JADE PARK MOBILE
HOME PARK

D18-D5

1 PLAN

# CITY OF ALBUQUERQUE

ALBUQUERQUE, NEW MEXICO

INTER-OFFICE CORRESPONDENCE

January 28, 1969

TO: Frank J. Bailey

SUBJECT: Jade Park Drainage Study

Analyzation of the surrounded contributing areas and the subdivision itself was based on the following assumptions:

Considering the area above or east of the proposed subdivision the contributing flow to the south half or lower portion will be from an area approximately five miles long and averaging 2,000 ft. in width. This is bisected by a collector arroyo at present that lies between the Domingo Baca and the Pino arroyos and flows through the southern half of the subdivision, the average slope being 2.6%; also, the assumptions were made that:

1. Eubank, Wyoming or Barstow will act as a cutoff or diversion to drainage flow.
2. And/or the time of concentration of the area to the east of there will not increase the peak of the hydrograph.
3. A "C" or runoff factor of 0.3 for unimproved bare ground was used.
4. The intensity "I" or rainfall was 3.4 inches. (30 minute duration-100 year storm-Albuquerque Area-1961)

Therefore, using the rational formula,

$$Q = \frac{10{,}500 \text{ (2 miles)} \times 2{,}000 \text{ ft.} \times 0.3 \times 3.4}{43{,}560 \text{ ft.}}$$

$$Q = 490 \text{ c.f.s.}$$

Roughly taking the velocity as V = Q/A "A" here being the carrier cross section or assuming the arroyo flowing full 1.5' deep by 50' wide, the A would be 75 sq. ft.

$$V = \frac{490}{75} \text{ c.f.s.} = 6.5 \text{ ft. per sec.}$$

The time of concentration:

For arroyo = 10,500/60 min. ÷ 6.5'/sec. = 27 min.

As the area is cut up by small arroyo, only 5 minutes were allowed for overland flow. The total elapsed collection time will be plus or minus 32 minutes. The duration of storm assumption was then closely correct.

Where this flow enters the subdivision at San Rafael and Louisiana the consultant for the developer uses the proposed elevation of 5317.0.

For flows entering the subdivision from San Francisco, this easterly drainage area consists of approximately 286 acres. Using the same design entered for the rational formula, we have a Q = 360 c.f.s. It is noted that if developement of the easterly area is made, runoff would be diverted to the Domingo Baca.

Where this flow enters the subdivision (150 ft. north of San Francisco) the City rough grade elevation for Louisiana is 5317.0±. The consultant elevation is approximately the same.

To carry this flow through Jade Park subdivision plus any contributing interior drainage, San Francisco should be made 44 ft. in width with no crown, with a normal 8" curb. The exit is an existing arroyo.

A cross sectional street area of a 4 inch curb with a 4 inch crown (see attached drawing) will carry (at a minimum slope) an amount of Q = 10.5 c.f.s. By computing all interior flows, the runoff based on the rational formula, but I = 3.75 and C = 0.50, the above street cross section is ample enough.

A 20 ft. drainage easement is necessary from Dale Ct. NE to the large Drainage Easement which adds not more than 30 c.f.s. to the flow. Another easement from Herbert Dr. NE 150 ft. to the edge of the subdivision will be necessary to carry the small amount of runoff away. The easement should empty into an existing arroyo.

Another outside flow approaching the subdivision will be carried northward to the Domingo Baca by Louisiana NE.

Robert W. Blair

ROBERT W. BLAIR
Chief Inspector

RWB:gjr
cc: W. T. Stevens
1 for the file ✓

January 8, 1969

Mr. Dan Hagan
Universal Constructors, Inc.
Station B., Box 6008
Albuquerque, New Mexico

Gentlemen:

RE: JADE PARK GRADING PROJECT
ADDENDUM #1

The following points are for clarification in preparation of your bids for grading Jade Park:

1. Grading of the following streets will not be included:

   a. Louisiana Boulevard
   b. Pino Street
   c. San Pedro Boulevard
   d. San Rafael Boulevard

2. The profile grade shown is for finished and grade. Grading for this contract will be grading to an elevation eight (8) inches below the finished grades shown on the drawings.

3. Grading will be for a 32 foot wide street. At the curb line the grading will be up or shown on a slope not to exceed 2:1.

4. Compaction for the dike on either side of the drainage easement will be that obtained by the equipment used in constructing the dike. The same will apply to waste areas on either side of the streets within the lots.

It is requested that you acknowledge receipt of this addendum in your bid.

Sincerely,

SCANLON-DERICKSON, INC.

Wendell W. Derickson

Wendell W. Derickson

WWD:mag

JAN 9 REC'D

1/7/68 2/14/69

SECTION 1

GRADING AND PREPARATION OF SUB-GRADE

1-01. SCOPE: The work covered by this section of the specifications consists of furnishing all labor, equipment, and materials and in performing all operations and incidentals in connection with the grading and preparation of the sub-grade of streets in strict accordance with this section of the specifications.

1-02. GENERAL: This specification consists of grading and preparation of the sub-grade prior to the installation of curbs, gutters and paving and includes excavation, borrow, embankments and shoulders, and other operations including hauling, wetting, rolling and all necessary operations.

1-03. METHOD OF OBTAINING COMPACTION: The method and equipment used by the Contractor to obtain the required compaction of the subgrade shall be left entirely up to the contractor. "END RESULTS METHOD TO GOVERN."

The number of compaction tests and locations covering a given area shall be designated by the Engineer.

1-04. CONSTRUCTION METHODS:

a. Cuts and Fills: Excavation shall include any material which is encountered in the work and shall be "unclassified". Embankment is fill material which supports the pavement or roadway and is to be placed on subgrade which has been scarified six inches (6") deep and compacted. Embankment material may come from excavated areas and the top twelve inches (12") of the embankment shall be material selected by the Engineer. Embankment shall be placed in successive horizontal layers not exceeding eight inches (8") loose depth. The top six inches (6) in residential streets and the top twelve (12") in arterial streets of the subgrade shall be compacted to 95% of maximum density as determined by AASHO Test Method T-180 (Modified Proctor) for materials having less than 35% passing the No. 200 sieve and 90% of the Modified Proctor for materials having 35% or more passing the No. 200 sieve. Embankment below the top six inches (6") in residential streets and the top twelve (12") in arterial streets of the subgrade shall be compacted to at least 90% of the Modified Proctor. When transitions from excavation to embankment occur, additional material shall be excavated, if necessary by benching, so that the natural ground surface will not be less than 12 inches below the top of the subgrade.

b. Preparing Sub-Grade: When ordered by the Engineer, the Contractor will be required to "Proof Roll" the sub-grade by making four passes with a heavy pneumatic roller over the prepared subgrade. No additional compensation will be made to the contractor for "Proof Rolling." The surface of all cuts and fills shall be so shaped that they will conform after compaction, to the proper grade and contour of the under side of the pavement. In general, a tolerance of one half inch (½") will be allowed in checking the section provided such deviation is not extended over six feet (6') and is not off consistently in the same direction. The Contractor shall furnish a straightedge, template or other means approved by the Engineer for checking the subgrade. Sufficient sugrade shall be prepared in advance to insure satisfactory prosecution of the work and shall be maintained free of holes, ruts and soft spots.

All soft and unstable material and other portions of the subgrade which will not compact readily or serve the intended purposes shall be removed and replaced with suitable material from excavation or borrow or suitable materials shall be added and, by manipulation, be incorporated into the subgrade to produce a material meeting subgrade requirements. All boulders or ledge rock appearing in the excavation shall be removed or broken off to a depth of not less than 6 inches below the subgrade. The resulting areas and all other low sections, holes, or depressions shall be brought to required grade with satisfactory materials and the entire subgrade shaped to line, grade and cross-section.

During construction, embankment and excavations shall be kept shaped and drained. The storage or stock-piling of materials on the subgrade will not be permitted. No base course or surfacing shall be laid until the subgrade has been checked and approved, and in no case shall any base course be placed on a muddy subgrade.

c. Waste Materials: Excess material from excavation shall be wasted in areas designated by the Engineer or as shown on the plans. It shall be placed in layers not exceeding twelve inches (12") and bladed to obtain compaction. The top twelve inches (12") shall be free of rock or other objectionable material. Any waste areas shown on the plans are tentative and no assurance is given hereby that the areas may be used for disposal of waste material.

The contractor shall dispose of all waste material whether or not a place is designated for it and no additional compensation shall be allowed.

d. Water: Water required for setting and compacting the subgrade shall be obtained from the City of Albuquerque Water Department and all arrangements made with the City of Albuquerque. There will be no separate payment for water.

1-05. MEASUREMENT AND PAYMENT: No separate payment will be made for the items of work done to this section of the Specifications and all operations incidental to providing a completed project will be included in the lump sum bid for the work involved.

| | |
|---|---|
| Drainage Easement | 2,810.42 |

| ROADS AND STREETS: | LINEAL FEET |
|---|---|
| San Rafael | 2,640 |
| Jade Park Avenue | 2,792 |
| Hallmark Avenue | 2,255 |
| Terri Ave | 922 |
| Ned Street | 547 |
| Inn Avenue | 1,269 |
| Ray Street | 1,367 |
| Ruth Avenue | 1,022 |
| Jackie Street | 1,122 |
| Coronado Avenue | 866 |
| Pino | 1,529 |
| San Pedro Drive | 1,056 |
| Louisiana Boulevard | 1,584 |
| Lee Court | 333 |
| Herbert Street | 389 |
| Dale Court | 194 |
| | 19,887 |

# CITY OF ALBUQUERQUE

ALBUQUERQUE, NEW MEXICO

INTER-OFFICE CORRESPONDENCE

August 17, 1971

TO: E. F. Hensch, Director, Public Works

SUBJECT: Jade Park Drainage Ditch

I have been receiving a number of complaints regarding the drainage ditch through Jade Park. It appears to me that the drainage area as approved by the City Engineering Division leaves much to be desired. The water entering the channel at Jade Park far exceeds its capacity. I feel that we should take some steps to divert the water east of Louisiana or Wyoming into a larger channel. I understand there are at least two channels available for this diversion. May I have your opinion as to the situation.

Fred L.

Fred L. Goodman
Assistant to City Manager

FLG:kp

Public Works Director

# CITY OF ALBUQUERQUE

ALBUQUERQUE, NEW MEXICO

INTER-OFFICE CORRESPONDENCE

TO: Frank L. Horan, Acting City Manager
City Manager's Office

August 17, 1971

SUBJECT: Floods during the month of August 1971

As requested by you, the following information is provided, concerning run-off and resultant damage from the recent heavy rains:

The first storm of this series actually occurred on July 31, 1971, running into August 1. Rainfall was very heavy in the Northeast Heights over both the Embudo Arroyo Water Shed and the Hahn Arroyo Water Shed. The dip section at Moon Street South of Indian School Road was nearly obliterated by this rain, resulting in repairs exceeding $6,000 to restore it. Also, the new channel liner on the Hahn Arroyo West of California Street was severely damaged by rain which got through joints or broken areas in the new construction. This will be repaired as a "guarantee" item and has been turned over to the Engineer's Office for action. Nearly every major intersection from Eubank Blvd. East, was badly silted with gravel and dirt, necessitating a general cleanup. Water undercut the banks of the Embudo and Hahn Arroyos and numerous locations from Wyoming Blvd. East, which required immediate temporary repairs to prevent collapse of rear walls of abutting lots.

Light rains continued to occur on the afternoons of August 2, 3 and August 5. These rains did no severe damage but aggravated conditions for both repair of arroyo-scouring and patching of washed out streets.

On Friday, August 6, a heavy rain struck the north end of town working westward from the mountains across the river and in a slightly southerly direction, eventually terminating on the far West Heights near Central Avenue. This rain did very extensive damage in the area North of Central Avenue from Atrisco West to Coors, causing mud slides and upheaval of streets, flooding numerous properties, and damaging Pat Hurley Park. In addition, the rains destroyed the south side of the new Academy Road Structure dip section, on Academy Road N. E. adjacent to Arroyo Del Oso Golf Course. Waters also flowed directly through the North Dump of the Refuse Division from the Pino Arroyo rendering that land fill area useless for the time being. It also washed out all dirt roads in the vicinity including Wyoming Blvd., Louisiana Blvd., San Pedro, San Antonio Rd., and others. In addition, it flooded some roads in Jade Park Mobile Home Development near Louisiana Blvd. and San Francisco St., as well as some other roads abutting the North Fork of the Pino Arroyo which flows directly through Jade Park via a man-made channel. Street crews worked all day Saturday, August 7, cleaning up the West Heights areas and repairing structures and roads in the Northern part of the Northeast Heights area. Liquid Waste crews also assisted in pumping out flooded areas and cleaning out plugged catch basins.

Flood Report Continued

During the week of August 8, 9, and 10, we had only light sprinkles with moderate rains occurring on August 11 throughout the City. However, the rains were continuous over a lengthly period of the evening and did not cause appreciable run-off since the intensity was not sufficiently severe.

