HYDROLOGY D18/D6A

LA QUINTA MOTOR INN

D18- D6A

1 PLAN

CITY OF ALBUQUERQUE
MUNICIPAL DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION

HYDROLOGY SECTION PROJ. NO. D-18 DATE: 2/16/84

PLANNING DIVISION NO. _____

CONFERENCE RECAP

SUBJECT: La Quintana Motor Inn

WHO	REPRESENTING
ATTENDANCE: Ray Chambers	
Billy Goolsby	

FINDINGS: ① Drainage Plan per DPM
② Discharge based on analysis of downstream capacity of ~~[illegible]~~ new interchange system and the outfall to Pino Arroyo.
③ Erosion Control Plan required for the period of construction

Please provide copy of this recap with Submittal

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

SIGNED: Billy G. Goolsby SIGNED: Ray Chambers
TITLE: CE/Hydrology TITLE: A/E CCIC Design Group
DATE: 2/16/84 DATE: 2-16-84

INFORMATION SHEET

PROJECT TITLE LA QUINTA MOTOR INNS TYPE OF SUBMITTAL DRAINAGE PLAN

ZONE ATLAS PAGE NO. D-18 CITY ADDRESS _____

LEGAL DESCRIPTION TRACT A, McKAY SUBDIVISION

ENGINEERING FIRM BOHANNAN-HUSTON CONTACT BRIAN BURNETT

ADDRESS 4125 CARLISLE BLVD. NE PHONE 505-881-2000

OWNER LA QUINTA MOTOR INNS CONTACT _____

ADDRESS SAN ANTONIO, TX. PHONE _____

ARCHITECT CCIC DESIGN GROUP CONTACT RICHARD BRAY

ADDRESS 3500 INDIAN SCHOOL PHONE 505-266-5521

SURVEYOR _____ CONTACT _____

ADDRESS _____ PHONE _____

CONTRACTOR _____ CONTACT _____

ADDRESS _____ PHONE _____

PRE-DESIGN MEETING:

___ YES
_X_ NO
___ COPY OF CONFERENCE RECAP SHEET PROVIDED

PLEASE CHECK TYPE OF APPROVAL EXPECTED WITH THIS SUBMITTAL:

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

DATE SUBMITTED: APRIL 30, 1984

BY: _____

RECEIVED
APR 30 1984
HYDROLOGY SECTION

BOHANNAN-HUSTON INC.
ENGINEERS PLANNERS PHOTOGRAMMETRISTS
4125 CARLISLE BLVD., N. E. ALBUQUERQUE, NEW MEXICO 87107 505 881-2000
6713 VISCOUNT BLVD., EL PASO, TEXAS 79925 915 778-4491
330 GARFIELD, SANTA FE, NEW MEXICO 87501 505 988-7671

April 30, 1984

Mr. Fred J. Aguirre
Civil Engineer/Hydrology
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

Re: La Quinta Motor Inns Drainage Plan D18-D6a

Dear Fred:

Enclosed is one copy of the drainage management plan for the referenced site which is located at the northeast corner of the intersection of San Antonio Blvd. NE and I-25 East Frontage Road.

If you have any questions, please feel free to contact James Topmiller or me.

Sincerely yours,

Brian G. Burnett, P.E.
Project Manager

Enclosure

cc: Mr. Richard Bray

JT/mw
Job No. 4 138 0

RECEIVED
APR 30 1984
HYDROLOGY SECTION

PRINCIPALS
JERRY R. BOHANNAN, P.E. & L.S.
LARRY W. HUSTON
MICHIAL M. EMERY, P.E.

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

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

May 22, 1984

Mr. Brian Burnett
Bohannan-Huston, Inc.
4125 Carlisle Boulevard NE
Albuquerque, NM 87107

REF: GRADING AND DRAINAGE PLAN FOR LA QUINTA MOTOR INN (D18-D6A) RECEIVED APRIL 30, 1984

Dear Brian:

The above referenced plan, dated April 30, 1984, is approved.

