proposed action. The following concerns were identified.

1.6.5.1. Effects of lining the canal on sacred plants.
1.6.5.2. Effects of construction activities during religious ceremonies.

2.0 Description of Alternatives Including the Proposed Action

2.1. Introduction

This chapter will be devoted to describing and comparing the alternatives including a summary of environmental consequences. The chapter has five sections as follows:

2.1.1. Description of Alternatives
2.1.2. Process Used to Consider, Select, and Eliminate Alternatives
2.1.3. Discussion of Reclamation's Preferred Alternative
2.1.4. Summary Comparison of the Activities, the Predicted Achievement of the Project Objectives, and the Predicted Environmental Effects of All Alternatives (see table on page 11)

2.2. Description of the Alternatives

2.2.1. No Action Alternative (A):

Implementation of this alternative would not satisfy the purpose and need of the proposed action. Weaknesses in the Canal would continue to exist including inefficiencies of the delivery structures. In addition, high seepage and evaporation losses would continue to exist at the present rate.

2.2.2. Proposed Alternative (B)

Three Canal sections A, B, and C (see Figure 2, Page 9) would be concrete lined with side slopes of 1:5:1. Although the dimensions would be different for each section, it would be necessary to carry a maximum flow of 1,590 cubic feet per second (cfs). The Partidor Check, Franklin Check, and the Wasteway One Check Structures would be replaced with new efficient Structures. The Partidor Check Structure would discharge water to Reach C of the Riverside Canal. The Franklin Check Structure would discharge water to the Franklin feeder, an existing, earthen-lined, irrigation canal which flows to the northeast to feed the Franklin Canal. Both check structures would contain two, twelve-foot wide radial gates to control flow. The Wasteway One Structure is intended to pass water from Reach C to the existing Canal. Its design would also include a side-channel weir to allow water to be wasted in an emergency from Reach C to the Rio Grande.

Access to the Project during construction would be along the current right-of-way roads.

2.3. Process Used to Consider, Select, and Eliminate Alternatives

2.3.1. An effective alternative would correct weaknesses in the Canal and help satisfy the need to help increase the water supply and efficiency of water delivery to the District. The following are criteria used for the process to select a preferred alternative:

2.3.1.1. An engineering design that fulfills the objectives listed in section 1.4.
2.3.1.2. An alternative that would be comply with the Lower Rio Grande Act (P.L. 106-576) including any additions to the Act that would affect this project.
2.3.1.3. An alternative that would be most cost effective.

2.3.2. The following table compares alternatives considered including the preferred alternative:

Alternatives Considered	Criteria for Selecting the Preferred Alternative		
	Meets Objective criteria in sections 1.4 and 2.3.1	Complies with Public Law 106-576	Cost Effective
No action	No	No	No
1. Elimination of canals	No	No	No
2. Reconstruction of canals	Partially	No	No
3. Replacement of canals with large diameter pipe	Yes	Yes	No
4. Concrete line canal sections A, B, and C	Yes	Yes	Yes

2.3.3. The following is a cost analysis for the previous table:

2.3.3.1. No Action Alternative

The no action alternative would leave the Canal and associated facilities as they exist today. This option would leave at risk the City's water and sewage treatment plants from flooding, contamination of the Park and surrounding area with untreated sewage during such flood, and make the capture and reuse of flood water impossible, resulting in an average loss to the region of between 3,000 and 20,000 acre-feet of water each year. The cost of the no action alternative is estimated to range on average between $1 and $7 million dollars per year depending on the risk of flooding and the cost of developing alternative water resources.

2.3.3.2. Elimination of Canals

The Canal is used to deliver approximately 50% of the raw water supply of the City, and supply irrigation water to over 45,000 acres of irrigable land. The elimination of the canal would result in tens of millions of dollars of economic damage per year. The long term cost of the elimination of the canal could total in excess of a billion dollars. The canal is also used to convey storm water from the American Canal Extension to the Rio Grande. Elimination of the Canal would require the

re-engineering of the American Canal Extension at a cost several million dollars. Damage caused by flooding to the City's primary water and sewage treatment plants could range from hundred of thousands to millions of dollars. A third use of the Canal is to convey treated sewage effluent for reuse downstream. Elimination of the canal would require such effluent be discharged to the Rio Grande, resulting in a loss of over 60,000 acres- feet of reused water and the loss to the City of 12,000 acres-feet of upstream raw water treated by the City. The direct cost of the loss of the reuse water ranges between $2 and $4 million per year.

