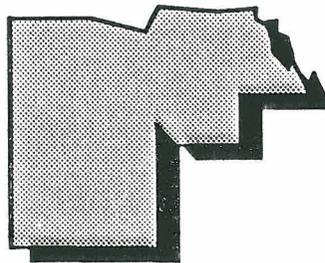


FT

**ROOSEVELT IRRIGATION DISTRICT
LITCHFIELD PARK OVERCHUTE PROJECT
CONTRACT NO. FCD 94-07**

**OVERCHUTE
ALTERNATIVES ANALYSIS**



**FLOOD CONTROL DISTRICT
of
MARICOPA COUNTY**

**April 1995
SFC Project No. 1202101**

Prepared by:

**SFC ENGINEERING COMPANY
7776 Pointe Parkway West
Suite 290
Phoenix, Arizona 85044
(602) 438-2200**



*A Member of the
Stanley Technology Group*



April 11, 1995
Flood Control District
of Maricopa County
Page 2 of 2

- g. Riprap bank protection is shown on the channel bends for Alternative No. 3.

3. Section 5.0 - OPINION OF ESTIMATED CONSTRUCTION COSTS

- a. An estimate of the acres and costs of rights-of-way for each alternative have been addressed in the cost opinion tables. Unit right-of-way costs provided by the Flood Control District have been used as appropriate.
- b. Utility relocation costs given to Russ Miracle at the March 28, 1995 meeting have added to the alternative cost analysis tables.

4. COST ESTIMATE TABLES

- a. The unit price of riprap bank protection for Alternative 3 has been changed to \$71.50 per cubic yard.

Sincerely,

SFC ENGINEERING COMPANY

Thomas M. Koenekamp

Thomas M. Koenekamp, P.E.
Project Manager

Enclosures

**ROOSEVELT IRRIGATION DISTRICT
LITCHFIELD PARK OVERCHUTE PROJECT
CONTRACT FCD 94-07**

OVERCHUTE ALTERNATIVES ANALYSIS

	<u>PAGE</u>
1.0 PROJECT DESCRIPTION	1
2.0 HYDROLOGIC ANALYSIS AND HYDRAULIC DESIGN	1
2.1 Hydrologic Analysis	1
2.1.1 Existing Conditions	1
2.1.2 Hydrologic Modeling	2
2.2 Hydraulic Design	4
3.0 Alternatives	4
3.1 Alternative No. 1 - Reduce Indian School Road R.O.W	5
3.2 Alternative No. 2 - Realign RID Canal	5
3.3 Alternative No. 3 - Eastern Overchute Site	5
4.0 LOCATION OF CONFLICTING UTILITIES	6
4.1 Alternative No. 1 - Reduce Indian School Road R.O.W	6
4.2 Alternative No. 2 - Realign RID Canal	6
4.3 Alternative No. 3 - Eastern Overchute Site	6
5.0 ESTIMATED CONSTRUCTION COSTS	7
5.1 Alternative No. 1 - Reduce Indian School Bypass R.O.W	7
5.2 Alternative No. 2 - Realign RID Canal	8
5.3 Alternative No. 3 - Eastern Overchute Site	8
6.0 CONCLUSIONS AND RECOMMENDATIONS	8



1.0 PROJECT DESCRIPTION

The White Tanks ADMS reported that the 100-year flood will result in storm water ponding against the raised embankments of the Roosevelt Irrigation District (RID) canal in the vicinity of Litchfield Road and the RID Canal, and that flows will breach the canal and travel southerly through an area currently planned for residential development. The purpose of this project is to complete designs for construction of an overchute/siphon structure to safely pass floodwater from the 100-year storm the south side of the RID Canal and into an existing drainage channel.

The proposed overchute/siphon structure is to be located in the vicinity of the intersection of Litchfield Road and the RID canal. Drainage channels to be constructed along the upstream (north) side of the RID canal will convey flows into the structure. At the 30 percent design level, it was identified that the available width between the proposed widening of Indian School Road Bypass and the RID canal was not adequate to convey flows from the east into the proposed overchute/siphon. After consideration of several alternatives, the three most viable alternatives were selected for detailed analysis for selection of a preferred alternative. The purpose of this report is to summarize the analysis of the alternatives.

2.0 HYDROLOGIC ANALYSIS AND HYDRAULIC DESIGN

2.1 HYDROLOGIC ANALYSIS

2.1.1 EXISTING CONDITIONS. Existing hydrologic conditions were established in the "White Tanks Area Drainage Master Plan" (White Tanks ADMS). Topographic mapping at a scale of 1 inch equals 400 feet with two-foot contour intervals was developed for that study for the watershed contributing flows to the RID Overchute/Siphon. This mapping was used to confirm runoff flow paths. Currently, flows concentrate along the embankment of the RID Canal and pond between the Litchfield Road Bypass and Dysart Road. Flows accumulate until the depth of water overtops the RID Canal embankments at the Litchfield Road Bypass and at existing detention basins located about 1,500 feet east of Litchfield Road. At both sites, the White Tanks ADMS predicted that the 100-year frequency, 24-hour duration storm will result in overtopping of the canal embankment, with water flowing southward onto lands currently being planned for

residential subdivisions. The proposed project will collect flows along the RID canal and convey them through an overchute structure to the south side of the RID canal into an existing drainage channel.

2.1.2 HYDROLOGIC MODELING. Hydrologic data developed for the "White Tanks Area Drainage Master Plan" (White Tanks ADMS) and the "Master Drainage Report for Litchfield Master Planned Community" were considered in establishing the design discharges. The White Tanks ADMS was developed to establish the limits of the 100-year floodplain within the project area and has been approved by the Federal Emergency Management Agency (FEMA). Documentation to modify the floodplain delineations will need to be based upon the data previously approved by FEMA. Therefore, the White Tanks ADMS hydrologic modeling was used to establish the design discharges for sizing the structures.

Since completion of the White Tanks ADMS, modifications to the drainage improvements have been completed along Dysert Road. The FCDMC studied these modifications as part of this project and modified the White Tanks ADMS HEC-1 model to incorporate existing drainage improvements constructed since completion of the White Tanks ADMS and to incorporate the modifications proposed in this project. The existing improvements include:

- An existing drainage channel along Dysart Road, from Camelback Road to the RID canal, constructed by the Maricopa County Department of Transportation (MCDOT),
- An existing drainage channel and detention basin, with a 30 inch diameter outlet, along the RID canal, from Dysart Road east approximately 2,500 feet, which was designed for MCDOT, work order 68644, and
- A block wall along the Indian School Road Bypass from Litchfield Road to the Litchfield Road Bypass.

The drainage modifications proposed for this project, which will affect the hydrologic model, that were incorporated into the HEC-1 model include:

- A drainage channel to be constructed along the south side of the Indian School Road Bypass, conveying flows southwesterly to the overchute/siphon,

- A proposed channel along the north RID canal embankment from the existing detention basins to the overchute/siphon,
- A drainage channel along the south side of Indian School Road Bypass to the overchute/siphon between Litchfield Road Bypass and Litchfield Road, and
- An overchute/siphon located at the intersection of Litchfield Road and the RID canal or at the outlet of the existing detention basins.

The modifications to the drainage subarea boundaries and the resulting peak discharges for the 100-year 24-hour storm are shown on figure 1. The revised model routes flows crossing the Indian School Road Bypass, between Dysart Road and Indian School Road, along the south side of Indian School Road Bypass toward the proposed overchute/siphon. The peak discharges conveyed along the south side of Indian School Road Bypass in the proposed channel are shown in figure 1.

The existing detention basins, located along the north side of the RID canal, and the peak inflow and outflow are also shown on figure 1. Three basins have been constructed along the north embankment of the RID canal which are separated by embankments with culvert pipe through the embankments which drain the basins. This project includes breaching the embankments separating the three separate basins and providing an outlet which consists of a trapezoidal channel section. The basin outflow is controlled by the proposed channel geometry exiting the basins. Modifying the channel geometry results in increases or decreases in the peak outflow or ponded water elevation. The selected channel geometry results in a water elevation in the basins which will not overtop the adjacent street (Plaza Circle) and will also result in a peak flow crossing the overchute/siphon which is less than the design capacity of the drainage channel downstream of the overchute/siphon (1532 cfs). The resulting peak discharge exiting the detention basins is 368 cfs and crossing the overchute/siphon is 1513 cfs. The peak flow of the combined channels along Indian School Road Bypass and the RID canal is 1390 cfs.

because of timing

2.2 Hydraulic Design The design discharges from the modified HEC-1 model discussed in the previous section were used in sizing the project features for each of the alternatives.

The siphon will be a reinforced concrete box culvert. The culvert is sized to convey a maximum canal flow of 385 cfs. The HEC-2 water surface profiles developed for the 30 percent design were used in this alternatives study. The siphon for each of the alternatives will be a two barrel, 8 foot wide by 8 foot high concrete box culvert.

The overchute is hydraulically designed to convey 1513 cfs. The structure grade is set to maintain the upstream surface water elevation below the existing ground elevation.

The existing Indian School Road Bypass storm drain is a 42 inch diameter cast in place concrete pipe extending from the Litchfield Road Bypass east to Litchfield Road. The storm drain is a 36 inch diameter concrete pipe east of Litchfield Road. The invert elevation of the existing pipe is about 1001.0 at the west side of Litchfield Road Bypass, 1002.6 at the west side of Litchfield Road, and 1006.0 approximately 146 feet east of Litchfield Road. With the overchute located at the Litchfield road alignment, and a proposed overchute crest elevation of 1005.5, the 36 inch diameter pipe at the east side of Litchfield Road can be diverted into the overchute.

3.0 ALTERNATIVES

The sizes, dimensions, slopes, and elevations established for this study are considered preliminary and may change during final design of the selected alternative. The estimates of construction costs are accordingly preliminary. The overchute/siphon and related drainage channels are sized to convey the peak discharge resulting from the estimated 100-year flood event. The designs were completed using normal depth hydraulics. Water surface profiles will be completed for the final designs. Figures 2, 3, and 4 show the project features for the three alternatives.

Intergovernmental agreements for maintenance of the project facilities have not been completed at this time. It is assumed for the purpose of this study that the maintenance of the facilities will be assumed by the Cities within which the facilities are located. It is also assumed that the overchute structure maintenance and daily inspection and cleaning will be assumed by the City of Litchfield Park.

3.1 Alternative No. 1 - Reduce Indian School Road Bypass R.O.W.

The first alternative consists of the project features as originally conceived, and the proposed width of the proposed Indian School Road Bypass reduced to accommodate a drainage channel along the north embankment of the RID canal. Presently the Indian School Road Bypass is being designed to add additional traffic lanes resulting in a 92 foot curb to curb width. With this road section, there is not adequate width between the road and the RID canal right-of-way to construct a drainage channel conveying flows from the east along the north side of the RID canal. The alternative 1 project features are shown on figure 2.

This alternative requires reduction of the proposed Indian School Road Bypass road width. To minimize the required channel width between Indian School Road Bypass and the RID canal, the channel is designed with a rectangular section. The channel extends from the overchute structure about 600 feet to the east. The Indian School Road Bypass channel and the detention basin outlet channel are transitioned into the rectangular channel. The minimum distance between the rectangular channel and the existing northern curb of the Indian School Road Bypass is about 86 feet. The Indian School Road Bypass roadway width will need to be reduced accordingly for this alternative.

3.2 Alternative No. 2 - Realign RID Canal

This alternative considers realigning a section of the RID canal to the south to accommodate construction of a trapezoidal unlined channel between the Indian School Road Bypass, with the 92 foot curb to curb section, and the RID canal. Approximately 900 feet of canal would be relocated. The overchute/siphon structure is similar in geometry to that of Alternative 1.

3.3 Alternative No. 3 - Eastern Overchute Site

This alternative relocates the overchute/siphon structure to the east near the outlet of the western most existing detention basin. Flows from the east are intercepted and diverted through the overchute before reaching the narrow section between the Indian School Road Bypass and the RID canal. A channel which intercepts flows from the north along Litchfield Road will convey these flows eastward to the overchute. The required design discharge for the channel between the Indian School Road Bypass and the RID canal is reduced from 1390 cfs to 560 cfs with this

alternative. An unlined trapezoidal channel will convey flows from the overchute, west along the south side of the RID canal, to the existing downstream channel.

4.0 LOCATION OF CONFLICTING UTILITIES

4.1 Alternative No. 1 - Reduce Indian School Bypass R.O.W. In the vicinity of the proposed overchute structure, construction will require relocation of;

- approximately 250 lineal feet of 6 inch diameter natural gas pipeline,
- approximately 250 lineal feet of buried telephone cable,
- relocation of two poles for overhead power lines,
- relocation of about 100 lineal feet of fiber optics cable owned by American Telephone and Telegraph Company (AT&T), and
- modifications to the existing 36 inch diameter Indian School Road Bypass storm drain that conveys flows from the roadway east of Litchfield Road into the proposed overchute structure.

Construction of the drainage channels east of Litchfield road will require relocation of;

- approximately 1,050 lineal feet of 8 inch diameter sanitary sewer,
- approximately 200 lineal feet of 15 inch diameter sanitary sewer,
- and approximately 600 lineal feet of buried telephone cable.

4.2 Alternative No. 2 - Realign RID Canal This alternative will require relocation of utilities essentially the same as alternative 1 with the exception of the AT&T fiber optics cable. With relocation of the RID canal, approximately 1,100 lineal feet of the fiber optics cable will need to be relocated.

4.3 Alternative No. 3 - Eastern Overchute Site The overhead power poles will not need to be relocated with this alternative. The lengths of relocation of the 6 inch diameter natural gas line are reduced to approximately 150 lineal feet. The length of buried telephone line at Litchfield Road requiring relocation is approximately 50 lineal feet. The length of the 15 inch sanitary sewer pipeline requiring relocation is approximately 100 lineal feet.

5.0 OPINION OF ESTIMATED CONSTRUCTION COSTS

Construction cost estimates were completed for each of the alternatives. The estimates are considered preliminary and are consistent with the level of design in completeness and detail. The cost estimates are summarized in tables 1, 2, and 3. These cost estimates are considered conservative and will be refined during the final design of the selected alternative. The costs for each of the major construction items are summarized on page one. Estimates for each major item are based upon estimates for components which are shown on the following two pages for each table. The quantities for the base construction costs were computed using averaged or approximate lengths and sizes for each component. Unit costs were based upon published costs for Arizona Department of Transportation (ADOT) construction contracts issued in 1993. The 1993 unit costs were escalated to 1995 costs using an inflation rate of five percent per year. The total for the estimated base construction costs are shown for each alternative. An allowance of twenty-five (25) percent of the base construction costs was added as a contingency to allow for unknown costs, such as unlisted items, increases in unit costs due to industry level of business, availability of local materials, and waste disposal sites.

Since the funding currently available for this project is limited, construction items directly related to the overchute/siphon were totaled separate from items which could be constructed as separate items in the future under separate construction contracts or by others.

