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DRAINAGE DESIGN REPORT

FOR

CIVIC CENTER PLAZA, INDIAN SCHOOL ROAD TO FOURTH STREET

SUBMITTED TO

CITY OF SCOTTSDALE, ARIZONA

JBA JOB NO. 2690

JUNE 7, 1985

27.0-01-6-06/85
DR 30

Johnson · Brittain
& Associates, Inc.
ENGINEERS · PLANNERS · SURVEYORS
630 East 9th Street · Tucson, Arizona 85705
Phone (602) 623-4314

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DATE SIGNED 6-6-85
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& Associates, Inc.
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June 6, 1985

City of Scottsdale
Capital Improvements Section
3939 Civic Center Plaza
Scottsdale, AZ 85251

RE: Civic Center Plaza, Indian School Road to Fourth Street and Second Street Stormdrain, Wells Fargo to Indian Bend Wash
JBA Job No. 2702

Gentlemen:

Attached please find the Design Drainage Report for the above-referenced projects. This report documents the hydrologic and hydraulic considerations made in conjunction with the design of these projects.

In addition to the drainage design issues normally encountered in projects of this nature, the question of whether or not to oversize the Second Street Stormdrain to accommodate future improvements within the downtown redevelopment area is addressed. A definitive answer would most appropriately be made with the benefit of a detailed master drainage plan. Because of the time constraints of these projects, a more general analysis has been completed which we believe to be adequate for the short term purposes of simply sizing the stormdrain. We would emphasize, however, the importance of undertaking a more detailed drainage planning study prior to beginning design work on the next concept segment.

If you have any questions regarding this report, please feel free to contact this office.

Sincerely,

JOHNSON-BRITTAIN & ASSOCIATES, INC.

Michael T. Johnson, P.E., R.L.S.
President

MTJ:lg
Enclosures

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SECTION 1
INTRODUCTION

The project under consideration is Civic Center Plaza, Indian School Road to Fourth Street. The purpose of this report is to document the hydrologic and hydraulic considerations made in conjunction with the engineering design of this project.

This section presents an overview of the project, particularly the drainage aspects. Specifically included is a discussion of the general project scheme, a general description of the drainage issues, and a brief description of the contents of the remainder of this report.

PROJECT DESCRIPTION

This project involves the reconstruction of Civic Center Plaza from Indian School Road to approximately Fourth Street. This new, wider roadway will be the first segment of the proposed "couplet" system concept, as recently adopted by the City of Scottsdale. When completed, the couplet system will serve as a by-pass, relieving the congested downtown portion of Scottsdale from much of the through traffic that presently overburdens it. The couplet concept is an integral part of the downtown redevelopment plan. A location map showing the proposed couplet system including the present project is included as Figure 1.1.

The new roadway will be widened to three northbound and two southbound through lanes. The new road will be depressed between First Avenue and Second Street and the park areas on either side joined via a landscaped bridge extending three hundred feet in length. This bridge, which is being referred to as the "mall crossing", has been designed in a manner that minimizes the tunnel perception through the utilization of a wide span, approach planters, a large opening in the deck creating a skylight effect, and a "water feature" which will include a waterfall through the opening to the roadway below.

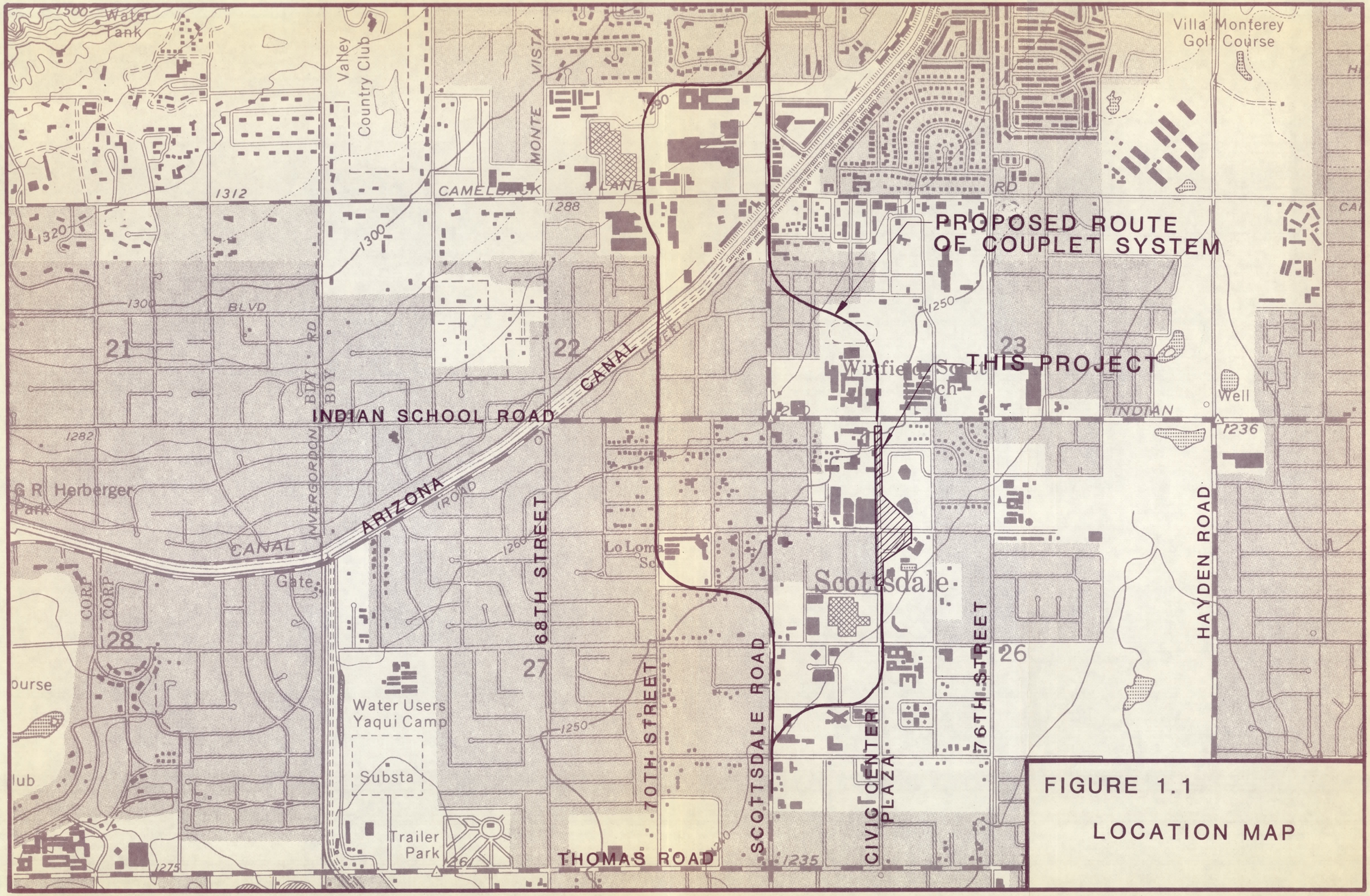


FIGURE 1.1

LOCATION MAP

Another important element of this project is a multi-level parking garage to be located east of Civic Center Plaza at Second Street, generally between the Library and Maricopa County Courts Building. The lower level of the garage will be below ground. The garage will have access to Civic Center Plaza from its ground level near the Courts Building, from the lower level to the depressed roadway near the mall crossing, and from Second Street to the east. A diagram of the general project scheme is presented in Figure 1.2.

The Civic Center Mall area is a source of great community pride, and significant attention and expense has been paid in the past in maintaining the indigenous architectural flavor. A most important feature of this project is the adherence to this general philosophy. Perhaps the most striking example of how this is being accomplished is the depression of the roadway and placing a portion of the parking garage underground. Although the underground construction leads to significant engineering problems and construction expense, it will result in an aesthetic and functional project that is consistent with, and perhaps an enhancement to, the prevailing architectural environment.

A second important aspect of this project is timing. It is considered essential to have construction of the mall crossing and new roadway completed by October 15 to coincide with the beginning of the fall activities in the area. The opening of the parking structure is to follow one month later. In order to meet this deadline, the design and construction is being completed in a series of "bid packages" so that initial construction can be on-going prior to final design completion. The timing aspect is made particularly challenging in this case by the complexity of the project. Close coordination and cooperation between the designers, contractors, City officials and other agencies will be necessary to successfully complete it on time.

FIGURE 1.2

PROJECT FEATURES

SIGNIFICANT DRAINAGE ISSUES

Several important drainage issues arise out of the nature of this project. The first is the need to drain the depressed areas of the roadway and parking garage. These areas are much too deep to drain by gravity and will require pumping. Pumps will be sized in a manner that is consistent with the appropriate City policies and codes, more specifically the following:

a. The lowest floor of the garage shall be free from flooding in a 100-year storm as generally outlined in Reference 1.

b. The maximum depth of ponding in the roadway is no greater than 8" in a 100-year storm as set forth in Reference 2.

Since there is no other way for drainage to overflow out of the depression, it will be necessary for the pumps to handle the total amount of drainage entering the project in a 100-year storm.

The cost of pumping storm water runoff leads to the second issue of consideration -- that of not allowing any more surface drainage to enter the depression than necessary. The design speed of the roadway, in combination with other vertical geometric constraints, makes it necessary to regrade the intersection of Civic Center Plaza and Second Street in a manner that allows any drainage entering the intersection to flow northerly into the depression. Since there is no opportunity to safely divert this surface flow upstream, a large storm drain in Second Street beginning at Wells Fargo and extending easterly under the new parking garage to Indian Bend Wash, has been proposed. This storm drain would necessarily be sized to intercept the 100-year storm prior to it entering the depression. It should be noted that the ramifications of flooding the depression extend beyond just a flooded roadway. Since the lower level of the garage will be open to the depression as well as the basements of the Library and Public Service Building, the possibility of flooding all three structures must also be considered.

The third drainage issue involves the possibility of sizing the storm drain to serve not only the project at hand, but also to accommodate future drainage improvements in the downtown redevelopment area. The cost of oversizing the present storm drain would be quite low relative to that of constructing an additional storm drain later. The City has correctly recognized a significant opportunity to save future cost and disruption of constructing a future storm drain, probably in Indian School Road. In addition to the general objective of serving the downtown redevelopment area, an oversized storm drain could also be used for other segments of the couplet, and to reduce the existing problem at the intersection of Indian School and Miller Roads.

In addition to these general issues, items associated with the project vicinity are also addressed. Among these are location and sizing of catch basins, on-site storm drains, and pump station sizing.

REMAINDER OF REPORT

The remaining sections of this report describe in more detail the approaches that have been used to address the drainage issues. Section 2 presents a discussion of the hydrologic procedures used to develop discharge peaks and other information.

Section 3 develops the sizing information for the Second Street storm drain, assuming that the storm drain is to be sized only as necessary to serve this project. This includes an evaluation of the off-site discharge that must be intercepted on Second Street upstream of the project, the on-site discharge that must be collected and discharged either directly or through pumping into the storm drain, and the combined flow downstream to Indian Bend Wash which will determine the required storm drain size.

Section 4 examines the relative merits of oversizing the storm drain to serve future drainage needs of the redeveloping downtown area. Several general schemes are posed and evaluated in terms of relative cost and function.

Section 5 describes the "on-site" drainage -- that being the drainage in the immediate vicinity of the project including the pavement drainage and the pump station. Section 6 describes the hydraulic design of the stormdrain inlet and pipe sizing.

Section 7 is a summary of key points, conclusions, and recommendations. The drainage aspects plans for the Second Avenue Storm Drain and Paving Plans for Civic Center Plaza reflect these conclusions and recommendations, as modified per comments from the City.

SECTION 2

HYDROLOGIC ANALYSIS

The term "hydrologic analysis" is used here to mean the development of the peak discharge and other runoff information necessary for the design of this project. The lack of natural relief to concentrate the flow and define definite watershed limits makes the hydrologic analysis a difficult procedure, necessitating a greater-than-normal amount of judgment and care.

This section describes the general procedures used to develop design discharges at various points later in this report. A description of the basin characteristics is first presented to provide the background reasoning for some of the work later on. That is followed by a discussion of the calculation procedures, and of the parameters to be used for various conditions.

BASIN CHARACTERISTICS

The area in which this project is located falls toward the southeast at slopes ranging from one-half to one percent. Examination of the contours shown on the location map suggests that in its natural condition, this area was uniform with very little relief which would serve to concentrate flow and define drainage patterns. In the natural state, the relatively low quantities of runoff that developed were carried off in shallow, flat swales flowing southeasterly toward Indian Bend Wash.

Development of the area has affected the drainage characteristics which affect the project in three general ways. The first is the construction of the Arizona Canal, which constitutes a reliable barrier for cutting off upstream flow, and serves as a definite upstream limit to the project basin.

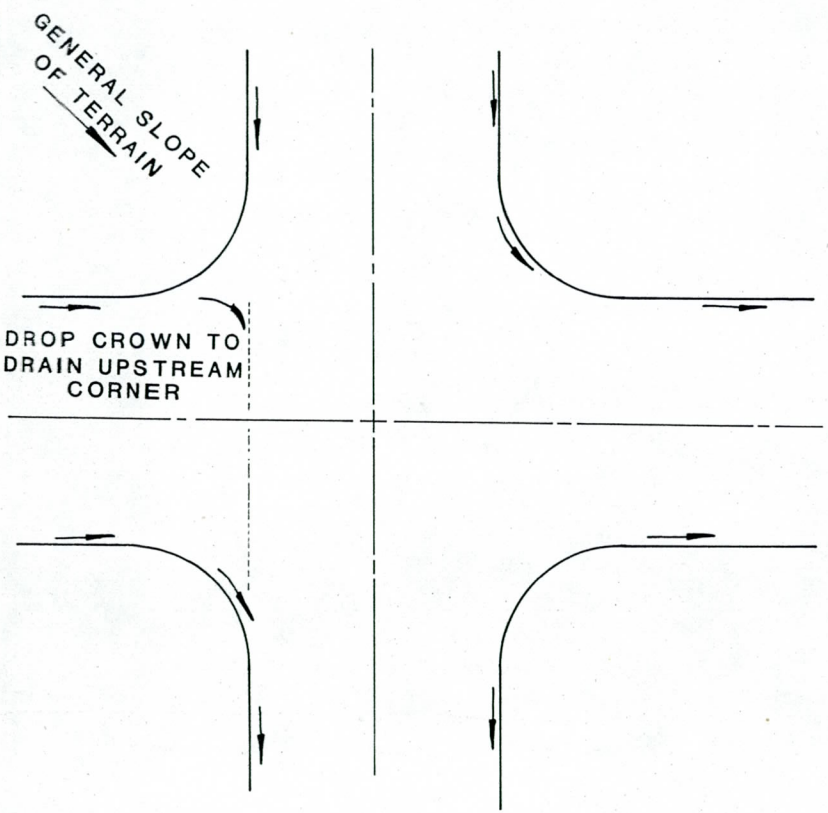
Another important effect of development has been to increase the quantities of runoff, both by the decrease in permeable area, and by increasing the runoff velocity through concentration of flow and improved hydraulic

efficiency of drainage courses. Most of the basin affecting this project is highly developed at this point, and is anticipated for even more intense usage in the future under a newly-adopted redevelopment plan. The effect of decreased permeability and increased runoff velocity is particularly noticeable in smaller, more frequent storms.

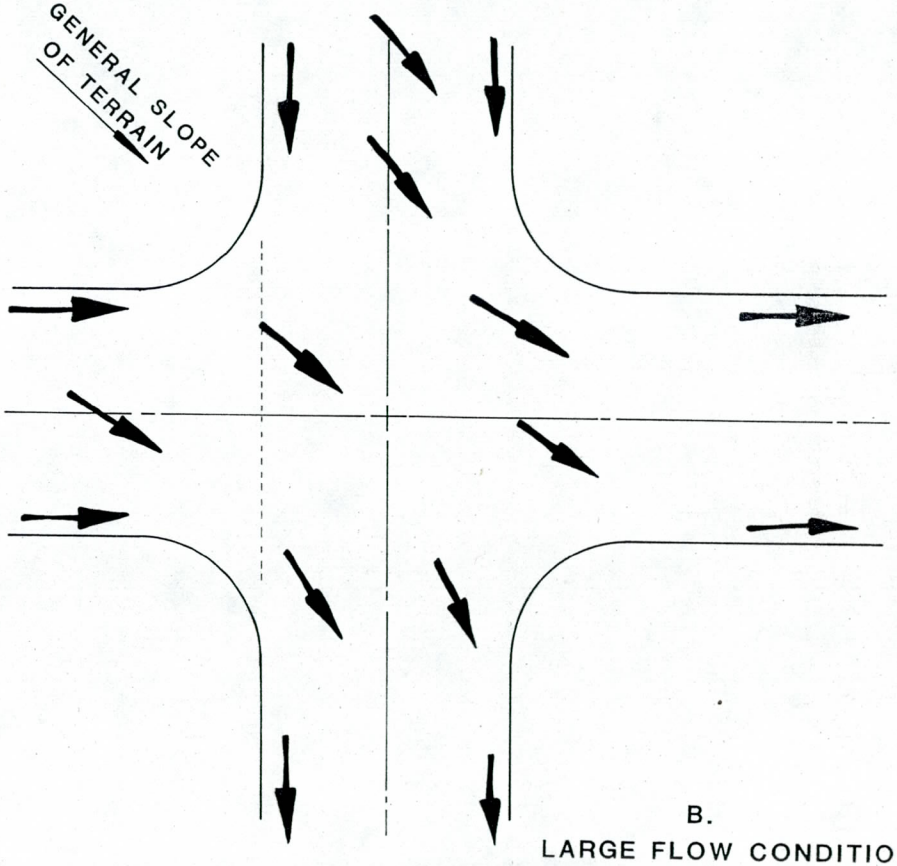
The third effect of development on drainage characteristics of particular significance here is alteration of the original flow patterns by construction of the street systems. The street systems do not provide a well-defined delineation of flow paths and watershed boundaries that holds for all cases.

A typical intersection, for example, will have flow entering from two directions, and flow leaving from two directions. The crown of the streets confines low flows to the gutters as indicated in Figure 2.1A. In large flows, however, the crown has a minimal effect with the exact split of flow depending on the street geometrics as well as the relative quantities of discharge entering from the two upstream legs, such as is indicated in Figure 2.1b.

Larger flows will often exceed the hydraulic capacity of the streets, flowing overland either across private property, or generally along the same path as the street flow if forced to do so by grading or improvements outside the right-of-way. The general effect of the street system on large flows is that it does not reliably force adherence to the low-flow patterns created by crowns and gutters, and tends to allow larger storms to follow the natural drainage patterns. It is very important to recognize that the traditional concept of fixed watershed boundaries and flow paths does not apply in this case where large flows are concerned, and that special care must be exercised in determining the effective watershed areas.



A.
LOW FLOW CONDITION



B.
LARGE FLOW CONDITION

FIGURE 2.1

TYPICAL INTERSECTION DRAINAGE

HYDROLOGIC PROCEDURE

The procedure used here to determine design runoff quantities is that prescribed by the City of Scottsdale in "Drainage Report Preparation" (Reference 1). The time-of-concentration has been determined from the following equation:

$$T_c = \frac{nb}{50} \frac{(Lc\ Lca)^{.3}}{(q\ Sc)^{.4}}$$

Where Lc = Length of watercourse

Lca = Distance from point-of-concentration to the center of gravity of the watershed.

nb = Basin factor, a parameter which describes the general hydraulic efficiency with which runoff flows through the basin (similar to Manning's "n" as will be discussed later).

Sc = Effective slope of the watercourse

q = Runoff supply rate (Ci)

Because it is a function of q, T_c varies with storm intensity, with the T_c for a two-year storm being greater than that of a 100-year storm. This equation has been calibrated (through the use of nb) to correspond to measured results from both the Walnut Gulch Experimental Watershed and the urbanized area of Tucson, and is considered to provide more realistic results than many of the older nomographs and equations. The fact that T_c does depend on q produces a non-linear situation which requires a more time-consuming trial-and-error solution procedure, however.

An adjustment to the Curve Numbers (CN) has also been made to account for the dependence of CN on precipitation (Pl) that has been observed by both the U.S. Soil Conservation Service and the U.S.D.A. Southwest Watershed Research Center. Descriptions of the CN adjustment, and of the time-of-concentration calculations, are provided in Reference 3.

HYDROLOGIC PARAMETERS

The reliability of results from any hydrologic calculation procedure are dependent on the selection of the appropriate parameters, as well as on the procedure. For this study, the development patterns and intensities anticipated by the downtown redevelopment plan are used.

Area and Watercourse Lengths (A, Lc, Lca). As discussed earlier, the exact delineation of area and flow path for a particular point-of-concentration (POC) is in this case not easily definable, and may in fact vary with the intensity of storm. For this reason, an overall drainage map showing all POCs for all cases of consideration would be difficult to prepare in a manner that is easily readable. To minimize confusion, separate maps have been prepared for each section where hydrologic calculations are necessary, showing only the areas under present consideration.

Percentage of Impermeable Cover. The downtown redevelopment plan shows seven zones of development:

1. Major Commercial/Office
2. Office/Residential
3. Resort/Residential
4. Specialty
5. Civic Center
6. Office/Commercial Mix
7. Medical

Based on the Reference 1 description of these development types, and on field observation of existing developed areas, the following percentages of impermeable cover for the various zones have been assumed:

Specialty (4)	80%
Office, Commercial, Residential Mix (1, 2, 6, 7)	65%
Civic Center, Resort/Residential (3, 5)	50%

No difference between "compact", "intermediate", and "large" is considered. Figure 2.2 shows areas for which these percentages of impermeable surface have been assumed.

Basin Factors nb. Basin factor can generally be thought of as the effective Manning's Roughness Coefficient "n" for the overall watershed. It is somewhat lower than the "n" along the watercourses since it also takes into account the character of flow before it reaches the principal paths of flow. Guidelines in Reference 3, for example, indicate nb to range from 0.028 to 0.036 for one to two house per acre suburban areas, which accounts for flow off lawns as well as along paved streets. Basin coefficients of 0.018 to 0 .022 are indicated for highly urbanized industrial commercial areas. A value of 0.020 is used in all cases for this study.

Minimum Time-of-Concentration. A minimum time-of-concentration of five minutes rather than ten minutes is used here. These short duration storms will apply only to small watersheds, particularly the depressed roadway that must be pumped. Because of the potential for damage above that normally associated with flooded streets, the shorter value is used here. Use of the five minute minimum time-of-concentration is required by both Pima County and City of Tucson as the result of problems they have experienced with localized flooding in short duration storms on very small drainage areas.

Other Parameters. Other parameters used for this study include:

100% B soil per the ADOT manual (Reference 4)
Precipitation values per City of Scottsdale (Reference 2)
50% cover on permeable areas

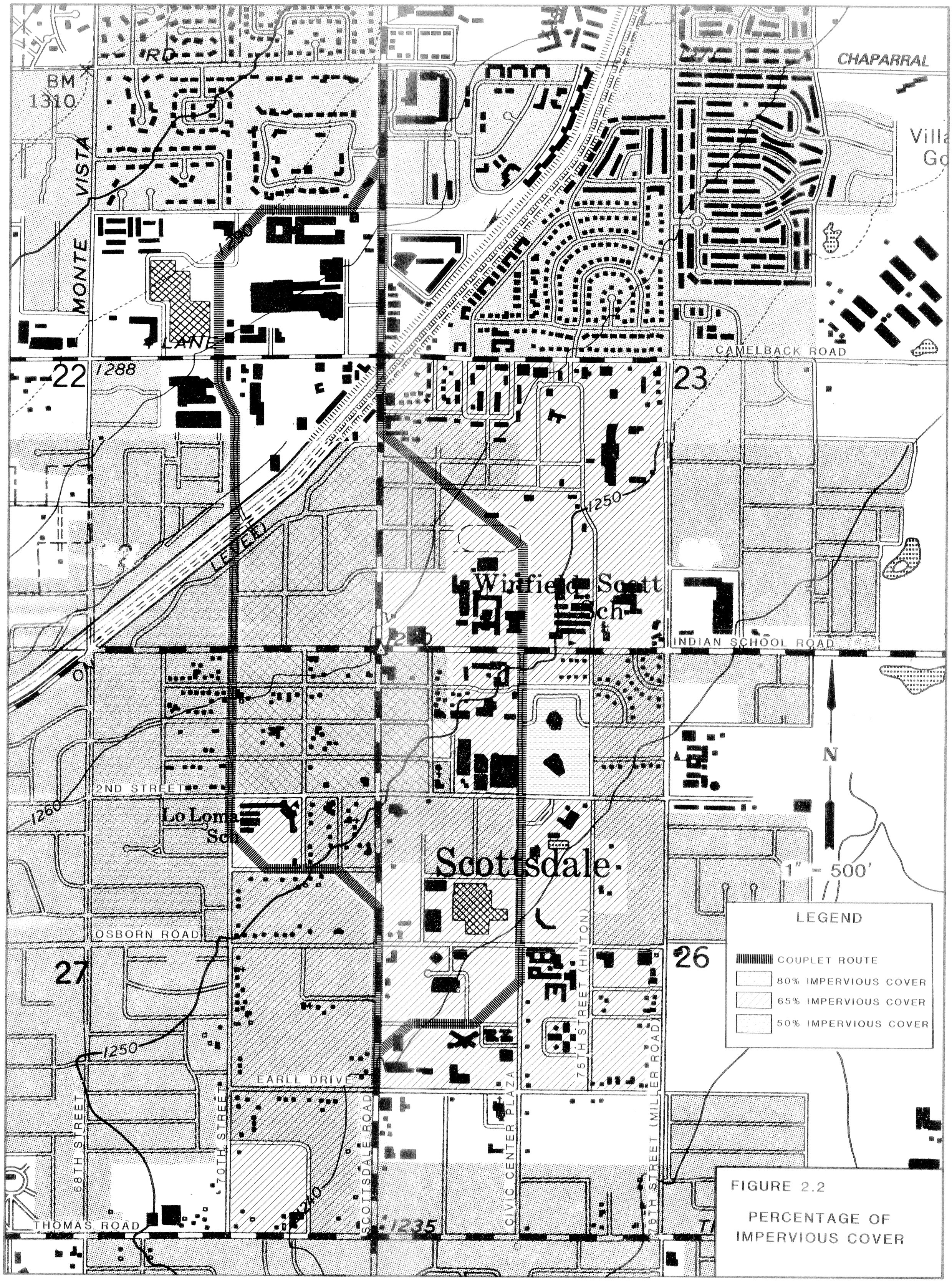


FIGURE 2.2

PERCENTAGE OF IMPERVIOUS COVER

SECTION 3

SECOND STREET STORM DRAIN REQUIREMENTS

This section develops the hydrologic and hydraulic design requirements for a storm drain in Second Street to serve the needs of this project. Those needs include 1) intercepting the overland flow in Second Street upstream of the project before it can enter the depressed roadway, and 2) providing an outlet for the direct and pumped discharge from the site. Consideration of oversizing for other purposes is reserved for Section 4. The specific purposes of this section are to determine the required inlet capacity necessary to intercept the upstream flow in the Second Street/Wells Fargo vicinity, and to determine the size of downstream storm drains that would be needed to serve this project if no oversizing were to occur.

