

- **Board of Directors**
Engineering and Operations Committee

July 11, 2000 Board Meeting

10-2

Subject

Inland Feeder Project Status Report for May 2000

Description

Arrowhead Tunnels (Redesign) – Reaches 1 and 2

The Project Team is currently redesigning the Arrowhead West Tunnel (AWT) and the Arrowhead East Tunnel (AET). It is estimated that the tunnels will be re-bid in October 2000 after review by the Board.

The proposed bolted and gasketed impermeable tunnel liner segments are currently being tested by the University of Illinois to verify that the structural strength and tolerances can withstand the high hydrostatic pressures present in the San Bernardino Mountains. The completion of testing is scheduled for August 2000.

Metropolitan has yet to receive U.S. Forest Service (USFS) approval to mine the remainder of the Arrowhead tunnels. A chronology detailing our continued efforts to secure permission to complete the project from the USFS is shown in [Attachment 1](#). A construction status on the Arrowhead tunnels is included as [Attachment 2](#).

Arrowhead West Tunnel – Reach 1

Negotiations are proceeding regarding demobilization of the contractor and settlement of the remaining claim issues. As-built drawings of the Devil and Waterman Canyon Portals are being prepared. The remaining contractor supplied equipment is being catalogued for inclusion in the specifications and bid documents for use in future contracts.

Arrowhead East Tunnel – City Creek Heading (Shank/Balfour Beatty) – Reach 2

The tunnel boring machine (TBM) has been removed from the City Creek heading and the shunt flow collars are been completed. The trailing gear remains to be removed and preparation is nearly complete for the installation of the final lining in the excavated portion of the tunnel.

Ameron International has completed manufacturing the approximately 30,500 feet of final impermeable tunnel liner. The contractor will use approximately 8,000 linear feet of liner at the City Creek heading. The remainder of the liner will be relocated and stored so that it can be used to line the remainder of the tunnel at a later date. Eight locations are currently under review as potential storage sites. Tunnel liner storage costs are estimated to be \$1.5 million. Construction claim issues regarding the excavated portion of the tunnel contract have been settled.

Highland Pipeline – Reach 3

The Highland Pipeline design is 90 percent complete. Once design is complete, the construction bidding will be placed on hold until work on the Arrowhead Tunnels is scheduled.

Mentone Pipeline – Reach 4

Notice To Proceed was given to the contractor, J.F. Shea Co., Inc., on April 20, 2000. The contractor began exploratory pothole work and removal of existing abandoned concrete railroad abutments in the Santa Ana River Wash area. In addition, the contractor has begun clearing and grubbing work, and has planned for excavation and pipe installation within the active wash area of the Santa Ana River. This project is scheduled for completion in February 2002.

Riverside Badlands Tunnel – Reaches 5 & 6

In May 2000, the TBM progressed 388 feet, bringing the total completed through May 31 to 17,289 feet (see [Attachment 3](#) for a summary of mining progress). Dewatering operations continue in San Timoteo Canyon to lower the groundwater during mining. As anticipated, slower mining rates are occurring due to the San Timoteo alluvial deposits. The contractor is chemically grouting in this area to control groundwater inflows into the tunnel, thereby enhancing TBM performance. This operation will continue through mid-June. The contractor has successfully mined beneath the Union Pacific Railroad.

Dewatering operations continue in Live Oak Canyon and a new pump has been installed in an existing well to supplement the dewatering effort. Pump tests will be performed to determine the necessity of any additional wells. Results will be completed by first week of June.

Schedule and Projected Costs

The Inland Feeder Project is currently scheduled for completion in 2004/2005; however, this date will be extended due to the revised construction work plan for the Arrowhead Tunnels. A new completion date will be established after USFS approval of the bolted and gasketed system. The project budget remains at \$1.188 billion. Total expenditures through May are \$441.2 million (see [Attachment 4](#) for a financial summary and [Attachment 5](#) for a schedule summary).

RECENT DEVELOPMENTS

Riverside Badlands Tunnel – Reaches 5 & 6

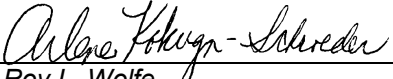

Mining on the Riverside Badlands Tunnel has advanced a total of 17,966 feet through June 15, 2000. Chemical grouting in San Timoteo Canyon has been completed and the grouting equipment has been demobilized. Successfully mining through San Timoteo Canyon and has now resumed in the hard rock material.

