HYDROLOGY E20/D8 1 of 2 FOUR PLANS

E20/D8

4 PLANS

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

Ken Schultz
Mayor

UTILITY DEVELOPMENT DIVISION
HYDROLOGY SECTION
(505) 768-2650

January 28, 1987

Property Owner
9309 Tancan Drive, NE
Albuquerque, New Mexico 87112

To Whom It May Concern:

Our office has been contacted in reference to a drainage concern at 9309 Tancan Drive, NE. Apparently, the builder of said address has punched several holes along the common block wall between Lots 18 and 22, allowing the drainage from Lot 18 to drain into Lot 22. This condition is inconsistent with the approved grading and drainage plan filed in our office December 10, 1981. If you will note on the enclosed plan, there is a drainage easement along the common property line between Lots 21 and 22, specified for this purpose. Also enclosed is a copy of the plat showing the drainage easement and portions of the drainage report for your subdivision pertaining to lot drainage.

Please accept this letter as formal notification of the above mentioned drainage problem and a request for correction of the problem.

If you have any questions or comments concerning this matter, please feel free to call me at 764-1699.

Cordially,

Richard L. Duran

Richard L. Duran
Drainage Inspector

cc: Randy Drew

Enclosures

RLD/ds

PUBLIC WORKS DEPARTMENT

Walter Nickerson, P.E., City Engineer

ENGINEERING GROUP

Telephone (505) 768-2500

AN EQUAL OPPORTUNITY EMPLOYER

BR file

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

February 2, 1983

E20-D8

Mr. Allen Whittel
AMDEC
P.O. Box 25000
Albuquerque, N.M. 87125

RE: YOUR LETTER OF JANUARY 17, 1983-GRADING PERMITS [illegible] ON WEST AND FAIRWAYS NORTH AT TANOAN

Dear Allen:

I am forwarding a response in regards to the referenced letter:

1. This office concurs with the simultaneous grading of the two subdivisions. What is the estimated time frame for construction of the subdivision infrastructures?

2. Erosion Control Plans are required for each development. I notice that the Wimbledon West plans call for utilizing th[illegible] planting strip adjacent to the street ROW. When will this work be [illegible] From our work in Santa Fe Village II we realized the importa[illegible] t establishing mix and providing a regular watering schedu[illegible]

3. Engineer certification will be required for all retaining walls within the project boundaries.

4. Per Section 9 of the Drainage Ordinance, no building permits will be issued until the drainage improvements, including retaining walls, are constructed or financial guarantees for the improvements are provided. We will be glad to work with you in formulating a phasing plan for the site improvements.

If you have any questions, please call.

Very truly yours,

Charles M. Easterling
Princ. Asst./City Engineer

CME/BGB/tsl

CITY OF ALBUQUERQUE

ALBUQUERQUE, NEW MEXICO

INTER-OFFICE CORRESPONDENCE January 12, 1982 REF. NO._____

TO: Sergio Miranda, Design Engineer

FROM: Jim Fink, Civil Engineer/Hydrology

SUBJECT: FAIRWAYS NORTH AT TANOAN PROJECT NO. 1362

Review of the construction plans for Fairways North have resulted in the following comments:

a. Private drainage easement entirely on the lots for which they will service.

b. Details showing the intersections of the private drainage channels with the streets should be included.

c. Spot elevations and grading around erosion control devices should be shown.

d. Low spots causing ponding against private streets as in lots 26 & 27 should be eliminated.

e. An erosion control plan for arears must be included.

JF/tsl

affiliated mortgage & development company amdec

a wholly owned subsidiary of Albuquerque Federal Savings and Loan Association

6400 uptown blvd., n.e.
albuquerque, new mexico

mailing address
p. o. box 25000
albuquerque, new mexico 87125

AM-979

January 7, 1982

Mr. Stephen D. Cannon
Project Engineer
Tom Mann Assoc., Inc.
811 Dallas, NE
Albuquerque, NM 87110

RE: Individual Lot Grading Criteria for Fairways North

Dear Steve:

As per the December 14, 1981 letter from Mr. Jim Fink, of the City of Albuquerque, I have listed below the criteria that the Architectural Control Committee will use for approving the individual lot drainage concepts.

LOT GRADING CRITERIA

1. All lot grading shall conform with the approved subdivision drainage plan and drainage report.

2. No onsite ponding is required, but may be allowed in special circumstances.

3. The house pad is to be constructed to provide positive drainage away from the pad in all directions.

4. The lots shall be drained toward the street or common swale as indicated on the approved drainage plan.

5. Runoff from one lot to another will not be allowed except in private drainage easements shown on the filed subdivision plat.

6. Grassed or landscaped swales shall be sloped at a minimum of one percent (1%) in the direction of flow.

7. Yard walls are to be designed as structural retaining walls when there is a vertical grade change greater than 18".

8. Construction within drainage easements that prevents storm water conveyance will be prohibited.

Please submit these to the City Hydrology Department.

Thank you.

Sincerely,

AFFILIATED MORTGAGE AND DEVELOPMENT COMPANY

Allan L. Whitesel

Allan L. Whitesel, P.E.
Chief Engineer

ALW:dlw

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

E20 - D8a

December 14, 1981

Mr. Stephen D. Cannon
Tom Mann & Associates
811 Dallas N.E.
Albuquerque, NM 87110

RE: FAIRWAYS NORTH AT TANOAN DRAINAGE PLAN

Dear Stephen:

The referenced drainage plan is approved as shown on Figure 6 "Developed Drainage Conditions" revised 12/08/81.

Please send a copy of the construction drawing to our office for our review. Also include an outline of the criteria that the Homeowners' Association's Architectural board will use to approve the individual drainage concepts.

If you have any questions or if I can be of any further help, please call.

Sincerely,

Jim Fink
Civil Engineer/Hydrology

JF/tsl

cc: Allan L. Whitesel, AMDEC
Jean J. Bordenave, Adam, Hamlyn, Anderson

Tom Mann Associates, Inc.
Engineers
811 DALLAS, N.E. • ALBUQUERQUE • NEW MEXICO • 87110 • 505-265-5611

10491
December 9, 1981

E20-D8a

Mr. Jim Fink
Hydrology Division
City of Albuquerque
P. O. Box 1293
Albuquerque, New Mexico 87103

RECEIVED
DEC 10 1981
ENGINEERING

Re: Fairways North At Tanoan
Drainage Report Addendum

Dear Jim:

Pursuant to comments from you and matters discussed during a December 8, 1981 meeting with representatives from the Hydrology Division of the City Engineer's Office, the following revisions concerning the subject drainage report are submitted. These revisions should be considered as an addendum to the previously submitted drainage report.

If these revisions are satisfactory, I need a letter of drainage plan approval subject to your review and approval of the construction plans which will show top of curb elevations, grading details, erosion control device details and culvert construction.

If you have any questions, do not hesitate to call. Thank you for your cooperation.

Yours truly,

TOM MANN & ASSOCIATES, INC.

Stephen D. Cannon

Stephen D. Cannon
Project Engineer

SDC:bb
Enc.
xc: Allan L. Whitesel, AMDeC w/enc.
Jean J. Bordenave, Adam, Hamlyn, Anderson w/enc.

ADDENDUM TO FAIRWAYS NORTH AT TANOAN DRAINAGE REPORT

Date of Report: October, 1981

Date of Addendum: December 8, 1981

The following revisions should be made to the subject report:

EXISTING CONDITIONS: There is an existing yard wall which intercepts and confines runoff flows on the south boundary of the Golf Course Fairways. Its location is shown on revised Figure Number 4. This yard wall reduces the size and runoff of Drainage Basin '6A + 6B'. The revised flows shown on Figure 4 are Q_{100} = 14.1 cfs and Q_{10} = 5.6 cfs.

PROPOSED DRAINAGE CONDITIONS: The following revisions are shown on revised Figure Number 6:

1. Drainage Basin Number 2 was enlarged slightly and Drainage Basin Number 11 was reduced slightly in size.

2. Due to the existing yard wall, offsite Basin 'C' was reduced in size.

3. Drainage Basins 3 and 14 have been enlarged to include runoff from south of Pebble Beach Drive.

4. Yard walls will be built along the subdivision boundary as shown. The walls north of the Golf Course should confine the runoff from the Golf Course and prevent offsite flows from entering platted lots.

5. Trickle flows from Basin 13 and offsite Basin C will pass through a small culvert beneath Pebble Beach Drive flowing west to a small retention pond located in the Golf Course area. This pond will be a maximum of 6 inches deep and hold approximately 1,000 cubic feet of runoff. It will be grassed and most small flows will infiltrate. Larger flows will overflow into Pebble Beach Drive. Large flows (Q_{100} = 8.6 cfs and Q_{10} = 3.2 cfs) will not pass through the culvert, but will turn and flow westward in Pebble Beach Drive.

6. Runoff from Drainage Basin 14 is collected in Pebble Beach Drive and conveyed west. This flow (Q_{100} = 13.0 cfs) combines with flows from offsite Basin E (Q_{100} = 0.4 cfs) and Basin Number 2 (Q_{100} = 32.9 cfs) at Tanoan Drive. The combined runoff flows south as it leaves the site. The peak discharge at this point is Q_{100} = 45.0 cfs.

These flows will be directed into the Arroyo del Pino via a continuation of Tanoan Drive (currently being designed as Wimbleton West).

7. Rip rap erosion control devices shall be built along the streets at the north end of the property as shown on the plan.

8. Locations for common drainage easements are shown on the plan and will be detailed on the filed plat. A copy of the proposed plat is included with this addendum.

CONCLUSIONS AND RECOMMENDATIONS: Referring to the previously submitted report, the following items are addressed:

3. A Homeowners' Association has been developed for the project site. The Association has an architectural board which will approve drainage concepts prior to construction.

7. In the existing state, the peak discharge (100-year frequency storm) exiting the site is equal to 48.9 cfs (36.2 cfs generated onsite and 12.7 cfs generated offsite). This runoff eventually flows north and enters the North Pino System.

8. In the developed state, the peak discharge (100-year frequency storm) exiting the site and flowing toward the North Pino System is 16.4 cfs (9.4 cfs generated onsite and 7.0 cfs generated offsite).

9. In the developed state, the peak discharge (100-year frequency storm) exiting the site and flowing south toward the Pino System and detention basin is 45.0 cfs (35.1 cfs generated onsite and 9.9 cfs generated offsite).

APPENDIX 'A'
CALCULATION OF RUNOFF IN EXISTING STATE

REVISED 12/08/81 BY S. CANNON

PROJECT: FAIRWAYS NORTH AT TANDAN
PROJECT NO.: 10491

DRAINAGE BASIN: 6A + 6B
CONDITION: EXISTING

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
GOLF COURSE FAIRWAY & GREEN	B	7.20	69	51 %
PERVIOUS AREA (NATIVE CONDITION)	B	6.65	80	47 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		0.18	95	1 %
	COMPOSITE:	14.03	75	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 2440 ft.
DROP: 77 ft.
SLOPE: 3.1 %
TIME OF CONCENTRATION: 0.20 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.6 in.
RUNOFF: 0.69 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.46 cfs/ac/in
PEAK DISCHARGE (Q): 14.1 c.f.s.

VOLUME: 35,100 c.f. 0.81ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.8 in.
RUNOFF: 0.28 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.46 cfs/ac/in
PEAK DISCHARGE (Q): 5.6 c.f.s.

VOLUME: 14,000 c.f. 0.32ac.ft.

APPENDIX 'B'
CALCULATION OF RUNOFF IN DEVELOPED STATE

SUMMARY OF DRAINAGE BASIN RUNOFF, REVISED 12/08/81 BY S. CANNON

PROJECT: FAIRWAYS NORTH AT TANDAN
PROJECT NO.: 10491

DRAINAGE BASIN RUNOFF SUMMARY
CONDITION:

DESCRIPTION	AREA (ac)	Q-100 (cfs)	V-100 (cf.)	Q-10 (cfs)	V-10 (cf.)
B + 1 + 5 + 6 +2	16.75	32.9	80,700	17.4	42,700
10 + 11	0.92	1.7	4,000	0.8	2,000
13 + C	9.72	8.6	21,000	3.2	7,700
D + 14 + C + 13	12.77	13.0	32,400	5.2	13,000
D+14+C+13+B+1+5+6+2+E+3	30.25	45.0	113,500	21.5	54,300

REVISED 12/08/81 S. CANNON

PROJECT: FAIRWAYS NORTH AT TANDAN
PROJECT NO.: 10491

DRAINAGE BASIN: B + 1 + 5 + 6 +2
CONDITION: DEVELOPED

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
PERVIOUS AREA (NATIVE CONDITION)	B	10.00	80	60 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		6.75	95	40 %
	COMPOSITE:	16.75	86	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 2190 ft.
DROP: 70 ft.
SLOPE: 3.1 %
TIME OF CONCENTRATION: 0.18 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.6 in.
RUNOFF: 1.33 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.48 cfs/ac/in
PEAK DISCHARGE (Q): 32.9 c.f.s.

VOLUME: 80,700 c.f. 1.85ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.8 in.
RUNOFF: 0.70 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.43 cfs/ac/in
PEAK DISCHARGE (Q): 17.4 c.f.s.

VOLUME: 42,700 c.f. 0.98ac.ft.

REVISED 12/08/81 S. CANNON

PROJECT: FAIRWAYS NORTH AT TANOAN
PROJECT NO.: 10491

DRAINAGE BASIN: 10 + 11
CONDITION: DEVELOPED

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
PERVIOUS AREA (NATIVE CONDITION)	B	0.66	80	72 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		0.26	95	28 %
	COMPOSITE:	0.92	84	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 520 ft.
DROP: 24 ft.
SLOPE: 4.6 %
TIME OF CONCENTRATION: 0.05 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.6 in.
RUNOFF: 1.21 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 1.7 c.f.s.

