9712 0727

97127727 0324

PRIVATE FACILITY
DRAINAGE COVENANT G-22/D015
#578181

This Drainage Covenant, between [state the name of the present real property owner exactly as shown on the real estate document conveying title to the present owner and state the legal status of the owner, for example, "single person," "husband and wife," "corporation of the State of _____," "partnership":] Kaufman & Broad of New Mexico, Inc. ("Owner"), whose address is 7850 Jefferson NE Suite 110, Alb., NM, 87109, and the City of Albuquerque, a New Mexico municipal corporation ("City"), whose address is P. O. Box 1293, Albuquerque, New Mexico 87103, is made in Albuquerque, Bernalillo County, New Mexico and is entered into as of the date Owner signs this Covenant.

1. Recital. The Owner is the owner of the following described real property located at [give legal description, and street address:] Tract C, Tinin Subdivision, west of Tramway Blvd. Between Candelaria Rd. and Comanche Rd. Recorded in Bernalillo County Clerk's Office April 27, 1983 Vol. C21 Folio 50 in Bernalillo County, New Mexico (the "Property").

Pursuant to City ordinances, regulations and other applicable laws, the Owner is required to construct and maintain certain drainage facilities on the Property, and the parties wish to enter into this Covenant to establish the obligations and responsibilities of the parties.

2. Description and Construction of Drainage Facility. The Owner shall construct the following "Drainage Facility" within the Property at the Owner's sole expense in accordance with the standards, plans and specifications approved by the City:

Two Temporary Desilting Ponds

The Drainage Facility is more particularly described in Exhibit A attached hereto and made a part hereof.

3. Maintenance of Drainage Facility. The Owner shall maintain the Drainage Facility at the Owner's sole cost in accordance with the approved Drainage Report and plans.

4. Benefit to Property. The Owner acknowledges and understands that the Drainage Facility required herein to be constructed on the Owner's property is for the private benefit

88F

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LEGAL DEPT. 8/19/88

and protection of the Owner's property and that failure to maintain such facility could result in damage or loss to the Property.

5. Inspection of Drainage Facility. The City shall have no duty or obligation whatsoever to perform any inspection, maintenance or repair of the Drainage Facility, it being the duty of the Owner, its heirs, successors and assigns to construct and maintain the facility in accordance with approved plans and specifications.

6. Liability of City. The Owner understands and agrees that the City shall not be liable to the Owner, its heirs, successors or assigns, or to any third parties for any damages resulting from the Owner's failure to construct, maintain or repair the Drainage Facility.

7. Indemnification. The Owner owns and controls the Drainage Facility and shall not permit the Drainage Facility to constitute a hazard to the health or safety of the general public. The Owner agrees to indemnify, defend and hold harmless the City, its officials, agents and employees, from any claims, actions, suits or other proceedings arising from or out of the negligent acts or omissions of the Owner, its agents, representatives, contractors or subcontractors or arising from the failure of the Owner, its agents, representatives, contractors or subcontractors to perform any act or duty required of the Owner herein; provided, however, to the extent, if at all, Section 56-7-1 NMSA 1978 is applicable to this Agreement, this Agreement to indemnify will not extend to liability, claims, damages, losses or expenses, including attorney's fees, arising out of (1) the preparation or approval of maps, drawings, opinions, reports, surveys, change orders, designs or specifications by the respective indemnitee, or the agents or employees of the respective indemnitee; or (2) the giving of or the failure to give direction or instructions by the respective indemnitee, where such giving or failure to give directions or instructions is the primary cause of bodily injury to persons or damage to property.

8. Assessment. Nothing in this Covenant shall be construed to relieve the Owner, its heirs, assigns and successors from an assessment against the Owner's Property for improvements to the Property under a duly authorized and approved Special Assessment District. The parties specifically agree that the value of the Drainage Facility will not reduce the amount assessed by the City.

9. Binding on Owner's Property. The covenants and obligations of the Owner set forth herein shall be binding on the Owner, its heirs, assigns and successors and on the Owner's Property and constitute covenants running with the Owner's


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LEGAL DEPT. 8/19/88

Property until released by the City. This Covenant can only be released by the City's Chief Administrative Officer with the concurrence of the City Engineer.

10. Entire Covenant. This Covenant contains the entire agreement of the parties and supersedes any and all other agreements or understandings, oral or written, whether previous to the execution hereof or contemporaneous herewith.

11. Changes to Covenant. Changes to this Covenant are not binding unless made in writing, signed by both parties.

12. Effective Date of Covenant. This Covenant shall be effective as of the date of signature of the Owner.

OWNER:

By: [signature]
Its: Dir. Forward Planning/Land acquistion
Dated: 7 Oct. 97

STATE OF New Mexico )
) ss
COUNTY OF Bernalillo )

~~The foregoing~~ This instrument was acknowledged before me ~~this~~ on 7th day of October, 19~~8~~97, by [name of person signing:] Jeff R. Dorwart, [title or capacity, for instance, "President" or "Owner":] Director of Land of [name of the entity which owns the Property if other than the individual signing, for instance, the name of the corporation, partnership, or joint venture:] Kaufman & Broad of N.M., INC.

Marda McCloskey
Notary Public

My Commission Expires:
5/31/99

CITY OF ALBUQUERQUE:

Accepted:

By: [signature]
Title: Acting Engineer
Dated: 11-24-97

[EXHIBIT A ATTACHED]



APPROVED AS TO FORM
LEGAL DEPT. 8/19/88

0327

## LEGAL DESCRIPTION POND "A":

SAID DRAINAGE FACILITY SITUATED WITHIN TRACT C, SECTION 3, T10N, R4E N.M.P.M. CITY OF ALNUQUERQUE, BERNALILLO COUNTY, NEW MEXICO, TININ SUBDIVISION, UNIT 1 AS THE SAME IS SHOWN AND DESIGNATED ON SAID PLAT FILED FOR RECORD IN THE OFFICE OF THE COUNTY CLERK OF BERNALILLO COUNTY, NEW MEXICO ON APRIL 27, 1983 IN VOLUME C21, FOLIO 50, AND BEING MORE PARTICULARLY DESCRIDED AS FOLLOWS:

BEGINNING AT ACS MONUMENT "2-G23" (NEW MEXICO STATE PLANE COORIDINATES FOR CENTRAL ZONE: X=426140.55, Y=1497438.88) BEARS N 25°57'37" W, A DISTANCE OF 1562.17 FEET TO THE POINT OF BEGINNING;

THENCE N 89°56'47" W, A DISTANCE OF 70.00 FEET TO A POINT;

THENCE N 00°03'13" E, A DISTANCE OF 70.00 FEET TO A POINT;

THENCE S 89°56'47" E, A DISTANCE OF 70.00 FEET TO A POINT;

THENCE S 00°03'13" W, A DISTANCE OF 70.00 FEET TO A POINT; BEGINNING AND CONTAINING 0.1125 ACRES (4900 SQUARE FEET) MORE OR LESS.

## LEGAL DESCRIPTION POND "B":

SAID DRAINAGE FACILITY SITUATED WITHIN TRACT C, SECTION 3, T10N, R4E N.M.P.M. CITY OF ALNUQUERQUE, BERNALILLO COUNTY, NEW MEXICO, TININ SUBDIVISION, UNIT 1 AS THE SAME IS SHOWN AND DESIGNATED ON SAID PLAT FILED FOR RECORD IN THE OFFICE OF THE COUNTY CLERK OF BERNALILLO COUNTY, NEW MEXICO ON APRIL 27, 1983 IN VOLUME C21, FOLIO 50, AND BEING MORE PARTICULARLY DESCRIDED AS FOLLOWS:

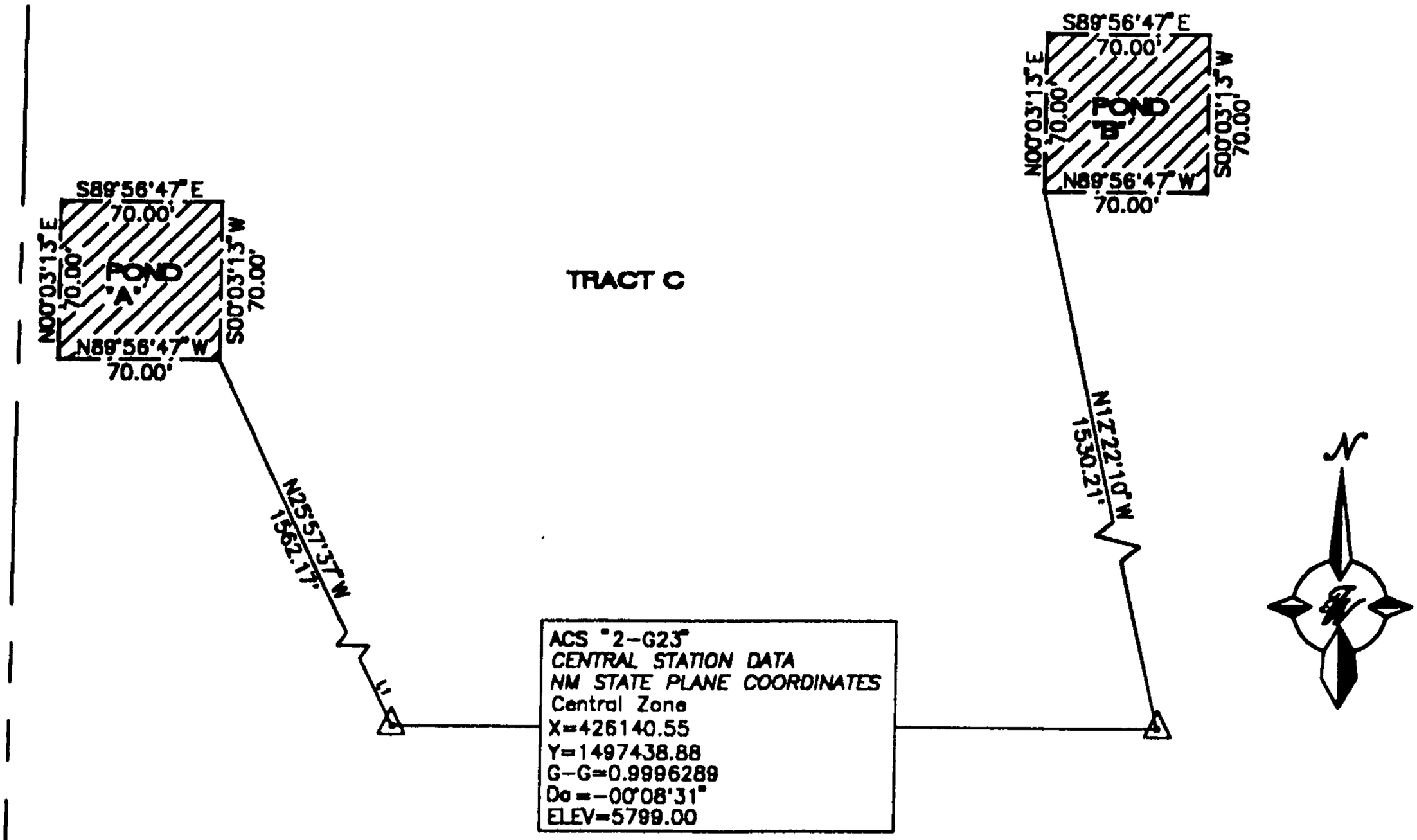
BEGINNING AT ACS MONUMENT "2-G23" (NEW MEXICO STATE PLANE COORIDINATES FOR CENTRAL ZONE: X=426140.55, Y=1497438.88) BEARS N 12°22'10" W, A DISTANCE OF 1530.21 FEET TO THE POINT OF BEGINNING;

THENCE N 89°56'47" W, A DISTANCE OF 70.00 FEET TO A POINT;

THENCE N 00°03'13" E, A DISTANCE OF 70.00 FEET TO A POINT;

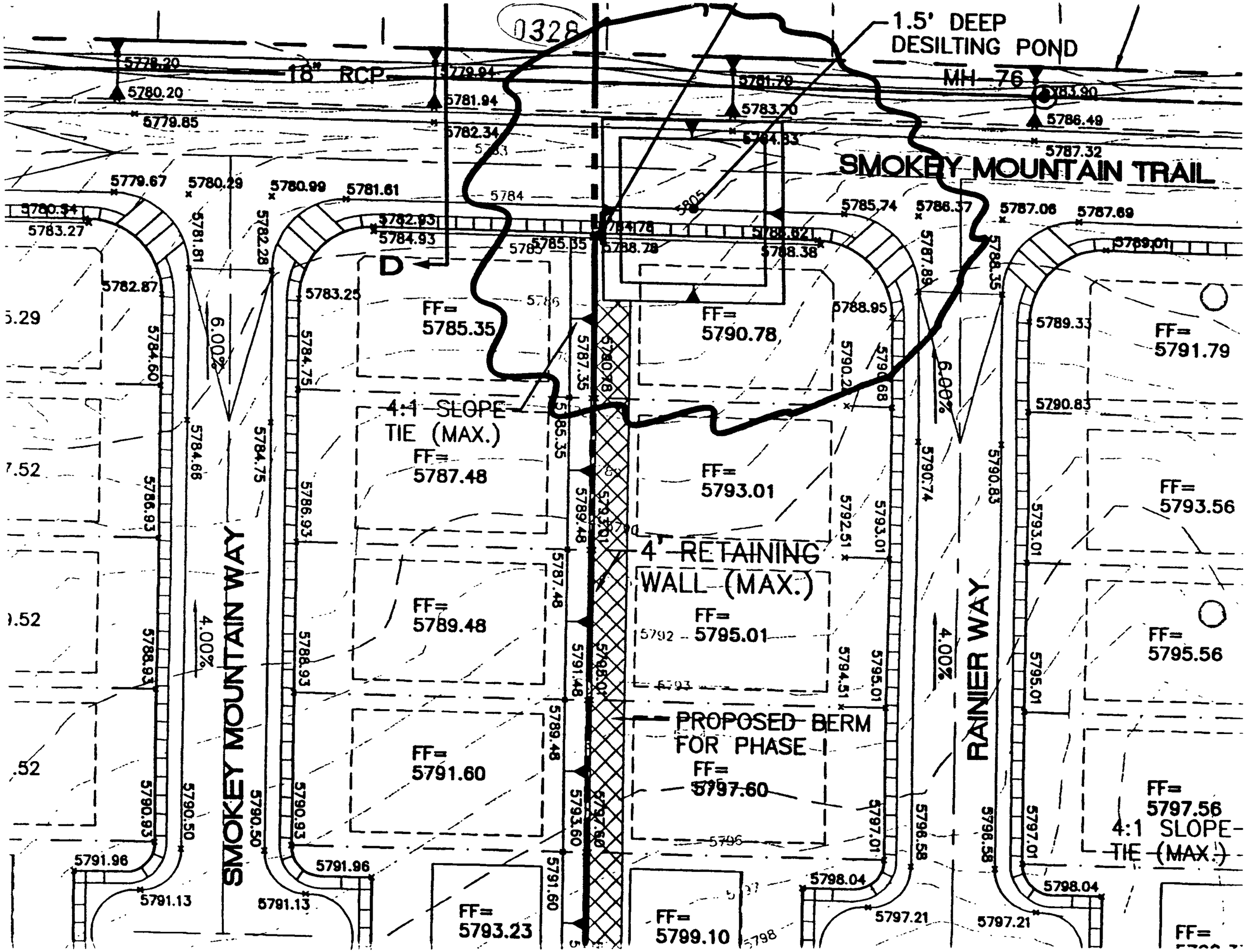
THENCE S 89°56'47" E, A DISTANCE OF 70.00 FEET TO A POINT;

THENCE S 00°03'13" W, A DISTANCE OF 70.00 FEET TO A POINT; BEGINNING AND CONTAINING 0.1125 ACRES (4900 SQUARE FEET) MORE OR LESS.




# EXHIBIT "A"

# DRAINAGE FACILITY DESCRIPTION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FF=
5791.79
4:1 SLOPE
TIE (MAX.)
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5787.48
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WALL (MAX.)
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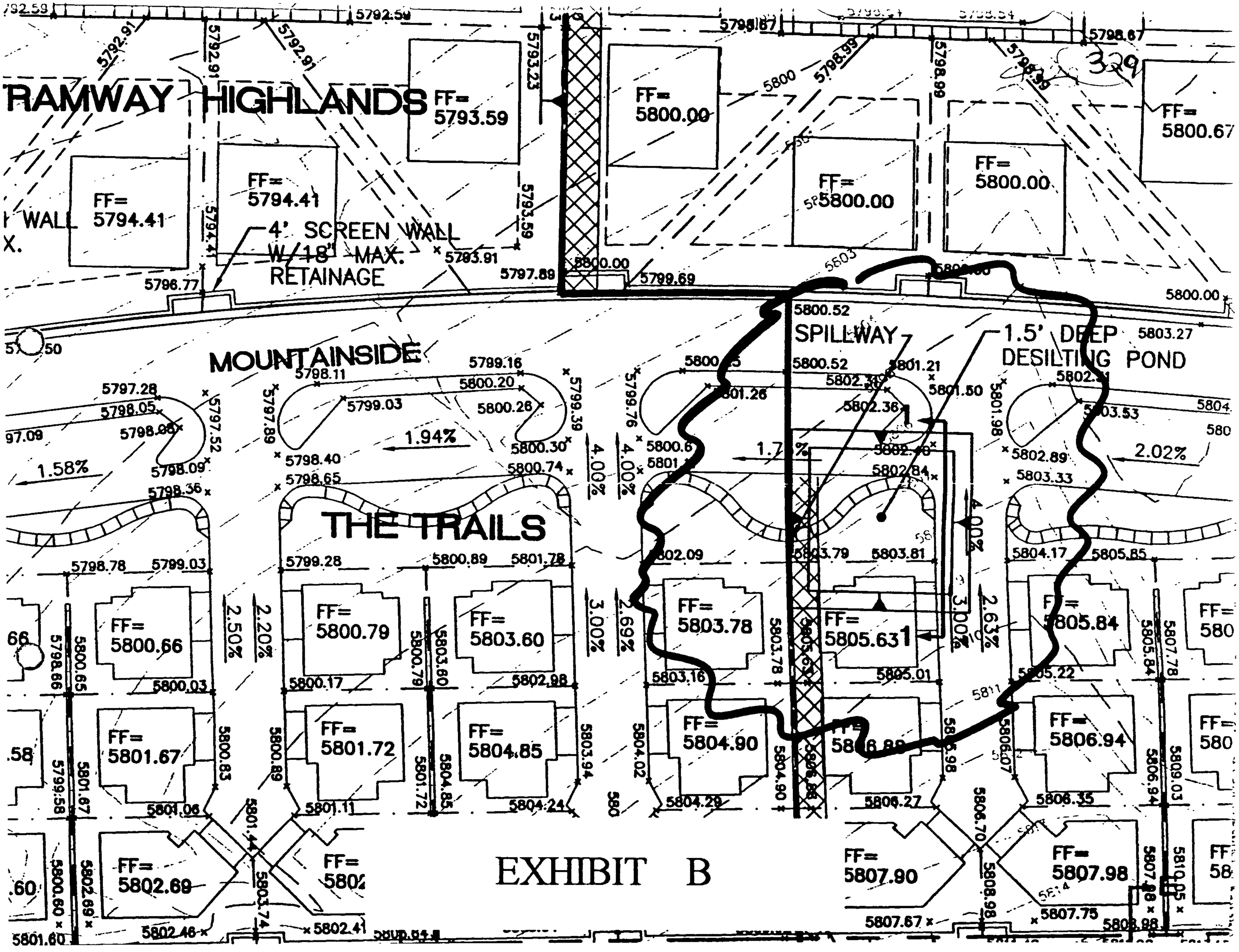
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FF= 5800.67
FF= 5794.41
FF= 5794.41
FF= 5800.00
FF= 5800.00
4' SCREEN WALL W/18" MAX. RETAINAGE
MOUNTAINSIDE
SPILLWAY
1.5' DEEP DESILTING POND
THE TRAILS
1.58%
1.94%
1.7 %
2.02%
4.00%
4.00%
4.00%
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2.20%
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EXHIBIT B

#578181

**REVOCABLE PERMIT**

THIS REVOCABLE PERMIT, made and entered into this 6th day of September, 1998, by and between the City of Albuquerque, New Mexico, a municipal corporation (hereinafter referred to as the "City") as grantor and Tramway High Points Home Owner's Assoc., Inc. (hereinafter referred to as the "Permittee") as permittee.