On August 12, 1971, heavy rains struck the North Valley areas in the evening, also severely damaging Jade Park and creating some havoc in the lower Broadway area due to erupting storm sewer manholes. However, the lower Broadway area was not severely damaged due to the preventive measures of issuing sandbags to property owners in that region some weeks ago when the flood season was anticipated. Street Maintenance did work until the early morning hours pumping out some flooded areas in the San Jose district, (mostly from street rights-of-way) and also cleaning up in the lower Broadway areas. It was necessary to contact Safety Flare Inc. to do barricading work for both ourselves and for Police requests along Williams Street and Commercial between approximately Bell and Southern Avenues; also on Broadway between Mountain Road and Lomas and on Fruit between High and Arno. Streets in the Jade Park Development and on Wyoming between San Antonio and Osuna were rendered virtually impassable. The arroyo through Jade Park in which the drainage easement was only 10 feet wide at the bottom, cut a complete new channel and now is nearly 40 feet wide through the entire development, with severe silting and erosion of all lots abutting that arroyo as well as heavy silting on Louisiana Blvd. Other lots were washed out at San Francisco and Louisiana in spite of the temporary dikes we had previously placed there to partially aid the flood situation and just South of Pino, at Louisiana, the South Fork of the Domingo Baca Arroyo emptied into Louisiana. With no provision for an outlet for the drainage, it therefore filled the entire depression on Louisiana, eventually reaching a depth in excess of 3 feet and finally overran some newly graded lots which had been raised on the west side of Louisiana Blvd. The Jade Park people (both managers and property owners) are both worried and indignant about the flooding conditions and apparent lack of suitable drainage. It is understood that plans have been prepared or will be prepared by the City Engineer's Office to help alleviate these problems. To date, we have not seen any revised plans to aid this drainage but understand that the same has been or will be issued to the Jade Park Development Corp. shortly. In addition, crews worked again on Pino Saturday, August 14, on re-channeling the arroyo at Jade Park as well as cleaning up badly silted dip sections along abutting streets and aiding property owners in temporary embankment construction to protect their lots.

The overall result on this series of storms is that Street Maintenance will have several months of repair work to correct erosion problems on the Hahn Arroyo, Embudo Arroyo, Tijeras Arroyo, Embudito Arroyo, and in a few areas along the Pino and Domingo Baca Arroyos. It is estimated that more than $50,000 will be needed in materials and supplies just to effect temporary relief for the scoured areas along the above arroyos. Not too much property damage was reported save for those lots in the 600 Blk. Caughran Place N. E. and along Panorama and Hillview Court N. E. Those lots were damaged by the earlier severe storm on July 27, 1971 and

verbal information on that storm was given to City Manager, Richard Wilson. Since that time, the City Street Division, has constructed a temporary interceptor ditch and dike East of the 600 Blk. Caughran Place N. E. which should prove effective and which apparently has pleased the property owners on that street. A similar interceptor ditch and dike will be constructed East of Panorama Place to protect that street and also Hillview Court N. E., as soon as designs are completed by Engineering and right-of-way acquisition is made.

From a personal viewpoint, talking with a number of the public in various areas affected by the storms I would conclude that the people feel that more thought should be given to the handling of drainage in these new developments of the N. E. Heights where grades are steep and flood water concentration is rapid; since in a large number of these streets flood waters are overrunning curbs, scouring lots, and depositing silt both in streets and in other unwanted areas on private property. Theoretically, all of these streets and/or the abutting right-of-way are designed to carry and contain all flood waters from a 100-Year Frequency Storm; however, the greatest reported storm intensity was evaluated by the US Corps of Engineers as only a 75-Year Frequency Storm and this is the storm which occurred on July 27, as mentioned previously. The streets, in some instances, have not carried these flows as designed and therein lies a possible problem requiring additional investigation by Engineering. It must also be realized that the same silting of many Heights streets which has caused annoyance to property owners has, in addition, reduced to some degree the carrying capacity for water within these streets. Actually, if it were not for the fact that so much raw earth has been moved in recent months, as a result of rapid house development in the Heights areas, much of this silt would not have been washed to the street areas since natural grass cover prior to development would have prevented much of this erosion. It may be expected in the future that, as all new lots are landscaped, grass or other cover will provide erosion control and the effect of silting will be reduced. Nevertheless, while silting action is reduced, the improvements may also increase the potential run-off to the streets and could cause flooding of a number of properties where such lots have not been raised sufficiently high above top-of-curb, to afford supplemental protection over and above suggested design carrying capacity of those streets.

Respectfully yours,

G E Paul

G. E. Paul, Street Maintenance Engineer

cc: F. Goodman, Ass't City Manager
E. F. Hensch, Public Works Director

cc: W T. Stevens - For your information - 1977 file

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

August 20, 1971

TO: William T. Stevens, City Engineer

FROM: Frank J. Bailey, Assist. City Engineer - Design

SUBJECT: MEMO FROM FRED GOODMAN CONCERNING JADE PARK DRAINAGE CHANNEL (NORTH PINO ARROYO).

In reply to Mr. Fred Goodman's memo, please be advised as follows: Prior to the construction of Jade Park Subdivision, a drainage report was prepared by Scanlon & Derickson on November 11, 1968. The report established a Q of 855 c.f.s. for subject channel under presently undeveloped conditions east of Louisiana. The report called for a typical section of the channel to be 38' across the top, 2.80' deep and 10' wide at the bottom with 5:1 side slopes. This section was not adequate and was redesigned by the City's Design Engineer and approved. This design called for a channel cross section on a .0245 slope with 2:1 side slopes, a 10 ft. width bottom and 5' (average depth). Using the above parameters and an unlined natural earth section, the channel would carry 1405 c.f.s. of water. In June, 1970 the Corp. of Engineering issued a report of Flood Plain Information for Albuquerque Arroyos Part I in which they established peak discharges in referenced arroyo of 1430 c.f.s. Standard Project Flood, and 1090 c.f.s. Intermediate Regional Flood. Both of these flows were established at Wyoming Blvd. and San Antonio Drive and were based on full development of areas east of Jade Park with streets, houses, etc. having a much higher run-off than would come from undeveloped areas as now exists.

The amount of water established by the Corps in the watershed study was used for the Pino (north and south) inlet structures to the North Diversion Channel. Therefore, the run-off quantities projected in the watershed area contributing to the North Arroyo Del Pino should remain in that area so as not to overload the other inlet structures at the North Diversion Ditch.

Several months ago a profile was run on the channel as built and was found not to have been constructed as the approved plans called for. It was also noted that ornamental vertical walls had been built at the Ray Street dip crossing. These walls caused a reduction in channel area resulting in turbulence and the depositing of silt in the channel at this point.

We would, therefore, recommend that Jade Park owners excavate the channel from Louisiana Blvd. to San Pedro Blvd. on the grade approved using the typical section approved, and also make an agreement with the owners of property east of Louisiana Blvd. to effectively funnel the north Pino wastershed water into the Jade Park channel east of Louisiana Blvd. The proposed C.I.P. bond issue provided no funds for storm sewers or channel lining in this area as ~~had been requested~~, therefore, the Jade Park owners should provide some form of bank stabilization thru Jade Park to ensure that the section as designed for the channel will be maintained as an effective waterway. When development of the area between Louisiana and Barstow (Wyoming) including paving of Louisiana takes place, the permanent channeling of water into the proper watershed channels and streets (North Pino, San Francisco and Domingo Baca) will occur.

It is also noted that Jade Park owners are now developing or will soon begin development in the area west of Louisiana Blvd. from San Francisco Ave. to approx. San Bernardino Ave. It is recommended that they provide a temporary dike along the west R.O.W. line of Louisiana to protect the property from sheet run-off and diverting the run-off into the new Domingo Baca Channel.

Sincerely,

Frank J. Bailey

Frank J. Bailey
Assist. City Engineer - Design

Approved by:

William T. Stevens

William T. Stevens
City Engineer

FJB/fs

cc: F Goodman (2) 9-8-71

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

August 30, 1971

TO: H. R. Orr, Jr., Assist. Dir. Public Works

FROM: W. T. Stevens, City Engineer

SUBJECT: REPORT ON JADE PARK DRAINAGE CHANNEL

Attached is the report on the Jade Park Drainage Channel as requested by Fred Goodman, Assistant to the City Manager.

W. T. Stevens
City Engineer

WTS/fs

Enclosure

Rm - 11-1-72 AHBA

Inez has an in progress Paving Est. on Jerickson from San Pedro to Louisiana. The W & S have been released & are under construction. Paving can be authorized upon Completion of W-S & receipt of 6% Fee.

JOHN B. ROBERT
EXECUTIVE ENGINEER

B. H. SWINBURNE, CHAIRMAN
W. C. SCRIVNER, VICE-CHAIRMAN
FRED LUTHY, JR., SEC.-TREAS.
MARVIN C. MAY, DIRECTOR
FRANCES McCOY, DIRECTOR

Albuquerque
Metropolitan
Arroyo
Flood
Control
Authority

2112 GIRARD N.E.
P. O. BOX 241 · ALBUQUERQUE, N. M. 87103
TELEPHONE 268-4519

RECEIVED
SEP 08
CITY ENGINEER

Bob —

September 6, 1972

Mr. V. Kimmick
City Engineering
P. O. Box 1293
Albuquerque, New Mexico

Gentlemen:

Recently you submitted a plan profile and cross section sheets for relocation of the North Pino Arroyo from San Pedro Boulevard, N. E. to a point where it crosses Interstate Route 25 for review.

The typical sections indicated a bottom width of twenty feet, side slopes of 1:1, a design flow depth of five feet with a two foot freeboard. In many of the typical sections shown it was necessary to construct dikes to attain the section. It is my opinion that the sections of the channel design are instable and, despite the fact that you propose to rip-rap the slopes around the outer radii of the curves, that considerable erosion will result in both the channel invert and the slopes. It also appears that the sixty foot right-of-way that you have secured is inadequate to handle the flow and to permit construction service roads for channel maintenance.

Based on your statement that the proposed channelization is of a temporary nature and will be the obligation of the developer, at the time of annexation of the abutting lands to improve the channel to its final design, the plan as proposed is approved. However, it is my recommendation that a channel section be established for the North Pino Arroyo from the East Interstate 25 frontage road to the

approximate end of the arroyo near the intersection of San Antonio and Juan Tabo Boulevard N. E.

Yours truly,

ALBUQUERQUE METROPOLITAN ARROYO
FLOOD CONTROL AUTHORITY

John B. Robert
Executive Engineer

JBR/cj

cc: R. Kielich

ZCC00363.

C.y.-Comm. Herb E.F. Hensch

File Jade Park Drainage.

TURPEN, HUNT & BOOTH
PROFESSIONAL ASSOCIATION OF
ATTORNEYS AND COUNSELORS AT LAW

DONALD C. TURPEN
T. L. HUNT
DAVID E. BOOTH

318 LOUISIANA, S. E.
ALBUQUERQUE, NEW MEXICO 87108
TELEPHONE (505) 268-4526

LOS LUNAS, NEW MEXICO OFFICE
LOS LUNAS Y
TELEPHONE (505) 865-9498

October 18, 1972

RECEIVED
OCT 20 1972
CITY COMMISSIONERS OFFICE

Board of City Commissioners
City of Albuquerque
Albuquerque, New Mexico

Attention: City Commission Chairman

Gentlemen:

I am writing to you in my capacity as attorney for twenty-seven families who live on their residential property which adjoins the drainage ditch that parallels Derickson Street and runs from Louisiana downward toward San Mateo.

As you may be aware, this ditch often carries great amounts of water when we receive a rain in Albuquerque. As a result of this rain, the constricted flow of water through the ditch and the unstableness of the arroyo's walls, the property of my clients has been seriously damaged and the property values decreased. The damage has come in the form of their property being eroded; specifically the footing has washed away from around fences and erosion has taken place to the point of destroying the foundation of the homes.

My purpose in writing to you is to explain that Jade Park Development Corporation, who originally developed this area, denies the ownership of any right to the ditch. The plats and replats in the Bernalillo County Courthouse reveal that in fact Jade Park did dedicate this ditch to the City. Understandably, my clients are quite unhappy with the lack of proper maintenance of this ditch, which it is our understanding is the City's obligation to maintain. It is my further understanding that recently a subdivision just west of San Mateo, in this area, has been approved and the drainage ditch that is a continuation of the ditch in question has been dedicated to the City. A partial solution to my clients' problem could possibly be for the City to connect these two ditches thus allowing a free flow of water past the property of my clients. I believe in the past when the water reached San Mateo, it was unable to drain further and thus backed up into the area of my clients' property. A better solution, perhaps, would be to riprap the walls of the ditch with some stable material.

Those clients of mine whose homes face Derickson Street have also been inconvenienced by the tardiness in paving Derickson. It is

my understanding that one of the purposes of paving Derickson Street is to carry some of the excess rainfall from this area. However, the street has not been paved and these clients are frequently faced with not being able to enter their driveways because of flooding from heavy rainfalls. I was promised on September 6, 1972 by Mr. Quentin Killig of the City Engineering Department that Derickson would be paved within two to three weeks. However, this paving has not been done and I have been informed the reason for lack of pavement is the City's failure to provide a grade for the paving contractor to use.

Please contact me in order that we may try to arrange an amicable and satisfactory solution to the problem before the damage increases further.

Sincerely,

TURPEN, HUNT & BOOTH

By David E. Booth
David E. Booth

DB:mga

# City of Albuquerque

BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

CITY COMMISSION: Harry E. Kinney, Chairman • Ray R. Baca, Vice-Chairman
Louis E. Saavedra, Commissioner • Nancy D. Koch, Commissioner
Robert C. Poole, Commissioner
CITY MANAGER: [redacted] Herbert H. Smith
City Hall, 400 Marquette, NW

Fast Dave
File with
Jade Park
Drainage

June 20, 1973

Mr. Jim McCann
Mobile America Incorporated
P. O. Box 8708
Albuquerque, NM 87108

Dear Mr. McCann:

The City of Albuquerque accepts the storm drainage ditch from Louisiana to San Pedro for maintenance.

