

YUMA PROJECT AND YUMA AUXILIARY PROJECT

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Yuma Project and Yuma Auxiliary Project

Southern Arizona is an area famous for its intense heat during the summer months. Temperatures average over 100 degrees Fahrenheit during July, and may exceed 115 degrees. The winter lows only drop to the mid-twenties. Though the area can be excruciating to humans in the summer, it offers plant life a 365 day growing season. The long season gives southern Arizona farmers an edge over their northern counterparts, year round production. Unfortunately, the same climate offering warm temperatures for crops, does not as generously provide water for them. Annual precipitation only averages 3.5 inches a year.¹

In answer to the desert's miserly ways, the United States Reclamation Service created the Yuma Project to exploit water from "America's Nile," the Colorado River.² Reclamation and the Yuma County Water Users' Association hoped to turn the harsh desert into a lush, green oasis of ripening crops, and a Shangri-la for its human inhabitants. Throughout the project's construction and settlement, Mother Nature refused to conform to men's ideals. She exacted a price for every success they achieved.

Project Location

Yuma is in the extreme southwest of Arizona, in the extreme southwest of the United States. The Yuma Project occupies some of Yuma County, near the United States-Mexican border, and part of Imperial County, California. The Reservation and Bard Divisions occupy most of the Yuma Indian Reservation in Imperial County while the Valley Division lies in Yuma County. The Yuma Auxiliary Project, authorized later, and often referred to as Yuma Mesa, the Mesa Division, or Unit "B," connects to the southern tip of the Yuma Project.³

Historic Setting

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1. Water and Power Resources Service, *Project Data* (Denver: GPO, 1981), 1360.
 2. Christine Pfaff, Rolla L. Queen, and David Clark, *The Historic Yuma Project: -History, Resource Overview, and Assessment-* (Denver: Bureau of Reclamation, 1992), 84.
 3. *Project Data*, 1358, 1363; Bureau of Reclamation, "Annual Project History, Yuma Project, 1922," Record Group 115, 34. Bureau of Reclamation, "Annual Project History, Yuma Project, 1916," Record Group 115, 33. Record Group 115 hereafter cited as RG 115.

The history of the Arizona desert began long before the arrival of Europeans on the American continent. The Quechuan Indians entered the Yuma Valley between 1000 and 1250 A.D. They established agriculture in the area before the arrival of the Spanish. The Quechuan relied on the force of the Colorado River for irrigation and fertilization of their crops. During the flood season in the winter or spring, the Quechuan moved away from the river's shores, to large underground chambers; topped with straw roofs. After the floods, the Quechuan returned to the river bottoms and planted their crops in the fertile soil deposited by the Colorado.⁴

Following the conquest of Mexico by Hernán Cortés and his conquistadors, Spanish explorers continued north into the Yuma area in the sixteenth century. Two Jesuit Monks, Pedro Nadal and Juan de la Asunción, entered the Yuma Valley as early as 1538. One of the later European explorers in the Yuma area was a Jesuit Priest, Francisco Garcés. He convinced Juan Bautista de Anza the Yuma area offered a launching point over the Colorado to southern California. Anza and Garcés led an expedition of thirty-four soldiers in 1773 to Yuma, contacting the Quechuan Indians whom the Spanish called Yumas; derived from Spanish for smoke. The Spanish established two missions in the Yuma Valley, Mission Purísima Concepción and Mission San Pedro y San Pablo de Bicuñer. The missions emphasized "civilization" of the Quechuan, who resisted just as emphatically. The conflict resulted in a Quechuan massacre of all Spanish males at the missions on July 17, 1781. Francisco Garcés lay among those killed.⁵

Mexico gained independence from Spain in 1821. Soon after, Anglo-American trappers penetrated Mexican territory above the Gila River, by way of the Gila Trail, in the 1820s; looking for beaver. During the Mexican-American War of 1846-48, American military forces under General Stephen Kearney followed the Gila Trail to Yuma in 1846. Later one of his officers, Lieutenant-Colonel Philip St. George Cooke, led the Mormon

4. Pfaff, Queen, and Clark, *The Historic Yuma Project*, 43

5. Lawrence Clark Powell, *Arizona: A Bicentennial History* (New York: W. W. Norton, 1976), 23-5; Pfaff, Queen, and Clark, *The Historic Yuma Project*, 21, 43-4.

Battalion, comprised of volunteers from Utah; along a route south of Kearney's to California. The United States defeated Mexico in 1848, and annexed approximately half of Mexico's territory in return for \$10 million.⁶

After the financial and territorial coup by the United States, disputes arose over land below the Gila River. President James K. Polk sent James Gadsden to negotiate with Mexico for the purchase of the territory in question, plus the Mexican states of Sonora and Baja California, for \$15 million. Congress considered the price for all the territory too expensive, and Santa Anna, the President of Mexico, would only sell the small section below the Gila. In 1854 the United States purchased the area south of the Gila River, now called the Gadsden Purchase, for \$10 million.⁷

The United States formed the Fort Yuma Indian Reservation, California, across the Colorado River from Arizona January 9, 1884, designating it the home for the Quechuan. The United States Government divided the Reservation into individual family lots according to the Dawes Severalty Act (General Allotment Act) of 1887.⁸ Allotment decreased the amount of land owned by the Native Americans as a group. In accordance with a 1910 amendment to the Dawes Act, each Quechuan on the Yuma Indian Reservation received ten acres, and the government opened the remaining land to white settlers.⁹

Ownership of much of the land in the Gadsden Purchase became disputed again in the 1890s. The United States and local landholders contested a section known as the "Algodones Grant," established under the Spanish and Mexican land grants pre-dating the Mexican-American War. In the Treaty of Guadalupe-Hidalgo, ending the war in 1848, the United States agreed to recognize ownership under Spanish land grants. Nevertheless, the U.S. government went to court against the land grant owners in 1893 and 1896, laying claim to the land. In both cases, the United States Court of Private Land Claims affirmed

6. Powell, *Arizona*, 25, 29-32; Pfaff, Queen, and Clark, *The Historic Yuma Project*, 44.

7. William H. Westover, *Yuma Footprints* (Tuscon, Arizona: Arizona Pioneer's Historical Society, 1966), 36-7; Powell, *Arizona*, 32.

