

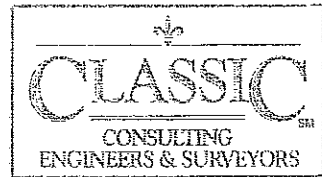
**MASTER DEVELOPMENT DRAINAGE PLAN
FOR
SOARING EAGLES COMMERCIAL**

FEBRUARY 2009

**PREPARED FOR:
YERGENSEN OBERING & WHITTAKER
115 S. WEBER
COLORADO SPRINGS CO 80903
(719) 475-8133**

**PREPARED BY:
CLASSIC CONSULTING ENGINEERS & SURVEYORS, LLC
6385 CORPORATE DRIVE, SUITE 101
COLORADO SPRINGS, CO 80919
(719) 785-0790**

2259.00

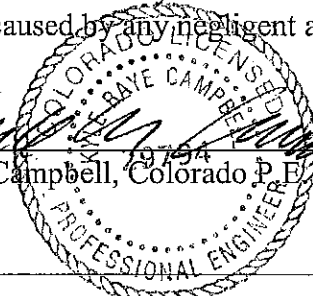


MASTER DEVELOPMENT DRAINAGE PLAN FOR SOARING EAGLES COMMERCIAL

DRAINAGE REPORT STATEMENT

ENGINEER'S STATEMENT:

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


Kyle R. Campbell
Kyle R. Campbell, Colorado P.E. #29794

2-10-09
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: Aurora One Real Estate, LP
By: *Edward R. Scott*
Title: Edward R. Scott, Jr., President
Address: 6003 Tuscan Village
Amarillo, Tx 79119

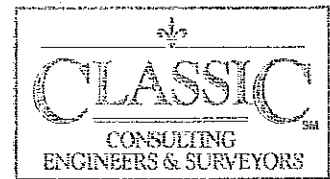
CITY OF COLORADO SPRINGS ONLY:

Filed in accordance with Section 7-7-906 (Drainage Ordinance) of the Code of the City of Colorado Springs 2001, as amended.

AB Kuehls
For the City Engineer

3/2/09
Date

Conditions:



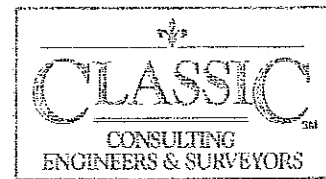
MASTER DEVELOPMENT DRAINAGE PLAN FOR SOARING EAGLES COMMERCIAL

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MASTER DEVELOPMENT DRAINAGE PLAN FOR SOARING EAGLES COMMERCIAL

PURPOSE

This is the Master Development Drainage Plan (MDDP) for Soaring Eagles Commercial. The purpose of this Drainage Plan is to identify major drainage features and facilities and to estimate peak rates of stormwater runoff, from on-site and off-site source, and outline the necessary improvements to safely route developed storm water runoff to adequate outfall facilities. This MDDP report is for concurrent submittal with a Concept plan. A final drainage report will need to be submitted upon development plan and construction drawing submittal.

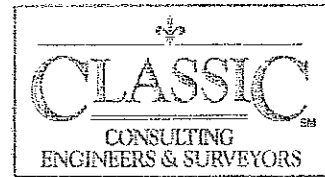
GENERAL DESCRIPTION

Soaring Eagles Commercial is a 27.939-acre site located within portion of the south half of section 36, township 14 south, range 66 west of the sixth principal meridian, City of Colorado Springs, El Paso County, Colorado. The site is bounded on the north by existing Hancock Expressway, to the west and south by existing Silver Hawk Avenue and to the east by existing residential Soaring Eagles Subdivision Filing No. 6. Soaring Eagles Commercial planned use includes 29.938 acres of commercial use.

Soil types considered at the site as determined by the "Soil Survey of El Paso County Area," June 1981, consist of Blakeland Loamy Sand "B" as prepared by the Soil Conservation Service (see map in Appendix).

EXISTING DRAINAGE CONDITIONS

The proposed site is partially located within the Peterson Field Drainage Basin and partially located within the Windmill Gulch Drainage Basin. The majority of the site in its existing condition consists of undeveloped grasslands typical of those areas located in north Colorado Springs. Existing grades on the site have slopes that typically range from 1% to 10%. The site is divided by a ridge. Drainage to the west of the ridge flows towards the intersection of Silver Hawk Avenue and Hancock Expressway, and is located within the Peterson Field Drainage Basin. Drainage to the east flows towards Silver Hawk Avenue and Soaring Eagles Subdivision Filing No. 6. where an existing 24"RCP storm sewer stub intercepts existing runoff. This site was previously overlot graded and a



ditch was created that intercepts flows before they reach the rear yards of the existing Soaring Eagles Subdivision Filing No. 6.

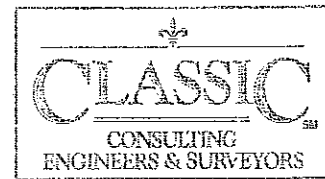
Basin EX1 ($Q_5 = 12$ cfs, $Q_{100} = 30$ cfs) consists of natural undeveloped ground. Currently existing flows travel overland towards the intersection of Silver Hawk Ave and Hancock Expressway. Flows run over the curb to an existing 10' D-10-R inlet which collects these flows and routes flows along with street flow from Silver Hawk Ave to an existing concrete channel located north of Hancock Expressway. There are 2 buried 30" RCP storm sewer stubs and a buried 36" RCP storm sewer stub future developed flows for this basin.

