MASTER DEVELOPMENT DRAINAGE PLAN
for
FIRST AND MAIN TOWN CENTER

March, 1999

Prepared for:

Development Management, Inc.
4065 N Sinton Road, Suite 200
Colorado Springs, CO 80907

Prepared by:

Rockwell-Minchow Consultants, Inc.
2928 Straus Lane, Suite 100
Colorado Springs, CO 80907
475-2575

Project# 97-092

MASTER DEVELOPMENT DRAINAGE PLAN
for
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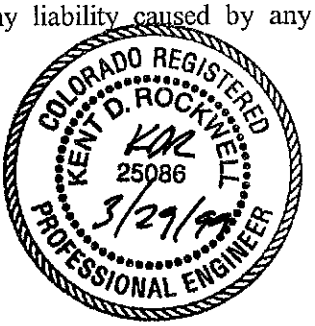
DRAINAGE PLAN STATEMENTS

ENGINEER'S STATEMENT

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the City/County for drainage reports and said report is in conformity with the master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

Kent D. Rockwell, P.E.

Kent D. Rockwell, P.E.



DEVELOPER'S STATEMENT

I, the developer, have read and will comply with all the requirements specified in this drainage report and plan.

BY: _____ DATE 3/29/99

TITLE: President

ADDRESS:

CITY OF COLORADO SPRINGS

Filed in accordance with Section 15-3-906 of the code of the City of Colorado Springs, 1980, as amended.

_____ 4/14/99
CITY ENGINEER DATE

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FIRST AND MAIN TOWN CENTER
March, 1999

General Location and Description

The First and Main Town Center site is situated directly east of Powers Boulevard and is bound on the north by North Carefree Circle, on the south by Constitution Avenue and on the east by existing Tutt Boulevard and the future southerly extension of Tutt Boulevard to Constitution Avenue. The site lies within portions of the west halves of Sections 30 and 31, Township 13 South, Range 65 West of the 6th P.M., El Paso County, Colorado (see Figure 1). The entire site includes approximately 133 acres within the Sand Creek Drainage Basin.

The area is currently undeveloped except for an existing arterial street (South Carefree Circle) which extends approximately 1400 feet east of Powers Boulevard. An existing 10' x 5' reinforced concrete box culvert (RCB) extends approximately 800 feet to the east from the Powers Boulevard and South Carefree intersection within this arterial street. At this point, the 10' x 5' RCB ties into a 14' x 6' RCB which discharges into an existing earthen drainage channel approximately 1400 feet east of Powers Boulevard.

The site sits approximately 10' to 15' below Powers Boulevard at the North Carefree Circle and Powers Boulevard intersection. An existing 10' bank slopes down from Powers to the east into the proposed site from North Carefree to a point approximately 1300 feet south of North Carefree. The remaining portion of the site is generally level with Powers. Well-established native grasses cover the majority of the site.

In general, the site slopes from north to south at slopes of approximately 3% to 6%. A fairly large mesa exists between South Carefree Circle and North Carefree Circle. A fairly large low lying area exists just northwest of the Tutt Boulevard and Constitution Avenue intersection.

No surface drainage currently enters this site from any off-site areas except for the "out parcel" located between South Carefree Circle and Constitution Avenue. Developed flows generated from the west side of Powers Boulevard are conveyed underground within the aforementioned box culvert within South Carefree Circle and conveyed to the east side of the project.

The sources of information used in the development of this study are listed below:

1. The Springs Ranch MDDP Update (December, 1996), prepared by Kiowa Engineering, Colorado Springs.

2. City of Colorado Springs and El Paso County "Drainage Criteria Manual", October 1987, revised November 1991.

3. Soil Survey for El Paso County, Colorado, U.S. Department of Agriculture, Soil Conservation Service, June 1980.

4. "Flood Insurance Studies for Colorado Springs and El Paso County, Colorado", prepared by the Federal Emergency Management Agency (FEMA), 1985.

5. "Sand Creek Drainage Basin Planning Study," prepared by Kiowa Engineering Corporation, as revised, March 1996.

Soils

According to the US Department of Agriculture Soil Conservation Services Soil Survey of El Paso County, The First and Main Town Center site is underlain by Stapleton\Bernal type soils (Soil 85) along the western property line; by Tructon type soils (Soil 97) within the central portion of the site; and by Blendon type soils (Soil 10) toward the eastern and southern portions of the site (see Figure 2). The Stapleton portion of Soil 85 is classified as a Hydrologic Group "B" soil, while the Bernal portion is a Hydrologic Group "D" soil. Both the Tructon and Blendon soil types are classified as Hydrological Group "B" soils

Due to the fact that the majority of this site contains Hydrologic Group "B" soils, this classification was utilized to select runoff coefficients.

Flood Plain Statement

According to the Federal Emergency Management Agency (FEMA), as depicted on Flood Insurance Rate Map Numbers 08041C0538, 08041C0539, 08041C0751, 08041C0752, dated March 1997, no portion of this site lies within a designated Flood Plain.

Drainage Design Criteria

The current City of Colorado Springs and El Paso County Drainage Criteria was used in the preparation of this report. Although the City's criteria requires the Soil Conservation Service (SCS) Hydrograph Procedure be utilized for basin greater than 100 acres, the Rational Method was used in the preparation of this report due to the small size of contributing basins and the fact that the site is divided into the northern portion and the southern portion. The Rational Method results in a more conservative approach for determining runoff quantities and drainage facility sizing. Peak runoff rates were determined for both the 5 year and 100 year frequency storms.

Existing Drainage Facilities

No drainage pipes enter this site from off-site areas except for the existing box culvert under South Carefree Circle. The flows within this culvert according to the Sand Creek Drainage Basin Planning Study prepared by Kiowa Engineering are 450 cfs during the 100 year storm.

Historic Drainage Analysis

This portion of the report analyzes the historic runoff quantities and patterns for the site and contributing or affected off-site areas. The site is defined by fourteen historic drainage basins which are depicted on the Historic Drainage Plan (Exhibit 1). Following is a description of each basin and the existing runoff patterns and drainage improvements:

Historic Basin H-1 consists of 39.91 acres at the northeast corner of the proposed project, including existing Tutt Boulevard which runs along the easterly side of this basin. Runoff quantities of Q_5 = 19.8 cubic feet per second (cfs) and Q_{100} = 45.8 cfs generated from this basin flow southerly within a wide shallow swale located in the middle of Basin H-1. These flows eventually reach the earthen channel at the east end of the existing box culvert within South Carefree Circle.

The south half of existing North Carefree Circle from Powers Boulevard to Tutt Boulevard comprises Basin H-2. This 3.58 acre basin, previously developed as an arterial roadway, generates runoff rates of 10.0 cfs during the 5 year storm and 17.6 cfs during the 100 year storm. Four 10' inlets currently collect these flows along the south side of North Carefree Circle just west of Tutt Boulevard. An existing 60" reinforced concrete pipe (RCP) and a 5' x 9' box culvert convey the collected flows easterly along North Carefree Circle to Sand Creek. Therefore, no flows enter Tutt Boulevard from Basin H-2.

Basin H-3 consists 35.19 acres extending from the intersection of Powers Boulevard and North Carefree to the north side of South Carefree Circle. Runoff rates of Q_5 = 16.7 cfs and Q_{100} = 40.6 cfs sheet flow across this basin entering South Carefree Drive at its intersection with Bloomington Drive (Historic Design Point No. 1).

Basin H-4 is located northeast of the South Carefree Circle and Powers Boulevard intersection. This 17.55 acre basin generates flows of Q_5 = 9.7 cfs and Q_{100} = 22.7 cfs which discharges as sheet flow into the north side of South Carefree Circle. These flows combine with the flows generated from Basin H-5 and H-6 and discharge to Historic Design Point No. 1.

The east half of Powers Boulevard from North Carefree Circle to South Carefree Circle comprises Basin H-5. Runoff rates of 17.8 cfs and 32.3 cfs, generated from this basin during the 5 year and 100 year storms, respectively, flow southerly within the roadside swale along the east side of Powers Boulevard. Upon reaching South Carefree Circle the flows enter into the southwest corner of Basin H-4 and enter the north side of South Carefree Circle.

Basin H-6 consists of 1.71 acres of the north half of existing South Carefree Circle from Powers Boulevard to Bloomington Drive. This basin generates runoff rates of 5.1 cfs during the 5 year storm and 9.2 cfs during the 100 year storm.

The combined flows of Q_5 = 35.9 cfs and Q_{100} = 80.5 cfs generated from Basins H-3, H-4, H-5 and H-6 converge at the Bloomington Drive and South Carefree Circle intersection (Historic Design Point No. 1). These flows are collected by 3 existing inlets and are discharged to the existing box culvert within South Carefree Circle. An additional 6' on-grade inlet located approximately 400 east of Powers collects a portion of the flows from Basins H-5 and H-6. From these collection points the flows are conveyed easterly within the existing box culvert.

Basin H-7 consists of the north half of existing South Carefree Circle from Bloomington Drive to the future extension of Tutt Boulevard along with 2.53 acres north of South Carefree Circle. Runoff rates of 3.9 cfs and 8.0 cfs are generated from this basin during the 5 year and 100 year storms, respectively. These flows discharge to the east end of South Carefree Circle where they currently pond before overtopping an existing berm.

The south side of existing South Carefree Circle from Powers Boulevard to Bloomington Drive comprises Basin H-8. This 1.26 acre basin generates runoff rates of Q_5 = 4.9 cfs and Q_{100} = 8.7 cfs which flows easterly as street flow to the South Carefree Circle and Bloomington Drive intersection. At this point, an existing 6' sump inlet collects these flows. An existing 18" RCP conveys the collected flows to the existing box culvert within South Carefree Circle.

The 1.78 acre Basin H-9 is located on the south side of South Carefree Circle between Bloomington and the extension of Tutt Boulevard. The runoff rates (Q_5 = 3.0 cfs and Q_{100} = 5.8 cfs) generated from this basin flow easterly to the east end of existing South Carefree Circle. Like the runoff generated from Basin H-7, these flows pond at the east end of South Carefree Circle before they overtop an existing berm and discharge to the existing earthen channel.

Basin H-10 is located in the southwest corner of the overall development and consists of 34.17 acres. The runoff generated from this basin flows toward the northeast corner of the Powers Boulevard and Constitution Avenue intersection. Runoff rates of 15.4 cfs during the 5 year storm and 37.1 cfs during the 100 year storm reach an existing 54" corrugated metal pipe (CMP) which is located under Constitution Avenue along the east side of Powers Boulevard (Historic Design Point No. 2).

Basin H-11, consisting of the east half of Powers Boulevard from South Carefree Circle to Constitution Avenue, generates runoff rates of Q_5 = 11.0 cfs and Q_{100} = 19.2 cfs. These runoff rates flow southerly within the roadside swale toward Historic Design Point No. 2.

Additional runoff reaches Historic Design Point No. 2 from the 0.96 acre Basin H-12 which consists of the north half of Constitution Avenue from a point approximately 500 feet east of Powers Boulevard to Powers Boulevard. The total flows reaching Historic Design Point No. 2 from Basins H-10, H-11 and H-12 are 16.4 cfs during the 5 year storm and 50.0 cfs during the 100 year storm.

According to the Final Drainage Report for Powers Boulevard Phase 2 Waynoka to Woodmen, dated July, 1987, this pipe was anticipated to convey 124 cfs to the southeast corner of Powers Boulevard and Constitution Avenue. As part of the Constitution Place Filing No. 1 development (Cub Foods), the amount of flow exiting this pipe was limited to 30 cfs to meet downstream capacity limitations.

Basin H-13 consists of 23.42 acres at the southeast corner of the proposed First and Main Town Center project. The runoff rates of 9.4 cfs and 23.8 cfs generated from this basin during the 5 year and 100 year storms, respectively sheet flow to the southeast toward an existing low point located just northwest of the Tutt Boulevard and Constitution Avenue intersection. The existing low area currently acts as a retention area for these flows.

Basin H-14 consists of approximately 750 feet along the north side of Constitution Avenue. Runoff rates of Q_5 = 3.8 cfs and Q_{100} = 6.8 cfs flow easterly within Constitution to the future Tutt Boulevard intersection. These flows currently enter the existing curb cut for Tutt Boulevard and flow northerly into Basin H-13.

Developed Drainage Analysis

This portion of the report analyzes the developed runoff quantities and patterns for the site along with the contributing or affected off-site areas. The developed drainage basins affecting the proposed project are depicted on the Developed Drainage Plan (Exhibit 2). Thirty-two developed basins define the proposed drainage patterns for this project. Following is a description of each basin and the proposed runoff patterns and drainage improvements

The following developed runoff quantities and drainage patterns are based on an evolving proposed grading plan and may vary with the final drainage reports for each area. For this report is was assumed sump conditions would be created just west of future Tutt Boulevard to collect on-site developed flows before entering Tutt Boulevard. The inlet sizes and pipe sizes are based primarily on 100 % collection in the individual basins unless otherwise noted. Depending on the desired level of service and the capacity of downstream streets and parking lot areas, the size of the facilities listed in this report will vary.