DESIGN DISCHARGES

For the purposes of this section, 100-year discharges are used. This is made necessary by the requirement of maintaining a 12 foot dry lane in a 100-year storm in the depression. Above and beyond that requirement, it is also necessary to keep the bottom level of the parking structure, and consequently the Library and Public Services Building, free from flooding in a 100-year storm.

Figure 3.1 is a map showing the approximate drainage area affecting the proposed storm drain. The watershed boundaries are based on the "large flow" condition and have been developed largely on the basis of the natural contours but following a stair-stepped pattern created by the gridded street system. It is recognized that these boundaries are not absolute, and that flow would be likely to break across them both into and out of the watershed. For this reason, they have been somewhat conservatively located with the steps to the outside of the probable natural boundaries.

The hydrologic analysis procedure described in the previous section has been applied at POC u (for Area U), POC v (Area V only), POC v' (Areas U

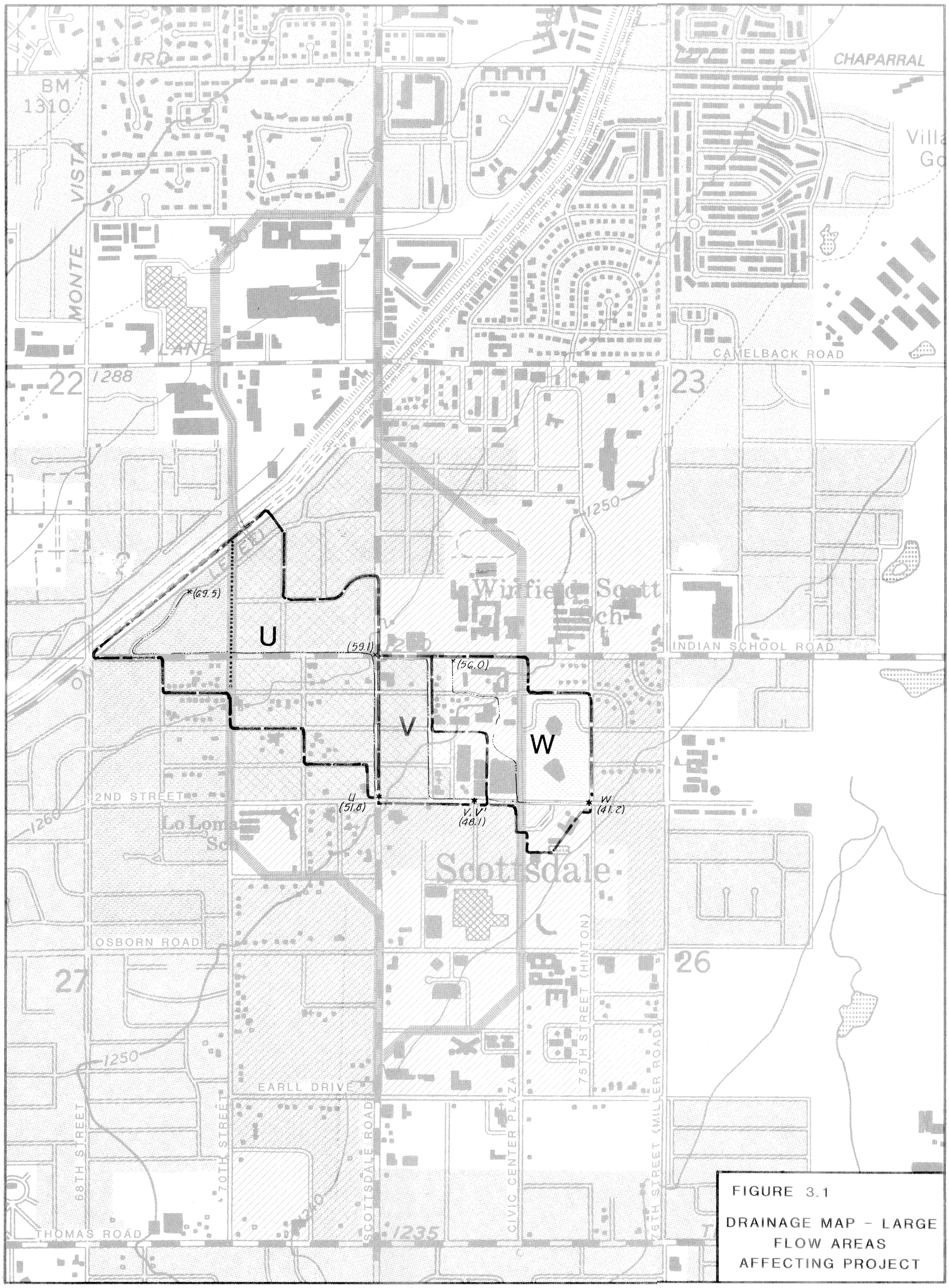


FIGURE 3.1

DRAINAGE MAP – LARGE FLOW AREAS AFFECTING PROJECT

and V combined), POC w (Area W only), and POC w' (Areas U, V, and W combined). Approximate flow paths and spot elevations are also shown.

A summary of results for the 100-year storm is as follows:

POC	Dscrp	A	L_c	T_c	i	Cw	Q_{100}
u	U	71.8	4300	14	6.19	.786	352
v	V	22.6	2100	7	8.23	.839	157
v'	U+V	94.4	5400	17	5.64	.798	429
w	W	36.3	2400	8	7.81	.722	206
w'	U+V+W	130.7	6200	18	5.50	.777	562

Detailed printouts of these calculations are included in Appendix A. The use of this data in sizing the Wells Fargo catch basins and the downstream storm drain will be dicussed below.

EXISTING SCOTTSDALE ROAD STORM DRAIN

The existing storm drain in Scottsdale Road will intercept a portion of the flow from Area U. This storm drain was designed during the 1970's to improve pavement drainage in conjunction with the reconstruction of Scottsdale Road. At Second Street, it is 66" in diameter and has a downstream slope of .0027 ft/ft.

Some of the hydrologic parameters and procedures used for designing the Scottsdale Road storm drain differ from those used here and should be noted.

1. The existing storm drain was designed to convey a 10-year storm in conjunction with the allowable width of gutter flow. The 100-year storm is being considered here for the reasons discussed previously.

2. A "low-flow" watershed configuration was assumed, which was appropriate for that case, but not for the 100-year storm used here.

3. The method used for estimating time of concentration resulted in runoff velocities typically in the range of two to three feet per second. The precipitation-dependent procedure used here results in velocities typically in the four to six fps range.

4. The downtown redevelopment plan indicates a higher intensity of future development that was anticipated during the design of the Scottsdale Road stormdrain.

It should also be noted that the consequences of an underdesigned pavement drainage system are a momentarily flooded roadway and the resulting inconvenience and traffic hazard to the motoring public. In addition to those consequences, the underdesign of the drainage system for the project could also result in serious damage to a number of municipal buildings and their contents.

The amount of drainage that would be intercepted by the existing storm drain in a 100-year storm is difficult to assess for two reasons. An exact re-analysis of the system using the 100-year storm values would be very time consuming and of questionable accuracy. This is so since As-Built plans are not available.

Also the assumption of normal flow may provide a reasonable result assuming that there are not significant losses other than frictional in the pipe, and assuming the system of inlets will effectively fill the pipe in a 100-year storm. Both assumptions are questionable, particularly the second, since much greater than normal problems with debris blocking catch basin inlets would be expected in a 100-year storm.

The safest approach to this problem would be to allow no credit for the existing storm drain, which would result in a discharge of 429 cfs reaching Wells Fargo. It would be overly conservative, however, to assume that the

storm drain would be empty in a 100-year storm, however, so the following considerations have been made:

1. The normal flow full-flow capacity for the 66" diameter .27% slope reach beginning at Second Street has been calculated to be 190 cfs (using Manning's formula with n = .012).

2. Energy losses other than frictional have been assumed to be small enough that they would not be overcome by head developing within the pipes before the water surface becomes high enough to interfere with the catch basin capacity.

3. The catch basin system, which was presumably designed to fill the pipe with 20% clogging (clogging factor of 1.25) in a 10-year storm, would be 50% clogged in a 100-year storm (clogging factor of 2.00). Since the system was originally designed to accommodate the 20% clogging, this condition would allow the storm drain to operate at about 75% of its capacity.

For this study then, it is assumed that 75% of the flow reaching POC u will be in the storm drain up to a maximum of 75% of the full flow capacity, or 140 cfs. The remainder is assumed to continue on to POC v.

DESIGN DISCHARGE FOR WELLS FARGO CATCH BASINS

Two approaches for estimating the effect of the Scottsdale storm drains on the 100-year discharge at Wells Fargo have been tried here. The first has been to compute the effective CA of Area U using the ratio of total discharge at u to the estimated storm drain capacity. The reduced CA of Area U has then been combined with Area V and the resulting total discharge determined using the time-of-concentration that would otherwise be incurred at POC v (v'). These calculations are as follows:

Q_{100} @ POC u:		353
Estimated Scottsdale Road storm drain capacity at Second Street:		140
Ratio:	140/350 =	.40
CA for POC u = .787 x 71.8 = 56.5		
x (1-ratio)	33.9	
CA for POC v = .839 x 22.6	19.0	
TOTAL:	52.9	

i for POC v' = 5.65

Q_{100} @ v' assuming storm drain 75% effective: 299 cfs

The second approach used here to estimate the quantity of discharge reaching the Wells Fargo catch basins has been to develop discharge hydrographs for Points u and v, split the hydrographs at u in accordance with the assumed storm drain capacity stated above, and sum the result with the hydrograph at v, assuming an appropriate time delay for the flow to travel along Second Street from Scottsdale Road to Wells Fargo. This time delay has been estimated to be the difference in T_c computed at u and v' of three minutes. (Times of 2.5 and 3.5 minutes correspond to velocities of 7.3 and 5.2 fps over the 1100 foot reach.)

Printouts of the hydrographs are presented in Appendix B. Note that "Point 01" corresponds to POC u, and "Point 02" to POC v. The results of this analysis show the virtually identical result of 301 cfs. For this reason a design value of 300 cfs has been used for delineating the required inlet capacity of the cluster of catch basins in the vicinity of Wells Fargo.

EVALUATION OF ASSUMPTIONS

In light of the amount of damage that could potentially result, the question of what would occur if the assumptions made here are incorrect should be asked. Specifically questionable are the exact delineation of the effective watershed area, and the assumption that Scottsdale storm drain will in fact operate at 75% capacity during a 100-year storm.

One degree of safety exists in the fact that the capacity of Second Street to convey flow is limited. Field observations and a review of the topographic mapping indicate a number of driveways and other locations where flow in excess of approximately 8" will begin to breakout to the south.

An approximation of the capacity of Second Street has been made assuming the following:

That 200 LF of effective weir length exists upstream of Wells Fargo which will begin to function once the flow depth in the street exceeds 0.6'.

That the capacity of flow in Second Street is that found by applying Manning's Equation as adjusted for triangular flow using W = 56', Sx = .02'/ft, So = .004'/ft, and n = .016.

That the effective watershed area is 25% higher than anticipated. This would result in a Q_{100} that is 25% higher, or 536 cfs.

That the stormdrain in Scottsdale Road is of negligible benefit.

The resulting stage-discharge relation for the combined street-weir flow would be as shown in Figure 3.2, which would indicate that in this "worst case" condition, approximately 319 cfs would remain in Second Street, not substantially higher than the discharges computed earlier.

On the basis of these analyses, a design discharge of 300 cfs would still appear to be appropriate for the Wells Fargo catch basins. It should be noted that future drainage components in the downtown area will put much of this water into underground conveyance systems prior to reaching this location, reducing the need for inlet capacity at this location in the future.

DESIGN DISCHARGE FOR STORM DRAIN

A procedure similar to that described for inlet design has also been utilized to determine the required discharge for the Second Street storm drain, downstream from the project. For this purpose, the discharge at POC w' representing the combined drainage areas U, V and W, has been computed first by using the effective CA of Area U as follows:

CA for Area U reduced as before:	33.9
CA for V	19.0
CA for W (= 36.3 x .722)	26.2
Total:	79.1
i @ T_c = 18	5.5
Effective Q_{100}	435 cfs

The split hydrograph approach results in a Q_{100} of 397 cfs. A design discharge for the Second Street storm drain is taken here to be 435 cfs. It will be shown later that this discharge would require an 84" diameter pipe, disregarding any oversizing that might be desirable to serve drainage needs other than that of the present project.

FLOW CAPACITY OF SECOND STREET

Flow in Second Street[1]		Breakout Flow Flow Over Weir[2]		Total
d	Q_{street}	h	Q_{weir}	Flow
.7	84	.1	13	97
.8	117	.2	36	153
.9	155	.3	66	221
1.0	196	.4	101	297
1.1	243	.5	141	384
1.2	293	.6	186	479
1.25	319	.65	210	529
1.3	346	.7	234	580
1.4	404	.8	286	690

1. $Q = .56\ z/n\ S_o^{1/2}\ (d^{8/3} - d_c^{8/3})$

2. $Q = 2.0\ Lh^{1.5}$

FIGURE 3.2

FLOW CAPACITY OF SECOND STREET

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SECTION 4

STORMDRAIN OVERSIZING INVESTIGATION

It was found in the previous section that an 84" stormdrain in Second Street would adequately serve the needs of this particular project. Additional underground conveyance is likely to be needed to serve future development of the downtown area, and it has been suggested that oversizing the Second Street stormdrain may prove to be a cost-effective way of serving some or all of that need.

This notion would seem intuitively correct as an increase in pipe diameter from 84" to 96" would increase the capacity from 481 cfs to 687 cfs, or 43%. Based on the preliminary engineer's cost estimate for this project, the minimal corresponding increase in cost would be from $568,000 to $702,000, or 22%. To develop this same additional capacity of 206 cfs through the addition of another pipe of equivalent length over a similar alignment would require a 60" stormdrain at a total cost of $360,000, raising the total cost to $968,000. This cost differential may in fact be even greater since the second stormdrain would probably have to be located along a major traffic/utility corridor such as Indian School Road or Osborne Road. (No dollar value has been placed on the effect of traffic disruption and public inconvenience of construction along such a corridor.)

It would clearly be beneficial to construct the oversized line <u>if</u> the additional capacity can be effectively utilized at that location, and <u>if</u> the added capacity were to be needed in the reasonably near future so that the present value of the future work does not appreciably decrease. Due to constraints of grade and clearance under the parking garage, it would be difficult to use a pipe size greater than 96". A summary of estimated costs and capacities for various pipe sizes is presented in Figure 4.1.

The purpose of this section is to determine if oversizing of the Second Street stormdrain is appropriate. It should be noted here that a detailed drainage master plan of the redevelopment area would under normal

COMPARISON OF PIPE CAPACITIES/COSTS
FOR CURRENT SECOND STREET STORM DRAIN

Pipe	Capacity	Cost of Pipe Installed (3376 L.F.)	Cost of Incidentals	Total Cost	Increased Cost of Oversizing
84" RCP	481	664,700	104,400	749,100	--
84" CIP	481	463,400	104,400	567,800	--
96" RCP	687	789,200	104,400	893,600	$144,500
96" CIP	687	597,900	104,400	702,300	$134,500

NOTES:

1. These costs are based on preliminary engineer's estimate for alternative pipe sizes and types. Cost of drain from depressed roadway excluded.

2. Incidental costs per lineal foot = $30.92.

3. Flow capacities based on S_o = .0048, n = .012 normal flow calculation

FIGURE 4.1

conditions be called for to answer this question. Because time constraints do not allow for a detailed study, a somewhat general investigation has been made. The results of this work are intended to provide a reasonable basis for estimating an appropriate Second Street storm drain size so that the construction of the project can proceed on schedule. A detailed storm water management study should still be performed, however, for planning other storm drain laterals, mains, and other drainage improvements in the area.

The criteria used here are stated in terms of the frequency of storms that will be carried entirely by the stormdrain system. No generally accepted design levels for drainage systems in downtown areas appear to exist. To develop an appropriate criteria, reference has first been made to the normally accepted requirement for pavement drainage that the 10-year storm be carried as combined stormdrain/gutter flow in such a manner that at least one travel lane is kept open in each direction. A second point of consideration is the typical flood plain ordinance requirement that businesses and residences be free from flooding in a 100-year storm.

Two separate criteria are examined here:

1. The stormdrain be capable of conveying the entire 10-year storm. This is a more stringent requirement than the pavement drainage standard, since that allows gutter capacity to be included as well.

2. That the entire 25-year storm be contained in the stormdrain.

Both criteria have been applied to the schemes investigated here to see what effect they have on cost, and in this sense become alternatives themselves.

The purpose of choosing either a 10-year or 25-year criterion is to simplify the procedure of determining the overall stormdrain outflow capacity that will be needed. A more detailed drainage master plan would look at specific problems and locations, and would not necessarily apply a

single criterion in all cases. Some locations would in all likelihood require higher design levels than others. (For example, the flat grades and low finish flows of many of the Fifth Avenue Shops may dictate a higher design level in that area than would the north-south minor streets south of Indian School, where drainage is relatively good.)

EXISTING SCOTTSDALE ROAD STORMDRAIN

Significant underground conveyance already exists with the presence of the existing Scottsdale Road stormdrain. Since any future general scheme will work in conjunction with that facility, an evaluation of its current capacity is determined here.

For this purpose, the drainage map of Figure 4.2 has been prepared showing the existing stormdrain and the approximate watershed boundaries that would exist with a fully developed stormdrain system in place. Lacking a detailed master plan. These boundaries and flow paths, as with those for the proposed drainage schemes shown later, are only approximate. They are thought to be sufficiently accurate for the purpose of determining the ultimate underground capacities that will be necessary to carry the redevelopment area runoff to Indian Bend Wash.

The anticipated runoff quantities at various points along the Scottsdale stormdrain are indicated in Figure 4.3. Also shown are the normal flow pipe capacities for each point and the approximate return frequency they represent. A summary of the hydrologic calculations from which this information was developed is presented in Appendix C. (This estimate of hydraulic capacity assumes that the downstream reaches of the stormdrain have been sized to approximately the same level of design as those investigated here.)

It appears from Figure 4.3 that the existing pipe has capacities that range from roughly 2.4 to 7.8 years. This result is not unexpected when it is considered that the stormdrain was originally designed to convey a ten-year

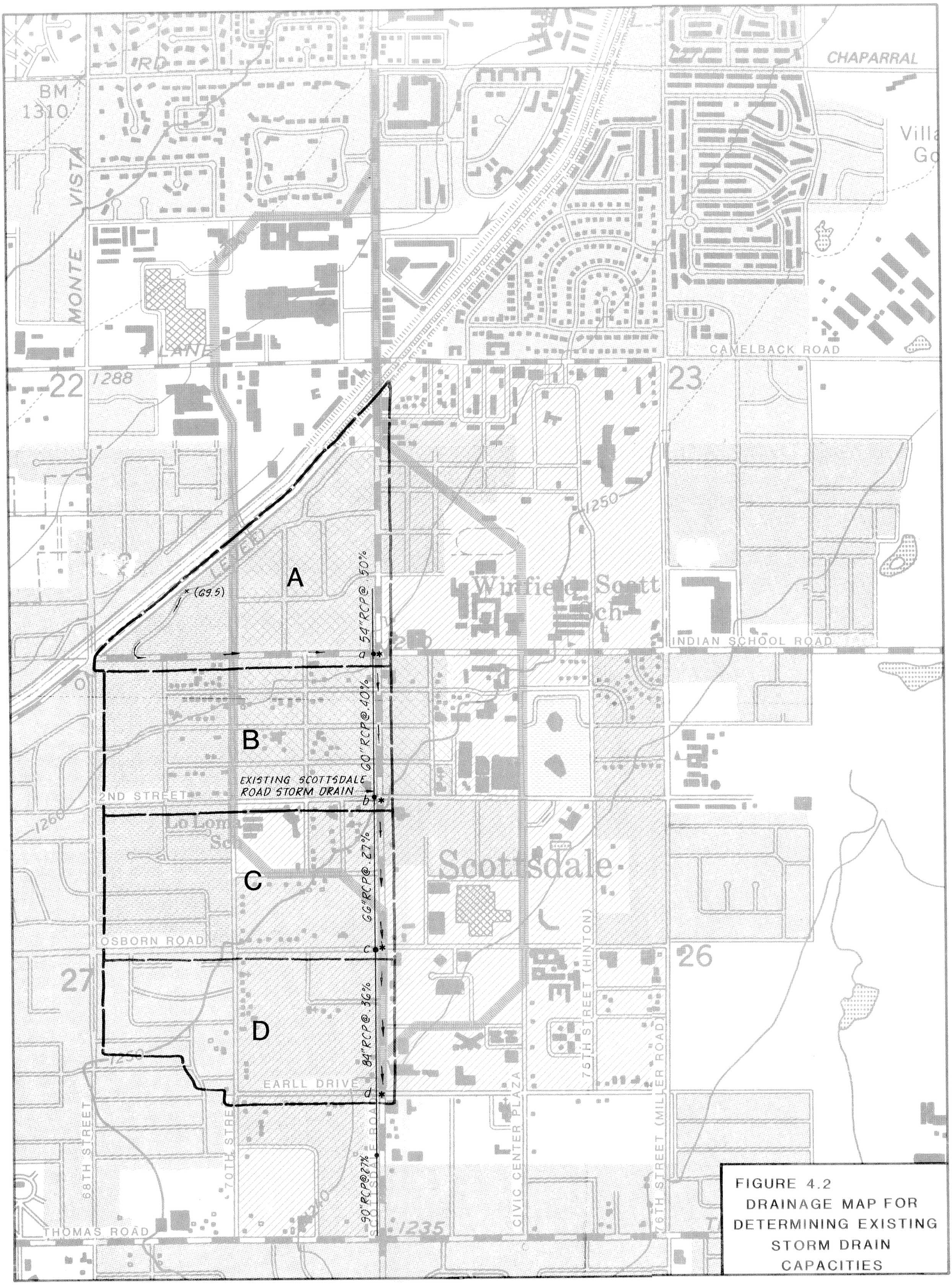


FIGURE 4.2
DRAINAGE MAP FOR DETERMINING EXISTING STORM DRAIN CAPACITIES

CAPACITY OF EXISTING SCOTTSDALE ROAD STORMDRAIN TO SERVE THE DOWNTOWN REDEVELOPMENT AREA

POC	Location	Frequency	Runoff	Pipe Capacity	Approximate Return Frequency Capacity*
a.	Indian School Road	2	87	150	5.0
		5	149		
		10	198		
		25	266		
		50	334		
b.	Second Street	2	154	190	2.6
		5	272		
		10	363		
		25	494		
		50	631		
c.	Osborn Road	2	209	420	7.8
		5	379		
		10	525		
		25	739		
		50	947		
d.	Earll Drive	2	380	430	6.2
		5	708		
		10	994		
		25	1142		
		50	1854		

*Based on log-normal interpolation between 2 and 10 year values.

FIGURE 4.3

storm in conjunction with the allowable spread of gutter flow, and that the existing rather than future watersheds were assumed.

INCLUSION OF EXISTING STORM DRAIN INTO FUTURE SYSTEM

Because the existing Scottsdale stormdrain was designed to meet the 10-year pavement drainage criterion and because its design did not anticipate the increased effective drainage area that will be created by the presence of a functioning stormdrain system, it does not have adequate capacity to serve the entire area upstream of Scottsdale Road for either the 10-year or 25-year criterion. The stormdrain schemes investigated here provide opportunities to intercept flow from upstream portions of the watershed -- specifically at Indian School and at Second Street -- leaving additional capacity in the downstream reaches.

If the upstream area north of Indian School were cut off, and the existing stormdrain needed to serve only Areas B, C and D, the Scottsdale Road stormdrain would still not have adequate capacity to serve either criterion, as can be seen from Figure 4.4. (It is close to the 10-year criterion, however, and may be considered acceptable.) The hydrologic calculations used to develop Figure 4.4 are presented in Appendix D.

If the upstream area north of Second Street is intercepted, then the capacity of the existing stormdrain will adequately serve the remaining area as indicated in Figure 4.5. This situation would leave more than adequate capacity to serve Areas C and D. This extra margin of capacity would provide a welcomed measure of flexibility for designing the future downtown drainage system. The hydrologic calculations used to generate Figure 4.5 are presented in Appendix E.

