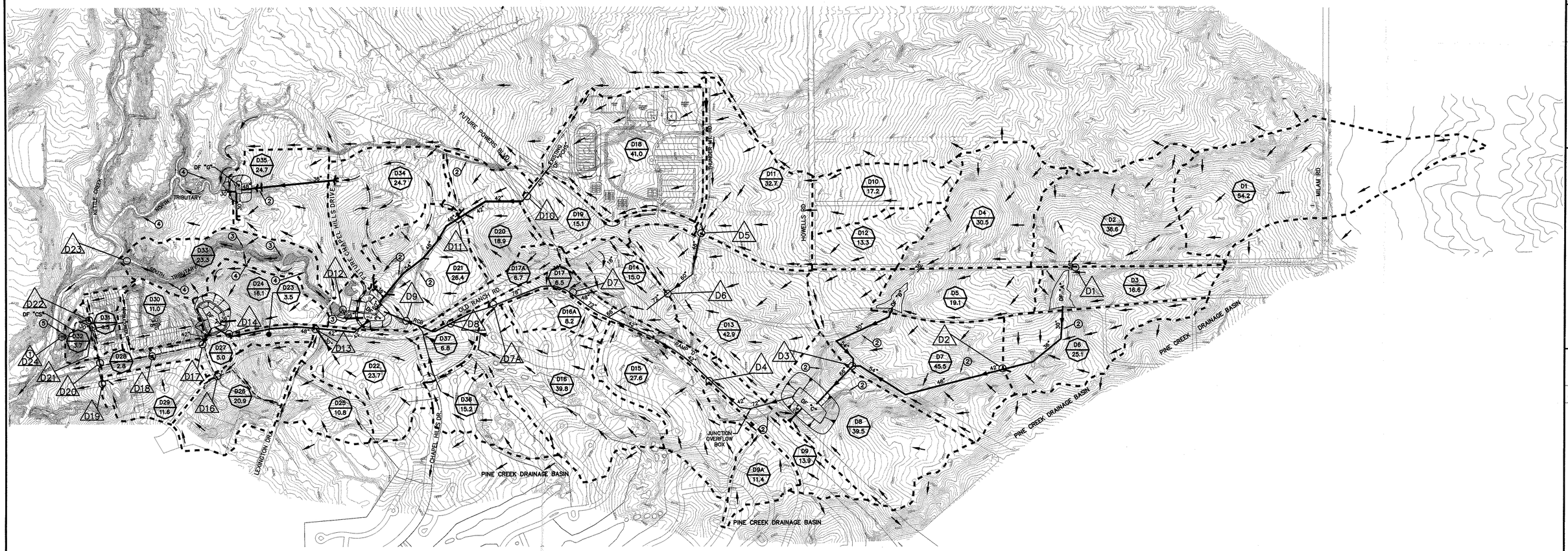
KETTLE CREEK DRAINAGE BASIN
OLD RANCH ROAD TRIBUTARY
MASTER DEVELOPMENT DRAINAGE PLAN

FULLY DEVELOPED CONDITION BASIN MAP AND MASTER PLAN



KEYED NOTES

1. ANALYSIS POINT D24 REPRESENTS A DIRECT ADDITION OF THE HYDROGRAPHS AT ANALYSIS POINT D23 AND THE OUTLET HYDROGRAPH FROM THE CREEKSIDE ESTATES REGIONAL DETENTION FACILITY. IT DOES NOT REFLECT ANY OTHER FLOW IN KETTLE CREEK.
2. NATURAL CHANNEL IS PROPOSED TO BE ELIMINATED IN THIS AREA. STORM WATER TO BE CONVEYED IN A PROPOSED STORM DRAIN.
3. REMOVE EXISTING EMBANKMENT DOWN TO LEVEL OF PERMANENT POOL. PROTECT REMAINING EMBANKMENT IF PRUDENT TO DO SO IN ORDER TO PROTECT AGAINST EXCESSIVE EROSION.
4. NATURAL CHANNEL PROPOSED TO REMAIN UNIMPROVED IN THIS AREA.
5. DETENTION FACILITY OUTLET AND SPILLWAY ARE PROPOSED TO BE REVISED.