Basin I is the same as historic Basin H-2. The drainage patterns of this basin will not change from its current state. All flows are collected within existing inlets along the south side of North Carefree Circle just west of Tutt Boulevard and then pipe easterly to Sand Creek.

The 16.03 acres located just southwest of the Tutt Boulevard and North Carefree Circle intersection comprises Basin II. This basin generates flows of 34.4 cfs during the 5 year storm and 64.1 cfs during the 100 year storm. The exact development of this area is unknown at this time, but in general runoff from this basin sheet flows southerly to a future access road. Just upstream of the access road, two 10' sump inlets will be constructed to collect all the flows generated from Basin II. A 30" reinforced concrete pipe (RCP) will convey these flows southerly just west side of Tutt Boulevard.

This portion of Tutt Boulevard at a slope of 1% has a five year street capacity of 17.1 cfs/side.

Basin III consists of 5.03 acres just south of Basin II. Like Basin II, runoff from this basin will flow toward a proposed access road extending westerly from Tutt Boulevard. An additional 10' inlet will collect the flow rates of Q_5 = 16.7 cfs and Q_{100} = 29.9 cfs generated from Basin III. The proposed storm sewer system along the west side of Tutt Boulevard will be increased to a 36" RCP to convey these additional collected flows.

The 7.82 acres south of Basin III comprise Basin IV. Runoff rates of 26.2 cfs during the 5 year storm and 46.4 cfs during the 100 year storm will sheet flow easterly toward Tutt Boulevard. An 18' sump inlet will collect these flows at the east end of the proposed parking lot. Once the exact development layout is known for this basin, additional inlets will be installed upstream to collect flows earlier. At this point, the storm sewer extending southerly from this sump inlet will be increased to a 42" RCP.

Basin V, consisting of 3.45 acres, generates flows of 12.2 cfs and 21.3 cfs during the 5 year and 100 year storms, respectively. These flows also discharge to a proposed access road located at the south end of this basin. A 6' sump inlet will be constructed along the access road to collect these flows. The total routed flows generated from Basins II, III, IV and V (Design Point #1) are 71.3 cfs during the 5 year storm and 129.3 cfs during the 100 year storm. A 42" RCP will convey these flows southerly toward South Carefree Circle.

An additional 7.59 acres located just south of Basin V comprises Basin VI. This basin also slopes from northwest to southeast toward Tutt Boulevard conveying the flows to another access road on the south side of this basin. Two 8' sump inlets will collect a total of 24.5 cfs during the 5 year storm and 42.4 cfs during the 100 year storm. The storm sewer system just downstream of Basin VI will also be a 42" RCP.

Basin VII consists of an additional 3.61 acres at the northwest corner of South Carefree Circle and Tutt Boulevard. The runoff rates of Q_5 = 12.4 cfs and Q_{100} = 21.8 cfs generated from this basin will be collected within a 6' sump inlet at the southeast corner of this basin. The total routed flows reaching Design Point #2 from Basins II, III, IV, V, VI, and VII are 95.1 cfs during the 5 year storm and 169.2 cfs during the 100 year storm. A 42" RCP will convey all the collected flows from Basins II, III, IV, V, VI and VII to the proposed channel to be constructed downstream of South Carefree Circle.

The east half of Tutt Boulevard from North Carefree Circle to a point approximately 1400 feet south comprises Basin VIII. Runoff quantities of 5.0 cfs during the 5 year storm and 10.0 cfs during the 100 year storm flow southerly within the east side of Tutt Boulevard. Tutt Boulevard, at a minimum slope of 1% and a corresponding street capacity of 17.1 cfs per side during the 5 year storm, has adequate capacity to convey these flows to Basin XVIII.

Basin IX is located just southeast of the Powers Boulevard and North Carefree Circle intersection. This basin generates flows of 28.8 cfs during the 5 year storm and 49.5 cfs during the 100 year storm. Two 10' on-grade inlets and a 12' sump inlet will collect all the flows generated from this basin. A 24" RCP will convey these flows southerly through Basin XII.

The 5.72 acres just south and west of Basin IX comprises Basin X. A 12' sump inlet will be constructed toward the south end of this basin to collect approximately 90 % of the 20.2 cfs and 35.0 cfs generated from this basin during the 5 year and 100 year storms, respectively. A 36" RCP will convey these flows southerly through Basin XII.

Basin XI is located just south of Basin X and generates flows of 16.6 cfs during the 5 year storm and 30.3 cfs during the 100 year storm. These flows will collect within the site roadways and be collected by a 4' sump inlet. The total 100 year flows from Basins IX, X and XI will be piped through Basin XII in a 36" RCP.

Approximately 18.08 acres in the middle of the proposed site comprises Basin XII. The majority of this basin consists of proposed parking with 2 to 3 clusters of buildings. Four – 8' sump inlets will be constructed throughout this basin to collect the runoff rates of Q_5 = 61.5 cfs and Q_{100} = 108.8 cfs generated from this basin. A 42" RCP will be required to convey the flows collected from this basin and Basins IX, X and XI. It is anticipated that approximately 150 cfs will be conveyed southerly within this pipe.

Basin XIII is a 4.63 acre basin just north of South Carefree Circle. Runoff rates of 16.5 cfs and 29.1 cfs are generated from this basin during the 5 year and 100 year storms, respectively. An existing 8' sump inlet will collect these flows and discharge to the existing 14' x 6' RCB via various sizes of existing pipes..

An existing 42" RCP currently is stubbed from the existing 14'x 6' RCB located within South Carefree Circle. This 42" RCP will be convey the total flows reaching Design Point # 5 from Basins IX, X, XI, XII and XIII (Q_5 = 94.6 cfs and Q_{100} = 166.6 cfs).

Basin XIV is located just west of Basin XIII and generates flows of 28.0 cfs during the 5 year storm and 48.4 cfs during the 100 year storm. An additional 18' sump inlet at the southeast corner of this basin is required to collect the flows generated from this basin. This inlet, as is the case with many of the basin, may be replaced with more inlets placed throughout the basin instead of just at the low point of the basin. The exact location of inlets will be determined at the time of the Final Drainage Report. These collected flows will discharge directly to the existing box culvert via a 30" RCP. (Once more detailed information is obtained on the site, the additional pipe connection may not be required. All developed flows from Basins IX through XIV may enter the existing 42" RCP.)

The east half of Powers Boulevard from North Carefree Circle to South Carefree Circle comprises Basin XV. An existing road side swale along the east side of Powers Boulevard carries flows of 12.3 cfs and 21.5 cfs generated from this basin during the 5 year and 100 year storms, respectively. This road side swale will remain as is except for the southerly portion of the swale . Currently, the roadside swale turns to the east at the southerly portion of this basin. Upon development, these flows will be directed into Basin XVI.

Developed Basin XVI is the same as historic Basin H-6 which consists of 1.71 acres along the north half of existing South Carefree Circle from Powers Boulevard to Bloomington Drive. This developed basin generates runoff rates of 5.1 cfs during the 5 year storm and 9.2 cfs during the 100 year storm. The combined flows of Q_5 = 13.8 cfs and Q_{100} = 24.8 cfs will reach Design Point No. 4 as street flow. An existing 8' sump inlet and an existing 12' sump inlet will collect these flows at the northwest corner of South Carefree Circle and Bloomington Drive. An existing 21" RCP conveys these collected flows to the existing 10' x 5' RCB in South Carefree Circle.

Basin XVII consists of the north half of existing South Carefree Circle from Bloomington Drive to the future extension of Tutt Boulevard. Runoff rates of 4.4 cfs and 7.6 cfs are generated from this basin during the 5 year and 100 year storms, respectively. These flows discharge to the east end of South Carefree Circle. A 4' sump inlet will be constructed at the northwest corner of the Tutt Boulevard and South Carefree Circle intersection to collect these flows along with the flows generated from the west half of Tutt Boulevard.

The east half of Tutt Boulevard from South Carefree Circle to a point approximately 1700 feet north comprise Basin XVIII. The runoff rates of Q_5 = 2.2 cfs and Q_{100} = 4.1 cfs generated from this basin combine with the runoff from Basin VIII. The routed flows of 5.9 cfs during the 5 year storm and 11.9 cfs during the 100 year storm from Basins VIII and XVIII reach Design Point # 5 as street flow. A 4' sump inlet on the east side of Tutt Boulevard will collect these flows. A proposed 42" RCP extending southeasterly from Design Point 3A will convey these all the collected flows from Basins II, III, IV, V, VI, VII and VIII and XVIII to the proposed channel to be located downstream of the South Carefree Circle and Tutt Boulevard intersection.

Basin XIX is identical to historic Basin H-8 which generates runoff rates of 4.9 cfs during the 5 year storm and 8.7 cfs during the 100 year storm. An existing 6' sump inlet at the southwest corner of Bloomington Drive and South Carefree Circle will collect the flows generated from this basin. These flows are conveyed directly to the 10' x 5' RCB via an existing 18" RCP.

The south side of South Carefree Circle from Bloomington Drive to Tutt Boulevard comprises Basin XX. This 0.93 acre basin generates flows of 3.7 cfs during the 5 year storm and 6.6 cfs during the 100 year storm which flow easterly with South Carefree Circle. This flows will then turn into Basin XXI and flow southerly within the west side of Tutt Boulevard as street flow.

The 2.80 acres at the southwest corner of Tutt Boulevard and South Carefree Circle comprise Basin XXI. The runoff rates of Q_5 = 8.0 cfs and Q_{100} = 14.6 cfs generated from this basin sheet flow southeasterly toward Tutt Boulevard. A 4' sump inlet will be constructed just west of Tutt Boulevard to collect these flows plus the flows generated from Basin XX.

Basin XXII consists of approximately 9.18 acres of property owned by a separate entity. For the purpose of this report, it was assumed that this area will also be developed as commercial sites. The runoff generated from this basin (Q_5 = 27.0 cfs and Q_{100} = 46.6 cfs) flows from north to south to the southeast corner of this basin. A proposed access road, to be constructed along the south side of this basin, will intercept these flows and convey them easterly. A 18' inlet will collect these flows just west of Tutt Boulevard.

The east half of Tutt Boulevard from South Carefree Circle to Constitution Avenue comprises Basin XXIII. The flows of 4.5 cfs and 7.9 cfs generated from this basin during the 5 year and 100 year storms, respectively, are carried southerly along the east side of Tutt Boulevard to a proposed low point in Tutt approximately 100 feet north of Constitution Avenue. A single 4' sump inlet will be constructed along the east side of Tutt Boulevard to collect these flows.

Basin XXIV is located just south of South Carefree Circle and consists of 9.49 acres. The runoff generated from this basin will be directed to the east side of the proposed buildings. An 18' sump inlet will collect these flows. A 30" RCP will be constructed on the east side of the proposed buildings to convey the flow rates of 29.4 cfs and 50.4 cfs generated during the 5 year and 100 year storms, respectively.

The 9.86 acres just south of Basin XXIV comprises Basin XXV which generates flows of 35.2 cfs during the 5 year storm and 61.6 cfs during the 100 year storm. These flows will also be collected on the east side of the proposed buildings within two 15' sump inlets. A 36" RCP will convey these flows along with the flows from Basin XXIV southerly into Basin XXIX.

Basin XXVI consists of 6.63 acres at the southeast corner of the Powers Boulevard and South Carefree Circle intersection. Runoff rates of Q_5 = 13.4 cfs and Q_{100} = 27.6 cfs are generated from this basin. These flows will be allowed to sheet flow into Basin XXVII.

An additional Q_5 = 24.8 cfs and Q_{100} = 44.5 cfs are generated from Basin XXVII consisting of 8.31 acres. At a minimum, two 12' sump inlets will be place throughout Basin XXVII to collect flows from Basins XXVI and XXVII (Q_5 = 38.2 and Q_{100} = 72.1 cfs). Again, additional inlets may be utilized upstream within this basin to reduce surface flows within the basin. This will be determined at the time of the Final Drainage Report. The collected flows will be conveyed southerly within a 30" RCP.

Basin XXVIII, located just northeast of the Powers Boulevard and Constitution Avenue intersection, generates runoff rates of 17.5 cfs during the 5 year storm and 29.8 cfs during the 100 year storm. A 10' sump inlet will be constructed at the low point of this basin to collect the flows generated this basin. The flows will be conveyed easterly toward Tutt Boulevard via a 24" RCP.

The 2.45 acres at the northwest corner of Constitution Avenue and Tutt Boulevard comprise Basin XXIX which generates flows of 13.3 cfs during the 5 year storm and 23.6 cfs during the 100 year storm. A 6' sump inlet will be install at the southeast corner of this basin to collect the flows generated from this basin. A 54" RCP will convey these flows plus the flows generated from Basins XX through XVIII across future Tutt Boulevard and into Sand Creek Detention Pond No. 1.

Developed Basin XXX is the same as historic Basin H-11, consisting of the east half of Powers Boulevard from South Carefree Circle to Constitution Avenue. This basin generates runoff rates of Q_5 = 11.0 cfs and Q_{100} = 19.2 cfs. These runoff rates flow southerly within the roadside swale toward Design Point No. 6.

