

SOUTH ACADEMY PLAZA
DRAINAGE REPORT & PLAN

completed by J.S.S.

MAY 1986

REVISED JUNE 1986

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SOUTH ACADEMY PLAZA
DRAINAGE REPORT & PLAN

MAY 1986
REVISED JUNE 1986

RECEIVED
PUBLIC WORKS/ENGINEERING
COLORADO SPRINGS, COLO.

JUN 12 1986
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Prepared for:
WESTERN STATES INVESTMENTS
102 EAST PIKES PEAK
COLORADO SPRINGS, CO

Prepared by:
POLOK ENGINEERING, INC.
228 N. Cascade, Suite 102
Colorado Springs, CO 80903

File No. 850245

May 15, 1986

City of Colorado Springs
Engineering Division
30 S. Nevada
Colorado Springs, CO 80901

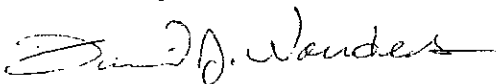
RE: South Academy Plaza

Gentlemen:

In accordance with the requirements of the City of Colorado Springs Subdivision Ordinance, a drainage report and plan has been prepared for the proposed 10.8 acre site at Academy Boulevard and Astrozon Boulevard. The site is located in the Sand Creek Basin in the City of Colorado Springs. This report has been prepared under current City of Colorado Springs Drainage Criteria.

Six (6) complete copies of the drainage report are transmitted for your review and comments. Please contact me if you have any questions.

Sincerely,



Daniel J. Wonders, P.E.

DJW:jb


File 850245

DRAINAGE REPORT & PLAN

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 the negligent acts, errors or omissions on my part in preparing this report.

Daniel J. Wonders
Daniel J. Wonders



Developer's Statement:

The developer has read and will comply with all of the requirements specified in this report.

Western States Investment Co.
Business Name

By: R. W. Can

Title: General Partner

Address: _____

City of Colorado Springs

Filed in accordance with Section 15-3-906 of the Code of the City of Colorado Springs, 1980, as amended.

[Signature]
City Engineer

6/24/86
Date

Conditions:

SOUTH ACADEMY PLAZA
DRAINAGE REPORT & PLAN

SCOPE

This is a drainage study for South Academy Plaza, a 10.8 acre site located on the easterly side of Academy Boulevard, south of Astrozon Boulevard, in Colorado Springs. The site is zoned PBC-2. A commercial development is anticipated. This study will consider the impact, if any, of the proposed development on surrounding properties and adjacent roads with respect to drainage.

HISTORICAL DRAINAGE CHARACTERISTICS

One exterior flow enters the site at the intersection of Jet Wing Drive and Morley Drive. The runoff is generated by the majority of Southborough Subdivision #2. The Southborough area generates 26.0 cfs of runoff. This runoff is discharged onto the site by a 36 inch RCP. The runoff heads westerly towards Academy Boulevard and is trapped with no apparent outlet in a low area. The Southborough Drainage Plan showed an existing 24 inch CMP running under Academy Boulevard, but no sign of it could be found.

PROPOSED DRAINAGE CHARACTERISTICS

The proposed drainage patterns will not change from the historical conditions.

The proposed plan will follow the plan outlined in the Sand Creek Drainage Study. The study intends for the runoff to be directed to the Sand Creek Channel. The drainage plan for South Academy Place Subdivision outlines the plan for a 36 inch CMP to be constructed along its southern boundary as shown on the approved drainage plan prepared by R. Keith Hook & Associates. The 36 inch CMP will ultimately discharge into Sand Creek.

At time of development of South Academy Plaza, a storm sewer will be designed to connect the 36 inch RCP at Jet Wing Drive with the 36 inch CMP at South Academy Place. The 10.8 acre site will drain into this future storm sewer through a 12' DIOR inlet placed in a sump condition. South Academy Plaza will generate 24.2 cfs of runoff. The 36 inch CMP along South Academy Place has adequate capacity for the anticipated flows.

The 10.8 acre site will not discharge any runoff onto State Highway 83. The proposed curb and gutter, to be constructed on Academy Boulevard along South Academy Plaza's frontage, will carry only the existing runoff that is presently flowing in the curb from the north.