Sincerely yours,

V. M. Kimmick
City Engineer

VMK/er

cc: George Paul
Bob Kielich
Ken Beckstrom

8/8/72 DDP 1

INTERSECTION OF JADE PARK CHANNEL AND SAN PEDRO N.E.

ALTERNATE 1

1) Purchase an additional 10 feet of R.O.W. on both the north and south channel. cost $1^{35}$/SF
2) Cut back the slopes to a 3:1
3) Relocate fences.
4) utility relocation.

ALTERNATE 2

1) continue ~~fence~~ side slopes where possible 3:1 min.
2) construct retaining walls where necessary
3) include cost of fence removal & ~~relocat~~ replacement.

ALTERNATE 3

1) Construct concrete blanket for slope protection 1:1 min acceptable slope.
2) include cost of fence removal & replacement.

Lots under consideration
Lots 12, 13, & 19 Block 13
Lots 18, & 19 Block 1

8/8/78 DDP 2/

Problem areas

North Bank.

Sta 0+42 to Sta 2+25

South Bank

Sta 0+67 to Sta 3+25

UTILITY LINE REZOCATIONS SAME FOR ALL ALTERN.

ALTERNATE 1

NORTH BANK.

Sta 0+42 to Sta 2+75.00 (Lots 13 & 19)

From sta 2+75.00 on side slopes from 2½:1 can be maintained.

Cost of land

10' X 233' X $1.35/□' = $3,145.50 → 3145.50

Installing Chain Link Fence 6' high

233' X 6' X 1.80/□' = $2516.40 → 2516.40

Remove Chain link Fence 6' high

233 X 6' X 1.60/□' = $2236.80 → 2236.80

Channel grading

140 cy X 3.00/cy = 420.00 → 420.00

SOUTH BANK

Sta 0+67 to Sta 3+25

can maintain slopes 2½:1 from there on.

cost of land

285' X 10' X 1.35/□' = 3847.50 → 3847.50

Installing chain link Fence.

285' X 6' X 1.80/□' = 3078.00 → 3078.00

Remove Chain link Fence.

285' X 6' X 1.60/□' = 2736.00 → 2736.00

8/8/78 DDA 3/

Channel Grading
211cy X 3.00/cy = $633.00 → $633.00

TOTAL Cost. $18,613.20

ALTERNATE 2

North Bank.
Retaining walls sta 0+42 to Sta 1+42
Conc. channel blanket slope prot. Sta 1+42 to Sta 2+25

retaining wall 5' high (aver.) (5'x.67') = 3.35 □'
base 3'X1' = 3 □'
Total 6.35 □'
vol = 6.35 □' X 100' = 635 □' ÷ 27 = 24cy.
24cy @ 280.00/cy = $6720.00 6720.00
Remove & Replace chain link fence. (1.50+1.60)
100'X6'X3.40 = $2040.00 2040.00

Channel lining (additional) 4" thick
6' width (aver.)
6'X83 = 498 □'
498 □' X 2.00/□' = $996.00 996.00

8/8/78 DDQ 4

South Bank.

~~Retaining~~ Wall Sta 0+67 to Sta 2+00

Conc. Channel Blanket slope prot. Sta 2+00 to Sta 3+25

"

retaining wall + base section = 6.35 □'

vol = 6.35 □' x 133 ÷ 27 x $280.00/cy = $ 8758.30

channel lining (additional) 4" thick

6.5' width (aver.)

6.5' x 133' x 2.00/□' = $1729.00 = $ 1729.00

TOTAL COST = $ 20,243

ALTERNATE 3

Channel lining - extend to R/W - may exceed 1:1 for short distances in lower reaches.

NORTH BANK

Sta 0+42 to 2+25

aver width 5.5'

5.5' x 183' x 2.00/□' = $2013.00 → $2013.00

SOUTH BANK

Sta 0+67 to Sta 3+25

aver width 6.5'

6.5' x 258 x 2.00/□' = $3354.00 $3354.00

TOTAL COST $5367.00

CAMPBELL-HICKS and ASSOCIATES, Inc.
Soils Testing Laboratory
Consulting Civil Engineers
232 Muriel Street, N.E. • Phone (505) 296-7139 • Albuquerque, New Mexico 87123

# DRAINAGE STUDY OF CONDITIONS RELATIVE TO THE DEVELOPMENT OF JADE PARK MOBILE HOME SUBDIVISION

September 1971

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DRAINAGE STUDY OF CONDITIONS
RELATIVE TO THE DEVELOPMENT OF
JADE PARK MOBILE HOME SUBDIVISION

## I. GENERAL

The purpose of this report is to present findings pertinent to estimating and handling of runoff for use in the master planned development of Jade Park Mobile Home Subdivision and to describe a proposed method for providing adequate storm drainage in the area.

## II. LOCATION

The area considered in this report is bounded on the West by San Pedro Drive, N.E.; on the North by San Bernardino, N.E. from San Pedro Drive, N.E. to Georgia Street, N.E. and Ranchitos Road from Georgia Street to Louisiana Blvd., N.E.; on the East by Georgia Street, N.E. from San Bernardino, N.E. to Ranchitos Road, N.E. and Louisiana Blvd., N.E. from Ranchitos Road, N.E. to Derickson Ave., N.E.; on the South by Derickson Ave., N.E. in the Elena Gallegos Grant. It is situated mainly in the Southeast one-half (SE 1/2) of the Northeast one-quarter (NE 1/4) and the Northeast one-half (NE 1/2) of the Southeast one-quarter (SE 1/4) of Section 24, Township 11 North, Range 3 East, N.M.P.M.

## III. EXISTING DRAINAGE CONDITIONS

### A. General

This area being generally located between the Arroyo Domingo de Baca and the North Arroyo Del Pino and lies on the mesas and alluvial fans located on the West side of the Sandia Mountains.

At the present time the area has been developed except for two small sections. One of these sections is bounded on the West by San Pedro Drive, N.E.; on the North by Ranchitos Road, N.E.; on the East by Luana Street, N.E.; and on the South by San Francisco Road. The other section is bounded on the West by San Pedro Drive, N.E.; on the North by San Bernardino, N.E.; on the East by Georgia Street, N.E.; and on the South by Ranchitos Road, N.E. The undeveloped area is crossed by small arroyos in the general East-West direction. In the developed portion the streets and drainage easement are in an East-West direction.

B. Topography

The area lies on alluvial fans on the West side of the Sandia Mountains between San Pedro Drive, N.E. and Louisiana Blvd., N.E.; North of Derickson Ave., N.E. and South of Arroyo Domingo de Baca. The area, except the undeveloped portion, has been graded and streets constructed as shown on Exhibit "B" MASTER PLAN OF DRAINAGE.

C. Drainage Areas and Channels

Presently there are four separate drainage areas contributing runoff from the East. However, when the area East of the Jade Park Mobile Home Subdivision is developed there will be only two major channels contributing to the runoff. The larger incoming drainage area, known as North Arroyo Del Pino, contributes about 2,054 c.f.s. to the drainage ditch runoff. The other drainage area contributes about 590 c.f.s. to the San Francisco Road runoff. Both channels enter Jade Park at Louisiana Blvd., N.E.

IV. PROPOSED DRAINAGE PLANS

A. General

In order to provide an adequate system of storm drainage for this development it was necessary to:

(1) Determine the drainage areas which can and will contribute storm runoff during a 100 year design storm.

(2) Determine the amount of runoff which could be expected after the entire area is developed.

(3) Prepare a table of street carrying capacities for use in sizing streets and overflow sections (section above high curb to property line). See exhibit "E".

(4) Determine the points where the storm runoff will concentrate.

(5) Determine the ability of each of the drainage channels, streets plus overflow sections, and structures to handle the runoff that may concentrate on them.

(6) Determine and recommend the means by which the expected runoff can be carried by the master planned area.

(7) Design additional channels and structures to simulate and distribute the expected runoff in a manner similar to the existing terrain at the outlet end.

B. Drainage Areas

A study was made of the Drainage Study of the Albuquerque Arroyos prepared by the U.S. Corps of Engineers for the Albuquerque Metropolitan Arroyo Flood Control Authority in June 1970. Next a study of the photograph (Exhibit "A") to determine the areas which could conceivably contribute runoff to the development was made for which a copy of computations are contained in Exhibit "C" of this report. Finally the master plan of drainage, Exhibit "B", was prepared showing the entire area with directions of flows as well as runoff quantities.

C. Runoff Quantities

The quantities of storm runoff to be expected from each drainage area was determined using the Rational Formula, $Q = CIA$, where: $Q$ = quantity of storm runoff in cubic feet per second; $C$ = coefficient of runoff dependent upon the type of surface drained; $I$ = intensity of rainfall in inches per hour for a duration equal to the total accumulation time in minutes; and $A$ = area of contributing water shed in acres.

The area (A) of each separate contributing area was determined by outlining the watershed on the Master Plan and measuring the area (by planimeter) in acres.

The intensity (I) of rainfall was determined by assuming a 100 year frequency rainfall and then utilizing Intensity Duration Frequency Curves (chart 1) for the Albuquerque Area, "Master Plan of Drainage, City of Albuquerque, New Mexico and Environs", 1963, prepared by Gordon Herkenhoff and Associates, Consulting Engineers, together with expected accumulation of runoff from each of the areas. The total accumulation times are determined by a combination of Yarnell's method and probable future streets and drainage channel alignments and grades, as shown, assuming overland flows to be across either poor grass, asphalt pavement or bare soil surfaces, depending on the probable type of development in each area and estimating the probable type of grading to be done in each area: San Francisco Road and Louisiana Blvd., N.E. are asphalt paved with standard curb and gutters (8"). The remaining streets in the subdivision are asphalt paved with 4" concrete curbs and gutters. All streets

have a 2" crown. These times of flow were calculated by the use of tables on pages 5.00, 5.04, and 5.05 of Design by E. E. Seelye.

The coefficient of runoff (C) was determined by assuming the maximum possible development in the areas under consideration. A coefficient of 0.65 is used for areas where dense residential development was most probable. A coefficient of 0.70 should be used for commercial areas or where a large amount of the exposed surface is impermeable.

The quantities of runoff are shown along with areas after development on Exhibit "B", the Master Plan of Drainage for this subdivision.

D. Drainage Channels and Facilities

All existing structure capacities, as well as any proposed future structures, were verified from computer output which forms a part of Exhibit "E" and is based on Manning's Equation Q=AV where $V=\frac{1.486}{n} R^{2/3} S^{1/2}$ when A=cross-sectional area of the channel or structure; R=hydraulic radius of channel or area divided by wetted perimeter; S=slope of channel or facility in feet per foot and "n" values of 0.015 for concrete and asphalt surfaces, 0.013 for concrete pipes, 0.0225 for dirt lined channels or a composite "n" value based on proportional wetted surfaces with different values.

## V. CONCLUSIONS AND RECOMMENDATIONS

On the basis of this study and its calculations it is concluded that the development of this area can be satisfactorily accomplished provided adequate storm drainage is done as recommended below:

A. Construct the channels as indicated on Exhibit "B" prior to or at least concurrently with construction of the adjacent lots.

B. The 40' drainage easement provided for the North Arroyo Del Pino as shown on Exhibit "B" with a minimum slope of about 2.42% has the sides lined with 6 inches of concrete. On Exhibit "B" is a detail of what would be required. The cost of the above concrete lining would be about $8.00 per square yard or a total cost of $49,000.00. This cost is based on an estimated concrete quantity and using the 1970 New Mexico State Highway Department average unit bid price.

In conjunction with this it would also be advisable to open the drainage channel from the Jade Park limits on San Pedro Drive, N.E. to the structures provided for on Interstate 25.

C. Since lining of the sides of the channels is indicated due to the developing of lands adjacent to and East of the Jade Park area a time table is implied. At this time it appears likely that by about the end of 1973 the North Arroyo Del Pino must be lined as shown in Exhibit "B".

D. Recommended street grades are contained in Exhibit "D" of this report.

If all the above recommendations are followed, this Master Plan of Drainage should provide the necessary requirements to adequately protect and make this a very satisfactory development.

Respectfully submitted,

Donald L. Campbell

Donald L. Campbell
P.E. & L.S. No. 3633

EXHIBIT C

SUMMARY OF RUNOFF COMPUTATIONS

| Sheet No. | Area Number | Area (in acres) | Expected Runoff (in c.f.s.) Individual | Total |
|---|---|---|---|---|
| 1 | 1 | 11 | 30 | |
| 2 | 2 | 10 | 29 | 59 |
| 3 | 3 | 5 | 15 | 74 |
| 4a | 4a | 10 | 31 | |
| 4b | 4b | 8 | 25 | 647 |
| 5 | 5 | 7 | 22 | 669 |
| 6 | 6 | 7 | 20 | |
| 7 | 7 | 8 | 23 | |
| 8 | 8 | 15 | 36 | 80 |
| 9 | 9 | 8 | 23 | 712 |
| 10 | 10 | 9 | 26 | 761 |
| 11 | 11 | 6 | 19 | |
| 12 | 12 | 16 | 44 | |
| 13 | 13 | 19 | 52 | 96 |
| 14 | 14 | 8 | 24 | 88 |
| 15 | 15 | 6 | 18 | |
| 16 | 16 | 1 | 3 | |
| 17 | L-1 | 1 | 4 | 182 |
| 18 | 1-A | 18 | 44 | |
| 19 | DE-1 | 3 | 13 | 2079 |
| 20 | SP-1 | 2 | 8 | 613 |

RUNOFF COMPUTATIONS

Sheet No. 1

Job No. Jade Park

Drainage Area No. 1

Area = 11 acres

Maximum Overland Flow: L = 170 S = 2.7

Maximum Channel Flow:

Channel No. 1 L = 1595 S = 2.5

Channel No. 2 L = 431 S = 0.4

Channel No. 3 L = _____ S = _____

Accumulation Time:

Overland Flow: 11.5 min.

