

Return to  
Flood Control District  
Library  
Mona 60117

**APPENDIX V  
TO THE ACDC TASK FORCE FINAL REPORT**

Property of  
Flood Control District of MC Library  
Please Return to  
2001 W. Durango  
Phoenix, AZ 85009

**The Arizona  
Canal Diversion Channel Task Force  
Minority Report**

April, 1986

A118.938

**APPENDIX VII  
TO THE ACDC TASK FORCE FINAL REPORT**

Property of  
Flood Control District of MC Library  
Please Return to  
2001 W. Durango  
Phoenix, AZ 85009

**The Arizona  
Canal Diversion Channel Task Force  
Minority Report**

April, 1986

A118.938

TO: The Honorable Mayor Goddard and City Council Members

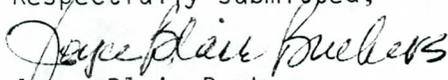
Our extended review of Reach Four as members of the ACDC Task Force has produced some significant facts and some encouraging prospects. Because of our concerns over the approach of the Task Force and the lack of unbiased resources to assist us, we submit the following items as our major concerns to Reach Four.

1. The Corps of Engineers, by their own admission, does not have underlying support data for their current cost benefit estimates.
2. The Corps of Engineers is presently undertaking an entirely new cost benefit study that will be completed in September of 1986.
3. The City of Phoenix and the ACDC Task Force has never had the opportunity to fully and independently study either Reach Four or possible alternatives. The majority of the Task Force agreed that an independent study should be performed and that Reach Four is aesthetically unacceptable.
4. Because of the time required for the Corps to complete the new cost benefit analysis and the lead time involved in the existing ACDC construction schedule, the City of Phoenix has the time to undertake a professional and independent review of Reach Four and possible alternatives.
5. Some of the alternatives proposed appear to offer potential cost savings over Reach Four.

We believe Phoenix should learn from Scottsdale's outstanding Indian Bend Wash flood control project. Reach Four is a standard 1940's unimaginative approach to flood control and inconsistent with the present creativity of the City of Phoenix. By working together, with the spirit of cooperation, we can find a more acceptable solution.

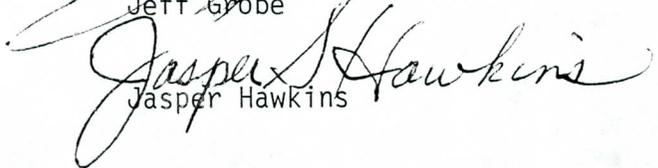
We ask that you review this report and just as you've seen fit to protect other areas of our city, to seek ways to provide creative and aesthetically acceptable flood control.

Respectfully submitted,

  
Joyce Blair Buekers

  
Kemberly S. Clark

  
Jeff Grobe

  
Jasper Hawkins

# ACDC TASK FORCE SUPPLEMENTAL REPORT

## TABLE OF CONTENTS

	<u>Page</u>
INTRODUCTION	1
CONCERNS RELATIVE TO THE ACDC TASK FORCE PROCEEDINGS AND REPORT	1
1. No Independent Analysis of Alternatives Was Possible	1
2. Conflicting Data and Unanswered Questions Make It Imprudent to Proceed With Any Project Without Further Study	2
3. Inaccurate Statements in Task Force Report Give Rise to Unwarranted Conclusions	3
CONCLUSIONS REGARDING REACH FOUR	3
1. Reach Four is Aesthetically Unacceptable	3
2. Like Scottsdale, Phoenix Must Pursue Creative Flood Control Measures	4
3. Reach Four Lacks Cost-Effectiveness	4
4. Citizens Oppose Reach Four	5
5. Cudia City Wash Area is the Only Major Flood Risk	6
CONCLUSIONS REGARDING ALTERNATIVES	6
1. Aesthetically Acceptable and Cost-Effective Alternatives to Reach Four Exist	6
2. Tunneling Alternatives Provide Both Invisible Flood Protection and Cost Savings	6
3. Stanford Basin Alternative Provides Park-Like Flood Protection With Large Savings	7
4. Alternatives Permit Downsizing of Reach Three	7
5. Alternatives Can Use Rights-of-Way Along Arizona Canal	7

6. Alternatives Selected by City Can Use Reach Four  
Federal Funding

Page

8

RECOMMENDATIONS

9

Notes

APPENDICES

- A. Critical Inaccuracies in Task Force Report
- B. Pictures of Los Angeles Channels
- C. Indian Bend Wash; A Scottsdale Success Story
- D. Excerpts from Accounting Report of Costs of Alternatives
- E. Editorials Opposing Reach Four
- F. Descriptions of Alternatives
- G. Pamphlet and Pictures of "Mole" Tunneling Technology With Informational Letter
- H. Map and Drawing of Stanford Drive Basin
- I. Estimate of Cost for Alternative Study
- J. Criteria for Selecting Alternatives

Exhibits

## ACDC TASK FORCE SUPPLEMENTAL REPORT

### INTRODUCTION

The four members of the Arizona Canal Diversion Channel Task Force submitting this report are a part of the majority of the Task Force which passed 6-4 the recommendation to City Council that an independent feasibility study should be undertaken to examine the use of tunneling technology as an alternative to the concrete ditch solution of Reach Four.<sup>1</sup> However, we also believe there are other creative alternatives to Reach Four and ask that they be pursued as well. There is time available to study the feasibility of alternatives,<sup>2</sup> and so the City of Phoenix should not be stampeded into simply adopting Reach Four. The Phoenix City Council has never fully considered alternatives to Reach Four.<sup>3</sup> The Main Task Force Report recognizes (on page 4) that decisions regarding the project were made "perhaps without the degree of involvement of elected officials or citizens appropriate for a project of this magnitude." We believe that the private sector would generously contribute financially and professionally to a private/public sector partnership whose goal would be the completion of an impartial study of alternatives.

We believe that Reach Four is not an acceptable solution to the potential flooding problems created by the Cudia City Wash. If the City of Phoenix does not want Reach Four, the Army Corps of Engineers has stated that it will not build it.<sup>4</sup>

Rather than duplicate the historical and general background portions of the Task Force Report, we are herewith providing a summarized Supplemental Report, appropriately footnoted to document our conclusions and coordinate with the Task Force Report. We have also provided exhibits and other pertinent documentation which support our position. This Report will bring to your attention our concerns about the approach taken by the Task Force and the Task Force Report, followed by our conclusions and recommendations regarding Reach Four and alternatives. This Report is divided into a descriptive summary of positions along with illustrative appendices and detailed narrative footnotes with exhibits.

### CONCERNS RELATIVE TO THE ACDC TASK FORCE PROCEEDINGS AND REPORT

1. No Independent Analysis of Alternatives Was Possible. The Task Force was unable to fulfill its charge to advise the City Council on "non-ACDC flood control alternatives." Although charged to evaluate alternatives to Reach Four, no independent technical experts in the areas of hydrology, economics or civil engineering were made available to assist the Task Force.<sup>5</sup> The Army Corps of Engineers,<sup>6</sup> the Maricopa County Flood Control District,<sup>7</sup> the City Engineer's Office<sup>8</sup> and the Salt River Project,<sup>9</sup> all of which had publicly promoted Reach Four for over a decade, became the de facto technical resources upon which the Task Force had to rely. These agencies mobilized manpower and resources not for the purpose of finding creative alternatives, but solely to support Reach Four.

For example, the Main Task Force Report recognizes (on page 5) that "the Corps and the Flood Control District have been less than forthcoming with the Task Force and the public regarding the detention basin alternative suggested by PRC Toups," referring to the fact that the agencies had compared the cost savings of the alternative to the cost of the entire ACDC (rather than just Reach Four) to "minimize the apparent cost savings of the Toups alternative". In addition, the Corps saw to it that the cost estimate of every alternative proposed by Task Force members was in excess of costs for Reach Four. The Corps' estimates were padded in a number of ways which added unsubstantiated costs ranging from \$10 million to \$40 million to proposed Task Force alternatives.<sup>10</sup> As an illustration, in considering the 48th Street/Crosscut Canal alternative (discussed more fully in Appendix F attached to this Report), the Corps included the requirement that the alternative accommodate 60% more flood water than Reach Four and thus major construction costs were added.<sup>11</sup> Also, although the Corps only added a 15% contingency factor for Reach Four, the Corps added in a 30% contingency factor for all Task Force alternatives.<sup>12</sup>

It is a tribute to the Task Force that it reached its recommendation for further study of the "Mole" alternative despite heavy opposition to any further study of alternatives by the Maricopa County Flood Control District and the Corps of Engineers. As a consequence of the public position taken by the Flood Control District and Corps of Engineers the majority of the Task Force determined that a study of an alternative to Reach Four must be accomplished by a group of engineers independent of the Maricopa County Flood Control District and the Army Corps of Engineers. The need for independent analysis was the conclusion of a majority of the Task Force.<sup>13</sup> The estimated cost of such an independent study would not be prohibitive.<sup>14</sup> Since any study of alternatives must take into account community feelings and values, a supervisory task group of citizens must be appointed to work with the engineers. This is dealt with more fully in our recommendations.

## 2. Conflicting Data and Unanswered Questions Make It Imprudent to Proceed With Any Project Without Further Study

There are many critical issues in which the Task Force received conflicting data and other issues in which few or no facts were received. This section will highlight only a few of the factual problem areas.

One example of the conflicting information received by the Task Force is in regard to the need for flood control at the Cudia City Wash at 40th Street based upon the flood events which occurred in 1972. Some fundamental issues regarding the 1972 flood were left unresolved. First, evidence before the Task Force referred to the 1972 flood as a 50-year flood, a 70-year flood, a 100-year flood and a 500-year flood.<sup>15</sup> Second, and critical to the cost-effectiveness of Reach Four, conflicting information was received by the Task Force regarding the amount of damage caused by the 1972 flood. The benefits attributed by the Corps to the construction of the ACDC were alleged to contain only the physical damages sustained in the 1972 flood in the areas of Phoenix that would have been

prevented by the ACDC.<sup>16</sup> The Corps, however, included \$5.0 million dollars of "other damages" that occurred well outside the ACDC-protected area entirely within the city limits of Scottsdale and Tempe.<sup>17</sup> The approximate \$5.0 million of "other damages" which should not have been attributed as a benefit to the ACDC amounts to almost 50% of the total benefits thus rendering all the benefit/cost ratio calculations as inaccurate.<sup>18</sup> Finally, other issues surrounding the liability of SRP for some of the flood damages of 1972 were left unanswered.<sup>19</sup>

Another area of factual dispute is with regard to the actual costs of Reach Four. We believe the actual costs of Reach Four will certainly be higher than the Corps has concluded. For example, costs for blasting in parts of Reach Four<sup>20</sup> and additional costs for aesthetic treatment as prescribed by the Task Force have not been added into Reach Four costs.<sup>21</sup>

A third unresolved issue is the question of whether Reach Four was legally added by the Corps in 1974 to the already congressionally approved ACDC without the need for additional congressional authorization.<sup>22</sup> If Reach Four was not properly authorized, the project may not receive federal funding. But, as will be discussed later in this Report, if it was within the discretionary authority of the Corps to add Reach Four to the ACDC without congressional authorization, the Corps can similarly add an alternative to Reach Four.

Other major issues left unresolved are the legal scope of the SRP easements along the Arizona Canal which is important for determining costs of alternatives;<sup>23</sup> the effect of the enlargement of the floodgates at the Cross-Cut Canal which is necessary for determining the availability of the Arizona Canal for flood protection;<sup>24</sup> and the effect the addition of the siphon at Indian Bend Wash has upon the magnitude of future floods in the Cudia City Wash area.<sup>25</sup>

3. Inaccurate Statements in Task Force Report Give Rise To Unwarranted Conclusions. We believe that the Task Force Report contains many critical and unsupportable statements which are essential to the conclusions of the Task Force and must be addressed in this Report. Appendix A attached immediately following this Report addresses numerous such examples by first quoting from the Task Force Report and then responding to the issue.

#### CONCLUSIONS REGARDING REACH FOUR

1. Reach Four is Aesthetically Unacceptable. It was the unanimous opinion of the Task Force that Reach Four is ugly and should not be constructed as proposed.<sup>26</sup> The Task Force Report recognizes (on page 6) that "There is no doubt that the ACDC will be unattractive . . . it will add a stark concrete lined channel bordered with a six-foot fence . . . debris will undoubtedly accumulate in the bottom of the channel." Reach Four is an insensitive and obsolete 1940's concrete ditch solution to flood control. The channel is a 4.6 mile long, two-story deep, 36-foot wide empty ditch located along the north bank of the Arizona Canal.<sup>27</sup> This flood control approach has left lasting scars in Los Angeles. A

visionary City Council should not permit such a scar in Phoenix. (Photographs of the Los Angeles channels are attached as Appendix B immediately following this Report.) The photographs of the L.A. channels were taken by a Task Force member who attended a tour of the channels conducted by the Army Corps of Engineers. As ugly as these channels appear, these are the best L.A. has to offer. Phoenix can do better.

The open ditch construction of Reach Four is aesthetically very disruptive to Phoenix. Although the Task Force concluded that extensive landscaping would lessen the negative impact, no amount of mitigating actions can totally eliminate this ugly scar across the city.<sup>28</sup> The Task Force Report concludes that extensive mitigating factors must be adopted to make Reach Four acceptable. However, the addition of such substantial aesthetic treatment will significantly increase the projected cost of Reach Four, thereby possibly making other alternatives even more economically attractive. Estimates of these additional costs have not been included in the Task Force Report.

2. Like Scottsdale, Phoenix Must Pursue Creative Flood Control Measures. Phoenix is faced with a situation remarkably similar to that which faced Scottsdale not too many years ago when the Corps of Engineers proposed a similar concrete ditch through that community. (The book Indian Bend Wash: A Scottsdale Success Story is attached as Appendix C immediately following this Report.) The City of Scottsdale appointed a citizen task force to study the project. This committee recommended a study of creative alternatives by an independent engineer. The engineer retained by the City produced three alternatives to the proposed concrete ditch. The City of Scottsdale rejected the Corps' concrete ditch approach and diligently pursued the alternative which resulted in the Corps' construction of the award-winning Indian Bend Wash Greenbelt.<sup>29</sup> Where Scottsdale had the advantage of land area which allowed a creative recreational alternative, Phoenix now has the benefit of advanced and proven engineering technology to provide it with an equally creative solution. Phoenix should not settle for less.

3. Reach Four Lacks Cost-Effectiveness. Reach Four began as an addition to the ACDC at an anticipated cost of \$20 million.<sup>30</sup> By 1982 expected costs had grown to \$54 million<sup>31</sup> and by 1986 costs have ballooned to \$81 million. (Excerpts from the accounting report of costs of alternatives prepared by the accounting firm Laventhol & Horwath are attached as Appendix D immediately following this Report.)<sup>32</sup> If Reach Four were evaluated today, using current discount rates, it would never be approved since it would have a negative benefit/cost ratio. Even using a 3-1/4% discount rate, which the Corps feels is authorized, Reach Four has only a marginal cost-effectiveness.<sup>33</sup> The Corps of Engineers submitted to the Task Force its own document evaluating the project using a more reasonable 7-3/4% discount rate, and this showed significantly less than a dollar of benefit for every dollar spent.<sup>34</sup> This corresponds to a congressional study in 1982 which found that the entire ACDC has a negative benefit/cost ratio.<sup>35</sup>

There is a need for an independent economic study since the flood benefits provided by this project have never been clearly understood

and may in fact have been overestimated by 50% as discussed earlier in this Report. If the benefits provided by the project are half the original estimate, the cost-effectiveness of the project would be half of that projected.<sup>36</sup> However, a thorough economic analysis would be necessary to determine if there is a need for a flood control measure of the magnitude provided by Reach Four.<sup>37</sup> Unfortunately, no economic experts were available to assist the Task Force in this area.

The Main Task Force Report argues (on page 8) that "the benefit/cost ratio to the City and its citizens is obviously favorable because direct costs to the City are minimal." We do not subscribe to this theory that federal money is free money nor do we believe that the City of Phoenix should adopt such a position with the federal government. After all, Phoenix citizens are U.S. citizens and fiscal responsibility in tight budget times is the responsibility of all citizens.

4. Citizens Oppose Reach Four. Considerable and long-standing opposition to Reach Four is well-documented. Newspaper clippings on file at the public library dating as early as 1965 quote Phoenix residents opposing the cement channel design of the ACDC. In 1966, a bond issue floated to fund the project was defeated by a ratio of 3 to 1. During the following years the Corps of Engineers held a handful of neighborhood meetings, and individuals quoted at those meetings expressed strong criticism of the aesthetics, landscaping and general design of the project.

More recently, in 1985, the Arizona Biltmore Estates Village Association reaffirmed its long-standing opposition and were joined by numerous other homeowner and citizen groups. At that same time, Citizens Against Reach Four and Citizens Against Reach Three were organized and in two weeks the groups gathered more than 2000 signatures opposing the project. Also, major newspapers and magazines took editorial positions opposing Reach Four as contrary to the interests of the neighborhood residents and all city citizens.<sup>38</sup> (Copies of editorials are attached as Appendix E to this Report.)

A recent survey of homeowners living south of Arizona Canal, the supposed beneficiaries of Reach Four, indicated opposition to the construction of Reach Four.<sup>39</sup> Finally, during the many months of the Task Force deliberations, hundreds of citizens have attended the meetings and have spoken in opposition to Reach Four. Interestingly, despite public notice of the Task Force meetings, there have been no visible supporters of the project. Even though the supposed beneficiaries (the homeowners) are opposed to Reach Four, the project continues because of vested interests of the Corps, the Flood Control District and the Salt River Project.

One of the primary beneficiaries of Reach Four is the Salt River Project which pays nothing for Reach Four yet receives Reach Four as essentially an "insurance policy" protecting it against liability arising from any potential future flooding of the Arizona Canal from the Cudia City Wash area.<sup>40</sup> The Main Task Force Report recognized (on page 26) that SRP is the only governmental entity which clearly has liability from

flooding of the Arizona Canal along Reach Four and the ACDC would reduce such liability. It is clear that, in contrast to the Phoenix citizenry which has strongly voiced its opposition to the ACDC, the Salt River Project benefits greatly and has lobbied hard to protect its interest.

5. Cudia City Wash Area Is The Only Major Flood Risk. After months of Task Force meetings it has become apparent that in Reach Four there is only one area of major flooding potential which requires flood control: the Cudia City Wash area located just west of 40th Street.<sup>41</sup> In the area from 32nd Street to 12th Street there is no significant flood danger,<sup>42</sup> and the minor floodwaters that may arise in that area can be managed by existing conditions if the Cudia City Wash area problem is solved.<sup>43</sup>

Regardless of the amount of flooding in the 32nd Street to 12th Street area, which has been the subject of much debate, the problem is not sufficient to warrant such a massive, costly project as Reach Four. In fact, prior to the Cudia City flood in 1972, the ACDC was designed to end at 12th Street as its easternmost point.<sup>44</sup> Thus, Reach Four is simply an expensive, ugly open concrete conduit to transport Cudia City Wash waters from 40th Street to Reach Three at 12th Street.

#### CONCLUSIONS REGARDING ALTERNATIVES.

1. Aesthetically Acceptable and Cost-Effective Alternatives to Reach Four Exist. In the last few meetings of the Task Force, it became abundantly clear that there are numerous viable alternatives to Reach Four. (Descriptions of the seven alternatives are provided in Appendix F attached to this Report.) Many of these alternatives have little or no negative impact on the community, have similar or lower total cost compared to Reach Four and have considerably lower local cost. (Cost comparisons prepared by Laventhol & Horwath are attached as Appendix D.) All of the alternatives presented by the Task Force solve the potential flooding problem at Cudia City Wash. The alternatives set out in this Supplemental Report (in Appendix F), such as the 40th Street Mole and the Stanford Drive Detention Basin, were conceived by lay persons.<sup>45</sup> It is our belief that a creative and enthusiastic, independent professional study would result in additional creative solutions which were beyond the means and time of the Task Force.

2. Tunneling Alternatives Provide Both Invisible Flood Protection and Cost Savings. One particularly promising alternative endorsed by a majority of the Task Force for study by the City of Phoenix is the use of an automatic tunneling machine (a "Mole") to tunnel from the Salt River northward to the Cudia City Wash thus delivering the Cudia City floodwaters south and utilizing the natural gradient.<sup>46</sup> The Mole is currently being used by the Arizona Department of Transportation for the Papago Freeway drains<sup>47</sup> and also has been used in the construction of the Central Arizona Project.<sup>48</sup> Contrary to the Task Force Report, Mole technology is time-tested and is not "atypical."<sup>49</sup> (A pamphlet, pictures and fact sheet describing and depicting the Mole are found in Appendix G immediately following this Report.)

The Mole is particularly useful in urban areas because it tunnels invisibly far underground and therefore does not require the taking of homes or businesses and does not cause disruption during the construction process. A tunnel would alleviate the scar of Reach Four. It is possible that the Mole can be used in a number of different ways to create alternatives to Reach Four such as combining the Mole and detention basin concepts.

The 40th Street Mole alternative has been estimated to cost \$18 million less than Reach Four. Also, this alternative would cost only \$2 million of local funds as compared to over \$18 million in local funds for Reach Four.<sup>50</sup>

3. Stanford Basin Alternative Provides Park-Like Flood Protection With Large Savings. A second promising alternative to Reach Four is the creation of a detention basin along the Arizona Canal south of Stanford Drive between 34th Street and the west boundary of the Phoenix Country Day School.<sup>51</sup> (A location map and architectural drawing of proposed basin is attached as Appendix H following this Report.) The detention basin would capture and hold the characteristically high-intensity, low volume flooding<sup>52</sup> from the Cudia City Wash area and deliver the water in small underground conduits east to 24th Street and from there in a small open channel to Reach Three. The Basin could be developed as a park similar to a down-sized Indian Bend Wash Park. The Basin would create recreational opportunities and add to the ambiance of the neighborhood unlike Reach Four and its negative aesthetic impact.

The Basin is so economical that it could almost be built solely with the local funds committed already to Reach Four. This solution is estimated to cost almost \$41 million less than Reach Four and more than \$5 million less in local funds.<sup>53</sup> The only hurdle that must be overcome to adopt this creative solution is to convince the Paradise Valley Town Council to accept a park within its boundaries rather than a concrete ditch.<sup>54</sup>

4. Alternatives Permit Downsizing of Reach Three. Reaches One and Two, which protect against flooding from the Cave Creek Wash, can be built without Reaches Three and Four.<sup>55</sup> The elimination of Reach Four and the implementation of an alternative would permit the significant downsizing of Reaches Two and Three and result in a taxpayer savings of \$15 to \$20 million.<sup>56</sup> The savings could be used to construct a cover over additional portions of those Reaches and make those Reaches more aesthetically acceptable. Accordingly, finding an alternative to Reach Four will potentially allow the City Council to also address the concerns of citizens in the Reach Three area.

5. Alternatives Can Use Rights-of-Way Along Arizona Canal. Several of the potential alternatives involve the use of the 50-foot wide Arizona Canal right-of-way north of the canal, which is owned by the federal government and managed by SRP. The use of the right-of-way should be available for flood control measures without compensation. Only specific out-of-pocket expenses incurred by SRP should be compensated. The use of the Arizona Canal right-of-way has two important assets: (1)

it negates the neighborhood disruption caused by the taking of homes and businesses required for the construction of Reach Four and (2) it deletes the tremendous cost of this taking of homes and businesses, which is a 100% local taxpayer cost.

6. Alternatives Selected by City Can Use Reach Four Federal Funding. There are those who would have the City Council believe there are no available federal funds for alternatives to Reach Four. But if the Corps of Engineers was able to add Reach Four in 1974 under its "statutory powers to make incremental changes in congressionally authorized projects" it can add alternatives to Reach Four under the same authority.<sup>57</sup> In fact, in 1974 the Corps proposed a culvert under 40th Street to the Salt River as an alternative to Reach Four.<sup>58</sup> The Corps was apparently ready to add the 40th Street culvert to the ACDC without seeking additional congressional authorization. Under the reasoning that added Reach Four and considered the 40th Street culvert, other alternatives can now be funded without additional congressional authorization. If additional authorization is needed for an alternative to Reach Four, Reach Four itself needs the additional authorization from Congress which the Corps never sought.

Congressman John McCain's office sought an opinion of the Minority Counsel to the House Public Works Committee regarding the issue of funding for alternatives.<sup>59</sup> The opinion fails to answer the most important issue: if Reach Four could be added under Corps discretion without seeking additional authorization, why cannot alternatives to Reach Four be similarly added? If Reach Four is presently an authorized portion of the ACDC, then, according to the opinion of counsel:

To the extent that the alternatives can be characterized as improvement to the design that provide enhancement of project purposes without significantly increasing costs, the likelihood is increased that the Corps will proceed to construction without seeking additional congressional authorization.<sup>60</sup>

Senator Barry Goldwater posed a series of questions directly to the Army Corps of Engineers. To the question of whether the Corps of Engineers has the authority to change the Reach Four design and incorporate the 40th Street Mole alternative in the project, if feasible, the Corps responded:

The Chief of Engineers has the discretionary authority to change project design if the specific alternative is consistent with the intent of the original Congressional authorization and is the most economical means of construction.

Similarly, to the question of whether the Corps has the flexibility and discretion to change the project plan and adopt an alternative to Reach Four, the Corps answered "we do, providing the alternative is consistent with the authorization and does not increase the federal cost."<sup>61</sup>

In Senate hearings Senator Dennis DeConcini sought answers from Robert Dawson of the Corps of Engineers regarding various aspects of the ACDC.<sup>62</sup> Although the Corps has responded to a number of Senator DeConcini's questions with answers similar to those received by Congressman McCain and Senator Goldwater, the Corps has refused to respond to perhaps the most important question posed.

What is the Corps policy regarding changes in design and construction on projects already authorized and underway which would result in a cost-savings to the federal government? Have there been cases where once a project was authorized, the design and scope of a project changed, reducing costs, and the Corps was able to make the changes without seeking additional authorization from the Congress? Please explain.<sup>63</sup>

Also, the Corps' responses to Senator DeConcini's questions do not attempt to distinguish the addition of Reach Four from the addition of alternatives to Reach Four.

In the responses to questions from Congressman McCain, Senator Goldwater and Senator DeConcini, little analysis is made regarding the issue of local and federal cost sharing. Although the responses indicate that federal-local cost sharing may be affected if an alternative to Reach Four is chosen, the responses are vague as to particulars of those effects. Considering the fact that the local cost share of the ACDC is one of the highest in the country (over twice the historical average for flood control projects),<sup>64</sup> it is inconceivable to us that a higher proportion of costs would be placed upon local interests for an alternative to Reach Four.

### RECOMMENDATIONS

1. The City of Phoenix should withhold endorsement of Reach Four and endorse an aesthetically-acceptable and cost-effective flood control alternative for the Cudia City Wash area.

2. The City of Phoenix should retain independent engineering consultants to study and pursue the Mole tunneling option, the park-like detention basin alternative, a combination of the Mole and detention basin or any other new and creative alternatives which solve the Cudia City Wash problem. (An estimate of the costs to study the Mole alternative is attached as Appendix I to this Report.)

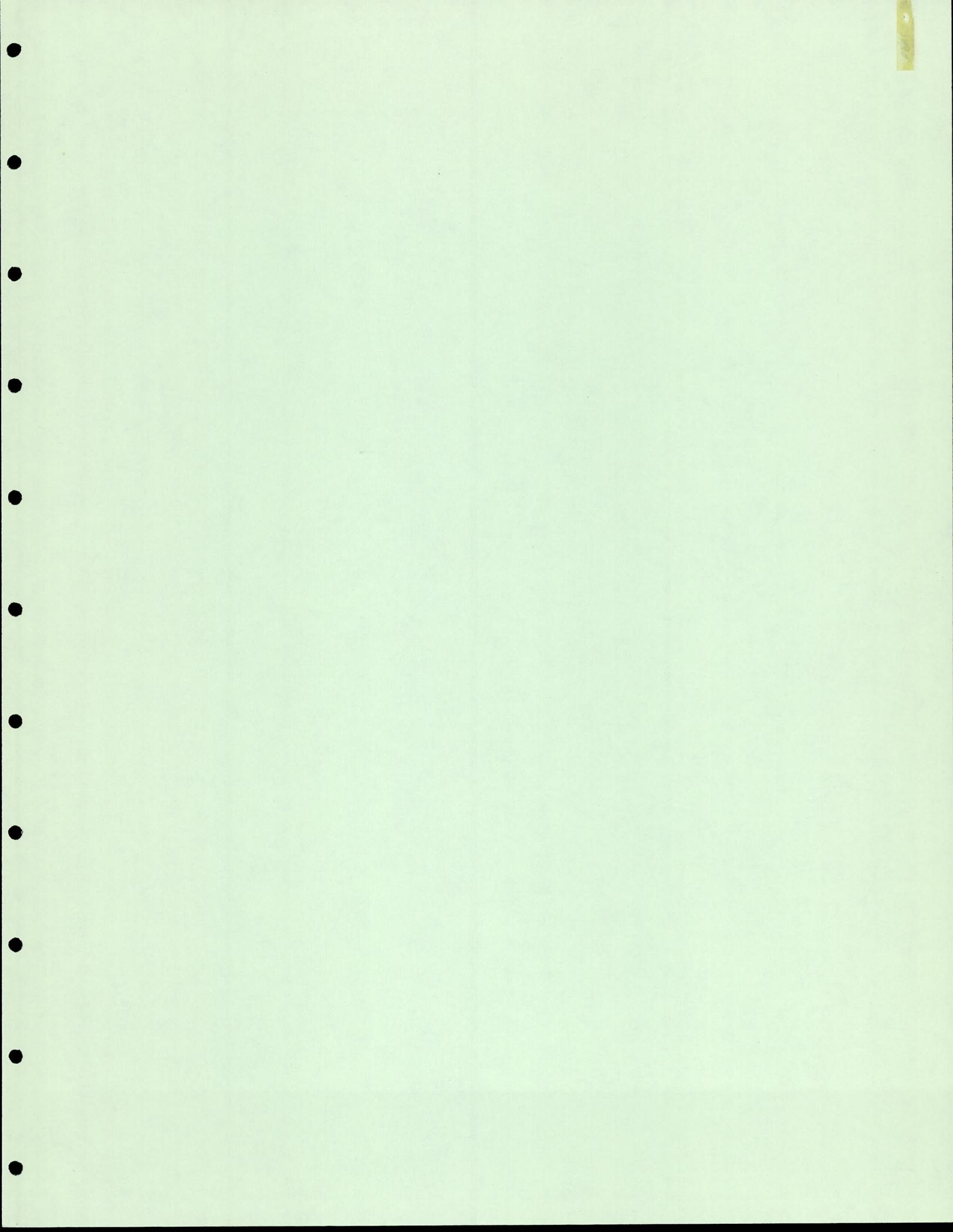
3. The City Council should appoint a balanced three-to five-member citizens' supervisory task committee, composed of members of the ACDC Task Force, to assist in the selection of the independent engineering firm, to oversee the progress of study and review the firm's final report. The task committee should report its findings and recommendations to the City Council.

4. The City Council should evaluate the alternatives using the criteria recommended in this Supplemental Report (See Appendix J attached to this Report.)

5. The City should encourage, and not be reluctant to endorse, an alternative which utilizes the Arizona Canal right-of-way. This is federal land and should be made available for flood control measures.

6. If an alternative is selected for Reach Four, work should be done immediately to re-evaluate Reach Three toward significantly downsizing it, covering it, considering alternatives to Reach Three and considering the elimination of Reach Three east of Seventh Street.

7. The City of Phoenix should request that the Corps of Engineers, in the spirit of cooperation and fiscal responsibility, exercise its discretionary authority to fund an alternative to Reach Four as selected by the City.



