



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

April 29, 1982

Mr. Steve Corle
Gordon Herkenhoff & Assoc.
302 Eighth Street N.W.
Albuquerque, N.M. 87102

RE: RUST TRACTOR DRAINAGE REPORT

Dear Steve:

The referenced report is hereby approved based on your recent plan submittal which indicated free discharge from the site.

We appreciate your cooperation and look forward to working with you in the future.

Very truly yours,

Brian G. Burnett
Civil Engineer/Hydrology

BGB/tsl

MUNICIPAL DEVELOPMENT DEPARTMENT

Richard S. Heller, P.E., City Engineer

ENGINEERING DIVISION

Telephone (505) 766-7467

AN EQUAL OPPORTUNITY EMPLOYER



GORDON HERKENHOFF & ASSOCIATES, INC.
302 Eighth Street, N.W.
Albuquerque, New Mexico 87102
(505) 247-0294
ENGINEERING COMPUTATIONS

NAME OF PROJECT

RUST TRACTOR

COMPUTED BY

SGC

CHECKED BY

JOB NUMBER

SHEET NUMBER

1 OF 5

DATE

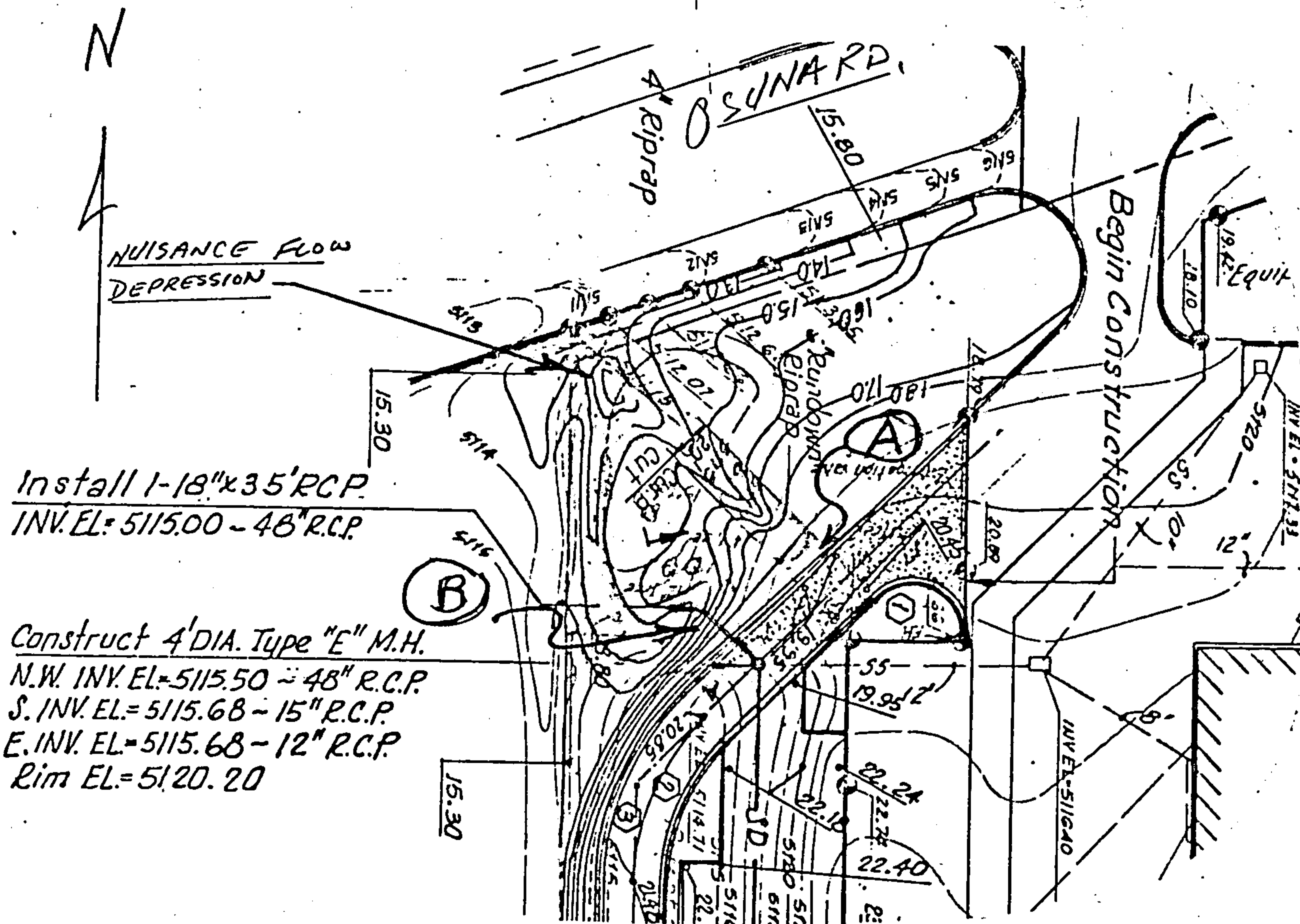
Apr 19, 1982

RUST TRACTOR DRAINAGE:

SWALE CONFIGURATION FOR NW PROPERTY CORNER...

(A) DISCHARGE FROM DEPRESSED CURB ON BACK
PROPERTY ACCESS ROAD

(B) DISCHARGE FROM 18" STORM DRAIN





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FROM DRAINAGE REPORT:
(APPENDIX "I" POND INFLOW DATA)

DISCHARGE @ (A) ...

$Q_A = \text{DISCHARGE FROM AREA } A_3$

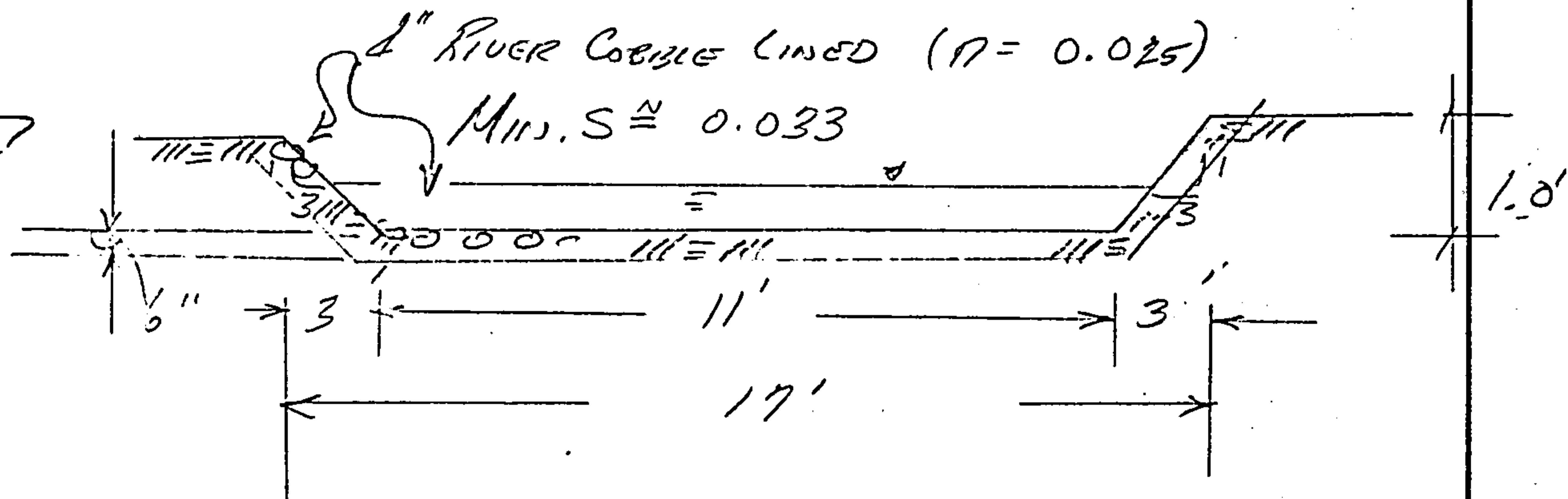
$$Q_A = \frac{7132 \text{ FT}^3/\text{MIN}}{300 \text{ SEC}/\text{MIN}} = 23.77 \text{ cfs}$$

CHANNEL CONFIGURATION:

$$Q = \frac{1.486}{n} A R_h^{2/3} S^{1/2} \Rightarrow d = 0.38 \text{ FT} < 1.5 (0.4') \\ V_{cl} = 5.2 \text{ FT/S}$$

$$A = 11d + 3d^2$$

$$P = 11 + 2\sqrt{(3d)^2 + d^2}$$



(NEXT SHEET)



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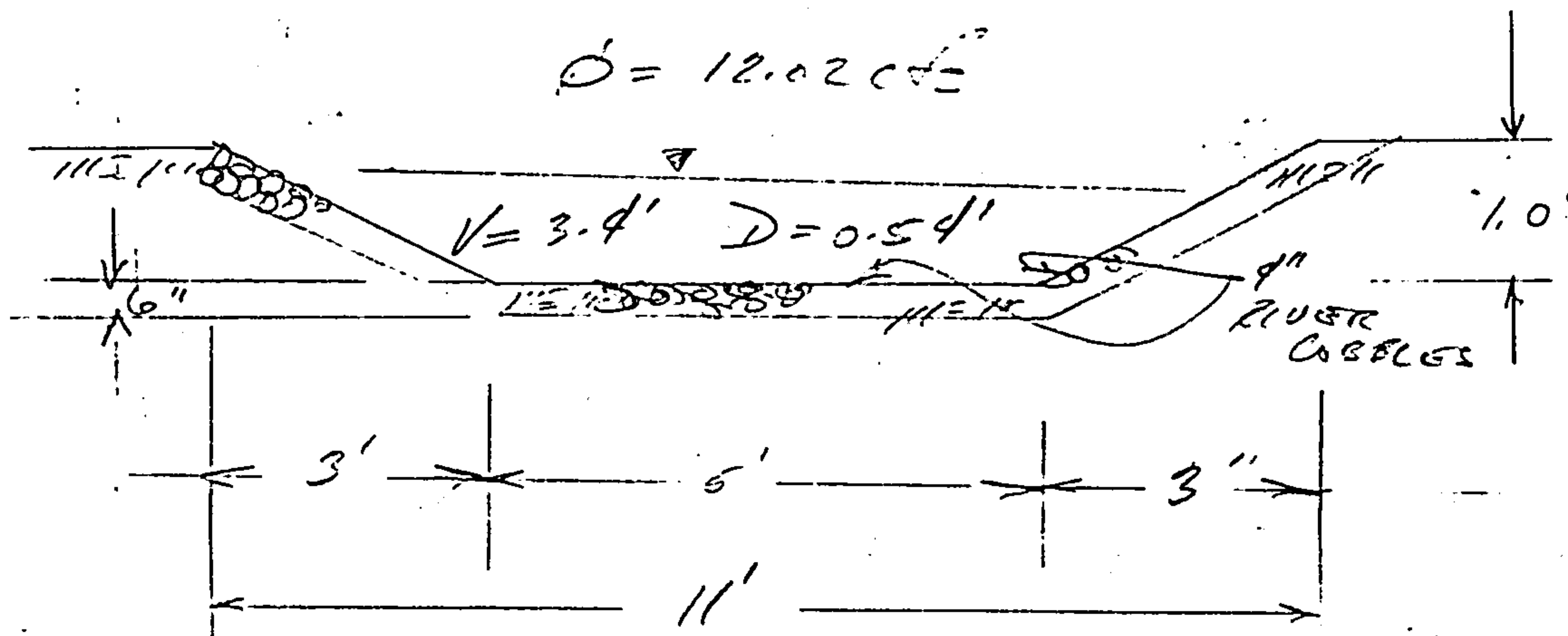
DATE

DISCHARGE @ (C);

$$Q_1 \approx \frac{2827 + 780}{300} = 12.02 \text{ cfs} \Rightarrow D = 0.54' \\ V = 3.4'$$

$$MINS \approx 0.01$$

$$n = 0.025$$



TOTAL Q TO OSUNA :

$$Q_T = 12.02 + 23.77 = \underline{35.79 \text{ cfs}}$$



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DISCHARGE @ (C) :

(TO OSUNA)

$$\text{COMBINED } Q = 35.79 \text{ cfs}$$

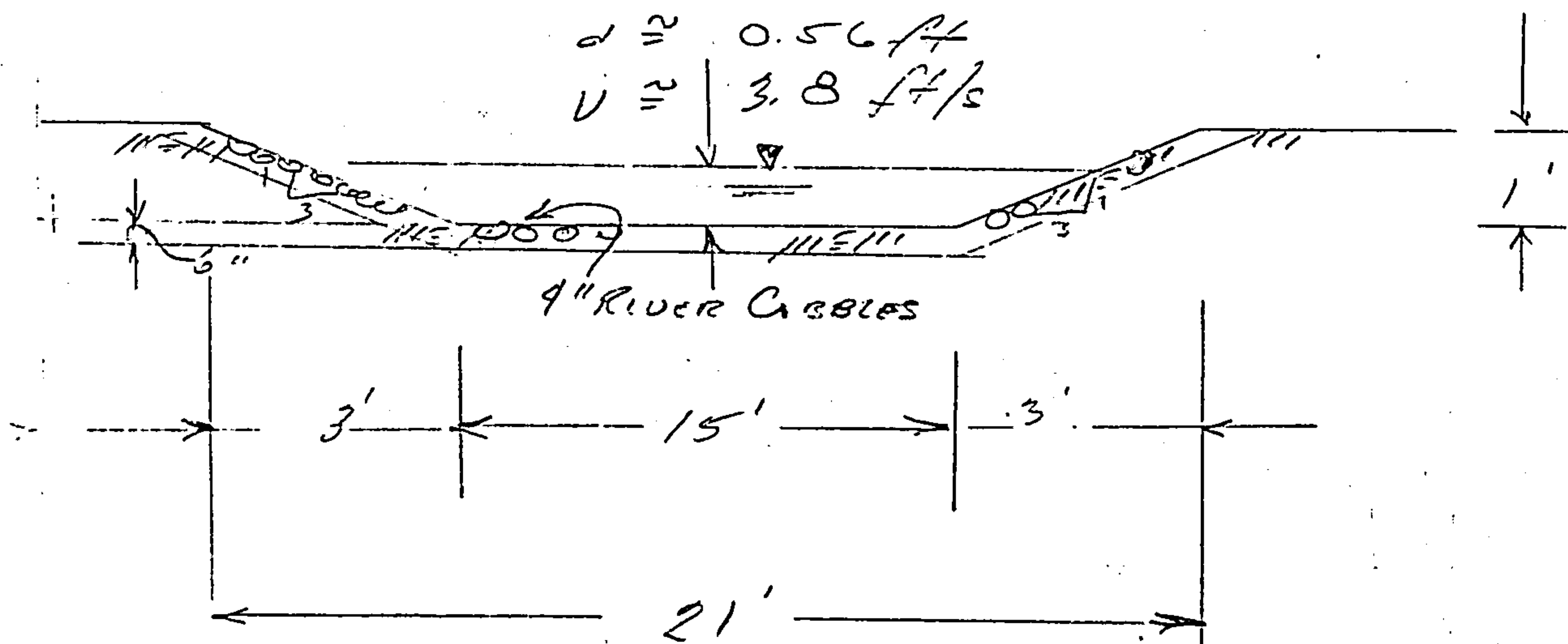
$$S \approx 0.01$$

$$n = 0.025$$

$$\text{THEN: } Q = 35.79 \text{ cfs}$$

$$d \approx 0.56 \text{ ft}$$

$$V \approx 3.8 \text{ ft/s}$$





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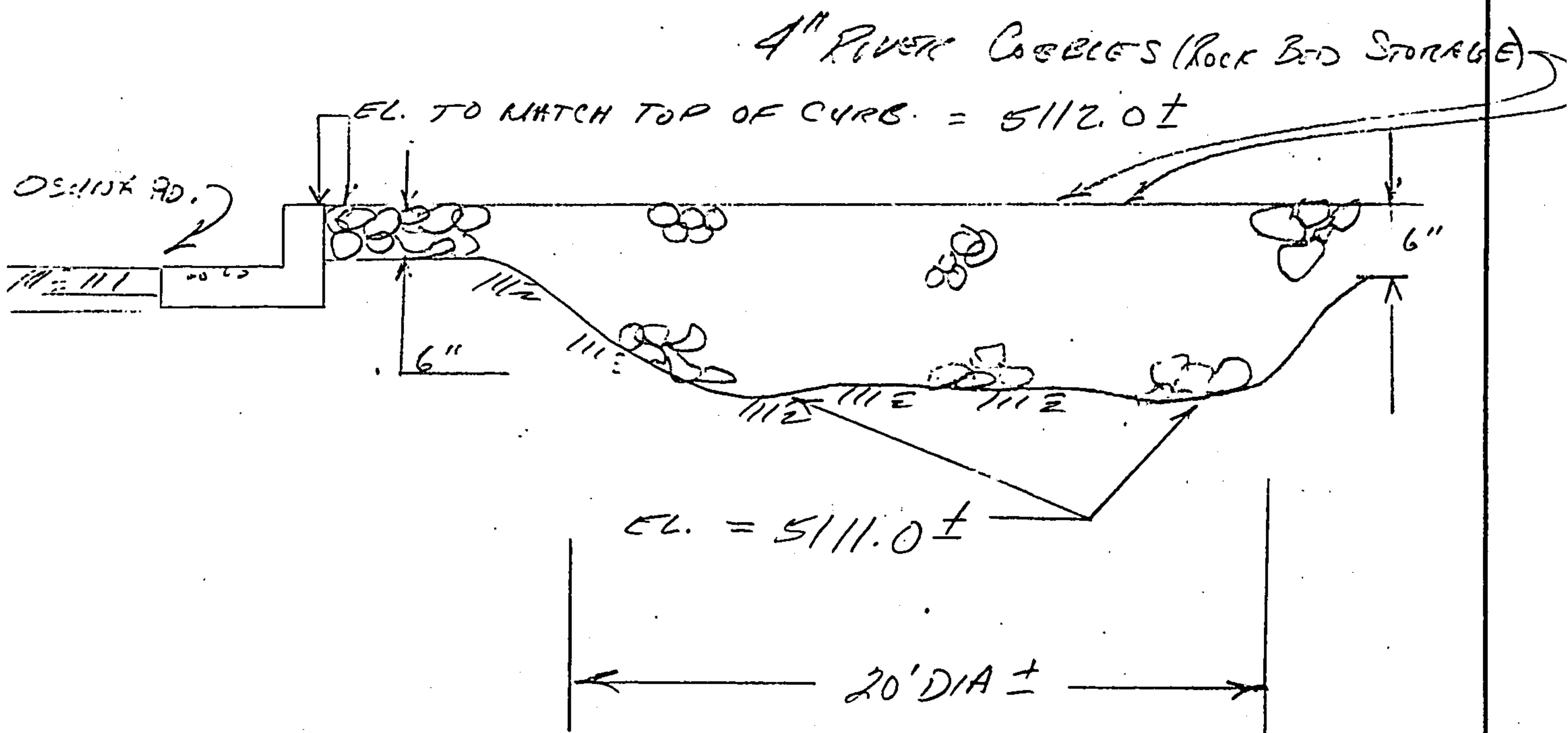
SHEET NUMBER

5 OF 5

DATE

NUISANCE FLOW DEPRESSION :

(ROCK BED STORAGE DETAIL)



FILE CO



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

Ken Schultz
Mayor

UTILITY DEVELOPMENT DIVISION
HYDROLOGY SECTION
(505) 768-2650

August 17, 1987

David Smith
Easterling & Associates, Inc.
5643 Paradise Blvd., NW
Albuquerque, New Mexico 87124

Re: DRAINAGE PLAN FOR GRADING @ RUST TRACTOR
(E-17/D25) RECEIVED JULY 31, 1987
D22

Dear Mr. Smith:

The above referenced plan dated July 31, 1987, is approved for grading permit.

If you should have any questions regarding further procedures, please call me at 768-2650.

Cordially,

Carlos A. Montoya, P.E.
City/County Floodplain Administrator

CAM/bsj

PUBLIC WORKS DEPARTMENT

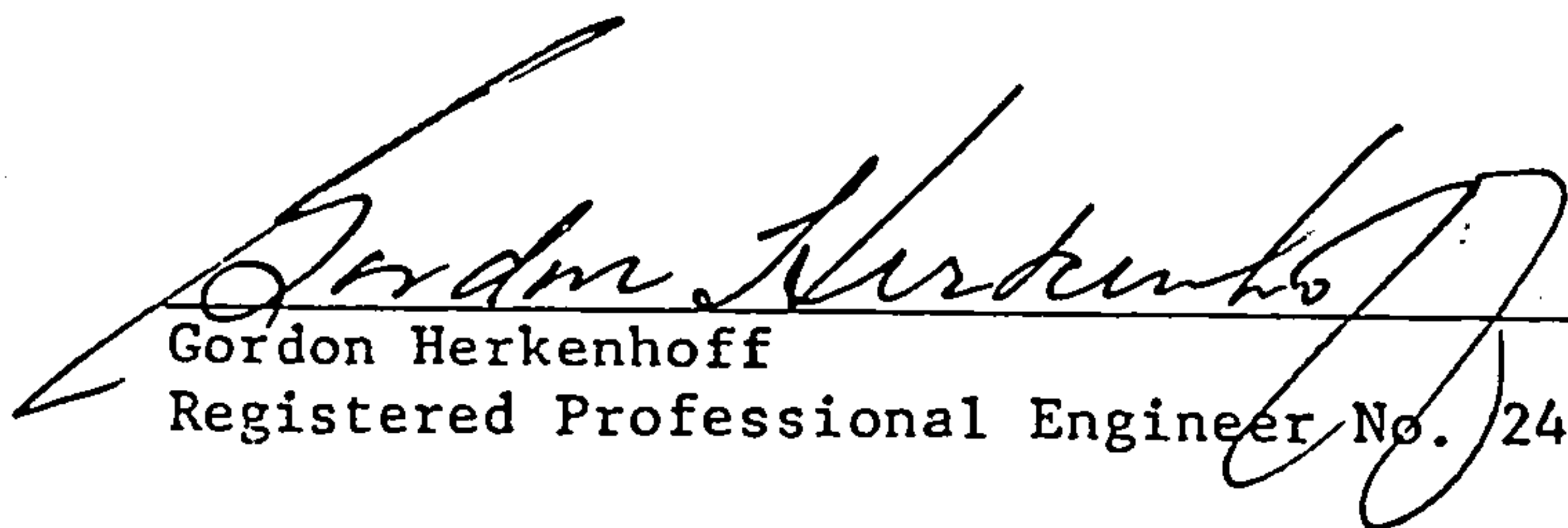
Walter Nickerson, P.E., City Engineer

ENGINEERING GROUP

Telephone (505) 768-2500

AN EQUAL OPPORTUNITY EMPLOYER

I hereby certify that this revised drainage plan for the Rust Tractor Company located at 4000 Osuna Road, N.E., Albuquerque, New Mexico, was prepared under my direction, conforms to Drainage Resolution No. 1980-15 and City of Albuquerque Resolution No. 59-1976, and is true and correct to the best of my knowledge and belief.