Policy

Board Request

Fiscal Impact

None.

for	 Roy L. Wolfe Acting Manager, Corporate Resources	6/19/2000 Date
	 Ronald R. Jester General Manager	6/27/2000 Date

- [Attachment 1 – Arrowhead East Tunnel Selective Summary Chronology](#)
- [Attachment 2 – Construction Status on the Arrowhead East and West Tunnels](#)
- [Attachment 3 – Riverside Badlands Tunnel mining progress](#)
- [Attachment 4 – Financial Summary](#)
- [Attachment 5 – Schedule Summary](#)

**The Arrowhead East Tunnel
And Metropolitan's Urgent Issues with the U.S. Forest Service (USFS)**

Selective Summary Chronology

Environmental Review

- 1990-1993 - MWD conducts extensive environmental review & public comment.
- San Manuel Band of Mission Indians (Tribe) is formally notified of all proceedings, and provides no comments or objections.
- USFS issues a Special Use Permit for MWD's AET.
- March 1997 - MWD purchases 900 acres of Mitigation Land & Transfers Title to the USFS.

Construction of Tunnel

- April 1998 - Construction of AET begins.
- April 4, 1999 - MWD voluntarily stopped tunnel excavation to begin grouting program.

Groundwater Seepage Issues

- May 17, 1999 - MWD begins intensive cutoff grouting program to supplement the pre-excavation grouting and mitigate groundwater seepage.
- MWD staff intensifies negotiations to address groundwater concerns of USFS and Tribe.
- June 3, 1999 - USFS details concerns and expectations regarding tunneling.
- Sept. 22, 1999 - MWD offers a formal proposal to continue tunneling.
- Nov. 2, 1999 - USFS requests supplemental funds from MWD as reimbursement for USFS staff time.
- Nov. 5, 1999 - USFS informs MWD that tunneling operations may not commence without prior written approval.
- Nov. 15, 1999 - USFS provides comments on MWD's September 1999 Proposal.
- Dec. 14, 1999 - MWD notifies Tribe by letter of MWD's intention to install final lining at the excavated section of tunnel to eliminate current groundwater inflows.

Proposals to Revise Project

- Jan. 2000 - MWD staff proposes to stop tunneling from the east and requests permission from USFS to grout and final line the excavated portion of AET ahead of schedule in order to eliminate groundwater seepage. MWD proposes to construct tunnels utilizing the USFS and the Tribe's preferred method. Metropolitan submits plan to USFS and Tribe to move forward for their review.
- March 28, 2000 - USFS grants conditional approval of MWD's September 1999 Proposal.
- March 31, 2000 - MWD provides USFS detailed report on technology of Bolted & Gasketed Lining Process.
- April 11, 2000 - MWD notifies contractor that the tunneling portion of their contract has been deleted from their current contract due to impracticability.

Currently, the General Manager is holding biweekly meetings with the USFS to expedite resolution of outstanding issues in order to proceed with tunnel construction.

Construction Status on the Arrowhead East and West Tunnels (May 2000)

The AWT and the AET are part of the Inland Feeder Project, a 44.2-mile, 12-foot diameter pipeline. Approximately 8 ½ miles of the Arrowhead Tunnels alignment traverses below the San Bernardino National Forest in the foothills of the San Bernardino Mountains, in San Bernardino County north of the City of San Bernardino. The AET alignment is located northeast of the Reservation for the Tribe (see map below). At its closest point, the AET alignment is approximately 3,000 feet (horizontally) north of the most northeasterly corner of the Reservation and 2,000 feet (vertically) below the ground surface of the San Bernardino Mountains.



The environmental documentation for this Project, which was produced in conjunction with the USFS, consisted of a Final Environmental Impact Report (dated February 1993) in compliance with the California Environmental Quality Act, an Environmental Assessment and Finding of No Significant Impact issued by the USFS. The technical, environmental and mitigation aspects of the tunnels were all addressed consistent with the NEPA process. The USFS was involved throughout the development and review of the tunnel planning and design. The tunnels are now being constructed pursuant to a Special Use Permit issued by the USFS. The permit expires in December 2002.

