



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

HYDROLOGY SECTION
123 Central NW, Albuquerque, NM 87102
(505) 766-7644

November 11, 1986

Thomas Isaacson, P.E.
Isaacson & Arfman, P.A.
128 Monroe Street, NE
Albuquerque, New Mexico 87108

RE: DRAINAGE REPORT FOR CAVAN COMMERCE CENTER
(L-16/D23) RECEIVED OCTOBER 22, 1986

Dear Mr. Isaacson:

I would like to hereby acknowledge the receipt of your submittal. I do not know of any approvals that you have not already received that I can grant with this submittal.

The above referenced report will remain on file in our office and serve as a master plan for the proposed development area. Subsequent, individual tract, drainage plans will be required. These individual plans are required to comply with the drainage scheme approved in your report.

If I can be of further assistance, please call me at 768-2650.

Cordially,

Billy J. Goolsby
Billy J. Goolsby, P.E.
C.E./Hydrology Section

cc: Joe Beers, Cavan Associates

BJG/bsj

PUBLIC WORKS DEPARTMENT

Walter Nickerson, P.E., City Engineer

ENGINEERING GROUP

Telephone (505) 768-2500

AN EQUAL OPPORTUNITY EMPLOYER



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

DESIGN HYDROLOGY SECTION
123 Central NW, Albuquerque, NM 87102
(505) 766-7644

June 11, 1986

Mr. Thomas Isaacson
Isaacson & Arfman, PA
128 Monroe Street NE
Albuquerque, NM 87108

REF REVISED DRAINAGE REPORT FOR YALE BUSINESS PARK (L16-D23)
RECEIVED MAY 27, 1986

Dear Mr. Isaacson:

The above referenced report, dated May 29, 1986, is hereby approved for Preliminary and Final platting.

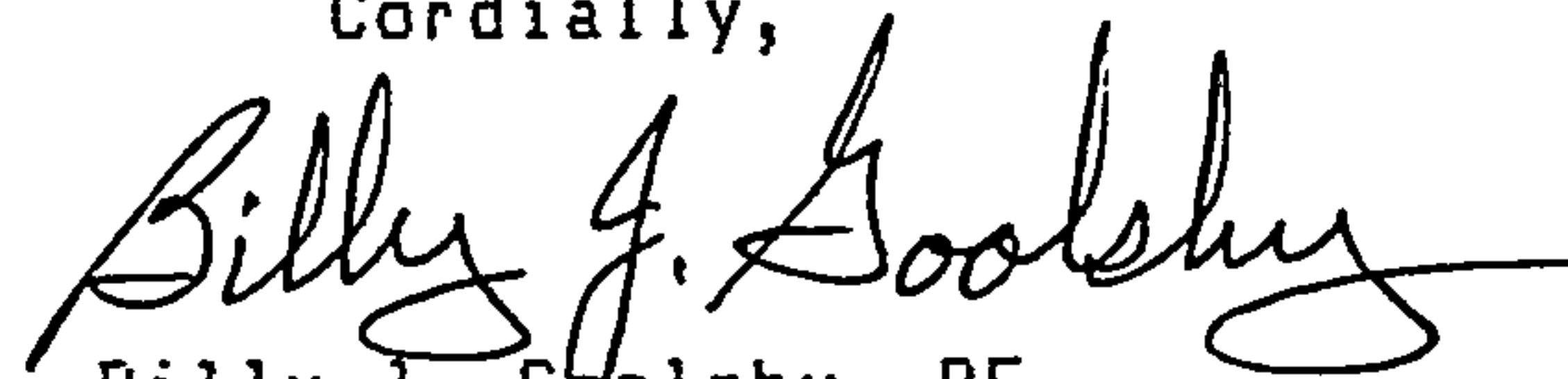
Please be advised that for Preliminary Plat approval you will need to provide to DRB an infrastructure listing for review and approval. For Final Plat, an executed Subdivision Improvements Agreement including the approved infrastructure listing will be required.

Also, prior to submittal to DRC for Work Order, please provide to this office a complete report incorporating all the current revised computations and plan and any other typo corrections along with the detailed construction plans for the streets and storm sewer facilities.

It is also understood that a drainage plan for each tract will be required to be submitted for review and approval for Building Permits.

Should you have any questions or comments, please call.

Cordially,


Billy J. Goolsby, PE
CE/Hydrology

BJG:mrk

cc: Cavan Associates, 500 Marquette NW; Attn: Joe Beers

MUNICIPAL DEVELOPMENT DEPARTMENT

C. Dwayne Sheppard, P.E., City Engineer

ENGINEERING DIVISION

Telephone (505) 766-7467

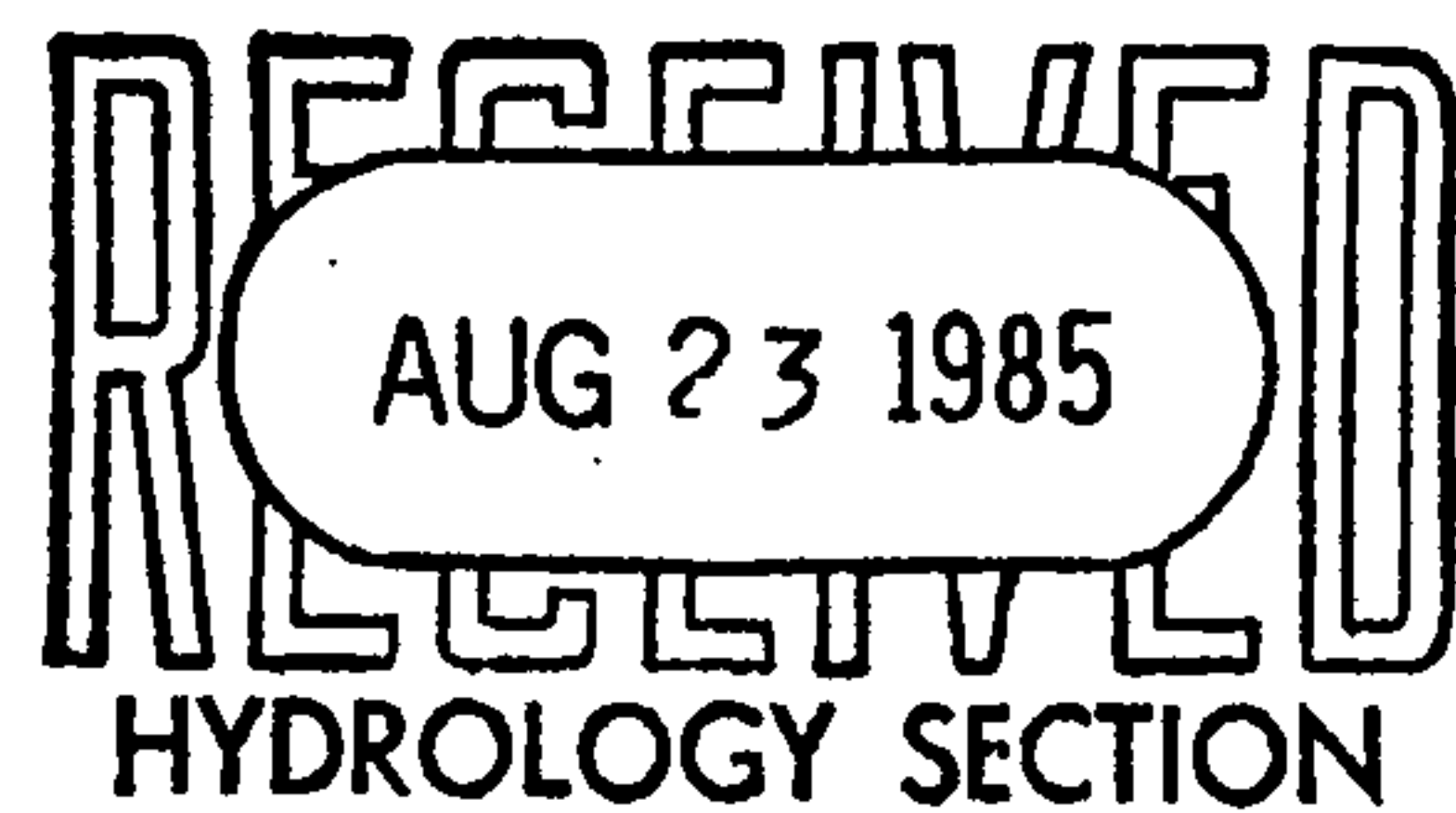
AN EQUAL OPPORTUNITY EMPLOYER

DRAINAGE REPORT

FOR

YALE BUSINESS PARK

AUGUST, 1985



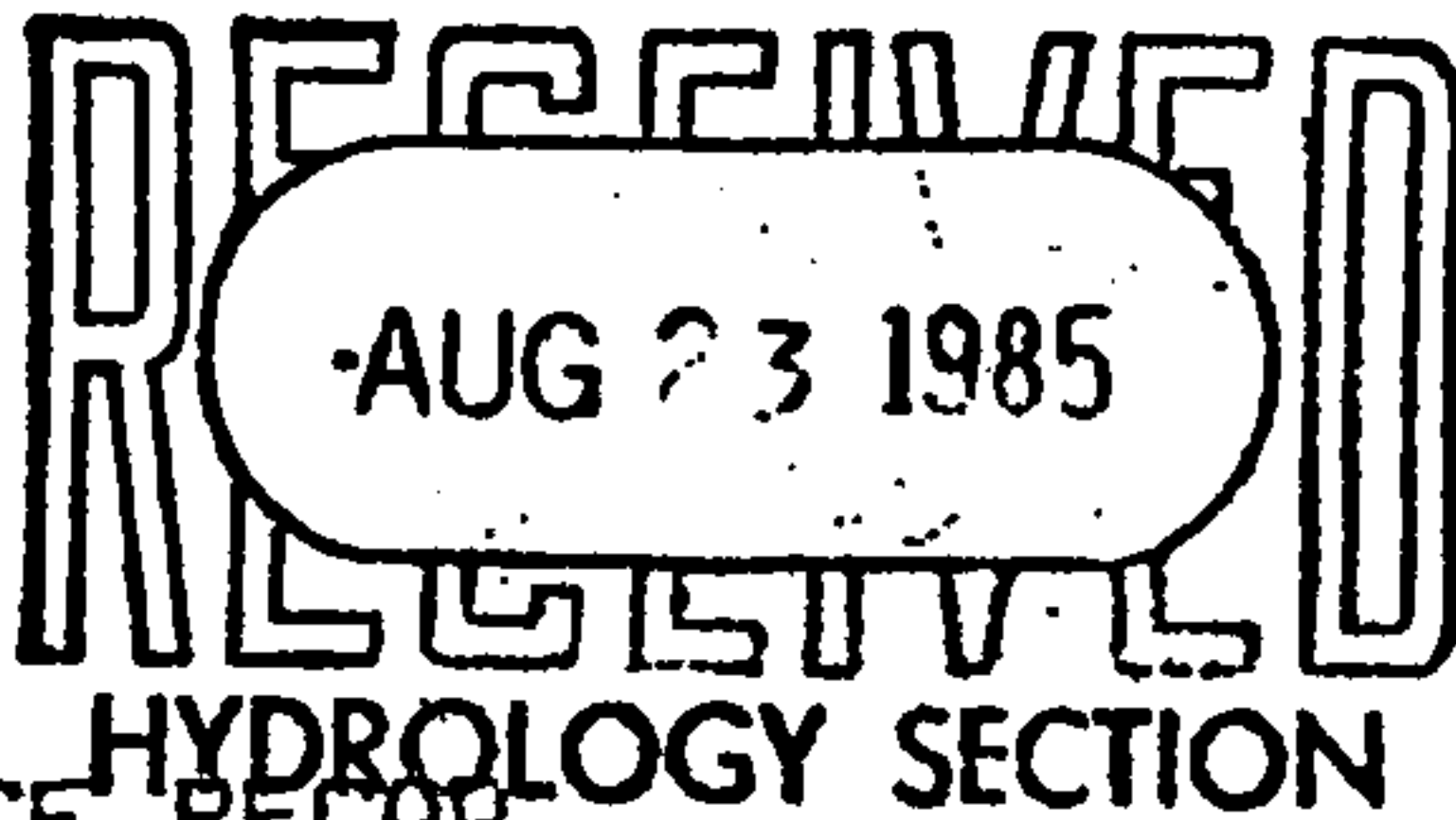
PROJECT TITLE: Yale Business Park ZONE ATLAS/DRNG. FILE #: L-16 / D23
LEGAL DESCRIPTION: "Parcels A, 29A & 30A" filed 12/26/84, Vol. C25, Folio 198 & 19
CITY ADDRESS: Northeast Corner of Yale & Gibson
ENGINEERING FIRM: Isaacson & Arfman, P.A. CONTACT: Thomas O. Isaacson
ADDRESS: 128 Monroe Street NE 87108 PHONE: 268- 8828
OWNER: Gibson/Yale Inc. CONTACT: Alan Darrow
ADDRESS: 4205 Lead Avenue SE 87108 PHONE: 268-4317
ARCHITECT: _____ CONTACT: _____
ADDRESS: _____ PHONE: _____
SURVEYOR: Elder Company CONTACT: Ned Elder
ADDRESS: 530 Jefferson NE PHONE: 268-1830
CONTRACTOR: _____ CONTACT: _____
ADDRESS: _____ PHONE: _____

PRE-DESIGN MEETING:

☒ YES

☐ NO

☒ COPY OF CONFERENCE RECAP
SHEET PROVIDED



DRB NO. 84-849-1

EPC NO. Z -85-41

PROJ. NO. -

TYPE OF SUBMITTAL:

☒ DRAINAGE REPORT

☐ DRAINAGE PLAN

☐ CONCEPTUAL GRADING & DRAINAGE PLAN

☐ GRADING PLAN

☐ EROSION CONTROL PLAN

☐ ENGINEER'S CERTIFICATION

CHECK TYPE OF APPROVAL SOUGHT:

☐ SKETCH PLAT APPROVAL

☒ PRELIMINARY PLAT APPROVAL

☐ SITE DEVELOPMENT PLAN APPROVAL

☒ FINAL PLAT APPROVAL

☐ BUILDING PERMIT APPROVAL

☐ FOUNDATION PERMIT APPROVAL

☐ CERTIFICATE OF OCCUPANCY APPROVAL ***

☐ ROUGH GRADING PERMIT APPROVAL

☐ GRADING/PAVING PERMIT APPROVAL

☐ OTHER _____ (SPECIFY)

DATE SUBMITTED: August ²³~~22~~, 1985

BY: Thomas O. Isaacson

Yale / Buhner Park

CONFERENCE RECAP

DRAINAGE FILE/ZONE ATLAS PAGE NO.: L 16 DATE: 8/2/85

PLANNING DIVISION NOS: EPC: Z-85-41 DRB: _____

SUBJECT: Parcel located at the N.E. corner of Yale & Gibson
(43 acres)

APPROVAL REQUESTED:

☒ PRELIMINARY PLAT	_____ FINAL PLAT
_____ SITE DEVELOPMENT PLAN	_____ BUILDING PERMIT
_____ OTHER	_____ ROUGH GRADING

	WHO	REPRESENTING
ATTENDANCE:	<u>TOM ISAACSON</u>	_____
	<u>FRED AGUIRRE</u>	_____
	_____	_____
	_____	_____

FINDINGS:

1. An approved drainage report is required for subject request
2. An approved infrastructure listing (~~for~~ private/public) required for preliminary plat approval
3. The allowable discharge will be based on downstream capacity
4. City Surveyor's approval required for preliminary plat approval.

Note: The drainage report required needs to be of sufficient detail to identify the required infrastructure and to establish the drainage scheme for each lot. Each subsequent lot will require a drainage plan in compliance with the approved drainage report.

The undersigned agrees that the above findings are summarized accurately and are only subject to change if further investigation reveals that they are not reasonable or that they are based on inaccurate information. ***

SIGNED: <u>Fred Aguirre</u>	SIGNED: <u>Tom Isaacson</u>
TITLE: _____	TITLE: _____
DATE: <u>8/2/85</u>	DATE: <u>8/2/85</u>

NOTE PLEASE PROVIDE A COPY OF THIS RECAP WITH THE DRAINAGE SUBMITTAL

INTRODUCTION

The Yale Business Park is a 43 acre tract of land located at the northeast corner of Yale Blvd. and Gibson Blvd. (see Figure 1). The property is bordered by Yale Blvd. on the west, Ross Avenue and Vail Avenue on the north, Columbia Drive on the east and Gibson Blvd. on the south.

Yale Business Park has recently been re-zoned (Z-85-41) as Special Use for O-1 and C-2 uses. The zoning plan calls for the subdivision of the property into 13 tracts with a "looped" street system (see Figure 17).

Yale Blvd. is presently under construction for a street widening project, Municipal Arterial Project MAP-M-6019 (900), MDD Project No. 1960. This widening and reconstruction project is located between Gibson Blvd. and Stadium Blvd. The Yale Business Park property is included in a drainage study for the Yale widening project which was prepared by William Matotan & Associates dated May 1984.

EXISTING DRAINAGE CONDITIONS

Off-Site Flows: The major off-site tributary area lies to the east of the property (see Figure 2). This area is divided into two parts for drainage analysis, a 5.7 acre part which has

uncontrolled runoff and the Bag & Save Shopping Center which has controlled runoff. The 100 year runoff from the uncontrolled part is 20 cfs (Sheet 3, Appendix A). The controlled 100 year runoff from the Bag & Save Shopping Center is 5 cfs (Drainage Report No. L16/D6). Consequently the total 100 year frequency runoff for this existing offsite drainage area is 25 cfs.

There are other small offsite drainage areas at the southeast corner and the far northeast corner which are shown on Figure 17. These areas are included in the runoff computations for both the existing and developed site condition.

On-Site: On-site flows concentrate at two locations along the west property line of the project. Existing 100 year flows have been calculated for these two points and are shown as Drainage Analysis Points 17 and 18 on Figure 17. *Figure show typical street section.* Computations for these points are found on Sheets 39 and 40 and are 14 and 34 cfs, respectively. These figures include all offsite tributary areas. The SCS soil map for the area is found on Sheet 2.

EXISTING STORM SEWER SYSTEMS

There are two storm sewer systems which border the property on the north, west and south. For convenience these two systems are referred to as the Ross-Vail-Carlisle System (on the north) and the Gibson-Kirtland System (on the south). Figures 3-7 show the locations of the systems.

Must be referring to the Drainage Plan

There is an extension of the Ross-Vail-Carlisle System south on Yale from the intersection of Yale & Ross into the property at 'A' Street (see ^{Drainage Plan} Figure 17). A portion of this extension is existing and a portion (into 'A' Street) is under construction in the Yale widening project.

There is also an extension of the Gibson-Kirtland System into the property at 'B' Street. The portion is also under construction in the Yale widening project.

Both of these extensions into the property have been sized to accept fully developed, uncontrolled flows from the tributary drainage areas.

DEVELOPED DRAINAGE PLAN

Proposed Improvements: The proposed street and tract layout is shown on ^{Drainage Plan} Figure 17. Preliminary street grades for 'A' and 'B' Streets are shown on Figures 15 and 16 respectively.

A section of 24" storm sewer is proposed to intercept off-site flows in Columbia Drive and carry them to the 'B' Street cul-de-sac. ^{See Fig. 8} New storm sewer extensions will also be constructed near the westerly ends of 'A' and 'B' Streets to intercept street drainage and convey it to the main storm sewer systems. Fig. 10-13

Free Discharge Justification: Free discharge for the project is requested and is justified by the following analysis.

It is proposed that 100 year runoff from the property be intercepted by extensions to the existing storm sewer systems in 'A' and 'B' Streets. Free discharge from the property will runoff and be conveyed away by the storm sewer before the peak flows are collected and conveyed by the two main storm sewer systems adjacent to the project. Calculations confirm this premise as follows.

The time of concentration for flows collecting in 'A' Street and running to manhole No. 705 at the intersection of Yale and Ross is 9.5 minutes (see Sheet 21). The time of concentration for flows in the Ross-Vail-Carlisle storm sewer system at manhole No. 705 is 48.6 minutes (Sheet 24). Therefore project peak flows will enter the main storm sewer system approximately 39 minutes before system peak flows arrive.

In a similar analysis, flows collecting in Street 'B' will concentrate in the Gibson-Kirtland System at manhole No. 802 in 9.7 minutes (Sheets 21 and 22) and the peak system flows will arrive at the same manhole in 45.6 minutes (Sheet 25) or 36 minutes later. Consequently project peak flows will easily enter the storm sewer system some 36 minutes before the system peak arrives.

Hydrographs for the project flows entering each storm sewer system along with the system flow hydrographs are shown on Sheets 42 and 44. Runoff calculations for the storm sewer system are found on Sheets 41 and 43.

Proposed Storm Sewers: New storm sewers are proposed at 3 locations on the project, at the east and between Tracts 11 and 12, at the west end of 'A' Street and at the west end of 'B' Street.

Figures 8 and 9 show the proposed storm drain between Tracts 11 and 12. Flows will be collected in an inlet on the west side of Columbia Drive and conveyed in a 24" line north and then west to the 'B' Street cul-de-sac. At the cul-de-sac, flows will enter the street as surface flows and will be divided so that half of the total flow will proceed as gutter flow on each side of the street. Hydraulic grade line calculations for the storm drain are found on Sheet 34.

Figures 10 and 11 show the plan and profile for the storm drain extension on 'A' Street. Hydraulic grade line calculations are found on Sheets 35 and 36.

Figures 12 and 13 show the storm drain extension on 'B' Street. Hydraulic grade line calculations are found on Sheet 37.

Developed Flow Rates: Figures 17 shows the locations of the Drainage Analysis Points and a tabulation of the developed 100 year flow rates at these points. Flow rates have been calculated for uncontrolled runoff of developed land.

Sheet 2 shows the SCS Soil map of the area. The percent impervious factor is calculated to be 75% and is found on Sheet 4. Special use zoning approval of the property requires a minimum of 20% of the area to be landscaped and an additional 10% of the parking area to be landscaped (see Zoning Case Z-85-41).

Drainage Analysis Points are generally located at the street gutters opposite the extension of the Tract line to the gutters and indicate the street flow in one gutter at that point. Development of each Tract will require conveyance of all runoff from the tract to the street without infringing upon the downslope tract. Flow rates include 50% of the runoff from the off-site drainage east of the property, where appropriate, since off-site flows will be divided 50-50 where they enter the 'B' Street cul-de-sac. Flow calculations for Drainage Analysis Points 1-16 are found on Sheets 5-20 respectively.

Calculations for selecting the storm drain inlets on 'A' and 'B' Streets are found on Sheets 27-30. In these calculations it is shown the street flow depths do not exceed 0.6 feet. Some runoff will flow directly into Ross Avenue east of Yale. Calculations on Sheet 31 verify that there is sufficient storm sewer inlet

capacity to safely intercept these flows.

Downstream Capacity: The storm sewer capacity in Yale Blvd. is 187 cfs (Sheet 31) and peak project runoff is 64 cfs (Sheet 32) showing adequate capacity in that section. The storm sewer capacity of the Ross-Vail-Carlisle System west of Ross is 273 cfs (Sheet 38) and the peak project runoff is 84 cfs (Sheet 38) from the site which also shows adequate capacity.

The storm sewer capacity from 'B' Street to the Gibson-Kirtland System is 67 cfs which exceeds the 64 cfs project flow (Sheet 33). The minimum system capacity west of this connection is 135 cfs which also exceeds the project runoff of 64 cfs by 71 cfs (Sheet 38).

Sediment Control: Two sedimentation ponds are proposed to control and reduce sediment which would tend to accumulate in streets. Pond locations are shown on Figure 17. Conceptual pond design is shown on Figure 14.

Tract Drainage Concept: All tracts will be allowed to drain along historic drainage paths until development of tract begins. Development of any tract will require grading and construction of that tract to convey water to the street system. Flows from developed tracts may not flow onto topographically lower tracts. Flows entering a developing tract may be deflected and carried through the temporary drainage easement located on the adjacent,

upslope tract. Upon development of a tract any temporary drainage easement in that tract will be automatically vacated.

Free, uncontrolled discharge will be allowed from each tract. Individual grading and drainage plans, approved by the City Design Hydrology Section, will be required on each tract. See "Drainage Concept for Tracts", Figure 17, for additional information on tract drainage.

SUMMARY

Yale Business Park is a land development located at the northeast corner of Yale and Gibson which proposes to divide a 43 acre parcel into 13 tracts, zoned Special Use for O-1 and C-2. An interior, looped public street system will be dedicated.

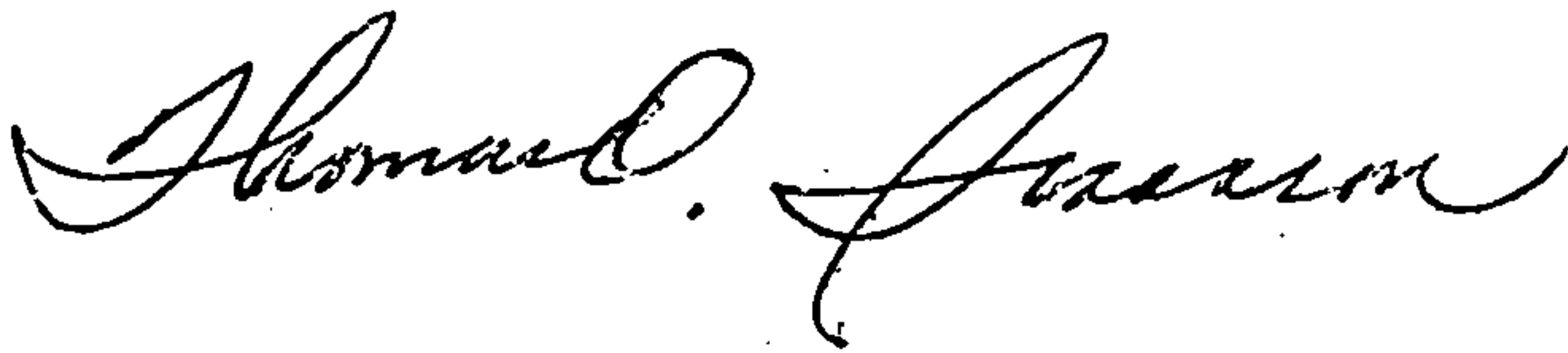
Offsite flows onto the property are minor. At the east end there is an offsite drainage area with a 100 year runoff potential of 25 cfs. It is proposed to intercept this drainage in a storm sewer system.

There are two existing storm sewer systems located along the north, south and portions of the west boundary. Both of these systems have relatively long times of concentration on the order of 45 minutes. Concentration times for the Buiness Park are less than 10 minutes, consequently free discharge is allowable from the site into the storm sewer systems as project flows will beat

the peak storm sewer system flows. Storm sewer extensions will be required on the two streets in the Park to intercept the project flows. The downstream capacity of the existing storm system is adequate to accept the project flows with reserve capacity.

Temporary drainage easement will be reserved on the final subdivision plat to provide flexibility in developing the individual tracts in the subdivision.

Respectively Submitted



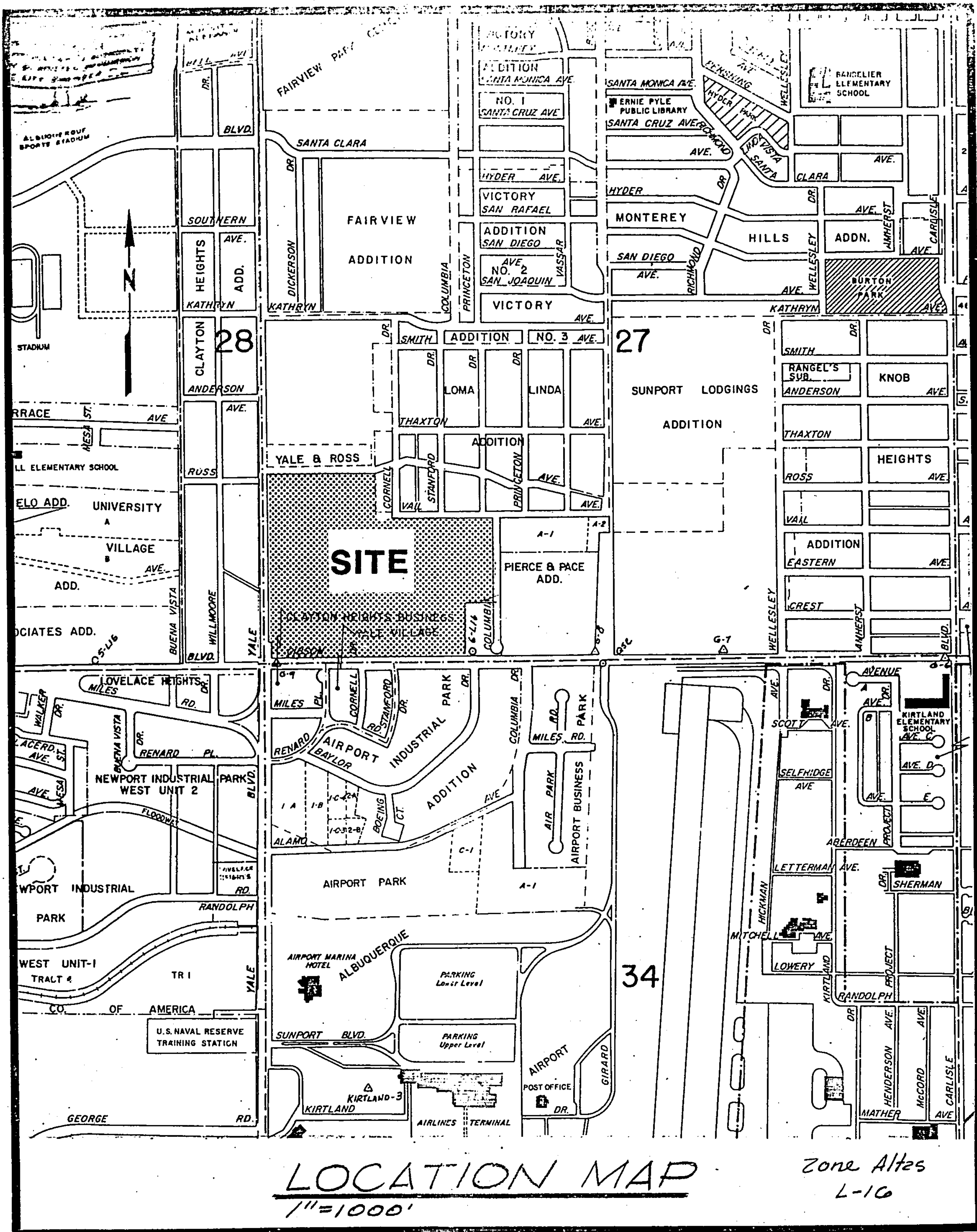
Thomas O. Isaacson

Isaacson & Arfman, P.A.



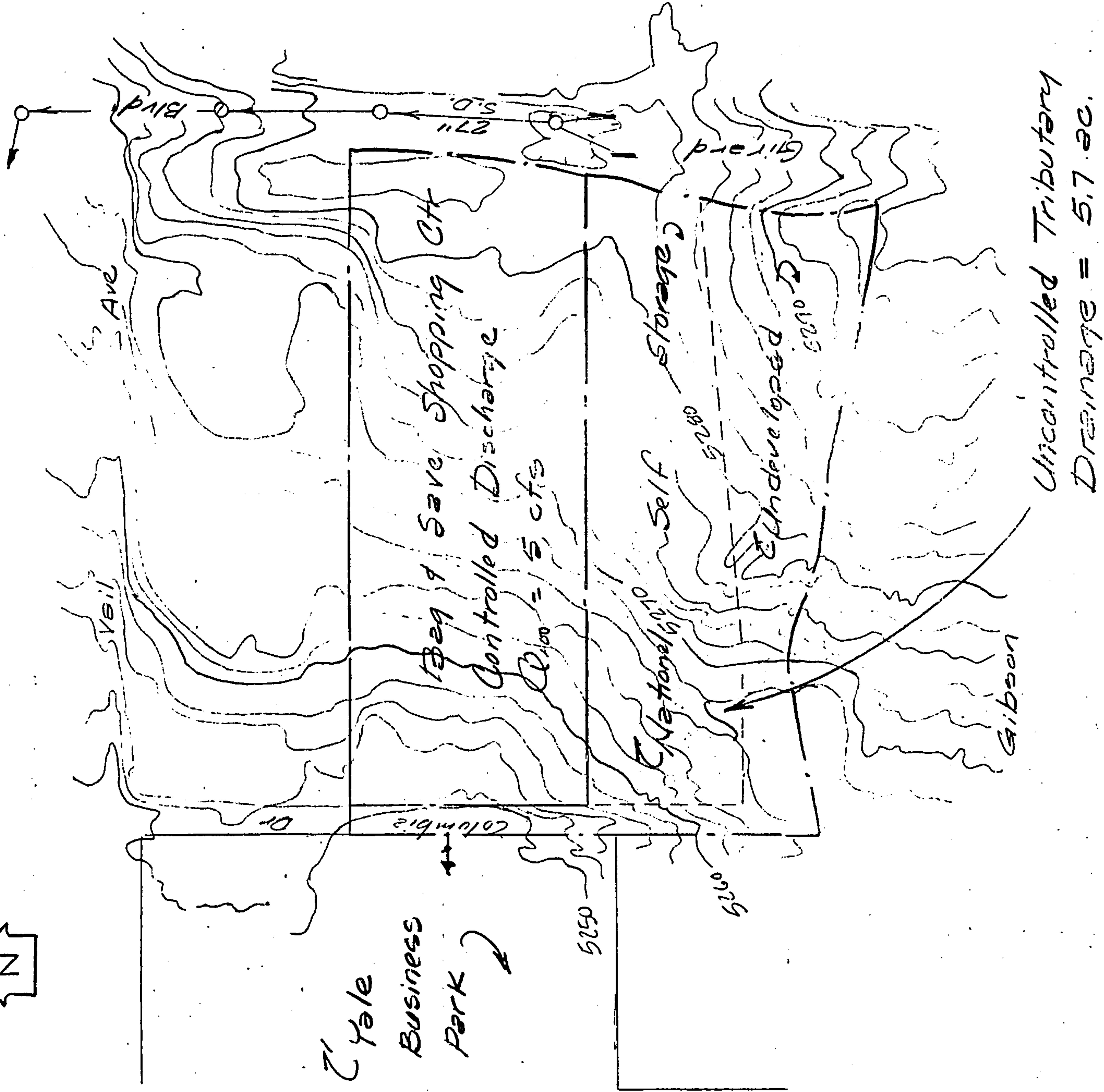
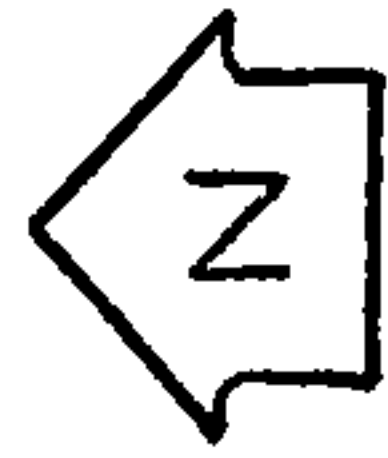
TOI:ram

FIGURES



Isaacson &
Arfman, P.A.

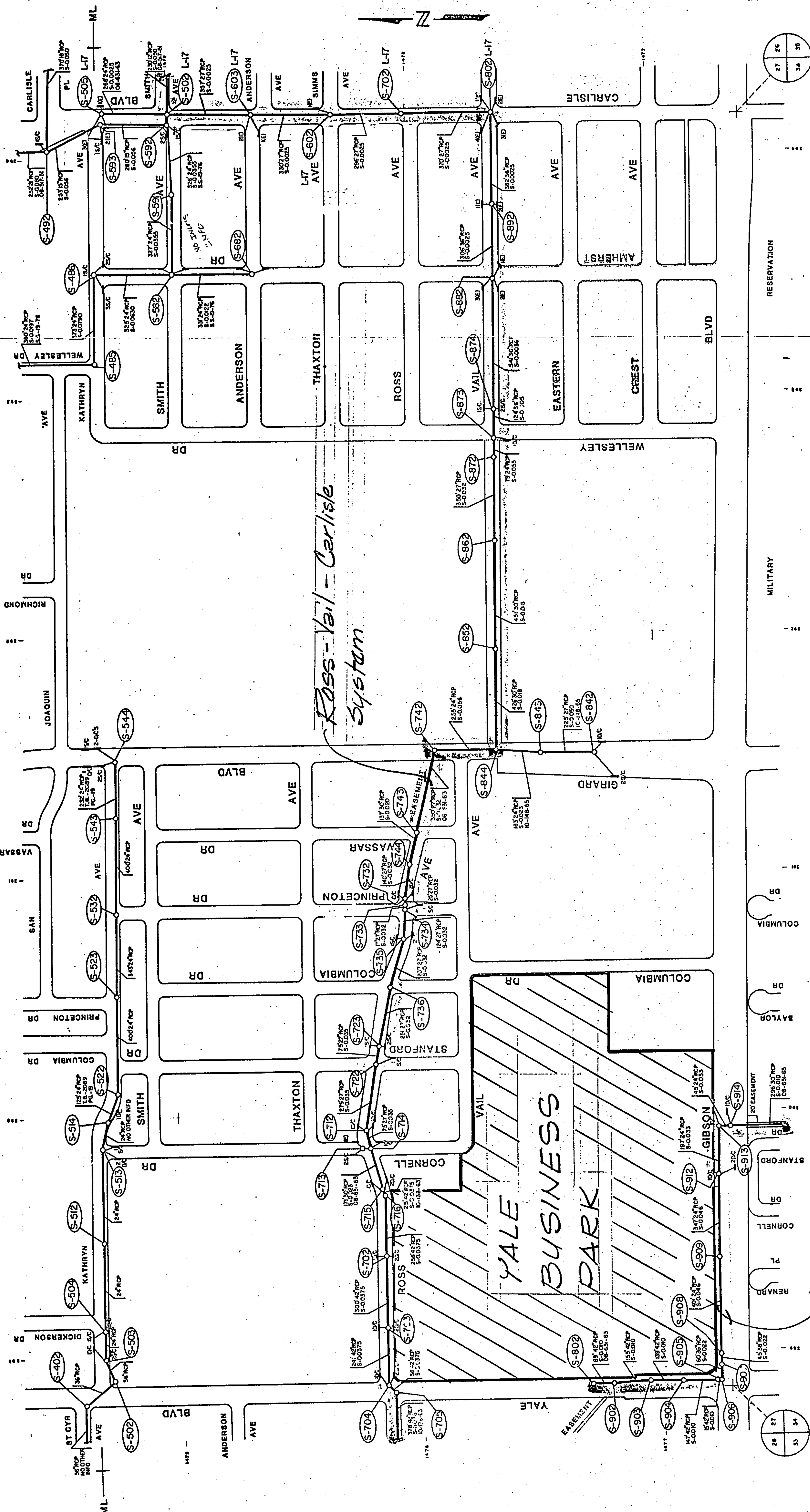
SUBJECT _____ JOB NO. _____
BY _____ DATE _____ SHEET NO. _____ OF _____
Figure 1



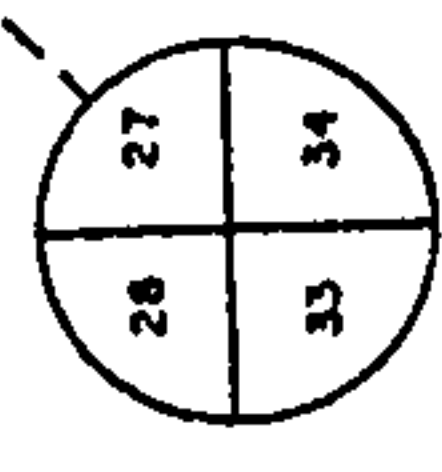
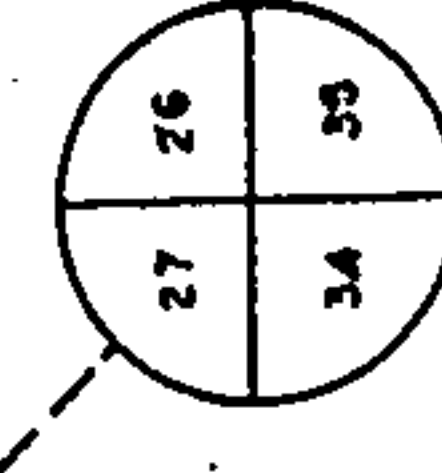
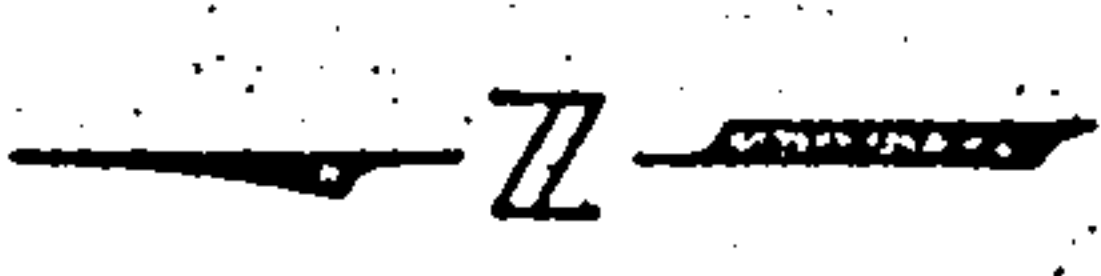
OFFSITE DRAINAGE

Scale: 1" = 200'

NEXT SHEET No. L-15



NEXT SHEET No. L-17S



Gibson-Kirtland System

Ross-Vail-Carlisle System

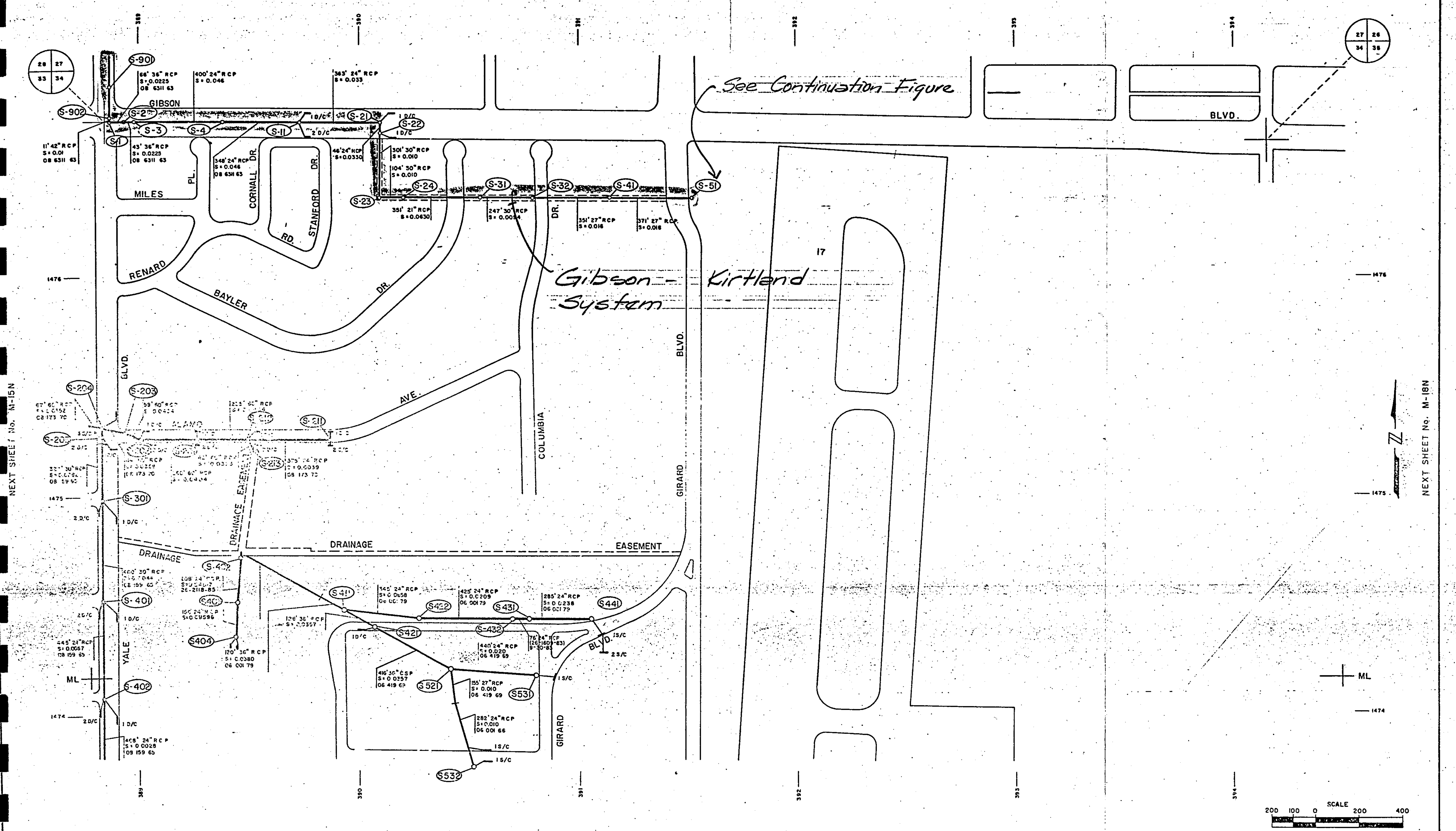
YALE BUSINESS PARK

DRAINAGE FACILITIES MAP		
LEGEND		MAP GRID
STORM SEWER LINE	NOTES	REVISIONS
MANHOLE	1. MANHOLE IDENTIFICATION REQUIRES BOTH THE MAP GRID & MANHOLE NO.	DATE
STORM INLET	2. MANHOLE NUMBERS CARRIED FROM ADJACENT MAPS HAVE THE MAP GRID SHOWN.	REMARKS

L-16S

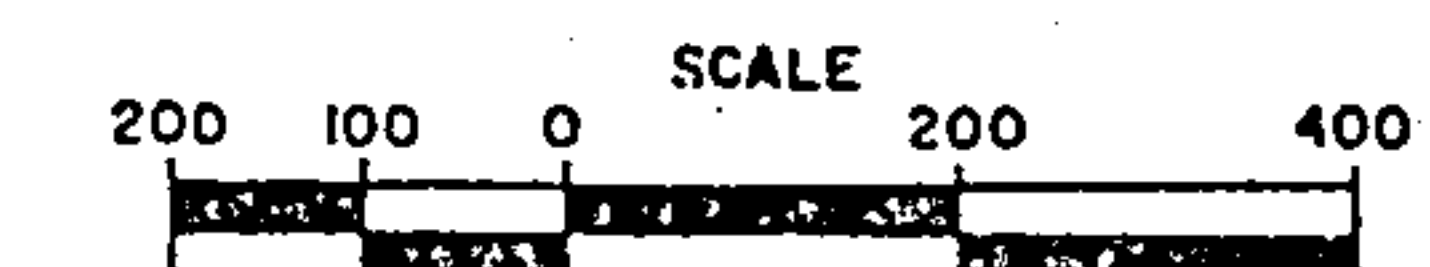
NEXT SHEET No. N-16N

Figure 4



NEXT SHEET No. M-15N

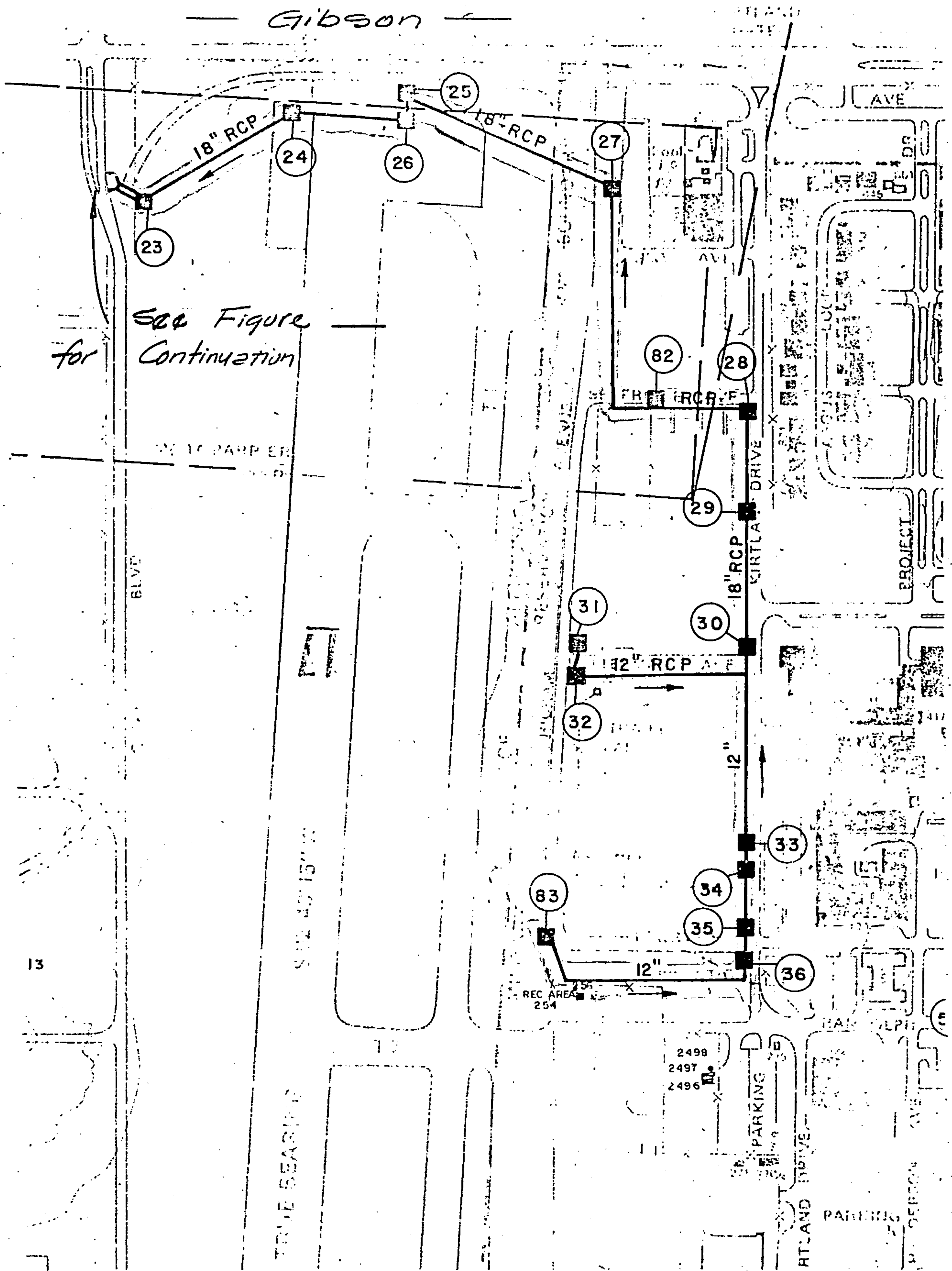
NEXT SHEET No. M-18N



DRAINAGE FACILITIES MAP			
LEGEND	NOTES	REVISIONS	MAP GRID
— STORM SEWER LINE ○ MANHOLE ○ MANHOLE NUMBER ○ STORM INLET	1 MANHOLE IDENTIFICATION REQUIRES BOTH THE MAP GRID & MANHOLE NO 2 MANHOLE NUMBERS CARRIED FROM ADJACENT MAPS HAVE THE THE MAP GRID SHOWN	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100	M-16N

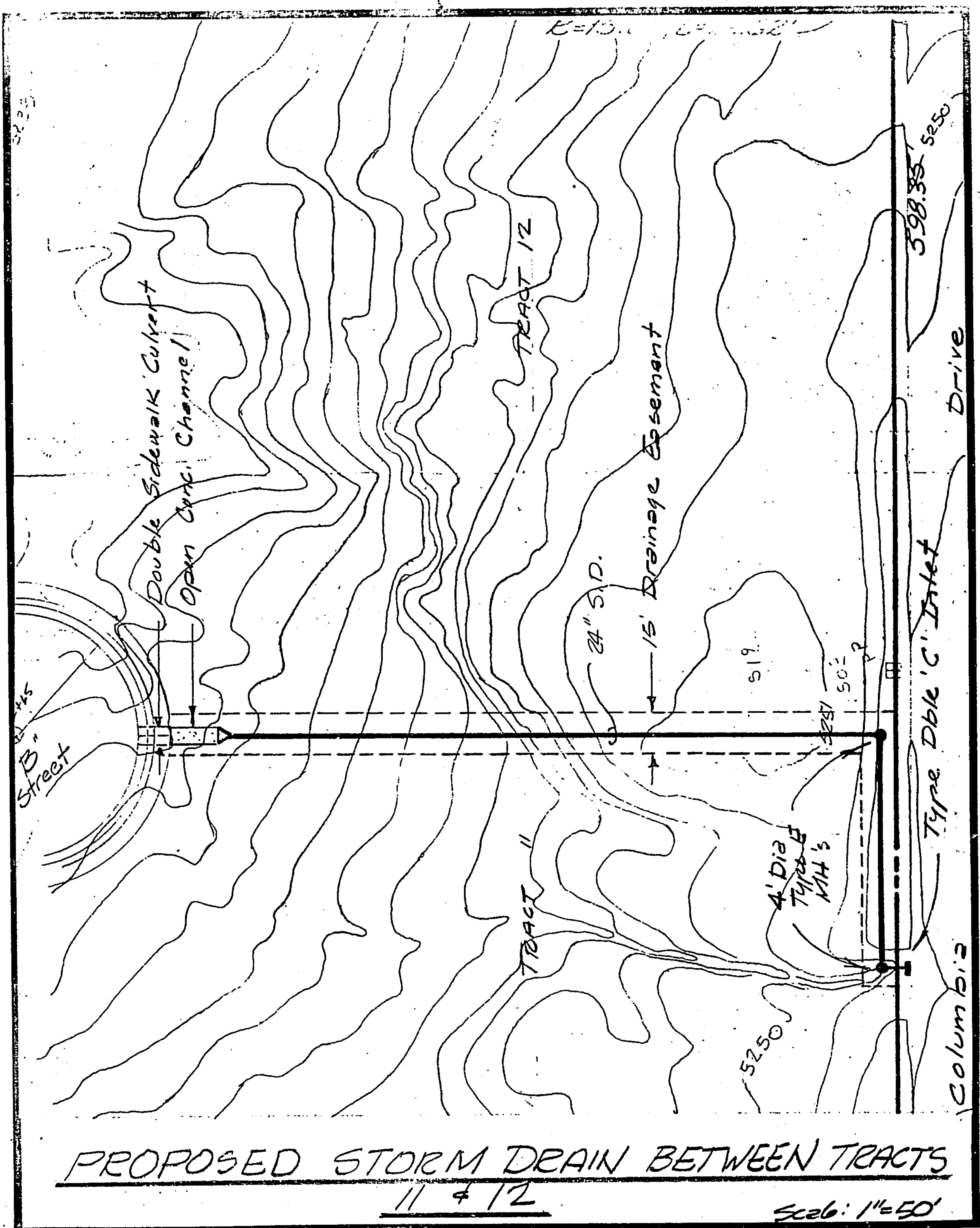
NEXT SHEET No. M-16S

Figure 6



KIRTLAND STORM DRAIN SYSTEM

Figure 7

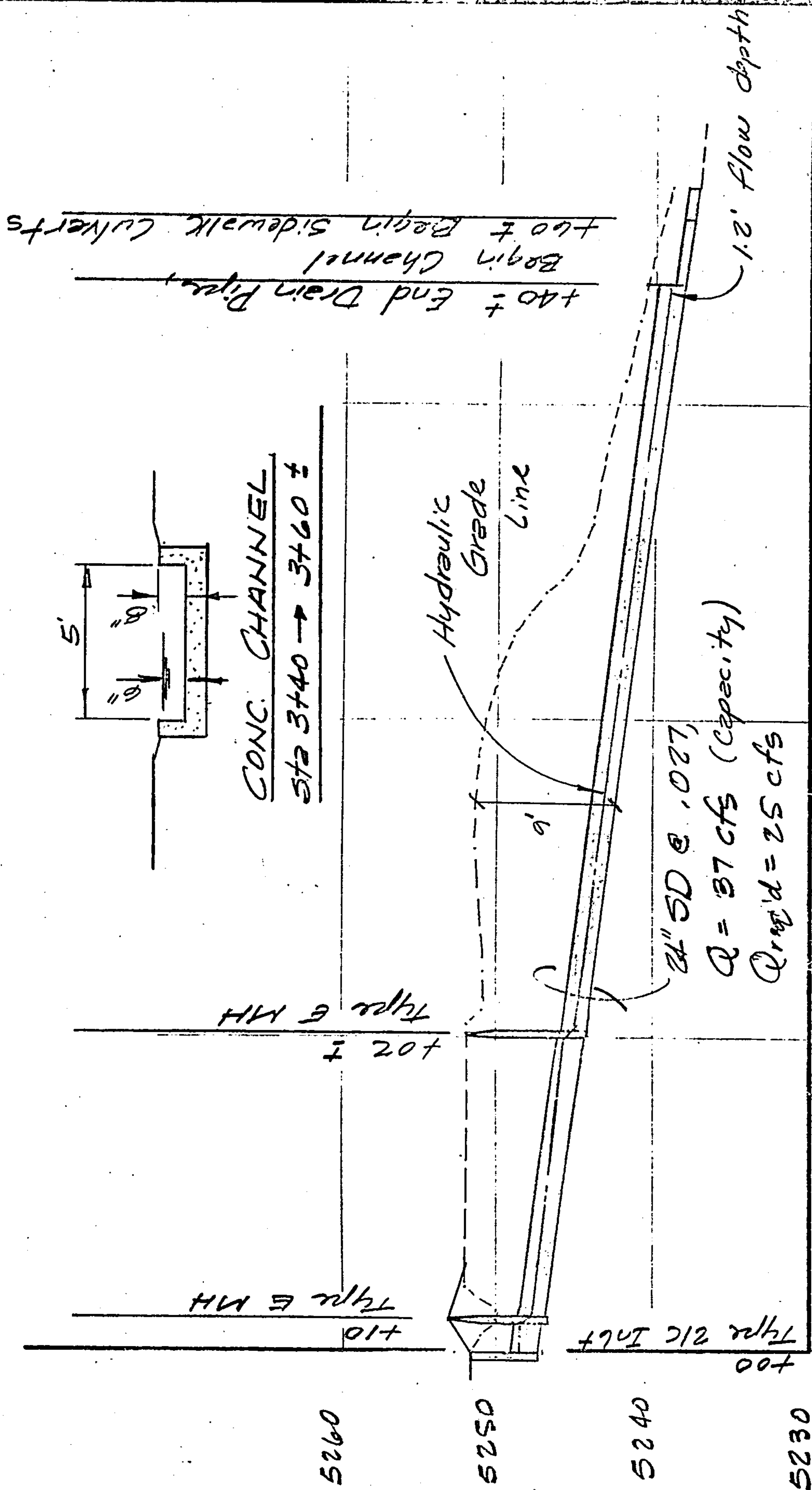


PROPOSED STORM DRAIN BETWEEN TRACTS
11 & 12

Scale: 1"=50'

Isaacson &
 Arfman, P.A.

