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**ARIZONA CANAL DIVERSION CHANNEL
TASK FORCE**

FINAL REPORT

**TO THE
CITY OF PHOENIX
MAYOR AND CITY COUNCIL**

April 1986

A118.925

ACDC TASK FORCE
FINAL REPORT

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CITY COUNCIL REPORT

AGENDA

DATE: April 21, 1986

DATE:

TO: Mayor and City Council

ITEM:

FROM: Richard H. Lee
ACDC Task Force Chairman

SUBJECT: ACDC TASK FORCE FINAL REPORT AND RECOMMENDATIONS

INTRODUCTION

Attached is the Final Report of the ACDC Task Force. This transmittal briefly summarizes the Task Force's major conclusions and recommendations. This report does not include comments in response to the Minority Report (Appendix VII) prepared by four dissenting members of the Task Force, as the Minority Report was prepared following the adjournment of the full ACDC Task Force and was only recently submitted.

FINDINGS AND CONCLUSIONS

Reach 4

The proposed ACDC is briefly described on pages 2-3 of the ACDC Task Force Final Report (unless otherwise noted page and appendices references are to the Majority Final Report). The channel is designed to divert floodwaters along the north side of the Arizona Canal to Skunk Creek. Through the City of Phoenix, it is concrete-lined and varies in width from 36-50 feet in Reach 4 to 200 feet at Cactus Road. It is designed to reduce flood damage not only from flooding south of the Arizona Canal, but also from ponding along its north bank. A map showing the location of the ACDC and its four segments, or "Reaches," is Attachment 7.

Reach 4 includes a sedimentation basin on the grounds of the Phoenix County Day School near 40th Street and Camelback. The basin is gradually sloping, unlined and relatively unobtrusive. The school's athletic fields, but no structures, will be located within it. Reach 4 is uncovered from Cudia City Wash near 40th Street and Camelback, except for a 1,297 foot section near 32nd Street where the additional costs of covering are less than the cost of relocating Stanford Drive and for a 4,625 foot section through the Arizona Biltmore Hotel where additional costs of covering are less than additional right-of-way costs. (Through the planning process, the City obtained an easement through the Biltmore property which permits a covered channel, but requires payment for severance damages if the channel is left uncovered.) The only other section proposed by the Corps of Engineers for covering is through Sunnyslope High School in Reach 3.

Reach 4 is designed to handle flood waters from Cudia City Wash and a number of smaller washes and drainage areas between 40th Street and 12th Street. Its elimination would not impair the effectiveness of the remaining Reaches. (See pages 16-17.)

Aesthetics

The entire ACDC through the City of Phoenix will be unattractive. It is a concrete-lined ditch with a six-foot fence on each side. The aesthetic impact increases as the width increases, with the greatest impact in Reach 2. Elimination of Reach 4 will not materially reduce the size of Reach 2.

Several factors mitigate the aesthetic impact. First, the channel is entrenched along its length and is screened from the south by the banks of the Arizona Canal itself. Second, between major streets screening walls, landscaping, and existing back yard fences will conceal the channel from adjacent neighborhoods. Third, current plans provide for landscape nodes of varying sizes at most major streets. Fourth, bridge railings at major streets will obstruct view of the ACDC from passing passenger automobiles. Fifth, the Corps now proposes more aesthetic (probably wrought iron look) fencing, rather than chain link, along the ACDC, at least at high visibility locations. Finally, the Corps has indicated a willingness to explore other aesthetic mitigation features and SRP has agreed to allow greater use of its right-of-way for landscaping.

In addition, the Flood Control District staff indicates that it will recommend wrought iron look fence rather than chain link along the entire ACDC. The Corps has informally indicated its agreement. The Task Force concurs in this recommendation and has made additional aesthetic recommendations including many based upon observations by the City Parks Department. (See Pages 6-7 and Attachments 3-4.)

Cost Estimates

The combined Corps of Engineers -- Flood Control District (hereafter abbreviated COE and FCD), cost estimate for the ACDC is \$210 million in 1985 dollars. The cost estimate for Reach 4 is \$58,537,000 (including the Cudia City sedimentation basin) (See Page 4); however, the COE estimates that an additional \$1,200,000 should be allowed for blasting in the area between 32nd Street and 24th Street. The Task Force also estimates that the projected cost of building Reaches 1, 2 and 3 large enough to accommodate Reach 4 water is \$16,100,000 for a total cost of approximately \$76 million. Reach 1 is already under construction, and substantial engineering design costs have already been incurred for Reach 4, and most of the right-of-way has been acquired; as a result, non-recoverable costs presently total from \$5.6 million to \$7.1 million. Non-recoverable costs increase the marginal costs of switching to another alternative. Non-recoverable costs will increase when a portion of Reach 2 goes to bid this summer. When both Reaches 2 and 3 have been bid non-recoverable costs will total \$14.1 million plus engineering fees. (See Appendix IV, Notes 2-B.)

Need

The Task Force's tour of Reach 4 confirmed that there is clear physical evidence of significant washes and gulleys intersecting Reach 4. Most dramatic is the Cudia City Wash; however, other concentrated inflow points were evident.

Other evidence of the flood threat in Reach 4 includes: (1) the unanimous opinion of all engineers who have testified, including the engineer employed by Rostland, Inc. and the Arizona Biltmore Estates Homeowners Association; (2) hydrology reports done for the COE; and (3) the history of storms and floods in the Phoenix metropolitan area summarized in the hydrology reports in the COE Study of the 1972 flood. Copies of maps showing the area flooded in June 1972, a 50-year flood, are Attachments 8-9. Attachment 8 focuses on flooding from canal breaks and overtoppings between 24th and 40th Streets. Attachment 9 shows the entire flood area. The cost of flooding which would be prevented by Reach 4 are substantial. No evidence has been presented to the Task Force suggesting that there have been any flood control measures implemented since the 1976 study, which were not considered in the 1976 study, that would materially affect the need for Reach 4 or substantially effect project benefits. (See page 14.)

Costs and Benefits

The benefit-cost ratio to the City and its citizens is obviously favorable because direct costs to the City are minimal. Although the ACDC local share of flood control costs is higher than typical for past federal flood control projects, costs of the project to County citizens are approximately 33% of the costs of Reach 4 flood control. Since the ratio of local benefits to local costs is very positive, the benefit-cost issue is whether the total costs are so disproportionate to benefits that Phoenix citizens should, in good conscience, forego federal funding. The Task Force has concluded that the costs are not disproportionate to the benefits.

As a prerequisite for federal funding, the COE performs a benefit-cost study on each water or flood control project and in certain increments within the project. While the Task Force is disappointed that the supporting COE documentation does not separately break out the benefit-cost analysis for Reach 4, the main volume of the 1976 COE memorandum does report in summary form that a separate analysis was done for Reach 4 and that Reach 4 qualified for federal funding at a 3 1/4% discount rate. (See pages 8-9.)

While benefit estimates used for the COE benefit-cost analysis are based upon mathematical projections, projections of future growth, and detailed data not fully included in its written material and since discarded, the projections appear consistent with the results of the 1972 flood and development in the flood area since 1972. (See pages 14-15.) The combined FCD-COE cost estimate for Reach 4 (including the sedimentation basin) is less than FCD's 1976 cost estimates adjusted for inflation. (See page 10.) Therefore, if those original benefit projections were accurate and increased proportionately with the cost of living, and if the current construction figures are accurate, the benefit-cost ratio remains positive.

The question of the discount rate used in the federal benefit-cost ratio has received much attention. The COE reports that the benefit-cost ratio for Reach 4 would not qualify for federal funding if a discount rate higher than 4% were used. If the current discount rate used by the federal government (7 5/8% or higher) were applied, it is extremely unlikely that any Reach 4 alternative could qualify for federal funding. It is important to note that neither the discount rate nor projected benefits are increased to reflect estimated future inflation. Therefore, the Task Force has concluded that the 3 1/4% interest rate is reasonable. (See pages 12-13.)

More fundamentally, the Task Force urges that excessive reliance not be placed upon the numerical benefit-cost ratio used by the federal government. A new benefit-cost study is underway using current information and the 3 1/4% discount rate. In the unlikely event that the study proves negative, Reach 4 might well be doomed in any event. However, the Task Force believes that the best reason for flood control in Reach 4 was given by the COE in a congressional report: "[T]he high level of benefits to extensive residential and commercial development." (See pages 11-12.)

Alternatives

The alternatives considered by the Task Force are discussed in detail in the Final Report. (See pages 17-25.) They are described and summarized in Appendix III and their costs estimates in Appendix IV.

In summary, the only known reasonably priced alternatives for which detailed information is available are detention basins or the 48th Street Old Cross-Cut Canal alternatives. The known 48th Street alternatives are much more disruptive and expensive than Reach 4 or assume that the channel will be built within the SRP right-of-way, which is probably not possible and certainly more expensive than estimated. Any other 48th Street alternative is many years from implementation. It is unlikely that any alternative except a detention basin alternative could obtain federal funding comparable to Reach 4 or be put in place in time to achieve cost savings by down-sizing Reaches 2 and 3. Without the cost savings from down-sizing Reaches 2 and 3, the relative costs of almost any known alternative (including a detention basin alternative) would be much greater than the costs to complete Reach 4. Although the detention basin alternatives are attractive, they would dramatically increase the local costs and are strongly opposed by the Town of Paradise Valley. Moreover, the possible negative aesthetic impacts of detention basins have not been considered by the Task Force.

One other alternative deserves comment. In the waning days of the Task Force it was suggested that mole technology similar to that used to dig the drains for the Papago freeway could provide a cheaper alternative than Reach 4. Since the mole tunnels under existing utilities, streets, and bridges, this would cut right-of-way costs which are local costs and avoid extensive open channels.

Moreover, cost estimates by the engineer for Rostland, Inc. and the Citizens Against Reach 4 suggested that a mole constructed drain down 40th Street would be cheaper than Reach 4. (See pages 21 and 22; Appendix III, pages 3 and 4; and Appendix IV, Notes 16-19). Based upon its review of the record, the Task Force reached the following conclusions:

- A. This alternative is likely to be more expensive than Reach 4.
- B. It is unlikely that the feasibility can be determined until after most or all of the costs of handling Reach 4 water in Reach 2 and 3 have been expended or committed.
- C. It is likely that implementation of the proposal 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 4.
- E. This alternative does not control flooding or ponding from flows intersecting the Arizona Canal west of 32nd Street.

Despite these discouraging findings, a majority of the Task Force (with two opposing votes) also voted to recommend that the City delay endorsement of Reach 4 and retain an independent consultant to study the mole alternative. The reasons for the anomalous vote are that the Task Force received far less information on this alternative than the others and that the study was to be a phased study limited at the outset to determine whether there is a significant possibility that these problems could be overcome.

RECOMMENDATIONS

The Task Force's primary recommendations are the following:

1. Recommended criteria for evaluating alternatives, Attachment 1; and
2. Summary of policy options, Attachment 2;
3. Recommended aesthetic conditions, Attachments 3 and 4.

One of the Task Force's most fundamental recommendations is the set of criteria for evaluation of alternatives adopted by a vote of 7 to 2 (one absent and the Chair not voting). These criteria are the heart of the Task Force recommendations and were supported by two of the signers of the minority report.

The second majority recommendation of the Task Force is a set of policy options adopted by the Task Force as defining what are considered to be the responsible policy options, together with a brief description of the key problems with Reach 4 and the various alternatives (6 in favor, 2 opposed, 1 abstention, 1 absent and the Chair not voting). This definition of options was supported by one of the signers of the minority report.

The third majority recommendation was a set of aesthetic conditions (7 in favor, 2 opposed, 1 absent and the Chair not voting). The Task Force believes that support of Reach 4 or any alternative should be subject to these conditions and that they should be considered for application to Reaches 2 and 3. An additional set of aesthetic conditions was supported by a plurality of the Task Force (5 in favor, 4 opposed, 1 abstention and 1 absence).

Two other recommendations were that the City cooperate with the COE in preparation of a new benefit-cost study by providing current and projected development statistics (9 in favor, 1 absent and the Chair not voting) and that the City recommend to the COE that the new ratio be calculated using the 3 1/4% discount rate (6 in favor, 3 opposed, 1 absent and the Chair not voting).

In addition to these basic recommendations, the Task Force voted on each of the policy options to express the members' individual conclusions. (See Attachment 2.) In these votes, several Task Force members dissented from the negative effects included by the majority in the description of alternatives in the Summary of Policy Options. By 6 to 4 votes, the Task Force voted both to endorse Reach 4 subject to aesthetic conditions and to delay Reach 4 to study the use of a "mole" to construct an alternative drain. In addition, absent Task Force member W. E. FitzSimons, who missed many of the Task Force meetings because of serious health problems, indicated in writing his strong continuing support of Reach 4.

This apparently anomalous vote is clarified by the statements to the Task Force by members Wolf and Lee, who voted for both recommendations, and by an additional recommendation adopted at the urging of Chairman Lee in connection with his change to vote in favor of study of the mole alternative.

The mole alternative was not presented to the Task Force until late in its deliberations. No significant details were presented until the Task Force had begun to vote on its recommendations. Ms. Wolf explained her position as follows:

Ms. Wolf:

Mr. Chairman, if I could just make one point. I think that your motion is a good one for the following reason: I think this Task Force has been presented with lots and lots of sound information, valuable information, on all the alternatives with the exception of the mole, and I personally felt that the Task Force would have been remiss if the City Council had felt that we had not done adequate study of the mole in order to reach any conclusion on it.

Chairman Lee:

Are you satisfied with the investigation of the other alternatives?

Ms. Wolf:

Yes.

ACDC Taskforce Minutes, February 14, 1983, page 42.

The Task Force voted to recommend that the study of the mole alternative be:

[A] phased study and that detailed engineering and geological investigations not be undertaken unless it appears, based upon preliminary study, that there is a significant possibility that

it would be a better alternative [than Reach 4] under the
criteria enumerated [in Attachment 1].

The vote was 7 in favor, 2 opposed and 2 absent. All three members of the
minority present voted to support this limitation.

Respectfully submitted,



Richard H. Lee
ACDC Task Force Chairman

3439e

ATTACHMENT 1
RECOMMENDED CRITERIA FOR EVALUATION OF ALTERNATIVES

(As amended and approved)

7 in Favor, 2 Opposed, 1 Absent, Chair Did Not Vote

- I. The Task Force recommends to the City Council that for an alternative to be determined preferable to Reach 4, it should consider the following criteria:
- (1) The alternative can be determined to have a strong chance of implementation soon enough to delete planning for Reach 4 from construction of Reach 2 and 3 or should provide benefits adequate to justify the costs of alternative and any non-recoverable costs of providing for Reach 4 waters in Reaches 2 and 3.
 - (2) Funding can be obtained for the alternative as a change to the current authorized project under the fundamentally same terms and conditions or have additional benefits sufficient to justify the increase in local economic costs.
 - (3) The alternative has a benefit-cost ratio, calculated on equivalent assumptions, that would be more favorable than Reach 4 or have a benefit-cost ratio that is equal to or better than Reach 4 and permit a substantial reduction in amount of uncovered channel.
 - (4) To ensure compatibility the benefit-cost ratio of competing alternatives should be compared using a 100-year period commencing in 1991 and use current property values and Corps of Engineers current methodology and the original authorizing discount rate (3-1/4%).
 - (5) That the alternative not substantially increase projected local funding requirements or have additional benefits sufficient to justify the increase in local economic costs.
 - (6) The alternative would not be likely to preclude absolutely or as a practical matter (e.g. by substantially increasing the costs of implementation) implementation of:
 - (a) Any potential transportation corridor along 48th Street;
 - (b) Flood control solutions for flows intersecting the Arizona Canal between 40th and 32nd Streets;
 - (c) Flood control solutions for flows intersecting the Arizona Canal between 32nd Street and Dreamy Draw Wash; or
 - (d) Flood control solutions for flows intersecting the Arizona Canal between 40th and 56th Streets, for flows intersecting the Cross-Cut Canal between the Arizona Canal and the Grand Canal, or for any other area with a significant flooding problem;

- (e) Any other significant planned public project.
 - (7) The benefit-cost ratio should only consider recreational costs or benefits if they are reasonably certain. If either recreational costs or benefits are included both should be included.
 - (8) The material to be used in any cost or benefit study should include existing hydrology studies, studies becoming available from other sources during the study period, and existing economic studies and the update presently being done by Corps of Engineers, and information available from available public records. The report should not be significantly delayed to do additional basic studies.
- II. The Task Force recommends that if a benefit-cost ratio is used to evaluate alternatives that it should meet the following conditions and assumptions:
- (1) Corps of Engineers flood damage projections should be updated based upon current property values, and
 - (2) The benefit-cost ratio used by the City should include as benefits, inter alia:
 - A. Benefits calculated by Corps of Engineers [subject to adjustment up or down based upon an independent review of new estimates for reasonableness], estimated costs of emergency services, dollar value of Reach 4 to City in connection with storm sewer system development, estimated dollar value of additional federal funding for streets resulting from addition of storm drains permitted by ACDC, any excess recreation benefits in excess of those necessary to achieve a 1.0 benefit-cost ratio for recreation facilities, and other quantifiable economic benefits; or
 - B. Reasonably equivalent data from reputable independent consultant.
 - (3) The benefit-cost ratio used by the City should include as costs:
 - A. Corps of Engineers estimates of construction [subject to adjustment up or down based upon review for reasonableness by an independent consultant] plus Flood Control District estimates of costs of lands and damages; or
 - B. Reasonable equivalent data from reputable independent consultants if such data is not available for an alternative being evaluated.
 - (4) The project should be evaluated using the authorizing discount rate for Reach 4 (3-1/4%) and using a 100-year amortization period commencing in 1991.

- (5) Intangible benefits, non-included economic benefits to other governments and individuals, and the residual value of the project and the right-of-way should be regarded as adequate to offset any intangible costs and unanticipated cost increases.

ATTACHMENT 2
SUMMARY OF POLICY OPTIONS

(Summary was approved by the Task Force: 6 in favor,
2 opposed, 1 abstention, 1 absent, Chairman did not vote.)

Option Number	Task Force Preference	Option
1.	10 opposed 1 absent ^{1/}	Endorse Reach 4 given that: A. This alternative will cost approximately \$79 million including the costs in Reach 1, 2, 3 for Reach 4 water of which at least \$2.6 million is not recoverable. B. This alternative will require relocation of a number of homes, apartment units and an office building, most of which have already been acquired. C. This alternative will consist of an unattractive concrete channel, covered in only two places, along attractive, or potentially attractive, stretches of the Arizona Canal.
2.	6 in favor 4 opposed 1 absent	Endorse Reach 4 subject to aesthetic conditions.
3.	10 opposed 1 absent	Endorse Reach 4 subject to aesthetic conditions and subject to withdrawal of endorsement if City Council determines that the benefits do not justify costs after review of the COE revised benefit-cost ratio expected to be completed by the end of Federal FY 1986.
4.	10 opposed 1 absent	Adopt Option 3 subject to an independent review for reasonableness by staff or an independent consultant, of one or both of the following: A. COE construction estimates. B. COE benefit estimates.
5.	8 opposed 1 in favor 1 abstention 1 absent	Determine that the aesthetic effects of Reach 4 outweigh any possible benefits and oppose Reach 4 without regard to alternatives.
6.	6 opposed 4 in favor ^{2/} 1 absent	Delay endorsement of Reach 4 and retain, or request that the Flood Control District retain an independent consultant to determine if a 48th Street alternative can be implemented given that:

Option Number	Task Force Preference	Option
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- A. It is likely that the alternative will be more expensive than Reach 4.
- B. It is probable that the alternative will require the relocation of a number of homes and businesses none of which have been acquired.
- C. It is probable that the alternative will require an open channel along the old Cross Cut Canal and the Arizona Canal or major added expenses for covering.
- D. It is unlikely that the alternative will receive Federal funding on similar terms as Reach 4.
- E. This alternative will not control flooding or ponding from flows intersecting the canal west of 32nd Street.

7. 6 opposed
4 in favor^{3/}
1 absent

Delay endorsement of Reach 4 and retain or request that the Flood Control District retain an independent consultant to determine if a detention basin alternative can be implemented given that:

- A. It is likely, but not certain, that the project can receive funding under current authorization;
- B. It is probable that this alternative will require the relocation of a number of homes and businesses. The alternative is opposed by the Town of Paradise Valley (and perhaps the Phoenix Country Day School); and
- C. It is highly probable that the local costs of the alternative will be dramatically greater than of Reach 4.
- D. This alternative will not control flooding or ponding from flows intersecting the canal west of 32nd Street.

8. 6 in favor^{4/}
4 opposed
1 absent

Delay endorsement of Reach 4, and retain an independent consultant to do necessary studies, modeling and computer an analysis to determine whether a drain can be drilled from the Arizona Canal to the Salt River project using a "mole" construction method given that:

Option Number	Task Force Preference	Option
		A. It is likely that the alternative will be more expensive than Reach 4.
		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 4 water in Reach 2 and 3 have been expended or committed.
		C. It is likely that implementation of the proposal 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 4.
		E. This alternative does not control flooding or ponding from flows intersecting the Arizona Canal west of 32nd Street.
9.	6 opposed 4 in favor 1 absent	Delay endorsement of Reach 4 and retain an independent consultant to study the alternatives described in options 6, 7 and 8.
10.	7 opposed 2 in favor 1 abstention 1 absent	Adopt option 1, 2, 3, 4, 6, 7, 8 or 9 and seek to cut costs by negotiating with SRP to permit the use of Arizona Canal right-of-way for the ACDC or an alternative.

NOTES

1. One member, W. E. FitzSimons, who has indicated his continued support for Reach 4 in writing to the Chairman, was absent from all voting due to serious health problems.
2. Three of the votes in favor of this option were with the qualification that points A through E be deleted.
3. Two of the votes in favor of this option were with the qualification that points A through D be deleted.
4. Three of these votes in favor of this option were with the qualification that points A through E be deleted. One of these three votes was further stipulated that a feasibility study could be completed in three to six months for a cost of \$72,000, with supporting letter on file.

KC/cg/(3439e)

ATTACHMENT 3
AESTHETIC CONDITIONS
(As amended and approved)

7 in Favor, 2 Opposed, 1 Absent, Chairman Did Not Vote

City Council's approval of the ACDC Reach 4 or alternative should be conditioned upon satisfactory resolution and binding commitments concerning the items listed below. The Task Force suggests that the City Council may wish to apply this list of aesthetic conditions to Reach 3 and Reach 2.

1. Installation of proper irrigation system.
2. Proper underpass design, particularly providing for adequate drainage.
3. Negotiation of a landscape easement agreement with the Salt River project to assure proper landscaping on the south side of the ACDC.
4. Implementation of review of plant material selection and use of plant materials and irrigation system determined to be appropriate by the City of Phoenix Parks Department.
5. Agreement as to which large trees adjoining the Arizona Canal will be preserved with the view towards preserving such trees in all but the most extraordinary cases.
6. Increase in right-of-way for landscaping nodes at major intersections or covering small areas of the ACDC adjoining major streets (such as by widening and landscaping proposed bridges to provide non-vehicle bearing aesthetic/pedestrian areas) or both to provide for aesthetic amelioration and on SRP right-of-way south of Arizona Canal cover width of right-of-way at minimum.
7. Negotiation of canal maintenance agreements between the Flood Control District and the City of Phoenix to assure adequate maintenance of the right-of-way including landscaping and irrigation systems.
8. Negotiation of satisfactory agreements between City on Flood Control District and SRP for landscaping on SRP right-of-way including the south sides of both ACDC and Arizona Canal.
9. Substitution of wrought iron-type fencing rather than chain link at least in high use and high visibility areas.
10. Provision of adequate ingress and egress to the trail system at and around 24th Street.
11. Replace any existing recreational facilities removed by Reach 4 with a similar amount of equivalent facility (e.g., replace grass with grass).

12. Review of design of proposed underpasses to insure adequate drainage and ease of maintenance.
13. The appointment of both staff and citizens' committees to monitor the implementation of the ACDC (through Reaches 2, 3 and 4 or alternatives), and to negotiate with the Corps of Engineers, the Flood Control District, and the Salt River Project to improve aesthetic conditions including without limitation the following:
 - A. Improvement of existing underpasses including improved maintenance and modifications to improve maintenance and usability and safety.
 - B. Increasing the number of trees versus shrubs located in the right-of-way including where possible along the south bank of the ACDC.
 - C. Implementation of adequate lighting where appropriate including underpasses and major street intersections.
 - D. Addition of limited area of grassy park areas where appropriate for picnicking, etc.
 - E. Investigation of design competition, for amelioration of existing aesthetic problems and aesthetic problems to be created by the ACDC, in areas such as 16th Street and Glendale.
 - F. Provision of adequate garbage containers.
 - G. Investigation of possibility of tinting or coloring concrete by pigmentation, desert varnish, or paint to achieve the most unobtrusive, neutral color.
 - H. Assurance of public access to bike and equestrian paths along the Arizona Canal and ACDC through the Arizona Biltmore area.
 - I. Investigation of possibility of modifying construction to facilitate future covering of ACDC in areas near major streets.
 - J. Redesign bicycle paths from straight to serpentine paths wherever conceivably possible including, if necessary, the acquisition of additional right-of-way to permit serpentine paths in at least some areas if necessary to break up straight paths into serpentine paths in certain areas along the ACDC route.
 - K. Implementation of appropriate recreation or park facilities at major intersections or existing parks where appropriate (such facilities should provide parking only for maintenance vehicles and bicycles except along existing parks).

- L. Investigation of cooperation with local neighborhood groups and the Junior League to add features where appropriate including implementation of Major Canal Beautification Project, including possible implementation of projects such as creation of desert botanical gardens along the canal providing for native plants with appropriate identification (similar to Cave Creek Highway), and creation of water features using cooperative efforts with the Salt River Project (similar to proposals in Scottsdale).

ATTACHMENT 4
ADDITIONAL AESTHETIC CONDITIONS
(As amended and approved)

5 in Favor, 4 Opposed, 1 Abstention, 1 Absent

In addition to the conditions set forth above, City Council's approval of the ACDC Reach 4 or alternatives should be conditioned upon satisfactory resolution and of the following additional conditions:

- o A coalition of ACDC aesthetics-related committees, task forces, etc. should be formed that includes representatives of the City of Phoenix Parks Department, Planning Department, the Maricopa County Flood Control District, the Army Corps of Engineers, the Salt River Project, homeowners associations in the affected areas, neighborhood groups and the Junior League. This coalition should be spearheaded by the City of Phoenix.
- o The potential of utilizing the Arizona Canal/ACDC right-of-way for a linear park system should be studied. Such a system could possibly be used to tie together some of the existing parks in the North Phoenix area.
- o Park nodes should be created at certain major intersections such as 40th Street/Camelback; 16th Street/Lincoln; 10th Street/Northern; Central and Seventh Avenue.

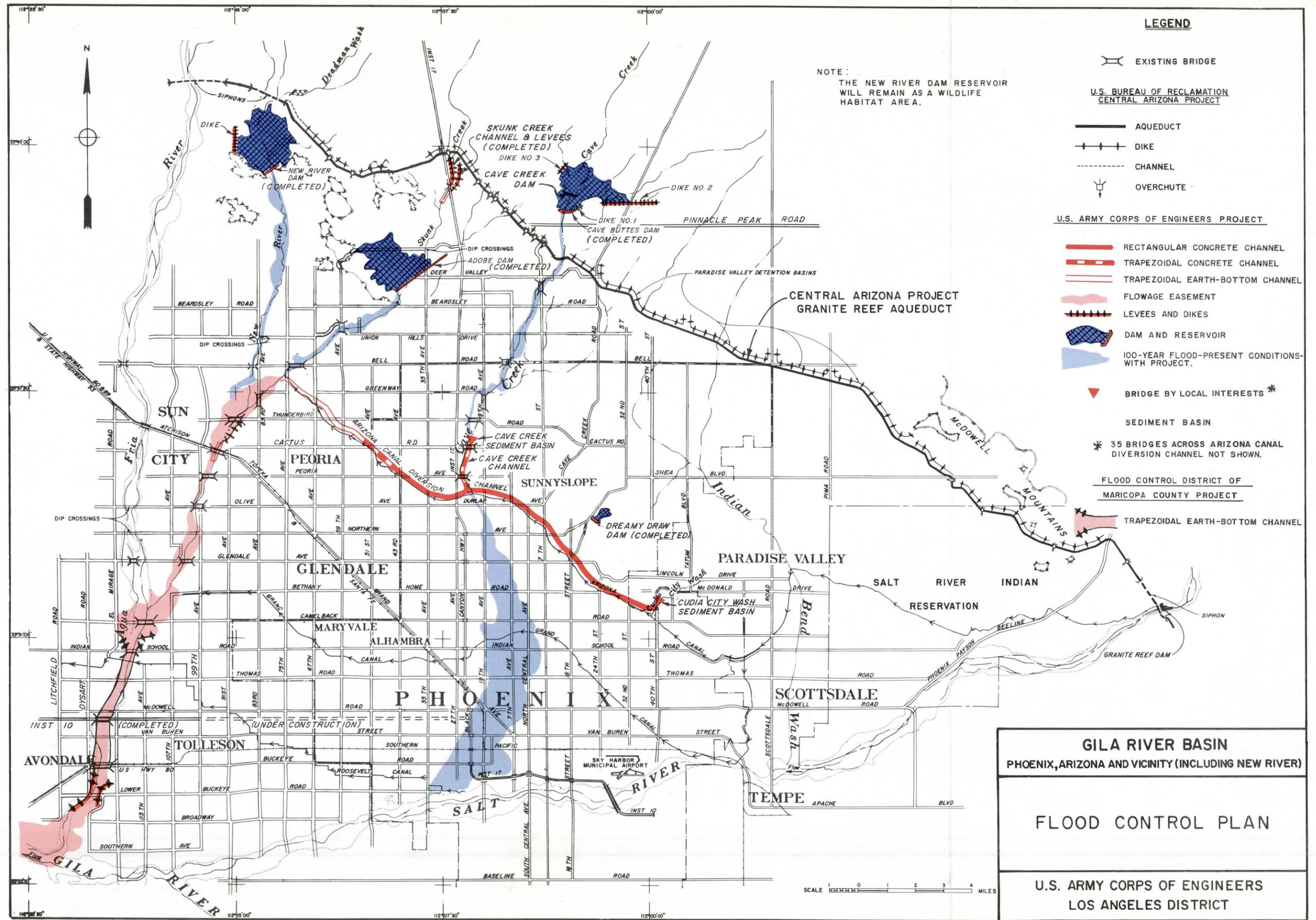
ATTACHMENT 5
MISCELLANEOUS TASK FORCE RECOMMENDATIONS

<u>Recommendation Number</u>	<u>Vote</u>	<u>Recommendation</u>
I	9 in favor 1 absent Chairman did not vote	That the City cooperate with the Corps of Engineers in preparation of a new cost/benefit ratio by providing current and projected population, valuations, and other economic statistics for the affected area.
II	6 in favor 3 opposed 1 absent Chairman did not vote	That the City recommend to the Corps of Engineers that the new benefit-cost ratio be performed using the 3-1/4% discount rate and current economic statistics and projections.
III	5 in favor 5 opposed 1 absent	That no alternative which does not include a diversion channel from 12th to 32nd Streets be built unless, as a condition of the surrender of the Arizona Biltmore conditional easement, the party to whom the easement reverts either pays the Flood Control District the fair market value of the easement or builds a detention facility adequate to detain and disburse, without damage resulting, the waters from a 100-year flood from the drainage areas intersecting the canal between 24th and 32nd Streets.

