SAN BENITO IRRIGATION SYSTEM
(Cameron County Irrigation District #2)
San Benito vicinity
Cameron County
Texas

HAER No TX-132

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

FIELD RECORDS

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
U.S. Department of the Interior
1849 C Street NW
Washington, D.C. 20240-001

HISTORIC AMERICAN ENGINEERING RECORD

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(Cameron County Irrigation District #2)

HAER No. TX-132

Location: The San Benito Irrigation System covers approximately 100,000 acres of land in central Cameron County, Texas, in the Lower Rio Grande Valley. The district is bounded on the southern end by the Rio Grande and on the northern end by the Arroyo Colorado. It is roughly 10 miles wide and 24 miles long. Within the district are the cities of San Benito (where the irrigation district's offices are headquartered), Rio Hondo, and Los Indios. There are over 228 miles of canals throughout the system. The pumping plant—the primary structure of the system—is located in the southwest corner of the district, immediately southwest of the town of Los Indios. It is approximately 0.5 mile south of Military Highway on Weber Drive and is connected by a half-mile-long inlet to the Rio Grande. The pumping plant is located at latitude 26.04448, longitude -97.75563. This coordinate was taken near the headworks on November 17, 2011, using a Global Positioning System (GPS) mapping grade accurate to +/- 3 meter after differential correction. The coordinate's datum is North American Datum of 1983. The location of the resource has no restriction on its release to the public.

Present Owner/ Occupant: Cameron County Irrigation District #2

Present Use: The San Benito Irrigation System remains in use as an irrigation system providing water to more than 50,000 acres of agricultural lands. It also supplies water to two cities and two private water corporations for municipal water use, and to a regional power plant for industrial use.

Significance: The San Benito Irrigation System was one of the early commercial irrigation systems constructed in the lower Rio Grande Valley and contributed to the development of the Valley and its status as leading agricultural center. It was the only irrigation system in the region designed to be primarily gravity-fed, to utilize dry river beds (known as *resacas*) as main canals, and to use locks for barge travel. Developed by the San Benito Land and Water Company in 1906–1912, the irrigation system was part of a greater speculative real estate venture focused on the establishment of the town of San Benito and a regional railway, which in turn spurred rapid settlement of the Valley in the early twentieth century. Though modernized in part, the system retains many historic features, including the extensive canal system and pumping plant.

Historians: Caroline Wright, Melissa Wiedenfeld, and Kathryn Plimpton of HDR Environmental, Operations and Construction, Inc. (HDR EOC), December 2011

Project Information: This research and documentation project was conducted by HDR EOC under subcontract to Louis Berger and Associates, prime contractor to the U.S. Army Corps of Engineers, Galveston District. The project was sponsored and funded by the U.S. Department of Homeland Security, Customs and Border Protection. Caroline Wright was the Principal Investigator; historical research was completed by Melissa Wiedenfeld and Kathryn Plimpton. Large-format photography was completed by Timothy McGrath, principal of Image West, Colorado, as subcontractor to HDR on November 16–18, 2011. Fieldwork to document the pumping plant and irrigation system was conducted during several field sessions in September and November 2011.

Part I. Historical Information

A. Physical History:

1. Dates of construction: 1906–1912

2. Engineer: Samuel Arthur Robertson (1867–1938)

3. Builder: Samuel Arthur Robertson

4. Original plans and construction:
Original designs for the San Benito Irrigation System called for a simplified version of the elements of most other systems built in the same region and time period but with several characteristics that took into account the unique characteristics of the site and its geography.[1] It included the same basic features—headworks and pumping plant, main and lateral canals, and various gates—though

[1] If there was a single, complete set of plans for the headworks, pumping plan, or canals, its existence today is unknown. Information related to the planning of the original system is compiled from multiple sources, all referenced elsewhere in this document, including: promotional brochures which describe the features of the headgates and the overall system and include simple line maps of the canals; historic photographs produced by the San Benito Land and Water Company for promotional purposes (notably, the advertising brochure entitled, *A Statement of Facts Concerning the Farming Lands and Gravity Irrigation Canal of the San Benito Land and Water Company…* published in 1910); contemporary newspaper articles that describe the design of the system and some of its elements, ongoing construction work, and mechanical equipment; and various secondary sources that reference similar contemporary materials. While these resource materials give few specifics regarding many elements of the system, the conditions of the present-day system in comparison to these descriptions and other references indicate that no major deviations from the plans presented in these documents were made.

it was uniquely designed to take advantage of the slope of the land on which it was built. Unlike most of the Valley, in the San Benito area the river is at a higher elevation than the land. Less engineering is required than needed by other irrigation systems to remove water from the river and pump it uphill. The San Benito system was designed to intake 90 percent of its water through gravity alone and 10 percent through the use of a small pumping plant. Water was moved by gravity or pump through the headworks, a structure through which water was diverted from the river, and into a system of canals. Another unique feature of the system was the use of *resacas*, depressions left in the land after changes in the course of the Rio Grande, as part of the main canal system for additional storage. The main canals were fed directly by the headworks, and in turn fed smaller lateral canals. To control the flow of water through the system, five locks were constructed along the main canals to act as dams. Various gate structures regulated the flow of water from one canal to another and to farmlands.

The original headworks was an open, rectilinear structure made of board-formed concrete walls built into the bank of the Rio Grande, which ran north to south at this specific location. It was intended that water would enter the headworks through one of eight gates in the headwall at the river, pass through the open portion of the works, and flow out eight corresponding gates in the rear wall into the main canal to the east. The small pumping plant that was part of the original headworks, to supply water to lands of certain elevations and in case of low water in the river, was constructed immediately south of the headworks, at the river's edge. A small wooden structure, built partially on the wall of the headworks, likely housed mechanical equipment.

A 2-mile-long man-made canal connected the pumping plant to the system of *resacas*, or dry river beds, which constituted a portion of the main canal of the irrigation system. The canal began at the rear of the headworks, flowed east, and made a left turn to flow in a northerly direction. The main canal was originally intended to be 11 miles long, but was extended to 33 miles in length before the initial phase of construction was completed. There were an unknown number of lateral canals constructed as part of the original system. The man-made canals were intended to be 50' wide whereas the *resacas* were 250' wide and up to 17' deep. Lateral canals varied in size and depth based on the amount of water they were intended to convey and sited to provide water to every 40 acres of land.

Five locks were constructed between the pumping plant and the town of San Benito along the main canal. Little information is known about the design and construction of most of the locks other than that they were constructed of tall concrete walls with wooden swing gates and were designed to support the passage of 20' by 60' barges along the canal, as described in promotional materials.[2]

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[2] San Benito Land and Water Company, *A Statement of Facts Concerning the Farming Lands and Gravity Irrigation Canal of the San Benito Land and Water Company…* (Houston: Cumming and Sons, 1910).

Photographs of Lock #2, the only remaining lock, show two parallel walls, with angled wings, with the gate set perpendicular to the walls. Photographs of another lock show one long wall with the gates set within in it.[3]

Water is distributed between primary, secondary, and tertiary canals through the use of gates of varying kinds. Water is accessed by farmers either by gates that lead to small ditches dug on their lands, or through standpipes that allow access to gates in underground pipes. Gates or standpipes are located at places where canals intersect with other canals or ditches, or where underground pipes intersect. There are also concrete flumes and other types of water conveyance structures throughout the system, some of which are more fully discussed in Part II of this document. The irrigation district does not know how many gates, standpipes, or other conveyance features exist within the system.

Gates generally feature a board-formed concrete structure with a wooden, moveable gate. Flumes and other conveyance structures are generally also made of board-formed concrete. The design of these features changed little throughout the twentieth century and the irrigation district has no record of when certain gates were constructed or altered. The wooden elements of some gate structures have been replaced with mechanical metal gates in undocumented years and, in some instances, with solar-powered, computerized gates in recent years, though the concrete superstructures remain. Unless a feature is physically dated (as some are) or happens to be specifically referenced in the meeting minutes of the district board (which rarely happened), it is difficult to date them. Unless a historic photograph gives an accurate location, it can be difficult to ascertain which gate is depicted because of the similarities in the appearance of all gates. The gates photographed as part of this report are representative of gates that exist throughout the system.

5. Alterations and additions:

The original pumping plant was replaced sometime around 1917 when ownership of the system changed. The new plant was constructed in roughly the same location as the original, immediately south of the headworks, though it appears to have been a significantly larger structure. This building was connected to a large brick chimney for ventilation of the boilers powering the steam driven engines. A small workshop was also likely constructed at the same time. As described below, the circa 1917 pumping plant was replaced in the late 1940s and is still extant but not in use.

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[3] Original prints of photos taken during and shortly after construction for promotional purposes are located in the Alba Heywood Collection in the Rare Books Department at the University of North Texas.

In 1917, construction of a new main canal, the Low Line Canal, was begun. The new canal was constructed roughly perpendicular to the original canal, now dubbed the High Line Canal. Whereas the High Line extended north to connect with the *resaca*, the Low Line extended east from the pumping plant to serve the farmers in the southern portion of the district. Multiple changes were made to the headworks to support the new canal, and new pumps were purchased in 1919 and 1920. Additional water chambers, flumes, gates and discharge sections were added to the headworks at unknown dates in a design that allowed pumped water to be sent to either the High Line or Low Line Canal as needed. Over time, these sections of the headworks were covered with small, ramshackle structures. A large concrete canal was constructed to connect the High Line Canal to its own discharge on the north side of the headworks.

A change in course of the Rio Grande in 1925 required the digging of a .5-mile-long inlet channel to reconnect the pumping plant to the river's water. In the mid-1940s, two storage reservoirs were constructed along Military Road, just northeast of the pumping plant. These reservoirs, one of 700 acres and one of 325 acres, also act as settling basins, wherein sediment pumped in from the river along with the water settles to the bottom of the reservoir keeping it out of the canal system.

The pumping plant structure, exclusive of the concrete headworks, was replaced in the late 1940s. This was work was done to accommodate new pumps and engines needed to increase the flow of water into the system and to modernize the plant. This pumping plant with an office wing, interior equipment, pit and headworks, and warehouse building are extant, though unused, today. It is documented as HAER No. TX-132-A.

New canals, along with necessary gates and other structures, have been added to the district over time. Little information exists to closely trace that development, although the character and general construction method of canals and gates remain the same. The first underground pipelines were installed in the district during the 1920s to both replace existing canals and add new conveyance lines. Additionally, some earthen canals were lined with concrete to address seepage issues. These types of projects have occurred regularly throughout the history of the district, though most canals remain open earth canals. Most of the original locks have been removed. The one remaining lock, Lock #2, has been significantly altered but is still identifiable.

A new vertical lift pump was installed at the plant in the 1970s. The pump was located in a steel pier structure built out over the river inlet, just north of the pump house, with underground piping connecting back to the headworks. The large brick chimney constructed circa 1918 was torn down in the 1980s after having been struck by lightning.

In 2004, a new pumping plant was built just north of the headworks. The inlet channel was slightly extended to the north and the new plant was constructed at the channel's end. An onsite residence of unknown date was torn down to allow for this construction. A new residence was constructed on the south end of the property. The construction of this plant required the realignment of the entries to the two main canals, both of which are now fed by the new plant through underground pipes. A portion of both canals were filled in as part of the realignment and a large area of the site has been paved over. A small concrete office structure sits in the former path of the High Line Canal.

B. Historical Context:

"Little Drops of Water
Little Grains of Sand
Make the Farmer Wealthy
On the Rio Grande."[4]

Lower Rio Grande Valley Background and Early Irrigation Efforts

Over 1,800 miles long with a rivershed of over 180,000 square miles, the Rio Grande is the fifth largest river in North America. It begins in southwestern Colorado, travels through New Mexico, and forms the border of Texas and Mexico on its way to the Gulf of Mexico. The delta, or valley, of the Rio Grande is built up of a mixture of soils carried down the river and from its numerous tributaries; this soil created productive agricultural land and early Anglo visitors and settlers saw much promise in the region. The first recorded explorations of the area, in the sixteenth century, remarked on the fertile appearance of the land and the size of the river.[5] "The Valley" as the Lower Rio Grande Valley is commonly known, made of present day Starr, Hidalgo, Willacy and Cameron Counties, was built upon the promise of the river and the land.

Developers of the Valley touted the accomplishments of early farmers who grew crops notable for their quantity and quality with no need for fertilization. The climate of the Valley, they said, arid and temperate as it was, would allow farmers to grow year-round crops and to grow some crops earlier than they could be grown in other regions of the country, making the first profits. The suitability of the climate, they said, would allow Texas to rival California and Florida in the production of citrus. Success in this region would be a no-lose proposition. "There is no section of the United States that guarantees a better return for money invested with a view to developing its immense possibilities, than Cameron County."[6] Beginning with only 16,000 residents in 1900, Cameron

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[4] Poem featured in San Benito Land and Water Company newspaper advertisements.

[5] J. Lee Stambaugh and Jillian Stambaugh, *The Lower Rio Grande Valley of Texas* (Austin: The Jenkins Publishing Company, San Felipe Press, 1974), 2.

[6] William H. Chatfield, *The Twin Cities of the Border and the Country of the Lower Rio Grande* (New Orleans: Brandao, 1893), 38.

County's population nearly doubled in size every decade for the first half of the twentieth century. Despite challenges faced throughout the twentieth century, the Valley is still the leading producer of fruits, vegetables, and other crops in the state of Texas and produces a significant portion of all citrus in the United States.

Two significant issues challenged early settlers looking to capitalize on the region's promises: a lack of water beyond the river banks, and transportation within and outside of the region. Although the Rio Grande was an impressive river, farmlands without direct access to it had no source of water other than rain, which was unpredictably bountiful one year and absent the next. The ground, though richly fertile, has no substrata and does not hold moisture. The dark soil quickly hardens and cracks when dry. The development of commercial agricultural for the regions would be dependent on the construction of irrigation systems, which represented an engineering challenge to early settlers because of the immediate rise of the land away from the river. Large-scale development of the region would also need transportation systems. Brownsville, established in 1848 and the seat of Cameron County, was the only major settlement in the Valley for many years. Though it was accessible by ship, most of the Rio Grande was not navigable due to the frequent changes in course leaving shallow riverbeds and frequent sandbars. Until the early twentieth century, railroads stopped at San Antonio, Corpus Christi, or Laredo. Cameron County was relatively inaccessible in the southern tip of Texas and remained culturally isolated from the rest of Texas. Railroads were necessary to bring people and equipment into the Valley to build towns and agricultural facilities as well as to transport expected harvests out of the Valley to consumers elsewhere.

Small-scale irrigation dating back to native cultures and the earliest European settlers was present in some parts of Texas prior to establishment of larger irrigation efforts in the Valley. Early Spanish explorers recorded Native Americans near the present-day cities of El Paso and Pecos diverting river water through small ditches to irrigate crops.[7] Franciscan missionaries from Spain built *acequias*, canals to provide water for drinking and irrigation, at missions across the state as early as the 1680s. Portions of the *acequia* system in San Antonio, built throughout the eighteenth century for the seven missions there, are still in use for irrigation today. Portions of the system have been designated a National Historic Landmark and a Historic Civil Engineering Landmark. By the end of the nineteenth century, some parts of Texas had extensive irrigation systems. Many land owners had windmills to pull water from underground wells or small pump stations to lift it from rivers. Small irrigation companies had built larger ditch systems near Del Rio, San Felipe, Port Lavaca, and along the upper portion of the Rio Grande.[8]

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[7] Morris E. Bloodworth and Paul T. Gillett, "Irrigation," *Handbook of Texas Online*, http://www.tshaonline.org/handbook/online/articles/ahi01, accessed December 9, 2011.

[8] Augustus Jesse Bowie, *U.S. Department of Agriculture Office of Experiment Stations Bulletin: Irrigation in Southern Texas* (Washington, D.C.: Government Printing Office, 1904), 323, 423, 426–427.