Basin EX2 ($Q_5 = 4$ cfs, $Q_{100} = 10$ cfs) consists of natural undeveloped ground. Currently existing flows travel overland, directly towards a created swale located along the rear property lines of the existing Soaring Eagles Subdivision No. 6 residential area. Flows from the swale are collected in an existing 24" RCP storm sewer stub provided with the construction of Silver Hawk Ave.

PROPOSED DRAINAGE CONDITIONS

This site has been previously studied with the Soaring Eagles Subdivision Filing No. 1 Final Drainage Report by Rockwell Minchow Consultants Inc dated February 2001 and the Soaring Eagles Filing No. 5 Final Drainage Plan and Report by Rockwell Minchow Consultants Inc dated January 2003. Developed flows generated from this site will be directed towards the existing storm sewer stubs that were provided with construction of these previous Soaring Eagles filings with consideration for water quality measures.

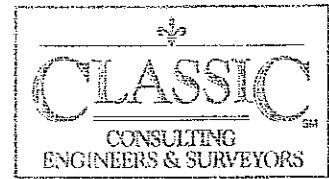
Design Point 1 ($Q_5 = 22$ cfs, $Q_{100} = 42$ cfs). Design Point 1 consists of 7.43 (Basin A-1) acres of retail/ commercial development with associated buildings, parking lots, and landscaping. Developed flows will sheet flow in a northerly direction and be routed to a proposed water quality pond located at Design Point 1. Per the approved Soaring Eagles Subdivision Filing No.1 Final Drainage Report there is an 36" RCP storm sewer stub is located in the back of an existing 10' D-10-R inlet in Hancock Expressway and will accept $Q_5 = 23.8$ cfs, $Q_{100} = 43.1$ cfs This relates to 8.8 acres of developed flow from the previous report. This storm sewer stub will be utilized and exact water quality measures will be required with the final drainage report.



Design Point 2 ($Q_5 = 13$ cfs, $Q_{100} = 25$ cfs) Design Point 2 consists of 3.78 acres (Basin A-2) of retail/commercial development with associated buildings, parking lots, and landscaping. Developed flows will sheet flow in north westerly direction and be routed to a proposed water quality pond located at the intersection of Hancock Expressway and Silver Hawk Ave. Per the approved Soaring Eagles Subdivision Filing No.1 Final Drainage Report there is a 30" RCP storm sewer stub is located in the back of an existing 10' D-10-R inlet at the intersection of Silver Hawk Ave and Hancock Expressway and will accept $Q_5 = 17.9$ cfs, $Q_{100} = 32.4$ cfs. This relates to 5.7 acres of developed flow from the previous report. This storm sewer stub will be utilized and exact water quality measures will be required with the final drainage report.

Design Point 3 ($Q_5 = 23$ cfs, $Q_{100} = 44$ cfs) Design Point 3 consists of 6.77 acres (Basin A-3) of retail/commercial development with associated building, parking lots, and landscaping. Developed flows will sheet flow westerly to a proposed water quality pond located at Design Point 3. Per the approved Soaring Eagles Subdivision Filing No.1 Final Drainage Report there is a 30" RCP storm sewer stub is located in the back of an existing 10' D-10-R inlet in Silver Hawk Ave and will accept $Q_5 = 27.7$ cfs, $Q_{100} = 50.3$ cfs. This relates to 9.9 acres of developed flow from the previous report. This storm sewer stub will be utilized and exact water quality measures will be required with the final drainage report.

Design Point 4 ($Q_5 = 18$ cfs, $Q_{100} = 35$ cfs) Design Point 4 consists 5.14 acres (Basin B) of retail/commercial development with associated building, parking lots, and landscaping. Developed flows will be collected and routed to a proposed water quality pond located in the southeasterly corner of the site located at Design Point 4. Per the approved Soaring Eagles Subdivision Filing No.5 Final Drainage Report there is a 24" RCP storm sewer stub is stub into the proposed Soaring Eagles Commercial site at the southeast corner will accept 29 cfs. The report also allows for 7.3 cfs 100 year to travel in the Silver Hawk Ave as street flow. This storm sewer stub will be utilized and exact water quality measures will be required with the final drainage report that may include some minor detention if developed flows exceed allowable release at this location.



Basin C ($Q_5 = 1$ cfs, $Q_{100} = 1$ cfs). Basin C consists of 0.45 acres of landscape area that will sheet flow to Hancock Expressway.

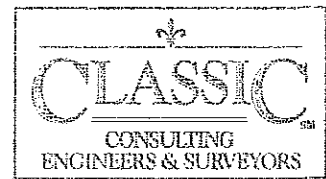
Basin D ($Q_5 = 0.4$ cfs, $Q_{100} = 1$ cfs). Basin D consists of 0.35 acres of landscape area that will sheet flow to Silver Hawk Ave

Basin E ($Q_5 = 2$ cfs, $Q_{100} = 4$ cfs). Basin E consists of 1.29 acres of landscape area that will sheet flow to Silver Hawk Ave.

