Introduction

• Who is FICO?
Project Team

Kimley-Horn and Associates, Inc.
River Master Plan,
Civil Engineering,
Water, WasteWater & Drainage

J.E. Fuller
River Hydraulics

Larson, Voss, Assoc.
Land Planning

Crown Community Development
Partner in FICO since 1948

Frank Thomson & Associates
Planning
The Caliber Group
Public Relations & Outreach

Strategic Issues Management Group
Public Affairs
FICO’s 6,000 Acres: Comprise One-Third of Sahuarita

Additional 1,000 acres are in Pima County
What is a Specific Plan?

Specific Plan is a document that regulates land use and development within a specified area of the town.

Specific Plan Documents include:

- Site Analysis
  - Existing Conditions
- Map and Text Elements
  - Land Uses
  - Open Space
  - Streets/Circulation
  - Drainage/Hydrology
  - Water and Sewer
  - Public Facilities & Services
  - Development Standards
- Must satisfy technical requirements
Why Plan Now?

• History has proven that if you do not plan for growth, growth will plan for you.

• FICO experiencing growth pressures now – infrastructure, ROW, utilities, community facilities.

• 1990’s: Rancho Sahuarita Specific Plan Adopted.

• 2000-2010: Town grew from 3,200 – 25,000 pop.

• What would area look like without Master Plan?

• Example: San Antonio River.

• Santa Cruz River: 12 linear miles-single land owner.

• Vision for river and blueprint for quality growth.

• Proactive long-range planning allows for better decision-making for all.

Source: Pima Association of Governments
Community Land Use Plan
6,000 acres in Sahuarita and adjoining Green Valley: 40-50 year plan

- River Park/Open Space
- Rural Neighborhoods
- Village Neighborhoods
- Urban Neighborhoods
- Employment Campus
- Campus Park Industrial
- Mixed Use Activity Centers
- River Center District
Open Space and Trails

- Approx. 2,100 acres of open space (over 1,000 in river corridor)
- 37% of total project area
- Consistent with O.S. Plans
- Linear Greenway Park
- Additional O.S. Corridors
- ~50 miles of trails
- 2 community / district parks
- Neighborhood parks
- ¼ mile walking distance
Community Villages
6,000 acres, 40-50 year build-out

The Groves: Employment focus

Town/River Center: Urban core, primary activity centers

River Park: Residential neighborhoods-district park

Valle Vista: Rural character
Santa Cruz River ……. The Common Thread - Linkage

• This makes property unique and special
• 12 linear miles – single owner
• Over 1,000 acres of contiguous open space
• Regional recreational amenity for all
• Directly through center of town
• Ability and motivation to develop the plan now
Purpose
Develop a conceptual river master plan for the Santa Cruz River through Sahuarita Farms
Objectives

- Provide for safe development within the floodplain of the Santa Cruz River
- Provide for conveyance of the 100-year flood event
Objectives

Design of a sustainable river corridor that provides cost-effective multi-use opportunities for habitat enhancement, recharge, and flood control, while minimizing the costs for future public and private infrastructure located within the footprint of the river corridor.
SANTA CRUZ RIVER MASTER PLAN

Objectives

• Enhance the river corridor as a benefit and amenity to the local community.
FICO SAHUARITA FARMS
SANTA CRUZ RIVER MASTER PLAN

Project Background – Existing Conditions

Previous Flooding (1977/1983/1993)
Environmental/Biology
Cultural Resources
Offsite Tributaries
Floodplain/Floodway
USGS Gage at Continental Road

Peak Discharges from 1948 through 2006

Oct 1977 – 28,500 cfs

Oct 1983 – 45,000 cfs

Jan 1993 - 32,400 cfs
OCT 1977 FLOOD PHOTOS

Discharge = 28,500 cfs
Continental Road Bridge – West Abutment Failure
1983 AERIAL FLOOD PHOTOS

Discharge = 45,000 cfs
100-year FEMA regulatory discharge
1983 Flood Continental Farms/Esperanza Wash
1983 Flood Continental Road
1983 Flood Continental Road
1983 Flood Confluence with Box Canyon Wash
1983 Flood Sahuarita Road
1983 Flood Sahuarita Road/Nogales Hwy
1983 Flood Pima Mine Road
1983 Flood Sahuarita Ranch @ Pima Mine Road
1993 FLOOD - AERIAL PHOTOS

Discharge = 32,400 cfs
1993 Flood Continental Farms/Green Valley WWTP
1993 Flood UPRR Railroad Spur
1993 Flood Sahuarita Road Bridge
1993 Flood

Pima Mine Road
Railroad Bridge
1993 Flood-Debris buildup on trees and sediment deposited in field
1993 Flood Sahuarita Road at Nogales Hwy
1993 Flood Pima Mine Road (looking south)
SANTA CRUZ RIVER
Environmental

• Purpose:
  1. Identify potential environmental planning constraints, issues and sensitive areas
  2. Address environmental surveying, permitting, and agency coordination
Environmental