GENERAL NOTES:

1. PROPOSED STORM DRAINS SHOWN ON THIS PLAN ARE ONLY INTENDED TO INDICATE GENERAL LOCATIONS AND APPROXIMATE SIZES OF FUTURE FACILITIES. ACTUAL STORM DRAIN SIZES AND LOCATIONS SHALL BE DETERMINED WITH MORE DETAILED ANALYSIS AT THE TIME OF DETAILED DESIGN OF THE FACILITIES. IT IS LIKELY THAT ADDITIONAL FACILITIES NOT SHOWN ON THIS PLAN WILL BE REQUIRED.
2. PROPOSED DETENTION FACILITIES SHOWN ON THIS PLAN ARE ONLY INTENDED TO INDICATE GENERAL LOCATIONS AND LAND AREA REQUIRED FOR THESE FACILITIES. ACTUAL LOCATIONS AND LAND AREA REQUIRED SHALL BE DETERMINED AT THE TIME OF DETAILED DESIGN OF THE FACILITIES.
3. EXCEPT AS OTHERWISE NOTED, THIS PLAN SHALL NOT MODIFY THE REQUIREMENTS OF PREVIOUSLY APPROVED MASTER DEVELOPMENT DRAINAGE PLANS AND FINAL DRAINAGE REPORTS.

SUB-BASIN DATA SUMMARY
FULLY DEVELOPED CONDITION

SUB BASIN I.D.	AREA (sq miles)	AREA (acres)	PERCENT IMPERVIOUS	CN	LAG (hours)	Q5 (cfs)	Q100 (cfs)
D1	0.085	54.2	5.0	67.5	0.383	17	72
D2	0.057	36.6	10.0	69.0	0.224	20	72
D3	0.026	16.6	33.3	75.0	0.287	13	40
D4	0.048	30.5	9.2	68.2	0.245	14	56
D5	0.030	19.1	30.5	74.5	0.239	16	47
D6	0.039	25.1	42.7	79.2	0.164	34	86
D7	0.071	45.5	46.8	79.8	0.173	62	157
D8	0.062	39.5	72.3	92.2	0.111	111	205
D9	0.022	13.9	41.1	77.0	0.291	14	37
D9A	0.018	11.4	31.8	74.5	0.213	10	30
D10	0.027	17.2	8.3	68.0	0.307	7	27
D11	0.051	32.7	29.6	74.2	0.231	27	81
D12	0.021	13.3	34.5	74.6	0.280	10	31
D13	0.067	42.9	72.6	91.5	0.123	115	219
D14	0.023	15.0	56.7	78.0	0.158	19	49
D15	0.043	27.6	31.0	75.0	0.200	26	75
D16	0.062	39.8	21.0	72.5	0.197	31	98
D16A	0.013	8.2	36.0	78.0	0.143	11	28
D17	0.010	6.5	32.8	76.5	0.117	10	25
D17A	0.011	6.7	80.9	99.0	0.120	21	36
D18	0.064	41.0	38.0	75.3	0.252	38	106
D19	0.024	15.1	40.0	80.9	0.122	25	58
D20	0.030	18.9	80.4	96.5	0.108	62	107
D21	0.041	26.4	62.5	86.5	0.137	56	117
D22	0.037	23.7	40.9	78.5	0.156	31	81
D23	0.005	3.5	56.7	88.0	0.110	8	15
D24	0.025	16.1	25.7	74.5	0.151	16	48
D25	0.017	10.8	53.2	82.2	0.156	18	42
D26	0.033	20.9	30.0	75.5	0.145	24	66
D27	0.008	5.0	46.5	80.0	0.143	8	19
D28	0.004	2.8	49.8	84.0	0.137	5	11
D29	0.018	11.6	37.8	78.2	0.146	15	40
D30	0.017	11.0	25.5	74.4	0.157	11	32
D31	0.007	4.5	40.0	78.5	0.146	6	16
D32	0.006	3.7	5.0	68.0	0.114	3	9
D33	0.036	23.3	10.4	70.2	0.138	18	59
D34	0.039	24.7	38.5	77.0	0.159	30	80
D35	0.039	24.7	40.0	78.0	0.161	32	83
D36	0.024	15.2	19.5	72.0	0.237	10	34
D37	0.011	6.8	93.1	99.0	0.124	23	40
TOTAL	1.269	812.0					