Please attach a copy of this approved plan along with an erosion control plan for the period of construction to the construction set prior to release of the building permit.

If I can be of further asssitance, please contact me at 766-7644.

Sincerely yours,

Billy J. Goolsby

Billy J. Goolsby, PE
City/County Flood Plain Admin.

BJG:mrk

DRAINAGE REPORT
FOR
LA QUINTA MOTOR INN
SAN ANTONIO BLVD. @ I-25

PREPARED FOR:

LA QUINTA MOTOR INNS, INC.
10010 SAN PEDRO AVENUE
SAN ANTONIO, TX 78216

PREPARED BY:

BOHANNAN–HUSTON, INC.
4125 CARLISLE BLVD. NE
ALBUQUERQUE, NM 87107

Job No. 4 138 0

Brian G. Burnett, P.E.
N.M.P.E. No. 8514

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PURPOSE

The purpose of this report is to outline the drainage management plan for a 3.5-acre hotel and restaurant site. The City Drainage Ordinance and Development Process Manual will be used to establish the plan.

SITE LOCATION AND DESCRIPTION

The site lies at the northeast corner of the intersection of San Antonio Blvd. NE and the Pan American Freeway. The site is bordered on the north by the Meadows Mobile Home Community and on the east by a small vacant tract of undeveloped land. Figure 1 identifies the project site.

The site slopes gently to the west at approximately 2.5 percent. Currently under construction, NMSHD plans for a San Antonio/I-25 underpass call for 10-20 foot cuts on the south and west borders of the site as San Antonio passes under the interstate highway. Figure 2 is a topographic plan of the proposed work.

The soils class for the site is designated as Tijeras group and is listed as SCS Soil Type 'B'. A soils map from the SCS Bernalillo County Survey has been included in Figure 3.

EXISTING CONDITIONS

The FEMA Floodway maps indicate that a flood plain exists 450' south of the site along the basin created by the Pino Arroyo. However, no flood plain is shown on the site itself.

Existing drainage from the site occurs at the low (west) end of the site where 2-36" RCP culverts convey off-site and on-site runoff under and across the I-25 right-of-way. However, with the construction of the San Antonio/I-25 underpass, the 36" RCP culverts will be removed and a new storm sewer system installed under the new roadway. The storm sewer system will include a 24" RCP stubout designed specifically to collect runoff generated on-site. A sketch of the new storm sewer system is shown in Figure 2.

PROPOSED CONDITIONS

A. Method of Analysis

Criteria outlined in Section 22.2 of the Development Process Manual (DPM) is used to compute existing and developed flow rates. The FEMA Floodway map, included in the rear pocket of this report, identifies the drainage basins used to design the storm sewer system mentioned earlier. The storm sewer system will be constructed as part of the I-25 Frontage Road Improvements.

B. Off-Site Runoff Conveyance

The site naturally carries runoff only from the undeveloped parcel of land at the site's east boundary. In accordance with the site plan, a retaining wall to be constructed at the east property line will provide openings for historical off-site runoff to the site. It is expected that, once developed, the parcel will redirect its runoff away from the site.

A 10' temporary drainage easement is being acquired along the east boundary to provide an area to install small gravel/boulder basins around the wall openings. The basins will minimize soil passage through the wall openings onto the parking lots.

C. Determining Downstream Capacity

The storm sewer system being constructed in San Antonio Blvd. and Pan American Freeway provides an appropriate outfall for runoff generated on-site. In accordance with the Drainage Ordinance, Section 12G, site runoff should not exceed downstream capacity.

In determining downstream capacity, it must be assumed that all basins contributing storm runoff to the storm sewer system are entitled to their fair percentage of the available system capacity. These contributing basins are shown on the FEMA Floodway map in the rear pocket. Several other assumptions are required to evaluate the system:

1. The San Antonio/Pan American storm sewer system has a maximum capacity of 54 cfs, based on a 30" line size and a minimum slope of 0.017. (Appendix 4).

2. The undeveloped tract to the east (Basin D) will be developed to a condition requiring the use of "C" value equal to 0.7.