## SUPPLEMENTAL REPORT NOTES

1 A majority of the members of the Task Force recommended to City Council, on a vote of 6 in favor and 4 opposed, that the City:

Delay endorsement of Reach Four, and retain an independent consultant to do necessary studies, modeling and computer analysis to determine whether a drain can be drilled from the Arizona Canal to the Salt River using a Mole construction method given that:

- A. It is likely that the alternative will be more expensive than Reach Four.
- B. It is unlikely that the feasibility can be determined for this atypical technology until after most or all of the costs of handling Reach Four water in Reaches Two and Three have been expended and committed.
- C. It is likely that implementation of the proposed alternative will delay flood control for Cudia City Wash.
- D. It is unlikely that this alternative will receive federal funding on the same terms as Reach Four.
- E. This alternative does not control flooding ponding from flows intersecting the Arizona Canal west of 32nd Street.

(See Task Force Document Zc-36 in Appendix 1 attached to the Task Force Report.) Three of the six members who voted in favor of this recommendation believed the five assumptions listed as A through E above to be erroneous and supported the recommendation after removal of those assumptions. For a full discussion of the erroneous nature of the assumptions regarding the Mole alternative, see notes 46 through 50 and text accompanying those notes in this Supplemental Report.

2 Although the Corps of Engineers has begun construction of Reach One on the far west side of the Valley, Reach Three construction is not scheduled to begin until the last quarter of fiscal year 1988 and Reach Four construction is not scheduled until fiscal year 1990. (See Exhibit 1 attached.) Since Reaches One and Two can be designed and built to handle the flows from the Cave Creek without Reaches Three and Four (see note 55 of this Report), the City of Phoenix has two to three years to study and plan for an alternative.

3 The following discussion highlights the history of the addition of Reach Four to the ACDC and the extremely limited search for better alternatives to that concrete ditch solution.

The flood of June 22, 1972, prompted "local interests" (primarily the Maricopa County Flood Control District and the City of Phoenix) to request that the Corps of Engineers study the feasibility of extending the ACDC approximately 4.6 miles upstream from 12th Street (Dreamy Draw) to 40th Street (Cudia City Wash), now known as Reach Four. The purpose of adding this fourth reach to the ACDC was in response to the

flooding primarily at Cudia City Wash during that June flood.

Prior to adding Reach Four the Corps claimed in its 1976 Design Memorandum that it considered three options for controlling flood flows from the Cudia City Wash, the first of which was addition of Reach Four:

- OPTION 1. Extend the ACDC upstream from Dreamy Draw to Cudia City Wash with adequate capacity to convey Cudia City Wash peak discharges (Reach Four);
- OPTION 2. Construct a number of small detention basins in the Cudia City Wash drainage area to reduce peak discharge, and extend a small channel upstream from Dreamy Draw to Cudia City Wash with adequate capacity to convey the reduced peak discharges; and
- OPTION 3. Construct a collector channel along the Arizona Canal from 36th to 40th Streets and a box culvert under 40th Street to convey the collected floodwaters south to the Salt River.

According to the Corps, any of these three options would have been sufficient to protect the area south of the Arizona Canal against flooding from above, including Option 3 which provided for no flood control works between 34th and 12th Streets. (See notes 41 through 43 of this Report for a complete discussion of the low volume of flooding between 32nd and 12th Streets.)

It appears that scant consideration was given to Option 3, the one option that did not involve extending the ACDC to 40th Street. Option 3 was first proposed by the Paradise Valley Town Council at or about the time of a Council meeting on October 10, 1974. Six months earlier, however, in April, 1974, the Corps of Engineer had circulated a brochure entitled "Alternate Plans for Flood Control and Recreational Development", which outlined six alternative plans to the plan for the New River Phoenix City Streams Project as authorized by Congress. All four alternatives that included the ACDC envisioned construction of an extended ACDC from 40th Street to Skunk Creek, which included Reach Four. Obviously, the Corps of Engineers had decided six months before Option 3 was first proposed that if the ACDC were to be constructed, it would extend through Reach Four to 40th Street. The following sequence of events indicates that the box culvert plan of Option 3 was never fairly considered.

On May 7, 1974, five months before Option 3 was first proposed, the Phoenix City Council adopted a Resolution endorsing Alternative Plan 5b (including the ACDC with Reach Four). In its Resolution, the Phoenix City Council made a specific endorsement of "construction of the Arizona Canal Diversion Channel extending from approximately 40th Street to 75th Avenue where it intercepts Skunk Creek."

On October 10, 1974, the Paradise Valley Town Council adopted a motion registering "strong opposition" to the construction of detention

basins within the Town (as contemplated in Option 2) as well as to the proposed extension of Reach Four of the ACDC through the Town limits (as contemplated in Options 1 and 2). The Town Council presented Option 3 (covered culvert down 40th Street to the Salt River) to the Corps as an alternative to the proposed ACDC extension and the detention basins.

On December 9, 1974, the Board of Directors of the Flood Control District adopted a Resolution endorsing Alternative Plan 5b (including the ACDC with Reach Four).

Thus, barely two months after Option 3 was first proposed, the Board of Directors of the Maricopa County Flood Control District had decided to proceed with an extended ACDC, essentially as conceived in Option 1. The Phoenix City Council, having acted five months earlier, obviously never had a chance to review the 40th Street culvert alternative endorsed by Paradise Valley. Accordingly, no alternative to Reach Four (save a politically unacceptable series of holding basins dispersed within Paradise Valley) was ever given fair consideration and analysis. (The references to specific Task Force Documents to support the information contained in this note can be found in pages 4 through 15 of Task Force Document E-3.)

4 The Corps of Engineers responded to a letter request from the Maricopa County Flood Control District that:

Strictly speaking, we need nothing further from the city or the Flood Control District to continue and construct all of the ACDC. On the other hand, should the city of Phoenix take a stand against any portion of the ACDC, it will be very difficult to obtain funding to construct that portion.

(See Task Force Document V-7, Tab T.)

5 The Task Force had been promised by members of City Council that professional hydrologists and engineering experts would be available for technical expertise. However, no independent experts were ever provided. Instead, the Corps of Engineers, designers of the project, and the Maricopa County Flood Control District, promoters of the project, were ultimately given formal positions as de facto engineering experts, along with members of City engineering staff. All of these people had been involved in the planning and/or design of Reach Four, and therefore were prejudiced in its behalf. No independent engineers were made available to evaluate technical data.

6 The Corps of Engineers, having designed the ACDC and Reach Four, have obviously promoted it since its inception. Indeed, they have shown a strong prejudice against the consideration of any alternative to Reach Four. This can be documented in a number of ways. One in particular is the Corps' dismissal of a holding basin and underground channel alternative proposed by the engineering firm PRC Toups. PRC Toups

documented the fact that the alternative would provide the same flood protection as Reach Four but at a cost 15% less expensive than Reach Four. In disputing the potential cost savings of 15% as presented by PRC Toups, the Corps compared the cost of this alternative to the cost of the entire ACDC project, and not just to Reach Four. The Corps, therefore, stated that this would save only 3%, where in fact the savings would be 15%. See Task Force Document V-7, Tab H. (For further discussion of this wrongful treatment of the PRC Toups proposal, see pages 5 and 19 of the Main Task Force Report.) In fact, the Corps even concocted a strategy to undermine the PRC Toups alternative through political means. (See Exhibit 2 attached to this Report.)

Further evidence of the Corps' bias is its zeal in its promotion of Reach Four to the Task Force. During deliberations of the Task Force, the Corps brought in a number of staff members from Los Angeles, along with displays, slides, elaborate renderings and a variety of materials, all prepared at taxpayers' expense to promote the necessity of Reach Four. These materials were prepared in response to specific objections of citizen opposition groups and Task Force questions and were professionally prepared to counter that opposition.

Finally, the Corps' prejudice against alternatives to Reach Four is demonstrated by its unwillingness to provide citizen groups with the necessary information to formulate alternatives and compare the alternatives to Reach Four. The Corps of Engineers was very reluctant to provide the necessary documents to Citizens Against Reach Four even when it was required to do so under the Freedom of Information Act (FOIA). On September 7, 1984, a request was made under FOIA to the Los Angeles District of the Corps for records relating to the ACDC. The District Office refused to honor the request and this refusal was upheld by the Deputy Chief Counsel of the Corps. On January 10, 1985 an appeal was filed with the Secretary of the Army. Although by statute the appeal must be determined within 20 days, the Secretary took no action for eight months. Finally, on September 20, 1985 the Secretary of the Army recognized the error of the Corps in withholding its documents and ordered the Corps to open up its files. Documents were made available in the Los Angeles office of the Corps on October 28 and 29, 1986. A full year elapsed while waiting to obtain the Corps documents.

Further examples of the Corps' bias and unwillingness to deal fairly with alternatives are documented throughout this report.

7 The Maricopa County Flood Control District has on many occasions indicated its reluctance to consider alternatives to Reach Four. For example, the Task Force Report on page 5 notes that the Flood Control District knew of the detailed analysis of the PRC Toups proposal but denied its existence until it was forced to disclose the document by the Freedom of Information Act request. The Report also suggests that the Corps and the Flood Control District misled the Task Force as to the cost savings of the PRC Toups alternative because it "may well have been anxious to minimize the apparent cost savings of the [PRC] alternative. . . ." (See letter from Flood Control District to PRC Toups attached as Exhibit 3.)

Further evidence of the Flood Control District's unmitigated support of Reach Four is the fact that both General Manager Dan Sagramoso and Supervisor George Campbell sought to have Congressman Rudd withdraw his request to the Corps to have a new benefit/cost study made of Reach Four. (See Exhibit 4 attached to this Report.) The District was apparently concerned about what the new study would reveal. Mr. Sagramoso even wrote to SRP General Manager Jack Pfister to elicit his support to discourage Congressman Rudd. (See Task Force Document V-7, Tab D.)

8 Although the Phoenix City Engineer first sought to have the concept of the ACDC restudied, the City Engineer has recently become a proponent of Reach Four. Prior to the appointment of the ACDC Task Force, the Office of the City Engineer recommended that "the Council show continued support . . . of . . . the Corps' General Design Memorandum for the ACDC." (See Exhibit 5 attached to this Report.)

9 Salt River Project has displayed an unwillingness to accept any alternative to the ACDC. Early in the discussion of the design of the ACDC, both the City of Phoenix and Maricopa County Flood Control District sought to combine the ACDC, including Reach Four, with the Arizona Canal; a logical solution instead of the present plan to have two side-by-side channels. But as the Task Force Report notes on page 5, that possibility was rejected by SRP. The Task Force also examined the possible use of SRP's 50-foot wide right-of-way just north of the Canal for the ACDC, rather than the condemnation of private property. However, any alternative utilizing the right-of-way was firmly opposed by SRP to the Task Force.

10 The Corps continually submitted unsubstantiated cost estimates for alternatives which caused their costs to be in excess of those estimated for Reach Four. These estimates included astronomical increases that far exceeded both C.P.I. and E.N.R. increases for the same period of time. Land and damage costs for each alternative were unverifiable by the Task Force except to note that the Corps' estimate was 130% more than the actual costs for Reach Four and that the lower actual costs of Reach Four were used for comparative purposes with all of the alternatives. The 130% overstatement of land and damage costs for Reach Four occurs in the final Report of the ACDC Task Force at page 3.

11 The added costs for the increased design capacity of the 48th Street alternatives (15,000 cfs vs. 9,400 cfs) are contained in Task Force Document S-4.

12 The Corps required all alternatives to bear the additional burden of a 30% contingency against the 15% contingency included in the Reach Four costs. This additional contingency was required by the Corps in spite of the fact that their own cost estimates made in 1983 only used a 15% contingency when they analyzed the PRC Toups alternative. The

Corps' own use of a 15% contingency for the PRC Toups alternative is shown in Task Force Document V-7, Tab H.

The combination of overstating land and damage costs by 130%, increasing construction costs to add 60% design capacity and requiring a 50% increase in contingencies is just one example of the unfairness of the Corps' cost estimates for the alternatives that the Task Force Report displays in Appendix IV. These examples of the unfairness of the cost estimates for alternatives justifies the absolute need for independent engineering and economic analysis of the alternatives prior to reaching any decision on Reach Four.

13 See note 1 of this Report.

14 In response to a request by a Task Force member, Howard Needles Tammen & Bergendoff (HNTB), designers of the Papago Freeway drainage tunnels, submitted a phased estimate of costs for a study of the underground drainage tunnel under 40th Street. (See letter attached as Appendix I to this Report.) The first phase is divided into five sections which includes all levels of the study except for the hole boring tests and is estimated to cost \$42,000. The Boring Subcontract is estimated to cost \$29,400.

15 The Main Task Force Report on page 11 notes that the Corps believed the flood to be a 50-year flood (a severity of flooding that would occur once every 50 years). The authors of the book Indian Bend Wash, A Scottsdale Success Story, on page 47, believed "on June 22, 1987, disaster struck the city. A 70-year flood, the most disastrous in the city's history, swept through the area." The Corps designed the ACDC to handle a 100-year flood: "the ACDC is designed to carry the 100-year flood." Executive Summary (page vi) of March 1985 Final Design Memorandum No. 3 for the Arizona Canal Diversion Channel (Including Cave Creek Channel and Sediment Basins on Cave Creek and Cudia City Wash). Finally, Mr. Rod McMullin, General Manager of Salt River Project (SRP), testified at a trial in 1974 regarding the 1972 flood, that the flood was so rare it was actually a 500-year flood (a flood that occurs only once every 500 years). McMullin's testimony was relied upon by SRP in its brief to the Arizona Court of Appeals and the Court adopted McMullin's testimony in its opinion. See Task Force Documents Y-10 and Y-11.

16 The flawed figure of \$10.5 million (1975 price levels) was used by the Corps in calculating the benefit/cost ratio of the ACDC. See Main Task Force Report on page 10; the report on the flood of June 22, 1972 (prepared by the Corps) on page 55; the General Design Memorandum No. 3 - 1975 on page 29; and the economics appendix 6 of the G.D.M. No. 3 - \_\_\_\_\_ on page A6-19, Table 9 (probable overflow from canals) and as part of the damage-discharge curve depicted in Figure 2.

17 The Corps included "other damages" (non-physical damage costs)

such as \$2.6 million of business losses and emergency costs limited not just to the City of Phoenix but also the cities of Scottsdale and Tempe. The Corps also included \$2.4 million of physical damages that occurred east of 40th Street and entirely within the cities of Scottsdale and Tempe. When Task Force member Jeff Grobe confronted Stan Lutz of the Army Corps of Engineers with the above information regarding the estimates of damages, Mr. Lutz admitted that the Corps "may have misled the Task Force." Phone conference during the first week of March, 1986.

The table below, based on the Corps' damage estimates contained in the Report on the flood of June 22, 1972, certifies the degree of error contained in the Corps' base benefit/cost ratio calculations:

BUSINESS LOSSES AND EMERGENCY COSTS INCLUDED IN ACDC BENEFITS

	'72\$'s	Corps Index	'75\$'s	Corps %	'75\$'s
TABLE 4	\$695,000	x 41.8%	= \$985,510	x 70%	= \$ 689,857
5	278,000	x 41.8%	= 394,204	x 70%	= 275,942
6	1,054,000	x 41.8%	= 1,494,572	x 70%	= 1,046,200
7	556,000	x 41.8%	= 788,408	x 70%	= 551,885
			Subtotal "other damages"		\$2,563,884

PHYSICAL DAMAGES OUTSIDE EFFECTIVE AREA OF ACDC INCLUDED BY CORPS IN ACDC BENEFITS

	'72\$'s	Corps Index	'75\$'s	Corps %	'75\$'s
TABLE 4	\$1,245,000	x 41.8%	= \$1,765,410	x 70%	= \$1,235,787
5	1,005,000	x 41.8%	= 1,425,090	x 70%	= 997,563
5*	512,000	x 41.8%	= 726,016	x 70%	= (508,211) --
				508,211 x 25%	= 127,052
			Subtotal "other damages"		\$2,360,402
			Total "other damages"		\$4,924,286

\*40th St. to 64th St. = 25% of total damages between Cave Creek and 64th St.

The tables 4-7 noted above are found in the report on the flood of June 22, 1972 and refer to four different areas of Phoenix, Scottsdale and Tempe for which damage costs were compiled. The damages were in 1972 dollars so the Corps updated them to 1975 dollars for their 1976 GDM by using an index of 41.8% for the increase in value between 1972 and 1975. The Corps then stated in the 1976 GDM on page 29 that the ACDC would have prevented 70% of the total damages compiled for the 1972 flood. The table shows that not only were \$2.6 million dollars of business losses and emergency costs "inadvertently" included in the Corps benefit analysis but that \$2.4 million dollars of damages that occurred outside the effective area of the ACDC were also included in the Corps benefit analysis of the ACDC.

attributable to ACDC benefits, it is interesting to note that the Corps did not see fit to attribute any portion of the damages incurred below the Arizona Canal and above the Grand Canal to the direct rainfall experienced in that area. The center of the 1972 storm was directly above the area between the two Canals (5" of rainfall in 2 hours) and therefore the ACDC could not have prevented any of the damages caused by the center of the storm itself. (See isohytol map in '72 flood report.)

19 In 1973, the homeowners living below the Arizona Canal sued SRP for damage caused by water escaping from the Canal. The court dismissed the homeowners' complaint but on appeal the Arizona Court of Appeals reinstated the complaint holding that the homeowners could recover from SRP if the homeowners could prove that SRP negligently failed to improve the diversion gates at the Old Crosscut Canal or if SRP negligently failed to maintain the south bank of the Arizona Canal. Markiewicz v. Salt River Valley Water Users' Association. Records at the Maricopa County Superior Court indicate that SRP settled with the plaintiffs for an undisclosed amount of money.

20 See Task Force Report on page 10.

21 In addition to the substantial cost of the recommended increased general landscaping and maintenance, the cost of major recommended improvements such as covering the channel at bridges and construction of a series of park nodes will undoubtedly add millions to the final cost of Reach Four.

22 See note 57 of this Report and the text accompanying that note for a complete discussion of the federal authorization issue.

23 The Corps submitted an updated cost breakdown for utilizing the old Crosscut Canal (48th Street alternative) as an alternative to Reach Four in October of 1985. See Task Force Document S-4. The costs were in excess of the estimated costs for Reach Four because the Corps' proposal required the 48th Street alternative to accommodate 60% more water (15,000 cfs vs. 9,400 cfs) than Reach Four, purchase of additional right-of-way and a 50% greater contingency (30% vs. 15%) than Reach Four. Several citizen modifications to the Corps' alternative were proposed to utilize the Arizona Canal right-of-way in order to delete both the cost and the disruption caused by the need to purchase additional right-of-way north of the Arizona Canal between 40th Street and 48th Street.

During the discussion of these modifications (which appeared to make the alternative less costly than Reach Four even accommodating 60% more water and inclusion of a 50% greater contingency factor), SRP submitted a detailed study of the 40th Street to 48th Street area. (See Task Force Document V-9.) The SRP study showed that for almost the entire length of the Canal in that area there were major encroachments to within 15 to 20 feet of the Canal itself when the Task Force had been led to

believe that the right-of-way to be utilized was 50 feet. A response by the Citizens Against Reach Four proposed that SRP remove all of the encroachments into the 50-foot right-of-way and restore it to its original clear and unobstructed condition so that it could be utilized for flood control purposes. (See Task Force Document W-7.) It was then, and only then, that SRP revealed for the first time that neither SRP or the federal government had a legal 50-foot right-of-way in that area. See Task Force Document X-22). This lack of legal right-of-way remains unverified by the Task Force.

It is curious to note that it was only after the citizen-proposed modifications appeared to be less costly than Reach Four (in spite of all the added construction costs required by the Corps in comparison to Reach Four) that SRP felt compelled to reveal the right-of-way problem, some two months after the Corps originally proposed the alternative. SRP has stated that the future use of the Arizona Canal right-of-way for utilities is an important source of future income. Yet SRP now admits that there are several restrictions upon its use of the right-of-way. Therefore, SRP opposes any flood control proposal that will not assist it in recapturing land adjacent to the Arizona Canal. It is interesting to note that the Corps is currently studying what the Task Force has labeled "Reach Five" which extends from 40th Street to 64th Street. (See Task Force Minutes Aug.26,). The Corps proposes to purchase all abutting properties between 40th Street and 48th Street, thus providing the opportunity to restore to SRP the 50 feet of right-of-way to its original clear and unobstructed condition at a cost of millions of dollars to the taxpayer but without cost to SRP.

24 After the 1972 flood, the Flood Control District proposed the installation of the Arizona Canal gates and improvement of the Crosscut Canal at 48th Street to permit the emptying of the Arizona Canal into the Crosscut Canal so the Arizona Canal can divert floodwaters from Cudia City wash and other minor washes to the west. The proposal was initially discussed at the regular meeting of the Citizens Advisory Board of the Flood Control District on September 13, 1972. At that meeting, Colonel John C. Lowry, Chief Engineer and General Manager of the Flood Control District, stated the benefits of the project:

The opening of those gates after the channel is completed will permit the Salt River Project to almost immediately empty the canal at that point. If that had been in operation on June 22, 1972, the canal would not have broken, the damage along the canal, particularly down where Cudia City is where the Salt River Project has a wash and spillway, and where the canal broke near 38th Street people were badly damaged by floods, would probably not have occurred because the emptying of that Arizona Canal is going to permit that flood water to be picked up coming from the east of 48th Street into this Cave Creek and Old Crosscut channel. (See Task Force Document V-7, Tab G.)

These gates were indeed installed the following year and therefore mitigation of flood damages per Col. Lowry is now possible. The

empty Arizona Canal can be used during flooding periods to divert flood waters between 32nd and 12th Streets if the Cudia City Wash problem is solved by an alternative to Reach Four.

25 During the 1972 flood, floodwaters flowing to the Indian Bend Wash in Scottsdale backed up behind the Arizona Canal and eventually flowed into the Canal. This water was transported westward by the Canal to further add to the flooding problem at the Cudia City Wash and areas to the west. In December, 1972, the Maricopa County Flood Control District approved a study for a siphon of the Arizona Canal under the Indian Bend Wash. The siphon would allow floodwaters to enter the Wash unimpeded, reducing the problem of water backing up behind the Canal. A plan introduced by the Corps in September, 1973, contained four main elements, one of which included an inlet area consisting of an unlined channel from Indian Bend Road to McDonald Drive, a siphon of the Arizona Canal under the Wash and an interceptor along the north bank of the Canal to funnel waters into the inlet area. Now that the siphon is in place, a flood similar to that in 1972 would not further complicate the Cudia City Wash and Reach Four area with flood water from Scottsdale Indian Bend Wash. (See Indian Bend Wash: A Success Story on pages 47 and 49 in Appendix C attached to this Report.)

26 The Task Force voted unanimously to reject the first policy option which called for the endorsement of Reach Four as presently planned. (See Task Force Document ZC-36 in Appendix 1 attached to the Main Task Force Report.)

27 For a more complete description of Reach Four and other alternatives to solve the Cudia City Wash problem, see Appendix F following this Supplemental Report.

28 The Corps' initial plans for aesthetic treatment were negligible. The included some limited landscaping and proposals to treat the concrete with various coloring agents. In one approach, the Corps proposed the use of artificial desert varnish which could give the channel a more earth-tone color by applying the varnish to the entire channel wall. The second method proposed was to use varnish in graphic patterns, which would create a totally non-natural appearance, perhaps even exaggerating the visual invasion of the channel. In attempting to minimize the impact of the proposed chain-link fence, the Corps proposed coating the chain-link with vinyl in either brown, black or green. These proposals indicate the minimal attention the Corps has given to the aesthetic impact of the channel. (See Army Corps Design Memorandum No. 3, March 1985, pages A1-16 to A1-17 and A1-27.)

Further, the landscaping as proposed by the Corps appears to be unacceptable and incompatible with Arizona standards. In testimony to the Task Force, Mr. Leroy Brady, Director of Roadside Development for the Arizona Department of Transportation, reviewed the proposed landscape plans and found significant problems with the types of plants selected by

the Corps. Many were incompatible with Arizona guidelines, and, according to Mr. Brady, many would not provide proper growth and visual enhancement of the channel. (See Task Force Minutes on Nov.18,1985). He made several suggestions of the types of plantings successfully used by ADOT, but these recommendations to date have not been adopted by the Corps.

In many instances citizens requested covering the channel, and the Corps repeatedly stated that that could not be done. Finally, at a Task Force meeting, the Corps acknowledged that covering could be implemented at certain locations, primarily near street crossings, where the visual impact of the channel would be particularly unattractive. (See Task Force Minutes on Dec. 19, 1985 .) In response to continued Task Force questioning, the Corps concluded that it was within their budgetary discretion to include covering for a predetermined distance back away from the bridged street crossings. One Task Force member further suggested the planting of trees at oblique angles to obscure the channel from view.

From the many discussions the Task Force had relative to the aesthetic issues, it is obvious that substantial and costly aesthetic treatment would be necessary to mitigate the effect of the channel.

29           Flooding problems in Scottsdale were centered in the Indian Bend Wash--an eroded, seven-mile long area running north and south through the center of the community. In 1959, the Maricopa County Flood Control District enlisted the aid of the Army Corps of Engineers to find solutions to the flooding. In 1961, the Corps presented a plan to build a concrete channel on the site of the Indian Bend Wash. This channel, which would be about 23 feet deep, 170 feet wide and seven miles long, would empty into the Salt River to the South. Scottsdale citizens thought there had to be another solution. In 1964, the City Council authorized a citizens' committee called the "Scottsdale Town Enrichment Program," or STEP Committee, to act in an advisory capacity, coordinating its efforts with public works and parks and recreation commissions. In response to the STEP Committee's recommendations to turn the entire Indian Bend Wash into a greenbelt of recreation/flood control projects, Scottsdale citizens expressed strong opposition to the concept of the concrete channel, and defeated a county bond election in 1965.

In October, 1965, the City Council unanimously authorized engineer John R. Erickson to conduct an independent study and to analyze the program planned for the Wash by the Corps of Engineers. The "Erickson Plan" became the first real engineering study for a greenbelt alternative, establishing the engineering and economic feasibility of this concept. In December, 1967, John Erickson and Water Resource Associates released their "Flood Control Feasibility Report," recommending the construction of two detention dams in the upstream area and a downstream earthen channel incorporated into the greenbelt. This independent study and report verified the feasibility of the STEP Committee's recommendation to create a greenbelt which could also serve as an effective way to control floods. Although the greenbelt concept had been proven feasible and had been enthusiastically supported by the citizens, the Corps of Engineers had to be convinced of this untraditional, untried method of flood control. Their approval and cooperation were necessary, not only to design and

build the project, but to acquire the necessary funds. Through the combined efforts of many people, including concerned citizens, members of Congress, city staff, City Council and members of the STEP Committee and other city commissioners, the Corps came to agree with the greenbelt alternative and federal funds were finally committed to the project. (See Indian Bend Wash attached as Appendix C.)

30 See Task Force Document V-7, Tab B.

31 See Task Force Document E-3 on page 24.

32 See Arizona Canal Diversion Channel Cost Alternatives Report prepared by the accounting firm of Laventhol & Horwath. The full report can be found in Exhibit 6.

33 A benefit/cost analysis is used by policy makers to justify spending public funds for long-term public projects. A benefit/cost ratio of less than 1 means that the project is not economically justified. One component of the benefit/cost formula is the discount rate.

The economic feasibility of a water project such as Reach Four is heavily dependent upon the discount rate used to convert future costs and benefits into present values. Since the preponderance of the costs of a project generally occur soon after a project is authorized, the choice of the proper discount rate has the greatest impact upon the benefit factor in the benefit/cost ratio because benefits accrue over an extended period of time. Just a small change in the discount rate used can have a significant effect upon the benefit/cost ratio in a project such as Reach Four which has a projected life longer than 100 years.

In selecting the proper discount rate, we must look to the purpose of a discount rate. The general purpose of the discount rate, as noted above, is to convert future costs and benefits into present values. This conversion is accomplished by reflecting the inflation-free financial return the government should expect if the project money were invested and by reflecting the private-sector opportunities which are foregone when public projects are built. Presently the federal Office of Management and Budget requires the use of a 10% discount rate for public investment projects which is intended to reflect the real cost of opportunities foregone in the private sector. The 10% figure is a bit high. Recently yields on AAA corporate bonds have hovered around 11% while inflation as measured by the Consumer Price Index has averaged about 3%. From this analysis one can argue that the real, inflation-free opportunity cost of capital is about 8%. The official federal government discount rate for flood and water projects, which can be criticized for a number of reasons, is 8-3/4%.

Although reasonable people might disagree as to the proper discount rate, if either an 8% discount rate or a 10% discount rate is used, the benefit/cost ratio for Reach Four is well below 1.0. Although

we do not have the data to permit the calculation of the exact ratio, we suspect the range of benefit/cost ratio using these discount rates to be between 0.3 and 0.4. In other words, the public can expect to gain only 30 cents to 40 cents in benefits for each dollar invested in Reach Four if one accepts a discount rate of 8%. The Corps of Engineers admits in documents gained through the Freedom of Information Act that if a discount rate of 8-3/4% is used, Reach Four has a benefit/cost ratio of 0.63. Moreover, those documents indicate that a 4% discount rate must be used before the benefit/cost ratio is equal to 1.0. (See Task Force Document V-7, Tabs E and F.)

The benefit/cost ratios noted above are consistent with an economic analysis submitted by the Corps to a House of Representatives Subcommittee in 1982 which asked that all Corps projects be re-evaluated using then current discount rates. Although there is no separate benefit/cost ratio for Reach Four, the 1982 study calculated a .93 benefit/cost ratio for the entire ACDC using a 7-5/8% discount rate.

In June, 1985, Congress, at the request of Congressman Rudd, required the Corps to provide an updated benefit/cost analysis using "current guidelines and policy directives." A discussion of the Flood Control District's concern over this analysis and attempt to block it is contained in note 7 of this Report.

While Reach Four might barely produce \$1 of benefit for every \$1 spent, the Chief of the Corps of Engineers has stated: "There are a lot of water projects around the nation that are good solid projects that produce \$4 in benefits for every \$1 spent, even \$9 for \$1 spent." See Arizona Business Journal article in Exhibit 7.

34 See Task Force Document V-7, Tab E.

35 In March, 1982, the Department of the Army submitted a report to the Subcommittee on Environment, Energy, and Natural Resources, House Committee on Government Operations, concerning cost/benefit figures on various Corps projects, including the New River Phoenix City Streams Project. In that report, the Army calculated the total benefit-to-cost ratio for the Project to be 1.8 to 1 at the 3-1/4 percent discount rate. The Army also analyzed the Project using the 7-5/8 percent discount rate in effect in 1982, and found that the ratio for the Project dropped to 0.93 to 1.

The purported objective of the Army's study was to identify and eliminate projects that were not cost-effective. Each project was analyzed in four steps. The first three steps involved an objective screening of a project's cost-effectiveness under objective standards using the 1982 discount rate of 7-5/8 percent. Of the 52 projects considered by the Army, only four failed to meet the cost-effectiveness criteria of the first three analytic steps. One of those four failing projects was the New River Phoenix City Streams Project. The Project was saved, however, by the subjective fourth step of the Army's analysis:

Although a remaining benefit/remaining cost ratio of 0.9 at 7-5/8% would cause concern if this project were in the preauthorization planning phase, the accuracy of an update using indices without resurveys and the high level of non-Federal participation (almost 45% non-Federal Funds, over twice the historical average for flood control projects) are persuasive factors in our decision to continue support. Additional factors that support this decision include strong local support with no known objections and the high level of benefits to extensive residential and commercial development. Army Corps of Engineers, Review of Water Projects, Hearing Before a Subcomm. of the House Comm. on Gov. Operations, 97th Cong. 2d Sess. 56 (1982).

36 See notes 16-18 and accompanying text of this Report for a complete discussion of the unresolved question of damages caused by the 1972 flood.

37 Congressman Rudd added to House Appropriations Bill H.R. 2959 a requirement that the Corps of Engineers conduct a benefit/cost analysis of Reach Four using current guidelines and policy directives. To date, the new benefit/cost analysis has not been completed. (See Task Force Document V-7, Tab D, and also see note 7 of this Report.)

38 As Reach Four came before Phoenix City Council in June 1985 for approval, opposition to the project mounted. The Arizona Biltmore Estates Village Association reaffirmed their long-standing opposition and were joined by various groups and organizations which expressed grave concerns or outright opposition. These groups included the Pueblos Hermosa Homeowners, Torre Blanca Homeowners, North Central Phoenix Homeowners, and the Camelback East Village Planning Committee. Following a public meeting held by Citizens Against Reach Four in June, 1985, Citizens Against Reach Three also was organized and became active. In preparation for a public hearing held by Phoenix City Council, the two citizen groups gathered more than 2,000 signatures opposed to the project in less than two weeks, resulting in the appointment of the ACDC Task Force.