ANALYSIS POINT DATA SUMMARY
FULLY DEVELOPED CONDITION

ANALYSIS POINT	WATERSHED AREA (acres)	WATERSHED AREA (sm)	Q2 (cfs)	Q5 (cfs)	Q10 (cfs)	Q25 (cfs)	Q50 (cfs)	Q100 (cfs)	POINT DESCRIPTION
D1	90.8	0.14	11	31	48	79	102	127	TOTAL FLOW
DFA	107.4	0.17	17	44	66	105	134	165	TOTAL POND INFLOW
D2	132.5	0.21	30	64	81	101	116	131	TOTAL FLOW
DFB	49.8	0.08	13	30	44	68	85	103	TOTAL POND INFLOW
D3	227.6	0.36	73	148	198	254	291	330	TOTAL FLOW
DFC	267.1	0.42	139	237	311	405	465	524	TOTAL POND INFLOW
D4	278.5	0.44	47	64	73	85	93	102	TOTAL FLOW
D5	63.2	0.10	19	40	58	88	110	133	TOTAL FLOW
D6	106.1	0.17	90	141	178	238	280	323	TOTAL FLOW
D7	441.1	0.69	153	244	311	418	492	587	TOTAL FLOW
D7A	447.6	0.70	164	263	335	451	532	614	TOTAL FLOW
D8	502.3	0.78	191	310	398	538	637	739	TOTAL FLOW
D9	524.3	0.82	208	337	433	585	692	803	TOTAL FLOW
D10	56.1	0.09	15	25	32	44	54	65	TOTAL FLOW
D11	75.0	0.12	60	85	103	129	147	167	TOTAL FLOW
DFE	625.7	0.98	299	470	596	796	935	1079	TOTAL POND INFLOW
D12	**	0.98	9	77	148	297	417	525	OUTFLOW TO NAT. CHANNEL
D13	* 649.4	1.02	55	79	95	118	132	148	TOTAL FLOW
D14	* 652.9	1.02	58	84	101	127	144	161	TOTAL FLOW
DFF	* 669.0	1.05	66	100	123	159	184	208	TOTAL POND INFLOW
D16	* 31.7	0.05	23	41	55	77	92	108	TOTAL FLOW
D17	* 700.7	1.10	48	59	64	85	101	117	TOTAL FLOW
D18	* 705.7	1.10	49	59	72	98	116	135	TOTAL FLOW
D19	* 11.6	0.02	9	15	20	20	20	20	INTERCEPTED FLOW
D20	* 720.1	1.13	49	74	97	125	145	165	TOTAL FLOW
D21	* 731.1	1.14	49	84	111	146	171	196	TOTAL FLOW IN STORM DRAIN
D22	* 735.6	1.15	52	90	119	158	184	211	TOTAL FLOW
DFG	* 739.3	1.16	53	93	123	164	192	221	TOTAL POND INFLOW
D23	**	0.04	9	80	153	307	440	544	TOTAL FLOW
D24	762.6	1.19	40	111	188	348	501	630	TOTAL FLOW FROM "DFG" & D23
DFG	49.4	0.08	33	60	81	115	138	162	TOTAL POND INFLOW

* WATERSHED AREAS DO NOT REFLECT THE TRIBUTARY AREA REDUCTION DUE TO THE DIVERSION OF FLOW Q's ARE COMPUTED BASED ON THE ACTUAL BASIN AREAS.

** PEAK FLOW DIVERTED TO NATURAL CHANNEL DURING INFREQUENT RUNOFF EVENTS.

LEGEND

- 5660 — EXISTING CONTOUR 10'
- EXISTING CONTOUR 2'
- DEVELOPED BASIN BOUNDARY
- EXISTING STORM DRAIN
- 48" — ESTIMATED STORM DRAIN SIZE PROPOSED STORM DRAIN
- RBC — PROPOSED REINFORCED BOX CULVERT
- DRAINAGE DIRECTION
- D8 / 39.5 — BASIN IDENTIFIER / BASIN AREA (ACRES)
- D4 — ANALYSIS POINT
- ① — KEYED NOTE REFERENCE