3. Basin 'F' extends no further east on San Antonio than the construction limits of the NMSHD underpass project. This was the extent of the basin used by the NMSHD in sizing the storm sewer system. Preliminary plans for the San Antonio Drive/Pino Arroyo Improvements (prepared by Andrews, Asbury & Robert, Inc.) indicate that runoff will be directed south to the arroyo immediately east of the underpass construction limits.

From the calculations shown in Appendix 1, the hotel site's share of the downstream storm sewer system is 13.5 cfs. The total runoff rate generated by the site is 16 cfs. Therefore, the discharge from runoff generated on-site will be controlled to a rate of 13.5 cfs and ponding of 645 cfs (Appendix 2) of runoff will be required.

D. Controlling Discharge

Total discharge from the site, however, must also include off-site flows conveyed across the site from the undeveloped tract to the east (Basin D). Basin D has an undeveloped flow rate of 3 cfs. Undeveloped flow rate is used because once the tract is developed, it will be required to drain away from the hotel site. Approximately 69% (2 cfs) of Basin D will discharge with Basin BC to the San Antonio right-of-way and will be collected by an inlet on the north side of the roadway (Appendix 4). The remaining 1 cfs of Basin D will discharge to the controlled discharge area of Basin A on-site. Therefore, the controlled discharge of Basin A must be increased by 1 cfs.

Runoff from basin A will be controlled discharge. This will be accomplished by installing a ponding area in the low end of Basin A with an outlet sized to allow a controlled rate of discharge. To establish that discharge rate, we have:

Total allowed site discharge –	13.5 cfs
Basin BC discharge to San Antonio –	6.3 cfs
Allowable Basin A discharge –	7.2 cfs
Basin D undeveloped runoff contribution to Basin A –	1.0 cfs
Total Basin A allowable controlled discharge rate –	8.2 cfs

The ponding outlet will be a 24" pipe using a controlling orifice plate with a 13" diameter orifice. The 24" pipe will connect to the storm sewer system extended near the site's west boundary.

SITE MANAGEMENT PLAN

Plate 1 indicates the grading plan for the site. Previous discussion has supported the following key elements of the plan:

1. The retaining wall at the east boundary of the site has been provided with wall openings to allow safe conveyance of off-site flows to the site.

2. A 645 cubic foot ponding area has been provided at the low (west) end of the site. The ponding area allows no more than 1 foot depth of water before flowing over the curb. It is located away from parking spaces.

3. A 24" pipe with orifice plate will be the outlet from the pond. The orifice plate will control discharge from the pond at 8.2 cfs using a 13" diameter orifice.

4. A smaller portion of the tract has been graded to allow discharge of 6.3 cfs to the San Antonio right-of-way. Runoff will be collected by an inlet on the roadway's north side.