Gordon Herkenhoff
Registered Professional Engineer No. 243

2-22-82
Date

Approved:

For the City of Albuquerque



ENGINEERS DRAINAGE REPORT FOR RUST TRACTOR

I. INTRODUCTION

The property addressed in this report is a 39.2 acre parcel located at 4000 Osuna Rd. N.E., and owned by the Rust Tractor Co. The north portion of the property is a fenced 25 acre industrial business site with approximately 55 percent of the area impervious. To the south, and abutting on the Bear Canyon Arroyo is an additional 14.2 acres also owned by Rust Tractor. This land is currently undeveloped, with soil classified by the Bernalillo Soil Conservation Service map as "embudo gravelly, fine sandy loam".

The bounds of the property are as follows:

- A. On the north by Osuna Rd. N.E.
- B. On the south by the Bear Canyon Arroyo.
- C. On the east by the lands owned by Jack Clifford, and then by Kircher Blvd.
- D. On the west by Motorola Corp. property.

II. PURPOSE

The purpose of this report is to provide information describing the existing drainage conditions on the Rust property, as well as to address the problems future development would create and their solutions. Reference is made to the original drainage report for the site dated October 9, 1974 and approved by AMAFCA.

III. DESCRIPTION OF SITE

A. Existing

Storm flows on the 25 acre site are controlled by:

1. Depression of landscaped, grassy areas.
2. Percolation in gravelled, equipment display areas.
3. Underground conveyance from rooftops and parking areas to retention ponds.
4. Sheet flow to retention ponds.
5. The interception of offsite flows of 52 cfs from the east, by an unlined ditch. This flow is conveyed along the southern property line of the northern 25 acres, to the west Rust Tractor/Motorola property line. There, the ditch turns south to follow the common property line to the bank of the Bear

Canyon Arroyo. It then turns westward to outfall into the Bear Canyon Arroyo.

The southerly 14.2 acres of the Rust Tractor Property is undeveloped range land with some prairie grasses. Runoff from the site is comprised of undeveloped historical runoff from 16.7 acres of Jack Clifford land to the east, as well as the 14.2 acres of undeveloped Rust Tractor land. The combined runoff flows generally northwest, and is diverted west along the south property line of Rust Tractor's 25 acre site by a dirt berm. Upon reaching the westerly property line of the Rust Tractor land, the water is either carried to the Bear Canyon Arroyo by the Motorola ditch or ponds in low spots to percolate and evaporate.

The natural fall of the land is from the southeast, to the northwest. The northern 25 acres were graded at the time of construction (1974), to carry approximately 60% of the storm runoff from that parcel to the retention pond located in the northwest corner of the property or to the street. To maximize the infiltration, the back 10 acres of that site were either graded flat in permeable areas or sloped gently to the southwest. This flow enters a retention pond located in the southwest corner of the site.

One additional source of water exists which enters the retention pond in the southwest corner. This is the "washdown" water from an on-site equipment washing operation. This water is to be rerouted to the sanitary sewer or recycled in the future, as has been approved by the City of Albuquerque - Water Resources Department.

B. Future

Future plans call for construction of several new, large buildings on the 25 acre site, as well as an increased paved area for parking and inventory stack-out.

The two retention ponds which exist in the northwest and southwest corner of the site will be eliminated, and an access road will be constructed from Osuna Rd. N.E. to the back 14.2 acres of the property. Detention ponding will be provided in the extreme northwest corner of the site to limit the discharge from the front 16 acres to the undeveloped-historical five year flow.

Where the offsite flow of approximately 52 cfs (see approved drainage report dated October 1974) is presently accepted by a dirt lined ditch on the east side of the property, this will continue. Where the new access road crosses the ditch at the southwest corner, two 24" metal pipe culverts will convey the flow underneath the roadway and into the Motorola owned segment of the ditch. From there, the flow will follow its present path around the Motorola property, and eventually outfall to the Bear Canyon Arroyo.

Flows from the back 9 acres of the 25 acre site, which were historically collected in the existing southwest retention pond, will proceed

overland to the extreme southwest corner of the site. From this point, the flow will be collected and conveyed via a 480 foot long, 30 inch pipe, along the east side of the proposed access road, and to the bank of the Bear Canyon Arroyo. This pipe will then be joined in an open drop inlet by flow from the back 14.2 acre site. The combined flow will then outfall into the Bear Canyon Arroyo via a 48 inch RCP.

The back 14.2 acre site of the Rust Tractor property is intended to be left in its virgin state at this time. Construction will be limited to 450 feet of access road along its western boundary, which results in approximately two percent development. However, should the site be developed in the future, 55 percent development was assumed to prevent extensive modification of drainage facilities. Fundamental to the treatment of the south 14.2 acres is the assumption that when that area is developed, the general path of runoff from the adjacent offsite 16.7 acres, as well as that from the 14.2 acres of Rust property, will continue to be generally southeast, to northwest. Upon reaching the northerly property line of the back 14.2 acres, the combined flows are to be diverted by a swale at this time (or equivalent means in the future), to the west property line access road. They will then be collected in the southwest corner and pass into the Bear Canyon Arroyo via the 48 inch RCP, along with the underground pipe flow from the back of the 25 acre site.

IV. HYDROLOGY AND HYDRAULICS

A. Hydrology

The Denver Rational Method hydrology was used in the preparation of this report. Times of concentration were derived from the Overland Time of Flow Curves where possible. Where slopes exceeded the chart limits, an assumption was made based on best engineering judgment, and those times were verified by the California Culverts Practice formula as follows:

$$T_c \text{ (HRS)} = \frac{(11.9 L^3)}{H} 0.385$$

where: L = Longest path in miles
H = Elevation difference in feet

Rational formula constants ("C") were based on:

C = 0.95 (impervious)
C = 0.40 (pervious)

A 1.25 multiple was used for developing the 100 year constants, as called for by the method. A typical peak flow from a 100 year storm would then be determined using the following formula:

$$Q_{100} \text{ (CFS)} = C i A$$

where: $C = 1.25(\% \frac{\text{developed}}{100} \times 0.95 + (1 - \% \frac{\text{developed}}{100}) \times 0.40)$

i = Average Rainfall Intensity (In/Hr).

A = Watershed Area (Acres).

The one hundred year intensity curve was developed from the National Oceanographic and Atmospheric Administrator (NOAA), Weather Atlas (volume II, 1973).

Ten year rain storm runoff quantities were not determined due to the fact that where runoff leaves the site, it is either:

1. A historically unattenuated flow (sheet flow to street).
2. New detention ponding with discharge into the street (and the Q5 undeveloped is the restriction).
3. A condition (or system), which presently conveys and will continue to convey, the 100 year-undeveloped flow from offsite-across the site.
4. A condition (or system), which conveys the 100 year flow to a point where it can be discharged unattenuated, into the Bear Canyon Arroyo.

All new on-site storm drain construction accommodates the 100 year storm peak.

B. Hydraulics

Where channel hydraulics were involved, Mannings equation was used to determine flow quantities. This analysis was done by programmable calculator, and printouts are included in the calculation section.

Pipe hydraulics were done by nomograph. Where steel culverts were used, the Handbook of Steel Drainage and Highway Construction Products was used. Where concrete pipe products were used, the Bureau of Reclamation Design of Small Dams was used. Pipes were checked for inlet and outlet control.

V. DISCUSSION

For analysis, the Rust property was divided into four major areas. Lettered "A" thru "D", each of these represents drainage to a different discharge point.

Within area "A", there were three subareas which were of different nature. These were assigned the following subscript numbers: Area "A-1", "A-2" and "A-3". (Refer to Fig. No. 1. Site Layout and Grading Plan.)

A. Area "A"

1. Area A-1: This is a subarea which is located in the north-easterly quadrant of the north 25 acre site. Character is approximately 60 percent overland flow through parking lots, and 40 percent roof drainage. All flows pass via drains to underground pipes which convey them to the existing retention pond in the northwest corner. Future plans will increase the percentage of impervious surface, and consequently runoff. In order to simplify the treatment of this system of inlets and drains, the maximum gravity discharge was assumed to occur in the 12 inch pipe which outfalls into the existing northwest retention pond. This 12 inch pipe will be joined with the new storm drain line from area A-2, and ultimately discharge into a new detention pond in the landscaped area in the same northwest corner of the site. The rate of discharge will be approximately 2.6 cubic feet per second (cfs), and it will take approximately four hours for the easterly parking lot and depressed landscaped area to drain.

2. Area A-2: This subarea contributes roof runoff from the Service Shops and the Utility Building. The water flows via an underground system to the retention pond in the southwest corner of the northerly 25 acre site. Future plans require the existing drain lines to be excavated, and regraded to carry the peak 100 year flow northward to intercept the 12 inch storm drain line from area A-1. The combined flow will then discharge via an 18 inch pipe into the proposed detention pond in the northwest corner of the property. The maximum flow from the area is approximately 7.9 cfs.

3. Area A-3: This subarea is composed of paved and landscaped areas. Flow currently is overland to the existing northwest retention pond. Future construction will substantially increase the percentage of impervious area with parking lots and the proposed back lot access road. The existing northwest retention pond will also be eliminated. In order to accommodate these changes, grading of new construction is such that flows will be east to west to intercept the west access road. Those flows will then pass north along the access road to the proposed new detention ponding area in the northwest corner via a curb cut. The peak runoff from this area is approximately 23.8 cfs.

B. Area "B"

Area B is composed of parking lots, merchandise stack-out areas, and some graveled and landscaped area. Although two inlets currently exist in this area, they are insufficiently depressed to significantly contribute to the parking lot drainage. The historical flow from the area is overland, passing out the west driveway onto Osuna Rd. No increase in impervious surfaces will occur in this area, and no increase in runoff will be realized under current plans. The current 100 yr - 6 hr runoff from this area is approximately 30.2 cfs.

C. Area "C"

Area C is a combination of permeable soil surfaces, and retention ponding. Future development will result in increased runoff from the site

due to building and parking lot construction. Storm runoff will continue to pass from east to west after expansion. However, the retention pond will be eliminated and a pipe inlet constructed in conjunction with a catch basin. The flow accumulating there will pass underneath the existing ditch that runs along the south property line of the northerly 25 acres, and be carried to the bank of the Bear Canyon Arroyo. There it will be joined by a drop inlet to a 48 inch reinforced concrete pipe, and be discharged into the Bear Canyon Arroyo. This runoff quantity will be approximately 26.1 cfs.

D. Area "D"

Area D is composed of 14.2 acres of undeveloped land. No development work is planned for this site at the present time, excepting the construction of the access road. Offsite flow from 16.7 acres of adjacent, easterly undeveloped land is currently accepted as sheet flow. Future plans include a ditch to route this water across the Rust Tractor site, if required. Because downstream facilities on the Rust site are designed to handle only the offsite flow from the present undeveloped state, future discharges shall be limited to the 100 year - 6 hour undeveloped runoff or less. The undeveloped offsite flow of 18.4 cfs, in addition to the developed area "D" flow of 27.5 cfs, results in a 100 year runoff of 45.9 cfs.

For the present, flow shall continue to be overland to the northerly boundary of this 14.2 acre site, then westerly by swale or dirt berm, until reaching the access road constructed along the west property line. The runoff will then flow to the low southwest corner of the site where it will enter a drop inlet. Upon entering the drop inlet, the water will combine with the flow from Area "C" and be discharged through a 48 inch RCP into the Bear Canyon Arroyo. The combined discharge rate is approximately 72.0 cfs.

VI. DRAINAGE IMPROVEMENTS

A. Area "A"

Construct 595 feet of new storm drain. Maximum capacity is equal to peak flow from roof tops in area A-2, and the maximum gravity discharge from area A-1.

A-1 2.6 cfs

A-2 7.9 cfs

Combined discharge at outfall 10.5 cfs

Construct detention pond in northwest corner with:

1. A minimum bottom area of 11,150 square feet.
2. A minimum 3:1 side slopes on banks.
3. A maximum perimeter length of 650 feet.

4. A minimum depth to outlet works-inlet invert of 2.00 feet.
5. One 29" x 18" metal pipe arch culvert for outlet works with a concrete headwall at the inlet.
6. A minimum of 6 inches over-excavation in pond bottom to be filled with 6" river cobbles and to contain nuisance flows.
7. The entire pond is to be landscaped, and the banks protected by well tended grass.
8. An emergency spillway is to be created by grading a swale around the west side of the pond to encourage overflow to pass onto Osuna Rd. without breaching the pond banks.
9. A maximum 100 year ponding depth of approximately 18 inches.
10. Inlet slopes from the access road, and outlet slopes to Osuna Road are to be riprapped or otherwise protected.

The peak allowable discharge based on the 5 year - 6 hour runoff from the 25 acre site is 26.3 cfs. The peak actual discharge from the pond during the 100 year storm should be approximately 10.5 cfs (see Figure No. 2 and calculations). This occurs at a depth of 18 inches in the pond.

B. Area "B"

No changes.

C. Area "C"

A catch basin shall be constructed as shown on the grading plan and approximately 480 feet of 30 inch reinforced concrete pipe (or a hydraulic equivalent) shall be installed across the back 14.2 acres to the banks of the Bear Canyon Arroyo. Peak flow during the 100 year storm is equal to the pipe capacity of 26.5 cfs.

D. Area "D"

An elevated access road is to be constructed along the west property line in this area. In addition, a swale is to be graded along the north property line and a New Mexico Highway Department Type I - depressed median inlet built. Inlet capacity is to be equal to or greater than the combined offsite historical and the onsite developed flow for the 100 year - 6 hour storm. These are:

Offsite Historical	18.5 cfs
Onsite 55% Developed	<u>27.4 cfs</u>
Total Capacity	45.9 cfs

A 48 inch reinforced concrete pipe or a hydraulic equivalent is to be installed to outfall into the Bear Canyon Arroyo as shown on the accompanying plan. Total flow capacity is to be equal to the combined flows from Areas "C" and "D".

Area "C" Pipe Flow	26.5 cfs
Area "D" Combined Flow	<u>45.9 cfs</u>
48 inch Design Flow	72.4 cfs

A riprapped outfall will be constructed as shown on the plans to protect the bank of the Bear Canyon Arroyo. This will have to be modified in the future as the trapezoidal channel planned by AMAFCA is constructed. It should be noted that the hydraulic analysis of the pipes was based on simultaneous runoff peaks in the Bear Canyon Channel and from the property. This should be highly conservative.

E. Offsite Flows

No major improvements are planned to accommodate offsite flows. The ditch which is presently in place across the north 25 acre site will be "dressed up", and two 24" metal pipe culverts installed to carry that flow under the new access road.



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Albuquerque, New Mexico 87102
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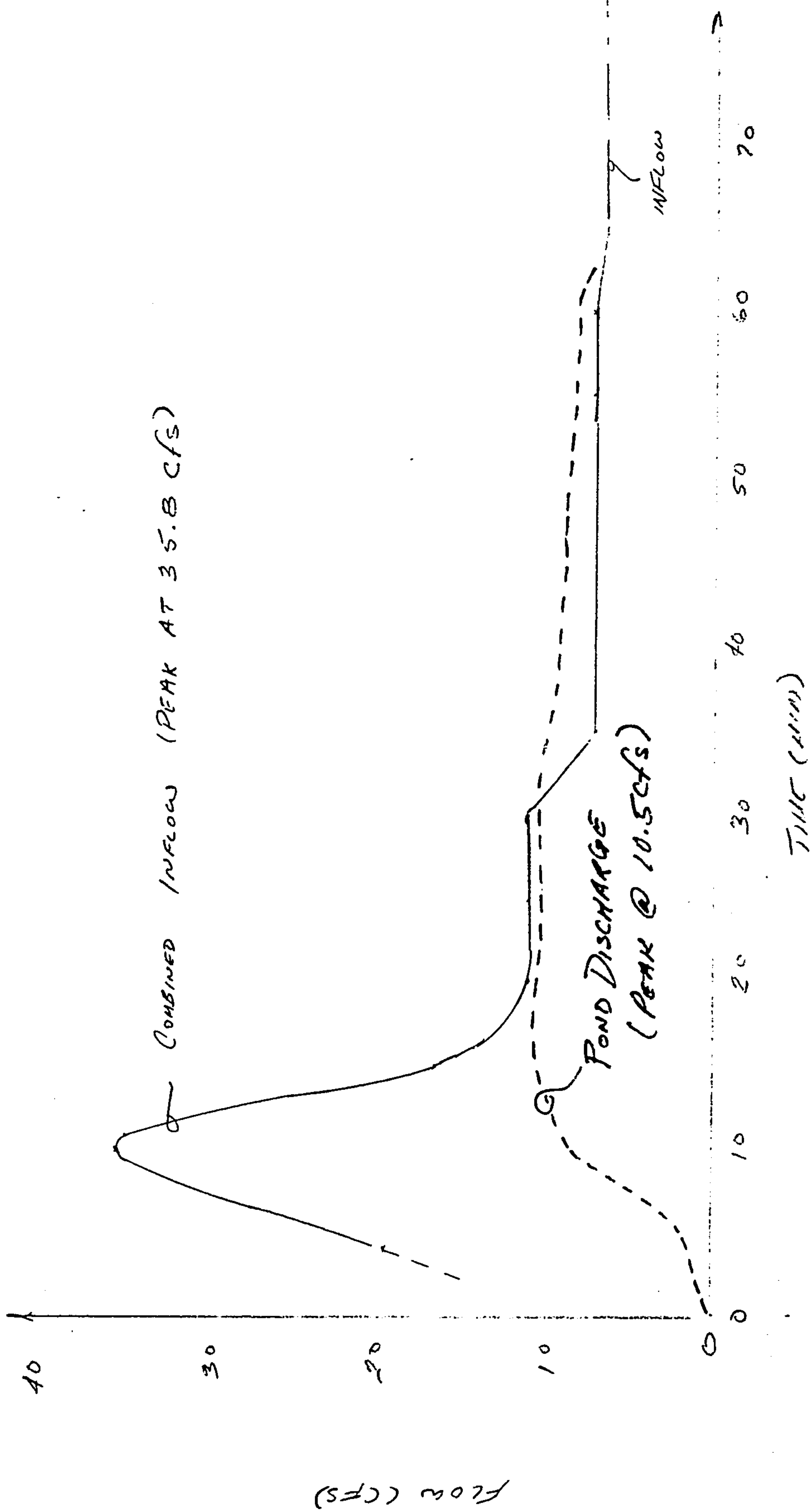
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FIG#2 NORTHWEST POND INFLOW/OUTFLOW HYDROGRAPH
(DISCHARGE VIA 2'-25"X16" CHANNEL)



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TABLE #1, FLOW SUMMARY SHEET
(100 YR - 6 HR)

<u>POINT OF DISCHARGE</u>	<u>HISTORICAL FLOW (CFS)</u>	<u>DEVELOPED DISCHARGE (CFS)</u>	<u>INCREASE (CFS)</u>
OSUNA RD.	30.2	40.7	10.5
BEAR CANYON ARROYO	53.8	91.8	38.0

VII. CONCLUSIONS

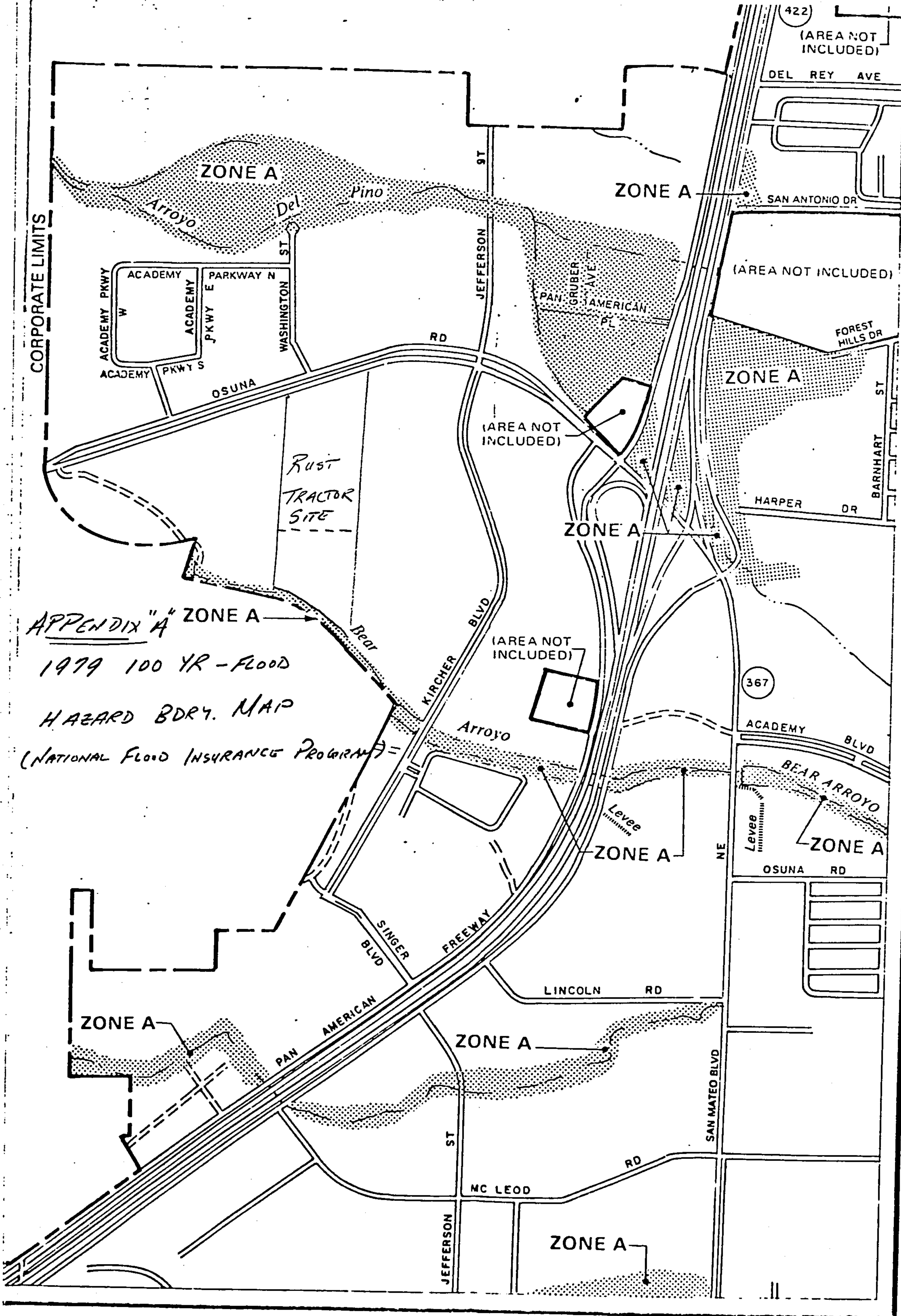
Development plans will raise the percentage of impervious surface from 60 to 63 percent on the 25 acre site, and from 0 to 55 percent on the undeveloped site.

