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## FEATURE DESCRIPTIONS: PART 6. CANALS, AZ BB:13:481 (ASM)

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Archaeological work conducted during the Rio Nuevo Archaeology project resulted in the discovery of hundreds of features—areas in which human activities took place. Descriptions of excavated features and summarized data on unexcavated features are presented in this chapter. Descriptions of human burials found during the project are provided in Chapter 18 (this volume).

Work during this project was conducted at four different archaeological sites. The San Agustín Mission, Mission Gardens, Brickyard, and Congress Street loci were located at the Clearwater site, AZ BB:13:6 (ASM), on the western side of the Santa Cruz River. AZ BB:13:481 (ASM) were the Prehistoric, Protohistoric, and Historic era canals, ditches, and a spillway, also located on the western side of the Santa Cruz River. The Tucson Presidio has been designated AZ BB:13:13 (ASM), and the site includes both prehistoric- and historic-era features. Finally, a portion of a historic-era residential block on the northern side of Clark Street and east of the Interstate 10 (I-10) frontage road was designated AZ BB:13:735 (ASM).

The feature descriptions in this chapter are grouped by locus, except for canals, which are described in Part 6 and which are grouped by time period. All site numbers in this chapter are Arizona State Museum (ASM) numbers. Radiocarbon dates are reported in both uncalibrated radiocarbon years before present (b.p.), and in calibrated calendar years at the 1-sigma range of probability. Excavated and unexcavated features are listed, by site/locus and time period, in Table 4.1 (see Part 1 of this chapter).

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During test trenching and excavations at the Clearwater site, AZ BB:13:6 (ASM), numerous irrigation canals were discovered (Figures 4.96 and 4.97). Canals are considered linear features because they typically cross long distances and can transverse other sites. Following Arizona State Museum (ASM) guidelines, canals are assigned a separate site number. AZ BB:13:481 (ASM) had previously been used for the prehistoric- and historic-era canals located on the western side of the Santa Cruz River between 29th Street on the south and Alameda Street to the north. Testing of the Rio Nuevo South property and trenching along Alameda Street in 1995 located numerous irrigation canals (Diehl 1996; Freeman et al. 1999; Thiel 1995). The work conducted for the Rio Nuevo Archaeological project in 2000-2003 resulted in the discovery of additional portions of these previously discovered canals, as well as previously unknown canal alignments. These were also assigned to BB:13:481.

All the canals were buried beneath the current ground surface, and were typically identified in backhoe trenches and exposed in multiple trenches. Archaeologists measured and drew profiles of many of the canal exposures. Ostracode samples were collected

from certain canals. In several cases, excavation units were placed inside canals, allowing for the recovery of artifacts and for a better understanding of the constructions and dimensions of the water control features. A total of 36 canals, including 6 Early Agricultural, 13 Hohokam, 4 Protohistoric, and 13 Historic examples, were documented during the project (Table 4.5). Other irrigation canals lie outside the Rio Nuevo project area, buried beneath nearby roads, homes, and yards. Although currently inaccessible, these canals may one day be discovered during future utility replacements and other construction projects.

### EARLY AGRICULTURAL PERIOD CANALS

#### San Agustín Mission Locus

##### *Feature 53*

Feature 53 (Figure 4.98) was a small canal that curved from the south to the east before being lost in the 1950s landfill. The canal was traced for 34.2 m. On average, it was 1.3 m wide at the top and narrowed to

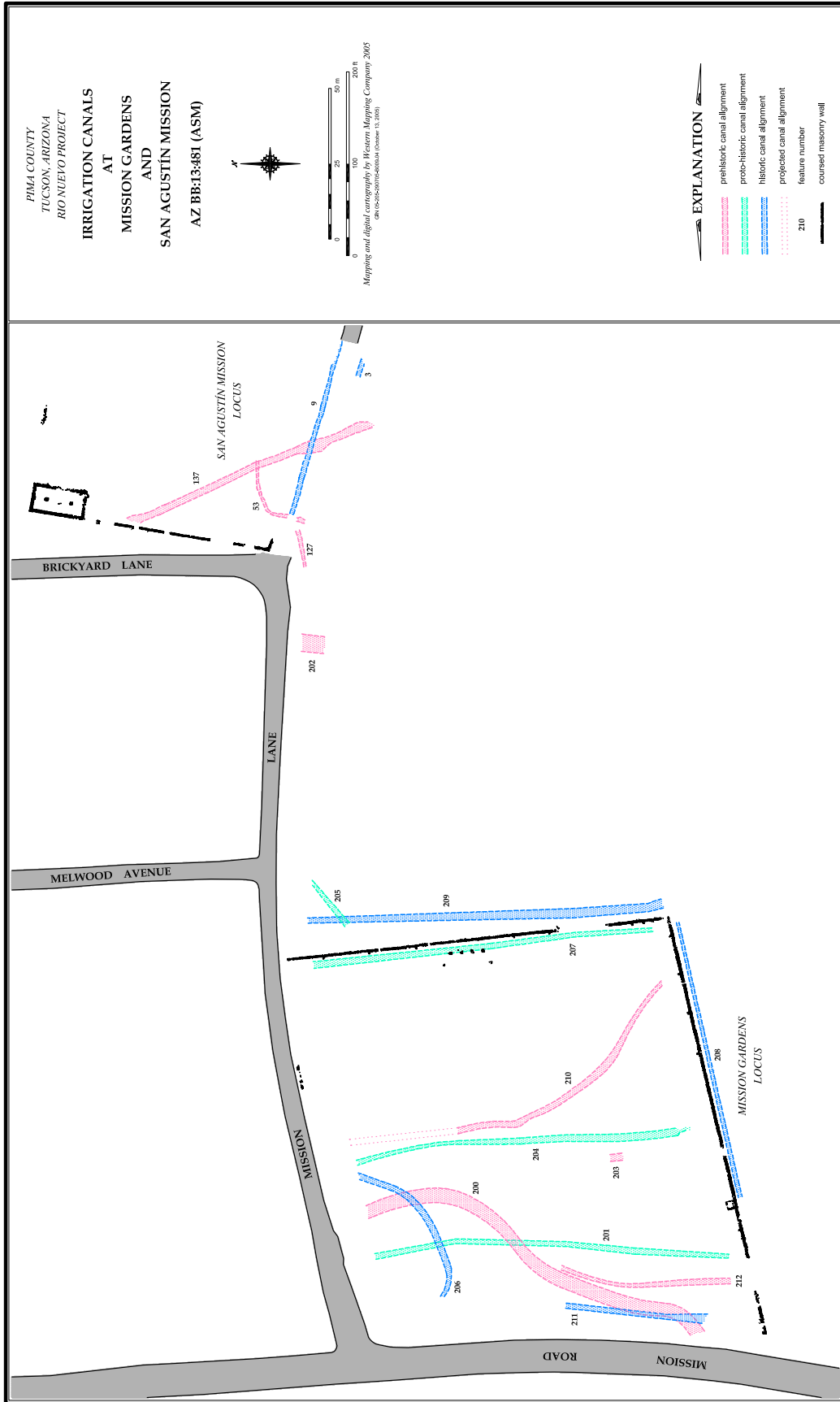


Figure 4.96. Irrigation canals, AZ BB:13:481 (ASM), at the San Agustín Mission and the Mission Gardens loci, the Clearwater site, AZ BB:13:6 (ASM).