8. Louis C. Faron, "Indian, American," *Encyclopedia Americana* (Danbury, Connecticut: Grolier Inc., 1991), 15-6.

9. Bureau of Reclamation, "Annual Project History, Yuma Project, 1943," RG 115, 48; Water and Power Resources, *Project Data*, 1359; "Indian, American," 16.

ownership by the land grant holders. The United States appealed the decision, gaining a reversal in 1898 and obtaining title to the land.¹⁰

Shortly after the federal government gained control of the land, private ditch companies formed to irrigate lands in the Yuma Valley. The resulting gravity systems proved unsatisfactory because of silt accumulation in the headings. Squatters who moved into the area, had to deal with inconsistent annual runoff supplying their crops with water. The government returned the Algodones Grant to entry in 1901, and prospective farmers began filing on the best tracts. However floods prevented any consistent farming of the land.¹¹

Project Authorization

Yuma Project

In August 1903 President Theodore Roosevelt turned the abandoned Fort Yuma Military Reservation, in Arizona, over to the newly formed Reclamation Service for development of irrigation projects. Subsequent surveys determined the viability of reclaiming the nearby arid land under the Reclamation Act of June 17, 1902 (32 Stat. 388). Potential water users incorporated the Yuma County Water Users' Association November 2, 1903, to contract with Reclamation for building the Yuma Project. Secretary of the Interior Ethan A. Hitchcock authorized the project May 10, 1904.¹²

Reclamation purchased the property of the local irrigation and ditch companies and maintained their operation until the project could supply water. The private companies included the Colorado Valley Pumping and Irrigating Company, the Yuma Valley Union Land and Water Company, the Yuma Pumping Irrigation Company, and the Irrigation Land and Improvement Company. The Irrigation Land and Improvement Co. fought Reclamation's takeover through legal action, eventually ending up in the U.S. Supreme Court. The case may have been settled prior to the scheduled court date in 1908, because it

10. Bureau of Reclamation, "Annual Project History, Yuma Project, 1943," RG 115, 48-49.

11. *Ibid.*, 49.

12. Bureau of Reclamation, "Annual Project History, Yuma Project, 1944," RG 115, 28; Reclamation, "Project History, Yuma Project, 1943," 49; Water and Power Resources, *Project Data*, 1359.

never went before the Court. Reclamation assumed control of the property the same year.¹³

Yuma Auxiliary Project

Reclamation originally conceived the Yuma Auxiliary Project as a supplement to the Yuma Project in order to irrigating 45,000 acres of farm land on what came to be called Yuma Mesa. With a vision toward expanding irrigation, Reclamation considered extending the project to the mesa even before completion of the diversion works at Laguna Dam. Reclamation divided the Auxiliary Project into four divisions simply named Units A, B, C, and D. Initial surveys of Yuma Mesa began in 1916. Congress authorized the project in an act of January 25, 1917 (39 Stat. 868).¹⁴

Construction History

Yuma Project

The Yuma Project began with Francis L. Sellew as Project Engineer. Project work commenced with construction of Laguna Dam. Reclamation engineers faced the problem of designing a dam to control the Colorado River and divert water to adjoining canals, while preventing silt from entering the canals. Engineers studied dams in other countries to aid in determining the dam design. The investigations resulted in an "Indian Weir," a style similar to the Okla Weir across the Jumna River in India; with elements from an Egyptian dam across the Nile, downstream from Cairo.¹⁵

Reclamation awarded the contract for dam construction to J. G. White and Company July 6, 1905. White started work on July 19, 1905. Cement delivery for Laguna Dam began as a complicated operation. The company shipped material by railroad to Yuma. At Yuma they either loaded it on a steam boat or into wagons. The rock comprising fill for the dam constantly gave White problems. It came from quarries in the abutments at either end of the dam structure. The rock fractured too much with annoying regularity, often 50 percent of

13. Pfaff, Queen, and Clark, *The Historic Yuma Project*, 51.

14. Reclamation, "Project History, Yuma Project, 1916," 33; Reclamation, "Project History, Yuma Project, 1943," 49; Francis L. Sellew, "Report on the Yuma Project of the United States Reclamation Service," Bureau of Reclamation Records, RG 115, box 912, 16; Water and Power Resources, *Project Data*, 1363.

15. Sellew, "Report on the Yuma Project," 6.

the quarried rock went to waste.¹⁶

In August 1906 White petitioned for relief from the contract because of excessive losses. The contractor's representatives and a board of Reclamation engineers met at a conference in California. Reclamation refused to release White from the contract, but admitted the construction material did not meet expectations. A supplemental contract emerged from the conference, paying the company compensation for losses and extending the deadline. White & Co. still did not meet the deadline date. Reclamation took over construction of Laguna Dam by force account on January 22, 1907.¹⁷

Reclamation eased the burden of cement delivery to the construction site after they assumed control. Reclamation built a levee on the California side of the Colorado. The Service gained the cooperation of the Southern Pacific Railroad and built a rail line on the levee. After completion of the rail line in March 1908, the railroad delivered supplies directly to the work site on the California side of the dam.¹⁸

To dewater the Laguna Dam site, Reclamation raised the cofferdams on the upstream and downstream sides of the dam site, using waste from the rock quarries. In addition, workers prepared sluiceways to divert water around the dam construction. Fragmentation of the rock forced Reclamation to line the sluiceways with concrete. Reclamation closed the cofferdams on December 11, 1908, and water bypass commenced. Upon closure of the cofferdams, Reclamation laid standard gauge railroad track, on a trestle across the closure, to connect the rock quarries. Work crews dumped loose rock from the trestle as fast as possible to keep the water from washing it away. Large pumps operating between the cofferdam structures evacuated water from the dam site. Reclamation dredged the alluvial deposit under the center of the site to a depth of twelve feet, after pumping out most of the water.¹⁹

Reclamation built three concrete walls for the dam structure along the river bed.