Loss of retention ponding will result in an increased discharge to the Bear Canyon Arroyo of 38.0 cfs, and an increase of 10.5 cfs into Osuna Road. This 10.5 cfs is below the 5 yr - 6 hr undeveloped discharge of 26.25 cfs.

The total runoff into Osuna Road from the Rust property is the sum of the 10.5 cfs increase and the present 30.2 cfs. This sum of 40.7 cfs was then compared to the combined street capacity in Appendix "I". That capacity of 135.4 cfs is approximately 3.3 times the flow originating from the Rust property.

VIII. RECOMMENDATIONS

Because the plans as described herein are in substantial compliance with the City's drainage policy, it is recommended that this report be approved in its entirety so that construction may proceed.





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Preliminary Pond Sizing - Rust

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Jan 20, 1982

APPENDIX "F"

① To: determine the 100-year - 6 hr intensity/duration curve.

Met: 100 year values

@ $T = 5 \text{ min}$

$T = 10 \text{ min}$

$T = 15 \text{ min}$

$T = 30 \text{ min}$

$T = 1 \text{ hr}$

$T = 2 \text{ hr}$

② Ditto - 5 year

③ Procedure; 1) Read precipitation for 100-year 6 hr storm from isopleth maps.

$$P_{100-6} = 2.4''$$

2) Read " " for 100-year 24 hours

$$P_{100-24} = 2.6''$$

3) Read " " $P_{2-6} = 1.0''$

4) Read " " $P_{2-24} = 2.0''$

5) NOAA 1966 11 - Determine 2yr 6 hr estimated 1.0 hr values

$$Y_2 = 0.5 \quad \checkmark$$

$$Y_{100} = 2.2 \quad \checkmark$$



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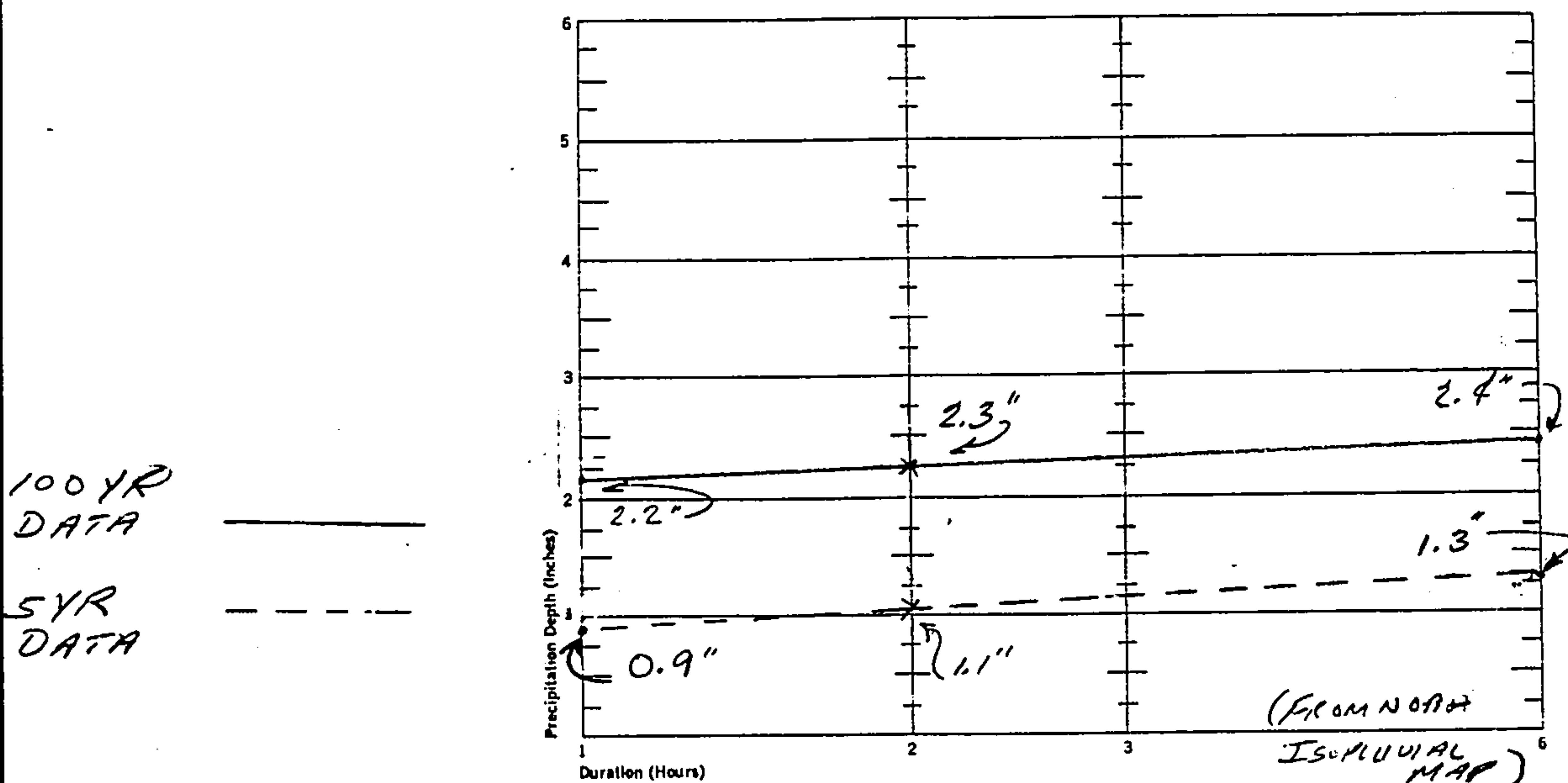
2 OF

DATE

6) $Y_{100-1} = 2.2''$

	<u>T (MIN)</u>	<u>RATIO TO 1HR (R)</u>	<u>P (IN)</u>
100 YR DATA	5	0.29	0.6
	10	0.45	1.0
	15	0.57	1.3
	30	0.79	1.7
	60	1.0	2.2
FROM FIG 15(b) DATA	120	—	2.3

$P(T) \text{ FOR } T \leq 1 \text{ HR} = R \times 2.2$



(B)

Figure 15. Precipitation depth-duration diagram (1- to 100-hr).
a. New Mexico east of generalized crest of Sangre de Cristo Range and Sacramento Mountains (Region 1, fig. 18).
b. New Mexico west of generalized crest of Sangre de Cristo Range and Sacramento Mountains (Region 2, fig. 18).



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⑤ Procedure : 1) DETERMINE P_{5-1} !!!
FIG 6 - NOAA

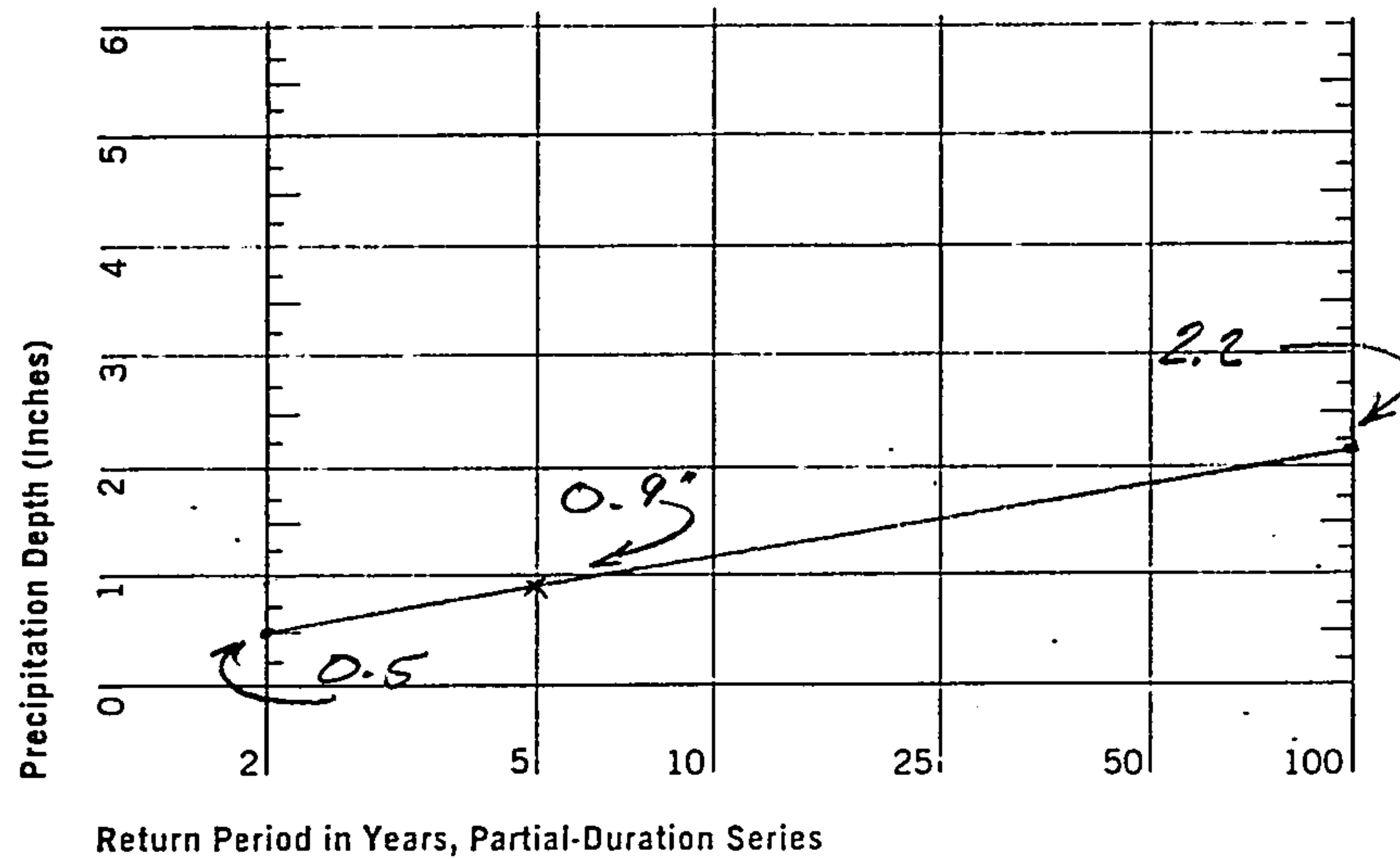


Figure 6. Precipitation depth versus return period for partial-duration series.

$$P(T) \text{ FOR } T \leq 1 \text{ HR} = R \times 0.9$$

<u>T (MIN)</u>	<u>RATIO TO 1HR (R)</u>	<u>P (IN)</u>
5	0.29	0.3
10	0.45	0.4
15	0.57	0.5
30	0.79	0.7
60	1.0	0.9
120	—	1.1

SVR
DATA

FROM
PKEU
PAGE -
FIG 15(b)
NOAA



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DATE

Jan 20, 1972

RESULTS :

COMBINING DATA :

DETERMINE THE INTENSITY FOR EACH DURATION -

→ NOTE: $INTENSITY = \frac{PRECIPITATION}{TIME (HRS)}$

TABLE #1 : INTENSITY DURATION DATA FOR 5 & 100 YR STORM.

<u>TIME (MIN)</u>	<u>PRECIPITATION (IN)</u>		<u>INTENSITY (IN/HR)</u>	
	<u>5 YR</u>	<u>100 YR</u>	<u>5 YR</u>	<u>100 YR</u>
<i>5</i>	<i>0.3</i>	<i>0.6</i>	<i>3.6</i>	<i>7.2</i>
<i>10</i>	<i>0.4</i>	<i>1.0</i>	<i>2.4</i>	<i>6.0</i>
<i>15</i>	<i>0.5</i>	<i>1.3</i>	<i>2.0</i>	<i>5.2</i>
<i>30</i>	<i>0.7</i>	<i>1.7</i>	<i>1.4</i>	<i>3.4</i>
<i>60</i>	<i>0.9</i>	<i>2.2</i>	<i>0.9</i>	<i>2.2</i>
<i>120</i>	<i>1.1</i>	<i>2.3</i>	<i>0.6</i>	<i>1.2</i>



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BUST TRACTOR

COMPUTED BY

SGC

CHECKED BY

JOB NUMBER

SHEET NUMBER

5 OF

DATE

Jan 20, 1982

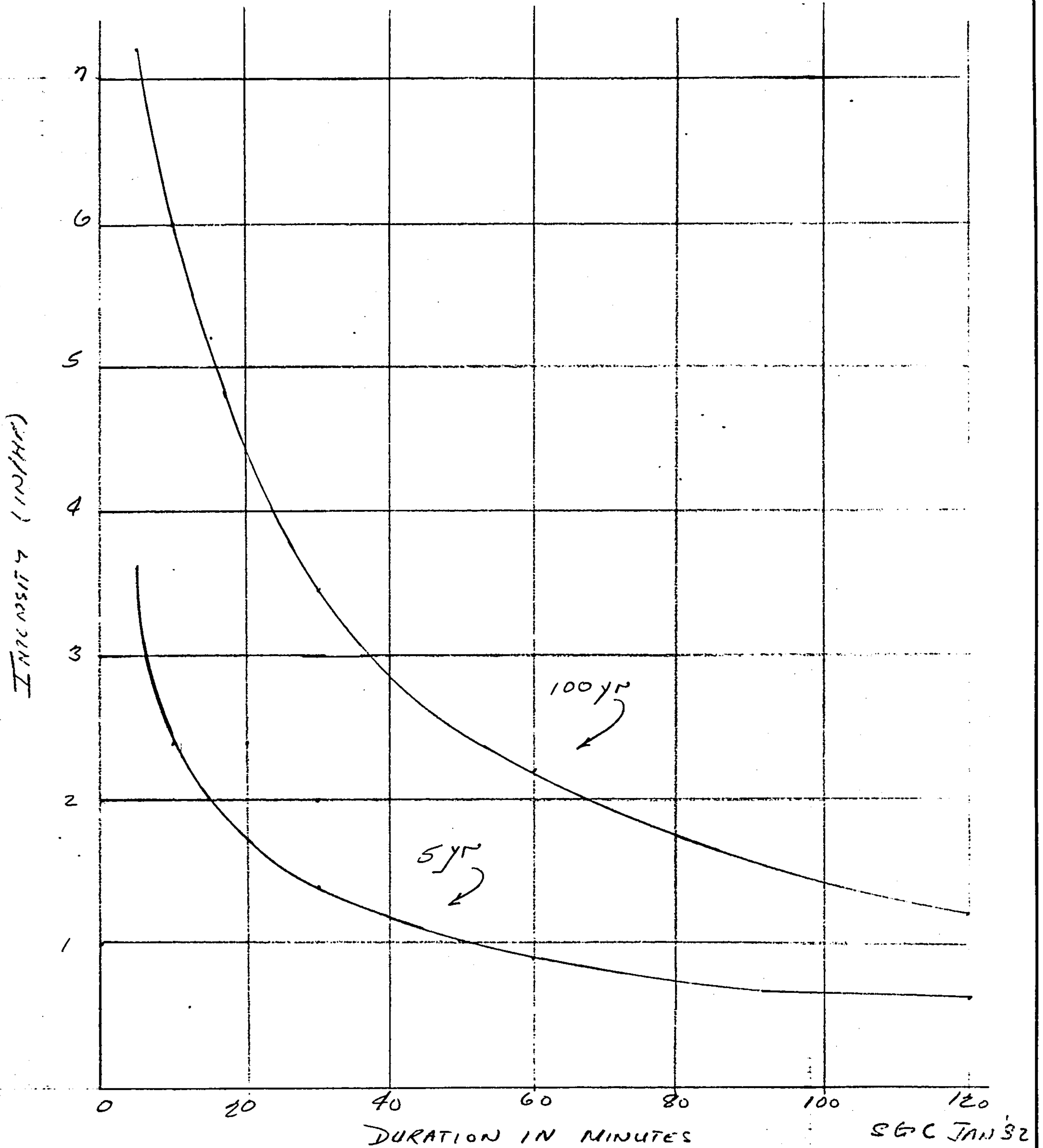


FIG. A INTENSITY / DURATION FREQUENCY CURVES

NOTE: Curve Based on Data
Contained in NOAA ATLAS 2, VOL IV Dated 1973



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APPENDIX "G"

DEVELOP A HYETOGRAPH FOR THE 6-HR STORM, BASED ON THE CITY 1-HR HYETOGRAPH.

ASSUMPTION : 1) 85% OF RAINFALL OCCURS IN 1ST HOUR.
2) 15% " " " " IN LAST 5 HOURS.

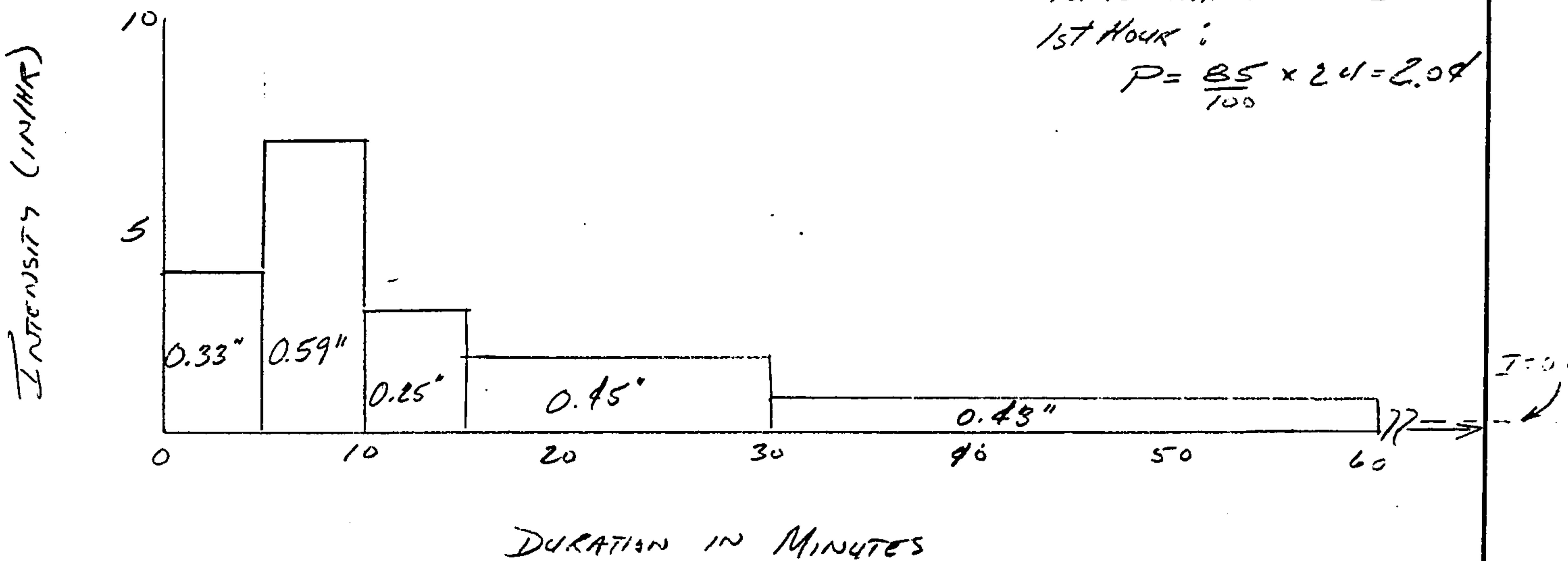


FIG. #1 : 100YR - 6HR HYETOGRAPH
(1st Hour)



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APPENDIX "H"

DETERMINE MAX ALLOWABLE POND DISCHARGE FROM SITE...

