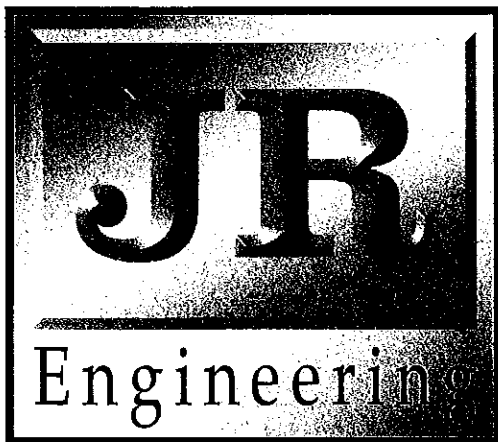


AMENDMENT OF
MASTER DEVELOPMENT DRAINAGE PLAN
FOR
VILLAGE CENTER AT PINE CREEK
AND
PRELIMINARY/FINAL DRAINAGE REPORT
FOR
VILLAGE CENTER AT PINE CREEK FILING NO. 2
AND
PINE CREEK VILLAGE CENTER FILING NO. 1



JR Engineering

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**AMENDMENT OF
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July 16, 1999

Prepared For:

LP47, LLC dba LA PLATA INVESTMENTS
7150 Campus Drive, Suite 365
Colorado Springs, CO 80920
(719) 260-7477

Prepared By:

JR ENGINEERING
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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 negligence, errors, or omissions on my part in preparing this report.


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

8-31-99
Date

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: 
Bob Ingels

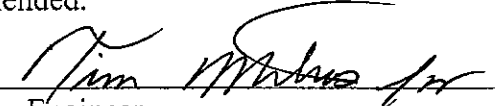
Title: _____

Address: 7150 Campus Drive, Suite 365

Colorado Springs, Colorado 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.


City Engineer

Sept 17, 1999
Date

Conditions:

JR Engineering

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July 29, 1999

City of Colorado Springs
Subdivision Engineering Review Team
101 W. Costilla, Room 113
Colorado Springs, CO 80903

ATTN: Tim Mitros

RE: Amendment of 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 Village Center Filing No. 1

Dear Tim:

The above-referenced amendment entails combing the two-(2) outfalls to Pine Creek previously in system "A" to a single outfall.

This change resulted in sub-basins 1A and 1B, as revised, being discharged to the Lexington Drive Street gutter.

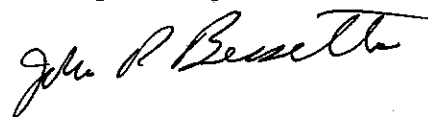
An additional inlet was added at Design Point 4A and the detention pond re-sized to handle the increased flow.

The flowby at Design Point 14 into Chapel Hill Drive was held to the same rate as the previous report.

If you have any questions, please do not hesitate to call.

Sincerely,

JR Engineering



John R. Bessette, P.E.
Senior Project Engineer

/le 871644/AmendmentLtr.doc

**AMENDMENT FOR
 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**

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APPENDIX

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 F.E.M.A. FLOODPLAIN MAP
 ON-SITE AND OFF-SITE HYDROLOGIC CALCULATIONS
 ON-SITE AND OFF-SITE HYDRAULIC CALCULATIONS
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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 $CA_5 = 15.68$, $Q_{100} = 90$ 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 has been completed 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 37 acres in size. The proposed pond will store an estimated volume of 5.15 acre-feet and will discharge at a peak rate of 16 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 Design Point W1 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 $Q_5 = 2$ cfs and $Q_{100} = 3$ 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. Note, in the "Final Drainage

Report for Channel Improvements Chapel Hills Drive over Pine Creek” a separate 36” diameter outfall was provided for the 16’ and 32’ long inlets. Q_{100} was reduced to 325 cfs in the 54” diameter outfall. 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 550 feet down Lexington Drive then north to outfall in adjacent Pine Creek. Runoff from Lexington Drive, Basin 1C; and adjacent lots, Drainage Basins 1, 1C, 9, and 10 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 of 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 be developed as a portion of an apartment site. A 24" diameter RCP connection at Design Point 3 is provided to convey runoff generated in this basin ($Q_5 = 7$ cfs, $Q_{100} = 15$ cfs) to Junction Point 1.

Basin 1C is a portion of the proposed Lexington Drive right of way. It is assumed that the estimated peak runoff from the basin ($Q_5 = 4$ cfs, $Q_{100} = 7$ cfs) will be split evenly between the north and south sides of the street resulting in $Q_5 = 2$ cfs and $Q_{100} = 3$ cfs contributing to both Design Points 1 and 2. A proposed 6' on grade curb inlet at this point will intercept an estimated $Q_5 = 2$ cfs and $Q_{100} = 2$ cfs. An estimated flowby of $Q_5 = 0$ cfs and $Q_{100} = 1$ cfs will continue down the south side of Lexington Drive to Design Point 4A. At Design Point 2 a portion of the runoff from one half of Basin 1C ($Q_5 = 2$ cfs, $Q_{100} = 3$ cfs) is intercepted ($Q_5 = 2$ cfs, $Q_{100} = 2$ cfs) by a proposed 6' long on grade curb inlet. An estimated flowby of $Q_5 = 0$ cfs and $Q_{100} = 1$ cfs will continue down the north side of Lexington Drive to Design Point 6.

The combined flows from Design Points 1, 2, 3, and 9 are estimated to be $Q_5 = 58$ cfs, $Q_{100} = 100$ cfs at SD Junction Point 2.

The combined flows at SD Junction Point 2 will be conveyed to SD Junction Point 2A via a proposed 42" diameter RCP where flows from Basins 2 and 10 will be added.

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 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 will be conveyed to SD Junction Point 2A via a proposed 30" diameter private storm drain.

The combined flows at SD Junction Point 2A. ($Q_5 = 77$ cfs, $Q_{100} = 135$ cfs) are proposed to be conveyed to a Pine Creek outfall in a proposed 42" diameter RCP.

Basin 1A is expected to be developed as a portion of an apartment site. Runoff from the basin ($Q_5 = 11$ cfs, $Q_{100} = 22$ cfs) is proposed to flow to Lexington Drive and then west to Design Point 4A via the southerly side of Lexington Drive.

Basin 1B is expected to be developed as a portion of a single family attached home site. Final grading of the basin shall direct runoff to drain into the north side of adjacent Lexington Drive. Estimated peak runoff rates from the site are $Q_5 = 5$ cfs, $Q_{100} = 10$ cfs. The runoff will be conveyed in the north side of Lexington Drive to a proposed inlet at 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 to Design Point 4. A proposed 36" diameter private storm drain will convey the collected runoff from Design Point 4 to SD Junction Point 3A.

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. Final grading of the single family site shall direct runoff to the north side of Lexington Drive. An estimated peak runoff rate of $Q_5 = 7$ cfs and $Q_{100} = 14$ 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 $Q_5 = 11$ cfs and $Q_{100} = 23$ cfs at Design Point 6. A proposed 20 foot long on grade inlet is expected to intercept ($Q_5 = 9$ cfs, $Q_{100} = 15$ cfs) at this point. An estimated $Q_5 = 3$ cfs and $Q_{100} = 8$ cfs will flow by the inlet and will be conveyed in the north side of Lexington Drive to Design Point 8.

Basin 3A 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. Runoff rates generated within Basin 3A are estimated at $Q_5 = 3$ cfs and $Q_{100} = 5$ cfs at Design Point 4A.

At Design Point 4A ($Q_5 = 12$ cfs, $Q_{100} = 25$ cfs) a 10' long on grade inlet is proposed to intercept $Q_5 = 7$ cfs, $Q_{100} = 9$ cfs. The intercepted flow is combined with flow from Design Point 4 at SD Junction Point 3A $Q_5 = 43$ cfs, $Q_{100} = 83$ cfs. The flowby from Design Point 4A, $Q_5 = 5$ cfs, $Q_{100} = 16$ cfs is conveyed on the south side of Lexington Drive to Design Point 5.

Basin 3B contains the easterly half of Future Street and the adjacent slope along the west side of the proposed luxury apartment site. Runoff rates generated within Basin 3B are estimated at $Q_5 = 3$ cfs, $Q_{100} = 5$ cfs at Design Point 4A.

Basin 3C contains the westerly half of Future Street. Runoff rates generated in Basin 3C are estimated at $Q_5 = 2$ cfs, $Q_{100} = 4$ 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 3C 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 3B, Basin 3C and Basin 6 and the flowby from the inlet upstream of Design Point 4A are estimated at $Q_5 = 10$ cfs and $Q_{100} = 25$ cfs. The peak runoff rates at Design Point 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.

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 ($Q_5 = 8$ cfs, $Q_{100} = 14$ cfs) 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, and convey it through basin 5C to Design Point 7.

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.

The combined flows from basins 5A, 5B and 5C will be conveyed in the proposed private storm drain to 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 through the proposed 16' inlet and proposed 42" RCP 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 $Q_5 = 16$ cfs and $Q_{100} = 34$ cfs in the south side of Lexington Drive. Two proposed 1 – 20', 1 – 16' long grade inlets separated by a minimum of 20 feet will intercept an estimated $Q_5 = 14$ cfs and $Q_{100} = 29$ cfs at Design Point 7. An estimated $Q_5 = 0$ cfs, $Q_{100} = 5$ cfs will flow by the inlets and be discharged to the east side of Chapel Hills Drive at Design Point 14.

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 $Q_5 = 10$ cfs and $Q_{100} = 20$ 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 $Q_5 = 12$ cfs and $Q_{100} = 28$ cfs at Design Point 8. Two proposed 1 – 18", 1 – 16' foot long on grade inlets separated by a minimum of 20' are expected to intercept ($Q_5 = 12$ cfs, $Q_{100} = 25$ 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.

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 Basin 12 includes the westerly slope of a site that is expected to be developed as a single family attached residential development with bulk of this basin included in the site for the proposed

Village Center Detention Basin. Runoff from this basin is expected to be $Q_5 = 3$ cfs and $Q_{100} = 7$ cfs. This runoff will contribute directly to the proposed detention pond as sheet surface flow.

(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 $Q_5 = 8$ 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 are upsized to handle this flow (see Proposed Drainage Characteristics, (A) General Description).

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 550 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 550 feet to the northeast to SD Junction Point 2.

At SD Junction Point 1, runoff from Basin 1 ($Q_5 = 8$ cfs, $Q_{100} = 15$ 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 ($Q_5 = 2$ cfs, $Q_{100} = 3$ cfs). The estimated combined flow at SD Junction Point 1 will be ($Q_5 = 9$ cfs, $Q_{100} = 16$ 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 ($Q_5 = 2$ cfs, $Q_{100} = 3$ cfs). The estimated combined flow at SD Junction Point 2 will be $Q_5 = 58$ cfs and $Q_{100} = 100$ cfs. A proposed 42" diameter storm drain will convey this flow to SD Junction Point 2A. At SD Junction Point 2A flow is combined with flow from SD Junction Point 8 in the proposed private storm drain system conveying runoff collected at Design Point E1 and E2 Basins 9 and 10. The combined flows at SD Junction Point 2A, $Q_5 = 77$ cfs, $Q_{100} = 135$ cfs are proposed to be conveyed to outfall in Pine Creek in a 42" diameter RCP. Erosion control measures will be required at the outfall point.

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, $Q_{100} = 74$ cfs) to SD Junction Point 3A where intercepted flow from the proposed inlet ($Q_5 = 7$ cfs, $Q_{100} = 9$ cfs) at Design Point 4A is combined for a total of $Q_5 = 43$ cfs, $Q_{100} = 83$ cfs. The combined flow is conveyed approximately 150' to the west in a proposed 36" diameter RCP to SD Junction Point 3B. At SD Junction Point 3B flow intercepted by a proposed inlet at Design Point 6 ($Q_5 = 9$ cfs, $Q_{100} = 15$ cfs) will enter the storm drain. The estimated combined flow in the storm drain at SD Junction Point 3A will be $Q_5 = 54$ cfs and $Q_{100} = 101$ 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 $Q_5 = 63$ cfs and $Q_{100} = 117$ cfs. This flow will be conveyed to SD Junction Point 5 in a proposed 42" diameter storm drain.

At SD Junction Point 5 flow from SD Junction Point 7 (the combined flow from Basins 5A, 5B, and 5C; $Q_5 = 22$ cfs, $Q_{100} = 39$ cfs) via the proposed 30" diameter stub and the intercepted flow from the inlets at Design Point 7, $Q_5 = 16$ cfs, $Q_{100} = 29$ cfs, total flow $Q_5 = 37$ cfs, $Q_{100} = 78$ cfs will enter the system via a proposed 36" diameter RCP. The estimated combined flow in the storm drain at SD Junction Point 5 will be $Q_5 = 100$ cfs and $Q_{100} = 185$ cfs. This flow will be conveyed to Pond Junction Point 6, Village Center Detention Pond, in a proposed 42" diameter RCP storm outfall where it will be combined with flow intercepted by proposed inlets at Design Point 8 ($Q_5 = 12$ cfs, $Q_{100} = 25$ cfs) and conveyed to the proposed detention pond in a separate 24" diameter RCP outfall. The total estimated routed flow to the Pond Junction Point 6 will be $Q_5 = 113$ cfs and $Q_{100} = 211$ cfs.

