MASTER DEVELOPMENT
DRAINAGE PLAN
FOR
EASTVIEW ESTATES AND
FINAL DRAINAGE REPORT FOR
EASTVIEW ESTATES FILING NO. 1

J·R ENGINEERING
A Subsidiary of Westrian

J·R ENGINEERING
A Westrian Company

MASTER DEVELOPMENT DRAINAGE PLAN FOR EASTVIEW ESTATES AND FINAL DRAINAGE REPORT FOR EASTVIEW ESTATES FILING NO. 1

August 2004

Prepared For:

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MASTER DEVELOPMENT DRAINAGE PLAN FOR EASTVIEW ESTATES AND FINAL DRAINAGE REPORT FOR EASTVIEW ESTATES FILING NO. 1

J·R ENGINEERING
A Westrian Company

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 DBPS of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

AARON B. EBERT 34208 REGISTERED PROFESSIONAL ENGINEER STATE OF COLORADO

Aaron B. Ebert, Colorado P.E. #34208
For and On Behalf of JR Engineering, LLC

10-5-04
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: Lennar Communities Colorado

By: _____
Kevin Walker

Title: Vice President

Address: 7222 Commerce Center Drive, Suite 118

Colorado Springs, CO 80919

CITY OF COLORADO SPRINGS ONLY:

_____
City Engineer

1/8/04
Date

Conditions:

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MASTER DEVELOPMENT DRAINAGE PLAN FOR EASTVIEW ESTATES AND FINAL DRAINAGE REPORT FOR EASTVIEW ESTATES FILING NO. 1

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APPENDIX

MASTER DEVELOPMENT DRAINAGE PLAN FOR EASTVIEW ESTATES AND FINAL DRAINAGE REPORT FOR EASTVIEW ESTATES FILING NO. 1

PURPOSE

This document is the Master Development Drainage Plan for Eastview Estates and the Final Drainage Report for Eastview Estates Filing No. 1. The purpose of this report is to analyze the drainage patterns, peak rates of storm water runoff, recommend solutions for drainage concerns resulting from development, and identify necessary improvements to safely route storm water runoff to adequate outfall facilities.

GENERAL DESCRIPTION

Eastview Estates is located in the northeast corner of Sections 20, Township 13 South, Range 65 West of the Sixth Principal Meridian in the City of Colorado Springs, County of El Paso. The 73.77-acre parcel, of which the southern 35 acres are currently being annexed into the City of Colorado Springs, requires a Master Development Drainage Plan per the City of Colorado Springs drainage criteria. The parcel is bounded to the north by Stetson Hills Boulevard, to the west by proposed Stetson Hills South Filings No. 2 and 3, and a City of Colorado Spring Park site. The site is bounded to the south by existing Willowind at Stetson Hills Filing No. 1, 2, and 3, to the east by Marksheffel Road and undeveloped land located within El Paso County. The development contains a planned 56.26-acre residential subdivision zoned R1-6000/DFOZ, a 10.24-acre commercially zoned area (PBC) located in the northeastern corner of the parcel, and a 7.27-acre area located in the southeast corner of the parcel that is zoned PUD for multi-family use. The commercial and multi-family areas shall be discussed in greater detail within future drainage reports.

EXISTING DRAINAGE CONDITIONS

Eastview Estates is divided by an existing east to west ridgeline that separates the parcel into a northern and southern half. This ridgeline separates the regional sub-basins of Sand Creek into the Main Sand Creek Drainage Basin and Upper Sand Creek Drainage Basin as indicated by the "Sand Creek Drainage Basin Planning Study," revised March 1996 by Kiowa Engineering Corporation. The northern portion of the parcel lies within Basin 27 of the Upper Sand Creek Drainage Basin. This portion slopes westward at a varying grade from 2% to 3:1 toward proposed Stetson Ridge South Subdivision Filing Nos. 1, 2 and 3. The southern portion of the parcel lies within Basin 38 of the East Fork of Sand Creek Drainage Basin and slopes southerly at a varying grade of 2% to 10% to existing Willowind at Stetson Hills Subdivision. Eastview Estates is currently vegetated with native grass. The soils across the site are Truckton Sandy Loam, a deep well-drained soil formed in alluvial residuum derived from arkosic sedimentary rock. The soil has a moderately rapid permeability, which reflects a condition Hydrologic Group "B" soils as determined by the "Soil Survey of El Paso County Area," prepared by S.C.S. (see appendix). In addition, the Sand Creek D.B.P.S. indicated that the aforementioned sub-basins have not been studied in detail and do not require any major drainage facilities.

As stated above, Eastview Estates lies within two regional sub-basins of the Sand Creek Drainage Basin; East Fork and Upper Sand Creek Drainage Basins. Existing runoff from the portions of proposed Eastview Estates within the Upper Sand Creek Drainage Basin have been previously studied within the "Final Drainage Report and Plan for Stetson Ridge South Filing No. 1, 2 and 3" dated June 2001 by Leigh Whitehead & Associates, Inc. The aforementioned report anticipated the development of the adjacent site (Eastview Estates) into a single-family residential area and utilized corresponding C-values used to determine the peak runoff. A total of 36.84 acres is anticipated to reach the planned Stetson Hills South Filings 1 thru 3. Of this area, 29.32 acres (shown within the enclosed drainage map as Basins SS-24 and SS-31) is to be directed to the Stetson Ridge South Filing No. 3 producing runoff totaling Q_5 = 53.2 cfs, Q_{100} = 116.6 cfs. Of the total runoff, a minimum of Q_5 = 33.8 cfs, Q_{100} = 58.3 cfs is to be intercepted by a subsurface proposed 36" RCP located within proposed Steward Lane, while a maximum of Q_5 = 19.4 cfs, Q_{100} = 58.3 cfs is allowed to be conveyed as surface flow atop the roadway where it will be intercepted by a series of downstream sump inlets. The remaining 7.52 acres of the 36.84

acres (shown within the enclosed drainage map as Basins SS-27 and SS-33) produced anticipated flows totaling Q_5 = 17.1 cfs, Q_{100} = 27.6 cfs. This runoff is to be collected within Statute Drive and conveyed to a series of downstream sump inlets.

Similarly the existing drainage runoff for the portion of proposed Eastview Estates within the East Fork of Sand Creek has been previously studied within the "Master Development Drainage Plan for Stetson Hills Enclave," dated September 2000 by Leigh Whitehead & Associates, Inc., and the "Final Drainage Report and Plan for Willowind at Stetson Hills Filing Nos. 1, 2 and 3" dated March 2001 by Leigh Whitehead & Associates, Inc. This report anticipated the development of the adjacent site (Eastview Estates) into a single-family residential area, and utilized corresponding C-values used to determine the peak runoff. The anticipated developed runoff from 43.55 acres is expected to reach the now existing Willowind at Stetson Hills Subdivision site, of which 39.56 acres would produce runoff totaling Q_5 = 68.9 cfs, Q_{100} = 153.6 cfs (shown within the enclosed drainage map as Basins WW-12). The runoff is to be directed to Antelope Ridge Drive where it is to be collected as surface and subsurface flows. The majority of the collected runoff (Q_5 = 68.9 cfs, Q_{100} = 143.0 cfs) is to be intercepted by a subsurface proposed 42" RCP located within existing roadway, while the remaining (Q_{100} = 10.6 cfs) is allowed to be conveyed as surface flow atop the roadway where it would be intercepted by downstream inlets. The remaining 3.99 acres of the 43.55 acres (shown within in the enclosed drainage map as Basins WW-B4) produced anticipated flows totaling Q_5 = 3.9cfs and Q_{100} = 13.1 cfs. This runoff is to be directed towards Dunecrest Drive where it is to be collected within the existing street.

PROPOSED DRAINAGE CHARACTERISTICS

Upper Sand Creek Drainage Basin

Planned development for the northern portion of Eastview Estates is to construct a single-family residential subdivision zoned R1-6000/DFOZ to the west of Marksheffel Road and south of Stetson Hill Boulevard that shall be known as Eastview Estates Filing No. 1. Located to the north and east of proposed Antelope Ridge Drive is a 10.24-acre commercially zoned area. Surface runoff for this future commercial development will be directed towards a detention pond.

A drainage report will be required with development of the commercial site. This pond will have a basin sedimentation facility that will act as a water quality feature for the highly impermeable area and detain higher than anticipated runoff from the proposed commercial site. Surface runoff from the residential area will be collected within the proposed interior streets and storm drain systems and directed to existing collection systems located within the easterly filings of the adjacent Stetson Ridge South Subdivisions.

