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DRAINAGE PLAN
PIKES PEAK PARK SUBDIVISION
NOS. 10, 11, 12, 13
COLORADO SPRINGS, COLORADO

DONELL JEFFRIES
PROFESSIONAL ENGINEER
REGISTERED LAND SURVEYOR
SUBDIVISION LAYOUT & DESIGN

1502 Rainier Drive PH. 636-5138
Colorado Springs, Colorado 80910

April 5, 1965

Director of Public Works

City of Colorado Springs

Colorado Springs, Colorado

Dear Sir:

Enclosed is the drainage report and plans for removing rainfall runoff from Pikes Peak Park Subdivisions No. 10, 11, 12, and 13 in Colorado Springs, Colorado.

Respectfully submitted,

Donell Jeffries

Registered Engineer # 3479

DRAINAGE PLAN

PIKES PEAK PARK

SUBDIVISIONS NO. 10, 11, 12, & 13

COLORADO SPRINGS

COLORADO

TABLE OF CONTENTS

DISCUSSION OF AREA

Pikes Peak Park Subdivisions No. 10, 11, 12, and 13 lie in Southeast Colorado Springs, being just North of Hancock Road and East of South Circle Drive. The area is being planned as a medium to lower price residential district, with fairly small lots and minimum street widths.

All of the subdivisions will drain into Sand Creek, primarily by the route of Monterey Road. The topography is rolling except for steep hills along the west side and a flat area near the Sand Creek channel. Soils in the area have been found to consist mostly of sands except for very small areas of clay at a few locations. The infiltration should be high into this type soil with consequent lower runoff from rainfall. This soil is classified in the "B" group in hydrologic soil classification.

In estimating the storm water runoff, 40% of the area was considered impervious, consisting of paved streets, roofs, concrete walks and drives. The remaining 60% was assumed to fall in Curve No. 69, Table A-2, Page 426, "Design of Small Dams".* The rainfall pattern assumed was the same as that used in the Sand Creek Drainage Study and Master Drainage Plan of the City of Colorado Springs. In this study the 50 year frequency, one hour duration, 2.0 inch intensity storm was considered as producing the highest probable flood peaks.

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* "Design of Small Dams", United States Bureau of Reclamation, 1961.

There are three main drainage routes serving these subdivisions. Approximately 49 acres will drain to the Southwest corner of Subdivision No. 10. The quantity of water at the intersection of Carmel Drive and Del Mar Drive will be about 63 c.f.s. This amount should be carried adequately between the curbs of Carmel Drive with no need for extra drainage facilities at this point.

The major portions of these four subdivisions will drain into Monterey Road and thence into Sand Creek. As shown by the attached hydrographs the quantity of storm water runoff does not become excessive except near the East end of Subdivision No. 11. In order to reduce the cost of the drainage facilities and increase the capacity of the street itself, Monterey Road has been designed with a 60 feet curb to curb width. The curbs will be 8 inches deep and kept in balance across the street. This permits the street to carry approximately 240 c.f.s..

The policy of the city has been to carry any excess over one half of the street capacity in storm sewers or ditches. Therefore a ditch will be required from the intersection of Laramie Drive to Sand Creek in order to prevent Monterey Road from being overloaded.

The open ditch design will also be used to convey the drainage coming down San Marcos Drive from Granada Drive into Sand Creek. This section of ditch will be only about 150 feet long. An easement 10 feet wide will be required for this ditch.

It is felt that the concrete lined ditch will be less expensive and more trouble free than underground systems. Since the street has a right of way of 80 feet, it is possible to provide such ditch and still maintain adequate width driving lanes. At intersections the flow will be carried in pipe-arch corrugated metal pipe culverts.

Pikes Peak Park Subdivision No. 13 is bordered on the east side by Sand Creek, one of the smaller tributaries of Fountain Creek. The Sand Creek Basin consists of about 50 square miles along the Northeast and East side of Colorado Springs. The existing channel near Subdivision No. 13 is quite wide and irregular. In line with the Master Drainage Plan of the City, it is planned to straighten the channel and make it serve as a green belt conductor of surface drainage.