In addition to addressing tunnel design and construction, the environmental documents established a groundwater monitoring and mitigation program to deal with the potential effects on surface and groundwater resources features. The completed monitoring and mitigation plan were reviewed by USFS. Metropolitan has regularly

monitored over 100 features along and flanking the tunnel alignments. Some of these sites have been monitored for two or more years prior to commencement of construction. The USFS has supervised the monitoring process and has received copies of all monitoring data. Metropolitan has also provided monthly monitoring reports to the Tribe. In recent months, reports have been provided to both the USFS and the Tribe on a weekly basis.

Construction on the AET commenced in May 1998. The tunnel was being excavated in a northwesterly direction from the City Creek Portal on the east, planning to finish the tunnel excavation at the Strawberry Creek Portal on the west near Waterman Canyon. In early 1999, areas of high groundwater inflows were encountered in the tunnel approximately 6,000 to 7,000 feet westerly from the City Creek Portal. Groundwater outflows from the City Creek Portal peaked at approximately 1,400 gallons per minute (gpm). Although the environmental documents identified the potential for peak inflows up to 2,000 gpm, the Tribe and the USFS both raised concerns that Metropolitan was not in compliance with pre-NEPA design of the tunnel, and that impacts on groundwater resources exceeded those set forth in the environmental documents. Although Metropolitan didn't concur with the San Manuel's and the USFS's contentions, Metropolitan made every attempt to address their concerns. In April 1999, at approximately 8,008 feet into the tunnel excavation from the City Creek Portal, Metropolitan ceased the tunnel excavation and completed an intensive grouting program to further reduce groundwater inflows to the current flow of less than 275 gpm measured at the City Creek Portal.

Over time, some of the exploration/observation wells installed by Metropolitan above and near the AET tunnel alignment have shown a decline in groundwater levels that exceeded expected seasonal variation. The declines in water levels were attributed to the groundwater inflows into the tunnel since the time the inflows were first encountered. Recent readings in these boreholes have shown that the decline has leveled off, likely the result of Metropolitan's grouting program. A few springs located on the surface in the forest near the alignment also appear to have been affected by the tunnel inflows. A small temporary pipeline was placed to the springs and the spring flows have been restored to protect the wildlife. To date, the Tribe's groundwater consultant has not been able to attribute any changes in the groundwater levels beneath the reservation to the tunnel construction. Considering the highly fractured nature of the rock and the design of the finished tunnel it is not likely that the declines in groundwater levels near the tunnel would result in a permanent regional impact.

As of May 2000, the USFS has not authorized Metropolitan to resume tunnel excavation from the City Creek Portal. The USFS has requested that sustained water outflows from the tunnel not exceed 500 gpm on a weekly average. Metropolitan committed to both the USFS and the Tribe that it will not re-commence tunnel excavation without providing advance notice and information regarding changes in the tunnel design or the contractors means and methods.

Metropolitan has conferred with its Board of Consultants and other experts to evaluate a number of alternative measures to complete the AET and AWT. Based on their recommendations, Metropolitan has proposed a plan to modify tunnel construction in response to concerns of the USFS and the Tribe. In January 2000, Metropolitan submitted a document to the USFS detailing the proposed plan. The plan called for: dismantling the TBM from the existing City Creek portion of the AET; grouting the areas of groundwater inflows from the portion of the excavated tunnel previously occupied by the TBM; installing shunt flow grout collars at strategic locations in the tunnel; and installing the impermeable reinforced concrete cylinder pipe in the 8,008 feet of excavated tunnel back to the City Creek Portal, thereby eliminating groundwater inflows; and finally, the restoration of the City Creek Portal. The remaining 22,450 feet of the AET will be excavated from the Strawberry Creek Portal with a new TBM using a bolted and gasketed, segmented initial liner for initial ground support and the primary groundwater barrier. The impermeable, reinforced concrete cylinder pipe will be placed as a final liner. Similarly, the plan to excavate the AWT has changed to using a new TBM installing a bolted and gasketed segmented initial lining for ground support and the primary groundwater barrier and an impermeable final liner, either welded steel or reinforced concrete cylinder pipe.

The tunnels are being designed to incorporate a bolted and gasketed primary support system that will control groundwater intrusion into the tunnel. The bolted and gasketed segments are currently being tested by the University of Illinois to verify that the structural strength and tolerances can withstand the high hydrostatic pressures present in the San Bernardino Mountains. The completion of testing is scheduled for August 2000.

