HYDROLOGY M16/D2 ONE PLAN

M 16/D2

1 PLAN

November 3, 1980

Mr. Bruno Conegliano
Municipal Development Dept.
City of Albuquerque
Post Office Box 1293
Albuquerque, New Mexico 87103

RE: Kachina Hotel Site at Yale & Gibson

Dear Mr. Conegliano:

At the request of the developers for the Kachina Hotel, CCIC has been asked to investigate the drainage characteristics for the site located at the southeast corner of Yale Boulevard and Gibson Boulevard. The developers can not be totally committed to this project until a preliminary drainage concept can be agreed upon between the City and Project Engineer. At such a time, CCIC's architectural department will then be directed to start on construction drawings.

What CCIC is proposing is to follow the Interim Drainage Guidelines of November 1979. In particular, Section (B) Ponding, paragraph 5, which provides for a positive discharge at the Q_5 rate into the adjacent drop inlet in Gibson Boulevard. Preliminary discussions along these lines have been presented to Fred Aguirre on October 30, 1980. We also fully intend to satisfy the requirements of Part a and c of the previously mentioned paragraph.

If you feel that this is an acceptable approach in order to reach an approved drainage plan, please sign below. If not, we would appreciate a letter stating why the Interim Drainage Guidelines would not apply to this site and perhaps a few suggestions from your department on what might be an acceptable drainage solution.

Respectfully,

Fred C. Arfman

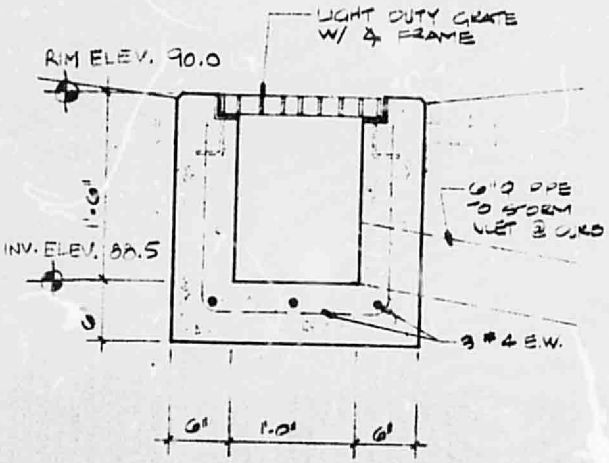
Fred C. Arfman, PE
Associate Vice President

FCA:df

Use Standard Detail Dwg. K-17 for installation.

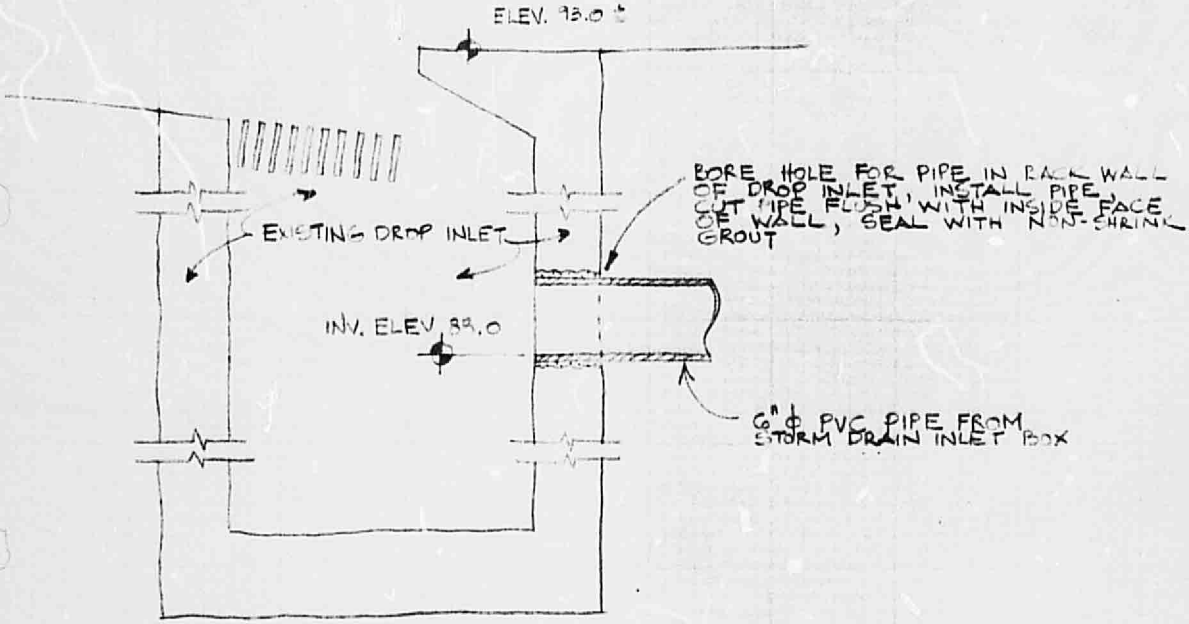
Fred Aguirre for Bruno Conegliano 11-3-80
Bruno Conegliano
City Hydrology Engineer

Chambers, Campbell, Isaacson, Chaplin, Inc.
architects engineers planners 8500 menaul boulevard ne albuquerque, new mexico 87112 (505) 292-8832



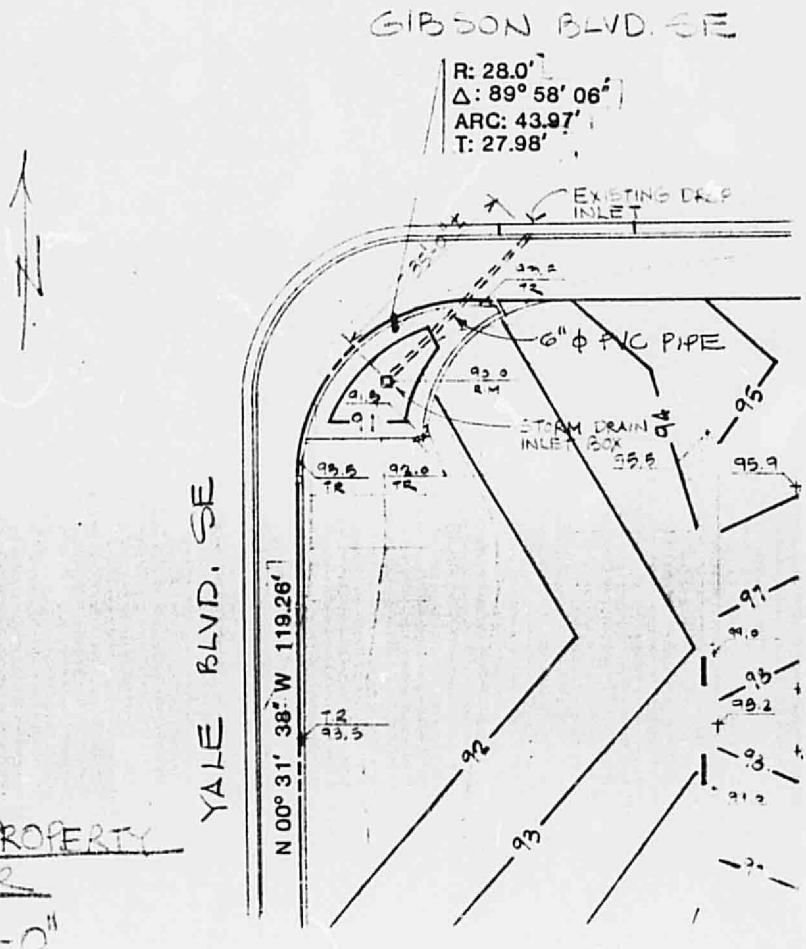
STORM DRAIN INLET BOX

1"