Upper Sand Creek Drainage Basin Detailed Description

Offsite basin OS-A (Q_5 = 7.9 cfs, Q_{100} = 18.6 cfs) is a section of rural agricultural developed land located along the eastern side of Marksheffel Road that extends from a high point north of the intersection of Marksheffel Road and Stetson Hills Boulevard to the west to a high point within Huber Road, southerly to an existing 30" culvert that crosses existing Marksheffel Road some 450' south of said intersection. Runoff from this 8.26-acre area is currently conveyed to the commercial portion of the proposed Eastview Estates via an existing 30" CMP culvert. Any further development of this basin must adhere to the allowable flows provided by this report (Q_5 = 7.9 cfs, Q_{100} = 18.6 cfs). Any additional flows will need to be detained and released at these rates. The existing 30" CMP will be temporarily extended through the proposed grading of future Marksheffel Road. The commercial site drainage report will detail the ultimate system that will convey this off-site runoff into the proposed detention pond.

Basin OS-B consists of the existing southern half of Stetson Hills Boulevard from Marksheffel Road to the existing northern entrance (proposed Antelope Ridge Drive) into the proposed site. This area consists of 1.75 acres and generates a peak flow of 7.5 cfs for the 5-year event and 14.3 cfs for the 100-year event. Basin OS-B and Basin R (Q_5 = 2.1 cfs, Q_{100} = 3.9 cfs) combine at Design Point AP-0 (Q_5 = 9.0 cfs, Q_{100} = 17.1 cfs) at a proposed 12' at-grade inlet. The 12' at-grade inlet intercepts flows of Q_5 = 6.4 cfs and Q_{100} = 10.7 cfs. The intercepted flow combines with the outfall of the commercial site's detention pond (Q_5 = 32.7 cfs, Q_{100} = 40.0 cfs) within a proposed 36" RCP at SD-1 (Q_5 = 39 cfs, Q_{100} = 50 cfs).

Drainage Basin A (Q_5 = 43.9 cfs, Q_{100} = 84.4 cfs) consists of 11.25 acres of which 10.24 acres is currently planned as a commercial site. The remaining 1.01 acres contains a portion of the

ultimate section of Marksheffel Road and adjacent right-of-way. Runoff produced from this site will combine with the runoff from the aforementioned offsite basin OS-A at Design Point AP-1 (Q_5 = 42.7 cfs, Q_{100} = 83.4 cfs). These flows were calculated by combining the total flow of Basin A with its peak time of concentration (7.1 minutes) and a flow from an estimated portion of basin OS-A that will reach Design Point 1 within that same 7.1 minutes. A detention pond (approx. 0.76 Ac-ft. of storage) with an outlet control structure will need to be constructed prior to development of the commercial site. The pond will act to truncate the peak runoff and improve water quality of the runoff from the commercial site. Treated flow will outfall from the pond in a proposed 24" RCP pipe located at Design Point AP-2 at restricted rates of Q_5 = 32.7 cfs, Q_{100} = 40.0 cfs. These restricted flows combine with the flows from AP-0 at SD-1 (Q_5 = 39 cfs, Q_{100} = 50 cfs) in a 36" RCP storm sewer. The 36" storm sewer will continue within the roadway to SD-2. As previously mentioned, a drainage report will be required with development of the commercial site.

Flow-by from AP-0 (Q_5 = 2.6 cfs, Q_{100} = 6.4 cfs) combines with runoff from 10.28 acres of residential lots, and streets (Basins B and C) at AP-4 for a combined developed flow of Q_5 = 21.1 cfs, Q_{100} = 44.9 cfs. Each of the two 14' sump inlets at AP-4 will intercept Q_5 = 10.6 cfs and Q_{100} = 22.5 cfs. The intercepted flow combines with the runoff from SD-1 within a proposed 42" RCP at SD-2 (Q_5 = 51 cfs, Q_{100} = 87 cfs).

Runoff from Basin F (2.91 acres) collects at Design Point AP-3 (Q_5 = 5.4 cfs, Q_{100} = 11.3 cfs). These flows collect in a 4' D-10-R sump inlet located within the northeast corner of a roundabout within Antelope Ridge Drive. These flows are conveyed to SD-2 by an 18" RCP storm system. At SD-2 (Q_5 = 51 cfs, Q_{100} = 87 cfs) flows are directed west through a 42" RCP to tie into the Stetson Ridge South Filing No. 3 storm system located within Steward Lane.

Basin P (Q_5 = 3.2 cfs, Q_{100} = 6.7 cfs) sheet flows to the west into the back of the residential lots facing Standard Drive within Stetson Ridge South Filing No. 3. These flows combine with the surface flow from Basin D (Q_5 = 12.9 cfs, Q_{100} = 27 cfs) at design point AP-5 (Q_5 = 15.3 cfs, Q_{100} = 32.1 cfs). These flows are less than the maximum allowable surface runoff of Q_5 = 19.4 cfs, Q_{100} = 58.3 cfs established within the "Final Drainage Report and Plan for Stetson

Ridge South Filing No. 1, 2 and 3." The runoff within the subsurface 36" RCP, Design Point SD-3, that is to be conveyed to the existing 36" located within the existing portion of Steward Lane is Q_5 = 51 cfs, Q_{100} = 88 cfs. These flows are less than the anticipated release rates of Q_5 = 53.2 cfs, Q_{100} = 116 cfs established within the "Final Drainage Report and Plan for Stetson Ridge South Filing No. 1, 2 and 3".

Basin Q is 0.82 acres of residential lots. The peak runoff from this basin is estimated to be Q_5 = 2.2 cfs and Q_{100} = 4.6 cfs which will be conveyed as surface flow to the back of the residential lots within Stetson Ridge South Filing No. 3 and within proposed Statute Drive to AP-6. At AP-6, these flows combine with flows from Basin E, 4.91 acres of residential lots and streets (Q_5 = 10.3 cfs, Q_{100} = 21.5 cfs). The combined surface flows (Q_5 = 12.0 cfs, Q_{100} = 25.1 cfs) are acceptable to the anticipated release rates of Q_5 = 17.1 cfs, Q_{100} = 27.6 cfs established within the "Final Drainage Report and Plan for Stetson Ridge South Filing No. 1, 2 and 3".

East Fork Sand Creek Drainage Basin

Planned development for the southern portion of Eastview Estates is to construct the remainder of the planned single-family residential subdivision zoned R1-6000/DFOZ/NP and a 7.20 acre multi-family site located north of Willowind at Stetson Hills Filings No. 1, 2, and 3 and west of Marksheffel Road. Runoff from this multi-family site will be treated with a water quality sedimentation facility before being released into the proposed storm system within Antelope Ridge Drive. Flows from the remainder of the single-family subdivision will be collected within the proposed interior streets and storm drain systems and directed to existing collection systems located within the northern filing of Willowind at Stetson Hills.

Runoff from future Marksheffel Road, located to the east of the site, will be considered to comply with the assumptions made within the Final Drainage Report and Plan for Willowind at Stetson Hills Filing No. 1, 2 and 3, which states runoff from future roadway will be conveyed to a planned inlet located within Marksheffel Road and conveyed to the existing box culvert, with carryover conveyed to the low point within Barnes Road.

East Fork Sand Creek Drainage Basin Detailed Description

Basin G consists of 7.19 acres of residential lots and streets within the southern portion (Filing No. 2) of Eastview Estates. The runoff from this basin will be conveyed within the internal streets to Design Point AP-7 total Q_5 = 14.2 cfs, Q_{100} = 29.7 cfs. This runoff will be collected in a 20' D-10-R sump inlet located within a roundabout on Antelope Ridge Drive. It will be conveyed through a 24" RCP pipe to a manhole at SD-4.

Basin H produces flows of Q_5 = 8.9 cfs and Q_{100} = 18.6 cfs from its 5.27 acres of residential lots and streets. These flows are collected at Design Point AP-8 by a 10' D-10-R sump inlet. Flows are to be conveyed to SD-4 (Q_5 = 21 cfs, Q_{100} = 44 cfs) through an 18" RCP storm pipe. These combined flows from Basin G and H will flow south through a 30" RCP within Antelope Ridge Drive to SD-5. At SD-5 (Q_5 = 24 cfs, Q_{100} = 45 cfs) flows from SD-4 combine with flows from Basin I (3.85 acres) that are collected by a 12' at-grade inlet at AP-9 (Q_5 = 8.5 cfs, Q_{100} = 17.8 cfs). Analysis has been done to ensure that this flow does not exceed the curb of the gutter and flow into surrounding lots (see Appendix: Hydraulic Calculations). The surface flow-by and subsurface flows continue south down Antelope Ridge Drive towards Willowind Filing No. 3.

Basin M (3.0 acres, Q_5 = 5.5 cfs, Q_{100} = 11.5 cfs) consists of residential lots and streets as well as a portion of the park site located to the west of Steward Lane and south of Kettle Drum Street. The flows from this basin, along with Basin L (3.45 acres, Q5 = 7.9 cfs, Q100 = 16.5 cfs) combine at AP-10 (Q_5 = 11.8 cfs, Q_{100} = 24.7 cfs). Two 20' at-grade inlets located west of the intersection of Antelope Ridge Drive and Steward Lane intercept these flows. A 24" RCP will route these flows to the proposed 42" RCP where they will combine with the flows from SD-5 at SD-6 (Q_5 = 32 cfs, Q_{100} = 62 cfs).