DETENTION FACILITY DATA SUMMARY

DETENTION FACILITY I.D.	PEAK INFLOW (CFS) Q2	Q5	Q10	Q25	Q50	Q100	PEAK OUTFLOW (CFS) Q2	Q5	Q10	Q25	Q50	Q100	ESTIMATED PEAK STORAGE (ACRE-FEET) V2	V5	V10	V25	V50	V100
A	17	44	66	105	134	165	17	38	45	54	60	65	0	0.1	1	2	3	4
B	13	30	44	68	85	103	13	30	39	47	52	57	0	0.0	0.1	0.4	1	1
C	139	237	311	405	465	524	45	80	66	75	81	86	3	7	10	14	18	21
E	299	470	596	796	935	1079	60	137	213	366	489	600	11	16	19	23	25	28
F	66	100	123	159	184	208	48	57	61	66	71	76	8	8	8	8	8	9
G	33	60	81	115	138	162	2	11	23	31	36	41	1	2	2	3	4	4
CREEKSIDE	53	93	123	164	192	221	37	55	61	73	79	90	3	5	5	5	5	5
P.C. HIGH SCHOOL	19	38	51	74	90	106	1	6	14	29	33	36	1	1	2	2	3	3

UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE APPROPRIATE REVIEWING AGENCIES, J.R. ENGINEERING APPROVES THEIR USE ONLY FOR THE PURPOSES DESIGNATED BY WRITTEN AUTHORIZATION.

PREPARED FOR

J·R ENGINEERING
A Subsidiary of Westrian
430 ArrowsWest Drive • Colorado Springs, CO 80907
719-633-2868 • Fax: 719-633-5430
www.jrengineering.com