In contrast, early land divisions and land use in the Valley reflected the lack of irrigation systems. Spanish land grants were configured as long, narrow plots known as *porciones* that allotted every land owner half a mile of Rio Grande frontage. Until the late nineteenth century most land in the Valley was used for ranching. Landowners rarely bothered to clear the dense mesquite and cactus brush, except to allow for small subsistence gardens near the river. In the few settled areas in the Valley at the turn of the twentieth century, water was still sold from barrels filled at the river or at cisterns and pulled behind donkeys.

In the Valley, the land generally rises as it moves inland from the Gulf and the Rio Grande, meaning that, although ditches could be graded into the land, water could not easily be moved great distances. With the advent and mass-manufacture of steam engine-driven centrifugal pumps, similar to those used to pump water from the bilges of ships, in the last half of the nineteenth century it became possible to pump the water up from the river and across the land. The pumps used in these systems were relatively small, limited in size in part to the challenge of transporting them. Pumps would be shipped by boat to Brownsville or by train to Laredo and then ferried on the Rio Grande. In its natural state, the Rio Grande changed course frequently and sections of the river often had shallow riverbeds and frequent sandbars, making the shipping of large, heavy equipment difficult. The earliest mechanical pumping systems in the Valley, therefore, were relatively small and were built by individual farmers to irrigate their private lands for commercial use.

One of the first commercial farms and the first modern irrigation system in the Valley was that of George Brulay. Brulay installed a pump on the river at his Rio Grande Plantation, 9 miles south of Brownsville, in the 1870s. Brulay's engine and pump had a capacity to lift 8,000 gallons per minute 22' up from the river to irrigate up to 300 acres of land. He was the first planter to grow cotton in Cameron County and successfully produced a bale of cotton per acre on his irrigated fields.[9] Brulay, who was born in France and traveled by ship to South America and Mexico before settling in Texas, began growing sugar cane on his land and in 1876 built the first sugar mill in the Valley. By 1890 he was growing and processing over 200 acres of sugar cane.[10] A severe drought in the early 1890s spurred other area planters to establish private irrigation systems on their own lands. In the Santa Maria area, Frank Rabb and Fred Starck installed a pump on their San Thomas Plantation around 1891.[11] Hidalgo-area planter and sheriff John Closner dug canals and put a pump on his San Juan Plantation in 1895 in order to irrigate 200 acres, half of his overall acreage of sugar cane.[12] The Santa Maria Canal Company built a 7-mile-long canal connected to a small pump in 1897.[13] These early pumps were generally

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[9] Thomas Ulvan Taylor, U.S. Geological Survey, *Water-supply and Irrigation Paper, No. 71: Irrigation Systems of Texas* (Washington, D.C.: Government Printing Office, 1902), 69.

[10] Stambaugh and Stambaugh, 183.

[11] Ibid., 187.

[12] Ibid., 185.

[13] Ibid., 184.

constructed on the edge of the river itself, on temporary platforms, in fear that the riverbanks, due to the natural changes of the river, were unstable and could collapse, allowing anything built on them to topple into the river.

Army Lieutenant W. H. Chatfield visited the Valley in the early 1890s and produced an extensive booklet touting the possibilities of a grand agricultural economy in the region, noting that major infrastructure would be needed for the Valley to prosper and develop on a large scale. He was certain that although railroads would be necessary to fully capitalize on the potential, irrigation systems were of primary importance in settling and developing the Valley and should be the focus of those looking to invest in infrastructure. Railroads, and people, would follow; he wrote, "Let capital put water upon any portion of this land and before a year elapsed there would be such a rush for privileges that the system of irrigation would have to be extended to accommodate the applicants. By the time the first crops were ready for market there fore would be one or two railroads bidding for the business of transporting them."[14]

During his travels through the region, Chatfield studied the characteristics of the land and the Rio Grande. In the area near Penitas in Hidalgo County, when the Rio Grande rose, it would spill through low spots in the banks and into *resacas* and the *Arroyo Colorado*, a small branch of the river roughly paralleling it to the north. This was a problem for farmers who had not yet attempted their own canal systems, as the water would flood crops planted in low-lying areas when the river overran its banks and those of the *resacas*. However, Chatfield reasoned that if the water's direction over the land could be controlled, it could be contained in the *resacas* and stored for use during the seasons when rain was sparse. He proposed constructing canals at the points where the Rio Grande tended to overflow its banks; the canals would direct the water into the *resacas*. Levees would be constructed around the *resacas* to deepen them, with dams between them to control the flow of the water through the system and ensure that each section of land would receive the share of water necessary to irrigate it. This, he believed, would provide irrigation to all of the lower, flatter portions of the Valley, roughly all of Hidalgo and Cameron Counties. To provide irrigation upriver to Starr County further north, he proposed damming the Rio Grande north of Rio Grande City and building storage reservoirs into the hills.[15] His ideas to guide the water from the Rio Grande through low spots in the banks and to direct it through canals to *resacas* for storage were key elements of the plan conceived for the San Benito system.

The Hidalgo and Cameron Irrigation Company was the first commercial irrigation venture to make a corporate filing. In 1896, they filed a claim "appropriating all un-appropriated waters of the river and all the underflow, stored and rain water, all the lakes and *resacas* and all other water in or out of sight" to irrigate 800,000 acres with a 30' wide, 100-mile-long canal, that could deliver 1,370 cubic feet of water per second. This

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[14] Chatfield, 40.

[15] Ibid., 42

unrealistic plan, intended to use more water than actually flowed in the Rio Grande, was never undertaken. Chatfield's own "Chatfield Irrigation Company" also never constructed any part of his scheme, and the first large-scale commercial pump and irrigation system was not constructed until 1900.

Formation of the San Benito Land and Water Company

The development of irrigation systems, land speculation for new towns, and the establishment of the railroad were intertwined in the making of the modern Valley. In 1903, after a series of false starts by other companies that left many in the Valley wary, a syndicate led by established railroad men Uriah Lott and Benjamin Yoakum, persuaded by Valley businessman and landowner Leonidas "Lon" C. Hill, was formed for the purpose of expanding rail service into south Texas to promote growth in population and agriculture.[16] Yoakum, then president of the Rock Island Railroad, was a native Texan and former land speculator who wished to spur prosperous development in the state. The vision of the company was to provide a rail line stretching from Chicago, through Saint Louis, Memphis, Baton Rouge, Houston, and Brownsville and ultimately to Mexico City. The St. Louis, Brownsville, and Mexico Railway (SLB&M) would be a 200-mile-long route along the Texas Gulf Coast, with a spur line west along the Rio Grande. It would connect to existing Frisco and Rock Island lines north and west at Corpus Christi and would become part of the Gulf Coast Line running east from Houston to New Orleans.

Construction of the line was funded largely by donations of money and land from companies, towns, and private individuals who would benefit from access to the rail. These donations lined the pockets of the syndicate board members and influenced the siting of the line. The famous King, Kenedy, and Yturria families, whose ranches comprised most of the land between Corpus Christi and Brownsville and whose support would be necessary for rail, were all represented as incorporators of the new railroad company and donated monies, land, or both. All told, 240,000 acres of land were acquired for the rail line, rights-of-way, depots, and terminals, much of it donated from landowners looking to profit from the line.[17]

Construction of the route, known colloquially as "Lott's railroad," began in 1903 and the section from Brownsville to the present-day town of Robstown, south of Corpus Christi, was completed in 1904. The first passenger route ran on July 4th with much celebration in the city of Brownsville. In the first season the crops leaving the Valley were sparse; freight trains ran only three times weekly and the first full car of vegetables would not be

[16] "Inside History of the Building of the Lott Road to Brownsville," *San Antonio Express*, date unknown, ca. 1902 (Lon C. Hill vertical file, Center for American History, University of Texas at Austin)

[17] "Gringo Builders," *Brownsville Daily Herald*, February 7, 1939 (Lon C. Hill vertical file, Center for American History, University of Texas at Austin).

shipped until March 1905.[18] The entire stretch of rail, 343 miles from Brownsville to Houston, was officially opened on December 31, 1907.[19]

Sam Robertson, one of the primary engineers involved in siting and constructing the new line, was a Missouri native who began working on rail construction projects at the age of fifteen as a manual laborer. By the time he was twenty he had worked on rail construction projects throughout the country and with no formal education had graduated into a position as a construction engineer. With several partners he organized the Southern Contracting Company to take a subcontract from Johnson Brothers, the firm hired to oversee construction of the SLB&M line. Though he had little financial means of his own, he won the contract by underbidding the firm that Johnson Brothers usually hired. This characterized Robertson's approach to business. The Southern Contracting Company was to undertake track-laying, surfacing, and construction of trestle bridges along the route from Robstown to Brownsville, as well as the spur line from Harlingen west to the town of Sam Fordyce. Robertson had built rail lines in many more populated areas of the country and had observed development of towns and agricultural and irrigation systems in Louisiana, Wyoming, Colorado, Utah, and other parts of Texas.[20] Upon completion of the SLB&M Railway, Robertson would remain in the Valley to found the San Benito Land and Water Company and construct his own irrigation system.

Through the course of the rail construction in 1904 Robertson noticed one section of land that was dotted by large depressions with high banks—the *resacas* previously discovered by Chatfield. Robertson recounted his surprise at having to cut into the ground through the banks to achieve the proper railroad grade rather than build up ground as would normally be necessary.[21] In exploring this particular section, he also found the river to be at a higher elevation than the land and knew, from his experiences building western railways and seeing other agricultural systems, that these were ideal conditions for an irrigation system. Robertson likely was aware of Chatfield's booklet and proposed irrigation system. He certainly understood that this land was well situated for a large-scale gravity-fed irrigation system that would not work elsewhere in the Valley. He envisioned an extensive canal irrigation system, with a gravity-fed headgate that would make use of the *resacas* as built-in storage reservoirs. This system would support agricultural lands and a speculative town at a site 30' lower in elevation than the river.

He is said to have met the owners of this land, James Landrum and Benjamin Oliver Hicks, in May of 1904 when they brought their families to picnic while watching

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[18] James Lewellyn Allhands, *Gringo Builders* (private, 1931), 147-148.

[19] George C. Werner, "St. Louis, Brownsville and Mexico Railway," *Handbook of Texas Online*, http://www.tshaonline.org/handbook/online/articles/eqs30, accessed December 9, 2011.

[20] "How Rails Came to the Valley," unattributed manuscript by member of Johnson Brothers firm (Samuel Robertson vertical files, Center for American History, the University of Texas at Austin).

[21] Colonel Sam A. Robertson, "Oldtimer Recalls his First Meal at Lon Hill's Camp," *Valley Morning Star* (Harlingen, TX), July 29, 1932 (Samuel Robertson vertical files, Center for American History, the University of Texas at Austin).

construction of the rail line. Robertson related that the three of them rode through sections of their lands as he discussed his idea for an irrigation system and a townsite. He so thoroughly convinced them of his plans that they made a handshake deal to hold the lands for Robertson until he could afford to purchase them. Landrum did donate land for the construction of the rail through his property, and Robertson's original townsite of Bessie was marked as a stop on the main SLB&M line in 1903.[22]

In May of 1905, a year after the initial handshakes, Robertson entered into contracts with the Landrum and Hicks families for the purchase of portions of their land. Out of his original 6,888 acres, Landrum had previously donated 240 to the SLB&M. He set aside 2,000 acres for himself and agreed to sell 4,248 acres to Robertson. The Hicks contract has fewer details about the rest of his land, but he also agreed to sell 4,248 acres. Robertson paid each landowner a $500.00 deposit with the agreement to pay $3.00 per acre for the land when he had raised the capital. The contract allowed him to begin subdividing the land into a townsite and farm lots of 160 acres, with the stipulation that the platting begin within five months from the date of contract and be completed within eight months. The contract also required Robertson to construct a pumping plant and canals to Landrum's and Hicks' lands, to be completed within sixteen months. Robertson was given the right to charge both farmers up to $6.00 an acre for water. The contract included a secondary offer to neighboring land owner Hill, who was developing his own Harlingen Land and Irrigation Company. If Robertson failed to meet the stipulations of the contract, Hill would be given the option to buy the land for the same terms.[23]

With the land promised, Robertson began planning for his irrigation system. A large concrete headgate and works would be cut into the riverbank, with levees built up on either side. This headgate would allow water to flow through regulated openings, into a 2-mile-long man-made canal connected to the *resacas*.[24] He would plot the town of Bessie at the juncture of the railroad and the *resaca* for both economy and beauty. Though the system was touted at the time, and in many records since, as being entirely gravity-fed by design, the original plans, in fact, included a small pumping system to feed a portion of the canals that did flow upland and to provide water when the river was low.[25] The canals and the *resacas* would be regulated with five locks to move the water down in elevation across the land. Robertson's original system was designed to irrigate 2,000 acres of crops. In addition, the canals and locks would be wide enough to allow passage of special 20' x 60' barges to deliver crops to processing plants and the rail yard in town of Bessie, the original name for the town planned by Robertson for the area of the

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[22] Brownsville Historical Association, "Opening the Last Frontier," *Blast from the Past, Volume 1: A Windowto Yesteryear from the Archives of the Brownsville Historical Association*. Self-published, 1997.

[23] Deed and Supplements, Frances R. and James L. Landrum to S. A. Robertson, May 20, 1905 (Filed October 18, 1910), Cameron County, Texas, Volume 4, pages 408–423 (Alba Heywood Collection, University of North Texas Archives/Rare Books Department).

[24] San Benito Land and Water Company, 10–12.

[25] William R. Compton Company, *Irrigation in Rio Grande Valley, Texas* (privately published, 1910), 4–5.

Landrum holdings, south of what became the town of San Benito.[26] There is no evidence as to whether the canal and lock system were actually used for navigation, though even the idea was a unique one for irrigation and development systems in the Valley.

Robertson was unable to immediately find investors for his project—Yoakum turned him down when approached—and began a new construction company, the Rio Grande Contracting Company, to earn capital by building projects for other developers and finance syndicates. With this company he completed multiple projects for Yoakum, including construction of canals for the American Rio Grande Land and Irrigation Company and lines for the Trinity and Brazos Railroad. These projects netted Robertson $40,000, enough to begin his own project. In 1906 he began clearing land for what he initially called the Bessie Land and Water Company.[27] Work began in the *resacas* near the location of Lock #2,[28] just south of the townsite. Robertson's plan was to begin the project and entice additional funding as backers could be convinced of the project's success.[29]

Ultimately, Robertson found the needed financial backing in Alba, O. W., and Scott Heywood; Robert Lynn Batts; Ed F. Rowson; William H. Stenger; and Adolph Clarence Swanson who together brought $500,000 capital. The Heywood brothers were former vaudeville actors who formed an oil syndicate upon hearing of the discovery at Spindletop in 1901. They made considerable money on oil leases acquired in the Beaumont area and were part of the discovery of oil in south Louisiana later that same year.[30] Stenger was an associate of the Heywoods in their oil concerns and had a role in building the irrigation system in Brownsville.[31] Batts was a native Texan, lawyer, state attorney general, and judge, and in his later career he served as general counsel for Gulf Oil, which began at Spindletop.[32] Rowson was involved in the oilfield business in Louisiana with the Heywoods, and he and Swanson were partners in a real estate firm in Houston.[33]

Robertson met Rowson through business dealings and it was Rowson who provided the introduction to Alba Heywood. Rowson had stepped in to assist Robertson in financing

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[26] San Benito Land and Water Company, 12.

[27] San Benito Land and Water Company, 10–12.

[28] William R. Compton Company, 4–5.

[29] San Benito Land and Water Company, 12.

[30] Robert Wooster, "Heywood, Alba," *Handbook of Texas Online*, http://www.tshaonline.org/handbook/online/articles/fhe38 accessed December 9, 2011.

[31] "New Company is Organized," *Brownsville Daily Herald*, April 5, 1907, http://texashistory.unt.edu/ark:/67531/metapth147424, accessed December 9, 2011.

