



**MASTER DEVELOPMENT DRAINAGE PLAN
FOR
BLACK SQUIRREL BUSINESS PARK**

September 2000
Revised September 2000
Revised March 2001
Revised April 2001

Prepared for:

PICOLAN, INC.
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Prepared by:

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Job No. 8896.43

**MASTER DEVELOPMENT DRAINAGE PLAN
FOR
BLACK SQUIRREL BUSINESS PARK**



DRAINAGE REPORT STATEMENT

ENGINEER'S STATEMENT:

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

L. D. Rubey
Luanne D. Rubey, Colorado P.E. #32339
For and On Behalf of JR Engineering, LLC

4-26-01
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: Picolan, Inc.

By: [Signature]

Title: Vice President

Address: 90 South Cascade Avenue, Suite 1300

Colorado Springs, CO 80903

[Signature]
City Engineer

MAY 3, 2001
Date

Conditions:

**MASTER DEVELOPMENT DRAINAGE PLAN
FOR
BLACK SQUIRREL BUSINESS PARK**

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MASTER DEVELOPMENT DRAINAGE PLAN FOR BLACK SQUIRREL BUSINESS PARK

PURPOSE

JR Engineering was contracted by Picolan, Inc. to complete a master development drainage plan and hydraulic calculations for the proposed Black Squirrel Business Park. This contract was initiated to accommodate the proposed residential and commercial sites as well as the roadways east of Voyager Parkway and south of existing Ramtron Drive. The Black Squirrel Drainage Basin Planning Study, the Northgate Master Development Drainage Plan, the Northgate Filing No. 3 Addendum and Ramtron Filing No. 1 Preliminary and Final Drainage Report and the Preliminary/Final Drainage Report for Deer Creek at Northgate were reviewed while constructing this drainage report.

This document is the Master Development Drainage Plan for the Black Squirrel Business Park project.

This project consists of building Ridgeline and Snowflake Drives (approximately 2,200 linear feet of roadway improvements in a 65 foot right-of-way), residential and commercial developments. Ridgeline Drive originates at Voyager Parkway south of the existing Ramtron Drive intersection; and extends northeast to the proposed Deer Creek at Northgate Filing No. 1 Subdivision. The purpose of this report is to analyze the impact of flows from the developed roadways as well as the proposed developments based on horizontal and vertical layouts and alignments. The total area within this study is ± 100 acres with an additional ± 105 acres of off-site flow tributary to our site. (See attached Historic Conditions Map).

This report will identify the drainage improvements necessary to safely route storm water runoff along the improved roadway to adequate storm facilities. This report will also identify the size of the proposed regional detention facility and the primary storm drain outfall systems and analyze the capacities of proposed storm conveyance systems.

GENERAL DESCRIPTION

Black Squirrel Business Park is located in Sections 16 and 17, Township 12 South, Range 66 West of the Sixth Principal Meridian, in the City of Colorado Springs, County of El Paso, State of Colorado. The proposed improvements include Ridgeline Drive which begins at Voyager Parkway and extends eastward approximately 2,200 linear feet to the proposed Deer Creek at Northgate Filing No. 1 Subdivision. The proposed improvements also include the following: a ± 14.3 acre office-industrial park development north of Ridgeline Drive, south of the existing Ramtron Drive, and east of Voyager Parkway; a ± 5.5 acre single family residential development known as Sunset View; a ± 45.2 acre single family residential development known as Deer Creek at Northgate; a ± 15.7 acre office-industrial park development south of Ridgeline Drive, east of Voyager Parkway and north of Black Squirrel Creek; and a ± 29 acre office-industrial park development south of Black Squirrel Creek, north of Jet Stream Drive and east of Voyager Parkway. In addition, ± 105 acres of off-site flow from the north and ± 2 acres of off-site flow from the east and from the existing Ramtron Development are considered in this analysis. This project lies within the Black Squirrel Drainage Basin.

The soils within the eastern drainage basin and along proposed roadway consist of Tomah (Soil Unit #93), Bresser (Soil Unit #12) and Peyton (Soil Unit #68), as outlined in the SCS Soil Survey for El Paso County area. These soil units lie within Hydrologic Soil Group 'B'.

The existing site consists of some rolling terrain as well as some steep slopes closer to the Black Squirrel Creek. Slopes range from 4% to 15% while closer to the creek 50% and greater is possible. Ground cover within this area consists of a Mountain Grass Ecosystem with a Mountain Shrub Ecosystem along the existing drainage ways.

Current land use along the proposed Ridgeline Drive is undeveloped unplatted land. The proposed land use is office-industrial park and single family residential.

EXISTING DRAINAGE CONDITIONS

The existing terrain consists of slopes ranging from 5% to 15% north of a pronounced ridge dividing the site running east to west and 50% slopes near the Black Squirrel Creek.

Existing overland flows from Basin OS-1 flow from the northeast to the southwest. The flows come southwest to the northerly boundary of the Deer Creek Subdivision (see Basin OS-1/DP 1) $Q_{10} = 93.0$ cfs and $Q_{100} = 185.0$ cfs (per Black Squirrel Creek D.B.P.S.). At this location, an existing valley becomes evident and conveys flows from adjacent slope to the southwest (see Basin H-A) $Q_5 = 24.0$ cfs and $Q_{100} = 58.0$ cfs. The existing flows exit "The Deer Creek at Northgate Filing No. 1" site at the southwest corner. These flows, (see Design Point 5) $Q_5 = 118.0$ cfs and $Q_{100} = 244.00$ cfs, focus in a natural drainage channel and are conveyed to an existing detention pond, to the southwest, on the north edge of Black Squirrel Creek. The pond was constructed with the development of the Ramtron Filing No. 1 commercial site. (See the Northgate Filing No. 3 Addendum and Ramtron Filing No. 1 Preliminary and Final Drainage Report dated August 14, 1989).

There is also a well defined ridge that aligns east to west, dividing the Deer Creek site in half (see Historic Conditions Drainage Map). The basins located to the south of this ridge (Basin H-B, $Q_5 = 15.0$ cfs and $Q_{100} = 36.0$ cfs, Basin OS-4, $Q_5 = 1.0$ cfs and $Q_{100} = 2.0$ cfs and Basin OS-5, $Q_5 = 1.0$ cfs and $Q_{100} = 1.0$ cfs) all sheet flow to the south and directly into Black Squirrel Creek at Design Point 8 ($Q_5 = 17$ cfs, $Q_{100} = 40$ cfs).

All flows tributary to existing Ramtron Drive are directed across Voyager Parkway, to the west and into an existing detention pond created for these developments. This pond is located west of the Voyager Parkway and Ramtron Drive intersection. See the following drainage reports: "Northgate Filing No. 3 Addendum and Ramtron Filing No. 1 Preliminary and Final Drainage Report," dated July 19, 1989, revised August 14, 1989 and "Northgate Master Development Drainage Plan Black Squirrel Creek and Miscellaneous Basins," dated October 1988.

All flows within the COM-1, COM-2 and COM-3 areas flow overland to Black Squirrel Creek. Some flows flow directly to Black Squirrel Creek and then west to an existing box culvert under Voyager Parkway. Some flows are directed to an existing detention pond on the north side of

Black Squirrel Creek. (See "Northgate Filing No. 3 and Ramtron Filing No. 1 Preliminary and Final Drainage Report," by URS Consultants, dated August 1989).

Using the SCS Unit Hydrograph Method (Pond Pack 7) and historic drainage basins, total historic flows of $Q_2 = 27$ cfs, $Q_5 = 79$ cfs, $Q_{10} = 123$ cfs, $Q_{50} = 259$ cfs, $Q_{100} = 355$ cfs were obtained for the VOY-1, COM-1, COM-2, COM-3, CPH-1, OS-1 areas (see calculations in Appendix). These flows are the total flows to Black Squirrel Creek from these areas in the historic condition. The calculation of these flows does not consider the existing temporary detention pond as this is to be removed when the regional ponds are constructed.

Area H-B, OS-4 and OS-5 are not considered in the SCS analysis as they drain to Design Point 8 and to a property south of Deer Creek at Northgate prior to entering Black Squirrel Creek. Due to topography, these flows will require a separate detention pond at the time this area is developed.

The Prebles Meadow Jumping Mouse has been trapped in this area. An Army Corps of Engineers permit has been obtained for work within the mouse's habitat within the Northgate property. See Appendix for a copy of the permit.

PROPOSED DRAINAGE CONDITIONS

This area has previously been studied in the "Black Squirrel Drainage Basin Planning Study", prepared by URS Consultants, dated January 1985 and the Northgate Master Development Drainage Plan (Black Squirrel Creek and miscellaneous basins), prepared by URS Consultants, dated November 1988. Per the D.B.P.S. and M.D.D.P., regional detention ponds are to be built upstream and downstream of Deer Creek at Northgate. The proposed off-site pond (Pond 1) upstream of Deer Creek at Northgate is to be built with the development to the north so as to release historic rate after development and to remain in conformance with the D.B.P.S. and the M.D.D.P. The proposed regional detention pond downstream of the Deer Creek Subdivision (Pond 2) is to be constructed with the Deer Creek at Northgate Filing No. 1 Subdivision. This pond is to control flows from the Deer Creek Subdivision (CPH-1 Basin), the Sunset View Subdivision, the commercial sites south of Ramtron Drive, and Ramtron and Snowflake Drive

(COM-1). The commercial site south of Black Squirrel Creek (COM-3) is tributary to and detained in Pond 3. This area is also being over detained in Pond 2. Future commercial area COM-2 is tributary to and detained in Pond 4. The net release from this entire area is to be historic peak flows only for the 2, 5, 10, 50 and 100-year events. The total area of this study is ± 205 acres; ± 105 acres from off-site and ± 100 acres on-site.

Off-site historic flows to the Deer Creek Subdivision from Basin OS-1 to the northeast are $Q_{10} = 93.0$ cfs and $Q_{100} = 185.0$ cfs per the D.B.P.S. A temporary backwater pool with inlet is to be constructed with The Deer Creek at Northgate development at the northerly boundary of Deer Creek Subdivision. Flows then will be collected internal to the development, conveyed by a storm system to the southwest corner and into the proposed regional detention pond, $Q_5 = 104.0$ cfs and $Q_{100} = 276.0$ cfs. A 60" R.C.P. storm from the Deer Creek Subdivision will convey flows to the proposed regional detention pond (Pond 2). This pipe will be constructed by the Deer Creek Subdivision developer. See "Preliminary/Final Drainage Report for Deer Creek at Northgate Filing No. 1", by Classic Consulting Engineers and Surveyors, dated February 2001.

Developed flows from the Sunset View Subdivision sheet flow to the southwest. Ridgeline Drive will convey flows from Sunset View Subdivision. This in turn will be conveyed to two proposed sump inlets in Ridgeline Drive. (See Ridgeline Drive Final Drainage Report).