HYDRAULIC CALCULATIONS

Hydraulic calculation were done using the Rational Method, as outlined in the Areawide Urban Runoff Control Manual for the Pikes Peak Area Council of Governments.

$$Q = C i A$$

where

Q = peak runoff, cubic feet per cfs second,

C = runoff coefficient representing drainage area characteristics

i = average intensity of rainfall for the duration required for the runoff to become established and flow from the entire basin, inches per hour.

A = size of drainage basin, acres

As required by the City of Colorado Springs Subdivision Policy Manual, the 5 year frequency storm was analyzed since peak flows generated were less than 500 cfs.

SUMMARY

The only flow entering the site is from the 36" RCP at Jet Wing Drive and Morley Drive. At the time the site is developed, a public storm sewer will be designed to connect this 36" RCP and the 36" CMP in South Academy Place. All flow generated by the site will be directed into this storm sewer. The 36" storm sewer that runs through South Academy Place Subdivision has already been designed and portions built. It is designed to carry flow from our site and Southborough Subdivision No. 2 as indicated in Figure 1. It is not designed to carry flow from Academy Boulevard, see approved Addenda to Drainage Report and Plan for Astrozon Plaza Subdivision dated Sept. 1985 by Leigh Whitehead & Associates. Included in this report are calculations for flow conditions in Academy Boulevard.

The development of this site will not increase the flow in Academy Boulevard.

South Academy Plaza does not lie within any known 100 year floodplain as shown by Federal Emergency Management Agency Maps.

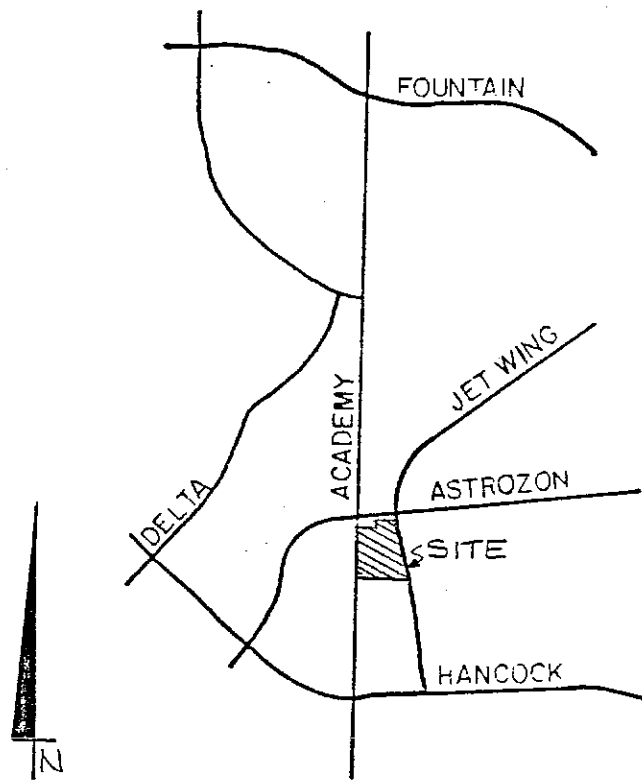
The estimated costs for private drainage improvements - none required.

The estimated costs of public drainage improvements are as follows:

45 LF 36" CMP @40.00/LF	\$ 1,800.00
100 LF 36" CMP (Bored under Academy Boulevard) @\$300/LF	30,000.00
552 LF 30" CMP @\$25.00/LF	13,800.00
1 12' DIOR inlet @\$6000/EA	<u>6,000.00</u>
	\$ 51,600.00
10% Engineering & Contingencies	<u>5,160.00</u>
TOTAL	\$ 56,760.00