DRAIN CONNECTION TO STORM SEWER

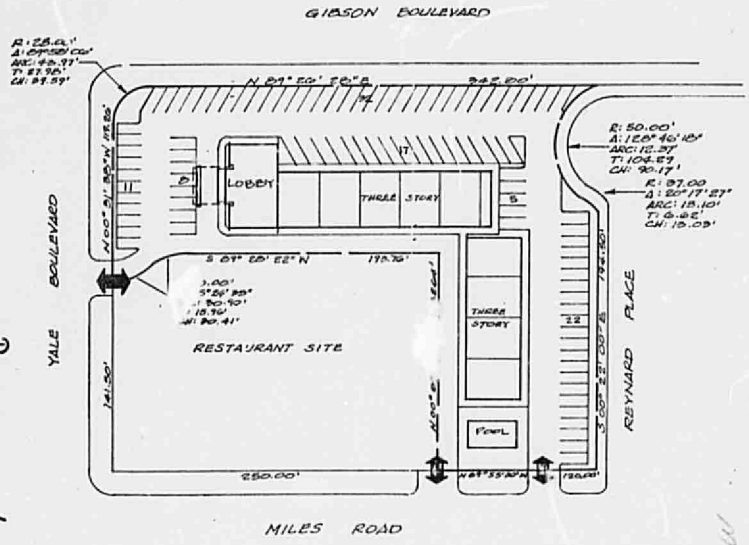
1"=1'-0"

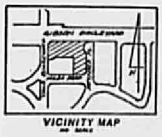


PLAN @ PROPERTY CORNER

1" = 20'-0"

To/ Bruno Consiglio
City Hall 4th Fl.
City Engrg. 9/9/80





PRELIMINARY SITE PLAN

LA QUINTA MOTOR INN
ALBUQUERQUE, NEW MEXICO

LAND USAGE:

MOTEL: 64,000 ±sq ft
* PARKING: 106 SPACES
RENTAL UNITS: 106
200±sq ft per RENTAL UNIT

RESTAURANT: N/A ±sq ft
PARKING: N/A SPACES

NORTH

* 11 PARKING SPACES AVAILABLE ON RESTAURANT SITE

DATE: 7-22-80

[redacted]

DIMENSIONS AND AREAS ARE SUBJECT TO CHANGE BY SURVEY. ALL DIMENSIONS ARE APPROXIMATE AND SUBJECT TO FINAL SURVEY

Reviewed w/ Joe Vance
9/6/80

letter rec. pc

M10-D2

Project: La Quinta Motor Inn
Review Notes:
By: Brian Burnett
Date: 6-2-81

Report: (pages 1-4)

1. Page 1 - Introduction: "... proposed storm water runoff will be allowed to surge and be ...

   Definition of "surge"?

2. Page 3 - Computational Procedures:

   A general agreement here at the City is that the C values for landscaped areas should not be less than the value used for natural ground. The primary reason behind this is that irrigation of the landscaping reduces infiltration capacities. ~~Although this value does not affect computations, consideration of this point should be made in future reports.~~

3. Page 3: Some reference should be indicated concerning the equations used for the ponding formulas, outflow pipe.

Appendices (A1-A7)

1. Page A-1 - Predeveloped Drainage Characteristics
   OK, but necessary?

2. Page A-1 - Developed Drainage Characteristics
   OK, but necessary?

3. Page A-2 - Basin A Developed Area
   OK

4. Page A-3 - Basin B - Developed Area
   OK

* 5. Note: Numerical Answers contained in B & C (page A-2) are correct. However, some mention should be made on the determination of the composite C value. This value will be higher if the C for undeveloped is placed at 0.4.

General Comments:

1. Page 5 - Recommendations Statement 2
   "The cut shall have an opening to allow flows from the parking area into the pond."

   This "opening" is not indicated on the plans. It appears that water enters the pond along its entire perimeter.

2. Page 5 Recommendations Statement 3
"... and an overflow spillway design to allow flows, in excess from the 100yr storm to exit the site."

No where is it indicated where the spillway is located. The should also be some details and design computations if this is to be done.

3. Page 5 - Recommendations Statement 4
"The pond shall be allowed to overflow onto parking surface during major storms..."

Is the pond going to be paved?

4. The equations on page 3 yield a pond volume of 3680 cuft.

a. The above figure is based on a Q_5 of 2.2 cfs. I question the use of the nomograph (Page A 5) to find this value. If the rational formula is used, and an intensity obtained from the NOAA Atlas the following Q_5 is obtained:

$Q_5 = 0.85(2.82)1.2 = 2.88$ cfs

The value of 2.82 in/hr was obtained from weather bureau data for the 5 yr - storm (.47 in for 10 minute duration).

$\frac{2.2}{1.2 \times .85}$

This value is lower than the 2.2 cfs used in the equation.

Note using 2.88 $T = 25.6$ min
Vol = 2960 cu ft.

5. Using the methodolgy outlined, the Vol computed on page A-2 is denoted as V_s in the procedure.

Required storage volume (V_t):

$$V_t = V_s \times Ac. \times C$$

Using values provided:

$$V_t = 3678 \times 1.2 \times 0.85$$

$$V_t = 3752 \text{ cu ft.}$$

6. Based on current policy, runoff developed - runoff undeveloped must be ponded. The following figures indicate the required ponding:

$\forall_{developed\ A} = 8897$ cuft (page A-2)

$\forall_{undeveloped} = (0.4) \times (0.2) \times (52334)$

$= 4187$ cuft.

The difference that must be ponded

$\forall = 8897 - 4187 = 4710$ cuft.

Utilizing the value obtained in #5 of these notes ($\forall_t = 3752$) the difference

$= 960$ cu.ft. of ponding

7. There should be some added detail of the pond area, roof drainage, and drop inlet along with information verifying that the connection to the drop inlet on Gibson can be made.

8. The grading along E side of Bldg C. does not appear adequate to transfer the water from the SE corner to the 06 contour at the North end of the building (ie water will stand next to the building). Possibly a swale could be used here.

9. It doesn't appear that all the drainage South of Bldg. A and Bldg B will reach the pond. A more definite contouring scheme is needed at the SE corner of the lot.