CAPACITY OF EXISTING SCOTTSDALE ROAD STORMDRAIN WITH DRAINAGE AREA TRUNCATED AT INDIAN SCHOOL

POC	Location	Frequency	Runoff	Pipe Capacity	Approximate Return Frequency Capacity
b'	Scottsdale Road at Second St.	2	88	190	8.1
	Area B only	5	152		
		10	205		
		25	282		
		50	355		
c'	Scottsdale Road at Osborn	2	140	420	19.7
	Areas B+C	5	250		
		10	337		
		25	477		
		50	600		
d'	Scottsdale Road at Earll	2	179	430	9.9
	Areas B+C+D	5	313		
		10	431		
		25	608		
		50	763		

FIGURE 4.4

CAPACITY OF EXISTING SCOTTSDALE ROAD STORMDRAIN WITH DRAINAGE AREA TRUNCATED AT SECOND STREET

POC	Location	Frequency	Runoff	Pipe Capacity	Approximate Return Frequency Capacity
c"	Scottsdale Road at Osborn (Area C)	2	72	420	100
		5	125		
		10	175		
		25	245		
		50	310		
		100	411		
d"	Scottsdale Road at Earll (Areas C+D)	2	113	430	25
		5	201		
		10	279		
		25	395		
		50	514		
		100	628		

FIGURE 4.5

ALTERNATIVE SCHEMES

Scheme 1. The first scheme investigated here includes the construction of a new stormdrain in Indian School Road, extending from Indian Bend Wash to Marshall Way. This stormdrain would be sized to intercept the entire design flow reaching Indian School (either the 10-year criterion or the 25-year criterion). The Second Street stormdrain would be extended to Scottsdale Road to intercept the remaining flow at that point (from Area B) so that the Scottsdale Road stormdrain could adequately serve the remaining area (Areas C and D in Figure 4.2). A relatively large stormdrain in Indian School would be required, but no oversizing of the 84" Second Street pipe would be necessary. The extension from Wells Fargo to Scottsdale would be smaller. A map reflecting this scheme is included as Figure 4.6.

Discharges along the Indian School stormdrain corresponding to the various points of concentration and the resulting pipe size requirement for both the 10-year and 25-year criteria are shown in Figure 4.7. Similar information for the Second Street stormdrain shown in Figure 4.8 indicates that oversizing would not be required for either criterion. The hydrologic calculations used to develop Figure 4.7 and 4.8 are included in Appendices F and G respectively.

Scheme 2. The second scheme investigated here is that of eliminating or reducing the extent of stormdrain necessary in Indian School Road by oversizing the Second Street stormdrain. With this scheme, the Second Street installation would be extended past Scottsdale Road to Marshall Way, and then northward to Indian School. Laterals would also extend northward in 75th to Indian School and then eastward to Civic Center Plaza. A map showing this scheme is presented as Figure 4.9. The accumulation of runoff quantities, and corresponding pipe sizes, are shown in Figure 4.10. It can be seen from Figure 4.10 that oversizing the Second Street stormdrain to 96" will meet the 10-year criterion if Area M is precluded from entering the system. The 25-year criterion can be met with 102" stormdrain if Area M is excluded, an option which is probably not feasible due to constaints

on the maximum pipe size. Hydrologic calculations for Scheme 2 are presented in Appendix H.

Scheme 3. Because of the 96" maximum diameter constraint, the 25-year criterion cannot be satisfied with Scheme 2. A third scheme has been proposed here that utilizes the maximum diameter of pipe in Second Street in conjunction with a minimal stormdrain installation in Indian School. This scheme is shown in Figure 4.11. Under this scheme, it is still necessary to extend the Second Street stormdrain to Marshall Way and Indian School. The lateral in 75th is not needed, however.

The accumulated flows and corresponding pipe sizes are shown in Figures 4.12 and 4.13. The hydrologic calculations are included in Appendix I.

COST ESTIMATE

The relative cost differential between the proposed alternatives has been determined here on the basis of the following assumptions:

1. The unit costs of various sizes and types of stormdrains are shown in Figure 4.14. Both the price of pipe installed and an estimated "incidental" cost for utility relocation, pavement replacement, traffic control, etc., are shown. The incidental costs have been estimated on the basis of the engineer's estimate for the current project. The incidental costs shown for major roadways such as Indian School are assumed to be twice those for Second Street.

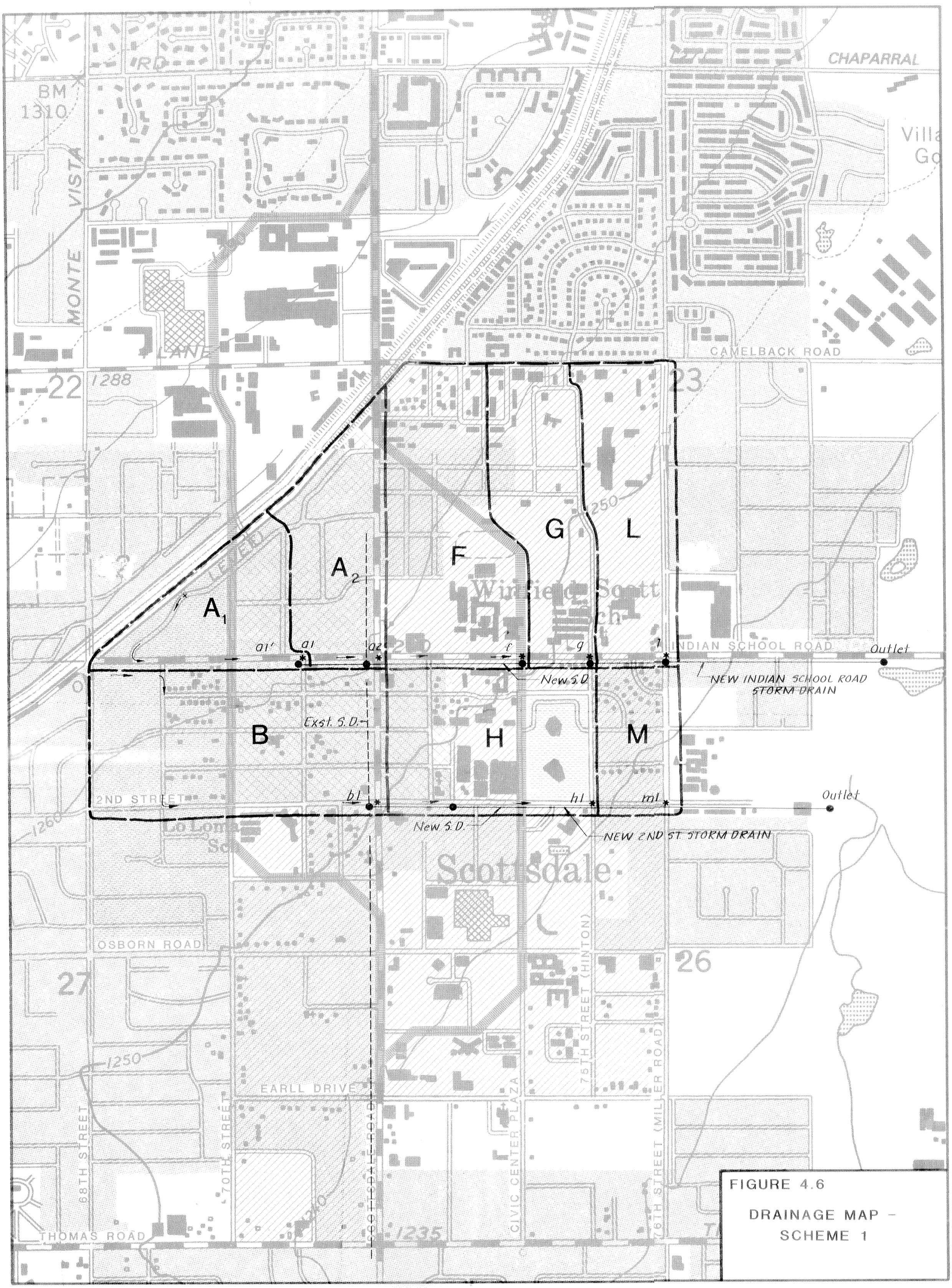


FIGURE 4.6

DRAINAGE MAP – SCHEME 1

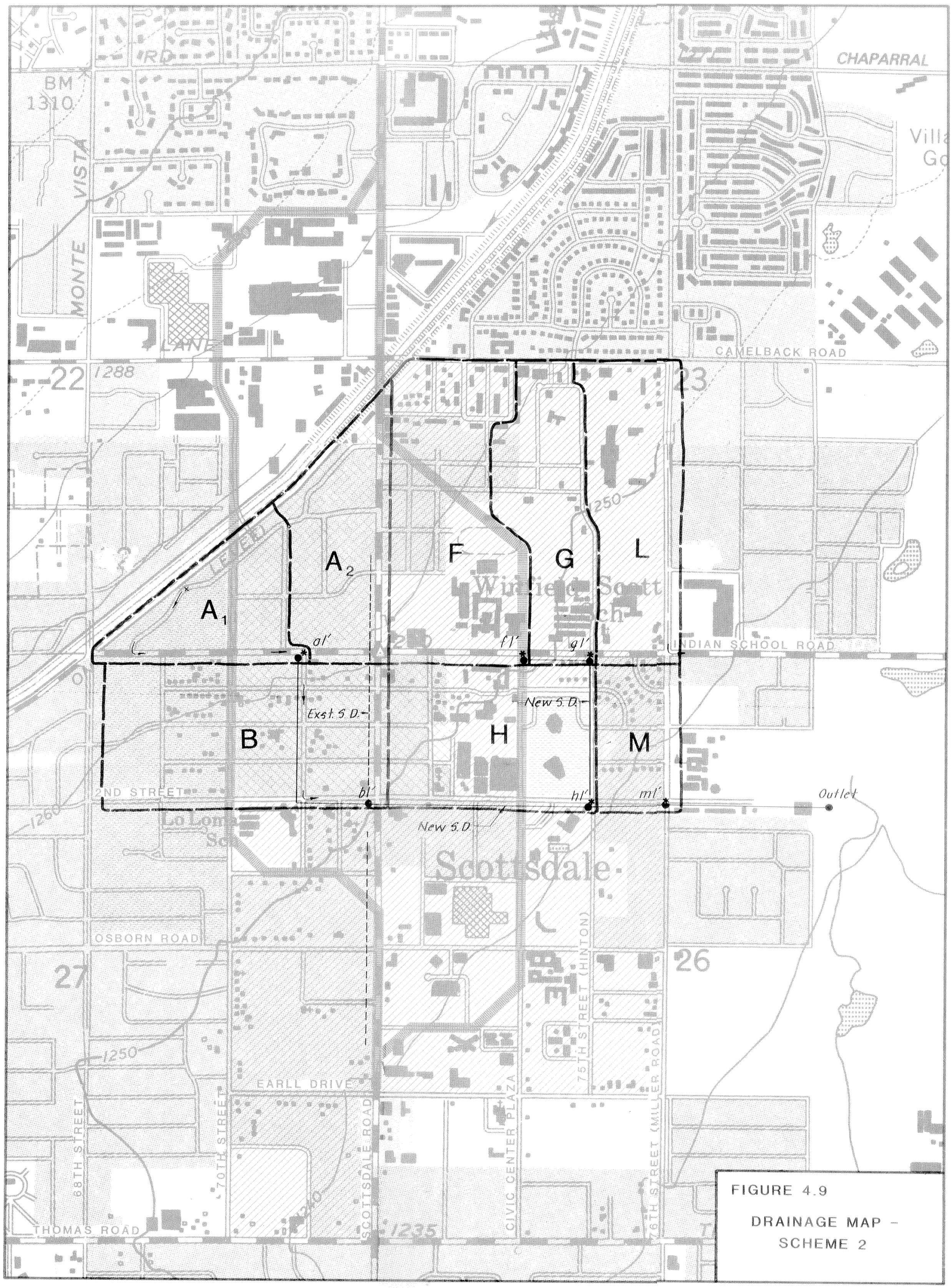


FIGURE 4.9

DRAINAGE MAP – SCHEME 2

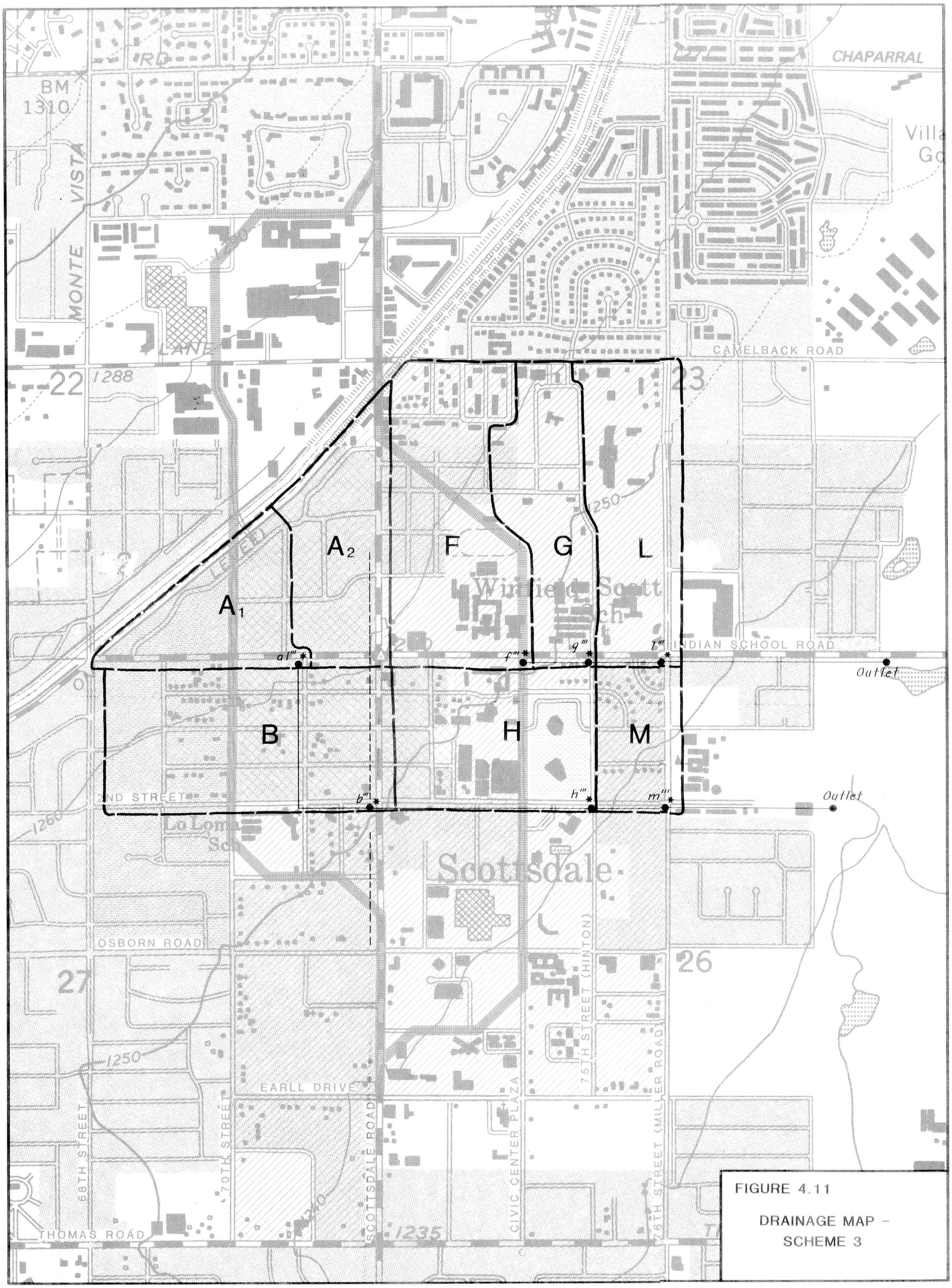


FIGURE 4.11

DRAINAGE MAP – SCHEME 3

ACCUMULATED DISCHARGES, PIPE SIZE REQUIREMENTS FOR INDIAN SCHOOL ROAD STORMDRAIN -- SCHEME 1

POC	Location	Frequency	Runoff	Required Storm Drain Diameter* 10-Year Criterion	25-Year Criterion
a1	Marshall Way	2	39	48"	54"
		5	68		
		10	92		
		25	123		
		50	154		
a2	Scottsdale Road	2	87	60"	66"
		5	149		
		10	198		
		25	266		
		50	334		
f	Civic Center Plaza	2	143	72"	84"
		5	248		
		10	339		
		25	461		
		50	589		
g	75th Street	2	177	78"	90"
		5	307		
		10	419		
		25	569		
		50	730		
1	Miller Road	2	208	84"	96"
		5	365		
		10	499		
		25	695		
		50	868		

*Assumes effective energy gradient of .5%

FIGURE 4.7

ACCUMULATED DISCHARGES, PIPE SIZE REQUIREMENTS FOR
SECOND STREET STORMDRAIN (SCHEME 1)

POC	Location	Frequency	Runoff	Required Storm Drain Diameter 10-Year Criterion	25-Year Criterion
b1	Second St. at Scottsdale Rd. (Area B)	2	88	60"	72"
		5	152		
		10	205		
		25	282		
		50	355		
h1	Second St. at Hinton (Area B+H)	2	141	72"	84"
		5	244		
		10	327		
		25	452		
		50	566		
m1	Second Street at Miller (Area B+H+M)	2	153	78"	84"
		5	269		
		10	361		
		25	494		
		50	642		

FIGURE 4.8

ACCUMULATED DISCHARGES, PIPE SIZE REQUIREMENTS FOR SECOND STREET STORMDRAIN (SCHEME 2)

POC	Location	Frequency	Runoff	Required Storm Drain Diameter 10-Year Criterion	25-Year Criterion
a1'	Marshall Way and Indian School (A1)	2	39	48"	54"
		5	68		
		10	92		
		25	123		
		50	154		
b1'	Second St. at Indian School (A+B)	2	156	78"	84"
		5	272		
		10	374		
		25	504		
		50	631		
f1'	Indian School at Civic Center Plaza (F)	2	75	60"	66"
		5	130		
		10	177		
		25	236		
		50	296		
g1'	Indian School at 75th (F+G)	2	111	66"	78"
		5	197		
		10	265		
		25	366		
		50	459		
h1'	Second Street at 75th (A+B+E+F+H)	2	257	96"	102"
		5	464		
		10	627		
		25	873		
		50	1116		
m1'	Second Street at Miller (A+B+E+F+H+M)	2	265	96"	108"
		5	477		
		10	643		
		25	908		
		50	1158		

FIGURE 4-10

ACCUMULATED DISCHARGES, PIPE SIZE REQUIREMENTS FOR SECOND STREET STORM DRAIN (SCHEME 3)

POC	Location	Frequency	Runoff	Required Storm Drain Diameter 10-Year Criterion	25-Year Criterion
a1'''	Marshall Way and Indian School (A1)	2	39	48"	54"
		5	68		
		10	92		
		25	123		
		50	154		
b'''	Second St. at Indian School (A+B)	2	154	78"	84"
		5	272		
		10	363		
		25	494		
		50	631		
h'''	Second Street at 75th (A+B+H)	2	172	84"	90"
		5	304		
		10	418		
		25	581		
		50	742		
m'''	Indian School at 75th (F+G)	2	180	84"	96"
		5	321		
		10	443		
		25	611		
		50	778		

FIGURE 4.12

ACCUMULATED DISCHARGES, PIPE SIZE REQUIREMENTS FOR INDIAN SCHOOL ROAD STORM DRAIN -- SCHEME 3

POC	Location	Frequency	Runoff	Required Storm Drain Diameter* 10-Year Criterion	25-Year Criterion
g'''	75th Street	2	111	66"	78"
		5	197		
		10	265		
		25	366		
		50	459		
1'''	Miller Road	2	150	78"	84"
		5	270		
		10	363		
		25	496		
		50	621		

*Assumes effective energy gradient of .5%

FIGURE 4.13

2. Only the lines shown in Figures 4.6, 4.9 and 4.11 are included. It is assumed that the collection systems upstream of each POC will be the same.

3. No consideration has been made for the fact that Schemes 2 and 3 require additional cost for improvements that won't actually be required for several years. The future value of the added cost would be less than the costs shown here. If the future improvements are not completed within the next few years, this effect may become significant.

4. No cost has been placed on the disruption and inconvenience to the public that the construction of a major stormdrain in Indian School Road would create.

It is emphasized here that this analysis is intended to provide an indication of the cost differentials involved with the various alternatives. These costs should not be used for budgetary or other purposes. A detailed stormwater management plan is necessary to develop more complete information.

Cost estimates for Schemes 1, 2 and 3 are shown in Figures 4.15, 4.16, and 4.17 respectively. A summary of costs is presented in Figure 4.18. Worksheets from which these cost estimates have been developed are presented in Appendix J.

EFFECT OF STORMDRAIN SYSTEM ON LARGE FLOWS

It should be noted that the stormdrain system will create definitive watershed delineation for the design storm as a minimum, plus whatever excess the streets can contain -- provbably the next higher frequency storm -- assuming the street drainage pattern coincides with those of the stormdrain. This effectively means the "low flow" delineation would apply up through approximately the 25-year frequency for the 10-year stormdrain

ASSUMED UNIT COST OF RCP STORM DRAIN FOR MAJOR AND MINOR CORRIDOR ROUTES

Pipe Size	Capacity at 50%	Cost of Pipe (per L.F.)	Minor Street Corridors		Major Street Corridors	
			Cost of Incidentals	Total Unit Cost	Cost of Incidentals	Total Unit Cost
36"	51	$ 50	$25	$ 75	$50	$100
48"	110	65	25	90	50	115
54"	151	80	25	105	50	130
60"	200	90	30	120	60	150
66"	258	110	30	140	60	170
72"	325	130	30	160	60	190
78"	402	160	30	190	60	220
84"	491	190	30	220	60	250
90"	590	215	35	250	70	285
96"	701	240	35	275	70	310
102"	824	265	35	300	70	335
108"	959	290	35	325	70	360

FIGURE 4.14

RELATIVE COST ESTIMATE FOR SCHEME 1
(REFERS TO FIGURE 4.6)

		10-Year Criterion				25-Year Criterion			
Pipe Reach	**Length**	**Q**	**d**	**Unit Cost**	**Cost**	**Q**	**d**	**Unit Cost**	**Cost**
Outlet to m1	1500'	361	78"	$190	$285,000	494	84"	$220	$330,000
m1 to h1	700'	327	72"	160	112,000	452	84"	220	154,000
h1 to b1	2000'	205	60"	120	240,000	282	72"	160	320,000
Outlet to 1	2000'	499	84"	250*	500,000	695	96"	310*	620,000
1 to g	700'	419	78"	220*	154,000	569	90"	285*	200,000
g to f	600'	339	72"	190*	114,000	461	84"	250*	150,000
f to a2	1300	198	60"	150*	195,000	266	66"	170*	221,000
a2 to a1	700	92	48"	115*	81,000	123	54"	130*	91,000
	9500'				$1,681,000				$2,086,000

*Assumes higher unit cost due to location in major roadway.

FIGURE 4.15

RELATIVE COST ESTIMATE FOR SCHEME 2
(REFERS TO FIGURE 4.9)

		10-Year Criterion				25-Year Criterion			
Pipe Reach	**Length**	**Q**	**d**	**Unit Cost**	**Cost**	**Q**	**d**	**Unit Cost**	**Cost**
Outlet - m1	1500'	643	96"	$275	$412,500	908	108"	$325	$488,000
m1' - h1'	700'	627	96"	275	192,500	873	102"	300	210,000
h1' - b1'	2000'	374	78"	190	380,000	504	84"	220	440,000
b1' - a1'	2000'	912	48"	90	180,000	123	54"	105	210,000
g1' - h1'	1300'	265	66"	140	182,000	366	78"	190	247,000
f1' - g1'	600'	177	60"	150*	90,000	236	66"	170*	102,000
	81,000'				$1,439,000				$1,697,000

*Assumes higher unit cost due to location in major roadway.

FIGURE 4.16

RELATIVE COST ESTIMATE FOR SCHEME 3
(REFERS TO FIGURE 4.11)

Pipe Reach	Length	10-Year Criterion				25-Year Criterion			
		Q	d	Unit Cost	Cost	Q	d	Unit Cost	Cost
Outlet to l'''	2000'	363	78"	$220*	$440,000	496	84"	$250*	$500,000
l''' to g'''	700'	265	66"	170*	119,000	366	78"	220*	154,000
g''' to f'''	600'	177	60"	150*	90,000	236	66"	170*	102,000
Outlet to m'''	1500'	443	84"	220	330,000	611	96"	275	413,000
m''' to h'''	700'	418	84"	220	154,000	581	90"	250	175,000
h''' to b'''	2000'	363	78"	190	380,000	494	84"	220	440,000
b''' to a'''	2000	92	48"	90	180,000	123	54"	105	210,000
					$1,693,000				$1,994,000

*Assumes higher unit cost due to location in major roadway.

FIGURE 4.17

SUMMARY OF RELATIVE COSTS

Option	Description	Relative Cost in Millions	
		10-Year Criterion	25-Year Criterion
Scheme 1.	Construct present Second Street storm drain at minimum size. Construct a future storm drain in Indian School Road to Marshall Way.	$1.68	$2.09
Scheme 2.	Oversize the present Second Street storm drain. Construct no future storm drain in Indian School. Construct a lateral northward in 75th to serve Indian School (and a lateral in Indian School over to Civic Center Plaza).	$1.44	($1.70)*
Scheme 3.	Construct maximum-sized (96") present Second Street storm drain. Construct a smaller storm drain up Indian School to Civic Center Plaza to avoid lateral in Hinton, and to serve 25-year criterion.	$1.69	$1.99

*Twenty-five year criterion can't be met with this scheme without going to greater than 96" diameter.

FIGURE 4.18

criterion, and the 50-year storm for the 25-year criterion. The 100-year and larger storms would tend to revert to the "large flow" patterns although to a lesser extent than presently would occur.

Great care must be used in the design of the upstream collection system to ensure that the Second Street stormdrain is not overloaded by the areas upstream of Scottsdale Road to the extent that it no longer has the ability to carry the entire 100-year storm approaching the depressed roadway from the areas downstream of Scottsdale Road.

Observations. The purpose of this effort is to determine the appropriate size of the stormdrain to be installed in Second Street at this time. The minimum size required to protect this project against the 100-year storm was found to be 84". The maximum size that can be installed along this alignment is 96" due to grade and other physical constraints. For lack of a detailed master drainage plan for the downtown redevelopment area, a more general analysis has been performed to determine as best as possible the advisability of oversizing to 96".