SUBJECT _____ JOB NO. _____
 BY _____ DATE _____ SHEET NO. _____ OF _____
 Figure 8



3+00

2

10 + 4 1 +

0

for Easement

Min. req. = 24'

← 2(9) + 4' + 2' →

2 x D_i + 4' + 4'

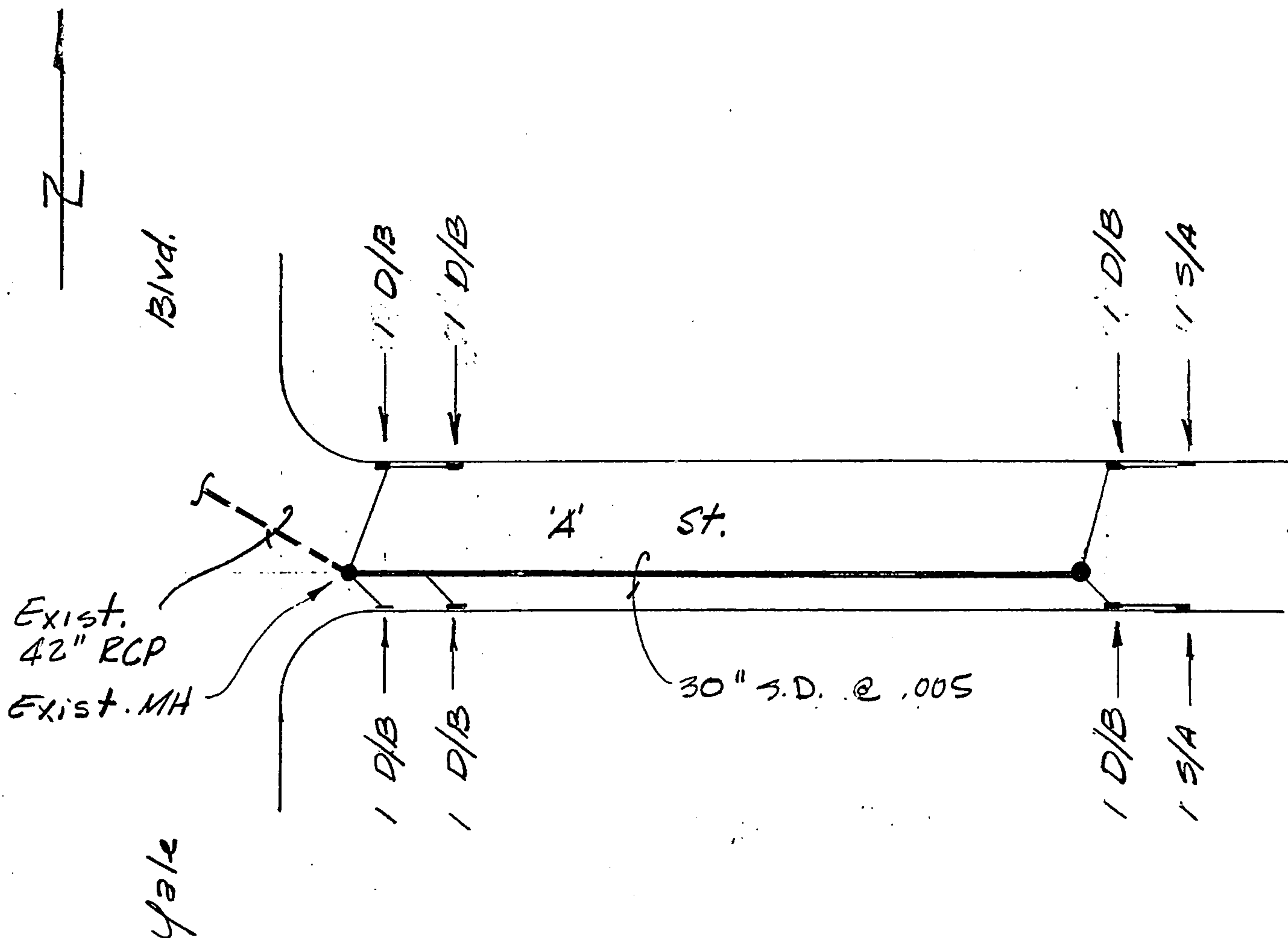
PROFILE - STORM DRAIN BETWEEN TRACTS

11 of 12

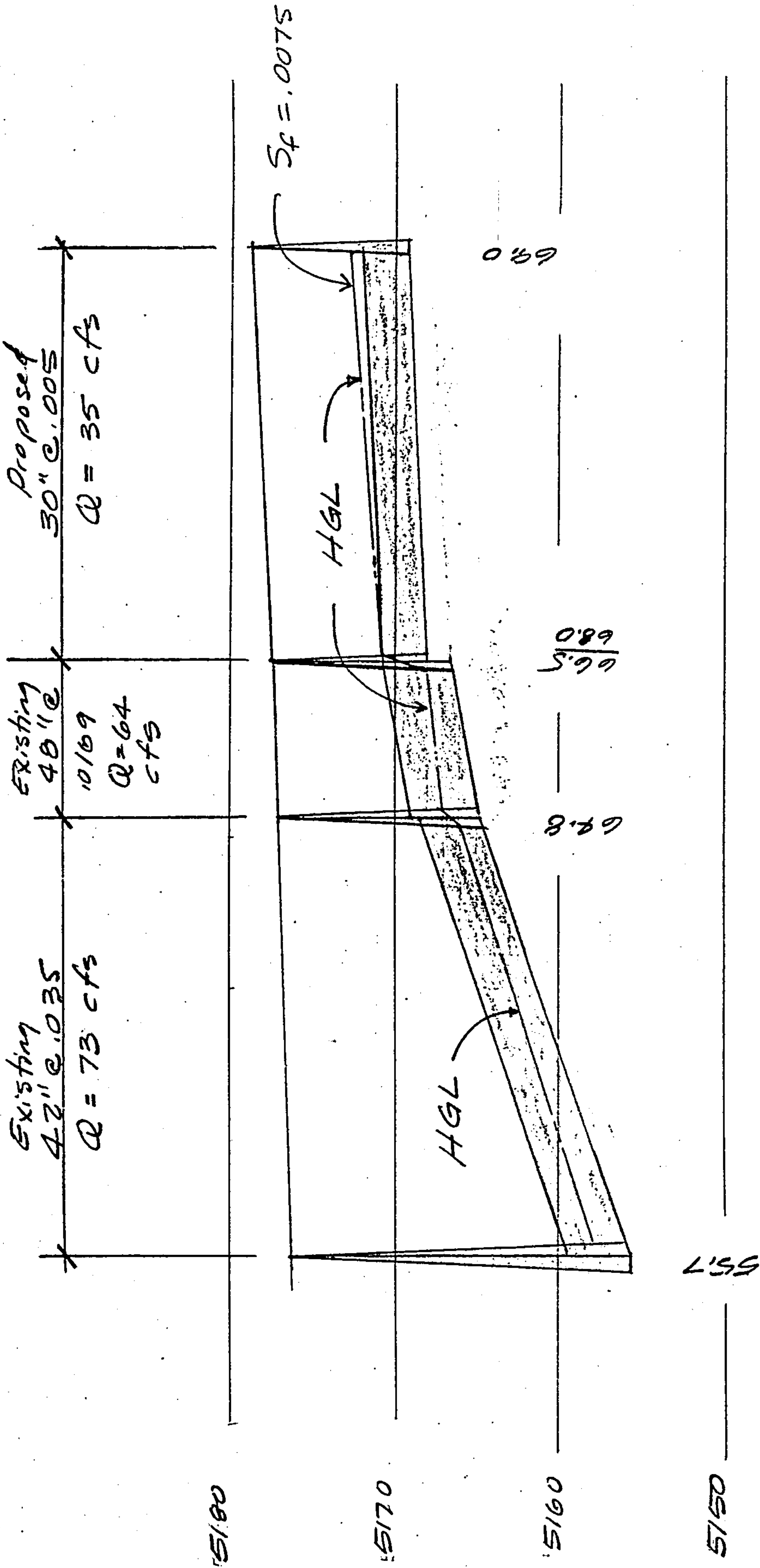
Isaacson & Arfman, P.A.

SUBJECT _____ JOB NO. _____
BY _____ DATE _____ SHEET NO. _____ OF _____

Figure 9

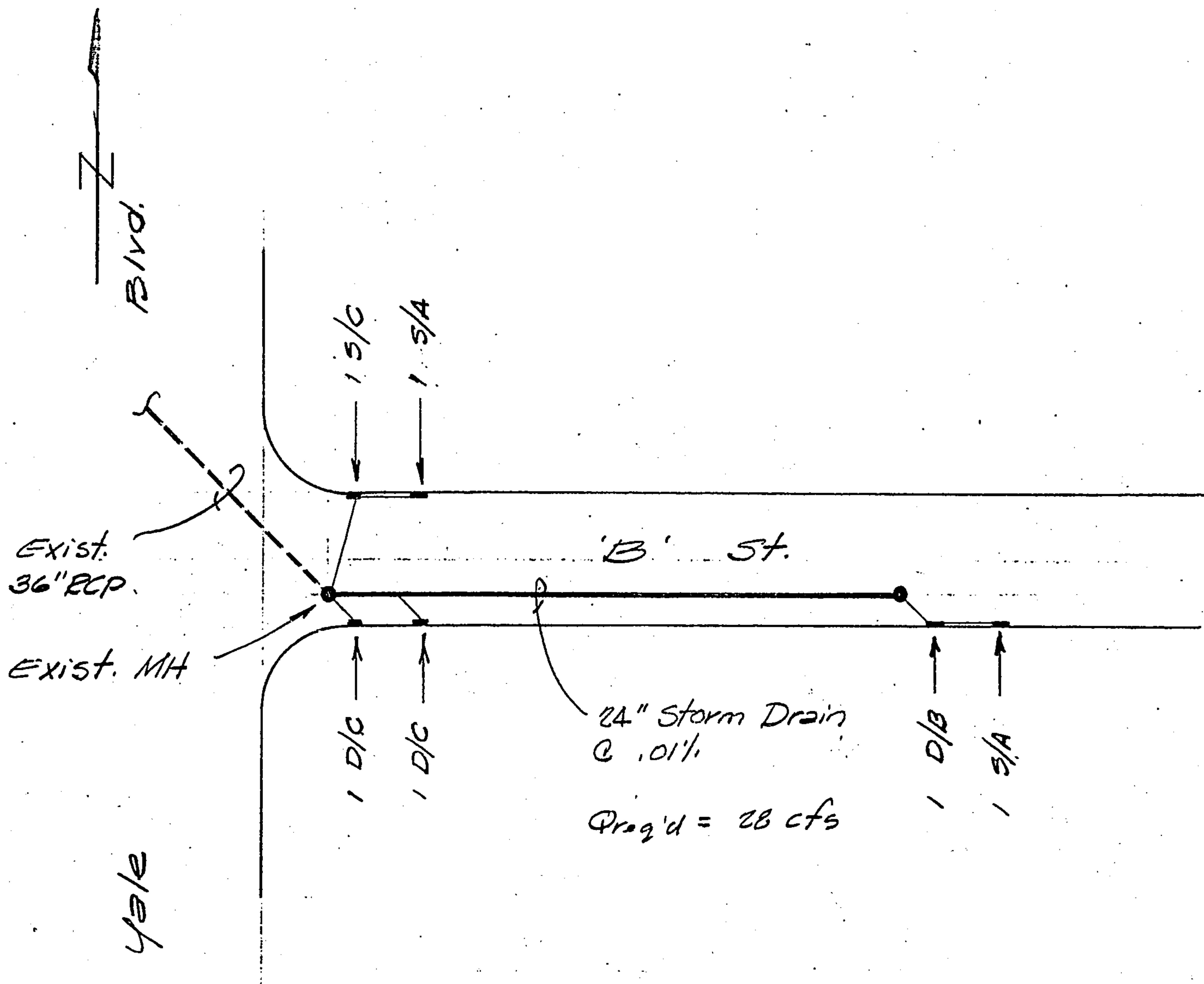


PROPOSED STORM DRAIN
IMPROVEMENTS - 'A' STREET
 Scale: 1" = 50'



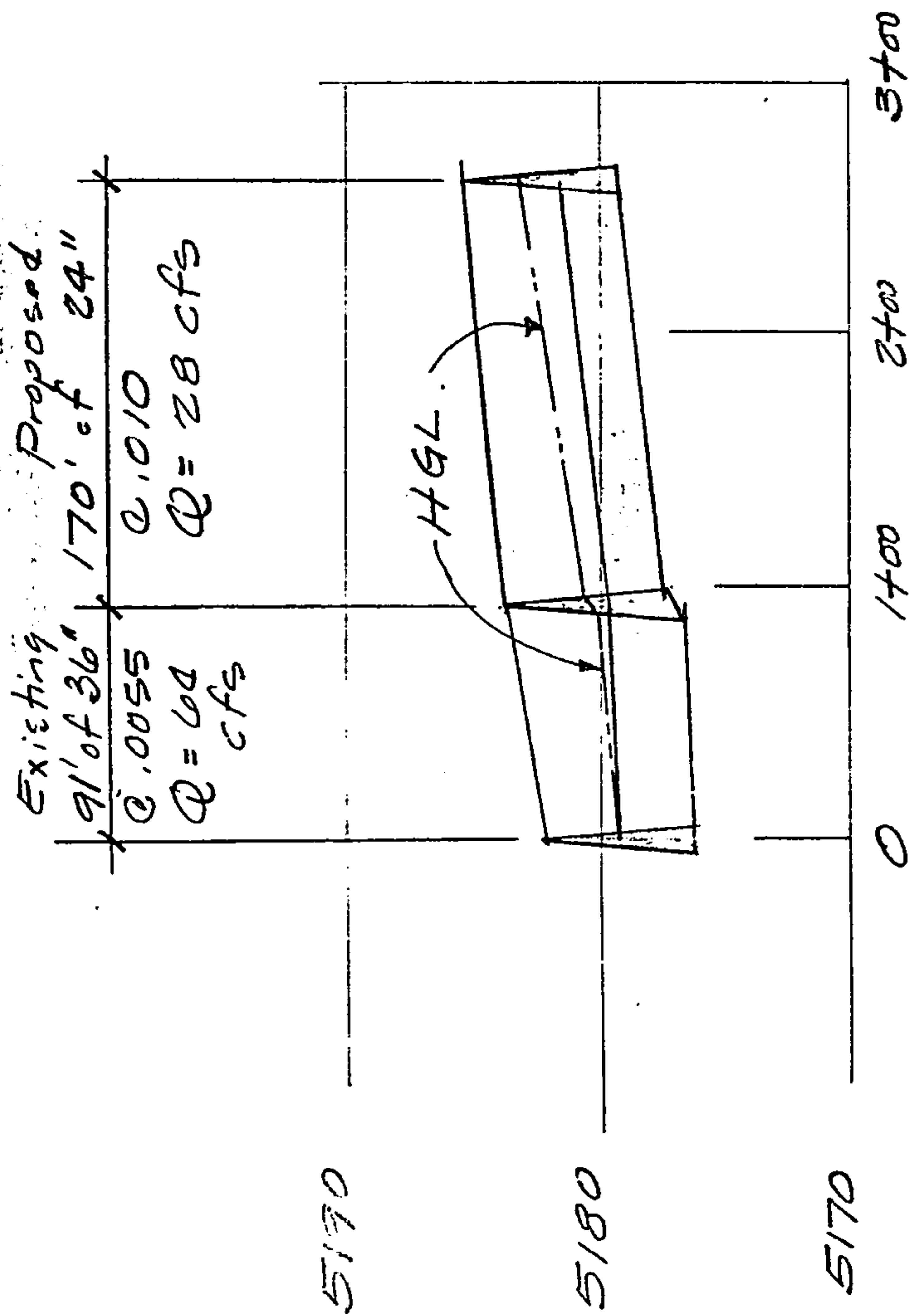
STORM DRAIN PROFILE 4' STREET TO ROSS

1" = 100' H.
= 10' V.



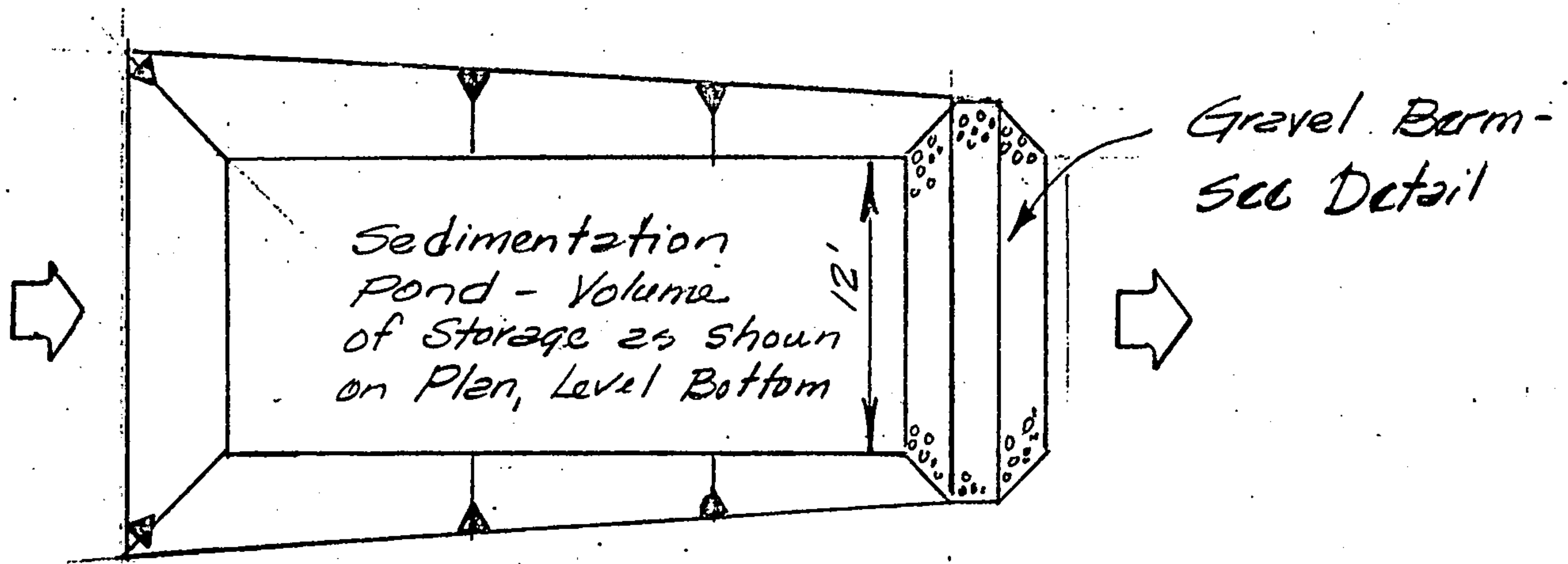
PROPOSED STORM DRAIN IMPROVEMENTS - 'B' STREET

Scale: 1" = 50'



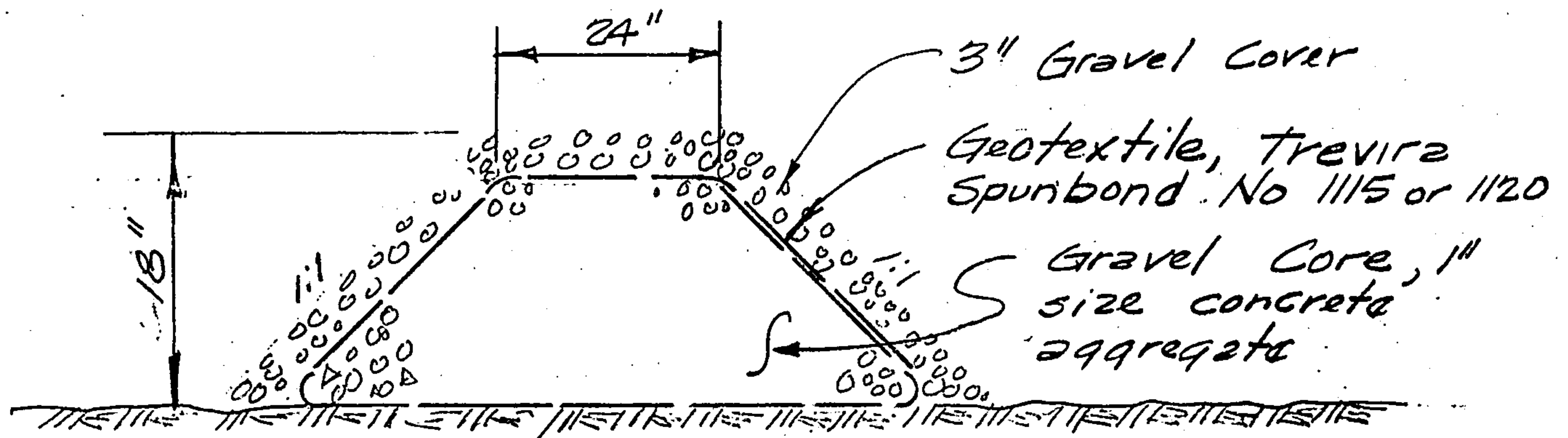
STORM DRAIN PROFILE
'B' STREET TO GIBSON -
KIRTLAND LINE

1" = 100' H.
 = 10' V.



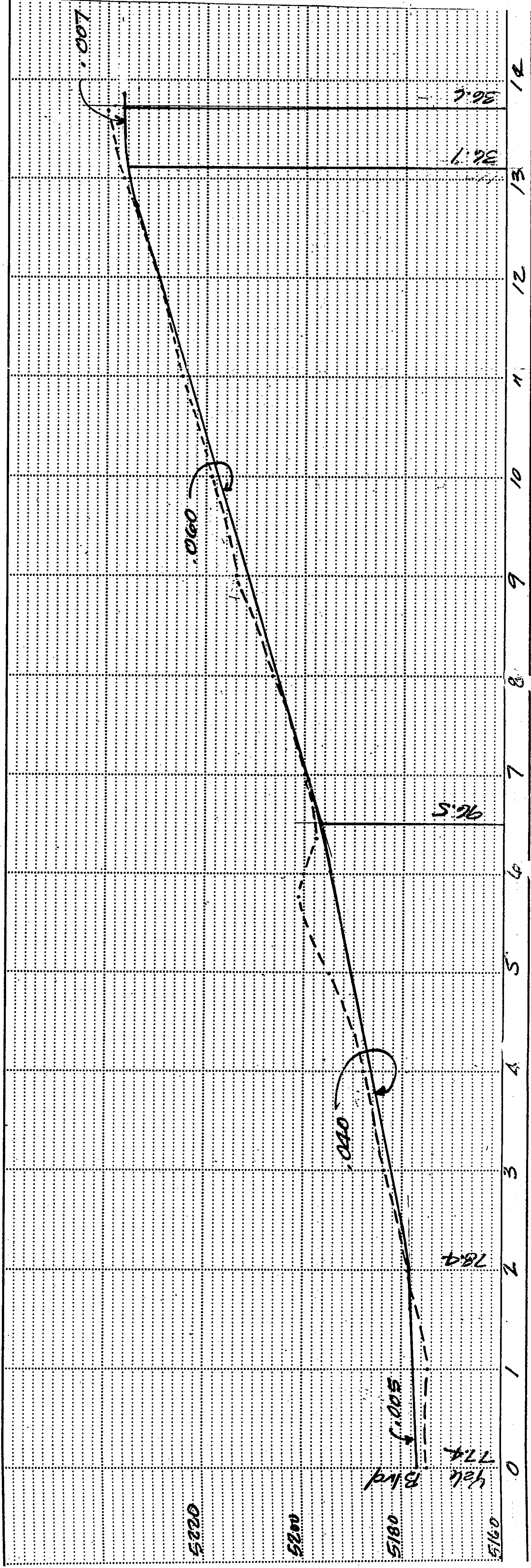
SEDIMENTATION POND PLAN

No Scale

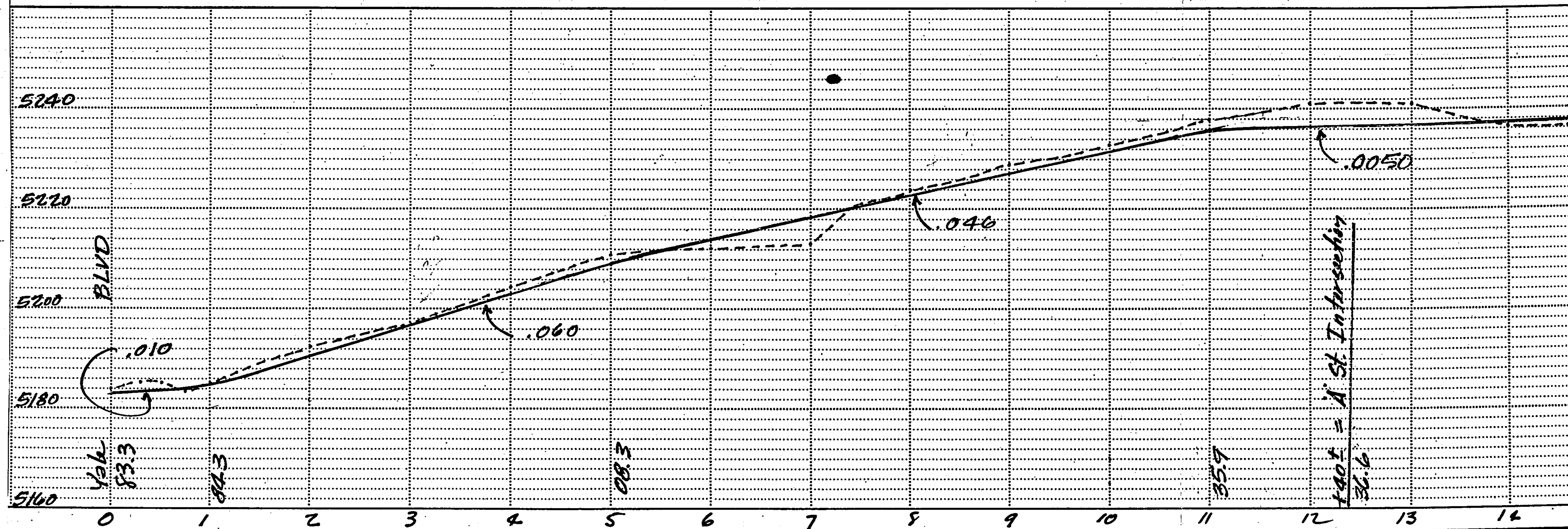


GRAVEL BERM

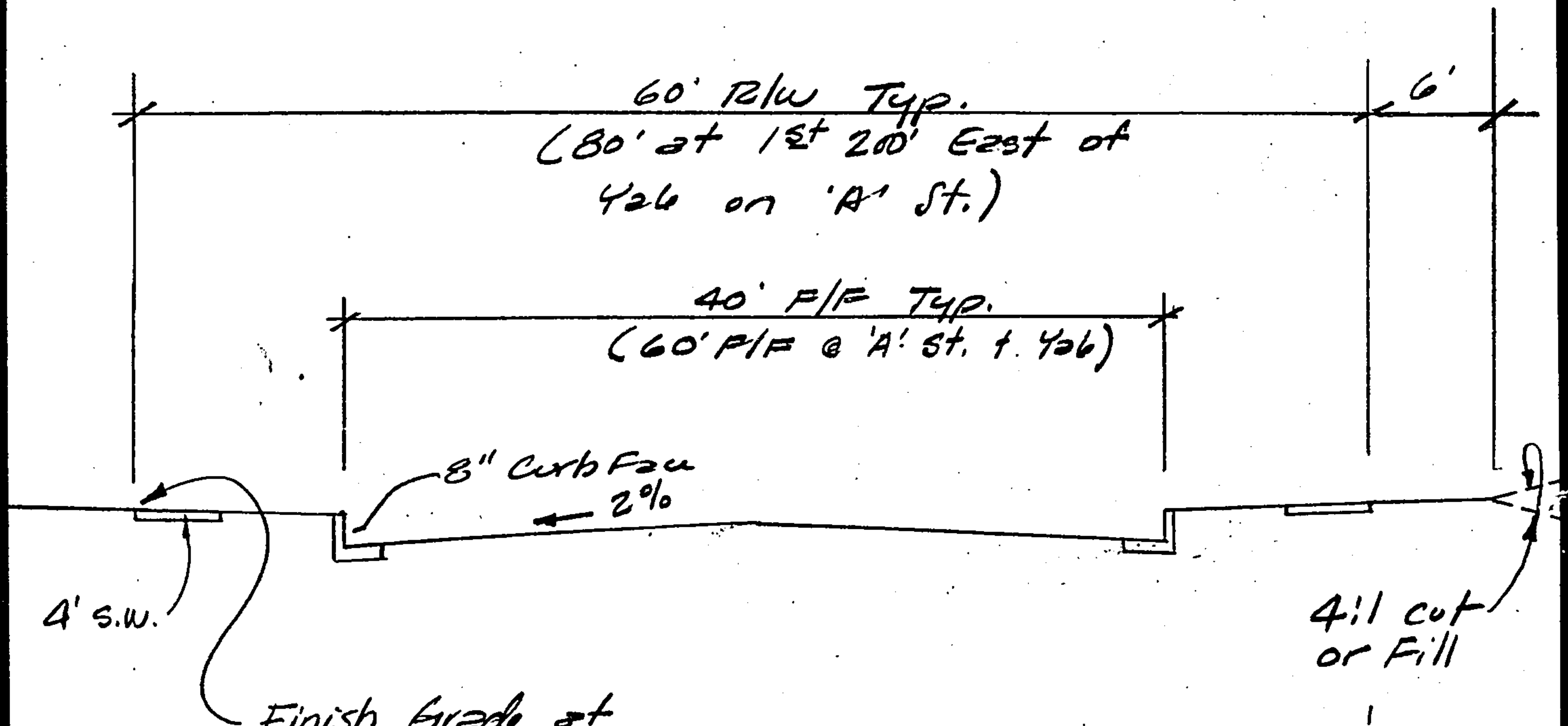
No Scale



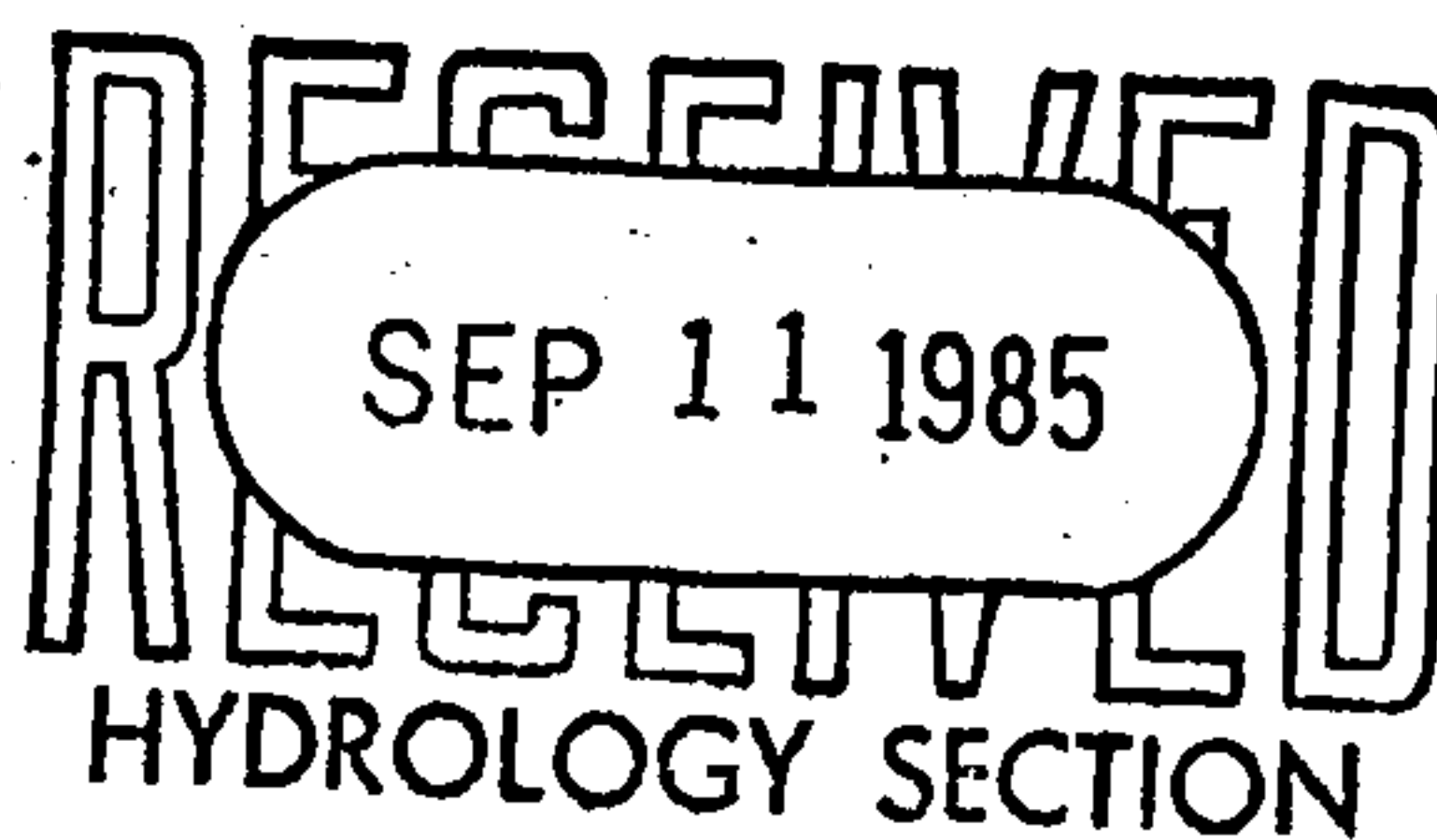
'A' STREET PROFILE



'B' STREET PROFILE



Finish Grade at
R 0.33' above
Top of Curb



TYPICAL STREET SECTION

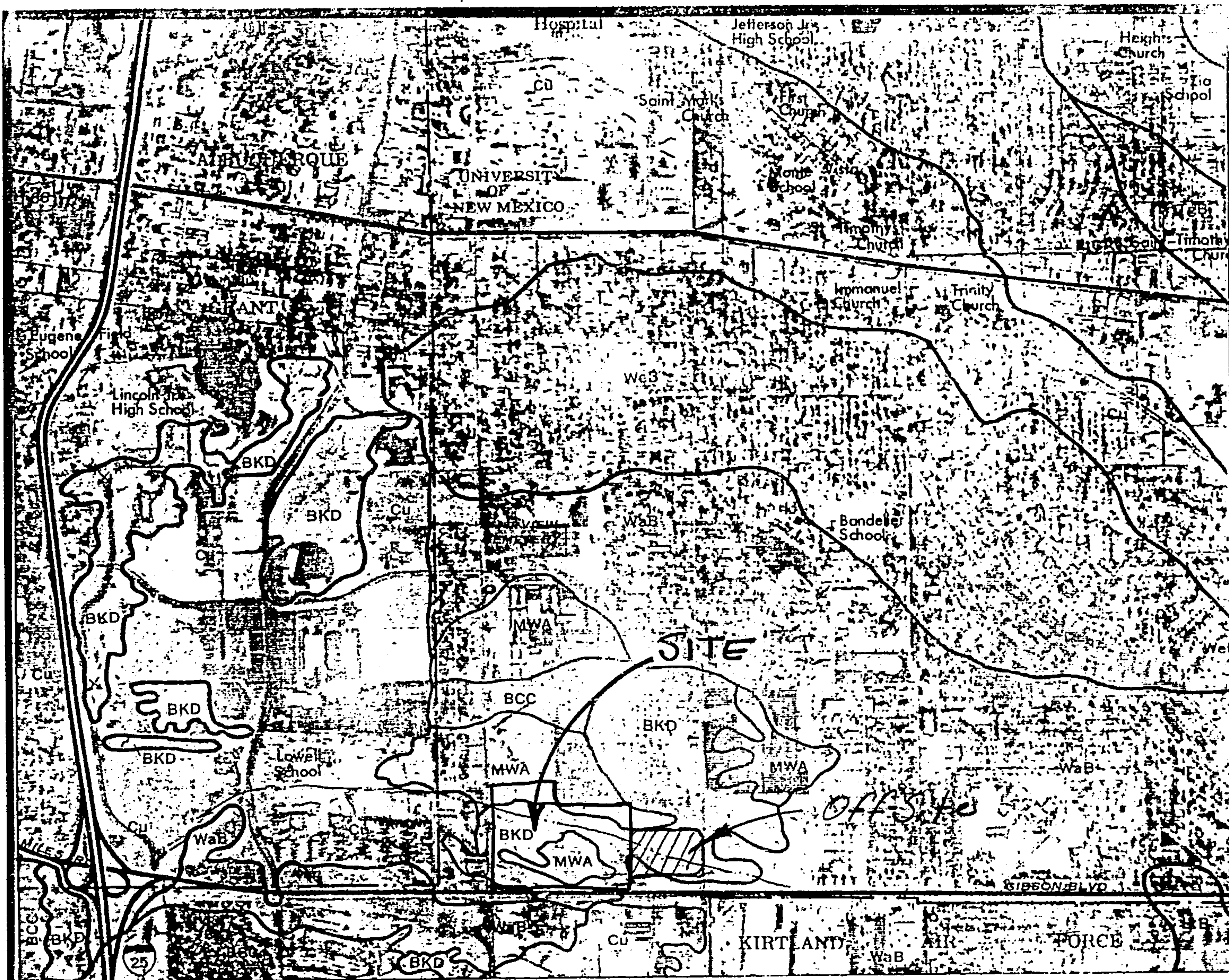
1" = 10' H.
= 5' V.

APPENDIX 'A'

OFFSITE DRAINAGE :

Off-site Drainage Area is separated into two sub-areas; Bag & Save Tract and the remaining area. Separation is made to account for controlled discharge from Bag & Save Site. Per Drainage Report for Bag & Save, $Q_{100} = 5 \text{ cfs}$

$$\begin{array}{rcl} Q_{100} & \text{Bag \& Save} & = 5 \text{ cfs} \\ Q_{100} & \text{Remaining Offsite (Sh 3)} & = \underline{20} \\ & & \Sigma = 25 \text{ cfs} \end{array}$$



SCS SOILS MAP

1" = 2000'

Soil

HYDRO GROUP

BKD

A

MWA

B

Wab

B

RUNOFF CALCULATIONS

(Rational Formula)

LOCATION: Offsite Area (East of Site)

DRAINAGE AREA:

$$\text{Planimeter Rdg } \underline{412} \times .015 \\ \times \text{Map Scale } \underline{200}^2 \div 43,560$$

$$A = \underline{5.7} \text{ acres}$$

TIME OF CONCENTRATION:

Drainage Basin Data:

$$L = \frac{400}{800} \text{ ft.}, \text{ fall} = \frac{22}{32} \text{ ft.}, \text{ Slope} = \frac{.06}{.04} \text{ ft/ft } \begin{matrix} \text{(Columbia Dr.)} \\ \text{(Overland)} \end{matrix}$$

☒ Overland Flow:

$$v = \underline{1.1} \text{ ft/sec (Pl. 22.2 B-1)}$$

$$T_c = \underline{727} \text{ sec} = \underline{12} \text{ min.}$$

$$T_c = \underline{12} \text{ min.}$$

☒ Street Flow:

$$v = \underline{6.7} \text{ ft/sec (Pl. 22.2 B-2)}$$

$$T_c = \underline{60} \text{ sec} = \underline{1} \text{ min.}$$

$$T_c = \underline{1} \text{ min}$$

$$\Sigma = \underline{13} \text{ min}$$

☐ Arroyo Flow:

$$T_c = 0.0078 \frac{L^{0.77}}{S^{0.385}} = \underline{\hspace{1cm}} \text{ min.}, T_c = \underline{\hspace{1cm}} \text{ min}$$

RUNOFF COEFFICIENT:

SCS Soil Group: (A) B C D

% Impervious = 95 % (fully developed)

C Factor (Pl 22.2 C-1)

$$C = \underline{.85}$$

RAINFALL INTENSITY:

$$100 \text{ yr depth} = \underline{2.28}'' \text{ (Pl. 22.2 D-1)}$$

$$\text{Intensity Factor} = \underline{1.85} \text{ (Pl. 22.2 D-2)}$$

$$\text{Intensity} = \text{depth} \times \text{factor},$$

$$I = \underline{4.22}''/\text{hr.}$$

PEAK RUNOFF RATE:

$$Q = CIA = \frac{.85}{+ 5 \text{ cfs from Bq + Sewer}} \times \underline{4.22} \times \underline{5.7}$$

$$Q_{100} = \frac{20}{+ 5} \text{ cfs} = \underline{25} \text{ cfs}$$

On-Site

DETERMINATION OF % IMPERVIOUS FACTOR OF TRAKTS

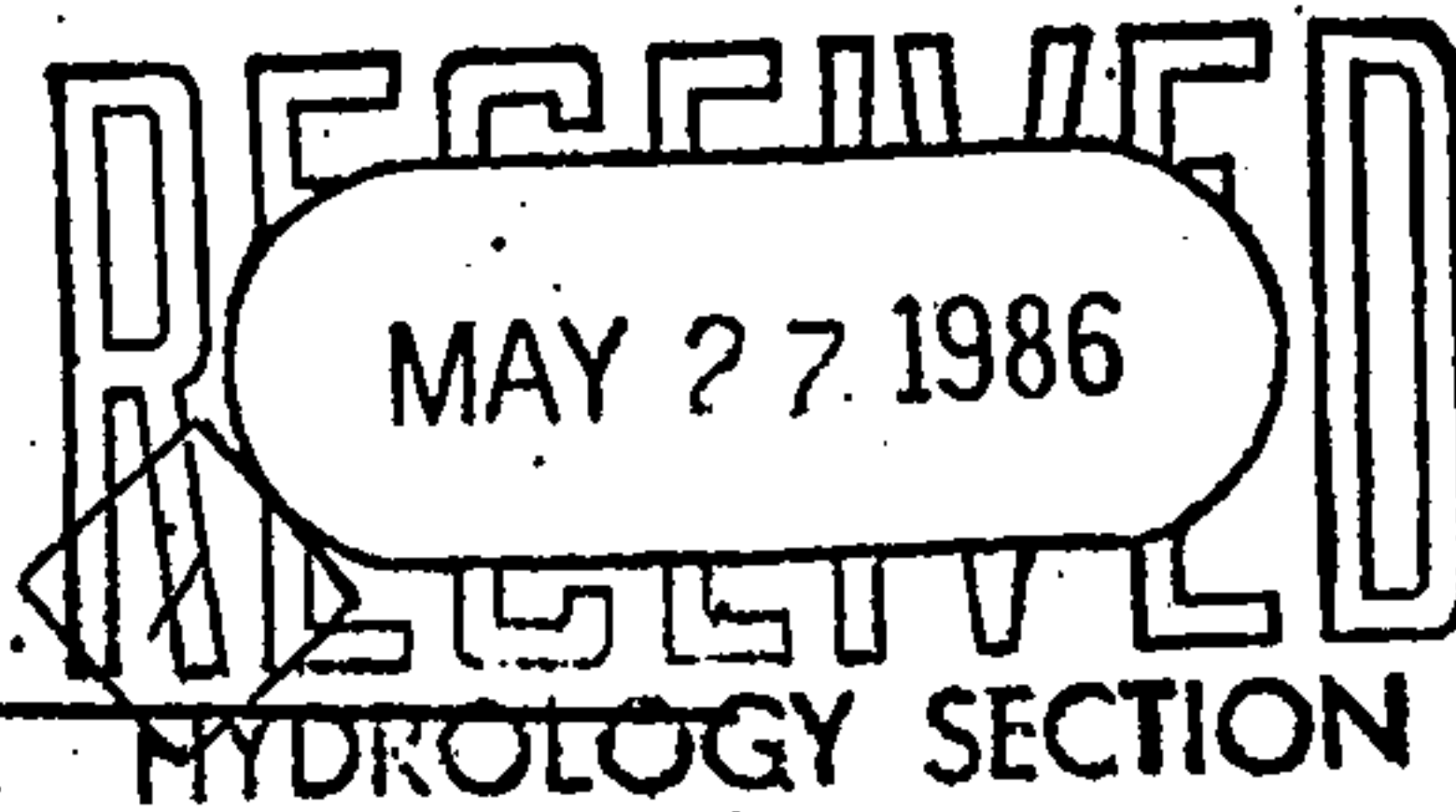
Special Use Zoning Requirements require a minimum of 20% of the site area to be landscaped and an additional 10% of the paved area to be landscaped.

Therefore % Pervious = 20% basic
Paving will cover approximately 50% of site so
Paving Portion = $50\% \times 10\% = 5\%$
 $\Sigma = 25\%$ Pervious

% Impervious = $100 - 25 = 75\%$

RUNOFF CALCULATIONS

(Rational Formula)



PROJECT: Yale Business Park Analysis Point#

DRAINAGE AREA:

Planimeter Rdg. 1200 x .015

x Map Scale 100 2 ÷ 43,560 A = 4.1 acres

TIME OF CONCENTRATION:

Drainage Basin Data:

*Overland
Street*

L = 550 ft., fall = 20 ft., slope = .04 ft/ft
300 1.5 1005

☒ Overland Flow:

v = 2.7 ft/sec (Pl 22.2 B-1)

Tc = 204 sec. = 3.4 min. Tc = 3.4 min.

☒ Street Flow:

v = 1.9 ft/sec. (Pl 22.2 B-2)

Tc = 158 sec. = 2.6 min. Tc = 2.6 min.

☐ Arroyo Flow:

Tc = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = min. Tc = min.

Σ Tc = 6.0 min.

Use Tc = 10 min

RUNOFF COEFFICIENT:

% Impervious = 75% (See Street 4)

Soil Group A: 20 @ 0.60 =

Soil Group B: 20 @ 0.73 =

*All Group A
Soils, C=0.60*

Σ = Σ =

C = =

C = 0.60

RAINFALL INTENSITY:

100 year depth = 2.28 " (Pl. 22.2 D-1)

Intensity Factor = 2.11 (Pl. 22.2 D-2)

Intensity = depth x factor

I = 4.81 "/hr.

PEAK RUNOFF RATE:

Q = CIA = .60 x 4.81 x 4.1 Q₁₀₀ = 11.8 cfs

x 0.657 = Q₁₀ = 7.8 cfs

VOLUME OF RUNOFF:

Soil Group A: 20 @ 0.60 CN = = 83

Soil Group B: 20 @ 0.73 CN = =

Σ = Σ =

Q = 1 " (Pl 22.2 C-4)

V = $Q A = \frac{1}{12} \times 4.1 \times 43,560 = 14,880$ cu. ft.

T = $2V \div Q_{100} \div 60 = 42$ min

RUNOFF CALCULATIONS

(Rational Formula)

PROJECT: Yale Business Park Analysis Point# 2

DRAINAGE AREA:

Planimeter Rdg. 1260 x .015

x Map Scale 100 2 ÷ 43,560 A = 4.3 acres

TIME OF CONCENTRATION:

Drainage Basin Data:

L = 125 ft., fall = 150 ft., slope = .005 ft/ft
.06

☒ Overland Flow:

v = 1.9 ft/sec (Pl 22.2 B-1)
Tc = 60 sec. = 1.1 min. Tc = 1.1 min.

☒ Street Flow:

v = 6.7 ft/sec. (Pl 22.2 B-2)
Tc = 22 sec. = 0.4 min. Tc = 0.4 min.

☐ Arroyo Flow:

Tc = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = min. Tc = min.

Σ Tc = 1.5 min.

RUNOFF COEFFICIENT:

% Impervious = 75% (See Street 4)

Soil Group A: 2.4 ac @ 0.60 = 1.44

Soil Group B: 1.9 ac @ 0.73 = 1.39

Σ = 4.3 Σ = 2.83

C = $\frac{2.83}{4.3}$ = .66

C = .66

RAINFALL INTENSITY:

100 year depth = 2.28 " (Pl. 22.2-D-1)

Intensity Factor = 2.11 (Pl. 22.2 D-2)

Intensity = depth x factor

I = 4.81 "/hr.

PEAK RUNOFF RATE:

Q = CIA = .66 x 4.81 x 4.3 Q₁₀₀ = 13.7 cfs

x 0.657 = Q₁₀ = 9.0 cfs

VOLUME OF RUNOFF:

Soil Group A: 2.4 ac @ CN = 83 = 199.2

Soil Group B: 1.9 ac @ CN = 89 = 169.1

Σ = 4.3 Σ = 368.3, CN = 86

Q = 1.1 (Pl 22.2 C-4)

V = $QA = \frac{1.1}{12} \times 4.3 \times 43,560 = 17,170$ cu. ft.

T = $2V \div Q_{100} \div 60 = 42$ min

RUNOFF CALCULATIONS

(Rational Formula)

PROJECT: Yab. Business Park Analysis Point# 3

DRAINAGE AREA:

Planimeter Rdg. 1360 x .015

x Map Scale 100 2 ÷ 43,560 A = 4.7 acres

TIME OF CONCENTRATION:

Drainage Basin Data:

L = 500 ft., fall = _____ ft., slope = .06 ft/ft

☐ Overland Flow:

v = 6.7 ft/sec (Pl 22.2 B-1)

Tc = _____ sec. = _____ min. Tc = _____ min.

☒ Street Flow:

v = 6.7 ft/sec. (Pl 22.2 B-2)

Tc = 75 sec. = 1.2 min. Tc = 1.2 min.

☐ Arroyo Flow:

Tc = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = _____ min. Tc = _____ min.

Σ Tc = 1.2 min.

Use 10 min.

RUNOFF COEFFICIENT:

% Impervious = 75% (See Sheet 4)

Soil Group A: .9 ac @ 0.60 = .5

Soil Group B: 3.8 ac @ 0.73 = 2.8

Σ = 4.7 Σ = 3.3

C = $\frac{3.3}{4.7}$ = 0.70

C = .70

RAINFALL INTENSITY:

100 year depth = 2.28 " (Pl. 22.2 D-1)

Intensity Factor = 2.11 (Pl. 22.2 D-2)

Intensity = depth x factor

I = 4.81 "/hr.

PEAK RUNOFF RATE:

Q = CIA = .70 x 4.81 x 4.7 Q₁₀₀ = 15.8 cfs

x 0.657 = Q₁₀ = 10.6 cfs

VOLUME OF RUNOFF:

Soil Group A: .9 ac @ CN = 83 = 74.7

Soil Group B: 3.8 ac @ CN = 89 = 338.2

Σ = 4.7

Σ = 412.9 ÷ 4.7 = 88

q = 1.2 " (Pl 22.2 C-4)

V = qA = $\frac{1.2}{12}$ x 4.7 ac x 43,560 = 20,473 cu. ft.

T = 2V ÷ Q₁₀₀ ÷ 60 = 43 min

RUNOFF CALCULATIONS

(Rational Formula)

PROJECT: Yak Business Park Analysis Point# 4

DRAINAGE AREA:

Planimeter Rdg. 1310 x .015

x Map Scale 100 2 ÷ 43,560 A = 4.5 acres

TIME OF CONCENTRATION:

Drainage Basin Data:

L = 460 ft., fall = _____ ft., slope = .04 ft/ft

☐ Overland Flow:

v = _____ ft/sec (Pl 22.2 B-1)

Tc = _____ sec. = _____ min. Tc = _____ min.

☒ Street Flow:

v = 5.3 ft/sec. (Pl 22.2 B-2)

Tc = 87 sec. = 1.5 min. Tc = 1.5 min.

☐ Arroyo Flow:

Tc = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = _____ min. Tc = _____ min.

Σ Tc = 1.5 min.

Use 10 min.

RUNOFF COEFFICIENT:

% Impervious = 75% (See Sheet 4)

Soil Group A: 3.5 ac @ 0.60 = 2.10

Soil Group B: 1.0 ac @ 0.73 = .73

Σ = 4.5 Σ = 2.83

C = $\frac{2.83}{4.5}$ =

C = 0.63

RAINFALL INTENSITY:

100 year depth = 2.28 " (Pl. 22.2 D-1)

Intensity Factor = 2.11 (Pl. 22.2 D-2)

Intensity = depth x factor

I = 4.81 "/hr.

PEAK RUNOFF RATE:

Q = CIA = 163 x 4.81 x 4.5 Q₁₀₀ = 13.6 cfs

x 0.657 = Q₁₀ = 9.0 cfs

VOLUME OF RUNOFF:

Soil Group A: 3.5 ac @ CN = 83 = 290.5

Soil Group B: 1.0 ac @ CN = 89 = 89.0

Σ = 4.5 Σ = 379.5 - 4.5 = 84

q = 1.0 (Pl 22.2 C-4)

V = qA = $\frac{1}{12}$ x 4.5 ac x 43,560 = 16,335 cu. ft.

T = 2V ÷ Q₁₀₀ - 60 = 40 min

(5/86)

RUNOFF CALCULATIONS

(Rational Formula)

PROJECT: Yale Business Park Analysis Point# Offsite

DRAINAGE AREA:

Planimeter Rdg. 412 x .015

x Map Scale 200 2 ÷ 43,560 A = 5.7 acres

TIME OF CONCENTRATION:

Drainage Basin Data:

L = 400 ft., fall = 22 ft., slope = .04 ft/ft (Columbia Dr. (overland))
800 32 .04

☒ Overland Flow:

v = 1.1 ft/sec (Pl 22.2 B-1)

Tc = 727 sec. = 12 min. Tc = 12 min.

☒ Street Flow:

v = 6.7 ft/sec. (Pl 22.2 B-2)

Tc = 60 sec. = 1 min. Tc = 1 min.

☐ Arroyo Flow:

Tc = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = min. Tc = min.

Σ Tc = 13 min.

RUNOFF COEFFICIENT:

% Impervious = 80% (See Street 4)

Soil Group (A) ac c 0.60 =

Soil Group B: ac c 0.73 =

Σ = Σ =

C = C = .64

RAINFALL INTENSITY:

100 year depth = 2.28 " (Pl. 22.2-D-1)

Intensity Factor = 1.85 (Pl. 22.2 D-2)

Intensity = depth x factor I = 4.22 "/hr.

PEAK RUNOFF RATE:

Q = CIA = .64 x 4.22 x 5.7 Q₁₀₀ = 15.4 cfs*

x 0.657 = Q₁₀ = 10.1 cfs

VOLUME OF RUNOFF:

Soil Group (A) ac c CN = = 87

Soil Group B: ac c CN = =

Σ = Σ =

q = 1.15 (Pl 22.2 C-4)

V = qA = $\frac{1.15}{12} \times 5.7 \times 43,560 = 23,795$ cu. ft.

T = 2V ÷ Q₁₀₀ - 60 = 52 min

(5/86)* Plus Peak Runoff From Bag & Save Tract
of 5 cfs (Controlled Discharge) 15.4 + 5 = 20.4 cfs

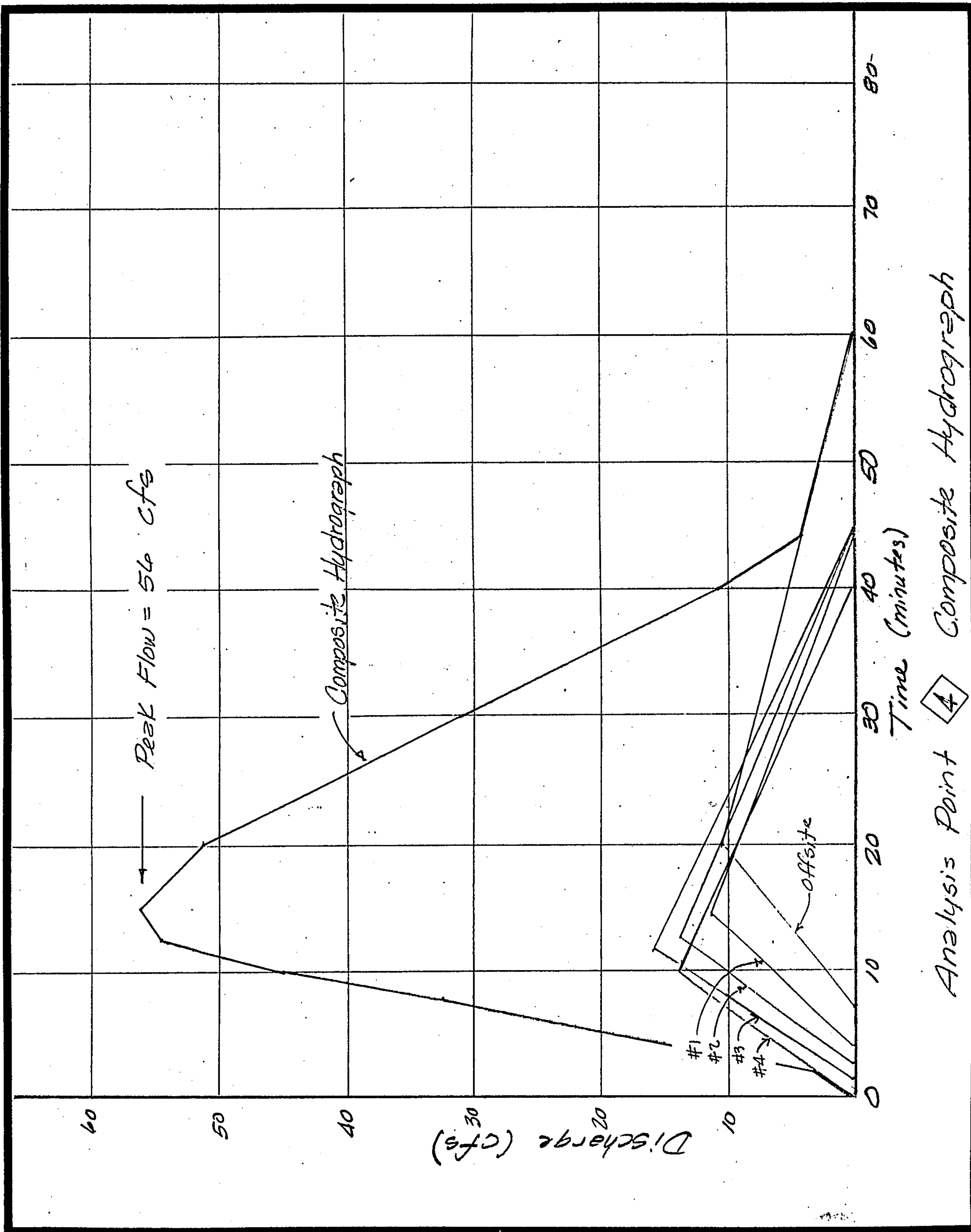
DETERMINATION OF Q_{100} at Analysis Pt 4

Total Flow Rate will be determined by addition of incremental hydrographs from Analysis Points 1 thru 4 plus 50% of offsite flows entering property from east. 50% value is used to account for splitting the total flow at the east side of the cul-de-sac where offsite flows enter the street system.

Plotting Table Information:

Incr. Hydro No.	Analysis Point No.	Q_{100} Peak (CFS)	Hydro. Peak Time (min)	Travel Time (min)	Accumulated Peak Time (min)
4	4	13.6	40	1.5	-
3	3	15.8	43	1.2	1.5
2	2	13.7	42	1.5	2.7
1	1	11.8	42	2.6	4.2
0	Offsite	10.2	52	0.6*	7.4
					13

* Travel time through on-site storm drain from east boundary line to cul-de-sac



Analysis Point 4 Composite Hydrograph

RUNOFF CALCULATIONS

(Rational Formula)

PROJECT: Yale Business Park Analysis Point# 5

DRAINAGE AREA:

Planimeter Rdg. 390 x .015

x Map Scale 100 2 ÷ 43,560 A = 1.3 acres

TIME OF CONCENTRATION:

Drainage Basin Data:

L = 480 ft., fall = 25 ft., slope = .052 ft/ft

☒ Overland Flow:

v = 3.0 ft/sec (Pl 22.2 B-1)

Tc = 100 sec. = 2.7 min. Tc = 2.7 min.

☐ Street Flow:

v = ft/sec. (Pl 22.2 B-2)

Tc = sec. = min. Tc = min.

☐ Arroyo Flow:

Tc = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = min. Tc = min.

Σ Tc = 2.7 min.

Use 10 min.

RUNOFF COEFFICIENT:

% Impervious = 75% (See Sheet 4)

Soil Group A: ac c 0.60 =

Soil Group (B): ac c 0.73 =

Σ = Σ =

C = =

C = .73

RAINFALL INTENSITY:

100 year depth = 2.28 " (Pl. 22.2-D-1)

Intensity Factor = 2.11 (Pl. 22.2 D-2)

Intensity = depth x factor

I = 4.81 "/hr.

PEAK RUNOFF RATE:

Q = CIA = .73 x 4.81 x 1.3 Q₁₀₀ = 4.6 cfs

x 0.657 = Q₁₀ = 3.0 cfs

VOLUME OF RUNOFF:

Soil Group A: ac c CN = =

Soil Group (B): ac c CN = 89 =

Σ = Σ = 89

Q = 1.3 (Pl 22.2 C-4)

V = $\frac{Q}{12}$ A = $\frac{1.3}{12}$ x 1.3 ac x 43,560 = 6135 cu. ft.

T = 2V ÷ Q₁₀₀ ÷ 60 = 45 min

RUNOFF CALCULATIONS

(Rational Formula)

PROJECT: Yale Business Park Analysis Point# 6

DRAINAGE AREA:

Planimeter Rdg. 145 x .015

x Map Scale 100 2 ÷ 43,560 A = 0.5 acres

TIME OF CONCENTRATION:

Drainage Basin Data:

L = 170 ft., fall = _____ ft., slope = .06 ft/ft

☐ Overland Flow:

v = _____ ft/sec (Pl 22.2 B-1)

Tc = _____ sec. = _____ min. Tc = _____ min.

☒ Street Flow:

v = 6.7 ft/sec. (Pl 22.2 B-2)

Tc = 25 sec. = .4 min. Tc = .4 min.

☐ Arroyo Flow:

Tc = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = _____ min. Tc = _____ min.

☒ Tc = .4 min.

RUNOFF COEFFICIENT:

USE 10 min.

% Impervious = 75% (See Sheet 4)

Soil Group A: .3 ac @ 0.60 = .18

Soil Group B: .2 ac @ 0.73 = .15

$\Sigma = .5$ $\Sigma = .33$

C = $\frac{.33}{.5} = .65$

C = .65

RAINFALL INTENSITY:

100 year depth = 2.28 " (Pl. 22.2 D-1)

Intensity Factor = 2.11 (Pl. 22.2 D-2)

Intensity = depth x factor

I = 4.81 "/hr.

PEAK RUNOFF RATE:

Q = CIA = .65 x 4.81 x 0.5 Q₁₀₀ = 1.6 cfs

x 0.657 = Q₁₀ = 1.0 cfs

VOLUME OF RUNOFF:

Soil Group A: .3 ac @ CN = 83 = 24.9

Soil Group B: .2 ac @ CN = 89 = 17.8

$\Sigma = .5$ $\Sigma = 42.7 - .5 = 85$

Q = 1.0 (Pl 22.2 C-4)

V = $QA = \frac{1.0}{12} \times .5 \times 43,560 = 1815$ cu. ft.

T = $2V \div Q_{100} \div 60 = 38$ min

RUNOFF CALCULATIONS

(Rational Formula)

PROJECT: Yak. Business Park Analysis Point# 7

DRAINAGE AREA:

Planimeter Rdg. 425 x .015

x Map Scale 2 ÷ 43,560 A = 1.5 acres

TIME OF CONCENTRATION:

Drainage Basin Data:

L = 500 ft., fall = ft., slope = .035 ft/ft

☐ Overland Flow:

v = ft/sec (Pl 22.2 B-1)

Tc = sec. = min. Tc = min.

☒ Street Flow:

v = 5 ft/sec. (Pl 22.2 B-2)

Tc = 100 sec. = 1.7 min. Tc = 1.7 min.

☐ Arroyo Flow:

Tc = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = min. Tc = min.

Σ Tc = 1.7 min.

RUNOFF COEFFICIENT:

Use 10 min.

% Impervious = 75% (See Sheet 4)

Soil Group A: 1.2 ac @ 0.60 = .72

Soil Group B: 0.3 ac @ 0.73 = .22

Σ = 1.5 Σ = .94

C = $\frac{.94}{1.5}$ = .63

C = .63

RAINFALL INTENSITY:

100 year depth = 2.28 " (Pl. 22.2 D-1)

Intensity Factor = 2.11 (Pl. 22.2 D-2)

Intensity = depth x factor

I = 4.81 "/hr.

PEAK RUNOFF RATE:

Q = CIA = .63 x 4.81 x 1.5 Q₁₀₀ = 4.6 cfs

x 0.657 = Q₁₀ = 3.0 cfs

VOLUME OF RUNOFF:

Soil Group A: 1.2 ac @ CN = 83 = 99.6

Soil Group B: 0.3 ac @ CN = 89 = 26.7

Σ = 1.5 Σ = 126.3 ÷ 1.5 = 84

q = 0.95 " (Pl 22.2 C-4)

V = q A = $\frac{.95}{12}$ x 1.5 ac x 43,560 = 5173 cu. ft.