No.	REVISED ROYAL PINE DRIVE STORM SEWER AT POWERS RAMP "D"	BY	DATE
1		VSF	10/2002

H-SCALE 1"=400' | V-SCALE N/A | DATE 03/28/01 | DESIGNED BY VSF | DRAWN BY ELY | CHECKED BY

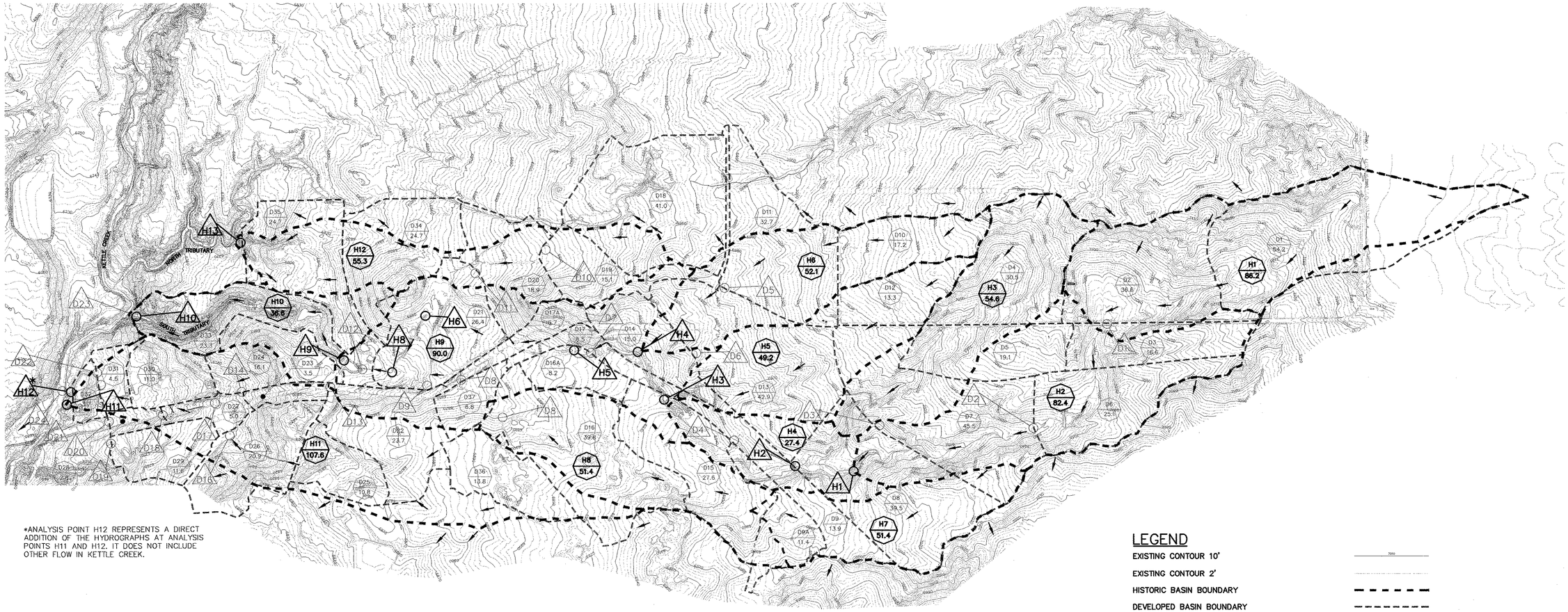
KETTLE CREEK DRAINAGE BASIN

OLD RANCH ROAD TRIBUTARY
MASTER DEVELOPMENT DRAINAGE PLAN
FULLY DEVELOPED CONDITION
BASIN MAP AND MASTER PLAN

SHEET 1 OF 1

JOB NO. 28877.10

KETTLE CREEK DRAINAGE BASIN
OLD RANCH ROAD TRIBUTARY
DRAINAGE BASIN PLANNING STUDY AND MASTER DEVELOPMENT DRAINAGE PLAN
HISTORIC CONDITION DRAINAGE BASIN MAP



*ANALYSIS POINT H12 REPRESENTS A DIRECT ADDITION OF THE HYDROGRAPHS AT ANALYSIS POINTS H11 AND H12. IT DOES NOT INCLUDE OTHER FLOW IN KETTLE CREEK.

LEGEND

- EXISTING CONTOUR 10'
- EXISTING CONTOUR 2'
- HISTORIC BASIN BOUNDARY
- DEVELOPED BASIN BOUNDARY
- DRAINAGE FLOW ARROW
- DEVELOPED BASIN IDENTIFIER / AREA IN ACRES (D15 / 33.2)
- HISTORIC BASIN IDENTIFIER / AREA IN ACRES (H4 / 27.4)
- HISTORIC ANALYSIS POINT (H2)
- DEVELOPED ANALYSIS POINT (H2)

N

500 250 0 500 1000

SCALE: 1" = 500'

(HISTORIC) UNDEVELOPED CONDITION BASIN DATA AND FLOW RATE SUMMARY

SUBBASIN ID ⊖	AREA (acres)	AREA (sq mi)	CN	LAG (hrs)	Q10 (cfs)	q10 (cfs/ac)	Q100 (cfs)	q100 (cfs/ac)
H1	86.2	0.135	66	0.420	35	0.4	99	1.1
H2	82.4	0.129	66	0.303	43	0.5	118	1.4
H3	54.6	0.085	66	0.314	27	0.5	76	1.4
H4	27.4	0.043	66	0.188	19	0.7	51	1.9
H5	49.2	0.077	66	0.286	27	0.5	72	1.5
H6	52.1	0.081	66	0.392	22	0.4	62	1.2
H7	37.8	0.059	66	0.359	17	0.4	48	1.3
H8	51.4	0.080	66	0.346	24	0.5	67	1.3
H9	90.0	0.141	66	0.359	47	0.5	130	1.4
H10	36.6	0.057	66	0.215	24	0.7	63	1.7
H11	107.6	0.168	66	0.411	45	0.4	125	1.2
H12	55.3	0.086	66	0.397	23	0.4	65	1.2

(HISTORIC) UNDEVELOPED CONDITION ANLYSIS POINT WATERSHED AREA AND FLOW RATE SUMMARY

ANALYSIS POINT △	AREA (acres)	AREA (sq mi)	Q2 (cfs)	Q5 (cfs)	Q10 (cfs)	Q25 (cfs)	Q50 (cfs)	Q100 (cfs)
H1	166	0.26	11	36	60	105	140	179
H2	224	0.35	14	48	81	144	193	247
H3	301	0.47	18	60	99	181	246	317
H4	352	0.55	22	73	121	217	294	376
H5	352	0.55	22	72	121	216	291	376
H6	352	0.55	22	73	120	215	291	374
H7	90	0.14	7	23	35	60	81	103
H8	442	0.69	27	94	155	274	371	477
H9	531	0.83	31	107	178	320	432	557
H10	570	0.89	32	110	184	331	448	577
H11	109	0.17	9	28	45	76	99	125
H12	678	1.06	37	129	219	398	535	693
H13	58	0.09	5	14	23	40	52	65