Additional runoff reaches Design Point No. 6 from the 0.96 acre Basin XXXI which consists of the north half of Constitution Avenue from a point approximately 500 feet east of Powers Boulevard to Powers. The total flows reaching the existing 54" CMP under Constitution Avenue (Design Point # 6) from Basins XXX and XXXI are 13.7 cfs during the 5 year storm and 23.9 cfs during the 100 year storm.

As stated above, the Final Drainage Report for Powers Boulevard Phase 2 Waynoka to Woodmen, dated July, 1987, stated that the 54" CMP anticipated a flow of 124 cfs. However, as part of the Constitution Place Filing No. 1 development (Cub Foods), the amount of flow exiting this pipe was limited to 30 cfs to meet downstream capacity limitations. Therefore, the 54" CMP and the downstream facilities can accept the proposed flow rates reaching Design Point #6.

Basin XXXII consists of approximately 750 feet along the north side of Constitution Avenue. Runoff rates of Q_5 = 3.8 cfs and Q_{100} = 6.8 cfs flow easterly within Constitution to the future Tutt Boulevard intersection. These flows will enter Tutt Boulevard and flow northerly to a future low point in Tutt Boulevard approximately 100' north of Constitution Avenue. An additional 4' sump inlet will collect these flows.

Proposed Facilities

The proposed drainage facilities are reflected on the Developed Drainage Plan.

A preliminary itemization of the proposed drainage facilities are listed below. These items are private non-reimbursable drainage facilities.

ITEM	QUANTITY		UNIT PRICE	EXTENDED COST
18' D-10-R Inlets	4	Ea.	$5,000.00	$20,000.00
15' D-10-R Inlets	2	Ea.	$4,000.00	$8,000.00
12' D-10-R Inlets	4	Ea.	$3,700.00	$14,800.00
10' D-10-R Inlets	6	Ea.	$3,300.00	$19,800.00
8' D-10-R Inlets	6	Ea.	$3,000.00	$18,000.00
6' D-10-R Inlets	3	Ea.	$2,500.00	$7,500.00
4' D-10-R Inlets	7	Ea.	$2,000.00	$14,000.00
Rip Rap Pad	2	Ea.	$5,000.00	$10,000.00
Type I Manhole	17	Ea.	$3,000.00	$51,000.00
30" x 45° Bend	2	Ea.	$700.00	$1,400.00
36" x 45° Bend	2	Ea.	$1,000.00	$2,000.00
42" x 45° Bend	1	Ea.	$1,200.00	$1,200.00
54" F.E.S. (CMP)	1	Ea.	$1,400.00	$1,400.00
54" F.E.S. (RCP)	1	Ea.	$1,800.00	$1,800.00
24" RCP	2,900	L.F.	$32.00	$92,800.00
30" RCP	2,060	L.F.	$40.00	$82,400.00
36" RCP	2,070	L.F.	$44.00	$91,080.00
42" RCP	2,530	L.F.	$62.00	$156,860.00
54" RCP	170	L.F.	$80.00	$13,600.00
	Sub-Total			$607,640.00
	15% Eng. & Contingency			$91,146.00
	Grand Total			$698,786.00

Public Reimbursable Items

The Sand Creek Drainage Basin Planning Study, as prepared by Kiowa Engineering, proposes an open channel from the Tutt Boulevard and South Carefree Circle intersection to Sand Creek Detention Pond #1. The proposed channel as presented in the Sand Creek Study has a 25' bottom with a 10 year storm flow depth of 4'. This channel will be the outfall point for the northern portion of the First and Main Town Center site which is consistent with the Sand Creek Drainage Basin Study.

This outfall channel is considered a public reimbursable drainage facility and its estimated cost per Kiowa Engineering is $379,100. At this time, it is anticipated that this channel will be constructed with the First and Main Town Center project. However, the right-of-way for this channel is not owned by the First and Main Town Center owners and has not been dedicated to the City. In the event this right-of-way can not be obtained an alternative route for an outfall pipe will be constructed southerly from Design Point #5 to a point just north of Constitution Avenue.

Drainage Fees

The First and Main Town Center project is located within the Sand Creek Drainage Basin. The total area for which facilities or fees will be due is approximately 133 acres.

The 1999 Drainage and Bridge Fees for the Sand Creek Drainage Basin are $5,959.00/acre and $370.00/acre, respectively. The 1998 Pond Fees for the Sand Creek Drainage Basin are $352.00/acre (Land) and $1,384.00/acre (Facilities

The overall fees for the First and Main Town Center project are based on 133 acres.

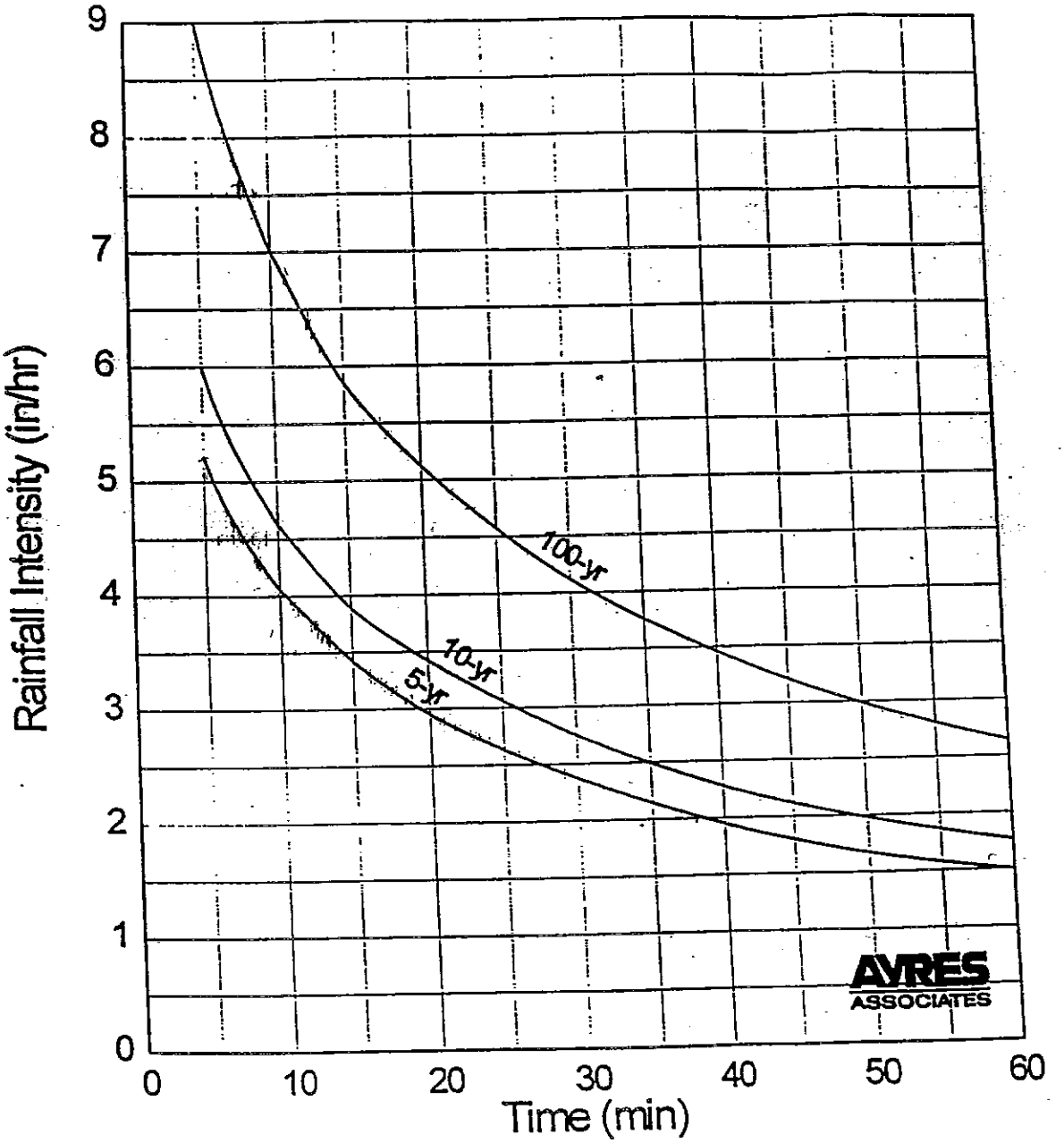
	Acres	$ Per Acre Fee	Total
Drainage Fees:	133	$5,959.00	$ 792,547.00
Bridge Fees:	133	$ 370.00	$ 49,210.00
Pond Fees (Land):	133	$ 352.00	$ 46,816.00
Pond Fees (Facilities):	133	$1,384.00	$ 184,072.00
			$1,072,645.00

A pond surcharge of $914.00/acre is currently being assessed on all Stetson Hills property and Springs Ranch property. The only portion of the First and Main Town Center Development which is within the Stetson Hills or Springs Ranch developments is Tutt Boulevard.

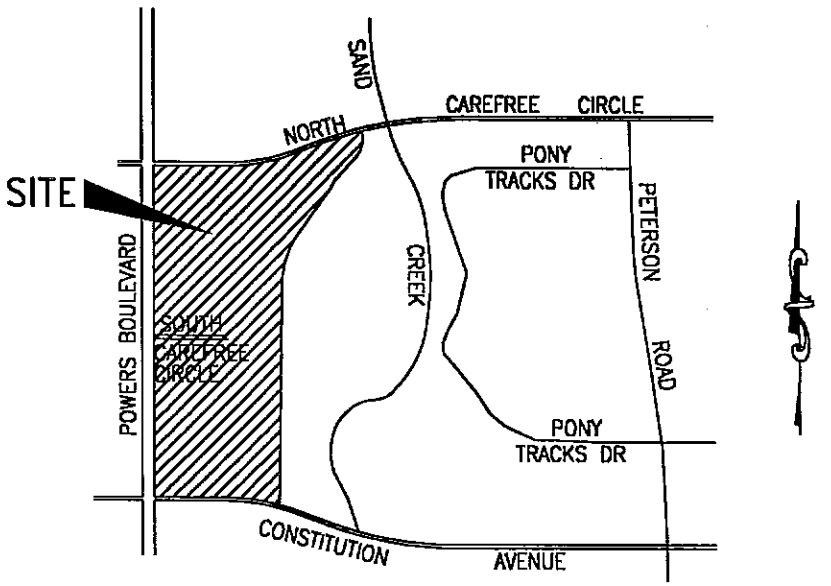
Proposed Sand Creek Detention Pond #1

Exhibit 4 shows the proposed preliminary grading for Sand Creek Detention Pond # 1. This pond will be constructed by others within the next 6 to 9 years, or possibly earlier, depending on the upstream development rate. The proposed grading indicates a "dam" to be constructed along the north side of Constitution Avenue with a spillway elevation of approximately 6410. As shown on Exhibit 4, the proposed "dam" wraps around to the west side of the pond which is the east side of Tutt Boulevard. The proposed top of dam at this point is approximately 6414 and the intersection of Tutt Boulevard and Constitution Avenue sets at elevation 6406.