Basin F This basin is part of the Soaring Eagles Commercial site, but will be dedicated to CDOT for future Powers Blvd ramp construction.

STORM WATER QUALITY

Storm water quality calculations and design were performed in accordance with the City of Colorado Springs Drainage Criteria Volume 2. The Soaring Eagles Commercial site will be required to adhere to water quality standards. Exact water quality calculations will be required upon final drainage report and development plan submittal. The use of the designated existing storm sewer stubs will require water quality measures be installed. Final design of these recommended facilities that include planning for water quality management of storm water runoff features will be designed during final design and construction of the proposed improvements. Storm water quality measures will be utilized in order to reduce the amount of sediment, debris and pollutants that are allowed to enter the existing storm sewer system. These features include but are not limited to Extended Detention Basin Sedimentation Facilities, Sand Filter Extended Detention Basins, and Porous Landscape Detention. These measures will be taken into consideration upon final design of the individual water quality facilities as well as the development of the individual lots within the Soaring Eagles Commercial property. If developed flows release at any of the provided storm sewer stubs exceeds capacity, detention may be required with water quality.



HYDROLOGIC CALCULATIONS

Hydrologic calculations were performed using the City of Colorado Springs/El Paso County Drainage Criteria Manual, as revised in November 1991 and October 1994 Rational Method was used to size the onsite drainage systems and water quality ponds.

EROSION CONTROL PLAN

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

FLOODPLAIN STATEMENT

A portion of this site is not located within a floodplain as determined by the Flood Insurance Rate Maps (F.I.R.M.) Map Number 08041C0761F, effective date, March 17, 1997 (See Appendix).

DRAINAGE AND BRIDGE FEES

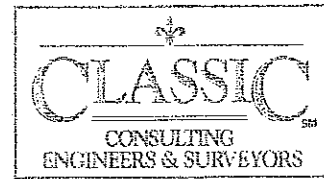
This area lies within the Peterson Field Drainage Basin and the Windmill Gulch Drainage Basin. The year 2009 drainage and bridge fees are as follows:

Soaring Eagles Commercial Peterson Field

Drainage Fees:	
\$10,129/acre x 22.80 acres	\$ 230,941.20
Bridge Fees:	
\$467/acre x 22.80 acres	\$ 10,647.60
TOTAL	<u>\$241,588.80</u>

Soaring Eagles Commercial Windmill Gulch Drainage Basin

Drainage Fees:	
\$11,040/acre x 5.14 acres	\$ 56,745.60
Land Fees:	
\$3,055/acre x 5.14 acres	\$ 15,702.70
Bridge Fees:	
\$224/acre x 5.14 acres	\$ 1,151.36
TOTAL	<u>\$73,599.66</u>



SUMMARY

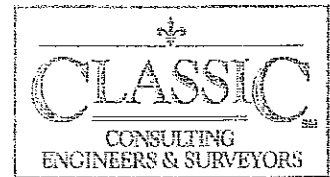
This is a Master Development Drainage Plan for the Soaring Eagles Commercial site prepared for submittal with a concept plan for the planned uses for this site. All drainage patterns conform to the previously approved reports, Soaring Eagles Filing No. 5 Final Drainage Plan and Report dated January 2003 by Rockwell Minchow Consultants Inc and Soaring Eagles Subdivision Filing No. 1 Final Drainage Report dated February 2001 by Rockwell Minchow Consultants Inc. The planned use in these previous reports remains the same, community commercial. There are existing storm sewer stubs that will be utilized upon development of this parcel. A final drainage report will be required upon development and final plat submittal that will include detailed water quality provisions.

PREPARED BY:

Classic Consulting Engineers & Surveyors, LLC

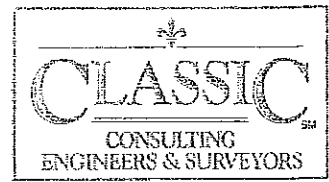
A handwritten signature in black ink, appearing to read "David L. Gibson", is written over a horizontal line.