VOLUME: 4,000 c.f. 0.09ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.8 in.
RUNOFF: 0.62 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 0.8 c.f.s.

VOLUME: 2,000 c.f. 0.05ac.ft.

REVISED 12/08/81 S. CANNON

PROJECT: FAIRWAYS NORTH AT TANDAN
PROJECT NO.: 10491

DRAINAGE BASIN: 13 + C
CONDITION: DEVELOPED

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
GOLF COURSE FAIRWAY & GREEN	B	7.20	69	74 %
PERVIOUS AREA (NATIVE CONDITION)	B	2.20	80	23 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		0.32	95	3 %
	COMPOSITE:	9.72	72	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 1900 ft.
DROP: 59 ft.
SLOPE: 3.1 %
TIME OF CONCENTRATION: 0.17 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.6 in.
RUNOFF: 0.60 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.50 cfs/ac/in
PEAK DISCHARGE (Q): 8.6 c.f.s.

VOLUME: 21,000 c.f. 0.48ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.8 in.
RUNOFF: 0.22 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.50 cfs/ac/in
PEAK DISCHARGE (Q): 3.2 c.f.s.

VOLUME: 7,700 c.f. 0.18ac.ft.

REVISED 12/08/81 S. CANNON

PROJECT: FAIRWAYS NORTH AT TANOAN
PROJECT NO.: 10491

DRAINAGE BASIN: D + 14 + 13 + C
CONDITION: DEVELOPED

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
GOLF COURSE GREEN & FAIRWAY	B	7.20	69	56 %
PERVIOUS AREA (NATIVE CONDITION)	B	4.71	80	37 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		0.86	95	7 %
COMPOSITE:		12.77	75	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 2440 ft.
DROP: 79 ft.
SLOPE: 3.2 %
TIME OF CONCENTRATION: 0.20 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.6 in.
RUNOFF: 0.70 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.46 cfs/ac/in
PEAK DISCHARGE (Q): 13.0 c.f.s.

VOLUME: 32,400 c.f. 0.74ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.8 in.
RUNOFF: 0.28 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.46 cfs/ac/in
PEAK DISCHARGE (Q): 5.2 c.f.s.

VOLUME: 13,000 c.f. 0.30ac.ft.

REVISED 12/08/81 S. CANNON

PROJECT: FAIRWAYS NORTH AT TANDAN
PROJECT NO.: 10491

DRAINAGE BASIN: D+14+C+13+B+1+5+6+2+E+3
CONDITION: DEVELOPED

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
GOLF COURSE FAIRWAY & GREEN	B	7.20	69	24 %
PERVIOUS AREA (NATIVE CONDITION)	B	15.06	80	50 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		7.99	95	26 %
	COMPOSITE:	30.25	81	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 2600 ft.
DROP: 80 ft.
SLOPE: 3.0 %
TIME OF CONCENTRATION: 0.21 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.6 in.
RUNOFF: 1.03 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.44 cfs/ac/in
PEAK DISCHARGE (Q): 45.0 c.f.s.

VOLUME: 113,500 c.f. 2.61ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.8 in.
RUNOFF: 0.49 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.44 cfs/ac/in
PEAK DISCHARGE (Q): 21.5 c.f.s.

VOLUME: 54,300 c.f. 1.25ac.ft.

Tom Mann Associates, Inc.
Engineers
811 DALLAS, N.E. • ALBUQUERQUE • NEW MEXICO • 87110 • 505-265-5611

E20-D8A

10491
October 28, 1981

RECEIVED
OCT 29 1981
CITY ENGINEER

Mr. Charles M. Easterling
Principal Assistant
City Engineer/Hydrology
City of Albuquerque
P. O. Box 1293
Albuquerque, New Mexico 87103

Re: Fairways North at Tanoan - Drainage Report

Dear Chuck:

Transmitted herewith are two (2) copies of the Drainage Report for the subject property. Also enclosed is a copy of the planning history of the project and a copy of the proposed Drainage Covenant.

I would appreciate your comments as soon as possible. Thank you.

Yours truly,

TOM MANN & ASSOCIATES, INC.

Stephen D. Cannon

Stephen D. Cannon
Project Engineer

SDC:bb
Encs.
xc: Allan Whitesel

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

RECEIVED
OCT 29 1981
ENGINEERING

DRAINAGE REPORT INFORMATION SHEET

PROJECT TITLE Fairways North at Tanoan

ZONE ATLAS PAGE NO. E-20, 21 CITY ADDRESS N/A

LEGAL ADDRESS (See Below)

ENGINEERING FIRM Tom Mann & Associates, Inc. CONTACT Steve Cannon

ADDRESS 811 Dallas N.E. PHONE 265-5611

OWNER Affiliated Mortgage and Development Co. CONTACT Allan Whitesel

ADDRESS P. O. Box 25000 Albuquerque, New Mexico 87125 PHONE 883-3501

ARCHITECT/SURVEYOR N/A CONTACT

ADDRESS PHONE

DATE SUBMITTED

BY Steve Cannon

LEGAL ADDRESS: A certain parcel of land situated within Projected Sections 28 & 29, T 11 N, R 4 E; N.M.P.M.; within the ELENA GALLEGOS GRANT, lying between the Fairway of the Tanoan Golf Course & 2 PSC Transmission Line Easement.

RECEIVED DC 26

DRAINAGE COVENANT

OCT 29 1981

ENGINEERING

THIS COVENANT made this _____ day of _____, 1981, by and between the City of Albuquerque, a municipal corporation, (City) and Affiliated Mortgage and Development Company (Owner, which term includes successors and assigns.)

RECITAL

The Owner is owner of certain real property located at Tanoan in Albuquerque, New Mexico, (the Property) and more particularly described as follows:

Fairways North at Tanoan.

That pursuant to City ordinances, regulations, and other applicable laws, the Owner is required to install and/or maintain certain drainage facilities on the Property, and the parties wish to provide for an agreement as to the obligations and responsibilities for same.

DESCRIPTION OF FACILITIES

The following facilities are to be constructed and/or maintained by the owner:

Those shown on the approved plan.

CONSTRUCTION OF DRAINAGE FACILITIES

The Owner shall construct the drainage facilities in accordance with standards, plans, and specifications prescribed and approved by the City.

MAINTENANCE OF FACILITIES

The Owner shall, at his cost in accordance with the standards, plans, and specifications prescribed by the City, maintain said drainage facility. The City shall have the right to enter periodically upon the Property to inspect the drainage facility.

FAILURE TO COMPLY AND LIEN

In the event that the Owner shall fail to construct the drainage facility in accordance with standards, plans, and specifications prescribed and approved by the City or fail to adequately maintain said facilities, the City shall give the Owner notice in writing to construct, correct, or maintain said

facilities, and if the Owner fails to comply erewith within 30 days, the City may enter upon said property to perform the necessary construction or maintenance. The cost of the City's performing such construction or maintenance shall be paid by the Owner. In the event the Owner fails to pay said cost within thirty (30) days after being billed for same, the City may file a lien against the Property.

LIABILITY

The City shall not be liable for any damages to the Owner resulting from its construction, modification, or maintenance of said facilities.

NOTICE

The written notice provided for herein shall be accomplished by mailing same to:

AMDeC
P. O. Box 25000
Albuquerque, New Mexico 87125

The Owner may change said address by giving written notice, certified mail, return receipt requested, to the City Engineer, City Hall, at 505 Marquette Street, Albuquerque, New Mexico, 87103.

INDEMNIFICATION AND HOLD HARMLESS

The Owner agrees to defend, indemnify, and hold harmless, the City, its officials, agents and employees from and against any and all claims, actions, suits, or proceedings of any kind brought against said parties for or on account of any matter arising from the drainage facility provided for herein or the Owner's failure to construct, maintain, or modify the drainage facility under this Covenant.

COVENANT RUNNING WITH THE PROPERTY

The obligation of the Owner set forth herein shall be binding upon the Owner, his heirs, and assigns, and the property of the Owner as described herein and will run with said property until released by the City.

OWNER

By: _____

Title: _____

REVIEWED BY THE LEGAL DEPARTMENT:

_____
Assistant City Attorney

CITY OF ALBUQUERQUE

_____
Chief Administrative Officer

REVIEWED BY THE PRINCIPAL ASST. CITY ENGINEER - HYDROLOGY

_____
Charles M. Easterling

ACKNOWLEDGEMENTS

STATE OF NEW MEXICO)
) ss.
COUNTY OF BERNALILLO)

The foregoing instrument was acknowledged before me this _____day of _____, 1981, by _____, _____
(Name of Officer) (Title)
_____, a _____
(Name of Corporation) (State of Incorporation)
corporation, on behalf of said corporation.

_____
Notary Public

My Commission Expires:
_____

STATE OF NEW MEXICO)
) ss.
COUNTY OF BERNALILLO)

The foregoing instrument was acknowledged before me this _____day of _____, 1981, by _____
(Name of Acknowledging Partner or Partners)
on behalf of _____,
(Name of Partnership)
a partnership.

_____
Notary Public

My Commission Expires:
_____

STATE OF NEW MEXICO)
) ss.
COUNTY OF BERNALILLO)

The foregoing instrument was acknowledged before me by _____, on this _____day of _____, 1981.

_____
Notary Public

My Commission Expires:
_____

STATE OF NEW MEXICO)
) ss.
COUNTY OF BERNALILLO)

The foregoing instrument was acknowledged before me this _____day of _____, 1981, by _____ Chief Administrative Officer of the City of Albuquerque, municipal corporation, on behalf of said corporation.

_____
Notary Public

My Commission Expires:
_____

July 14, 1980

RECEIVED
JUL 15 1980
CITY ENGINEER

Mr. Fred Aguirre
City Engineering
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

Re: Fairway Estates, Unit 2 - Revised Drainage Management Plan

Dear Mr. Aguirre:

I am writing in response to your letter of 7/8/80 and our subsequent telephone conversation of this morning. Your item number two will be addressed in three parts:

1) It is my understanding that the Traffic Engineer will not permit construction of the street at point 11 as a temporary dead end. This street must provide continuous access through to Village Greens West as a contingency of subdivision approval. This will ensure drainage conveyance through to the Pino Arroyo. At the Pino Arroyo AMAFCA has dictated the conditions for release of flows and AMDeC is complying with those dictates.

2) All drainage surfaces in sub areas 9 & 11 will ultimately be turf. Should the installation of the turf not be concurrent with the street construction we will include a temporary desilting basin at point 11 in our construction plans.

3) I believe the potential effects of grading on the properties north and west are covered in the report under heading "f". These effects being largely the result of runoff from individual landscaped lots sheeting to the north and west are considered minimal and substantially less than what is occuring naturally.

I hope this addresses your questions adequately. Please call if there is anything else we can furnish.

Sincerely yours,

Kent M. Whitman

Kent M. Whitman, P.E.

cc: Allen Whitesel

KMW/lds

SURVEYING
ENGINEERING
LAND PLANNING

P.O. Box 1328
Corrales, New Mexico 87048
(505) 897-6000

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

July 8, 1980

Mr. Kent Whitman
Community Science Corp.
P.O. Box 1328
Corrales, New Mexico 87048

Reference: Fairway Estates Unit 2

Dear Mr. Whitman:

The drainage report for Fairway Estates Unit 2 is conceptually compatible with City and AMAFCA requirements. Final approval will be withheld however, until the following items are addressed:

1. An approved plat must be submitted. This plat should contain all necessary easements. See comment Number 2 on letter dated September 20, 1979, from Bruno Conegliano to you, where applicable.

2. An interim drainage plan, covering the period up to completion of all downstream drainage facilities, must be submitted. This should contain a grading plan with pad elevations and include provisions for a detention and desilting basin in sub area 11. Any effect on surrounding properties, notably to the north and west, due to grade changes should be discussed in full.

If you have any questions on the above, please feel free to contact me.

Very truly yours,

Fred J. Aguirre

Fred J. Aguirre
Civil Engineer

FJA/lc
xc: Richard Leonard, AMAFCA
Drainage File

RICHARD E. LEONARD
EXECUTIVE ENGINEER

B. H. SWINBURNE, CHAIRMAN
WILLIAM V. HEREFORD, VICE-CHAIRMAN
FRANCES McCOY, SECRETARY-TREASURER
VERNON DOAK, DIRECTOR
KLESTON LAWS, DIRECTOR

Albuquerque Metropolitan Arroyo Flood Control Authority

2600 PROSPECT AVE. N.E.
P. O. BOX 25851 - ALBUQUERQUE, N. M. 87125
TELEPHONE 344-3516

Oct 3, RCC
~~September 24~~, 1979

RECEIVED
OCT 0 4 1979
CITY ENGINEER

Mr. Kent M. Whitman
Community Sciences Corporation
P.O. Box 1328
Corrales, NM 87048

Dear Kent:

Reference: a. Our meeting of September 18, 1979, concerning Fairway Estates Unit 2.

b. Your recent letter to Ms. Sweenhart, same subject.

AMAFCA requires no on-site detention beyond the requirements specified by the City.