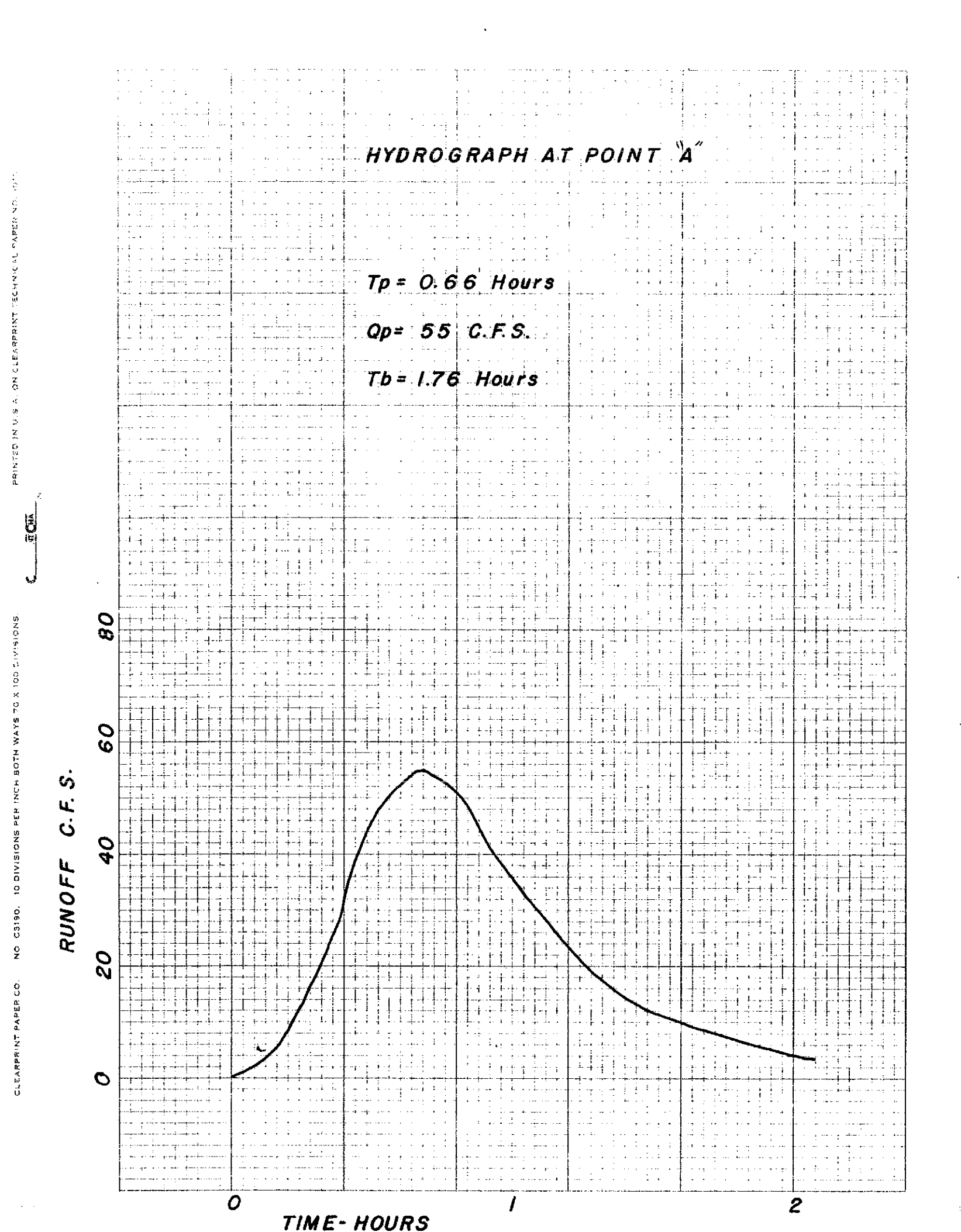
Some consideration has been given to providing upstream flood control in the nature of retention reservoirs which would retain a portion of the peak flow for later release. No such reservoirs exist at the present time, however, and the probable flood has been assumed in this report to be uncontrolled by such dams and reservoirs.

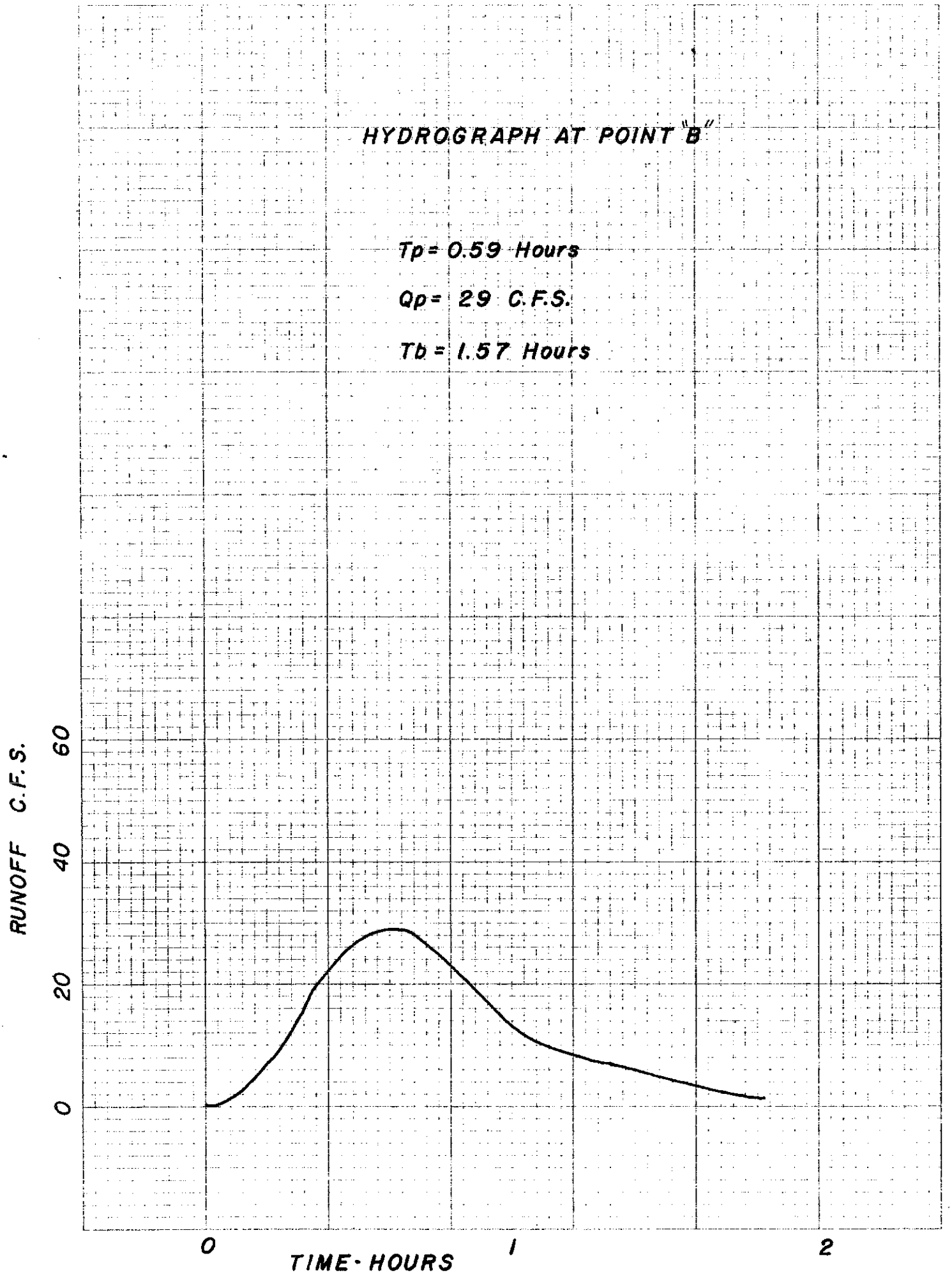
Although there is rarely any flow of water at all in the creek, sometimes several years elapsing between such occurrences, it is possible for Sand Creek to suddenly become a serious threat from flooding. The possibility of damage by flood waters have been viewed by different engineers with widely varying opinions.