WITNESSETH, that in consideration of the mutual obligations and covenants herein, the parties hereto do mutually agree as follows:

1. Permit. Subject to the terms and conditions of this Permit, the City grants Permittee the right to construct, install, operate, maintain, replace and remove Landscaping (hereinafter referred to as the "Facility") within the public rights-of-way at the following locations, as more particularly shown on the drawing which is attached hereto as Exhibit A and made a part of this Permit:

See Attached Exhibit "A"

(hereinafter referred to as the "Location")

2. Use. The Permittee shall use the Location solely for Landscaping and will not use it for any other purpose whatsoever without first obtaining the written consent of the City.

3. Compensation. As compensation for this Permit, the Permittee shall pay the City the sum of One Hundred and 00/100 Dollars ($ 100.00) as a one time administration fee.

The One time administration Fee shall be paid to the City upon execution of this Permit.

4. Term, Termination and Removal. This Permit will remain in effect for a period of Ten (10) years from the date of execution of this Permit (hereinafter referred to as the "Term"), unless terminated and revoked as a result of:

a. The Permittee's breach of any provision of or default in the performance of any obligation pursuant to this Permit. If Permittee breaches any of the provisions hereof or is in default in the performance of any obligation imposed hereunder, the City may give thirty (30) days written notice (the "Notice Period") to the Permittee of the termination of this Permit. If the Permittee remains in default or the breach of any provision hereof remains incurred at the end of the Notice Period, this

Permit shall terminate; or

b. The City's giving the Permittee written notice ninety (90) days in advance of termination; or

c. The Permittee's giving the City written notice ninety (90) days in advance of termination; or

d. An order of a court of competent jurisdiction.

Upon termination of this Permit and any renewal hereof, the Permittee shall abandon the use of the Facility, and shall remove the Facility and restore the right-of-way as nearly as possible to the condition it was in prior to removal, all at the sole expense of the Permittee.

If, after termination and within thirty (30) days after being directed to do so by the City, the Permittee fails to remove the Facility and restore the right-of-way, the City may perform the work and the Permittee shall reimburse the City within thirty (30) days after the City submits a bill to the Permittee for the costs of such work.

Termination of this Permit for any reason shall not release the Permittee from any liability or obligation relating to the installation, operation, maintenance or removal of the Facility or any other term of this Permit.

5. Renewal of Permit. If both the City and the Permittee wish to extend the Term of this Permit, then, before the expiration of the Term, the City and the Permittee shall enter into good faith negotiations, the object of which will be to agree upon the terms of a renewal of this Permit. The agreement of the City shall not be withheld unreasonably. If an agreement is reached, all terms, including the agreed-upon consideration, shall be reduced to a writing signed by both parties.

6. Location, Installation, Maintenance and Removal. At its own expense, the Permittee shall install and construct the Facility of such material, and in a manner that will not at any time be a source of danger to, or interfere with the City's present or future use of the right-of-way, or the use of the right-of-way by any utility presently franchised by the City, or interfere with its use as a public way. If during installation it becomes evident that the Permittee's proposed installation will interfere with existing City installations or any existing underground installations, then the Permittee shall modify its installation at the Location to avoid the conflict, after obtaining the City's approval for the change, at the sole expense of the Permittee. All permits required by the City for work within the right-of-way will be the responsibility of the Permittee's contractor.

After installation of the Facility, the Permittee shall back-fill, compact, repair and repave all resulting trenches, curbs, gutters and pavement to the satisfaction of the City, restoring them to as close to their original condition as is reasonably possible.

If, in the judgement of the City, the Permittee at any time fails to perform its obligations under this section, the City, at the City's option, may perform whatever work the City deems necessary for the public safety, health and welfare, and the Permittee shall reimburse the City within thirty (30) days after the City submits a bill to the Permittee for the costs of performing such work. However, the City is not required to perform such work, and any failure by the City to perform the Permittee obligations shall not release the Permittee from liability for any loss or damage caused by the Permittee's failure to perform its obligations.

Installation, maintenance and removal of the Facility shall be accomplished in a manner which will not unreasonably impede traffic adjacent to the Location or impede its use as a public way, as determined by the City. The timing and manner of such construction, maintenance and removal shall be done in compliance with the City's requirements.

If the facility or any part thereof is the cause of an emergency condition, and the City determines that the situation makes it unreasonable to notify the Permittee or await action by the Permittee, the City may take whatever actions it deems necessary to remedy the emergency situation at the sole expense of the Permittee, which will reimburse the City within thirty (30) days after the City submits a bill to the Permittee for the costs of such actions.

7. As-Builts. Upon completion of the construction and installation of the Facility, the Permittee shall promptly provide the City with one set of reproducible as-built, record drawings, reflecting construction and installation as actually accomplished.

8. Insurance. During the Term of this Permit, including renewals, if any, the Permittee shall obtain and maintain liability insurance in an amount of not less than $1,000,000 combined single limit for accidents or occurrences which cause bodily injury, death or property damage to any member of the public caused by or related to the construction, installation, operation, maintenance, replacement, removal or other activity related to the Facility. The insurance policy shall name the City of Albuquerque, its employees and elected officials, as their interest may appear, as additional insured. Any cancellation provision must provide that if the policy is cancelled prior to the expiration date of the Permit, materially changed or not renewed, the issuing company will mail thirty (30) days written notice to the City, Attention: Risk Management. A certificate of insurance in compliance

with the above must be furnished to the City with the execution of this Permit and prior to commencement of construction.

9. Indemnity/Liability. At all times the Permittee shall defend, indemnify and save harmless the City, its officers, agents and employees against all claims, demands, damages and causes of action which results from or arises out of the construction, installation, operation, maintenance, replacement or removal of the Facility including any loss, damage or expense arising out of loss of or damage to property, injury to or death of persons, or mechanics' or other liens of any character, or taxes or assessments of any kind, except to the extent or degree that the City itself is found contributorily negligent. To the extent, if at all, Section 56-7-1 NMSA 1978 is applicable to this Agreement, this Agreement to indemnify will not extend to liability, claims, damages, losses or expenses, including attorney's fees, arising out of (1) the preparation or approval of maps, drawings, opinions, reports, surveys, change orders, designs or specifications by the indemnitee, or the agents or employees of the indemnitee; or (2) the giving of or the failure to give direction or instructions by the indemnitee, where such giving or failure to give directions or instructions is the primary cause of bodily injury to persons or damage to property. The indemnification required hereunder shall not be limited as a result of the specifications of any applicable insurance coverage. Nothing herein is intended to impair any right or immunity under the laws of the State of New Mexico.

10. Entire Agreement. This Permit contains the entire agreement of the parties regarding the Facility and supersedes any and all other agreements or understandings, oral or written, whether previous to the execution hereof or contemporaneous herewith.

11. Changes. Changes to this Permit are not binding unless made in writing, signed by both parties.

12. Captions. The captions to the sections or paragraphs of this Permit are not part of this Permit and will not affect the meaning or construction of any of its provision.

13. Binding Effect. This Permit is binding upon and inures to the benefit of the successors and/or assigns of the parties.

14. Compliance with Laws. The Permittee and its contractors shall comply with all federal, state and local laws, ordinances, regulations and rules and will not discriminate illegally against any person. The Permittee's attention is specifically drawn to 62-14-1 et seq. NASA, (1978 Comp., 1984 Repl. Pamphlet) regarding excavation damage to pipelines and underground utility lines.

15. Applicable Law. This Permit is governed by and construed and enforced in accordance with the laws of the State of New Mexico.

16. Construction and Severability. If any part of this Permit is held to be invalid or unenforceable, the remainder of this Permit will remain valid and enforceable if the remainder of the Permit is reasonably capable of completion.

17. Assignment. The Permittee shall not assign any interest in this Agreement and shall not transfer any interest in this Agreement (whether by assignment or novation).

18. Notice. For purposes of giving formal written notice to the Permittee, the Permittee's address is:

Tramway High Point Home Owner's Association, Inc.
4921 Alexander Blvd., NE, Suite B
Albuquerque, NM 87107
Phone No. 344-9400

For purposes of giving formal, written notice of the City, the City's address is:

Mayor
City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

Copies of any notices to the City must also be given to:

Director, Public Works Department
City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

Written notice must be made either personally or by certified United States Mail. If the notice is mailed, the notice will be complete when deposited in the United State Mail, postage paid, and addressed as required in this Section. Notice of change of address will be given in the same manner as required by this section.

19. Approval Required. This Permit Agreement shall not become effective or binding until approved by the City's Public Works Department Director.

Judy D. Woodward Bern. Co. AGRE R 19.00
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Page: 5 of 7
09/09/1998 09:44A
Bk-9815 Pg-2639
One-Time 10/96

IN WITNESS WHEREOF, the City and the Permittee have executed this Permit Agreement the day and year first above written.

CITY OF ALBUQUERQUE

Approved By:

Director, Public Works Dept.

Date: 9/6/98

City Engineer

8/31/98

8/31/98

Permittee:

By:

Title: Director of Forward Planning / AND PRESIDENT, BOARD OF DIRECTORS

9/2/98

**CITY'S NOTARY**

STATE OF NEW MEXICO )
) ss
COUNTY OF BERNALILLO )

This instrument was acknowledged before me on 6th day of September, 1998, by ~~Robert E. Gurule, Director~~ Larry A. Blair, Director, Public Works Department of the City of Albuquerque, a municipal corporation on behalf of said corporation.

Notary Public

My Commission Expires:
1-27-2002

**PERMITTEE'S NOTARY**

STATE OF NEW MEXICO )
) ss
COUNTY OF BERNALILLO )

OFFICIAL SEAL
L. M. RANE
Notary Public
State of New Mexico
My Commission Expires 1-21-99

This instrument was acknowledged before me on 29th day of July, 1998, by JEFF DORWART, PRESIDENT OF THE BOARD OF DIRECTORS of TRAMWAY THOMAS HOA, a New Mexico NON-PROFIT CORPORATION on behalf of said CORPORATION.

Notary Public

My Commission Expires:
1-21-99

Judy D. Woodward Bern. Co. AGRE R 19.00
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Page: 6 of 7
09/09/1998 09:44A
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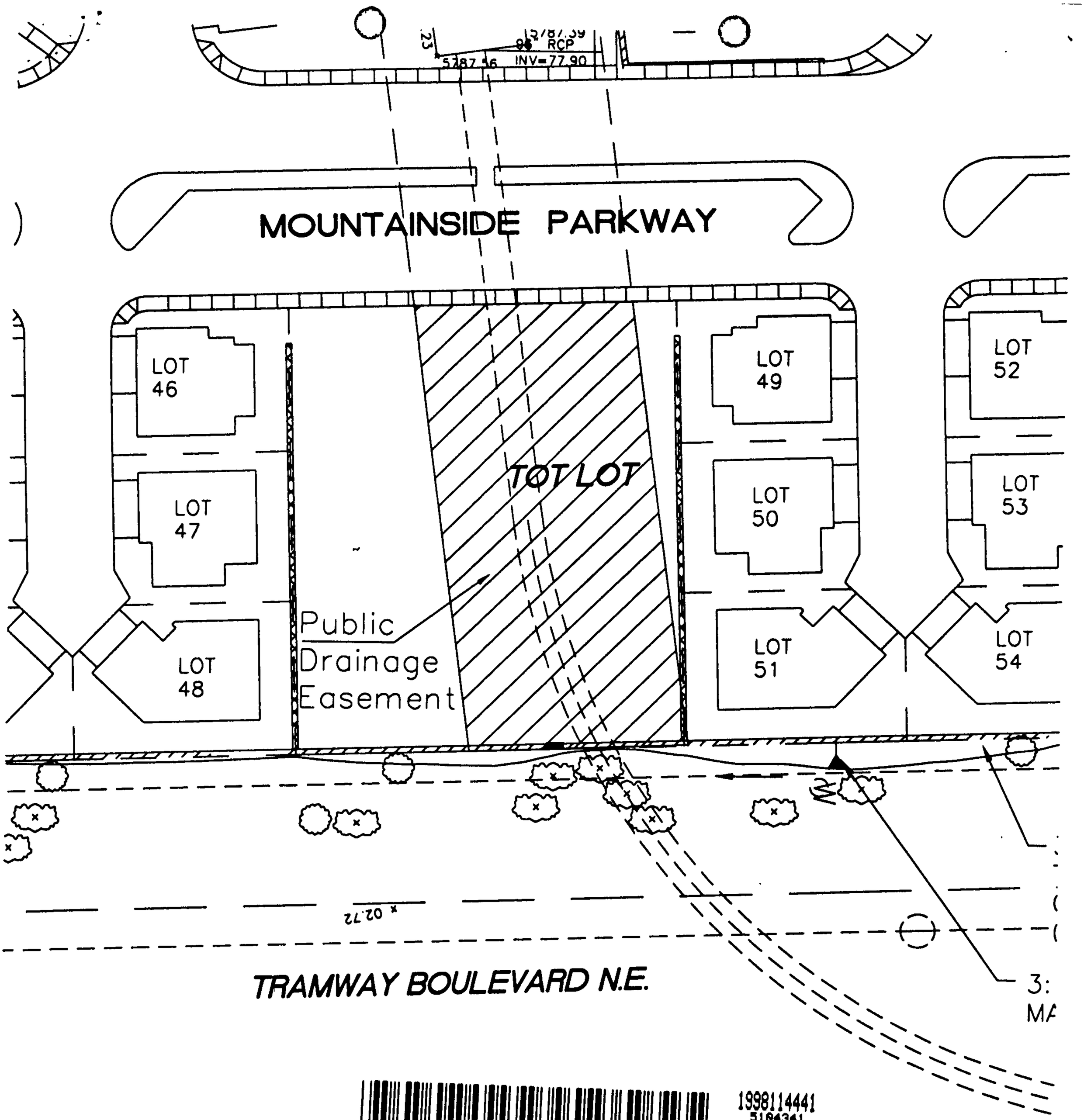


Judy D. Woodward Bern. Co. AGRE R 19.00
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Page: 7 of 7
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# EXHIBIT "A"

## TRAMWAY HIGHLAND SUBDIVISION

CITY OF
Albuquerque

April 28, 1998

Shahab Biazar, P.E
Tierra West, LLC
4421 McLeod Road, NE
Suite D
Albuquerque, NM 87109

***RE: TRAMWAY HIGHLANDS SUBDIVISION(G22-D15). GRADING PLAN FOR APPROVAL OF GRADE CHANGES. ENGINEER'S STAMP DATED APRIL 2, 1998.***

Dear Mr. Biazar:

Based on the information provided on your April 8, 1998 resubmittal and the Design Review Committee Meeting of April 27,1998, the subject plan is approved.

Prior to Certificate of Occupancy release, the Engineer will need to certify the project per the DPM.

If I can be of further assistance, please feel free to contact me at 924-3984.

Sincerely,

John P. Murray, P.E.
Hydrology

c: Andrew Garcia
File

DRAINAGE REPORT
FOR

# *TRAMWAY HIGHLANDS*

Prepared by:

JUL 31 1997
HYDROLOGY SECTION

*Tierra West, LLC*
4421 McLeod Rd., NE, Suite D
Albuquerque, New Mexico 87109

July, 1997

I certify that this report was prepared under my supervision, and I am a registered professional engineer in the state of New Mexico in good standing.

RONALD RAY BOHANNAN
NEW MEXICO
7868
REGISTERED
PROFESSIONAL ENGINEER

Ronald R. Bohannan
PE NO. 7868
7-31-97

Job No 960054

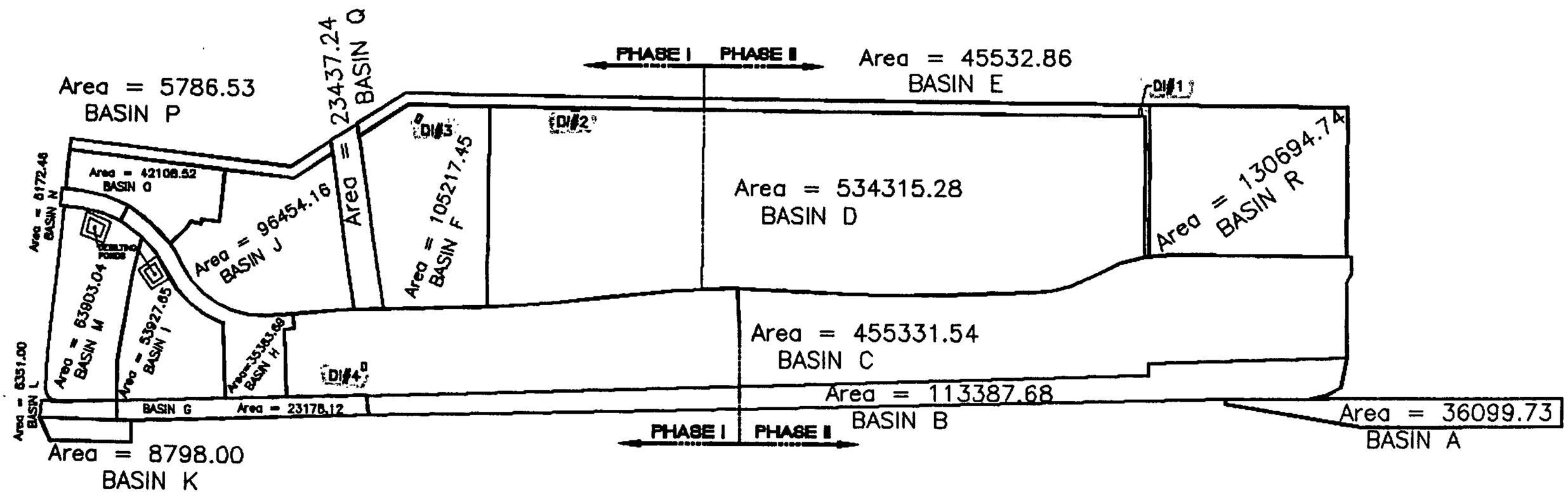
## Proposed Conditions and On-Site Drainage Management Plan

The site is proposed to use the streets to surface flow through the project. Proposed storm sewer structures will intercept the flow and convey the storm water to the South Glenwood Channel and offsite. This site will develop in two phases. The first Phase will be developed from Candelaria Road north to approximately the midpoint of the project. The second phase will complete the project to Comanche Road. The entire site will be graded in Phase I. Most of the storm sewer improvements will be built as part of Phase I as well. The second phase will have dust control and revegetation measures for the site. All of the offsite flows will drain to proposed storm sewer inlets and/or desilting ponds.

*Drainage Management Plan*

The overall offsite and on-site runoff are broken into several developed basins. With the exception of Basins N and M, the runoff is designed to drain into the South Glenwood Channel. Only a small portion of the runoff (Basins N and M) will continue to drain south to Candelaria Boulevard. Basins A, B, K, and L are the basins offsite that represent the shoulder areas of Tramway Boulevard. The proposed drainage management under developed conditions is as follow (please refer to the proposed basin layout):

- Basin A (4.35 cfs), offsite basin, will continue to surface flow to Basin B.
- Basin B (7.61 cfs), offsite basin, along with the runoff from Basin A (at a total runoff rate of 11.96 cfs) is being routed along the east property line and through the tot lot to




# PROPOSED BASINS

South Glenwood Channel. The flow will be collected in drop inlet #4 within Basin C and then the runoff will drain to an existing 96" RCP via a 18" RCP.

- Basin C represents the majority of the patio homes pods north of the South Glenwood Channel. These pods will surface drain to Mountain Side Boulevard and then south to the channel. Basin C (46.73 cfs) will surface flow south to a proposed drainage opening designated as drainage point # 8. From this point, the runoff will drain to Basin Q (South Glenwood Channel). Drainage point # 8 has been designed to drain flows up to 58.69 cfs and will serve as an emergency drainage point if drop inlet # 4 were to become clogged. Hydraulic calculations have been shown in the report.
- Basins D and F represent the Tramway Highlands or single family lots. The lots which are west of Mountain Side Boulevard drain west in the street to drop inlets #2 and #3 and then to the 30 foot buffer area. At this point, the flow is directed south and is collected in a 42" RCP storm sewer pipe and conveyed to the existing channel within basin Q. Basin D (54.83 cfs) will surface flow south and west and drain to a proposed inlet (Type "DBL-A") designated as drop inlet # 2. From this inlet the runoff will drain to Basin Q (South Glenwood Channel) via a storm sewer pipe through Basin E. Basin F (10.81 cfs), will surface flow west to a proposed inlet (Type "C") designated as drop inlet # 3. From this inlet the runoff will drain to Basin Q (South Glenwood Channel) via a storm sewer pipe through Basin E.
- Basin R represents the Mountain Side YMCA site. The current flows of the site exit at the southwest corner of the YMCA. The runoff (15.05 cfs) at this point will drain to a proposed inlet (Type "C") designated as drop inlet # 1 in Basin E. From this inlet the

runoff will drain to Basin Q (South Glenwood Channel) via a storm sewer pipe in Basin E.

