feasibility study proceeded to develop a consensus plan for improvements of the Tres Rios area. A number of habitat restoration alternatives, with some flood control components, were developed and evaluated with the non-Federal sponsor. The alternatives and the selected plan were presented in the *Tres Rios, Arizona Feasibility Report*, April 2000.

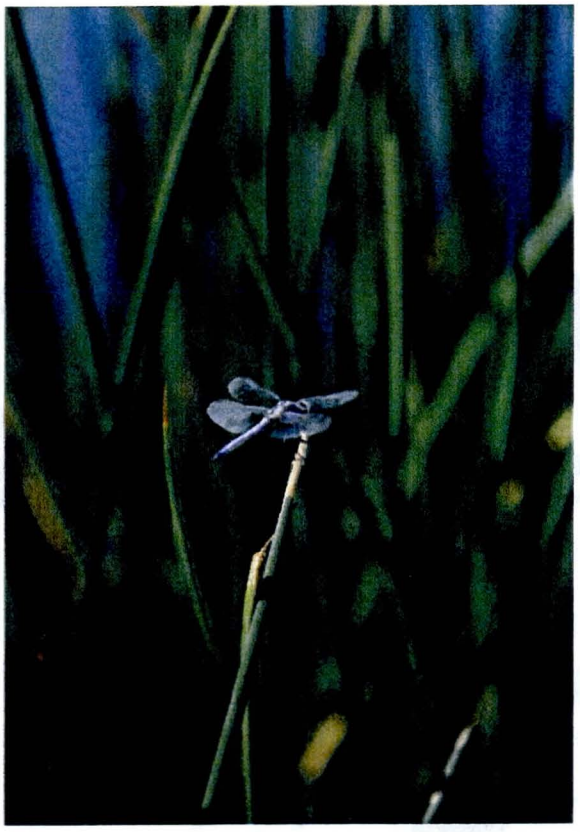
The selected plan was chosen because it most closely met the following environmental restoration project objectives (as taken from the *Tres Rios, Arizona Feasibility Report*):

1. Rehabilitate and create conditions for sustainable riparian habitat in the vicinity of Tres Rios.

2. Create a complete and diverse riparian system similar to the natural riparian habitat historically represented in this area, i.e., creates a mosaic of habitat types including mesquite bosque, cottonwood-

willow overstory, wetland marsh, and open water.
3. Reduce flood damages to the Holly Acres community, surrounding development, and agricultural areas.

4. Maximize environmental education and passive recreation opportunities, which are incidental to restoration.



The water supply for the selected plan for the environmental restoration project is the 91st Avenue Wastewater Treatment Plant (WWTP), a facility operated by the multi-city SROG. This WWTP currently discharges highly treated effluent to the Salt River east of 91st Avenue. The discharges have diurnal flow variations resulting from fluctuations in water usage, long travel times in the COP collection system, and the contractual obligations to provide effluent as cooling water to Arizona Nuclear Power Plant (ANPP) generators.

In 1995, the COP, SROG and the United States Bureau of Reclamation (BOR) constructed and began operating the Tres Rios Constructed Wetlands Demonstration Project (demo project) located at the WWTP. These demonstration wetlands consist of the six acre Hayfield Site, on former agricultural fields, and the four acre Cobble Site in the Salt River channel.

The objectives of the demo project were to:

1. Determine if constructed wetland systems can polish pre-treated effluent to a level that will meet the perceived future discharge requirements.

2. Develop scale-up parameters for larger systems.

3. Quantify the net environmental benefits such a system would return in the Tres Rios area.

The research results from the demonstration wetlands influenced the design of the environmental restoration project. The results that are reflected in this specific phase of the Tres Rios project include the design and development of the first wetland complex that will polish disinfected effluent and provide incidental water quality improvements of discharges from the WWTP, while moderating the diurnal flow variations. These wetlands are termed the Flow Regulating Wetlands (FRW) for their role in allowing the fluctuation of effluent flows to take place within these wetlands. This will allow a more constant flow to be discharged into the river and to a system of wetland corridors located on the north bank of the Salt River, termed the Overbank Wetlands (OBW). Normal (average) operating conditions are expected to range from 90 million gallons per day (mgd) in the summer to 120 mgd in the winter. In addition, the

FRW and OBW systems have been designed to control and manage flows up to 200 mgd and can convey up to 450 mgd under contingency scenarios. The recreational opportunities surrounding the development of this phase of the Tres Rios project will build upon the success and experience that the City has already gained in the demonstration project and the City's recently completed Rio Salado Habitat Restoration Area, and will allow the City to greatly expand their mission of education and passive recreation.

Existing Wildlife Habitat

The study area provides wetland and riparian habitat for numerous species of fish and wildlife including waterfowl and both Federal and State listed species. Both wetland and riparian habitats are disappearing at an alarming rate in Arizona and the Southwest. These habitats are used by a high percentage of Federal and State threatened and endangered species. The two wetland facilities will create and rehabilitate conditions for sustainable riparian habitat in the vicinity of the project area. The FRW and OBW will be a critical portion of a diverse riparian system that will echo to the natural riparian habitat historically represented in this area. The rehabilitated habitat will incorporate a diverse mix of habitat types including shoreline and transitional vegetative communities, deep and shallow emergent marsh zones and open water/aquatic areas, riparian forest canopy, multi-layered (intermediate and ground cover) structure, as well as mesquite bosques and upland refugium commonly observed along river terraces. The rehabilitated vegetation along the overbank area will help to reduce flood damage to the surrounding areas, while the FRW will provide for improved habitat, water quality, and flow attenuation. The OBW wetland facilities will serve as a platform for environmental education and allow for passive recreation opportunities. Not only will the FRW and OBW provide and rehabilitate a diverse riparian habitat, but the development of these connected wetland systems will also convey the water necessary to support additional downstream restoration features that will in turn support additional wildlife. The primary role of the FRW is to dampen the fluctuation in the WWTP disinfected effluent outflow so that a more constant flow can be discharged into the river through the OBW. The FRW will provide substantial habitat value while at the same time provide the incidental benefits of improved water quality to downstream features and a consistent water flow that is so crucial in maintaining these diverse habitats and their associated wildlife.

A survey conducted by the U. S. Fish and Wildlife Service in May, 1991 found three pair of Yuma Clapper Rail nesting in the study

area. Accordingly, if the proper habitat is re-established, which is one of the projects primary goals, there is the strong possibility that a significant increase in similar threatened or endangered populations would be expected in the area.

Since construction of the Tres Rios Demonstration Project two years ago, representatives of the Bureau of Reclamation and the Phoenix Audubon Society have been recording the types of fish and wildlife that have utilized the constructed wetlands. Over 50 types of birds have been observed using the wetlands. Additionally, five types of fish, fourteen types of mammals (most notably bobcat, beaver, and javelina), and numerous amphibians have been observed. Though sightings have been made in the study area, to date, no threatened or endangered species have been observed utilizing the wetlands.

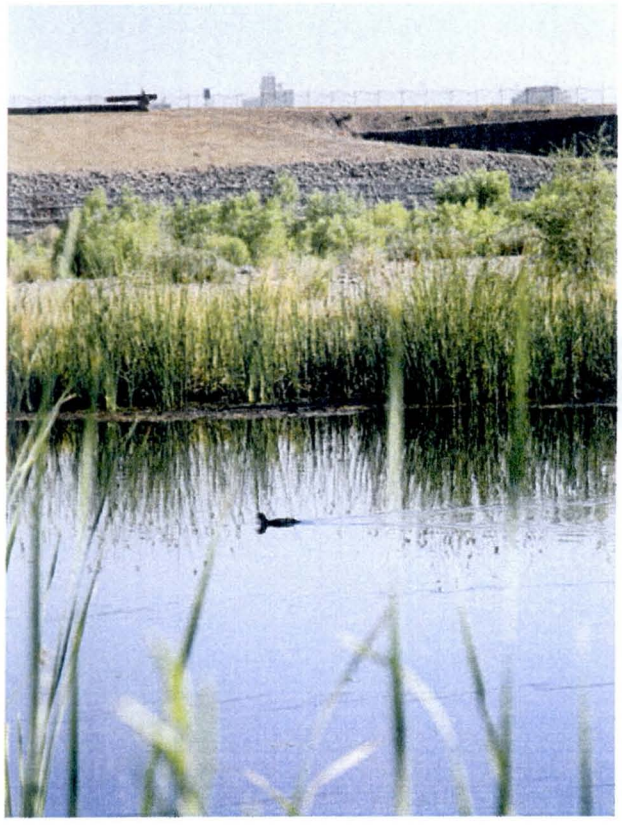
Existing Recreation Linkages

The FRW and OBW will be a unique attribute to the metropolitan area and are expected to gain the interest of a variety of visitors. These will range from the academic and scientific communities to the avid bird watching community and the many interested visitors in between. This high profile project provides an opportunity to educate the public on many levels such as environmental protection, river restoration, arid riparian habitat, and treatment wetlands. The general public and others may realize the goals and mission of the USACE and the in-depth coordination within SROG to rehabilitate this portion of the Salt and Gila rivers.

The J2 design team has identified significant recreational opportunities both within the project and linkages to areas and other projects that are immediately adjacent or make some connection to this project.

On the western border of the study area lies Estrella Mountain Regional Park. The park is owned and managed by Maricopa County Parks and Recreation Department. The County has developed a master plan for the 19,200 acre park, located approximately 20 miles southwest of downtown Phoenix. The master plan envisions the preservation of scenic desert wilderness areas while incorporating sensitive development of recreational facilities and activities. The plan accommodates the expected annual demand of 1 million visitors, while ensuring that the existing Sonoran Desert environment remains in its pristine condition.

Adjacent shared-use path development includes extensive work by the City of Phoenix linking into this project. This is exemplified through the designation of several shared-use path and street systems being identified as trail corridors on the City's *Trails System Master Plan*. These shared-use paths by the City of Phoenix are further supplemented



by those planned for by the City of Avondale as part of their El Rio network and their efforts on the Monument Hill Historic Trail.