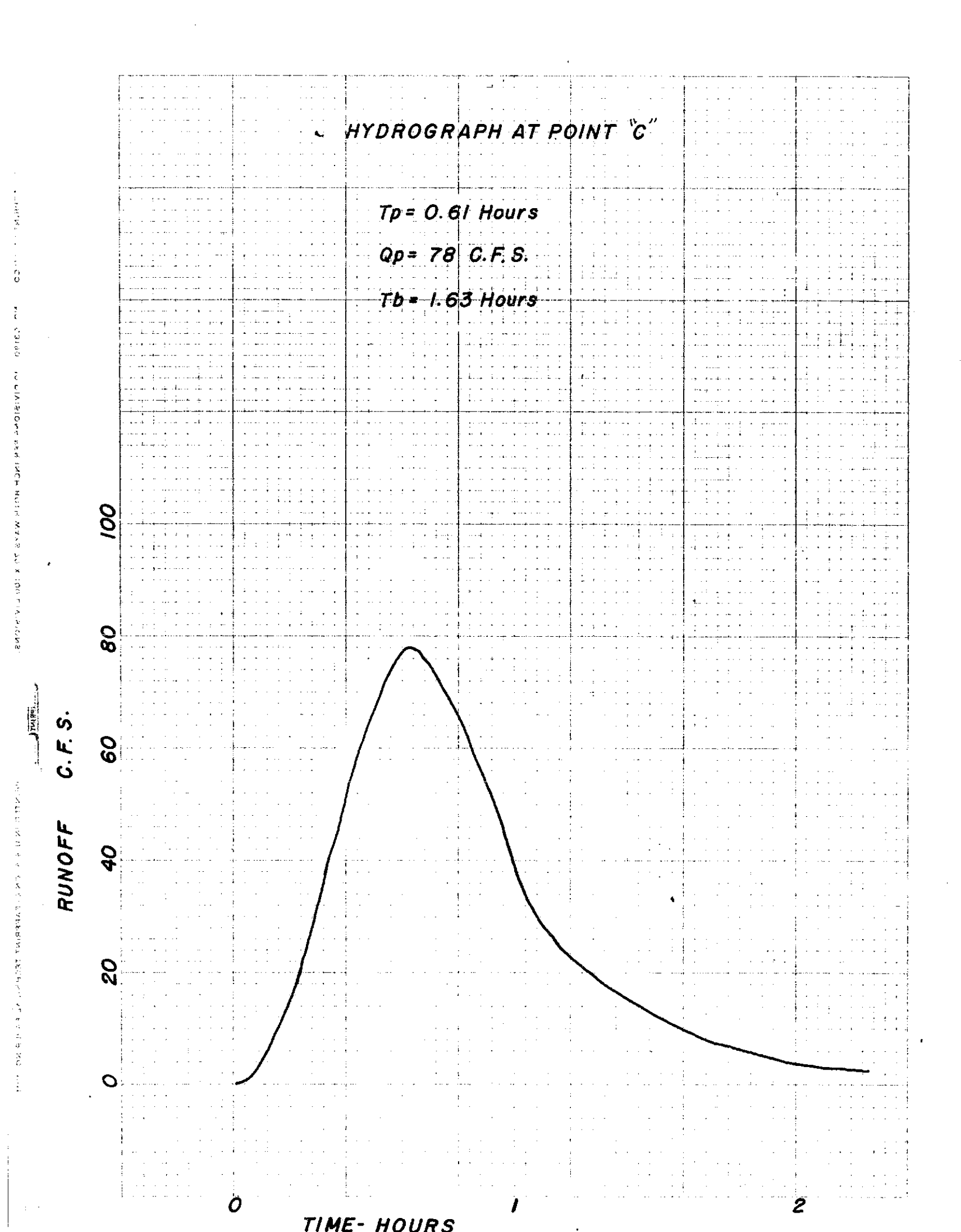
For example, the design of Hancock Road across the creek by El Paso County in 1964 provided only about 20 square feet of opening for culverts. Conversely, the Master Drainage Plan of the City recommends an opening of 1100 square feet at this point.