Developed flows from the 14.3 acre commercial site north of Ridgeline Drive also sheet flow to the southwest to the low point in Ridgeline Drive (Design Point 9). A preliminary/final drainage report (FDR) will be required for this site at the time of development. This site is to have a storm system constructed and directed to the proposed pond (Pond 2). A 36" diameter culvert is required to convey the developed flows from north to south under Ridgeline Drive.

The 36" storm system will convey flows from the north as well as surface flows from Ridgeline Drive's two proposed inlets. This 36" storm system will be stubbed to the north for a future tie to a system in the 14.3-acre commercial site, ($Q_5 = 43.8$ cfs, $Q_{100} = 78.3$ cfs). This flow will be combined with the flows in Ridgeline Drive and from basins SV-1, SV-2, SF-1, OS-A, OS-B, RL-1, RL-2, RD-1, OSJ, OSI and OS-B. The total developed flow will be conveyed to Pond 2

via a storm sewer. These surface flows are collected in the two sump inlets at DP-2 and DP-8. At the time of development for these areas, final drainage reports will be required.

Developed flows from the ±5.7 acre (COM-2) portion of the future office-industrial park site south of Ridgeline Drive will flow overland to the future private pond (Pond 4). This pond will incorporate water quality measures, as will Pond 2 and Pond 3. The total release from this study's area to the Black Squirrel Creek will be restricted to the 2, 5, 10, 50 and 100-year historic peak levels. Pond 4 is proposed on the north side of Black Squirrel Creek, just east of Voyager Parkway.

While the southwest portion of this parcel (Basin C2-A) (south of Ridgeline Drive) is draining to Pond 4, the north and east portions (Basins C-2B's 10.85 acres) is draining to an onsite storm sewer system. This system will connect to the 36" storm system and be conveyed to Pond 2.

Developed flows from the ±29 acre (COM-3) future office-industrial park south of Black Squirrel Creek and north of Jet Steam Drive will flow to a future private pond (Pond 3) located on the south side of Black Squirrel Creek. This pond will be privately owned and maintained and will be primarily a water quality feature. Pond 4 will over detain for this area.

Developed flows from the 5.8 acres of Voyager Parkway (VOY-1) will follow current drainage patterns and flow to the existing sump inlet at the box culvert at Design Point 10, unrestricted.

REGIONAL DETENTION PONDS

Using the SCS Unit Hydrograph Method, one regional pond and two private ponds were sized to restrict developed flows to the historic 2, 5, 10, 50 and 100-year peak flows. Pond 2 will be constructed by Picolan, Inc. at the time Deer Creek at Northgate is constructed and will be owned and maintained by the City of Colorado Springs. Pond 4 will be constructed by the developer at the time the commercial site south of Ridgeline Drive is constructed. This pond will be privately owned and maintained. The pond located south of Black Squirrel Creek (Pond 3) will be privately owned and maintained and constructed by the developer of the COM-3 site. Developed combined flows of $Q_2 = 35$ cfs, $Q_5 = 69$ cfs, $Q_{10} = 96$ cfs, $Q_{50} = 176$ cfs and $Q_{100} =$

218 are calculated from the combined basins VOY-1, OS-1, COM-1, COM-2, COM-3 and CPH-1. The proposed regional Pond 2 will require a volume of 13 ac-ft, with a 48" release pipe for the 100-year event and a 12" diameter orifice for the 2, 5, 10 and 50-year events. Pond 3 will require a volume of 3.0 ac-ft with a 1' diameter orifice plate for the 2-year event and a 50' overflow weir for the 5, 10, 50 and 100-year events. Pond 4 will require a volume of 0.45 ac-ft and will utilize the existing restrictor. See map in appendix for release from each pond. See calculation in appendix for high water level of each pond.

An Army Corps of Engineers 404 permit has been issued for mitigation of disturbance to the Prebles Meadow Jumping Mouse habitat in this area. Mitigation will take place in the two proposed regional ponds. It is important that erosion be controlled at the source and not allowed to fill the ponds and destroy the planted mitigated vegetation.

HYDROLOGIC CRITERIA AND METHODOLOGY

The Rational and SCS Unit Hydrograph Methods were utilized in the determination of stormwater runoff generated from storm events with a 2, 5, 10, 50 and 100-year recurrence interval. Rainfall data of 2", 2.6", 3", 4" and 4.6" were used for the 2, 5, 10, 50, and 100-year events. The off-site basins impacting the proposed development were determined from FIMS topography and the latest D.B.P.S. and M.D.D.P. along with existing developments. Culverts were sized using the Culvert Master program by Haesteeds. Ditches were sized using the Flow Master program by Haesteeds.

FLOODPLAIN STATEMENT

A portion of the development in the Black Squirrel Business Park is within a designated FEMA flood zone as determined by the Flood Insurance Rate Map Community Panel Number 080059-0040B, effective December 18, 1986. The existing Black Squirrel Creek is within Zone A, see map in the Appendix.

EROSION CONTROL PLAN

The City of Colorado Springs Drainage Criteria Manual specifies that an Erosion Control Plan and associated cost estimate be submitted in conjunction with the Final Drainage Report. Erosion control and reseeding requirements have been implemented on the plans.

DRAINAGE BASIN FEE

Drainage fees shall be calculated at the time of final drainage reports.

CONSTRUCTION COST OPINION (Public Reimbursable)

Item	Description	Quantity	Cost/Unit	Cost
DETENTION POND 2				
1.	24" RCP	120 L.F.	\$ 35.00/L.F.	\$ 4,200.00
2.	48" RCP	112 L.F.	\$ 90.00/L.F.	\$ 10,080.00
3.	24" Flared End Section	2 EACH.	\$ 600.00/EA.	\$ 1,200.00
4.	48" Flared End Section	2 EACH	\$ 900.00/EA.	\$ 1,800.00
5.	Grading	N/A	\$ 93,360.00/EA.	\$ 93,360.00
6.	Spillway	N/A	\$ 4,000.00/L.F.	\$ 4,000.00
7.	Rip-rap			
		Sub-Total		<u>\$ 114,640.00</u>
		15% Engineering and Contingencies		\$ 17,196.00
		TOTAL		<u>\$ 131,836.00</u>

**CONSTRUCTION COST OPINION
(Public Non-Reimbursable)**

<u>Item</u>	<u>Description</u>	<u>Quantity</u>	<u>Cost/Unit</u>	<u>Cost</u>
1.	6' D-10-R Sump Inlet	1 EACH	\$ 3,400.00/L.F.	\$ 3,400.00
2.	14' D-10-R Sump Inlet	1 EACH	\$ 5,800.00/EA.	\$ 5,800.00
2.	36" Storm Pipe	165 L.F.	\$ 50.00/L.F.	\$ 8,250.00
3.	36" Flared End Section	1 EACH	\$ 750.00/EA.	\$ 750.00
		Sub-Total		<u>\$ 18,200.00</u>
		15% Engineering and Contingencies		\$ 2,730.00
		TOTAL		<u>\$ 20,930.00</u>


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

SUMMARY

The Black Squirrel Business Park, Sunset View and Deer Creek Subdivisions will be developed in conjunction with Regional Detention Ponds No. 2 and No. 4 and private Detention Pond No. 3. The purpose of these ponds is to limit developed flow to the 2, 5, 10, 50 and 100-year historic peak levels. No adverse downstream impacts are anticipated due to this development.

PREPARED BY:

JR Engineering



Luanne D. Rubey, P.E.
Project Manager

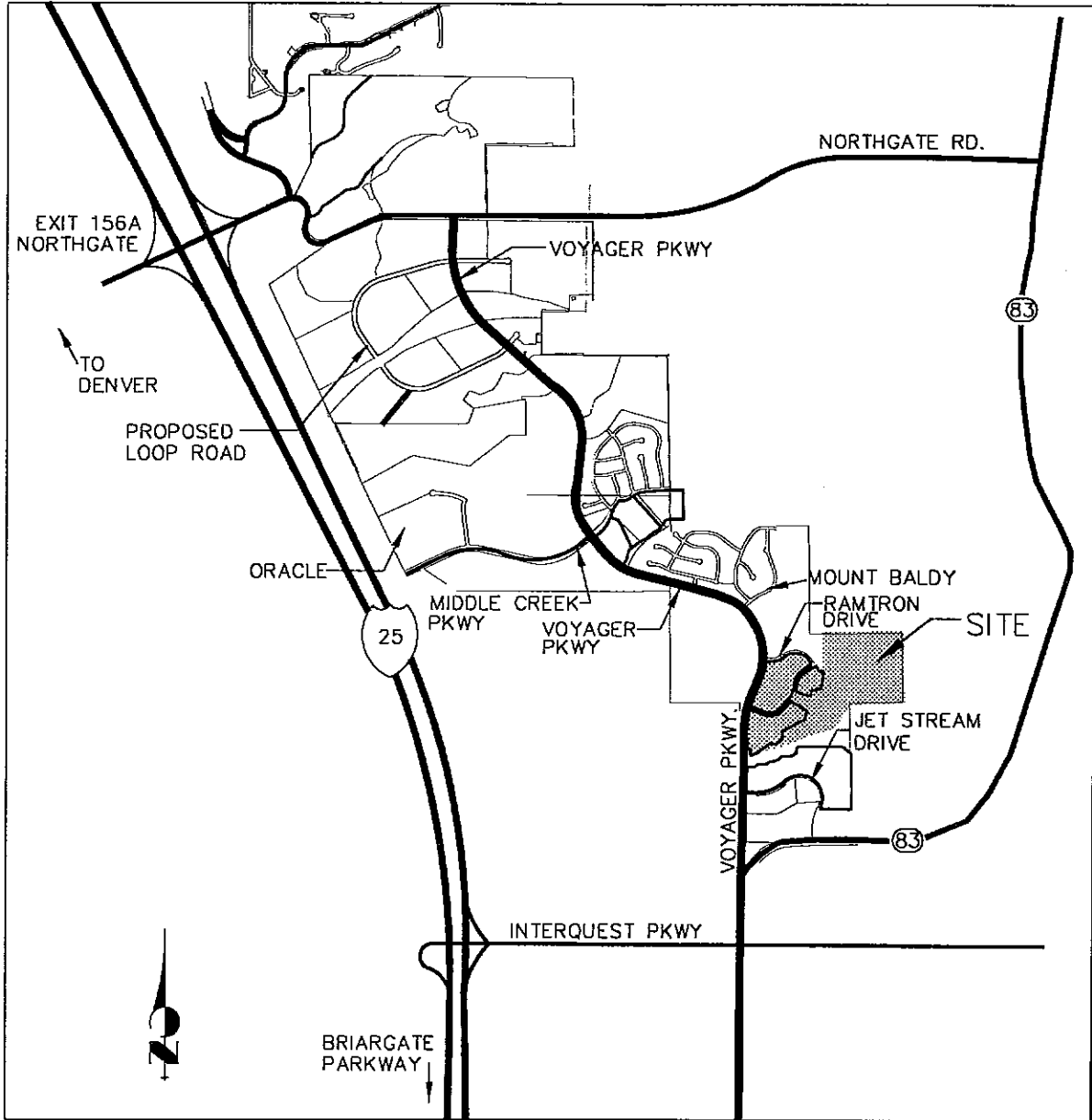
/kd/889643/MDDP.doc

REFERENCES

1. "City of Colorado Springs/El Paso County Drainage Criteria Manual," 1991, revisions Nov. 1994.
2. "Soil Survey for El Paso County Area," Soil Conservation Service.
3. "Northgate Master Plan Amendment," NES, Inc., November 1999.
4. "Northgate Master Development Drainage Plan," URS Consultants, Inc., December 1987.
5. "Black Squirrel Drainage Basin Planning Study," URS Consultants, Inc., November 1988.
6. "Preliminary/Final Drainage Report for Deer Creek at Northgate," JR Engineering, April 2000, revised July 2000.
7. "Northgate Filing No. 3 Addendum and Ramtron Filing No. 1 Preliminary and Final Drainage Report," URS Consultants, Inc., July 19, 1989, revised August 14, 1989.
8. "Northgate Master Development Drainage Plan Black Squirrel Creek and Miscellaneous Basins," URS Consultants, Inc., October 1988.
9. "Preliminary/Final Drainage Report for Deer Creek at Northgate Filing No. 1," by Classic Consulting Engineers and Surveyors, dated February 2001.