Metropolitan's modified tunnel construction plan is specifically designed to incorporate the comments and preferred means and methods of tunnel construction proposed by the USFS, the Tribe and their consultants. Numerous meetings have been held between Metropolitan and the USFS to discuss the plan. In March 2000, the USFS conditionally approved the plan to line the City Creek heading of the AET.

After the April 11, 2000 Metropolitan Board meeting, Metropolitan's staff notified the contractor, Shank/Balfour Beatty (Shank), that the tunneling portion of the construction contracts for the AWT and AET have been deleted due to impracticability. Shank was directed to complete the construction of the pipelines at Waterman Canyon, Devil Canyon and Strawberry Creek. Ameron International, acting as a sub-contractor to Shank, has completed the manufacturing of the impermeable liner for the AET. In the coming months, Shank will install the final impermeable liner in the approximately 8,000 linear feet of excavated tunnel from the City Creek heading back to the City Creek Portal. Shank will also make the connection to the existing pipeline outside the City Creek Portal and complete the restoration of the portal. Metropolitan will also move the remainder of the already manufactured pipe to a new storage location until such time the pipe can be installed in the tunnel. Landscaping and final construction of the City Creek Portal will be completed under this existing contract.

The Project Team is currently revising both the schedule and budget for the re-design and re-bidding of the AWT and the AET. It is estimated that the new tunnel specifications would be re-bid in October 2000 upon presenting to the Board.

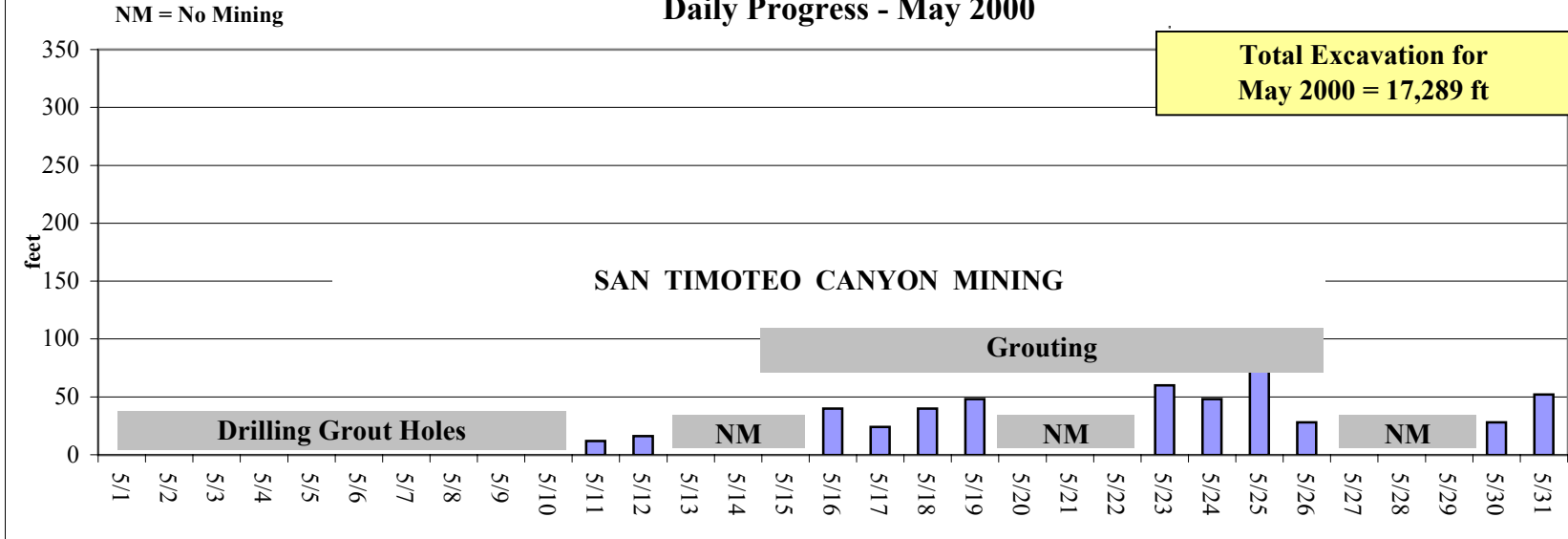
The original amount of the construction bid for the AET was \$87.6 million. The projected cost for the work according to the new plan to address the concerns of the USFS and Tribe, including the redesign effort is now estimated at over \$200 million. The tunnel is scheduled for completion in early 2005. Since the Special Use Permit expires in December 2002, Metropolitan is requesting an approval to move forward with the modified project and an extension of the permit by the USFS.