5.1 Alternative No. 1 - Reduce Indian School Bypass R.O.W. Table 1 summarizes the cost estimates for Alternative 1. The total construction cost is \$1,587,607. The construction items directly related to the overchute/siphon have a base construction cost of \$576,982 and a cost with unlisted items and contingencies of \$721,227.

5.2 Alternative No. 2 - Realign RID Canal. Table 2 summarizes the cost estimates for alternative 2. The total construction cost is \$1,579,333. The construction items directly related to the overchute/siphon have a base construction cost of \$773,155 and a cost with unlisted items and contingencies of \$966,444.

5.3 Alternative No. 3 - Eastern Overchute Site. Table 3 summarizes the cost estimates for alternative 3. The total construction cost is \$1,634,404. The construction items directly related to the overchute/siphon have a base construction cost of \$597,659 and a cost with unlisted items and contingencies of \$747,074.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Each of the alternatives studied are feasible to construct, will meet the objectives of this project, and will reduce the limits of the 100-year floodplain along the north side of the RID canal between Dysart Road and the Litchfield Road Bypass. Each of the alternatives will have similar impacts to the RID canal operating water surface and, with construction of a temporary bypass, can be constructed without significantly impacting RID canal operations.

Alternative 1 (reduce Indian School Road Bypass R.O.W.) results in the second highest total estimated construction cost and will result in right-of-way restrictions to the Indian School Road Bypass limiting the traffic capacity of the road. Therefore alternative 1 is not recommended.

Alternative 2 (realign RID canal) will result in the lowest total estimated construction cost. However, this alternative will require the greatest initial project cost for construction of the overchute/siphon, \$773,155 base construction cost and \$966,444 with allowances for unlisted items and contingencies.

Alternative 3 (eastern overchute site) results in the highest total construction cost, but can be completed with an initial construction cost of the overchute/siphon, \$597,659 base construction cost and \$747,074 with allowances for unlisted items and contingencies.

If the FCDMC budget cannot be expanded to provide for construction of Alternative 2, it is recommended that Alternative 3 be selected for final design.

TABLE 1
OPINION OF PROBABLE CONSTRUCTION COSTS
ALTERNATIVE NO. 1
 REDUCE INDIAN SCHOOL BYPASS R.O.W.
 Maricopa County Flood Control District Contract No. FCD 94-07
 April 1995

Item No.	Description	Quantity	Unit	Unit Price	Amount	THIS PROJECT	BY OTHERS
1	Mobilization, demobilization, preparatory work, project closure, and cleanup.	1	LS			\$23,447	\$21,848
2	Overchute/Siphon Structure	1	LS			\$219,008	
3	Overchute Inlet Channel	1	LS			\$45,833	\$240,420
4	Detention Basin Outlet Channel	1	LS			\$16,138	
5	Indian School Road Bypass Channel	1	LS				\$196,535
6	Temporary Canal Bypass	1	LS			\$17,325	
7	Demolition and Removal	1	LS			\$60,280	
8	Utility Relocation	1	LS			\$110,350	
9	Rights-of-way	1	LS			\$84,600	\$234,300
SUBTOTAL BASE CONSTRUCTION COSTS						\$576,982	\$693,104
11	Contingencies @ 25 Percent					\$144,245	\$173,276
SUBTOTAL ESTIMATED CONSTRUCTION COSTS						\$721,227	\$866,380
TOTAL EST. CONSTRUCTION COSTS							\$1,587,607

6234

842 COST

TABLE 2
OPINION OF PROBABLE CONSTRUCTION COSTS
ALTERNATIVE NO. 2
REALIGN R.I.D. CANAL
Maricopa County Flood Control District Contract No. FCD 94-07
April 1995

Item No.	Description	Quantity	Unit	Unit Price	Amount	
						THIS CONTRACT
						BY OTHERS
1	Mobilization, demobilization, preparatory work, project closure, and cleanup.	1	LS		\$32,331	\$12,191
2	Overchute/Siphon Structure	1	LS		\$219,008	
3	Overchute Inlet Channel	1	LS			\$47,285
4	Detention Basin Outlet Channel	1	LS		\$16,138	
5	Indian School Road Bypass Channel	1	LS			\$196,535
6	Temporary Canal Bypass	1	LS		\$1,925	
7	Demolition and Removal	1	LS		\$60,280	
8	Utility Relocation	1	LS		\$160,350	
9	Canal Relocation	1	LS		\$188,922	
10	Rights-of-way	1	LS		\$94,200	\$234,300
SUBTOTAL BASE CONSTRUCTION COST					\$773,155	\$490,311
Contingencies @ 25 Percent					\$193,289	\$122,578
SUBTOTAL ESTIMATED CONSTRUCTION COSTS					\$966,444	\$612,889
TOTAL ESTIMATED CONSTRUCTION COSTS					\$1,579,333	

TABLE 3
OPINION OF PROBABLE CONSTRUCTION COSTS
ALTERNATIVE NO. 3
EASTERN OVERCHUTE SITE
 Maricopa County Flood Control District Contract No. FCD 94-07
 April 1995

Item No.	Description	Quantity	Unit	Unit Price	Amount	
						THIS CONTRACT
						BY OTHERS
1	Mobilization, demobilization, preparatory work, project closure, and cleanup.	1	LS		\$21,269	\$22,646
2	Overchute/Siphon Structure	1	LS		\$213,467	
3	Intersection Collection Channel	1	LS			\$256,383
4	Detention Basin Outlet Channel	1	LS		\$16,138	
5	Indian School Road Bypass Channel	1	LS			\$196,535
6	Temporary Canal Bypass	1	LS		\$17,325	
7	Demolition and Removal	1	LS		\$28,600	
8	Utility Relocation	1	LS		\$88,850	
9	Overchute Outlet Channel	1	LS		\$61,009	
10	Rights-of-Way	1	LS		\$151,000	\$234,300
	SUBTOTAL BASE CONSTRUCTION COST				\$597,659	\$709,864
	Contingencies @ 25 Percent				\$149,415	\$177,466
SUBTOTAL ESTIMATED CONSTRUCTION COSTS					\$747,074	\$887,330
TOTAL ESTIMATED CONSTRUCTION COSTS					\$1,634,404	

TABLE 1
OPINION OF PROBABLE CONSTRUCTION COSTS
ALTERNATIVE NO. 1
 REDUCE INDIAN SCHOOL BYPASS R.O.W.
 Maricopa County Flood Control District Contract No. FCD 94-07
 April 1995

Item No.	Description	Quantity	Unit	Unit Price	Amount	
						THIS PROJECT
						BY OTHERS
1	Mobilization, demobilization, preparatory work, project closure, and cleanup.	1	LS		\$23,447	\$21,848
2	Overchute/Siphon Structure	1	LS		\$219,008	
3	Overchute Inlet Channel	1	LS		\$45,833	\$240,420
4	Detention Basin Outlet Channel	1	LS		\$16,138	
5	Indian School Road Bypass Channel	1	LS			\$196,535
6	Temporary Canal Bypass	1	LS		\$17,325	
7	Demolition and Removal	1	LS		\$60,280	
8	Utility Relocation	1	LS		\$110,350	
9	Rights-of-way	1	LS		\$84,600	\$234,300
	SUBTOTAL BASE CONSTRUCTION COSTS				\$576,982	\$693,104
11	Contingencies @ 25 Percent				\$144,245	\$173,276
	SUBTOTAL ESTIMATED CONSTRUCTION COSTS				\$721,227	\$866,380
					TOTAL EST. CONSTRUCTION COSTS	\$1,587,607

TABLE 1
OPINION OF PROBABLE CONSTRUCTION COSTS
ALTERNATIVE NO. 1

REDUCE INDIAN SCHOOL BYPASS R.O.W.

Maricopa County Flood Control District Contract No. FCD 94-07

April 1995

Item No.	Description	Quantity	Unit	Unit Price	Amount
COST ESTIMATE FOR MOBILIZATION AND DEMOBILIZATION					
1A	Mobilization, demobilization, preparatory work, project closure, and cleanup (@ 5% of total construction costs)				
	SUBTOTAL COST EST. FOR MOB. AND DEMOB	1	LS		\$23,447
OVERCHUTE/SIPHON STRUCTURE					
2A	2 - 8 FT x 8 FT CBC x 67.5 FT 1.892 cy/lf x 67.5 lf Per ADOT Standard Dwg. No. B-02.70	127.7	CY	\$390.50	\$49,871
2B	Siphon Inlet				
	Apron (3"Gunite)	115.5	SQ-Y	\$34.65	\$4,001
	Headwall	21.9	CY	\$390.50	\$8,548
	Wing Walls	28.4	CY	\$390.50	\$11,090
2C	Siphon Outlet				
	Apron (3"Gunite)	115.5	SQ-Y	\$34.65	\$4,001
	Headwall	21.9	CY	\$390.50	\$8,548
	Wing Walls	28.4	CY	\$390.50	\$11,090
2D	Overchute Inlet				
	Apron	97.2	CY	\$165.00	\$16,042
	Retaining Walls	96.3	CY	\$390.50	\$37,607
2E	Overchute Outlet Apron				
	Apron	68.8	CY	\$165.00	\$11,344
2F	Access Road Ramps	65.3	CY	\$165.00	\$10,780
2G	Structural Excavation	3070	CY	\$11.00	\$33,766
2H	Structural Backfill	533	CY	\$23.10	\$12,320
	SUBTOTAL OVERCHUTE/SIPHON STRUCTURE				\$219,008
COST ESTIMATE FOR OVERCHUTE INLET CHANNEL					
3A	Retaining Walls	436.8	CY	\$390.50	\$170,570
3B	Channel Floor (6 IN.)	2000.0	SQ-Y	\$25.30	\$50,600
3C	Excavation	4167	LF	\$11.00	\$45,833
3D	Backfill	833	CY	\$23.10	\$19,250
	SUBTOTAL COST ESTIMATE FOR OVERCHUTE INLET CHANNEL				\$286,254

TABLE 1
OPINION OF PROBABLE CONSTRUCTION COSTS
ALTERNATIVE NO. 1

REDUCE INDIAN SCHOOL BYPASS R.O.W.
 Maricopa County Flood Control District Contract No. FCD 94-07
 April 1995

Item No.	Description	Quantity	Unit	Unit Price	Amount
COST ESTIMATE FOR DETENTION BASIN OUTLET CHANNEL					
4A	Drainage Excavation	1,991	CY	\$3.85	\$7,664
4B	Riprap Bank Protection	118.5	CY	\$71.50	\$8,474
SUBTOTAL COST ESTIMATE FOR DETENTION BASIN OUTLET CHANNEL					\$16,138
COST ESTIMATE FOR INDIAN SCHOOL BYPASS CHANNEL					
5A	Drainage Excavation	38,194	CY	\$3.85	\$147,049
5B	Riprap Bank Protection	250	CY	\$71.50	\$17,875
5C	Dip Roadway Sections (2)				
	Asphaltic Cement (3")	656	Ton	\$21.01	\$13,788
	Agregate Base (6")	648	CY	\$27.50	\$17,824
SUBTOTAL COST ESTIMATE FOR INDIAN SCHOOL BYPASS CHANNEL					\$196,535
TEMPORARY CANAL BYPASS					
6A	Drainage Excavation	4,500	CY	\$3.85	\$17,325
SUBTOTAL TEMPORARY CANAL BYPASS					\$17,325
COST ESTIMATE FOR DEMOLITION AND REMOVAL					
7A	2 - 8 ft x 8 ft x 66 ft CBC w/ Wings	274	CY	\$220.00	\$60,280
SUBTOTAL COST ESTIMATE FOR DEMOLITION AND REMOVAL					\$60,280
COST ESTIMATE FOR UTILITY RELOCATION					
8A	Relocate 6" Gas Line	250	LF	\$100.00	\$25,000 *
8B	Relocate UG Telephone Line	250	LF	\$30.00	\$7,500 *
8C	Relocate AT&T Fiber Optics Cable	100	LF	\$50.00	\$5,000 *
8D	Relocate 8" Sanitary Sewer	1,050	LF	\$30.00	\$31,500 *
8E	Modify Indian Sch. Bypass 42" SD	130	LF	\$95.00	\$12,350 *
8F	Relocate 15" Sainitary Sewer	200	LF	\$55.00	\$11,000 *
8G	Relocate UG Telephone Line	600	LF	\$30.00	\$18,000 *
SUBTOTAL COST ESTIMATE FOR UTILITY RELOCATION					\$110,350
COST ESTIMATE FOR RIGHTS-OF-WAY					
9A	Overchute Structure Site	0.26	AC	\$30,000.00	\$7,800 *
9B	Detention Basin Outlet Channel Site and Overchute Inlet Channel Site	2.56	AC	\$30,000.00	\$76,800 *
9C	Indian School Bypass Channel Site	7.81	AC	\$30,000.00	\$234,300 *
SUBTOTAL COST ESTIMATE FOR RIGHTS-OF-WAY					\$318,900

* Unit Costs Provided by FCDMC

TABLE 2
OPINION OF PROBABLE CONSTRUCTION COSTS
ALTERNATIVE NO. 2
REALIGN R.I.D. CANAL
Maricopa County Flood Control District Contract No. FCD 94-07
April 1995

Item No.	Description	Quantity	Unit	Unit Price	Amount	
						THIS CONTRACT
						BY OTHERS
1	Mobilization, demobilization, preparatory work, project closure, and cleanup.	1	LS		\$32,331	\$12,191
2	Overchute/Siphon Structure	1	LS		\$219,008	
3	Overchute Inlet Channel	1	LS			\$47,285
4	Detention Basin Outlet Channel	1	LS		\$16,138	
5	Indian School Road Bypass Channel	1	LS			\$196,535
6	Temporary Canal Bypass	1	LS		\$1,925	
7	Demolition and Removal	1	LS		\$60,280	
8	Utility Relocation	1	LS		\$160,350	
9	Canal Relocation	1	LS		\$188,922	
10	Rights-of-way	1	LS		\$94,200	\$234,300
	SUBTOTAL BASE CONSTRUCTION COST				\$773,155	\$490,311
	Contingencies @ 25 Percent				\$193,289	\$122,578
SUBTOTAL ESTIMATED CONSTRUCTION COSTS					\$966,444	\$612,889
TOTAL ESTIMATED CONSTRUCTION COSTS					\$1,579,333	