At Design Point AP-11, two 20' at-grade inlets intercept flows from of design points AP-9 (Q_5 = 4 cfs, Q_{100} = 11 cfs) and AP-10 (Q_5 = 4 cfs, Q_{100} = 10 cfs) as well as runoffs from Basin K (5.32 acres Q_5 = 11.4 cfs, Q_{100} = 23.8 cfs). These combined flows at AP-11 (Q_5 = 16.5 cfs, Q_{100} = 39.3 cfs) enter the 42" RCP within Antelope Ridge, via two 24" storm drains, at SD-7 (Q_5 = 42 cfs, Q_{100} = 82 cfs). The flow-by from the inlets at AP-11 (Q_5 = 2.8 cfs, Q_{100} = 9.7 cfs) is conveyed as surface flow into Willowind at Stetson Hills Filing No. 3 and is within the limits set forth by the

"Final Drainage Report and Plan for Willowind at Stetson Hills Filing No. 1, 2 and 3" of $Q_5 = 0$ cfs and $Q_{100} = 10.6$ cfs. Based upon design calculations, the 20' at-grade inlets have a flow-by of 2.8 cfs, which is greater than specified within the Willowind drainage report, which is acceptable since it is not cost effective to size the inlets for zero flow-by.

The multi-family site, discussed earlier in this section, is contained within Basin J, 8.1 acres producing flows of $Q_5 = 13.0$ cfs and $Q_{100} = 27.0$ cfs. This runoff will be treated within a water quality pond located on the south side of the multi-family site at Design Point AP-12. These flows are conveyed through a 24" RCP, SD-8 ($Q_5 = 13.0$ cfs, $Q_{100} = 27.0$ cfs), into the proposed 42" RCP located within Antelope Ridge Drive. These flows combine with the flows mentioned at SD-7 and discharge into the existing 42" RCP storm drain within the existing portion of Antelope Ridge Drive at SD-9 ($Q_5 = 54.0$ cfs, $Q_{100} = 106.0$ cfs). These flows are less than the allowable subsurface flows established in the "Final Drainage Report and Plan for Willowind at Stetson Hills Filing Nos. 1, 2, and 3" of $Q_5 = 68.9$ cfs, $Q_{100} = 143.0$ cfs.

Basin O, 2.04 acres of residential lots and streets, produces flows of $Q_5 = 4.4$ cfs and $Q_{100} = 9.2$ cfs which runoff to the backs of the residential lots of Willowind Filing No.3 and within Dunecrest Drive. This water sheet flows onto the lots of Willowind Filing No. 3 and drain into the existing streets per the lot drainage patterns. The amount of flow that runs onto Willowind No. 3 from Basin O is ($Q_5 = 4.4$ cfs, $Q_{100} = 9.2$ cfs). Surface flows within the street at AP-14 are negligible, but the total amount contributing to the existing subdivision is less than the allowable surface runoff established in the "Final Drainage Report and Plan for Willowind at Stetson Hills Filing Nos. 1, 2, and 3" of $Q_5 = 7.4$ cfs and $Q_{100} = 20.9$ cfs.

HYDROLOGIC/HYDRAULIC CRITERIA

This report has been prepared in accordance with the 1994 City/County Drainage Criteria Manual. The Rational Method was used to estimate storm water runoff anticipated from design storms with a 5-year and 100-year recurrence interval. (Current Criteria dated October 12, 1994).

EROSION CONTROL PLAN

The City/County Drainage Criteria Manual specifies that an Erosion Control Plan and associated cost estimate be submitted in conjunction with the Final Drainage Report. We respectfully request the Erosion Control Plan be submitted in conjunction with the Overlot Grading Plan and construction assurances posted prior to obtaining a grading permit.

CONSTRUCTION COST OPINION

Eastview Estates Filing No. 1

Public Drainage Facilities (Non-Reimbursable)
Opinion of Probable Cost

Item	Description	Quantity	Unit Cost	Cost
1.	12' D-10-R Inlet	1 EACH	$7,000.00/EA	$ 7,000.00
2.	14' D-10-R Sump Inlet	2 EACH	$8,000.00/EA	$ 16,000.00
3.	18" R.C.P.	425 L.F.	$30.00/L.F.	$ 12,750.00
4.	24" R.C.P.	34 L.F.	$40.00/L.F.	$ 1,360.00
5.	30" R.C.P.	44 L.F.	$45.00/L.F.	$ 1,980.00
6.	36" R.C.P.	212 L.F.	$55.00/L.F.	$ 11,660.00
7.	42" R.C.P.	992 L.F.	$80.00/L.F.	$ 79,360.00
8.	5' ID Manhole	4 EACH	$4,000.00/EA	$ 16,000.00
		Sub-Total		$ 146,110.00
		15% Engineering and Contingencies		$ 21,916.50
		TOTAL		**$ 168,026.50**

Eastview Estates Filing No. 2

Public Drainage Facilities (Non-Reimbursable)
Opinion of Probable Cost

Item	Description	Quantity	Unit Cost	Cost
1.	4' D-10-R Inlet	1 EACH	$4,000.00/EA	$ 4,000.00
2.	10' D-10-R Inlet	1 EACH	$6,000.00/EA	$ 6,000.00
3.	12' D-10-R Inlet	1 EACH	$7,000.00/EA	$ 7,000.00
4.	20' D-10-R Inlet	5 EACH	$14,000.00/EA	$ 70,000.00
5.	18" R.C.P.	225 L.F.	$30.00/L.F.	$ 6,750.00
6.	24" R.C.P.	215 L.F.	$40.00/L.F.	$ 8,600.00
7.	36" R.C.P.	667 L.F.	$55.00/L.F.	$ 36,685.00
8.	42" R.C.P.	146 L.F.	$80.00/L.F.	$ 11,680.00
9.	5' ID Manhole	3 EACH	$4,000.00/EA	$ 12,000.00
		Sub-Total		$ 162,715.00
		15% Engineering and Contingencies		$ 24,407.25
		TOTAL		**$ 187,122.25**

Commercial Site

Public Drainage Facilities (Non-Reimbursable)
Opinion of Probable Cost

Item	Description	Quantity	Unit Cost	Cost
1.	12' D-10-R Inlet	1 EACH	$7,000.00/EA	$ 7,000.00
2.	24" R.C.P.	34 L.F.	$40.00/L.F.	$ 1,360.00
3.	30" R.C.P.	775 L.F.	$45.00/L.F.	$ 34,875.00
4.	Flared End Section	2 EACH	$2,000.00/EA	$ 4,000.00
5.	Detention Pond	1 EACH	$20,000.00/EA	$ 20,000.00
		Sub-Total		$ 67,235.00
		15% Engineering and Contingencies		$ 10,085.25
		TOTAL		**$ 77,320.25**

JR Engineering 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, BRIDGE AND POND FEES

Eastview Estates is located within the Sand Creek Drainage Basin. Currently, this basin is subject to drainage, bridge and pond fees. The following is a breakdown of current fees required for this development:

Filing No. 1

1.	DRAINAGE FEES		
	$7,448.00 x 20.65 Acres	=	$ 153,801.20
2.	BRIDGE FEES		
	$454.00 x 20.65 Acres	=	$ 9,375.10
3.	POND FEES - LAND		
	$586.00 x 20.65 Acres	=	$ 12,100.90
4.	POND FEES - FACILITY		
	$1,637.00 x 20.65 Acres	=	$ 33,804.05
	TOTAL		**$ 209,081.25**

Cash fees or credits will be required for plat recordation.

Filing No. 2

1.	DRAINAGE FEES		
	$7,448.00 x 26.03 Acres	=	$ 193,871.44
2.	BRIDGE FEES		
	$454.00 x 26.03 Acres	=	$ 11,817.62
3.	POND FEES - LAND		
	$586.00 x 26.03 Acres	=	$ 15,253.58
4.	POND FEES - FACILITY		
	$1,637.00 x 26.03 Acres	=	$ 42,611.11
	TOTAL		**$ 263,553.75**

Filing No. 3

1.	DRAINAGE FEES		
	$7,448.00 x 9.76 Acres	=	$ 72,692.48
2.	BRIDGE FEES		
	$454.00 x 9.76 Acres	=	$ 4,431.04
3.	POND FEES - LAND		
	$586.00 x 9.76 Acres	=	$ 5,719.36
4.	POND FEES - FACILITY		
	$1,637.00 x 9.76 Acres	=	$ 15,977.12
	TOTAL		**$ 98,820.00**

Commercial Site

1.	DRAINAGE FEES		
	$7,448.00 x 10.24 Acres	=	$ 76,267.52
2.	BRIDGE FEES		
	$454.00 x 10.24 Acres	=	$ 4,648.96
3.	POND FEES - LAND		
	$586.00 x 10.24 Acres	=	$ 6,000.64
4.	POND FEES - FACILITY		
	$1,637.00 x 10.24 Acres	=	$ 16,762.88
	TOTAL		**$ 103,680.00**

Multi-Family Site

1.	DRAINAGE FEES		
	$7,448.00 x 7.27 Acres	=	$ 54,146.96
2.	BRIDGE FEES		
	$454.00 x 7.27 Acres	=	$ 3,300.58
3.	POND FEES - LAND		
	$586.00 x 7.27 Acres	=	$ 4,260.22
4.	POND FEES - FACILITY		
	$1,637.00 x 7.27 Acres	=	$ 11,900.99
	TOTAL		**$ 73,608.75**

FLOODPLAIN STATEMENT

No Portion of this site is located within the floodplain as determined by the Flood Insurance Rate Map (F. I .R .M.) Community Panel Numbers 08041C0537F, 08041C0539F, 08041C0543F, and 08041C0545 dated March 17, 1997. A copy of the F.E.M.A. Flood Insurance Rate Map is located in the Appendix.