- Topography/Physiography
- Biotic Communities and Vegetation
- Wildlife and Wildlife Movement Corridors
- Threatened, Endangered, and Sensitive Species/Habitat
Environmental

- Natural Resource Zone Map
- Potential Jurisdictional Waters of the US
Environmental

- **Recommendations:**
  - Conduct Native Plant Survey
  - Enhance vegetation along drainages for habitat
  - Species specific survey for Pima Pineapple cactus
  - Potential Clean Water Act Section 404 permit for tributaries
Cultural

- Conducted a Class I Records Search
- 1 mile radius along river corridor
- Area of Potential Effect (APE) 10,300 acres
Cultural

**Recommendations:**

- Full cultural survey any areas not field checked in last 10 years before necessary mitigation for river improvements
- Assess historical properties outside project area not directly impacted by development; effects for setting, feel, and association with surrounding landscape
Offsite Tributaries

- Purpose:
  - Conduct drainage study to determine the offsite 100-year flows at locations along the Santa Cruz River at the FICO property boundaries.
  - Analyze the capacity of the tributaries vs. the 100-year flow.
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<tr>
<th>Tributary</th>
<th>Capacity [cfs]</th>
<th>HEC-1 Result [cfs]</th>
<th>Does Tributary have enough capacity for 100-year event?</th>
<th>Wash Name</th>
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<td>E-2</td>
<td>325</td>
<td>1,282</td>
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<td>E-3</td>
<td>315</td>
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<td>4,040</td>
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<td>E-6B</td>
<td>195</td>
<td>439</td>
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<td>W-8b (concrete channel)</td>
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<td>W-20</td>
<td>3,611</td>
<td>1,625</td>
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</table>
Offsite Tributary Analysis Findings

- 3-hr 100-year storm
- 16 out of 34 tributaries do not have the capacity of the 100-year event
PLANNING CONSTRAINTS AND OPPORTUNITIES

- $Q_{100} = 45,000$ cfs (regulatory)
- $Q_{\text{design}} = 55,000$ cfs (Pima County Floodplain Ordinance)
- Existing Floodplain/Floodway
- Land Ownership/Town and County Jurisdictions
- Jurisdictional Waters of the US for river and Tributaries
- Tributaries
Terraced Channel Typical Section
Erosion Hazard Setback Typical Section

PROPOSED TERRACE
130' TO 720'

PROPOSED LOW FLOW CHANNEL
510' TO 610'

PROPOSED TERRACE
150' TO 650'

GENERAL EXCAVATION

10:1

500' EROSION HAZARD SETBACK REQUIREMENT

EXISTING SANTA CRUZ RIVER

500' EROSION HAZARD SETBACK REQUIREMENT
Terraced and Erosion Hazard Sections

Typical of improvements south of Sahuarita Rd.

Typical of improvements north of Sahuarita Rd.
River Master Plan Elements

Erosion Hazard Section
- Elimination of West Overbank
- EHS overbank 500 - 600 ft
- Lateral Weir to return flow to floodplain

Structural Section
- Terraces on both banks 150-200 ft wide
- Low flow channel: 20-25 year flood
- Bank protected
- Levee to capture active east overbank flows

Recover Lands from Floodplain
Santa Cruz River
Sediment Transport
Scour Evaluation
Long Term Analysis

Technical Data Notebook for Santa Cruz River
Sediment Transport, Scour, and Long Term Analyses:
Demetric Wash to Pima Mine Road

Prepared for
Farmers Investment Corporation
March 2010
By Ian P. Sharp, P.E., CFM
JE Fuller Hydrology & Geomorphology Inc.
Facing upstream from Pima Mine RR Bridge.  

Facing downstream from Pima Mine Rd.  

Scour of Pima Mine Road Bridge piers. The bottom of the pier base (top of pile shafts) is now 3 feet above the channel but was originally 6 feet below the channel bed when built in 1969-1970.  

Scoured bank upstream of Pima Mine Road.
Current vs Historic Aerials
Santa Cruz River - Average Bed Elevation and Deposition after 10, 30, and 50 Years of Mean Daily Flow

Sediment Deposition - 5 section running average

Bed Elevation

Main Channel Distance (miles)

