MASTER DEVELOPMENT DRAINAGE PLAN
FOR
VILLAGE CENTER AT PINE CREEK
AND
PRELIMINARY/FINAL DRAINAGE REPORT
FOR
VILLAGE CENTER AT PINE CREEK FILING NO. 2
AND
PINE CREEK VILLAGE CENTER FILING NO. 1

JR Engineering, Ltd.

RETURN WITHIN 2 WEEKS TO:
CITY OF COLORADO SPRINGS
STORM WATER & SUBDIVISION
101 W. COSTILLA. SUITE 113
COLORADO SPRINGS, CO 80903
(719) 385-5979

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January 14, 1998
Revised February 11, 1998

Prepared For:

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DRAINAGE REPORT STATEMENT

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 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.

Kyle M. Campbell (signature) — 3.9.98

Kyle R. Campbell, Colorado P.E. #29794 — Date
For and On Behalf of JR Engineering, Ltd.

DEVELOPER'S STATEMENT:
I, the developer, have read and will comply with all of the requirements specified in this drainage report and plan.

Business Name: LP47, LLC dba La Plata Investments

By: (signature)
Bob Ingels

Title: ______

Address: 7150 Campus Dr., Suite 365

Colorado Springs, CO 80920

CITY OF COLORADO SPRINGS ONLY:
Filed in accordance with Section 15-3-906 of the Code of the City of Colorado Springs, 1980, as amended.

Tim Mitros (signature) — 3/14/98

City Engineer — Date

Conditions: Private MAINT. Agreement req'd for pond

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MASTER DEVELOPMENT DRAINAGE PLAN FOR VILLAGE CENTER AT PINE CREEK
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AND
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PURPOSES

This document is the Master Development Drainage Plan for Village Center at Pine Creek and the Preliminary/Final Drainage Report for Village Center at Pine Creek Filing No. 2 and Pine Creek Village Center Filing No. 1. The purpose of this report is to estimate peak rates of stormwater runoff, recommend solutions for potential drainage problems resulting from development, and identify necessary improvements to safely route storm water runoff to adequate outfall facilities.

GENERAL DESCRIPTION

Village Center at Pine Creek (the site) is located in the southeast corner of Section 28 and the northeast corner of Section 33, Township 12 South, Range 66 West, City of Colorado Springs, County of El Paso, State of Colorado. This site is bounded to the north by Pine Creek Golf Course and Pine Creek, to the east by Pine Creek, to the south by Briargate Parkway, and to the west by Chapel Hills Drive.

At the present time Briargate Parkway paving and curb and gutter are complete along the full frontage of the site. Paving and curb and gutter extend approximately 800 feet north of Briargate Parkway in the Chapel Hills Drive right-of-way. Chapel Hills will be extended north to Treelake Drive in the springs of 1998.

The 63.3 acre site is presently mostly undisturbed land vegetated with native grass. Some of the land adjacent to Briargate Parkway, and Chapel Hills Drive was disturbed during construction of existing portions of said roadways.

The average soil condition within the site reflects Blakeland Loamy Sand, Hydrologic Group "A" as determined by the "Soil Survey of El Paso County Area," prepared by the S.C.S. (see Appendix).

Future public roadways planned to be built within Village Center at Pine Creek are Lexington Drive (between Chapel Hills Drive and Briargate Parkway), and a connector street between Briargate Parkway and Lexington Drive labeled "Future street" on the plan.

Proposed uses of this 63.3 acre parcel are included combination commercial/retail, patio homes and luxury apartments.

Village Center at Pine Creek Filing No. 2 is a proposed 7.5 acre commercial center to be located in the western portion of the site. It will be bounded on the west by Chapel Hills Drive, to the north by proposed Lexington Drive, to the east by a future street, and to the south by Briargate Parkway and Pine Creek Village Center Filing No. 1. The streets adjacent to Village Center at Pine Creek Filing No. 2 are planned to be constructed concurrent with the development of Chapel Hills Drive Filing No. 2.

Pine Creek Village Center Filing No. 1 is a 2.7 acre Tract located at the southwest corner of Village Center at Pine Creek. The site will contain Village Drive (a private access road), parking, commercial buildings, and a large landscaped open space.

EXISTING DRAINAGE CONDITIONS

Village Center at Pine Creek (the site) is located within the Pine Creek Drainage Basin. As demonstrated in the "Final Drainage Report For Briargate Parkway Filing No. 1, Briargate Parkway and its' associated storm drain system collect the upstream offsite surface runoff along the south side of the site and convey it around the site. The site slopes outward on all other sides and thus is not impacted by offsite surface runoff. Runoff generated within the site is discharged to adjacent Pine Creek. This discharge is direct to the Creek in some areas and is over portions of Pine Creek Golf Course in others.

As shown in the "Final Drainage Report For Briargate Parkway Filing No. 1" an existing 42" diameter RCP storm drain that originates south of Briargate Parkway currently daylights within the site north of the intersection of Lexington Drive and Briargate Parkway. The report and related reports indicate peak flow rates and associated CA equivalent values in the 42" storm drain of Q_5 = 51 cfs and CA_5 = 16.68, Q_{100} = 90 cfs and CA_{100} = 15.99. The time of concentration associated with these flows is estimated at 17.2 minutes. Design Point 9 of the current analysis is at the existing end of this 42" storm drain.

The "Final Drainage Plan for Chapel Hills Drive" planned for discharges of Q_5 = 38 cfs and Q_{100} = 76 cfs from approximately 20.3 acres of this site to discharge into the Chapel Hills Drive Storm Drain. The drainage area associated with this discharge was shown as Basin PC-19 and Basin PC-20 on the Chapel Hills Drive Drainage Plan. This discharge into the Chapel Hills Storm Drain was to occur via two stubs into the storm drain. A 30" diameter stub was to be constructed into the site south of Lexington Drive to collect and convey Q_5 = 30 cfs and Q_{100} = 56 cfs. An 18" diameter stub was to be constructed into the site north of Lexington Drive to collect and convey Q_5 = 8 cfs and Q_{100} = 20 cfs. Due to changes within the site that occurred after the Chapel Hills Drive Report was prepared the 30" diameter stub was not constructed. The 18" stub was constructed as planned.

An Update to The Pine Creek Drainage Basin Planning Study is currently being prepared by JR Engineering Ltd. The update plans for runoff from the eastern portion of the site to be discharged directly to Pine Creek.

PROPOSED DRAINAGE CHARACTERISTICS

(A) General Description

Runoff from Village Center at Pine Creek will be discharged from the site either to Chapel Hills Drive and associated storm drain, or directly to Pine Creek via surface flow over the Golf Course or via proposed storm drains.

1. Discharge to Chapel Hills Drive

The majority of the runoff from Village Center at Pine Creek will be directed to a proposed detention pond that will be constructed at the northwest corner of the site. This private pond will be sized to accept and detain free discharge, 100-year design storm runoff, (assuming current land use projections), from a proposed watershed that is approximately 33 acres in size. The proposed pond will store an estimated volume of 4.9 acre-feet and will discharge at a peak rate of 17 cfs in the 100-year design storm. The proposed pond will outfall to the existing Chapel Hills Drive storm drain via the existing 18" diameter storm drain stub. A small area located in the southwest corner of the site will discharge approximately $Q_5 = 7$ cfs and $Q_{100} = 13$ cfs of runoff directly into the east side of Chapel Hills Drive via. Village Drive. Flowby from proposed inlets in Lexington Drive combined with runoff from a small portion of the site located adjacent to Chapel Hills Drive (Basin 8) will also discharge $Q_5= 6$ cfs and $Q_{100}= 12$ cfs to the surface of Chapel Hills Drive.

The "Final Drainage Report for Chapel Hills Drive" did not anticipate the above described surface flow to Chapel Hills Drive. However, there is capacity in the Chapel Hills Drive street section to convey the additional flow north to the sump located at the Pine Creek Crossing. The total additional 100-year surface flow to Chapel Hills Drive is estimated to be 22 cfs. It is estimated that this additional flow will be divided approximately even between the east and west sides of Chapel Hills Drive as it reaches the sump due to superelevation in portions of the Chapel Hills Drive street section. An 8 foot long inlet was proposed in the Chapel Hills Drive Report to be constructed in the sump on the west side of Chapel Hills Drive to intercept a $Q_{100} = 20$ cfs. A 24 foot long inlet was proposed in the Chapel Hills Drive report to be constructed in the sump on the east side of Chapel Hills Drive to intercept a $Q_{100} = 58$ cfs. These inlets and associated storm drain connections will be upsized in order to accommodate the increase in runoff to the inlets. The west side inlet will be upsized to 16' long to intercept 31 cfs (20+11). The east side inlet will be upsized to 32' long to intercept 69 cfs (58+11). The storm drain connection to the inlets will be upsized from the originally planned 30" diameter to 36" diameter to accommodate the additional 22 cfs of flow. The combined peak 100-year flow from these inlets is estimated to be 90 cfs.

The sum of the proposed 100-year peak discharge rates from the site to Chapel Hills Drive and associated storm drain system is 39 cfs. This is considerably lower than the peak rate of 76 cfs as planned for in the "Final Drainage Report for Chapel Hills Drive" (see existing conditions section). Thus, the current plan is compatible with the downstream system.

2. Direct Discharge to Pine Creek

Runoff from the portion of the site located east of Lexington Drive will be collected in a private storm drain system that will outfall in adjacent Pine Creek.

The existing 42" diameter storm drain in the Lexington Drive right of way at Briargate Parkway will be extended approximately 850 feet down Lexington Drive then north to outfall in adjacent Pine Creek. Runoff from Lexington Drive and adjacent lots located to the north and south between Briargate Parkway and the point that the proposed storm drain will turn out of the right of way will be intercepted and conveyed to Pine Creek Via this storm drain.

Along the northern boundary of the site a slope area will discharge a small amount of unconcentrated runoff to adjacent Pine Creek either directly or via the adjacent golf course.

(B) Detailed Surface Drainage Characteristics and Constraints

In the developed condition, land use on the north side of Lexington Drive is expected to consist of single family attached housing. The east side if Lexington Drive is expected to consist of townhomes. The south side of Lexington Drive, east of the "future street", is expected to consist of multi-family luxury apartments. Development west of the "future street" and south of Lexington Drive is expected to consist of commercial/retail uses. A separate runoff coefficient for calculating flows was assessed to each area based on projected land use.

Basin 1 is expected to developed as a portion of an apartment site. Runoff generated in the basin (Q_5 = 8 cfs, Q_{100} = 16 cfs) will discharge directly to the west side of adjacent Lexington Drive. The runoff will then be conveyed in the west side of Lexington Drive to a proposed inlet to be located at Design Point 1.