- Basin E is the 30 foot buffer area that will contain the storm sewer line. This basin also will contain the runoff from the YMCA, the Tramway Highlands, and the surface flows from the basin itself. Basin E (3.22 cfs) will surface flow to Basin Q (South Glenwood Channel). Basin E is designed to surface flow within a rectangular earthen channel with two header walls on each side. The channel is also designed as an emergency spillway and will carry the flows for basins D, F, and R in case drop inlets 1, 2 and 3 were to ever become clogged. Therefore, the channel at Crossing Point # 1 (CP #1) has the capacity to carry 18.27 cfs, at Crossing Point # 2 (CP #2) has the capacity to carry 73.10 cfs, and at Crossing Point # 3 (CP #3) has the capacity to carry 83.91 cfs.
- Basins I and M represent the commercial tract of land that is not being developed with this project. We are proposing that both basins surface flow to two desilting ponds on site. These flows then will surface flow to Mountain Side Boulevard. Basins G, K, and L from the Tramway right-of-way will drain to Basins I and M. Basin G (1.56 cfs) will surface flow to Basin I. Basin I (6.22 cfs), along with Basin G (1.56 cfs), will surface flow to the west at a total runoff rate of 7.78 cfs to a proposed desilting pond. From there the runoff will overflow into Basin H at Drainage Point #6 (DP #6). Basin K (1.07 cfs) will continue to surface flow west to Basin L. Basin L (0.44 cfs), along with flows from Basin K, will continue to surface flow west to Basin M at a total

runoff of 1.51 cfs. Basin M (7.37 cfs), along with flows from Basins K and L, will continue to surface flow west to a proposed desilting pond. From this pond the runoff will overflow into Basin N at Drainage Point # 7 (DP #7) at a total runoff rate of 8.88 cfs. Basin N (0.55 cfs), along with flow from Basins K, L, and M, will surface flow south to Candelaria Boulevard at a total runoff of 9.43 cfs.

- Basin H (3.65 cfs), along with flows from Basin G & I, will surface flow west to Basin O at a total runoff rate of 11.43 cfs.
- Basin O (4.34 cfs), along with flows from Basin G, H, and I, surface flows to Basin P at a total runoff rate of 21.35 cfs. Basin O drains to Basin P at Drainage Points 3, 4, and 5. Drainage Point 3 (DP #3) drains Basin H and 28% of Basin O (1.22 cfs) with a total runoff of 22.57 cfs. Drainage Point 4 (DP #4) drains 41% of Basin O (1.78 cfs). Drainage Point 5 (DP #5) drains 31% of Basin O (1.34 cfs).
- Basin J (9.92 cfs) will surface flow to the west to Basin P. Basin J discharges the runoff into the Basin P at Drainage Points #1 (DP #1) and #2 (DP #2) located within Basin J. Drainage Point #1 (DP #1) drains 83.50% of Basin J (8.28 cfs). Drainage Point #2 (DP #2) drains 16.50% of Basin J (1.64 cfs).
- Basin P (0.66 cfs), along with flows from Basins O and J, will surface flow north to Basin Q (South Glenwood Channel) at a total runoff of 31.93 cfs. Basin P is designed to surface flow within a rectangular earthen channel with two header walls on each side. The channel is analyzed at Crossing Points #4 (CP #4) and #5 (CP #5). The channel at Crossing Point # 4 has the capacity to carry 22.01 cfs and at Crossing Point # 5 has the capacity to carry 31.930 cfs.

The details on the drainage management plan are shown on *"Proposed Basins / Basin Analysis Map"* enclosed in the map pocket. The details on the storm sewer pipe and the connections to the existing storm sewer structures will be coordinated and designed through DRC. See the following sheet for calculations.

**Phasing Plan**

This site will develop in two phases. The first phase will be developed from Candelaria Road north to approximately the midpoint of the project. The second phase will complete the project to Comanche Road. The entire site will be graded in Phase I. Most of the storm sewer improvements will be built as part of Phase I as well. The second phase will have dust control and revegetation measures for the site. All of the offsite flows will drain to proposed storm sewer inlets and/or desilting ponds. The majority of the storm sewer structures will be built as part of Phase I. Desilting ponds will be placed at the phase line to intercept the silts prior to entering the site.

**Emergency Overflow Plan**

The site has been designed for emergency situations. The 30 foot buffer (Basin E) is designed to handle the runoff from Basins D, F, and R in case storm drain inlets #1, #2, and #3 were ever to become clogged. Drainage point #8 is designed to handle flows from Basins A and B in case drop inlet #4 was ever to become clogged.

## Infrastructure Requirements

The required infrastructure list is included in section VII of this report to use as a guide to the overall list for the project.

## Summary

The proposed drainage basins are maintaining the existing drainage patterns. The majority of the runoff from the basins (A through J, O, P, & R) drain to Basin Q (South Glenwood Channel) with 31.93 cfs from the south, 83.91 cfs from the north, and 58.69 cfs from east of the channel. The rest of the basins (K, L, M, & N) surface flow to Candelaria Road at a runoff rate of 9.43 cfs.

The drainage calculations have been preformed using the City of Albuquerque Design Development Manual (DPM) Section 22.2, Hydrology, volume 2, design criteria for the City of Albuquerque, New Mexico in Corporation with Bernalillo County, New Mexico, and Albuquerque Metropolitan Arroyo Flood Control Authority dated January, 1993.

CITY OF
Albuquerque

August 19, 1997

Martin J. Chávez, Mayor

Shahab Biazar, P.E.
Tierra West
4421 McCleod Road NE
Albuquerque, NM 87108

***RE: TRAMWAY HIGHLANDS (G22-D15). DRAINAGE REPORT FOR PRELIMINARY PLAT, SITE DEVELOPMENT PLAN FOR SUBDIVISION, AND GRADING PERMIT APPROVALS. ENGINEER'S STAMP DATED JULY 31, 1997.***

Dear Mr. Biazar:

Based on the information provided on your July 31, 1997 submittal, the above referenced submittal is approved for Preliminary Plat, Site Development Plan for Subdivision, and Grading Permit.

Prior to Final Plat approval, a Drainage Covenant for the sediment ponds will be required.

If I can be of further assistance, please feel free to contact me at 924-3984.

Sincerely,

Lisa Ann Manwill, P.E.
Engineering Assoc./Hyd.

c: Andrew Garcia
File

DRAINAGE REPORT
FOR

# *TRAMWAY HIGHLANDS*

Prepared by:

RECEIVED
JUL 31 1997
HYDROLOGY SECTION

*Tierra West, LLC*
4421 McLeod Rd., NE, Suite D
Albuquerque, New Mexico 87109

July, 1997

I certify that this report was prepared under my supervision, and I am a registered professional engineer in the state of New Mexico in good standing.

Ronald R. Bohannan
PE NO. 7868

RONALD RAY BOHANNAN
NEW MEXICO
7868
REGISTERED
PROFESSIONAL ENGINEER

7-31-97

Job No 960054

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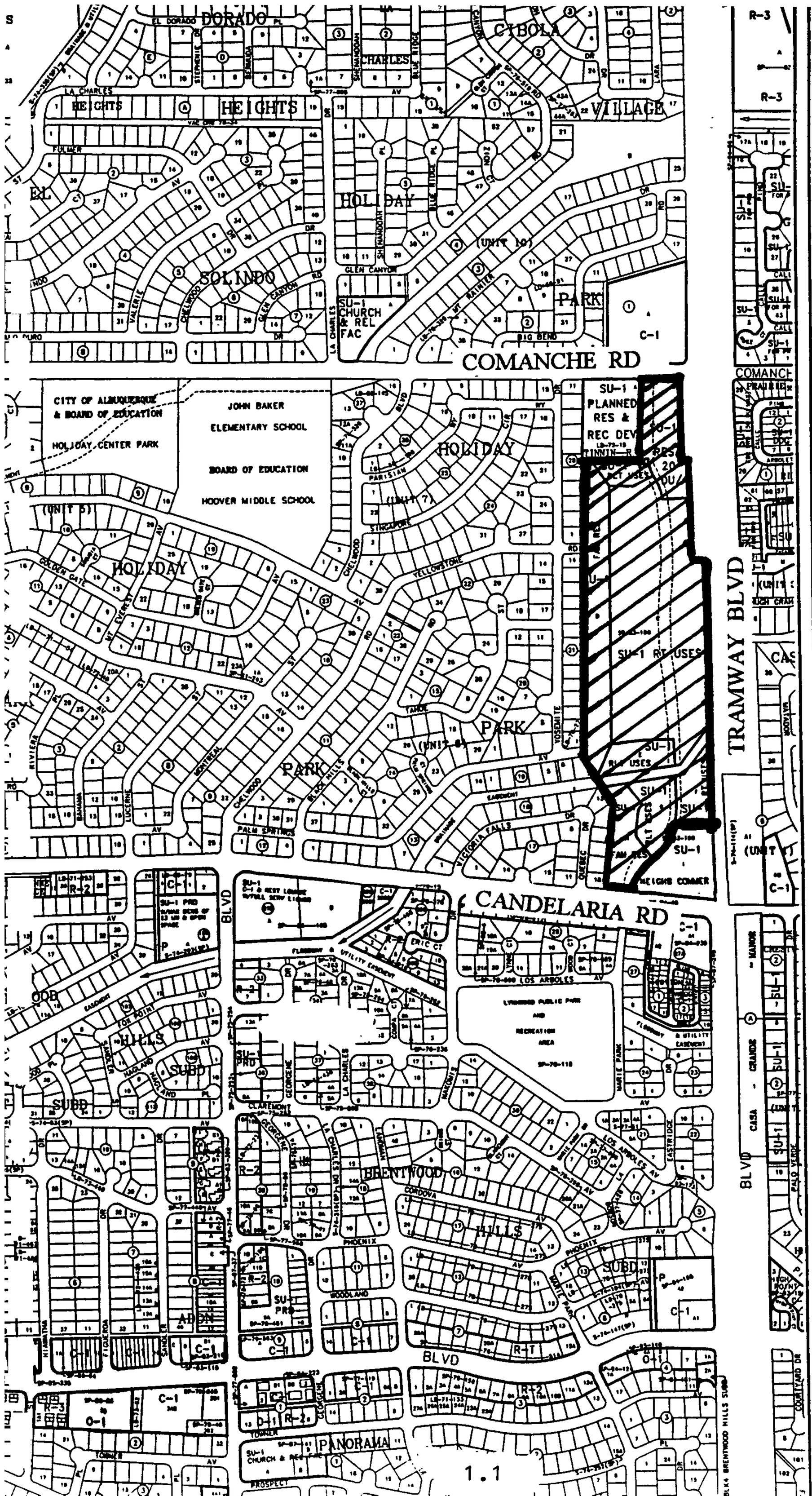
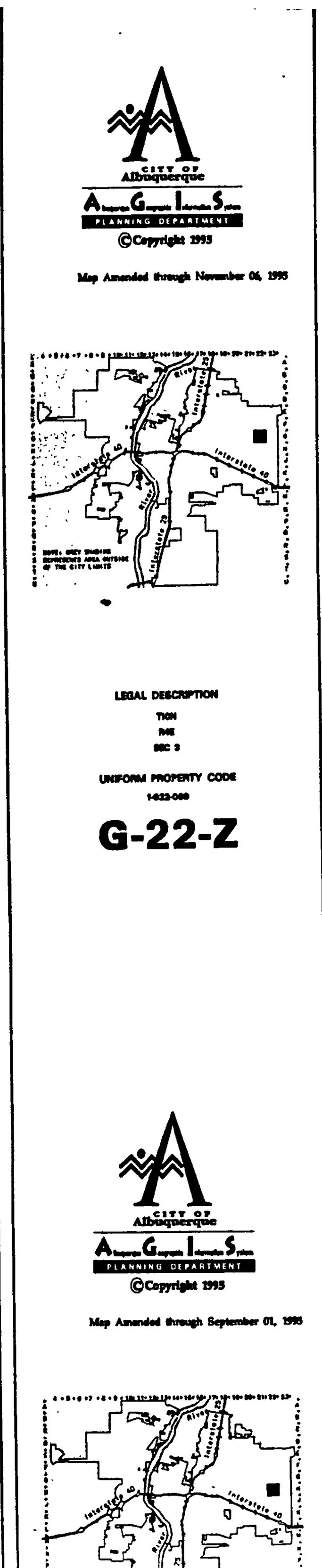
# Section I

# Report




CITY OF Albuquerque

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PLANNING DEPARTMENT

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Map Amended through November 06, 1995

LEGAL DESCRIPTION

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R4E

SEC 3

UNIFORM PROPERTY CODE

1-022-000

# G-22-Z

CITY OF Albuquerque

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## Location

Tramway Highlands is located on the west side of the Tramway Boulevard between Comanche Road and Candelaria Road and contains ±31.13 acres. See attached Zone Atlas page number G-22 for location. We are proposing to subdivide the site into 252 lots, 98 single family homes and 152 patio homes.

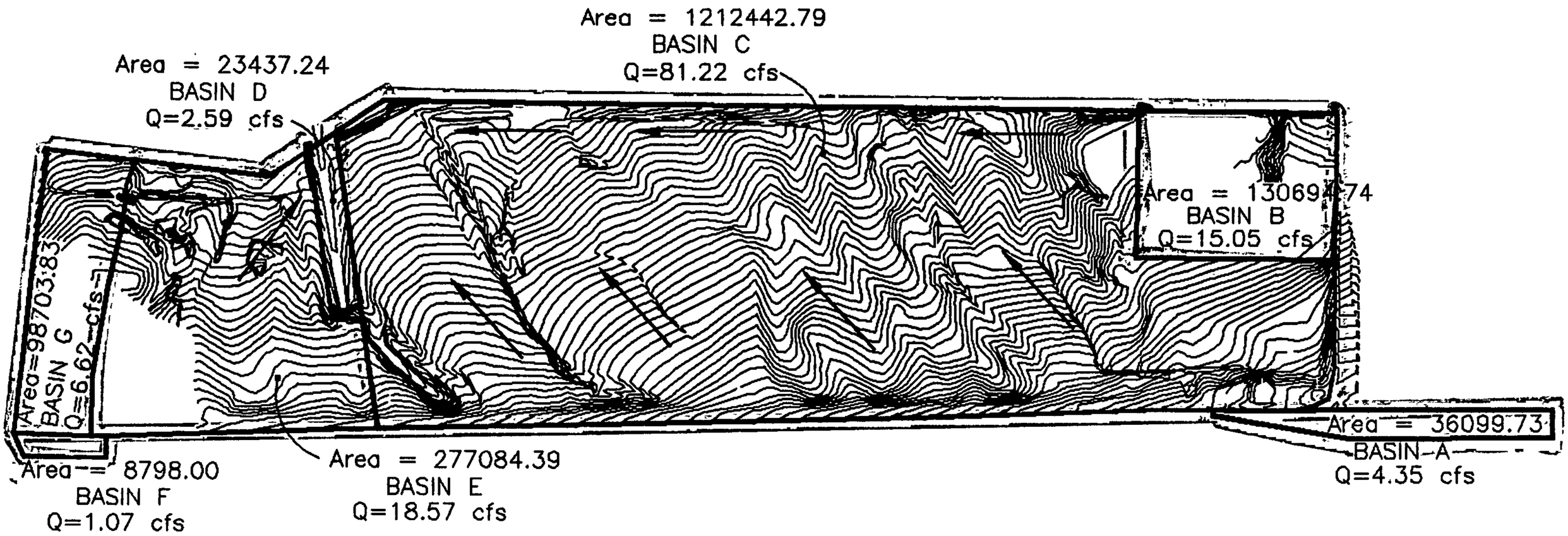
## Purpose

The purpose of this drainage report is to present a grading and drainage solution for Tramway Highlands subdivision. We are requesting grading, site development for subdivision, preliminary plat, and final plat approval.

## Existing Drainage Conditions

Currently the site is undeveloped and all of the runoff sheet flows from Tramway Boulevard to the west. A majority of the flow enters the South Glenwood Channel. However, a sizable portion impacts the existing Holiday Park Subdivision to the west.

Most of the runoff drains to the South Glenwood Channel. A small portion of the site drains south to Candelaria Road. In order to define the existing drainage conditions in more detail, (see attached exhibit for existing basin layout) the site has been broken into several




# EXISTING BASINS

1.3

basins . The existing drainage pattern for the basins are as follows:

- Basin A, an offsite drainage basin, drains south and west to Basin C at a flow rate of 4.35 cfs. Basin A is a portion of the runoff from Tramway Boulevard runoff which does not get picked up by the existing storm sewer inlet at the northwest corner of the Comanche Road and Tramway Boulevard. The runoff passes Comanche Road and enters the site at the northeast corner of the Tract.
- Basin B (the existing Mountain Side YMCA), an offsite drainage basin, drains south to basin C at a flow rate of 15.05 cfs. The runoff from Basin B drains west and then south to Basin C at the northwest corner of the Tract.
- Basin C (81.22 cfs), along with basins A and B, drains south and west to Basin D (South Glenwood Channel) at a total runoff of 100.62 cfs. Basin C is the majority of the project. For purposes of the existing analysis, the small portion of Tramway Boulevard from the edge of the paving surface to the right-of-way has been included. The area is negligible in size.
- Basin D (4.20 cfs) is the South Glenwood Channel. Basin D is an existing offsite runoff from the Tramway Boulevard right-of-way from the edge of the existing paving to the property line.
- Basin E drains north and west to Basin D at flow rate of 17.58 cfs. As mentioned all of the basins along Tramway Boulevard contain a portion of the Tramway Boulevard right-of-way.
- Basin F, an offsite basin, drains to basin G at a flow rate of 1.07 cfs. Basin F is portion of the paved area from Tramway Boulevard which enters Basin G from

the east end of the basin.

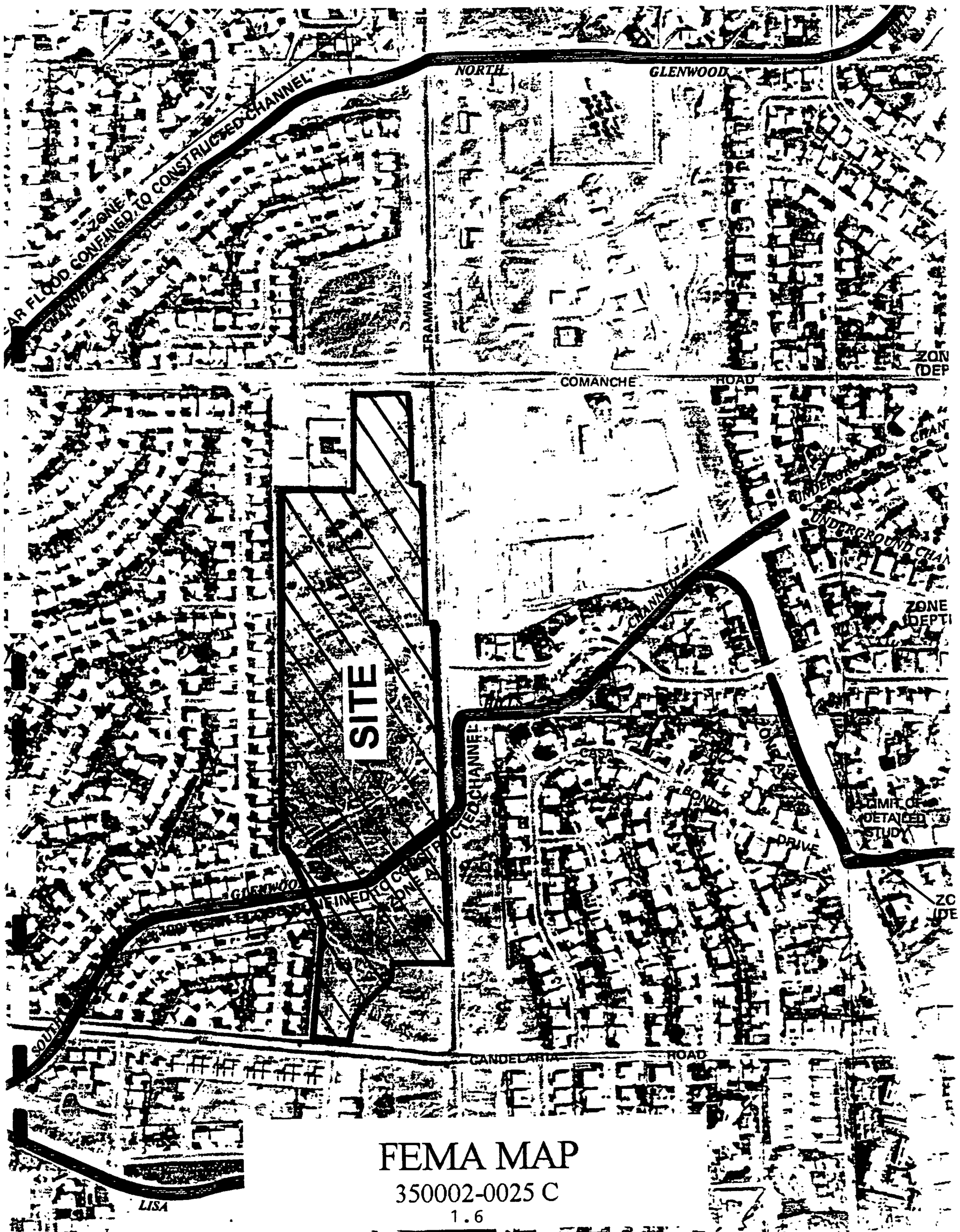
- Basin G (6.95 cfs), along with Basin F, drains south and west to Candelaria Road at a total runoff rate of 8.02 cfs.