Sincerely,

Richard E. Leonard

Richard E. Leonard
Executive Engineer

ic
cc: R. Heller
B. Conegliano ✓
J. Smith, AMDEC
S. Sweenhart, AMDEC

community sciences corporation

P.O. Box 1328
Corrales, New Mexico 87048
(505) 897-0000

RECEIVED
OCT 01 1979
CITY ENGINEER

Ms. Sheilah Sweenhart
AMDEC
6400 Uptown Blvd., NE
Albuquerque, NM 87110

Re: Fairway Estates North - Drainage Plan Review

Dear Sheilah:

We met with Dick Heller and Bruno Conegliano on 9-17 to discuss the Drainage Management Plan for Fairway Estates North. Their comments regarding our plan were as follows:

1) Street flows discharging into the PNM easement along the north boundary will require 10 year retention ponds to prevent nuisance to the Albuquerque Acres land owners.

2) A drainage easement will be required across the PNM easement to the west where we will be discharging from culverts beneath Ventura into the PNM easement and ultimately into the City Park/Drainage easement provided for the N. Pino.

3) All on site swales draining more than one lot will require lot line drainage easements and these should be private.

4) The acceptability of free discharge into the N. Pino Basin is a policy decision which must be made by Amafca.

Accordingly we met with Rich Leonard on 9-18 to discuss the plan with him. His inclination was to allow the free discharge approach provided Fairways North/Presley @Tanoan will be the only subdivisions using this approach. Rich indicated he would like to discuss the proposal with Jim Smith prior to making a final decision, and he said the decision would be forthcoming in approximately 1 week.

We will contact Rich again in a week if we do not hear from him within that time period.

Sincerely yours,

Kent M. Whitman

Kent M. Whitman, P.E.

cc: Jim Smith
Rich Leonard, Amafca
Dick Heller, City Engineer
Bruno Conegliano, City Hydrologist

SURVEYING
ENGINEERING
LAND PLANNING

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

September 20, 1979

Mr. Kent Whitman
Community Sciences Corporation
P. O. Box 1328
Corrales, New Mexico 87048

SUBJECT: DRAINAGE REPORT FOR FAIRWAY ESTATES SUBDIVISION UNIT 2 AND PRESLEY HOMES SUBDIVISION TANOAN

Dear Mr. Whitman:

Following a review of the drainage plan in our offices regarding the referenced subdivisions, the following comments are made:

1. The drainage report indicates that no control of the run-off will be exercised either in terms of retention or detention. This approach is not consistent with the AMAFCA Policy Resolution nor with the conditions of the existing drainage facilities west of the subdivision.

2. No plat has been submitted indicating the exact boundary of the two properties object of this study. It is my assumption that the property line along the north boundary line coincides with the south boundary line of San Antonio Road and that the PNM easement is part of this property. If this is the case, drainage easements will have to be dedicated over the swale north of sub-area 7 and 8. Similarly, a right-of-way must be dedicated over the natural water courses collecting the flows from sub-areas 13, 14 and 15 and over the ponding areas which will be provided to detain the ten-year flows emanating from drainage areas just mentioned. Also, public drainage easements must be reserved over the swales indicated in sub-areas 10 and 11. Some of these drainage easements (i.e., proposed swale in sub-area 11) may be temporary in nature and may revert to the owner if and when a change in land use will occur. All these swales must be designed and constructed for non-erosive flow conditions and either gravel or grass protection needs to be supplied to prevent and minimize sediment mobilization.

3. Wherever swales are indicated inside and within blocks of lots, private drainage easements must be dedicated and adequate means to prevent mobilization of sediment and the deposition of it

on private or public streets must be prevented. There appears to be a conflict between street drainage and lot drainage in sub-area 12.

4. A detention and desilting area must be supplied for sub-area 11 upstream of the inlet and must be maintained by the developer until a change in land use occurs.

5. An overall inflow and outflow hydrograph for the pond at the northwest corner of the property must be supplied, an easement must be secured west of Ventura Road from the west property line of Ventura to the North Pino Arroyo, and a channel developed to carry the flow from the arroyo. In all cases where a swale covered by drainage easement is indicated, plan, profile and cross-sections of the facilities will have to be supplied to this office. Please note that at all locations where riprap is indicated, filter cloth must be supplied under the riprap.

If you have any questions on the above, please don't hesitate to contact my office.

Very truly yours,

Bruno Conegliano
Asst. City Engineer - Hydrology

BC:bm
CC: R. E. Leonard, AMAFCA
R. S. Heller
Drainage File

NOTES ON MEETING

September 17, 1979

TANOAN DEVELOPMENT

Dick Heller, Bruno Conegliano, Kent Whitman, Carl Depue attending.

Bruno: In my file is an easement. This agreement at one time put in the provision of the channel to drain the first part of Cherry Hills. I don't know if there was even executed or became part of the agreement. This was an easement for the first part. The second part is graded but nothing has happened. There is no easement on hand for the second channel. When Cherry Hills came into being, the idea was to construct a channel to take the water across Academy here into the arroyo.

Kent: All the water from Cherry Hills was to be diverted in that direction.

Bruno: There is supposed to be a channel along Ventura and drain into here. Temporary facilities until Southern has improved. There is no facility in existence. No way for the water to go.

Kent: Our analysis shows that this water really should be going down north pino here.

Carl: We have an inlet here that brings water.

Bruno: Have a similar problem. Piece of land immediately north of subdivision, proposed to cross this land with drainage facility. No easement, don't know who it belongs to. Never had an easement.

Dick: Can't we run it in the street?

Bruno: Are you propsoing to put easements along property where you have the swales?

Kent: They are designed with blanket easements; all property easements have ten foot area.

Bruno: Is Presley going to go private streets? Where is the boundary of the subdivision? Street ownership makes substantial difference.

We can't have something dumping and accumulating in the Public Service Company easement. I think we have to have an easement to collect this water and handle it.

A storm drain is needed to protect the street.

Some type of continuous drainage easement and, if here is where San Antonio Road is, need channel outside easement of San Antonio Road.

Kent: The easement is no problem. The drainage facility we are talking about is compatible with PNM easement. We can make this strip a drainage easement.

Kent: I agree it will erode more frequently, but these lots will be highly landscaped.

Bruno: If we provide, we will have to come back at a later date with some remedial action.

Kent: Maybe the best thing to do is what we originally had in mind - ponds.

How about if we put in ponds here that have, for example, 5 or 10 year ponding capacity? That is effectively going to cut that off completely.

Bruno: I feel we still should have continuity so that water will be able to move.

Kent: We're putting in a facility that will virtually eliminate it for all small storms.

Bruno: I think you have to have a channel in this location.

Kent: For small storms put in intermediate size ponding basins.

You're concerned about getting easement across PNM easement to the channel. Drainage easement comes down to park area.

Bruno: There has been a problem in getting easements. Talk to Dwayne.

Carl: Problem is because water erodes the street. The area where park is is not paved.

Bruno: If you want to dump in here, there has got to be an easement.

Kent: Presley has seen this plan and given it his blessing. We propose to desilt it to a certain point.

Bruno: Water should be essentially clear and swales grassed. We don't want an eyesore. Either the builder or the developer puts in grass. Six CFS is good amount of water. There should be some recognizable facility. It will have to be able to carry 6 CFS.

Some treatment indicated at the undeveloped land boundary. What is the boundary of the subdivision Presley is siding and where is the easement going to come from?

Kent: All that there is now is a bladed swale to keep water from going onto lots. Need a separate easement when it's decided what to do with it.

As I understand, we need to make small ponds, ten-year ponds, at three locations. Here then we have to get an easement across PNM.

Bruno: I'm very concerned about North Pino arroyo crossing Wyoming. There is no protective channel. Concrete lined on one side and nothing on the other. Severe potential of erosion. Can't go with unrestrained flow. I'm concerned that these lots do not have protection.

Kent: Amdec only owes the downstream development.

Dick: Rich Leonard feels that AMAFCA owes them something in cooperation because of facility put there. He's emphatic about not dumping.

Dick: If this is all private easements here to here, he has to show what will be discharged into streets. Make it all private easements and that solves the problem.

Bruno: But we want clean water coming into the street. Make it clearly stipulated for private easements.

Kent: Lawyers say we can't do that. But we'll see what we can do.

RECEIVED

OCT 29 1981

ENGINEERING

DRAINAGE REPORT for FAIRWAYS NORTH AT TANOAN

JOB NO. 1-049

Tom Mann Associates, Inc.

811 DALLAS, N.E. · ALBUQUERQUE · NEW MEXICO · 87110

ENGINEERS

DRAINAGE REPORT

FOR

FAIRWAYS NORTH AT TANOAN

OCTOBER, 1981

RECEIVED
OCT 29 1981
CITY ENGINEER

PREPARED FOR: AFFILIATED MORTGAGE AND DEVELOPMENT COMPANY
P. O. BOX 25000
ALBUQUERQUE, NEW MEXICO 87125

PREPARED BY: TOM MANN & ASSOCIATES, INC.
811 DALLAS N.E.
ALBUQUERQUE, NEW MEXICO 87110
(505) 265-5611

REGISTERED PROFESSIONAL ENGINEER
STATE OF
THOMAS T.
MANN, JR.
3792
NEW MEXICO
AND LAND SURVEYOR

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

DRAINAGE REPORT INFORMATION SHEET

PROJECT TITLE Fairways North at Tanoan

ZONE ATLAS PAGE NO. E-20, 21 CITY ADDRESS N/A

LEGAL ADDRESS (See Below)

ENGINEERING FIRM Tom Mann & Associates, Inc. CONTACT Steve Cannon

ADDRESS 811 Dallas N.E. PHONE 265-5611

OWNER Affiliated Mortgage and Development Co. CONTACT Allan Whitesel

ADDRESS P. O. Box 25000 Albuquerque, New Mexico 87125 PHONE 883-3501

ARCHITECT/SURVEYOR N/A CONTACT

ADDRESS PHONE

DATE SUBMITTED

BY Steve Cannon

LEGAL ADDRESS: A certain parcel of land situated within Projected Sections 28 & 29, T 11 N, R 4 E; N.M.P.M.; within the ELENA GALLEGOS GRANT, lying between the Fairway of the Tanoan Golf Course & a PNM Transmission Line Easement.

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INTRODUCTION

This report presents a drainage management plan for the development of Fairways North at Tanoan. Two previous drainage plans prepared by Community Sciences Corporation have been submitted on the subject property; "Fairways Estates Subdivision & Presley Homes Subdivision at Tanoan" was prepared in August, 1979, and "Fairways Estates Unit 2 Drainage Management Plan (Revised)" was prepared in June 1980. The second drainage report received conceptual approval from the City Hydrologist on July 8, 1980.

AMDeC has revised their plans for the development of the subject property since that time. This report presents a drainage plan for the revised concept. AMDeC is currently planning the development of the adjacent property to the west. (Design by Adam, Hamlyn & Anderson.)

PURPOSE AND SCOPE

The purpose of this drainage report is to establish the criteria for controlling runoff resulting from a development in a manner that is acceptable to the City of Albuquerque and to the Albuquerque Metropolitan Arroyo Flood Control Authority.

This plan determines the runoff resulting from a 100-year frequency storm falling on the site under existing and developed conditions.

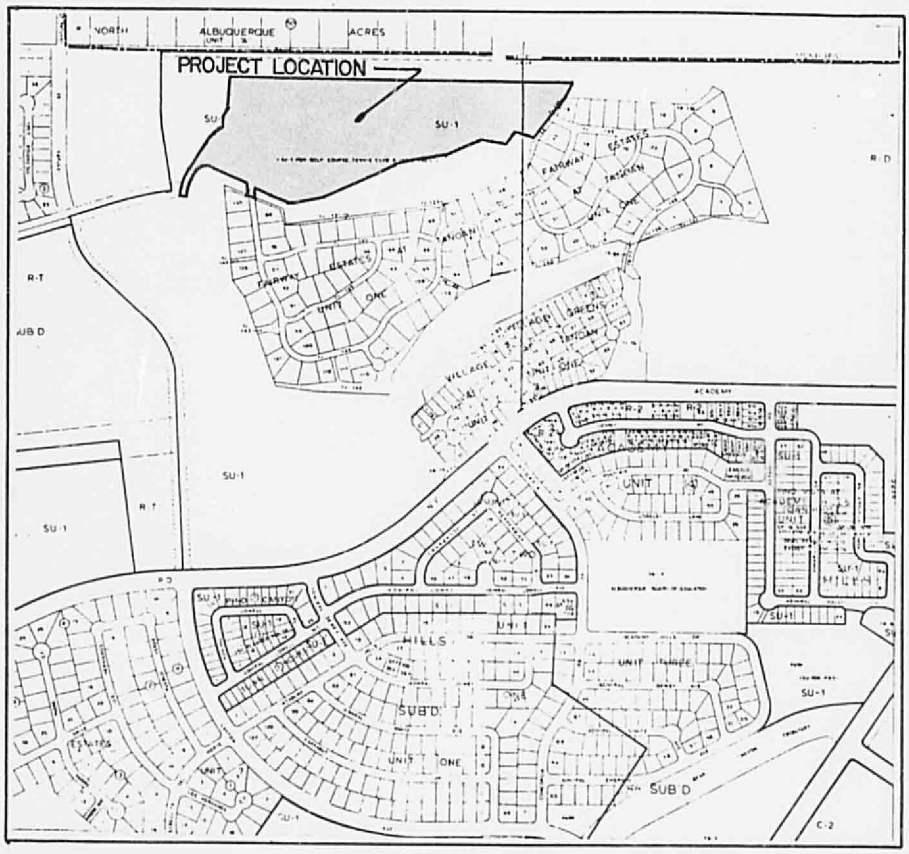
The scope of this plan is to ensure that the proposed project will be protected from storm runoff and that the development will not increase the flooding potential of adjacent properties.