The print media also joined the citizen opposition to Reach Four. On May 17, 1985, the Arizona Republic commented: "This pork-barrel plan will only give Phoenix a black eye at a time when it needs support in Congress for timely funding of the highly deserving and much-needed Central Arizona Project. The proposal should be ditched--if not abandoned--and a more modest plan adopted." In September, 1985, Publisher Ken Welch, writing in Phoenix Magazine, stated, "We believe Reach Four and perhaps Reach Three should be challenged by the entire City . . . . The Mayor and City Council must accept their responsibility for the future visual quality of the city. . . ." (See Appendix E for copies of Editorials.)

39 In late 1985, Valley Forward Association formed an ACDC

committee to study the project. Although the committee was made up predominantly of Reach Four supporters including the present manager and past managers of the Maricopa County Flood Control District, a poll conducted by the Valley Forward ACDC committee reflected the citizen opposition to Reach Four. The poll was conducted just among homeowners south of the canal who would be the main beneficiaries of purported flood protection and was expected by may to reflect significant support for the project. Instead, among those polled, 60 percent were opposed; 68 percent favored an alternative; and 61% percent said they would prefer or accept an alternative even if it would involve personal cost in insuring their homes and property against loss. (See Exhibit 8 attached) In a letter to Citizens Against Reach Four, Dan Devers, Executive Director of the Valley Forward Association, wrote in closing: "The Executive Committee holds no position and is not now able to recommend a course of action on ACDC-- there being yet unavailable information on certain alternatives that seem promising."

40 SRP is the clear beneficiary of Reach Four. The Deer Valley Planning Committee perceptively stated:

The Arizona Canal will be the primary beneficiary of the proposed channel, yet SRP has seen fit to give next to nothing in return. Rather, SRP insists that its present neighbors to the north have their land condemned so that SRP may reap the benefits at no cost to itself. We consider this an unconscionable misfeasance of the public trust presently placed with SRP (see Exhibit 9 attached).

SRP also benefits because Reach Four protects SRP from liability for floodwaters topping or breaching the Arizona Canal. (See note 9 of this Report.) Finally, SRP also receives the benefit of unobstructed rights-of-way for future use for utility lines. (See note 23 of this Report.)

41 In the portion of Reach Four between 32nd Street and the Cudia City Wash (approximately 40th Street) the design side-inflows of water total 9,200 cubic feet per second (cfs). (See Task Force Report on page 7). That .75 mile (18%) portion of the 4.1 mile long Reach Four contains 57% of the total water to be accommodated. That portion of Reach Four averages 12,000 cfs per mile while the balance of Reach Four, from 32nd Street to 12th Street, only averages 2,000 cfs per mile.

42 The Task Force Report, in eleven different and conflicting statements, proposes that the storm waters emanating from the area between 32nd Street and Dreamy Draw (12th Street) are of such magnitude as to substantiate the construction of a channel to divert them.

The Corps, when asked about the magnitude of these flows, responded that "obviously the flows are not huge" (Task Force Document S-6, page 56). The Corps, when describing the Paradise Valley detention

basin alternative that it submitted, was asked "what size Reach Four does that presume (between Cudia and Dreamy Draw)" and its answer was "it would be initially a relatively small pipe. Maybe you decide with this sort of plan that the residual flow could go into the Arizona Canal." (Task Force Document S-8, page 19.) The Corps, in its original alternative proposal utilizing 40th Street, ended the channel at 34th Street indicating that that location was satisfactory to eliminate the flood hazard and that any further westward extension of the channel was unnecessary. In 1985, the Corps reanalyzed the 40th Street alternative and extended the channel from 34th Street to 32nd Street, indicating the same conclusion, that the hazard from flooding between 32nd Street and Dreamy Draw was not considered a significant factor.

The facts substantiate the Corps' conclusion in that the design capacity of the channel between 32nd Street (8,300 cfs) and Dreamy Draw (9,440 cfs) is 1,140 cfs, or only 12% of the total design capacity of the channel. In addition, the cost of the channel between 32nd Street and Dreamy Draw is \$48.0 million of the \$73.8 million that Chairman Lee has allocated to Reach Four. That cost of \$48.00 million is 65% of the cost of Reach Four which is needed to accommodate only 12% of the flood waters. Certainly not a cost beneficial nor needed element of flood control for Maricopa County.

In addition, in the 1972 flood the Cudia City floodflows were allowed to fill the Arizona Canal beyond its capacity and to contribute to its overflow in many locations and its actual breakage in others. The damages due to breaks that occurred in the portion below 32nd Street to 40th Street were estimated by the Corps to be \$3.0 million or approximately \$4.0 million per mile. (See Report on Flood of June 22, 1972 at page 48, Task Force Document I-5.) The damages that occurred above and below the Arizona Canal between 32nd Street and 12th Street were estimated by the Corps to be \$450,000 or approximately \$134,000 per mile (See Report on Flood of June 22, 1972 at pages 37 and 48). The justification for constructing a flood control channel (between 32nd Street and 12th Street) that costs an average of \$20.0 million per mile (1985 price levels) to mitigate flood damages that average less than \$275,000 per mile (1985 price levels, 1972 conditions) does not appear to be reasonable.

43           The Arizona Canal can be a valuable flood control measure particularly now that floodwaters from the Indian Bend Wash no longer will flow into the Arizona Canal (see note 25 of this Report) and since the Arizona Canal can be emptied quickly down the Crosscut Canal by the new headgates (see note 24 of this Report). If the Arizona Canal is emptied by use of both the siphon at the Indian Bend Wash and the headgates at the Crosscut Canal at 48th Street, then it would be able to accommodate inflow in the area from 32nd Street to 12th Street. It would, in fact, act as a flood control channel. The Arizona Canal can accommodate up to 1,200 cfs if the Cudia City water is diverted and not allowed to enter the Canal. The Flood Control District has in the past admitted that if the new headgates at the Crosscut Canal were opened and the Arizona Canal emptied, the 1972 flood would have been prevented. (See note 24 of this Report.) Further, in areas where an individual small wash might pose a potential

flood problem, sump holes such as those near 10th Street and Northern could be dug, of natural earthen lining, to accommodate the inflow.

44 See note 4 of this Report.

45 Some welcome assistance was provided by the engineering firm of W. S. Gookin and Associates, the accounting firm of Laventhol & Horwath, the engineering firm of HNTB and contractor Ron Pulice.

46 The "Mole" is used in urbanized areas to create drainage channels underground. In the case of the 40th Street alternative, a large hole would be dug at the Salt River near 40th Street, where the Mole is then placed underground some 30-50 feet. It begins a claw-action process to dig its way northward, at that underground level, along a designated course. Similar to a mining operation, a railway is built to follow the path of the Mole, so the excavated material can be loaded onto "ore-type" cars and taken back south to the hole, where the car is lifted to the surface and the excavated material dumped. The above-ground process is similar to that of a sand-and-gravel operation. This continues the entire length of the desired tunnel, until finally reaching the northern end, another large hole is dug and the Mole equipment is lifted out. There is no above-ground disruption at any point except the hole at each end of the tunnel. The digging and the transfer of excavated material all take place underground.

47 The Mole has been an integral part of the construction of the Papago Freeway, used to create three drainage tunnels. They are a 14-foot diameter tunnel along Culvert Street from 7th Avenue to west of 10th Street; a 21-foot diameter tunnel from an outfall at the Salt River at 20th Street and University Drive northward up to a point near 21st Street and Moreland; and a 21-foot diameter tunnel from a point at the Salt River near Central Avenue northward under 2nd Street up to Moreland Street.

Of the 11 bids submitted for this tunnel construction, the variance in bid prices among the top five was only \$7 million of a \$50 million project, indicating a very precise construction operation. The comments of the engineers who designed these tunnels with respect to the progress of the work is attached in their letter dated January 21, 1986. This indicates that the work has progressed on schedule, on budget and with very little problem. (See letter in Appendix G.)

48 The Mole was used by the U.S. Army Corps of Engineers to drill through the Buckskin Mountains during construction of the CAP.

49 The Mole has been used extensively in almost every major city in the United States, including Houston, New York, Cleveland, Austin, Milwaukee (water conveyance tunnels), Los Angeles (drainage into the Pacific Ocean), Chicago (water conveyance), Dallas (expressway) and

Washington, D.C. (sanitary department and also over 40 miles of the subway system). The Bureau of Reclamation has also used the Mole extensively.

50 See Laventhol & Horwath Report in Exhibit 6. Contrary to an opinion of the Corps of Engineers, W. S. Gookin holds the professional opinion that floodwaters can be delivered to the Salt River through a single pipe. The use of a single pipe results in a lower cost than attributed to the proposal by the Corps. (See Gookin letter attached as Exhibit 10.) A majority of the Task Force believe the 40th Street Mole merited further study by an independent engineer.

51 See Appendix F for a complete description of all alternatives.

52 In fact, the Chief of the Corps of Engineers Hydrologic Engineering Section, Joseph B. Evelyn, recognized the value of this use of small holding basins as a "viable alternative" to Reach Four, and made such recommendation to the Chief of the engineering section in charge of the ACDC project. Mr. Evelyn stated that:

In reviewing some SPF and discharge frequency values computed in the Phoenix area, the idea occurred to me to compare the volume of the design flood hydrograph for the Arizona Canal Diversion (ACDC) to the volume of the proposed ACDC channel itself. The important concept is that although the design flood hydrograph have very high peak discharges, the total volume of the flood hydrographs are relatively small due to the local (thunderstorms) nature of the design storm. The net result is that the introduction of relatively small quantity of storage will result in a large reduction in the required channel capacity necessary to convey the flood. (See Task Force Document V-7, Tab J (emphasis added).)

Importantly, Mr. Evelyn concluded that the potential reduction in costs, required right-of-way, and impact on the community appear to be significant enough to warrant further intensive study. However, no such study has been presented by the Corps or found through the search of their files. The Corps and District seem determined to simply proceed with Reach Four despite the costs and effect on the community.

53 See Laventhol & Horwath Report in Appendix D and Exhibit 6. It should be noted that the right-of-way costs between 24th Street and 12th Street are not included. But these costs may not be substantial because much of the right-of-way is through public land such as the treatment plant and public parks and because of the smaller right-of-way required by the down-sized channel.

54 After reading the Indian Bend Wash report, the parallels between the Stanford Drive park and the Indian Bend Wash park are apparent. See note 29 of this Report.

55 The purpose of Reaches One and Two is to protect communities from the massive floodwaters of Cave Creek. Those floodwaters are diverted west through Reaches One and Two without regard to Reaches Three and Four. In fact, Dan Sagramoso has admitted to the Maricopa County Board of Supervisors that Reaches One and Two can be built without Reaches Three and Four. Minutes of Board of Supervisors, February, 1986.

56 The \$15 million estimate is found in the Task Force Report at page 16. The \$20 million estimate is from the Laventhol & Horwath Report in Exhibit 6.

57 There is serious doubt concerning the legality of the Corps' action in adding Reach Four without additional congressional authorization.

On February 1, 1974, the South Pacific Division of the Corps held a required plan formulation conference on the ACDC in the Los Angeles District of the Corps of Engineers. One of the items on the agenda was the question of whether the post-authorization addition of Reach Four was within the discretionary authority of the Chief of Engineers so that no independent congressional authorization would be necessary and the original 3-1/4% discount rate could be used in the incremental economic analysis of that Reach. The conference concluded that the extension of the ACDC to include Reach Four was not within the discretionary authority of the Chief of Engineers (see Task Force Document V-7, Tab A.) If the addition of Reach Four is not within the discretion of the Corps then a separate congressional authorization and economic analysis using current discount rates are required.

On April 5, 1974, the Office of the Chief of Engineers, Washington, D.C., wrote to the Division Engineer of the South Pacific Division to comment on the proposed use of the 3-1/4% discount rate for the economic evaluation of Reach Four. The Office of the Chief of Engineers concurred with the conference reports finding that the addition of Reach Four was not within its discretionary authority and therefore was not eligible to use the 3-1/4% discount rate. The Chief of Engineers stated that:

If estimate of additional cost for extension of Arizona Canal Diversion Channel, from 12th to 40th Street is approximately \$20,000,000 (July, 1973 prices) or approximately 15% of total project cost (Stages I, II, III), the extension can be considered within the discretionary authority of the Chief. (See Task Force Document V-7, Tab B.)

But the original cost estimate for Reach Four was \$39,000,000, much greater than the \$20,000,000 maximum. (See Phase I Design Memorandum on page 73.)

58 See note 3 of this Report.

59 The letter from Congressman McCain and the opinion of counsel are found in Exhibit 12.

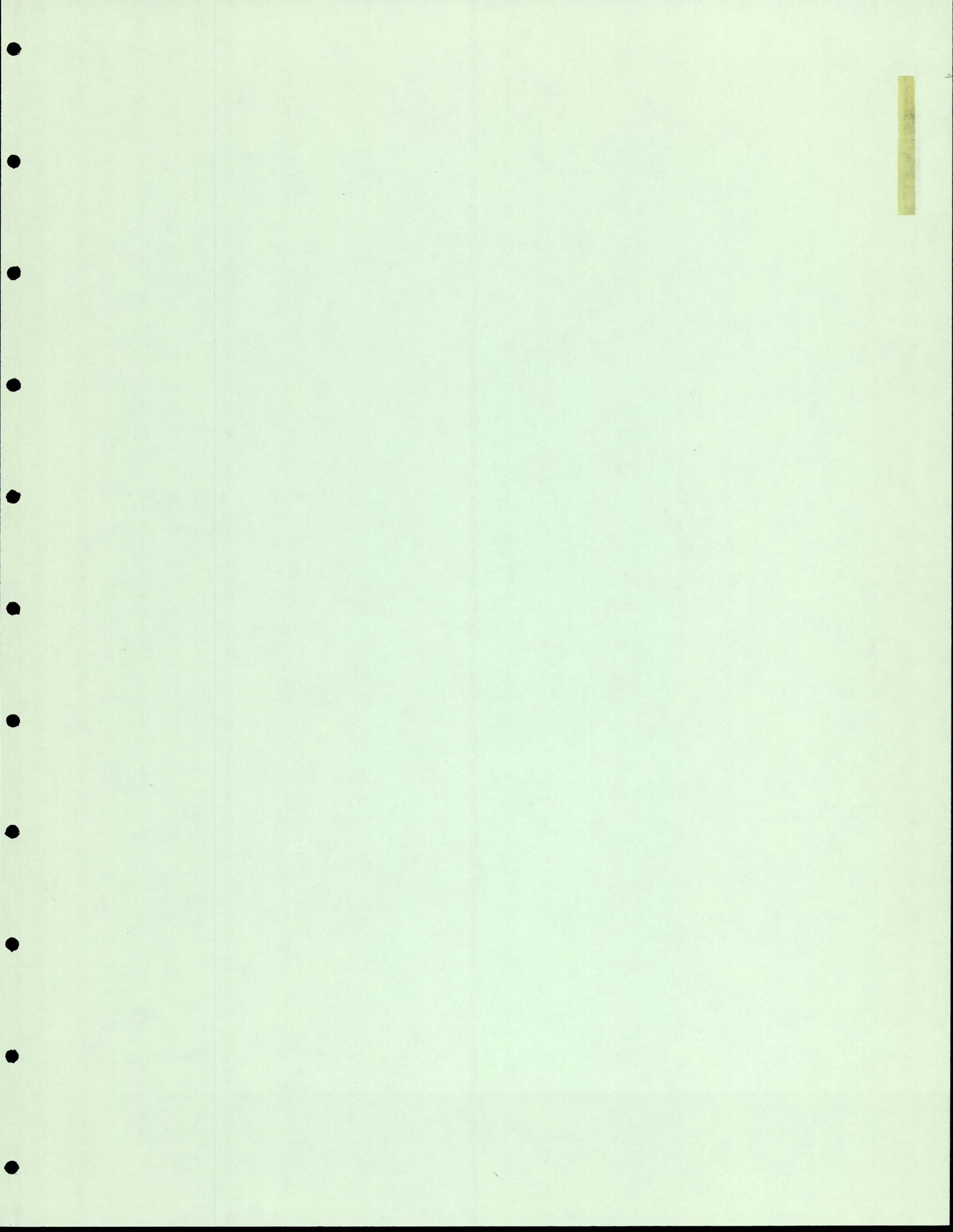
60 See Opinion of Counsel referenced in note 59 of this Report on page 3.

61 Questions of Senator Goldwater and the responses of the Corps of Engineers are found in Exhibit 13.

62 Questions of Senator DeConcini and the responses of the Corps of Engineers are found in Exhibit 13.

63 See Exhibit 13.

64 See note 25 of this Report.



APPENDIX A

Inaccuracies in Task Force Report

## APPENDIX A

### CRITICAL INACCURACIES IN TASK FORCE REPORT

1. "Each of the issues the City Council has asked the Task Force have been thoroughly studied . . . ." (See Main Task Force Report on page 2.) Pages 2 and 3 of this Supplemental Report documents numerous areas where the Task Force received conflicting information or little or no facts at all on many critical issues. In addition to those discussed, the Task Force made no attempt to verify any of the land and damages estimates submitted as costs of Reach Four. These cost estimates are absolutely critical in determining the total taxpayer costs for any of the alternatives and yet the cost estimates by the Corps and cost estimates by the Flood Control District varied by 30%. The only estimates available to the Task Force were those submitted by either the Corps or the Flood Control District and these estimates were submitted without any substantiating evidence as to their accuracy. On one occasion when substantiating cost data was submitted by the Corps on one of the proposed alternatives, mathematical errors of almost \$10.0 million were discovered.

In addition, the Task Force did not attempt to ascertain the method of calculation of the Corps' original benefits estimate for Reach Four upon which the Corps added Reach Four to the originally authorized ACDC; neither did the Task Force inquire as to the Corps' original method of calculations for the cost of Reach Four which were alleged to have included the "hidden costs" of increasing the sizes of Reach One, Two and Three to accommodate Reach Four water. Other examples of Corps errors and manipulations of figures cause us to distrust much of the Corps' cost and benefit analysis. For example, when the Corps submitted an updated cost for the 40th Street alternative, they stated that it had increased in cost to \$112 million from their original estimate of \$45.0 million in 1976. This astronomical increase is far in excess of ENR or CPI for the same period of time. The Corps was less than forthcoming or detailed in its attempt to explain the wide divergence of costs and the matter was dropped by the Task Force. In addition, when the Corps was asked to evaluate the PRC Toups proposal, the Corps purposefully misled the Task Force as to potential savings. See Note 6 of this Report.

2. "It is unlikely that any alternative except a detention basin alternative could obtain federal funding comparable to Reach 4 . . . ." Any alternatives other than detention basin alternatives would have to obtain new Congressional authorization. "New authorization would not only carry much higher local costs for lands and damages, but would also carry much higher local funding requirements." (See Task Force Report on pages 24 and 25.) These statements are fully discussed and refuted on pages 8 and 9 of this Supplemental Report. These statements do not square with the evidence put before the Task Force nor do they square with the Corps' own actions. The Corps' own policy documents are clear that the situation in which the Corps exercised its discretion to add Reach Four is exactly parallel to the situation today of choosing an alternative to Reach Four. In fact, when the Corps added Reach Four to the ACDC, it claims it rejected an alternative to take Cudia City waters through a culvert down 40th Street to the Salt River. Other than advances

in technology which make the 40th Street Mole proposal more acceptable than the 40th Street culvert proposal of the Corps, there is no distinction in terms of the legality of adding one and not the other. If Reach Four was legally added to the ACDC, so can other alternatives be substituted in place of Reach Four. Other alternatives are appropriate to consider because many are far less costly than Reach Four. For a full discussion of the legality of adding Reach Four, see note 57 of this Report.

3. "... it would take many additional years to study and complete an alternative to Reach 4." (See Task Force Report on page 25.) This statement is totally false. Included with this report is a letter from an independent engineering firm estimating both cost and time of a feasibility study to use the Mole tunneling technique under 40th Street. The estimated time for the study is approximately 3-6 months. Further, since the Corps' own schedule of construction shows that Reach Three is not slated to begin until the last quarter of fiscal year 1988, there is ample time to study, design and implement plans for an alternative. Additionally, a detention basin alternative would possibly be the least complicated of all alternatives considered to date, and require the least design and engineering time.

4. "... covering the channel in an area east of 32nd Street will prevent the risk of flooding that could result from a sudden reduction in capacity [due to covering] at the covered section near the Biltmore." (See Task Force Report on page 28.) This statement in the Task Force Report is totally misleading and is an example of the misinformation which pervades the Report in a biased support of Reach Four. Any storm in excess of a 100-year storm will cause serious flooding at the point where water in the open channel attempts to enter the enclosed channel. The Report fails to mention that the increased risk of flooding has merely been moved from the Biltmore property to homeowners east of 32nd Street in the Town of Paradise Valley. These homeowners, both north and south of Reach Four, will be subjected, historically for the first time, to flooding caused by the backup of these waters.

5. "The Corps has pointed out that flows in excess of 100 year flood will overflow the canal and flow through the Cudia City Wash's historic flow pattern." (See Task Force Report on page 28.) In their attempt to disclaim liability for flooding areas historically out of flood danger, the Corps and the Flood Control District claim that overflow from Reach Four will be released into old flood areas. During Task Force hearings, the Corps admitted that there has been no provision made for overflow in either design or cost estimates. The fact is that new areas will be flooded and the Flood Control District (and perhaps the City of Phoenix) will bear liability for that flooding.

6. "... [The Task Force] received little citizen input on aesthetics." (See Task Force Report on page 7.) At the Task Force hearing held on the subject of aesthetics, the number of citizens in attendance was substantial. The Task Force Report intimates that those in attendance were against Reach Four and therefore would provide no input on aesthetics. The truth is that many citizens oppose Reach Four precisely

on the question of aesthetics. They simply believe that no amount of landscaping and other so called mitigating factors can eliminate the scar that Reach Four will cause in their neighborhoods. Those who might favor Reach Four could have attended the hearing and discussed aesthetics. Apparently they did not choose to do so.

7. "... bridge railings at major streets will obstruct view of the ACDC from passing passenger automobiles." (See Task Force Report on page 6.) This statement totally ignores the fact that the major vantage point when driving across a bridge over the ACDC will be the oblique angle when driving onto and off of the bridge. At those points a long, unobstructed stretch of the ACDC will clearly be visible. And, while the railings may bar the view for some automobiles as they cross over the bridge, not all vehicles are the same height, and for many the ACDC will be clearly visible from the bridges.

8. "... the Channel is screened from the south by the banks of the Arizona Canal itself." "Reaches of the Arizona Canal north-bank elevations [are] equal to or less than the south-wall height of the ACDC..." (See Task Force Report on pages 6 and 27.) The Task Force Report makes these two conflicting statements in its attempt to hide the aesthetic and flooding problems of Reach Four. The Report would like the City Council to believe that the south bank of the Arizona Canal will obscure the view of Reach Four. Yet the Report acknowledges that if the Arizona Canal is higher than Reach Four, a dangerous flooding problem is created if water overflows the walls of Reach Four and is dammed up against the Arizona Canal.

9. "The only 48th Street alternative variant which could conceivably solve all of these problems with a reasonable cost figure would be a covered channel combined with a transportation corridor." (See Task Force Report on page 21.) In fact, the use of the Mole under 48th Street would be a very viable solution to the Cudia City Wash flows. (See discussion of 48th Street Mole option in Appendix F.) In addition, since the Corps of Engineers has conceded that they are now studying a channel from 56th Street westward to 48th Street and use of the Crosscut Canal to carry the floodwater south to Salt River, it is very logical to consider including floodwaters from both east and west of 48th Street, to converge and empty into the Crosscut Canal and flow southward through the Canal to the Salt River. Further, in light of the proposed 48th Street transportation corridor, the combined project incorporating transportation and flood control from both 40th Street and 56th Street might be the most economical approach of all.

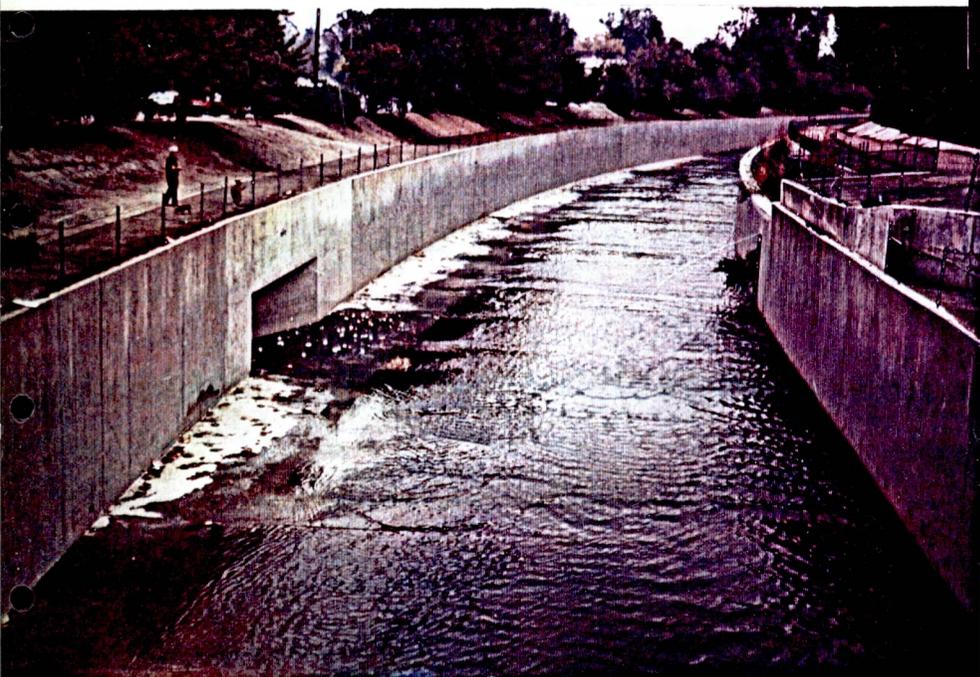
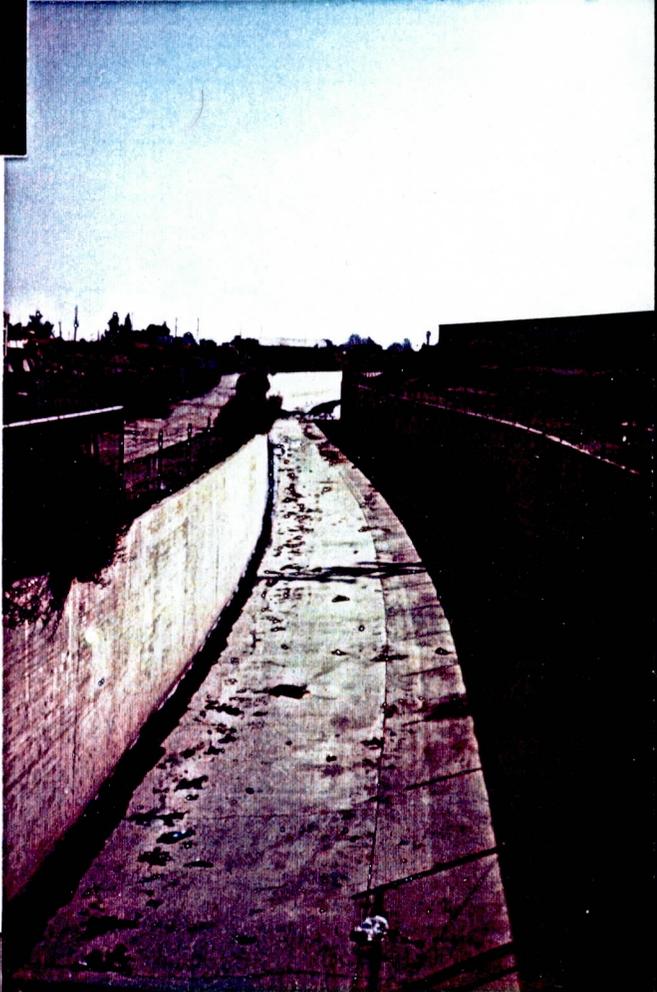
10. "In summary, the only known reasonably priced alternatives are detention basins or the 48th Street Old Cross-Cut Canal alternatives." (See Task Force Report on page 24.) This statement clearly ignores the economic viability of the Mole tunneling under 40th Street from Cudia City Wash to the Salt River. (See discussion on pages 6 and 7 of this Supplemental Report.) Preliminary estimates show this alternative to cost \$17 million less than Reach Four.