10. Access shown through the pond. should be shown.

6-3-81 Meeting with Fred Arfman

Comments:

1. $Q_o = Q_5 = 2.2$ cfs is a conservative value when compared to NOAA Atlas value of 2.30 in/hr

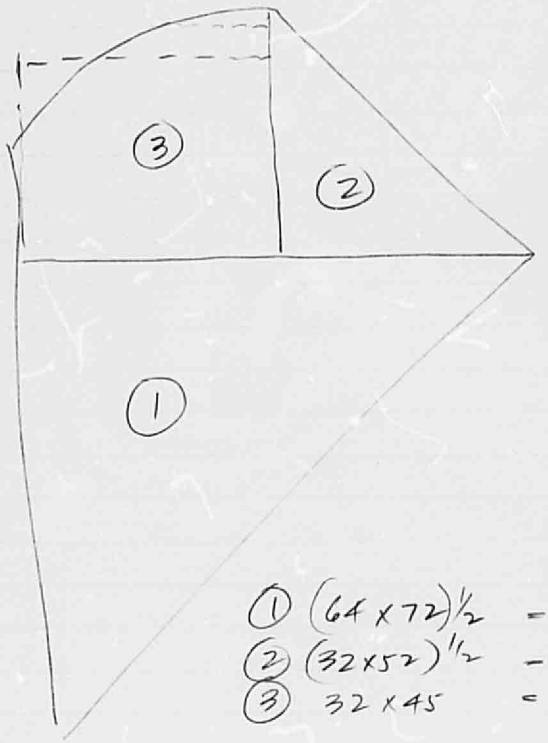
2. The composite C of 0.85 was estimated. Although the value was accepted this time, I did indicate that C values (composite) in the future must be computed.

3. The architect will include on the construction plans the detail of the skewed connection to the drop Inlet on Gibson. It will be referenced as Dwg K-17.

Brian Burnett

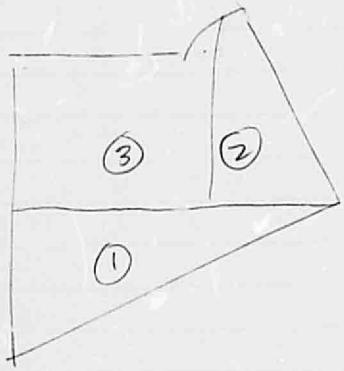
Pond Capacity Check:
Note: these are rough estimates

93' contour



1	$(64 \times 72)\frac{1}{2}$	=	2300
2	$(32 \times 52)\frac{1}{2}$	=	830
3	32×45	=	1440
			4570

92' Contour



① $(42 \times 55)\frac{1}{2} = 1155$
② $(20 \times 40)\frac{1}{2} = 400$
③ $(22 \times 40) = 880$
2435

91' Contour ~ 156

Total Pond Area: $(4570 + 2435)\frac{1}{2} \times 1.0 = 3500$
Average End Method
$+ (2435 + 156)\frac{1}{2} \times 1.0 = 1290$
4790

$4790 > 4710 \Rightarrow$ Capacity Met

RECOMMENDATIONS

1. All developed storm water flows from drainage Area A shall be collected, by means of site grading, at the site's northwest corner.

2. The landscaped pond shall be encompassed by a concrete header curb and wall. The curb shall have an opening to allow flows from the parking area to pass into the pond.

3. The pond shall have two means of discharge. One, a drain 6" diameter at 0.1% grade, (see Appendix), and an overflow spillway design to allow flows, in excess from the 100-year storm, to exit the site. The drain shall have a minor catch basin with grate and connect to the back side of the quad-catch basin in Gibson Boulevard.

4. The pond shall be allowed to overflow onto the parking surface during major storms. Overflow is projected to reach the 5192.7 contour level. At this level, the surge/detention pond will have a ponding volume capacity of 3678 cu. ft.
For sizing the ultimate surge/detention pond, the developed volume for Drainage Basin "A" minus the undeveloped volume yields the pond's required capacity (4710 cu.ft.) . This pond volume equates to a pond surface elevation of 5193 . See Exhibit I .

City of Albuquerque
P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

June 9, 1981

Mr. Fred C. Arfman
Isaacson, Arfman Consulting Engineers
2727 San Pedro Dr. N.E.
Albuquerque, New Mexico 87110

RE: LA QUINTA MOTOR INN (M16-D2)

Dear Mr. Arfman:

The drainage report for the referenced site is approved. This approval is based on the changes made to the Recommendations page contained in the report, and the condition that the Storm Drain Inlet detail will appear in the construction plans.

If you have any further questions, please feel free to call me.

Very truly yours,

Brian G. Burnett
Civil Engineer/Hydrology

BGB/tsl

City of Albuquerque
P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

June 10, 1981

Mr. Richard Bray
C.C.I.C.
3500 Indian School Rd. NE
Albuquerque, N.M. 87106

RE: DRAINAGE REPORT APPROVAL FOR LA QUINTA MOTOR INN

Dear Mr. Bray:

Fred Arfman requested that you receive a copy of the approval letter for your files.

If you have any further questions, please feel free to call me.

Very truly yours,

Brian G. Burnett
Civil Engineer/Hydrology

BGB/tsl

Attachment

ISAACSON & ARFMAN, P.A.
CONSULTING ENGINEERING ASSOCIATES

2727 SAN PEDRO N.E. SUITE 114A
ALBUQUERQUE, NEW MEXICO 87110
TELEPHONE – 883-2800

April 16, 1982

Mr. Richard Bray
CCIC Design Group
3500 Indian School Road N.E.
Albuquerque, New Mexico 87106

Re: La Qunita Motor Inn Drainage

Dear Richard:

On April 15, 1982 an as-built survey way preformed on the westerly most section of the parking and landscaped area of the La Qunita Motor Inn (see attachment). Using this survey as a basis of comparison to the original grading plan, the following points must be considered:

1. The original drainage stydy (approved by the City of Albuquerque: 11-3-80) called for surge/detention pond water surface elevation of 5192.7. This elevation equates to a ponding volume of 3680 cu. ft. (by original grading plan).

2. When analyzing the ponding potential of the as-builts, the ponding volume is approximately 1,620 C. F. with respect to an overflow spillway elevation of 5193.26.

3. The rim elevation of the 2" x 12" inlet located in the gravel landscaped area is 92.07 with an invert of 90.58. The plan rim elevation was 90.0 with an invert of 88.5.

4. The discharge pipe has a plan diameter of 6 inches (4" PVC as-built). Plan connection invert to the quad-combination inlet in Gibson Blvd. was set at 88.0 (as-built elev. = 90.63).

In conclusion, it appears that the west parking area was <u>not</u> built in accordance to plans, thereby adversely affecting the ponding volume potential by a reduction of 2,060 cubic feet. Also, the 12" x 12" inlet was constructed 2.07 feet higher than planned and the planned 6" PVC was built as a 4" with its outfall invert at 90.63 versus a planned 88.0.

All of the above items, except the discharge pipe diameter, are potential points of contention with the City, and a solution

must be worked out with the City Hydrology Section before a permanent Certificate of Occupancy can be secured.

Sincerely,

ISAACSON & ARFMAN, P.A.

Fred C. Arfman, P.E.