LOCATION AND DESCRIPTION

Fairways North at Tanoan is located in the Northeast Heights, south of San Antonio Road and east of Ventura Street (see Figure 1). The site is situated within Sections 28 & 29, Township 11 North, Range 4 East, N.M.P.M., within the Elena Gallegos Grant, lying between the Fairway of the Tanoan Golf Course and a Public Service Company of New Mexico Transmission Line Easement.

? ~~70~~ 67

The parcel is 24.9 acres in size and will be developed as seven single family lots. Custom homes will be designed on lots which are approximately 0.25 acre and up in size. All streets will be private.



VICINITY MAP

SCALE: 1" = 800'

E-20-21-Z

FIGURE 1

DESIGN CRITERIA

Storm runoff for the site was determined by the Soil Conservation Service (SCS) Curve Number approach for a small watershed (less than 2,000 acres). This approach determines the peak discharge and associated volume of runoff for a given frequency storm falling within the study area. The following criteria was used to determine peak discharge.

Watershed Curve Numbers: The runoff curve numbers for various watershed conditions are listed in Plate 1. Using these values, a composite curve number (C_n) can be computed for an entire watershed.

Time of Concentration: The time of concentration (T_c) is the time it takes for runoff to travel from the hydraulically most distant part of the watershed area to the point of reference. Times of Concentration were estimated upon the Kirpich Equation where:

$$Tc = (0.00013) * (L^{0.77}) / (s^{0.385})$$

Rainfall: Based upon the 1973, NOAA ATLAS 2, VOLUME N, the 100-year, 6-hour precipitation = 2.6", the 10-year, 6-hour precipitation = 1.8".

Direct Runoff: The SCS runoff equation is used to determine Runoff:

$$Q = (P-(0.2 * S))^2 / (P+(0.8 * S))$$

$$Cn = 1000 / (10 + S)$$

Where Q = accumulated volume of runoff in inches depth over the drainage area.

P = accumulated rainfall in inches depth over the drainage area.

S = Potential maximum retention of water by the soil in equivalent inches depth over the drainage area.

C_n = Watershed Curve Number.

Distribution Curve: The distribution curve (DC) is based on the percent of one hour versus 24 hours precipitation and is dependent upon the location of the drainage basin. Based upon Exhibit 2-3 of the SCS Peak Rates of Discharge for Small Watersheds, DC = 70.

Peak Discharge: The peak discharge is obtained from Plate II which plots the cfs/ac/inch of runoff versus Tc for select distribution curves. This is then multiplied by the drainage area in acres and the direct runoff in inches to obtain peak discharge in cfs.

Volume of Runoff: The volume of runoff from a watershed is expressed as the direct runoff in inches multiplied by the watershed area.

Proposed conveyance swales and street sections were designed based upon the Manning Equation for uniform flow, where:

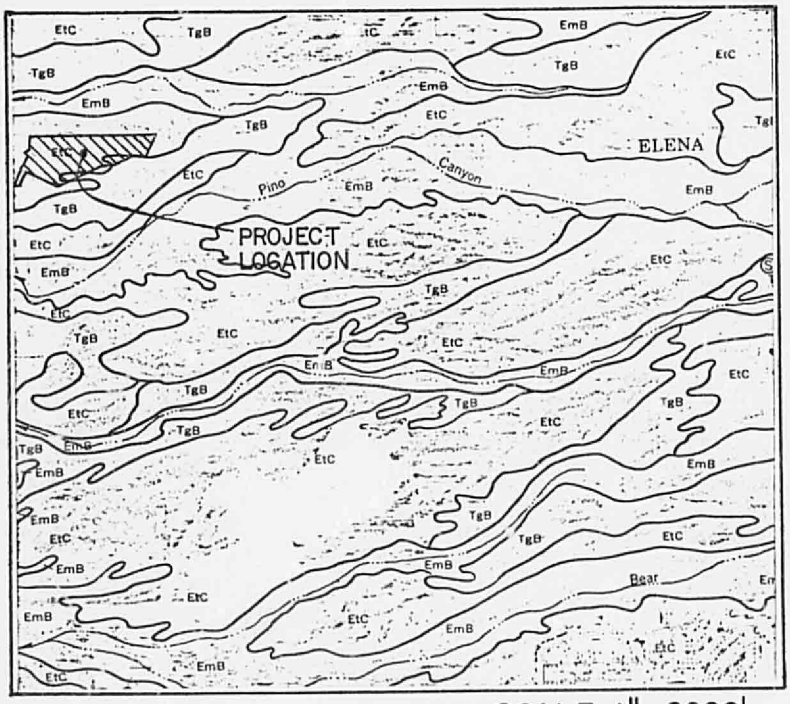
$$Q = (1.486 / n) * A * (R^{2/3}) * (s^{1/2})$$

EXISTING DRAINAGE CONDITIONS

The site is bounded on the north by a 150 foot wide P.N.M. easement. This easement is used for an overhead Transmission Line, but otherwise remains in its native condition. Fairways Estates Unit 1 lies to the east and is partially developed. (Streets have been constructed, but lots are not yet built out.) A Tanoan Golf Course fairway is adjacent to the south boundary, and the land to the west lies undeveloped. Plans for the development of the land to the west are currently underway.

From the SCS Soils Map, shown in Figure 2, it can be seen that the majority of the soil on site is composed of Embudo - Tijeras Complex (ETC), with some evidence of Tijeras Gravely Fine Sandy Loam (TGB). These are mostly alluvial sands and silts with decomposed granite as the major soil constituent. The native vegetation covers approximately 15 percent of the soil surface and is principally mesa drop seed, black grama and some cholla cactus. The land slopes from east to west at approximately 4 percent and the erosion hazard is moderate. Runoff is medium and is classified under hydrological soil group 'B'.

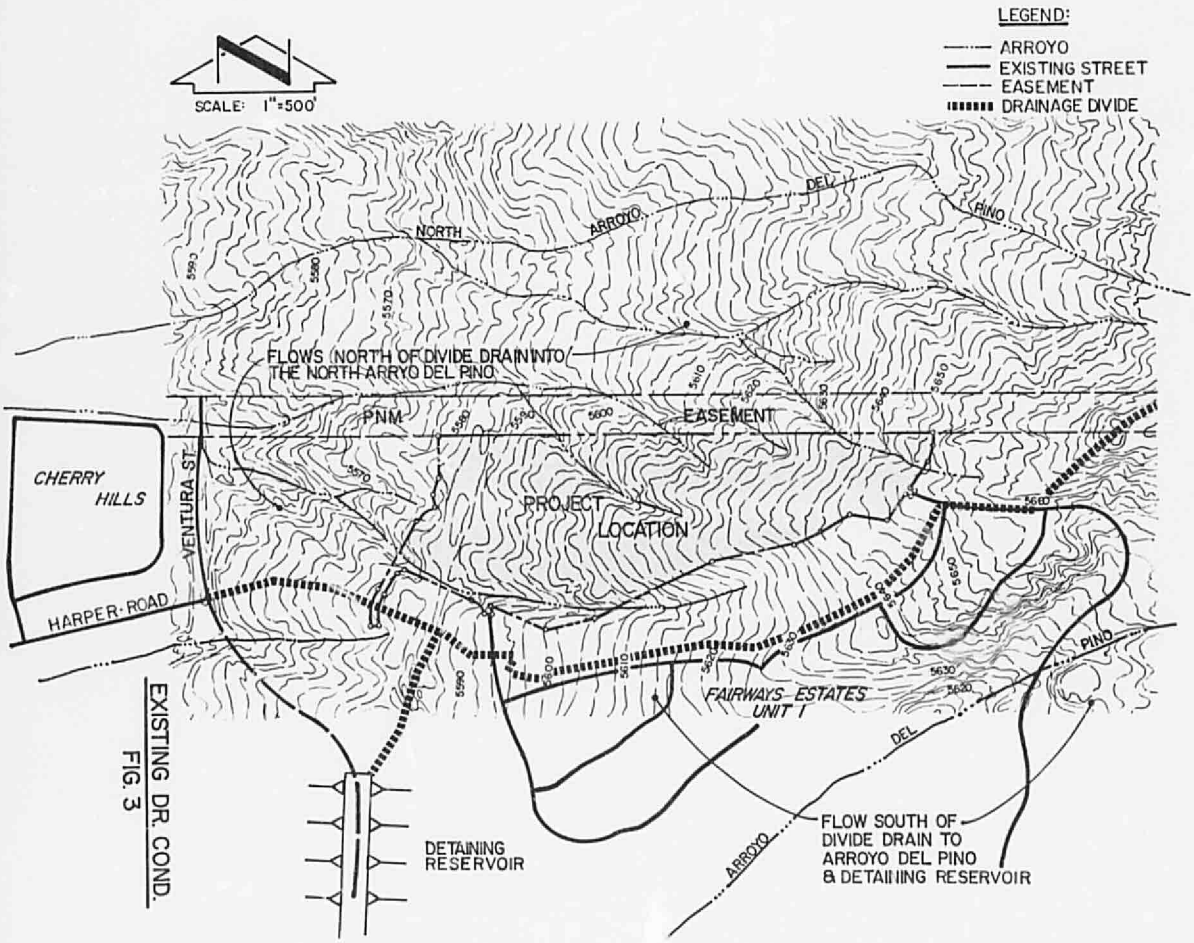
The existing drainage conditions are shown superimposed on the Albuquerque City Topo Map shown in Figure 3. Runoff from the site is collected in a series of small arroyos that run north and west, eventually emptying into the North Arroyo del Pino. The majority of Fairways Unit 1 drains south to the Arroyo del Pino and the associated detention reservoir. The ridge dividing the two flows is shown in Figure 3.



SCALE: 1" = 2000'

BERNALILLO COUNTY SCS SOILS MAP SHEET 22 OF 66

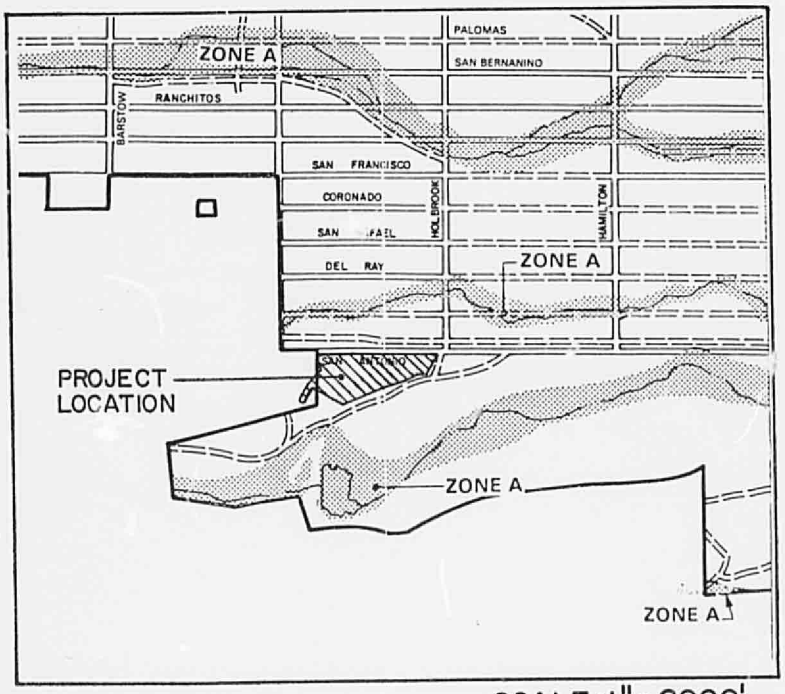
FIGURE 2



EXISTING DR. COND.
FIG. 3

Existing Drainage Basins affecting the site are shown in Figure 4 (located inside the back cover). Offsite Basins 1A and 1B contribute concentrated flows onto the site from the east. Storm flows enter the site via a drainage swale within Basin 1A and via a paved street in Basin 1B. Both flows combine onsite and flow northwesterly across the northeast corner of the site. Basins 2, 3, 4 and 5 originate onsite and flow northwesterly across the site. Onsite flows (6A) combine with runoff from Unit 1 and the existing golf course (6B) to produce a combined flow at the west end of the site. Peak discharges from the 100-year and 10-year frequency storms are shown in Figure 4. Onsite Basins 1C, 2, 3, 4, 5 and 6A generate a total of 36.2 cfs during the 100-year frequency storm. These flows all travel north and west to the North Pino del Arroyo.

The Flood Hazard Map for the site is shown in Figure 5. It can be seen from the map that the project site does not lie within a flood hazard zone or a flood plain. In addition, there are no existing drainage easements on the site.



SCALE: 1" = 2000'

BERNALILLO COUNTY FLOOD HAZARD MAP – SHEET 4 OF 15

FIGURE 5

PROPOSED DRAINAGE CONDITIONS

The proposed drainage scheme is shown in Figure 6 which can be found inside the back cover. The plan shows (1) proposed streets and lots, (2) proposed drainage basins, (3) existing contours at 1'-0" intervals, (4) direction and slope of proposed storm flows in the streets, (5) proposed drainage swales and (6) peak discharges for the 100-year and 10-year frequency storms at select points.

The intent of the subdivision is to provide single family lots for custom home construction. The development concept is to keep the site as natural as possible, providing grading only for street and common drainage swale construction. This will minimize erosion hazard and dust problems over the build-out period. The lots will be custom graded by the lot owner at the time of the house construction. Further duscussion of these improvements will be presented below:

Lot Grading:

Lots will not be graded (except as necessary for street construction) by the developer at this time. The individual owner will grade the lot at the time of house construction. No ponding will be required; however, the lot must be graded in such a manner as to provide positive drainage away from the house pad and toward the street or rear yard swale. Swales are to be constructed where necessary on the lot to prevent runoff from one lot onto another.