FIGURES

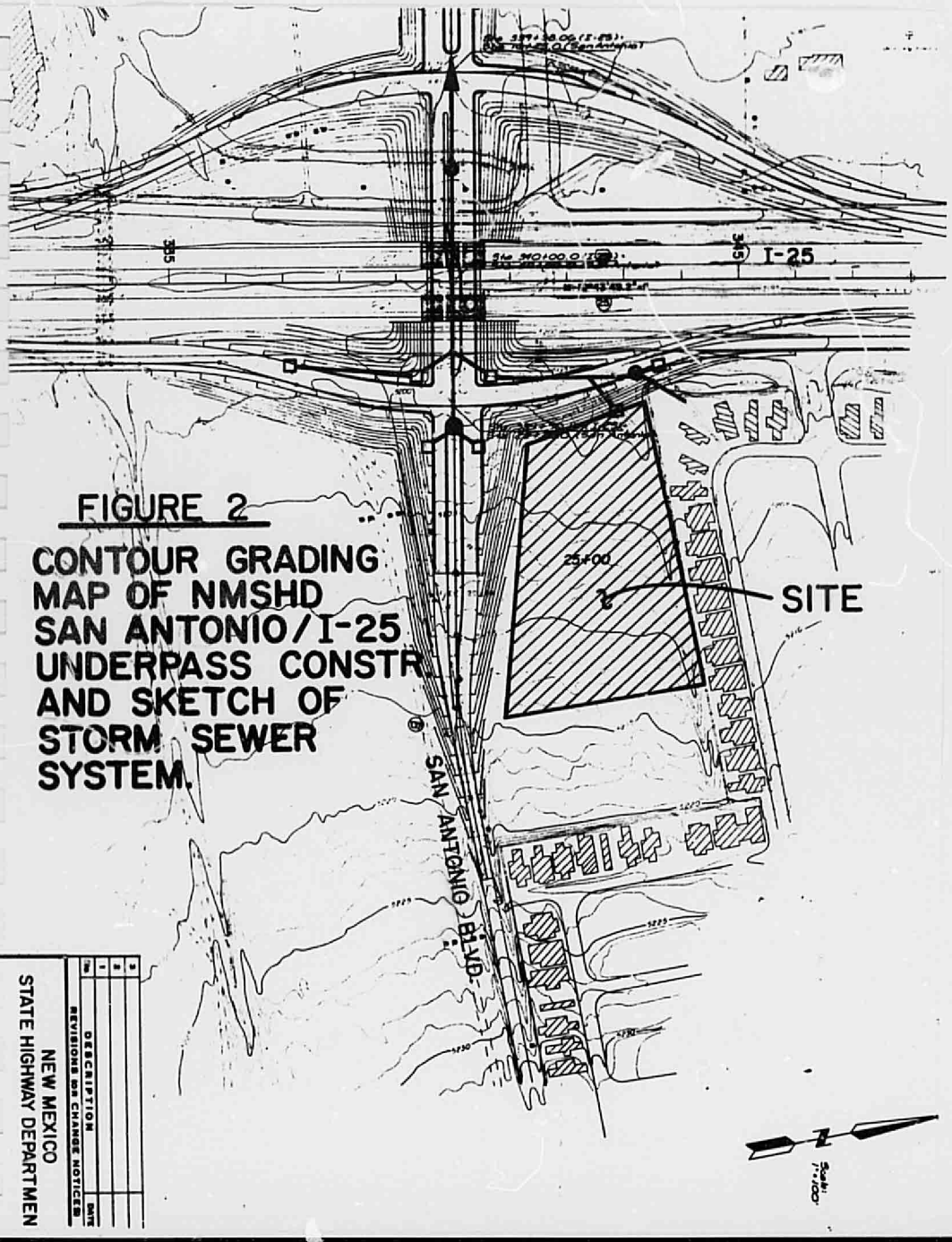

FIGURE 2

CONTOUR GRADING MAP OF NMSHD SAN ANTONIO/I-25 UNDERPASS CONSTR. AND SKETCH OF STORM SEWER SYSTEM.

PLATES

APPENDIX 1

ON-SITE/OFF-SITE RUNOFF COMPUTATIONS

BASIN "A"

north and west sections of La Quinta site, draining to storm drain @ NW corner of site

$S = 0.015$ Area = 2.1 acres

$L = 605'$ over paved surface to storm drain onsite

paved area velocity = 1.67 fps, from Plate 22.2 B-1

calculate time of concentration, T_c

$$T_c = \frac{L}{V(60)} = \frac{605}{1.67(60)} = 6 \text{ min. (use 10 min.)}$$

Runoff flows and volume (100-yr. storm)

assume 100% impervious, then $C = 1.0$ Plate 22.2 C-1

from Plate 22.2 D-2, rainfall 6-hr volume = 2.2"

then intensity, $I = (6\text{-hr})\,6.84\,t_c^{-0.51}$ Plate 22.2 D-2

$$I = (2.2)\,6.84\,(10^{-0.51})$$

$$= 4.65 \text{ in/hr}$$

then peak discharge, $Q_p = CIA$

$$= 1.0(4.65)\,2.1$$

$$Q_p = 9.76 \text{ cfs}$$

and runoff volume, $V = \frac{2.2}{12}(1.0)\,2.1$

$$= 0.38 \text{ acre-ft.}$$

$$= 16{,}552 \text{ cf}$$

PROJECT NAME La Quinta Drainage SHEET ____ OF ____
PROJECT NO. Report - #41380 BY JT DATE 4/5/84
SUBJECT ____ CH'D ____ DATE ____