APPENDIX

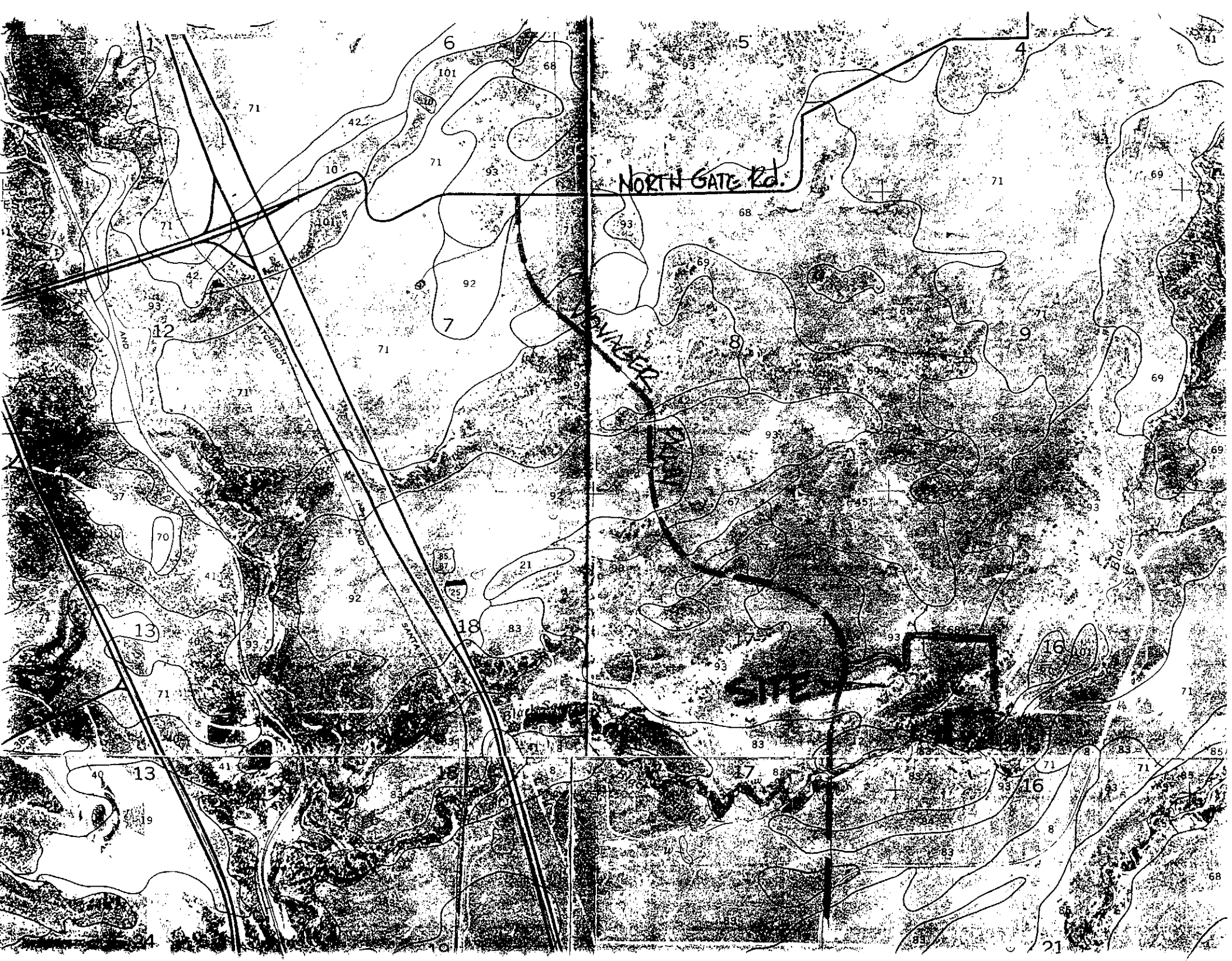
VICINITY MAP



VICINITY MAP

N.T.S.

S. C. S. SOIL SURVEY



F.E.M.A. FIRM MAP

E LIMITS
EL PASO COUNTY

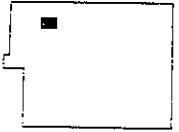
CITY OF
COLORADO SPRINGS

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP


EL PASO COUNTY,
COLORADO
(UNINCORPORATED AREAS)

PANEL 40 OF 625
(SEE MAP INDEX FOR PANELS NOT PRINTED)



PANEL LOCATION:
COMMUNITY-PANEL NUMBER
080059 0040 B

EFFECTIVE DATE:
DECEMBER 18, 1986



Federal Emergency Management Agency

MIDDLE CREEK
PARKWAY

VOYAGER PKWY

CORPORATE LIMITS

ZONE X

18

EL PASO
COUNTY

17

16

SITES

ZONE A

ZONE

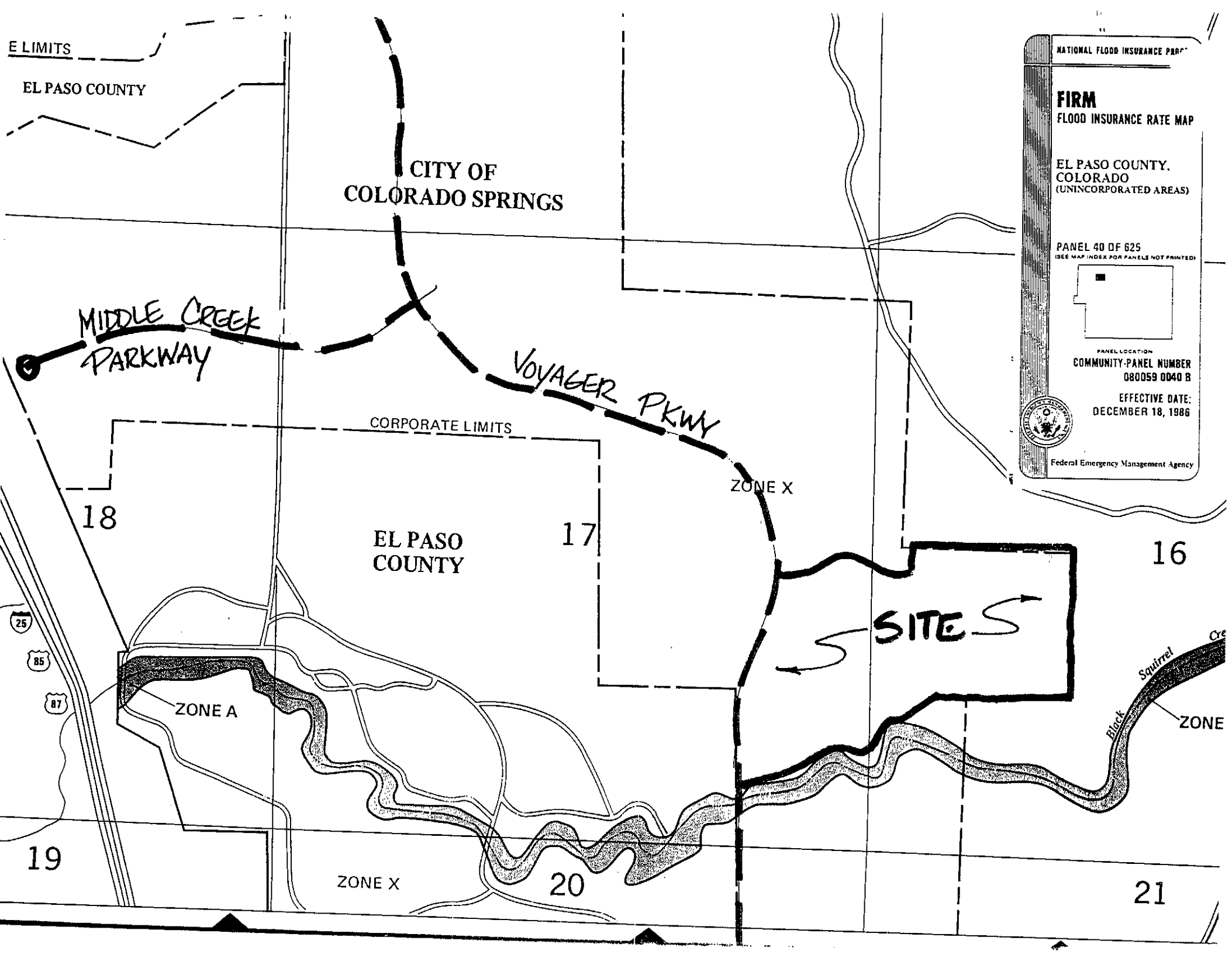
19

ZONE X

20

21

Squirrel Cre
Black



HYDROLOGIC CALCULATIONS

BLACK SQUIRREL BUSINESS PARK MASTER DEVELOPMENT DRAINAGE PLAN (Area Drainage Summary)

BASIN	AREA TOTAL (Acres)	WEIGHTED		OVERLAND				STREET / CHANNEL FLOW				T _i	INTENSITY		TOTAL FLOWS	
		C ₅	C ₁₀₀	C ₅	Length	Height	T _C	Length	Slope	Velocity	T _i	TOTAL	I ₅	I ₁₀₀	Q ₅	Q ₁₀₀
		<small>* For Calcs. See Runoff Summary</small>		(ft)	(ft)	(min)	(ft)	(%)	(fps)	(min)	(min)	(in/hr)	(in/hr)	(c.f.s.)	(c.f.s.)	
OS-A	0.14	0.25	0.35	0.25	87.15	9.00	6.87					6.87	4.6	8.2	0.16	0.39
OS-B	0.82	0.25	0.35	0.25	164.55	16.00	9.63					9.63	4.1	7.2	0.84	2.06
OS-J	0.2	0.90	0.95	0.25	172.36	4.00	15.81	102.16	3.92%	6.93	0.25	16.05	3.4	5.7	0.61	1.08
SV-1	3.99	0.40	0.55	0.25	216.20	24.50	10.49	421.65	7.10%	9.33	0.75	11.24	3.9	6.7	6.22	14.78
SV-2	1.33	0.25	0.35	0.25	474.80	48.00	16.14	0	0.0%	0.0	0.0	16.14	3.4	5.7	1.12	2.65
SF-1	0.61	0.90	0.95	0.25	45.19	3.00	5.72	530	3.68%	6.71	1.32	7.04	4.6	8.1	2.51	4.71