Maricopa County is targeting the completion of its Sun Circle Trail System through this reach of the Gila and Salt Rivers. Recreation use patterns are expected to expand throughout the study area. The Sun Circle Trail System, a component of the National Recreation Trail, comprises a 110 mile loop encompassing the Phoenix metro area. The shared-use path system offers a unique opportunity for hiking, horseback riding, and bicycling throughout the urban area. Approximately 75-80 percent of the Sun Circle Trail System is in place. The County has an agreement with the Flood Control District of Maricopa County to establish the trail corridor within the floodplain of Skunk Creek from the north to its confluence with the Gila River. The Tres Rios River Management Plan is an excellent opportunity to designate this additional segment of the shared-use path and form a major non-motorized connection with other trails within the metro area.

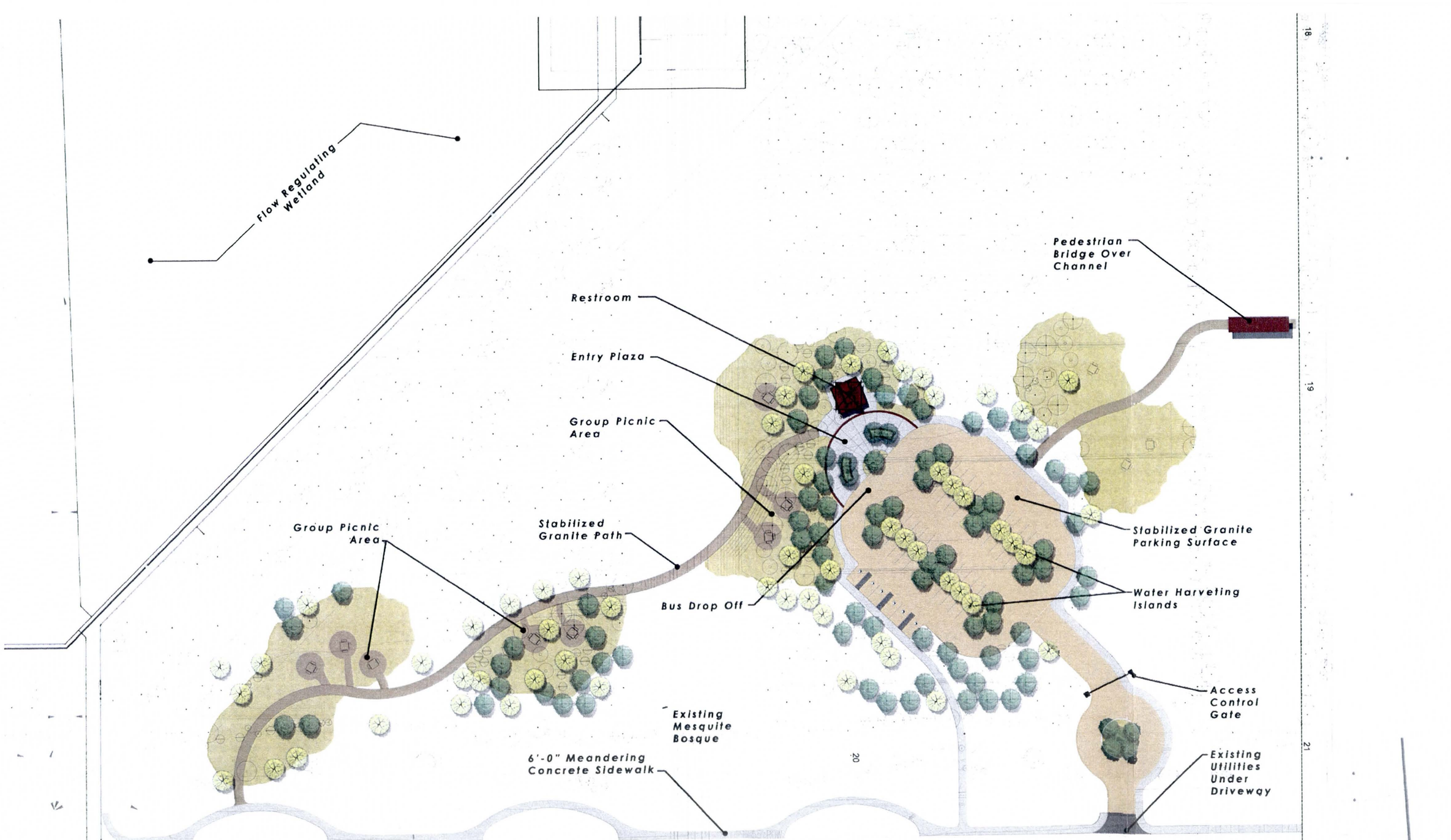
The City of Phoenix has identified this river corridor as one of its major chains of trail corridors. It will link the Tres Rios Restoration Project to the future Rio Salado Oeste Restoration Project and then to the constructed Rio Salado Habitat Restoration Area. This river trail system will be one of the main corridors, remaining paramount, in the overall success of the City's trails and passive recreational opportunities system.

Recreation Project Overview

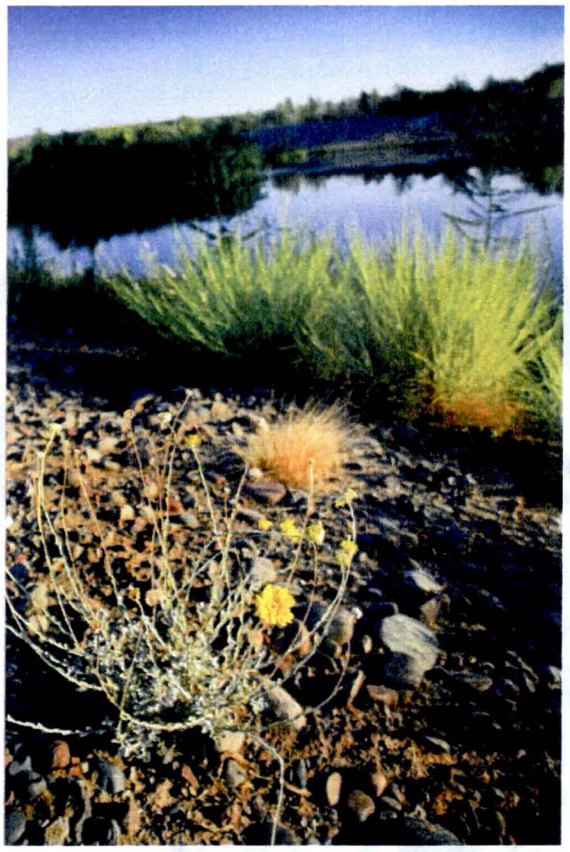
J2 Design identified the following areas within the Tres Rios project site for recreational opportunities:

91st Avenue Staging Area North - Trail Access Staging and Linkage to Passive Picnic and Education Areas:

There is limited opportunity to interface directly with the FRW, but this location offers a tremendous passive visual recreational corridor from which to observe the diverse wildlife that is expected to inhabit or visit these wetlands. This staging area provides for all weather access to the interconnected trail and passive recreational opportunities of the project. J2 identified a parcel of land within the project that was not currently programmed for development of any active wetland habitat or supporting infrastructure efforts. This area provided for strong consideration of a pedestrian staging area immediately west of 91st Avenue. This location provides convenient and safe access to and from 91st