[32] "Batts, Robert Lynn," *Handbook of Texas Online*, http://www.tshaonline.org/handbook/online/articles/fbaal, accessed December 9, 2011.

[33] Local Items, *Brownsville Daily Herald*, April 6, 1907, http://texashistory.unt.edu/ark:/67531/metapth147425, accessed December 9, 2011.

small aspects of the project as it struggled forward. Through communications with Rowson and Robertson, Heywood was so confident in the project that he loaned Robertson $500.00 for an emergency before ever laying eyes on Robertson or the site.[34] Heywood would become the biggest financial contributor to the project.

The San Benito Land and Water Company was officially chartered on March 19, 1907. The name was changed from Bessie when it was discovered that the United State Postal Service had established an office at another site in Texas named Bessie. It is local tradition that Robertson chose the development's original name in honor of Lott's daughter and that San Benito was the suggestion of one of Robertson's men in honor of Yoakum. However, entries in the social section of the Brownsville newspaper mention Landrum's "San Benito Ranch" as early as 1895.[35] A news article from October of 1903 describes the platting of a town to be called Bessie on a section of that ranch. Based on the location cited, this Bessie, which predates Robertson's arrangement with Landrum and Hicks, would have been located around modern-day La Feria, 14 miles west of San Benito on the SLB&M spur road.[36]

Alba Heywood was elected President of the new company with the other investors taking the other offices, including Robertson as Secretary. An official announcement of the company formation and the development's name change was made in the Brownsville paper. The April 1907 article touted the 11 miles of canal already constructed by Robertson and described the pump house currently under construction to house the pumps ordered through a firm in Houston.[37]

The original contract between Robertson and Landrum had been extended several times, as Robertson was unable to meet the initial deadlines. The final contracts between Landrum and Hicks and the Land and Water Company required full payment for the land, and extended the deadline for connecting Landrum's lands to the irrigation system until December 31, 1907. If that deadline was missed, Landrum would be owed an extra $10.00 per acre above the previously agreed upon $3.00.[38] The company contracted with Lon C. Hill in the spring of 1907 to purchase 6,500 acres of his property along with small amounts of land from other neighboring landowners. In 1908, they purchased another 10,000 acres from Joe and Fred Combes, bringing their holdings close to 30,000 acres.[39]

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[34] "Giving the Rio Grand Valley the Railroad that Will Be the Open Sesame to its Treasure Vaults," *San Antonio Express*, September 9, 1911 (Samuel Robertson vertical files, Center for American History, the University of Texas at Austin).

[35] Purely Personal, *Brownsville Daily Herald*, December 20, 1895, http://texashistory.unt.edu/ark:/67531/metapth61858, accessed December 9, 2011.

[36] "Bessie, At San Benito Ranch," *Brownsville Daily Herald*, October 20, 1903, http://texashistory.unt.edu/ark:/67531/metapth146449, accessed December 9, 2011.

[37] "New Company is Organized," *Brownsville Daily Herald*, April 5, 1907, http://texashistory.unt.edu/ark:/67531/metapth147424, accessed December 9, 2011.

[38] Deed and Supplements, Frances R. and James L. Landrum to S. A. Robertson.

[39] "Giving the Rio Grand Valley."

Where Robertson had initially seen only a small district and town, Heywood had bigger visions and pushed the company towards those.

Progress came quickly in both the town of San Benito and on the irrigation system. Lands were officially turned over to the first buyers on April 9, 1907—seventeen farm lots and several town lots, the first going to a businessman who built a small hotel.[40] The town of San Benito was platted on 320 acres, distributed equally north and south of the railroad, and segregated between Caucasian and Mexican residents east and west of the *resaca*.[41] Construction of a brick depot and school had been contracted by the Company, along with two commercial structures.[42] The Land and Water Company quickly set out to build their first headquarters, a wood frame structure on the town's main street, Sam Houston Avenue. Though the city would be not officially incorporated until 1911, a post office was established in May of 1907 with Robertson as Post Master.[43] By the end of 1907, water mains were being dug through the city streets, financed by the Company.[44] Robertson and his investment group all built large houses in San Benito, showing their personal commitment to the town's success. In the summer of 1907, Heywood personally gave $1,000.00 to the family of the first child born in San Benito.[45]

The Company took out front page advertisements in the *Brownsville Daily Herald* on a near daily basis to tout their accomplishments and lure those seeking to buy into the promise of easy opportunity in the Valley. These advertisements, though possibly prone to exaggeration, are the only source of information regarding the speed of construction of the irrigation system. In October of 1907 they tout 20 miles of canals. By the spring of 1908, 33 miles of canals, allowing for irrigation of 30,000 acres of crops. With the purchase of additional lands, the Company expanded the original goal of 2,000 irrigable acres to 45,000 irrigable acres of farmland. The system of lateral canals and diversion canals was designed to deliver water directly to every 40-acre plot of land, where the Company-built ditches could be tapped into, under certain restrictions, by landowners.[46]

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[40] "Things Moving at San Benito," *Brownsville Daily Herald*, April 9, 1907, http://texashistory.unt.edu/ark:/67531/metapth147427, accessed December 9, 2011.

[41] Kearney, 40.

[42] Local Items, *Brownsville Daily Herald*, May 18, 1907, http://texashistory.unt.edu/ark:/67531/metapth147461, accessed December 9, 2011.

[43] Charles M. Robinson, III, "San Benito, TX," *Handbook of Texas Online*, http://www.tshaonline.org/handbook/online/articles/hes01, accessed December 9, 2011.

[44] Allhands, 97.

[45] Local Items, *Brownsville Daily Herald*, July 26, 1907, http://texashistory.unt.edu/ark:/67531/metapth147518, accessed December 9, 2011.

[46] Front page advertisements, *Brownsville Daily Herald*, numerous dates 1907–1908, available through the Portal to Texas History hosted by The University of North Texas Libraries http://texashistory.unt.edu.

The headworks of the San Benito system, where water entered the canal system from the Rio Grande, were, at some point, originally planned for a location 6 miles downriver from their current location. This location would have placed them physically closer to the city of San Benito and the initial canal work carried out by Robertson.[47]

Plans were changed in 1907 to construct the headworks at what would become the community of Los Indios.[48] This location, on a U-shaped curve of the river, placed the plant closer to the southernmost *resacas* in the section of land owned by the company. The initial configuration of the system's headworks was a series of simple walls built of board-formed, steel-reinforced concrete. The main headgate wall, built into the river bank with a protection levee on either side, was 250' in length and 22' tall, ranging from 2' wide at the top to 4' wide at the base with a 17' wide spread-footing. Steel foundation pilings were driven 26' deep, with Wakefield sheet piling installed along both outside edges of the footing and a central row of pilings. Eight 4' x 6' openings were built into the wall base, each with a vertical sliding gate controlled by a manual turn-wheel mechanism built into rectangular projections at the top of the wall. The wall was constructed at an elevation on the river banks that would prevent water from overtopping it during flooding events and would ensure that the gates were never above low waters.[49] Behind the main wall were other walls of the headworks, built in a roughly trapezoidal shape. Additional gates in the base of the wall parallel to the main headgates further regulated the amount and speed of water allowed to enter the main canal, which began just beyond the headworks.[50]

A small wood-frame structure built immediately south of the headworks, using the headworks as part of its foundations, contained the original pumps, engines, and boiler. Brick for the boiler stack was made on site. The original pumps included either a 78" pump and two 34" pumps, or a 72" pump and two 24" pumps.[51] The company purchased a 45-horsepower launch with which to ship the equipment upriver from Brownsville, rather than delivering it over land from the depot in San Benito.[52] The first water was pumped through the system on December 26, 1907. The main canal was not yet completed and this first pump was connected to a smaller lateral canal and activated to reach the January 1, 1908, deadline to provide water to Landrum's and Hicks' lands.[53]

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[47] "San Benito is Doing Things," *Brownsville Daily Herald*, August 7, 1907, http://texashistory.unt.edu/ark:/67531/metapth147528, accessed December 9, 2011.

[48] Ibid.

[49] San Benito Land and Water Company, 10–12.

[50] Observed from historic photographs and physical conditions at the headworks.

[51] Articles from the April 5, 1907, and December 27, 1907, *Brownsville Daily Herald* give conflicting information about the sizes of pumps purchased for the first pumping plant and are the only sources that reference the first pumps.

[52] Local Items, *Brownsville Daily Herald*, June 4, 1907, http://texashistory.unt.edu/ark:/67531/metapth147475, accessed December 9, 2011.

[53] "Pump Starts at San Benito," *Brownsville Daily Herald*, December 27, 1907, http://texashistory.unt.edu/ark:/67531/metapth147646, accessed December 9, 2011.

Digging of the canals was constant work. The 27-mile-long main canal was completed by the end of 1908, though many miles of lateral canals continued to be dug. Canals were dug using large steam engine powered, horse-drawn plows. These giant machines would scrape dirt from the bottom of a canal and dump it along the upper side as they moved in a long line. The canals were carefully constructed to specified slopes to achieve proper movement of the water. Advertisements in early 1909 publicized that 50 miles of lateral canals, a small dent in the overall system, had been dug. Construction work was performed largely by Mexican laborers at cheap rates. Many of the promotional brochures advertising land sales during the period told of the availability of large numbers of farm workers from across the border that would work for very little. Pay for the entire construction crew of the San Benito system was $2,000 a week.[54]

To entice buyers, land companies—including San Benito Land and Water Company—advertised extensively in newspapers of the day, touting (and perhaps exaggerating) the warm weather, the richness of the soil, the size and technical advantages of their irrigation systems, and the attractiveness and amenities of their towns—brick depots and schools, doctors and educated teachers. Land companies and the railroad company produced brochures with photographs of expansive canals, bountiful crops, and new buildings that conveyed to prospective landowners the promises of riches they could find in the Valley. William Doherty, Traffic Manager for the SLB&M, started the *Gulf Coast Magazine* and worked with passenger rail systems across the country to establish low "homeseekers rates" to bring potential land owners from across the country to the Valley. Homeseekers, along with tourists and gawkers willing to put up with a sales pitch, could travel on the first and third Tuesdays of the month to any station in the Valley from anywhere in the United States with fixed prices based on the city of origin. They would be toured through the new towns and surrounding farmlands and irrigation systems in open air trucks or trailers. They would be entertained with dinners and dances and taken on special excursions to Matamoros or the Gulf of Mexico and treated to fresh fruit picked right from the fields. Names of purchasers were listed in the newspaper with their home states representing a large swath of the country, particularly the Midwest. Newspaper articles of the day often read as advertisements themselves and descriptions by those who had taken the homeseekers' tours were published in papers in other cities.[55]

Lots were sold by the San Benito Land and Water Company for a cash deposit of a third of the overall cost with the balance due in three annual payments at 6 percent interest. At the height of sales, some land was valued at as much as $300.00 an acre. Deeds specified the responsibilities of the Land and Water Company and the landowner in regards to water. These required the company to furnish water, "in sufficient quantity, in connection with the ordinary natural rainfall" to enable the landowner to grow crops on their land. If service were interrupted by acts of God or mechanical failure, landowners would not be

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[54] Ibid.

[55] Allhands, 41–42.

required to pay their water fees. For lack of water related to negligence of the company, the company would pay planters damages on lost crop revenues, up to $10 an acre.[56]

Requests for access to water would be granted after 5 days, taking into consideration the impact of the request on other water users on the system. When new access to water was requested by a planter, company engineers would determine where on a given lateral the new access point would be made and would construct a gate. The landowner would construct all ditches, levees, and gates needed to direct and control water on their property under direction of the company engineer. Landowners were responsible for ensuring water did not go to waste and for properly draining their fields to the system's drainage ditches. The charges for irrigation were a flat $3.00 per acre "fixed water rent" along with a per crop charge based on the type of crop planted. Corn and cotton were $4.00 an acre; cane, alfalfa, and other field crops requiring a similar amount of water were $6.00 an acre; fruits and vegetables were $10.00 an acre. A second planting of crops in a year would cost half the fee of a first planting. Payment of water rents was to be made upon the sale of crops or at specific dates each year if crops did not sell. To ensure payment, the Company held a lien against all crops. The Company also held a right-of-way easement on all canals and laterals, including 20' along both sides to allow access for maintenance and construction of electric and phone lines.[57]

While construction of the canals continued and early land sales flourished, Robertson, Heywood, and other officials of the Land and Water Company worked continuously to improve their venture. As Robertson said later in his life, he dumped all the money he made from construction contracts for other companies into San Benito, though he never made significant profits on any of the development.[58] The Company, or its specific members, were responsible for much of the town's infrastructure. Heywood established the San Benito Bank and Trust, which would be the city's primary financial institution for decades. Robertson and Heywood built a small electric plant to provide power to the city of San Benito. Water storage tanks were built in town to supply water to hotels and the rail yard. A telephone system was installed within the city and in some rural parts of the district.[59] Eventually the Company would replace their first, wood-frame office building, with a large, two-story brick structure in the Mission Revival style designed by the Austin architectural firm Endress and Walsh.[60]

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[56] Deed, San Benito Land and Water Company to Alba Heywood, February 12, 1909 (Filed March 11, 1909), Cameron County, Texas, Volume P, pages 308–315 (Alba Heywood Collection, University of North Texas Archives/Rare Books Department).

[57] Deed, San Benito Land and Water Company to Alba Heywood, February 12, 1909 (Filed March 11, 1909), Cameron County, Texas, Volume P, pages 308–315 (Alba Heywood Collection, University of North Texas Archives/Rare Books Department).

[58] Brownsville Historical Association, 94.

[59] Stambaugh, 273–275.

[60] "Water District Building," Texas Historical Marker Files, http://atlas.thc.state.tx.us/viewform.asp?atlas_num=5061011789&site_name=Water%20District%20Building&class=5000, accessed December 9, 2011.

In 1907 H. G. Stillwell shut down his successful nursery in Hidalgo to move to the San Benito area where he partnered with Heywood to open the San Benito Nursery. Although profits were important, they also set out to demonstrate the ease with which a wide variety of plants, both familiar and exotic, could be grown in the area. Stillwell had been the first planter in Cameron County to plant a commercial citrus crop several years prior.[61] Despite his previous successes, Stillwell and Heywood expected too much from their demonstration plantings in San Benito. Much of their first crops of walnuts, olives, figs, bananas, grapes, and other exotic fruits did not survive hard freezes in the first year. Stillwell's demonstration farm and nursery ultimately proved successful, sticking to truck crops of common fruits, vegetables, and citrus.

During this same period, Robertson and Heywood continued to work in other parts of the region as well, with Robertson always in need of additional capital and adventure. Heywood, with Hill and Stenger, purchased the Brownsville pumping plant after the rice plantation there failed. Robertson, with the Rio Grande Construction company, was involved in the preliminary engineering of an irrigation system being planned by John Closner for the town of Chapin (now Edinburg) west of San Benito. He also worked on building the San Antonio, Chapin, and Rio Grande Railroad, a new branch of the SLB&M.[62]

In 1909 the average cost of land in the San Benito development was $70 an acre with some sales as high as $150 an acre.[63] By the end of that year, nearly all land within 5 miles of the rail line had been sold and Robertson and his board were faced with the dilemma of making the additional lands more appealing to buyers and profitable to themselves. It is unclear if the system of barge travel intended for the *resacas* and canals ever operated or was considered useful or successful but the Company's land salesmen knew they could increase the price of the unsold land and sell it more readily if it had easier access to rail. Out of a late night strategy meeting, Robertson devised the San Benito-Rio Grande Valley Interurban Railroad, known as the "Spider Web," to cross the lands irrigated by the San Benito system. As he had done with the construction of the canals, Robertson began this project with no funding. He approached Yoakum again for funding and was turned down. He borrowed against unsold Company land and from individual property owners that would benefit directly from the new line and bought steel and ties on credit from suppliers he had previously worked with.[64] Upon seeing the success of the line as it progressed, Yoakum fronted Robertson money for his payroll. He was able to purchase a small gas-driven engine which became known locally as the "Gallopin' Goose." The 128 miles of the Spider Web brought rail access to within 3 to 5

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[61] "San Benito is Doing Things," *Brownsville Daily Herald*, August 7, 1907, http://texashistory.unt.edu/ark:/67531/metapth147528, accessed December 9, 2011.