Basin 1A is expected to be developed as a portion of an apartment site. Runoff from the basin (Q_5 = 9 cfs , Q_{100} = 18 cfs) is expected to be collected into a future storm drain system within the apartment site at Design Point 3. The runoff will then be conveyed to SD Junction Point 1 via a proposed private 24" diameter storm drain.

Basin 1B is expected to be developed as a portion of a single family attached home site. The basin will be graded to drain into the north side of adjacent Lexington Drive. Estimated peak runoff rates from the site are Q_5 = 3 cfs and Q_{100} = 5 cfs. The runoff will be conveyed in the north side of Lexington Drive to a proposed inlet at Design Point 2.

Basin 1C is a portion of the proposed Lexington Drive right of way. It is assumed that the estimated peak runoff from the basin (Q_5 = 5 cfs, Q_{100} = 9 cfs) will be split evenly between the north and south sides of the street resulting in Q_5 = 2.5 cfs and Q_{100} = 4.5 cfs contributing to both Design Points 1 and 2. At Design Point 1 the combined flow from one half of Basin 1C and all of Basin 1 is estimated at Q_5 = 9 cfs and Q_{100} = 19 cfs. A proposed 16' on grade curb inlet at this point will intercept an estimated Q_5 = 7 cfs and Q_{100} = 12 cfs. An estimated flow of Q_5 = 2 cfs and Q_{100} = 7 cfs will flow by the inlet and continue down the south side of Lexington Drive to Design Point 5. At Design Point 2 the combined flow from one half of Basin 1C and all of Basin 1B is estimated at Q_5 = 4 cfs and Q_{100} = 7 cfs. A proposed 16' on grade curb inlet at this point will intercept an estimated Q_5 = 4 cfs and Q_{100} = 6 cfs. An estimated flow of Q_5 = 0 cfs and Q_{100} = 1 cfs will flow by the inlet and continue down the north side of Lexington Drive to Design Point 6.

Basin 2 is within the area expected to be developed as luxury apartments site. In the developed condition this basin will generate an estimated Q_5 = 37 cfs and Q_{100} = 74 cfs. This runoff is expected to be collected in a private storm drain system within the site (Design Point 4). A proposed 36" diameter private storm drain will convey the collected runoff from Design Point 4 to SD Junction Point 3.

The bulk of Basin 2A is expected to be developed as a portion of a single family attached home site. A portion of the north side of Lexington Drive is also included in the basin. The single family site is expected to be graded to drain to the north side of Lexington Drive. An estimated peak runoff rate of Q_5 = 9 cfs and Q_{100} = 18 cfs will be generated within the basin. The combined flow from this basin and the flowby from the upstream inlet at Design Point 2 is expected to be Q_5 = 12 cfs and Q_{100} = 19 cfs at Design Point 6. A proposed 20 foot long on grade inlet is expected to intercept (Q_5 = 9 cfs, Q_{100} = 13 cfs) at this point. An estimated Q_5 = 3 cfs and Q_{100} = 6 cfs will flow by the inlet and will be conveyed in the north side of Lexington Drive to Design Point 8.

Basin 3 contains a portion of the south side of Lexington Drive. The remainder of the basin is expected to be slope area on the proposed luxury apartment site that will drain directly into Lexington Drive and the adjacent Future Street. Runoff rates generated within Basin 3 are estimated at Q_5 = 6 cfs and Q_{100} = 12 cfs. Basin 6, a portion of Village Center at Pine Creek Filing No. 2 (the proposed commercial site) will contribute (Q_5 = 1 cfs, Q_{100} = 2 cfs) to the west side of the future street. Runoff from Basin 3 and Basin 6 will be conveyed within the future street and the South side of Lexington Drive to Design Point 5. At Design Point 5 the combined peak rates from Basin 3 and Basin 6 and the flowby from the inlet upstream of Design Point 1 are estimated at Q_5 = 8 cfs and Q_{100} = 19 cfs. The peak runoff rates at DP-5 are less than the maximum street capacity so the runoff will be conveyed in the south side of Lexington Drive to Design Point 7 downstream.

The bulk of Basin 4 is expected to be developed as a portion of a single family attached home site. A portion of the north side of Lexington Drive is also included in the basin. The single family site is expected to be graded to drain to the north side of Lexington Drive. An estimated peak runoff rate of Q_5 = 11 cfs and Q_{100} = 21 cfs will be generated within the basin. The combined flow from this basin and the flowby from the upstream inlet at Design Point 6 is expected to be Q_5 = 13 cfs and Q_{100} = 26 cfs at Design Point 8. Two proposed 18 foot long on grade inlets separated by a minimum of 20' are expected to intercept (Q_5 = 13cfs, Q_{100} = 23 cfs) at this point. An estimated Q_5 = 0 cfs, Q_{100} = 3 cfs will flow by the inlet and will be discharged to the east side of Chapel Hills Drive at Design Point 14.

Basins 5A and 5B are part of Village Center at Pine Creek Filing No. 2 (the commercial area). The majority of the basin will be paved parking lots, sidewalks or buildings. Runoff from Basin 5A (Q_5 = 8cfs. Q_{100} = 14cfs) will be collected in and will travel across the parking lot to Design Point 10 near the intersection of the entrance and Center Drive. Runoff from Basin 5B (Q_5 = 4 cfs, Q_{100} = 7 cfs) will also be collected and conveyed in the parking lot to Design Point 10. The combined peak flow rate from Basin 5A and Basin 5B are estimated at Q_5 = 10 cfs and Q_{100} = 18 cfs at Design Point 10. A proposed private storm drain system will be designed to collect the combined runoff at or near to Design Point 10.

Basin 5C is a portion of Village Center at Pine Creek Filing No. 2 (the commercial area). The majority of the basin will be paved parking lots, sidewalks or buildings. Runoff from Basin 5C (Q_5 = 12 cfs. Q_{100} = 21 cfs) will be collected in and will travel across the parking lot to Design Point 11. The above mentioned private storm drain system will collect the runoff from the basin at or near Design Point 11. Care should be taken in the design of the private collection system to assure that ponding depths at the future inlets do not impact the adjacent proposed buildings. Collection of the runoff at multiple locations as opposed to a single inlet point should be considered as desirable when the design of the system is performed.

Runoff collected from Basin 5C and upstream Design Point 10 will be combined in the proposed private storm drain at or near SD Junction Point 7 for a Peak flow rate of Q_5 = 22 cfs and Q_{100} = 39 cfs. The combined flow will be conveyed through a proposed 24" diameter storm drain to SD Junction Point 5 in the proposed Lexington Drive storm drain.

Basin 5D is a portion of Village Center at Pine Creek Filing No. 2 (the commercial area). The majority of the basin will be paved parking lots, sidewalks or buildings. Runoff from Basin 5D (Q_5 =11 cfs, Q_{100} = 18 cfs) will be collected in and will travel across the parking lot to Design

Point 12. The flows at Design Point 12 will be collected by a proposed private storm drain system to be designed in the future with the plans for the commercial site. A proposed private 18" diameter storm drain will convey the collected flow from Design Point 12 to SD Junction Point 4 in the proposed Lexington Drive Storm drain.

Basin 5E is a portion of Village Center at Pine Creek Filing No. 2 (the commercial area). Basin 5E will generate estimated peak flows of Q_5 = 8 cfs and Q_{100} = 13 cfs. For the purpose of this analysis it is assumed that all of the runoff from Basin 5E will be discharged into the south side of adjacent Lexington Drive. In final design it may be desirable to collect some or all of the flows from Basin 5E and convey them directly to the private storm drain system that will be constructed through this basin. If the storm drain is not utilized for the conveyance, a hardened rundown channel will likely be required to convey flow from the top of the slopes in the basin to the street.

At Design Point 7 the combined runoff from Basin 5E and the flows from Design Point 5 will produce estimated peak flow rates of Q_5 = 15 cfs and Q_{100} = 33 cfs in the south side of Lexington Drive. Two proposed 16 feet long on grade inlets separated by a minimum of 20 feet will intercept an estimated Q_5 = 14 cfs and Q_{100} = 27 cfs at Design Point 7. An estimated Q_5 = 1 cfs, Q_{100} = 6 cfs will flow by the inlets and be discharged to the east side of Chapel Hills Drive at Design Point 14.

Basin 7 is a portion of Village Center at Pine Creek Filing No. 2 (the commercial area). The majority of Basin 7 is to be impervious area. Runoff generated in the basin (Q_5 = 5 cfs, Q_{100} = 8 cfs) will be collected in the proposed parking and driveways and will be conveyed and discharged to Village Drive. The runoff will be conveyed down Village Drive to Chapel Hills Drive.

Basin 11 is Pine Creek, Village Center Filing No. 1. The basin includes private Village Drive and adjacent parking. The remainder of the basin is a small landscaped open space area. Runoff from this basin (Q_5 = 4 cfs, Q_{100} = 8 cfs) will be collected in Village Drive and conveyed to the east side of Chapel Hills Drive. At the intersection of Village Drive and Chapel Hills Drive

(Design Point W1) the combined flow from Basin 7 and Basin 11 (Q_5 = 7 cfs, Q_{100} = 13 cfs) will be discharged to the east side of Chapel Hills Drive. The combined flow will then be conveyed to the sump in Chapel Hills Drive at Pine Creek via Chapel Hills Drive

Basin 8 is a portion of Village Center at Pine Creek Filing No. 2 (the commercial area). The majority of Basin 8 is expected to be impervious area. Runoff generated within the basin (Q_5 = 2 cfs, Q_{100} = 3 cfs) will discharge directly to the east side of Chapel Hills Drive.

Design Point 14 was created for the purpose of quantifying the surface runoff to be added to Chapel Hills Drive from the site. Included in the flow assumed to be at Design Point 14 is the flowby from the proposed inlets in Lexington Drive (Design Points 7 and 8), runoff from Basin 8, and runoff from Basin 7 and Basin 11(Design Point W1). The peak rates of the total surface flow to be discharged from the site into Chapel Hills Drive is estimated to be Q_5 = 9 cfs and Q_{100} = 22 cfs at Design Point 14. This flow will be conveyed down Chapel Hills Drive to the sump at Pine Creek. Inlets and associated storm drains at the sump will be upsized to handle this flow (see Proposed Drainage Characteristics, (A) General Description).

In the developed condition Basin 9 and Basin 10 are expected to be developed as townhome sites. Runoff from these sites will be independent to the rest of the site. In Basin 9, estimated flows of Q_5 = 19 cfs and Q_{100} = 39 cfs will travel in a northeasterly direction to a point (Design Point E1) where they will be intercepted by a proposed private storm drain system. Estimated runoff from Basin 10 (Q_5 = 9 cfs, Q_{100} = 18 cfs) will also travel in a northeasterly direction and be intercepted by the proposed private storm drain system at Design Point E2. The combined flows from these basins (Q_5 = 27 cfs, Q_{100} = 55 cfs) at SD Junction Point 8 East will be conveyed to Pine Creek via a proposed 30" diameter private storm drain.

