

COMMENCING THE MODERNIZATION PROJECT ON THE GILA GRAVITY MAIN CANAL

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ABSTRACT

The Gila Gravity Main Canal diverts approximately 700,000 acre-feet annually from the Colorado River at Imperial Dam. The canal serves five irrigation and drainage districts, as well as a number of other contractors and domestic areas. It is federally owned and its administrative board is made up of representatives from each irrigation district. The canal currently faces three problems: sedimentation, imprecise flow measurement, and a lack of real-time monitoring capabilities. Planned responses to these problems include dredging, the installation of a Replogle flume, remote monitoring and canal automation systems, and the application of a clay sealant. This project will be funded by a grant from the Border Environment Cooperation Commission (BECC) and a challenge grant through the US Bureau of Reclamation.

THE GILA PROJECT

The Gila Project was first authorized by 48Stat.195 in 1933. The Project was reauthorized under 61Stat.628 in 1947.

The 20-mile Gila Gravity Main Canal was completed in 1943. The Canal serves Wellton-Mohawk Irrigation and Drainage District (63,000 acres), Yuma Mesa Irrigation and Drainage District (authorized to irrigate up to 20,000 acres), Yuma Irrigation District (authorized to irrigate up to 11,600 acres), North Gila Valley Irrigation and Drainage District (authorized to irrigate up to 6,587 acres), and Unit B Irrigation and Drainage District. In addition, the Canal provides water for a number of other contractors including domestic water for the City of Yuma, Far West Water Company, (a private water company) and the Marine Corps Air Station - Yuma. 2004 diversions from the Colorado River were more than 700,000 acre-feet.

The Districts

Wellton-Mohawk Irrigation and Drainage District (WMIDD): Wellton-Mohawk Irrigation and Drainage District (WMIDD) irrigates approximately 63,000 acres and provides domestic water of up to 12,000 acre-feet with an annual consumptive use of 278,000 acre-feet. WMIDD is located east of Yuma and extends west from the Dome Narrows to the Mohawk Pass along the Gila River.

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The Gila River is an ephemeral stream. Water from the Gila Gravity Main Canal is supplied to the District by means of three pumping plants. The District is authorized to provide 12,000 acre-feet of domestic water. The principal domestic water user supplied at this time is the Town of Wellton. (The Town of Wellton was named from being a “well town” for steam-powered railroad engines.) Major projects in the area involving water are a proposed gas-fired power plant – the Wellton-Mohawk Generating Facility and an oil refinery proposed by Arizona Clean Fuels.

WMIDD’s contract with the Secretary of Interior, for a permanent water supply of 278,000 acre-feet, includes credits for return flows to the Colorado River. Most of the return flows from the District come from a drainage well system of over 90 wells. The drainage is conveyed from the District in the Main Outlet Drain (MOD) to the Yuma Desalt Plant. The drainage bypasses the Yuma Desalt Plant into the Main Outlet Drain extension (MODE) and is conveyed to the Cienega de Santa Clara, a marsh below Mexicali, Mexico. Public Law 93-320 authorized the construction of the Yuma Desalt Plant to treat Wellton-Mohawk drainage. There is substantial controversy over the operation of the Yuma Desalt Plant. If operated, flows to the Santa Clara Slough would be reduced.

WMIDD is also the Wellton-Mohawk Division of the Gila Project. The other Division is the Yuma Mesa Division. WMIDD plays a major role in winter produce for the nation, including lettuce, broccoli and other similar vegetables.

Yuma Mesa Irrigation and Drainage District (YMIDD): Yuma Mesa Irrigation and Drainage District (YMIDD) is the largest of three irrigation districts of the Yuma Mesa Division of the Gila Project. YMIDD is authorized to irrigate up to 20,000 acres under its contract with the Secretary of Interior. The District is located on the Yuma Mesa where the soils are sandy. Water is lifted to the District from the Gila Gravity Main Canal through the Yuma Mesa Pumping Plant. The primary crops grown are alfalfa and some citrus. The sandy soils are not conducive to growing the produce that is otherwise successful in the area.

The District shares an undivided 250,000 acre-feet consumptive use entitlement with the Yuma Irrigation District and North Gila Valley Irrigation and Drainage District.

Yuma Irrigation District (YID): Yuma Irrigation District (YID) is farmed using wells along the Gila River. When the Gila Gravity Main Canal was built, Yuma Irrigation District became the South Gila unit of the Yuma Project.

YID is technically advanced. Fields are laser leveled, ditches are lined and turnouts are metered. YID provides water for a substantial portion of the Yuma area winter produce crop. A groundwater mound under the Yuma mesa projects into YID. The groundwater mound requires drainage pumping in order to

maintain groundwater levels low enough to permit farming.

North Gila Valley Irrigation and Drainage District (NGIDD): North Gila Valley Irrigation and Drainage District (NGIDD) is one of the earliest diverters of Colorado River water. It has some Present Perfected Rights (PPR) under the decree in *Arizona vs. California*. It is the smallest of the irrigation districts in the Gila Project with authority to irrigate up to 6,587 acres on a consumptive use contract with some 4,000 acres of Present Perfected Rights. North Gila is perhaps the converse of the Yuma Irrigation District. Because of its proximity to the Colorado River and only minor problems with groundwater, the District does not have lined canals. Drainage from the District does not include drainage wells.

The Administrative Board

The Administrative Board is comprised of representatives from each of the irrigation districts. The Gila Gravity Main Canal is the property of the Federal Government.

The Canal

The diversion point of the Canal is Imperial Dam on the Colorado River between the states of Arizona and California. On the west side of the river the diversion is for the Yuma Project, comprised of the Yuma County Water Users' Association, the Bard Irrigation District, and the Imperial Irrigation District.