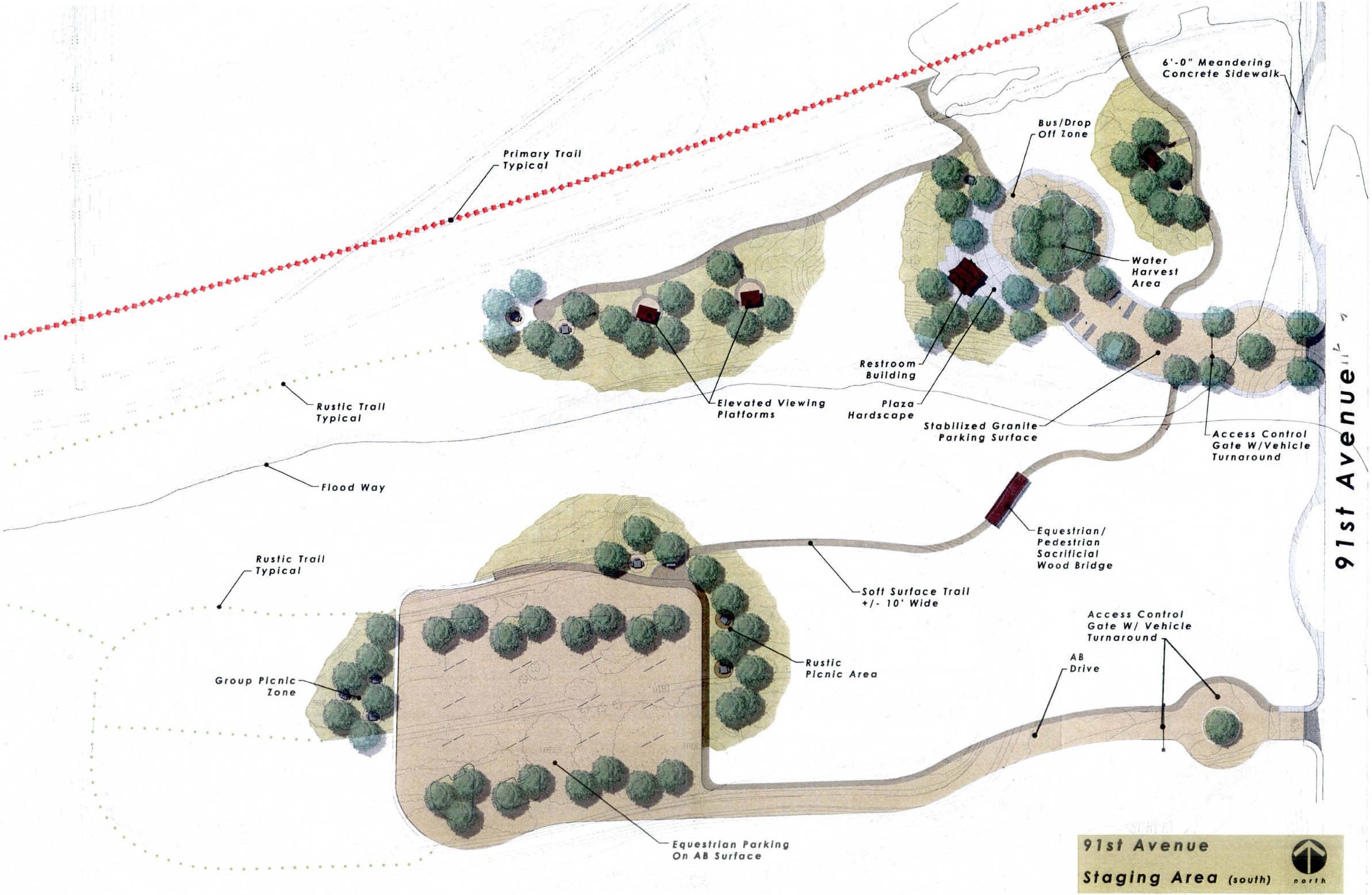

Flow Regulating Wetland
Restroom
Entry Plaza
Group Picnic Area
Pedestrian Bridge Over Channel
Group Picnic Area
Stabilized Granite Path
Bus Drop Off
Stabilized Granite Parking Surface
Water Harveting Islands
Access Control Gate
Existing Mesquite Bosque
6'-0" Meandering Concrete Sidewalk
Existing Utilities Under Driveway
18
19
20
21
91st Avenue
91st Avenue
Staging Area (north)
north

Avenue. This area is located is outside of any potential storm flow events that may impact other areas of the project site. This area is immediately adjacent to the FRW and provides adequate area for the interface between the public and these unique viewing corridors and habitats. We have designed a 46 stall parking lot to provide for the users that are expected to frequently visit this project and the unique habitats and wildlife that they support. The parking surface is intended to be constructed and composed of stabilized and or roller compacted, locally produced decomposed granite, to maintain the overall goal of minimizing the carbon footprint related to the development of these passive recreational opportunities and promoting alternative pavement options. This staging area size and location would be able to support the development of a restroom to serve both the passive picnic user and trail users. It also provides access to several picnic nodes located to the south of the actual parking area for users to enjoy and to view into the FRW habitats. This staging area will also serve as one of the projects four (4) potential trail heads from which to venture either into the project or to the extensive interconnected trail systems that link into the project. The linkage to the east would be back to the proposed multi-use paved trail that is shown to parallel 91st Avenue. The linkage to the north would be composed of a small pedestrian designed bridge over the proposed drainage channel and linking to the trail system that encompasses the FRW north and western boundary. This trail was envisioned as utilizing the top of the existing channel bank as its alignment. This linkage also allows trail users to link to the programmed City of Phoenix 95th Avenue trail system to the north of this project. The trail linkage to the south of this staging area was targeted at providing some passive picnic and educational nodes within the project.



91st Avenue Staging Area South - Trail Access Staging and Linkage to Passive Picnic, Observation and Education Areas:

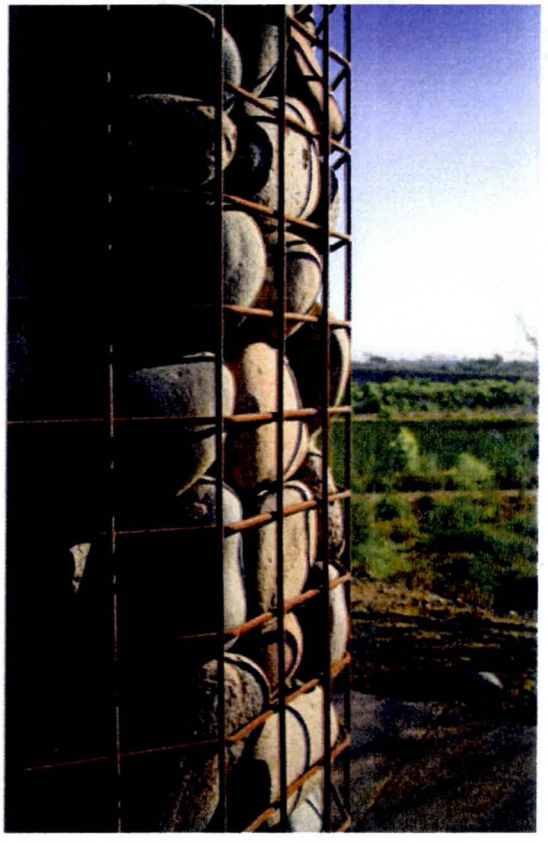
This staging area provides for all weather access to the interconnected trail and passive recreation and educational opportunities programmed for this project. This staging area entrance aligns with the existing entrance on the east side of 91st Avenue which leads to the current Tres Rios Demonstration project Hayfield Site. The footprint and layout were designed to maximize a hard stable surface parking area that is capable of supporting 24 vehicles and allow for passenger bus loading and unloading. The site is above the 100 year flood event and should remain protected through the majority of storm events. The materials for this parking area, although not envisioned as decomposed granite, should be developed in support of the overall approach of limiting the carbon footprint and maximizing its environmental potential. Suggested pavement options include porous concrete pavement, concrete pavers and or a gravel pave system. All of these, and others not mentioned, would demonstrate the


Primary Trail
Typical
6'-0" Meandering
Concrete Sidewalk
Bus/Drop
Off Zone
Water
Harvest
Area
Restroom
Building
Plaza
Hardscape
Elevated Viewing
Platforms
Stabilized Granite
Parking Surface
Access Control
Gate W/Vehicle
Turnaround
91st Avenue
Rustic Trail
Typical
Flood Way
Equestrian/
Pedestrian
Sacrificial
Wood Bridge
Soft Surface Trail
+/- 10' Wide
Rustic Trail
Typical
Access Control
Gate W/ Vehicle
Turnaround
AB
Drive
Rustic
Picnic Area
Group Picnic
Zone
Equestrian Parking
On AB Surface
91st Avenue
Staging Area (south)
north

commitment towards the ideal of limited impact to the environment. This staging area location offers great opportunities to link all of the proposed trail systems, as well as support a restroom and access to several picnic and observation nodes located to the west and east. This staging area can easily link to the 91st Avenue multi-use paved trail, to the equestrian and cobble site rustic trail system and to the project's primary trail network. This staging area offers tremendous visual corridors into both the FRW and the river corridor to the south due to its raised elevation. The planned recreational opportunities capitalize on these inherent site characteristics.

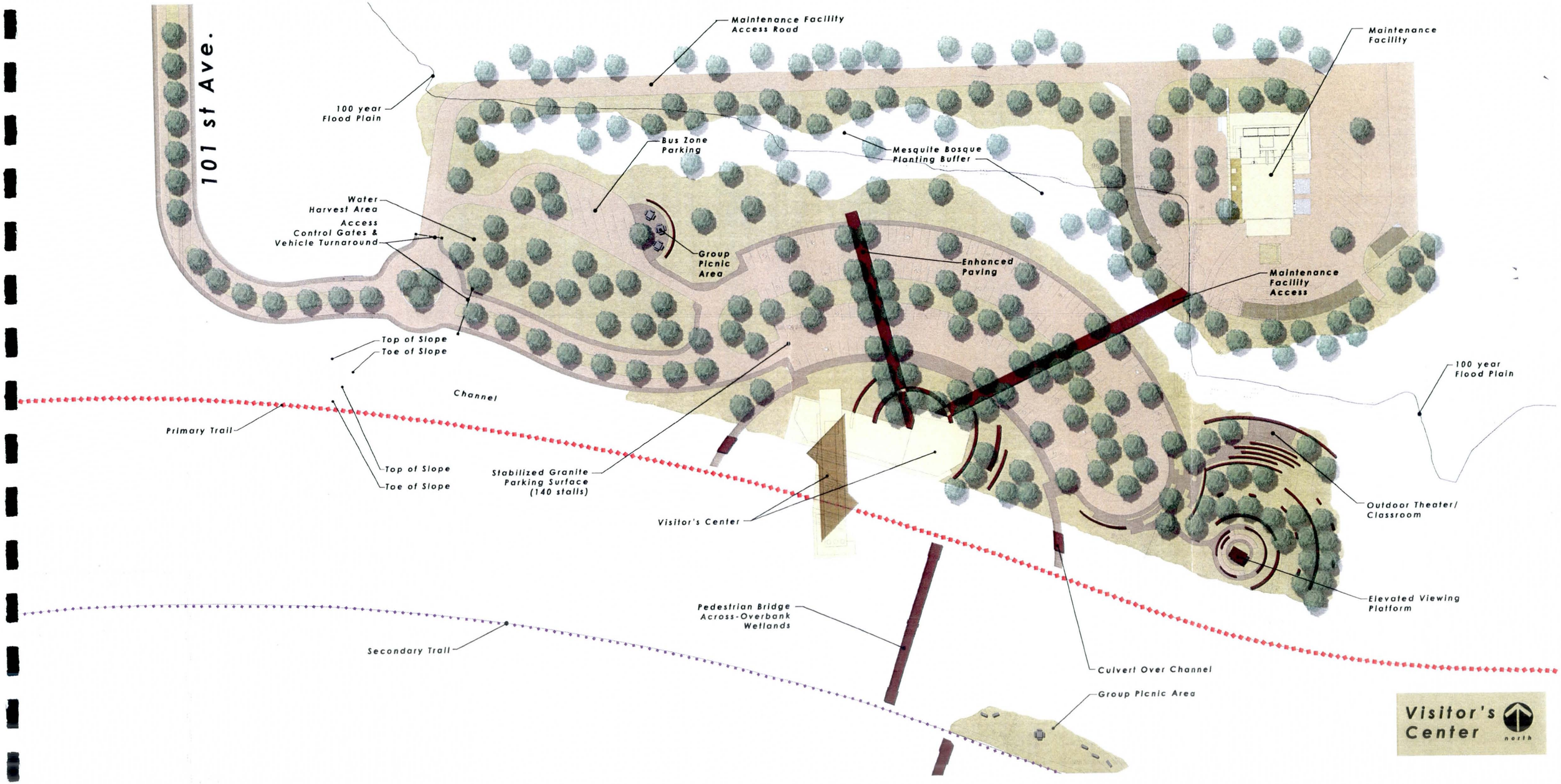
91st Avenue Staging Area South - Equestrian and Trail Access Staging:

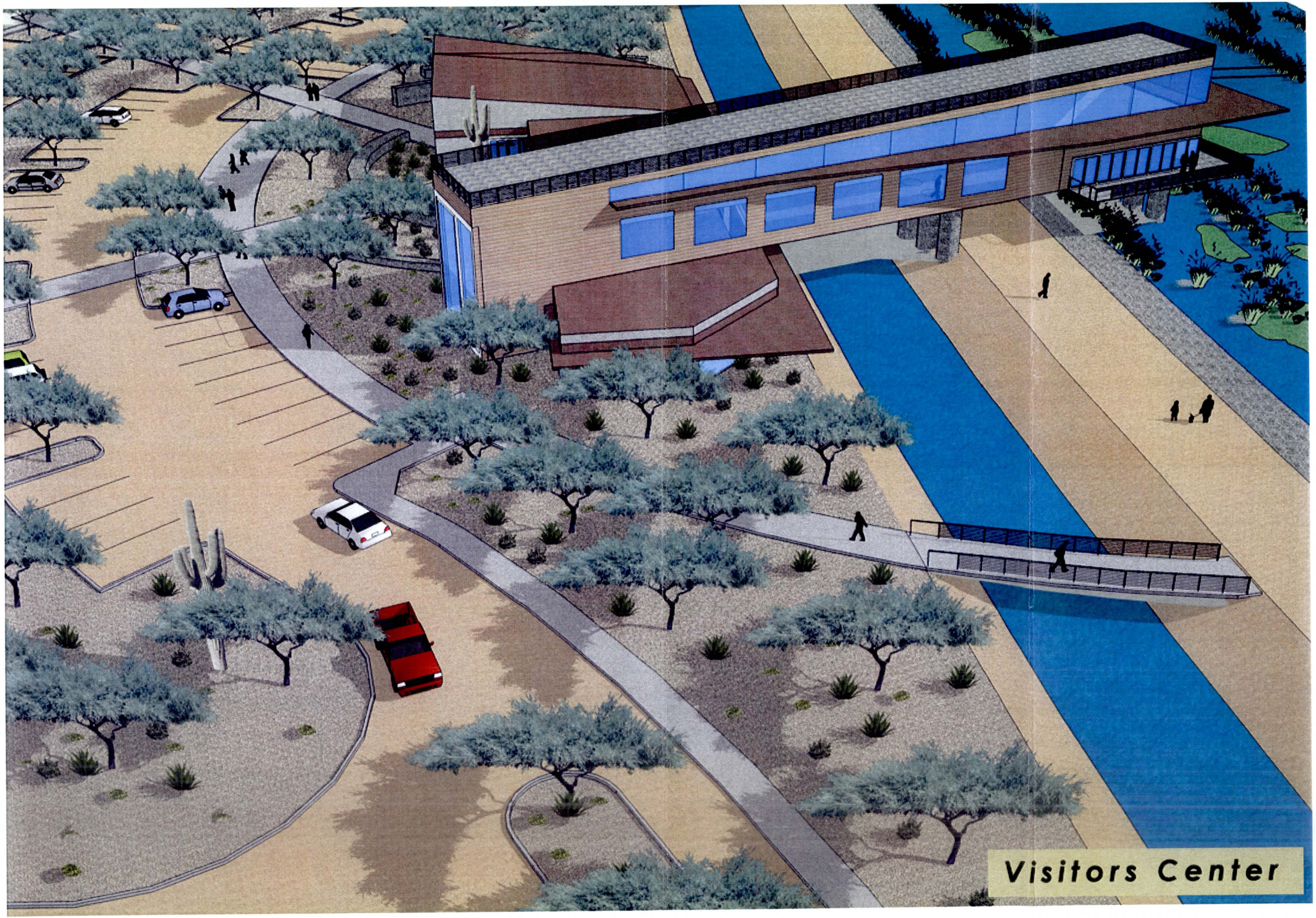
The opportunities to allow access by equestrians that frequent the corridor are somewhat limited. This staging area located south of the FRW and west of 91st Avenue is an area that offers both equestrian as well as pedestrian access directly to the river. This entrance is to be gated for security and access control and aligns with the current maintenance access to the existing cobble site. The footprint of the parking area has been sized and oriented to accommodate the turning movements of large horse trailers. The location of the staging area takes advantage of the current "Cobble Site" Demonstration area that has been targeted to be decommissioned as part of this larger, more extensive, Tres Rios habitat development project. The cobble site offers great opportunities to utilize existing grades, roadway networks, and trails to the advantage of the future recreational aspects that are being proposed. This site is programmed with the parking surface intended to be constructed and composed of roller compacted aggregate base. Once again aligning with overall goal of minimizing the carbon footprint related to the development of these passive recreational opportunities and promoting alternative pavement options. This staging area location is subject to damage during larger flow events which is an additional reason that recycled materials form the backbone of this site's development. This site will also provide access to the "rustic" trail system that connects directly to the river corridor.



101st Avenue Staging Area and Visitors Center and Maintenance Facility

This staging area occupies the largest single piece of land owned by the City of Phoenix and within close proximity to existing City utilities. It is within this area that we were able to successfully locate a 16,000 square foot visitors center that overlooks the OBW. The orientation of the building relates primarily to the views into and as part of the OBW. The building's cantilever design over the immediately adjacent trail, over bank, and associated drainage channels maximizes 270 degree viewing. The parking, like several of the other parking areas associated with these recreational endeavors is programmed to be a combination of stabilized and or roller compacted, locally produced decomposed granite, and other alternative pavement options such as porous


101 st Ave.
Maintenance Facility Access Road
Maintenance Facility
100 year Flood Plain
Bus Zone Parking
Mesquite Bosque Planting Buffer
Water Harvest Area
Access Control Gates & Vehicle Turnaround
Group Picnic Area
Enhanced Paving
Maintenance Facility Access
Top of Slope
Toe of Slope
Channel
100 year Flood Plain
Primary Trail
Top of Slope
Toe of Slope
Stabilized Granite Parking Surface (140 stalls)
Visitor's Center
Outdoor Theater/ Classroom
Elevated Viewing Platform
Pedestrian Bridge Across-Overbank Wetlands
Secondary Trail
Culvert Over Channel
Group Picnic Area
Visitor's Center
north


Visitors Center


Visitors Center

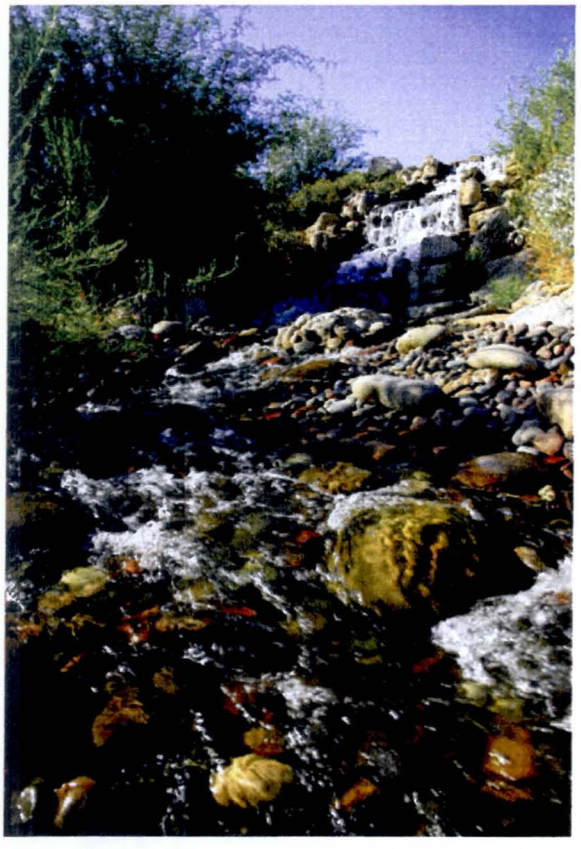

Visitors Center


Visitors Center

concrete pavement, concrete pavers, or a gravel pave system. This will allow for passenger car and passenger bus traffic while maintaining the overall goal of minimizing the carbon footprint related to the development of these passive recreational opportunities and promoting alternative pavement options. The parking was designed to accommodate both automobile patrons (140 spaces) as well as buses (6 spaces). The accommodation of bus parking was placed to accommodate tour groups or educational events. All parking areas will be designed to maximize water harvesting techniques relative to storm water capture and plant material irrigation. The site is home to an outdoor theater, classroom teaching area, and picnic area that could easily accommodate 75 to 100 students. This site was also designed to support a large City owned and operated maintenance facility. The size and layout of this two acre, walled and enclosed maintenance facility, mimics the existing facility that the City of Phoenix recently constructed at the Rio Salado Habitat Restoration Area at 7th Avenue. Access to this maintenance facility is through a separate access drive that is gated and controlled. This site has strong connections to both the primary and secondary trail systems associated with the OBW via several pedestrian bridges interlinking the trails together.