TABLE 2
OPINION OF PROBABLE CONSTRUCTION COSTS
ALTERNATIVE NO. 2

REALIGN R.I.D. CANAL

Maricopa County Flood Control District Contract No. FCD 94-07

April 1995

Item No.	Description	Quantity	Unit	Unit Price	Amount
COST ESTIMATE FOR MOBILIZATION AND DEMOBILIZATION					
1A	Mobilization, demobilization, preparatory work, project closure, and cleanup (@ 5% of total construction costs - items 2-9)				
	SUBTOTAL COST EST. FOR MOB. AND DEMOB.	1	LS		\$32,331
OVERCHUTE/SIPHON STRUCTURE					
2A	2 - 8 FT x 8 FT CBC x 67.5 FT 1.892 cy/lf x 67.5 lf Per ADOT Standard Dwg. No. B-02.70	127.7	CY	\$390.50	\$49,871
2B	Siphon Inlet				
	Apron (3"Gunite)	115.5	SQ-Y	\$34.65	\$4,001
	Headwall	21.9	CY	\$390.50	\$8,548
	Wing Walls	28.4	CY	\$390.50	\$11,090
2C	Siphon Outlet				
	Apron (3"Gunite)	115.5	SQ-Y	\$34.65	\$4,001
	Headwall	21.9	CY	\$390.50	\$8,548
	Wing Walls	28.4	CY	\$390.50	\$11,090
2D	Overchute Inlet				
	Apron	97.2	CY	\$165.00	\$16,042
	Retaining Walls	96.3	CY	\$390.50	\$37,607
2E	Overchute Outlet Apron				
	Apron	68.8	CY	\$165.00	\$11,344
2F	Access Road Ramps	65.3	CY	\$165.00	\$10,780
2G	Structural Excavation	3070	CY	\$11.00	\$33,766
2H	Structural Backfill	533	CY	\$23.10	\$12,320
	SUBTOTAL OVERCHUTE/SIPHON STRUCTURE				\$219,008
COST ESTIMATE FOR OVERCHUTE INLET CHANNEL					
3A	Drainage Excavation	7,639	CY	\$3.85	\$29,410
3B	Riprap Bank Protection	250	CY	\$71.50	\$17,875
	SUBTOTAL COST ESTIMATE FOR OVERCHUTE INLET CHANNEL				\$47,285

TABLE 2
OPINION OF PROBABLE CONSTRUCTION COSTS
ALTERNATIVE NO. 2
REALIGN R.I.D. CANAL
Maricopa County Flood Control District Contract No. FCD 94-07
April 1995

Item No.	Description	Quantity	Unit	Unit Price	Amount
COST ESTIMATE FOR DETENTION BASIN OUTLET CHANNEL					
4A	Drainage Excavation	1,991	CY	\$3.85	\$7,664
4B	Riprap Bank Protection	118.5	CY	\$71.50	\$8,474
SUBTOTAL COST ESTIMATE FOR DETENTION BASIN OUTLET CHANNEL					\$16,138
COST ESTIMATE FOR INDIAN SCHOOL BYPASS CHANNEL					
5A	Drainage Excavation	38,194	CY	\$3.85	\$147,049
5B	Riprap Bank Protection	250	CY	\$71.50	\$17,875
5C	Dip Roadway Sections (2)				
	Asphaltic Cement (3")	656	Ton	\$21.01	\$13,788
	Agregate Base (6")	648	CY	\$27.50	\$17,824
SUBTOTAL COST ESTIMATE FOR INDIAN SCHOOL BYPASS CHANNEL					\$196,535
TEMPORARY CANAL BYPASS					
6A	Drainage Excavation	500	CY	\$3.85	\$1,925
SUBTOTAL TEMPORARY CANAL BYPASS					\$1,925
COST ESTIMATE FOR DEMOLITION AND REMOVAL					
7A	2 - 8 ft x 8 ft x 66 ft CBC	274	CY	\$220.00	\$60,280
SUBTOTAL COST ESTIMATE FOR DEMOLITION AND REMOVAL					\$60,280
COST ESTIMATE FOR UTILITY RELOCATION					
8A	Relocate 6" Gas Line	250	LF	\$100.00	\$25,000 *
8B	Relocate UG Telephone Line	250	LF	\$30.00	\$7,500 *
8C	Relocate AT&T Fiber Optics Cable	1,100	LF	\$50.00	\$55,000 *
8D	Relocate 8" Sanitary Sewer	1,050	LF	\$30.00	\$31,500 *
8E	Modify IndianSch. Bypass Storm Drain	130	LF	\$95.00	\$12,350 *
8F	Relocate 15" Sainitary Sewer	200	LF	\$55.00	\$11,000 *
8G	Relocate UG Telephone Line	600	LF	\$30.00	\$18,000 *
SUBTOTAL COST ESTIMATE FOR UTILITY RELOCATION					\$160,350
COST ESTIMATE FOR CANAL RELOCATION					
9A	Canal Excavation	7778	CY	\$3.50	\$27,222
9B	Canal Lining (3" Gunite)	5133	SQ-Y	\$31.50	\$161,700
SUBTOTAL COST ESTIMATE FOR CANAL RELOCATION					\$188,922
COST ESTIMATE FOR RIGHTS-OF-WAY					
10A	Overchute Structure Site	0.26	AC	\$30,000.00	\$7,800 *
10B	Detention Basin Outlet Channel Site and Overchute Inlet Channel Site	2.56	AC	\$30,000.00	\$76,800 *
10C	Indian School Bypass Channel Site	7.81	AC	\$30,000.00	\$234,300 *
10D	Canal Relocation Site	0.24	AC	\$40,000.00	\$9,600 *
SUBTOTAL COST ESTIMATE FOR RIGHTS-OF-WAY					\$328,500

* Unit Costs Provided by FCDMC

TABLE 3
OPINION OF PROBABLE CONSTRUCTION COSTS
ALTERNATIVE NO. 3
 EASTERN OVERCHUTE SITE
 Maricopa County Flood Control District Contract No. FCD 94-07
 April 1995

Item No.	Description	Quantity	Unit	Unit Price	Amount		
						THIS CONTRACT	BY OTHERS
1	Mobilization, demobilization, preparatory work, project closure, and cleanup.	1	LS		\$21,269		\$22,646
2	Overchute/Siphon Structure	1	LS		\$213,467		
3	Intersection Collection Channel	1	LS				\$256,383
4	Detention Basin Outlet Channel	1	LS		\$16,138		
5	Indian School Road Bypass Channel	1	LS				\$196,535
6	Temporary Canal Bypass	1	LS		\$17,325		
7	Demolition and Removal	1	LS		\$28,600		
8	Utility Relocation	1	LS		\$88,850		
9	Overchute Outlet Channel	1	LS		\$61,009		
10	Rights-of-Way	1	LS		\$151,000		\$234,300
	SUBTOTAL BASE CONSTRUCTION COST				\$597,659	\$709,864	
	Contingencies @ 25 Percent				\$149,415	\$177,466	
	SUBTOTAL ESTIMATED CONSTRUCTION COSTS				\$747,074	\$887,330	
	TOTAL ESTIMATED CONSTRUCTION COSTS				\$1,634,404		

TABLE 3
OPINION OF PROBABLE CONSTRUCTION COSTS
ALTERNATIVE NO. 3
 EASTERN OVERCHUTE SITE
 Maricopa County Flood Control District Contract No. FCD 94-07
 April 1995

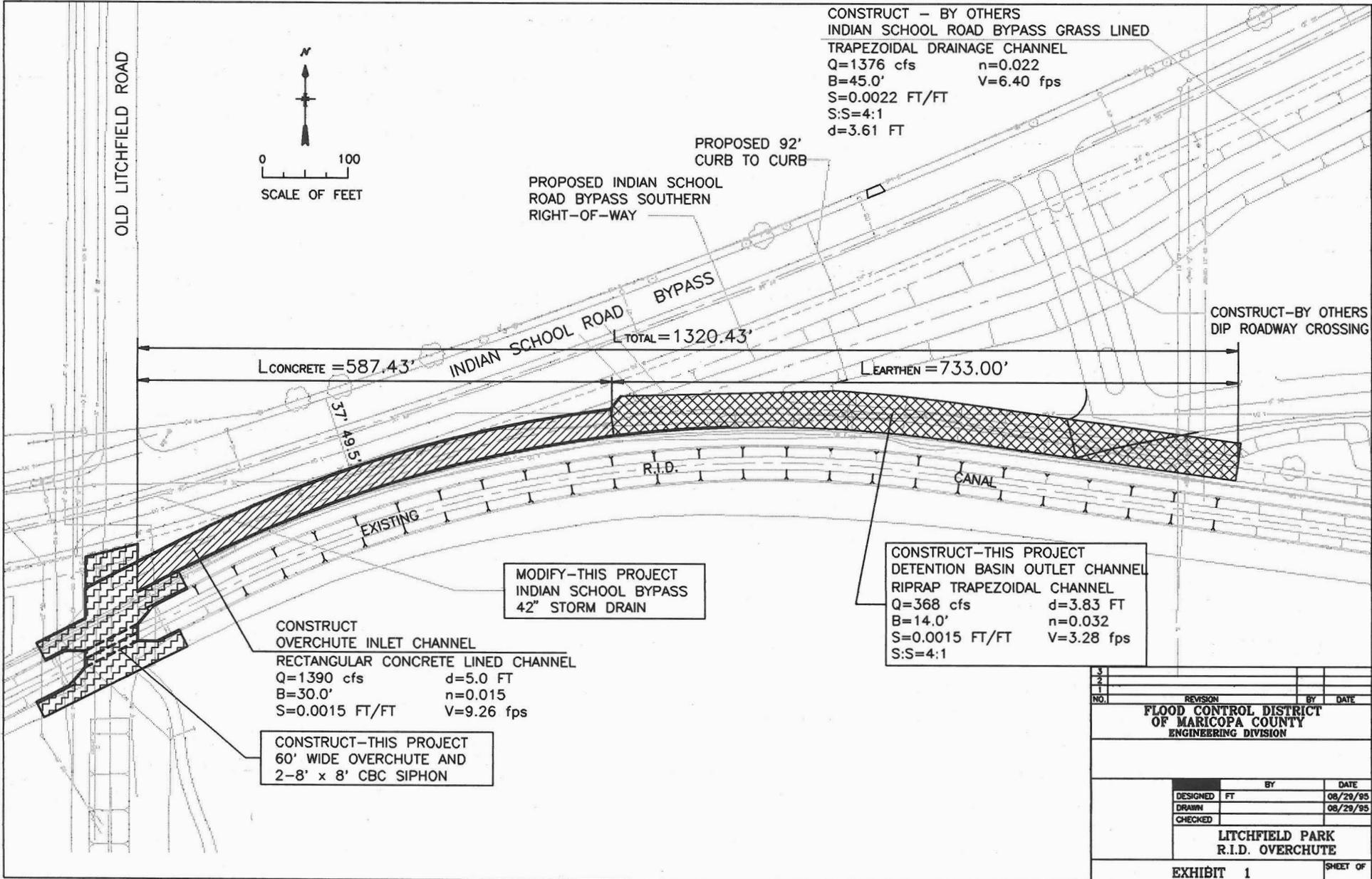
Item No.	Description	Quantity	Unit	Unit Price	Amount
COST ESTIMATE FOR MOBILIZATION AND DEMOBILIZATION					
1A	Mobilization, demobilization, preparatory work, project closure, and cleanup (@ 5% of total construction costs)				
	SUBTOTAL COST EST. FOR MOB. AND DEMOB.	1	LS		\$21,269
OVERCHUTE/SIPHON STRUCTURE					
2A	2 - 8 FT x 8 FT CBC x 67.5 FT 1.892 cy/lf x 60 lf Per ADOT Standard Dwg. No. B-02.70	113.5	CY	\$390.50	\$44,330
2B	Siphon Inlet				
	Apron (3"Gunite)	115.5	SQ-Y	\$34.65	\$4,001
	Headwall	21.9	CY	\$390.50	\$8,548
	Wing Walls	28.4	CY	\$390.50	\$11,090
2C	Siphon Outlet				
	Apron (3"Gunite)	115.5	SQ-Y	\$34.65	\$4,001
	Headwall	21.9	CY	\$390.50	\$8,548
	Wing Walls	28.4	CY	\$390.50	\$11,090
2D	Overchute Inlet				
	Apron	97.2	CY	\$165.00	\$16,042
	Retaining Walls	96.3	CY	\$390.50	\$37,607
2E	Overchute Outlet Apron				
	Apron	68.8	CY	\$165.00	\$11,344
2F	Access Road Ramps	65.3	CY	\$165.00	\$10,780
2G	Structural Excavation	3070	CY	\$11.00	\$33,766
2H	Structural Backfill	533	CY	\$23.10	\$12,320
	SUBTOTAL OVERCHUTE/SIPHON STRUCTURE				\$213,467
COST ESTIMATE FOR INTERSECTION COLLECTION CHANNEL					
3A	Retaining Walls	436.8	CY	\$390.50	\$170,570
3B	Channel Floor (6 IN.)	1133.3	SQ-Y	\$25.30	\$28,673
3C	Excavation	3444	LF	\$11.00	\$37,889
3D	Backfill	833	CY	\$23.10	\$19,250
	SUBTOTAL COST ESTIMATE FOR INTERSECTION COLLECTION CHANNEL				\$256,383

TABLE 3
OPINION OF PROBABLE CONSTRUCTION COSTS
ALTERNATIVE NO. 3
 EASTERN OVERCHUTE SITE
 Maricopa County Flood Control District Contract No. FCD 94-07
 April 1995

Item No.	Description	Quantity	Unit	Price	Amount
COST ESTIMATE FOR DETENTION BASIN OUTLET CHANNEL					
4A	Drainage Excavation	1,991	CY	\$3.85	\$7,664
4B	Riprap Bank Protection	118.5	CY	\$71.50	\$8,474
SUBTOTAL COST ESTIMATE FOR DETENTION BASIN OUTLET CHANNEL					\$16,138
COST ESTIMATE FOR INDIAN SCHOOL BYPASS CHANNEL					
5A	Drainage Excavation	38,194	CY	\$3.85	\$147,049
5B	Riprap Bank Protection	250	CY	\$71.50	\$17,875
5C	Dip Roadway Sections (2)				
	Asphaltic Cement (3")	656	Ton	\$21.01	\$13,788
	Aggregate Base (6")	648	CY	\$27.50	\$17,824
SUBTOTAL COST ESTIMATE FOR INDIAN SCHOOL BYPASS CHANNEL					\$196,535
TEMPORARY CANAL BYPASS					
6A	Drainage Excavation	4,500	CY	\$3.85	\$17,325
SUBTOTAL TEMPORARY CANAL BYPASS					\$17,325
COST ESTIMATE FOR DEMOLITION AND REMOVAL					
7A	2 - 8 ft x 8 ft x 66 ft CBC	130	CY	\$220.00	\$28,600
SUBTOTAL COST ESTIMATE FOR DEMOLITION AND REMOVAL					\$28,600
COST ESTIMATE FOR UTILITY RELOCATION					
8A	Relocate 6" Gas Line	150	LF	\$100.00	\$15,000 *
8B	Relocate UG Telephone Line	50	LF	\$30.00	\$1,500 *
8C	Relocate AT&T Fiber Optics Cable	100	LF	\$50.00	\$5,000 *
8D	Relocate 8" Sanitary Sewer	1,050	LF	\$30.00	\$31,500 *
8E	Modify Indian Sch. Bypass Storm Drain	130	LF	\$95.00	\$12,350 *
8E	Relocate 15" Sainitary Sewer	100	LF	\$55.00	\$5,500 *
8F	Relocate UG Telephone Line	600	LF	\$30.00	\$18,000 *
SUBTOTAL COST ESTIMATE FOR UTILITY RELOCATION					\$88,850
COST ESTIMATE FOR OVERCHUTE OUTLET CHANNEL					
9A	Drainage Excavation	11,204	CY	\$3.85	\$43,134
9B	Riprap Bank Protection	250	CY	\$71.50	\$17,875
COST ESTIMATE FOR OVERCHUTE OUTLET CHANNEL					\$61,009
COST ESTIMATE FOR RIGHTS-OF-WAY					
10A	Overchute Structure Site	0.26	CY	\$30,000.00	\$7,800 *
10B	Detention Basin Outlet Channel Site and Overchute Inlet Channel Site	2.56	CY	\$30,000.00	\$76,800 *
10C	Indian School Bypass Channel Site	7.81	CY	\$30,000.00	\$234,300 *
10A	Canal Relocation Site	1.66	CY	\$40,000.00	\$66,400 *
COST ESTIMATE FOR OVERCHUTE OUTLET CHANNEL					\$385,300