APPENDIX



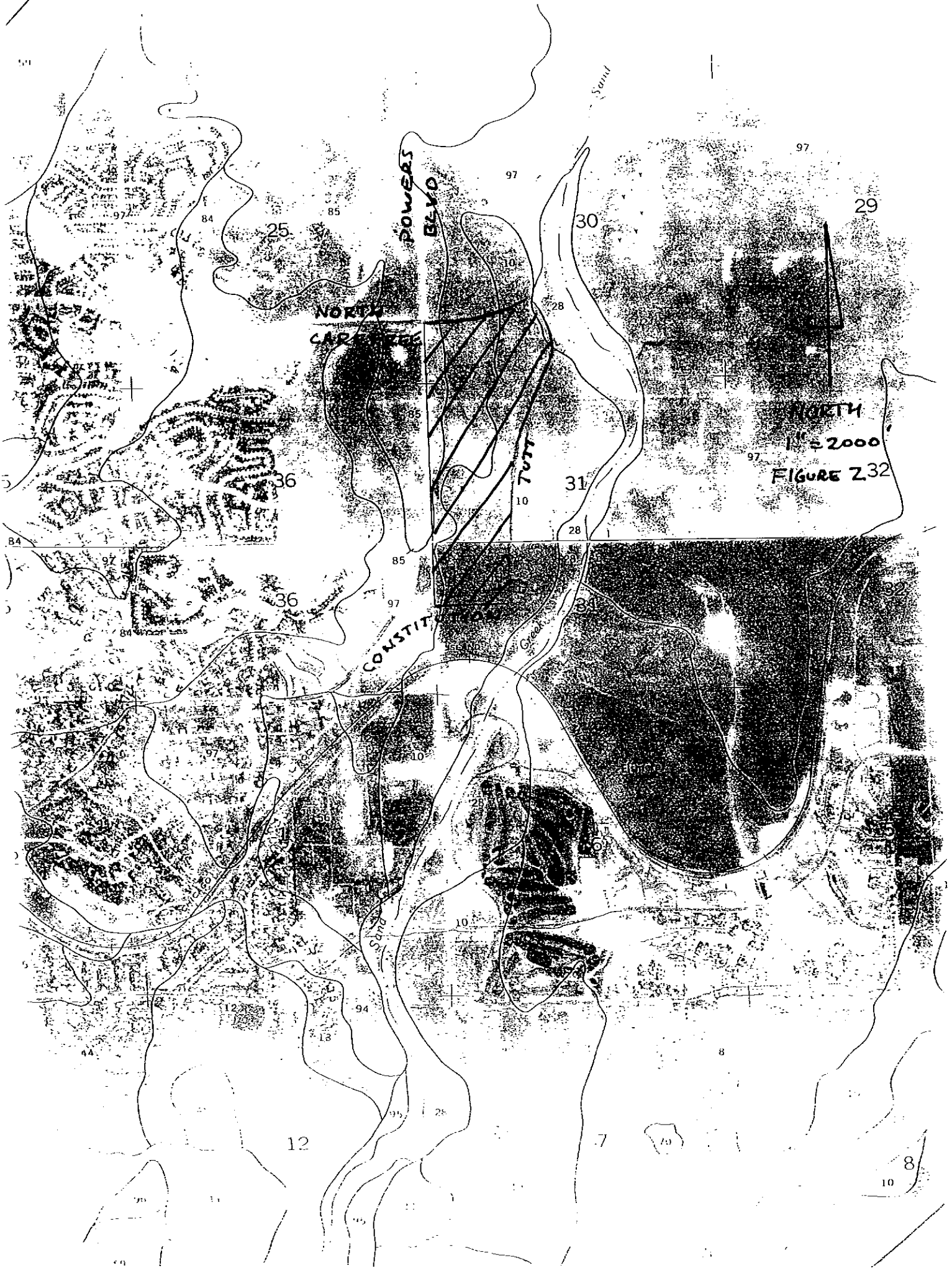
Interim Release October 12, 1994 , Rainfall Intensity Curves
City Of Colorado Springs Drainage Criteria Manual



Vicinity Map

NOT TO SCALE

FIGURE 1


POWERS BLVD
NORTH CARR CREEK
TUTT
CONSTITUTION
Great Sand
NORTH
1" = 2000'
FIGURE 2.32
25
30
29
36
31
32
34
12
7
8

drology

Location: H-1
Area: 39.91 Ac.
Soil or Land Use: A & B

Runoff Coefficient, C:

Area Zone	Area	C5	C100	%Area
PASTURE	36.60	0.25	0.35	90 %
CHURCH	2.4	0.80	0.90	6 %
STREET	1.6	0.90	0.90	4 %

Composite: C5 0.31 C100 0.41 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	1000	2 %		40.0
SWALE	1700	1.6%	1.8	15.7

T_c Total: 55.7

Intensity, I (inches/hr) from Fig 5-1

I5: 1.6 in/hr I100 2.8 in/hr

Peak Flow: Q = CIA in cfs

Q5 19.8 cfs Q100: 45.8 cfs

Hydrology

Location: H-2
Area: 3.58 Ac.
Soil or Land Use:

Runoff Coefficient, C:

Area Zone	Area	C5	C100	%Area
STREET	3.04	0.90	0.90	85%
LANDSCAPING	0.54	0.25	0.35	15 %

Composite: C5 0.80 C100 0.82 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	20	2%		5.7
STREET	1800	3%	3.5	8.6

T_c Total: 14.3

Intensity, I (inches/hr) from Fig 5-1

I5: 3.5 in/hr I100 6.0 in/hr

Peak Flow: Q = CIA in cfs

Q5 10.0 cfs Q100: 17.6 cfs

drology

Location: H-3
Area: 35.19 Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	C5	C100	%Area
PASTURE	0.25	0.35	100 %

Composite: C5 0.25 C100 0.35 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	1000	4 %		31.8
SWALE	1700	3 %	2.7	10.5

T_c Total: 42.3

Intensity, I (inches/hr) from Fig 5-1

I5: 1.9 in/hr I100 3.3 in/hr

Peak Flow: Q = CIA in cfs

Q5 16.7 cfs Q100: 40.6 cfs

Hydrology

Location: H-4
Area: 17.55 Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	C5	C100	%Area
PASTURE	0.25	0.35	100 %

Composite: C5 0.25 C100 0.35 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	1000	4%		31.8
SWALE	550	2.5%	2.5	3.7

T_c Total: 35.5

Intensity, I (inches/hr) from Fig 5-1

I5: 2.2 in/hr I100 3.7 in/hr

Peak Flow: Q = CIA in cfs

Q5 9.7 cfs Q100: 22.7 cfs

drology

Location: H-5
Area: 6.51 Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	AREA	C5	C100	%Area
STREET	4.51	0.90	0.90	69%
LANDSCAPING	2.0	0.25	0.35	31%

Composite: C5 0.70 C100 0.73 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	30	5%		5.1
STREET	1500	3.6%	4.0	6.3

T_c Total: 11.4

Intensity, I (inches/hr) from Fig 5-1

I5: 3.9 in/hr I100 6.8 in/hr

Peak Flow: Q = CIA in cfs

Q5 17.8 cfs Q100: 32.3 cfs

Hydrology

Location: H-6
Area: 1.71 Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	C5	C100	%Area
STREET	0.90	0.90	80%
LANDSCAPING	0.25	0.35	20%

Composite: C5 0.77 C100 0.79 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	30	2%		6.9
STREET	600	1%	2	5.0

T_c Total: 11.9

Intensity, I (inches/hr) from Fig 5-1

I5: 3.9 in/hr I100 6.8 in/hr

Peak Flow: Q = CIA in cfs

Q5 5.1 cfs Q100: 9.2 cfs

drology

Location: H-7
Area: 3.47 Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	AREA	C5	C100	%Area
STREET	0.94	0.90	0.90	27.1%
PASTURE	2.53	0.25	0.35	72.9%

Composite: C5 0.43 C100 0.50 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	600	4%		24.6

T_c Total: 24.6

Intensity, I (inches/hr) from Fig 5-1

I5: 2.6 in/hr I100 4.6 in/hr

Peak Flow: Q = CIA in cfs

Q5 3.9 cfs Q100: 8.0 cfs

Hydrology

Location: H-8
Area: 1.26 Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	C5	C100	%Area
STREET	0.90	0.90	80%
LANDSCAPING	0.25	0.35	20%

Composite: C5 0.77 C100 0.79 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	700	1%	2.0	5.8

T_c Total: 5.8

Intensity, I (inches/hr) from Fig 5-1

I5: 5.0 in/hr I100 8.7 in/hr

Peak Flow: Q = CIA in cfs

Q5 4.9 cfs Q100: 8.7 cfs

drology

Location: H-9
Area: 1.78 Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	Area	C5	C100	%Area
STREET	0.69	0.90	0.90	39%
PASTURE	1.09	0.25	0.35	61%

Composite: C5 0.50 C100 0.56 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	140	2%		15.0

T_c Total: 15.0

Intensity, I (inches/hr) from Fig 5-1

I5: 3.4 in/hr I100 5.8 in/hr

Peak Flow: Q = CIA in cfs

Q5 3.0 cfs Q100: 5.8 cfs

Hydrology

Location: H-10
Area: 34.17 Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	C5	C100	%Area
PASTURE	0.25	0.35	100%

Composite: C5 0.25 C100 0.35 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	1000	2%		40.0
SWALE	850	2%	2.1	6.7

T_c Total: 46.7

Intensity, I (inches/hr) from Fig 5-1

I5: 1.8 in/hr I100 3.1 in/hr

Peak Flow: Q = CIA in cfs

Q5 15.4 cfs Q100: 37.1 cfs

''vdrology

Location: H-11
Area: 4.19 Ac.
Soil or Land Use:

Runoff Coefficient, C:

Area Zone	AREA	C5	C100	%Area
STREET	3.35	0.90	0.90	80 %
LANDSCAPING	0.84	0.25	0.35	20 %

Composite: C5 0.77 C100 0.79 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	30	2%		6.9
STREET	1500	2.5%	3.1	8.1

T_c Total: 15.0

Intensity, I (inches/hr) from Fig 5-1

I5: 3.4 in/hr I100 5.8 in/hr

Peak Flow: Q = CIA in cfs

Q5 11.0 cfs Q100: 19.2 cfs

Hydrology

Location: H-12
Area: 0.96 Ac.
Soil or Land Use:

Runoff Coefficient, C:

Area Zone		C5	C100	%Area
STREET	0.82	0.90	0.90	85 %
LANDSCAPING	0.14	0.25	0.35	15 %

Composite: C5 0.80 C100 0.82 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	40'	3%		7.0
STREET	500	2.5%	3.1	2.7

T_c Total: 9.7

Intensity, I (inches/hr) from Fig 5-1

I5: 4.1 in/hr I100 7.1 in/hr

Peak Flow: Q = CIA in cfs

Q5 3.1 cfs Q100: 5.6 cfs

drology

Location: H-13
Area: 23.42 Ac.
Soil or Land Use:

Runoff Coefficient, C:

Area Zone	C5	C100	%Area
PASTURE	0.25	0.35	100%

Composite: C5 0.25 C100 0.35 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	1000	1.2%		47.3
SWALE	800	3%	2.7	4.9

T_c Total: 52.2

Intensity, I (inches/hr) from Fig 5-1

I5: 1.6 in/hr I100 2.9 in/hr

Peak Flow: Q = CIA in cfs

Q5 9.4 cfs Q100: 23.8 cfs

Hydrology

Location: H-14
Area: 1.16 Ac.
Soil or Land Use:

Runoff Coefficient, C:

Area Zone	C5	C100	%Area
STREET	0.90	0.90	85%
LANDSCAPING	0.25	0.35	15%

Composite: C5 0.80 C100 0.82 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	20	2%		5.7
STREET	500	1%	2.0	4.2

T_c Total: 9.9

Intensity, I (inches/hr) from Fig 5-1

I5: 4.1 in/hr I100 7.1 in/hr

Peak Flow: Q = CIA in cfs

Q5 3.8 cfs Q100: 6.8 cfs

Hydrology

Location: Historic Design Point #1
Area: 60.96 Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	Area	C5	C100	%Area
H-3	35.19	0.25	0.35	57.7 %
H-4	17.55	0.25	0.35	28.8 %
H-5	6.51	0.70	0.73	10.7 %
H-6	1.71	0.77	0.79	2.8 %
	60.96			

Composite: C5 0.31 C100 0.40 100%

Time of Concentration: T_c in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
Use Basin H-3				42.3

T_c Total: 42.3

Intensity, I (inches/hr) from Fig 5-1

I5: 1.9 in/hr I100 3.3 in/hr

Peak Flow: Q = CIA in cfs

Q5 35.9 cfs Q100: 80.5 cfs

Hydrology

Location: Historic Design Pt. #2
Area: 39.32 Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	Area	C5	C100	%Area
H-10	34.17	0.25	0.35	86.9 %
H-11	4.19	0.77	0.79	10.7 %
H-12	0.96	0.80	0.82	2.4 %
	39.32			

Composite: C5 0.32 C100 0.41 100%

Time of Concentration: T_c in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
Use H-10				46.7

T_c Total: 46.7

Intensity, I (inches/hr) from Fig 5-1

I5: 1.8 in/hr I100 3.1 in/hr

Peak Flow: Q = CIA in cfs

Q5 16.4 cfs Q100: 50.0 cfs

Hydrology

Location: I
Area: 3.58 Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	Area	C5	C100	%Area
STREET	3.04	0.90	0.90	85%
LANDSCAPING	0.54	0.25	0.35	15%

Composite: C5 0.80 C100 0.82 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	20	2%		5.7
STREET	1800	3%	3.5	8.6

T_c Total: 14.3

Intensity, I (inches/hr) from Fig 5-1

I5: 3.5 in/hr I100 6.0 in/hr

Peak Flow: Q = CIA in cfs

Q5 10.0 cfs Q100: 17.6 cfs

Hydrology

Location: II
Area: 16.03 Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	C5	C100	%Area	Area
STREETS	0.90	0.90	8.7%	1.40
OPEN SPACE	0.25	0.35	5.0%	0.80
OFFICE	0.75	0.80	43.0%	6.89
RESIDENTIAL	0.60	0.70	43.3%	6.94

Composite: C5 0.67 C100 0.74 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	250	5.6%		14.2
STREET	500	1.6%	2.5	3.3

T_c Total: 17.5

Intensity, I (inches/hr) from Fig 5-1

I5: 3.2 in/hr I100 5.4 in/hr

Peak Flow: Q = CIA in cfs

Q5 34.4 cfs Q100: 64.1 cfs

Hydrology

Location: III
Area: 5.03 Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	Area	C5	C100	%Area
PARKING	4.53	0.90	0.90	90%
LANDSCAPING	0.50	0.25	0.35	10%

Composite: C5 0.83 C100 0.85 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	30	2%		6.9
SWALE	600	2.6%	3.2	3.1