107th Avenue Staging Area

This staging area is the only other equestrian and automobile staging area. The parking, like several of the other parking areas associated with these recreational endeavors is programmed to be composed of stabilized and or roller compacted, locally produced decomposed granite to maintain the overall goal of minimizing the carbon footprint related to the development of these passive recreational opportunities and promoting alternative pavement options. This site will accommodate 33 automobiles and 5 horse trailers. This small staging area also boast the inclusion of a restroom as well as a group picnic ramada outdoor classroom. This staging area has a direct link to the primary and secondary trails through a series of bridges and trail connections. There exists a Flood Control District (FCD) collector channel to the south of this staging area. Currently, a maintenance road parallels both the north and south sides of the channel. The north side maintenance road will be improved with an ADA accessible surface and be jointly used by visitors to the Tres Rios project and the FCD operations and maintenance staff. The maintenance road on the south side of the channel should remain protected in place. FCD will require access into the channel for maintenance from 105th Avenue to the terminus of the channel. Any obstructions to the maintenance access, such as a pedestrian crossing over the channel, will need to be engineered and evaluated by the FCD and the City of Phoenix in order to ensure conformance with their operations and maintenance needs and practices.



115th Avenue Staging Area

107th Ave

Access Control Gate W/ Vehicle Turnaround

Picnic Ramada W/ Horse Tie-Ups Typical

Stabilized Granite Parking

Removable Bollards @ Drop Off For Maintenance Access

Restroom

Seat Wall

Outdoor Classroom

Multi-Use Primary Trail

Toe of Levee

Maintenance Road

Multi-Use Primary Trail

Top of Levee

Maintenance Road

Elevated Viewing Platform

Channel

Pedestrian Bridge Over- Overbank Wetlands

Overbank Wetlands

Rustic Picnic Area

Channel

Maintenance Road

Culvert Over Channel

Multi-Use Secondary Trail

Pedestrian Bridge Over- Overbank Wetlands

Stairs Down to Maintenance Road

Equestrian Parking On Roller Compacted Surface

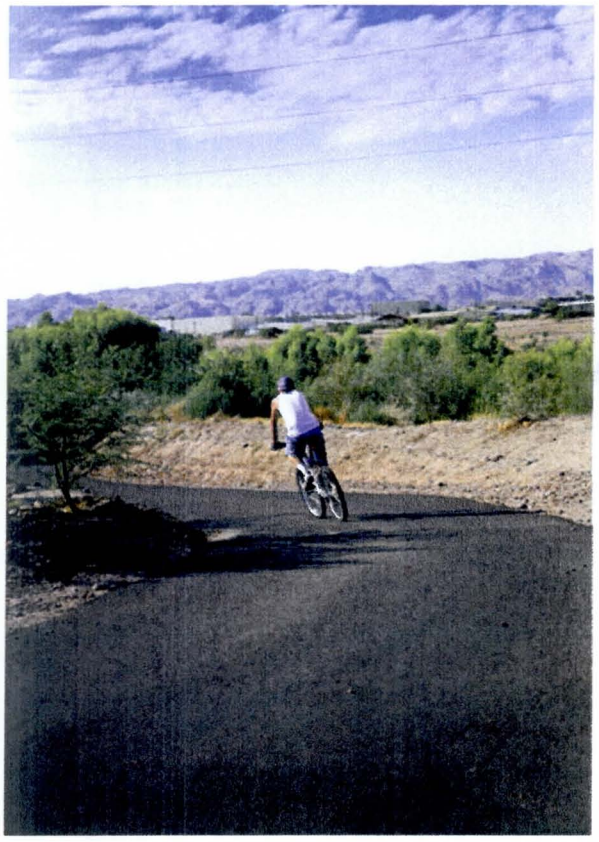
Access Control Gate

Multi-Use Secondary Trail

107th Avenue

Staging Area

north



This is the smallest of all of the programmed staging areas and is located immediately east of 115th Avenue and will accommodate 10 automobile spaces. The parking, like several of the other parking areas associated with these recreational endeavors is programmed to be composed of stabilized and or roller compacted, locally produced decomposed granite to maintain the overall goal of minimizing the carbon footprint related to the development of these passive recreational opportunities and promoting alternative pavement options. This site was chosen to accommodate the small number of pedestrians that are currently using this site as a staging area. This site, although small, will allow those users to gain access to the planned primary trail system associated with the Tres Rios project. Users will also gain access to the river for bird watching and have potential ephemeral linkage (subject to river flows) across the river to Monument Hill. The far western limits will also provide for a river trail connection to the future City of Avondale's El Rio Trail system that is under development.

Trail Hierarchy

Primary Trail: The primary trail system will occupy the main levee and embankment system of the project and will serve a dual purpose as both trail and main maintenance road. The trail surface is programmed to be a hard surface trail of concrete, asphalt, or roller compacted and or stabilized, locally mined, decomposed granite of 1/4" minus material size that is ADA accessible. This trail is designated to be the most stable of all three designated trail systems and will be the only ADA accessible system that will run from 115th Avenue on the west to 91st Avenue on the east. As described above, this is the only trail system that will interconnect each of the four trail staging areas. This trail is designated to me a minimum of 10'-0" wide with a 2'-0" recovery area to either side. In some locations where the trail is immediately adjacent to a steep drop of either channel or river embankment handrail may be needed because of safety reasons. It is important to note that most Maricopa County trails do have a handrail associated with their ultimate development. This trail should be punctuated periodically with benches and areas of respite for use by trail users. The benches or areas designed for rest should take into consideration the overall aesthetic of the corridor and the restoration efforts that facilitated the alignment. The aesthetic vocabulary for these features will be established by the City of Phoenix and will utilize, as a basis, the strong and positive vocabulary that has been established along the Rio Salado for ramadas, benches, and material finishes.

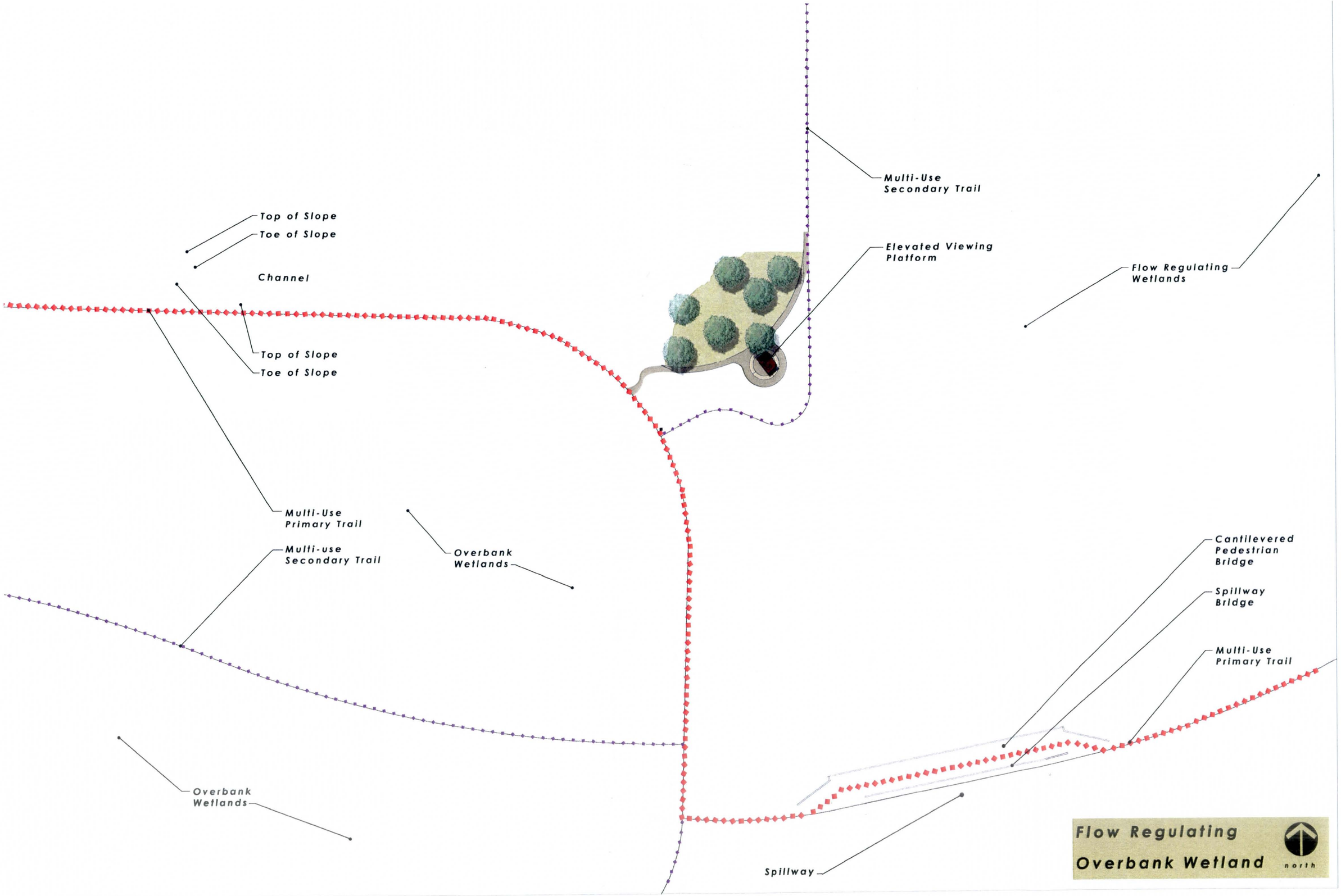
Secondary Trail: The secondary trail system should me a minimum of 10'-0" wide with a 2'-0" recovery area to either side. This trail will most likely will be either roller compacted soil or 1/4" minus decomposed granite. This trail is contained in two primary areas. Area one is the embankments

associated with the OBW interior cells. This trail system will circulate through the middle and southern edges of these ponds. They will be connected to the primary trail system through either land or pedestrian bridges. The locations of the pedestrian bridges for these proposed linkages are programmed to link critical features of the trail system (staging areas) and to take advantage of the proposed deep water zones of the OBW. The reason for the bridge locations in deep water is to protect the bridge structure from the occasional prescribed burning of wetland vegetation that is required to maintain a healthy ecosystem and to offer unobstructed views into the wetlands. The second area that is designated as a secondary trail corridor is the loop trail along the north and west of the FRW. This secondary trail makes the connection to the 91st Avenue Staging Area North. This trail alignment follows the alignment of the bank created for the drainage channel designed by the USACE. It flows around the FRW and offers some strong potential viewing areas into the FRW. This alignment will also provide for the future linkage to the City of Phoenix's 95th Avenue trail. As with the primary trail system, a handrail may be required to protect the trail user from any adjacent steep drops. Again, a case by case basis for handrails will have to be evaluated since many of them will be in harms way during some of the large flood events. This trail is shown to be punctuated periodically with picnic ramadas, overlooks, benches, and other areas of respite for trail users. The aesthetic vocabulary for these items shall be established by the City of Phoenix and shall utilize, as a basis, the strong and positive vocabulary that has been established along the Rio Salado for ramadas, benches, and material finishes.