(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 24" and 42" diameter storm sewers to Pond Junction Point 6 ($Q_5 = 113$ cfs, $Q_{100} = 213$ cfs) and surface flow from Basin 12 ($Q_5 = 3$ cfs, $Q_{100} = 7$ cfs). Total peak inflow rates to the pond (Design Point 13) are estimated at $Q_5 = 115$ cfs and $Q_{100} = 216$ cfs. The pond will outfall at a peak 100-year flow rate of 16 cfs 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 5.15 acre feet using the Modified Rational Method found in the "Quick TR-55 Version 5.46" and Pond-2 Version 5.20 software packages. 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. **Completed.**

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 an 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-(Completed)

(Public Improvements)

| <u>Item</u> | <u>Description</u> | <u>Quantity</u> | <u>Unit Cost</u> | <u>Cost</u> |
|---|-------------------------------|-----------------|------------------|---------------------------|
| 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 | | | | <u>\$ 6,250.00</u> |

VILLAGE CENTER AT PINE CREEK FILING NO. 2

(Public Improvements, Storm Drain System B)

| Item | Description | Quantity | Unit Cost | Cost |
|-------------|--------------------|-----------------|------------------|---------------------|
| 1. | 10' Long Inlet | 1 EACH | \$4,600/EA | \$ 4,600.00 |
| 2. | 16' Long Inlet | 2 EACH | \$6,400/EA | \$ 12,800.00 |
| 3. | 18' Long Inlet | 1 EACH | \$7,000/EA | \$ 7,000.00 |
| 4. | 20' Long Inlet | 1 EACH | \$7,600/EA | \$ 7,600.00 |
| 5. | 48" RCP | 16 L.F. | \$90/L.F. | \$ 1,440.00 |
| 6. | 42" RCP | 700 L.F. | \$70/L.F. | \$ 49,000.00 |
| 7. | 36" RCP | 250 L.F. | \$50/L.F. | \$ 12,500.00 |
| 8. | 24" RCP | 100 L.F. | \$35/L.F. | \$ 3,500.00 |
| 9. | 18" RCP | 20 L.F. | \$25/L.F. | \$ 500.00 |
| 10. | Wyes | 3 EACH | \$1,800/EA | \$ 5,400.00 |
| 11. | Bends | 3 EACH | \$1,500/EA | \$ 4,500.00 |
| 12. | Type 1 MH | 3 EACH | \$6,500/EA | <u>\$ 19,500.00</u> |

Subtotal Village Center at Pine Creek Filing No. 2 (Public Improvements) \$128,340.00

(Private Improvements)

| | | | | |
|-----|-----------------|----------|------------|---------------------|
| 11. | Pond excavation | 1 EACH | L.S. | \$ 10,000.00 |
| 12. | Pond inlet | 1 EACH | \$8,000/EA | \$ 8,000.00 |
| 13. | Pond outlet | 1 EACH | \$5,000/EA | \$ 5,000.00 |
| 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 | \$2,800/EA | <u>\$ 11,200.00</u> |

Subtotal Village Center at Pine Creek Filing No. 2 (Private Improvements) \$ 56,350.00

Total Village Center at Pine Creek Filing No. 2 Construction Cost \$184,690.00

FUTURE VILLAGE CENTER AT PINE CREEK FILINGS

(Public Improvements, System B)

| Item | Description | Quantity | Unit Cost | Cost |
|-------------|----------------------------------|-----------------|------------------|--------------|
| 1. | 42" RCP | 970 L.F. | \$70/L.F. | \$ 67,900.00 |
| 2. | 24" RCP | 90 L.F. | \$35/L.F. | \$ 3,150.00 |
| 3. | 6' Long Inlet | 2 EACH | \$3,400/EA | \$ 6,800.00 |
| 4. | Wyes | 2 EACH | \$1,800/EA | \$ 3,600.00 |
| 5. | Bends | 3 EACH | \$1,500/EA | \$ 4,500.00 |
| 6. | Type 1 MH | 1 EACH | \$6,500/EA | \$ 6,500.00 |
| 7. | Storm Drain Outlet Protection | 1 EACH | \$8,000/EA | \$ 8,000.00 |

Subtotal Future Village Center at Pine Creek (Public Improvements) \$100,450.00

(Private Improvements)

| | | | | |
|----|-----------|----------|------------|--------------|
| 6. | 30" RCP | 650 L.F. | \$40/L.F. | \$ 26,000.00 |
| 7. | 24" RCP | 50 L.F. | \$35/L.F. | \$ 1,750.00 |
| 8. | Type 1 MH | 1 EACH | \$6,500/EA | \$ 6,500.00 |
| 9. | Bends | 1 EACH | \$1,500/EA | \$ 1,500.00 |

Subtotal Future Village Center at Pine Creek (Private Improvements) \$ 35,750.00

Total Future Village Center at Pine Creek Construction Cost \$136,200.00

Total Pine Creek Village Center Filing No. 1 Construction Cost Completed
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 \$308,050.00

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 prepared by JR Engineering. As such this development will not negatively impact the planned design flows in downstream Pine Creek.

PREPARED BY:

JR Engineering



John R. Bessette, P.E.
Senior Project Engineer



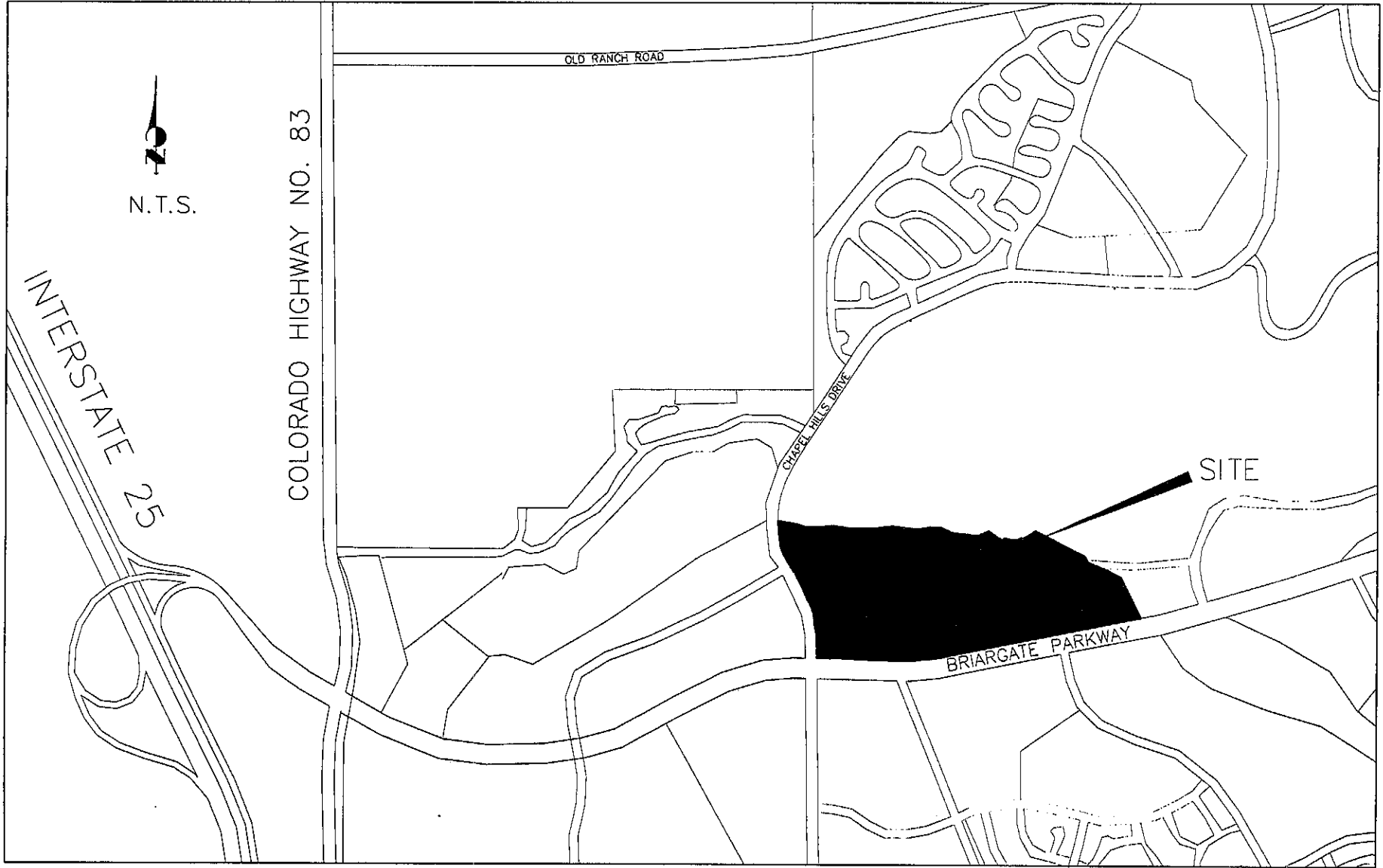
Virgil Sanchez, E.I.
Design Engineer I

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 June 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, dated January 1997.
6. "Pine Creek Drainage Basin Planning Study Update", currently being prepared by JR Engineering.
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.
10. "Final Drainage Report for Channel Improvements Chapel Hills Drive Bridge over Pine Creek", by JR Engineering, dated June 1998.

APPENDIX

**VICINITY
MAP**



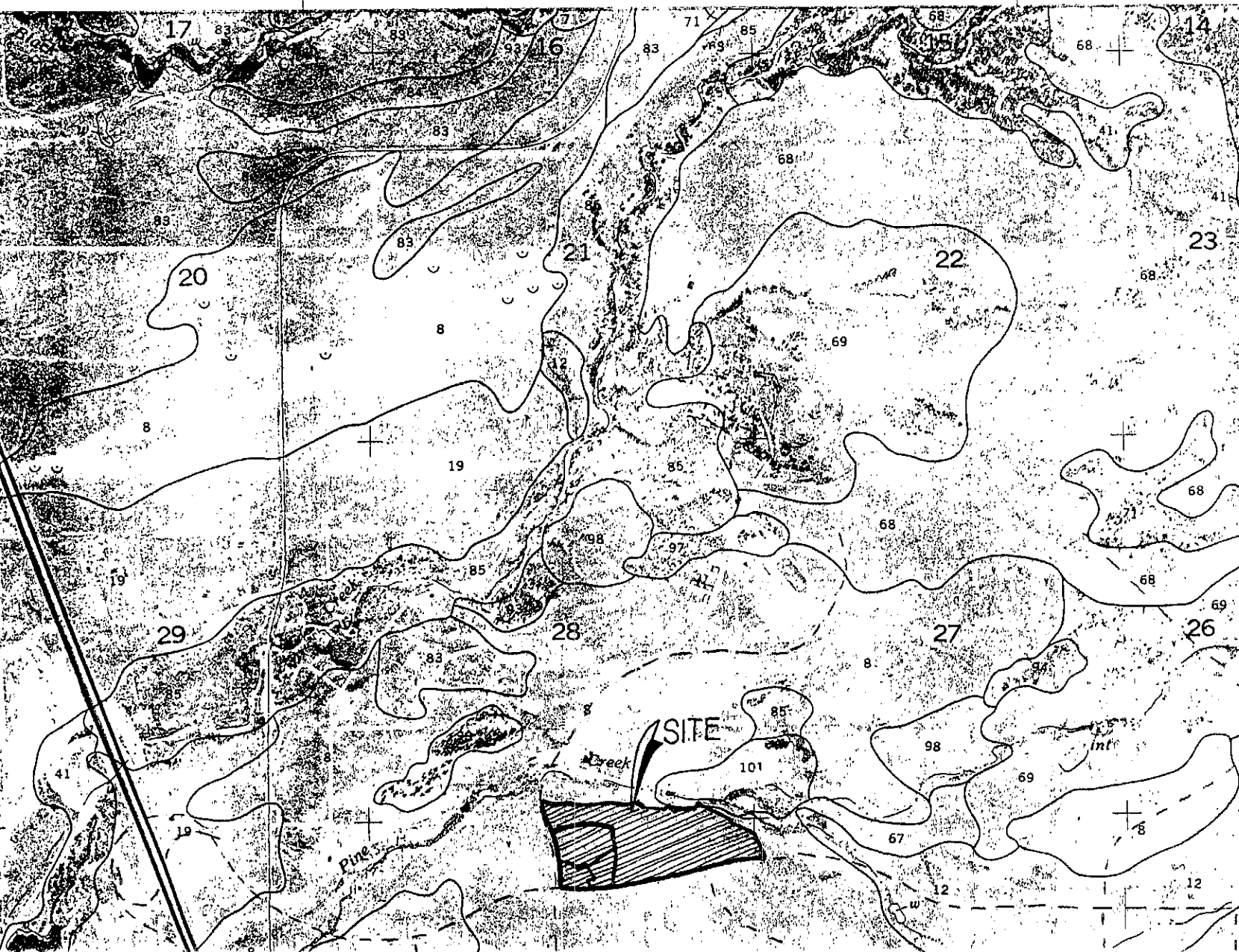
VICINITY MAP

**SOILS
MAP**

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

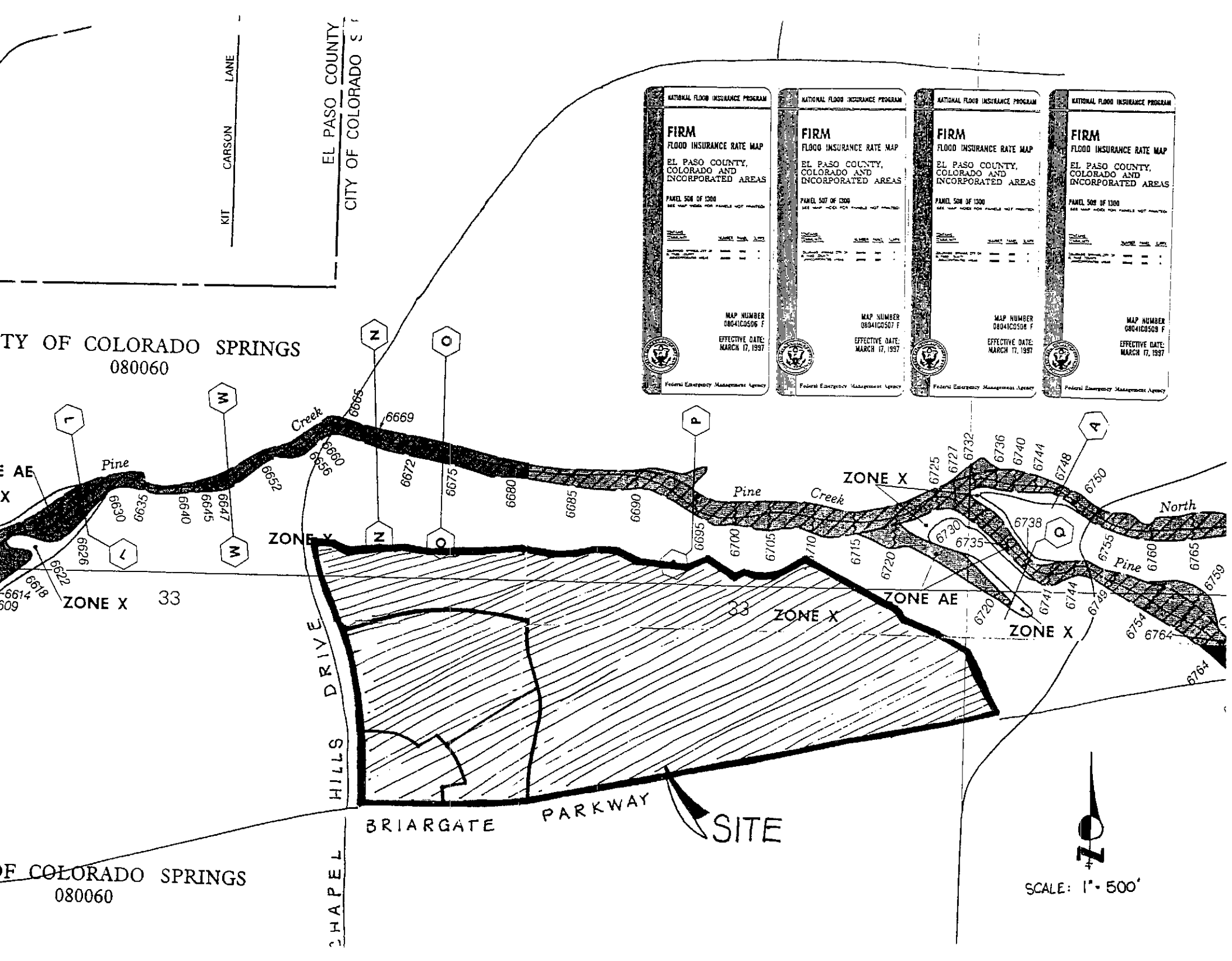
104° 45' (W)