FCA/cvi

Attachments

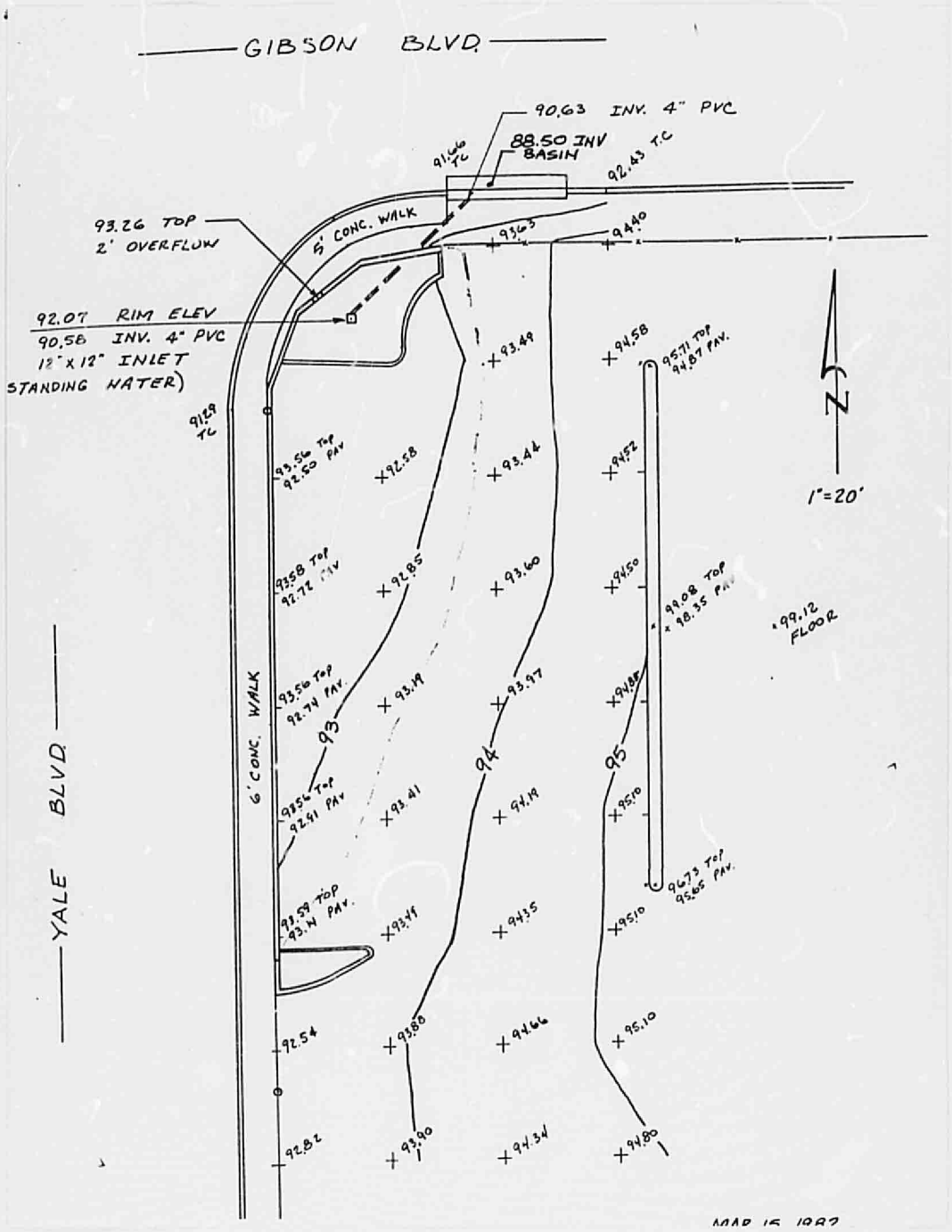
POND VOLUME DETERMINATION (AS-BUILT)

CONTOUR ELEVATION	AREA ON PLANS (1" = 20')	ACTUAL SQ. FOOTAGE	VOLUME
93.25	7.95	3180	
			670
93.00	5.445	2180	
			470
92.75	3.99	1596	
			300
92.50	2.00	800	
			140
92.25	0.78	312	
			40
92.00		10	

SURGE POND CAPACITY = 1,620 C.F.

ISAACSON & ARFMAN, P.A.
Consulting Engineering Associates

SUBJECT LA QUINTA JOB NO.
BY EGN DATE 4-16 SHEET NO. OF


GIBSON BLVD
YALE BLVD
90.63 INV. 4" PVC
88.50 INV BASIN
91.66 T.C
92.43 T.C
93.26 TOP
2' OVERFLOW
5' CONC. WALK
93.63
94.40
92.07 RIM ELEV
90.58 INV. 4" PVC
12" x 12" INLET
STANDING WATER)
91.29 T.C
6' CONC. WALK
93.56 Top 92.50 PAV
93.58 Top 92.72 PAV
93.56 Top 92.74 PAV
93.56 Top 92.91 PAV
93.59 TOP 93.14 PAV.
92.54
92.82
92.58
92.85
93.19
93.41
93.49
93.80
93.90
93
93.49
93.44
93.60
93.97
94.19
94.35
94.66
94.34
94
94.58
94.52
94.50
94.85
95.10
95.10
95.10
94.80
95
95.71 TOP 94.87 PAV.
99.08 TOP 98.35 PAV
95.73 TOP 95.65 PAV.
99.12 FLOOR
N
1"=20'
MAR 15 1987

ISAACSON & ARFMAN, P.A.
CONSULTING ENGINEERING ASSOCIATES

2727 SAN PEDRO N.E. SUITE 114A
ALBUQUERQUE, NEW MEXICO 87110
TELEPHONE – 883-2800

April 26, 1982

M. 16-3

Mr. Fred Aguirre
City of Albuquerque
P. O. Box 1293
Albuquerque, New Mexico 87103

Re: La Qunita Motor Inn

Dear Fred:

It has been requested by the Babenco Development Company, contractor for the above mentioned project, that our firm act as a go-between for his firm and the City's Hydrology Section. As discussed in our recent telephone conversation and confirmed by your staff, there is a non-conformity between construction plans and As-built data. Attached to this correspondence you will find a letter to a Mr. Richard Bray, CCIC Design Group, Project Architect for this development. In it you will find the results of our As-built investigation. Also attached is a copy of the As-Builts and original grading/construction plans for your use and convienence.

As an engineer who is involved in the growth of our community, I feel that a dis-service is being performed by the local architects, engineers, and governing bodies, in that situations like this one are constantly re-occurring. Out of town, as well as local contractors, who are not aware of the sensitive nature of our drainage procedures and guidelines, are being held accountable for failures to comply only after a project is built-out. The ramifications of this are obvious, in that any re-construction of drainage/grading improvements would usually be cost prohibitive once the job is completed.

I can only assume that the contractors make their field adjustments thinking that a more workable product would be the end result of their efforts. It has been suggested that a note of caution be placed by the architect or plan reviewer on the pertinent sheets stating that any variation in plan will prohibit the City from accepting the project.

The above comments were make in general and as suggestions that the City Hydrology Section might want to consider. In particular to the La Quinta Motor Inn, I can make the following recommendations:

1. Have the contractor place a parallel 6" dia. outfall drain pipe at a slope such that the surge pond will not exceed 1600 C.F. (existing pond capaicty is 1620 C.F.).

2. Have the project's owner supply the City with a hold-harmless letter (in no way does the existing grading/drainage impair the structure since excess storm water would simply overflow at the spillway and enter onto the driving surface of the Yale-Gibson intersection).

3. Do not remove the existing pavement and lower the grade since the contractor's intentions were good in that he was striving for a better parking area. Also the fact remains that the only agency involved in the construction process that knew of the ponding volume requirements was the City. It would appear that the expense for such a major re-construction would be an excessive burden on the contractor.

These are my informal recommendations to your department and would be readily available to aid in the expedious conclusion to this matter.

Very truly yours,

ISAACSON & ARFMAN, P.A.