BASIN "B,C"

southeast corner of La Quinta tract

$S = 0.029$ Area = 1.35 acres

$L = 470'$ from back of basin to V-ditch @ San Antonio

$L = 230'$ length of V-ditch to storm inlet

Calculate time of concentration, T_c, in basin only

$$T_c = \frac{L}{V(60)} = \frac{470}{2.3(60)} = 3.4 \text{ min. (use 10 min)}$$

velocity over paved surface = 2.3 fps Plate 22.2 E.1

* since actual $T_c = 3.4$ min. must be increased to 10 min., neglect travel time in V-ditch (3 min.)

RUNOFF FLOWS AND VOLUME (100-yr storm)

assume 100% impervious, then C = 1.0 Plate 22.2 C.1

6-hr rainfall = 2.2" Plate 22.2 D-2

then intensity, $I = (6\text{-hr})\, 6.84\, T_c^{-0.51}$

$$= 2.2\,(6.84)\,10^{-0.51}$$

$$= 4.65 \text{ in/hr}$$

then peak discharge $= Q_p = CIA$

$$= 1.0\,(4.65)\,1.35$$

$$= 6.28 \text{ cfs}$$

and max. volume, $V = \frac{22}{12}(C)A = 0.18(1.0)1.35$

$$= 0.24 \text{ ac-ft}$$

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BASIN "D"

undeveloped tract east of La Quinta site, draining to La Quinta site until its development when drainage will be routed to San Antonio

S = 0.02
Area = 1.9
L = 450' from back of basin to V-ditch in San Antonio
L = 480' length of earth V-ditch to storm inlet
velocity over paved surface = 1.92 fps Plate 22.2 B-1

calculate basin only time of concentration, T_c

$$T_c = \frac{L}{V(60)} = \frac{450}{1.92(60)} = 3.9 \text{ min.} \quad (\text{use } 10 \text{ min.})$$

RUNOFF FLOWS AND VOLUMES 100 yr storm

assume C = 0.7 for future development
and rainfall over 6 hrs. = 2.2 hrs Plate 22.2 D-2

then Intensity, $I = (6 \text{ hr fall})\, 6.84\, t_c^{-0.51}$

$$= (2.2)\, 6.84\, (10^{-0.51})$$

$$= 4.65 \text{ in/hr}$$

then peak discharge, $Q_p = CIA$

$$Q_p = 0.7\,(4.65)\,1.9$$

$$= 6.18 \text{ cfs}$$

then runoff volume, $V = 2.2/12\,(0.7)\,1.9$

$$= 0.24 \text{ ac-ft}$$

$$= 10620 \text{ cf}$$

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Calculate travel time in V-ditch from Basin D to storm inlet: $L = 480'$, $V = 0.85$ fps

$$\text{travel time} = \frac{L}{V(60)} = \frac{480}{0.85(60)} = 9.4 \text{ min}^*$$

*9.4 min. is less than T_c = 10 min., neglect travel time in V-ditch

Also, with City plans to improve San Antonio, flow in the V-ditch will transfer to curb and gutter and thereby decrease travel time.

PROJECT NAME _____ SHEET _____ OF _____
PROJECT NO. _____ BY _____ DATE _____
SUBJECT _____ CH'D _____ DATE _____

BASIN D

Determine undeveloped runoff rate:

Slope ≈ 0.021 Length of Run = 450'

Area = 1.9 acres

From plate 22.2 B-1, DPM, Ground velocity = 0.85 fps

then $T_c = \frac{L}{V(60)}$ = 8.82 min. (use 10 min.)