BLACK SQUIRREL BUSINESS PARK MASTER DEVELOPMENT DRAINAGE PLAN (Area Drainage Summary)

BASIN	AREA TOTAL (Acres)	WEIGHTED		OVERLAND				STREET / CHANNEL FLOW				T_t	INTENSITY		TOTAL FLOWS	
		C_s	C_{100}	C_s	Length (ft)	Height (ft)	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.)
		<small>* For Calcs See Runoff Summary</small>														
RD-1	0.24	0.90	0.95	0.25	0	0	0.0	158.35	5.05%	7.87	0.34	0.34	5.2	9.0	1.11	2.04
RL-1 NORTH	1.68	0.90	0.95	0.25	37.77	9.00	3.43	1346.54	7.06%	9.3	2.41	5.84	4.8	8.6	7.27	13.78
RL-2 SOUTH	1.33	0.90	0.95	0.25	81.19	3.00	9.30	1272.60	7.27%	9.44	2.25	11.55	3.9	6.7	4.63	8.43
RL-OS	0.19	0.90	0.95	0.25	37.27	9.00	3.39	100	0.50%	2.47	0.67	4.07	5.2	9.6	0.88	1.70
COM	14.30	0.90	0.95	0.25	230	30.00	10.33	1030	0.83%	3.19	5.38	15.71	3.4	5.8	43.77	78.25

Calculated by: SKC
Date: #####
Checked by: _____

**BLACK SQUIRREL BUSINESS PARK MASTER DEVELOPMENT
DRAINAGE PLAN
(Surface Routing Summary)**

Design Point(s)	Contributing Basins	Equivalent CA ₅	Equivalent CA ₁₀₀	Maximum T _C	Intensity		Flow	
					I ₅	I ₁₀₀	Q ₅	Q ₁₀₀
DP-2	(RD-1 + RL-1) AND RAMTRON R3	3.18	3.49	16.00	3.8	5.7	12.09	19.92
DP-8	(OS-A SF-1 + RL-2) STREET ONLY	1.56	1.65	11.55	3.9	6.7	6.01	10.97
DP-8	(OS-A SF-1 + RL-2 + OS-B + SV-1 + SV-2)	4.09	5.03	16.10	3.4	5.7	13.76	28.62
DP-2	(RD-1 + RL-1 + COM)	14.60	15.41	15.70	3.4	5.8	49.67	88.79
DP-8	(ENTIRE ROADWAY W/ COM)	18.51	20.25	15.70	3.4	5.8	62.97	116.68

Calculated by: SKC
 Date: 2/19/2001
 Checked by: _____

HYDRAULIC CALCULATIONS AND PIPE DESIGN

**RAMTRON CORPORATE VILLAGE MASTER
DEVELOPMENT DRAINAGE PLAN
(Inlet Calculations - Sump Condition)**

Design Point DP-2

Total Flow:

Q_5	=	12.1 cfs
Q_{100}	=	19.9 cfs

Maximum allowable ponding depth at sump:

D_5	=	0.50
D_{100}	=	0.75 (dmax)
Q_i	=	$1.7(L_i + 1.8(W))(d_{max} + w/12)^{1.85}$

Clogging Factor = 1.25
 $L_i (1.25)$ = Length of inlet opening

5-Year Event: 6 foot inlet required

100-Year Event: 6 foot inlet required

*(Install a public 6' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows
at this design point.)*

Calculated by: SKC
 Date: 9/19/2000
 Checked by: _____

**RAMTRON CORPORATE VILLAGE MASTER
DEVELOPMENT DRAINAGE PLAN
(Inlet Calculations - Sump Condition)**

Design Point DP-8

Total Flow:
 $Q_5 = 13.8$ cfs
 $Q_{100} = 28.6$ cfs

Maximum allowable ponding depth at sump:

$D_5 = 0.50$
 $D_{100} = 0.70$ (dmax)

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

Clogging Factor = 1.25
 $L_i(1.25) =$ Length of inlet opening

5-Year Event: 8 foot inlet required

100-Year Event: 14 foot inlet required

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

Calculated by: SKC
Date: 9/19/2000
Checked by:

RIDGELINE DRIVE OUTFALL
Worksheet for Circular Channel

Project Description	
Project File	h:\fmw\project3.fm2
Worksheet	RIDGLINE DRIVE OUTFALL
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data	
Mannings Coefficient	0.013
Channel Slope	0.020000 ft/ft
Depth	3.00 ft
Diameter	36.00 in

*USE AT RIDGELINE DR.
CROSSING INLET TO INLET.
AND NORTH OF ROADWAY.*

Results		
Discharge	94.32	cfs
Flow Area	7.07	ft ²
Wetted Perimeter	9.42	ft
Top Width	0.73e-7	ft
Critical Depth	2.87	ft
Percent Full	100.00	
Critical Slope	0.017383	ft/ft
Velocity	13.34	ft/s
Velocity Head	2.77	ft
Specific Energy	5.77	ft
Froude Number	0.24e-3	
Maximum Discharge	101.46	cfs
Full Flow Capacity	94.32	cfs
Full Flow Slope	0.020000	ft/ft
Flow is subcritical.		

RIDGELINE DRIVE OUTFALL
Worksheet for Circular Channel

Project Description	
Project File	h:\fmw\project3.fm2
Worksheet	RIDGLINE DRIVE OUTFALL
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data	
Mannings Coefficient	0.013
Channel Slope	0.031000 ft/ft
Depth	3.00 ft
Diameter	36.00 in

*USE AS OUTFALL
SO. OF RIDGELINE DR.
INCLUDES ALL TRIB. TO
ROADWAY.*

Results		
Discharge	117.43	cfs
Flow Area	7.07	ft ²
Wetted Perimeter	9.42	ft
Top Width	0.73e-7	ft
Critical Depth	2.94	ft
Percent Full	100.00	
Critical Slope	0.027841	ft/ft
Velocity	16.61	ft/s
Velocity Head	4.29	ft
Specific Energy	7.29	ft
Froude Number	0.3e-3	
Maximum Discharge	126.32	cfs
Full Flow Capacity	117.43	cfs
Full Flow Slope	0.031000	ft/ft
Flow is subcritical.		

POND RELEASE 30 cfs
Worksheet for Circular Channel

Project Description	
Project File	h:\fmw\project2.fm2
Worksheet	POND ON NORTH SIDE OF B.SQ. CRK RAMTR0N
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data	
Mannings Coefficient	0.013
Channel Slope	0.018000 ft/ft
Depth	2.00 ft
Diameter	24.00 in

Results		
Discharge	30.35	cfs
Flow Area	3.14	ft ²
Wetted Perimeter	6.28	ft
Top Width	0.00	ft
Critical Depth	1.87	ft
Percent Full	100.00	
Critical Slope	0.015560	ft/ft
Velocity	9.66	ft/s
Velocity Head	1.45	ft
Specific Energy	FULL	ft
Froude Number	FULL	
Maximum Discharge	32.65	cfs
Full Flow Capacity	30.35	cfs
Full Flow Slope	0.018000	ft/ft

POND RELEASE 207 cfs
Worksheet for Circular Channel

Project Description	
Project File	h:\fmw\project2.fm2
Worksheet	POND ON NORTH SIDE OF B.SQ. CRK RAMTRON
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Discharge

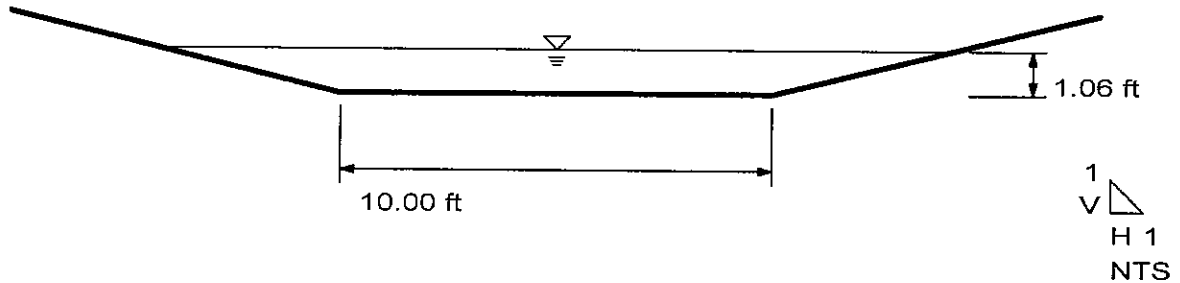
Input Data	
Mannings Coefficient	0.013
Channel Slope	0.021000 ft/ft
Depth	4.00 ft
Diameter	48.00 in

Results	
Discharge	208.15 cfs
Flow Area	12.57 ft ²
Wetted Perimeter	12.57 ft
Top Width	0.12e-6 ft
Critical Depth	3.87 ft
Percent Full	100.00
Critical Slope	0.018420 ft/ft
Velocity	16.56 ft/s
Velocity Head	4.26 ft
Specific Energy	8.26 ft
Froude Number	0.28e-3
Maximum Discharge	223.91 cfs
Full Flow Capacity	208.15 cfs
Full Flow Slope	0.021000 ft/ft
Flow is subcritical.	

Cross Section
Cross Section for Trapezoidal Channel

Project Description	
Project File	x:\2880000.all\2889643\hydro\flowmaster\tempswal.fm2
Worksheet	Temp swale for ridgeline runoff to pond
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.030
Channel Slope	0.020000 ft/ft
Depth	1.06 ft
Left Side Slope	4.000000 H : V
Right Side Slope	4.000000 H : V
Bottom Width	10.00 ft
Discharge	92.00 cfs



Temp swale for ridgeline runoff
Worksheet for Trapezoidal Channel

Project Description	
Project File	x:\2880000.all\2889643\hydro\flowmaster\tempswal.fm2
Worksheet	Temp swale for ridgeline runoff to pond
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.030
Channel Slope	0.020000 ft/ft
Left Side Slope	4.000000 H : V
Right Side Slope	4.000000 H : V
Bottom Width	10.00 ft
Discharge	92.00 cfs

Results	
Depth	1.06 ft
Flow Area	15.15 ft ²
Wetted Perimeter	18.77 ft
Top Width	18.50 ft
Critical Depth	1.17 ft
Critical Slope	0.013915 ft/ft
Velocity	6.07 ft/s
Velocity Head	0.57 ft
Specific Energy	1.64 ft
Froude Number	1.18
Flow is supercritical.	