39° 00' (N)



↑
N
SCALE: 1" = 2000'

F.E.M.A.
FLOODPLAIN MAP



KIT CARSON LANE

EL PASO COUNTY
CITY OF COLORADO SPRINGS

CITY OF COLORADO SPRINGS
080060

AE
X
33
ZONE X

CITY OF COLORADO SPRINGS
080060

HILLS DRIVE
CHAPEL L

BRIARGATE PARKWAY
SITE

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---------|---|----|---|---|------|----|---|----|---|------|---|---|---|---|---|---------|---|---|---|---|------|----|---|----|---|------|---|---|---|---|---|---------|---|---|---|---|------|----|---|----|---|------|---|---|---|---|---|---------|---|---|---|---|------|----|---|----|---|------|---|---|---|---|
| <p>NATIONAL FLOOD INSURANCE PROGRAM</p> <p>FIRM FLOOD INSURANCE RATE MAP</p> <p>EL PASO COUNTY, COLORADO AND INCORPORATED AREAS</p> <p>PANEL 506 OF 1300 SEE MAP HOOD FOR PANELS NOT PRINTED</p> <table border="1"> <tr> <td>Map No.</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> <tr> <td>Zone</td> <td>AE</td> <td>X</td> <td>33</td> <td>X</td> </tr> <tr> <td>Rate</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> </tr> </table> <p>MAP NUMBER 08041C0506 F</p> <p>EFFECTIVE DATE: MARCH 17, 1997</p> <p>Federal Emergency Management Agency</p> | Map No. | 1 | 2 | 3 | 4 | Zone | AE | X | 33 | X | Rate | 1 | 1 | 1 | 1 | <p>NATIONAL FLOOD INSURANCE PROGRAM</p> <p>FIRM FLOOD INSURANCE RATE MAP</p> <p>EL PASO COUNTY, COLORADO AND INCORPORATED AREAS</p> <p>PANEL 507 OF 1300 SEE MAP HOOD FOR PANELS NOT PRINTED</p> <table border="1"> <tr> <td>Map No.</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> <tr> <td>Zone</td> <td>AE</td> <td>X</td> <td>33</td> <td>X</td> </tr> <tr> <td>Rate</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> </tr> </table> <p>MAP NUMBER 08041C0507 F</p> <p>EFFECTIVE DATE: MARCH 17, 1997</p> <p>Federal Emergency Management Agency</p> | Map No. | 1 | 2 | 3 | 4 | Zone | AE | X | 33 | X | Rate | 1 | 1 | 1 | 1 | <p>NATIONAL FLOOD INSURANCE PROGRAM</p> <p>FIRM FLOOD INSURANCE RATE MAP</p> <p>EL PASO COUNTY, COLORADO AND INCORPORATED AREAS</p> <p>PANEL 508 OF 1300 SEE MAP HOOD FOR PANELS NOT PRINTED</p> <table border="1"> <tr> <td>Map No.</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> <tr> <td>Zone</td> <td>AE</td> <td>X</td> <td>33</td> <td>X</td> </tr> <tr> <td>Rate</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> </tr> </table> <p>MAP NUMBER 08041C0508 F</p> <p>EFFECTIVE DATE: MARCH 17, 1997</p> <p>Federal Emergency Management Agency</p> | Map No. | 1 | 2 | 3 | 4 | Zone | AE | X | 33 | X | Rate | 1 | 1 | 1 | 1 | <p>NATIONAL FLOOD INSURANCE PROGRAM</p> <p>FIRM FLOOD INSURANCE RATE MAP</p> <p>EL PASO COUNTY, COLORADO AND INCORPORATED AREAS</p> <p>PANEL 509 OF 1300 SEE MAP HOOD FOR PANELS NOT PRINTED</p> <table border="1"> <tr> <td>Map No.</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> <tr> <td>Zone</td> <td>AE</td> <td>X</td> <td>33</td> <td>X</td> </tr> <tr> <td>Rate</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> </tr> </table> <p>MAP NUMBER 08041C0509 F</p> <p>EFFECTIVE DATE: MARCH 17, 1997</p> <p>Federal Emergency Management Agency</p> | Map No. | 1 | 2 | 3 | 4 | Zone | AE | X | 33 | X | Rate | 1 | 1 | 1 | 1 |
| Map No. | 1 | 2 | 3 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Zone | AE | X | 33 | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rate | 1 | 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Map No. | 1 | 2 | 3 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Zone | AE | X | 33 | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rate | 1 | 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Map No. | 1 | 2 | 3 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Zone | AE | X | 33 | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rate | 1 | 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Map No. | 1 | 2 | 3 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Zone | AE | X | 33 | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rate | 1 | 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

North
SCALE: 1" = 500'

**HYDROLOGIC
CALCULATIONS**

**VILLAGE CENTER FILING NO.2
WEIGHTED C VALUES**

| BASIN | TOTAL AREA (AC) | MAJOR STREETS | | | APARTMENT SITE | | | | PATIO HOME/LANDSCAPE | | | | | WEIGHTED | |
|-------|-----------------|---------------|----------------|------------------|----------------|-----------|----------------|------------------|----------------------|-------|-----------|----------------|------------------|----------------|------------------|
| | | AREA (AC) | C ₅ | C ₁₀₀ | USE | AREA (AC) | C ₅ | C ₁₀₀ | USE | DU/AC | AREA (AC) | C ₅ | C ₁₀₀ | C ₅ | C ₁₀₀ |
| 1 | 2.15 | | | | A | 2.2 | 0.7 | 0.8 | | | | | | 0.70 | 0.80 |
| 1A | 3.17 | 0.2 | 0.90 | 0.95 | A | 3.0 | 0.7 | 0.8 | | | | | | 0.72 | 0.82 |
| 1B | 1.81 | 0.2 | 0.90 | 0.95 | | | | | P | 6 | 1.6 | 0.65 | 0.75 | 0.67 | 0.77 |
| 1C | 0.86 | 0.9 | 0.90 | 0.95 | | | | | | | | | | 0.90 | 0.95 |
| 2 | 11.36 | | | | A | 11.4 | 0.7 | 0.8 | | | | | | 0.70 | 0.80 |
| 2A | 2.74 | 0.3 | 0.90 | 0.95 | | | | | P | 6 | 2.4 | 0.6 | 0.7 | 0.62 | 0.72 |
| 3A | 0.76 | 0.4 | 0.90 | 0.95 | | | | | L | | 0.4 | 0.25 | 0.35 | 0.55 | 0.63 |
| 3B | 1.25 | 0.4 | 0.90 | 0.95 | | | | | L | | 0.9 | 0.25 | 0.35 | 0.43 | 0.52 |
| 3C | 0.58 | 0.4 | 0.90 | 0.95 | | | | | L | | 0.2 | 0.25 | 0.35 | 0.64 | 0.71 |
| 4 | 3.86 | 0.6 | 0.85 | 0.90 | A | | | | P | 6 | 3.3 | 0.6 | 0.7 | 0.64 | 0.73 |
| 5A | 1.63 | | | | C | 1.6 | 0.90 | 0.90 | | | | | | 0.90 | 0.90 |
| 5B | 0.75 | | | | C | 0.8 | 0.90 | 0.90 | | | | | | 0.90 | 0.90 |
| 5C | 2.84 | | | | C | 2.8 | 0.90 | 0.90 | | | | | | 0.90 | 0.90 |
| 5D | 2.50 | | | | C | 2.5 | 0.90 | 0.90 | | | | | | 0.90 | 0.90 |
| 5E | 1.68 | | | | C | 1.7 | 0.90 | 0.90 | | | | | | 0.90 | 0.90 |
| 6 | 0.22 | | | | C | 0.2 | 0.90 | 0.90 | | | | | | 0.90 | 0.90 |
| 7 | 1.05 | | | | C | 1.1 | 0.90 | 0.90 | | | | | | 0.90 | 0.90 |
| 8 | 0.38 | | | | C | 0.4 | 0.90 | 0.90 | | | | | | 0.90 | 0.90 |
| 9 | 5.74 | | | | C | 5.7 | 0.70 | 0.80 | | | | | | 0.70 | 0.80 |
| 10 | 2.66 | | | | C | 2.7 | 0.70 | 0.80 | | | | | | 0.70 | 0.80 |
| 11 | 2.28 | 0.8 | 0.90 | 0.95 | | | | | L | | 1.5 | 0.25 | 0.35 | 0.47 | 0.55 |
| 12 | 2.00 | | | | | | | | L | | 2.0 | 0.25 | 0.35 | 0.25 | 0.35 |
| 13 | 5.13 | | | | | | | | | | 5.1 | 0.25 | 0.35 | 0.25 | 0.35 |

JR ENGINEERING, LTD.

4935 NORTH 30TH STREET
 COLORADO SPRINGS, COLORADO 80919
 (719) 593-2593 FAX (719) 528-6613

6/18/99

Projec: Village Center Filing No. 2

Engineer: VAS/JRB

Job No.: 8716.41

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

| BASIN | TOTAL AREA (Ac) | SOIL TYPE | WEIGHTED | | OVERLAND | | | | SWALE | | | | STREET | | | | T _c Total (min) | INTENSITY | | TOTAL FLOWS | |
|-------|-----------------|-----------|----------------|------------------|----------------|-------------|-----------|----------------------|-------------|-----------|----------------|----------------------|-------------|-----------|----------------|----------------------|----------------------------|------------------------|--------------------------|----------------------|------------------------|
| | | | C _s | C ₁₀₀ | C _s | Length (ft) | Slope (%) | T _c (min) | Length (ft) | Slope (%) | Velocity (fps) | T _c (min) | Length (ft) | Slope (%) | Velocity (fps) | T _c (min) | | I _s (in/hr) | I ₁₀₀ (in/hr) | Q _i (cfs) | Q ₁₀₀ (cfs) |
| 1 | 2.15 | A | 0.70 | 0.80 | 0.75 | 150 | 4.0% | 5.1 | 300 | 4.0% | 7.0 | 0.7 | | | | | 5.8 | 4.8 | 8.7 | 8 | 15 |
| | | | | | | | | | | | | | | | | | | CA(equiv) | 1.51 | 1.72 | |
| 1A | 3.17 | A | 0.72 | 0.82 | 0.75 | 150 | 4.0% | 5.1 | 400 | 4.0% | 7.0 | 1.0 | 100 | 3.8% | 6.8 | 0.2 | 6.3 | 4.7 | 8.4 | 11 | 22 |
| | | | | | | | | | | | | | | | | | | | | 2.28 | 2.59 |
| 1B | 1.81 | A | 0.67 | 0.77 | 0.25 | 50 | 2.0% | 8.9 | 50 | 4.0% | 7.0 | 0.1 | 400 | 3.8% | 6.8 | 1.0 | 10.0 | 4.1 | 7.1 | 5 | 10 |
| | | | | | | | | | | | | | | | | | | | | 1.22 | 1.39 |
| 1C | 0.86 | A | 0.90 | 0.95 | 0.25 | 30 | 2.0% | 6.9 | | | | | 560 | 6.0% | 8.6 | 1.1 | 8.0 | 4.4 | 7.7 | 4 | 7 |
| | | | | | | | | | | | | | | | | | | CA(equiv) | 0.77 | 0.82 | |
| 2 | 11.36 | 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 | 2.74 | A | 0.62 | 0.72 | 0.25 | 50 | 2.0% | 8.9 | 50 | 3.3% | 6.4 | 0.1 | 500 | 3.8% | 6.8 | 1.2 | 10.3 | 4.0 | 7.0 | 7 | 14 |
| | | | | | | | | | | | | | | | | | | CA(equiv) | 1.71 | 1.97 | |
| 3A | 0.76 | A | 0.55 | 0.63 | 0.25 | 15 | 20.0% | 2.3 | | | | | 550 | 3.8% | 6.8 | 1.3 | 3.6 | 5.4 | 9.9 | 3 | 5 |
| | | | | | | | | | | | | | | | | | | CA(equiv) | 0.42 | 0.46 | |
| 3B | 1.25 | A | 0.43 | 0.52 | 0.25 | 40 | 4.0% | 6.4 | | | | | 750 | 4.0% | 7.0 | 1.8 | 8.1 | 4.4 | 7.7 | 3 | 5 |
| | | | | | | | | | | | | | | | | | | CA(equiv) | 0.54 | 0.65 | |
| 3C | 0.58 | A | 0.64 | 0.71 | 0.25 | 15 | 4.0% | 3.9 | | | | | 750 | 4.0% | 7.0 | 1.8 | 5.7 | 4.8 | 8.7 | 2 | 4 |
| | | | | | | | | | | | | | | | | | | CA(equiv) | 0.37 | 0.41 | |
| 4 | 3.86 | A | 0.64 | 0.73 | 0.25 | 50 | 2.0% | 8.9 | | | | | 800 | 3.8% | 6.8 | 2.0 | 10.9 | 3.9 | 6.8 | 10 | 20 |
| | | | | | | | | | | | | | | | | | | CA(equiv) | 2.46 | 2.82 | |
| 5A | 1.63 | 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 | 0.75 | 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 | 2.84 | 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) | 2.66 | 2.56 | |
| 5D | 2.50 | 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 | 1.68 | 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 | 0.22 | 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 | 1.05 | 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 | 0.38 | 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 | 5.74 | 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 | 2.66 | 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 | 2.30 | 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 | 2.00 | 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 | 7 |
| | | | | | | | | | | | | | | | | | | CA(equiv) | 0.50 | 0.70 | |
| 13 | 5.13 | A | 0.25 | 0.35 | 0.25 | 150 | 33.0% | 6.1 | | | | | | | | | 6.1 | 4.7 | 8.5 | 7 | 16 |
| | | | | | | | | | | | | | | | | | | CA(equiv) | 1.28 | 1.80 | |

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4935 NORTH 30TH STREET
 COLORADO SPRINGS, COLORADO 80919
 (719) 593-2593 FAX (719) 528-6613