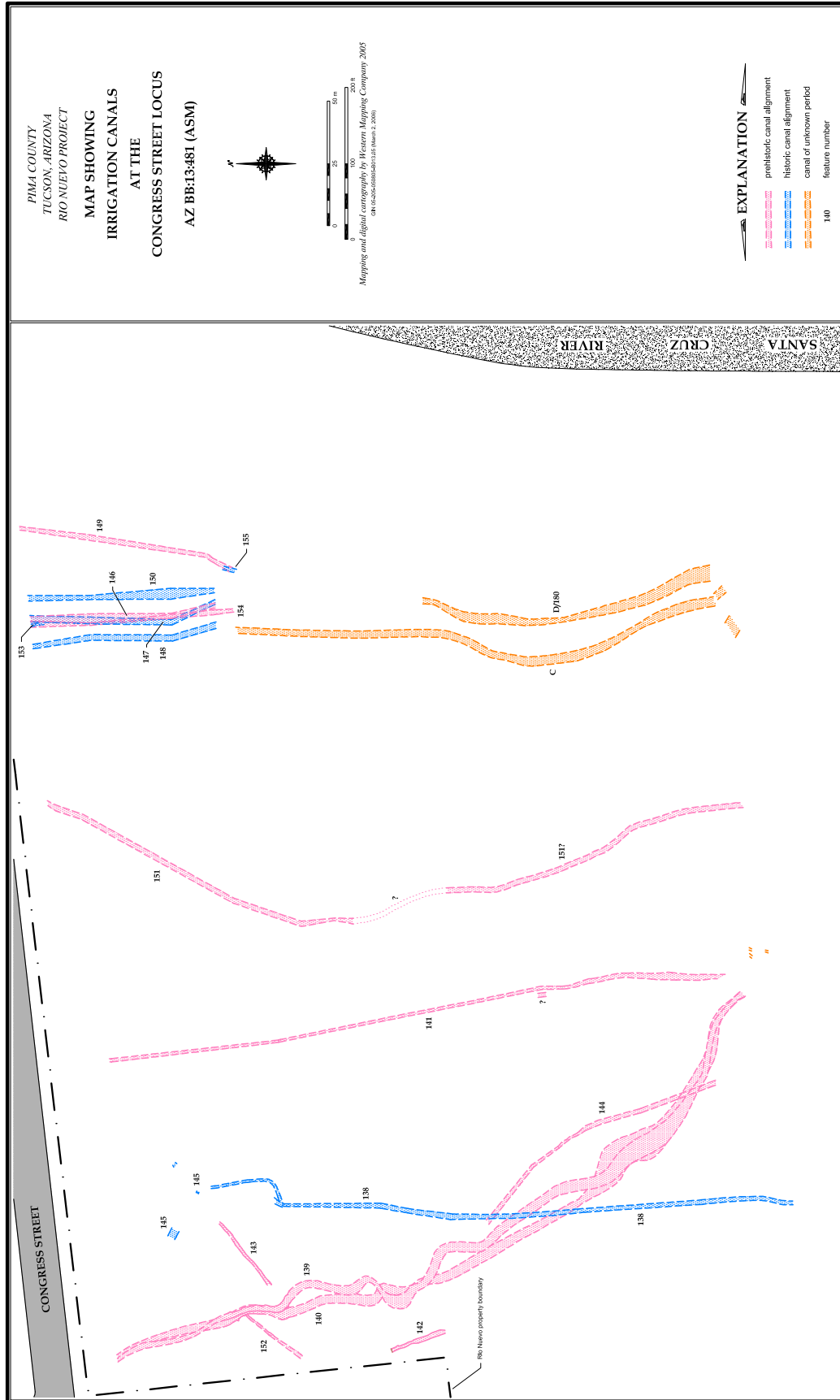


Figure 4.97. Irrigation canals, AZ BB:13:481 (ASM), located at the Congress Street locus, the Clearwater site, AZ BB:13:6 (ASM).

**Table 4.5.** Canal feature numbers at AZ BB:13:481 (ASM), by locus and period/era.

Locus	Early Agricultural	Hohokam	Protohistoric	Historic
Congress Street/Brickyard	139, 140, 141, 152	142, 143, 144, 146, 149, 151, 154	-	138, 145, 147, 148, 150, 153, 155
San Agustín Mission	53, 127	137	-	3, 9
Mission Gardens	-	200, 202, 203, 210, 212	201, 204, 205, 207	206, 208, 209, 211



**Figure 4.98.** Photograph of canal Feature 53, AZ BB:13:481 (ASM), at the San Agustín Mission locus, the Clearwater site, AZ BB:13:6 (ASM).

70 cm wide at the base. The canal was basin shaped in profile and was 43 cm deep. Portions of the canal were apparently lined with fire-cracked rock. Three excavation units were placed in the feature, which was filled with a homogenous light brown to tan silt. The canal appears to have been filled in during a flood event—probably the same flood that dumped light-colored silt into numerous nearby Cienega phase pit structures and pits.

Artifact density was low within the feature and included pieces of flaked stone, ground stone, animal bone, and a few intrusive later ceramics. Ostra-

code samples were collected from the eastern cross section in excavation Unit 112.

Based on its stratigraphic context, this canal dates to the Cienega phase (800 B.C.-A.D. 50) of the Early Agricultural period.

#### *Feature 127*

Feature 127 was located in Trench 19 and appears to be orientated southwest to northeast. It was identified as a 7-cm-thick U-shaped band of yellowish-brown silt. The canal was 1.1 m wide and 40 cm deep, with its top found 30 cm below the existing ground surface. It lies beneath the 5- to 10-cm-thick band of flood-deposited yellowish-brown silt that filled many of the Early Agricultural period features at the San Agustín Mission locus. The base of the canal was lined with a fine yellow silt lens above which was a moderately compact dark brown clayey silt. No artifacts were recovered from the profile.

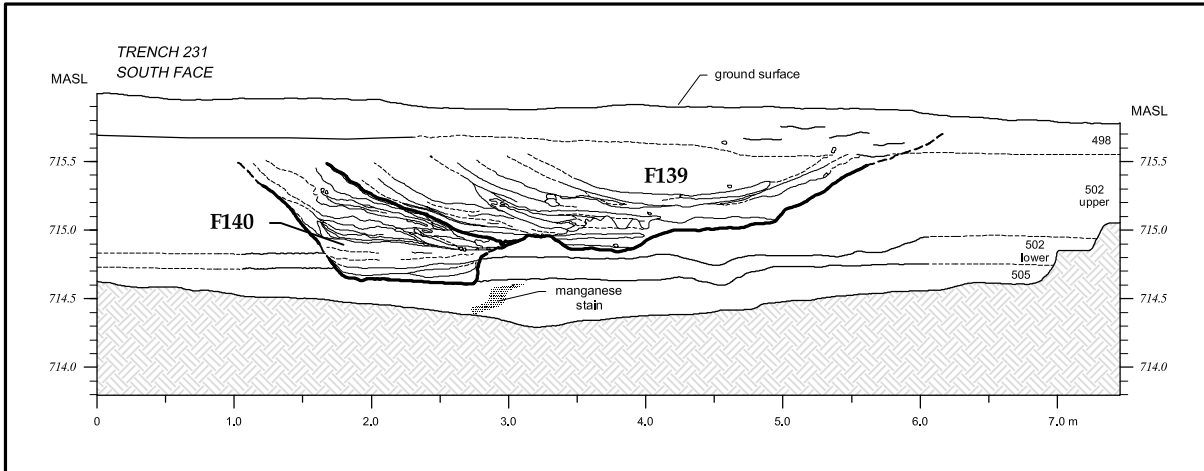
Based on its stratigraphic context, this canal dates to the Cienega phase (800 B.C.-A.D. 50) of the Early Agricultural period.

#### **Congress Street/Brickyard Loci**

#### *Feature 139*

Feature 139 was identified in Trenches 201, 203, 205, 207, 210, 211, 213, 214, 215, 216, 223, 225, 231, 232, 233, 234, 267, 275, 276, 277, 278, 279, 280, 284, and 285. It was drawn in Trenches 201, 205, 207, 215, 216, 231, 232, 275, 276, 277, 278, 279, 280, 284, and 285. The canal ran southeast to northwest and was traced for about 260 m. The overall extent of the canal area was 3.02 m wide, a result of the canal moving to the east through time. The last use of the canal resulted in a basin- or U-shaped channel approximately 1.3 m wide and 71 cm deep, originating at between 32 cm and 72 cm below the modern ground surface. The upper surface of this last use was truncated by the plowzone.

A 2-m by 2-m excavation unit was placed in the canal. The fill was moderately compact dark gray-brown silty clay with lenses of yellow silt and highly compacted light gray-brown clay. The base of the



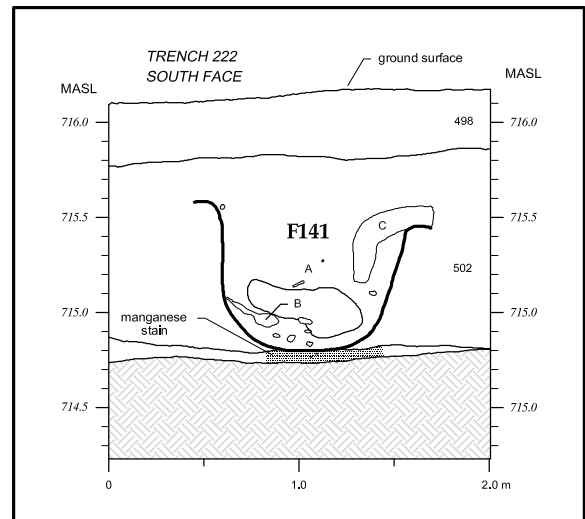
**Figure 4.99.** Cross section of canal Feature 140, AZ BB:13:481 (ASM), at the Congress Street and Brickyard loci, the Clearwater site, AZ BB:13:6 (ASM).

canal was stained with manganese. Screening of the dirt resulted in the discovery of 18 pieces of fire-cracked rock, as well as sherds, flaked stone, a flaked stone “eccentric,” ground stone, shell, and animal bone. Ostracode samples were collected from the northern wall of Trench 201, the southern wall of Trench 203, the eastern wall in Trench 215, and the southern wall of Trench 232. A radiocarbon date on a piece of charcoal revealed the canal dates to 2140±40 b.p. (uncalibrated <sup>14</sup>C years), or 200-110 B.C. (at the 1-sigma range of probability). Because canal Feature 139 intruded canal Feature 140, this radiocarbon date also provides a minimum age for Feature 140.

*Feature 140*

Feature 140 (Figure 4.99) was found in Trenches 201, 203, 205, 207, 216, 267, 275, 276, 277, 278, 279, 284, and 285. It was drawn in Trenches 201, 203, 205, 207, 215, 216, 231, 232, 275, 276, 277, 278, 279, 284, and 285. The canal ran southeast to northwest, and was traced for about 120 m. The canal was between 2.40 m and 3.75 m wide, and was 1.03 m deep, originating at 62 cm below the modern ground surface.