David L. Gibson E.I.
Project Engineer



REFERENCES

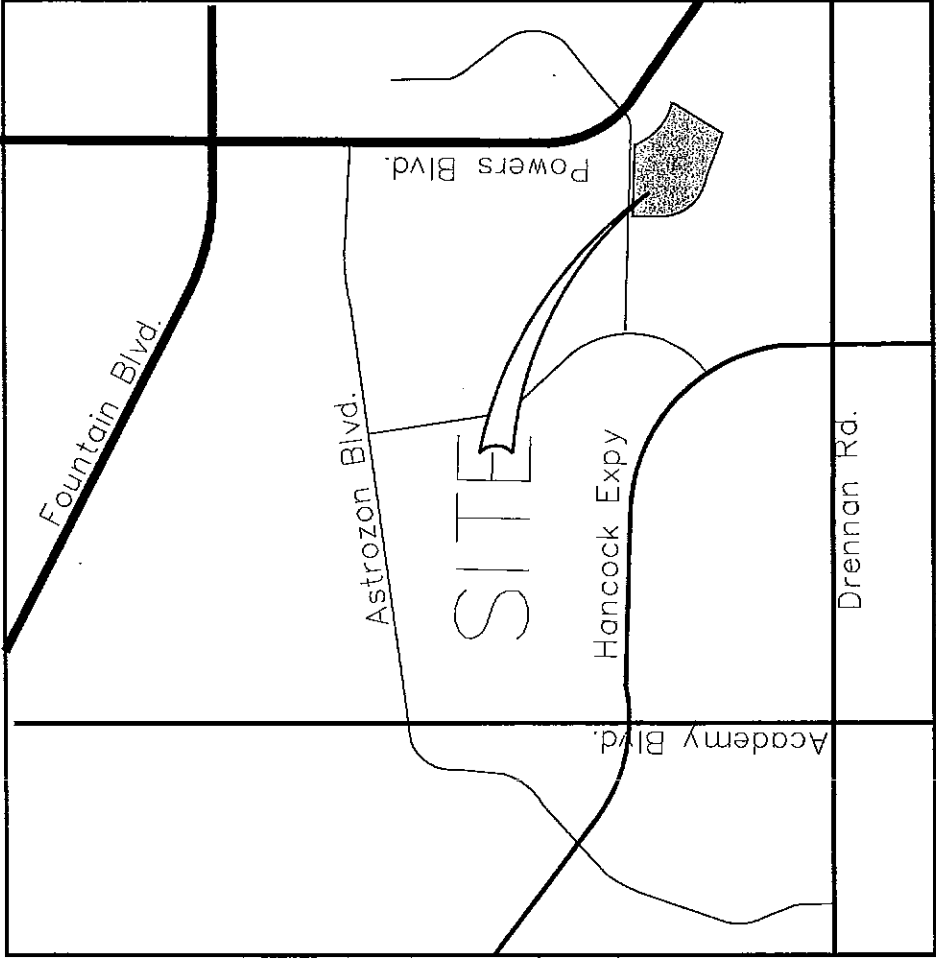
1. City of Colorado Springs/County of El Paso Drainage Criteria Manual dated October 1991.
2. "Drainage Criteria Manual, Volume No. 2," by City of Colorado Springs Engineering Division, dated November 1, 2002.
3. "Soaring Eagles Filing No. 5 Final Drainage Plan and Report," by Rockwell Minchow Consultants, Inc. Dated January 2003
4. "Soaring Eagles Subdivision Filing No. 1 Final Drainage Report" by Rockwell Minchow Consultants, Inc. Dated February 2001

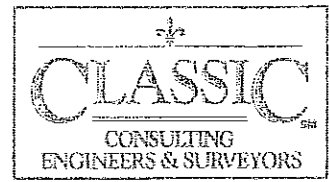


APPENDIX



VICINITY MAP



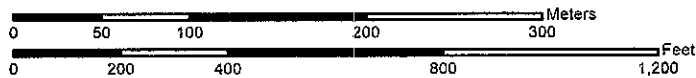


SOILS MAP (S.C.S. SURVEY)






































Soil Map



Map Scale: 1:4,060 if printed on A size (8.5" x 11") sheet.



MAP LEGEND

Area of Interest (AOI)			Very Stony Spot
	Area of Interest (AOI)		Wet Spot
Soils			Other
	Soil Map Units	Special Line Features	
Special Point Features			Gully
	Blowout		Short Steep Slope
	Borrow Pit		Other
	Clay Spot	Political Features	
	Closed Depression		Cities
	Gravel Pit	Water Features	
	Gravelly Spot		Oceans
	Landfill		Streams and Canals
	Lava Flow	Transportation	
	Marsh or swamp		Rails
	Mine or Quarry		Interstate Highways
	Miscellaneous Water		US Routes
	Perennial Water		Major Roads
	Rock Outcrop		Local Roads
	Saline Spot		
	Sandy Spot		
	Severely Eroded Spot		
	Sinkhole		
	Slide or Slip		
	Sodic Spot		
	Spoil Area		
	Stony Spot		

MAP INFORMATION

Map Scale: 1:4,060 if printed on A size (8.5" x 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
 Coordinate System: UTM Zone 13N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: El Paso County Area, Colorado
 Survey Area Data: Version 6, Aug 21, 2008