Channel No. 1 Flow:

Velocity= 5.7 ft/sec; Time = $\frac{1595}{5.7 \times 60}$ = 4.7 min.

Channel No. 2 Flow:

Velocity= 2.5 ft/sec; Time = $\frac{431}{2.5 \times 60}$ = 3.5 min.

Channel No. 3 Flow:

Velocity= _____ ft/sec; Time = $\frac{\quad}{\times 60}$ = _____ min.

Total Accumulation Time: T = 19.7 min.

$I = \frac{189}{T+25} = \frac{189}{44.7} = 4.2$

Q = CIA = ( .65 )( 4.2 )( 11 ) = 30 c.f.s.

Pino Ave., N.E. 55' S.W. of Louisiana Blvd.
N.E. to Luana St. N.E. O.K.

Date: 9-22-71

Comp. by: [illegible]

Checked by: [illegible]

RUNOFF COMPUTATIONS

Sheet No. 2

Job No. Jade Park

Drainage Area No. 2

Area = 10 acres

Maximum Overland Flow: L = 175 S = 3.0

Maximum Channel Flow:

Channel No. 1 L = 1330 S = 2.7

Channel No. 2 L = 264 S = 0.9

Channel No. 3 L = _____ S = _____

Accumulation Time:

Overland Flow: 11.7 min.

Channel No. 1 Flow:

Velocity= 5.7 ft/sec; Time = $\frac{1330}{5.7 \times 60}$ = 3.9 min.

Channel No. 2 Flow:

Velocity= 3.6 ft/sec; Time = $\frac{264}{3.6 \times 60}$ = 1.2 min.

Channel No. 3 Flow:

Velocity= _____ ft/sec; Time = $\frac{\quad}{\times 60}$ = _____ min.

Total Accumulation Time: T = 16.8 min.

$I = \frac{189}{T+25} = \frac{189}{41.8} = 4.5$

Q = CIA = ( .65 )( 4.5 )( 10 ) = 29 c.f.s.

Date: 9-22-71

Comp. by: [illegible]

Checked by: [illegible]

RUNOFF COMPUTATIONS

Sheet No. 3

Job No. Jade Park

Drainage Area No. 3

Area = 5 acres

Maximum Overland Flow: L = 150 S = 3.0

Maximum Channel Flow:

Channel No. 1 L = 1262 S = 2.1

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time:

Overland Flow: 10.8 min.

Channel No. 1 Flow:

Velocity = 5.7 ft/sec; Time = $\frac{1262}{5.7 \times 60}$ = 3.7 min.

Channel No. 2 Flow:

Velocity = _____ ft/sec; Time = $\frac{\quad}{\times 60}$ = _____ min.

Channel No. 3 Flow:

Velocity = _____ ft/sec; Time = $\frac{\quad}{\times 60}$ = _____ min.

Total Accumulation Time: T = 14.5 min.

$I = \frac{189}{T+25} = \frac{189}{39.5} = 4.7$

Q = CIA = ( .65 )( 4.7 )( 5 ) = 15 c.f.s.

Date: 9-22-71

Comp. by: T. Crager

Checked by: HCP

RUNOFF COMPUTATIONS

Sheet No. 4a

Job No. Jade Park

Drainage Area No. 4a

Area = 10 acres

Maximum Overland Flow: L = 150 S = 3.0

Maximum Channel Flow:

Channel No. 1 L = 1210 S = 2.0

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time:

Overland Flow: 10.7 min.

Channel No. 1 Flow:

Velocity= 5.1 ft/sec; Time = $\frac{1210}{5.1 \times 60}$ = 4.0 min.

Channel No. 2 Flow:

Velocity=_____ft/sec; Time = $\frac{\quad}{\times 60}$ = _____min.

Channel No. 3 Flow:

Velocity=_____ft/sec; Time = $\frac{\quad}{\times 60}$ = _____min.

Total Accumulation Time: T = _____min.

$I = \frac{189}{T+25} = \frac{189}{39.7} = 4.8$

Q = CIA = ( .65 )( 4.8 )( 10 ) = 31 c.f.s.

Date: 9-22-71

Comp. by: [signature]

Checked by: [signature]

RUNOFF COMPUTATIONS

Sheet No. 4-b

Job No. Jade Park

Drainage Area No. 4-b

Area = 8 acres

Maximum Overland Flow: L = 190 S = 3.7

Maximum Channel Flow:

Channel No. 1 L = 4130 S = 1.4

Channel No. 2 L = 1300 S = 2.4

Channel No. 3 L = _____ S = _____

Accumulation Time:

Overland Flow: 11.3 min.

Channel No. 1 Flow:

Velocity= 8.0 ft/sec; Time = $\frac{4130}{8.0 \times 60}$ = 0.9 min.

Channel No. 2 Flow:

Velocity= 10.3 ft/sec; Time = $\frac{1300}{10.3 \times 60}$ = 2.1 min.

Channel No. 3 Flow:

Velocity= _____ ft/sec; Time = $\frac{\quad}{\times 60}$ = _____ min.

Total Accumulation Time: T = 14.3 min.

$I = \frac{189}{T+25} = \frac{189}{39.3} = 4.8$

Q = CIA = ( .65 )( 4.8 )( 8 ) = 25 c.f.s.

Total Q: 591 + 31 + 25 = 647 c.f.s.

647 - 183 = 464 c.f.s.

San Francisco Rd. from Louisiana Blvd. N.E. to Ray St. N.E. 0.60' Above High Curb @ 2.5%

Date: 9-22-71

Comp. by: [signature]

Checked by: [signature]

RUNOFF COMPUTATIONS

Sheet No. 5

Job No. Jade Park

Drainage Area No. 5

Area = 7 acres

Maximum Overland Flow: L = 220 S = 3.4

Maximum Channel Flow:

Channel No. 1 L = 904 S = 2.4

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time:

Overland Flow: 12.3 min.

Channel No. 1 Flow:

Velocity = 10.3 ft/sec; Time = $\frac{904}{10.3 \times 60}$ = 1.5 min.

Channel No. 2 Flow:

Velocity = _____ ft/sec; Time = $\frac{\quad}{\times 60}$ = _____ min.

Channel No. 3 Flow:

Velocity = _____ ft/sec; Time = $\frac{\quad}{\times 60}$ = _____ min.

Total Accumulation Time: T = 13.8 min.

$I = \frac{189}{T+25} = \frac{189}{38.8} = 4.9$

Q = CIA = ( .65 )( 4.9 )( 7 ) = 22 c.f.s.

Total Q = 647 + 22 = 669 c.f.s.

669 - 183 = 486 c.f.s.

San Francisco Rd. N.E. from Ray St. N.E. to Wallmark Ave N.E. 0.55' Above High Curb @ 2.5%

Date: 9-22-71

Comp. by: [signature]

Checked by: [signature]

RUNOFF COMPUTATIONS

Sheet No. 6

Job No. Jade Park

Drainage Area No. 6

Area = 7 acres

Maximum Overland Flow: L = 150 S = 3.0

Maximum Channel Flow:

Channel No. 1 L = 1270 S = 2.6

Channel No. 2 L = 160 S = 2.7

Channel No. 3 L = _____ S = _____

Accumulation Time:

Overland Flow: 10.7 min.

Channel No. 1 Flow:

Velocity= 5.7 ft/sec; Time = $\frac{1270}{5.7 \times 60}$ = 3.7 min.

Channel No. 2 Flow:

Velocity= 5.7 ft/sec; Time = $\frac{160}{5.7 \times 60}$ = 0.4 min.

Channel No. 3 Flow:

Velocity= _____ ft/sec; Time = $\frac{\quad}{\times 60}$ = _____ min.

Total Accumulation Time: T = 14.8 min.

$I = \frac{189}{T+25} = \frac{189}{39.8} = 4.8$

Q = CIA = ( .65 )( 4.8 )( 7 ) = 20 c.f.s.

Date: 9-22-71

Comp. by: T. Cuoyn

Checked by: [illegible]

RUNOFF COMPUTATIONS

Sheet No. 7

Job No. Jade Park

Drainage Area No. 7

Area = 8 acres

Maximum Overland Flow: L = 230 S = 2.6

Maximum Channel Flow:

Channel No. 1 L = 1356 S = 2.8

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time:

Overland Flow: 13.0 min.

Channel No. 1 Flow:

Velocity= 6.2 ft/sec; Time = $\frac{1356}{6.2 \times 60}$ = 3.6 min.

Channel No. 2 Flow:

Velocity=_____ft/sec; Time = $\frac{\quad}{\times 60}$ = _____min.

Channel No. 3 Flow:

Velocity=_____ft/sec; Time = $\frac{\quad}{\times 60}$ = _____min.

Total Accumulation Time: T = 16.6 min.

$I = \frac{189}{T+25} = \frac{189}{41.6} = 4.5$

Q = CIA = ( .65 )( 4.5 )( 8 ) = 23 c.f.s.

Date: 9-22-71

Comp. by: [signature]

Checked by: [signature]

RUNOFF COMPUTATIONS

Sheet No. 8

Job No. Tolo Park

Drainage Area No. 8

Area = 15 acres

Maximum Overland Flow: L = 300 S = 3.0

Maximum Channel Flow:

Channel No. 1 L = 2634 S = 2.7

Channel No. 2 L = 918 S = 1.0

Channel No. 3 L = _____ S = _____

Accumulation Time:

Overland Flow: 13.5 min.

Channel No. 1 Flow:

Velocity= 5.7 ft/sec; Time = $\frac{2634}{5.7 \times 60}$ = 7.7 min.

Channel No. 2 Flow:

Velocity= 3.4 ft/sec; Time = $\frac{918}{3.4 \times 60}$ = 4.5 min.

Channel No. 3 Flow:

Velocity= _____ ft/sec; Time = $\frac{\quad}{\times 60}$ = _____ min.

Total Accumulation Time: T = 25.7 min.

$I = \frac{189}{T+25} = \frac{189}{50.7} = 3.7$

Q = CIA = ( .65 )( 3.7 )( 15 ) = 36 c.f.s.

Date: 9-22-71

Comp. by: [illegible]

Checked by: [illegible]

RUNOFF COMPUTATIONS

Sheet No. 9

Job No. Jade Park

Drainage Area No. 9

Area = 8 acres

Maximum Overland Flow: L = 230 S = 3.4

Maximum Channel Flow:

Channel No. 1 L = 1100 S = 2.1

Channel No. 2 L = 310 S = 1.8

Channel No. 3 L = _____ S = _____

Accumulation Time:

Overland Flow: 12.5 min.

Channel No. 1 Flow:

Velocity= 5.1 ft/sec; Time = $\frac{1100}{5.1 \times 60}$ = 3.6 min.

Channel No. 2 Flow:

Velocity= 5.1 ft/sec; Time = $\frac{310}{5.1 \times 60}$ = 0.9 min.

Channel No. 3 Flow:

Velocity= _____ ft/sec; Time = $\frac{\quad}{\times 60}$ = _____ min.

Total Accumulation Time: T = 16.8 min.

$I = \frac{189}{T+25} = \frac{189}{41.8} = 4.5$

Q = CIA = ( .65 )( 4.5 )( 8 ) = 23 c.f.s.

Total Q = 20 + 23 + 669 = 712 c.f.s.

712 - 183 = 529 c.f.s.

San Francisco Rd. N.E. from Wallmark Ave. N.E. to Jade Park Ave. N.E. 0.5' Above High Curb @ 2.5%

Date: 9-22-71

Comp. by: T. Gray

Checked by: [illegible]

RUNOFF COMPUTATIONS

Sheet No. 10

Job No. Jade Park

Drainage Area No. 10

Area = 9 acres

Maximum Overland Flow: L = 220 S = 3.4

Maximum Channel Flow:

Channel No. 1 L = 1436 S = 2.4

Channel No. 2 L = 330 S = 2.7

Channel No. 3 L = _____ S = _____

Accumulation Time:

Overland Flow: 12.5 min.

Channel No. 1 Flow:

Velocity= 5.7 ft/sec; Time = $\frac{1436}{5.7 \times 60}$ = 4.2 min.

Channel No. 2 Flow:

Velocity= 5.7 ft/sec; Time = $\frac{1436}{5.7 \times 60}$ = 1.0 min.

Channel No. 3 Flow:

Velocity= _____ ft/sec; Time = $\frac{\quad}{\times 60}$ = _____ min.

Total Accumulation Time: T = 17.7 min.

$I = \frac{189}{T+25} = \frac{189}{42.7} = 4.4$

Q = CIA = ( .65 )( 4.4 )( 9 ) = 26 c.f.s.

Total Q = 23 + 26 + 712 = 761 c.f.s.

761 - 183 = 578 c.f.s.