T_c Total: 10.0

Intensity, I (inches/hr) from Fig 5-1

I5: 4.0 in/hr I100 7.0 in/hr

Peak Flow: Q = CIA in cfs

Q5 16.7 cfs Q100: 29.9 cfs

Hydrology

Location: IV
Area: 7.82 Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	Area	C5	C100	%Area
PARKING	4.61	0.90	0.90	59%
LANDSCAPING	0.51	0.25	0.35	6.5%
BLDG	2.70	0.90	0.90	34.5%
	7.82			

Composite: C5 0.86 C100 0.86 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	30	2%		6.9
STREET	650	2.2%	3.0	3.6

T_c Total: 10.5

Intensity, I (inches/hr) from Fig 5-1

I5: 3.9 in/hr I100 6.9 in/hr

Peak Flow: Q = CIA in cfs

Q5 26.2 cfs Q100: 46.4 cfs

l. .rology

Location: I
Area: 3.45 Ac.
Soil or Land Use:

Runoff Coefficient, C:

Area Zone	Area	C5	C100	%Area
BLDG	1.34	0.90	0.90	38.8 %
LANDSCAPING	0.21	0.25	0.35	6.1 %
PARKING	1.90	0.90	0.90	55.1 %

Composite: C5 0.86 C100 0.87 100%

Time of Concentration: T_c in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	40	2%		8.0
STREET	300	3.3%	3.8	1.3

T_c Total: 9.3

Intensity, I (inches/hr) from Fig 5-1

I5: 4.1 in/hr I100 7.1 in/hr

Peak Flow: Q = CIA in cfs

Q5 12.2 cfs Q100: 21.3 cfs

Hydrology

Location: II
Area: 7.59 Ac.
Soil or Land Use:

Runoff Coefficient, C:

Area Zone	Area	C5	C100	%Area
BLDG	1.77	0.90	0.90	23.3 %
LANDSCAPING	0.58	0.25	0.35	7.6 %
PARKING	5.24	0.90	0.90	69.1 %

Composite: C5 0.85 C100 0.86 100%

Time of Concentration: T_c in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	40	2%		8.0
STREET	725	2.5%	3.1	3.9

T_c Total: 11.9

Intensity, I (inches/hr) from Fig 5-1

I5: 3.8 in/hr I100 6.5 in/hr

Peak Flow: Q = CIA in cfs

Q5 24.5 cfs Q100: 42.4 cfs

F. rology

Location: VII
Area: 3.61 Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	Area	C5	C100	%Area
BLDG	0.58	0.90	0.90	16.1%
LANDSCAPING	0.30	0.25	0.35	8.3%
PARKING	2.73	0.90	0.90	75.6%

Composite: C5 0.84 C100 0.85 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	40.0	2%		8.0
STREET	300	3.3	3.8	1.3

T_c Total: 9.3

Intensity, I (inches/hr) from Fig 5-1

I5: 4.1 in/hr I100 7.1 in/hr

Peak Flow: Q = CIA in cfs

Q5 12.4 cfs Q100: 21.8 cfs

Hydrology

Location: VIII
Area: 4.58 Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	Area	C5	C100	%Area
STREET	1.31	0.90	0.90	28.6%
LANDSCAPING	3.27	0.25	0.35	71.4%

Composite: C5 0.44 C100 0.51 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	150	1.5%		17.0
STREET	1600	1.5%	2.5	10.7

T_c Total: 27.7

Intensity, I (inches/hr) from Fig 5-1

I5: 2.5 in/hr I100 4.3 in/hr

Peak Flow: Q = CIA in cfs

Q5 5.0 cfs Q100: 10.0 cfs

Hydrology

Location: TX
Area: 8.59 Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	AREA	C5	C100	%Area
BLDG	3.06	0.90	0.90	35.6 %
PARKING	4.98	0.90	0.90	58.0 %
LANDSCAPING	0.55	0.25	0.35	6.4 %

Composite: C5 0.86 C100 0.86 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	80	30%		4.6
STREET	1250	2.5%	3.1	6.7

T_c Total: 11.3

Intensity, I (inches/hr) from Fig 5-1

I5: 3.9 in/hr I100 6.7 in/hr

Peak Flow: Q = CIA in cfs

Q5 28.8 cfs Q100: 49.5 cfs

Hydrology

Location: X
Area: 5.72 Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	AREA	C5	C100	%Area
BLDG	0.24	0.90	0.90	4.2%
PARKING	4.93	0.90	0.90	86.2 %
LANDSCAPING	0.55	0.25	0.35	9.6 %

Composite: C5 0.84 C100 0.85 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	80	30%		4.6
STREET	925	3.0%	3.5	4.4

T_c Total: 9.0

Intensity, I (inches/hr) from Fig 5-1

I5: 4.2 in/hr I100 7.2 in/hr

Peak Flow: Q = CIA in cfs

Q5 20.2 cfs Q100: 35.0 cfs

Hydrology

Location: XI
Area: 4.20 Ac.
Soil or Land Use:

Runoff Coefficient, C:

Area Zone	Area	C5	C100	%Area
PARKING		0.90	0.90	90 %
LANDSCAPING		0.25	0.35	10 %
	4.20			

Composite: C5 0.84 C100 0.85 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	80	30 %		4.6
STREET	400	2.1%	2.9	2.3

T_c Total: 6.9

Intensity, I (inches/hr) from Fig 5-1

I5: 4.7 in/hr I100 8.5 in/hr

Peak Flow: Q = CIA in cfs

Q5 16.6 cfs Q100: 30.3 cfs

Hydrology

Location: XII
Area: 18.08 Ac.
Soil or Land Use:

Runoff Coefficient, C:

Area Zone	Area	C5	C100	%Area
BLDG	4.59	0.90	0.90	25.4 %
PARKING	12.14	0.90	0.90	67.1 %
LANDSCAPING	1.35	0.25	0.35	7.5 %
	18.08			

Composite: C5 0.85 C100 0.86 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	30	5 %		5.1
STREET	850	2.4%	3.0	4.7

T_c Total: 9.8

Intensity, I (inches/hr) from Fig 5-1

I5: 4.0 in/hr I100 7.0 in/hr

Peak Flow: Q = CIA in cfs

Q5 61.5 cfs Q100: 108.8 cfs

Hydrology

Location: XIII
Area: 4.63 Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	Area	C5	C100	%Area
STREETS	2.32	0.90	0.90	90%
LANDSCAPING	0.26	0.25	0.35	10%

Composite: C5 0.83 C100 0.85 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	30	2%		6.9
STREET	400	4%	4.0	1.7

T_c Total: 8.6

Intensity, I (inches/hr) from Fig 5-1

I5: 4.3 in/hr I100 7.4 in/hr

Peak Flow: Q = CIA in cfs

Q5 16.5 cfs Q100: 29.1 cfs

Hydrology

Location: XIV
Area: 10.62 Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	Area	C5	C100	%Area
BLDG	2.54	0.90	0.90	23.9%
LANDSCAPING	0.81	0.25	0.35	7.6%
PARKING	7.27	0.90	0.90	68.5%
	10.62			

Composite: C5 0.85 C100 0.86 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	130	2%		14.4
STREET	800	2.8%	3.4	3.9

T_c Total: 18.3

Intensity, I (inches/hr) from Fig 5-1

I5: 3.1 in/hr I100 5.3 in/hr

Peak Flow: Q = CIA in cfs

Q5 28.0 cfs Q100: 48.4 cfs

Hydrology

Location: XV
Area: 4.70 Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	Area	C5	C100	%Area
STREET	3.76	0.90	0.90	80%
LANDSCAPING	0.94	0.25	0.35	20%

Composite: C5 0.77 C100 0.79 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	20	2%		5.7
STREET	2300	3.5%	4.0	9.6

T_c Total: 15.3

Intensity, I (inches/hr) from Fig 5-1

I5: 3.4 in/hr I100 5.8 in/hr

Peak Flow: Q = CIA in cfs

Q5 12.3 cfs Q100: 21.5 cfs

Hydrology

Location: XVI
Area: 1.71 Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	C5	C100	%Area
STREET	0.90	0.90	80%
LANDSCAPING	0.25	0.35	20%

Composite: C5 0.77 C100 0.79 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	30	2%		6.9
STREET	600	1%	2	5.0

T_c Total: 11.9

Intensity, I (inches/hr) from Fig 5-1

I5: 3.9 in/hr I100 6.8 in/hr

Peak Flow: Q = CIA in cfs

Q5 5.1 cfs Q100: 9.2 cfs

Hydrology

Location: XVII
Area: 0.94 Ac.
Soil or Land Use:

Runoff Coefficient, C:

Area Zone	C5	C100	%Area
STREET	0.90	0.90	100%

Composite: C5 0.90 C100 0.90 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
STREET	600	1%	2.0	5.0

T_c Total: 5.0

Intensity, I (inches/hr) from Fig 5-1

I5: 5.2 in/hr I100 9.0 in/hr

Peak Flow: Q = CIA in cfs

Q5 4.4 cfs Q100: 7.6 cfs

Hydrology

Location: XVIII
Area: 1.22 Ac.
Soil or Land Use:

Runoff Coefficient, C:

Area Zone	Area	C5	C100	%Area
STREET	0.67	0.90	0.90	54.9%
LANDSCAPING	0.55	0.25	0.35	45.1%

Composite: C5 0.61 C100 0.65 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	300	3%		19.1

T_c Total: 19.1

Intensity, I (inches/hr) from Fig 5-1

I5: 3.0 in/hr I100 5.2 in/hr

Peak Flow: Q = CIA in cfs

Q5 2.2 cfs Q100: 4.1 cfs

Hydrology

Location: XIX
Area: 1.26 Ac.
Soil or Land Use:

Runoff Coefficient, C:

Area Zone	Area	C5	C100	%Area
STREET		0.90	0.90	80%
LANDSCAPING		0.25	0.35	20%

Composite: C5 0.77 C100 0.79 100%

Time of Concentration: T_c in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
STREET	700	1%	2.0	5.8

T_c Total: 5.8

Intensity, I (inches/hr) from Fig 5-1

I5: 5.0 in/hr I100 8.7 in/hr

Peak Flow: Q = CIA in cfs

Q5 4.9 cfs Q100: 8.7 cfs

Hydrology

Location: XX
Area: 0.93 Ac.
Soil or Land Use:

Runoff Coefficient, C:

Area Zone	Area	C5	C100	%Area
STREET		0.90	0.90	80%
LANDSCAPING		0.25	0.35	20%

Composite: C5 0.77 C100 0.79 100%

Time of Concentration: T_c in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
STREET	500	1%	2.0	4.2

T_c Total: USE 5.0

Intensity, I (inches/hr) from Fig 5-1

I5: 5.2 in/hr I100 9.0 in/hr

Peak Flow: Q = CIA in cfs

Q5 3.7 cfs Q100: 6.6 cfs

F `rology

Location: XXI
Area: 2.80 Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	Area	C5	C100	%Area
OFFICE	2.34	0.75	0.80	83.6 %
STREET	0.36	0.90	0.90	12.9 %
LANDSCAPING	0.10	0.25	0.35	3.5 %

Composite: C5 0.75 C100 0.80 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	40	2%		8.0
STREET	450	1%	2.0	3.8

T_c Total: 11.8

Intensity, I (inches/hr) from Fig 5-1

I5: 3.8 in/hr I100 6.5 in/hr

Peak Flow: Q = CIA in cfs

Q5 8.0 cfs Q100: 14.6 cfs

Hydrology

Location: XXII
Area: 9.18 Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	Area	C5	C100	%Area
FUTURE COMM.	5.42	0.85	0.87	59.0 %
STREET/PUBL	3.38	0.90	0.90	36.8 %
LANDSCAPING	0.38	0.25	0.35	4.2 %
	9.18			

Composite: C5 0.84 C100 0.86 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	40	2%		8.0
STREET	1000	2.4%	3.0	6.9

T_c Total: 14.9

Intensity, I (inches/hr) from Fig 5-1

I5: 3.5 in/hr I100 5.9 in/hr

Peak Flow: Q = CIA in cfs

Q5 27.0 cfs Q100: 46.6 cfs

Hydrology

Location: XXIII
Area: 2.45 Ac.
Soil or Land Use:

Runoff Coefficient, C:

Area Zone	AREA	C5	C100	%Area
STREET	1.95	0.90	0.90	79.5 %
LANDSCAPING	0.50	0.25	0.35	20.5 %

Composite: C5 0.77 C100 0.79 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	200	2%		17.9
STREET	1800	1.6%	2.5	12.0

T_c Total: 29.9

Intensity, I (inches/hr) from Fig 5-1

I5: 2.4 in/hr I100 4.1 in/hr

Peak Flow: Q = CIA in cfs

Q5 4.5 cfs Q100: 7.9 cfs

Hydrology

Location: XXIV
Area: 9.49 Ac.
Soil or Land Use:

Runoff Coefficient, C:

Area Zone	AREA	C5	C100	%Area
BLDG	3.34	0.90	0.90	35.2 %
STREET/PKG	5.54	0.90	0.90	58.4 %
LANDSCAPING	0.61	0.25	0.35	6.4 %
	9.49			

Composite: C5 0.86 C100 0.87 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	40	2%		8.0
STREET	825	1.5%	2.5	5.5