Date(s) aerial images were photographed: 7/30/2005

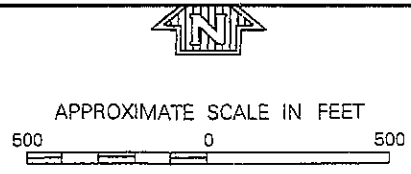
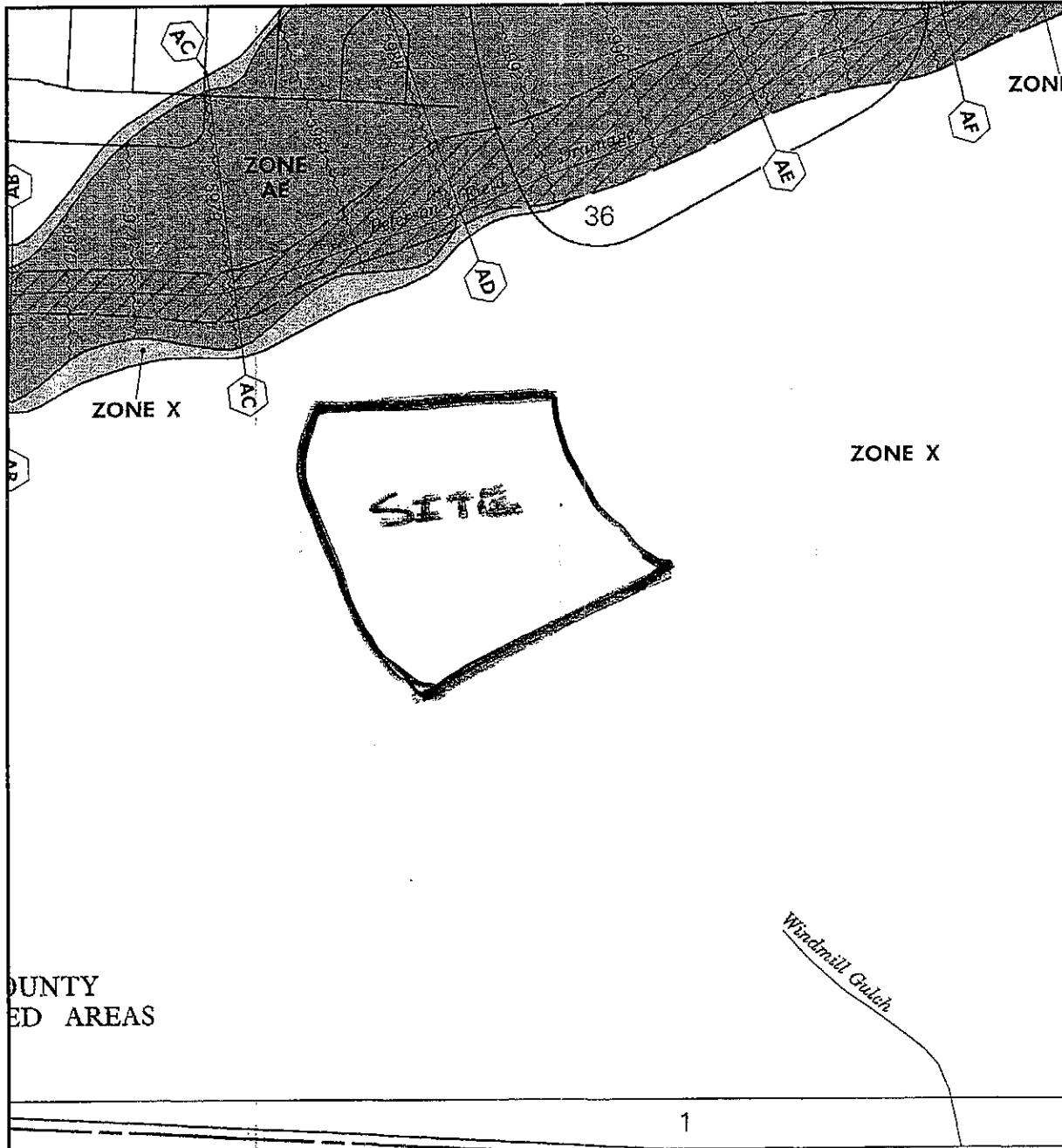
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

El Paso County Area, Colorado (CO625)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	51.0	100.0%
Totals for Area of Interest		51.0	100.0%



F.E.M.A. MAP



NATIONAL FLOOD INSURANCE PROGRAM

**FIRM
FLOOD INSURANCE RATE MAP
EL PASO COUNTY,
COLORADO AND
INCORPORATED AREAS**

PANEL 761 OF 1300
(SEE MAP INDEX FOR PANELS NOT PRINTED)

<u>CONTAINS:</u> <u>COMMUNITY</u>	<u>NUMBER</u>	<u>PANEL</u>	<u>SUFFIX</u>
COLORADO SPRINGS, CITY OF	080080	0761	F
EL PASO COUNTY, UNINCORPORATED AREAS	080089	0761	F

**MAP NUMBER
08041C0761 F**

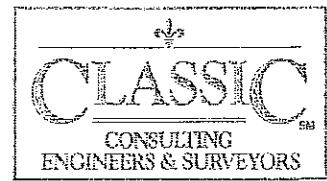
**EFFECTIVE DATE:
MARCH 17, 1997**



Federal Emergency Management Agency

COUNTY
ED AREAS

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



HYDROLOGIC CALCULATIONS

JOB NAME: SOARING EAGLES COMMERCIAL
 JOB NUMBER: 2259.00
 DATE: 02/09/09
 CALCULATED BY: DLG

MASTER DEVELOPMENT DRAINAGE PLAN ~ BASIN RUNOFF COEFFICIENT SUMMARY EXISTING

BASIN	TOTAL AREA (AC)	IMPERVIOUS AREA / STREETS			LANDSCAPE/UNDEVELOPED AREAS			WEIGHTED		WEIGHTED CA	
		AREA (AC)	C(5)	C(100)	AREA (AC)	C(5)	C(100)	C(5)	C(100)	CA(5)	CA(100)
EX-1	21.41	0.00	0.90	0.95	21.41	0.25	0.35	0.25	0.35	5.35	7.49
EX-2	6.53	0.00	0.90	0.95	6.53	0.25	0.35	0.25	0.35	1.63	2.29