Basin 12 includes portion of a site that is expected to be developed as a single family attached residential development. The bulk of this basin will be included in the site containing the proposed Village Center Detention Basin. Runoff form this basin is expected to be Q_5 = 3 cfs and Q_{100} = 6 cfs. This runoff will contribute directly to the proposed detention pone as concentrated surface flow.

Basin 13 includes a large slope area along the northern boundary of Village Center at Pine Creek. This area is expected to be vegetated pervious surface. Runoff from this basin is expected to occur as non-concentrated flows either directly to adjacent Pine Creek or to the Pine Creek Golf Course. Peak flow rates from the entire basin are estimated at Q_5 = 7 cfs and Q_{100} = 16 cfs.

(C) Sub-Surface Drainage Characteristics

Two public storm drain systems are proposed for this site. These systems have been labeled on the drainage plan contained in the appendix of this report as Storm Drain Systems "A" and "B". System "A" will begin be a continuation of the existing 42" storm drain that currently ends in the proposed Lexington right of way just north of Briargate Parkway. This system will extend approximately 850 feet down Lexington Drive then north through a future drainage easement to outfall in Pine Creek. System "B" will originate at the proposed apartment site located at the southeast corner of the "Future Street" and Lexington Drive. This system will extend west down Lexington Drive to and will outfall in the proposed private Village Center Detention Basin near Chapel Hills Drive.

1. Storm Drain System "A"

System "A" will begin at the end of the existing 42" RCP storm drain in Lexington Drive (Design Point 9). Peak flow rates in the storm drain at this point are expected to be Q_5 = 51 cfs and Q_{100} = 90 cfs as discussed in the "Existing Drainage Condition" section of this report. A proposed 42" storm drain will convey this flow approximately 850 feet to the northeast to SD Junction Point 2.

At SD Junction Point 1, runoff from Basin 1A (Q_5 = 9 cfs, Q_{100} = 18 cfs) that will be conveyed through a proposed 24" diameter stub will be combined with runoff intercepted by a proposed inlet at Design Point 1 on the south side of Lexington Drive (Q_5 = 7 cfs, Q_{100} = 12 cfs). The estimated combined flow at SD Junction Point 1 will be (Q_5 = 16 cfs, Q_{100} = 30 cfs). A proposed 24" diameter storm drain will convey this flow to SD Junction Point 2.

At SD Junction Point 2, flow from SD Junction Point 1 will be combined with flow from Design Point 9 and runoff intercepted by a proposed inlet at Design Point 2 on the north side of Lexington Drive (Q_5 = 4 cfs, Q_{100} = 6 cfs). The estimated combined flow at SD Junction Point 2 will be Q_5 = 65 cfs and Q_{100} = 111 cfs. A proposed 42" diameter storm drain will convey this flow to Pine Creek. Erosion control measures will be required at the outfall point into Pine Creek.

2. Storm Drain System "B"

The Public portion of System "B' will begin at the south right of way line of Lexington Drive just east of the "Future Street". A proposed 36" diameter storm drain will convey flows from Basin 2 (the proposed apartment site; Q_5 = 37 cfs, Q_{100} = 72 cfs) approximately 250' to the west to SD Junction Point 3. At SD Junction Point 3 flow intercepted by a proposed inlet at Design Point 6 (Q_5 = 9 cfs, Q_{100} = 13 cfs) will enter the storm drain. The estimated combined flow in the storm drain at SD Junction Point 3 will be Q_5 = 47 cfs and Q_{100} = 89 cfs. This flow will be conveyed to SD Junction Point 4 in a proposed 42" diameter storm drain to be combined with flow from a proposed 18" diameter stub from Basin 5D, Design Point 12 (Q_5 = 11 cfs, Q_{100} = 18 cfs). The estimated peak rates in the storm drain at SD Junction Point 4 will be Q_5 = 57 cfs and Q_{100} = 106 cfs. This flow will be conveyed to SD Junction Point 5 in a proposed 42" diameter storm drain.

At SD Junction Point 5 runoff from SD Junction Point 7 (the combined flow from Basins 5A, 5B, and 5C; Q_5 = 22 cfs, Q_{100} = 39 cfs) will enter the storm drain via a proposed 24" diameter stub. The estimated combined flow in the storm drain at SD Junction Point 5 will be Q_5 = 77 cfs and Q_{100} = 141 cfs. This flow will be conveyed to SD Junction Point 6 in a proposed 48" diameter storm drain where it will be combined with flow intercepted by proposed inlets at Design Point 7 (Q_5 = 15 cfs, Q_{100} = 27 cfs) and Design Point 8 (Q_5 = 13 cfs, Q_{100} = 24 cfs). The total estimated flow in the storm drain at SD Junction Point 6 will be Q_5 = 106 cfs and Q_{100} = 200 cfs. A proposed 48" or 54" diameter storm drain will convey the flow to the adjacent proposed Village Center Detention Pond.

(D) Detention Pond Characteristics

The proposed private Village Center Detention Pond will be located in the northwest corner of Village Center at Pine Creek, adjacent to Chapel Hills Drive. Inflow to the pond will be through a large diameter storm drain from SD Junction Point 6 (Q_5 = 106 cfs, Q_{100} = 200 cfs) and surface flow from Basin 12 (Q_5 = 3 cfs, Q_{100} = 6 cfs). Total peak inflow rates to the pond (Design Point 13) are estimated at Q_5 = 110 cfs and Q_{100} = 209 cfs. The pond will outfall at a peak 100-year flow rate of 17cfs through an 18" diameter storm drain stub constructed with the existing, adjacent storm drain in Chapel Hills Drive. The storage requirement for the 100-year design storm has been estimated at 4.9 acre feet using the Modified Rational Method found in the "Quick TR-55 Version 5.46" software package. As a safety measure for storms greater than the 100-year design storm or potential clogging of the outlet, the pond will be designed to pass the 100-year peak inflow rate over an armored spillway in emergency situations. The spillway elevation will be set at the 100-year design water surface. Two feet of freeboard above the water surface that would occur if the 100-year design inflow were required to flow over the spillway will be maintained around the perimeter of the pond excluding the spillway. The proposed detention pond will be maintained by a landowners association to be formed within the Village Center area.

(E) Pine Creek Adjacent to Village Center

The approved DBPS indicates the following treatment for Pine Creek adjacent to Village Center at Pine Creek:

1. Concrete channel transition section into the crossing under Chapel Hills Drive.
2. Natural channel upstream of the above transition.

The current plan for the transition into the Chapel Hills Drive crossing structure is to place rip-rap lining in the 50-foot reach immediately upstream of the crossing. This lining will be constructed with the Chapel Hills Drive crossing. Construction of the crossing is expected to begin in April 1998. The remainder of the adjacent channel is well vegetated and appears to be quite stable. This channel will be left undisturbed to the extent possible in order to preserve wildlife habitat and maintain the natural stability of the channel. Treatment to dissipate energy at the proposed outfalls from Village Center at Pine Creek will be required. This treatment will be designed with the outfall lines.

The current plan for sections of Pine Creek to be left untreated is for LP47, LLC doing business as La Plata Investments, LLC to maintain ownership of the channel and be responsible for its maintenance.

(F) Improvements Required for Individual Filings

1. Pine Creek Village Center Filing No. 1

The only drainage improvements required for this filing are the upsizing of the Chapel Hills Drive drainage inlets and associated storm drains at Pine Creek. These improvements will be constructed with the Chapel Hills Drive crossing over Pine Creek. Construction of this crossing is expected to be completed in 1998.

2. Village Center at Pine Creek Filing No. 2

Lexington Drive between Chapel Hills Drive and the proposed "Future Street" (approximately 850 L.F.) will be constructed at the time of development of the filing. The portion of Storm Drain "B" associated with this portion of Lexington Drive will be required to be constructed at the time of the development of the filing. Construction of the Village Center Detention Pond will also be required at the time of development of this filing. This filing is expected to be developed within 1998.

Separate construction cost opinions have been provided for the improvements required for the above noted filings within this report. The remaining proposed improvements will be programmed to be constructed with future filings.

HYDROLOGIC/HYDRAULIC CRITERIA

Hydrologic calculations were performed using the City of Colorado Springs/El Paso County Drainage Criteria Manual, as revised in November 1991 and October 1994. The Rational Method was used to estimate stormwater runoff anticipated from design storms with 5-year and 100-year recurrence intervals.

HYDRAULIC CALCULATIONS

Calculations have been done to verify conveyance capacity of the proposed storm drains using "Flow Master" software. A more detailed analysis of the storm drain system will be required in the final design of the systems. Inlet capacities were calculated per City of Colorado Springs Criteria using a computer spreadsheet.

EROSION CONTROL PLAN

The City of Colorado Springs Drainage Criteria Manual specifies and Erosion Control Plan and associated cost estimate be submitted with the Final Drainage Report. The area included in this Master Development Drainage Plan will be platted in several different filings. We respectfully request that the individual Erosion Control Plans be submitted in conjunction with the Overlot Grading Plans to be submitted with each filing.

FLOODPLAIN STATEMENT

No portion of this site is within a designated F.E.M.A. floodplain as determined by Flood Insurance Rate Map community Panel Numbers 08041C0506 F, 08041C0507 F, 08041C0508, and 08041C0509 F, effective March 17, 1997. See the Appendix for a Floodplain Information Map, which shows the location of the site.