The majority of the existing basins (A through E) drain to the South Glenwood Channel at a total runoff rate of 121.78 cfs. The remaining basins (F and G) drain to Candelaria Road at runoff rate of 7.69 cfs.

**Flood Plain and Soil Condition**

The site is located on FEMA Map section 350002 panel 25 (October 14, 1983 FEMA Map) as shown on the attached excerpt. The map shows that the site lies within a 100 year flood plain. This entire flood plain is contained within a City of Albuquerque concrete lined channel (South Glenwood Channel).

The site contains one soil type as indicated on the Soil Map from the Soil Conservation Service Survey of Bernalillo County. This soil type is Embudo-Tijeras Complex (EtC). Embudo soils are used for community development, watershed, range, and wildlife habitat. This mapping unit is 50 percent Embudo gravelly fine sandy loam, 0 to 5 percent slopes, and about 35 percent Tijeras gravelly fine sandy loam that has 1 to 9 percent slopes. The Embudo soil is in drainage ways and depressions, and the Tijeras soil is on low ridges in narrow undulations. On both soils runoff is medium and the hazard of water erosion is moderate. Included in this unit in mapping are areas of Tesajo, Millet, Wink soils which make up about 15 percent of the unit. See attached map for location.

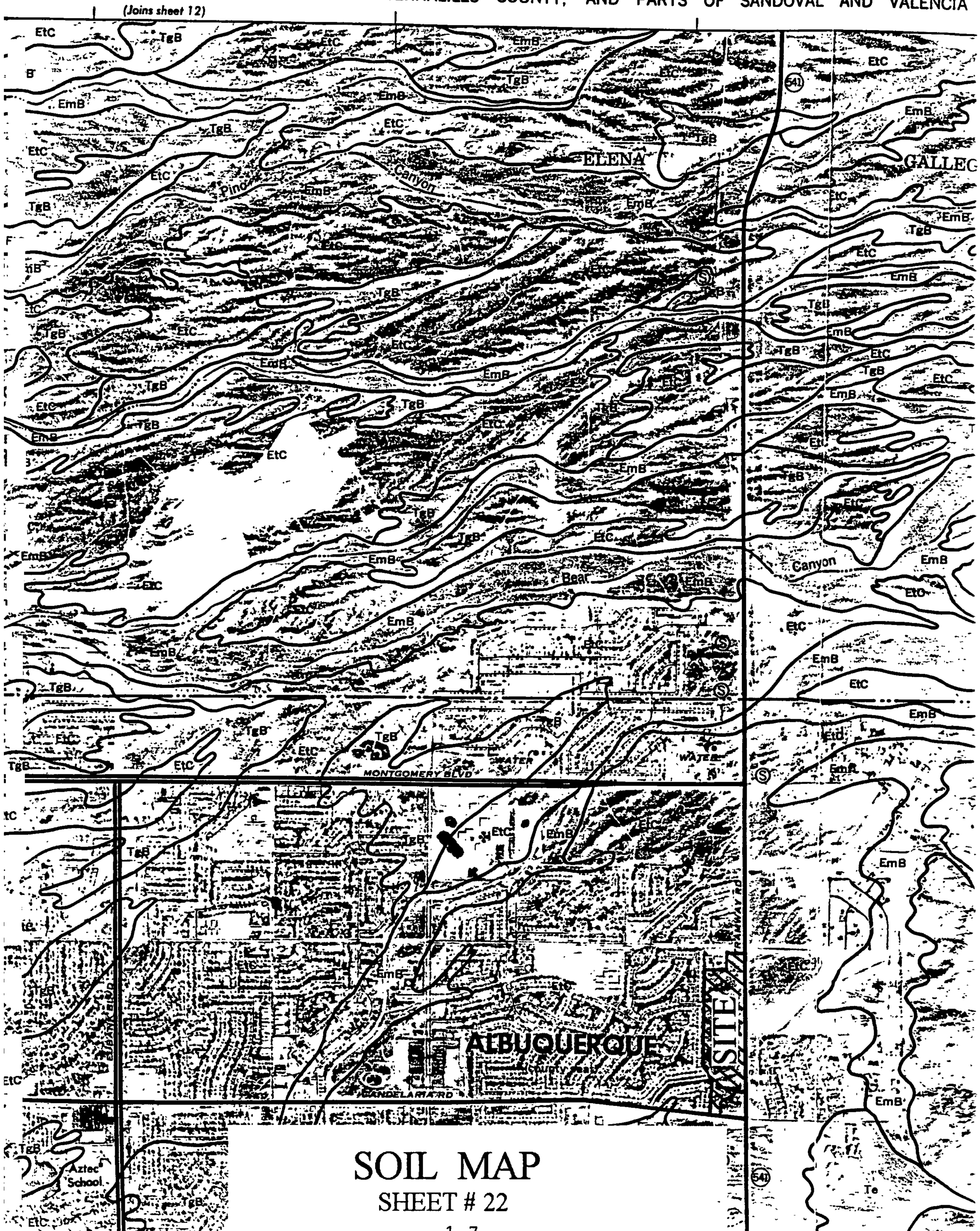



# FEMA MAP

350002-0025 C

1.6

BERNALILLO COUNTY, AND PARTS OF SANDOVAL AND VALENCIA




# SOIL MAP

## SHEET # 22

1 7

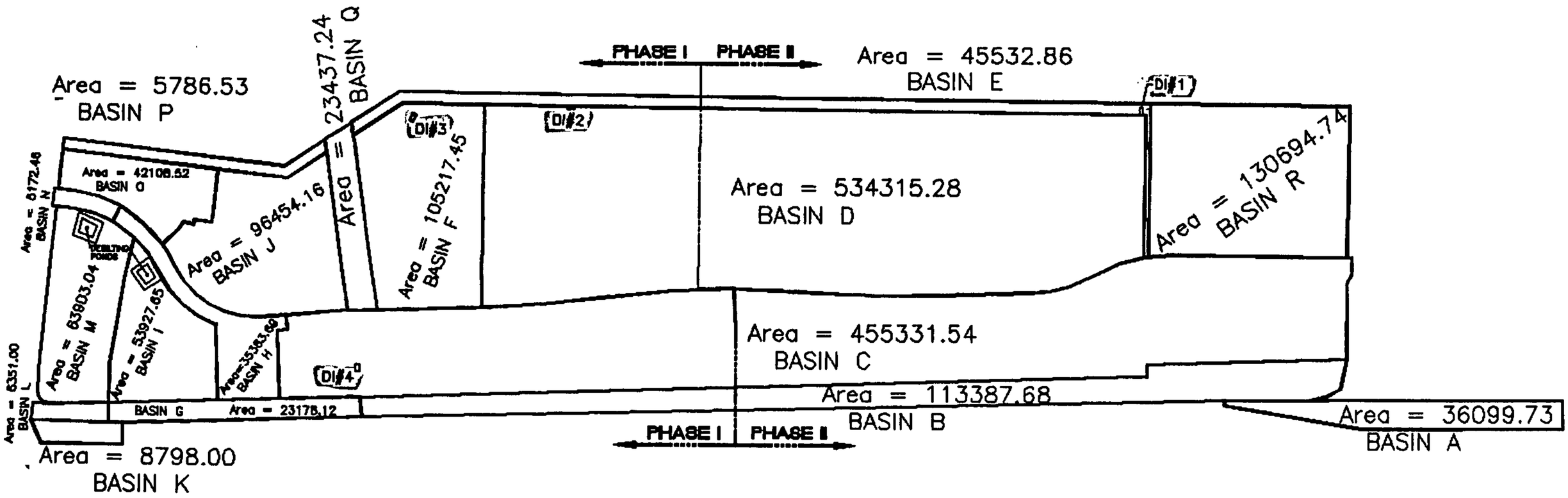
## Proposed Conditions and On-Site Drainage Management Plan

The site is proposed to use the streets to surface flow through the project. Proposed storm sewer structures will intercept the flow and convey the storm water to the South Glenwood Channel and offsite. This site will develop in two phases. The first Phase will be developed from Candelaria Road north to approximately the midpoint of the project. The second phase will complete the project to Comanche Road. The entire site will be graded in Phase I. Most of the storm sewer improvements will be built as part of Phase I as well. The second phase will have dust control and revegetation measures for the site. All of the offsite flows will drain to proposed storm sewer inlets and/or desilting ponds.

*Drainage Management Plan*

The overall offsite and on-site runoff are broken into several developed basins. With the exception of Basins N and M, the runoff is designed to drain into the South Glenwood Channel. Only a small portion of the runoff (Basins N and M) will continue to drain south to Candelaria Boulevard. Basins A, B, K, and L are the basins offsite that represent the shoulder areas of Tramway Boulevard. The proposed drainage management under developed conditions is as follow (please refer to the proposed basin layout):

- Basin A (4.35 cfs), offsite basin, will continue to surface flow to Basin B.
- Basin B (7.61 cfs), offsite basin, along with the runoff from Basin A (at a total runoff rate of 11.96 cfs) is being routed along the east property line and through the tot lot to




# PROPOSED BASINS

South Glenwood Channel. The flow will be collected in drop inlet #4 within Basin C and then the runoff will drain to an existing 96" RCP via a 18" RCP.

- Basin C represents the majority of the patio homes pods north of the South Glenwood Channel. These pods will surface drain to Mountain Side Boulevard and then south to the channel. Basin C (46.73 cfs) will surface flow south to a proposed drainage opening designated as drainage point # 8. From this point, the runoff will drain to Basin Q (South Glenwood Channel). Drainage point # 8 has been designed to drain flows up to 58.69 cfs and will serve as an emergency drainage point if drop inlet # 4 were to become clogged. Hydraulic calculations have been shown in the report.
- Basins D and F represent the Tramway Highlands or single family lots. The lots which are west of Mountain Side Boulevard drain west in the street to drop inlets #2 and #3 and then to the 30 foot buffer area. At this point, the flow is directed south and is collected in a 42" RCP storm sewer pipe and conveyed to the existing channel within basin Q. Basin D (54.83 cfs) will surface flow south and west and drain to a proposed inlet (Type "DBL-A") designated as drop inlet # 2. From this inlet the runoff will drain to Basin Q (South Glenwood Channel) via a storm sewer pipe through Basin E. Basin F (10.81 cfs), will surface flow west to a proposed inlet (Type "C") designated as drop inlet # 3. From this inlet the runoff will drain to Basin Q (South Glenwood Channel) via a storm sewer pipe through Basin E.
- Basin R represents the Mountain Side YMCA site. The current flows of the site exit at the southwest corner of the YMCA. The runoff (15.05 cfs) at this point will drain to a proposed inlet (Type "C") designated as drop inlet # 1 in Basin E. From this inlet the

runoff will drain to Basin Q (South Glenwood Channel) via a storm sewer pipe in Basin E.

- Basin E is the 30 foot buffer area that will contain the storm sewer line. This basin also will contain the runoff from the YMCA, the Tramway Highlands, and the surface flows from the basin itself. Basin E (3.22 cfs) will surface flow to Basin Q (South Glenwood Channel). Basin E is designed to surface flow within a rectangular earthen channel with two header walls on each side. The channel is also designed as an emergency spillway and will carry the flows for basins D, F, and R in case drop inlets 1, 2 and 3 were to ever become clogged. Therefore, the channel at Crossing Point # 1 (CP #1) has the capacity to carry 18.27 cfs, at Crossing Point # 2 (CP #2) has the capacity to carry 73.10 cfs, and at Crossing Point # 3 (CP #3) has the capacity to carry 83.91 cfs.
- Basins I and M represent the commercial tract of land that is not being developed with this project. We are proposing that both basins surface flow to two desilting ponds on site. These flows then will surface flow to Mountain Side Boulevard. Basins G, K, and L from the Tramway right-of-way will drain to Basins I and M. Basin G (1.56 cfs) will surface flow to Basin I. Basin I (6.22 cfs), along with Basin G (1.56 cfs), will surface flow to the west at a total runoff rate of 7.78 cfs to a proposed desilting pond. From there the runoff will overflow into Basin H at Drainage Point #6 (DP #6). Basin K (1.07 cfs) will continue to surface flow west to Basin L. Basin L (0.44 cfs), along with flows from Basin K, will continue to surface flow west to Basin M at a total

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- Basin H (3.65 cfs), along with flows from Basin G & I, will surface flow west to Basin O at a total runoff rate of 11.43 cfs.
- Basin O (4.34 cfs), along with flows from Basin G, H, and I, surface flows to Basin P at a total runoff rate of 21.35 cfs. Basin O drains to Basin P at Drainage Points 3, 4, and 5. Drainage Point 3 (DP #3) drains Basin H and 28% of Basin O (1.22 cfs) with a total runoff of 22.57 cfs. Drainage Point 4 (DP #4) drains 41% of Basin O (1.78 cfs). Drainage Point 5 (DP #5) drains 31% of Basin O (1.34 cfs).
- Basin J (9.92 cfs) will surface flow to the west to Basin P. Basin J discharges the runoff into the Basin P at Drainage Points #1 (DP #1) and #2 (DP #2) located within Basin J. Drainage Point #1 (DP #1) drains 83.50% of Basin J (8.28 cfs). Drainage Point #2 (DP #2) drains 16.50% of Basin J (1.64 cfs).
- Basin P (0.66 cfs), along with flows from Basins O and J, will surface flow north to Basin Q (South Glenwood Channel) at a total runoff of 31.93 cfs. Basin P is designed to surface flow within a rectangular earthen channel with two header walls on each side. The channel is analyzed at Crossing Points #4 (CP #4) and #5 (CP #5). The channel at Crossing Point # 4 has the capacity to carry 22.01 cfs and at Crossing Point # 5 has the capacity to carry 31.930 cfs.

The details on the drainage management plan are shown on *"Proposed Basins / Basin Analysis Map"* enclosed in the map pocket. The details on the storm sewer pipe and the connections to the existing storm sewer structures will be coordinated and designed through DRC. See the following sheet for calculations.

**Phasing Plan**

This site will develop in two phases. The first phase will be developed from Candelaria Road north to approximately the midpoint of the project. The second phase will complete the project to Comanche Road. The entire site will be graded in Phase I. Most of the storm sewer improvements will be built as part of Phase I as well. The second phase will have dust control and revegetation measures for the site. All of the offsite flows will drain to proposed storm sewer inlets and/or desilting ponds. The majority of the storm sewer structures will be built as part of Phase I. Desilting ponds will be placed at the phase line to intercept the silts prior to entering the site.

**Emergency Overflow Plan**

The site has been designed for emergency situations. The 30 foot buffer (Basin E) is designed to handle the runoff from Basins D, F, and R in case storm drain inlets #1, #2, and #3 were ever to become clogged. Drainage point #8 is designed to handle flows from Basins A and B in case drop inlet #4 was ever to become clogged.

## Infrastructure Requirements

The required infrastructure list is included in section VII of this report to use as a guide to the overall list for the project.

## Summary

The proposed drainage basins are maintaining the existing drainage patterns. The majority of the runoff from the basins (A through J, O, P, & R) drain to Basin Q (South Glenwood Channel) with 31.93 cfs from the south, 83.91 cfs from the north, and 58.69 cfs from east of the channel. The rest of the basins (K, L, M, & N) surface flow to Candelaria Road at a runoff rate of 9.43 cfs.

The drainage calculations have been preformed using the City of Albuquerque Design Development Manual (DPM) Section 22.2, Hydrology, volume 2, design criteria for the City of Albuquerque, New Mexico in Corporation with Bernalillo County, New Mexico, and Albuquerque Metropolitan Arroyo Flood Control Authority dated January, 1993.

# Section II

# Runoff Calculations

**RUNOFF CALCULATIONS**

The site is @ Zone 4

**LAND TREATMENT**

D = 60 %, B = 20 %, C = 20 %

**DEPTH (INCHES) @ 100-YEAR STORM**

$P_{60}$ = 2.23 inches

$P_{360}$ = 2.90 inches

$P_{1440}$ = 3.65 inches

**DEPTH (INCHES) @ 10-YEAR STORM**

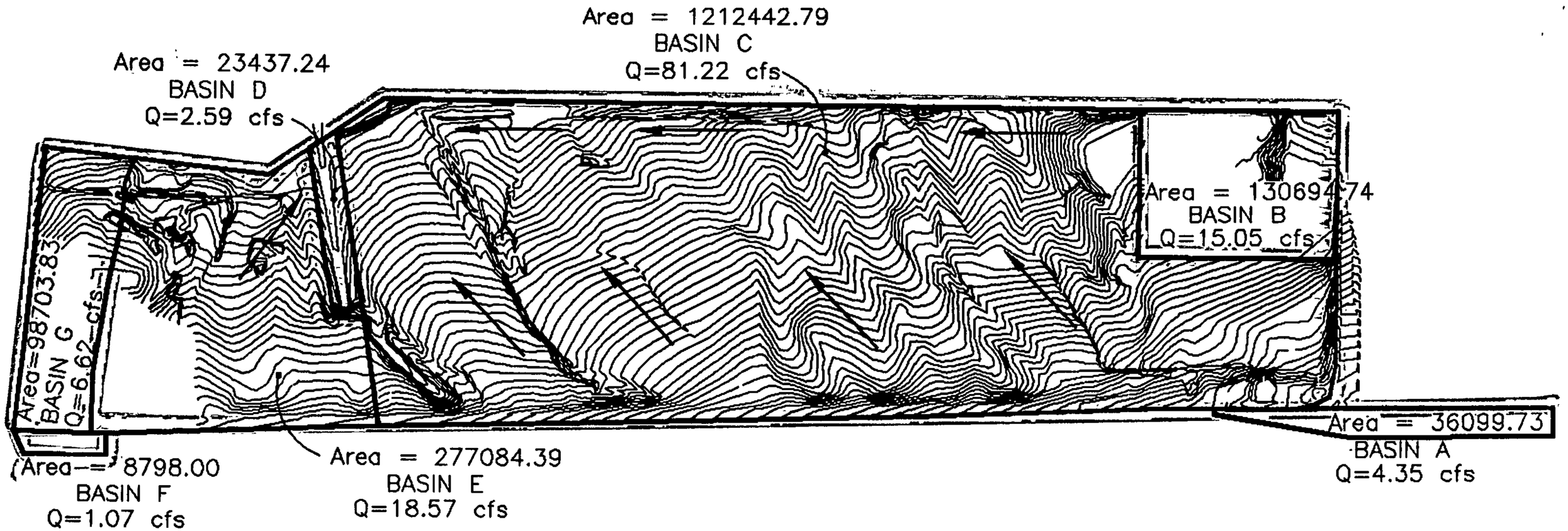
$P_{60}$ = 2.23 x 0.667
= 1.49 inches

$P_{360}$ = 1.93

$P_{1440}$ = 2.43

See the summary output from AHYMO calculations.