MAX. ALLOWABLE $Q = Q_{5/6}$ (5yr - 6 hr Storm)

Using FIG 3-1 OVERLAND TIME OF FLOW CURVES

$$T_c = 3 \times 21 = 63 \text{ MINUTES}$$

$$\text{WHERE: } S = \frac{18}{1300} \approx 0.014$$

$$L = 1300 \text{ ft}$$

$$C = 1.25 \times 0.40 = 0.50$$

THEN: FROM FIG. A INTENSITY/DURATION FREQUENCY CURVES

$$\text{Intensity: } I_{5/6} = 2.1 \text{ IN/HR}$$

AND: THE RATIONAL METHOD: $Q = C i A$

$$Q_{5/6} = 0.50 \times 2.1 \times 25 = \underline{26.25 \text{ CFS}}$$

$$\text{WHERE: } Q = \text{Flow in CFS}$$

$$C = 0.50 \text{ (RATIONAL C)}$$

$$i = 2.1 \text{ (AVERAGE INTENSITY IN IN/HR)}$$

$$A = 25 \text{ (WATERSHED AREA IN ACRES)}$$



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rust - Zone A (Zone A1)

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ASSUME THE MAXIMUM FLOW FROM THIS AREA
IS CONTROLLED BY THE 12" PIPE FLOWING TO THE
EXISTING POND ON THE NW CORNER OF THE PROPERTY.
THEN:

$$Q_{12"} \approx \underline{2.6 \text{ cfs}} \quad (1)$$

WHERE: $S = 0.0052$

$n = 0.013$

CHECK TO ASSURE THAT MUCH FLOW IS AVAILABLE
FROM THE STORM:

RATIONAL METHOD: $Q = C_i A$

$$Q_{100} = 1.0 \times 6.0 \times 5.92 \quad (\text{ASSUME } T_c = 10 \text{ MIN})$$

$$\text{ZONE A1} \quad \therefore Q_{100} = 35.52 \text{ cfs} > 2.6 \text{ cfs}$$

DETERMINE APPROXIMATE TIME PIPE WILL FLOW ...

MAXIMUM PRECIPITATION IN 1 HR FOR THE 100 YR STORM
IS ~ 2.04 IN (85% OF 100 YR - 6 HR VALUE) (2)

AFTER 1 HR, AVERAGE INFLOW RATE IS:

$$\text{INTENSITY AFTER 1 HR} = \frac{\text{REMAINING } \cancel{P} \text{ IN STORM}}{\text{TIME IN HRS}}$$

$$\therefore I = \frac{(1 - 0.85) 2.4}{5} = 0.072 \text{ IN/HR}$$

THEN: THE AVERAGE $\bar{Q}$ FALLING IN THE LAST 5 HRS,

$$\bar{Q} = 1.0 \times 0.072 \times 5.92$$

$$\therefore \bar{Q} = 0.42 \text{ cfs} < 2.6 \text{ cfs}$$

(O.K. TO DISREGARD LAST 5 HRS $\cancel{P}$)



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SHEET NUMBER

OF

COMPUTED BY

S G C

CHECKED BY

JOB NUMBER

DATE

(CONT'D)

THEN: TIME TO FLOW @ 2.6 CFS:

$$T_{2.6} = \frac{\text{1ST HOUR VOLUME OF RUNOFF}}{\text{RATE OF DISCHARGE}}$$

WHERE: 1ST HOUR VOLUME = $T_D \times \text{AREA}$

$$\text{1ST HOUR VOLUME} = \frac{2.04 \text{ IN} \times 5.92 \text{ ACRES} \times 43,560 \text{ FT}^2/\text{ACRE}}{12 \text{ IN/FT}}$$

$$\text{OR: 1ST HOUR VOLUME} = 43,839 \text{ FT}^3$$

$$\text{FINALLY: } T_{2.6} = \frac{43,839 \text{ FT}^3}{2.6 \text{ CFS} \times 3600 \text{ S/HR}} = \underline{\underline{4.68 \text{ HRS}}}$$



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PLOT - ZONE A (ZONE A-2)

COMPUTED BY

E.G.C.

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OF

DATE

PIPES HAVE BEEN SIZED TO CARRY THE MAXIMUM
100 YR FLOW HERE, TO A MANHOLE WHICH
WILL BE CONSTRUCTED AT THE JUNCTION OF
THE R1 PIPE OUTFALL AND THE PROPOSED ROADWAY
IN THE NW CORNER OF THE PROPERTY.

Zone A₂: RATIONAL METHOD

$$Q = C i A$$

WHERE: $C = 1.0$

$i = 6.0 \text{ IN/HR}$ ($T_c = 10 \text{ MIN ASSUMED}$)

$A = 1.32 \text{ ACRES}$

THEN: $Q_{100} = 1.0 \times 6.0 \times 1.32 = \underline{\underline{7.92 \text{ CFS}}}$



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East - Zone A (Zone A3)

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OF

DATE

ZONE A3 DRAINS PARKING LOTS ON THE
WEST SIDE OF THE PROPERTY VIA OVERLAND
FLOW.

FIND T_c USING:

FIG 3-1, OVERLAND TIME OF FLOW CURVES (3)

$$T_c = 6 \text{ MIN (USE 10 MIN)}$$

WHERE: $\Delta H = 9 \text{ FT}$

$$L = 900 \text{ FT}$$

$$C = 1.00$$

DETERMINE MAXIMUM FLOW FROM AREA A-3 TO DETENTION
POND.

$$Q = C i A$$

WHERE: $C = 0.98$

$$i = 6.0 \text{ in/hr}$$

$$A = 3.33 \text{ Acres}$$

THEN: $Q = 19.58 \text{ cfs}$



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ZONE A (CONT'D)

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OF

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DETERMINE APPROXIMATE FLOW TO POND AFTER
 $T = 4.6$ HRS...

RECALL THAT IT TAKES THE A1 AREA ~ 4.6 hrs
TO EVACUATE THE RAINFALL VOLUME FALLING
THEREON. AFTER 4.6 hrs $Q_{OUT} \cong Q_{FALLING}$.
BECAUSE ZONES A-2, E, A3 ARE DESIGNED TO
FLOW TO THE POND AT THE RATE OF
RAINFALL, THE Q INTO THE NW POND BECOMES
EQUAL TO THE THE INTENSITY $\times$ THE COMBINED
AREA $\times$ THE COMPOSITE "C".

$$Q = C i A$$

Where: $C = \frac{5.92}{10.57} \times 1.0 + \frac{1.32}{10.57} \times 1.0 + \frac{3.33}{10.57} \times 0.98$

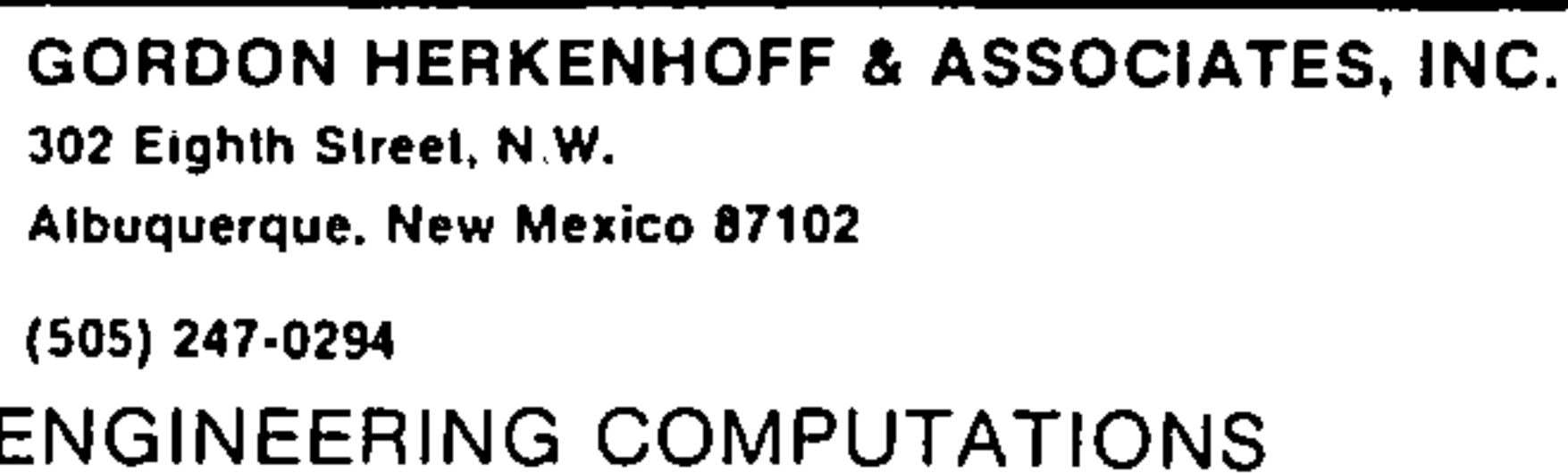
$$\therefore C = 0.99$$

$$i = 0.07 \text{ IN/HR}$$

$$A = 10.57$$

$$Q = 0.99 \times 0.07 \times 10.57 = \underline{\underline{0.73 \text{ CFS}}}$$

@ $4.6 \text{ hrs} < T < 6 \text{ hrs}$



RUST TRACTOR (POND) CONFIGURATION

OF

DATE _____

PROPOSED POND FOR NEW CORNER

PLAN VIEW

52

RAD Bud

March 1965

1/2 x 1/4 100 YK
DEPT H

1578

2

220"

Rock Bed

STOXA GRE

(6th Street)

Handwritten: 7

ELASTIC MEMBRANE-

TO PRESENT WITH

6" Rock Ripran

SECTION 7-11

25

Notes:

Minimum Bottom Area is 11,150 ft².

② MIN DEPTH @ PIPES 2.0 FT.
(INVERT TO BANK TOP)

③ Maximum Bank

PERIMETER LENGTH IS 650 FT.

DEPRESS 4" @ OVERTFLOW

✓ PCCP

✓

11

2

$Q_{100} = 22.6 \text{ cfs}$

7-25X16 (HPR)



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OF

DATE

FEB 12, 1988

APPENDIX "I"

GENERATE THE INFLOW DATA FOR THE DETENTION POND
LOCATED AT THE N.W. CORNER OF THE PROPERTY.

NOTE THAT THE COMBINED STORM DRAIN FLOW IS
ACCOMMODATED BY AN 18" Ø RCP WHICH FLOWS AT
THE SUM OF THE A1 & A2 PIPE DISCHARGE RATES

THIS IS $2.6 + 7.9 = 10.5$ cfs.

ZONE "A" - POND INFLOW DATA

TIME (MIN)	PD* (IN)	ZONE A-3		ZONE A-2		A-1	TOTAL
		MULT	VOL (FT ³)	MULT	VOL (FT ³)	VOL (FT ³)	VOL (FT ³)
5	.33	$A = 3.33$ $MULT = 1.00 \times 3.33 \times \frac{43,560}{12}$	3,989	$A = 1.32$ $MULT = 1.00 \times 1.32 \times \frac{43,560}{12}$	1,581	390	5,960
10	.59		7,132		2,827	780	10,739
15	.25		3,022		1,198	780	5,000
20	.15		1,813		719	780	3,312
25	.15		↓		↓	↓	↓
30	.15	$C = 1.00$	↓	$C = 1.00$	↓	↓	↓
35	.08		967		383	↓	2130
40	.08		↓		↓	↓	↓
45	.08		↓		↓	↓	↓
50	.08		↓		↓	↓	↓
55	.08		↓		↓	↓	↓
60	0.08		—		—	↓	↓
65	0.07		846		335	↓	1,961
			↓		↓	↓	↓

5 MIN
INT.

$\{ 1 \text{ hr} < T < 4.6 \text{ hr}$

* PRECIPITATION TAKEN FROM MODIFIED 1-HR HYETOGRAPH
FIG #1, 100 YR - 6 HR HYETOGRAPH

(NEXT SHEET)



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RUST - POND "A"

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OF

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POND VOLUME:

① BY PLANIMETER - USE 17,000 $\#$ SURFACE
PERIMETER $\approx 650'$

② AREA LOST DUE TO 3:1 S.S. @ 3' DEPTH
 $AA = 3 \times 3 \times 650 = 5,850 \#$

③ DETERMINE SURFACE AREAS AT 0, 0.5, & 1.5' DEPTH

$$SLD = (17,000 - 5,850) + \frac{D}{3} \times 5,850$$

RESULTS

<u>DEPTH (FT)</u>	<u>SURFACE AREA (FT²)</u>	<u>AV. AREA (FT²)</u>	<u>VOL. (FT³)</u>
0.0	11,150	—	—
0.5	12,125	11,437	5,819
1.0	13,100	12,125	12,125
1.5	14,075	12,613	18,918



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RUST - ZONE "A" POND

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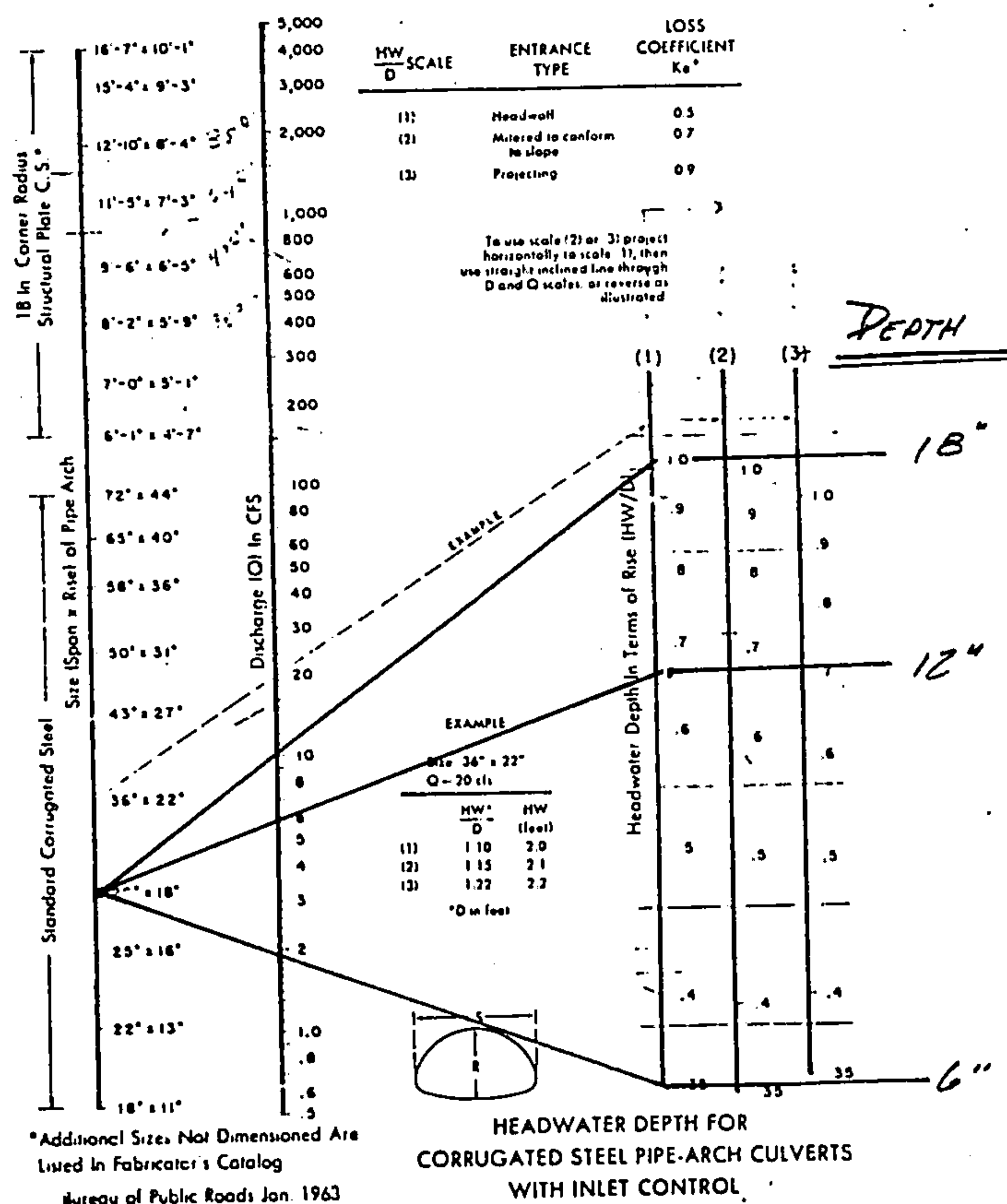
OF

DATE

PIPE SELECTION -

POND DEPTH FIXED @ 18"

USE: 29" X 18" CMPA N/INLET CONTROL & HEADWALL.

FROM THE HANDBOOK OF STEEL DRAINAGE AND HIGHWAY
CONSTRUCTION PRODUCTS ④...

STAGE (FT)	DISCHARGE (CFS)
0	0
0.5	2.0
1.0	6.0
1.5	10.5

Fig. 4-20. Inlet control and headwater depths for corrugated steel pipe-arch culverts. Headwater depth should be kept low because pipe arches are generally used where headroom is limited.



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P1ST - ZONE "A" P1ND

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NORTHWEST POND PERFORMANCE CURVES

*DISCHARGE
(29x18" CMPA)*

VOLUME

POND STAGE (FT)

POND Vol. (FT³ x 10³)
POND DISCHARGE (CFS)

1.5

1.0

0.5

0

0

2.5

5.0

7.5

10.0

12.5

15.0

17.5

20.0

0

2.0

4.0

6.0

8.0

10.0



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SHEET NUMBER

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NORTHWEST POND ROUTING DATA:

Use: 1-29"x18" CMPA W/ CONCRETE HEADWALL @ INLET
& MITERED DISCHARGE.

TIME (MIN)	INC. VOL. (FT ³)	ACC. VOL. (FT ³)	DEPTH (FT)	Q OUT (CFS)	VOL. OUT (CFS)	NET REM. VOL. (FT ³)
0	—	—	—	—	—	—
5	—	5,960	0.50	2.0	600	5,360
10	10,739	16,099	1.30	8.6	2,580	13,519
15	5,000	18,519	1.48	10.5	3,150	15,369
20	3,312	18,631	1.49	10.5	3,150	15,531
25	3,312	18,843	1.50	10.5	3,150	15,693
30	3,312	19,005	1.51	10.5	3,150	15,855
35	2,130	17,985	1.44	9.8	2,940	15,045
40	2,130	17,175	1.38	9.2	2,760	14,415
45	2,130	16,545	1.33	8.8	2,640	13,905
50	2,130	16,035	1.30	8.3	2,490	13,545
55	2,130	15,675	1.26	8.2	2,460	13,215
60	2,130	15,345	1.23	8.0	2,400	12,945
65	1961	14,906	1.22	8.0	2,400	12,506



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NORTHWEST POND HYDROGRAPHS

PEAK @ 35.8 CFS

POND DISCHARGE DURING 100 YR-6 HR STORM
(PEAK @ 17.1 CFS)

LOW FLOW OCCURS
FOR 24 HRS

COMBINED INFLOW

A-3 INFLOW

A-1 INFLOW

A-2 INFLOW

TIME (HRS)

FLOWS IN CFS



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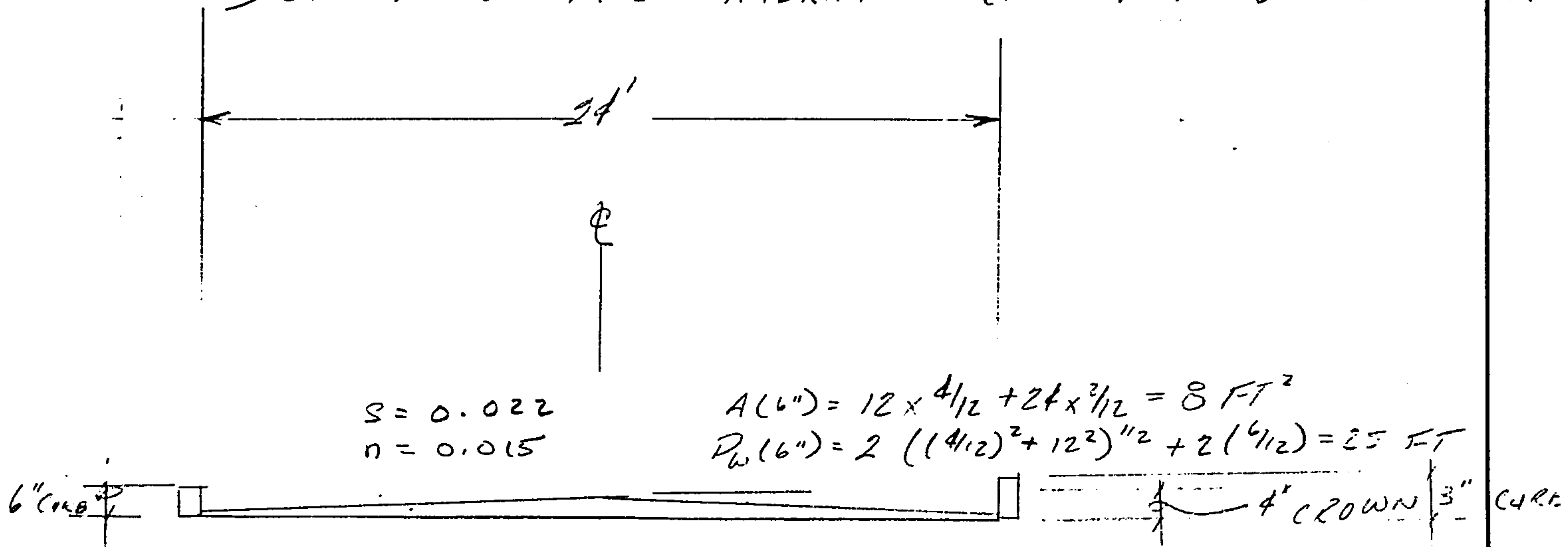
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DATE

FEB 24, 1972

DETERMINE THE HYDRAULIC CAPACITY ON OSUNA RD



OSUNA RD, HYDRAULIC X-SECTION

CHECK SOUTH LANE OF OSUNA RD. FOR
NOMINAL HYDRAULIC CAPACITY AT R...