2.3.3.3. Reconstruction of Canals

One of the primary objectives of the proposed project is to increase the flow capacity of the Canal to 1,500 cfs. Reconstruction of the Canal to provide this flow capacity without concrete lining the Canal would require a doubling of the width of the Canal. This larger Canal would require the purchase of additional right-of-way or the transfer of land in the Park to the District. A portion of the existing Canal has been condemned by the Department of Homeland Security and cannot be enlarged. The cost of reconstruction of the Canal, if possible, would be several times greater in cost than the proposed improvements.

2.3.3.4. Replacement of Canal with Large Diameter Pipe

The design flow rate of the Canal is approximately 800 cfs, the current capacity of the Canal is approximately 500 cfs. The Canal is supplied by the American Canal Extension which has a capacity in excess of 1,500 cfs. The proposed design of the concrete lining of Canal is 1,500 cfs. It typically is not economical to use pipelines or box culverts for the conveyance of surface water for flows greater than 75 to 125 cfs, unless the land cost for the Canal is very large or other constraints exist on the location of the conveyance facility. Pipelines or box culverts can be designed and built for flows of 1,500 cfs or greater but at a significantly greater cost than an open channel. For a 1,500 cfs facility the additional cost increase between a pipeline or box culvert and a concrete lined open canal would range between $3 to $5 million per mile.

2.3.3.5. Concrete Line Canal Sections A, B, and C

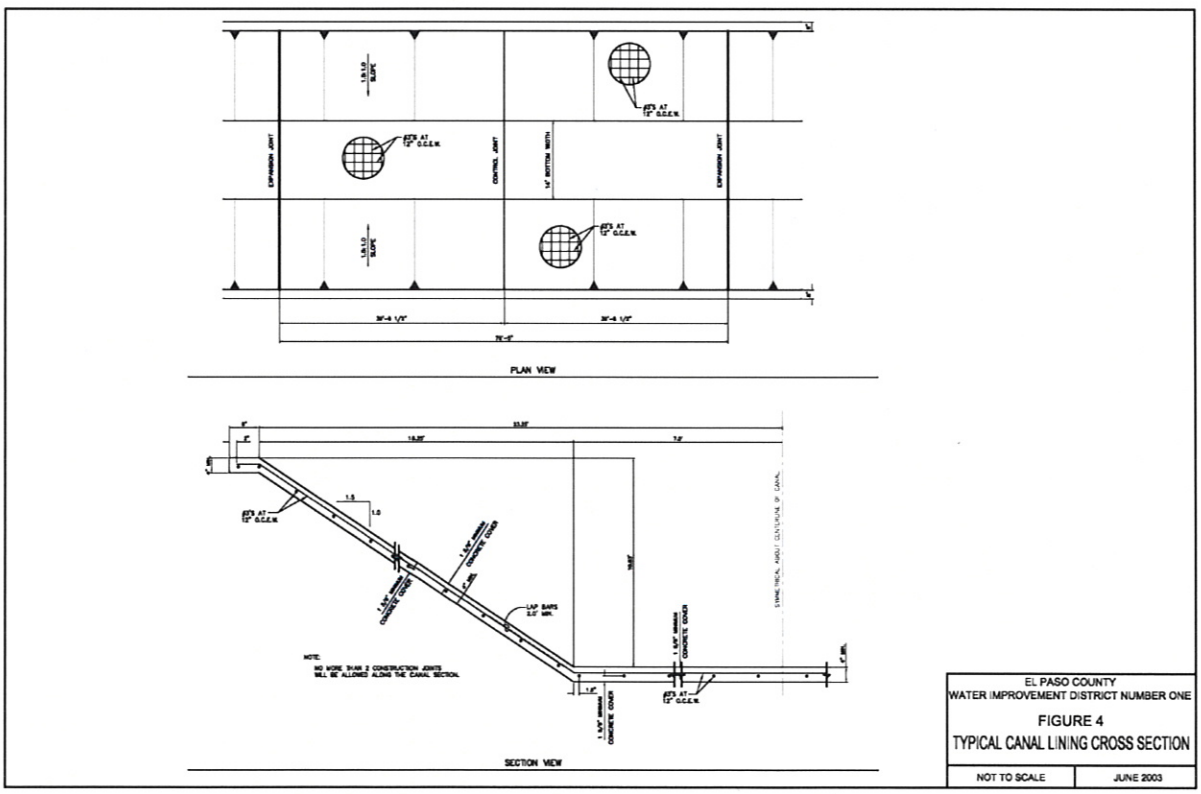
This is the least costly option when installation cost, maintenance cost, and reliability issues are considered. Concrete lined canals have been successfully built and operated for many decades, and have been extensively used in the United States and through-out the world. When properly designed and built, concrete lined canals have a life cycle of over 75 years. The cost of the Project is estimated to be approximately $6

million dollars. The cost of this Project would be much less than the other alternatives described on Page 7.