APPENDIX B

Pictures of Los Angeles Channels

APPENDIX B

Task Force photos of  
Los Angeles Flood Control  
Channels



APPENDIX C

Indian Bend Wash; A Scottsdale Success Story

See Book in Jacket Pocket at End of This Report

(A Reference Copy is Available in the  
Arizona Room of the Central Library, 12 East McDowell)

APPENDIX D

Excerpts from Accounting Report of  
Costs of Alternatives

# ARIZONA CANAL DIVERSION CHANNEL SUMMARY OF COSTS FOR ALTERNATIVES

DOLLAR COST (In thousands)

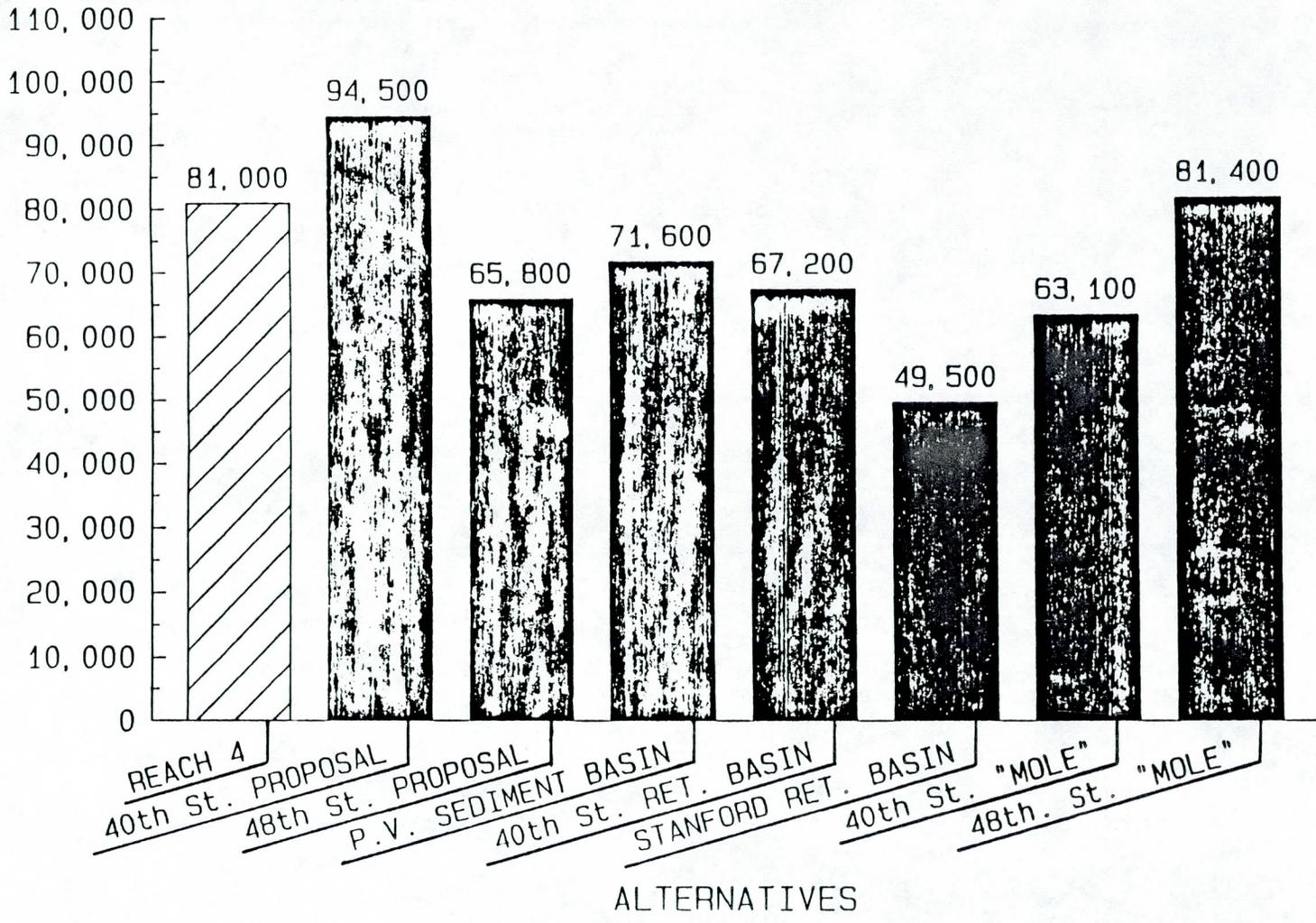


EXHIBIT I(a)

## EXHIBIT I

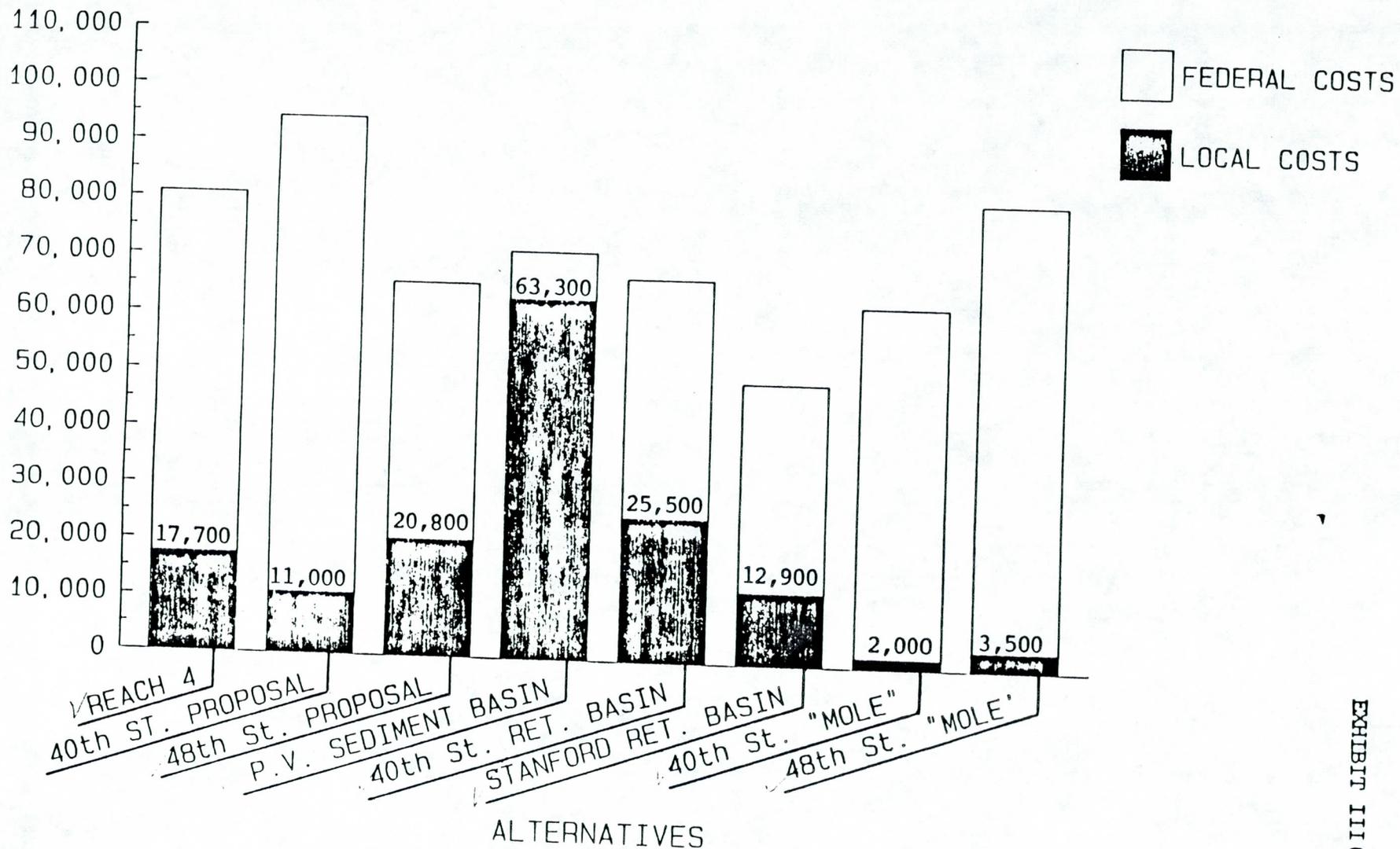
ARIZONA CANAL DIVERSION CHANNEL  
Summary of Taxpayer Costs for Alternatives

(Amounts Rounded to Nearest \$100,000)  
 1985 Dollars

		Reach 4	40th Street Proposal	48th Street Proposal	Paradise Valley Sediment Basin	40th Street Retention Basin	Stanford Drive Retention Basin	40th Street "Mole"	48th Street "Mole"
<u>CONSTRUCTION COSTS</u>									
Construction costs	(Note 1)	\$27,400,000	\$50,900,000	\$23,500,000	\$ 4,700,000	\$20,600,000	\$17,300,000	\$41,300,000	\$39,500,000
Additional construction costs	(Note 2)	<u>1,000,000</u>	-	<u>2,800,000</u>	-	<u>1,000,000</u>	<u>1,000,000</u>	-	-
Total construction costs before built-in contingency, engineering fees and other costs		28,400,000	50,900,000	26,300,000	4,700,000	21,600,000	18,300,000	41,300,000	39,500,000
Contingency factor									
Adjusted construction costs before engineering fees	(Note 3)	<u>4,300,000</u>	<u>15,300,000</u>	<u>7,800,000</u>	<u>1,400,000</u>	<u>6,500,000</u>	<u>5,500,000</u>	<u>6,200,000</u>	<u>5,900,000</u>
		32,700,000	66,200,000	34,100,000	6,100,000	28,100,000	23,800,000	47,500,000	45,400,000
Army Corps of Engineers fees (20%)	(Note 4)	<u>6,500,000</u>	<u>13,200,000</u>	<u>6,800,000</u>	<u>1,200,000</u>	<u>5,600,000</u>	<u>4,800,000</u>	<u>9,500,000</u>	<u>9,100,000</u>
Subtotal construction costs		39,200,000	79,400,000	40,900,000	7,300,000	33,700,000	28,600,000	57,000,000	54,500,000
Channel construction costs	(Note 5)	-	-	-	-	-	-	-	<u>19,300,000</u>
Adjusted total construction costs		<u>39,200,000</u>	<u>79,400,000</u>	<u>40,900,000</u>	<u>7,300,000</u>	<u>33,700,000</u>	<u>28,600,000</u>	<u>57,000,000</u>	<u>73,800,000</u>
<u>OTHER FIXED COSTS</u>									
Land and relocation, net of any cost savings attributable to land damages and bridges for 40th and 48th Street proposals	(Note 6)	17,100,000	9,000,000	18,800,000	61,900,000	24,100,000	11,500,000	600,000	2,100,000
Cudia City Wash Sediment Basin	(Note 7)	3,700,000	3,700,000	3,700,000	-	-	-	3,100,000	3,100,000
Cost for Reach One, not recoverable	(Note 8)	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
Additional costs for Reaches Two and Three	(Note 9)	20,000,000	-	-	-	7,000,000	7,000,000	-	-
Non-recoverable costs for Reach Four lands	(Note 10)	-	<u>1,400,000</u>	<u>1,400,000</u>	<u>1,400,000</u>	<u>1,400,000</u>	<u>1,400,000</u>	<u>1,400,000</u>	<u>1,400,000</u>
Total other fixed costs		<u>41,800,000</u>	<u>15,100,000</u>	<u>24,900,000</u>	<u>64,300,000</u>	<u>33,500,000</u>	<u>20,900,000</u>	<u>6,100,000</u>	<u>7,600,000</u>
<b>TOTAL TAXPAYER COSTS</b>		<u>\$81,000,000</u>	<u>\$94,500,000</u>	<u>\$65,800,000</u>	<u>\$71,600,000</u>	<u>\$67,200,000</u>	<u>\$49,500,000</u>	<u>\$63,100,000</u>	<u>\$81,400,000</u>

# ARIZONA CANAL DIVERSION CHANNEL LOCAL/FEDERAL COSTS OF ALTERNATIVES

DOLLAR COST (In thousands)



ARIZONA CANAL DIVERSION CHANNEL  
Federal and Local Costs of Alternatives

EXHIBIT III

(Amounts Rounded to Nearest \$100,000)  
1985 Dollars

	<u>Reach 4</u>	<u>40th Street Proposal</u>	<u>48th Street Proposal</u>	<u>Paradise Valley Sediment Basin</u>	<u>40th Street Retention Basin</u>	<u>Stanford Drive Retention Basin</u>	<u>40th Street "Mole"</u>	<u>48th Street "Mole"</u>
<u>FEDERAL COSTS</u>								
Total construction costs including contingencies and corporate fees	\$39,200,000	\$ 79,400,000	\$40,900,000	\$ 7,300,000	\$33,700,000	\$28,600,000	\$57,000,000	\$73,800,000
Cudia City Wash Sediment Basin	3,100,000	3,100,000	3,100,000	-	-	-	3,100,000	3,100,000
Costs for Reach 1, not recoverable	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
Additional costs for Reaches 2 and 3	<u>20,000,000</u>	-	-	-	<u>7,000,000</u>	<u>7,000,000</u>	-	-
Total federal costs	<u>63,300,000</u>	<u>83,500,000</u>	<u>45,000,000</u>	<u>8,300,000</u>	<u>41,700,000</u>	<u>36,600,000</u>	<u>61,100,000</u>	<u>77,900,000</u>
<u>LOCAL COSTS</u>								
Land and relocations net of any cost savings attributable to land damages and bridges for 40th and 48th Street proposals	\$17,100,000	\$ 9,000,000	\$18,800,000	\$61,900,000	\$24,100,000	\$11,500,000	-	\$ 1,500,000
Cudia City Wash Sediment Basin	600,000	600,000	600,000	-	-	-	\$ 600,000	600,000
Non-recoverable costs for Reach 4 lands	-	<u>1,400,000</u>	<u>1,400,000</u>	<u>1,400,000</u>	<u>1,400,000</u>	<u>1,400,000</u>	<u>1,400,000</u>	<u>1,400,000</u>
Total local costs	<u>17,700,000</u>	<u>11,000,000</u>	<u>20,800,000</u>	<u>63,300,000</u>	<u>25,500,000</u>	<u>12,900,000</u>	<u>2,000,000</u>	<u>3,500,000</u>
TOTAL FEDERAL AND LOCAL COSTS PER EXHIBIT I	<u>\$81,000,000</u>	<u>\$ 94,500,000</u>	<u>\$65,800,000</u>	<u>\$71,600,000</u>	<u>\$67,200,000</u>	<u>\$49,500,000</u>	<u>\$63,100,000</u>	<u>\$81,400,000</u>

APPENDIX E

Editorials Opposing Reach Four



# THE ARIZONA REPUBLIC

EUGENE C. PULLIAM  
1889-1975  
Publisher 1946-1975

EUGENE S. PULLIAM  
President

DARROW TULLY  
Publisher

PHIL SUNKEL  
Editor of The Editorial Pages

ALAN MOYER  
Managing Editor

WM.R. HOGAN  
Director of Operations

BILL SHOVER  
Director of Community Services

CONRAD KLOH  
Director of Sales

Where The Spirit Of The Lord Is, There Is Liberty—II Corinthians 3:17

## EDITORIALS

### PORK BARREL

## A Costly Flood Channel

**I**T is a \$63 million question.

The dilemma is whether to build Reach 4 — from 12th to 40th streets near Camelback Road — of the Arizona Canal Diversion Channel.

Supporters of the costly project have not made a convincing case. But one thing is clear: The diversion channel would never stand the scrutiny of a modern, federal cost-benefit analysis. Congress would refuse to approve it as a new project without some 35 percent upfront local funding — if then.

It is equally clear, given the opposition, that such local funding would not be offered. And the U.S. Army Corps of Engineers project would die. So, we are looking at a \$63 million pork barrel by present-day standards.

It is the corps doing business as usual, and supporters of the flood-control project getting a free financial ride along the 22-foot deep concrete channel.

The channel will offer expensive flood protection to residents, but it will also be an eyesore among fine local homes.

The project emerged after a 1972 neighborhood flood between 32nd Street and 40th Street which, caused less than \$7 million in damages.

So, \$63 million will be spent to avoid perhaps another \$7 million in damages some vague day.

If many local residents are willing to forgo protection at some risk, then why build the channel? Why not consider a less costly alternative, as Councilman Ed Korrick proposes?

One alternative might be widening the Salt River Project's Arizona Canal, which would offer more flood control. SRP has opposed that for a long time, giving the appearance of acting as a corporation when it is suitable and a fellow citizen when it is convenient to wear its hat as a tax-free municipality.

Many local conservatives are vocally backing the costly channel. This is hypocrisy, since they would not support it if they had to come up with upfront funding.

Nor can they wriggle out of the fact the channel repays only 81 cents on each dollar invested.

This pork-barrel plan will only give Phoenix a black eye at a time when it needs support in Congress for timely funding of the highly deserving and much-needed Central Arizona Project.

The proposal should be ditched — if not abandoned — and a more modest plan adopted.

# The Reach Four Controversy

*Concrete swath should be challenged by entire city*

**E**ven though the planning for this flood-control extension of the Arizona Canal Diversion Channel (ACDC) dates back 11 years, evidently it is still far off in terms of an acceptable plan.

As approved in 1974, Reach Four would extend from 40th Street and Camelback Road to 12th Street and Northern Avenue. At least three other alternatives have been proposed; one of them — the 48th Street/Cross-cut Canal — has strong backing from Reach Four opponents.

We realize it is a tough decision. It is difficult for laymen to make a judgment comparing the technical aspects put forth by the Army Corps of Engineers and the Maricopa County Flood Control District with the aesthetics (or lack thereof) of a 4.5-mile concrete ditch measuring 36 feet wide by 24 feet deep.

Ed Korrick, Phoenix City Council member from District 6, recently stated the challenge clearly. He said, "My concern is: Is this necessary? I think we should explore every alternative before we go ahead. The channel is a vicious infringement on the landscape. We want to make sure that it is worth the millions that are being spent on it.

"I voted for this in 1982, but I didn't understand the consequences to the neighborhood at the time. It was just a line on a map."

After spending a great deal of time looking at this project from all points of view, our immediate conclusion is that it

involves much more than a disruption of a high-value real estate area.

We consider this project a major crossroads for the mayor, the council and the district system. If the decision is based on the provincialism of districts, then unfortunately the ditch will probably be dug. However, we think the council has matured with the district system and will view this project as vitally important to the future image of the city and the Valley.

In fact, the entire metropolitan area should be up in arms over this project, insisting that every alternative be considered.

As we have pointed out so often in this column, the total look of the Valley is our priceless heritage. The mountains — and, in this case, the foothills of those mountains — are important and should be protected at all costs. It really wouldn't make too much sense to redevelop a beautiful downtown area, preserve the mountains and then cut a concrete swath through the city.

Although ACDC may be a technical solution to flooding problems, we believe strongly that Reach Four and perhaps Reach Three should be challenged by the entire city, not just the neighborhoods immediately affected.

The mayor and City Council must accept their responsibility for the future visual quality of the city, as well as act to preclude a repetition of the damage done by the 1972 flood.

Let's insist they do their homework this time and not repeat the 1982 vote. **PM**





# THE ARIZONA REPUBLIC

EUGENE C. PULLIAM  
1889-1975  
Publisher 1946-1975

EUGENE S. PULLIAM  
President

DARROW TULLY  
Publisher

PAT MURPHY  
Editor

ALAN MOYER  
Managing Editor

WM.R. HOGAN  
Director of Operations

CONRAD KLOH  
Director of Sales

BILL SHOVER  
Director of Community Services

Where The Spirit Of The Lord Is, There Is Liberty—II Corinthians 3:17

## Editorials

### Is Big Ditch Needed?

**C**AN the skyrocketing costs of the 17-mile Arizona Canal Diversion Channel be justified against the comparative benefits of the flood-control ditch?

Some believe that the channel, which would cross northern Phoenix, might cost as much as \$1 billion.

Its cost in 1981 dollars is projected to be \$361 million, and \$612 million in 1991 dollars.

But no one is willing to estimate final costs.

Dan Sagramoso, general manager of the Maricopa County Flood Control District, does not believe the project will cost as much as \$1 billion.

However, other experts are willing to talk privately about the ultimate \$1 billion total.

Circumstances and flood control for the Phoenix metropolitan area have changed in the 17 years since the channel was approved by Congress as part of the larger Phoenix-New River Streams Project.

The flood control district agreed to finance 23 percent of the \$225 million in original costs based on a 3 1/4-percent discount rate in 1974 dollars.

Sagramoso now estimates that the county share of the total costs could be \$268 million — not just the few million dollars as originally planned. That represents 45 percent of the cost, not 23 percent.

If the overall \$1 billion cost is accurate and Maricopa County's share is 45 percent,

residents would pay \$450 million toward the channel.

Certainly such enormous expenditures for protection against hundred-year floods, or runoff from desert downpours that might rush into the Salt River Project's Arizona Canal, deserve more intensive examination.

County supervisors might examine whether the same dollars should be spent for water storage and flood control on the Salt and Verde rivers, a contribution the county may still have to make toward a new Cliff Dam, New Waddell and a new or enlarged Roosevelt Dam.

More than \$50 million already has been spent on the channel project, mostly in condemning property.

However, dirt has not been turned for the ditch.

So the project could be halted if it were found not to be cost-effective, or an inefficient answer to flood control.

Or, the project could be scaled back.

Funding might better be spent on new dams.

Wisdom and logic suggest that a project designed nearly two decades ago, and yet to be built, may have become obsolete.

In the public interest, shouldn't that question at least be asked by public officials who manage public resources?

APPENDIX F

Descriptions of Alternatives

## APPENDIX F

### DESCRIPTIONS OF ALTERNATIVES

Any discussion of alternative solutions to the floodwaters of the Cudia City Wash must begin by considering the appropriate facts of Reach Four. Although this Supplemental Report does not accept Reach Four as an acceptable alternative, for discussion purposes it will be described first.

#### A. REACH FOUR

As has been described in much greater detail earlier in this Report, as currently designed by the Corps of Engineers, Reach Four begins at a 14-acre sediment basin located on the Phoenix Country Day School property and proceeds westerly in a 65-70 foot right-of-way just north of the Arizona Canal. Reach Four meets Reach Three at 12th Street. Of its 4.6 mile length, Reach Four is covered in total for approximately 1 mile at Stanford Drive and at the Arizona Biltmore Hotel. Reach Four requires the taking of 28 homes, 36 apartments and one business along the Arizona Canal. Construction of Reach Four will also result in serious disruption to the Biltmore Hotel. Total taxpayer cost for this alternative is \$81 million, including local taxpayer cost of \$17.7 million.

#### B. STANFORD DRIVE DETENTION BASIN

The central focus of this alternative is a detention basin extending from 34th Street east to the western property line of the Phoenix Country Day School and from the south side of Stanford Drive to within 15 feet of the north bank of the Arizona Canal. (See location map and architectural drawing in Appendix H.) All detention basin alternatives center on the fact that flooding in the Cudia City Wash area has been the result of high-intensity, low volume flooding. A detention basin captures floodwaters which are then gradually released. In this alternative the basin can be developed as a park in a manner similar to the Indian Bend Wash Park. The basin is connected to a series of underground conduits which run from 32nd Street to 24th Street in the Arizona Canal right-of-way. From 24th Street the water is carried in a small, open concrete channel located within the Arizona Canal right-of-way. This alternative requires the taking of only 19 homes along the Arizona Canal, much less than taken by Reach Four. Total taxpayer cost of this alternative is \$49.5 million, including local taxpayer cost of \$12.9 million.

#### C. 40TH STREET RETENTION BASIN

This alternative requires a basin which occupies the entire Phoenix Country Day School site and a smaller basin at 35th Street. The water is delivered to 12th Street in the same manner as the Stanford Drive Detention Basin. This alternative requires the taking of Phoenix Country Day School and two homes. Total taxpayer cost of this alternative is \$67.2 million, including local taxpayer cost of \$25.5 million.

#### D. 40TH STREET MOLE

A "Mole" is an automatic tunneling machine. (See Appendix G.) It has been used to bore a seven-mile long pipeline through the Buckskin Mountains and is currently being used to construct the floodwater pipeline from the Papago Freeway, under downtown, to the Salt River. The Mole tunnels at a depth that is beneath utilities and structures so as not to disturb either. This alternative proposes the same sediment basin at Phoenix Country Day School as presently designed for Reach Four. Water is transferred from the basin easterly under the Arizona Canal to 40th Street and then southerly under 40th Street to the Salt River. The water travels within conduits generated by the Mole. This alternative eliminates the need for taking any homes or businesses and eliminates any disruption of properties or vehicular traffic on 40th Street. Total taxpayer cost of this alternative is \$63.1 million, including local taxpayer cost of \$2 million.

#### E. 48TH STREET MOLE

Mole-generated conduit extends from the sediment basin at Phoenix Country Day School easterly under the Arizona Canal to 48th Street and then southerly under the Crosscut Canal to Osborn Road. From Osborn Road the water is conveyed through an open concrete channel to the Salt River. This alternative eliminates the need to take any homes or properties along the Arizona Canal. Total taxpayer cost of this alternative is \$81.4 million, including local taxpayer cost of \$3.5 million.

#### F. 48TH STREET PROPOSAL

Water from the sediment basin at Phoenix Country Day School is conveyed in a covered concrete channel from 34th Street to 48th Street. The channel is to be built within the right-of-way of the Arizona Canal. From the Arizona Canal southerly to the Salt River the water is conveyed in an open concrete channel through the Old Cross-cut Canal. This alternative eliminates the taking of any homes or properties along the Arizona Canal. Total taxpayer cost of this alternative is \$65.8 million, including local taxpayer cost of \$20.8 million.

#### G. PARADISE VALLEY SEDIMENT BASINS I

A series of 10 detention basins located along the Cudia City Wash and its tributaries will retain sufficient flow so that the flood waters can be systematically drained into the Arizona Canal. This alternative requires the taking of the Phoenix Country Day School and an unknown number of homes. Total taxpayer cost of this alternative is \$71.6 million, including local taxpayer cost of \$63.3 million.

#### H. 40TH STREET PROPOSAL

Water from the sediment basin at the Phoenix Country Day School is carried in a covered channel from 32nd Street to 34th Street and in an open concrete channel from 34th Street to 40th Street. The channel is built on the Arizona Canal right-of-way. From 40th Street south the

water is conveyed to the Salt River through a covered concrete channel down 40th Street. This alternative requires the taking of an unknown number of homes and three office buildings. Total taxpayer cost of this alternative is \$94.5 million, including local taxpayer cost of \$11.0 million.

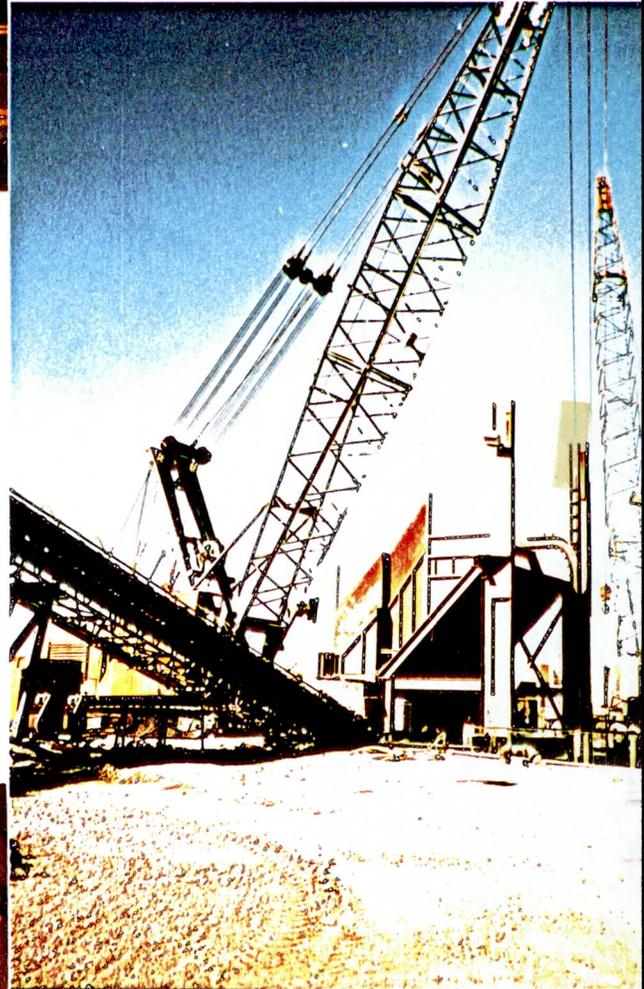
APPENDIX G

MOLE TUNNELING TECHNOLOGY

Above ground view of Mole construction area; no visible effects

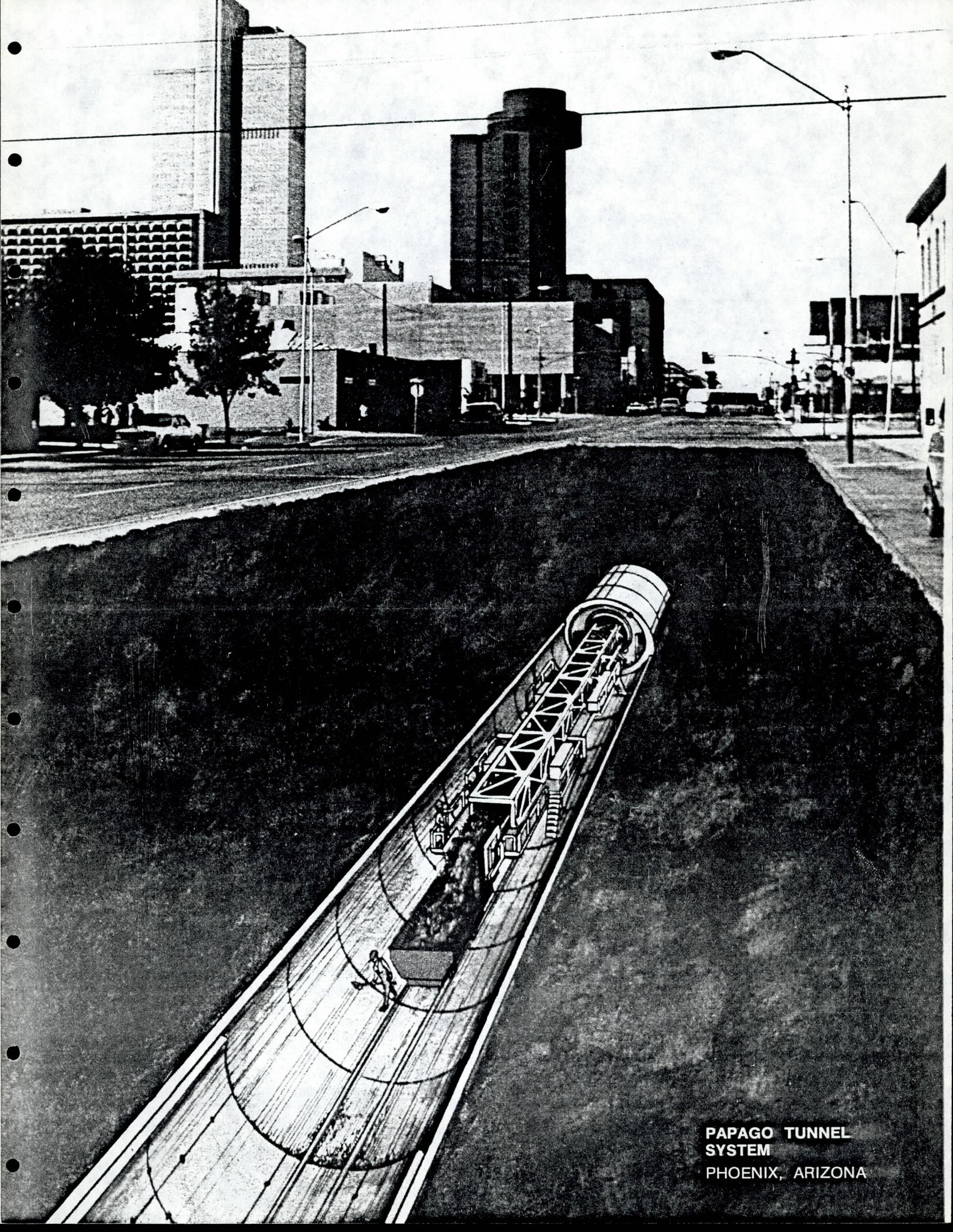


Only visible effect of Mole is temporary site at tunnel opening

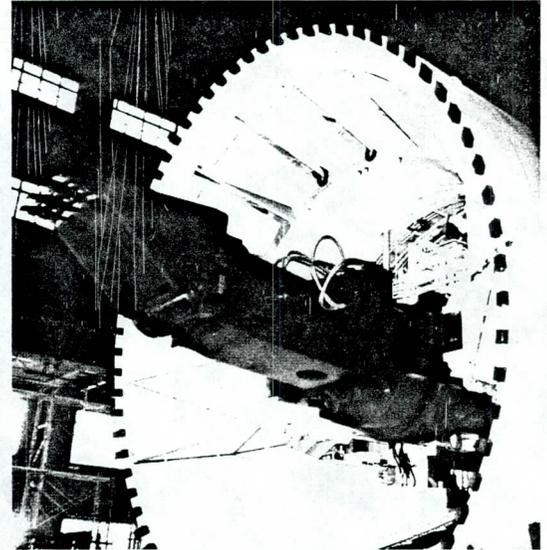
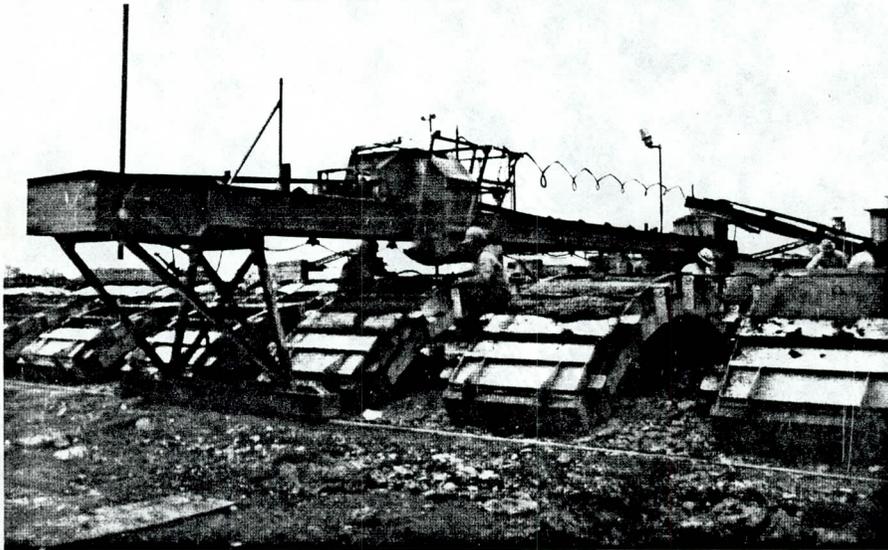
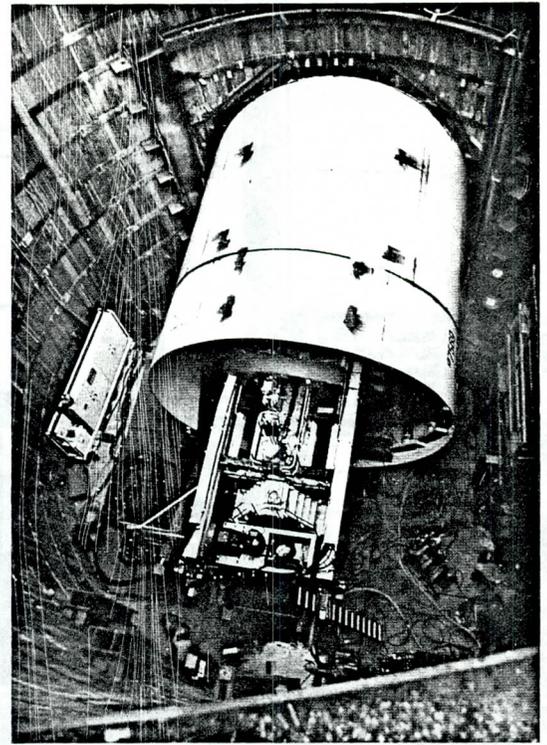
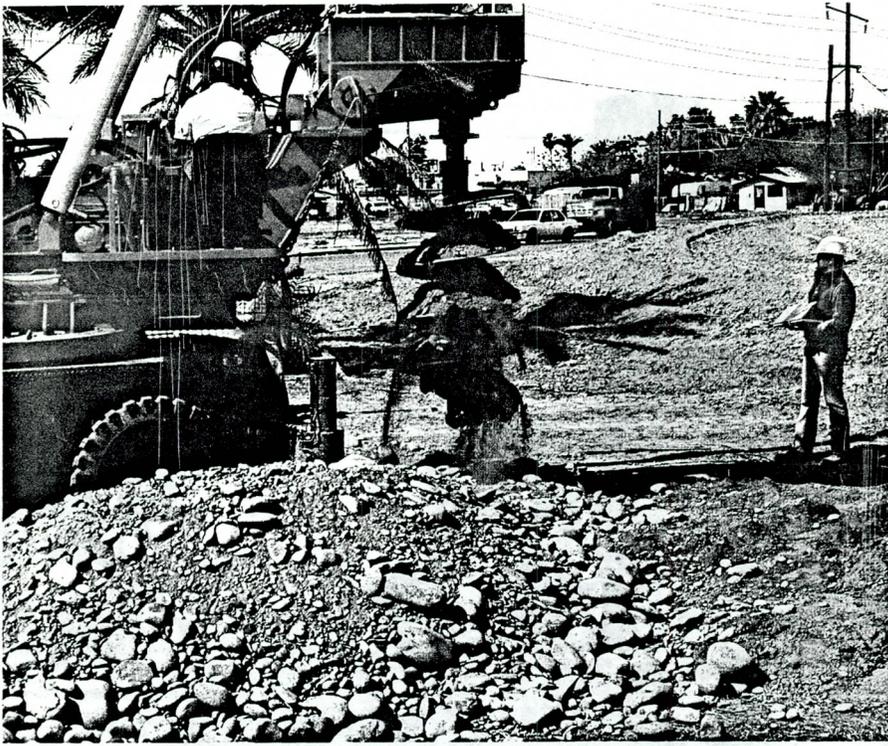


Completed section of tunnel; cars removing dirt from Mole construction area





**PAPAGO TUNNEL  
SYSTEM**  
PHOENIX, ARIZONA



The Arizona Department of Transportation retained HNTB as their Management Consultant for the 14-mile I-10 Inner Loop Freeway, also called the Papago Freeway, in metropolitan Phoenix. The general topography of the Phoenix Valley causes a depressed portion of the freeway to

receive storm water runoff from a 44-square mile, fully developed urban watershed. The only potential outlet for this storm runoff into the project is the Salt River, 3½ miles south of the depressed freeway. Since downtown Phoenix lies between the project and the Salt River, HNTB designed three tunnels to intercept and convey the runoff to the Salt River.