MANNINGS EQN:

LET: $D = 6''$

$$\text{THEN: } Q = \frac{1.486}{n} \times A \times R_H^{2/3} \times S^{1/2} \quad (\text{CFS})$$

$$\text{OR: } Q = \frac{1.486}{0.015} \times 8 \times \left(\frac{8}{25}\right)^{2/3} \times (0.022)^{1/2}$$

$$\therefore Q = 54.78 \text{ cfs}$$

$$\text{COMBINED RUST DISCHARGE TO STREET} = 30.2 + 10.5 = 40.7 \text{ cfs}$$
$$\therefore 54.78 > 40.7 \text{ cfs}$$

CONCLUSION: THERE IS ENOUGH CAPACITY IN THE
SOUTH LANE OF OSUNA RD. TO
ACCOMMODATE THE RUST TRACTOR DISCHARGE
DISREGARDING OTHER FLOWS THAT MAY
BE OCCURRING THERE.

(NEXT SHEET)



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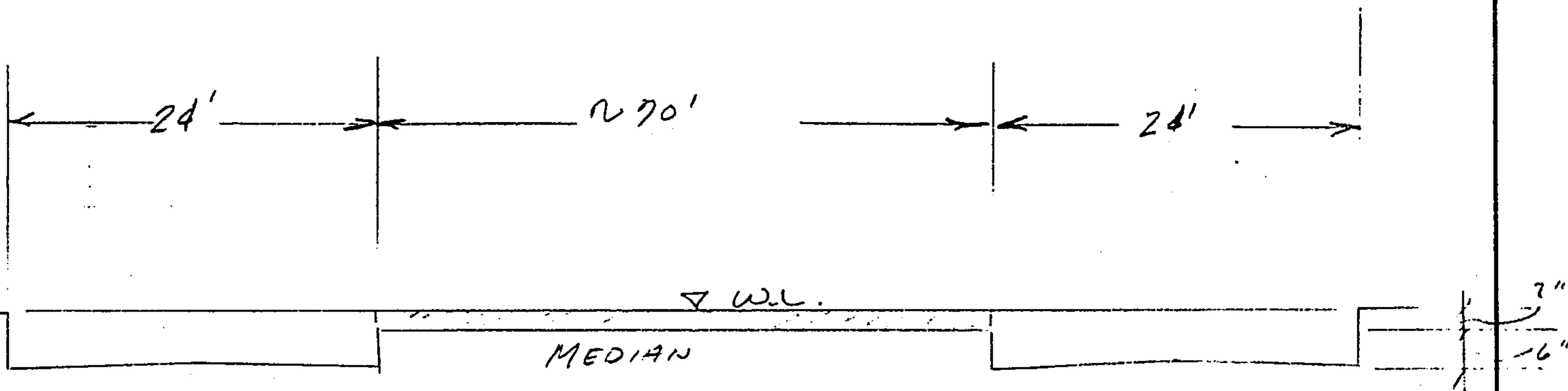
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JOB NUMBER

SHEET NUMBER

2 OF 2

DATE



CHECK APPROXIMATE HYDRAULIC CAPACITY OF ENTIRE STREET WIDTH:

CAPACITY OF SHADED AREA:

$$n = 0.03 \text{ (EARTH)}$$

$$S = 0.022$$

$$A = \frac{1}{2} \times \sim 70 = 11.67 \text{ FT}^2$$

$$P_H = \sim 70'$$

$$R_H = \frac{11.67}{70} = 0.167$$

$$\text{THEN: } Q = \frac{1.486}{0.03} \times 11.67 \times (0.167)^{\frac{2}{3}} \times 0.022^{1/2} = 25.84 \text{ CFS}$$

TOTAL CAPACITY:

$$Q_T = 2 \times \text{STREET CAPACITY (PREV. SHEET)} + \text{MEDIAN CAPACITY (FROM ABOVE)}$$

$$Q_T = 2 \times 54.78 + 25.84 \approx \underline{135.4 \text{ CFS}}$$

CONCLUSION: THE STREET H₁₀ IS ~ 2.9 TIMES THE CAPACITY REQUIRED TO ACCOMMODATE THE RUST TRACTOR DISCHARGE.



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NAME OF PROJECT

East TRACTOR (LIFE E)

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DATE

Feb 15 1972

APPENDIX "J"

DETERMINE RUNOFF INTO STREET FROM PAVED "SIDEWALK"
AREAS WHICH COMPOSE ZONE E...

NOTE: Area = 5.42 Acres

% Dev = 65

C = 0.93

$T_c = 8$ MIN (BY FIG 3-1, OVERLAND TIME
OF FLOW CURVE) ③

(Use 10 min)

Then: $Q_{100} = 0.93 \times 6.0 \times 5.42$

$\therefore Q_{100} = \underline{\underline{30.24 \text{ cfs}}}$

[This is an existing condition]



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RUST TRAIL (ZONE 2)

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DETERMINE THE RUNOFF FLOWING FROM EAST, TO WEST
ACROSS THE BACK NINE ACRES OF THE NORTHERN
25 ACRE LOT. MAX. PERMISSIBLE DEVELOPMENT PERCENTAGE
IS 50%.

$$A = 9.01 \text{ acres}$$

$$\% \text{ Dev} = 50$$

$$C = 0.84$$

NOTE: BECAUSE THE DURATION TIME OF CONCENTRATION
CURVES DO NOT ADDRESS SLOPES AS
SLIGHT AS EXIST HERE ($S = \frac{25.0 - 24.5}{900}$),
ARBITRARILY ASSUME A $T_c = 30$ MINUTES.
THIS SEEMS REASONABLE SINCE THE SITE IS
ESSENTIALLY GRADED FLAT, 50% PERMEABLE
DIRT SURFACE, & SYMMETRICAL.

CHECK BY THE CALIFORNIA CULVERTS PRACTICE FORM:

$$T_c (\text{hrs}) = \left(\frac{11.9 L^3}{H} \right)^{0.375}$$

$$T_c = \left[\frac{11.9 \left(\frac{900}{5-3.3} \right)^3}{25.0 - 24.5} \right]^{0.375} = 0.44 \text{ hrs}$$

$$0.44 \text{ hrs} \approx 26 \text{ MIN} \approx 30 \text{ MIN}$$

(Reasonable!)

(Next Sheet)

(Cont'd)

 GORDON HERKENHOFF & ASSOCIATES, INC. 302 Eighth Street, N.W. Albuquerque, New Mexico 87102 (505) 247-0294 ENGINEERING COMPUTATIONS	NAME OF PROJECT <i>PAST TRENCH (Zone C)</i>		SHEET NUMBER OF
	COMPUTED BY <i>S & C</i>	CHECKED BY	JOB NUMBER
			DATE <i>7/6/51</i>

THEN: $\frac{I}{100} = 3.45 \text{ in/hr}$

$Q_{100} = 0.74 \times 3.45 \times 9.01$

OR: $Q_{100} = \underline{\underline{26.11}} \text{ cfs (Zone C)}$



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Albuquerque, New Mexico 87102
(505) 247-0294
ENGINEERING COMPUTATIONS

NAME OF PROJECT

RUST TRACTOR (ZONE D)

COMPUTED BY

SGC

CHECKED BY

JOB NUMBER

SHEET NUMBER

OF

DATE

7.6.15.1982

THERE ARE TWO COMPONENTS OF FLOW ACROSS THIS LOT. THE LOT ITSELF IS COMPRISED OF 14.19 ACRES BOUNDED ON THE SOUTH BY THE BEAR CANYON ARROYO. ITS NORTHERN EDGE IS THE SOUTH PROPERTY LINE OF THE EXISTING 25 ACRE RUST TRACTOR SITE.

THERE IS AN ADDITIONAL 16.7 ACRES OF UNDEVELOPED PROPERTY WHICH HISTORICALLY DRAINS ACROSS THIS PROPERTY FROM THE EAST.

① HISTORICAL OFFSITE FLOW:

$$\Delta H = 5152 - 5128 = 24'$$

$$L = 1200'$$

$$S = 0.02$$

$$A = 16.7 \text{ Acres}$$

$$C = 0.40 \times 1.25 = 0.50$$

$$T_c = 57 \text{ Min} \quad (\text{E: FIG 3-1 OVERLAND TIME OF FLOW CURVES}) \quad (2)$$

$$I_{100} = 2.2 \text{ IN/HR}$$

$$\text{THEN: } Q_{100} = 0.50 \times 2.2 \times 16.7 = \underline{\underline{18.37 \text{ CFS}}}$$

(NEXT SHEET)

(Contd)



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302 Eighth Street, N.W.
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(505) 247-0294
ENGINEERING COMPUTATIONS

NAME OF PROJECT

RUST TRACTOR (Zone D)

COMPUTED BY

S G C

CHECKED BY

JOB NUMBER

SHEET NUMBER

OF

DATE

Feb 15 1975

② DEVELOPED DITCH FLOW:

$$\text{MAX \% DEV} = 55$$

$$A = 14.19 \text{ Acres}$$

$$C = (0.40 \times .45 + 0.95 \times .55) / 1.25 = 0.88$$

$$\Delta H = 5147 - 5128 = 19.0$$

$$L = 1200$$

$$T_c = 60 \text{ MIN (FIG 3-1, OVERLAND TIME OF FLOW IN FEET)} \quad \textcircled{E}$$

$$I_{100} = 2.2 \text{ IN/HR}$$

$$\text{THEN: } Q_{100} = 0.88 \times 2.2 \times 14.19$$

$$\text{OR: } Q_{100} = \underline{\underline{27.47 \text{ cfs}}}$$

TOTAL DRAINAGE TO SW CORNER OF ZONE D

$$\text{IS } Q_T = 27.47 + 18.37 = \underline{\underline{45.84 \text{ cfs}}}$$



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302 Eighth Street, N.W.
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(505) 247-0294
ENGINEERING COMPUTATIONS

NAME OF PROJECT

RUST TRACTOR (DROP INLET DESIGN)

COMPUTED BY

SGC

CHECKED BY

JOB NUMBER

SHEET NUMBER

OF

DATE

APPENDIX "K"

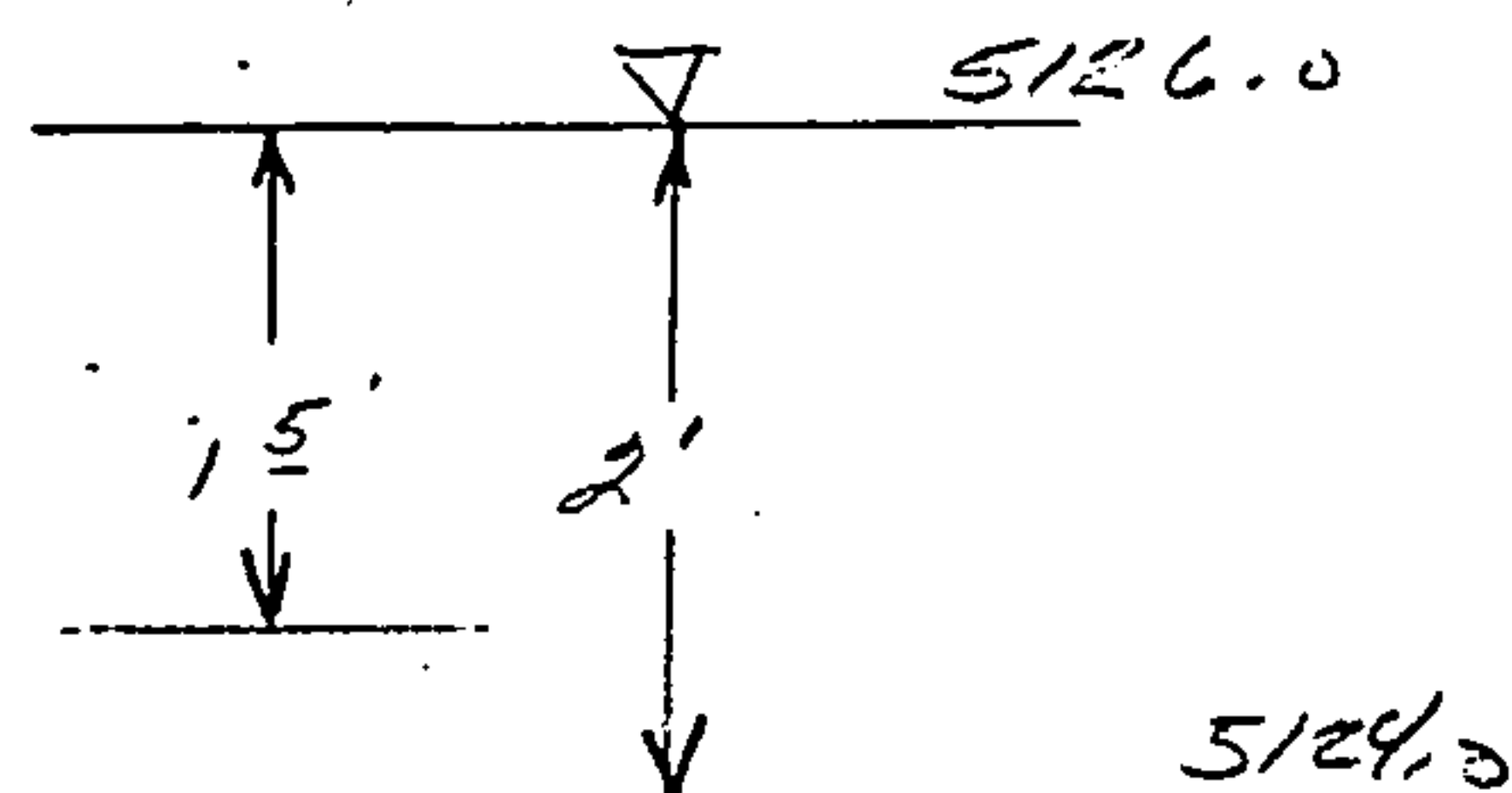
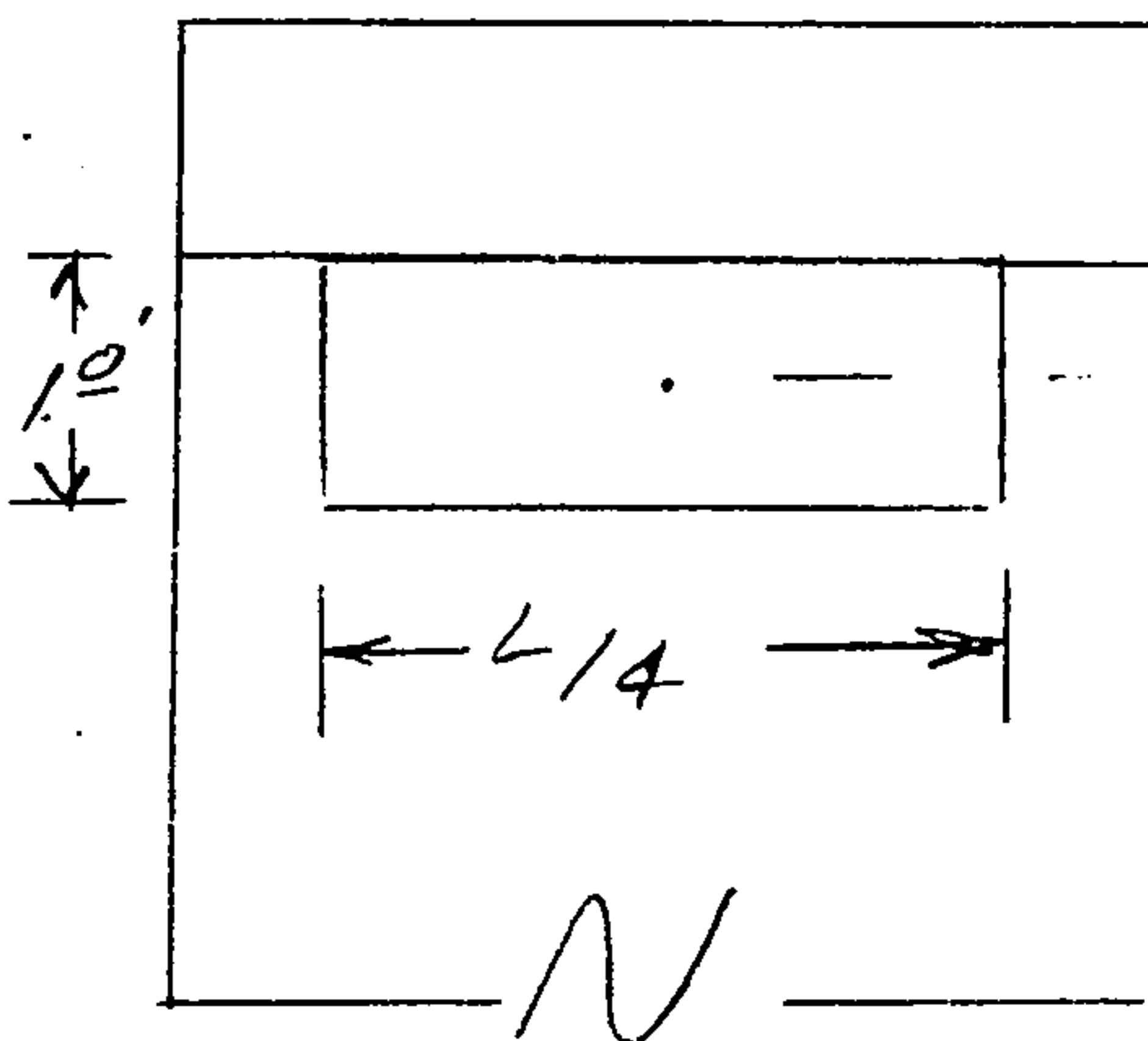
ASSUME: MAX ELEV. TO POND IS 5126.0

INLET INVERT ELEV. IS 5124.0.

ASSUME A 1' HIGH INLET APERTURE, & DETERMINE
WIDTH OF APERTURE.

PRECAST SLAB

$$Q_{100} = 45.84 \text{ cfs}$$



$$CAP = 0.6 \times 1.0 \text{ FT}^2/\text{FT} \times \sqrt{2g \times 1.5}$$

OR:

$$CAP = 5.90 \text{ cfs/ft}$$

$$\text{THEN: } L = \frac{45.84}{5.90} = 7.8 \text{ FEET OF APERTURE}$$

TYPE I - NMHD STANDARD DEPRESSED MEDIAN
INLET HAS 16 FEET OF APERTURE.

$$F.S. = \frac{16}{7.8} \approx 2.1 \quad (\text{USE NMHD INLET})$$



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302 Eighth Street, N.W.
Albuquerque, New Mexico 87102
(505) 247-0294
ENGINEERING COMPUTATIONS

NAME OF PROJECT

COMPUTED BY

SHC

CHECKED BY

JOB NUMBER

SHEET NUMBER

OF

DATE

APPENDIX "L"

OFFSITE 25 - FLOW VERIFICATION:

AREA - 15.8 ACRES

C - 0.50 (1.25 x 0.40)

$\Delta H = 5154 - 5128 = 26 \text{ FT}$

L = 1100 FT

C = 2.4 %

$T_c = 50 \text{ MIN}$

$i = 2.45 \text{ IN/HR}$

THEN: $Q_{100} = C i A$

$$\text{or } Q_{100} = 0.50 \times 2.45 \times 15.8 = \underline{19.36 \text{ cfs}}$$

THIS IS 32.64 CFS BELOW THE 52 CFS
IN THE APPROVED 1974 DRAINAGE REPORT.



GORDON HERKENHOFF & ASSOCIATES, INC.
302 Eighth Street, N.W.
Albuquerque, New Mexico 87102
(505) 247-0294
ENGINEERING COMPUTATIONS

NAME OF PROJECT

RUST TRACTS (DITCH DESIGN)

COMPUTED BY

SGC

CHECKED BY

JOB NUMBER

SHEET NUMBER

OF

DATE

7.6.15.11

REDESIGN DITCH ALONG SOUTH R OF NORTH 55 ACRES

ASSUME: DITCH TO REMAIN AT EXISTING GRADE

① FROM DRAINAGE REPORT DONE BY WM. W. ELLISON & ASS. DATED OCT 1974 - THE HISTORICAL OFFICE Q_{100} TO BE MAINTAINED BY THIS DITCH IS 52 CFS.

② FROM SURVEY DATA:

$$S = 0.001 \text{ FT/FT}$$

DIRT LINING:

$$\text{MANNING'S } n = 0.03$$

$$SS = 2:1$$

③ BY "CHART":

(MANNING'S EQN.)