ATTACHMENT 6
SUMMARY OF TASK FORCE VOTES

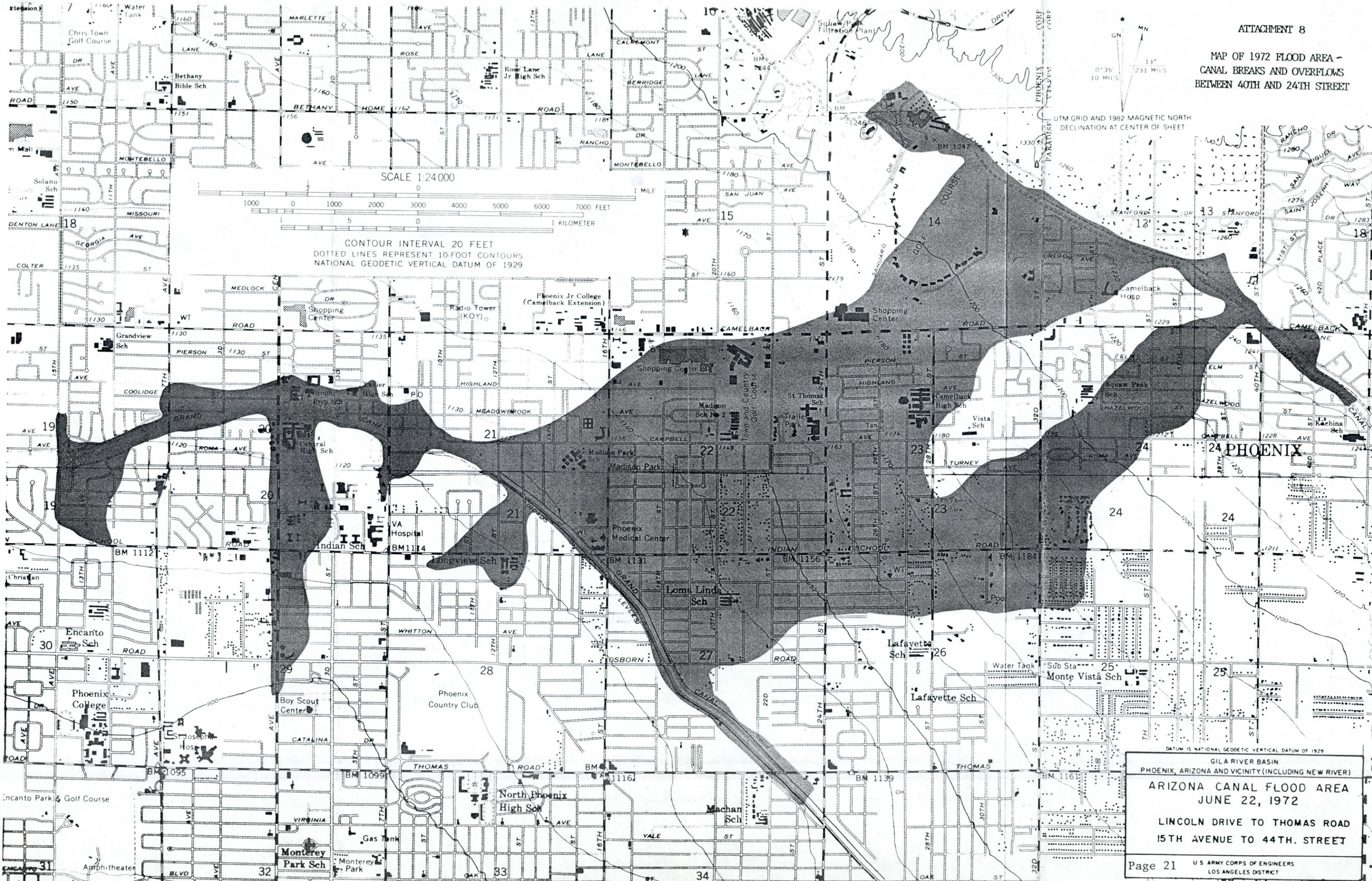
	Buekers	Clark	Cody	Grobe	Hawkins	Lee	Pickrell	Sing	Weesner	Wolf	FitzSimons	Total
Summary of Policy Options	Abs.	No	Yes	Yes	No	-	Yes	Yes	Yes	Yes	*	6 In Favor 2 Opposed 1 Abstention
Option 1	No	No	No	No	No	No	No	No	No	No	*	10 Opposed
Option 2	No	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes	*	6 In Favor 4 Opposed
Option 3	No	No	No	No	No	No	No	No	No	No	*	10 Opposed
Option 4	No	No	No	No	No	No	No	No	No	No	*	10 Opposed
Option 5	No	Abs.	No	No	Yes	No	No	No	No	No	*	8 Opposed 1 In Favor 1 Abstention
Option 6	Yes	Yes	No	Yes	Yes	No	No	No	No	No	*	6 Opposed 4 In Favor
Option 7	Yes	Yes	No	Yes	Yes	No	No	No	No	No	*	6 Opposed 4 In Favor
Option 8	Yes	Yes	No	Yes	Yes	Yes	No	No	No	Yes	*	6 In Favor 4 Opposed
Option 9	Yes	Yes	No	Yes	Yes	No	No	No	No	No	*	6 Opposed 4 In Favor
Option 10	Yes	Abs.	No	Yes	No	No	No	No	No	No	*	7 Opposed 2 In Favor 1 Abstention
Criteria For Evaluating Alternatives	Yes	No	Yes	Yes	No	-	Yes	Yes	Yes	Yes	*	7 In Favor 2 Opposed
Aesthetic Conditions	Yes	No	Yes	Yes	No	-	Yes	Yes	Yes	Yes	*	7 In Favor 2 Opposed
Additional Aesthetic Conditions	Yes	Yes	Abs.	Yes	Yes	No	No	No	No	Yes	*	5 In Favor 4 Opposed 1 Abstention
Misc. Recommendations												
I	Yes	Yes	Yes	Yes	Yes	-	Yes	Yes	Yes	Yes	*	9 In Favor
II	No	No	Yes	Yes	No	-	Yes	Yes	Yes	Yes	*	6 In Favor 3 Opposed
III	No	No	Yes	Yes	No	Yes	No	Yes	Yes	No	*	5 In Favor 5 Opposed
Phased Study of Mole	Yes	Yes	Yes	*	Yes	Yes	No	Yes	No	Yes	*	7 In Favor 2 Opposed

* Task Force member W. E. FitzSimons who has indicated his continuing support for Reach 4 was absent from all voting due to serious health problems and member Jeff Grobe was absent from the final meeting.



MAP OF 1972 FLOOD AREA - CANAL BREAKS AND OVERFLOWS BETWEEN 40TH AND 24TH STREET

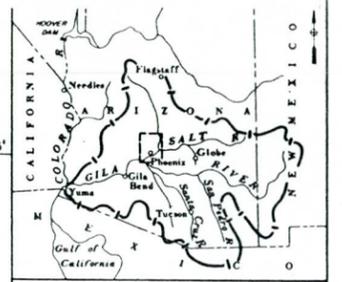
UTM GRID AND 1982 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET



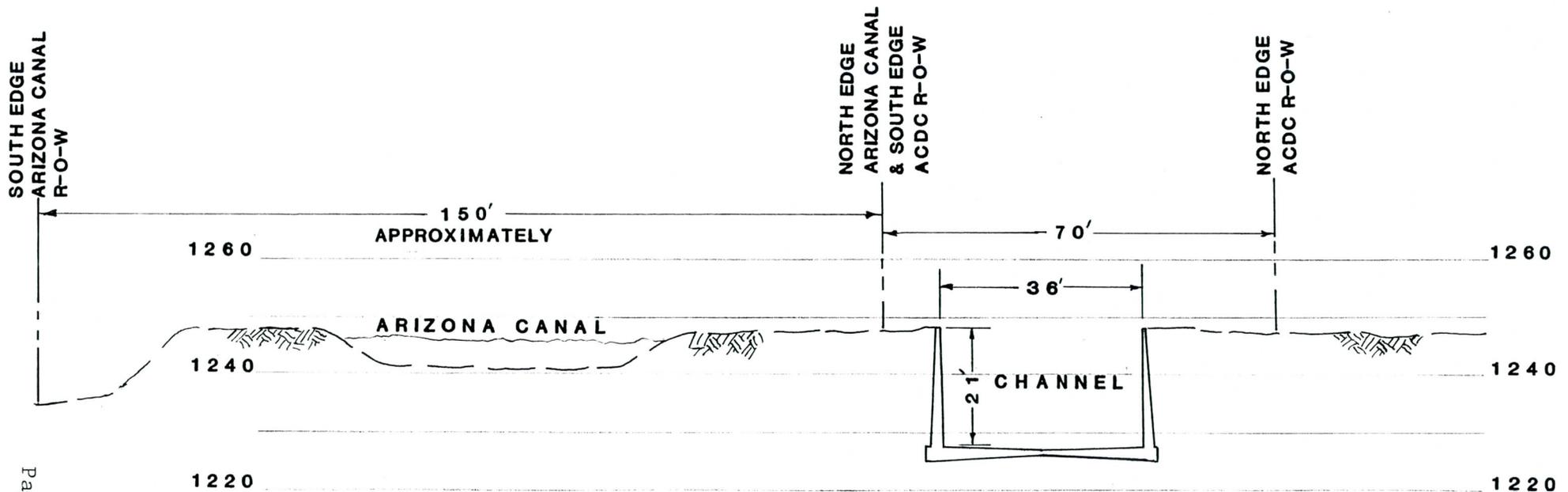
CONTOUR INTERVAL 20 FEET
DOTTED LINES REPRESENT 10-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

GILA RIVER BASIN
PHOENIX, ARIZONA AND VICINITY (INCLUDING NEW RIVER)
ARIZONA CANAL FLOOD AREA
JUNE 22, 1972
LINCOLN DRIVE TO THOMAS ROAD
15TH AVENUE TO 44TH STREET
Page 21 U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

ATTACHMENT 9
1972 FLOOD AREA



CROSS SECTION OF ARIZONA CANAL DIVERSION CHANNEL EAST OF 36TH STREET





FINAL REPORT
OF THE
ACDC TASK FORCE

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APPENDIX I: BACKGROUND AND HISTORY

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REPORT OF ACDC
TASK FORCE

I. ACDC - OVERVIEW

A. Introduction

In June 1985, as a result of concerns about Reach 4 of the Arizona Canal Diversion Channel (ACDC), the Mayor and City Council appointed a Citizens Task Force to study this issue. Specifically, the Task Force was formed to advise the City Council on the following matters:

- o The history of the ACDC, in particular, Reach 4;
- o The need for Reach 4 including documentation of flood danger and flood litigation procedures;
- o The effect of the elimination or modification of Reach 4 on the rest of the project;
- o Local liability with and without Reach 4; and
- o The public costs for non-ACDC flood control alternatives.

Every effort was made to ensure that the Task Force contained a balanced representation of both those opposed to and those in favor of the project as well as some neutral individuals. Task Force members and their initial position with regard to Reach 4 as indicated for the record at one of the first meetings of the Task Force are as follows: Ms. Joyce Buekers (neutral); Ms. Kemberly Clark (opposed); Ms. Debra Cody (neutral); Mr. W. E. FitzSimons (in favor); Mr. Jeff Grobe (neutral); Mr. Jasper Hawkins (opposed); Mr. Richard H. Lee, Chairman (neutral); Mr. Charles Pickrell (opposed); Mr. Charles Sing (neutral); Mr. Don Weesner (in favor); and Ms. Ann Wolf (neutral).

The Task Force has been meeting on a regular basis since July 15, 1985. A total of 28 meetings have been held including five public hearings and a tour of Reaches 3 and 4. The public hearings were held at various locations in the community to facilitate community participation. Locations included Camelback High School, Central High School, Sunnyslope Community Center and the Phoenix City Council Chambers.

The Task Force has reviewed literally thousands of pages of documents, maps and materials including information prepared by the Army Corps of Engineers (COE), the Maricopa County Flood Control District (FCD), the City of Phoenix Engineering Department, Citizens Against Reach 4, engineers and private citizens. Much of the material distributed was requested by or specifically prepared for the Task Force. Detailed minutes or transcripts of all meetings, including the public hearings, are available. A court reporter was used for most of the meetings to ensure a thorough and accurate record of the proceedings. A complete set of all materials distributed at or for Task Force meetings is available in the City Council Conference Room. See also

Appendix II: Materials Distributed List. In addition, a reference collection was established in the Arizona Room of the Central Library containing copies of all Task Force materials, maps and a number of other documents and files related to the ACDC. See Appendix III: ACDC Bibliography/Reference Library.

The Management & Budget Department provided primary staff support to the Task Force. Representatives of the City of Phoenix Engineering Department, Maricopa County Flood Control District, the Army Corps of Engineers, and Citizens Against Reach 4 were present at every meeting and provided useful input. Thousands of hours have been devoted to the work of the Task Force. Each member has taken the City Council's charge seriously and has recognized the impact the decision regarding Reach 4 can have on this community.

Over the course of its deliberations, the Task Force has heard testimony from a number of experts including engineers, economists, and attorneys. Concerned citizens both opposed to and in favor of Reach 4 have addressed the Task Force. Each of the issues the City Council has asked the Task Force to address have been thoroughly studied including the history and background of Reach 4, its necessity, aesthetic considerations, design modifications, costs, local liability and alternatives. Each of these issues are discussed in this report. After seven months of extensive study the Task Force has made its recommendations and forwards this final report to the City Council.

B. Design

Documentation for this section can be found in Design Memorandum No. 12, Sept. 1985, Task Force Document Number T-3, hereinafter cited as Design Memorandum, Sept. 1985, T.F. Doc. # T-3; and in Fact Sheet on Reach 4, Task Force Document Number F-6, hereinafter cited as T.F. Doc. # F-6.

The Arizona Canal Diversion Channel (the "ACDC") is designed to prevent flooding from waters ponding along the north side of the Arizona Canal and from waters overtopping or breaking through the Arizona Canal to the South. It will intercept floodwaters from the Phoenix Mountains and from Cudia City Wash, Dreamy Draw, Cave Creek, and several minor tributaries, as well as from uncontrolled overland flow and storm drains. It is designed to intercept and convey to Skunk Creek flows up to a 100-year flood (a flood which is estimated to have a one percent chance of occurring in any one year). If it performs as designed it will eliminate flood damages from such flows and will substantially reduce damages from flows in excess of a 100-year flood.

The ACDC will extend approximately 17 miles along the north side of the Arizona Canal from Cudia City Wash near 40th Street to Skunk Creek. The south wall or side slope will in most areas nearly adjoin the north border of the Salt River Project right-of-way. The Canal and the channel will share a maintenance road which will also double as a bike path. Adjacent to the maintenance road will be an equestrian path.

The ACDC employs three types of construction and will be built in four segments (or, in engineering jargon, four "reaches"). Reach 1, presently

under construction, is a 4.4 mile unlined channel from Cactus Road to Skunk Creek. Reach 2 will run 4.7 miles from Cave Creek Wash near 23rd Avenue to Skunk Creek. From Cactus to 47th Avenue (0.75 mile) it consists of a concrete lined trapezoidal channel from 160 to 200 feet wide. Between Cave Creek Wash and 47th Avenue Reach 2 is a concrete lined rectangular channel 110 feet wide. The wall heights through this Reach are approximately 21 feet. Reaches 3 and 4 are concrete lined rectangular channels. Reach 3 from Cave Creek to Dreamy Draw (near 12th Street) will be 50 to 60 feet wide and 20.5 to 23.5 feet deep. It will be 3.6 miles long and will be covered for a 2,565 foot stretch to prevent disruption to Sunnyslope High School.

Reach 4 runs 4.2 miles from Dreamy Draw to Cudia City Wash near 40th Street. The rectangular channel will be 36 to 50 feet wide and 20.5 to 24.5 feet deep. The channel will be open except for a covered portion along Stanford Drive, east of 32nd Street (1,297 feet) and from just east of the Arizona Biltmore Hotel to 24th Street (4,625 feet) where the additional costs of covering are offset by savings in right-of-way acquisition costs.

The ACDC will be entrenched for its entire length to allow side inflow to enter over the channel walls. Confluence structures will be required at major tributary locations and pipe inlets will be used where local ponding occurs. A total of 31 vehicular bridges will be required at all streets, driveways, and highways that presently cross the canal. Four new pedestrian bridges will also be required.

C. First Costs (Right-of-Way Acquisition and Construction)

The total first costs for construction of the Phoenix and Vicinity Project which includes the ACDC, four dams, and other measures (flood control and recreational facilities, as well as wildlife mitigation and lands and archaeological mitigation), was estimated at \$439 million (October 1984 price levels), of which \$217 million is a federal cost and \$222 million is a non-federal cost. These estimates included \$149 million in federal costs and \$155 in non-federal costs for the construction of the ACDC, including recreation facilities.

Below is a table showing COE cost estimates for Reaches 2, 3 and 4 of the ACDC including associated sediment basins. Also shown are cost estimates adjusted to reflect some actual expenditures and revised cost projections prepared by the Maricopa County Flood Control District.

	<u>COE Estimate</u> (1985 Price Level)	<u>FCD Estimate</u> (1985 Price Level)
Construction Costs	\$144,260,000	\$144,260,000
Lands and Damages	87,695,000	37,967,261
Relocations of Roads		
Bridges and Utilities	<u>22,915,000</u>	<u>24,800,000</u>
Total Flood Control	\$254,870,000	\$207,027,261
Recreation Facilities	<u>3,060,000</u>	<u>3,060,000</u>
Total ACDC	\$257,930,000	\$210,087,261

Design Memorandum, Sept. 1985, Table 11 at 123, T.F. Doc. # T-3 and ACDC Local Costs as of July 27, 1985, Flood Control District of Maricopa County, T.F. Doc. # C-2, Tab. 6.

Neither set of figures attempts to estimate the effect of inflation between 1985 and the completion of construction in 1991. The primary difference between the COE and FCD figures is that the COE includes as Lands and Damages costs an estimate of the present value of the right-of-way. The Flood Control District projects its actual costs will be much lower in large part because it acquired some of the right-of-way in prior years and because the planning process has enabled the City of Phoenix to acquire much of the right-of-way without cost. The FCD's actual and projected costs for Reaches 2, 3 and 4 are almost \$48 million less than the COE's most recent estimates.

The current estimate of the first costs of Reach 4 provided by the FCD is \$58,537,000 (rather than \$66,370,000 as indicated by the COE). In addition it is anticipated that there will be additional costs for blasting and that the costs incurred in Reach 1, 2 and 3 to handle Reach 4 water add another \$16 million to the project. A more detailed breakdown of costs is contained in Appendix IV: Cost Comparison of Reach 4 Alternatives, which is attached.

D. Involvement of Local Interests

To some degree the debate on Reach 4 has degenerated into an ad hominem attack on the Corps of Engineers. It may well be that to some degree the Corps and the Flood Control District have brought this upon themselves. Many have alleged that in the past the Corps has stonewalled its critics. The Task Force can make no such claim. The Corps of Engineers has devoted substantial resources to answering its inquiries and has provided information, such as updated cost studies of alternatives, not even requested by the Task Force. On only one issue, the cost of detention basins, has the Corps not been candid with the Task Force and on that matter the Corps seemed to be acting solely to avoid embarrassment to the Flood Control District.

In retrospect it does not seem that this was a Corps of Engineers project imposed on local interests as some have suggested. The crucial decisions have been made by local governments, although perhaps without the degree of involvement of elected officials or citizens appropriate for a project of this magnitude. See Appendix II: Partial Chronology of City Actions Pertaining to the ACDC, attached.

The idea of extending the Arizona Canal Diversion Channel through Reach 4 to intersect flows causing the 1972 flood came from the City of Phoenix. Later, alternatives were suggested for detention basins, including one by the Corps of Engineers. That alternative and the 40th Street drain alternative were rejected, not because of unfavorable reports by the Corps of Engineers (although the 40th Street drain alternative did receive an unfavorable cost estimate from the Corps of Engineers), but because of objections by the City of Phoenix and the Flood Control District. Design Memorandum, No. 3, March 1976 at 72-73, hereinafter cited as Design Memorandum, March 1976. See also id. at 66.

The Corps of Engineers also apparently studied the possibility of combining the ACDC including Reach 4 with the Arizona Canal. That alternative was not rejected by the Corps of Engineers but by the Salt River Project (SRP), a local quasi-governmental entity which controls the Federal right-of-way of the Arizona Canal. Design Memorandum, March 1976, at 66-67.

In 1983, the Corps of Engineers was asked to compare a detention basin alternative suggested by PRC Toups on behalf of the Arizona Biltmore Estates Homeowners Association. It did so and returned cost estimates showing that alternative to be substantially less costly. That alternative was again rejected because of local opposition by the Town of Paradise Valley and the Flood Control District. Indeed it is fair to say that the primary reason that Reach 4 was selected over the detention basin alternative was the substantial increase in local costs of implementing a detention basin alternative rather than any Corps of Engineers preference for a concrete channel. Circumstantial evidence confirms that the project is not a Corps of Engineers "make work" construction project. In Design Memorandum, March 1976, the Corps of Engineers recommended dropping 38.9 miles of channel (23.4 miles of this concrete lined) from the authorized plan. Id. at 70, 8-10.

As noted, however, the Corps and the Flood Control District have been less than forthcoming with the Task Force and the public concerning the detention basin alternative suggested by PRC Toups. The Flood Control District and the Corps reported to the Task Force that the alternative was less expensive than Reach 4 (although it noted that the costs might be greatly increased by development that had taken place since 1983 and by the costs of relocating the Phoenix Country Day School). The only cost estimate supplied to the Task Force by the COE or the FCD was the information supplied to Toups: that this alternative was little more than three percent cheaper than the Reach 4 alternative. Letter dated December 15, 1983 from D. Sagramoso to E. Adair included in T.F. Doc. # E-3 Tab 10. No detailed cost estimates or comparisons were provided and the Task Force was led to believe or at least to assume that detailed cost figures were not available. When updated cost figures on alternatives were provided to the Task Force by the Corps of Engineers, no figures were provided for the Toups alternative. In light of this, documents provided to the Task Force by Rostland, Inc. attorneys were a rude surprise. Detailed 1983 cost estimates and comparisons with Reach 4 were available in the files of both the Corps and the Flood Control District. Letter dated November, 1983 from N. Arno, Chief Engineering Division, COE to D. Sagramoso, FCD with enclosed cost data, included in T.F. Doc. # V-7, Tab H. Moreover, the 2.7 percent cost savings was 2.7 percent of the entire ACDC not of simply Reach 4. The total cost savings of the Toups alternative over Reach 4 was approximately \$8,200,000, or 12.5 percent. The cost estimates suggest that the Flood Control District may well have been anxious to minimize the apparent cost savings of the Toups alternative because the shift from construction costs (primarily Federal) to right-of-way costs (local) would have increased local costs by \$8,820,000, based July 1983 prices.

These alternatives, as well as some additional alternatives that have recently been proposed, will be discussed in more detail later in this report.

II. ACDC AESTHETICS

There is no doubt that the ACDC will be unattractive. At its best the Arizona Canal can be quite attractive. Where mature trees and plants adjoin it, it has been described as "park like." The canal banks are used for walking, jogging, horseback riding and bicycling. While the ACDC will be much larger and therefore more aesthetically intrusive west of Cave Creek Wash in Reach 2, some of the prettier areas of the Arizona Canal are located in Reaches 3 and 4.

While the ACDC will increase ease of use for bike and horse riders and add underpasses at five major streets (including 16th Street and Northern Avenue in Reach 4), it will add a stark concrete lined channel bordered with a six foot fence. Between cleanings and storms, debris will undoubtedly accumulate in the bottom of the channel.

Several factors mitigate the aesthetic impact. First, the channel is entrenched along its length and is screened from the south by the banks of the Arizona Canal itself. Second, between major streets screening walls, landscaping, and existing back yard fences will conceal the channel. Third, current plans provide for landscape nodes of varying sizes at most major streets. Fourth, bridge railings at major streets will obstruct view of the ACDC from passing passenger automobiles. Finally, the Corps has indicated a willingness to explore other aesthetic mitigation features and SRP has agreed to allow greater use of its right-of-way for landscaping.

Three Task Force members and one City staff person visited flood control channels in the Los Angeles area. Their impressions were widely divergent but they agreed that the major aesthetic impact of the ACDC will be for those who cross the channel at major streets and those who use the adjacent paths for walking, jogging, or riding. They also agreed that the harshness of a concrete channel is heightened by unrelieved straight lines or inadequate landscaping.

The City Parks Department has also expressed concern that the ACDC needs additional aesthetic treatment. City landscape architects particularly emphasized the need to minimize the impact on Herberger Parks near Sunnyslope High School and Granada Park, to add additional land for landscaping at certain major streets including some in Reach 4, and to monitor both the selection of plant and irrigation materials and landscape implementation particularly where the ACDC right-of-way is narrow. They have suggested that one of the most effective ways of breaking the angular monotony of the ACDC for riders and pedestrians would be additional landscaping on the south side of the channel and the use of serpentine paths where possible. Finally, they urged obtaining a landscaping easement to ensure landscaping in the SRP right-of-way. Memo dated November 15, 1985 to ACDC Task Force from B. Rowe, Landscape Architect, City of Phoenix, Parks, Recreation and Library Department, T.F. Doc. # W-3 and memo dated February 20, 1985 to Ed Korrick, City Councilmember, from J. Colley, Director, Parks, Recreation and Library Department.

Most members of the Task Force also concurred in these conclusions and share a number of other preferences: The use of a wrought iron type fence is aesthetically more pleasing than chain link. Bridges will largely screen

visibility of the channel from passing automobiles, but additional channel covering at major streets, even if only extending the bridges to the edge of the street right-of-way, combined with appropriate design and landscaping could substantially improve the aesthetics at major streets. Finally, the addition of landscaping on the SRP right-of-way at major streets could not only soften the impact of the ACDC but also greatly improve the aesthetics of the canal itself, particularly in areas like 16th Street and Lincoln and 7th Avenue and Dunlap where the canal is particularly unattractive.

Unfortunately, the Task Force received little citizen input on aesthetics. Few people commented on the issue except to complain that the ditch was ugly. At the public hearing devoted to the subject, participants largely refused to comment, apparently taking the position expressed by Citizens Against Reach 4 that to discuss aesthetics was to concede the inevitability of Reach 4. The Reach Four Newsletter, Citizens Against Reach 4, Oct. 1985, T.F. Doc. # U-4.

IV. THE NEED FOR REACH 4

A. Reach 4 Flood Damages

The Corps of Engineers' studies document the need for control of floods from flows intersecting the Arizona Canal between 40th Street and 12th Street. The engineer for Rostland and the Citizens Against Reach Four confirmed the risk of flood damages from the Cudia City Wash suggesting that flood risk figures provided by the Corps, while reasonably accurate, may even be slightly underestimated. Arizona Biltmore Estates and the ACDC, W.S. Gookin and Associates, May 31, 1982, T.F. Doc. # I-7 at 7, hereinafter cited as Gookin Report, and ACDC Task Force Meeting Minutes, September 23, 1985 at 62, T.F. Doc. # S-3. He also confirmed that the flood estimates were prepared using procedures generally accepted in the engineering field. The Task Force's tour of Reach 4 confirmed that there is clear physical evidence of significant washes and gulleys intersecting Reach 4. Most dramatic is the Cudia City Wash; however, other concentrated inflow points were evident.

Hydrology studies done for the Corps indicate that the following points along Reach 4 will produce concentrated peak flows in excess of 1,000 cfs:

<u>Approximate Location</u>	<u>100-Year Flood</u>
Cudia City Wash	6,700 with proposed sediment basin 6,800 without proposed sediment basin
Upstream from 32nd Street	2,400
Below Ocotillo Road	1,900
Below 16th Street	2,300

E.g., Design Memorandum, Sept. 1985, T.F. Doc. # T-3.

In addition, one major drainage area which intersects Reach 4 between 32nd Street and 19th Street (Id, plate 42.) will contribute well over 2,000 cfs peak flow during a 100-year flood, although no single point within it will

produce inflows in excess of 1,000 cfs. Id. at page 79-82. Over 1,000 cfs of that flow intersects the canal between 30th Street and 24th Street. Id. plate 44.

South of the Arizona Canal the natural flow paths have been obliterated by development. Apparently these paths were not obliterated by urbanization but by agriculture over the approximate 100-year history of irrigation based farming. Flow from relatively small storms are intersected by the Arizona Canal and result in ponding along that bank. As the volume of water increases it overflows into the Arizona Canal. This ponding has relatively frequently resulted in the flooding of homes along the north bank. The capacity of the Arizona Canal is relatively small, only 1,000-1,200 cfs in the vicinity of Cudia City Wash. Moreover, the capacity diminishes as the canal proceeds west. Significant rains quickly exceed the relatively small capacity of the canal and pour over various spillways to the south. In major storms the flow of water south of the canal is substantial and is often increased by breaks in the south bank of the canal.

When the land was not urbanized, flooding of the volume encountered during 1972 produced relatively little damage. By 1972, urbanization had increased to the point that damages were substantial. Since that time, much more development, both commercial and residential, has occurred within the Reach 4 overflow area.