CONSTRUCTION COST OPINION

PINE CREEK VILLAGE CENTER FILING NO. 1

(Public Improvements)

Item	Description	Quantity	Unit Cost	Cost
1.	Upsize 8' Long Inlets to 16'	1 EACH	$2,500/EA	$ 2,500.00
2.	Upsize 24' Long Inlets to 32'	1 EACH	$2,500/EA	$ 2,500.00
3.	Upsize 30" RCP to 36" RCP	125 L.F.	$10/L.F.	$ 1,250.00

Total Pine Creek Village Center Filing No. 1 Construction Cost **$ 6,250.00**

VILLAGE CENTER AT PINE CREEK FILING NO. 2

(Public Improvements)

Item	Description	Quantity	Unit Cost	Cost
1.	16' Long Inlet	2 EACH	$6,400/EA	$ 12,800.00
2.	18' Long Inlet	2 EACH	$7,000/EA	$ 14,000.00
3.	20' Long Inlet	1 EACH	$7,600/EA	$ 7,600.00
4.	48" RCP	150 L.F.	$90/L.F.	$ 13,500.00
5.	42" RCP	680 L.F.	$70/L.F.	$ 47,600.00
6.	30" RCP	50 L.F.	$40/L.F.	$ 2,000.00
7.	18" RCP	80 L.F.	$25/L.F.	$ 2,000.00
8.	48" x 48" x 30" Wye	1 EACH	$1,800/EA	$ 1,800.00
9.	48" x 42" x 30" Wye	1 EACH	$1,800/EA	$ 1,800.00
10.	42" x 42" x 18" Wye	1 EACH	$1,800/EA	$ 1,800.00

Subtotal Village Center at Pine Creek Filing No. 2 (Public Improvements) $104,900.00

(Private Improvements)

Item	Description	Quantity	Unit Cost	Cost
11.	Pond Inlet/Outlet Structures	2 EACH	$5,000/EA	$ 10,000.00
12.	36" RCP	110 L.F.	$50/L.F.	$ 5,500.00
13.	42" x 42" x 36" Wye	1 EACH	$1,800/EA	$ 1,800.00
14.	30" RCP	160 L.F.	$40/L.F.	$ 6,400.00
15.	24" RCP	400 L.F.	$35/L.F.	$ 14,000.00
16.	18" RCP	70 L.F.	$25/L.F.	$ 1,750.00
17.	4' Long Inlet	4 EACH	$2,500/EA	$ 10,000.00

Subtotal Village Center at Pine Creek Filing No. 2 (Private Improvements) $ 49,450.00

Total Village Center at Pine Creek Filing No. 2 Construction Cost **$154,350.00**

FUTURE VILLAGE CENTER AT PINE CREEK FILINGS

(Public Improvements)

Item	Description	Quantity	Unit Cost	Cost
1.	42" RCP	1200 L.F.	$70/L.F.	$ 84,000.00
2.	24" RCP	50 L.F.	$35/L.F.	$ 1,750.00
3.	16' Long Inlet	2EACH	$2,500/EA	$ 12,800.00
4.	Storm Drain Outlet Protection	1 EACH	$8,000/EA	$ 8,000.00
	Subtotal Future Village Center at Pine Creek (Public Improvements)			$106,550.00

(Private Improvements)

Item	Description	Quantity	Unit Cost	Cost
5.	36" RCP	180 L.F.	$50/L.F.	$ 9,000.00
6.	30" RCP	600 L.F.	$40/L.F.	$ 24,000.00
7.	24" RCP	50 L.F.	$35/L.F.	$ 1,750.00
8.	54" I.D. Manhole	1 EACH	$5,400/EA	$ 5,400.00
9.	Storm Drain Outlet Protection	1 EACH	$7,000/EA	$ 7,000.00
	Subtotal Future Village Center at Pine Creek (Private Improvements)			$ 47,150.00
	Total Future Village Center at Pine Creek Construction Cost			**$153,700.00**

Total Pine Creek Village Center Filing No. 1 Construction Cost	$ 6,250.00
Total Village Center At Pine Creek Filing No. 2 Construction Cost	$154,350.00
Total Future Village Center At Pine Creek Construction Cost	$153,700.00
TOTAL VILLAGE CENTER AT PINE CREEK CONSTRUCTION COST	**$314,300.00**

JR Engineering, Ltd. cannot and does not guarantee that the construction cost will not vary from these opinions of probable costs. These opinions represent our best judgement as design professionals familiar with the construction industry and this development in particular.

DRAINAGE AND BRIDGE FEES

This 63.3 acre area lies within the Pine Creek Drainage Basin. Pine Creek is a non-fee drainage basin. The developer is responsible for the installation of all drainage facilities.

SUMMARY

The analysis and text presented in this report demonstrate the adequacy of the proposed drainage facilities to collect and convey the runoff from the 5-year and 100-year design storms per City Of Colorado Springs Criteria. The proposed development of Village Center at Pine Creek is compatible with the Drainage Basin Planning Study Update that is currently being prepared by JR Engineering. As such this development will not negatively impact the planned design flows in downstream Pine Creek.

PREPARED BY:

Virgil Sanchez, E.I.
Design Engineer I
Land Development
For and On Behalf of JR Engineering, Ltd.

Vancel Fossinger, P.E.
Project Engineer
Land Development
For and On Behalf of JR Engineering, Ltd.

\vb\871641\drainage.doc

REFERENCES

1. "City of Colorado Springs/County of El Paso Drainage Criteria Manual", dated November 1991.

2. Soils Survey of El Paso County Area, Colorado Soil Conservation Service.

3. "Pine Creek Drainage Basin Planning Study", by Obering, Wurth & Associates, dated Jun 1988, revised October 1988.

4. "Amendment No. 1 to Pine Creek Drainage Basin Planning Study", by Obering, Wurth & Associates, dated July 1992.

5. "Final Drainage Report for Chapel Hills Drive", by JR Engineering, Ltd., dated January 1997.

6. "Pine Creek Drainage Basin Planning Study Update", currently being prepared by JR Engineering, Ltd.

7. "Final Drainage Report for Briargate Parkway Filing No. 1", by JR Engineering, dated September 1996.

8. "Final Drainage Report for Summerfield at Briargate Filing No. 7", by JR Engineering, dated September 1995.

9. "Final Drainage Report for Summerfield at Briargate Filing No. 8", by JR Engineering, dated October 1996.