SUMMARY

Construction of this subdivision will not adversely affect the surrounding developments. All drainage facilities were sized using the 1991 City/County Drainage Criteria and will safely discharge storm water runoff to adequate outfalls.

PREPARED BY:

JR Engineering, LLC

Matthew A. Larson, E.I.
Design Engineer I

JR Engineering, LLC

Aaron B. Egbert, P.E.
Senior Project Manager

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REFERENCES

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

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

3. "Sand Creek Drainage Basin Planning Study," by Kiowa Engineering Corporation, dated June 1996.

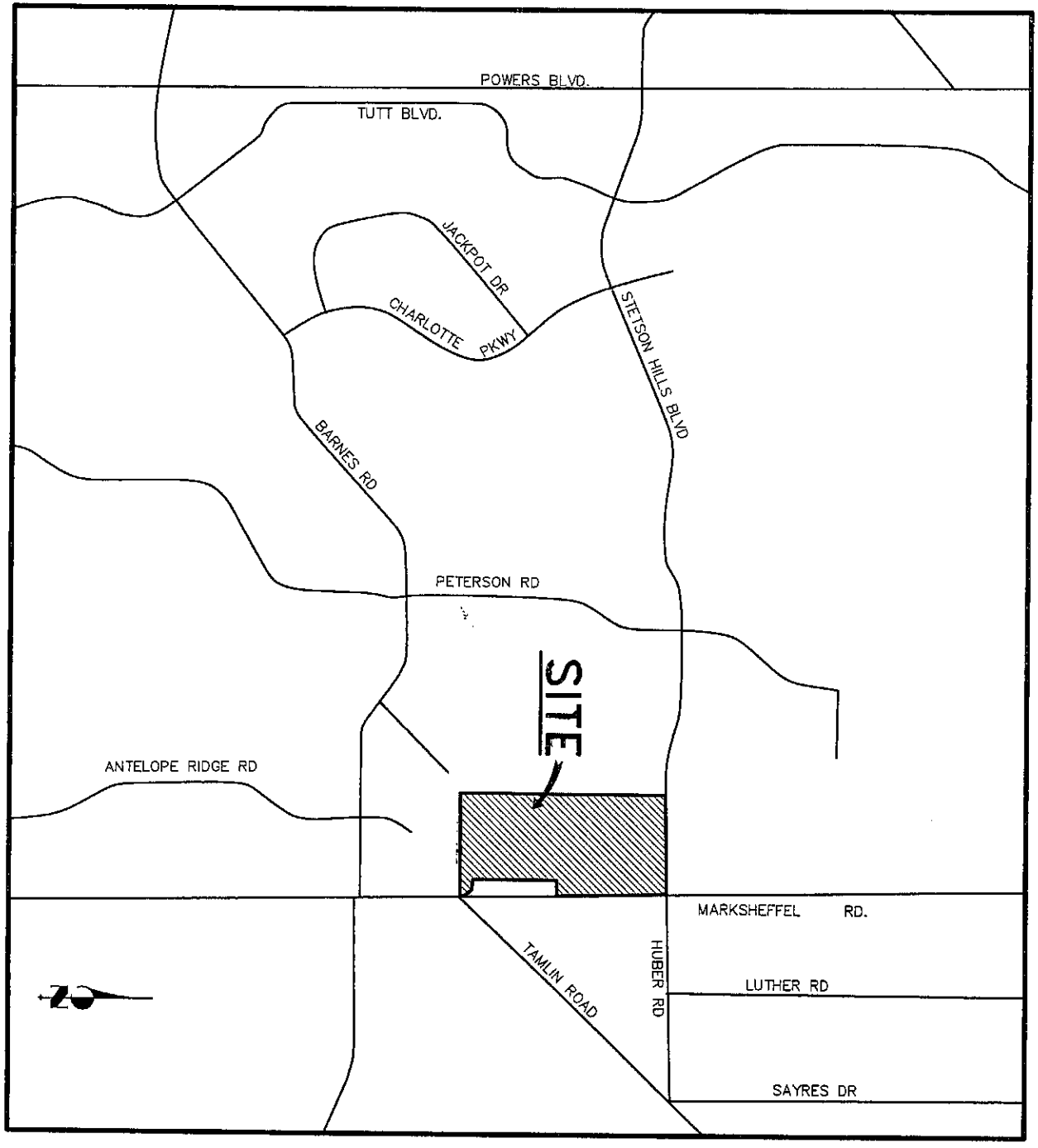
4. "Master Development Drainage Plan for Stetson Ridge East," by Leigh Whitehead & Associates, Inc., dated February 2000.

5. "Final Drainage Report and Plan for Willowind at Stetson Hills Filing Nos. 1, 2 and 3," by Leigh Whitehead & Associates, Inc., dated March 2001.

6. "Final Drainage Report and Plan for Stetson Ridge South Filing Nos. 1, 2 and 3," by Leigh Whitehead & Associates, Inc., dated June 2001.

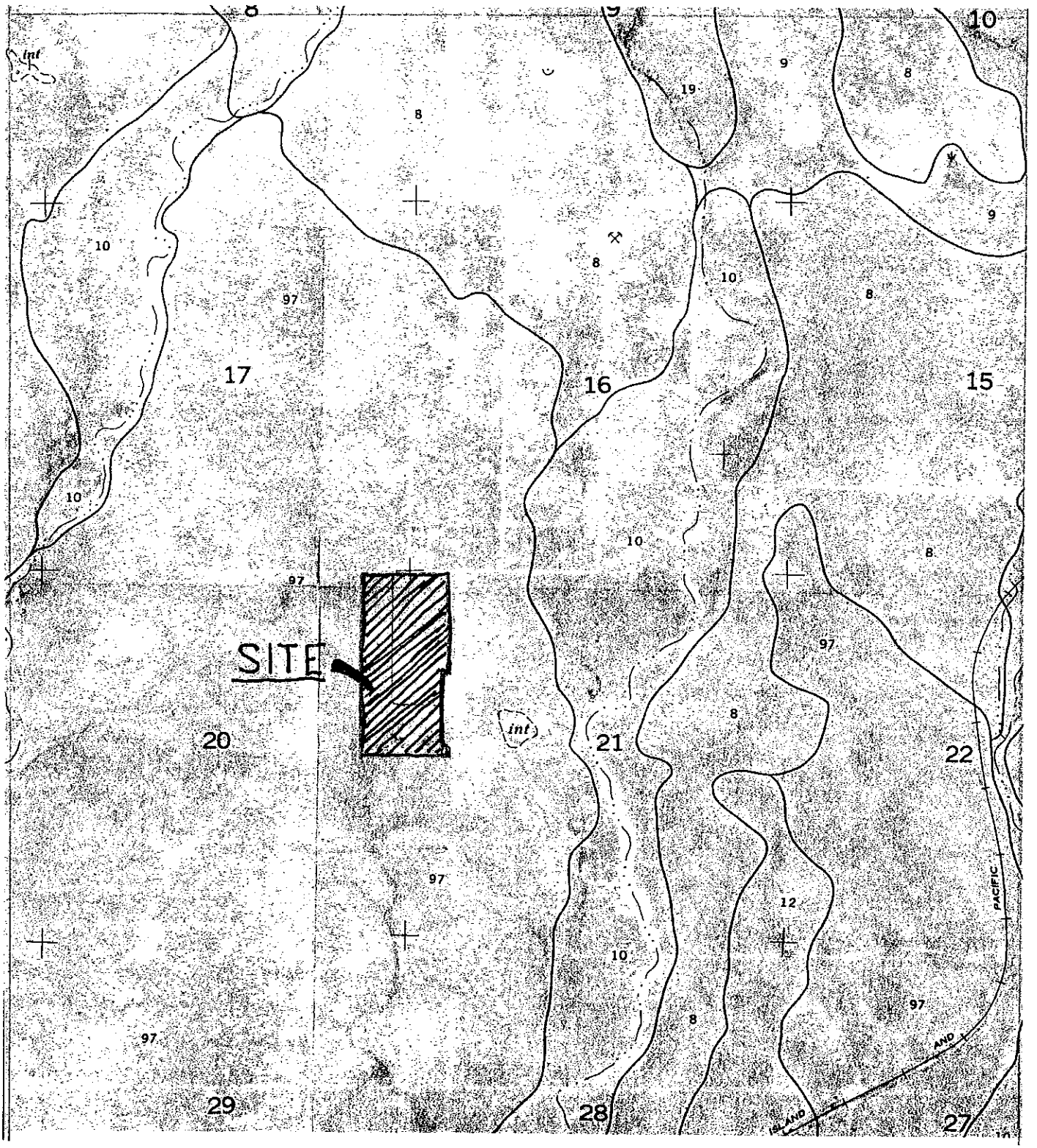
APPENDIX

VICINITY MAP



VICINITY MAP
N.T.S.