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

Routing

| VILLAGE CENTER FILING NO. 2 SURFACE ROUTING | | | | | | | | | | | | | |
|--|-----------------------------|-----------------|-------------------|----------------|-------------|-----------|----------------|----------------------|-------------------------|------------------------|--------------------------|----------------------|------------------------|
| DESIGN POINT | CONTRIBUTING BASINS | CA (equiv.) | | T _c | ROUTING | | | | T _c (min) | INTENSITY | | TOTAL FLOWS | |
| | | CA ₅ | CA ₁₀₀ | | Length (ft) | Slope (%) | Velocity (fps) | T _c (min) | | I ₅ (in/hr) | I ₁₀₀ (in/hr) | Q ₅ (cfs) | Q ₁₀₀ (cfs) |
| 1 | 1/2 1C | 0.39 | 0.41 | 8.0 | | | | | 8.0 | 4.4 | 7.7 | 2 | 3 |
| | | 0.39 | 0.41 | | | | | | | | | | |
| 2 | 1/2 1C | 0.39 | 0.41 | 8.0 | | | | | 8.0 | 4.4 | 7.7 | 2 | 3 |
| | | 0.39 | 0.41 | | | | | | | | | | |
| 3 | 1 | 1.51 | 1.72 | 5.8 | | | | | 5.8 | 4.8 | 8.7 | 7 | 15 |
| | | 1.51 | 1.72 | | | | | | | | | | |
| 4 | 2 | 7.95 | 9.09 | 6.9 | | | | | 6.9 | 4.6 | 8.1 | 36 | 74 |
| | | 7.95 | 9.09 | | | | | | | | | | |
| 4A | FB-DP1 1A 3A | 0.01 | 0.12 | 8.0 | | | | | | | | 12 | 25 |
| | | 2.28 | 2.59 | 6.3 | | | | | | | | | |
| | | 0.42 | 0.48 | 3.6 | | | | | 8.0 | 4.4 | 7.7 | | |
| 5 | FB-DP4A 6 3B+3C | 2.71 | 3.18 | | | | | | | | | 10 | 25 |
| | | 1.21 | 2.06 | 8.0 | 100 | 3.8% | 6.82 | 0.24 | 8.2 | 4.3 | 7.6 | | |
| | | 0.20 | 0.20 | 6.2 | | | | | | | | | |
| | | 0.91 | 1.06 | 5.7 | | | | | | | | | |
| 6 | FB-DP2 1B 2A | 2.33 | 3.32 | | | | | | | | | 11 | 23 |
| | | 0.01 | 0.12 | | | | | | | | | | |
| | | 1.22 | 1.39 | 10.0 | 600 | 3.8% | 6.82 | 1.47 | 11.5 | 3.9 | 6.7 | | |
| | | 1.71 | 1.97 | 10.3 | | | | | | | | | |
| 7 | DP5 5E | 2.94 | 3.47 | | | | | | | | | 16 | 34 |
| | | 2.33 | 3.32 | 8.2 | 650 | 3.8% | 6.82 | 1.59 | 9.8 | 4.1 | 7.1 | | |
| | | 1.51 | 1.51 | 5.9 | | | | | | | | | |
| 8 | FB-DP6 4 | 3.84 | 4.83 | | | | | | | | | 12 | 28 |
| | | 0.66 | 1.21 | | | | | | | | | | |
| | | 2.46 | 2.82 | 10.9 | | | | | 10.9 | 3.9 | 6.8 | | |
| 9 | OS-1 | 3.12 | 4.03 | | | | | | | | | 51 | 90 |
| | | 15.68 | 15.99 | 17.2 | | | | | 17.2 | 3.3 | 5.6 | | |
| 10 | 5A 5B | 15.68 | 15.99 | | | | | | | | | 10 | 18 |
| | | 1.47 | 1.47 | 5.4 | 270 | 2.5% | 5.53 | 0.81 | 6.2 | 4.7 | 8.5 | | |
| | | 0.68 | 0.68 | 5.0 | | | | | | | | | |
| 11 | 5C | 2.14 | 2.14 | | | | | | | | | 12 | 21 |
| | | 2.56 | 2.56 | 7.6 | | | | | 7.6 | 4.5 | 7.9 | | |
| 12 | 5D | 2.56 | 2.56 | | | | | | | | | 11 | 18 |
| | | 2.25 | 2.25 | 7.6 | | | | | 7.6 | 4.5 | 7.9 | | |
| 13 | 12 JUNC 6 | 2.25 | 2.25 | | | | | | | | | 115 | 216 |
| | | 0.50 | 0.70 | 5.1 | | | | | | | | | |
| | | 25.56 | 27.09 | 7.9 | | | | | 7.9 | 4.4 | 7.8 | | |
| 14 | FB-DP8 W1 FB-DP7 8 | 26.06 | 27.79 | | | | | | | | | 8 | 22 |
| | | 0.00 | 0.49 | | | | | | | | | | |
| | | 2.02 | 2.21 | 14.8 | 200 | 4.0% | 7.00 | 0.48 | 15.3 | 3.4 | 5.8 | | |
| | | 0.07 | 0.69 | | | | | | | | | | |
| E1 | 9 | 0.34 | 0.34 | | | | | | | | | 19 | 38 |
| | | 2.43 | 3.74 | | | | | | | | | | |
| E2 | 10 | 4.02 | 4.59 | 6.6 | | | | | 6.6 | 4.7 | 8.3 | 9 | 18 |
| | | 4.02 | 4.59 | | | | | | | | | | |
| W1 | 7 11 | 1.86 | 2.13 | 6.7 | | | | | 6.7 | 4.6 | 8.2 | 7 | 13 |
| | | 1.86 | 2.13 | | | | | | | | | | |
| | | 0.95 | 0.95 | 6.9 | | | | | 14.8 | 3.5 | 5.9 | | |
| | | 1.07 | 1.27 | 14.8 | | | | | | | | | |
| | | 2.02 | 2.21 | | | | | | | | | | |

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4935 NORTH 30TH STREET
 COLORADO SPRINGS, COLORADO 80919
 (719) 593-2593 FAX (719) 528-6613

FB = FLOWBY

Project: Village Center Filing No. 2

Engineer: VAS/JRB

Job No.: 8716.41

**Village Center Filing No. 2
PIPE ROUTING**

| S.D. JUNC POINT | CONTRIBUTING BASINS | CA (equiv.) | | Previous T _c | ROUTING | | | | T _c (min) | INTENSITY | | TOTAL FLOWS | |
|-----------------------|----------------------------|-----------------|-------|----------------------------|----------------|--------------|-------------------|-------------------------|-------------------------|---------------------------|-----------------------------|-------------------------|---------------------------|
| | | CA ₅ | CA100 | | Length (ft) | Slope (%) | Velocity (fps) | T _c (min) | | I ₅ (in/hr) | I ₁₀₀ (in/hr) | Q ₅ (cfs) | Q ₁₀₀ (cfs) |
| | | | | | | | | | | | | | |
| 1 JUNC | INL DP-1 DP-3 | 0.38 | 0.29 | 8.0 | 50 | 2.00% | 11.60 | 0.1 | 8.1 | 4.4 | 7.7 | 9 | 16 |
| | | 1.51 | 1.72 | 5.8 | | | | | | | | | |
| | | 1.88 | 2.01 | | | | | | | | | | |
| 2 JUNC | INL DP-2 DP-9 JUNC 1 | 0.38 | 0.29 | 8.0 | 550 | 8.00% | 16.38 | 0.6 | 17.8 | 3.2 | 5.4 | 58 | 100 |
| | | 15.68 | 15.99 | 17.2 | | | | | | | | | |
| | | 1.88 | 2.01 | 0.0 | | | | | | | | | |
| | | 17.94 | 18.29 | | | | | | | | | | |
| 2A JUNC | JUNC 2 JUNC 8 | 17.94 | 18.29 | 17.8 | 160 | 2.00% | 11.00 | 0.2 | 18.0 | 3.2 | 5.4 | 77 | 135 |
| | | 5.88 | 6.72 | 7.2 | | | | | | | | | |
| | | 23.82 | 25.01 | | | | | | | | | | |
| 3A JUNC | DP4 INL DP4A | 7.95 | 9.09 | 6.9 | 150 | 4.00% | 20.21 | 0.1 | 7.1 | 4.6 | 8.1 | 43 | 83 |
| | | 1.49 | 1.12 | | | | | | | | | | |
| | | 9.44 | 10.21 | | | | | | | | | | |
| 3B JUNC | JUNC 3A INL DP-6 | 9.44 | 10.21 | 7.1 | 160 | 4.00% | 20.21 | 0.1 | 7.2 | 4.5 | 8.0 | 54 | 101 |
| | | 2.28 | 2.26 | | | | | | | | | | |
| | | 11.72 | 12.47 | | | | | | | | | | |
| 4 JUNC | DP-12 JUNC 3B | 2.25 | 2.25 | 7.6 | 350 | 4.00% | 20.94 | 0.3 | 7.5 | 4.5 | 7.9 | 63 | 117 |
| | | 11.72 | 12.47 | 7.2 | | | | | | | | | |
| | | 13.97 | 14.72 | | | | | | | | | | |
| 5 JUNC | JUNC 4 JUNC 7 | 13.97 | 14.72 | 7.5 | 320 | 4.00% | 22.63 | 0.2 | 7.7 | 4.4 | 7.8 | 100 | 185 |
| | | 8.47 | 8.83 | | | | | | | | | | |
| | | 22.44 | 23.55 | | | | | | | | | | |
| 6 JUNC | JUNC 5 INL DP-8 | 22.44 | 23.55 | 7.7 | 330 | 4.00% | 32.96 | 0.2 | 7.9 | 4.4 | 7.8 | 113 | 211 |
| | | 3.12 | 3.54 | 10.9 | | | | | | | | | |
| | | 25.56 | 27.09 | | | | | | | | | | |
| 7 JUNC | DP-10 DP-11 INL DP-7 | 2.14 | 2.14 | 6.2 | | | | | 7.6 | 4.5 | 7.9 | 38 | 70 |
| | | 2.56 | 2.56 | 7.6 | | | | | | | | | |
| | | 3.77 | 4.14 | | | | | | | | | | |
| | | 8.47 | 8.83 | | | | | | | | | | |
| 8 JUNC | 9 10 | 4.02 | 4.59 | 6.6 | 410 | 5.00% | 11.26 | 0.6 | 7.2 | 4.5 | 8.1 | 27 | 55 |
| | | 1.86 | 2.13 | 6.7 | | | | | | | | | |
| | | 5.88 | 6.72 | | | | | | | | | | |

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4935 NORTH 30TH STREET
 COLORADO SPRINGS, COLORADO 80919
 (719) 593-2593 FAX (719) 528-6613