APPENDIX

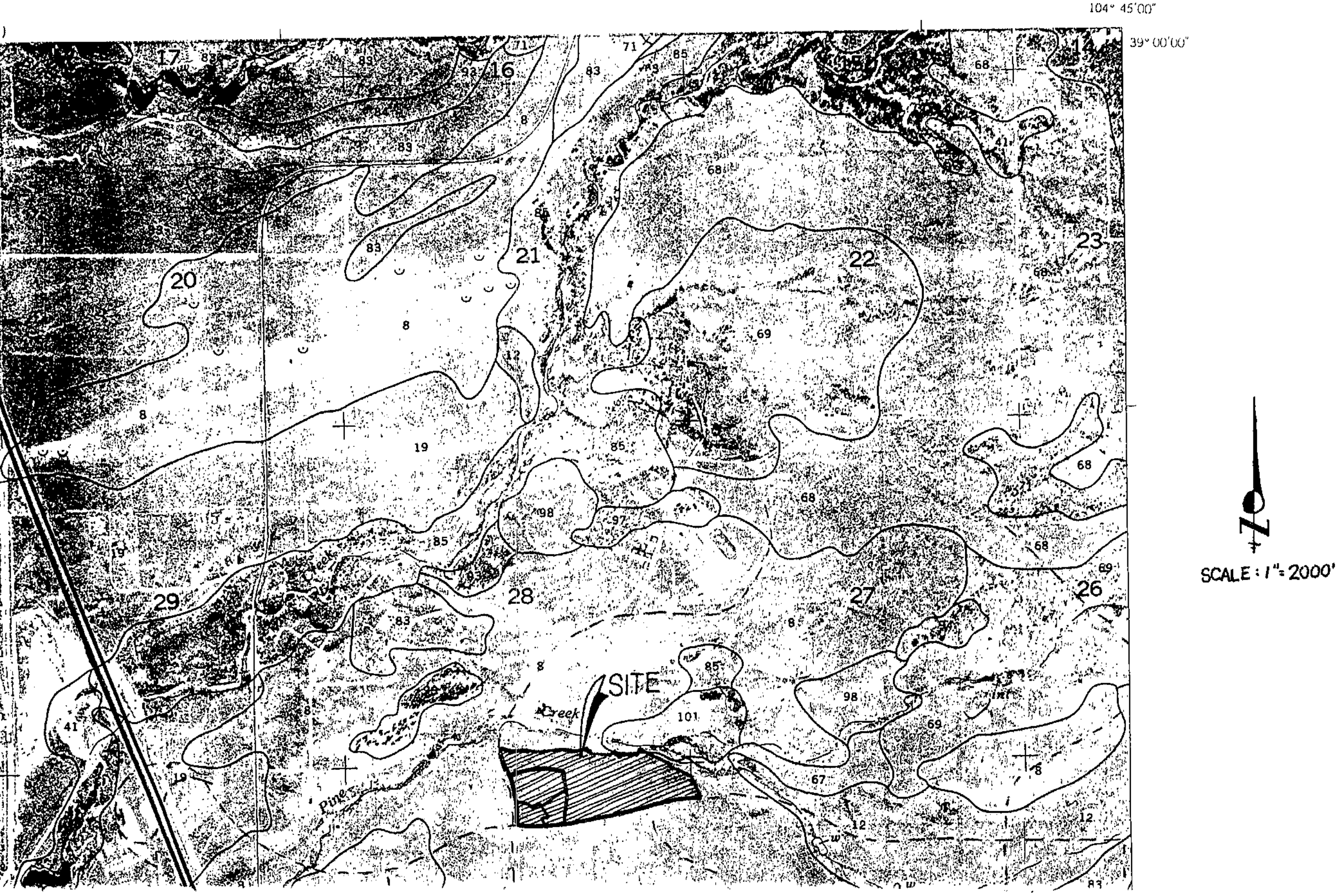
VICINITY
MAP

VICINITY MAP

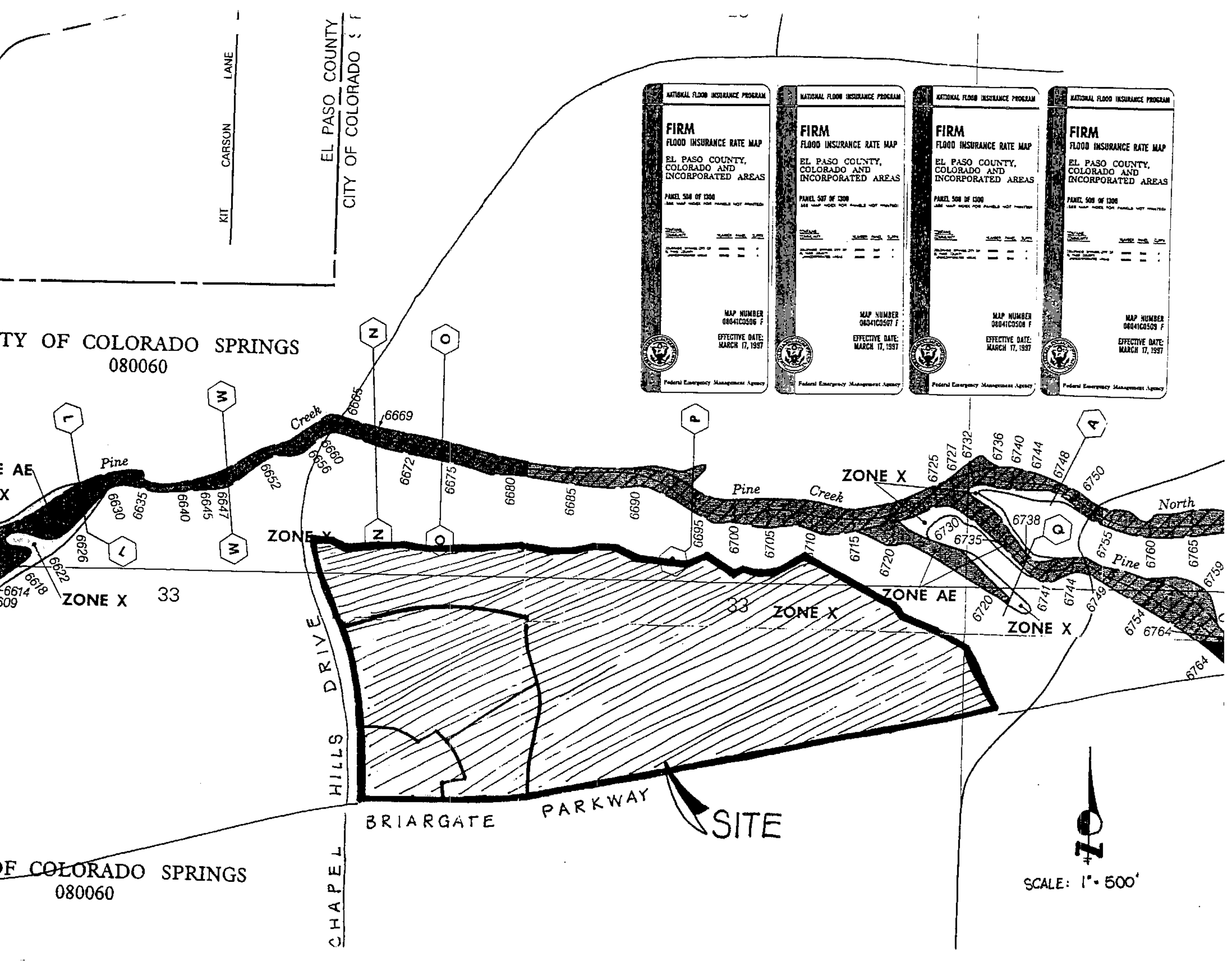
SOILS

MAP

SHEET NO. 8
EL PASO COUNTY AREA, COLORADO
(PIKEVIEW QUADRANGLE)



F.E.M.A.
FLOODPLAIN MAP



FIRM
FLOOD INSURANCE RATE MAP
EL PASO COUNTY, COLORADO AND INCORPORATED AREAS
NATIONAL FLOOD INSURANCE PROGRAM
Federal Emergency Management Agency
EFFECTIVE DATE: MARCH 17, 1997
EL PASO COUNTY
CITY OF COLORADO
KIT CARSON LANE
CITY OF COLORADO SPRINGS 080060
ZONE AE
ZONE X
Pine Creek
North
33
CHAPEL HILLS DRIVE
BRIARGATE PARKWAY
SITE
SCALE: 1" = 500'

HYDROLOGIC CALCULATIONS

VILLAGE CENTER FILING NO.2
WEIGHTED C VALUES

BASIN	TOTAL AREA (AC)	MAJOR STREETS AREA (AC)	MAJOR STREETS C_5	MAJOR STREETS C_{100}	APARTMENT SITE USE	APARTMENT SITE AREA (AC)	APARTMENT SITE C_5	APARTMENT SITE C_{100}	PATIO HOME/LANDSCAPE USE	PATIO HOME/LANDSCAPE DU/AC	PATIO HOME/LANDSCAPE AREA (AC)	PATIO HOME/LANDSCAPE C_5	PATIO HOME/LANDSCAPE C_{100}	WEIGHTED C_5	WEIGHTED C_{100}
1	2.4				A	2.4	0.7	0.8						0.70	0.80
1A	2.7				A	2.7	0.7	0.8						0.70	0.80
1B	0.9								P	6	0.9	0.65	0.75	0.65	0.75
1C	1.2	1.2	0.90	0.95										0.90	0.95
2	11.4				A	11.4	0.7	0.8						0.70	0.80
2A	3.5								P	6	3.5	0.65	0.75	0.65	0.75
3	2.7	0.5	0.90	0.95					L		2.2	0.25	0.35	0.37	0.46
4	3.9	0.6	0.85	0.90	A				P	6	3.3	0.65	0.75	0.68	0.77
5A	1.6				C	1.6	0.90	0.90						0.90	0.90
5B	0.8				C	0.8	0.90	0.90						0.90	0.90
5C	2.8				C	2.8	0.90	0.90						0.90	0.90
5D	2.5				C	2.5	0.90	0.90						0.90	0.90
5E	1.7				C	1.7	0.90	0.90						0.90	0.90
6	0.2				C	0.2	0.90	0.90						0.90	0.90
7	1.1				C	1.1	0.90	0.90						0.90	0.90
8	0.4				C	0.4	0.90	0.90						0.90	0.90
9	5.7				C	5.7	0.70	0.80						0.70	0.80
10	2.7				C	2.7	0.70	0.80						0.70	0.80
11	2.3	0.8	0.90	0.95					L		1.5	0.25	0.35	0.47	0.55
12	1.7								L		1.7	0.25	0.35	0.25	0.35
13	5.1										5.1	0.25	0.35	0.25	0.35

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Project Village Center Filing No. 2
Engineer: VAS
Job No.: 8716.41

VILLAGE CENTER FILING NO. 2
(RATIONAL METHOD Q=CIA)

BASIN	TOTAL AREA (Ac)	SOIL TYPE	WEIGHTED C_5	WEIGHTED C_{100}	OVERLAND C_5	OVERLAND Length (ft)	OVERLAND Slope (%)	OVERLAND T_c (min)	SWALE Length (ft)	SWALE Slope (%)	SWALE Velocity (fps)	SWALE T_c (min)	STREET Length (ft)	STREET Slope (%)	STREET Velocity (fps)	STREET T_c (min)	T_c Total (min)	INTENSITY I_5 (in/hr)	INTENSITY I_{100} (in/hr)	TOTAL FLOWS Q_5 (cfs)	TOTAL FLOWS Q_{100} (cfs)
1	2.4	A	0.70	0.80	0.75	150	4.0%	5.1	600	4.0%	7.0	1.4					6.5	4.7	8.3	8	16
																			CA(equiv)	1.65	1.89
1A	2.7	A	0.70	0.80	0.75	150	4.0%	5.1	400	4.0%	7.0	1.0					6.0	4.8	8.5	9	18
																				1.87	2.14
1B	0.9	A	0.65	0.75	0.25	50	2.0%	8.9					250	3.8%	6.8	0.6	9.6	4.1	7.2	3	5
																				0.59	0.68
1C	1.2	A	0.90	0.95	0.25	30	2.0%	6.9					730	6.0%	8.6	1.4	8.3	4.3	7.6	5	9
																			CA(equiv)	0.59	0.68
2	11.4	A	0.70	0.80	0.75	150	4.0%	5.1	150	3.3%	6.4	0.4	600	3.8%	6.8	1.5	6.9	4.6	8.1	37	74
																			CA(equiv)	7.95	9.09
2A	3.5	A	0.65	0.75	0.25	50	2.0%	8.9					900	3.8%	6.8	2.2	11.1	3.9	6.8	9	18
																			CA(equiv)	2.25	2.60
3	2.7	A	0.37	0.46	0.25	40	33.0%	3.2					700	4.0%	7.0	1.7	4.8	5.0	9.2	6	12
																			CA(equiv)	1.00	1.25
4	3.9	A	0.68	0.77	0.25	50	2.0%	8.9					800	3.8%	6.8	2.0	10.9	3.9	6.8	11	21
																			CA(equiv)	2.62	2.98
5A	1.6	A	0.90	0.90	0.75	100	2.5%	4.8	180	2.5%	5.5	0.5					5.4	4.9	8.9	8	14
																			CA(equiv)	1.47	1.47
5B	0.8	A	0.90	0.90	0.90	20	2.0%	1.3	150	5.0%	7.8	0.3	150	1.0%	3.5	0.7	5.0	5.0	9.1	4	7
																			CA(equiv)	0.68	0.68
5C	2.8	A	0.90	0.90	0.75	150	1.5%	7.0	250	4.4%	7.3	0.6					7.6	4.5	7.9	12	21
																			CA(equiv)	2.56	2.56
5D	2.5	A	0.90	0.90	0.75	150	1.5%	7.0	250	4.4%	7.3	0.6					7.6	4.5	7.9	11	18
																			CA(equiv)	2.25	2.25
5E	1.7	A	0.90	0.90	0.75	100	1.5%	5.7	30	30.0%	19.2	0.0	80	4.0%	7.0	0.2	5.9	4.8	8.6	8	13
																			CA(equiv)	1.51	1.51
6	0.2	A	0.90	0.90	0.25	20	2.0%	5.7					110	1.0%	3.5	0.5	6.2	4.7	8.5	1	2
																			CA(equiv)	0.20	0.20
7	1.1	A	0.90	0.90	0.25	25	2.0%	6.3					225	3.3%	6.4	0.6	6.9	4.6	8.2	5	8
																			CA(equiv)	0.95	0.95
8	0.4	A	0.90	0.90	0.25	80	15.0%	5.8									5.8	4.8	8.6	2	3
																			CA(equiv)	0.34	0.34
9	5.7	A	0.70	0.80	0.75	100	2.0%	5.2	400	2.0%	4.9	1.3					6.6	4.7	8.3	19	39
																			CA(equiv)	4.02	4.59
10	2.7	A	0.70	0.80	0.75	100	1.5%	5.7	250	1.5%	4.3	1.0					6.7	4.6	8.2	9	18
																			CA(equiv)	1.86	2.13
11	2.3	A	0.47	0.55	0.25	150	2.5%	14.4	150	2.5%	5.5	0.5					14.8	3.5	5.9	4	8
																			CA(equiv)	1.07	1.27
12	1.7	A	0.25	0.35	0.25	100	33.0%	5.0	80	33.0%	20.1	0.1					5.1	5.0	9.0	3	6
																			CA(equiv)	1.86	2.13
13	5.1	A	0.25	0.35	0.25	150	33.0%	6.1									6.1	4.7	8.5	7	16
																			CA(equiv)	1.07	1.27

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Projec Village Center Filing No. 2
Engineer: VAS
Job No.: 8716.41