T_c Total: 13.5

Intensity, I (inches/hr) from Fig 5-1

I5: 3.6 in/hr I100 6.1 in/hr

Peak Flow: Q = CIA in cfs

Q5 29.4 cfs Q100: 50.4 cfs

Hydrology

Location: XXV
Area: 9.86 Ac.
Soil or Land Use:

Runoff Coefficient, C:

Area Zone	Area	C5	C100	%Area
BLDG	4.56	0.90	0.90	46.3 %
PARKING	1.68	0.90	0.90	17.0 %
LANDSCAPING	0.19	0.25	0.35	1.9 %
FUTURE COMM	3.43	0.85	0.87	34.8 %
	9.86			

Composite: C5 0.87 C100 0.88 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	50	8 %		5.7
STREET	600	1.8%	2.7	3.7

T_c Total: 9.4

Intensity, I (inches/hr) from Fig 5-1

I5: 4.1 in/hr I100 7.1 in/hr

Peak Flow: Q = CIA in cfs

Q5 35.2 cfs Q100: 61.6 cfs

Hydrology

Location: XXVI
Area: 6.63 Ac.
Soil or Land Use:

Runoff Coefficient, C:

Area Zone	Area	C5	C100	%Area
BLDG	0.91	0.90	0.90	13.7 %
PARKING	5.15	0.90	0.90	77.7 %
LANDSCAPING	0.57	0.25	0.35	8.6 %
	6.63			

Composite: C5 0.84 C100 0.85 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	100	2 %		12.6
STREET	1400	1.5%	2.5	9.3

T_c Total: 21.9

Intensity, I (inches/hr) from Fig 5-1

I5: 2.4 in/hr I100 4.9 in/hr

Peak Flow: Q = CIA in cfs

Q5 13.7 cfs Q100: 27.6 cfs

Hydrology

Location: XXVII
Area: 8.31 Ac.
Soil or Land Use:

Runoff Coefficient, C:

Area Zone	AREA	C5	C100	%Area
PARKING	7.48	0.90	0.90	90%
LANDSCAPING	0.83	0.25	0.35	10%

Composite: C5 0.83 C100 0.85 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	20	2%		5.7
STREET	1100	1.6%	2.5	7.3

T_c Total: 13.0

Intensity, I (inches/hr) from Fig 5-1

I5: 3.6 in/hr I100 6.3 in/hr

Peak Flow: Q = CIA in cfs

Q5 24.8 cfs Q100: 44.5 cfs

Hydrology

Location: XXVIII
Area: 5.47 Ac.
Soil or Land Use:

Runoff Coefficient, C:

Area Zone	AREA	C5	C100	%Area
BLDG	0.53	0.90	0.90	9.7%
PARKING	4.45	0.90	0.90	81.4%
LANDSCAPING	0.49	0.25	0.35	8.9%
	5.47			

Composite: C5 0.84 C100 0.85 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	65	2%		10.2
STREET	300	1.5%	2.5	2.0

T_c Total: 12.2

Intensity, I (inches/hr) from Fig 5-1

I5: 3.8 in/hr I100 6.4 in/hr

Peak Flow: Q = CIA in cfs

Q5 17.5 cfs Q100: 29.8 cfs

I rology

Location: XXIX
Area: 4.97 Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	AREA	C5	C100	%Area
BLDG	0.24	0.90	0.90	4.8 %
PARKING	1.86	0.90	0.90	37.4 %
LANDSCAPING	0.21	0.25	0.35	4.2 %
OFFICE	2.66	0.75	0.80	53.5 %
	4.97			

Composite: C5 0.79 C100 0.82 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	90	2%		12.0
STREET	500	1.5%	2.5	3.3

T_c Total: 15.3

Intensity, I (inches/hr) from Fig 5-1

I5: 3.4 in/hr I100 5.8 in/hr

Peak Flow: Q = CIA in cfs

Q5 13.3 cfs Q100: 23.6 cfs

Hydrology

Location: XXX
Area: 4.19 Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	AREA	C5	C100	%Area
STREET	3.35	0.90	0.90	80 %
LANDSCAPING	0.84	0.25	0.35	20 %

Composite: C5 0.77 C100 0.79 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	30	2%		6.9
STREET	1500	2.5%	3.1	8.1

T_c Total: 15.0

Intensity, I (inches/hr) from Fig 5-1

I5: 3.4 in/hr I100 5.8 in/hr

Peak Flow: Q = CIA in cfs

Q5 11.0 cfs Q100: 19.2 cfs

Hydrology

Location: XXXT
Area: 0.96 Ac.
Soil or Land Use:

Runoff Coefficient, C:

Area Zone		C5	C100	%Area
STREET	0.82	0.90	0.90	85 %
LANDSCAPING	0.14	0.25	0.35	15 %

Composite: C5 0.80 C100 0.82 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	40	3%		7.0
STREET	500	2.5%	3.1	2.7

T_c Total: 9.7

Intensity, I (inches/hr) from Fig 5-1

I5: 4.1 in/hr I100 7.1 in/hr

Peak Flow: Q = CIA in cfs

Q5 3.1 cfs Q100: 5.6 cfs

Hydrology

Location: XXXII
Area: 1.16 Ac.
Soil or Land Use:

Runoff Coefficient, C:

Area Zone	C5	C100	%Area
STREET	0.90	0.90	85 %
LANDSCAPING	0.25	0.35	15 %

Composite: C5 0.80 C100 0.82 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
OVERLAND	20	2%		5.7
STREET	500	1%	2.0	4.2

T_c Total: 9.9

Intensity, I (inches/hr) from Fig 5-1

I5: 4.1 in/hr I100 7.1 in/hr

Peak Flow: Q = CIA in cfs

Q5 3.8 cfs Q100: 6.8 cfs

Hydrology

Location: Design Pt #1
Area: 32.33 Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	AREA	C5	C100	%Area
II	16.03	0.67	0.74	49.6%
III	5.03	0.83	0.85	15.6%
IV	7.82	0.86	0.86	24.2%
V	3.45	0.86	0.87	10.6%
	32.33			

Composite: C5 0.76 C100 0.80 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
Basin II				17.5
Pipe Flow	2000'	1%	10	3.3

T_c Total: 20.8

Intensity, I (inches/hr) from Fig 5-1

I5: 2.9 in/hr I100 5.0 in/hr

Peak Flow: Q = CIA in cfs

Q5 71.3 cfs Q100: 129.3 cfs

Hydrology

Location: Design Pt #2
Area: 43.53 Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	AREA	C5	C100	%Area
Design Pt #1	32.33	0.76	0.80	74.3%
VI	7.59	0.85	0.86	17.4%
VII	3.61	0.84	0.85	8.3%
	43.53			

Composite: C5 0.78 C100 0.81 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
				20.8
Pipe Flow	900	1%	10	1.5

T_c Total: 22.3

Intensity, I (inches/hr) from Fig 5-1

I5: 2.8 in/hr I100 4.8 in/hr

Peak Flow: Q = CIA in cfs

Q5 95.1 cfs Q100: 169.2 cfs

H, .ology

Location: DESIGN PT #3
Area: 41.22 Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	AREA	C5	C100	%Area
IX	8.59	0.86	0.86	20,8 %
X	5.72	0.84	0.85	13,9 %
XI	4.20	0.84	0.85	10.2 %
XII	18.08	0.85	0.86	43.9 %
XIII	4.63	0.83	0.85	11.2 %

Composite: C5 0.85 C100 0.86 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
BASIN IX				11.3
STREET	2000	2%	2.8	11.9

T_c Total: 23.2

Intensity, I (inches/hr) from Fig 5-1

I5: 2.7 in/hr I100 4.7 in/hr

Peak Flow: Q = CIA in cfs

Q5 94.6 cfs Q100: 166.6 cfs

Hydrology

Location: DESIGN PT #4
Area: 6.41 Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	AREA	C5	C100	%Area
XV	4.70	0.77	0.79	
XVI	1.71	0.77	0.79	
	6.41			

Composite: C5 0.77 C100 0.79 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
BASIN XV				15.3
STREET	750	1%	2	6.2

T_c Total: 21.5

Intensity, I (inches/hr) from Fig 5-1

I5: 2.8 in/hr I100 4.9 in/hr

Peak Flow: Q = CIA in cfs

Q5 13.8 cfs Q100: 24.8 cfs

Hydrology

Location: DESIGN PT 3A
Area: _____ Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	Area	C5	C100	%Area
OP "2	43.53	0.78	0.81	88.2%
VIII	4.58	0.44	0.51	9.3%
XVIII	1.22	0.61	0.65	2.5%
	49.33			

Composite: C5 0.74 C100 0.78 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
DESIGN PT "2				22.3

T_c Total: 22.3

Intensity, I (inches/hr) from Fig 5-1

I5: 2.8 in/hr I100 4.8 in/hr

Peak Flow: Q = CIA in cfs

Q5 102.2 cfs Q100: 184.7 cfs

Hydrology

Location: _____
Area: _____ Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	C5	C100	%Area

Composite: C5 C100 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c

T_c Total: _____

Intensity, I (inches/hr) from Fig 5-1

I5: in/hr I100 in/hr

Peak Flow: Q = CIA in cfs

Q5 cfs Q100: cfs

Hydrology

Location: DESIGN POINT #5
Area: 5.80 Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	AREA	C5	C100	%Area
VIII	4.58	0.44	0.51	79.0 %
XVIII	1.22	0.61	0.65	21.0 %
	5.80			

Composite: C5 0.48 C100 0.54 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
BASIN VIII				27.7
SHEET	900	1%	2	7.5

T_c Total: 35.2

Intensity, I (inches/hr) from Fig 5-1

I5: 2.1 in/hr I100 3.8 in/hr

Peak Flow: Q = CIA in cfs

Q5 5.9 cfs Q100: 11.9 cfs

Hydrology

Location: DESIGN PT #6
Area: 5.15 Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	AREA	C5	C100	%Area
XXX	4.19	0.77	0.79	81.4 %
XXX1	0.96	0.80	0.82	18.6 %
	5.15			

Composite: C5 0.78 C100 0.80 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c

T_c Total: 15.0

Intensity, I (inches/hr) from Fig 5-1

I5: 3.4 in/hr I100 5.8 in/hr

Peak Flow: Q = CIA in cfs

Q5 13.7 cfs Q100: 23.9 cfs

Hydrology

Location: DESIGN PT #7
Area: 60.09 Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	Area	C5	C100	%Area
XX	0.93	0.77	0.79	1.5 %
XXI	2.80	0.75	0.80	4.7 %
XXII	9.18	0.84	0.86	15.3 %
XXIII	2.45	0.77	0.79	4.1 %
XXIV	9.49	0.86	0.87	15.8 %
XXV	9.86	0.87	0.88	16.4 %
XXVI	6.63	0.84	0.85	11.0 %
XXVII	8.31	0.83	0.85	13.9 %
XXVIII	5.47	0.84	0.85	9.0 %
XXIX	4.97	0.79	0.82	8.3 %

Composite: C5 0.83 C100 0.85 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c
BASIN XXVI				21.9
PIPE FLOW	1400	1.5%	15	1.5

T_c Total: 23.4

Intensity, I (inches/hr) from Fig 5-1

I5: 2.7 in/hr I100 4.7 in/hr

Peak Flow: Q = CIA in cfs

Q5 134.7 cfs Q100: 240.0 cfs

Hydrology

Location: _____
Area: _____ Ac.
Soil or Land Use: _____

Runoff Coefficient, C:

Area Zone	C5	C100	%Area

Composite: C5 C100 100%

Time of Concentration: T_c, in minutes:

Travel Type	L(ft)	s%	v(fps)	T_c

T_c Total: _____

Intensity, I (inches/hr) from Fig 5-1

I5: in/hr I100 in/hr

Peak Flow: Q = CIA in cfs

Q5 cfs Q100: cfs

BASIN II

AREA = 16.03

Q_5 = 34.4 cfs Q_{100} = 64.1 cfs

ASSUME 2 SUMP INLETS WITHIN THE INTERIOR OF BASIN II WILL COLLECTS FLOWS WEST OF TUTT. TUTT BOULEVARD COMPRISES APPROXIMATELY 1.50 ACRES OF BASIN II.