Fred C. Arfman

Fred C. Arfman
Vice President

Attachments

FCA/cvi

ISAACSON & ARFMAN, P.A.
CONSULTING ENGINEERING ASSOCIATES

2727 SAN PEDRO N.E. SUITE 114 A
ALBUQUERQUE, NEW MEXICO 87110
TELEPHONE – 883-2800

APPROVED FOR DRAINAGE
5-11-82
DATE
SIGNATURE
ADVISE CONTRACTOR INSPECTOR
WHEN DRAINAGE REQUIRED

May 11,1982

Mr. Fred Aguirre
Hydrology Section - M.D.D.
City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

RE: La Quinta Motor Inn

Dear Fred:

Our firm of Isaacson & Arfman, P.A. has been contracted by the Babanco Development Company of El Paso to make recommentations and oversee any construction activity that would bring the La Quinta's drainage improvements within the limits of the original drainage concept.

An as-built survey was preformed by our firm and the findings were forwarded to your office in our letter of April 26, 1982. The three recommendations presented in the correspondence were not satisfactory to City Hydrology since the original volume of storm water detention was not achieved by a 55% factor (1620 vs. 3680 C.F.). Thereby, a final compromise was agreed upon by members of our staff, contractor, owner and our firm. That agreement was to increase the surge pond's detention capacity to the original conceptual volume of 3,680 cu.ft. and provide the City with an Engineer's Certification.

On May 10th, the final of five drainage punch list items were completed and inspected. They are as follows and are referenced on the attached revised as-built drawing.

1. Raise the emergency overflow spillway to an elevation of at least 93.76 (½ ft. of additional depth equates to 2000 cu.ft.± increased volume).

2. Raise the top of wall on the parking lot's west perimeter to an elevation of 93.9.

3. Raise the curb at the site's Yale entrance planter to an elevation equal to or greater than that of the wall height.

Mr. Fred Aguirre
City of Albuquerque
May 11, 1982

4. Raise the asphalt paving directly east of the nose of curb (item #3) to an elevation equal or greater than that of the top of wall; then hold or increase that elevation to the east until it catches the original paving.

5. Place a extruded asphalt curb along the pond's north perimeter and east of the existing end of wall.

Due to the successful completion of the above five items, the surge pond has a potential increase in depth of 0.5+ ft. The ultimate water surface area has been increased from 3180 sq.ft. to 4700 sq.ft. At a half foot of additional depth, the increase ponding capacity is 1,970 cu.ft., giving a total of 3,590 cu.ft. This actual volume is 97.5%± of conceptual and should be considered equal.

It has been understood that the Hydrology Section would approve the drainage for the La Quinta Motor Inn upon the completion of the five punch list items and Engineer's Certification. I therefore state that the items have been completed to my satisfaction and I thereby certify that the conceptual ponding capacity and the actual ponding capacity are equavalent.

Sincerely,

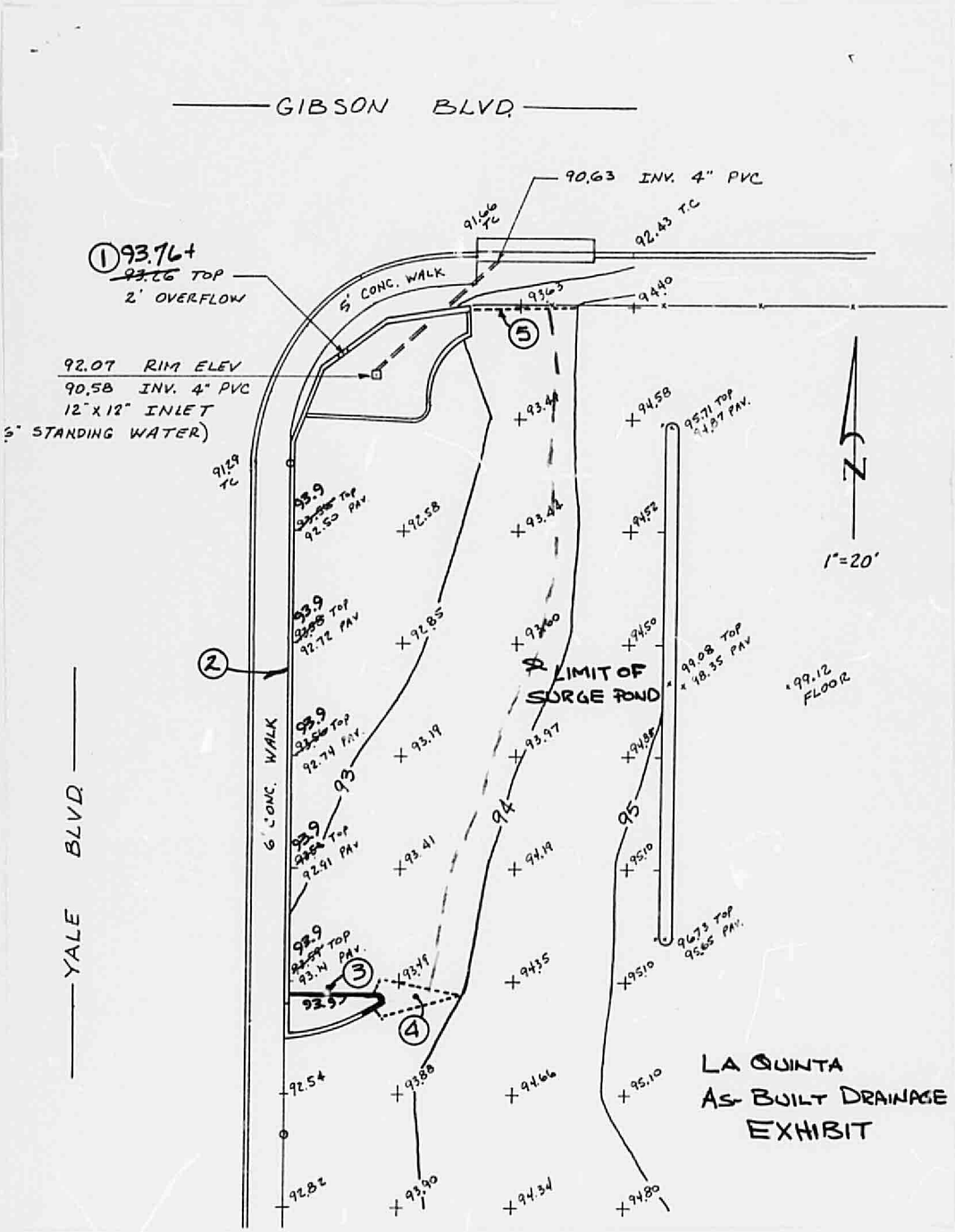
ISAACSON & ARFMAN, P.A.