VILLAGE CENTER FILING NO. 2
SURFACE ROUTING

DESIGN POINT	CONTRIBUTING BASINS	CA (equiv.) CA_5	CA100	T_c	ROUTING Length (ft)	Slope (%)	Velocity (fps)	T_c (min)	T_c (min)	INTENSITY I_5 (in/hr)	I_{100} (in/hr)	TOTAL FLOWS Q_5 (cfs)	Q_{100} (cfs)
1	1	1.65	1.89	6.5					6.5	4.7	8.3		
	1/2 1C	0.30	0.34	8.3									
		1.95	2.23									9	19
2	1B	0.59	0.68	9.6					9.6	4.1	7.2		
	1/2 1C	0.30	0.34	8.3									
		0.89	1.03									4	7
3	1A	1.67	2.14	6.0					6.0	4.8	8.5		
		1.67	2.14									9	18
4	2	7.95	9.09	6.9					6.9	4.6	8.1		
		7.95	9.09									37	74
5	DP-1 FB	0.48	0.83										
	6	0.20	0.20	6.2					6.2	4.7	8.5		
	3	1.00	1.25	4.8									
		1.68	2.28									8	19
6	DP-2 FB	0.89	0.21										
	2A	2.25	2.60	11.1					11.1	3.9	6.8		
		3.14	2.80									12	19
7	DP-5 FB	1.68	2.28										
	5E	1.51	1.51	5.9					5.9	4.8	8.6		
		3.19	3.79									15	33
8	DP-6 FB	0.75	0.89										
	4	2.62	2.98	10.9					10.9	3.9	6.8		
		3.38	3.87									13	26
9	OS-1	15.68	15.99	17.2					17.2	3.3	5.6		
		15.68	15.99									51	90
10	5A	1.47	1.47	5.4	270	2.5%	5.53	0.81	6.2	4.7	8.5		
	5B	0.68	0.68	5.0									
		2.14	2.14									10	18
11	5C	2.56	2.56	7.6					7.6	4.5	7.9		
		2.56	2.56									12	21
12	5D	2.25	2.25	7.6					7.6	4.5	7.9		
		2.25	2.25									11	18
13	12	1.07	1.27	5.1									
	JUNC 6	23.86	25.61	7.8					7.8	4.4	7.8		
		24.93	26.88									110	209
14	DP-8 FB	0.00	0.40										
	W1	2.02	2.21										
	DP-7 FB	0.12	0.72										
	8	0.34	0.34	14.8	100	4.0%	7.00	0.24	15.1	3.5	5.9		
		2.48	3.68									9	22
E1	9	4.02	4.59	6.6					6.6	4.7	8.3		
		4.02	4.59									19	38
E2	10	1.86	2.13	6.7					6.7	4.6	8.2		
		1.86	2.13									9	18
W1	7	0.95	0.95	6.9					14.8	3.5	5.9		
	11	1.07	1.27	14.8									
		2.02	2.21									7	13

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Project: Village Center Filing No. 2
Engineer: VAS
Job No.: 8716.41

FB = FLOWBY

Village Center Filing No. 2
PIPE ROUTING

S.D. JUNC POINT	CONTRIBUTING BASINS	CA (equiv.) CA_5	CA100	Previous T_c	ROUTING Length (ft)	Slope (%)	Velocity (fps)	T_c (min)	T_c (min)	INTENSITY I_5 (in/hr)	I_{100} (in/hr)	TOTAL FLOWS Q_5 (cfs)	Q_{100} (cfs)
1	INL DP-1	1.47	1.40	6.5	50	2.00%	11.60	0.1	6.6	4.7	8.3		
JUNC	DP-3	1.87	2.14	6.0									
		3.34	3.53									16	30
2	INL DP-2	0.89	0.82	9.6									
JUNC	DP-9	15.68	15.99	17.2	300	8.00%	16.38	0.3	17.5	3.2	5.5		
	JUNC 1	3.34	3.53	0.0									
		19.90	20.34									65	111
22	JUNC 2	19.90	20.34	17.5	120	33.00%	46.48	0.0	17.5	3.2	5.4		
OUTLET													
		19.90	20.34									65	111
3	DP-4	7.95	9.09	6.9	260	4.00%	20.21	0.2	7.1	4.5	8.1		
JUNC	INL DP-6	2.38	1.91	11.1									
		10.34	11.00									47	89
4	DP-12	2.25	2.25	7.6									
JUNC	JUNC 3	10.34	11.00	7.1	350	4.00%	20.94	0.3	7.4	4.5	7.9		
		12.59	13.25									57	106
5	JUNC 4	12.59	13.25	7.4	320	4.00%	22.63	0.2	7.7	4.4	7.9		
JUNC	JUNC 7	4.70	4.70	6.6									
		17.28	17.95									77	141
6	INL DP-7	3.19	3.79	5.9									
JUNC	JUNC 5	17.28	17.95	7.7	330	4.00%	32.96	0.2	7.8	4.4	7.8		
	INL DP-8	3.38	3.87	10.9									
		23.86	25.61									106	200
7	DP-10	2.14	2.14	6.2	360	4.00%	14.90	0.4	6.6	4.6	8.3		
JUNC	DP-11	2.56	2.56	7.6									
		4.70	4.70									22	39
8	9	4.02	4.59	6.6	410	5.00%	11.26	0.6	7.2	4.5	8.1		
	10	1.86	2.13	6.7									
		5.88	6.72									27	55

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Project: Village Center Filing No. 2
Engineer: VAS
Job No.: 8716.41

INL = 'CA' VALUE ENTERING INLET

L11
Worksheet for Circular Channel

Project Description	
Project File	x:\870000.all\871641\excel\871641.fm2
Worksheet	L11
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.050000	ft/ft
Diameter	18.00	in
Discharge	18.00	cfs

Results		
Depth	0.98	ft
Flow Area	1.23	ft^2
Wetted Perimeter	2.83	ft
Top Width	1.43	ft
Critical Depth	1.45	ft
Percent Full	65.60	
Critical Slope	0.025774	ft/ft
Velocity	14.65	ft/s
Velocity Head	3.33	ft
Specific Energy	4.32	ft
Froude Number	2.78	
Maximum Discharge	25.27	cfs
Full Flow Capacity	23.49	cfs
Full Flow Slope	0.029367	ft/ft
Flow is supercritical.		

L15
Worksheet for Circular Channel

Project Description	
Project File	x:\870000.all\871641\excel\871641.fm2
Worksheet	L15
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.030000	ft/ft
Diameter	24.00	in
Discharge	39.00	cfs

Results		
Depth	19.6	in
Flow Area	2.74	ft²
Wetted Perimeter	4.51	ft
Top Width	1.55	ft
Critical Depth	1.95	ft
Percent Full	81.55	
Critical Slope	0.026305	ft/ft
Velocity	14.22	ft/s
Velocity Head	3.14	ft
Specific Energy	4.77	ft
Froude Number	1.89	
Maximum Discharge	42.15	cfs
Full Flow Capacity	39.18	cfs
Full Flow Slope	0.029723	ft/ft
Flow is supercritical.		

E2
Worksheet for Circular Channel

Project Description	
Project File	x:\870000.all\871641\excel\871641.fm2
Worksheet	OS-2
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.200000	ft/ft
Diameter	30.00	in
Discharge	55.00	cfs

Results		
Depth	11.3	in
Flow Area	1.68	ft^2
Wetted Perimeter	3.30	ft
Top Width	2.42	ft
Critical Depth	2.35	ft
Percent Full	37.55	
Critical Slope	0.015543	ft/ft
Velocity	32.66	ft/s
Velocity Head	16.58	ft
Specific Energy	17.51	ft
Froude Number	6.90	
Maximum Discharge	197.31	cfs
Full Flow Capacity	183.42	cfs
Full Flow Slope	0.017982	ft/ft
Flow is supercritical.		

L8
Worksheet for Circular Channel

Project Description	
Project File	x:\870000.all\871641\excel\871641.fm2
Worksheet	L8
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.050000	ft/ft
Diameter	36.00	in
Discharge	74.00	cfs

Results		
Depth	17.9	in
Flow Area	3.51	ft²
Wetted Perimeter	4.70	ft
Top Width	3.00	ft
Critical Depth	2.71	ft
Percent Full	49.78	
Critical Slope	0.010813	ft/ft
Velocity	21.06	ft/s
Velocity Head	6.89	ft
Specific Energy	8.38	ft
Froude Number	3.43	
Maximum Discharge	160.42	cfs
Full Flow Capacity	149.13	cfs
Full Flow Slope	0.012311	ft/ft
Flow is supercritical.		

L12
Worksheet for Circular Channel

Project Description	
Project File	x:\870000.all\871641\excel\871641.fm2
Worksheet	L12
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.040000	ft/ft
Diameter	42.00	in
Discharge	106.00	cfs

Results		
Depth	21.7	in
Flow Area	5.00	ft^2
Wetted Perimeter	5.61	ft
Top Width	3.50	ft
Critical Depth	3.13	ft
Percent Full	51.57	
Critical Slope	0.009820	ft/ft
Velocity	21.19	ft/s
Velocity Head	6.98	ft
Specific Energy	8.78	ft
Froude Number	3.12	
Maximum Discharge	216.44	cfs
Full Flow Capacity	201.21	cfs
Full Flow Slope	0.011101	ft/ft
Flow is supercritical.		

L18
Worksheet for Circular Channel

Project Description	
Project File	x:\870000.all\871641\excel\871641.fm2
Worksheet	L18
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.100000	ft/ft
Diameter	48.00	in
Discharge	200.00	cfs

Results		
Depth	22.3	in
Flow Area	5.71	ft²
Wetted Perimeter	6.00	ft
Top Width	3.99	ft
Critical Depth	3.85	ft
Percent Full	46.44	
Critical Slope	0.016914	ft/ft
Velocity	35.00	ft/s
Velocity Head	19.03	ft
Specific Energy	20.89	ft
Froude Number	5.16	
Maximum Discharge	488.60	cfs
Full Flow Capacity	454.22	cfs
Full Flow Slope	0.019388	ft/ft
Flow is supercritical.		

