1518-1651.34-80

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

July 24, 1980

Mr. Bruno Conegliano
Assistant City Engineer - Hydrology
Municipal Development Department
Public Works Division
P.O. Box 1293
Albuquerque, New Mexico 87103

RE: BUTTRUM PLAZA, SUNSET WEST UNIT II

Dear Mr. Conegliano:

Pursuant to our meeting of July 23, 1980 we have the following comments:

1) Buttrum Plaza: you indicated that Mr. Aguirre will be reviewing this drainage report and as a consequence I will contact him concerning future questions. In regards to your requirement that we route 100% of our floodwaters through a detention facility, we strongly believe that this is not in keeping with Drainage Resolution 1972-2. We further believe that our plan for Buttrum Plaza does in fact comply with 1972-2, Page 4, Section 3, Requirement B. Should you require that we route 100% of our floodwaters through a detention pond we must view this, in the best interests of our client, as a deviation from adopted ordinances and will recommend to our client that he not comply with this requirement.

2) Sunset West - Unit II: originally Mr. Aguirre reviewed this report and provided us with his comments in a letter dated 3/28/80. We in turn responded to his comments in a letter dated 4/11/80. Subsequent to this Mr. Russell Givler and myself met with you at which time you expressed concern over two items; these being 1) turning of floodwaters from San Ygnacio to 90th and 2) lot ponding for those lots on Sage Road. We have agreed to include ponding on the Sage Road lots and informed you in our meeting of July 23rd that the design for the turning structure on 90th Street was included in the approved construction plans for Sunset West - Unit I. Since this design was approved for construction we are somewhat unclear as to why this issue is again being addressed under the drainage provisions for Unit II. At any rate, we would like to resolve any outstanding issues concerning this drainage report to enable us to complete our engineering.

Should you have any questions concerning the information presented herein, please feel free to call. We would appreciate your attention to these two reports in order to facilitate our final engineering.

Sincerely,

CHARLES W. CAMPBELL

CWC:pd

cc: Mr. Richard Heller
Mr. Fred Aquirre

Lett Rec file
copy in letter of Map Amendment - Skyview West file

FEDERAL EMERGENCY MANAGEMENT AGENCY
Washington, D.C. 20472

RECEIVED
JUN 12 1980
CITY ENGINEER

L9-D4

IN REPLY REFER TO:
IFE (218)
FLO-1

5 JUN 1980

RSH	ADM
HRO	SUR
CDS	COUN
DES	SEC
INSP	FILE
HYDRO RC.	RETURN

I hope we are never this prompt w/ a response RHA

Mr. Richard S. Heller
City Engineer
P.O. Box 1293
Albuquerque, NM 87103

Dear Mr. Heller:

This is in response to your letter of June 7, 1979, and subsequent data you have furnished, requesting that the Federal Insurance Administrator determine whether Skyview West, Unit 2, Albuquerque, New Mexico, as recorded in Volume C-14, Folio 150, in the Office of the Recorder, Bernalillo County, New Mexico, is located within the Special Flood Hazard Area.

We have reviewed the Flood Hazard Boundary Map in light of the additional flood data you furnished and have determined that Lots 37A through 41A, Block 11; Lots 5 through 29, Block 12; and Lots 3 through 22, Block 13, of the above mentioned property are not within the Special Flood Hazard Area as shown on the Federal Insurance Administration (FIA) Map Number H350002 Panel 0004B; therefore, flood insurance is not required.

Lots 1 through 4, Block 12; and Lots 1 and 2, Block 13, of the above mentioned property are not within the Special Flood Hazard Area; therefore, flood insurance is not required.

If flood insurance was purchased as a requirement of direct Federal or federally-related financial assistance for the above mentioned property, a full refund of the premium paid for the current policy year may be obtained from the servicing agent of the National Flood Insurance Program, through the particular insurance agent or broker who sold the policy, provided that no claim is pending or has been paid on the policy in question during the same policy year.

In order to facilitate the procedure by which eligible property owners may obtain a refund of premium, a written waiver or certificate must be obtained from the lender that imposed the requirement. Their certification will be required by your insurance agent if he is to process the premium refund request through the National Flood Insurance Program (NFIP).

The above stated results of your request for exemption from the Federal requirement for the purchase of flood insurance are based on minimum criteria established by FIA for flood plain management regulations and are intended only to

reflect your status in relation to the Federal requirement for the purchase of insurance. Community officials, based on knowledge of local conditions and in the interest of human safety, may set higher standards for construction in the flood plain than the minimum criteria established by FIA. If the State of New Mexico or the City of Albuquerque has adopted more restrictive and comprehensive flood plain management criteria, these criteria are encouraged and take precedence over the minimum federal criteria for the purpose of regulating development in the flood plain. This policy is set forth in Section 60.1(d) (presently appearing at its former Section 1910.1) of the National Flood Insurance Program regulations.

This determination has the effect of amending the Federal Insurance Administration (FIA) Map Number H350002 Panel 0004B. The City of Albuquerque and the State Coordinating Agency are being provided with copies of this letter of determination. A copy will also be forwarded to our servicing representative for insurance policies and claims at the following address:

National Flood Insurance Program
P.O. Box 34294
Bethesda, Maryland 20034
Telephone: (800) 638-6620

If you have any questions or if we can be of further assistance, please contact the Program Implementation & Engineering Office at (202) 755-6570 or toll free at (800) 424-8872.

Sincerely,

Gloria M. Jimenez
Federal Insurance Administrator

cc: NFIP
Local Map Repository
State Coordinating Agency for New Mexico

2096-1651.22

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

October 21, 1980

Mr. Richard Heller
City Engineer
Municipal Development Dept.
Public Works Division
P.O. Box 1293
Albuquerque, New Mexico 87103

RE: SUNSET WEST - UNIT II

Dear Dick:

Due to another unforseen schedule change we are hereby requesting that the meeting scheduled for October 27th at 9:00 be rescheduled to October 30th at 9:00. Copies of this correspondence are being sent to Mr. Conegliano and Mr. Sheppard and we are asking that both please be present on the 30th for discussions related to the resolution of drainage problems for the referenced subdivision.

Sincerely,

Chuck.

CHARLES W. CAMPBELL
CWC:er
cc: Mr. Bruno Conegliano
Mr. Dwayne Sheppard
Mr. Max Walker

735-1651.22-80

GORDON HERKENHOFF & ASSOCIATES, INC.
302 Eighth Street, N.W.
Albuquerque, New Mexico 87102
(505) 247-0295

April 11, 1980

29-D4

Mr. Fred Aguirre
Assistant City Hydrologist
Municipal Development Department
Public Works Division
P.O. Box 1293
Albuquerque, New Mexico 87103

RE: DRAINAGE REPORT - SUNSET WEST UNIT II

In response to your correspondence dated March 28, 1980 regarding the referenced report, we have the following comments:

1) Drainage Area 4: due to an error on our part a sentence was omitted on page 4 of the report. The following should be added to the page where shown on the enclosure:

> A portion of the area north of the mobile home park will also drain to Tower Road and be discharged to the north of Sunset West.

It is this portion of drainage area 4, 42.15 acres, which was subtracted from the 88.06 ac shown on Appendix B, leaving the 45.91 ac noted, this was erroneously left out of the text.

2) Should you wish to verify total areas we can provide you with a 1" = 200' ortho-topo with the drainage areas shown.

The mobile home parks value is shown on Appendix H, page 1 (see attached) and was included in the totals of all drainage areas.

3) We are aware of the easement/ponding problem and will address this appropriately on our grading plan.

We hope this sufficiently addresses your concerns. As you are aware, we are quite anxious to proceed with our engineering and would appreciate a response concerning this drainage report at your earliest possible convenience. Thank you.