Consideration of Figure 4.18 reveals the following:

1. That oversizing the present stormdrain would in fact be ultimately less expensive -- particularly if the reduction of the future Indian School cost to its future value is ignored.

2. That an opportunity for even greater cost savings exists if cast-in-place concrete pipe can be used along Second Street, but RCP is required in Indian School.

3. From Figure 4.1 the cost to the present project of oversizing would be approximately $150,000.

It is noted here that the commitment to a particular drainage criterion for the future downtown drainage system is not necessary at this time. Both

Schemes 1 and 3 can accommodate either the 10-year or 25-year criterion in the future. Scheme 2 can also be made to fit either criterion by allowing the excess runoff from Areas L and M to flow out of the redevelopment area above ground, an option that does not appear to be particularly objectionable. This is a fortunate circumstance as it would be advantageous to leave such a decision to be made during the more detailed planning that should be undertaken later. The selection of the oversize options also precludes the need to commit to one of the three particular schemes at this time.

Recommended Pipe Size. It is recommended here that the present stormdrain be oversized to 96" diameter. Although this action would increase the cost of the present project, it would probably reduce the overall ultimate cost of properly draining the downtown redevelopment area, and future segments of the couplet system. It would also provide greater flexibility in planning the ultimate downtown drainage system.

FLOW AT INDIAN SCHOOL AND CIVIC CENTER PLAZA

To avoid the need for a second 100-year stormdrain to intercept the flow in Indian School, that flow is being precluded from entering the depression with a rise in grade of Civic Center Plaza. This will result in low flows crossing Civic Center Plaza until construction of the segment to the north is completed, at which time appropriate catch basins and stormdrains will be installed.

This problem could be alleviated at this time via construction of additional stormdrains as suggested in one of the three general schemes. This would be expensive, and more importantly it would require a commitment at this time to a particular scheme and pipe size -- without the benefit of a master drainage plan. For those reasons, and since Civic Center will not begin to function as a major roadway until it is extended anyway, this flow has been allowed to cross Civic Center as gutter flow along Indian School for the time being.

SECTION 5

ON-SITE DRAINAGE

The previous sections have addressed the existing and future upstream drainage affecting this project. That drainage will be referred to here as "off-site" drainage since it consists of runoff generated by rainfall in upstream watersheds traversing the project location. "On-site" flow is considered here to be flow generated from rainfall in the immediate vicinity of the project, unable to be intercepted or diverted upstream by the proposed off-site improvements. In this section, the locations and quantities of on-site flow, and the methods for dealing with them are determined.

Figure 5.1 is a drainage map delineating the source of on-site runoff. Watersheds have been delineated for the flows entering the depression along both gutter lines from both directions. The cross-hatching indicates the area that will need to be pumped, this area including all the on-site drainage except the roof of the garage which can be discharged into the stormdrain directly. Since the Second Street stormdrain will be operating under pressure in a 100-year storm, it will not be possible for the lower garage level to be directly discharged, even though the stormdrain runs under the garage.

The discharge quantities for the various points of concentration shown in Figure 5.1 have been computed using the hydrologic methods of Section 2. The results are summarized in Figure 5.2, with detailed calculations shown in Appendix K.

Because of the greater than normal tendency for clogging in a 100-year storm, design discharges of 10 cfs for each gutter from each direction will be used. A design discharge of 60 cfs (27,000 gpm) will be used to size the pump station.

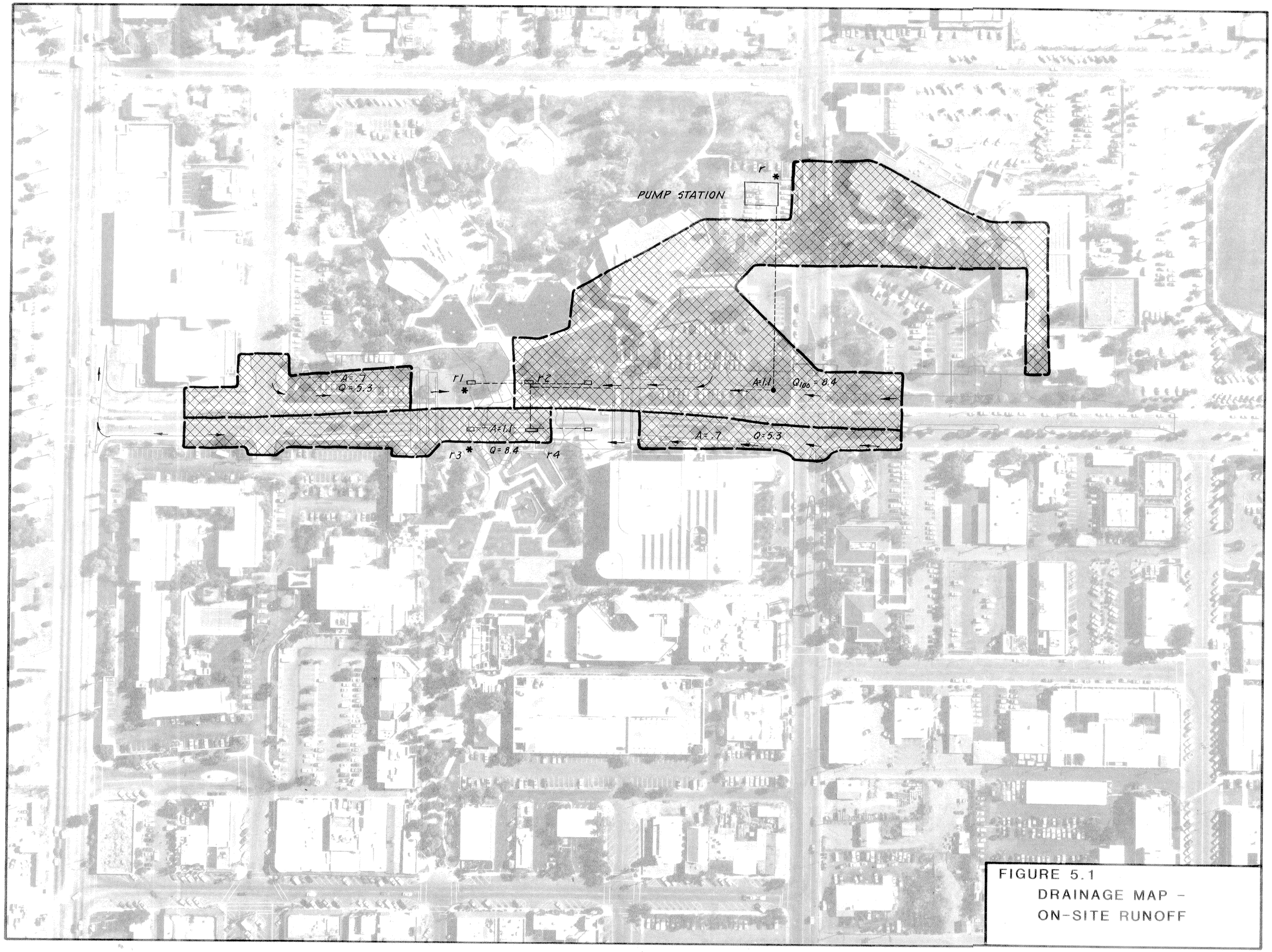


FIGURE 5.1
DRAINAGE MAP -
ON-SITE RUNOFF

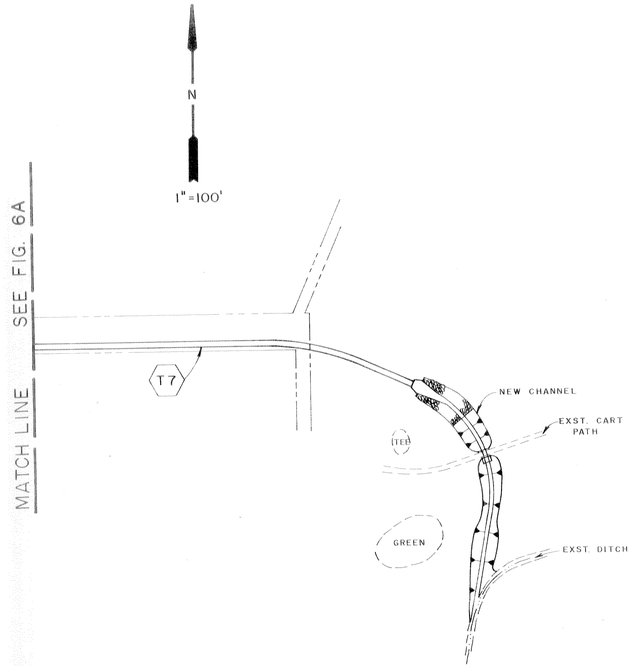
SECTION 6
HYDRAULIC DESIGN

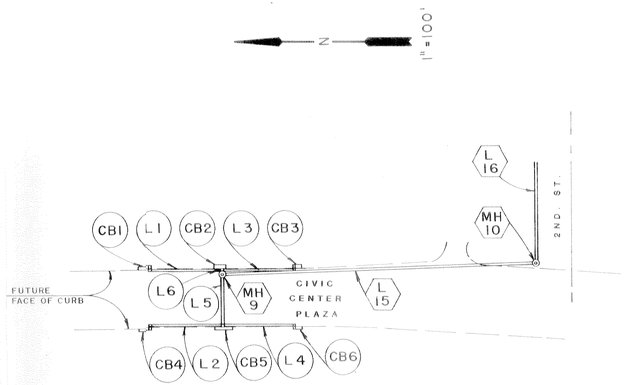
In the previous sections, the discharge quantities needed for designing the various drainage improvements have been determined. This section presents the hydraulic calculations used to design the various drainage system components.

Two individual stormdrain systems were designed to serve this project. The first system drains the new Civic Center Plaza roadway. The outlet for this stormsewer will be a pipe that runs from the low point in Civic Center Plaza to a stormwater pump station located near the northwest corner of Second Street and Hinton Avenue. The second system will pick up the drainage coming down Second Street upstream of Civic Center Plaza. The main trunk line of this system will serve as an outlet for the pump station, and will have its outfall at Indian Bend Wash. Both systems are graphically presented in Figures 6A and 6B.

The new profile of Civic Center Plaza was one of the major parameters considered in designing its stormsewer. A high point will be developed just south of Indian School Road. This will prevent the runoff flowing east on Indian School from entering the depressed section of Civic Center Plaza, and thus having to be pumped. The pavement drainage between this high point and the high point in the profile immediately south of Second Street will be picked up in a series of catch basins located in the depressed section under the new Mall crossing. Standard MAG curb opening catch basins were selected to minimize the clogging due to debris and the interference with vehicular traffic.

Three catch basins will be used on each side of the road. One will be located at the low point and two others will be placed on each side of the low point. By locating a catch basin upstream of the sump, sediment can be picked up in the stormdrain rather than settling out in the roadway at the low point where the runoff will have its lowest velocity. As shown in the



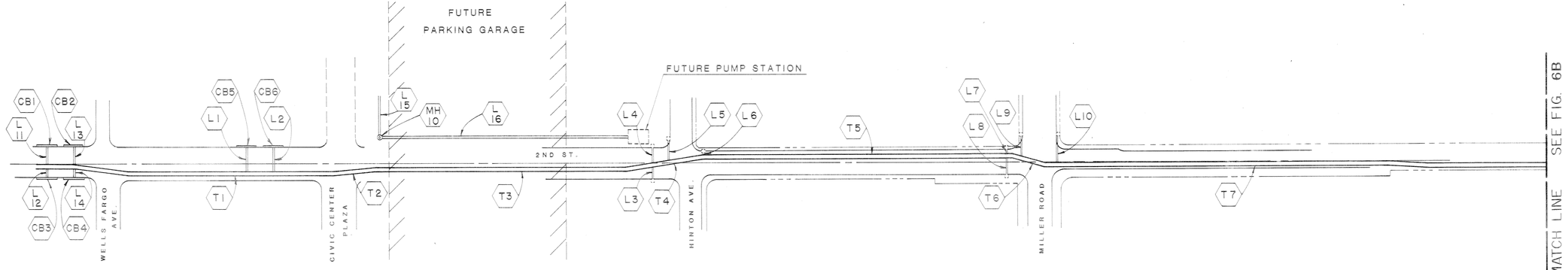


LEGEND

- CB1 CATCH BASIN NO.__(STORM DRAIN PLANS)
- L1 LATERAL NO.____(STORM DRAIN PLANS)
- T1 TRUNK LINE NO.__(STORM DRAIN PLANS)
- EXISTING CATCH BASIN
- CB1 CATCH BASIN NO.__(PAVING PLANS)
- L1 LATERAL NO.____(PAVING PLANS)
- T1 TRUNK LINE NO.__(PAVING PLANS)

FIGURE 6A

STORM DRAINAGE SYSTEM



LEGEND

CB1 CATCH BASIN NO. _ (STORM DRAIN PLANS)	CB1 CATCH BASIN NO. _ (PAVING PLANS)
L1 LATERAL NO. _____ (STORM DRAIN PLANS)	L1 LATERAL NO. _____ (PAVING PLANS)
T1 TRUNK LINE NO. _ (STORM DRAIN PLANS)	T1 TRUNK LINE NO. _ (PAVING PLANS)
EXISTING CATCH BASIN	

FIGURE 6B
STORM DRAINAGE SYSTEM

calculations included in Appendix L, the catch basins located on the grade will pick up approximately 61% of the runoff during a 100-year storm with the carryover flow being picked up in the catch basin at the bottom of the sag vertical curve.

After the inlets were sized and their locations determined, a system of conduits was designed to convey the storm runoff to the pump station. The procedure used to size the stormdrain pipes is based on pressure flow and is as follows:

1. A trial pipe diameter and slope are chosen such that when the pipe is carrying the computed discharge, it is flowing just full or under pressure. A minimum pipe size of 18" was used.

2. A hydraulic grade line is then computed for each line that is flowing under pressure. The hydraulic grade coincides with the level to which the water would rise in a vertical tube connected to the storm sewer flowing under pressure. By determining the elevation of the hydraulic grade line at the inlets, the possibility of blowouts can be avoided. In calculating the hydraulic grade line, the energy losses in the stormdrain system due to pipe friction, and the turbulence caused by the catch basins and manholes, must be considered. The calculation of the hydraulic grade line begins at the outlet of the first pipe which is under pressure and proceeds upstream. The starting elevation was taken to be the crown elevation of the pipe at the outlet.

The flows that were used to design the stormsewer were generated in another section of this report. It was determined that approximately 30 cfs would enter the stormsewer system in the depressed section of the roadway. Due to the uncertainty of which direction the flows would come from, the catch basins in the sump area were slightly oversized to accommodate the possibility of an unbalanced flow split. Another 30 cfs will enter the stormsewer somewhere in the new parking garage. Therefore, the pipe run from the pump station to the manhole immediately upstream of the parking

garage is sized to carry 60 cfs. The pipe from that manhole to the manhole located at the low point of the depressed section is sized to carry 30 cfs. The lateral pipes from the catch basins to the low point manhole are sized to carry 10 cfs each. The pipe size and hydraulic gradeline calculations are included in Appendix M.

SECOND STREET STORMDRAIN

It was determined earlier in this report that approximately 300 cfs would be the peak flow on Second Street at Wells Fargo during a 100-year storm. A series of catch basins was designed to pick up this flow upstream of Civic Center Plaza. The first four catch basins will operate under orifice flow conditions due to the high depth of flow, and will remove 224 cfs from the street. Approximately 38 cfs will be allowed to flow down Wells Fargo, which is a significant reduction in the quantity of runoff which would currently occur in a 100-year storm. The other 38 cfs will flow down the north gutter line of Second Street and be picked up in two catch basins. The carryover flow of 9 cfs past the last catch basin will enter the depressed section of Civic Center Plaza where it will be collected in the stormsewer discussed previously.

The elevation of the hydraulic grade line in the main trunk line will be below the crown of the pipe (i.e., the pipe will not be under pressure). This is because runoff will not enter this pipe upstream of this project until the trunk line is extended and additional catch basins are added. When this extension occurs, the flow reaching the catch basins at Wells Fargo will have been greatly reduced. Therefore, the size of the lateral pipes between the catch basins and the trunk line will not be controlled by the elevation of the hydraulic grade line at the trunk line.

The longitudinal slopes of these lateral pipes are great enough that their frictional slope will not serve as a control on the pipe capacity. Therefore, the limiting factor on the pipe capacity is the inlet control at the entrance to the pipe. The allowable headwater for each of these pipes was taken to be their diameter plus two feet. Since the pipes are placed

with a minimum of two feet of cover from the sub-base to the top of the pipe, the freeboard during a 100-year storm will be equal to the depth of the pavement structure (six to twelve inches).

Downstream of Civic Center Plaza, the new stormsewer will be replacing a smaller existing storm drain in Second Street. Therefore, existing catch basins which are connected to this smaller trunk line will be tied into the new trunk line using lateral pipes that are the same size as are being used currently.

SECTION 7

SUMMARY

A summary of the important points of this report is as follows:

1. The hydrology of this area is complicated to analyze due to the lack of watershed definition and uncertainty of the contribution of the existing stormdrain in larger storms.

2. The need for reliable analysis and design techniques is particularly important in this case, since flooding of this project could also result in damage to the parking structure, the Library, and the Public Service Building.

3. This project is extremely complicated, and is being pursued under a very tight time schedule. Construction contracts are being let in a series of bid packages so that preliminary construction can be underway prior to completion of final design plans.

4. A definitive decision on whether or not to oversize the stormdrain should be made on the basis of a detailed stormwater management plan for the downtown redevelopment area. Because of the time constraints, such a study cannot be made in time for a decision on oversizing. This study has generally reviewed the available alternatives, and determined approximate pipe sizes and relative costs of each. The intention of this effort is to provide adequate information from which the decision of whether to use an 84" or 96" stormdrain for the present project can be made. A detailed master plan is still needed and should be pursued in the near future.

5. The 96" stormdrain is recommended here since it allows the greatest amount of flexibility for future planning, it will probably result in a lower overall future cost even though it would make the present project

more expensive, and it would provide a greater margin of safety which is of particular importance to this project.

6. The catch basin cluster along Second Street in the vicinity of Wells Fargo has been designed to intercept the 100-year storm. As the collection system in the upstream area is developed, these basins will have excess capacity.

7. The easterly flow in Indian School Road will be precluded from entering the depression by means of a rise in Civic Center Plaza. This flow will temporarily cross Civic Center Plaza, on grade, until the next segment is built northward. At that time, the pavement drainage system for the new segment will resolve that problem in accordance with the master stormdrain plan.

REFERENCES

1. "Recommended Downtown Plan -- Guidelines, Implementation Program, Functional Use and Circulation Policy", Scottsdale Planning/Traffic Engineering; April 11, 1983.

2. "Drainage Report Preparation", Section 2 of Design Procedures and Criteria, City of Scottsdale Community Development Department; October, 1984.

3. "Hydrologic Manual for Engineering Design and Floodplain Management within Pima County, Arizona", Pima County Department of Transportation and Flood Control District; September, 1979.

4. "Design of Facilities to Manage Storm Water Runoff", Section 3 of Design Procedures and Criteria, City of Scottsdale Community Development Department; October 3, 1984.

APPENDIX A

HYDROLOGIC CALCULATIONS FOR DETERMINING SECOND STREET STORMDRAIN REQUIREMENTS

(POCs u, v, v', w, w')

PCFCD HYDROLOGY METHOD
Johnson, Brittain & Associates, Inc
05-30-1985

CvcCntrPlz Sctsdl Rd
JBA No 2690
Opened

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	21.6	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.442
	50.2	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--		65.8	--	--		.002	--	--		.705
A=	71.8 Ac																		Cw=	.626
5	21.6	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.488
	50.2	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--		72.7	--	--		.060	--	--		.744
A=	71.8 Ac																		Cw=	.667
10	21.6	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.532
	50.2	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--		75.2	--	--		.135	--	--		.770
A=	71.8 Ac																		Cw=	.698
25	21.6	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.585
	50.2	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--		77.5	--	--		.229	--	--		.799
A=	71.8 Ac																		Cw=	.735
50	21.6	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.628
	50.2	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--		79.0	--	--		.307	--	--		.821
A=	71.8 Ac																		Cw=	.763
100	21.6	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.664
	50.2	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--		80.1	--	--		.372	--	--		.839
A=	71.8 Ac																		Cw=	.786
500	21.6	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.680
	50.2	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--		80.5	--	--		.401	--	--		.846
A=	71.8 Ac																		Cw=	.796

RAINFALL

Rtn Frq	Map Values P6	P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
4300	18	.020	Highly Urbanized..

L= 4300 Lca= 2200 Sc=.00419 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	27	2.7	1.57	.626	0.98	71
5	1.35	21	3.4	2.60	.667	1.74	126
10	1.62	19	3.8	3.31	.698	2.31	167
25	1.97	17	4.2	4.26	.735	3.13	227
50	2.30	15	4.8	5.24	.763	4.00	289
100	2.61	14	5.1	6.19	.786	4.87	352
500	2.77	14	5.1	6.57	.796	5.23	378

PCFCD HYDROLOGY METHOD
Johnson, Brittain & Associates, Inc
05-30-1985

CvcCntrPlz Sctsdl Rd
JBA No 2690
Opened

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	Curve No (CN) C	Curve No (CN) D	P1	Adjusted Curve No (CN*) B	Adjusted Curve No (CN*) C	Adjusted Curve No (CN*) D	I	Runoff Coefficient (C) B	Runoff Coefficient (C) C	Runoff Coefficient (C) D	I	Avrg
2	22.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.705
	A= 22.6 Ac																			Cw= .705
5	22.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.744
	A= 22.6 Ac																			Cw= .744
10	22.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.770
	A= 22.6 Ac																			Cw= .770
25	22.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.799
	A= 22.6 Ac																			Cw= .799
50	22.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.821
	A= 22.6 Ac																			Cw= .821
100	22.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.839
	A= 22.6 Ac																			Cw= .839
500	22.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.846
	A= 22.6 Ac																			Cw= .846

RAINFALL

Rtn Frq	Map Values P6	Map Values P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
2100	11	.020	Highly Urbanized..
L= 2100	Lca= 1100	Sc=.00524	nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	13	2.7	2.28	.705	1.60	37
5	1.35	11	3.2	3.52	.744	2.62	60
10	1.62	10	3.5	4.38	.770	3.37	77
25	1.97	9	3.9	5.61	.799	4.48	102
50	2.30	8	4.4	6.87	.821	5.64	128
100	2.61	7	5.0	8.23	.839	6.90	157
500	2.77	7	5.0	8.73	.846	7.39	168

PCFCD HYDROLOGY METHOD
Johnson, Brittain & Associates, Inc
05-30-1985

CvcCntrPlz Sctsdl Rd
JBA No 2690
Opened

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	21.6	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.442
	50.2	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--		65.8	--	--		.002	--	--		.705
	22.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--		65.8	--	--		.002	--	--		.705
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
A=	94.4 Ac																			Cw= .645
5	21.6	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.488
	50.2	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--		72.7	--	--		.060	--	--		.744
	22.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--		72.7	--	--		.060	--	--		.744
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
A=	94.4 Ac																			Cw= .686
10	21.6	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.532
	50.2	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--		75.2	--	--		.135	--	--		.770
	22.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--		75.2	--	--		.135	--	--		.770
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
A=	94.4 Ac																			Cw= .716
25	21.6	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.585
	50.2	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--		77.5	--	--		.229	--	--		.799
	22.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--		77.5	--	--		.229	--	--		.799
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
A=	94.4 Ac																			Cw= .750
50	21.6	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.628
	50.2	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--		79.0	--	--		.307	--	--		.821
	22.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--		79.0	--	--		.307	--	--		.821
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
A=	94.4 Ac																			Cw= .777
100	21.6	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.664
	50.2	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--		80.1	--	--		.372	--	--		.839
	22.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--		80.1	--	--		.372	--	--		.839
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
A=	94.4 Ac																			Cw= .798
500	21.6	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.680
	50.2	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--		80.5	--	--		.401	--	--		.846
	22.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--		80.5	--	--		.401	--	--		.846
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
A=	94.4 Ac																			Cw= .808

RAINFALL

Rtn Frq	Map Values P6	P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
4300	18	.020	Highly Urbanized..
1100	4	.020	Highly Urbanized..
....	....	....	.....
....	....	....	.....
....	....	....	.....

L= 5400 Lca= 2700 Sc=.00406 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	32	2.8	1.41	.645	0.91	86
5	1.35	25	3.6	2.36	.686	1.62	154
10	1.62	22	4.1	3.06	.716	2.19	209
25	1.97	20	4.5	3.93	.750	2.95	280
50	2.30	18	5.0	4.83	.777	3.75	357
100	2.61	17	5.3	5.64	.798	4.51	429
500	2.77	16	5.6	6.15	.808	4.97	473

POC: W

W

PCFCD HYDROLOGY METHOD
Johnson, Brittain & Associates, Inc
05-30-1985

CvcCntrPlz Sctsdl Rd
JBA No 2690
Opened

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	24.3	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.573
	12.0	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		65.8	--	--		.002	--	--		.442
	A= 36.3 Ac																			Cw= .530
5	24.3	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.616
	12.0	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		72.7	--	--		.060	--	--		.488
	A= 36.3 Ac																			Cw= .574
10	24.3	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.651
	12.0	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		75.2	--	--		.135	--	--		.532
	A= 36.3 Ac																			Cw= .612
25	24.3	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.692
	12.0	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		77.5	--	--		.229	--	--		.585
	A= 36.3 Ac																			Cw= .657
50	24.3	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.724
	12.0	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		79.0	--	--		.307	--	--		.628
	A= 36.3 Ac																			Cw= .692
100	24.3	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.751
	12.0	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.1	--	--		.372	--	--		.664
	A= 36.3 Ac																			Cw= .722
500	24.3	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.763
	12.0	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.5	--	--		.401	--	--		.680
	A= 36.3 Ac																			Cw= .735

RAINFALL

Rtn Frq	Map Values P6	Map Values P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
2400	15	.020	Highly Urbanized..