RUNOFF 0% impervious — 0.34 = C

rainfall = 2.2 inches plate 22.2 D-2

Intensity, I = 4.65 in/hr

then pk Q = CIA = 0.34 (4.65) 1.9

pk. Q = 3 cfs

Approximately 31% of Basin D will drain to Basin A of the site. As Basin A will hold the required ponding, the controlled discharge from the pond will be increased by an amount of 1 cfs (0.31 X 3 cfs)

PROJECT NAME La Quinta Drainage SHEET ____ OF ____

PROJECT NO. Report - 4380 BY JT DATE 4.11.84

SUBJECT ____ CH'D ____ DATE ____

BASIN "E" Meadows Mobile Home Park (a portion only)

$S = 0.0225$ Area = 19 acres

$L = 2850'$ over paved surface to storm drain

from Plate 22.2 D-1, pavement velocity = 1.95 fps

calculate time of concentration, T_c

$$T_c = \frac{L}{V \times 60} = \frac{2850}{1.95(60)} = 24.3 \text{ min.}$$

Runoff volumes and flows (100-yr storm)

assume 50% impervious, then from Plate 22.2 C-1, $C = 0.57$.

from Plate 22.2 D-2, rainfall volume = 2.2"

and intensity $I = (2.2)\,6.84\,(24.3)^{-0.51}$

$= 2.95$ in/hour

and peak basin flow rate = $Q_p = CIA$

$Q_p = 0.57(2.95)\,19 = 32$ cfs

volume, $V = \frac{2.2}{12}(0.57)\,19 = 1.98$ acres-ft

$= 86250$ cf

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BASIN "F"

basin is the area excavated for the San Antonio underpass and the frontage roads north and south of San Antonio (east side of I-25)

S = 0.055 Area = 6.6 acres

L = 800' in earth V-ditch to storm drain

from Plate 22.2 B-1, max. velocity = 1.15 fps (flow runs in V-ditches & edge of pave.)

calculate time of concentration, Tc

$$T_c = \frac{L}{V(60)} = \frac{800}{1.15(60)} = 12 \text{ min.}$$

RUNOFF FLOW AND VOLUME (100 yr storm)

assume 50% impervious, C = 0.57 (from Plate 22.2 C-1)

rainfall volume (6 hrs) = 2.2"

then intensity = (6-hr V) $6.84\ t_c^{-0.51}$

$$I = 4.23 \text{ in/hr}$$

then peak discharge = CIA = Q_p

$$Q_p = 0.57\,(4.23)\,6.6$$
$$= 16 \text{ cfs}$$

volume, V = 2.2/12 (0.57) 6.6 = 0.69 acre-ft

= 30056 cf

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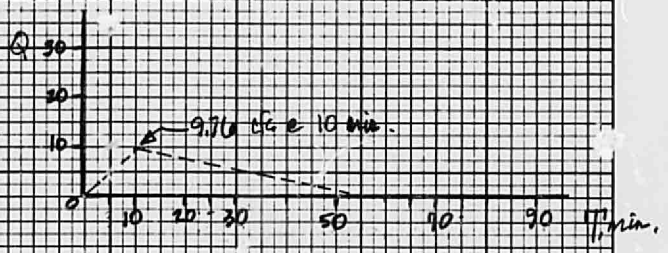
HYDROGRAPHS

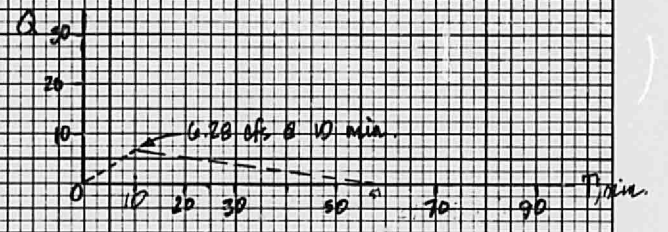
BASIN A

$T_c = 10$ min
$q_p = 9.76$ cfs
$V = 76652$ cf
$T = 2T_c = 56$ min.