Fred C. Arfman

Fred C. Arfman, VP
P.E. #7322

FCA/tg

attachment


GIBSON BLVD
90.63 INV. 4" PVC
91.66 TC
92.43 TC
1 93.76+
~~93.76~~ TOP
2' OVERFLOW
5' CONC. WALK
93.63
94.40
5
92.07 RIM ELEV
90.58 INV. 4" PVC
12" X 12" INLET
(5" STANDING WATER)
91.29 TC
93.9
~~93.50~~ TOP
92.50 PAV
92.58
93.44
94.58
95.71 TOP
94.87 PAV.
N
1"=20'
93.9
~~93.88~~ TOP
92.72 PAV
92.85
93.60
94.52
94.50
2
LIMIT OF
SURGE POND
99.08 TOP
98.35 PAV
99.12
FLOOR
93.9
~~93.50~~ TOP
92.74 PAV
93.19
93.97
94.85
93
94
95
93.9
~~93.88~~ TOP
92.91 PAV
93.41
94.19
95.10
96.73 TOP
95.85 PAV.
93.9
~~93.50~~ TOP
93.14 PAV.
3
93.46
94.35
95.10
92.97
4
YALE BLVD
6' CONC. WALK
92.54
93.88
94.66
95.10
92.82
93.90
94.34
94.80
LA QUINTA
AS-BUILT DRAINAGE
EXHIBIT

DRAINAGE STUDY

FOR

LA QUINTA MOTOR INN

FRED C. ARFMAN
NEW MEXICO
7322
REGISTERED PROFESSIONAL ENGINEER

RECEIVED
JAN 07 1981
CITY ENGINEER

Prepared by

CHAMBERS CAMPBELL, ISAACSON AND CHAPLIN, INC.
3500 Indian School Road, N.E.
Albuquerque, New Mexico

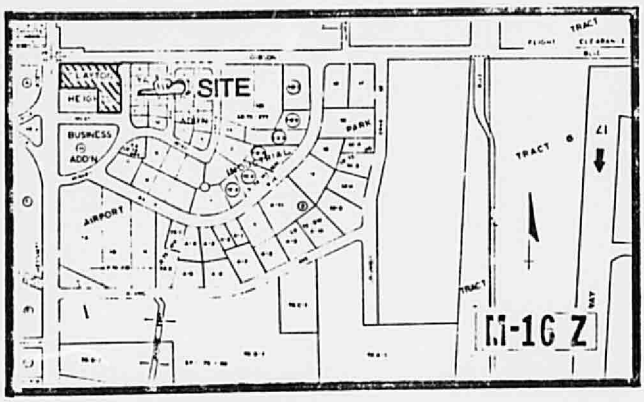
JANUARY 1981

This copy was checked
BGB

INTRODUCTION

CCIC has been contracted by the La Quinta Motor Inns, Inc. to provide architectural and engineering services for their new motel. As part of our engineering services, an investigation of the storm drainage characteristics was undertaken to analyze the site's undeveloped drainage conditions and the projected developed storm water flows. An analysis of these internal flows, in accordance to the Interim Drainage Guidelines, November 1979, Section (B) Ponding, is presented along with recommendation for compliance for the City of Albuquerque's and AMAFCA's requirements.

Careful attention has been given to how the proposed storm water runoff will be allowed to surge and be detained on site before entering into the adjacent street's storm sewer system.



VICINITY MAP

SITE LOCATION AND TOPOGRAPHY

The new La Quinta Motor Inn is to be constructed on a 1.436 acre site located on the southeast corner of Yale and Gibson in the City's southeast quadrant. This site is completely surrounded by developed areas, more precisely, Gibson Boulevard is to the north, Yale Boulevard to the west, a Goody's Restaurant and Miles Road to the south, and Renard Place to the east. Gibson and Renard have existing storm drains that abut the site's property lines. These storm drains play an important role in handling the site's storm water runoff for the drain in Renard Place intercepts all the flows to the east that previously ran off into Gibson Boulevard. But due to new construction on Gibson that eliminated the intersection of Renard and Gibson, a storm drain was constructed to relieve the flows that are generated down Renard Place. The catch basins in Gibson will be addressed in the ONSITE DRAINAGE AND RECOMMENDATION section of this report.

Ground topography has a regular contour pattern; site sloping to the west at a 5% grade (19 foot drop along 370 feet). The overall site consists of 1.436 acres that is covered with native grasses.

COMPUTATIONAL PROCEDURES

Hydrological flow rate calculations are based on the rational runoff method. Time of concentrations were calculated using the Overland Time of Travel for undeveloped areas. Estimates were made in percents of areas covered by each coverage type described below:

For Composite "C" Determination:

(a)	Streets, driveways, roofs and walks	0.90
(b)	Landscaped areas	0.20
(c)	Natural ground	0.40

In addition, all runoff volume calculations have been based on a 100-year - 6 hour rainfall of 2.4" as per the AMAFCA requirements. Except in the case of determining the ponding outflow, the 5 year storm was used as required.

The ponding formulas with an outflow through a pipe were used.

$$\text{Time} = -25 + \sqrt{7087.5 \frac{CA}{Q_o}}$$

$$\text{Volume} = 11340 \frac{CAT}{T+25} - 40\, Q_o\, T$$

OFFSITE DRAINAGE

The La Quinta Motor Inn site is not subject to any water courses, flood plain hazards, nor is it adjacent to any artificial water courses. However, as stated earlier, a storm drain system does exist in Gibson Boulevard. It has a quadruple combination catch basin at the site's northwest corner. The storm sewer empties into AMAFCA's South Diversion Channel approximately 2000 feet to the west. Also, all offsite flow from the east are diverted northward by Renard Place and enter into the same storm drainage system.

ONSITE DRAINAGE

Exhibit I delineates the internal patterns of drainage of the proposed developed site. Most of the developed flow shall be detained in a pond at the northwest corner of the site and then be allowed to exit into the storm drain in Gibson at a rate consistent with current policies. This subdrainage area shall be referred to as AREA A. The remaining portion of the site (10,200 sq. ft.) shall have its flows sheet flow to the west into the parking area and eventually the detention ponds for the neighboring Goody's Restaurant.

RECOMMENDATIONS

1. All developed storm water flows from drainage Area A shall be collected, by means of site grading, at the site's northwest corner.

2. The landscaped pond shall be encompassed by a concrete header curb and wall. The curb shall have an opening to allow flows from the parking area to pass into the pond.

3. The pond shall have two means of discharge. One, a drain 6" diameter at 0.1% grade, (see Appendix), and an overflow spillway design to allow flows, in excess from the 100-year storm, to exit the site. The drain shall have a minor catch basin with grate and connect to the back side of the quad-catch basin in Gibson Boulevard.

4. The pond shall be allowed to overflow onto the parking surface during major storms. Overflow is projected to reach the 5192.7 contour level. At this level, the surge/detention pond will have a ponding volume capacity of 3678 cu. ft.

Red checks indicate that numerical answers given are correct.

APPENDIX

1. PREDEVELOPED DRAINAGE CHARACTERISTICS

Area = 1.436 ac. = 62534 sq. ft.

C = 0.40

tc = 19 min. (see tc chart)

I = 189/(tc+25) = 4.3

Q = CIA

= (0.40)(4.3)(1.436)

= 2.47 cfs

V = CDA, where D = 2.4" = 0.2'

= (0.40)(0.2)(62534)

= 5003 cu. ft.

NOTE: Predeveloped storm water discharge doesn't have any apparent water course, therefore must assume that flows sheet flow to the west.

2. DEVELOPED DRAINAGE CHARACTERISTICS

Composite "C" = 0.85

Area (Basin A) = 1.20 ac. = 52,334 sq. ft.

Area (Basin B) = 0.234 ac. = 10,200 sq. ft.

TOTAL = 62,534 sq. ft.