T = 2V ÷ Q₁₀₀ - 60 = 37 min

DETERMINATION OF Q_{100} @ ANALYSIS PT 7

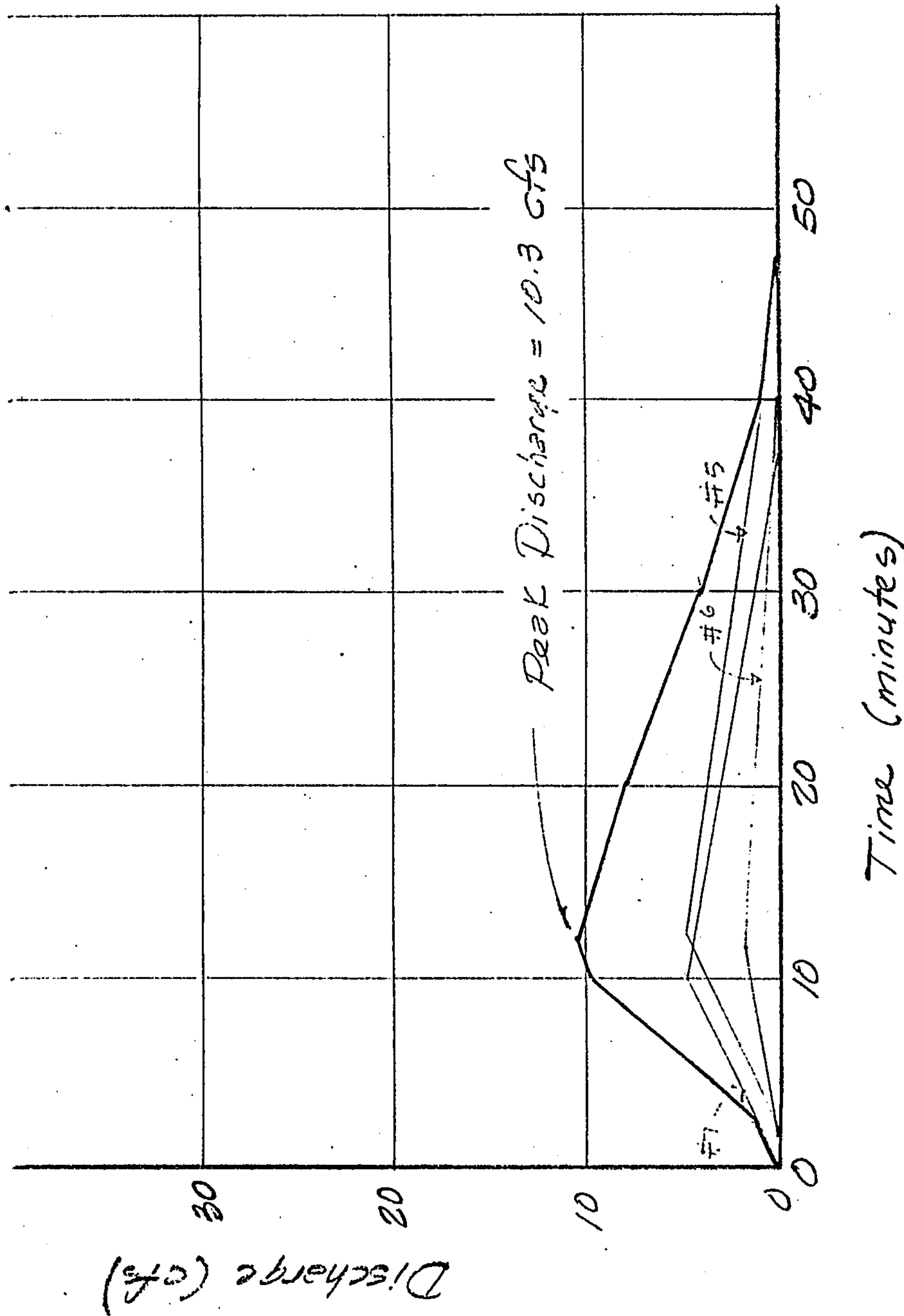
Total Flow Rate will be determined by addition of incremental hydrographs from Analysis Points 5 thru 7. No offsite flows are tributary.

Plotting Table Information

Incr. Hydro. No.	Analysis Point No.	Q_{100} Peak (cfs)	Hydro. Base Time (min)	Travel Time (min)	Accumulated Travel Time (min)
7	7	4.6	37	1.7	-
6	6	1.6	38	0.4	1.7
5	5	4.6	45	2.7	2.1

note: all peak hydrograph times are 10 minutes from beginning times

ANALYSIS POINT 7 COMPOSITE HYDROGRAPH



RUNOFF CALCULATIONS

(Rational Formula)

PROJECT: Yak Business Park Analysis Point# 8

DRAINAGE AREA:

Planimeter Rdg. 705 x .015

x Map Scale 100 2 ÷ 43,560

A = 2.4 acres

TIME OF CONCENTRATION:

Drainage Basin Data:

L = 420 ft., fall = 15 ft., slope = .036 ft/ft

☒ Overland Flow: (Paved)

v = 2.5 ft/sec (Pl 22.2 B-1)

Tc = 168 sec. = 2.8 min. Tc = 2.8 min.

☐ Street Flow:

v = ft/sec. (Pl 22.2 B-2)

Tc = sec. = min. Tc = min.

☐ Arroyo Flow:

Tc = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = min. Tc = min.

☐ Tc = 2.8 min.

Use 10 min.

RUNOFF COEFFICIENT:

% Impervious = 75% (See Sheet 4)

Soil Group A = sc c 0.60

Soil Group B = sc c 0.75

$\Sigma = \underline{\hspace{2cm}}$

$C = \underline{\hspace{2cm}}$

C = 0.60

RAINFALL INTENSITY:

100 year depth = 2.28 " (Pl. 22.2-D-1)

Intensity Factor = 2.11 (Pl. 22.2 D-2)

Intensity = depth x factor

I = 4.81 "/hr.

PEAK RUNOFF RATE:

Q = CIA = 0.6 x 4.81 x 2.4 Q₁₀₀ = 6.9 cfs.

x 0.657 = Q₁₀ = 4.6 cfs

VOLUME OF RUNOFF:

Soil Group A = sc c CN = 83 =

Soil Group B = sc c CN = =

$\Sigma = \underline{\hspace{2cm}}$

q = .9 " (Pl 22.2 C-4)

V = q.A = $\frac{.9}{12} \times 2.4 \times 43,560 = \underline{7841}$ cu. ft.

T = 2V ÷ Q₁₀₀ ÷ 60 = 38 min

RUNOFF CALCULATIONS

(Rational Formula)

PROJECT: Yale Business Park Analysis Point# 9

DRAINAGE AREA:

Planimeter Rdg. 1180 x .015

x Map Scale 100 2 ÷ 43,560 A = 4.1 acres

TIME OF CONCENTRATION:

Drainage Basin Data:

L = 250 ft., fall = 0.25 ft., slope = 1.005 ft/ft
1.063

☒ Overland Flow Street Flow

v = 1.9 ft/sec (Pl 22.2 B-1)

Tc = 132 sec. = 2.2 min. Tc = 2.2 min.

☒ Street Flow:

v = 6.6 ft/sec. (Pl 22.2 B-2)

Tc = 95 sec. = 1.6 min. Tc = 1.6 min.

☐ Arroyo Flow:

Tc = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = min. Tc = min.

Σ Tc = 3.8 min.

RUNOFF COEFFICIENT:

% Impervious = 75% (See Sheet 4)

Soil Group A ac c 0.60 =

Soil Group B ac c 0.73 =

Σ = Σ =

C = =

C = 0.60

Use 10 minutes

RAINFALL INTENSITY:

100 year depth = 2.28 " (Pl. 22.2 D-1)

Intensity Factor = 2.11 (Pl. 22.2 D-2)

Intensity = depth x factor

I = 4.81 "/hr.

PEAK RUNOFF RATE:

Q = CIA = 1.60 x 4.81 x 4.1 Q₁₀₀ = 11.8 cfs

x 0.657 = Q₁₀ = 7.8 cfs

VOLUME OF RUNOFF:

Soil Group A ac c CN = = 83

Soil Group B ac c CN = =

Σ = Σ =

q = 1.9 (Pl 22.2 C-4)

V = qA = $\frac{1.9}{12} \times 4.1 \times 43,560$ = 13,395 cu. ft.

T = 2V ÷ Q₁₀₀ - 60 = 38 min

RUNOFF CALCULATIONS

(Rational Formula)

PROJECT: Yale Business Park Analysis Point# 10

DRAINAGE AREA:

Planimeter Rdg. 395 x .015

x Map Scale 100 2 ÷ 43,560 A = 1.4 acres

TIME OF CONCENTRATION:

Drainage Basin Data:

L = 80 ft., fall = 200 ft., slope = .063 ft/ft
.040

☒ Overland Flow: Street Flow

v = 6.6 ft/sec (Pl 22.2 B-1) B-2

Tc = 12 sec. = 0.2 min. Tc = 0.2 min.

☒ Street Flow:

v = 5.5 ft/sec. (Pl 22.2 B-2)

Tc = 91 sec. = 1.5 min. Tc = 1.5 min.

☐ Arroyo Flow:

Tc = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = min. Tc = min.

Σ Tc = 1.7 min.

Use 10 min.

RUNOFF COEFFICIENT:

% Impervious = 75% (See Sheet 4)

Soil Group (A) sc c 0.60 =

Soil Group B: sc c 0.73 =

Σ = Σ =

C = =

C = .60

RAINFALL INTENSITY:

100 year depth = 2.28 " (Pl. 22.2 D-1)

Intensity Factor = 2.11 (Pl. 22.2 D-2)

Intensity = depth x factor

I = 4.81 "/hr.

PEAK RUNOFF RATE:

Q = CIA = 1.60 x 4.81 x 1.4 Q₁₀₀ = 4.0 cfs

x 0.657 = Q₁₀ = 2.6 cfs

VOLUME OF RUNOFF:

Soil Group (A) sc c CN = = 83

Soil Group B: sc c CN = =

Σ = Σ =

q = .9 " (Pl 22.2 C-4)

V = q A = $\frac{.9}{12} \times 1.4 \times 43,560$ = 4574 cu. ft.

T = $2V \div Q_{100} \div 60$ = 38 min

RUNOFF CALCULATIONS

(Rational Formula)

PROJECT: Yale Business Park Analysis Point# 11

DRAINAGE AREA:

Planimeter Rdg. 260 x .015

* Map Scale 100 2 ÷ 43,560 A = 0.9 acres

TIME OF CONCENTRATION:

Drainage Basin Data:

L = 230 ft., fall = _____ ft., slope = .04 ft/ft

☐ Overland Flow:

v = _____ ft/sec (Pl 22.2 B-1)

Tc = _____ sec. = 0.7 min. Tc = 0.7 min.

☒ Street Flow:

v = 5.5 ft/sec. (Pl 22.2 B-2)

Tc = 42 sec. = _____ min. Tc = _____ min.

☐ Arroyo Flow:

Tc = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = _____ min. Tc = _____ min.

Σ Tc = 0.7 min.

Use 10 min.

RUNOFF COEFFICIENT:

% Impervious = 75% (See Sheet 4)

Soil Group A: _____ ac @ 0.60 = _____

Soil Group B: _____ ac @ 0.73 = _____

Σ = _____ Σ = _____

C = _____ = _____

C = 0.60

RAINFALL INTENSITY:

100 year depth = 2.28 " (Pl. 22.2 D-1)

Intensity Factor = 2.11 (Pl. 22.2 D-2)

Intensity = depth x factor

I = 4.81 "/hr.

PEAK RUNOFF RATE:

Q = CIA = 0.60 x 4.81 x 0.9 Q₁₀₀ = 2.6 cfs

x 0.657 = Q₁₀ = 1.7 cfs

VOLUME OF RUNOFF:

Soil Group A: _____ ac @ CN = 83 = _____

Soil Group B: _____ ac @ CN = _____ = _____

Σ = _____ Σ = _____

q = .9 (Pl 22.2 C-4)

V = $qA = \frac{.9}{12} \times .9 \times 43,560 =$ 2940 cu. ft.

T = $2V \div Q_{100} - 60 =$ 38 min

RUNOFF CALCULATIONS

(Rational Formula)

PROJECT: Yak Business Park Analysis Point# 12

DRAINAGE AREA:

Planimeter Rdg. 260 x .015

x Map Scale 100 2 ÷ 43,560 A = 0.9 acres

TIME OF CONCENTRATION:

Drainage Basin Data:

L = 210 ft., fall = _____ ft., slope = .04 ft/ft

☐ Overland Flow:

v = _____ ft/sec (Pl 22.2 B-1)

Tc = _____ sec. = _____ min. Tc = _____ min.

☒ Street Flow:

v = 5.5 ft/sec. (Pl 22.2 B-2)

Tc = 38 sec. = 0.6 min. Tc = 0.6 min.

☐ Arroyo Flow:

Tc = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = _____ min. Tc = _____ min.

☒ Tc = 0.6 min.

RUNOFF COEFFICIENT:

% Impervious = 75% (See Sheet 4)

Soil Group A = _____ c 0.60 = _____

Soil Group B: _____ c 0.73 = _____

Σ = _____ Σ = _____

C = _____ = _____

C = 0.60

USE 10 min

RAINFALL INTENSITY:

100 year depth = 2.28 " (Pl. 22.2 D-1)

Intensity Factor = 2.11 (Pl. 22.2 D-2)

Intensity = depth x factor

I = 4.81 "/hr.

PEAK RUNOFF RATE:

Q = CIA = 0.6 x 4.81 x 0.9 Q₁₀₀ = 2.6 cfs

x 0.657 = Q₁₀ = 1.7 cfs

VOLUME OF RUNOFF:

Soil Group A: _____ c CN = 83 = _____

Soil Group B: _____ c CN = _____ = _____

Σ = _____ Σ = _____

Q = 1.9 (Pl 22.2 C-4)

V = QA = $\frac{1.9}{12} \times 1.9 \times 43,560 =$ 2940 cu. ft.

T = 2V ÷ Q₁₀₀ ÷ 60 = 28 min

DETERMINATION OF Q_{100} @ ANALYSIS PT 12

Total Flow Rate will be determined by addition of incremental hydrographs from Analysis Points 8 thru 12 plus 50% of offsite flows entering property from the east. 50% value is used to account for splitting the total off-site flow at the east side of the cul-de-sac where off-site flows enter the street system.

PLOTTING TABLE INFORMATION

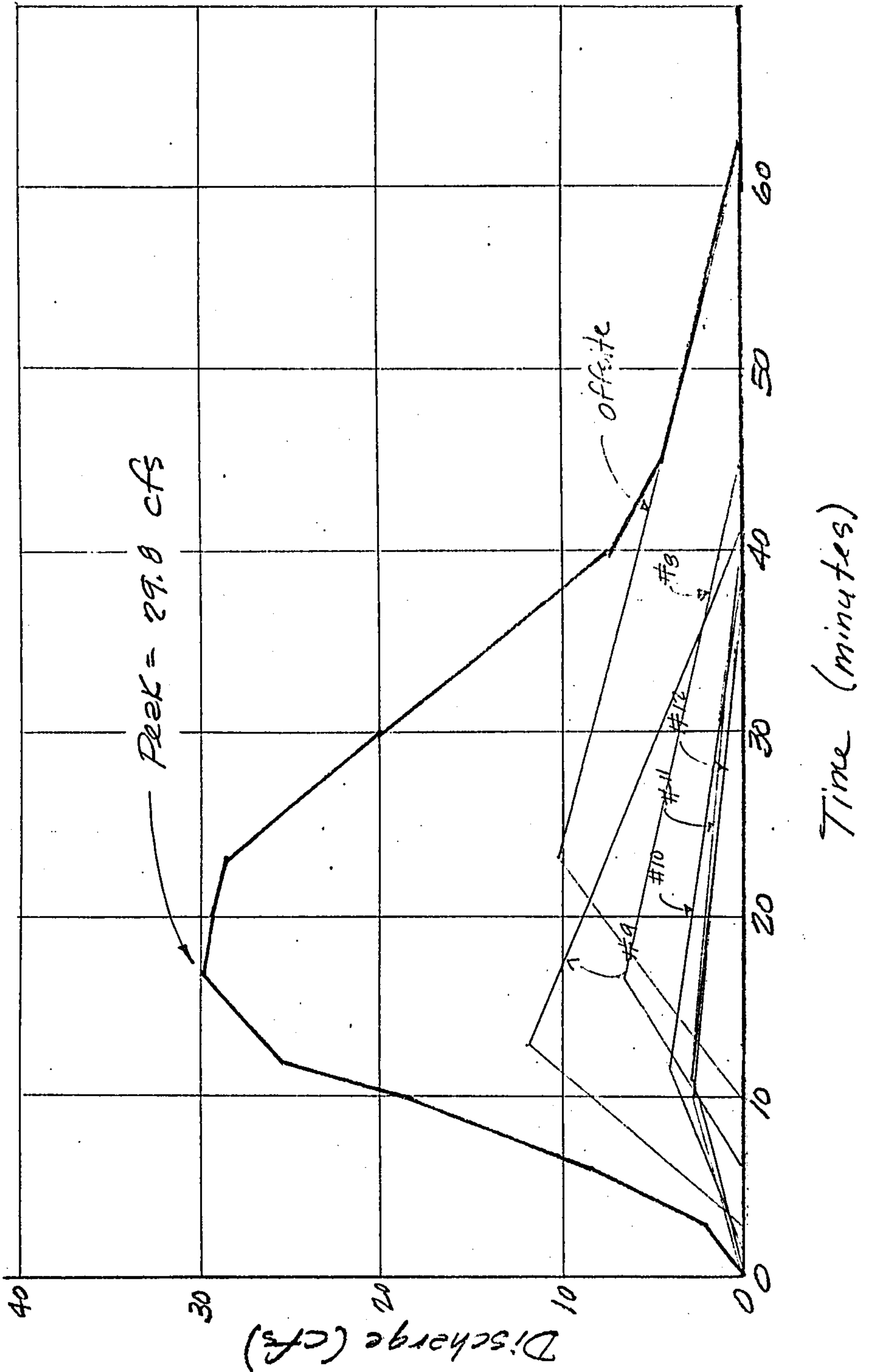
Incr. Hydro. No.	Analysis Point No.	Q_{100} Peak (cfs)	Hydro. Base Time (min)	Travel Time (min)	Accumulated Travel Time (min)	Peak Time (min)
12	12	2.6	38	0.6	-	10
11	11	2.6	38	0.6	0.6	10
10	10	4.0	38	1.7	1.2	10
9	9	11.8	38	3.8	2.9	10
8	8	6.9	38	2.8	6.7	10
offsite	offsite	10.2	52	0.6*	10.1	13

* Travel Time through on-site storm drain from east boundary line to cul-de-sac

COMPOSITE HYDROGRAPH FOR

ANALYSIS POINT

12



Isaacson &
Arfman, P.A.

SUBJECT Yak Business Park JOB NO.
BY T01 DATE 5/22/86 SHEET NO. A-19 OF

RUNOFF CALCULATIONS

(Rational Formula)

PROJECT: Y26 Business Park Analysis Point# 13

DRAINAGE AREA:

Planimeter Rdg. 905 x .015

x Map Scale 100 2 ÷ 43,560 A = 3.1 acres

TIME OF CONCENTRATION:

Drainage Basin Data:

L = 660 ft., fall = _____ ft., slope = .063 ft/ft

☐ Overland Flow:

v = _____ ft/sec (Pl 22.2 B-1)

Tc = _____ sec. = _____ min. Tc = _____ min.

☒ Street Flow:

v = 6.6 ft/sec. (Pl 22.2 B-2)

Tc = 100 sec. = 1.7 min. Tc = 1.7 min.

☐ Arroyo Flow:

Tc = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = _____ min. Tc = _____ min.

☐ Tc = 1.7 min.

RUNOFF COEFFICIENT:

Use 10 min.

% Impervious = 75% (See Sheet 4)

Soil Group A: 1.8 ac @ 0.60 = 1.08

Soil Group B: 1.3 ac @ 0.73 = .95

$\Sigma = 3.1$ $\Sigma = 2.03$

C = $\frac{2.03}{3.1} = 0.65$

C = 0.65

RAINFALL INTENSITY:

100 year depth = 2.28 " (Pl. 22.2-D-1)

Intensity Factor = 2.11 (Pl. 22.2 D-2)

Intensity = depth x factor

I = 4.81 "/hr.

PEAK RUNOFF RATE:

Q = CIA = .65 x 4.81 x 3.1 Q₁₀₀ = 9.7 cfs

x 0.657 = Q₁₀ = 6.4 cfs

VOLUME OF RUNOFF:

Soil Group A: 1.8 ac @ CN = 83 = 149.4

Soil Group B: 1.3 ac @ CN = 89 = 115.7

$\Sigma = 3.1$

$\Sigma = 265.10 \div 3.1 = 86$

q = 1.1 " (Pl 22.2 C-4)

V = q A = $\frac{4.1}{12} \times 3.1 \times 43,560 = 12,378$ cu. ft.

T = $2V \div Q_{100} \div 60 = 43$ min

RUNOFF CALCULATIONS

(Rational Formula)

PROJECT: Yale Business Park Analysis Point# 14

DRAINAGE AREA:

Planimeter Rdg. 570 x .015

x Map Scale 100 2 ÷ 43,560 A = 2.0 acres

TIME OF CONCENTRATION:

Drainage Basin Data:

L = 175 ft., fall = _____ ft., slope = .04 ft/ft

☐ Overland Flow:

v = _____ ft/sec (Pl 22.2 B-1)

Tc = _____ sec. = _____ min. Tc = _____ min.

☒ Street Flow:

v = 5.5 ft/sec. (Pl 22.2 B-2)

Tc = 32 sec. = 0.5 min. Tc = 0.5 min.

☐ Arroyo Flow:

Tc = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = _____ min. Tc = _____ min.

Σ Tc = 0.5 min.

USE 10 min

RUNOFF COEFFICIENT:

% Impervious = 75% (See Sheet 4)

Soil Group (A) _____ ac c = 0.60

Soil Group B: _____ ac c = 0.73 = _____

Σ = _____ Σ = _____

C = _____ = _____

C = .60

RAINFALL INTENSITY:

100 year depth = 2.28 " (Pl. 22.2 D-1)

Intensity Factor = 2.11 (Pl. 22.2 D-2)

Intensity = depth x factor

I = 4.81 "/hr.

PEAK RUNOFF RATE:

Q = CIA = .60 x 4.81 x 2.0 Q₁₀₀ = 5.8 cfs

x 0.657 = Q₁₀ = 3.8 cfs

VOLUME OF RUNOFF:

Soil Group (A) _____ ac c CN = 83 = _____

Soil Group B: _____ ac c CN = _____ = _____

Σ = _____ Σ = _____

q = .9 (Pl 22.2 C-4)

V = q A = $\frac{.9}{12} \times 2.0 \times 43,560 =$ 6534 cu. ft.

T = 2V ÷ Q₁₀₀ ÷ 60 = 38 min

RUNOFF CALCULATIONS

(Rational Formula)

PROJECT: Yak Business Park Analysis Point# 15

DRAINAGE AREA:

Planimeter Rdg. 1620 x .015

x Map Scale 100 2 ÷ 43,560 A = 5.6 acres

TIME OF CONCENTRATION:

Drainage Basin Data:

L = 290 ft., fall = 200 ft., slope = 104 ft/ft
.005

☒ Overland Flow: Street Flow B-2

v = 5.5 ft/sec (Pl 22.2 B-1)

Tc = 53 sec. = 0.9 min. Tc = 0.9 min.

☒ Street Flow:

v = 1.9 ft/sec. (Pl 22.2 B-2)

Tc = 105 sec. = 1.8 min. Tc = 1.8 min.

☐ Arroyo Flow:

Tc = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = min. Tc = min.

Σ Tc = 2.7 min.

Use 10 min.

RUNOFF COEFFICIENT:

% Impervious = 75% (See Sheet 4)

Soil Group A: ac @ 0.60 =

Soil Group B: ac @ 0.73 =

Σ = Σ =

C = =

C = 0.60

RAINFALL INTENSITY:

100 year depth = 2.28 " (Pl. 22.2 D-1)

Intensity Factor = 2.11 (Pl. 22.2 D-2)

Intensity = depth x factor

I = 4.81 "/hr.

PEAK RUNOFF RATE:

Q = CIA = 0.60 x 4.81 x 5.6 Q₁₀₀ = 16.2 cfs

x 0.657 = Q₁₀ = 10.6 cfs

VOLUME OF RUNOFF:

Soil Group A: ac @ CN = 83 =

Soil Group B: ac @ CN = =

Σ = Σ =
Q = 9 (Pl 22.2 C-4)

V = $Q \times A = \frac{9}{12} \times 5.6 \times 43,560 = 18,295$ cu. ft.

T = $2V \div Q_{100} \div 60 = 38$ min

DETERMINATION OF Q_{100} @ ANALYSIS POINT

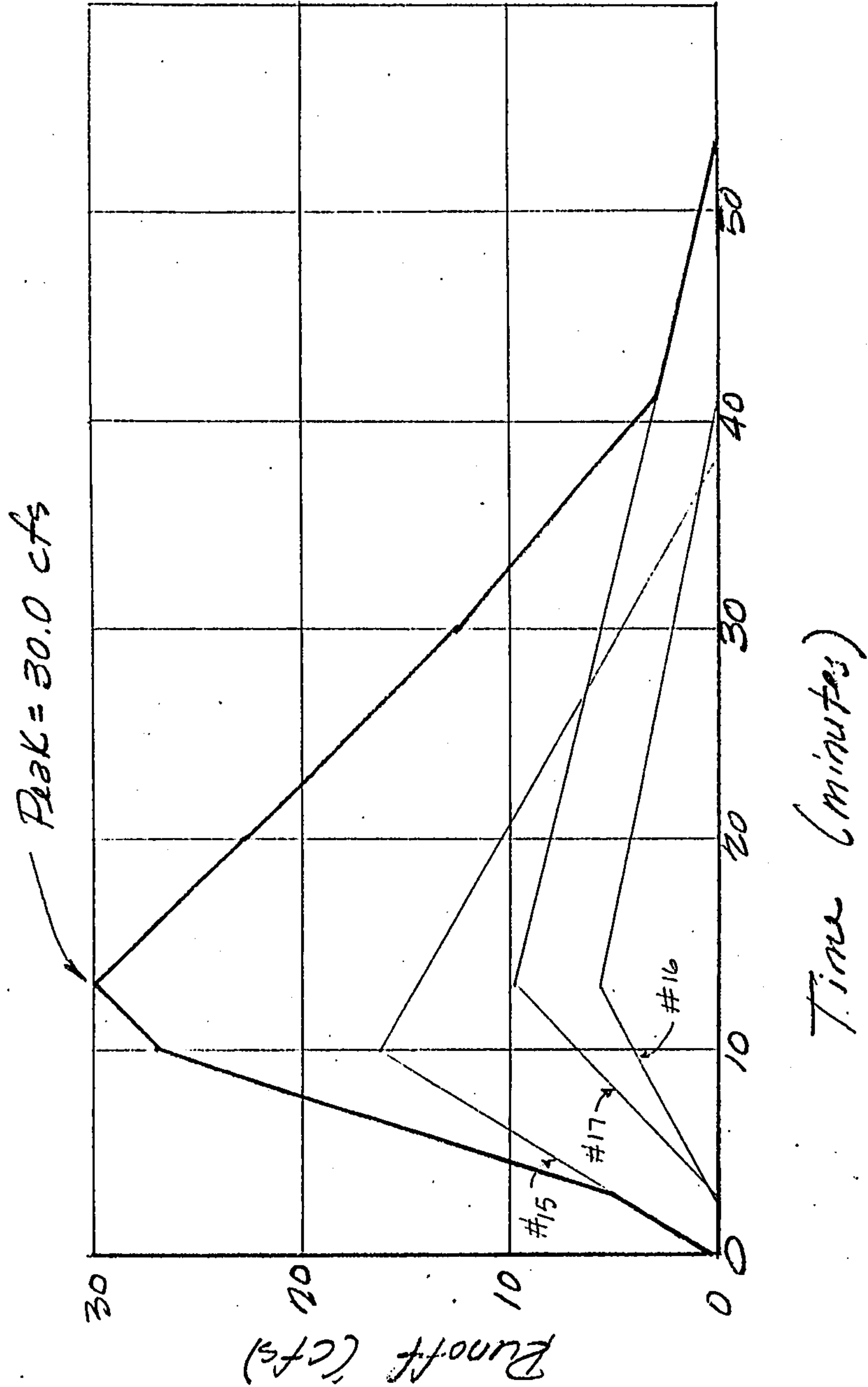
15

Total Flow will be determined by addition of incremental hydrographs from Analysis Points 13 thru 15, No offsite flows are tributary.

PLOTTING TABLE INFORMATION

Incr. Hydro No.	Analysis Point No.	Q_{100} Peak (cfs)	Hydro Base Time (min)	Travel Time (min)	Accum. Travel Time (min)
15	15	16.2	38	2.7	-
14	14	5.8	38	0.5	2.7
13	13	9.7	43	-	3.2

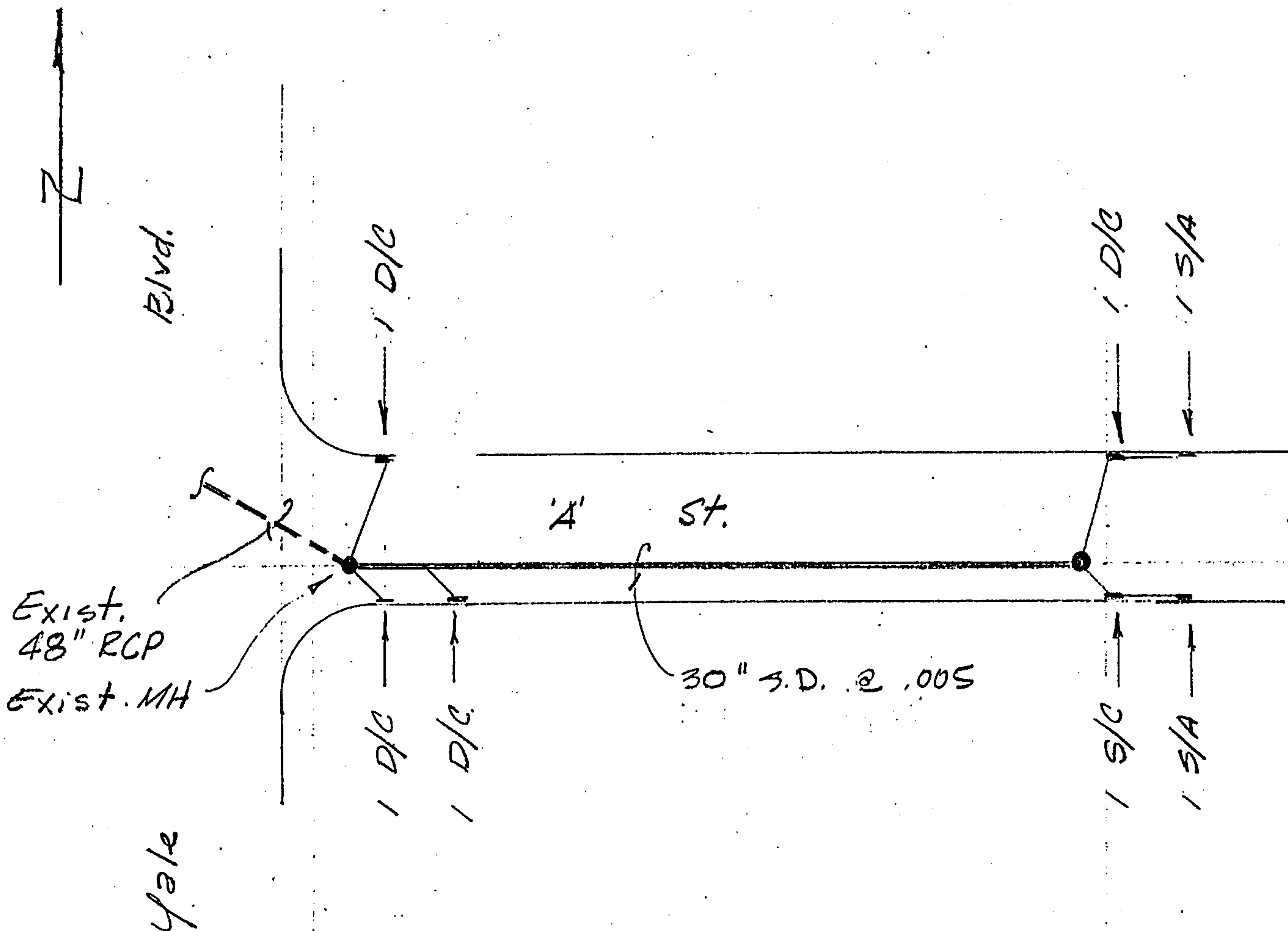
COMPOSITE HYDROGRAPH for
ANALYSIS POINT 15



STORM DRAIN INLET CALCULATION TABLE

Location	Q Upstream (cfs)	Street Grade (%)	Flow Depth (ft.)	"K" Value	Inlet Type	Inlet Capacity (cfs)	Q Passing (cfs)
North curb near A.P. (11)	27.2	3.9	.50	32	S/A	10.1	17.1
"	17.1	"	.43	32	D/C	15.7	1.4
North curb A.P. (12)	4	0.5	.38	12	D/C	4.2	±0
South curb opp A.P. (11)	13.8	3.9	.41	32	S/A	7.2	6.6
"	6.6	"	.33	"	S/C	5.0	1.6
South Curb @ A.P. (15)	17.8	0.5	.60	12	D/C	10.2	7.6
"	7.6	"	.46	"	D/C	6.6	1.0

"K" Value from Neenah Inlet Grate Capacity Manual for Type R-3246-AL
(lower style), p. 19, using a Transverse Street Slope of 2%
 $Q = K D^{5/3}$ for single grate, x 2 for double grate



PROPOSED STORM DRAIN
IMPROVEMENTS - 'A' STREET

Scale: 1" = 50'

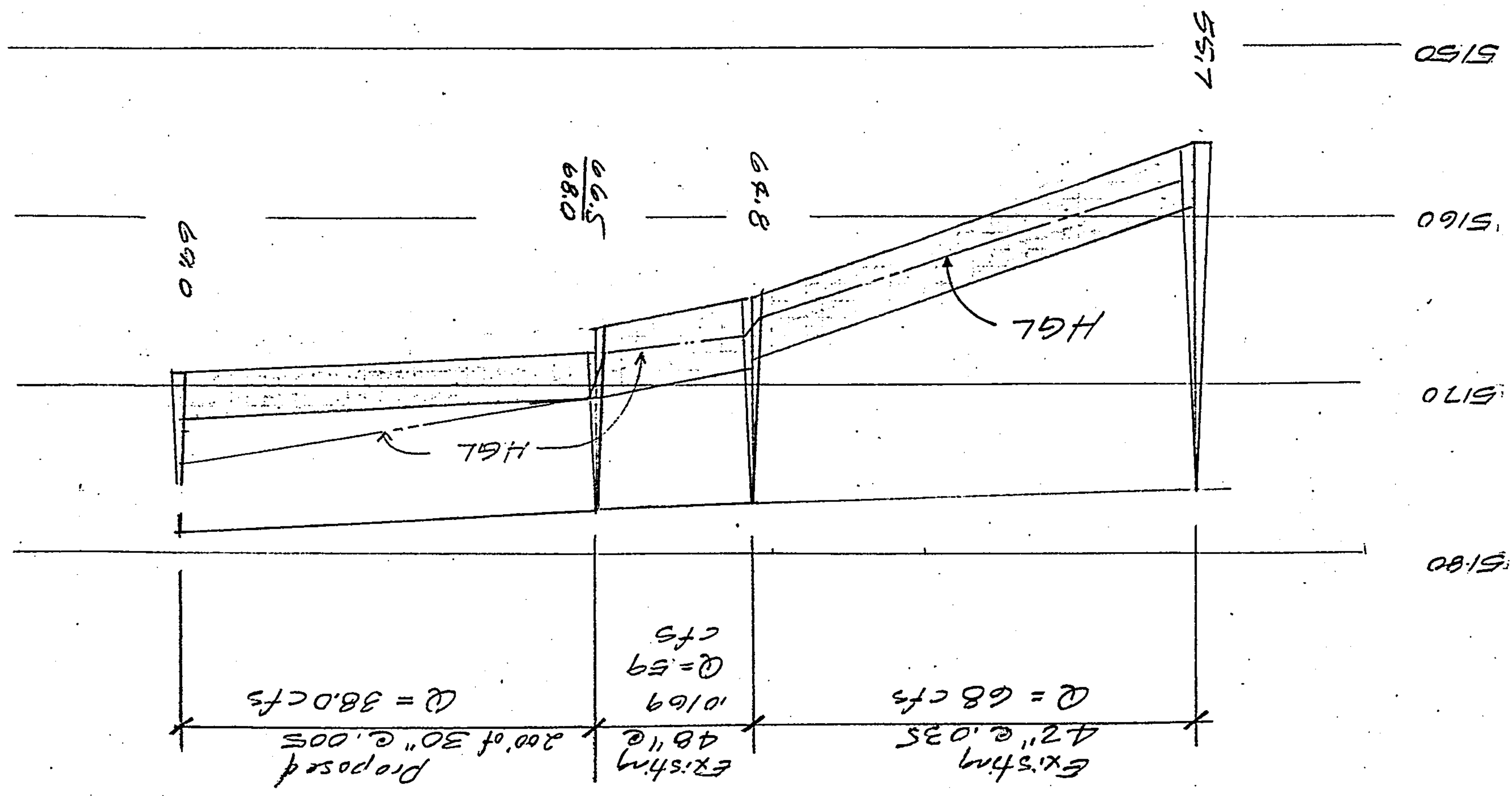
Isaacson &
 Arfman, P.A.

SUBJECT Yale Business Park JOB NO. _____
 BY TOL DATE 5/23/86 SHEET NO. A-26 OF _____
 Figure A-10

STORM DRAIN PROFILE A' STREET TO ROSS

1" = 100' H.
= 10' V.

M/H # 5-705
Yale & Ross



SUMMARY OF HYDRAULIC CALCULATIONS

PROJECT: Yale Business Park BY: TOL
 CLOSED CONDUIT LINE: Yale into A Street DATE: 5/27/86
 SHEET: 1 OF 1

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
STATION	STRUCT	D	Q	A	V	K	Sf	L	Δ	JUNCTION		LOSSES						Σ	E.G.	hv	H.G.
										D	θ	hf	hb	hj	h _{mh}	h _f	h _{mlsc}				
0+00	M.H.	42"	68	3.71	18.0	347	.035	265	-		45°	9.28	.70	-	.25	-	-	10.23		5.03	57.25
2+65	M.H.	48"	59	4.54	13.2	462	.017	95	-		45°	1.62	.36	-	.14	-	-	2.14		2.71	67.48
3+60	M.H.	30"	38	4.91	7.74	245	.024	200	-		-	4.81	-	-	-	-	-	4.81		.93	69.54
																					74.35

REMARKS: 42" & 48" SD's are existing
 & Flowing Part Full
 MANNING'S n: .013

42" SD: $\frac{A}{d} = \frac{1.45}{3.5}, A = 3032^*(3.5)^2 = 3.71 \text{ ft}^2, R = 2128^*(3.5) = .74, L = 1.486(3.71)^{.74^{.43}} = 347$

48" SD: $\frac{A}{d} = \frac{1.54}{4}, A = 2836^*(4)^2 = 4.54 \text{ ft}^2, R = 2102^*(4) = .84, L = 1.486(4.54)^{.84^{.43}} = 462$

30" SD: $\frac{A}{d} = \frac{1.486(4.91)^{.63^{.43}}}{.013} = 245$

* Ref. DPM, Pl 22.3 B-4

COMPUTER PRINTOUTS FOR Pipes Flowing Part-Full

42" Line in Yale Between Ross & 'A' Street

① DITCH CALCULATIONS FOR A CIRCULAR CHANNEL

$$S = .035 \text{ ft/ft}$$

$$V = 18.018 \text{ fps}$$

$$d = 1.452 \text{ ft}$$

$$Q = 68 \text{ cfs}$$

$$n = .013$$

$$L = 100 \text{ ft}$$

$$Tt = .093 \text{ min}$$

$$\text{Diameter} = 3.5 \text{ ft (42")}$$

CRITICAL FLOW INFORMATION

$$Sc = .005553 \text{ ft/ft}$$

$$Vc = 8.848 \text{ fps}$$

$$dc = 2.607 \text{ ft}$$

48" Line from Yale entering 'A' Street

② DITCH CALCULATIONS FOR A CIRCULAR CHANNEL

$$S = .0169 \text{ ft/ft}$$

$$V = 13.2 \text{ fps}$$

$$d = 1.543 \text{ ft}$$

$$Q = 59 \text{ cfs}$$

$$n = .013$$

$$L = 100 \text{ ft}$$

$$Tt = .126 \text{ min}$$

$$\text{Diameter} = 4 \text{ ft (48")}$$

CRITICAL FLOW INFORMATION

$$Sc = .004002 \text{ ft/ft}$$

$$Vc = 7.712 \text{ fps}$$

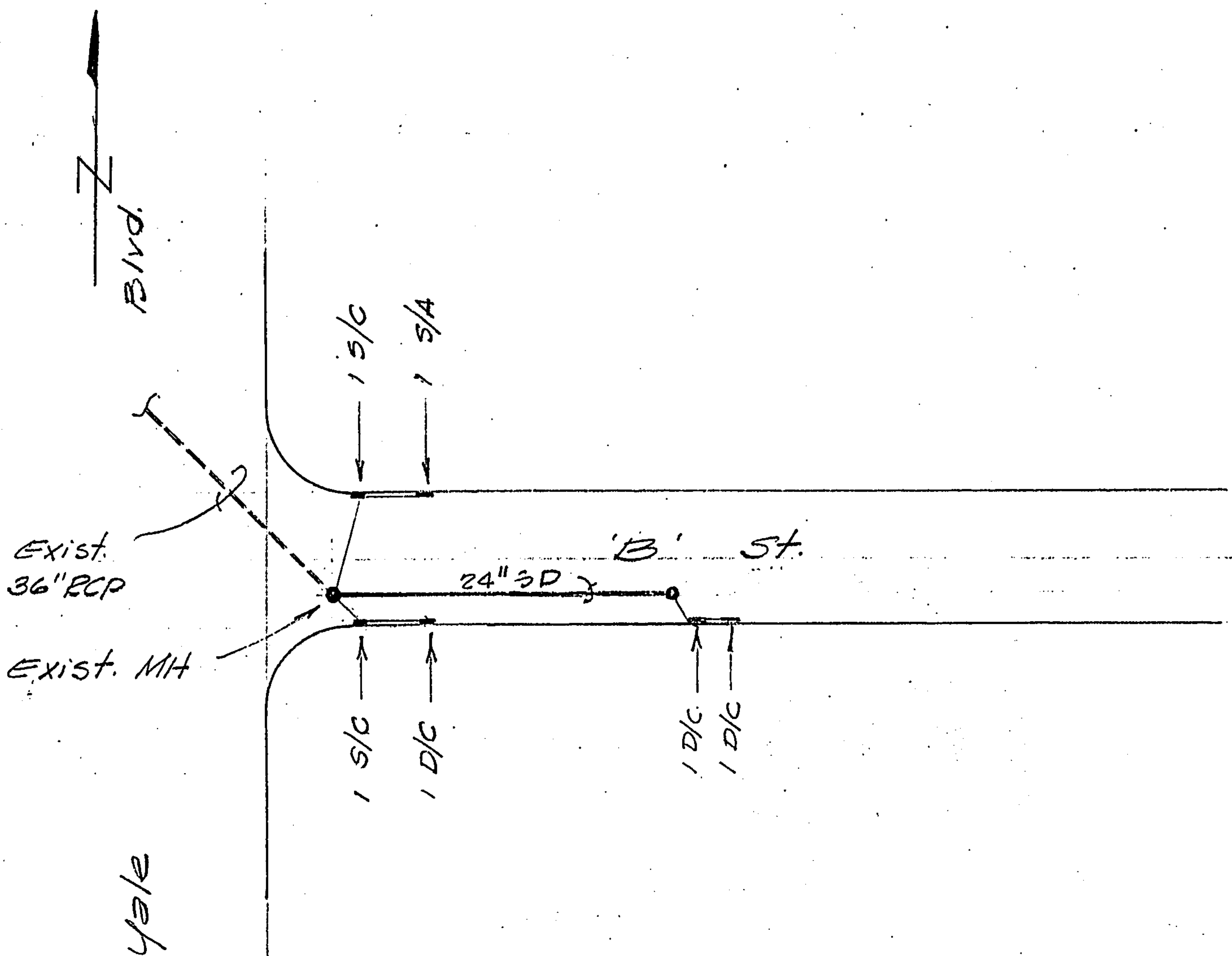
$$dc = 2.343 \text{ ft}$$

STORM DRAIN, INLET CALCULATION TABLE

[illegible]

"K" Value from Neenah Inlet Grate Capacity Manual for Type R-3246-AL (Clover style), p. 19, using a Transverse Street Slope of 2%

$Q = K D^{5/3}$ for one grate, x 2 for 2 grates

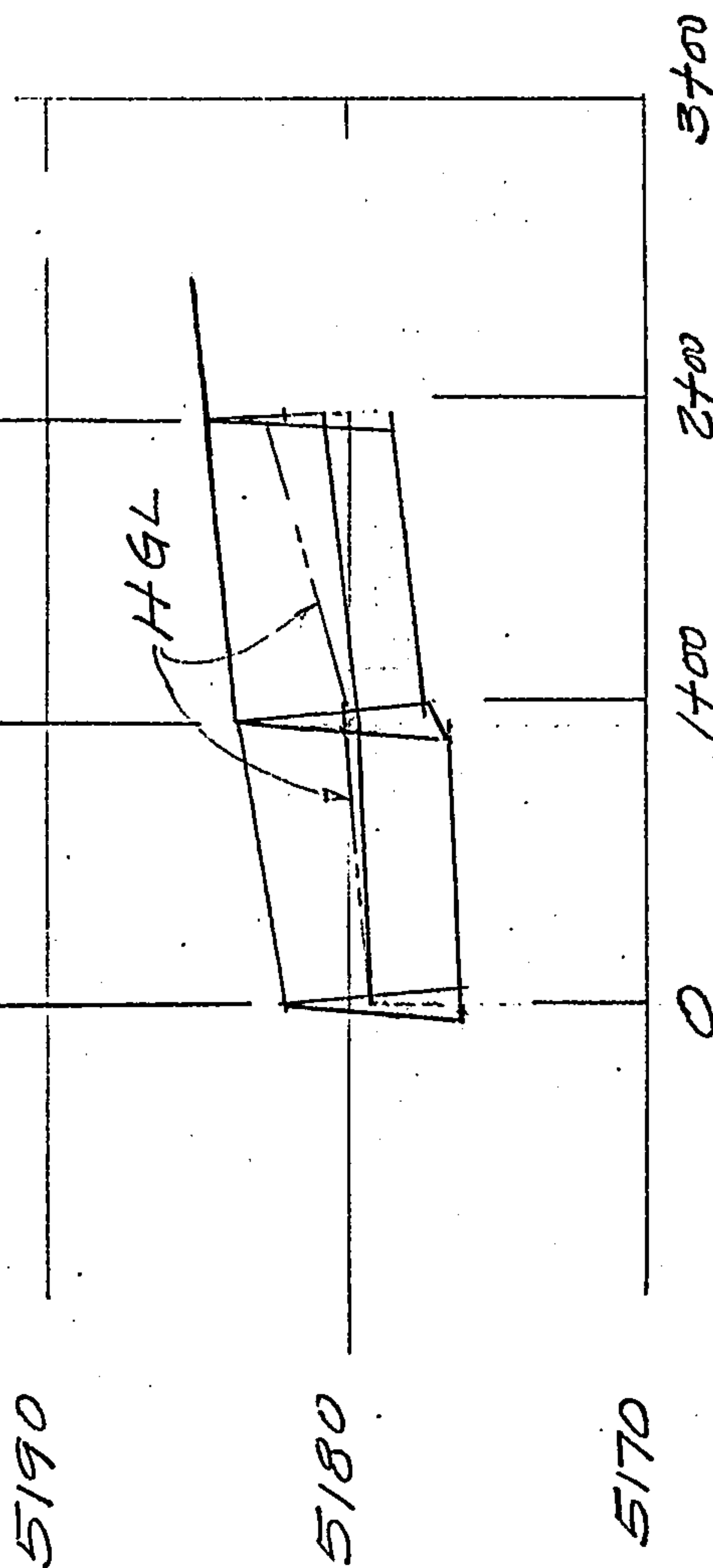


PROPOSED STORM DRAIN IMPROVEMENTS - 'B' STREET

Scale: 1" = 50'

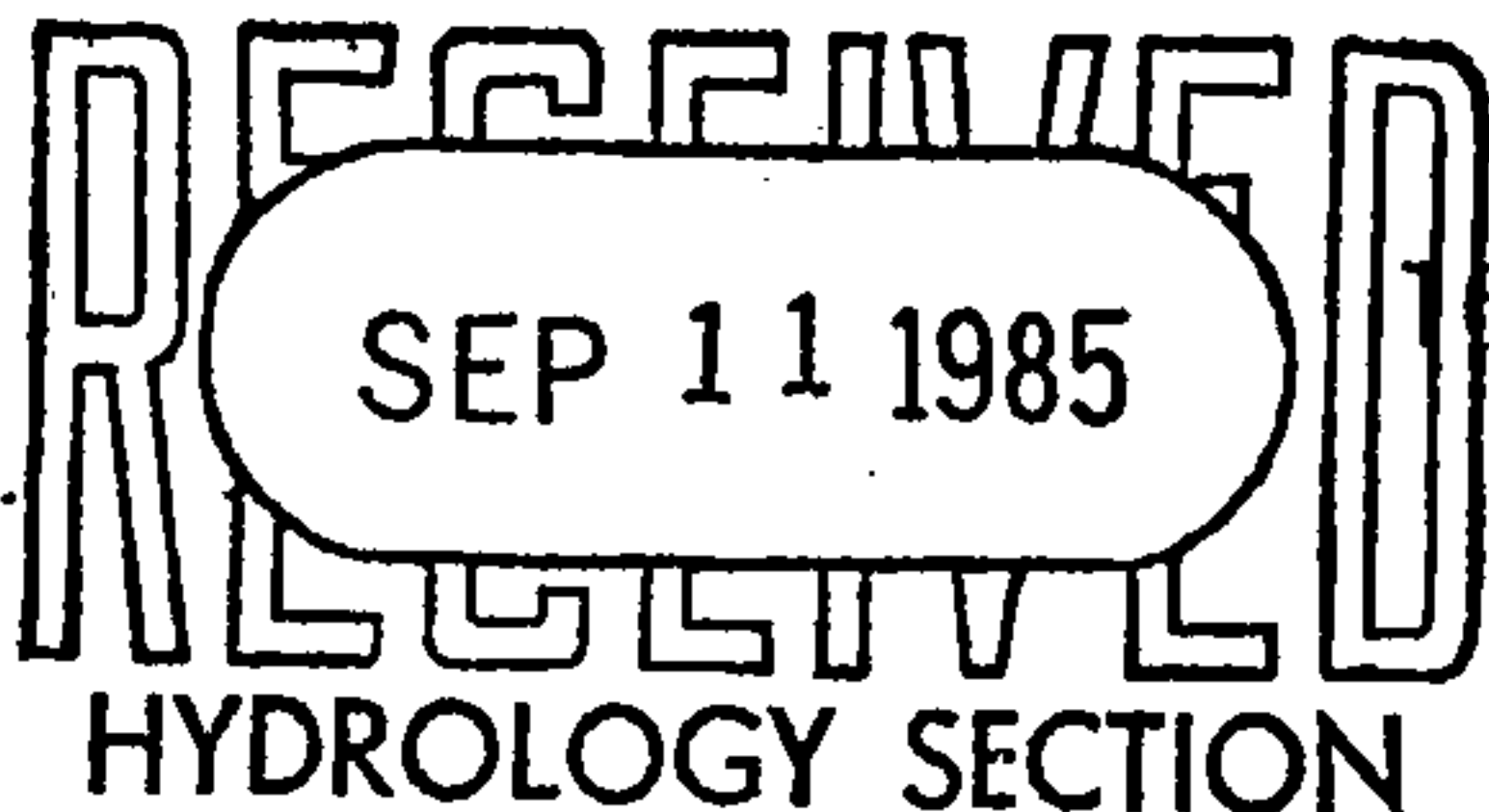
Proposed, 100' of 24" @ .010
Q = 34.3 cfs

Existing
9' of 36"
Q = 65.9
cfs



STORM DRAIN PROFILE
'B' STREET TO GIBSON -
KIRTLAND LINE

1" = 100' H.
= 10' V.



SUMMARY OF HYDRAULIC CALCULATIONS

BY: Toi
DATE: 9/10/85
SHEET: 1 OF 1

PROJECT: Yak Business Park LINE: Loss to 2" St.

CLOSED CONDUIT

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
STATION	STRUCT	D	Q	A	V	K	S _f	L	Δ	JUNCTION			LOSSES					Σ	E.G.	h _v	H.G.
										D	θ	h _f	h _b	h _j	h _{mh}	h _t	h _{mlec}				
0+00	MH	42"	73	3.96	18.4	387	.035	265	-		45°	9.28	.74	-	.24	-	-	10.28		523	5745
2+65	MH	48"	64	4.69	13.5	483	.017	95	-		45°	1.62	.40	-	.14	-	-	2.16		283	6773
3+60	MH	30"	35	4.91	7.13	410	.0075	245	-		-	1.79	-	-	-	-	-	1.79		3.77	6989
																					71.68

REMARKS: 42" & 48" S.D.'s are existing MANNING'S N: .013

Flowing part full

42" S.D.: $\frac{Q}{A} = \frac{1.5}{3.5}$, $A = .3229^*(3.5^2) = 3.96$ cfs, $R = .2257^*(3.5) = .79$, $K = \frac{1.486(3.96)^{.79^{2/3}}}{.013} = 387$

48" S.D.: $\frac{Q}{A} = \frac{1.6}{4}$, $A = .2934^*(4^2) = 4.69$ cfs, $R = .2142^*(4) = .86$, $K = \frac{1.486(4.69)^{.86^{2/3}}}{.013} = 483$

30" S.D.: $K = \frac{1.486(4.91)^{.63^{2/3}}}{.013} = 245$

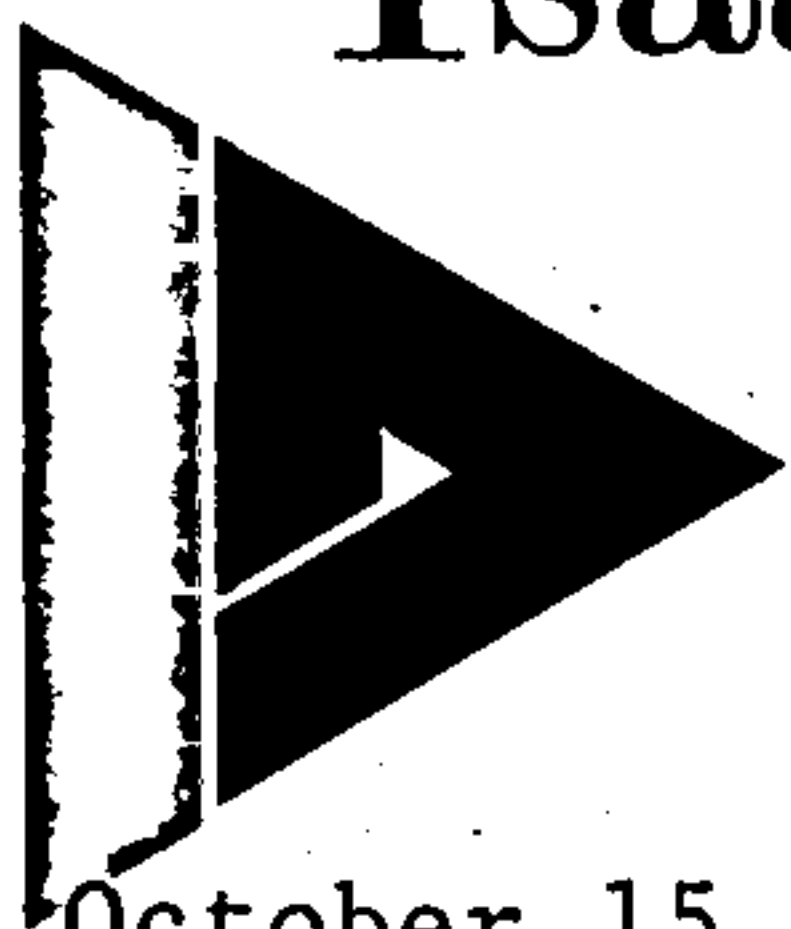
* Ref: PI 22.3, B-6, DPM

DRAINAGE REPORT

FOR

YALE BUSINESS PARK
(CAVAN COMMERCE CENTER)

AUGUST, 1985

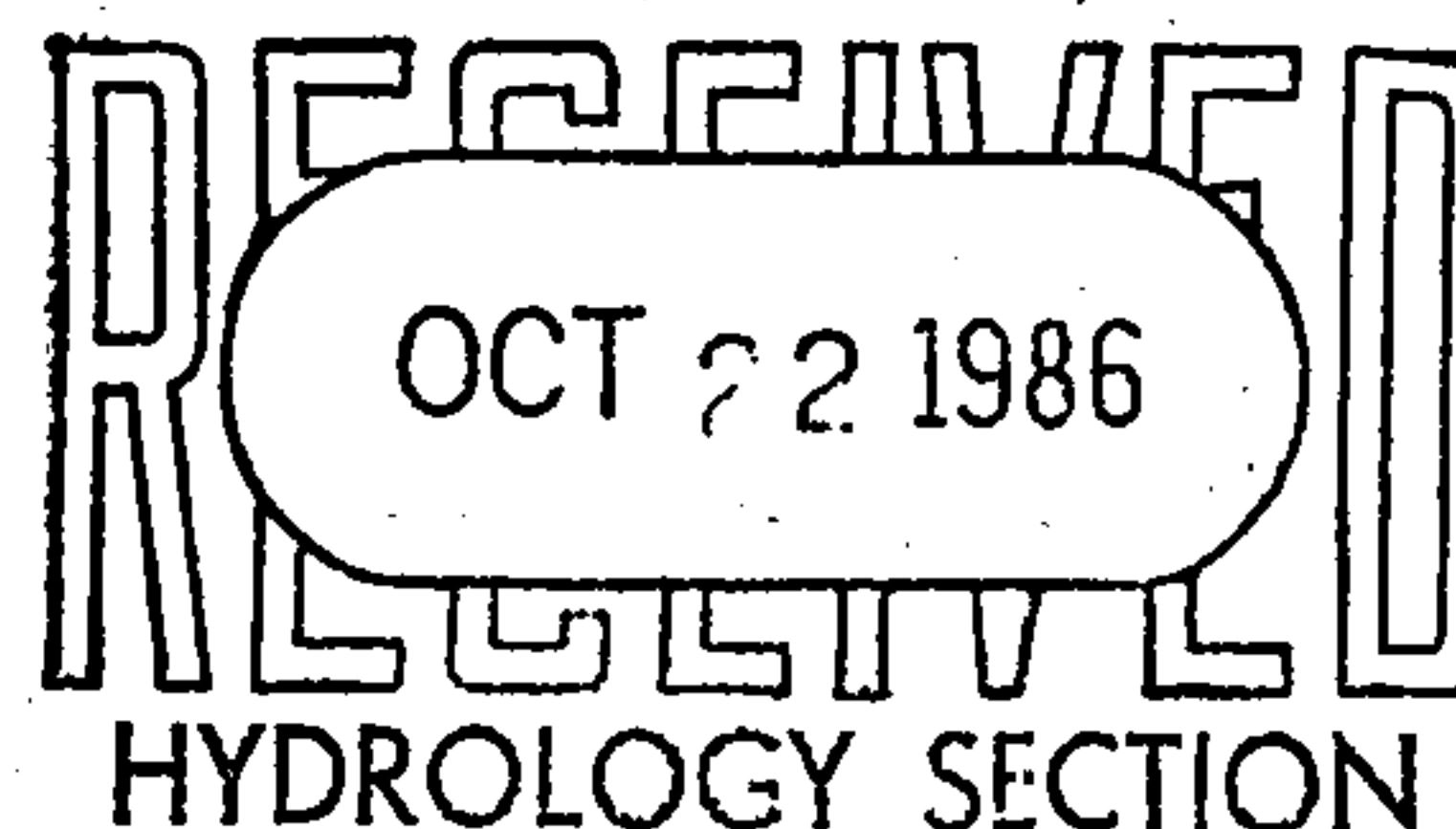


Isaacson & Arfman, P.A.

Consulting Engineering
Associates

October 15, 1986

Mr. Billy J. Goolsby, PE
Design Hydrology Section
City of Albuquerque
P.O. Box 1293
Albuquerque, N.M. 87103



Re: Yale Business Park (L16-D23),
Now Entitles Cavan Commerce Centre

Dear Mr. Goolsby:

The Drainage Report for Yale Business Park (now called Cavan Commerce Centre) was approved by your office in your letter of June 11, 1986. In that letter you asked for a complete report incorporating all revisions to the report. Enclosed is a complete report in accordance with your request. The detailed construction plans for streets and storm sewer facilities are on file with the Public Works/City Engineering Office (Project 30066).

A revision to the report has been made at the request of Fred Aguirre, Design Hydrology Section. In our report we had proposed temporary drainage easements along side lot lines which were noted to be "automatically vacated upon development of that particular tract". Fred informed our office at the DRB meeting on preliminary plat that such easements could be automatically vacated from a filed plat. He suggested that Drainage Covenants be utilized in lieu of temporary easements in these instances. We have revised the Drainage Plan drawing to reflect this change.

A second revision to the Report is a change to the sedimentation ponding concept. A detailed grading plan has been prepared for the entire subdivision which incorporated sedimentation ponds for each Tract. This grading plan has been approved by Mr. Carlos Montoya and is on file with the Design Hydrology Section. These individual ponds will provide more than the original sedimentation capacity and consequently, the two sedimentation ponds shown on the original Drainage Plan have been deleted.

We appreciate the corporation of the Design Hydrology Section in processing this Report.