Also see the following summary tables.




# EXISTING BASINS

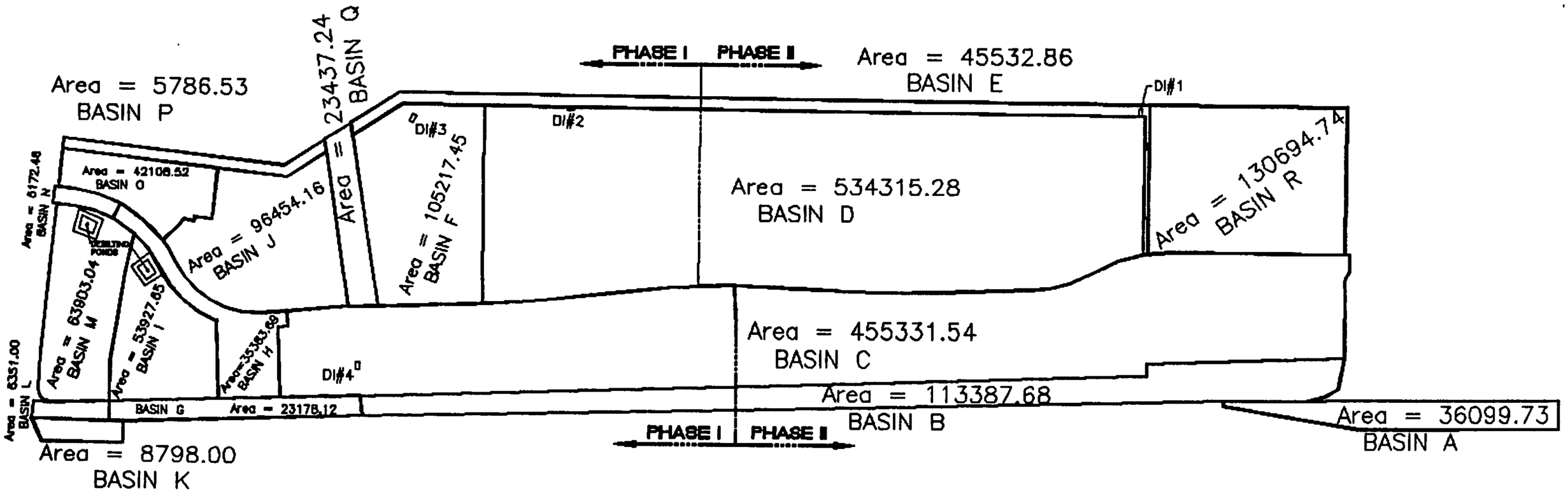
## *EXISTING DRAINAGE BASINS*

| SUB-BASIN | AREA (SF) | AREA (AC) | AREA ($MI^2$) |
|---|---|---|---|
| A | 36099.73 | 0.8287 | 0.001295 |
| B | 130694.74 | 3.0003 | 0.004688 |
| C | 1212442.79 | 27.8339 | 0.043490 |
| D | 23437.24 | 0.5380 | 0.000841 |
| E | 277084.39 | 6.3610 | 0.009939 |
| F | 8798.00 | 0.2020 | 0.000316 |
| G | 98703.83 | 2.2659 | 0.003541 |

## *BASINS RUNOFF CALCULATION RESULTS*

| BASIN | Q-100 CFS | Q-10 CFS |
|---|---|---|
| A | 4.35 | 2.90 |
| B | 15.05 | 9.85 |
| C | 81.22 | 39.63 |
| D | 2.59 | 1.67 |
| E | 18.57 | 9.06 |
| F | 1.07 | 0.71 |
| G | 6.62 | 3.23 |

***SEE AHYMO SUMMARY OUTPUT FILE FOR CALCULATION RESULTS***




# PROPOSED BASINS

## *DRAINAGE BASINS*

| BASIN | AREA (SF) | AREA (AC) | AREA (MI²) |
|---|---|---|---|
| A | 36099.73 | 0.8287 | 0.001295 |
| B | 113387.68 | 2.6030 | 0.004067 |
| C | 455331.54 | 10.4530 | 0.016333 |
| D | 534315.28 | 12.2662 | 0.019166 |
| E | 45532.86 | 1.0453 | 0.001633 |
| F | 105217.45 | 2.4155 | 0.003774 |
| G | 23178.12 | 0.5321 | 0.000831 |
| H | 35383.69 | 0.8123 | 0.001269 |
| I | 53927.65 | 1.2380 | 0.001934 |
| J | 96454.16 | 2.2143 | 0.003460 |
| K | 8798.00 | 0.2020 | 0.000316 |
| L | 6351.00 | 0.1458 | 0.000228 |
| M | 63903.04 | 1.4670 | 0.002292 |
| N | 5172.46 | 0.1187 | 0.000186 |
| O | 42108.52 | 0.9667 | 0.001510 |
| P | 5786.53 | 0.1328 | 0.000208 |
| Q | 23437.24 | 0.5380 | 0.000841 |
| R | 130694.74 | 3.0003 | 0.004688 |

## *BASINS RUNOFF CALCULATION RESULTS*

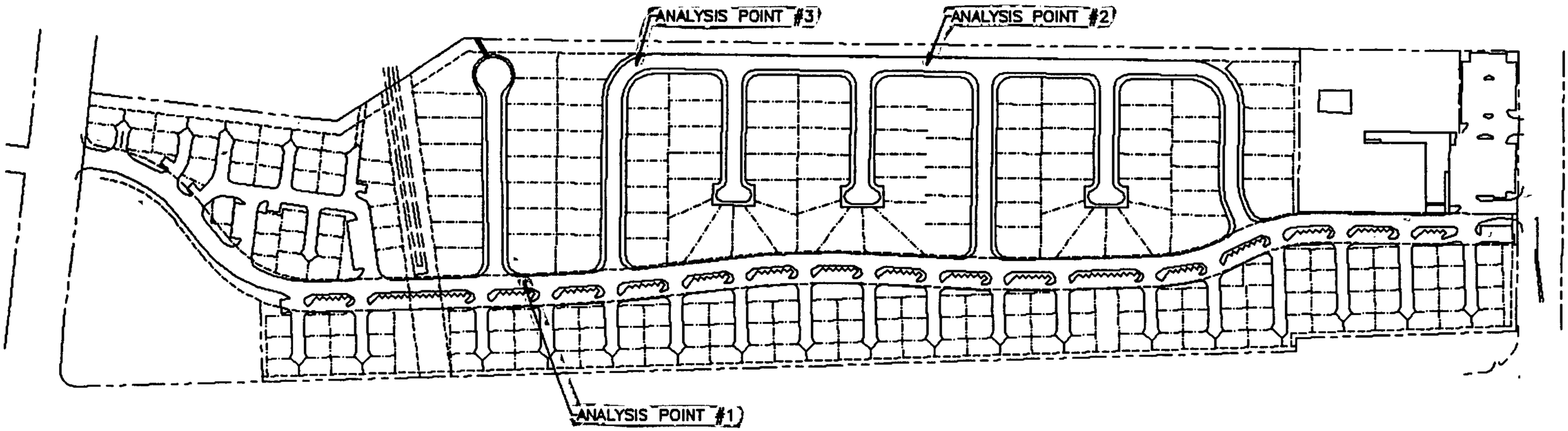
| BASIN | Q-100 CFS | Q-10 CFS |
|---|---|---|
| A | 4.35 | 2.90 |
| B | 7.61 | 3.71 |
| C | 46.73 | 29.42 |
| D | 54.83 | 34.52 |
| E | 3.22 | 1.65 |
| F | 10.81 | 6.81 |
| G | 1.56 | 0.76 |
| H | 3.65 | 2.30 |
| I | 6.22 | 4.07 |
| J | 9.92 | 6.24 |
| K | 1.07 | 0.71 |
| L | 0.44 | 0.21 |
| M | 7.37 | 4.82 |
| N | 0.55 | 0.35 |
| O | 4.34 | 2.73 |
| P | 0.66 | 0.42 |
| Q | 2.59 | 1.67 |
| R | 15.05 | 9.85 |

***SEE AHYMO SUMMARY OUTPUT FILE FOR CALCULATION RESULTS***

# Section III

# Street Capacity
# Hydraulic Calculations

8" STANDARD CURB & GUTTER
(ALL OTHER CURBS ARE
MOUNTABLE CURB AND GUTTER)




# CURB SIZE LAYOUT

## *FINDING STREET CAPACITY - 24 F-F CROSS-SECTION FOR 8" CURB*

Q = 1.49/n A R^(2/3) S^½
n =
SLOPE = STREET SLOPE
R^2/3 = (A/P)^2/3
D2 = WATER DEPTH AFTER HYDRAULIC JUMP = D1/2 [SQRT (1 + 8Fr²) - 1]
E = V² / 2g

**HALF STREET CALCULATIONS**

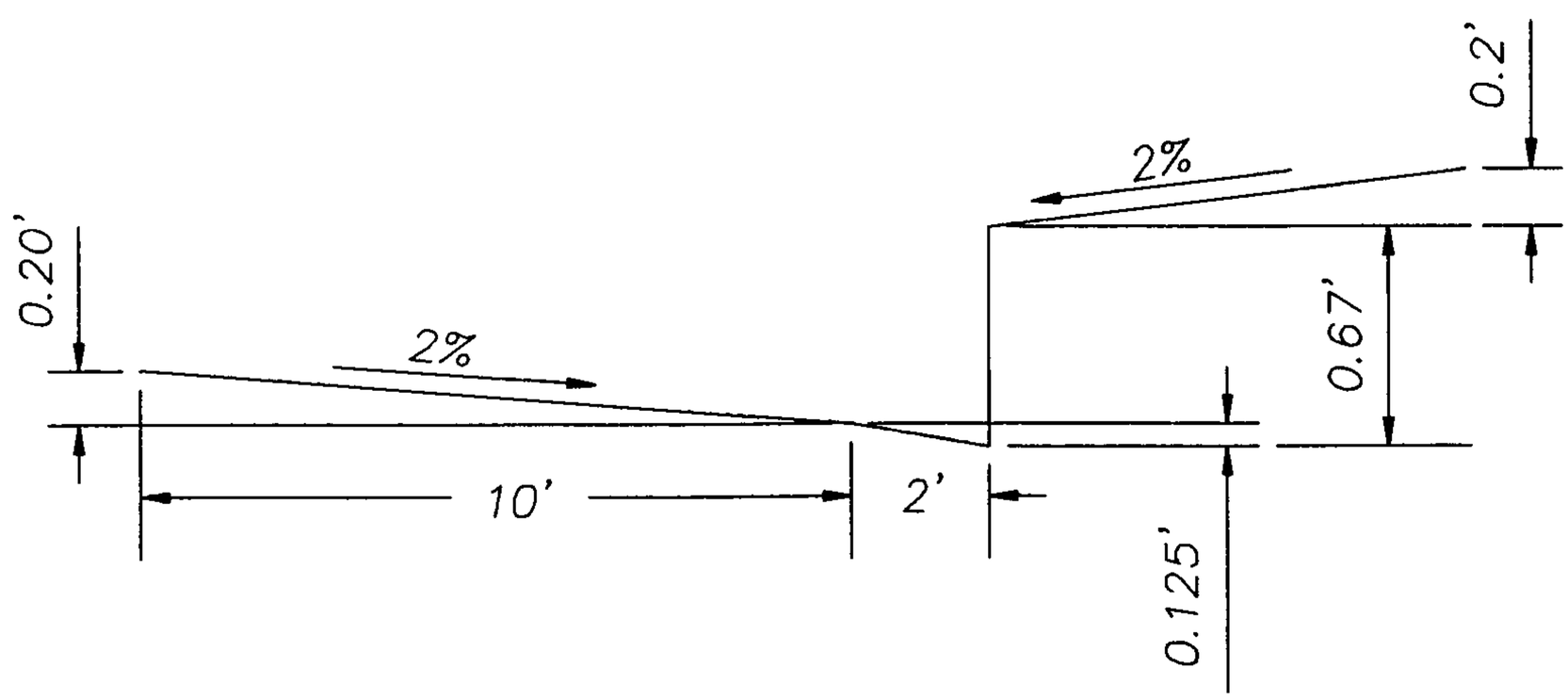
@Y □ 0.125
A1 = ½ Y (Y/0.0625) = 8Y²
P1 = SQRT[Y² + (Y/0.0625)²] + Y = SQRT(257 Y²) + Y

@ 0.125 < Y □ 0.325 & Y1 = Y - 0.125
A2 = A1 + ½Y1 (Y1/0.02) + 2Y1 = A1 + 25Y1² + 2Y1
P2 = P1 + SQRT[Y1² + (Y1/0.02)²] + Y1 = P1 + SQRT(2501 Y1²) + Y1

@ 0.325 < Y □ 0.667 & Y2 = Y - 0.325
A3 = A2 + 12Y2 + ½Y2[Y2/(0.02)] = A2 + 12 Y2
P3 = P2 + SQRT(Y2² + [Y2/(0.02)]²) = P2 + Y2

@ 0.667 < Y □ 0.847 & Y3 = Y - 0.667
A4 = A3 + 12Y3 + ½Y3[Y3/(0.02)] = A3 + 12 Y3 + 25 Y3²
P4 = P3 + SQRT(Y3² + [Y3/(0.02)]²) = P3 + SQRT(2501 Y3²)

SEE THE FOLLOWING SHEET FOR INPUT AND OUTPUT FILE FOR CALCULATIONS RESULTS FROM COMPUTER PROGRAM USING THE EQUATION SHOWN ABOVE




***24' F–F (8" CURB)***

Analysis Point 1

MOUNTAINSIDE PARKWAY STREET CAPACITY CALCULATIONS

INPUT FILE

100 46.73 0.0140
10 29.42 0.0140
999 0.00 0.00

OUTPUT FILE

---------- 24-FT F-F, 8" CURB STREET SECTION ----------

---------- STREET CAPACITY BASED ON 100-YR STORM ----------

| FLOW CFS | SLOPE FT/FT | Dn FT | Vn FT/S | D*V FT»/S | Fr | E FT | D2 FT |
|---|---|---|---|---|---|---|---|
| 46.73 | .01400 | .571 | 5.213 | 2.979 | 1.215 | .993 | .737 |

---------- END OF THE OUTPUT FILE ----------

---------- STREET CAPACITY BASED ON 10-YR STORM ----------

| FLOW CFS | SLOPE FT/FT | Dn FT | Vn FT/S | D*V FT»/S | Fr | E FT | D2 FT |
|---|---|---|---|---|---|---|---|
| 29.42 | .01400 | .480 | 4.345 | 2.086 | 1.105 | .773 | .548 |

---------- END OF THE OUTPUT FILE ----------

## *FINDING STREET CAPACITY - 28 F-F CROSS-SECTION FOR 4" CURB*

Q = 1.49/n A R^(2/3) S^½
n = 0.017
SLOPE = STREET SLOPE
R^2/3 = (A/P)^2/3
D2 = HYDRAULIC DEPTH AFTER HYDRAULIC JUMP = D1/2 [SQRT (1 + 8Fr²) - 1]
E = V² / 2g

**HALF STREET CALCULATIONS**

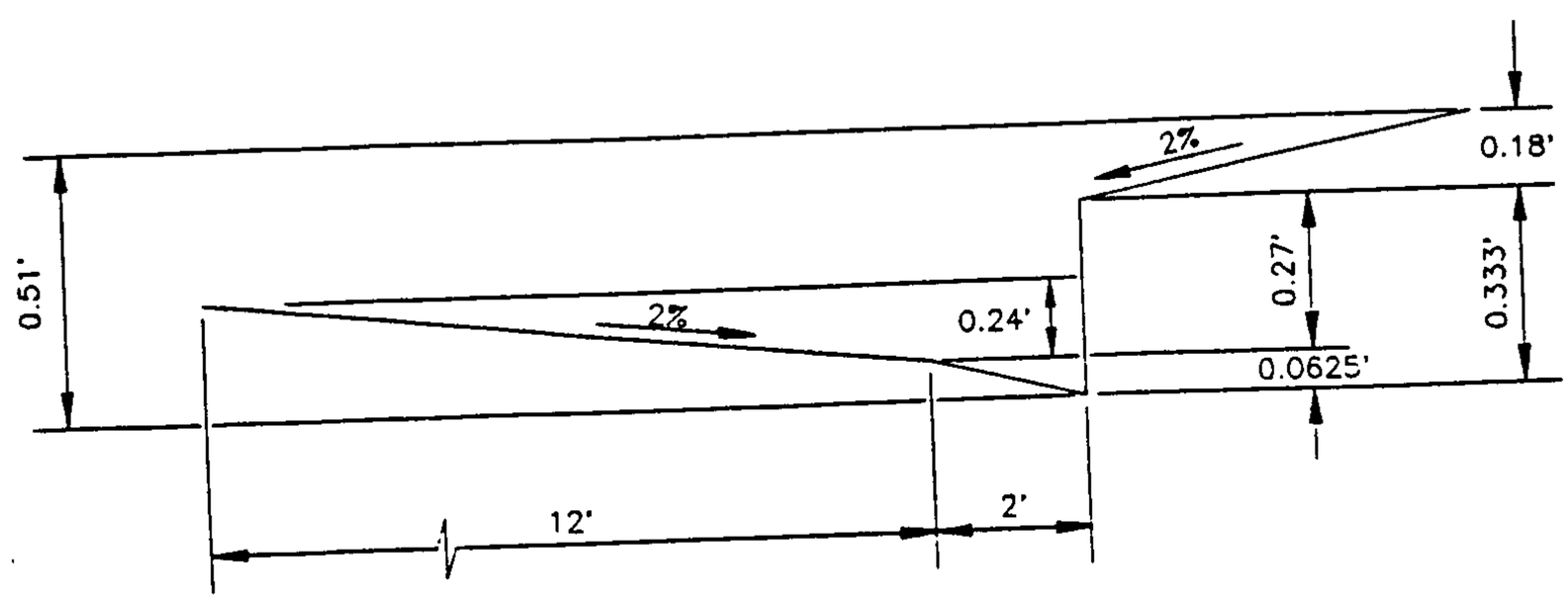
@Y < = 0.0625
A1 = ½ Y (Y/0.03125) = 16Y²
P1 = SQRT[Y² + (Y/0.03125)²] + Y = SQRT(1025 Y²) + Y

@ 0.0625 < Y < = 0.3025 & Y1 = Y - 0.0625
A2 = A1 + ½Y1 (Y1/0.02) + 2Y1 = A1 + 25Y1² + 2Y1
P2 = P1 + SQRT[Y1² + (Y1/0.02)²] + Y1 = P1 + SQRT(2501 Y²) + Y1

@ 0.3025 < Y < = 0.333 & Y2 = Y - 0.3025
A3 = A2 + 14Y2
P3 = P2 + Y2

@ 0.333 < Y < = 0.513 & Y3 = Y - 0.333
A4 = A3 + 14Y3 + ½Y3[Y3/(0.02)] = A3 + 14 Y3 + 25 Y3²
P4 = P3 + SQRT(Y3² + [Y3/(0.02)]²) = P3 + SQRT(2501 Y3²)

SEE THE FOLLOWING SHEET FOR INPUT AND OUTPUT FILE FOR CALCULATION RESULTS FROM COMPUTER PROGRAM USING THE EQUATION SHOWN ABOVE




28' F—F
4" CURB

NOT TO SCALE

Analysis Pt. 2

SMOKEY MOUNTAIN LOOP STREET CAPACITY CALCULATIONS

(CHECKING THE CAPACITY OF THE STREET HALF WAY WITH
USING 4" CURB)

FLOWING AT 50% OF (54.83 CFS AND 34.52 CFS)

INPUT FILE

100 27.42 0.0258
10 17.26 0.0258
999 0.00 0.00

OUTPUT FILE

---------- 28-FT F-F, 4" CURB STREET SECTION ----------

---------- STREET CAPACITY BASED ON 100-YR STORM ----------

| FLOW CFS | SLOPE FT/FT | Dn FT | Vn FT/S | D*V $FT^2/S$ | Fr | E FT | D2 FT |
|---|---|---|---|---|---|---|---|
| 27.42 | .02580 | .373 | 4.559 | 1.700 | 1.316 | .696 | .532 |

---------- END OF THE OUTPUT FILE ----------

---------- STREET CAPACITY BASED ON 10-YR STORM ----------

| FLOW CFS | SLOPE FT/FT | Dn FT | Vn FT/S | D*V $FT^2/S$ | Fr | E FT | D2 FT |
|---|---|---|---|---|---|---|---|
| 17.26 | .02580 | .315 | 3.992 | 1.259 | 1.253 | .563 | .423 |