* Unit Costs Provided by FCDMC

LITCHFIELD PARK / R.I.D. OVERCHUTE PROJECT
F.C.D. #94-07



CONSTRUCT - BY OTHERS
INDIAN SCHOOL ROAD BYPASS GRASS LINED
TRAPEZOIDAL DRAINAGE CHANNEL
Q=1376 cfs n=0.022
B=45.0' V=6.40 fps
S=0.0022 FT/FT
S:S=4:1
d=3.61 FT



PROPOSED 92'
CURB TO CURB
PROPOSED INDIAN SCHOOL
ROAD BYPASS SOUTHERN
RIGHT-OF-WAY

CONSTRUCT-BY OTHERS
DIP ROADWAY CROSSING

L CONCRETE = 587.43'

L TOTAL = 1320.43'

L EARTHEN = 733.00'

MODIFY-THIS PROJECT
INDIAN SCHOOL BYPASS
42" STORM DRAIN

CONSTRUCT-THIS PROJECT
DETENTION BASIN OUTLET CHANNEL
RIPRAP TRAPEZOIDAL CHANNEL
Q=368 cfs d=3.83 FT
B=14.0' n=0.032
S=0.0015 FT/FT V=3.28 fps
S:S=4:1

CONSTRUCT
OVERCHUTE INLET CHANNEL
RECTANGULAR CONCRETE LINED CHANNEL
Q=1390 cfs d=5.0 FT
B=30.0' n=0.015
S=0.0015 FT/FT V=9.26 fps

CONSTRUCT-THIS PROJECT
60' WIDE OVERCHUTE AND
2-8' x 8' CBC SIPHON

3			
2			
1			
NO.	REVISION	BY	DATE
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION			
		BY	DATE
DESIGNED	FT		08/29/95
DRAWN			08/29/95
CHECKED			
LITCHFIELD PARK R.I.D. OVERCHUTE			
EXHIBIT 1			SHEET OF

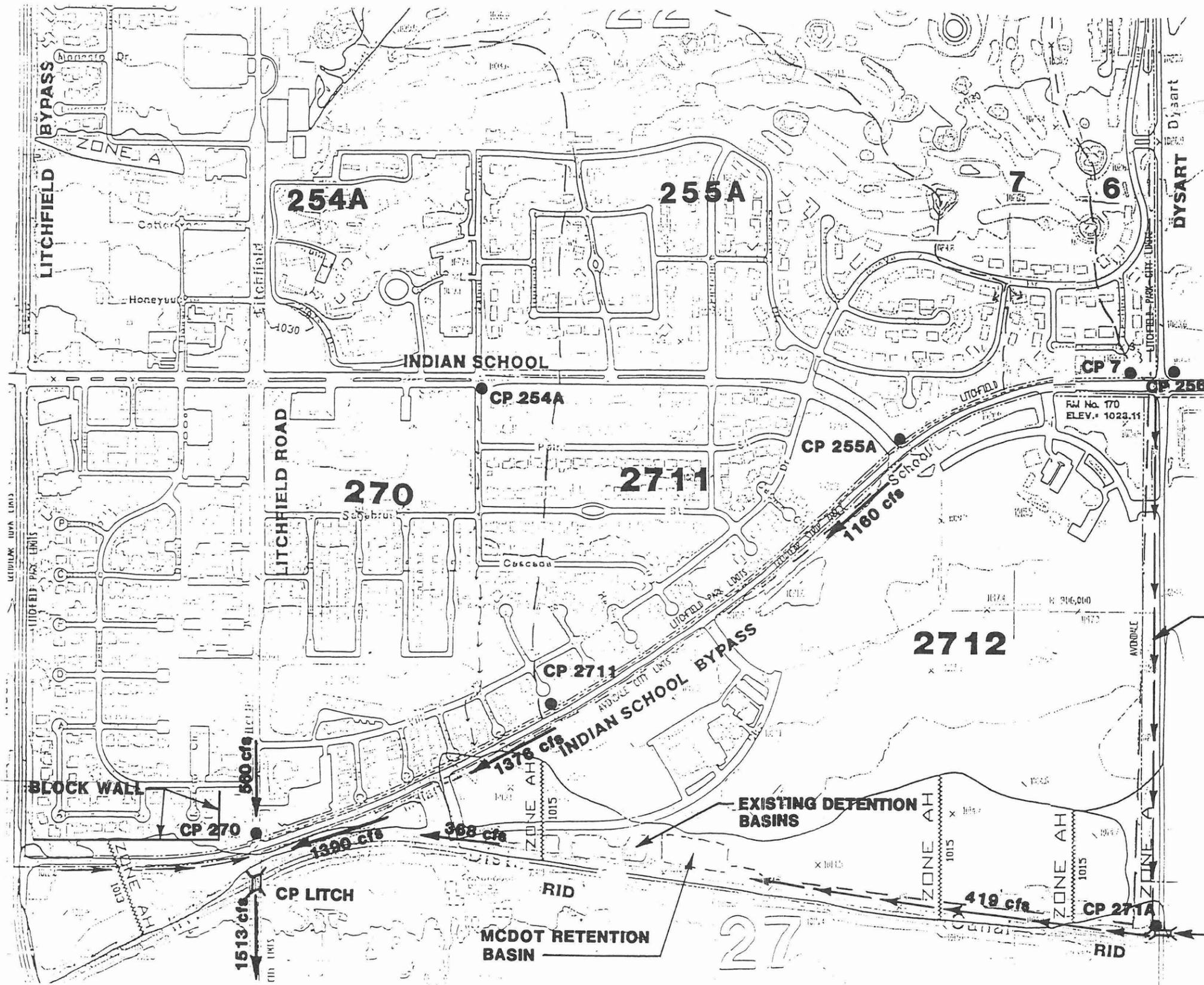
AGENDA

RID OVERCHUTE ALTERNATIVES

MAY 3, 1995

Felicia Terry-FCD
Stan Smith -FCD
Tom Hill-SunCor

1. The hydrology for the project was revised to account for the improvements. The discharges to the overchute were increased.
2. Three alternatives were developed by SFC Engineers.
 - A. Encroach on the Indian School Road Bypass Right-of-Way.
 - B. Realign the RID canal.
 - C. Move the overchute east past the right-of-way constraints.
3. Costs of the Alternatives are higher than anticipated.
4. The District is prepared to fund construction of the overchute and to create positive drainage to the overchute from the detention basins. The District is not prepared to fund the Indian School Road Bypass channel or the inlet channel..
5. The outlet channel from the overchute does not have the capacity to convey the 1513 cfs. It will need to be improved as the development occurs.
6. Comments from SunCor.



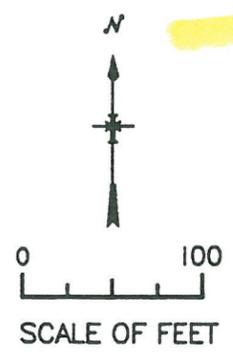
MCDOT DRAINAGE CHANNEL
(CAMELBACK ROAD
TO R.I.D. CANAL)

FIGURE 1
FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
HEC-1 MODEL SUMMARY
PROPOSED CONDITIONS
100-YEAR 24-HOUR

LITCHFIELD PARK
R.I.D. OVERCHUTE



OLD LITCHFIELD ROAD



OTHERS CONSTRUCT - SunCoB
FCD CONSTRUCTS

CONSTRUCT - BY OTHERS
INDIAN SCHOOL ROAD BYPASS GRASS LINED
TRAPEZOIDAL DRAINAGE CHANNEL
Q=1376 cfs n=0.022
B=45.0' V=6.40 fps
S=0.0022 FT/FT
S:S=4:1
d=3.61 FT

RELOCATE-THIS PROJECT
600 LF UG TELEPHONE LINE
RELOCATE-THIS PROJECT
1,050 LF 8" SANITARY SEWER
RELOCATE-THIS PROJECT
100 LF AT&T FIBER OPTICS CABLE

PROPOSED INDIAN SCHOOL
ROAD BYPASS SOUTHERN
RIGHT-OF-WAY

PROPOSED 92'
CURB TO CURB

SEE FIGURE 5
FOR CONTINUATION

CONSTRUCT-BY OTHERS
DIP ROADWAY CROSSING

INDIAN SCHOOL ROAD BYPASS

R.I.D.

CANAL

EXISTING

CONSTRUCT-BY OTHERS
GUNITE PROTECTION

MODIFY-THIS PROJECT
INDIAN SCHOOL BYPASS
42" STORM DRAIN

CONSTRUCT-THIS PROJECT
DETENTION BASIN OUTLET CHANNEL
RIPRAP TRAPEZOIDAL CHANNEL
Q=368 cfs d=3.83 FT
B=14.0' n=0.032
S=0.0015 FT/FT V=3.28 fps
S:S=4:1

RELOCATE-THIS PROJECT
200 LF 15" SANITARY
SEWER

CONSTRUCT-BY OTHERS
OVERCHUTE INLET CHANNEL
RECTANGULAR CONCRETE LINED CHANNEL
Q=1390 cfs d=5.0 FT
B=30.0' n=0.015
S=0.0015 FT/FT V=9.26 fps

CONSTRUCT-THIS PROJECT
60' WIDE OVERCHUTE AND
2-8' x 8' CBC SIPHON
RELOCATE-THIS PROJECT
250 LF 6" GAS LINE
RELOCATE-THIS PROJECT
250 LF UG TELEPHONE LINE

FCD
\$721,227

OTHERS
\$866,380

TOTAL
\$1,587,607

FIGURE 2

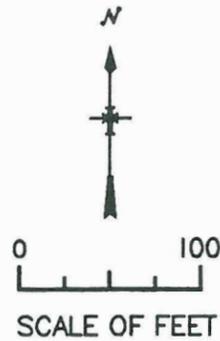
FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

ALTERNATIVE NO. 1 - REDUCE
INDIAN SCHOOL ROAD R.O.W.

LITCHFIELD PARK
R.I.D. OVERCHUTE



OLD LITCHFIELD ROAD



CONSTRUCT-BY OTHERS
INTERSECTION COLLECTION CHANNEL
TRAPEZOIDAL CONCRETE CHANNEL
Q=560 cfs d=4.0 FT
B=17.0' n=0.015
S=0.0009 FT/FT V=6.08 fps
S:S=1.5:1

MODIFY-THIS PROJECT
INDIAN SCHOOL BYPASS
42" STORM SEWER

CONSTRUCT-BY OTHERS
DIP ROADWAY CROSSING

PROPOSED INDIAN SCHOOL
ROAD BYPASS SOUTHERN
RIGHT-OF-WAY

PROPOSED 92'
CURB TO CURB

CONSTRUCT-BY OTHERS
INDIAN SCHOOL ROAD BYPASS GRASS
LINED TRAPEZOIDAL DRAINAGE CHANNEL
Q=1376 cfs n=0.022
B=45.0' V=6.40 fps
S=0.0022 FT/FT
S:S=4:1
d=3.61 FT

SEE FIGURE 5
FOR CONTINUATION

RELOCATE-THIS PROJECT
600 LF UG TELEPHONE LINE

RELOCATE-THIS PROJECT
1050 LF 8" SANITARY SEWER

RELOCATE-THIS PROJECT
100 LF 15" SANITARY SEWER

RIPRAP BANK
PROTECTION

INDIAN SCHOOL ROAD BYPASS

CANAL

R.I.D.

EXISTING

CONSTRUCT-THIS PROJECT
DETENTION BASIN OUTLET CHANNEL
RIPRAP LINED TRAPEZOIDAL CHANNEL
Q=368 cfs d=3.83 FT
B=14.0' n=0.032
S=0.0015 FT/FT V=3.28 fps
S:S=4:1

FIGURE 4
FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

ALTERNATIVE NO. 3 - EASTERN
OVERCHUTE SITE

LITCHFIELD PARK
R.I.D. OVERCHUTE

CONSTRUCT-BY OTHERS
INTERSECTION COLLECTION CHANNEL
UNLINED TRAPEZOIDAL CHANNEL
Q=560 cfs d=2.9 FT
B=42.0' n=0.022
S=0.0009 FT/FT V=3.59 fps
S:S=2:1

CONSTRUCT-THIS PROJECT
60' WIDE OVERCHUTE AND
2 - 8' x 8' CBC SIPHON

RELOCATE-THIS PROJECT
100 LF AT&T FIBER
OPTICS CABLE

RELOCATE-THIS PROJECT
150 LF 6" GAS LINE

RIPRAP BANK PROTECTION

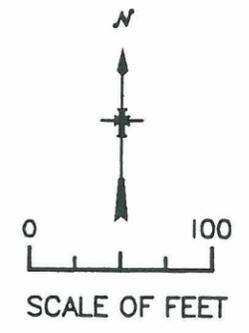
CONSTRUCT-THIS PROJECT
OVERCHUTE OUTLET CHANNEL
UNLINED TRAPEZOIDAL CHANNEL
Q=1513 cfs d=6.83 FT
B=32.0' n=0.022
S=0.0004± FT/FT V=3.73 fps
S:S=4:1

FED OTHERS TOTAL
\$747,074 \$887,330 \$1,634,404



OLD LITCHFIELD ROAD

CONSTRUCT-BY OTHERS
OVERCHUTE INLET GRASS
LINED TRAPEZOIDAL CHANNEL
Q=1390 cfs n=0.022
B=55.0' V=5.40 fps
S=0.0015 FT/FT
S:S=4:1
d=3.67 FT



CONSTRUCT-BY OTHERS
INDIAN SCHOOL ROAD BYPASS GRASS
LINED TRAPEZOIDAL DRAINAGE CHANNEL
Q=1376 cfs n=0.022
B=45.0' V=6.40 fps
S=0.0022 FT/FT
S:S=4:1
d=3.61 FT