The 6,700-foot long, 14-foot diameter North Tunnel will parallel a segment of the east-west I-10 corridor. At its mid-point will be a junction with the West Tunnel through which runoff will flow directly to the Salt River. The

14,000-foot long West Tunnel will have a 21-foot inside diameter and will be located under 2nd Street in the middle of the downtown area. A 14,000-foot East Tunnel, having also a 21-foot inside diameter, will be located parallel to the north-south corridor of the I-10 Inner Loop Freeway; and it will also drain into the Salt River. During the design runoff period, the three-tunnel system will carry more than 67,000 gallons of water per second (9,000 cfs).

The Papago Tunnel System is scheduled for completion in two stages: East and North in 1986 and the West in 1987.



1. Large diameter observation borings underway.
2. The tunnel boring machine is readied in the access shaft of the East Tunnel.
3. Liner segments being poured in the curing yard.
4. The tunnel boring machine assembled at the manufacturer's plant.

**Cover:**

Artist's rendering of the boring and lining process for the West Tunnel 50 feet beneath 2nd Avenue.

## HOWARD NEEDLES TAMMEN & BERGENDOFF

January 21, 1986

Ms. Kem Clark  
3737 North 7th Street  
Suite 106  
Phoenix, Arizona 85014

RE: I-10 Drain Tunnels  
Mayor's Task Force Interrogatories Responses

Dear Ms. Clark:

Enclosed for your use are responses to the subject interrogatories.

A summary and general description of the project is included below for your convenience:

Owner: Arizona Department of Transportation - Highway Division

Designer: Howard Needles Tammen & Bergendoff - Phoenix, Arizona

Contractor: Shank-Artukovich-Ohbayashi - Phoenix, Arizona

Description: The work is in the City of Phoenix and consists of one construction contract including the following three projects:

Project I-10-3(187) (North Tunnel)  
Approximately 6,700 lineal feet of 14-foot diameter tunnel along Culvert Street from 7th Avenue to west of 10th Street.

Project I-10-3(188) (East Tunnel)  
Approximately 13,900 lineal feet of 21-foot diameter tunnel from an outfall at the Salt River at 20th Street and University Drive northward to 21st Street north of the Maricopa Freeway then northward along 21st Street to a point south of Moreland Street.

**Architects Engineers Planners**

**Anchor Centre Two - Suite 400, 2207 East Camelback Road, Phoenix, Arizona 85016, 602 954-7420**

**Partners** James F. Finn PE, Paul L. Heineman PE, Gerard F. Fox PE, Browning Crow PE, Charles T. Hennigan PE, Edgar B. Johnson PE, Daniel J. Watkins PE, Daniel J. Spiga PE, John L. Colton PE, Francis X. Hall PE, Robert S. Coma PE, Donald A. Dupies PE, William Love AIA, Robert D. Miller PE, James L. Tuttle, Jr. PE, Hugh E. Schall PE, Cary C. Goodman AIA, Gordon H. Slaney, Jr. PE

**Associates** Daniel J. Appel PE, Robert W. Richards PE, Don R. Ort PE, Frederick H. Sterbenz PE, Robert B. Kollmar PE, Kendall T. Lincoln CPA, Jack P. Shedd PE, Roberts W. Smithem PE, Richard D. Beckman PE, Harry D. Bertossa PE, Ralph E. Robison PE, Cecil P. Counts PE, Stephen G. Goddard PE, Harvey K. Hammond, Jr. PE, Stanley I. Mast PE, Robert W. Anzia PE, Walter Sharko PE, James O. Russell PE, Ross L. Jensen AIA, Frank T. Lamm PE, Alexander F. Silady PE, John W. Wight PE, Thomas K. Dyer PE, Ronald W. Aarons AIA, H. Jerome Butler PE, Blaise M. Carriere PE, Michael P. Ingardia PE, Bernard L. Prince PE, Stephen B. Quinn PE, Saul A. Jacobs PE, James A. Smith, Ronald F. Turner AIA, C. Frank Harscher, III, Ewing H. Miller FAIA, Douglas C. Myhre PE, Carl J. Mellea PE

**Offices** Alexandria, VA, Atlanta, GA, Austin, TX, Baton Rouge, LA, Boston, MA, Casper, WY, Charleston, SC, Charleston, WV, Chicago, IL, Cleveland, OH, Dallas, TX, Denver, CO, Fairfield, NJ, Houston, TX, Indianapolis, IN, Kansas City, MO, Lexington, KY, Lexington, MA, Los Angeles, CA, Miami, FL, Milwaukee, WI, Minneapolis, MN, Newark, DE, New York, NY, Orlando, FL, Overland Park, KS, Philadelphia, PA, Phoenix, AZ, Raleigh, NC, Seattle, WA, Tampa, FL, Tulsa, OK

Ms. Clark  
January 21, 1986  
Page Two

Project I-10-3(189) (West Tunnel)  
Approximately 13,700 lineal feet of 21-foot diameter tunnel from an outfall at the Salt River near Central Avenue and then generally northward along Central Avenue to 2nd Street and northward along 2nd Street to Moreland Street.

Bid Price: \$49,633,450

Completion Date: Contract I-10-3(188) (East Tunnel) -- 730 calendar days

Contract I-10-3(187, 189) (North and West Tunnel) -- 910 calendar days

The responses to your interrogatories are listed in the same sequence as presented by you:

1. Is the current construction on schedule?

Contract I-10-3(187) - Tunnel excavation is completed  
North Tunnel and lining is presently underway.  
Project is on schedule.

Contract I-10-3(188) - Tunnel excavation is completed  
East Tunnel and lining is to begin presently.  
Project approximately three months behind schedule but substantial completion appears possible for scheduled finish.

Contract I-10-3(189) - Tunnel excavation is to begin by  
West Tunnel mid-February. Scheduled completion is still anticipated.

2. Is project within budget?

Project is currently within budget.

3. What stumbling blocks have arisen?

Early tunnel excavation was stopped by Contractor to modify tunneling machine for ground conditions encountered.

4. When will the East Tunnel be completed?

Contract I-10-3(188) will be completed July 1986.

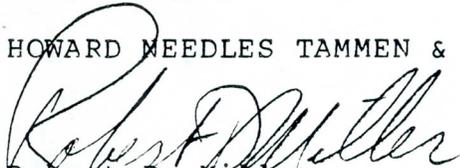
Ms. Clark  
January 21, 1986  
Page Three

5. If tunneling is considered:
- A. How long would it take for a feasibility study?  
3 to 6 months
  - B. Once feasibility study is completed, how long for design before construction?  
6 months to 1 year, depending on the property acquisition and easements for construction.

Enclosed for your use are several articles written about this project that have appeared in the technical literature and describe the construction process and design. If you require additional information or if additional questions should arise, please do not hesitate to contact me.

Very truly yours,

HOWARD NEEDLES TAMMEN & BERGENDOFF



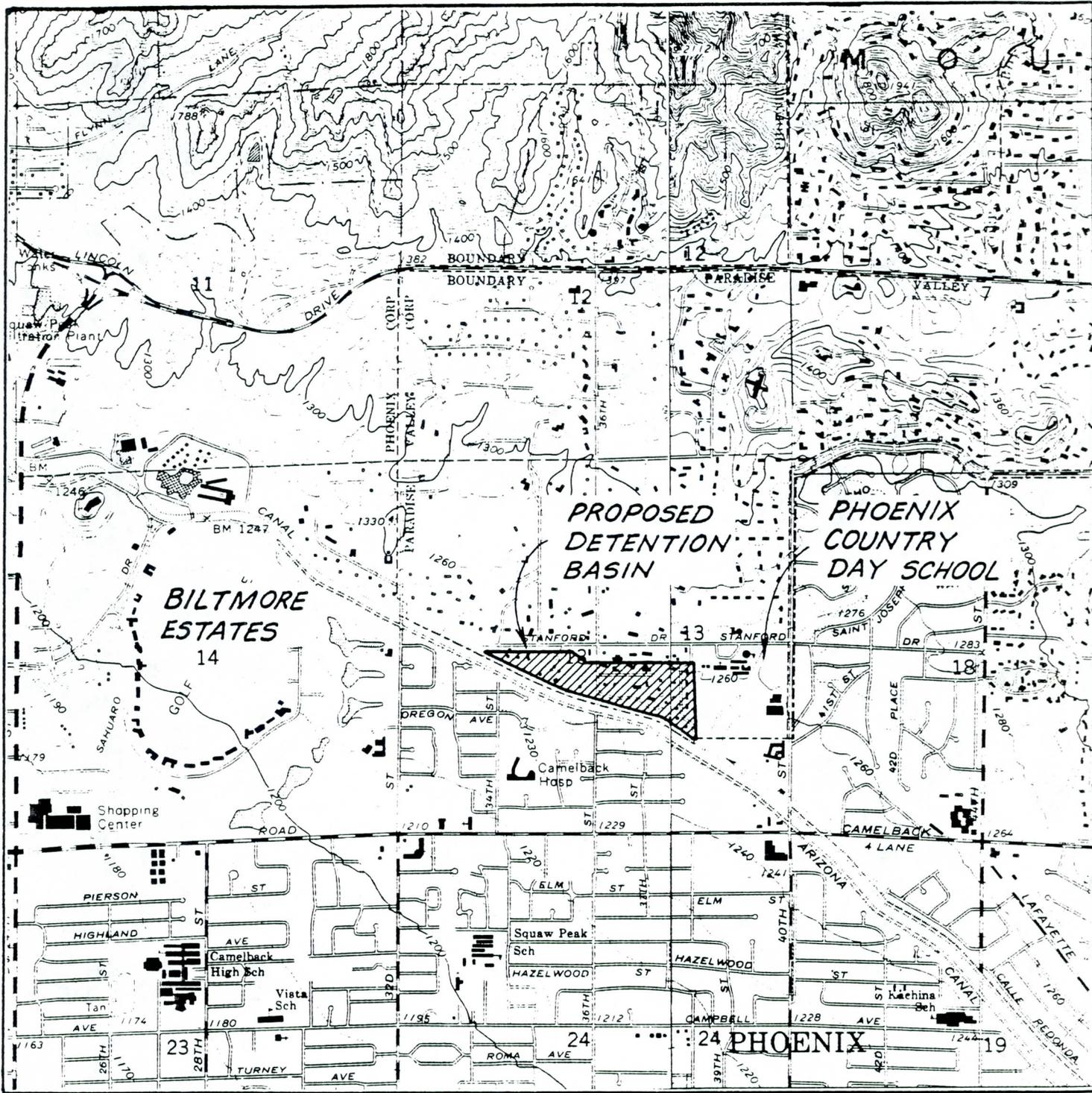
Robert D. Miller  
Partner

RDM/jb  
D150

APPENDIX H

Map and Drawing of Stanford Drive Basin

APPENDIX H  
STANFORD DRIVE DETENTION BASIN





DETENTION BASIN

APPENDIX I

Estimate of Cost for Alternative Study

ENGINEERS' COST  
ESTIMATE OF  
STUDY**HOWARD NEEDLES TAMMEN & BERGENDOFF**

February 10, 1986

Ms. Kem Clark  
 Kemberly S. Clark, Ltd.  
 Real Estate Investments  
 3737 North 7th Street, #105  
 Phoenix, Arizona 85014

Dear Ms. Clark:

At your request, we have prepared a study outline and estimates of costs for investigating the feasibility of large diameter drainage tunnels as an alternate to the present ACDC plan. The study would be performed in five sections or phases, each leading to those following. If a "fatal flaw" were uncovered in any phase, the study could be discontinued without further costs. The study program is as follows:

## Feasibility Study Program

- I. Site Conditions
  - (a) Existing Data
  - (b) Physical or Geologic Restraints/Restrictions
  - (c) Factors of Geologic Significance
    - 1) Ground Behavior
    - 2) Groundwater Considerations
  - (d) Subsurface Explorations
    - 1) Borings
    - 2) Testing and Analysis
  
- II. Alignment & Related Project Features
  - (a) Alignment
    - 1) Develop Horizontal Alignment
    - 2) Develop Restoration & Criteria for Takings/Underpinning
  - (b) Vertical Alignment
    - 1) Design Restrictions
    - 2) Clearance with Utilities/Foundations
  - (c) Right-of-way
    - 1) Takings and Easements
    - 2) Construction Access and Haul Routes

Architects Engineers Planners

Anchor Centre Two - Suite 400, 2207 Camelback Road, Phoenix, Arizona 85016, 602 954-7420

**Partners** James F. Finn PE, Paul L. Heineman PE, Gerard F. Fox PE, Browning Crow PE, Charles T. Hennigan PE, Edgar B. Johnson PE, Daniel J. Watkins PE, Daniel J. Spiga PE, John L. Cotton PE, Francis X. Hall PE, Robert S. Coma PE, Donald A. Dupes PE, William Love AIA, Robert D. Miller PE, James L. Tuttle, Jr. PE, Hugh E. Schall PE, Cary C. Goodman AIA, Gordon H. Stanley, Jr. PE

**Associates** Daniel J. Appel PE, Robert W. Richards PE, Don R. Ort PE, Frederick H. Sterbenz PE, Robert B. Kollmar PE, Kendall T. Lincoln CPA, Jack P. Shedd PE, Roberts W. Smith PE, Jack C. Thompson PE, Richard D. Beckman PE, Harry D. Bertossa PE, Ralph E. Robison PE, Cecil P. Counts PE, Stephen G. Goddard PE, Harvey K. Hammond, Jr. PE, Stanley I. Mast PE, Robert W. Anzia PE, Walter Sharko PE, James O. Russell PE, Ross L. Jensen AIA, Frank T. Lamm PE, Alexander F. Silady PE, John W. Wight PE, Thomas K. Dyer PE, Ronald W. Aarons AIA, H. Jerome Butler PE, Blaise M. Carriere PE, Michael P. Ingardia PE, Bernard L. Prince PE, Stephen B. Quinn PE, Saul A. Jacobs PE, James A. Smith, Ronald F. Turner AIA, C. Frank Harscher, III, Ewing H. Miller, FAIA, Douglas C. Myhre PE

**Offices** Alexandria, VA, Atlanta, GA, Austin, TX, Baton Rouge, LA, Boston, MA, Casper, WY, Charleston, SC, Charleston, WV, Chicago, IL, Cleveland, OH, Dallas, TX, Denver, CO, Fairfield, NJ, Houston, TX, Indianapolis, IN, Kansas City, MO, Lexington, KY, Lexington, MA, Los Angeles, CA, Miami, FL, Milwaukee, WI, Minneapolis, MN, Newark, DE, New York, NY, Orlando, FL, Overland Park, KS, Philadelphia, PA, Phoenix, AZ, Raleigh, NC, Seattle, WA, Tampa, FL, Tulsa, OK, Penang, Malaysia

Ms. Kem Clark  
February 10, 1986  
Page Two

- III. Preliminary Design:
  - (a) Lining Alternatives
  - (b) Construction Alternatives
  - (c) Hydraulic Surge Analysis
  - (d) Collection Structures
    - Location
    - Type
    - Significant Hydraulics Structure
    - Outlet Works
- IV. Construction Cost Estimates
  - (a) Cost Estimate
  - (b) Schedule
- V. Report Conclusions & Recommendations
  - (a) Tunnel Types
  - (b) Alignment Alternative
  - (c) Preliminary Taking and Easement Criteria
  - (d) Addition Study
    - Borings
    - Hydraulic Surge Analysis
    - Alignment Options
  - (e) Cost and Time Estimates

Estimated mandays required to perform the study are presented in this attached "Manpower Estimate". The estimated costs for performing the study are as follows:

TIME:	108 man-days x 8 hrs x \$42.00/hr	= \$36,288	(say
	(see attached table)		\$36,000)
TRAVEL/per diem:		=	5,000
TELEPHONE/SUPPLIES:		=	500
DRAFTING MATERIALS:		=	500
	SUBTOTAL	=	42,000

Ms. Kem Clark  
February 10, 1986  
Page Three

BORING SUBCONTRACT:

3 large diameter @ \$100/ft = 3(70')(\$100)	=	21,000
3 small diameter @ \$40/ft = 3(70')(\$40)	=	<u>8,400</u>
	SUBTOTAL	= \$29,400
	TOTAL	= 71,400
	(SAY	\$72,000)

Thanks for the opportunity to provide this information.  
Please call if you have any questions or comments.

Very Truly Yours,

HOWARD NEEDLES TAMMEN & BERGENDOFF

Robert D. Miller, P.E.  
Partner

  
RDM/klh  
attachment

cc: T. Smirnoff

APPENDIX J

Criteria for Selecting Alternatives

## APPENDIX J

### CRITERIA FOR SELECTING ALTERNATIVES

This Supplemental Report recommends that in considering alternatives to Reach Four the City Council consider the following:

1. Whether the alternative proposed has a total taxpayer cost less than Reach Four;
2. Whether the alternative proposed has a local taxpayer cost less than Reach Four;
3. Whether the alternative proposed has a benefit/cost ratio more favorable than the benefit/cost ratio for Reach Four;
4. Whether the alternative proposed permits a greater use of covered or underground channels to mitigate aesthetic problems;
5. Whether the alternative proposed incorporates park-like detention basins for multiple use;
6. Whether the alternative proposed will extensively disrupt neighborhoods and businesses;
7. Whether the alternative proposed can be implemented soon enough to effect savings in the construction of Reaches Two and Three;
8. Whether federal funding is available for construction of the alternative;
9. Whether the alternative proposed impacts other planned public projects.

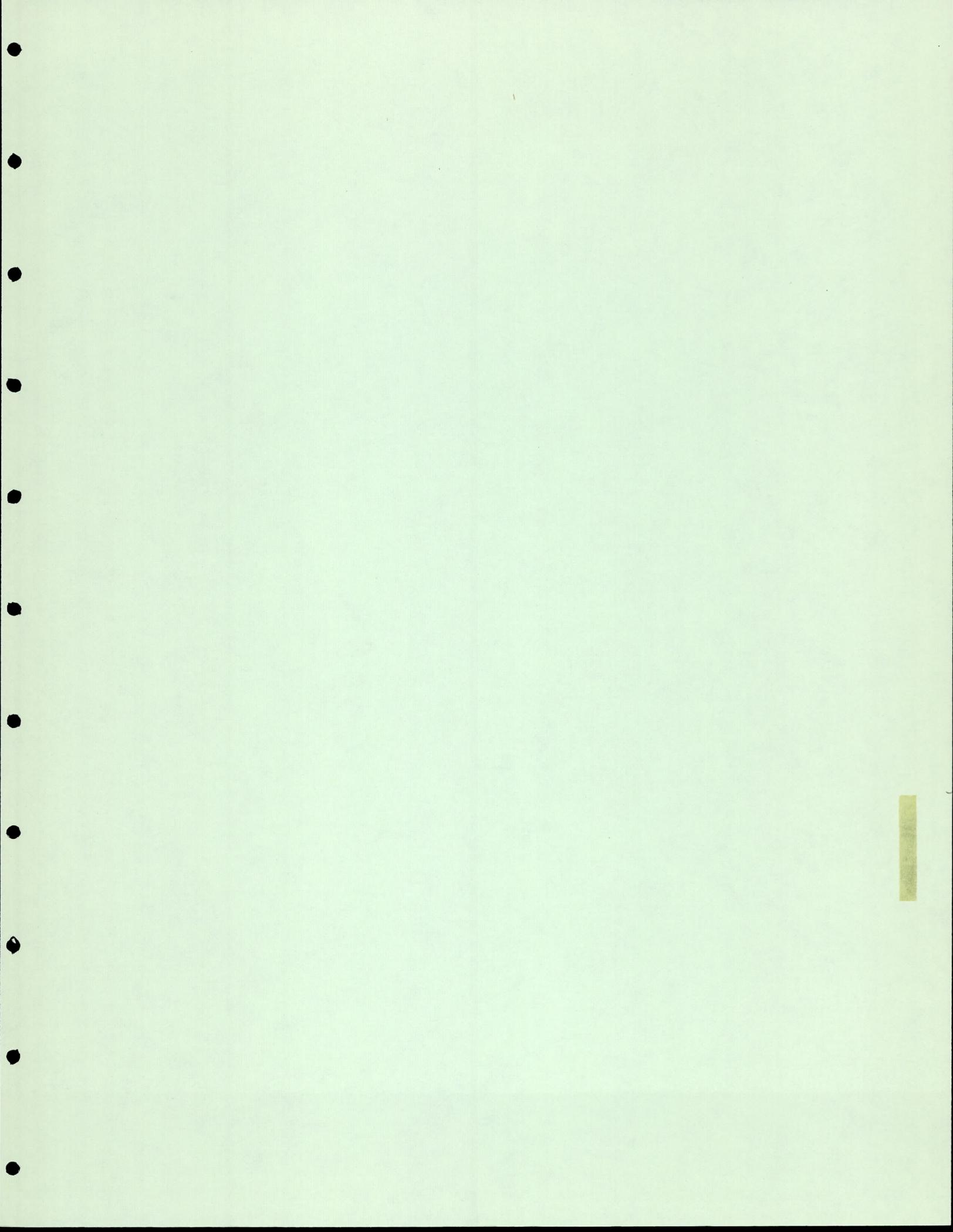


EXHIBIT 1

PHOENIX, ARIZONA AND VICINITY  
OPTIMUM DESIGN AND CONSTRUCTION SCHEDULE  
FOR REMAINING WORK ( OCT 84 PRICES )

FEATURE ITEMS	FY 85				FY 86				FY 87				FY 88				FY 89				FY 90				FY 91				FY 92				FY 93				FY 94				BALANCE TO COMPLETE
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q					
<b>DESIGN MEMORANDA</b>																																									
No 3- GDM Phase 2, Project Design																																									
Part 4- Skunk Creek, New River, and Agua Fria River																																									
Part 5- Arizona Canal Diversion Channel																																									
No 6A- Feature Design for Ph I Recreation, Cave Buttes Dam																																									
No 6B- Feature Design for Ph II Recreation, Cave Buttes Dam																																									
No 7A- Feature Design for Ph I Recreation, Adobe Dam																																									
No 7B- Feature Design for Ph II Recreation, Adobe Dam																																									
No 8- Feature Design for Cultural Resources Interpretive Center																																									
<b>FLOOD CONTROL PLANS AND SPECS/CONTRACTS</b>																																									
Skunk Creek, New River and Agua Fria River					40	100	37	29																																	
Arizona Canal Diversion Channel, Cactus Road to Skunk Creek									300/2535	18869	477																														
Arizona Canal Diversion Channel, Cave Creek to Cactus Rd.										3952	288/28324	28323																													
Arizona Canal Diversion Channel, Dreamy Draw to Cave Creek													1470	1461/6734	26957																										
Arizona Canal Diversion Channel, 40 <sup>th</sup> Street to Dreamy Draw																650	2495							14000	17020																
New River Dam									1700																																
<b>CULTURAL RESOURCES</b>																																									
Cultural Resources Interpretive Center										25	25/850																														
<b>RECREATION FACILITIES PLANS AND SPECS/CONTRACTS</b>																																									
Cave Buttes Dam- Phase I Development																																									
Cave Buttes Dam- Phase II Development																																									
Adobe Dam- Phase I Development																																									
Adobe Dam- Phase II Development																																									
Arizona Canal Diversion Channel, Skunk Creek to Cactus Road																																									

FUNDS IN THOUSANDS OF DOLLARS



- 1/ Includes FDM
- 2/ Includes recreation

EXHIBIT 2

SPLED-DM

15 December 1983

## MEMORANDUM FOR RECORD

SUBJECT: Phoenix, Arizona and Vicinity (including New River);  
Coordination Meeting Between LAD and the Flood Control District  
of Maricopa County

1. The subject meeting was held in the FCDMC offices on 30 November 1983. The purpose of the meeting was to discuss important issues concerning the Phoenix and Vicinity project. In attendance were:

FCDMC	COE
Dan Sagramoso	Norm Arno
Stan Smith	Bob Hall
John Burke	Dave Reichardt (part-time)
Bob Boyd	Tom Brock (part-time)
Dick Perrault	Stan Jutz
Nick Karan	
John Rodriguez	

2. A copy of a set of tables (copy attached) providing cost summary data for alternative designs for the Arizona Canal Diversion Channel was presented to FCDMC. The table includes estimates for 5 designs capable of accounting for predicted sediment inflow into the channel. One of the plans (T-2) includes the detention basin plan proposed by PRC Toups. The estimates for the least cost alternative, T-2, and the next least cost alternative, A-4, differ by only about 3 percent, which the group agreed is not significant for the level of the estimates presented. Because of the known objections from the Phoenix Country Day School and the Town of Paradise Valley to the T-2 plan, the small apparent cost advantage of the plan is not sufficient to warrant its selection. Mr. Sagramoso recommended a plan in which the FCDMC would first study the estimates provided along with detail back-up information to be provided by OCE. A detailed comparison would also be made between the COE and Toups estimates for alternative T-2. The second step in the plan would be to raise the decision making process to the political level. The process would begin with a short written response to PRC Toups providing the results of the estimates. In the event that PRC Toups asks to see detail information on design or cost estimates, as is expected, Mr. Hall suggested that their representatives be invited to LAD to review the data and to talk with the designers and estimators. The group reacted favorably to the idea. Toups would be expected to pass on the results of the estimates to their client, Arizona Biltmore Estates Association (ABEA). The Town Manager of Paradise Valley would be briefed at about the same time. After the initial reactions of ABEA, Paradise Valley and the Phoenix Country Day School, and

assuming that the expected confrontation occurs, the choice between the two plans would be escalated to the political level, involving the FCDMC Board of Supervisors, the Town of Paradise Valley and the City of Phoenix.

3. The known opposition of Phoenix Parks, Recreation and Library Department to a sediment basin downstream from Peoria Avenue on Cave Creek was discussed. The Parks Department opposition may be a serious obstacle to selection of either alternative T-2 or alternative A-4, since both include the objectionable basin. The problem will be approached by first briefing the Phoenix Engineering Department so that all concerned elements of the City of Phoenix can be consulted in establishing the City's overall position.

4. FCDMC was informed that model easements for the designated floodways and the floodway fringes on Skunk Creek, New River and Agua Fria River have been forwarded to SPD for approval. Mr. Sagramoso said that sending the designated floodway easement for approval was a deviation from what was said by Col. Taylor in an earlier telephone conference. Mr. Lutz stated that in that telephone conference Mr. Cheadle (Chief, SPLRE) had not said that the designated floodway easement did not have to be approved, only that he and his SPD counterpart felt very comfortable with it and that it was unlikely to change significantly. Prior to sending the designated floodway easement for approval, Mr. Cheadle had checked by telephone with Mr. LaPoint (Chief SPDRE) who had confirmed the necessity. (Writers Note: Any easement that deviates in any significant way from one of the standard estates must be approved by OCE). Mr. Sagramoso asked how long approval of the easement would take, but LAD was unable to give a reasonably firm time frame. Mr. Sagramoso then directed his people to proceed with acquisition of easements in the designated floodway based on the draft easement. FCDMC was aware that if OCE approval requires revision of the model easement, any easements acquired based on the draft might have to be revised to conform to the approved model.

5. A letter signed by Col. Taylor and stating that SPF levees from Indian School Road to Buckeye Road on the Agua Fria River would be acceptable if technical and environmental requirements can be met was given to Mr. Sagramoso. Dick Pereault reported that FCDMC is preparing a scope of work with Simons, Li and Associated (SLA) for design of SPF channels and levees on the Agua Fria River. The following technical design questions with COE responses were asked by FCDMC:

- a. Q. What freeboard is required for levees upstream from bridges?
- A. The same as for other levees - 3 feet.

b. Q. The embankment for Indian School Road will form the inlet for the channelization (with some training dikes), but in at least one place the road embankment would provide very little freeboard. Would 3 feet of freeboard be required?

A. Yes - 3 feet of freeboard would have to be provided by the road embankment if it is to serve as a levee.

c. Q. Does bank protection have to provide a factor of safety greater than 1?

A. The question was not clearly understood by COE people present, but FCDMC was advised that questions of this nature should be addressed to LAD's Hydraulics Section and Geotechnical Branch. Agreement was reached that FCDMC's design contractor should contact LAD's Hydraulics Section (Dave Cozacos) directly.

d. Q. Is there a requirement that utilities be protected to the SPF level? This question was asked because of existing power line towers located in the floodplain.

A. Mr. Hall stated that SPF protection of the towers would be provided because of the diverted flows from the river. Mr. Arno asked if the towers had significant potential for blocking flows in the channel if they failed, and he further stated that if this potential exists, then SPF protection for the towers should be provided. Mr. Sagramoso stated that the towers would probably block flows if they failed and, therefore, SPF protection would be provided by FCDMC. In response to a COE question, Mr. Perreault said that the towers or power line could not reasonably be relocated.