At least two different uses are visible. The first use cuts through cienega clays to the underlying silty clay and sand layers. Manganese staining is present at the base of the canal, with a light gray reddish-brown blocky clay filling the lower portion of the canal. The canal was re-dug into a broad basin shape. The base of this later canal was filled with dark brown blocky clay overlain by a light silty clay. The upper portion of the canal was filled with a reddish-brown silty clay. It is unclear, however, if this was deposited during use of the feature or after it was abandoned. Ostracode samples were collected from the northern wall of Trench 201, the southern wall of



**Figure 4.100.** Cross section of canal Feature 141, AZ BB:13:481 (ASM), at the Congress Street and Brickyard loci, the Clearwater site, AZ BB:13:6 (ASM).

Trench 203, the eastern wall of Trench 215, and the southern wall of Trench 232.

Based on its stratigraphic context, this canal dates to the Early Agricultural period.

*Feature 141*

Feature 141 (Figure 4.100) was found in Trenches 114, 219, 220, 222, 229, 236, and 237. It was drawn in Trenches 114, 219, 220, 222, 229, 236, and 237. The broadly U-shaped canal ran south to north and could be followed for 180 m. It was between 94 cm and 1.76 m wide, and was 60 cm to 90 cm deep, originating at 25 cm to 40 cm below the modern ground surface. The canal originated within Stratum 502 and cut through Stratum 503. It was filled

with a compact blocky brown clay with some lenses of sandy clay loam to sandy loam to silty clay loam, some of which probably lie at the base of a clean-out. In Trench 222, an area where material had slumped in from the side of the canal was clearly visible. A cluster of fire-cracked rock and charcoal was found at the base of the canal in Trench 114. The top of the canal was truncated by the plowzone. It cut through Feature 545 from BB:13:6, a roasting pit. Ostracode samples were collected from the northern faces of Trenches 219 and 220. A radiocarbon date from a charred maize cupule indicated the canal dates to 2470±40 b.p. (uncalibrated <sup>14</sup>C years), or about 770-430 B.C. (at the 1-sigma range of probability).

#### Feature 152

Feature 152 (Figure 4.101) was located in Trenches 201, 203, and 267, as well as in a stripped area. It was drawn in Trench 267. The canal ran southwest to northeast and was traced for about 27 m. The canal was 1.5 m wide and 39 cm deep. The base of the canal was filled with a medium brown sandy clay loam. Above this were a layer of dark brown blocky clay and a medium brown sandy clay. The canal originated in Stratum 503, and was cut down into Stratum 504.01. Ostracode samples were collected from the Trench 267 cross section. Based on its stratigraphic context, this canal dates to about 1500 B.C.

## HOHOKAM CANALS

### San Agustín Mission Locus

#### Feature 137

Feature 137 (Figure 4.102) was a large canal found during backhoe scraping and feature excavation at the San Agustín Mission locus. The canal ran southeast to northwest, passing through the southwestern corner of the later mission compound. It was exposed for a distance of over 88.20 m. On average, it was 1.88 m wide and 1.30 m deep. The top of the canal had been truncated by modern ground disturbance.

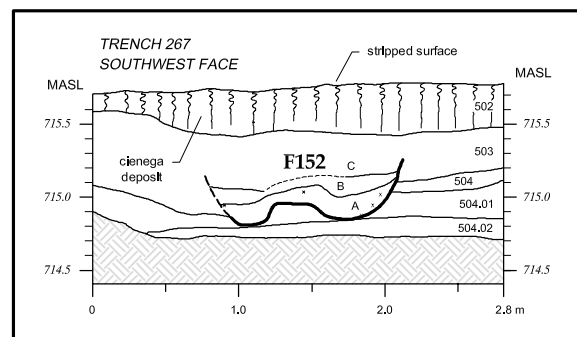
The canal was drawn in an area south of Mission Lane, where it cut through a Cienega phase pit structure, Feature 132. The broadly U-shaped canal was cut through cienega clays into the underlying silts. The sediments below the base of the

canal had manganese staining. The bottom of the interior of the canal was covered by a sandy loam, above which were layers of silty clay. At least one clean-out was visible. The upper portion of the canal had been filled in by a flood.

### Mission Gardens Locus

#### Feature 200

Feature 200 (Figure 4.103) was a massive canal located in Trenches 302, 308, 310, 311, 324, 325, and 356. It was drawn in Trenches 302, 310, and 311. The canal ran southwest to northeast through the western portion of the garden area before turning in a broad arc toward the northwest. It was traced over a distance of 121.8 m. In terms of overall size, this may be the largest Hohokam canal found to date in the Tucson Basin.



**Figure 4.101.** Cross section of canal Feature 152, AZ BB:13:481 (ASM), at the Congress Street and Brickyard loci, the Clearwater site, AZ BB:13:6 (ASM).



**Figure 4.102.** Photograph of canal Feature 137, AZ BB:13:481 (ASM), at the San Agustín Mission locus, the Clearwater site, AZ BB:13:6 (ASM).

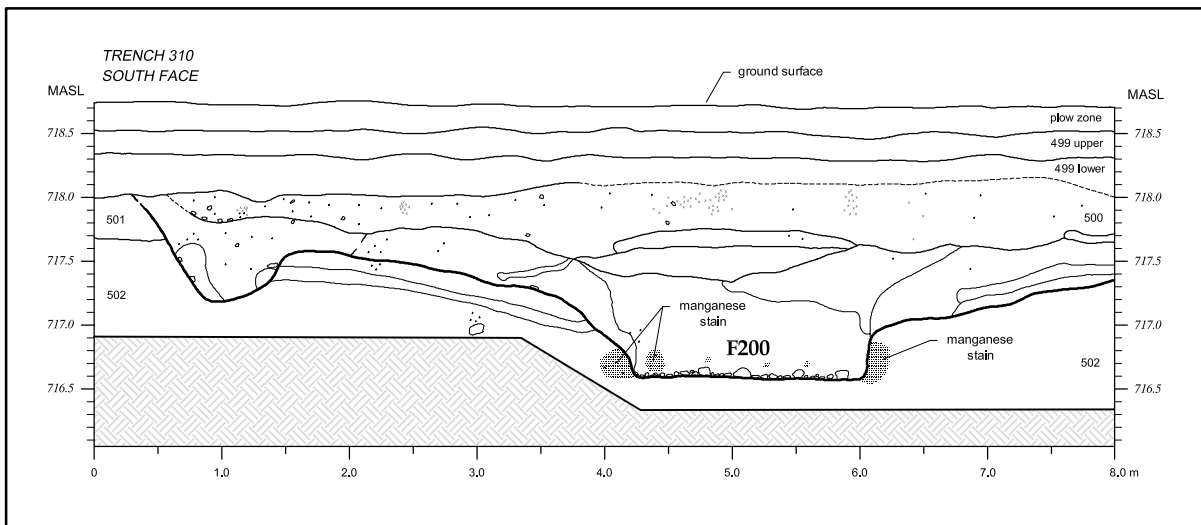
In Trench 302, the canal was 7.58 m wide and 2.20 m deep, originating at 42 cm below the modern ground surface. The canal cut through the dark brown cienega clays that are present within the gardens into an underlying compact light brown sandy-silty clay. The canal was filled with a layer of fine, loosely consolidated sand at its base. Above this was a layer of compact dark brown blocky clay that probably represents fine sediments that were deposited as the canal was in use. Above this was a pale tan sandy clayey silt or sand that filled the canal during a flood. This flood completely filled the canal, and there is no evidence that the Hohokam ever attempted to clean out and re-use the canal. Hohokam sherds were common within the fill. The canal was

sampled for ostracodes in the southern face of Trench 310.

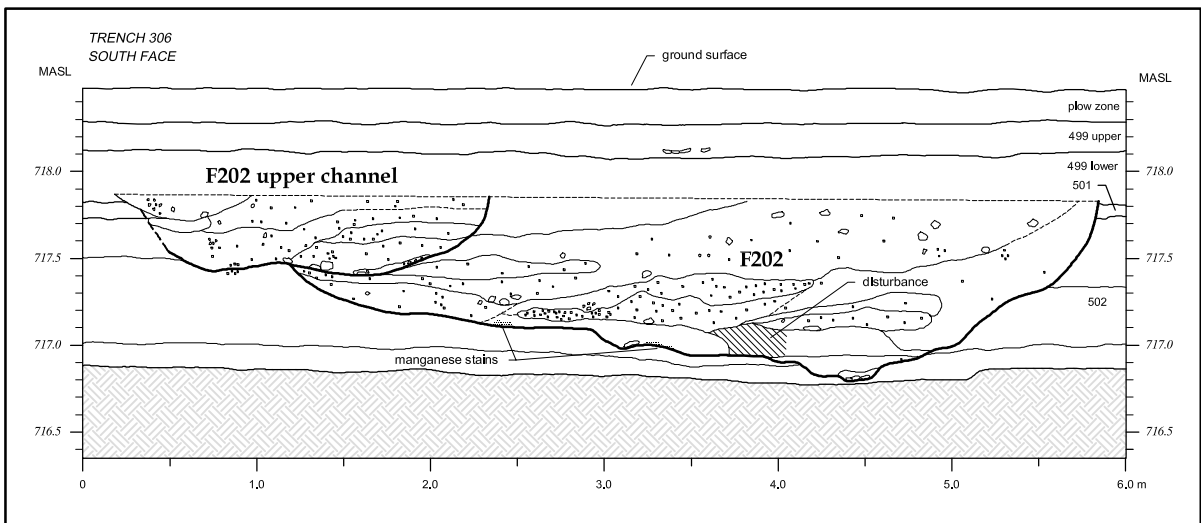
The age of this canal is bracketed between about 1000 and 900 <sup>14</sup>C years b.p. (uncalibrated), which places it in the Early or Middle Rincon phases (circa A.D. 950-1100) of the Hohokam Sedentary period.