Very truly yours,

Thomas O. Isaacson
TOI/aq

PROJECT TITLE: Yale Business Park ZONE ATLAS/DRNG. FILE #: L-16 - D23
 LEGAL DESCRIPTION: "Parcels A, 29A & 30A" filed 12/26/84, Vol. C25, Folio 198 &
 CITY ADDRESS: Northeast Corner of Yale & Gibson
 ENGINEERING FIRM: Isaacson & Arfman, P.A. CONTACT: Thomas O. Isaacson
 ADDRESS: 128 Monroe Street NE 87108 PHONE: 268-8828
 OWNER: Caven Association CONTACT: Alan Darrow Joe Beers
Gibson/Yale Inc.
 ADDRESS: 500 Marquette NW PHONE: 268-4317 242-0500
4205 Lead Avenue SE 87108
 ARCHITECT: _____ CONTACT: _____
 ADDRESS: _____ PHONE: _____
 SURVEYOR: Elder Company CONTACT: Ned Elder
 ADDRESS: 530 Jefferson NE PHONE: 268-1830
 CONTRACTOR: _____ CONTACT: _____
 ADDRESS: _____ PHONE: _____

PRE-DESIGN MEETING:

☒ YES
☐ NO

DRB NO. 84-849-1

EPC NO. Z-85-41

☒ COPY OF CONFERENCE RECAP
 SHEET PROVIDED

PROJ. NO. _____

RECEIVED
 OCT 22 1986
 RECEIVED
 HYDROLOGY SECTION

TYPE OF SUBMITTAL:

☒ DRAINAGE REPORT
☐ DRAINAGE PLAN
☐ CONCEPTUAL GRADING & DRAINAGE PLAN
☐ GRADING PLAN
☐ EROSION CONTROL PLAN
☐ ENGINEER'S CERTIFICATION

CHECK TYPE OF APPROVAL SOUGHT:

☐ SKETCH PLAT APPROVAL
☒ PRELIMINARY PLAT APPROVAL
☐ SITE DEVELOPMENT PLAN APPROVAL
☒ FINAL PLAT APPROVAL
☐ BUILDING PERMIT APPROVAL
☐ FOUNDATION PERMIT APPROVAL
☐ CERTIFICATE OF OCCUPANCY APPROVAL
☐ ROUGH GRADING PERMIT APPROVAL
☐ GRADING/PAVING PERMIT APPROVAL
☐ OTHER _____ (SPECIFY)

Re-Submitted 5/27/86
Re-Submitted 9-11-85

DATE SUBMITTED: August 22, 1985
 BY: Thomas O. Isaacson

CITY OF QUERQUE
MUNICIPAL DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION/DESIGN HYDROLOGY SECTION

Yale Business Park

CONFERENCE RECAP

DRAINAGE FILE/ZONE ATLAS PAGE NO.: L 16 DATE: 8/2/85

PLANNING DIVISION NOS: EPC: Z-85-41 DRB: _____

SUBJECT: POCKET LOCATED AT THE N.E. CORNER OF YALE & GIBSON
(43 ACRES)

APPROVAL REQUESTED:

☒ PRELIMINARY PLAT
☐ SITE DEVELOPMENT PLAN
☐ OTHER _____

☐ FINAL PLAT
☐ BUILDING PERMIT
☐ ROUGH GRADING

WHO
ATTENDANCE: TOM ISAACSON
FRED AGUIRRE

REPRESENTING

FINDINGS:

1. AN APPROVED DRAINAGE REPORT IS REQUIRED FOR SUBJECT REQUEST
2. AN APPROVED INFRASTRUCTURE LISTING (~~FOR~~ PRIVATE/PUBLIC) REQUIRED FOR PRELIMINARY PLAT APPROVAL
3. THE ALLOWABLE DISCHARGE WILL BE BASED ON DOWNSTREAM CAPACITY
4. CITY SURVEYOR'S APPROVAL REQUIRED FOR PRELIMINARY PLAT APPROVAL.

NOTE: THE DRAINAGE REPORT REQUIRED NEEDS TO BE OF SUFFICIENT DETAIL TO IDENTIFY THE REQUIRED INFRASTRUCTURE AND TO ESTABLISH THE DRAINAGE SCHEME FOR EACH LOT. EACH SUBSEQUENT LOT WILL REQUIRE A DRAINAGE ^{PLAN} IN COMPLIANCE WITH THE APPROVED DRAINAGE REPORT.

The undersigned agrees that the above findings are summarized accurately and are only subject to change if further investigation reveals that they are not reasonable or that they are based on inaccurate information.

SIGNED: Fred J. Aguirre SIGNED: Tom Isaacson
TITLE: _____ TITLE: _____
DATE: 8/2/85 DATE: 8/2/85

NOTE PLEASE PROVIDE A COPY OF THIS RECAP WITH THE DRAINAGE SUBMITTAL

INTRODUCTION

The Yale Business Park is a 43 acre tract of land located at the northeast corner of Yale Blvd. and Gibson Blvd. (see Figure 1). The property is bordered by Yale Blvd. on the west, Ross Avenue and Vail Avenue on the north, Columbia Drive on the east and Gibson Blvd. on the south.

Yale Business Park has recently been re-zoned (Z-85-41) as Special Use for O-1 and C-2 uses. The zoning plan calls for the subdivision of the property into 13 tracts with a "looped" street system (see Figure 17).

Yale Blvd. is presently under construction for a street widening project, Municipal Arterial Project MAP-M-6019 (900), MDD Project No. 1960. This widening and reconstruction project is located between Gibson Blvd. and Stadium Blvd. The Yale Business Park property is included in a drainage study for the Yale widening project which was prepared by William Matotan & Associates dated May 1984.

EXISTING DRAINAGE CONDITIONS

Off-Site Flows: The major off-site tributary area lies to the east of the property (see Figure 2). This area is divided into two parts for drainage analysis, a 5.7 acre part which has

uncontrolled runoff and the Bag & Save Shopping Center which has controlled runoff. The 100 year runoff from the uncontrolled part is 20 cfs (Sheet 3, Appendix A). The controlled 100 year runoff from the Bag & Save Shopping Center is 5 cfs (Drainage Report No. L16/D6). Consequently the total 100 year frequency runoff for this existing offsite drainage area is 25 cfs.

There are other small offsite drainage areas at the southeast corner and the far northeast corner which are shown on Figure 17. These areas are included in the runoff computations for both the existing and developed site condition.

On-Site: On-site flows concentrate at two locations along the west property line of the project. Existing 100 year flows have been calculated for these two points and are shown as Drainage Analysis Points 17 and 18 on Figure 17. Computations for these points are found on Sheets 39 and 40 and are 14 and 34 cfs respectively. These figures include all offsite tributary areas. The SCS soil map for the area is found on Sheet 2.

EXISTING STORM SEWER SYSTEMS

There are two storm sewer systems which border the property on the north, west and south. For convenience these two systems are referred to as the Ross-Vail-Carlisle System (on the north) and the Gibson-Kirtland System (on the south). Figures 3-7 show the locations of the systems.

There is an extension of the Ross-Vail-Carlisle System south on Yale from the intersection of Yale & Ross into the property at 'A' Street (see Figure 17). A portion of this extension is existing and a portion (into 'A' Street) is under construction in the Yale widening project.

There is also an extension of the Gibson-Kirtland System into the property at 'B' Street. The portion is also under construction in the Yale widening project.

Both of these extensions into the property have been sized to accept fully developed, uncontrolled flows from the tributary drainage areas.

DEVELOPED DRAINAGE PLAN

Proposed Improvements: The proposed street and tract layout is shown on Figure 17. Preliminary street grades for 'A' and 'B' Streets are shown on Figures 15 and 16 respectively.

A section of 24" storm sewer is proposed to intercept off-site flows in Columbia Drive and carry them to the 'B' Street cul-de-sac. New storm sewer extensions will also be constructed near the westerly ends of 'A' and 'B' Streets to intercept street drainage and convey it to the main storm sewer systems.

Free Discharge Justification: Free discharge for the project is requested and is justified by the following analysis.

It is proposed that 100 year runoff from the property be intercepted by extensions to the existing storm sewer systems in 'A' and 'B' Streets. Free discharge from the property will runoff and be conveyed away by the storm sewer before the peak flows are collected and conveyed by the two main storm sewer systems adjacent to the project. Calculations confirm this premise as follows.

The time of concentration for flows collecting in 'A' Street and running to manhole No. 705 at the intersection of Yale and Ross is 9.5 minutes (see Sheet 21). The time of concentration for flows in the Ross-Vail-Carlisle storm sewer system at manhole No. 705 is 48.6 minutes (Sheet 24). Therefore project peak flows will enter the main storm sewer system approximately 39 minutes before system peak flows arrive.

In a similar analysis, flows collecting in Street 'B' will concentrate in the Gibson-Kirtland System at manhole No. 802 in 9.7 minutes (Sheets 21 and 22) and the peak system flows will arrive at the same manhole in 45.6 minutes (Sheet 25) or 36 minutes later. Consequently project peak flows will easily enter the storm sewer system some 36 minutes before the system peak arrives.

Hydrographs for the project flows entering each storm sewer system along with the system flow hydrographs are shown on Sheets 42 and 44. Runoff calculations for the storm sewer system are found on Sheets 41 and 43.

Proposed Storm Sewers: New storm sewers are proposed at 3 locations on the project, at the east and between Tracts 11 and 12, at the west end of 'A' Street and at the west end of 'B' Street.

Figures 8 and 9 show the proposed storm drain between Tracts 11 and 12. Flows will be collected in an inlet on the west side of Columbia Drive and conveyed in a 24" line north and then west to the 'B' Street cul-de-sac. At the cul-de-sac, flows will enter the street as surface flows and will be divided so that half of the total flow will proceed as gutter flow on each side of the street. Hydraulic grade line calculations for the storm drain are found on Sheet 34.

Figures 10 and 11 show the plan and profile for the storm drain extension on 'A' Street. Hydraulic grade line calculations are found on Sheets 35 and 36.

Figures 12 and 13 show the storm drain extension on 'B' Street. Hydraulic grade line calculations are found on Sheet 37.

Developed Flow Rates: Figures 17 shows the locations of the Drainage Analysis Points and a tabulation of the developed 100 year flow rates at these points. Flow rates have been calculated for uncontrolled runoff of developed land.

Sheet 2 shows the SCS Soil map of the area. The percent impervious factor is calculated to be 75% and is found on Sheet 4. Special use zoning approval of the property requires a minimum of 20% of the area to be landscaped and an additional 10% of the parking area to be landscaped (see Zoning Case Z-85-41).

Drainage Analysis Points are generally located at the street gutters opposite the extension of the Tract line to the gutters and indicate the street flow in one gutter at that point. Development of each Tract will require conveyance of all runoff from the tract to the street without infringing upon the downslope tract. Flow rates include 50% of the runoff from the off-site drainage east of the property, where appropriate, since off-site flows will be divided 50-50 where they enter the 'B' Street cul-de-sac. Flow calculations for Drainage Analysis Points 1-16 are found on Sheets 5-20 respectively.

Calculations for selecting the storm drain inlets on 'A' and 'B' Streets are found on Sheets 27-30. In these calculations it is shown the street flow depths do not exceed 0.6 feet. Some runoff will flow directly into Ross Avenue east of Yale. Calculations on Sheet 31 verify that there is sufficient storm sewer inlet

capacity to safely intercept these flows.

Downstream Capacity: The storm sewer capacity in Yale Blvd. is 187 cfs (Sheet 31) and peak project runoff is 64 cfs (Sheet 32) showing adequate capacity in that section. The storm sewer capacity of the Ross-Vail-Carlisle System west of Ross is 273 cfs (Sheet 38) and the peak project runoff is 84 cfs (Sheet 38) from the site which also shows adequate capacity.

The storm sewer capacity from 'B' Street to the Gibson-Kirtland System is 67 cfs which exceeds the 64 cfs project flow (Sheet 33). The minimum system capacity west of this connection is 135 cfs which also exceeds the project runoff of 64 cfs by 71 cfs (Sheet 38).

Sediment Control: Two sedimentation ponds are proposed to control and reduce sediment which would tend to accumulate in streets. Pond locations are shown on Figure 17. Conceptual pond design is shown on Figure 14.

Tract Drainage Concept: All tracts will be allowed to drain along historic drainage paths until development of tract begins. Development of any tract will require grading and construction of that tract to convey water to the street system. Flows from developed tracts may not flow onto topographically lower tracts. Flows entering a developing tract may be deflected and carried through the temporary drainage easement located on the adjacent,

upslope tract. Upon development of a tract any temporary drainage easement in that tract will be automatically vacated.

Free, uncontrolled discharge will be allowed from each tract. Individual grading and drainage plans, approved by the City Design Hydrology Section, will be required on each tract. See "Drainage Concept for Tracts", Figure 17, for additional information on tract drainage.

SUMMARY

Yale Business Park is a land development located at the northeast corner of Yale and Gibson which proposes to divide a 43 acre parcel into 13 tracts, zoned Special Use for O-1 and C-2. An interior, looped public street system will be dedicated.

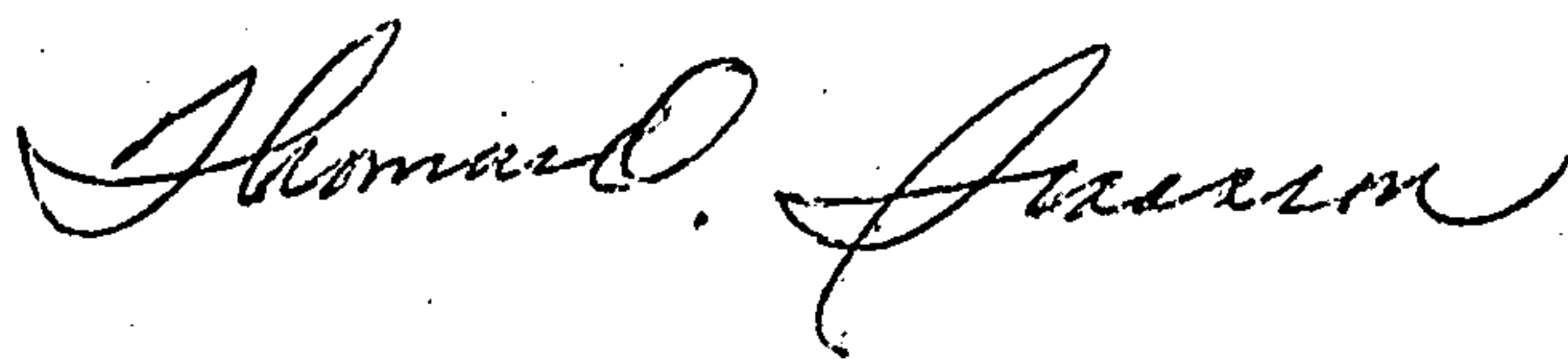
Offsite flows onto the property are minor. At the east end there is an offsite drainage area with a 100 year runoff potential of 25 cfs. It is proposed to intercept this drainage in a storm sewer system.

There are two existing storm sewer systems located along the north, south and portions of the west boundary. Both of these systems have relatively long times of concentration on the order of 45 minutes. Concentration times for the Buiness Park are less than 10 minutes, consequently free discharge is allowable from the site into the storm sewer systems as project flows will beat

the peak storm sewer system flows. Storm sewer extensions will be required on the two streets in the Park to intercept the project flows. The downstream capacity of the existing storm system is adequate to accept the project flows with reserve capacity.

Temporary drainage easement will be reserved on the final subdivision plat to provide flexibility in developing the individual tracts in the subdivision.

Respectively Submitted



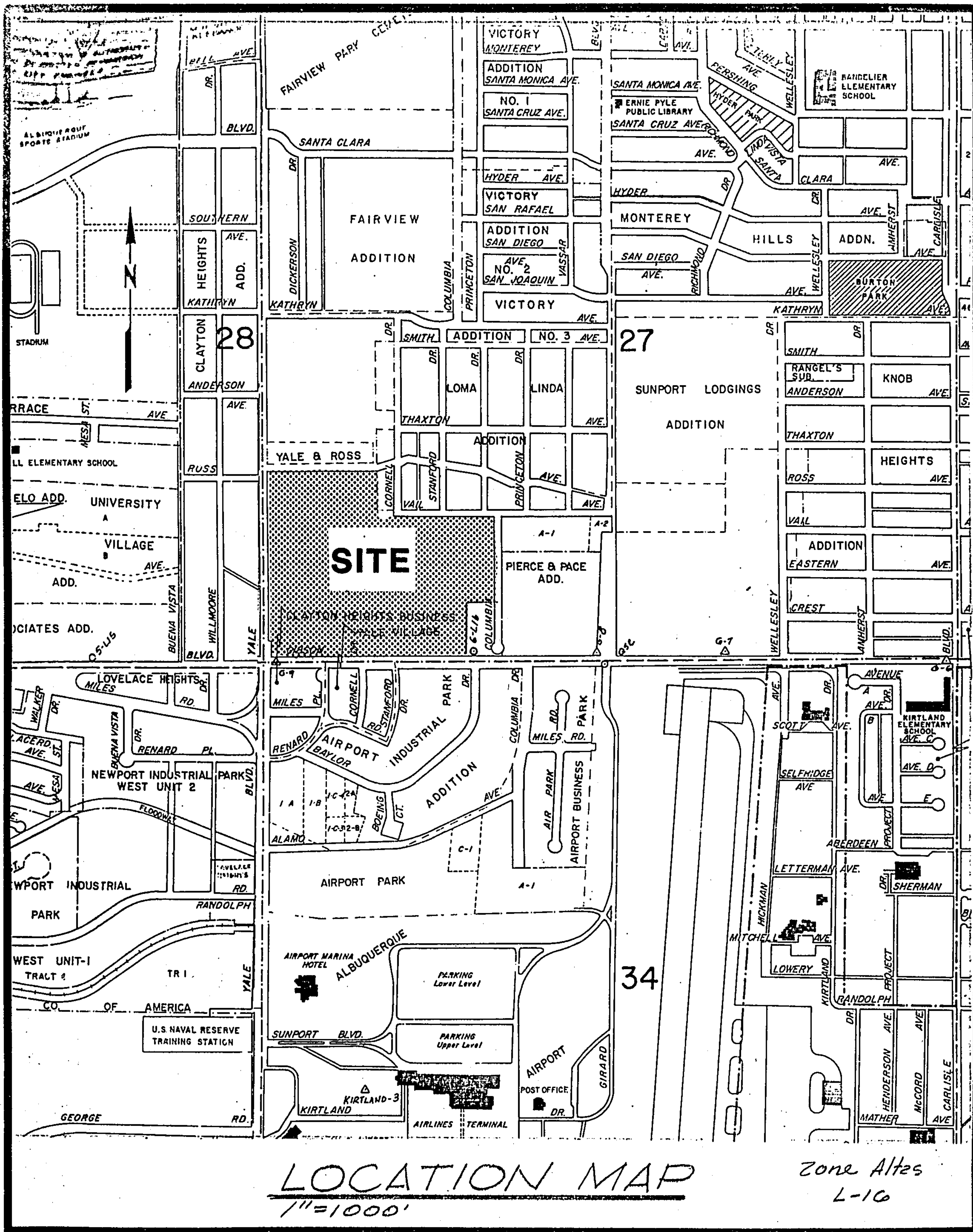
Thomas O. Isaacson

Isaacson & Arfman, P.A.



TOI:ram

FIGURES

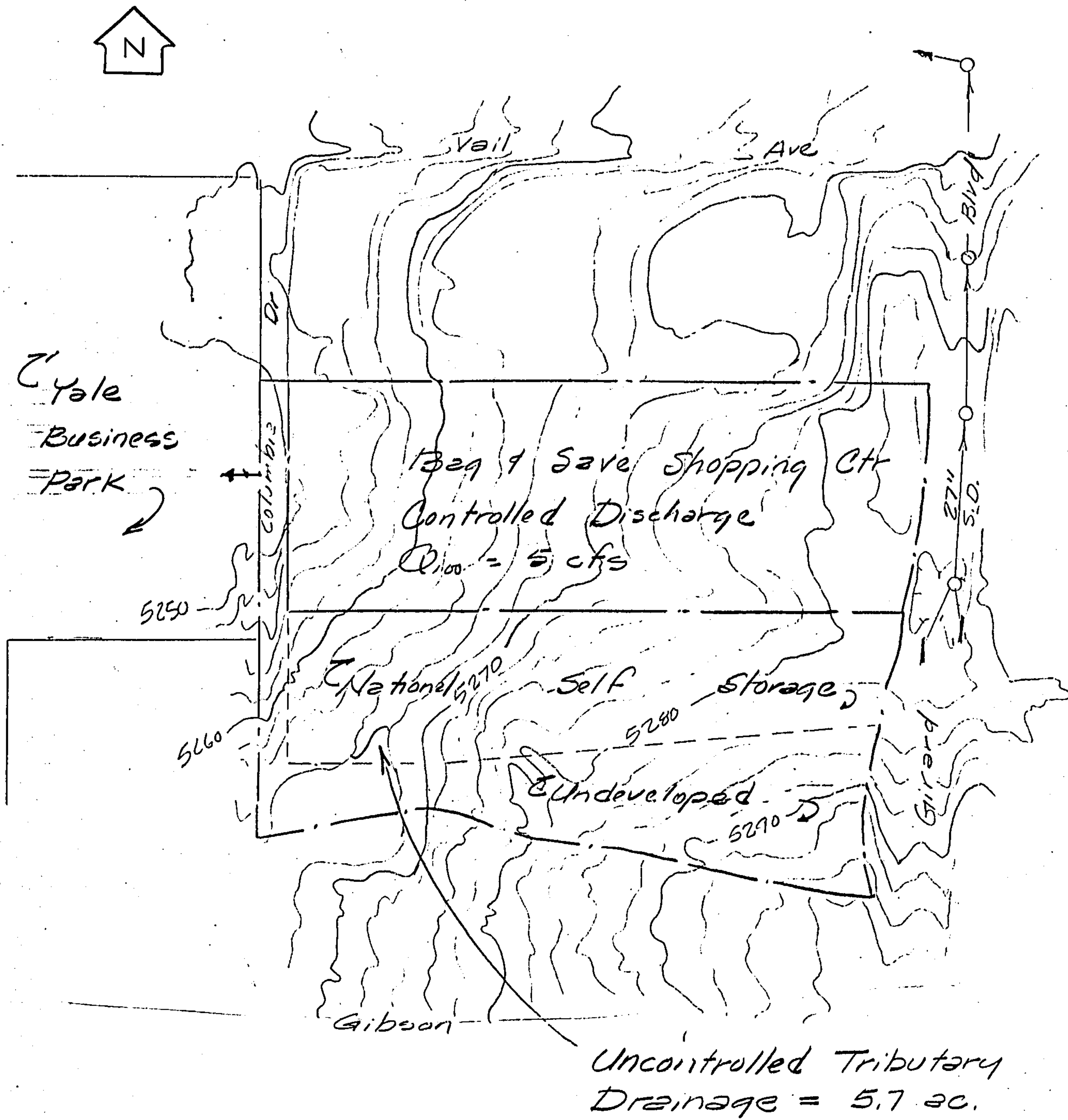


Isaacson &
Arfman, P.A.

SUBJECT _____ JOB NO. _____

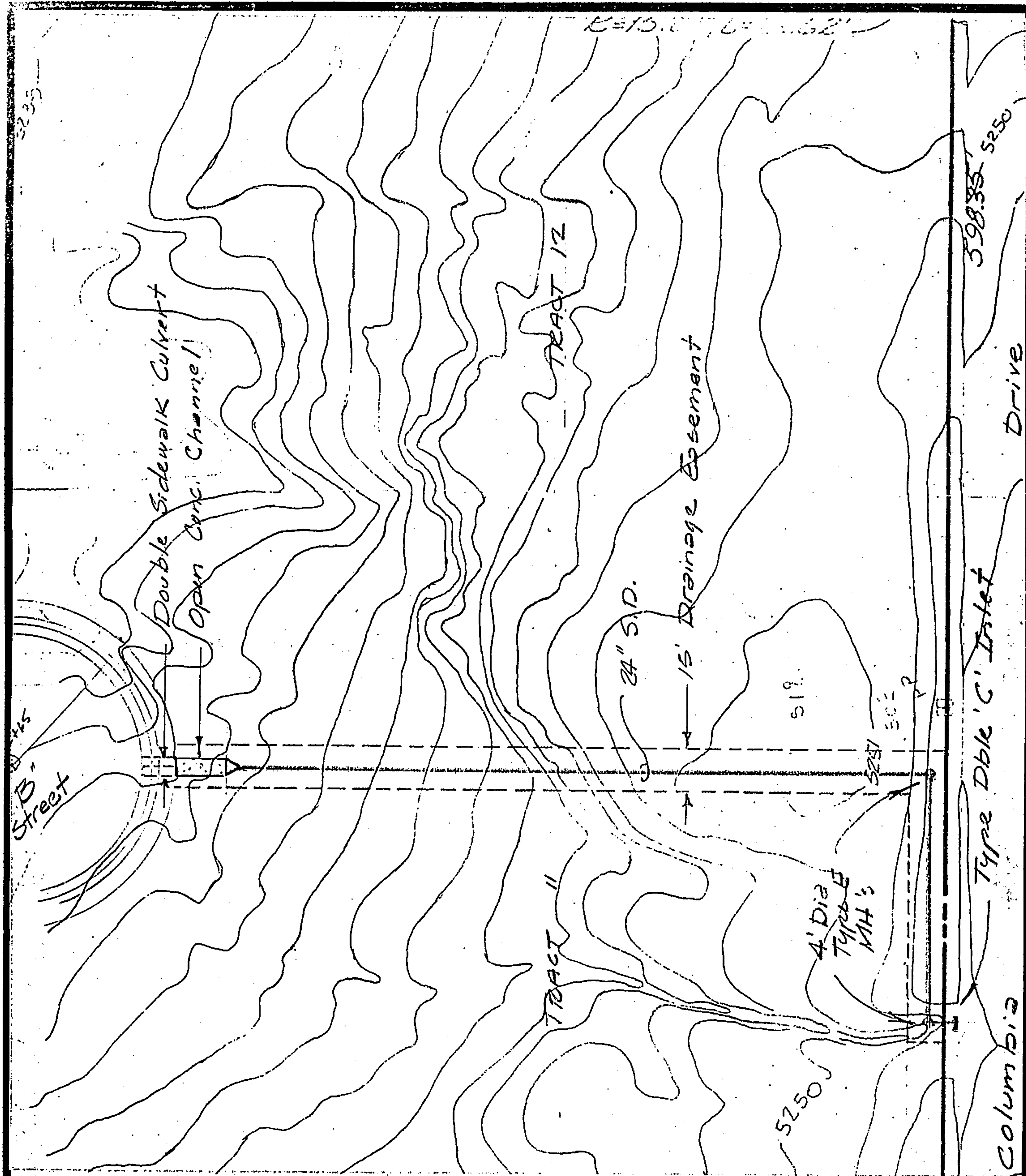
BY _____ DATE _____ SHEET NO. _____ OF _____

ENCLOSURE 1



OFFSITE DRAINAGE

Scale: 1" = 200'

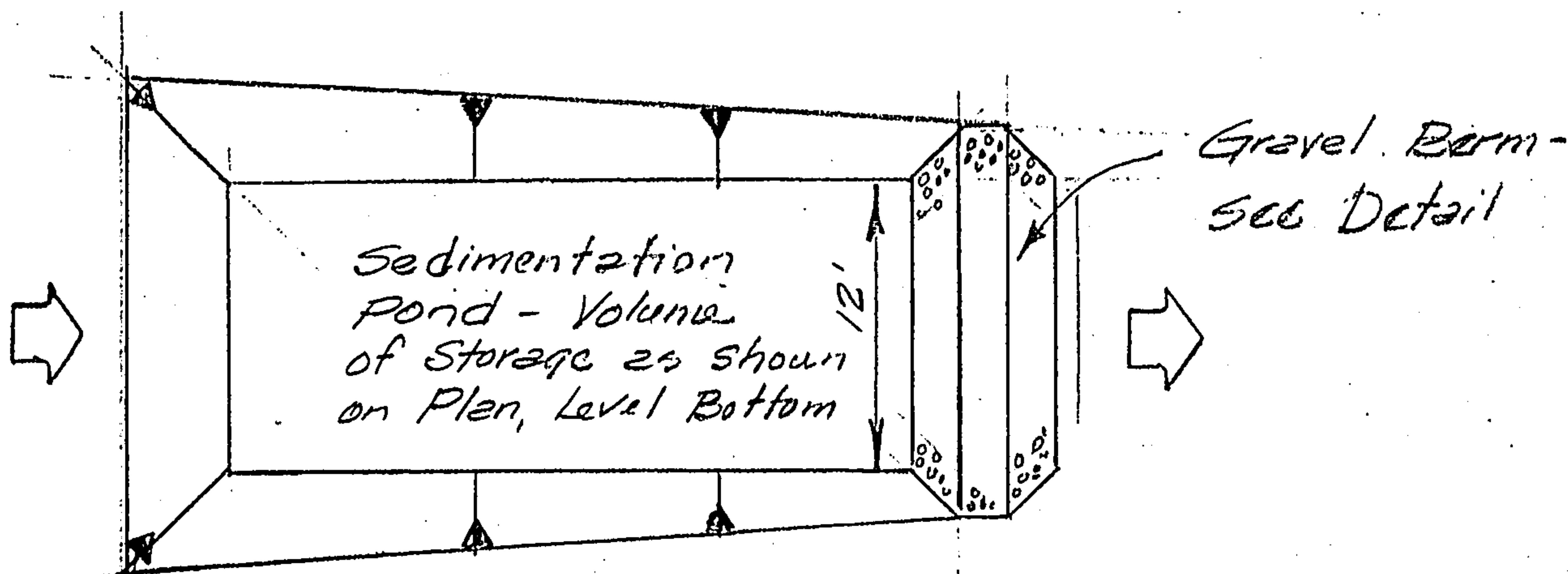


PROPOSED STORM DRAIN BETWEEN TRACTS
11 & 12

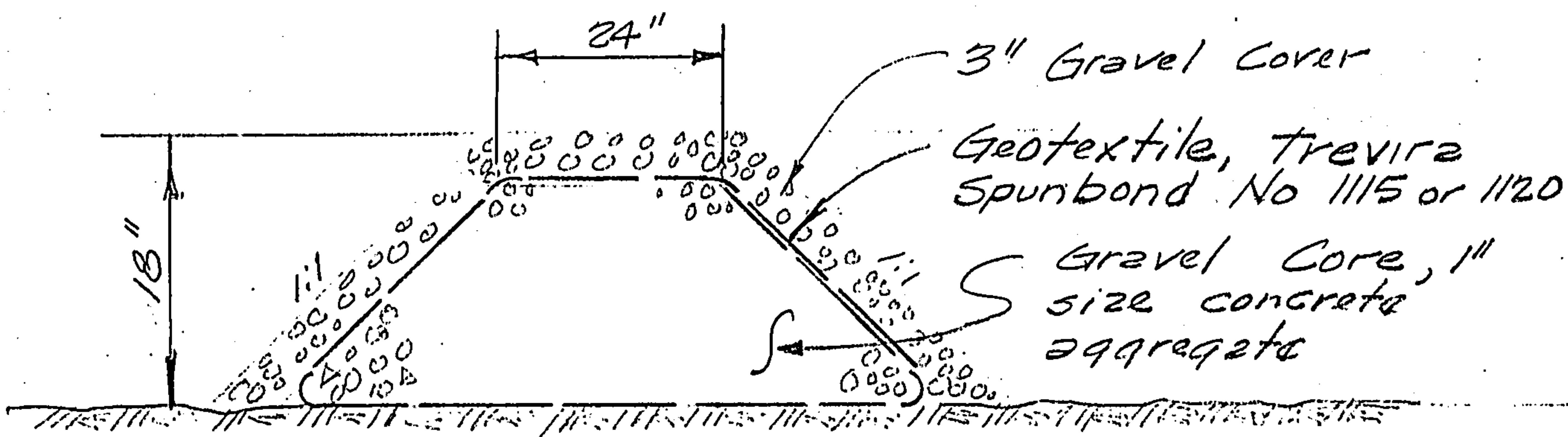
Scale: 1"=50'

Isaacson &
 Arfman, P.A.

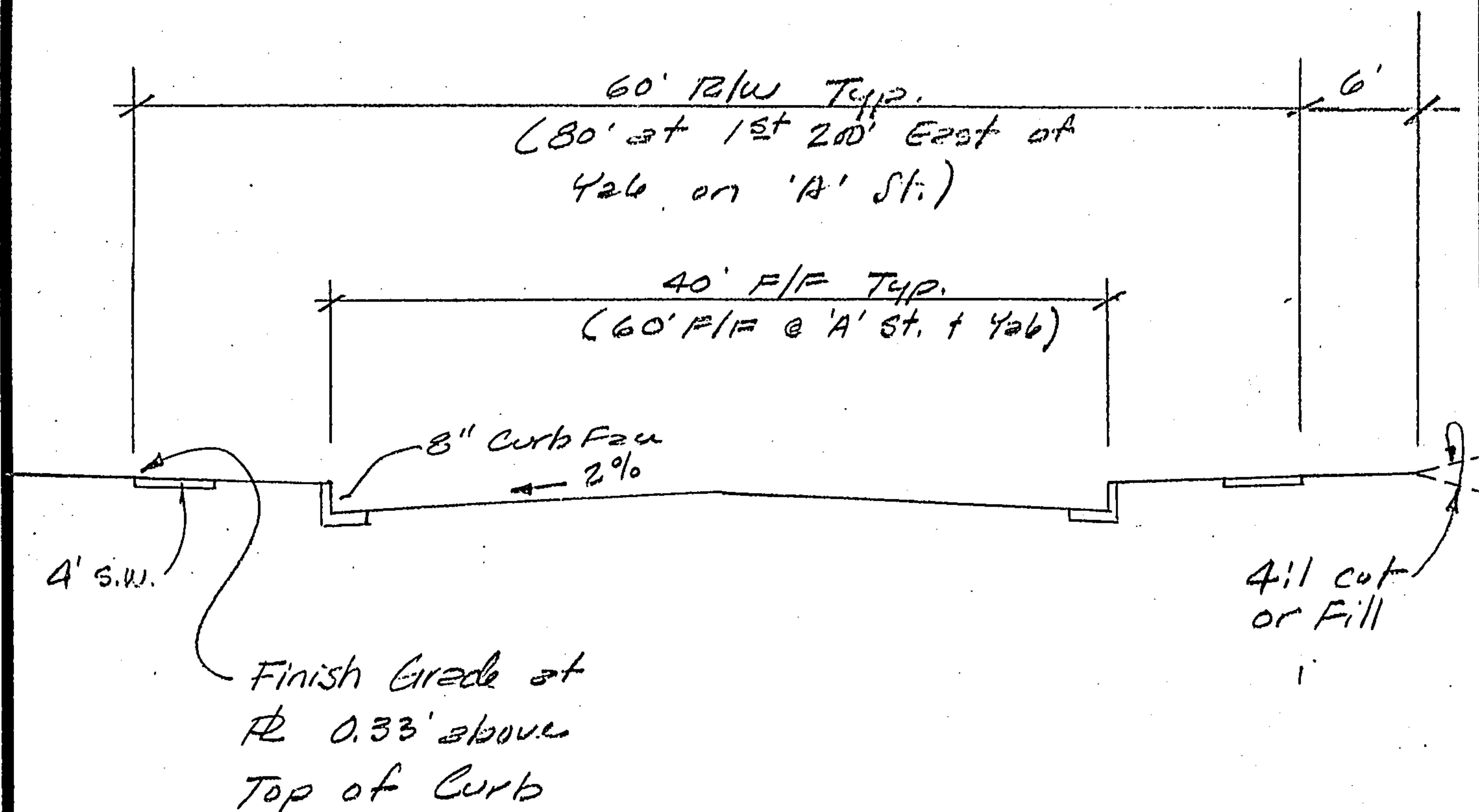
SUBJECT _____ JOB NO. _____
 BY _____ DATE _____ SHEET NO. _____ OF _____



SEDIMENTATION POND PLAN
No Scale



GRAVEL BERM
No Scale



TYPICAL STREET SECTION

1" = 10' H.
= 5' V.

APPENDIX 'A'



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

RECEIVED

JUN 19 1986

Ans'd.....

DESIGN HYDROLOGY SECTION
123 Central NW, Albuquerque, NM 87102
(505) 766-7644

June 11, 1986

Mr. Thomas Isaacson
Isaacson & Arfman, PA
128 Monroe Street NE
Albuquerque, NM 87108

REF REVISED DRAINAGE REPORT FOR YALE BUSINESS PARK (L16-D23)
RECEIVED MAY 27, 1986

Dear Mr. Isaacson:

The above referenced report, dated May 29, 1986, is hereby approved for Preliminary and Final platting.

Please be advised that for Preliminary Plat approval you will need to provide to DRB an infrastructure listing for review and approval. For Final Plat, an executed Subdivision Improvements Agreement including the approved infrastructure listing will be required.

Also, prior to submittal to DRC for Work Order, please provide to this office a complete report incorporating all the current revised computations and plan and any other typo corrections along with the detailed construction plans for the streets and storm sewer facilities.

It is also understood that a drainage plan for each tract will be required to be submitted for review and approval for Building Permits.

Should you have any questions or comments, please call.

Cordially,

Billy J. Goolsby, PE
CE/Hydrology

BJG:mrk

cc: Cavan Associates, 500 Marquette NW; Attn: Joe Beers

MUNICIPAL DEVELOPMENT DEPARTMENT

C. Dwayne Sheppard, P.E., City Engineer

ENGINEERING DIVISION

Telephone (505) 766-7467

AN EQUAL OPPORTUNITY EMPLOYER



May 27, 1986

Mr. Billy J. Goolsby
Design Hydrology Section
City of Albuquerque
123 Central Ave. N.W.
Albuquerque, N.M. 87102

Re: Drainage Report for Yale Business Park (L16-D23)

Dear Mr. Goolsby:

Transmitted are revised calculations and figures for the referenced project. This revised information is submitted in response to your letter of October 18, 1985.

In that letter your suggested that a more accurate method of determining the peak runoff rate for 'A' 'B' streets would be a technique of determining the individual hydrographs for each tract in the subdivision and adding the individual hydrographs along with the off-site contributions. This method has been used in accordance with our meeting of 5-19-86. Attached are various calculation sheets and figures supporting these revisions. The net affect of this alternative method of accompishing runoff rate calculations was to slightly increase the runoff rates at the subject streets.

During the process of revising the runoff calculations and storm sewer requirements for these revised rates, I recalculated the catch basins requirements based on the City's alternate inlet grate design (the louver configuration). This resulted in a decreased number of required inlets due to the greater inlet capacity of this design.

Reference is made to your second comment in your letter regarding the storm drain easement for the drain proposed to be located between Tracts 11 and 12. I have revised the easement width to a 20' dimension. We will meet the requirements of the easement width formula by keeping the finished cover over the storm drain line to a depth of 8' as measured from the storm drain invert to the finished ground surface.

Mr. Billy Goolsby
May 27, 1986
Page 2

This response to your review has been delayed due to a transfer of ownership of the land which placed a stop work order on our design services. The new owners are now anxious to proceed with the engineering work. Consequently we request your early review of this revised Drainage Report.

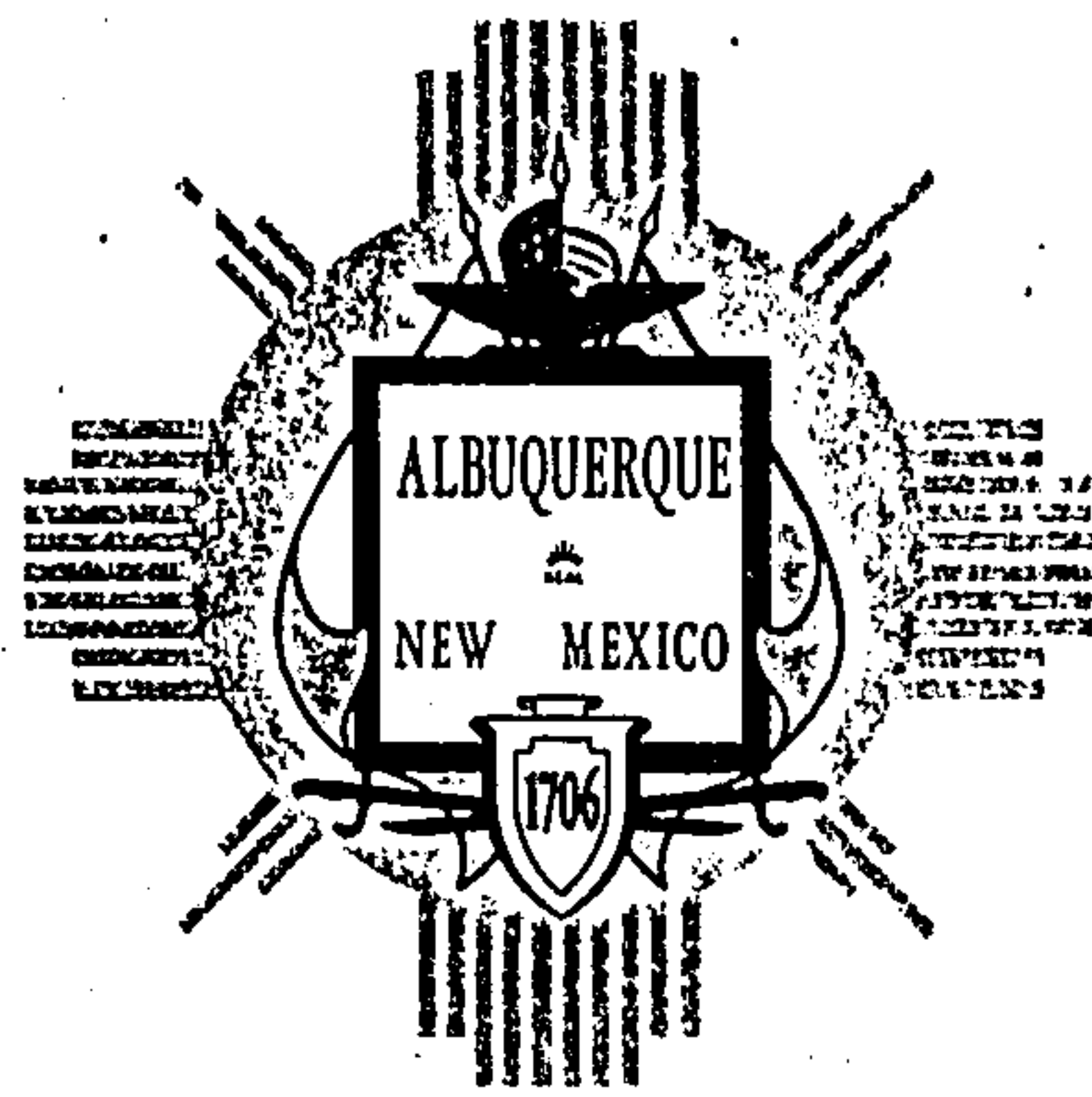
If you have questions on any of this material, please do not hesitate to contact our office.

Very truly yours,

Thomas O. Isaacson

TOI/aq

Attachments



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

DESIGN HYDROLOGY SECTION
123 Central NW, Albuquerque, NM 87102
(505) 766-7644

October 18, 1985

Mr. Tom Isaacson
Isaacson & Arfman, PA
128 Monroe St. NE
Albuquerque, NM 87108

RE: DRAINAGE REPORT FOR YALE BUSINESS PARK (L16-D23) RECEIVED
SEPTEMBER 11, 1985

Dear Mr. Isaacson:

I have reviewed the above referenced submittal and forward the following comments:

1. In checking through your analysis for the runoff from the site, I performed a conservative analysis of my own. This analysis addressed each tract individually. For the computations I used a "C" factor of 0.72, a time of concentration of 10 minutes. I then applies these factors, using the Rational Equation, to determine the runoff from each individual tract of development.

I then routed the runoff from each tract, using straight addition, to arrive at the total accumulated amount at the intersection of street "B" and Yale Blvd. The final composite peak rate of discharge in my analysis came to be approximately 90 c.f.s. In your report you identify the maximum at this same location as approximately 50 c.f.s.

I realize that my estimate is more conservative. However, due to the significant difference, I feel it would be more appropriate to address each tract for runoff amounts and then route to the lower end by time lags and hydrograph addition for the purpose of determining the exact size necessary for the proposed storm drains connecting streets "A" and "B".

MUNICIPAL DEVELOPMENT DEPARTMENT

C. Dwayne Sheppard, P.E., City Engineer

ENGINEERING DIVISION

Telephone (505) 766-7467

AN EQUAL OPPORTUNITY EMPLOYER

Mr. Tom Isaacson
October 18, 1985
Page -2-

2. The minimum easement required for an underground public utility, i.e. water, sewer or storm drain, is 20 feet as defined in the Subdivision Ordinance. In section 22.6, on page 99 of the DPM an equation is provided for determining Right-of-Way and easement widths for underground facilities based on depth. Using this equation and the profile presented in your report, I came up with a requirement of 24 feet for the 24" storm drain on the east side of the property.

Should you have any questions or comments, please call this office at 766-7644.

Cordially,

Billy J. Goolsby

Billy J. Goolsby
CE/Design Hydrology

for

BJG/cl



Isaacson & Arfman, P.A.

Consulting Engineering
Associates

September 11, 1985

Mr. Carlos Montoya
City of Albuquerque
Design Hydrology Section
123 Central NW
Albuquerque, N.M. 87102

RE: YALE BUSINESS PARK (L16-D23)

Dear Mr. Montoya:

In response to your letter of September 5, 1985 we are submitting the following information which you itemized as being lacking in your letter.

1. Professional engineer's stamp has been affixed to the plan drawing.
2. T. C. and F. L. elevations have been shown for Columbia, Vail, Ross, Yale and Gibson Streets. For your information all of these streets are either existing or currently under construction.
3. HGL calculations for proposed storm drains (sheets 45-47).
4. Cross sections for proposed streets--see Figure 17, enclosed.
5. Existing top of curb and flowline grades on adjacent streets--see revised Drainage Plan.
6. City project number for adjacent streets--Yale Blvd. is currently under design and the project number is MDD 1960. No other adjacent streets are under design or in construction (all are existing).

Also attached per your requirements is an updated Information Sheet.

We would appreciate your expeditious review of this report.

Very truly yours,



Thomas O. Isaacson

TOI:ram

128 Monroe, NE • Albuquerque, NM 87108 • (505) 268-8828



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

DESIGN HYDROLOGY SECTION
123 Central NW, Albuquerque, NM 87102
(505) 766-7644

RECEIVED
SEP 9 1985
[Signature]

September 5, 1985

Mr. Fred Arfman
Isaacson & Arfman, P.A.
128 Monroe St. NE
Albuquerque, NM 87108

REF: YALE BUSINESS PARK (L16-D23)

Dear Mr. Arfman:

A preliminary review of your submittal for Preliminary Plat and Final Plat approval has shown that the following information is lacking for this section to begin the review process:

Information Needed:

1. Professional Engineer's Stamp with signature and Date (Revision date) within the plan drawing also.
2. Detailed Grading Plan showing T.C. & F.L. Elevations (For Preliminary Plat and Rough Grading requests for Subdivisions) for Columbia, Vail Ross, Yale and Gibson.
3. HGL calculations for proposed storm drains.
4. Cross sections for proposed streets.

Plan Drawing:

1. Existing City top of curb and flow line elevations on or adjacent to site.

MUNICIPAL DEVELOPMENT DEPARTMENT

C. Dwayne Sheppard, P.E., City Engineer

ENGINEERING DIVISION

Telephone (505) 766-7467

AN EQUAL OPPORTUNITY EMPLOYER

Mr. Fred Arfman
September 5, 1985
Page -2-

2. City project number for adjacent streets or alleys being designed per requirement.

Please provide this information so that we may process your request as expediently as possible.

Cordially,


City Design/Hydrology Section

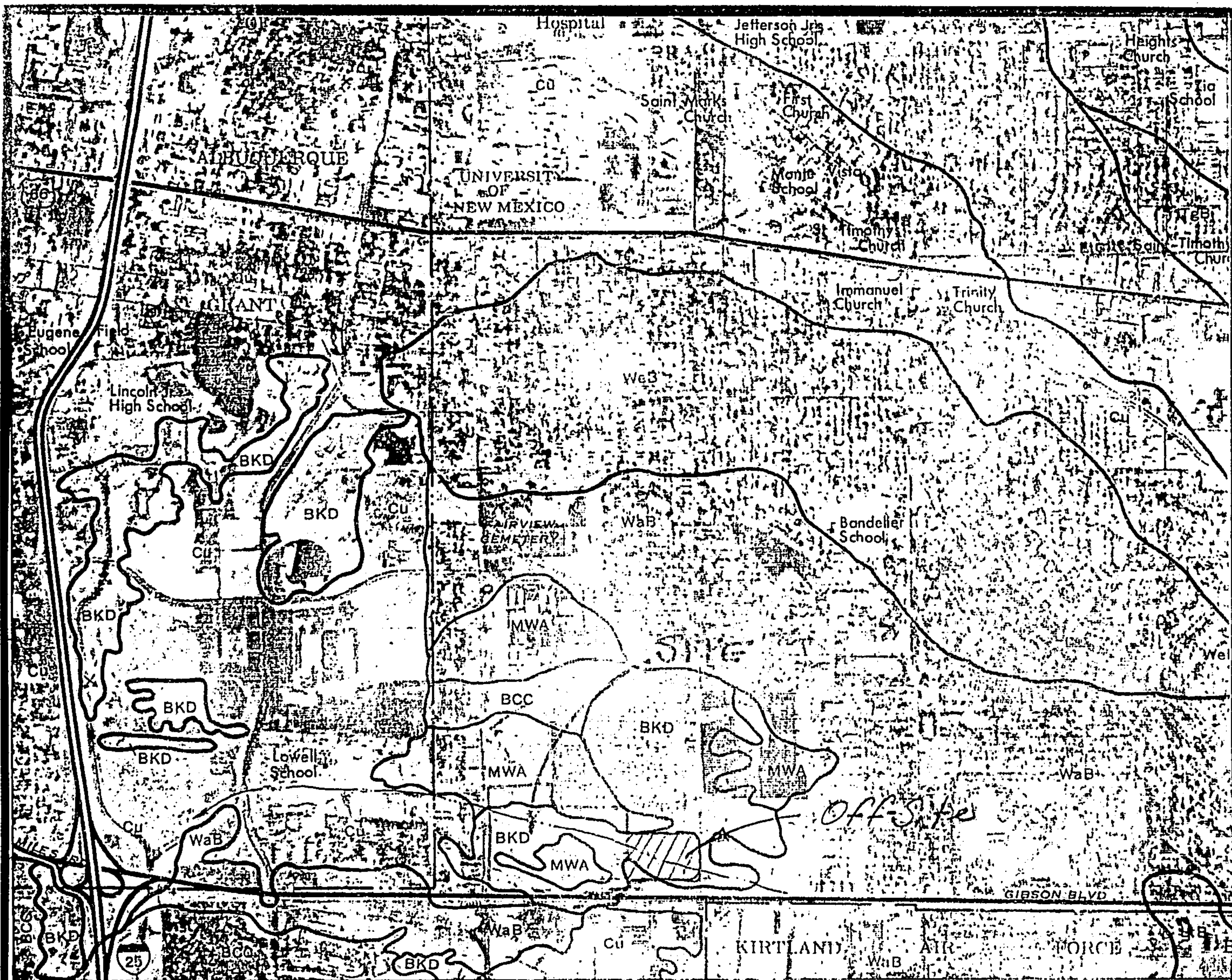
BJM/cl

OFFSITE DRAINAGE :

Offsite Drainage Area is separated into two sub-areas; Bag & Seve Tract and the remaining area. Separation is made to account for controlled discharge from Bag & Seve Site. Per Drainage Report for Bag & Seve, $Q_{100} = 5 \text{ cfs}$

$$\begin{array}{rcl} Q_{100} & \text{Bag \& Seve} & = 5 \text{ cfs} \\ Q_{100} & \text{Remaining Offsite (Sh 3)} & = \underline{20} \end{array}$$

$$\Sigma = 25 \text{ cfs}$$



SCS SOILS MAP

1" = 2000'

Soil

Hydro Group

BKD

A

MWA

1B

WAB

B

Isaacson &
Arfman, P.A.

SUBJECT Yale Business Park JOB NO.
BY TO DATE 8/8/85 SHEET NO. 2 OF

RUNOFF CALCULATIONS

(Rational Formula)

PROJECT: Yale Business Park

Analysis Point# 1

DRAINAGE AREA:

Planimeter Rdg. 1200 x .015

x Map Scale 100 2 ÷ 43,560

A = 4.1 acres

TIME OF CONCENTRATION:

Drainage Basin Data:

*Overland
Street*

L = 550 ft., fall = 20 ft., slope = .04 ft/ft
300 1.5 .005

☒ Overland Flow:

v = 2.7 ft/sec (Pl 22.2 B-1)

Tc = 2.04 sec. = 3.4 min. Tc = 3.4 min.

☒ Street Flow:

v = 1.9 ft/sec. (Pl 22.2 B-2)

Tc = 1.58 sec. = 2.4 min. Tc = 2.4 min.

☐ Arroyo Flow:

Tc = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = min. Tc = min.

Σ Tc = 6.0 min.

Use Tc = 10 min

RUNOFF COEFFICIENT:

% Impervious = 75% (See Sheet 4)

Soil Group A: ac c 0.60 =

Soil Group B: ac c 0.73 =

*All Group A
Soils, C=0.60*

Σ = Σ =

C = =

C = 0.60

RAINFALL INTENSITY:

100 year depth = 2.28 " (Pl. 22.2 D-1)

Intensity Factor = 2.11 (Pl. 22.2 D-2)

Intensity = depth x factor

I = 4.81 "/hr.

PEAK RUNOFF RATE:

Q = CIA = .60 x 4.81 x 4.1 Q₁₀₀ = 11.8 cfs

x 0.657 = Q₁₀ = 7.8 cfs

VOLUME OF RUNOFF:

Soil Group A: ac c CN = = 83

Soil Group B: ac c CN = =

Σ = Σ =

q = 1 " (Pl 22.2 C-4)

V = q A = $\frac{1}{12}$ x 4.1 ac x 43,560 = 14,880 cu. ft.

T = 2V ÷ Q₁₀₀ ÷ 60 = 42 min

(5/86)

SHA-1

RUNOFF CALCULATIONS

(Rational Formula)

PROJECT: Yale Business Park Analysis Point# 2

DRAINAGE AREA:

Planimeter Rdg. 1260 x .015

x Map Scale 100 2 ÷ 43,560 A = 4.3 acres

TIME OF CONCENTRATION:

Drainage Basin Data:

L = 125 ft., fall = 150 ft., slope = .005 ft/ft
.06

☒ Overland Flow:

v = 1.9 ft/sec (Pl 22.2 B-2)
Tc = 66 sec. = 1.1 min. Tc = 1.1 min.

☒ Street Flow:

v = 6.7 ft/sec. (Pl 22.2 B-2)
Tc = 22 sec. = 0.4 min. Tc = 0.4 min.

☐ Arroyo Flow:

Tc = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = min. Tc = min.

Σ Tc = 1.5 min.

RUNOFF COEFFICIENT:

% Impervious = 75% (See Sheet 4)

Soil Group A: 2.4 ac @ 0.60 = 1.44

Soil Group B: 1.9 ac @ 0.73 = 1.39

Σ = 4.3 Σ = 2.83

C = $\frac{2.83}{4.3}$ = .66

C = .66

USE Tc = 10 min

RAINFALL INTENSITY:

100 year depth = 2.28 " (Pl. 22.2-D-1)

Intensity Factor = 2.11 (Pl. 22.2 D-2)

Intensity = depth x factor

I = 4.81 "/hr.

PEAK RUNOFF RATE:

Q = CIA = .66 x 4.81 x 4.3 Q₁₀₀ = 13.7 cfs

x 0.657 = Q₁₀ = 9.0 cfs

VOLUME OF RUNOFF:

Soil Group A: 2.4 ac @ CN = 83 = 199.2

Soil Group B: 1.9 ac @ CN = 89 = 169.1

Σ = 4.3 Σ = 368.3, CN = 86

q = 1.1 (Pl 22.2 C-4)

V = qA = $\frac{1.1}{12}$ x 4.3 ac x 43,560 = 17,170 cu. ft.

T = $2V \div Q_{100} \div 60$ = 42 min

RUNOFF CALCULATIONS

(Rational Formula)

PROJECT: Yab. Business Park Analysis Point# 3

DRAINAGE AREA:

Planimeter Rdg. 1360 x .015

x Map Scale 100 2 ÷ 43,560 A = 4.7 acres

TIME OF CONCENTRATION:

Drainage Basin Data:

L = 500 ft., fall = _____ ft., slope = .06 ft/ft

☐ Overland Flow:

v = 6.7 ft/sec (Pl 22.2 B-1)

Tc = _____ sec. = _____ min. Tc = _____ min.

☒ Street Flow:

v = 6.7 ft/sec. (Pl 22.2 B-2)

Tc = 75 sec. = 1.2 min. Tc = 1.2 min.

☐ Arroyo Flow:

Tc = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = _____ min. Tc = _____ min.

Σ Tc = 1.2 min.

Use 10 min.

RUNOFF COEFFICIENT:

% Impervious = 75% (See Sheet 4)

Soil Group A: .9 ac @ 0.60 = .5

Soil Group B: 3.8 ac @ 0.73 = 2.8

Σ = 4.7 Σ = 3.3

C = $\frac{3.3}{4.7}$ = 0.70

C = .70

RAINFALL INTENSITY:

100 year depth = 2.28 " (Pl. 22.2 D-1)

Intensity Factor = 2.11 (Pl. 22.2 D-2)

Intensity = depth x factor

I = 4.81 "/hr.

PEAK RUNOFF RATE:

Q = CIA = 170 x 4.81 x 4.7 Q₁₀₀ = 15.8 cfs

x 0.657 = Q₁₀ = 10.6 cfs

VOLUME OF RUNOFF:

Soil Group A: .9 ac @ CN = 83 = 74.7

Soil Group B: 3.8 ac @ CN = 89 = 338.2

Σ = 4.7

Σ = 412.9 ÷ 4.7 = 88

q = 1.2 " (Pl 22.2 C-4)

V = qA = $\frac{1.2}{12}$ x 4.7 ac x 43,560 = 20,473 cu. ft.

T = $2V \div Q_{100} \div 60$ = 43 min

RUNOFF CALCULATIONS

(Rational Formula)

PROJECT: Yale Business Park Analysis Point# 4

DRAINAGE AREA:

Planimeter Rdg. 1310 x .015

x Map Scale 100 2 ÷ 43,560 A = 4.5 acres

TIME OF CONCENTRATION:

Drainage Basin Data:

L = 460 ft., fall = _____ ft., slope = .04 ft/ft

☐ Overland Flow:

v = _____ ft/sec (Pl 22.2 B-1)

Tc = _____ sec. = _____ min. Tc = _____ min.

☒ Street Flow:

v = 5.3 ft/sec. (Pl 22.2 B-2)

Tc = 87 sec. = 1.5 min. Tc = 1.5 min.

☐ Arroyo Flow:

Tc = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = _____ min. Tc = _____ min.

Σ Tc = 1.5 min.

Use 10 min.

RUNOFF COEFFICIENT:

% Impervious = 75% (See Street 4)

Soil Group A: 3.5 ac @ 0.60 = 2.10

Soil Group B: 1.0 ac @ 0.73 = .73

Σ = 4.5

Σ = 2.83

C = $\frac{2.83}{4.5}$ =

C = 0.63

RAINFALL INTENSITY:

100 year depth = 2.28 " (Pl. 22.2-D-1)

Intensity Factor = 2.11 (Pl. 22.2 D-2)

Intensity = depth x factor

I = 4.81 "/hr.

PEAK RUNOFF RATE:

Q = CIA = .63 x 4.81 x 4.5 Q₁₀₀ = 13.6 cfs

x 0.657 = Q₁₀ = 9.0 cfs

VOLUME OF RUNOFF:

Soil Group A: 3.5 ac @ CN = 83 = 290.5

Soil Group B: 1.0 ac @ CN = 89 = 89.0

Σ = 4.5

Σ = 379.5 ÷ 4.5 = 84

q = 1.0 (Pl 22.2 C-4)

V = $qA = \frac{1}{12} \times 4.5 \text{ ac} \times 43,560 = \underline{16,335}$ cu. ft.

T = $2V \div Q_{100} \div 60 = \underline{40}$ min

RUNOFF CALCULATIONS

(Rational Formula)

PROJECT: Yab. Business Park Analysis Point: Offsite

DRAINAGE AREA:

Planimeter Rdg. 412 x .015

x Map Scale 200 2 ÷ 43,560 A = 5.7 acres

TIME OF CONCENTRATION:

Drainage Basin Data:

L = 400 ft., fall = 22 ft., slope = .04 ft/ft (Columbia Overland, .04)

☒ Overland Flow:

v = 1.1 ft/sec (Pl 22.2 B-1)

Tc = 727 sec. = 12 min. Tc = 12 min.

☒ Street Flow:

v = 6.7 ft/sec. (Pl 22.2 B-2)

Tc = 60 sec. = 1 min. Tc = 1 min.

☐ Arroyo Flow:

Tc = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = min. Tc = min.

Σ Tc = 13 min.

RUNOFF COEFFICIENT:

% Impervious = 80% (~~75%~~ (See Street 4))

Soil Group (A) ac c 0.60 =

Soil Group B: ac c 0.73 =

Σ = Σ =

C = =

C = .64

RAINFALL INTENSITY:

100 year depth = 2.28 " (Pl. 22.2-D-1)

Intensity Factor = 1.85 (Pl. 22.2 D-2)

Intensity = depth x factor I = 4.22 "/hr.

PEAK RUNOFF RATE:

Q = CIA = .64 x 4.22 x 5.7 Q₁₀₀ = 15.4 cfs*

x 0.657 = Q₁₀ = 10.1 cfs

VOLUME OF RUNOFF:

Soil Group (A) ac c CN = = 87

Soil Group B: ac c CN = =

Σ = Σ =

q = 1.15 (Pl 22.2 C-4)

V = qA = $\frac{1.15}{12} \times 5.7 \text{ ac} \times 43,560 = \underline{23,715}$ cu. ft.