Drainage Fees - \$ 5034.00/AC
10.8 AC x \$ 5034.00/AC = \$ 54,367.20

Bridge Fees - \$ 420.00/AC
10.8 x \$ 420/AC = \$ 4,536.00

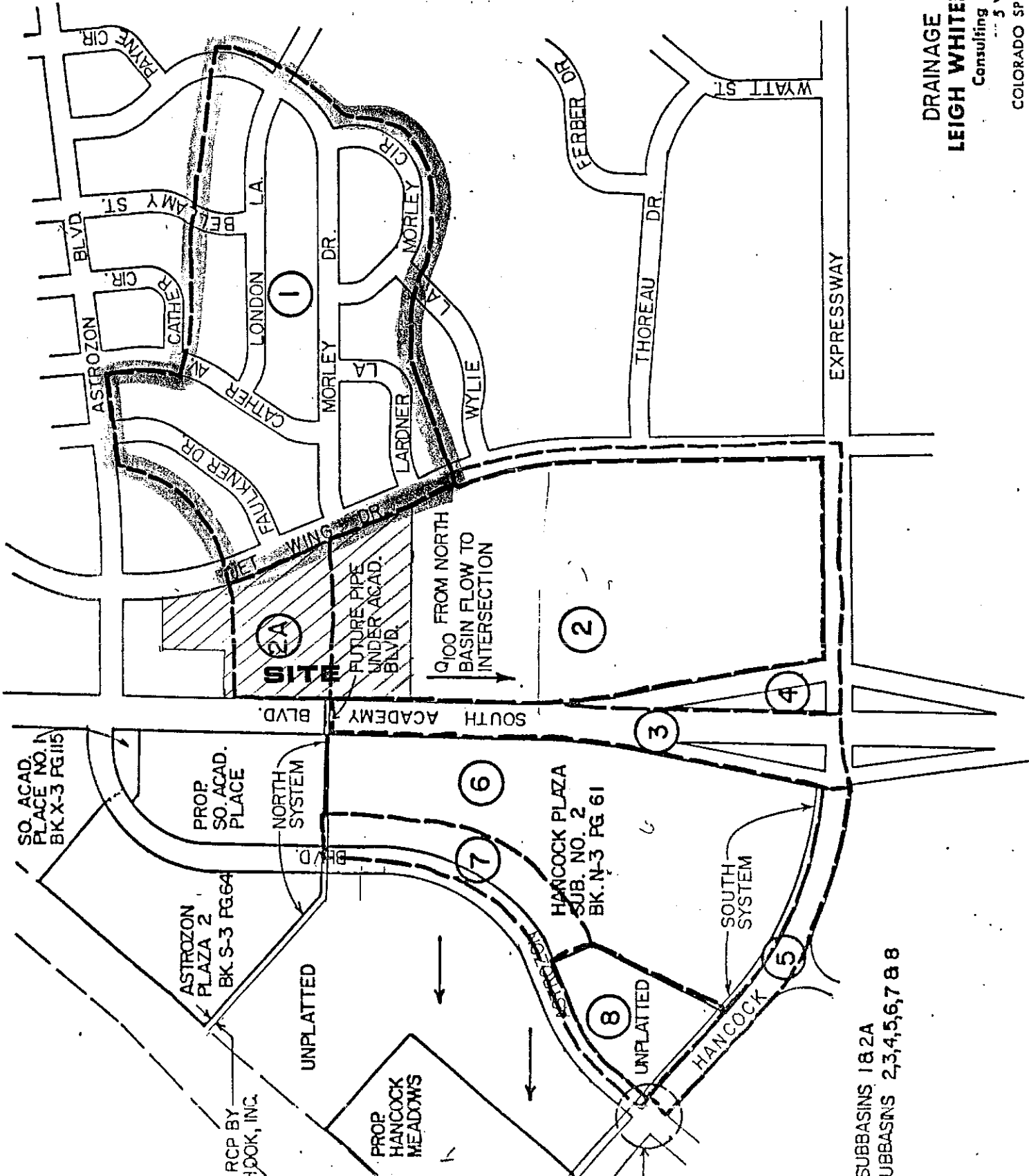


VICINITY MAP

FIGURE 1

1" = 500'
(APPROX)