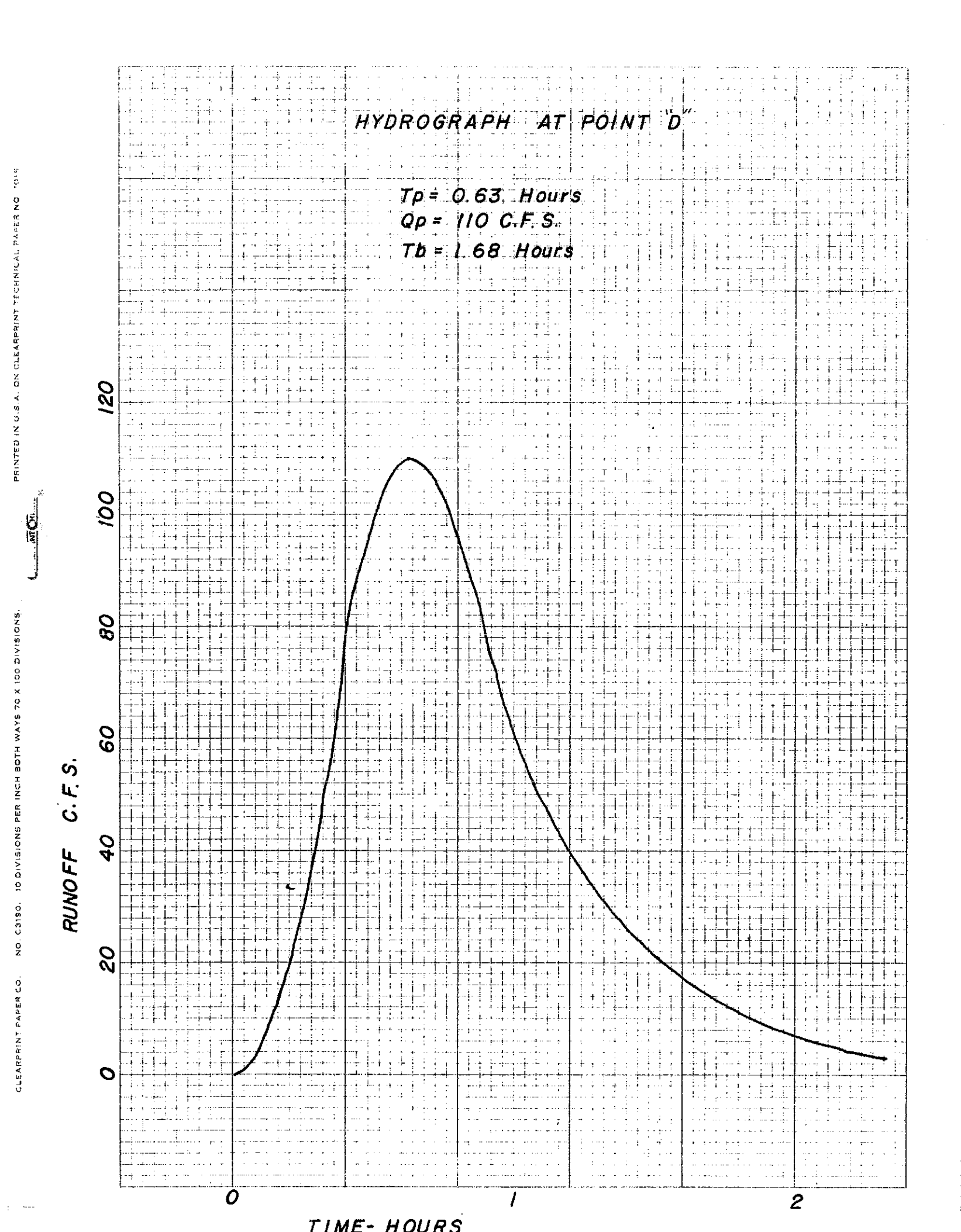
The same drainage study, using the synthetic hydrograph method, shows that a maximum probable flood peak of 11,000 cubic feet per second can be expected. A trapezoidal channel, 250 feet wide at the top, 150 feet wide at the bottom, 5 feet deep, and on a slope of 1.5 % can carry a volume of 20,000 cubic feet per second. In addition to the actual channel, the residences near the green belt are planned to be built 4 or 5 feet higher than the bank of the creek. This should allow a safety factor of about 4 to 1 in regard to possible damage from floods to houses near the creek.

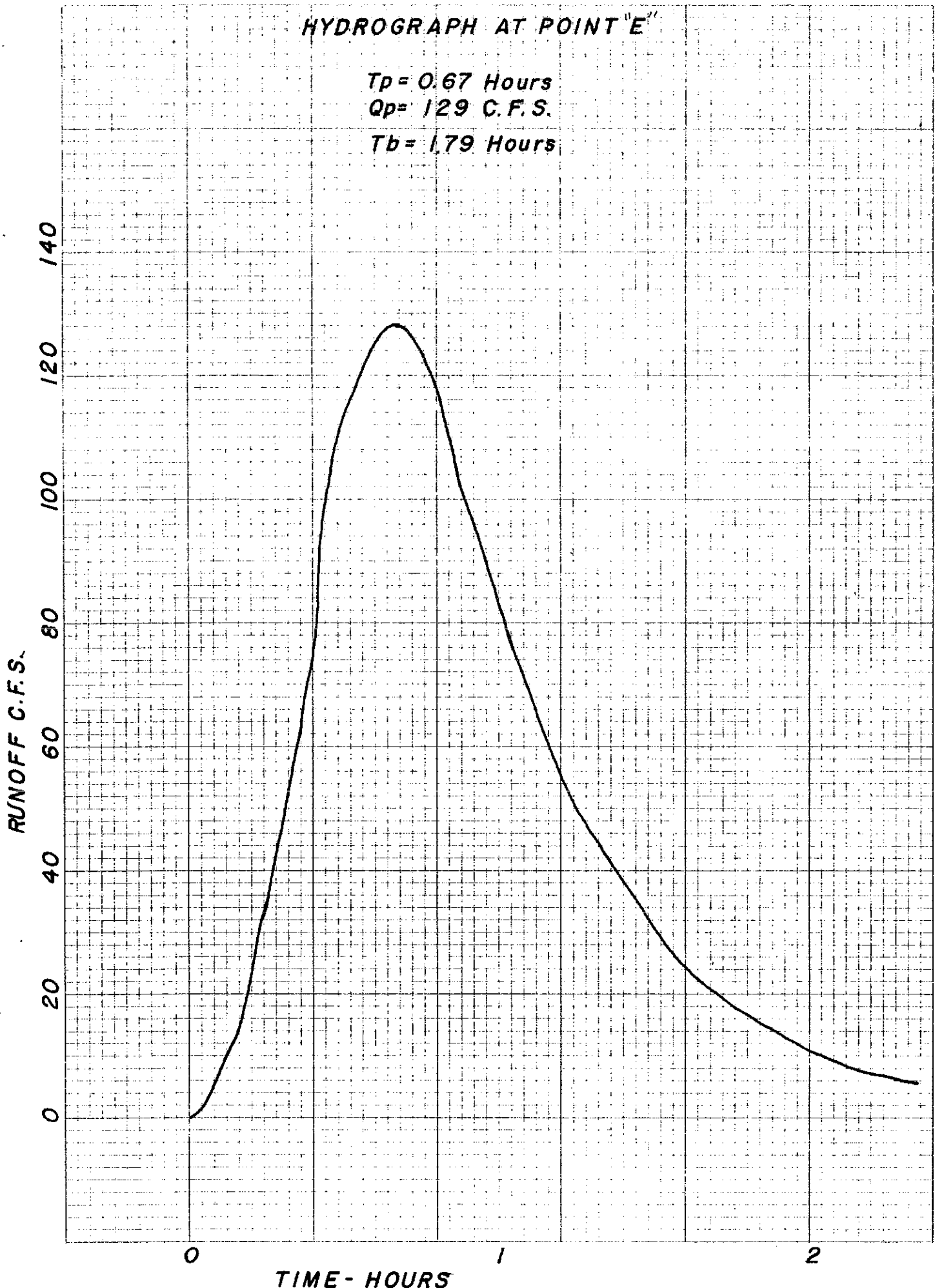
The inadequate amount of culvert capacity at Hancock Road and Sand Creek is a matter of some concern. The road will act as a dam in most cases, creating a reservoir about 7 feet deep. The road will then be topped by the flood and the water will spread out up and down Hancock which is on a fairly flat grade at this point. Even though the road itself may be damaged or destroyed, the houses in Subdivision No. 13 should be in little danger as they will be a minimum of 4 feet above the elevation of Hancock Road at the creek.