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

INL = 'CA' VALUE ENTERING INLET

**HYDRAULIC
CALCULATIONS**

| Village Center Filing No. 2 (Inlet Calculations - CONTINUOUS-GRADE Condition) (Inlets in Series) DESIGN POINT 1 | | | | | | | | | | | |
|---|---|--|--|-----------------------|--------------------------|--------------|--------------------------|-----------------|--------|-------------|-----------------|
| 100-YR. FLOW | | | | | | | | | | | |
| | Q(100) 3 DEPTH 0.17 SPREAD 4.3 CROSS SLOPE 2.0% STREET SLOPE 4.0% | I(100) 7.7 Fr 1.96 L(1) 6.5 L(2) 3.9 L(3) 13.9 | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">Inlet size ? L(i) = 6</td> </tr> <tr> <td style="text-align: center;">If Li < L(2) then Qi = 0</td> </tr> <tr> <td style="text-align: center;">CA(eqv.) = 0</td> </tr> <tr> <td style="text-align: center;">If Li > L(2) then Qi = 2</td> </tr> <tr> <td style="text-align: center;">CA(eqv.) = 0.29</td> </tr> <tr> <td style="text-align: center;">FB = 1</td> </tr> <tr> <td style="text-align: center;">FB % = 29%</td> </tr> <tr> <td style="text-align: center;">CA(eqv.) = 0.12</td> </tr> </table> | Inlet size ? L(i) = 6 | If Li < L(2) then Qi = 0 | CA(eqv.) = 0 | If Li > L(2) then Qi = 2 | CA(eqv.) = 0.29 | FB = 1 | FB % = 29% | CA(eqv.) = 0.12 |
| Inlet size ? L(i) = 6 | | | | | | | | | | | |
| If Li < L(2) then Qi = 0 | | | | | | | | | | | |
| CA(eqv.) = 0 | | | | | | | | | | | |
| If Li > L(2) then Qi = 2 | | | | | | | | | | | |
| CA(eqv.) = 0.29 | | | | | | | | | | | |
| FB = 1 | | | | | | | | | | | |
| FB % = 29% | | | | | | | | | | | |
| CA(eqv.) = 0.12 | | | | | | | | | | | |
| FLOW BY: | | | | | | | | | | | |
| | Q(100) 1 DEPTH 0.11 SPREAD 1.1 CROSS SLOPE 2.0% STREET SLOPE 4.0% | I(100) 7.7 Fr 1.96 L(1) 1.7 L(2) 1.0 L(3) 3.5 | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">Inlet size ? L(i) = 0</td> </tr> <tr> <td style="text-align: center;">If Li < L(2) then Qi = 0</td> </tr> <tr> <td style="text-align: center;">CA(eqv.) = 0</td> </tr> <tr> <td style="text-align: center;">If Li > L(2) then Qi = 0</td> </tr> <tr> <td style="text-align: center;">CA(eqv.) = 0</td> </tr> <tr> <td style="text-align: center;">FB = 1</td> </tr> <tr> <td style="text-align: center;">FB % = 100%</td> </tr> <tr> <td style="text-align: center;">CA(eqv.) = 0.12</td> </tr> </table> | 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.) = 0.12 |
| 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.) = 0.12 | | | | | | | | | | | |
| 5-YR. FLOW | | | | | | | | | | | |
| | Q(5) 2 DEPTH 0.14 SPREAD 2.5 CROSS SLOPE 2.0% STREET SLOPE 4.0% | I(10) 4.4 Fr 1.53 L(1) 3.0 L(2) 1.8 L(3) 6.4 | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">Inlet size ? L(i) = 6</td> </tr> <tr> <td style="text-align: center;">If Li < L(2) then Qi = 0</td> </tr> <tr> <td style="text-align: center;">CA(eqv.) = 0</td> </tr> <tr> <td style="text-align: center;">If Li > L(2) then Qi = 2</td> </tr> <tr> <td style="text-align: center;">CA(eqv.) = 0.38</td> </tr> <tr> <td style="text-align: center;">FB = 0</td> </tr> <tr> <td style="text-align: center;">FB % = 2%</td> </tr> <tr> <td style="text-align: center;">CA(eqv.) = 0.01</td> </tr> </table> | Inlet size ? L(i) = 6 | If Li < L(2) then Qi = 0 | CA(eqv.) = 0 | If Li > L(2) then Qi = 2 | CA(eqv.) = 0.38 | FB = 0 | FB % = 2% | CA(eqv.) = 0.01 |
| Inlet size ? L(i) = 6 | | | | | | | | | | | |
| If Li < L(2) then Qi = 0 | | | | | | | | | | | |
| CA(eqv.) = 0 | | | | | | | | | | | |
| If Li > L(2) then Qi = 2 | | | | | | | | | | | |
| CA(eqv.) = 0.38 | | | | | | | | | | | |
| FB = 0 | | | | | | | | | | | |
| FB % = 2% | | | | | | | | | | | |
| CA(eqv.) = 0.01 | | | | | | | | | | | |
| FLOW BY: | | | | | | | | | | | |
| | Q(5) 0 DEPTH 0.03 SPREAD -2.6 CROSS SLOPE 2.0% STREET SLOPE 4.0% | I(10) 4.4 Fr 0.00 L(1) 0.0 L(2) 0.0 L(3) 0.0 | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">Inlet size ? L(i) = 0</td> </tr> <tr> <td style="text-align: center;">If Li < L(2) then Qi = 0</td> </tr> <tr> <td style="text-align: center;">CA(eqv.) = 0</td> </tr> <tr> <td style="text-align: center;">If Li > L(2) then Qi = 0</td> </tr> <tr> <td style="text-align: center;">CA(eqv.) = 0</td> </tr> <tr> <td style="text-align: center;">FB = 0</td> </tr> <tr> <td style="text-align: center;">FB % = 100%</td> </tr> <tr> <td style="text-align: center;">CA(eqv.) = 0.01</td> </tr> </table> | 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.) = 0.01 |
| 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.) = 0.01 | | | | | | | | | | | |
| JR ENGINEERING, LTD. 4935 NORTH 30TH STREET COLORADO SPRINGS, COLORADO 80919 (719) 593-2593 FAX (719) 528-6613 | | 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) 3 DEPTH 0.17 SPREAD 4.3 CROSS SLOPE 2.0% STREET SLOPE 4.0% | I(100) 7.7 Fr 1.96 L(1) 6.5 L(2) 3.9 L(3) 13.9 | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Inlet size ? L(i) = 6</td> </tr> <tr> <td style="padding: 2px;">If Li < L(2) then Qi = 0</td> </tr> <tr> <td style="padding: 2px;">CA(eqv.) = 0</td> </tr> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">If Li > L(2) then Qi = 2</td> </tr> <tr> <td style="padding: 2px;">CA(eqv.) = 0.29</td> </tr> <tr> <td style="padding: 2px;">FB = 1</td> </tr> <tr> <td style="padding: 2px;">FB % = 29%</td> </tr> <tr> <td style="padding: 2px;">CA(eqv.) = 0.12</td> </tr> </table> | Inlet size ? L(i) = 6 | If Li < L(2) then Qi = 0 | CA(eqv.) = 0 | If Li > L(2) then Qi = 2 | CA(eqv.) = 0.29 | FB = 1 | FB % = 29% | CA(eqv.) = 0.12 |
| Inlet size ? L(i) = 6 | | | | | | | | | | | |
| If Li < L(2) then Qi = 0 | | | | | | | | | | | |
| CA(eqv.) = 0 | | | | | | | | | | | |
| If Li > L(2) then Qi = 2 | | | | | | | | | | | |
| CA(eqv.) = 0.29 | | | | | | | | | | | |
| FB = 1 | | | | | | | | | | | |
| FB % = 29% | | | | | | | | | | | |
| CA(eqv.) = 0.12 | | | | | | | | | | | |
| FLOW BY: | Q(100) 1 DEPTH 0.11 SPREAD 1.1 CROSS SLOPE 2.0% STREET SLOPE 4.0% | I(100) 7.7 Fr 1.96 L(1) 1.7 L(2) 1.0 L(3) 3.5 | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Inlet size ? L(i) = 0</td> </tr> <tr> <td style="padding: 2px;">If Li < L(2) then Qi = 0</td> </tr> <tr> <td style="padding: 2px;">CA(eqv.) = 0</td> </tr> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">If Li > L(2) then Qi = 0</td> </tr> <tr> <td style="padding: 2px;">CA(eqv.) = 0</td> </tr> <tr> <td style="padding: 2px;">FB = 1</td> </tr> <tr> <td style="padding: 2px;">FB % = 100%</td> </tr> <tr> <td style="padding: 2px;">CA(eqv.) = 0.12</td> </tr> </table> | 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.) = 0.12 |
| 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.) = 0.12 | | | | | | | | | | | |
| 5-YR. FLOW | | | | | | | | | | | |
| | Q(5) 2 DEPTH 0.14 SPREAD 2.5 CROSS SLOPE 2.0% STREET SLOPE 4.0% | I(10) 4.4 Fr 1.53 L(1) 3.0 L(2) 1.8 L(3) 6.4 | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Inlet size ? L(i) = 6</td> </tr> <tr> <td style="padding: 2px;">If Li < L(2) then Qi = 0</td> </tr> <tr> <td style="padding: 2px;">CA(eqv.) = 0</td> </tr> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">If Li > L(2) then Qi = 2</td> </tr> <tr> <td style="padding: 2px;">CA(eqv.) = 0.38</td> </tr> <tr> <td style="padding: 2px;">FB = 0</td> </tr> <tr> <td style="padding: 2px;">FB % = 2%</td> </tr> <tr> <td style="padding: 2px;">CA(eqv.) = 0.01</td> </tr> </table> | Inlet size ? L(i) = 6 | If Li < L(2) then Qi = 0 | CA(eqv.) = 0 | If Li > L(2) then Qi = 2 | CA(eqv.) = 0.38 | FB = 0 | FB % = 2% | CA(eqv.) = 0.01 |
| Inlet size ? L(i) = 6 | | | | | | | | | | | |
| If Li < L(2) then Qi = 0 | | | | | | | | | | | |
| CA(eqv.) = 0 | | | | | | | | | | | |
| If Li > L(2) then Qi = 2 | | | | | | | | | | | |
| CA(eqv.) = 0.38 | | | | | | | | | | | |
| FB = 0 | | | | | | | | | | | |
| FB % = 2% | | | | | | | | | | | |
| CA(eqv.) = 0.01 | | | | | | | | | | | |
| FLOW BY: | Q(5) 0 DEPTH 0.03 SPREAD -2.6 CROSS SLOPE 2.0% STREET SLOPE 4.0% | I(10) 4.4 Fr 0.00 L(1) 0.0 L(2) 0.0 L(3) 0.0 | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Inlet size ? L(i) = 0</td> </tr> <tr> <td style="padding: 2px;">If Li < L(2) then Qi = 0</td> </tr> <tr> <td style="padding: 2px;">CA(eqv.) = 0</td> </tr> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">If Li > L(2) then Qi = 0</td> </tr> <tr> <td style="padding: 2px;">CA(eqv.) = 0</td> </tr> <tr> <td style="padding: 2px;">FB = 0</td> </tr> <tr> <td style="padding: 2px;">FB % = 100%</td> </tr> <tr> <td style="padding: 2px;">CA(eqv.) = 0.01</td> </tr> </table> | 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.) = 0.01 |
| 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.) = 0.01 | | | | | | | | | | | |
| JR ENGINEERING, LTD. 4935 NORTH 30TH STREET COLORADO SPRINGS, COLORADO 80919 (719) 593-2593 FAX (719) 528-6613 | | 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 4A

| | | | |
|---------------------|------------|--------------------------|--|
| 100-YR. FLOW | | | |
| Q(100) 25 | I(100) 7.7 | Inlet size ? L(i) = 10 | |
| DEPTH 0.37 | Fr 2.59 | < L(2) then Qi = 9 | |
| | | CA(eqv.) = 1.122 | |
| SPREAD 14.2 | L(1) 28.4 | If Li > L(2) then Qi = 0 | |
| | | CA(eqv.) = 0 | |
| CROSS SLOPE 2.0% | L(2) 17.0 | FB = 16 | |
| STREET SLOPE 4.0% | L(3) 60.8 | FB % = 65% | |
| | | CA(eqv.) = 2.06 | |
| FLOW BY: | | | |
| Q(100) 16 | I(100) 7.7 | Inlet size ? L(i) = 0 | |
| DEPTH 0.31 | Fr 2.59 | < L(2) then Qi = 0 | |
| | | CA(eqv.) = 0 | |
| SPREAD 11.4 | L(1) 22.8 | If Li > L(2) then Qi = 0 | |
| | | CA(eqv.) = 0 | |
| CROSS SLOPE 2.0% | L(2) 13.7 | FB = 16 | |
| STREET SLOPE 4.0% | L(3) 48.9 | FB % = 100% | |
| | | CA(eqv.) = 2.06 | |

| | | | |
|-------------------|-----------|--------------------------|--|
| 5-YR. FLOW | | | |
| Q(5) 12 | I(10) 4.4 | Inlet size ? L(i) = 10 | |
| DEPTH 0.28 | Fr 2.40 | < L(2) then Qi = 7 | |
| | | CA(eqv.) = 1.492 | |
| SPREAD 9.8 | L(1) 18.1 | If Li > L(2) then Qi = 0 | |
| | | CA(eqv.) = 0 | |
| CROSS SLOPE 2.0% | L(2) 10.9 | FB = 5 | |
| STREET SLOPE 4.0% | L(3) 38.9 | FB % = 45% | |
| | | CA(eqv.) = 1.21 | |
| FLOW BY: | | | |
| Q(5) 0 | I(10) 4.4 | Inlet size ? L(i) = 0 | |
| DEPTH 0.00 | Fr 0.00 | < L(2) then Qi = 0 | |
| | | CA(eqv.) = 0 | |
| SPREAD -4.3 | L(1) 0.0 | If Li > L(2) then Qi = 0 | |
| | | CA(eqv.) = 0 | |
| CROSS SLOPE 2.0% | L(2) 0.0 | FB = 0 | |
| STREET SLOPE 4.0% | L(3) 0.0 | FB % = #DIV/0! | |
| | | CA(eqv.) = 0.00 | |

| | |
|--|---|
| <p>JR ENGINEERING, LTD. 4935 NORTH 30TH STREET COLORADO SPRINGS, COLORADO 80919 (719) 593-2593 FAX (719) 528-6613</p> | <p>Project: <u>Village Center Filing No. 2</u> Engineer: <u>VAS</u> Job No.: <u>8716.41</u></p> |
|--|---|

Village Center Filing No. 2

(Inlet Calculations - CONTINUOUS-GRADE Condition)

(Inlets in Series)

DESIGN POINT 6

100-YR. FLOW

TOTAL Q(100) 23 I(100) 6.7
 DEPTH 0.36 Fr 2.57
 SPREAD 13.8 L(1) 27.4
 CROSS SLOPE 2.0% L(2) 16.4
 STREET SLOPE 4.0% L(3) 58.6

| | |
|------------------------|----|
| Inlet size ? L(i) = | 20 |
| If Li < L(2) then Qi = | 0 |
| CA(eqv.) = | 0 |

| | |
|------------------------|------|
| If Li > L(2) then Qi = | 15 |
| CA(eqv.) = | 2.26 |
| FB = | 8 |
| FB % = | 35% |
| CA(eqv.) = | 1.21 |

FLOW BY: Q(100) 8 I(100) 6.7
 DEPTH 0.24 Fr 2.57
 SPREAD 7.9 L(1) 15.7
 CROSS SLOPE 2.0% L(2) 9.4
 STREET SLOPE 4.0% L(3) 33.7

| | |
|------------------------|---|
| 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 = | 8 |
| FB % = | 100% |
| CA(eqv.) = | 1.21 |

5-YR. FLOW

TOTAL Q(5) 11 I(5) 3.9
 DEPTH 0.28 Fr 2.39
 SPREAD 9.6 L(1) 17.6
 CROSS SLOPE 2.0% L(2) 10.6
 STREET SLOPE 4.0% L(3) 37.8

| | |
|------------------------|----|
| Inlet size ? L(i) = | 20 |
| If Li < L(2) then Qi = | 0 |
| CA(eqv.) = | 0 |

| | |
|------------------------|------|
| If Li > L(2) then Qi = | 9 |
| CA(eqv.) = | 2.28 |
| FB = | 3 |
| FB % = | 22% |
| CA(eqv.) = | 0.66 |

FLOW BY: Q(5) 3 I(10) 3.9
 DEPTH 0.16 Fr 1.85
 SPREAD 3.6 L(1) 5.2
 CROSS SLOPE 2.0% L(2) 3.1
 STREET SLOPE 4.0% L(3) 11.1

| | |
|------------------------|---|
| 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.) = | 0.66 |

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 (719) 593-2593 FAX (719) 528-6613

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) 34 I(100) 7.1
 DEPTH 0.42 Fr 2.61
 SPREAD 16.9 L(1) 34.0
 CROSS SLOPE 2.0% L(2) 20.4
 STREET SLOPE 3.8% L(3) 72.8

| |
|---------------------------|
| Inlet size ? L(i) = 20 |
| If Li < L(2) then Qi = 20 |
| CA(eqv.) = 2.85 |

| |
|--------------------------|
| If Li > L(2) then Qi = 0 |
| CA(eqv.) = 0 |
| FB = 14 |
| FB % = 41% |
| CA(eqv.) = 1.99 |

FLOW BY: Q(100) 14 I(100) 7.1
 DEPTH 0.30 Fr 2.61
 SPREAD 10.9 L(1) 21.9
 CROSS SLOPE 2.0% L(2) 13.2
 STREET SLOPE 3.8% L(3) 47.0

| |
|--------------------------|
| Inlet size ? L(i) = 16 |
| If Li < L(2) then Qi = 0 |
| CA(eqv.) = 0 |

| |
|--------------------------|
| If Li > L(2) then Qi = 9 |
| CA(eqv.) = 1.29 |
| FB = 5 |
| FB % = 35% |
| CA(eqv.) = 0.69 |

FLOW BY: Q(100) 5 I(100) 7.1
 DEPTH 0.20 Fr 2.61
 SPREAD 6.0 L(1) 12.0
 CROSS SLOPE 2.0% L(2) 7.2
 STREET SLOPE 3.8% L(3) 25.7

| |
|--------------------------|
| 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 = 5 |
| FB % = 100% |
| CA(eqv.) = 0.69 |

5-YR. FLOW

TOTAL Q(100) 16 I(10) 4.1
 DEPTH 0.32 Fr 2.42
 SPREAD 11.5 L(1) 21.4
 CROSS SLOPE 2.0% L(2) 12.9
 STREET SLOPE 3.8% L(3) 46.0

| |
|--------------------------|
| Inlet size ? L(i) = 20 |
| If Li < L(2) then Qi = 0 |
| CA(eqv.) = 0 |

| |
|---------------------------|
| If Li > L(2) then Qi = 11 |
| CA(eqv.) = 2.75 |
| FB = 4 |
| FB % = 28% |
| CA(eqv.) = 1.09 |

FLOW BY: Q(5) 4 I(10) 4.1
 DEPTH 0.20 Fr 2.06
 SPREAD 5.6 L(1) 8.8
 CROSS SLOPE 2.0% L(2) 5.3
 STREET SLOPE 3.8% L(3) 18.9

| |
|--------------------------|
| Inlet size ? L(i) = 16 |
| If Li < L(2) then Qi = 0 |
| CA(eqv.) = 0 |

| |
|--------------------------|
| If Li > L(2) then Qi = 4 |
| CA(eqv.) = 1.02 |
| FB = 0 |
| FB % = 6% |
| CA(eqv.) = 0.07 |

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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 8