Elevation (ft)
Santa Cruz River Hydrograph Attenuation Analysis

Prepared for
Farmers Investment Corporation

May 2010

By Ian P. Sharp, P.E., CFM
JE Fuller Hydrology & Geomorphology Inc.
<table>
<thead>
<tr>
<th>Model and Location</th>
<th>2-yr</th>
<th>10-yr</th>
<th>100-yr</th>
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<tbody>
<tr>
<td>At RM 62.335 (d/s of Continental Road)</td>
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<tr>
<td>All models</td>
<td>3,740</td>
<td>13,010</td>
<td>45,000</td>
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<td>Volume (ac-ft)</td>
<td>6,632</td>
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<td>At RM 60.046 (over 2.2 miles upstream of RMP)</td>
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<td>42,260</td>
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<td>At RM 57.104 existing &amp; 57.062 RMP (d/s of Nogales Highway)</td>
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<td>At RM 51.534 (0.2 mile u/s of Pima Mine Road)</td>
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<td>Existing Conditions</td>
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<td>RMP</td>
<td>3,233</td>
<td>11,303</td>
<td>38,473</td>
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</table>
• Proposed Conditions
  Hydraulics, Sediment, Scour
Proposed River Conditions Work Map
Proposed River Conditions Work Map
Proposed River Conditions Work Map
CONCEPT SANTA CRUZ RIVER MASTER PLAN
SAHUARITA, ARIZONA
RECOMMENDED CONCEPT PLANS

LEGEND
- APPROXIMATE WASH LINE
- EX PROPERTY LINE
- EX 100-YR WATER SURFACE ELEVATION
- EX RIVER PROFILE ALONG PROP ALIGNMENT
- PROP SOIL CEMENT TOEDOWN
- PROP RIVER PROFILE ALONG PROP ALIGNMENT
- PROP LEFT TOP OF BANK PROFILE
- PROP LEFT TOP OF SOIL CEMENT PROFILE
- PROP RIGHT TOP/TOE OF BANK PROFILE
- PROP RIGHT TOP/TOE OF BANK PROFILE
- APPROX EX 404 LIMITS
- PROP SOIL CEMENT BANK PROTECTION
- PROP EARTHEN BANK CHANNEL
- PROP RIP RAP CHANNEL PROTECTION
- PROP CONCRETE CHANNEL PROTECTION
- PROP ACCESS DRIVE
- 18+00 RIVER STATIONING
- PROP TERRACE SLOPE DIRECTION

PREPARED FOR:
FARMERS INVESTMENT CO.
1625 E. SAHUARITA ROAD
SAHUARITA, ARIZONA 85629

NOTES:
1. THESE PLANS ARE FOR PLANNING PURPOSES ONLY. NOT FOR CONSTRUCTION.
2. THIS DOCUMENT, TOGETHER WITH THE CONCEPTS AND DESIGNS PRESENTED HEREIN, AS AN INSTRUMENT OF SERVICE, IS INTENDED ONLY FOR THE SPECIFIC PURPOSE AND CLIENT FOR WHICH IT WAS PREPARED. REUSE OF AND IMPROPER RELIANCE ON THIS DOCUMENT WITHOUT WRITTEN AUTHORIZATION AND ADOPTION BY KIMLEY-HORN AND ASSOCIATES, INC. SHALL BE WITHOUT LIABILITY TO KIMLEY-HORN AND ASSOCIATES, INC.
3. ALL FLOWS USED FOR HYDRAULIC PROFILES USE A FLOW OF 45,000 CFS.
4. ALL TRIBUTARY FLOWS PROVIDED ON PLANS REFER TO THE PROPOSED 100-YEAR PEAK DISCHARGE.
5. THESE PLANS ARE SUBMITTED AS PART OF THE SAHUARITA FARMS SPECIFIC PLAN.
6. THE PROPOSED TRIBUTARY IMPROVEMENTS DEPICTED IN THE PLANS ARE FOR DRAINAGE PURPOSES AND DO NOT NECESSARILY REFLECT MULTI-USE AMENITIES PROVIDED IN THE SPECIFIC PLAN. THE DRAINAGE CORRIDORS ARE INTENDED TO SERVE AS JOINT FACILITIES FOR MULTI-USE.

LIST OF ABBREVIATIONS:
APPROX APPROXIMATELY
AVE AVENUE
BLVD BOULEVARD
CMP CORRUGATED METAL PIPE
DR DRIVE
ELEV ELEVATION
EX EXISTING
FT FEET
LN LANE
MIN MINIMUM
PL PLACE
PROP PROPOSED
R/W RIGHT-OF-WAY
RD ROAD
RMP RIVER MASTER PLAN
STA STATION
WSEL WATER SURFACE ELEVATION
YR YEAR
Santa Cruz River Enhancements

Improvement Concepts (upper terrace)
- Wetland and natural water recharge
- Native vegetation and wildlife corridors
- Trails and tranquil open spaces
- Active recreation
- Gateway and trailheads
Santa Cruz River Enhancement

Re-establish Habitat
Santa Cruz River Enhancement

Passive Recreation
Santa Cruz River Enhancement

Active Recreation
Santa Cruz River Enhancement

Gateway/Trailhead Connection to trails
Early Phase: River Park Trailhead and Anza Trail
SANTA CRUZ RIVER MASTER PLAN

• Project Benefits
  ✓ Public Safety
  ✓ Regional Flood Control
  ✓ Recreation
  ✓ Habitat and Wildlife
  ✓ Regional Access and Connectivity
  ✓ Water Conservation and Recharge Opportunities
Questions???

Cruz the River