[62] "Giving the Rio Grand Valley."

[63] William R. Compton Company, *Irrigation in Rio Grande Valley, Texas* (privately published, 1910), 7.

[64] Brownsville Historical Association, 95.

miles of every farm within the San Benito system. It would transport crops from the planters' front doors to the ice plant in San Benito and north to consumers outside the Valley. It spurred on additional land sales, and led to the formation of the city of Rio Hondo in the northeast portion of the district. The success of the Spider Web led Robertson to incorporate the Brownsville Street and Interurban Railroad Company, which retained the rights to construct, own, and operate a street and suburban railroad for both passengers and freight. He secured the rights for a similar system in Matamoros and dreamed of building a line to a resort on the coast. Only two miles of the Brownsville system were ever constructed, which were never connected to the Spider Web.[65]

Also essential to profitable shipping of crops throughout the country was proper processing. Fruits and vegetables needed refrigeration to survive train trips without spoilage. There were small ice plants in Brownsville and Port Isabel for the fishing industry, but these were impractical for local farmers. To help promote the economy and agriculture of San Benito, Robertson constructed a 40-ton ice plant in 1910. Making do with the usual lack of funding, Robertson's plant was built with an "old, cumbersome, steam plant of fly wheel type. Cotton seed hulls were used for insulating purposes, and certain other innovations were adopted, that would astonish orthodox refrigerating engineers of this day."[66] Despite the rigged construction, the plant was a successful venture and Robertson went on to build a plant in Harlingen at Yoakum's urging and the plants were given the official contracts to ice cars for the railroad, until it, and the entirety of the Frisco and Rock Island lines, went into receivership in 1913.[67]

Robertson and Heywood entered the sugar business in 1912. The San Benito Sugar Manufacturing Company planted 4,000 acres of cane in the northern section of the irrigation district and began construction of a 1,200 ton sugar mill along the railroad in San Benito. The building was a large brick structure with machinery engineered by A. F. Delbert of New Orleans. The company intended that the mill would process not only their own cane, but that of other farmers as well. The plant was proposed to cost $225,000 to construct, a price significantly lower than other mills in the area.[68] The actual construction cost was $350,000 and delays in construction meant the plant was not operational at the beginning of the 1912 harvest season, which was particularly problematic as to the other major mill in the area had been damaged by fire.[69] The San Benito mill produced approximately half the amount of sugar per ton of cane as anticipated and quickly went into bankruptcy.[70] The building was sold to the new Central

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[65] Allhands, 99–100.

[66] Ibid, 261.

[67] Brownsville Historical Association, 94.

[68] *Prospectus, San Benito Sugar Manufacturing Company*, The S.A. Robertson Company, 1911 (Samuel Robertson vertical files, Center for American History, the University of Texas at Austin).

[69] "San Bekito (sic) Sugar Mill May Grind this Season," *San Benito Light*, October 12, 1912 (Lon C. Hill vertical file, Center for American History, University of Texas at Austin).

[70] Stambaugh and Stambaugh, 188.

Power and Light Company and converted into a power plant for the region, for which it is still used.

A 1913 advertisement brochure published by the brand new *San Benito Light* boasted of San Benito having two banks, three brick schoolhouses, eight churches, six clubs, three hotels, 6 miles of concrete sidewalks and curbs, a city park, a modern city waterworks (with water supplied by the Land and Water Company), a public sewer system (constructed by Robertson's father-in-law's firm Dodds and Wedegartner[71]), twenty-four-hour electric service, an ice and cold storage plant, a canning factory, bottling works, steam laundry, an ice cream and creamery plant, brick and tile works, a creosoting plant, two cotton gins, a local and long distance phone company, a sugar mill, two auto garages, five construction companies, two livery stations, two theaters, a newspaper, a commercial club, a nursery, three lumber yards, a dredging company, a sheet metal works, a slew of retail businesses, and thirty-five brick buildings.[72] In 1914, Heywood's wife founded a public library, collecting books from residents to begin the catalog. By 1915 there was a third gin and a second cannery.

The speed of growth in San Benito was representative of that of other towns of the Valley as other irrigation systems and land schemes were developed. Many of the towns in the Valley were founded by development companies and boomed during this same period. By 1913 irrigation systems could be found in 100 counties in Texas. In the Valley 105,000 acres were under irrigation, approximately a fifth of the total irrigated acres in the state. Cameron County, specifically, accounted for over 45,000 acres, with a projected 35,000 additional acres that were in reach of irrigation systems.[73] More than $3,000,000 had been invested in irrigation in Cameron County. Between 1900 and 1910, the population of Cameron County increased from 16,095 to 27,158.[74] By 1920 the county's population had increased to 36,662. At its first official census count in 1920, the population of San Benito had reached 5,070. At that time, those numbers were predicted to more than double in the following decade.

All irrigation systems begun in the early years of Valley development were privately owned by individual farmers or for-profit companies. A state constitutional amendment in 1904 allowed for the creation of public entities to develop and use state waters and to issue bonds to provide for public services for irrigation. In the Valley, there was little interest in public irrigation districts as long as business was booming. However, irrigation was not generally the primary concern of the developers of the systems, and they were engaged in irrigation or other ventures only because those aided land promotions. As the

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[71] Kearney, 44.

[72] Most of the public services or amenities were only located or available on the east side of the resaca. In "Mexiquito," as the area west of the resaca was known, some public services were not available for decades later. The sewer system was not extended throughout all of these neighborhoods until the late 1940s.

[73] *Texas Almanac and State Industrial Guide 1914*, (Dallas: A.H. Belo and Company, 1914), 180–181.

[74] *Texas Almanac and State Industrial Guide 1911*, (Dallas: A.H. Belo and Company, 1911), 296.

sales of lands were completed, the companies had less funds and less interest in maintaining the irrigation systems.

As the physical size of the districts increased and as land continued to be subdivided and cultivated, additional water was needed to meet demand and greater maintenance was required on the systems. Not only were the original systems generally not designed to support the increases in acreage that occurred, canals needed constant upkeep and maintenance. The Rio Grande water carried large amounts of silt as it flowed towards the Gulf of Mexico. The silt was pumped into the irrigation systems with the water and collected in the canals, reducing the amount of water they could hold and slowing the flow. Dredging the canals of silt was an almost constant project. When farmers could not get the water they needed, they could not grow profitable crops and pay their rents, creating a larger maintenance gap. The influx of new farms and farmers led to overproduction of crops in some seasons when water was plentiful, causing prices and profits to decline. Those farmers who chose to try their hand at citrus faced seasons of meager earnings while orchards established themselves. As systems grew, many were also found to be lacking in adequate drainage. Without proper drainage of irrigation water, alkali would build up in the soil, rendering it useless for most crops. When the San Benito system was built, there were, as advertised, "one and a half mile of drainage ditches for every mile of irrigation canal," but San Benito was one of few irrigation systems to include drainage ditches in the original design. Drainage districts began to be founded as early as 1909 to deal with these and flood drainage issues. Private irrigation companies in need of capital, including San Benito, began to sell bonds to private investors to raise operating funds. Water rents, when paid by the planters, would be returned to investors rather than put into the system itself.[75]

There are records of multiple land development companies connected to Robertson operating as separate corporations in contract with San Benito Land and Water Company for the provision of water. In 1911 Robertson was represented as the Vice President of the Espiritu Santos Irrigated Land Company and as President of the San Benito Irrigated Land Company. In its agreement with the Espiritu Santos Irrigated Land Company, the San Benito Land and Water and Company would construct laterals across 2,500 acres of subdivided land for $25.00 an acre and canal easements.[76] The contract with the San Benito Irrigated Land Company was more complex, especially given Robertson's positions with the boards of both companies. The Land and Water Company would provide water to land developed by the Irrigated Land Company, on the northern end of the original San Benito holdings, in exchange for the installation of new pumps and engines at the Land and Water Company's pumping plant.[77]

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[75] Knight and Associates, *A History of Irrigation in the Lower Rio Grande Valley*. (Report prepared for Texas Department of Transportation, Environmental Affairs Division, June 2007), 44.

[76] "Meeting Minutes," Cameron County Irrigation District #2, November 13, 1912.

[77] Ibid.

The agreement stipulated that the equipment would be modern and economical, qualities that were subject to the approval of the irrigation system's engineer. The Espiritu Santos Irrigated Land Company would retain ownership of the pumping equipment installed on the Land and Water Company's property and would be responsible for the construction of any ditches needed to connect the lands to the existing canal system. It is presumed that this was a way for the Land and Water Company to improve its pumping plant through the profits from real estate sales rather than water rents, which likely would not have supported the project. However, this agreement would prove to be a problem for many years. In several years time, as reflected in various district board meeting minutes, only part of the pumping equipment was purchased and installed.

As the 1910s progressed, although the Valley was still experiencing growth, the gilding began to wear off. During this time, many Valley planters abandoned rural property for towns or to return to their home states as violence along the border increased. The Mexican Revolution began in 1910 when the Mexican government was overthrown and many Mexicans sought refuge in Texas during the war. Struggles against discrimination by Anglos led to armed resistance in the Valley. This came to a head in 1915 when a plan was discovered that called for an uprising of Mexican-Americans to reclaim Texas and other former Mexican territories. After attacks in other towns and ranches within the district, the mayor of San Benito created a special police force consisting of all the men between the ages of 21 and 60 to provide twenty-four hour guards and enacted strict curfews.[78] In response to the increase in attacks by revolutionaries, Valley representatives including Robertson went to Washington, D.C., to request military aid. In 1915 and 1916, 50,000 Army and National Guard troops were sent to the border.[79] The influx of troops provided a built-in customer for many planters, and for some planters there was surprising prosperity during this time. The declaration of war by the United States on Germany in 1917 removed most of the troops from the border, but prices for staple crops

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[78] Kearney, 49.

[79] Robertson himself joined the U.S. Army in 1916, signaling an end to his involvement with the irrigation system. He served as a scout under General John Pershing during expeditions into Mexico for Francisco "Pancho" Villa and other Mexican Revolutionaries. After nearly dying in Mexico, he went to Europe in 1917 where he led Army engineering divisions in building light rail systems in France, for which he was awarded the Army Distinguished Service Medal in 1919. Robertson stayed in Germany after the end of the war to assist in rebuilding efforts there. After returning from Europe, he was elected sheriff of Cameron County in 1922 on the basis of his opposition to the Ku Klux Klan, which was attempting to gain power in the area. In the late 1920s he took up development projects along the coast and was instrumental in planning the Port Isabel-San Benito Navigation District. Robertson built the Valley's first seaside resort on Padre Island, Del Mar, which was destroyed by a hurricane in 1933. The "Father of San Benito" died on August 22, 1938, in Brownsville and was buried in San Antonio. Kearney, 51; "Robertson, Samuel Arthur," *Handbook of Texas Online* http://www.tshaonline.org/handbook/online/articles/fro32, accessed December 9, 2011; "Valor Awards for Samuel Arthur Robertson," *Military Times Hall of Valor*, http://www.militarytimes.com/citations-medals-awards/recipient.php?recipientid=18095, accessed December 9, 2011.

rose during World War I contributing to the economy of the Valley. The local conflict was then followed by flu and diphtheria epidemics in 1918 and 1919.[80]

Even Heywood experienced personal financial difficulties during this period. In 1912 the San Benito Nursery venture was successfully sued by another area nursery.[81] He accrued over $16,000 in back water rent charges to his own land, and some of his land holdings were auctioned by the county sheriff for unpaid taxes.[82] Based on deeds, business contracts, and other documents, both Heywood and Robertson appear to have juggled their personal finances among many business ventures and bank accounts, even including, in Heywood's case, purchasing property in his wife's name. Heywood's personal papers include multiple requests for repayment of bank notes that were returned without payment.

Despite its attempts at expansions to gather capital, the San Benito Land and Water Company did not have the necessary funds to continue business and filed for receivership protection, a form of bankruptcy, on July 31, 1913.[83] Robertson and Fred Emert were appointed as receivers.[84] Robertson's San Benito Irrigated Land Company had yet to fulfill its contract for installation of new pumping equipment, although two 48" pumps had been purchased. Despite its debt problem, the Land and Water Company offered $85,000 towards the purchase of an engine and the installation of the system, likely in the hopes that the additional pumping capacity would garner more water rents.

In 1913 a new act by the state legislature was passed to clarify water rights issues in the state and to provide for a formal process of appropriating water rights through the creation of the Board of Water Engineers. The Irrigation Act also expanded on the 1904 amendment allowing for the creation of water districts by simplifying the process of approval and establishment. Rather than going through the state legislature, districts could now be created by a public election approved by two-thirds of the property owners in the proposed district's boundaries. In keeping with the previous law, water districts, as political subdivisions of the state, could issue bonds to purchase, construct, and improve systems for public service. The first irrigation district established under this law, which was written by Lon Hill, was the Cameron County Water Improvement District No. 1, formed out of Hill's Harlingen Land and Water Company. Hidalgo Irrigation District No.

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[80] Kearney, 49–50.

[81] Abstract of Judgment, The Texas Nursery Company vs. The San Benito Nursery Company Unincorporated, October 28, 1912 (filed December 12, 1912), Cameron County, Texas, Judgment Record Volume A, 72.

[82] Release of Water Lien, Cameron County Water Improvement District #2 to Alba Heywood and Mrs. Alba Heywood, Dated October 19, 1917 (filed November 5, 1917), Cameron County, Texas, Volume 56, 320–324.

[83] Sonia Kaniger, "Historical Features Assessment of Cameron County Irrigation District No. 2" (unpublished report for Section 106 Review purposes submitted to the Texas Historical Commission August 26, 2004), San Benito, Texas, 8.

[84] "Meeting Minutes," Cameron County Irrigation District #2, November 15, 1913

1 and the Union Irrigation District were other early public districts. Because of the various economic challenges in the last half of the 1910s, all but one of the original private irrigation systems were purchased either by newly created public districts or by new private entities.

Cameron County Irrigation District #2

Over the next three years it was clear that the San Benito Land and Water Company could not survive and its directors began to work with property owners towards creation of an irrigation district. They filed with Cameron County on June 10, 1914, to protect their rights to water from the Rio Grande for 78,000 acres of land. An election in the district was held on July 25, 1916, in which voters approved the creation of the Cameron County Irrigation District #2. The district was officially created on August 2, 1916,[85] with first Board of Directors consisting of Alba Heywood,[86] James Landrum, Richard Mitchell, N. R. Shafer, and P. R. Foley. Foley was elected President and Heywood Secretary at their first meeting on August 15, 1916.[87] Their first order of business was to place advertisements in industry magazines about the formation of the district to elicit correspondence from equipment manufacturers and prospective district managers. The directors of the Land and Water Company requested that the federal courts foreclose on the liens on their property and that the assets be sold off.

A second election was held in December of 1916 to approve the issuance of $600,000 in bonds, including $360,000 to purchase the irrigation system and $240,000 to undertake repairs and improvements to it. The landowners in the district approved the measure with 123 out of 125 voters agreeing to the package. Bonds were issued in February of 1917 from the St. Louis Union Bank, and in April the board voted to change the organization to a Water Improvement District—a distinction that allowed for broader taxing authority under state laws. The pumping plant, canals, and other irrigation system elements were officially conveyed to the Water Improvement District on April 16, 1917.[88]

Work in the first year of the Water Improvement District involved extensive maintenance and improvement to the system. Construction began in 1917 on the Low Line Canal to provide water directly to the southern end of the district, alleviating the need for one main canal to supply water to the entire district. A team of men was hired to undertake that work, construction of other new lateral and diversion canals, and dredging of existing canals. The work was supported by the community, with local businesses making donations to support the workers' camps in the district. In the first year of operation, the board also agreed to supply water to Rio Hondo and set a price at 5 cents per 1,000 gallons for that city's municipal system and that of San Benito.[89]

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[85] Kaniger, 8.