S. C. S. SOIL MAP



SCS SOIL SURVEY

SCS SOILS MAP
EASTVIEW ESTATES
JOB NO. 28965.02
NOVEMBER 20, 2003
REF. SHEET 9 OF 37

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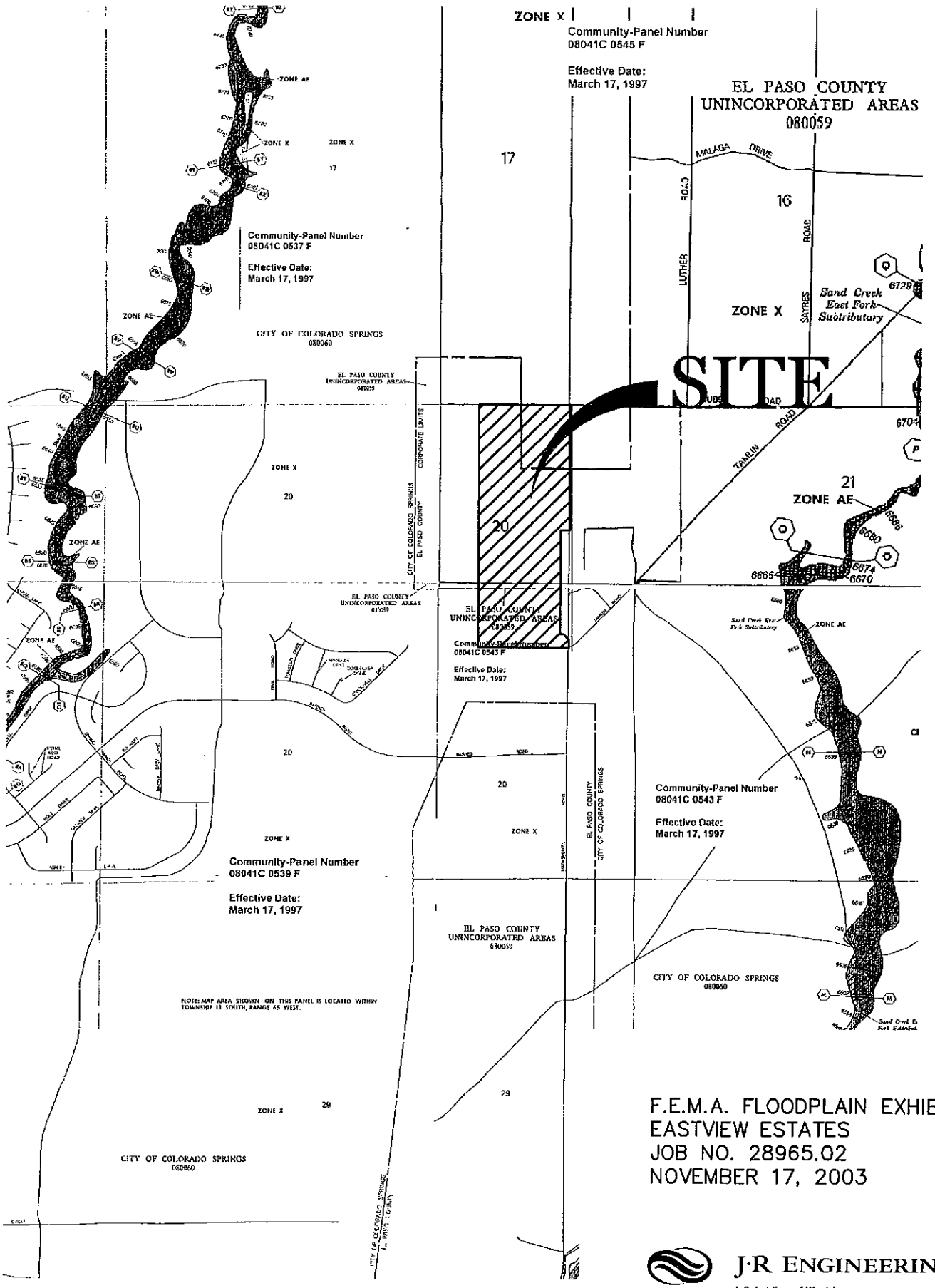
F. E. M. A. FLOODPLAIN MAP



F.E.M.A. FLOODPLAIN EXHIBIT
EASTVIEW ESTATES
JOB NO. 28965.02
NOVEMBER 17, 2003

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HYDROLOGIC CALCULATIONS

Eastview
Master Development Drainage Plan
(Area Runoff Coefficient Summary)

		RESIDENTAL			*STREETS*			*UNDEVELOPED*			*WEIGHTED*	
BASIN	*TOTAL AREA*	*AREA*	C_5	C_{100}	*AREA*	C_5	C_{100}	*AREA*	C_5	C_{100}	C_5	C_{100}
	(Acres)	*(Acres)*			*(Acres)*			*(Acres)*				
A	11.25	8.91	0.90	0.95	0.00	0.90	0.95	2.34	0.25	0.35	***0.76***	***0.83***
B	4.55	4.55	0.57	0.67	0.00	0.90	0.95	0.00	0.25	0.35	***0.57***	***0.67***
C	5.73	5.73	0.57	0.67	0.00	0.90	0.95	0.00	0.20	0.30	***0.57***	***0.67***
D	6.67	6.67	0.57	0.67	0.00	0.90	0.95	0.00	0.25	0.35	***0.57***	***0.67***
E	4.91	4.91	0.57	0.67	0.00	0.90	0.95	0.00	0.25	0.35	***0.57***	***0.67***
F	2.91	2.91	0.57	0.67	0.00	0.90	0.95	0.00	0.25	0.35	***0.57***	***0.67***
G	7.19	7.19	0.57	0.67	0.00	0.90	0.95	0.00	0.25	0.35	***0.57***	***0.67***

Calculated by: JLH
Date: 5/7/2004
Checked by: _____

Eastview
Master Development Drainage Plan
(Area Runoff Coefficient Summary)

		RESIDENTAL			*STREETS*			*UNDEVELOPED*			*WEIGHTED*	
BASIN	*TOTAL AREA* (Acres)	*AREA* (Acres)	C_5	C_{100}	*AREA* (Acres)	C_5	C_{100}	*AREA* (Acres)	C_5	C_{100}	C_5	C_{100}
H	5.27	5.27	0.57	0.67	0.00	0.90	0.95	0.00	0.25	0.35	*0.57*	*0.67*
I	3.85	3.85	0.57	0.67	0.00	0.90	0.95	0.00	0.25	0.35	*0.57*	*0.67*
J	8.05	8.05	0.57	0.67	0.00	0.90	0.95	0.00	0.20	0.30	*0.57*	*0.67*
K	5.32	5.32	0.57	0.67	0.00	0.90	0.95	0.00	0.25	0.35	*0.57*	*0.67*
L	3.45	3.45	0.57	0.67	0.00	0.90	0.95	0.00	0.25	0.35	*0.57*	*0.67*
M	2.99	2.99	0.57	0.67	0.00	0.90	0.95	0.00	0.25	0.35	*0.57*	*0.67*

Calculated by: JLH
Date: 5/7/2004
Checked by:

Eastview
Master Development Drainage Plan
(Area Runoff Coefficient Summary)

		RESIDENTAL			STREETS			UNDEVELOPED			WEIGHTED	
BASIN	TOTAL AREA (Acres)	AREA (Acres)	C_5	C_{100}	AREA (Acres)	C_5	C_{100}	AREA (Acres)	C_5	C_{100}	C_5	C_{100}
O	2.04	2.04	0.57	0.67	0.00	0.90	0.95	0.00	0.25	0.35	0.57	0.67
P	1.25	1.25	0.57	0.67	0.00	0.90	0.95	0.00	0.25	0.35	0.57	0.67
Q	0.82	0.82	0.57	0.67	0.00	0.90	0.95	0.00	0.25	0.35	0.57	0.67
R	0.45	0.00	0.57	0.67	0.45	0.90	0.95	0.00	0.25	0.35	0.90	0.95
OS-A	8.26	2.10	0.27	0.37	0.15	0.90	0.95	0.00	0.25	0.35	0.08	0.11
OS-B	1.75	0.00	0.57	0.67	1.60	0.90	0.95	0.15	0.25	0.35	0.84	0.90