San Francisco Rd NE. from Jade Park Ave. NE to San Pedro 0.5' Above High Curb @ 2.5%

Date: 9-22-71

Comp. by: [illegible]

Checked by: [illegible]

RUNOFF COMPUTATIONS

Sheet No. 11

Job No. Jade Park

Drainage Area No. 11

Area = 6 acres

Maximum Overland Flow: L = 155 S = 3.5

Maximum Channel Flow:

Channel No. 1 L = 850 S = 2.5

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time:

Overland Flow: 10.8 min.

Channel No. 1 Flow:

Velocity= 5.7 ft/sec; Time = $\frac{850}{5.7 \times 60}$ = 2.5 min.

Channel No. 2 Flow:

Velocity=_____ft/sec; Time = $\frac{\quad}{\times 60}$ = _____min.

Channel No. 3 Flow:

Velocity=_____ft/sec; Time = $\frac{\quad}{\times 60}$ = _____min.

Total Accumulation Time: T = 13.3 min.

$I = \frac{189}{T+25} = \frac{189}{38.3} = 4.9$

Q = CIA = ( .65 )( 4.9 )( 6 ) = 19 c.f.s.

Date: 9-22-71

Comp. by: T. Chen

Checked by: JHP

RUNOFF COMPUTATIONS

Sheet No. 12

Job No. Jade Park

Drainage Area No. 12

Area = 16 acres

Maximum Overland Flow: L = 180 S = 3.5

Maximum Channel Flow:

Channel No. 1 L = 2635 S = 2.6

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time:

Overland Flow: 12.3 min.

Channel No. 1 Flow:

Velocity= 5.7 ft/sec; Time = $\frac{2635}{5.7 \times 60}$ = 7.7 min.

Channel No. 2 Flow:

Velocity=_____ft/sec; Time = $\frac{\quad}{\times 60}$ = _____min.

Channel No. 3 Flow:

Velocity=_____ft/sec; Time = $\frac{\quad}{\times 60}$ = _____min.

Total Accumulation Time: T = 20.0 min.

$I = \frac{189}{T+25} = \frac{189}{45.0} = 4.2$

Q = CIA = ( .65 )( 4.2 )( 16 ) = 44 c.f.s.

Date: 9-22-71

Comp. by: T. Cruz

Checked by: [illegible]

RUNOFF COMPUTATIONS

Sheet No. 13

Job No. Tide Park

Drainage Area No. 13

Area = 19 acres

Maximum Overland Flow: L = 230 S = 3.0

Maximum Channel Flow:

Channel No. 1 L = 473 S = 0.5

Channel No. 2 L = 1700 S = 2.5

Channel No. 3 L = _____ S = _____

Accumulation Time:

Overland Flow: 12.4 min.

Channel No. 1 Flow:

Velocity= 2.5 ft/sec; Time = $\frac{473}{2.5 \times 60}$ = 3.2 min.

Channel No. 2 Flow:

Velocity= 5.7 ft/sec; Time = $\frac{1700}{5.7 \times 60}$ = 5.0 min.

Channel No. 3 Flow:

Velocity= _____ ft/sec; Time = $\frac{\quad}{\times 60}$ = _____ min.

Total Accumulation Time: T = 20.6 min.

$I = \frac{189}{T+25} = \frac{189}{45.6} = 4.2$

Q = CIA = ( .65 )( 4.2 )( 19 ) = 52 c.f.s.

Date: 9-22-71

Comp. by: [illegible]

Checked by: [illegible]

RUNOFF COMPUTATIONS

Sheet No. 14

Job No. Jade Park

Drainage Area No. 14

Area = 8 acres

Maximum Overland Flow: L = 100 S = 3.5

Maximum Channel Flow:

Channel No. 1 L = 990 S = 2.5

Channel No. 2 L = 264 S = 1.0

Channel No. 3 L = _____ S = _____

Accumulation Time:

Overland Flow: 11.5 min.

Channel No. 1 Flow:

Velocity= 5.7 ft/sec; Time = $\frac{990}{5.7 \times 60}$ = 3.4 min.

Channel No. 2 Flow:

Velocity= 3.6 ft/sec; Time = $\frac{264}{3.6 \times 60}$ = 1.2 min.

Channel No. 3 Flow:

Velocity= _____ ft/sec; Time = $\frac{\quad}{\times 60}$ = _____ min.

Total Accumulation Time: T = 16.1 min.

$I = \frac{189}{T+25} = \frac{189}{41.1} = 4.6$

Q = CIA = ( .65 )( 4.6 )( 8 ) = 24 c.f.s.

Total Q = 74 + 24 = 98 c.f.s.

98-50 = 48 c.f.s.

Pino Ave., N.E. from Luana St. N.E. to San Pedro Dr., N.E. 0.1' Above High Curb @ 2.5%

Date: 9-22-71

Comp. by: T. Gray

Checked by: [illegible]

RUNOFF COMPUTATIONS

Sheet No. 15

Job No. Jade Park

Drainage Area No. 15

Area = 6 acres

Maximum Overland Flow: L = 220 S = 3.0

Maximum Channel Flow:

Channel No. 1 L = 860 S = 2.5

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time:

Overland Flow: 12.5 min.

Channel No. 1 Flow:

Velocity= 5.7 ft/sec; Time = $\frac{860}{5.7 \times 60}$ = 2.5 min.

Channel No. 2 Flow:

Velocity= _____ ft/sec; Time = $\frac{\quad}{\times 60}$ = _____ min.

Channel No. 3 Flow:

Velocity= _____ ft/sec; Time = $\frac{\quad}{\times 60}$ = _____ min.

Total Accumulation Time: T = 15.0 min.

$I = \frac{189}{T+25} = \frac{189}{40.0} = 4.7$

Q = CIA = ( .65 )( 4.7 )( 6 ) = 18 c.f.s.

Date: 9-22-71

Comp. by: [illegible]

Checked by: [illegible]

RUNOFF COMPUTATIONS

Sheet No. 16

Job No. Tide Park

Drainage Area No. 16

Area = 1 acres

Maximum Overland Flow: L = 280 S = 2.1

Maximum Channel Flow:

Channel No. 1 L = 280 S = 0.7

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time:

Overland Flow: 19.5 min.

Channel No. 1 Flow:

Velocity= 3.6 ft/sec; Time = $\frac{280}{3.6 \times 60}$ = 1.3 min.

Channel No. 2 Flow:

Velocity= _____ ft/sec; Time = $\frac{\quad}{\times 60}$ = _____ min.

Channel No. 3 Flow:

Velocity= _____ ft/sec; Time = $\frac{\quad}{\times 60}$ = _____ min.

Total Accumulation Time: T = 20.8 min.

$I = \frac{189}{T+25} = \frac{189}{45.8} = 4.1$

Q = CIA = ( .65 )( 4.1 )( 1 ) = 3 c.f.s.

Date: 9-22-71

Comp. by: T. [illegible]

Checked by: [illegible]

RUNOFF COMPUTATIONS

Sheet No. 17

Job No. Tide Park

Drainage Area No. L-i

Area = 1 acres

Maximum Overland Flow: L = — S = —

Maximum Channel Flow:

Channel No. 1 L = 1293 S = 0.5

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time:

Overland Flow: 0.0 min.

Channel No. 1 Flow:

Velocity= 2.5 ft/sec; Time = $\frac{1293}{2.5 \times 60}$ = 8.6 min.

Channel No. 2 Flow:

Velocity=_____ft/sec; Time = $\frac{\quad}{\times 60}$ = _____min.

Channel No. 3 Flow:

Velocity=_____ft/sec; Time = $\frac{\quad}{\times 60}$ = _____min.

Total Accumulation Time: T = 8.6 min.

$I = \frac{189}{T+25} = \frac{189}{33.6} = 5.6$

Q = CIA = ( .65 )( 5.6 )( 1 ) = 4 c.f.s.

Total Q = 178 + 4 = 182 c.f.s.
182 - 22 = 160 c.f.s.
Louisiana Blvd. NE. 285' South of Rio Ave NE. to San Bernardino N.E. 0.4' Above High Curb @ 0.5%

Date: 9-22-71

Comp. by: [illegible]

Checked by: _____

RUNOFF COMPUTATIONS

Sheet No. 18

Job No. Jade Park

Drainage Area No. 1-A

Area = 18 acres

Maximum Overland Flow: L = 600 S = 2.0

Maximum Channel Flow:

Channel No. 1 L = 1750 S = 2.2

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time:

Overland Flow: 19.9 min.

Channel No. 1 Flow:

Velocity= 6.3 ft/sec; Time = $\frac{1750}{6.3 \times 60}$ = 4.6 min.

Channel No. 2 Flow:

Velocity=_____ft/sec; Time = $\frac{\quad}{\times 60}$ = _____min.

Channel No. 3 Flow:

Velocity=_____ft/sec; Time = $\frac{\quad}{\times 60}$ = _____min.

Total Accumulation Time: T = 24.5 min.

$I = \frac{189}{T+25} = \frac{189}{49.5} = 3.8$

Q = CIA = ( .65 )( 3.8 )( 18 ) = 44 c.f.s.

Date: 9-16-71

Comp. by: [illegible]

Checked by: [illegible]

RUNOFF COMPUTATIONS

Sheet No. 19

Job No. Tube Park

Drainage Area No. DE-1

Area = 3 acres

Maximum Overland Flow: L = _____ S = _____

Maximum Channel Flow:

Channel No. 1 L = 2950 S = 2.1

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time:

Overland Flow: 0.0 min.

Channel No. 1 Flow:

Velocity= 20.0 ft/sec; Time = $\frac{2950}{20.0 \times 60}$ = 2.46 min.

Channel No. 2 Flow:

Velocity= _____ ft/sec; Time = $\frac{\quad}{\times 60}$ = _____ min.

Channel No. 3 Flow:

Velocity= _____ ft/sec; Time = $\frac{\quad}{\times 60}$ = _____ min.

Total Accumulation Time: T = 2.46 min.

$I = \frac{189}{T+25} = \frac{189}{27.46} = 6.9$

Q = CIA = ( .65 )( 6.9 )( 3 ) = 13 c.f.s.

Total Q = 2054 + 12 + 13 = 2079 c.f.s.

Date: 9-20-71

Comp. by: T. C[illegible]

Checked by: _____

RUNOFF COMPUTATIONS

Sheet No. 30

Job No. Tab Park

Drainage Area No. SP-1

Area = 2 acres

Maximum Overland Flow: L = — S = —

Maximum Channel Flow:

Channel No. 1 L = 1595 S = 2.5

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time:

Overland Flow: 0.0 min.

Channel No. 1 Flow:

Velocity = 5.6 ft/sec; Time = $\frac{1595}{5.6 \times 60}$ = 4.8 min.

Channel No. 2 Flow:

Velocity = _____ ft/sec; Time = $\frac{\quad}{\times 60}$ = _____ min.

Channel No. 3 Flow:

Velocity = _____ ft/sec; Time = $\frac{\quad}{\times 60}$ = _____ min.

Total Accumulation Time: T = 4.8 min.

$I = \frac{189}{T+25} = \frac{189}{29.7} = 6.4$

Q = CIA = ( .65 )( 6.4 )( 2 ) = 8 c.f.s.

total Q = 18 + 98 = 116 ÷ 2 = 58 + 19 = 77

77 - 50 = 27 c.f.s.

San Pedro Dr. NE. from San Francisco Rd. NE. to San Bernardino N.E. 0.5' Above High Curb @ 2.5%

Date: 9-22-71

Comp. by: [illegible]

Checked by: [illegible]

EXHIBIT D

RECOMMENDED STREET GRADES

| STREET DESCRIPTION & LOCATION | MIN. % GRADE | CROWN HEIGTH | PROPERTY LINE ABOVE HIGH CURB |
|---|---|---|---|
| A. Derickson Ave., N.E. from Louisiana Blvd., N.E. to San Pedro Drive, N.E. | 1.0% | 2" | 0.5' |
| B. Jade Park Ave. from Louisiana Blvd., N.E. to San Francisco Rd., N.E. | 0.8% | 2" | 0.2' |
| C. Hallmark Ave., N.E. from Louisiana Blvd., N.E. to San Francisco Rd., N.E. | 1.1% | 2" | 0.1' |
| D. San Francisco Rd., N.E. from Louisiana Blvd., N.E. to San Pedro Drive, N.E. | 2.5% | 2" | 0.6' |
| E. Elona Drive, N.E. 420' South of Pino Ave., N.E. to Ray St., N.E. | 2.6% | 2" | 0.2' |
| F. Ina Drive, N.E. 271' South of Pino Ave., N.E. to Ray Street, N.E. | 2.5% | 2" | 0.2' |
| G. Ruth Avenue, N.E. 119' South of Pino Ave., N.E. to Luana St., N.E. | 1.2% | 2" | 0.1' |
| H. Ruth Ave., N.E. from Ned St., N.E. to San Pedro Drive, N.E. | 2.5% | 2" | 0.2' |
| I. Pino Ave., N.E. from Louisiana Blvd., N.E. to San Pedro Dr., N.E. | 2.5% | 2" | 0.4' |
| J. Kelly Ave., N.E. from Elona St., N.E. to Luana Street, N.E. | 2.7% | 2" | 0.2' |
| K. Kelly Ave., N.E. from Ned St., N.E. to San Pedro Drive, N.E. | 2.5% | 2" | 0.2' |
| L. Ranchitos Rd., N.E. from Louisiana Blvd., N.E. to 95' Northeast of San Pedro Drive, N.E. | 2.6% | 2" | 0.1' |
| M. San Louis Obispo, N.E. from Georgia St., N.E. to Arizona, N.E. | 2.5% | 2" | 0.1' |
| N. San Bernardino, N.E. from 115' Northeast of Georgia St., N.E. to San Pedro Drive, N.E. | 2.5% | 2" | 0.1' |