ARMY CORPS PERMIT



DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
SOUTHERN COLORADO REGULATORY OFFICE
720 NORTH MAIN STREET, SUITE 205
PUEBLO, COLORADO 81003-3046
FAX (719) 543-9475

January 17, 2001

REPLY TO
ATTENTION OF:

Mr. Grant Gurnee
Walsh Environmental Scientists
and Engineers, Inc.
4888 Pearl E. Circle, Suite 108
Boulder, Colorado 80301

Dear Mr. Gurnee:

In accordance with Section 7 of the Endangered Species Act (ESA) for impacts to the Preble's Meadow Jumping Mouse (*Zapus hudsonius prebelii*) (Preble's), a federally listed threatened species, and issuance of a Section 404 of the Clean Water Act individual permit authorization, we are giving you a provisional authorization for work within the Northgate Corporate Village/Picolan, Inc. and the Classic Academy (priorly called Stout Property). Action No. 1998 30164.

Due to unexpected circumstances, we will not be able to issue the individual permit authorization for the proposed development until after the first week of February 2001. Enclosed is a copy of permit conditions that will be required in the final permit authorization. As long as these conditions are met, you can begin work in the Astrolink and Classic Academy sites. Below we have also addressed incidental take.

Incidental Take Statement

Section 9 of the ESA and Federal regulation pursuant to 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct. Harm is further defined by the U.S. Fish and Wildlife Service (USFWS) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the USFWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of

otherwise lawful activity. Under the terms of section 7(b)(4) and section & (o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking in compliance with the terms and conditions of this Incidental take Statement.

The measures described below are non-discretionary, and must be undertaken by the Corps so that they become binding conditions of any grant or permit issued to Picolan, Inc. and Classic Academy, as appropriate, for the exemption in Section 7(o)(2) to apply. The Corps has the continuing duty to regulate the activity covered by this incidental take statement. If the Corps fails (1) to assume and implement the terms and conditions or (2) to require Picolan/Classic Academy to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps must report the progress of the action or its impact on the species to the USFWS, as specified in the incidental take statement.

The USFWS anticipates incidental take of the Preble's through direct killing will be difficult to detect due to their small size and hibernation underground during much of the period of project construction. However, the following level of take can be anticipated by loss of food, cover, and other essential habitat elements. The USFWS anticipates that the proposed action will result in incidental take of an undetermined number of Preble's through temporary impact of 0.86 acres of riparian habitat, permanent impact of 0.01 acres riparian habitat, temporary impact 10.28 acres of upland habitat, and permanently impact 37.87 acres of upland habitat occupied by Preble's. In the USFWS Biological Opinion, the USFWS determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

The following conditions are required for construction activities addressed in the USFWS Biological Opinion dated January 9, 2001 and construction activities, as described in the Walsh Environmental Scientists and Engineers, LLC Northgate Corporate Village Section 404 Permit Application, Biological Assessment, and Mitigation Plan dated December 15, 2000.

Reasonable and Prudent Measures

The USFWS believes that the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of Preble's.

1. The Corps will monitor the extent of habitat to assure that it does not exceed the authorized area.
2. The Corps will require timely revegetation and enhancement of the project area, as described in the conservation measures presented in the Mitigation Plan, to minimize the disturbance to Preble's habitat.

3. The Corps will ensure that proposed conservation measures, as further refined by the terms and conditions below, are formally adopted.

Terms and Conditions of the Section 404 Authorization – Action No. 1998 30164
In order to exempt from the prohibitions of Section 9 of the ESA, the applicant must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting and monitoring. These terms and conditions are non-discretionary.

1. Work in or near Preble's habitat will be supervised at all times by an onsite individual from Picolan or by an authorized representative. Implementation of the Mitigation Plan will be supervised by an entity experienced in reclamation or habitat restoration.
2. Final project figures will be provided to the Corps for review and approval. The figures will show the areas of Preble's habitat, the project construction footprints, areas of project impact (both temporary and permanent), the proposed locations of temporary construction fencing, and the proposed locations of fixed photographic points.
3. To the extent practicable, construction (including mitigation work) in and near riparian Preble's habitat will be timed to avoid work during the Preble's active season (May 1 – October 31). Should work be required in these areas during the active season, the applicant will notify the Corps and USFWS, and provide measures to minimize disturbance to the Preble's. Such measures may include limiting the duration of the work, preventing Preble's from entering the active work area, and expediting planned vegetative restoration as work is completed.
4. The Corps will ensure that restrictions on the future use of all areas designated as Preble's habitat, including areas created, restored, enhanced, or preserved for Preble's will be formalized through deed restrictions or other appropriate means:
 - a. Except as explicitly described, no alternatives will occur that adversely impact Preble's habitat, including but not limited to dumping or placing soil or other material such as trash, removal, or destruction of vegetation (with the exception of weed control), excavation or removal of soil, and activities detrimental to flood control, water conservation, or erosion control.
 - b. Provisions will be drafted to address required access/maintenance of utilities, detention basins, and outfall structures, and any other exemptions to "a." above that are acceptable to the Corps and USFWS.
 - c. Such deed restrictions will be in place by December 31, 2001.
5. Any future maintenance activities not covered in the project description that may impact the Preble's or its habitat, such as an excavation of accumulated silt from

portions of detention basins supporting vegetative habitat created for Preble's will be proposed to the Corps and the USFWS and addressed as appropriate under Section 7 of the ESA.

6. Performance criteria for shrub survival will be 80% survival in good health. Performance criteria will include a stipulation that a maximum coverage of State-listed noxious weeds (Colorado Noxious Weed Act) not exceed 5% on Preble's mitigation areas in any of the three drainages. Outside of mitigation areas, all State and local weed control ordinances must be adhered to.
7. Performance criteria to assess success of plantings, including grassland enhancement, will be detailed or modified, as appropriate, and forwarded to the Corps and USFWS for review within 60 days of issuance of a Corps permit for the project. The role of supplemental watering and a means to address viability of vegetation post cessation of such watering will be addressed.
8. The permittee will conduct annual monitoring of habitat creation, restoration, and enhancement efforts. A revised monitoring plan will be forwarded to the Corps and USFWS for review within 60 days of issuance of the permit. Monitoring will extend for no less than 3 growing seasons from completion of all plantings (rather than the 2 growing seasons described in applicants Biological Opinion) and until such time as the Corps and USFWS determines that proposed habitat creation, restoration, and enhancement have been successfully completed. Monitoring reports shall be forwarded to the Corps and USFWS after each growing season and prior to December 1. Should, the proposed creation, restoration, and enhancement plans prove ineffective, reinitiation of this consultation may be required.
9. Monitoring of all water management structures will also be conducted throughout the period of vegetative monitoring. Any unanticipated impacts to Preble's and its habitat associated with installation and operation of the Stormwater management system will be documented and addressed in coordination with the Corps and USFWS.
10. An annual site visit to review progress of the project will be held in late summer or fall of each year, at the discretion of the Corps and the USFWS.
11. To document use of the enhanced areas by Preble's and to assess the initial ability of Preble's to persist in the project area following construction, trapping efforts to monitor Preble's will be conducted on all three drainages on the site for three years. A proposed monitoring plan will be forwarded to the Corps and USFWS for review within 60 days of issuance of the permit. As an alternative, comparable resources could be devoted to a USFWS approved research study to determine the viability of Preble's in an area of human development.

12. Picolan will grant researchers approved by the USFWS access to the project area for future monitoring or research on Preble's.
13. To protect Preble's and other wildlife within the project area, Picolan will impose covenants on residential housing, including apartments and townhouses, in areas within one-quarter mile of Preble's habitat, prohibiting homeowners from allowing pets to range unaccompanied off of the owners property.
14. In order to discourage human use of Preble's habitat as selected locations, a split rail fence will be erected or other barrier maintained between Preble's habitat and residential areas, schools, trails, and recreational facilities. In addition, interpretive signs will be erected to notify the public of Preble's presence and the need to preserve its habitat. Proposed details of barriers and interpretive signs will be forwarded to the Corps and USFWS for review within 60 days of issuance of the permit.
15. In the unlikely event that a Preble's is encountered (dead, injured, or hibernating) during construction, the Colorado Field Office of the USFWS (303) 275-2370 will be contacted immediately.

As required by 50 CFR 402.16, reinitiation of formal consultation is required if (1) the amount or extent of incidental take is excessive, (2) new information reveals effects of the agency action may affect listed species or critical habitat in a manner or to an extent not considered in this opinion, (3) the agency action is subsequently modified in a manner that causes an adverse effect to the listed species or critical habitat that was not considered in this opinion, (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where incidental take exceeds the authorized, any operations causing such take must cease pending reinitiation.

Should you have any questions, feel free to call or write me at (719) 543-6915 or the Mr. Peter Plage at the USFWS at (303) 275-2370.