*Feature 202*

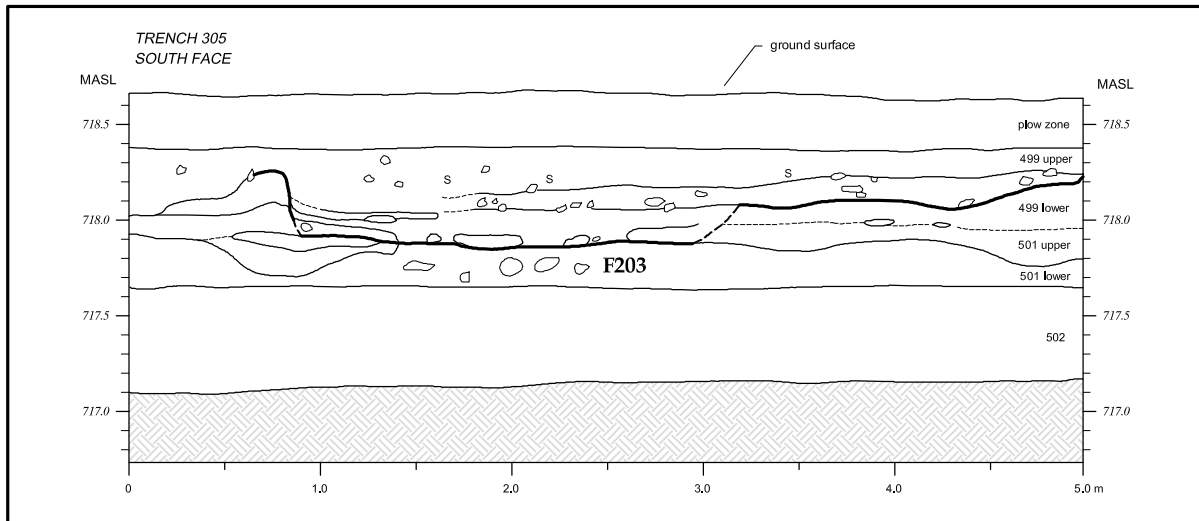
Feature 202 (Figure 4.104) was a large canal located and profiled in Trench 306 south of the corner of Mission Lane and Brickyard Lane. The canal was oriented north-south, perhaps trending toward the northeast, but the limited exposure makes it difficult to determine its exact alignment. The overall canal



**Figure 4.103.** Cross section of canal Feature 200, AZ BB:13:481 (ASM), at the Mission Gardens locus, the Clearwater site, AZ BB:13:6 (ASM).



**Figure 4.104.** Cross section of canal Feature 202, AZ BB:13:481 (ASM), at the Mission Gardens locus, the Clearwater site, AZ BB:13:6 (ASM).



**Figure 4.105.** Cross section of canal Feature 203, AZ BB:13:481 (ASM), at the Mission Gardens locus, the Clearwater site, AZ BB:13:6 (ASM).

cross section was 5.65 m wide; however, the canal shifted west through time, with the actual canal ranging from 80 cm to 194 cm wide at various times. It was 91 cm deep at its deepest point, with the top of the canal found 69 cm below the modern ground surface. Historic plowing may have truncated the upper portions of the canal. The canal was filled with a variety of sediments ranging from dark gray-brown sandy clay at the base to light brown silty clay near the top. The cutting of sediments within the canal suggested it was cleaned out on several occasions.

#### Feature 203

Feature 203 (Figure 4.105) was a probable prehistoric-era canal located and profiled only in Trench 305, a few meters west of canal Feature 210. It appeared to run south-north. The top of the canal was truncated by the plowzone. Below this, the canal was 3.8 m wide and 52 cm deep, with its top found 30 cm below the modern ground surface. The base of the canal was lined with intermittent lenses of clay and laminated bands of sand, silty sands, and clay. A berm may have been present along the eastern side of the canal, with some clean-out deposits east of the berm. Several sherds and pieces of fire-cracked rocks were present within the fill.

#### Feature 210

Feature 210 was located within Trenches 300, 305, 312, 317, 329, 330, 331, 332, and 333. It may also have been found in Trench 303. It was drawn in Trenches 324, 325, 331, 332, and 333. The canal ran southeast to northwest before gradually turning north. It was

traced for a total length of 124.7 m. On average, the feature was 1.7 m wide at the top, narrowing to 50 cm wide at the base. It was 90-95 cm deep. The canal had a U-shaped profile and cut a layer of cienega clay. It was filled with a layer of sand at its base. Above this was light brown compact clayey silt that, in turn, lay below a large deposit of medium brown compact sandy clay. The upper portions of the canal had been disturbed by plowing.

#### Feature 212

Feature 212 was found in Trenches 308, 310, 324, and 325. This Hohokam canal ran south to north, trending slightly to the northeast. It was traced for 55.1 m. The canal was not recorded in the field, but was identified in drawings of trench walls.

### Congress Street/Brickyard Loci

#### Feature 142

Feature 142 (Figure 4.106) was a canal found in Trench 206 and during backhoe scraping. It ran southeast to northwest, and was traced for approximately 20 m, extending west beyond the project area and south into a disturbed area. An excavation unit, 1.30 m long by 1.29 m wide, was placed over the feature. It was filled with blocky clay, with a thin sand lens above the canal base. In profile, the canal was basin shaped with shallow, sloping sides. On average, it was 1.2 m wide and 40 cm deep. Screening of dirt from the unit resulted in the recovery of one small sherd, some flaked stone, a piece of ground stone, and 56 pieces of fire-cracked rock. The canal originated



in Stratum 502. Ostracode samples were collected from a south-facing cross section at the edge of Strip-ping Block 2.

*Feature 143*

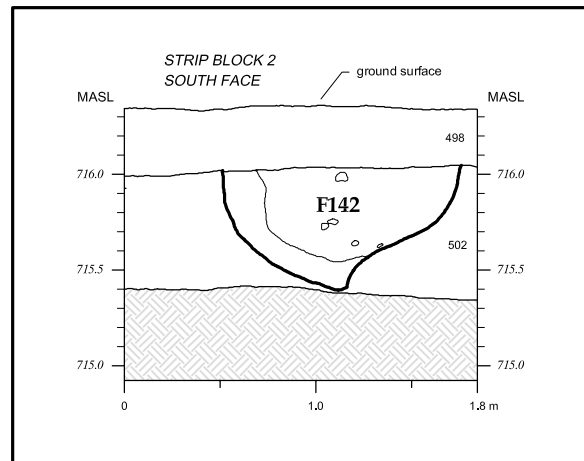
Feature 143 (Figure 4.107) was a canal located in Trench 201, in an unnumbered trench south of Trench 201, and during backhoe scraping. It was drawn in the unnumbered trench segment. Only a 10-m-long segment was documented, running southwest to northeast. The feature was originally thought to be a pit structure. The basin-shaped canal averaged 1.64 m wide and at least 46 cm deep. The base of the canal was reddish-brown lightly compacted sand. Above this was a layer of compact grayish-brown sandy clay loam which was, in turn, covered by compact brown sandy clay. Manganese staining was present below the base of the canal.

An excavation unit measuring 2 m long by 2 m wide was placed over the feature. It was identified as a canal based on the presence of distinctive sedi-ments that consisted of blocky clay similar to Stra-tum 502. The canal cut into the underlying orange brown sand, Stratum 504. Charcoal flecks and cal-cium carbonate stringers and nodules were present. Excavation of the unit resulted in the recovery of only a few artifacts – one piece of flaked stone, one sherd, and six pieces of fire-cracked rock. Ostracode samples were collected from the southern cross section in the unnumbered trench.

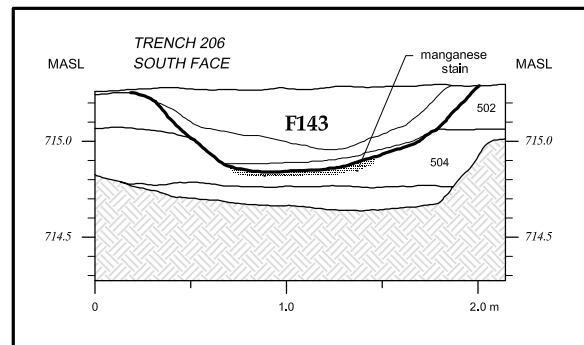
*Feature 144*

Feature 144 (Figure 4.108) was found in Trenches 208, 210, 212, 234, 246, 269, and 270. It was drawn in Trenches 212 and 270. The canal ran southeast to northwest, and was traced for about 110 m. On av-erage, the canal was 1.24 m wide in Trench 270, and was 80 cm deep. The base of the canal was filled with light brown clay and compact grayish-yellow silt. Above this were blocky gray clayey silt and very hard, compacted, grayish-yellow-brown silt. In some areas, the sediments had a green hue, perhaps indi-cating a high organic content or gley (low oxygen) conditions.