RELOCATE-THIS PROJECT
1100 LF AT&T FIBER
OPTICS CABLE

MODIFY-THIS PROJECT
INDIAN SCHOOL BYPASS
42" STORM DRAIN

RELOCATE-THIS PROJECT
600 LF UG TELEPHONE LINE

PROPOSED INDIAN SCHOOL
ROAD BYPASS SOUTHERN
RIGHT-OF-WAY

PROPOSED 92'
CURB TO CURB

INDIAN SCHOOL ROAD BYPASS

SEE FIGURE 5
FOR CONTINUATION

CONSTRUCT-BY OTHERS
DIP ROADWAY CROSSING

EXISTING R.I.D. CANAL

RELOCATE-THIS PROJECT
1050 LF 8" SANITARY SEWER

CONSTRUCT-THIS PROJECT
DETENTION BASIN OUTLET CHANNEL
RIPRAP LINED TRAPEZOIDAL CHANNEL
Q=368 cfs n=0.032
B=14.0' V=3.28 fps
S=0.0015 FT/FT
S:S=4:1
d=3.83 FT

RELOCATE-THIS PROJECT
200 LF 15" SANITARY
SEWER

CONSTRUCT-THIS PROJECT
REALIGNED GUNITE LINED
TRAPEZOIDAL R.I.D. CANAL

CONSTRUCT-THIS PROJECT
60' WIDE OVERCHUTE AND
2-8' x 8' CBC SIPHON

RELOCATE-THIS PROJECT
250 LF 6" GAS LINE

RELOCATE-THIS PROJECT
250 LF UG TELEPHONE LINE

FCD \$ 906,444 OTHERS \$ 612,889 TOTAL \$ 1,579,333

FIGURE 3
FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

ALTERNATIVE NO. 2 - REALIGN
R.I.D. CANAL

LITCHFIELD PARK
R.I.D. OVERCHUTE



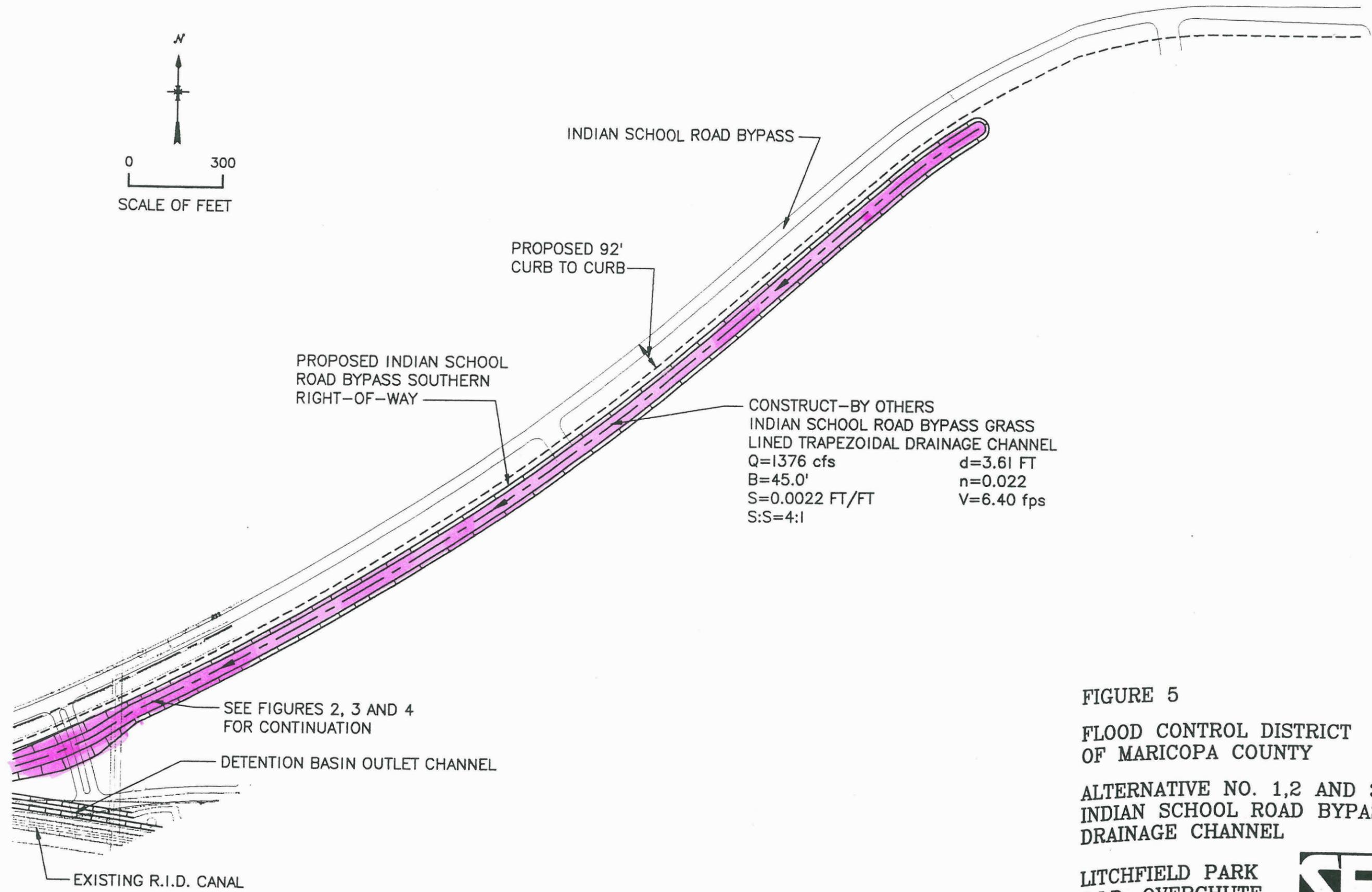
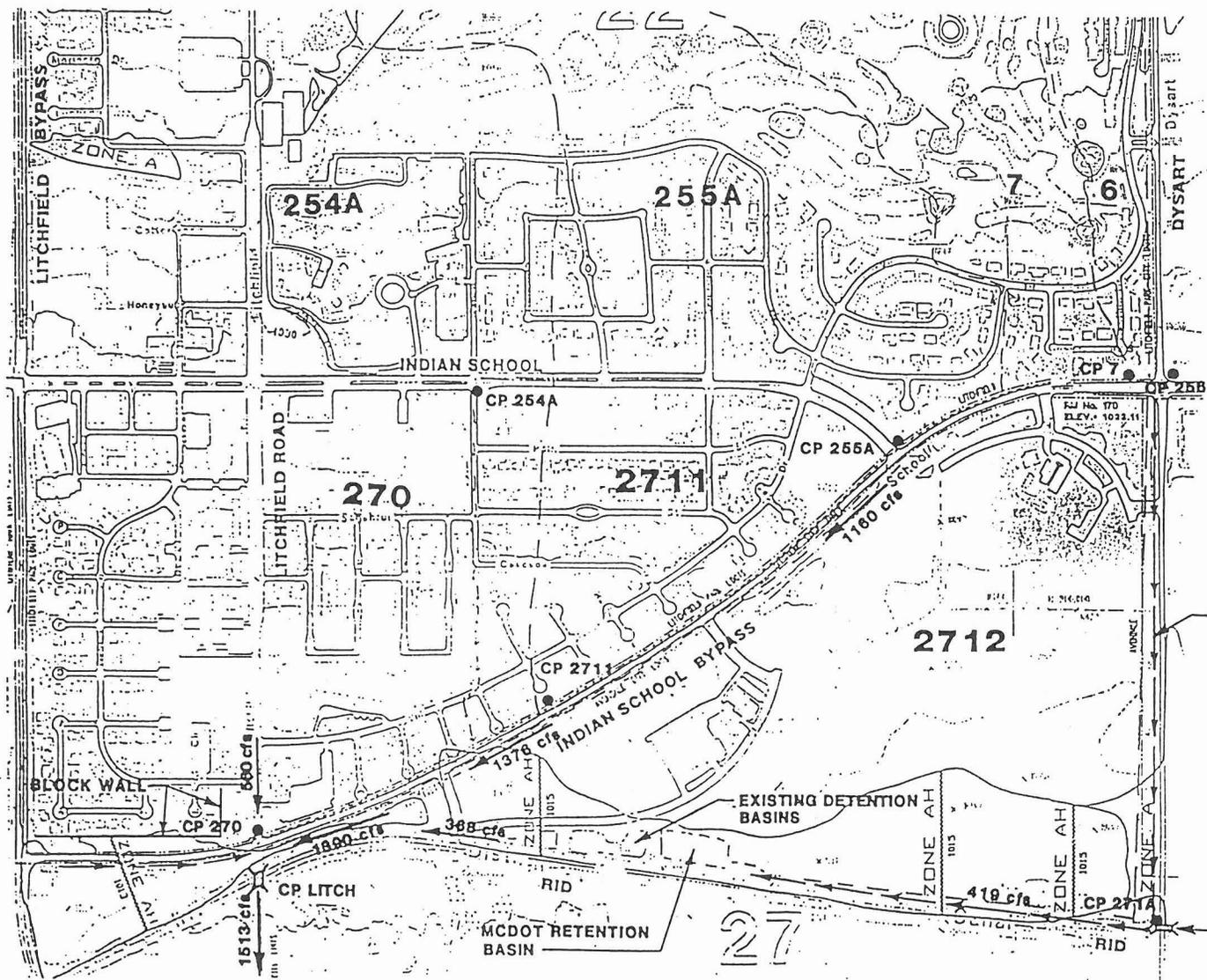


FIGURE 5
 FLOOD CONTROL DISTRICT
 OF MARICOPA COUNTY
 ALTERNATIVE NO. 1,2 AND 3 -
 INDIAN SCHOOL ROAD BYPASS
 DRAINAGE CHANNEL

LITCHFIELD PARK
 R.I.D. OVERCHUTE



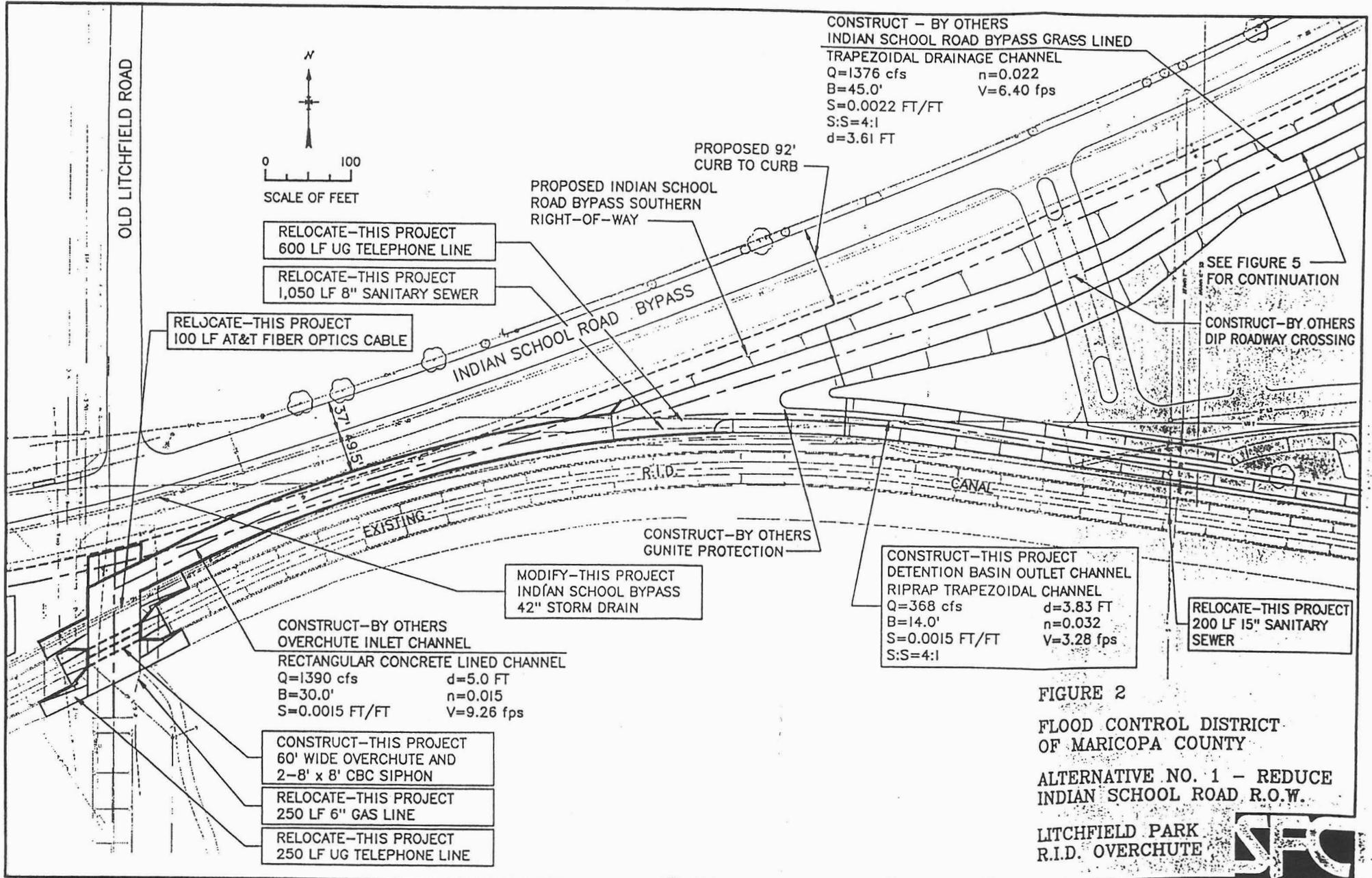


MCDOT DRAINAGE CHANNEL
(CAMELBACK ROAD
TO R.I.D. CANAL)

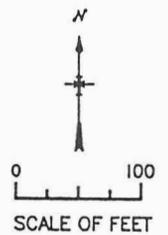
FIGURE 1
FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
HEC-1 MODEL SUMMARY
PROPOSED CONDITIONS
100-YEAR 24-HOUR

LITCHFIELD PARK
R.I.D. OVERCHUTE





CONSTRUCT - BY OTHERS
 INDIAN SCHOOL ROAD BYPASS GRASS LINED
 TRAPEZOIDAL DRAINAGE CHANNEL
 $Q=1376$ cfs $n=0.022$
 $B=45.0'$ $V=6.40$ fps
 $S=0.0022$ FT/FT
 $S:S=4:1$
 $d=3.61$ FT



RELOCATE-THIS PROJECT
 600 LF UG TELEPHONE LINE

RELOCATE-THIS PROJECT
 1,050 LF 8" SANITARY SEWER

RELOCATE-THIS PROJECT
 100 LF AT&T FIBER OPTICS CABLE

PROPOSED INDIAN SCHOOL
 ROAD BYPASS SOUTHERN
 RIGHT-OF-WAY

PROPOSED 92'
 CURB TO CURB

INDIAN SCHOOL ROAD BYPASS

SEE FIGURE 5
 FOR CONTINUATION

CONSTRUCT-BY OTHERS
 DIP ROADWAY CROSSING

EXISTING

CONSTRUCT-BY OTHERS
 GUNITE PROTECTION

MODIFY-THIS PROJECT
 INDIAN SCHOOL BYPASS
 42" STORM DRAIN

CONSTRUCT-THIS PROJECT
 DETENTION BASIN OUTLET CHANNEL
 RIPRAP TRAPEZOIDAL CHANNEL
 $Q=368$ cfs $d=3.83$ FT
 $B=14.0'$ $n=0.032$
 $S=0.0015$ FT/FT $V=3.28$ fps
 $S:S=4:1$