Sincerely,

Charles W. Campbell

Charles W. Campbell
CWC:er
cc: Max Walker

home park on 98th Street, drainage area 4 (See Appendix B) contributed approximately 71 C.F.S. (cubic feet per second) to the arroyo. Present facilities include a 24 inch C.M.P. (corrugated metal pipe) underground through the mobile home park, and a small area north of the mobile home park will contribute by overland flow. ADD SENTENCE INDICATED HERE These two flows (approximately 30 C.F.S. from the 24 inch C.M.P. and 27 C.F.S. from the overland flow) will combine to flow through the three 36 inch R.C.P. (reinforced concrete pipe) structure under 98th Street into the arroyo channel. In order to ensure capacity in case of any failure of constructed facilities upstream, the ditch section of the ditch-dike on the north side of San Ygnacio Rd. running parallel with both Units 1 & 2, is designed to accommodate 161 C.F.S. with the two foot high dike section above grade serving an additional protection. The ditch-dike will be extended east to 90th Street where it will be turned in a southerly direction to outfall into its original southeasterly course. A dike will also be placed on the easterly side of the 90th Street right of way to protect against overflow to the east. This ditch-dike section is designed to accomodate 167 C.F.S.

With the construction of Unit 1, which abuts to the west side of Unit 2, of the subdivision already underway, the only runoff entering Unit 2 from the west will be that portion of the onsite runoff from Unit 1 that will be carried in Sunbow and Sunridge Ave.

The most critical offsite flow to be considered is that which would utilize the southerly boundary of the subdivision (Sage Road) for outfall. Accumulated flows from Areas 1, 2, and 3 (See Appendix B) and the overflow not accomodated by the aforementioned 24 inch C.M.P. serving Area 4 would ultimately reach the inter-

GORDON HERKENHOFF & ASSOCIATES ALBUQUERQUE SANTA FE ENGINEERING COMPUTATIONS	NAME OF PROJECT Sunset West Unit 2 Hydrology & Hydraulic Computations			SHEET NUMBER 1 OF 4
	COMPUTED BY RBG	CHECKED BY	JOB NUMBER	DATE 1-30-80

Hydrology:

Drainage Area ④ (Appendix 8) $C = 0.40$

Area = 45.91 Ac. ; Tc = 23.99 min. ; I = 189/(23.99+25) = 3.86 In/HR.

Q = 0.40 × 3.86 × 45.91 = 70.89 C.F.S. value of mobile home park

Drainage Areas 1, 2, 3, 4 & the Mobile Home Park

Area = 421.37 Ac. ; Tc = 49.70 min. ; I = 189/(49.70+25) = 2.53 In/HR.

Composite C = [(Developed 49.82 × 0.7) + (Undeveloped 371.55 × 0.4)]/421.37 =

C = 0.44

Q = 421.37 × 2.53 × 0.44 = 469.07 C.F.S.

Subdivision Tract:

Gross Area = 17.866 acres

Natural Runoff:

Rate:- Area = 17.866 Ac. ; C = 0.40

$$T_c = \left[\frac{(920/5280)^3 \times 11.9}{28-6}\right]^{0.385} = 0.105 \text{ HR.} = 6.3 \text{ min.}$$

I = 189/(25+6.3) = 6.04 In/HR.

Q = 17.866 × 6.04 × 0.40 = 43.16 C.F.S.

Volume :-

100 yr. - 6 HR. Precipitation = 2.2 inches

V = 17.866 × (2.2/12) × 0.4 = 1.31 Ac. Ft. = 57,063.6 C.F.

Developed Runoff:

Rate:—

Area to Runoff = Street Area Plus Front Yard Area Plus Eight (8) Back Yard Area.

Hard Surface -

2,787.76 L.F. street × 41.25 Ft.	=	114,995.10 S.F.
958.36 L.F. street × 29.62 Ft.	=	28,386.62 S.F.
645.03 L.F. street × 31.62 Ft.	=	20,395.85 S.F.
76 Driveways × 15 Ft. × 20 Ft.	=	22,800 S.F.
Total		186,577.57 S.F.

Appendix H

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

March 28, 1980

Mr. Russell B. Givler
Gordon Herkenhoff & Assoc., Inc.
302 Eighth St. N.W.
Albuquerque, N.M. 87102

Re: Sunset West Subdivision Unit 2

Dear Mr. Givler:

The following are comments for the above subdivision:

1. In the hydrology computation - drainage area 4 is shown to be 45.91 ac. but on the map (Appendix B) it is shown to be 88.06 ac. Thereby the Q computed would be 136 cfs if the T_c value is correct.

2. Cannot verify total area for 1,2,3 and 4 and the Mobile Home Park Areas 1,2,3 and 4 add up to 389.38 ac. however, there is no value shown for the mobile home park.

3. It is not shown as to whether there is a utility easement between properties within the location of the backyard ponds or not. If there is the ponds must be located outside of the easements.

Sincerely,

Fred J. Aguirre
Civil Engineer

FJA/fs

cc - Drainage File

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

March 28, 1980

Mr. Russell B. Givler
Gordon Herkenhoff & Assoc., Inc.
302 Eighth St. N.W.
Albuquerque, N.M. 87102

Re: Sunset West Subdivision Unit 2

Dear Mr. Givler:

The following are comments for the above subdivision:

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3. It is not shown as to whether there is a utility easement between properties within the location of the backyard ponds or not. If there is the ponds must be located outside of the easements.

Sincerely,

Fred J. Aguirre
Civil Engineer

FJA/fs

cc - Drainage File

293-1651.22-80

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

February 14, 1980

Mr. Bruno Conegliano
Assistant City Engineer-Hydrology
City of Albuquerque
City Hall Building
Albuquerque, New Mexico 87102

RE: ENGINEER'S REPORT ON STORM DRAINAGE FOR SUNSET WEST SUBDIVISION UNIT 2

Transmitted herewith are three (3) copies of the referenced Engineer's report for your review and approval.

The developer is anxious to proceed with other aspects of the development which are contingent upon the approval of the drainage report. We will appreciate any effort you can give us to expedite this procedure.

Please endorse and return one (1) copy of the report at your earliest convenience. If there are any questions concerning the report, please contact me.

Russell B. Givler

RUSSELL B. GIVLER
RBG:er
Encls.
cc: Mr. Max Walker (w/5 enclosures)

RECEIVED
FEB 14 1980
CITY ENGINEER

Sunset West Subdivision

CITY OF ALBUQUERQUE, NEW MEXICO
CITY ENGINEER'S OFFICE

MEMORANDUM - January 29, 1979

TO: Phil Garcia, Planning Department
FROM: Bruno Conegliano, Assist. City Engineer-Hydrology
SUBJECT: SUNSET WEST SUBDIVISION

A review of the drainage conditions of the area surrounding the referenced subdivision, my comments are as follows:

The intersection of 98th Street and Gibson Blvd. is presently subjected to a flow in excess of 800cfs with the occurrence of a 100 years frequency storm and is intransitible with the occurrence of storms of lesser magnitude. Sage Road is expected to receive more than 500cfs with the 100 years storm and would also be intransitible. Overflow across 98th Street by an unnamed arroyo some 600 feet north of the intersection with Towner, would also make difficult the access to the Westgate Heights area. A diversionary facility could conceivably be built to the north of the proposed subdivision to prevent the sheet flow flooding which presently is indicated to occur over 1/3 of the subdivision which has resulted in the designation of this area as subject to flooding on the Flood Hazard Boundary Map.

The engineer proposes the utilization of part of the R.O.W. of St. Ignacio Rd. S.W. for this diversion. It is questionable whether this use of public street R.O.W. is desirable. At the present time the existing ephermeral water courses disappear in the alluvial fans indicating that the major part of the flows infiltrate into the ground, and do not affect properties to the east. Major diversionary works and drainage channels have been recommended for this area, but implementation of the recommendations by the consultants for the City and for AMAFCA is far in the future. In view of the absence of outfall drainage channels (and R.O.W.) and of the access problems mentioned, I recommend against approval of further development in this area until adequate drainage facilities can be provided.