Street Improvements:

The streets proposed for the subdivision are to be private ways and dedicated as drainage easements. The various cross sections are shown in Appendix C. Streets will be constructed with mountable roll-type curb except where a standard curb and gutter is necessary to convey the storm flows.

Drainage Swales:

Swales will be used at various locations to convey storm water. Lot swales draining more than one lot will be dedicated as private drainage easements and designed to carry the storm flows generated by the 100-year frequency storm.

The drainage concept is to provide no onsite ponding. The majority of runoff from the lots is to be collected via lot swales and streets and conveyed south toward the Arroyo del Pino and the detention basin. Lots north of Tanoan Drive will drain north. Several small arroyo systems within the PNM easement will collect the runoff and convey it into the North Pino System.

The site has been divided into several drainage basins for quantitative analysis. The following assumptions were used to determine flows generated by future lot development:

1. Impervious area created by roofs and patios will average approximately 2,500 square feet per lot.
2. Impervious area created by driveways will average approximately 400 square feet per lot.
3. The remaining pervious area on each lot will be developed in such a manner as to not increase the runoff potential beyond what it was in the native condition.

4. Direction of storm flows on each lot was based on existing topography and represents the most convenient way to develop each lot (see Figure 6).

Storm flows from Offsite Basin 'A' will be conveyed north across Tracts 147 and 148 via Drainage Swale No. 1 (See Appendix D), discharging into the PNM easement (Q_{100} = 7.6 cfs). A flared end section at the north end for erosion control is necessary.

Runoff from Offsite Basin 'B' and Basin No. 1 is collected in Tanoan Drive and conveyed west. Drainage Swale No. 2 located at the rear of Lots 41 through 49 collects runoff from Basin No. 6 and empties into Street 'A', which also collects flows from Basin No. 5. The combined flow discharges into Tanoan Drive and turns to flow west. At this point Q_{100} in Tanoan Drive = 18.9 cfs and Q_{100} in Street 'A' = 9.7 cfs.

Runoff from Offsite Basin 'D' and Basin 14 is collected at Pebble Beach Drive and conveyed west. This flow (Q_{100} = 4.2 cfs) combines with flows from Offsite Basin 'E' (Q_{100} = 0.4 cfs) and Basin No. 2 (Q_{100} = 31.5 cfs) at Tanoan Drive. The combined runoff flows south as it leaves the site. The peak discharge at this point, Q_{100}, is equal to 35.6 cfs. These flows will be directed into the Arroyo del Pino via continuation of Tanoan Drive (currently being designed by Adam, Hamlyn & Anderson).

Flows from Basin 13 and Offsite Basin 'C' will pass through a culvert beneath Pebble Beach Drive (Q_{100} = 16.[illegible] cfs) flowing west and then south through the golf course fairway.

Drainage Basin No. 8 discharges over a broad boundary to the north (Q_{100} = 3.6 cfs). Street 'C' collects runoff from Basin No. 9 and discharges to the north (Q_{100} = 3.3 cfs). A drainage swale collects flows from Basin No. 10 and discharges the flows into Street 'B' which also collects flows from Basin No. 11. The combined flow discharges to the north (Q_{100} = 3.4 cfs). Since the flows are concentrated as they leave both streets, a wire enclosed rip-rap apron (15' x 50' x 20") for erosion control should be constructed at the end of both streets. Basin No. 12 freely discharges to the north (Q_{100} = 0.2 cfs). All flows going north will flow into several small arroyo systems within the PNM easement which conveys the flows into the North Pino System.

Street storm flow capacity calculations are shown in Appendix C. Because of design slopes, standard curb and gutter should be used on Tanoan Drive from the southwest corner of the intersection with Street 'A' and on the first 350 feet of Street 'A'. Mountable roll-type curb and gutter is acceptable other places.

Drainage swale and culvert capacity are calculated in Appendix D.

CONCLUSIONS AND RECOMMENDATIONS

1. Previous drainage reports indicated that free discharge with the majority of runoff directed into the Pino Basin System would not significantly increase runoff rates in that basin. The Executive Engineer of AMAFCA has indicated that free discharge into the North Pino Basin is acceptable for this subdivision; therefore, the drainage plan presented in this report complies with the 1972 AMAFCA Resolution and City of Albuquerque Drainage Policy without requiring onsite ponding.
2. The developer shall construct streets and lot swales draining more than one lot as shown in Figure 6.
3. The individual lot owners shall grade each lot according to the following criteria:
   a. Construct the house pad to provide positive drainage away from the pad in all directions.
   b. Grading shall provide positive drainage toward the street or common drainage swale.
   c. Swales are to be constructed where necessary on the lot to prevent runoff from one lot to another.
   d. No ponding onsite is required.
4. All private ways (streets) and common swales shall be dedicated as drainage easements. No construction within the easement which blocks storm flows shall be allowed.
5. Street sections shall be constructed as shown in this report.
6. Swale sections and culverts shall be constructed as shown in this report.

7. In the existing state, the peak discharge (100-year frequency storm) exiting the site is equal to 58.7 cfs (36.2 cfs generated onsite and 22.5 cfs generated offsite). This runoff eventually flows north and enters the North Pino System.

8. In the developed state, the peak discharge (100-year frequency storm) exiting the site and flowing toward the North Pino System is 18.1 cfs (11.1 cfs generated onsite and 7.0 cfs generated off-site).

9. In the developed state, the peak discharge (100-year frequency storm) exiting the site and flowing south toward the Pino System and detention basin is 52.4 cfs (35.1 cfs generated onsite and 17.3 cfs generated offsite).

10. The rate of runoff discharged into the North Pino System has been decreased when compared to the existing state, and therefore, no further retention is necessary.

11. Erosion control devices, as indicated in this report, shall be built along the streets at the north end of the property.

12. The proposed improvements will not increase the flooding potential of adjacent properties.

13. The site does not lie within a designated flood hazard zone as demonstrated by the Flood Hazard Map.

APPENDIX A

CALCULATION OF RUNOFF INOEXISTING CONDITION

PROJECT: FAIRWAYS NORTH AT TANOAN
PROJECT NO.: 10491

DRAINAGE BASIN RUNOFF SUMMARY
CONDITION: EXISTING

DESCRIPTION	AREA (ac)	Q-100 (cfs)	V-100 (cf.)	Q-10 (cfs)	V-10 (cf.)
1A	2.80	4.1	9,700	1.9	4,500
1B	1.93	3.3	7,700	1.6	3,800
1A + 1B + 1C	6.34	9.8	23,000	4.6	10,800
#2	5.47	8.1	19,000	3.7	8,800
#3	4.45	6.6	15,400	3.0	7,100
#4	1.99	2.9	6,900	1.3	3,200
#5	5.03	7.4	17,500	3.4	8,100
#6A	6.34	8.8	22,000	4.1	10,200
6A + 6B	20.39	23.9	59,500	10.2	25,500

PROJECT: FAIRWAYS NORTH AT TANDAN
PROJECT NO.: 10491

DRAINAGE BASIN: 1A
CONDITION: EXISTING

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
PERVIOUS AREA (NATIVE CONDITION)	B	2.80	80	100 %
	COMPOSITE:	2.80	80	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 800 ft.
DROP: 25 ft.
SLOPE: 3.1 %
TIME OF CONCENTRATION: 0.09 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.6 in.
RUNOFF: 0.96 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 4.1 c.f.s.

VOLUME: 9,700 c.f. 0.22ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.8 in.
RUNOFF: 0.44 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 1.9 c.f.s.

VOLUME: 4,500 c.f. 0.10ac.ft.

PROJECT: FAIRWAYS NORTH AT TANOAN
PROJECT NO.: 10491

DRAINAGE BASIN: 1B
CONDITION: EXISTING

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
PERVIOUS AREA (NATIVE CONDITION)	B	1.60	80	83 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		0.33	95	17 %
	COMPOSITE:	1.93	83	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 640 ft.
DROP: 25 ft.
SLOPE: 3.9 %
TIME OF CONCENTRATION: 0.07 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.	FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 2.6 in.	RAINFALL: 1.8 in.
RUNOFF: 1.11 in.	RUNOFF: 0.54 in.
DISTRIBUTION CURVE: 75	DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in	DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 3.3 c.f.s.	PEAK DISCHARGE (Q): 1.6 c.f.s.
VOLUME: 7,700 c.f. 0.18ac.ft.	VOLUME: 3,800 c.f. 0.09ac.ft.

PROJECT: FAIRWAYS NORTH AT TANDAN
PROJECT NO.: 10491

DRAINAGE BASIN: 1A + 1B + 1C
CONDITION: EXISTING

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
PERVIOUS AREA (NATIVE CONDITION)	B	6.01	80	95 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		0.33	95	5 %
	COMPOSITE:	6.34	81	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 1200 ft.
DROP: 41 ft.
SLOPE: 3.4 %
TIME OF CONCENTRATION: 0.11 hr.

STORM CHARACTERISTICS:

formula for? SCS flows

FREQUENCY: 100 yr.; 6 hr.	FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 2.6 in.	RAINFALL: 1.8 in.
RUNOFF: 1.00 in.	RUNOFF: 0.47 in.
DISTRIBUTION CURVE: 75	DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in	DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 9.8 c.f.s.	PEAK DISCHARGE (Q): 4.6 c.f.s.
VOLUME: 23,000 c.f. 0.53ac.ft.	VOLUME: 10,800 c.f. 0.25ac.ft.

PROJECT: FAIRWAYS NORTH AT TANOAN
PROJECT NO.: 10421

DRAINAGE BASIN: #2
CONDITION: EXISTING

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
PERVIOUS AREA (NATIVE CONDITION)	B	5.47	80	100 %
	COMPOSITE:	5.47	80	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 700 ft.
DROP: 30 ft.
SLOPE: 4.2 %
TIME OF CONCENTRATION: 0.07 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.6 in.
RUNOFF: 0.96 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 8.1 c.f.s.

VOLUME: 19,000 c.f. 0.44ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.8 in.
RUNOFF: 0.44 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 3.7 c.f.s.

VOLUME: 8,800 c.f. 0.20ac.ft.

PROJECT: FAIRWAYS NORTH AT TANOAN
PROJECT NO.: 10491

DRAINAGE BASIN: #3
CONDITION: EXISTING

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
PERVIOUS AREA (NATIVE CONDITION)	B	4.45	80	100 %
	COMPOSITE:	4.45	80	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 1200 ft.
DROP: 47 ft.
SLOPE: 3.9 %
TIME OF CONCENTRATION: 0.11 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.6 in.
RUNOFF: 0.96 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 6.6 c.f.s.

VOLUME: 15,400 c.f. 0.35ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.8 in.
RUNOFF: 0.44 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 3.0 c.f.s.

VOLUME: 7,100 c.f. 0.16ac.ft.

PROJECT: FAIRWAYS NORTH AT TANOAN
PROJECT NO.: 10491

DRAINAGE BASIN: #4
CONDITION: EXISTING

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
PERVIOUS AREA (NATIVE CONDITION)	B	1.99	80	100 %
	COMPOSITE:	1.99	80	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 600 ft.
DROP: 30 ft.
SLOPE: 5.0 %
TIME OF CONCENTRATION: 0.06 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.6 in.
RUNOFF: 0.96 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 2.9 c.f.s.

VOLUME: 6,900 c.f. 0.16ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.8 in.
RUNOFF: 0.44 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 1.3 c.f.s.

VOLUME: 3,200 c.f. 0.07ac.ft.

HYDROLOGY E20/D8 2 of 2 FOUR PLANS

PROJECT: FAIRWAYS NORTH AT TANDAN
PROJECT NO.: 10491

DRAINAGE BASIN: #5
CONDITION: EXISTING

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
PERVIOUS AREA (NATIVE CONDITION)	B	5.03	80	100 %
	COMPOSITE:	5.03	80	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 880 ft.
DROP: 40 ft.
SLOPE: 4.5 %
TIME OF CONCENTRATION: 0.08 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.6 in.
RUNOFF: 0.96 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 7.4 c.f.s.

VOLUME: 17,500 c.f. 0.40ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.8 in.
RUNOFF: 0.44 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 3.4 c.f.s.

VOLUME: 8,100 c.f. 0.19ac.ft.

PROJECT: FAIRWAYS NORTH AT TANOAN
PROJECT NO.: 10491

DRAINAGE BASIN: #6A
CONDITION: EXISTING

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
PERVIOUS AREA (NATIVE CONDITION)	B	6.34	80	100 %
	COMPOSITE:	6.34	80	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 2440 ft.
DROP: 77 ft.
SLOPE: 3.1 %
TIME OF CONCENTRATION: 0.70 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.6 in.
RUNOFF: 0.96 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.46 cfs/ac/in
PEAK DISCHARGE (Q): 8.8 c.f.s.

VOLUME: 22,000 c.f. 0.51ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.8 in.
RUNOFF: 0.44 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.46 cfs/ac/in
PEAK DISCHARGE (Q): 4.1 c.f.s.

VOLUME: 10,200 c.f. 0.23ac.ft.

PROJECT: FAIRWAYS NORTH AT TANOAN
PROJECT NO.: 10491

DRAINAGE BASIN: 6A + 6B
CONDITION: EXISTING

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
GOLF COURSE FAIRWAY & GREEN	B	5.79	69	28 %
PERVIOUS AREA (NATIVE CONDITION)	B	14.42	80	71 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		0.18	95	1 %
COMPOSITE:		20.39	77	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 2440 ft.
DROP: 77 ft.
SLOPE: 3.1 %
TIME OF CONCENTRATION: 0.20 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.6 in.
RUNOFF: 0.80 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.46 cfs/ac/in
PEAK DISCHARGE (Q): 23.9 c.f.s.