100-YR. FLOW

TOTAL Q(100) 28 I(100) 6.8
 DEPTH 0.39 Fr 2.56

SPREAD 15.2 L(1) 29.9

CROSS SLOPE 2.0% L(2) 18.0
 STREET SLOPE 3.8% L(3) 64.1

| |
|--------------------------|
| Inlet size ? L(i) = 18 |
| If Li < L(2) then Qi = 0 |
| CA(eqv.) = 0 |

| |
|---------------------------|
| If Li > L(2) then Qi = 17 |
| CA(eqv.) = 2.43 |
| FB = 11 |
| FB % = 40% |
| CA(eqv.) = 1.61 |

FLOW BY: Q(100) 11 I(100) 6.8
 DEPTH 0.28 Fr 2.56

SPREAD 9.5 L(1) 18.7

CROSS SLOPE 2.0% L(2) 11.3
 STREET SLOPE 3.8% L(3) 40.2

| |
|--------------------------|
| Inlet size ? L(i) = 16 |
| If Li < L(2) then Qi = 0 |
| CA(eqv.) = 0 |

| |
|--------------------------|
| If Li > L(2) then Qi = 8 |
| CA(eqv.) = 1.11 |
| FB = 3 |
| FB % = 31% |
| CA(eqv.) = 0.49 |

FLOW BY: Q(100) 3 I(100) 6.8
 DEPTH 0.18 Fr 2.56

SPREAD 4.6 L(1) 9.1

CROSS SLOPE 2.0% L(2) 5.4
 STREET SLOPE 3.8% L(3) 19.4

| |
|--------------------------|
| 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.) = 0.49 |

5-YR. FLOW

TOTAL Q(100) 12 I(10) 3.9
 DEPTH 0.29 Fr 2.36

SPREAD 10.1 L(1) 18.4

CROSS SLOPE 2.0% L(2) 11.0
 STREET SLOPE 3.8% L(3) 39.4

| |
|--------------------------|
| Inlet size ? L(i) = 18 |
| If Li < L(2) then Qi = 0 |
| CA(eqv.) = 0 |

| |
|--------------------------|
| If Li > L(2) then Qi = 9 |
| CA(eqv.) = 2.28 |
| FB = 3 |
| FB % = 27% |
| CA(eqv.) = 0.84 |

FLOW BY: Q(5) 3 I(10) 3.9
 DEPTH 0.18 Fr 1.94

SPREAD 4.5 L(1) 6.8

CROSS SLOPE 2.0% L(2) 4.1
 STREET SLOPE 3.8% L(3) 14.6

| |
|--------------------------|
| Inlet size ? L(i) = 16 |
| If Li < L(2) then Qi = 0 |
| CA(eqv.) = 0 |

| |
|--------------------------|
| If Li > L(2) then Qi = 3 |
| CA(eqv.) = 0.84 |
| FB = 0 |
| FB % = 0% |
| CA(eqv.) = 0.00 |

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 Job No.: 8716.41

Village Center Filing No. 2
(Inlet Calculations - Sump Condition)
DESIGN POINT 10

Total Flow: $Q_5 = 10$ cfs
 $Q_{100} = 18$ cfs

Maximum allowable ponding depth at sump:

$D(5) = 0.5$ (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: foot inlet required

(Install a 8' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows)

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Engineer: VAS
Job No.: 8716.41

Village Center Filing No. 2
(Inlet Calculations - Sump Condition)
DESIGN POINT 11

Total Flow: $Q_5 = 12$ cfs
 $Q_{100} = 21$ cfs

Maximum allowable ponding depth at sump:

$D(5) = 0.5$ (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: foot inlet required

(Install a 8' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows)

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Engineer: VAS
Job No.: 8716.41

Village Center Filing No. 2
(Inlet Calculations - Sump Condition)
DESIGN POINT 12

Total Flow: $Q_5 = 11$ cfs
 $Q_{100} = 18$ cfs

Maximum allowable ponding depth at sump:

$D(5) = 0.5$ (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: foot inlet required

(Install a 8' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows)

JR ENGINEERING, LTD.

4935 NORTH 30TH STREET
COLORADO SPRINGS, COLORADO 80919
(719) 593-2593 FAX (719) 528-6613

Project: Village Center Filing No. 2

Engineer: VAS

Job No.: 8716.41

SYSTEM "A"
Worksheet for Circular Channel

| Project Description | |
|---------------------|-------------------|
| Project File | untitled.fm2 |
| Worksheet | VILLAGE CENTER |
| Flow Element | Circular Channel |
| Method | Manning's Formula |
| Solve For | Full Flow Slope |

| Input Data | |
|----------------------|------------|
| Mannings Coefficient | 0.013 |
| Diameter | 48.00 in |
| Discharge | 135.00 cfs |

| Results | |
|--------------------|-----------------------|
| Channel Slope | 0.008834 ft/ft |
| Depth | 48.0 in |
| Flow Area | 12.57 ft ² |
| Wetted Perimeter | 12.57 ft |
| Top Width | 0.00 ft |
| Critical Depth | 3.46 ft |
| Percent Full | 100.00 |
| Critical Slope | 0.008108 ft/ft |
| Velocity | 10.74 ft/s |
| Velocity Head | 1.79 ft |
| Specific Energy | FULL ft |
| Froude Number | FULL |
| Maximum Discharge | 145.22 cfs |
| Full Flow Capacity | 135.00 cfs |
| Full Flow Slope | 0.008834 ft/ft |

SYSTEM "A"
Worksheet for Circular Channel

| Project Description | |
|---------------------|-------------------|
| Project File | untitled.fm2 |
| Worksheet | VILLAGE CENTER |
| Flow Element | Circular Channel |
| Method | Manning's Formula |
| Solve For | Full Flow Slope |

| Input Data | |
|----------------------|------------|
| Mannings Coefficient | 0.013 |
| Diameter | 42.00 in |
| Discharge | 135.00 cfs |

| Results | |
|--------------------|----------------------|
| Channel Slope | 0.018007 ft/ft |
| Depth | 42.0 in |
| Flow Area | 9.62 ft ² |
| Wetted Perimeter | 11.00 ft |
| Top Width | 0.00 ft |
| Critical Depth | 3.33 ft |
| Percent Full | 100.00 |
| Critical Slope | 0.015612 ft/ft |
| Velocity | 14.03 ft/s |
| Velocity Head | 3.06 ft |
| Specific Energy | FULL ft |
| Froude Number | FULL |
| Maximum Discharge | 145.22 cfs |
| Full Flow Capacity | 135.00 cfs |
| Full Flow Slope | 0.018007 ft/ft |

SYSTEM "A"
Worksheet for Circular Channel

| Project Description | |
|---------------------|-------------------|
| Project File | untitled.fm2 |
| Worksheet | VILLAGE CENTER |
| Flow Element | Circular Channel |
| Method | Manning's Formula |
| Solve For | Full Flow Slope |

| Input Data | |
|----------------------|------------|
| Mannings Coefficient | 0.013 |
| Diameter | 42.00 in |
| Discharge | 100.00 cfs |

| Results | |
|--------------------|----------------------|
| Channel Slope | 0.009880 ft/ft |
| Depth | 42.0 in |
| Flow Area | 9.62 ft ² |
| Wetted Perimeter | 11.00 ft |
| Top Width | 0.00 ft |
| Critical Depth | 3.07 ft |
| Percent Full | 100.00 |
| Critical Slope | 0.008927 ft/ft |
| Velocity | 10.39 ft/s |
| Velocity Head | 1.68 ft |
| Specific Energy | FULL ft |
| Froude Number | FULL |
| Maximum Discharge | 107.57 cfs |
| Full Flow Capacity | 100.00 cfs |
| Full Flow Slope | 0.009880 ft/ft |

SYSTEM "A"
Worksheet for Circular Channel

| Project Description | |
|---------------------|-------------------|
| Project File | untitled.fm2 |
| Worksheet | VILLAGE CENTER |
| Flow Element | Circular Channel |
| Method | Manning's Formula |
| Solve For | Full Flow Slope |

| Input Data | |
|----------------------|-----------|
| Mannings Coefficient | 0.013 |
| Diameter | 42.00 in |
| Discharge | 90.00 cfs |

| Results | |
|--------------------|----------------------|
| Channel Slope | 0.008003 ft/ft |
| Depth | 42.0 in |
| Flow Area | 9.62 ft ² |
| Wetted Perimeter | 11.00 ft |
| Top Width | 0.00 ft |
| Critical Depth | 2.94 ft |
| Percent Full | 100.00 |
| Critical Slope | 0.007661 ft/ft |
| Velocity | 9.35 ft/s |
| Velocity Head | 1.36 ft |
| Specific Energy | FULL ft |
| Froude Number | FULL |
| Maximum Discharge | 96.81 cfs |
| Full Flow Capacity | 90.00 cfs |
| Full Flow Slope | 0.008003 ft/ft |

SYSTEM "A"
Worksheet for Circular Channel

| Project Description | |
|---------------------|-------------------|
| Project File | untitled.fm2 |
| Worksheet | VILLAGE CENTER |
| Flow Element | Circular Channel |
| Method | Manning's Formula |
| Solve For | Full Flow Slope |

| Input Data | |
|----------------------|-----------|
| Mannings Coefficient | 0.013 |
| Diameter | 24.00 in |
| Discharge | 19.00 cfs |

| Results | |
|--------------------|----------------------|
| Channel Slope | 0.007055 ft/ft |
| Depth | 24.0 in |
| Flow Area | 3.14 ft ² |
| Wetted Perimeter | 6.28 ft |
| Top Width | 0.00 ft |
| Critical Depth | 1.57 ft |
| Percent Full | 100.00 |
| Critical Slope | 0.007688 ft/ft |
| Velocity | 6.05 ft/s |
| Velocity Head | 0.57 ft |
| Specific Energy | FULL ft |
| Froude Number | FULL |
| Maximum Discharge | 20.44 cfs |
| Full Flow Capacity | 19.00 cfs |
| Full Flow Slope | 0.007055 ft/ft |

SYSTEM "B"
Worksheet for Circular Channel

| Project Description | |
|---------------------|-------------------|
| Project File | untitled.fm2 |
| Worksheet | VILLAGE CENTER |
| Flow Element | Circular Channel |
| Method | Manning's Formula |
| Solve For | Full Flow Slope |

| Input Data | |
|----------------------|------------|
| Mannings Coefficient | 0.013 |
| Diameter | 48.00 in |
| Discharge | 185.00 cfs |

| Results | |
|--------------------|-----------------------|
| Channel Slope | 0.016589 ft/ft |
| Depth | 48.0 in |
| Flow Area | 12.57 ft ² |
| Wetted Perimeter | 12.57 ft |
| Top Width | 0.00 ft |
| Critical Depth | 3.80 ft |
| Percent Full | 100.00 |
| Critical Slope | 0.014363 ft/ft |
| Velocity | 14.72 ft/s |
| Velocity Head | 3.37 ft |
| Specific Energy | FULL ft |
| Froude Number | FULL |
| Maximum Discharge | 199.01 cfs |
| Full Flow Capacity | 185.00 cfs |
| Full Flow Slope | 0.016589 ft/ft |

SYSTEM "B"
Worksheet for Circular Channel

| Project Description | |
|---------------------|-------------------|
| Project File | untitled.fm2 |
| Worksheet | VILLAGE CENTER |
| Flow Element | Circular Channel |
| Method | Manning's Formula |
| Solve For | Full Flow Slope |

| Input Data | |
|----------------------|------------|
| Mannings Coefficient | 0.013 |
| Diameter | 42.00 in |
| Discharge | 185.00 cfs |

| Results | |
|--------------------|----------------------|
| Channel Slope | 0.033815 ft/ft |
| Depth | 42.0 in |
| Flow Area | 9.62 ft ² |
| Wetted Perimeter | 11.00 ft |
| Top Width | 0.00 ft |
| Critical Depth | 3.45 ft |
| Percent Full | 100.00 |
| Critical Slope | 0.030717 ft/ft |
| Velocity | 19.23 ft/s |
| Velocity Head | 5.75 ft |
| Specific Energy | FULL ft |
| Froude Number | FULL |
| Maximum Discharge | 199.01 cfs |
| Full Flow Capacity | 185.00 cfs |
| Full Flow Slope | 0.033815 ft/ft |

SYSTEM "B"
Worksheet for Circular Channel

| Project Description | |
|---------------------|-------------------|
| Project File | untitled.fm2 |
| Worksheet | VILLAGE CENTER |
| Flow Element | Circular Channel |
| Method | Manning's Formula |
| Solve For | Full Flow Slope |

| Input Data | |
|----------------------|------------|
| Mannings Coefficient | 0.013 |
| Diameter | 42.00 in |
| Discharge | 117.00 cfs |

| Results | |
|--------------------|----------------------|
| Channel Slope | 0.013525 ft/ft |
| Depth | 42.0 in |
| Flow Area | 9.62 ft ² |
| Wetted Perimeter | 11.00 ft |
| Top Width | 0.00 ft |
| Critical Depth | 3.23 ft |
| Percent Full | 100.00 |
| Critical Slope | 0.011730 ft/ft |
| Velocity | 12.16 ft/s |
| Velocity Head | 2.30 ft |
| Specific Energy | FULL ft |
| Froude Number | FULL |
| Maximum Discharge | 125.86 cfs |
| Full Flow Capacity | 117.00 cfs |
| Full Flow Slope | 0.013525 ft/ft |

SYSTEM "B"
Worksheet for Circular Channel

| Project Description | |
|---------------------|-------------------|
| Project File | untitled.fm2 |
| Worksheet | VILLAGE CENTER |
| Flow Element | Circular Channel |
| Method | Manning's Formula |
| Solve For | Full Flow Slope |

| Input Data | |
|----------------------|------------|
| Mannings Coefficient | 0.013 |
| Diameter | 42.00 in |
| Discharge | 101.00 cfs |

| Results | |
|--------------------|----------------------|
| Channel Slope | 0.010079 ft/ft |
| Depth | 42.0 in |
| Flow Area | 9.62 ft ² |
| Wetted Perimeter | 11.00 ft |
| Top Width | 0.00 ft |
| Critical Depth | 3.08 ft |
| Percent Full | 100.00 |
| Critical Slope | 0.009069 ft/ft |
| Velocity | 10.50 ft/s |
| Velocity Head | 1.71 ft |
| Specific Energy | FULL ft |
| Froude Number | FULL |
| Maximum Discharge | 108.65 cfs |
| Full Flow Capacity | 101.00 cfs |
| Full Flow Slope | 0.010079 ft/ft |