BC/fs

cc - Dick Heller
Chuck Campbell
Drainage File

L9/D4

ENGINEER'S REPORT

ON

1651.22

STORM DRAINAGE
FOR
SUNSET WEST UNIT 2

February, 1980

GORDON HERKENHOFF & ASSOCIATES, INC.
302 Eighth Street, N.W.
Albuquerque, New Mexico 87102
ENGINEERS ARCHITECTS PLANNERS

ENGINEER'S REPORT

ON

1651.22

STORM DRAINAGE
FOR
SUNSET WEST UNIT 2

February, 1980

GORDON HERKENHOFF & ASSOCIATES, INC.
302 Eighth Street, N.W.
Albuquerque, New Mexico 87102
ENGINEERS ARCHITECTS PLANNERS

I hereby certify that this Drainage Report for Sunset West Subdivision Unit Two was prepared under my direction, conforms to Drainage Resolution 1972-2 and City of Albuquerque Resolution No. 59-1976, and is true and correct to the best of my knowledge and belief.

Gordon Herkenhoff
Registered Professional Engineer No. 243

2-13-80
Date

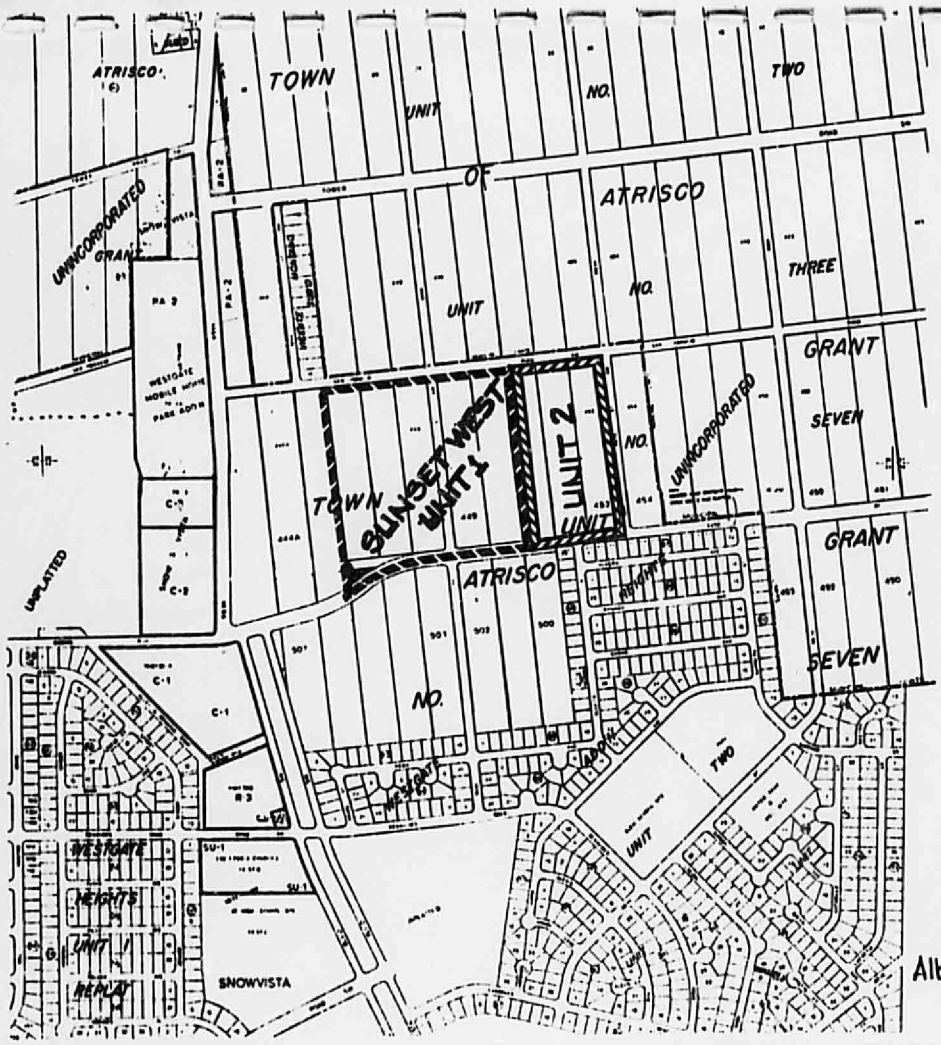
Approved:

For the City of Albuquerque

ENGINEER'S REPORT
STORM DRAINAGE
FOR SUNSET WEST
SUBDIVISION UNIT 2

INTRODUCTION: Sunset West Subdivision Unit 2 is located east (down stream) of Sunset West Subdivision Unit 1 (see vicinity map), which is under construction at the present time. The Engineer's Report on Storm Drainage for Sunset West dated July 1979 and approved August 30, 1979; (see appendix A) addressed the natural drainage in the area and established a means of providing protection from possible offsite flows to the subdivision with temporary and permanent facilities. These facilities will be extended on the north, east and south of Unit 2 of the subdivision.

There are several areas upstream from the site which must be evaluated in considering this tract. Some information for this area has been developed in the Albuquerque Metropolitan Arroyo Flood Control Authority's (A.M.A.F.C.A.) Drainage Management Plan Western Albuquerque Metropolitan Area and the Corps of Engineers Flood Plain Information, Albuquerque Arroyos Part III, Albuquerque, New Mexico. The Master Plan of Drainage, City of Albuquerque, New Mexico and Environs 1963 and the Flood Hazard Boundary Maps for the City of Albuquerque, N.M. were also consulted. The subdivision area appears to be outside any flood hazard area, although none of the aforementioned reports clearly exclude the site from possible floodwater encroachment. After careful study, it was concluded that the site could be protected from possible offsite flows with temporary and permanent facilities.



VICINITY MAP

SUNSET WEST
UNIT 2
Albuquerque, New Mexico

PURPOSE: The purpose of this report is to provide information regarding the hydrology and natural drainage facilities relating to Unit 2 of the subdivision and design criteria for areas to be graded and for facilities to be constructed.

DESCRIPTION OF THIS SITE AND PROJECT: The site consists of a 16.299 acre tract which is situated between Sage Road S.W. (Gibson Boulevard) and San Ygnacio Road S.W. and west of 90th Street S.W. to the east line of Unit 1 of the subdivision (see vicinity map).

The site will be subdivided into 76 lots for single family homes. The design size of the lots was 61 feet by 100 feet, although the average lot is larger. Homes to be constructed within the project are anticipated to approximate 1,300 square feet of living area plus a double car garage.

Existing development in the immediate area consists of single family subdivisions to the immediate west, Unit 1 of this subdivision and across the street on the south side of Sage Road S.W.

HYDROLOGY AND HYDRAULICS: As discussed in the introduction of this report, several hydrologic studies have been conducted relative to this area, but none of these reports either clearly eliminated from or situated the subdivision area within a flood hazard area. The current F.I.A. maps now eliminate the subdivision area from the flood hazard area, the aforementioned Corps of Engineers Report indicates a possibility that the arroyo intercepted by Tower Road S.W. at the 5150 contour (See Appendix B for 1:12,000 scale topographic map) could produce some shallow sheetflow north of the subdivision, although the limit of the study's extent was considerably north of the site. The A.M.A.F.C.A. study is no more

definite. A.M.A.F.C.A. is planning, in the immediate future, to act upon a study relative to diversion facilities planned to provide permanent protection from storm runoff for this immediate area downstream from approximately the 5170 contour. The exact location of the major facility has not been determined at this time. If the major facility is constructed upstream from the 5170 contour, the problem of local drainage within drainage areas 1, 2, 3 & 4, and downstream of the facility and west of 98th Street will have to be handled by the developers of that area. At this time no funds have been allocated for construction of this facility; however A.M.A.F.C.A.'s Executive Engineer has assigned a high priority for this work when funds become available. A.M.A.F.C.A. has had working drawings developed for extending the channel-dike system already partially constructed along the power line west of Westgate Subdivision (See Appendix B), and construction will be effected in the near future using their own maintenance forces. This will remove some area from a drainage basin contributing upstream (Area 4-Appendix B).