Rustic Trail: This trail system is the least defined system and will range in width from four feet to no more than six feet. The surface will be cleared and compacted native subgrade material. Alignment for this trail will be identified in the field through a field inventory and walk. The rustic trail will utilize the current trail network that occupies the river bottom. Semi-permanent rock cairns and trail markers should be placed along this rustic trail alignment to aid in use, safety, and in the case of minor flows, to help to identify and re-establish each trail alignment. The rustic trail will make several connections to the secondary trail to allow users to traverse between trails and trail experiences. There are no planned benches or formal picnic areas along the rustic trail. There does exist an opportunity when walking the alignment to identify existing river ruins (blocks of large concrete or consolidated soils) or large tree stumps or branches that may serve the purpose as a bench or table; knowing that these items are subject to inundation and potential damage and removal by flood flows.

Overall Aesthetic Character of Public Use and Recreational Features:

The overall aesthetic character of the design features for these facilities will be in response to the priorities established by the City of Phoenix along the Rio Salado Habitat Restoration Area. These

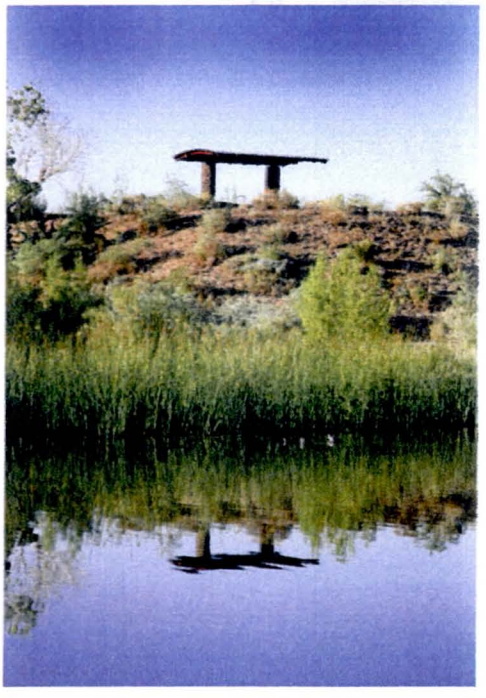

Top of Slope
Toe of Slope
Channel
Top of Slope
Toe of Slope
Multi-Use
Primary Trail
Multi-use
Secondary Trail
Overbank
Wetlands
Overbank
Wetlands
Multi-Use
Secondary Trail
Elevated Viewing
Platform
Flow Regulating
Wetlands
Cantilevered
Pedestrian
Bridge
Spillway
Bridge
Multi-Use
Primary Trail
Spillway
Flow Regulating
Overbank Wetland
north

characteristics generally include the use and re-use of materials that are enduring, integral, indigenous, and suitable for use in their basic and unmodified condition. The use of these materials enforces the value assigned to the natural setting, and contributes to the public's awareness that the focus of this project is the restoration of the river's natural habitats and beauty and that human interaction is secondary.

Overall, these planned public use facilities provide for the controlled public access into the restoration project. Typically, these facilities are also used as access points and staging areas for maintenance operations. The staging areas, ramadas and overlooks serve as trail heads and observation areas were the public can view interpretive information about the project. These areas will post the rules and regulations of the Tres Rios project and the area that it occupies. Several of these areas also serve the project as control points to limit vehicular traffic into the river area during non-use hours and during high flows.

The plant palette used for the staging areas will be consistent with the species identified for the habitat areas. There will be an additional focus on the placement of plants to serve various functional needs such as screening, shade, and interpretive uses. The staging area's designs provide several areas where interpretive opportunities can occur. These areas demonstrate micro-settings of the habitats or environmental conditions that occur within the overall riverine environment. These areas are important to provide the public exposure and interpretive, educational opportunities in a concentrated and easily accessible area. People who do not want to, or are unable to, use the larger trail system can still enjoy and be exposed to the natural settings within the limits of the planned and targeted staging areas and their specific habitats.

A typical overlook facility with seating and a shade canopy are programmed for use throughout this project's recreational additions. The aesthetic for these overlooks should again mirror the Rio Salado aesthetic and be adjusted to fit each unique and available site. The inclusion of gabions, partially elevated above adjacent grade and a railing, may be included between the overlook area and OBW to provide a physical barrier between the two elevations. Each situation will be reviewed relative to safety and accessibility, with framing and capturing of views of the highest importance.



DESCRIPTION OF RECREATION FEATURES

The Tres Rios Project provides a unique opportunity for resource-based recreation and environmental education. The restoration of the dry Rio Salado, Agua Fria and Gila River channels will bring a riparian open space feature to the west Valley. A desert riparian habitat near an urban area is unlike any other resource within the Valley, providing many unique recreation opportunities for residents and out of town visitors.

Drawing on a population base of two million in the Valley, it is estimated that visitation to the Tres Rios project

could top one half million annually. Primary use times for this unique resource would coincide with the "visitor season" between October and May when temperatures are moderate and migrating water fowl are at their peak.

The goal of the recreation component is to provide opportunities for visitors of all ages and backgrounds to enjoy this unique resource while developing an understanding of desert riparian habitats and how they relate to the environment as a whole. Additionally, it is an opportunity to acknowledge and understand the influence the Salt, Agua Fria and Gila Rivers have on the environment and cultures throughout history. Visitors to this extensive day-use area will have the opportunity to participate in a variety of recreation pursuits from enjoying scenic views, picnicking with the family, learning about the habitats or exploring the resource on foot, by bicycle, or horseback.

For planning purposes the recreation component has been interconnected through the use of three primary trail experiences as described above. As shown by the conceptual plan in the appendix, each of these trails provides a different venue for recreational opportunities which coincide with learning opportunities. This will allow participants to experience the resources first-hand and from differing perspectives.

The Primary Trail provides experiences including hiking, biking, and jogging or running to scenic overlooks, and leisure walking along the upper banks of a rehabilitated desert wetland habitat.

The Secondary Trail is where a visitor has an opportunity to get, literally, into the center of these riparian habitats. This interaction includes unique and intimate viewing areas and platforms with the ability to traverse over the tops of vegetation and open water on elevated pedestrian bridges. These bridges have been strategically located connecting these secondary trails with the Primary trail system.

The Rustic Trail represents an area relatively unaltered by humans, and will change in response to seasonal flows and flooding. People will enter this zone on the river's terms; it will contain few constructed features, allowing the observation of the natural forces of land and water and how they define and give shape to desert rivers. This system will also serve as the primary equestrian trail and interface with the river ecosystem.

The Primary Trail Experience

Tres Rios will provide a variety of recreation opportunities for users. Those visiting the project will be able to arrive by private vehicle or alternate mode of transportation, including horse, public transit, or bicycle. Users would enter at one of four primary staging area access points. These points include the three areas located adjacent to

91st Avenue and the planned staging areas at 101st Avenue, 107th Avenue, and 115th Avenue. Amenities at each access point will vary, but may include: parking, restroom facilities, water fountains, shade structures, site furniture and appropriate lighting. Each access point will provide appropriate signage and an orientation kiosk to give visitors an overview of the activities and experiences available and orient users to the sensitivity of the area and appropriate uses and expectations..

Opportunities available along the primary trail will include:

Multi-use Trails: Shared-use trails will allow visitors to explore the project on foot, horseback, or bicycle. The accessible compacted surfaces will accommodate a variety of cycling activities allowing for travel along the entire project. Other surface trails will traverse the project leading foot traffic, equestrians, and mountain bicyclists to scenic overlooks and loops throughout the area. Interpretive trails will allow for self-guided tours of the area.

Scenic Overlooks: Accessible locations along the roadways and trails will allow for family picnicking, and scenic vistas of the entire project. More secluded areas will provide for informal seating and meditation gardens.

Visitors Center: An opportunity exists for a major visitors center to be located within the project limits that would furnish visitors information and educational opportunities regarding the restoration of the habitats, the water cycle, a historical perspective of the rivers and flora and fauna within the project area. Additionally, signage located appropriately throughout the project will provide additional and supportive information.

Outdoor Classrooms: Strategically located outdoor educational areas are located throughout the project and will provide space for groups of 25 to 100 to attend lectures and special interest speakers in an environmental setting unequaled in the southwest.