JOB NAME: SOARING EAGLES COMMERCIAL
 JOB NUMBER: 2259.00
 DATE: 02/09/09
 CALC'D BY: DLG

MASTER DEVELOPMENT DRAINAGE PLAN ~ BASIN RUNOFF SUMMARY EXISTING

BASIN	WEIGHTED		OVERLAND			STREET / CHANNEL FLOW				Tc	INTENSITY			TOTAL FLOWS			
	CA(5)	CA(100)	C(5)	Length (ft)	Height (ft)	Tc (min)	Length (ft)	Slope (%)	Velocity (fps)	Tc (min)	TOTAL (min)	I(2) (in/hr)	I(5) (in/hr)	I(100) (in/hr)	Q(2) (cfs)	Q(5) (cfs)	Q(100) (cfs)
EX-1	5.35	7.49	0.25	1000	30	35.0	0	0.0%	0.0	0.0	35.0	1.61	2.22	3.94	9	12	30
EX-2	1.63	2.29	0.25	550	12	28.8	0	0.0%	0.0	0.0	28.8	1.80	2.48	4.41	3	4	10

JOB NAME: SOARING EAGLES COMMERCIAL
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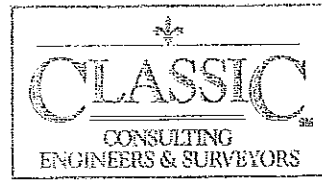
MASTER DEVELOPMENT DRAINAGE PLAN ~ BASIN RUNOFF COEFFICIENT SUMMARY

BASIN	TOTAL AREA (AC)	IMPERVIOUS AREA / STREETS			LANDSCAPE/UNDEVELOPED AREAS			WEIGHTED		WEIGHTED CA	
		AREA (AC)	C(5)	C(100)	AREA (AC)	C(5)	C(100)	C(5)	C(100)	CA(5)	CA(100)
A-1	7.43	7.43	0.75	0.80	0.00	0.25	0.35	0.75	0.80	5.57	5.94
A-2	3.78	3.78	0.75	0.80	0.00	0.25	0.35	0.75	0.80	2.84	3.02
A-3	6.77	6.77	0.75	0.80	0.00	0.25	0.35	0.75	0.80	5.08	5.42
B	5.14	5.14	0.75	0.80	0.00	0.25	0.35	0.75	0.80	3.86	4.11
C	0.45	0.00	0.75	0.80	0.45	0.25	0.35	0.25	0.35	0.11	0.16
D	0.35	0.00	0.75	0.80	0.35	0.25	0.35	0.25	0.35	0.09	0.12
E	1.29	0.00	0.75	0.80	1.29	0.25	0.35	0.25	0.35	0.32	0.45
F	2.94	0.00	0.75	0.80	2.94	0.25	0.35	0.25	0.35	0.74	1.03

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 CALC'D BY: DLG

MASTER DEVELOPMENT DRAINAGE PLAN ~ BASIN RUNOFF SUMMARY

BASIN	WEIGHTED		OVERLAND				STREET / CHANNEL FLOW				Tc	INTENSITY			TOTAL FLOWS		
	CA(5)	CA(100)	C(5)	Length (ft)	Height (ft)	Tc (min)	Length (ft)	Slope (%)	Velocity (fps)	Tc (min)	TOTAL (min)	I(2) (in/hr)	I(5) (in/hr)	I(100) (in/hr)	Q(2) (cfs)	Q(5) (cfs)	Q(100) (cfs)
A-1	5.57	5.94	0.25	100	6	8.8	750	2.3%	5.3	2.4	11.2	2.86	3.93	6.99	16	22	42
A-2	2.84	3.02	0.25	50	6	5.0	750	2.3%	5.3	2.4	7.3	3.33	4.58	8.14	9	13	25
A-3	5.08	5.42	0.25	50	6	5.0	750	2.3%	5.3	2.4	7.3	3.33	4.58	8.14	17	23	44
B	3.86	4.11	0.25	20	6	2.3	250	1.0%	1.0	4.2	6.5	3.45	4.75	8.45	13	18	35
C	0.11	0.16	0.25	100	10	7.4	0	0.0%	0.0	0.0	7.4	3.31	4.55	8.09	0.4	1	1
D	0.09	0.12	0.25	0	0	0.0	0	0.0%	0.0	0.0	5.0	3.71	5.10	9.07	0.3	0.4	1
E	0.32	0.45	0.25	0	0	0.0	0	0.0%	0.0	0.0	5.0	3.71	5.10	9.07	1	2	4
F	0.74	1.03	0.25	490	12	26.2	0	0.0%	0.0	0.0	26.2	1.90	2.61	4.65	1	2	5