Q ?	52.00000	RUN
GRADE ?	.00400	RUN
BOT W ?	3.00000	RUN
S.S. ?	3.00000	RUN
N BOT ?	.03000	RUN
N S.S. ?	.03000	RUN
D EST ?	2.00000	RUN
B=1.84691		RUN
VEL=3.29657		RUN
HEAD =2.01566		RUN
FR NG=2.54889		RUN

DEPTH $\approx$ 1.8 FT

BOTTOM WIDTH 3'

(WIDEN OUT FOR PAVE

IN LOT 2)



GORDON HERKENHOFF & ASSOCIATES, INC.
302 Eighth Street, N.W.
Albuquerque, New Mexico 87102
(505) 247-0294
ENGINEERING COMPUTATIONS

NAME OF PROJECT

Rust Tanks (Channel Hydraulics)

SHEET NUMBER

OF

COMPUTED BY

SEC

CHECKED BY

JOB NUMBER

DATE

Feb 15 1972

APPENDIX "M"

Channel Hydraulics: 115 Bear Canyon Ariz. to ...

FIELD SURVEY DATA:

EXISTING CHANNEL BOTTOM IS 25' WIDE

S.S. ARE 3.22:1 & 5.12:1

$n = 0.03$

BOTTOM SLOPE $\approx 1\%$

$Q_{100} = 2000 \text{ CFS}$ (ANAFCA)

BY "CHAN":

CONCLUSION:

DEPTH $\approx 4.5 \text{ FT}$
VEL $\approx 11.0 \text{ CFS}$ } @ 2000 CFS

2000.0000	RUN
GRADE ?	
.0100	RUN
BOT	
27.0000	RUN
S.S. ?	
3.0000	RUN
N BOT ?	
.0300	RUN
N S.S. ?	
.0300	RUN
D EST ?	
3.0000	RUN
D=4.3649	RUN
VEL=10.9501	RUN
HEAD =6.3695	RUN
FR NO=1.0507	RUN

(CONT'D)



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(505) 247-0294

ENGINEERING COMPUTATIONS

NAME OF PROJECT

RUST TRACTOR (CHANNEL OUTFALL)

COMPUTED BY

SGC

CHECKED BY

JOB NUMBER

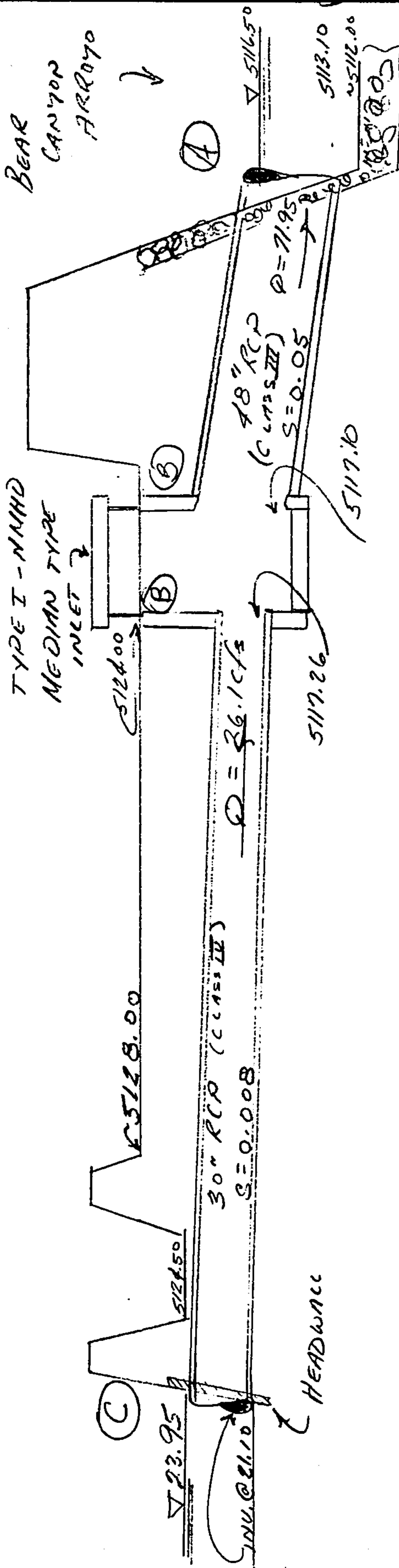
SHEET NUMBER

OF

DATE

AREA "D"

AREA "C"



POINT LOCATION	PIPE SIZE (IN)	HGL ELEV (FT)
A	48	5116.50
	HWD = (+ 0.98)	
B	48	5121.00
	(INLET CONTROL)	
B	30	5121.00
	HWD = (1.14)	
C	30	5123.95

APPENDIX "N" - AREA "C" 30" PIPE SECTIONS



GORDON HERKENHOFF & ASSOCIATES, INC.
302 Eighth Street, N.W.
Albuquerque, New Mexico 87102
(505) 247-0294
ENGINEERING COMPUTATIONS

NAME OF PROJECT

RUST TRACTOR (OUTLET)

(BEAR CANYON)

SHEET NUMBER

OF

COMPUTED BY

SGC

CHECKED BY

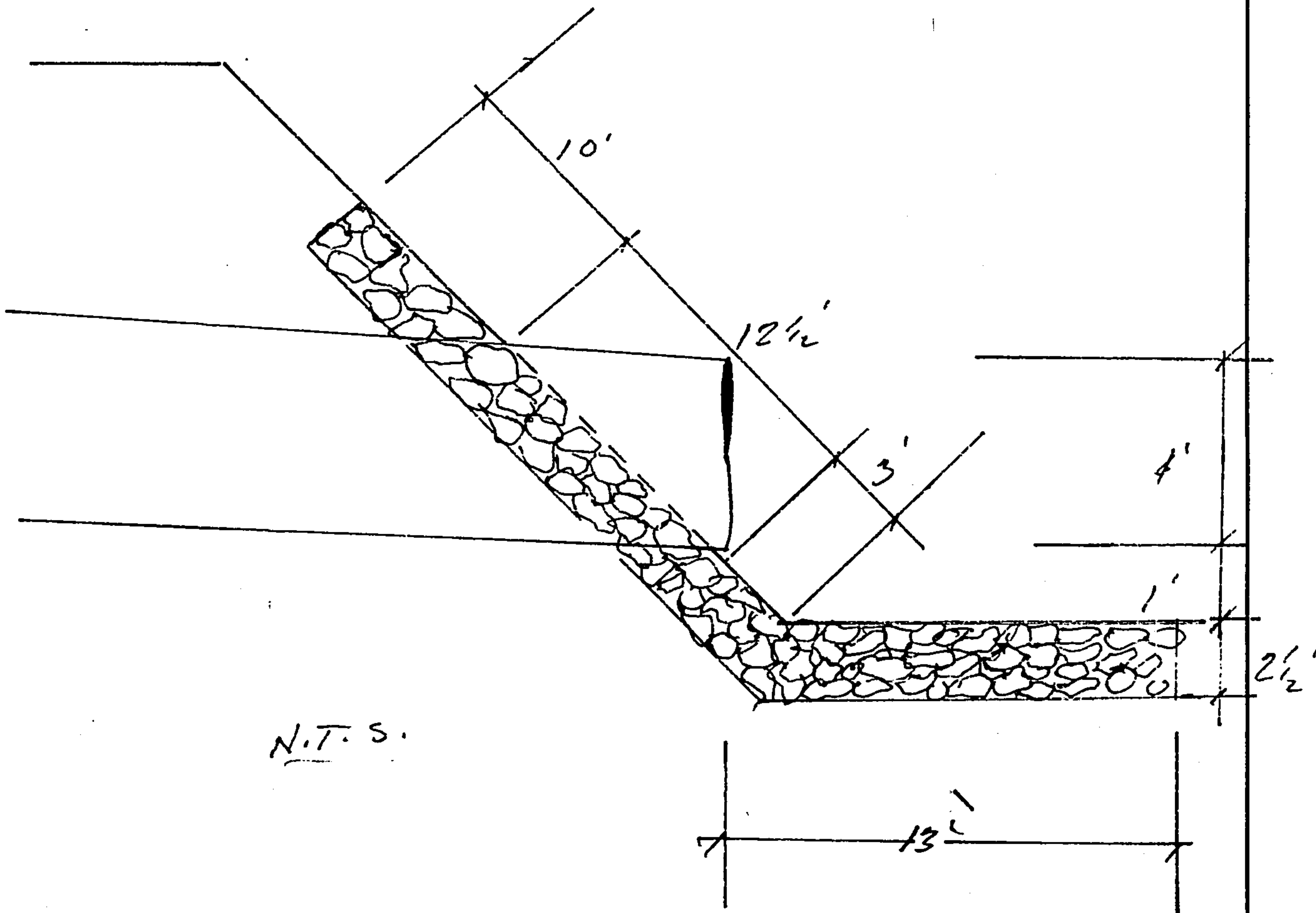
JOB NUMBER

DATE

FROM PREVIOUS NOMOGRAPH:

FOR MAXIMUM VELOCITY OF 10.9 FPS
IN CHANNEL, USE RIP RAP WITH AT
LEAST 60% OF MATERIAL 17" DIAMETER.
REMAINING PORTION MAY BE SMALLER.

LAYER THICKNESS = 1.5 D (USE 2 1/2 FT)



N.T.S.

SIDE VIEW

(SEE NEXT SHEET)



GORDON HERKENHOFF & ASSOCIATES, INC.
302 Eighth Street, N.W.
Albuquerque, New Mexico 87102
(505) 247-0294

ENGINEERING COMPUTATIONS

NAME OF PROJECT

RUST TRAILOR (RIP RAP)

COMPUTED BY

CHECKED BY

JOB NUMBER

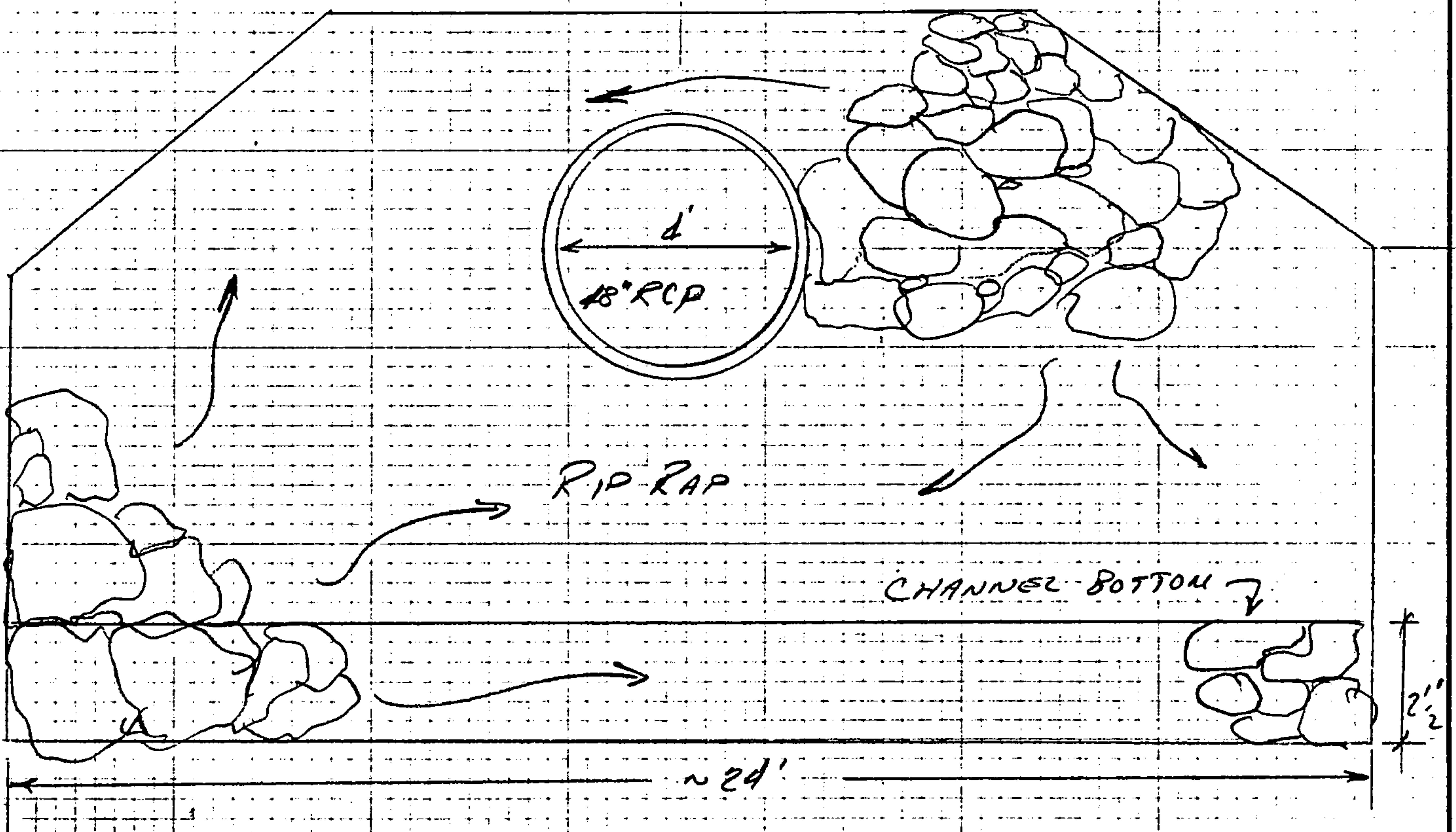
SHEET NUMBER

OF

DATE

BEAR CANYON - 48" RCP OUTFALL RIP RAP DETAIL
(CONT'D)

TOP OF BANK ~ 5129.07



FRONT VIEW

N.T.S.

NOTE: MINIMUM DISTANCE FROM EDGE OF
RIP RAP TO PIPE WALL 10' AT TOP &
SIDES.



GORDON HERKENHOFF & ASSOCIATES, INC.
302 Eighth Street, N.W.
Albuquerque, New Mexico 87102
(505) 247-0294
ENGINEERING COMPUTATIONS

NAME OF PROJECT

COMPUTED BY

CHECKED BY

JOB NUMBER

SHEET NUMBER

OF

DATE

APPENDIX "P"

HISTORICAL DISCHARGES BY AREA

AREA	ACREAGE	RATIONAL "C"	T _c (Hrs)	INTENSITY (IN/Hr)	FLOW (CFS)	POINT OF DISCHARGE
------	---------	--------------	----------------------	-------------------	------------	--------------------

A	10.57	1.00	10	6.0	63.4	RETAINED
B	5.42	0.93	10	6.0	30.2	OSUNA RD.
C	9.01	0.50	30	3.5	15.8	RETAINED
D	14.19	0.50	60	2.2	15.6	BEAR CANYON ARROYO
OFFSITE 16.7	16.7	0.50	57	2.2	18.4	BEAR CANYON ARROYO
* OFFSITE 25	15.80	0.50	50	2.5	19.8	BEAR CANYON ARROYO

* TAKEN FROM DRAINAGE REPORT DATED OCT 1974, AND FOR WHICH DIVERSION DITCH ON 25 ACRE SITE WAS DESIGNED.



GORDON HERKENHOFF & ASSOCIATES, INC.
302 Eighth Street, N.W.
Albuquerque, New Mexico 87102
(505) 247-0294
ENGINEERING COMPUTATIONS

NAME OF PROJECT

SHEET NUMBER

OF

COMPUTED BY

CHECKED BY

JOB NUMBER

DATE

DEVELOPED DISCHARGES BY AREA

AREA	ACREAGE	COMBINED RATIONAL "C"	Tc (MIN)	INTENSITY (IN/HR)	FLOW (CFS)	POINT OF DISCHARGE
A		DETENTION	POND	DISCHARGE	10.5	→ OSUNA RD.
B	5.42	0.93	10	6.0	30.2	OSUNA RD.
C	9.01	0.84	26	3.4	26.1	BEAR CANYON AVE
D	14.19	0.88	60	2.2	27.5	"
OFFSITE 16.7	16.17	0.50	57	2.2	18.4	"
OFFSITE 25	15.80	0.50	50	2.5	19.8	"

CITY OF ALBUQUERQUE



June 24, 2011

Guy C. Jackson, P.E.
Guy Jackson & Associates, LLC
10522 Florence Ave NE
Albuquerque, NM 87122

**Re: Wagner Equipment Awning & Concrete Apron
Grading and Drainage Plan
Engineer's Stamp dated 6-8-2011 (E17/D022)**

Dear Mr. Jackson,

Based upon the information provided in your submittal received 6-9-11, the above referenced plan is approved for Grading Permit and Building Permit. Please attach a copy of this approved plan to the construction sets prior to sign-off by Hydrology.

Prior to Certificate of Occupancy release, Engineer Certification per the DPM checklist will be required.

Hydrology is requesting that all proposed landscape areas are depressed to retain/infiltrate the moisture that falls on them.

If you have any questions, you can contact me at 924-3986 or Rudy Rael at 924-3977.

Sincerely,

A handwritten signature in cursive script that reads "Curtis Cherne".

Curtis Cherne, P.E., CFM.
Principal Engineer, Planning Dept.
Development and Building Services

RER/CAC
C: File

DRAINAGE AND TRANSPORTATION INFORMATION SHEET
(Rev. 12/05)

PROJECT TITLE: **Wagner Equipment-awning & concrete apron**
ZONE MAP/DRG. FILE # 5-17 / E-17
DRB#: NA EPC#: NA WORK ORDER#: NA

E-17/DOZZ

LEGAL DESCRIPTION: BLOCK B. GROUP 9 INDUSTRIAL PARK (4000 Osuna NE)

ENGINEERING FIRM: GUY JACKSON & ASSOCIATES, LLC
ADDRESS: 10522 FLORENCE AVE. NE
CITY, STATE: Albuquerque, NM

CONTACT: GUY JACKSON, PE
PHONE: 235-1426
ZIP CODE: 87122

OWNER: Wagner Equipment
ADDRESS: 4000 Osuna Rd. NE
CITY, STATE: Albuquerque, NM

CONTACT: Guy Jackson
PHONE: 235-1426
ZIP CODE: 87109

ARCHITECT: NA
ADDRESS: NA
CITY, STATE: NA

CONTACT: NA
PHONE: NA
ZIP CODE: NA

SURVEYOR: High Mesa Consulting Group.
ADDRESS: 6010 Midway Park NE
CITY, STATE: ALBUQUERQUE, NM

CONTACT: Chuck Cala
PHONE: 345-4250
ZIP CODE: 87109

CONTRACTOR: See Engineer
ADDRESS: _____
CITY, STATE: _____

CONTACT: _____
PHONE: _____
ZIP CODE: _____

TYPE OF SUBMITTAL:

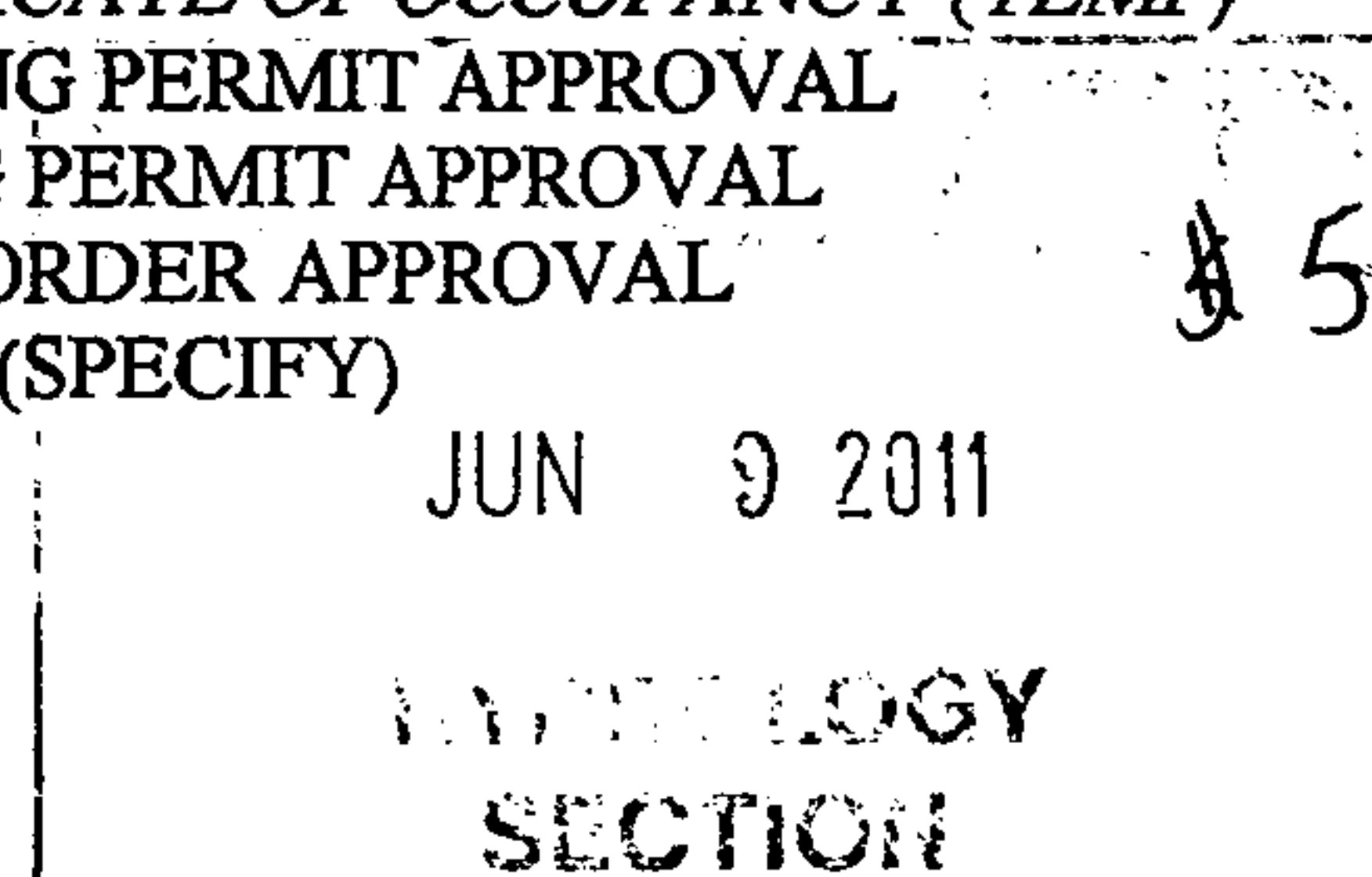
- ☐ DRAINAGE REPORT
☒ DRAINAGE PLAN 1st SUBMITTAL
☐ DRAINAGE PLAN RESUBMITTAL
☐ CONCEPTUAL G & D PLAN
☒ GRADING PLAN
☐ EROSION CONTROL PLAN
☐ ENGINEER'S CERT (HYDROLOGY)
☐ CLOMR/LOMR
☐ TRAFFIC CIRCULATION LAYOUT
☐ ENGINEER/ARCHITECT CERT (TCL)
☐ ENGINEER/ARCHITECT CERT (DRB S.P.)
☐ ENGINEER/ARCHITECT CERT (AA)
☐ OTHER (SPECIFY) _____

CHECK TYPE OF APPROVAL SOUGHT:

- ☐ SIA/FINANCIAL GUARANTEE RELEASE
☐ PRELIMINARY PLAT APPROVAL
☐ S. DEV. PLAN FOR SUB'D APPROVAL
☐ S. DEV. FOR BLDG. PERMIT APPROVAL
☐ SECTOR PLAN APPROVAL
☐ FINAL PLAT APPROVAL
☐ FOUNDATION PERMIT APPROVAL
☒ BUILDING PERMIT APPROVAL
☐ CERTIFICATE OF OCCUPANCY (PERM)
☐ CERTIFICATE OF OCCUPANCY (TEMP)
☒ GRADING PERMIT APPROVAL
☐ PAVING PERMIT APPROVAL
☐ WORK ORDER APPROVAL
☐ OTHER (SPECIFY) _____

WAS A PRE-DESIGN CONFERENCE ATTENDED:

- ☒ YES
☐ NO
☒ COPY PROVIDED



SUBMITTED BY: GUY JACKSON, PE DATE: 5-27-11

Requests for approvals of Site Development Plans and/or Subdivision Plats shall be accompanied by a drainage submittal. The particular nature, location and scope to the proposed development define the degree of drainage detail. One or more of the following levels of submittal may be required based on the following:

1. **Conceptual Grading and Drainage Plan:** Required for approval of Site Development Plans greater than five (5) acres and Sector Plans.
2. **Drainage Plans:** Required for building permits, grading permits, paving permits and site plans less than five (5) acres.
3. **Drainage Report:** Required for subdivision containing more than ten (10) lots or constituting five (5) acres or more.