RELOCATE-THIS PROJECT
 200 LF 15" SANITARY
 SEWER

CONSTRUCT-BY OTHERS
 OVERCHUTE INLET CHANNEL
 RECTANGULAR CONCRETE LINED CHANNEL
 $Q=1390$ cfs $d=5.0$ FT
 $B=30.0'$ $n=0.015$
 $S=0.0015$ FT/FT $V=9.26$ fps

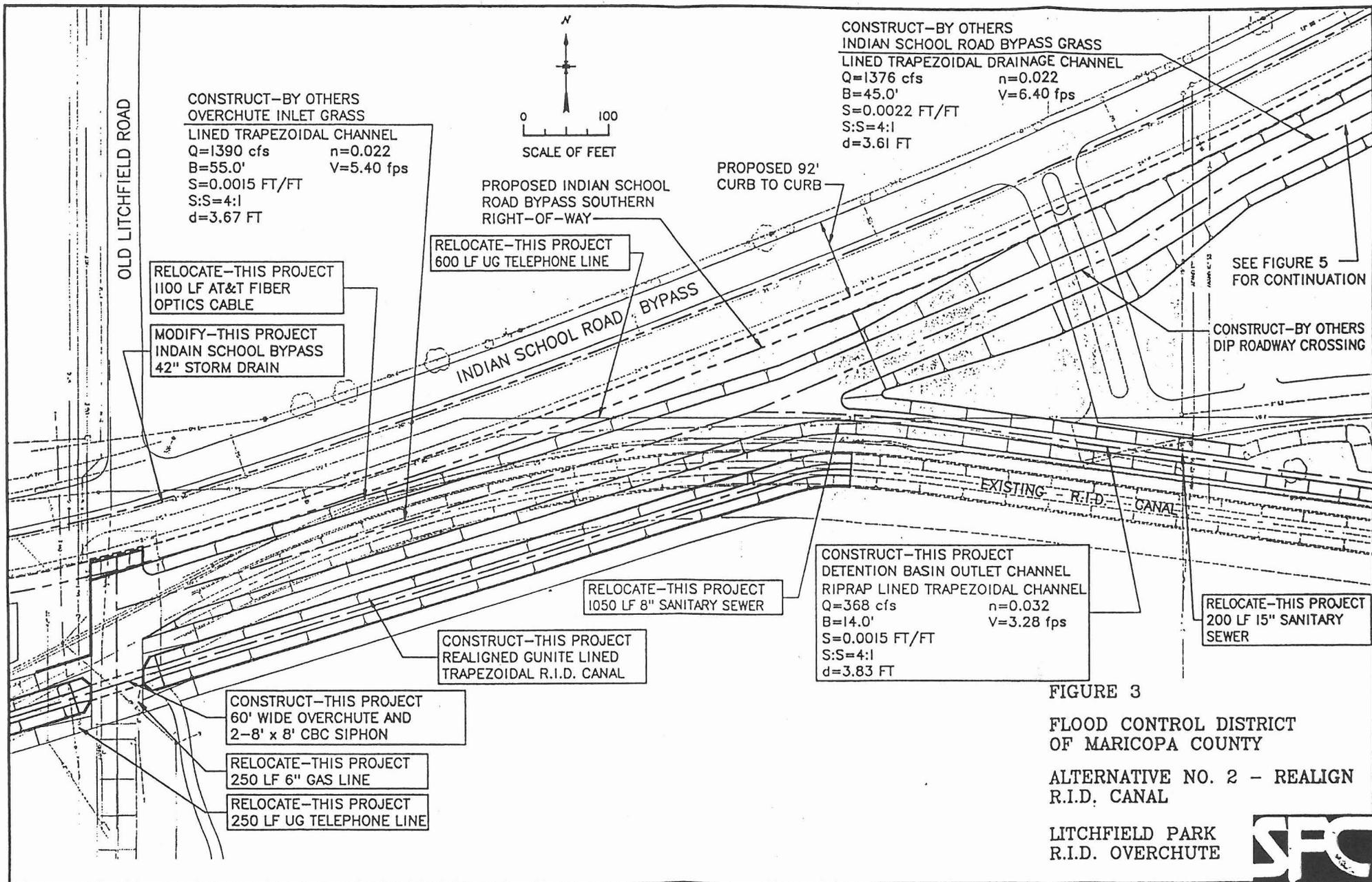
CONSTRUCT-THIS PROJECT
 60' WIDE OVERCHUTE AND
 2-8' x 8' CBC SIPHON

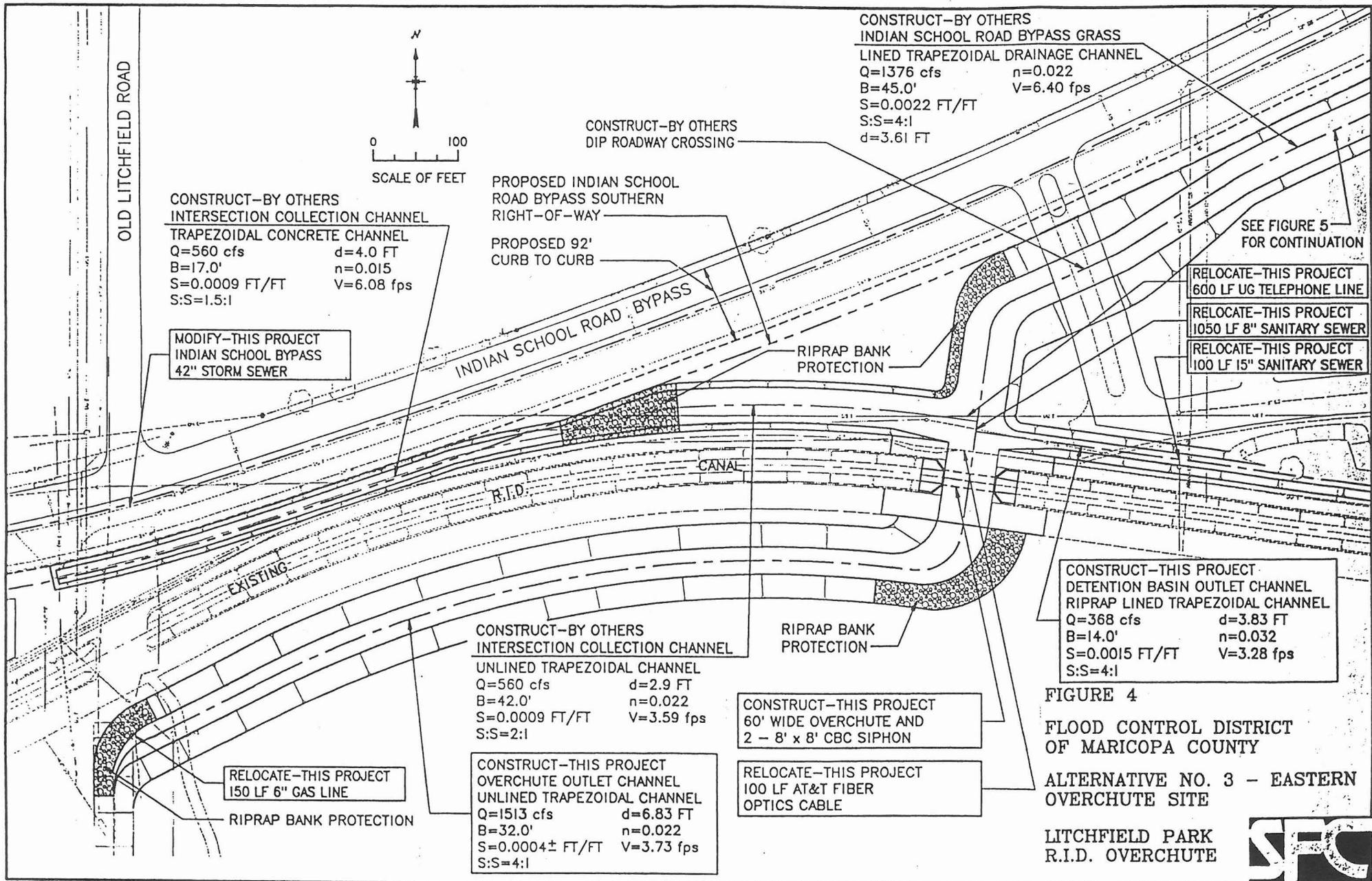
RELOCATE-THIS PROJECT
 250 LF 6" GAS LINE

RELOCATE-THIS PROJECT
 250 LF UG TELEPHONE LINE

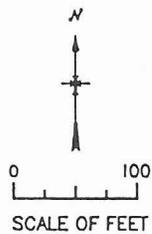
FIGURE 2
 FLOOD CONTROL DISTRICT
 OF MARICOPA COUNTY
 ALTERNATIVE NO. 1 - REDUCE
 INDIAN SCHOOL ROAD R.O.W.
 LITCHFIELD PARK
 R.I.D. OVERCHUTE







OLD LITCHFIELD ROAD



CONSTRUCT-BY OTHERS
INTERSECTION COLLECTION CHANNEL
TRAPEZOIDAL CONCRETE CHANNEL
Q=560 cfs d=4.0 FT
B=17.0' n=0.015
S=0.0009 FT/FT V=6.08 fps
S:S=1.5:1

MODIFY-THIS PROJECT
INDIAN SCHOOL BYPASS
42" STORM SEWER

CONSTRUCT-BY OTHERS
DIP ROADWAY CROSSING

PROPOSED INDIAN SCHOOL
ROAD BYPASS SOUTHERN
RIGHT-OF-WAY

PROPOSED 92'
CURB TO CURB

INDIAN SCHOOL ROAD BYPASS

RIPRAP BANK
PROTECTION

SEE FIGURE 5
FOR CONTINUATION

RELOCATE-THIS PROJECT
600 LF UG TELEPHONE LINE

RELOCATE-THIS PROJECT
1050 LF 8" SANITARY SEWER

RELOCATE-THIS PROJECT
100 LF 15" SANITARY SEWER

CANAL

CONSTRUCT-BY OTHERS
INTERSECTION COLLECTION CHANNEL
UNLINED TRAPEZOIDAL CHANNEL
Q=560 cfs d=2.9 FT
B=42.0' n=0.022
S=0.0009 FT/FT V=3.59 fps
S:S=2:1

RIPRAP BANK
PROTECTION

CONSTRUCT-THIS PROJECT
DETENTION BASIN OUTLET CHANNEL
RIPRAP LINED TRAPEZOIDAL CHANNEL
Q=368 cfs d=3.83 FT
B=14.0' n=0.032
S=0.0015 FT/FT V=3.28 fps
S:S=4:1

FIGURE 4
FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

CONSTRUCT-THIS PROJECT
60' WIDE OVERCHUTE AND
2 - 8' x 8' CBC SIPHON

ALTERNATIVE NO. 3 - EASTERN
OVERCHUTE SITE

RELOCATE-THIS PROJECT
150 LF 6" GAS LINE

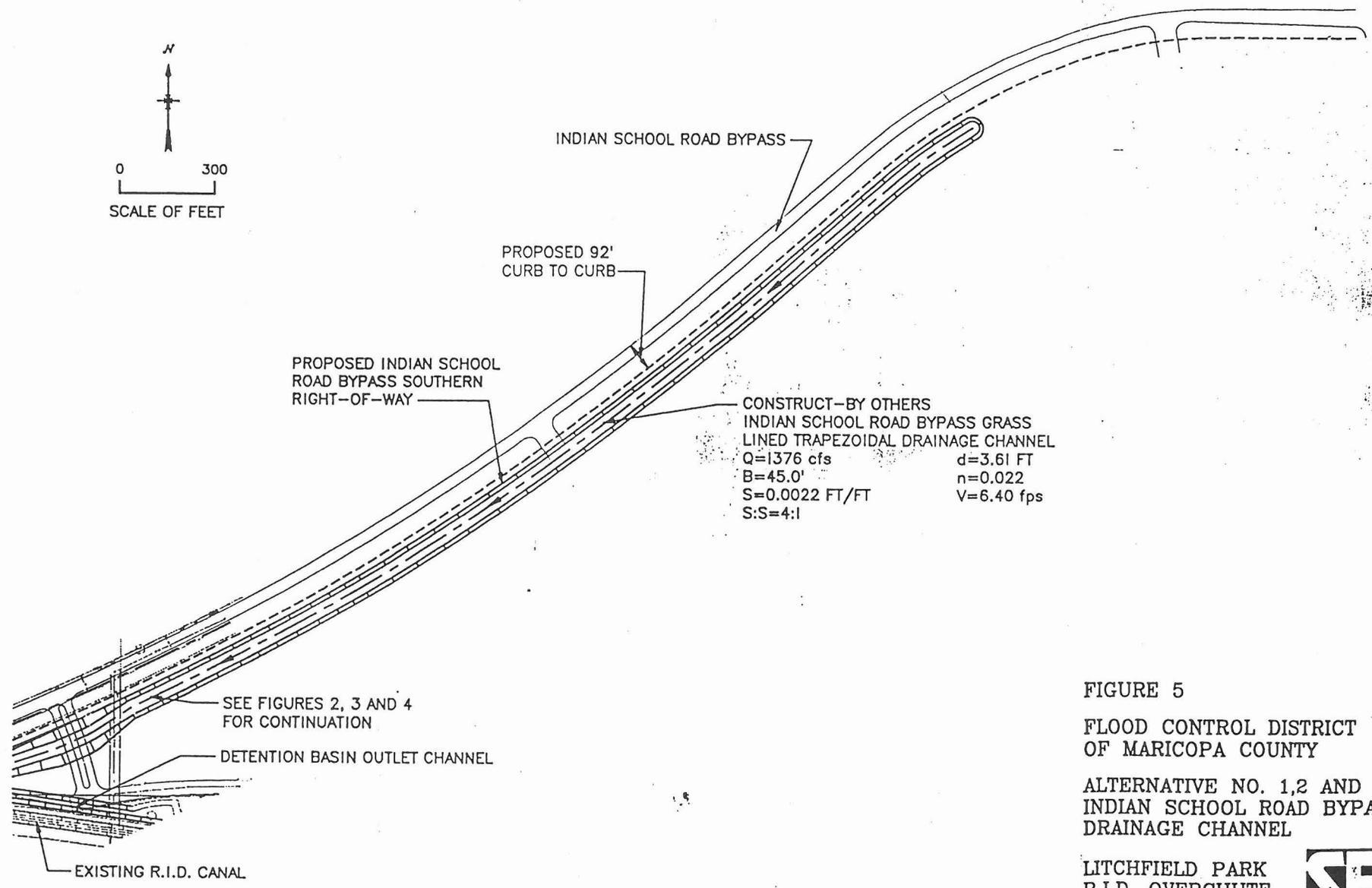
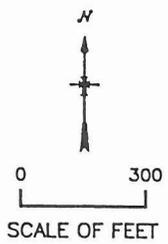
RIPRAP BANK PROTECTION