Van A. Truan
Chief, Southern Colorado
Regulatory Office

HISTORIC SCS ANALYSIS

Client: Picolan, Inc

Job No: 8896.49

Project: Capital Pacific By: LR/MS Chk. By: _____

Date: 6-29-00

Subject: Black Squirrel Creek

Sheet No: 2 of _____



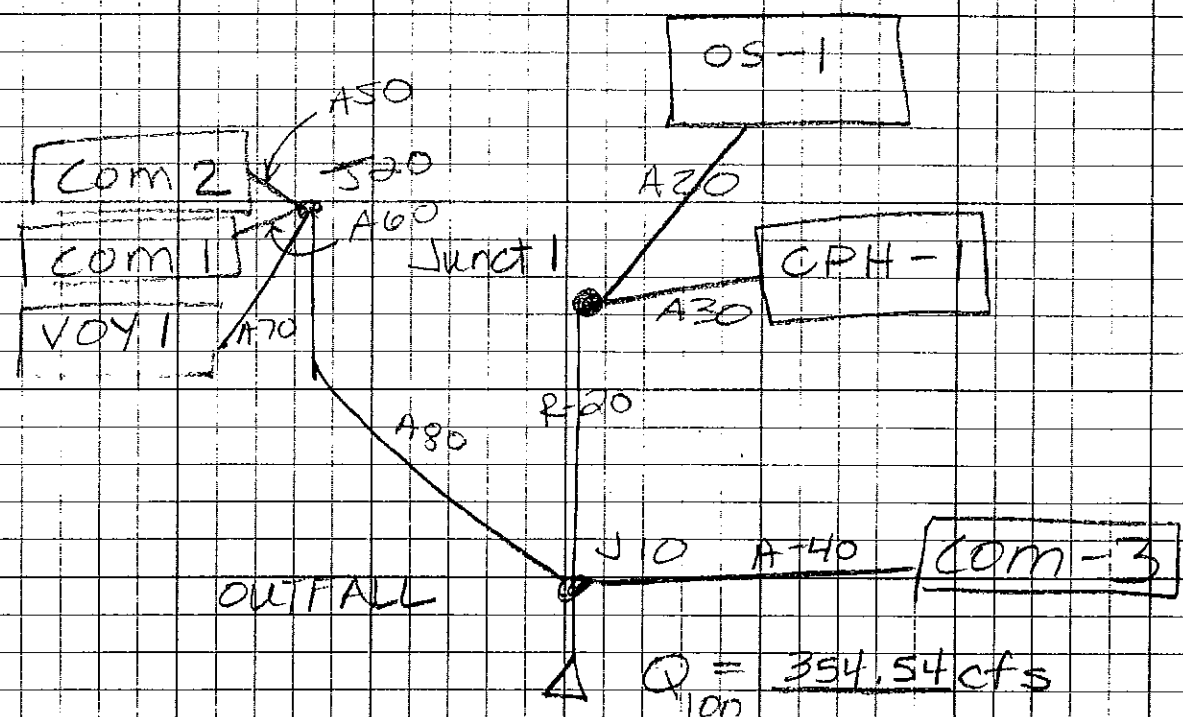
J-R ENGINEERING

A Subsidiary of Westrian

Analysis

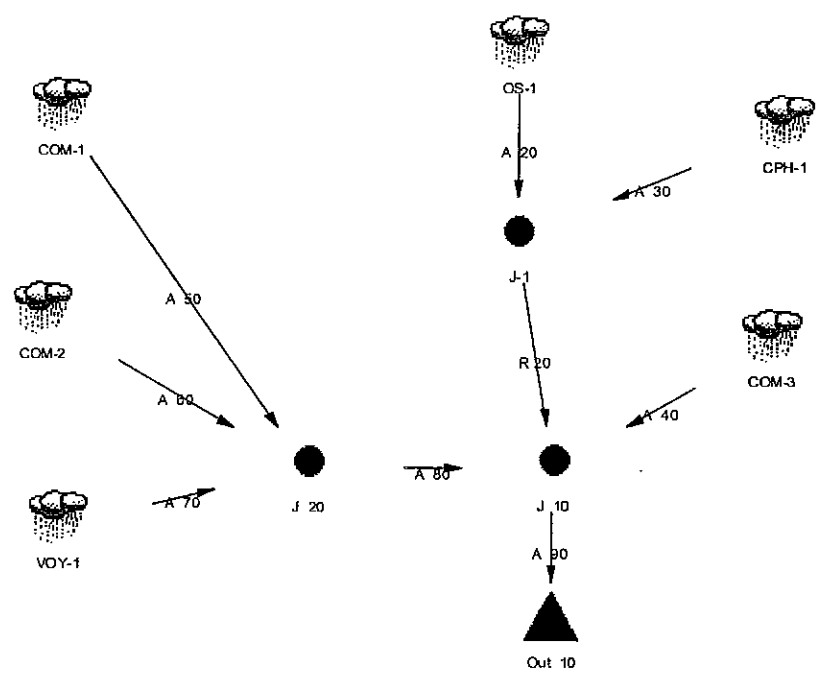
HISTORIC CONDITIONS

	Area (AC)	Type B Soil CN100	Tc (HR)
OS-1	105	69	0.4
CPH-1	33.8	69	0.46
COM-1	33.1	69	0.27
COM-2	5.7	69	0.46
COM-3	29	69	0.52
VOY-1	5.8	69	0.41



62900BSC/HIST.PPW

Q HISTORIC
2-12-01
2,5,10,50+100,



G2900BSCHIST.PPW

NETWORK SUMMARY -- NODES

(Trun.= HYG Truncation: Blank= None; L= Left; R= Rt; LR= Left & Rt)

DEFAULT Design Storm File, ID = COLOSPGS.RNQ 2.0in-2yr-24hr

Storm Tag Name = 24hr

.....
Data Type, File, ID = Synthetic Storm SCS IIA.RNF scsiiia-24hr

Storm Frequency = 2 yr

Total Rainfall Depth= 2.0000 in

Duration Multiplier = 1

Resulting Duration = 24.0000 hrs

Resulting Start Time= .0000 hrs Step= .2500 hrs End= 24.0000 hrs

Node ID	HYG Vol		Qpeak	Qpeak	Max WSEL
	Type	ac-ft	Trun. hrs	cfs	ft
COM-1	AREA	.598	6.1000	6.21	
COM-2	AREA	.103	6.2500	.72	
COM-3	AREA	.524	6.3000	3.32	
CPH-1	AREA	.611	6.2500	4.28	
J 10	JCT	3.838	6.2500	27.44	
J 20	JCT	.806	6.1000	7.34	
J-1	JCT	2.508	6.2000	19.02	
OS-1	AREA	1.898	6.2000	14.78	
Outfall OUT 10	JCT	3.838	6.2500	27.44	←
VOY-1	AREA	.105	6.2000	.80	

NETWORK SUMMARY -- NODES

{Trun. = HYG Truncation: Blank = None; L = Left; R = Rt; LR = Left & Rt}

DEFAULT Design Storm File, ID = COLOSPGS.RNQ 2.6in-5yr-24hr

Storm Tag Name = 24hr

Data Type, File, ID = Synthetic Storm SCS IIA.RNF scsii-24hr

Storm Frequency = 5 yr

Total Rainfall Depth = 2.6000 in

Duration Multiplier = 1

Resulting Duration = 24.0000 hrs

Resulting Start Time = .0000 hrs Step = .2500 hrs End = 24.0000 hrs

Node ID	HYG Vol Type	ac-ft	Qpeak Trun. hrs	Qpeak cfs	Max WSEL ft
COM-1	AREA	1.289	6.1000	17.16	
COM-2	AREA	.222	6.2000	2.09	
COM-3	AREA	1.129	6.2500	9.59	
CPH-1	AREA	1.316	6.2000	12.38	
J 10	JCT	8.271	6.2000	79.19	
J 20	JCT	1.737	6.1000	20.90	
J-1	JCT	5.405	6.2000	53.64	
OS-1	AREA	4.088	6.1500	41.80	
Outfall OUT 10	JCT	8.271	6.2000	79.19	
VOY-1	AREA	.226	6.1500	2.26	

NETWORK SUMMARY -- NODES

(Trun. = HYG Truncation: Blank= None; L=Left; R=Rt; LR= Left & Rt)

DEFAULT Design Storm File, ID = COLOSPGS.RNO 3.0in-10yr-24hr

Storm Tag Name = 24hr

Data Type, File, ID = Synthetic Storm SCS IIA.RNF scsiiia-24hr

Storm Frequency = 10 yr

Total Rainfall Depth= 3.0000 in

Duration Multiplier = 1

Resulting Duration = 24.0000 hrs

Resulting Start Time= .0000 hrs Step= .2500 hrs End= 24.0000 hrs

Node ID	HYG Vol		Qpeak Trun. hrs	Qpeak cfs	Max WSEL ft
	Type	ac-ft			
COM-1	AREA	1.847	6.1000	26.06	
COM-2	AREA	.318	6.2000	3.25	
COM-3	AREA	1.618	6.2500	14.95	
CPH-1	AREA	1.886	6.2000	19.30	
J 10	JCT	11.851	6.2000	123.24	
J 20	JCT	2.489	6.1000	32.15	
J-1	JCT	7.744	6.1500	84.01	
OS-1	AREA	5.858	6.1500	65.33	
Outfall OUT 10	JCT	11.851	6.2000	123.24	
VOY-1	AREA	.323	6.1500	3.55	

Type.... Executive Summary (Nodes) Page 2.01
 Name.... Watershed Event: 50 yr
 File.... X:\2880000.ALL\2889649\HYDRO\PONDPACK\SCS_BLACK_SQUIRREL_CREEK\62900BSCHIST.PPW
 Storm... scsiiia-24hr Tag: 24hr

NETWORK SUMMARY -- NODES

(Trun. = HYG Truncation: Blank = None; L = Left; R = Rt; LR = Left & Rt)

DEFAULT Design Storm File, ID = COLOSPGS.RNQ 4.0in-50yr-24hr

Storm Tag Name = 24hr

.....
 Data Type, File, ID = Synthetic Storm SCS IIA.RNF scsiiia-24hr
 Storm Frequency = 50 yr
 Total Rainfall Depth= 4.0000 in
 Duration Multiplier = 1
 Resulting Duration = 24.0000 hrs
 Resulting Start Time= .0000 hrs Step= .2500 hrs End= 24.0000 hrs

Node ID	HYG Vol Type	ac-ft	Qpeak Trun. hrs	Qpeak cfs	Max WSEL ft
COM-1	AREA	3.494	6.0500	52.79	
COM-2	AREA	.602	6.2000	6.77	
COM-3	AREA	3.061	6.2000	31.58	
CPH-1	AREA	3.567	6.2000	40.16	
J 10	JCT	22.412	6.1500	258.98	
J 20	JCT	4.707	6.1000	65.50	
J-1	JCT	14.644	6.1500	176.29	
OS-1	AREA	11.076	6.1500	136.19	
Outfall OUT 10	JCT	22.412	6.1500	258.98	
VOY-1	AREA	.612	6.1500	7.43	

Type.... Executive Summary (Nodes) Page 2.01
 Name.... Watershed Event: 100 yr
 File.... X:\2880000.ALL\2889649\HYDRO\PONDPACK\SCS_BLACK_SQUIRREL_CREEK\62900BSCHIST.PPW
 Storm... scsiiia-24hr Tag: 24hr

NETWORK SUMMARY -- NODES

(Trun. = HYG Truncation: Blank = None; L = Left; R = Rt; LR = Left & Rt)

DEFAULT Design Storm File, ID = COLOSPGS.RNO 4.6in-100yr-24hr

Storm Tag Name = 24hr

.....
 Data Type, File, ID = Synthetic Storm SCS IIA.RNF scsiiia-24hr
 Storm Frequency = 100 yr
 Total Rainfall Depth = 4.6000 in
 Duration Multiplier = 1
 Resulting Duration = 24.0000 hrs
 Resulting Start Time = .0000 hrs Step = .2500 hrs End = 24.0000 hrs

Node ID	HYG Vol Type	Qpeak ac-ft	Qpeak Trun. hrs	Max WSEL cfs	ft
COM-1	AREA	4.612	6.0500	71.39	
COM-2	AREA	.794	6.1500	9.27	
COM-3	AREA	4.041	6.2000	43.27	
CPH-1	AREA	4.709	6.1500	54.99	
J 10	JCT	29.583	6.1500	354.54	
J 20	JCT	6.213	6.1000	88.09	
J-1	JCT	19.329	6.1500	239.68	
OS-1	AREA	14.620	6.1500	184.70	
Outfall OUT 10	JCT	29.583	6.1500	354.54	
VOY-1	AREA	.807	6.1500	10.09	

DEVELOPED SCS ANALYSIS

Client: Picolan, Inc

Job No: 8896.43



Project: _____ By: LDR

Chk. By: _____

Date: 4-24-01

J-R ENGINEERING

A Subsidiary of Westrian

Subject: _____ Sheet No: 1 of 1

889649 | hydr of Pondpack

305 Pondpack 629008SC DEV B, PPW		Developed runs				
	2.0"	2.6"	3.0"	4.0"	4.6"	
	2yr	5yr	10yr	50yr	100yr	
HISTORIC	27	79	123	259	335 cfs	
* Developed	35	69	96	176	218 cfs	Routed
Developed Restricted						
	2yr	5yr	10yr	50yr	100yr	
Pond 1	38	70	86	127	150 cfs	
Pond 2	11	60	86	132	155 cfs	
Pond 3	7	8	37	120	141 cfs	
Pond 4	11	15	18	25	29 cfs	
Toy-1 (unrestricted)	14	18	21	28	33 cfs	
* 2 Ponds 2, 3, 4, Toy 1	43	101	162	305	358 cfs	
Pond HWL						100 yr peak ID VOLUME
	2yr	5yr	10yr	50yr	100yr	
Pond 1	6842.91	6844.18	6844.75	6846.33	6847.35	11.2 ACFT
Pond 2	6735.63	6736.91	6737.57	6739.63	6741.17	13.0 ACFT
Pond 3	6720.15	6720.38	6721.20	6721.76	6721.91	13.0 ACFT
Pond 4	6723.44	6723.85	6724.07	6724.41	6724.62	0.45 ac-ft

The routed total flows shown are an approximate view of the peak flow due to the added hydrographs.