[86] The board voted October 19, 1917, to forgive all of Alba Heywood's back rents.

[87] "Meeting Minutes," Cameron County Irrigation District #2, August 15, 1916.

[88] "Meeting Minutes," Cameron County Irrigation District #2, April 18, 1917.

[89] "Meeting Minutes," Cameron County Irrigation District #2, April 13, 1917.

The 48" pumps purchased under the contract with the San Benito Irrigation Company were installed, though it was quickly discovered that the pumping capacity of the new pumps when added to that of the existing pump was greater than the carrying capacity of the canal. Consequently the pumps' suction pipes collapsed. Numerous alterations were made to the headworks during the early operation of Irrigation District #2 although details on exactly when specific repairs were made are unclear. In August 1917, a portion of the headgates collapsed when too much water was pumped into the system while the Rio Grande was low and the pressure of water in the canal "forced an opening under the concrete floor of the big pit at the Headgates and had caused the sheet piling in front of the head wall to leave its position and allow a heavy flow back from the canal into the River."[90]

This August 1917 incident led to new plans for the installation of new pumps at the headworks and, likely, to the construction of a new structure over the headworks. Shortly after the report of damage, bids were solicited for "reroofing the Headgate Plant"[91] and this is presumably when the original pumping plant was replaced. The new building was a larger metal and wood clad frame structure built on the same location as the original plant, with a corner canted over a pumping channel in the headworks. An immense brick smokestack was constructed along with a wooden shop building.

The budget for the year 1918 included hiring an assessor and collector. The district clearly still had issues collecting water rents as all construction projects except those related to the Low Line Canal were suspended in the spring until flat rate payments could be collected. With the pumping plant still under construction, it was reported that there were problems filling the *resacas*.[92]

In August 1918, the board called for the district engineer to "abandon plans previously agreed to and sheet pile the channel up to the present piling and floor the discharge pit, connect the 48 inch pumps where they were previously, and put in gates near the present piling to control the flow in case of high water."[93] This indicates the first plans to enclose the open area of the headworks between the original wall along the river and the secondary gates. Foundations for pumping equipment and a flooring system were installed in this pit and small wood frame buildings were constructed atop of the concrete walls to protect the machinery. Though there are no precise dates of construction, these structures were likely built between 1919 and 1921, when new equipment was purchased. In 1919, as part of the as-yet-unresolved contract for the lands owned by the San Benito Irrigation Company, a 600 horsepower De La Vergne engine, and a 60" American Water Works double volute pump were purchased. In 1920, the district added two new 300

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[90] Ibid.

[91] "Meeting Minutes," Cameron County Irrigation District #2, August 20, 1917.

[92] Ibid., December 26, 1917.

[93] Ibid., August 16, 1918.

horsepower Ingersoll Rand oil engines, and two 42" Cameron centrifugal pumps were purchased for the plant. These three pumps are still extant in the 1940s pump house.

During the years following the end of the First World War, the Valley began to boom again. Populations increased, in part due to the return of many soldiers who had been stationed in the area during the Mexican Revolution. The introduction of the mechanically refrigerated rail car simplified shipping. Construction of the first major highway out of the Valley, to San Antonio, increased the ease of both personal and agricultural travel. The production of sugar cane decreased and many small planters turned to vegetables and truck farming. Many absentee farming programs were developed to promote investment in the region. The citrus industry expanded exponentially throughout the decade, with the number of trees planted increasing from 300,000 to over 6,000,000 by 1930. As predicted, the population of San Benito doubled in that same period.[94]

The irrigation district's own booming improvement program in the 1920s was reflected in its finances. The flat rate for the year 1921 was raised from the original $3.00 per acre to $8.00, with the first crop watering charge set at $3.00 for all crop types and $1.50 for second crops.[95] Notable improvements to the system undertaken through the early 1920s included the pumping plant expansions, river protection (construction of levees near the headworks), construction of housing for ditchriders,[96] and construction of several concrete flumes in the system. Though canals in the San Benito system were originally constructed as unlined ditches, as early as 1921 there was discussion about lining canals and placing underground piping, to alleviate problems with seepage or overtopping of canals. In 1921, the new district manager, Sam Robertson's brother Frank, was sent to California to tour systems there and learn about seepage, canal lining, and drainage.[97]

The irrigation district remained involved in other public projects, just as the San Benito Land and Water Company had been. The district paid for street paving in the vicinity of the district office building in San Benito,[98] assisted in building a bridge in Rio Hondo,[99] entered into contracts to provide water to the San Benito Rio Grande Valley Railway and Central Power and Light plant,[100] and agreed to supply water for no charge to the school

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[94] *Texas Almanac and State Industrial Guide*. Dallas: A.H. Belo and Company, 1933.

[95] "Meeting Minutes," Cameron County Irrigation District #2, December 23, 1920.

[96] Ditchriders, or canal riders as they are now known, control the gates and the flow of water through the irrigation system. Each rider oversees a specified section of the district and is responsible for regulating water allocated to planters in that section through the operation of gates, as well as for the maintenance of canals and gates.

[97] "Meeting Minutes," Cameron County Irrigation District #2, June 23, 1921.

[98] "Meeting Minutes," Cameron County Irrigation District #2, October 24, 1924.

[99] "Meeting Minutes," Cameron County Irrigation District #2, July 23, 1925.

[100] "Meeting Minutes," Cameron County Irrigation District #2, December 20, 1924.

that had been built in Los Indios.[101] The rural telephone system that had been built by the Land and Water Company was sold off separately and reestablished as a new telephone company, based out of the irrigation district office headquarters.[102]

The 1920s also saw an increase in concerns about drainage in the Valley as flooding represented a serious threat to life, property, and financial investment. Major floods in the region could take out tens of thousands of acres of crops. Most districts had constructed levees along the river in their sections, with some districts working together to ensure continuity, but it was felt that a large-scale approach was needed to truly address the problem. Multiple organizations were formed by the water, irrigation, and drainage districts to communicate with the federal government and promote the need for greater flood control in the Valley. Cameron County Water Improvement District #2 was part of the Associated Water Improvement and Irrigation Districts of the Lower Rio Grande Valley of Texas. In June 1922, after a major flood across the region, the group joined with others to petition the United States Reclamation Service to undertake a study of flood control issues in the Valley and contributed $12,000 towards the work.[103]

The plan produced by the Reclamation Service called for new floodways, levees along the rivers and floodways, and new diversion dams. The plan was deemed too costly by Cameron, Hidalgo, and Willacy Counties, and a new plan was developed by a committee of engineers that would lower the proposed costs. Upon concerns voiced by the Mexican government that a flood control system built only on the United States side of the river would adversely impact their border lands, the project was taken over by the International Boundary Commission (IBC). The IBC was created in 1889 to resolve border disputes between Mexico and the United States and had also overseen disputes related to distribution of the Rio Grande's water. The Elephant Butte Dam on the Rio Grande in New Mexico was constructed in the 1910s under the authority of the IBC to alleviate flooding in the upper sections of the river as part of an agreement to guarantee certain water allocations to Mexico. The IBC set about to create a new plan for the Lower Rio Grande that would address the concerns of both the United States and Mexico. The levee system would not be completed until the 1930s.[104]

In the meantime, modifications to the San Benito Irrigation System continued to be made because the river continued to move and flood. In addition to flooding, a major concern of irrigation districts was that the river would continue to change course as it had historically. A change in course away from an established pumping plant could leave a

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[101] "Meeting Minutes," Cameron County Irrigation District #2, October 30, 1924.

[102] "Meeting Minutes," Cameron County Irrigation District #2, August 18, 1927.

[103] "Meeting Minutes," Cameron County Irrigation District #2, June 15, 1922.

[104] Plimpton, Kathryn and Chad Blackwell, *Historic Context for the U. S. International Boundary and Water Commission Lower Rio Grande Flood Control Project*, report prepared for U. S. Army Corps of Engineers, Galveston District, Office of Border Patrol Customs and Border Protection, and U.S. Department of Homeland Security (Englewood, CO: HDR, Inc, June 2012), 13–16.

district without water. This occurred at the Cameron County #2 pumping plant at Los Indios in 1925, requiring that the irrigation district build a channel to reconnect the pumping plant to the river. The district had to purchase the land now between the plant and the river from Lon Hill for the channel. The total of 56.01 acres cost $3,600, $3,000 of which were paid in the form of credit on Hill's delinquent water rents to the district. Despite the economic upturn during the 1920s, the district spent much of the decade upside down financially because of large construction projects and the number of landowners, like Hill, who owed back rents.

Through the 1920s, the district experienced some continued financial difficulty, related primarily to unpaid water rents. In some years the annual operating budget was equal to the back rent owed to the district. The district took out a loan of $10,000 from the San Benito Bank and Trust in 1921,[105] though in subsequent years, water rates were lowered in hopes that landowners would be encouraged to pay. To make additional funds, the district rented out space in their office building and began renting out tillable lands alongside canals.[106] Still, in 1927 the district borrowed another $10,000 to help pay bills.[107]

As the Great Depression began, San Benito's population was 10,753,[108] meeting expectations that the numbers would double from the 1920 census. The amount of irrigated acres in Cameron County had tripled to 155,804.[109] The Depression would be as bleak a period in the Valley as it was elsewhere in the country. By the end of 1930 the district had to borrow $15,000 on top of the $20,000 they already owed because they were unable to collect sufficient water rents to cover that year's budget.[110] District employees took voluntary pay cuts and the district took whatever measures it could to bring in additional funding. A contract was signed to allow a button company to mine the canals for mussels and shells.[111] The board also voted to supply water to landowners outside of the district boundaries, when available.[112]

By 1933 the district's financial problems were undeniable, and the district sought further remedies. Most employees were making two-thirds of their 1930 salary and the manager was making nearly one-third. The board voted to apply for a loan from the Reconstruction Finance Corporation for the district to repay debts to private lenders and businesses. They were granted a loan of $264,500. A Category 3 hurricane hit the area on

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[105] "Meeting Minutes," Cameron County Irrigation District #2, May 20, 1921.

[106] "Meeting Minutes," Cameron County Irrigation District #2, April 26, 1928.

[107] "Meeting Minutes," Cameron County Irrigation District #2, September 1, 1927.

[108] *Texas Almanac and State Industrial Guide*, 65.

[109] Ibid., 40.

[110] "Meeting Minutes," Cameron County Irrigation District #2, December 11, 1930.

[111] "Meeting Minutes," Cameron County Irrigation District #2, September 17, 1931.

[112] "Meeting Minutes," Cameron County Irrigation District #2, March 23, 1933.

September 4, 1933,[113] causing unspecified damage to the pumping plant and to private farmland. Bonds were issued to cover the damage to the pumping plant. Interest on delinquent water rents was waived for any landowners who were able to pay the full amount of owed rents.[114] The operating budget approved for 1934 was one-third of what it had been in 1930 and the district had debts and delinquent water rents totaling over $400,000. The flat rate was reduced to $2.00 per acre that year with a $1.00 per crop watering fee.[115]

In 1935 the flat rate was reduced, again, to $1.50, after what the District Manager described as:

> "… the hardest year on the farmer in the history of the District. They were already bowed nearly to the breaking point with the low prices for the past few years, the hurricane in 1934, the operation of the Bankhead Bill and its tax in 1934, then two freezes this past spring, killing most of the truck crop and damaging fruit and trees, then two hail storms striking part of the District, much of the land being forced to lie out on account of the cotton reduction program, and to finish them off it rained excessively during May, June and first part of July, which helped the boll-weevil to get most of what was left after the 'Triple A' and Bankhead Acts had gotten through with them." [116]

Property owners who applied for seed loans through the Farm Credit System of the federal Reconstruction Finance Corporation and who agreed to pay six months of flat rates in advance were given amnesty on crop liens so they could qualify for the loans. As an incentive to help planters pay delinquent water rents, the district collaborated with the city of San Benito to pay for the salary of an officer to assist homeowners in closing loans through the Home Owners' Loan Corporation. Work to maintain the canals and repair hurricane damage was undertaken through the Civil Works Administration (CWA).[117] CWA workers also built a golf course and public park in San Benito and completed a beautification project on the banks of the *resaca* through town. A Works

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[113] 1933 was the second-most active Atlantic hurricane season behind 2005, with 21 hurricanes.

[114] "Meeting Minutes," Cameron County Irrigation District #2, September 7, 1933.

[115] "Meeting Minutes," Cameron County Irrigation District #2, December 14, 1933.

[116] "Meeting Minutes," Cameron County Irrigation District #2, November 27, 1935. The Bankhead Cotton Control Act was a piece of legislation passed in 1934 by Alabama Representative William Bankhead after his 1933 Agricultural Adjustment Act did not garner the hoped-for results. The "Triple A" paid subsidies, raised from taxes placed on agricultural processing companies, to farmers who opted to limit their crop production and kill excess livestock. The Cotton Control Act placed a mandatory heavy tax on any farm or gin that produced more than their allotted quota. While the Cotton Control Act did successfully raise cotton prices, it was repealed by Congress in 1936 after the Agricultural Adjustment Act was deemed unconstitutional by the Supreme Court. "William Bankhead," *Encyclopedia of Alabama*, http://www.encyclopediaofalabama.org/face/Article.jsp?id=h-1366, accessed December 12, 2011; "Agricultural Adjustment Administration," *North Carolina History Project*, http://www.northcarolinahistory.org/encyclopedia/290/entry, accessed December 12, 2011.

[117] "Meeting Minutes," Cameron County Irrigation District #2, December 14, 1933.

Progress Administration project in the drainage district improved existing drains and built new ones. In 1938, the district applied for an additional, smaller loan through the Reconstruction Finance Corporation for repairs and improvements to the irrigation system, including construction of a small settling basin. There were fewer acres in the district under cultivation in that year than had been in 1930, and San Benito's population had dropped by 10 percent.

In 1940, Frank Robertson marked his twentieth year of serving as the district's manager and chief engineer with a tribute to the employees of the district that recapped his years there:

> "We have gone through many ups and downs in the past twenty years. Some years have been prosperous and others hard to survive. We have built up the system from a run-down outfit to second to none in this Valley; have installed 600 HP of new Diesel engine power and 100,000 GQM of pumping capacity; rebuilt a large part of the canal system; changed from wooden headgates, checks, flumes, siphons and a number of bridges to concrete and other permanent structures; bought, or built, 8 dredges of various types and other equipment and paid for it; built 1.1 miles of concrete lined open canal and 23.5 miles of underground pipe distribution canals and many other improvements without increasing our bonded debt, and at the same time have reduced our Maintenance and Operation charges from a maximum of $8 per acre per year Flat Rate to $6, $4, $3, $2.27, $2, and for the past five years to $1.50 per acre per year and the water charge from a maximum of $3 to $1 per acre per watering and one large source of gratification has been that we have at no time been unable to deliver water when wanted, when there was any in the river to pump. During all this period of depression we have never missed a 'pay day' to our employees, nor been on 'scrip.'"[118]

Maintenance on the District system during the World War II years continued to be minimal as there were limited materials available to complete any projects. In the first year of the war the district engineer stockpiled gasoline to guard against future rationing. Nevertheless, the district managed to relieve themselves of all major debts by 1943. Construction expenses increased slowly after the war, allowing for repair and lining of canals and new underground pipelines.

Other local concerns in the early 1940s centered on the availability of water. The threat of new water storage reservoirs off the Rio Grande in Mexico prompted fears that Mexico would use all available water for their own irrigation projects. Some Texans began pushing for the U.S. government to plan for its own system of reservoirs and canals to siphon water for the sole use of the Valley. This led to the signing of the Water Treaty of 1944. The treaty called for the construction of the Falcon Dam and Reservoir to supply water and hydroelectric power to both the United States and Mexico in equal proportion.