Calculated by: JLH
Date: 5/7/2004
Checked by: _____

Eastview
Master Development Drainage Plan
(Area Drainage Summary)

		WEIGHTED		*OVERLAND*				*STREET / CHANNEL FLOW*				*Tc*	*INTENSITY*		*TOTAL FLOWS*	
BASIN	AREA TOTAL (Acres)	C_5	C_{100}	C_5	Length (ft)	Slope (%)	T_C (min)	Length (ft)	Slope (%)	Velocity (fps)	T_t (min)	TOTAL (min)	I_5 (in/hr)	I_{100} (in/hr)	Q_5 (c.f.s.)	Q_{100} (c.f.s.)
		* For Calcs See Runoff Summary														
A	11.3	0.76	0.83	0.25	75	33.3	4.3	750	2.0%	4.9	2.5	7.1	4.6	8.2	*39.8*	*76.5*
								75	3.0%	6.1	0.2					
														CA=	*8.60*	*9.28*
B	4.6	0.57	0.67	0.25	232	4.0	15.3	658	6.0%	8.6	1.3	16.6	3.3	5.9	*8.6*	*17.9*
														CA=	*2.59*	*3.05*
C	5.7	0.57	0.67	0.25	246	6.3	13.6	385	6.0%	8.6	0.7	14.3	3.5	6.3	*11.6*	*24.2*
														CA=	*3.27*	*3.84*
D	6.7	0.57	0.67	0.25	164	4.9	12.1	139	1.5%	4.3	0.5	15.7	3.4	6.0	*12.9*	*27.0*
								678	1.1%	3.7	3.1					
														CA=	*3.80*	*4.47*
E	4.9	0.57	0.67	0.25	115	3.0	11.8	168	3.1%	6.1	0.5	13.1	3.7	6.5	*10.3*	*21.5*
								123	2.0%	4.9	0.4					
								152	3.0%	6.1	0.4					
														CA=	*2.80*	*3.29*
F	2.9	0.57	0.67	0.25	290	4.8	16.1	420	3.4%	6.4	1.1	17.2	3.2	5.8	*5.4*	*11.3*
														CA=	*1.66*	*1.95*
G	7.2	0.57	0.67	0.25	207	5.3	13.2	469	3.9%	6.9	1.1	15.0	3.5	6.2	*14.2*	*29.7*
								265	4.0%	7.0	0.6					
														CA=	*4.10*	*4.82*

Calculated by: JLH
Date: 5/7/2004
Checked by: _____

Eastview
Master Development Drainage Plan
(Area Drainage Summary)

		WEIGHTED		*OVERLAND*				*STREET / CHANNEL FLOW*				*Tc*	*INTENSITY*		*TOTAL FLOWS*	
BASIN	**AREA TOTAL** *(Acres)*	C_5	C_{100}	C_5	**Length** *(ft)*	**Slope** *(%)*	T_C *(min)*	**Length** *(ft)*	**Slope** *(%)*	**Velocity** *(fps)*	T_t *(min)*	**TOTAL** *(min)*	I_5 *(in/hr)*	I_{100} *(in/hr)*	Q_5 *(c.f.s.)*	Q_{100} *(c.f.s.)*
		* For Calcs See Runoff Summary														
H	5.3	0.57	0.67	0.25	291	2.8	19.4	564	4.0%	7.0	1.3	20.8	3.0	5.3	***8.9***	***18.6***
														CA=	*3.00*	*3.53*
I	3.9	0.57	0.67	0.25	137	10.2	8.6	650	4.0%	7.0	1.5	11.5	3.9	6.9	***8.5***	***17.8***
								638	5.1%	7.9	1.3					
														CA=	*2.19*	*2.58*
J	8.1	0.57	0.67	0.25	550	4.4	22.9					22.9	2.8	5.0	***12.9***	***27.0***
														CA=	*4.59*	*5.39*
K	5.3	0.57	0.67	0.25	180	8.3	10.6	498	5.0%	7.8	1.1	12.5	3.8	6.7	***11.4***	***23.8***
								346	4.0%	7.0	0.8					
														CA=	*3.03*	*3.56*
L	3.5	0.57	0.67	0.25	149	9.4	9.3	595	4.0%	7.0	1.4	10.7	4.0	7.1	***7.9***	***16.5***
														CA=	*1.97*	*2.31*
M	3.0	0.57	0.67	0.25	177	4.5	12.9	751	4.0%	7.0	1.8	17.5	3.2	5.7	***5.5***	***11.5***
				0.25	31.9	33.3	2.8									
														CA=	*1.70*	*2.00*

Calculated by: JLH
Date: 5/7/2004
Checked by: _____

Eastview
Master Development Drainage Plan
(Area Drainage Summary)

		WEIGHTED		*OVERLAND*				*STREET / CHANNEL FLOW*				*Tc*	*INTENSITY*		*TOTAL FLOWS*	
BASIN	AREA TOTAL *(Acres)*	C_5 * For Calcs See Runoff Summary	C_{100}	C_5	Length *(ft)*	Slope *(%)*	T_C *(min)*	Length *(ft)*	Slope *(%)*	Velocity *(fps)*	T_t *(min)*	TOTAL *(min)*	I_5 *(in/hr)*	I_{100} *(in/hr)*	Q_5 *(c.f.s.)*	Q_{100} *(c.f.s.)*
O	2.0	0.57	0.67	0.25	138	3.6	12.2					12.2	3.8	6.7	*4.4*	*9.2*
														CA=	*1.16*	*1.37*
P	1.3	0.57	0.67	0.25	66	4.5	7.9					7.9	4.5	8.0	*3.2*	*6.7*
														CA=	*0.71*	*0.84*
Q	0.8	0.57	0.67	0.25	67	8.0	6.6					6.6	4.7	8.4	*2.2*	*4.6*
														CA=	*0.47*	*0.55*
R	0.5	0.90	0.95					75 150 200	2.0% 4.6% 1.0%	4.9 7.5 3.5	0.3 0.3 1.0	5.0	5.1	9.1	*2.1*	*3.9*
														CA=	*0.41*	*0.43*
OS-A	8.3	0.31	0.41	0.27	300	4.7	16.1	200 530	3.2% 1.0%	6.3 3.5	0.5 2.5	19.2	3.1	5.5	*7.9*	*18.6*
														CA=	*2.56*	*3.39*
OS-B	1.8	0.84	0.90	0.9	50	2.0	2.1	200 700	3.2% 6.0%	6.3 8.6	0.5 1.4	5.0	5.1	9.1	*7.5*	*14.3*
														CA=	*1.47*	*1.58*

Calculated by: JLH
Date: 5/7/2004
Checked by: _____

Eastview
Master Development Drainage Plan
(Area Routing Summary)

		CA EQUIVALENT		Initial Tc	ROUTING				Tc	INTENSITY		TOTAL FLOWS	
ANALYSIS POINTS	CONTRIBUTING BASINS AND ANALYSIS POINTS	CA_5	CA_{100}	For Basin/ Analysis Pt	Length	Slope	Velocity	T_t	TOTAL	I_5	I_{100}	Q_5	Q_{100}
		* For Calcs See Runoff Summary		(min)	(ft)	(%)	(fps)	(min)	(min)	(in/hr)	(in/hr)	(c.f.s.)	(c.f.s.)
AP-0	OS-B	1.47	1.58	5.0	425.0	2.3%	5.3	1.3	6.3	4.8	8.5	9.0	17.1
	R	0.41	0.43										
	TOTAL	1.88	2.01						6.3		CA=	1.88	2.01
AP-1	OS-A	2.56	3.39	19.2					19.2	3.1	5.5	34	69.4
	BASIN A	8.60	9.28									* (42.7)	* (83.4)
	TOTAL	11.16	12.67						19.2		CA=	13.87	15.22
AP-2	POND OUTFALL (FUTURE)	6.80	8.00	6.2					6.2	4.8	8.6	32.7	68.6
													* (40.0)
	TOTAL	6.80	8.00						6.2		CA=	6.80	4.65
AP-3	BASIN F	1.66	1.95	17.2					17.2	3.2	5.8	5.4	11.3
	TOTAL	1.66	1.95						17.2		CA=	1.66	1.95
AP-4	BASIN B	2.59	3.05	16.6					16.6	3.3	5.9	21.1	44.9
	BASIN C	3.27	3.84										
	FLOW-BY AP-0	0.54	0.75										
	TOTAL	6.40	7.64						16.6		CA=	6.40	7.64
AP-5	BASIN D	3.80	4.47	15.7					15.7	3.4	6.0	15.3	32.1
	BASIN P	0.71	0.84										
	TOTAL	4.51	5.31						15.7		CA=	4.51	5.31

*** (See Report for complete description of value)**

Calculated by: JLH
Date: 5/7/2004
Checked by: _____

Eastview
Master Development Drainage Plan
(Area Routing Summary)