Client: _____ Job No: 8896.43

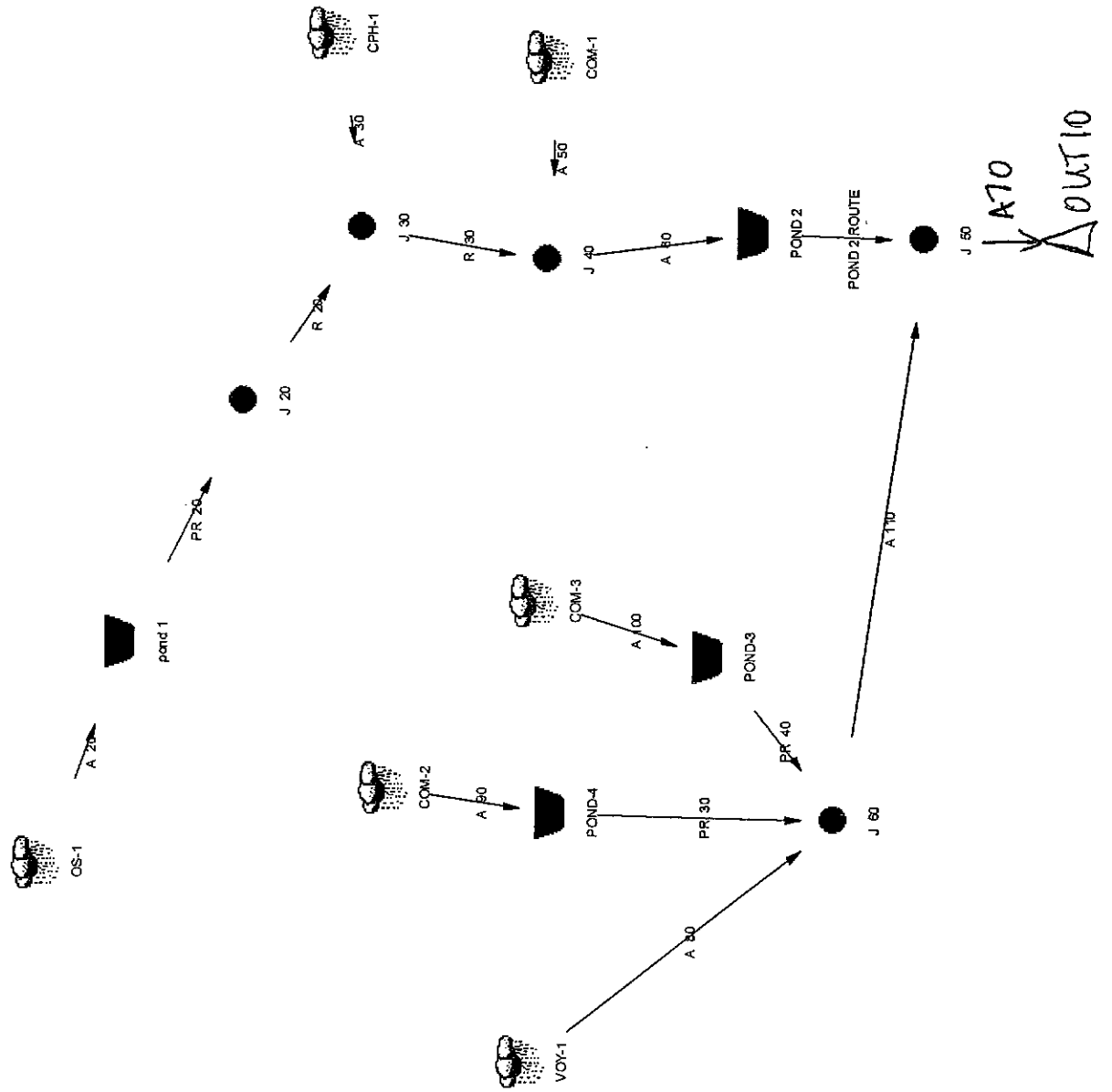


Project: _____ By: _____ Chk. By: _____ Date: _____

J-R ENGINEERING
A Subsidiary of Westrian

Subject: _____ Sheet No: 2 of 2

Developed Conditions				62900ASC DEV 3, PPW	
com-1	Area	CN	TC		
	33.1	92	0.28		
com-2	5.7ac	92	0.10hr		
com-3	29ac	92	0.30hr		
CPH-1	36.8	85	0.31hr		
voy-1	5.8ac	98	0.15hr		
Pond 3	Elev	ac-ft	Route pond 3 out		
	6716	0	Weir-rectangular		
	6718	0.8	6721.00 elev		
	20	1.35	50' Long 3.1 coeff		
	21	2.50	6721 to 6723		
	23	3.0	Orifice-circular		
	23	4.0	1-1' dia $HW = 6716$		
			0.6 = C, 6716 on		
			5732 off		
			HW Data 6716 to 6723		
POND 4	Elev	ac-ft			
	6724	0			
	6726	0.16	Orifice-circular		
	6728	0.48	1-42" dia $HW = 6724$		
			0.6 = C		
			6722 on, 6728 off		
Pond 1	Elev	ac-ft			
	6840	0			
	6842	2.02			
	6844	4.15			
	6846	8.32			
	6848	12.52			
Pond 2	Elev	ac-ft			
	6726	0	6734	4.53	6742 14.00ac ft
	6728	0.5	6736	6.56	
	6730	1.23	6738	8.85	
	6732	2.47	6740	11.41	



NETWORK SUMMARY -- NODES

(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File, ID = COLOSPGS.RNQ 2.0in-2yr-24hr

Storm Tag Name = 24hr

 Data Type, File, ID = Synthetic Storm SCS IIA.RNF scsiia-24hr

Storm Frequency = 2 yr

Total Rainfall Depth= 2.0000 in

Duration Multiplier = 1

Resulting Duration = 24.0000 hrs

Resulting Start Time= .0000 hrs Step= .2500 hrs End= 24.0000 hrs

Node ID	HYG Vol Type	ac-ft	Qpeak Trun. hrs	Qpeak cfs	Max WSEL ft
COM-1	AREA	3.410	6.0590	53.84	
COM-2	AREA	.587	5.9760	10.70	
COM-3	AREA	2.991	5.9760	49.56	
CPH-1	AREA	2.438	6.0590	35.65	
J 20	JCT	7.926	6.3910	38.43	
J 30	JCT	10.365	6.3910	46.73	
J 40	JCT	13.775	6.0590	85.30	
J 50	JCT	18.210	5.9760	35.18	
J 60	JCT	4.435	5.9760	29.09	
OS-1	AREA	7.927	6.1420	108.76	
Outfall OUT 10	JCT	18.210	5.9760	35.18	
POND 1	IN POND	7.927	6.1420	108.76	
POND 1	OUT POND	7.926	6.3910	38.43	6842.91
POND 2	IN POND	13.775	6.0590	85.29	
POND 2	OUT POND	13.775	8.4660	11.42	6735.63
POND-3	IN POND	2.991	5.9760	49.56	
POND-3	OUT POND	2.991	6.3080	7.22	6720.15
POND-4	IN POND	.587	5.9760	10.70	
POND-4	OUT POND	.587	5.9760	10.52	6723.44
VOY-1	AREA	.857	5.9760	13.61	

NETWORK SUMMARY -- NODES

(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File,ID = COLOSPGS.RNQ 2.6in-5yr-24hr

Storm Tag Name = 24hr

Data Type, File, ID = Synthetic Storm SCS IIA.RNF scsiiia-24hr

Storm Frequency = 5 yr

Total Rainfall Depth= 2.6000 in

Duration Multiplier = 1

Resulting Duration = 24.0000 hrs

Resulting Start Time= .0000 hrs Step= .2500 hrs End= 24.0000 hrs

Node ID	HYG Vol Type	Qpeak ac-ft	Qpeak Trun. hrs	Qpeak cfs	Max WSEL ft
COM-1	AREA	4.924	6.0590	77.24	
COM-2	AREA	.847	5.9760	15.07	
COM-3	AREA	4.319	5.9760	71.33	
CPH-1	AREA	3.860	6.0590	58.08	
J 20	JCT	12.211	6.3910	70.49	
J 30	JCT	16.071	6.3080	89.31	
J 40	JCT	20.994	6.1420	136.65	
J 50	JCT	27.305	6.9720	68.62	
J 60	JCT	6.311	5.9760	39.64	
OS-1	AREA	12.212	6.0590	172.33	
Outfall OUT 10	JCT	27.305	6.9720	68.62	
POND 1	IN POND	12.212	6.0590	172.33	
POND 1	OUT POND	12.211	6.3910	70.49	6844.18
POND 2	IN POND	20.994	6.1420	136.65	
POND 2	OUT POND	20.994	6.9720	59.10	6736.91
POND-3	IN POND	4.319	5.9760	71.33	
POND-3	OUT POND	4.318	6.3910	7.90	6720.88
POND-4	IN POND	.847	5.9760	15.07	
POND-4	OUT POND	.847	5.9760	14.66	6723.85
VOY-1	AREA	1.145	5.9760	17.90	

Type.... Executive Summary (Nodes)
 Name.... Watershed
 File.... X:\2880000.ALL\2889649\HYDRO\PONDPACK\SCS_BLACK_SQUIRREL_CREEK\62900BSCDEV3.PPW
 Storm... scsiiia-24hr Tag: 24hr

Type Page 2 of 2
 Event: 10 yr Watershed

Type: 10 yr Watershed
 Name: 62900BSCDEV3

NETWORK SUMMARY -- NODES

(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File, ID = COLOSPGS.RNQ 3.0in-10yr-24hr

Storm Tag Name = 24hr

 Data Type, File, ID = Synthetic Storm SCS IIA.RNF scsiiia-24hr
 Storm Frequency = 10 yr
 Total Rainfall Depth= 3.0000 in
 Duration Multiplier = 1
 Resulting Duration = 24.0000 hrs
 Resulting Start Time= .0000 hrs Step= .2500 hrs End= 24.0000 hrs