CITY OF ALBUQUERQUE
PLANNING DEPARTMENT
DEVELOPMENT SERVICE / HYDROLOGY SECTION

DATE: 4-6-11
CONFERENCE RECAP

ZONE ATLAS PAGE NO: _____

DRAINAGE FILE: E17-

ZONING: _____

DRB: _____

SUBJECT: Building Permit - add awnings and concrete ~ 5400 sq² improvements

STREET ADDRESS (IF KNOWN): 4000 OSUNA BLVD NE

SUBDIVISION NAME: Rust Tractor on OSUNA

APPROVAL REQUESTED: _____

ATTENDANCE: Guy Jackson Curtis Cherne

FINDINGS:

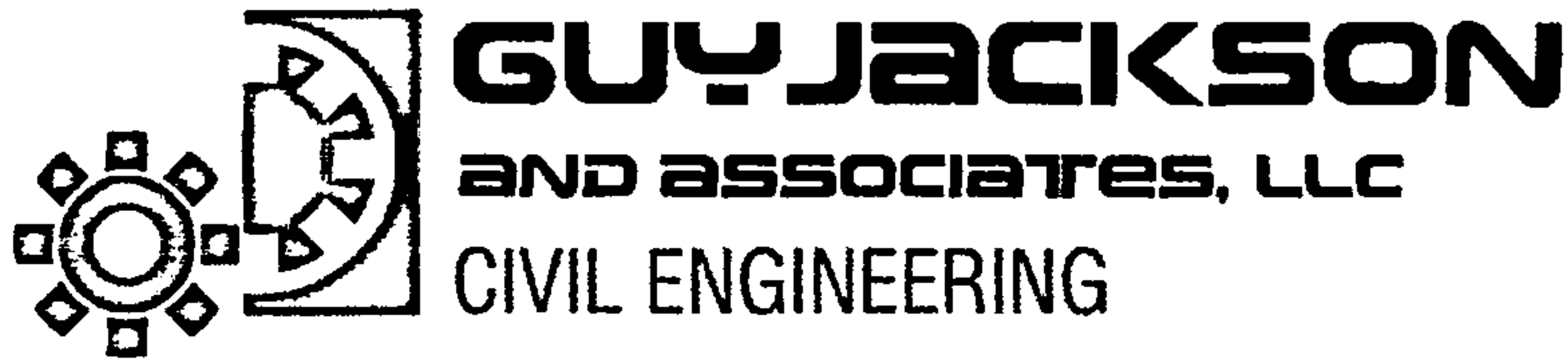
area proposed building/awnings and concrete to
drain to Area 3 on sheet C.D.2 Storm Drainage
Improvements ^{plan} Stamp date 7-20-01 Guy Jackson.

THE UNDERSIGNED AGREES THAT THE ABOVE FINDINGS ARE SUMMARIZED ACCURATELY AND ARE SUBJECT TO CHANGE IF FURTHER INVESTIGATION REVEALS THAT THEY ARE NOT REASONABLE OR THAT THEY ARE BASED ON INACCURATE INFORMATION.

SIGNED: Curtis A. Cherne
NAME (PRINT): Curtis A. Cherne

SIGNED: Guy Jackson
NAME (PRINT): Guy Jackson

****NOTE**** PLEASE PROVIDE A COPY OF THIS RECAP WITH YOUR DRAINAGE SUBMITTAL.



June 9, 2011

Curtis Cherne, PE
Section Head, Hydrology
Development Services
PO Box 1293
Albuquerque, New Mexico 87103

**Re: *Wagner Equipment, 4000 Osuna Rd. NE, Albuquerque, NM
(Zone Atlas Map E-17)***

Dear Curtis:

Attached for building permit approval are the following:

- One (1) drainage information sheet
- One (1) copy of the Conference Recap Sheet w/ Curtis C. & Guy J. (4-6-11)
- One (1) copy of the 2000 (CAMI) Master Drainage Plan
- One (1) copy of the grading plan
- One (1) copy of the drainage calcs/spreadsheet
- One (1) copy of the approval letter for the (BPLW 2001) –“Rust Tractor Storm Drain Improvements Drainage Report”

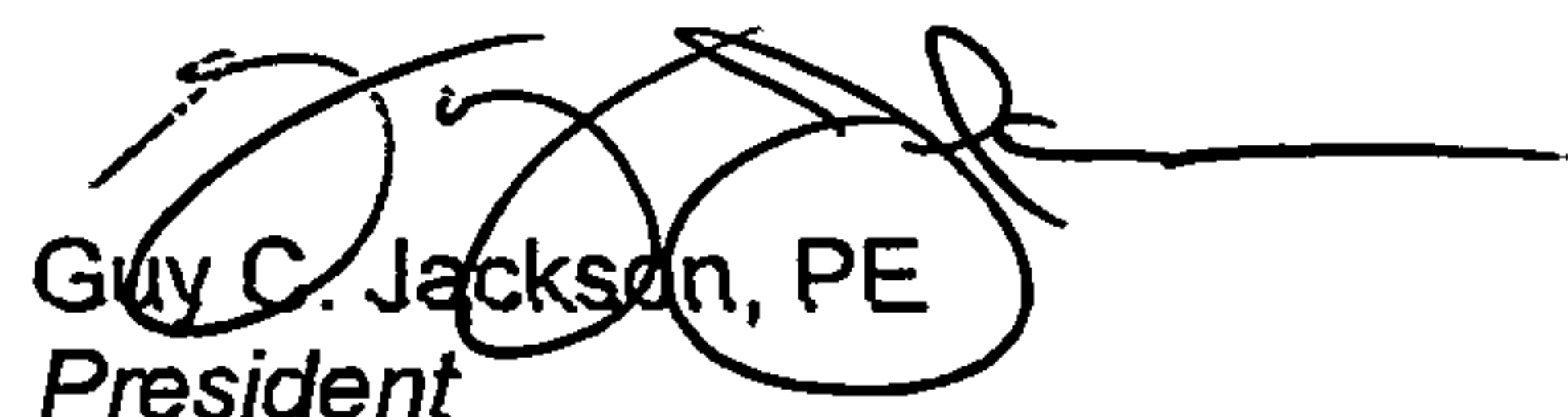
The project is located at 4000 Osuna Rd. NE. The proposed improvements include the construction of a 4800sf building mounted awning structure over existing concrete and the extension of approx. 4800sf of concrete apron adjacent to the east side of the existing building as shown on the attached plan.

Please note that if there is further need of explanation of the history of the phased construction at the site, I would be available to meet with the assigned reviewer of this submittal, since I was the engineer of record for the referenced “BPLW 2001 –Rust Tractor Storm Drain Improvements Drainage Report” and the construction plans.

Please contact me if you have any questions or comments.

Sincerely,

GUY JACKSON & ASSOCIATES, LLC



Guy C. Jackson, PE
President

10522 Florence Ave. NE
Albuquerque, NM 87122
505-235-1426



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

October 8, 2001

Guy Jackson, PE
BPLW
6200 Uptown Blvd, Ste 400
Albuquerque, NM 87110

**Re: Rust Tractor Storm Drain Improvements Drainage Report
Engineer Stamp 9-20-01 (E17/D22)**

Dear Mr. Jackson,

Based upon the information provided in your resubmittal dated 9-24-01, the above referenced plan is approved for Building Permit and SO#19 Permit.

Please attach a copy of these approved plans to the construction sets prior to sign-off by Hydrology.

A separate permit is required for construction within City R/W. A copy of this approval letter must be on hand when applying for the excavation permit.

Also, prior to Certificate of Occupancy release, Engineer Certification per the DPM checklist will be required.

If you have any questions, you can contact me at 924-3986.

Sincerely,

Bradley L. Bingham

Bradley L. Bingham, PE
Sr. Engineer Hydrology

C: Pam Lujan, CoA
file



City of Albuquerque

July 20, 2000

Ray Hensley, PE
CAMI
4001 Juan Tabo NE Ste A
Albuquerque, NM 87111

Re: Rust Tractor Master Drainage Plan
Engineer Stamp 6-22-00 (E17/D22)

Dear Mr. Hensley,

Based upon information provided in your submittal dated 6-27-00, the above referenced Master Drainage Plan is approved. You will still need to submit a specific grading and drainage plan for each Building Permit phase.

If you have any questions about my comments, you can contact me at 924-3986

Sincerely,

Bradley L. Bingham

Bradley L. Bingham, PE
Hydrology Review Engineer

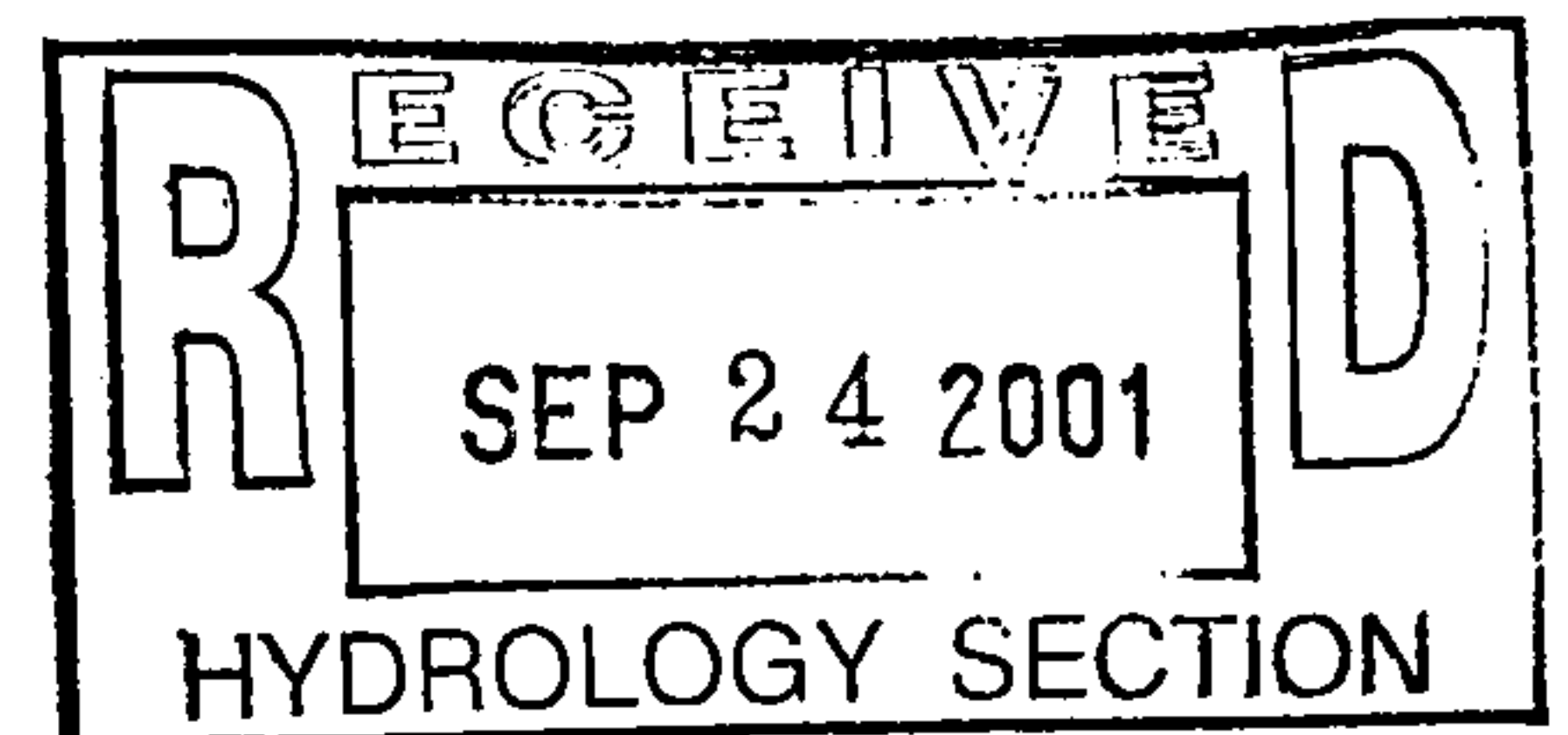
C: file

DRAINAGE REPORT

FOR

**RUST TRACTOR STORM DRAIN
IMPROVEMENTS
4000 OSUNA ROAD NE
ALBUQUERQUE, NM**

July 2001



BPLW ARCHITECTS & ENGINEERS, INC.

The following items pertaining to the Rust Tractor Osuna Road Site Drainage Plan are contained herein: 1) Existing Conditions, 2) Proposed Conditions, 3) Conclusion, 4) Vicinity Map, 5) Flood Hazard Map, 6) Calculations

Existing Conditions:

As shown by the Vicinity Map, the site is located at 4000 Osuna Rd. NE between Washington and Jefferson. The sites' legal description is Tract B-1-A-1 Group 9 Industrial Park. Bounded on the north by the Osuna Road and on the south by the BF Goodrich Aerospace and a vacant property owned by Rust Tractor. The western and eastern edges are bounded by Interstate Industrial Tract (Unit 2) respectively. Per the flood insurance rate maps 138 and 139 of 825 for Bernalillo County, dated September 1996, the site is not in a flood hazard zone area. However, the previous design and construction of BF Goodrich Aerospace has provided an outfall from the southwest corner of the site into the adjacent Bear Arroyo Drainage Channel. This outfall was previously approved in 1987, but was not constructed until the BF Goodrich Aerospace Project. From the drainage study for BF Goodrich site, the Bear Canyon Arroyo Channel Improvements for AMFACA -Reach 1 state that the maximum water surface elevation in the arroyo during the 100-year event is 5113.76 at station 15+00. The drainage plan and subsequent site improvements for BF Goodrich site provided a 36" diameter HDPE storm drain line designed to accept 23 cfs (max) from the Rust Tractor site. During a review of the previous drainage study for BF Goodrich site, an error was noticed in the HGL calculations. The previous report gave a conservative HGL. A revised copy of the HGL calculations indicating the corrected value is included in the report.

The grading plan shows existing contours at 1'-0" intervals, limit and character of the proposed improvements and also the existing conditions. As shown by this plan, the proposed construction consists of storm drainage ponds and associated piping, a private sanitary sewer, the widening of the east entrance at Osuna Road and a sidewalk improvements along Osuna Road.

All storm water runoff is presently retained on site. There is an approved Master Drainage Plan, generated by Construction Analysis & Management, Inc. (CAMI) dated June, 2000. All drainage improvements within this report are in compliance with the intent of the Master Drainage Plan.

Proposed Conditions:

Proposed improvements at this time are limited to the construction of a sidewalk along Osuna Road, installation of a recycled asphalt base course material in the service yards, and the reshaping/enlarging of the two storm drainage ponds. These Items are identified as Phases I, II & III on the CAMI Master Drainage Plan (MDP) dated June 2000.

The former retention pond located in the northwest corner of the site will be modified to detain the excess discharge of 24,890 cf as indicated on the approved Master Drainage Plan (MDP). This pond receives runoff from Area 1 and Area 4 as shown on the MDP. In the existing conditions, there are small storm drainage inlets located in Area 1. These inlets are connected together and discharge into the existing pond through small diameter (12" max) piping. In the analysis of the site, it was assumed that the existing

inlets do not appear to collect any water and that the cattleguard inlet at the entrance will be required to all excess runoff from Area 1. This will provide a conservative design for the cattleguard; see Analysis Point 1 (AP1). The 100 year 6 hour peak discharge of 21.40 cfs from Area 1 at AP1 will be conveyed from the cattleguard to the pond via a 24" HDPE with a velocity of 9.9 fps and a depth of 1.3 feet, see AP2.

Area 4 flows overland (sheet flow) and will also be collected / detained in Pond "A" in the northwest corner of the site. Area 4 generates a peak flow rate of 9.91 cfs, see AP3. Area 4A will continue to drain into Osuna via an existing off-site channel on the adjacent property to the west as identified on the MDP.

Pond "A" will has been sized to hold 24,890 cf with the berm for the pond set at 12" above the MWSEL. Calculations for the MWSEL and the standpipe that will discharge input Osuna Road can all be found for AP4. The standpipe will discharge through an 18 HDPE pipe with a maximum depth of 1.35 feet and a velocity of 10.6 fps. These values are for a free flowing pipe, without outlet control conditions. See AP5. The 18" pipe will connect to a dispersal basin and then through three (3) 24" wide standard COA sidewalk culverts and will discharge into Osuna Road, as shown in the MDP. See AP6 for sidewalk culvert capacity / depth analysis.

The east and south portions of the site will be collected / detained and finally released at a controlled rate of 23 cfs through the BF Goodrich site to the Bear Canyon Arroyo. Area 2 flows into the east drive access lane and is collected into a small area drain and a large cattleguard inlet in the visitor parking lot. Area 2 generates a peak discharge of 28.25cfs in the final built out configuration (this will capacity for Phase IV shown on the MDP). All flows collected in this area formerly discharged through a 10" pipe to the west and were collected in Pond "A". As part of the improvements of this project, we will be collecting and re-routing all the storm drainage from these existing inlets and piping the runoff to the pond located at the south side of the site. As stated above, provisions are being made to facilitate the Master planned building and parking lot in the northeast corner of the site as shown on as Phase IV of the MDP. This is being accommodated by extending a storm drain line and constructing a manhole in the employee parking lot that can be converted to a catch basin or extended as necessary for the future improvements. The storm drain piping is being sized for a maximum discharge rate of 16 cfs. See AP7. The remainder of Area 2 will be collected in the existing cattleguard or in the new inlet in the visitor parking area. It was assumed that the maximum flow that can reach the cattleguard will be less that 24 cfs due to the fully developed Area 2 generating 28.25cfs. AP8 was analyzed to verify capacity and depth of flow within the underground piping. AP8 gave a velocity of 7.6 fps inside the 24" HDPE pipe.

Analysis point AP9 is shown on the Overall Grading and Drainage Plan in four (4) locations because the pipe flowrate, diameter, material type and slope are all identical. Pond "B" has been sized to contain the 100yr, 6 hour excess runoff as calculated in the MDP. The ponding volume necessary is 85,444 cf. The volume for the 10 year, 6 hour storm was calculated to provide a Maximum Water Surface Elevation to be used in backwater calculations. The MWSEL for the 10 year event was 5119.75 and 5121.11 for the 100 year, 6 hour event. Analysis point AP10 was used to calculate these MWSEL values, and to give a starting point for calculating the discharge through a standpipe located in the southwest corner of the site in Pond "B". AP11 shows the orifice equation

and flowrates that will enter the standpipe when the pond is at full MWSEL. AP12 and AP13 were used to compute the velocity in the 24" and 36" HDPE discharge line at the southwest corner of the site. Velocities were 7.32 and 3.25 fps respectively. AP13 results in the approved controlled release rate of 23cfs into the existing 36 in HDPE pipe through the BF Goodrich Aerospace property and into the Bear Arroyo to the south, per the approved MDP.