T = 2V ÷ Q₁₀₀ - 60 = 52 min

(5/86)* Plus Peak Runoff From Bag & Save Tract of 5 cfs (Controlled Discharge) 15.4 + 5 = 20.4 cfs

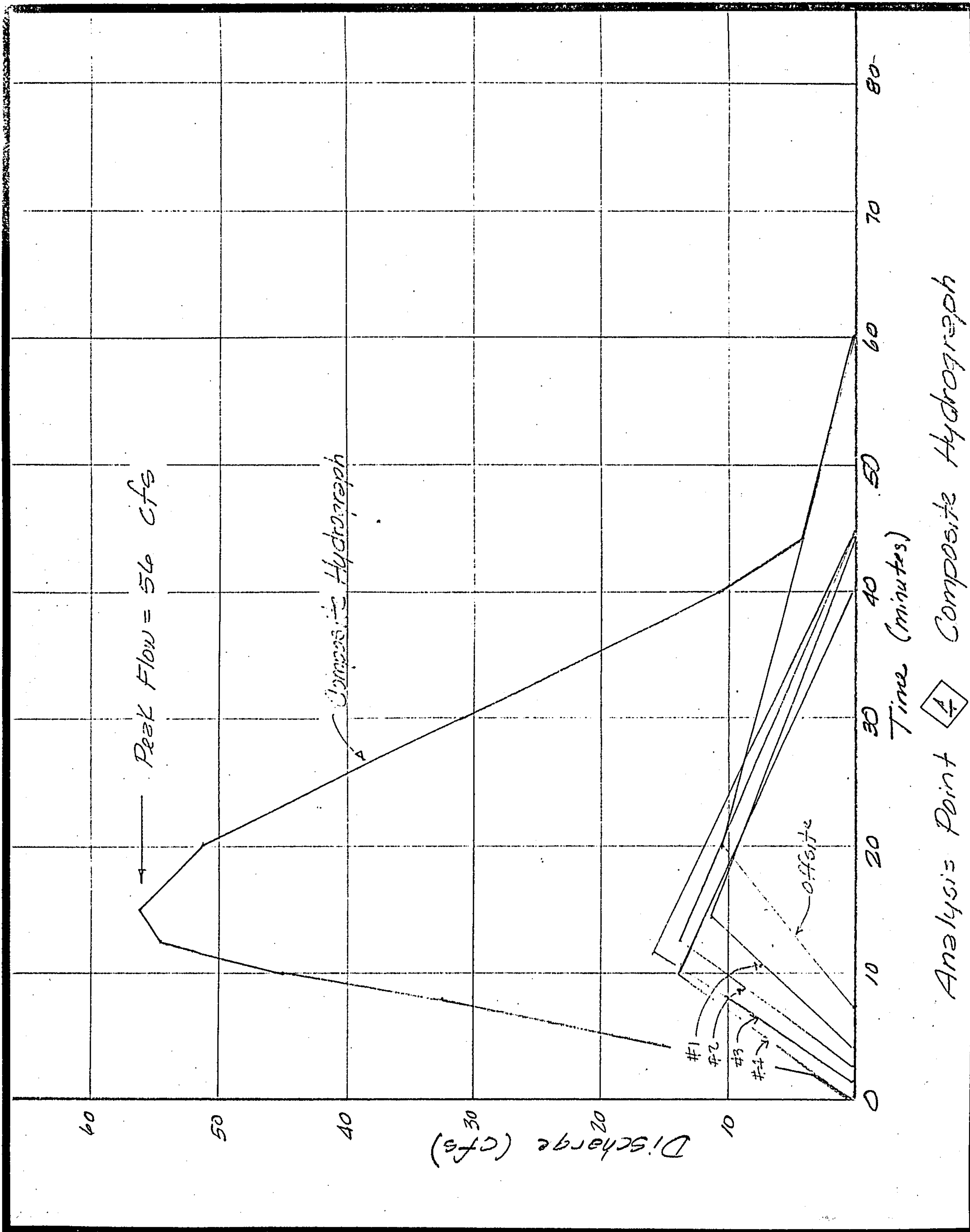
DETERMINATION OF Q_{100} at Analysis Pt 4

Total Flow Rate will be determined by addition of incremental hydrographs from Analysis Points 1 thru 4 plus 50% of offsite flows entering property from east. 50% value is used to account for splitting the total flow at the east side of the cul-de-sac where offsite flows enter the street system.

Plotting Table Information:

Incr. Hydro No.	Analysis Point No.	Q_{100} Peak (cfs)	Hydro. Base Time (min)	Travel Time (min)	Accumulated Travel Time (min)	Peak Time (min)
4	4	13.6	40	1.5	-	10
3	3	15.8	43	1.2	1.5	10
2	2	13.7	42	1.5	2.7	10
1	1	11.8	42	2.6	4.2	10
0	offsite	10.2	52	0.6*	7.4	13

* Travel time through on-site storm drain from east boundary line to cul-de-sac



RUNOFF CALCULATIONS

(Rational Formula)

PROJECT: Yale Business Park Analysis Point# 5

DRAINAGE AREA:

Planimeter Rdg. 390 x .015

x Map Scale 100 2 ÷ 43,560 A = 1.3 acres

TIME OF CONCENTRATION:

Drainage Basin Data:

L = 480 ft., fall = 25 ft., slope = .052 ft/ft

☒ Overland Flow:

v = 3.0 ft/sec (Pl 22.2 B-1)

Tc = 100 sec. = 2.7 min. Tc = 2.7 min.

☐ Street Flow:

v = ft/sec. (Pl 22.2 B-2)

Tc = sec. = min. Tc = min.

☐ Arroyo Flow:

Tc = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = min. Tc = min.

☐ Tc = 2.7 min.

Use 10 min.

RUNOFF COEFFICIENT:

% Impervious = 75% (See Sheet 4)

Soil Group A: ac @ 0.60 =

Soil Group (B): ac @ 0.73 =

Σ = Σ =

C =

C = .73

RAINFALL INTENSITY:

100 year depth = 2.28 " (Pl. 22.2-D-1)

Intensity Factor = 2.11 (Pl. 22.2 D-2)

Intensity = depth x factor

I = 4.81 "/hr.

PEAK RUNOFF RATE:

Q = CIA = .73 x 4.81 x 1.3 Q₁₀₀ = 4.6 cfs

x 0.657 = Q₁₀ = 3.0 cfs

VOLUME OF RUNOFF:

Soil Group A: ac @ CN =

Soil Group (B): ac @ CN = 59

Σ = Σ = 59

Q = 1.3 (Pl 22.2 C-4)

V = $QA = \frac{1.3}{12} \times 1.3 \times 43,560 = 6135$ cu. ft.

T = $2V \div Q_{100} \div 60 = 4.5$ min

RUNOFF CALCULATIONS

(Rational Formula)

PROJECT: Yale Business Park

Analysis Point# 6

DRAINAGE AREA:

Planimeter Rdg. 14.5 x .015

x Map Scale 100 2 ÷ 43,560

A = 0.5 acres

TIME OF CONCENTRATION:

Drainage Basin Data:

L = 170 ft., fall = _____ ft., slope = .06 ft/ft

☐ Overland Flow:

v = _____ ft/sec (Pl 22.2 B-1)

Tc = _____ sec. = _____ min. Tc = _____ min.

☒ Street Flow:

v = 6.7 ft/sec. (Pl 22.2 B-2)

Tc = 25 sec. = 4 min. Tc = 4 min.

☐ Arroyo Flow:

Tc = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = _____ min. Tc = _____ min.

☐ Tc = 4 min.

USE 10 min.

RUNOFF COEFFICIENT:

% Impervious = 75% (See Sheet 4)

Soil Group A: .3 ac @ 0.60 = .18

Soil Group B: .2 ac @ 0.73 = .15

$\Sigma = .5$ $\Sigma = .33$

C = $\frac{.33}{.5} = .65$

C = .65

RAINFALL INTENSITY:

100 year depth = 2.28 " (Pl. 22.2-D-1)

Intensity Factor = 2.11 (Pl. 22.2 D-2)

Intensity = depth x factor

I = 4.81 "/hr.

PEAK RUNOFF RATE:

Q = CIA = .65 x 4.81 x 0.5 Q₁₀₀ = 1.6 cfs

x 0.657 = Q₁₀ = 1.0 cfs

VOLUME OF RUNOFF:

Soil Group A: .3 ac @ CN = 83 = 24.9

Soil Group B: .2 ac @ CN = 81 = 17.8

$\Sigma = .5$ $\Sigma = 42.7 \div .5 = 85$

Q = 1.0 (Pl. 22.2 C-4)

V = $Q \times A = \frac{1.0}{12} \times .5 \times 43,560 = 1815$ cu. ft.

T = $2V \div Q_{100} \div 60 = 38$ min

RUNOFF CALCULATIONS

(Rational Formula)

PROJECT: Yolo Business Park

Analysis Point# 7

DRAINAGE AREA:

Planimeter Rdg. 425 x .015

x Map Scale 2 ÷ 43,560

A = 1.5 acres

TIME OF CONCENTRATION:

Drainage Basin Data:

L = 500 ft., fall = ft., slope = .035 ft/ft

☐ Overland Flow:

v = ft/sec (Pl 22.2 B-1)

Tc = sec. = min. Tc = min.

☒ Street Flow:

v = 5 ft/sec. (Pl 22.2 B-2)

Tc = 100 sec. = 1.7 min. Tc = 1.7 min.

☐ Arroyo Flow:

Tc = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = min. Tc = min.

☐ Tc = 1.7 min.

USE 10 min.

RUNOFF COEFFICIENT:

% Impervious = 75% (See Sheet 4)

Soil Group A: 1.2 ac @ 0.60 = .72

Soil Group B: 0.3 ac @ 0.73 = .22

$\Sigma = 1.5$ $\Sigma = .94$

C = $\frac{.94}{1.5} = .63$

C = .63

RAINFALL INTENSITY:

100 year depth = 2.28 " (Pl. 22.2-D-1)

Intensity Factor = 2.11 (Pl. 22.2 D-2)

Intensity = depth x factor

I = 4.81 "/hr.

PEAK RUNOFF RATE:

Q = CIA = .63 x 4.81 x 1.5 Q₁₀₀ = 4.6 cfs

x 0.657 = Q₁₀ = 3.0 cfs

VOLUME OF RUNOFF:

Soil Group A: 1.2 ac @ CN = 83 = 99.6

Soil Group B: 0.3 ac @ CN = 87 = 26.1

$\Sigma = 1.5$ $\Sigma = 126.7$ ÷ 1.5 = 84

q = 0.95 " (Pl 22.2 C-4)

V = q A = $\frac{.95}{12} \times 1.5 \text{ ac} \times 43,560 = 5173$ cu. ft.

T = 2V ÷ Q₁₀₀ ÷ 60 = 37 min

DETERMINATION OF Q_{100} @ ANALYSIS PT 7

Total Flow Rate will be determined by addition of incremental hydrographs from Analysis Points 5 thru 7. No offsite flows are tributary.

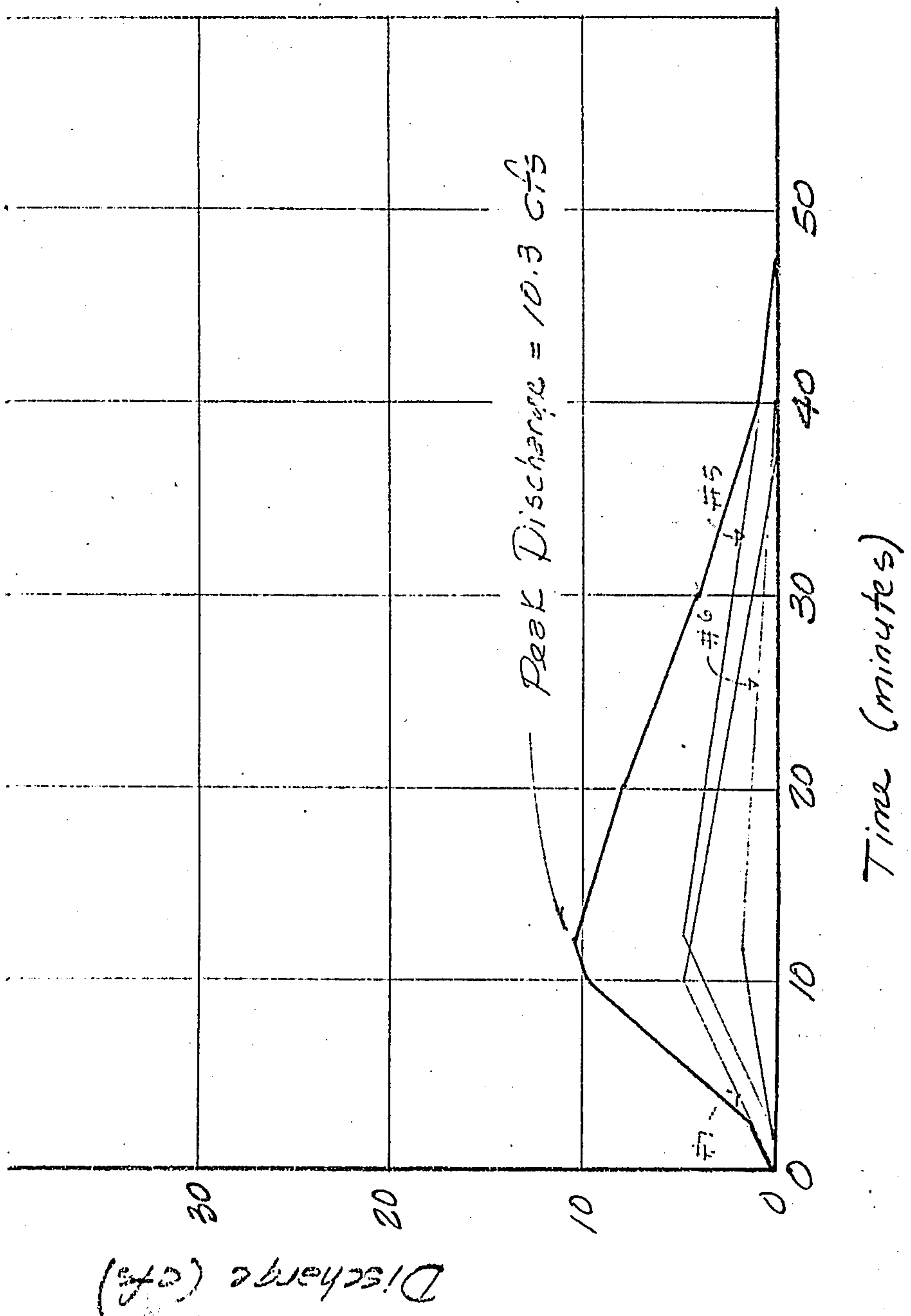
Plotting Table Information

Incr. Hydro. No.	Analysis Point No.	Q_{100} Peak (cfs)	Hydro. Base Time (min)	Travel Time (min)	Accumulated Travel Time (min)
7	7	4.6	37	1.7	-
6	6	1.6	38	0.4	1.7
5	5	4.6	45	2.7	2.1

note: all Peak hydrograph times are 10 minutes from beginning times

ANALYSIS POINT 7 COMPOSITE HYDROGRAPH

7



RUNOFF CALCULATIONS

(Rational Formula)

PROJECT: Yak Business Park Analysis Point# 8

DRAINAGE AREA:

Planimeter Rdg. .705 x .015

x Map Scale 100 2 ÷ 43,560 A = 2.4 acres

TIME OF CONCENTRATION:

Drainage Basin Data:

L = 420 ft., fall = 15 ft., slope = .036 ft/ft

☒ Overland Flow: (Paved)

v = 2.5 ft/sec (Pl 22.2 B-1)

Tc = 168 sec. = 2.8 min. Tc = 2.8 min.

☐ Street Flow:

v = _____ ft/sec. (Pl 22.2 B-2)

Tc = _____ sec. = _____ min. Tc = _____ min.

☐ Arroyo Flow:

Tc = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = _____ min. Tc = _____ min.

☒ Tc = 2.8 min.

Use 10 min.

RUNOFF COEFFICIENT:

% Impervious = 75% (See Sheet 4)

Soil Group A = _____ c 0.60

Soil Group B = _____ c 0.75

Σ = _____

C = _____

C = 0.60

RAINFALL INTENSITY:

100 year depth = 2.28 " (Pl. 22.2 D-1)

Intensity Factor = 2.11 (Pl. 22.2 D-2)

Intensity = depth x factor

I = 4.81 "/hr.

PEAK RUNOFF RATE:

Q = CIA = 0.6 x 4.81 x 2.4 Q₁₀₀ = 6.9 cfs

x 0.657 = Q₁₀ = 4.6 cfs

VOLUME OF RUNOFF:

Soil Group A = _____ c CN = 83 = _____

Soil Group B = _____ c CN = _____ = _____

Σ = _____

q = .9 " (Pl 22.2 C-4)

V = q.A = .9 x 2.4 ac x 43,560 = 784.1 cu ft.

T = 2V ÷ Q₁₀₀ - 60 = 38 min

RUNOFF CALCULATIONS

(Rational Formula)

PROJECT: Yale Business Park Analysis Point# 9

DRAINAGE AREA:

Planimeter Rdg. 1180 x .015

x Map Scale 100 2 ÷ 43,560 A = 4.1 acres

TIME OF CONCENTRATION:

Drainage Basin Data:

L = 250 ft., fall = 0.25 ft., slope = 1.005 ft/ft

☒ ~~Overland Flow~~ Street Flow

v = 1.9 ft/sec (Pl 22.2 B-1)

Tc = 132 sec. = 2.2 min. Tc = 2.2 min.

☒ Street Flow:

v = 6.6 ft/sec. (Pl 22.2 B-2)

Tc = 95 sec. = 1.6 min. Tc = 1.6 min.

☐ Arroyo Flow:

Tc = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = min. Tc = min.

☐ Tc = 3.8 min.

RUNOFF COEFFICIENT:

% Impervious = 75% (See Street 4)

Soil Group A: ac c 0.60 =

Soil Group B: ac c 0.73 =

Σ = Σ =

C = =

C = 0.60

Use 10 minutes

RAINFALL INTENSITY:

100 year depth = 2.28 " (Pl. 22.2 D-1)

Intensity Factor = 2.11 (Pl. 22.2 D-2)

Intensity = depth x factor

I = 4.81 "/hr.

PEAK RUNOFF RATE:

Q = CIA = 1.60 x 4.81 x 4.1 Q₁₀₀ = 11.8 cfs

x 0.657 = Q₁₀ = 7.8 cfs

VOLUME OF RUNOFF:

Soil Group A: ac c CN = = 83

Soil Group B: ac c CN = =

Σ = Σ =

q = 1.9 " (Pl 22.2 C-4)

V = qA = $\frac{1.9}{12} \times 4.1 \times 43,560$ = 13,395 cu. ft.

T = 2V ÷ Q₁₀₀ ÷ 60 = 38 min

RUNOFF CALCULATIONS

(Rational Formula)

PROJECT: Yale Business Park Analysis Point# 10

DRAINAGE AREA:

Planimeter Rdg. 395 x .015

x Map Scale 100 2 ÷ 43,560 A = 1.4 acres

TIME OF CONCENTRATION:

Drainage Basin Data:

L = 80 ft., fall = 200 ft., slope = .063 ft/ft
.040

☒ Overland Flow: Street Flow

v = 6.6 ft/sec (Pl 22.2 B-1) B-2

Tc = 12 sec. = 0.2 min. Tc = 0.2 min.

☒ Street Flow:

v = 5.5 ft/sec. (Pl 22.2 B-2)

Tc = 91 sec. = 1.5 min. Tc = 1.5 min.

☐ Arroyo Flow:

Tc = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = min. Tc = min.

Σ Tc = 1.7 min.

Use 10 min.

RUNOFF COEFFICIENT:

% Impervious = 75% (See Street 4)

Soil Group (A) 0.60 =

Soil Group B: 0.73 =

Σ = Σ =

C = C = .60

RAINFALL INTENSITY:

100 year depth = 2.28 " (Pl. 22.2 D-1)

Intensity Factor = 2.11 (Pl. 22.2 D-2)

Intensity = depth x factor

I = 4.81 "/hr.

PEAK RUNOFF RATE:

Q = CIA = .60 x 4.81 x 1.4 Q₁₀₀ = 4.0 cfs

x 0.657 = Q₁₀ = 2.6 cfs

VOLUME OF RUNOFF:

Soil Group (A) CN = = 83

Soil Group B: CN = =

Σ = Σ =

q = .9 " (Pl 22.2 C-4)

V = q A = $\frac{.9}{12} \times 1.4 \times 43,560 = 4574$ cu. ft.

T = 2V ÷ Q₁₀₀ ÷ 60 = 38 min

RUNOFF CALCULATIONS

(Rational Formula)

PROJECT: Yale Business Park Analysis Point# 11

DRAINAGE AREA:

Planimeter Rdg. 260 x .015

x Map Scale 100 2 ÷ 43,560 A = 0.9 acres

TIME OF CONCENTRATION:

Drainage Basin Data:

L = 230 ft., fall = _____ ft., slope = .04 ft/ft

☐ Overland Flow:

v = _____ ft/sec (Pl 22.2 B-1)

Tc = _____ sec. = 0.7 min. Tc = 0.7 min.

☒ Street Flow:

v = 5.5 ft/sec. (Pl 22.2 B-2)

Tc = 42 sec. = _____ min. Tc = _____ min.

☐ Arroyo Flow:

Tc = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = _____ min. Tc = _____ min.

Σ Tc = 0.7 min.

Use 10 min.

RUNOFF COEFFICIENT:

% Impervious = 75% (See Sheet 4)

Soil Group A: _____ ac @ 0.60 = _____

Soil Group B: _____ ac @ 0.73 = _____

Σ = _____ Σ = _____

C = _____ = _____

C = 0.60

RAINFALL INTENSITY:

100 year depth = 2.28 " (Pl. 22.2 D-1)

Intensity Factor = 2.11 (Pl. 22.2 D-2)

Intensity = depth x factor

I = 4.81 "/hr.

PEAK RUNOFF RATE:

Q = CIA = 0.60 x 4.81 x 0.9 Q₁₀₀ = 2.6 cfs

x 0.657 = Q₁₀ = 1.7 cfs

VOLUME OF RUNOFF:

Soil Group A: _____ ac @ CN = 83 = _____

Soil Group B: _____ ac @ CN = _____ = _____

Σ = _____ Σ = _____

Q = .9 (Pl 22.2 C-4)

V = $\frac{Q}{12} \times .9 \text{ ac} \times 43,560 =$ 2940 cu. ft.

T = $2V \div Q_{100} \div 60 =$ 38 min

RUNOFF CALCULATIONS

(Rational Formula)

PROJECT: Yak Business Park Analysis Point# 12

DRAINAGE AREA:

Planimeter Rdg. 260 x .015

x Map Scale 100 2 ÷ 43,560 A = 0.9 acres

TIME OF CONCENTRATION:

Drainage Basin Data:

L = 210 ft., fall = _____ ft., slope = .04 ft/ft

☐ Overland Flow:

v = _____ ft/sec (Pl 22.2 B-1)

Tc = _____ sec. = _____ min. Tc = _____ min.

☒ Street Flow:

v = 5.5 ft/sec. (Pl 22.2 B-2)

Tc = 38 sec. = 0.6 min. Tc = 0.6 min.

☐ Arroyo Flow:

Tc = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = _____ min. Tc = _____ min.

Σ Tc = 0.6 min.

RUNOFF COEFFICIENT:

% Impervious = 75% (See Sheet 4)

Soil Group A: _____ ac @ 0.60 = _____

Soil Group B: _____ ac @ 0.73 = _____

Σ = _____ Σ = _____

C = _____ = _____

C = 0.60

USE 10 min

RAINFALL INTENSITY:

100 year depth = 2.28 " (Pl. 22.2 D-1)

Intensity Factor = 2.11 (Pl. 22.2 D-2)

Intensity = depth x factor

I = 4.81 "/hr.

PEAK RUNOFF RATE:

Q = CIA = 0.6 x 4.81 x 0.9 Q₁₀₀ = 2.6 cfs

x 0.657 = Q₁₀ = 1.7 cfs

VOLUME OF RUNOFF:

Soil Group A: _____ ac @ CN = 83 = _____

Soil Group B: _____ ac @ CN = _____ = _____

Σ = _____ Σ = _____

Q = 1.9 (Pl 22.2 C-4)

V = QA = $\frac{1.9}{12} \times 1.9 \times 43,560 =$ 2940 cu. ft.

T = 2V ÷ Q₁₀₀ ÷ 60 = 28 min

DETERMINATION OF Q_{100} @ ANALYSIS PT 12

Total Flow Rate will be determined by addition of incremental hydrographs from Analysis Points 8 thru 12 plus 50% of offsite flows entering property from the east. 50% value is used to account for splitting the total off-site flow at the east side of the cul-de-sac where off-site flows enter the street system.

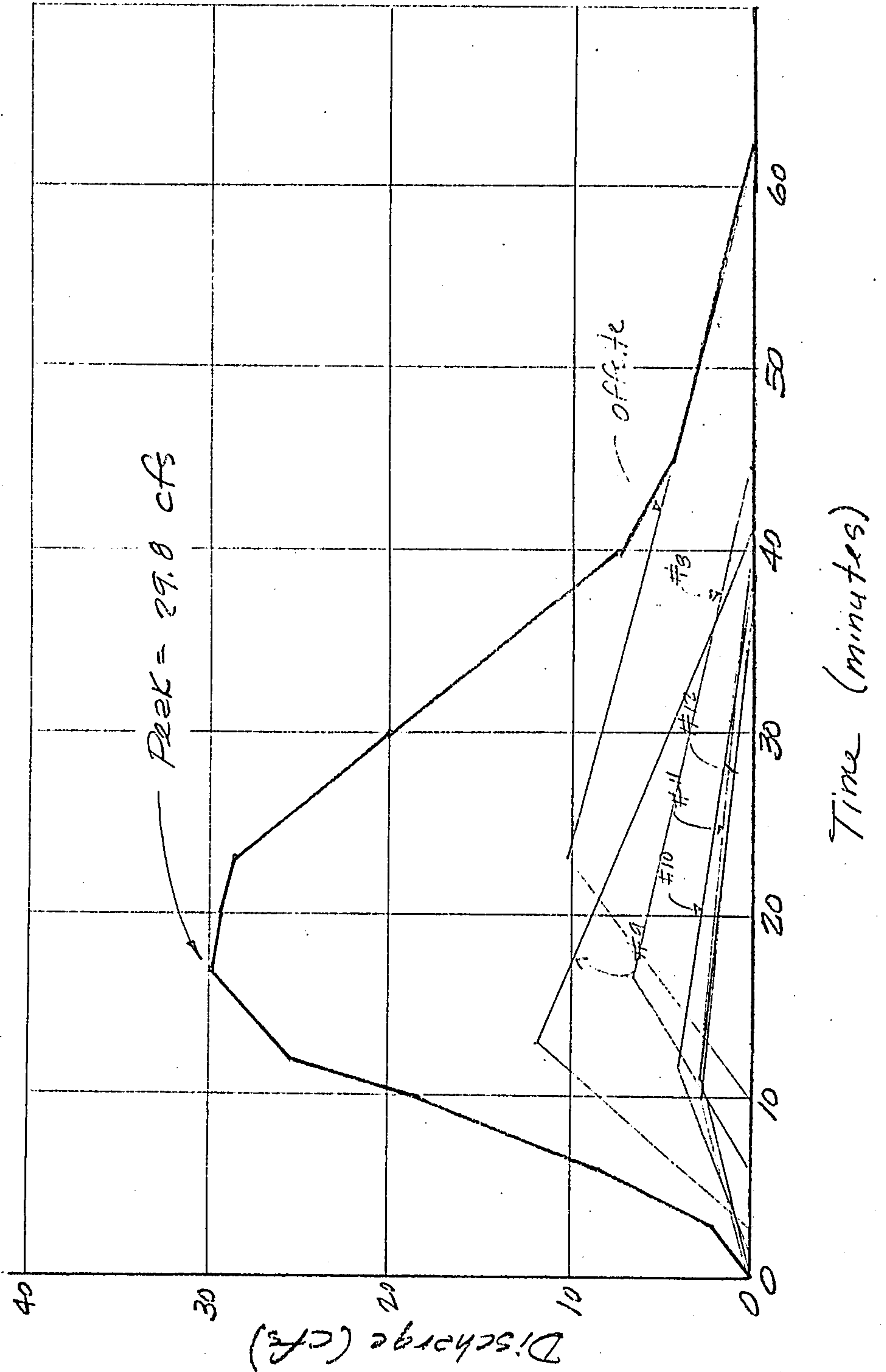
PLOTTING TABLE INFORMATION

Incrr. Hydro. No.	Analysis Point No.	Q_{100} Peak (cfs)	Hydro. Base Time (min)	Travel Time (min)	Accumulated Travel Time (min)	Peak Time (min)
12	12	2.6	38	0.6	-	10
11	11	2.6	38	0.6	0.6	10
10	10	4.0	38	1.7	1.2	10
9	9	11.8	38	3.8	2.9	10
8	8	6.9	38	2.8	6.7	10
offsite	offsite	10.2	52	0.6*	10.1	13

* Travel Time through on-site storm drain from east boundary line to cul-de-sac

COMPOSITE HYDROGRAPH FOR

ANALYSIS POINT 12



RUNOFF CALCULATIONS

(Rational Formula)

PROJECT: Y26 Business Park Analysis Point# 13

DRAINAGE AREA:

Planimeter Rdg. 905 x .015

* Map Scale 100 2 ÷ 43,560 A = 3.1 acres

TIME OF CONCENTRATION:

Drainage Basin Data:

L = 660 ft., fall = _____ ft., slope = .063 ft/ft

☐ Overland Flow:

v = _____ ft/sec (Pl 22.2 B-1)

Tc = _____ sec. = _____ min. Tc = _____ min.

☒ Street Flow:

v = 4.6 ft/sec. (Pl 22.2 B-2)

Tc = 100 sec. = 1.7 min. Tc = 1.7 min.

☐ Arroyo Flow:

Tc = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = _____ min. Tc = _____ min.

Σ Tc = 1.7 min.

Use 10 min.

RUNOFF COEFFICIENT:

% Impervious = 75% (See Sheet 4)

Soil Group A: 1.8 ac @ 0.60 = 1.08

Soil Group B: 1.3 ac @ 0.73 = .95

Σ = 3.1 Σ = 2.03

C = $\frac{2.03}{3.1}$ = 0.65

C = 0.65

RAINFALL INTENSITY:

100 year depth = 2.28 " (Pl. 22.2-D-1)

Intensity Factor = 2.11 (Pl. 22.2 D-2)

Intensity = depth x factor

I = 4.81 "/hr.

PEAK RUNOFF RATE:

Q = CIA = .65 x 4.81 x 3.1 Q₁₀₀ = 9.7 cfs

x 0.657 = Q₁₀ = 6.4 cfs

VOLUME OF RUNOFF:

Soil Group A: 1.8 ac @ CN = 83 = 149.4

Soil Group B: 1.3 ac @ CN = 89 = 115.7

Σ = 3.1

Σ = 265.10 ÷ 3.1 = 86

q = 1.1 " (Pl 22.2 C-4)

V = qA = $\frac{1.1}{12}$ x 3.1 ac x 43,560 = 12,378 cu. ft.

T = 2V ÷ Q₁₀₀ ÷ 60 = 43 min

RUNOFF CALCULATIONS

(Rational Formula)

PROJECT: Yale Business Park Analysis Point# 14

DRAINAGE AREA:

Planimeter Rdg. 570 x .015

x Map Scale 100 2 ÷ 43,560 A = 2.0 acres

TIME OF CONCENTRATION:

Drainage Basin Data:

L = 175 ft., fall = _____ ft., slope = .04 ft/ft

☐ Overland Flow:

v = _____ ft/sec (Pl 22.2 B-1)

Tc = _____ sec. = _____ min. Tc = _____ min.

☒ Street Flow:

v = 5.5 ft/sec. (Pl 22.2 B-2)

Tc = 32 sec. = 0.5 min. Tc = 0.5 min.

☐ Arroyo Flow:

Tc = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = _____ min. Tc = _____ min.

Σ Tc = 0.5 min.

USE 1.0 min

RUNOFF COEFFICIENT:

% Impervious = 75% (See Sheet 4)

Soil Group A: _____ ac @ 0.60 = _____

Soil Group B: _____ ac @ 0.73 = _____

Σ = _____ Σ = _____

C = _____ = _____

C = .60

RAINFALL INTENSITY:

100 year depth = 2.28 " (Pl. 22.2-D-1)

Intensity Factor = 2.11 (Pl. 22.2 D-2)

Intensity = depth x factor

I = 4.81 "/hr.

PEAK RUNOFF RATE:

Q = CIA = .60 x 4.81 x 2.0 Q₁₀₀ = 5.8 cfs

x 0.657 = Q₁₀ = 3.8 cfs

VOLUME OF RUNOFF:

Soil Group A: _____ ac @ CN = 83 = _____

Soil Group B: _____ ac @ CN = _____ = _____

Σ = _____ Σ = _____

Q = 9 (Pl 22.2 C-4)

V = QA = $\frac{9}{12} \times 2.0 \times 43,560 =$ 6534 cu. ft.

T = 2V ÷ Q₁₀₀ ÷ 60 = 38 min

RUNOFF CALCULATIONS

(Rational Formula)

PROJECT: Yak Business Park Analysis Point# 15

DRAINAGE AREA:

Planimeter Rdg. 1620 x .015

x Map Scale 100 2 ÷ 43,560 A = 5.6 acres

TIME OF CONCENTRATION:

Drainage Basin Data:

L = 290 ft., fall = _____ ft., slope = 104 ft/ft
200 .005

☒ Overland Flow: Street Flow B-2

v = 5.5 ft/sec (Pl 22.2 B-1)

Tc = 53 sec. = 0.9 min. Tc = 0.9 min.

☒ Street Flow:

v = 1.9 ft/sec. (Pl 22.2 B-2)

Tc = 105 sec. = 1.8 min. Tc = 1.8 min.

☐ Arroyo Flow:

Tc = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = _____ min. Tc = _____ min.

Σ Tc = 2.7 min.

Use 10 min.

RUNOFF COEFFICIENT:

% Impervious = 75% (See Sheet 4)

Soil Group A: _____ ac @ 0.60 = _____

Soil Group B: _____ ac @ 0.73 = _____

Σ = _____ Σ = _____

C = _____ = _____

C = 0.60

RAINFALL INTENSITY:

100 year depth = 2.28 " (Pl. 22.2 D-1)

Intensity Factor = 2.11 (Pl. 22.2 D-2)

Intensity = depth x factor

I = 4.81 "/hr.

PEAK RUNOFF RATE:

Q = CIA = 0.60 x 4.81 x 5.6 Q₁₀₀ = 16.2 cfs

x 0.657 = Q₁₀ = 10.6 cfs

VOLUME OF RUNOFF:

Soil Group A: _____ ac @ CN = 83 = _____

Soil Group B: _____ ac @ CN = _____ = _____

Σ = _____ Σ = _____

Q = 9 (Pl 22.2 C-4)

V = $\frac{Q}{12}$ A = $\frac{9}{12}$ x 5.6 ac x 43,560 = 18,295 cu. ft.

T = 2V ÷ Q₁₀₀ - 60 = 38 min

DETERMINATION OF Q_{100} @ ANALYSIS POINT

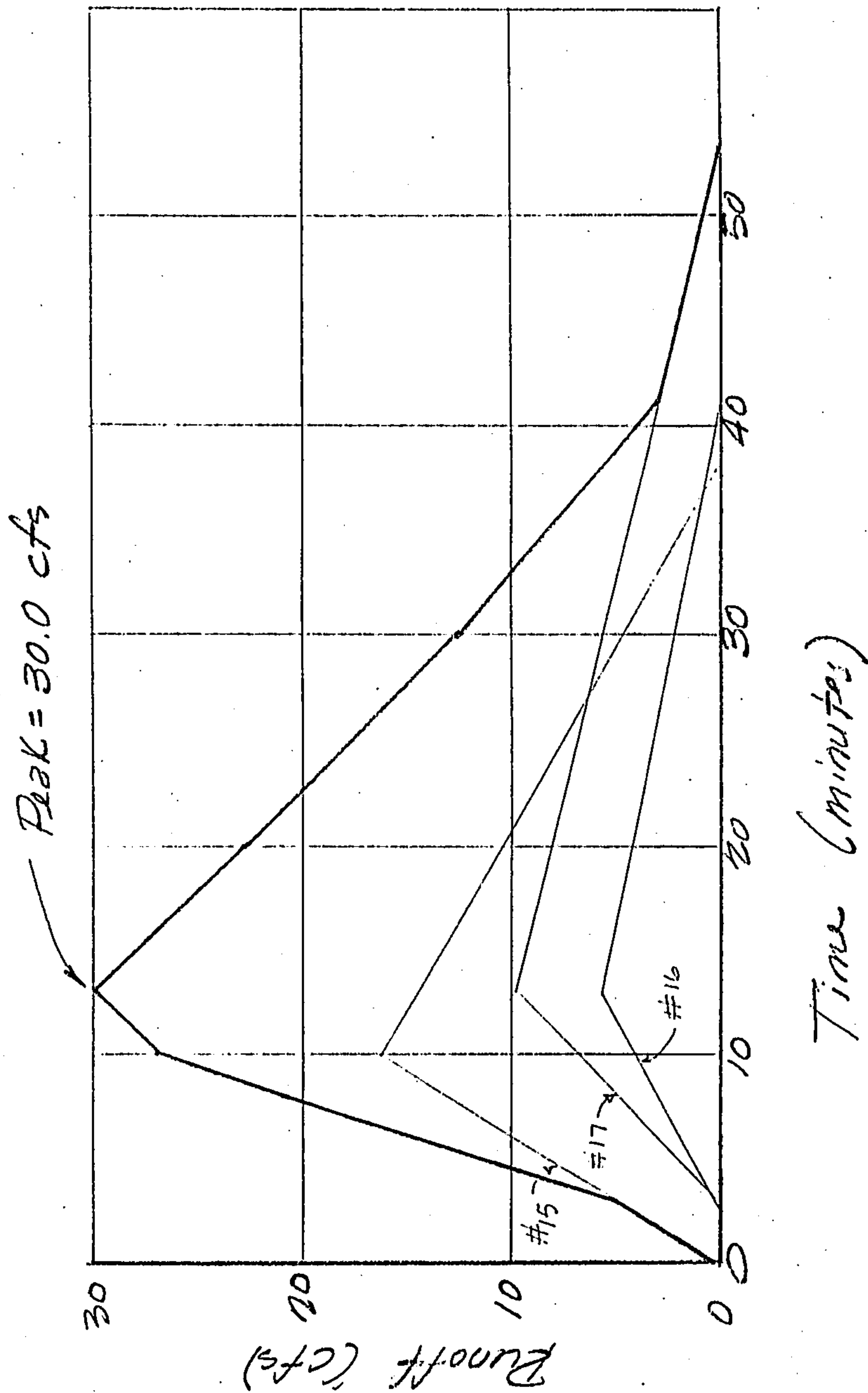
15

Total Flow will be determined by addition of incremental hydrographs from Analysis Points 13 thru 15. No offsite flows are tributary.

PLOTTING TABLE INFORMATION

Incr. Hydro No.	Analysis Point No.	Q_{100} Peak (cfs)	Hydro Base Time (min)	Travel Time (min)	Accum. Travel Time (min)
15	15	16.2	38	2.7	—
14	14	5.8	38	0.5	2.7
13	13	9.7	43	—	3.2

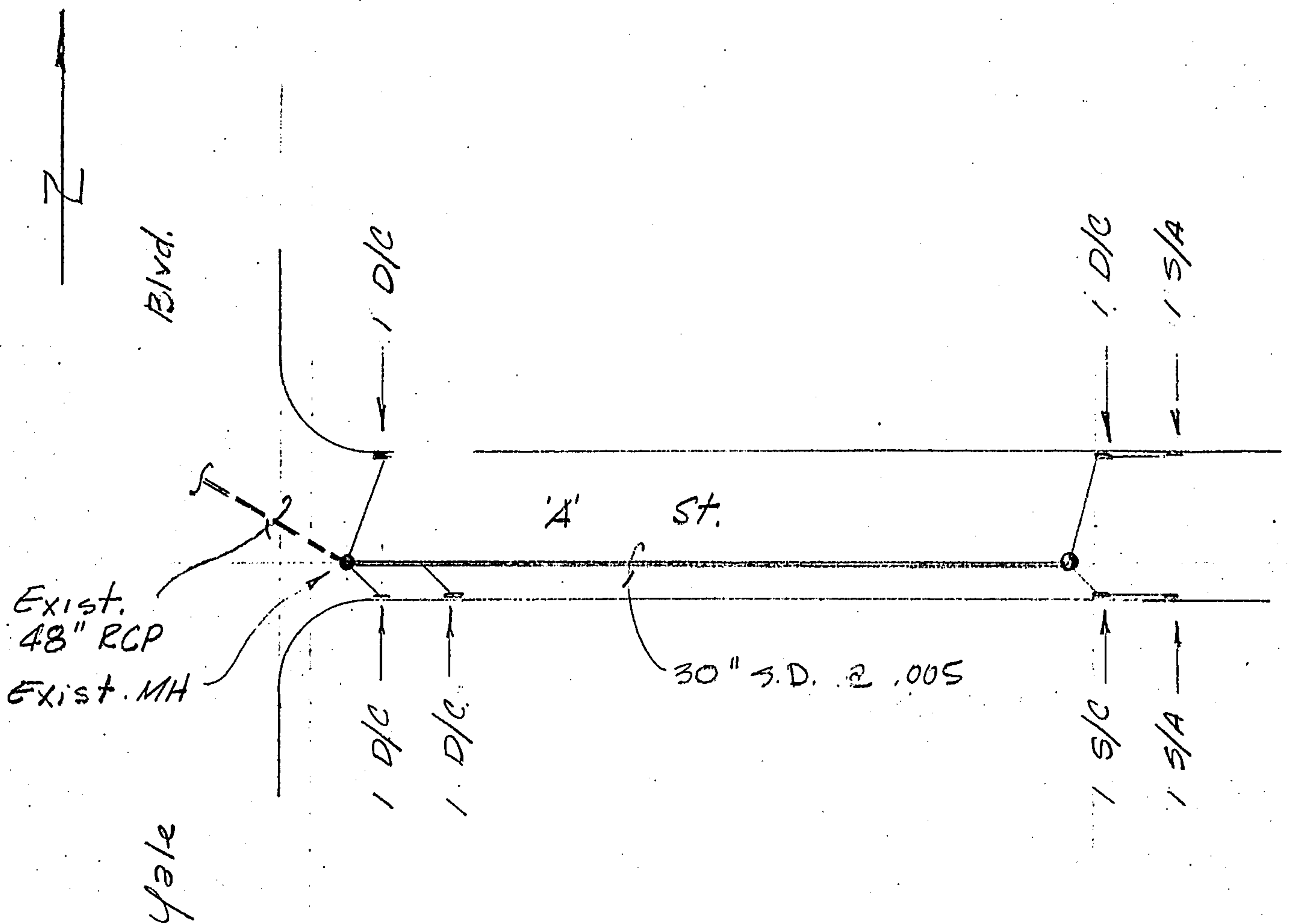
COMPOSITE HYDROGRAPH for
ANALYSIS POINT 15



STORM DRAIN INLET CALCULATION TABLE

Location	Q Upstream (cfs)	Street Grade (%)	Flow Depth (ft.)	"K" Value	Inlet Type	Inlet Capacity (cfs)	Q Passing (cfs)
North curb near A.P. 11	27.2	3.9	.50	32	S/A	10.1	17.1
"	17.1	"	.43	32	D/C	15.7	1.4
North curb A.P. 12	4	0.5	.38	12	D/C	4.2	±0
South curb opp A.P. 11	13.8	3.9	.41	32	S/A	7.2	6.6
"	6.6	"	.33	"	S/C	5.0	1.6
South Curb @ A.P. 15	17.8	0.5	.60	12	D/C	10.2	7.6
"	7.6	"	.46	"	D/C	6.6	1.0

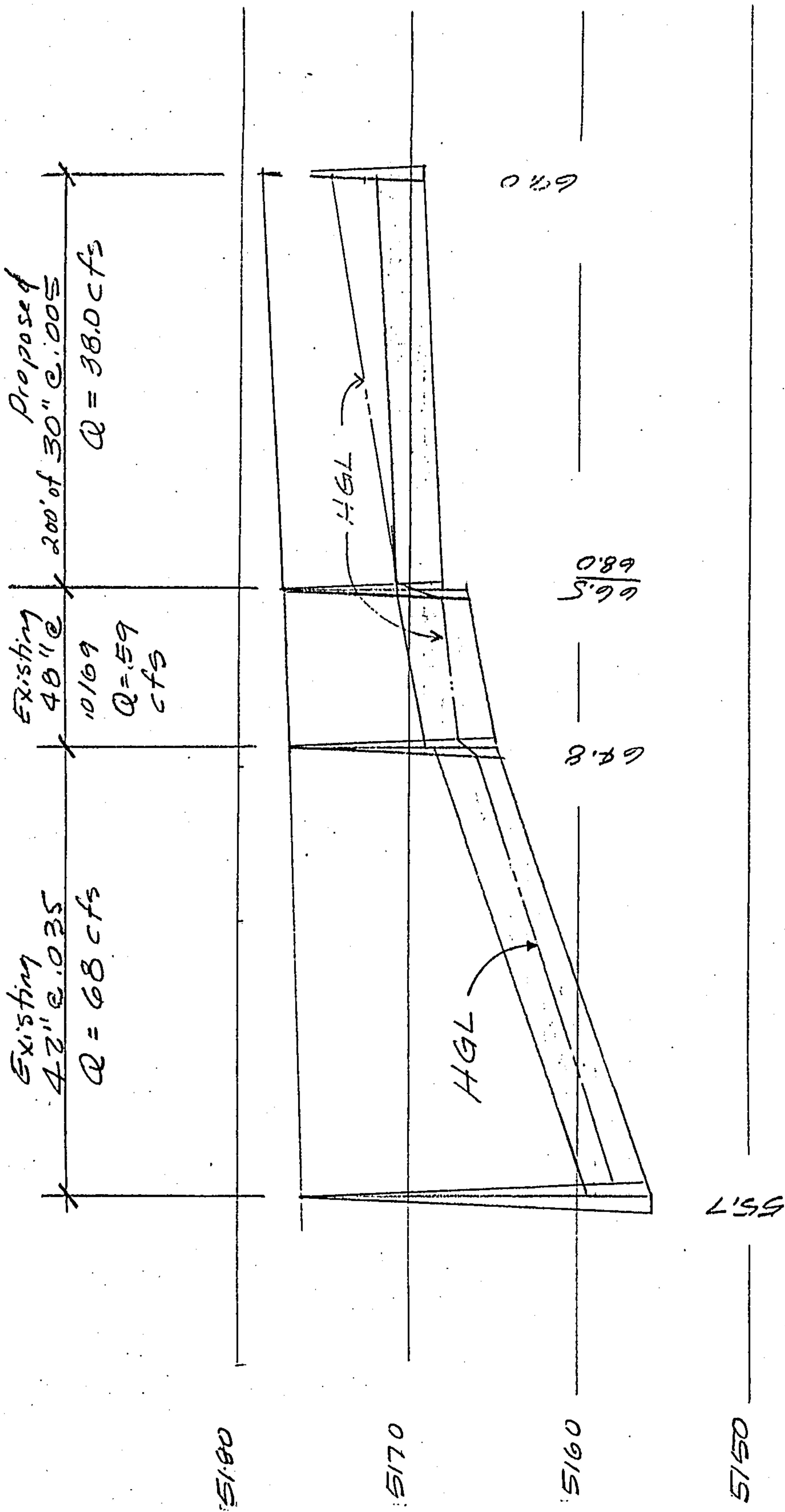
"K" Value from Neenah Inlet Grate Capacity Manual for Type R-3246-AL
(lower style), p. 19, using a Transverse Street Slope of 2%
Q = $K D^{5/3}$ for single grate, x 2 for double grate



PROPOSED STORM DRAIN
IMPROVEMENTS - 'A' STREET
 Scale: 1" = 50'

Isaacson &
 Arfman, P.A.

SUBJECT Yale Business Park JOB NO. _____
 BY TOL DATE 5/23/86 SHEET NO. A-26 OF _____
 TOTAL SHEETS 4-10



STORM DRAIN PROFILE A' STREET TO ROSS

1" = 100' H.
= 10' V.

M/H # S-705
Yale & Ross

SUMMARY OF HYDRAULIC CALCULATIONS

PROJECT: Yale Business Park

CLOSED CONDUIT

LINE: Yale into A Street

BY: TOI

DATE: 5/27/86

SHEET: 1 OF: 1

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
STATION	STRUCT	D	Q	A	V	K	S _f	L	Δ	JUNCTION		LOSSES							E.G.	h _y	H.G.
										D	θ	h _f	h _b	h _j	h _{mh}	h _t	h _{misc}	Σ			
0+00	MH #905																				
		42"	68	3.71	18.0	347	.035	265	-		45°	9.28	.70	-	.25	-	-	10.23		5.03	57.25
2+65	MH																				
		48"	59	4.54	13.2	462	.017	95	-		45°	1.62	.38	-	.14	-	-	2.14		2.71	67.48
3+60	MH																				
		30"	38	4.91	7.74	245	.024	200	-		-	4.81	-	-	-	-	-	4.81		.93	69.54
																					74.35

REMARKS: 42" & 48" SD's are existing
Flowing Part Full

MANNING'S n: .013

42" SD: $\frac{D}{d} = \frac{1.45}{3.5}$, $A = 3032^* (3.5)^2 = 3.71$, $R = .2128^* (3.5) = .74$, $K = \frac{1.486 (3.71) .74^{2/3}}{.013} = 347$

48" SD: $\frac{D}{d} = \frac{1.54}{4}$, $A = .2836^* (4)^2 = 4.54$, $R = .2102^* (4) = .84$, $K = \frac{1.486 (4.54) .84^{2/3}}{.013} = 462$

30" SD: $K = \frac{1.486 (4.91) .63^{2/3}}{.013} = 245$

* Ref. DPM, PI 22.3 B-6

COMPUTER PRINTOUTS FOR Pipes Flowing Part-Full

42" Line in Yale Between Ross & 'A' Street

① DITCH CALCULATIONS FOR A CIRCULAR CHANNEL

S = .035 ft/ft

V = 18.018 fps

d = 1.452 ft

Q = 68 cfs

n = .013

L = 100 ft

Tt = .093 min

Diameter = 3.5 ft (42")

CRITICAL FLOW INFORMATION

Sc = .005553 ft/ft

Vc = 8.848 fps

dc = 2.607 ft

48" Line from Yale entering 'A' Street

② DITCH CALCULATIONS FOR A CIRCULAR CHANNEL

S = .0169 ft/ft

V = 13.2 fps

d = 1.543 ft

Q = 59 cfs

n = .013

L = 100 ft

Tt = .126 min

Diameter = 4 ft (48")

CRITICAL FLOW INFORMATION

Sc = .004002 ft/ft

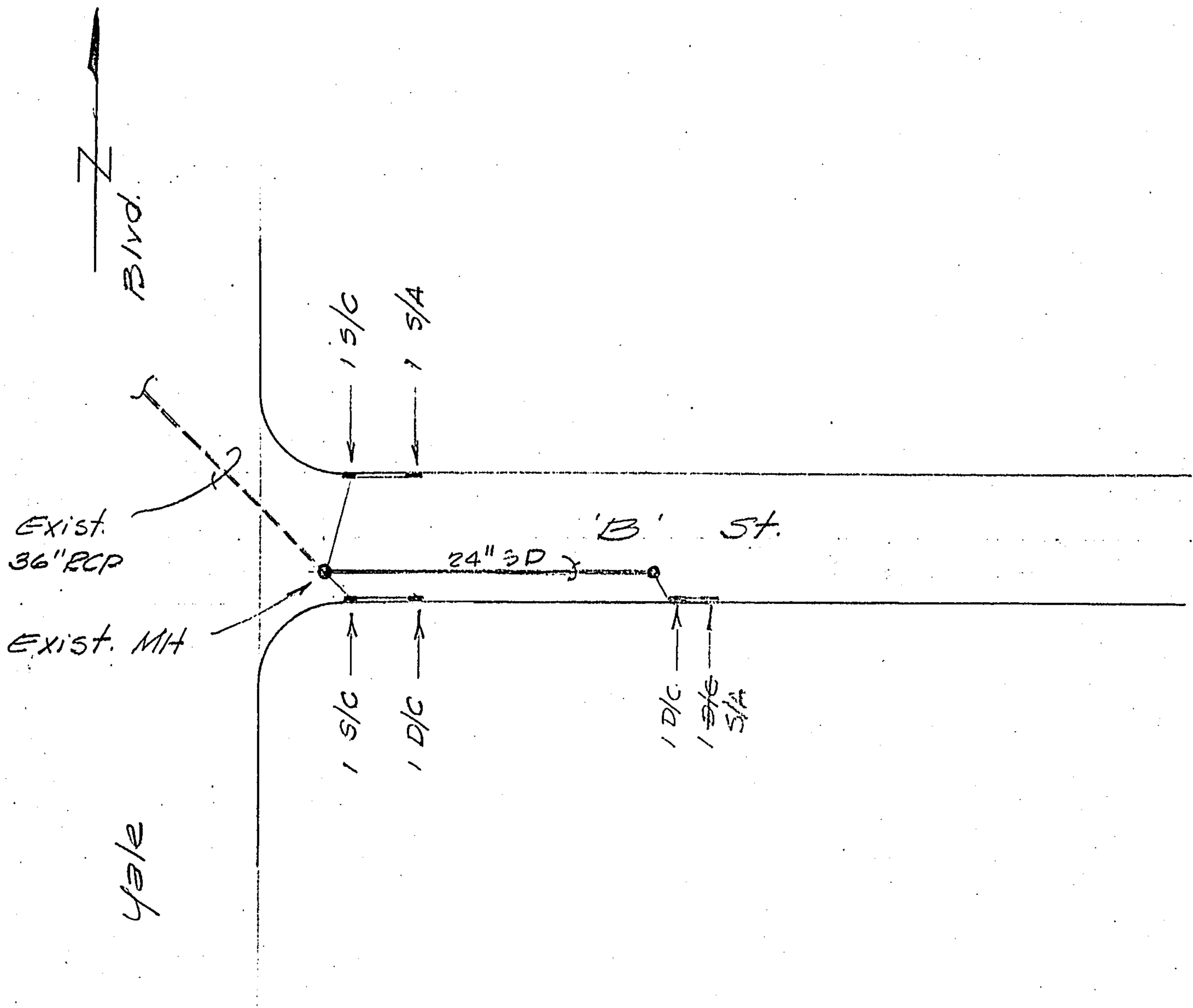
Vc = 7.712 fps

dc = 2.343 ft

STORM DRAIN INLET CALCULATION TABLE

Location	Q Upstream (cfs)	Street Grade (%)	Flow Depth (ft.)	"K" Value	Inlet Type	Inlet Capacity (cfs)	Q Passing (cfs)
north curb @ A.P. 7	10.3	1.0	.45	23	S/A	6.1	4.2
	4.2	"	.35	"	S/C	4.0	0.2
South curb $\frac{1}{2}$ between 3 & 4	42.4	6.1	.52	38	S/A	12.8	29.6
"	29.6	"	.47	"	D/C	21.5	8.1
South curb @ A.P. 4	21.7	1.0	.56	23	D/C	17.5	4.2
	4.2	"	.35	"	S/C	4.0	0.2

"K" Value from Neenah Inlet Grate Capacity Manual for Type R-3246-A1
 (lower style), p. 19, using a Transverse Street Slope of 2%
 Q = $K D^{5/3}$ for one grate, x 2 for 2 grates



PROPOSED STORM DRAIN IMPROVEMENTS - 'B' STREET

Scale: 1" = 50'

Proposed, 100' of 24" @ .010
 $Q = 34.3$ cfs

Existing
 91' of 36"

$Q = .0055$

$Q = 65.9$

cfs

5190

5180

5170

HGL

0 1400 2400 3400

STORM DRAIN PROFILE
'B' STREET TO GIBSON -
KIRTLAND LINE

1" = 100' H.
 = 10' V.

SUMMARY OF HYDRAULIC CALCULATIONS

BY: Tol

DATE: 5/23/84..

SHEET: 1 OF: 1

PROJECT: Yale Business Park

CLOSED CONDUIT

LINE: Yale into 'B' Street

[illegible]

REMARKS:

MANNING'S n: .013

$$K_{36''} = \frac{1.486 (7.07) .75^{2/3}}{1013} = 660$$

$$K_{30''} = \frac{1.486 (3.14) .50^{2/3}}{.017} = 225$$

Sh A-33

RUNOFF CALCULATIONS

(Rational Formula)

LOCATION: Offsite Area (East of Site)

DRAINAGE AREA:

$$\text{Planimeter Edg } \underline{412} \times .015 \\ \times \text{Map Scale } \underline{200}^2 \div 43,560$$

$$A = \underline{5.7} \text{ acres}$$

TIME OF CONCENTRATION:

Drainage Basin Data:

$$L = \frac{400}{800} \text{ ft.}, \text{ fall} = \frac{22}{32} \text{ ft.}, \text{ Slope} = \frac{.06}{.04} \text{ ft./ft.} \begin{cases} \text{Columbia Dr.} \\ \text{(Overland)} \end{cases}$$

☒ Overland Flow:

$$V = \underline{1.1} \text{ ft./sec (Pl. 22.2 B-1)}$$

$$T_c = \underline{727} \text{ sec} = \underline{12} \text{ min.}$$

$$T_c = \underline{12} \text{ min.}$$

☒ Street Flow:

$$V = \underline{6.7} \text{ ft./sec (Pl. 22.2 B-2)}$$

$$T_c = \underline{60} \text{ sec} = \underline{1} \text{ min.}$$

$$T_c = \underline{1} \text{ min}$$

$$\Sigma = \underline{13} \text{ min}$$

☐ Arroyo Flow:

$$T_c = 0.0078 \frac{L^{0.77}}{S^{0.385}} = \underline{\hspace{1cm}} \text{ min.}, T_c = \underline{\hspace{1cm}} \text{ min}$$

RUNOFF COEFFICIENT:

SCS Soil Group: (A) B C D

% Impervious = 95 % (fully developed)

C Factor (Pl 22.2 C-1)

$$C = \underline{.85}$$

RAINFALL INTENSITY:

100 yr depth = 2.28" (Pl. 22.2 D-1)

Intensity Factor = 1.85 (Pl. 22.2 D-2)

Intensity = depth x factor,

$$I = \underline{4.22} \text{"/hr.}$$

PEAK RUNOFF RATE:

$$Q = CIA = \underline{.85} \times \underline{4.22} \times \underline{5.7} \\ + 5 \text{ cfs from Bag + Sew}$$

$$Q_{100} = \frac{20 \text{ cfs}}{+ 5} = \underline{15} \text{ cfs}$$

On-Site

DETERMINATION OF % IMPERVIOUS FACTOR OF TRACTS

Special Use Zoning Requirements require a minimum of 20% of the site area to be landscaped and an additional 10% of the paved area to be landscaped.

Therefore % Pervious = 20% basic

Paving will cover approximately 50% of site so

Paving Portion = $50\% \times 10\% = 5\%$

$\Sigma = 25\%$ Pervious

% Impervious = $100 - 25 = 75\%$

RUNOFF CALCULATIONS

(Rational Formula)

LOCATION: Analysis Pt 1

DRAINAGE AREA: $\frac{1}{2}$ Offsite = 2.9 ac
On-Site = 4.1

Planimeter Rdg _____ x .015 7.0

x Map Scale _____² ÷ 43,560

A = 7.0 acres

TIME OF CONCENTRATION: Offsite = 13.0

ON-Site: Storm Drain Flow

Drainage Basin Data: $360' \div 10.8' / \text{sec} \div 60 = 0.6$

L = 300 ft., fall = 1.9 ft., Slope = .005 ft/ft

☐ Overland Flow:

V = _____ ft/sec (Pl. 22.2 B-1)

T_c = _____ sec = _____ min,

T_c = _____ min.

☒ Street Flow:

V = _____ ft/sec (Pl. 22.2 B-2)

T_c = 158 sec = 2.6 min,

T_c = 2.6 min

Σ T_c = 16.2

☐ Arroyo Flow:

T_c = $0.0078 \frac{L^{0.77}}{S^{0.385}} =$ _____ min,

T_c = _____ min

RUNOFF COEFFICIENT: $\frac{2.9 \text{ ac} @ .85 = 2.47}{4.1 \text{ ac} @ .60 = 2.46}$
7.0 4.93

SCS Soil Group: A B C D 7.0

% Impervious = _____ %

C Factor (Pl. 22.2 C-1)

C = .70

RAINFALL INTENSITY:

100 yr depth = 2.28" (Pl. 22.2 D-1)

Intensity Factor = 1.65 (Pl. 22.2 D-2)

Intensity = depth x factor,

I = 3.76" / hr.

PEAK RUNOFF RATE:

Q = C/A = .70 x 3.76 x 7.0

+ 1/2 of Beg & Save Flows

Q₁₀₀ = $\frac{.19}{+3} = 22$ cfs

(Rational Formula)

LOCATION : Analysis Point 2

DRAINAGE AREA: $\frac{1}{2}$ Offsite = 2.9
On Site = 8.4
Planimeter Rdg _____ x .015 11.3
x Map Scale _____² ÷ 43,560

$A = \underline{11.3} \text{ acres}$

TIME OF CONCENTRATION: @ P.F. $\diamond \frac{1}{2}$ = 16.2

Drainage Basin Data:

$L = \text{---} \text{ft.}, f_{all} = \text{---} \text{ft.}, \text{slope} = \text{---} \text{ft/ft}$

☐ Overland Flow:

$V = \text{---} \text{ft/sec}$ (Fl. 22.2 B-1)

$$T_c = \text{--- sec} = \text{--- min},$$
$$T_c = \underline{\hspace{2cm}} \text{ min.}$$

☐ Street Flow:

$$120' @ .005, v = 1.9$$

140' @ .06, $v = 6.7$

1.0

0.3

$$V = \text{---} ft/sec \text{ (Pl. 22.2 B-2)} \quad \sum T_c = 17.5$$
$$T_c = \text{-----} \text{ sec} = \text{-----} \text{ min},$$

$T_c = \text{-----} \text{ min}$

☐ Arroyo Flow:

$$T_c = 0.0078 \quad L^{0.77}$$
$$T_c = 1.1 \text{ min}$$
$$A = 2.9 \text{ sec} @ .85 = 2.47$$
$$A_2 = 6.5 \times 60 = 3.90$$
$$B_1 = 1.9 \quad " \quad " \quad ,72 = \frac{1.37}{.72}$$

RUNOFF COEFFICIENT

SCS Soil Group:

$\frac{7.74}{11.3} =$

% Impervious = % 1.9 ac. @

C Factor (PI 22.2 C-1)

$$C = \underline{.168}$$

RAINFALL INTENSITY:

100 yr depth = 2.28" (Pl. 22.2 D-1)

Intensity Factor = 1.59 (Pl. 22.2 D-2)

Intensity = depth $\times$ factor,

$$I = 3.62''/\text{hr.}$$

PEAK RUNOFF RATE:

$$Q = C/A = .68 \times 3.62 \times 11.3$$

Q-28 cfs

+ 3 from Bag 1 Seve

$$+3 = 3/cfs$$

RUNOFF CALCULATIONS

(Rational Formula)

LOCATION: Analysis Point 3

DRAINAGE AREA: Area @ Pt 2 = $\frac{11.3}{4.7}$
 + Additional $\frac{4.7}{16.0}$
 Planimeter Rdg _____ x .015
 x Map Scale _____² ÷ 43,560

A = 16.0 acres

TIME OF CONCENTRATION: @ Pt. 2 = 17.5

Drainage Basin Data:

L = 500 ft., fall = _____ ft., Slope = .06 ft/ft

☐ Overland Flow:

v = _____ ft/sec (Pl. 22.2 B-1)

T_c = _____ sec = _____ min,

T_c = _____ min.