In short, there is little doubt that there is significant flood risk in the Reach 4 overflow area. This area is highly urbanized and flooding damage from severe storms is likely to be significant.

B. Reach 4 Benefits and Costs

On the benefit/cost issue several things can be said with assurance:

1. The ratio of City benefit to City cost is overwhelmingly favorable;
2. The ratio of Phoenix citizen benefit to Phoenix citizen cost is overwhelmingly favorable;
3. The ratio of Maricopa County citizen benefit to the Maricopa County citizen cost is overwhelmingly favorable.

The benefit/cost ratio to the City and its citizens is obviously favorable because direct costs to the City are minimal. The City will contribute one-half the funds for certain major equestrian/bicycle path underpasses and receive in return not only those underpasses but also improvements to trail and bike path systems. It will pay nothing for flood control. The costs to its citizens are relatively small. Costs of the project to County citizens are less than 33% of the costs of Reach 4 flood control costs, plus a percentage of Federal costs equal to their pro rata share of all Federal taxes, a very small figure. Costs to Phoenix citizens would be only 55% of the cost to the citizens of the County as a whole, or approximately 18% of all Reach 4 costs.

Since the ratio of local benefits to local costs is very positive, the benefit/cost issue is whether the total costs are so disproportionate to benefits that Phoenix citizens should in good conscience forego federal funding. The starting point for consideration of this issue is the original incremental benefit/cost ratio for Reach 4 from page 73 of the Design Memorandum, March 1976.

Arizona Canal Diversion Channel
(40th Street to Dreamy Draw)

Incremental Analysis*

First Cost**

Construction	\$25,500
Land and damages	9,100
Relocations	<u>4,400</u>
Total	\$39,000

Average Annual Cost**

Interest and amortization	\$ 1,056
Operation and maintenance	<u>25</u>
Total	\$ 1,081

Equivalent Annual Benefits

Damages prevented	\$ 1,403
Excess of benefits over cost	322
Benefit to cost ratio	1.3

* Cost and benefits in thousands of dollars; economics based on 3-1/4 percent discount rate and 100-year life of project.

** Includes increased costs of required larger channel from Dreamy Draw to Cave Creek (Reach 3).

It is important that the significance or precision of the numerical benefit/cost ratio used by the federal government in authorizing the project not be overemphasized. Formal b-c ratios are not generally determinative in state or city budgeting. It is inconsistent to give undue emphasis to such ratios in only one area of expenditures. More fundamentally, such ratios tend to give the illusion of more precision than is justifiable. A benefit-cost ratio is merely the ratio of two sets of approximations. Cost estimates are unavoidably less than precise. Calculation of flood control benefits involves a series of estimates including the likely frequency of various types of storms, the likely flooding which would result, the likely damages which would

result from such flooding, and the likely dollar value of the resulting damages. The ratio can be manipulated by changing the benefits or costs to be included, the period of amortization, the discount ratio, or the residual value of lands or improvements. Finally, many of the benefits and the costs accruing to the city and its citizens are either not quantifiable or are otherwise not included in the Corps numerical benefit/cost calculations. See T.F. Doc. # P-4 and Z-13.

Current cost estimates for Reach 4 are approximately \$76 million (1985 Price Level) (including the added detention basin and the costs of the increased size of Reaches 2 and 3 to accommodate Reach 4 water). This is slightly less than \$80 million which would result if Reach 4 cost increases equaled increases in the Phoenix area Consumer Price Index since the benefit-cost ratio was calculated (approximately 105%). This is partially because the COE's cost estimates for lands and damages far exceed FCD's projected expenditures. Therefore, if the original benefit projections were accurate and increased proportionately with the cost of living and if the current construction figures are accurate, the benefit/cost ratio remains positive.

To go behind these numbers, it is necessary to consider the Corps underlying data. The Corps data on benefits is continued in the Appendix Number 6 to Design Memorandum, March 1976. Unfortunately, this appendix does not contain all the data underlying its conclusions or the conclusions in the Design Memoranda. In addition, the organization of the appendix leaves much to be desired and it does not separately document the incremental benefit/cost ratio for Reach 4. Finally, the benefits for flood damage reduction used to justify Reach 4 assume increases resulting from future development and an affluence factor which the Task Force has not attempted to validate. Design Memorandum, March 1976 at 97. Id. Appendix 6, ("Economics Appendix") at A6-17, para. 67b and 68, Tables 4-6, 9. See A6-46. T.F. Doc. # 0-3.

On the other hand, in calculating benefits from flood reduction, the COE includes only property damage* from floods, not death or personal injury. Of greater economic impact, the calculations exclude the costs of flood fighting, evacuation, and other emergency costs noting that: "These costs would be so enormous that no generally accepted methodology was available to predict them." Design Memorandum, March 1976, Appendix 6, Economics at A6-18. Finally, the benefits calculations may exclude other tangible and intangible benefits to the City and its citizens. See T.F. Doc. # P-4 and Z-13.

Information contained in the Corps' Economic Appendix suggests that projected damages for major floods in the area will be very great unless Reach 4 is constructed. These projections appear to be realistic and consistent with the 1972 flood damage figure. The 1972 Flood Report prepared by the COE estimated that the ACDC without Reach 4 would have prevented only \$400,000 (1972 level) of the damages from the 1972 flood including damages above and below the Arizona Canal. Id. at 56, paragraph 35(b)(2). It is estimated that

* Chairman's Note: Property damage includes estimated lost return to investments and lost wages projected for various levels of funding from data from the June 22, 1972 flood. Economic Appendix at A6 - 18, paragraph 7D.

Dreamy Draw Dam would have prevented an additional \$26,000 (1972 price level) in damages (Id.) and that the ACDC, including Reach 4, would have prevented 70% of the damages, or \$7.4 million, assuming 1972 conditions, or \$10.5 assuming 1975 conditions. Design Memorandum, March 1976 at 29. Therefore, the overwhelming portion of the damages prevented would be those from flows emanating from Reach 4. Id. at 32-33. See 1972 Flood Report at 48 and Index Map, Plate One.

The Economic Appendix projects the results of the 1972 flood to floods of greater magnitude. Economic Appendix A6-18-19, paragraph 72 and 73, and Table 9, T.F. Doc. # 0-3. The report references flows at Cudia City Wash of 4,000 cfs (approximately equal to the 1972 flood, a "fifty year flood"), 5,800 (substantially less than a 100-year flood), and 14,800, (approximately a standard project flood). The pertinent sections of paragraph 72 and 73 provide:

72. The major flood of record for which accurate damage data is available in this area (the 22 June 1972 flood) was concentrated in the area of "Most Probable Overflow from Breaches in Canals." The estimated discharge was 4,000 cfs along Cudia City Wash at the Arizona Canal. This discharge approximates the 50-year storm in this area.

73. Damages from this storm amounted to about \$7.4 million (1972 conditions) along areas studied, particularly in the vicinity of Cudia City Wash and the Arizona Canal. These damages would amount to approximately \$10.5 million under present (1975) conditions of development and price level (see Table 9).

The figures for the portion of Table 9 which estimates damages from the most probable overflow from overtopping of canals under 1975 conditions and price level plus a rough estimate of such damages* at 1985 prices (but 1975 conditions) are as follows:

<u>Discharge (cfs) Measured at Cudia City Wash at Arizona Canal</u>	<u>1975 Price Levels</u>	<u>Estimated 1975 conditions and 1985 Price Levels</u>
14,800*	\$162,119,000	\$332,343,000
5,800	78,729,000	161,394,000
4,000	10,500,000	21,525,000

*Standard project flood under future conditions of development.

While there is considerable evidence that without Reach 4 large floods would do extensive damage, perhaps the best justification of the project is set forth in a report by the Corps of Engineers to Congress in 1982 concerning projects in which the benefit/cost ratios were less than 1.0 at the then current discount rate (7-5/8%). The Corps commented:

* Chairman's Note: These figures represent total damages not damages which would be prevented by the alternative. Annualized estimates of benefits (damages prevented) can be derived from comparing the residential damages for Alternative 1 and 3 (which do not include Reach 4) and for Alternatives 2, 4, 5 and 5b in Table 10. Id.

"We [Department of the Army, Office of the Assistant Secretary] concluded that the Flood Control Project at Phoenix, Arizona, with the remaining benefits/costs ratio of .09 at 7 5/8% should continue to be supported in light of the high (over 40%) share of the cost which local interests were willing to bear and the type of residential and commercial flood damage reduction benefits that this project would confer." Letter of March 4, 1982 from William R. Gianelli, Assistant Secretary of the Army to The Honorable Tony Moffett, reprinted in Report of Hearing before Subcommittee of the Committee on Government Operations, House of Representatives, 97th Congress, Second Session (April 6, 1982) at Page 10 (hereinafter cited as 1982 Hearing). T.F. Doc. # E-3, Tab 9.

The Corps report to Congress indicated in further detail as follows:

Although the remaining benefit/cost ratio of 0.9 at 7 5/8% would cause concern if this project were in the pre-authorization 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." 1982 Hearing at 76.

C. Counter arguments Regarding Benefits/Costs

Four attacks have been made on the benefit/cost ratio of the project:

1. The discount rate is too low;
2. The Corps of Engineers' construction estimates are too low because they underestimate the cost of blasting and the cost of disposing of excess excavation material;
3. The benefit estimates are too high because the likelihood of flooding is overestimated and subsequent improvements, including the Biltmore detention basins and improved gates from the Arizona Canal to the Cross Cut Canal have been ignored; and
4. The costs of acquiring the right-of-way in the Arizona Biltmore area have been underestimated.

(1) Discount Rate

One of the attacks made upon the project is that it has a benefit to cost ratio of less than one when calculated using the higher discount rate now used by the Federal Government in evaluating flood control projects. Explicitly or implicitly, this is an attack on the use of the 3-1/4% discount rate used when Reach 4 was authorized.

The Citizens Against Reach 4 have stated that the use of the discount figure is "an attempt to take into account inflation over the 100 year life of the project." Arizona Canal Diversion Channel -- Background and Potential Problems, presented by Citizens Against Reach 4, at 27, included in T.F. Doc. # E-3 Tab 1. This is clearly erroneous. Projected benefits used in calculating the Reach 4 benefit/cost ratio are stated in constant dollars. They do not include the increased cost of flood damages which will result from inflation. Therefore, the discount rate should not take into account projected inflation. 1982 Hearing at 15.

Some critics point to current market interest rates as evidence that the 3-1/4% interest rate is inappropriate. These critics also ignore that benefit/cost ratios are calculated in constant dollars. Current nominal interest rates must not only compensate for the use of money, but also for future price level changes. While the 3-1/4% interest rate is lower than current nominal interest rates, it is substantially higher than the real interest rate (nominal rate less than inflation) for fixed income investments or for governmental borrowing over any period of U.S. financial history lasting more than a few years. E.g., Id. and T.F. Doc. # N-9.

An economist produced by Citizens Against Reach 4 disputed the use of the 3 1/4% discount rate. He conceded, however, that the discount rate should be a rate free of inflationary expectations because cost/benefit ratios are in constant dollars. He was unable to specify what he believed to be an appropriate interest rate indicating that the matter is disputed among economists. ACDC Task Force Public Hearing Minutes, September 5, 1986, T.F. Doc. # P-3, at 4-33. See also 1982 Hearings at 15.

Economists debate the appropriate theoretical approach to use in selecting the discount rate for evaluating government investment. Estimates of the appropriate rates range from 3% to 10%. 1982 Hearings at 15. It is undisputed, however, that the interest rate is not designed to take into account the effect of inflation. 1982 Hearings at 1982.

In short, the 3-1/4% discount rate which was used for evaluating new Federal government water projects when the Phoenix and Vicinity Project was first proposed, is not an illogical discount rate for making benefit/cost decisions. Perhaps, however, all that needs to be said in connection with this debate is that the State of Arizona specifies a 3% discount rate for determining the benefit/cost ratio for flood control system programs in the State. Arizona Department of Water Resources, Flood Control Assistance Program, Program Descriptions and Procedures for Implementation at 41 (1983). It seems inappropriate for the City of Phoenix to apply a more stringent economic test for a project which benefits the citizens of Phoenix than that specified by the State of Arizona. Indeed it is questionable whether it should apply any test that is stricter than that specified by the funding source.

(2) Construction Costs

Ron Pulice, a contractor living adjacent to the canal, and a member of Citizens Against Reach 4, advised the Task Force of his experience in successfully blasting his own swimming pool. Pulice estimates that the

cost of blasting for Reach 4 will be higher than estimated by the Corps and alleges that the cost of transporting and disposing of excess fill has been dramatically underestimated.

The Corps denies that its estimate of the cost of removing excess fill is unrealistic. Certainly it is evident that the issue has not been overlooked. Excavation and the compaction of excess excavated materials are line items in COE cost estimates for Reach 4. See Design Memorandum, Sept. 1985 at 134. The disposal of excess excavated materials is discussed as Section 5 of that memorandum. Id. at 107. See Id. Plate 47.

The Corps of Engineers admits that its cost estimates do not include the costs of necessary blasting in the Biltmore area. The Corps estimates approximately \$1 million for this purpose, but it indicates that the estimate is somewhat arbitrary. T.F. Doc. # T-4 at 16. Debra Cody, an engineer and a member of the Task Force estimates that the entire channel could be blasted through the Biltmore area for \$3 million. She commented, however, that this is an extremely high (worst case) estimate of cost and that blasting is unlikely to be required through this entire stretch. She concluded that COE cost estimates were reasonable, even conservative. ACDC Task Force Meeting Minutes, October 14, 1985, T.F. Doc. # T-4 at 14.

(3) Benefit Estimates

The only testimony presented to the Committee suggesting that the Cudia City flooding problem had been mis-estimated by the Corps was presented by an engineer hired by the Arizona Biltmore Homeowners Association/Rostland, Inc. who indicated that if anything, the flood danger was underestimated. Gookin Report. T.F. Doc. # I-7. Nothing has been introduced to contradict the flood damage estimates prepared by the Corps. Although all of the details supporting the benefit/cost ratio for Reach 4 are not separately set forth, COE flood damage estimates in the supporting Economic Appendix, which appear to be consistent with the results of the 1972 flood, indicate that a 50-year or 100-year flood without Reach 4 would produce enormous damages. See pages 10 to 12, supra.

Citizens Against Reach 4 have suggested that the Corps damages projections have ignored improvements since the 1972 flood. Contrary to these statements, the Arizona Biltmore detention basins are expressly recognized, indeed recognized in detail, in the Corps calculations. See, e.g., Design Memorandum, March 1976 at 48, 50 and Plates 44 and 45. Moreover, no one has suggested that these detention basins would have a significant effect in a serious storm situation of the type that the ACDC is designed to ameliorate. See PRC Toups Study at 4, contained in T.F. Doc. # E-3 at Tab 10. Finally, City and COE engineers have testified without contradiction that the basins will have no significant impact on flooding from such storms. T.F. Doc. # V-7, Tab G at 4.

At the City Council's May 15, 1985 public hearing on the ACDC, it was argued that conditions had changed rendering Reach 4 no longer necessary. As evidence, it was submitted that the area to be protected by Reach 4 was no longer included in the A-zone (area subject to greater than 1 foot of water in floods smaller than a 100 year flood) on the Flood Insurance Rate Map (FIRM) for the Federal Emergency Management Agency (FEMA).

This is misleading since the area was never in an A-zone. This is certainly not because there is no flood danger. The 1972 flood, which was only a fifty year flood, demonstrated that. Apparently, the reason that no A-zone is designated is that FEMA takes the position that it cannot determine the areas where the flooding will occur. Norman Arno, Chief, Engineering Division, Corps of Engineers reports that FEMA gives the following explanation for its maps:

- a. The cause of the past failures of the canal banks is uncertain. Failure could have occurred from the capacity of the canal being exceeded or it could have been breached from streamflows from the north.
- b. The Arizona Canal might fail in different places in different flood events.
- c. The width of canal bank failure is unpredictable. Narrower breaks would tend to concentrate flows, causing greater damages to fewer structures. Wider breaks would tend to cause less severe damages to a greater number of structures.

Letter dated July 3, 1985 to James Attebery, City of Phoenix, Engineer. T.F. Doc. # J-10.

While the Corps disputes the rationale of FEMA, *id.*, the point is irrelevant for evaluating Reach 4. FEMA does not dispute the flooding problem from washes in Reach 4 but merely argues it doesn't know exactly where it will occur. Since the entire area south of the Arizona Canal would be protected from these washes by Reach 4, the precise location of the problem is irrelevant.

The only evidence presented to the Committee suggesting any change in circumstances since the 1972 flood which would reduce flood damages is one reference in a transcript of the September, 1972 Maricopa County Flood Control District Advisory Committee hearing. T.F. Doc. # V-7, Tab G. At that time, the Director, Colonel Lowry, suggested that the improvements to the gates between the Arizona Canal and the Cross Cut Canal would have prevented the canal breaks in 1972. This statement was apparently made before the 1972 Flood Study was completed by the Corps of Engineers and it is in variance with all the factual testimony before the Task Force. Task Force member and SRP employee Don Weesner has testified that the irrigation water from the Arizona Canal had been dumped well before the flooding started. ACDC Task Force Public Hearing Minutes, August 7, 1985, T.F. Doc. # J-12 at 10. See also T.F. Doc. # F-17. Moreover, the capacity of the Arizona Canal in the vicinity of the Cudia City Wash is only 1,200 cfs. The peak flow of the Cudia City Wash during the 1972 flood was estimated at approximately 4,000 cfs. No witness before the Task Force has suggested, and SRP and City engineers have denied, that the gates would have any significant effect on flooding from the Cudia City Wash or other washes in the Reach 4 area in the event of a serious storm. In any event, the new flood gates were installed and operating and were part of the existing conditions in 1974 and 1975 when the Corps prepared its damage and benefit/cost estimates.

(4) Biltmore Right-of-Way

Rostland, Inc. has argued that right-of-way through the Biltmore area is not sufficient because (1) SRP does not have a valid right-of-way adjoining the Arizona Canal across a portion of property near the Arizona Biltmore Hotel, and (2) additional right-of-way will be necessary for construction work in another parcel because of the topography. The Corps of Engineers and the Flood Control District are well aware of both claims and dispute them. The first is a far more serious issue for SRP than for the Flood Control District.

The Corps of Engineers is well aware of the right-of-way constraints and the available right-of-way, and have planned the project and estimated costs with knowledge of those constraints. In any event, the channel is to be covered in this area in order to minimize damages and disruption to the Biltmore. It appears unlikely that the costs of acquiring easements for construction of the covered channel would likely be high enough to justify halting the ACDC. In any event, it ill behooves the Task Force or the City to allow the threat of litigation to block a project of benefit to the City where the party at risk in that litigation professes confidence in its position.

D. Conclusion

Evidence of the flood threat in Reach 4 includes: (1) the unanimous opinion of all engineers who have testified, including the firm employed by Rostland, Inc. and the Arizona Biltmore Estates Homeowners Association; (2) hydrology reports obtained by COE; (3) the physical evidence of gullies and washes viewed by the Task Force and (4) the history of storms and floods in the Phoenix metropolitan area (including but not limited to the 1972 Flood). There is substantial evidence that the cost of flooding which would be prevented by Reach 4 would be substantial. There is no significant evidence that this flood damage potential has abated since Reach 4 was proposed or evaluated.

IV. THE EFFECT OF THE ELIMINATION OR MODIFICATION OF REACH 4 ON THE REST OF THE PROJECT

The elimination of Reach 4 from the ACDC Project would probably not affect the completion of Reaches 1, 2 and 3 in that the rest of the project is not dependent on the construction of Reach 4. However, these reaches were designed larger to handle the extra water from Reach 4. The Task Force has not investigated the benefit/cost ratio of the ACDC project with the elimination of Reach 4. Some preliminary COE analysis reported that a larger ACDC, even one large enough to handle a standard project flood, would be cost justified. Therefore, it is likely that the benefit/cost ratio would remain positive.

Reach 1 is currently under construction, therefore no down-sizing of this Reach is possible. If Reach 4 were eliminated from the design of the ACDC, Reaches 2 and 3 could be down-sized resulting in \$15 million savings in these reaches. Reach 2A (Cactus Road to 47th Drive) contract plans are almost completed and construction is scheduled to begin this Fall (1986). Reach 3

contract plans are scheduled to be completed by October 1987 and construction is scheduled to begin in July 1988. T.F. Doc. # C-2, Tab 4. Therefore, unless the decision to eliminate Reach 4 is made soon, downsizing and the resulting cost savings will not be possible.

If Reach 4 is not built, the flooding problems in this area will remain. Most of the alternatives that have been proposed do not control all of the flooding in this Reach. If Reach 4 were eliminated without down-sizing the other reaches the effect would be to increase the costs of flood control, although some increased benefits would result from the additional channel capacity resulting from the oversizing.

If Federal funding for Reach 4 is declined, it will be a long time before any alternative can be selected and the funding source secured. The Corps and the Flood Control District have taken the position, which a majority of the Committee members share, that:

"Unless a viable alternative [to Reach 4] with a strong chance of implementation is identified, down-sizing of the remainder of the ACDC, primarily Reach 3, might not be wise because it would preempt a future decision to implement Reach 4 as designed should local opinion be changed by a reoccurrence of a flood event similar to 1972." Letter dated August 12, 1985 from Dennis Butler, Colonel, Corps of Engineers, District Engineer, to the Honorable Eldon Rudd.

Unless an alternative is selected and the funding source secured before the completion of the remainder of the ACDC, the remaining reaches will be built with the capacity to handle Reach 4 should it subsequently be added. A significant portion of the cost savings of an alternative to a Reach 4 (approximately \$15 million at current cost levels) occur as a result of the down-sizing of Reaches 2 and 3, therefore, the marginal costs of each of the alternatives will be \$15 million greater unless an alternative is funded within a very short period of time.

V. THE ALTERNATIVES TO REACH 4

A summary of cost estimates for various alternatives to Reach 4 for which adequate cost estimates are available is attached. See Appendix IV: Cost Comparison of Reach 4 Alternatives. Currently Reach 4 is cheaper than all the alternatives for which detailed cost estimates are available except the Laventhol and Horwath (L&H) estimates for the Corps of Engineers detention basin alternative and the L&H estimate of the 48th Street and the Mole alternative. L&H is a CPA firm employed by Citizens Against Reach 4 to produce an analysis of costs of various alternatives based upon various Task Force documents (including documents prepared by Jasper Hawkins, Citizens Against Reach 4 and an engineer employed by the Citizens Against Reach 4 and the Arizona Biltmore Homeowners Association). For many alternatives L&H has simply totalled COE and FCD figures as modified by assumptions stated by Jasper Hawkins or the Citizens Against Reach 4. Exhibit I from the L&H report is included in Appendix IV. L&H's calculations differ from COE calculations in estimates for additional costs for Reaches 2 and 3 to accommodate water

from Reach 4 or its alternative and the method of calculating non-recoverable costs (the primary difference is that L&H assumes no non-recoverable costs from COE fees). The L&H 48th Street alternative costs must be increased substantially because of the discovery that SRP right-of-way is much narrower than anticipated. (COE estimates for this alternative are substantially higher.) The COE detention basin alternative is only slightly higher than Reach 4 and assumes an alternative location can be found for the Phoenix Country Day School and that its operations can be moved without disruption. If this is not possible, substantial additional costs would be incurred. The L&H estimate for the Mole alternative may have substantially underestimated the amount of pipe required by the proponent's plans. The L&H estimate for the COE detention basin alternative does not include the non-recoverable costs of Reach 4. Therefore, Reach 4 is almost certainly cheaper than the L&H (and Mole) 48th Street alternative and is probably slightly less expensive than the Corps detention basin alternative.

A. Detention Basin Alternatives

Because Phoenix storms are characterized by high peaks and low volume, relatively modest detention basins can reduce the size or eliminate the channel. These detention alternatives, however, would increase the cost of lands and damages, a local cost, from \$17,667,000 (Reach 4) to \$61,880,000 (Corps of Engineers detention basin alternative) or \$43,300,000 (PRC Troups alternative). See Appendix III: Cost Comparison of Reach 4 Alternatives. Each of these alternatives would be vigorously opposed by the Town of Paradise Valley, which has endorsed Reach 4, and Phoenix Country Day School which has reached an agreement with the Flood Control District for use of its property for Reach 4.

Design Memorandum, March 1976 at 73-74 reports that the COE Detention Basin alternative was rejected for the following reasons:

1. It did not provide protection from inflows between Cudia City and Dreamy Draw (12th Street);
2. The City of Phoenix strongly desired Reach 4 to intercept these flows and to provide discharge points for future storm drains;
3. The FCD supported Reach 4; and
4. It appeared that right-of-way costs for detention basins would increase substantially as the area developed.

In addition to the opposition of the Town of Paradise Valley and of the FCD recited elsewhere, the Task Force has received a copy of a letter dated October 20, 1974 from the Town Manager of Paradise Valley in opposition of the detention basin and Reach 4, together with minutes of a Town Council meeting which emphasize that its objection to detention basins was more severe than to Reach 4. T.F. Doc. # E-3, Tab 7 and V-7, Tab I. On November 18, 1985 the Town reiterated its opposition to detention basins, but endorsed Reach 4. T.F. Doc.# X-3, Letter and Resolution.

The record also indicates that while Cudia City Wash is the primary reason for Reach 4, a portion of Reach 4 benefits accrue from controlling flooding from other drainage areas. This is illustrated by the increase in

Reach 4 capacity from 6,8000 cfs at Cudia City Wash to 9,000 cfs upstream of Dreamy Draw. Design Memorandum, Sept. 1985 plate 42. See also T.F. Doc. # F-6. Peak flows for drainage areas downstream from Cudia City have been set forth at page 7, supra.

In 1972, significant flooding occurred downstream from the Cudia City Wash and the wash near 32nd Street. In Reach 4 significant major overflows occurred near the Arizona Biltmore at 30th Street and at Tenth Street, 16th Street, 18th Street and 20th Street. 1972 Flood Report.

The reported opposition of the City of Phoenix to the detention basins accurately reflects staff opinion. It is not clear, however, the degree to which elected City of Phoenix officials were involved in the choice of Reach 4 rather than the alternatives. Considerable light is cast upon the FCD preference for the ACDC over the detention basin alternatives by the results of a COE cost study of a detention basin alternative developed by PRC Toups for the Arizona Biltmore Homeowners Association.

The Toups alternative provided protection from inflows intersecting the Arizona Canal between Cudia Wash and Dreamy Draw. It proposed two detention basins (including one which encompassed the site of Phoenix Country Day School) which would reduce the size but not eliminate Reach 4 from 24th Street to 12th Street. It proposed that the detention basins would empty into two box culverts. A third box culvert would drain the area between 24th and 32nd Street. All three box culverts were to be built in the SRP right-of-way without compensation to SRP and would empty into a smaller open concrete channel similar to but smaller than Reach 4 as proposed west of 24th Street.

That option was rejected by the Flood Control District. In a letter dated December 15, 1983, Flood Control District Chief Engineer Dan Sagramoso explained the District's position:

"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."

Letter dated December 15, 1983, from D. Sagramoso to E. Adair; T.F. Doc. # E-13, Tab 10.

The numbers supporting the analysis obtained from the COE by Citizens Against Reach 4 indicate, however, that while the cost savings of the Toups alternative was only 2.7%, it was 2.7% of the entire ACDC project not merely Reach 4 costs. T.F. Doc. # V-7 Tab H. Cost savings as a percentage of Reach 4 costs were 11.9%. In short, in 1983, it was a much more economical alternative. Those figures also suggest the major reason for the opposition of the FCD was the impact of the change upon local funding. While the 1983 estimate suggested the alternative would be \$8,200,000 lower overall, local costs would have been \$8,820,000 higher. Current figures show local costs of the Toups Alternative would be \$26,000,000 greater than Reach 4. See Appendix IV, attached.

In general, a majority of the Task Force would prefer the detention basin alternative if practical and if cost competitive. Unfortunately, the Toups alternative and the other detention basin schemes face several problems. First, the cost adjusted figures for the Toups alternative are now greater than the estimates for Reach 4, in part because of substantial cost savings in Reach 4's actual local costs of lands and relocations. Second, the Town of Paradise Valley strongly opposes the option. Third, expensive houses have now been built in the area of the detention basins proposed by the Corps and other construction has taken place at the site of the Toups 40th Street detention basin. Fourth, the costs of relocating the Phoenix Country Day School are difficult to calculate and the move would be a substantial disruption for the school. Fierce opposition of its patrons is to be expected. Finally, it is only fair to note that the cost estimates for the Toups alternative do not include the costs of any aesthetic treatment and that the Task Force preference for the detention basin alternative is without any detailed consideration or examination of the aesthetics of the detention basins or their impact upon their surroundings.

B. 48th Street Alternative

Another superficially attractive alternative is to take the waters from the Cudia City Wash and the other washes east of 32nd Street east along the Arizona Canal to the old Cross Cut Canal and to increase the capacity of the old Cross Cut. Like the COE detention basin alternative, this alternative and its variants do not solve flooding from flows west of 32nd Street.

Task Force member Jasper Hawkins submitted a 48th Street alternative to Reach 4 which was cheaper than Reach 4 because it proposed to use the SRP right-of-way without compensation to SRP or to encroaching property owners. To implement the Hawkins alternative, the Citizens Against Reach 4 suggests that:

"SRP . . . restore the R.O.W. to its original 100% clear condition and move their power poles as far as allowable by regulation" T.F. Doc. # W-7.

In short, Citizens Against Reach 4 wish SRP to suddenly reverse, without compensation, many years of encroachment on SRP right-of-way, disrupting the property of approximately 60 homes and businesses. This issue is now moot, however, as SRP reports that its right-of-way through this area is substantially less than its standard 50 foot from the high water line contemplated by the Hawkins alternative. Therefore, this alternative would not yield the cost savings assumed by Hawkins. See T.F. Doc. # X-22.

Two Reach 4 opponents have submitted alternatives seeking to avoid the disruption of homes and businesses caused by the Hawkins 48th alternative. It is, however, unlikely that either can be implemented within the SRP right-of-way. One submitted by Ron Pulice involves construction of a box culvert under the Arizona Canal. The Pulice alternative further assumes that SRP would agree or could be compelled to accept his proposed construction method in reliance on the assumption it would be completed during the annual 30-day canal dry-up periods. See T.F. Doc. # W-13 and W-14. The Pulice alternative does not itemize costs and assumes that SRP will pay all the costs of a south retaining wall, backfill, and relocation of power lines. T.F. Doc. # W-13. SRP has not agreed to undertake these costs and presently

opposes the alternative as formulated because it is not confident construction can be completed during its annual "dry-up" periods or that it will not endanger SRP structures.