VOLUME: 59,500 c.f. 1.37ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.8 in.
RUNOFF: 0.35 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.46 cfs/ac/in
PEAK DISCHARGE (Q): 10.2 c.f.s.

VOLUME: 25,500 c.f. 0.59ac.ft.

APPENDIX B

CALCULATION OF RUNOFF IN DEVELOPED CONDITION

PROJECT: FAIRWAYS NORTH AT TANOAN
PROJECT NO.: 10491

DRAINAGE BASIN RUNOFF SUMMARY
CONDITION: DEVELOPED

(composit CN) ?

DESCRIPTION	AREA (ac)	Q-100 (cfs)	V-100 (cf.)	Q-10 (cfs)	V-10 (cf.)
OFFSITE 'A'	4.68	7.0	16,400	3.2	7,600
OFFSITE 'B'	1.80	3.4	8,100	1.8	4,200
B + 1	9.11	18.9	44,900	10.1	23,900
#6	1.08	1.9	4,400	0.9	2,200
5 + 6	4.85	9.7	22,800	5.1	11,900
B + 1 + 5 + 6 + 2	15.99	31.5	77,200	16.6	40,900
#13	2.53	4.1	9,700	2.0	4,700
13 + C	14.08	16.8	40,800	7.2	17,500
OFFSITE 'D'	0.46	0.8	1,900	0.4	1,000
OFFSITE 'E'	0.13	0.4	900	0.2	600
A + 7	5.11	7.6	17,900	3.5	8,300
#8	2.14	3.6	8,600	1.8	4,200
#9	1.63	3.3	7,700	1.7	4,000
#10	0.43	0.7	1,600	0.3	800
10 + 11	1.76	3.4	8,000	1.7	4,100
#12	0.14	0.2	500	0.1	200
D + 14	2.35	4.2	9,800	2.1	4,900
D + 14 + B + 1 + 5 + 6 + 2 + E + 3	18.72	35.6	89,700	18.8	47,400

PROJECT: FAIRWAYS NORTH AT TANDAN
PROJECT NO.: 10491

DRAINAGE BASIN: OFFSITE 'A'
CONDITION: DEVELOPED

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
PERVIOUS AREA (NATIVE CONDITION)	B	4.61	80	99 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		0.07	95	1 %
	COMPOSITE:	4.68	80	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 800 ft.
DROP: 25 ft.
SLOPE: 3.1 %
TIME OF CONCENTRATION: 0.09 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.6 in.
RUNOFF: 0.97 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 7.0 c.f.s.

VOLUME: 16,400 c.f. 0.38ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.8 in.
RUNOFF: 0.45 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 3.2 c.f.s.

VOLUME: 7,600 c.f. 0.17ac.ft.

PROJECT: FAIRWAYS NORTH AT TANOAN
PROJECT NO.: 10491

DRAINAGE BASIN: OFFSITE 'B'
CONDITION: DEVELOPED

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
PERVIOUS AREA (NATIVE CONDITION)	B	1.21	80	67 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		0.59	95	33 %
	COMPOSITE:	1.80	85	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 640 ft.
DROP: 25 ft.
SLOPE: 3.9 %
TIME OF CONCENTRATION: 0.07 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.6 in.
RUNOFF: 1.25 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 3.4 c.f.s.

VOLUME: 8,100 c.f. 0.19ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.8 in.
RUNOFF: 0.65 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 1.8 c.f.s.

VOLUME: 4,200 c.f. 0.10ac.ft.

PROJECT: FAIRWAYS NORTH AT TANOAN
PROJECT NO.: 10491

DRAINAGE BASIN: B + 1
CONDITION: DEVELOPED

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
PERVIOUS AREA (NATIVE CONDITION)	B	5.18	80	57 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		3.93	95	43 %
	COMPOSITE:	9.11	86	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 1633 ft.
DROP: 54 ft.
SLOPE: 3.3 %
TIME OF CONCENTRATION: 0.14 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.6 in.
RUNOFF: 1.36 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.53 cfs/ac/in
PEAK DISCHARGE (Q): 18.9 c.f.s.

VOLUME: 44,900 c.f. 1.03ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.8 in.
RUNOFF: 0.72 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.53 cfs/ac/in
PEAK DISCHARGE (Q): 10.1 c.f.s.

VOLUME: 23,900 c.f. 0.55ac.ft.

PROJECT: FAIRWAYS NORTH AT TANOAN
PROJECT NO.: 10491

DRAINAGE BASIN: #6
CONDITION: DEVELOPED

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
PERVIOUS AREA (NATIVE CONDITION)	B	0.86	80	80 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		0.22	95	20 %
	COMPOSITE:	1.08	83	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 850 ft.
DROP: 38 ft.
SLOPE: 4.4 %
TIME OF CONCENTRATION: 0.08 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.6 in.
RUNOFF: 1.14 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 1.9 c.f.s.

VOLUME: 4,400 c.f. 0.10ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.8 in.
RUNOFF: 0.56 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 0.9 c.f.s.

VOLUME: 2,200 c.f. 0.05ac.ft.

PROJECT: FAIRWAYS NORTH AT TANDAN
PROJECT NO.: 10491

DRAINAGE BASIN: 5 + 6
CONDITION: DEVELOPED

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
PERVIOUS AREA (NATIVE CONDITION)	B	3.05	80	63 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		1.80	95	37 %
	COMPOSITE:	4.85	86	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 1150 ft.
DROP: 36 ft.
SLOPE: 3.1 %
TIME OF CONCENTRATION: 0.11 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.	FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 2.6 in.	RAINFALL: 1.8 in.
RUNOFF: 1.30 in.	RUNOFF: 0.68 in.
DISTRIBUTION CURVE: 75	DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in	DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 9.7 c.f.s.	PEAK DISCHARGE (Q): 5.1 c.f.s.
VOLUME: 22,800 c.f. 0.52ac.ft.	VOLUME: 11,900 c.f. 0.27ac.ft.

PROJECT: FAIRWAYS NORTH AT TANOAN
PROJECT NO.: 10491

DRAINAGE BASIN: B + 1 + 5 + 6 + 2
CONDITION: DEVELOPED

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
PERVIOUS AREA (NATIVE CONDITION)	B	9.50	80	59 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		6.49	95	41 %
	COMPOSITE:	15.99	86	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 2190 ft.
DROP: 70 ft.
SLOPE: 3.1 %
TIME OF CONCENTRATION: 0.18 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.6 in.
RUNOFF: 1.33 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.48 cfs/ac/in
PEAK DISCHARGE (Q): 31.5 c.f.s.

VOLUME: 77,200 c.f. 1.77ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.8 in.
RUNOFF: 0.71 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.48 cfs/ac/in
PEAK DISCHARGE (Q): 16.6 c.f.s.

VOLUME: 40,900 c.f. 0.94ac.ft.

PROJECT: FAIRWAYS NORTH AT TANOAN
PROJECT NO.: 10491

DRAINAGE BASIN: #13
CONDITION: DEVELOPED

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
PERVIOUS AREA (NATIVE CONDITION)	B	2.21	80	87 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		0.32	95	13 %
	COMPOSITE:	2.53	82	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 130 ft.
DROP: 6 ft.
SLOPE: 4.6 %
TIME OF CONCENTRATION: 0.02 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.	FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 2.6 in.	RAINFALL: 1.8 in.
RUNOFF: 1.07 in.	RUNOFF: 0.52 in.
DISTRIBUTION CURVE: 75	DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in	DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 4.1 c.f.s.	PEAK DISCHARGE (Q): 2.0 c.f.s.
VOLUME: 9,700 c.f. 0.22ac.ft.	VOLUME: 4,700 c.f. 0.11ac.ft.

PROJECT: FAIRWAYS NORTH AT TANOAN
PROJECT NO.: 10491

DRAINAGE BASIN: 13 + C
CONDITION: DEVELOPED

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
GOLF COURSE FAIRWAY & GREEN	B	5.79	69	41 %
PERVIOUS AREA (NATIVE CONDITION)	B	6.93	80	49 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		1.36	95	10 %
	COMPOSITE:	14.08	77	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 1900 ft.
DROP: 59 ft.
SLOPE: 3.1 %
TIME OF CONCENTRATION: 0.17 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.	FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 2.6 in.	RAINFALL: 1.8 in.
RUNOFF: 0.80 in.	RUNOFF: 0.34 in.
DISTRIBUTION CURVE: 75	DISTRIBUTION CURVE: 75
DISCHARGE: 1.50 cfs/ac/in	DISCHARGE: 1.50 cfs/ac/in
PEAK DISCHARGE (Q): 16.8 c.f.s.	PEAK DISCHARGE (Q): 7.2 c.f.s.
VOLUME: 40,800 c.f. 0.94ac.ft.	VOLUME: 17,500 c.f. 0.40ac.ft.

PROJECT: FAIRWAYS NORTH AT TANOAN
PROJECT NO.: 10491

DRAINAGE BASIN: OFFSITE 'D'
CONDITION: DEVELOPED

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
PERVIOUS AREA (NATIVE CONDITION)	B	0.34	80	74 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		0.12	95	26 %
	COMPOSITE:	0.46	84	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 290 ft.
DROP: 8 ft.
SLOPE: 2.7 %
TIME OF CONCENTRATION: 0.04 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.6 in.
RUNOFF: 1.19 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 0.8 c.f.s.

VOLUME: 1,900 c.f. 0.04ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.8 in.
RUNOFF: 0.60 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 0.4 c.f.s.

VOLUME: 1,000 c.f. 0.02ac.ft.

PROJECT: FAIRWAYS NORTH AT TANOAN
PROJECT NO.: 10491

DRAINAGE BASIN: OFFSITE 'E'
CONDITION: DEVELOPED

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		0.13	95	100 %
	COMPOSITE:	0.13	95	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 90 ft.
DROP: 1 ft.
SLOPE: 1.1 %
TIME OF CONCENTRATION: 0.02 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.6 in.
RUNOFF: 2.06 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 0.4 c.f.s.

VOLUME: 900 c.f. 0.02ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.8 in.
RUNOFF: 1.29 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 0.2 c.f.s.

VOLUME: 600 c.f. 0.01ac.ft.

PROJECT: FAIRWAYS NORTH AT TANOAN
PROJECT NO.: 10491

DRAINAGE BASIN: A + 7
CONDITION: DEVELOPED

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
PERVIOUS AREA (NATIVE CONDITION)	B	5.04	80	99 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		0.07	95	1 %
	COMPOSITE:	5.11	80	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 920 ft.
DROP: 29 ft.
SLOPE: 3.1 %
TIME OF CONCENTRATION: 0.09 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.6 in.
RUNOFF: 0.97 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 7.6 c.f.s.

VOLUME: 17,900 c.f. 0.41ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.8 in.
RUNOFF: 0.45 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 3.5 c.f.s.

VOLUME: 8,300 c.f. 0.19ac.ft.

PROJECT: FAIRWAYS NORTH AT TANOAN
PROJECT NO.: 10491

DRAINAGE BASIN: #8
CONDITION: DEVELOPED

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
PERVIOUS AREA (NATIVE CONDITION)	B	1.76	80	82 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		0.38	95	18 %
	COMPOSITE:	2.14	83	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 130 ft.
DROP: 6 ft.
SLOPE: 4.6 %
TIME OF CONCENTRATION: 0.02 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.6 in.
RUNOFF: 1.11 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 3.6 c.f.s.

VOLUME: 8,600 c.f. 0.20ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.8 in.
RUNOFF: 0.55 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 1.8 c.f.s.

VOLUME: 4,200 c.f. 0.10ac.ft.

PROJECT: FAIRWAYS NORTH AT TANOAN
PROJECT NO.: 10491

DRAINAGE BASIN: H9
CONDITION: DEVELOPED

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
PERVIOUS AREA (NATIVE CONDITION)	B	1.00	80	61 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		0.63	95	39 %
	COMPOSITE:	1.63	86	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 330 ft.
DROP: 11 ft.
SLOPE: 3.3 %
TIME OF CONCENTRATION: 0.04 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.6 in.
RUNOFF: 1.31 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 3.3 c.f.s.

VOLUME: 7,700 c.f. 0.18ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.8 in.
RUNOFF: 0.69 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 1.7 c.f.s.

VOLUME: 4,000 c.f. 0.09ac.ft.

PROJECT: FAIRWAYS NORTH AT TAHOAN
PROJECT NO.: 10491

DRAINAGE BASIN: #10
CONDITION: DEVELOPED

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
PERVIOUS AREA (NATIVE CONDITION)	B	0.37	80	86 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		0.06	95	14 %
	COMPOSITE:	0.43	82	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 430 ft.
DROP: 22 ft.
SLOPE: 5.1 %
TIME OF CONCENTRATION: 0.04 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.6 in.
RUNOFF: 1.08 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 0.7 c.f.s.

VOLUME: 1,600 c.f. 0.04ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.8 in.
RUNOFF: 0.52 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 0.3 c.f.s.

VOLUME: 800 c.f. 0.02ac.ft.

PROJECT: FAIRWAYS NORTH AT TANOAN
PROJECT NO.: 10491

DRAINAGE BASIN: 10 + 11
CONDITION: DEVELOPED

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
PERVIOUS AREA (NATIVE CONDITION)	B	1.16	80	66 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		0.60	95	34 %
	COMPOSITE:	1.76	85	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 520 ft.
DROP: 24 ft.
SLOPE: 4.6 %
TIME OF CONCENTRATION: 0.05 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.6 in.
RUNOFF: 1.27 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 3.4 c.f.s.

