

**DRAINAGE REPORT**  
**FOR**  
**CHEYENNE MOUNTAIN BOULEVARD**

**APPROVED SUBJECT TO:**

1. Approval of Master Drainage Plan
2. That no additional flows other than those shown will be allowed to enter the roadway or system

*Approved R.A. [Signature] 10/12/23*



**Drexel, Barrell & Co.**

**SURVEYORS • ENGINEERING CONSULTANTS**

1425 PEARL STREET      BOULDER, COLORADO 80302      PHONE 442-4338

**DRAINAGE REPORT**

**FOR**

**CHEYENNE MOUNTAIN BOULEVARD**

CERTIFICATIONS

I, John A. Proffit, a registered engineer in the State of Colorado, hereby certify that the attached drainage plan and report for proposed Cheyenne Mountain Boulevard were prepared under my direction and supervision and are correct to the best of my knowledge and belief. I further certify that said drainage report is in accordance with all City of Colorado Springs ordinances, specifications and criteria, to the best of my knowledge.



John A. Proffit

The developer has read and will comply with all of the requirements specified in this drainage report as approved by the City Engineer.

By Robert E. [Signature]

Title Project Engineer

DRAINAGE REPORT  
CHEYENNE MOUNTAIN BOULEVARD

This project consists of completing construction of Cheyenne Mountain Boulevard from where it presently ends at Quail Lake Road, to the intersection with Highway 85-87. The street as proposed is approximately 2000 feet long, is located in the S $\frac{1}{2}$  NW $\frac{1}{4}$  and the N $\frac{1}{2}$  SW $\frac{1}{4}$  of Section 32, T. 14 S., R. 66 W. of the 6th P.M., and will drain a basin containing approximately 41 acres. This portion of Cheyenne Mountain Boulevard does not lie within a subdivision.

The drainage has been studied for this project in order that adequate drainage facilities can be provided in the street at the time of construction. The areas fronting on and draining into this street have not yet been subdivided and are not developed. The drainage area considered herein comprises the entire contributing area of a small natural drainage basin which is now carried under Highway 85-87 by one small existing culvert. The natural drainage is overland easterly to an existing natural channel to Interstate Highway I-80. There exists a large box culvert under the

Interstate Highway, which also receives the drainage from a large additional portion of Cheyenne Mountain Ranch. This drainage is being studied by others and will be considered in a separate report.

The area contributing drainage to Cheyenne Mountain Boulevard is planned for development as a laboratory and research center. The Rational Method was used in computation of storm runoff. It was estimated that the maximum "C" after total development would be 0.5. A one-hour rainfall of 2 inches was used. All drainage basins considered in this design are indicated on the enclosed Drainage Plan, and all data and calculations are shown on the Drainage Design Data sheet enclosed herein.

Since the area under consideration is greater than 20 acres, the drainage calculations were checked by the Synthetic Hydrograph Method. These calculations are indicated on the Design Data sheet enclosed herein. In all cases the flow calculated by the Hydrograph Method was less than that obtained by using the Rational Method. Therefore, the data resulting from the Rational Method was used in the design of drainage facilities.

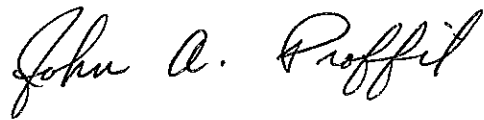
The water will be carried within the street until the quantity reaches the maximum allowable quantity. It will then be picked up by standard City of Colorado Springs Catch Basins at the location indicated on the enclosed Drainage Plan. The runoff will then be carried through the proposed new storm sewer down Cheyenne Mountain Boulevard. The remaining runoff will be introduced into the storm sewer through additional inlets near the end of the project, and then the flow will be carried under Highway 85-87 through a bored and jacked 36" R.C.P. On the east side of the highway the flow will be dispersed into overland flow by a short length of rippapped channel. The runoff will reach the aforementioned natural drainage channel by overland flow.

The land onto which this runoff is being dumped is owned by Gates Land Company, the builders of Cheyenne Mountain Boulevard. The subject land is eventually planned for development as commercial area, and the runoff water will probably have to be picked up and piped at the time this land is developed.