| | STREET DESCRIPTION & LOCATION | MIN. % GRADE | CROWN HEIGTH | PROPERTY LINE ABOVE HIGH CURB |
|---|---|---|---|---|
| O. | Arizona St., N.E. from Ranchitos Rd., N.E. to San Bernardino, N.E. | 1.0% | 2" | 0.1' |
| P. | Ned St., N.E. from Kelly Ave, N.E. to Pino St., N.E. | 0.5% | 2" | 0.1' |
| Q. | Ned St., N.E. from Ruth Ave., N.E. to Pino Ave., N.E. | 0.5% | 2" | 0.1' |
| R. | Luana St., N.E. 50' North of Kelly Ave., N.E. to Ranchitos Rd., N.E. | 0.5% | 2" | 0.1' |
| S. | Luana St., N.E. 50' North of Kelly Ave., N.E. to Pino Ave., N.E. | 0.5% | 2" | 0.1' |
| T. | Luana St., N.E. 50' South of Ruth Ave., N.E. to Pino Avenue, N.E. | 0.5% | 2" | 0.1' |
| U. | Luana St., N.E. 50' South of Ruth Ave., N.E. to San Francisco Rd., N.E. | 0.5% | 2" | 0.1' |
| V. | Ray St., N.E. from Ina Dr., N.E. to San Francisco Road, N.E. | 0.5% | 2" | 0.1' |
| W. | Ray St., N.E. 50' North of Hallmark Ave., N.E. to San Francisco Road, N.E. | 0.5% | 2" | 0.1' |
| X. | Ray St., N.E. 50' North of Hallmark Ave., N.E. to 50' North of Jade Park Ave., N.E. | 0.5% | 2" | 0.1' |
| Y. | Ray St., N.E. 50' North of Jade Park Ave., N.E. to 25' North of Derickson Ave., N.E. | 3.0% | 2" | 0.6' |
| Z. | Georgia St., N.E. 25' North of Pino Ave., N.E. to San Bernardino, N.E. | 0.5% | 2" | 0.1' |
| AA. | Jackie St., N.E. from Jade Park Ave., N.E. to San Francisco Rd., N.E. | 2.0% | 2" | 0.1' |
| BB. | Louisiana Blvd., N.E. from 285' South of Pino Ave., N.E. to Arroyo Domingo de Baca | 0.5% | 8" | 0.4' |
| CC. | San Pedro Dr., N.E. from San Francisco Rd., N.E. to Arroyo Domingo de Baca | 2.5% | 8" | 0.5' |

EXHIBIT E

STREET CARRYING CAPACITIES
AT VARIOUS GRADES
IN CFS

| STREET WIDTH | TYPE CROWN | CURB HT | .0050 | .0100 | .0150 | .0200 | .0250 | .0300 | .0350 | .0400 |
|---|---|---|---|---|---|---|---|---|---|---|
| 32' | 4" | 4" | 6 | 8 | 10 | 11 | 13 | 14 | 15 | 16 |
| | 2" | 4" | 18 | 25 | 31 | 36 | 40 | 44 | 46 | 51 |
| | 0" | 4" | 35 | 50 | 61 | 71 | 79 | 87 | 94 | 100 |
| | 0" | 2" | 11 | 16 | 19 | 22 | 25 | 28 | 30 | 32 |
| 40' | 4" | 4" | 7 | 10 | 12 | 14 | 16 | 17 | 19 | 20 |
| | 2" | 4" | 23 | 32 | 39 | 45 | 51 | 55 | 60 | 64 |
| | 0" | 4" | 44 | 63 | 77 | 89 | 99 | 109 | 117 | 126 |
| | 0" | 2" | 14 | 20 | 24 | 28 | 31 | 34 | 37 | 40 |
| 44' | 4" | 4" | 8 | 11 | 14 | 16 | 18 | 19 | 21 | 22 |
| | 2" | 4" | 25 | 35 | 43 | 50 | 56 | 61 | 66 | 70 |
| 48' | 8" | 8" | 27 | 38 | 47 | 54 | 60 | 66 | 71 | 76 |
| | 6" | 8" | 53 | 75 | 92 | 106 | 118 | 130 | 140 | 150 |
| | 4" | 8" | 85 | 121 | 148 | 171 | 191 | 209 | 226 | 242 |
| | 2" | 8" | 124 | 175 | 215 | 248 | 277 | 304 | 328 | 351 |

| R/W | ST WD | HI CURB DEPTH | R/W TO R/W OVERFLOW SECTIONS CAPACITIES | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 50' | 32' | 0.1 | 14 | 19 | 23 | 27 | 30 | 33 | 36 | 38 |
| | | 0.2 | 43 | 61 | 75 | 86 | 96 | 105 | 114 | 122 |
| | | 0.4 | 137 | 193 | 237 | 273 | 305 | 335 | 361 | 386 |
| 60' | 40' | 0.1 | 17 | 24 | 29 | 33 | 37 | 41 | 44 | 47 |
| | | 0.2 | 53 | 75 | 92 | 106 | 119 | 130 | 140 | 150 |
| | | 0.4 | 168 | 238 | 292 | 337 | 376 | 412 | 445 | 476 |
| | | 0.6 | 331 | 468 | 573 | 662 | 740 | 810 | 875 | 936 |

Sheet 1 of 2 sheets

R/W TO R/W
OVERFLOW SECTIONS CAPACITIES

| R/W | ST WD | HI CURB DEPTH | .0050 | .0100 | .0150 | .0200 | .0250 | .0300 | .0350 | .0400 |
|---|---|---|---|---|---|---|---|---|---|---|
| 60' | 44' | 0.1 | 18 | 25 | 31 | 36 | 40 | 44 | 47 | 50 |
| | | 0.2 | 57 | 80 | 98 | 113 | 127 | 139 | 150 | 160 |
| | | 0.4 | 180 | 254 | 311 | 359 | 402 | 440 | 475 | 508 |
| | | 0.6 | 353 | 499 | 612 | 706 | 790 | 865 | 934 | 999 |
| 64' | 48' | 0.1 | 19 | 27 | 33 | 39 | 43 | 47 | 51 | 55 |
| | | 0.2 | 61 | 87 | 106 | 123 | 137 | 150 | 162 | 174 |
| | | 0.4 | 195 | 275 | 337 | 390 | 436 | 477 | 515 | 551 |
| | | 0.6 | 383 | 541 | 663 | 766 | 856 | 938 | 1013 | 1083 |

FACE TO FACE = ? 32
CURB = ? 4
CROWN = ? 4

| N | A | P | S | S1/2 | R | R2/3 | V | Q |
|---|---|---|---|---|---|---|---|---|
| .0150 | 3.5556 | 32.6759 | .0050 | .0707 | .1088 | .2279 | 1.5966 | 5.6768 |
| .0150 | 3.5556 | 32.6759 | .0100 | .1000 | .1088 | .2279 | 2.2579 | 8.0283 |
| .0150 | 3.5556 | 32.6759 | .0150 | .1225 | .1088 | .2279 | 2.7654 | 9.8326 |
| .0150 | 3.5556 | 32.6759 | .0200 | .1414 | .1088 | .2279 | 3.1932 | 11.3537 |
| .0150 | 3.5556 | 32.6759 | .0250 | .1581 | .1088 | .2279 | 3.5701 | 12.6938 |
| .0150 | 3.5556 | 32.6759 | .0300 | .1732 | .1088 | .2279 | 3.9109 | 13.9054 |
| .0150 | 3.5556 | 32.6759 | .0350 | .1871 | .1088 | .2279 | 4.2242 | 15.0195 |
| .0150 | 3.5556 | 32.6759 | .0400 | .2000 | .1088 | .2279 | 4.5159 | 16.0565 |

FACE TO FACE = ? 32
CURB = ? 4
CROWN = ? 2

| N | A | P | S | S1/2 | R | R2/3 | V | Q |
|---|---|---|---|---|---|---|---|---|
| .0150 | 7.1111 | 32.6690 | .0050 | .0707 | .2177 | .3619 | 2.5348 | 18.0254 |
| .0150 | 7.1111 | 32.6690 | .0100 | .1000 | .2177 | .3619 | 3.5848 | 25.4917 |
| .0150 | 7.1111 | 32.6690 | .0150 | .1225 | .2177 | .3619 | 4.3904 | 31.2209 |
| .0150 | 7.1111 | 32.6690 | .0200 | .1414 | .2177 | .3619 | 5.0696 | 36.0508 |
| .0150 | 7.1111 | 32.6690 | .0250 | .1581 | .2177 | .3619 | 5.6680 | 40.3060 |
| .0150 | 7.1111 | 32.6690 | .0300 | .1732 | .2177 | .3619 | 6.2090 | 44.1530 |
| .0150 | 7.1111 | 32.6690 | .0350 | .1871 | .2177 | .3619 | 6.7065 | 47.6907 |
| .0150 | 7.1111 | 32.6690 | .0400 | .2000 | .2177 | .3619 | 7.1696 | 50.9835 |

FACE TO FACE = ? 32
CURB = ? 4
CROWN = ? 0

| N | A | P | S | S1/2 | R | R2/3 | V | Q |
|---|---|---|---|---|---|---|---|---|
| .0150 | 10.6667 | 32.6667 | .0050 | .0707 | .3265 | .4742 | 3.3817 | 35.4316 |
| .0150 | 10.6667 | 32.6667 | .0100 | .1000 | .3265 | .4742 | 4.6976 | 50.1078 |
| .0150 | 10.6667 | 32.6667 | .0150 | .1225 | .3265 | .4742 | 5.7534 | 61.3693 |
| .0150 | 10.6667 | 32.6667 | .0200 | .1414 | .3265 | .4742 | 6.6434 | 70.8632 |
| .0150 | 10.6667 | 32.6667 | .0250 | .1581 | .3265 | .4742 | 7.4276 | 79.2274 |
| .0150 | 10.6667 | 32.6667 | .0300 | .1732 | .3265 | .4742 | 8.1365 | 86.7893 |
| .0150 | 10.6667 | 32.6667 | .0350 | .1871 | .3265 | .4742 | 8.7884 | 93.7438 |
| .0150 | 10.6667 | 32.6667 | .0400 | .2000 | .3265 | .4742 | 9.3952 | 100.2156 |

FACE TO FACE = ? 32
CURB = ? 2
CROWN = ? 0

| N | A | P | S | S1/2 | R | R2/3 | V | Q |
|---|---|---|---|---|---|---|---|---|
| .0150 | 5.3333 | 32.3333 | .0050 | .0707 | .1649 | .3008 | 2.1069 | 11.2368 |
| .0150 | 5.3333 | 32.3333 | .0100 | .1000 | .1649 | .3008 | 2.9796 | 15.8913 |
| .0150 | 5.3333 | 32.3333 | .0150 | .1225 | .1649 | .3008 | 3.6493 | 19.4627 |
| .0150 | 5.3333 | 32.3333 | .0200 | .1414 | .1649 | .3008 | 4.2138 | 22.4736 |
| .0150 | 5.3333 | 32.3333 | .0250 | .1581 | .1649 | .3008 | 4.7112 | 25.1263 |
| .0150 | 5.3333 | 32.3333 | .0300 | .1732 | .1649 | .3008 | 5.1608 | 27.5245 |
| .0150 | 5.3333 | 32.3333 | .0350 | .1871 | .1649 | .3008 | 5.5743 | 29.7298 |
| .0150 | 5.3333 | 32.3333 | .0400 | .2000 | .1649 | .3008 | 5.9592 | 31.7825 |

FACE TO FACE = ? STOP

0.656 / 1.238 / 3

RUN

FACE TO FACE = ? 40
CURB = ? 4
CROWN = ? 4

| N | A | P | S | S1/2 | R | R2/3 | V | Q |
|---|---|---|---|---|---|---|---|---|
| .0150 | 4.4444 | 40.6741 | .0050 | .0707 | .1093 | .2286 | 1.6011 | 7.1159 |
| .0150 | 4.4444 | 40.6741 | .0100 | .1000 | .1093 | .2286 | 2.2643 | 10.0634 |
| .0150 | 4.4444 | 40.6741 | .0150 | .1225 | .1093 | .2286 | 2.7731 | 12.3251 |
| .0150 | 4.4444 | 40.6741 | .0200 | .1414 | .1093 | .2286 | 3.2022 | 14.2318 |
| .0150 | 4.4444 | 40.6741 | .0250 | .1581 | .1093 | .2286 | 3.5801 | 15.9116 |
| .0150 | 4.4444 | 40.6741 | .0300 | .1732 | .1093 | .2286 | 3.9218 | 17.4303 |
| .0150 | 4.4444 | 40.6741 | .0350 | .1871 | .1093 | .2286 | 4.2361 | 18.8249 |
| .0150 | 4.4444 | 40.6741 | .0400 | .2000 | .1093 | .2286 | 4.5285 | 20.1268 |