Conclusions:

Offsite flows do not enter the site due to the drainage patterns established by the existing paving improvements and constructed perimeter berming and ditches of the adjacent sites.

The calculations contained in this report analyze the developed conditions for the 10 and 100-year 6-hour rainfall event. The procedure for 40 acre or smaller basins set by section 22.2 Hydrology of the Development Process Manual, Volume 2, Design Criteria, dated January 1993, has been used to quantify the peak rate of discharge and volume of runoff generated.

All basins and flowrates are in compliance with the approved Master Drainage Plan dated June, 2000. Improvements will convert the existing drainage system from complete retention to a detention configuration while limiting peak runoff rates to those previously approved.

Backwater calculations have been performed to verify that the hydraulic grade line remains below the finished grade.

Backwater calc.

[illegible]

[illegible]

Backwater calc.

[illegible]

GJA

Civil Engineering

PROJECT WAGNER EQUIPMENT
 PROJECT NO.
 DATE 05/27/11
 BY GJA

DPM Section 22.2 - Hydrology

Part A-Watersheds less than 40 acres.

January, 1993

INSTRUCTIONS

- * Spread sheet requires three input areas (dark cells):
 - Location
 - >A.1 Precipitation Zone
 - >A.3 Land Treaments
- * Values from the tables are automatically placed using "if" statements.
- * Table values should be checked for correctness for each use.

SUMMARY

Location	BASIN 3					TOTALS	
Precipitation Zone	2	2	2	2	2	2	
Land Area	0.08	0.00	0.00	0.00	0.00	0.08	acres
Excess Precipitation Volume							
>>> 100-year 6-hour (design)	0.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.01	acre-ft.
10-year 6-hour	0.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.01	acre-ft.
2-year 6-hour	0.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.01	acre-ft.
100-year 24-hour	0.02	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.02	acre-ft.
Peak Discharge Rates (DPM)							
>>> Q100 (design)	0.38	0.00	0.00	0.00	0.00	0.38	cfs
Q10	0.26	0.00	0.00	0.00	0.00	0.26	cfs
Q2	0.15	0.00	0.00	0.00	0.00	0.15	cfs

CALCULATIONS FOLLOW

INPUT AND CALCULATIONS

LOCATION		BASIN 3					
>A.1 PRECIPITATION ZONE (from Table A-1)		2	2	2	2	2	2
TOTALS							
>A.2 DEPTHS							
(from Table A-2)							
100-YEAR STORM (P60)		2.01	2.01	2.01	2.01	2.01	2.01 inches
100-YEAR STORM (P360)		2.35	2.35	2.35	2.35	2.35	2.35 inches
100-YEAR STORM (P1440)		2.75	2.75	2.75	2.75	2.75	2.75 inches
10-YEAR (P360) (Calculated: P360*RPF10)		1.57	1.57	1.57	1.57	1.57	1.57 inches
2-YEAR (P360) (Calculated: P360*RPF2)		1.02	1.02	1.02	1.02	1.02	1.02 inches
TOTALS							
>A.3 LAND TREATMENTS (AI)							
Treatment A		0.00	0.00	0.00	0.00	0.00	0.00 acres
Treatment B		0.00	0.00	0.00	0.00	0.00	0.00 acres
Treatment C		0.00	0.00	0.00	0.00	0.00	0.00 acres
Treatment D		0.08	0.00	0.00	0.00	0.00	0.08 acres
Total Area		0.08	0.00	0.00	0.00	0.00	0.08 acres
=====							
>A.4 ABSTRACTIONS		See A.5	See A.5	See A.5	See A.5	See A.5	See A.5

CALCULATIONS FOLLOW

INPUT AND CALCULATIONS (CONT)

>A.5 EXCESS PRECIPITATION 6 HOUR AND 24 HOUR (EI)							TOTALS
from Table A-8							
100-year 6-hour							
Treatment A	0.53	0.53	0.53	0.53	0.53	0.53	inches
Treatment B	0.78	0.78	0.78	0.78	0.78	0.78	inches
Treatment C	1.13	1.13	1.13	1.13	1.13	1.13	inches
Treatment D	2.12	2.12	2.12	2.12	2.12	2.12	inches
WEIGHTED E (Sum EI*A/A)	2.12	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	2.12	inches
VOLUME V100:6h (E*A)	0.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.01	acre-ft.
	625.65	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	625.65	ft^3
=====							
10-year 6-hour							
Treatment A	0.13	0.13	0.13	0.13	0.13	0.13	inches
Treatment B	0.28	0.28	0.28	0.28	0.28	0.28	inches
Treatment C	0.52	0.52	0.52	0.52	0.52	0.52	inches
Treatment D	1.34	1.34	1.34	1.34	1.34	1.34	inches
WEIGHTED E (Sum EI*A/A)	1.34	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	1.34	inches
VOLUME V10:6h (E*A)	0.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.01	acre-ft.
	395.46	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	395.46	ft^3
=====							
2-year 6-hour							
Treatment A	0.00	0.00	0.00	0.00	0.00	0.00	inches
Treatment B	0.02	0.02	0.02	0.02	0.02	0.02	inches
Treatment C	0.15	0.15	0.15	0.15	0.15	0.15	inches
Treatment D	0.79	0.79	0.79	0.79	0.79	0.79	inches
WEIGHTED E (Sum EI*A/A)	0.79	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.79	inches
VOLUME V2:6h (E*A)	0.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.01	acre-ft.
	233.14	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	233.14	ft^3
=====							
100-year 24-hour							
VOLUME V100:24h							
(V100-6h+Ad*P1440-P360)/12	0.02	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.02	acre-ft.
	743.70	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	743.70	ft^3
=====							

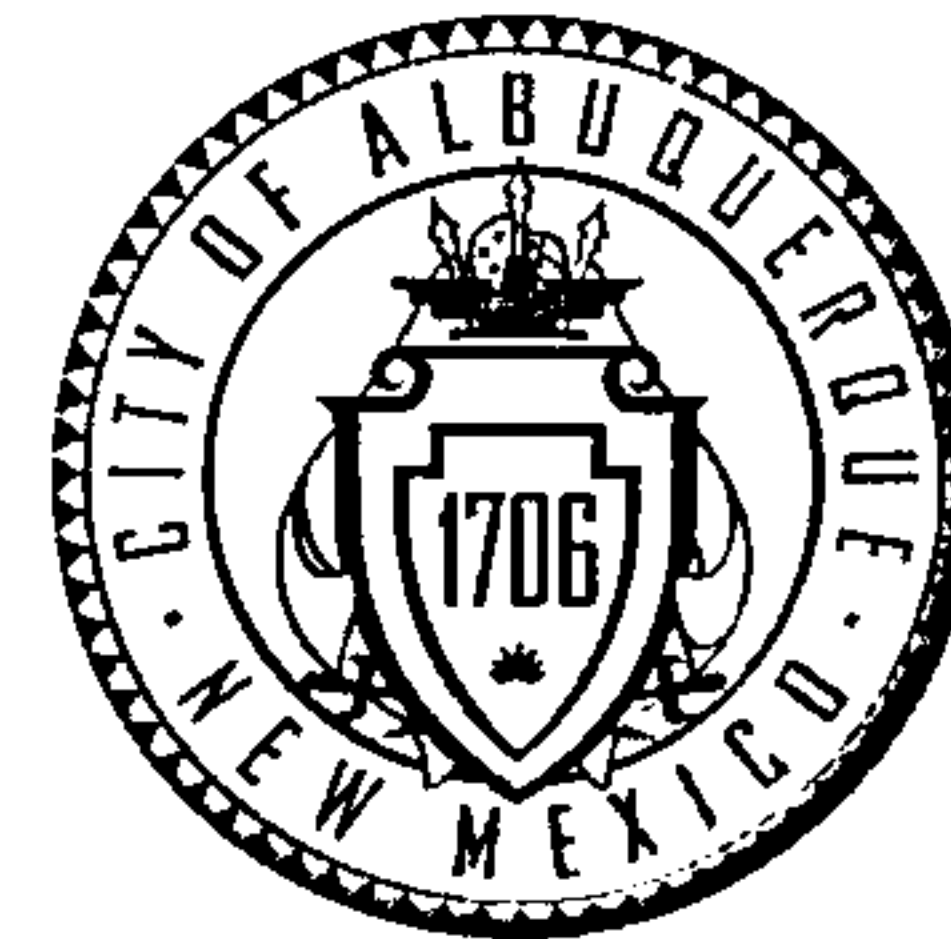
100
 Proposed
 CALCULATIONS FOLLOW

INPUT AND CALCULATIONS (CON'T)

A.6 PEAK DISCHARGE RATE FOR SMALL WATERSHEDS (QI)							
from Table A-9							
100-year						TOTALS	
Treatment A	1.56	1.56	1.56	1.56	1.56	1.56	cfs/acre
Treatment B	2.28	2.28	2.28	2.28	2.28	2.28	cfs/acre
Treatment C	3.14	3.14	3.14	3.14	3.14	3.14	cfs/acre
Treatment D	4.70	4.70	4.70	4.70	4.70	4.70	cfs/acre
Q100 (Sum Qi*Ai)	0.38	0.00	0.00	0.00	0.00	0.38	cfs
10-year							
Treatment A	0.38	0.38	0.38	0.38	0.38	0.38	cfs/acre
Treatment B	0.95	0.95	0.95	0.95	0.95	0.95	cfs/acre
Treatment C	1.71	1.71	1.71	1.71	1.71	1.71	cfs/acre
Treatment D	3.14	3.14	3.14	3.14	3.14	3.14	cfs/acre
Q10 (Sum Qi*Ai)	0.26	0.00	0.00	0.00	0.00	0.26	cfs
2-year							
Treatment A	0.00	0.00	0.00	0.00	0.00	0.00	cfs/acre
Treatment B	0.08	0.08	0.08	0.08	0.08	0.08	cfs/acre
Treatment C	0.60	0.60	0.60	0.60	0.60	0.60	cfs/acre
Treatment D	1.86	1.86	1.86	1.86	1.86	1.86	cfs/acre
Q2 (Sum Qi*Ai)	0.15	0.00	0.00	0.00	0.00	0.15	cfs

CALCULATIONS FOLLOW

CITY OF ALBUQUERQUE



January 12, 2012

Guy C. Jackson, P.E.
Guy Jackson & Associates, LLC
10522 Florence Ave. NE
Albuquerque, NM 87122

Re: Wagner Equipment, 4000 Osuna Blvd. NE
Permanent Certificate of Occupancy - Approved
Engineer's Stamp dated 06-08-11 (E-17/D022)
Certification dated 01-11-12

Dear Mr. Jackson,

Based on the Certification received 01-11-12, the site is approved for a release of a Permanent Certificate of Occupancy by Hydrology.

Hydrology is asking for an electronic copy, in .pdf format, of this certification for our records. This certification can be e-mailed to me at: tsims@cabq.gov.

If you have any questions, you can contact me at 924-3982.

Sincerely,

Timothy E. Sims
Plan Checker—Hydrology Section
Development and Building Services

C: CO Clerk—Katrina Sigala
File

PO Box 1293

Albuquerque

NM 87103

www.cabq.gov

DRAINAGE AND TRANSPORTATION INFORMATION SHEET
(Rev. 12/05)

PROJECT TITLE: **Wagner Equipment-awning & concrete apron**
ZONE MAP/DRG. FILE # 5-17
DRB#: NA EPC#: NA WORK ORDER#: NA

E-17/DOZ2

LEGAL DESCRIPTION: BLOCK B. GROUP 9 INDUSTRIAL PARK

ENGINEERING FIRM: GUY JACKSON & ASSOCIATES, LLC
ADDRESS: 10522 FLORENCE AVE. NE
CITY, STATE: Albuquerque, NM

CONTACT: GUY JACKSON, PE
PHONE: 235-1426
ZIP CODE: 87122

OWNER: Wagner Equipment
ADDRESS: 4000 Osuna Rd. NE
CITY, STATE: Albuquerque, NM

CONTACT: Guy Jackson
PHONE: 235-1426
ZIP CODE: 87109

ARCHITECT: NA
ADDRESS: NA
CITY, STATE: NA

CONTACT: NA
PHONE: NA
ZIP CODE: NA

SURVEYOR: High Mesa Consulting Group.
ADDRESS: 6010 Midway Park NE
CITY, STATE: ALBUQUERQUE, NM

CONTACT: Chuck Cala
PHONE: 345-4250
ZIP CODE: 87109

CONTRACTOR: See Engineer
ADDRESS: _____
CITY, STATE: _____

CONTACT: _____
PHONE: _____
ZIP CODE: _____

TYPE OF SUBMITTAL:

☐ DRAINAGE REPORT
☐ DRAINAGE PLAN 1st SUBMITTAL
☐ DRAINAGE PLAN RESUBMITTAL
☐ CONCEPTUAL G & D PLAN
☐ GRADING PLAN
☐ EROSION CONTROL PLAN
☒ ENGINEER'S CERT (HYDROLOGY)
☐ CLOMR/LOMR
☐ TRAFFIC CIRCULATION LAYOUT
☐ ENGINEER/ARCHITECT CERT (TCL)
☐ ENGINEER/ARCHITECT CERT (DRB S.P.)
☐ ENGINEER/ARCHITECT CERT (AA)
☐ OTHER (SPECIFY) _____

CHECK TYPE OF APPROVAL SOUGHT:

☐ SIA/FINANCIAL GUARANTEE RELEASE
☐ PRELIMINARY PLAT APPROVAL
☐ S. DEV. PLAN FOR SUB'D APPROVAL
☐ S. DEV. FOR BLDG. PERMIT APPROVAL
☐ SECTOR PLAN APPROVAL
☐ FINAL PLAT APPROVAL
☐ FOUNDATION PERMIT APPROVAL
☐ BUILDING PERMIT APPROVAL
☐ CERTIFICATE OF OCCUPANCY (PERM)
☒ CERTIFICATE OF OCCUPANCY (TEMP)
☐ GRADING PERMIT APPROVAL
☐ PAVING PERMIT APPROVAL
☐ WORK ORDER APPROVAL
☐ OTHER (SPECIFY) _____

WAS A PRE-DESIGN CONFERENCE ATTENDED:

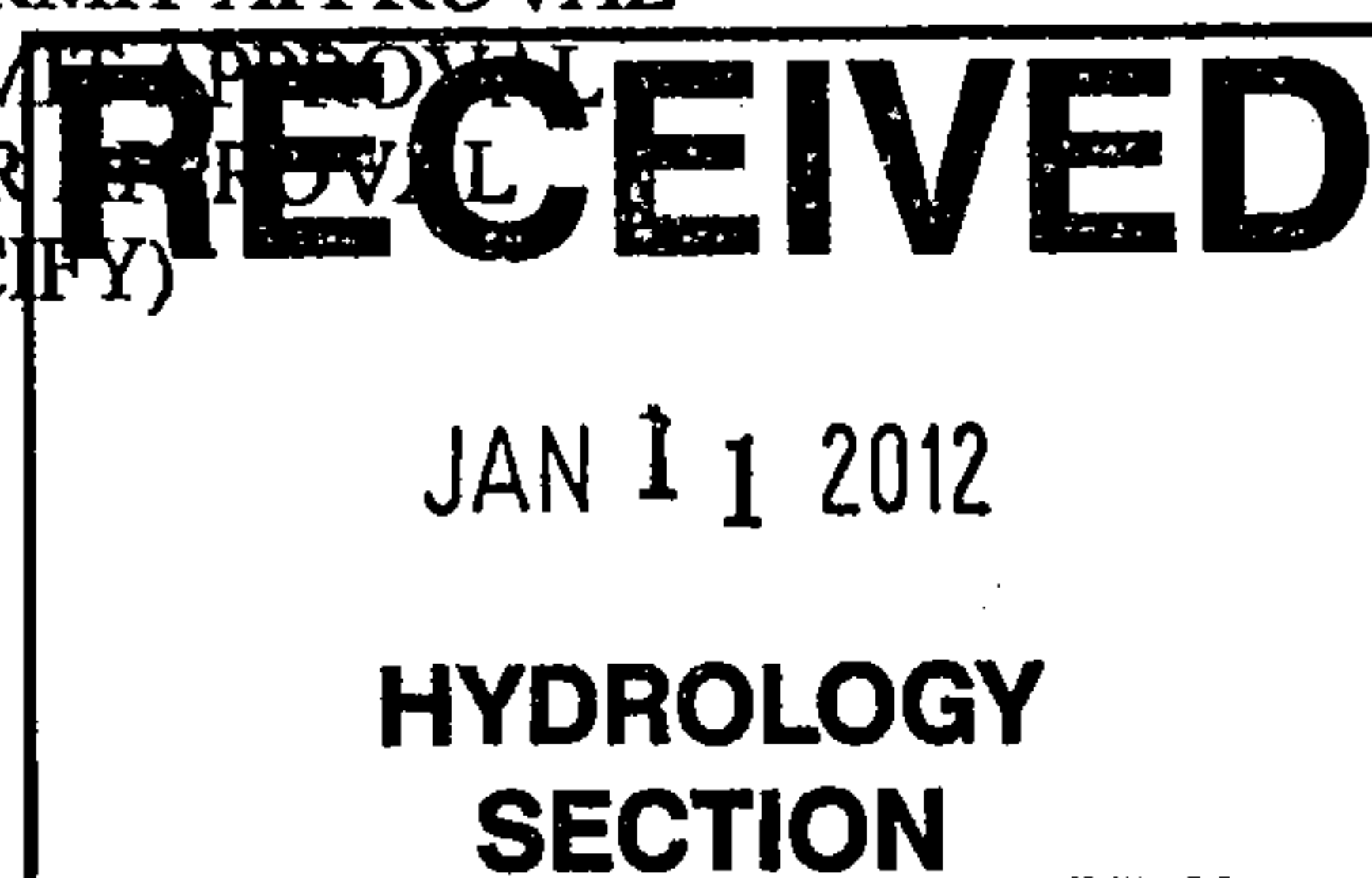
☒ YES
☐ NO
☒ COPY PROVIDED

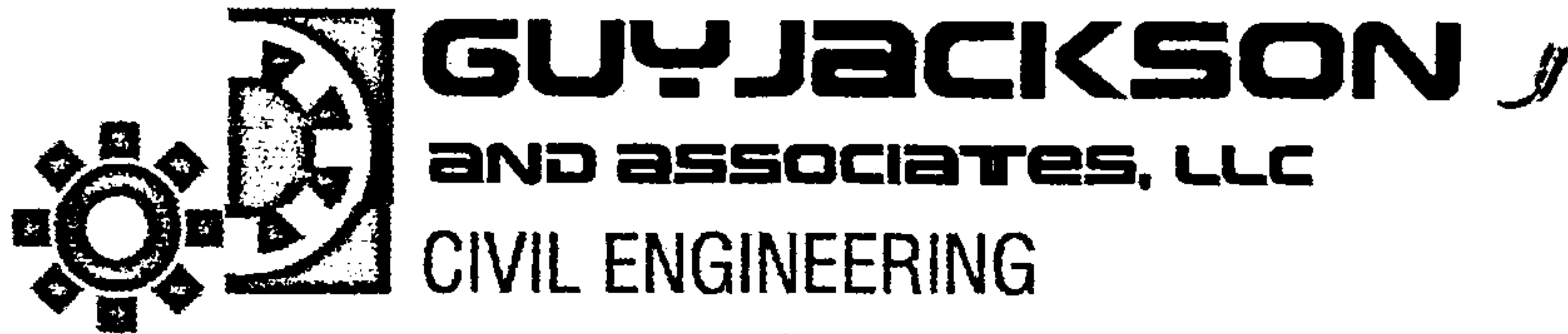
SUBMITTED BY: GUY JACKSON, PE

DATE: 1-11-12

Requests for approvals of Site Development Plans and/or Subdivision Plats shall be accompanied by a drainage submittal. The particular nature, location and scope to the proposed development define the degree of drainage detail. One or more of the following levels of submittal may be required based on the following:

1. **Conceptual Grading and Drainage Plan:** Required for approval of Site Development Plans greater than five (5) acres and Sector Plans.
2. **Drainage Plans:** Required for building permits, grading permits, paving permits and site plans less than five (5) acres.
3. **Drainage Report:** Required for subdivision containing more than ten (10) lots or constituting five (5) acres or more.





January 11, 2012

Curtis Cherne, PE
Section Head, Hydrology
Development Services
PO Box 1293
Albuquerque, New Mexico 87103

**Re: *Wagner Equipment, 4000 Osuna Rd. NE, Albuquerque, NM
(Zone Atlas Map E-17)***

Dear Curtis:

Attached for Permanent Certificate of Occupancy approval are the following:

- One (1) Drainage Information Sheet
- One (1) copy of the Grading & Drainage Certification Plan

The project is located at 4000 Osuna Rd. NE. The proposed improvements included the construction of a 4800sf building mounted awning structure over existing concrete and the extension of approx. 4800sf of concrete apron adjacent to the east side of the existing building as shown on the attached plan.

Please contact me if you have any questions or comments.
Sincerely,

GUY JACKSON & ASSOCIATES, LLC

Guy C. Jackson, PE
President
10522 Florence Ave. NE
Albuquerque, NM 87122
505-235-1426