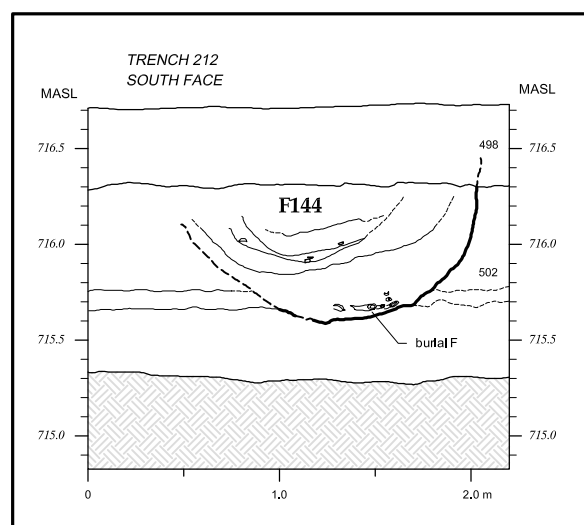
Feature 144 was also studied through an excava-tion unit measuring 1.14 m by 90 cm that was placed in the feature after human bone was discovered. Ex-cavation of a 5-cm level resulted in the recovery of flaked stone, 70 pieces of fire-cracked rock, a pos-sible figurine fragment, 20 sherds, a hammerstone, and additional human bone. A human burial may have eroded into the canal. The fill of the feature was a blocky tan compact clay. Ostracode samples were collected from the northern cross section of Trench 212.



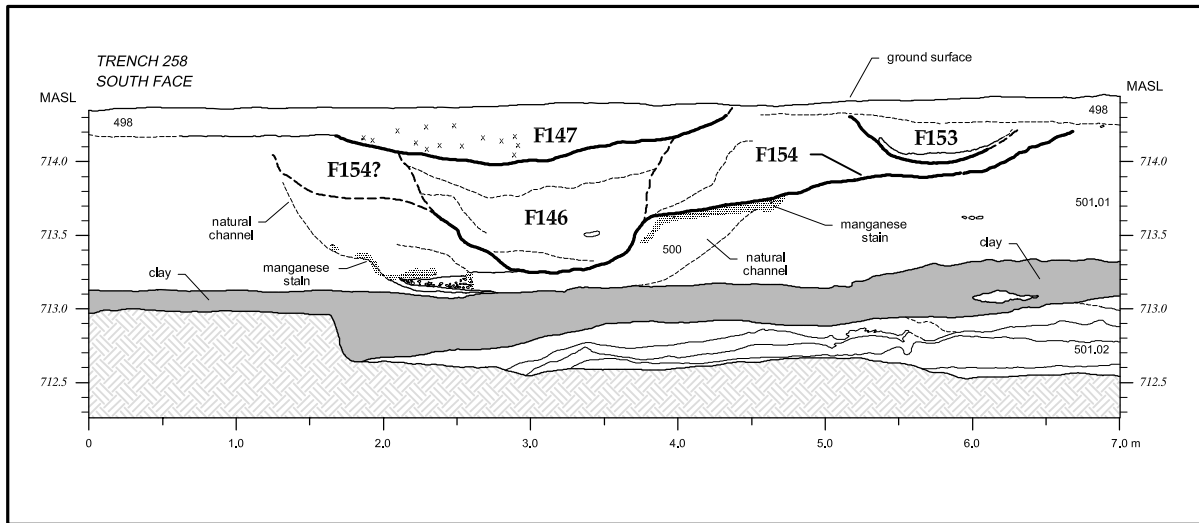
**Figure 4.106.** Cross section of canal Feature 142, AZ BB:13:481 (ASM), at the Congress Street and Brickyard loci, the Clearwater site, AZ BB:13:6 (ASM).



**Figure 4.107.** Cross section of canal Feature 143, AZ BB:13:481 (ASM), at the Congress Street and Brickyard loci, the Clearwater site, AZ BB:13:6 (ASM).



**Figure 4.108.** Cross section of canal Feature 144, AZ BB:13:481 (ASM), at the Congress Street and Brickyard loci, the Clearwater site, AZ BB:13:6 (ASM).



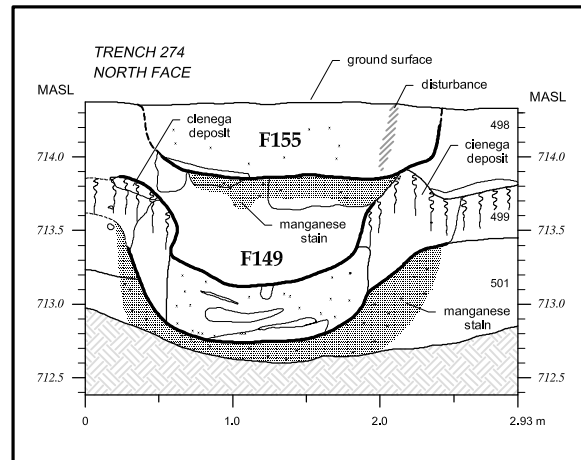
**Figure 4.109.** Cross section of canal Feature 146, AZ BB:13:481 (ASM), at the Congress Street and Brickyard loci, the Clearwater site, AZ BB:13:6 (ASM).

#### Feature 146

Canal Feature 146 (Figure 4.109) was located in Trenches 248, 253, 255, 258, 260, and 274. The canal was drawn in Trenches 253, 255, and 258. It ran southwest to northeast and was traced for roughly 90 m. On average, the canal was between 1.16 m and 3.16 m wide, and was 66 cm deep. It was filled with dark brown compact silty sand at its base, with tan compact clayey silt above. Manganese staining was visible at the base of the feature. Feature 146 was cut into by another canal, Feature 147. It intruded into the eastern side of canal Feature 154 in Trenches 258 and 271. Ostracode samples were collected from the southern cross section of Trench 253 and from Trench 258. This canal contained pottery sherds of the Late Rincon and Tanque Verde phases (circa A.D. 1100-1300).

#### Feature 149

Feature 149 (Figure 4.110) was found in Trenches 253, 258, 260, and 274. The canal was drawn in Trenches 253, 258, 260, and 274. It was traced for approximately 90 m. The broad, basin-shaped canal averaged 2.5 m wide at the top, narrowing to 1.1 m at the base. It was about 1.0 m deep. The canal had been dug through the dark brown, blocky cienega clay into the underlying light tan-brown sandy silt. The base of the canal was filled with water-deposited sands, above which were blocky, dark brown clay with coarse sands mixed in. A re-excavation of the canal was visible, with the clays dug out to make a U-shaped canal that was 1.6 m wide and 64 cm deep. Some overbank deposits were visible in the profile of Trench 274. This latter canal was filled with

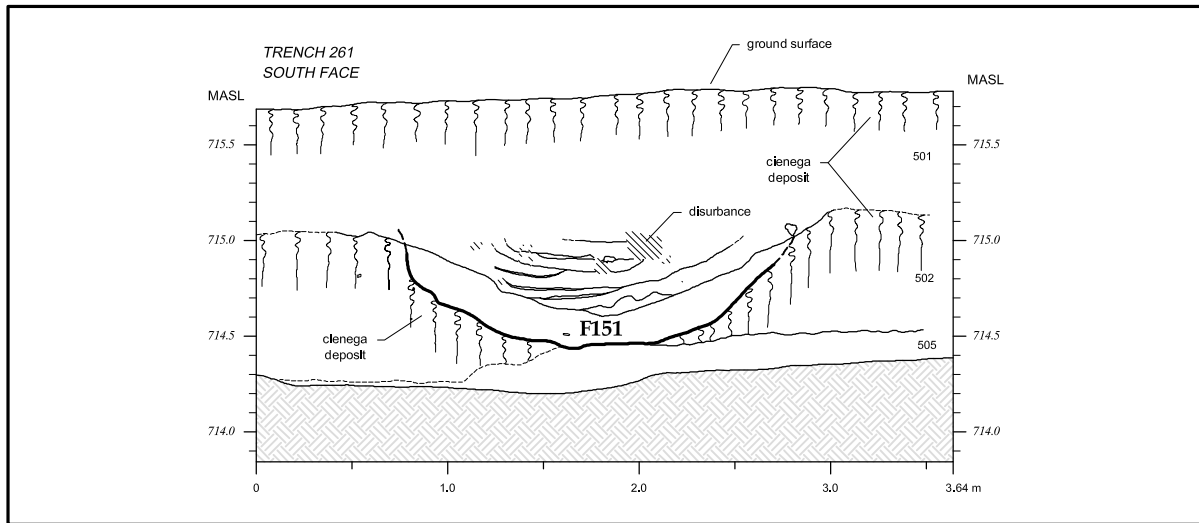


**Figure 4.110.** Cross section of canal Feature 149, AZ BB:13:481 (ASM), at the Congress Street and Brickyard loci, the Clearwater site, AZ BB:13:6 (ASM).

a thick band of tan-yellowish sands deposited during a flood. Above this was a layer of brown cienega clays that developed after the canal was filled in by the sandy flood deposit. This canal contained sherds of the Tanque Verde phase (circa A.D. 1150-1300).