OFFSITE BASIN



SUBBASINS 1&2A
UBBASINS 2,3,4,5,6,7&8

FLOW IN ACADEMY BLVD

$$T_c = \frac{1.8(1.1 - C) \sqrt{L}}{S^{1/3}}$$

$$C = 0.75$$

$$L = 825'$$

$$S = 1.82\%$$

$$T_c = \frac{1.8(1.1 - 0.75) \sqrt{825}}{(1.82)^{1/3}} = 14.82 \text{ min.}$$

$$i = 3.7 \text{ in/hr}$$

$$A = \text{Astrojet Sub No. 1, 2, \& 3} + \frac{1}{2} \text{ of Astrozon Blvd \& Academy Blvd}$$

$$= 2.58 + 0.66$$

$$A = 3.24 \text{ Acres}$$

$$Q_B = C_i A = 0.75(3.7)(3.24) = 8.99 \text{ cfs}$$

Calculate flow depth in Academy Blvd for 5 year storm.

$$Q = 0.56 \frac{Q}{n} d^{8/3} \epsilon^{1/2}$$

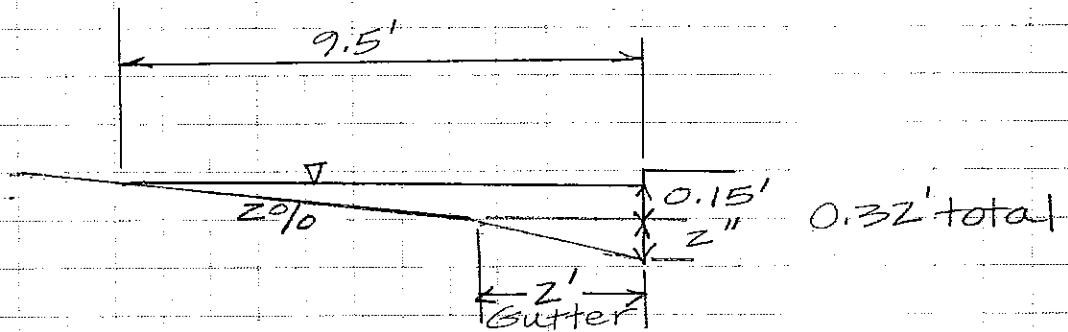
$$n = 0.013$$

$$Q = 8.99 \text{ cfs}$$

$$\epsilon = 50$$

$$S = 0.0071$$

$$d = \left[\frac{0.0}{0.56 \times 5'2"} \right]^{3/8}$$
$$= \left[\frac{0.013(9.0)}{0.56(50)(0.0071)^{1/4}} \right]^{3/8}$$
$$= 0.32'$$