The Secondary Trail Experience

The Secondary Trail routes will provide for a more intimate recreational experience including a majority of these facilities nestled amongst and within the OBW. These trails will include extensive interpretive trails, outdoor classrooms and study areas. The Secondary Trail will be accessible by strategic connections to the primary trail system. At each transition point to the Secondary Trail system, appropriate signage will inform visitors of the new habitats they are entering and any user restrictions and expectations. The Secondary Trail system will provide opportunities for environmental education and developing an understanding of how the habitats have been rehabilitated. Some areas of the

Secondary Trail system may be designated as areas of scientific study. Researchers would have the opportunity to perform a wide variety of experiments and testing to monitor the health of the OBW. The health of the system and water quality monitoring will be an ongoing effort by the City and scientists.

Opportunities available along the secondary trail will include:

Multi-use Trails: Trails will transition visitors from the Primary Trail system to the more sensitive wetland habitat and will be available to hikers and horseback riders. An interpretive trail will be provided for visitors.

Scenic Overlooks: Locations along the Secondary Trail system will allow for family picnicking, and scenic vistas of the immediately adjacent wetlands and framed surrounding mountain views. More secluded areas will provide for informal seating and wildlife observation gardens.

Habitat Views: Special areas will provide wildlife blinds allowing visitors an opportunity to observe wildlife in its natural habitat. Signage about the particular habitat and potential wildlife will be provided.

Demonstration Walks: Gardens along the Secondary Trail system will provide visitors insight into the inner workings of a habitat restoration project and its role in water conservation. Special "wetland" walks and trails to areas that allow unique views and intimate contact with aquatic vegetation and its associated diverse wildlife will be provided.

Study Areas: These unique areas will allow opportunities for educational institutions to conduct long range or one-day study of the unique workings of the Tres Rios Project including water conservation, water quality, riparian areas and habitat restoration, as well as vegetation and wildlife studies.

Birding: These unique areas will allow opportunities for birders to view and learn about the variety of waterfowl, birds of prey, migratory, and song birds that will find sanctuary within the Tres Rios habitat.

Outdoor Classrooms: Areas will be designed for groups and classes of 50 to 75 to gather and prepare for learning experiences at the project.

The Rustic Trail Experience

The Rustic Trail alignment is the most sensitive habitat of the Tres Rios project and will provide visitors unique opportunities to view, enjoy, and experience a desert river that is undergoing a metamorphosis as it re-establishes its unique environment. This area allows one to explore an unaltered riparian zone supported only by limited stream flows and surface runoff. The Rustic Trail is physically located within the river channel. Through signage and use of limited improvements for public use, protection of biologically

sensitive animals and plant life can occur. Only limited mechanized means of travel will be allowed along the Rustic Trail. Natural surface trails will lead visitors from the Secondary Trail system to the Rustic Trail system. The Rustic Trail system will cross active storm water flows and active stream beds, thus expanding opportunities to explore the river habitat on a more personal level. Visitors to the area will leave with a heightened awareness of the fragile relationship between water availability and habitat in the desert.

VISITATION ESTIMATES

Annual Visitation

The Tres Rios Recreation Component is designed to provide for high quality experiences in a unique riparian area. Overall capacity of the parking facilities will be designed for approximately 253 automobile vehicles, 12 buses and over 15 horse trailers. Based on historical data maintained by the City of Phoenix for resource based-recreational sites, it is estimated that an average of 2.75 visitors arrive in each vehicle. Additionally, it is estimated that an average of .25 visitors arrive at the site by an alternate mode of transportation including bicycle, foot traffic and public transportation.

In the Valley of the Sun, visitation to recreational sites coincides with temperature. Visitation occurs in two seasons: WINTER (October through May); and SUMMER (June through September.) The WINTER months in the Valley have maximum average temperatures of 87 degrees. Visitors from around the world come to Phoenix during this time, as well as numerous "winter residents." SUMMER months bring hot sunny days, and occasional afternoon thunderstorms. Temperatures average 102 degrees, making the early mornings and evenings the best time for outdoor recreational pursuits.

Anticipated visitation at Tres Rios is based on use projections during PRIME-TIME and NON-PRIME-TIME throughout the year. PRIME TIME consists of high visitation days, and includes weekends and holidays. NON-PRIME TIME are weekdays. A visit to Tres Rios is expected to span three hours, although many visits will be longer, and some much shorter. Turnover refers to the number of times it is anticipated a parking space will be filled daily. Below is a breakdown of anticipated visitation during WINTER and SUMMER.

WINTER 79 % of annual use
412,500 visitors
PRIME-TIME 70 days 3
turnovers 157,500 visitors
NON-PRIME-TIME 170 days 2
turnovers 255,000 visitors
SUMMER 21 % of annual use
111,000 visitors
PRIME-TIME 28 days 2
turnovers 42,000 visitors
NON-PRIME-TIME 92 days 1
turnover 69,000 visitors
TOTAL ANNUAL VISITATION

523,500

Future Visitation Growth

As the Valley's population grows, and the Tres Rios project matures, visitation to the resource is anticipated to increase. It is anticipated that WINTER PRIME TIME visitation will be at facility capacity. The growth during this time will be with those visiting the resource through alternative means such as improved trail linkages. Growth in this time period will increase by 5% over 20 years, for a total increase of 20,625 visitors.

The greatest increase over time will be during the four summer months. The City of Phoenix has documented changes in user patterns during the summer months with other resource based facilities. As trees mature, providing more shade, and facilities are at capacity during WINTER PRIME TIME, visitors will seek alternative times to enjoy Tres Rios. It is anticipated that visitation during the summer will increase by 72% over 20 years for a total increase of 80,500 visitors.

Overall visitation increase for the resource over 20 years is projected to be approximately 100,000.

INTERPRETIVE EDUCATION PROGRAM

Objectives

The purpose of the Interpretive Education Program will be to provide visitors with educational information to enhance the Tres Rios experience. The program includes educational information presented in a creative and exciting way. The interpretive objectives are defined in terms of what the visitor will learn while at Tres Rios.

The program will be structured so visitors will learn the following:

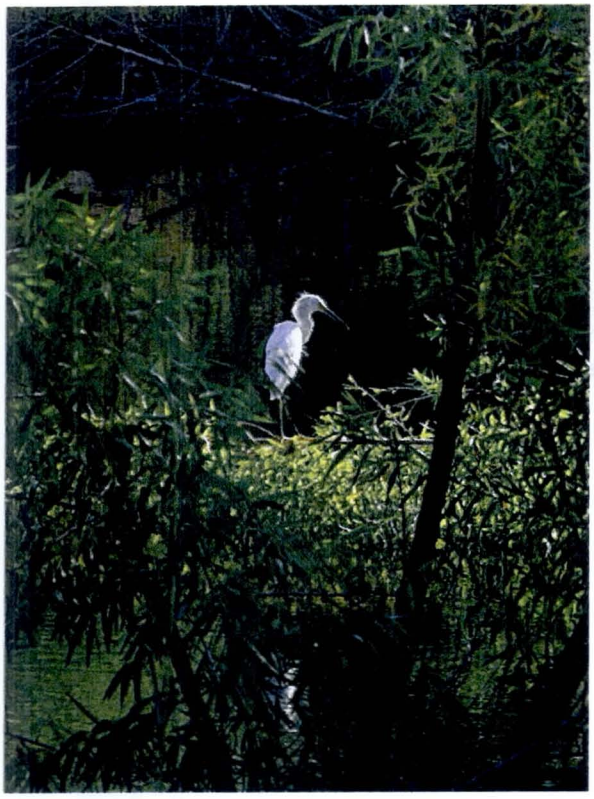
1. The site is a constructed habitat restoration project which has multiple uses.

2. Tres Rios can benefit people by providing recreational and educational experiences.

3. Complex ecological interactions occur among the organisms in a habitat restoration project including microorganisms, aquatic life, plants, birds and other wildlife.

4. Wildlife can best be seen by blending in quietly with nature.

5. To more fully experience the habitat, the visitor should rely not only on sight but also on hearing, touch and



smell.

6. Recycling water is good for the environment.

7. People play the major role in Phoenix's urban water cycle.

8. A desert riparian area is a unique and limited resource to be appreciated and respected.

These learning objectives will be realized through the construction of physical facilities. A major visitors center will be planned, designed, and funded in cooperation with a consortium of concerned groups such as government and educational agencies, non-profit groups, and commercial sponsors. Additionally, other facilities and amenities such as trails, entry points, and kiosks located throughout the Tres Rios project will allow for the development of interpretive signs, displays, and supplemental materials.

Develop Partnerships

School districts, organizations, and individuals within the community as well as governmental agencies will wish to become more involved with the Tres Rios interpretive education program. They may fund or manage certain public use features and provide volunteer services. Individual volunteers or a student program may be organized to help with planting and replanting within the project. School districts and local organizations which become partners may set up or rotate interpretive displays within the facility. A cascade effect will also be put into place to incorporate students and programs from the universities, community colleges, high schools, elementary schools, and pre-schools.

School Curriculum

Support materials for school curricula would be developed by the City in conjunction with the supporting educational system for pre and post-visit activities as well as for on-site visits. These could include a packet of teaching materials to provide some hands on experience prior to a class visit. The packet could contain wildlife specimens, maps, diagrams, field guides for plant and animal identification, water-quality testing kits, and perhaps dip nets for viewing and identifying species during the visit. The curriculum would also be presented in an outdoor classroom setting at the site.

Guided Nature Walks

A monthly schedule of guided nature walks would complement the interpretive education program. These walks could be developed and led by volunteers. Environmental and wildlife

organizations such as the Phoenix Audubon Society, Sonoran Arthropod Studies Institute, and the Arizona Native Plant Society as well as agencies such as the Arizona Game and Fish Department could periodically sponsor events which would be open to the general public.

HABITAT RESTORATION OVERVIEW

The Tres Rios project spans a 9.2 mile corridor and covers more than 5,600 acres. The Salt, Gila and Agua Fria Rivers, once viable desert rivers and lush riparian habitats, were changed as the Valley of the Sun grew and water sources were diverted and dammed. The three rivers through Phoenix are being revitalized and rejuvenated for their wildlife habitat value as well as for flood control, passive recreation, and as a resource that needs to be rehabilitated.