The Pulice alternative also does not acknowledge the additional costs required along the Cross-Cut Canal because the bottom of the box culvert will be at least 22, and perhaps more than 34 feet below grade where it intersects the Cross-Cut Canal. See T.F. Doc. # V-9 Weesner letter, November 12, 1985, attachment at page 1, paragraph 3. Finally, the COE has indicated that while the Pulice alternative is probably technically feasible, it would require replacement of bridges not contemplated in the cost estimates by Pulice and that construction would be much more expensive than contemplated by Pulice. T.F. Doc. # X-20.

The final 48th Street alternative variant was presented by Rostland Engineer, Scudder Gookin. This alternative called for tunneling two pipelines under the Arizona Canal and the upper portion of the Cross-Cut Canal. The channel from the intersection of the tunnels with the old Cross-Cut to the Salt River would be dramatically bigger than the old Cross-Cut Canal. Information provided by the Corps and the City of Phoenix indicate that this mole technology is substantially more complicated than suggested by Gookin, and that mole cost estimates cannot be simply extrapolated from one project to another, T.F. Doc. # X-20 and Y-5. Assuming, however, that costs could be extrapolated from the contractor's bid for storm drains along the Papago Freeway and adding the additional costs of the sediment basins and non-recoverable Reach 4 costs, it seems likely that this mole alternative will cost more than \$98 million*, plus the costs of inlet and outlet structures.

All of the 48th Street alternatives suffer to a greater or lesser degree from another problem. Each requires the disruption of homes and businesses along the Arizona Canal between 40th and 48th Streets and transports the aesthetic problems from the Reach 4 area to between 40th and 48th Streets along the Arizona Canal and the old Cross-Cut Canal area. The Hawkins and Pulice alternatives alleviate the effect between 40th and 48th by placing the channel under the canal, but uses a technology which could be used along Reach 4 at roughly the same costs. In any event, when the necessary costs are added to these estimates, these alternatives are substantially greater than Reach 4. Although the aesthetic impact on 48th Street of replacing the open Cross Cut Canal with an open concrete channel is less than adding an open concrete channel along Reach 4, such a channel would still be larger than the existing canal. The aesthetic impact of an open channel between 40th and 48th Streets is as bad as in Reach 4 and the disruption of homes and office buildings is worse than in Reach 4.

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. The City is exploring the possibility of using the 48th Street/Old Cross-Cut corridor for a transportation corridor and a flood control project for the Arcadia area and the area between 40th and 56th Street along the Arizona Canal. To use the corridor for Cudia City Wash flood control without including these other projects would be

*Chairman's Note: Should read "cost more than \$91,456,000."

unwise since it would preclude these other projects. Unfortunately, it is inconceivable that an integrated project could be designed in time to be reasonably assured of completion by the time Reaches 2 and 3 are constructed. In any event, neither plans or cost estimates are available and there is no indication that it would be a less costly method of solving the Cudia City Wash flood problem than Reach 4.

C. 40th Street Drain

In 1974 the Town of Paradise Valley proposed a drain under 40th Street as an alternative to the ACDC. The Corps reported that it had analyzed the alternative and determined that it would cost \$45 million, \$6 million more than its estimate for Reach 4. Design Memorandum, March 6, 1976, at 73-74. The Corps rejected that alternative at the urging of the FCD not only because of the higher cost, but also because it did not provide protection for inflows between Cudia City and Dreamy Draw.

A recent Corps cost update indicated the cost would be nearly \$112 million plus the non-recoverable costs for Reach 1. Local costs are estimated at \$33.8 million. As a cheaper alternative for the 40th Street drain, Task Force member Jasper Hawkins suggested using a "mole" to drill a drain tunnel from the Arizona Canal to the Salt River. Like the cost estimates for the 48th Street "mole" alternative, this alternative uses the bid for a drain for the Papago Freeway as the basis for his estimate. This technology is substantially more complicated than other construction technology and cost estimates cannot accurately be extrapolated from one project to another. In addition, the alternative fails to provide for the costs of necessary channelization of the Salt River or of dry well or other pipe drainage features. In short, it seems likely that this alternative will prove more costly than Reach 4.

D. Use of SRP Right-of-Way

It has been suggested that Reach 4 or one of the alternatives should be built in the SRP canal right-of-way. Citizens Against Reach 4 have pointed out that this is Federally owned land administered by the Bureau of Reclamation and that therefore it should be used for flood control purposes. Use of the right-of-way would require approval by the Bureau and there has been no indication that it would be willing to grant such approval. In fact, both the Corps of Engineers and the Salt River Project have expressed serious concerns about the structural integrity of the canal if the channel is constructed too close to the canal walls. Task Force member and SRP employee Don Weesner has indicated that he feels at least 30-35 feet is necessary between the channels to ensure their integrity and to provide adequate space for the heavy machinery used periodically for canal cleaning and maintenance.

The possibility of combining the ACDC with the Arizona Canal was studied by the COE in the early 1970's. Four different plans were considered, however, none were acceptable to the Salt River Valley Water Users Association. (This association manages the SRP irrigation project and operates and maintains the transmission and distribution system within the Project's 250,000 acre area.) Primary reasons for the rejection of this alternative included conflict in operational requirements between water supply and

flood control; insufficient storage capacity for the water distribution system, maintenance problems in removing sediment deposits; and high maintenance and operation costs associated with the use of pumps. Design Memorandum, Sept. 1976 at 66-67. See also Summary of Alternative Plans, prepared by FCD, T.F. Doc. # F-7.

Other proposals for the use of SRP right-of-way involve placing portions of Reach 4 or its alternatives in covered conduits in or under the Arizona Canal. These alternatives require substantial construction during the annual dry-up period. SRP has expressed concern about ensuring that the Arizona Canal is not shut down for any length of time substantially longer than its annual one month dry up period when canal maintenance work is performed. If construction were to take longer than anticipated, then the Arizona Canal would be unable to provide water to its agricultural customers as well as municipal water treatment facilities. This could have serious ramifications for those sources dependent on this water supply.

SRP is also concerned about the interference such an encroachment of right-of-way would have on the placement of utilities, their own as well as other entities. SRP recognizes the economic potential for leasing this right-of-way for cable, fiber optics, etc.

Finally it has been suggested that Reach 4 might simply be built closer to the Canal. No evidence has been presented to the Task Force to indicate that simply moving the ACDC closer to the Arizona Canal would produce cost savings. In fact, construction costs would increase considerably as would the risk during construction. Design Memorandum, March 1976 at 67. Some land acquisition costs probably could be avoided, however, such a plan would not eliminate, but only reduce the size of the ACDC right-of-way. In any event, most of the needed land has now been purchased and a substantial portion of these costs are non-recoverable. Most important is that moving the ACDC closer to the Arizona Canal would not improve the aesthetics of the project. In fact, it would reduce the space available for landscaping and would constrict the location of the pedestrian and equestrian paths, increasing rather than reducing the aesthetic impact.

E. Non-structural Alternatives

The Committee has also received information on a "non-structural" alternative to Reach 4. That alternative would be for the City to require, or strongly encourage, the purchase of flood insurance in flood areas affected by the Reach 4 Canal overflow. That alternative is surprisingly costly.

The City's Flood Plain Management engineer has projected that the present worth (using a 3-1/4% discount rate) of flood insurance premiums at current rates for a Zone B Hazard Area is \$77 million. T.F. Doc. # T-7. If, as is very likely, the area is remapped to reflect the actual flooding hazard, the present worth of premiums would increase to \$163,171,000. These estimates are undoubtedly very conservative. First, it is projected that Federal Flood Insurance subsidies will be eliminated by 1989 and average residential flood insurance premiums will increase from the current \$237 per annum to \$400 per annum. Second, the estimates ignore the flood insurance premium costs of property owners in the ponding area along the north side of the Arizona Canal,

many of whom presently are required to purchase insurance. Finally, the estimate assumes that there are only 2,400 homes in the flood area south of the Canal. Id. In 1972, 2,600 homes were damaged south of the Canal from the 30th Street through 40th Street overflow areas alone. Moreover, other homes were damaged by canal overflows near 20th Street, 18th Street and 16th Street. 22 June 1972 Flood Report, at 45, 48. Moreover, the 1972 flood in the Reach 4 area was approximately a 50-year flood. Many more residences would require insurance if the flood insurance were required in a 100 year flood plain. The number of residential units affected by a 100 year flood would be considerably greater than that affected by the 50 year flood. See, e.g., Table 16, Economic Appendix; Design Memorandum, March 1976, and T.F. Doc. # J-10.

The insurance option is not only expensive but it does not reduce the City's emergency expenses or provide the other ancillary benefits provided by Reach 4. In addition, there is some unfairness in requiring those within the flood plain to bear all the costs. Normally, it is fair to have those who benefit from flood control bear the costs. Here, however, we do not have a flooding problem created by people who knowingly built in a flood area, but a flooding problem caused because the washes and flow paths below the Canal were obliterated by farming long before the houses were built. For all these reasons but particularly because of the high apparent cost, flood insurance does not appear to be a sound alternative.

There is one other "non-structural" alternative that should be reviewed simply because it was mentioned before the Task Force on several occasions. That is a sort of "self insurance." It was suggested that a sum equal to the costs of Reach 4 be banked and the interest used to pay for damages. It was suggested that this nest egg could easily draw interest at 10% which would pay for any flood damages.

There are several problems. First, of course, there are presently no safe long-term investments yielding anything close to 10% without risks to the principal. Second, in the real world, unlike the world of cost/benefit analysis, future damages are not inflation free. Nominal interest rates include both "real" interest and an inflationary expectation. No fixed income investments in this country has historically earned as much as two or three percent "real" interest over anything approaching a 100-year period. Two or three percent would not yield sufficient funds to pay projected average annual damages. Moreover, just as the real world does not share "inflation free damages," it does not have "average annual damages." A particular year may have much greater than average damage and may substantially consume the principal.

The "bank account" or "self insurance" is a purely hypothetical alternative argument in any event. Federal funds are not available for such a purpose. The scheme is not only economically unsound but it also suffers from all of the benefit shortages that characterize the flood insurance alternative. In short, even if the alternative was more than hypothetical, it would be unsound.

F. Summary

In summary, the only known reasonably priced alternatives are detention basins or the 48th Street Old Cross-Cut Canal alternatives. The known 48th Street alternatives are much more expensive than Reach 4 or assume that the channel will be built within the SRP right-of-way which is probably not possible and certainly more expensive than estimated. Any other 48th Street alternative is many years from implementation. It is unlikely that any alternative except a detention basin alternative could obtain Federal funding comparable to Reach 4 or be put in place in time to achieve cost savings for down-sizing Reaches 2 and 3. Without the cost savings from down-sizing Reaches 2 and 3, the relative costs of almost any known alternative (including a detention basin alternative) would be much greater than the costs to complete Reach 4. Although the detention basin alternatives are attractive, they would dramatically increase the local costs and are opposed by the Town of Paradise Valley. Moreover, the aesthetic impacts of detention basins have not been considered by the Task Force.

G. Funding for Alternatives

Apparent national political and fiscal realities complicate the evaluation of alternatives. After considerable analysis by Corps officials, the Corps has taken the position, since at least 1976, that Reach 4 is a modification permitted under the original 1965 Federal authorization of the Phoenix and vicinity project See T.F. Doc. # X-3. Congressman Eldon Rudd's office has also indicated that the Congressman believes the addition of Reach 4 to the project was within the Corps' authority.

Corps representatives at the project level express grave doubt that alternatives which involve the diversion of waters and entirely different routes could be made today without a separate Congressional authorization. The validity of this concern has been confirmed by several Congressional staff. A letter by Congressman McCain to determine whether alternatives could be considered under the original authorization has thus far gone unanswered.

Since detention basin alternatives have been previously considered by the Corps and do not involve routing the flood waters through an entirely new and unstudied area, it is possible that this alternative could be included in the current authorization if the benefit/cost ratios were compatible to Reach 4. It appears, however, that any alternatives other than detention basin alternatives would have to obtain new Congressional authorization. Any such alternative requiring new authorization would have to be evaluated at the current discount rates. These discount rates would almost certainly preclude the project because of the high right-of-way acquisition costs. New authorization would not only carry much higher local costs for lands and damages, but would also carry much higher local funding requirements. Most critically, authorization of a new project is not assured no matter what the benefit/cost ratio. It appears that this will be the first Congressional session in a number of years in which Congress has approved significant water projects. Both because of the budget situation and opposition by members of Congress, it is likely to be some time before additional western water projects are authorized. Another factor in delaying authorization is the continued debate in Congress about the level of local funding requirements for such projects.

Even if an alternative could be funded through the Federal process, the process of evaluating new projects and reasonably anticipatable budgetary constraints suggest it would take many additional years to study and complete an alternative to Reach 4. These additional years are years during which business and residential areas in Northeast Phoenix would be subject to flooding from Cudia City Wash and the small drainage areas of Reach 4. In any fair comparison of benefit/costs of alternatives, this would be a factor in favor of Reach 4.

VI. LOCAL LIABILITY WITH AND WITHOUT REACH 4

The Task Force has received information on three local liability issues. These are: First, whether the City or the FCD could be sued for flood damages if Reach 4 is not built. Second, what is the present flooding liability of local governmental units. Third, what is the potential flood damage liability of the Flood Control District and the City if Reach 4 or an alternative is built.

A. Liability for not Constructing Reach 4

Several Task Force members have raised the issue of whether the City of Phoenix or the FCD could be sued for flood damages if Reach 4 is not built. The City Attorney has refused a Task Force request that he address the issue; however, such liability appears unlikely. The attorney for the Flood Control District in T.F. Doc. # J-11 has commented:

Question: Would the Flood Control District be liable in tort for possible future flood damage if it withdrew its sponsorship of a portion of the ACDC?

Answer: No. Arizona law provides immunity to governmental entities for certain policy decisions. The decision to build a flood control project is a question of discretionary administrative or political policy. However, withdrawal of FCD sponsorship of any portion of the ACDC might constitute a breach of its contractual agreement with the federal government and possibly subject it to suit.

Question: Do other municipalities, which are contiguous to and will "contribute" runoff to the flood waters in the ACDC, have a legal responsibility to control flood waters before they reach the ACDC?

Answer: Municipalities have no greater or lesser responsibility to control water in natural washes than any other landowners. They would be liable should they undertake a project and damage adjacent landowners. Their decision not to undertake flood control or drainage projects presumptively enjoys the same immunity previously discussed in regard to the District.

B. Present Flood Damage Liability

Currently the only local government or quasi-governmental interests which appear to have a risk of liability from flooding along Reach 4 is the SRP or technically, the Salt River Valley Water User's Association, and the Salt River Project Agricultural Improvement and Power District (a political subdivision of the State of Arizona). The SRP has been the subject of flood damage lawsuits arising out of the operation of its canals. The ACDC would dramatically reduce the likelihood of such liability.

C. Flood Damage Liability from Construction or Operation of Reach 4 ACDC

Rostland, Inc. and the Citizens Against Reach 4 have argued that:

Because local governments have been required to hold the Corps of Engineers harmless for any damage resulting from the ACDC, it is clear that the Maricopa County Flood Control District, and perhaps the City of Phoenix, may well be forced to shoulder the liability for damage attributable to any inadequate design of Reach 4. No consideration was given to these potential costs in the Corps' cost/benefit analysis of Reach 4.

T.F. Doc. # E-3, Tab 2 at 12.

This argument appears overstated in several respects: First only the FCD, not the City, was required to hold the U.S. Government harmless. Second pursuant to U.S.C. § 1962d.15 (Public Law 93-25L, § 9), the "Hold and Save" clause was modified to add "except those damages due to the fault or negligence of the United States or its contractors." See Addendum to Design Memorandum No. 3, October 13, 1977. Third, the liability suggested by Rostland and attorneys is not for simple "inadequate design" but for introducing flood damage in an area where it would not have occurred.

The attorney for the Flood Control District has commented in T.F. Doc. # J-11:

Question: Would the Flood Control District be liable for damage caused by flood waters escaping the completed channel?

Answer: The District serves only as local sponsor for the project. Its responsibilities and liabilities are outlined under its "221 Agreement" with the Corps, and include maintaining and operation of the completed project in accordance with Corps regulations. The liability of the District for escaping flood waters would be contingent on a factual showing of negligence by the District in its maintenance or operation of the project.

Notwithstanding this comment it appears quite possible that either the Federal Government and the Flood Control District or both will be held liable in damages if the ACDC introduces or increases flooding in an area flooding occurred. The Corps has considered the possibility and concluded there is little risk of such damages:

When floods exceed the design discharge, ACDC flows will overtop the left (south) bank of ACDC and fill the existing Arizona Canal. Reaches of the Arizona Canal north-bank elevations equal to or less than the south-wall height of the ACDC and the numerous bridges with low clearance above the top of the ACDC walls will ensure a distributed overflow from the ACDC to the Arizona Canal. The Arizona Canal, which was in place before the existing urban development, has overflow spillways for floodflows. Hence, floods in excess of a 100-year event will cause flooding in downstream areas at the same locations as have historically occurred; however, those floods will be reduced in magnitude by the conveyance of floodwater westward in the ACDC.

Design Memorandum, September 1985. T.F. Doc. # T-3, at 77-78.

The Task Force has identified four potential ways the ACDC could cause or increase damage by diverting flood waters:

1. The reduction in capacity of the ACDC at the covered portion near the Biltmore;
2. Flooding from over flows when ACDC capacity is exceeded;
3. Flooding north of the channel from channel failure; and
4. Flooding south of the channel from channel failure.

Of these only the last is a significant possibility.

The first three possibilities are without foundation. First, Rostland's engineer has admitted that the current design which calls for 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 at the covered section near the Biltmore. Second, as noted above, because the ACDC is entrenched, overflows from the ACDC will not flood new areas but will merely occur where they would have occurred before the ACDC was built. Third, because the channel is entrenched below the grade to the north, even a channel failure would not introduce flooding to the north.

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. The attorneys for the Rostland and Citizens Against Reach 4 make the curious argument that "development has completely obliterated" that path. T.F. Doc. # J-20 at 2. That is true, but Reach 4 will dramatically reduce, not increase, the quantity of water which will flow through existing neighborhoods.

The only realistic possibility of liability to the Corps or the FCD is if the channel fails and introduces water into new areas or in increased amounts to the south. This possibility was raised by Scudder Gookin, an engineer hired by Rostland and the Arizona Biltmore Homeowner's Association. He concedes, however, that the conditions for such failure can occur only rarely. The risk of liability is minimal because the risk of channel failure is low and the flows from failure would be limited.

Engineers including those from the Corps, the FCD, the City and those who are on the Task Force argue that the risk of channel failure is small. The channel will be entrenched below grade to the north. The north bank of the Arizona Canal will be either higher or only slightly lower than the south wall of the ACDC. No water can escape to the south until the north and south banks of the Arizona Canal and the south bank of the ACDC fail. Moreover, flows must exceed peak (100 year flood) capacity for long enough to scour away the north bank of the canal before the channel would be exposed to failure. Since the desert floods are high peak and relatively short duration, the possibility would occur rarely, only in floods substantially greater than 100-year floods. Even then the risk of failure is small because the channel is of reinforced concrete and, because, as a result of the gradual slope, the water velocity is relatively low. Finally, since the channel is deep and entrenched, even in the event of channel failure not all water would be released but only that portion flowing above the elevation of the land near the south bank of the Arizona Canal.

Since the Arizona Canal is constantly decreasing in depth and volume and the channel is increasing, the top water level of the channel is constantly decreasing in relationship to the bottom of the Arizona Canal. Design Memorandum, Sept. 1985, Plates 30 through 33. Channel failure is most likely to occur where the most water intersects the ACDC. These are areas which would experience flooding without the ACDC and therefore, the liability would likely be limited to the net increase in damages caused by the failure. This net increase would be limited even after channel failure because the portion of ACDC below grade would continue to convey water as the peak flows subsided.

All things considered, the likelihood of flood damage being caused or diverted as a result of the ACDC appears remote. The risk of liability, if any, would rest on the Federal Government and the FCD who have no hesitancy about accepting it.

D. Personal Injury Liability From Construction or Operation of ACDC

One other area of potential liability has been raised, liability for damage for injury or death from persons falling into the ACDC. This is a real risk but not a great one. The County of Los Angeles Department of Public Works maintains 470 miles of open concrete channels. Its records since 1978 reflect only 10 major injury claims and no fatalities from falls in open channels. T.F. Doc. # V-5.

Members of the Task Force who visited Los Angeles noted approximately 5 foot chain link fences along the county's open channels. In contrast, the ACDC as designed calls for 6 foot fences. The FCD staff will recommend, that to the extent possible, the fence be similar to the wrought iron type fence commonly used around schools not only because it is more attractive but also because it is more difficult to scale than chain link.

While the risk of injury and death cannot be precluded, risks are often posed by public facilities including highways, bridges, overpasses, even the Arizona Canal itself. The risks posed by the channel will be obvious. If the fencing is maintained, scaling the fence will be difficult. Since it is unlikely that there will be any injury to young children or to those who are merely careless, it is unlikely that the FCD will incur liability unless it is negligent in maintaining the fence.

Like all public projects, the ACDC does pose some risk of liability. The entities who bear the risks are satisfied to undertake them. Similar risks are posed by the structural alternatives to Reach 4. Necessarily each requires numerous man made structural improvements and either damming or redirecting flood waters through areas it would not otherwise pass. On balance, risks of liability do not appear to be substantial.



APPENDIX I

BACKGROUND AND HISTORY
ACDC and REACH 4

1. New River and Phoenix Streams Project

In 1959, at the request of local governments, the Army Corps of Engineers began formulating a comprehensive flood-control plan for the Phoenix area.^{1/} This request came as a result of increasing concerns about the threat of flooding after four floods in the previous ten-year period. The flood-control master plan eventually developed by the Corps consisted of five geographical phases: Phase A, Indian Bend Wash from the Arizona Canal to the Salt River; Phase B, New River and Phoenix City Streams; Phase C, Glendale-Maryvale area and South Phoenix; Phase D, Salt River downstream to the Gila River; and Phase E, Indian Bend Wash north of the Arizona Canal. The Arizona Canal Diversion Channel (ACDC) is a component of Phase B of the master plan, the New River and Phoenix City Streams Project. Phases A and B have been authorized by Congress as flood control projects. Phases C through E were subsequently incorporated into the Phoenix Urban Study.^{2/}

Phase B, the New River and Phoenix City Streams project, Phoenix, Arizona, and Vicinity project, was authorized by the Flood Control Act of 1965 (Public Law 89-298, 89th Congress.) The authorized plan, New River and Phoenix City Streams, is described in House Document 216, 89th Congress, 1st Session.^{3/}

The purpose of the flood control project is to protect people from flood-flows originating in the 2,695 square mile mountain and desert drainage area north of Phoenix. Many streams including Cudia City Wash, Dreamy Draw, Cave Creek, Skunk Creek, New River, and the Agua Fria River drain flows from this mountain and desert area to the Phoenix area. Currently, a major factor in Phoenix area flooding is the interaction between the Arizona Canal (an irrigation water delivery system flowing to the west) and the many streams which intersect the canal. Urban development has obliterated the historic courses of these streams below the canal. The problem is worsened by overland drainage from the north. The raised canal bank traps the floodwaters until they overtop the canal. During flooding, flows from these streams have broken

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1. U.S. Army Corps of Engineers, Los Angeles District, paper entitled Arizona Canal Diversion Channel, Part of the Authorized Flood Control Project of the U.S. Army Corps of Engineers for Phoenix and Vicinity, at 1-2 (June, 1985) [hereinafter cited as COE paper ACDC, June, 1985]. (T.F. Doc. No. F-6)
 2. U.S. Army Corps of Engineers, Los Angeles District, New River and Phoenix City Streams; Design Memorandum No. 3, General Design Memorandum--Phase I, Plan Formulation, Main Report, at 1-2 (1976) [hereinafter cited as 1976 Design Memorandum]. (Reference Library Document No. COE-2)
 3. Id. at 2.

through and over the canal. The flooding problem has become more severe as urban development north of the canal increases and runoff has become greater.^{4/}

As authorized by Congress, the New River and Phoenix City Streams Project called for construction of dams and diversion channels designed to control flood waters from the Dreamy Draw, Cave Creek, Skunk Creek and New River drainage areas.^{5/} As a component of the authorized plan, the Arizona Canal Diversion Channel ("ACDC") was to be constructed from 12th Street, Dreamy Draw to Skunk Creek in the vicinity of 75th Avenue, a distance of approximately 12 miles.^{6/} The ACDC was designed to run parallel to and upstream from the Arizona Canal in order to intercept floodwaters from the Phoenix Mountains and from Dreamy Draw, Cave Creek and several minor tributaries, as well as from uncontrolled overland flow and storm drains.^{7/}

As with all Federal flood control projects, Congress conditioned its authorization of the Phoenix and Vicinity project on local commitment to accept certain obligations and requirements of cooperation with the Corps of Engineers.^{8/} Local authorities were required to: (a) provide without cost to the Federal Government all lands, easements and rights-of-way necessary for the project; (b) perform and bear the cost of all necessary construction, modification or relocation of highways, roads, bridges and utilities; (c) hold the Federal Government harmless with respect to damages due to construction except those damages due to the fault or negligence of the United States or its contractors; (d) maintain and operate all works after construction; (e) prevent encroachment on channels or within detention basin areas; and (f) hold the Federal Government harmless with respect to water-rights claims resulting from construction, maintenance or operation of the Project.^{9/} Congress also required that before the start of any construction on the Project, local authorities must agree to contribute 2.3 percent of the cost of construction.^{10/}

Following the authorization of the project in 1965, the Maricopa County Flood Control District sought to provide the required local financial support by asking Maricopa County property owners to approve a \$22.7 million county bond issue which included the ACDC and other flood control projects. The

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4. COE paper ACDC, June, 1985.
 5. 1976 Design Memorandum at 5.
 6. Id. at 8.
 7. Id. at 5.
 8. Id. at 2.
 9. Id. at 2-4 and Addendum at 3.
 10. Id. at 4.

proposal failed at the polls by a 3-1 margin.^{11/} Subsequently, the necessary assurances of local commitment to accept these obligations and requirements were provided by the Board of Directors of the Flood Control District of Maricopa County in resolutions of October 23, 1967 and December 6, 1971.^{12/} The Corps of Engineers thereafter began construction of Phase One of the project, Dreamy Draw Dam, which was essentially completed by August, 1973.^{13/}

2. Addition of Reach Four

The historical flood of most relevance to Reach 4 occurred in 1972:

On the morning of June 22, 1972, a heavy thunderstorm hit northeastern Phoenix. The maximum unofficial intensity reported was 5.25 inches during an estimated 2-hour period in the vicinity of 24th Street and Camelback Road in Phoenix. The storm in the Phoenix area was highly localized centering on an area of 10 square miles (4 inches or more) in the vicinity of Squaw Peak. Heavy runoff occurred from the south slopes of the Phoenix Mountains; and sheetflow inundated large areas in Paradise Valley and on the southwest slopes of the McDowell Mountains. Flooding occurred along Indian Bend Wash from Paradise Valley through Scottsdale and Tempe to the Salt River. A U.S. Geological Survey recording stream gage at Indian Bend Road indicated a peak discharge of 17,000 cfs [cubic feet per second]. In addition, an estimated 3,000 cfs flowed across Indian Bend Road for a peak flow of 20,000 cfs. This flood is estimated to have a frequency of occurrence of once every 70 years. Flooding also occurred at the Arizona and Grand Canals as floodwaters ponded behind the canal levees. Peak discharges ranged from 4,200 cfs estimated on Cudia City Wash 1,000 feet upstream from McDonald Drive (approximately a 50-year flood) to 860 cfs on Dreamy Draw at 16th Street. Immediately following the flood, the Los Angeles District conducted a flood damage survey. The results of this survey were published in the "Report on Flood of 22 June 1972, Phoenix Metropolitan

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11. "Flood Plan Rejected By 3 to 1," Arizona Republic, March 9, 1966. (In Reference Library Doc. No. OT-10)
 12. Design Memorandum No. 3, Supplement to Main Report, Correspondence, at SB-8 (Resolution of the Flood Control District of Maricopa County, Arizona, December 9, 1974).
 13. Design Memorandum No. 3 at 101.