#### Feature 151

Canal Feature 151 (Figure 4.111) was located in Trenches 246, 249, 256, 257, 261, 262, 263, 264, and 265. It was drawn in Trenches 257, 261, 265, and 354. It ran in a broad arc from southeast to northwest and then northeast over a distance of 300 m, having been located in previous trenching in 1995. On average, the canal was 2.2 m wide at the top,



**Figure 4.111.** Cross section of canal Feature 151, AZ BB:13:481 (ASM), at the Congress Street and Brickyard loci, the Clearwater site, AZ BB:13:6 (ASM).

narrowing to 86 cm at the base. The canal averaged 84 cm deep, originating at roughly 78 cm below the modern ground surface. The feature was filled with layers of brown clay, sand, tan silty clay, and bands of sand and clay. Some evidence for cleaning out and re-use of the canal is suggested by the basin-shaped fill layers. Manganese staining was present below the base of the canal. Ostracode samples were collected from the southern faces of Trenches 265 and 354.

#### *Feature 154*

Feature 154 (see Figure 4.109) was located in Trenches 255, 258, 271, 272, and 273. It was drawn in Trenches 255, 258, 271, 272, and 273. The feature ran north-south and was traced for about 85 m. This canal was between 1.0 m and 1.2 m wide, and ranged in depth from 16 cm to 91 cm in Trenches 272 and 271, respectively. The shallow depth in Trench 271 is a result of the top of the feature being cut into by canal Feature 146. In Trench 258, the canal was cut by canal Features 146 and 153. In Trench 273, the canal was also disturbed by a large pit.

The lower fill of the canal was dark brown, compact silty clay. The canal was re-dug, shifted to the east, and made 20 cm deeper. This re-dug portion was filled at the base by a tan compact clayey silt. Above this was dark brown compact blocky clay that was capped by a light brown compact clayey silt. In Trench 255, a flood event filled much of the canal in that area. Ostracode samples were collected from the Trench 255 cross section. This canal contained pottery sherds of the Late Rincon and Tanque Verde phases (circa A.D. 1100-1300).

## PROTOHISTORIC PERIOD CANALS

### Mission Gardens Locus

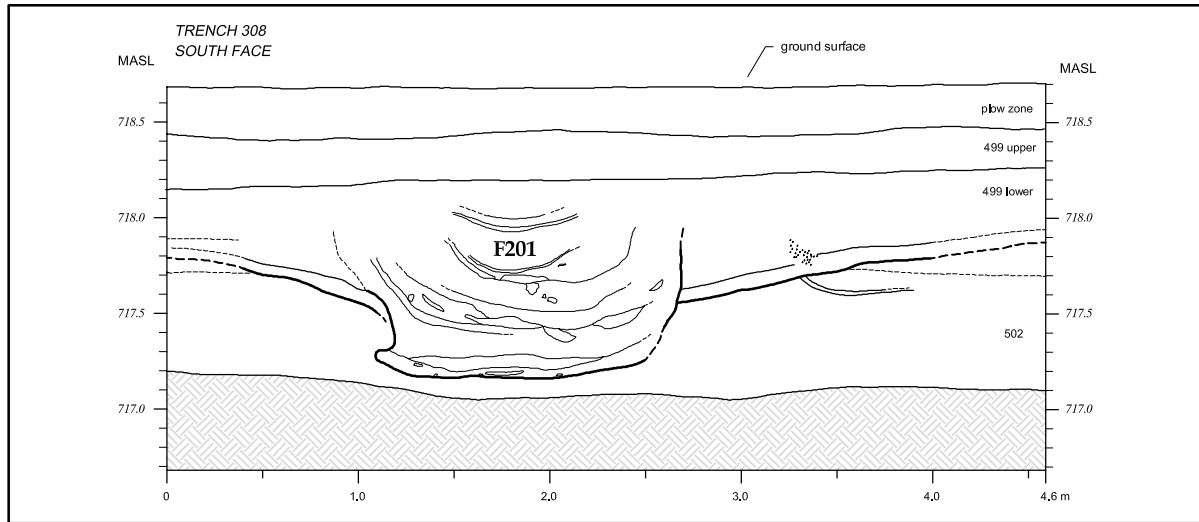
#### *Feature 201*

Feature 201 (Figure 4.112) was a canal found in Trenches 302, 308, 310, 311, and 324. Cross sections of the canal were drawn in Trenches 302, 308, 310, and 311. The canal ran in a south-to-north direction. It was traced for 116 m. The canal ranged from 1.35-4.80 m wide at the top, narrowing to between 60 cm and 1.3 m at the base. It was between 84 cm and 1.22 m deep, with the top of the canal 39 cm below the modern ground surface. Examination of the cross section of the canal suggested it was re-dug several times. Most of the fill was a light brown-brown clayey silt. Bands of fine sands and silts were present within the feature. The base of the canal contained a light gray-brown sandy clayey silt with some coarse sands and numerous small shells. Just above the base was a lens of bedded medium sands. Through time, as the canal was filled and re-dug, it became progressively more narrow and shallow.

Many sherds, flaked stone, and pieces of fire-cracked rocks were present in the fill. Excavation was conducted within the base of the canal in backhoe Trench 302. Sherds, flaked stone, and shell were collected, as was a flotation sample. The canal was sampled for ostracodes in the southern walls of Trenches 308 and 310.

#### *Feature 204*

Feature 204 (Figure 4.113) was located within Trenches 300, 302, 305, 312, 317, 332, 333, and 352. It

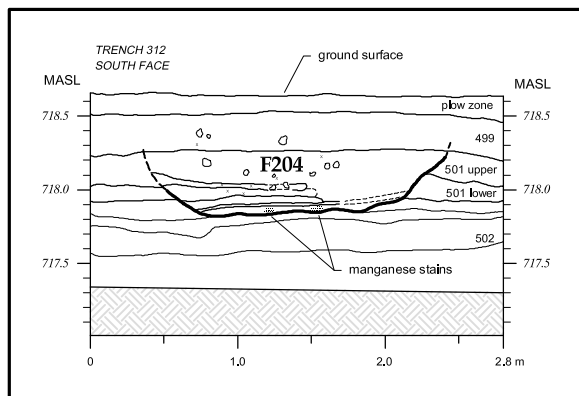


**Figure 4.112.** Cross section of canal Feature 201, AZ BB:13:481 (ASM), at the Mission Gardens locus, the Clearwater site, AZ BB:13:6 (ASM).

was drawn in Trenches 302, 305, and 312. The canal ran south to north, gradually turning northwest through the portion documented within the Mission Gardens. It was traced for 103.6 m. The canal averaged 2 m wide and 50 cm deep, with the top of the feature found at 30 cm below the modern ground surface, probably truncated by historic plowing. The fill of the U-shaped canal consisted of laminated lenses of brown silty sands and clays. A small amount of manganese staining was present along the base, just above a clay band. Several pieces of fire-cracked rock were noted in the cross sections.

*Feature 205*

Feature 205 (Figure 4.114) was a canal found in Trenches 307, 316, and 334; it was drawn in Trench 307. This canal ran southwest to northeast, and it was

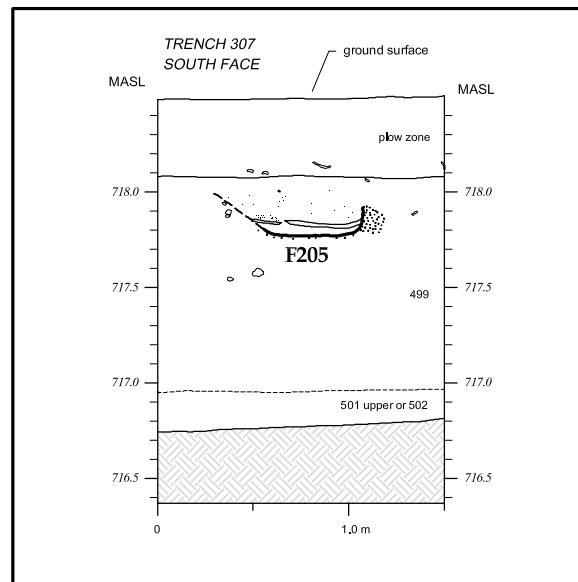


**Figure 4.113.** Cross section of canal Feature 204, AZ BB:13:481 (ASM), at the Mission Gardens locus, the Clearwater site, AZ BB:13:6 (ASM).

traced for 20.3 m. On average, it was about 90 cm wide and 31 cm deep, with the top of the canal found at 41 cm below the modern ground surface. The fill of the canal was a blocky clay with a layer of fine sands above. In one area, a concentration of small freshwater mollusks was visible in the cross section.

*Feature 207*

Feature 207 (Figure 4.115) was a canal found in Trenches 300, 301, 302, 304, 305, and 350. It was drawn in Trenches 300, 301, 325, and 304. The canal



**Figure 4.114.** Cross section of canal Feature 205, AZ BB:13:481 (ASM), at the Mission Gardens locus, the Clearwater site, AZ BB:13:6 (ASM).

ran south to north and was located immediately west of the eastern Mission Gardens wall. This suggested the canal existed when the wall was built, perhaps in the 1790s. However, the structure located on the interior of the eastern wall, Feature 3083, was positioned above the canal, indicating the canal was no longer in use when the dwelling was built. The exact date of construction for this building is unknown, although it appears on the 1862 Fergusson Field map, and excavation within the floor area of the building located English transfer-print ceramics that may date to the 1840s. The canal had cut into Feature 3106, a large unexcavated bell-shaped pit.