An extensive study was made of all available information and mapping together with several field inspections relative to the extent of offsite storm runoff that might encroach upon the subdivision site. It is believed that the aforementioned arroyo intercepted by Tower Road S.W. at the 5150 contour would not contribute to any flood hazard for the subdivision, since the depth of the Tower Road excavation is such that the large part of any flow would be diverted in an easterly direction on the road alignment. However, this is not a provable theory, therefore a combination ditch-dike will be placed within the San Ygnacio Road S.W. right of way (See Hydrologic & Hydraulic Computations-Appendix H) to provide protection from the possibility of this overflow. This facility will also serve to intercept and conduct flows accumulated in the arroyo crossing the north boundary of the subdivision. Prior to the construction of the mobile

home park on 98th Street, drainage area 4 (See Appendix B) contributed approximately 71 C.F.S. (cubic feet per second) to the arroyo. Present facilities include a 24 inch C.M.P. (corrugated metal pipe) underground through the mobile home park, and a small area north of the mobile home park will contribute by overland flow. These two flows (approximately 30 C.F.S. from the 24 inch C.M.P. and 27 C.F.S. from the overland flow) will combine to flow through the three 36 inch R.C.P. (reinforced concrete pipe) structure under 98th Street into the arroyo channel. In order to ensure capacity in case of any failure of constructed facilities upstream, the ditch section of the ditch-dike on the north side of San Ygnacio Rd. running parallel with both Units 1 & 2, is designed to accommodate 161 C.F.S. with the two foot high dike section above grade serving an additional protection. The ditch-dike will be extended east to 90th Street where it will be turned in a southerly direction to outfall into its original southeasterly course. A dike will also be placed on the easterly side of the 90th Street right of way to protect against overflow to the east. This ditch-dike section is designed to accomodate 167 C.F.S.

With the construction of Unit 1, which abuts to the west side of Unit 2, of the subdivision already underway, the only runoff entering Unit 2 from the west will be that portion of the onsite runoff from Unit 1 that will be carried in Sunbow and Sunridge Ave.

The most critical offsite flow to be considered is that which would utilize the southerly boundary of the subdivision (Sage Road) for outfall. Accumulated flows from Areas 1, 2, and 3 (See Appendix B) and the overflow not accomodated by the aforementioned 24 inch C.M.P. serving Area 4 would ultimately reach the inter-

section of Sage Road and 98th Street. Flows from the mobile home park development would also reach this point through the concrete flume discharge to 98th Street near the alignment of San Ygnacio and the 24 inch C.M.P. draining a 36 inch square catch basin at the southeast corner of the mobile home park. It is believed that any structural failures or other occurences which might reroute flows would still deliver and distribute flows in much the same manner as can presently be expected, although a somewhat greater flow might be anticipated in the channel north of Sage Road. A topographic map (Appendix F) indicates existing conditions in this vicintiy. The maximum flow anticipated to reach the intersection is 469 C.F.S. including that contriubted by all of Areas 1, 2, 3 and 4 and the mobile home park. Even the small scale topographic map in Appendix F clearly indicates the absolute certainty that there would be overflow creating sheetflow conditions in the intersection. While there is a defined channel on the north side of and adjacent to Sage Road, it is narrow and shallow, and the natural tendency for outfall is in a southeasterly direction. It is speculated that at the outset of the flow only a small quantity would utilize the Sage Road channel, and, as the channel was scoured, a somewhat larger flow could be expected. It is estimated that one-fourth of the total flow with a maximum of 150 C.F.S. would be expected to follow this channel under the most adverse conditions. In order to ensure safe capacity of the designed section, the paved street will be constructed with a 12 inch high straight curb producing a hydraulic capacity of 224 C.F.S. (See Appendix H). The entire area between the north back of curb and the right-of-way line along the south line of Unit 2, will be paved with sidewalk to protect from overflow scouring. This treatment is identical to that used in Unit 1 along the north right-of-way line of Sage Road S.W.

The intersection of Sage Road S.W. with Blazick Street S.W., and with 90th Street S.W. will be constructed with a temporary design as shown in Appendix H to accomodate anticipated flows, until permanent protection is afforded by construction of the A.M.A.F.C.A. Diversion Channel upstream. A retaining wall will be constructed on the street boundaries of the lot at the northeast corner of the intersection of Sage Road and Blazick Street to the elevation of the rough pad grade to ensure that meandering flows at the intersection remain channelized, and a two foot high dike fifty feet long will be constructed between the edges of new pavement and existing pavement in lieu of the 8 inch extruded asphalt curb at the southeast corner of the intersection for the same purpose. A four (4) foot concrete cutoff wall will be constructed at the east in extremity of 90th Street to protect the pavement from downstream outfall.

It is believed that the aforementioned facilities will provide adequate protection from offsite storm runoff.

Onsite construction will provide for compliance with Drainage Resolution 1972-2 (See Appendix H for computations). The gross developed area in Unit 2, including San Ygnacio, Sage Road, and 90th St. is 17.866 acres. Prior to development this area would generate 100 year frequency storm runoff at a rate of 43.16 C.F.S. and a volume of 57,063.6 cubic feet (C.F.). The developed runoff from Unit 2, will be generated from street areas, driveways, sidewalks, and front yards, and eight (8) lots which have a 100% drainage. The remaining 68 lots will have interior drainage with no outfall to the streets (see Drainage layout). The developed area generating runoff that will enter the street system for conduct offsite is 8.36 acres, and a rate of 29.80 C.F.S. and a volume of 44,431.20 C.F. Both the rate and volume are well below the natural runoff from

the site hereinbefore mentioned. The maximum interior street flow will occur on Sunbow Ave. The maximum internal runoff from Unit 1, 23 C.F.S., will be carried down Sunbow Ave. Between Unit 1 and Blazick Street, on which some of the flow will be carried to Sage Road, there are ten (10) lots that will contribute approximately 2.85 C.F.S. to the flow in Sunbow Ave. The total anticipated flow in Sunbow Ave. of 25.85 C.F.S. is well under the curb full minimum street capacity of 32 C.F.S.

The typical design lot cross section and plan is indicated on the Drainage Layout. The anticipated volume of runoff on the undrained portion of a design lot is 527.9 C.F. The average depth of lot ponds will be:

Upper Lots = 9 1/4"

Lower Lots = 11 1/4"

RECOMMENDATIONS: It is recommended that the City of Albuquerque approve this report, in that it provides for adequate site protection together with accomodating the requirements set forth in drainage regulations.

APPENDIX INDEX

APPENDIX A

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

August 30, 1979

Mr. Joe Pino
Gordon Herkenhoff & Assoc.
302 Eighth Street N.W.
Albuquerque, New Mexico 87102

RE: SUNSET WEST UNIT ONE

Dear Mr. Pino:

I have reviewed your letter dated August 21, 1979 which addresses, in a satisfactory manner, the concerns of the City Engineers Office. I feel that it is desirable to dedicate a temporary drainage easement along the west side of the property as indicated to you by telephone which will revert to the owner at the time of the development of the parcel of property between this Subdivision and 98th Street. Conveyance of an appropriate instrument, satisfactory to the City Engineers Office, will allow signature of the plat for this development.

Very truly yours,

Bruno Conegliano
Asst. City Engineer-Hydrology

BC/tsl

cc: Rick Leonard, AMAFCA
R. S.Heller, City Engineer
File

then computed by dividing the total overland flow length by the average velocity.