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[118] "Meeting Minutes," Cameron County Irrigation District #2, May 6, 1940.

The earlier so-called "Valley Gravity Project" did not entirely die, though, and was pushed by some groups' suspicions of Mexico's intentions for several more years. The project would have constructed 239 miles of concrete main and lateral canals across the Valley from below Falcon Dam. It would have provided water to all irrigation districts in the Valley, including 683,000 acres of land for a total cost of $126 million, over half of which the Valley would have to provide. A vote was held in July of 1949 in which landowners in most districts voted against plan. The board and manager of Irrigation District #2 were solidly against the plan and spent their time focused on more pressing concerns.[119]

In 1944 a total of $26,900 was allotted for new construction in the district; $18,000 was dedicated to constructing rights-of-way for a proposed new storage reservoir and settling basin, which would serve to alleviate some maintenance costs of the district by requiring less frequent canal dredging.[120] In 1945, the flat rate was raised for the first time in a decade, to $2.00 per acre. Total maintenance and operation costs in 1945 were over $200,000, double the average annual cost during the 1930s.[121] A 700-acre storage reservoir and settling basin was constructed during 1945 and a second 325-acre basin begun, both located along Military Road northeast of the pumping plant.[122]

Postwar Rebuilding of the Cameron County Irrigation District #2 System

By the end of the war, with fifteen years of only minimal maintenance, the Cameron County Irrigation District #2 system and pumping plant were in poor shape. The district began looking towards major improvements to the system as the economy recovered and as machinery and building materials were once again readily available. The 1947 end of year report shows that 725 gates were replaced or repaired, thirty-two wooden bridges over canals were replaced with concrete bridges, fifty-five new structures were installed to deliver water from canals to farmlands, and five underground pipelines were installed. Considerable work was also carried out on the drainage system.[123]

In 1946, a year in which the Valley experienced a severe water shortage, the district solicited bids for a new engine and pump for the pumping plant. The district set aside $120,194 in the 1947 budget for improvements to the system. This included funding to purchase new pumping equipment as well as $5,000 for the pumping plant building, specifically to include, "the roof over the New Pump as well as replacing the old Building over the 60" pump and the 36" pump."[124]

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[119] "Meeting Minutes," Cameron County Irrigation District #2, August 11, 1949.

[120] "Meeting Minutes," Cameron County Irrigation District #2, December 16, 1943.

[121] "Meeting Minutes," Cameron County Irrigation District #2, December 7, 1944.

[122] "Meeting Minutes," Cameron County Irrigation District #2, December 20, 1945.

[123] "Meeting Minutes," Cameron County Irrigation District #2, November 26, 1947.

[124] "Meeting Minutes," Cameron County Irrigation District #2, September 26, 1946.

It appears that the district decided to replace the entire existing pumping plant, which dated to approximately 1917, with multiple later additions. They referred to this new structure, everything built on top of the concrete headworks, and pumping pits, as the "roof" of the plant in meeting minutes. New pumps would be added to the southern end of the pumping pit, where the very first steam plant sat.[125] They would then construct a new "roof" over all of the pumps, new and old, to create a single, unified structure. They planned for this new roof to be constructed of metal.

Initial plans for the new pumping structure were stalled because all area contractors had sufficient work to keep them busy and none were interested in working at the pumping plant where the foundations were irregularly shaped. The district manager proposed that the district build the new building themselves, estimating that a "frame building with ship-lap and Tenneseal or Corrugated iron roofing" could be completed for a cost between $7,000 and $10,000. They also planned to have a machine shop constructed at the pumping plant site, budgeted at $15,000.[126] These are the structures that remain at the plant today.

There are only few, vague references in minutes from district board meetings to use in reconstructing these events. The minutes carry simple progress updates that the work is ongoing and is accomplished when the staff finds time. The construction of the warehouse was bid out by a private contractor in 1949, as it was a new building and therefore did not pose the same construction challenges as the pumping plant. The local newspaper reports only on the project as a reroofing of the pumping plant—a simplification given the considerable structural work. No fanfare was made when the work was completed in 1949, despite the extensive undertaking that it was and the improvements that the new engines promised to the system as a whole. In contrast, the *San Benito News* featured many front page articles and dedicated an entire edition of the paper to the renovation of Central Power and Light's La Palma power plant in the former San Benito Sugar Mill.

In 1947, the district also made an official request of the Missouri Pacific Railroad, which had acquired all the Valley-area rail lines in the 1920s, to remove the tracks of the San Benito Rio Grande Valley system. Because the highway system in the area had improved, Robertson's Spider Web, once integral to the economy of the district, was now in the way. Crops were still shipped out of the Valley by rail, but were delivered to processing plants and rail yards by truck.[127]

Despite other technological changes in agriculture, irrigation technology had not changed significantly since the early twentieth century. The District's oil and diesel gas engines that operated the pumps were replaced with natural gas and electrical engines at unknown

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[125] "Water District Buys New Pump Equipment," *San Benito Light*, December 12, 1946.

[126] "Meeting Minutes," Cameron County Irrigation District #2, November 26, 1947.

[127] "Meeting Minutes," Cameron County Irrigation District #2, September 11, 1947.

dates. An engineering report completed in the 1960s concluded that despite the deficiencies in the pumping plant it was not economically feasible to completely replace it.[128] In the 1970s, a vertical lift pump was installed on a steel pier structure over the water adjacent to the pump house.[129]

Cameron County Water Improvement District reverted back to Cameron County Irrigation District #2 effective February 1, 1981. In 1991 Cameron County Irrigation District #13 was joined to the northern end of the district, bringing the total acreage of District #2 to nearly 100,000.[130] The majority of projects accomplished in the last half of the twentieth century include replacement of gates, lining of canals or replacement of canals with pipeline and routine repair and upkeep. District employees describe their work as near constant maintenance. No alterations were made to the headworks or the 1940s pumping plant, short of the changes to the pumping equipment.

In recent years, the district has undertaken large projects under the federal Lower Rio Grande Valley Water Resources Conservation and Improvement Act of 2000. This act aimed to identify ways to improve water access and water systems along the Rio Grande and to provide funding for engineering and construction of identified projects. With this assistance, Cameron County Irrigation District #2 constructed a major new pipeline to better serve the farms previously in District #13 and a new pumping plant. When the new plant was constructed in 2004, the 1940s plant, with its six pumps ranging in age from 1918 to the 1970s, was able to pump only 510 cubic feet per second (cfs). The engines of the new plant have the capacity to pump 700 cfs, 100 cfs more water than the canal will hold, accommodating for shutting down pumps for maintenance. The new pumping plant was projected to be able to save the district 2,171 acre-feet of water and 721,904 kilowatt-hours year.[131] Current charges in the district are an annual operation and maintenance assessment of $30.00 for the first acre of land watered by a farmer and $9.50 for each additional acre along with a water assessment of $7.00 per acre per irrigation.[132]

Today, Cameron County and the Valley are still leading producers of many crops in the state. Seven percent of cotton produced in Texas comes from the Valley, and 75 percent of onions. Virtually all citrus grown in Texas comes from the Valley. Cameron County

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[128] Johnson Consulting Engineers Planners, "Plan of Rehabilitation: Preliminary Engineering Report, Cameron County Water Improvement District #2," June 1967, http://idea.tamu.edu/documents/plan_of_rehabi.PDF, accessed December 9, 2011.

[129] Kaniger, 9.

[130] Ibid, 2.

[131] "Cameron County Irrigation District #2," Border Environment Cooperation Commission http://www.cocef.org/aproyectos/ExComCameronCounty2003_09ing.htm, accessed December 12, 2011.

[132] Kaniger, 2.

produces 12,500 acres of sugar cane and 78,000 acres of sorghum grain a year.[133] Tourism plays a large role in the economy of Cameron County, but agriculture is still the primary source of income. Although San Benito was outgrown by Harlingen and other Valley cities, it is still a significant agricultural center. Cameron County Irrigation District #2 is one of the largest irrigation districts in the Lower Rio Grande Valley today, being allocated a full 10 percent of all water allotments of the Rio Grande below Falcon Dam, still operating largely with the system built more than 100 years ago.[134]

Part II. Structural/Design Information

A. General Statement:

1. Character:

The San Benito Irrigation System, also known as Cameron County Irrigation District #2, is significant as an example of an early Lower Rio Grande Valley agricultural irrigation system. When originally designed circa1907, the system was unique as the only one in the area intended to operate primarily as a gravity irrigation system taking advantage of the landscape where it was constructed. Although the gravity system never functioned on its own, due to the quick expansion of the district, it is representative of the spirit and intentions of its builder.

The pumping plant stands as a symbol of the history of the district. The structure was altered numerous times in its history, even into the twenty-first century. Most changes incorporated existing and historic features including the original headworks and pumping equipment and other alterations dating to the circa 1917 plant. The original headgates exist, clearly understandable, within the layers of later alterations. While much information regarding dates and exact plant configurations is unknown, the major changes to the plant can be traced. Minor modifications were carried out in the 1910s, but the plant structure has changed little in appearance and function since the last major alterations in the late 1940s. Though it is largely nonoperational, pumping equipment left in the plant spans an eighty year period of time, demonstrating that technological changes were few and illustrating how changes have been incorporated along side the original.

The rest of the system has only changed minimally in the century since it was first begun. The canals and *resacas* that were built by Sam Robertson in the early 1900s still carry water throughout the system. Canals and ditches have been added to the original plan, as needed, and some open canals have been traded for underground pipelines, but the overall plan of the system is still based on the original plans. Many

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[133] "South Texas Industry Profile: Agriculture," Texas Comptroller of Public Accounts, http://www.window.state.tx.us/specialrpt/tif/southtexas/sidebars/agriculture.html, accessed December 12, 2011.

[134] Megan Stubbs et al., *Evolution of Irrigation Districts and Operating Institutions: Texas Lower Rio Grande Valley* (College Station: Texas A&M, Texas Water Resources Institute, July 2003), 19.

of the original subsidiary structures, such as the locks, have been lost or heavily modified. Because technology and design of water gates did not significantly change throughout most of the twentieth century it is virtually impossible to identify the dates of these specific features, or to identify which of them have been altered. However, this means that overall character of the open canals remains. Much of the district retains its rural character, with flowing canals bordering active crop land and standpipes dotting the sides of highways. In the town of San Benito, the remains of water works and cotton gins along the *resaca* illustrate the *resaca's* irrigation function, juxtaposed with the picturesque park that runs the length of its banks.

The operation of the system is vital to the area. Although major technological upgrades are desired for the district, the cost to line or pipe all the canals for increased efficiency would be prohibitive. The system will likely continue to operate as originally planned for the foreseeable future.

2. Condition of fabric:

The historic pumping plant is in fair to poor condition. It has seen little maintenance over time and none since the construction of the new pumping plant in 2004. Historic equipment remains inside the structure though it is not operational. When the new plant was built, portions of the original High Line and Low Line canals connected to the original plant were infilled. The new plant connects to the canals through large, underground, concrete pipes. The location of the heads of the original canals can still be read in the landscape.

The earthen canals of the system are in good condition. They have undoubtedly changed shape and size over time as they are routinely dredged for silt and the walls are rebuilt as needed to correct for erosion. However, their basic configuration and dimensions remain generally as constructed. Both the High Line and Low Line Canals have been realigned and placed into underground pipes at the headworks, in conjunction with the construction of the new pumping plant. Although this does represent a loss of historic integrity, the relationship between the canals and the historic plant is still clear. The condition of historic pipelines in the district is unknown, though some have been replaced over time.

The one remaining historic lock, lock # 2, is in poor condition. It has been altered multiple times, first with replacement of the swinging lock gates with vertical lift gates, and then with construction of an automobile bridge across the top. One of its side walls is largely missing. The roadway over it has been blocked and is presumably structurally unsound for the passage of cars.

Gates and other structures throughout the system have largely all been altered to some extent. Most concrete superstructure work is in fair shape, with spalling and cracking as expected for minimally maintained structures. Most wooden and metal elements have been replaced over time due to natural deterioration from continual water exposure. These should generally be considered sacrificial elements and are most

commonly replaced with similar materials and technology. The function of the gates remains the same in most instances. Twenty-one gates in the system have been replaced with solar-powered, computerized gates fitted into historic concrete superstructures. This represents a small portion of the unknown number of total gates in the system.

B. Description

All irrigation systems in the Valley consist of the same basic elements to move water from the river to farmland: pumping plants with headworks, main canals, lateral and other sub-canals, underground pipes, and various types of gates and standpipes. Water is removed from the river, generally, through mechanical pumps and is moved into the headworks. The various parts and chambers of the headworks control the speed and flow of water as it is discharged into the canals. Main canals feed lateral canals, which can lead to secondary and tertiary canals and underground pipes. The flow of water between canals and into agricultural fields is controlled by different types of gates which serve to not only control where the water is allowed to go, but at what speeds, which is essential to the operation of the overall irrigation system. Each system, of course, has features unique to itself.

Because the land in the Valley generally continues to slope upward as it moves away from the riverbank, most irrigation systems have at least two, and sometimes three, lift stations, or pumping plants. First lift plants are located directly on the river and pump water up to introduce it to the canal system. At needed intervals along the main canal, where natural ridges occur in the landscape, the second or third plants in the canal lift the water again. The San Benito system is unique in that it has only one pumping plant, to lift water from the Rio Grande, owing to the low slope of the land away from the river.

Irrigation pump stations contain numerous large centrifugal pumps powered by high-horsepower engines. The pumps are generally placed in concrete pits within simple industrial structures below ground level along the riverbank, or bank of a separate river channel in some instances. Large suction pipes extend out from the structure into the river to draw the water in. Early engines were steam powered and connected to large, wood-burning boilers and large brick chimneys. Through the course of the century, as plants were upgraded, engines were replaced with newer technology: first oil or diesel gasoline-driven engines, then electric with modern engines being controlled by computerized systems. The change in equipment was often reflected with a change in the structures that housed them, which is true for the pumping plant at San Benito.

An integral part of the pumping plants are the headworks. Headworks provide for control, regulation, and metering of water as it moves from the pumps into the canal system. They are constructed of a series of chambers and stalls connected to the pumps inside the pumping plant structure. The various pipes, chambers and canal discharges are separated by gates or flumes that control the amount, speed, and force of the water flowing into the

main canal. The velocity of water as it enters different parts of the canal system is essential to maintain proper movement of the water through the canals.

The pumping plant and headworks of the San Benito Irrigation System are described in greater detail as HAER-TX-132A.

Though San Benito has only one pumping plant, some irrigation systems in the Valley require second or third plants to lift water up at natural ridges in the land. In addition to these, smaller pumps are sometimes required to move water from the main canals up smaller changes in elevation to private lands. Cameron County Irrigation District #2 allowed for lower watering rates for farmers that needed these pumps to water their lands because the pumps were privately constructed and operated. One of these pumping stations exists on the Low Line Canal, along the access road to the pumping plant. A small structure covered in corrugated aluminum encloses the pump. The pump was installed at a late enough date that it pumps water into an underground pipeline.

Once the water leaves the headworks, it enters the main canal. Canals are the primary feature of an irrigation system—no matter how the water enters the system, it is moved from the entry point to the fields by canals. Main canals are wide and shallow with a low downward slope, generally of approximately 2’ per mile as a standard. The manmade portions of the main canal in the San Benito system are 50’ wide. Those portions of the main canal utilizing the existing *resacas* are up to 250’ wide. The majority of the High Line Canal in the San Benito system is made up of *resacas*, as noted with its curling and looping path. The *resacas* were connected to each other and to the pumping plant with manmade sections of canal. All other canals in the system are manmade and are straight.

Canals of older irrigation systems generally have flat bottoms and angled side walls because that was the simplest shape made with the equipment available. Canals were historically dug by large mechanical machines pulled by teams of horses. As the machines were pulled forward they would scoop dirt from the ground, carry it up a conveyor, and dump it alongside the canal, forming the banks while creating the ditch. The optimal shape, to reduce friction and erosion, has a rounded bottom, a shape which later or smaller canals tend to take.