16. *Ibid.*, 8-10.

17. *Ibid.*, 8-9.

18. *Ibid.*, 10.

19. *Ibid.*, 7, 9-11.

Before placement of the walls, laborers drove six inch wood sheet pilings into the bed under the sites for the walls. The pilings protected against seepage, and for the third wall provided a foundation over the soft bottom. The upstream crestwall reached an elevation of 151 feet above sea level. Reclamation located the second wall 57½ feet downstream from the first. They put the third 93½ feet below the second.²⁰

Reclamation placed loose rock from the quarries between the walls as fill. Below the downstream wall they constructed an apron of stone forty to fifty feet wide, to protect the dam against any cutback from the river. Reclamation began paving the top of the dam with 2-3½ foot thick stones on the Arizona side of the dam. The quarries did not have enough suitable rock to continue this method of pavement, so Reclamation opted for an eighteen inch layer of concrete. Crews placed rock on the upstream side of the crestwall for protection.²¹

Stoney type iron gates with rollers comprised the sluicing works for the main canals on the project. Three gates controlled the California sluiceway and one controlled the Arizona side. Pillars, rising forty-one feet above the river bed, supported the gates. In normal operations water entered the sluiceways slowly, allowing silt to drop to the bottom. Only the fairly silt free, top fifteen to eighteen inches of water flowed through. To clean the sluiceways, crews closed the canal control gates, and opened the sluice gates to allow water to flow through faster and wash out the accumulated silt.²²

Mexican-Americans constituted the majority of workers on Laguna Dam. A few Native Americans also labored on the dam. Francis Sellew wrote, "in the cooler months of the year a fair percentage of wandering white men were carried on the rolls."²³ White workers primarily comprised the skilled labor. Workers proved plentiful from October to June, but in the summer months; when temperatures could reach 115 degrees, maintaining a full work force proved difficult. Reclamation established mess halls and commissaries for

20. *Ibid.*, 6-7.

21. *Ibid.*, 6-7, 9.

22. *Ibid.*, 8.

23. *Ibid.*, 13.

the convenience of workers and their families.²⁴

The Yuma Main Canal left Laguna Dam from the California side. About 1½ miles from Laguna Dam, the Yuma Main Canal split into the Yuma Main Canal and the Reservation Main Canal at Indian Heading. The Yuma Main continued southwest through the Reservation Division to the 9.9 foot Siphon Drop Spillway, where Reclamation later built a powerplant. It continued another 3.5 miles to the Colorado River Siphon, and through the siphon under the river. At the town of Yuma, the Yuma Main Canal split into the East and West Main Canals, which continued through the Valley Division; south, and west then south, respectively, to the Mexican border.²⁵

Construction of three sections of the Yuma Main Canal, by force account, began in 1909 and continued until completion in July 1912. Reclamation divided construction of the section between Indian Heading and the Siphon Drop Spillway into six sections, and contracted out to five companies. Reclamation built the East Main Canal by force account under the supervision of R. M. Priest. Construction started in November 1911 and finished in April 1912. Reclamation started work on the West Main Canal beginning with the first two and one half mile section in January 1912, completing it in May 1912. Canal construction continued in November 1913, and Reclamation finished the West Main Canal to the Mexican border in 1915.²⁶

Work commenced on the Reservation Main Canal in 1907, and adjacent laterals in 1908. The Mojave and Cocopah Canals emerged from a split of the Reservation Main Canal. The Walapai Canal, constructed from 1908 to 1910, broke off from the Yuma Main Canal at Siphon Drop Powerplant, traveling south to the Ottawa lateral, just north of Winterhaven, California. Reclamation established sixty miles of laterals on the Yuma

24. *Ibid.*, 13-14.

25. Pfaff, Queen, and Clark, *The Historic Yuma Project*, 61; Sellew, "Report on the Yuma Project," 15; Water and Power Resources, *Project Data*, 1358-61. The Yuma Main Canal was originally called the California Main Canal.

26. Bureau of Reclamation, "Annual Project History, Yuma Project, 1915," RG 115, 22; Pfaff, Queen, and Clark, *The Historic Yuma Project*, 65-6.

Indian Reservation to utilize the water from the canals.²⁷

Reclamation began the Colorado River Siphon, in November 1909, to allow the Yuma Main Canal to cross the Colorado River to supply water to the Valley Division of the project. Reclamation considered the option of a flume over the river, but decided a flume would risk exposure to floods and hinder the river during high water. Engineers chose an inverted siphon, through the sandstone lying fifty feet beneath the Colorado River bed. Reclamation sank the two vertical shafts as concrete "open caissons" on opposite sides of the river, with a fourteen foot diameter, concrete tube connecting the two under the river bed.²⁸