NOTES:

1. PEAK FLOW RATES WERE ESTIMATED WITH HEC-1 COMPUTER MODEL USING THE SCS UNIT HYDROGRAPH METHOD.
2. HISTORIC FLOW RATES WERE ESTIMATED BASED ON AN ASSUMED CONDITION PRIOR TO ANY DEVELOPMENT IN THE WATERSHED. TOPO SHOWN ON THIS MAP REFLECTS SOME CHANGES CAUSED BY DEVELOPMENT. HOWEVER, FLOW PATHS UTILIZED IN THIS ANALYSIS WERE ESTIMATED BASED ON PRE-DEVELOPMENT CONDITIONS TO THE EXTENT POSSIBLE.

UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE APPROPRIATE REVIEWING AGENCIES, JR ENGINEERING APPROVES THEIR USE FOR ANY PURPOSES DESIGNATED BY WRITTEN AUTHORIZATION.

PREPARED FOR

JR ENGINEERING
A Subsidiary of Westrian
4391 Arrowswest Drive • Colorado Springs, CO 80907
719-593-2593 • Fax 719-593-2636
www.jrengineering.com

No.	REVISION	BY	DATE

H-SCALE 1"=500' | V-SCALE N/A | DATE 04/18/01 | DESIGNED BY VSF | DRAWN BY SDG | CHECKED BY

KETTLE CREEK DRAINAGE BASIN
OLD RANCH ROAD TRIBUTARY
DRAINAGE BASIN PLANNING STUDY AND MASTER DEVELOPMENT DRAINAGE PLAN
HISTORIC DRAINAGE BASIN MAP