A. Total Site

Q = CIA

= (0.85)(5.4)(1.436)

= 6.6 cfs

V = CDA

= (0.85)(0.2)(62534)

= 10,630 cu. ft.

B. Developed area contributing to pond (Basin A)

A = 1.20 ac. = 52,334 sq. ft.

Q = CIA

= (0.85)(5.4)(1.2)

= 5.5 cfs

V = CDA

= (0.85)(0.2)(52334)

= 8897 cu. ft.

C. Developed area sheet flowing offsite (Basin B)

A = 0.234 ac. = 10,200 sq. ft.

Q = CIA

= (0.85)(5.4)(0.234)

= 1.1 cfs

V = CDA

= (0.85)(0.2)(10,200)

= 1734 cu. ft.

D. Surge Pond and Pipe Discharge using the formula stated earlier

$T = -25 + (7087.5 \frac{CA}{Q_o})^{1/2}$, where C = 0.85 A - 1.20 ac. Q_o = 2.2 cfs

$Q_o = Q_5$

T = 32.3 min.

$Vol. = 11340 (\frac{CAT}{T+25}) - 40\ Q_o\ T$

$= 11340 [\frac{(0.85)(1.2)(32.3)}{32.3+25}] - 40(2.2)(32.3)$

= [11340(0.575)] - 2842.4

= 3678.1 cu. ft.

NOTE: This volume determination confirms two design parameters:

1. Surge pond has sufficient capacity.

2. Spillway overflow elevation is now adjusted to an elevation of 5192.7 feet.

E. Discharge Pipe

From the accompanying charts, a 6" diameter pipe at a slope of 0.1% will provide the desired discharge rate, Q_5, of 2.2 cfs.

Therefore, catch basin rim = 90.0

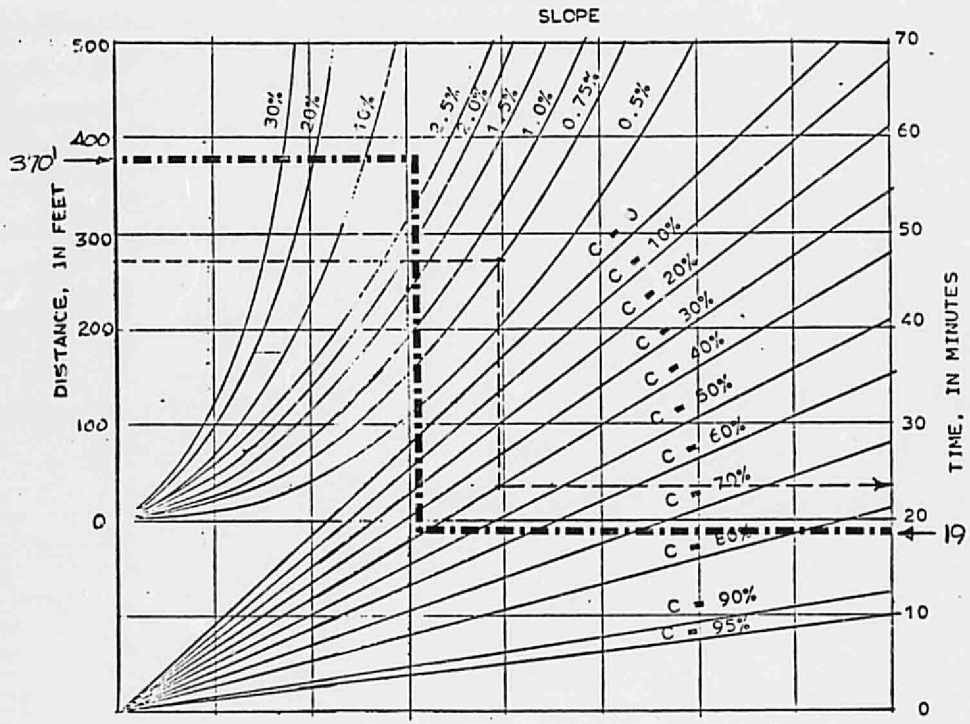
depth of basin = 1.5

invert = 88.5

length of pipe = 35' x 0.1% slope = 0.04

invert at quad-catch basin = 88.5 - 0.04 = 88.46

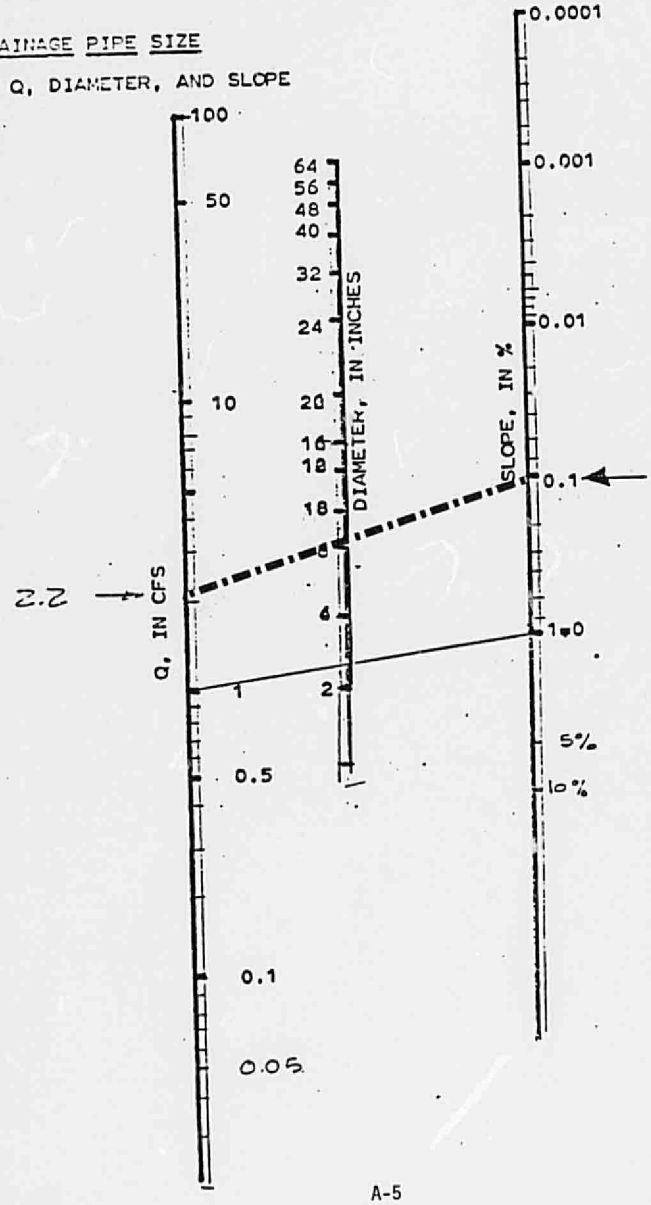
TIME OF CONCENTRATION (t_c)