The sandstone proved porous and fractured, forcing Reclamation to postpone work on February 21, 1911, until they found a more suitable alternative construction method. A consulting board of engineers, consisting of Francis Sellew, Louis Hill, and Silas Woodard, former Division Engineer on the East River Tunnels of the Pennsylvania Railroad; met on April 10, 1911. They decided to use the pneumatic process to finish the siphon. Reclamation rented an air compressor plant from Charles Haskin and Company, a Boston tunnel contractor, because no equipment existed in the west. The equipment arrived in late May 1911 with 26 crewmen experienced in compressed air operations. Work continued smoothly, and the siphon began operation June 29, 1912. The siphon's entry shaft, on the California side of the Colorado, extends 76 feet deep and 17 feet in diameter. The Arizona side's exit shaft travels 74 feet deep with a 23 foot diameter. The connecting concrete tube stretches 955 feet between the vertical shafts.²⁹

Reclamation built a series of levees to protect the river banks against the annual Colorado River floods. The Reservation levee, on the west bank of the Colorado, extended from Lagunato to Araz on the Southern Pacific line; four miles west of Yuma. Reclamation built the levee by force account in 1907-09. The Yuma Valley levees followed the east bank of the river to the Colorado-Gila confluence, then from the confluence to the United States-

27. Pfaff, Queen, and Clark, *The Historic Yuma Project*, 65; Sellew, "Report on Yuma Project," 16; Water and Power Resources, *Project Data*, 1358, 1361.

28. Pfaff, Queen, and Clark, *The Historic Yuma Project*, 62; Sellew, "Report on the Yuma Project," 22.

29. Pfaff, Queen, and Clark, *The Historic Yuma Project*, 63-4.

Mexico border. Contractors constructed fourteen miles of the Yuma Valley levees in 1905-06.³⁰

Reclamation observed that meandering of the Colorado River frequently changed its location, and threatened permanent facilities on the Yuma Project. The Service recognized levee systems would require almost constant maintenance. They developed an idea to put a railroad on the levees and dump rock riprap directly on threatened sections of the levees from rail cars. The plan would allow quick repairs in emergencies, and eventually proved successful on the Southern Pacific line on the Reservation levee during the flood of 1912. Francis Sellew contacted the Southern Pacific Railroad in 1911 for the possible construction of another railroad system in the Yuma Project area.³¹

The Southern Pacific balked at Sellew's proposal. Although the S.P.'s "Laguna Branch" on the Reservation levee proved profitable during dam construction, profits declined when the line relied on passengers and freight traffic.³² The railroad debate continued into 1914. Secretary of the Interior Franklin K. Lane approved a railroad constructed and maintained by the Reclamation Service in meetings March 24-26, 1914. The Southern Pacific rejected the Reclamation proposal on March 30, 1914. Lane responded he already approved Reclamation's construction of a railroad, and concluded his correspondence "with the hope that the Southern Pacific would assist by making connections and rates on the Southern Pacific for the new railroad."³³

Reclamation budgeted \$230,000 for construction of the railroad. Sellew purchased track and equipment for \$126,800, including secondhand track from the Arizona Eastern Railroad (part of the Southern Pacific system), and ties from Baltford Construction Company of Portland, Oregon.³⁴ Reclamation started the Yuma Valley Railroad in April 1914 with grading and other preparatory work for construction. After ironing out some right

30. *Ibid.*, 18-20.

31. Brit Allan Storey, "The Bureau of Reclamation's Yuma Valley Railroad: A Historical Study Prepared by the Denver Office of the Bureau of Reclamation at the Request of the Lower Colorado Region, Bureau of Reclamation" (Denver: Bureau of Reclamation, 1990), 2, 9.

32. *Ibid.*, 4.

33. *Ibid.*, 12-4.

34. *Ibid.*, 14.

of way conflicts, Reclamation began railroad construction on May 1, 1914.³⁵

Wage strikes by workers and exceedingly hot weather only slightly impeded work on the Yuma Valley Railroad. Reclamation completed the railroad in February 1915. The Service improved its railroad yards in August, October, and December 1915, and in April 1916 built a loop at the end of the line for more efficiency. Construction of the loop required Reclamation to move 5000 yards of levee and relay 2200 feet of track. Upon completion, the Yuma Valley line stretched for 23½ miles to the Mexican border.³⁶

Reclamation began preliminary work for the Siphon Drop Powerplant in 1925. Excessive opening bids forced Reclamation to complete the excavation work for the structure by force account. Wet excavation proved necessary because the substructure of the building lay eleven feet below ground water. Reclamation used Wakefield piling of two by twelve inch pine sheets in twenty-two foot lengths to make a cofferdam. Workers accomplished most of the work with an excavator. For the finishing touches, they washed sand into two bays with high pressure water from a two inch hose and a three-quarter inch nozzle. An excavator removed the material from the bays.³⁷

Charles Olcester, a local contractor, received the modified contract for the construction of the building. He started work in 1926. Olcester added two more siphons to the Siphon Drop Spillway to handle the 1,500 second feet of water needed to operate the powerplant at full capacity. The Siphon Drop Powerplant began operation in 1926. The plant initially supplied electricity to the "B" Lift and the Boundary Pumping Plants.³⁸

Laguna Dam was an unusual structure for its time because of the design and dimensions. The weir only measured forty-three high, nearly two-thirds of which lay below the river bed. The structure raised the river ten feet. The three corewalls gave the dam a width of over 150 feet. Canals on the Yuma Project totaled 53 miles with 218 miles of

35. *Ibid.*, 15, 18.

36. *Ibid.*, 18-9. For more detailed information about the Yuma Valley Railroad, consult Brit Allan Storey's "The Bureau of Reclamation's Yuma Valley Railroad."