Area, Arizona" dated October 1972.^{14/} The survey revealed that the principal areas of flood damage were along a 14-mile reach of Indian Bend Wash (\$1.9 million damages); along 16 miles of the Arizona Canal from Cave Creek to Indian Bend Wash (\$1.8 million damages); along eight major breaks in the Arizona Canal (\$4.3 million damages); along 8 miles of the Grand Canal from 15th Avenue to 44th Street (\$1.7 million damages); and along four breaks in the Grand Canal (\$0.9 million damages). The total damages due to flooding (1972 price level) were estimated at \$10.6 million. Under present (1975) conditions of development and price levels, these damages would amount to about \$15 million. The proposed Arizona Canal diversion channel would prevent 70 percent of these damages which would amount to approximately \$7.5 million (1972 conditions) or \$10.5 million (1975 conditions).^{15/}

During the June 22, 1972 flood over 3,000 acres were flooded, including residential, commercial, and public properties, as well as irrigation works.^{16/} Of the estimated \$4.3 million in flood damages incurred below the Arizona Canal, \$3.8 million in damages resulted from breaks in the Arizona Canal at 32nd and 40th Streets.^{17/}

Following the flood of June 22, 1972 the Maricopa County Flood Control District and the City of Phoenix requested 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). (This extension is known as Reach Four).^{18/} This reach of channel, which was not a part of the authorized plan, was requested to intercept floodflows generated in the Phoenix Mountains just north of the Arizona Canal. Major washes, including Cudia City Wash, intersect the Arizona Canal between 36th and 40th Streets.^{19/}

The Corps of Engineers undertook a study to review the New River and Phoenix City Streams, Arizona, flood control project, as authorized, to either reaffirm the plan or reformulate and develop a plan more suitable under

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14. T.F. No. I-5 (COE #38), Report on Flood of 22 June 1972.
 15. Design Memorandum No. 3 at 29. (Footnote added).
 16. Id. at 33.
 17. Id.
 18. Id. at 72. See text at Note 43 through 44, infra, for the location of Reaches 1, 2 and 3.
 19. Id.

existing conditions, taking into account environmental and technical considerations, economic feasibility, social impact, and public opinion and needs.^{20A/} The results of that study are contained in Design Memorandum No. 3. The study concluded that flooding from overtopping of the Arizona Canal was a danger to residential and commercial development primarily in the area of Cave Creek and in the area east of Cave Creek. It estimated that, in 1976, the canal overtopping area east of Cave Creek (the area protected by Reach 3 and Reach 4) contained 21,500 single-family residents (housing approximately 59,100 people), the Biltmore Shopping Center, and various strip commercial facilities.^{20B/}

As part of their review of the project, in April 1974, the Corps of Engineers held a public hearing soliciting input on six alternative plans to the plan for the entire New River and Phoenix City Streams Project including the ACDC as authorized by Congress in 1965.^{21/} Alternative 1 called for no additional flood control construction, and Alternative 3 called for construction of dams only.^{22/} The remaining four alternatives (2, 4, 5a and 5b) envisioned construction of an extended ACDC from 40th Street to Skunk Creek, which included Reach Four. Alternative 2 included a Cave Creek diversion channel (in addition to the Arizona Canal) and a change in location of Adobe and Cave Buttes Dams. Alternative 4 consists of the same channels described under Alternative 2; however, they would be larger to convey greater discharges because of the elimination of the dams. Under Alternative 5a, Cave Buttes, Adobe and New River Dams would be built as well as the Arizona Canal and Cave Creek diversion channels. Alternative 5b is basically the same as 5a except that the Cave Creek diversion channel would be eliminated.^{23/}

On May 7, 1974, the Phoenix City Council adopted a Resolution endorsing Alternative Plan 5b.^{24/} In its Resolution of May 7, 1974, 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."^{25/}

20A. Id. at Syllabus, page i.

20B. Id. at 34.

21. U.S. Army Corps of Engineers, Los Angeles District, New River and Phoenix City Streams; Alternative Plans for Flood Control and Recreational Development (circulated in April 1974; published in final form in April, 1977). (In Reference Library Doc. No. COE-17).

22. Id. at 32-33, 40-41.

23. Id. at 36-37, 44-45, 48-49, 52-53.

24. City of Phoenix, City Council Resolution Number 14324, May 7, 1974. (In Reference Library Doc. Nos. CP-3 and CP-10).

25. Id., Section 2.

Eventually, the Corps of Engineers chose to add Reach Four to the ACDC. However, prior to reaching that decision, the Corps considered three options for controlling flood flows from the Cudia City Wash, the first being the addition of Reach Four:

- OPTION A. Extend the ACDC eastward from Dreamy Draw to Cudia City Wash with adequate capacity to convey Cudia City Wash peak discharges (up to the 100-year flood) and intercepted 100-year flood flows west to Skunk Creek;
- OPTION B. Construct a number of small detention basins in the Cudia City Wash drainage area (within the Town of Paradise Valley) to reduce peak discharge, together with a diversion channel, extend a small channel upstream from Dreamy Draw to Cudia City Wash with adequate capacity to convey the reduced peak discharges and intercepted flood flows to Skunk Creek; and
- OPTION C. Construct a collector channel along the Arizona Canal from 36th to 40th Street and a box culvert under 40th Street from the Arizona Canal to the Salt River.^{26/}

Option C was first proposed by the Paradise Valley Town Council at or about the time of a Council meeting on October 10, 1974.^{27/} At the October 10, 1974 meeting the Paradise Valley Town Council adopted a motion registering "strong opposition" to the construction of detention basins within the town (as contemplated in Option B) as well as to the proposed extension of Reach Four of the ACDC through the town limits (as contemplated in Options A and B). The Town Council presented Option C (the collector channel and covered culvert down 40th Street to the Salt River) to the Corps as an alternative to the proposed ACDC extension and the detention basins.^{28/}

The Corps reported that the alternative suggested by the Paradise Valley Town Council would require a box culvert at 40th Street that would range in size from 25 to 35 feet wide by 12 to 15 feet deep. The design did not consider side inflows and would have required some channelization of the Salt River. The Corps of Engineers estimated that the cost of this plan would be

26. Design Memorandum No. 3, at 72.

27. Design Memorandum No. 3, Supplement to Main Report, Correspondence at SC-42-SC-43 (Letter of October 20, 1974, from Duncan Brooks to Major Kirkpatrick); Design Memorandum No. 3 at 74.

28. Id.

in excess of \$45 million (1976 Price Level).^{29A/} This exceeded the estimated cost of Reach 4 by \$6 million (1976 Price Level).^{29B/} On December 9, 1974, Herbert P. Donald, Chief Engineer and General Manager of the Maricopa County Flood Control District, affirmed the district's support of the diversion channel plan and recommended to Colonel John V. Foley of the Los Angeles District, Corps of Engineers, that no further consideration be given to the concept of detention basins in Cudia City Wash in view of the Paradise Valley Town Council's opposition.^{30/} Because of this and the probable substantial increase in rights-of-way costs for the detention basins as the area is developed, the diversion channel without the detention basins was the plan recommended by the Corps of Engineers. Although the detention basin plan and the 40th Street drain plan would provide flood protection to the City of Phoenix from flows emanating from Cudia City Wash, these plans would not provide protection from tributary flows emanating from the Phoenix Mountains between Cudia City Wash and Dreamy Draw drainage areas. The Corps reported that an additional reason for selecting Reach 4 over the alternatives was that the City of Phoenix "strongly" desired the diversion channel in Reach 4 to intercept these flows and to provide discharge points for future storm drains.^{31/}

On December 9, 1974, the Board of Directors of the Flood Control District adopted a Resolution endorsing Alternative Plan 5b and providing the necessary assurances of local cooperation and commitment to contribute 2.3 percent of total construction costs.^{32/} After the endorsements by the Phoenix City Council and the Board of Directors of the Maricopa County Flood Control District,^{33/} the Corps of Engineers selected Alternative Plan 5b including Reach Four as the recommended plan for the New River Phoenix City Streams Project. According to the Corps of Engineers, the recommendation was based on engineering, economic, social and environmental considerations, as well as the desires of local interests. More specifically, it was recommended by the Corps of Engineers because:^{34/}

29A. Id.

29B. Id. at 73.

30. Design Memorandum No. 3, Correspondence Supplement, at SA-32.

31. Id. at 74.

32. Id. at 75.

33. Design Memorandum No. 3, Correspondence Supplement, at SB-8--SB-11 and Phoenix City Council Resolution Number 14324, Mar. 7, 1974.

34. Design Memorandum No. 3 at 74, 93-94.

- (a) The plan provides flood protection to the highly urbanized areas along Cave Creek and south of the Arizona Canal.
- (b) The plan provides the maximum net benefits.
- (c) The plan provides a favorable benefit-to-cost ratio.
- (d) This plan has the least impact on the environment as compared to the other plans that provide comparable benefits.
- (e) The plan is compatible with the desires of the general public.
- (f) Nonwater-oriented recreational uses can be developed in the basins above the dams while trails and associated recreation development can be incorporated along the channels.

In March of 1976 the Phoenix City Council reaffirmed its support for the Phoenix and Vicinity project.^{35/} During 1981, the City Council authorized the transfer to the Flood Control District all rights and interests the City had acquired in the right-of-way for the ACDC.^{36/} An intergovernmental agreement with the Flood Control District regarding bridge construction and road and utility relocations for the ACDC was approved in September 1984.^{37/}

On May 7, 1985 the City Council adopted Resolution No. 16558 supporting the construction of the ACDC between 51st Avenue and 12th Street. The resolution reserved endorsement of the ACDC from 12th Street to 40th Street (Reach 4) pending a public hearing. A public hearing on Reach 4 was held May 15, 1985 and in June the Mayor and City Council appointed the Arizona Canal Diversion Channel Task Force to study the Reach 4 issue and to make recommendations to the City Council. (A more detailed chronology of events/actions taken by the City of Phoenix regarding the Phoenix and Vicinity project is attached. See Appendix A).

On November 14, 1985, the Paradise Valley Town Council adopted Resolution No. 488, supporting the ACDC Reach IV as presently proposed with a request for consideration of design alternatives which will beautify the project and minimize its impact on the residents of Paradise Valley. The Council further

35. City of Phoenix, City Council Resolution No. 14624, March 23, 1976. (In Reference Library, Doc. No. CP-8 and T.F. Doc. No. X-10).

36. See Appendix ___ and file entitled "Partial Chronology of ACDC Events Related to the City Council and City of Phoenix Actions." (In Reference Library CP-8 and T.F. Doc. No. X-10).

37. Id.

opposed any alternatives which would construct retention basins in the town of Paradise Valley.^{38/}

3. Design Consideration: Arizona Canal Diversion Channel

Because of its scope, the Corps of Engineers has decided to complete the New River Phoenix City Streams Project in phases.^{39/} Phase One of the Project consisted of construction of the Dreamy Draw Dam, which was completed in 1973.^{40/} Phase Two consisted of construction of the Cave Buttes Dam and was completed in 1979.^{41/} Project phases three and four, respectively, are Adobe Dam, which was completed in 1982, and New River Dam, which is currently under construction.^{42/}

The ACDC will be the final Phase of the Project.^{43/} The ACDC has been divided into four smaller reaches which will be constructed in the following order: Reach One, Skunk Creek to Cactus Road; Reach Two, Cactus Road to Cave Creek; Reach Three, Cave Creek to Dreamy Draw; and Reach Four, Dreamy Draw to 40th Street.^{44/} Construction of the ACDC from Skunk Creek to Cactus Road began in Fall, 1985, with an estimated completion date of September, 1987.^{45/} ACDC construction from Cactus Road to Dreamy Draw is set to begin in March, 1987, with completion estimated in mid-1990. Dreamy Draw to 40th Street is scheduled to begin construction in January 1990, to be completed in late 1991.^{46/}

38. Letter from Joan R. Lincoln, Mayor of the Town of Paradise Valley to Terry Goddard, Mayor of Phoenix, regarding resolution supporting Reach IV, dated November 18, 1985 (resolution attached).

39. Los Angeles District, U.S. Army Corps of Engineers, New River and Phoenix City Streams, Arizona, Overall Master Plan, Design Memorandum No. 4, at 19 (1980) [hereinafter cited as Master Plan].

40. Id.

41. Id.

42. Id.

43. Master Plan, at 19.

44. Id.

45. Flood Control District of Maricopa County, Arizona Canal Diversion Channel Reaches 3 and 4 Notebook, prepared for ACDC Task Force tour. July 27, 1985, Tab 4. (In Reference Library, Doc. No. FCD-3 and T.F. Doc. No. C-2).

46. Id.

As presently designed, the ACDC will extend for approximately 17.3 miles from 40th Street to Skunk Creek. Reach Four of the ACDC will consist of a rectangular concrete channel with a bottom width ranging from 36 to 40 feet and a depth measured on its vertical walls ranging from 21.5 to 25.0 feet.^{47/} The Channel will be entrenched along its entire length to allow inflow to enter over the channel walls.^{48/} The Channel will be modified to a covered box section from the Arizona Biltmore Hotel to 24th Street and in the Sunnyslope High School area due to less available right-of-way and to minimize disruption to these properties.^{49/} A safety fence made of chain link, wrought iron or block will be provided along uncovered sections of the channel.^{50/}

The ACDC is designed to provide protection against 100-year flood flows along its course.^{51/} The Corps analyzed three levels of flood protection for the area south of the Arizona Canal: the Standard Project Flood, the 100-year flood, and the 50-year flood. The Standard Project Flood (SPF) is the flood that would result from the most severe combination of meteorological and hydrologic conditions considered reasonably characteristic of the region. The 100-year flood is the flood that has a one percent chance of occurring in any one year. The 50-year flood is the flood that has a two percent chance of occurring in any one year. The Corps found that improvements to prevent each size flood would be economically justified. However, the Corps also found that improvements to protect against the 100-year flood were in the best overall public interest.^{52/} There were two main reasons.

First, the Corps found that improvements to protect people south of the Arizona Canal against the 100-year flood would result in largest net economic benefits than improvements to protect people from a lesser (50-year) or greater (SPF) level of protection.^{53/}

47. Design Memorandum No. 3 at 105 and Flood Control District Notebook, Tab 5.

48. Id.

49. 1985 Phase II Design Memorandum, at A1-7. Covering at Sunnyslope High School was added subsequent to this report.

50. Response Study Workshops for Esthetic Design for the Arizona Canal Diversion Channel, November 27 through December 12, 1984, at 7; The Arizona Republic, C3, June 9, 1985. (See Reference Library Doc. No. OT-10).

51. Design Memorandum No. 3, at 105. A 100-year flood is a flood that has a 1% chance of occurring in a given year.

52. OCE Review Comments, "December 1976 continued in T.F. Doc. No. X-4 and COE paper ACDC, June, 1985, (T.F. Doc. No. F-6).

53. Id.

Second, the Corps concluded, based largely on local objections, that improvements to protect people from a Standard Project Flood would be too economically and socially disruptive to the Phoenix metropolitan area. Constructing the ACDC to provide SPF protection for residents south of the Arizona Canal would require the Flood Control District to acquire substantially more land than for the authorized project: The Corps of Engineers estimated that SPF protection, which would permanently remove 62 percent more land from the tax rolls in home relocations; increase apartment building relocations by 55 percent; increase business relocations by 63 percent; and require 630 additional acres of flowage easements along Skunk Creek and the New and Agua Fria Rivers to compensate for the additional waters that would be diverted. The Flood Control District has said that since it could not afford the increased costs, it could not continue to support the project if SPF design criteria were adopted for the ACDC.



APPENDIX II

PARTIAL CHRONOLOGY OF ACDC EVENTS RELATED
TO CITY COUNCIL AND CITY OF PHOENIX ACTIONS

The following is a partial chronology of events/actions taken by the City of Phoenix regarding the Phoenix and Vicinity Flood Control Project including the ACDC. Due to incomplete records not all events may be noted.

- 9/17/63 City Council Resolution No. 11537 - Resolution supporting the general concepts of the Flood Control Program proposed by the Flood Control District of Maricopa County.
- 11/1/63 Memorandum from Mr. Glendening to Mr. Vickers concerning the Flood Control District of Maricopa County, Phase B Report.
- 5/11/65 City Council Resolution No. 12041 - Resolution supporting the Bond Election of the Flood Control District of Maricopa County, Arizona, for the sale of Flood Control District bonds to provide funds for Flood Control purposes in the Salt River Bed; in Cave Creek; in Indian Bend Wash; along the north side of the Arizona Canal and through the Old Arizona Cross Cut Canal; near the north slopes of the South Mountains; and along the Grand Canal.
- 2/15/66 City Council Resolution No. 12236 - Resolution supporting "Yes" vote at the March 8, 1966 Special Election re: bonds for comprehensive flood protection program in Maricopa County.
- 10/24/67 City Council Resolution No. 12745 - Resolution commending the Board of Supervisors of Maricopa County for its expressed support of and intended participation by resolution furthering protection from flooding in Phoenix and the vicinity through the construction of Cave Buttes and Dreamy Draw Detention Basins, and pledging the support of the City of Phoenix in this endeavor.
- 9/30/69 City Council Resolution No. 13268 - Resolution providing for the conveyance of necessary right-of-way to the Flood Control District of Maricopa County for the construction of the Dreamy Draw Flood Control District.
- 1/29/70 Memorandum from James E. Attebery, City Engineer, to Mr. Esser, concerning recent activity by the Flood Control District of Maricopa County. It summarized activity involving: Cave Buttes and Dreamy Draw Dams, Union Hills Diversion Channel, and flood damage insurance and floodplain zoning.
- 11/16/71 City Council Resolution No. 13781 - Resolution declaring the need for Federally subsidized flood insurance and asserting assurances that the City has or will provide necessary regulations for land use and control measures with effective enforcement provisions, all for the purpose of providing protection from floods as set forth in the National Flood Insurance Act of 1968 as amended.

- 10/17/72 Request for Council Action prepared by Engineering asking the City Council to enter into an agreement with Flood Control District of Maricopa County which grants easements over City property for the construction, maintenance, flowage, and material extraction necessary for Dreamy Draw Flood Control Dam.
- 11/17/72 Three separate contracts granting the easements necessary to construct, maintain, flow, and excavate material at the Dreamy Draw Flood Control Dam.
- 2/6/73 City Council Resolution No. 14038 - Resolution pledging the support of the Council of the City of Phoenix of a County Flood Control District bond issue to carry out the Flood Control Program recommended by the Maricopa Association of Governments; and urging that such bond proposal be presented to the citizens of the District at an early date.
- 2/6/73 City Council Resolution No. 14039 - Resolution pledging the support of the Council of the City of Phoenix of the construction of Orme Dam at the earliest possible time and further urging other governmental units and citizens of the Salt River Valley to strongly support such construction.
- 12/18/73 Notice that a public hearing will be held before the Council of the City of Phoenix on January 22, 1974 dealing with floodplain regulations.
- 1/21/74 City of Phoenix, Arizona, Proposed Flood Plain Regulations, discussed at public hearing held January 22, 1974.
- 1/22/74 Public hearing held before the City Council dealing with floodplain regulations.
- 2/5/74 City Council Resolution No. 14252 - Resolution authorizing the filing with the Arizona Water Commission the floodplain delineation maps presented at the public hearing held January 22, 1974, to consider proposed floodplain regulations.
- 2/12/74 Ordinance No. G-1343--Ordinance establishing floodplain regulations controlling use of land and construction within the channel and floodplain areas along water courses, streams, and lakes in the City as part of a Floodplain Management Program.
- 4/23/74 Memorandum from Mr. Glendening, Deputy City Manager to Mr. Wentz, City Manager, regarding Flood Control and Storm Drainage Program for the City of Phoenix. With attachments including a copy of a paper presented to the American Society of Civil Engineers October 6, 1972 entitled "Phoenix Flood Control Master Plan."
- 4/24/74 Memorandum from Mr. Wentz, City Manager, to Mayor and City Council, regarding Flood Control and Storm Drainage Program for the City of Phoenix (for April 29, Policy Session).

4/24/74 Memorandum from Mr. Christensen to Mr. Glendening regarding alternative plans for flood control and recreational development.

4/24/74 Memorandum from Mr. Attebery to Mr. Glendening regarding Flood Control Programs.

4/25/74 Public meeting for the purpose of discussing the six alternative plans for flood control developed by the U.S. Army Corps of Engineers.

4/29/74 City Council briefing on the six alternatives and approval of 56.

4/29/74 Memorandum from Warner Leipprandt, Deputy Planning Director to John Beatty, Planning Director regarding Follow-up Memo to Memo dated April 24, 1974 regarding alternative flood plan proposals for the North Phoenix area.

4/30/74 Memorandum from Mr. Glendening, Deputy City Manager, to Mr. Wentz, City Manager regarding Flood Control and Storm Drainage Program for the City of Phoenix on policy agenda, April 29, 1974.

5/7/74 City Council Resolution No. 14324--Resolution endorsing an "Alternative Plan for Flood Control and Recreational Development--April 1974" to be known as "Alternative 5-B" proposing Cave Buttes Dam; Adobe Dam; New River Dam; and Arizona Canal Diversion Channel with recreational facilities.

5/29/74 City Council approval of a proposal that the City reassert directly to the County Board of Supervisors its strong position of support for Alternative 5B.

5/31/74 Memorandum from Mr. Attebery to Mr. Glendening regarding alternatives to flood control - Phoenix and New River Vicinity.

11/22/74 Memorandum from Major W. T. Kirkpatrick, Corps of Engineers, concerning recreational development in conjunction with flood control along New River and Phoenix City streams.

12/5/74 Memorandum from Charles M. Christiansen, City of Phoenix Parks and Recreation Director, to James E. Attebery, City Engineer, concerning his department's recommendation that the City Council approve a resolution regarding recreational development in flood control areas.

12/24/74 Memorandum recommending Council approval of Zoning Application No. 119-74 that states that Arizona Biltmore Estates, Inc. will grant sufficient right-of-way for ACDC from 32nd Street to 24th Street.

- 12/31/74 City Council Resolution No. 14431--Resolution authorizing the City Manager to execute an agreement with the Maricopa County Parks and Recreation Department and the U.S. Army, Corps of Engineers, whereby the City of Phoenix accepts the Maricopa County Parks and Recreation Department as the liaison agent for the entire County for recreational development projects along the various flood control projects instituted by the U.S. Army, Corps of Engineers.
- 6/11/75 Memorandum from Fred Glendening to John Wentz, City Manager, suggesting that the City send a representative to a public hearing that the Federal Insurance Administration is holding in Los Angeles concerning Flood Plain Management Regulation. The City Council authorized the City Manager at its June 23, 1975 Policy Meeting to send a representative to the hearing.
- 2/17/76 Memorandum from James E. Attebery, City Engineer, to Mr. Glendening, Executive Assistant to the City Manager, concerning Phase B portion of the Maricopa County Flood Control Program. (City Council briefing by Corps of Engineers.)
- 3/1/76 City Council Policy Session - consideration of proposed actions on Maricopa County Flood Control Program and endorsement of current Corps of Engineers plan.
- 3/23/76 City Council Resolution No. 14624 re-endorsing the revised plan for Phase B.
- 12/20/76 City Council Report from James E. Attebery, City Engineer, to Mr. Hall, Executive Assistant to the City Manager, concerning a Northeast Phoenix Flood Study. City Council gave approval to participate in Northeast Phoenix flood study. (Consent agenda.)
- 11/18/77 City Council Report from James Attebery, City Engineer, to Robert Brunton, Development Services Manager, concerning the Northeast Drainage Study.
- 11/28/77 City Council briefing on Northeast Drainage Study. Council approval of overall concept and permission to proceed with preliminary design.
- 5/8/78 City Council Report from James E. Attebery, City Engineer, to Robert Brunton, Development Services Manager, concerning flood control activities and programs in the Valley. (City Council policy session briefing.)
- 10/27/78 Use Agreement between Arizona Biltmore Estates, Inc. (ABE) and the Flood Control District of Maricopa County (FCD) allowing ABE to construct a maintenance facility along the Arizona Canal on FCD land and to remove it when FCD is ready to begin constructing ACDC.

- 10/15/79 City Council Report from James E. Attebery, City Engineer, to Robert Brunton, Development Services Manager, regarding revised right-of-way requirements for ACDC from Cave Creek Wash to 43rd Avenue. (City Council policy discussion.)
- 11/23/79 City Council Report from James E. Attebery, City Engineer, to Robert Brunton, Development Services Manager, concerning the National Flood Insurance Program. City Council gave approval to request a time extension for approval of flood hazard maps.
- 10/29/79 Use Agreement between Rostland Arizona, Inc. and the Flood Control District of Maricopa County (FCD) allowing Rostland to construct a BBQ pit, wall, benches, etc., on FCD land and to remove them when the right-of-way is needed to construct ACDC.
- 12/3/79 City Council Report from James E. Attebery, City Engineer, to Robert Brunton, Development Services Manager, concerning the National Flood Insurance Program. (City Council policy briefing.)
- 12/10/79 City Council Report from James E. Attebery, City Engineer, to Robert Brunton, Development Services Manager, offering a brief history of the ACDC and recommending that Council endorse the revised channel and right-of-way concept presented on 10/15/79. (City Council Policy Session. Council gave approval of concept.)
- 1/8/80 City Council Resolution No. 15307--Resolution approving the revised channel configuration and right-of-way requirements for the Arizona Canal Diversion Channel between Cave Creek and 43rd Avenue.
- 5/5/80 City Council approval to draft resolution as described below.
- 5/27/80 City Council Resolution No. 15382 - resolution urging the Board of Directors of the Flood Control District of Maricopa County to increase the present tax levy in order to expedite sorely needed flood control works for the protection of life and property in greater Phoenix and Maricopa County.
- 12/30/80 City Council Report from James E. Attebery, City Engineer, to Robert Brunton, Development Services Manager, concerning a transfer of right-of-way for the ACDC to FCD. City Council authorized transfer of property rights.
- 2/24/81 Ordinance No. S-12398--an Ordinance authorizing the City Manager to grant a permanent drainage easement 132' wide by 1,650' long to Maricopa County at 43rd Avenue and the Arizona Canal for flood control facilities.
- 7/8/81 Special Warranty Deed between the City of Phoenix and the Flood Control District of Maricopa County (FCD) conveying interests in real property to FCD.

- 7/14/81 Use Agreement between Western Savings and Loan Association and the Flood Control District of Maricopa County (FCD) allowing Western Savings to use FCD land along the Arizona Canal for parking, driveways, etc., and to remove them when the right-of-way is needed to construct ACDC.
- 3/29/82 City Council Report from James Colley, Parks, Recreation and Library Director to Charles Christiansen, General Services Manager regarding Arizona Canal Diversion Channel Trail Crossings.
- 4/13/82 Article in the Arizona Republic alleging that the U.S. House of Representatives' Environment, Energy, and Natural Resources Subcommittee suggests that the New River and Phoenix streams flood control project be cancelled.
- 4/16/82 City Council Report from James E. Attebery, City Engineer, to Robert Brunton, Development Services Manager concerning the article carried in the Arizona Republic reporting the suggested cancellation of the ACDC project.
- 4/20/82 Memorandum from Bill Chase, Water Resources Management Advisor, to C. A. Howlett, Executive Assistant to the Mayor regarding New River and Phoenix City Streams Flood Control Project funding, with attached draft letter from Mayor Margaret T. Hance to Congressman Toby Moffett, Chairman, Subcommittee on Environment, Energy, and Natural Resources.
- 5/3/82 Letter from Congressman Eldon Rudd to Mayor Margaret T. Hance regarding the Arizona Republic article that stated that a House Subcommittee suggested that the New River and Phoenix City streams project be cancelled. Congressman Rudd's letter assured that the House Subcommittee on Environment, Energy, and Natural Resources did not recommend that the Phoenix project be cancelled.
- 5/19/82 Letter from William D. Green, LTC, Corps of Engineers, to Mayor Margaret T. Hance regarding her letter to Congressman Moffett and cost estimates for the Phoenix project.
- 1/17/83 City Council Report from James E. Attebery, City Engineer, to Robert Brunton, Development Services Manager, giving the City Council background information on ACDC and alternatives. (City Council policy briefing)
- 4/4/83 City Council Report from James E. Attebery, City Engineer, to Mr. Hall, Street Transportation Administrator concerning street realignment caused by the construction of major public projects. Council approval to procedure for abandoning and relocating City right-of-ways. (Consent agenda)

- 4/11/83 Letter from James E. Attebery, City Engineer, to Robert L. Boyd, Property Acquisition Manager, Flood Control District of Maricopa County concerning the City Council consenting to the realignment of Hatcher Road east of 19th Avenue (see City Council Report dated 4/4/83).
- 5/5/84 Resolution No. FCD84-3--Resolution by the Board of Directors of the Flood Control District of Maricopa County endorsing the design alternative (A-4) for the ACDC.
- 6/19/84 City Council Report from James E. Attebery, City Engineer, to Severo Esquivel, Surface Transportation Manager, concerning a resolution to retain floodplain management authority City-wide.
- 6/26/84 City Council Report from James E. Attebery, City Engineer, to Severo Esquivel, Surface Transportation Manager, concerning the County's and Corps' public involvement program for the ACDC. (City Council Policy Briefing.)
- 8/24/84 City Council Report from James E. Attebery, City Engineer to Severo Esquivel, Surface Transportation Manager, concerning the City's ability to influence the Corps of Engineers' design of the ACDC. (Information Report)
- 9/14/84 City Council Report from James E. Attebery, City Engineer, to Severo Esquivel, Surface Transportation Manager, providing background information on the ACDC as requested by the City Council.
- 9/20/84 Intergovernmental agreement between the Flood Control District of Maricopa County and the City of Phoenix regarding bridge construction and road and utility relocations for the ACDC.
- 12/7/84 City Council Report from James E. Attebery, City Engineer, to Severo Esquivel, Surface Transportation Manager, providing follow-up information on the ACDC.
- 2/12/85 City Council Report from James E. Attebery, City Engineer, to Severo Esquivel, Surface Transportation Manager, providing background information on the ACDC and the recently completed draft General Design Memorandum for the ACDC.
- 2/16/85 City Council Report from James E. Attebery, City Engineer, to Severo Esquivel, Surface Transportation Manager, concerning Corp of Engineers' design of ACDC.
- 2/26/85 City Council policy discussion. Council gave approval to consider a Council resolution endorsing revised concept and aesthetic programs of the ACDC.

- 3/13/85 Memorandum from James E. Attebery, City Engineer, to Roderick McDougall, City Attorney, asking Mr. McDougall to draft a City Council resolution endorsing the revised concepts and aesthetic treatments for the ACDC as described in Mr. Attebery's City Council Report to Mr. Esquivel dated 2/12/85.
- 4/7/85 City Council Resolution No. 16558--a Resolution supporting the construction of the ACDC between 51st Avenue and 12th Street. This resolution reserves endorsement of the ACDC from 12th Street to 40th Street (Reach 4) pending a public hearing.
- 5/1/85 Request for Council Action prepared by Dave Harmon, Assistant City Engineer, asking that a public hearing on the ACDC between 12th Street and 40th Street (Reach 4) be held at the Formal Council meeting on May 15, 1985.
- 5/15/85 Public hearing held before the Phoenix City Council at its May 15, 1985 formal meeting.
- 6/19/85 Arizona Canal Diversion Channel Task Force formed.

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APPENDIX III

SUMMARY OF REACH 4 ALTERNATIVES

I. REACH 4: A 14 acre multi-use sediment basin located on Phoenix Country Day School property at approximately 40th Street connected to an open concrete channel 40 to 50 feet wide which extends northwest in a 60 to 75 foot right-of-way that abuts the northerly line of the Salt River Project (SRP) right-of-way (ROW) to 12th Street. Portions of the 4.6 mile Reach 4 are covered at Stanford Drive east of 32nd Street (1,297 feet) and at the Arizona Biltmore Hotel (4,625 feet). This alternative takes 28 single family homes, 36 apartment units and one office building along the north bank of the Arizona Canal of which all but 4 of the homes have been acquired. These acquisitions detailed by area are as follows:

Area	<u>12th St. to 24th St.</u>	<u>24th St. to 32nd St.</u>	<u>32nd St. to 40th St.</u>
Acquired:	23 Homes (\$2.3 Mil)	1 Home (\$379,000)	4 Homes (\$700,000)
	36 Apartment Units (\$1.3 Mil)		
	1 Commercial Building (\$243,000)		
To Be Acquired:	None	1 Home (Est. \$600,000)	3 Homes (Est. \$700,000)
Totals	23 Homes (\$2.3 Mil)	2 Homes (Est. \$979,000)	7 Homes (Est. \$1,400,000)
	36 Apt. Units (\$1.3 Mil)		
	1 Commercial Building (\$243,000)		

* Does not include number of parcels or cost of partial taking, vacant land or costs of relocation.