An estimated cost of the storm drainage system proposed herein follows:

<u>Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Amount</u>
24" R.C.P. CL III	L.F.	1022	26.00	\$26,572
27" R.C.P. CL III	L.F.	80	29.00	2,320
18" R.C.P. CL III	L.F.	20	22.00	440
36" R.C.P. CL III	L.F.	120	32.00	3,840
36" R.C.P., B&J	L.F.	50	150.00	7,500
STANDARD MANHOLES	EA.	4	450.00	1,800
STANDARD CATCH BASINS	EA.	4	1000.00	4,000
DISCHARGE CHANNEL	L.S	-	1500.00	<u>1,500</u>
TOTAL ESTIMATED COST				\$47,972

Respectfully submitted,  
Drexel, Barrell & Company



John A. Proffit, P.E.

# STORM DRAINAGE DESIGN DATA - SYNTHETIC HYDROGRAPH METHOD

LOCATION OF DESIGN POINT	BASIN	AREA		L (FT.)	H (FT.)	Tc (HR.)	D (HR.)	Tp (HR.) (0.6Tc + D/2)	RUNOFF CURVE NUMBER	Q (IN.)	PEAK RUNOFF Qp (C.F.S.) $\frac{484 AQ}{Tp}$	SUMMATION RUNOFF (C.F.S.)	STREET INTERSECTIONS	REMARKS	
		AC.	SQ. MI.												
A	1	2.9	0.005	400	19	0.1	1	0.56	96	1.4	6.1			LESS THAN CALCULATION BY RATIONAL METHOD	
B	2	15.6	0.024	1800	170	0.1	1	0.56	96	1.4	29.1			" "	
C	3	10.1	0.024	2030	104	0.15	1	0.59	96	1.4	18.4			" "	
D	4	4.9	0.008	690	48	0.1	1	0.56	96	1.4	9.7			" "	
E	5	7.4	0.012	1040	68	0.1	1	0.56	96	1.4	14.5			" "	
												77.80			
TOTAL BASIN		40.9	0.064	2900	118	0.2	1	0.62	96	1.4	70.0	70.0			