		CA EQUIVALENT		Initial Tc	ROUTING				Tc	INTENSITY		TOTAL FLOWS	
ANALYSIS POINTS	CONTRIBUTING BASINS AND ANALYSIS POINTS	CA_5	CA_{100}	For Basin/ Analysis Pt	Length	Slope	Velocity	T_t	TOTAL	I_5	I_{100}	Q_5	Q_{100}
		* For Calcs See Runoff Summary		(min)	(ft)	(%)	(fps)	(min)	(min)	(in/hr)	(in/hr)	(c.f.s.)	(c.f.s.)
AP-6	BASIN E	2.80	3.29	13.1					13.1	3.7	6.5	12.0	25.1
		0.47	0.55										
	TOTAL	3.27	3.84						13.1		CA=	3.27	3.84
AP-7	BASIN G	4.10	4.82	15.0					15.0	3.5	6.2	14.2	29.7
	TOTAL	4.10	4.82						15.0		CA=	4.10	4.82
AP-8	BASIN H	3.00	3.53	20.8					20.8	3.0	5.3	8.9	18.6
	TOTAL	3.00	3.53						20.8		CA=	3.00	3.53
AP-9	BASIN I	2.19	2.58	11.5					11.5	3.9	6.9	8.5	17.8
	TOTAL	2.19	2.58						11.5		CA=	2.19	2.58
AP-10	BASIN L	1.97	2.31	17.5					17.5	3.2	5.7	11.8	24.7
	BASIN M	1.70	2.00										
	TOTAL	3.67	4.31						17.5		CA=	3.67	4.31
AP-11	BASIN K	3.03	3.56	12.5					12.5	3.2	5.7	16.5	39.3
	FLOWBY AP-9	1.07	1.66										
	FLOWBY AP-10	1.01	1.63										
	TOTAL	5.11	6.86						17.5		CA=	5.11	6.86
AP-12	BASIN J	4.59	5.39	22.9					22.9	2.8	5.0	12.9	27.0
		4.59	5.39						22.9		CA=	4.59	5.39
AP-13	FLOWBY AP-11	0.76	1.45	12.5					12.5	3.8	6.7	2.8	9.7
	TOTAL	0.76	1.45						12.5			0.76	1.45
AP-14	BASIN O	1.16	1.37	12.2					12.2	3.8	6.7	4.4	9.2
	TOTAL	1.16	1.37						12.2			1.16	1.37

Calculated by: JLH
Date: 5/7/2004
Checked by: _____

Eastview
Master Development Drainage Plan
(Storm Drain Routing Summary)

		CA EQUIVALENT		Initial Tc	ROUTING				Tc	INTENSITY		TOTAL FLOWS	
STORM DRAIN POINT	CONTRIBUTING BASINS AND ANALYSIS POINTS	CA_5	CA_{100}	For Basin/ Analysis Pt	Length	Slope	Velocity	T_t	TOTAL	I_5	I_{100}	Q_5	Q_{100}
		* For Calcs See Runoff Summary		(min)	(ft)	(%)	(fps)	(min)	(min)	(in/hr)	(in/hr)	(c.f.s.)	(c.f.s.)
*SD-1**	INLET @ AP-0	1.34	1.26	6.3					6.3	4.8	8.5	*39*	*50*
	AP-2	6.80	4.65										
	TOTAL	8.14	5.91						6.3		CA=	*8.14*	*5.91*
SD-2	SD-1	8.14	5.91	17.2	535.0	2.0%	10.0	0.9	18.1	3.2	5.6	*51*	*87*
	AP-3	1.66	1.95										
	AP-4	6.40	7.64										
	TOTAL	16.19	15.49						18.1		CA=	*16.19*	*15.49*
SD-3	SD-2	16.19	15.80	17.2	860.0	2.0%	10.0	1.4	18.7	3.1	5.6	*51*	*88*
	TOTAL	16.19	15.80						18.7		CA=	*16.19*	*15.80*
SD-4	AP-7	4.10	4.82	20.8					20.8	3.0	5.3	*21*	*44*
	AP-8	3.00	3.53										
	TOTAL	7.10	8.35						20.8		CA=	*7.10*	*8.35*
*SD-5**	INLET @ AP-9	1.12	0.92	20.8	180.0	2.0%	10.0	0.3	21.1	2.9	5.2	*24*	*48*
	SD-4	7.10	8.35										
	TOTAL	8.22	9.27						21.1		CA=	*8.22*	*9.27*
*SD-6**	INLETS @ AP-10	2.66	2.68	20.8	505.0	4.0%	10.0	0.8	21.6	2.9	5.2	*32*	*62*
	SD-5	8.22	9.27										
	TOTAL	10.89	11.95						21.6		CA=	*10.89*	*11.95*

* - CA values intercepted by inlet are calculated by subtracting
the CA values from the Flowby CA value on the at-grade inlet spreadsheet

Calculated by: JLH
Date: 5/7/2004
Checked by: _____

Eastview
Master Drainage Development Plan
(Storm Drain Routing Summary)

		CA EQUIVALENT		Initial Tc	ROUTING				Tc	INTENSITY		TOTAL FLOWS	
STORM DRAIN POINT	CONTRIBUTING BASINS AND ANALYSIS POINTS	CA_5	CA_{100}	For Basin/ Analysis Pt	Length	Slope	Velocity	T_t	TOTAL	I_5	I_{100}	Q_5	Q_{100}
		* For Calcs See Runoff Summary		(min)	(ft)	(%)	(fps)	(min)	(min)	(in/hr)	(in/hr)	(c.f.s.)	(c.f.s.)
SD-7*	SD-6	10.89	11.95	21.6	27.0	3.5%	10.0	0.0	21.6	2.9	5.2	42	82
	INLETS @ AP-11	3.60	3.96										
	TOTAL	14.49	15.91						21.6		CA=	14.49	15.91
SD-8	WQ POND AP-12	4.59	5.39	22.9					22.9	2.8	5.0	13	27
		4.59	5.39						22.9				
SD-9	SD-7	14.49	15.91	22.9	50.0	4.0%	10.0	0.1	22.9	2.8	5.0	54	106
	SD-8	4.59	5.39										
	TOTAL	19.08	21.30						22.9		CA=	19.08	21.30

* - CA values intercepted by inlet are calculated by subtracting the CA values from the Flowby CA value on the at-grade inlet spreadsheet

Calculated by: JLH
Date: 5/7/2004
Checked by: _____

HYDRAULIC CALCULATIONS

Eastview
Master Development Drainage Plan
(Inlet Calculations - At-Grade)

Proposed 12' Inlet at AP-0

5-YR FLOW					
Q(5)	9.0	I(5)	4.8		
DEPTH	0.35	Fr	1.28	Inlet size ? L(i) =	12
SPREAD	13.3	L(1)	13.0	If Li < L(2) then Qi =	8
CROSS SLOPE	2.0%	L(2)	7.8	If Li > L(2) then Qi =	6
STREET SLOPE	1.0%	L(3)	27.9	FB =	2.6
				CA(eqv.)=	0.54

100-YR FLOW					
Q(100)	17.1	I(100)	8.5		
DEPTH	0.43	Fr	1.35	Inlet size ? L(i) =	12
SPREAD	17.5	L(1)	18.1	If Li < L(2) then Qi =	11
CROSS SLOPE	2.0%	L(2)	10.9	If Li > L(2) then Qi =	11
STREET SLOPE	1.0%	L(3)	38.8	FB =	6.4
				CA(eqv.)=	0.75

Eastview
Master Development Drainage Plan
(Inlet Calculations - At-Grade)

Proposed 12' Inlet at AP-9

5-YR FLOW					
Q(5)	8.5	I(5)	3.9		
DEPTH	0.35	Fr	2.35	Inlet size ? L(i) =	12
SPREAD	13.0	L(1)	23.5	If Li < L(2) then Qi =	4
CROSS SLOPE	2.0%	L(2)	14.1	If Li > L(2) then Qi =	5
STREET SLOPE	3.4%	L(3)	50.3	FB =	4
				CA(eqv.)=	1.07

100-YR FLOW					
Q(100)	17.8	I(100)	6.9		
DEPTH	0.44	Fr	2.49	Inlet size ? L(i) =	12
SPREAD	17.6	L(1)	33.7	If Li < L(2) then Qi =	6
CROSS SLOPE	2.0%	L(2)	20.2	If Li > L(2) then Qi =	9
STREET SLOPE	3.4%	L(3)	72.2	FB =	11
				CA(eqv.)=	1.66

Eastview
Master Development Drainage Plan
(Inlet Calculations - At-Grade)

Proposed 20' Inlet at AP-10

5-YR FLOW					
Q(5)	5.9	I(5)	3.2		
DEPTH	0.31	Fr	2.46	Inlet size ? L(i) =	20
SPREAD	11.0	L(1)	20.8	If Li < L(2) then Qi =	6
CROSS SLOPE	2.0%	L(2)	12.5	If Li > L(2) then Qi =	4
STREET SLOPE	4.0%	L(3)	44.7	FB =	2
				CA(eqv.)=	0.50