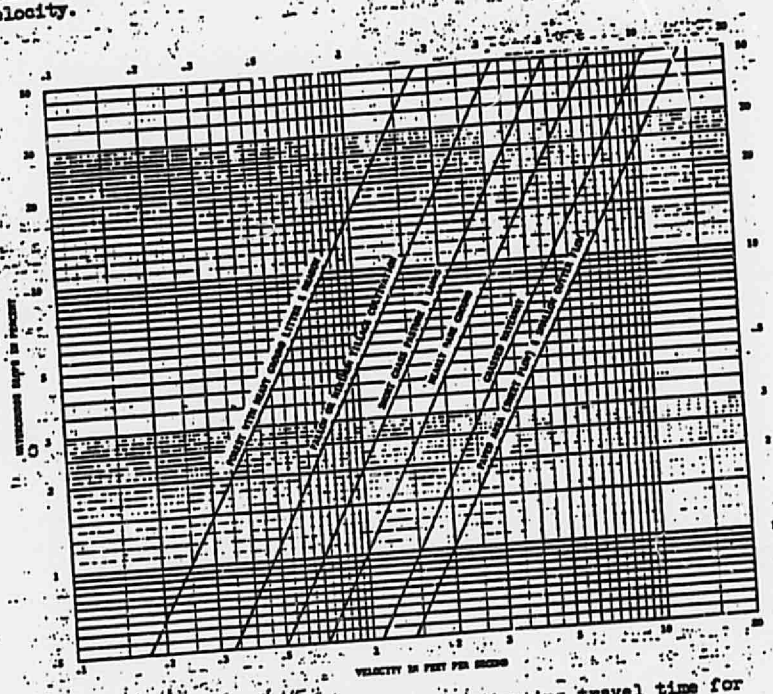


Figure 3-1.--Average velocities for estimating travel time for overland flow.

Storm sewer or road gutter flow

Travel time through the storm sewer or road gutter system to the main open channel is the sum of travel times in each individual component of the system between the uppermost inlet and the outlet. In most cases average velocities can be used without a significant loss of accuracy. During major storm events, the sewer system may be fully taxed and additional overland flow may occur, generally at a significantly lower velocity than the flow in the storm sewers. By using average conduit sizes and an average slope (excluding any vertical drops in the system), the average velocity can be estimated using Manning's formula.

Since the hydraulic radius of a pipe flowing half full is the same as when flowing full, the respective velocities are equal. Travel time may

APPENDIX D

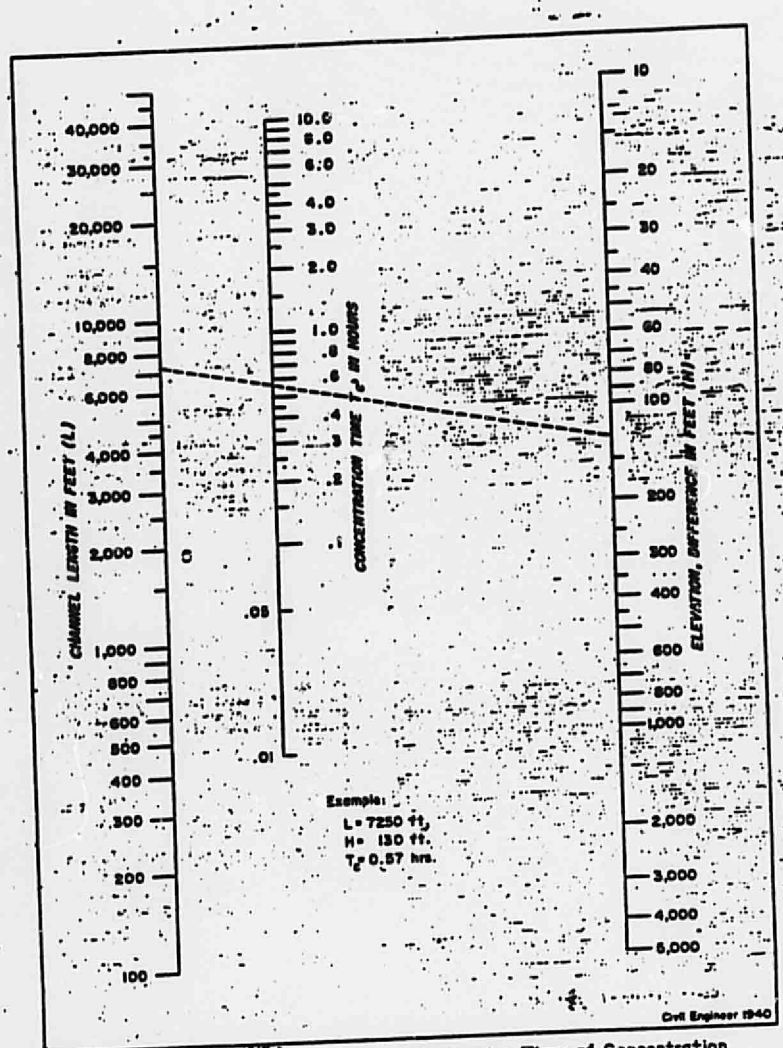
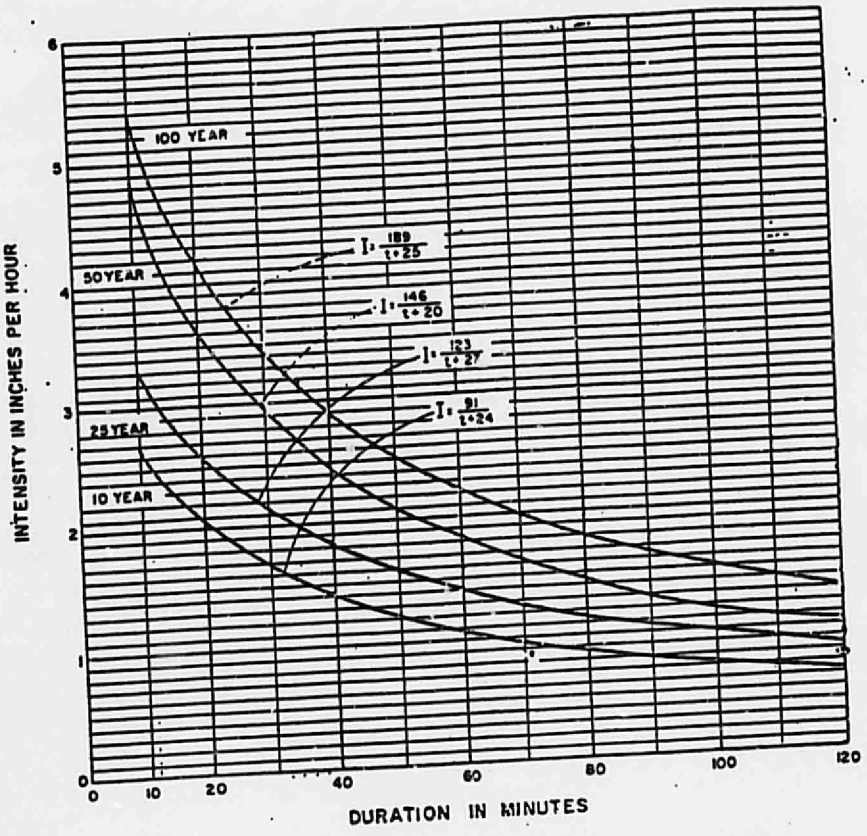