☒ Street Flow:

v = 6.7 ft/sec (Pl. 22.2 B-2)

T_c = 75 sec = 1.2 min,

T_c = 1.2 min

☐ Arroyo Flow:

T_c = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = _____ min,

Σ T_c = 18.1 min

T_c = _____ min

RUNOFF COEFFICIENT: A Soils, 11.3 ac @ .68 = 7.68
 B Soils, 3.8 ac @ .60 = 2.28
 C Soils, 0.9 ac @ .72 = .65

SCS Soil Group: A B C D $\frac{10.61}{16.0}$

% Impervious = _____ %

C Factor (Pl 22.2 C-1)

C = .66

RAINFALL INTENSITY:

100 yr depth = 2.28" (Pl. 22.2 D-1)

Intensity Factor = 1.54 (Pl. 22.2 D-2)

Intensity = depth x factor,

I = 3.50"/hr.

PEAK RUNOFF RATE:

Q = C/A = .66 x 3.50 x 16.0

Q₁₀₀ = 37 cfs

+ 3 cfs from Bag House, + 3 = 40 "

RUNOFF CALCULATION

(Rational Formula)

LOCATION: Analysis pt 4
 Note: All upstream flows above Tract 8 to be
 DRAINAGE AREA: intercepted by Drop Inlets

Planimeter Edg $\times .015$

$\times$ Map Scale $\div 43,560$

$A = 4.5 \text{ acres}$

TIME OF CONCENTRATION:

Drainage Basin Data:

$L = 500 \text{ ft}$, fall = 24 ft , slope = $.048 \text{ ft/ft}$

☒ Overland Flow:

$v = 2.9 \text{ ft/sec}$ (Pl. 22.2 B-1)

$T_c = 172 \text{ sec} = 2.9 \text{ min}$

$T_c = 3 \text{ min}$

☐ Street Flow:

$v = \text{ft/sec}$ (Pl. 22.2 B-2)

$T_c = \text{sec} = \text{min}$

$T_c = \text{min}$

☐ Arroyo Flow:

$T_c = 0.0078 \frac{L^{0.77}}{S^{0.385}} = \text{min}$

$T_c = \text{min}$

SCS Soil Group: A B C D
 A Soils, 36 ac @ .60 = 2.16
 B Soils, 0.9 ac @ .72 = .65

$\frac{2.81}{.65} = 4.32$

% Impervious = $\frac{75}{100} = 75\%$

C Factor (Pl. 22.2 C-1)

$C = .62$

RAINFALL INTENSITY:

100 yr depth = $2.28''$ (Pl. 22.2 D-1)

Intensity Factor = 2.11 (Pl. 22.2 D-2)

Intensity = depth $\times$ factor,

$I = 4.82''/\text{hr}$

PEAK RUNOFF RATE:

$Q = CIA = .62 \times 4.82 \times 4.5$

$Q = 13 \text{ cfs}$

ISAACSON & Artman, P.A.

SUBJECT 426 Business Park
 BY 101 DATE 8/12/95 SHEET NO. 8

RUNOFF CALCULATIONS

(Rational Formula)

LOCATION: Analysis Pt 5

DRAINAGE AREA:

$$\text{Planimeter Rdg} \times .015 \\ \times \text{Map Scale}^2 \div 43,560$$

$$A = \underline{1.3} \text{ acres}$$

TIME OF CONCENTRATION:

Drainage Basin Data:

$$L = \underline{480} \text{ ft.}, \text{ fall} = \underline{25} \text{ ft.}, \text{ Slope} = \underline{.052} \text{ ft./ft.}$$

☒ Overland Flow:

$$V = \underline{3.0} \text{ ft./sec (Pl. 22.2 B-1)}$$

$$T_c = \underline{160} \text{ sec} = \underline{2.7} \text{ min.}$$

$$T_c = \underline{2.7} \text{ min.}$$

☐ Street Flow:

$$V = \underline{\quad} \text{ ft./sec (Pl. 22.2 B-2)}$$

$$T_c = \underline{\quad} \text{ sec} = \underline{\quad} \text{ min.}$$

$$T_c = \underline{\quad} \text{ min.}$$

☐ Arroyo Flow:

$$T_c = 0.0078 \frac{L^{0.77}}{S^{0.385}} = \underline{\quad} \text{ min.}, \quad T_c = \underline{\quad} \text{ min.}$$

RUNOFF COEFFICIENT:

SCS Soil Group: A (B) C D

% Impervious = 75 %

C Factor (Pl 22.2 C-1)

$$C = \underline{.72}$$

RAINFALL INTENSITY:

$$100 \text{ yr depth} = \underline{2.28} \text{ " (Pl. 22.2 D-1)}$$

$$\text{Intensity Factor} = \underline{2.11} \text{ (Pl. 22.2 D-2)}$$

$$\text{Intensity} = \text{depth} \times \text{factor},$$

$$I = \underline{4.82} \text{ "/hr.}$$

PEAK RUNOFF RATE:

$$Q = CIA = \underline{.72} \times \underline{4.82} \times \underline{1.3}$$

$$Q_{100} = \underline{5} \text{ cfs}$$

RUNOFF CALCULATIONS

(Rational Formula)

LOCATION: Analysis Point 6

DRAINAGE AREA:

$$\text{Planimeter Rdg} \times .015 \\ \times \text{Map Scale}^2 \div 43,560$$

$$A = \underline{1.8} \text{ acres}$$

TIME OF CONCENTRATION:

Drainage Basin Data: from Pt 5 = 2.7 min
 $L = \underline{170} \text{ ft.}, \text{fall} = \underline{\quad} \text{ ft.}, \text{Slope} = \underline{.06} \text{ ft/ft}$

☐ Overland Flow:

$$V = \underline{\quad} \text{ ft/sec (Pl. 22.2 B-1)}$$

$$T_c = \underline{\quad} \text{ sec} = \underline{\quad} \text{ min.}$$

$$T_c = \underline{\quad} \text{ min.}$$

☒ Street Flow:

$$V = \underline{6.7} \text{ ft/sec (Pl. 22.2 B-2)}$$

$$T_c = \underline{25} \text{ sec} = \underline{.4} \text{ min.}$$

$$T_c = \underline{.4} \text{ min}$$

$$\Sigma T_c = \underline{3.1} \text{ min}$$

☐ Arroyo Flow:

$$T_c = 0.0078 \frac{L^{0.77}}{S^{0.385}} = \underline{\quad} \text{ min.}, T_c = \underline{\quad} \text{ min}$$

RUNOFF COEFFICIENT:

$$A \text{ Soils, } 0.3 \text{ ac @ } .60 = .24$$

$$B \text{ " } 1.5 \text{ ac @ } .72 = 1.08$$

$$\underline{1.32}$$

$$\div 1.8 =$$

SCS Soil Group: A B C D

% Impervious = 75 %

C Factor (Pl 22.2 C-1)

$$C = \underline{0.73}$$

RAINFALL INTENSITY:

$$100 \text{ yr depth} = \underline{2.28}'' \text{ (Pl. 22.2 D-1)}$$

$$\text{Intensity Factor} = \underline{2.11} \text{ (Pl. 22.2 D-2)}$$

$$\text{Intensity} = \text{depth} \times \text{factor},$$

$$I = \underline{4.82}''/\text{hr.}$$

PEAK RUNOFF RATE:

$$Q = C/A = \underline{.73} \times \underline{4.82} \times \underline{1.8}$$

$$Q_{100} = \underline{6} \text{ cfs}$$

RUNOFF CALCULATIONS

(Rational Formula)

LOCATION: Analysis Point 7

DRAINAGE AREA:

Planimeter Edg _____ x .015
x Map Scale _____² ÷ 43,560

$A = \underline{3.3} \text{ acres}$

TIME OF CONCENTRATION: @ Pt 6 =

2.7 min.

Drainage Basin Data:

$L = \underline{500} \text{ ft.}, \text{ fall} = \underline{\quad} \text{ ft.}, \text{ Slope} = \underline{.005} \text{ ft./ft.}$

☐ Overland Flow:

$v = \underline{1} \text{ ft./sec (Pl. 22.2 B-1)}$

$T_c = \underline{\quad} \text{ sec} = \underline{\quad} \text{ min.}$

$T_c = \underline{\quad} \text{ min.}$

☒ Street Flow:

$v = \underline{1.9} \text{ ft./sec (Pl. 22.2 B-2)}$

$T_c = \underline{263} \text{ sec} = \underline{4.4} \text{ min.}$

$T_c = \underline{4.4} \text{ min}$

$\Sigma T_c = 7.1 \text{ min}$

☐ Arroyo Flow:

$T_c = 0.0078 \frac{L^{0.77}}{S^{0.385}} = \underline{\quad} \text{ min.}, T_c = \underline{\quad} \text{ min}$

RUNOFF COEFFICIENT:

A. Soils, 1.58 ac @ .60 = 0.95
B. Soils, 1.72 ac @ .72 = 1.24
2.19

SCS Soil Group: A B C D

% Impervious = _____ %

$\frac{0.95}{2.19} = 0.43$

C Factor (Pl 22.2 C-1)

$C = \underline{.66}$

RAINFALL INTENSITY:

100 yr depth = 2.28" (Pl. 22.2 D-1)

Intensity Factor = 2.11 (Pl. 22.2 D-2)

Intensity = depth x factor,

$I = \underline{4.82} \text{"/hr.}$

PEAK RUNOFF RATE:

$Q = CIA = \underline{.66} \times \underline{4.82} \times \underline{3.3}$

$Q_{100} = \underline{11} \text{ cfs}$

RUNOFF CALCULATIONS

(Rational Formula)

LOCATION: Analysis Pt. 8

DRAINAGE AREA: $\frac{1}{2}$ Off-Site = 2.9 ac
 On Site = 2.4
 Planimeter Rdy $\times .01553$
 $\times$ Map Scale $\div 43,560$

A = 5.3 acres

TIME OF CONCENTRATION: Off Site = 13.0

Drainage Basin Data: Storm Drain Flow

$360' \div 10.8'/\text{sec} = 60 = 0.6$
 $L = 100$ ft., fall = --- ft., Slope = $.005$ ft/ft

☐ Overland Flow:

$V = \text{---}$ ft/sec (Pl. 22.2 B-1)

$T_c = \text{---}$ sec = --- min, $T_c = \text{---}$ min.

☒ Street Flow:

$V = 1.9$ ft/sec (Pl. 22.2 B-2)

$T_c = 53$ sec = 0.9 min, $T_c = 0.9$ min
 $\Sigma T_c = 14.5$ min

☐ Arroyo Flow:

$T_c = 0.0078 \frac{L^{0.77}}{S^{0.385}} = \text{---}$ min, $T_c = \text{---}$ min

RUNOFF COEFFICIENT: $\frac{2.9 \text{ ac} @ .85 = 2.47}{2.4 \text{ ac} @ .60 = 1.44}$
 $\frac{2.47}{3.91}$

SCS Soil Group: A B C D $\div 5.3$

% Impervious = --- %

C Factor (Pl. 22.2 C-1) $C = .74$

RAINFALL INTENSITY:

100 yr depth = 2.28" (Pl. 22.2 D-1)

Intensity Factor = 1.75 (Pl. 22.2 D-2)

Intensity = depth $\times$ factor, $I = 3.99$ "/hr.

PEAK RUNOFF RATE:

$Q = C/A = .74 \times 3.99 \times 5.3$
 $+ 3 \text{ cfs from Bldg Sewer, } + 3 = 19 \text{ cfs}$
 $Q_{100} = 16 \text{ cfs}$

RUNOFF CALCULATIONS

(Rational Formula)

LOCATION: Analysis Pt 9

DRAINAGE AREA: @ Pt 8 = 5.3
 Additional = $\frac{4.1}{9.4}$
 Planimeter Rdy _____ x .015
 x Map Scale _____² ÷ 43,560

A = 9.4 acres

TIME OF CONCENTRATION: @ Pt 8 =

14.5

Drainage Basin Data:

L = _____ ft., fall = _____ ft., Slope = _____ ft./ft

☒ ~~Street~~ Flow: 220' @ .005

V = 1.9 ft./sec (Pl. 22.2 B-1)

T_c = 116 sec = 1.9 min,

T_c = 1.9 min.

☒ Street Flow: 640' @ .063

V = 6.7 ft./sec (Pl. 22.2 B-2)

T_c = 96 sec = 1.6 min,

T_c = 1.6 min

☐ Arroyo Flow:

T_c = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = _____ min, T_c = _____ min

Σ T_c = 18.0

RUNOFF COEFFICIENT: $\frac{5.3 \times .74}{4.1 \times .60} = \frac{3.92}{2.46} = 1.59$

SCS Soil Group: A B C D ÷ 9.4

% Impervious = _____ %

C Factor (Pl 22.2 C-1) = C = .68

RAINFALL INTENSITY:

100 yr depth = 2.28" (Pl. 22.2 D-1)

Intensity Factor = 1.57 (Pl. 22.2 D-2)

Intensity = depth x factor,

I = 3.57"/hr.

PEAK RUNOFF RATE:

Q = C/A = .68 x 3.57 x 9.4
 + 3 cfs from Bag 1 Save Q₁₀₀ = 23 cfs
 + 3 = 26

RUNOFF CALCULATIONS

(Rational Formula)

LOCATION: Analysis Point 10

DRAINAGE AREA: @ Pt 9 = 9.4
 Additional = 1.7
 Planimeter Rdg _____ x .01511.1
 x Map Scale _____² ÷ 43,560

A = 11.1 acres

TIME OF CONCENTRATION: @ Pt 9 = 18.0

18.0

Drainage Basin Data:

L = _____ ft., fall = _____ ft., Slope = _____ ft/ft

☐ Overland Flow:

v = _____ ft/sec (Pl. 22.2 B-1)

T_c = _____ sec = _____ min,

T_c = _____ min.

☒ Street Flow: 300' @ .04

v = 5.3 ft/sec (Pl. 22.2 B-2)

T_c = 57 sec = .9 min,

T_c = .9 min

☐ Arroyo Flow:

Σ T_c = 18.9

T_c = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = _____ min, T_c = _____ min

RUNOFF COEFFICIENT: $\frac{9.4 \text{ ac} @ .68 = 6.39}{1.7 \text{ ac} @ .60 = 1.02}$

SCS Soil Group: A B C D $\frac{7.41}{11.1} = .67$

% Impervious = _____ %

C Factor (Pl 22.2 C-1)

C = .67

RAINFALL INTENSITY:

100 yr depth = 2.28" (Pl. 22.2 D-1)

Intensity Factor = 1.53 (Pl. 22.2 D-2)

Intensity = depth x factor,

I = 3.48"/hr.

PEAK RUNOFF RATE:

Q = CIA = .67 x 3.48 x 11.1

+ 3 from Beg & Save $\frac{Q_{100}}{2} + 3 = 29$
 cfs

RUNOFF CALCULATIONS

(Rational Formula)

LOCATION: Analysis Point 11

DRAINAGE AREA: @ Pt 10 = $\frac{11.1}{0.9}$
 Planimeter Reading $\times .675$
 $\times$ Map Scale $\div 43,560$ $A = 12.0$ acres

TIME OF CONCENTRATION: @ Pt 10 = 18.9

Drainage Basin Data:

$L = 230$ ft., fall = --- ft., Slope = $.04$ ft/ft

☐ Overland Flow:

$V = \text{---}$ ft/sec (Pl. 22.2 B-1)

$T_c = \text{---}$ sec = --- min, $T_c = \text{---}$ min.

☒ Street Flow:

$V = 5.3$ ft/sec (Pl. 22.2 B-2)

$T_c = 43$ sec = $.7$ min, $T_c = .7$ min

☐ Arroyo Flow:

$T_c = 0.0078 \frac{L^{0.77}}{S^{0.385}} = \text{---}$ min, $\Sigma T_c = 19.6$ min

RUNOFF COEFFICIENT:

SCS Soil Group: A B C D

% Impervious = 75 %

C Factor (Pl 22.2 C-1)

$C = .66$

RAINFALL INTENSITY:

100 yr depth = 2.28 " (Pl. 22.2 D-1)

Intensity Factor = 1.5 (Pl. 22.2 D-2)

Intensity = depth $\times$ factor,

$I = 3.42$ "/hr.

PEAK RUNOFF RATE:

$Q = C/A = \frac{.66}{+3} \times 3.42 \times 12$ $Q_{100} = 27$ cfs
 $+ 3$ cfs from Beg & Svr, $+ 3 = 30$ cfs

RUNOFF CALCULATIONS

(Rational Formula)

LOCATION: Analysis Pt 12
 NOTE: All upstream Flows to be intercepted
 DRAINAGE AREA: by Drop Inlets

Planimeter Rdg _____ x .015
 x Map Scale _____² ÷ 43,560 A = 0.9 acres

TIME OF CONCENTRATION: By Inspection, $T_c = 10$ min.
 Drainage Basin Data:
 L = _____ ft., fall = _____ ft., Slope = _____ ft/ft

☐ Overland Flow:
 $V = \text{_____ ft/sec (Pl. 22.2 B-1)}$
 $T_c = \text{_____ sec} = \text{_____ min}, \quad T_c = \text{_____ min.}$

☐ Street Flow:
 $V = \text{_____ ft/sec (Pl. 22.2 B-2)}$
 $T_c = \text{_____ sec} = \text{_____ min}, \quad T_c = \text{_____ min}$

☐ Arroyo Flow:
 $T_c = 0.0078 \frac{L^{0.77}}{S^{0.385}} = \text{_____ min}, \quad T_c = \text{_____ min}$

RUNOFF COEFFICIENT:
 SCS Soil Group: A B C D
 % Impervious = 75 %
 C Factor (Pl 22.2 C-1) C = .60

RAINFALL INTENSITY:
 100 yr depth = 2.24" (Pl. 22.2 D-1)
 Intensity Factor = 2.11 (Pl. 22.2 D-2)
 Intensity = depth x factor, I = 4.82"/hr.

PEAK RUNOFF RATE:
 $Q = C/A = \underline{.6} \times \underline{4.82} \times \underline{.9} \quad Q_{100} = \underline{3} \text{ cfs}$

RUNOFF CALCULATIONS

(Rational Formula)

LOCATION: Analysis Pt 13

DRAINAGE AREA:

$$\text{Planimeter Rdg} \times .015 \\ \times \text{Map Scale}^2 \div 43,560$$

$$A = \underline{3.1} \text{ acres}$$

TIME OF CONCENTRATION: By Inspection, $T_c < 10 \text{ min}$

Drainage Basin Data:

Use 10 min

$$L = \text{--- ft.}, \text{fall} = \text{--- ft.}, \text{Slope} = \text{--- ft./ft.}$$

☐ Overland Flow:

$$V = \text{--- ft./sec (Pl. 22.2 B-1)}$$

$$T_c = \text{--- sec} = \text{--- min.}$$

$$T_c = \text{--- min.}$$

☐ Street Flow:

$$V = \text{--- ft./sec (Pl. 22.2 B-2)}$$

$$T_c = \text{--- sec} = \text{--- min.}$$

$$T_c = \text{--- min.}$$

☐ Arroyo Flow:

$$T_c = 0.0078 \frac{L^{0.77}}{S^{0.385}} = \text{--- min.}, T_c = \underline{10} \text{ min}$$

RUNOFF COEFFICIENT:

A Soils, 1.76 ac @ .60 = 1.06

B " , 1.34 ac @ .72 = .96

SCS Soil Group: A B C D

2.02

% Impervious = --- %

$$\div 3.1 = .65$$

C Factor (Pl 22.2 C-1)

$$C = \underline{.65}$$

RAINFALL INTENSITY:

$$100 \text{ yr depth} = \underline{2.28"} \text{ (Pl. 22.2 D-1)}$$

$$\text{Intensity Factor} = \underline{2.11} \text{ (Pl. 22.2 D-2)}$$

$$\text{Intensity} = \text{depth} \times \text{factor},$$

$$I = \underline{4.82"}/\text{hr.}$$

PEAK RUNOFF RATE:

$$Q = C/A = \underline{.65} \times \underline{4.82} \times \underline{3.1}$$

$$Q_{100} = \underline{10} \text{ cfs}$$

RUNOFF CALCULATIONS

(Rational Formula)

LOCATION: Analysis Pt. 14

DRAINAGE AREA: @ Pt 14 = 3.1 ac
 Additional = 2.0
 Planimeter Rdy _____ x .015 5.1
 x Map Scale _____ ² ÷ 43,560

A = 5.1 acres

TIME OF CONCENTRATION: By Inspection, $T_c < 10$ min,
 Drainage Basin Data: Use 10 min
 $L = \text{--- ft.}$, $\text{fall} = \text{--- ft.}$, $\text{Slope} = \text{--- ft/ft}$

☐ Overland Flow:

$V = \text{--- ft/sec}$ (Pl. 22.2 B-1)

$T_c = \text{--- sec} = \text{--- min}$, $T_c = \underline{10}$ min.

☐ Street Flow:

$V = \text{--- ft/sec}$ (Pl. 22.2 B-2)

$T_c = \text{--- sec} = \text{--- min}$, $T_c = \text{--- min}$

☐ Arroyo Flow:

$T_c = 0.0078 \frac{L^{0.77}}{S^{0.385}} = \text{--- min}$, $T_c = \text{--- min}$

RUNOFF COEFFICIENT: @ Pt 13, 3.1 ac @ .65 = 2.02
 Additional, $\frac{2.0}{5.1} \times .60 = \frac{1.20}{3.22}$

SCS Soil Group: A B C D $\div 5.1 = .63$

% Impervious = --- %

C Factor (Pl 22.2 C-1) $C = \underline{.63}$

RAINFALL INTENSITY:

100 yr depth = 2.79" (Pl. 22.2 D-1)

Intensity Factor = 2.11 (Pl. 22.2 D-2)

Intensity = depth x factor,

$I = \underline{4.82}$ "/hr.

PEAK RUNOFF RATE:

$Q = C/A = .63 \times 4.82 \times 5.1$

$Q_{100} = \underline{15}$ cfs

RUNOFF CALCULATIONS

(Rational Formula)

15

LOCATION: Analysis pt.
 Note: All upstream flows to be intercepted by drop inlets
 DRAINAGE AREA:
 Planimeter Rdy $\times .015$
 $\div 43,560$
 $\times$ Map Scale
 $A = 5.6$ acres

TIME OF CONCENTRATION: By Inspection, $T_c < 10$ min, use 10 min

$L =$ ft, fall = ft, slope = ft/ft

☐ Overland Flow:

$V =$ ft/sec (Pl 22.2 B-1)

$T_c =$ sec = min,

$T_c =$ min.

☐ Street Flow:

$V =$ ft/sec (Pl 22.2 B-2)

$T_c =$ sec = min,

$T_c = 10$ min

☐ Arroyo Flow:

$T_c = 0.0078 \frac{L^{0.77}}{S^{0.385}}$

$T_c =$ min,

$T_c =$ min

RUNOFF COEFFICIENT:

SCS Soil Group: (A) B C D

% Impervious = 75 %

C Factor (Pl 22.2 C-1)

$C = .60$

RAINFALL INTENSITY:

100 yr depth = 2.28" (Pl 22.2 D-1)

Intensity factor = 2.11 (Pl 22.2 D-2)

Intensity = depth $\times$ factor,

$I = 4.82$ "/hr.

PEAK RUNOFF RATE:

$Q = CIA = .60 \times 4.82 \times 5.6$

$Q = 16$ cfs

Isaacson & Arltman, P.A.

BY 701

SUBJECT: Yale Business Park

DATE: 8/13/85 SHEET NO. 19

RUNOFF CALCULATIONS

(Rational Formula)

16

LOCATION: Analysis Pt

DRAINAGE AREA:

Planimeter Rdg $\times .015$

$\times$ Map Scale $\div 43,560$

$A = 2.7$ acres

TIME OF CONCENTRATION:

By

In question, $T_c < 10$ min

Drainage Basin Data:

use 10 min

$L =$ ft, fall = ft, slope = ft/ft

☐ Overland Flow:

$V =$ ft/sec (Pl 22.2 B-1)

$T_c =$ sec = min,

$T_c = 10$ min.

☐ Street Flow:

$V =$ ft/sec (Pl 22.2 B-2)

$T_c =$ sec = min,

$T_c =$ min

☐ Arroyo Flow:

$T_c = 0.0078 \frac{L^{0.77}}{S^{0.385}}$

$T_c =$ min

RUNOFF COEFFICIENT:

SCS Soil Group: A B C D

% Impervious = 15 %

C Factor (Pl 22.2 C-1)

$C = 1.60$

RAINFALL INTENSITY:

100 yr depth = 2.28" (Pl 22.2 D-1)

Intensity Factor = 2.11 (Pl 22.2 D-2)

Intensity = depth $\times$ factor,

$I = 4.82$ in/hr.

PEAK RUNOFF RATE:

$Q = CIA = 1.60 \times 4.82 \times 2.7$

$Q = 8$ cfs

Isaacson & Arltman, PA

DATE: 8/13/85

SHEET NO. 20

COMPUTE ON-SITE TIME OF CONCENTRATION

Street A:

Overland Flow (Tract 12):

380' @ 5.3%, $v = 3.0$ /sec

$$T_{c1} = 380 \div 3 \div 60 = \underline{2.1 \text{ min}}$$

Street Flow:

450' @ .005%, $v = 1.9$ /s

$$T_{c2} = 450 \div 1.9 \div 60 = \underline{4.0 \text{ min}}$$

700' @ .06, $v = 6.7$ /sec

$$T_{c3} = 700 \div 6.7 \div 60 = \underline{1.7 \text{ min}}$$

450' @ .04%, $v = 5.3$ /sec

$$T_{c4} = 450 \div 5.3 \div 60 = \underline{1.4 \text{ min}}$$

Storm Drain Flow (To MH 705 @ Yale & Ross)

102' of 48" @ .0169, $v = 14.86$ /sec

$$T_{c5} = 102 \div 14.8 \div 60 = \underline{0.1 \text{ min}}$$

260' of 42" @ .035, $v = 19.4$

$$T_{c6} = 260 \div 19.6 \div 60 = \underline{0.2 \text{ min}}$$

Street B:

Overland Flow (Tract 11)

530' @ .068, $v = 3.5$ /sec

$$T_{c1} = 530 \div 3.5 \div 60 = \underline{2.5 \text{ min}}$$

Street Flow:

400' @ .005, $v = 1.9$ /sec

$$T_{c2} = 400 \div 1.9 \div 60 = \underline{3.5 \text{ min}}$$

640' @ .06, $v = 6.7$ /sec

$$T_{c3} = 640 \div 6.7 \div 60 = \underline{1.6 \text{ min}}$$

420' @ .04, $v = 5.3$ /sec

$$T_{c4} = 420 \div 5.3 \div 60 = \underline{1.3 \text{ min}}$$

100' @ .01%, $v = 2.7$ /sec

$$T_{c5} = 100 \div 2.7 \div 60 = \underline{0.6 \text{ min}}$$

$$\Sigma T_c = \underline{9.5 \text{ min}}$$

Street 'B' (Cont):

Storm Sewer Flow:

90' of 36" C .0055, $v = 7.00$

$90 \div 7.00 \div 60 = \underline{0.2 \text{ min}}$

$\sum T_c = 9.7 \text{ min}$

COMPUTE TIME OF CONCENTRATION FOR
STORM SEWER SYSTEMS ON NORTH
(ROSS - VEIL - CARLISLE SYSTEM) AND SOUTH
(GIBSON - KIRTLAND SYSTEM)

See Pipe Flow Time Calculations on
following two sheets:

DRAINAGE AREA TABULATION:

Analysis POINT 	Planimeter Rdg	Conversion Factor	Area (Ac.)
1	1200		4.1
2	1260		4.3
3	1360		4.7
4	1310		4.5
5	390		1.3
6	145		0.5
7	425		1.5
8	705		2.4
9	1180		4.1
10	395		1.7
11	260		0.9
12	260		0.9
13	905		3.1
14	570		2.0
15	1620		5.6
16	785		2.7
~~17~~			

Conversion Factor: $.015 \times 100^2 \div 43,560 = .00342$

FLOW TIME CALCULATIONS

ROSS - VAIL - CARLISLE SYSTEM

[illegible]

Isaacson &
Arfman, P.A.

SUBJECT Yak Business Pk JOB NO. _____
BY TOI DATE 8/14/85 SHEET NO. 24 OF _____

FLOW TIME CALCULATIONS GIBSON - KIRTLAND SYSTEM

Zone	From (MH #)	To (MH #)	Length (ft.)	Velocity (ft./sec.)	Time (sec.)
------	-------------	-----------	--------------	---------------------	-------------

M-16N	36	12	.0010	1.43	418
"	36	12	.0005	1.01	99
"	35	12	.0003	.79	191
"	34	12	.0029	2.44	41
"	33	12	.0010	1.43	362
"	30	18	.0009	1.78	202
"	29	18	.0013	2.14	121
"	28	18	.0010	1.88	133
"	27	18	.0009	1.78	337
"	25	18	.0006	1.46	69
"	24	18	.0030	3.26	92
"	23	18	.0286	10.05	45
M-16N	51	27	.016	7.22	73
"	32	30	.0094	8.10	30
"	31	21	.0630	16.5	21
"	24	30	.0100	8.36	48
"	22	24	.0330	13.08	31
"	11	24	.0460	15.44	48
"	3	36	.0225	14.15	8
L-16S	906	42	.0100	10.46	51

2735.502
-60 = 45.6 min

Isaacson & Arltman, P.A.

Yale Business File
701 8/19/85
2507

TIME OF CONCENTRATION Comparison & Free

DISCHARGE DETERMINATION

Ross - Veil - Carlisle Storm Drain System

(To MH #705)

Street A, $T_c = 48.6$ min (Sh 24)

Street A, $T_c = 9.5$ min (Sh 21)

Gibson - Kirland Storm Drain System (Sh 25)

(To MH #802) $T_c = 45.6$ min

Street B, $T_c = 9.7$ min (Sh 22)

Summary:

Since the time to peak in each

storm Drain System is over

35 minutes longer than the

time to peak for the subdivision

runoff the subdivision flows

will "beat" the system flows.

Therefore "free discharge" from

the subdivision is justified.

STORM DRAIN INLET SELECTION:

Street A, North Curb:

$$Q_{100} @ \text{D.A. Pt } \diamond 11 = 30 \text{ cfs}$$

Locate 1st 2 Inlets within vertical curve of street, approx street grade = .01 %

$$\text{flow depth} = 0.6' \pm$$

Inlet Capacity

$$1/A = 8 \text{ cfs}$$

$$2/B = \frac{12}{20} "$$

$$\text{Flow passing} = 30 - 20 = 10 \text{ cfs}$$

C D.A. Pt $\diamond 12$

$$Q_{100} = 10 \text{ cfs (passing D.A. Pt 11)} \\ + \frac{3 \text{ cfs}}{13 \text{ cfs}}$$

$$\text{Street grade} = 0.005\%, d = 0.55'$$

Inlet Capacity:

$$2/B = 8$$

$$2/B = \frac{5}{13}$$

$$\text{Flow Passing} = 13 - 13 = 0 \text{ cfs}$$

STORM DRAIN INLET SELECTION - CONT.

Street 'A', South Curb:

Between D.A. Pt $\diamond 14$ + $\diamond 15$

$$Q_{100} = 15 \text{ cfs}$$

Locate 1st 2 Inlets within vertical curve
of street, $S = .01\%$, flow
depth = .5'

Inlet Capacity:

$$1/A = 6 \text{ cfs}$$

$$\begin{array}{r} 2/B = 9 \\ \hline 15 \text{ cfs} \end{array}$$

At D.A. Pt $\diamond 15$

$$Q_{100} = 16 \text{ cfs}$$

Street grade = 0.005%, flow
depth = .57'

Inlet Capacity

$$2/B = 8$$

$$2/B = \frac{8}{16}$$

$$\text{Flow Passing} = 16 - 16 = 0 \text{ cfs}$$

Street 'B', North Curb:

At D.A. Pt $\square 7$

$$Q = 11 \text{ cfs}$$

$$S = .01\%$$

$$\text{flow depth} = .46'$$

STORM DRAIN INLET SELECTION - CON'T

Inlet Capacity

$$1/A = 5 \text{ cfs}$$

$$1/C = \frac{5}{10} \text{ cfs}$$

$$\text{Flow Passing} = 11 - 10 = 1 \text{ cfs}$$

Street 'B', South Curb :

Between A.P.'s $\diamond 3$ + $\diamond 4$:

$$Q_{100} = 40 \text{ cfs}$$

$$S = .04\%$$

$$\text{flow depth} = .55'$$

Inlet Capacity :

$$1/A = 10 \text{ cfs}$$

$$2/B = \frac{18}{28}$$

$$\text{Flow Passing} = 40 - 28 = 12 \text{ cfs}$$

$$S = .04\%$$

$$\text{flow depth} = .38'$$

Inlet Capacity :

$$2/B = 10 \text{ cfs}$$

$$\text{Flow Passing} = 12 - 10 = 2 \text{ cfs}$$

At A.P. $\diamond 4$

$$Q_{100} = 2 + 13 = 15 \text{ cfs}$$

$$S = 0.01\%$$

$$\text{flow depth} = .52'$$

Storm DRAIN Inlet Selection- CON'T :

Inlet Capacity :

$$2/c = 7.5 \text{ cfs}$$

$$2/c = \frac{7.5}{15} \text{ cfs}$$

CHECK INLET CAPACITY OF ROSS AVE INLETS

Q_{in} to Ross, A.P. $\diamond 10 = 8$ cfs

Street Slope = 3.3% $\pm$

Flow Depth = .35'

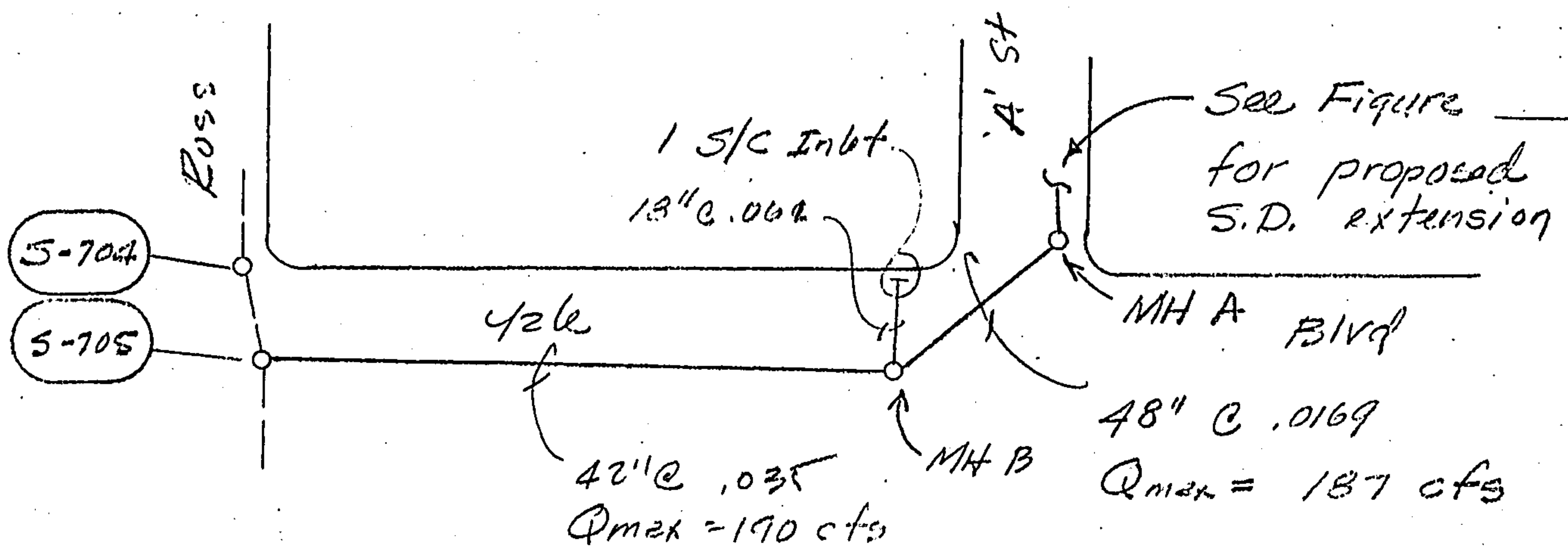
Existing Inlets: 6 no. D/C's

Inlet capacity on 1 D/C @ 3.3% slope,
flow depth of .35' = 6 cfs

Therefore, there is more than
adequate inlet capacity for
runoff to Ross Ave

CHECK STORM DRAIN CAPACITY IN YALE

BLVD FROM 'A' STREET NORTH TO ROSS:



SKETCH

MH A Analysis

Maximum Q in 'A' Street @ Yoke c MH A

<u>A.P. #</u>	<u>Q</u>
11	30
12	3
14	15
15	16
	<u>64</u> cfs

Pipe Capacity = 187 cfs , so OK

MH 'B' ANALYSIS

Max Q

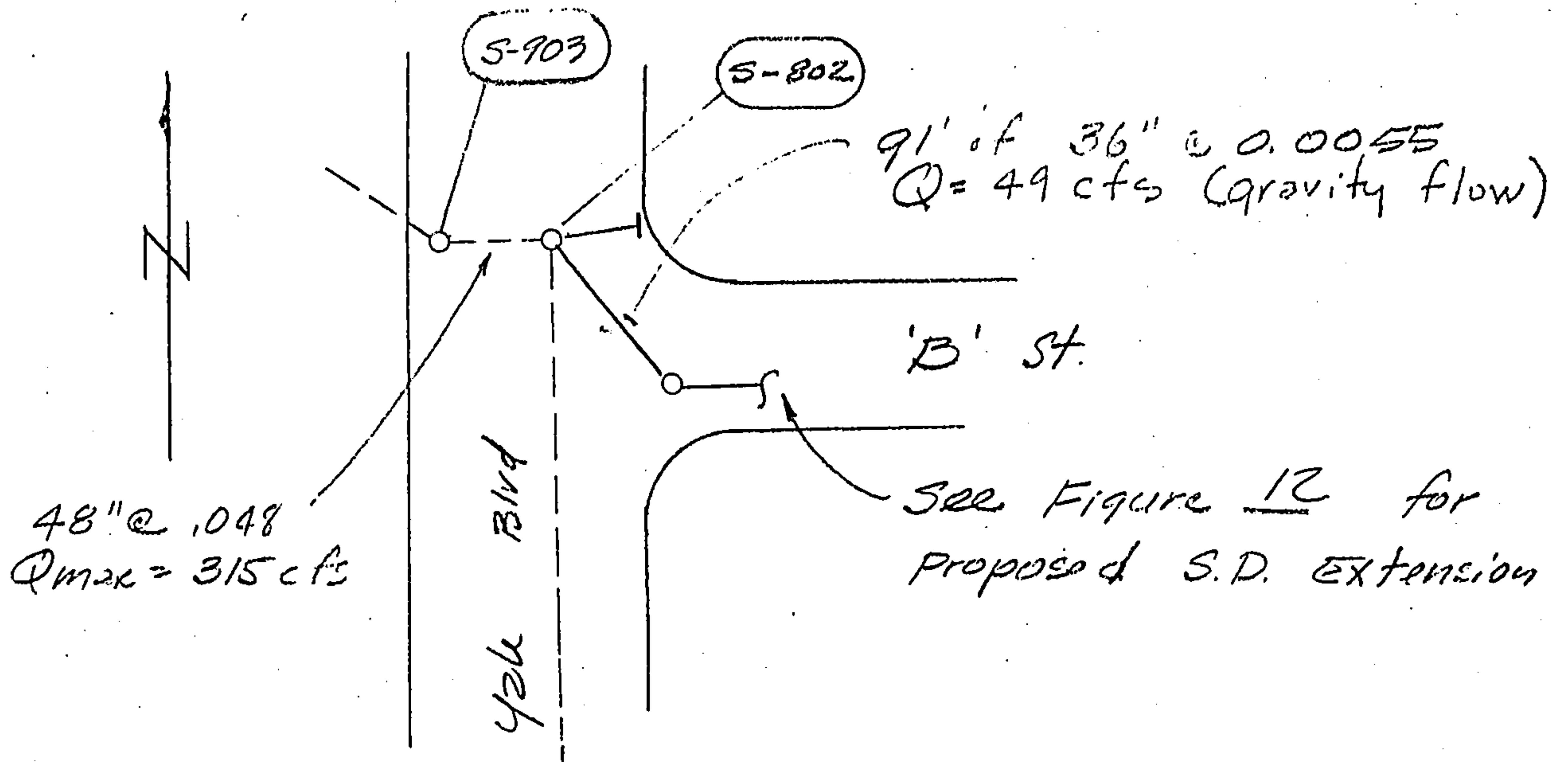
from 'A' St. = 64 cfs

from S/C Inlet on Yoke = 9 "

73 cfs

Pipe Capacity = 190 cfs , so OK

CHECK STORM DRAIN CAPACITY FROM 'B' STREET
TO MAIN LINE IN YALE:



Q_{max} From 'B' St.

<u>A.P. #</u>	<u>Q</u>
3	40
4	13
7	11
	<u>64 cfs</u>

Pipe Capacity of 36" for gravity flow is 49 cfs which is less than req'd 64 cfs. Check capacity for pressure flow. At Hydraulic Grade Line (HGL) slope of .01', $Q_{max} = 67$ cfs which is adequate. HGL will be well below street surface. Therefore, Storm Drain Capacity is OK

CALCULATE HYDRAULIC GRADE LINE FOR
STORM DRAIN BETWEEN TRACTS 11 & 12:

Partial Pipe Flow Condition, Computer printout
below gives flow conditions

$$S = .027 \text{ ft/ft}$$

$$V = 12.719 \text{ fps}$$

$$d = 1.199 \text{ ft}$$

$$Q = 25 \text{ cfs}$$

$$n = .013$$

$$L = 100 \text{ ft}$$

$$T_t = .131 \text{ min}$$

$$\text{Diameter} = 2 \text{ ft}$$

Head Losses at Manhole:

$$\text{Velocity Head} = \frac{v^2}{2g} = \frac{12.719^2}{64.4} = 2.51'$$

$$\text{Manhole Loss} = .05 (H_v) = .05 \times 2.51 = 0.13'$$

$$\text{Bend Loss} = K_b (H_v)$$

$$K_b = 0.20 \sqrt{\frac{90}{90}} = 0.20$$

$$\text{Loss} = .20 (2.51) = 0.50$$

$$\underline{0.63'}$$

See Figure 9 for plot of H.G.L. on profile.
H.G.L. is below the ground surface line.

COMPUTE HYDRAULIC GRADE LINE FOR
'A' ST. STORM DRAIN TO ROSS SYSTEM:

Partial Pipe flow in 48" running north
in Yale to Ross System. Computer
printout below gives flow conditions:

$$S = .035 \text{ ft/ft}$$

$$V = 18.361 \text{ fps}$$

$$d = 1.511 \text{ ft}$$

$$Q = 73 \text{ cfs}$$

$$n = .013$$

$$L = 100 \text{ ft}$$

$$Tt = .091 \text{ min}$$

$$\text{Diameter} = 3.5 \text{ ft}$$

Head Loss @ MH

$$H_v = \frac{v^2}{2g} = \frac{18.36^2}{64.4} = 5.23'$$

$$\text{MH Loss} = .05 H_v = .26'$$

$$\text{Bend Loss} = .2 \sqrt{\frac{45}{90}} \times 5.23 = .74'$$

1.00

for 48" section

computer printout gives flow conditions

$$S = .0169 \text{ ft/ft}$$

$$V = 13.494 \text{ fps}$$

$$d = 1.612 \text{ ft}$$

$$Q = 64 \text{ cfs}$$

$$n = .013$$

$$L = 100 \text{ ft}$$

$$Tt = .124 \text{ min}$$

$$\text{Diameter} = 4 \text{ ft}$$

$$H_v = \frac{13.49^2}{64.4} = 2.83'$$

$$\text{Manhole Losses} = .05 \times 2.83 = .14'$$

$$\text{Bend Loss} = .2 \sqrt{\frac{45}{90}} \times 2.83 = .40'$$

$$\Sigma h_L = .54'$$

COMPUTE HYDRAULIC GRADE LINE FOR
'B' ST TO GIBSON - KIRTLAND LINE

For 36" Section

$$\text{for } Q = 64, \quad S_p = .010\%$$

$$V = 9.44 \text{ ft/s}$$

$$H_v = \frac{9.44^2}{64.4} = 1.38'$$

$$\text{Manhole Loss, } .05 \times 1.38 = .07'$$

$$\text{Bend Loss, } .2 \sqrt{\frac{4.5}{90}} \times 1.38 = \frac{.20}{.27'}$$

For 24" Section

$$\text{for } Q = 28 \text{ cfs, } S_p = .015\%$$

CHECK DOWNSTREAM CAPACITY

for Ross - Veil - Carlisle System

<u>from</u>	<u>To</u>	<u>Dia</u>	<u>S</u>	<u>Q</u>
707	706	48"	.036	273
706	704	"	"	"
704	705	"	"	"
705	Hdwall	54	.030	341

Q_{max} from 'A' St. System = 64 cfs

Q " " Site to Ross = $\frac{20}{84}$

for Gibson - Kirtland System

<u>from</u>	<u>To</u>	<u>Dia</u>	<u>S</u>	<u>Q</u>
903	804	36"	.042	137
804	803	"	"	"
803	705	42"	.018	135
705	Hdwall	54	.030	341

Q_{max} from 'B' St. System = 64 cfs

Capacity above 'A' St System = $135 - 64 = 71$ cfs

RUNOFF CALCULATIONS

(Rational Formula)

LOCATION: Analysis Point 17

DRAINAGE AREA:

$$\text{Planimeter Edg } 3590 \times .015 \\ \times \text{Map Scale } 100^2 \div 43,560$$

$$A = 12.4 \text{ acres}$$

TIME OF CONCENTRATION:

Drainage Basin Data:

$$L = 1600 \text{ ft.}, \text{ fall} = 75 \text{ ft.}, \text{ Slope} = .047 \text{ ft./ft.}$$

☐ Overland Flow:

$$V = \text{--- ft./sec (Pl. 22.2 B-1)}$$

$$T_c = \text{--- sec} = \text{--- min.}$$

$$T_c = \text{--- min.}$$

☐ Street Flow:

$$V = \text{--- ft./sec (Pl. 22.2 B-2)}$$

$$T_c = \text{--- sec} = \text{--- min.}$$

$$T_c = \text{--- min.}$$

☒ Arroyo Flow:

$$T_c = 0.0078 \frac{L^{0.77}}{S^{0.385}} = 7 \text{ min.}, T_c = 7 \text{ min.}$$

RUNOFF COEFFICIENT:

USE 10 min

A 20.5	7.7 ac @ .16 = 1.23
B Soils	4.7 ac @ .34 = 1.60
	<u>2.83</u>
	$\div 12.4 = .23$

SCS Soil Group: A B C D

% Impervious = 0 %

C Factor (Pl 22.2 C-1)

$$C = .23$$

RAINFALL INTENSITY:

$$100 \text{ yr depth} = 2.28" \text{ (Pl. 22.2 D-1)}$$

$$\text{Intensity Factor} = 2.11 \text{ (Pl. 22.2 D-2)}$$

$$\text{Intensity} = \text{depth} \times \text{factor},$$

$$I = 4.82" / \text{hr.}$$

PEAK RUNOFF RATE:

$$Q = CIA = .23 \times 4.82 \times 12.4$$

$$Q_{100} = 14 \text{ cfs}$$

RUNOFF CALCULATIONS

(Rational Formula)

LOCATION: Analysis Point 18

DRAINAGE AREA: Offsite = 5.7
 Planimeter Rdg 9260 x .015
 x Map Scale 100² ÷ 43,560 = 31.9 A = 37.6 acres
37.6

TIME OF CONCENTRATION:

Drainage Basin Data:

L = 1950 ft., fall = 72 ft., Slope = .037 ft/ft

☐ Overland Flow:

V = _____ ft/sec (Pl. 22.2 B-1)

T_c = _____ sec = _____ min, T_c = _____ min.

☐ Street Flow:

V = _____ ft/sec (Pl. 22.2 B-2)

T_c = _____ sec = _____ min, T_c = _____ min

☒ Arroyo Flow:

T_c = 0.0078 $\frac{L^{0.77}}{S^{0.385}}$ = 9.5 min, T_c = 9.5 min

RUNOFF COEFFICIENT:

A Soils T_c Off site = 13
 29.92 x .16 = 4.78 22.5 min
 A " 2.5 ac. 1.10 = 2.50

SCS Soil Group: A B C D

% Impervious = _____ % B Soils, 5.2 x .39 = 1.77
9.05

C Factor (Pl 22.2 C-1) ÷ 37.6 C = .24

RAINFALL INTENSITY:

100 yr depth = 2.28" (Pl. 22.2 D-1)

Intensity Factor = 1.40 (Pl. 22.2 D-2)

Intensity = depth x factor, I = 3.19"/hr.

PEAK RUNOFF RATE:

Q = CIA = .24 x 3.19 x 37.6 Q₁₀₀ = 29 cfs
 + Controlled Runoff from Bay / Sewer = 5 / = 34 cfs

RUNOFF CALCULATIONS

(Rational Formula)

LOCATION: Offsite Drainage @ Yale + Ross

DRAINAGE AREA:

$$\text{Planimeter Rdg } 145 \times .015 \\ \times \text{Map Scale } 2000^2 \div 43,560$$

$$A = 20 \text{ acres}$$

TIME OF CONCENTRATION:

Drainage Basin Data:

$$L = \text{--- ft.}, \text{fall} = \text{--- ft.}, \text{Slope} = \text{--- ft./ft.}$$

☐ Overland Flow:

$$V = \text{--- ft./sec (Pl. 22.2 B-1)}$$

$$T_c = \text{--- sec} = \text{--- min.}$$

$$T_c = \text{--- min.}$$

☐ Street Flow:

$$V = \text{--- ft./sec (Pl. 22.2 B-2)}$$

$$T_c = \text{--- sec} = \text{--- min.}$$

$$T_c = \text{--- min.}$$

☐ Arroyo Flow:

$$T_c = 0.0078 \frac{L^{0.77}}{S^{0.385}} = \text{--- min.}, T_c = \text{--- min.}$$

Storm Drain Flow (Sh 24) = 44 min

RUNOFF COEFFICIENT:

SCS Soil Group: A (B) C D

% Impervious = 55 %

C Factor (Pl 22.2 C-1)

$$C = .6$$

RAINFALL INTENSITY:

$$100 \text{ yr depth} = 2.28" \text{ (Pl. 22.2 D-1)}$$

$$\text{Intensity Factor} = .94 \text{ (Pl. 22.2 D-2)}$$

$$\text{Intensity} = \text{depth} \times \text{factor},$$

$$I = 2.14" / \text{hr.}$$

PEAK RUNOFF RATE:

$$Q = CIA = .6 \times 2.14 \times 200$$

$$Q_{100} = 257 \text{ cfs}$$

SYSTEM:

$$\begin{aligned} \text{Runoff Volume} &= 2.28 \div 12 \\ &\times 200 \times 43,560 \times .6 \\ &= 993,170 \text{ cu. ft.} \end{aligned}$$

$$T = 24/9.8$$

$$\begin{aligned} &= 2 \times 993,170 \div 257 \div 60 \\ &= 129 \text{ min} \end{aligned}$$

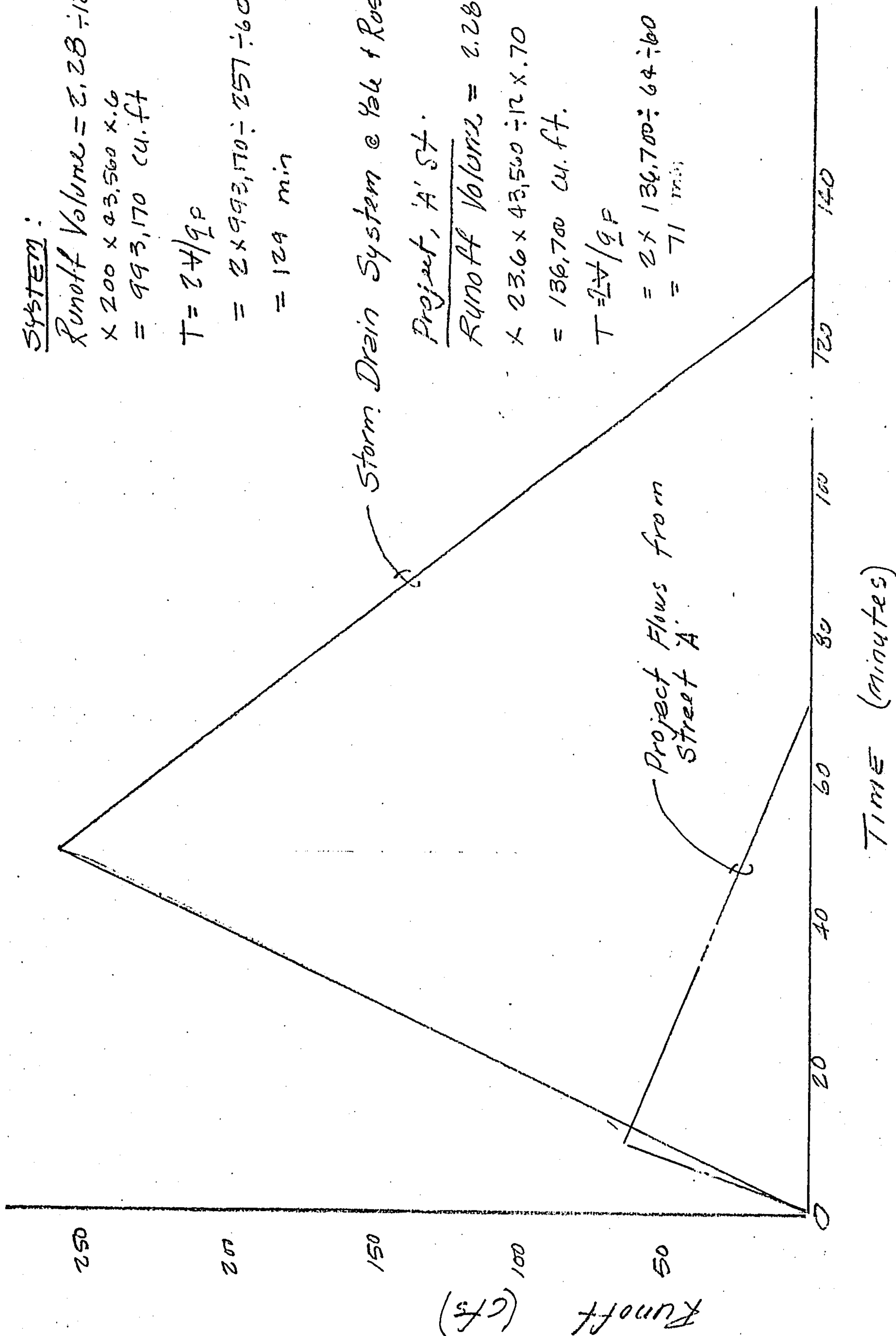
Storm Drain System @ Yale & Ross

Project, 'A' St.

$$\begin{aligned} \text{Runoff Volume} &= 2.28 \\ &\times 23.6 \times 43,560 \div 12 \times .70 \\ &= 136,700 \text{ cu. ft.} \end{aligned}$$

$$T = 24/9.8$$

$$\begin{aligned} &= 2 \times 136,700 \div 64 \div 60 \\ &= 71 \text{ min} \end{aligned}$$



HYDROGRAPH COMPARISONS @ YALE & ROSS

Runoff Calculations

(Rational Formula)

LOCATION: Offsite Draining of Yolk opposite B Street

DRAINAGE AREA:

$$\text{Planimeter Rdg } \frac{95}{95} \times .015$$

$$\times \text{Map Scale } \frac{2000}{2} \div 43,560$$

$$A = 131 \text{ acres}$$

TIME OF CONCENTRATION:

Drainage Basin Data:

$$L = \text{ft, fall} = \text{ft, slope} = \text{ft/ft}$$

☐ Overland Flow:

$$V = \text{ft/sec (Pl. 22.2 B-1)}$$

$$T_c = \text{sec} = \text{min, min.}$$

$$T_c = \text{min.}$$

☐ Street Flow:

$$V = \text{ft/sec (Pl. 22.2 B-2)}$$

$$T_c = \text{sec} = \text{min, min.}$$

$$T_c = \text{min.}$$

☐ Arroyo Flow:

$$L = 0.77$$

$$T_c = \frac{0.0078}{50.385} = \text{min, min.}$$

Storm Drain Flow (Sh 25)

$$T_c = \text{min, min.}$$

RUNOFF COEFFICIENT:

SCS Soil Group: A (B) C D

$$\% \text{ Impervious} = \frac{50}{50} \%$$

$$C \text{ Factor (Pl. 22.2 C-1)}$$

$$C = 157$$

RAINFALL INTENSITY:

$$100 \text{ yr depth} = 2.28" \text{ (Pl. 22.2 D-1)}$$

$$\text{Intensity Factor} = .97 \text{ (Pl. 22.2 D-2)}$$

$$\text{Intensity} = \text{depth} \times \text{factor,}$$

$$I = 2.21" / \text{hr.}$$

Peak Runoff Rate:

$$Q = CIA = .57 \times 2.21 \times 131$$

$$Q = 165 \text{ cfs}$$

SYSTEM:

$$V = 2.28 \div 12 \times 131 \times 43,560$$

$\times 1.57$

$$= 618,000 \text{ cu. ft.}$$

$$T = 2V / QP$$

$$= 2 \times 618,000 \div 165 \div 60$$

$$= 125 \text{ min}$$

PROJECT

$$V = 2.28 \div 12 \times 23.8 \times 43,560$$

$\times 1.46$

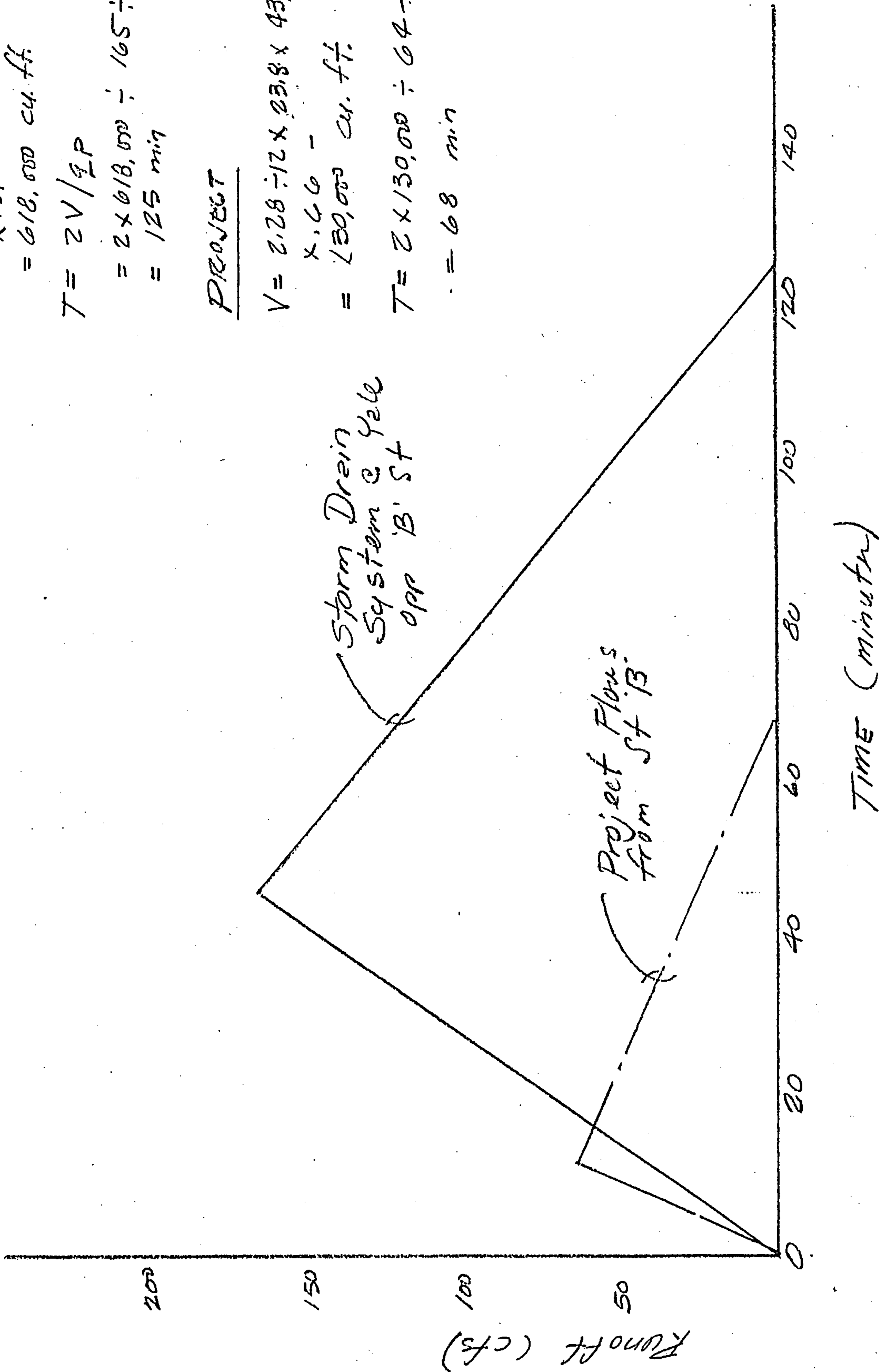
$$= 230,000 \text{ cu. ft.}$$

$$T = 2 \times 230,000 \div 64 \div 60$$

$$= 68 \text{ min}$$

Storm Drain
System & Yale
opp 'B' St

Project Flows
from St 'B'



HYDROGRAPH COMPARISONS @ YALE

OPPOSITE 'B' STREET

SUMMARY OF HYDRAULIC CALCULATIONS

PROJECT: Yale Business Park BY: Tol
 CLOSED CONDUIT LINE: Loss to A St. DATE: 9/10/85
 SHEET: 1 OF 1

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
STATION	STRUCT	D	Q	A	V	K	S _f	L	Δ	JUNCTION		LOSSES						E.G.	h _v	H.G.	
										D	θ	h _f	h _b	h _j	h _{mh}	h _t	h _{misc}				Σ
0+00	MH	42"	73	3.96	18.4	387	.035	265	-		45°	9.28	.74	-	.26	-	-	10.28		523	5745
2+65	MH	48"	64	4.69	13.5	483	.017	95	-		45°	1.62	.40	-	.14	-	-	2.16		283	6773
3+60	MH	30"	35	4.91	7.13	410	.0073	245	-		-	1.79	-	-	-	-	-	1.79		0.79	6989
																					7168
														</							

REMARKS: 42" & 48" S.D.'s are existing MANNING'S n: .013

1 flowing part full

$$42" \text{ S.D.: } \frac{D}{d} = \frac{1.5}{3.5}, A = .3229^*(3.5^2) = 3.96 \text{ ft}^2, R = .2257^*(3.5) = .79, K = \frac{1.486(3.96).79^{2/3}}{.013} = 387$$

$$48" \text{ S.D.: } \frac{D}{d} = \frac{1.6}{4}, A = .2934^*(4^2) = 4.69 \text{ ft}^2, R = .2142^*(4) = .86, K = \frac{1.486(4.69).86^{2/3}}{.013} = 483$$

$$30" \text{ S.D.: } K = \frac{1.486(4.91).63^{2/3}}{.013} = 245$$

* Ref: PI 22.3, B-6, DPM



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

4444

July 21, 1986

Scott McGee
Isaacson & Ariman, P.A.
128 Monroe, NE
Albuquerque, New Mexico 87108

RE: DRAINAGE PLAN FOR CAVAN COMMERCE CENTER
(L-16/D23) RECEIVED JULY 3, 1986

Dear Mr. McGee:

The above referenced plan, dated July 3, 1986, is approved for Rough Grading. However, we are unable to sign-off until Preliminary Plat is approved.