$Q_5 = \left(\frac{1.50}{16.03}\right)(34.4)$ $Q_{100} = \left(\frac{1.50}{16.03}\right)(64.1)$

= 3.2 cfs = 6.0 cfs

$Q_5 = (34.4 - 3.2)/2$ $Q_{100} = (64.1 - 6.0)/2$

= 15.6 cfs/SUMP INLET = 29.1 cfs/SUMP INLET

APPROACH FLOWS

ASSUME FLOWS APPROACH INLET EVENLY FROM BOTH SIDES

$$Q = 0.56\left(n\frac{1}{S_x}\right)(S_o)^{1/2} d^{8/3}$$

$$Q_5 = \frac{15.6}{2} = 0.56\left(\frac{1}{(0.016)(0.02)}\right)(0.005)^{1/2} d^{8/3}$$

$d = 0.35$

$$Q_{100} = \frac{29.1}{2} = 0.56\left(\frac{1}{(0.016)(0.02)}\right)(0.005)^{1/2} d^{8/3}$$

$d = 0.45$

TOTAL FLOWS

$$Q = 1.7\left(L_i + 1.8(w)\right)\left(d_{MAX} + 0.33\right)^{1.85}$$

5 yr $\quad 15.6 = 1.7\left(10 + 1.8(3)\right)\left(d_{MAX} + 0.33\right)^{1.85}$ $\quad$ TRY $L = 10'$

$d_{MAX} = 0.43$ $\quad \therefore$ OK

100 yr $\quad 29.1 = 1.7\left(10 + 1.8(3)\right)\left(d_{MAX} + 0.33\right)^{1.85}$

$d_{MAX} = 0.73$ $\quad \therefore$ OK

BASIN TTT

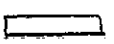
AREA = 5.03

$Q_5 = 16.7$ cfs $\quad$ $Q_{100} = 29.9$ cfs

APPROXIMATELY 0.41 ACRES COMPRISES FUTURE TUTT BLVD.

ASSUME 1 SUMP INLET WILL BE INSTALLED JUST WEST OF TUTT BOULEVARD

WEST $\quad$ EAST



$Q_5 = 15.3$ $\quad$ $Q_5 = 1.4$

$Q_{100} = 27.5$ $\quad$ $Q_{100} = 2.4$

APPROACH FLOW (WORSE CASE)

$$Q_5 = 15.3 = 0.56\left(\frac{1}{(0.016)(0.02)}\right)(0.005)^{1/2} d^{8/3}$$

$$d = 0.46 \qquad \therefore \text{ OK}$$

$$Q_{100} = 27.5 = 0.56\left(\frac{1}{(0.016)(0.02)}\right)(0.005)^{1/2} d^{8/3}$$

$$d = 0.57 \qquad \therefore \text{ OK}$$

TOTAL FLOW

$Q_5 = 16.7$ cfs $\qquad Q_{100} = 29.9$ cfs

$$Q_5 = 16.7 = 1.7\left(10 + 1.8(3)\right)\left(d_{MAX} + 0.33\right)^{1.85} \qquad \text{Try } L = 10'$$

$$d_{MAX} = 0.45 \qquad \therefore \text{ OK}$$

$$Q_{100} = 29.9 = 1.7\left(10 + 1.8(3)\right)\left(d_{MAX} + 0.33\right)^{1.85}$$

$$d_{MAX} = 0.74 \qquad \therefore \text{ OK}$$

BASIN IV

$Q_5 = 26.2$ $\quad Q_{100} = 46.4$

THESE FLOWS WILL ALL BE CONTAINED WITHIN THE PROPOSED PARKING LOT. ASSUME 1 SUMP INLETS WITH FLOWS SPLIT EVENLY.

APPROACH FLOW

$$Q_5 = \frac{26.2}{2} = 13.1 = 0.56\left(\frac{1}{0.016\,(0.02)}\right)(0.005)^{1/2} d^{8/3}$$

$d = 0.43$ $\quad \therefore$ OK

$$Q_{100} = \frac{46.4}{2} = 23.2 = 0.56\left(\frac{1}{0.016\,(0.02)}\right)(0.005)^{1/2} d^{8/3}$$

$d = 0.53$ $\quad \therefore$ OK

TOTAL FLOWS

$$Q_5 = 26.2 = 1.7\left(18 + 1.8(3)\right)\left(d_{MAX} + 0.33\right)^{1.85}$$ TRY $L = 18'$

$d_{MAX} = 0.47$

$$Q_{100} = 46.4 = 1.7\left(18 + 1.8(3)\right)\left(d_{MAX} + 0.33\right)^{1.85}$$

$d_{MAX} = 0.76$

BASIN IV

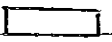
$Q_5 = 12.2$ $\qquad$ $Q_{100} = 21.3$

AREA = 3.45

ASSUME SUMP INLET ON THE NORTH SIDE OF ACCESS ROAD WITH FLOWS OF $Q_5 = 3.9$ cfs

$Q_{100} = 6.8$ cfs REACHING SUMP INLET FROM THE EAST.

WEST $\qquad$ EAST



$Q_5 = 8.3$ $\qquad$ $Q_5 = 3.9$

$Q_{100} = 14.5$ $\qquad$ $Q_{100} = 6.8$

APPROACH FLOWS

$$Q_5 = 8.3 = 0.56 \left(\frac{1}{0.016(0.02)}\right)(0.005)^{1/2}(d)^{8/3}$$

$$d = 0.36$$

$$Q_{100} = 14.5 = 0.56 \left(\frac{1}{0.016(0.02)}\right)(0.005)^{1/2} d^{8/3}$$

$$d = 0.45$$

TOTAL FLOWS

$$Q_5 = 12.2 = 1.7\left(6 + 1.8(3)\right)\left(d_{max} - 0.33\right)^{1.85} \qquad \text{Try } 6'$$

$$d = 0.45$$

$$Q_{100} = 21.3 = 1.7\left(6 + 1.8(3)\right)\left(d_{max} - 0.33\right)^{1.85}$$

$$d = 0.72$$

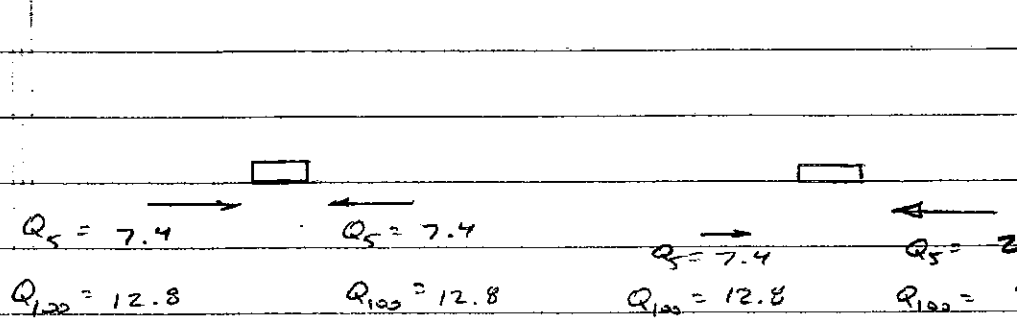
BASIN VI

$Q_5 = 24.5$ $\quad Q_{100} = 42.4$

AREA = 7.59

ASSUME TWO SUMP INLETS WILL COLLECT THESE FLOWS JUST WEST OF TUTT BOULEVARD

AREA FROM TUTT IS 0.70 ACRES - $Q_5 = 2.3$ $\quad Q_{100} = 3.9$



APPROACH FLOWS

$$Q_5 = 7.4 = 0.56 \left(\frac{1}{0.016(0.02)}\right)(0.005)^{1/2} d^{8/3}$$

$$d = 0.35$$

$$Q_{100} = 12.8 = 0.56 \left(\frac{1}{0.016(0.02)}\right)(0.005)^{1/2} d^{8/3}$$

$$d = 0.43$$

TOTAL FLOWS

$$Q_5 = 14.8 = 1.7 \left(8 + 1.8(3)\right)(d_{MAX} + 0.33)^{1.85} \qquad \text{TRY } 8'$$

$$d = 0.46$$

$$Q_{100} = 25.6 = 1.7 \left(8 + 1.8(3)\right)(d_{MAX} + 0.33)^{1.85}$$

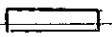
$$d = 0.74$$

BASIN VII

$Q_5 = 12.4$ $\quad Q_{100} = 21.8$

AREA = 3.61

BASIN III WITH BASICALLY INCLUDE A SINGLE SUMP INLET WITHIN A PROPOSED PARKING LOT. ASSUME FLOWS WITH APPROACH INLET EQUALLY FROM BOTH SIDES.



$Q_5 = 6.2$ $\quad Q_{100} = 10.9$ $\quad\quad$ $Q_5 = 6.2$ $\quad Q_{100} = 10.9$

APPROACH FLOW

$$Q_5 = 6.2 = 0.56\left(\frac{1}{0.016(0.02)}\right)(0.005)^{1/2}(d^{8/3})$$

$$d = 0.33 \qquad \therefore \text{ OK}$$

$$Q_{100} = 10.9 = 0.56\left(\frac{1}{0.016(0.02)}\right)(0.005)^{1/2}d^{8/3}$$

$$d = 0.40$$

TOTAL FLOW

$$Q_5 = 12.4 = 1.7\left(6 + 1.8(3)\right)(d_{max} + 0.33)^{1.85} \qquad \text{TRY C'}$$

$$d_{max} = 0.46$$

$$Q_{100} = 21.8 = 1.7\left(6 + 1.8(3)\right)(d_{max} + 0.33)^{1.85}$$

$$d_{max} = 0.74$$

BASIN VIII

$Q_5 = 5.0$ $Q_{100} = 10.0$

TUTT BOULEVARD MINIMUM SLOPE = 1%

$Q_{SCAP} = 171.7\, S^{1/2}$

$= 171.7 (0.01)^{1/2}$

$= 17.2$ ∴ OK

BASIN IX

$Q_5 = 28.8$ $Q_{100} = 49.5$

AREA = 8.59

THIS BASIN WILL BE DIVIDED INTO BASICALLY 3 AREAS

ASSUME 2 INLETS WILL BE ON 3% GRADES. 3RD INLET WILL BE IN A SUMP CONDITION

1ST 2 INLETS IN SUCCESSION

$Q_5 = 7.2$ $Q_{100} = 12.4$

$T = 3.04 \left[\frac{Q}{S^{1/2}}\right]^{3/8}$ $T = 3.04 \left[\frac{12.4}{(0.03)^{1/2}}\right]^{3/8}$

$= 3.04 \left[\frac{7.2}{(0.03)^{1/2}}\right]^{3/8}$ $= 15.1$

$= 12.3$

$F_w = 16.4\left[(T-2)(S_x)\right]^{1/6}(S)^{1/2}$

$= 16.4\left[(12.3-2)(0.02)\right]^{1/6}(0.03)^{1/2}$

$= 2.18$

$F_w = 16.4\left[(15.1-2)(0.02)\right]^{1/6}(0.03)^{1/2}$

$= 2.27$

$L_1 = 2.49(S_x)^{0.3} F_w T$

$= 2.49(0.02)^{0.3}(2.18)(12.3)$

$= 20.6$

$L_1 = 2.49(0.02)^{0.3}(15.1)(2.27)$

$= 26.4$

$L_2 = 3.27(S_x)^{0.5}(F_w)(T)$

$= 3.27(0.02)^{0.5}(2.18)(12.3)$

$= 12.4$

$L_2 = 3.27(0.02)^{0.5}(2.27)(15.1)$

$= 15.9$

$L_3 = 1.65\ F_w\ (T)$

$= 1.65\ (2.18)(12.3)$

$= 44.2$

$L_3 = 1.65\ (15.1)(2.27)$

$= 56.6$

Try $L_i = 10 < L_2$

$Q_i = Q\ \frac{L_i}{L_1}$

$= 7.2\left(\frac{10}{20.6}\right)$

$Q_i = 3.5$

$Q_i = 12.4\left(\frac{10}{26.4}\right)$

$= 4.7$

$Q_{FB} = 3.7$

$Q_{FB} = 7.7$

FOR ESTIMATING PURPOSES ASSUME ON-GRADE INLETS COLLECT 50% DURING 5 YEAR STORM & 40% DURING 100 YEAR STORM.

2ND INLET

$Q_5 = 7.2 + 3.7$

$= 10.9$

$Q_{100} = 12.4 + 7.7$

$= 20.1$

50% COLLECTION

40% COLLECTION

$Q_i = 5.5$

$Q_i = 8.0$

$Q_{FB} = 5.4$

$Q_{FB} = 12.1$

FLOW REACHING SUMP INLET @ LOW POINT OF BASIN X

$Q_5 = 5.4 + 14.4$

$= 19.9$

$Q_{100} = 12.1 + 24.7$

$= 36.8$

ASSUME ALL FLOWS REACH SUMP INLET FROM 1 DIRECTION

APPROACH FLOWS

$$Q_5 = 19.9 = 0.56 \left(\frac{1}{0.02(0.016)}\right)(0.005)^{1/2}(d)^{8/3}$$

$$d = 0.50$$

$$Q_{100} = 36.8 = 0.56 \left(\frac{1}{(0.02)(0.016)}\right)(0.005)^{1/2} d^{8/3}$$

$$d = 0.63$$

TOTAL FLOWS

$$19.9 = 1.7\left(12 + 1.8(3)\right)\left(d_{max} + 0.33\right)^{1.85} \qquad \text{Try } 12'$$

$$= 0.48$$

$$36.8 = 1.7\left(12 + 1.8(3)\right)\left(d_{max} + 0.33\right)^{1.85}$$

$$d = 0.80$$

BASIN X

$Q_5 = 20.2$ $\qquad Q_{100} = 35.0$

AREA = 5.72

ASSUME 90% OF THE FLOW REACHES UPPER SUMP INLET & 10% REACHES LOWER SUMP INLET

APPROACH FLOWS

$$Q_5 = 18.2 = 0.56\left(\frac{1}{(0.016)(0.02)}\right)(0.005)^{1/2} d^{8/3}$$

$$d = 0.49$$

$$Q_{100} = 31.5 = 0.56\left(\frac{1}{0.016\,(0.02)}\right)(0.005)^{1/2} d^{8/3}$$

$$d = 0.60$$

TOTAL FLOWS

$$Q_5 = 18.2 = 1.7\left(12 + 1.8(3)\right)\left(d_{max} + 0.33\right)^{1.85} \qquad \text{Try } 12'$$

$$d_{max} = 0.44$$

$$Q_{100} = 31.5 = 1.7\left(12 + 1.8(3)\right)\left(d_{max} + 0.33\right)^{1.85}$$

$$= 0.70$$

$Q_5 = 2.0$ $Q_{100} = 3.5$

THESE FLOWS WILL ENTER BASIN XI AS STREET FLOW.