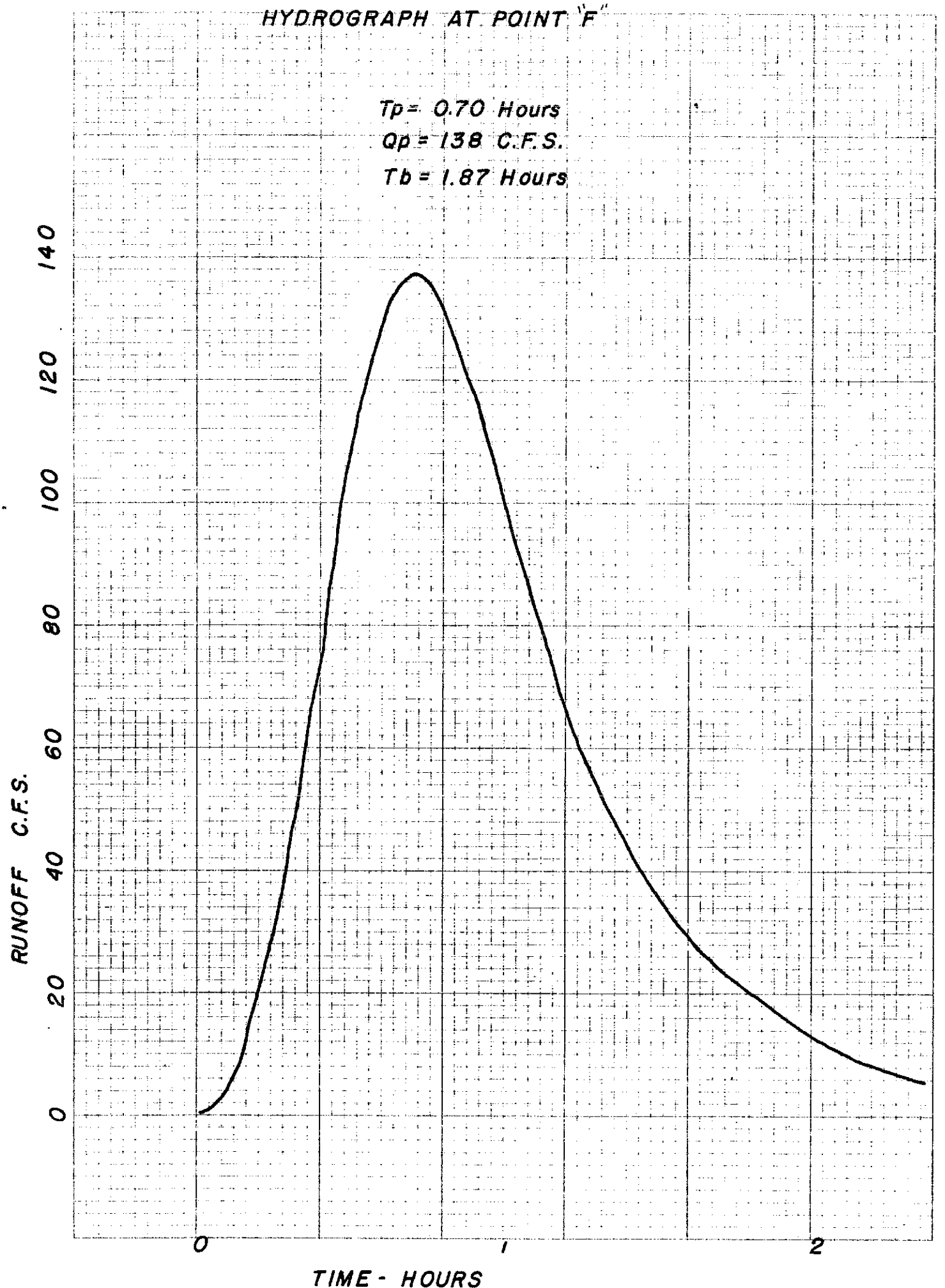


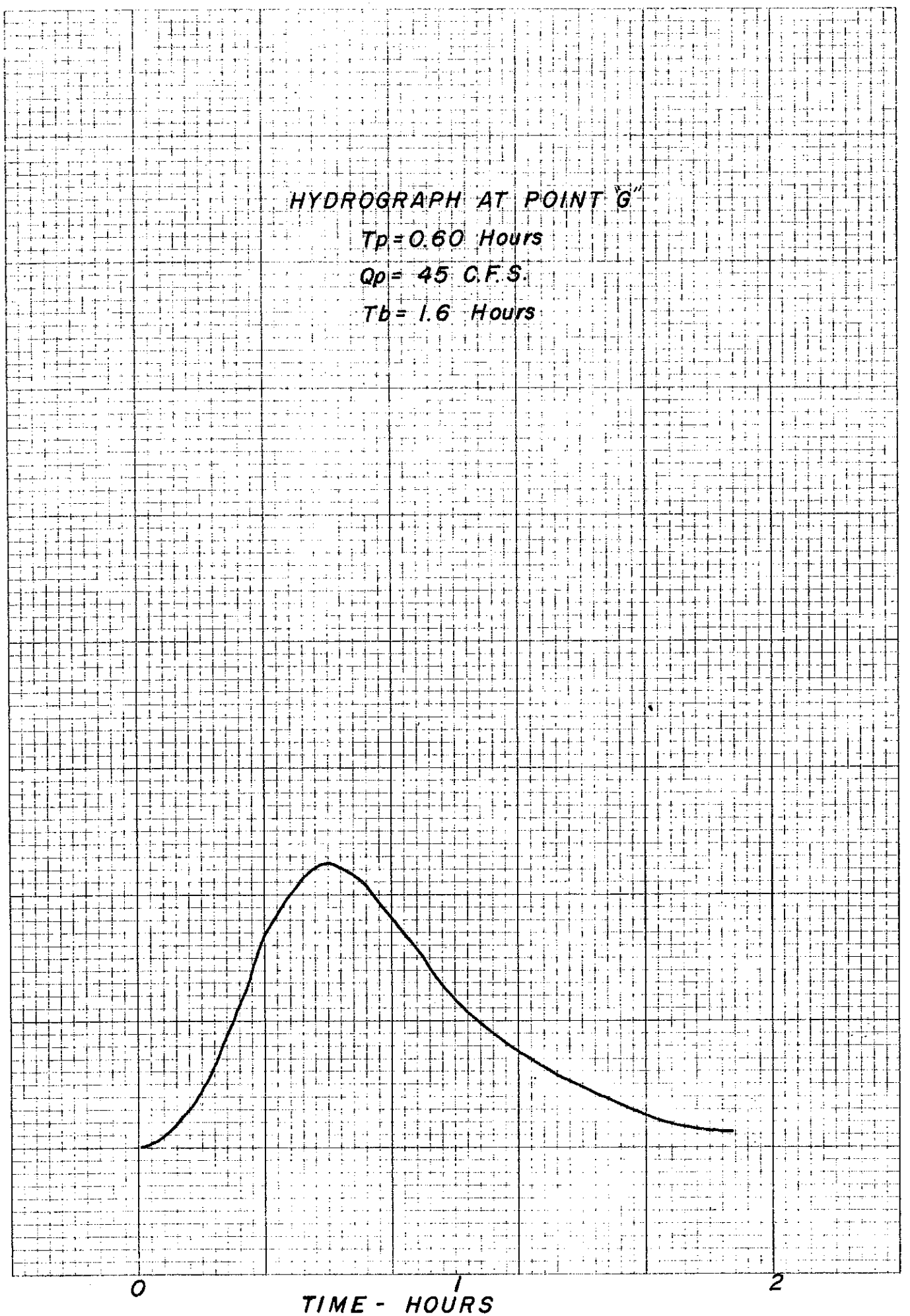



HYDROGRAPH AT POINT "C"
Tp = 0.61 Hours
Qp = 78 C.F.S.
Tb = 1.63 Hours
RUNOFF C.F.S.
0
20
40
60
80
100
0
1
2
TIME- HOURS









BASIC DRAINAGE ASSUMPTIONS

(a) Hydrologic Method--Soil Conservation Service Synthetic Hydrograph Method as modified by the Bureau of Reclamation.

(b) 50 Year Storm--2inches in one hour rainfall.

(c) Soil Type-- Generally sandy, soil group B in hydrologic soil classification.