37. Bureau of Reclamation, "Annual Project History, Yuma Project, 1925," RG 115, 72, 75.

38. Reclamation, "Project History, Yuma Project, 1925," 66, 75; Bureau of Reclamation, "Annual Project History, Yuma Project, 1926," RG 115, 42; Pfaff, Queen, and Clark, *The Historic Yuma Project*, 98.

laterals.³⁹

Yuma Auxiliary Project

Reclamation and local farmers envisioned Yuma Mesa as a suitable location for growing citrus fruits. John G. Marzel went to southern California to study "the most modern and best practices of irrigation systems in citrus fruit districts."⁴⁰ W. W. Schlecht and S.A. McWilliams also ventured to southern California for further investigations, but determined they needed a full seasons's worth of data.⁴¹

Reclamation made S.A. McWilliams the Supervising Engineer of the Yuma Auxiliary Project. Yuma Mesa construction commenced September 27, 1920, when the George Brothers Company of Somerton, Arizona began their contract on the supply canal. George Brothers' contract included the earthwork of the Mesa Supply Canal, part of the Unit "B" lateral, and other small laterals. The company completed the contract January 22, 1921. Reclamation graded six miles of Unit "B" road and prepared it for surfacing in 1920 by force account. Work started on the road to the "B" Lift pumping plant January 8, 1921. Reclamation finished five miles of road before reducing the work force in May.⁴²

Reclamation began the "B" lift pumping plant in February 1921. Concrete placement in the building finished in August, just before the start of the 72 inch diameter force main pipe leading to the top of the mesa. Reclamation virtually finished the force main before the end of the year. Although designed for three pumping units, the building only received one immediately after completion. Reclamation sealed expansion cracks in the force main pipe in 1922 by chiseling out the cracks and filling them with mineral rubber. Workers back filled the pipe after making repairs. Operation of the pumping plant started May 1, 1922.⁴³

Reclamation estimated they would need approximately twenty miles of pipe for the

39. Water and Power Resources, *Project Data*, 1360.

40. Reclamation, "Project History, Yuma Project, 1916," 59; Bureau of Reclamation, "Annual Project History, Yuma Project, 1917," RG 115, 27.

41. *Ibid.*, 1917, 27-8.

42. Bureau of Reclamation, "Annual Project History, Yuma Project, 1920," RG 115, 32-33; Bureau of Reclamation, "Annual Project History, Yuma Project, 1921," RG 115, 106.

43. Reclamation, "Project History, Yuma Project, 1921," 107-8; Reclamation, "Project History, Yuma Project, 1922," 34, 99.

mesa's Unit "B" laterals. Reclamation reached an agreement with the Lock Joint Pipe Company to use a type of pipe patented by the company. Inexperience among the workers with the Lock Joint pipe resulted in some inferior pipe laying quality after success with the initial batches. The Project History blamed some of it on ignorance of smaller details in the rush for greater quantities of pipe.⁴⁴

Reclamation began making longer sections of pipe in 1922, in an effort to halve the manufacture time. The longer time necessary for the pipe to season proved the downside of the process. Fire destroyed the crushing plant January 15, 1922, partially interfering with progress. Pipe production continued through the problems. J. H. Maxey contracted earthwork for five miles of Unit "B" canals and laterals in 1922 and proceeded with the construction. When completed, the Yuma Auxiliary Project had 3.6 miles of canals and 18 miles of laterals.⁴⁵

Post Construction History

Yuma Project

Floods constituted a major hazard for the Yuma Project even before Reclamation completed final construction. As mentioned before, one major flood occurred in 1912. A larger flood hit the Yuma Project in 1916, breaking previous records. Flood water from the Gila River began rising on January 18, 1916, and by January 22 flowed over the lower Reservation levee causing 800 feet in breaks. The floods washed out the high fill of the Southern Pacific main line. Reclamation recorded a flow of 215,000 second-feet. A second wave of flooding started on the Gila River a few days later, and reached Yuma city on January 30. The second flood measured 162,000 second-feet of discharge.⁴⁶

Both floods combined to inundate 10,000 of the 16,000 acres on the Reservation Division. They displaced 50,000 yards of the main canal and 35,000 yards of levees. The waters only flooded 3,000 of the 50,000 acres on the Valley Division. Reclamation quickly

44. Reclamation, "Project History, Yuma Project, 1922," 109-10.

45. Reclamation, "Project History, Yuma Project, 1922," 36-7; Water and Power Resources, *Project Data*, 1364.

46. Reclamation, "Project History, Yuma Project, 1916," 78-9.

gathered men and equipment to begin repairs on the levees after the first flood. They repaired the upper Yuma Valley levee, allowing rail service to resume operations. Trains carried earth from Yuma to repair breaks on the lower Reservation levee. Workers repaired one of the breaks, but the second flood postponed any further work. Laguna Dam remained intact during the flooding, and no damage occurred to any major irrigation structures. The second flood halted work on the canal breaks, but Reclamation restored service in fifteen days.⁴⁷

Floods stranded over one hundred families on the mesa west of the Reservation Unit in California. Reclamation transported food supplies through the flooded areas in a relief effort. The "Project History" lauded the cooperation of the Yuma Indian Reservation's superintendent, Loson L. Odle, in the operation. During the flooding Yuma city fell under virtual martial law. A company of the Twelfth Infantry Regiment patrolled the town, assisted on levee work, and worked around Reclamation headquarters. The soldiers moved their camp inside the levee, near the Reclamation office, because flood waters covered their campsite with five feet of water.⁴⁸

The floods breached a levee at Yuma city built by the War Department in 1893. The break caused flooding in Yuma's business section. The age of the levee, combined with a lack of maintenance on it, caused it to seep at the base and become spongy. Flood water entered through a small hole at the base around 5:00 A.M. The water rapidly eroded a section of the levee. By 9:00 A.M., four to five feet of water flowed through Yuma's main street.⁴⁹

Floods did not pose the sole danger to the levees' integrity. The constant meandering of the Colorado damaged the Reservation levee in 1918. World War I hampered repairs on the levee by causing a shortage of unskilled and skilled labor on the project. Unskilled

47. *Ibid.*, 79-81.
48. *Ibid.*, 82, 84-5.
49. *Ibid.*, 80, 84.