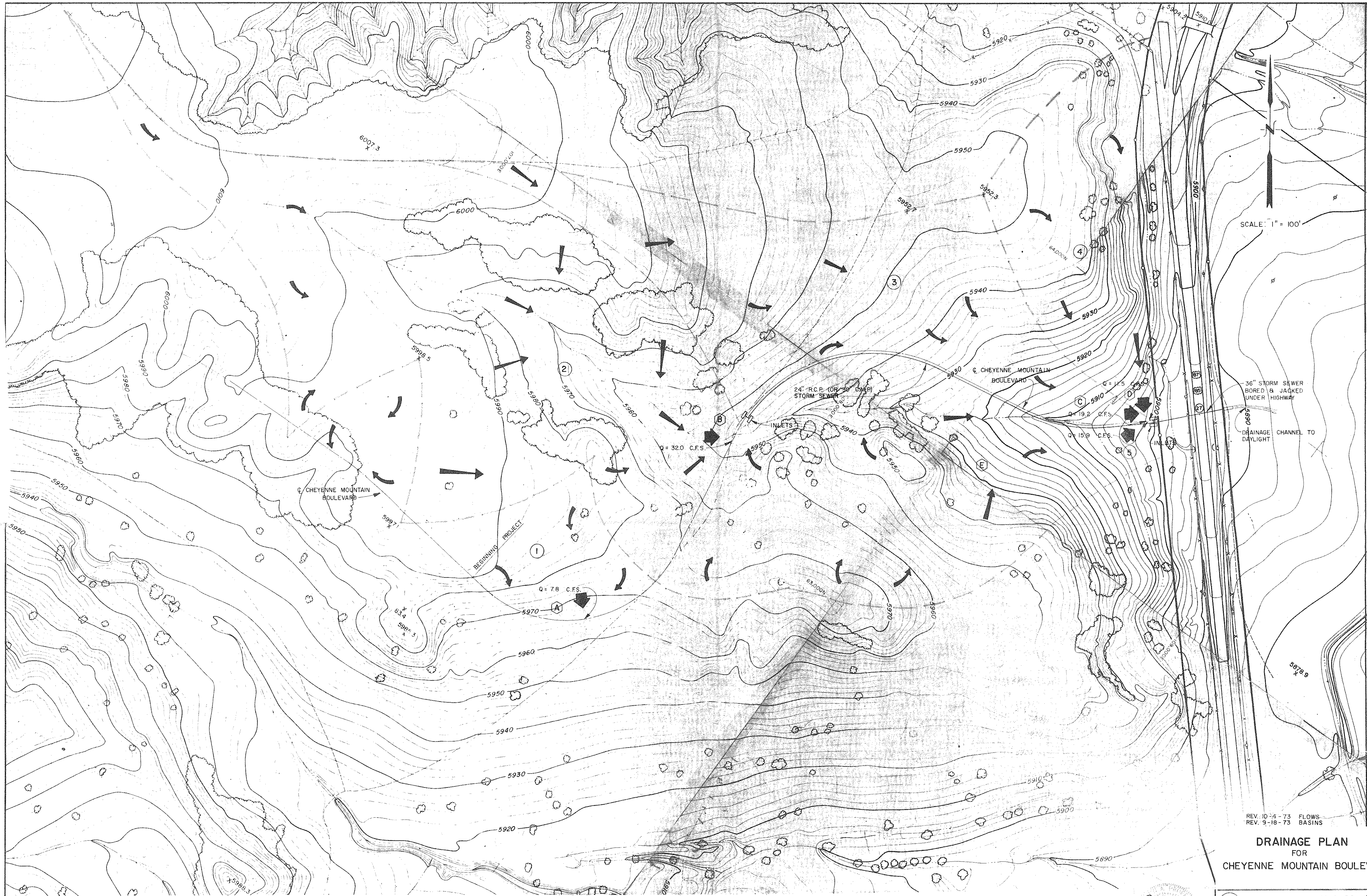
STORM DRAINAGE SYSTEM PRELIMINARY DESIGN DATA																						
Location of Design Point	Basins	Length ft.	Inlet Time min.	Flow Time		Time of Concentration min.	Coefficient "C"	Intensity "I" in./hr.	Area "A" acre	Direct Runoff cfs	Other Runoff cfs	Summation Runoff cfs	Street		Pipe			Street		Pipe		Remarks
				Street min.	Pipe min.								Slope %	Allowable Capacity cfs	Slope %	Size in.	Capacity cfs	Design cfs	Velocity fps	Design cfs	Velocity fps	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
A	1	400				11	0.5	5.4	2.9	7.8		7.8	0.65	30								RUNOFF INTO STREET CARRY IN STREET
B	2	1800				18	0.5	4.1	15.6	32.0	7.8	39.8			5.5	24	53					PICKED UP BY NEW INLETS CARRIED IN NEW STORM SEWER
C	3	2030				20	0.5	3.8	10.1	19.2		19.2										
D	4	690				13	0.5	4.7	4.9	11.5	19.2	30.7										
E	5	1040				16	0.5	4.3	7.4	15.9	30.7	46.6			1.6	36	84					RUNOFF FROM BASINS 3 4 & 5 IS PICKED UP IN NEW INLETS IN STREET. TOTAL COMBINED FLOW OF 86.4 C.F.S. IS CARRIED UNDER HIGHWAY IN NEW STORM SEWER, AND DISPERSED INTO OVERLAND FLOW.

FIGURE 6-1. TYPICAL FORM FOR STORM DRAINAGE SYSTEM PRELIMINARY DESIGN DATA

DRAINAGE DESIGN DATA  
CHEYENNE MOUNTAIN BLVD.

9/17/73





SCALE: 1" = 100'

REV. 10-4-73 FLOWS  
REV. 9-18-73 BASINS

**DRAINAGE PLAN**  
FOR  
**CHEYENNE MOUNTAIN BOULEVARD**

*John A. Puffert*  
8/27/73

<b>DREXEL, BARRELL &amp; CO.</b> REGISTERED SURVEYORS CONSULTING ENGINEERS BOULDER, COLORADO		
DATE 8-21-73 SCALE 1" = 100'	DRAWN K.P. & R.P.	NO. CID-008