Village Center Filing No. 2

(Inlet Calculations - CONTINUOUS-GRADE Condition)

(Inlets in Series)

DESIGN POINT 1

100-YR. FLOW

Q(100) 19	I(100) 8.3	Inlet size ? L(i) =	16
DEPTH 0.33	Fr 2.52	If Li < L(2) then Qi =	0
		CA(eqv.)=	0
SPREAD 12.4	L(1) 24.0		
		If Li > L(2) then Qi =	12
CROSS SLOPE 2.0%	L(2) 14.4	CA(eqv.)=	1.398
STREET SLOPE 4.0%	L(3) 51.5	FB =	7
		FB % =	37%
		CA(eqv.)=	0.83

FLOW BY:

Q(100) 7	I(100) 8.3	Inlet size ? L(i) =	0
DEPTH 0.23	Fr 2.52	If Li < L(2) then Qi =	0
		CA(eqv.)=	0
SPREAD 7.2	L(1) 14.0		
		If Li > L(2) then Qi =	0
CROSS SLOPE 2.0%	L(2) 8.4	CA(eqv.)=	0
STREET SLOPE 4.0%	L(3) 30.1	FB =	7
		FB % =	100%
		CA(eqv.)=	0.83

5-YR. FLOW

Q(5) 9	I(10) 4.7	Inlet size ? L(i) =	16
DEPTH 0.25	Fr 2.33	If Li < L(2) then Qi =	0
		CA(eqv.)=	0
SPREAD 8.5	L(1) 15.2		
		If Li > L(2) then Qi =	7
CROSS SLOPE 2.0%	L(2) 9.1	CA(eqv.)=	1.467
STREET SLOPE 4.0%	L(3) 32.5	FB =	2
		FB % =	25%
		CA(eqv.)=	0.48

FLOW BY:

Q(5) 2	I(10) 4.7	Inlet size ? L(i) =	0
DEPTH 0.15	Fr 1.78	If Li < L(2) then Qi =	0
		CA(eqv.)=	0
SPREAD 3.3	L(1) 4.5		
		If Li > L(2) then Qi =	0
CROSS SLOPE 2.0%	L(2) 2.7	CA(eqv.)=	0
STREET SLOPE 4.0%	L(3) 9.6	FB =	2
		FB % =	100%
		CA(eqv.)=	0.48

JR ENGINEERING, LTD.
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Project: Village Center Filing No. 2
Engineer: VAS
Job No.: 8716.41

Village Center Filing No. 2

(Inlet Calculations - CONTINUOUS-GRADE Condition)
(Inlets in Series)
DESIGN POINT 2

100-YR. FLOW

Q(100)	7	I(100)	7.2	
DEPTH	0.24	Fr	2.27	
SPREAD	7.5	L(1)	13.1	
CROSS SLOPE	2.0%	L(2)	7.9	
STREET SLOPE	4.0%	L(3)	28.2	

Inlet size ? L(i) =	16
If Li < L(2) then Qi =	0
CA(eqv.)=	0
If Li > L(2) then Qi =	6
CA(eqv.)=	0.818
FB =	1
FB % =	20%
CA(eqv.)=	0.21

FLOW BY:

Q(100)	1	I(100)	7.2	
DEPTH	0.13	Fr	2.27	
SPREAD	2.2	L(1)	3.9	
CROSS SLOPE	2.0%	L(2)	2.3	
STREET SLOPE	4.0%	L(3)	8.3	

Inlet size ? L(i) =	0
If Li < L(2) then Qi =	0
CA(eqv.)=	0
If Li > L(2) then Qi =	0
CA(eqv.)=	0
FB =	1
FB % =	100%
CA(eqv.)=	0.21

5-YR. FLOW

Q(5)	4	I(10)	4.1	
DEPTH	0.18	Fr	2.03	
SPREAD	4.8	L(1)	7.5	
CROSS SLOPE	2.0%	L(2)	4.5	
STREET SLOPE	4.0%	L(3)	16.1	

Inlet size ? L(i) =	16
If Li < L(2) then Qi =	0
CA(eqv.)=	0
If Li > L(2) then Qi =	4
CA(eqv.)=	0.888
FB =	0
FB % =	0%
CA(eqv.)=	0.00

FLOW BY:

Q(5)	0	I(10)	4.1	
DEPTH	0.02	Fr	0.00	
SPREAD	-3.5	L(1)	0.0	
CROSS SLOPE	2.0%	L(2)	0.0	
STREET SLOPE	4.0%	L(3)	0.0	

Inlet size ? L(i) =	0
If Li < L(2) then Qi =	0
CA(eqv.)=	0
If Li > L(2) then Qi =	0
CA(eqv.)=	0
FB =	0
FB % =	100%
CA(eqv.)=	0.00

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Village Center Filing No. 2

(Inlet Calculations - CONTINUOUS-GRADE Condition)
(Inlets in Series)
DESIGN POINT 5

100-YR. FLOW

TOTAL Q(100) 19	I(100) 8.5	Inlet size ? L(i) =	0
DEPTH 0.34	Fr 2.53	If Li < L(2) then Qi =	0
		CA(eqv.)=	0
SPREAD 12.6	L(1) 24.6		
		If Li > L(2) then Qi =	0
CROSS SLOPE 2.0%	L(2) 14.8	CA(eqv.)=	0
STREET SLOPE 4.0%	L(3) 52.7	FB =	19
		FB % =	100%
		CA(eqv.)=	2.28

FLOW BY:

Q(100) 19	I(100) 8.5	Inlet size ? L(i) =	0
DEPTH 0.34	Fr 2.53	If Li < L(2) then Qi =	0
		CA(eqv.)=	0
SPREAD 12.6	L(1) 24.6		
		If Li > L(2) then Qi =	0
CROSS SLOPE 2.0%	L(2) 14.8	CA(eqv.)=	0
STREET SLOPE 4.0%	L(3) 52.7	FB =	19
		FB % =	100%
		CA(eqv.)=	2.28

5-YR. FLOW

TOTAL Q(100) 8	I(10) 4.7	Inlet size ? L(i) =	0
DEPTH 0.24	Fr 2.29	If Li < L(2) then Qi =	0
		CA(eqv.)=	0
SPREAD 7.9	L(1) 13.8		
		If Li > L(2) then Qi =	0
CROSS SLOPE 2.0%	L(2) 8.3	CA(eqv.)=	0
STREET SLOPE 4.0%	L(3) 29.7	FB =	8
		FB % =	100%
		CA(eqv.)=	1.68

FLOW BY:

Q(5) 8	I(10) 4.7	Inlet size ? L(i) =	0
DEPTH 0.24	Fr 2.29	If Li < L(2) then Qi =	0
		CA(eqv.)=	0
SPREAD 7.9	L(1) 13.8		
		If Li > L(2) then Qi =	0
CROSS SLOPE 2.0%	L(2) 8.3	CA(eqv.)=	0
STREET SLOPE 4.0%	L(3) 29.7	FB =	8
		FB % =	100%
		CA(eqv.)=	1.68

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Engineer: VAS
Job No.: 8716.41

Village Center Filing No. 2

(Inlet Calculations - CONTINUOUS-GRADE Condition)

(Inlets in Series)

DESIGN POINT 6

100-YR. FLOW

TOTAL Q(100)	19	I(100)	6.8
DEPTH	0.33	Fr	2.52
SPREAD	12.5	L(1)	24.3
CROSS SLOPE	2.0%	L(2)	14.6
STREET SLOPE	4.0%	L(3)	52.1

Inlet size ? L(i) =	20
If Li < L(2) then Qi =	0
CA(eqv.)=	0
If Li > L(2) then Qi =	13
CA(eqv.)=	1.911
FB =	6
FB % =	32%
CA(eqv.)=	0.89

FLOW BY:

Q(100)	6	I(100)	6.8
DEPTH	0.22	Fr	2.52
SPREAD	6.6	L(1)	12.9
CROSS SLOPE	2.0%	L(2)	7.8
STREET SLOPE	4.0%	L(3)	27.7

Inlet size ? L(i) =	0
If Li < L(2) then Qi =	0
CA(eqv.)=	0
If Li > L(2) then Qi =	0
CA(eqv.)=	0
FB =	6
FB % =	100%
CA(eqv.)=	0.89

5-YR. FLOW

TOTAL Q(100)	12	I(10)	3.9
DEPTH	0.28	Fr	2.41
SPREAD	10.0	L(1)	18.5
CROSS SLOPE	2.0%	L(2)	11.1
STREET SLOPE	4.0%	L(3)	39.7

Inlet size ? L(i) =	20
If Li < L(2) then Qi =	0
CA(eqv.)=	0
If Li > L(2) then Qi =	9
CA(eqv.)=	2.384
FB =	3
FB % =	24%
CA(eqv.)=	0.75

FLOW BY:

Q(5)	3	I(10)	3.9
DEPTH	0.17	Fr	1.93
SPREAD	4.1	L(1)	6.1
CROSS SLOPE	2.0%	L(2)	3.6
STREET SLOPE	4.0%	L(3)	13.0

Inlet size ? L(i) =	0
If Li < L(2) then Qi =	0
CA(eqv.)=	0
If Li > L(2) then Qi =	0
CA(eqv.)=	0
FB =	3
FB % =	100%
CA(eqv.)=	0.75

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Project: Village Center Filing No. 2
Engineer: VAS
Job No.: 8716.41

Village Center Filing No. 2

(Inlet Calculations - CONTINUOUS-GRADE Condition)

(Inlets in Series)

DESIGN POINT 7

100-YR. FLOW

	TOTAL Q(100)	33	I(100)	8.6	Inlet size ? L(i) =	16
	DEPTH	0.41	Fr	2.60	If Li < L(2) then Qi =	16
					CA(eqv.)=	1.843
	SPREAD	16.5	L(1)	32.9		
					If Li > L(2) then Qi =	0
	CROSS SLOPE	2.0%	L(2)	19.8	CA(eqv.)=	0
	STREET SLOPE	3.8%	L(3)	70.5	FB =	17
					FB % =	51%
					CA(eqv.)=	1.95
FLOW BY:	Q(100)	17	I(100)	8.6	Inlet size ? L(i) =	16
	DEPTH	0.32	Fr	2.60	If Li < L(2) then Qi =	0
					CA(eqv.)=	0
	SPREAD	11.9	L(1)	23.8		
					If Li > L(2) then Qi =	11
	CROSS SLOPE	2.0%	L(2)	14.3	CA(eqv.)=	1.226
	STREET SLOPE	3.8%	L(3)	50.9	FB =	6
					FB % =	37%
					CA(eqv.)=	0.72
FLOW BY:	Q(100)	6	I(100)	8.6	Inlet size ? L(i) =	0
	DEPTH	0.22	Fr	2.60	If Li < L(2) then Qi =	0
					CA(eqv.)=	0
	SPREAD	6.9	L(1)	13.7		
					If Li > L(2) then Qi =	0
	CROSS SLOPE	2.0%	L(2)	8.3	CA(eqv.)=	0
	STREET SLOPE	3.8%	L(3)	29.5	FB =	6
					FB % =	100%
					CA(eqv.)=	0.72