The primary goal of the Tres Rios project is to rehabilitate habitat values within the three river beds. To effectively rehabilitate these values, four primary components must be provided: space, shelter, food, and water.

The Tres Rios area provides the necessary space to support a variety of wildlife. The open space of the river connects with undisturbed downstream and upstream areas, providing a green-way corridor for wildlife. Additionally, migratory birds utilize rivers as navigational tools and respite and the re-establishment of Tres Rios habitat will provide a missing link in that migratory map.

Shelter will be rehabilitated through reintroducing native plants. By maximizing plant diversity including ground cover, small shrubs, and larger trees, a three-dimensional structure is achieved providing shelter and escape for wildlife. Plant diversity also provides the food necessary for wildlife in seeds, fruits, nuts, and nectar.

Reintroducing water in varying amounts provides the final element of successful habitat restoration.

Mimicking natural flood cycles and restoring these four elements to the Tres Rios area will provide primary habitat value and diversity:

Open Desert: Vegetation species include- creosote bush, triangle leaf bursage, little leaf palo verde, blue palo verde, saguaro cactus, prickly pear cactus, ocotillo, and hedgehog cactus. These will be mainly located along or adjacent to the primary trail system at the highest elevations of the river channel.

Mesquite Upland: Vegetation types include- velvet mesquite, screw bean mesquite, elderberry, greythorn, wolfberry, and hackberry. These species are a transitional species and will serve as a

transition from Primary to Secondary trail area. This transition usually occurs on the slopes and upper river terraces as elevation descends from the river over banks.

Cottonwood-Willow: Vegetation types include- Goodding willow, Fremont cottonwood, reeds, and elderberry. As one of the true indicator plants for a successful wetland and habitat restoration, these plant families will be highly sought after and will be propagated immediately adjacent to the OBW and FRW. This plant community typically occurs in the lowest elevations of the river terraces where water is most readily available.

Wetland Marsh: Vegetation types include- cattail and giant bulrush. This species is prevalent within the river corridor already and with the re-introduction of a readily available and long-term water source, these species will thrive. They will inhabit all areas of standing water that have adequate depths.

Aquatic Strand: Vegetation types include- volunteer native grasses and scrub. Like the cattail and wetland marsh plants these aquatic strand plant areas are also prevalent within the river corridor already and with the re-introduction of a readily available and long-term water source, these species will thrive. They will inhabit all areas of standing water that have adequate depths.

Many native desert birds, mammals, and reptiles may find a home in the rehabilitated habitat in the Tres Rios area. They could include:

Small Mammals: Coyote, skunk, raccoon, beaver, bat, and fox.

Rodents: Pack rat, deer mouse, cactus mouse, hispid cotton rat, and ground squirrel.

Shore Birds: Egret, great blue heron, green heron, black-crowned night heron, black-necked stilt, and least bittern.

Other Birds: Quail, cactus wren, dove, gila woodpecker, thrasher, verdin, Aberts towhee, vermillion flycatcher, cardinal, roadrunner, black-tailed gnat catcher, yellow-headed blackbird, red-winged blackbird, and cowbird.

Raptors: Cooper's hawk, red tailed hawk, great horned owl, kestrels, and peregrine falcon.

Reptiles: Gopher snake, king snake, whip snake, ground snake, fence lizard, whip-tail lizard, banded gecko, and spiny lizard.

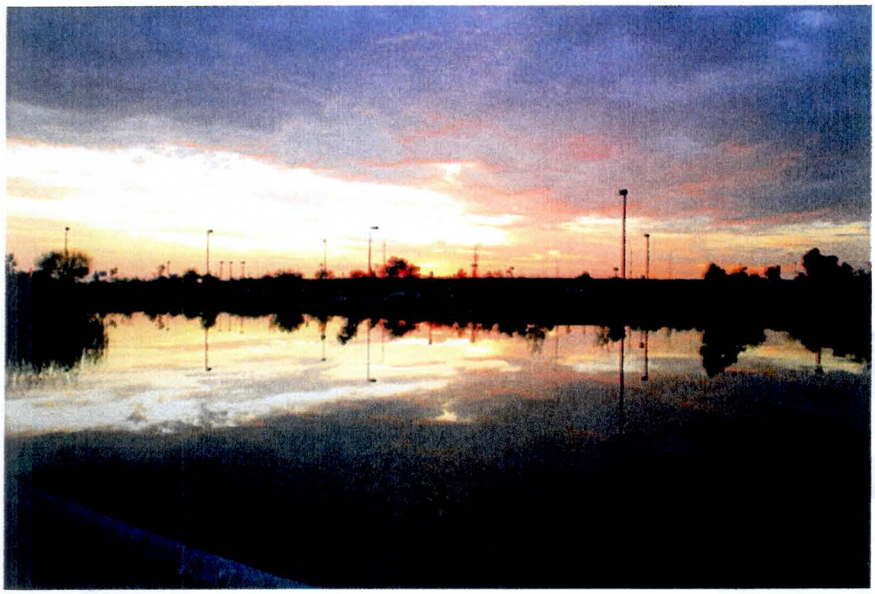
Endangered or other federally-listed wildlife that could be seen at Tres Rios include the Yuma clapper rail,

yellow-billed cuckoo, and willow flycatcher.

CONCLUSION:

The goals of Tres Rios Project are consistent with that of the overall goal expressed by the SROG partners at the initiation of this project: to rehabilitate the native wetland and riparian habitats that were historically associated with the confluence of the three most important rivers of the Phoenix metropolitan area the Salt, Gila, and Agua Fria Rivers and their associated wetland and riverine ecosystems. The passage of time has brought many changes to these rivers. The existing environment is very different from the free-flowing rivers that provided the basis of life in the desert southwest. The growth and development of the Phoenix Metropolitan area and vicinity has also brought changes to the river systems. The rivers still serve the needs of the people on a flood control protection basis, but the environment that defined the rivers has been destroyed or eliminated over the past 100 years. The most influential changes have been the placement of upstream dams to divert water for crop irrigation, control of cyclical flooding, and creation of a power source for the latest inhabitants of this area. These changes have severely limited the hydrology and the related natural wildlife communities once abundant and associated with these river corridors. The current desolate nature of large portions of these river areas has created a geographic, economic, social, and visual division in the communities that were originally established along their banks because of the life giving resources that they provided, clean water and food. The objective of this Project is to rehabilitate a river environment that represents many of the natural water systems that were present along these river's paths through the desert southwest.

The primary objective is to provide a wetland ecosystem that will once again achieve a sustainable balance of flora and fauna within the confines and limits of this specific project with its water source the Phoenix Water Treatment Plant at 91st Avenue. This balance will be achieved through management and operation of this environment and the water that will sustain its continued development. While the primary goal of the City of Phoenix and USACE objective is to rehabilitate significant ecosystem function, structure, and dynamic processes that have been degraded, a secondary objective will be the important promotion of passive human interaction within this fragile environment. This aspect of human participation will be controlled through the introduction of specific trails and educational areas that have been discussed above. The J2 team envisions a project that will be viewed and experienced not as an obstacle to be bridged and backed up too, but as an area that invites controlled visitation and incorporates the history and significance of wetlands and a healthy riverine environment to the desert southwest. To develop and maintain this environment the public must be educated on how to become stewards of the river corridor (local residential, commercial community,



and anticipated visitors) and of these unique habitats.

The City will have to focus on incorporating controlled passive recreational and educational elements and features into the Project. The following design principles can serve as the guidelines when reviewing any passive recreational and educational elements proposed for incorporation into the project:

1. *Recycle-Reuse:* Use both site-specific and manufactured recycled items in the Project as site furnishings and construction materials that are illustrative of the river's history and use. This is the main principle that connects the entire Project and should be applied to the restoration aspects of the Project and the public use facilities where it is cost effective and feasible.

2. *Accessibility*: Provide balanced, controlled, safe, and creative solutions for people of all ages and abilities without sacrificing the variety of challenging experiences and realities that a large environmental restoration project like Tres Rios will present. Access will be balanced and controlled to ensure that it does not negatively impact the environmental restoration aspects of the Project.

3. *Local Materials*: Use indigenous materials and facilities to minimize maintenance challenges for the future and educate the public to the diverse materials and solutions that are both locally and regionally significant and available.

4. *Create Connections*: Promote the development of connections between different uses and facilities both within and outside the Project. This connection will include the review of the adjacent El Rio project, the City of Phoenix trail systems, Sun Circle Trail, Monument Hill, and Pee Posh connections and other recreational linkages that come on-line as this project develops.

5. *Historical Interpretation*: Describe, interpret, and honor the history of the river, its people, and the cities that grew on its banks in every aspect of the Project's design and programming. Position the Project as a national, regional, cultural, and recreational resource for the USACE, the City of Phoenix, and the SROG contributing partners to this effort and to the nation on a whole about the importance of these unique ecosystems and the importance that they continue to have on our lives.

6. *Respect the Setting*: Enhance the river corridor so that it is compatible and consistent with its natural habitat and the overall Project that is the nucleus of this endeavor.

7. *Create Discovery Zones:* Create spaces and areas along the project edge that serve as "discovery zones" and destinations that invite and educate the visiting public in a positive and enlightened manner.

8. *Encourage Frequent and Year-Round Use:* Provide a cohesive mix of attractive, safe experiences, and spaces along and within the project that tell the story of wetland habitats and their intricate balance in the water cycle relative to this precious ecosystem. This story needs to include the river's relationship to the environment, the history and culture that prospered along these three river banks, and the diverse desert ecosystem that they support. This story should create a compelling and positive user experience that results in the creation of a visual and tactile memory. An experience that promotes repeated journeys to Tres Rios Project to better appreciate this unique project and these unique habitats and how intertwined our lives are to these environments.

Tres Rios

final recreation concept

6.9.2008

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North

U.S. Army Corps of Engineers