6. Mr. Perreault asked if any decision had been made on the down-stream termination of the Agua Fria River floodplain/floodway. He was answered that this question has not as yet been addressed in detail by LAD. Mr. Lutz asked if there was some urgency to providing an answer. Mr. Perreault stated that there is some urgency because FCDMC wants to enter into negotiations for a large parcel of land that would be affected by the configuration of the downstream end of the Agua River floodplain.

7. Mr. Sagramoso stated that the City of Peoria is very concerned that flood protection be provided for the sports complex along Skunk Creek and that they would like to see bank stabilization and/or channelization through the reach. No response was made by COE.

8. Mr. Hall asked the status of the proposed Glendale airport. Mr. Rodriguez responded that he hadn't had recent contact with the airport planners but believed that design is proceeding.

9. Mr. Perreault asked what role COE would take in the construction of the channels and levees FCDMC proposes to build on the Agua Fria River. Mr. Sagramoso asked if the Corps would be interested in managing the construction. The response was that the minimum role of the Corps would be to "look over FCDMC's shoulder" to assure construction quality. Mr. Hall stated that managing might fit well into LAD Construction Division's schedule, helping to resolve some expected work load leveling problems, but that this would have to be coordinated with Construction Division. Mr. Sagramoso stated that having COE manage the FCDMC channel construction would only be done if it were less costly than hiring a construction management firm, which would be normal FCDMC procedure.

10. FCDMC had sent a letter to LAD asking that LAD accept mandatory disposal sites for ACDC construction and providing reasons supporting the necessity of mandatory sites. Mr. Arno stated that we had only recently received the letter, and though the FCDMC reasons appeared valid, we had not had a chance to study the question in depth. Both Mr. Arno and Mr. Hall iterated LAD's normal policy of requiring optional disposal sites to take advantage of potential favorable market conditions that might be reflected in lower construction bid prices. Mr. Sagramoso stated that communities in which the disposal sites would be located would impose grading and compaction requirements. He asked if these requirements could be included in the construction contract. The goal of the requirements would be to make the sites developable after construction. Messrs. Arno and Hall responded that grading requirements and "equipment" compaction could be included in the contract. FCDMC asked what percentage of compaction would be provided by "equipment" compaction, and whether a developable site would be produced. The question could not readily be answered.

12. Mr. Sagramoso and Mr. Arno agreed that another general coordination meeting would be held in about 2 months. A tentative date of January 31 was established.

*Stan Lutz*  
STAN LUTZ  
Project Manager

CF:  
DE RDG FILE  
SPLRE  
SPLRE-AR  
SPLED  
SPLED-D  
SPLED-DM

EXHIBIT 3



# FLOOD CONTROL DISTRICT

of

Maricopa County

3335 West Durango Street • Phoenix, Arizona 85009  
Telephone (602) 262-1501

EXHIBIT 3

BOARD of DIRECTORS

Hawley Atkinson, Chairman  
George L. Campbell  
Tom Freestone  
Fred Koory, Jr.  
Ed Pastor

D. E. Sagramoso, P.E., Chief Engineer and General Manager

DEC 15 1983

Mr. Edward A. Adair, P. E.  
PRC Engineering  
4131 North 24th Street  
Phoenix, Arizona 85016

Dear Mr. Adair:

As you know, the Flood Control District submitted your conceptual study of an alternative to the ACDC to the Corps of Engineers for review of its technical and economic feasibility. We have now received the Corps' conclusions concerning your proposal and other alternatives developed by the Corps.

At the time your study was submitted, the Corps of Engineers was preparing to develop design alternatives to account for the impact of sediment that will be carried into the diversion channel during periods of flooding. Sediment transport had not been considered during the initial plan formulation and is not reflected in the Phase I General Design Memorandum plans or costs.

Because the Corps needed to develop data in more detail than was included in your study, the alternative you proposed was refined in their new analysis. The results of this analysis show that there is no significant difference between the costs of the detention basin alternative and the planned alternative, especially considering the vagaries of determining the costs of relocating the Phoenix Country Day School.

In other words, the estimated cost differences in the two alternatives vary from zero to about 2.7%, depending on the specific site to which the Phoenix Country Day School might be relocated, and preparation of a more detailed estimate of the site development and other relocation costs. Even assuming some overall cost savings in the detention basin alternative, the overall savings would reduce the federal cost and increase the local cost by the saved amount, thus increasing the local tax burden or reducing funds available for other needed flood control projects.

We have reviewed the cost estimates used in the Corps' comparison of the alternatives and find them reasonable. We have also applied the more detailed engineering analysis developed by the Corps to the estimate included in your March 1983 presentation and find that the adjusted cost estimates and the Corps' estimate are within acceptable variances.

Mr. Edward A. Adair  
Page 2

Aside from cost there are a number of factors to consider:

1. Since Salt River Project's long standing policy will not permit construction of the underground conduits within the Arizona Canal right-of-way, the detention basin alternative offers no less inconvenience to your client during the construction period than does the planned alternative. The width of the excavation would be about the same in either case, e.g., a 36 foot wide covered channel versus three 10 foot wide box culverts.

2. There is more positive control of side drainage under the planned alternative.

3. The detention basin alternative is more disruptive in that not only must the school be relocated, but homes or other facilities may well have to be relocated to make room for the school at a new site.

4. The detention basin alternative has been and is now vigorously opposed by the Town of Paradise Valley because the basins are located within the Town limits although the Town is not benefited by the project.

5. The Phoenix Country Day School opposes relocation.

In consideration of the above, I am prepared to recommend that the Corps of Engineers continue to pursue the project as described in the Phase I GDM, with inclusion of appropriate sediment control facilities. It has been a pleasure working with you and we greatly appreciate your demonstrated professionalism in developing the alternative and interacting with us to further explore the matter.

Sincerely,



D. E. Sagramoso, P. E.

Copies to: Mr. Oscar Butt, Paradise Valley Town Manager  
Mr. James E. Attebery, Phoenix City Engineer  
Mr. W. D. Mathews, Dooley-Jones & Associates  
Mr. Norman Arno, Los Angeles District, Corps of Engineers

EXHIBIT 4

## OFFICE OF THE BOARD OF SUPERVISORS

MARICOPA COUNTY BOARD OF SUPERVISORS  
802 County Administration Bldg. 111 S. 3rd Ave., Phoenix, Arizona 85003

August 30, 1985



802-262-3415

The Honorable Eldon Rudd  
U. S. House of Representatives  
2465 Rayburn Building  
Washington, D. C. 20515

Dear Eldon:

I recently learned of your action to add language to the FY86 House Appropriations Subcommittee for Energy and Water Development mark-up, which if I understand it correctly would require the U.S. Army Corps of Engineers to rejustify Reach 4 of the Arizona Canal Diversion Channel (ACDC) using current guidelines and policy directives.

I am sure that you remember the flood event of June, 1972, that caused significant damages in the area below the Arizona Canal between 40th Street and Central Avenue and how the City of Phoenix and the Flood Control District appealed to the Corps to add measures to the Phoenix and Vicinity Flood Control Project to eliminate the possibility of this happening again. In thinking about how and why Reach 4 of the ACDC was added, you must consider that the current rate of 8 3/8% would be used instead of the 3 1/4% under which the project was authorized. This of course is a major consideration. Not to address it in this light would only lead to its defeat.

As you know, the Phoenix City Council has recently formed a Task Force to examine Reach 4 of the ACDC in response to opposition originating from the area around the Arizona Biltmore Hotel. I am afraid that the language you are inserting into the appropriation bill will pre-empt the local decision process. Even though the District's Board of Directors and the Phoenix City Council have endorsed the ACDC including Reach 4 in the past, and I am confident that the Task Force and the City Council will confirm that endorsement, your action could cause Congress to not fund this needed portion of the project, although, I'm sure this is not your intent.

I urge you to please reconsider the action you have taken and withdraw the language added during the mark-up process. I would welcome the opportunity to discuss this project with you, but in the meantime, please allow the local interests to prevail.

Sincerely,

George L. Campbell  
Supervisor, District 2

GLC:hjg  
cc: Ted Hedberg, District Representative  
bc: Congressman John McCain  
✓ Dan Sagramoso

FLOOD CONTROL DISTRICT  
RECEIVED

SEP 03 '85

CHANG	HYDRO
ASC	LMgt
ADMIN	SUCP
C & O	FILE
ENGR	DESTROY
FINANCE	
REMARKS	

TOM FREESTONE  
District 1

GEORGE L. CAMPBELL  
District 2

FRED KOORY, JR.  
District 3

CAROLE CARPENTER  
District 4

ED PASTOR  
District 5

EXHIBIT 5



FLD 060201

date February 12, 1985

to: Mr. Esquivel, Surface Transportation Manager

from: Mr. Attebery, City Engineer *ATW*subject: CORPS OF ENGINEERS' DESIGN OF THE ARIZONA CANAL  
DIVERSION CHANNEL (ACDC)

AGENDA

On September 4, 1984, the Council heard a presentation on the ACDC. It was noted that the U. S. Army Corps of Engineers (Corps) would conduct public hearings (workshops) on the amenities and aesthetic treatments to the design.

The workshops have been completed and many suggestions incorporated into the project. Staff suggests that the Council hear a status report of the ACDC. We further recommend that Council approve the revised design concepts and aesthetic treatments and adopt a Resolution endorsing the Corps' General Design Memorandum for the ACDC.

#### BACKGROUND

For more than 18 years, the Flood Control District of Maricopa County (FCDMC) working with the Corps, has studied and developed a flood control plan for the protection of Phoenix and the neighboring cities to our west. The Corps has titled it "Phoenix, Arizona and Vicinity (Including New River)" flood control project.

The plan that is currently approved and under design resulted from a 1975 restudy of the 5-b plan. The restudy was required by the Federal Government and included analyses of a number of alternative plans and their environmental impacts.

The restudy was presented to the Phoenix City Council at a Briefing Session of April 29, 1974 and a Plan known as 5-b was endorsed May 7, 1974 (Resolution No. 14324).

In the fall of 1975, the Corps and the FCDMC held a number of public hearings with citizen groups in a number of neighborhoods in an endeavor to explain the recommended 5-b Plan. Our staff attendance at these hearings led to the conclusion that the flood control elements of the plan were sound, reasonable and understandable to the public.

Unquestionably the most impactful element of the flood control plan is the ACDC, particularly through the City of Phoenix. A substantial amount of right of way is required for the construction even though the City has been working with the developers to reserve this right of way for more than 15 years. Approximately 175 homes in our City need to be acquired by the FCDMC in order to construct the diversion channel. The channel design that is proposed is a rectangular concrete shape, again in an effort to minimize the impact of right-of-way taking and home removal.

#### DISCUSSION

When the Corps evaluates a flooding problem for federal participation, they determine the extent of damages and estimated costs of project construction. To have a fundable project, there must be a positive benefit to cost ratio. When our project analysis was done, the major damages would occur in the Cave Creek and Cudia City Wash areas. While these washes are quite visible above the Arizona Canal, they have been obliterated (by development) south of the Arizona Canal.

Needless to say, the potential for damages in our City was in the many millions of dollars and the project was justified.

The components of the project that gives Phoenix the most protection are the Cave Buttes Dam and the ACDC. The ACDC runs from Skunk Creek at the edge of Peoria through Glendale and into the City of Phoenix terminating at 40th Street. It is 17 miles long north of and parallel to the Arizona Canal. It will be designed to handle a 100-year storm flow. It will also be designed to serve as an outlet for a number of City storm sewer lines.

Main drainage pickup points in Phoenix include Cave Creek Wash near 23rd Avenue, 10th Street Wash east of 7th Street, Dreamy Draw near 12th and 16th Streets, two or three major washes through the Biltmore properties between 24th and 32nd Streets, and the Cudia City Wash near 39th Street.

The Corps' Los Angeles District has asked for the City of Phoenix' endorsement of this project. Our Resolution will go along with the ACDC's General Design Memorandum as it goes up the Corps "chain of command." Earlier draft copies of this memorandum were distributed to interested City departments and a copy was placed in the Council Conference Room. Our approval may help to expedite this project and aid in its continued funding.

#### FINANCIAL IMPACT

The total estimated cost of the ACDC project is \$299,800,000 (October 1984 dollars). The federal government will pay about \$190,898,000. As the local sponsor, the FCDMG must acquire the right of way, construct bridges and relocate utilities, all of which is estimated to cost \$108,902,000. In addition, the FCDMG will maintain the system after it is completed.

The direct cost to the City of Phoenix is minimal. It consists of staff time and some recreational facilities in the Cave Creek Sediment Basin and at other locations yet to be determined. The cost savings to the City is in the tens of millions. Not only do we receive flood protection below the Arizona Canal, but we will have an outlet for our storm drainage systems north of the Arizona Canal. Instead of carrying water in pipes to either the Salt River or Skunk Creek, the water can be discharged directly into the ACDC.

The ACDC has been part of our long-term planning for storm drains north of the Arizona Canal for controlling the Cave Creek Wash, 10th Street Wash, Cudia City Wash and other washes. It will lead to solutions for drainage and street paving in Sunnyslope, North Mountain, and Deer Valley areas.

#### RECOMMENDATION

We recommend the City Council hear the presentation on this project. And the Council show continued support with adoption, at a formal meeting, of a Resolution endorsing the Corps' General Design Memorandum for the ACDC. This will serve as a positive support for the project to assist the Corps in obtaining continued support and funding.

J. E. ATTEBERY, City Engineer



DAVID HARMON  
Assistant City Engineer

DBH:gjs

c: Mr. Attebery  
Mr. Williams

EXHIBIT 6

ARIZONA CANAL DIVERSION CHANNEL  
COST ALTERNATIVES



**Laventhol & Horwath**  

---

Certified Public Accountants

Citizens Against Reach Four  
Phoenix, Arizona

At your request we have performed the procedures enumerated below with respect to the cost summary of Reach Four and the respective alternatives per the attached exhibits and notes thereto. It is understood that the report will be submitted to the Mayor's Task Force for their consideration and the report should not be used for any other purpose.

1. We have consulted with you in compiling the attached exhibits and explanatory notes as to style and format.
2. We have examined the underlying documentation included in the Arizona Canal Diversion Channel (ACDC) Library, and in addition, the Conceptual Estimate, dated November 30, 1983; W. S. Gookin & Associates letter, dated January 9, 1986; and the Arizona Department of Transportation, Highways Division tabulation of bids which are all to be submitted at the ACDC Task Force meeting to be held January 13, 1986, which support the amounts used in the exhibits and notes.
3. We have combined the various alternatives presented in the exhibits and notes from information previously compiled for you.
4. We have recomputed the clerical accuracy of the exhibits and notes.

As a result of performing the above procedures, we have concluded that all amounts included in the exhibits and notes which are referenced to underlying documentation are based upon the documentation. Further, we have concluded that the exhibits and notes are clerically accurate. Please be advised that the information listed below forming part of the exhibits and notes were not included in the ACDC library and, therefore, have not been subjected to procedure number 2 above.

Note 1 - The distance of 5,280 linear feet from 40th Street to 32nd Street for the Stanford Drive Retention Basin.

- Note 2 - The distance of 3,500 linear feet to cover "24th Street to Cudia City Wash" for the 40th Street proposal, and 9,300 linear feet to cover "34th Street to 48th Street" for the 48th Street proposal.
- The fencing savings for the 48th Street proposal.
- Note 3 - The Corps recommendations for a 30% contingency for the 40th Street Retention Basin and Stanford Drive Retention Basin.
- Note 5 - The distance of 15,840 linear feet used in the calculation of channel construction for the 48th Street "Mole."
- Note 6 - The number of bridges that was included in the calculation of total cost of bridges according to Task Force Document S-9, used to derive a cost per bridge of \$250,000, and the quantity of six bridges used in the calculation of \$1,500,000 bridge costs for the 48th Street "Mole."
- The cost of \$1,000,000 for moving the Arizona Canal under the Reach Four proposal according to a telephone conversation with Mr. Sagramoso (General Manager of the Maricopa County Flood Control District). These costs being increased on a per foot basis to \$1,200,000 and \$2,800,000 for the 40th and 48th Street proposals, respectively.
- Note 9 - Additional costs of construction and bridges bear a direct relationship to changes in design cubic feet per second.

The procedures outlined above do not comprise an examination made in accordance with generally accepted auditing standards. Therefore, we do not express an opinion on the accounts or items contained in the exhibits and notes. If we were to perform additional procedures or an examination in accordance with generally accepted auditing standards, we might be able to report additional matters to you. We further do not conclude as to the propriety of the documentation examined by us.

*Laventhol & Horwath*

Laventhol & Horwath  
January 11, 1986

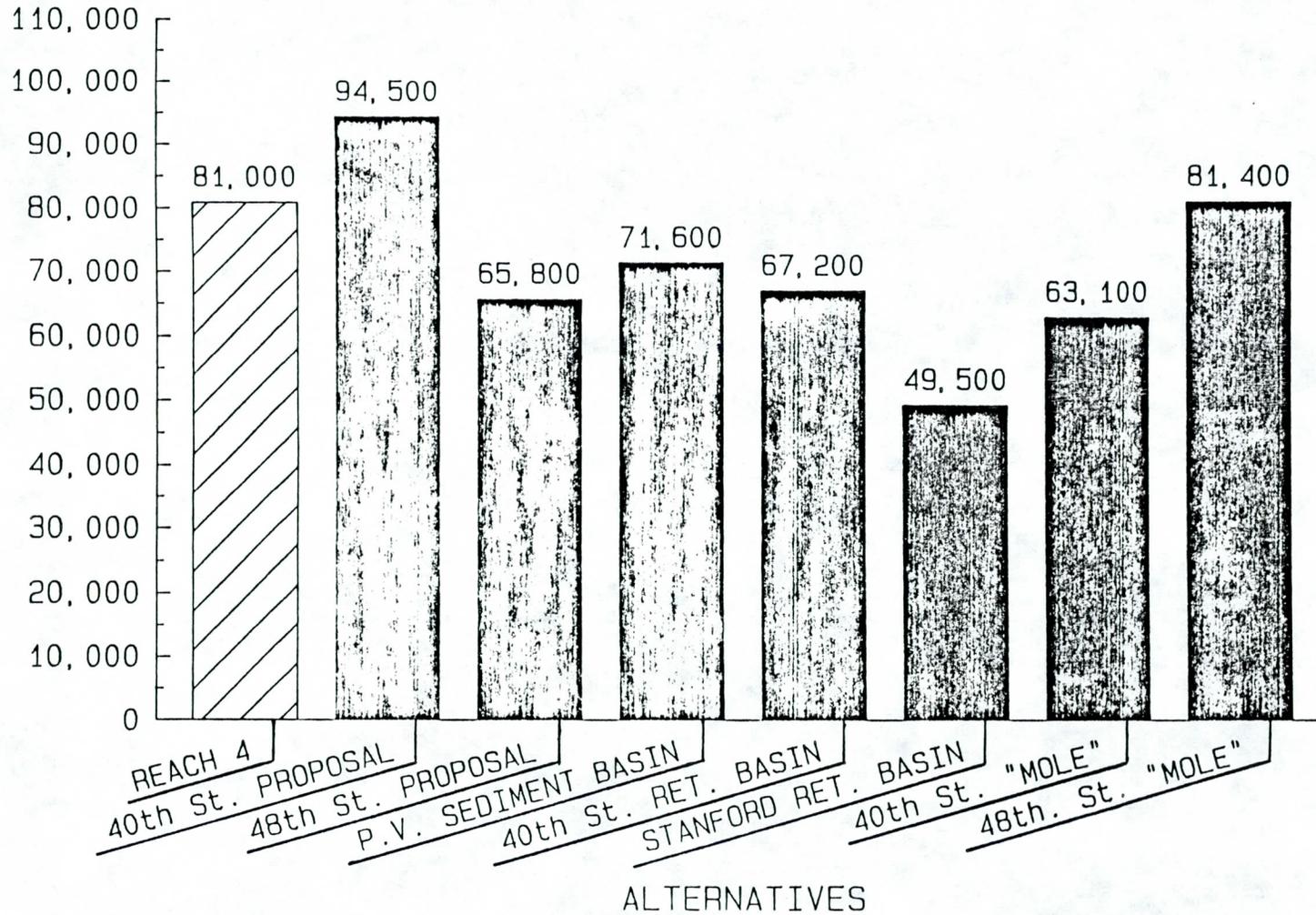
ARIZONA CANAL DIVERSION CHANNEL  
Summary of Taxpayer Costs for Alternatives

(Amounts Rounded to Nearest \$100,000)  
1985 Dollars

		<u>Reach 4</u>	<u>40th Street Proposal</u>	<u>48th Street Proposal</u>	<u>Paradise Valley Sediment Basin</u>	<u>40th Street Retention Basin</u>	<u>Stanford Drive Retention Basin</u>	<u>40th Street "Mole"</u>	<u>48th Street "Mole"</u>
<u>CONSTRUCTION COSTS</u>									
Construction costs	(Note 1)	\$27,400,000	\$50,900,000	\$23,500,000	\$ 4,700,000	\$20,600,000	\$17,300,000	\$41,300,000	\$39,500,000
Additional construction costs	(Note 2)	<u>1,000,000</u>	-	<u>2,800,000</u>	-	<u>1,000,000</u>	<u>1,000,000</u>	-	-
Total construction costs before built-in contingency, engineering fees and other costs		28,400,000	50,900,000	26,300,000	4,700,000	21,600,000	18,300,000	41,300,000	39,500,000
Contingency factor									
Adjusted construction costs before engineering fees	(Note 3)	<u>4,300,000</u>	<u>15,300,000</u>	<u>7,800,000</u>	<u>1,400,000</u>	<u>6,500,000</u>	<u>5,500,000</u>	<u>6,200,000</u>	<u>5,900,000</u>
		32,700,000	66,200,000	34,100,000	6,100,000	28,100,000	23,800,000	47,500,000	45,400,000
Army Corps of Engineers fees (20%)	(Note 4)	<u>6,500,000</u>	<u>13,200,000</u>	<u>6,800,000</u>	<u>1,200,000</u>	<u>5,600,000</u>	<u>4,800,000</u>	<u>9,500,000</u>	<u>9,100,000</u>
Subtotal construction costs		39,200,000	79,400,000	40,900,000	7,300,000	33,700,000	28,600,000	57,000,000	54,500,000
Channel construction costs	(Note 5)	-	-	-	-	-	-	-	<u>19,300,000</u>
Adjusted total construction costs		<u>39,200,000</u>	<u>79,400,000</u>	<u>40,900,000</u>	<u>7,300,000</u>	<u>33,700,000</u>	<u>28,600,000</u>	<u>57,000,000</u>	<u>73,800,000</u>
<u>OTHER FIXED COSTS</u>									
Land and relocation, net of any cost savings attributable to land damages and bridges for 40th and 48th Street proposals	(Note 6)	17,100,000	9,000,000	18,800,000	61,900,000	24,100,000	11,500,000	600,000	2,100,000
Cudia City Wash Sediment Basin	(Note 7)	3,700,000	3,700,000	3,700,000	-	-	-	3,100,000	3,100,000
Cost for Reach One, not recoverable	(Note 8)	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
Additional costs for Reaches Two and Three	(Note 9)	20,000,000	-	-	-	7,000,000	7,000,000	-	-
Non-recoverable costs for Reach Four lands	(Note 10)	-	<u>1,400,000</u>	<u>1,400,000</u>	<u>1,400,000</u>	<u>1,400,000</u>	<u>1,400,000</u>	<u>1,400,000</u>	<u>1,400,000</u>
Total other fixed costs		<u>41,800,000</u>	<u>15,100,000</u>	<u>24,900,000</u>	<u>64,300,000</u>	<u>33,500,000</u>	<u>20,900,000</u>	<u>6,100,000</u>	<u>7,600,000</u>
<b>TOTAL TAXPAYER COSTS</b>		<u>\$81,000,000</u>	<u>\$94,500,000</u>	<u>\$65,800,000</u>	<u>\$71,600,000</u>	<u>\$67,200,000</u>	<u>\$49,500,000</u>	<u>\$63,100,000</u>	<u>\$81,400,000</u>

# ARIZONA CANAL DIVERSION CHANNEL SUMMARY OF COSTS FOR ALTERNATIVES

DOLLAR COST (In thousands)



ARIZONA CANAL DIVERSION CHANNEL  
RECONCILIATION OF REACH FOUR TOTAL TAXPAYER  
COSTS FROM CORPS ESTIMATES TO EXHIBIT I

(Amounts Rounded to Nearest \$100,000)  
1985 Dollars

Total taxpayer costs, Corps estimates, including right of ways by dedication, per Design Memorandum No. 12 (page 123) (Note 11)		\$66,700,000
Increase in construction costs:		
Exhibit I	\$ 39,200,000	
Add construction included in Cudia City Wash (\$3,700,000 - \$600,000 land and relocations below)	<u>3,100,000</u>	
	42,300,000	
Design Memorandum No. 12	<u>(40,900,000)</u>	1,400,000
Increase in land and relocations:		
Exhibit I	17,100,000	
Add land and relocations included in Cudia City Wash above	<u>600,000</u>	
	17,700,000	
Add right of ways acquired by dedication not included in Exhibit I (Note 12)	<u>9,400,000</u>	
	27,100,000	
Design Memorandum No. 12	<u>(25,500,000)</u>	1,600,000
Less right of ways acquired by dedication not included in Exhibit I, but included in Design Memorandum No. 12 above (Note 12)		(9,400,000)
Decrease in recreations:		
Exhibit I	-	
Design Memorandum No. 12	<u>300,000</u>	(300,000)
Cost for Reach One not recoverable:		
Exhibit I	1,000,000	
Design Memorandum No. 12	<u>-</u>	1,000,000
Additional costs for Reaches Two and Three:		
Exhibit I	20,000,000	
Design Memorandum No. 12	<u>-</u>	<u>20,000,000</u>
TOTAL TAXPAYER COSTS, EXHIBIT I		<u>\$81,000,000</u>

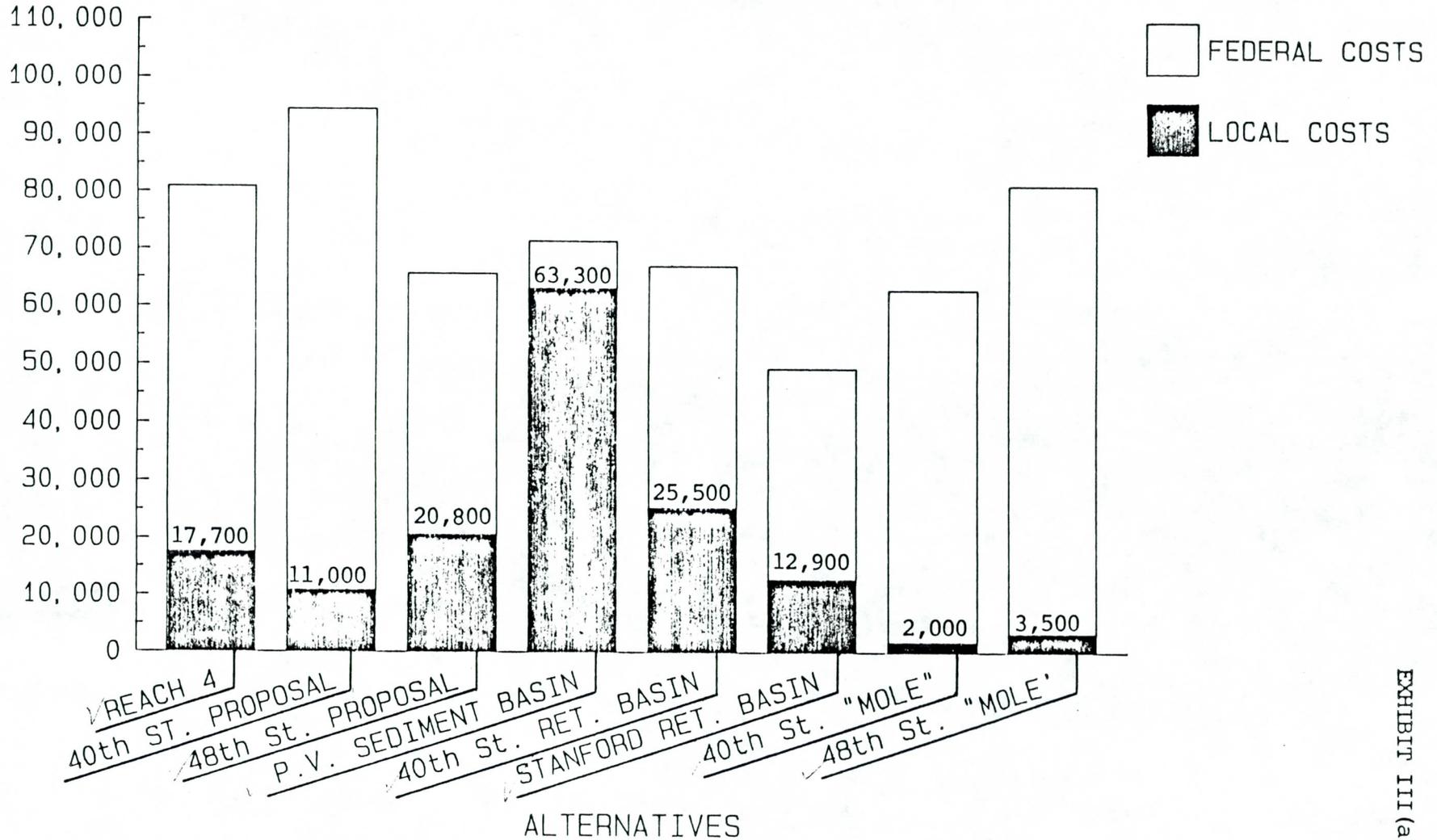
ARIZONA CANAL DIVERSION CHANNEL  
Federal and Local Costs of Alternatives

(Amounts Rounded to Nearest \$100,000)  
1985 Dollars

	<u>Reach 4</u>	<u>40th Street Proposal</u>	<u>48th Street Proposal</u>	<u>Paradise Valley Sediment Basin</u>	<u>40th Street Retention Basin</u>	<u>Stanford Drive Retention Basin</u>	<u>40th Street "Mole"</u>	<u>48th Street "Mole"</u>
<u>FEDERAL COSTS</u>								
Total construction costs including contingencies and corporate fees	\$39,200,000	\$ 79,400,000	\$40,900,000	\$ 7,300,000	\$33,700,000	\$28,600,000	\$57,000,000	\$73,800,000
Cudia City Wash Sediment Basin	3,100,000	3,100,000	3,100,000	-	-	-	3,100,000	3,100,000
Costs for Reach 1, not recoverable	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
Additional costs for Reaches 2 and 3	<u>20,000,000</u>	-	-	-	<u>7,000,000</u>	<u>7,000,000</u>	-	-
Total federal costs	<u>63,300,000</u>	<u>83,500,000</u>	<u>45,000,000</u>	<u>8,300,000</u>	<u>41,700,000</u>	<u>36,600,000</u>	<u>61,100,000</u>	<u>77,900,000</u>
<u>LOCAL COSTS</u>								
Land and relocations net of any cost savings attributable to land damages and bridges for 40th and 48th Street proposals	\$17,100,000	\$ 9,000,000	\$18,800,000	\$61,900,000	\$24,100,000	\$11,500,000	-	\$ 1,500,000
Cudia City Wash Sediment Basin	600,000	600,000	600,000	-	-	-	\$ 600,000	600,000
Non-recoverable costs for Reach 4 lands	-	<u>1,400,000</u>	<u>1,400,000</u>	<u>1,400,000</u>	<u>1,400,000</u>	<u>1,400,000</u>	<u>1,400,000</u>	<u>1,400,000</u>
Total local costs	<u>17,700,000</u>	<u>11,000,000</u>	<u>20,800,000</u>	<u>63,300,000</u>	<u>25,500,000</u>	<u>12,900,000</u>	<u>2,000,000</u>	<u>3,500,000</u>
 <u>TOTAL FEDERAL AND LOCAL COSTS PER EXHIBIT I</u>	 <u>\$81,000,000</u>	 <u>\$ 94,500,000</u>	 <u>\$65,800,000</u>	 <u>\$71,600,000</u>	 <u>\$67,200,000</u>	 <u>\$49,500,000</u>	 <u>\$63,100,000</u>	 <u>\$81,400,000</u>