BASIN XI

$Q_5 = 7.3$ $Q_{100} = 12.8$

AREA = 2.01

$Q_5 = 7.3 + 2.0$ $Q_{100} = 12.8 + 3.5$

$= 9.3$ $= 16.3$

ASSUME SUMP INLET W/ ALL FLOWS REACHING INLET FROM 1 SIDE

APPROACH FLOWS ARE O.K.

TOTAL FLOWS

$Q_5 = 9.3 = 1.7\left(4' + 1.8(2)\right)\left(d_{MAX} + 0.33\right)^{1.85}$ TRY 4'

$d_{MAX} = 0.42$

$Q_{100} = 16.3 = 1.7\left(4' + 1.8(2)\right)\left(d_{MAX} + 0.33\right)^{1.85}$

$d_{MAX} = 0.69$

BASIN XII

$Q_5 = 61.5$ $Q_{100} = 108.8$

AREA = 18.08

BASIN XII CONSISTS OF THE MAIN PARKING AREA PLUS 2 CLUSTERS OF BUILDINGS. FOR THE PURPOSE OF THIS REPORT ASSUME 4 SUMP INLETS CAN BE PLACED THROUGHOUT THIS BASIN TO COLLECT THESE FLOWS.

$Q_5/4 = 61.5/4 = 15.4$ $Q_{100}/4 = 108.8/4 = 27.2$

APPROACH FLOWS O.K.

TOTAL FLOWS

$Q_5 = 15.4 = 1.7(8' + 1.8(3))(d_{max} + 0.33)^{1.85}$ Try 8'

$d = 0.48$

$Q_{100} = 27.2 = 1.7(8' + 1.8(3))(d_{max} + 0.33)^{1.85}$

$d = 0.77$

BASIN XIII

$Q_5 = 9.2$ $Q_{100} = 16.2$

AREA = 2.58

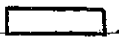
BASIN XIII DRAINS TO AN EXISTING ___' SUMP INLET AT THE NORTHEAST CORNER OF BLOOMINGTON DRIVE & SOUTH CARPENTER CIRCLE.

BASIN XIV

$Q_5 = 28.0$ $Q_{100} = 48.4$

AREA = 10.62

ASSUME 1 SUMP INLET WILL COLLECT THESE FLOWS WITHIN THE PROPOSED PARKING LOT



→ $Q_5 = 14.0$ ← $Q_5 = 14.0$

$Q_{100} = 24.2$ $Q_{100} = 24.2$

APPROACH FLOWS ARE O.K.

TOTAL FLOWS

$$Q_5 = 28.0 = 1.7\left(18 + 1.8(3)\right)\left(d_{MAX} + 0.33\right)^{1.85}$$ Try 18'

$$d_{MAX} = 0.50$$

$$Q_{100} = 48.4 = 1.7\left(18 + 1.8(3)\right)\left(d_{MAX} + 0.33\right)^{1.85}$$

$$d_{MAX} = 0.78$$

BASIN XV & XVI

DESIGN P_T # 4

$Q_5 = 13.8$ $Q_{100} = 24.8$

EXISTING 6' AND ' SUMP INLETS COLLECT THESE FLOWS AT THE NORTHWEST CORNER OF BLOOMINGTON & SOUTH CAREFREE CIRCLE

BASIN XVII

A SUMP INLET WILL BE PLACED AT THE EAST END OF BASIN XVII

$Q_5 = 4.4$ cfs $\qquad Q_{100} = 7.6$ cfs

APPROACH FLOWS ARE O.K.

$Q_5 = 4.4 = 1.7\,(4 + 1.8(3))(d_{max} + 0.33)^{1.85}$ try 4'

$d_{max} = 0.17$

$Q_{100} = 7.6 = 1.7\,(4 + 1.8(3))(d_{max} + 0.33)^{1.85}$

$d_{max} = 0.34$

BASIN XVIII & VIII

DESIGN PT #5

$Q_5 = 5.9$ $\qquad Q_{100} = 11.9$

AN ADDITIONAL 4' SUMP INLET WILL BE INSTALLED ON THE EAST SIDE OF TUFF BOULEVARD TO COLLECT THESE FLOWS

$Q_5 = 5.9 = 1.7\,(4 + 1.8(3))(d_{max} + 0.33)^{1.85}$

$d_{max} = 0.25$

$Q_{100} = 11.9 = 1.7\,(4 + 1.8(3))(d_{max} + 0.33)^{1.85}$

$d_{max} = 0.51$

BASIN ~~XTX~~

$Q_5 = 4.9$ $Q_{100} = 8.7$

AN EXISTING 6' INLET AT THE SOUTHWEST CORNER OF SOUTH GREENTREE CIRCLE & BLOOMINGTON DRIVE COLLECTS THESE FLOWS

BASIN ~~XX~~

$Q_5 = 3.7$ $Q_{100} = 6.6$

THESE FLOWS WILL TURN SOUTHERLY IN TUTT BOULEVARD & ENTER BASIN XXI

BASIN XXI

$Q_5 = 8.0$ $Q_{100} = 14.6$

AREA = 2.80

ASSUME A SUMP INLET WILL BE INSTALLED JUST WEST OF TUTT BOULEVARD TO COLLECT THE FLOWS FROM BASINS ~~XX~~ & XXI

TUTT BOULEVARD

→ $Q_5 = 6.2$ $Q_{100} = 11.4$

← $Q_5 = 1.8 + 3.7 = 5.5$ $Q_{100} = 3.2 + 6.6 = 9.8$

APPROACH FLOWS ARE O.K

TOTAL FLOWS

$Q_5 = 6.2 = 1.7\left(4 + 1.8(3)\right)\left(d_{max} + 0.33\right)^{1.85}$ TRY $L = 4'$

$d_{max} = 0.27$

$Q_{100} = 11.4 = 1.7\left(4 + 1.8(3)\right)\left(d_{max} + 0.33\right)^{1.85}$

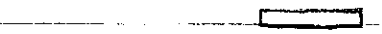
$d_{max} = 0.50$

BASIN XXII

$Q_5 = 27.0$ $Q_{100} = 46.6$

AREA = 9.18

ASSUME FLOWS REACH SUMP INLET AT THE SOUTH END OF BASIN XXII



JUST (AREA = 1.72 Ac)

→

$Q_5 = 21.9$ $Q_5 = 5.1$

$Q_{100} = 37.9$ $Q_{100} = 8.7$

APPROACH FLOWS

$Q_5 = 21.9 = 0.56\left(\frac{1}{0.016(0.02)}\right)(0.005)^{1/2} d^{8/3}$

$d = 0.52$

$Q_{100} = 37.9 = 0.56\left(\frac{1}{0.016(0.02)}\right)(0.005)^{1/2} d^{8/3}$

$d = 0.64$

XXII

TOTAL FLOWS

$$Q_5 = 27.0 = 1.7\left(18 + 1.8(3)\right)\left(d_{max} + 0.33\right)^{1.55}$$ Try $L = 18'$

$$d = 0.48$$

$$Q_{100} = 46.6 = 1.7\left(18 + 1.8(3)\right)\left(d_{max} + 0.33\right)^{1.85}$$

$$d = 0.76$$

BASIN XXIII

$Q_5 = 4.5$ $Q_{100} = 7.9$

TUTT BOULEVARD HAS THE CAPACITY TO CONVEY THESE FLOWS TO CONSTITUTION AVENUE. INSTALL A 4' SUMP INLET ON THE EAST SIDE OF TUTT BOULEVARD

BASIN XXIV

$Q_5 = 29.4$ $Q_{100} = 50.4$

THESE FLOWS COLLECT AT THE REAR OF THE PROPOSED BUILDINGS. AT THIS TIME ASSUME 1 SUMP INLETS WILL BE INSTALLED WITH HALF THE FLOW ENTERING INLET FROM EACH DIRECTION

APPROACH FLOWS

$$Q_5 = 14.7 = 0.56\left(\frac{1}{0.016(0.02)}\right)(0.005)^{1/2} d^{8/3}$$

$$d = 0.45$$

$$Q_{100} = 25.2 = 0.56\left(\frac{1}{0.016(0.02)}\right)(0.005)^{1/2} d^{8/3}$$

$$d = 0.55$$

TOTAL FLOWS

$$Q_5 = 29.4 = 1.7(18 + 1.8(3))(d_{max} + 0.33)^{1.5}$$ 18'

$$d = 0.52$$

$$Q_{100} = 50.4 = 1.7(18 + 1.8(3))(d_{max} + 0.33)^{1.5}$$

$$d = 0.81$$

BASIN XXU

$Q_5 = 35.2$ $\quad Q_{100} = 61.2$

ASSUME 2 SUMP INLETS WILL COLLECT THESE FLOWS.

APPROACH FLOWS ARE $Q_5 = 8.8$ & $Q_{100} = 15.3$

PER SIDE OF INLET ∴ APPROACH FLOWS ARE O.K.

TOTAL FLOWS

$$Q_5 = \frac{35.2}{2} = 1.7\left(15 + 1.8(3)\right)\left(d_{max} + 0.33\right)^{1.85}$$ TRY 15'

$d = 0.68$

$$Q_{100} = \frac{61.2}{2} = 1.7\left(15 + 1.8(3)\right)\left(d_{max} + 0.33\right)^{1.85}$$

0.60

BASIN XXVI

$Q_5 = 13.4$ $Q_{100} = 27.6$

THESE FLOWS WILL ENTER BASIN XXVII AS STREET FLOW

BASIN XXVII

$Q_5 = 24.8$ $Q_{100} = 44.5$

PLUS XXVI

$Q_5 = 24.8 + 13.4 = 38.2$ $Q_{100} = 27.6 + 44.5 = 72.1$

SEVERAL INLETS WILL BE PLACED THROUGHOUT THIS BASIN TO COLLECT THESE FLOWS.

BASIN XXVIII

$Q_5 = 17.5$ $Q_{100} = 29.8$

A SINGLE INLET WILL BE CONSTRUCTED TO COLLECT THESE FLOWS W/ FLOWS SPLIT

APPROACH FLOWS ARE O.K.

TOTAL FLOWS

$Q_5 = 17.5 = 1.7\,(10 + 1.8(3))(d_{max} + 0.33)^{1.85}$ THEY 10'

$d = 0.47$

$Q_{100} = 29.8 = 1.7\,(10 + 1.8(3))(d_{max} + 0.33)^{1.85}$

$d = 0.74$

BASIN XXXIX

$Q_5 = 13.3$ $Q_{100} = 23.6$

AN ADDITIONAL SUMP INLET WILL BE INSTALLED TO COLLECT THESE FLOWS

APPROACH FLOWS O.K.

TOTAL FLOWS

$Q_5 = 13.3 = 1.7\left(6 + 1.8(3)\right)\left(d_{MAX} + 0.33\right)^{1.85}$ TRY 6'

$d = 0.49$

$Q_{100} = 23.6 = 1.7\left(6 + 1.8(3)\right)\left(d + 0.33\right)^{1.85}$

$d = 0.78$

XXX & XXXI COMBINE AT DESIGN POINT #6

$Q_5 = 13.7$ $Q_{100} = 23.7$

THESE FLOWS WILL ENTER 54" CMP AT THE NORTHEAST CORNER OF THE POWERS & CONSTITUTION INTERSECTION & FLOW SOUTHERLY WITHIN THE ROADSIDE SWALE ALONG THE EAST SIDE OF POWERS BLVD.

BASIN XXXII WILL ENTER TUTT BLVD AND FLOW NORTHERLY TO A 4' SUMP INLET.

DESIGN POINT NORTH

	C_5	C_{100}	AREA	% AREA
DESIGN PT #2	0.78	0.81	43.53	43.0 %
DESIGN PT #3	0.85	0.86	41.22	40.8 %
BASIN XIV	0.85	0.86	10.62	10.5 %
DESIGN PT 5	0.48	0.54	5.80	5.7 %
			101.17	
COMPOSITE	0.80	0.82		

USE T_c FROM DESIGN PT #2 = 22.3

$I_5 = 2.8$ $I_{100} = 4.8$

$Q_5 = 226.6$ $Q_{100} = 398.2$

@ 1% PIPE MUST BE 66"