Endorsed by the Town of Paradise Valley.

NOTE: Cost estimates for Alternatives I through IV are contained in Appendix IV.

II. DETENTION BASIN ALTERNATIVES

- A. P.R.C. TOUPS (40TH STREET) DETENTION BASIN: A relatively deep detention basin (average 27 foot depth) occupying the entire Phoenix Country Day School site and a smaller basin near 35th Street are drained by two underground box culverts. These culverts are joined by a third which drains the Arizona Biltmore and Arizona Biltmore Estates area and terminate in a reduced size to ACDC at 24th Street. Assumes that all the box culverts would be built within the SRP right-of-way without compensation (presumably the conduits need not be in the SRP right-of-way through the Arizona Biltmore area where the Flood Control District has an easement). Takes at least two homes, 36 apartments and one commercial building, and the entire Phoenix Country Day School, plus 23 homes scheduled to be taken between 24th Street and 12th Street as part of Reach 4.

Requires use of SRP right-of-way without compensation to SRP.

Opposed by the Town of Paradise Valley.

Does not control drainage areas or ponding west of 32nd Street.

- B. STANFORD DRIVE DETENTION BASIN (HAWKINS): A detention basin from 32nd Street to the west 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 (partially within the SRP right-of-way) through box culverts into a reduced ACDC from 24th Street to 12th Street similar to the previous alternative. Takes 19 homes along the Arizona Canal plus 23 homes, 36 apartments and one office building scheduled to be taken between 24th Street and 12th Street.

No updated cost figures or construction details submitted beyond P.R.C. Toups "Conceptual Study Estimates." This alternative was not submitted to the Task Force until December, 1985 although Mr. Hawkins indicated it is based upon material provided to the Arizona Biltmore Estates Homeowners Association by P.R.C. Toups sometime prior to 1984.

Probably opposed by the Town of Paradise Valley although the Town has never been formally presented with this alternative.

Does not control drainage or ponding west of 32nd Street.

- C. PARADISE VALLEY DETENTION BASIN (CORPS OF ENGINEERS): Ten detention basins of varying sizes located along the Cudia City wash and its tributaries draining into the Arizona Canal. Takes an estimated 55 homes, five to seven commercial buildings, the Phoenix Country Day School, and a portion of the golf course at Paradise Valley Country Club. Recent information from the FCD indicates more homes would be needed, but FCD said if implemented, sites should be reconsidered in light of recent development. Opposed by Town of Paradise Valley.

Does not control drainage in the area or ponding west of 32nd Street.

III. 40TH STREET ALTERNATIVES

- A. 40TH STREET CHANNEL (TOWN OF PARADISE VALLEY AND CORPS OF ENGINEERS): Sediment basin (similar to Reach 4) drain into concrete collector channel between 32nd and 40th Streets then into double covered concrete box culverts down 40th Street to the Salt River. The collector channel is open except near 32nd Street. Takes four major office buildings and would cause considerable disruption to business and homes along 40th Street during construction.

Does not control draining or ponding west of 32nd Street.

- B. 40TH STREET CHANNEL (L&H): This alternative is the same as previous alternative option except that it provides for a covered collector channel within the SRP right-of-way to reduce taking of homes or office buildings.

Local costs not calculated.

Requires the use of SRP right-of-way without compensation to SRP. Does not control drainage or ponding west of 32nd Street.

- B. 40TH STREET MOLE ALTERNATIVE (HAWKINS/GOOKIN): Reach 4 sediment basin drains into tunnel constructed by "mole" under utilities, streets and bridges. Extends under the Arizona Canal to 40th Street then south to the Salt River. Proposed to eliminate the need for taking homes or office buildings and the disruption along 40th Street.

Cost figures are very speculative. Mole technology costs depend to a great degree on difficult to predict subsurface conditions and upon the competition for mole equipment at the time of construction. Additional costs may arise because of subsurface conditions including perched water and bedrock.

Does not control drainage or ponding west of 32nd Street.

Local costs were not computed but would be much lower than Reach 4.

Requires the use of SRP right-of-way but is sufficiently below grade so as not to interfere with SRP's use of the right-of-way.

IV. 48TH STREET ALTERNATIVES

- A. 48TH STREET ALTERNATIVE (CORPS OF ENGINEERS): Sediment basin drains into concrete collector channel between 32nd Street and 48th Street. Collector channel is open except for a 1,297 foot section under Stanford Drive. At 48th Street, it would pass under the Arizona Canal into a substantially expanded concrete lined open

channel along the right-of-way of the current Cross-Cut Canal. Because of a steeper slope the channel can be smaller than Reach 4.

This alternative would take 64 homes and three major office buildings and probably would also take large commercial building built over cross-cut canal south of Washington.

Does not control drainage or ponding west of 32nd Street but it picks up flows intersecting the Arizona Canal between 40th Street and 48th Street and flows intersecting the Old Cross-Cut Canal from the east.

- B. 48TH STREET MOLE ALTERNATIVE (HAWKINS/GOOKIN): Similar to the 40th Street Mole Alternative but the tunnel extends under the Arizona Canal to 48th Street and then under the old Cross-Cut Canal south to approximately Osborn. From there to the Salt River, the water is conveyed in an open concrete channel.

See discussion of 40th Street Mole Alternative.

Does not take homes or office buildings along the Arizona Canal but would probably require taking of a commercial structure south of Washington Street over the Cross-Cut Canal.

Local costs not computed.

Does not control drainage or ponding west of 32nd Street (or drainage east of 40th or south of Arizona Canal).

- C. 48TH STREET ALTERNATIVE (HAWKINS AND PULICE ALTERNATIVES): Similar to the Corps' 48th Street alternative, but provide for covering collector channel from 34th Street to 48th Street and locating collector channels directly under or immediately north of the canal in SRP right-of-way.

These alternatives are moot because both erroneously assume the SRP has a 50 foot right-of-way north of the Arizona Canal between 40th and 48th Street and that "encroaching" business and residential property uses could be eliminated without compensation to the owners or SRP. Cost estimates for the Pulice alternative assume that SRP would pay certain costs incidental to construction. Corps and SRP suggest that both alternatives would be substantially more costly to construct than suggested by their proponents. The SRP has expressed serious reservations whether the alternatives could be constructed without endangering SRP facilities or disrupting canal operations and has not agreed to bear the costs allocated it by the Pulice estimates.

Probably takes the same homes and businesses as the Corps 48th Street Alternative including a commercial building built over the Cross-Cut Canal south of Washington.

Local costs not computed.

Does not control drainage or ponding west of 32nd Street.

- V. COVERED CHANNEL: Current plans for Reach 4 include covered areas near the Arizona Biltmore Hotel east of 24th Street and under Stanford Drive east of 32nd Street where the higher construction costs are offset by lower right-of-way and relocation costs. Other portions of Reach 4 could be covered.

The additional cost of covering all remaining sections of Reach 4 would almost certainly exceed \$16 million in additional construction costs plus COE fees and contingency allowances. In addition, covering adds additional engineering problems because provisions must be made for drains or inlet structures. It is likely that small open concrete collector channels would be required in certain areas. It is probable that the cost of additional covering would be a local cost if Reach 4 were covered.

VI. NONSTRUCTURAL ALTERNATIVES

- A. FLOOD INSURANCE: Calls for the City to require the purchase of flood insurance in flood areas affected by the Reach 4 overflow area.

Estimates of current value (3 1/4% discount rate) of flood premium costs over 100 years (COE evaluated ACDC over a slightly shorter period, e.g. the 100 year evaluation period commenced upon the estimated completion of the first dam rather than estimated completion date of then ACDC) range from \$77 million to \$163 million. These estimates, however, do not include federal costs flood premium subsidies (it is expected that the subsidies will be phased out and premiums increased by 1989) or the flood insurance premium for property owners in the ponding area along the north side of the Arizona Canal, a number of whom presently are required to purchase insurance. These estimates assume only 2,400 homes in the flood area south of the Canal; however, in the 1972 (50 year flood) 2,600 homes were damaged south of the Canal from the 30th Street through 40th Street overflows and other homes were damaged by Canal overflows in Reach 4 area near 20th Street, 18th Street and 16th Street. Many more residences would require insurance if flood insurance were required in a 100-year flood plain. The alternative does not reduce the City's emergency expenses or provide the other ancillary benefits provided by Reach 4.

- B. "SELF INSURANCE": A sum equal to the costs of Reach 4 could be banked and the interest used to pay for damages. It was suggested that this nest egg could easily draw interest at 10% which would pay for any flood damages. Normal interest rates include both "real" interest and an inflationary expectation. It is unlikely that any safe fixed income investments would yield even two or three percent "real" interest over a long term period. Two or

three percent would not yield sufficient funds to pay projected average annual damages. Moreover, damages may well exceed average damages and substantially consume the principal. Federal funds are not available for such purpose. The scheme is not only economically unsound but it also suffers from the benefit shortages that characterize the flood insurance alternative.

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APPENDIX IV: COST COMPARISON OF REACH 4 ALTERNATIVES

(1985 Price Levels Except Where Otherwise Noted)

	REACH 4		40th Street Alternative		48th Street Alternative	
	COE/FCD Figures ^{1/}	L&H Figures ^{4/}	COE Figures ^{5/}	L&H Figures ^{6/}	COE Figures ^{7/}	L&H Figures ^{8/}
<u>Channel</u>						
Construction	\$27,375,000		\$50,861,000		\$23,544,000	
Contingency	4,125,000		15,189,000		7,063,000	
SUBTOTAL	31,500,000		66,050,000		30,607,000	
COE Fees	6,300,000		13,210,000		6,121,000	
SUBTOTAL	37,800,000					
Blasting	1,000,000					
Additional Contingency - COE Fees	200,000					
TOTAL CHANNEL CONSTRUCTION	39,000,000		79,260,000		36,728,000	
Lands and Damages Without Est. Costs of Sed. Basin (Adj. to 1985 Figures)	17,067,000		29,100,000		39,235,000	
<u>Sedimentation Basin</u>						
Construction, Lands & Damages, Including Contingency and COE Fees		Const. 3,070,000	3,070,000		3,070,000	
		Lands & Damages & Relocations 600,000	600,000		600,000	
SUBTOTAL	59,737,000		112,030,000		79,633,000	
Additional Costs of Reach 1 for Reach 4 Water ^{2A/}	1,000,000		N/A		N/A	
Additional Costs of Reaches 2 and 3 for Reach 4 Water ^{2B/}	15,100,000		N/A		N/A	
SUBTOTAL	75,837,000		112,030,000		79,633,000	
<u>Non-Recoverable Costs^{3/}</u>						
A. Damages and Relocations	1,600,000					
B. Reach 1 Costs For Reach 4 Water	1,000,000					
C. Federal Engineering Costs	3,000,000 to 4,500,000					
Total Non-Recoverable Costs	5,600,000 to 7,100,000		5,600,000 to 7,100,000		5,600,000 to 7,100,000	
TOTAL	\$75,837,000	\$81,000,000	\$117,630,000 to 119,130,000	\$94,500,000	\$85,233,000 to 86,733,000	^{8/} Not available.
Direct Cost to Maricopa County Taxpayers	\$20,330,000 ^{15/}		\$ 33,800,000 ^{15/}		\$42,800,000 ^{15/}	

1521i

	PV Detention Basin		PRC Toups-Cudia City Detention Basin		Stanford Drive Detention Basin	
	COE ^{9/}	L&H ^{10/}	COE ^{11/}	L&H ^{12/}	COE/TF ^{13/}	L&H ^{14/}
Channel Construction Including Contingency and COE Fees	\$ 7,320,000		\$19,100,000			
Lands and Damages Without Est. Costs of Sed. Basin (Adj. to 1985 Figures)	61,880,000		17,100,000			
Sedimentation Basin Construction, Lands Damages, Including Contingency and COE Fees		Const. N/A	11,450,000			
		Lands & Damages & Relocations N/A	19,200,000 to 27,450,000			
SUBTOTAL	69,200,000		66,850,000 to 75,100,000			
Additional Costs of Reach 1 for Reach 4 Water ^{2A/}		N/A	N/A			
Additional Costs of Reaches 2 and 3 for Reach 4 Water ^{2B/}		N/A	2,100,000		N/A	
SUBTOTAL	69,200,000		68,950,000 to 77,200,000		64,750,000	
Non-Recoverable Costs ^{3/}						
A. Damages and Relocations	1,600,000					
B. Reach 1 Costs For Reach 4 Water	1,000,000					
C. Federal Engineering Costs	3,000,000 to 4,500,000					
Total Non-Recoverable Costs	5,600,000 to 7,100,000	5,600,000 to 7,100,000	5,600,000 to 7,100,000		5,600,000 to 7,100,000	
TOTAL	74,800,000 to \$76,300,000	\$71,600,000	\$74,550,000 to 84,300,000	\$67,200,000	\$70,350,000 to 71,850,000	\$49,500,000
		Plus costs of utility relocations	(1983 Price Level) depending on ROW costs plus cost of aesthetic treatment and side drain structures.		(1983 Price Level) plus costs of aesthetic treatment and side drain structures.	(Adjusted to 1985 dollars) plus cost of aesthetic treatment and side drain structures.
Direct Cost to Maricopa County Taxpayers	\$63,600,000 ^{15/}		\$38,600,000 to \$43,850,000 ^{11/} , ^{15/} (1983 Price Levels)		\$39,100,000 ^{15/} (Approx.)	

	40th Street Mole		48th Street Mole	
	<u>COE/TF 16/</u>	<u>L&H 17/</u>	<u>COE/TF 18/</u>	<u>L&H 19/</u>
Pipe Construction	\$41,300,000 to \$ 79,300,000		\$39,350,000	
Contingency (30%)	\$12,570,000 to 23,790,000		11,805,000	
SUBTOTAL	\$53,870,000 to 103,090,000		51,155,000	
COE Fees (20%)	\$10,893,000 to 20,618,000		10,231,000	
SUBTOTAL	\$64,763,000 to 123,708,000		61,386,000	
Cross Cut Canal Construction Costs - (Per L&H 14/)	N/A		19,300,000 14/	
Lands and Damages (Per L&H)	(None assumed by L&H)		2,100,000	
Sedimentation Basin Construction	3,070,000		3,070,000	
Lands and Damages	600,000		(Included in Lands and Damages above by L&H)	
<u>Non-Recoverable Costs 3/</u>				
A. Damages and Relocations	1,600,000			
B. Reach 1 Costs for Reach 4 Water	1,000,000			
C. Federal Engineering Costs	3,000,000 to 4,500,000			
Total Non-Recoverable Costs	5,600,000 to 7,100,000		5,600,000 to 7,100,000	
 TOTAL	\$74,033,000 to 134,478,000 plus costs of inlet structures and one outlet structure plus costs of right-of-way required if any.		\$63,000,000 Includes \$250,000 for inlet structures but nothing for outlet.	
			\$91,456,000 to \$92,956,000 plus costs of 2 inlet structures and one outlet structure.	
			\$81,400,000 Includes \$500,000 for inlet but nothing for outlet structures.	

APPENDIX IV
COST COMPARISON OF REACH 4
AND ALTERNATIVES

FOOTNOTES

Introductory Note

The attached cost comparison uses figures from the COE & FCD. Also noted (and included as a final page) are summaries prepared by Laventhal & Horwath ("L&H"). L&H was employed by Citizens Against Reach 4 to produce an analysis of costs of various alternatives based upon various Task Force documents (including documents prepared by Jasper Hawkins and documents submitted by the Citizens Against Reach 4 and an engineer employed by the Citizens Against Reach 4 and the Arizona Biltmore Homeowners Association). For many alternatives L&H has simply totalled COE and FCD figures as modified by assumptions stated by Jasper Hawkins or the Citizens Against Reach 4. Exhibit I from the L&H report is attached (See Table 2). L&H's calculations differ from COE calculations in estimates for additional costs for Reaches 2 and 3 to accommodate water from Reach 4 or its alternative and the method of calculating non-recoverable costs (the primary difference is that L&H assumes no non-recoverable costs from COE fees).

The assumption used by L&H also assumes that a 15% rather than 30% contingency factor should be used for the mole alternatives. The COE uses a 30% (rather than 15% as in Reach 4) because they are based upon preliminary estimates not detailed engineering studies and plans as is Reach 4. See T.F. Doc. # Zc-28 and # Zc-29. Mole construction costs are particularly difficult to predict without detailed engineering studies and testing. See T.F. Doc # Y-5. Other differences are noted in footnotes.

L&H has also calculated local cost figures, but these figures do not include the local contributions to construction costs or local costs for compaction of excess excavated material. See T.F. Doc. # Zc-45.

- 1 Reach 4 figures from T.F. Doc. # T-9 with \$600,000 Land and Relocation costs allocated to Sedimentation basin per T.F. Doc. # T-3, Design Memorandum, Sept. 1985. Costs of Blasting is taken from T.F. Doc. # S-8 at 24 and 25, plus 20% estimated COE Fees. Lands and Damages figure for channel includes utility relocations and bridges.
- 2A The additional costs of Reaches 1, 2, and 3 for Reach 4 water. These figures are taken from T.F. Doc. # V-7, Tab H. By comparing the costs of Flood Control Alternative T-2 (Toups Plan for flood control basins and smaller ACDC) with Alternative A-4 (Reach 4 with Sediment Basins). A-4 was the alternative adopted for Reach 4 and the remainder of the ACDC. The additional cost of Reach 1 for Reach 4 waters is \$950,000, plus an Engineering News Record Construction Cost Estimate Index adjustment of 5%, or a total of \$997,500. Cf. T.F. Doc. # Zc-31, supra.

- 2B The COE cost comparison indicates that substituting the PRC Toups alternative for Reach 4 would cut costs of Reach 2 and 3 by \$12,300,000 (1983 Price Level), see footnote 2A, supra. Indexed to 1985 (per Engineering News Record Construction Cost Index) these savings amount to \$12,967,500 or approximately \$13 million. If Reach 4 were entirely eliminated rather than merely scaled down as in the Toups Alternative, costs in Reach 3 could be cut by an additional \$2,130,000 for a total of approximately \$15,100,000. See COE Comments on Laventhal and Horwath Report, Note 9, Additional Costs for Reaches 2 and 3. T.F. Doc. # Zc-31.
- 3 Non-recoverable Reach 4 lands and relocations damages (\$6,800,000 at 1985 prices less \$5,200,000 resale value) total \$1,600,000; calculated from T.F. Doc. V-7, Tab H and C-3, Tab 6. This figure may understate such costs. Undoubtedly some right of way would not be sold but would be retained to preserve presently existing detention basins and flood control facilities in the area west of 32nd Street. Non-recoverable costs from Reach 1 are \$997,500, calculated from T.F. Doc. # V-7 Tab H. See supra note 2A. In addition, the Corps of Engineers has already incurred most of the costs represented by its \$6,500,000 "fee" for design and administration of Reach 4. Plans are virtually complete and the only remaining costs are for preparing contract plans and specifications, and for engineering support, supervision, and inspection during construction. The budget figure for these remaining costs for Reach 4 is \$2 million. The non-recoverable cost of Reach 4 to the federal treasury therefore includes approximately \$4.5 million in COE costs. See T.F. Doc. # Zc-30. Hawkins urges that the \$4.5 million is excessive for COE fees and therefore a range of \$3 million to \$4.5 million is used for illustrative purposes.
- 4 Taken from T.F. Doc. # U-8, submitted by J. Hawkins. Hawkins figure for Reach 4 exceeds COE figure because of \$63,000 in rounding, 15% contingency on blasting costs, use of Reach 4 Land and Relocation costs not adjusted to 1985 Dollars, and use of higher figure for Reach 1, 2, 3, costs of Reach 4 water than indicated by T.F. Doc. V-7, Tab H.
- 5 T.F. Document S-10.
- 6 See supra note 4. L&H figure for 40th Street Alternative is lower than COE figure because it assumes use of SRP right-of-way without compensation to SRP. Reach 4 Land and Relocation costs not adjusted to 1985 dollars and use of higher figure for Reach 1, 2, 3, costs of Reach 4 water. Includes additional costs for moving Arizona Canal. Assumes that there will be no costs incurred for acquisition or modification of office building across Cross Cut Canal south of Washington. See supra note 4. See also infra note 8.
- 7 T.F. Doc. S-9.
- 8 The L&H figures have been rendered moot by the discovery that the SRP right-of-way between 40th and 48th is less than 50 feet north and south of high water line assumed by Hawkins.

- 9 T.F. Doc. S-11.
- 10 See supra note 4. L&H figure is lower because of use of higher figure for Reach 1, 2, and 3 costs of Reach 4 water and use of land and use of relocation costs not adjusted to 1985 Dollars.
- 11 T.F. Doc. # V-7, supra note 2. The cost of right-of-way for the channel should be no more than right-of-way for Reach 4. Therefore the cost of right-of-way is cut from \$24,100,000 to \$17,000,000. Further cost savings might be possible if portions of the conduit between 40th and 24th Streets were placed in SRP right-of-way. The costs do not include inflation or additional local costs of lands resulting from development since 1983. The range is added because the Flood Control District has estimated that the cost of detention basins lands and damages could be \$8.25 million more than the figures used by the COE. No L&H data presented.
- 12 See Note 11. L&H figures for PRC Toups alternative (40th Street Detention Basin) differ from the COE estimate because L&H includes no costs for relocation and right-of-way costs between 24th Street and 12th Street despite that the COE cost estimate lists \$20,300,000 for these costs T.F. Doc. # V-7, Tab H, and that the Toups study does not assume any cost savings for reduced right-of-way and relocation between 24th Street and 12th Street (Dreamy Draw). See Toups Study, page 10, note b. (Land acquisition between 24th Street and 12th Street includes 23 houses, 1 commercial business, and 36 apartment units.) L&H does increase construction costs to 1985 dollars. The L&H study also includes a higher estimate for the cost of carrying water from its basins through Reaches 2 and 3.
- 13 See Notes 11 and 12. These figures are very speculative and are based on COE estimates for the PRC Toups Alternative (40th Street Detention Basin) subject to adjustments from the Toups conceptual study for the Stanford Drive Retention Basin Alternative. The PRC Toups Conceptual estimate for the Stanford Drive Detention Basin Alternative concluded it would require \$3.3 million less in construction costs and \$500,000 less in right-of-way. T.F. Doc. # Z-20. The Task Force cost estimate for Stanford Drive Detention Basin uses costs for the 40th Street Detention Basin less these costs \$3.8 million plus contingency and COE fees. While this is an imprecise measure of costs, it appears more accurate than the L&H figures which contain no costs for relocation or right-of-way between 24th Street and 12th Street. See footnote 12.
- 14 See Note 12. Assumes lower non-recoverable costs for Reach 4 and higher additional costs for additional water from alternative which flows through Reaches 2 and 3 and no right-of-way and relocation costs east of 24th Street.
- 15 Local costs are computed for projects for which detailed COE cost estimates exist. Local costs for the detention basins do not include local cost for compaction of excess excavated materials. Local costs for Reach 4 and alternatives do not include any portion of local costs of Reaches 1, 2 and 3. Local costs for alternatives to Reach 4 do not include local share of non-recoverable Reach 1 costs but do include non-recoverable Reach 4 lands and damage costs. See supra note 3.

- 16 Because of the reasons mentioned in Appendix III, mole construction cost estimates are very speculative. The pipe construction figures for mole construction are calculated from per unit costs used by Hawkins in the Laventhal and Horwath Report, pipe sizes contained in the calculation submitted by W.S. Gookin T.F. Doc. # W-10, and the pipe lengths estimated by the Corps of Engineers. T.F. Doc. # Zc-28. No estimate is included for the cost of inlet structures east of 32nd Street and at the Cudia City Wash or for an outlet structure at the Salt River. See Table below.

40th Street Mole

	<u>Pipe Size</u>	<u>Distance</u>
East of 32nd Street to Cudia City Wash	14'	3,500
Cudia City Wash to 40th Street	21'	1,500
40th Street to Salt River	21'	23,500

Cost of pipe construction with two 21 foot pipes

$$\begin{array}{l} \text{14' Pipe} \\ 3,500 \times 1,270 = \$ 4,445,000 \end{array}$$

$$\begin{array}{l} \text{21' Pipe} \\ 50,000 \times 1,498 = \underline{\$74,900,000} \\ \underline{\$79,345,000} \end{array}$$

Cost of pipe construction with one 21 foot pipe

$$\begin{array}{l} 25,000 \times 1,498 = \$37,450,000 \\ 3,500 \times 1,270 = \underline{4,445,000} \\ \underline{\$41,895,000} \end{array}$$

The range of figures in the Table depends upon how many pipes, and the size of the pipes, necessary to convey the water.

Chairman's Note: On April 21, 1986, the Corps of Engineers indicated that in a review of the preliminary design of the 40th Street Mole Alternative it was determined that two 21-foot pipes would not be necessary as was originally assumed in the calculations presented in the Comparison of Costs Table. This would reduce the range of costs from \$74,033,000 to \$134,478,000, to \$74,033,000 to \$75,533,000.

- 17 The L&H figures differ by assuming only a 15% rather than 30% contingency allowance used by the COE in evaluating all non-Reach 4 alternatives. See also Introductory Notes.
- 18 The pipe construction figures for mole construction are calculated from per unit costs used by Hawkins in the Laventhal and Horwath Report, the pipe sizes contained in the calculation submitted by W.S. Gookin T.F. Doc. # W-10 and the pipe lengths estimated by the Corps of Engineers. T.F. Doc. # Zc-29. No estimate is included for the cost of inlet

structures east of 32nd and at the Cudia City Wash or for an outlet structure at the Salt River. The estimates for the cost of construction along the cross cut canal are taken from estimates submitted by Jasper Hawkins. See Table below. No estimate is included for the costs of relocations (including bridges, utilities, etc.) or any right-of-way from Osborn to the Salt River.

48th Street Mole

	<u>Pipe Size</u>	<u>Distance</u>
East of 32nd Street to Cudia City Wash	14'	3,500
Cudia City to 48th Street	1 @ 14'	9,000
	1 @ 21'	9,000
Arizona Canal to Osborn	1 @ 14'	3,600
	1 @ 21'	3,600

14 ' Pipe

16,100 @ 1,270	=	\$20,447,000
12,600 @ 1,498	=	<u>\$18,874,800</u>
		\$39,321,800

19 See footnotes 17 and 18. Estimate varies from T.F. Doc. # Zc-29 because of the assertion that Gookin's plan requires only one 14 foot and one 21 foot pipe rather than two 21 foot pipes from Cudia City Wash to 48th Street and because L&H assumes a 15% contingency and the COE uses a 30%.