Metropolitan is committed to mitigation of impacts as defined in the environmental documents. For example, as stated above, Metropolitan has installed temporary piping to supply water to surface springs that appear to have been, at least temporarily, impacted by the AET construction. Although there is no indication of impact to surface or groundwater resources on tribal lands, Metropolitan cannot guarantee there will be no impact. The Tribe's position has been that mitigation is not an acceptable alternative for the offset of potential impacts. They have also indicated, on more than one occasion, that no impact is the only acceptable alternative. Because the revised tunnel construction procedures will further reduce the potential for impacts, Tribe's concerns should also be reduced. However, the potential for impacts has not been eliminated. Staff continues to work with the Tribe to provide appropriate and acceptable mitigation for any damage or loss demonstrated by the Tribe.

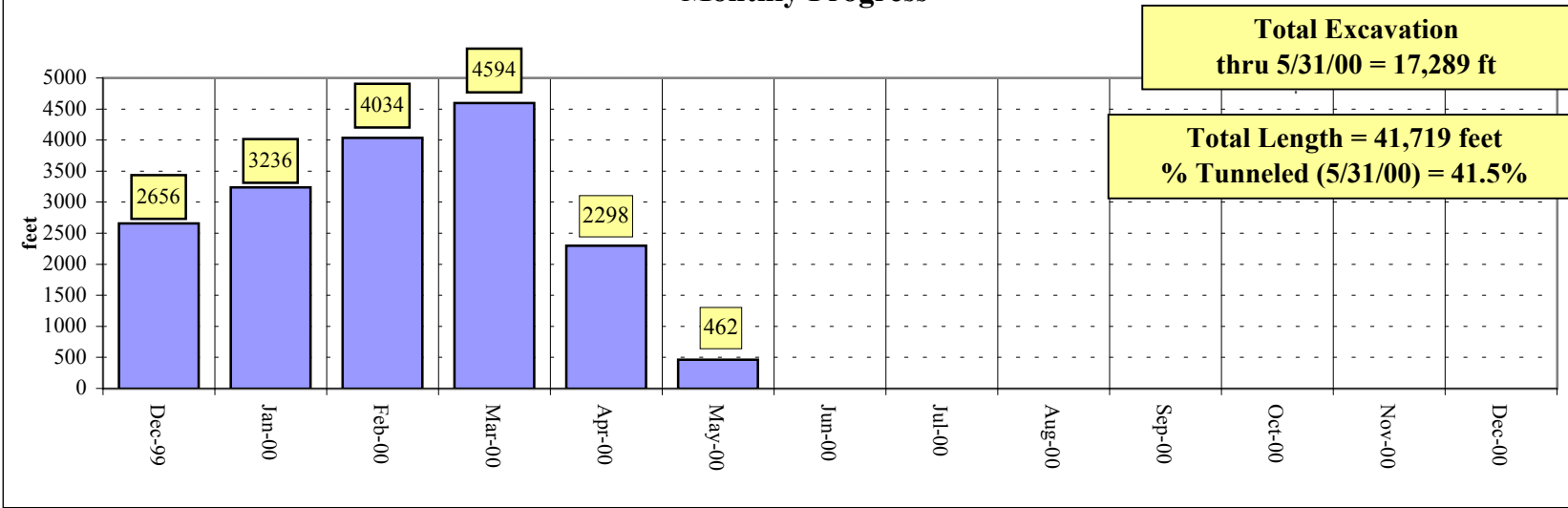
Metropolitan is committed to building all components of the Inland Feeder Project as well as continuing a positive working relationship with the USFS and the Tribe. The USFS indicated to Metropolitan its desire to review and approve any future construction plans. In response to that request, meetings have been and will continue to be held between Metropolitan, the USFS and the Tribe to discuss the specifics of lining City Creek and the plans to proceed with tunnel construction.