CONSTRUCT-THIS PROJECT
OVERCHUTE OUTLET CHANNEL
UNLINED TRAPEZOIDAL CHANNEL
Q=1513 cfs d=6.83 FT
B=32.0' n=0.022
S=0.0004± FT/FT V=3.73 fps
S:S=4:1

RELOCATE-THIS PROJECT
100 LF AT&T FIBER
OPTICS CABLE

LITCHFIELD PARK
R.I.D. OVERCHUTE



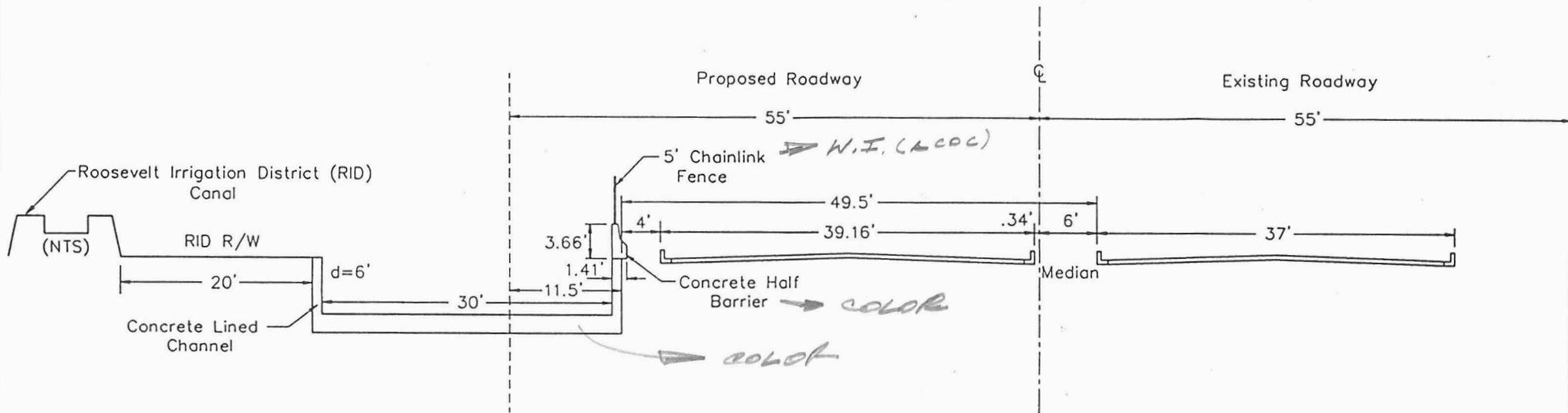


CONSTRUCT-BY OTHERS
 INDIAN SCHOOL ROAD BYPASS GRASS
 LINED TRAPEZOIDAL DRAINAGE CHANNEL
 Q=1376 cfs d=3.61 FT
 B=45.0' n=0.022
 S=0.0022 FT/FT V=6.40 fps
 S:S=4:1

FIGURE 5
 FLOOD CONTROL DISTRICT
 OF MARICOPA COUNTY
 ALTERNATIVE NO. 1,2 AND 3 -
 INDIAN SCHOOL ROAD BYPASS
 DRAINAGE CHANNEL

LITCHFIELD PARK
 R.I.D. OVERCHUTE



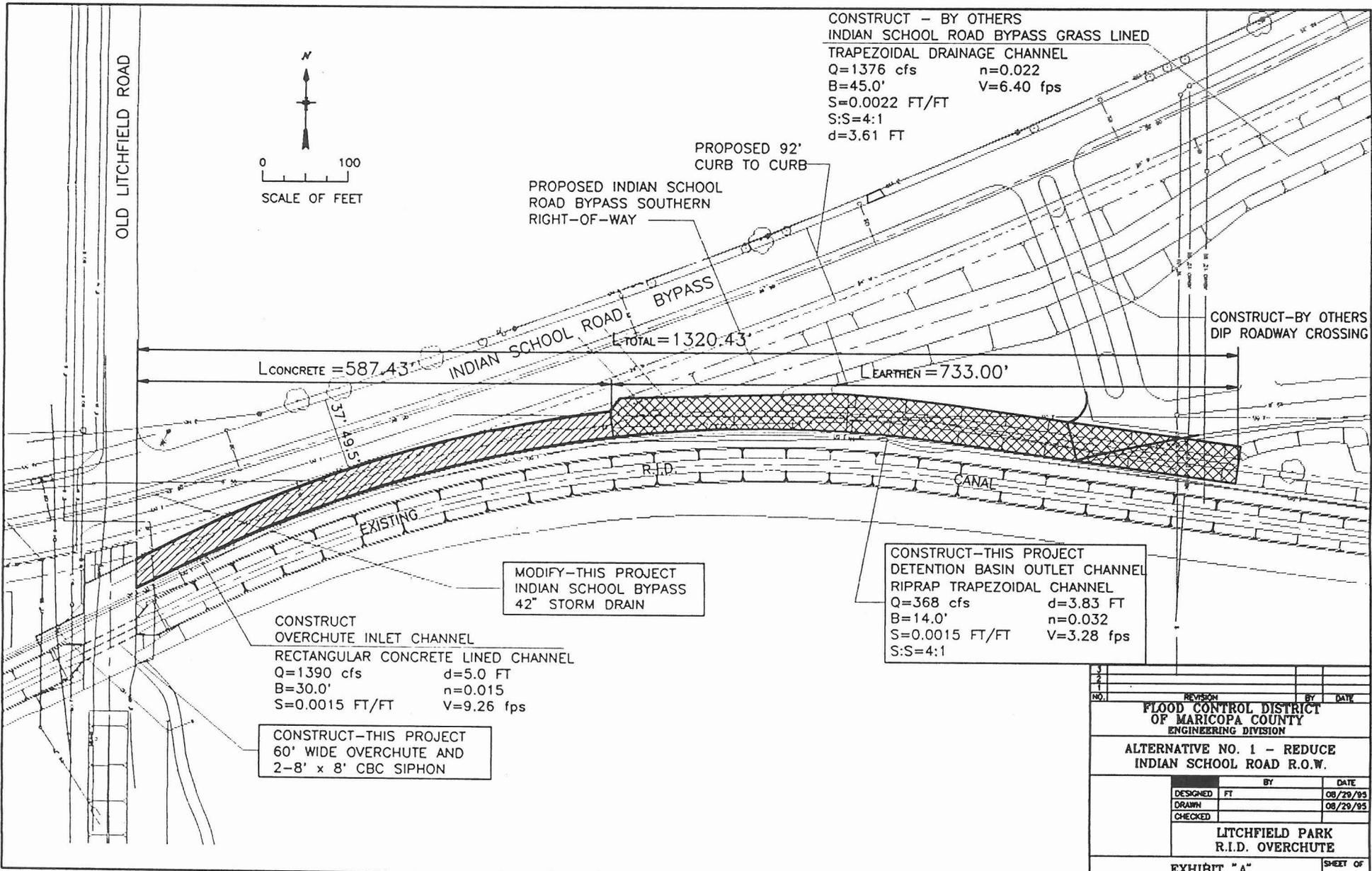


CROSS SECTION OF ALTERNATE NO. 1

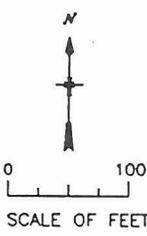
LOOKING WEST ON INDIAN SCHOOL ROAD BYPASS
 (CHANNEL WOULD ENCROACH IN THE ROAD'S R/W)

SCALE: 1"=10'

**LOCATION OF CHANNEL
WHICH NEEDS TO BE MAINTAINED**



CONSTRUCT - BY OTHERS
 INDIAN SCHOOL ROAD BYPASS GRASS LINED
 TRAPEZOIDAL DRAINAGE CHANNEL
 Q=1376 cfs n=0.022
 B=45.0' V=6.40 fps
 S=0.0022 FT/FT
 S:S=4:1
 d=3.61 FT



PROPOSED INDIAN SCHOOL
 ROAD BYPASS SOUTHERN
 RIGHT-OF-WAY

PROPOSED 92'
 CURB TO CURB

CONSTRUCT-BY OTHERS
 DIP ROADWAY CROSSING

L_{CONCRETE} = 587.43'

L_{TOTAL} = 1320.43'

L_{EARTHEN} = 733.00'

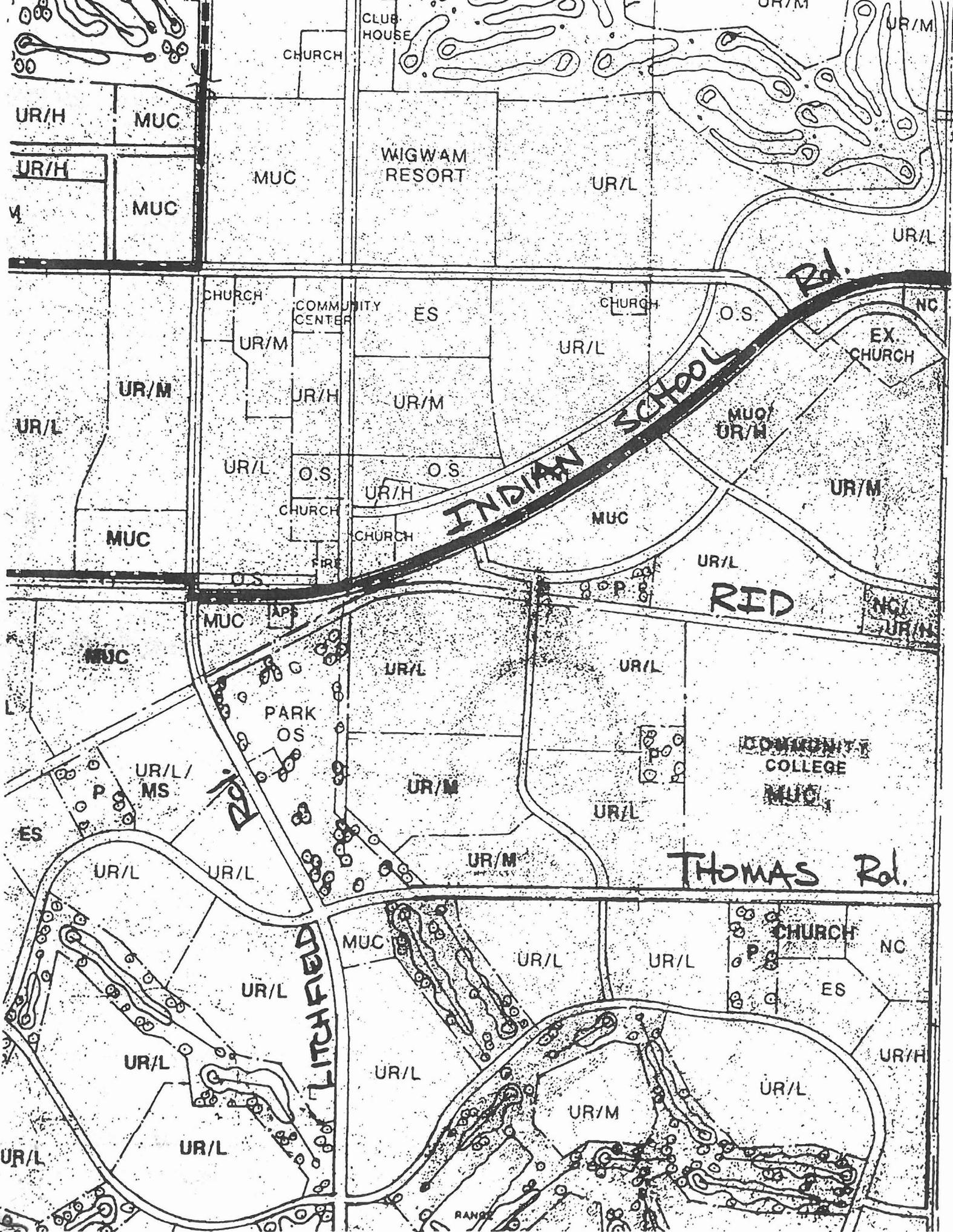
MODIFY-THIS PROJECT
 INDIAN SCHOOL BYPASS
 42" STORM DRAIN

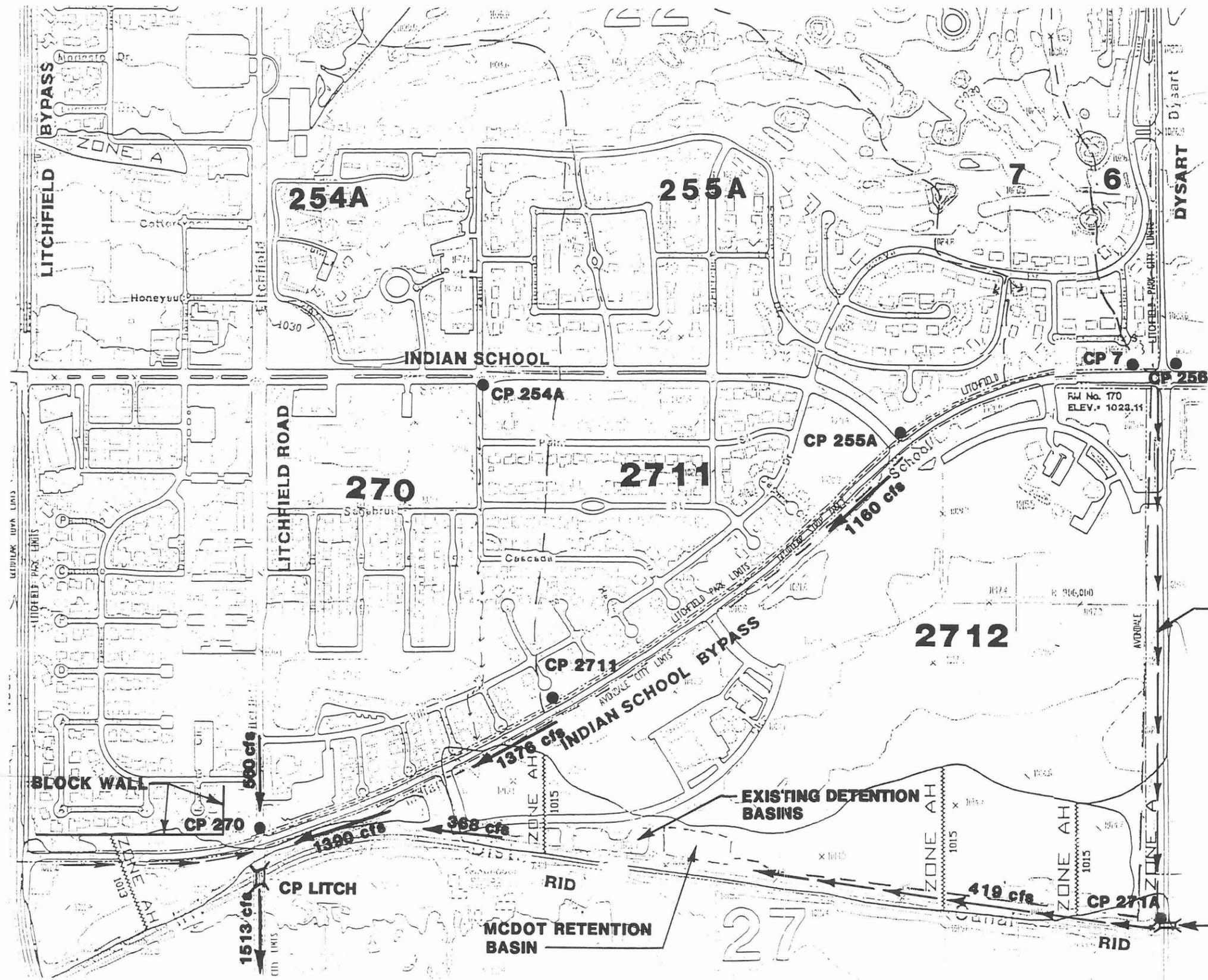
CONSTRUCT-THIS PROJECT
 DETENTION BASIN OUTLET CHANNEL
 RIPRAP TRAPEZOIDAL CHANNEL
 Q=368 cfs d=3.83 FT
 B=14.0' n=0.032
 S=0.0015 FT/FT V=3.28 fps
 S:S=4:1