2.4. Proposed Action, Alternative B

The proposed Project area lies within El Paso County, Texas as indicated in Figure 1. The existing components of the segment of the Canal include approximately 16,000 feet of earthen-lined canal with bottom widths varying from 45 to 90 feet. The proposed Canal (see Figure 2 of Page 9, section A, B, and C) begins at the downstream end of the existing American Canal. The Project is divided into three segments: A, B, and C. Reach B connects to the middle of Reach, A at a point just downstream of the Wastewater Treatment Plant Bridge. Reach A terminates at the Partidor Check Structure. Reach C extends from the Partidor Check structure to the Wasteway One Check Structure.

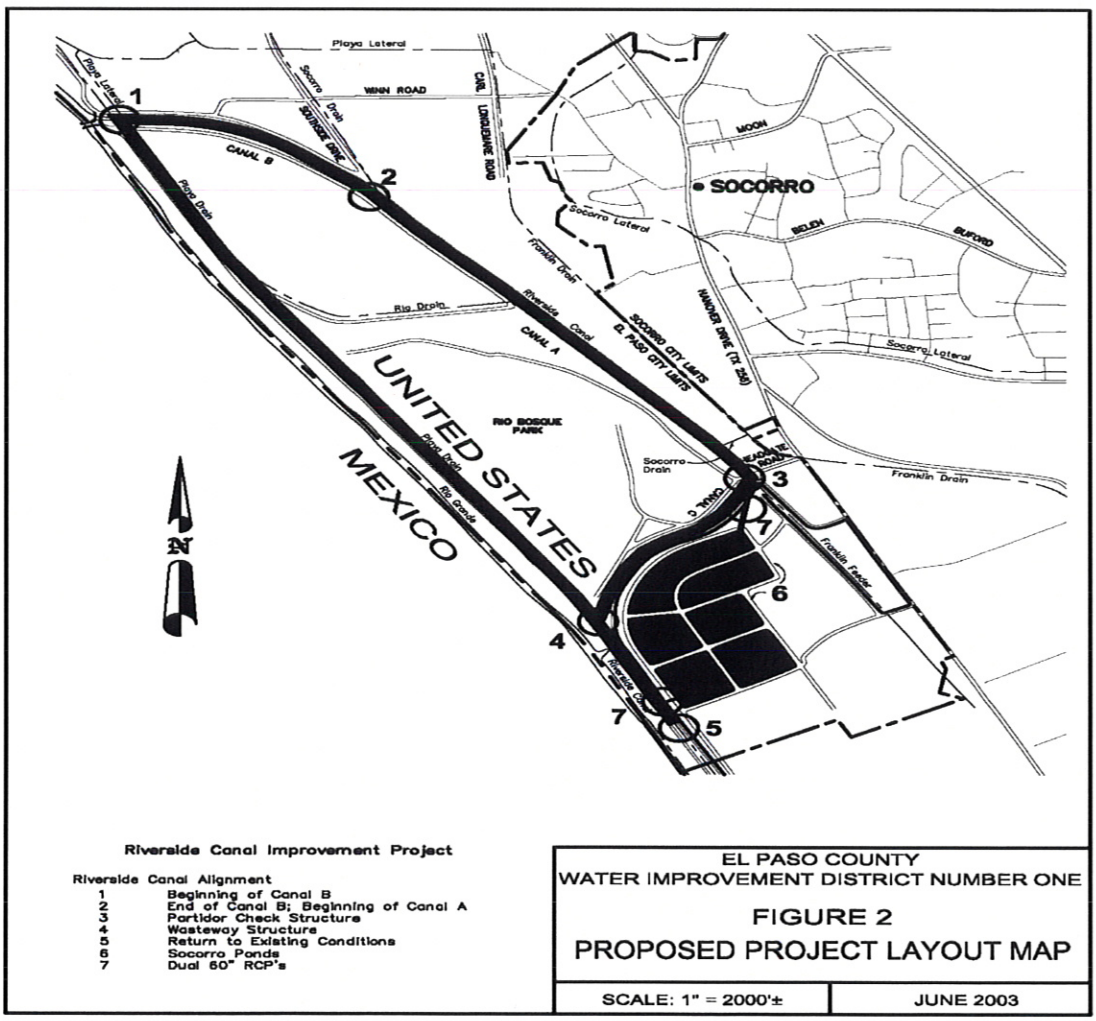
Canal sections A, B, and C will be concrete lined with side slopes of 1:5:1 and a depth of about 11 feet. Each is designed to carry a maximum flow of 1,590 cfs while maintaining about 4 feet of total freeboard. Section A has a length of 7,630 feet and a bottom width of 14 feet. Section B has a length of 4,000 feet and a bottom width of 18 feet. Section C has a length of 4,370 feet and a bottom width of 28 feet. A typical canal lining cross-section is shown in Figure 4 as follows:

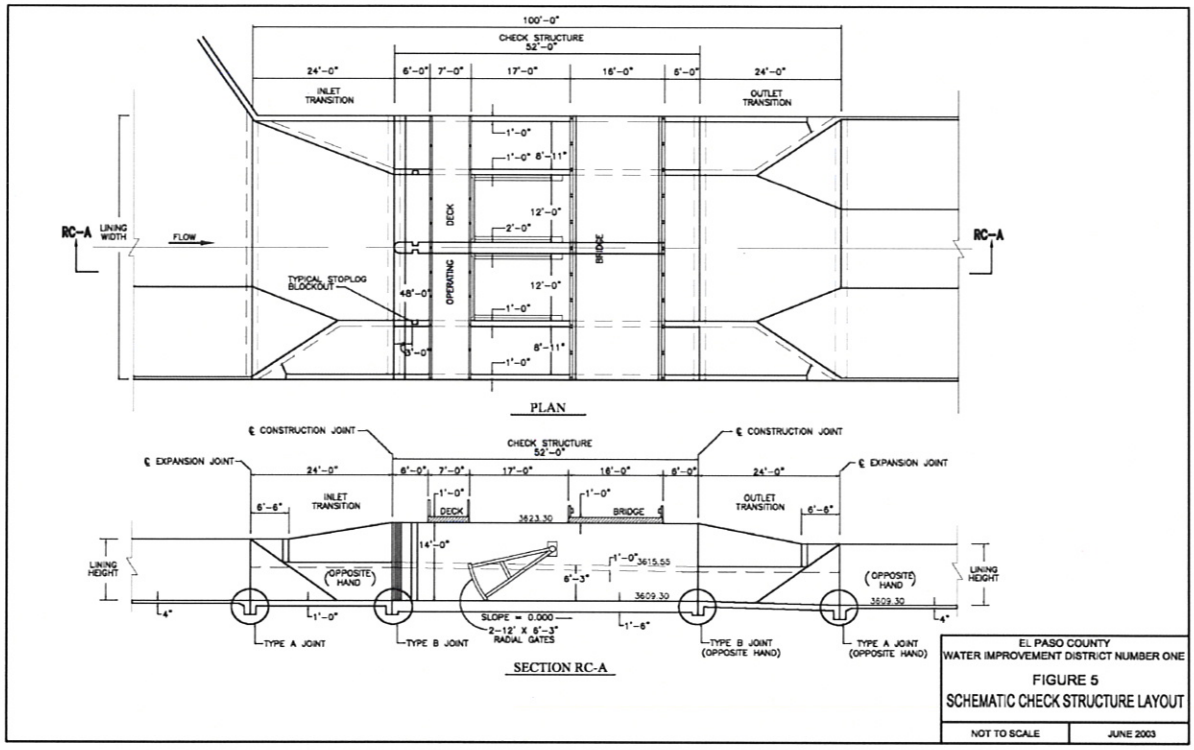


The Partidor and Franklin Check Structures would be constructed to allow more concise and efficient management of water within the primary canal systems. Both check structures would contain two, twelve-foot wide radial gates to manage flow. The Partidor check would also

contain overflow bypass channels on both sides of the radial gate bays, giving it a total bypass capacity of approximately 1590 cfs. The structures would each be approximately 140 feet long. Transition sections would be constructed from the proposed concrete-lined Canal A, into the structure, and through to the Franklin Feeder. A Schematic Check Structure Layout is provided at Figure 5 on page 10.

Also the Canal would be lined from the Partidor Check Structure to the Wasteway One Check Structure (see Figure 2, below). The design of Wasteway One Check Structure would match that of the Franklin and Partidor Check Structures. Included at the Wasteway One Check Structure would be the construction of a side-channel weir to allow water to be wasted (in an emergency) or sluiced (for maintenance) from Canal reach C to the Rio Grande through an existing wasteway culvert (see Figure 6, Page 10). The proposed Socorro Ponds shown on Figure 2, below are no longer a part of the Project.