If you have any questions, call me at 766-7644.

Cordially,

Carlos A. Montoya, P.E.
City/County Floodplain Administrator

CAM/bsj

~~CONFIDENTIAL - NOT FOR DISTRIBUTION~~

~~CONFIDENTIAL - NOT FOR DISTRIBUTION~~

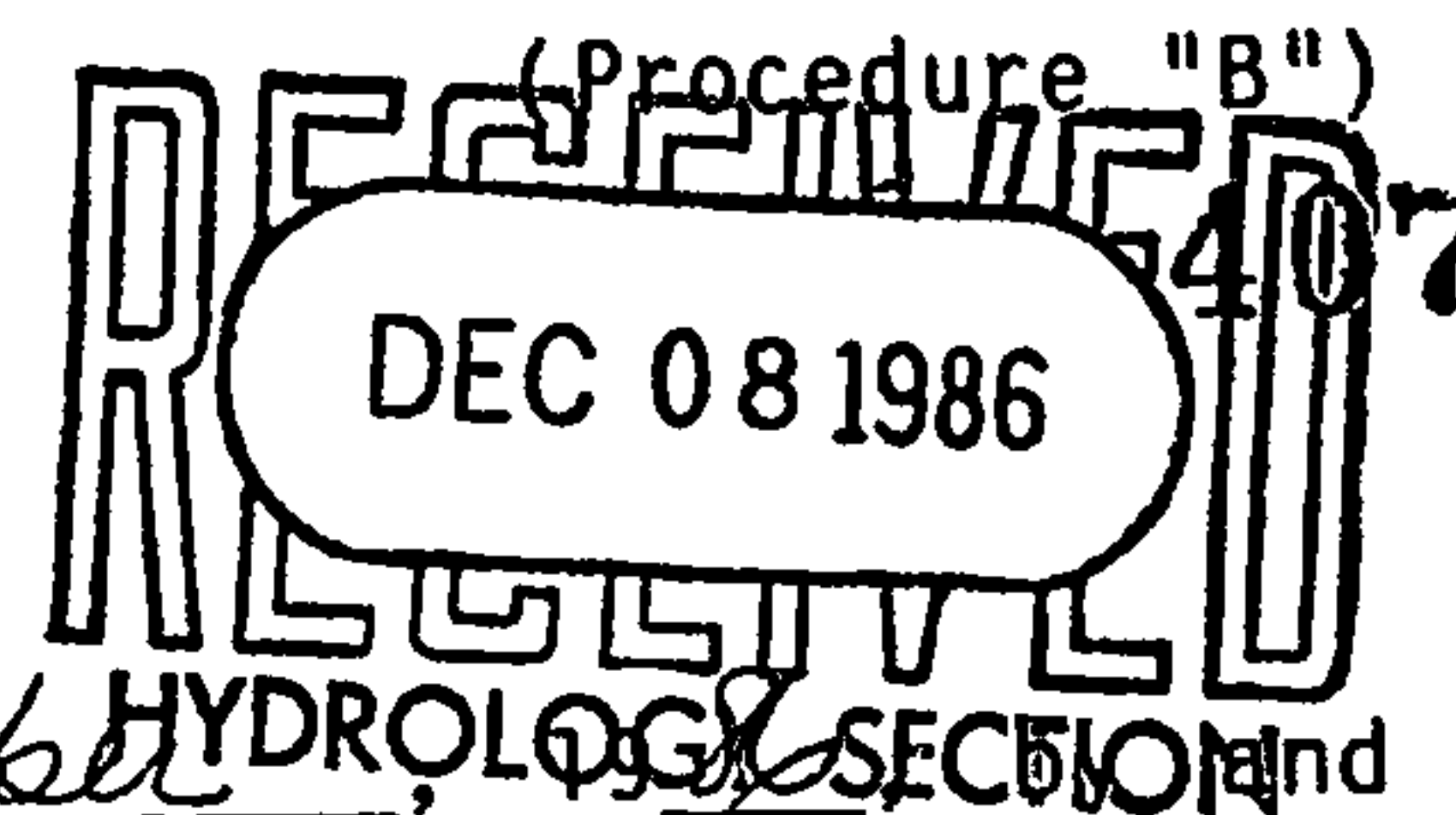
ENGINEERING DIVISION

Telephone (505) 766-7467

AN EQUAL OPPORTUNITY EMPLOYER

86119956

AGREEMENT TO CONSTRUCT
SUBDIVISION IMPROVEMENTS



THIS AGREEMENT made this 4th day of December, 1986
between the City of Albuquerque, New Mexico (hereinafter referred to as
"City") and Cavan Associates, Ltd.

(hereinafter referred to as "Developer") pursuant to Section 6 of the City's
Subdivision Ordinance (Enactment No. 56-1983, effective June 29, 1983).

WHEREAS, the Developer is developing certain lands within the City of
Albuquerque, County of Bernalillo, State of New Mexico known
as Cavan Sunport Centre (hereinafter referred to as the
"Subdivision"); and

WHEREAS, the Developer has submitted and the City has approved a
preliminary plat identified as Cavan Sunport Centre
describing the Subdivision; and

WHEREAS, Section 6 of the City's Subdivision Ordinance requires the
Developer to install and construct certain public improvements at no cost to
the City; and

WHEREAS, the City requires the execution of an Agreement to construct said
public improvements, together with actual satisfactory construction or
acceptable guarantees of construction as specified below, as a prerequisite to
approval of a Final Plat of the Subdivision; and

WHEREAS, the Developer must obtain City approval of construction plans,
specifications, and cost estimates for the improvements and upon City approval
of such construction plans, specifications, and cost estimates the City is
prepared to issue the Developer a Work Order permitting the commencement of
construction activities upon execution of this Agreement and payment of all

required fees, all as set forth and specified in Exhibit "A", which is attached hereto and incorporated herein as if fully set forth in this Agreement; and

WHEREAS, the City is willing to inspect or monitor the private inspection of the improvements during the course of their construction and accept said improvements upon their satisfactory completion, all as set forth and specified in Exhibit "B", which is attached hereto and incorporated herein as if fully set forth in this Agreement; and

WHEREAS, the Developer financially guarantees the satisfactory completion of the infrastructure construction required herein and the payment of all labor and material costs and charges, all as set forth and specified in Exhibit "C", which is attached hereto and incorporated herein as if fully set forth in this Agreement;

NOW, THEREFORE, in consideration of the above, the City and the Developer hereby agree as follows:

1. The Developer shall, on or before the 1st day of September, 1987, complete to the satisfaction of the City the improvements required for the Subdivision as set forth, specified and referenced in Exhibit "A" attached hereto. The improvements which the Developer shall satisfactorily complete within the time limitation stated above are described and identified in Exhibit "D", which is attached hereto and incorporated herein as fully set forth in this Agreement.

The time limitation stated above may be extended by the City Engineer for a period not to exceed twelve (12) months if the Developer shows adequate reasons for said extension.

2. After execution of this Agreement, payment of all fees as specified in Exhibit "A" attached hereto, and, if applicable, delivery of the financial guarantee specified in Exhibit "C" attached hereto, the Developer shall be issued a Work Order by the City. The Developer shall advise the City Engineer in advance of the actual start of construction and arrange for all inspections required and specified in Exhibit "B" attached hereto. The Developer shall permit the City or other participating agencies to make such tests and inspections during the construction of the improvements and upon completion of the improvements as are necessary or desirable.

3. Prior to final acceptance of the completed improvements by the City, the Developer shall furnish to the City Engineer all documentation of the completion of construction as set forth and specified in Exhibit "A" attached hereto.

4. Until acceptance of the improvements by the City, the Developer shall be solely responsible for maintaining the premises being subdivided in a safe condition. The Developer agrees to defend, indemnify and hold harmless the City and its officers, agents and employees from and against all suits, actions or claims of any character brought because of any injury or damage arising out of the ^{faulty} design or construction of the improvements or by reason of any act or omission, or misconduct of the Developer, his agents, employees or the Engineer or Contractor or their agents or employees. The indemnity required hereunder shall not be limited by reason of the specifications of any particular insurance coverage in this Agreement. Nothing herein is intended to impair any right or indemnity under the laws of the State of New Mexico.

5. The Developer shall procure or cause to be procured and maintain public liability insurance in the amount of not less than One Million Dollars (\$1,000,000) combined single limit for accidents or occurrences which cause bodily injury, death or property damage to any member of the public resulting from any condition of the lands of the subdivision or improvements therein or the construction activities thereon. The insurance policy must name the City of Albuquerque, its employees, and elected officials, as their interest may appear, as additional insureds. The Developer shall maintain such insurance until acceptance of the improvements by the City. Any cancellation provision must provide that if the policy is cancelled prior to the expiration date hereof, materially changed, or not renewed, the issuing company will mail 30 days written notice to the City, attention City Engineer. The Developer shall furnish the City Engineer a certificate of said insurance prior to issuance of a Work Order for construction of the improvements.

6. If at the time that construction of the Project is completed the City does not own the real property on or in which the improvements are constructed, the Developer shall convey such real property and property rights as the City deems necessary, together with all improvements, to the City free and clear of all claims, encumbrances and liens prior to final acceptance of the improvements by the City. Conveyance may be appropriate dedication on the final plat of the subdivision.

7. At the time of acceptance of the completed improvements or any portion thereof by the City, the Developer shall furnish or cause to be furnished a bond or other suitable guarantee in a form and with a surety satisfactory to the City to guarantee the completed project against defective

411

materials and workmanship for a period of three (3) years following the date of acceptance by the City.

8. The City shall either perform or monitor the performance of inspections during the course of construction of the improvements and inspect the improvements upon their completion in a timely manner, all as set forth and specified in Exhibit "B" attached hereto.

9. The City shall designate a Construction Engineer and/or Inspector for this project.

10. The City shall make available at established reproduction costs for the use of the Developer or its agents all of its maps, records, laboratory tests, or other data pertinent to the work to be performed by the Developer or its agents pursuant to this Agreement and also any other maps, records, or other materials available to the City upon the City's request to any other public agency or body.

11. The City shall issue a Certificate of Completion and Acceptance for the Improvements upon final completion to the City's satisfaction of the Improvements as described in the plans and specifications as set forth and specified in Exhibit "A" attached hereto. However, the City Engineer, in his discretion, may issue a Certificate of Completion and Acceptance for a portion of the Improvements in accordance with the conditions and procedures set forth in Exhibit "C" attached hereto.

12. If the Developer has requested Final Plat approval by the City prior to the actual construction of the improvements, the City will approve the Final Plat for recordation upon execution of this Agreement, payment of all fees specified in Exhibit "A" attached hereto, delivery of the financial guarantee specified in Exhibit "C" attached hereto and full compliance with the City's Subdivision Ordinance.

13. This Agreement shall not be assigned except with the written consent of the parties hereto and the express written concurrence of any surety who has undertaken to guarantee the completion of the Improvements. If so assigned, this Agreement shall extend to and be binding upon the successors and assigns of the parties hereto.

14. In the event of the sale, conveyance, or assignment of the Subdivision or any portion thereof, the City will not release the Developer from its obligations under this Agreement and will continue to hold the Developer responsible for all Improvements until a successor in interest to the Developer has posted a suitable guarantee and entered into a Subdivision Improvement Agreement with the City. At such time as acceptable security has been posted by the Developer's successor in interest and the Agreement executed, the City will release the guarantee.

15. Should there be a conflict between the terms and conditions of this Agreement (with Exhibits A, B, C, and D) and the terms and conditions of any other document referred to herein, the terms and conditions of this Agreement (with Exhibits A, B, C, and D) shall govern.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the date first above written.

DEVELOPER
 Cavan Associates, Ltd.
[Signature]
 Signed
 Robert D. Custer
 Name
 Regional Vice President
 Title

CITY OF ALBUQUERQUE, NEW MEXICO

[Signature]
 James N. Hicks Jr., Principal Engineer,
 Design Division, Public Works Dept.
[Signature]
 Gene Romo
 Chief Administrative Officer

ATTEST:

N/A
 City Clerk

REVIEWED BY:

[Signature]
 Assistant City Attorney
[Signature]
 City Attorney

STATE OF NEW MEXICO)
) ss.
 COUNTY OF BERNALILLO)

The foregoing instrument was acknowledged before me this 9th day
 of September, 1986, by Robert D. Custer
 of Cavan Associates, Ltd.

[Signature]
 Notary Public

My Commission Expires:

August 29, 1988



OFFICIAL SEAL
 Nancyanne Faux
 NOTARY PUBLIC - STATE OF NEW MEXICO
 Notary Bond Filed with Secretary of State
 My Commission Expires 8/29/88

STATE OF NEW MEXICO)
) ss.
 COUNTY OF BERNALILLO)

The foregoing instrument was acknowledged before me this 4th day
 of December, 1986, by Gene Romo, Chief Administrative
 Officer of the City of Albuquerque.

[Signature]
 Notary Public

My Commission Expires:

3-17-90

TO SUBDIVISION IMPROVEMENT AGREEMENT
 EXECUTED BY AND BETWEEN Cavan Associates, Ltd. (DEVELOPER)
 AND CITY OF ALBUQUERQUE, NEW MEXICO (CITY) ON
 THE 4th DAY OF December, 1986.

1. COMMITMENT TO CONSTRUCT IMPROVEMENTS.

The Developer shall construct in a manner satisfactory to the City the improvements listed in Paragraph 1 of the Subdivision Improvement Agreement and which are shown in greater detail on the Developer's proposed and approved Subdivision Improvements Plan, which was filed with the office of the City Engineer and identified as Project No. 3006.

2. DESIGN AND CONSTRUCTION METHODS.

As soon as reasonably practical after approval of the Developer's Preliminary Plat of the Subdivision, the Developer shall submit to the City Engineer final construction plans, specifications, and cost estimates for the proposed public improvements. At this time, the Developer shall pay all fees required under Section 12.D of the City's Subdivision Ordinance and Paragraph 4 of this Exhibit.

The Developer has engaged Isaacson & Arfman, P.A.
 as Engineer(s) for the construction project, who are Registered Professional Engineers in the State of New Mexico. The Developer shall ensure that the Engineer(s), in such capacity, shall provide the following services prior to, during, and after construction of the improvements:

Design of all public infrastructure improvements required
by the City of Albuquerque

415

The Developer shall ensure that the Engineer(s) perform all of the above services in a satisfactory manner and submit to the City Engineer any reports required by the City Engineer.

The Developer has engaged Brown Dazlyl, Inc. as Contractor(s), who is properly licensed in the State of New Mexico. The Developer shall ensure that the Contractor(s), in such capacity, shall in a manner satisfactory to the City construct the improvements as shown on Developer's proposed Subdivision Improvements Plan (Project No. 3006), incorporating any change orders approved by the City Engineer, City of Albuquerque Interim Standard Specifications for Public Works Construction, 1985, and all other applicable laws, regulations, and policies. Construction surveying and testing shall be performed as set forth in Exhibit "B" of the Subdivision Improvement Agreement between Developer and the City.

3. COMPLETION OF CONSTRUCTION.

The Developer shall report the completion of construction in writing to the City Engineer. Upon receipt of the report, the City Engineer or his representative shall visually inspect the public improvements to verify completion of construction according to plan. Subsequent to verification, the Developer shall submit to the City Engineer a "final acceptance package", which shall consist of the following documents:

a. "As-built" drawings of reproducible quality, depicting all construction of the public improvements as actually accomplished in the field and certified by a New Mexico Registered Professional Engineer or Land Surveyor, as appropriate,

b. A list of quantities of contract items in place, using the bid items in the City Engineer's Standard Estimated Unit Prices.

This list shall be divided into the following categories as applicable:

416

- (1) Sanitary sewer items and quantities;
- (2) Water service items and quantities;
- (3) Street paving quantities;
- (4) Street curb and gutter quantities; and
- (5) Storm drainage improvements and quantities.

The City shall concurrently provide a written certification from the City Engineer that the construction has been performed in substantial compliance with the City of Albuquerque Interim Standard Specifications for Public Works Construction, 1985, and with the approved final plans and specifications for public improvements. If the City is acting as the Contractor for all or a portion of the improvements constructed pursuant to this Agreement, the City shall prepare its own final acceptance package documents for those improvements actually constructed by the City.

Upon receipt of the Developer's "final acceptance package", the City Engineer shall review it for completeness and accuracy. If the documentation has been satisfactorily completed, the City Engineer shall approve the package and issue a Certificate of Completion and Acceptance. Any financial guarantee provided by the Developer in accordance with Section 6.D.2 of the City's Subdivision Ordinance and as described in Exhibit "C" to the Subdivision Improvement Agreement between the Developer and the City shall be released no later than sixty (60) days after approval of the final acceptance package by the City Engineer.

4. PAYMENT OF FEES.

Prior to issuance of a Work Order, the Developer shall pay to the City the following fees:

Prior to final acceptance of the improvements by the City, the Developer shall pay any other City fees which may have been incurred during the course of construction.

EXHIBIT "B"
TO SUBDIVISION IMPROVEMENT AGREEMENT
EXECUTED BETWEEN Cavan Associates, Ltd. (DEVELOPER)
AND THE CITY OF ALBUQUERQUE (CITY)
ON THE 4th DAY OF December, 1986.

418

1. CONSTRUCTION INSPECTION METHODS.

Inspection of the subdivision improvement construction shall be performed by the City of Albuquerque, a New Mexico Registered Professional Engineer, in accordance with all applicable laws, ordinances and regulations. If said inspection is performed by an entity other than the City, the City may monitor said inspection and the Developer shall ensure that the inspecting entity provides all inspection results, reports and related data to the City as required for review. The City retains the right to perform its own general overall inspection of the construction project at any time prior to final acceptance of the improvements if deemed necessary or advisable by the City Engineer. For any inspections performed by the City, the Developer shall pay to the City a reasonable fee therefor.

2. CONSTRUCTION SURVEYING.

Construction surveying for the subdivision improvement project shall be performed by Walker Surveying in accordance with all applicable laws, ordinances and regulations. If said construction surveying is performed by an entity other than the City, the City may monitor said construction surveying and the Developer shall ensure that the construction surveying entity provides all construction surveying field notes, plats, reports and related data to the City as required for review. If any construction surveying is performed by the City, the Developer shall pay to the City a reasonable fee therefor.

3. FIELD TESTING.

Field testing of the subdivision improvement construction shall be performed by Fox & Associates, a certified testing laboratory under the supervision of a New Mexico Registered Professional Engineer, in accordance with the technical standards contained in the applicable contract documents and all applicable laws, ordinances and regulations. If any field testing is performed by an entity other than the City, the City may monitor said field testing and the Developer shall ensure that the field testing entity provides all field testing results, reports and related data to the City as required for review. If any field testing is performed by the City, the Developer shall pay to the City a reasonable fee therefor.

4. RECORD TESTING.

Notwithstanding the provisions of Paragraph 3 above, the City retains the right to perform any and all record testing which may be deemed necessary or advisable by the City Engineer at the expense of the Developer.

EXHIBIT "C"
TO SUBDIVISION IMPROVEMENT AGREEMENT
EXECUTED BETWEEN Cavan Associates, Ltd. (DEVELOPER)
AND THE CITY OF ALBUQUERQUE (CITY) ON
THE 4th DAY OF December, 1986.

1. PLAT APPROVAL STATUS

The Developer has/has not (circle one) requested final plat approval by the City prior to construction of the Subdivision Improvements described in Paragraph 1 of the Subdivision Improvement Agreement. If the Developer has not requested final plat approval prior to construction of the improvements, no financial guarantee is required by the City. However, the Developer understands and agrees that the City will not approve the Developer's proposed plat until the improvements are completed in accordance with the Agreement to which this document is attached as an Exhibit.

If the Developer has requested final plat approval prior to the construction of the improvements, a financial guarantee in an amount of not less than 125 percent of the costs of completing the improvements (as estimated by the City Engineer) is required pursuant to the City's Subdivision Ordinance. Said financial guarantee must be irrevocable in form and may be effected by a bond, letter of credit, escrow deposit, or other acceptable pledge of liquid assets payable to the City in the event of Developer's default under the Subdivision Improvement Agreement.

2. FINANCIAL GUARANTEE

With respect to the Subdivision Improvement Agreement to which this document is attached as an Exhibit, the Developer has acquired or is able to acquire the following described financial guarantee (describe fully, indicate amount, identification number, names of bank or bonding entity, inclusive dates of guarantee, and all other relevant information):

An Escrow Letter in the amount of \$544,180.50 was issued on October

29, 1986 for the purpose of providing financial guarantee for project #3006.

Inclusive dates: September 1, 1987 through November 1, 1987.

The Developer understands and agrees that the original executed financial guarantee described above must be delivered to the City simultaneously with the City's execution of the Subdivision Improvement Agreement between Developer and the City; and must be in an amount of not less than 125 percent of the cost of completing the improvements, as estimated by the City Engineer.

In the event the Developer shall fail or neglect to fulfill his obligations under this Agreement, the City shall have the right to construct or cause to be constructed the Improvements specified herein, as shown on the Final Plat and in the plans and specifications as approved, and the Developer as Principal and the surety or sureties shall be jointly and severally liable to pay to and indemnify the City, the total cost to the City thereof, including but not limited to, engineering, legal, and contingent costs together with any damages, either direct or consequential, which the City may sustain on account of the failure of the Developer to carry out and execute all of the provisions of the Agreement to which this document is attached as an Exhibit. The City shall have the unconditional right to call upon the financial guarantee provided by the Developer described in this paragraph for the purposes specified and in the amounts enumerated in such guarantee.

3. PROCEDURES FOR REDUCTION OF FINANCIAL GUARANTEE UPON PARTIAL COMPLETION OF IMPROVEMENTS.

The Developer may request a reduction in the amount of financial guarantee upon partial completion of the subdivision improvements. To qualify for a financial guarantee reduction, the completed improvements must be of a free-standing nature, functionally independent of any uncompleted

improvements, and completed in substantial compliance with the subdivision improvement construction plans as determined by an inspection conducted by the City.

If the completed improvements meet the above requirements, the City Engineer will then estimate the cost of completing the remaining improvements. The Developer may then submit the following documents to the City for review and approval:

a) A revised financial guarantee in an amount of not less than 125 percent of the City Engineer's estimated cost of completing the remaining improvements;

b) A release of the original financial guarantee for execution by the City;

c) Documentation that the completed improvements and the land in which the completed improvements are located are subject to no liens, claims or other encumbrances;

d) A bond or other suitable instrument guaranteeing the completed improvements against defective materials and workmanship for a period of three (3) years as set forth in Paragraph 7 of the Subdivision Improvement Agreement between the Developer and the City.

Upon receipt of the above-described documents in forms acceptable to the City, the City shall issue a Certificate of Completion and Acceptance for the completed improvements and accepts the revised financial guarantee tendered by the Developer.

STATE OF NEW MEXICO
COUNTY OF BERNALILLO
FILED FOR RECORD

1986 DEC -5 PM 3:07

Ma 426A 407-422
DORIS C. WALLER
CLERK & RECORDER
C-2

Sunwest Bank of Albuquerque, N.A.
P.O. Box 25500
Albuquerque, New Mexico 87125-5500
Tel. 505-765-2211

FILED WITH CITY CLERK'S OFFICE

12-05-86

Scott K. Browning
Vice President

October 29, 1986

**SUNWEST
BANK**

Mr. Gene Romo
Chief Administrative Officer
City of Albuquerque
P. O. Box 1293
Albuquerque, NM 87103

RE.: Escrow Letter for Cavan Sunport Centre
City of Albuquerque Project No. 3006
YBP Limited Partnership

Dear Mr. Romo:

This is to advise the City of Albuquerque that Sunwest Bank of Albuquerque, N. A., holds in Escrow in our loan reserves the sum of \$544,180.50 for the exclusive purpose of providing the financial guarantees required by Cavan Associates, Ltd.; YBP Limited Partnership, for the installation of those improvements in Cavan Sunport Centre (Project No. 3006) identified in the Agreement between the City of Albuquerque and Cavan Associates, Ltd. The Agreement is attached hereto as Exhibit "A", and is recorded in Book Misc. 426-A, at pages 407 to 422, of the records of the County of Bernalillo, State of New Mexico ("Agreement").

The funds from this Escrow of loan reserves will be released for the specific purpose of paying for the installation of the improvements referenced in the Agreement, and will only be released upon the written approval by William F. McNamara, City Engineering Department, or such other City representative as shall be designated by the City Engineer. If, by the date September 1, 1987, the improvements described in the Agreement have not been fully installed, inspected, approved and accepted by the City of Albuquerque, then upon presentation between the dates September 1, 1987 and November 1, 1987 of the City's notarized certification, executed by the Chief Administrative Officer of the City of Albuquerque, stating that Cavan Associates, Ltd. has failed to comply with the terms of the Agreement, and also certifying the estimated costs of completing the improvements specified in the Agreement, then Sunwest Bank of Albuquerque, N. A. shall draw by Certified Check to the City of Albuquerque, from the Escrow of loan reserves, the amount of 125% of the estimated costs of completing the improvements specified in the Agreement, not to exceed \$544,180.50.

This Escrow of loan reserves for the benefit of the City of Albuquerque shall be irrevocable until the occurrence of one of the following:

1. Sixty (60) days following final City acceptance of the completed improvements specified in the Agreement;

Mr. Gene Romo
October 29, 1986
Page TWO

2. City notification of failure of Cavan Associates, Ltd. to comply with the terms of the Agreement, and payment by Certified Check from Sunwest Bank of Albuquerque, N. A. to the City of Albuquerque of the sum of 125% of the estimated costs of completing the improvements specified in the Agreement; or

3. The expiration of the date November 1, 1987.

Very truly yours,

SUNWEST BANK OF ALBUQUERQUE, N. A.

BY: Scott K. Browning
Scott K. Browning
Vice President

APPROVED AS TO FORM:

CITY OF ALBUQUERQUE

Allen V. Kearney
Assistant City Attorney

Approved As To Form

[Signature]
City Attorney

Date: 12/2/86

86119955

SIDEWALK VARIANCE AGREEMENT

8600200
L16/D23
400

THIS AGREEMENT made this 4th day of December, 1986,

by and between the City of Albuquerque, New Mexico (hereinafter referred to as (City") and Cavan Associates, Ltd.

referred to as "Developer"), pursuant to Section 6 of the City's Subdivision Ordinance (Enactment No. 56-1983, effective June 29, 1983) and Section 16 of the City's Sidewalk Ordinance (Enactment No. 39-1981, Approved May 20, 1981).

WHEREAS, the Developer is developing certain lands within the City of Albuquerque, County of Bernalillo, State of New Mexico, known as Cavan Sunport Centre (hereinafter referred to as the "Subdivision"); and

WHEREAS, the Developer has submitted and the City has approved a preliminary plat identified as Cavan Sunport Centre; and

WHEREAS, the timetable for constructing the sidewalks within the subdivision is not finalized at this time and the Developer has requested a "SIDEWALK VARIANCE" to defer construction of said sidewalks; and

WHEREAS, the City requires the execution of an Agreement and acceptable guarantees for the construction of said public improvements as specified below, as a prerequisite of the approval of the "SIDEWALK VARIANCE".

NOW, THEREFORE, in consideration of the above, the City and the Developer hereby agree as follows:

1. The Developer agrees to complete the required sidewalk improvements on or before February 4, 1988; such period for completion may be extended by the City Engineer to a date not to exceed that specified in the Development Review Board (DRB) findings for the above referenced "SIDEWALK VARIANCE", a copy of which is attached hereto as Exhibit "A". Any such extension will require justification and extended financial guarantee as outlined in Exhibit "B".

2. After execution of this Agreement, and delivery of the financial guarantee specified in Exhibits "B" & "C" attached hereto, the Developer shall receive approval for the "SIDEWALK VARIANCE".

3. Said financial guarantee shall run for a period of sixty (60) days beyond the completion date noted in item 1 and as specified in Exhibits "B" & "C" attached hereto.

4. This Agreement shall not be assigned except with the written consent of the parties hereto and the express written concurrence of any surety who has undertaken to guarantee the completion of the Improvements. If so assigned, this Agreement shall extend to and be binding upon the successors and assigns of the parties hereto.

5. In the event of the sale, conveyance, or assignment of the Subdivision or any portion thereof, the City will not release the Developer from its obligations under this Agreement and will continue to hold the Developer responsible for all Improvements until a successor in interest to the Developer has posted a suitable guarantee and entered into a Sidewalk Variance Agreement with the City. At such time as acceptable security has been posted by the Developer's successor in interest and the Agreement executed, the City will release the guarantee.

6. Should there be a conflict between the terms and conditions of this Agreement (with Exhibits A, B, & C) and the terms and conditions of any other document referred to herein, the terms and conditions of this Agreement (with Exhibits A, B, & C) shall govern.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the date first above written.

DEVELOPER
Cavan Associates, Ltd.

Robert D. Custer
Regional Vice President

ATTEST:

N/A
City Clerk

REVIEWED BY:

William W. Kearney
Assistant City Attorney

City Attorney

CITY OF ALBUQUERQUE, NEW MEXICO

402

James N. Hicks, Jr.
Principal Engineer
Design Division, Public Works Dept.

Gene Romo
Gene Romo
Chief Administrative Officer

STATE OF NEW MEXICO)
COUNTY OF BERNALILLO) ss.

The foregoing instrument was acknowledged before me this 24th day of September, 19 86, by Robert D. Custer of Cavan Associates, Ltd.

Lola F. Spaccanuti
Notary Public

My commission expires:

04-22-90

STATE OF NEW MEXICO)
COUNTY OF BERNALILLO) ss.

The foregoing instrument was acknowledged before me this 4th day of December, 19 86, by Gene Romo, Chief Administrative Officer of the City of Albuquerque.

Priscilla Phillips
Notary Public

My commission expires:

3-17-90

AUG 05 1986

Ans'd.....403



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

MAYOR

KEN SCHULTZ

CHIEF
ADMINISTRATIVE OFFICER

GENE ROMO

DEPUTY CAO
PUBLIC SERVICES

FRANK MARTINEZ

DEPUTY CAO
PLANNING/DEVELOPMENT

BILL MUELLER

July 30, 1986

Cavan Associates Ltd.
500 Marquette Building, Suite 300
Albuquerque, NM 87102

REF:S-86-45 Isaacson & Arfman, P.A., agents for Cavan Associates, Ltd.,
DRB-84-849 request Preliminary Plat approval for Parcels A, 29A, and 30A,
(SE) Within Section 27, T10N, R3E, NMPM, zoned SU-1 for C-2 and O-1 Uses
(City) and located in the northeast corner of the intersection of
Gibson Blvd SE and Yale Ave SE, containing approximately 41.8
acres. (L-16)

At the July 29, 1986, Development Review Board meeting, the request for a Preliminary Plat and a Sidewalk Variance were approved.

A temporary deferral of the installation of sidewalks on International Avenue and Center Street is approved with construction to be at the earlier of the two following dates:

1. When an individual tract or lot is developed.
2. Within 2 years of the date of the approval of the final plat.
3. Additional extensions may be approved in deferral time at the discretion of the Development Review Board.
4. Financial assurances are required for the initial deferral and for any subsequent deferrals.

If you have any questions, please call me at 768-3946.

Richard Dineen, Chairman
Development Review Board

cc:Traffic Engineering
City Engineering
Transportation
File

Isaacson & Arfman, PA., 128 Monroe NE, 87108

EXHIBIT "B"
TO SIDEWALK VARIANCE AGREEMENT
EXECUTED BY AND BETWEEN Cavan Associates, Ltd. (DEVELOPER)
AND THE CITY OF ALBUQUERQUE (CITY) ON
THE 4th DAY OF December, 19 86

1. FINANCIAL GUARANTEE

A financial guarantee in an amount of not less than 125 percent of the costs for sidewalk improvements within the subdivision as detailed in Exhibit "C" (as estimated by the City Engineer) is required pursuant to the City's Subdivision Ordinance. Said financial guarantee must be irrevocable in form and may be effected by a bond, letter of credit, escrow deposit, or other acceptable pledge of liquid assets payable to the City in the event of Developer's default under the Sidewalk Variance Agreement to which this Exhibit "B" is attached.

With respect to the Sidewalk Variance Agreement to which this document is attached as an Exhibit, the Developer has acquired or is able to acquire the following described financial guarantee (describe fully, indicate amount, identification number, name of bank or bonding entity, inclusive dates of guarantee, and all other relevant information):

An escrow letter issued by Sunwest Bank of Albuquerque in the
amount of \$42,724.83. Inclusive dates: February 4, 1988 through
April 4, 1988.

The Developer understands and agrees that the original executed financial guarantee described above must be delivered to the City simultaneously with the City's execution of the Sidewalk Variance Agreement between the Developer and the City; and must be in an amount of not less than 125 percent of the cost of completing the improvements, as estimated by the City Engineer (see Exhibit "C").

In the event the Developer shall fail or neglect to fulfill his obligations under this Agreement, the City shall have the right to construct or cause to be constructed the Improvements specified herein, as shown on the Final Plat and in the plans and specifications as approved, and the Developer as Principal and the surety or sureties shall be jointly and severally liable to pay to and indemnify the City, the total cost to the City thereof, including but not limited to, engineering, legal, and contingent costs together with any damages, either direct or consequential, which the City may sustain on account of the failure of the Developer to carry out and execute all of the provisions of the Agreement to which this document is attached as an Exhibit. The City shall have the unconditional right to call upon the financial guarantee provided by the Developer described in this paragraph for the purposes specified and in the amounts enumerated in such guarantee.

2. PROCEDURES FOR EXTENSION

The Developer may request that the period of construction and financial guarantee be extended for an additional period of time mutually agreed upon by both the City Engineer and the Developer (time of construction may not exceed term of Sidewalk Variance without the additional consent of the Development Review Board). The amount and form (letter of credit, escrow deposit or other acceptable pledge of liquid assets payable to the City) of the said financial guarantee shall also be mutually agreed upon by both the City and the Developer but shall not exceed 125% of the estimated construction cost at the time of consideration.

ENGINEER'S ESTIMATE OF COST TO CONSTRUCT SIDEWALKS
WITH 25% MARK UP. PRICES PER CITY ENGINEER'S STANDARD UNIT PRICES

City Index #	Description	Unit Price	Quantity	Unit	Contract Amount
P-42	4" PCC SDWK	\$ 1.43	23,902	SY	\$ 34,179.86

FOR FINANCIAL GUARANTEE

$$34,179.86 \times 125\% = \$42,724.83$$

Rev. 10/85

STATE OF NEW MEXICO
COUNTY OF SERRAVALLO
FILED AND RECORDED

1986 DEC -5 PM 3:06

Map 426A PG 400-406
COLORES C. WALTER
CLERK & RECORDER
[Signature]

12-05-86

Scott K. Browning
Vice President

October 29, 1986



Mr. Gene Romo
Chief Administrative Officer
City of Albuquerque
P. O. Box 1293
Albuquerque, NM 87103

RE.: Escrow Letter for Cavan Sunport Centre
City of Albuquerque Project No. 3006
YBP Limited Partnership

Dear Mr. Romo:

This is to advise the City of Albuquerque that Sunwest Bank of Albuquerque, N. A., holds in Escrow in our loan reserves the sum of \$42,724.83 for the exclusive purpose of providing the financial guarantees required by Cavan Associates, Ltd.; YBP Limited Partnership, for the installation of sidewalks in Cavan Sunport Centre (Project No. 3006) identified in the Agreement between the City of Albuquerque and Cavan Associates, Ltd. The Agreement is attached hereto as Exhibit "A", and is recorded in Book Misc. 426A, at pages 400 to 406, of the records of the County of Bernalillo, State of New Mexico ("Agreement").

The funds from this Escrow of loan reserves will be released for the specific purpose of paying for the installation of the sidewalks referenced in the Agreement, and will only be released upon the written approval by William F. McNamara, City Engineering Department, or such other City representative as shall be designated by the City Engineer. If, by the date February 4, 1988, the improvements described in the Agreement have not been fully installed, inspected, approved and accepted by the City of Albuquerque, then upon presentation between the dates February 4, 1988 and April 4, 1988 of the City's notarized certification, executed by the Chief Administrative Officer of the City of Albuquerque, stating that Cavan Associates, Ltd. has failed to comply with the terms of the Agreement, and also certifying the estimated costs of completing the improvements specified in the Agreement, then Sunwest Bank of Albuquerque, N. A. shall draw by Certified Check to the City of Albuquerque, from the Escrow of loan reserves, the amount of 125% of the estimated costs of completing the improvements specified in the Agreement, not to exceed \$42,724.83.

This Escrow of loan reserves for the benefit of the City of Albuquerque shall be irrevocable until the occurrence of one of the following:

1. Sixty (60) days following final City acceptance of the completed improvements specified in the Agreement;

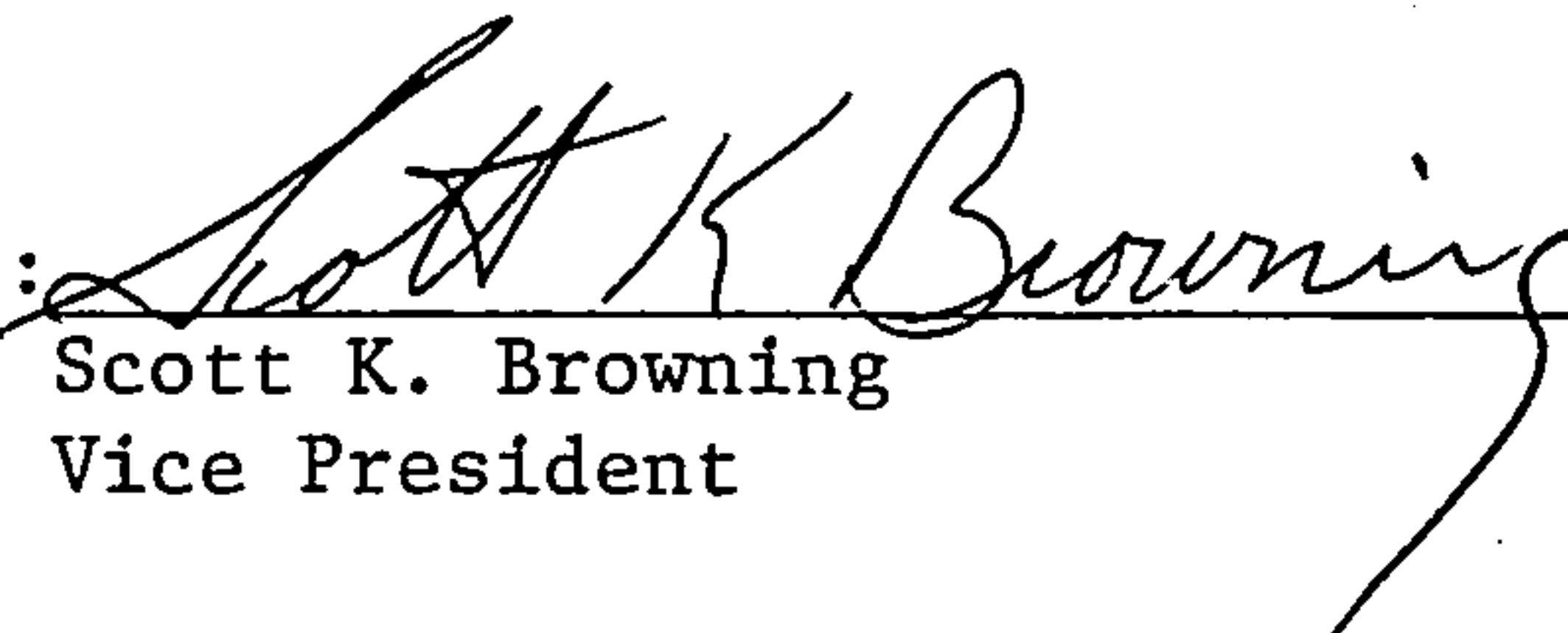
Mr. Gene Romo
October 29, 1986
Page TWO

2. City notification of failure of Cavan Associates, Ltd. to comply with the terms of the Agreement, and payment by Certified Check from Sunwest Bank of Albuquerque, N. A. to the City of Albuquerque of the sum of 125% of the estimated costs of completing the improvements specified in the Agreement; or

3. The expiration of the date April 4, 1988.

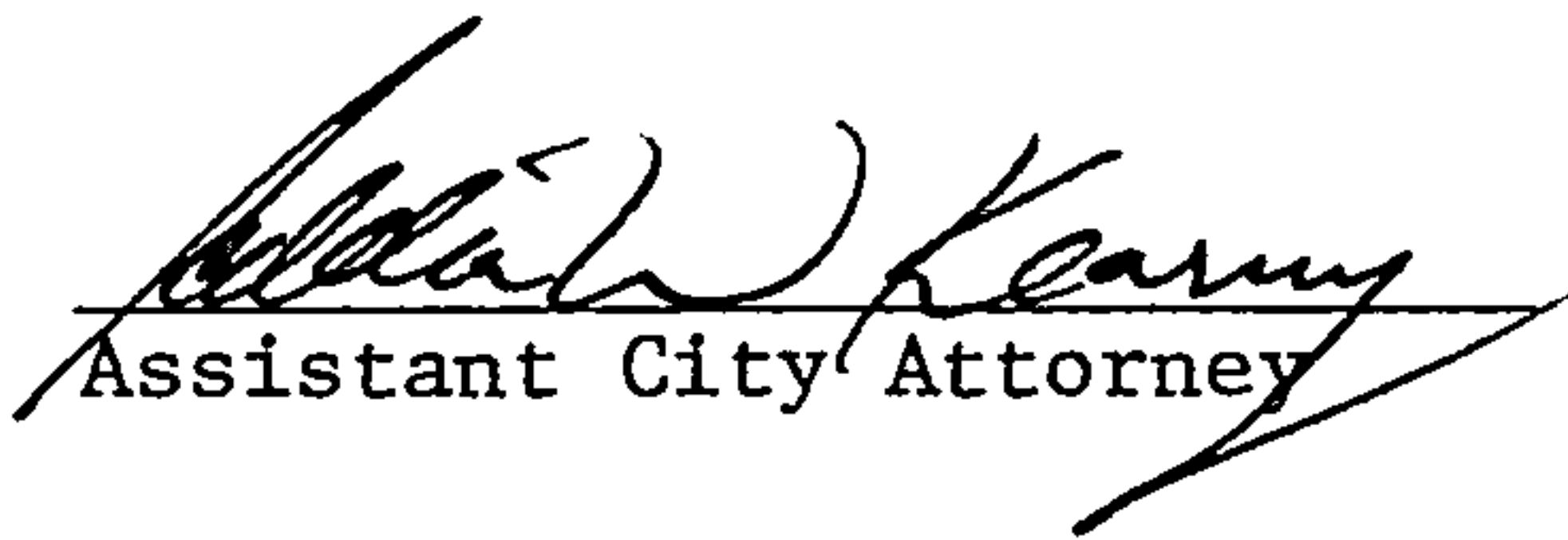
Very truly yours,

SUNWEST BANK OF ALBUQUERQUE, N. A.

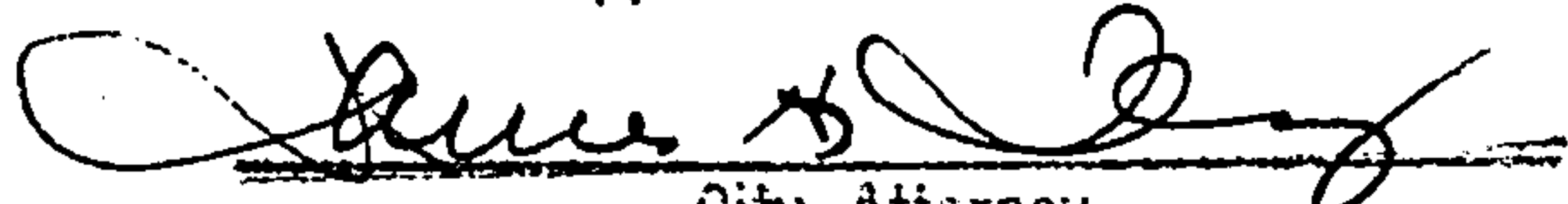
BY: 
Scott K. Browning
Vice President

APPROVED AS TO FORM:

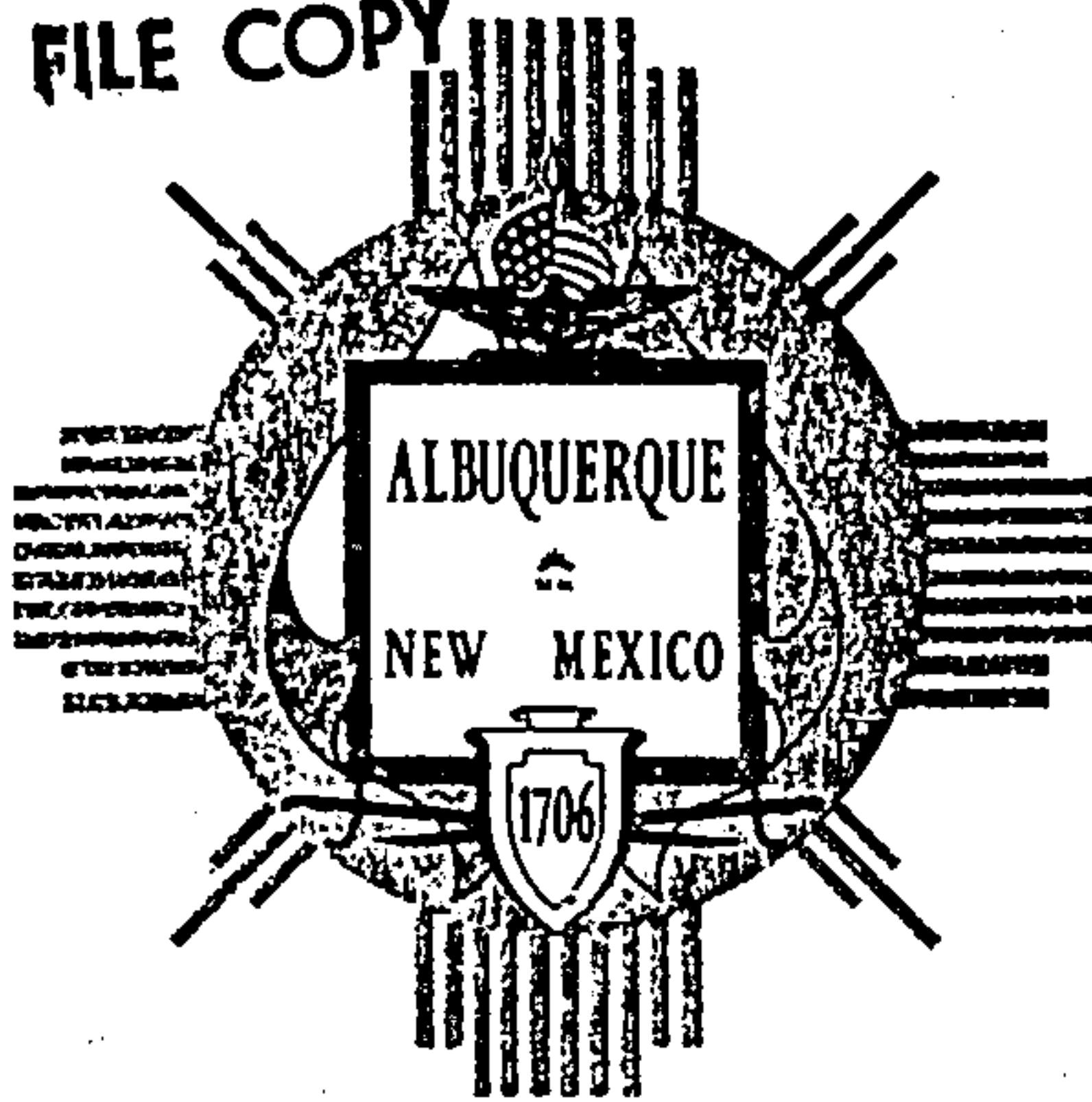
CITY OF ALBUQUERQUE


Assistant City Attorney

Approved As To Form


City Attorney
Date: 12/2/86

FILE COPY



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

HYDROLOGY SECTION

123 Central NW, Albuquerque, NM 87102
(505) 766-7644

November 11, 1986

Thomas Isaacson, P.E.
Isaacson & Arfman, P.A.
128 Monroe Street, NE
Albuquerque, New Mexico 87108

RE: DRAINAGE REPORT FOR CAVAN COMMERCE CENTER
(L-16/D23) RECEIVED OCTOBER 22, 1986

Dear Mr. Isaacson:

I would like to hereby acknowledge the receipt of your submittal. I do not know of any approvals that you have not already received that I can grant with this submittal.

The above referenced report will remain on file in our office and serve as a master plan for the proposed development area. Subsequent, individual tract, drainage plans will be required. These individual plans are required to comply with the drainage scheme approved in your report.

If I can be of further assistance, please call me at 768-2650.

Cordially,

Billy J. Boolsby
Billy J. Boolsby, P.E.
C.E./Hydrology Section

cc: Joe Beers, Cavan Associates

BJG/bsj

PUBLIC WORKS DEPARTMENT

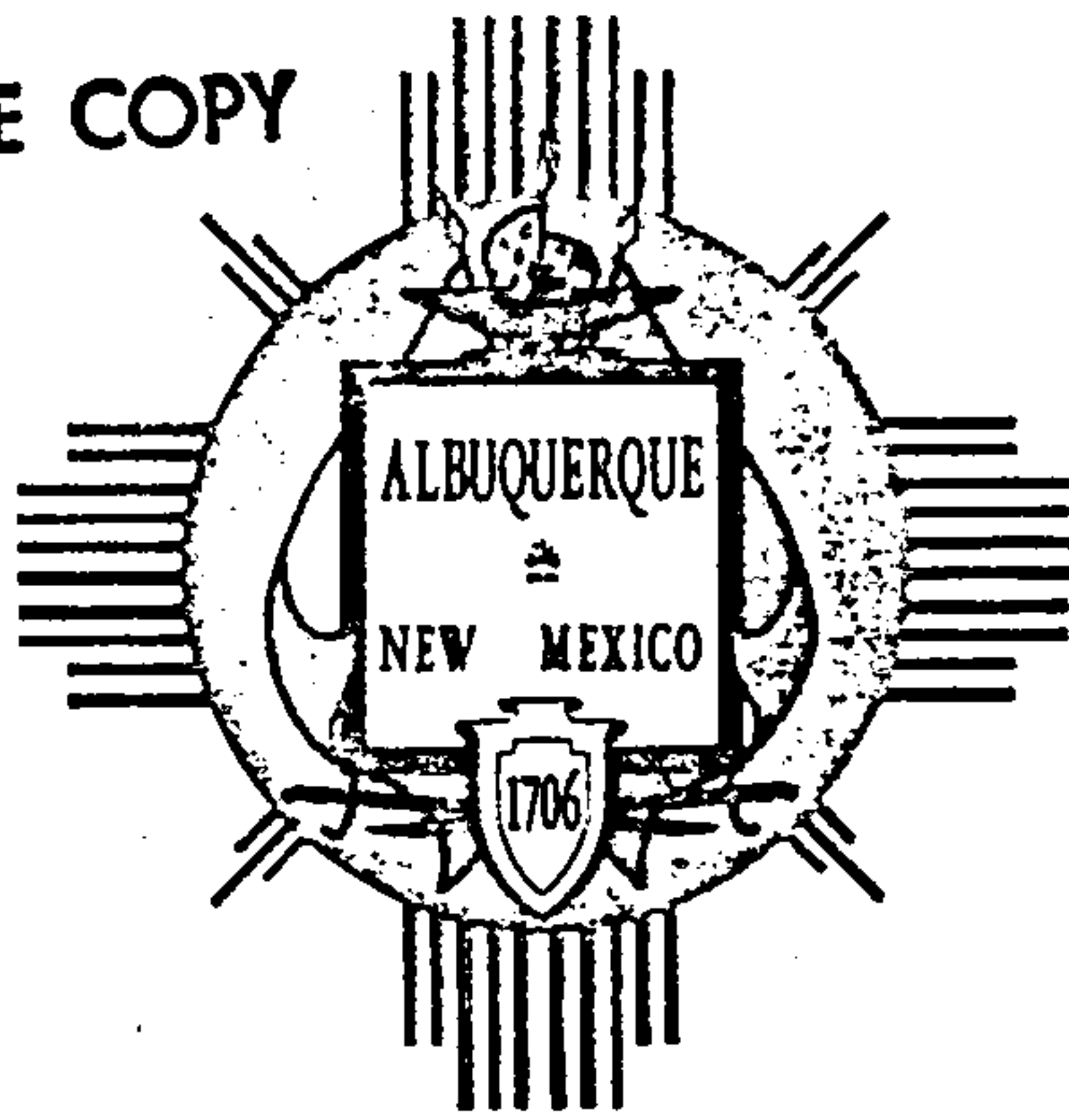
Walter Nickerson, P.E.; City Engineer

ENGINEERING GROUP

Telephone (505) 768-2500

AN EQUAL OPPORTUNITY EMPLOYER

FILE COPY



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

July 21, 1986

Scott McGee
Isaacson & Arfman, P.A.
128 Monroe, NE
Albuquerque, New Mexico 87108

RE: DRAINAGE PLAN FOR CAVAN COMMERCE CENTER
(L-16/D23) RECEIVED JULY 3, 1986

Dear Mr. McGee:

The above referenced plan, dated July 3, 1986, is approved for Rough Grading. However, we are unable to sign-off until Preliminary Plat is approved.

If you have any questions, call me at 766-7644.

Cordially,

Carlos A. Montoya, P.E.
City/County Floodplain Administrator

CAM/bsj

~~RESTRICTED - NOT FOR DISTRIBUTION~~

~~CONFIDENTIAL - NOT FOR DISTRIBUTION~~

ENGINEERING DIVISION

Telephone (505) 766-7467

AN EQUAL OPPORTUNITY EMPLOYER

DRAINAGE INFORMATION SHEET

PROJECT TITLE: CAVAN COMMERCE CENTER ZONE ATLAS/DRAINAGE FILE # L-16 / D23

LEGAL DESCRIPTION: PARCELS 29A, 30A, & PARCEL A (VOL C25, FOLIO 198 & 19)

CITY ADDRESS: NE CORNER OF YALE BLVD / GIBSON BLVD INTERSECTION

ENGINEERING FIRM: ISAACSON & ARFMAN, PA CONTACT: SCOTT MCGEE

ADDRESS: 128 MONROE NE PHONE: 268-8828

OWNER: CAVAN ASSOCIATES, LTD CONTACT: JOE BEERS

ADDRESS: 3320 E. SHEA BLVD, PHOENIX, AZ, 85028 PHONE: (602) 996-0929

ARCHITECT: CONTACT:

ADDRESS: PHONE:

SURVEYOR: ELDER CO. CONTACT: ED ELDER

ADDRESS: 530 JEFFERSON NE PHONE: 268-1830

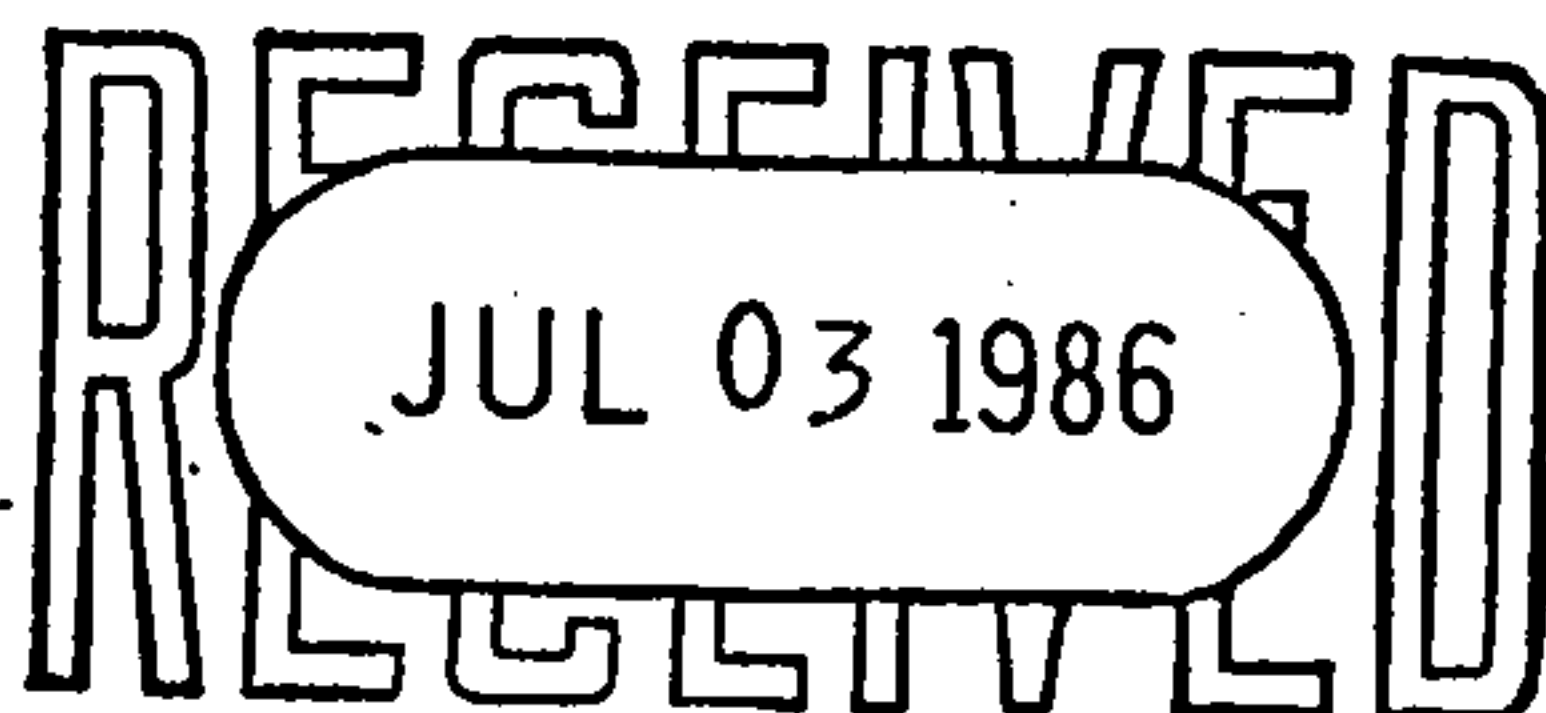
CONTRACTOR: BROWNE, DAZLYL CONTACT: DENNIS HEFLICK

ADDRESS: 3206 CANDELARIA NE PHONE: 883-6905

PRE-DESIGN MEETING:

 YES

 X NO



DRB NO.

EPC NO.

PROJECT NO.