Figure 2-2 Nomograph to Determine Time of Concentration

CALIFORNIA CULVERT PRACTICE —

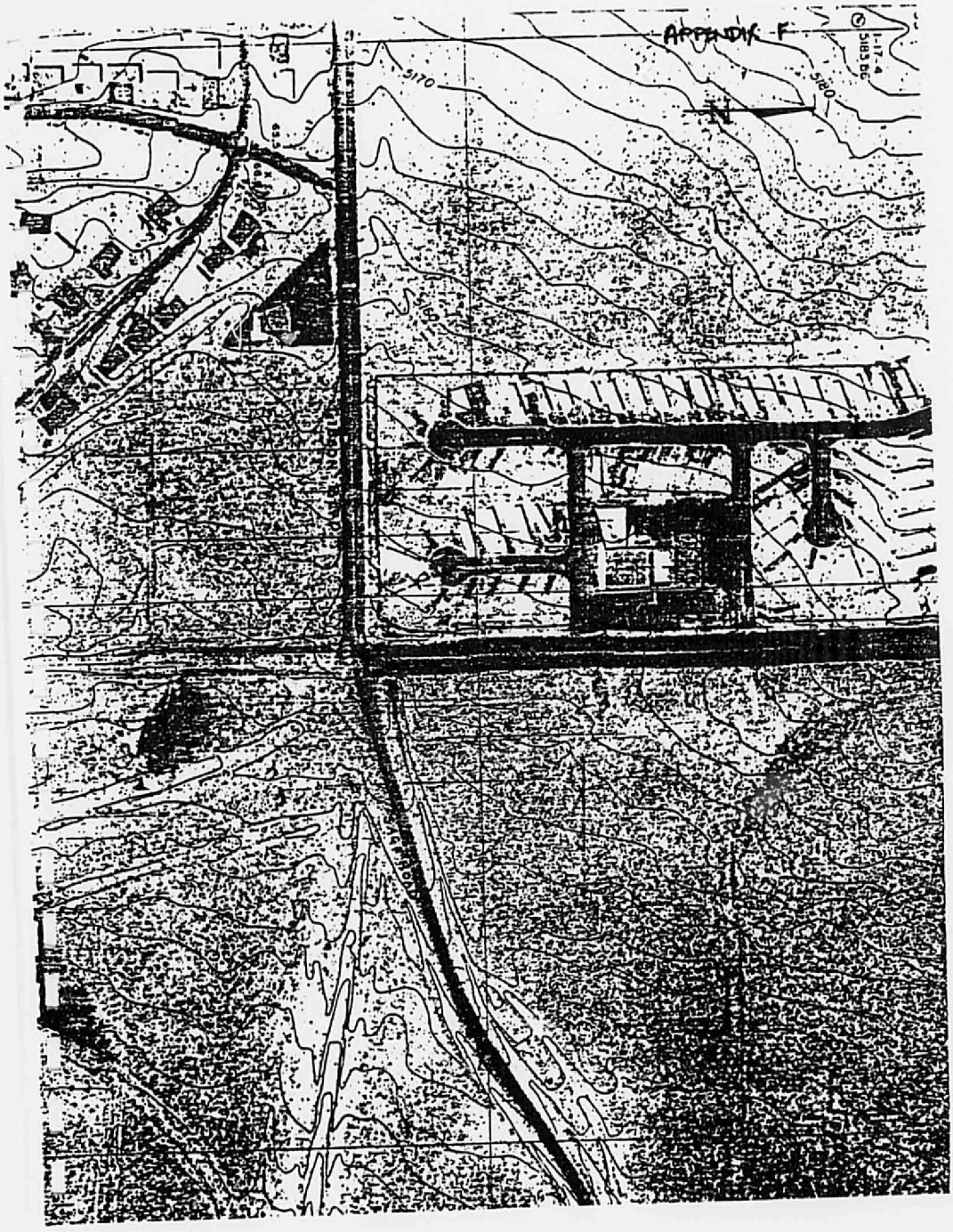
$$T_c = \left[11.9\,(L_{MILES})^3 / H_{FEET}\right]^{0.385}$$

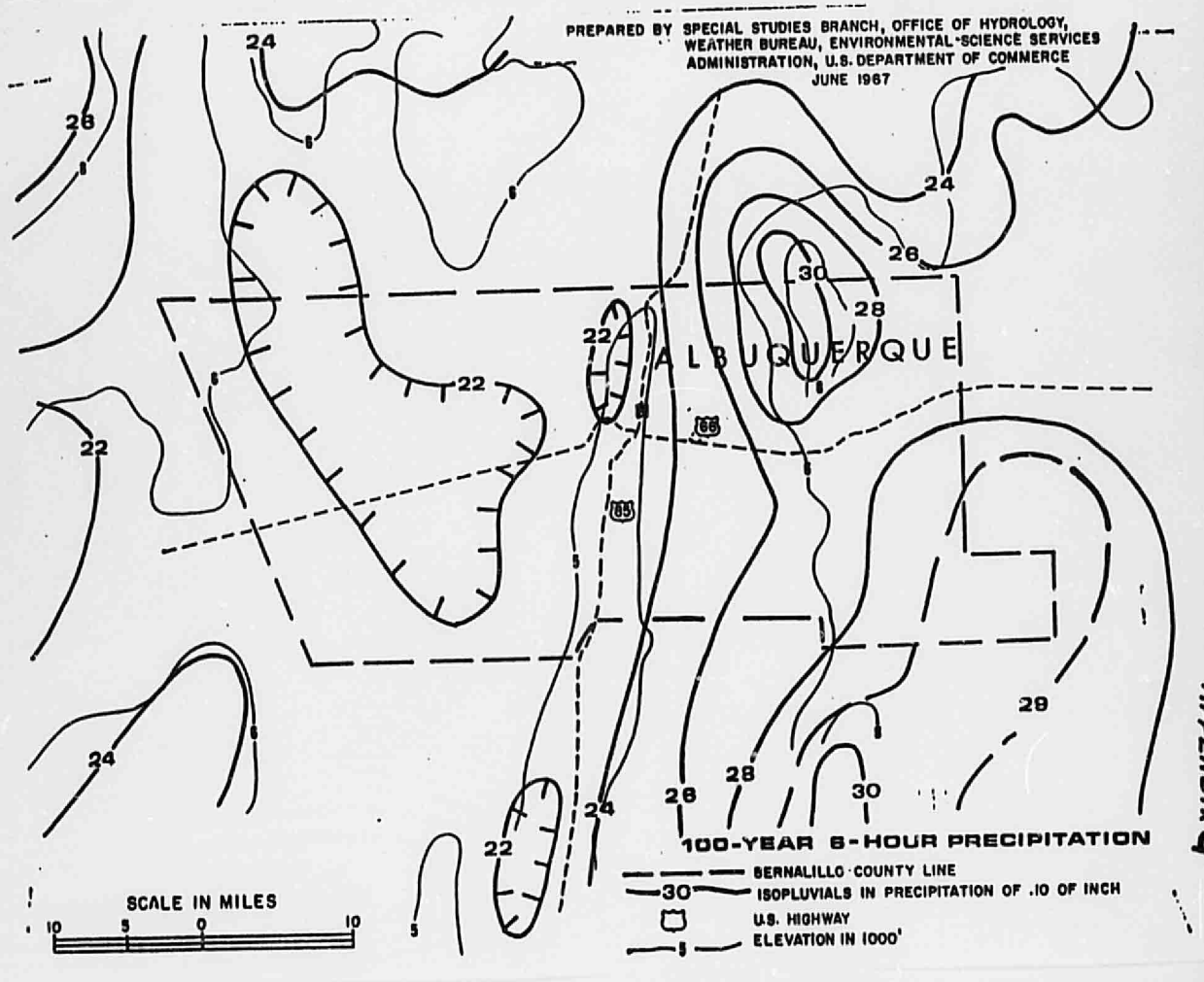
APPENDIX E



INTENSITY DURATION FREQUENCY CURVES

ALBUQUERQUE, N.M.




PREPARED BY SPECIAL STUDIES BRANCH, OFFICE OF HYDROLOGY,
WEATHER BUREAU, ENVIRONMENTAL SCIENCE SERVICES
ADMINISTRATION, U.S. DEPARTMENT OF COMMERCE
JUNE 1967
ALBUQUERQUE
25
SCALE IN MILES
10 5 0 10
100-YEAR 6-HOUR PRECIPITATION
BERNALILLO COUNTY LINE
30 ISOPLUVIALS IN PRECIPITATION OF .10 OF INCH
U.S. HIGHWAY
5 ELEVATION IN 1000'

APPENDIX G

GORDON-HERKENHOFF & ASSOCIATES ALBUQUERQUE SANTA FE ENGINEERING COMPUTATIONS	NAME OF PROJECT Sunset West Unit 2 Hydrology & Hydraulic Computations			SHEET NUMBER 1 OF 4
	COMPUTED BY RBG	CHECKED BY	JOB NUMBER	DATE 1-30-80

Hydrology:

Drainage Area ⓐ (Appendix B) C = 0.40

Area = 45.91 Ac.; Tc = 23.99 min.; I = 189/(23.99+25) = 3.86 In/HR.