(d) The area will be developed primarily as single family dwellings with small areas of apartments and commercial.

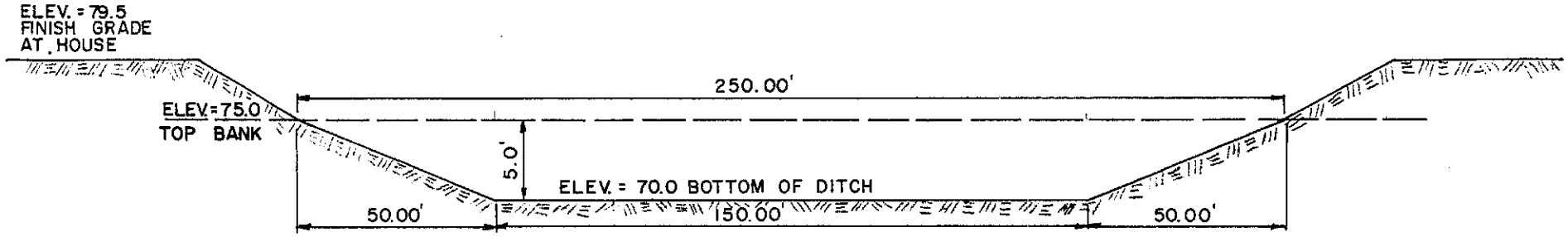
(e) 40% of the area is considered impervious, consisting of paved streets, roofs, concrete walks or drives.

(f) Runoff from the open ground (60%) would fall in Curve No. 69, Table A-2, Page 426, "Design of Small Dams".

(g) Q= 0.28 inches (from chart, Page 429, "Design of Small Dams".