The canal was traced for 110.2 m, and ranged between 1.34 m and 2.40 m wide and 13 cm to 53 cm deep, originating at 32 cm below the modern ground surface. It had been truncated by historic-era plowing. The base of the canal was filled with a gray-brown, silty sand that, in turn, was overlain by a light grayish-brown, sandy silt with some sands and a fair amount of charcoal staining and small mollusk shells. Many fire-cracked rocks, sherds, and small shells were visible in the fill. The canal cut through the cienega clays present within the site. Ostracode samples were removed from the southern cross section in Trench 300.

## HISTORIC ERA CANALS

### San Agustín Mission Locus

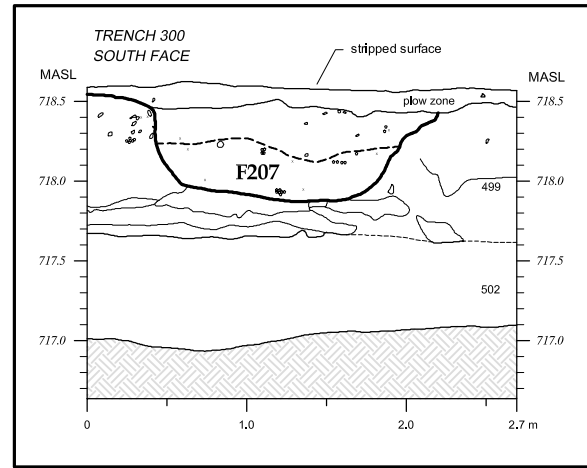
#### *Feature 3, Millrace or Spillway*

Feature 3 (Figure 4.116) was the millrace, or spillway, for Solomon Warner's grist mill, which began operating in 1875. It ran down the southern side of Mission Lane, and the excavated portion was lined with stones. Most of the interior of the millrace had been previously excavated by Jack Williams in 1986; unfortunately, Williams has not published a description of what he found. The surviving portion is at least 6.35 m long and 60 cm wide, with rock and mortar walls at least 22 cm high. The interior was filled with layers of brown to gray-brown, silty sandy clay. An ostracode sample was taken from one cross section of the feature.

#### *Feature 9*

Feature 9 was a historic-era *acequia* (canal) that ran along the northern side of Mission Lane. The *acequia* is visible on a photograph thought to have been taken in the mid-1870s. The photograph reveals that the canal was spanned by a plank footbridge in the area north of the Leopoldo Carrillo house. The

canal was probably dug sometime in the 1860s, because it cuts Feature 61, a pit with European ceramics that date to the 1850s to 1860s.



**Figure 4.115.** Cross section of canal Feature 207, AZ BB:13:481 (ASM), at the Mission Gardens locus, the Clearwater site, AZ BB:13:6 (ASM).



**Figure 4.116.** Feature 3, Solomon Warner's millrace; the northern wall of the millrace has been severely damaged by modern roadwork, San Agustín Mission locus, the Clearwater site, AZ BB:13:6 (ASM).

Four excavation units were placed in the *acequia* to allow recovery of artifacts and samples. The canal was traced for 59.4 m, extending into unexplored areas to the west and east. It averaged 2 m wide and 47 cm deep. The construction of Mission Lane over the feature likely resulted in the removal of the upper portions of the feature. The sediment filling the *acequia* was a light brown loam that was moderately compact. It included a number of large rocks that probably came from the foundation of the southern mission compound wall that would have been located immediately to the north. The canal was basin shaped, and the internal stratigraphy suggested it was cleaned out at least once while in use.

### Mission Gardens Locus

#### Feature 206

Feature 206 (Figure 4.117) was found in Trenches 302, 309, 311, and 328. It was drawn in Trench 302, where it was cut at an oblique angle, and in Trenches 309 and 328. The canal arcs from west to north through the northwest corner of the Mission Gardens. It was traced for 55.1 m. The canal was 1.36 m wide in Trench 309 and averaged 33 cm deep, with the top of the canal found at 44 cm below the ground surface. The top of the canal had been cut by the historic plowzone. The canal had a fairly flat base with gradually sloping sides. It was filled with a compact light brown fine sandy silt with charcoal flecks, fire-cracked rocks, sherds, and snail shells. Ostracode samples were collected from the western wall of Trench 309.

#### Feature 208

Feature 208 (Figure 4.118) was located in Trenches 315 and 319; it was drawn in both trenches. This canal ran along the exterior of the southern Mission Gardens wall. It was traced for 92.8 m. In Trench 315, the canal was 1.3 m wide and 58 cm deep, originating at the base of the historic plowzone, 30 cm below the modern ground surface. The U-shaped canal was filled with water-lain, brown clay and dark brown, sandy silty clay at its base. Immediately above this was a dark brown, sandy silty clay that included pieces of rusted metal. Berms were visible on each side of the canal. The canal had been cut into the medium brown, clayey silt band that overlies the compact cienega clays at the gardens.

#### Feature 209

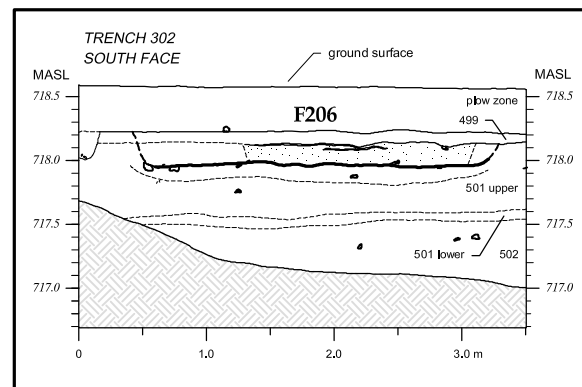
Feature 209 was a canal found in Trenches 301, 302, 305, 316, and 320. It was drawn in Trenches 301, 305, and 320. The south-to-north running canal was located

east of the eastern wall of the Mission Gardens. It was traced for 118.9 m. Two separate uses of the canal were evident, with the canal moving east through time in Trench 320, and east to west in Trench 305.

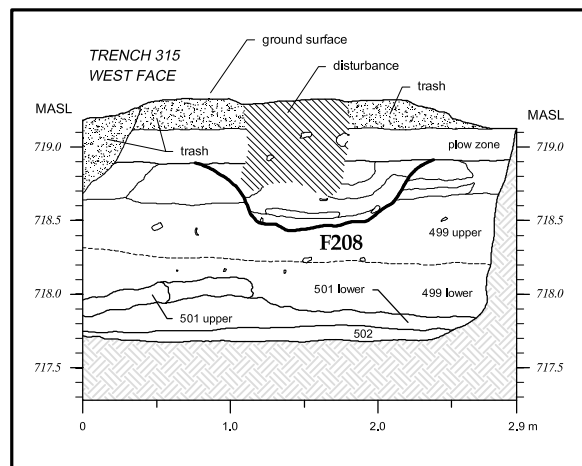
The first phase was a canal that was at least 1.5 m wide and 26 cm deep excavated into the underlying, tan-brown, silty loam. This original canal was filled with a grayish-brown, clayey silty sand with bits of charcoal and occasional small gastropod shells. During the second phase of the canal, it averaged about 1.8 m wide and 60 cm deep. The base of the feature was filled with water-lain sands with many sherds, pieces of flaked stone, and fire-cracked rock. Above this was a thick layer of dark brown, sandy clayey silt that also contained numerous artifacts.

#### Feature 211

Feature 211 was located in Trenches 324, 325, and 327; it was drawn in Trenches 325 and 327. The canal



**Figure 4.117.** Cross section of canal Feature 206, AZ BB:13:481 (ASM), at the Mission Gardens locus, the Clear-water site, AZ BB:13:6 (ASM).



**Figure 4.118.** Cross section of canal Feature 208, AZ BB:13:481 (ASM), at the Mission Gardens locus, the Clear-water site, AZ BB:13:6 (ASM).

ran along the western side of the Mission Gardens, approximately 9 m or so inside the western wall. It was traced for 46.4 m. The canal ranged from 1.55 m to 1.80 m wide and 1.05 m to 1.20 m deep. It was filled with light gray clay at its base, trending toward gray silts above. Some historic-era trash was present in the upper fill, with the upper portions of the canal truncated by the modern plowzone. A possible re-use of the canal was noted in Trench 327, where a separate channel was present along the western side of the main channel.

**Congress Street/Brickyard Loci**

*Feature 138*

Feature 138 (Figure 4.119) was discovered in Trenches 102, 200, 202, 204, 208, 209, 211, 227, 228, 239, 243, 250, 281, and 282. It was drawn in Trenches 102, 200, 202, 204, 209, 227, 228, 239, 243, 250, 281, and 282. The canal ran north-south for 210 m turning directly east, and then turning back north for another 30 m, until finally turning northeast. This canal appears on the 1862 field map (see Figure 1.2) and was the Acequia Madre Primera, one of the primary irrigation canals during the American Territorial period.

The basin-shaped canal ranged in width from 80 cm to 1.58 m. On average, it was 50 cm deep, originating at ground surface to 40 cm below the ground surface. It had been truncated by the historic-era plowzone, and had been disturbed by the brickyard operations in some areas. The base of the canal was filled with a light reddish-brown clayey sand, above which were layers of compact grayish-brown clayey silt, reddish-brown clay, and very compact blocky light reddish-brown silt. The canal cut into the underlying cienega clay, Stratum 502.