SOURCE: 10

DRAINAGE PIPE SIZE

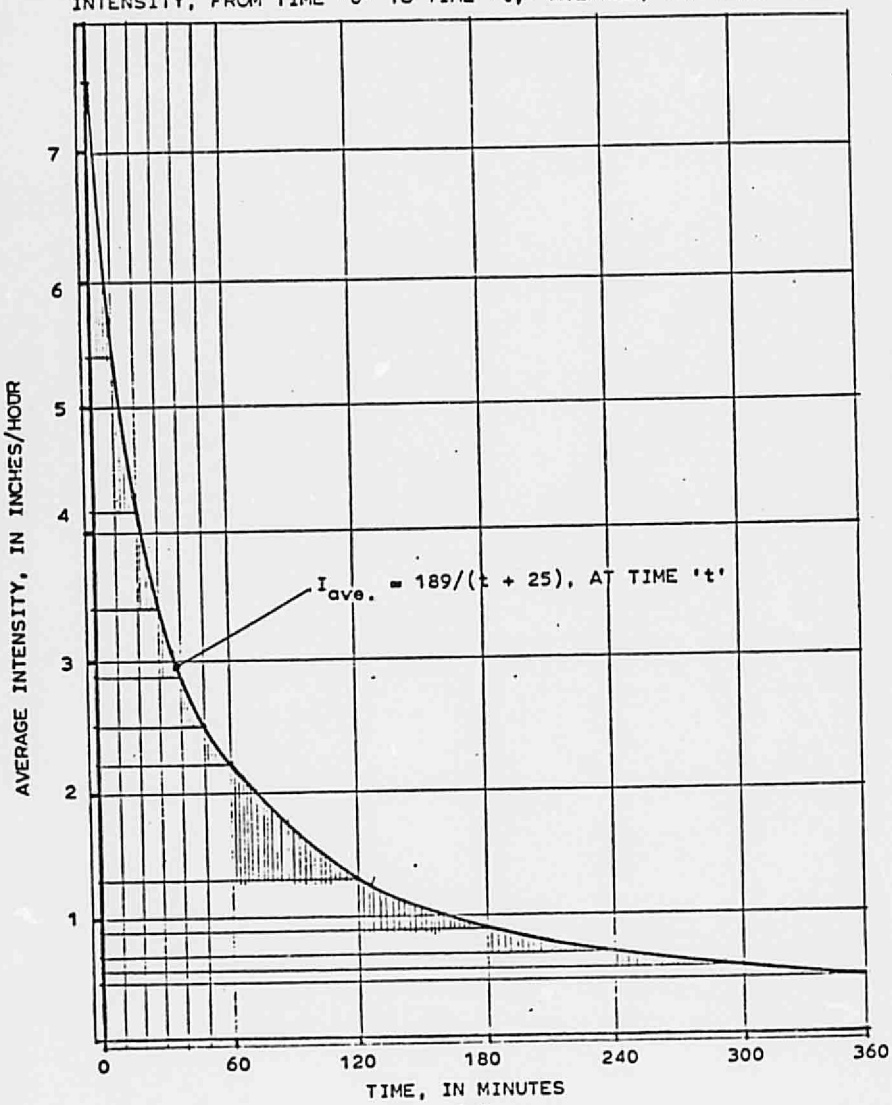
BY Q, DIAMETER, AND SLOPE

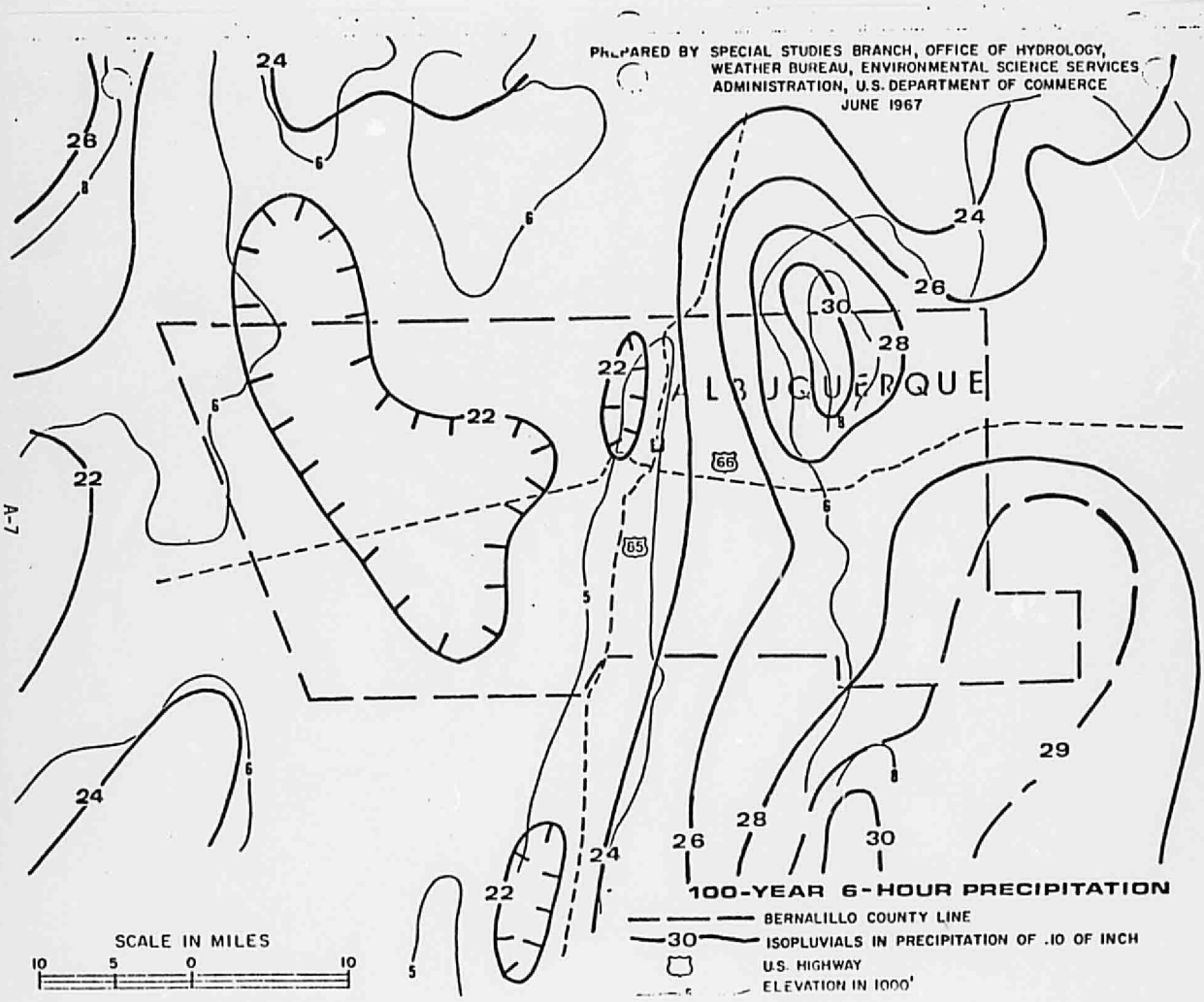


SOURCE: 9

INTENSITY

ALBUQUERQUE
INTENSITY, FROM TIME '0' TO TIME 't,' AVERAGE; 100 YEAR RAIN

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JUNE 1967
ALBUQUERQUE
66
65
100-YEAR 6-HOUR PRECIPITATION
BERNALILLO COUNTY LINE
ISOPLUVIALS IN PRECIPITATION OF .10 OF INCH
U.S. HIGHWAY
ELEVATION IN 1000'
SCALE IN MILES
10 5 0 10