The main canal, or canals as is the case in San Benito, carry water along one path through the length of a district. Water is not supplied from the main canal directly to the fields, but rather moves directly into lateral canals. Lateral canals are smaller ditches that run alongside fields, at a higher elevation to allow the water to move by gravity into the fields. In a given system there are secondary and tertiary lateral canals crossing the district that feed off the primary laterals from the main canals. When originally laid out, the San Benito system was intended to provide a lateral to every 40 acres of land. As original farm sites were broken up over time, more lines were constructed to reach more farms. As of 2011 there are approximately 323 miles of canals and pipelines within the Cameron County Irrigation District #2 including approximately 202 miles of canals, both main and lateral, and 102 miles of underground pipelines.

Smaller lateral canals are built with a steeper slope to achieve the proper water speed. Water flowing too fast causes excessive erosion of the canal banks and a build-up of silt within the canals, which causes the water to slow, allowing for the build up of aquatic plants. Most irrigation districts, including San Benito, began lining open canals in the 1920s or 1930s to improve the functionality of the systems—lined canals reduce erosion and seepage and allow water to flow more smoothly. Underground pipes also began to be utilized at this time, though for generally as a replacement for smaller canals only. San Benito began installing underground pipe in lieu of some open canals in the 1920s.

Underground pipes are the modern standard for new laterals and for improvements to existing laterals because they alleviate seepage and erosion. Underground pipes are characterized above ground by the presence of concrete standpipes, which allow for trapped air in the pipes to vent out and for placement and control of gates in the pipe system. There are a wide variety of sizes of standpipes in a given system, relating to their age, the size of the underground pipe they are connected to, and the number of gates they allow access to. All aboveground canals are flanked by banks and a road on at least one side of the canal, if not both, to allow access to the canals for maintenance and operation. The district owns the land on which the canals were built. The roads are sometimes owned by the district as well, but are often located on easements given by the owner of the farm flanking the canal.

The district has rights to divert 164,381.15 acre-feet of water per year from the Rio Grande; 147,823.65 acre-feet of the allotment is dedicated to irrigation uses and the rest is for municipal and industrial uses.[135] Within the district are the towns of San Benito and Rio Hondo, totaling over 60,000 residents, which receive municipal water from the irrigation system, as do two private water supply companies. The Central Power and Light plant, which provides power to up to 800,000 customers and continues to operate in the historic former San Benito Sugar Mill building, also continues to receive water from the system. The average amount of water actually diverted by the district is approximately half its overall allotment. The reported water conveyance efficiency, the ratio of the amount of water delivered compared to the amount of water pumped into the system, was originally only 40 percent.

As the canals and ditches cross irrigation districts for miles, they are often crossed by roads, or must cross other geographic features. Flumes move water over depressions in the landscape or over other canals. Flumes were largely wood in the early periods of construction but were quickly replaced with concrete, and can either be fully enclosed, rounded pipes or open boxes. Because smaller amounts of water are channeled, the water must be controlled as it enters the flume to reduce the amount of water being allowed into the flume at once, and as it exits to reduce turbulence and maintain the speed of the

[135] An acre-foot is a cubic measurement that describes the amount of water needed to cover an acre of land in a foot of water. It is equal to approximately 43,560 cubic feet of water.

connecting canal. Flumes often have small headworks, with several small gates associated with them to achieve this. There were multiple concrete flumes constructed within the historic period of the San Benito system, though only one was located during this project's field research, off Nelson Road just south of Fresnal Road and west of Arroyo Colorado Estates. This large box flume, with associated headworks, connects two laterals across the main canal in the northern end of the district. At road crossings canals move through metal or concrete culverts, which can be box-shaped or round. Because these have been replaced over time as needed for road repairs, there is no standard design. Often, water is funneled into concrete siphons at one end of a culvert to manage the velocity of the water so that it will continue to flow once it has moved under the width of the road.

Another feature introduced to an irrigation system to help control the flow of water is a weir. Weirs can be placed at the openings to inlet channels, in flumes, and in canals to slow the flow of water at a specific point in the system, to limit the amount of water entering a certain feature of the system, and possibly to measure the amount of water passing through the system. Weirs can either be drop weirs that function much like a dam, or submerged weirs where only walls can be seen above the water. Similar features on the San Benito system were the original lock structures, built to increase the elevation of the water as it moved through the main canal and *resaca* system. There were five locks constructed between the pumping plant and the *resacas* in the city of San Benito; the locks had large swing gates that could be opened to allow for the passage of boats as well as water. One lock remains, Lock #2, located south of the city of San Benito, where West Hudson Road crosses the main canal. This lock has been significantly altered at unknown dates. The first alteration was the removal of the swing gates and replacement of three vertical lift gates. A second alteration was the construction of a roadway over the lock. Support posts were placed through the middle of the lock cutting the former boat path in half. The roadway has been blocked presumably because it is not structurally sound. The original walls of the lock are in poor condition, with one large angled wing completely missing.

A number of different types of gates and other features control the flow of water through the ditches and from ditch to ditch. Cameron County Irrigation District #2 has no record of the total amount of gates in the San Benito system because records were not kept regarding the construction of these features. Check gates are structures that span the width of a large canal and act like a dam to ensure that the water level in a particular section of canal is high enough to feed into neighboring laterals. Most gate superstructures are concrete, with the actual gates being made of metal or wood. Wooden gates are constructed of two or more layers of flat, dimensional wood, butt-jointed, with perpendicular strapping or battens bolted to the boards. Metal irrigation gates have existed since the late 1800s and are commonly round metal plates within a large metal frame. The check gates on the San Benito system, of either wood or metal, are generally lift gates, which move up or down in vertical channels by large threaded rods connected to manual turn wheels mounted on the gate superstructure. Given the nature of their use, being continually submerged or exposed to water, individual gates are regularly replaced,

though the technology and many of the specific mechanical elements remain unchanged. A check gate may consist of several individually operated gates depending on the width of the canal it crosses. The gates are designed to funnel water through the openings to increase the velocity of water as it passes into the next portion of the canal.

Gates that connect main canals to lateral canals, or lateral canals to other lateral canals, are called headgates. Headgates generally function the same as check gates, and are of similar construction methods, although they are smaller with only a single lift gate. Gates that connect laterals to ditches on individual farmlands are called take-out gates. Division boxes, concrete boxes with simple wooden gates, were also used to join multiple canals, allowing proportional amounts of water to flow into two canals at the same time, without manual gate adjustment. Historic gates have been commonly updated with mechanical motors or even computerized gates powered by solar panels, though given the vast number of gates that exist in a given system, the majority remain unchanged. Cameron County Irrigation District #2 has computerized twenty-three gates of an unknown number of total gates in the system.

The gates owned by the system, as opposed to those on farmlands, are controlled solely by the irrigation district. The districts employ a number of canal riders (or ditch riders as they were historically known) who each oversee all the gates in a given section of the system. Their job involves knowing where water is needed when and opening and closing the gates necessary to achieve that. Historically, canal riders worked on horseback, riding alongside the canals. They were required to provide and care for their own horses though housing was provided for them and their families in the section they oversaw. Today, the amount of water released from the Falcon Dam is controlled by the Watermaster, under the Texas Commission on Environmental Quality. The district's Water Supervisor places orders for water with the Watermaster based on the amount of water predicted to be needed in the various sections of the district in five days' time. The ordered water is released from Falcon Dam and takes five days to travel the length of the river to the inlet channel at the pumping plant. The district is then responsible for ensuring that they pump the ordered water, or else it will be "wasted" as it travels to the Gulf of Mexico.

The modern pumping plant at Los Indios has electronic meters on each pump and on the pipes to the canals to ensure that the use of water is precise. Prior to the introduction of these meters, water was measured by gauging stations required by the International Boundary and Water Commission (IBWC). As evidenced by irrigation district meeting minutes, the IBWC could require that a district install a certain number of gauges, sharing some of the costs with the district. These are typified by a small shed alongside a canal with a minimal structure spanning the canal that would support the gauge.

From a lateral canal, water is released to individual farms through take-out gates, which are simply smaller versions of other gate types. Today, most farms are connected to the system through underground pipes, though historically farms also had small private ditches connected to laterals. Most fields are laid out in furrows, where crops are planted in long rows of hills interspersed with small ditches. Water is released from a gate into

one furrow that runs the length of a field along its edge, perpendicular to the crop rows. Water flows from the main furrow into the others, soaking into the ground around the plants. With the invention of modern materials, small technological advancements have been made to this ancient system. Plastic piping, typical of smaller-scale irrigation systems, is sometimes used to direct water into the furrows. Most commonly in the Valley farmers use a polyethylene pipe, known as “poly-pipe,” to direct and push water into the furrows. This inexpensive fabric-like pipe, which is flat when not in use, is connected to the standpipes and rolled out along the length of the main furrow. When filled, the water builds up pressure in the pipe, forcing it out holes punched at intervals aligned with the furrows. When not in use, the pipe can be easily rolled-up for storage or moved to another field. Various types of underground irrigation or drip irrigation systems can be connected to the larger system in fields, but because these involve large installation costs they are not common.

A final and significant part of an irrigation system is the drainage system. When allowed to fully evaporate, the water provided for irrigation in the Valley leaves behind alkali deposits in the soil, making the soil unusable for agriculture. Drainage ditches allow run-off from fields, and even storm water run-off in urban areas, to drain back to the Rio Grande or to the Gulf of Mexico. Many early irrigation systems did not include drainage ditches in their original construction, and these were added later, usually by county drainage districts that function in much the same way as the irrigation districts. The San Benito Land and Water Company did construct drainage ditches as part of their original system and, in fact, advertised 1.5 miles of drainage ditch for every mile of irrigation ditch. The drainage ditches are smaller than the irrigation ditches and canals and run between them to capture run-off from fields. Still, maintenance and operation of the systems were early concerns and the Cameron County Drainage District #3, was established in 1912 to oversee the drainage system in the San Benito area. The drainage district still exists and operates in conjunction with Cameron County Irrigation District #2 and oversees issues related not just to crop drainage, but also drainage of rain water and potential flood waters.

The system has three storage reservoirs. The two largest are just northeast of the pumping plant, off of the Low Line Canal and hold 5,500 acre-feet of water. These were built primarily to act as settling basins. Settling basins allow silt to settle out of the water before the water enters the canals. Otherwise, the silt that enters the canals collects in them, causing water to move slower and requiring more frequent dredging of the canals. The Falcon Dam now acts as a massive settling basin for the Lower Rio Grande Valley and the San Benito System’s three storage reservoirs are now used only when extra water storage is needed. The smaller upper storage reservoir is located in the northern end of the district and is used to store water for periods of high demand.

C. Site Information

The Cameron County Irrigation District #2 covers a total of approximately 100,000 acres in agricultural areas and in towns, so the associated landscapes vary significantly.

The pumping plant site has been altered over time with the demolition and construction of buildings, changes to the river course, construction of levees, and construction of the U.S. Department of Homeland Security "border fence" on top of the levees. The immediate site is now smaller and built-up with the district's structures, including the new (2004) pumping plant, office, and paving. The former paths of the canals are visible in the landscape to some extent, as well as the location of the historic steam chimney. The only notable landscape feature is the small alley of desert willows along a sidewalk east of the office wing. This sidewalk leads to steps that descend to a large paved concrete area in the space contained by the pump house, office wing, and warehouse. Concrete footers flank the stairs and edge the paved area. Although the sidewalk and alley are not visible in any known historic photographs, it likely led to the entrance of the circa 1917 pumping plant structure.

Throughout the district, canals are noted by the rise in earth that forms their banks. Many canals are flanked with roads that allow access to fields and maintenance of the canals. In San Benito the canal banks are wide and flat with a recently built walking path along one section. Several major roads and the original SLB&M Railway cross the *resacas* in town. Two cotton gins and the city water treatment plant also sit on the side of the *resaca*. Historically, the road easements of the canal system were also the location for early phone and electric lines. Standpipes dot fields showing the location of underground pipelines.

The main canal runs in a generally northern direction, though the *resacas* flow in a series of undulating oxbows. Primary laterals run perpendicular to the canal, or to the point at which they join the canal. Gates and other system features can be found by following the roads flanking the canals. By understanding the function of different gates and other structures, their location can be predicted by studying the interaction of canals on maps. Historic gates and structures are found primarily in the southern portion of the district, between the pumping plant and San Benito. Although these structures do exist in other portions of the district, those areas feature more underground pipelines.

Part III. Sources of Information

A. Primary Sources

Alba Heywood Collection, University of North Texas Archives/Rare Books Department.

Deed and Supplements, Frances R. and James L. Landrum to S. A. Robertson, May 20, 1905 (Filed October 18, 1910), Cameron County, Texas, Volume 4, pages 408–423.

Deed, San Benito Land and Water Company to Alba Heywood, February 12, 1909 (Filed March 11, 1909), Cameron County, Texas, Volume P, pages 308–315.

Abstract of Judgment, The Texas Nursery Company vs. The San Benito Nursery Company Unincorporated, October 28, 1912 (Filed December 12, 1912), Cameron County, Texas, Judgment Record Volume A, 72.

Release of Water Lien, Cameron County Water Improvement District #2 to Alba Heywood and Mrs. Alba Heywood, Dated October 19, 1917 (Filed November 5, 1917), Cameron County, Texas, Volume 56, 320–324.

Batts, Robert Lynn. *Abstract of Title of Lands of San Benito Land and Water Co. in Concepcion de Carricitos, Cameron County, Texas*. Austin, TX: Von Boeckmann-Jones Company, 1910. Center for American History, The University of Texas at Austin.

Chatfield, William H. *The Twin Cities of the Border and the Country of the Lower Rio Grande.* New Orleans, LA: E. P. Brandao, 1893. Center for American History, The University of Texas at Austin.

Compton, William R. and Company. *Irrigation in Rio Grande Valley, Texas*. Reprint. St. Louis, MO: William R. Compton Company, n.d. [publication estimated early 1910s].

Halff Associates, Inc. *Report on Structural Investigation, Pump Station Building, Los Indios Texas, Cameron County Irrigation District #2.* September 2000. http://idea.tamu.edu/documents/investigation_report.PDF, accessed December 9, 2011.

Johnson Consulting Engineers Planners. “Plan of Rehabilitation: Preliminary Engineering Report. Cameron County Water Improvement District #2.” June 1967. http://idea.tamu.edu/documents/plan_of_rehabi.PDF, accessed December 9, 2011.

Meeting Minutes, Cameron County Irrigation District #2, San Benito, Texas. 1913–1958.

“Passenger Traffic Dept. Frisco Lines.” *Irrigation in the Gulf Coast Country of Texas,* privately printed brochure, unattributed as to printer/publisher, 1910. Center for American History, The University of Texas at Austin.

Prospectus, San Benito Sugar Manufacturing Company. The S. A. Robertson Company, 1911. Center for American History, The University of Texas at Austin.

San Benito Land and Water Company. *A Statement of Facts Concerning the Farming Lands and Gravity Irrigation Canal of the San Benito Land and Water Company: Which are Located in the Fertile Lower Rio Grande Valley, Cameron County, Texas, on the Main Line of the St. Louis, Brownsville and Mexico Railway.* Houston: Cumming and Sons, 1910. Center for American History, The University of Texas at Austin.

B. Secondary Sources

"Agricultural Adjustment Administration." *North Carolina History Project,* http://www.northcarolinahistory.org/encyclopedia/290/entry, accessed December 12, 2011.

Allhands, James Lewellyn. *Gringo Builders*. Privately published, 1931.

Ashton, John. "Kenedy, Miflin." *Handbook of Texas Online*. Texas State Historical Association, http://www.tshaonline.org/handbook/online/articles/fke23, accessed December 9, 2011.