CONSTRUCT
 OVERCHUTE INLET CHANNEL
 RECTANGULAR CONCRETE LINED CHANNEL
 Q=1390 cfs d=5.0 FT
 B=30.0' n=0.015
 S=0.0015 FT/FT V=9.26 fps

CONSTRUCT-THIS PROJECT
 60' WIDE OVERCHUTE AND
 2-8' x 8' CBC SIPHON

NO.	REVISION	BY	DATE
1			
2			
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION			
ALTERNATIVE NO. 1 - REDUCE INDIAN SCHOOL ROAD R.O.W.			
	DESIGNED	FT	DATE
	DRAWN		08/29/95
	CHECKED		08/29/95
LITCHFIELD PARK R.I.D. OVERCHUTE			
EXHIBIT "A"			SHEET OF





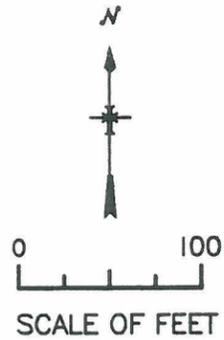
MCDOT DRAINAGE CHANNEL
(CAMELBACK ROAD
TO R.I.D. CANAL)

FIGURE 1
FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
HEC-1 MODEL SUMMARY
PROPOSED CONDITIONS
100-YEAR 24-HOUR

LITCHFIELD PARK
R.I.D. OVERCHUTE



OLD LITCHFIELD ROAD



CONSTRUCT - BY OTHERS
INDIAN SCHOOL ROAD BYPASS GRASS LINED
TRAPEZOIDAL DRAINAGE CHANNEL
Q=1376 cfs n=0.022
B=45.0' V=6.40 fps
S=0.0022 FT/FT
S:S=4:1
d=3.61 FT

PROPOSED 92'
CURB TO CURB

PROPOSED INDIAN SCHOOL
ROAD BYPASS SOUTHERN
RIGHT-OF-WAY

RELOCATE-THIS PROJECT
600 LF UG TELEPHONE LINE

RELOCATE-THIS PROJECT
1,050 LF 8" SANITARY SEWER

RELOCATE-THIS PROJECT
100 LF AT&T FIBER OPTICS CABLE

INDIAN SCHOOL ROAD BYPASS

SEE FIGURE 5
FOR CONTINUATION

CONSTRUCT-BY OTHERS
DIP ROADWAY CROSSING

EXISTING

R.I.D.

CANAL

CONSTRUCT-BY OTHERS
GUNITE PROTECTION

MODIFY-THIS PROJECT
INDIAN SCHOOL BYPASS
42" STORM DRAIN

CONSTRUCT-THIS PROJECT
DETENTION BASIN OUTLET CHANNEL
RIPRAP TRAPEZOIDAL CHANNEL
Q=368 cfs d=3.83 FT
B=14.0' n=0.032
S=0.0015 FT/FT V=3.28 fps
S:S=4:1

RELOCATE-THIS PROJECT
200 LF 15" SANITARY
SEWER

CONSTRUCT-BY OTHERS
OVERCHUTE INLET CHANNEL
RECTANGULAR CONCRETE LINED CHANNEL
Q=1390 cfs d=5.0 FT
B=30.0' n=0.015
S=0.0015 FT/FT V=9.26 fps

CONSTRUCT-THIS PROJECT
60' WIDE OVERCHUTE AND
2-8' x 8' CBC SIPHON

RELOCATE-THIS PROJECT
250 LF 6" GAS LINE

RELOCATE-THIS PROJECT
250 LF UG TELEPHONE LINE

*why is
this not
By us.*

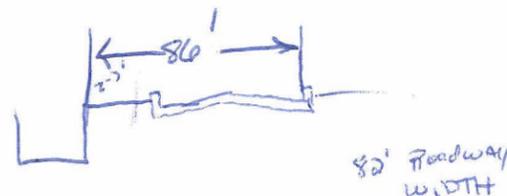


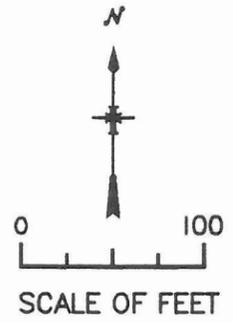
FIGURE 2

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

ALTERNATIVE NO. 1 - REDUCE
INDIAN SCHOOL ROAD R.O.W.

LITCHFIELD PARK
R.I.D. OVERCHUTE





CONSTRUCT-BY OTHERS
OVERCHUTE INLET GRASS
LINED TRAPEZOIDAL CHANNEL
Q=1390 cfs n=0.022
B=55.0' V=5.40 fps
S=0.0015 FT/FT
S:S=4:1
d=3.67 FT

CONSTRUCT-BY OTHERS
INDIAN SCHOOL ROAD BYPASS GRASS
LINED TRAPEZOIDAL DRAINAGE CHANNEL
Q=1376 cfs n=0.022
B=45.0' V=6.40 fps
S=0.0022 FT/FT
S:S=4:1
d=3.61 FT

RELOCATE-THIS PROJECT
1100 LF AT&T FIBER
OPTICS CABLE

MODIFY-THIS PROJECT
INDIAN SCHOOL BYPASS
42" STORM DRAIN

RELOCATE-THIS PROJECT
600 LF UG TELEPHONE LINE

PROPOSED INDIAN SCHOOL
ROAD BYPASS SOUTHERN
RIGHT-OF-WAY

PROPOSED 92'
CURB TO CURB

SEE FIGURE 5
FOR CONTINUATION

CONSTRUCT-BY OTHERS
DIP ROADWAY CROSSING

INDIAN SCHOOL ROAD BYPASS

EXISTING R.I.D. CANAL

RELOCATE-THIS PROJECT
1050 LF 8" SANITARY SEWER

CONSTRUCT-THIS PROJECT
DETENTION BASIN OUTLET CHANNEL
RIPRAP LINED TRAPEZOIDAL CHANNEL
Q=368 cfs n=0.032
B=14.0' V=3.28 fps
S=0.0015 FT/FT
S:S=4:1
d=3.83 FT

RELOCATE-THIS PROJECT
200 LF 15" SANITARY
SEWER

CONSTRUCT-THIS PROJECT
REALIGNED GUNITE LINED
TRAPEZOIDAL R.I.D. CANAL

CONSTRUCT-THIS PROJECT
60' WIDE OVERCHUTE AND
2-8' x 8' CBC SIPHON

RELOCATE-THIS PROJECT
250 LF 6" GAS LINE

RELOCATE-THIS PROJECT
250 LF UG TELEPHONE LINE

OLD LITCHFIELD ROAD

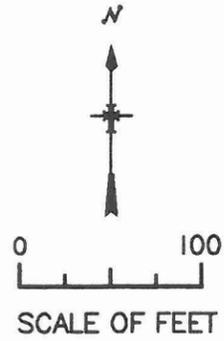
FIGURE 3
FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

ALTERNATIVE NO. 2 - REALIGN
R.I.D. CANAL

LITCHFIELD PARK
R.I.D. OVERCHUTE



OLD LITCHFIELD ROAD



CONSTRUCT-BY OTHERS
INTERSECTION COLLECTION CHANNEL
TRAPEZOIDAL CONCRETE CHANNEL
Q=560 cfs d=4.0 FT
B=17.0' n=0.015
S=0.0009 FT/FT V=6.08 fps
S:S=1.5:1

MODIFY-THIS PROJECT
INDIAN SCHOOL BYPASS
42" STORM SEWER

CONSTRUCT-BY OTHERS
DIP ROADWAY CROSSING

PROPOSED INDIAN SCHOOL
ROAD BYPASS SOUTHERN
RIGHT-OF-WAY

PROPOSED 92'
CURB TO CURB

INDIAN SCHOOL ROAD BYPASS

RIPRAP BANK
PROTECTION

SEE FIGURE 5
FOR CONTINUATION

RELOCATE-THIS PROJECT
600 LF UG TELEPHONE LINE

RELOCATE-THIS PROJECT
1050 LF 8" SANITARY SEWER

RELOCATE-THIS PROJECT
100 LF 15" SANITARY SEWER

CANAL

R.I.D.

EXISTING

CONSTRUCT-BY OTHERS
INTERSECTION COLLECTION CHANNEL

UNLINED TRAPEZOIDAL CHANNEL
Q=560 cfs d=2.9 FT
B=42.0' n=0.022
S=0.0009 FT/FT V=3.59 fps
S:S=2:1

RIPRAP BANK
PROTECTION

CONSTRUCT-THIS PROJECT
DETENTION BASIN OUTLET CHANNEL
RIPRAP LINED TRAPEZOIDAL CHANNEL
Q=368 cfs d=3.83 FT
B=14.0' n=0.032
S=0.0015 FT/FT V=3.28 fps
S:S=4:1

FIGURE 4

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

ALTERNATIVE NO. 3 - EASTERN
OVERCHUTE SITE

LITCHFIELD PARK
R.I.D. OVERCHUTE



RELOCATE-THIS PROJECT
150 LF 6" GAS LINE

RIPRAP BANK PROTECTION

CONSTRUCT-THIS PROJECT
OVERCHUTE OUTLET CHANNEL
UNLINED TRAPEZOIDAL CHANNEL
Q=1513 cfs d=6.83 FT
B=32.0' n=0.022
S=0.0004± FT/FT V=3.73 fps
S:S=4:1

CONSTRUCT-THIS PROJECT
60' WIDE OVERCHUTE AND
2 - 8' x 8' CBC SIPHON

RELOCATE-THIS PROJECT
100 LF AT&T FIBER
OPTICS CABLE

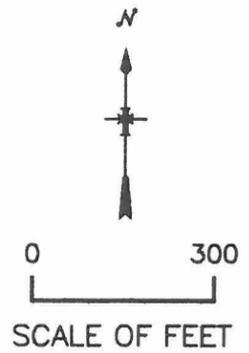
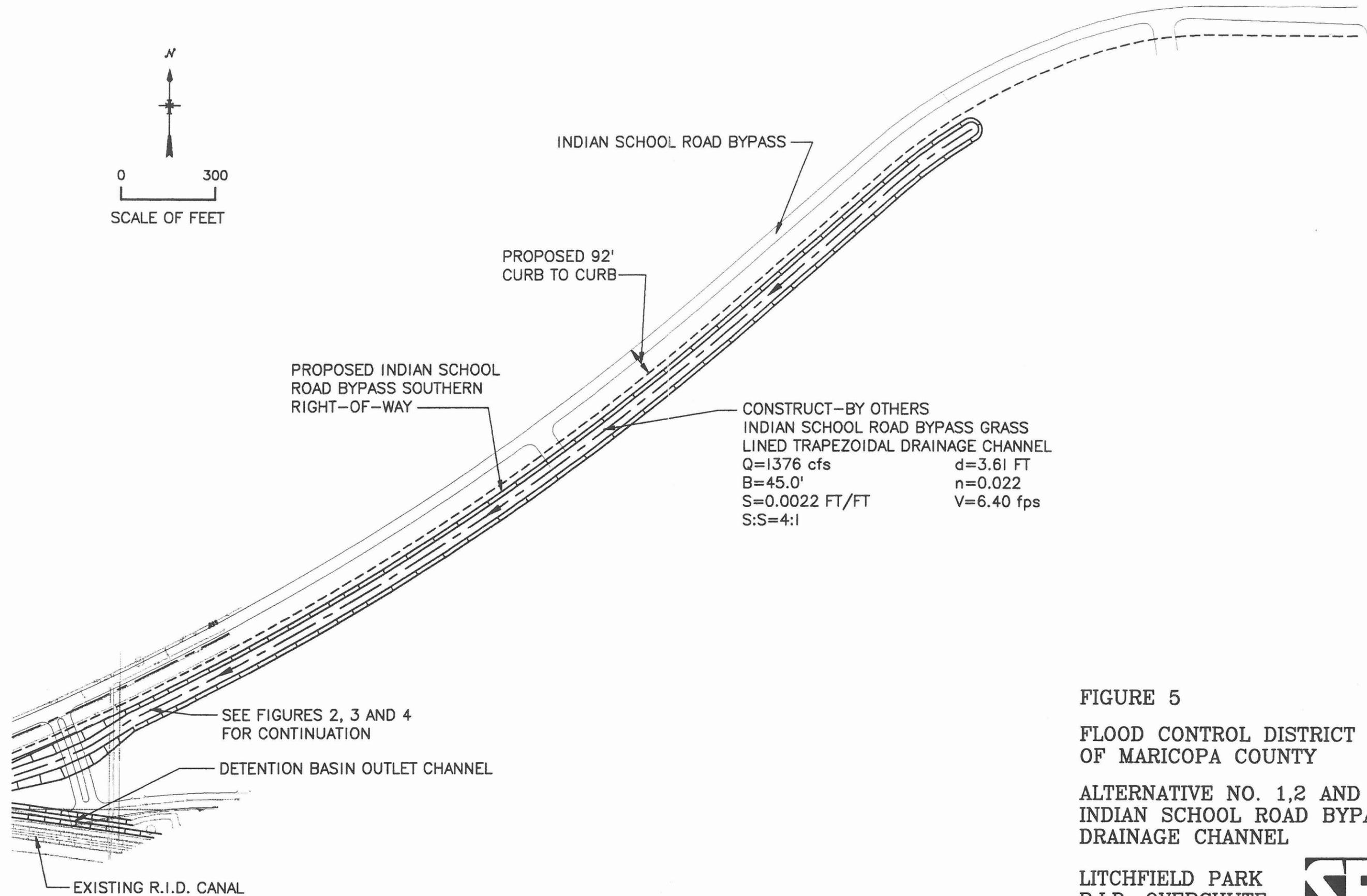


FIGURE 5
 FLOOD CONTROL DISTRICT
 OF MARICOPA COUNTY
 ALTERNATIVE NO. 1,2 AND 3 -
 INDIAN SCHOOL ROAD BYPASS
 DRAINAGE CHANNEL
 LITCHFIELD PARK
 R.I.D. OVERCHUTE