APPENDIX V

MATERIALS DISTRIBUTED AT OR FOR
ACDC TASK FORCE MEETINGS

Meeting No. 1, July 15, 1985

- A-1 o Agenda
- A-2 o List of Task Force members, with mailing addresses
- A-3 o ACDC Task Force Appointments memo from Mayor Terry Goddard, Policy Agenda, June 18 and 25, 1985
- A-4 o ACDC Reach IV, City Council Report from Peter F. Starrett, Information Item, May 7, 1985 (with attached report from Army Corps of Engineers)
- A-5 o Reach 4, Arizona Canal Diversion Channel Information Report, from Jim Attebery, May 14, 1985 (FLD 060202)
- A-6 o Verbatim Minutes of Formal Council Meeting, ACDC Public Hearing, May 15, 1985
- A-7 o ACDC Briefing Paper, prepared by U.S. Army Corps of Engineers, June 1985, 12 pages with attachments
- A-8 o Response Summary - Workshops for Esthetic Design for ACDC, November - December, 1984
- A-9 o Letter from Representative Eldon Rudd, to Kemberly Clark, July 3, 1985 with attachments including cost information
- A-10 o Newspaper clippings - distributed by Kem Clark, July 15, 1985

Meeting No. 2, July 22, 1985

- B-1 o Agenda
- B-2 o Summary Minutes of July 15 meeting (approved)
- B-3 o List of materials distributed to Task Force
- B-4 o List of proposed rules and procedures
- B-5 o Pamphlet on open meeting law

Distributed at Meeting:

- B-6 o Alternative Meeting Locations

- B-7 o Memo regarding Storm Sewers for ACDC Task Force to Mr. Lee from Mr. Attebery dated July 22, 1985
- B-8 o Letter from D. E. Sagramoso to Mr. DeUriarte dated May 21, 1985 with attachments, re: Reach 4, ACDC.
- B-9 o Fact Sheet on Reach 4, ACDC prepared by Staff of City of Phoenix Engineering Department and Flood Control District of Maricopa County, May 1985.
- B-10 o Letter to Col. John C. Lowry from Jim Attebery, regarding Flood Control Program - Arizona Canal Diversion Channel, January 12, 1973
- B-11 o Flood Control in the Desert, a Progress Report, prepared by D.E. Sagramoso, Flood Control District, May 28, 1985
- B-12 o Concerns Regarding the Arizona Canal Diversion Channel, prepared by: Kem Clark, July 1985
- B-13 o Position Statement (1-page), Citizens Against Reach Three, updated
- B-14 o Citizens Against Reach Four Position Paper - (7 pages)

Meeting No. 3, July 27, 1985 (Saturday Tour of Reaches 3 and 4)

- C-1 o Agenda
- C-2 o Notebook from Maricopa County Flood Control District prepared for Tour, July 27, 1985. Contents:

TAB

1. Pertinent Data
2. Recommended Plan - Aerial Mosaics
3. Recommended Plan - Hydraulic Plans and Profiles
4. Construction Schedule
5. Comparative Widths of Arizona Canal and ACDC
6. Recommended Plan - Total Project Costs (Summary)
Total Project Costs (Detail)
Local Costs, Current and Projected
7. Flood Control Tax Levy
Phoenix Contribution to Flood Control Tax Base
8. Recommended Plan - Current Status of Land Acquisitions, by Reach
9. Record of Breaks in the Arizona Canal
Reach 4, Watershed Subarea Boundaries
Arizona Canal Diversion Canal, Background and History
10. Other Information

- C-3 o Glossary of Terms, titled "Phoenix, Arizona and Vicinity (Including New River) - for Notebook (See C-2) Tab 10 "Other Information"

Meeting No. 4, July 29, 1985

- D-1 o Agenda
- D-2 o Minutes of July 22 Meeting with attachments: No. 1 - List of Information Requests by Jasper Hawkins; No. 2 - List of Possible Information to be Requested by Richard Lee. (approved)
- D-3 o List of Material Distributed at or for ACDC Task Force Meetings - Updated
- D-4 o Memo from Kathy Cale to Task Force, Listing Public Hearing Locations and Dates and Regular Meeting Schedule

Distributed at Meeting:

- D-5 o List(s) of Arguments Against ACDC Extension, Citizens Against Reach IV and Citizens Against Reach III (prepared by staff as preliminary document July 1985), 2 pages
- D-6 o Summary of Markiewicz Lawsuit dated July 29, 1985, 1 page
- D-7 o Proposed Agenda for July 31 Public Hearing
- D-8 o Sample of Card to be Used at Task Force Public Hearings
- D-9 o Copy of letter from Richard Lee regarding Public Hearings (mass mailed), dated July 29 (From 2nd mailing; most were mailed 7/25/85)

Meeting No. 5, July 31, 1985 - Public Hearing

- E-1 o Agenda
- E-2 o Statement by Charles Pickrell regarding Reach IV alternative dated July 31, 1985 (1 page).
- E-3 o Notebook prepared by Vern Schweigert, Citizens Against Reach IV. Contents:

TAB

1. Reach Four Position Paper - "Arizona Canal Diversion Channel - Background and Potential Problems"
2. Biltmore Hotel Letter to Mayor Terry Goddard regarding Reach Four of the ACDC, March 18, 1985
3. Maricopa County Flood Control District Response Letter to Biltmore Hotel Letter, May 14, 1985
4. Letter from Biltmore Hotel replying to Maricopa County Flood Control District, June 19, 1985

5. Federal Emergency Management Agency - National Flood Insurance Program Maps
6. Various Newspaper Articles on the ACDC
7. List of Organizations Opposing or Calling for Re-evaluation of Reach Four and/or Reach Three
8. Addendum to Minutes of June 16, 1982 Meeting of Valley Forward Board of Directors
9. Congressional Subcommittee Report on Review of Army Corps of Engineers Water Projects
10. PRC Toups Conceptual Study of an Alternative to ACDC

Meeting No. 6, August 5, 1985

- F-1 o Agenda
- F-2 o Minutes - July 27, 1985 (approved)
- F-3 o Minutes - July 29, 1985 (approved)
- F-4 o Materials Distributed - Revised August 1, 1985
- F-5 o Information Requests Lists
- F-6 o Revised Fact Sheet on Reach IV - dated July 30, 1985 - replaces Document B-9, distributed at Meeting No. 2, July 22, 1985
- F-7 o Summary of Alternative Plans, provided by Maricopa County Flood Control District (undated)
- F-8 o Draft of Agenda - August 7, 1985

Distributed at Meeting:

- F-9 o Letter from A.J. Pfister, General Manager, SRP to Mayor Goddard, dated July 11, 1985 regarding flood control and the City's proposed draft General Plan, with attached excerpt of draft General Plan Element on Safety
- F-10 o Memo from Kathy Cale to Task Force dated August 5, 1985 regarding status of Reference Library with attachments:
 - A. List of material identified by Mr. Hawkins
 - B. Preliminary document list by Corps of Engineers
- F-11 o Revised preliminary list of Arguments Against Reach IV, dated August 5, 1985, prepared by staff for Task Force deliberations
- F-12 o Memo to ACDC Task Force from Dan Sagramoso, dated August 5, 1985 regarding Flood Control District capital expenditures

- F-13 o Cost of Reach III ACDC in 1984, (one page) provided by Maricopa County Flood Control District
- F-14 o Map of ACDC Reach III color coded to show up and down stream storm drains, (one page) provided by Maricopa County Flood Control District
- F-15 o Map of storm operation facilities showing capacities, drains and major washes, Salt River Valley Water Users Association, Water Transmission Division, (one page) provided by Maricopa County Flood Control District
- F-16 o Letter from Wayne W. Linthacum, Consulting Engineer to ACDC Task Force (August 5, 1985) regarding ACDC, with attached excerpt from Who's Who in Engineering and Who's Who in Arizona 1984-85
- F-17 o ACDC and Reach IV: Inflow and Possible Flooding Areas of Arizona Canal, information prepared by Salt River Project, distributed by Don Weesner (four pages with three pages of color coded maps)
- F-18 o Packet of information and pamphlets provided by Salt River Project, including:
 - A. A Valley Reborn: The Story of the Salt River Project
 - B. Gift From the Hohokam
 - C. Miracle or Mirage: Water Need and Supplies in the Salt River Project April 1982
 - D. SRP - Electrical Service Area
 - E. Map of Salt River Project area and Central Arizona

Meeting No. 7, August 7, 1985 - Public Hearing

- G-1 o Agenda
- G-2 o Revised Summary of Objections to Reach IV
- G-3 o Letter from Congressman Rudd to Tony Piasecki, Management Intern, dated July 29, 1985, regarding inquiry on status of Rudd's request for an updated cost benefit ratio analysis of Reach IV with the following attachments:
 - A. Technical report language
 - B. Corps testimony on ACDC
- G-4 o Memo from Dan Sagramoso to Task Force dated August 7, 1985 regarding ACDC Peak Flow Routing (four pages)

- G-5 o Information from Flood Control District including:
 - A. Extracts from Zoning Application
 - B. Grant of Easement by Arizona Biltmore Estates, May 7, 1977
 - C. Corrective Grant of Easement, May 17, 1977 (twelve pages total) August 7, 1985

Meeting No. 8, August 9, 1985 - Makeup Tour (Same materials and agenda as Tour on July 27, 1985)

- H-1 o Agenda

Meeting No. 9, August 12, 1985

- I-1 o Agenda
- I-2 o List of Materials Distributed (August 8, 1985)

Distributed at Meeting:

- I-3 o Minutes of July 31, 1985 Public Hearing (approved)
- I-4 o Minutes of August 5, 1985 Task Force Meeting (approved)
- I-5 o Excerpts of 1972 Flood Report
- I-6 o Revised List of Arguments Against Reach IV
- I-7 o Gookin Report: Arizona Biltmore Estates and the Arizona Canal Diversion Channel - Cudia City Wash to 16th Street
- I-8 o Newspaper Clipping - Editorial, August 11, 1985
- I-9 o List of Materials Distributed (Updated August 12, 1985)
- I-10 o Letter from Mr. Linthacum to Task Force dated August 12, 1985 regarding Gookin Report of May 1982

Meeting No. 10, August 19, 1985

- J-1 o Agenda
- J-2 o Agenda for public hearing, August 21, 1985
- J-3 o Materials distributed list (August 15, 1985)
- J-4 o Minutes of August 9 Makeup Tour (approved)
- J-5 o Letter from Mr. Lee to Mr. Hughes dated August 7, 1985
- J-6 o Copies of maps contained in 1972 Flood Report - addendum to document I-5

Distributed at Meeting:

- J-7 o Copy of materials Distributed List (August 19, 1985)
- J-8 o Printout From Richard Lee - listing telephone calls, contacts, and conferences re: ACDC (Dated August 14, 1985)
- J-9 o Color map prepared by City of Phoenix Engineering Department identifying flood plain, June 1972 flood area, existing and proposed storm drains, identified storm sewer needs, etc.
- J-10 o Letter (with map) to Mr. Attebery from Norman Arno, Chief, Engineering Division, Corps of Engineers, dated 7/3/85 regarding F.I.R.M. maps and floodplain south of the Arizona Canal with enclosed map - flood potential south of Arizona Canal between the Cave Creek Floodplain and 40th Street, prepared for the Federal Insurance Administration by the U.S. Army Corps of Engineers published September 1973.
- J-11 o Memo regarding liability prepared by the General Counsel for the Flood Control District
- J-12 o Minutes of August 7 public hearing (approved)
- J-13 o Minutes of August 12 meeting (approved)
- J-14 o Letter from Mrs. Richard Jones to Task Force dated August 9, 1985
- J-15 o Break Even Interest Rate prepared by Corps of Engineers, August 19, 1985
- J-16 o Phoenix and Vicinity, Stage 2 Benefit-Cost Ratio
- J-17 o Phoenix and Vicinity Construction Cost Overrun/Underrun Analysis of Completed Features
- J-18 o Letter from Don Weesner to Task Force dated August 19, 1985 regarding Gookin Report
- J-19 o Memo from Don Weesner on response to questions asked at August 7 meeting
- J-20 o Letter from Marriner Cardon to Task Force dated August 19, 1985 regarding potential liability

Meeting No. 11, Public Hearing - August 21, 1985

- K-1 o Agenda
- K-2 o Memo from D. Sagramoso to Task Force dated August 20, 1985 regarding discount rate used for economic analysis of water resources
- K-3 o Excerpts from Economics Appendix provided by Corps of Engineers in response to request by Task Force on August 5, 1985

- K-4 o Wall and Fencing Studies provided by Ruth Chase, Army Corps of Engineers
- K-5 o Letter to Vern Schweigert from Thomas Delgado, Manager of the Land Department, Salt River Project dated August 19, 1985 regarding right-of-way
- K-6 o Memo from D. Sagramoso to Task Force dated August 21, 1985 regarding partial response to Task Force information requests directed to Corps of Engineers and Flood Control District
- K-7 o Water Quality of Storm Water Runoff, Summary Sheet prepared by Susan Keith, Water Quality Advisor

Meeting No. 12, August 26, 1985

- L-1 o Agenda
- L-2 o Materials Distributed List

Material Distributed at Meeting:

- L-3 o Information on alternatives provided to the Phoenix City Council in 1975
- L-4 o Newspaper article, "L.A. River - Can It Still Protect Basin Against a Major Storm?" - Los Angeles TIMES, 7/24/85

Meeting No. 13, September 5, 1985 - Public Hearing

- M-1 o Agenda
- M-2 o Materials Distributed List
- M-3 o Minutes of August 19, 1985 meeting (approved)
- M-4 o Minutes of August 26, 1985 meeting (approved)
- M-5 o Memo from Kathy Cale to Task Force dated August 29, 1985 regarding board and commission membership cards and assignment of motor pool parking

Meeting No. 14, September 9, 1985

- N-1 o Agenda
- N-2 o Materials Distributed List
- N-3 o Amendment to Rules of Procedure - Voting Policy - dated August 12, 1985
- N-4 o Correspondence Regarding Nursery Standards for Container Grown Stock from James Abell to Vern Schweigert, dated August 22, 1985 (with transmittal letter from Paul Reynolds to Kathy Cale dated August 28, 1985)

- N-5 o City Council Report dated August 20, 1985 from Mr. Attebery, City Engineer, Re: ACDC Task Force status report
- N-6 o Feature Design Memorandum for ACDC Appendix 3: Aesthetic Design, Erosion Control and Recreation. Preliminary Draft dated August 20, 1985, prepared by Army Corps of Engineers
- N-7 o Summary of Arguments Against Reach IV - Revised List - dated September 5, 1985
- N-8 o ACDC Bibliography - Most documents available in the Arizona Room of the Phoenix Central Library
- N-9 o Information sheet distributed by Richard Lee. Contains information on Growth-Income, Income, and Bond Funds
- N-10 o Valley Forward Survey distributed by Jasper Hawkins
- N-11 o Letter from David Mitchell, Co-Chairman, Citizens Against Reach 4 to Richard Lee with copy of ad to appear in Republic/Gazette, submitted by Citizens Against Reach IV. (Copies of names to appear in ad available in Management and Budget Department)

Meeting No. 15, September 16, 1985

- 0-1 o Agenda
- 0-2 o Materials Distributed List
- 0-3 o Economics, Appendix 6, Gila River Basin, New River and Phoenix City Streams, Arizona prepared by Corps of Engineers
- 0-4 o Newspaper Article; "Canal Debate Proving Rehash," Arizona Republic, September 9, 1985 (Extra - North Phoenix/Paradise Valley editions).
- 0-5 o Proposed amendments to meeting minutes as proposed by Jasper Hawkins. (adopted)
- 0-6 o Letter from Richard Lee to Rod McDougall, City Attorney, dated September 10, 1985 regarding letter from Vern Schweigert Re: Information on donations to Citizens Against Reach 4, dated August 26, 1985.
- 0-7 o Updated printout from Richard Lee listing telephone calls, contacts, conferences, etc., regarding ACDC - dated September 9, 1985.
- 0-8 o Minutes of Meeting No. 9, August 12, 1985 (approved as amended)
- 0-9 o Minutes of Meeting No. 10, August 21, 1985 (Public Hearing) (approved)

Distributed at Meeting

- O-10 o Map of Right-of-Way Easements for ACDC in Biltmore Area (only 1 available). Map is on file in the Arizona Room of the Central Library.
- O-11 o Wall and Fencing Studies - Design and cost studies provided by Corps of Engineers, September 16, 1985
- O-12 o Resume of Robert W. Hinks, Assistant Professor of Engineering, ASU
- O-13 o ACDC Interest Survey - By Junior League
- O-14 o "Fact Sheet" on ACDC Prepared by Junior League

Meeting No. 16, September 23

- P-1 o Agenda
- P-2 o Materials Distributed List
- P-3 o Minutes of September 5 Public Hearing
- P-4 o Memo Prepared by Dave Burris, City of Phoenix Engineering
- P-5 o Memo from Rod McDougall, City Attorney, to Pat Manion, Executive Assistant, regarding Open Meeting Law and the use of private clubs for meeting locations - with attached letter from Michael Sillyman, Assistant Attorney General, dated May 28, 1985.
- P-6 o Letter from Angela C. Melczer, Community Vice President of the Junior League of Phoenix to Jim Colley, Phoenix Parks Director, dated September 23, 1985 - regarding Canal Beautification Task Force.
- P-7 o Junior League Canal Bank Improvements, Preliminary Draft - August 27, 1985.
- P-8 o Excerpts from From the Ground Up, a guide to assist neighborhood park committees and friends groups, 1983.
- P-9 o Maricopa County Flood Control District Chart conveying distances between location.
- P-10 o Parks Brochure.
- P-11 o ACDC Aesthetic Design, Erosion Control and Recreation Feature Design Maps -33 plates.
- P-12 o Task Force member address and telephone list.

Meeting No. 17, Public Hearing - October 3, 1985

- Q-1 o Agenda

- Q-2 o Agenda of Special Meeting with Parks Department staff, September 30, 1985.
- Q-3 o Materials Distributed List
- Q-4 o Letter from Dan Sagramoso to David Loach, Citizens Against Reach III, dated September 24, 1985.
- Q-5 o Flyer of October 3, 1985 public hearing.

Materials Distributed at Meeting:

- Q-6 o Letter from James A. Speedie, Chairman North Mountain Village Planning Committee to Mayor Goddard, August 27, 1985.
- Q-7 o Planning Department recommendation re: Special Permit #52-85, September 26, 1985.
- Q-8 o Letter from Joyce Buekers to Junior League members dated September 27, 1985.
- Q-9 o Minutes of special meeting with Parks Department staff, Monday, September 30, 1985.
- Q-10 o Design Criteria Computation Sheet for Rectangular Covered Channel, dated May 10, 1985 provided by Corps of Engineers.
- Q-11 o Comparison of open rectangular channel versus covered rectangular channel, dated September 20, 1985 provided by Corps of Engineers.
- Q-12 o Letter from Norman Arno, Army Corps of Engineers to Mr. David Loach, Citizens Against Reach III dated September 29, 1985 with attached letter and public statement on behalf of Citizens Against Reach III dated September 10, 1985.
- Q-13 o Statement from William R. Pulice entitled ACDC Reach IV: A Workable Compromise.

Meeting No. 18 - October 7, 1985

- R-1 o Agenda
- R-2 o Materials Distributed List
- R-3 o Minutes of the September 16, 1985 Meeting.
- R-4 o Statement by Kemberly Clark to ACDC Task Force at the October 3, 1985 Public Hearing.
- R-5 o Appropriation Information for ACDC Project, Summarized Financial Data, dated January 22, 1979.
- R-6 o Chart by Maricopa County Flood Control District indicating distances between various locations along the ACDC (update of Document D-9).

Meeting No. 19 - October 14, 1985

- S-1 o Agenda
- S-2 o Materials Distributed List
- S-3 o Minutes of the September 23, 1985 meeting.
- S-4 o Copies of overhead slides used by Stan Lutz during presentation on Alternatives to Reach IV at the October 7 meeting.
- S-5 o Information on population and dwelling units by Census Tract.
- S-6 o Minutes of the September 9, 1985 Meeting.
- S-7 o Minutes of the October 3, 1985 Public Hearing.
- S-8 o Minutes of the October 7, 1985 Meeting.
- S-9 o Corps of Engineers Work Sheets on Cudia City Wash - Old Cross Cut Canal Alternative, dated September 1985.
- S-10 o Corps of Engineers work Sheets on 40th Street Channel Alternative, dated October 2, 1985.
- S-11 o Corps of Engineers Worksheets on Paradise Valley Detention Basins, dated August 14, 1985.
- S-12 o Letter from Paul W. Taylor, Colonel, Corps of Engineers to Mr. D. E. Sagramoso, Chief Engineer, Flood Control District of Maricopa County, dated September 22, 1982.

Meeting No. 20 - October 28, 1985

- T-1 o Agenda
- T-2 o Materials Distributed List

Distributed at Meeting

- T-3 o Corps of Engineers, Design Memorandum No. 12, Feature Design, Draft dated September 1985 with transmittal letter from Norman Arno, Corps of Engineers to Kathy Cale, City of Phoenix, dated October 11, 1985.
- T-4 o Minutes of October 14, 1985 ACDC Task Force meeting.
- T-5 o Letter from Congressman John McCain to George Van Cleve, Minority Counsel, subcommittee on Water and Power Resources, committee on Interior and Insular Affairs U.S. House of Representatives dated October 18, 1985.
- T-6 o Proposed changes to ACDC Task Force minutes. (approved)

- T-7 o Memo to ACDC Task Force from City of Phoenix Engineering Department Re: estimated flood insurance costs, dated October 28, 1985.
- T-8 o Letter from Dennis Dowdy (abridged), Corps of Engineers to City of Phoenix, re: change of address for Corps Offices in Phoenix, dated October 18, 1985.
- T-9 o ACDC equivalent annual costs; Cudia City Wash to Dreamy Draw (Reach 4) including Cudia City Wash Sediment Basin, dated October 24, 1985.

Meeting No. 21 - November 4, 1985

- U-1 o Agenda
- U-2 o Materials Distributed List
- U-3 o Memo to Task Force members from Kathy Cale re: Location of next meeting (Lower Council Chambers) dated October 30, 1985.
- U-4 o The Reach 4 News, Citizens against Reach Four Newsletter dated October 1985, provided by Paul Reynolds Buchen & Co.

Distributed at Meeting

- U-5 o Memo to Task Force Members from Anthony A. Piasecki regarding new building activity along Reach IV of ACDC.
- U-6 o Memo to Kathy Cale from James E. Attebery, City Engineer, regarding Town of Paradise Valley's consideration of ACDC.
- U-7 o Sample questionnaire developed by Task Force member Charles Pickrell.
- U-8 o Arizona Canal Diversion Channel - Summary of costs for various alternatives, October 1985 - distributed by Jasper Hawkins.
- U-9 o Drawings of cross-section of revised 40th Street and 48th Street alternatives - distributed by Jasper Hawkins.
- U-10 o ACDC Task Force cost and liability data - excerpts from Task Force meetings of August 7, 1985 - October 14, 1985 - distributed by Jasper Hawkins.

Meeting No. 22 - November 12, 1985

- V-1 o Agenda
- V-2 o Materials distributed list.
- V-3 o Letter from Task Force Chairman, Richard H. Lee, to Mr. David Loach, Citizens Against Reach III, regarding setting up a meeting.

- V-4 o Map of 1972 flood area indicating number of property owners by sections of flood area - provided by Dave Burris as a follow-up to his presentation of November 4, 1985.

Distributed at Meeting:

- V-5 o Letter from Larry Ammon, Division Engineer, County of Los Angeles, Department of Public Works to Richard Lee, dated October 30, 1985.
- V-6 o Arizona Republic newspaper article, "Foes of Flood-Control Canal to Fight With 'New Evidence'", "by Anne Koonce, Tuesday, November 12, 1985.
- V-7 o Memorandum from Citizens Against Reach 4 to ACDC Task Force dated November 8, 1985, Re: Documents from files of the Army Corps of Engineers (bound document).
- V-8 o Minutes of the October 28, 1985 ACDC Task Force meeting.
- V-9 o Memo with attachments from Don Weesner to Richard Lee, re: Reach 4 alternatives - Cudia City Wash to 48th Street.

Meeting No. 23 - November 18, 1985

- W-1 o Agenda
- W-2 o Materials distributed list

Materials Distributed at Meeting

- W-3 o Memo from Bill Rowe, City of Phoenix Landscape Architect to ACDC regarding ACDC Design Memorandum #12, dated November 15, 1985.
- W-4 o Comparative Schedule of Growth Indicators by Census Tract 1970-1980 Prepared by Management and Budget Department - November 18, 1985.
- W-5 o Alternatives to ACDC Reach IV Covered Channel in SRP Right-of-Way Cudia City Wash to Old Cross Cut Canal, 2 pages prepared by Army Corps of Engineers for ACDC Task Force, November 18, 1985.
- W-6 o Minutes of the November 4 ACDC Task Force meeting.
- W-7 o Response by Citizens Against Reach IV to concerns raised by SRP in Task Force Document V-9.
- W-8 o Analysis of Task Force Document V-7 (Documents from Files of the Army Corps of Engineers, prepared by Citizens Against Reach IV).
- W-9 o Cover Page of Rocky Mountain Construction Journal dated April 8, 1985, South Edition depicting "mole" tunneling machine.
- W-10 o Memo to Richard Lee from Scudder Gookin dated November 18, 1985 regarding Reach IV Alternatives - Cudia City Wash to the Salt River.

- W-11 o Arizona Canal Diversion Channel, Proof of Construction Costs, October 1985, provided by Jasper Hawkins.
- W-12 o Memo to Richard Lee, ACDC Task Force from W. R. Pulice, President of Pulice Construction, Inc., dated November 18, 1985 regarding Reach IV Alternatives/Soil Conditions.
- W-13 o Forty-eighth Street Alternative (in Federal Right of Way). Construction Sequence presented by Ron Pulice, November 18, 1985.
- W-14 o Diagrams of Reach IV Alternative presented by Ron Pulice, November 18, 1985.
- W-15 o Memo to Richard Lee from Charles Pickrell dated November 18, 1985 regarding Reach IV with two letters in support of Reach IV.

Meeting No. 24 - December 9, 1985 (December 2 meeting was cancelled)

- X-1 o Agenda (for December 2 meeting)
- X-2 o Materials Distributed List
- X-3 o Post-authorization Change Report and Regulation Information - provided by the Corps of Engineers, November 18, 1985.
- X-4 o Selection of 100-year Flood as Design Flood for ACDC, Information - prepared by the Army Corps of Engineers, November 18, 1985.
- X-5 o Phoenix Business Journal "Reach IV Opponents Seek to Delay Task Force Recommendation" - November 18, 1985.
- X-6 o Letter to Mayor Terry Goddard from Mayor Joan Lincoln, Paradise Valley, regarding Paradise Valley Town Council Resolution supporting Reach IV as presently proposed - dated November 18, 1985 with copy of Resolution #488 and letter from Georgie Leckie, Phoenix Country Day School attached.
- X-7 o "Traffic Woes Lead List of Residents' Concerns," Arizona Republic, November 1, 1985, Extra - 3N-A.
- X-8 o Minutes from the November 12, 1985 ACDC Task Force Meeting.
- X-9 o Transmittal Letter from Richard Lee to Kathy Cale dated November 26, 1985 regarding ACDC Public Records. Attachments include: letter from Richard Lee to Rod McDougall regarding Public Records - ACDC Task Force, dated September 10, 1985; letter from Vern Schweigert to Lee regarding Citizens Against Reach IV Donations, dated August 26, 1985; letter from Rod McDougall to Lee, dated November 20, 1985; letter from Rod McDougall to Jim Flanagan, dated July 16, 1985 regarding Public Access to Public Records.
- X-10 o "Partial Chronology of ACDC Events Related to City Council and City of Phoenix Actions" - prepared by Management and Budget Department, dated December 4, 1985.

- X-11 o Draft outline of ACDC Task Force report for the City Council, prepared by Jasper Hawkins, dated December 3, 1985.
- X-12 o Letter from Steven A. Betts, Attorney with Streich, Lang, Weeks & Cardon transmitting additional documents received pursuant to Freedom of Information Act Request, dated December 4, 1985.
- X-13 o Excerpts from Inside Phoenix 1985 regarding median home prices.
- X-14 o Agenda for Monday, December 9, 1985 Meeting.
- X-15 o Actual and estimated population figures for Phoenix and Maricopa County, compared to estimated provided by Corps of Engineers in GDM No. 3, 1976.
- X-16 o Materials Distributed List.
- X-17 o Minutes of the November 18, 1985 ACDC Task Force Meeting.
- X-18 o Preliminary Draft Report of the ACDC Task Force.
Segment A - Background and History
Segment B - Benefit/Cost
Segment C - Alternatives
- X-19 o Table of comparison costs of Reach IV and alternatives
- X-20 o Memo from Corps of Engineers regarding Comments on Plan to Place ACDC Under the Arizona Canal (Pulice Alternatives), December 9, 1985.
- X-21 o Draft of Additional Recommendations for possible inclusion in Task Force Report, prepared by Richard Lee, December 9, 1985.
- X-22 o Memo from Don Weesner to Richard Lee regarding Reach IV Alternatives and the action items requested from SRP on November 18, 1985.
- X-23 o Draft of Summary for possible inclusion in Task Force Report prepared by Richard Lee, 12/9/85.
- X-24 o Draft of alternative recommendations for possible inclusion in Task Force Report, prepared by Richard Lee, December 9, 1985.
- X-25 o Alternatives Description, prepared by Jasper Hawkins, December 9, 1985.

Meeting No. 25 - December 19, 1985

- Y-1 o Agenda
- Y-2 o Materials Distributed List
- Y-3 o Preliminary Draft Report of the ACDC Task Force.
Segment A - Background and History
Segment B - Benefit/Cost and Alternatives

- Y-4 o Draft of Local/Federal Costs of Alternatives to Reach IV (in 1985 dollars) prepared by staff
- Y-5 o Memo from James Attebery, City Engineer, to Kathy Cale regarding drainage tunnels under the Papago Freeway Inner Loop, December 13, 1985.
- Y-6 o Memo from Susan J. Kieth, Water Quality Advisor, to Kathy Cale regarding water quality issues associated with urban runoff into the Arizona Canal, December 17, 1985.
- Y-7 o Digest of Water Resources Policies and Authorities - prepared by the Army Corps of Engineers, Office of the Chief of Engineers, June 30, 1983.
- Y-8 o Flood Insurance Rate Map for the City of Phoenix, Arizona (panel 75 of 35) revised June 1, 1984 by the Federal Emergency Management Agency, National Flood Insurance Program and provided by the Flood Control District of Maricopa County.
- Y-9 o Chronological History of the Reach 4 Addition to the ACDC, prepared by Jasper Hawkins
- Y-10 o Excerpt from M. M. Markiewiez, et al., vs. Salt River Valley Water Users' Association and Salt River Project Agricultural Improvement and Power District regarding the June 22, 1972 Flood. Provided by Jasper Hawkins.
- Y-11 o Excerpt from M. M. Markiewiez, et al., vs. Salt River Valley Water Users' Association and Salt River Project Agricultural Improvement and Power District regarding the June 22, 1972 Flood. Provided by Jasper Hawkins.
- Y-12 o Opinion of the Court in the Markiewiez, et al., vs. Salt River Valley, etc., dated January 24, 1978. Provided by Jasper Hawkins.
- Y-13 o Aesthetic Conditions - Draft prepared by Richard Lee, outlining aesthetic conditions which should be met before the City Council approves Reach 4.
- Y-14 o Local Liability - Draft prepared by Richard Lee, outlining local liability issues associated with Reach 4 and the ACDC.
- Y-15 o Summary of Costs Associated with Reach 4 and Alternatives, Draft prepared by Richard Lee.
- Y-16 o City Council Policy Options - Prepared by Richard Lee and outlines the policy options associated with Reach 4 which the City Council could adopt.