VOLUME: 8,000 c.f. 0.18ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.8 in.
RUNOFF: 0.66 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 1.7 c.f.s.

VOLUME: 4,100 c.f. 0.09ac.ft.

PROJECT: FAIRWAYS NORTH AT TANOAN
PROJECT NO.: 10491

DRAINAGE BASIN: #12
CONDITION: DEVELOPED

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
PERVIOUS AREA (NATIVE CONDITION)	B	0.11	80	79 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		0.03	95	21 %
COMPOSITE:		0.14	83	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 100 ft.
DROP: 7 ft.
SLOPE: 7.0 %
TIME OF CONCENTRATION: 0.01 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.	FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 2.6 in.	RAINFALL: 1.8 in.
RUNOFF: 1.15 in.	RUNOFF: 0.57 in.
DISTRIBUTION CURVE: 75	DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in	DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 0.2 c.f.s.	PEAK DISCHARGE (Q): 0.1 c.f.s.
VOLUME: 500 c.f. 0.01ac.ft.	VOLUME: 200 c.f. 0.00ac.ft.

PROJECT: FAIRWAYS NORTH AT TANOAN
PROJECT NO.: 10491

DRAINAGE BASIN: D + 14
CONDITION: DEVELOPED

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
PERVIOUS AREA (NATIVE CONDITION)	B	1.81	80	77 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		0.54	95	23 %
	COMPOSITE:	2.35	83	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 540 ft.
DROP: 20 ft.
SLOPE: 3.7 %
TIME OF CONCENTRATION: 0.06 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.6 in.
RUNOFF: 1.16 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 4.2 c.f.s.

VOLUME: 9,800 c.f. 0.22ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.8 in.
RUNOFF: 0.58 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 2.1 c.f.s.

VOLUME: 4,900 c.f. 0.11ac.ft.

PROJECT: FAIRWAYS NORTH AT TANOAN
PROJECT NO.: 10491

DRAINAGE BASIN: D + 14 + B + 1 + 5 + 6 + 2 + E + 3
CONDITION: DEVELOPED

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
PERVIOUS AREA (NATIVE CONDITION)	B	11.31	80	60 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)	B	7.41	95	40 %
COMPOSITE:		18.72	86	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 2600 ft.
DROP: 76 ft.
SLOPE: 2.9 %
TIME OF CONCENTRATION: 0.22 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.	FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 2.6 in.	RAINFALL: 1.8 in.
RUNOFF: 1.32 in.	RUNOFF: 0.70 in.
DISTRIBUTION CURVE: 75	DISTRIBUTION CURVE: 75
DISCHARGE: 1.44 cfs/ac/in	DISCHARGE: 1.44 cfs/ac/in
PEAK DISCHARGE (Q): 35.6 c.f.s.	PEAK DISCHARGE (Q): 18.8 c.f.s.
VOLUME: 89,700 c.f. 2.06ac.ft.	VOLUME: 47,400 c.f. 1.09ac.ft.

PROJECT: FAIRWAYS NORTH AT TANOAN
PROJECT NO.: 10491

DRAINAGE BASIN: D + 14 + B + 1 + 5 + 6 + 2 + E + 3
CONDITION: DEVELOPED

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
PERVIOUS AREA (NATIVE CONDITION)	B	11.31	80	60 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)	B	7.41	95	40 %
	COMPOSITE:	18.72	86	100 %

WATERSHED CHARACTERISTICS:

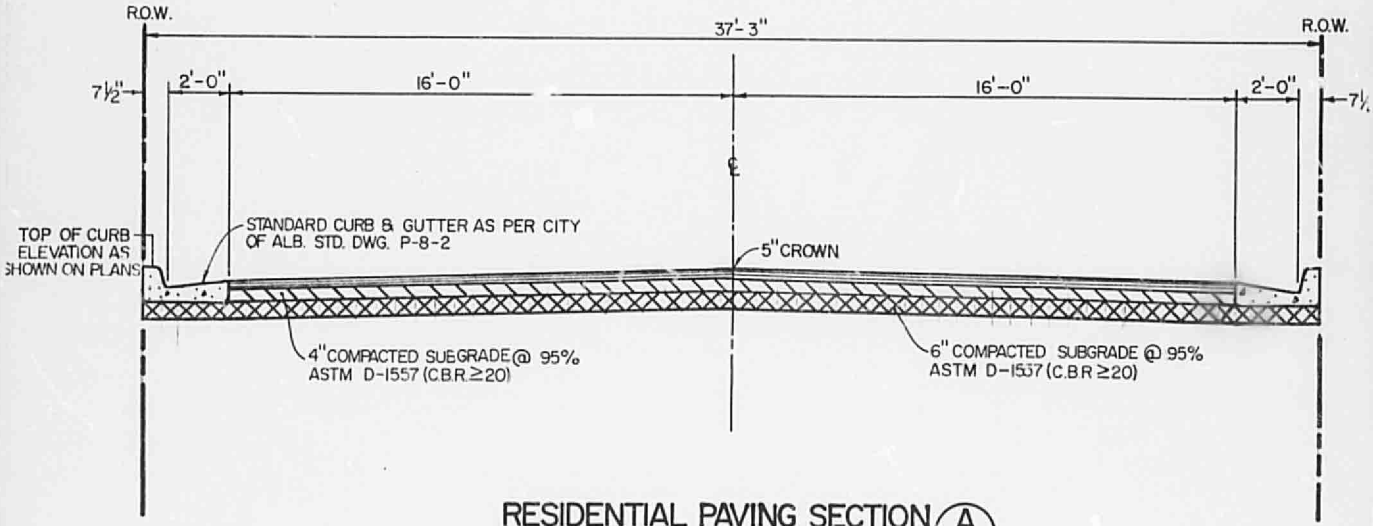
FLOW TYPE: GULLIED
LENGTH: 2600 ft.
DROP: 76 ft.
SLOPE: 2.9 %
TIME OF CONCENTRATION: 0.22 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.	FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 2.6 in.	RAINFALL: 1.8 in.
RUNOFF: 1.32 in.	RUNOFF: 0.70 in.
DISTRIBUTION CURVE: 75	DISTRIBUTION CURVE: 75
DISCHARGE: 1.44 cfs/ac/in	DISCHARGE: 1.44 cfs/ac/in
PEAK DISCHARGE (Q): 35.6 c.f.s.	PEAK DISCHARGE (Q): 18.8 c.f.s.
VOLUME: 89,700 c.f. 2.06ac.ft.	VOLUME: 47,400 c.f. 1.09ac.ft.

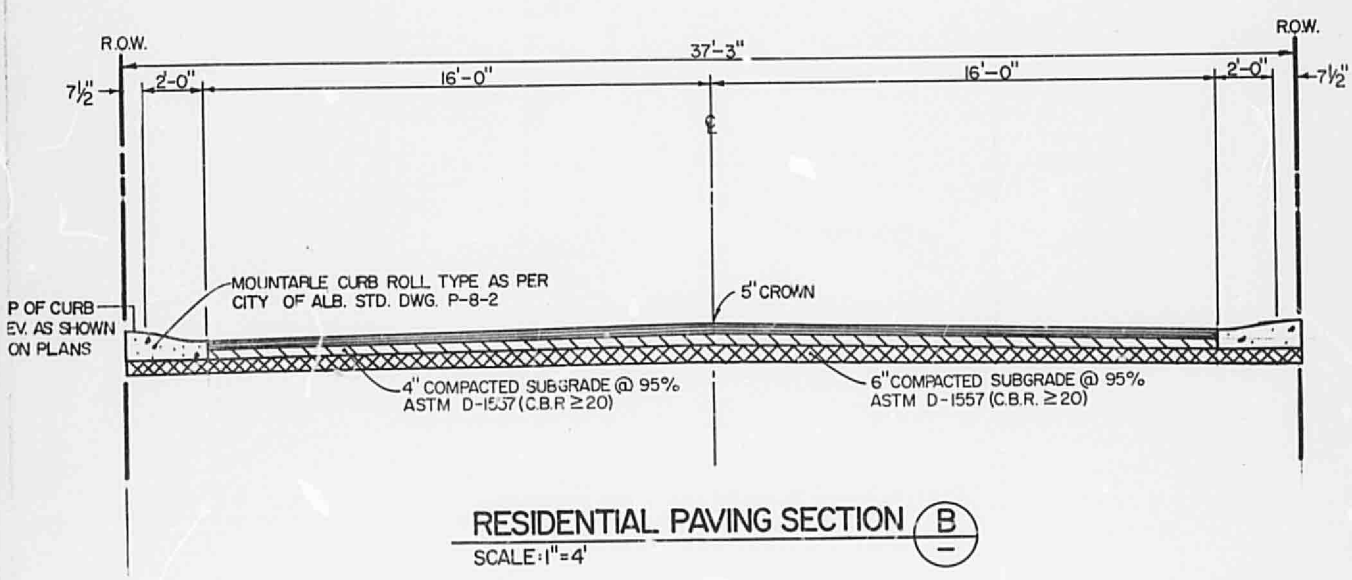
APPENDIX C

CALCULATION OF STREET STORM FLOW CAPACITIES



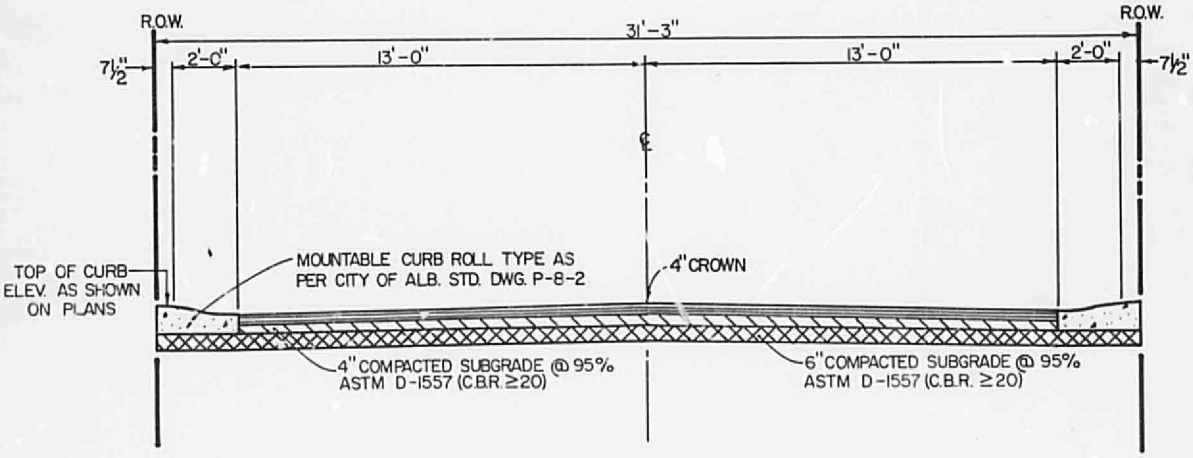
RESIDENTIAL PAVING SECTION (A)

SCALE: 1" = 4'



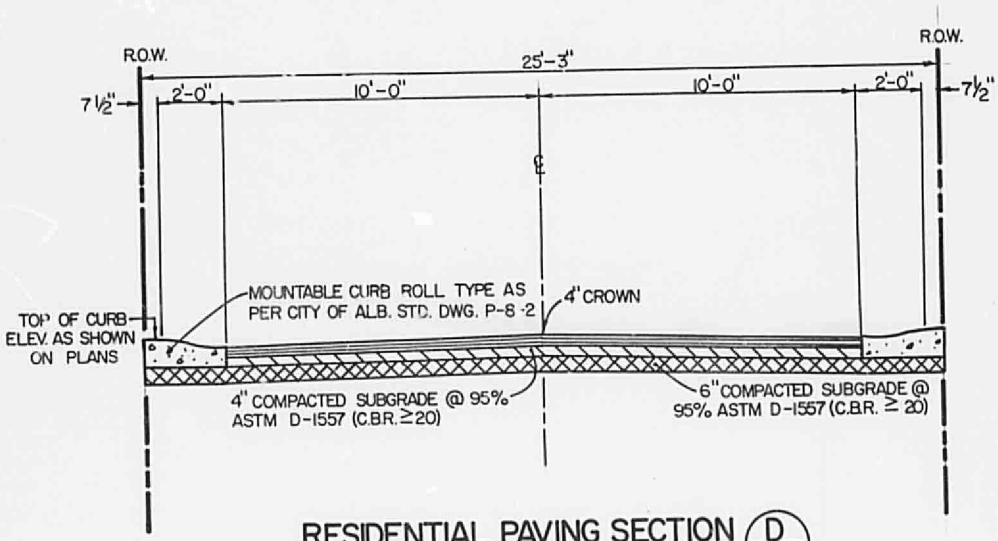
RESIDENTIAL PAVING SECTION (B/—)

SCALE: 1" = 4'



RESIDENTIAL PAVING SECTION C

SCALE: 1" = 4'



RESIDENTIAL PAVING SECTION D/—

SCALE: 1" = 4'

STREET STORM FLOW CAPACITIES: STREET SECTIONS

FROM	ANGLE	DIST	NORTH	EAST	TO
STREET SECTION 'A'					
***** START			0.00000	0.67000	1
1 INV	N 46 45 44.6 W	0.9197	0.63000	0.00000	2
2 INV	N 3 43 08.4 E	2.0042	2.63000	0.13000	3
3 INV	N 0 44 43.8 E	15.3713	18.00000	0.33000	4
4 INV	S 90 00 00.0 E	0.3400	18.00000	0.67000	5
5 INV	S 0 00 00.0 W	18.0000	0.00000	0.67000	1
			0.00000	0.67000	1
NO CLOSURE ERROR		8.18ft	.0002ac		