 COPY OF CONFERENCE
RECAP SHEET PROVIDED

TYPE OF SUBMITTAL:

 DRAINAGE REPORT

 DRAINAGE PLAN

 CONCEPTUAL GRADING & DRAIN PLAN

 X GRADING PLAN

 EROSION CONTROL PLAN

 ENGINEER'S CERTIFICATION

CHECK TYPE OF APPROVAL SOUGHT:

 SECTOR PLAN APPROVAL

 SKETCH PLAT APPROVAL

 PRELIMINARY PLAT APPROVAL

 SITE DEVELOPMENT PLAN APPROVAL

 FINAL PLAT APPROVAL

 BUILDING PERMIT APPROVAL

 FOUNDATION PERMIT APPROVAL

 CERTIFICATE OF OCCUPANCY APPROVAL

 X ROUGH GRADING PERMIT APPROVAL

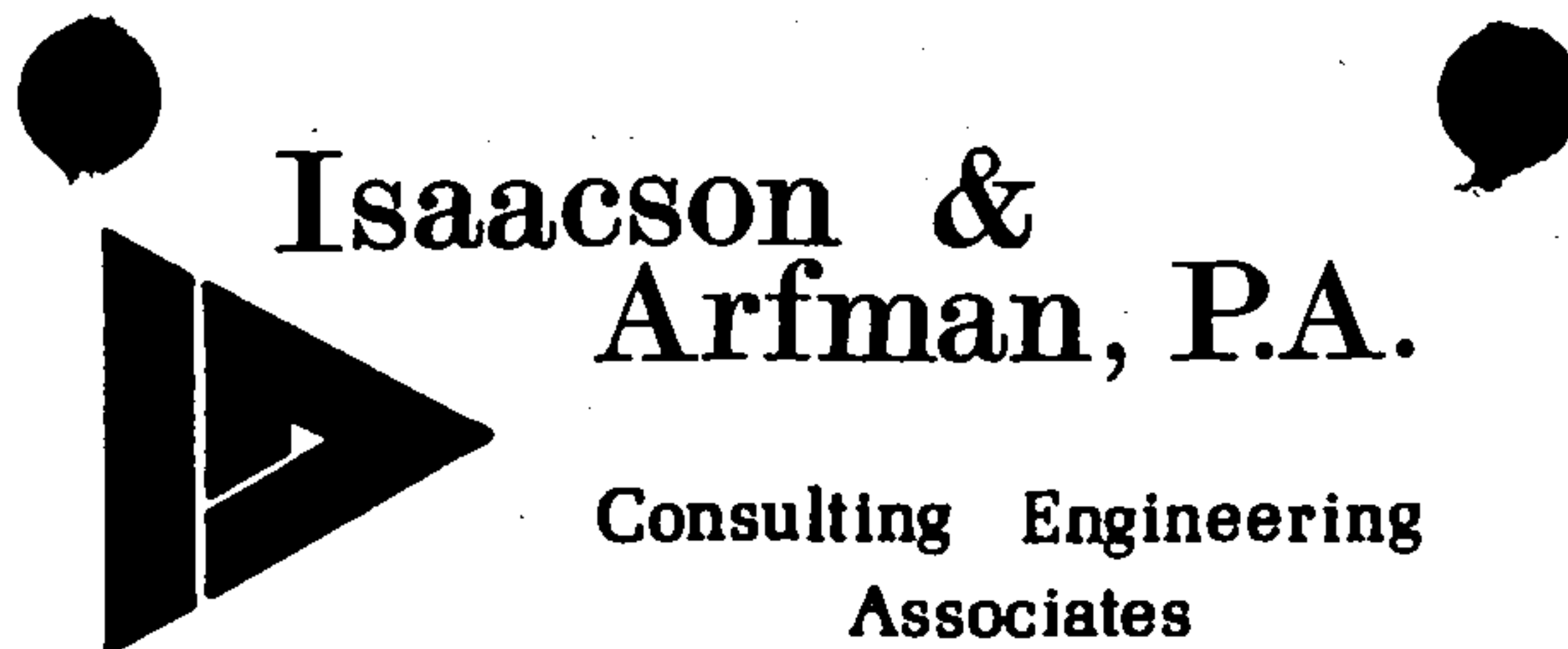
 GRADING/PAVING PERMIT APPROVAL

 OTHER (SPECIFY)

DATE SUBMITTED: July 3, 1986

BY: Scott M McGee

REV. 6/85



Isaacson &
Arfman, P.A.

Consulting Engineering
Associates

Letter of Transmittal

To HYDROLOGY
2nd @ Central
ALBUQUERQUE, NM

Date 7-3-86
Job No. 462

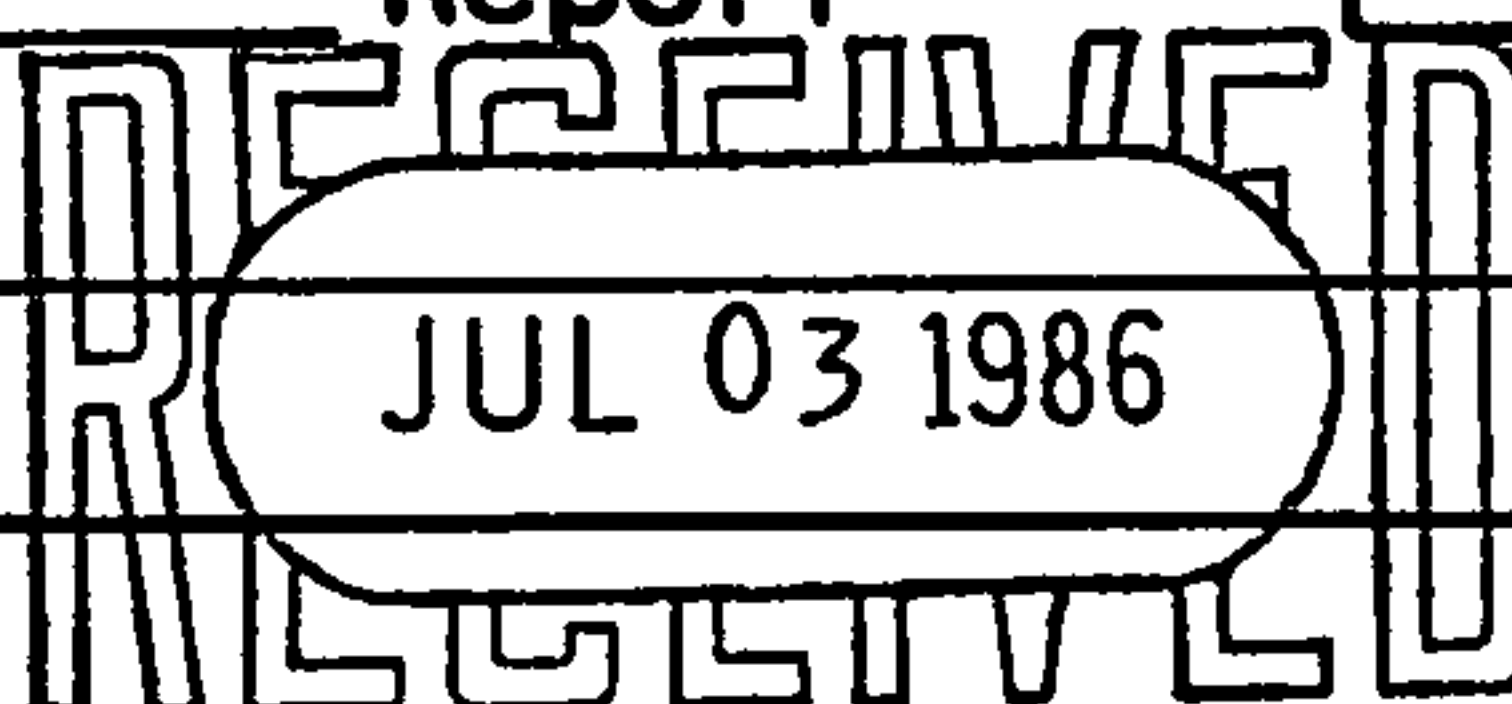
Attn: BARBARA

Reference YALE BUSINESS PARK

Gentlemen:

We transmit to you 1 copy(ies) of the following

- | | |
|--|--|
| ☐ _____ Plats | ☐ Shop Drawings |
| ☒ <u>ROUGH GRADING</u> Plans | ☐ Submittals |
| ☐ Specifications | ☐ Material Specifications |
| ☐ _____ Report | ☐ Copy of Letter |
| ☐ _____ | |
| ☐ _____ | |
| ☐ _____ | |



This information is transmitted to the HYDROLOGY SECTION

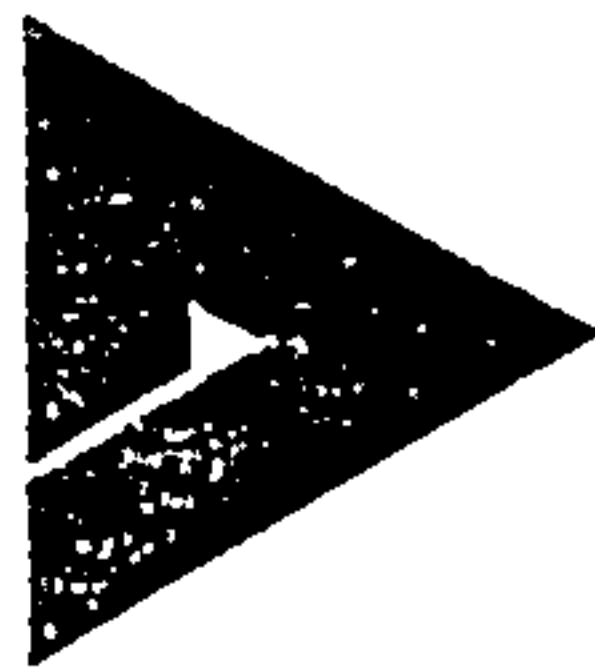
- | | |
|--|---|
| ☐ As per your request | ☐ For your files |
| ☒ For your review & approval | ☐ For your use |
| ☐ For your information | ☐ Please review & return |
| ☐ For your attention | ☐ For return to your files |
| ☐ For your signature | ☐ Please advise |
| ☐ _____ | |
| ☐ _____ | |

Remarks: _____

By: Scott M. McFee

Copies To _____

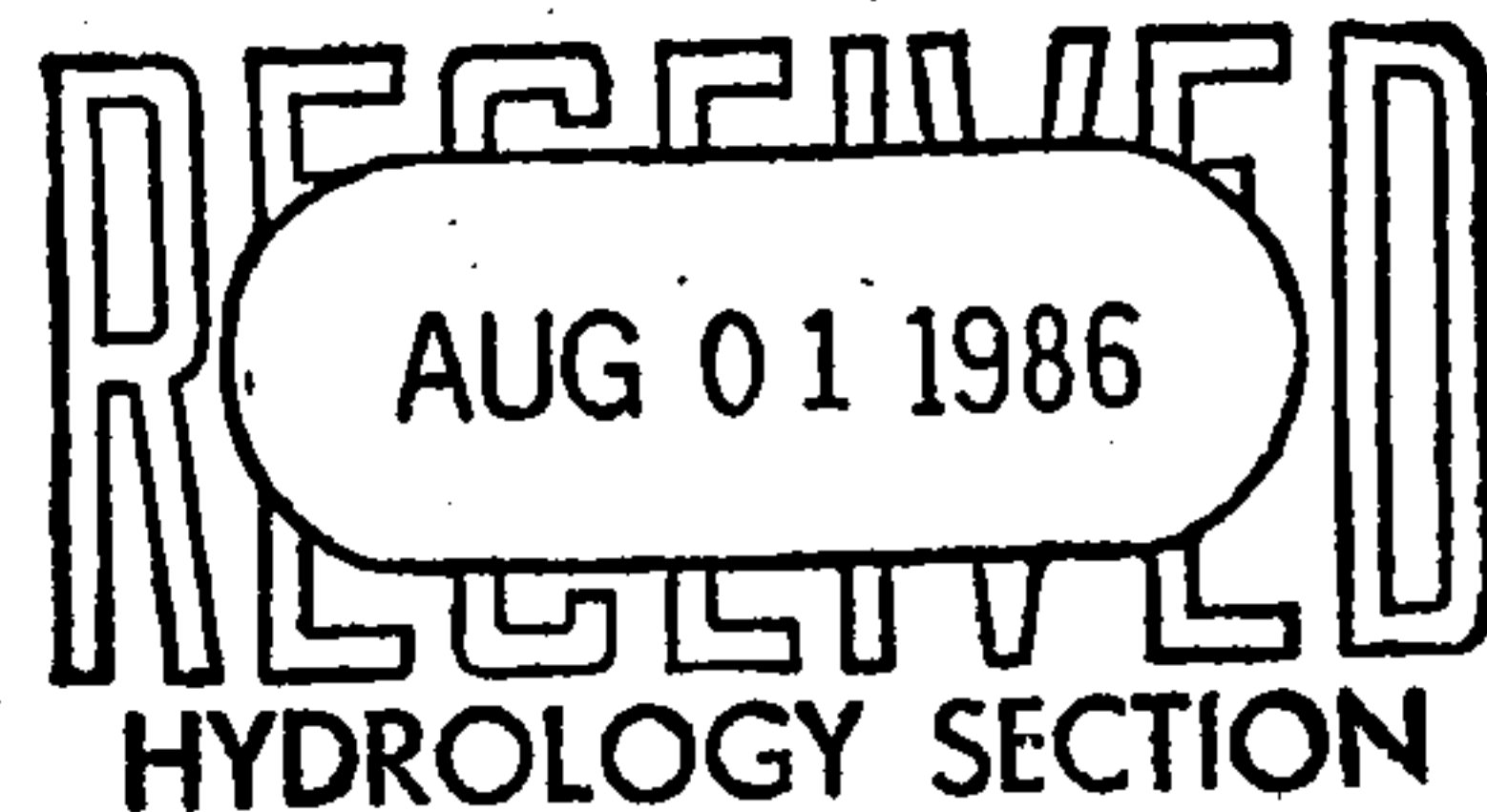
Isaacson &
Arfman, P.A.



Consulting Engineering
Associates

June 26, 1986

Planning Department
City of Albuquerque
P.O. Box 1293
Albuquerque, N.M. 87103



Re: Cavan Commerce Center

Dear Gentlemen:

Transmitted are 22 sets of plats, Application for Subdivision, Infrastructure Listing, approval letter from Hydrology Section, water and sewer availability letter and the application fee for the Cavan Commerce Center Subdivision. The sketch Plat for this property was filed under the name of "Yale Business Park" and was heard by DRB on 8/20/85, DRB-84-849-1.

Very truly yours,

Thomas O. Isaacson

TOI/aq

cc: Joe Beers, Cavan Associates, LTD

EXHIBIT "D"
to Subdivision Improvements Agreement

DEVELOPMENT REVIEW BOARD (D.R.B.)
REQUIRED INFRASTRUCTURE LISTING
for Cavan ~~Commerce Center~~ ^{SUPPORT CENTRE}

Following is a summary of Public/Private Infrastructure required to be constructed or financially guaranteed to be constructed for the above development.

Size	Type Improvement	Location	From	To
12"	Water Line	N. Commerce Ctr. Dr.	International Yale Blvd.	500' east
12"	Water Line	S. Commerce Ctr. Dr.	Centre Yale Blvd.	500' east
12"	Water Line	Tracts 5 & 6	N. Commerce Ctr. Dr.	S. Commerce Ctr. Dr.
10"	Water Line	N. Commerce Ctr. Dr.	500' east of Yale	Girard Blvd.
10"	Water Line	S. Commerce Ctr. Dr.	500' east of Yale	Columbia Dr.
8"	Sanitary Sewer	N. Commerce Ctr. Dr.	Yale Blvd.	1100' east
8"	Sanitary Sewer	S. Commerce Ctr. Dr.	Yale Blvd.	1450' east
30"	Storm Drain	N. Commerce Ctr. Dr.	Yale Blvd.	200' east
24"	Storm Drain	S. Commerce Ctr. Dr.	Yale Blvd.	100' east
24"	Storm Drain	Tract 11	S. Commerce Ctr. Dr.	Columbia
& Drng. Channel				
60' FF(1)	Street	N. Commerce Ctr. Dr.	Yale Blvd.	200' east
60'-40' FF(2)	Street (Taper Section)	N. Commerce Ctr. Dr.	200' east of Yale	350' east of Yale
40' FF(3)	Street	N. Commerce Ctr. Dr.	350' east of Yale	S. Commerce Ctr. Dr.
40' FF(3)	Street	S. Commerce Ctr. Dr.	Yale Blvd.	To End 1500'
4'	Conc. Sidewalk	N. Commerce Ctr. Dr.	Yale Blvd.	S. Commerce Ctr. Dr.
4'	Conc. Sidewalk	S. Commerce Ctr. Dr.	Yale Blvd.	To End 1500'

Traffic Signal Conduit & Bases Across International

- (1) Includes 2 ea. Std. Curb & Gutter Sections & 56' arterial paving.
- (2) Includes 2 ea. Std. Curb & Gutter Sections & 56' to 36' arterial paving (Taper Section).
- (3) Includes 2 ea. Std. Curb & Gutter Sections & 36' arterial paving.
- (4) Includes Sidewalks along Streets

Prepared by: Thomas O. Isaacson

Printed Name: Thomas O. Isaacson

Firm: Isaacson & Arfman, P.A.

10" Water Line (X) Tracts 6 & 5

International Ave

Centre Ave

Page 1 of 1

Development Review Board Member Approvals

<u>Robert A. Fennell</u> 7-29-86 Traffic Date	<u>Thomas O. Isaacson</u> 7-29-86 WUD Date	<u>Grant Haines</u> 7-29-86 Parks & Rec. Date
<u>Frank J. Quinn</u> 7/29/86 City Engineer/AMAFCA Date	<u>Richard E. Brown</u> 7-29-86 DRB Chairman Date	



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

RECEIVED

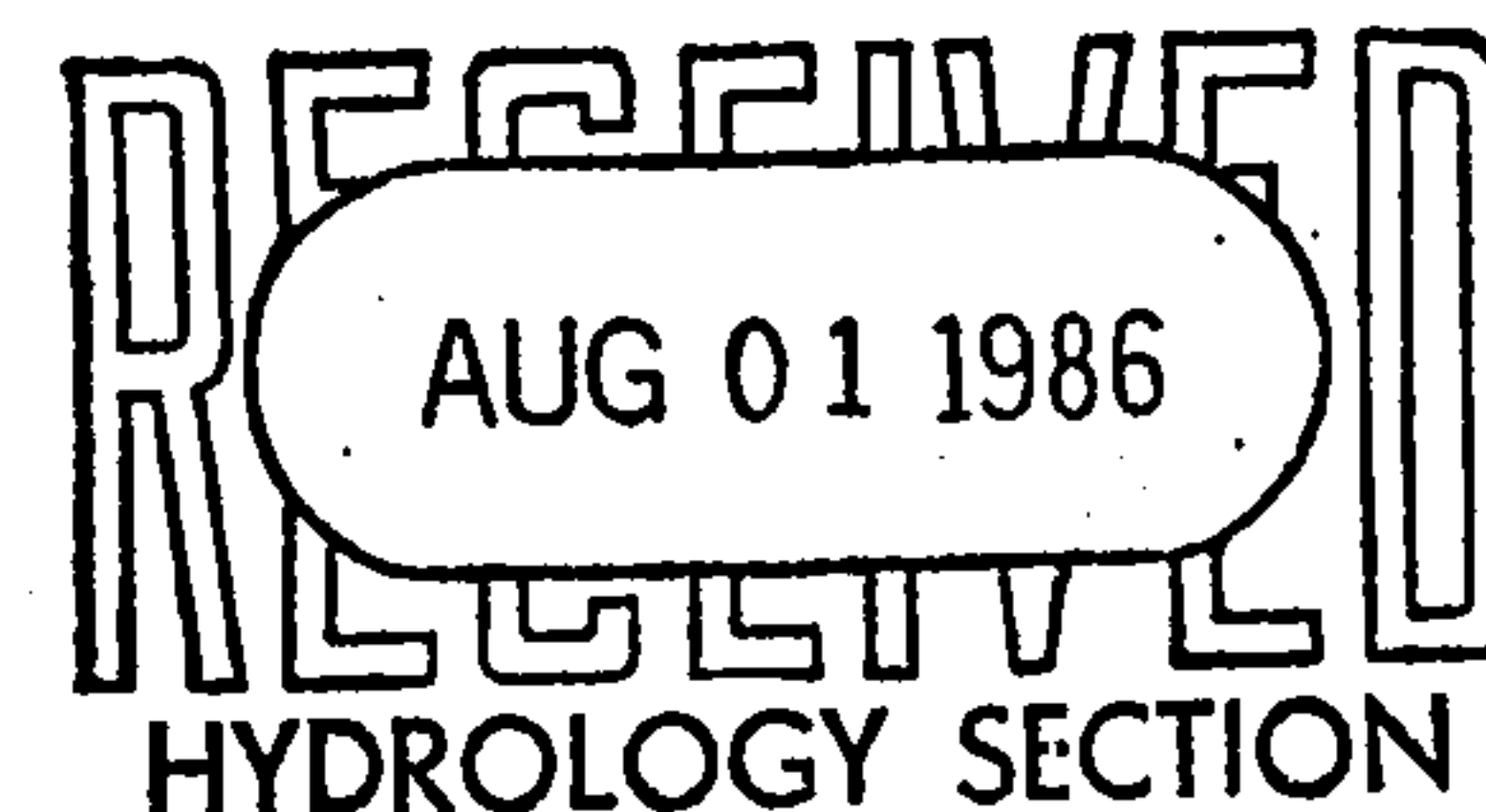
JUN 19 1986

Ans'd.....

DESIGN HYDROLOGY SECTION
123 Central NW, Albuquerque, NM 87102
(505) 766-7644

June 11, 1986

Mr. Thomas Isaacson
Isaacson & Arfman, PA
128 Monroe Street NE
Albuquerque, NM 87108



REF REVISED DRAINAGE REPORT FOR YALE BUSINESS PARK (L16-D23)
RECEIVED MAY 27, 1986

Dear Mr. Isaacson:

The above referenced report, dated May 29, 1986, is hereby approved for Preliminary and Final platting.

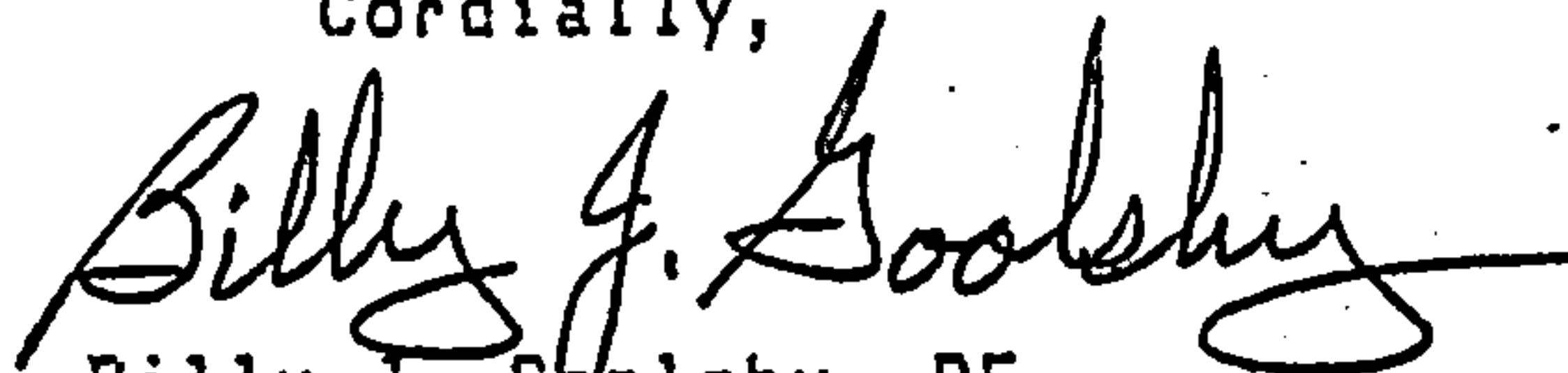
Please be advised that for Preliminary Plat approval you will need to provide to DRB an infrastructure listing for review and approval. For Final Plat, an executed Subdivision Improvements Agreement including the approved infrastructure listing will be required.

Also, prior to submittal to DRC for Work Order, please provide to this office a complete report incorporating all the current revised computations and plan and any other typo corrections along with the detailed construction plans for the streets and storm sewer facilities.

It is also understood that a drainage plan for each tract will be required to be submitted for review and approval for Building Permits.

Should you have any questions or comments, please call.

Cordially,


Billy J. Goolsby, PE
CE/Hydrology

BJG:mrk

cc: Cavan Associates, 500 Marquette NW; Attn: Joe Beers

MUNICIPAL DEVELOPMENT DEPARTMENT

C. Dwayne Sheppard, P.E., City Engineer

ENGINEERING DIVISION

Telephone (505) 766-7467

AN EQUAL OPPORTUNITY EMPLOYER



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

MAYOR
Harry E. Kinney

CHIEF
ADMINISTRATIVE OFFICER
Bob V. Stover

RECEIVED

September 9, 1985

SEP 11 1985

Mr. Thomas Isaacson
Isaacson & Arfman, P.A.
128 Monroe, N.E.
Albuquerque, New Mexico 87108

RE: WATER AND SANITARY SEWER AVAILABILITY (L-16)

Dear Mr. Isaacson:

This statement of availability is issued in response to your inquiry of August 1, 1985. All statements made herein are contingent upon the information provided in that inquiry.

Subject Property: Yale Business Park
(Formerly Yale/Gibson Tract)

Proposed Development:	TRACT.	ZONING	AREA (ACRES)	STORIES
	1	C-2	1.5	2
	2	C-2	1.5	2
	3	O-1	2.2	2
	4	C-2	6.3	8
	5	C-2	1.1	2
	6	C-2	1.1	2
	7	O-2	3.2	5
	8	O-1	3.9	6
	9	O-2	4.5	7
	12	O-1	2.5	3
	13	O-1	3.6	3

WATER:

Proposed site is located within water pressure Zones 2E and 3E Ridgecrest Trunk. Service to the 2E portion will be provided from the existing line in Yale and 3E portion from the existing line in Girard and Columbia, availability is contingent upon the completion and acceptance of the following line extensions:

1. A 10" Pressure Zone 3E water line in Vail Avenue looped through the site from the existing 14" line in Girard with ties to the existing 3E line in Columbia.

2. A 12" water pressure Zone 2E looped through the site with ties to the existing 8" stubs off the 12" line in Yale.

(See attached Map)

All on site line extensions must be located either within City streets or City approved water line easements.

Above line extensions are necessary in order to meet the 4072 GPM fire flow protection requirements set by the Fire Department. Number and location of the fire hydrants must be approved by the Fire Department.

All above required line extensions are at the Developer's expense.

Water Utility Expansion Charges will be imposed.

SEWER:

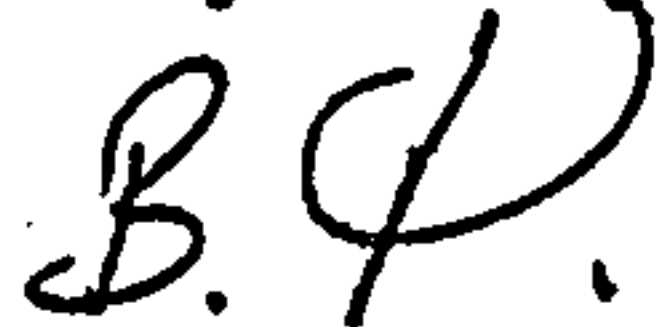
Sanitary service is available from the existing line in Yale, City owned on site line extensions will be required, size and alignment will be determined at later date. Line extensions are at the developer's expense.

Referenced project is subject to sanitary sewer Utility Expansion Charges.

This statement of availability will remain in effect for a period of one year and applies only to the proposed development identified herein. Its validity is in part contingent on the continuing accuracy of the information supplied by the developer. Changes in the proposed development may require re-evaluation of availability, and should be brought to our attention as soon as possible. Any outstanding prorata and/or standby assessments must be paid at the time service is taken. All charges assessed and/or rates collected will be based on applicable ordinances and policies in effect at the time service is actually requested and authorized.

If you have further questions, and/or comments please do not hesitate to contact me.

Very truly yours,



Brian Pirooz, Staff Engineer
Water Utilities Department/Engineering Division (766-7354)

BP:fe

Attachments: (Location, water and sewer system maps)

xc: MEM/JEE/JM
Roy Robinson, Water Systems
D. Brosman, Liquid Waste (Re: Facility Line #139)
J. Gutierrez, Customer Services
f/readers (L-16) f/avail (L-16) f/Yale Business Park (L-16)



YALE

BLVD.

EXISTING 12" WATERLINE

REQUIRED ZONE 2E
12" WATERLINE
EXTENSION

INTERNAL

BASEMENT PER
WATER UTILITIES
LPT. REQUIREMENTS

REQUIRED ZONE 3E
10" WATERLINE
EXTENSION

LOOP

CORNELL DR.

EXISTING 8" WATERLINE

VAIL

EXISTING 4" WATERLINE

AVE.

BLVD.

GIRARD

EXISTING 14" WATERLINE

EXISTING 8" WATERLINE

COLUMBIA

DR.

LONG. CHANNEL

11

12

13

7

6

5

8

9

10

1

2

3

GIBSON

BLVD.

SHEET FLOW

ZONE ATLAS - L-16 S

FILE COPY



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

DESIGN HYDROLOGY SECTION
123 Central NW, Albuquerque, NM 87102
(505) 766-7644

June 11, 1986

Mr. Thomas Isaacson
Isaacson & Arfman, PA
128 Monroe Street NE
Albuquerque, NM 87108

REF REVISED DRAINAGE REPORT FOR YALE BUSINESS PARK (L16-D23)
RECEIVED MAY 27, 1986

Dear Mr. Isaacson:

The above referenced report, dated May 29, 1986, is hereby approved for Preliminary and Final platting.

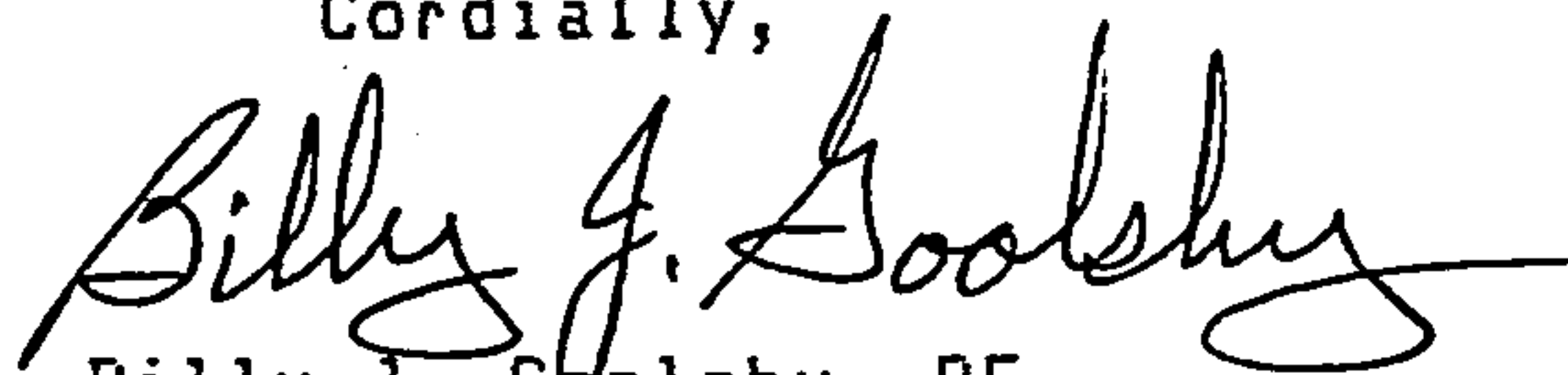
Please be advised that for Preliminary Plat approval you will need to provide to DRB an infrastructure listing for review and approval. For Final Plat, an executed Subdivision Improvements Agreement including the approved infrastructure listing will be required.

Also, prior to submittal to DRC for Work Order, please provide to this office a complete report incorporating all the current revised computations and plan and any other typo corrections along with the detailed construction plans for the streets and storm sewer facilities.

It is also understood that a drainage plan for each tract will be required to be submitted for review and approval for Building Permits.

Should you have any questions or comments, please call.

Cordially,


Billy J. Goolsby, PE
CE/Hydrology

BJG:mrk

cc: Cavan Associates, 500 Marquette NW; Attn: Joe Beers

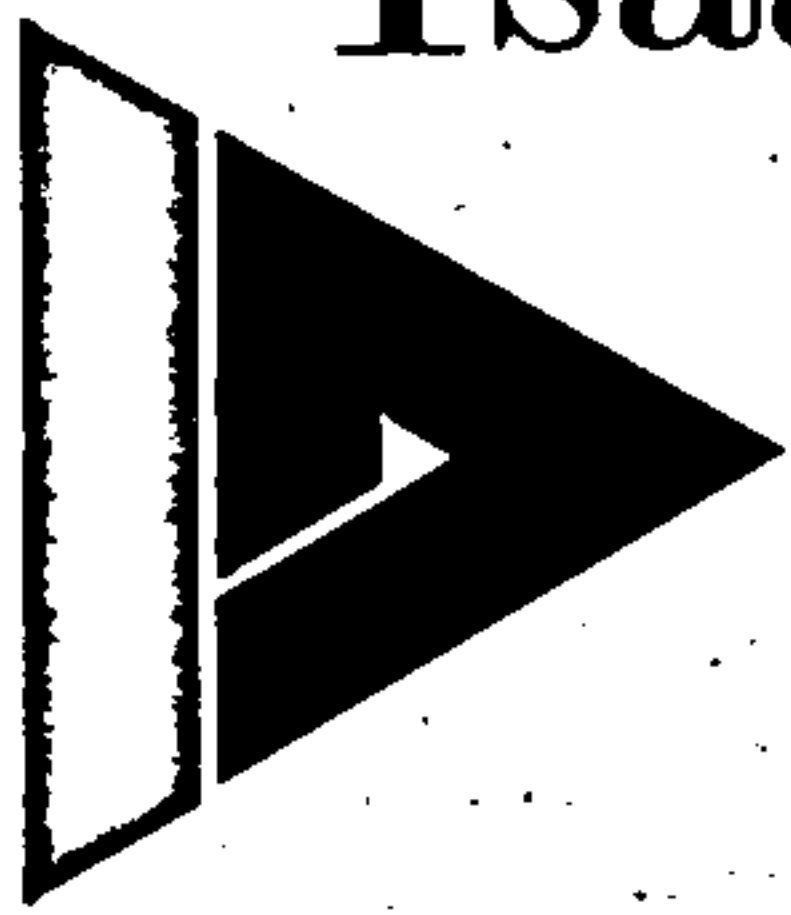
MUNICIPAL DEVELOPMENT DEPARTMENT

C. Dwayne Sheppard, P.E., City Engineer

ENGINEERING DIVISION

Telephone (505) 766-7467

AN EQUAL OPPORTUNITY EMPLOYER

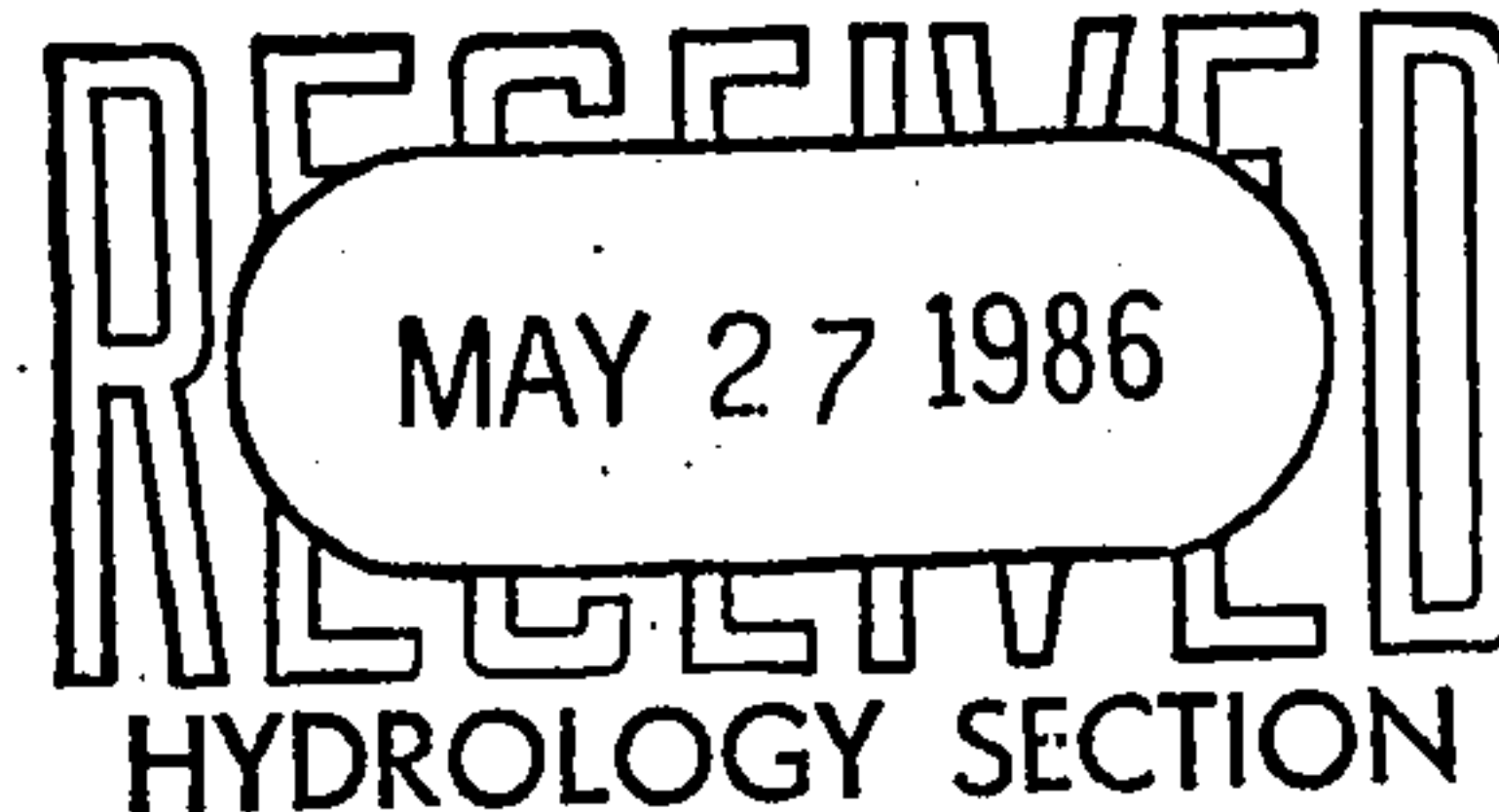


Isaacson & Arfman, P.A.

Consulting Engineering
Associates

May 27, 1986

Mr. Billy J. Goolsby
Design Hydrology Section
City of Albuquerque
123 Central Ave. N.W.
Albuquerque, N.M. 87102



Re: Drainage Report for Yale Business Park (L16-D23)

Dear Mr. Goolsby:

Transmitted are revised calculations and figures for the referenced project. This revised information is submitted in response to your letter of October 18, 1985.

In that letter you suggested that a more accurate method of determining the peak runoff rate for 'A' 'B' streets would be a technique of determining the individual hydrographs for each tract in the subdivision and adding the individual hydrographs along with the off-site contributions. This method has been used in accordance with our meeting of 5-19-86. Attached are various calculation sheets and figures supporting these revisions. The net affect of this alternative method of accomplishing runoff rate calculations was to slightly increase the runoff rates at the subject streets.

During the process of revising the runoff calculations and storm sewer requirements for these revised rates, I recalculated the catch basins requirements based on the City's alternate inlet grate design (the louver configuration). This resulted in a decreased number of required inlets due to the greater inlet capacity of this design.

Reference is made to your second comment in your letter regarding the storm drain easement for the drain proposed to be located between Tracts 11 and 12. I have revised the easement width to a 20' dimension. We will meet the requirements of the easement width formula by keeping the finished cover over the storm drain line to a depth of 8' as measured from the storm drain invert to the finished ground surface.

Mr. Billy Goolsby
May 27, 1986
Page 2

This response to your review has been delayed due to a transfer of ownership of the land which placed a stop work order on our design services. The new owners are now anxious to proceed with the engineering work. Consequently we request your early review of this revised Drainage Report.

If you have questions on any of this material, please do not hesitate to contact our office.

Very truly yours,

A handwritten signature in cursive script, appearing to read "Thomas O. Isaacson".

Thomas O. Isaacson

TOI/aq

Attachments

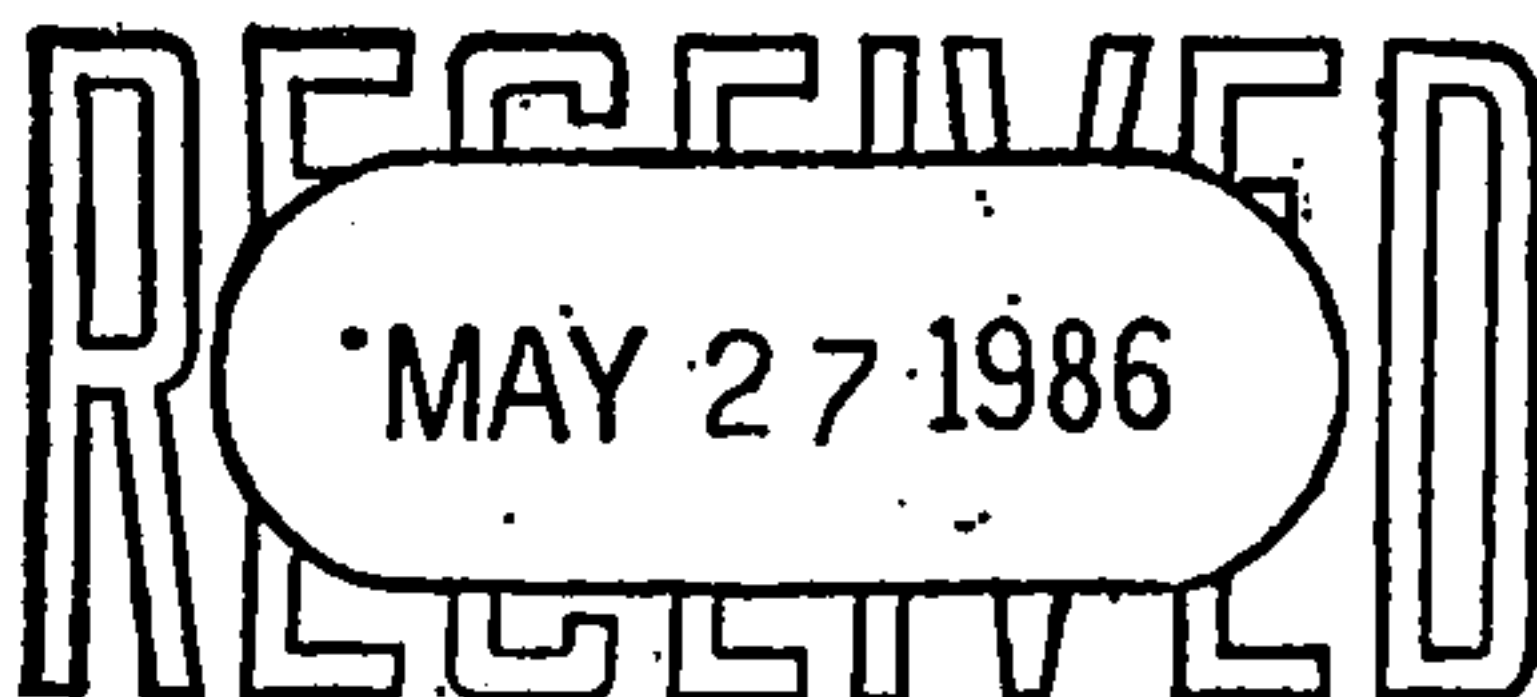
PROJECT TITLE: Yale Business Park ZONE ATLAS/DRNG. FILE #: L-16-D23
LEGAL DESCRIPTION: "Parcels A, 29A & 30A" filed 12/26/84, Vol. C25, Folio 198 &
CITY ADDRESS: Northeast Corner of Yale & Gibson
ENGINEERING FIRM: Isaacson & Arfman, P.A. CONTACT: Thomas O. Isaacson
ADDRESS: 128 Monroe Street NE 87108 PHONE: 268-8828
OWNER: ~~Caven Associates~~ Gibson/Yale Inc. CONTACT: ~~Alan Darrow~~ Joe Beers
ADDRESS: ~~500 Marquette NW~~ 4205 Lead Avenue SE 87108 PHONE: 268-4317 242-0500
ARCHITECT: _____ CONTACT: _____
ADDRESS: _____ PHONE: _____
SURVEYOR: Elder Company CONTACT: Ned Elder
ADDRESS: 530 Jefferson NE PHONE: 268-1830
CONTRACTOR: _____ CONTACT: _____
ADDRESS: _____ PHONE: _____

PRE-DESIGN MEETING:

☒ YES

☐ NO

☒ COPY OF CONFERENCE RECORD HYDROLOGY SECTION SHEET PROVIDED



DRB NO. 84-849-1

EPC NO. Z-85-41

PROJ. NO. -

TYPE OF SUBMITTAL:

☒ DRAINAGE REPORT

☐ DRAINAGE PLAN

☐ CONCEPTUAL GRADING & DRAINAGE PLAN

☐ GRADING PLAN

☐ EROSION CONTROL PLAN

☐ ENGINEER'S CERTIFICATION

CHECK TYPE OF APPROVAL SOUGHT:

☐ SKETCH PLAT APPROVAL

☒ PRELIMINARY PLAT APPROVAL

☐ SITE DEVELOPMENT PLAN APPROVAL

☒ FINAL PLAT APPROVAL

☐ BUILDING PERMIT APPROVAL

☐ FOUNDATION PERMIT APPROVAL

☐ CERTIFICATE OF OCCUPANCY APPROVAL

☐ ROUGH GRADING PERMIT APPROVAL

☐ GRADING/PAVING PERMIT APPROVAL

☐ OTHER _____ (SPECIFY)

Re-Submitted 5/27/86
Re-Submitted 9-11-85

DATE SUBMITTED: August 22, 1985

BY: Thomas O. Isaacson



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

DESIGN HYDROLOGY SECTION
123 Central NW, Albuquerque, NM 87102
(505) 766-7644

October 18, 1985

Mr. Tom Isaacson
Isaacson & Arfman, PA
128 Monroe St. NE
Albuquerque, NM 87108

RE: DRAINAGE REPORT FOR YALE BUSINESS PARK (L16-D23) RECEIVED
SEPTEMBER 11, 1985

Dear Mr. Isaacson:

I have reviewed the above referenced submittal and forward the following comments:

1. In checking through your analysis for the runoff from the site, I performed a conservative analysis of my own. This analysis addressed each tract individually. For the computations I used a "C" factor of 0.72, a time of concentration of 10 minutes. I then applies these factors, using the Rational Equation, to determine the runoff from each individual tract of development.

I then routed the runoff from each tract, using straight addition, to arrive at the total accumulated amount at the intersection of street "B" and Yale Blvd. The final composite peak rate of discharge in my analysis came to be approximately 90 c.f.s. In your report you identify the maximum at this same location as approximately 50 c.f.s.

I realize that my estimate is more conservative. However, due to the significant difference, I feel it would be more appropriate to address each tract for runoff amounts and then route to the lower end by time lags and hydrograph addition for the purpose of determining the exact size necessary for the proposed-storm drains connecting streets "A" and "B".

MUNICIPAL DEVELOPMENT DEPARTMENT

C. Dwayne Sheppard, P.E., City Engineer

ENGINEERING DIVISION

Telephone (505) 766-7467

AN EQUAL OPPORTUNITY EMPLOYER

2. The minimum easement required for an underground public utility, i.e. water, sewer or storm drain, is 20 feet as defined in the Subdivision Ordinance. In section 22.6, on page 99 of the DPM an equation is provided for determining. Right-of-Way and easement widths for underground facilities based on depth. Using this equation and the profile presented in your report, I came up with a requirement of 24 feet for the 24" storm drain on the east side of the property.

Should you have any questions or comments, please call this office at 766-7644.

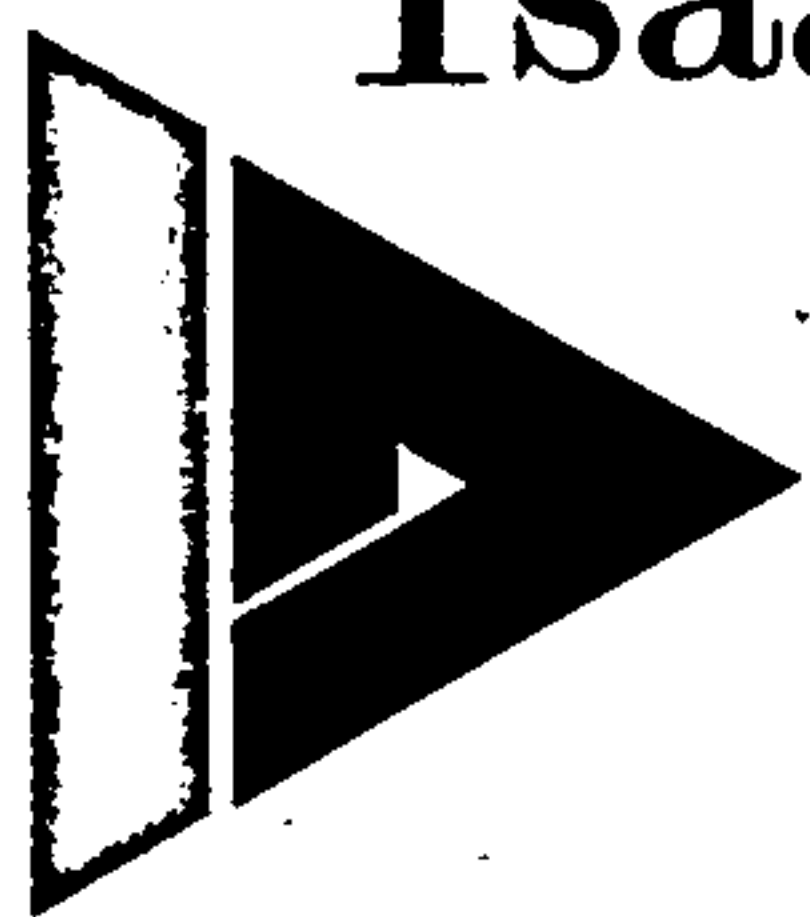
Cordially,

Billy J. Goolsby

Billy J. Goolsby
CE/Design Hydrology

for

BJG/cl



Isaacson & Arfman, P.A.

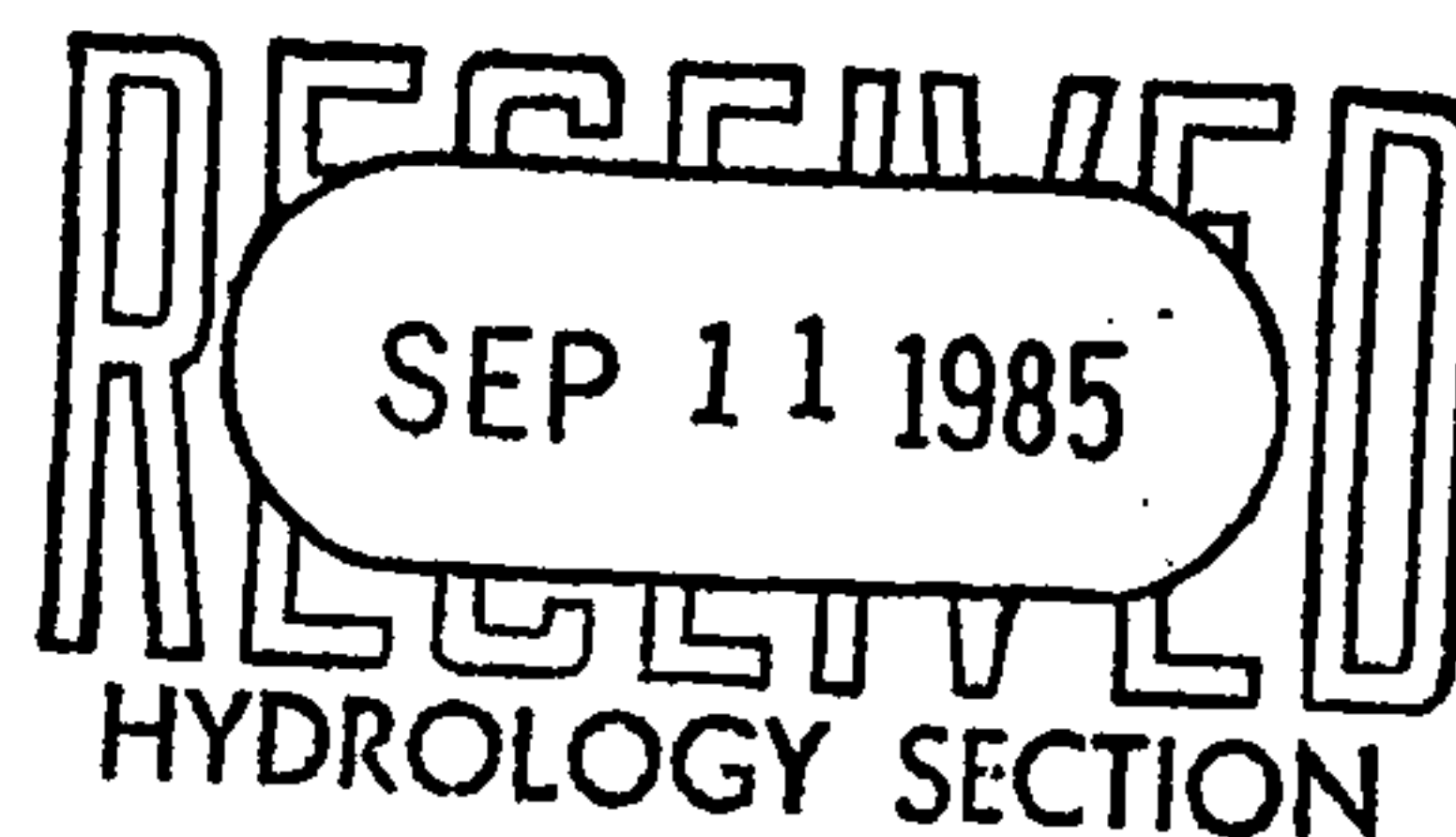
Consulting Engineering
Associates

September 11, 1985

Mr. Carlos Montoya
City of Albuquerque
Design Hydrology Section
123 Central NW
Albuquerque, N.M. 87102

RE: YALE BUSINESS PARK (L16-D23)

Dear Mr. Montoya:



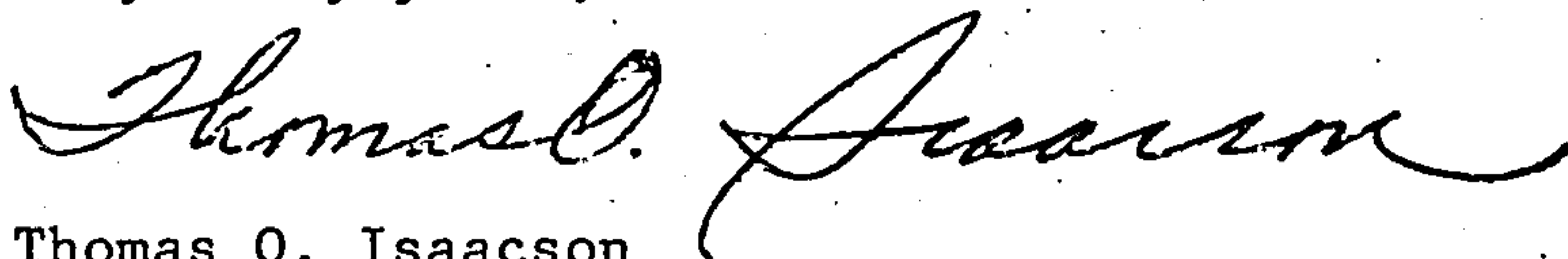
In response to your letter of September 5, 1985 we are submitting the following information which you itemized as being lacking in your letter.

1. Professional engineer's stamp has been affixed to the plan drawing.
2. T. C. and F. L. elevations have been shown for Columbia, Vail, Ross, Yale and Gibson Streets. For your information all of these streets are either existing or currently under construction.
3. HGL calculations for proposed storm drains (sheets 45-47).
4. Cross sections for proposed streets--see Figure 17, enclosed.
5. Existing top of curb and flowline grades on adjacent streets--see revised Drainage Plan.
6. City project number for adjacent streets--Yale Blvd. is currently under design and the project number is MDD 1960. No other adjacent streets are under design or in construction (all are existing).

Also attached per your requirements is an updated Information Sheet.

We would appreciate your expeditious review of this report.

Very truly yours,



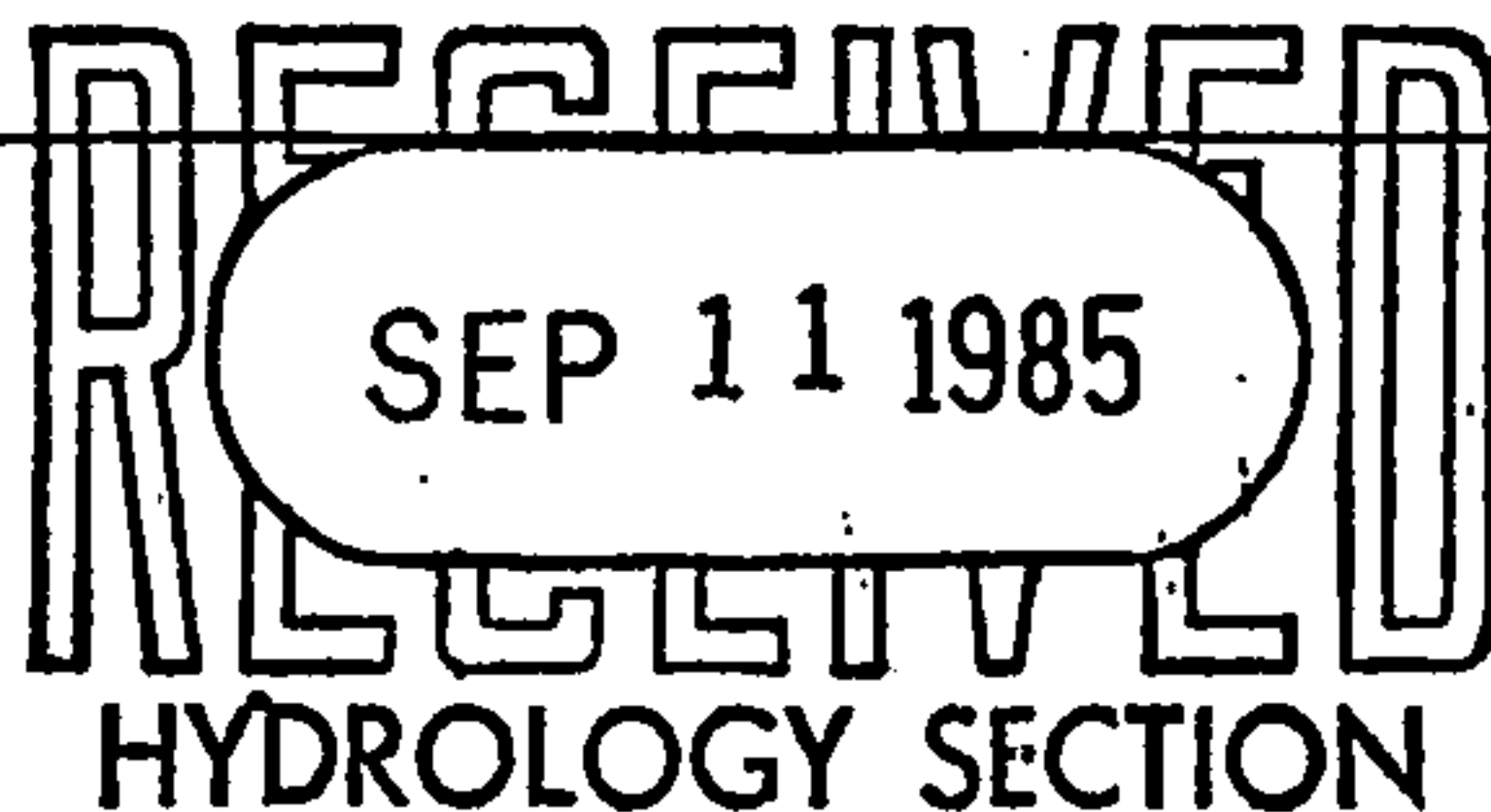
Thomas O. Isaacson

TOI:ram

128 Monroe, NE • Albuquerque, NM 87108 • (505) 268-8828

DRAINAGE INFORMATION SHEET

PROJECT TITLE: Yale Business Park ZONE ATLAS/DRNG. FILE #: L-16-D23
 LEGAL DESCRIPTION: "Parcels A, 29A & 30A" filed 12/26/84, Vol. C25, Folio 198 & 199
 CITY ADDRESS: Northeast Corner of Yale & Gibson
 ENGINEERING FIRM: Isaacson & Arfman, P.A. CONTACT: Thomas O. Isaacson
 ADDRESS: 128 Monroe Street NE 87108 PHONE: 268-8828
 OWNER: Gibson/Yale Inc. CONTACT: Alan Darrow
 ADDRESS: 4205 Lead Avenue SE 87108 PHONE: 268-4317
 ARCHITECT: _____ CONTACT: _____
 ADDRESS: _____ PHONE: _____
 SURVEYOR: Elder Company CONTACT: Ned Elder
 ADDRESS: 530 Jefferson NE PHONE: 268-1830
 CONTRACTOR: _____ CONTACT: _____
 ADDRESS: _____ PHONE: _____



PRE-DESIGN MEETING:

☒ YES
☐ NO
☒ COPY OF CONFERENCE RECAP SHEET PROVIDED

DRB NO. 84-849-1
 EPC NO. Z-85-41
 PROJ. NO. -

TYPE OF SUBMITTAL:

☒ DRAINAGE REPORT
☐ DRAINAGE PLAN
☐ CONCEPTUAL GRADING & DRAINAGE PLAN
☐ GRADING PLAN
☐ EROSION CONTROL PLAN
☐ ENGINEER'S CERTIFICATION

CHECK TYPE OF APPROVAL SOUGHT:

☐ SKETCH PLAT APPROVAL
☒ PRELIMINARY PLAT APPROVAL
☐ SITE DEVELOPMENT PLAN APPROVAL
☒ FINAL PLAT APPROVAL
☐ BUILDING PERMIT APPROVAL
☐ FOUNDATION PERMIT APPROVAL
☐ CERTIFICATE OF OCCUPANCY APPROVAL
☐ ROUGH GRADING PERMIT APPROVAL
☐ GRADING/PAVING PERMIT APPROVAL
☐ OTHER _____ (SPECIFY)

Re-Submitted 9-11-85

DATE SUBMITTED: August 22, 1985

BY: Thomas O. Isaacson



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

DESIGN HYDROLOGY SECTION
123 Central NW, Albuquerque, NM 87102
(505) 766-7644

September 5, 1985

Mr. Fred Arfman
Isaacson & Arfman, P.A.
128 Monroe St. NE
Albuquerque, NM 87108

REF: YALE BUSINESS PARK (L16-D23)

Dear Mr. Arfman:

A preliminary review of your submittal for Preliminary Plat and Final Plat approval has shown that the following information is lacking for this section to begin the review process:

Information Needed:

1. Professional Engineer's Stamp with signature and Date (Revision date) within the plan drawing also.
2. Detailed Grading Plan showing T.C. & F.L. Elevations (For Preliminary Plat and Rough Grading requests for Subdivisions) for Columbia, Vail Ross, Yale and Gibson.
3. HGL calculations for proposed storm drains.
4. Cross sections for proposed streets.

Plan Drawing:

1. Existing City top of curb and flow line elevations on or adjacent to site.

MUNICIPAL DEVELOPMENT DEPARTMENT

C. Dwayne Sheppard, P.E., City Engineer

ENGINEERING DIVISION

Telephone (505) 766-7467

AN EQUAL OPPORTUNITY EMPLOYER

Mr. Fred Arfman
September 5, 1985
Page -2-

2. City project number for adjacent streets or alleys being designed per requirement.

Please provide this information so that we may process your request as expediently as possible.

Cordially,



City Design/Hydrology Section

BJM/cl