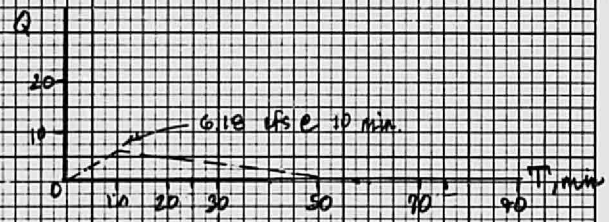
BASINS B,C

$T_c = 10$ mins
$q_p = 6.28$ cfs
$V = 70454$ cf
$T = 55$ min.



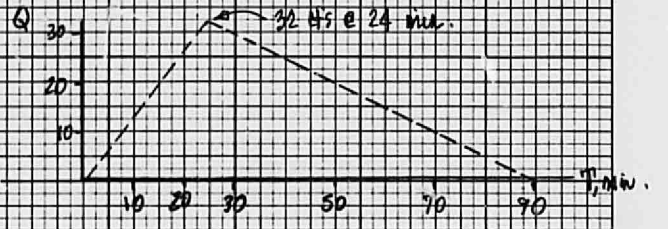
BASIN D

$T_c = 10$ min.
$q_p = 6.18$ cfs
$V = 10620$ cf
$T = 57$ min.



BASIN E

$T_c = 24$ min.
$q_p = 32$ cfs
$V = 86250$ cf
$T = 90$ min.



PROJECT NAME LA QUINTA DRAINAGE SHEET ____ OF ____
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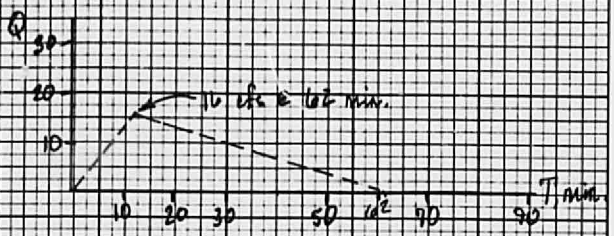
SUBJECT ____ CH'D ____ DATE ____

(cont.)

BASIN F

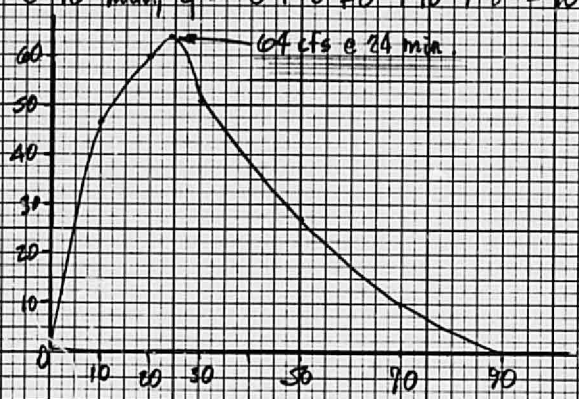
T_c = 12 min.
q_p = 16 cfs
V = 30056 cf
T = 62 min.



COMPOSITE HYDROGRAPH

coordinate determinations

@ 10 min., q = 10 + 6 + 6 + 12 + 13 = 47 cfs
@ 20 min., q = 12 + 5 + 5 + 25 + 13 = 60 cfs
@ 24 min., q = 12 + 4 + 4 + 32 + 12 = 64 cfs
@ 30 min., q = 5 + 3 + 3 + 30 + 10 = 51 cfs
@ 50 min., q = 1 + 1 + 1 + 20 + 4 = 27 cfs
@ 90 min., q = 0 + 0 + 0 + 10 + 0 = 10 cfs



PROJECT NAME LA QUINTA DRAINAGE SHEET ____ OF ____
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SUBJECT ____ CH'D ____ DATE ____

APPENDIX 2

REQUIRED PONDING DETERMINATION

Determine appropriate release rates:

1) Capacity downstream of site — 54 cfs

capacity required for La Quinta site, Basins, 6.6 acre Basin F tract, and 1.9 acre Basin D tract — 64 cfs @ T = 24 min.