"Batts, Robert Lynn." *Handbook of Texas Online.* Texas State Historical Association, http://www.tshaonline.org/handbook/online/articles/fbaal, accessed December 9, 2011.

Bloodworth, Morris E., and Paul T. Gillett. "Irrigation." *Handbook of Texas Online*, Texas State Historical Association, http://www.tshaonline.org/handbook/online/articles/ahi01, accessed December 9, 2011.

Bowie, Augustus Jesse. "Irrigation in Southern Texas." *U.S. Department of Agriculture, Office of Experiment Stations Bulletin.* Washington, D.C.: Government Printing Office: 1904.

Brownsville Historical Association. *Blast from the Past, Volume 1: A Windowto Yesteryear from the Archives of the Brownsville Historical Association*. Self-published, 1997.

Bureau of Reclamation, U. S. Department of Interior. *Plan of Development for Valley Gravity Project, Lower Rio Grande, Texas*. Washington D.C.: Government Printing Office, 1948.

"Cameron County Irrigation District #2," Border Environment Cooperation Commission. http://www.cocef.org/aproyectos/ExComCameronCounty2003_09ing.htm, accessed December 12, 2011.

Center for American History, The University of Texas at Austin
John Closner vertical file
Lon C. Hill vertical file
Irrigation vertical file
Sam A. Robertson vertical file.

Friend, W. H. "Citrus Fruit Culture." *Handbook of Texas Online.* Texas State Historical Association, http://www.tshaonline.org/handbook/online/articles/afc01, accessed December 08, 2011.

Foscue, Edwin, *Irrigation in the Lower Rio Grande Valley of Texas.* Booklet reprinted from the Geographical Review, Vol. XXIII, No. 3, July 1933.

Haywood, John. "A Brief Legal History of the Irrigation Rights Controversy of Lands Originating in Spanish and Mexican Grants in the Rio Grande Valley of Texas." Thesis, Texas Southmost College, 1974.

Hobbs, Richard. *Glamour Valley*. San Benito, TX: Cameron County News and Farm Journal, 1943.

Holleran, Michael. "Statewide Historic Context Study: Irrigation Ditches and Canals (Colorado)." Denver: Colorado Historical Society, 2005.

Honor to These Pioneers: In the Vital Work of Bringing Transportation Facilities to the Lower Rio Grande Valley… Gulf Coast Lines of the Missouri Pacific System, 1925. Samuel Robertson vertical files, Center for American History, The University of Texas at Austin.

Huie, Trudie Waddell. "A History of the Water Problems in the Lower Rio Grande Valley of Texas." Thesis, Texas College of Arts and Industries, 1957.

JRP Historical Consulting Services. *Water Conveyance Systems in California: Historic Context Development and Evaluation Procedures*. California Department of Transportation, 2000.

Kaniger, Sonia. "Historical Features Assessment of Cameron County Irrigation District No. 2." Unpublished report for Section 106 Review purposes, submitted to the Texas Historical Commission August 26, 2004. On file at the offices of the Cameron County Irrigation District #2, San Benito, Texas.

Kearney, Milo. "The Shifting Relationship Between Harlingen and San Benito in the First Three Decades of the Twentieth Century." In *Studies in Matamoros and Cameron County History*, ed. Milo Kearney, Anthony Knopp, and Antonio Zavaleta, 37–75. Brownsville, TX: University of Texas at Brownsville, 1997.

Knight and Associates. *A History of Irrigation in the Lower Rio Grande Valley*. Report prepared for Texas Department of Transportation Environmental Affairs Division. Buda, TX: Knight and Associates, 2007.

Knight and Associates. *Evaluation of the Irrigation System of Cameron County Irrigation District No. 2. (San Benito)*. Report prepared for Texas Department of Transportation Environmental Affairs Division. Buda, TX: Knight and Associates, 2007.

Lower Rio Grande Valley Water Users Association. *Gravity Irrigation News*. McAllen, TX: privately published, 1922–1948.

Matthews, William Kenneth. "A History of Irrigation in the Lower Rio Grande Valley." Master's thesis, University of Texas, Austin, 1938.

Mayer, Alice H. *Pioneer Days in San Benito.* San Benito?: n.p., 1964?

McKenna, Verna. "Robertson, Samuel Arthur." *Handbook of Texas Online.* Texas State Historical Association, http://www.tshaonline.org/handbook/online/articles/fro32, accessed December 9, 2011.

McNail, J. L. "The History and Development of Irrigation in the Lower Rio Grande Valley." Master's thesis, Texas College of Arts and Industries, 1948.

Olin, W. H. *American Irrigation Farming*. Chicago: A.C. McClurg and Company, 1913.

Plimpton, Kathryn and Chad Blackwell. *Historic Context for the U. S. International Boundary and Water Commission Lower Rio Grande Flood Control Project.* Report prepared for U. S. Army Corps of Engineers, Galveston District, Office of Border Patrol Customs and Border Protection, and U.S. Department of Homeland Security. Englewood, CO: HDR, Inc, June 2012.

Richards, John. *Centrifugal Pumps: An Essay on their construction and operation.…* San Francisco: The Industrial Publishing Company, 1894.

Robinson, Charles M., III. *A History of San Benito.* Harlingen, TX: Sand Dollar Graphics, 1982.

Robinson, III, Charles M. "San Benito." *The Handbook of Texas Online*. Texas State Historical Association, http://www.tshaonline.org/handbook/online/articles/SS/hes1.html, accessed on December 9, 2011.

"South Texas Industry Profile: Agriculture." Texas Comptroller of Public Accounts http://www.window.state.tx.us/specialrpt/tif/southtexas/sidebars/agriculture.html, accessed December 12, 2011.

Stambaugh, J. Lee, and Lillian J. Stambaugh. *The Lower Rio Grande Valley of Texas.* Austin, TX: Jenkins Publishing and San Felipe Press, 1974.

Stubbs, Megan, M. Edward Rister, Ronald D. Lacewell, John R. Ellis, Allen W. Sturdivant, John R. C. Robinson, Linda Fernandez. *Evolution of Irrigation Districts and Operating Institutions: Texas Lower Rio Grande Valley*. College Station: Texas A&M, Texas Water Resources Institute, July 2003.

Taylor, Thomas Ulvan. "Irrigation Systems of Texas," *U.S. Geological Survey, Water-supply and Irrigation Paper*. Washington, D.C.: Government Printing Office, 1902.

Texas Almanac and State Industrial Guide. Dallas: A.H. Belo and Company, 1911, 1914, 1933, 1942.

Thompson, James Heaven. "A Nineteenth-Century History of Cameron County, Texas." Thesis, Texas Southmost College, 1965.

"Water District Building." Texas Historical Marker Files, http://atlas.thc.state.tx.us/viewform.asp?atlas_num=5061011789&site_name=Water%20District%20Building&class=5000, accessed December 9, 2011.

Watson, Mrs. James. *The Lower Rio Grande Valley of Texas and its Builders*. Mission, TX: privately printed, 1931.

"William Bankhead." *Encyclopedia of Alabama*. http://www.encyclopediaofalabama.org/face/Article.jsp?id=h-1366, accessed December 12, 2011.

Werner, George C. "St. Louis, Brownsville and Mexico Railway." *Handbook of Texas Online*. Texas State Historical Association, http://www.tshaonline.org/handbook/online/articles/eqs30, accessed December 9, 2011.

Wooster, Robert. "Heywood, Alba." *Handbook of Texas Online*. Texas State Historical Association, http://www.tshaonline.org/handbook/online/articles/fhe38, accessed December 9, 2011.

Appendix A. Photographs

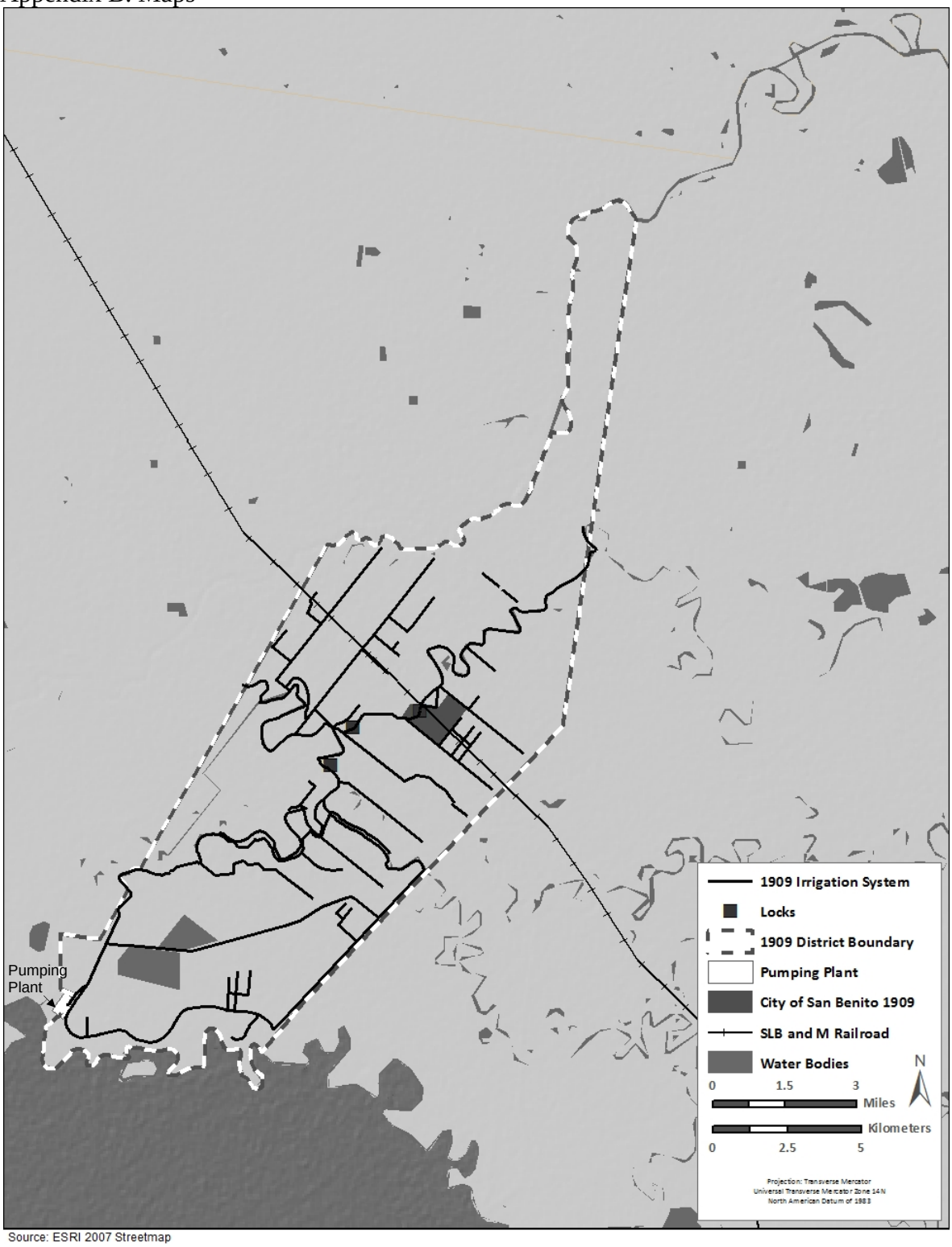
Circa 1909. Original configuration of Lock #2.
Photograph: Alba Heywood Collection, University of North Texas Archives/Rare Books Department.

1909. Construction of canal with large dredge.
Photograph: Alba Heywood Collection, University of North Texas Archives/Rare Books Department.

1939. Aerial view of pumping plant, looking south. Note concrete connector to headworks to High Line Canal and former residence to right of canal. Photograph: International Boundary and Water Commission.

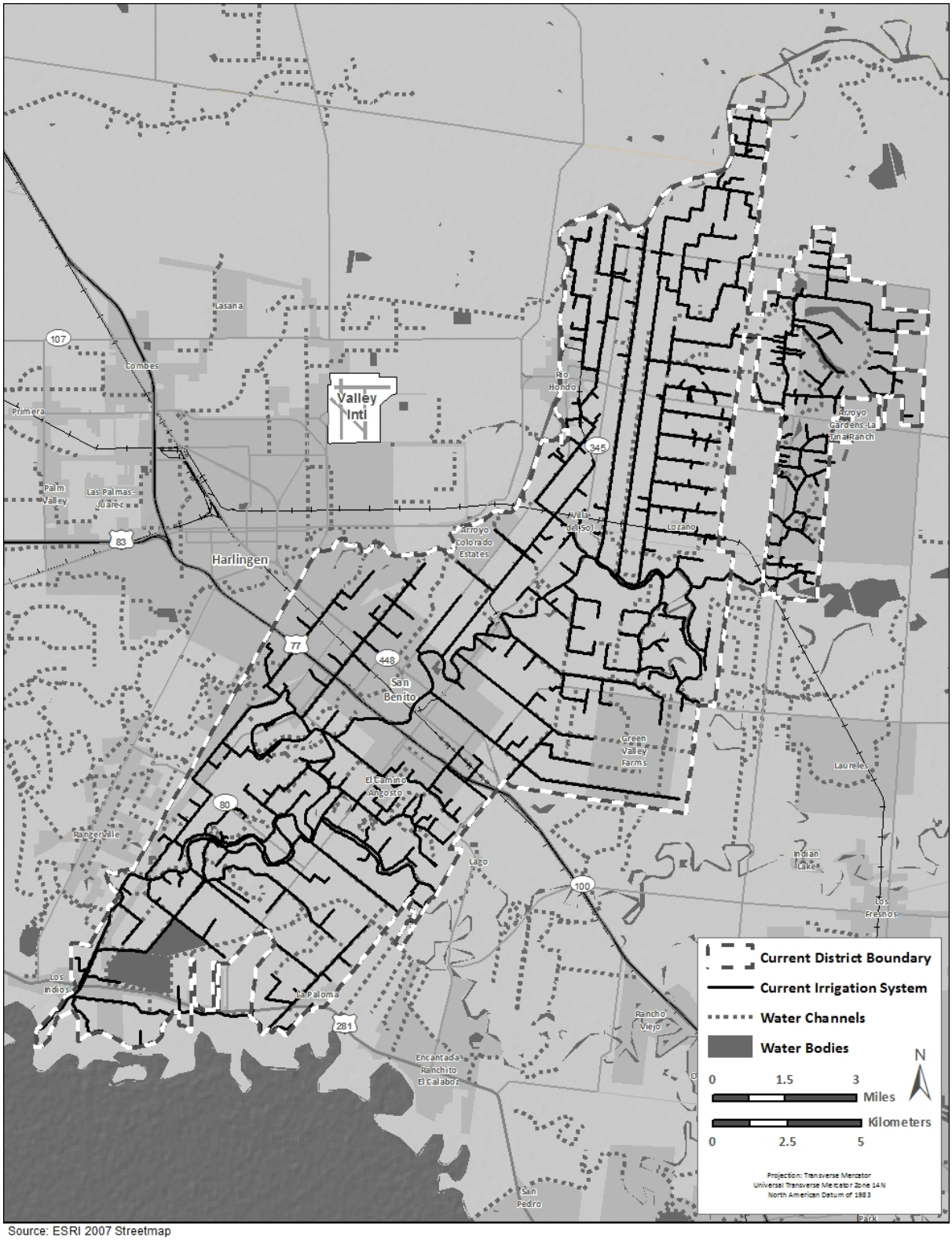
2011. Late concrete standpipe and poly-pipe. Photograph: Caroline Wright, HDR.

Appendix B. Maps



San Benito Irrigation System ca. 1910. (Map by HDR, 2011, based on map published in "*A Statement of Facts…*" promotional brochure published in 1910.)

San Benito Irrigation System ca. 1939. (Map by HDR, 2011, based on a map included in an aerial survey of the district, housed in the Cameron County Irrigation District #2 offices.)



San Benito Irrigation System ca. 2011. (Map by HDR, 2011, based on current maps of the system provided by Cameron County Irrigation District #2.)