SYSTEM "B"
Worksheet for Circular Channel

| Project Description | |
|---------------------|-------------------|
| Project File | untitled.fm2 |
| Worksheet | VILLAGE CENTER |
| Flow Element | Circular Channel |
| Method | Manning's Formula |
| Solve For | Full Flow Slope |

| Input Data | |
|----------------------|-----------|
| Mannings Coefficient | 0.013 |
| Diameter | 36.00 in |
| Discharge | 83.00 cfs |

| Results | |
|--------------------|----------------------|
| Channel Slope | 0.015487 ft/ft |
| Depth | 36.0 in |
| Flow Area | 7.07 ft ² |
| Wetted Perimeter | 9.42 ft |
| Top Width | 0.00 ft |
| Critical Depth | 2.80 ft |
| Percent Full | 100.00 |
| Critical Slope | 0.013391 ft/ft |
| Velocity | 11.74 ft/s |
| Velocity Head | 2.14 ft |
| Specific Energy | FULL ft |
| Froude Number | FULL |
| Maximum Discharge | 89.28 cfs |
| Full Flow Capacity | 83.00 cfs |
| Full Flow Slope | 0.015487 ft/ft |

SYSTEM "B"
Worksheet for Circular Channel

| Project Description | |
|---------------------|-------------------|
| Project File | untitled.fm2 |
| Worksheet | VILLAGE CENTER |
| Flow Element | Circular Channel |
| Method | Manning's Formula |
| Solve For | Full Flow Slope |

| Input Data | |
|----------------------|-----------|
| Mannings Coefficient | 0.013 |
| Diameter | 42.00 in |
| Discharge | 70.00 cfs |

| Results | |
|--------------------|----------------------|
| Channel Slope | 0.004841 ft/ft |
| Depth | 42.0 in |
| Flow Area | 9.62 ft ² |
| Wetted Perimeter | 11.00 ft |
| Top Width | 0.00 ft |
| Critical Depth | 2.62 ft |
| Percent Full | 100.00 |
| Critical Slope | 0.005837 ft/ft |
| Velocity | 7.28 ft/s |
| Velocity Head | 0.82 ft |
| Specific Energy | FULL ft |
| Froude Number | FULL |
| Maximum Discharge | 75.30 cfs |
| Full Flow Capacity | 70.00 cfs |
| Full Flow Slope | 0.004841 ft/ft |

SYSTEM "B"
Worksheet for Circular Channel

| Project Description | |
|---------------------|-------------------|
| Project File | untitled.fm2 |
| Worksheet | VILLAGE CENTER |
| Flow Element | Circular Channel |
| Method | Manning's Formula |
| Solve For | Full Flow Slope |

| Input Data | |
|----------------------|-----------|
| Mannings Coefficient | 0.013 |
| Diameter | 24.00 in |
| Discharge | 19.00 cfs |

| Results | |
|--------------------|----------------------|
| Channel Slope | 0.007055 ft/ft |
| Depth | 24.0 in |
| Flow Area | 3.14 ft ² |
| Wetted Perimeter | 6.28 ft |
| Top Width | 0.00 ft |
| Critical Depth | 1.57 ft |
| Percent Full | 100.00 |
| Critical Slope | 0.007688 ft/ft |
| Velocity | 6.05 ft/s |
| Velocity Head | 0.57 ft |
| Specific Energy | FULL ft |
| Froude Number | FULL |
| Maximum Discharge | 20.44 cfs |
| Full Flow Capacity | 19.00 cfs |
| Full Flow Slope | 0.007055 ft/ft |

SYSTEM "B"
Worksheet for Circular Channel

| Project Description | |
|---------------------|-------------------|
| Project File | untitled.fm2 |
| Worksheet | VILLAGE CENTER |
| Flow Element | Circular Channel |
| Method | Manning's Formula |
| Solve For | Full Flow Slope |

| Input Data | |
|----------------------|-----------|
| Mannings Coefficient | 0.013 |
| Diameter | 24.00 in |
| Discharge | 25.00 cfs |

| Results | | |
|--------------------|----------|-----------------|
| Channel Slope | 0.012214 | ft/ft |
| Depth | 24.0 | in |
| Flow Area | 3.14 | ft ² |
| Wetted Perimeter | 6.28 | ft |
| Top Width | 0.00 | ft |
| Critical Depth | 1.76 | ft |
| Percent Full | 100.00 | |
| Critical Slope | 0.010977 | ft/ft |
| Velocity | 7.96 | ft/s |
| Velocity Head | 0.98 | ft |
| Specific Energy | FULL | ft |
| Froude Number | FULL | |
| Maximum Discharge | 26.89 | cfs |
| Full Flow Capacity | 25.00 | cfs |
| Full Flow Slope | 0.012214 | ft/ft |

SYSTEM "B"
Worksheet for Circular Channel

| Project Description | |
|---------------------|-------------------|
| Project File | untitled.fm2 |
| Worksheet | VILLAGE CENTER |
| Flow Element | Circular Channel |
| Method | Manning's Formula |
| Solve For | Full Flow Slope |

| Input Data | |
|----------------------|----------|
| Mannings Coefficient | 0.013 |
| Diameter | 18.00 in |
| Discharge | 8.00 cfs |

| Results | |
|--------------------|----------------------|
| Channel Slope | 0.005801 ft/ft |
| Depth | 18.0 in |
| Flow Area | 1.77 ft ² |
| Wetted Perimeter | 4.71 ft |
| Top Width | 0.00 ft |
| Critical Depth | 1.10 ft |
| Percent Full | 100.00 |
| Critical Slope | 0.007426 ft/ft |
| Velocity | 4.53 ft/s |
| Velocity Head | 0.32 ft |
| Specific Energy | FULL ft |
| Froude Number | FULL |
| Maximum Discharge | 8.61 cfs |
| Full Flow Capacity | 8.00 cfs |
| Full Flow Slope | 0.005801 ft/ft |

**DETENTION POND
CALCULATIONS**

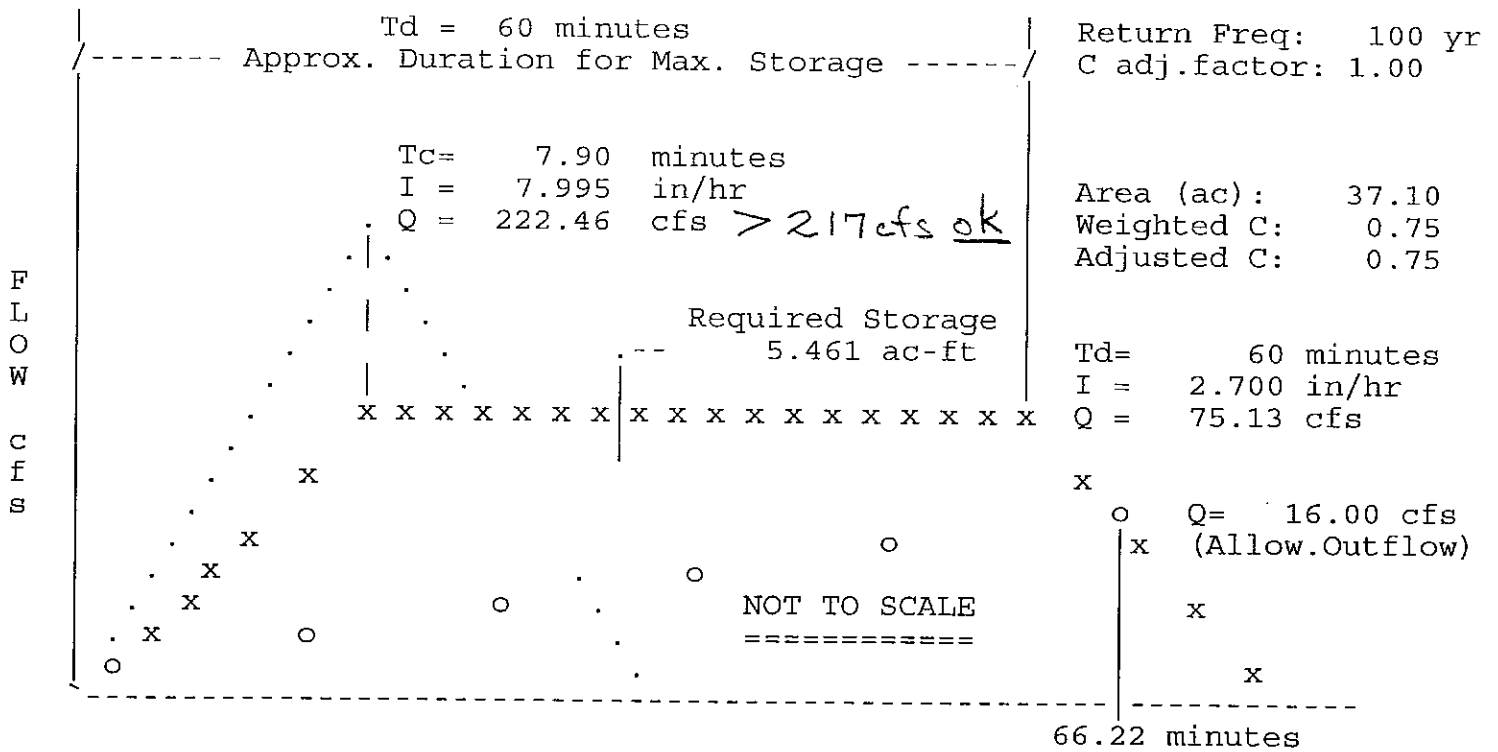
MODIFIED RATIONAL METHOD
 ---- Graphical Summary for Maximum Required Storage ----

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

VILLAGE CENTER POND WATERSHED (I METHOD)

 * RETURN FREQUENCY: 100 yr | Allowable Outflow: 16.00 cfs *
 * 'C' Adjustment: 1.000 | Required Storage: 5.461 ac-ft *

 * Peak Inflow: 75.13 cfs | Inflow .HYD stored: VCPONDI .HYD *



Quick TR-55 Ver.5.46 S/N:
 Executed: 16:33:13 06-29-1999

VILLAGE CENTER POND WATERSHED (I METHOD)

**** Modified Rational Hydrograph ****
 Weighted C = 0.750 Area= 37.100 acres Tc = 7.90 minutes
 Adjusted C = 0.750 Td= 60.00 min. I= 2.70 in/hr Qp= 75.13 cfs
 RETURN FREQUENCY: 100 year storm Adj.factor = 1.00
 Output file: VCPONDI .HYD

HYDROGRAPH FOR MAXIMUM STORAGE
 For the 100 Year Storm

| Time Hours | Time increment = 0.033 Hours Time on left represents time for first Q in each row. | | | | | | |
|---------------|---|-------|-------|-------|-------|-------|-------|
| 0.032 | 18.07 | 37.09 | 56.11 | 75.13 | 75.13 | 75.13 | 75.13 |
| 0.265 | 75.13 | 75.13 | 75.13 | 75.13 | 75.13 | 75.13 | 75.13 |
| 0.498 | 75.13 | 75.13 | 75.13 | 75.13 | 75.13 | 75.13 | 75.13 |
| 0.732 | 75.13 | 75.13 | 75.13 | 75.13 | 75.13 | 75.13 | 75.13 |
| 0.965 | 75.13 | 75.13 | 57.06 | 38.04 | 19.02 | 0.00 | |

Quick TR-55 Ver.5.46 S/N:
 Executed: 16:33:13 06-29-1999

VILLAGE CENTER POND WATERSHED (I METHOD)

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

$$Q = \text{adj} * C * I * A$$

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) |
|-------------------|---------------|---------------|-------------|-------------|-------------|------------|----------------|-----------------|
| VC POND BASN | 0.750 | 37.10 | | | | | | |
| | | | 7.90 | 0.750 | 0.750 | 7.995 | 37.10 | 222.46 |


```

*****
*
* Village Center Pond
*
*
*
*
*
*
*****
  
```

Inflow Hydrograph: x:\870000.ALL\871641\PONDDPAK\VCPONDI .HYD
 Rating Table file: x:\870000.ALL\871641\PONDDPAK\VILLAGE .PND

----INITIAL CONDITIONS----
 Elevation = 73.00 ft
 Outflow = 0.00 cfs
 Storage = 0 cu-ft

GIVEN POND DATA

| ELEVATION (ft) | OUTFLOW (cfs) | STORAGE (cu-ft) |
|-------------------|------------------|--------------------|
| 73.00 | 0.0 | 0 |
| 74.00 | 6.4 | 15,312 |
| 76.00 | 10.6 | 79,036 |
| 78.00 | 13.8 | 152,320 |
| 80.00 | 16.3 | 235,805 |
| 81.00 | 17.4 | 281,400 |

INTERMEDIATE ROUTING
 COMPUTATIONS

| 2S/t (cfs) | 2S/t + 0 (cfs) |
|---------------|-------------------|
| 0.0 | 0.0 |
| 255.2 | 261.6 |
| 1317.4 | 1328.0 |
| 2538.9 | 2552.7 |
| 3930.5 | 3946.8 |
| 4690.5 | 4707.9 |

Time increment (t) = 2.0 min.

Pond File: x:\870000.ALL\871641\PONDPAK\VILLAGE .PND
 Inflow Hydrograph: x:\870000.ALL\871641\PONDPAK\VCPONDI .HYD
 Outflow Hydrograph: x:\870000.ALL\871641\PONDPAK\OUT .HYD