# ARIZONA CANAL DIVERSION CHANNEL LOCAL/FEDERAL COSTS OF ALTERNATIVES

DOLLAR COST (In thousands)



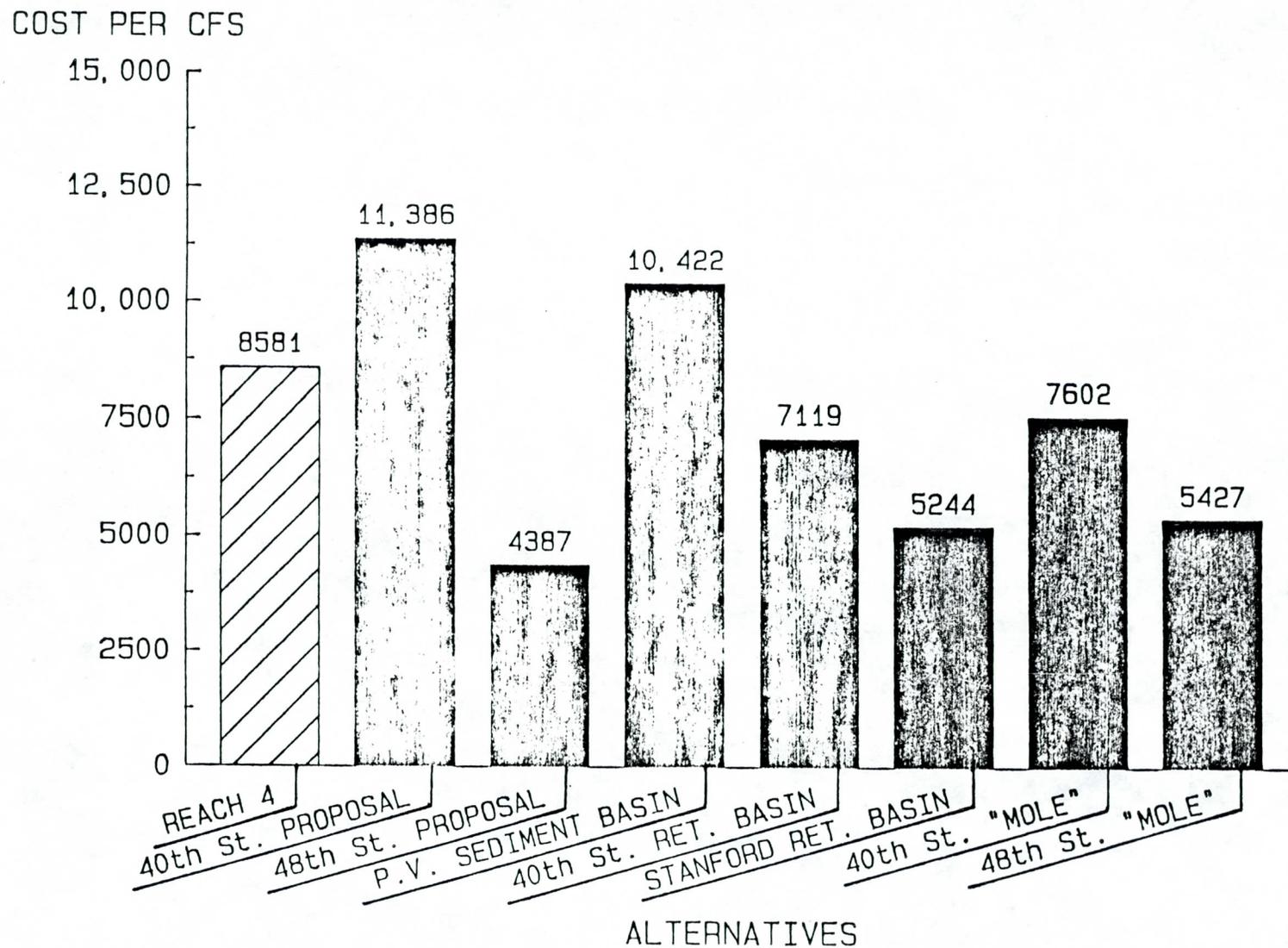
## EXHIBIT IV

ARIZONA CANAL DIVERSION CHANNEL  
Summary of Costs for Alternatives Per Design Cubic Feet Per Second (CFS)

(Amounts Rounded to Nearest \$100,000)  
 1985 Dollars

<u>Alternatives</u>	<u>Design CFS</u>	<u>Total Tax Payers Cost (Per Exh. I)</u>	<u>Cost Per Design CFS</u>	<u>Design CFS References</u>
Reach Four	9,440	\$ 81,000,000	\$ 8,581	Task Force Document C2-Tab 3
40th Street Proposal	8,300	94,500,000	11,386	Task Force Document S-4
48th Street Proposal	15,000	65,800,000	4,387	Task Force Document S-4
Paradise Valley Sediment Basin	6,870	71,600,000	10,422	Task Force Document C2-Tab 3
40th Street Retention Basin	9,440	67,200,000	7,119	Task Force Document C2-Tab 3
Stanford Drive Retention Basin	9,440	49,500,000	5,244	Task Force Document C2-Tab 3
40th Street "Mole"	8,300	63,100,000	7,602	Task Force Document S-4
48th Street "Mole"	15,000	81,400,000	5,427	Task Force Document S-4

# ARIZONA CANAL DIVERSION CHANNEL SUMMARY OF COSTS FOR ALTERNATIVES PER DESIGN CFS



ARIZONA CANAL DIVERSION CHANNEL

Notes to Exhibits  
1985 Dollars

Note 1

Construction cost for the respective alternatives are taken from:

Reach Four	Design Memorandum No. 12 (Page 134)
40th Street Proposal	Task Force Document S-10
48th Street Proposal	Task Force Document S-9
Paradise Valley Sediment Basin	Task Force Document S-11

	<u>40th Street Retention Basin</u>	<u>Stanford Drive Retention Basin</u>
40th Street Basin	\$ 8,000,000*	\$ -
35th Street Basin	3,450,000*	3,450,000*
Channel Conduit	<u>19,100,000*</u>	<u>14,950,000***</u>
	30,550,000	18,400,000
Eliminate 30% contingency and 20% Corps fee, divide by:	<u>1.56</u>	<u>1.56</u>
	19,580,000	11,790,000
Stanford Drive Retention Basin	-	<u>4,660,000**</u>
Index to adjust price Levels from 1983 to 1985 (per Engineering News Record Building Cost Index)	<u>19,580,000</u>	16,450,000
	<u>X 1.05</u>	<u>X 1.05</u>
	<u>20,560,000</u>	<u>17,270,000</u>
Rounded	<u>\$20,600,000</u>	<u>\$17,300,000</u>

\* Per Task Force Document V-7, Tab H

\*\* Per Conceptual Estimate, November 30, 1983

\*\*\* \$19,100,000 (Per Task Force Document V-7, Tab H)  
(4,150,000) (5280 linear feet X \$786 per linear foot based on \$/linear foot per Task Force Document V-7, Tab H)

\$14,950,000

ARIZONA CANAL DIVERSION CHANNEL

Notes to Exhibits  
1985 Dollars

Note 1 (Continued)

40th Street "Mole"

Computations are based on 4,000 linear feet of 14 foot diameter pipe at \$1,270 per linear foot, and 24,000 linear feet of 21 foot diameter pipe at \$1,498 per linear foot. The footage is being based on representations received from W.S. Gookin and Associates and the dollar per foot is being based on the Arizona Department of Transportation, Highways Division tabulation of bids. Also included is a cost of \$250,000 for inlet structures per representations from W.S. Gookin and Associates.

48th Street "Mole"

Computations are based on 13,000 linear feet at \$1,270 per linear foot of 14 foot diameter pipe, and 15,000 linear feet of 21 foot diameter pipe at \$1,498 per linear foot. The footage is being based on representations received from W.S. Gookin and Associates and the dollar per foot is being based on the Arizona Department of Transportation, Highways Division tabulation of bids. Also included is a cost of \$500,000 for inlet structures per representations from W.S. Gookin and Associates.

ARIZONA CANAL DIVERSION CHANNEL

Notes to Exhibits  
1985 Dollars

Note 2

Additional construction costs for Reach Four, 40th Street Retention Basin and Stanford Drive Retention Basin relate to "Cost of Blasting" and are taken from Task Force Document U-10 (page 14).

Additional costs for the 40th Street proposal are taken from Task Force Document Q-11, adjusted for contingency and Corps fees. Fencing costs are taken from Task Force Document S-10.

Fencing	\$ (61,000)
Stanford Drive Channel covered portion not required (1215 feet x \$1,357 per foot)	(1,649,000)
Cover 34th Street to Cudia City Wash (3500 feet x \$483 per foot)	<u>1,691,000</u>
Net Cost	(19,000)
Index to adjust price level from 1982 to 1985 (per Engineering News Record Building Cost Index)	X <u>1.01</u> <u>(19,190)</u>
Rounded	<u>\$ -0-</u>

The cost for Stanford Drive Channel and the cover for the additional portion do not include a contingency factor or the Corps fees.

ARIZONA CANAL DIVERSION CHANNEL

Notes to Exhibits  
1985 Dollars

Note 2 (Continued)

Additional costs for the 48th Street proposal are taken from Task Force Document Q-11, adjusted for contingency and Corps fees. Fencing costs are taken from Task Force Documents S-9.

Fencing	\$ (100,000)
Stanford Drive Channel covered portion not required (1,215 feet x \$1,357 per foot)	(1,649,000)
Cover 34th Street to 48th Street (9,300 feet x \$483 per foot)	<u>4,491,900</u>
Net Cost	2,742,900
Index to adjust price level from 1984 to 1985 (per Engineering News Record Building Cost Index)	X <u>1.01</u> <u>2,770,329</u>
Rounded	<u>\$ 2,800,000</u>

The cost for Stanford Drive Channel and the cover for the additional portion do not include a contingency factor or the Corps fees.

Note 3

The built-in contingency factor is based upon the precision of the estimated construction costs. Reach Four estimated construction costs are deemed more precise by Corps of Engineers than the other alternatives.

- The 15% used for Reach Four is taken from Design Memorandum No. 12 (pages 134 - 135).
- The 30% used for alternative proposals is taken from Task Force documents S-9, S-10 and S-11 for the 40th Street proposal, 48th Street proposal and Paradise Valley Sediment Basin alternatives, respectively. The 40th Street Retention Basin and Stanford Drive Retention Basin alternatives are based on Corps of Engineers recommendations.
- The 15% used for 40th Street "Mole" and 48th Street "Mole" is based on 17 bids for the Papago Freeway in 1985 dollars. The difference between the three lowest bids being 11%.

ARIZONA CANAL DIVERSION CHANNEL

Notes to Exhibits  
1985 Dollars

Note 4

The Army Corps of Engineers fees of 20% are taken from Design Memorandum No.12 pages 134. The amount of Corps fees for each alternative was recomputed by multiplying the percentage times the estimated construction costs.

Note 5

Channel construction unit costs from Osborn to the Salt River are \$1,205 per foot (Task Force Document Q-11), multiplied by 15,840 feet (J. Hawkins representations); indexed to 1985 price levels.

Note 6

Land and relocation costs for Reach Four are taken from Task Force Document T-9, ACDC, local costs as of October 24, 1985.

A summary of land and relocation costs for the 40th Street proposal, 48th Street proposal, and Paradise Valley Sediment Basin are as follows:

	<u>40th Street Proposal</u>	<u>48th Street Proposal</u>	<u>Paradise Valley Sediment Basin</u>
Total land & relocation costs	\$29,077,000	\$39,235,263	\$61,880,000
Land and damages	(18,975,000)	(23,255,000)	-
Bridges	( 2,282,000)	-	-
	7,820,000	15,980,263	61,880,000
Arizona Canal movement	<u>1,200,000</u>	<u>2,800,000</u>	-
	<u>\$ 9,020,000</u>	<u>\$18,780,263</u>	<u>\$61,880,000</u>
Rounded	<u>\$ 9,000,000</u>	<u>\$18,800,000</u>	<u>\$61,900,000</u>

The land and relocation costs, in addition to the savings for land and damages, and bridges, are taken from Task Force Document S-10, S-9 and S-11 for the 40th Street proposal, 48th Street proposal and Paradise Valley Sediment Basin alternative, respectively. Costs for the movement of the Arizona Canal have been increased on a per foot basis by \$1,200,000 and \$2,800,000 for the 40th and 48th Street proposal, respectively, as a result of a phone conversation with the County regarding the costs of moving the Arizona Canal in the Reach Four alternative.

ARIZONA CANAL DIVERSION CHANNEL

Notes to Exhibits  
1985 Dollars

Note 6 (Continued)

	<u>40th Street Retention Basin</u>	<u>Stanford Drive Retention Basin</u>
Land costs indexed from 1983 to 1985 price levels (Per Engineering News Record Building Cost Index)	\$20,200,000	\$ 7,600,000
Relocation costs	<u>3,900,000</u>	<u>3,900,000</u>
	<u>\$24,100,000</u>	<u>\$11,500,000</u>

Land costs for the 40th Street Retention Basin are taken from Task Force Document V-7, Tab H. Land costs for the Stanford Drive Retention Basin are taken from Conceptual Estimates, November 30, 1983, and Task Force Document V-7, Tab H. The assumption has been made that right of ways acquired by dedication (\$9,400,000), and the cost of lands already purchased in Reach Four (\$6,600,000) are not included in the \$20,200,000 and \$7,600,000 for the 40th Street and Stanford Drive Retention Basins, respectively. Relocation costs for the 40th Street and Stanford Drive Retention Basins are taken from Design Memorandum No. 12, page 135, less \$1,000,000 for moving the Arizona Canal per telephone conversation with Mr. Sagramoso (General Manager of the Maricopa County Flood Control District).

Land and relocation costs of \$600,000 for the 40th Street "Mole" are taken from Design Memorandum No. 12, page 129, and of \$2,100,000 for the 48th Street "Mole," includes \$600,000 taken from Design Memorandum No. 12, page 129, and \$1,500,000 (being the relocation costs of six bridges at \$250,000 per bridge) based on Task Force Document S-9.

ARIZONA CANAL DIVERSION CHANNEL

Notes to Exhibits  
1985 Dollars

Note 7

The Cudia City Wash Sediment Basin cost is taken from Design Memorandum No. 12, page 129 and includes a contingency fee of 15% and Corps fee of 20%. A summary of the costs is as follows:

Land and relocation costs	\$ 600,000
Construction costs	2,300,000
Contingency factor	300,000
Corps fee	<u>500,000</u>
	<u>\$ 3,700,000</u>

For the 40th and 48th Street "Moles," land and relocation costs are included in Note 6.

Note 8

Non-recoverable costs for Reach One are taken from Task Force Document V-7, Tab H.

Total costs for Reach One per Alternative A-4 (Reach Four)	\$ 39,150,000
Total costs for Reach One per Alternative T-2 (Toups 40th Street retention basin)	<u>(38,200,000)</u>
	950,000
Index to adjust price levels from 1983 to 1985 (per Engineering News Record building cost index)	X <u>1.05</u>
	<u>977,500</u>
	Rounded <u>\$ 1,000,000</u>

Note 9

Additional costs for Reaches 2 and 3 are taken from Task Force Document V-7, Tab H.

Total cost of construction and bridges Alternative A4 (Reach Four)	\$ 87,750,000
Total cost of construction and bridges Alternative T2 (Toups 40th Street Retention Basin)	<u>(75,400,000)</u>
	12,350,000
Index to adjust from 1983 costs to 1985 (Per Engineering News Record Building Cost Index)	X <u>1.05</u>
	<u>12,967,500</u>

ARIZONA CANAL DIVERSION CHANNEL

Notes to Exhibits  
1985 Dollars

Note 9 (continued)

Additional costs of construction and bridges  
for Reach Four over Toups 40th Street Retention  
Basin Rounded \$ 13,000,000

The differences in the design cubic feet per second at 12th  
Street for the above alternatives are:

	<u>Cubic Feet Per Second</u>	<u>% of Total</u>	<u>Reference</u>
Alternative A4 (Reach Four)	9,440	100%	(Per Task Force Document C-2, Tab 3)
Alternative T2 (Toups 40th Street Retention Basin)	<u>(3,340)</u>	<u>35%</u>	*
Additional design cubic feet per second for Reach Four over Toups 40th Street Retention Basin	<u>6,100</u>	<u>65%</u>	

\* 2,200 cubic feet per second (Task Force Document E-3,  
Tab 10)

1,140 cubic feet per second (additional design cubic feet  
per second from 24th Street to 12th Street per  
Task Force Document C-2, Tab 3)

3,340

There will be a proportional saving in costs for Reaches 2 and 3  
for all alternatives to Reach Four per J. Hawkins representa-  
tions:

Reach Four 40th Street & Stanford Drive Retention Basins	13,000,000/65% =	<u>\$20,000,000</u> (100%)
All other alter- natives	20,000,000 X 35% =	<u>\$ 7,000,000</u> ( 35%)
	20,000,000 X 0% =	<u>\$ - 0 -</u> ( 0%)

ARIZONA CANAL DIVERSION CHANNEL

Notes to Exhibits  
1985 Dollars

Note 10

Monies actually expended for Reach Four lands	\$6,600,000	(Task Force Document C-2 Tab 6)
Monies recoverable from resale of Reach Four lands	<u>(5,200,000)</u>	(Task Force Document U-10, page 14)
Non-recoverable costs for Reach Four lands	<u>\$1,400,000</u>	

Note 11

The total taxpayer costs, Corps estimates represents total cost of Reach Four proposal as of October 14, 1985. This amount includes cost of right of ways acquired by dedication. The amount is taken from Design Memorandum No. 12, page 123.

Note 12

This amount represents the value of right of ways acquired by dedication.

Per Design Memorandum No. 12, page 123	\$ 20,500,000
Less: Cost at July, 1985, including Cudia City Wash Sediment Basin (Note 7)	<u>(11,100,000)</u>
Value acquired by dedication	<u>\$ 9,400,000</u>

EXHIBIT 7

# More local effort sought in water projects

By James W. Brosnan  
Scripps Howard News Service

WASHINGTON — The chief of the U.S. Corps of Engineers will ask Congress this week to impose new taxes on waterway users and charge local communities more for navigation and flood control projects.

The administration wants local sponsors to bear 25 percent to 35 percent of the cost for flood control, 35 percent for irrigation, 50 percent for recreation and pay the full cost of power and water supplies.

Corps chief Robert Dawson says that without the new revenues the corps' programs could be severely curtailed under the Gramm-Rudman deficit reduction act.

(Maricopa County Flood Control District director Dan Sagramoso said the cost-sharing proposal would have little impact in the Valley.

"We're already paying more than that," he said. "It's more like 45 percent local."

(The local contribution for Corps flood-control projects includes acquiring land and relocating streets and utilities, he explained.

(The \$439 million worth of Corps flood-control projects in the Phoenix area include the recently completed Dreamy Draw, Cave Buttes, Adobe and New River dams and the Arizona Canal Diversion Channel under construction from Glendale to Paradise Valley.)

The U.S. House last fall agreed to authorize \$20 billion for 350 projects nationwide. A more modest bill pegged at \$12 billion for about

167 projects has an outside chance of making it to the Senate floor this week.

Environmentalists question the price tag at a time of severe budget cuts for other programs.

"The idea of authorizing \$20 billion worth of projects is a little absurd," said Charlene Dougherty, legislative director for the National Audubon Society.

Dawson counters, "There are a lot of water projects around the nation that are good solid projects that produce \$4 in benefits for every \$1 spent, even \$9 for every \$1 spent.

"If we can get those projects in place in a way that recognizes the budgetary realities, that recognizes Gramm-Rudman, then we've got a winner."

Dawson argues that stiffer requirements for local cost-sharing would winnow out unneeded projects and cut the cost of others.

The price tag on deepening harbors in Baltimore and Norfolk, Va., and Mobile, Ala., authorized in a 1985 appropriations bill, dropped from \$1.4 billion to \$537 million when local sponsors decided they could do with less. A plan to deepen the Mississippi River Channel south of Baton Rouge was scaled back from \$492 million to \$316 million.

Dawson is moving to stop a lot of projects by requiring local sponsors to put up half the cost of the initial feasibility studies.

(Sagramoso said Maricopa County taxpayers already are

paying half the cost of a study to determine whether the Crosscut Canal can be used to drain flood flows from the Arcadia neighborhood on the southwest side of Camelback Mountain.)

"In the past everybody wanted to have the federal government take all the risk. If it turned out in 10 to 20 years to be a great project, fine. If it was a dog, so what. We didn't risk it," Dawson said.

As a result the Corps wound up spending \$2 billion for the Tennessee-Tombigbee Waterway and got a "bum rap" as "being nothing but a pork barrel agency," Dawson said.

Cost-sharing has drawn opposition from Southern congressmen, however.

Sen. Thad Cochran, R-Miss., said, "We're not in a position to share much of the cost in my state."

"We haven't found any area yet that was raising their hand wanting to cost-share," Dawson said. "The overriding point is we're not going to have a bill, and we're not going to have a program without cost-sharing."

James W. Brosnan is a reporter with the Washington Bureau of *The Commercial Appeal* in Memphis, Tenn.)

PLAY THE INSTANT GAME!

**DUCE  
IS WILD**

Millions in instant prizes!  
Win the grand prize of a million dollars or more!

**ARIZONA LOTTERY**

© 1985 Arizona Lottery

**It's working for Arizona.**

Must be 18 years or older to purchase tickets.  
Grand prize of \$1,000 a week for life payable at age 18 or older.

EXHIBIT 8

EXHIBIT 8

In June of 1972, heavy rains caused ruptures in the over-filled Arizona Canal and resulted in water damage to homes South of that Canal.

A proposal has been presented under the terms of which a catch basin would be built on the North side of the Arizona Canal which would direct trapped rain water to the West and significantly reduce the possibility of this type of flood damage in the event of other heavy drain-offs of rain and water from the North in the future.

Such a basin or below-grade canal has been planned for the Flood Control District of Maricopa County and designed by the U.S. Army Corp. of Engineers. To build it will require expenditure of Federal funds as well as additional local tax contributions.

483 OF 532 APPROACHED

	<u>YES</u>	<u>NO</u>
1. Prior to this document, were you aware of the 1972 flood damage in your area (South of the Arizona Canal)?	<u>406</u>	<u>77</u>
2. Prior to this document, were you aware of the proposal to construct the diversion channel (North of the Arizona Canal)?	<u>428</u>	<u>55</u>
3. Are you in favor of the construction of the diversion channel funded by U.S. and local tax sources?	<u>192</u>	<u>291</u>
4. Would you prefer an alternative to #3?	<u>328</u>	<u>155</u>
5. Would you prefer or accept an alternative to #3 which would involve personal cost in insuring your home and property against such loss?	<u>297</u>	<u>169</u>
		17 W/OUT ANS.
6. Has the person presenting you with this document expressed an opinion or in any manner suggested an answer favorable to his point of view?	<u>478</u>	<u>6</u>
		6 W/OUT ANS.

8/16/85 - 8/19/85

EXHIBIT 9

EXHIBIT 9  
DEER VALLEY PLANNING COMMITTEE

REPORT OF THE  
FLOOD CONTROL SUBCOMMITTEE

The Flood Control Subcommittee of the Deer Valley Planning Committee has reviewed the main body of the draft General Design Memorandum and the draft Environmental Statement prepared by the U. S. Army Corps of Engineers for its Flood Control Project: Gila River Basin, New River and Phoenix City Streams. The documents present more detailed proposals in accordance with "Alternative 5b" which was presented as one of six alternatives at a public hearing on 25 April 1974. The "Alternative 5b" approach to flood control for Phoenix has been endorsed by, among others, Phoenix City Council resolution 14324 of 7 May 1974, and the Flood Control District of Maricopa County Board of Directors resolution of 3 June 1974.

The project, as described in the two draft documents, substantially affects the Deer Valley area, as well<sup>as</sup> the Deer Valley Area Plan previously approved (December 1973) by Phoenix City Council. Features of the project lying within the Deer Valley plan area include:

- Adobe Dam in the northwest plan area
- Cave Creek Park along the east of the plan
- Arizona Canal along the south of the plan

The context in which this review of the Corps' draft documents is understood to be occurring is that of a general design, whose approval cycle must be completed prior to commencing construction of the first project feature, Cave Buttes Dam. We understand the critical urgency of Cave Buttes Dam. We note that priority construction of that feature is common to four of the six alternative plans presented by the Corps of Engineers some 18 months ago. Even if Cave Buttes Dam were the only project feature ever constructed, it would be an improvement of Phoenix'

present position vis-a-vis flood hazards in the City. It therefore seems reasonable to us that Cave Buttes should be able to proceed unhindered by uncertainties about the Arizona Canal Diversion Channel raised in this report.

#### ARIZONA CANAL DIVERSION CHANNEL

At the present time, the Deer Valley Planning Committee must accept and support efforts of citizens who expressed their views at our meeting of October 2nd. That view is to oppose construction of the Arizona Canal Diversion Channel.

The Deer Valley Area Plan, approved by Phoenix City Council as the plan for Deer Valley after expenditure of in excess of 10,000 citizen manhours in its development, does not consider the flood control channel to be the best use of the land.

We have read the economic analyses of costs and benefits prepared by the Corps of Engineers. These conclude that the channel is justifiable. We have heard statements by the City's Engineering Department that Deer Valley cannot have storm sewers unless the channel is installed as an outlet for collected waters.

But, we have also heard the cries of frustrated citizens to be affected by the project. Based upon such information as the committee has been able to gather, the Deer Valley Planning Committee does not believe that Effects on Social Well-Being have been considered to the extent required by Sub-section V.B of "Standards for Planning Water and Related Land Resources," Federal Register, XXXVIII, No. 174, Part III, pages 24778-862, Sept. 10, 1973. The sociological effects with which the committee is concerned include not only those of the channel itself, but also of those antecedant to construction of the channel. These latter effects, antecedant to construction, have been totally ignored in the environmental impact statement.

We agree that governmental planning should not be conducted in secret. We also believe, however, that the principle of "Put up or shut up" should also apply to governmental planning. That is, governmental

planning should not proceed when (a) the process of planning has an adverse affect on large numbers of the citizens, and (b) funds for mitigating that adverse affect are at best figments of the planner's imagination. In the case of the Arizona Canal Diversion Channel, both (a) and (b) obtain:

People along the north bank of the Arizona Canal have had the marketing of their homes affected by the planning of the channel. They have received advice from those planning the project that they don't have to advise buyers of the plans because the plans are "public knowledge." Offering such advice, we believe, is an implied admission by the planners themselves that the planning process itself would narrow the number of buyers for a home to be affected by the plan. Further, we regard it as dangerous advice in an era increasingly becoming one of "Let the seller beware."

Yet when the affected homeowners apply to the Flood Control District for relief, they are effectively told that they must remain in limbo at least until 1981. Indeed, the history of Flood Control District funds for acquiring lands appears to run in inverse order to need. We consider this unprecedented cruelty to the citizenry of Deer Valley.

Our conclusion is therefore that plans for the Arizona Canal Diversion Channel be dropped because (a) substantial adverse effects on social well-being are being experienced by the planning process itself, (b) these adverse affects have been ignored in the environmental impact statement, (c) funds are unavailable with which to mitigate those effects, and (d) the history of Flood Control District funding does not indicate that funds will be available for required land acquisition until long after the scheduled 1981.

We do not, however, take a one-sided view against flood protection for the Cities of Phoenix and Glendale. Rather, we believe that alternatives exist. The members of the Deer Valley Planning Committee are drawn from the business community, and we find defective a management/planning process in which the following common-place techniques do not obtain:

1. Optimization of the mix of resources in a plan, using programming techniques available in operations research, a branch of management science developed by the military during World War II. Two items in the Corps' development of Alternative 5b lead us to recommend the use of O.R. programming techniques. First, most of the probabilistic damage curves for floods at various points in the system have already been worked out. Second, the manner in which a \$30,000,000 pipe was added for Alternative 3 (p. 135 of the GDM No. 3) is disquieting. Third, planning of the channel for 100-year flood protection appears to be unwarranted when the city plans to furnish sewers for only one- or two-year flood protection.
2. Cost data should be used which ignores sunk costs. We do not understand how intelligent management decisions can be made by the various government agencies involved which do not differentiate between sunk costs and costs yet to be incurred. We recognize that it is government responsibility to measure the total cost of a project to society, which includes sunk costs for land removed from other uses. But we also recognize that it is government responsibility to effectively manage public funds, and that requires the differentiation we believe necessary.
3. Discount rates should approximate those expected to be observed. Otherwise, the discount process becomes specious and wasteful of public funds spent in its development.

Additional comments on the Arizona Danal Diversion Channel include the following:

4. We consider it unfortunate that the Flood Control District, the City of Phoenix, and the Corps of Engineers apparently accept the intransigent attitude expressed by Salt River Project toward flood control. The Arizona Canal will be

the primary beneficiary of the proposed channel, yet SRP has seen fit to give next to nothing in return. Rather, SRP insists that its present neighbors to the north have their land condemned so that SRP may reap the benefits at no cost to itself. We consider this an unconscionable misfeasance of the public trust presently placed with SRP.

5. We further recommend that alternate diversion of storm waters into the city storm drain system south of the Arizona Canal be considered. Other alternatives include planning of detention reservoirs along Cave Creek and at other locations within Deer Valley. While we are forced to accept that Alternative 5b is a way to furnish 100-year flood protection to Phoenix, we are not convinced that it is the only way. We are, however, convinced that there must be a better way. We do not accept that "a way" is necessarily the "best way," and are further unconvinced that "a way" should be followed merely because a substantial sum has been spent on its development.
  
6. An alternative should be developed to preserve all of the Arroyo Elementary School land, without sacrificing other homes. Further straightening of the bend in the existing canal at that point, with more extensive use of the less intensely developed private and public land adjacent to the south bank of the canal should make it unnecessary to take school land or abutting developed private residential land on the north side. It would be preferable to use and re-cover school land, as is planned in Sunnyslope, rather than destroying more homes and neighborhoods to provide new land for the school.

## CAVE CREEK PARK

Cave Creek Park will be a City of Phoenix project with minimal Corps of Engineers participation. The DVPC's comments on the park plans as presented by the Corps are as follows:

1. The park boundaries as shown in the General Design Memorandum generally conform to those of the Deer Valley Area Plan. An exception which concerns us is the area of 24th Avenue south of Thunderbird Road. Park plans presented by Corps show a park boundary requiring the acquisition of several existing homes along the east side of 24th Avenue. A map entitled "Cave Creek Park Acquisition Plan," prepared by the City of Phoenix Parks and Recreation Department and dated January 8, 1975, shows the area as a "deleted acquisition," i.e., no longer planned for acquisition. Clarification is required as to the park boundaries actually to be used.
2. To ensure that the DVPC is apprised of park plans, we request DVPC participation in the recreation task force described on pages 87-88 of the General Design Memorandum. We understand that such participation is currently in the process of being requested by Corps.

## ADOBE DAM

Adobe Dam will be constructed in the northwest corner of the Deer Valley Area Plan. The dam will reduce a Skunk Creek standard project flood to less than 2000 cfs, thus permitting water from the Arizona Canal Diversion Channel to be introduced below it without increasing the flood hazard southwest of Greenway and 83rd Avenue. Adobe Dam and the Arizona Canal Diversion Channel are therefore much inter-related projects. The DVPC's comments on Adobe Dam and plans for the park in the floodplain behind it are as follows:

1. We understand that the alternative of using two dams to control the Skunk Creek watershed is being actively

considered by Corps. We believe that the reduction in dam height at Site No. 4 permitted by the alternative would decrease sociological effects of the dam in both Saddleback Meadows and in Jade Park, and therefore recommend its adoption.