L= 2400 Lca= 1200 Sc=.00625 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	15	2.7	2.13	.530	1.13	41
5	1.35	12	3.3	3.40	.574	1.95	71
10	1.62	11	3.6	4.23	.612	2.59	95
25	1.97	9	4.4	5.61	.657	3.68	135
50	2.30	8	5.0	6.87	.692	4.76	174
100	2.61	8	5.0	7.81	.722	5.64	206
500	2.77	8	5.0	8.29	.735	6.09	223

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	72.8	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.705
	24.3	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		65.8	--	--		.002	--	--		.573
	33.6	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		65.8	--	--		.002	--	--		.442
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 130.7 Ac																			Cw= .613
5	72.8	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.744
	24.3	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		72.7	--	--		.060	--	--		.616
	33.6	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		72.7	--	--		.060	--	--		.488
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 130.7 Ac																			Cw= .655
10	72.8	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.770
	24.3	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		75.2	--	--		.135	--	--		.651
	33.6	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		75.2	--	--		.135	--	--		.532
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 130.7 Ac																			Cw= .687
25	72.8	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.799
	24.3	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		77.5	--	--		.229	--	--		.692
	33.6	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		77.5	--	--		.229	--	--		.585
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 130.7 Ac																			Cw= .724
50	72.8	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.821
	24.3	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		79.0	--	--		.307	--	--		.724
	33.6	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		79.0	--	--		.307	--	--		.628
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 130.7 Ac																			Cw= .753
100	72.8	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.839
	24.3	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		80.1	--	--		.372	--	--		.751
	33.6	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.1	--	--		.372	--	--		.664
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 130.7 Ac																			Cw= .777
500	72.8	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.846
	24.3	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		80.5	--	--		.401	--	--		.763
	33.6	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.5	--	--		.401	--	--		.680
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 130.7 Ac																			Cw= .788

RAINFALL

Rtn Frq	Map Values P6	P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
4300	18	.020	Highly Urbanized..
1100	4	.020	Highly Urbanized..
800	7	.020	Highly Urbanized..
....	....	....	.....
....	....	....	.....

L= 6200 Lca= 3100 Sc=.00442 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	35	3.0	1.33	.613	0.82	108
5	1.35	27	3.8	2.26	.655	1.48	195
10	1.62	24	4.3	2.92	.687	2.00	264
25	1.97	21	4.9	3.81	.724	2.76	363
50	2.30	20	5.2	4.57	.753	3.44	454
100	2.61	18	5.7	5.49	.777	4.27	562
500	2.77	17	6.1	5.99	.788	4.72	621

APPENDIX B

HYDROGRAPH CALCULATIONS FOR SECOND STREET STORMDRAIN REQUIREMENTS

POINT 01 (POC u)

POINT 02 (POC v')

POINT 03 (POC w')

```
DISCHARGE HYDROGRAPH--        PRECIPITATION--          TRIAL BASIN SIZE--
  Discharge Pt:  1 (1-40)       A:   71.80  (Ac)           Qp= 351    Vt= 12.228
  Starting Time:   0 (min)      Cw: .786                 Reduced Peak:     0
  Stopping Time:  60            Tc:  14 (min)              Approx Vol=        AF
  Time Increment:  5            P1: 2.60  P2: 2.88

DETENTION/BREAKOUT DATA--          DISCHARGE TRAVEL DATA--
    WSE       Vsto     Qo1    Qo2       Qo1   Vel  Qlost      Qo2   Vel    Qlost
  -------   -------     0      0         0   5.0    0         0  10.0     0
  -------   -------    50    140      1000   5.0    0      1000  10.0     0
  -------   -------    50    140      ----   ----  ----     ----  ----    ----
  -------   -------   460    140      ----   ----  ----     ----  ----    ----
  -------   -------  ----   ----      ----   ----  ----     ----  ----    ----
  -------   -------  ----   ----      ----   ----  ----     ----  ----    ----
  -------   -------  ----   ----      ----   ----  ----     ----  ----    ----
  -------   -------  ----   ----      ----   ----  ----     ----  ----    ----
  -------   -------  ----   ----      ----   ----  ----     ----  ----    ----
  -------   -------  ----   ----      ----   ----  ----     ----  ----    ----
  -------   -------  ----   ----      ----   ----  ----     ----  ----    ----
                                   Destination Pt:  2   Destination Pt: 10
                                   Reach Length:  1100  Reach Length:  1000
==========================================================================
    Inflow Peak Discharge/Time          Outflow Peak Discharge/Time
          351     20.02               Discharge 1     211     20.02
                                      Discharge 2     140     15.00
Do you want a detailed printout?  (Y/N)
```

DISCHARGE HYDROGRAPH--
Discharge Pt: 2_ (1-40)
Starting Time: 0 (min)
Stopping Time: 60
Time Increment: 5

PRECIPITATION--
A: 22.60 (Ac)
Cw: .839
Tc: 7 (min)
P1: 2.60 P2: 2.88

TRIAL BASIN SIZE--
Qp= 157 Vt= 4.108
Reduced Peak: 0
Approx Vol= AF

DETENTION/BREAKOUT DATA--

WSE	Vsto	Qo1	Qo2
_____	_____	0	0
_____	_____	1000	0
_____	_____	____	____
_____	_____	____	____
_____	_____	____	____
_____	_____	____	____
_____	_____	____	____
_____	_____	____	____
_____	_____	____	____
_____	_____	____	____
_____	_____	____	____
_____	_____	____	____

DISCHARGE TRAVEL DATA--

Qo1	Vel	Qlost	Qo2	Vel	Qlost
0	5.0	0	0	____	____
1000	5.0	0	____	____	____
____	____	____	____	____	____
____	____	____	____	____	____
____	____	____	____	____	____
____	____	____	____	____	____
____	____	____	____	____	____
____	____	____	____	____	____
____	____	____	____	____	____
____	____	____	____	____	____
____	____	____	____	____	____
____	____	____	____	____	____

Destination Pt: 3 Destination Pt: 0
Reach Length: 1000 Reach Length: _____

==========

Inflow Peak Discharge/Time
298 23.69

Outflow Peak Discharge/Time
Discharge 1 298 23.69
Discharge 2 0 0.00

```
DISCHARGE HYDROGRAPH--        PRECIPITATION--          TRIAL BASIN SIZE--
  Discharge Pt:  3 (1-40)       A:   36.30  (Ac)           Qp= 205   Vt=  5.679
  Starting Time:   0 (min)      Cw: .722                 Reduced Peak:     0
  Stopping Time:  60            Tc:   8 (min)               Approx Vol=        AF
  Time Increment:  5            P1: 2.60  P2: 2.88

DETENTION/BREAKOUT DATA--          DISCHARGE TRAVEL DATA--
    WSE       Vsto     Qo1   Qo2       Qo1   Vel  Qlost      Qo2   Vel   Qlost
  -------   -------      0     0         0   5.0     0        0   ----  ----
  -------   -------   1000     0      1000   5.0     0      ----  ----  ----
  -------   -------   ----  ----      ----  ----  ----      ----  ----  ----
  -------   -------   ----  ----      ----  ----  ----      ----  ----  ----
  -------   -------   ----  ----      ----  ----  ----      ----  ----  ----
  -------   -------   ----  ----      ----  ----  ----      ----  ----  ----
  -------   -------   ----  ----      ----  ----  ----      ----  ----  ----
  -------   -------   ----  ----      ----  ----  ----      ----  ----  ----
  -------   -------   ----  ----      ----  ----  ----      ----  ----  ----
  -------   -------   ----  ----      ----  ----  ----      ----  ----  ----
  -------   -------   ----  ----      ----  ----  ----      ----  ----  ----
  -------   -------   ----  ----    Destination Pt: 13   Destination Pt: 11
  -------   -------   ----  ----    Reach Length:  1000  Reach Length:  1000
==============================================================================
    Inflow Peak Discharge/Time          Outflow Peak Discharge/Time
          397    27.02             Discharge 1    397    27.02
                                   Discharge 2      0    27.02
Do you want a detailed printout?  (Y/N)
```

HYDROGRAPH CALCULATION RESULTS
Johnson, Brittain & Associates

CvcCntrPlz Wells Fargo CB sizi
2690.01 05-19-1985
05-31-1985

INFLOW HYDROGRAPH

T	Prcp	Pt 0 (Qo0)	Pt 0 (Qo0)	Pt 0 (Qo0)	Total Qin
0	0	0	0	0	0
5	43	0	0	0	43
10	121	0	0	0	121
15	229	0	0	0	229
20	350	0	0	0	350
20.02	351	0	0	0	351
25	280	0	0	0	280
30	212	0	0	0	212
35	159	0	0	0	159
40	114	0	0	0	114
45	79	0	0	0	79
50	55	0	0	0	55
55	39	0	0	0	39
60	27	0	0	0	27
20.02					**351**

STORAGE/DISCHARGE

T	Qin	Vsto	WSE	Qo1	Qo2
0	0	0.000	0.00	0	0
5	43	0.000	0.00	11	32
10	121	0.000	0.00	32	89
15	229	0.000	0.00	89	140
20	350	0.000	0.00	210	140
20.02	351	0.000	0.00	211	140
25	280	0.000	0.00	140	140
30	212	0.000	0.00	72	140
35	159	0.000	0.00	42	117
40	114	0.000	0.00	30	84
45	79	0.000	0.00	21	58
50	55	0.000	0.00	14	40
55	39	0.000	0.00	10	28
60	27	0.000	0.00	7	20
0.00				**211**	**140**

DOWNSTREAM FLOW

(To Pt 2) Qlost	Vel	Time to DS Pt	Qo1	(To Pt 10) Qlost	Vel	Time to DS Pt	Qo2
0	5.00	3.67	0	0	10.00	1.67	0
0	5.00	8.67	11	0	10.00	6.67	32
0	5.00	13.67	32	0	10.00	11.67	89
0	5.00	18.67	89	0	10.00	16.67	140
0	5.00	23.67	210	0	10.00	21.67	140
0	5.00	23.69	211	0	10.00	21.69	140
0	5.00	28.67	140	0	10.00	26.67	140
0	5.00	33.67	72	0	10.00	31.67	140
0	5.00	38.67	42	0	10.00	36.67	117
0	5.00	43.67	30	0	10.00	41.67	84
0	5.00	48.67	21	0	10.00	46.67	58
0	5.00	53.67	14	0	10.00	51.67	40
0	5.00	58.67	10	0	10.00	56.67	28
0	5.00	63.67	7	0	10.00	61.67	20
		23.69	**211**			**16.67**	**140**

HYDROGRAPH CALCULATION RESULTS
Johnson, Brittain & Associates

CvcCntrPlz Wells Fargo CB sizi
2690.01 05-19-1985
05-31-1985

INFLOW HYDROGRAPH

T	Prcp	Pt 1 (Qo1)	Pt 0 (Qo0)	Pt 0 (Qo0)	Total Qin
0	0	0	0	0	0
3.67	18	0	0	0	18
5	29	2	0	0	31
10	83	15	0	0	98
15	156	43	0	0	199
15.06	157	43	0	0	200
20	115	119	0	0	234
23.69	88	211	0	0	298
25	79	192	0	0	271
30	51	121	0	0	172
35	31	61	0	0	92
40	20	37	0	0	57
45	12	27	0	0	40
50	8	19	0	0	27
55	6	13	0	0	19
60	4	9	0	0	13
23.69					298

STORAGE/DISCHARGE

T	Qin	Vsto	WSE	Qo1	Qo2
0	0	0.000	0.00	0	0
3.67	18	0.000	0.00	18	0
5	31	0.000	0.00	31	0
10	98	0.000	0.00	98	0
15	199	0.000	0.00	199	0
15.06	200	0.000	0.00	200	0
20	234	0.000	0.00	234	0
23.69	298	0.000	0.00	298	0
25	271	0.000	0.00	271	0
30	172	0.000	0.00	172	0
35	92	0.000	0.00	92	0
40	57	0.000	0.00	57	0
45	40	0.000	0.00	40	0
50	27	0.000	0.00	27	0
55	19	0.000	0.00	19	0
60	13	0.000	0.00	13	0
0.00				298	0

DOWNSTREAM FLOW

(To Pt 3) Qlost	Vel	Time to DS Pt	Qo1	(To Pt 0) Qlost	Vel	Time to DS Pt	Qo2
0	5.00	3.33	0	0	0.00	0.00	0
0	5.00	7.00	18	0	0.00	0.00	0
0	5.00	8.33	31	0	0.00	0.00	0
0	5.00	13.33	98	0	0.00	0.00	0
0	5.00	18.33	199	0	0.00	0.00	0
0	5.00	18.40	200	0	0.00	0.00	0
0	5.00	23.33	234	0	0.00	0.00	0
0	5.00	27.02	298	0	0.00	0.00	0
0	5.00	28.33	271	0	0.00	0.00	0
0	5.00	33.33	172	0	0.00	0.00	0
0	5.00	38.33	92	0	0.00	0.00	0
0	5.00	43.33	57	0	0.00	0.00	0
0	5.00	48.33	40	0	0.00	0.00	0
0	5.00	53.33	27	0	0.00	0.00	0
0	5.00	58.33	19	0	0.00	0.00	0
0	5.00	63.33	13	0	0.00	0.00	0
		27.02	298			0.00	0

HYDROGRAPH CALCULATION RESULTS
Johnson, Brittain & Associates

CvcCntrPlz Wells Fargo CB sizi
2690.01 05-19-1985
05-31-1985

INFLOW HYDROGRAPH

T	Prcp	Pt 2 (Qo1)	Pt 0 (Qo0)	Pt 0 (Qo0)	Total Qin
0	0	0	0	0	0
3.33	19	0	0	0	19
5	35	8	0	0	44
7	58	18	0	0	77
10	100	50	0	0	150
15	194	129	0	0	323
15.87	205	148	0	0	353
18.40	179	200	0	0	379
20	162	204	0	0	366
25	115	259	0	0	374
27.02	99	298	0	0	397
30	77	237	0	0	314
35	49	142	0	0	191
40	31	77	0	0	108
45	20	50	0	0	70
50	13	35	0	0	48
55	9	24	0	0	33
60	6	17	0	0	23
27.02					397

STORAGE/DISCHARGE

T	Qin	Vsto	WSE	Qo1	Qo2
0	0	0.000	0.00	0	0
3.33	19	0.000	0.00	19	0
5	44	0.000	0.00	44	0
7	77	0.000	0.00	77	0
10	150	0.000	0.00	150	0
15	323	0.000	0.00	323	0
15.87	353	0.000	0.00	353	0
18.40	379	0.000	0.00	379	0
20	366	0.000	0.00	366	0
25	374	0.000	0.00	374	0
27.02	397	0.000	0.00	397	0
30	314	0.000	0.00	314	0
35	191	0.000	0.00	191	0
40	108	0.000	0.00	108	0
45	70	0.000	0.00	70	0
50	48	0.000	0.00	48	0
55	33	0.000	0.00	33	0
60	23	0.000	0.00	23	0
0.00				397	0

DOWNSTREAM FLOW

(To Pt 13) Qlost	Vel	Time to DS Pt	Qo1	(To Pt 11) Qlost	Vel	Time to DS Pt	Qo2
0	5.00	3.33	0	0	0.00	0.00	0
0	5.00	6.67	19	0	0.00	0.00	0
0	5.00	8.33	44	0	0.00	0.00	0
0	5.00	10.33	77	0	0.00	0.00	0
0	5.00	13.33	150	0	0.00	0.00	0
0	5.00	18.33	323	0	0.00	0.00	0
0	5.00	19.20	353	0	0.00	0.00	0
0	5.00	21.73	379	0	0.00	0.00	0
0	5.00	23.33	366	0	0.00	0.00	0
0	5.00	28.33	374	0	0.00	0.00	0
0	5.00	30.36	397	0	0.00	0.00	0
0	5.00	33.33	314	0	0.00	0.00	0
0	5.00	38.33	191	0	0.00	0.00	0
0	5.00	43.33	108	0	0.00	0.00	0
0	5.00	48.33	70	0	0.00	0.00	0
0	5.00	53.33	48	0	0.00	0.00	0
0	5.00	58.33	33	0	0.00	0.00	0
0	5.00	63.33	23	0	0.00	0.00	0
		30.36	397			0.00	0

APPENDIX C

HYDROLOGIC CALCULATIONS FOR DETERMINATION OF EXISTING SCOTTSDALE ROAD STORMDRAIN

(POCs a, b, c, d)

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.705
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		65.8	--	--		.002	--	--		.442
A=	78.6 Ac																		Cw=	.641
5	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.744
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		72.7	--	--		.060	--	--		.488
A=	78.6 Ac																		Cw=	.682
10	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.770
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		75.2	--	--		.135	--	--		.532
A=	78.6 Ac																		Cw=	.712
25	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.799
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		77.5	--	--		.229	--	--		.585
A=	78.6 Ac																		Cw=	.747
50	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.821
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		79.0	--	--		.307	--	--		.628
A=	78.6 Ac																		Cw=	.774
100	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.839
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.1	--	--		.372	--	--		.664
A=	78.6 Ac																		Cw=	.796
500	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.846
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.5	--	--		.401	--	--		.680
A=	78.6 Ac																		Cw=	.806

RAINFALL

Rtn Frq	Map Values P6	P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
3000	9	.020	Highly Urbanized..

L= 3000 Lca= 1500 Sc=.00300 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	23	2.2	1.72	.641	1.10	87
5	1.35	19	2.6	2.75	.682	1.87	149
10	1.62	17	2.9	3.50	.712	2.49	198
25	1.97	15	3.3	4.50	.747	3.36	266
50	2.30	14	3.6	5.45	.774	4.21	334
100	2.61	13	3.8	6.38	.796	5.08	402
500	2.77	12	4.2	6.98	.806	5.63	446

PCFCD HYDROLOGY METHOD
Johnson, Brittain & Associates, Inc
05-30-1985

CvcCntrPlz Sctsdl Rd
JBA No 2690
Opened

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient* (C) B	C	D	I	Avrg
2	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.705
	55.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		65.8	--	--		.002	--	--		.442
	A= 158.6 Ac																		Cw=	.614
5	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.744
	55.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		72.7	--	--		.060	--	--		.488
	A= 158.6 Ac																		Cw=	.655
10	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.770
	55.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		75.2	--	--		.135	--	--		.532
	A= 158.6 Ac																		Cw=	.687
25	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.799
	55.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		77.5	--	--		.229	--	--		.585
	A= 158.6 Ac																		Cw=	.725
50	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.821
	55.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		79.0	--	--		.307	--	--		.628
	A= 158.6 Ac																		Cw=	.754
100	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.839
	55.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.1	--	--		.372	--	--		.664
	A= 158.6 Ac																		Cw=	.778
500	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.846
	55.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.5	--	--		.401	--	--		.680
	A= 158.6 Ac																		Cw=	.788

RAINFALL

Rtn Frq	Map Values P6	Map Values P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
4300	18	.020	Highly Urbanized..

L= 4300 Lca= 2200 Sc=.00419 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	27	2.7	1.57	.614	0.96	154
5	1.35	21	3.4	2.60	.655	1.70	272
10	1.62	19	3.8	3.31	.687	2.27	363
25	1.97	17	4.2	4.26	.725	3.09	494
50	2.30	15	4.8	5.24	.754	3.95	631
100	2.61	14	5.1	6.19	.778	4.82	770
500	2.77	14	5.1	6.57	.788	5.18	828

A+B+C.(Acm.S)

PCFCD HYDROLOGY METHOD
Johnson, Brittain & Associates, Inc
05-30-1985

CvcCntrPlz Sctsdl Rd
JBA No 2690
Opened

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.705
	44.9	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		65.8	--	--		.002	--	--		.573
	90.6	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		65.8	--	--		.002	--	--		.442
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	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 239.0 Ac																			Cw= .580
5	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.744
	44.9	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		72.7	--	--		.060	--	--		.616
	90.6	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		72.7	--	--		.060	--	--		.488
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	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 239.0 Ac																			Cw= .623
10	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.770
	44.9	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		75.2	--	--		.135	--	--		.651
	90.6	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		75.2	--	--		.135	--	--		.532
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	A= 239.0 Ac																			Cw= .657
25	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.799
	44.9	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		77.5	--	--		.229	--	--		.692
	90.6	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		77.5	--	--		.229	--	--		.585
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 239.0 Ac																			Cw= .698
50	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.821
	44.9	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		79.0	--	--		.307	--	--		.724
	90.6	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		79.0	--	--		.307	--	--		.628
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 239.0 Ac																			Cw= .730
100	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.839
	44.9	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		80.1	--	--		.372	--	--		.751
	90.6	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.1	--	--		.372	--	--		.664
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	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 239.0 Ac																			Cw= .756
500	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.846
	44.9	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		80.5	--	--		.401	--	--		.763
	90.6	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.5	--	--		.401	--	--		.680
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 239.0 Ac																			Cw= .767

RAINFALL

Rtn Frq	Map Values P6	Map Values P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
5600	23	.020	Highly Urbanized..
....	....	....	.....
....	....	....	.....
....	....	....	.....
....	....	....	.....

L= 5600 Lca= 2800 Sc=.00411 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	34	2.7	1.36	.580	0.79	190
5	1.35	27	3.5	2.26	.623	1.41	340
10	1.62	24	3.9	2.92	.657	1.92	462
25	1.97	21	4.4	3.81	.698	2.66	640
50	2.30	19	4.9	4.69	.730	3.42	824
100	2.61	18	5.2	5.49	.756	4.15	999
500	2.77	17	5.5	5.99	.767	4.59	1107

POC= d

A+B+C+D

PCFCD HYDROLOGY METHOD
Johnson, Brittain & Associates, Inc
05-30-1985

CvcCntrPlz Sctsdl Rd
JBA No 2690
Opened

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.705
	88.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		65.8	--	--		.002	--	--		.573
	117.0	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		65.8	--	--		.002	--	--		.442
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 308.7 Ac																		Cw=	.568
5	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.744
	88.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		72.7	--	--		.060	--	--		.616
	117.0	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		72.7	--	--		.060	--	--		.488
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 308.7 Ac																		Cw=	.610
10	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.770
	88.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		75.2	--	--		.135	--	--		.651
	117.0	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		75.2	--	--		.135	--	--		.532
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 308.7 Ac																		Cw=	.646
25	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.799
	88.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		77.5	--	--		.229	--	--		.692
	117.0	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		77.5	--	--		.229	--	--		.585
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 308.7 Ac																		Cw=	.687
50	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.821
	88.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		79.0	--	--		.307	--	--		.724
	117.0	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		79.0	--	--		.307	--	--		.628
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 308.7 Ac																		Cw=	.720
100	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.839
	88.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		80.1	--	--		.372	--	--		.751
	117.0	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.1	--	--		.372	--	--		.664
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 308.7 Ac																		Cw=	.747
500	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.846
	88.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		80.5	--	--		.401	--	--		.763
	117.0	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.5	--	--		.401	--	--		.680
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 308.7 Ac																		Cw=	.759

RAINFALL

Rtn Frq	Map Values P6	P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
6900	28	.020	Highly Urbanized..
....	....	....	.....
....	....	....	.....
....	....	....	.....
....	....	....	.....

L= 6900 Lca= 3500 Sc=.00406 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	42	2.7	1.18	.568	0.67	209
5	1.35	33	3.5	1.99	.610	1.22	379
10	1.62	29	4.0	2.61	.646	1.69	525
25	1.97	25	4.6	3.45	.687	2.37	739
50	2.30	23	5.0	4.23	.720	3.04	947
100	2.61	21	5.5	5.04	.747	3.77	1173
500	2.77	20	5.8	5.51	.759	4.19	1303

APPENDIX D

HYDROLOGIC CALCULATIONS FOR SCOTTSDALE ROAD

STORMDRAIN WITH DRAINAGE AREA TRUNCATED AT INDIAN SCHOOL ROAD

(POCs b', c', d')

PCFCD HYDROLOGY METHOD
Johnson, Brittain & Associates, Inc
05-30-1985

CvcCntrPlz Sctsdl Rd
JBA No 2690
Opened

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	44.0	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.705
	36.0	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		65.8	--	--		.002	--	--		.442
	A= 80.0 Ac																		Cw=	.587
5	44.0	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.744
	36.0	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		72.7	--	--		.060	--	--		.488
	A= 80.0 Ac																		Cw=	.629
10	44.0	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.770
	36.0	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		75.2	--	--		.135	--	--		.532
	A= 80.0 Ac																		Cw=	.663
25	44.0	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.799
	36.0	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		77.5	--	--		.229	--	--		.585
	A= 80.0 Ac																		Cw=	.703
50	44.0	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.821
	36.0	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		79.0	--	--		.307	--	--		.628
	A= 80.0 Ac																		Cw=	.734
100	44.0	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.839
	36.0	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.1	--	--		.372	--	--		.664
	A= 80.0 Ac																		Cw=	.760
500	44.0	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.846
	36.0	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.5	--	--		.401	--	--		.680
	A= 80.0 Ac																		Cw=	.771

RAINFALL

Rtn Frq	Map Values P6	P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
3200	16	.020	Highly Urbanized..

L= 3200 Lca= 1600 Sc=.00500 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	20	2.7	1.86	.587	1.09	88
5	1.35	16	3.3	2.99	.629	1.88	152
10	1.62	14	3.8	3.84	.663	2.55	205
25	1.97	12	4.4	4.97	.703	3.50	282
50	2.30	11	4.8	6.00	.734	4.40	355
100	2.61	11	4.8	6.82	.760	5.18	418
500	2.77	10	5.3	7.48	.771	5.77	465

PCFCD HYDROLOGY METHOD
Johnson, Brittain & Associates, Inc
05-30-1985

CvcCntrPlz Sctsdl Rd
JBA No 2690
Opened

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	44.0	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.705
	44.9	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		65.8	--	--		.002	--	--		.573
	71.5	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		65.8	--	--		.002	--	--		.442
	A= 160.4 Ac																			Cw= .551
5	44.0	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.744
	44.9	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		72.7	--	--		.060	--	--		.616
	71.5	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		72.7	--	--		.060	--	--		.488
	A= 160.4 Ac																			Cw= .594
10	44.0	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.770
	44.9	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		75.2	--	--		.135	--	--		.651
	71.5	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		75.2	--	--		.135	--	--		.532
	A= 160.4 Ac																			Cw= .630
25	44.0	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.799
	44.9	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		77.5	--	--		.229	--	--		.692
	71.5	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		77.5	--	--		.229	--	--		.585
	A= 160.4 Ac																			Cw= .674
50	44.0	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.821
	44.9	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		79.0	--	--		.307	--	--		.724
	71.5	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		79.0	--	--		.307	--	--		.628
	A= 160.4 Ac																			Cw= .708
100	44.0	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.839
	44.9	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		80.1	--	--		.372	--	--		.751
	71.5	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.1	--	--		.372	--	--		.664
	A= 160.4 Ac																			Cw= .736
500	44.0	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.846
	44.9	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		80.5	--	--		.401	--	--		.763
	71.5	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.5	--	--		.401	--	--		.680
	A= 160.4 Ac																			Cw= .749

RAINFALL

Rtn Frq	Map Values P6	P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
4500	23	.020	Highly Urbanized..