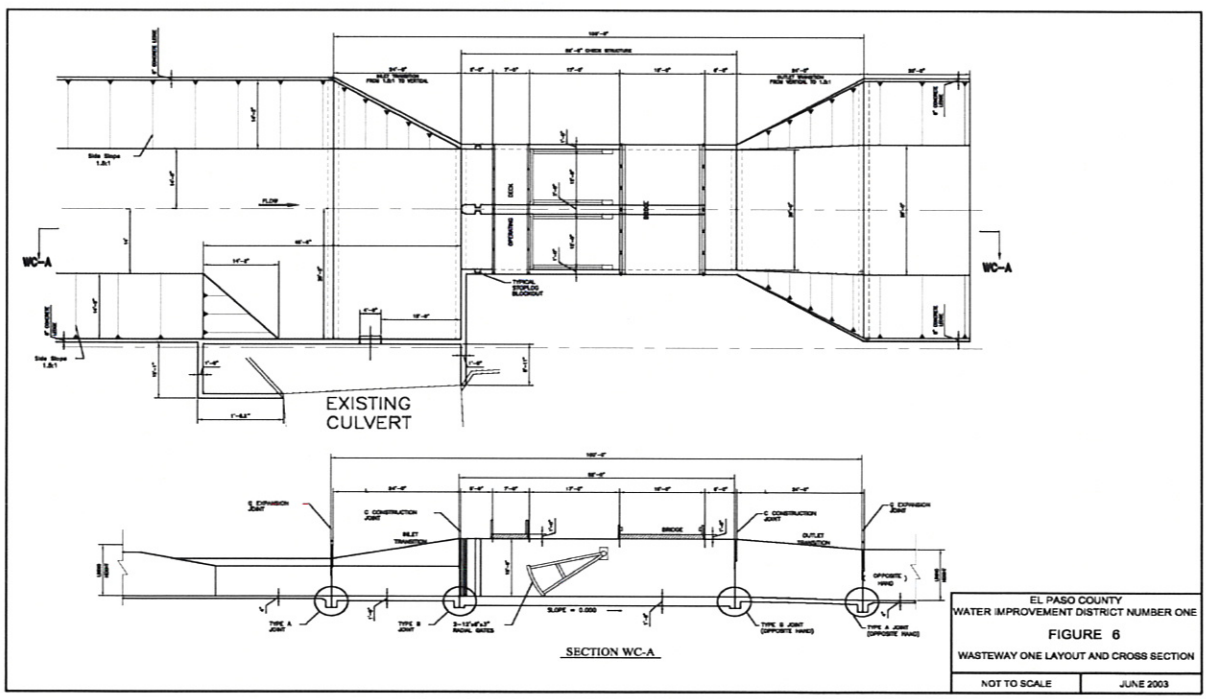




EL PASO COUNTY
WATER IMPROVEMENT DISTRICT NUMBER ONE

FIGURE 5
SCHEMATIC CHECK STRUCTURE LAYOUT

NOT TO SCALE | JUNE 2003



EL PASO COUNTY
WATER IMPROVEMENT DISTRICT NUMBER ONE

FIGURE 6
WASTEWAY ONE LAYOUT AND CROSS SECTION

NOT TO SCALE | JUNE 2003

2.5. Summary Comparison of the Alternatives, the Predicted Achievement of the Project Objectives, and the Predicted Environmental effects of Reasonable Alternatives.

Reasonable Alternatives	Affected Resources	Predicted Impacts (Issues section 1.6) of the Alternatives on the Resources	Predicted Achievement of objective criteria listed in section 1.4 and section 2.4.1 to fulfill the need.
No Action A	Vegetation	None	None
	Wildlife	None	None
	Wetlands	None	None
	Water Resources	Continued seepage from the unlined canal.	None
	Environmental Justice	None	None
	Indian Trust Assets	None	None
	Cultural Resources	None	None
	Air Quality and Noise	None	None
Proposed Action Alternative B	Vegetation	Impacts vegetation during construction and on the concrete lined area. Vegetation will return on open soil areas.	Not applicable (N/A)
	Wildlife	No impacts to threatened & endangered species Other wildlife species may be temporarily displaced to nearby unlined canals, though most species disturbed during construction are expected to return.	N/A
	Wetlands	Eliminating seepage from the canal would not affect the Rio Bosque Park.	None
	Water Resources	Eliminating seepage from the canal would have no permanent affect on the Rio Grande Alluvium.	Improvement in deliveries and diversion of water to the canal. Nearly eliminates seepage losses to the groundwater.
	Environmental Justice	None	None
	Indian Trust Assets	None	None
	Cultural Resources	The canal would be lined and the check structures would be replaced. Traditional Cultural Resources will not be impacted.	None
	Air Quality and Noise	During construction temporary increase in dust and noise above existing levels.	N/A