Q = 0.40 × 3.86 × 45.91 = 70.89 C.F.S.

Drainage Areas 1, 2, 3, 4 & the Mobile Home Park

Area = 421.37 Ac.; Tc = 49.70 min.; I = 189/(49.70+25) = 2.53 In/HR.

Composite C = [(Developed 49.82 × 0.7) + (Undeveloped 371.55 × 0.4)]/421.37 =

C = 0.44

Q = 421.37 × 2.53 × 0.44 = 469.07 C.F.S.

Subdivision Tract:

Gross Area = 17.866 acres

Natural Runoff:

Rate:- Area = 17.866 Ac.; C = 0.40

$$Tc = \left[\frac{(926/5280)^3 \times 11.9}{28-6}\right]^{0.385} = 0.105 \text{ HR.} = 6.3 \text{ min.}$$

I = 189/(25+6.3) = 6.04 In/HR.

Q = 17.866 × 6.04 × 0.40 = 43.16 C.F.S.

Volume:-

100 yr. - 6 HR. Precipitation = 2.2 inches

V = 17.866 × (2.2/12) × 0.4 = 1.31 Ac. Ft. = 57,063.6 C.F.

Developed Runoff:

Rate:-

Area to Runoff = Street Area Plus Front Yard Area Plus Eight (8) Back Yard Area.

Hard Surface -

2,787.76 LF. street × 41.25 Ft.	=	114,995.10 S.F.
958.36 LF. street × 29.62 Ft.	=	28,386.62 S.F.
645.03 LF. street × 31.62 Ft.	=	20,395.85 S.F.
76 Driveways × 15 Ft. × 20 Ft.	=	22,800 S.F.
Total		186,577.57 S.F.

Appendix H

GORDON HERKENHOFF & ASSOCIATES ALBUQUERQUE SANTA FE ENGINEERING COMPUTATIONS	NAME OF PROJECT Sunset West Unit 2 Hydrology & Hydraulic Computations			SHEET NUMBER 2 OF 4
	COMPUTED BY RBG	CHECKED BY	JOB NUMBER	DATE 1-30-80

Hydrology (Cont'd):

Unpaved Surface –

2,787.76 L.F. street	x 8.75 Ft. =	24,392.90 S.F.
958.36 L.F. street	x 4.38 Ft. =	4,197.62 S.F.
645.03 L.F. street	x 3.38 Ft =	2,180.20 S.F.
2,787.76 L.F. Front Yards	x 40 Ft =	111,510.40 S.F.
616.32 L.F. Front Yards	x 20 Ft. =	12,326.40 S.F.
Less Driveways	=	- 22,800 S.F.
Entire Lots 665 L.F.	x 81 Ft. =	45,765. S.F.
Total	=	177,572.52 S.F.

Area = 186,577.57 + 177,572.52 = 364,150 S.F.
= 8.36 Ac.

Comp. C = [(186,577.57 x 0.9) + (177,572.52 x 0.4)] / 364,150 = 0.66
Travel = 1500 L.F., Average Vel. = 2.5 F.P.S.
T_c = 1,500 / (2.5 x 60) = 10.0 min.
I = 189 / (25 + 10) = 5.4 In/HR.
Q = 8.36 x 5.4 x 0.66 = 29.80 C.F.S.

Volume –
V = 8.36 x (2.2/12) x 0.66 = 1.02 Ac. Ft. = 44,431.20 C.F.

Lot Retention:

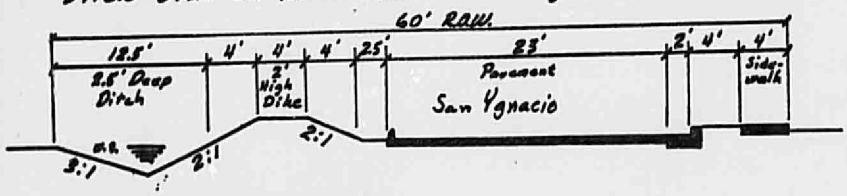
Anticipated Volume –
Areas – 1,800 S.F. House & Garage
3,080 S.F. Landscaped } 80 x 61 = 4,880 S.F.
Comp. C = [(1,800 x 0.9) + (3,080 x 0.4)] / 4,880 = .59
Volume = 4,880 x (2.2/12) x 0.59 = 527.9 C.F.

Pond Depth Required:–
Upper Lots = 527.9 / (55 x 12.5) = .7678' = 9¼" in depth
Lower Lots = 527.9 / (55 x 10.25) = .9364' = 11¼" in depth

GORDON HERKENHOFF & ASSOCIATES ALBUQUERQUE · SANTA FE ENGINEERING COMPUTATIONS	NAME OF PROJECT Sunset West Unit 2 Hydrology & Hydraulic Computations			SHEET NUMBER 3 OF 4
	COMPUTED BY R.B.G.	CHECKED BY	JOB NUMBER	DATE 1-30-80

Hydraulics:

Ditch - Dike On North Side of San Ygnacio Rd. S.W. in Unit #2



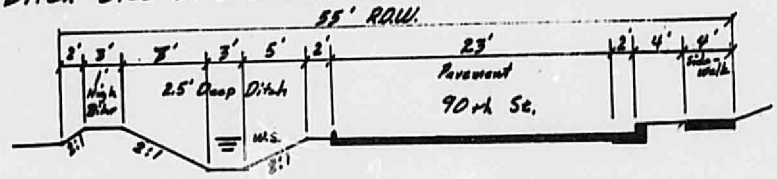
$S = 0.01925$; $n = 0.022$

Area = $12.5 \times 2.5/2 = 15.63$ S.F. ; WP = $5.59 + 7.91 = 13.5$ L.F.

$V = (1.486/0.022)(15.63/13.5)^{2/3}(0.01925)^{1/2} =$ 10.33 F.P.S.

$Q = 15.63 \times 10.33 =$ 161.51 C.F.S.

Ditch - Dike On East Side of 90th St. S.W. Unit 2



$S = 0.0097$ $n = 0.022$

Area = $(3 \times 2.5) + [(10 \times 2.5)]/2 = 20$ S.F. ; WP = $5.59 + 5.59 + 3 = 14.18$ L.F.

$V = (1.486/0.022)(20/14.18)^{2/3}(0.0097)^{1/2} =$ 8.37 F.P.S.

$Q = 8.37 \times 20 =$ 167.4 C.F.S.

Sage Road

$n = 0.015$; $S = 0.015$ minimum

Area = $(1 + 0.67)/2 \times 26 = 21.71$ S.F. ; WP = 27.67 L.F.

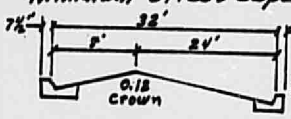
$V = (1.486/0.015)(21.71/27.67)^{2/3}(0.015)^{1/2} =$ 10.32 F.P.S.

$Q = 21.71 \times 10.32 =$ 224.08 C.F.S.