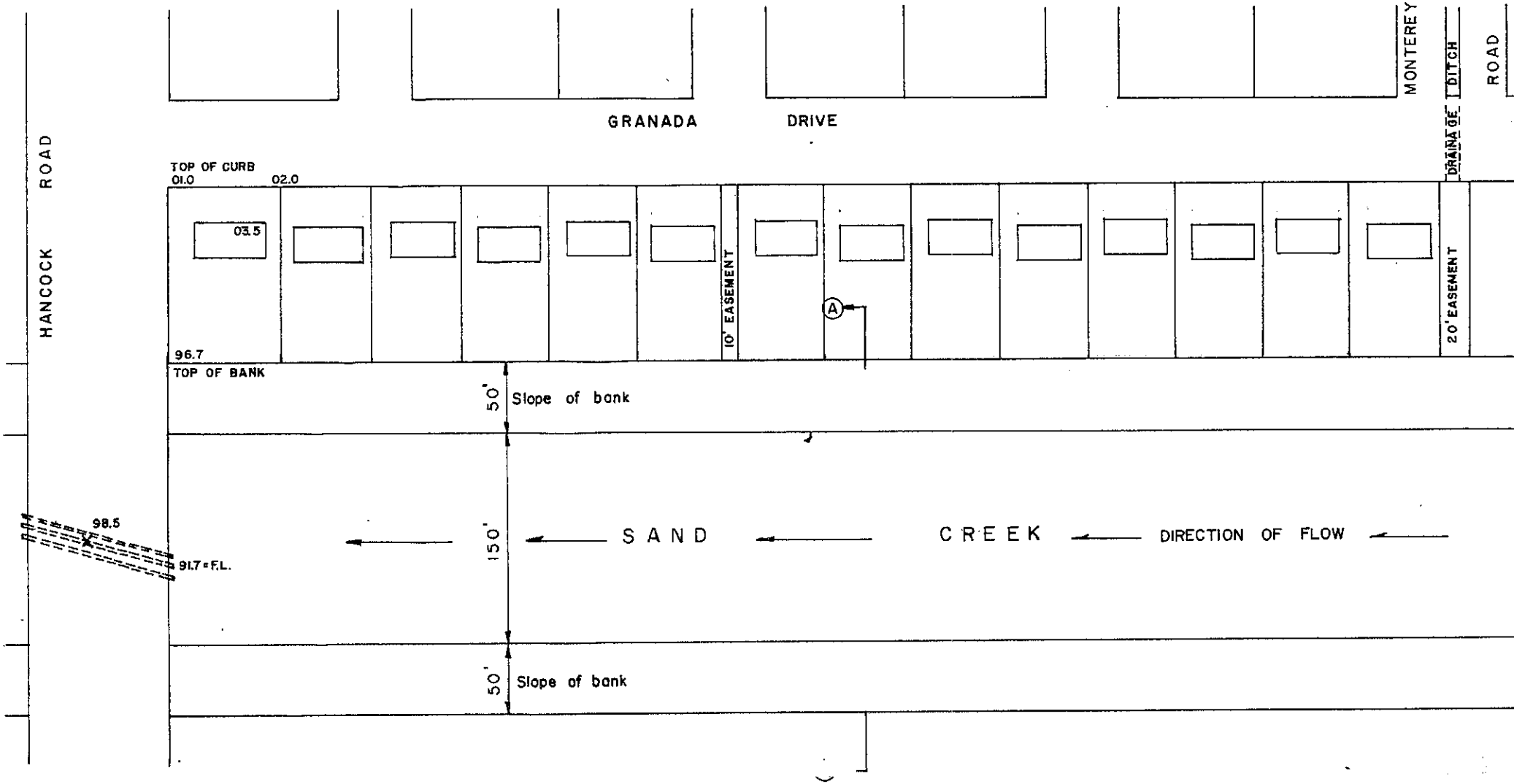
(h) Total Runoff = 40% x 2 in. (impervious) = 0.80
60% x .28 in. (lawns, etc.) = 0.17
Total = 0.97 inches

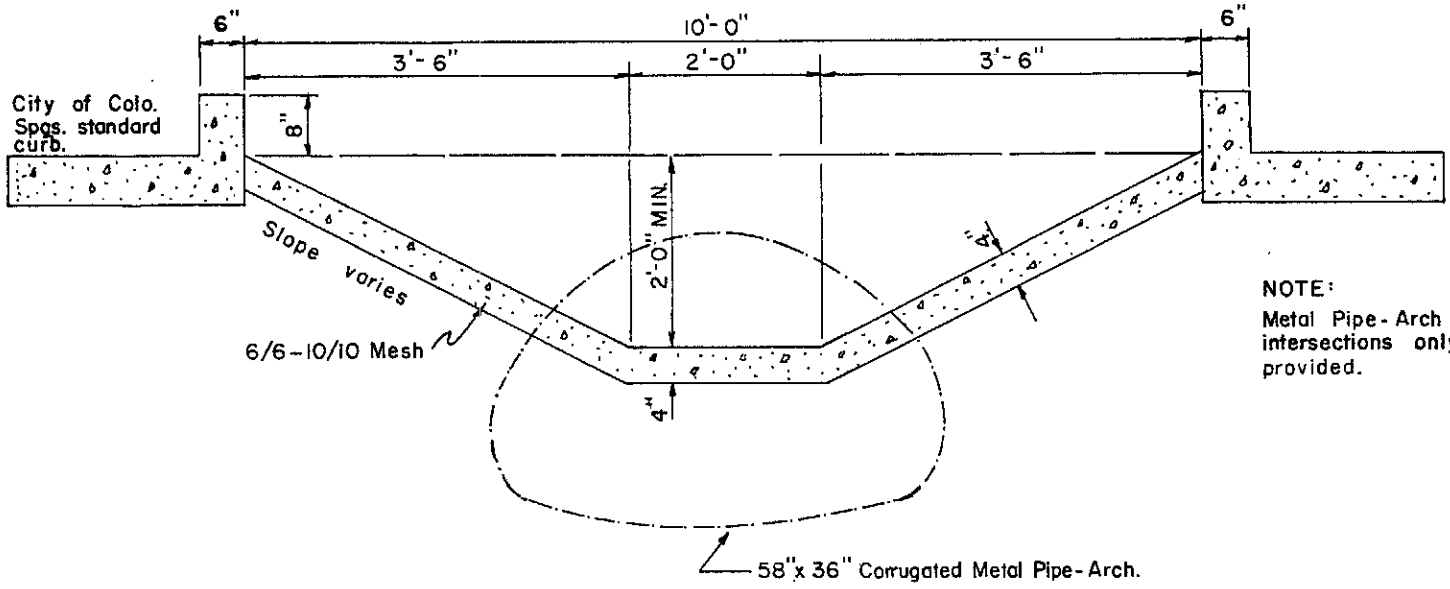
Point In Basin	Acres Drained	Square Miles	Length	Height	Time of Concentration	Time to Peak	Peak Flow Rate
A	49	.0766	2500'	35'	0.27	0.66	55
B	23	.0359	1600'	50'	0.15	0.59	29
C	65	.1016	2400'	90'	0.18	0.61	78
D	95	.1484	3200'	115'	0.22	0.63	110
E	118	.1844	4300'	145'	0.28	0.67	.129
F	132	.2063	5000'	145'	0.34	0.70	138
G	37	.0578	2500'	140'	0.16	0.60	45