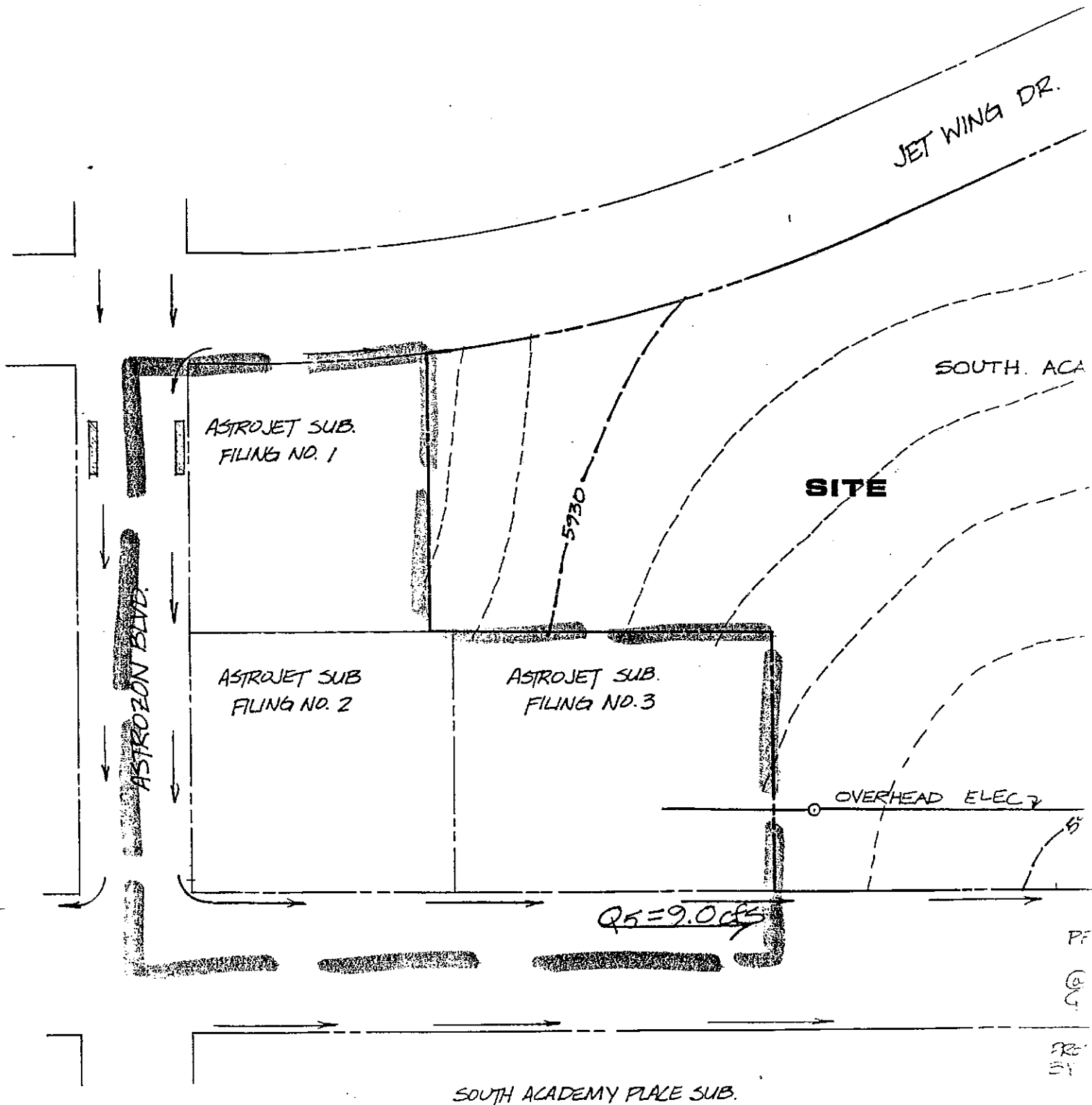


$$\text{width in street} = \frac{0.15}{0.02} = 7.5'$$

$$\text{total width} = 7.5' + \overset{\text{Gutter}}{2.0'} = 9.5'$$

DRAINAGE BASIN FLOWING INTO ACADEMY BLVD.

SOUTHBOROUGH SUB #2
DRAINAGE BASIN 1



PF
G
G
225
24

SOUTHBOROUGH SUB #2
DRAINAGE BASIN 1

MORLEY DR.

EXISTING CATCH
BASINS

5930

JET WING DR.

EXISTING 36" RCP

$Q_s = 26.0 cfs$

PROPOSED 30" CMP (PUBLIC)

@ 1.5%

$Q_{capacity} = 27.2 cfs$

10' DRAINAGE EASEMENT

SOUTH. ACADEMY PLAZA

UNPLATTED

ASTROJET SUB.
FILING NO. 1

5930

ASTROJET SUB.
FILING NO. 2

ASTROJET SUB.
FILING NO. 3

ASTROZON BLVD.

OVERHEAD ELEC

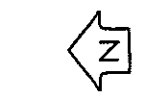
12' DIOR.
SUMP
CONDITION

247 cfs
INTO INLET

DRAINAGE EASEMENT
5' EACH SIDE OF INLET

$Q_s = 50.7 cfs$ TOTAL

5920



SCALE 1" = 100'

PROPOSED 36"
CMP
@ 2.00%
 $Q_{capacity} = 51.1 cfs$

NOTE: PROPOSED 36" CMP TO BE BORED
UNDER ACADEMY BLVD. PER C.D.H REQUIREMENTS.
ACADEMY BLVD.

PROPOSED 36" CMP
BY OTHERS

SOUTH ACADEMY PLACE SUB.

HANCOCK PLAZA SUB.