FROM	ANGLE	DIST	NORTH	EAST	TO
STREET SECTION 'B'					
***** START			0.83333	0.00000	6
6 INV	S 78 57 32.9 E	1.7405	0.50000	1.70833	7
7 INV	N 86 05 58.3 E	0.9188	0.56250	2.62500	8
8 INV	N 89 01 48.9 E	16.0023	0.83333	18.62500	9
9 INV	N 90 00 00.0 W	18.6250	0.83333	0.00000	6
			0.83333	0.00000	6
NO CLOSURE ERROR		2.73ft	.0001ac		

FROM	ANGLE	DIST	NORTH	EAST	TO
STREET SECTION 'C'					
***** START			0.83333	0.00000	10
10 INV	S 78 57 32.2 E	1.7405	0.50000	1.70830	11
11 INV	N 86 05 58.7 E	0.9188	0.56250	2.62500	12
12 INV	N 88 48 23.5 E	13.0028	0.83333	15.62500	13
13 INV	N 90 00 00.0 W	15.6250	0.83333	0.00000	10
			0.83333	0.00000	10
NO CLOSURE ERROR		2.32ft	.0001ac		

FROM	ANGLE	DIST	NORTH	EAST	TO
STREET SECTION 'D'					
***** START			0.83333	0.00000	15
15 INV	S 78 57 32.9 E	1.7405	0.50000	1.70833	16
16 INV	N 86 05 58.3 E	0.9188	0.56250	2.62500	17
17 INV	N 88 26 55.1 E	10.0037	0.83333	12.62500	18
18 INV	N 90 00 00.0 W	12.6250	0.83333	0.00000	15
			0.83333	0.00000	15
NO CLOSURE ERROR		1.92ft	.0000ac		

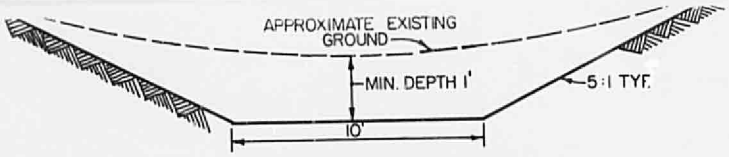
STREET STORM FLOW CAPACITIES

MANNING EQUATION: Q = (1.486/n) * A * (R^0.67) * (S^0.5)

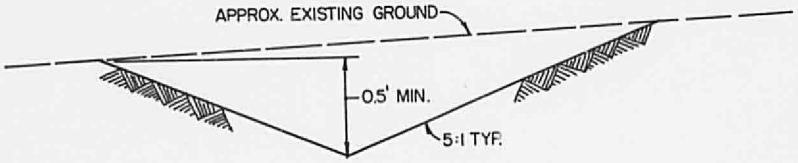
STREET	n	AREA (sf)	P (ft)	R (ft)	SLOPE (ft/ft)	Q/2 (cfs)	Q (cfs)	v (fps)
STREET SECTION 'A'	0.020	8.18	18.3	0.45	0.0050	25.1	50.2	3.1
STREET SECTION 'A'	0.020	8.18	18.3	0.45	0.0100	35.5	71.1	4.3
STREET SECTION 'B'	0.020	2.73	18.7	0.15	0.0050	4.0	8.0	1.5
STREET SECTION 'B'	0.020	2.73	18.7	0.15	0.0100	5.6	11.2	2.1
STREET SECTION 'B'	0.020	2.73	18.7	0.15	0.0200	8.0	15.9	2.9
STREET SECTION 'B'	0.020	2.73	18.7	0.15	0.0300	9.7	19.5	3.6
STREET SECTION 'B'	0.020	2.73	18.7	0.15	0.0400	11.2	22.5	4.1
STREET SECTION 'C'	0.020	2.32	15.7	0.15	0.0300	8.3	16.7	3.6
STREET SECTION 'C'	0.020	2.32	15.7	0.15	0.0350	9.0	18.0	3.9
STREET SECTION 'C'	0.020	2.32	15.7	0.15	0.0400	9.6	19.3	4.2
STREET SECTION 'D'	0.020	1.92	12.7	0.15	0.0050	2.9	5.7	1.5
STREET SECTION 'D'	0.020	1.92	12.7	0.15	0.0100	4.0	8.1	2.1
STREET SECTION 'D'	0.020	1.92	12.7	0.15	0.0200	5.7	11.5	3.0
STREET SECTION 'D'	0.020	1.92	12.7	0.15	0.0300	7.0	14.0	3.7
STREET SECTION 'D'	0.020	1.92	12.7	0.15	0.0400	8.1	16.2	4.2
STREET SECTION 'D'	0.020	1.92	12.7	0.15	0.0500	9.1	18.1	4.7

APPENDIX D

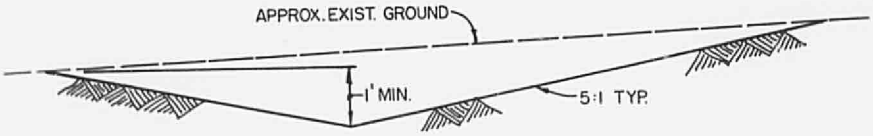
CALCULATION OF SWALE & CULVERT CAPACITIES



SWALE SECTION 4/–
HORIZ. SCALE: 1"=5'
VERT. SCALE: 1"=2'



SWALE SECTIONS 2/– 3/–
HORIZ. SCALE: 1"=2
VERT. SCALE: 1"=1'



SWALE SECTION 1/–
SCALE: 1"=2'

SWALE CAPACITIES

CHANNEL SECTION : #1

GIVEN:

BOTTOM WIDTH = 0 ft.
MANNINGS 'n' = 0.030
SIDE SLOPES = 5:1
BOTTOM SLOPE = 0.5 %
DEPTH = 1.0 ft.

Q = 10.9 cfs > 7.6 cfs OK

velocity = 2.2 fps

CHANNEL SECTION : #2

GIVEN:

BOTTOM WIDTH = 0 ft.
MANNINGS 'n' = 0.030
SIDE SLOPES = 5:1
BOTTOM SLOPE = 4.2 %
DEPTH = 1.0 ft.

Q = 31.6 cfs > 1.9 cfs OK

velocity = 6.3 fps

CHANNEL SECTION : #3

GIVEN:

BOTTOM WIDTH = 0 ft.
MANNINGS 'n' = 0.030
SIDE SLOPES = 5:1
BOTTOM SLOPE = 1.0 %
DEPTH = 1.0 ft.

Q = 15.4 cfs > 0.7 cfs OK

velocity = 3.1 fps

SWALE CAPACITIES

CHANNEL SECTION : #4

GIVEN:

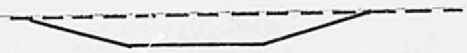
BOTTOM WIDTH = 10.0 ft.

MANNINGS 'n' = 0.030

SIDE SLOPES = 5:1

BOTTOM SLOPE = 1.0 %

DEPTH = 1.0 ft.



Q = 60.9 cfs > 16.8 cfs OK

velocity = 4.1 fps

CULVERT CAPACITIES

GIVEN:

Q(100) = 16.8 cfs

n = 0.015

SLOPE = 1.0 %

DIA. OF PIPE = 24"

APPENDIX E

"SCS" PLATES

LAND USE DESCRIPTION	Hydrologic Soil Group				Present Area				Future Area			
	A	B	C	D	A	B	C	D	A	B	C	D
Cultivated land[1]: without conservation treatment	72	81	88	91								
: with conservation treatment	62	71	78	81								
: poor condition	68	79	86	89								
Pasture or range land: fair condition	54	70	80	85								
: good condition	39	61	74	80								
Meadow: good condition	30	58	71	78								
Wood or Forest land: thin stand, poor cover, no mulch	45	66	77	83								
good cover[2]	25	55	70	77								
Open Spaces, lawns, parks, golf courses, cemeteries, etc.												
good condition: grass cover on 75% or more of the area	39	61	74	80								
fair condition: grass cover on 50% to 75% of the area	49	69	79	84								
Commercial and business areas (85% impervious)	89	92	94	95								
Industrial districts (72% impervious)	81	88	91	93								
Residential [3]												
Average lot size — Average % Impervious[4]												
1/8 acre or less — 65	77	85	90	92								
1/4 acre — 38	61	75	83	87								
1/3 acre — 30	57	72	81	86								
1/2 acre — 25	54	70	80	85								
1 acre — 20	51	68	79	84								
Paved parking lots, roofs, driveways, etc.[5]	98	98	98	98								
Streets and roads:												
paved with curbs and storm sewers[5]	98	98	98	98								
gravel	76	85	89	91								
dirt	72	82	87	89								

1/ For a more detailed description of agricultural land use curve numbers, refer to National Engineering Handbook, Section 4, Hydrology, Chapter 9, August 1972.

2/ Good cover is protected from grazing and litter and brush cover soil.

3/ Curve numbers are computed assuming the runoff from the house and driveway is directed towards the street with a minimum of roof water directed to lawns where additional infiltration could occur.

4/ The remaining pervious areas (lawn) are considered to be in good pasture condition for these curve numbers.

5/ In some warmer climates of the country, a curve number of 96 may be used

Present CN _____
Runoff Volume = _____ in.
= DA(AC) x $\frac{RO(in.)}{12}$ = _____ ac.ft.

Future CN _____
Runoff Volume = _____ in.
= DA(AC) x $\frac{RO(in.)}{12}$ = _____ ac.ft.

Area, Acres _____ Date _____
Project _____
Approved By _____

PLATE I

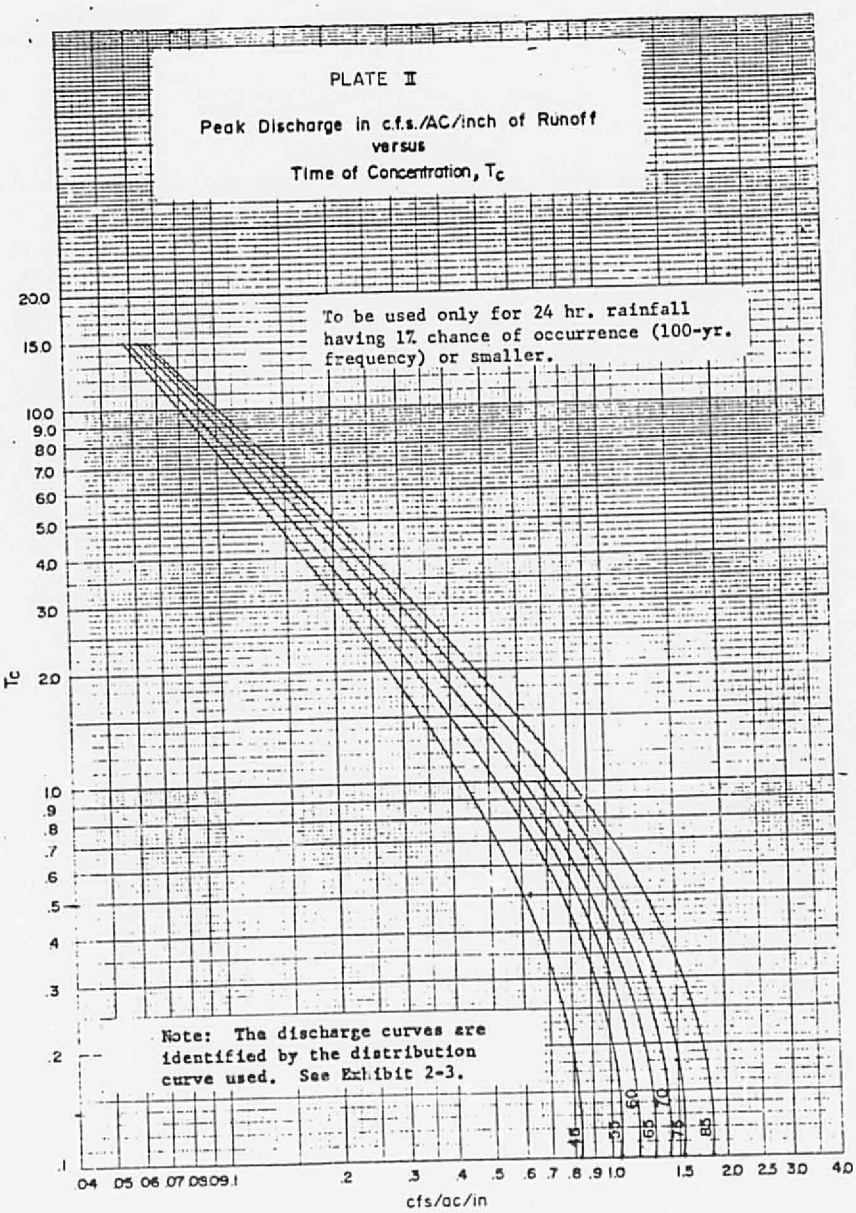


PLATE II
Peak Discharge in c.f.s./AC/inch of Runoff
versus
Time of Concentration, Tc
To be used only for 24 hr. rainfall having 1% chance of occurrence (100-yr. frequency) or smaller.
Note: The discharge curves are identified by the distribution curve used. See Exhibit 2-3.
Tc
20.0
15.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
.04 .05 .06 .07 .08 .09 .1 .2 .3 .4 .5 .6 .7 .8 .9 1.0 1.5 2.0 2.5 3.0 4.0
cfs/ac/in
.45
.55
.65
.75
.85