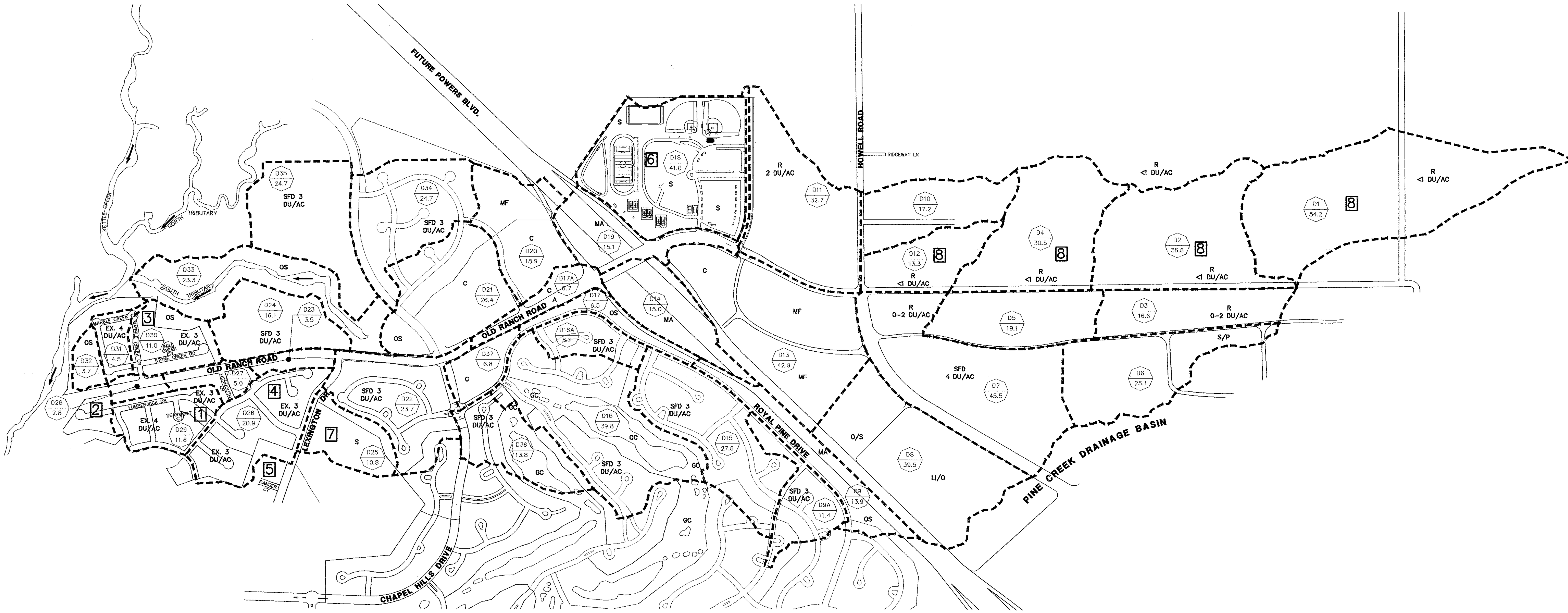
SHEET 1 OF 1

JOB NO. 8877.10

DRAINAGE BASIN PLANNING STUDY AND MASTER DEVELOPMENT DRAINAGE PLAN

PLATTED SUBDIVISION I.D. AND LAND USE MAP

KETTLE CREEK DRAINAGE BASIN
OLD RANCH ROAD TRIBUTARY



LAND USE LEGEND

DESCRIPTION	SYMBOL
COMMERCIAL	C
LIGHT INDUSTRIAL/OFFICE	LI/O
OPEN SPACE	OS
RURAL RESIDENTIAL	R
GOLF COURSE	GC
MAJOR ARTERIAL ROADWAY	MA
MULTI FAMILY RESIDENTIAL	MF
SINGLE FAMILY DETACHED	SFD
SCHOOL	S
SCHOOL/PARK	S/P
SINGLE FAMMILY ATTACHED	SFA
DWELLING UNITS PER ACRE	XX DU/AC
EXISTING DEVELOPMENT	EX

SUBDIVISION INDEX

SUBDIVISION INDEX	☐
CREEKSIDE ESTATES FILING NO. 1	1
CREEKSIDE ESTATES FILING NO. 2	2
CREEKSIDE ESTATES FILING NO. 3	3
CREEKSIDE ESTATES FILING NO. 4	4
KITTY HAWK VILLAGE IN CHAPEL HILLS	5
ACADEMY HIGHSCHOOL FILING NO. 5	6
PINE CREEK FILING NO. 10	7
MISCELLANEOUS 4 ACRE TO 20 ACRE LOTS	8

NOTE:

THE LAND USES SHOWN ON THIS MAP ARE THE LAND USES ASSUMED FOR THE PUPOSE OF PREPARING THIS MDDP AND ASSOCIATED DRAINAGE ANALYSIS. THESE LAND USES ARE PATTERNED AFTER THE MAY 1998 BRIARGATE MASTER PLAN AND MORE SPECIFIC NEIGHBORHOOD PLANS WHERE AVAILABLE.

LEGEND

SUB-BASIN ID (BASIN)
SUB-BASIN AREA (ACRES) (ACRE)
SUB-BASIN BOUNDARY - - - - - - - -

500 250 0 500 1000
SCALE: 1" = 500'

KETTLE CREEK DRAINAGE BASIN
OLD RANCH ROAD TRIBUTARY
DRAINAGE BASIN PLANNING STUDY AND
MASTER DEVELOPMENT DRAINAGE PLAN
PLATTED SUBDIVISION I.D. AND LAND USE MAP
JOB NO. 8877.10
04/18/01
SHEET 1 OF 1

J·R ENGINEERING
A Subsidiary of Westrian
4310 ArrowsWest Drive • Colorado Springs, CO 80907
719-593-2593 • Fax 719-528-6613 • www.jrengineering.com

KETTLE CREEK DRAINAGE BASIN
OLD RANCH ROAD TRIBUTARY
DRAINAGE BASIN PLANNING STUDY AND MASTER DEVELOPMENT DRAINAGE PLAN
EXISTING STORM DRAIN FACILITY MAP