AREA = 1,000 SQ. FT., VELOCITY = 20 FT./SEC., CAPACITY = 20,000 C. F. S.

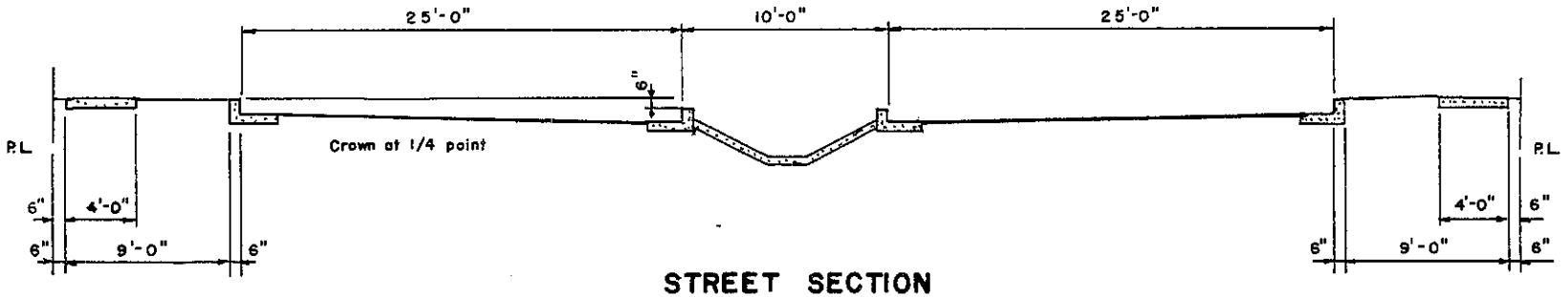
SECTION (A)





NOTE:
Metal Pipe-Arch to be used across intersections only. 9" cover to be provided.

TYPICAL DITCH SECTION



STREET SECTION

COMMERCIAL
15.7 AC.

PIKES PEAK PARK NO.8

CABRILLO CIRCLE NO. 9

MONTEZUMA DRIVE

JR. HIGH SCHOOL
25.0 AC.±

INV. EL 6008

INV. EL 8008

CHURCH

DRAINAGE

COMMERCIAL
27.99 AC.

CARMEL DRIVE

CITY LIMITS

PIKES PEAK PARK NO.10

EL MORRO ROAD

3.5 AC.

14 acres 18 c.f.s.

OLYMPIC DRIVE

CAPULIN DRIVE

MONTEZUMA DRIVE

MONTEREY

49 acres 55 c.f.s.

DEL MAR DRIVE

RESIDENTIAL
COUNTY

48 acres 61 c.f.s.

KODIAK DRIVE

PIKES PEAK ROAD

PIKES PEAK PARK NO.11

SUMTER DR.

MEDIUM COST

SAND CREEK DRAINAGE

ELEM. SCHOOL
13 AC.

MULTI-FAMILY

SCALE 1"= 200'

DITCH TO CHANNEL

LASSEN DR.

95 acres 110 c.f.s.

104 acres 115 c.f.s.

116 acres 125 c.f.s.

LARAMIE DR.

PINNACLE DR.

2 acres 14 c.f.s.

PIKES PEAK PARK NO.12

SANOMA

SAN MARCOS DR.

4 acres 46 c.f.s.

23 acres 270 c.f.s.

COMM.

DELTA DR.

PIKES PEAK PARK NO. 13

3 acres 34 c.f.s.

GRANADA

OPEN GREEN

BELT

ACADEMY BOULEVARD

M-1 INDUSTRIAL
COUNTY

HANCOCK EXPRESSWAY

PROPOSED SPUR TRACK
10 AC. ±

PLANNED INDUSTRIAL PARK

PIKES PEAK PARK NO. 14

PRIVATE CROSSING

RR YARDS

CITY LIMITS

UNDERGROUND MOUNTAIN STATES LINE

UNDERGROUND AT&T LINE

CANAL EASEMENT 60' - APPROX. LOCATION

PROPOSED SPUR TRACK

M-1 INDUSTRIAL

CITY LIMITS

PROPOSED SEWER MAIN

SPROUL — 20.183 AC.

ELECTRICAL LINE EASEMENT

PROPOSED SEWER

DONALD R. JEFFRIES
REGISTERED
3479
P.E.
STATE OF COLORADO