---------- END OF THE OUTPUT FILE ----------

Analysis Pt. 3

## *FINDING STREET CAPACITY - 28 F-F CROSS-SECTION FOR 8" CURB*

Q = 1.49/n A R^(2/3) S^½
n = 0.017
SLOPE = STREET SLOPE
R^2/3 = (A/P)^2/3
D2 = WATER DEPTH AFTER HYDRAULIC JUMP = D1/2 [SQRT (1 + 8Fr²) - 1]
E = V² / 2g

**HALF STREET CALCULATIONS**

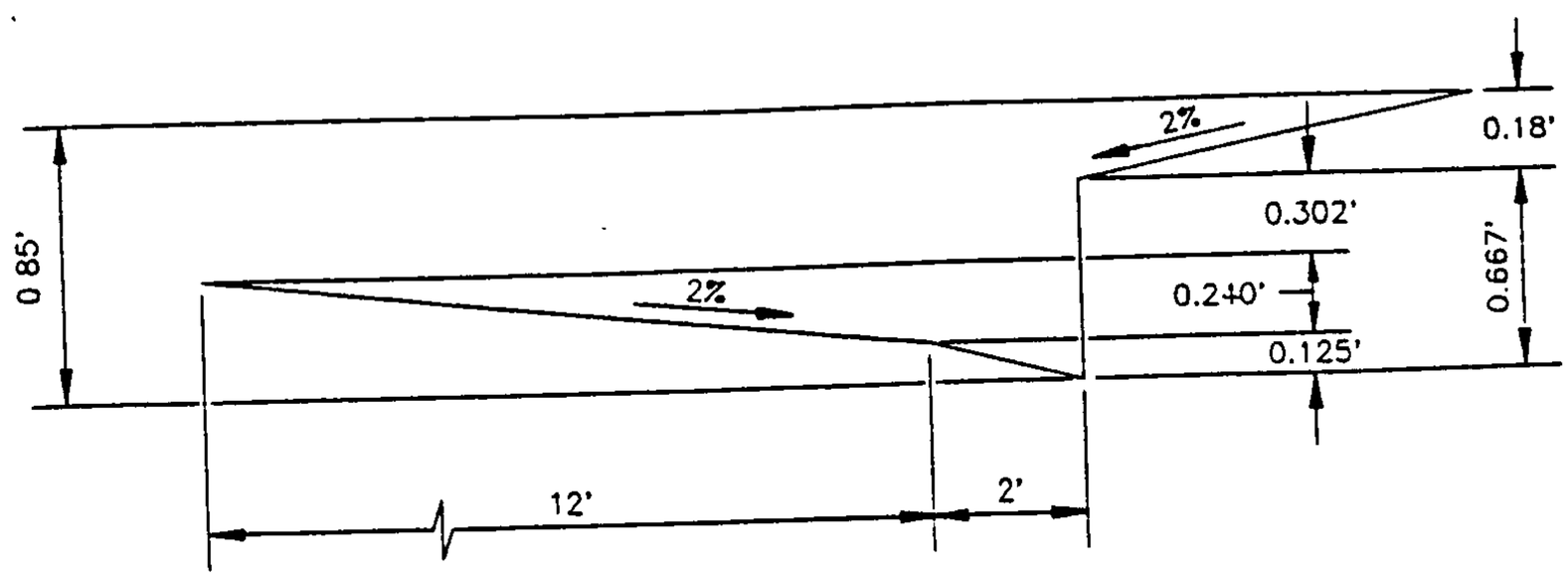
@Y < = 0.125
A1 = ½ Y (Y/0.0625) = 8Y²
P1 = SQRT[Y² + (Y/0.0625)²] + Y = SQRT(257 Y²) + Y

@ 0.125 < Y < = 0.365 & Y1 = Y - 0.125
A2 = A1 + ½Y1 (Y1/0.02) + 2Y1 = A1 + 25Y1² + 2Y1
P2 = P1 + SQRT[Y1² + (Y1/0.02)²] + Y1 = P1 + SQRT(2501 Y1²) + Y1

@ 0.365 < Y < = 0.667 & Y2 = Y - 0.365
A3 = A2 + 14Y2 + ½Y2[Y2/(0.02)] = A2 + 14 Y2
P3 = P2 + SQRT(Y2² + [Y2/(0.02)]²) = P2 + Y2

@ 0.667 < Y < = 0.847 & Y3 = Y - 0.667
A4 = A3 + 14Y3 + ½Y3[Y3/(0.02)] = A3 + 14 Y3 + 25 Y3²
P4 = P3 + SQRT(Y3² + [Y3/(0.02)]²) = P3 + SQRT(2501 Y3²)

SEE THE FOLLOWING SHEET FOR INPUT AND OUTPUT FILE FOR CALCULATION RESULTS FROM COMPUTER PROGRAM USING THE EQUATION SHOWN ABOVE




28' F—F
8" CURB

NOT TO SCALE

SMOKEY MOUNTAIN LOOP STREET CAPACITY CALCULATIONS

INPUT FILE

100 54.83 0.0258
10 34.52 0.0258
999 0.00 0.00

OUTPUT FILE

---------- 28-FT F-F, 8" CURB STREET SECTION ----------

---------- STREET CAPACITY BASED ON 100-YR STORM ----------

| FLOW CFS | SLOPE FT/FT | Dn FT | Vn FT/S | D*V $FT^2/S$ | Fr | E FT | D2 FT |
|---|---|---|---|---|---|---|---|
| 54.83 | .02580 | .530 | 6.300 | 3.337 | 1.525 | 1.146 | .908 |

---------- END OF THE OUTPUT FILE ----------

---------- STREET CAPACITY BASED ON 10-YR STORM ----------

| FLOW CFS | SLOPE FT/FT | Dn FT | Vn FT/S | D*V $FT^2/S$ | Fr | E FT | D2 FT |
|---|---|---|---|---|---|---|---|
| 34.52 | .02580 | .454 | 5.247 | 2.381 | 1.372 | .881 | .683 |

---------- END OF THE OUTPUT FILE ----------

## *STREET CAPACITY ANALYSIS FOR CANDELARIA*

The flow contributed to Candelaria from Tramway Highlands project is 9.43 cfs, and the flow from Candelaria itself is ± 3.00 cfs. Therefore, the total flow in Candelaria is approximately 12.43 cfs. We have analyzed only one side of the street for flow capacity. We are only contributing the flow on the west bound of the Candelaria. West bound portion of Candelaria contains two lanes and slopes at 3.35% grade. The street capacity for Candelaria is ± 17.59 cfs, and the flow in the street is only 12.43 cfs. Therefore, Candelaria has adequate capacity for the runoff in the street. The runoff in Candelaria is intercepted through a series of inlet prior to exceeding its. From there the runoff is routed to South Glenwood channel via storm sewer pipe. See the following spreadsheet for street flow capacity calculation.

## *FINDING STREET CAPACITY FOR CANDELARIA*
## *24' (2 Lane) Half Street Section - 8" CURB*

Q = 1.49/n A (A/P)^(2/3) S^½
n = 0.017
SLOPE 0.0335
R^2/3 = (A/P)^2/3
E = HYDRAULIC JUMP

@Y < or = 0.125
A1 = 1/2 Y (Y/0.0625) = $8Y^2$
P1 = SQRT[$Y^2$ + $(Y/0.0625)^2$] + Y = SQRT($257Y^2$) + Y

| Y (FT) | A | P | R^2/3 | Q | Q/A | Fr | D*V | E |
|---|---|---|---|---|---|---|---|---|
| 0.0250 | 0.01 | 0.43 | 0.05 | 0.05 | 10.00 | 11.15 | 0.25 | 0.38 |
| 0.0500 | 0.02 | 0.85 | 0.08 | 0.03 | 1.31 | 1.03 | 0.07 | 0.05 |
| 0.0750 | 0.05 | 1.28 | 0.11 | 0.08 | 1.72 | 1.11 | 0.13 | 0.09 |
| 0.1000 | 0.08 | 1.70 | 0.13 | 0.17 | 2.08 | 1.16 | 0.21 | 0.12 |
| 0.1250 | 0.13 | 2.13 | 0.15 | 0.30 | 2.42 | 1.20 | 0.30 | 0.16 |

@ 0.125 < Y < or = 0.565 & Y1 = Y - 0.125
A2 = A1 + 1/2 Y1 (Y1/0.02) + 2Y1 = A1 + $25Y1^2$ + 2Y1
P2 = P1 + SQRT[$Y1^2$ + $(Y1/0.02)^2$] + Y1 = P1 + SQRT($2501Y^2$) + Y1

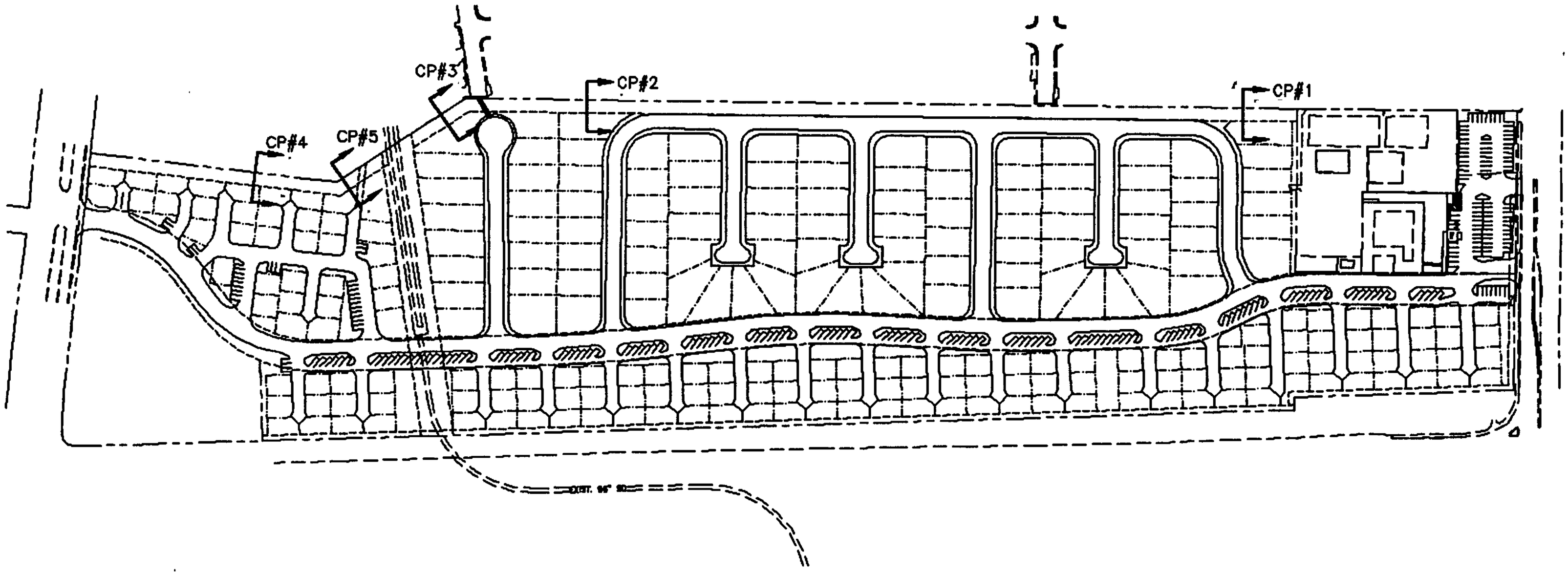
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0.2000 | 0.42 | 5.95 | 0.17 | 1.13 | 2.71 | 1.07 | 0.54 | 0.22 |
| 0.3000 | 1.24 | 11.06 | 0.23 | 4.62 | 3.72 | 1.20 | 1.12 | 0.38 |
| 0.4000 | 2.57 | 16.16 | 0.29 | 12.04 | 4.69 | 1.31 | 1.88 | 0.57 |
| 0.5000 | 4.39 | 21.26 | 0.35 | 24.54 | 5.59 | 1.39 | 2.80 | 0.77 |
| 0.5650 | 5.85 | 24.57 | 0.38 | 35.90 | 6.14 | 1.44 | 3.47 | 0.90 |

@ 0.565 < Y < or = 0.6667 & Y2 = Y - 0.565
A3 = A2 + 24Y2
P3 = P2 + Y2

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0.6000 | 6.69 | 24.61 | 0.42 | 44.86 | 6.71 | 1.53 | 4.03 | 1.03 |
| 0.6250 | 7.29 | 24.63 | 0.44 | 51.74 | 7.10 | 1.58 | 4.44 | 1.12 |
| 0.6500 | 7.89 | 24.66 | 0.47 | 58.99 | 7.48 | 1.64 | 4.86 | 1.21 |
| 0.6750 | 8.49 | 24.68 | 0.49 | 66.62 | 7.85 | 1.68 | 5.30 | 1.31 |
| 0.7000 | 9.08 | 24.71 | 0.51 | 74.60 | 8.21 | 1.73 | 5.75 | 1.40 |
| 0.5840 | 6.30 | 24.59 | 0.40 | 40.67 | 6.45 | 1.49 | 3.77 | 0.97 |
| 0.6000 | 6.69 | 24.61 | 0.42 | 44.86 | 6.71 | 1.53 | 4.03 | 1.03 |
| 0.6667 | 8.29 | 24.67 | 0.48 | 64.03 | 7.73 | 1.67 | 5.15 | 1.27 |

# Section IV

# Crossing Points
# Hydraulic Calculations
# (Rectangular Channels)




# CROSSING POINT LOCATIONS

# *DRAINAGE SUMMARY TABLE*

**CROSSING POINTS**

| CROSS-SECTION (#) | WATER / WALL HEIGHT (FT) | FLOW (CFS) | MINIMUM REQUIRED WIDTH (FT) |
|---|---|---|---|
| 1 | 0.60 | 18.27 | 7.48 |
| 2 | 1.25 | 73.10 | 9.77 |
| 3 | 1.40 | 83.91 | 9.48 |
| 4 | 0.60 | 22.01 | 9.31 |
| 5 | 0.80 | 31.93 | 8.64 |

Rectangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: CSSW

Comment: CROSSING POINT #1 (CP#1)

Solve For Bottom Width

Given Input Data:

| | |
|---|---|
| Manning's n..... | 0.035 |
| Channel Slope.... | 0.0200 ft/ft |
| Depth..... | 0.50 ft |
| Discharge..... | 18.27 cfs |

Computed Results:

| | |
|---|---|
| Bottom Width..... | 10.28 ft |
| Velocity..... | 3.56 fps |
| Flow Area..... | 5.14 sf |
| Flow Top Width... | 10.28 ft |
| Wetted Perimeter. | 11.28 ft |
| Critical Depth... | 0.46 ft |
| Critical Slope... | 0.0259 ft/ft |
| Froude Number.... | 0.89 (flow is Subcritical) |

Open Channel Flow Module, Version 3.12 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Rectangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: CSSW2

Comment: CROSSING POINT #2 (CP #2)

Solve For Bottom Width

Given Input Data:

| | |
|---|---|
| Manning's n..... | 0.035 |
| Channel Slope.... | 0.0200 ft/ft |
| Depth..... | 1.25 ft |
| Discharge..... | 73.10 cfs |

Computed Results:

| | |
|---|---|
| Bottom Width..... | 9.77 ft |
| Velocity..... | 5.99 fps |
| Flow Area..... | 12.21 sf |
| Flow Top Width... | 9.77 ft |
| Wetted Perimeter. | 12.27 ft |
| Critical Depth... | 1.20 ft |
| Critical Slope... | 0.0225 ft/ft |
| Froude Number.... | 0.94 (flow is Subcritical) |

Open Channel Flow Module, Version 3.12 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Rectangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: CSSW3

Comment: CROSSING POINT #3 (CP #3)

Solve For Bottom Width

Given Input Data:

| | |
|---|---|
| Manning's n..... | 0.035 |
| Channel Slope.... | 0.0200 ft/ft |
| Depth..... | 1.40 ft |
| Discharge..... | 83.91 cfs |

Computed Results:

| | |
|---|---|
| Bottom Width..... | 9.48 ft |
| Velocity..... | 6.32 fps |
| Flow Area..... | 13.27 sf |
| Flow Top Width... | 9.48 ft |
| Wetted Perimeter. | 12.28 ft |
| Critical Depth... | 1.35 ft |
| Critical Slope... | 0.0226 ft/ft |
| Froude Number.... | 0.94 (flow is Subcritical) |

Open Channel Flow Module, Version 3.12 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Rectangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: CSSW4

Comment: CROSSING POINT #4 (CP #4)

Solve For Bottom Width

Given Input Data:

| | |
|---|---|
| Manning's n..... | 0.035 |
| Channel Slope.... | 0.0200 ft/ft |
| Depth..... | 0.60 ft |
| Discharge..... | 22.01 cfs |

Computed Results:

| | |
|---|---|
| Bottom Width..... | 9.31 ft |
| Velocity..... | 3.94 fps |
| Flow Area..... | 5.59 sf |
| Flow Top Width... | 9.31 ft |
| Wetted Perimeter. | 10.51 ft |
| Critical Depth... | 0.56 ft |
| Critical Slope... | 0.0252 ft/ft |
| Froude Number.... | 0.90 (flow is Subcritical) |

Open Channel Flow Module, Version 3.12 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Rectangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: CSSW5

Comment: CROSSING POINT #5 (CP #5)

Solve For Bottom Width

Given Input Data:

| | |
|---|---|
| Manning's n..... | 0.035 |
| Channel Slope.... | 0.0200 ft/ft |
| Depth..... | 0.80 ft |
| Discharge..... | 31.93 cfs |

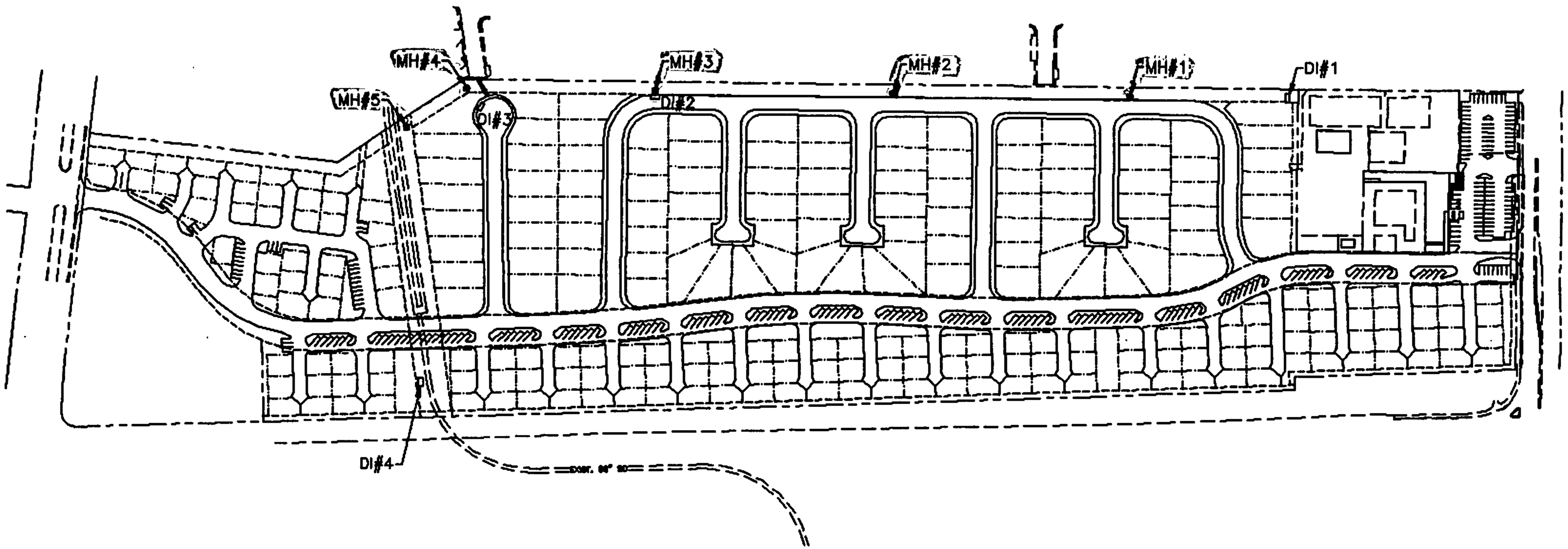
Computed Results:

| | |
|---|---|
| Bottom Width..... | 8.64 ft |
| Velocity..... | 4.62 fps |
| Flow Area..... | 6.91 sf |
| Flow Top Width... | 8.64 ft |
| Wetted Perimeter. | 10.24 ft |
| Critical Depth... | 0.75 ft |
| Critical Slope... | 0.0243 ft/ft |
| Froude Number.... | 0.91 (flow is Subcritical) |