RIVERSIDE BADLANDS TUNNEL

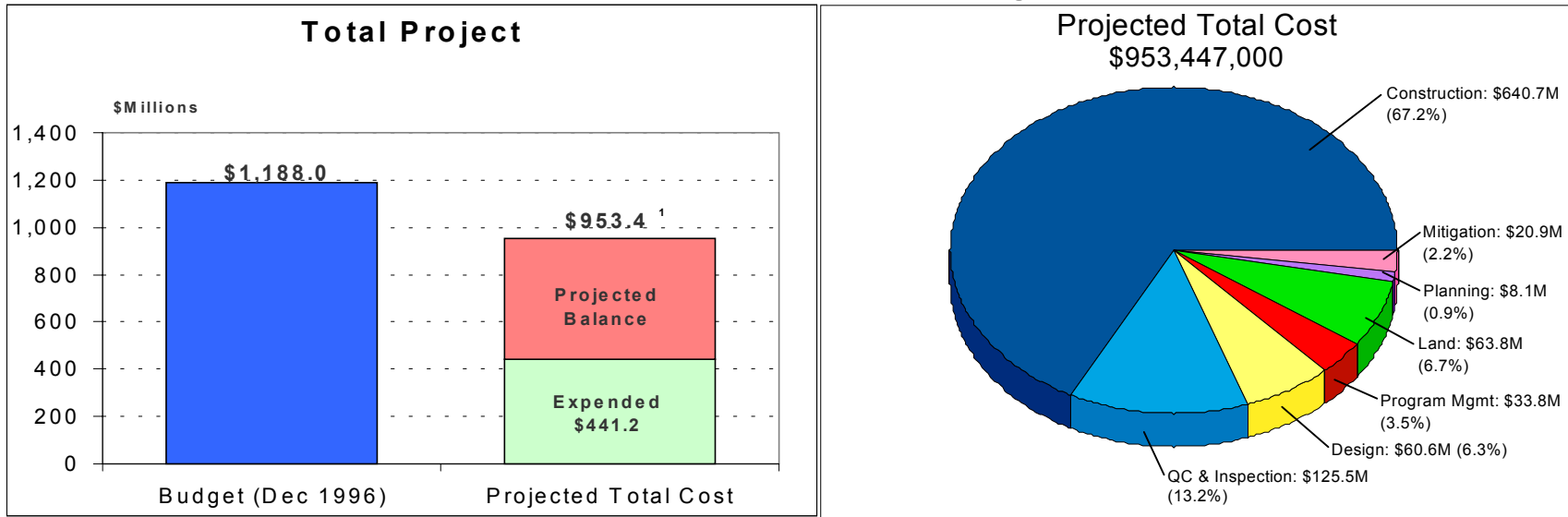
Daily Progress - May 2000



Monthly Progress

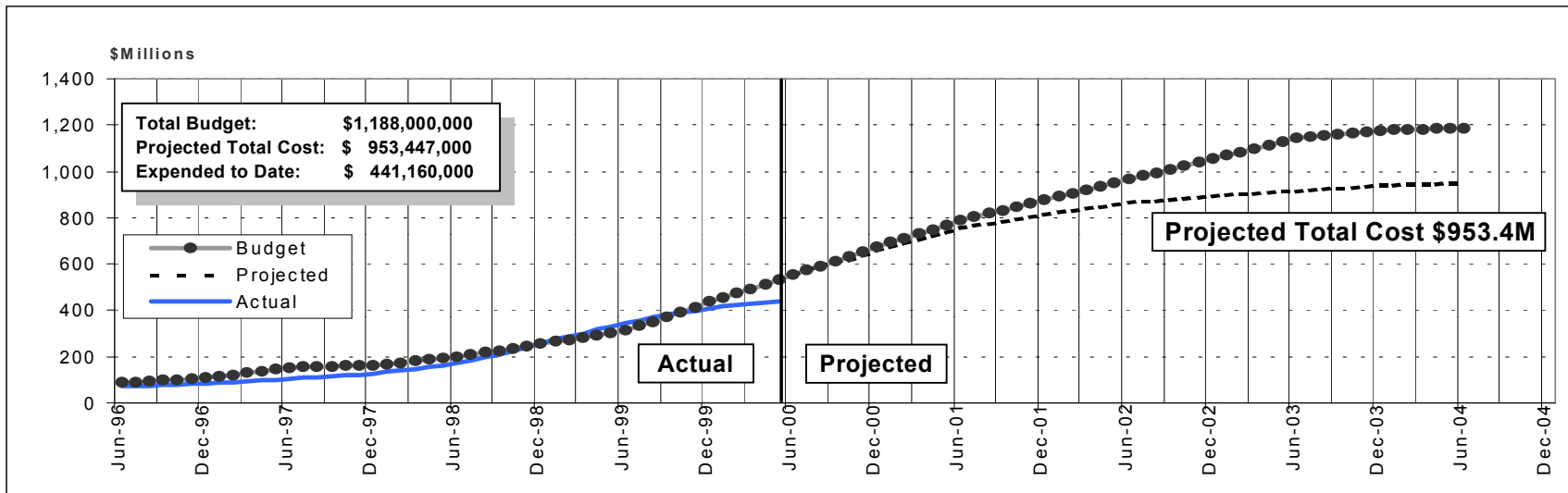


Financial Summary



1. Based on knowledge of current field conditions.

Project Cash Flow



Schedule Summary

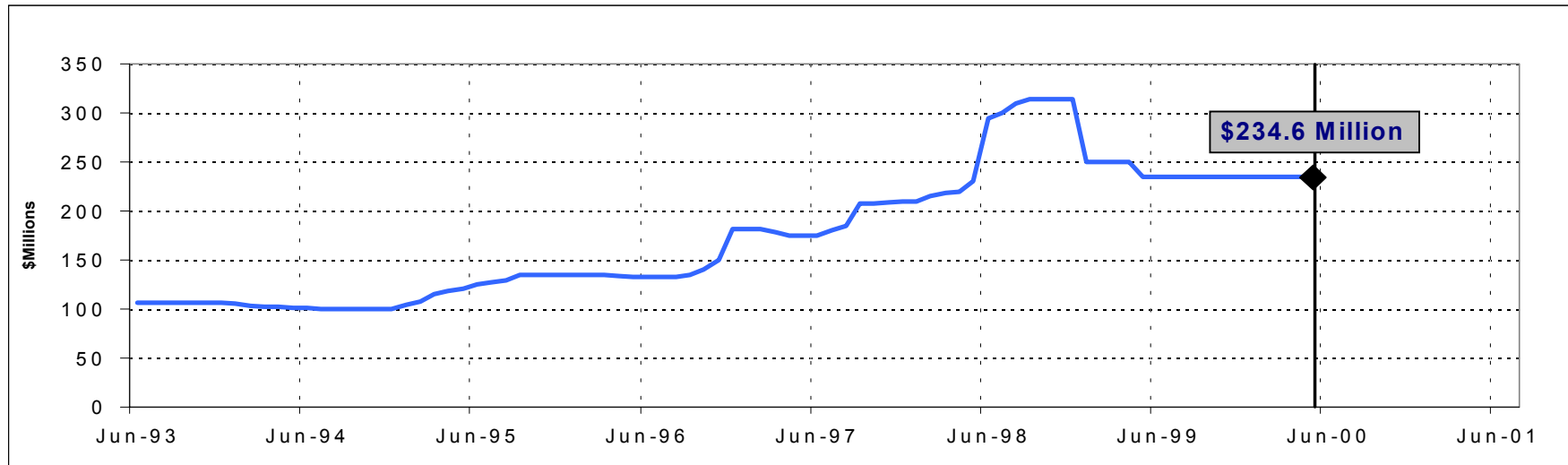
DESCRIPTION	PROGRESS		COMPLETION DATE		COMMENTS
	PLANNED ¹	ACTUAL	CONTRACT ²	FORECAST	
<i>Design</i> Highland Pipeline	100%	90%	----	Aug-00	Once design is complete, construction bidding will be placed on hold until work on the Arrowhead Tunnels is scheduled.
<i>Construction</i> Arrowhead West Tunnel	45%	25%	Dec-02	T.B.D.	On hold.
Arrowhead East Tunnel	70%	38%	Jan-03	T.B.D.	On hold.
Mentone-RUSD Pipeline ³	100%	100%	Complete	Complete	Construction completed February 1998.
Mentone Pipeline			Feb-02	Feb-02	Contractor has begun mobilization.
Riverside Badlands Tunnel	35%	47%	Aug-03	Apr-02	Mining has advanced 17,289 feet.
Riverside Pipeline North	100%	100%	Complete	Complete	Construction completed November 1999.
Riverside Pipeline South	100%	100%	Complete	Complete	Construction completed August 1999.

1. Based on Approved Schedule

2. Original Contract Duration + Approved Extensions

3. Represents 3,400 foot section of Mentone Pipeline constructed to support opening of new high school.

Remaining Budget ¹



1. Project budget minus projected total cost.