INFLOW HYDROGRAPH

ROUTING COMPUTATIONS

| TIME (min) | INFLOW (cfs) | I1+I2 (cfs) | 2S/t - 0 (cfs) | 2S/t + 0 (cfs) | OUTFLOW (cfs) | ELEVATION (ft) |
|---------------|-----------------|----------------|-------------------|-------------------|------------------|-------------------|
| 1.9 | 18.07 | ----- | 0.0 | 0.0 | 0.00 | 73.00 |
| 3.9 | 37.09 | 55.2 | 52.5 | 55.2 | 1.35 | 73.21 |
| 5.9 | 56.11 | 93.2 | 138.5 | 145.7 | 3.56 | 73.56 |
| 7.9 | 75.13 | 131.2 | 256.9 | 269.8 | 6.43 | 74.02 |
| 9.9 | 75.13 | 150.3 | 393.2 | 407.2 | 6.97 | 74.27 |
| 11.9 | 75.13 | 150.3 | 528.5 | 543.5 | 7.51 | 74.53 |
| 13.9 | 75.13 | 150.3 | 662.6 | 678.7 | 8.04 | 74.78 |
| 15.9 | 75.13 | 150.3 | 795.8 | 812.9 | 8.57 | 75.03 |
| 17.9 | 75.13 | 150.3 | 927.8 | 946.0 | 9.10 | 75.28 |
| 19.9 | 75.13 | 150.3 | 1058.9 | 1078.1 | 9.62 | 75.53 |
| 21.9 | 75.13 | 150.3 | 1188.9 | 1209.1 | 10.13 | 75.78 |
| 23.9 | 75.13 | 150.3 | 1317.9 | 1339.1 | 10.63 | 76.02 |
| 25.9 | 75.13 | 150.3 | 1446.2 | 1468.1 | 10.97 | 76.23 |
| 27.9 | 75.13 | 150.3 | 1573.8 | 1596.4 | 11.30 | 76.44 |
| 29.9 | 75.13 | 150.3 | 1700.8 | 1724.1 | 11.63 | 76.65 |
| 31.9 | 75.13 | 150.3 | 1827.2 | 1851.1 | 11.97 | 76.85 |
| 33.9 | 75.13 | 150.3 | 1952.8 | 1977.4 | 12.30 | 77.06 |
| 35.9 | 75.13 | 150.3 | 2077.8 | 2103.1 | 12.63 | 77.27 |
| 37.9 | 75.13 | 150.3 | 2202.2 | 2228.1 | 12.95 | 77.47 |
| 39.9 | 75.13 | 150.3 | 2325.9 | 2352.4 | 13.28 | 77.67 |
| 41.9 | 75.13 | 150.3 | 2449.0 | 2476.2 | 13.60 | 77.87 |
| 43.9 | 75.13 | 150.3 | 2571.4 | 2599.2 | 13.88 | 78.07 |
| 45.9 | 75.13 | 150.3 | 2693.5 | 2721.7 | 14.10 | 78.24 |
| 47.9 | 75.13 | 150.3 | 2815.1 | 2843.8 | 14.32 | 78.42 |
| 49.9 | 75.13 | 150.3 | 2936.3 | 2965.4 | 14.54 | 78.59 |
| 51.9 | 75.13 | 150.3 | 3057.0 | 3086.6 | 14.76 | 78.77 |
| 53.9 | 75.13 | 150.3 | 3177.4 | 3207.3 | 14.97 | 78.94 |
| 55.9 | 75.13 | 150.3 | 3297.2 | 3327.6 | 15.19 | 79.11 |
| 57.9 | 75.13 | 150.3 | 3416.7 | 3447.5 | 15.40 | 79.28 |
| 59.9 | 75.13 | 150.3 | 3535.7 | 3566.9 | 15.62 | 79.46 |
| 61.9 | 57.06 | 132.2 | 3636.3 | 3667.9 | 15.80 | 79.60 |
| 63.9 | 38.04 | 95.1 | 3699.6 | 3731.4 | 15.91 | 79.69 |
| 65.9 | 19.02 | 57.1 | 3724.7 | 3756.6 | 15.96 | 79.73 |
| 67.9 | 0.00 | 19.0 | 3711.9 | 3743.7 | 15.94 | 79.71 |

POND OUTLET:

COMPUTE W.S. ELEV. VS DISCHARGE

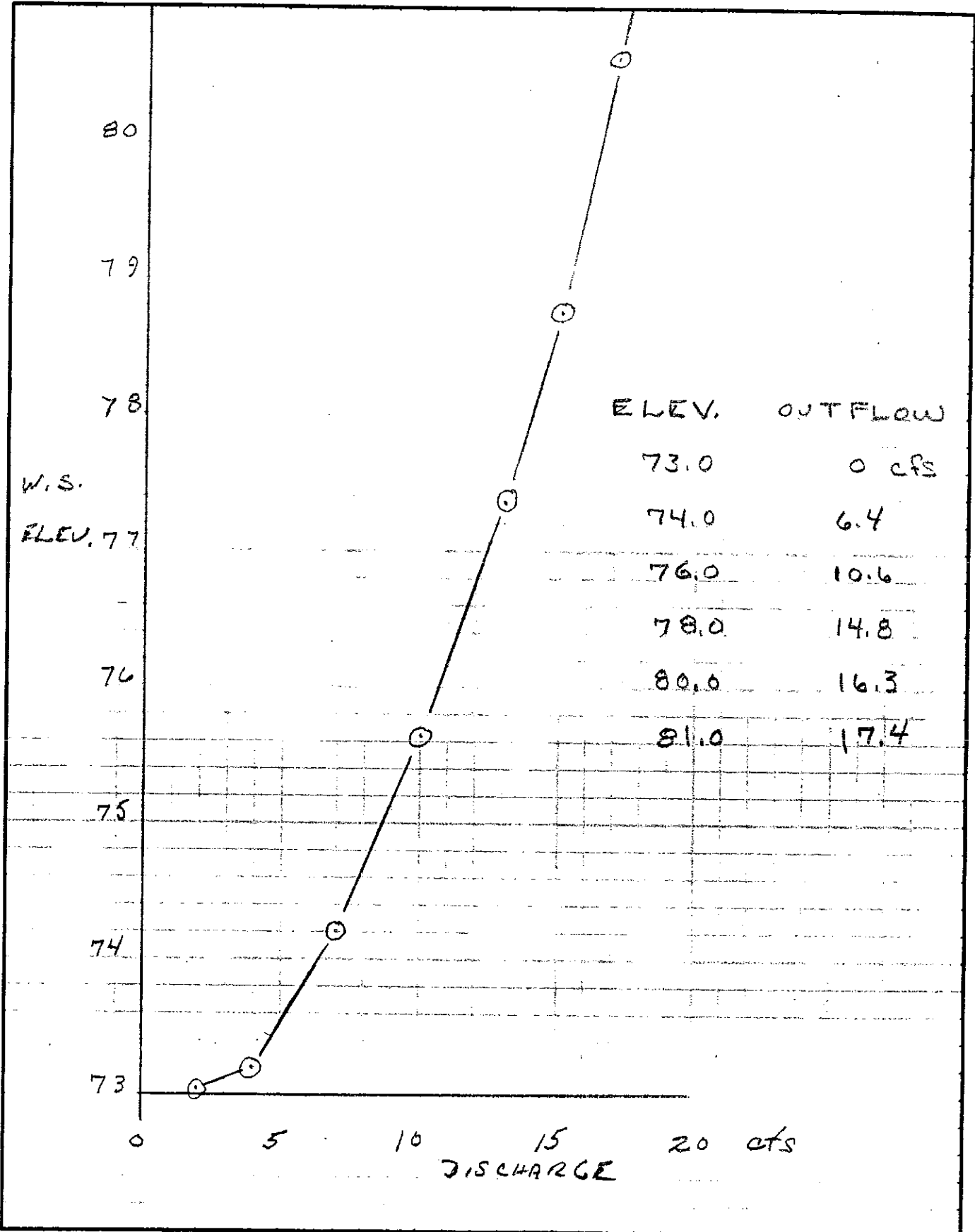
FOR 18" DIA. OUTLET, H.C.L. 6673

AT STORM MAIN JUNCTION.

210 LF OF 18" DIA RCP POND TO M.F. 10.

AREA OF 18" DIA PIPE 1.77 S.F.

| Q | V | $1.49 \frac{V^2}{2g}$ | FRICT SLOPE | PIPE H.L. | T.H.L. | W.S. ELEV. |
|----|------|-----------------------|----------------|--------------|--------|---------------|
| 17 | 9.6 | 2.15' | 0.026 | 5.46' | 7.61' | 6680.61 |
| 15 | 8.48 | 1.65' | 0.020 | 4.20' | 5.85' | 6678.85 |
| 13 | 7.35 | 1.24' | 0.015 | 3.15' | 4.39' | 6677.39 |
| 10 | 5.65 | 0.74' | 0.009 | 1.89 | 2.63 | 6675.63 |
| 7 | 3.95 | 0.36' | 0.004 | 0.84 | 1.20 | 6674.20 |
| 4 | 2.26 | 0.12' | 0.0004 | 0.08 | 0.20 | 6673.20 |
| 2 | 1.13 | 0.03' | NEG | NEG. | 0.03 | 6673.03 |



***** SUMMARY OF ROUTING COMPUTATIONS *****

Pond File: x:\870000.ALL\871641\PONDDPAK\VILLAGE .PND
Inflow Hydrograph: x:\870000.ALL\871641\PONDDPAK\VCPONDI .HYD
Outflow Hydrograph: x:\870000.ALL\871641\PONDDPAK\OUT .HYD

Starting Pond W.S. Elevation = 73.00 ft

***** Summary of Peak Outflow and Peak Elevation *****

Peak Inflow = 75.13 cfs
Peak Outflow = 15.96 cfs
Peak Elevation = 79.73 ft

***** Summary of Approximate Peak Storage *****

Initial Storage = 0 cu-ft
Peak Storage From Storm = 224,418 cu-ft

Total Storage in Pond = 224,418 cu-ft = 5.15 AC-FT

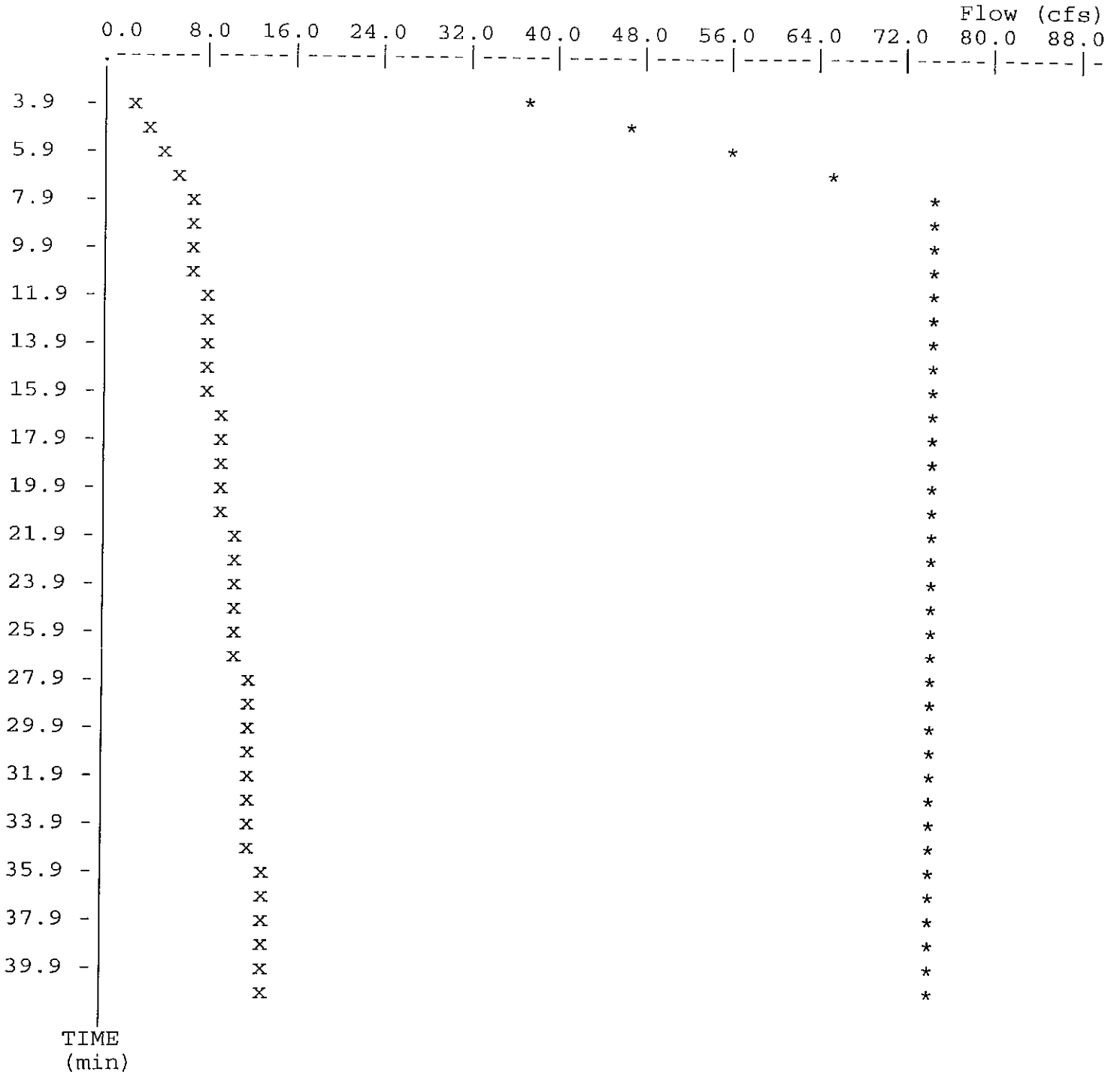
Warning: Inflow hydrograph truncated on left side.

Pond File: x:\870000.ALL\871641\PONDPAK\VILLAGE .PND
 Inflow Hydrograph: x:\870000.ALL\871641\PONDPAK\VCPONDI .HYD
 Outflow Hydrograph: x:\870000.ALL\871641\PONDPAK\OUT .HYD

EXECUTED: 06-29-1999

Peak Inflow = 75.13 cfs
 Peak Outflow = 15.96 cfs
 Peak Elevation = 79.73 ft

16:40:41



* File: x:\870000.ALL\871641\PONDPAK\VCPONDI .HYD Qmax = 75.1 cfs
 x File: x:\870000.ALL\871641\PONDPAK\OUT .HYD Qmax = 16.0 cfs

POND-2 Version: 5.20
 S/N:

Village Center Pond, 6/23/99

CALCULATED 06-23-1999 08:51:45
 DISK FILE: X:\870000.all\871641\pondpak\VILLAGE .VOL

Planimeter scale: 1 inch = 20 ft.

| Elevation (ft) | Planimeter (sq.in.) | Area (sq.ft) | A1+A2+sqr(A1*A2) (sq.ft) | * Volume (cubic-ft) | Volume Sum (cubic-ft) |
|-------------------|------------------------|-----------------|-----------------------------|---------------------------|--------------------------|
| 73.00 | 11.60 | 4,640 | 0 | 0 | 0 |
| 74.00 | 73.95 | 29,580 | 45,935 | 15,312 | 15,312 |
| 76.00 | 85.50 | 34,200 | 95,586 | 63,724 | 79,036 |
| 78.00 | 97.85 | 39,140 | 109,927 | 73,284 | 152,320 |
| 80.00 | 111.00 | 44,400 | 125,227 | 83,485 | 235,805 |
| 81.00 | 117.00 | 46,800 | 136,784 | 45,595 | 281,400 |

* Incremental volume computed by the Conic Method for Reservoir Volumes.

$$\text{Volume} = (1/3) * (\text{EL2}-\text{EL1}) * (\text{Area1} + \text{Area2} + \text{sq.rt.}(\text{Area1}*\text{Area2}))$$

where: EL1, EL2 = Lower and upper elevations of the increment
 Area1, Area2 = Areas computed for EL1, EL2, respectively
 Volume = Incremental volume between EL1 and EL2

PLUGGED FLOW CONDITION

Q_{100} OVER SPILLWAY: 217 cfs

H/W L Q_{100} 6679.73 POND PAK

ANALYSIS USE 6680.0 SPILLWAY
ELEVATION,

ASSUME: 80 LF OF WEIR LENGTH.

$$Q_{100} = 3LH^{3/2}$$

$$217 = (3)(80)H^{3/2}$$

$$H = 0.86'$$

SPILLWAY SURFACE 6680.00

H DEPTH 0.86

PLUGGED W.S. ELEV. 6680.86

FREE BOARD 2.00

MIN. BERM ELEV. 6682.86

USE 6683

PROVIDE 80 LF OF SPILLWAY
LENGTH

**DRAINAGE
MAP**