FACE TO FACE = ? 40
CURB = ? 4
CROWN = ? 2

| N | A | P | S | S1/2 | R | R2/3 | V | Q |
|---|---|---|---|---|---|---|---|---|
| .0150 | 8.8889 | 40.6685 | .0050 | .0707 | .2186 | .3628 | 2.5418 | 22.5936 |
| .0150 | 8.8889 | 40.6685 | .0100 | .1000 | .2186 | .3628 | 3.5946 | 31.9582 |
| .0150 | 8.8889 | 40.6685 | .0150 | .1225 | .2186 | .3628 | 4.4025 | 39.1333 |
| .0150 | 8.8889 | 40.6685 | .0200 | .1414 | .2186 | .3628 | 5.0836 | 45.1873 |
| .0150 | 8.8889 | 40.6685 | .0250 | .1581 | .2186 | .3628 | 5.6836 | 50.5209 |
| .0150 | 8.8889 | 40.6685 | .0300 | .1732 | .2186 | .3628 | 6.2261 | 55.3499 |
| .0150 | 8.8889 | 40.6685 | .0350 | .1871 | .2186 | .3628 | 6.7249 | 59.7771 |
| .0150 | 8.8889 | 40.6685 | .0400 | .2000 | .2186 | .3628 | 7.1893 | 63.9045 |

FACE TO FACE = ? 40
CURB = ? 4
CROWN = ? 0

| N | A | P | S | S1/2 | R | R2/3 | V | Q |
|---|---|---|---|---|---|---|---|---|
| .0150 | 13.3333 | 40.6667 | .0050 | .0707 | .3279 | .4755 | 3.3308 | 44.4104 |
| .0150 | 13.3333 | 40.6667 | .0100 | .1000 | .3279 | .4755 | 4.7104 | 62.8058 |
| .0150 | 13.3333 | 40.6667 | .0150 | .1225 | .3279 | .4755 | 5.7691 | 76.9211 |
| .0150 | 13.3333 | 40.6667 | .0200 | .1414 | .3279 | .4755 | 6.6616 | 88.8808 |
| .0150 | 13.3333 | 40.6667 | .0250 | .1581 | .3279 | .4755 | 7.4479 | 99.3047 |
| .0150 | 13.3333 | 40.6667 | .0300 | .1732 | .3279 | .4755 | 8.1587 | 108.7828 |
| .0150 | 13.3333 | 40.6667 | .0350 | .1871 | .3279 | .4755 | 8.8124 | 117.4989 |
| .0150 | 13.3333 | 40.6667 | .0400 | .2000 | .3279 | .4755 | 9.4209 | 125.6116 |

FACE TO FACE = ? 40
CURB = ? 2
CROWN = ? 0

| N | A | P | S | S1/2 | R | R2/3 | V | Q |
|---|---|---|---|---|---|---|---|---|
| .0150 | 6.6667 | 40.3333 | .0050 | .0707 | .1653 | .3012 | 2.1098 | 14.0654 |
| .0150 | 6.6667 | 40.3333 | .0100 | .1000 | .1653 | .3012 | 2.9837 | 19.8914 |
| .0150 | 6.6667 | 40.3333 | .0150 | .1225 | .1653 | .3012 | 3.6543 | 24.3619 |
| .0150 | 6.6667 | 40.3333 | .0200 | .1414 | .1653 | .3012 | 4.2196 | 28.1307 |
| .0150 | 6.6667 | 40.3333 | .0250 | .1581 | .1653 | .3012 | 4.7177 | 31.4511 |
| .0150 | 6.6667 | 40.3333 | .0300 | .1732 | .1653 | .3012 | 5.1679 | 34.4530 |
| .0150 | 6.6667 | 40.3333 | .0350 | .1871 | .1653 | .3012 | 5.5820 | 37.2135 |
| .0150 | 6.6667 | 40.3333 | .0400 | .2000 | .1653 | .3012 | 5.9674 | 39.7829 |

0.658 / 1.206 / 3

FACE TO FACE = ? 44
CURB = ? 4
CROWN = ? 4

| N | A | P | S | S1/2 | R | R2/3 | V | Q |
|---|---|---|---|---|---|---|---|---|
| .0150 | 4.8889 | 44.6734 | .0050 | .0707 | .1094 | .2288 | 1.6027 | 7.8354 |
| .0150 | 4.8889 | 44.6734 | .0100 | .1000 | .1094 | .2288 | 2.2666 | 11.0810 |
| .0150 | 4.8889 | 44.6734 | .0150 | .1225 | .1094 | .2288 | 2.7760 | 13.5714 |
| .0150 | 4.8889 | 44.6734 | .0200 | .1414 | .1094 | .2288 | 3.2054 | 15.6709 |
| .0150 | 4.8889 | 44.6734 | .0250 | .1581 | .1094 | .2288 | 3.5838 | 17.5206 |
| .0150 | 4.8889 | 44.6734 | .0300 | .1732 | .1094 | .2288 | 3.9258 | 19.1928 |
| .0150 | 4.8889 | 44.6734 | .0350 | .1871 | .1094 | .2288 | 4.2404 | 20.7306 |
| .0150 | 4.8889 | 44.6734 | .0400 | .2000 | .1094 | .2288 | 4.5331 | 22.1620 |

FACE TO FACE = ? 44
CURB = ? 4
CROWN = ? 2

| N | A | P | S | S1/2 | R | R2/3 | V | Q |
|---|---|---|---|---|---|---|---|---|
| .0150 | 9.7778 | 44.6684 | .0050 | .0707 | .2189 | .3632 | 2.5443 | 24.8779 |
| .0150 | 9.7778 | 44.6684 | .0100 | .1000 | .2189 | .3632 | 3.5982 | 35.1826 |
| .0150 | 9.7778 | 44.6684 | .0150 | .1225 | .2189 | .3632 | 4.4069 | 43.0897 |
| .0150 | 9.7778 | 44.6684 | .0200 | .1414 | .2189 | .3632 | 5.0887 | 49.7557 |
| .0150 | 9.7778 | 44.6684 | .0250 | .1581 | .2189 | .3632 | 5.6893 | 55.6286 |
| .0150 | 9.7778 | 44.6684 | .0300 | .1732 | .2189 | .3632 | 6.2323 | 60.9380 |
| .0150 | 9.7778 | 44.6684 | .0350 | .1871 | .2189 | .3632 | 6.7317 | 65.8206 |
| .0150 | 9.7778 | 44.6684 | .0400 | .2000 | .2189 | .3632 | 7.1964 | 70.3652 |

OB

0.523 / 0.821 / 3



THIS MICROIMAGE IS THE BEST POSSIBLE REPRODUCTION DUE TO THE POOR QUALITY OF THE ORIGINAL DOCUMENT

FACE TO FACE = ? 46
CURB = ? 8
CROWN = ? 8

| N | A | P | S | S1/2 | R | R2/3 | V | Q |
|---|---|---|---|---|---|---|---|---|
| .0150 | 10.6667 | 49.3580 | .0050 | .0707 | .2161 | .3601 | 2.5227 | 26.9084 |
| .0150 | 10.6667 | 49.3580 | .0100 | .1000 | .2161 | .3601 | 3.5676 | 38.0543 |
| .0150 | 10.6667 | 49.3580 | .0150 | .1225 | .2161 | .3601 | 4.3694 | 46.6068 |
| .0150 | 10.6667 | 49.3580 | .0200 | .1414 | .2161 | .3601 | 5.0453 | 53.8159 |
| .0150 | 10.6667 | 49.3580 | .0250 | .1581 | .2161 | .3601 | 5.6409 | 60.1691 |
| .0150 | 10.6667 | 49.3580 | .0300 | .1732 | .2161 | .3601 | 6.1799 | 65.9120 |
| .0150 | 10.6667 | 49.3580 | .0350 | .1871 | .2161 | .3601 | 6.6743 | 71.1931 |
| .0150 | 10.6667 | 49.3580 | .0400 | .2000 | .2161 | .3601 | 7.1358 | 76.1086 |

FACE TO FACE = ? 48
CURB = ? 8
CROWN = ? 6

| N | A | P | S | S1/2 | R | R2/3 | V | Q |
|---|---|---|---|---|---|---|---|---|
| .0150 | 16.0000 | 49.3472 | .0050 | .0707 | .3242 | .4720 | 3.3061 | 52.8978 |
| .0150 | 16.0000 | 49.3472 | .0100 | .1000 | .3242 | .4720 | 4.6755 | 74.8088 |
| .0150 | 16.0000 | 49.3472 | .0150 | .1225 | .3242 | .4720 | 5.7254 | 91.6216 |
| .0150 | 16.0000 | 49.3472 | .0200 | .1414 | .3242 | .4720 | 6.6128 | 105.7955 |
| .0150 | 16.0000 | 49.3472 | .0250 | .1581 | .3242 | .4720 | 7.3927 | 118.2830 |
| .0150 | 16.0000 | 49.3472 | .0300 | .1732 | .3242 | .4720 | 8.0983 | 129.5726 |
| .0150 | 16.0000 | 49.3472 | .0350 | .1871 | .3242 | .4720 | 8.7471 | 139.9544 |
| .0150 | 16.0000 | 49.3472 | .0400 | .2000 | .3242 | .4720 | 9.3511 | 149.6175 |

FACE TO FACE = ? 48
CURB = ? 8
CROWN = ? 4

| N | A | P | S | S1/2 | R | R2/3 | V | Q |
|---|---|---|---|---|---|---|---|---|
| .0150 | 21.3333 | 49.3395 | .0050 | .0707 | .4324 | .5718 | 4.0055 | 85.4504 |
| .0150 | 21.3333 | 49.3395 | .0100 | .1000 | .4324 | .5718 | 5.6645 | 120.8451 |
| .0150 | 21.3333 | 49.3395 | .0150 | .1225 | .4324 | .5718 | 6.9377 | 147.9044 |
| .0150 | 21.3333 | 49.3395 | .0200 | .1414 | .4324 | .5718 | 8.0110 | 170.9007 |
| .0150 | 21.3333 | 49.3395 | .0250 | .1581 | .4324 | .5718 | 8.9565 | 191.0728 |
| .0150 | 21.3333 | 49.3395 | .0300 | .1732 | .4324 | .5718 | 9.8114 | 209.3098 |
| .0150 | 21.3333 | 49.3395 | .0350 | .1871 | .4324 | .5718 | 10.5975 | 226.0804 |
| .0150 | 21.3333 | 49.3395 | .0400 | .2000 | .4324 | .5718 | 11.3292 | 241.6901 |

FACE TO FACE = ? 48
CURB = ? 8
CROWN = ? 2

| N | A | P | S | S1/2 | R | R2/3 | V | Q |
|---|---|---|---|---|---|---|---|---|
| .0150 | 26.6667 | 49.3349 | .0050 | .0707 | .5405 | .6636 | 4.7488 | 126.5522 |
| .0150 | 26.6667 | 49.3349 | .0100 | .1000 | .5405 | .6636 | 6.7136 | 178.9283 |
| .0150 | 26.6667 | 49.3349 | .0150 | .1225 | .5405 | .6636 | 8.2510 | 219.8539 |
| .0150 | 26.6667 | 49.3349 | .0200 | .1414 | .5405 | .6636 | 9.5265 | 254.0667 |
| .0150 | 26.6667 | 49.3349 | .0250 | .1581 | .5405 | .6636 | 10.6538 | 284.1578 |
| .0150 | 26.6667 | 49.3349 | .0300 | .1732 | .5405 | .6636 | 11.6758 | 311.4021 |
| .0150 | 26.6667 | 49.3349 | .0350 | .1871 | .5405 | .6636 | 12.6061 | 336.1493 |
| .0150 | 26.6667 | 49.3349 | .0400 | .2000 | .5405 | .6636 | 13.4472 | 358.5926 |

0.663 / 1.229 /

50' R.O.W. 3.2' F to F

| R above Hi Card | n | A | P | S | R | R2/3 | S1/2 | V | Q=AV |
|---|---|---|---|---|---|---|---|---|---|
| | .0060 | 4.1000 | 50.0000 | .0050 | .0820 | .1887 | .0707 | 3.3054 | 13.5522 |
| | .0060 | 4.1000 | 50.0000 | .0100 | .0820 | .1887 | .1000 | 4.6745 | 19.1658 |
| | .0060 | 4.1000 | 50.0000 | .0150 | .0820 | .1887 | .1224 | 5.7251 | 23.4732 |
| 0.1 | .0060 | 4.1000 | 50.0000 | .0200 | .0820 | .1887 | .1414 | 6.6108 | 27.1045 |
| | .0060 | 4.1000 | 50.0000 | .0250 | .0820 | .1887 | .1581 | 7.3911 | 30.3038 |
| | .0060 | 4.1000 | 50.0000 | .0300 | .0820 | .1887 | .1732 | 8.0966 | 33.1961 |
| | .0060 | 4.1000 | 50.0000 | .0350 | .0820 | .1887 | .1870 | 8.7453 | 35.8559 |
| | .0060 | 4.1000 | 50.0000 | .0400 | .0820 | .1887 | .2000 | 9.3491 | 38.3316 |
| | .0060 | 8.2000 | 50.0040 | .0050 | .1639 | .2995 | .0707 | 5.2467 | 43.0235 |
| | .0060 | 8.2000 | 50.0040 | .0100 | .1639 | .2995 | .1000 | 7.4200 | 60.8444 |
| | .0060 | 8.2000 | 50.0040 | .0150 | .1639 | .2995 | .1224 | 9.0876 | 74.5189 |
| | .0060 | 8.2000 | 50.0040 | .0200 | .1639 | .2995 | .1414 | 10.4935 | 86.0470 |
| | .0060 | 8.2000 | 50.0040 | .0250 | .1639 | .2995 | .1581 | 11.7321 | 96.2034 |
| 0.2 | .0060 | 8.2000 | 50.0040 | .0300 | .1639 | .2995 | .1732 | 12.8519 | 105.3856 |
| | .0060 | 8.2000 | 50.0040 | .0350 | .1639 | .2995 | .1870 | 13.8816 | 113.8295 |
| | .0060 | 8.2000 | 50.0040 | .0400 | .1639 | .2995 | .2000 | 14.8401 | 121.6888 |
| | .0060 | 16.4000 | 50.0160 | .0050 | .3278 | .4755 | .0707 | 8.3273 | 136.5692 |
| | .0060 | 16.4000 | 50.0160 | .0100 | .3278 | .4755 | .1000 | 11.7767 | 193.1381 |
| | .0060 | 16.4000 | 50.0160 | .0150 | .3278 | .4755 | .1224 | 14.4234 | 236.5449 |
| | .0060 | 16.4000 | 50.0160 | .0200 | .3278 | .4755 | .1414 | 16.6547 | 273.1385 |
| 0.4 | .0060 | 16.4000 | 50.0160 | .0250 | .3278 | .4755 | .1581 | 18.6206 | 305.3781 |
| | .0060 | 16.4000 | 50.0160 | .0300 | .3278 | .4755 | .1732 | 20.3978 | 334.5250 |
| | .0060 | 16.4000 | 50.0160 | .0350 | .3278 | .4755 | .1870 | 22.0322 | 361.3283 |
| | .0060 | 16.4000 | 50.0160 | .0400 | .3278 | .4755 | .2000 | 23.5534 | 386.2762 |