Open Channel Flow Module, Version 3.12 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

# Section V

# Drop Inlet
# Hydraulic Calculations




# DROP INLET LOCATIONS

# *Drop Inlet #1*

**STORM DROP INLET "TYPE C" (EFFECTIVE AREA-IN PONDING SECTION)**

Area @ the Grate:

L = 38 ⅜" - 7 (½"$_{\text{MIDDLE BARS}}$)
= 34 ⅞" = 2.9063'

W = 25 ½" - 13 (½"$_{\text{MIDDLE BARS}}$)
= 19" = 1.5833'

Area = 2.9063 x 1.5833
= 4.601 SF

Effective are = 4.601 - .5 (4.601)$_{\text{Clogging Factor}}$
= 2.30 SF @ the Grate

Are @ the Throat:

L = 47 ⅜" = 3.9479'

H = 10 ¾" - 4 ½"
= 6 ¼" = 0.5208'

Area = 3.9479' x 0.5208
= 2.06 SF @ the Throat

Total Area

Area = $2.30_{\text{Grate}} + 2.06_{\text{Throat}}$
= 4.36 SF

**ORIFICE EQUATION (CHECKING THE WATER DEPTH AT THE INLET)**

$Q = CA\sqrt{(2gH)}$

C = 0.6
A = 4.36 SF
g = 32.2
Solve for H = Water Depth
Q = 15.05 cfs

H = $(Q/CA)^2 / (2g)$
= $(15.05/ 0.6 \times 4.21)^2 / (2 \times 32.2)$
= 0.51'

## *Drop Inlet #2*

**STORM DROP INLET "DBL-A" (EFFECTIVE AREA-IN PONDING SECTION)**

Area @ the Grate:

L = 88 ¾" - 2 ($6"_{ENDS}$) - $6"_{CENTER\ PIECE}$ - 14 ($½"_{MIDDLE\ BARS}$)
= 63 ¾" = 5.3125'

W = 25 ½" - 13 ($½"_{MIDDLE\ BARS}$)
= 19" = 1.5833'

Area = 5.3125 x 8.41
= 8.41 SF

Effective are = 8.41 - .5 $(8.41)_{Clogging\ Factor}$
= 4.21 SF @ the Grate

Are @ the Throat:

L = 13.50'

H = 10 ¾" - 4 ½"
= 6 ¼" = 0.5208'

Area = 13.50 x 0.5208
= 7.0308 SF @ the Throat

Total Area

Area = $4.21_{Grate}$ + $7.0308_{Throat}$
= 11.2408 SF

**ORIFICE EQUATION (CAPACITY CALC. FOR THE INLET)**

$Q = CA\sqrt{(2gH)}$

C = 0.6
A = 11.2408 SF
g = 32.2
H = 0.87'
Solve for Q = ?

Q = 0.6 (11.2408) √(2 x 32.2 x 0.87)
= 63.63 cfs < 54.83 cfs

# *Drop Inlet #3*

**STORM DROP INLET "TYPE C" (EFFECTIVE AREA-IN PONDING SECTION)**

Area @ the Grate:

L = 38 ⅜" - 7 (½"$_{\text{MIDDLE BARS}}$)
= 34 ⅞" = 2.9063'

W = 25 ½" - 13 (½"$_{\text{MIDDLE BARS}}$)
= 19" = 1.5833'

Area = 2.9063 x 1.5833
= 4.601 SF

Effective are = 4.601 - .5 (4.601)$_{\text{Clogging Factor}}$
= 2.30 SF @ the Grate

Are @ the Throat:

L = 47 ⅜" = 3.9479'

H = 10 ¾" - 4 ½"
= 6 ¼" = 0.5208'

Area = 3.9479' x 0.5208
= 2.06 SF @ the Throat

Total Area

Area = $2.30_{\text{Grate}} + 2.06_{\text{Throat}}$
= 4.36 SF

**ORIFICE EQUATION (CHECKING THE WATER DEPTH AT THE INLET)**

$Q = CA\sqrt{(2gH)}$

C = 0.6
A = 4.36 SF
g = 32.2
Solve for H = Water Depth
Q = 10.81 cfs

H = $(Q/CA)^2 / (2g)$
= $(10.81/ 0.6 \times 4.21)^2 / (2 \times 32.2)$
= 0.27'

# *Drop Inlet #4*

**STORM DROP INLET "TYPE C" (EFFECTIVE AREA-IN PONDING SECTION)**

Area @ the Grate:

L = 38 ⅜" - 7 (½"$_{\text{MIDDLE BARS}}$)
= 34 ⅞" = 2.9063'

W = 25 ½" - 13 (½"$_{\text{MIDDLE BARS}}$)
= 19" = 1.5833'

Area = 2.9063 x 1.5833
= 4.601 SF

Effective are = 4.601 - .5 (4.601)$_{\text{Clogging Factor}}$
= 2.30 SF @ the Grate

Are @ the Throat:

L = 47 ⅜" = 3.9479'

H = 10 ¾" - 4 ½"
= 6 ¼" = 0.5208'

Area = 3.9479' x 0.5208
= 2.06 SF @ the Throat

Total Area

Area = $2.30_{\text{Grate}} + 2.06_{\text{Throat}}$
= 4.36 SF

**ORIFICE EQUATION (CHECKING THE WATER DEPTH AT THE INLET)**

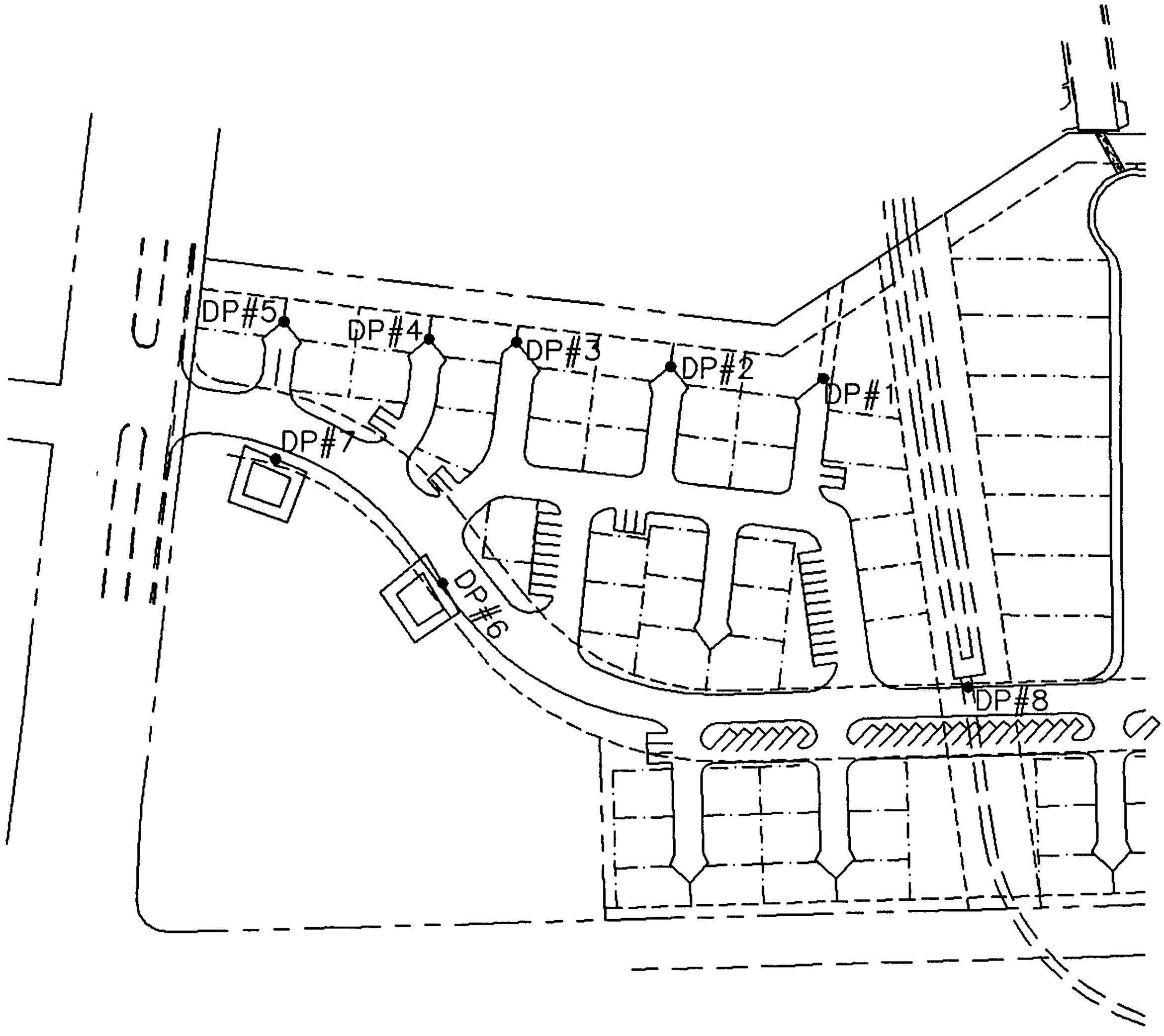
$Q = CA\sqrt{(2gH)}$

C = 0.6
A = 4.36 SF
g = 32.2
Solve for H = Water Depth
Q = 18.57 cfs

H = $(Q/CA)^2 / (2g)$
= $(18.57/ 0.6 \times 4.21)^2 / (2 \times 32.2)$
= 0.78'

# Section VI

# Drainage Points
# Hydraulic Calculations




# DRAINAGE POINT LOCATIONS

## *DRAINAGE PIPES SUMMARY TABLE*

| DRIANAGE POINT (#) | WATER HEIGHT (FT) | FLOW (CFS) | MINIMUM REQUIRED WIDTH (FT) | WIDTH PROVIDED (FT) |
|---|---|---|---|---|
| 1 | 0.50 | 8.28 | 7.94 | 8.00 |
| 2 | 0.33 | 1.64 | 2.94 | 3.00 |
| 3 | 0.87 | 22.57 | 9.43 | 10.00 |
| 4 | 0.33 | 1.78 | 3.18 | 3.25 |
| 5 | 0.33 | 1.34 | 2.40 | 2.50 |
| 6 | 0.50 | 7.78 | 7.46 | 8.00 |
| 7 | 0.50 | 8.88 | 8.75 | 8.75 |
| 8 | 0.67 | 58.69 | 36.28 | 36.50 |

## *DRAINAGE POINT # 1*

Width required for the drainage from street into the drainage easement

$Q = CLH^{3/2}$
$Q = 8.28$ cfs
$H = 0.50'$
$C = 2.95$
Solve for L = (Width of the entrance)

$L = Q/CH^{3/2}$
$= 8.28 / (2.95 \times 0.50^{3/2})$
$= 7.94'$

Use L = 8.00' minimum

## *DRAINAGE POINT # 2*

Width required for the drainage from street into the drainage easement

$Q = CLH^{3/2}$
$Q = 1.64$ cfs
$H = 0.33'$
$C = 2.95$
Solve for L = (Width of the entrance)

$L = Q/CH^{3/2}$
$= 1.64 / (2.95 \times 0.33^{3/2})$
$= 2.94'$

Use L = 3.00' minimum

## *DRAINAGE POINT # 3*

Width required for the drainage from street into the drainage easement

$Q = CLH^{3/2}$
$Q = 22.57$ cfs
$H = 0.87'$
$C = 2.95$
Solve for L = (Width of the entrance)

$L = Q/CH^{3/2}$
$= 22.57 / (2.95 \times 0.87^{3/2})$
$= 9.43'$

Use L = 10.00' minimum

## *DRAINAGE POINT # 4*

Width required for the drainage from street into the drainage easement

$Q = CLH^{3/2}$
$Q = 1.78$ cfs
$H = 0.33'$
$C = 2.95$
Solve for L = (Width of the entrance)

$L = Q/CH^{3/2}$
$= 1.78 / (2.95 \times 0.33^{3/2})$
$= 3.18'$

Use L = 3.25' minimum

## *DRAINAGE POINT # 5*

Width required for the drainage from street into the drainage easement

$Q = CLH^{3/2}$
$Q = 1.34$ cfs
$H = 0.33'$
$C = 2.95$
Solve for L = (Width of the entrance)

$L = Q/CH^{3/2}$
$= 1.34 / (2.95 \times 0.33^{3/2})$
$= 2.40'$

Use L = 2.50' minimum

## *DRAINAGE POINT # 6*

Width required for the drainage from the desilting pond

$Q = CLH^{3/2}$
$Q = 7.78$ cfs
$H = 0.50'$
$C = 2.95$
Solve for L = (Width of the entrance)

$L = Q/CH^{3/2}$
$= 7.78 / (2.95 \times 0.50^{3/2})$
$= 7.46'$

Use L = 8.00' minimum

## *DRAINAGE POINT # 7*

Width required for the drainage from the desilting pond

$Q = CLH^{3/2}$
$Q = 8.88$ cfs
$H = 0.50'$
$C = 2.95$
Solve for L = (Width of the entrance)

$L = Q/CH^{3/2}$
$= 7.78 / (2.95 \times 0.50^{3/2})$
$= 8.51'$

Use L = 8.75' minimum

## *DRAINAGE POINT #8*

Width required for the drainage from street into AMAFCA's channel

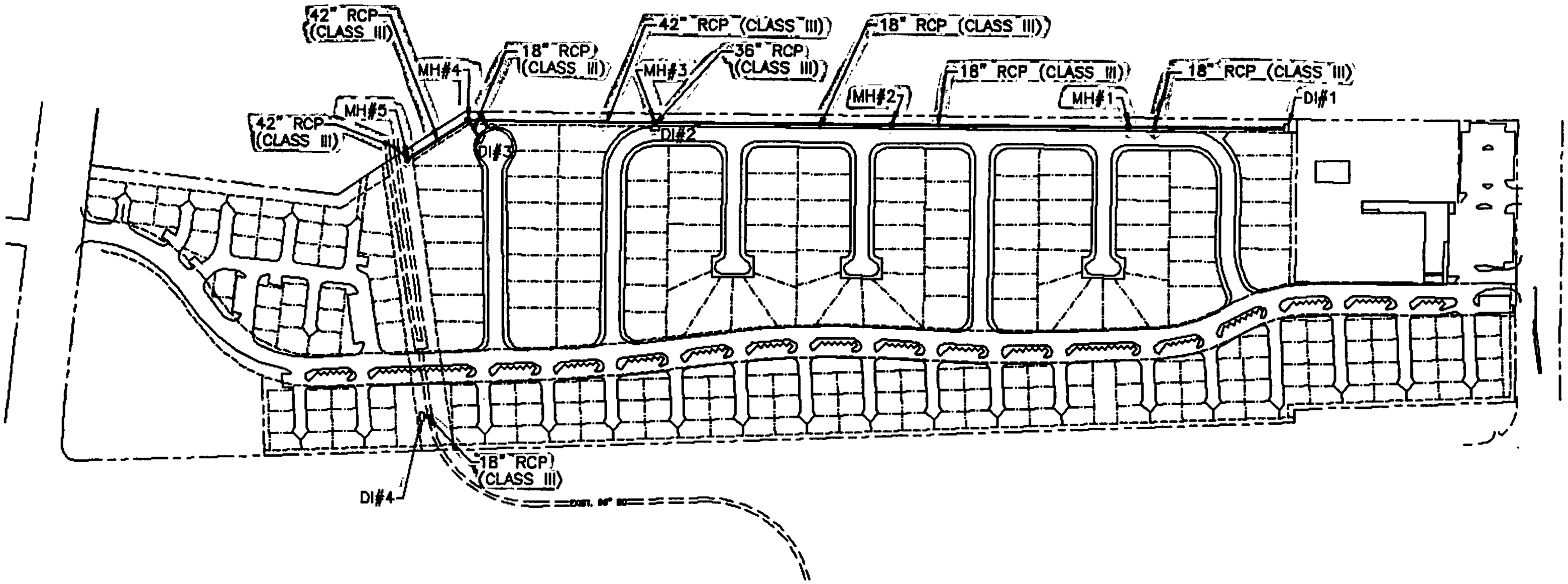
$Q = CLH^{3/2}$
$Q = 58.69$ cfs
$H = 0.67'$
$C = 2.95$
Solve for L = (Width of the entrance)

$L = Q/CH^{3/2}$
$= 58.69 / (2.95 \times 0.67^{3/2})$
$= 36.28'$

Use $L = 36.50'$

# Section VII

# Drainage Pipe
# Hydraulic Calculations




# DRAINAGE PIPE LOCATIONS

# *DRAINAGE PIPES SUMMARY TABLE*

| CONNECTION | PIPE SIZE | SLOPE % | FLOW CFS | FLOW DEPTH FT | VELOCITY FT/S |
|---|---|---|---|---|---|
| MH 5 TO EXISTING CONCRETE CHANNEL | 42" | 0.50 | 80.69 | 1.12 | 9.08 |
| MH 4 TO MH 5 | 42" | 0.50 | 80.69 | 1.12 | 9.08 |
| MH 3 TO MH 4 | 42" | 0.40 | 69.88 | 1.38 | 8.16 |
| MH 2 TO MH 3 | 18" | 2.52 | 15.05 | 1.38 | 11.44 |
| MH 1 TO MH 2 | 18" | 2.78 | 15.05 | 1.17 | 11.91 |
| DI 1 TO MH 1 | 18" | 3.50 | 15.05 | 1.43 | 13.06 |
| DI 2 TO MH 3 | 36" | 0.75 | 54.83 | 1.43 | 9.98 |
| DI 3 TO MH 4 | 18" | 1.30 | 10.81 | 2.20 | 8.22 |
| DI 4 TO EXISTING 96" RCP | 18" | 2.00 | 13.36 | 1.04 | 10.18 |

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name:

Comment: MH # 1 TO MH # 2

Solve For Actual Depth

Given Input Data:

| | |
|---|---|
| Diameter..... | 1.50 ft |
| Slope..... | 0.0278 ft/ft |
| Manning's n..... | 0.012 |
| Discharge..... | 15.05 cfs |

Computed Results:

| | |
|---|---|
| Depth..... | 1.01 ft |
| Velocity..... | 11.91 fps |
| Flow Area..... | 1.26 sf |
| Critical Depth.... | 1.41 ft |
| Critical Slope.... | 0.0151 ft/ft |
| Percent Full..... | 67.24 % |
| Full Capacity..... | 18.97 cfs |
| QMAX @.94D..... | 20.41 cfs |
| Froude Number..... | 2.22 (flow is Supercritical) |

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Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name:

Comment: MH # 2 TO MH # 3

Solve For Actual Depth

Given Input Data:

| | |
|---|---|
| Diameter..... | 1.50 ft |
| Slope..... | 0.0252 ft/ft |
| Manning's n..... | 0.012 |
| Discharge..... | 15.05 cfs |

Computed Results:

| | |
|---|---|
| Depth..... | 1.05 ft |
| Velocity..... | 11.44 fps |
| Flow Area..... | 1.32 sf |
| Critical Depth.... | 1.41 ft |
| Critical Slope.... | 0.0151 ft/ft |
| Percent Full..... | 69.74 % |
| Full Capacity..... | 18.06 cfs |
| QMAX @.94D..... | 19.43 cfs |
| Froude Number..... | 2.06 (flow is Supercritical) |

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Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name:

Comment: MH # 3 TO MH # 4

Solve For Actual Depth

Given Input Data:

| | |
|---|---|
| Diameter..... | 3.50 ft |
| Slope..... | 0.0040 ft/ft |
| Manning's n..... | 0.012 |
| Discharge..... | 69.88 cfs |

Computed Results:

| | |
|---|---|
| Depth..... | 2.91 ft |
| Velocity..... | 8.16 fps |
| Flow Area..... | 8.56 sf |
| Critical Depth.... | 2.62 ft |
| Critical Slope.... | 0.0050 ft/ft |
| Percent Full..... | 83.26 % |
| Full Capacity..... | 68.93 cfs |
| QMAX @.94D..... | 74.15 cfs |
| Froude Number..... | 0.79 (flow is Subcritical) |