laborers received \$2.25-\$3.00 a day while skilled workers collected \$4.50-\$5.25.⁵⁰ Native Americans worked some of the more tedious jobs on the Yuma Valley Railroad. Two patrolled the railroad clearing brush and making some repairs. They lived in section houses, small shack-like structures, next to the line.⁵¹

The inexperience of farmers caused some problems early on. Some of the less knowledgeable farmers used excessive water. This led to seepage bringing alkali to the surface. Rodents, especially rats and gophers, endangered project canals with their burrows. Reclamation considered the rats more harmful because they burrowed in the banks below the water's surface, and trapping could only occur after un-watering the canals. Gophers frequently caused small breaks in the laterals, but Reclamation considered them a less serious problem.⁵²

Laguna Dam held up well after construction, but in 1923 engineers Louis Hill and Porter Preston recommended strengthening the talus below the dam toe and extending it ninety-five feet down river. Reclamation approved the recommendation, and work began to extend a 2,000 foot wide section of talus. Two cubic yard concrete blocks augmented the California side of the talus. Rock comprised the talus extension on the Arizona side because Reclamation determined the Arizona quarries provided better quality rock than the California quarries. Reclamation finished the talus in February 1924.⁵³

Fire claimed the project office on January 24, 1925. Reclamation moved the office into an old barracks building temporarily. The barracks was long and only one room wide. Clerks kept some files on a screened porch for lack of space. No vault existed for the project's more valuable files. The tone in the 1926 Project History revealed some of the consternation project supervisors felt about the situation. Reclamation built a new office

50. Bureau of Reclamation, "Annual Project History, Yuma Project, 1918," RG 115, 45-6.

51. C. F. Harvey, "Indian Workmen on the Yuma Project," *Reclamation Record*, April 1917, 194.

52. Reclamation, "Project History, Yuma Project, 1918," 61; Bureau of Reclamation, "Annual Project History, Operation and Maintenance Report, Yuma Project, 1913," RG 115, 11.

53. Bureau of Reclamation, "Annual Project History, Yuma Project, 1923," RG 115, 66-67; Bureau of Reclamation, "Annual Project History, Yuma Project, 1924," RG 115, 68.

building in 1928.⁵⁴

The stock market crash of 1929 and the ensuing Great Depression of the 1930s caused a severe loss of employment for many Americans. The creation of the Emergency Conservation Works (ECW) and the Civilian Conservation Corps (CCC) helped many young males obtain employment and job skills. Reclamation regularly used CCC companies on its projects. CCC Company 835 worked on the Yuma Project from camp BR-13 in 1936. The company cleared rights of way along fifty-nine miles of canals on the Reservation and Valley Divisions. Part of the company, designated the rodent control force, trapped over 3,300 gophers. BR-13 remained occupied until May 4 and from November 2 through the remainder of the year.⁵⁵

The CCC camps usually stayed vacant in the summer months. In 1938, CCC companies occupied BR-13 January 1 to March 31 and November 19 to the end of the year. One company inhabited BR-74 from the first of the year until the beginning of June. The government diverted the company intended for occupation of BR-74, in the last half of the year, to New England to clean up hurricane damage.⁵⁶

The CCC companies, on the Yuma Project in 1939, sometimes averaged as low as 100, and as high as 200 recruits. Reserve Army or Navy officers often commanded the CCC companies. During 1939, the CCC leveled spoil banks, accomplished general cleanup of brush, and trimming of date palms. They paved parking areas at project headquarters and lined canals with concrete. The CCC built a four room house with garage on Reclamation lands, and prepared the area for landscaping. Heavy rains on September 4, 5, and 6, 1939 damaged canals on the Reservation Division. Recruits from BR-13 immediately went to the field and helped make repairs.⁵⁷

An earthquake struck the Yuma Project May 18, 1940, incurring considerable

54. Reclamation, "Project History, Yuma Project, 1925," 67; Reclamation, "Project History, Yuma Project, 1926," 35; Bureau of Reclamation, "Annual Project History, Yuma Project, 1928," RG 115, 20.

55. Bureau of Reclamation, "Annual Project History, Yuma Project, 1936," RG 115, 57.

56. Bureau of Reclamation, "Annual Project History, Yuma Project, 1938," RG 115, 75.

57. Bureau of Reclamation, "Annual Project History, Yuma Project, 1939," RG 115, 77-8, 82-3.

damage to the project's irrigation system, especially on the Valley Division. Twenty flumes received heavy damage, as did bridges and culverts in the area. Canal banks shattered under the quake's force. Geysers of sand spewed from the cracks in the ground, up to six feet in the air. The earthquake damaged sections of levee railroad grade near Gadsden. Repair crews started work immediately following the quake and succeeded in resuming water deliveries in all but five laterals by the end of May.⁵⁸

Reclamation built an earthen dike across the Yuma Main Canal in 1941, ending diversion from Laguna Dam. Afterward the Siphon Drop Powerplant, the Valley Division, and part of the Reservation Division, received their water supplies from the All-American Canal of the Boulder Canyon Project. Reclamation closed the outlets on Laguna Dam June 23, 1948, and it ceased diversion duties. The Reservation Division became directly linked to the All-American Canal and Imperial Dam. Reclamation ceased operation of the Siphon Drop Powerplant in 1972, deciding it had become obsolete.⁵⁹

The outbreak of World War II forced Reclamation to insure security measures on the Yuma Project. Reclamation placed guards at project structures. To maintain a twenty-four hour watch, they armed pumping and power plant operators. World War II induced a labor shortage as did World War I. To alleviate the problem, Reclamation began to use the services of Italian prisoners of war in 1943.⁶⁰

The Yuma County Water Users' Association (YCWUA) hired Cocopah Indians from Mexico for brush clearing work. Reclamation could not use project funds to pay the Cocopahs because they were Mexican citizens, so the YCWUA paid them from Association funds.⁶¹ In 1944, the labor shortage was so pronounced that the Project History said all men who applied for work were hired.⁶² On June 6, 1945, Reclamation pressed German prisoners

58. Bureau of Reclamation, "Annual Project History, Yuma Project, 1940," RG 115, 42-4.

59. Bureau of Reclamation, "Annual Project History, Yuma Project, 1941," RG 115, 12, 43; Reclamation, "Project History, Yuma Project, 1943," 15; Bureau of Reclamation, "Annual Project History, Yuma Project, 1949," RG 115, 15; Water and Power Resources, *Project Data*, 1360-1.