2. We recommend that the Corps consider channeling Scatter Wash from I-17 westward along the south of Adobe Mountain in behind the dam. Scatter Wash has flooded the south end of Jade Park on at least two occasions since 1970.
3. Existence of Adobe Dam park in conjunction with Thunderbird Park will substantially increase traffic on Pinnacle Peak Road. We therefore recommend that the interchange at I-17 and Pinnacle Peak Road be modified from its present half-diamond serving only the Flagstaff direction, to a full diamond serving also the Phoenix direction.
4. The General Design Memorandum and the Environmental Statement show a gymkhana in a triangular-shaped site at Pinnacle Peak Road and 47th Avenue. We recommend relocation of the gymkhana to the south of Pinnacle Peak Road, perhaps using existing structures on the Medigovich ranch. This recommendation is made for two reasons: (1) All trails for horse use require crossing of either 47th Avenue or Pinnacle Peak Road, with the dangerous result of mixing high-speed automobiles and low-speed horses; (2) lights and activity associated with a gymkhana would violate the life style of homeowners in the existing subdivision.
5. In the aerial photograph of the area (Plate 23 of the GDM), the rectangular green-cross-hatch area in the northwest is a platted subdivision with two occupied residences and two homes under construction. The area should therefore be color-coded as urban use rather than agricultural use.

6. To ensure that the DVPC is apprised of park plans, changes to which will obviously be required if two dams are used on Skunk Creek, we request DVPC participation in the recreation task force described on pages 87-88 of the General Design Memorandum. We understand that such participation is currently in the process of being requested by Corps.

EXHIBIT 10

2D-5E



# W. S. Gookin & Associates

Consulting Engineers

4203 North Brown Avenue  
Scottsdale, Arizona 85251  
(602) 947-3741

W. S. GOOKIN, P.E., L.S., R.M., PRESIDENT  
W. SCUDDER GOOKIN, P.E., L.S., VICE-PRESIDENT  
T. ALLEN J. GOOKIN, P.E., L.S., TREASURER

## MEMORANDUM

To: Mr. Richard Lee, Chairman  
From: Mr. W. Scudder Gookin, P.E., L.S.  
Date: February 14, 1986  
Subject: 40th Street Mole Alternate Calculations

Questions have been raised concerning whether or not a single 21 foot barrel is sufficient for the 40th Street alternate. To examine this question, there follows a preliminary examination of the parameters of the proposal.

Utilizing USGS Quadrangle sheets titled Paradise Valley, Arizona, Tempe, Arizona, Sunnyslope, Arizona and Phoenix, Arizona. The following information was found:

Approximate invert of Cudia City Wash just north of the Arizona Canal is 1250 msl.

Approximate invert of 34th Street Wash just north of the Arizona Canal is 1255 msl.

Approximate invert of the Salt River at 40th Street is 1110 msl.

Approximate distance from Cudia City Wash to the Salt River along 40th Street is 28,500 feet.

Approximate distance from 34th Street Wash to Cudia City Wash is 4,000 feet.

Net difference in elevation from Cudia City to Salt River is 140 feet.

Net difference in elevation from 34th Street Wash to Cudia City is 5 feet.

Net difference in elevation from 34th Street Wash to Salt River is 145 feet.

Examination of a Maricopa County Flood Control Map dated August 10, 1982 (Roll 3 of 4 rolls) indicates the flood level of the Salt River near 40th Street for the 100 year storm to

February 14, 1986

be approximately 1,119 feet msl. It was felt important to consider the possibility of simultaneous discharge of the 40th Street alternative with the Salt River during the peak 100 year event. This would be more conservative than Standard Project Design, approaching maximum probable flood.

Making this very conservative, simultaneous assumption, a reduction of 9 feet of available differential head must be made. This means the differential head from 34th Street Wash to the Salt River at 100 year flood stage is 136 feet. The differential head from Cudia City Wash to the Salt River becomes 131 feet and the drop between the 34th Street Wash and the Cudia City Wash remains the same at 5 feet.

Based on these assumptions, the following slopes are derived:

34th Street Wash to Cudia City:

$$5 \text{ feet} / 4000 \text{ feet} = 0.0013$$

Cudia City to Salt River:

$$131 \text{ feet} / 28,500 \text{ feet} = 0.0046$$

34th Street Wash to Salt River:

$$136 \text{ feet} / 32,500 \text{ feet} = 0.0042$$

Since we are examining a closed pipe system, the available head only becomes critical at inlet and outlet conditions. And, since the invert of the lined tunnel would typically be 45 to 50 feet below grade, it is possible that the hydraulic flow line may not be critical at any point. To test this hypothesis, we may solve using Manning's equation. Others may argue that Chezy/Cutter or Darcey would be better, but this is more a matter of preference than a difference in results for this type of calculation. Manning's is the most widely accepted.

#### CAPACITY CALCULATIONS

The capacity of a pipe can be determined by utilizing Manning's equation.

Manning's Equation:

$$V = \frac{1.486 r^{2/3} s^{1/2}}{n} \quad \text{where}$$

February 14, 1986

V = velocity

1.486 = a constant required to convert from metric units to english units

r = the hydraulic radius = A/p  
 A = End Area  
 p = wetted perimeter

s = the slope

n = the roughness factor - an empirically derived number

Q = quantity of water = VA

#### 14 FOOT DIAMETER

Assuming a full flowing round pipe of 14 foot diameter (34th Street Wash to Cudia City Wash).

Q = 2100 cfs (task force doc. S-4)

A = 153.9380

p = 43.9823

r = 3.5

V = 13.64 = Q/A

n = 0.012 (good cement mortar surface - Urquhart)  
 where required slope s is

$$s = \frac{(Vn)^2}{(r^{2/3} 1.486)}$$

$$s = \frac{(13.64 (0.012))^2}{(3.5^{2/3} 1.486)}$$

s = 0.0023 ft/ft

February 14, 1986

**TRANSITION**

Since it is 4000 feet from 34th Street Wash to Cudia City Wash, the required drop (head loss) is 9.1350 feet. Allowing for the 5 foot natural drop due to ground level differences and the differential head from Cudia City to the Salt River the available head becomes 126.8650 feet of drop. Before an effective slope can be determined, it is necessary to deduct for what are called minor losses. In this case, the minor losses are made up of the rapid expansion loss from a 14 foot pipe to a 21 foot pipe and the loss through the 21 foot pipe at the curve to go down 40th Street.

**Minor Losses:**

Enlargement from 14 feet to 21 feet = 0.9 feet head.  
Bend in 21 foot pipe at 24 feet/second = 2.8 feet head.

—  
Minor losses total = 3.7 feet head

Deducting the minor losses from the available head gives a working head of 123.165.

$$s = 123.165/28500 = 0.0043$$

**21 FOOT DIAMETER**

Assuming a full flowing round pipe of 21 feet diameter:

$$r = 346.36/65.97 = 5.25$$

$$n = 0.012 \text{ (good cement mortar surface - Urquhart)}$$

$$s = 0.0043$$

$$A = 346.36$$

$$V = \frac{1.486 (5.25)^{2/3} (0.0043)^{1/2}}{0.012}$$

$$V = \frac{1.486 \times 3.0207 \times 0.0656}{0.012}$$

February 14, 1986

$$V = \frac{0.2909}{0.012}$$

$$V = 24.5386$$

$$Q = V \times A$$

$$Q = 24.5386 \times 346.36$$

$$Q = 8499.1895$$

$$Q = 8500 \text{ cfs (rounded)}$$

Required  $Q = 8300$  cfs -- Therefore, excess capacity exists in pipe.

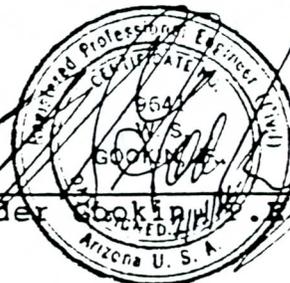
Since the capacity has been shown, the only remaining question is the propriety of a design velocity of 24 fps. This velocity is high but not unreasonably so for an intermittent use conduit made of reinforced concrete. Velocities of much higher than this are used in the spillway tunnels of Hoover Dam and Glenn Canyon Dam. The only significant damage that has occurred in those structures was at the point of a nearly right angle turn taken at maximum velocity after several days of use. The Corps of Engineers has said they have numerous projects in California that exceed 40 fps.

The 40th Street alternate will not run at capacity for more than a few hours and contains no sharp turns.

#### CONCLUSION

For the above reasons, the 40th Street alternate is a workable solution.

W. Scudder Cookin, P.E., L.S.



WSG:mb

EXHIBIT 11

COMMITTEE ON INTERIOR  
AND INSULAR AFFAIRS  
COMMITTEE ON  
FOREIGN AFFAIRS  
SELECT COMMITTEE ON AGING

Congress of the United States  
House of Representatives  
Washington, DC 20515

21 March 1986

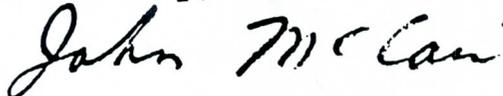
Richard Lee, Esq.  
Murphy & Posner  
1500 Kent Tower  
Phoenix, Arizona 85013

Dear Mr. Lee:

Enclosed is a letter which I received from John S. Doyle, Minority Counsel for Water Resources to the Committee on Public Works and Transportation, in which he expresses his views on certain questions pertaining to Reach Four of the Arizona Canal Diversion Channel.

I am pleased to provide this letter to you and your Task Force and hope that Mr. Doyle's views will assist you in your efforts on this matter.

Sincerely,



John McCain  
Member of Congress

cc: Steven Betts, Esq.

JM/aa

Committee on Public Works and Transportation

U.S. House of Representatives

Room 2165, Rayburn House Office Building

Washington, D.C. 20515

TELEPHONE: AREA CODE 202, 225-4472

March 13, 1986

JAMES J. HOWARD, CHAIRMAN

Honorable John McCain  
1123 Longworth HOB  
Washington, D. C. 20515

Dear Congressman McCain:

This is in response to your request for my views concerning the authority of the U.S. Army Corps of Engineers to undertake construction of alternatives to a portion of the Arizona Canal Diversion Channel ("ACDC") generally known as Reach Four ("Reach Four"). Gabe Rozsa, Assistant Minority Counsel for Water Resources, provided significant assistance in the preparation of this letter.

My understanding of the situation is as follows.

The overall project for flood control in the Phoenix area was originally authorized pursuant to Section 204 of the Flood Control Act of 1965. That section authorizes construction of a project for flood protection at Phoenix, Arizona, and vicinity, substantially in accordance with the recommendations of the Chief of Engineers in House Document Number 216, Eighty-ninth Congress ("Chief's Report"). The Chief's Report recommended a comprehensive plan of improvement which included, inter alia, construction of the ACDC, which was envisioned at the time to consist of a 2-mile rectangular concrete section and a 10-mile trapezoidal earthen section with a design capacity ranging from 1,500 to 18,500 cubic feet per second.

In 1977, the plan for the project was modified by the Division Engineer, South Pacific Division. The modification included an additional 4.6 mile extension of the ACDC plus measures to collect flows from washes intersecting the Arizona Canal. The project is currently under construction with approximately 18% of the work on the entire project and 11% of the ACDC construction complete as of February 1986.

Because of local controversy surrounding Reach Four, the Mayor of Phoenix has appointed a Task Force to examine a number of alternatives to the plan developed by the Corps.

You have asked for my thoughts on the Corps' authority to modify the project to accommodate any alternatives that may be

proposed and the availability of funding for such modification if one is approved.

At the outset, let me note that the Corps authorities often turn on the terminology of project authorization documents rather than on a particular body of cohesive law. Nonetheless, there is a body of law and policy that is relevant to the questions you have asked.

Ordinarily, Corps water projects are specifically authorized by the Congress on the basis of a detailed study and report prepared by the Corps recommending construction of a project. These reports are routinely submitted to the Congress and are often printed as House or Senate Documents (see, for example, House Document No. 216, 89th Congress, First Session for the Corps' report on the Gila River Basin, New River and Phoenix City Streams, Arizona, project). The reports are usually quite lengthy and provide a detailed description of the problems intended to be addressed, the alternatives considered, the relative costs, benefits, and environmental consequences of those alternatives and the Corps recommended plan of improvement. The report is prepared by the Corps District Engineer in whose district the project would be situated and is reviewed by the Division Engineer, the Board of Engineers for Rivers and Harbors and the Chief of Engineers.

If the report is favorable, it undergoes coordination within the Administration and is submitted to the Congress for authorization. That authorization is typically in the form of an omnibus water resources authorization bill which may contain authorization for scores of water projects. The projects are usually individually authorized using statutory language calling for construction "substantially in accordance with the recommendations of the Chief of Engineers" as contained in the relevant authorizing document.

It is common for initiation of a project to be delayed until several years after authorization. The delay may be caused by an inability to obtain needed funding for the project, but usually also involves time required to undertake the necessary additional detailed architectural and engineering design work. During the design phase of the project, new problems or solutions not fully considered during the feasibility phase of the project may be discovered. When this is the case, the Corps has interpreted its authorities as allowing a certain amount of discretion to modify the project's plan of improvement without having to resubmit the project for further congressional authorization. Congress has generally concurred with this approach.

While each case is generally decided on its own merits, the Corps overall policy is to approve changes of a project which are needed for engineering or construction reasons to produce the

degree and extent of flood protection intended by the Congress. Where proposed modifications encompass a material change in scope, however, the Corps has generally recognized the need to consult with the Congress and, if necessary, to seek further authorization. Examples of the kinds of changes which the Corps has determined may require congressional consultation include the addition of project purposes, significant changes in project cost, scale, features, benefits, or a major reallocation of project costs.

Turning to the specifics of the Phoenix project, I note that the Corps has already redesigned the project, changing in a number of respects the basic design envisioned at the time of authorization. One of the changes adopted was the extension and modification of the ACDC. It is my understanding that the ACDC changes were proposed by the City of Phoenix in order to intercept potential flood waters from areas north of the canal and to allow for improved recreational development of the canal. These changes were made under the Corps interpretation of the Chief of Engineers' discretionary authority and did not involve a request for further congressional authorization.

As to the specific alternatives which the City of Phoenix is currently considering, I note that they fall into the general category of additional features to the original design. As such, the changes could require congressional notification and, possibly, further congressional authorization. A determination of the need for notification or authorization would ordinarily be initiated by the Corps after the specific alternatives were analyzed to determine how they would mesh with the current plan of improvement. To the extent that the alternatives can be characterized as improvements to the design that provide enhancement of project purposes without significantly increasing costs, the likelihood is increased that the Corps will proceed to construction without seeking additional congressional authorization.

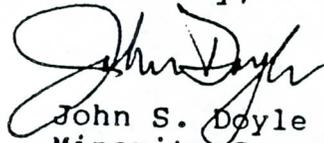
As to the question of the cost that may be allocated to local interests, the general policy in the past has been to apply the same cost-sharing requirements to modifications of on-going projects as are applicable to the underlying project. If, for example, the project was initiated under what is generally viewed as "traditional" cost sharing, the costs of a modification to the project would be subject to the same cost-sharing as the original project. Because the Phoenix project was initiated subject to traditional cost sharing, it is my view that the application of this policy would result in applying that same cost-sharing to any alterations of the project approved by the Corps. You should be advised, however, that in their effort to increase the non-Federal share of project costs, the Corps has been attempting to require new, higher cost sharing for separable elements of projects which

have not yet been initiated -- particularly where the separable element is a modification of the original project. In any event, should congressional authorization be required for implementation of one of the alternatives, the authorizing language could specify the level of cost sharing that would be required.

As a final note, I would simply add that the Corps is being far more cautious about approving project modifications under the Chief of Engineers' discretionary authority today than in the past. This is as a result of pressure from the Office of Management and Budget to control increases in project scope and cost. It may also be attributed to a desire, again on the part of OMB, to impose new cost-sharing requirements by treating project modifications as new project elements.

I hope this information is helpful. Please let me know if I can be of further assistance.

Sincerely,



John S. Doyle  
Minority Counsel  
Water Resources

JSD/grk

EXHIBIT 12

~~QUESTIONS FOR THE RECORD FROM SENATOR GOLDWATER~~  
SUBMITTED BY

2723W

## PHOENIX ARIZONA AND VICINITY - ARIZONA DIVERSION CANAL, ARIZONA

S-097 Question. There is a citizen's task force appointed by the Mayor of Phoenix to study alternatives to Reach Four of the Arizona Canal Diversion Channel. This project is a feature of the Phoenix, Arizona, and vicinity flood control project. The task force was established in response to strong concerns expressed by the people of North Phoenix about Reach Four and the disruption of park land and homes that would result from the construction of an open channel. The task force has agreed on an alternate design for the diversion channel involving the construction of a tunnel to carry water to the Salt River. This alternative will soon be presented to the City Council of Phoenix. Is the Corps aware of this alternative proposal by the Phoenix Task Force?

Answer. Yes, ~~it~~.

S-098 Question. If this alternative to Reach Four is feasible, do you have the authority to change the Reach Four design and incorporate the changes in the project?

Answer. The Chief of Engineers has the discretionary authority to change project design if the specific alternative is consistent with the intent of the original Congressional authorization and is the most economical means of construction.

S-099 Question. If the design change is possible, would it change the cost sharing requirements under which the project is being built?

Answer. Cost sharing requirements most likely would change, to what degree depends on the proposal selected.

S-100 Question. What would be required for the Corps to give this alternative design an evaluation?

Answer. To evaluate this proposal, the Corps would be required to develop a cost estimate comparison, analyze the design to insure realization of authorized benefits, and assess environmental impacts.

S-101 Question. Do you have the flexibility and discretion to change your plan and adopt an alternative for Reach Four?

Answer. We do, providing the alternative is consistent with the authorization and does not increase the Federal cost.

S-102 Question. Has the Corps considered a "Mole" construction tunnel of the type which is now being constructed in Phoenix for the Papago Freeway?

Answer. To date this type of tunnel has not been considered.

EXHIBIT 13

7

Senator DeConcini, I have some detailed questions on the "Mole Tunnel Alternative" that I would like to have answered.

Mr. Dawson. I will have the District answer those questions based on their understanding of the proposal and supply those answers for the record.

The information follows:

24 Question. SEN. DE CONCINI. Would the "Mole Tunnel alternative" provide comparable flood control benefits as the Reach 4 of the ACDC? Please explain. Would any area which would be protected from floods by Reach 4 lose protection under the "Mole Alternative"?

Answer. MR. DAWSON. No, sir. The "mole alternative" would not control the tributary drainage areas between 32nd Street and Dreamy Draw, a distance of approximately 3 1/2 miles.

25 Question. MR. DE CONCINI. Would there be some liability incurred either by the Federal government or the non-Federal entities for redirecting the flood waters down to the Salt River?

Answer. SEN. DAWSON. The Section 221 Agreement provides that the local sponsor would bear any liability. Without an analysis of the specific alternative, and its impacts on the area, potential liabilities cannot be assessed at this time.

126 Question. SEN. DE CONCINI. If an alternative to Reach 4 were requested by the City of Phoenix, and if it was not necessary to seek additional Congressional authorization, could you estimate what kind of delay this would mean for the completion of the Project?

Answer. MR. DAWSON. The Corps cannot estimate the potential delay until they had a chance to evaluate the specific alternative which was proposed.

27 Question. SEN. DE CONCINI. When will major construction occur on Reaches 3 and 4 of the ACDC? How much money has been spent to date at the Federal level in preparation for these reaches?

Answer. MR. DAWSON. Construction is programmed for initiation in June 1988 on Reach 3 and in December 1989 on Reach 4. Total expenditures to date for overall project design is about \$14.3 million. ~~to do~~ not separately account for design costs associated with parts of the overall plan under design. No construction has yet been performed on Reaches 3 and 4. The Corps does

8 Question. SEN. DE CONCINI. If changes were recommended by the City of Phoenix for Reach 4 along the lines of a Mole Tunnel, would the Federal and non-Federal percentages of participation stay the same?

Answer. MR. DAWSON. They would almost certainly change, depending on the specific proposal involved.

1 I wonder if you could supply me with information. Have  
 2 you really made substantial alterations and changed substan-  
 3 tially this whole plan? We need to know that in Arizona very,  
 4 very rapidly, or it is going to end up being an additional  
 5 burden to the recipients out there.

6 Mr. Dawson. We will certainly give you that in detail for  
 7 the record, if we may, Senator.

8 Senator DeConcini. Thank you.

insert 24A → Senator DeConcini, ] ADDITIONAL QUESTIONS [  
 9 Mr. Chairman, these other questions, I think, will be  
 10 similar. They will require some time to answer. With the  
 11 diligence of the Corps, who is here, I will submit them for the  
 12 record, and ask that they be answered as rapidly as they can  
 13 be.

14 Thank you, Mr. Chairman.

15 Chairman Hatfield. Thank you, Senator. They will be  
 16 submitted in our general written questions.

] CANADIAN PARTICIPATION IN SOURIS RIVER BASIN [  
 17 The Senator from North Dakota, Mr. Burdick.

18 Senator Burdick. I would like to report to you that last  
 19 week I was doing my best to improve relations with our sister  
 20 country, Canada. We had a very good meeting up there. I am  
 21 pleased to report that Premier Devine announced on February 12  
 22 that Saskatchewan would proceed with the Rafferty and Alameda  
 23 reservoir structures. I would like to thank you for your  
 24 support of these projects.

25 On February 6, a meeting was held in my office with the

Questions Submitted by Senator Dennis DeConcini

Corps of Engineers, FY 87 Budget

February 20, 1986

Overview

1. Of the new starts proposed for funding in FY 87, which projects are dependent upon the proposed cost-sharing policy being approved by the Congress?
2. If the proposed cost sharing policy is not authorized, what will be the impact on the Corps program for 87?
3. The FY 85 Supplemental Appropriations bill appropriated funds for new Corps projects contingent on the passage of cost-sharing legislation. If cost-sharing legislation is not enacted, does the Corps plan to proceed on entering into cost-sharing agreements with non-Federal entities on a case-by-case basis for those projects contained in the FY 85 Bill?
4. Have any discussions taken place to date between the Corps and non-Federal entities mentioned earlier on cost-sharing agreements?
5. Many small communities and localities have legitimate water needs or flood control needs but lack a sufficient tax base to meet cost sharing requirements. What provisions have been made for waiver of cost sharing requirements when warranted?
6. I note the Administration has requested \$3.078 billion for the Corps Civil Works Program in Fiscal Year 1987. How much additional capability does the Corps have in Fiscal Year 1987?
7. Do you anticipate any carry-over balances from Fiscal Year 1986? If so, could you estimate how much will be carried over?

41 Corps  
Projects  
\$63.1  
Million  
May 15, 1986

Clifton, Arizona

1. As you know, the Corps has been studying flood control alternatives for the Town of Clifton, Arizona. Could you please provide the Committee with an updated report on the status of this study and what steps are necessary to move from the study phase?
2. Does the Corps have sufficient funds in its FY 86 budget to complete the Clifton study? How about the FY 87 budget? If there are not sufficient funds requested in FY 87, please explain to the Committee why these funds were not requested.

3. It is my understanding that the Corps is studying a combination of structural measures and relocation for the Town of Clifton. Could these efforts be separated? For example, could the structural portion calling for a dyke to provide flood protection for the southern region of the Town be separated from the relocation effort?

4. If so, does the Corps have authority under the Small Projects authorization to build a dyke? If not, please explain.

5. What are the estimated costs for construction of a dyke?

6. If the Town of Clifton supported an effort to separate the relocation from the structural elements, would the Corps be willing to move forward now on the dyke prior to study completion?

7. How much flood protection could be provided to the Town of Clifton with a flood control dyke?

8. Please bring the Committee up to date on the status of families residing in the area of the proposed relocation. Have the majority of the people already moved?

9. If a decision was made to move forward on dyke construction, would it still be necessary to complete the Clifton study?

10. If the Corps can construct the dyke under existing authority, why has no action been taken to date? Please explain.

11. Does the Corps have sufficient funding under Small Projects to undertake the dyke work in FY 86-FY 87?

#### Arizona Canal Diversion Channel

1. As you know, the City of Phoenix has appointed a Citizens Task Force Committee to evaluate Reach 4 of the ACDC and recommend possible alternatives. If the City of Phoenix were to undertake a feasibility study on an alternative known as "The Mole Tunnel", could the Corps review that study to determine whether or not the costs and benefits were accurate?

2. What is the Corps policy regarding changes in design and construction on projects already authorized and underway which would result in a cost-savings to the Federal government? Have there been cases where once a project was authorized, the design and scope of a project changed, reducing costs, and the Corps was able to make the changes without seeking additional authorization from the Congress? Please explain.

3. If possible, could you provide the Committee with an analysis of a study on cost alternatives to Reach 4 of the ACDC prepared by Laventhol and Horwath?

4. Would the "Mole Tunnel Alternative" provide comparable flood control benefits as the Reach 4 of the ACDC? Please explain. Would any area which would be protected from floods by Reach 4 lose protection under the "Mole Alternative"?
5. Would there be some liability incurred either by the Federal government or the non-Federal entities for redirecting the flood waters down to the Salt River?
6. If an alternative to Reach 4 were requested by the City of Phoenix, and if it was not necessary to seek additional Congressional authorization, could you estimate what kind of delay this would mean for the completion of the Project?
7. When will major construction occur on Reaches 3 and 4 of the ACDC? How much money has been spent to date at the Federal level in preparation for these reaches?
8. If changes were recommended by the City of Phoenix for Reach 4 along the lines of a Mole Tunnel, would the Federal and non-Federal percentages of participation stay the same?

#### Rillito River

1. Last year I was informed that the Rillito River interim study would be completed by September, 1985. That completion date has now been slipped to June, 1986. Could you tell me the reasons for this slippage?
2. In your July, 1985 draft Rillito Report you expressed that there was an identifiable federal interest in participating in the construction of a comprehensive bank stabilization and recreation system along the Rillito River. Indications are that your final report may call for a much smaller federal participation. Since your draft findings had been shared with Pima County and the other interested parties, those entities proceeded in good faith with their planning and construction process. Have you indeed now altered the position that you took in July 1985 on the Rillito River project and if so, why?
3. Based upon the belief that the County had reached an understanding with the Corps on the Rillito River project, Pima County began work in 1985 on a portion of the project assuming the costs for that work would be considered part of the non-federal contribution and would not affect the overall cost-benefit calculations. I am now informed that you are considering denying Pima County any credit for the work initiated in 1985. Can you explain this reversal which, if implemented, will have the effect of penalizing Pima County for proceeding with essential flood repair and flood hazard mitigation work?

EXHIBIT 14

ELDON RUDD  
4TH DISTRICT, ARIZONA

WASHINGTON OFFICE:  
2465 RAYBURN BUILDING  
WASHINGTON, DC 20515  
(202) 225-3381

DISTRICT OFFICE:  
6900 E. CAMELBACK ROAD  
SCOTTSDALE, AZ 85251  
(602) 241-2801

COMMITTEE ON APPROPRIATIONS

Congress of the United States  
House of Representatives  
Washington, DC 20515

March 27, 1986

Ms. Kem Clark  
Kemberly Clark, Ltd.  
3737 N. 7th Street  
Suite #105  
Phoenix, AZ. 85014

Dear Ms. Clark,

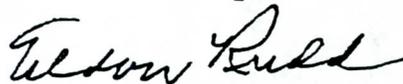
Thank you for your letter of February 25, 1986 in which make reference to questions you would like to be considered by the U. S. Army Corps of Engineers regarding the Reach Four portion of the ACDC.

Enclosed is a copy of the questions asked of General Palladino during his appearance before the Energy and Water Development Subcommittee, of which I am a member. General Palladino indicated that the new cost-benefit ratio analysis for Reach Four that I requested will be finished in September of this year.

I am satisfied that the Corps will consider every cost-effective means which provides the level of flood control as the original design. That commitment will be forthcoming to my Office in writing. As soon as I hear from the Corps of Engineers, I will once again be in contact with you.

With every good wish,

Sincerely,



Eldon Rudd  
Member of Congress

ER:dd

Enclosure - (1)

1645  
~~877~~

1395

ARIZONA CANAL DIVERSION CHANNEL

Mr. RUDD. Thank you. The beautiful City of Phoenix, Arizona—and you had a photograph of that a moment ago on the wall—we have an issue that has become very emotional there. I know you are acquainted with just how emotional it is. It has to do with flood control.

We discovered that it is necessary—in the 1972, 1982 and 1983 flooding that took place there—in that area of Arizona and the flooding that has taken place since. We have provided some good flood control measures. The last flood control measure that has been agreed to by every city council that I know of, and by all the people involved, has to do with the ACDC area, and the emotions have been extremely high over the 40th Street area, which isn't a very long area but it has brought about a lot of high feeling because of the hotels, resort areas that are built around this particular area, and expensive homes, this sort of thing, claiming that the channel is going to be ugly and lower property values. We know flood control is absolutely necessary in the area. The Phoenix task force recently indicated to me verbally that they were considering the use of a mole, something like that, tunneling under 40th Street, through that whole area, to provide a tunnel which would handle the runoff. Have you ever considered one as a way to solve the problem?

General PALLADINO. Sir, in looking at the project, we do consider a variety of construction techniques which will provide the most economical solution. On this particular issue, we did not initially consider the use of a mole as a solution because it is relatively straightforward to use an open cut, the current method of construction.

Mr. RUDD. Did you not consider it because of the enormous costs?

General PALLADINO. Our engineering judgment leads us to believe a solution of that type would be considerably more expensive and not cost-competitive with the method contemplated.

Mr. RUDD. In a superflood, would the tunneling effect even handle that, or could you have enough control over it? Does that mean you would have to build a tunnel a mile in diameter? Is that a consideration that would have to be taken for an alternative resolution of the problem?

General PALLADINO. That is clearly an issue that has to be considered, sir.

Mr. RUDD. If such a clearly different solution were to be decided on, would that require additional congressional authorization? Or could you act under the authorization?

General PALLADINO. Sir, it may require additional authorization depending upon the specifics.

Mr. RUDD. On a clearly different design?

General PALLADINO. Depending how it would address the purpose and other factors associated with the authorization.

Mr. RUDD. What is the design you have settled on now?

General PALLADINO. Sir, the current design, speaking specifically of that reach, would involve an open cut. In some areas, it is covered. So it would be a channel constructed through an open cut and later covered along critical portions.

1646

Mr. RUDD. Are you in a position to consider a change in the design logically and reasonably, in view of the fact that a drastically changed design would require possible reauthorization, a long time for economic impact statements, and that sort of thing? Would you be in a position to change that design? I say that without asking whether or not you would recommend it. You are going to do whatever the decision is that you do. I understand that. Are these factors important enough that you would recommend changing the design drastically?

General PALLADINO. Sir, we are always, of course, open to ideas which would result in improvements. In the final analysis, our criteria is focused on least cost solutions.

Mr. RUDD. I think in line with what Chairman Bevill discussed on this particular project, we can expect all of the answers to it in September. Is that right?

General PALLADINO. That is correct, sir.

Mr. RUDD. I certainly thank you, General. Thank you for being here. I appreciate your cooperation. Thank you, Mr. Chairman.

Mr. BEVILL. The Chair recognizes Mr. Watkins.

Mr. WATKINS. I don't think Mr. Myers has spoken.

Mr. MYERS. I have questions for the record from other Members. Representative Lagomarsino has some questions which we would like you to supply the answers for the record.

General PALLADINO. Yes, sir.

### Questions Submitted by Congressman Lagomarsino

#### SANTA BARBARA COUNTY

*Question.* What is the cost to complete the reconnaissance study for the Santa Barbara County Beach Erosion study?

*Answer.* The cost to complete the reconnaissance phase of the study is \$149,000.

*Question.* How soon could the study be completed?

*Answer.* It could be completed nine months following receipt of funds.

#### SANTA BARBARA HARBOR

*Question.* What would be the cost to complete the reconnaissance study for Santa Barbara Harbor?

*Answer.* The cost to complete the reconnaissance phase of the study is \$220,000.

#### INTERNATIONAL ACTIVITIES

Mr. WATKINS. Mr. Chairman, I think you, Mr. Rudd and Mr. Fazio did an excellent job in discussing the South Pacific Division. General, I am concerned, are you doing any work in Mexico or other foreign areas?

General PALLADINO. No, sir.

Mr. WATKINS. Do you have any people that go into Mexico?

General PALLADINO. No, sir.

Mr. WATKINS. Any area like Panama or outer regions of the continental United States?

General PALLADINO. No, sir, we do not.

Mr. WATKINS. None whatsoever?

General PALLADINO. None whatsoever.