L= 4500 Lca= 2300 Sc=.00511 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	27	2.8	1.57	.551	0.86	140
5	1.35	21	3.6	2.60	.594	1.54	250
10	1.62	19	3.9	3.31	.630	2.09	337
25	1.97	16	4.7	4.38	.674	2.95	477
50	2.30	15	5.0	5.24	.708	3.71	600
100	2.61	14	5.4	6.19	.736	4.56	737
500	2.77	13	5.8	6.76	.749	5.06	818

POC: d'

B+C+D

PCFCD HYDROLOGY METHOD
Johnson, Brittain & Associates, Inc
05-30-1985

CvcCntrPlz Sctsdl Rd
JBA No 2690
Opened

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	Curve No (CN) C	Curve No (CN) D	P1	Adjusted Curve No (CN*) B	Adjusted Curve No (CN*) C	Adjusted Curve No (CN*) D	I	Runoff Coefficient (C) B	Runoff Coefficient (C) C	Runoff Coefficient (C) D	Runoff Coefficient (C) I	Runoff Coefficient (C) Avrg
2	44.0	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.705
	88.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		65.8	--	--		.002	--	--		.573
	97.9	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		65.8	--	--		.002	--	--		.442
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 230.1 Ac																			Cw= .542
5	44.0	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.744
	88.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		72.7	--	--		.060	--	--		.616
	97.9	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		72.7	--	--		.060	--	--		.488
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 230.1 Ac																			Cw= .586
10	44.0	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.770
	88.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		75.2	--	--		.135	--	--		.651
	97.9	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		75.2	--	--		.135	--	--		.532
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 230.1 Ac																			Cw= .623
25	44.0	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.799
	88.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		77.5	--	--		.229	--	--		.692
	97.9	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		77.5	--	--		.229	--	--		.585
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 230.1 Ac																			Cw= .667
50	44.0	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.821
	88.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		79.0	--	--		.307	--	--		.724
	97.9	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		79.0	--	--		.307	--	--		.628
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 230.1 Ac																			Cw= .702
100	44.0	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.839
	88.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		80.1	--	--		.372	--	--		.751
	97.9	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.1	--	--		.372	--	--		.664
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 230.1 Ac																			Cw= .731
500	44.0	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.846
	88.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		80.5	--	--		.401	--	--		.763
	97.9	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.5	--	--		.401	--	--		.680
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 230.1 Ac																			Cw= .743

RAINFALL

Rtn Frq	Map Values P6	Map Values P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
5800	28	.020	Highly Urbanized..
....	....	....	.....
....	....	....	.....
....	....	....	.....
....	....	....	.....

L= 5800 Lca= 2900 Sc=.00483 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	33	2.9	1.38	.542	0.75	174
5	1.35	26	3.7	2.30	.586	1.35	313
10	1.62	23	4.2	2.98	.623	1.86	431
25	1.97	20	4.8	3.93	.667	2.62	608
50	2.30	19	5.1	4.69	.702	3.29	763
100	2.61	17	5.7	5.64	.731	4.12	957
500	2.77	16	6.0	6.15	.743	4.57	1061

APPENDIX E

HYDROLOGIC CALCULATIONS FOR SCOTTSDALE ROAD

STORMDRAIN WITH DRAINAGE AREA TRUNCATED AT SECOND STREET

(POCs c", d")

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	44.9	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.573
	35.5	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		65.8	--	--		.002	--	--		.442
	A= 80.4 Ac																			Cw= .515
5	44.9	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.616
	35.5	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		72.7	--	--		.060	--	--		.488
	A= 80.4 Ac																			Cw= .559
10	44.9	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.651
	35.5	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		75.2	--	--		.135	--	--		.532
	A= 80.4 Ac																			Cw= .598
25	44.9	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.692
	35.5	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		77.5	--	--		.229	--	--		.585
	A= 80.4 Ac																			Cw= .645
50	44.9	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.724
	35.5	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		79.0	--	--		.307	--	--		.620
	A= 80.4 Ac																			Cw= .682
100	44.9	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.751
	35.5	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.1	--	--		.372	--	--		.664
	A= 80.4 Ac																			Cw= .712
500	44.9	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.763
	35.5	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.5	--	--		.401	--	--		.680
	A= 80.4 Ac																			Cw= .726

RAINFALL

Rtn Frq	Map Values P6	P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
3200	13	.020	Highly Urbanized..

L= 3200 Lca= 1600 Sc=.00406 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	23	2.3	1.72	.515	0.88	72
5	1.35	19	2.8	2.75	.559	1.54	125
10	1.62	16	3.3	3.60	.598	2.15	175
25	1.97	14	3.8	4.68	.645	3.02	245
50	2.30	13	4.1	5.61	.682	3.82	310
100	2.61	12	4.4	6.59	.712	4.69	380
500	2.77	12	4.4	6.98	.726	5.07	411

PCFCD HYDROLOGY METHOD
Johnson, Brittain & Associates, Inc
05-30-1985

CvcCntrPlz Sctsdl Rd
JBA No 2690
Opened

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	88.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.573
	61.9	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		65.8	--	--		.002	--	--		.442
	A= 150.1 Ac																			Cw= .519
5	88.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.616
	61.9	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		72.7	--	--		.060	--	--		.488
	A= 150.1 Ac																			Cw= .563
10	88.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.651
	61.9	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		75.2	--	--		.135	--	--		.532
	A= 150.1 Ac																			Cw= .602
25	88.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.692
	61.9	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		77.5	--	--		.229	--	--		.585
	A= 150.1 Ac																			Cw= .648
50	88.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.724
	61.9	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		79.0	--	--		.307	--	--		.628
	A= 150.1 Ac																			Cw= .685
100	88.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.751
	61.9	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.1	--	--		.372	--	--		.664
	A= 150.1 Ac																			Cw= .715
500	88.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.763
	61.9	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.5	--	--		.401	--	--		.680
	A= 150.1 Ac																			Cw= .729

RAINFALL

Rtn Frq	Map Values P6	P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
4500	18	.020	Highly Urbanized..

L= 4500 Lca= 2300 Sc=.00400 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	31	2.4	1.44	.519	0.75	113
5	1.35	25	3.0	2.36	.563	1.33	201
10	1.62	22	3.4	3.06	.602	1.84	279
25	1.97	19	3.9	4.03	.648	2.61	395
50	2.30	17	4.4	4.96	.685	3.40	514
100	2.61	16	4.7	5.80	.715	4.15	628
500	2.77	15	5.0	6.32	.729	4.60	696

APPENDIX F

HYDROLOGIC CALCULATIONS FOR INDIAN SCHOOL ROAD STORMDRAIN

SCHEME 1

(POCs a1, a2, f, g, l)

PCFCD HYDROLOGY METHOD
Johnson, Brittain & Associates, Inc
05-30-1985

CvcCntrPlz Sctsdl Rd
JBA No 2690
Opened

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	17.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.705
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		65.8	--	--		.002	--	--		.442
	A= 36.7 Ac																		Cw=	.568
5	17.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.744
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		72.7	--	--		.060	--	--		.488
	A= 36.7 Ac																		Cw=	.611
10	17.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.770
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		75.2	--	--		.135	--	--		.532
	A= 36.7 Ac																		Cw=	.646
25	17.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.799
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		77.5	--	--		.229	--	--		.585
	A= 36.7 Ac																		Cw=	.688
50	17.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.821
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		79.0	--	--		.307	--	--		.628
	A= 36.7 Ac																		Cw=	.720
100	17.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.839
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.1	--	--		.372	--	--		.664
	A= 36.7 Ac																		Cw=	.748
500	17.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.846
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.5	--	--		.401	--	--		.680
	A= 36.7 Ac																		Cw=	.760

RAINFALL

Rtn Frq	Map Values P6	P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
2300	7	.020	Highly Urbanized..

L= 2300 Lca= 1200 Sc=.00304 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	20	1.9	1.86	.568	1.05	39
5	1.35	16	2.4	2.99	.611	1.83	68
10	1.62	14	2.7	3.84	.646	2.48	92
25	1.97	13	2.9	4.82	.688	3.31	123
50	2.30	12	3.2	5.79	.720	4.17	154
100	2.61	11	3.5	6.82	.748	5.10	189
500	2.77	10	3.8	7.48	.760	5.68	210

POC: a2

A=A1+A2

PCFCD HYDROLOGY METHOD
Johnson, Brittain & Associates, Inc
05-30-1985

CvcCntrPlz Sctsdl Rd
JBA No 2690
Opened

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.705
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		65.8	--	--		.002	--	--		.442
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
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A= 78.6 Ac																			Cw=	.641
5	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.744
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		72.7	--	--		.060	--	--		.488
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	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
A= 78.6 Ac																			Cw=	.682
10	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.770
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		75.2	--	--		.135	--	--		.532
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A= 78.6 Ac																			Cw=	.712
25	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.799
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		77.5	--	--		.229	--	--		.585
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	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
A= 78.6 Ac																			Cw=	.747
50	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.821
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		79.0	--	--		.307	--	--		.628
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A= 78.6 Ac																			Cw=	.774
100	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.839
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.1	--	--		.372	--	--		.664
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A= 78.6 Ac																			Cw=	.796
500	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.846
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.5	--	--		.401	--	--		.680
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A= 78.6 Ac																			Cw=	.806

RAINFALL

Rtn Frq	Map Values P6	Map Values P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
3000	9	.020	Highly Urbanized..
....	....	....	.....
....	....	....	.....
....	....	....	.....
....	....	....	.....

L= 3000 Lca= 1500 Sc=.00300 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	23	2.2	1.72	.641	1.10	87
5	1.35	19	2.6	2.75	.682	1.87	149
10	1.62	17	2.9	3.50	.712	2.49	198
25	1.97	15	3.3	4.50	.747	3.36	266
50	2.30	14	3.6	5.45	.774	4.21	334
100	2.61	13	3.8	6.38	.796	5.08	402
500	2.77	12	4.2	6.98	.806	5.63	446

PCFCD HYDROLOGY METHOD
Johnson, Brittain & Associates, Inc
05-30-1985

CvcCntrPlz Sctsdl Rd
JBA No 2690
Opened

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.705
	70.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		65.8	--	--		.002	--	--		.573
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		65.8	--	--		.002	--	--		.442
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
A= 148.7 Ac																			Cw=	.609
5	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.744
	70.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		72.7	--	--		.060	--	--		.616
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		72.7	--	--		.060	--	--		.488
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	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
A= 148.7 Ac																			Cw=	.651
10	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.770
	70.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		75.2	--	--		.135	--	--		.651
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		75.2	--	--		.135	--	--		.532
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	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
A= 148.7 Ac																			Cw=	.683
25	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.799
	70.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		77.5	--	--		.229	--	--		.692
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		77.5	--	--		.229	--	--		.585
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A= 148.7 Ac																			Cw=	.721
50	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.821
	70.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		79.0	--	--		.307	--	--		.724
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		79.0	--	--		.307	--	--		.628
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A= 148.7 Ac																			Cw=	.750
100	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.839
	70.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		80.1	--	--		.372	--	--		.751
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.1	--	--		.372	--	--		.664
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A= 148.7 Ac																			Cw=	.775
500	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.846
	70.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		80.5	--	--		.401	--	--		.763
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.5	--	--		.401	--	--		.680
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A= 148.7 Ac																			Cw=	.786

RAINFALL

Rtn Frq	Map Values P6	Map Values P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
4300	18	.020	Highly Urbanized..
....	....	....	.....
....	....	....	.....
....	....	....	.....
....	....	....	.....

L= 4300 Lca= 2200 Sc=.00419 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	27	2.7	1.57	.609	0.95	143
5	1.35	22	3.3	2.55	.651	1.66	248
10	1.62	19	3.8	3.31	.683	2.26	339
25	1.97	17	4.2	4.26	.721	3.07	461
50	2.30	15	4.8	5.24	.750	3.93	589
100	2.61	14	5.1	6.19	.775	4.80	719
500	2.77	14	5.1	6.57	.786	5.16	773

PCFCD HYDROLOGY METHOD
Johnson, Brittain & Associates, Inc
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CvcCntrPlz Sctsdl Rd
JBA No 2690
Opened

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.705
	112.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		65.8	--	--		.002	--	--		.573
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		65.8	--	--		.002	--	--		.442
	A= 190.7 Ac																			Cw= .601
5	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.744
	112.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		72.7	--	--		.060	--	--		.616
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		72.7	--	--		.060	--	--		.488
	A= 190.7 Ac																			Cw= .643
10	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.770
	112.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		75.2	--	--		.135	--	--		.651
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		75.2	--	--		.135	--	--		.532
	A= 190.7 Ac																			Cw= .676
25	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.799
	112.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		77.5	--	--		.229	--	--		.692
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		77.5	--	--		.229	--	--		.585
	A= 190.7 Ac																			Cw= .715
50	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.821
	112.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		79.0	--	--		.307	--	--		.724
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		79.0	--	--		.307	--	--		.628
	A= 190.7 Ac																			Cw= .745
100	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.839
	112.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		80.1	--	--		.372	--	--		.751
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.1	--	--		.372	--	--		.664
	A= 190.7 Ac																			Cw= .770
500	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.846
	112.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		80.5	--	--		.401	--	--		.763
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.5	--	--		.401	--	--		.680
	A= 190.7 Ac																			Cw= .781

RAINFALL

Rtn Frq	Map Values P6	P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
4900	23	.020	Highly Urbanized..
L= 4900	Lca= 2500	Sc=.00469	nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	28	2.9	1.53	.601	0.92	177
5	1.35	23	3.6	2.48	.643	1.59	307
10	1.62	20	4.1	3.23	.676	2.18	419
25	1.97	18	4.5	4.15	.715	2.96	569
50	2.30	16	5.1	5.10	.745	3.80	730
100	2.61	15	5.4	5.96	.770	4.59	881
500	2.77	14	5.8	6.57	.781	5.13	985

A+F+G+L

PCFCD HYDROLOGY METHOD
Johnson, Brittain & Associates, Inc
05-30-1985

CvcCntrPlz Sctsdl Rd
JBA No 2690
Opened

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.705
	162.4	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		65.8	--	--		.002	--	--		.573
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		65.8	--	--		.002	--	--		.442
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 241.0 Ac																			Cw= .595
5	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.744
	162.4	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		72.7	--	--		.060	--	--		.616
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		72.7	--	--		.060	--	--		.488
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 241.0 Ac																			Cw= .638
10	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.770
	162.4	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		75.2	--	--		.135	--	--		.651
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		75.2	--	--		.135	--	--		.532
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	A= 241.0 Ac																			Cw= .671
25	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.799
	162.4	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		77.5	--	--		.229	--	--		.692
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		77.5	--	--		.229	--	--		.585
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	A= 241.0 Ac																			Cw= .710
50	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.821
	162.4	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		79.0	--	--		.307	--	--		.724
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		79.0	--	--		.307	--	--		.628
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 241.0 Ac																			Cw= .740
100	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.839
	162.4	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		80.1	--	--		.372	--	--		.751
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.1	--	--		.372	--	--		.664
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	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 241.0 Ac																			Cw= .766
500	59.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.846
	162.4	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		80.5	--	--		.401	--	--		.763
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.5	--	--		.401	--	--		.680
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 241.0 Ac																			Cw= .777

RAINFALL

Rtn Frq	Map Values P6	Map Values P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
5500	26	.020	Highly Urbanized..
....	....	....	.....
....	....	....	.....
....	....	....	.....
....	....	....	.....

L= 5500 Lca= 2800 Sc=.00473 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	31	3.0	1.44	.595	0.86	208
5	1.35	25	3.7	2.36	.638	1.50	365
10	1.62	22	4.2	3.06	.671	2.06	499
25	1.97	19	4.8	4.03	.710	2.86	695
50	2.30	18	5.1	4.83	.740	3.57	868
100	2.61	16	5.7	5.80	.766	4.44	1079
500	2.77	16	5.7	6.15	.777	4.78	1161

APPENDIX G

HYDROLOGIC CALCULATIONS FOR SECOND STREET STORMDRAIN

SCHEME 1

(POCs bl, hl, ml)

PCFCD HYDROLOGY METHOD
Johnson, Brittain & Associates, Inc
05-30-1985

CvcCntrPlz Sctsdl Rd
JBA No 2690
Opened

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	44.0	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.705
	36.0	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		65.8	--	--		.002	--	--		.442
	A= 80.0 Ac																			Cw= .587
5	44.0	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.744
	36.0	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		72.7	--	--		.060	--	--		.488
	A= 80.0 Ac																			Cw= .629
10	44.0	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.770
	36.0	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		75.2	--	--		.135	--	--		.532
	A= 80.0 Ac																			Cw= .663
25	44.0	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.799
	36.0	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		77.5	--	--		.229	--	--		.585
	A= 80.0 Ac																			Cw= .703
50	44.0	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.821
	36.0	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		79.0	--	--		.307	--	--		.628
	A= 80.0 Ac																			Cw= .734
100	44.0	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.839
	36.0	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.1	--	--		.372	--	--		.664
	A= 80.0 Ac																			Cw= .760
500	44.0	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.846
	36.0	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.5	--	--		.401	--	--		.680
	A= 80.0 Ac																			Cw= .771

RAINFALL

Rtn Frq	Map Values P6	P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
3200	16	.020	Highly Urbanized..

L= 3200 Lca= 1600 Sc=.00500 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	20	2.7	1.86	.587	1.09	88
5	1.35	16	3.3	2.99	.629	1.88	152
10	1.62	14	3.8	3.84	.663	2.55	205
25	1.97	12	4.4	4.97	.703	3.50	282
50	2.30	11	4.8	6.00	.734	4.40	355
100	2.61	11	4.8	6.82	.760	5.18	418
500	2.77	10	5.3	7.48	.771	5.77	465

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	62.2	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.705
	18.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		65.8	--	--		.002	--	--		.573
	57.2	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		65.8	--	--		.002	--	--		.442
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 137.6 Ac																			Cw= .578
5	62.2	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.744
	18.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		72.7	--	--		.060	--	--		.616
	57.2	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		72.7	--	--		.060	--	--		.488
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 137.6 Ac																			Cw= .621
10	62.2	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.770
	18.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		75.2	--	--		.135	--	--		.651
	57.2	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		75.2	--	--		.135	--	--		.532
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 137.6 Ac																			Cw= .655
25	62.2	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.799
	18.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		77.5	--	--		.229	--	--		.652
	57.2	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		77.5	--	--		.229	--	--		.585
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 137.6 Ac																			Cw= .696
50	62.2	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.821
	18.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		79.0	--	--		.307	--	--		.724
	57.2	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		79.0	--	--		.307	--	--		.628
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 137.6 Ac																			Cw= .728
100	62.2	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.839
	18.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		80.1	--	--		.372	--	--		.751
	57.2	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.1	--	--		.372	--	--		.664
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 137.6 Ac																			Cw= .754
500	62.2	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.846
	18.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		80.5	--	--		.401	--	--		.763
	57.2	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.5	--	--		.401	--	--		.680
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 137.6 Ac																			Cw= .766

RAINFALL

Rtn Frq	Map Values P6	P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
4100	25	.020	Highly Urbanized..
....	....	....	.....
....	....	....	.....
....	....	....	.....
....	....	....	.....

L= 4100 Lca= 2100 Sc=.00610 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	22	3.1	1.76	.578	1.02	141
5	1.35	18	3.8	2.83	.621	1.76	244
10	1.62	16	4.3	3.60	.655	2.36	327
25	1.97	14	4.9	4.68	.696	3.26	452
50	2.30	13	5.3	5.61	.728	4.08	566
100	2.61	12	5.7	6.59	.754	4.97	689
500	2.77	11	6.2	7.23	.766	5.54	768

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	62.2	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.705
	41.4	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		65.8	--	--		.002	--	--		.573
	57.2	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		65.8	--	--		.002	--	--		.442
	A= 160.8 Ac																			Cw= .577
5	62.2	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.744
	41.4	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		72.7	--	--		.060	--	--		.616
	57.2	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		72.7	--	--		.060	--	--		.488
	A= 160.8 Ac																			Cw= .620
10	62.2	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.770
	41.4	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		75.2	--	--		.135	--	--		.651
	57.2	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		75.2	--	--		.135	--	--		.532
	A= 160.8 Ac																			Cw= .655
25	62.2	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.799
	41.4	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		77.5	--	--		.229	--	--		.692
	57.2	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		77.5	--	--		.229	--	--		.585
	A= 160.8 Ac																			Cw= .695
50	62.2	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.821
	41.4	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		79.0	--	--		.307	--	--		.724
	57.2	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		79.0	--	--		.307	--	--		.628
	A= 160.8 Ac																			Cw= .727
100	62.2	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.839
	41.4	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		80.1	--	--		.372	--	--		.751
	57.2	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.1	--	--		.372	--	--		.664
	A= 160.8 Ac																			Cw= .754
500	62.2	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.846
	41.4	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		80.5	--	--		.401	--	--		.763
	57.2	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.5	--	--		.401	--	--		.680
	A= 160.8 Ac																			Cw= .766

RAINFALL

Rtn Frq	Map Values P6	P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
4800	28	.020	Highly Urbanized..

L= 4800 Lca= 2400 Sc=.00583 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	25	3.2	1.63	.577	0.94	153
5	1.35	20	4.0	2.68	.620	1.66	269
10	1.62	18	4.4	3.40	.655	2.23	361
25	1.97	16	5.0	4.38	.695	3.05	494
50	2.30	14	5.7	5.45	.727	3.96	642
100	2.61	13	6.2	6.38	.754	4.81	779
500	2.77	13	6.2	6.76	.766	5.18	839

APPENDIX H

HYDROLOGIC CALCULATIONS FOR SECOND STREET STORMDRAIN

SCHEME 2

(POCs a1', b1', f1', g1', h1', m1')

PCFCD HYDROLOGY METHOD
Johnson, Brittain & Associates, Inc
05-30-1985

CvcCntrPlz Sctsdl Rd
JBA No 2690
Opened

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	17.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.705
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		65.8	--	--		.002	--	--		.442
	A= 36.7 Ac																		Cw=	.568
5	17.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.744
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		72.7	--	--		.060	--	--		.488
	A= 36.7 Ac																		Cw=	.611
10	17.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.770
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		75.2	--	--		.135	--	--		.532
	A= 36.7 Ac																		Cw=	.646
25	17.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.799
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		77.5	--	--		.229	--	--		.585
	A= 36.7 Ac																		Cw=	.688
50	17.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.821
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		79.0	--	--		.307	--	--		.628
	A= 36.7 Ac																		Cw=	.720
100	17.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.839
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.1	--	--		.372	--	--		.664
	A= 36.7 Ac																		Cw=	.748
500	17.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.846
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.5	--	--		.401	--	--		.680
	A= 36.7 Ac																		Cw=	.760

RAINFALL

Rtn Frq	Map Values P6	P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
2300	7	.020	Highly Urbanized..

L= 2300 Lca= 1200 Sc=.00304 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	20	1.9	1.86	.568	1.05	39
5	1.35	16	2.4	2.99	.611	1.83	68
10	1.62	14	2.7	3.84	.646	2.48	92
25	1.97	13	2.9	4.82	.688	3.31	123
50	2.30	12	3.2	5.79	.720	4.17	154
100	2.61	11	3.5	6.82	.748	5.10	189
500	2.77	10	3.8	7.48	.760	5.68	210

POC: b1'

A+B

PCFCD HYDROLOGY METHOD
Johnson, Brittain & Associates, Inc
05-30-1985

CvcCntrPlz Sctsdl Rd
JBA No 2690
Opened

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.705
	55.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		65.8	--	--		.002	--	--		.442
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A= 158.6 Ac																			Cw=	.614
5	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.744
	55.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		72.7	--	--		.060	--	--		.488
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A= 158.6 Ac																			Cw=	.655
10	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.770
	55.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		75.2	--	--		.135	--	--		.532
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A= 158.6 Ac																			Cw=	.687
25	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.799
	55.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		77.5	--	--		.229	--	--		.585
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A= 158.6 Ac																			Cw=	.725
50	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.821
	55.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		79.0	--	--		.307	--	--		.628
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A= 158.6 Ac																			Cw=	.754
100	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.839
	55.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.1	--	--		.372	--	--		.664
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A= 158.6 Ac																			Cw=	.778
500	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.846
	55.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.5	--	--		.401	--	--		.680
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A= 158.6 Ac																			Cw=	.788

RAINFALL

Rtn Frq	Map Values P6	Map Values P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
4300	19	.020	Highly Urbanized..
....	....	....	.....
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....	....	....	.....
....	....	....	.....

L= 4300 Lca= 2200 Sc=.00442 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	26	2.8	1.59	.614	0.98	156
5	1.35	21	3.4	2.60	.655	1.70	272
10	1.62	18	4.0	3.40	.687	2.34	374
25	1.97	16	4.5	4.38	.725	3.18	508
50	2.30	15	4.8	5.24	.754	3.95	631
100	2.61	14	5.1	6.19	.778	4.82	770
500	2.77	13	5.5	6.76	.788	5.33	852

POC: f1'

F

PCFCD HYDROLOGY METHOD
Johnson, Brittain & Associates, Inc
05-30-1985

CvcCntrPlz Sctsdl Rd
JBA No 2690
Opened

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	70.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.573
	A= 70.1 Ac																			Cw= .573
5	70.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.616
	A= 70.1 Ac																			Cw= .616
10	70.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.651
	A= 70.1 Ac																			Cw= .651
25	70.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.692
	A= 70.1 Ac																			Cw= .692
50	70.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.724
	A= 70.1 Ac																			Cw= .724
100	70.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.751
	A= 70.1 Ac																			Cw= .751
500	70.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.763
	A= 70.1 Ac																			Cw= .763

RAINFALL

Rtn Frq	Map Values P6	P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
3400	18	.020	Highly Urbanized..