100-YR FLOW					
Q(100)	12.4	I(100)	5.7		
DEPTH	0.39	Fr	2.62	Inlet size ? L(i) =	20
SPREAD	15.2	L(1)	30.7	If Li < L(2) then Qi =	8
CROSS SLOPE	2.0%	L(2)	18.4	If Li > L(2) then Qi =	8
STREET SLOPE	4.0%	L(3)	65.8	FB =	5
				CA(eqv.)=	0.82

Eastview
Master Development Drainage Plan
(Inlet Calculations - At-Grade)

Proposed 20' Inlet at AP-11

5-YR FLOW					
Q(5)	8.2	I(5)	3.2		
DEPTH	0.34	Fr	2.28	Inlet size ? L(i) =	20
SPREAD	12.8	L(1)	22.4	If Li < L(2) then Qi =	7
CROSS SLOPE	2.0%	L(2)	13.5	If Li > L(2) then Qi =	6
STREET SLOPE	3.3%	L(3)	48.1	FB =	2
				CA(eqv.)=	0.76

100-YR FLOW					
Q(100)	19.7	I(100)	5.7		
DEPTH	0.45	Fr	2.45	Inlet size ? L(i) =	20
SPREAD	18.4	L(1)	34.6	If Li < L(2) then Qi =	11
CROSS SLOPE	2.0%	L(2)	20.8	If Li > L(2) then Qi =	12
STREET SLOPE	3.3%	L(3)	74.2	FB =	8
				CA(eqv.)=	1.45

Analysis Point 3

Total Flow: Q_5 = **5.4** cfs

Q_{100} = **11.3** cfs

Maximum allowable ponding depth at sump:

D_5 = 0.50

D_{100} = 0.67 (dmax)

Qi = = 1.7(Li+1.8(W))(dmax + w/12)^1.85

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: **4** foot inlet required

100-Year Event: **4** foot inlet required

(Install a public 4' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: JLH

Date: 5/7/2004

Checked by: _____

Eastview Master Development Drainage Plan
(Inlet Calculations - Sump Condition)

Analysis Point 4

Total Flow:

Q_5 = **21.1** cfs

Q_{100} = **44.9** cfs

Maximum allowable ponding depth at sump:

D_5 = 0.50

D_{100} = 0.67 (dmax)

Qi = = 1.7(Li+1.8(W))(dmax + w/12)^1.85

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: **16** foot inlet required

100-Year Event: **28** foot inlet required

(Install two public 14' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: JLH

Date: 5/7/2004

Checked by: _____

Analysis Point 7

Total Flow:

Q_5 = **14.2** cfs

Q_{100} = **29.7** cfs

Maximum allowable ponding depth at sump:

D_5 = 0.50

D_{100} = 0.57 (dmax)

Qi = = 1.7(Li+1.8(W))(dmax + w/12)^1.85

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: **8** foot inlet required

100-Year Event: **20** foot inlet required

(Install a public 20' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: JLH

Date: 5/7/2004

Checked by: _____

Analysis Point 8

Total Flow:

Q_5 = **8.9** cfs

Q_{100} = **18.6** cfs

Maximum allowable ponding depth at sump:

D_5 = 0.50

D_{100} = 0.57 (dmax)

Qi = = 1.7(Li+1.8(W))(dmax + w/12)^1.85

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: **4** foot inlet required

100-Year Event: **10** foot inlet required

(Install a public 10' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: JLH

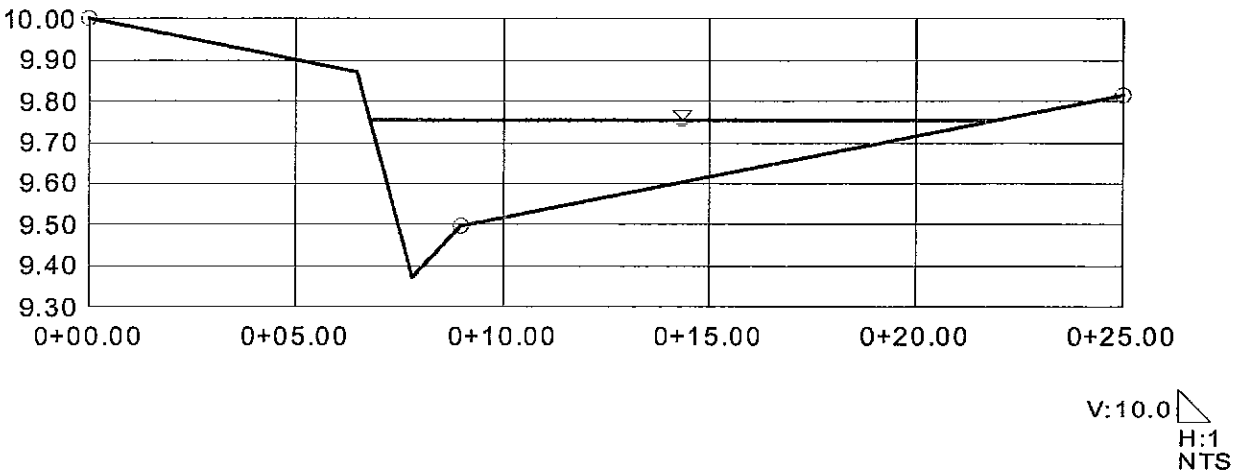
Date: 5/7/2004

Checked by: _____

50' ROW Ramp Curb Half Width Cross Section
Cross Section for Irregular Channel

Project Description	
Worksheet	50' ROW Ramp Curb Half Widt
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.014	
Channel Slope	0.075000	ft/ft
Water Surface Elevation	9.75	ft
Elevation Range	9.37 to 10.00	
Discharge	17.80	cfs



Worksheet
Worksheet for Circular Channel

Project Description	
Worksheet	42"
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Slope

Input Data		
Mannings Coefficient	0.013	
Diameter	42.0	in
Discharge	88.00	cfs

Results		
Channel Slope	0.007651	ft/ft
Depth	42.0	in
Flow Area	9.6	ft²
Wetted Perimeter	7.33	ft
Top Width	0.00	ft
Critical Depth	2.92	ft
Percent Full	100.0	%
Critical Slope	0.007438	ft/ft
Velocity	9.15	ft/s
Velocity Head	1.30	ft
Specific Energy	57.6	in
Froude Number	0.00	
Maximum Discharg	94.66	cfs
Discharge Full	88.00	cfs
Slope Full	0.007651	ft/ft
Flow Type	N/A	

Worksheet
Worksheet for Circular Channel

Project Description	
Worksheet	36" TO CONNECT
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Slope

Input Data		
Mannings Coefficient	0.013	
Diameter	36.0	in
Discharge	88.00	cfs

Results		
Channel Slope	0.017409	ft/ft
Depth	36.0	in
Flow Area	7.1	ft²
Wetted Perimeter	0.00	ft
Top Width	0.00	ft
Critical Depth	2.83	ft
Percent Full	100.0	%
Critical Slope	0.015054	ft/ft
Velocity	12.45	ft/s
Velocity Head	2.41	ft
Specific Energy	64.9	in
Froude Number	0.00	
Maximum Discharg	94.66	cfs
Discharge Full	88.00	cfs
Slope Full	0.017409	ft/ft
Flow Type	N/A	

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Worksheet
Worksheet for Circular Channel

Project Description	
Worksheet	30" LATERAL
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Slope

Input Data		
Mannings Coefficient	0.013	
Diameter	30.0	in
Discharge	22.50	cfs

Results		
Channel Slope	0.003009	ft/ft
Depth	30.0	in
Flow Area	4.9	ft²
Wetted Perimeter	6.28	ft
Top Width	0.00	ft
Critical Depth	1.61	ft
Percent Full	100.0	%
Critical Slope	0.005362	ft/ft
Velocity	4.58	ft/s
Velocity Head	0.33	ft
Specific Energy	33.9	in
Froude Number	0.00	
Maximum Discharg	24.20	cfs
Discharge Full	22.50	cfs
Slope Full	0.003009	ft/ft
Flow Type	N/A	

Worksheet
Worksheet for Circular Channel

Project Description	
Worksheet	18"
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Slope

Input Data		
Mannings Coefficient	0.013	
Diameter	18.0	in
Discharge	11.30	cfs

Results		
Channel Slope	0.011574	ft/ft
Depth	18.0	in
Flow Area	1.8	ft²
Wetted Perimeter	5.67	ft
Top Width	0.00	ft
Critical Depth	1.28	ft
Percent Full	100.0	%
Critical Slope	0.010786	ft/ft
Velocity	6.39	ft/s
Velocity Head	0.64	ft
Specific Energy	25.6	in
Froude Number	0.00	
Maximum Discharg	12.16	cfs
Discharge Full	11.30	cfs
Slope Full	0.011574	ft/ft
Flow Type	N/A	

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DRAINAGE MAP