R above
Ui CuZD

60 R.O.W. 40 F to F

| | n | A | P | S | R | R2/3 | S1/2 | V | Q=AV |
|---|---|---|---|---|---|---|---|---|---|
| | .0060 | 5.0000 | 60.0000 | .0050 | .0833 | .1907 | .0707 | 3.3411 | 16.7058 |
| | .0060 | 5.0000 | 60.0000 | .0100 | .0833 | .1907 | .1000 | 4.7251 | 23.6256 |
| | .0060 | 5.0000 | 60.0000 | .0150 | .0833 | .1907 | .1224 | 5.7870 | 28.9353 |
| 0.1 | .0060 | 5.0000 | 60.0000 | .0200 | .0833 | .1907 | .1414 | 6.6823 | 33.4116 |
| | .0060 | 5.0000 | 60.0000 | .0250 | .0833 | .1907 | .1581 | 7.4710 | 37.3554 |
| | .0060 | 5.0000 | 60.0000 | .0300 | .0833 | .1907 | .1732 | 8.1841 | 40.9207 |
| | .0060 | 5.0000 | 60.0000 | .0350 | .0833 | .1907 | .1870- | 8.8399 | 44.1995 |
| | .0060 | 5.0000 | 60.0000 | .0400 | .0833 | .1907 | .2000 | 9.4502 | 47.2512 |
| | .0060 | 10.0000 | 60.0020 | .0050 | .1666 | .3028 | .0707 | 5.3036 | 53.0365 |
| | .0060 | 10.0000 | 60.0020 | .0100 | .1666 | .3028 | .1000 | 7.5005 | 75.0050 |
| | .0060 | 10.0000 | 60.0020 | .0150 | .1666 | .3028 | .1224 | 9.1862 | 91.8620 |
| | .0060 | 10.0000 | 60.0020 | .0200 | .1666 | .3028 | .1414 | 10.6073 | 106.0731 |
| 0.2 | .0060 | 10.0000 | 60.0020 | .0250 | .1666 | .3028 | .1581 | 11.8593 | 118.5933 |
| | .0060 | 10.0000 | 60.0020 | .0300 | .1666 | .3028 | .1732 | 12.9912 | 129.9125 |
| | .0060 | 10.0000 | 60.0020 | .0350 | .1666 | .3028 | .1870 | 14.0321 | 140.3215 |
| | .0060 | 10.0000 | 60.0020 | .0400 | .1666 | .3028 | .2000 | 15.0010 | 150.0100 |
| | .0060 | 20.0000 | 60.0140 | .0050 | .3332 | .4806 | .0707 | 8.4179 | 168.3581 |
| | .0060 | 20.0000 | 60.0140 | .0100 | .3332 | .4806 | .1000 | 11.9047 | 238.0943 |
| | .0060 | 20.0000 | 60.0140 | .0150 | .3332 | .4806 | .1224 | 14.5802 | 291.6048 |
| | .0060 | 20.0000 | 60.0140 | .0200 | .3332 | .4806 | .1414 | 16.8358 | 336.7163 |
| 0.4 | .0060 | 20.0000 | 60.0140 | .0250 | .3332 | .4806 | .1581 | 18.8230 | 376.4602 |
| | .0060 | 20.0000 | 60.0140 | .0300 | .3332 | .4806 | .1732 | 20.6195 | 412.3915 |
| | .0060 | 20.0000 | 60.0140 | .0350 | .3332 | .4806 | .1870 | 22.2716 | 445.4338 |
| | .0060 | 20.0000 | 60.0140 | .0400 | .3332 | .4806 | .2000 | 23.8094 | 476.1887 |
| | .0060 | 30.0000 | 60.0340 | .0050 | .4997 | .6297 | .0707 | 11.0281 | 330.8439 |
| | .0060 | 30.0000 | 60.0340 | .0100 | .4997 | .6297 | .1000 | 15.5961 | 467.8839 |
| | .0060 | 30.0000 | 60.0340 | .0150 | .4997 | .6297 | .1224 | 19.1012 | 573.0384 |
| 0.6 | .0060 | 30.0000 | 60.0340 | .0200 | .4997 | .6297 | .1414 | 22.0562 | 661.6878 |
| | .0060 | 30.0000 | 60.0340 | .0250 | .4997 | .6297 | .1581 | 24.6596 | 739.7894 |
| | .0060 | 30.0000 | 60.0340 | .0300 | .4997 | .6297 | .1732 | 27.0132 | 810.3987 |
| | .0060 | 30.0000 | 60.0340 | .0350 | .4997 | .6297 | .1870 | 29.1776 | 875.3306 |
| | .0060 | 30.0000 | 60.0340 | .0400 | .4997 | .6297 | .2000 | 31.1922 | 935.7678 |

```
R VH
    R.O.... = ? 60
    SHEET = ? 44

  OVERFLOW = ? 0.1
        N        A        P        R        R2/3
     .0060   5.2000   60.0012    .0867    .1958
        S       S1/2      V        Q
     .005    .0707   3.4296   17.8391
     .010    .1000   4.8502   25.2212
     .015    .1225   5.9403   30.8896
     .020    .1414   6.8593   35.6682
     .025    .1581   7.6659   39.8783
     .030    .1732   8.4009   43.6845
     .035    .1871   9.0740   47.1846
     .040    .2000   9.7005   50.4425
  OVERFLOW = ? 0.2
        N        A        P        R        R2/3
     .0060  10.4000   60.0030    .1733    .3109
        S       S1/2      V        Q
     .005    .0707   5.4440   56.6174
     .010    .1000   7.6989   80.0691
     .015    .1225   9.4292   98.0642
     .020    .1414  10.8880  113.2848
     .025    .1581  12.1731  126.6003
     .030    .1732  13.3350  138.6887
     .035    .1871  14.4034  149.7955
     .040    .2000  15.3979  160.1382
  OVERFLOW = ? 0.4
        N        A        P        R        R2/3
     .0060  20.8000   60.0200    .3466    .4934
        S       S1/2      V        Q
     .005    .0707   8.6403  179.7191
     .010    .1000  12.2193  254.1612
     .015    .1225  14.9655  311.2526
     .020    .1414  17.2807  359.4382
     .025    .1581  19.3204  401.8641
     .030    .1732  21.1644  440.2200
     .035    .1871  22.8602  475.4920
     .040    .2000  24.4386  508.3223
  OVERFLOW = ? 0.6
        N        A        P        R        R2/3
     .0060  31.2000   60.0449    .5195    .6463
        S       S1/2      V        Q
     .005    .0707  11.3189  353.1501
     .010    .1000  16.0074  499.4296
     .015    .1225  19.6049  611.6739
     .020    .1414  22.6378  706.3001
     .025    .1581  25.3099  789.6675
     .030    .1732  27.7256  865.0375
     .035    .1871  29.9470  934.3472
     .040    .2000  32.0147  998.8592
  OVERFLOW = ? STOP


  0.615 /      1.844 /          9
```

R also Hi Cors

64' B.O.W. 48' F.b F

| | n | A | P | S | R | R2/3 | S1/2 | V | Q=AV |
|---|---|---|---|---|---|---|---|---|---|
| | .0060 | 5.6000 | 64.0000 | .0050 | .0875 | .1970 | .0707 | 3.4516 | 19.3291 |
| | .0060 | 5.6000 | 64.0000 | .0100 | .0875 | .1970 | .1000 | 4.8813 | 27.3355 |
| | .0060 | 5.6000 | 64.0000 | .0150 | .0875 | .1970 | .1224 | 5.9784 | 33.4790 |
| | .0060 | 5.6000 | 64.0000 | .0200 | .0875 | .1970 | .1414 | 6.9032 | 38.6582 |
| 0.1 | .0060 | 5.6000 | 64.0000 | .0250 | .0875 | .1970 | .1581 | 7.7180 | 43.2212 |
| | .0060 | 5.6000 | 64.0000 | .0300 | .0875 | .1970 | .1732 | 8.4547 | 47.3465 |
| | .0060 | 5.6000 | 64.0000 | .0350 | .0875 | .1970 | .1870 | 9.1321 | 51.1401 |
| | .0060 | 5.6000 | 64.0000 | .0400 | .0875 | .1970 | .2000 | 9.7626 | 54.6710 |
| | .0060 | 11.2000 | 64.0040 | .0050 | .1749 | .3128 | .0707 | 5.4788 | 61.3636 |
| | .0060 | 11.2000 | 64.0040 | .0100 | .1749 | .3128 | .1000 | 7.7483 | 86.7813 |
| | .0060 | 11.2000 | 64.0040 | .0150 | .1749 | .3128 | .1224 | 9.4897 | 106.2849 |
| | .0060 | 11.2000 | 64.0040 | .0200 | .1749 | .3128 | .1414 | 10.9577 | 122.7273 |
| 0.2 | .0060 | 11.2000 | 64.0040 | .0250 | .1749 | .3128 | .1581 | 12.2511 | 137.2132 |
| | .0060 | 11.2000 | 64.0040 | .0300 | .1749 | .3128 | .1732 | 13.4205 | 150.3096 |
| | .0060 | 11.2000 | 64.0040 | .0350 | .1749 | .3128 | .1870 | 14.4957 | 162.3529 |
| | .0060 | 11.2000 | 64.0040 | .0400 | .1749 | .3128 | .2000 | 15.4966 | 173.5626 |
| | .0060 | 22.4000 | 64.0180 | .0050 | .3499 | .4965 | .0707 | 8.6959 | 194.7890 |
| | .0060 | 22.4000 | 64.0180 | .0100 | .3499 | .4965 | .1000 | 12.2979 | 275.4733 |
| | .0060 | 22.4000 | 64.0180 | .0150 | .3499 | .4965 | .1224 | 15.0618 | 337.3845 |
| | .0060 | 22.4000 | 64.0180 | .0200 | .3499 | .4965 | .1414 | 17.3918 | 389.5780 |
| 0.4 | .0060 | 22.4000 | 64.0180 | .0250 | .3499 | .4965 | .1581 | 19.4447 | 435.5615 |
| | .0060 | 22.4000 | 64.0180 | .0300 | .3499 | .4965 | .1732 | 21.3006 | 477.1337 |
| | .0060 | 22.4000 | 64.0180 | .0350 | .3499 | .4965 | .1870 | 23.0072 | 515.3633 |
| | .0060 | 22.4000 | 64.0180 | .0400 | .3499 | .4965 | .2000 | 24.5958 | 550.9466 |
| | .0060 | 33.6000 | 64.0440 | .0050 | .5246 | .6504 | .0707 | 11.3918 | 382.7651 |
| | .0060 | 33.6000 | 64.0440 | .0100 | .5246 | .6504 | .1000 | 16.1104 | 541.3116 |
| | .0060 | 33.6000 | 64.0440 | .0150 | .5246 | .6504 | .1224 | 19.7312 | 662.9686 |
| | .0060 | 33.6000 | 64.0440 | .0200 | .5246 | .6504 | .1414 | 22.7836 | 765.5303 |
| 0.6 | .0060 | 33.6000 | 64.0440 | .0250 | .5246 | .6504 | .1581 | 25.4728 | 855.8888 |
| | .0060 | 33.6000 | 64.0440 | .0300 | .5246 | .6504 | .1732 | 27.9041 | 937.5793 |
| | .0060 | 33.6000 | 64.0440 | .0350 | .5246 | .6504 | .1870 | 30.1399 | 1012.7014 |
| | .0060 | 33.6000 | 64.0440 | .0400 | .5246 | .6504 | .2000 | 32.2209 | 1082.6233 |

## REFERENCES


A. Albuquercue Arroyos- Part I by Corp of Engineers, June 1970 and supplement

B. Master Plan of Drainage-City of Albuquerque, New Mexico and Environs by Gordon Herkenhoff and Associates, Consulting Engineers, 1963

C. Design by Elwyn E. Seelye, Volume 1, 2nd edition, 1945

D. Handbook of Hydraulics by Horace W. King and Ernest F. Brater, 5th edition, 1963

E. Miscellaneous Publication No. 204 by David L. Yarnell, U.S. Department of Agriculture

F. Engineering Manual of the War Department, Part XIII, Chapter 1, December 1945