60. Bureau of Reclamation, "Annual Project History, Yuma Project, 1942," RG 115, 30; Reclamation, "Project History, Yuma Project, 1943," 35.

61. Reclamation, "Project History, Yuma Project, 1943," 35.

62. Reclamation, "Project History, Yuma Project, 1944," 35.

of war into service on the Yuma Project. The Germans cleared brush and weeds out of canals and laterals.⁶³

Canal Breaks were a constant irritation following construction of the Yuma Project. None of the breaks proved serious, but they did cause inconveniences. Some breaks occurred in the main canals, but most happened in the smaller canals and laterals. In July 1947 a section of Laguna Dam, 5 feet wide and 225 feet long, settled 2½ feet. No damage or ill effects resulted from the settling.⁶⁴

Yuma Auxiliary Project

The Yuma Auxiliary's project office worked to furnish water to 2500 acres of land on the "B" Unit of the mesa by April 1, 1922. Unit "B" eventually irrigated over 3,000 acres on Yuma Mesa. The plans for the three other units and the expected 45,000 irrigated acres never developed. An act on June 13, 1949 (63 Stat. 172) reduced the Yuma Auxiliary Project to 3,305 acres in size, and switched it to the Gila Project for its water supply. Reclamation decommissioned the "B" Lift Pumping Plant and employed the Mesa Pumping Plant of the Gila Project to furnish water to Yuma Mesa.⁶⁵

Settlement of the Project

The Yuma Project and Yuma Auxiliary Project did not draw heavy settlement in the years immediately following construction. Yuma was the largest of the five project communities in 1918 with 6,500 people. Somerton, Arizona, followed with 750 people. Gadsden, Arizona had a population of 200. The two California towns, combined, did not add up to Gadsden's population; Winterhaven had 125 people and 15 occupied Bard.⁶⁶

Project towns saw a drop off in population in 1920 probably in part due to economic depression after World War I. Most of the towns only lost a small percentage of their

63. Bureau of Reclamation, "Annual Project History, Yuma Project, 1945," RG 115, 11.

64. Reclamation, "Project History, Yuma Project, 1936," 16; Reclamation, "Project History, Yuma Project, 1941," 46; Bureau of Reclamation, "Annual Project History, Yuma Project, 1947," RG 115, 10; Bureau of Reclamation, "Annual Project History, Yuma Project, 1948," RG 115, 9; Reclamation, "Project History, Yuma Project, 1949," 8.

65. Reclamation, "Project History, Yuma Project, 1921," 109; Pfaff, Queen, and Clark, *The Historic Yuma Project*, 105; Water and Power Resources, *Project Data*, 1363.

66. Reclamation, "Project History, Yuma Project, 1918," 84; Bureau of Reclamation, "Annual Project History, Yuma Project, 1919," RG 115, 65.

populations, but Yuma's population dropped to 3,800 people. The reduction lasted a short time, and by the end of the 1920s Yuma approached 10,000 people. Bard and Winterhaven had populations of fifty each by 1929. Gadsden increased to 300 and Somerton returned to its pre-1920 mark of 1,500 people. Farm population on the Yuma Project reached 5,100 in 1920. The number decreased to about 3,500 by the end of the decade.⁶⁷

Yuma grew some during the 1930s, while Somerton declined slightly and Gadsden lost two-thirds of its people by 1940. Bard and Winterhaven increased significantly to 150 and 250 people respectively. By 1946 Yuma jumped to 20,000 people, Somerton grew to 2,500, Winterhaven increased by 50, but the other two towns stayed approximately the same. The farm population declined to only 2,877 by 1945.⁶⁸ The population on project farms decreased to 2,700 by 1990. The project towns of Yuma and Somerton increased greatly by the same year. Somerton grew to a population of 5,282, and Yuma had almost 55,000 people. The Yuma Auxiliary Project supplied water in 1989 to a farm population of 325 and a total of 675 people received water from the project.⁶⁹

Water users on the Bard Unit of the Reservation Division formed the Bard Irrigation District in 1927. The Yuma County Water Users' Association reached a contract agreement with Reclamation February 5, 1931 to take over individual payment accounts. Water users on the Yuma Auxiliary formed the Unit "B" Irrigation and Drainage District in 1947. Reclamation continues operation and maintenance of the Indian Unit of the Reservation Division. Reclamation rewarded returning World War II veterans on March 10, 1948, by awarding twenty-six Valley and Reservation Division homesteads to veterans in a public drawing.⁷⁰

67. Reclamation, "Project History, Yuma Project, 1920," 69; Bureau of Reclamation, "Annual Project History, Yuma Project, 1929," RG 115, 113.

68. Reclamation, "Project History, Yuma Project, 1940," 131; Bureau of Reclamation, "Annual Project History, Yuma Project, 1946," RG 115, 117; Pfaff, Queen, and Clark, *The Historic Yuma Project*, 88.