Meeting No. 26 - January 13, 1986

- Z-1 o Agenda

- Z-2 o Notice cancelling January 6 Meeting
- Z-3 o Minutes of December 19 Meeting
- Z-4 o Materials Distributed List
- Z-5 o Letter from Don Weesner to Richard Lee re: Properties Within Reach 4 Patented Prior 1891.
- Z-6 o Memo from Richard Lee re: Transmittal of material for meeting of January 13.
- Z-7 o Recommended Criteria for Evaluation of Reach 4 Alternatives
- Z-8 o Aesthetic Conditions
- Z-9 o Summary of Policy Options
- Z-10 o Miscellaneous Task Force Recommendations
- Z-11 o Draft of ACDC Task Force Report to City Council Including Appendix I: Background and History and Appendix IV: Cost Comparison of Reach 4 Alternatives
- Z-12 o Introduction for Inclusion in Task Force Report
- Z-13 o Benefits not Included COE Cost/Benefit Analyses
- Z-14 o Appendix to Task Force Report: Summary of Alternatives to Reach 4
- Z-15 o Arizona Republic newspaper article "Phoenix: To Your Health," July 18, 1985
- Z-16 o Revised Agenda
- Z-17 o Minutes to the December 9, 1985 Task Force Meeting
- Z-18 o Letter from W. S. Gookin and Associates to Richard Lee, dated January 13, 1985 re: proposed 40th Street storm drain
- Z-19 o Letter from W. S. Gookin and Associates to Richard Lee dated January 9, 1986 re: costs and quantities
- Z-20 o Conceptual estimate dated November 30, 1983
- Z-21 o Arizona Department of Transportation Tabulation of Bids: Phoenix-Casa Grande Highway (Storm Water Drainage Tunnels).
- Z-22 o Arizona Canal Diversion Channel Cost Alternatives, Laventhal and Horwath (bound booklet) dated January 11, 1986

Continuation of January 13, 1986 Task Force Meeting - Additional
Materials for February 10, 1986

- Zc-23 o Transmittal memo from Kathy Cale to Task Force members dated January 17, 1986
- Zc-24 o Excerpts of minutes of January 13, 1986 Task Force meeting
- Zc-25 o Agenda for continued meeting, February 10, 1986
- Zc-26 o Letter from W. E. FitzSimons to Richard Lee dated December 11, 1985, re: Completion of Task Force work
- Zc-27 o Letter from Don Weesner to Jasper Hawkins dated January 20, 1986, re: SRP right-of-way
- Zc-28 o Memo from COE re: Laventhal and Horwath report, 40th Street "Mole" Plan, dated January 29, 1986
- Zc-29 o Memo from COE re: Laventhal and Horwath report, 48th Street "Mole" Plan, dated January 29, 1986
- Zc-30 o Memo from COE re: Laventhal and Horwath report: COE fees for Reach IV, dated January 29, 1986
- Zc-31 o Memo from COE re: Laventhal and Horwath report, Note 9, Additional costs for Reaches 2 and 3, dated January 29, 1986
- Zc-32 o Letter to James Attebery, City Engineer, from Richard Lee, dated January 22, 1986 re: thank you for staff assistance
- Zc-33 o Photocopies of photographs of "Mole" operation for Papago Tunnel. A limited number of original photographs were distributed at January 13, 1986 Task Force meeting. Material provided by Kem Clark
- Zc-34 o Amended and approved Recommended Criteria for Evaluation of Alternatives dated January 13, 1986
- Zc-35 o Amended and approved Aesthetic Conditions dated January 13, 1986
- Zc-36 o Amended and approved Summary of Policy Options dated January 13, 1986
- Zc-37 o Approved Miscellaneous Task Force Recommendations (This Document was inadvertently omitted from the last mailing and replaces transmittal memo from Kathy Cale previously numbered Document Zc-37)
- Zc-38 o Appendix - Cost Comparison Reach 4 Alternatives and Footnotes
- Zc-39 o Proposed amendments to Aesthetic Conditions per Joyce Buekers dated February 4, 1986

- Zc-40 o Excerpt of Materials Distributed List for January 13 and February 10, 1986 meetings, updated February 4, 1986
- Zc-41 o Minutes of January 13 meeting, excluding excerpt from transcript submitted previously as Document Zc-24)
- Zc-42 o Revised Page One of Minutes for December 9 meeting, listed as Document Z-17
- Zc-43 o Appendix III - Summary of Reach 4 Alternatives
- Zc-44 o Corrected Cost Comparison of Reach 4 Alternatives (excludes Footnotes) previously listed as Document Zc-38
- Zc-45 o Local/Federal Costs of Reach 4 and Alternatives
- Zc-46 o Summary Position Statement form for ACDC Task Force Members - Optional
- Zc-47 o Report of the ACDC Task Force - February 10, 1986
- Zc-47A o Insert to Final Report, page 17
- Zc-48 o Appendix VI: ACDC Bibliography/Reference Library
- Zc-49 o Excerpt of Materials Distributed List for January 13 and February 10, 1986 meetings, dated February 10, 1986
- Zc-50 o Appendix I: Background and History ACDC and Reach 4

Continuation of Previous Meeting - Additional Materials for February 14, 1986

- Zd-51 o Agenda for February 14, 1986
- Zd-52 o Newspaper article, "Panel Still Split Over Reach 4 of Flood Channel," Phoenix Gazette, Tuesday, February 11, 1986
- Zd-53 o Insert A to Appendix III: Summary of Reach 4 Alternatives
- Zd-54 o Additional notes for Appendix IV: Cost Comparison of Reach 4 Alternatives
- Zd-55 o Revised Cost Comparison of Reach 4 Alternatives
- Zd-56 o Memorandum from W. S. Gookin to R. H. Lee, re: 40th Street "Mole" alternate calculations, dated February 14, 1986
- Zd-57 o Status of parcels in Reach 4, provided by the Flood Control District, dated February 14, 1986
- Zd-58 o Paradise Valley Alternative - Total number of homes and parcels required, provided by the Flood Control District, dated February 14, 1986

- Zd-59 o Reach 4 land acquisition, provided by Flood Control District, dated February 14, 1986
- Zd-60 o Letter from R. Lee to Buekers, Clark and Hawkins re: drafting of minority report and the Open Meeting Law, dated February 7, 1986

Other Materials Distributed to Task Force

- ZZ-1 Letter from Richard Lee to ACDC Task Force Re: Call for revisions/corrections to Final Report, dated January 31, 1986
- ZZ-2 Letter from Richard Lee to Charles Hill Re: Thank you for staff support to Task Force dated January 29, 1986
- ZZ-3 Minutes of the February 10 meeting
- ZZ-4 Minutes of the February 14 meeting
- ZZ-5 Letter from John McCain to Richard Lee Re: Questions raised regarding Reach 4 dated March 21, 1986 with letter from John S. Doyle to Congressman McCain, responding to questions raised regarding Reach 4 dated March 12, 1986

ACDC MINORITY COMMITTEE - MATERIALS DISTRIBUTED

Subcommittee Meeting, February 24, 1986

- A/Sub-1 Agenda
- A/Sub-2 ACDC Task force Minority Report: Conclusions and Recommendations (Preliminary Draft)

Subcommittee Meeting, Tuesday, March 4, 1986

- B/Sub-1 Agenda
- B/Sub-2 Minutes of the February 24 Meeting
- B/Sub-3 ACDC Task Force Minority Report (Working Draft)

Subcommittee Meeting Thursday, March 13, 1986

- C/Sub-1 Agenda
- C/Sub-2 Minutes of the March 4 Meeting
- C/Sub-3 Junior League Environmental Position Statement Relative to Canal Beautification
- C/Sub-4 ACDC Task Force Minority Report (Working Draft)

Subcommittee Meeting Tuesday, March 18, 1986

D/Sub-1 Agenda

D/Sub-2 Minutes of the March 13 meeting

D/Sub-3 ACDC Task Force Minority Report (Working Draft)

Subcommittee Meeting April 3, 1986

E/Sub-1 Agenda

E/Sub-2 Minutes of the March 18, 1986 meeting

Subcommittee Meeting Monday, April 14, 1986

F/Sub-1 Agenda

F/Sub-2 Minutes of the April 3, 1986 meeting

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APPENDIX VI

ACDC BIBLIOGRAPHY/REFERENCE LIBRARY

The following documents regarding the Arizona Diversion Channel have been identified. Most are available in the Arizona Room of the Phoenix Central Library. Also available at the Library are copies of all information distributed at or for ACDC Task Force meetings. See List of Materials Distributed filed with Task Force Meeting Material.

CORPS OF ENGINEERS

The Corps of Engineers has identified the following list of materials pertaining to the ACDC. The numbers in parenthesis indicate location of availability according to the following:

- (1) Available in the Arizona Room of the Phoenix Public Library, 12 East McDowell, special collection of ACDC material.
- (2) Document of which only one or a very few copies are available and that must be retained for Corps of Engineers records. A copy is available for review at the Corps office in Phoenix, 3636 North Central Avenue, Room 740, Phoenix, Arizona 85012-1936 (telephone 241-2003).
- (3) Will be made available to the Task Force upon request.
- (4) Already available in the Central Library's regular collection.

1. Design Memorandum No. 1, Feature Design for Dreamy Draw Dam, was published in January 1972. The report is exclusively devoted to the evaluation of Dreamy Draw Dam from economic, social, environmental, and engineering viewpoints. The evaluation led to the favorable decision to construct Dreamy Draw Dam. (1)

2. Design Memorandum No. 2 Hydrology, Part 1, was published in October 1974. The report details the meteorologic and hydrologic characteristics of the Phoenix area and defines the hydrologic design criteria for the proposed dams and channels. (2)

3. Design Memorandum No. 3, General Design Memorandum -- Phase I, Plan Formulation, was completed in March 1976. The report reviews the authorized plan and reformulates a plan (including Dreamy Draw Dam) more suitable to existing conditions by updating the basic design criteria for the study area -- its resources, problems, and needs. Alternative flood-control and recreational plans were considered before final selection of the recommended plan. (1) Photocopy available in Library.

4. Design Memorandum No. 3, General Design Memorandum -- Phase II, Project Design, Part 1, Cave Buttes Dam (including Cave Creek to Peoria Avenue), was completed in July 1976. The report summarizes the plan recommended in the

Phase I report and updates the plan and cost estimates for the entire project. Appendix 1 presents the detailed design of Cave Buttes Dam. Appendix 2 discusses the analysis of the Cave Creek floodplain between Cave Buttes Dam and the Arizona Canal and presents a delineation of the floodway and floodway fringes to be managed by local interests. (1)

5. Design Memorandum No. 3, General Design Memorandum -- Phase II, Project Design, Part 2, Adobe Dam (including Skunk Creek to Arizona Canal), was completed in April 1979. The report summarizes the plan recommended in the Phase I report and updates the plan and cost estimates for the entire project. Appendixes 1 and 1a of Part 2 discuss the detailed design of Adobe Dam and Skunk Creek channel and levees. Appendix 2 presents (a) an analysis of the Skunk Creek floodplain between Adobe Dam and the proposed ACDC and (b) a delineation of the floodway and floodway fringes to be managed by local interests. (1)

6. Supplemental Report to Design Memorandum No. 1, Floodway Delineation for Dreamy Draw (Dreamy Draw Dam to the Arizona Canal), was completed in June 1979. The report represents the future 100-year floodplain and floodway and operation and maintenance requirements for Dreamy Draw. (2)

7. Design Memorandum No. 4, Overall Master Plan, New River and Phoenix City Streams, Arizona, was completed in September 1980. The report addresses the necessity of viewing the entire Phoenix, Arizona, and Vicinity (Including New River) Flood Control Project as an entity for planning purposes, outlines the relationship of the project to recreational facilities developed or proposed by other agencies; discusses the resources of the project area; and describes the general land-use plan for the entire project. (2)

8. Design Memorandum No. 5, Master Plan and Feature Design for Recreation, Dreamy Draw Dam, was completed September 1982. The report analyzes the resources of the area, describes a specific plan for recreational development, and provides a basis for preparation of plans and specifications. (3)

9. Design Memorandum No. 2, Hydrology, Part 2, was published in April 1982. The report updates hydrologic studies since the Phase I Design Memorandum was published in March 1976. (1)

10. New River Dam (including New River to Skunk Creek) Design Memorandum No. 3, General Design Memorandum -- Phase II, Project Design, Part 3, was completed in November 1982. The report summarizes the plan recommended in the Phase I report, updates the plan and cost estimates for the entire project, and presents the feature design for the New River Dam. (1)

11. Arizona Canal Diversion Channel (including Cave Creek Channel and Sediment Basins on Cave Creek and Cudia City Wash), Design Memorandum No. 3, General Design Memorandum -- Phase II, Project Design, Part 5, was completed in March 1985. The report summarizes the plan recommended in the Phase I report, evaluates alternative design considered since the Phase I report, and presents an updated recommended plan with revised cost estimates. Feature

design for the first reach of the Arizona Canal Diversion Channel is presented. The general design for the remainder of the Arizona Canal Diversion Channel is displayed along with an updated environmental assessment, geologic analysis, recreation plan, and sedimentation study. (1)

12. Interim Report on Survey for Flood Control, Phoenix, Arizona, and Vicinity (including New River) was published in January 1964. This report describes investigations made to develop a comprehensive plan that would serve as a framework for all flood control work in the Phoenix metropolitan area. (2)

13. Flood Insurance Study -- Phoenix, Arizona was published in September 1973. This report contains flood overflow information for the National Flood Insurance Program. (2)

14. Deleted. Document duplicates #3 on this list.

15. Gila River Basin, New River and Phoenix City Streams, Design Memorandum No. 3, General Design Memorandum -- Phase I, Plan Formulation, Appendices was completed in March 1976. Contains technical appendices for Hydrology; Geology, Soils and Material, Site Selection of Dams; Alternative Plans; Treatment; and Cost Estimates. (2) Duplicates #3 with appendices added.

16. Gila River Basin, New River and Phoenix City Streams, Design Memorandum No. 3, General Design Memorandum -- Phase I, Plan Formulation, Supplement to Main Report, Correspondence (March 1976) (2)

17. Gila River Basin, New River and Phoenix City Streams, Arizona, Alternative Plans for Flood Control and Recreational Development was completed in April 1974. This brochure presented the feasible alternatives studied, for evaluation by local citizens at a public meeting held in Phoenix on April 25, 1974. (1) Photocopy available in Library.

18. Report on Flood of 22 June 1972, Phoenix Metropolitan Area, Arizona was finished in October 1972. The report describes the storm and flood in the Phoenix metropolitan area during the period June 21-22, 1972 and presents the resultant flood damages. (1)

19. February 1979 Flood Damage Report describes the storms and floods in Maricopa County, Arizona, during the period of February 27 through March 6, 1978, and presents the resultant flood damages. (2)

20. Flood Damage Report, Phoenix Metropolitan Area, December 1978 Flood was published in November 1979. This report is an assessment of damages resulting from the floods of December 17-23, 1978. (4)

21. Phoenix Flood Damage Survey February 1980 was completed in April 1981. This report is an assessment of flood damages in Maricopa County resulting from the floods of February 13-22, 1980. (2)

22. Gila River Basin, New River and Phoenix City Streams, Arizona, Letter From the Secretary of the Army Transmitting A Letter From the Chief of engineers, Department of the Army, dated 21 May 1965, Submitting a Report,

Together with Accompanying Papers and Illustrations, On an Interim Report On Gila River Basin, New River and Phoenix City Streams, Arizona, Authorized by the Flood Control Act Approved June 28, 1938. This is the submittal to Congress of the District Engineers' Interim Report on Survey for Flood Control, Phoenix, Arizona and Vicinity (Including New River). (2)

23. Amplification to the Final Environmental Impact Statement, New River and Phoenix City Streams Flood Control Project, Maricopa County, Arizona was completed in December 1977. The report provided information regarding the preservation of historic resources within the Cave Buttes Dam project area, specifically the effect of the project on Cave Creek Dam. (3)

24. Floodplain Information Study for Maricopa County, Arizona, Vol. V, New River Report was completed in April 1967. This report was prepared to provide information on flood hazards along New River for the guidance of the State of Arizona and the Flood Control District of Maricopa County in (a) advising county and city planning organizations and private land developers about those hazards and (b) setting up appropriate controls to insure optimum and prudent use of the floodplain. (3)

25. Floodplain Information, Agua Fria River, Maricopa County, Arizona was completed in March 1968. This report was prepared to provide information on flood hazards along the Agua Fria River for the guidance of the State of Arizona and the Flood Control District of Maricopa County in (a) advising county and city planning organizations and private land developers about those hazards and (b) setting up appropriate controls to insure optimum and prudent use of the floodplain. (3)

26. Floodplain Information Study for Maricopa County, Arizona, Vol. II, Cave Creek Report was completed in November 1964. This report was prepared to provide information on flood hazards along Cave Creek for the guidance of the State of Arizona and the Flood Control District of Maricopa County in (a) advising county and city planning organizations and private land developers about those hazards and (b) setting up appropriate controls to insure optimum about prudent use of the floodplain. (2)

27. Final Sediment Transport Report for Lower Agua Fria River was finished in November 1984 by Simons, Li and Associates. This report presents an analysis for the sediment conditions for the lower Agua Fria River. This information is then incorporated into the detailed analysis to determine the flood areas for the establishment of floodway and floodway fringe easements. (3)

28. Final Sediment Transport Report for Lower Skunk Creek and Lower New River (ACDC outlet to Agua Fria River) was finished in February 1985 by Simons, Li and Associates. This report presents an analysis of the sediment conditions for the lower New River and lower Skunk Creek. This information is then incorporated into the detailed analysis to determine the flood areas for the establishment of floodway and floodway fringe easements. (3)

29. Deleted. Material included in No. 11

30. Arizona Canal Diversion Channel, Part of the Authorized Flood Control Project of the US Army Corps of Engineers for Phoenix and Vicinity was published in June 1982. This paper presents planning and technical information on the design of the Arizona Canal Diversion Channel (and addresses issues raised in Gookin Report). (1)

31. Arizona Canal Diversion Channel, Part of the Authorized Flood Control Project of the US Army Corps of Engineers for Phoenix and Vicinity was published in June 1985. This paper presented planning and technical information on the design of the Arizona Canal Diversion Channel. This is a revision to the June 1982 paper. (1)

32. Proposed Plan for Flood Control and Recreational Development was prepared in October 1975. This brochure presents the details of the plan recommended for flood control and recreational development in the Phoenix area. It also describes the various alternatives studied and the basis for the selection of the recommended plan. (1)

33. Phoenix Urban Study was completed in August 1978. This report was a joint effort by the Corps and local government to develop a coordinated water resource management plan that would be consistent with other urban programs. (2)

34. Final Environmental Impact Statement, New River and Phoenix City Streams, Maricopa County, Arizona was completed in March 1976. The Environmental Statement complies with the National Environmental Policy Act of 1969 (Public Law 91-190) and describes (a) the recommended plan for the project, (b) the environmental setting without the project, (c) the relationship of the project to existing land use plans, (d) the probable impact of the project on the environment, (e) the alternatives to the recommended plan for the project, (f) the relationship between the short-term use of the environment and the maintenance and enhancement of long-term productivity, (g) the irreversible and irretrievable commitments of resources which would be involved in the project should it be implemented, and (h) the coordination effort which has taken place. (4)

35. Deleted. Document duplicates #30 on this list.

36. Geology, Soils and Materials Appendix 4 was published in August 1985. The report summarizes the degree of involvement in the excavation of materials from the diversion channel and sediment basins areas. Included are seventeen plates which show the geological features of the areas. (1) The plates are:

1. Regional Geology Map.
2. Structural Features and Locations of Earthquake Epicenters in Arizona.
3. Plan of Exploration, Sta. 998+85 to 922+00, Logs of Test Holes TH 80-1 and TH 80-2 and Drill Holes DH 82-1, 2 and DH 82-8.
4. Plan of Exploration, Sta. 922+00 to 800+00, Logs of Test Holes TH 80-3 and TH 80-4 and Drill Holes DH 82-3 to DH 82-5.
5. Logs of Test Holes TH 80-5 to TH 80-8 and Drill Holes DH 82-6 and DH 82-7.

6. Plan of Exploration, Sta. 800+00 to 630+00, Logs of Test Holes TH 80-12 through TH 80-18 and Drill Holes DH 82-9 and DH 82-10.
7. Logs of Test Holes TH 80-12 through TH 80-18.
8. Plan of Exploration, Sta. 630+00 to 464+00, Logs of Test Holes TH 80-19 through TH 80-23.
9. Logs of Test Holes TH 80-24 through TH 80-29.
10. Plan of Exploration, Sta. 464+00 to 341+80, Logs of Test Holes TH 80-30 through TH 80-32.
11. Seismic Refraction Surveys; Time-Distance Curves and Profiles, SL 82-1 through 82-3, 82-7, 82-11, and 82-12.
12. Seismic Refraction Surveys; Time-Distance Curves and Profiles, SL 82-4 through 82-6, and 82-8 through 82-10.
13. Geotechnical Investigations; Detailed Plans and Profiles.
14. Caudia City Wash Sediment Basin, Plan of Exploration, Lots of Test Holes TH 84-8 through TH 84-11.

15. Cave Green Sedimentation Basin, Plan of Exploration, Lots of Test Holes TH 84-3 through TH 84-7.
16. Cave Creek Channel, Sta. 75+00 to Sta. 99+50, Plan of Exploration, Logs of Test Trenches TT 84-1 through TT 84-5, TT 84-7 and TT 84-14 through TT 84-16.
17. Cave Creek Channel, Sta. 45+10 to Sta. 75+00, Plan of Exploration, Logs of Test Holes and Test Trenches TH 84-1 and TT 84-2, TT 84-6 and TT 84-8 through TT 84-13.

37. Arizona Canal Diversion Channel Reaches 2, 3, 4 and Cudia City Wash Sediment Basin Aesthetic Design, Erosion Control and Recreation Feature Design was completed August 20, 1985 and presented at the ACDC Public Hearing held on August 21, 1985. This represents thirty-three plates which show design features relating to aesthetics, erosion control and recreation.
(1)

38. Deleted. Duplicates #18.

39. Economics, Appendix 6 contains alternatives, economic information, impacts and other information on flood projects.

40. Draft Supplemental Environmental Assessment. Phoenix and vicinity, ACDC, Maricopa County, December, 1985.

CITY OF PHOENIX

- CP-1 City Clerk's Office Misc. (File) includes Requests for Council Action, deeds of property to Maricopa County, setting public hearing dates, resolutions, etc.
- CP-2 Minutes of Formal Council Meeting; ACDC Public Hearing, May 15, 1985.
- CP-3 Council Reports and Resolutions. (File) See attached index.
- CP-4 Flooding History. (File) See attached index.
- CP-5 News Items and Letters. (File) See attached index.
- CP-6 Public Meetings. (File) See attached index.
- CP-7 Reports. (File) See attached index.
- CP-8 Partial Chronology of Events/Actions taken by City of Phoenix related to the ACDC.

FLOOD CONTROL DISTRICT

- FCD-1 Agreement between the United States of America and Flood Control District of Maricopa County for Local Cooperation at Phoenix, Arizona and Vicinity (including New River) Flood Control Project, Gila River Basin, Arizona, dated July 21, 1977.
- FCD-2 Resolution (No. FCD 84-3). Endorsement of the Design Alternative (A-4) for the Arizona Canal Diversion Channel, dated March 5, 1984.
- FCD-3 Tour Notebook (Part of materials from Task Force Meeting and Tour of Reaches 3 and 4 on 7-27-85. Same as Document C-2 from materials distributed to ACDC Task Force.

TAB

1. Pertinent Data
2. Recommended Plan - Aerial Mosaics
3. Recommended Plan - Hydraulic Plans and Profiles
4. Construction Schedule
5. Comparative Widths of Arizona Canal and ACDC
6. Recommended Plan - Total Project Costs (Summary)
Total Project Costs (Detail)
Local Costs, Current and Projected
7. Flood Control Tax Levy
Phoenix Contribution to Flood Control Tax Base
8. Recommended Plan - Current Status of Land Acquisitions, by Reach

9. Record of Breaks in the Arizona Canal
Reach 4, Watershed Subarea Boundaries
Arizona Canal Diversion Canal, Background and History
10. Other Information

FCD-4 Contract for Engineering Services, Contract FCD 85-21. Contract with PRC Engineering for supplemental assistance on a as requested basis, dated 7/22/85.

FCD-D Quarter section map of Arizona Biltmore Estates area showing easement for ACDC. Prepared by Flood Control District.

OTHERS

OT-1 Conceptual Study, An Alternative to ACDC. March 29, 1983. Prepared by PRC, Toups, A Division of PRC Engineering, Inc.

OT-2 Notebook: Prepared by Citizens Against Reach 4, Presented by Vern Schweigert

Table of Contents:

- a. Reach 4 position paper - "Arizona Canal Diversion Channel - Background and Potential Problems"
- b. Biltmore Hotel Letter to Mayor Terry Goddard regarding Reach 4 of the ACDC, March 18, 1985
- c. Maricopa County Flood Control Dist. response letter to Biltmore Hotel Letter, May 14, 1985
- d. Federal Emergency Management Agency - National Flood Insurance Program Maps
- e. Select newspaper articles on the ACDC
- f. List of organizations opposing or calling for reevaluation of Reach 3 and/or Reach 4
- g. Addendum of minutes of June 16, 1982 meeting of Valley Former Board of Directors
- h. Congressional Subcommittee Report on review of Army Corps of Engineers Water Projects
- i. PRC Toups Conceptual Study of an Alternative to ACDC

OT-3 Arizona Biltmore Estates and the Canal Diversion Channel Cudia City Wash to 16th Street. Report prepared by W.S. Gookin & Associates, 5/21/82.

- OT-4 Sediment Transport Analysis Report for the Arizona Canal Diversion Channel. Boyle Engineers Corp., December, 1982.
- OT-5 Metro Phoenix Street Atlas
- OT-6 Petition of Opposition from Citizens Against Reach 4.
- OT-7 ACDC and Its Impact Upon the Arizona Biltmore Hotel: Summary of Facts. Submitted by Citizens Against Reach 4
- OT-8 Chronology of ACDC Events (3/81 - 12/83), prepared by Citizens Against Reach 4, including information on:
- a. ACDC Request Under Freedom of Information Act
 - b. Public Support?
 - c. Consideration of Alternatives
 - d. Project Cost Effectiveness
 - e. Cost/Benefit Analysis
 - f. Listed Alternatives
 - g. List of Organizations Opposing or Calling for Reevaluation of Reach 4/and or Reach 3
- OT-9 Arizona Canal: Inflow and Possible Flooding Areas. Prepared by Salt River Project. (Contains color coded maps and photographs.)
- OT-10 Newspaper Clippings.
- OT-11 Alternatives Study: ACDC, December 1982. Prepared by PRC Toups, A Division of PRC Engineering, Inc., prepared for: Arizona Biltmore Estates Village Association.
- OT-12 Valley Forward Meeting Minutes. June 16, 1982. Topic: ACDC
- OT-13 Information Sheet Regarding Flood Control and Petition Requesting Participating Agencies to Proceed with the ACDC. Contains a short message to persons affected by the 1972 flood. It asks these people to fill out a brief questionnaire and sign a petition in favor of the ACDC. It also includes a map of the 1972 flood area.
- OT-14 Flood Report, dated September 4-6, 1970. Table of contents and excerpts from a report on the September 4-6, 1970 flood in Phoenix and vicinity. Original source document not identified.
- OT-15 Flood Insurance Rate Map; City of Phoenix, Arizona; Maricopa County - There are two maps of Phoenix and Maricopa County flood plains published by the Federal Emergency Management Agency. One was published December 4, 1979 and the other on June 1, 1984.
- OT-16 List of ACDC Aesthetic Treatment Meetings - This list shows the date, time, project location, meeting place, and number of impacted property owners for each meeting concerning aesthetics along the ACDC.

- OT-17 Arizona Canal Improvements Program, Scottsdale, Arizona, Taliesin Associated Architects, 1984.
- OT-18 Water Resources Evaluation. Submitted to Town of Paradise Valley, Arizona, May 1985, Anderson-Nichols & Company.
- OT-19 Memorandum from Citizens Against Reach IV to ACDC Task Force.
Re: Documents from files of the Army Corps of Engineers. Dated November 8, 1985. Contains Exhibits A through T - No Table of Contents. (Bound. Same as Task Force Document V-7)
- OT-20 Duplicates CP-8.
- OT-21 Box of additional information obtained from Corps;Streich, Lang, Weeks and Cardon on behalf of Citizens Against Reach IV.
- OT-22 Markiewicz v. Salt River Valley Water Users Association. Summary of case from Pacific Reporter provided by Kem Clark.
- OT-23 Photographs of "Mole" operation for the Papago Tunnel. Material provided by Task Force member Kem Clark.
- OT-24 ACDC Cost Alternatives, prepared by Laventhol & Horwath, Certified Public Accountants.

Revised, February, 1986

INDEX TO CITY OF PHOENIX FILES

File No. CP-3 - COUNCIL REPORTS & RESOLUTIONS

- Request for Public Hearing - Reach 4 - 5-1-85
- Council Support of ACDC
- Resolution No. 16558
- Resolution No. 14324
- City Council Report - 9-14-84
- City Council Report - 12-7-84
- Agreement between Flood Control District & Phoenix
- City Council Report - 8-24-84
- Resolution (FCD 84-3)
- City Council Report - 1-17-83
- Hatcher Road Realignment
- Flood Control District - Briefing of New Council
- Letter from Mayor Hance to Toby Moffett
- City Council Report - 4-13-82
- News Article - Federal Funding
- Letter from Eldon Rudd to Mayor Hance
- Letter from Corps of Engineers to Mayor Hance
- Request for Council Action - Easements
- Ordinance No. S 12398
- Document No. 4
- City Council Report - Transfer of Right of Way
- Document No. 5
- Resolution No. 15307
- City Council Report - 11-26-79
- Document No. 3
- City Council Report - 11-3-79
- Document No. 1
- Resolution No. 14324
- Recreational Development
- Resolution No. 14431
- Ordinance No. G-1343 - 2-12-74

File No. CP-4 - FLOODING HISTORY

- Biltmore Estates Homeowners Assoc., Reach 4
- Fred Glendening - History of Flooding in Phoenix - 1967
- Flood of 1921 - Arizona Republican
- Flood of 1943 - Arizona Republic
- Fred Glendening - Report to Council - 1974
- Paper to American Society of Civil Engineers - 1972

File No. CP-5 - NEWS ITEMS & LETTERS

- Republic - 5-21-85
- Gazette - 3-2-85
- Response to Editorial - 1-20-83
- Republic - 8-11-78
- Republic - 10-21-75
- Gazette - 11-25-75
- Tempe Daily News - 10-15-75
- Gazette - 10-20-75
- Gazette - 7-22-75
- Republic - 8-27-75
- Scottsdale Progress - 8-11-72
- Republic - 9-23-74
- Assorted Letters

File No. CP-6 - PUBLIC MEETINGS

- Request for Council Action - 5-1-85
- ACDC Task Force Roster
- Petition for ACDC
- Questions & Answers
- Meetings on Reach 3
- Senita School Meeting
- Public Information Meetings
- ACDC Workshops
- Summary of Public Meetings
- Questions on Reach 4
- City Council Report ACDC
- City Engineer Participation

File No. CP-7 - REPORTS

- Schedule of Design & Construction
- Summary of ACDC
- Summary of Field Inspection
- Response to Ed Korrick
- ACDC Report, Reach 4
- Plants & Landscaping
- Utility Relocations
- Salt River Project Comments
- Aesthetic Treatment Work
- SRP - Desilting
- W.S. Gookin Report
- Army Corps of Engineers Report
- Position Paper
- Bridges on ACDC
- Activities - 1980
- Right-of-Way Acquisition - Biltmore



APPENDIX VII

ACDC TASK FORCE
MINORITY REPORT

(Bound Under Separate Cover)