HYDRAULIC CALCULATIONS

JOB NAME: SOARING EAGLES COMMERCIAL
 JOB NUMBER: 2259.00
 DATE: 02/09/09
 CALCULATED BY: DLG

MASTER DEVELOPMENT DRAINAGE PLAN ~ SURFACE ROUTING SUMMARY EXISTING

Design Point(s)	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Inlet Size
					I(5)	I(100)	Q(5)	Q(100)	
1	BASIN EX-1	5.35	7.49	35.0	2.22	3.94	12	30	
2	BASIN EX-2	1.63	2.29	28.8	2.48	4.41	4	10	

JOB NAME: SOARING EAGLES COMMERCIAL
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 DATE: 02/09/09
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MASTER DEVELOPMENT DRAINAGE PLAN ~ SURFACE ROUTING SUMMARY

Design Point(s)	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Inlet Size
					I(5)	I(100)	Q(5)	Q(100)	
1	BASIN A-1	5.57	5.94	11.2	3.93	6.99	22	42	
2	BASIN A-2	2.84	3.02	7.3	4.58	8.14	13	25	
3	BASIN A-3	5.08	5.42	7.3	4.58	8.14	23	44	
4	BASIN B	3.86	4.11	6.5	4.75	8.45	18	35	

Designer: DAVID GIBSON
 Company: CCES
 Date: January 20, 2009
 Project: SOARING EAGLES COMMERCIAL
 Location: WATER QUALIT DP 1

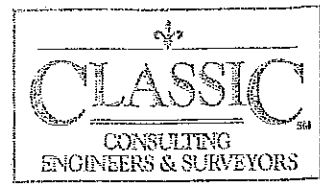
<p>1. Basin Storage Volume</p> <p>A) Tributary Area's Imperviousness Ratio ($i = I_a / 100$)</p> <p>B) Contributing Watershed Area (Area)</p> <p>C) Water Quality Capture Volume (WQCV) $(WQCV = 1.0 * (0.91 * I^3 - 1.19 * I^2 + 0.78 * I))$</p> <p>D) Design Volume: $Vol = (WQCV / 12) * Area * 1.2$</p>	<p>$I_a =$ <u>90.00</u> %</p> <p>$i =$ <u>0.90</u></p> <p>Area = <u>7.43</u> acres</p> <p>WQCV = <u>0.40</u> watershed inches</p> <p>Vol = <u>0.298</u> acre-feet</p>
<p>2. Outlet Works</p> <p>A) Outlet Type (Check One)</p> <p>B) Depth at Outlet Above Lowest Perforation (H)</p> <p>C) Required Maximum Outlet Area per Row, (A_o)</p> <p>D) Perforation Dimensions (enter one only): i) Circular Perforation Diameter OR ii) 2" Height Rectangular Perforation Width</p> <p>E) Number of Columns (nc, See Table 6a-1 For Maximum)</p> <p>F) Actual Design Outlet Area per Row (A_o)</p> <p>G) Number of Rows (nr)</p> <p>H) Total Outlet Area (A_{ot})</p>	<p><input checked="" type="checkbox"/> Orifice Plate <input type="checkbox"/> Perforated Riser Pipe <input type="checkbox"/> Other: _____</p> <hr/> <p>H = <u>2.00</u> feet</p> <p>$A_o =$ <u>0.63</u> square inches</p> <p>D = <u>0.6000</u> inches, OR W = _____ inches</p> <p>$nc =$ <u>2</u> number</p> <p>$A_o =$ <u>0.57</u> square inches</p> <p>$nr =$ <u>6</u> number</p> <p>$A_{ot} =$ <u>3.39</u> square inches</p>
<p>3. Trash Rack</p> <p>A) Needed Open Area: $A_t = 0.5 * (\text{Figure 7 Value}) * A_{ot}$</p> <p>B) Type of Outlet Opening (Check One)</p> <p>C) For 2", or Smaller, Round Opening (Ref.: Figure 6a):</p> <p>i) Width of Trash Rack and Concrete Opening (W_{conc}) from Table 6a-1</p> <p>ii) Height of Trash Rack Screen (H_{TR})</p>	<p>$A_t =$ <u>121</u> square inches</p> <p><input checked="" type="checkbox"/> $\leq 2"$ Diameter Round <input type="checkbox"/> 2" High Rectangular <input type="checkbox"/> Other: _____</p> <hr/> <p>$W_{conc} =$ <u>6</u> inches</p> <p>$H_{TR} =$ <u>48</u> inches</p>

Designer: DAVID GIBSON
 Company: CCES
 Date: January 20, 2009
 Project: SOARING EAGLES COMMERCIAL
 Location: WATER QUALITY DP 2