69. Pfaff, Queen, and Clark, *The Historic Yuma Project*, 88; Bureau of the Census, *Twenty-first Census of the United States, 1990*, on CD-ROM; Bureau of Reclamation, "Annual Project History, Combined Projects: Gila Project, Yuma Project, Yuma Auxiliary Project, Supplying Water to Mexico, 1989," RG 115, Appendix C: Yuma Auxiliary Project.

70. Bureau of Reclamation, "Annual Project History, Yuma Project, 1931," RG 115, 30; Reclamation, "Project History, Yuma Project, 1940," 35; Reclamation, "Project History, Yuma Project, 1948," 9; Bureau of Reclamation,

(continued...)

Uses of Project Water

The Yuma Project's primary function is irrigation of project lands. The Siphon Drop Powerplant generated hydro-electric power primarily for Yuma Project facilities. The "B" Lift Pumping Plant received its power from Siphon Drop Powerplant while still in operation. The increased number of siphons for greater productivity allowed Reclamation to sell surplus electricity to the surrounding area.⁷¹

The Yuma Project grows a variety of crops (see Table I), and the 365 day growing season makes profit seem more probable. Alfalfa often proves a more successful crop, sometimes accounting for two-thirds of the total crop yield. The Yuma Project benefitted Yuma livestock; beef and dairy cattle, and even ostriches.⁷² Utilization of Yuma Mesa and the warm climate in the Yuma Auxiliary Project enables farmers to grow citrus fruits not common in most of the country. These crops include; oranges, grapefruit, and lemons; with colorful commercial names like "Desert Chief".⁷³

Table I. Crops grown on the Yuma Project 1910-18. Source: Reclamation, Operation and Maintenance, Yuma Project, 1910, 5; Reclamation, Operation and Maintenance, Yuma Project, 1911, 14; Reclamation, Operation and Maintenance, Yuma Project, 1913, 15, 19; Reclamation, Project History, Yuma Project, 1918, 80.

Alfalfa Hay	Corn Fodder	Turnips
Alfalfa Seed	Lettuce	Wheat
Barley	Maize	Oats
Corn Sorghum	Truck	Tomatoes
Fruit	Onions	Melons
Cotton-Egypt	Cauliflower	Squash
Cotton-Short	Beets	Pumpkins
Tobacco	Peaches	Almonds
Strawberries	Plums	Beans
Peaches	Apricots	Potatoes
Cane	Asparagus	Cucumbers

(...continued)

"Annual Project History, Combined Projects: Gila Project, Yuma Project, Yuma Auxiliary Project, Supplying Water to Mexico, 1988," RG 115, xii; Reclamation, Project History, Combined Projects, 1989, xii.

71. Reclamation, "Project History, Yuma Project," 1925, 66.

72. Bureau of Reclamation, "Annual Project History, Operation and Maintenance Report, Yuma Project, 1910," RG 115, 5; Bureau of Reclamation, "Annual Project History, Operation and Maintenance Report, Yuma Project, 1911," RG 115, 5; Bureau of Reclamation, "Annual Project History, Operation and Maintenance Report, Yuma Project, 1912," RG 115, 3; Bureau of Reclamation, "Annual Project History, Operation and Maintenance Report, Yuma Project, 1913," RG 115, 19; No author given, "Yuma Project: Wonderland of the Southwest: Where 150,000 Acres of Valley and Mesa Lands Adjacent to the Colorado River is Being Reclaimed by the United States Reclamation Service" (Yuma, Arizona: Yuma Chamber of Commerce, 1916), 30.

73. Reclamation, "Project History, Yuma Project, 1916," 59; Pfaff, Queen, and Clark, *The Historic Yuma Project*, 83.

Conclusion

The Yuma Project has historic significance for several reasons. The project was one of the earliest Reclamation projects following the Reclamation Act of 1902. It remains the oldest project on the Colorado River. In recognition of the Yuma Project's importance, Reclamation historians Christine Pfaff, architectural historian; Rolla L. Queen, historical archaeologist; and David Clark, historian; recommended it and some of its facilities for a listing on the National Register of Historic Places.⁷⁴ Laguna Dam received consideration for the National Register. Reclamation recommended the construction camp sites for listing along with the dam and its adjacent structures. The unusual design of the dam for the time of its construction probably makes it eligible for the National Register. The historians advocated the construction camp sites for their historic and archaeological potential.⁷⁵

The Siphon Drop Powerplant was the only powerplant built on the Yuma Project. It remains intact as constructed in the mid-1920s. The Colorado River Siphon received consideration because, though it lies in the Yuma Crossing National Historic Landmark District, it does not conform to the designated period of significance for the district. The siphon represents an important engineering accomplishment. With the exception of two pumps to supply municipal water to Yuma, the Colorado River Siphon continues operating as originally constructed.⁷⁶

Yuma Crossing, formerly the Fort Yuma Military Reservation, was listed on the National Register for its military significance in the 1800-99 time period. Historians also recommended the area for its role as the Reclamation project office, from 1902 to the mid 1940s, for the Yuma Project. Restoration efforts reestablished much of the complex to its military appearance prior to the arrival of Reclamation. In the process, those restoring the military post destroyed many Reclamation structures in the complex.⁷⁷

Whatever the fate of the Yuma Project structures and facilities, the project itself

74. Pfaff, Queen, and Clark, *The Historic Yuma Project*, 140.

75. *Ibid.*, 141, 143-4.

76. *Ibid.*, 144-6.

77. *Ibid.*, 146-7.

represents man's continual struggle to master his environment. The idea of manipulating the unpredictable forces of the Colorado River in order to provide water and change a desert into an agricultural oasis, demonstrates the ingenuity and drive of citizens in the western United States. New concern about the impact of such projects on the environment often results in condemnation of the government agencies involved. Such outcry fails to take into account the historic desire of local citizens for the projects, and the prevalent ignorance or indifference of late nineteenth and early twentieth century humanity toward environmental concerns.

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