64 > 54 cfs — insufficient capacity available

2) Free discharge of undeveloped sites @ T = 24 min (pk.)

a) Basin E (mobile home park) — 32 cfs

b) Basin F (vacant tract south of San Antonio) — 12 cfs

c) Basins A,BC (site) — 16 cfs

d) Basin D (vacant tract to east) — 4 cfs

TOTAL — 64 cfs

3) Determine each tract's (or basins) fair share of the storm sewer capacity:

a) Basin E — 32/64 (54 cfs) = 27.0 cfs

b) Basin F — 12/64 (54 cfs) = 10.1 cfs

c) Basins A,BC — 16/64 (54 cfs) = 13.5 cfs

d) Basin D — 4/64 (54 cfs) = 3.4 cfs

(check) TOTAL — 54 cfs (OK)

PROJECT NAME La Quinta Drainage SHEET ____ OF ____
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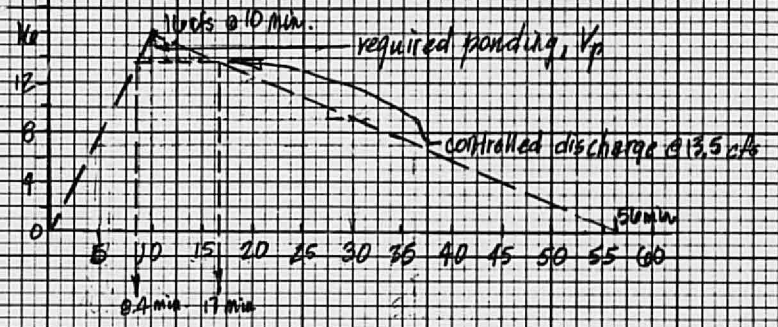
4) Determine required onsite ponding &
total site discharge = 16 cfs (Basins A, B, C)



required ponding, $V_p = \frac{1}{2}(2.5)(10-8.4)\,60 + \frac{1}{2}(2.5)(17-10)(60)$

$= 120$ c.f $+ 625$ c.f

$= 645$ cubic feet

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SUBJECT ____ CH'D ____ DATE ____

APPENDIX 3

ORIFICE PLATE FOR 24" PIPE CALCULATION

JOB # 41380

DESIGN ORIFICE PLATE FOR 24" OUTLET TO CARRY 8.2 CFS FROM LA QUINTA SITE

—ASSUME SHARP EDGED—

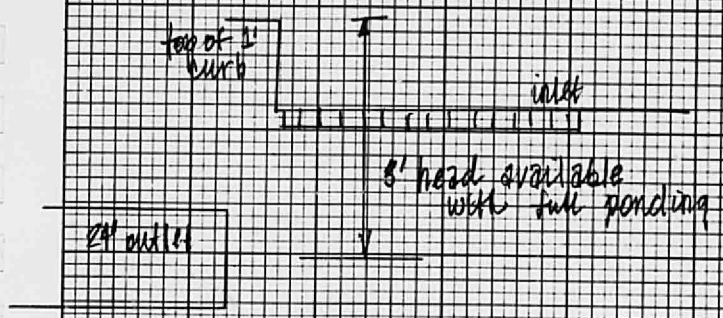
then $C_d = 0.62$ and by the orifice equation solve for required orifice,

$$Q = C_d A_0 \sqrt{2gh} \quad \text{or}$$

$$A_0 = \frac{Q}{C_d \sqrt{2gh}} = \frac{8.2 \text{ cfs}}{0.62(\sqrt{2 \cdot 32.2})3}$$

$$A_0 = 0.95 \text{ ft}^2$$

$$\text{dia. of orifice} = \sqrt{\frac{4A_0}{\pi}} = 1.10 \text{ ft.} \approx 13.2''$$



PROJECT NAME La Quinta Drainage SHEET ____ OF ____
PROJECT NO. Report #41380 BY ____ DATE ____
SUBJECT ____ CH'D ____ DATE ____

APPENDIX 4

SAN ANTONIO/I-25 UNDERPASS STORM SEWER SYSTEM