An excavation unit was placed within the canal. The fill was primarily a blocky, gray-brown, sandy clay that was uniform until just above the base of the canal, where a thin layer of sand or silty sand was present. Small bands of clays and sands were present in other profiles, and the canal was cleaned out and re-used on at least one occasion. Artifacts found in the canal included fired bricks, glass, flaked stone, historic ceramics, Native American sherds, paper, shell buttons, and leather. Ostracode samples were collected from the southern wall of Trench 202 and the southern wall of Trench 204.

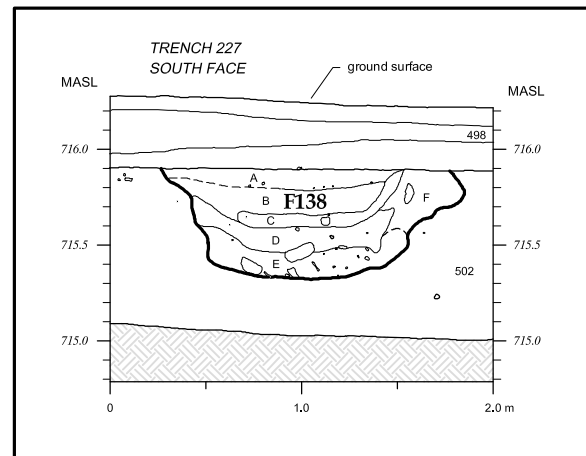
*Feature 145*

Feature 145 (Figure 4.120) was documented only in Trench 240. The canal was 96 cm wide and 60 cm deep. The lower portion was U-shaped, expanding outward slightly along the top 26 cm. The lower fill

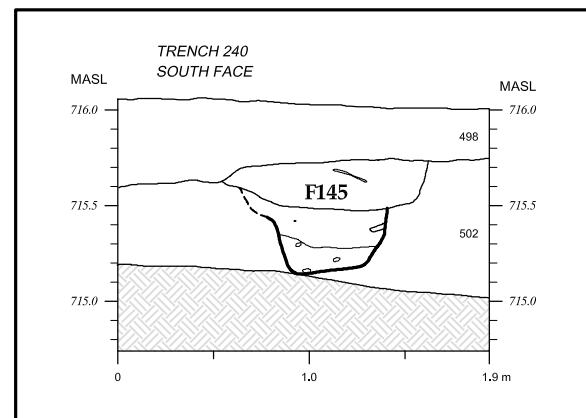
was a light brown compact sandy clay. Above this was a light brown, very compact, silty clay and a medium brown, moderately compact, clay loam. A piece of metal was in the upper fill. Historic plowing may have removed the upper portion of the feature, with the disturbed zone extending 28 cm from the modern ground surface. The exact orientation of the canal could not be determined, but it appeared to be from southeast to northwest.

*Feature 147*

Feature 147 (see Figure 4.109) was found in Trenches 248, 253, 255, 258, 271, 272, and 273, and was drawn in Trenches 253, 255, 258, 271, and 272. The canal ran southeast to northwest before turning due north. It was traced for 75 m. On average, the canal was 2.4 m wide and was about 30 cm deep, originating at 43 cm below modern ground surface.



**Figure 4.119.** Cross section of canal Feature 138, AZ BB:13:481 (ASM), at the Congress Street and Brickyard loci, the Clearwater site, AZ BB:13:6 (ASM).



**Figure 4.120.** Cross section of canal Feature 145, AZ BB:13:481 (ASM), at the Congress Street and Brickyard loci, the Clearwater site, AZ BB:13:6 (ASM).

It was filled with a red-brown, silty sand that was moderately compact. Inclusions were small amounts of coarse sand, caliche flecks, and bits of charcoal. One sherd lay on the base of the canal in the profile of Trench 255. The top of this canal was truncated by the plowzone. It cut into the top of Feature 146, a prehistoric canal. Ostracode samples were collected from the southern wall of Trench 253.

#### Feature 148

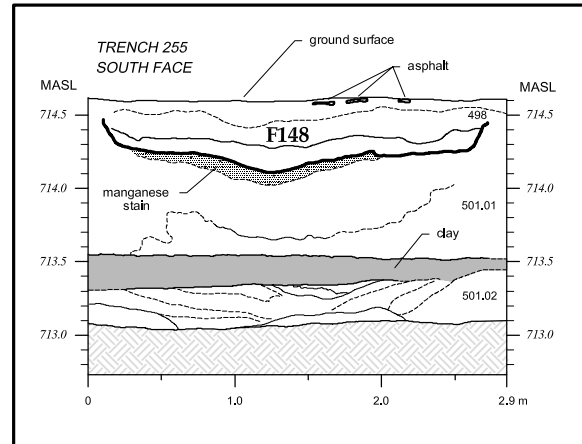
Feature 148 (Figure 4.121) was located in Trenches 248, 253, 255, 258, 271, 272, 273, and 286. It was drawn in Trench 253, 255, 258, 273, and 286. This canal was possibly documented during the trenching in 1995, and as a result, may have been traced for roughly 275 m. It ran on a fairly south-to-north alignment, bowing slightly west in one segment. On average, the canal was 6 m wide in Trench 253 and 25 cm deep, although it was truncated by the modern plowzone. In Trench 286, Feature 148 was 2.1 m wide and 98 cm deep. The canal was more than 52 cm below the modern ground surface. The base of the canal had small lenses of orange gravel and sand, above which were layers of silty clays. Ostracode samples were collected from the southern wall of Trench 253. This canal probably appears on the 1862 field map.

#### Feature 150

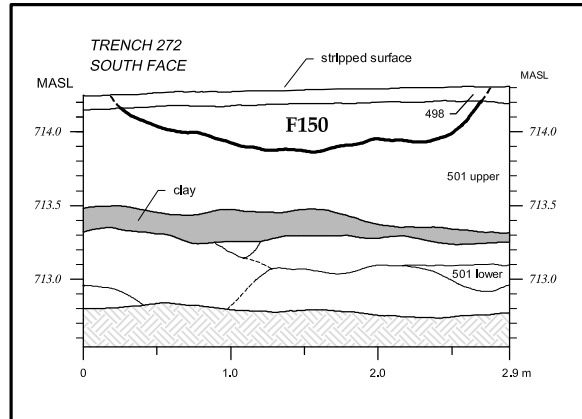
Feature 150 (Figure 4.122) was found in Trenches 248, 253, 255, 258, 271, and 272; it was drawn in Trenches 253, 255, 258, 271, and 272. The basin-shaped canal ran south to north and was traced for 75 m. The canal was between 2.46 m and 2.55 m wide and between 41 cm and 55 cm deep, originating at about 40 cm below the modern ground surface. The upper fill of the canal was a compact, brown, silty sandy clay with the lower fill being a brown, clayey silty sand that was moderately compact. Small charcoal flecks were dispersed throughout the fill. The upper portion of the canal was truncated by plowing. Ostracode samples were collected from the southern wall of Trench 253.

#### Feature 153

Feature 153 (see Figure 4.109) was found in Trenches 258 and 271, and it was drawn in Trench 258. This canal was traced for only a short distance and ran north-south. On average, it was 1.1 m wide and about 25 cm deep. The top of the canal had been cut by the plowzone and was found at about 20 cm below the modern ground surface. The canal had dark brown, blocky clay at the base, above which



**Figure 4.121.** Cross section of canal Feature 148, AZ BB:13:481 (ASM), at the Congress Street and Brickyard loci, the Clearwater site, AZ BB:13:6 (ASM).



**Figure 4.122.** Cross section of canal Feature 150, AZ BB:13:481 (ASM), at the Congress Street and Brickyard loci, the Clearwater site, AZ BB:13:6 (ASM).

was a thick layer of dark, grayish-brown, silty clay. The canal cut into Feature 154, another canal. Ostracode samples were collected from the Trench 258 cross section.

#### Feature 155

Feature 155 (see Figure 4.110) was a canal located in Trench 274, where it was drawn. The broad basin-shaped feature was 2.04 m wide and 50 cm deep. It was filled with a very compact, brown, sandy clay. Charcoal flecks were present in the fill. The base of the canal had manganese staining. The top of the feature was located at the modern ground surface, suggesting it may be one of the more recent historic-era canals. Feature 155 intruded a prehistoric canal, Feature 149.



## **SUMMARY**

The first eyewitness accounts of Tucson, written by Father Eusebio Kino and his compatriots during the 1690s, as well as the map drafted in 1862, all indicate the importance of irrigated agriculture for the people who lived along the Santa Cruz River. The archaeological investigations of the Rio Nuevo project documented some of these Protohistoric period and Historic era canals, including the Acequia Madre Primera, the major canal used by Mexican farmers dur-

ing the mid-nineteenth century. Also found were numerous large Hohokam canals. The entire surface flow of the Santa Cruz River was essentially being diverted through these canals to irrigate crops of maize, beans, squash, tobacco, and cotton. The Rio Nuevo Archaeology project has shown that irrigation has a long history in the Tucson Basin, extending back to at least 1500 B.C. The discovery of Early Agricultural period canals at the Mission and Congress Street loci provide additional evidence for water management by these early farmers.



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