L= 3400 Lca= 1700 Sc=.00529 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	20	2.8	1.86	.573	1.06	75
5	1.35	16	3.5	2.99	.616	1.84	130
10	1.62	14	4.0	3.84	.651	2.50	177
25	1.97	13	4.4	4.82	.692	3.33	236
50	2.30	12	4.7	5.79	.724	4.19	296
100	2.61	11	5.2	6.82	.751	5.12	362
500	2.77	11	5.2	7.23	.763	5.52	390

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	Curve No (CN) C	Curve No (CN) D	P1	Adjusted Curve No (CN*) B	Adjusted Curve No (CN*) C	Adjusted Curve No (CN*) D	I	Runoff Coefficient (C) B	Runoff Coefficient (C) C	Runoff Coefficient (C) D	I	Avrg
2	112.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.573
	A= 112.1 Ac																		Cw=	.573
5	112.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.616
	A= 112.1 Ac																		Cw=	.616
10	112.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.651
	A= 112.1 Ac																		Cw=	.651
25	112.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.692
	A= 112.1 Ac																		Cw=	.692
50	112.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.724
	A= 112.1 Ac																		Cw=	.724
100	112.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.751
	A= 112.1 Ac																		Cw=	.751
500	112.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	2.77	80.5	--	--	99.0	.481	--	--	.958	.763
	A= 112.1 Ac																		Cw=	.763

RAINFALL

Rtn Frq	Map Values P6	Map Values P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
4000	22	.020	Highly Urbanized..

L= 4000 Lca= 2000 Sc=.00550 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	23	2.9	1.72	.573	0.98	111
5	1.35	18	3.7	2.83	.616	1.74	197
10	1.62	16	4.2	3.60	.651	2.34	265
25	1.97	14	4.8	4.68	.692	3.24	366
50	2.30	13	5.1	5.61	.724	4.06	459
100	2.61	12	5.6	6.59	.751	4.95	559
500	2.77	12	5.6	6.98	.763	5.33	602

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	121.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.705
	130.3	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		65.8	--	--		.002	--	--		.573
	76.3	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		65.8	--	--		.002	--	--		.442
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	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 328.3 Ac																			Cw= .592
5	121.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.744
	130.3	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		72.7	--	--		.060	--	--		.616
	76.3	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		72.7	--	--		.060	--	--		.488
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	A= 328.3 Ac																			Cw= .634
10	121.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.770
	130.3	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		75.2	--	--		.135	--	--		.651
	76.3	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		75.2	--	--		.135	--	--		.532
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	A= 328.3 Ac																			Cw= .667
25	121.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.799
	130.3	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		77.5	--	--		.229	--	--		.692
	76.3	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		77.5	--	--		.229	--	--		.585
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	A= 328.3 Ac																			Cw= .707
50	121.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.821
	130.3	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		79.0	--	--		.307	--	--		.724
	76.3	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		79.0	--	--		.307	--	--		.628
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	A= 328.3 Ac																			Cw= .738
100	121.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.839
	130.3	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		80.1	--	--		.372	--	--		.751
	76.3	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.1	--	--		.372	--	--		.664
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	A= 328.3 Ac																			Cw= .763
500	121.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.846
	130.3	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		80.5	--	--		.401	--	--		.763
	76.3	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.5	--	--		.401	--	--		.680
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	A= 328.3 Ac																			Cw= .774

RAINFALL

Rtn Frq	Map Values P6	P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
6300	28	.020	Highly Urbanized..
....	....	....	.....
....	....	....	.....
....	....	....	.....
....	....	....	.....

L= 6300 Lca= 3200 Sc=.00444 mbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	36	2.9	1.31	.592	0.78	257
5	1.35	28	3.8	2.21	.634	1.40	464
10	1.62	25	4.2	2.84	.667	1.89	627
25	1.97	22	4.8	3.73	.707	2.64	873
50	2.30	20	5.3	4.57	.738	3.37	1116
100	2.61	19	5.5	5.33	.763	4.07	1346
500	2.77	18	5.8	5.82	.774	4.51	1491

PCFCD HYDROLOGY METHOD
Johnson, Brittain & Associates, Inc
05-30-1985

CvcCntrPlz Sctsdl Rd
JBA No 2690
Opened

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	121.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.705
	153.5	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		65.8	--	--		.002	--	--		.573
	76.3	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		65.8	--	--		.002	--	--		.442
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 351.5 Ac																		Cw=	.590
5	121.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.744
	153.5	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		72.7	--	--		.060	--	--		.616
	76.3	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		72.7	--	--		.060	--	--		.488
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 351.5 Ac																		Cw=	.633
10	121.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.770
	153.5	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		75.2	--	--		.135	--	--		.651
	76.3	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		75.2	--	--		.135	--	--		.532
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 351.5 Ac																		Cw=	.666
25	121.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.799
	153.5	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		77.5	--	--		.229	--	--		.692
	76.3	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		77.5	--	--		.229	--	--		.585
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 351.5 Ac																		Cw=	.706
50	121.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.821
	153.5	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		79.0	--	--		.307	--	--		.724
	76.3	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		79.0	--	--		.307	--	--		.626
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 351.5 Ac																		Cw=	.737
100	121.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.839
	153.5	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		80.1	--	--		.372	--	--		.751
	76.3	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.1	--	--		.372	--	--		.664
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 351.5 Ac																		Cw=	.762
500	121.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.846
	153.5	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		80.5	--	--		.401	--	--		.763
	76.3	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.5	--	--		.401	--	--		.680
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
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	A= 351.5 Ac																		Cw=	.774

RAINFALL

Rtn Frq	Map Values P6	P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
7000	32	.020	Highly Urbanized..
....	....	....	.....
....	....	....	.....
....	....	....	.....
....	....	....	.....

L= 7000 Lca= 3500 Sc=.00457 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	38	3.1	1.27	.590	0.75	265
5	1.35	30	3.9	2.13	.633	1.35	477
10	1.62	27	4.3	2.72	.666	1.82	643
25	1.97	23	5.1	3.63	.706	2.56	908
50	2.30	21	5.6	4.43	.737	3.27	1158
100	2.61	20	5.8	5.20	.762	3.96	1405
500	2.77	19	6.1	5.65	.774	4.37	1550

APPENDIX I

HYDROLOGIC CALCULATIONS FOR SCHEME 3

PCFCD HYDROLOGY METHOD
Johnson, Brittain & Associates, Inc
06-05-1985

CvcCntrPlz Sctsdl Rd
JBA No 2690
Opened

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	17.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.705
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		65.8	--	--		.002	--	--		.442
	A= 36.7 Ac																		Cw=	.568
5	17.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.744
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		72.7	--	--		.060	--	--		.488
	A= 36.7 Ac																		Cw=	.611
10	17.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.770
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		75.2	--	--		.135	--	--		.532
	A= 36.7 Ac																		Cw=	.646
25	17.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.799
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		77.5	--	--		.229	--	--		.585
	A= 36.7 Ac																		Cw=	.688
50	17.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.821
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		79.0	--	--		.307	--	--		.628
	A= 36.7 Ac																		Cw=	.720
100	17.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.839
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.1	--	--		.372	--	--		.664
	A= 36.7 Ac																		Cw=	.748
500	17.6	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.846
	19.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.5	--	--		.401	--	--		.680
	A= 36.7 Ac																		Cw=	.760

RAINFALL

Rtn Frq	Map Values P6	P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
2300	7	.020	Highly Urbanized..

L= 2300 Lca= 1200 Sc=.00304 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	20	1.9	1.86	.568	1.05	39
5	1.35	16	2.4	2.99	.611	1.83	68
10	1.62	14	2.7	3.84	.646	2.48	92
25	1.97	13	2.9	4.82	.688	3.31	123
50	2.30	12	3.2	5.79	.720	4.17	154
100	2.61	11	3.5	6.82	.748	5.10	189
500	2.77	10	3.8	7.48	.760	5.68	210

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.705
	55.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		65.8	--	--		.002	--	--		.442
	A= 158.6 Ac																		Cw=	.614
5	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.744
	55.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		72.7	--	--		.060	--	--		.488
	A= 158.6 Ac																		Cw=	.655
10	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.770
	55.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		75.2	--	--		.135	--	--		.532
	A= 158.6 Ac																		Cw=	.687
25	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.799
	55.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		77.5	--	--		.229	--	--		.585
	A= 158.6 Ac																		Cw=	.725
50	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.821
	55.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		79.0	--	--		.307	--	--		.628
	A= 158.6 Ac																		Cw=	.754
100	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.839
	55.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.1	--	--		.372	--	--		.664
	A= 158.6 Ac																		Cw=	.778
500	103.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.846
	55.1	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.5	--	--		.401	--	--		.680
	A= 158.6 Ac																		Cw=	.788

RAINFALL

Rtn Frq	Map Values P6	P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
4300	18	.020	Highly Urbanized..

L= 4300 Lca= 2200 Sc=.00419 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	27	2.7	1.57	.614	0.96	154
5	1.35	21	3.4	2.60	.655	1.70	272
10	1.62	19	3.8	3.31	.687	2.27	363
25	1.97	17	4.2	4.26	.725	3.09	494
50	2.30	15	4.8	5.24	.754	3.95	631
100	2.61	14	5.1	6.19	.778	4.82	770
500	2.77	14	5.1	6.57	.788	5.18	828

PCFCD HYDROLOGY METHOD
Johnson, Brittain & Associates, Inc
06-05-1985

CvcCntrPlz Sctsdl Rd
JBA No 2690
Opened

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	121.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.705
	41.4	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		65.8	--	--		.002	--	--		.573
	76.3	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		65.8	--	--		.002	--	--		.442
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 239.4 Ac																		Cw=	.598
5	121.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.744
	41.4	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		72.7	--	--		.060	--	--		.616
	76.3	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		72.7	--	--		.060	--	--		.488
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 239.4 Ac																		Cw=	.640
10	121.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.770
	41.4	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		75.2	--	--		.135	--	--		.651
	76.3	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		75.2	--	--		.135	--	--		.532
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 239.4 Ac																		Cw=	.674
25	121.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.799
	41.4	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		77.5	--	--		.229	--	--		.692
	76.3	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		77.5	--	--		.229	--	--		.585
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 239.4 Ac																		Cw=	.712
50	121.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.821
	41.4	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		79.0	--	--		.307	--	--		.724
	76.3	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		79.0	--	--		.307	--	--		.628
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 239.4 Ac																		Cw=	.743
100	121.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.839
	41.4	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		80.1	--	--		.372	--	--		.751
	76.3	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.1	--	--		.372	--	--		.664
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 239.4 Ac																		Cw=	.768
500	121.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.846
	41.4	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		80.5	--	--		.401	--	--		.763
	76.3	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.5	--	--		.401	--	--		.680
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 239.4 Ac																		Cw=	.779

RAINFALL

Rtn Frq	Map Values P6	Map Values P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
7000	30	.020	Highly Urbanized..
....	....	....	.....
....	....	....	.....
....	....	....	.....
....	....	....	.....
L= 7000	Lca= 3500	Sc=.00429	nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	39	3.0	1.25	.598	0.75	180
5	1.35	31	3.8	2.08	.640	1.33	321
10	1.62	27	4.3	2.72	.674	1.83	443
25	1.97	24	4.9	3.55	.712	2.53	611
50	2.30	22	5.3	4.34	.743	3.23	778
100	2.61	20	5.8	5.20	.768	3.99	963
500	2.77	20	5.8	5.51	.779	4.29	1036

PCFCD HYDROLOGY METHOD
Johnson, Brittain & Associates, Inc
06-05-1985

CvcCntrPlz Sctsdl Rd
JBA No 2690
Opened

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	121.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.705
	18.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		65.8	--	--		.002	--	--		.573
	76.3	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		65.8	--	--		.002	--	--		.442
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 216.2 Ac																		Cw=	.601
5	121.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.744
	18.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		72.7	--	--		.060	--	--		.616
	76.3	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		72.7	--	--		.060	--	--		.488
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 216.2 Ac																		Cw=	.643
10	121.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.770
	18.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		75.2	--	--		.135	--	--		.651
	76.3	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		75.2	--	--		.135	--	--		.532
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 216.2 Ac																		Cw=	.676
25	121.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.799
	18.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		77.5	--	--		.229	--	--		.692
	76.3	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		77.5	--	--		.229	--	--		.585
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 216.2 Ac																		Cw=	.714
50	121.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.821
	18.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		79.0	--	--		.307	--	--		.724
	76.3	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		79.0	--	--		.307	--	--		.628
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 216.2 Ac																		Cw=	.745
100	121.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.839
	18.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		80.1	--	--		.372	--	--		.751
	76.3	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.1	--	--		.372	--	--		.664
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 216.2 Ac																		Cw=	.769
500	121.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.846
	18.2	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--		80.5	--	--		.401	--	--		.763
	76.3	12	100%B	Urban Lawn	50%	50%	CvcCntr/Resort....	74	--	--		80.5	--	--		.401	--	--		.680
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	.....	..	.....	.....	..	..	.....	..	..	..	....	....	....	....		....	....	....		....
	A= 216.2 Ac																		Cw=	.780

RAINFALL

Rtn Frq	Map Values P6	P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
6300	27	.020	Highly Urbanized..
....	....	....	.....
....	....	....	.....
....	....	....	.....
....	....	....	.....

L= 6300 Lca= 3200 Sc=.00429 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	36	2.9	1.31	.601	0.79	172
5	1.35	29	3.6	2.17	.643	1.39	304
10	1.62	25	4.2	2.84	.676	1.92	418
25	1.97	22	4.8	3.73	.714	2.67	581
50	2.30	20	5.3	4.57	.745	3.40	742
100	2.61	19	5.5	5.33	.769	4.10	894
500	2.77	18	5.8	5.82	.780	4.54	990

PCFCD HYDROLOGY METHOD
Johnson, Brittain & Associates, Inc
06-05-1985

CvcCntrPlz Sctsdl Rd
JBA No 2690
Opened

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	70.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.573
	A= 70.1 Ac																		Cw=	.573
5	70.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.616
	A= 70.1 Ac																		Cw=	.616
10	70.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.651
	A= 70.1 Ac																		Cw=	.651
25	70.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.692
	A= 70.1 Ac																		Cw=	.692
50	70.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.724
	A= 70.1 Ac																		Cw=	.724
100	70.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.751
	A= 70.1 Ac																		Cw=	.751
500	70.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.763
	A= 70.1 Ac																		Cw=	.763

RAINFALL

Rtn Frq	Map Values P6	P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
3400	18	.020	Highly Urbanized..

L= 3400 Lca= 1700 Sc=.00529 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	20	2.8	1.86	.573	1.06	75
5	1.35	16	3.5	2.99	.616	1.84	130
10	1.62	14	4.0	3.84	.651	2.50	177
25	1.97	13	4.4	4.82	.692	3.33	236
50	2.30	12	4.7	5.79	.724	4.19	296
100	2.61	11	5.2	6.82	.751	5.12	362
500	2.77	11	5.2	7.23	.763	5.52	390

PCFCD HYDROLOGY METHOD
Johnson, Brittain & Associates, Inc
06-05-1985

CvcCntrPlz Sctsdl Rd
JBA No 2690
Opened

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	112.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.573
	A= 112.1 Ac																			Cw= .573
5	112.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.616
	A= 112.1 Ac																			Cw= .616
10	112.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.651
	A= 112.1 Ac																			Cw= .651
25	112.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.692
	A= 112.1 Ac																			Cw= .692
50	112.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.724
	A= 112.1 Ac																			Cw= .724
100	112.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.751
	A= 112.1 Ac																			Cw= .751
500	112.1	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.763
	A= 112.1 Ac																			Cw= .763

RAINFALL

Rtn Frq	Map Values P6	P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
4000	22	.020	Highly Urbanized..
L= 4000	Lca= 2000	Sc=.00550	nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	Q	Q
2	0.93	23	2.9	1.72	.573	0.98	111
5	1.35	18	3.7	2.83	.616	1.74	197
10	1.62	16	4.2	3.60	.651	2.34	265
25	1.97	14	4.8	4.68	.692	3.24	366
50	2.30	13	5.1	5.61	.724	4.06	459
100	2.61	12	5.6	6.59	.751	4.95	559
500	2.77	12	5.6	6.98	.763	5.33	602

POC: I'''

F+G+L

PCFCD HYDROLOGY METHOD
Johnson, Brittain & Associates, Inc
06-05-1985

CvcCntrPlz Sctsdl Rd
JBA No 2690
Opened

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	Curve No (CN) C	Curve No (CN) D	P1	Adjusted Curve No (CN*) B	Adjusted Curve No (CN*) C	Adjusted Curve No (CN*) D	I	Runoff Coefficient (C) B	Runoff Coefficient (C) C	Runoff Coefficient (C) D	Runoff Coefficient (C) I	Runoff Coefficient (C) Avrg
2	162.4	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.573
	A= 162.4 Ac																		Cw=	.573
5	162.4	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.616
	A= 162.4 Ac																		Cw=	.616
10	162.4	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.651
	A= 162.4 Ac																		Cw=	.651
25	162.4	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.692
	A= 162.4 Ac																		Cw=	.692
50	162.4	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.724
	A= 162.4 Ac																		Cw=	.724
100	162.4	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.751
	A= 162.4 Ac																		Cw=	.751
500	162.4	12	100%B	Urban Lawn	50%	65%	Office/Cmrcl/Rsdn.	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.763
	A= 162.4 Ac																		Cw=	.763

RAINFALL

Rtn Frq	Map Values P6	Map Values P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
4700	26	.020	Highly Urbanized..

L= 4700 Lca= 2400 Sc=.00553 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	26	3.0	1.59	.573	0.91	150
5	1.35	20	3.9	2.68	.616	1.65	270
10	1.62	18	4.4	3.40	.651	2.22	363
25	1.97	16	4.9	4.38	.692	3.03	496
50	2.30	15	5.2	5.24	.724	3.79	621
100	2.61	14	5.6	6.19	.751	4.65	761
500	2.77	13	6.0	6.76	.763	5.16	844

APPENDIX J

PRELIMINARY ENGINEER'S COST ESTIMATE

MATERIALS LIST 05/30/05

JOB : 2690.2 2nd St. Storm Drain #1

ITEM NUMBER	DESCRIPTION	QTY.	UNIT COST	TOTAL COST
2020001	Removal of Structures and Obstructions	1 ls	10000.00	10000.00
2020041	Removal of Pipe	208 lf	4.00	832.00
2030401	Drainage Excavation	655 cy	4.00	2620.00
4060004	Pavement Patch (Type A)	2144 sy	6.50	13936.00
4060005	Pavement Patch (Type T)	500 sy	8.00	4000.00
4060006	Pavement Patch (Type A Mod)	784 sy	5.00	3920.00
5011002	Pipe, Reinforced Concrete, Class II, 12"	73 lf	20.00	1460.00
5011012	Pipe, Reinforced Concrete, Class II, 18"	204 lf	25.00	5100.00
5011022	Pipe, Reinforced Concrete, Class II, 24"	8 lf	35.00	280.00
5030353	Catch Basin,2-12' Wings(MAG Det. 533-1)	4 ea	3000.00	12000.00
5050000	Access Barrier	1 ea	800.00	800.00
5050065	Manhole (MAG Det. 520 & 522)	2 ea	1200.00	2400.00
5050066	Manhole (MAG Det. 521 & 522)	2 ea	1400.00	2800.00
5050068	Manhole (MAG Det 420)	7 ea	1200.00	8400.00
6010007	Structural Concrete (Class A)	27 cy	280.00	7560.00
6040001	Structural Steel	1520 lb	.50	760.00
8080277	Valve (8"x4") (With Tapping)	1 ea	800.00	800.00
8080403	Pipe (Vitrified Clay) (8")	517 lf	12.00	6204.00
8080405	Pipe (Vitrified Clay) (12")	65 lf	17.00	1105.00
8080406	Pipe (Vitrified Clay) (15")	10 lf	25.00	250.00
8080413	Pipe (Vitrified Clay, Extra Strength) (8")	152 lf	15.00	2280.00
8080692	Pipeline Encasement	66 lf	40.00	2640.00
8081422	Pipe (Ductile Iron) (8") (Class 50)	21 lf	35.00	735.00
8082204	Pipe (Asbestos Cement) (4")	166 lf	8.00	1328.00
9030201	Reconstruct Woven Wire Fence, Type 1	75 lf	10.00	750.00
9050505	Safety Rail (Triple)	36 lf	30.00	1080.00
9080241	Concrete Sidewalk (MAG Det. 230 & 231)	243 sf	7.00	1701.00
9130003	Riprap (Grouted)	145 cy	60.00	8700.00
		total cost		104441.00

MATERIALS LIST 05/30/85

JOB : 2690.3 2nd St. S.D. Alt. A

ITEM NUMBER	DESCRIPTION	QTY.	UNIT COST	TOTAL COST
5011042	Pipe, Reinforced Concrete, Class II, 36"	100 lf	45.00	4500.00
5011043	Pipe, Reinforced Concrete, Class III, 36"	444 lf	50.00	22200.00
5011053	Pipe, Reinforced Concrete, Class III, 48"	484 lf	65.00	31460.00
5011092	Pipe, Reinforced Concrete, Class II, 96"	2103 lf	230.00	483690.00
5011093	Pipe, Reinforced Concrete, Class III, 96"	1273 lf	240.00	305520.00
		total cost		847370.00

MATERIALS LIST 05/30/85

JOB : 2690.4 2nd St. S.D. Alt. B

ITEM NUMBER	DESCRIPTION	QTY.	UNIT COST	TOTAL COST
5011092	Pipe, Reinforced Concrete, Class II, 96"	113 lf	230.00	25990.00
5011093	Pipe, Reinforced Concrete, Class III, 96"	246 lf	240.00	59040.00
5012536	Pipe, Cast-In-Place, 36"	544 lf	30.00	16320.00
5012548	Pipe, Cast-In-Place, 48"	484 lf	40.00	19360.00
5012596	Pipe, Cast-In-Place, 96"	3017 lf	170.00	512890.00
		total cost		633600.00

MATERIALS LIST 05/30/85

JOB : 2690.5 2nd St. S.D. Alt. C

ITEM NUMBER	DESCRIPTION	QTY.	UNIT COST	TOTAL COST
5011042	Pipe, Reinforced Concrete, Class II, 36"	100 lf	45.00	4500.00
5011043	Pipe, Reinforced Concrete, Class III, 36"	444 lf	50.00	22200.00
5011053	Pipe, Reinforced Concrete, Class III, 48"	484 lf	65.00	31460.00
5011082	Pipe, Reinforced Concrete, Class II, 84"	2103 lf	175.00	410085.00
5011083	Pipe, Reinforced Concrete, Class III, 84"	1273 lf	200.00	254600.00
		total cost		722845.00

MATERIALS LIST 05/30/85

JOB : 2690.6 2nd St. S.D. Alt. D

ITEM NUMBER	DESCRIPTION	QTY.	UNIT COST	TOTAL COST
5011082	Pipe, Reinforced Concrete, Class II, 84"	113 lf	195.00	22035.00
5011083	Pipe, Reinforced Concrete, Class III, 84"	246 lf	200.00	49200.00
5012536	Pipe, Cast-In-Place, 36"	544 lf	30.00	16320.00
5012548	Pipe, Cast-In-Place, 48"	484 lf	40.00	19360.00
5012584	Pipe, Cast-In-Place, 84"	3017 lf	130.00	392210.00
		total cost		499125.00

APPPENDIX K

HYDROLOGIC CALCULATIONS FOR ON-SITE DRAINAGE ANALYSIS

(POCs r1, r2, r3, r4, r)

PCFCD HYDROLOGY METHOD
Johnson, Brittain & Associates, Inc
05-30-1985

CvcCntrPlz Sctsdl Rd
JBA No 2690
Opened

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	0.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.705
	A= 0.7 Ac																			Cw= .705
5	0.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.744
	A= 0.7 Ac																			Cw= .744
10	0.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.770
	A= 0.7 Ac																			Cw= .770
25	0.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.799
	A= 0.7 Ac																			Cw= .799
50	0.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.821
	A= 0.7 Ac																			Cw= .821
100	0.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.839
	A= 0.7 Ac																			Cw= .839
500	0.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.846
	A= 0.7 Ac																			Cw= .846

RAINFALL

Rtn Frq	Map Values P6	P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
600	20	.020	Highly Urbanized..

L= 600 Lca= 300 Sc=.03333 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	5	2.0	3.25	.705	2.29	2
5	1.35	5	2.0	4.69	.744	3.49	2
10	1.62	5	2.0	5.64	.770	4.35	3
25	1.97	5	2.0	6.87	.799	5.49	4
50	2.30	5	2.0	8.00	.821	6.56	5
100	2.61	5	2.0	9.09	.839	7.63	5
500	2.77	5	2.0	9.64	.846	8.16	6

POC: r2

East.gtr.frm.S

PCFCD HYDROLOGY METHOD
Johnson, Brittain & Associates, Inc
05-30-1985

CvcCntrPlz Sctsdl Rd
JBA No 2690
Opened

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	1.1	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.705
																				Cw= .705
A= 1.1 Ac																				
5	1.1	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.744
																				Cw= .744
A= 1.1 Ac																				
10	1.1	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.770
																				Cw= .770
A= 1.1 Ac																				
25	1.1	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.799
																				Cw= .799
A= 1.1 Ac																				
50	1.1	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.821
																				Cw= .821
A= 1.1 Ac																				
100	1.1	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.839
																				Cw= .839
A= 1.1 Ac																				
500	1.1	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.846
																				Cw= .846
A= 1.1 Ac																				

RAINFALL

Rtn Frq	Map Values P6	Map Values P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
600	20	.020	Highly Urbanized..