5-YR. FLOW

	TOTAL Q(100)	15	I(10)	4.8	Inlet size ? L(i) =	16
	DEPTH	0.31	Fr	2.41	If Li < L(2) then Qi =	0
					CA(eqv.)=	0
	SPREAD	11.4	L(1)	21.1		
					If Li > L(2) then Qi =	10
	CROSS SLOPE	2.0%	L(2)	12.7	CA(eqv.)=	2.108
	STREET SLOPE	3.8%	L(3)	45.2	FB =	5
					FB % =	34%
					CA(eqv.)=	1.09
FLOW BY:	Q(5)	5	I(10)	4.8	Inlet size ? L(i) =	16
	DEPTH	0.21	Fr	2.11	If Li < L(2) then Qi =	0
					CA(eqv.)=	0
	SPREAD	6.2	L(1)	10.0		
					If Li > L(2) then Qi =	5
	CROSS SLOPE	2.0%	L(2)	6.0	CA(eqv.)=	0.966
	STREET SLOPE	3.8%	L(3)	21.4	FB =	1
					FB % =	11%
					CA(eqv.)=	0.12

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Project: Village Center Filing No. 2

Engineer: VAS

Job No.: 8716.41

Village Center Filing No. 2

(Inlet Calculations - CONTINUOUS-GRADE Condition)

(Inlets in Series)

DESIGN POINT 8

100-YR. FLOW

TOTAL Q(100)	26	I(100)	6.8	Inlet size ? L(i) =	18
DEPTH	0.38	Fr	2.55	If Li < L(2) then Qi =	0
				CA(eqv.)=	0
SPREAD	14.9	L(1)	29.2		
				If Li > L(2) then Qi =	16
CROSS SLOPE	2.0%	L(2)	17.6	CA(eqv.)=	2.352
STREET SLOPE	3.8%	L(3)	62.7	FB =	10
				FB % =	39%
				CA(eqv.)=	1.52

FLOW BY:

Q(100)	10	I(100)	6.8	Inlet size ? L(i) =	18
DEPTH	0.27	Fr	2.55	If Li < L(2) then Qi =	0
				CA(eqv.)=	0
SPREAD	9.2	L(1)	18.1		
				If Li > L(2) then Qi =	8
CROSS SLOPE	2.0%	L(2)	10.9	CA(eqv.)=	1.118
STREET SLOPE	3.8%	L(3)	38.9	FB =	3
				FB % =	26%
				CA(eqv.)=	0.40

FLOW BY:

Q(100)	3	I(100)	6.8	Inlet size ? L(i) =	0
DEPTH	0.16	Fr	2.55	If Li < L(2) then Qi =	0
				CA(eqv.)=	0
SPREAD	4.0	L(1)	7.7		
				If Li > L(2) then Qi =	0
CROSS SLOPE	2.0%	L(2)	4.7	CA(eqv.)=	0
STREET SLOPE	3.8%	L(3)	16.6	FB =	3
				FB % =	100%
				CA(eqv.)=	0.40

5-YR. FLOW

TOTAL Q(100)	13	I(10)	4.8	Inlet size ? L(i) =	18
DEPTH	0.30	Fr	2.38	If Li < L(2) then Qi =	0
				CA(eqv.)=	0
SPREAD	10.6	L(1)	19.3		
				If Li > L(2) then Qi =	10
CROSS SLOPE	2.0%	L(2)	11.6	CA(eqv.)=	1.992
STREET SLOPE	3.8%	L(3)	41.5	FB =	4
				FB % =	28%
				CA(eqv.)=	0.79

FLOW BY:

Q(5)	4	I(10)	4.8	Inlet size ? L(i) =	18
DEPTH	0.18	Fr	2.00	If Li < L(2) then Qi =	0
				CA(eqv.)=	0
SPREAD	5.0	L(1)	7.7		
				If Li > L(2) then Qi =	4
CROSS SLOPE	2.0%	L(2)	4.6	CA(eqv.)=	0.789
STREET SLOPE	3.8%	L(3)	16.4	FB =	0
				FB % =	0%
				CA(eqv.)=	0.00

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Project: Village Center Filing No. 2
Engineer: VAS
Job No.: 8716.41

VILLAGE CENTER FILING NO. 2

(Inlet Calculations - SUMP Condition)
Chapel Hills Drive Sump Inlet
West Side of Road

Total Flow: Q_5 = cfs

Q_{100} = 31 cfs

Maximum allowable ponding depth at sump:

D(5) = (top of curb)
D(100) = 0.67 (dmax)

$$Q_i = 1.7(L_i+1.8(W))(d_{max}+w/12)^{1.85}$$

W = 3 FT
w = 4 IN

Clogging Factor = 1.25

L_i (Clogging Factor) = Length of inlet opening

5-Year Event: [ ] foot inlet required

100-Year Event: [16] foot inlet required

(Install a 26' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows)

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Project:	**Village Center Filing No. 2**
Engineer:	**VAS**
Job No.:	**8716.41**

Village Center Filing No. 2

(Inlet Calculations - SUMP Condition)
Chapel Hills Drive Sump Inlet
East Side of Road

Total Flow: Q_5 = cfs

Q_{100} = 69 cfs

Maximum allowable ponding depth at sump:

D(5) = (top of curb)
D(100) = 0.83 (dmax)

$$Q_i = 1.7(L_i+1.8(W))(d_{max}+w/12)^{1.85}$$

W = 3 FT
w = 4 IN

Clogging Factor = 1.25

L_i (Clogging Factor) = Length of inlet opening

5-Year Event: [ ] foot inlet required

100-Year Event: [32] foot inlet required

(Install a 44' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows)

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Project:	**Village Center Filing No. 2**
Engineer:	**VAS**
Job No.:	**8716.41**

DETENTION POND CALCULATIONS

Quick TR-55 Ver.5.46   S/N:
Executed: 12:24:46   01-13-1998

MODIFIED RATIONAL METHOD
---- Graphical Summary for Maximum Required Storage ----

First peak outflow point assumed to occur at inflow recession leg.

VILLAGE CENTER POND SIZING, 100 YR DEVELOPED CONDITION

```
**********************************************************************
*  RETURN FREQUENCY: 100 yr     |  Allowable Outflow:    17.00 cfs   *
*  'C' Adjustment: 1.000        |  Required Storage:     4.913 ac-ft *
*--------------------------------------------------------------------*
*  Peak Inflow:   69.09 cfs        Inflow .HYD stored: NONE STORED   *
**********************************************************************
```

```
       |              Td =  60 minutes                   |  Return Freq:   100 yr
      /------- Approx. Duration for Max. Storage ------/   C adj.factor: 1.00
       |                                                 |
       |                                                 |
       |                Tc=    8.00  minutes             |
       |                I =   7.950  in/hr               |  Area (ac):    32.72
       |               . Q =  203.42  cfs                |  Weighted C:    0.78
       |              .|.                                |  Adjusted C:    0.78
 F     |             . * .                               |
 L     |            .  |  .          Required Storage    |
 O     |           .   |   .      .--     4.913 ac-ft    |  Td=       60 minutes
 W     |          .    |    .     |                      |  I =    2.700 in/hr
       |         .     x x x x x x x|x x x x x x x x x x x  Q =    69.09 cfs
 c     |        .                 |
 f     |       .   x                                        x
 s     |      .                                               o   Q=   17.00 cfs
       |     .  x                                  o          |x   (Allow.Outflow)
       |    . x                  .     o                      |
       |   . x          o       .          NOT TO SCALE       |     x
       |  . x      o             .          ============      |
       | o                        .                           |        x
       `-------------------------------------------------------------------------
              X:\870000.ALL\871641\PONDPAK              66.03 minutes
```

Quick TR-55 Ver.5.46 S/N:
Executed: 12:24:46 01-13-1998

VILLAGE CENTER POND SIZING, 100 YR DEVELOPED CONDITION

**** Modified Rational Hydrograph *****

Weighted C = 0.782 Area= 32.720 acres Tc = 8.00 minutes

Adjusted C = 0.782 Td= 60.00 min. I= 2.70 in/hr Qp= 69.09 cfs

RETURN FREQUENCY: 100 year storm Adj.factor = 1.00
Output file: NONE STORED

HYDROGRAPH FOR MAXIMUM STORAGE
For the 100 Year Storm

Time Hours	Time increment = 0.050 Hours. Time on left represents time for first Q in each row.						
0.033	17.27	43.18	69.09	69.09	69.09	69.09	69.09
0.383	69.09	69.09	69.09	69.09	69.09	69.09	69.09
0.733	69.09	69.09	69.09	69.09	69.09	69.09	51.81
1.083	25.91	0.00					

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VILLAGE CENTER POND SIZING, 100 YR DEVELOPED CONDITION

* * * * * * SUMMARY OF RATIONAL METHOD PEAK DISCHARGES * * * * * *

Q = adj * C * I * A

Where: Q=cfs, C=Weighted Runoff Coefficient, I=in/hour, A=acres
adj = 'C' adjustment factor for each return frequency

RETURN FREQUENCY = 100 years
'C' adjustment, k = 1
Adj. 'C' = Wtd.'C' x 1

Subarea Descr.	Runoff 'C'	Area acres	Tc (min)	Wtd. 'C'	Adj. 'C'	I in/hr	Total acres	Peak Q (cfs)
A	0.782	32.72						
			8.00	0.782	0.782	7.950	32.72	203.42

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****

MODIFIED RATIONAL METHOD
---- Grand Summary For All Storm Frequencies ----

****

First peak outflow point assumed to occur at inflow recession leg.

VILLAGE CENTER POND SIZING, 100 YR DEVELOPED CONDITION

Area = 32.72 acres Tc = 8.00 minutes

Frequency (years)	Adjusted 'C'	Duration minutes	Intens. in/hr	Qpeak cfs	Allowable cfs	VOLUMES Inflow (ac-ft)	Storage (ac-ft)
100	0.782	60	2.700	69.09	17.00	5.710	4.913

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MODIFIED RATIONAL METHOD
---- Summary for Single Storm Frequency ----

First peak outflow point assumed to occur at inflow recession leg.

VILLAGE CENTER POND SIZING, 100 YR DEVELOPED CONDITION

RETURN FREQUENCY: 100 yr `C' Adjustment = 1.000 Allowable Q = 17.00 cfs

Hydrograph file: NONE STORED Tc = 8.00 minutes

Weighted `C'	Adjusted 'C'	Duration minutes	Intens. in/hr	Areas acres	Qpeak cfs	VOLUMES Inflow (ac-ft)	Storage (ac-ft)
0.782	0.782	8	7.950	32.72	203.42	2.242	2.054
0.782	0.782	10	7.000	32.72	179.11	2.467	2.256
0.782	0.782	15	5.800	32.72	148.40	3.066	2.797
0.782	0.782	20	5.100	32.72	130.49	3.595	3.267
0.782	0.782	30	4.200	32.72	107.47	4.441	3.996
0.782	0.782	40	3.500	32.72	89.55	4.934	4.372
0.782	0.782	50	3.000	32.72	76.76	5.287	4.608
						Storage	Maximum
0.782	0.782	60	2.700	32.72	69.09	5.710	4.913

DRAINAGE

MAP