<p>1. Basin Storage Volume</p> <p>A) Tributary Area's Imperviousness Ratio ($i = I_a / 100$)</p> <p>B) Contributing Watershed Area (Area)</p> <p>C) Water Quality Capture Volume (WQCV) $(WQCV = 1.0 * (0.91 * I^3 - 1.19 * I^2 + 0.78 * I))$</p> <p>D) Design Volume: $Vol = (WQCV / 12) * Area * 1.2$</p>	<p>$I_a =$ <u>90.00</u> %</p> <p>$i =$ <u>0.90</u></p> <p>Area = <u>3.96</u> acres</p> <p>WQCV = <u>0.40</u> watershed inches</p> <p>Vol = <u>0.159</u> acre-feet</p>
<p>2. Outlet Works</p> <p>A) Outlet Type (Check One)</p> <p>B) Depth at Outlet Above Lowest Perforation (H)</p> <p>C) Required Maximum Outlet Area per Row, (A_o)</p> <p>D) Perforation Dimensions (enter one only): i) Circular Perforation Diameter OR ii) 2" Height Rectangular Perforation Width</p> <p>E) Number of Columns (nc, See Table 6a-1 For Maximum)</p> <p>F) Actual Design Outlet Area per Row (A_o)</p> <p>G) Number of Rows (nr)</p> <p>H) Total Outlet Area (A_{ot})</p>	<p><input checked="" type="checkbox"/> Orifice Plate <input type="checkbox"/> Perforated Riser Pipe <input type="checkbox"/> Other: _____</p> <hr/> <p>H = <u>2.00</u> feet</p> <p>$A_o =$ <u>0.34</u> square inches</p> <p>D = <u>0.6500</u> inches, OR W = _____ inches</p> <p>$nc =$ <u>4</u> number</p> <p>$A_o =$ <u>0.33</u> square inches</p> <p>$nr =$ <u>6</u> number</p> <p>$A_{ot} =$ <u>1.99</u> square inches</p>
<p>3. Trash Rack</p> <p>A) Needed Open Area: $A_t = 0.5 * (\text{Figure 7 Value}) * A_{ot}$</p> <p>B) Type of Outlet Opening (Check One)</p> <p>C) For 2", or Smaller, Round Opening (Ref.: Figure 6a):</p> <p>i) Width of Trash Rack and Concrete Opening (W_{conc}) from Table 6a-1</p> <p>ii) Height of Trash Rack Screen (H_{TR})</p>	<p>$A_t =$ <u>71</u> square inches</p> <p><input checked="" type="checkbox"/> $\leq 2"$ Diameter Round <input type="checkbox"/> 2" High Rectangular <input type="checkbox"/> Other: _____</p> <hr/> <p>$W_{conc} =$ <u>3</u> inches</p> <p>$H_{TR} =$ <u>48</u> inches</p>

Designer: DAVID GIBSON
 Company: CCES
 Date: January 20, 2009
 Project: SOARING EAGLES COMMERCIAL
 Location: WATER QUALITY DP 3

<p>1. Basin Storage Volume</p> <p>A) Tributary Area's Imperviousness Ratio ($i = I_a / 100$)</p> <p>B) Contributing Watershed Area (Area)</p> <p>C) Water Quality Capture Volume (WQCV) $(WQCV = 1.0 * (0.91 * I^3 - 1.19 * I^2 + 0.78 * I))$</p> <p>D) Design Volume: $Vol = (WQCV / 12) * Area * 1.2$</p>	<p>$I_a =$ <u>90.00</u> % $i =$ <u>0.90</u> Area = <u>6.58</u> acres WQCV = <u>0.40</u> watershed inches Vol = <u>0.264</u> acre-feet</p>
<p>2. Outlet Works</p> <p>A) Outlet Type (Check One)</p> <p>B) Depth at Outlet Above Lowest Perforation (H)</p> <p>C) Required Maximum Outlet Area per Row, (A_o)</p> <p>D) Perforation Dimensions (enter one only): i) Circular Perforation Diameter OR ii) 2" Height Rectangular Perforation Width</p> <p>E) Number of Columns (nc, See Table 6a-1 For Maximum)</p> <p>F) Actual Design Outlet Area per Row (A_o)</p> <p>G) Number of Rows (nr)</p> <p>H) Total Outlet Area (A_{ot})</p>	<p><input checked="" type="checkbox"/> Orifice Plate <input type="checkbox"/> Perforated Riser Pipe Other: _____</p> <p>H = <u>2.00</u> feet $A_o =$ <u>0.56</u> square inches D = <u>0.8000</u> inches, OR W = _____ inches $nc =$ <u>1</u> number $A_o =$ <u>0.50</u> square inches $nr =$ <u>6</u> number $A_{ot} =$ <u>3.02</u> square inches</p>
<p>3. Trash Rack</p> <p>A) Needed Open Area: $A_t = 0.5 * (\text{Figure 7 Value}) * A_{ot}$</p> <p>B) Type of Outlet Opening (Check One)</p> <p>C) For 2", or Smaller, Round Opening (Ref.: Figure 6a):</p> <p>i) Width of Trash Rack and Concrete Opening (W_{conc}) from Table 6a-1</p> <p>ii) Height of Trash Rack Screen (H_{TR})</p>	<p>$A_t =$ <u>105</u> square inches</p> <p><input checked="" type="checkbox"/> $\leq 2"$ Diameter Round <input type="checkbox"/> 2" High Rectangular Other: _____</p> <p>$W_{conc} =$ <u>6</u> inches $H_{TR} =$ <u>48</u> inches</p>



DRAINAGE MAP