L= 600 Lca= 300 Sc=.03333 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	5	2.0	3.25	.705	2.29	3
5	1.35	5	2.0	4.69	.744	3.49	4
10	1.62	5	2.0	5.64	.770	4.35	5
25	1.97	5	2.0	6.87	.799	5.49	6
50	2.30	5	2.0	8.00	.821	6.56	7
100	2.61	5	2.0	9.09	.839	7.63	8
500	2.77	5	2.0	9.64	.846	8.16	9

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	0.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.705
	A= 0.7 Ac																			Cw= .705
5	0.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.744
	A= 0.7 Ac																			Cw= .744
10	0.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.770
	A= 0.7 Ac																			Cw= .770
25	0.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.799
	A= 0.7 Ac																			Cw= .799
50	0.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.821
	A= 0.7 Ac																			Cw= .821
100	0.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.839
	A= 0.7 Ac																			Cw= .839
500	0.7	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.846
	A= 0.7 Ac																			Cw= .846

RAINFALL

Rtn Frq	Map Values P6	P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
600	20	.020	Highly Urbanized..

L= 600 Lca= 300 Sc=.03333 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	5	2.0	3.25	.705	2.29	2
5	1.35	5	2.0	4.69	.744	3.49	2
10	1.62	5	2.0	5.64	.770	4.35	3
25	1.97	5	2.0	6.87	.799	5.49	4
50	2.30	5	2.0	8.00	.821	6.56	5
100	2.61	5	2.0	9.09	.839	7.63	5
500	2.77	5	2.0	9.64	.846	8.16	6

PCFCD HYDROLOGY METHOD
Johnson, Brittain & Associates, Inc
05-30-1985

CvcCntrPlz Sctsdl Rd
JBA No 2690
Opened

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	1.1	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.705
	A= 1.1 Ac																			Cw= .705
5	1.1	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.744
	A= 1.1 Ac																			Cw= .744
10	1.1	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.770
	A= 1.1 Ac																			Cw= .770
25	1.1	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.799
	A= 1.1 Ac																			Cw= .799
50	1.1	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.821
	A= 1.1 Ac																			Cw= .821
100	1.1	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.839
	A= 1.1 Ac																			Cw= .839
500	1.1	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.846
	A= 1.1 Ac																			Cw= .846

RAINFALL

Rtn Frq	Map Values P6	P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
600	20	.020	Highly Urbanized..

L= 600 Lca= 300 Sc=.03333 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	5	2.0	3.25	.705	2.29	3
5	1.35	5	2.0	4.69	.744	3.49	4
10	1.62	5	2.0	5.64	.770	4.35	5
25	1.97	5	2.0	6.87	.799	5.49	6
50	2.30	5	2.0	8.00	.821	6.56	7
100	2.61	5	2.0	9.09	.839	7.63	8
500	2.77	5	2.0	9.64	.846	8.16	9

Pump.station

PCFCD HYDROLOGY METHOD
Johnson, Brittain & Associates, Inc
05-30-1985

CvcCntrPlz Sctsdl Rd
JBA No 2690
Opened

WATERSHED

Rtn Frq	Subarea	Soil Type No	Soil Type Percent	Vegetative Cover Type	Vegetative Cover Dns	Imp Cover	Description	Curve No (CN) B	C	D	P1	Adjusted Curve No (CN*) B	C	D	I	Runoff Coefficient (C) B	C	D	I	Avrg
2	7.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	.93	65.8	--	--	99.0	.002	--	--	.881	.705
A=	7.5 Ac																		Cw=	.705
5	7.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.35	72.7	--	--	99.0	.060	--	--	.915	.744
A=	7.5 Ac																		Cw=	.744
10	7.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.62	75.2	--	--	99.0	.135	--	--	.929	.770
A=	7.5 Ac																		Cw=	.770
25	7.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	1.97	77.5	--	--	99.0	.229	--	--	.941	.799
A=	7.5 Ac																		Cw=	.799
50	7.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.30	79.0	--	--	99.0	.307	--	--	.949	.821
A=	7.5 Ac																		Cw=	.821
100	7.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.61	80.1	--	--	99.0	.372	--	--	.955	.839
A=	7.5 Ac																		Cw=	.839
500	7.5	12	100%B	Urban Lawn	50%	80%	Specialties.....	74	--	--	2.77	80.5	--	--	99.0	.401	--	--	.958	.846
A=	7.5 Ac																		Cw=	.846

RAINFALL

Rtn Frq	Map Values P6	Map Values P24	Calculated/Corrected Values P1	P2	P3	P6	P24
2	1.20	1.40	0.93	1.01	1.07	1.17	1.37
5	1.70	2.00	1.35	1.47	1.55	1.71	2.01
10	2.00	2.40	1.62	1.77	1.87	2.06	2.43
25	2.60	3.00	1.97	2.16	2.28	2.51	2.97
50	2.80	3.40	2.30	2.51	2.65	2.93	3.47
100	3.40	4.00	2.61	2.86	3.02	3.33	3.95
500	--	--	2.77	3.03	3.20	3.53	4.19

WATERCOURSE

Subreach Length	Elev Diff	Basin Factor	Watercourse Type
1200	20	.020	Highly Urbanized..

L= 1200 Lca= 600 Sc=.01667 nbw=.0200

RUNOFF

Rtn Frq	P1	Tc	v	i	Cw	q	Q
2	0.93	5	4.0	3.25	.705	2.29	17
5	1.35	5	4.0	4.69	.744	3.49	26
10	1.62	5	4.0	5.64	.770	4.35	33
25	1.97	5	4.0	6.87	.799	5.49	41
50	2.30	5	4.0	8.00	.821	6.56	50
100	2.61	5	4.0	9.09	.839	7.63	58
500	2.77	5	4.0	9.64	.846	8.16	62

APPENDIX L

CATCH BASIN INLET CAPACITY CALCULATIONS

Johnson · Brittain
& Associates, Inc.
ENGINEERS PLANNERS SURVEYORS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: SCOTTSDALE CIVIC CENTER
Location: NORTH BOUND LANE
Project No.: 2690

DESIGN DATA

Frequency: 100 years
P_6 = _____ in. P_{24} = _____ in. P_1 = _____ in.
T_{all} = n = .016
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
CB1	11+18.49	17+34.48							10	—	10	.029	.02	3125	0.28	14.0
CB2	17+34.48	18+34.48							—	7.76	7.76	SUMP	.02	—	0.52	26.0
CB3	19+34.48	24+71.70							10	—	10	.029	.02	3125	0.28	14.0

INLET CALCULATIONS

Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$	
17+34.48	SINGLE MAG 17' WING	0.28	6.12	3.88	61%
18+34.48	SINGLE MAG 10' WING	0.52	7.76	—	100%
19+34.48	SINGLE MAG 17' WING	0.28	6.12	3.88	61%

Inlet Type: Single / Double

Single / Double

Computed by: DCB Checked by: RDB Date: 5/14/85

Johnson · Brittain
& Associates, Inc.
ENGINEERS · PLANNERS · SURVEYORS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: SCOTTSDALE CIVIC CENTER
Location: SOUTH BOUND LANE
Project No.: 2690

DESIGN DATA

Frequency: 100 years
P_6 = _____ in. P_{24} = _____ in. P_1 = _____ in.
T_{all} = n = .016
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
CB4	11+11.40	17+34.48									10	.029	.02	3125	0.28	14.0
CB5	17+34.48	18+34.48									7.76	SUMP	.02	—	0.28	14.0
CB6	19+34.48	24+71.70									10	.029	.02	3125	0.28	14.0

INLET CALCULATIONS

Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
17+34.48	SINGLE MAG 17' WING	0.28	6.12	3.88
18+34.48	DOUBLE MAG 10' WING	0.28	7.76	—
19+34.48	SINGLE MAG 17' WING	0.28	6.12	3.88

100%

Inlet Type: Single / Double

MAG. STD.

Single / Double

Computed by: DCB Checked by: RDB Date: 5/14/85

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& Associates, Inc.
ENGINEERS PLANNERS SURVEYORS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: SCOTTSDALE CIVIC CENTER
Location: SOUTH OF UNDERPASS
Project No.: 2690

DESIGN DATA

Frequency: 100 years
P_6 = _____ in. P_{24} = _____ in. P_1 = _____ in.
T_{all} = n = 0.016
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
NB	24+71.70	24+94	522.6	*	0.44	0.95	5	9.1	3.80	0	3.80	.005	.02	3125	0.27	13.50
SB	24+71.70	24+94	522.6	26	0.31	0.95	5	9.1	2.68	0	2.68	.005	.02	3125	0.24	11.88

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
NB	24+94	(1)			
SB	24+94	(1)			

Inlet Type: Single / Double

* IRREGULAR AREA

Single / Double

(1) MAX. DESIGN SPREAD NOT REACHED. CATCH BASINS ON NEXT JOB.

Computed by: DCB Checked by: RDB Date: 5/14/85

LOCATION DATA
Highway CIVIC CENTER PLAZA
Location INDIAN SCHOOL — 2ND ST.
Project No. 2690

DESIGN DATA
Frequency 100 years
P_6= ____ in. P_{24}= ____ in. P_1= ____
Outlet TW Elev. = ____
Pipe n = 0.013

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SEWER CALCULATIONS

Location Line No.	From - To		Drainage Area No.	Increm. CA	Σ CA	Time of Flow, Min. Inlet	Sewer	Design	I in./hr	Q cfs	Sewer Profile Crown Elevation Inlet	Outlet	Length ft.	Slope ft./ft.	Sewer Design Diam. In.	Q full cfs	V f.p.s.	
L1	CB1	CB2				10	–	10		10	23.45	22.47	98	.01	18	10.5	6.5	d/D = 0.82
L2	CB4	CB5				10	–	10.		10	23.69	22.81	98	.009	18	9.97	5.7	–
L3	CB3	CB2				10	–	10		10	23.45	22.47	98	.01	18	10.5	6.5	d/D = 0.82
L4	CB6	CB5				10	–	10		10	23.69	22.81	98	.009	18	9.97	5.7	–
L5	CB5	MH9								20	22.81	22.30	70	.007	24	19.3	6.4	–
L6	CB2	MH9								20	22.47	22.30	7	.024	24	35.3	11.5	d/D = 0.54
L15	MH9	MH10								30	22.70	21.80	484	0.002	36	32	4.2	–
L16	MH10	Pump Station								60	21.80	20.97	485	0.0017	48	64	4.8	–

Computed by: DCB Checked by: RDB Date: 5-85

SUMMARY OF HYDRAULIC CALCULATIONS

PRESSURE FLOW DESIGN

Calc. by DCB
Chk. by RDB
Project: Civic Center Plaza
Lines:
Freq: 100 Yr.
Dist.
Date 5-85
Sheet ___ of ___

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
										LOSSES									
STRUCTURE	STATION	S.D. TYPE SIZE	Q	A	V	K	S_f	L	Δ	H_f	H_B	H_J	H_T	H_{MH}	H_{MISC}	ΣH_L	E.G.	h_v	H.G.
MH 9																	22.93	.63	22.30
L5		24	20	3.142	6.37	226.2	.0078	70		.55	–	–	–			.55	23.48	.63	22.85
CB5									90°					.06		.06	23.41	.50	22.91
L2		18	10	1.767	5.66	105.1	.0091	98		.89						.89	24.30	.50	23.80
CB4																			

Gutter elev @ CB 5 = 24.74
Gutter elev @ CB 4 = 26.19

$V = \frac{Q}{A}$

APPENDIX M

STORMDRAIN CAPACITY CALCULATIONS

CIVIC CENTER PLAZA - 2ND STREET STORM

DRAIN DESIGN

STA 14+40 N&S - CB1 & CB3

$Q = 300$ cfs $\quad S_o = 0.426\%$ $\quad S_x = 1.23\%$

$d = 0.91'$ (See next page)

Height of Curb Opening = 5.5" = 0.46'

REFERENCE Section 3-502.04, "Design of Facilities to Manage Stormwater Runoff," City of Scottsdale

$d/H = 0.91'/0.46 = 1.9 > 1.4$

∴ Use orifice flow equation (Note that due to the high flow depth, the catch basin operates as an orifice independent of the longitudinal street slope.

$$Q_i = 5.38\, A \left(d_i - \frac{h}{2} \right)^{0.5}$$

$A = h L_i = 0.46 \,(37/1.25) \Rightarrow$ 25% clogging factor

$= 13.62 \text{ ft}^2$

$$Q_i = 5.38\,(13.62) \left(0.91 - \frac{0.46}{2} \right)^{0.5}$$

$= 60$ cfs

Use two MAG Std Det. 533-1 catch basins with double 17' wings @ Sta 14+40

$Q_i = 2\,(60) = 120$ cfs

Carryover $Q = 300 - 120$ cfs $= 180$ cfs

JOB # 2690
Civic Center Plaza
BY: RDB
5/29/85

CROSS SECTION Sta. 14+40

STATION	0.00	ELEVATION	60.00
STATION	0.10	ELEVATION	49.20
STATION	7.00	ELEVATION	49.00
STATION	9.00	ELEVATION	49.18
STATION	9.10	ELEVATION	48.68
STATION	35.00	ELEVATION	49.00
STATION	65.00	ELEVATION	48.54
STATION	65.10	ELEVATION	49.04
STATION	88.90	ELEVATION	48.95
STATION	89.00	ELEVATION	60.00

RESULTS

Manning's 'n' 0.016
Channel Slope 0.426%
W.S. Elevation 49.59
Area 63.15 SF
Perimeter 90.68 Ft.
Near Bank 0.1
Far Bank 88.9
Discharge 300.77 cfs
Velocity 4.76 fps

STA 14+90 N & S (CB2) & (CB4)

$Q = 180\,cfs$ $S_o = 0.426\%$ $S_x = 1.23\%$

$d = 0.73'$ (See next page)

$d/H = 0.73/0.46 = 1.6 > 1.4$

∴ Use orifice flow equation

$Q_i = 5.38\,A\left(d_i - \frac{h}{2}\right)^{0.5}$

$Q_i = 5.38\,(13.62)\left(0.73 - \frac{0.46}{2}\right)^{0.5}$

$= 52\,cfs$

Use two MAG Std Det 533.1 catch basins with double 17' wings @ Sta 15+00

$Q_i = 2(52) = 104\,cfs$

Carryover $Q = 180 - 104\,cfs = 76\,cfs$

$1/2\,(76\,cfs) = 38\,cfs$ goes down Wells Fargo.

STA 18+15, North (CB5)

$S_o = 0.0202\,ft/ft$ $S_x = 0.0174\,ft/ft$

$Q = 38\,cfs$

To find d; use gutter flow equation (Fig 3-43)

$Z/n = 57/0.016 = 3592$

$d = 0.47'$

JOB # 2690
Civic Center Plaza
BY: RDB
5/29/85

CROSS SECTION Sta. 14+90

STATION	0.00	ELEVATION	60.00
STATION	0.10	ELEVATION	49.20
STATION	7.00	ELEVATION	49.00
STATION	9.00	ELEVATION	49.18
STATION	9.10	ELEVATION	48.68
STATION	35.00	ELEVATION	49.00
STATION	65.00	ELEVATION	48.54
STATION	65.10	ELEVATION	49.04
STATION	88.90	ELEVATION	48.95
STATION	89.00	ELEVATION	60.00

RESULTS

Manning's 'n' 0.016
Channel Slope 0.426%
W.S. Elevation 49.41
Area 46.36 SF
Perimeter 90.30 Ft.
Near Bank 0.1
Far Bank 88.9
Discharge 180.18 cfs
Velocity 3.89 fps

Size Catch Basin using Fig 5-6 from "Design of Urban Highway Drainage, The State of the Art", FHWA, Aug, 1979.

$T = \frac{0.47}{0.0174} = 27.0'$

$d_w = S_x (T-2) = 0.0174 (25) = 0.44'$

For a MAG Std. Det. 533.1 catch basin with double 17' wings $L_i = 37/1.25 = 29.6'$

$Q_i / Q = 0.64 \quad Q_i = 0.64 (38)$
$= 24$ cfs

Carryover $Q = 14$ cfs

STA 18+65, North (CB6)

$S_o = 0.0202$ ft/ft , $S_x = 0.0206$ ft/ft

$Q = 14$ cfs

$Z/n = 48.6/0.016 = 3037$

$d = 0.34'$

$T = \frac{0.34}{0.0206} = 16.5'$

$d_w = 0.0206 (16.5-2) = 0.30'$

For a MAG Std. Det. 533.1 catch basin with a single 17' wing. $L_i = 20/1.25 = 16'$

$Q_i / Q = 0.62 \quad Q_i = 0.62 (14) = 9$ cfs

Carryover $Q = 5$ cfs ⇒ INTO DEPRESSED SECTION

STANDARD CURB-OPENING INLET CHART

W = 2 ft.
a = 2 in.
h = 6 in.

One inch is 25.4mm
One foot is 0.3048m

EXAMPLE

Given — S_x = 0.02 ft./ft.; T = 10 ft.; S_o = 0.03 ft./ft.

Find — L_i = 11.8 ft. L_i = 34 ft.; Q_i/Q = 0.65 Q_i/Q = 1.0

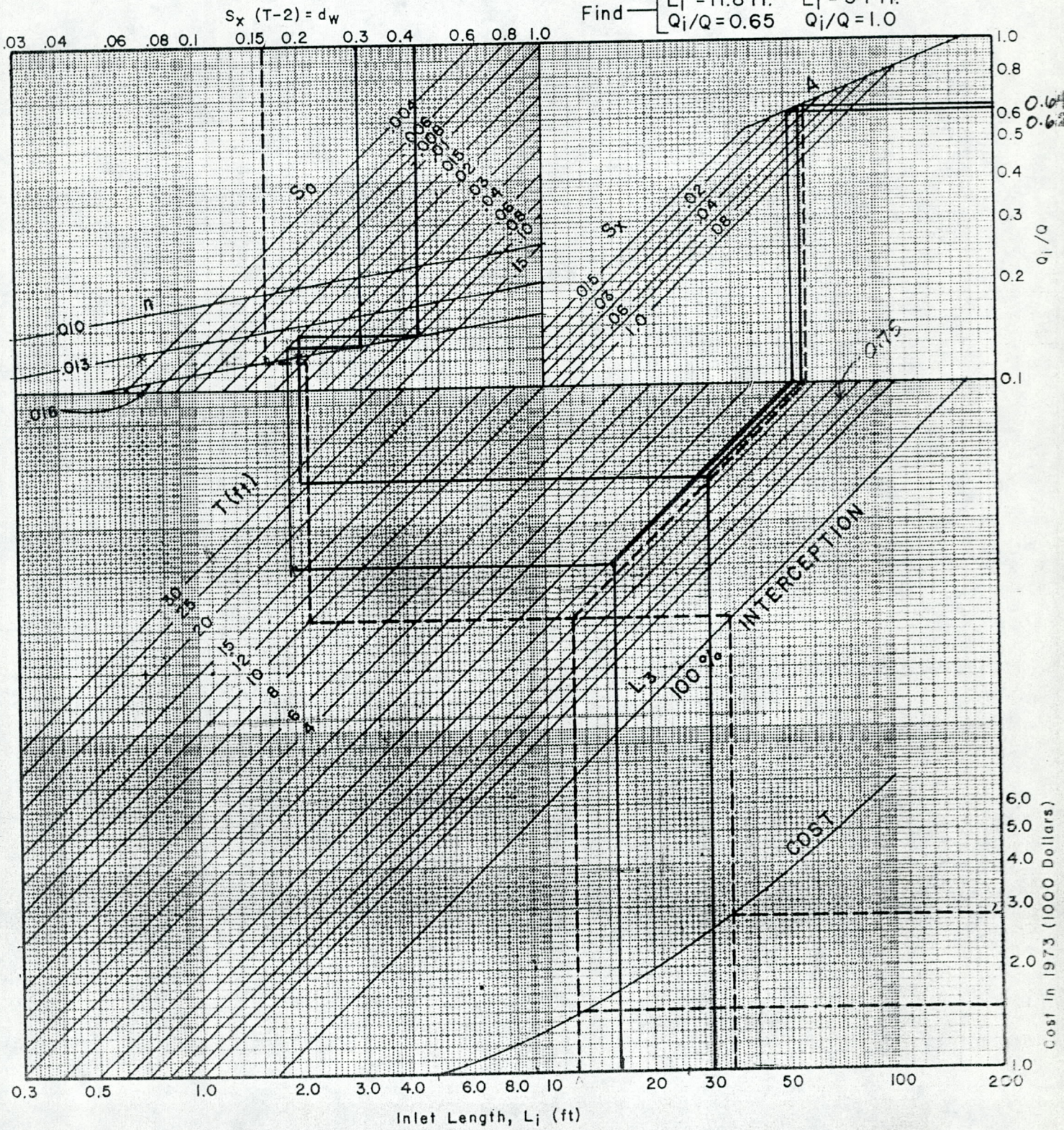


FIG. 5-6

LATERAL PIPE SIZING

STA 14+40 N & S (L11) & (L12)

Q = 60 cfs

ELEV of HGL in Mainline will not control since no water will enter pipe upstream of this point until the storm sewer system is extended. When this extension occurs runoff will no longer be reaching this catch basin.

The pipe slopes are steep enough (25% & 51%) that the control on the hydraulic capacity of the pipe will be at the inlet.

Using Fig 3-22 from the City of Scottsdale Design Procedures, Section 3: (AHW = D+2')

For a 36" RCP $\frac{HW}{D} = 1.6$ HW = 4.80' ✓

Use 36" RCP's for laterals @ 14+40

STA 14+90 N & S (L13) & (L14)

Q = 52 cfs

For a 36" RCP $\frac{HW}{D} = 1.42$ HW = 4.26' ✓

Use 36" RCP's for laterals @ 14+90

STA 18+15, N (L1)

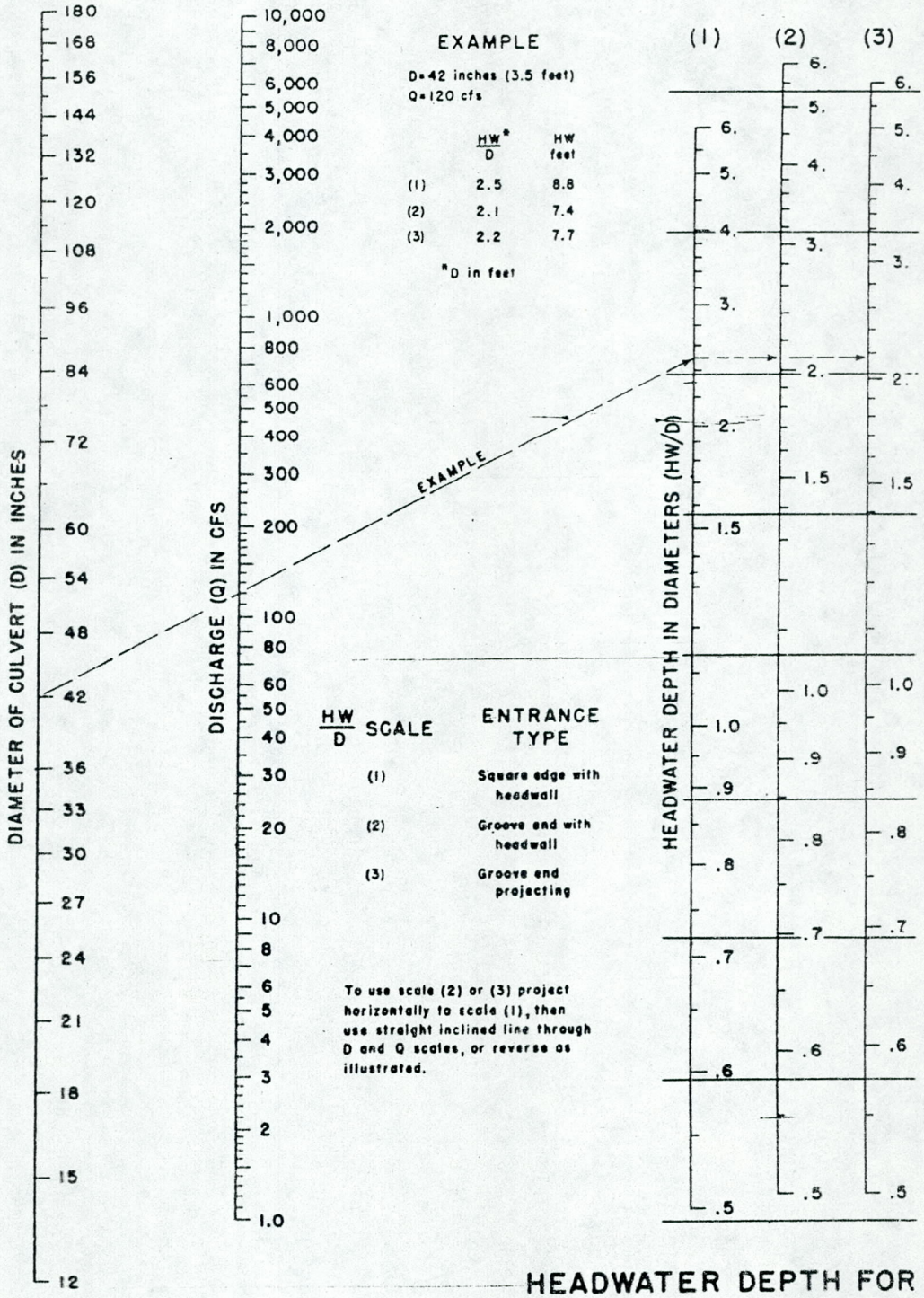
Q = 24 cfs

For a 24" RCP $\frac{HW}{D} = 1.75$ HW = 3.5' ✓

STA 18+65, N (L2)

$Q = 9$ cfs

For an 18" RCP $\frac{HW}{D} = 1.3$ $HW = 1.95'$ ✓



HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

BUREAU OF PUBLIC ROADS JAN. 1963

FIGURE 3-22