Node ID	HYG Vol Type	Qpeak ac-ft	Qpeak Trun. hrs	Qpeak cfs	Max WSEL ft
COM-1	AREA	5.958	6.0590	92.95	
COM-2	AREA	1.026	5.9760	17.99	
COM-3	AREA	5.226	5.9760	85.97	
CPH-1	AREA	4.871	6.0590	73.96	
J 20	JCT	15.221	6.3910	86.06	
J 30	JCT	20.092	6.2250	117.29	
J 40	JCT	26.050	6.1420	175.30	
J 50	JCT	33.638	6.8890	95.61	
J 60	JCT	7.589	5.9760	45.69	
OS-1	AREA	15.222	6.0590	217.41	
Outfall OUT 10	JCT	33.638	6.8890	95.61	
POND 1	IN POND	15.222	6.0590	217.41	
POND 1	OUT POND	15.221	6.3910	86.06	6844.75
POND 2	IN POND	26.050	6.1420	175.30	
POND 2	OUT POND	26.049	6.8890	85.65	6737.57
POND-3	IN POND	5.226	5.9760	85.97	
POND-3	OUT POND	5.225	6.2250	36.87	6721.20
POND-4	IN POND	1.026	5.9760	17.99	
POND-4	OUT POND	1.026	5.9760	17.57	6724.07
VOY-1	AREA	1.338	5.9760	20.74	

NETWORK SUMMARY -- NODES

(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File, ID = COLOSPGS.RNQ 4.0in-50yr-24hr

Storm Tag Name = 24hr

 Data Type, File, ID = Synthetic Storm SCS IIA.RNF scsiia-24hr
 Storm Frequency = 50 yr
 Total Rainfall Depth= 4.0000 in
 Duration Multiplier = 1
 Resulting Duration = 24.0000 hrs
 Resulting Start Time= .0000 hrs Step= .2500 hrs End= 24.0000 hrs

Node ID	HYG Vol Type	Qpeak ac-ft	Qpeak Trun. hrs	Qpeak cfs	Max WSEL ft
COM-1	AREA	8.594	6.0590	132.29	
COM-2	AREA	1.480	5.9760	25.23	
COM-3	AREA	7.538	5.9760	122.57	
CPH-1	AREA	7.537	6.0590	115.45	
J 20	JCT	23.078	6.3910	127.09	
J 30	JCT	30.615	6.1420	187.31	
J 40	JCT	39.209	6.1420	284.85	
J 50	JCT	50.045	6.0590	176.13	
J 60	JCT	10.837	6.0590	165.45	
OS-1	AREA	23.078	6.0590	334.49	
Outfall OUT 10	JCT	50.045	6.0590	176.13	
POND 1	IN POND	23.078	6.0590	334.49	
POND 1	OUT POND	23.078	6.3910	127.09	6846.33
POND 2	IN POND	39.209	6.1420	284.85	
POND 2	OUT POND	39.209	6.8060	131.77	6739.63
POND-3	IN POND	7.538	5.9760	122.57	
POND-3	OUT POND	7.538	6.0590	120.37	6721.76
POND-4	IN POND	1.480	5.9760	25.23	
POND-4	OUT POND	1.480	5.9760	24.83	6724.41
VOY-1	AREA	1.820	5.9760	27.82	

NETWORK SUMMARY -- NODES

(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File, ID = COLOSPGS.RNQ 4.6in-100yr-24hr

Storm Tag Name = 24hr

Data Type, File, ID = Synthetic Storm SCS IIA.RNF scsiiia-24hr

Storm Frequency = 100 yr

Total Rainfall Depth= 4.6000 in

Duration Multiplier = 1

Resulting Duration = 24.0000 hrs

Resulting Start Time= .0000 hrs Step= .2500 hrs End= 24.0000 hrs

Node ID	HYG Vol Type	Qpeak ac-ft	Qpeak Trun. hrs	Max WSEL cfs	ft
COM-1	AREA	10.197	6.0590	155.82	
COM-2	AREA	1.756	5.9760	29.54	
COM-3	AREA	8.945	5.9760	144.46	
CPH-1	AREA	9.201	6.0590	141.04	
J 20	JCT	27.940	6.3910	149.99	
J 30	JCT	37.141	6.1420	227.33	
J 40	JCT	47.338	6.1420	344.31	
J 50	JCT	60.147	6.1420	218.34	
J 60	JCT	12.809	6.0590	193.45	
OS-1	AREA	27.941	6.0590	406.32	
Outfall OUT 10	JCT	60.147	6.1420	218.34	
POND 1	IN POND	27.941	6.0590	406.32	
POND 1	OUT POND	27.940	6.3910	149.99	6847.35
POND 2	IN POND	47.338	6.1420	344.31	
POND 2	OUT POND	47.338	6.8890	154.58	6741.17
POND-3	IN POND	8.945	5.9760	144.46	
POND-3	OUT POND	8.944	6.0590	141.16	6721.91
POND-4	IN POND	1.756	5.9760	29.54	
POND-4	OUT POND	1.756	5.9760	29.16	6724.62
VOY-1	AREA	2.109	5.9760	32.06	

Type... Pond Routing Summary Page 12.05
Name... POND 1 OUT Tag: 24hr Event: 100 yr
File... X:\2880000.ALL\2889649\HYDRO\PONDPACK\SCS_BLACK_SQUIRREL_CREEK\62900BSCDEV3.PPW
Storm... scsii-24hr Tag: 24hr

LEVEL POOL ROUTING SUMMARY

HYG Dir = X:\2880000.ALL\2889649\HYDRO\PONDPACK\SCS_BLACK_SQUIRREL_CREEK\
Inflow HYG file = NONE STORED - POND 1 IN 24hr
Outflow HYG file = NONE STORED - POND 1 OUT 24hr

Pond Node Data = POND 1
Pond Volume Data = POND 1
Pond Outlet Data = ROUTE POND 1 OUT

No Infiltration

INITIAL CONDITIONS

Starting WS Elev = 6840.00 ft
Starting Volume = .000 ac-ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = .0830 hrs

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

=====
Peak Inflow = 406.32 cfs at 6.0590 hrs
Peak Outflow = 149.99 cfs at 6.3910 hrs

Peak Elevation = 6847.35 ft
Peak Storage = 11.164 ac-ft
=====

MASS BALANCE (ac-ft)

+ Initial Vol = .000
+ HYG Vol IN = 27.941
- Infiltration = .000
- HYG Vol OUT = 27.940
- Retained Vol = .001

Unrouted Vol = -.000 ac-ft (.000% of Inflow Volume)

Type.... Pond Routing Summary Page 12.15
Name.... POND 2 OUT Tag: 24hr Event: 100 yr
File.... X:\2880000.ALL\2889649\HYDRO\PONDPACK\SCS_BLACK_SQUIRREL_CREEK\62900BSCDEV3.PPW
Storm... scsiiia-24hr Tag: 24hr

LEVEL POOL ROUTING SUMMARY

HYG Dir = X:\2880000.ALL\2889649\HYDRO\PONDPACK\SCS_BLACK_SQUIRREL_CREEK\
Inflow HYG file = NONE STORED - POND 2 IN 24hr
Outflow HYG file = NONE STORED - POND 2 OUT 24hr

Pond Node Data = POND 2
Pond Volume Data = POND 2
Pond Outlet Data = ROUTE POND 2 OUT

No Infiltration

INITIAL CONDITIONS

Starting WS Elev = 6726.00 ft
Starting Volume = .000 ac-ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = .0830 hrs

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

=====
Peak Inflow = 344.31 cfs at 6.1420 hrs
Peak Outflow = 154.58 cfs at 6.8890 hrs

Peak Elevation = 6741.17 ft
Peak Storage = 13.051 ac-ft
=====

MASS BALANCE (ac-ft)

+ Initial Vol = .000
+ HYG Vol IN = 47.338
- Infiltration = .000
- HYG Vol OUT = 47.338
- Retained Vol = .000

Unrouted Vol = -.000 ac-ft (.000% of Inflow Volume)

Type.... Pond Routing Summary Page 12.26
Name.... POND-3 OUT Tag: 24hr Event: 100 yr
File.... X:\2880000.ALL\2889649\HYDRO\PONDPACK\SCS_BLACK_SQUIRREL_CREEK\62900BSCDEV3.PPW
Storm... scsiia-24hr Tag: 24hr

LEVEL POOL ROUTING SUMMARY

HYG Dir = X:\2880000.ALL\2889649\HYDRO\PONDPACK\SCS_BLACK_SQUIRREL_CREEK\
Inflow HYG file = NONE STORED - POND-3 IN 24hr
Outflow HYG file = NONE STORED - POND-3 OUT 24hr

Pond Node Data = POND-3
Pond Volume Data = POND-3
Pond Outlet Data = PR 30

No Infiltration

INITIAL CONDITIONS

Starting WS Elev = 6716.00 ft
Starting Volume = .000 ac-ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = .0830 hrs

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

=====
Peak Inflow = 144.46 cfs at 5.9760 hrs
Peak Outflow = 141.16 cfs at 6.0590 hrs

Peak Elevation = 6721.91 ft
Peak Storage = 2.953 ac-ft
=====

MASS BALANCE (ac-ft)

+ Initial Vol = .000
+ HYG Vol IN = 8.945
- Infiltration = .000
- HYG Vol OUT = 8.944
- Retained Vol = .000

Unrouted Vol = -.000 ac-ft (.000% of Inflow Volume)

Type... Pond Routing Summary Page 12.33
Name... POND-4 OUT Tag: 24hr Event: 100 yr
File... X:\2880000.ALL\2889649\HYDRO\PONDPACK\SCS_BLACK_SQUIRREL_CREEK\62900BSCDEV3.PPW
Storm... scsija-24hr Tag: 24hr

LEVEL POOL ROUTING SUMMARY

HYG Dir = X:\2880000.ALL\2889649\HYDRO\PONDPACK\SCS_BLACK_SQUIRREL_CREEK\
Inflow HYG file = NONE STORED - POND-4 IN 24hr
Outflow HYG file = NONE STORED - POND-4 OUT 24hr

Pond Node Data = POND-4
Pond Volume Data = POND-4
Pond Outlet Data = PR 40

No Infiltration

INITIAL CONDITIONS

Starting WS Elev = 6722.00 ft
Starting Volume = .000 ac-ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = .0830 hrs

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

=====
Peak Inflow = 29.54 cfs at 5.9760 hrs
Peak Outflow = 29.16 cfs at 5.9760 hrs

Peak Elevation = 6724.62 ft
Peak Storage = .099 ac-ft
=====

MASS BALANCE (ac-ft)

+ Initial Vol = .000
+ HYG Vol IN = 1.756
- Infiltration = .000
- HYG Vol OUT = 1.756
- Retained Vol = .000

Unrouted Vol = -.000 ac-ft (.000% of Inflow Volume)

(TRACT D2 0.45 ACRE-FOOT) POND CALCULATIONS

POND 4

ELEVATIONS	SF	CF	AF	SUM
6722	0		0.05	0
6724	2309.94			0.05
		7035.86	0.16	
6726	4725.92			0.16 0.21
		13864.44	0.32	
6728	9138.52			0.48 0.53
TOTAL		20900.30	0.48	

DRAINAGE MAP