STORM DRAIN PIPE DATA TABLE				
I.D. NUMBER	LENGTH	DIAMETER	TYPE	SLOPE
SD1	81'	24"	RCP	1.00%
SD2	26'	48"	RCP	2.20%
SD3	11'	48"	RCP	2.50%
SD4	56'	48"	RCP	2.50%
SD5	30'	24"	RCP	2.00%
SD6	85'	24"	RCP	2.00%
SD7	208'	24"	RCP	9.60%
SD8	364'	48"	RCP	2.50%
SD9	31'	48"	RCP	2.25%
SD10	148'	18"	RCP	13.20%
SD11	27'	42"	RCP	5.14%
SD12	494'	42"	RCP	5.14%
SD13	440'	42"	RCP	5.00%
SD14	114'	42"	RCP	4.00%
SD15	71'	30"	RCP	3.64%
SD16	33'	42"	RCP	4.00%
SD17	336'	42"	RCP	4.00%
SD18	36'	36"	RCP	2.00%
SD19	103'	36"	RCP	2.20%
SD20	21'	36"	RCP	2.20%
SD21	10'	36"	RCP	2.50%
SD22	168'	36"	RCP	4.80%
SD23	296'	30"	RCP	9.60%
SD24	181'	30"	RCP	2.80%
SD25	24'	30"	RCP	2.80%
SD26	8'	30"	RCP	1.20%
SD27	81'	30"	CMP	3.60%
SD28	63'	48"	RCP	1.00%
SD29	92'	48"	RCP	1.00%
SD30	81'	24"	RCP	1.00%

DRAINAGE INLET DATA TABLE				
I.D. NUMBER	LENGTH	TYPE	DEPTH	CONNECTOR STORM DRAIN
DI1	6'	D-10-R	4.5'	37', 18" RCP @ 2.00%
DI2	4'	D-10-R	5.0'	54', 24" RCP @ 2.00%
DI3	4'	D-10-R	5.0'	N/A
DI4	10'	D-10-R	4.5'	37', 24" RCP @ 2.00%
DI5	20'	D-10-R	6.0'	N/A
DI6	20'	D-10-R	4.0'	29', 30" RCP @ 2.00%
DI7	14'	D-10-R	3.7'	N/A
DI8	20'	D-10-R	3.0'	37', 18" RCP @ 1.00%
DI9	20'	D-10-R	3.5'	48', 18" RCP @ 4.00%
DI10	20'	D-10-R	3.0'	54', 18" RCP @ 4.00%
DI11	20'	D-10-R	4.0'	52', 24" RCP @ 5.00%
DI12	20'	D-10-R	5.0'	14', 18" RCP @ 5.00%
DI13	10'	D-10-R	3.0'	45', 18" RCP @ 8.80%
DI14	10'	D-10-R	4.5'	180', 18" RCP @ 1.50%
DI15	18'	D-10-R	8.0'	5', 36" RCP @ 1.00%
DI16	10'	D-10-R	8.0'	N/A
DI17	16'	D-10-R	9.0'	N/A
DI18	15'	D-10-R	4.0'	50', 24" RCP @ 1.00%
DI19	10'	D-10-R	6.0'	20', 24" RCP @ 20.00%

MANHOLE DATA TABLE		
I.D. NUMBER	TYPE	DEPTH (FT)
MH1	TYPE 1	9.5'
MH2	TYPE 1	6.0'
MH3	TYPE 1	7.8'
MH4	TYPE 1	11.9'
MH5	TYPE 1	8.7'
MH6	TYPE 1	11.0'

NOTE:

THE INFORMATION CONTAINED ON THIS MAP WAS OBTAINED IN THE REVIEW OF DRAINAGE PLANS AND CONSTRUCTION PLANS. THE INFORMATION IS INTENDED TO DEMONSTRATE THE GENERAL EXTENT OF EXISTING DRAINAGE FACILITIES AND IS NOT INTENDED OR WARRANTED FOR ANY OTHER USE.

LEGEND

SUB-BASIN ID — D6
SUB-BASIN AREA (ACRES) — 25.1
SUB-BASIN BOUNDARY
EXISTING STORM DRAIN — SD15
EXISTING STORM MANHOLE — MH1
EXISTING STORM DRAIN INLET — DI15

400 200 0 400 800
SCALE: 1" = 400'

KETTLE CREEK DRAINAGE BASIN
OLD RANCH ROAD TRIBUTARY
DRAINAGE BASIN PLANNING STUDY AND MASTER DEVELOPMENT DRAINAGE PLAN
EXISTING STORM DRAIN FACILITY MAP
JOB NO. JOB NO. 8877.10
04/18/01
SHEET 1 OF 1

J·R ENGINEERING
A Subsidiary of Westrian
4310 ArrowsWest Drive • Colorado Springs, CO 80907
719-593-2593 • Fax: 719-528-6613 • www.jrengineering.com