The Gila Project annually diverts approximately 700,000 acre-feet. The Canal is unlined and 20.5 miles long. More than half of the water diverted is delivered to WMIDD.

PROBLEMS

Since 1943, sediment load from the Colorado River has deposited between three and five feet of sediment on the bottom of the Canal. With an average designed depth of 13.5 feet and an average designed width of 22 feet, the impact on canal operations of the sediment deposit is substantial. The first step in modernizing the Canal is sediment removal.

A second problem addressed by the modernization project is the lack of precise water flow measurement. Improved water flow measurement is a priority for conservation. Improved water flow measurement through construction of a water measurement structure will assist not only in conserving water but in managing and operating the Canal.

A third problem is the lack of real-time capability to monitor the operations of the Canal. The Administrative Board plans to install remote monitoring equipment in order to more efficiently operate and manage the Canal.

One of the near future goals of the Administrative Board is automated canal operation. The remote monitoring equipment will assist in eventually establishing a system for automated operation of the Canal. Additional equipment will be installed for automated operation.

A final problem on the Canal is seepage. There are certain areas in the Canal where seepage occurs. A clay lining of the Canal has been proposed to alleviate this problem.

Solutions to the Problems

1. Sediment removal is planned to be accomplished by dredging.
2. The water measurement structure proposed is a Replogle Flume.
3. Remote monitoring and canal automation systems are proposed in a thick book, as usual, from the Cal Poly Irrigation Training and Research Center, detailing the equipment and systems necessary to bring the plans to fruition.
4. The Canal sealing will be with the use of a Bentonite-like clay.

FINANCING THE CANAL MODERNIZATION PROJECT

The initial cost estimate of the Project was over \$1.7 million. The Border Environment Cooperation Commission (BECC) was offering, at the time, grant funds in the amount of \$40 million to the United States side of the Mexican border for irrigation and other water projects. The total amount available for projects along the Mexican border was \$80 million. The \$40 million going to the Mexican side of the border did not require matching funds. The \$40 million going to the U.S. side of the border required 50 percent matching funds.

An application to BECC was submitted identifying the five components of the Project:

1. Canal Sediment Removal,
2. Canal Efficiency Enhancement,
3. Water Measurement Improvement,
4. Remote Control and
5. Canal Sealing.

The estimated cost for the Project was \$1,756,255.

A Steering Committee and Technical Work Group were formed and required public meetings held. An Environmental Assessment for NEPA compliance was prepared. A Categorical Exclusion was issued. Correspondence from water districts was submitted in support of the Project. Upon submittal of the requested documentation and public participation meetings, a Comprehensive Final Public

Participation Report was sent to BECC.

The Project was approved by BECC for \$827,500. North American Development Bank (NADBank) is preparing the grant contract.

Western Water Initiative Challenge Grant Program

The Department of the Interior, Bureau of Reclamation Challenge Grant Program (Challenge Grant) provided an opportunity for funding which could be used as part of the Board's 50 percent matching funds obligation.

The Board applied for and received a Challenge Grant in the amount of \$227,250.

Component Costs and Work Schedules

The following tables show the anticipated costs for the Project Components and the expected timelines for completion. Work on the water measurement structure has commenced. The "dirt work" is completed and concrete work will begin shortly.

Table 1. Budget

	Canal Sealing	Canal Efficiency Enhancem't	Water Measurem't Improvem't	Remote Control	Canal Sediment Removal	Total
SUMMARY BUDGET						
Project Budgeted Costs	147,000	815,000*	312,500	included	850,000	2,124,500
Design Costs Admin	8,000	46,500*	5,000	included	75,255	134,755
<i>TOTAL</i>	<i>155,000</i>	<i>861,500</i>	<i>317,500</i>		<i>925,255</i>	<i>2,259,255</i>
DETAIL BUDGET						
Equipment costs	15,000	315,000	60,000	included	317,037	707,037
Other Equipment & Operating costs					155,664	155,664
Maintenance & Repairs					55,000	55,000
Fuel & Supplies					65,800	65,800
Engineering & Design					49,854	49,854
USBR Design		46,500*	5,000	included		51,500
Labor Costs	65,000	110,000	155,000	32,500	222,075	584,575
Contract Admin & Supervision		23,000	35,000	7,500	59,825	125,325
USBR Construction	15,000	155,000	62,500			232,500
Indirect Costs	60,000	172,000*		included		232,000
<i>TOTAL</i>	<i>155,000</i>	<i>821,500</i>	<i>317,500</i>	<i>40,000</i>	<i>925,255</i>	<i>2,259,255</i>

Table 1. Budget (cont.)

FUNDING	Canal Sealing	Canal Efficiency Enhancem't	Water Measurem't Improvem't	Remote Control	Canal Sediment Removal	Total
NAD Bank Funds	97,500	149,500	214,713	32,500	317,037	827,500
Water 2025 Challenge Grant	15,000	155,000*	62,500	included		232,500
GGM CAB Funds	15,000	23,000	40,287	7,500	120,800	214,187
GGM CAB In Kind	27,500	494,000			487,418	487,418
<i>TOTAL FUNDING</i>	<i>155,000</i>	<i>821,500</i>	<i>317,500</i>	<i>40,000</i>	<i>925,255</i>	<i>2,259,255</i>

Table 2. Sediment Removal Costs

Operating Costs	65,800
Repairs	55,000
Labor Costs	222,075
Additional Equipment	155,664
<i>Total</i>	<i>498,539</i>
Engineering	49,854
Supervision	59,825
<i>Total with Engineering and Supervision</i>	<i>608,218</i>
Dredge Cost	317,037
<i>Total with Dredge</i>	<i>925,255</i>