GORDON HERKENHOFF & ASSOCIATES ALBUQUERQUE SANTA FE ENGINEERING COMPUTATIONS	NAME OF PROJECT: Sunset West Unit 2 Hydrology & Hydraulic Computations			SHEET NUMBER 4 OF 4
	COMPUTED BY RBG	CHECKED BY	JOB NUMBER	DATE 1-30-80

Hydraulics (Cont'd):

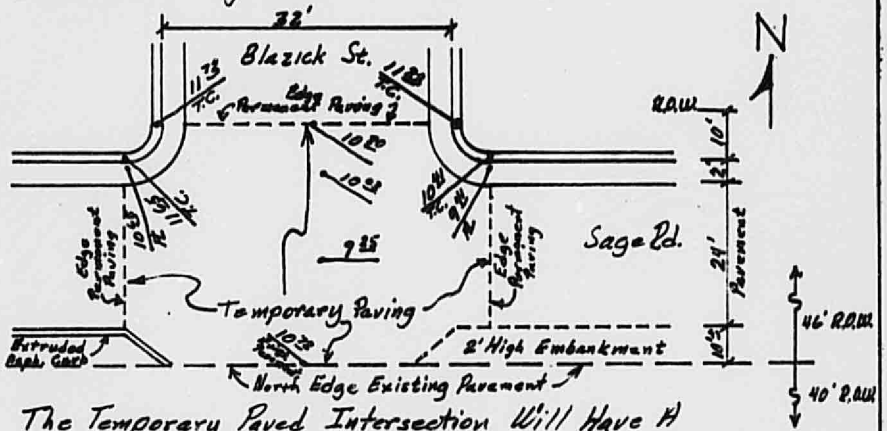
Minimum Street Capacity:



n = 0.015; S = 0.006 minimum

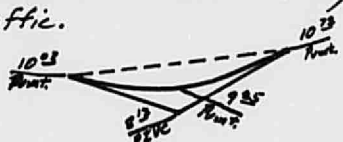
Area = [(8.17+0.05)/2 × 8] + [(8.47+0.05)/2 × 24]
= 0.88 + 8.64 = 9.52 S.F.
W.P. = 32.84 L.F.
R = 9.52/32.84 = 0.29
V = (1.486/0.015) (0.29)^⅔ (0.006)^½ = 3.36 F.P.S.
Q = 9.52 × 3.36 = 32.00 C.F.S.

Intersection Sage Road & Blazick Street:



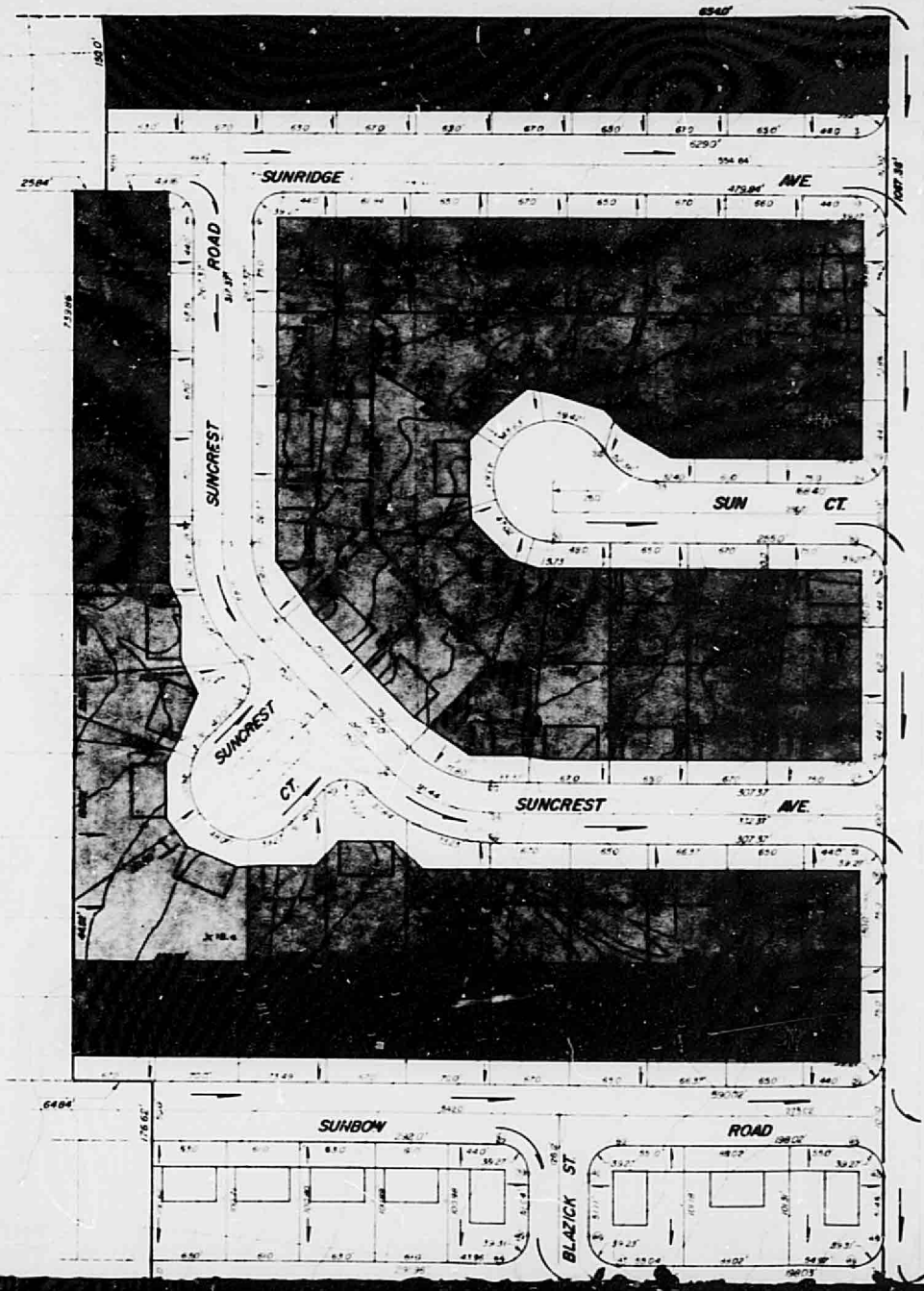
The Temporary Paved Intersection Will Have A Parabolic Cross-Section To Provide For Accomodating The Anticipated Flow And To Permit Opening The Intersection To Vehicular Traffic.

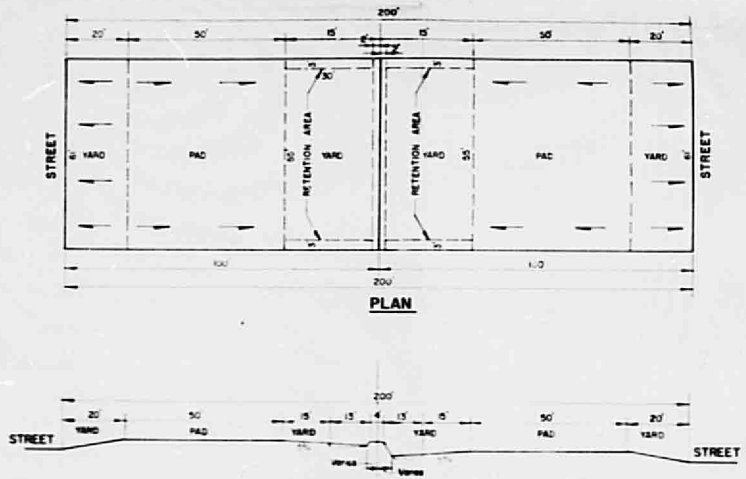
Cross Section



S = 1.56/41 = 0.03805
Width = 36'
n = 0.015
Depth = 1.13'
Water depth = 0.78'

Area = 27.141 S.F.
V = 15.28 F.P.S.; Q = 433.70 C.F.S. @ full depth (1.13)





TYPICAL DESIGN LOT

LEGEND

ON SITE DRAINAGE Retained on Site

DIRECTION OF FLOW

AS BUILT INFORMATION

BENCH MARKS

SURVEY INFORMATION

FIELD NOTES BY DATE

REFERENCES

MAP NO.

EST. NO.

W.O. NO.

NO. REMARKS BY DATE

REVISIONS

DESIGN

DESIGNED BY DATE

DRAWN BY DATE

CHECKED BY DATE

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

TITLE: SUNSET WEST UNIT TWO
DRAINAGE LAYOUT

APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
City Engineer			Liquid Waste		
A.C.E. - Design			Traffic		
A.C.E. - Hydrology			Water		

APPROVED FOR CONSTRUCTION

SUNSET