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Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name:

Comment: MH # 4 TO MH # 5

Solve For Actual Depth

Given Input Data:

| | |
|---|---|
| Diameter..... | 3.50 ft |
| Slope..... | 0.0050 ft/ft |
| Manning's n..... | 0.012 |
| Discharge..... | 80.69 cfs |

Computed Results:

| | |
|---|---|
| Depth..... | 3.04 ft |
| Velocity..... | 9.08 fps |
| Flow Area..... | 8.89 sf |
| Critical Depth.... | 2.81 ft |
| Critical Slope.... | 0.0057 ft/ft |
| Percent Full..... | 86.99 % |
| Full Capacity..... | 77.07 cfs |
| QMAX @.94D..... | 82.91 cfs |
| Froude Number..... | 0.82 (flow is Subcritical) |

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Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name:

Comment: MH # 5 TO EXISTING CONCRETE CHANNEL

Solve For Actual Depth

Given Input Data:

| | |
|---|---|
| Diameter..... | 3.50 ft |
| Slope..... | 0.0050 ft/ft |
| Manning's n..... | 0.012 |
| Discharge..... | 80.69 cfs |

Computed Results:

| | |
|---|---|
| Depth..... | 3.04 ft |
| Velocity..... | 9.08 fps |
| Flow Area..... | 8.89 sf |
| Critical Depth.... | 2.81 ft |
| Critical Slope.... | 0.0057 ft/ft |
| Percent Full..... | 86.99 % |
| Full Capacity..... | 77.07 cfs |
| QMAX @.94D..... | 82.91 cfs |
| Froude Number..... | 0.82 (flow is Subcritical) |

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Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name:

Comment: DI # 1 TO MH #1

Solve For Actual Depth

Given Input Data:

| | |
|---|---|
| Diameter..... | 1.50 ft |
| Slope..... | 0.0350 ft/ft |
| Manning's n..... | 0.012 |
| Discharge..... | 15.05 cfs |

Computed Results:

| | |
|---|---|
| Depth..... | 0.93 ft |
| Velocity..... | 13.06 fps |
| Flow Area..... | 1.15 sf |
| Critical Depth.... | 1.41 ft |
| Critical Slope.... | 0.0151 ft/ft |
| Percent Full..... | 62.06 % |
| Full Capacity..... | 21.29 cfs |
| QMAX @.94D..... | 22.90 cfs |
| Froude Number..... | 2.59 (flow is Supercritical) |

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Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name:

Comment: DI # 2 TO MH #3

Solve For Actual Depth

Given Input Data:

| | |
|---|---|
| Diameter..... | 3.00 ft |
| Slope..... | 0.0075 ft/ft |
| Manning's n..... | 0.012 |
| Discharge..... | 54.83 cfs |

Computed Results:

| | |
|---|---|
| Depth..... | 2.18 ft |
| Velocity..... | 9.98 fps |
| Flow Area..... | 5.49 sf |
| Critical Depth.... | 2.40 ft |
| Critical Slope.... | 0.0060 ft/ft |
| Percent Full..... | 72.55 % |
| Full Capacity..... | 62.58 cfs |
| QMAX @.94D..... | 67.31 cfs |
| Froude Number..... | 1.23 (flow is Supercritical) |

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Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name:

Comment: DI # 3 TO MH #4

Solve For Actual Depth

Given Input Data:

| | |
|---|---|
| Diameter..... | 1.50 ft |
| Slope..... | 0.0130 ft/ft |
| Manning's n..... | 0.012 |
| Discharge..... | 10.81 cfs |

Computed Results:

| | |
|---|---|
| Depth..... | 1.05 ft |
| Velocity..... | 8.22 fps |
| Flow Area..... | 1.32 sf |
| Critical Depth.... | 1.26 ft |
| Critical Slope.... | 0.0086 ft/ft |
| Percent Full..... | 69.74 % |
| Full Capacity..... | 12.97 cfs |
| QMAX @.94D..... | 13.96 cfs |
| Froude Number..... | 1.48 (flow is Supercritical) |

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Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name:

Comment: DI # 4 TO EXISTING 96" RCP

Solve For Actual Depth

Given Input Data:

| | |
|---|---|
| Diameter..... | 1.50 ft |
| Slope..... | 0.0200 ft/ft |
| Manning's n..... | 0.012 |
| Discharge..... | 13.36 cfs |

Computed Results:

| | |
|---|---|
| Depth..... | 1.04 ft |
| Velocity..... | 10.18 fps |
| Flow Area..... | 1.31 sf |
| Critical Depth.... | 1.36 ft |
| Critical Slope.... | 0.0120 ft/ft |
| Percent Full..... | 69.55 % |
| Full Capacity..... | 16.09 cfs |
| QMAX @.94D..... | 17.31 cfs |
| Froude Number..... | 1.84 (flow is Supercritical) |

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# Section VIII

# AHYMO
# FILES

```
*****************************************************************
*                      TRAMWAY HIGHLANDS                        *
*****************************************************************
*                       PROPOSED BASINS                         *
*****************************************************************
*                    100-YEAR,  6-HR STORM                      *
*****************************************************************
*
START                TIME=0.0
*
* BASIN A
*
RAINFALL             TYPE=1 RAIN QUARTER=0.0 IN
                     RAIN ONE=2.23 IN RAIN SIX=2.90 IN
                     RAIN DAY=3.65 IN DT=0.03333 HR
COMPUTE NM HYD       ID=1 HYD NO=100.1 AREA=0.001295 SQ MI
                     PER A=0.00 PER B=0.00 PER C=0.00 PER D=100.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN B
*
COMPUTE NM HYD       ID=2 HYD NO=100.2 AREA=0.004067 SQ MI
                     PER A=0.00 PER B=100.00 PER C=0.00 PER D=0.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN C
*
COMPUTE NM HYD       ID=1 HYD NO=100.3 AREA=0.016333 SQ MI
                     PER A=0.00 PER B=20.00 PER C=20.00 PER D=60.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN D
*
COMPUTE NM HYD       ID=1 HYD NO=100.4 AREA=0.019166 SQ MI
                     PER A=0.00 PER B=20.00 PER C=20.00 PER D=60.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN E
*
COMPUTE NM HYD       ID=1 HYD NO=100.5 AREA=0.001633 SQ MI
                     PER A=0.00 PER B=80.00 PER C=20.00 PER D=0.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN F
*
COMPUTE NM HYD       ID=1 HYD NO=100.6 AREA=0.003774 SQ MI
                     PER A=0.00 PER B=20.00 PER C=20.00 PER D=60.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN G
*
COMPUTE NM HYD       ID=1 HYD NO=100.7 AREA=0.000831 SQ MI
                     PER A=0.00 PER B=100.00 PER C=0.00 PER D=0.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN H
*
COMPUTE NM HYD       ID=1 HYD NO=100.8 AREA=0.001269 SQ MI
                     PER A=0.00 PER B=20.00 PER C=20.00 PER D=60.00
                     TP=-0.1333 HR MASS RAINFALL=-1
```

```
*
* BASIN I
*
COMPUTE NM HYD       ID=1 HYD NO=100.9 AREA=0.001934 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN J
*
COMPUTE NM HYD       ID=1 HYD NO=100.10 AREA=0.003460 SQ MI
                     PER A=0.00 PER B=20.00 PER C=20.00 PER D=60.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN K
*
COMPUTE NM HYD       ID=1 HYD NO=100.11 AREA=0.000316 SQ MI
                     PER A=0.00 PER B=0.00 PER C=0.00 PER D=100.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN L
*
COMPUTE NM HYD       ID=1 HYD NO=100.12 AREA=0.000228 SQ MI
                     PER A=0.00 PER B=100.00 PER C=0.00 PER D=0.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN M
*
COMPUTE NM HYD       ID=1 HYD NO=100.13 AREA=0.002292 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN N
*
COMPUTE NM HYD       ID=1 HYD NO=100.14 AREA=0.000186 SQ MI
                     PER A=0.00 PER B=20.00 PER C=20.00 PER D=60.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN O
*
COMPUTE NM HYD       ID=1 HYD NO=100.15 AREA=0.001510 SQ MI
                     PER A=0.00 PER B=20.00 PER C=20.00 PER D=60.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN P
*
COMPUTE NM HYD       ID=1 HYD NO=100.16 AREA=0.000208 SQ MI
                     PER A=0.00 PER B=20.00 PER C=0.00 PER D=80.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN Q
*
COMPUTE NM HYD       ID=1 HYD NO=100.17 AREA=0.000841 SQ MI
                     PER A=0.00 PER B=10.00 PER C=15.00 PER D=75.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN R
*
COMPUTE NM HYD       ID=1 HYD NO=100.18 AREA=0.004688 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
```

```
*
*****************************************************************
*                    10-YEAR,  6-HR STORM                       *
*****************************************************************
*
START                TIME=0.0
*
* BASIN A
*
RAINFALL             TYPE=1 RAIN QUARTER=0.0 IN
                     RAIN ONE=1.49 IN RAIN SIX=1.93 IN
                     RAIN DAY=2.43 IN DT=0.03333 HR
COMPUTE NM HYD       ID=1 HYD NO=10.1 AREA=0.001295 SQ MI
                     PER A=0.00 PER B=0.00 PER C=0.00 PER D=100.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN B
*
COMPUTE NM HYD       ID=1 HYD NO=10.2 AREA=0.004067 SQ MI
                     PER A=0.00 PER B=100.00 PER C=0.00 PER D=0.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN C
*
COMPUTE NM HYD       ID=1 HYD NO=10.3 AREA=0.016333 SQ MI
                     PER A=0.00 PER B=20.00 PER C=20.00 PER D=60.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN D
*
COMPUTE NM HYD       ID=1 HYD NO=10.4 AREA=0.019166 SQ MI
                     PER A=0.00 PER B=20.00 PER C=20.00 PER D=60.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN E
*
COMPUTE NM HYD       ID=1 HYD NO=10.5 AREA=0.001633 SQ MI
                     PER A=0.00 PER B=80.00 PER C=20.00 PER D=0.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN F
*
COMPUTE NM HYD       ID=1 HYD NO=10.6 AREA=0.003774 SQ MI
                     PER A=0.00 PER B=20.00 PER C=20.00 PER D=60.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN G
*
COMPUTE NM HYD       ID=1 HYD NO=10.7 AREA=0.000831 SQ MI
                     PER A=0.00 PER B=100.00 PER C=0.00 PER D=0.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN H
*
COMPUTE NM HYD       ID=1 HYD NO=10.8 AREA=0.001269 SQ MI
                     PER A=0.00 PER B=20.00 PER C=20.00 PER D=60.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN I
*
```

```
COMPUTE NM HYD       ID=1 HYD NO=10.9 AREA=0.001934 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN J
*
COMPUTE NM HYD       ID=1 HYD NO=10.10 AREA=0.003460 SQ MI
                     PER A=0.00 PER B=20.00 PER C=20.00 PER D=60.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN K
*
COMPUTE NM HYD       ID=1 HYD NO=10.11 AREA=0.000316 SQ MI
                     PER A=0.00 PER B=0.00 PER C=0.00 PER D=100.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN L
*
COMPUTE NM HYD       ID=1 HYD NO=10.12 AREA=0.000228 SQ MI
                     PER A=0.00 PER B=100.00 PER C=0.00 PER D=0.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN M
*
COMPUTE NM HYD       ID=1 HYD NO=10.13 AREA=0.002292 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN N
*
COMPUTE NM HYD       ID=1 HYD NO=10.14 AREA=0.000186 SQ MI
                     PER A=0.00 PER B=20.00 PER C=20.00 PER D=60.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN O
*
COMPUTE NM HYD       ID=1 HYD NO=10.15 AREA=0.001510 SQ MI
                     PER A=0.00 PER B=20.00 PER C=20.00 PER D=60.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN P
*
COMPUTE NM HYD       ID=1 HYD NO=10.16 AREA=0.000208 SQ MI
                     PER A=0.00 PER B=20.00 PER C=0.00 PER D=80.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN Q
*
COMPUTE NM HYD       ID=1 HYD NO=10.17 AREA=0.000841 SQ MI
                     PER A=0.00 PER B=10.00 PER C=15.00 PER D=75.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN R
*
COMPUTE NM HYD       ID=1 HYD NO=10.18 AREA=0.004688 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
*************************************************************************
FINISH
```

AHYMO SUMMARY TABLE (AHYMO194) - AMAFCA Hydrologic Model - January, 1994 RUN DATE (MON/DAY/YR) =06/11/1997
INPUT FILE = pr USER NO.= R_BOHANN.I01

| COMMAND | HYDROGRAPH IDENTIFICATION | FROM ID NO. | TO ID NO. | AREA (SQ MI) | PEAK DISCHARGE (CFS) | RUNOFF VOLUME (AC-FT) | RUNOFF (INCHES) | TIME TO PEAK (HOURS) | CFS PER ACRE | PAGE = 1 NOTATION |
|---|---|---|---|---|---|---|---|---|---|---|
| START | | | | | | | | | | TIME= .00 |
| RAINFALL TYPE= 1 | | | | | | | | | | RAIN6= 2.900 |
| COMPUTE NM HYD | 100.10 | - | 1 | .00130 | 4.35 | .182 | 2.64141 | 1.500 | 5.251 | PER IMP= 100.00 |
| COMPUTE NM HYD | 100.20 | - | 2 | .00407 | 7.61 | .233 | 1.07600 | 1.500 | 2.922 | PER IMP= .00 |
| COMPUTE NM HYD | 100.30 | - | 1 | .01633 | 46.73 | 1.817 | 2.08531 | 1.500 | 4.471 | PER IMP= 60.00 |
| COMPUTE NM HYD | 100.40 | - | 1 | .01917 | 54.83 | 2.132 | 2.08531 | 1.500 | 4.470 | PER IMP= 60.00 |
| COMPUTE NM HYD | 100.50 | - | 1 | .00163 | 3.22 | .100 | 1.14274 | 1.500 | 3.084 | PER IMP= .00 |
| COMPUTE NM HYD | 100.60 | - | 1 | .00377 | 10.81 | .420 | 2.08531 | 1.500 | 4.477 | PER IMP= 60.00 |
| COMPUTE NM HYD | 100.70 | - | 1 | .00083 | 1.56 | .048 | 1.07600 | 1.500 | 2.938 | PER IMP= .00 |
| COMPUTE NM HYD | 100.80 | - | 1 | .00127 | 3.65 | .141 | 2.08531 | 1.500 | 4.495 | PER IMP= 60.00 |
| COMPUTE NM HYD | 100.90 | - | 1 | .00193 | 6.22 | .256 | 2.48487 | 1.500 | 5.024 | PER IMP= 90.00 |
| COMPUTE NM HYD | 100.10 | - | 1 | .00346 | 9.92 | .385 | 2.08531 | 1.500 | 4.478 | PER IMP= 60.00 |
| COMPUTE NM HYD | 100.11 | - | 1 | .00032 | 1.07 | .045 | 2.64141 | 1.500 | 5.290 | PER IMP= 100.00 |
| COMPUTE NM HYD | 100.12 | - | 1 | .00023 | .44 | .013 | 1.07600 | 1.500 | 2.994 | PER IMP= .00 |
| COMPUTE NM HYD | 100.13 | - | 1 | .00229 | 7.37 | .304 | 2.48487 | 1.500 | 5.022 | PER IMP= 90.00 |
| COMPUTE NM HYD | 100.14 | - | 1 | .00019 | .55 | .021 | 2.08531 | 1.500 | 4.641 | PER IMP= 60.00 |
| COMPUTE NM HYD | 100.15 | - | 1 | .00151 | 4.34 | .168 | 2.08531 | 1.500 | 4.491 | PER IMP= 60.00 |
| COMPUTE NM HYD | 100.16 | - | 1 | .00021 | .66 | .026 | 2.32833 | 1.500 | 4.939 | PER IMP= 80.00 |
| COMPUTE NM HYD | 100.17 | - | 1 | .00084 | 2.59 | .103 | 2.30336 | 1.500 | 4.816 | PER IMP= 75.00 |
| COMPUTE NM HYD | 100.18 | - | 1 | .00469 | 15.05 | .621 | 2.48487 | 1.500 | 5.015 | PER IMP= 90.00 |
| START | | | | | | | | | | TIME= .00 |
| RAINFALL TYPE= 1 | | | | | | | | | | RAIN6= 1.930 |
| COMPUTE NM HYD | 10.10 | - | 1 | .00130 | 2.90 | .116 | 1.67988 | 1.500 | 3.493 | PER IMP= 100.00 |
| COMPUTE NM HYD | 10.20 | - | 1 | .00407 | 3.71 | .097 | .44688 | 1.500 | 1.426 | PER IMP= .00 |
| COMPUTE NM HYD | 10.30 | - | 1 | .01633 | 29.42 | 1.074 | 1.23345 | 1.500 | 2.814 | PER IMP= 60.00 |
| COMPUTE NM HYD | 10.40 | - | 1 | .01917 | 34.52 | 1.261 | 1.23345 | 1.500 | 2.814 | PER IMP= 60.00 |
| COMPUTE NM HYD | 10.50 | - | 1 | .00163 | 1.65 | .043 | .49105 | 1.500 | 1.578 | PER IMP= .00 |
| COMPUTE NM HYD | 10.60 | - | 1 | .00377 | 6.81 | .248 | 1.23345 | 1.500 | 2.818 | PER IMP= 60.00 |
| COMPUTE NM HYD | 10.70 | - | 1 | .00083 | .76 | .020 | .44688 | 1.500 | 1.434 | PER IMP= .00 |
| COMPUTE NM HYD | 10.80 | - | 1 | .00127 | 2.30 | .083 | 1.23345 | 1.500 | 2.829 | PER IMP= 60.00 |
| COMPUTE NM HYD | 10.90 | - | 1 | .00193 | 4.07 | .161 | 1.55658 | 1.500 | 3.289 | PER IMP= 90.00 |
| COMPUTE NM HYD | 10.10 | - | 1 | .00346 | 6.24 | .228 | 1.23345 | 1.500 | 2.819 | PER IMP= 60.00 |
| COMPUTE NM HYD | 10.11 | - | 1 | .00032 | .71 | .028 | 1.67988 | 1.500 | 3.520 | PER IMP= 100.00 |
| COMPUTE NM HYD | 10.12 | - | 1 | .00023 | .21 | .005 | .44688 | 1.500 | 1.460 | PER IMP= .00 |
| COMPUTE NM HYD | 10.13 | - | 1 | .00229 | 4.82 | .190 | 1.55658 | 1.500 | 3.288 | PER IMP= 90.00 |
| COMPUTE NM HYD | 10.14 | - | 1 | .00019 | .35 | .012 | 1.23345 | 1.500 | 2.917 | PER IMP= 60.00 |
| COMPUTE NM HYD | 10.15 | - | 1 | .00151 | 2.73 | .099 | 1.23345 | 1.500 | 2.826 | PER IMP= 60.00 |
| COMPUTE NM HYD | 10.16 | - | 1 | .00021 | .42 | .016 | 1.43328 | 1.500 | 3.169 | PER IMP= 80.00 |
| COMPUTE NM HYD | 10.17 | - | 1 | .00084 | 1.67 | .063 | 1.40745 | 1.500 | 3.108 | PER IMP= 75.00 |
| COMPUTE NM HYD | 10.18 | - | 1 | .00469 | 9.85 | .389 | 1.55658 | 1.500 | 3.284 | PER IMP= 90.00 |
| FINISH | | | | | | | | | | |

```
*****************************************************************
*                      TRAMWAY HIGHLANDS                        *
*****************************************************************
*                       EXISTING BASINS                         *
*****************************************************************
*                    100-YEAR,  6-HR STORM                      *
*****************************************************************
*
START                TIME=0.0
RAINFALL             TYPE=1 RAIN QUARTER=0.0 IN
                     RAIN ONE=2.23 IN RAIN SIX=2.90 IN
                     RAIN DAY=3.65 IN DT=0.03333 HR
*
* BASIN A
*
COMPUTE NM HYD       ID=1 HYD NO=100.1 AREA=0.001295 SQ MI
                     PER A=0.00 PER B=0.00 PER C=0.00 PER D=100.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN B
*
COMPUTE NM HYD       ID=2 HYD NO=100.2 AREA=0.004688 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN C
*
COMPUTE NM HYD       ID=3 HYD NO=100.3 AREA=0.043490 SQ MI
                     PER A=0.00 PER B=100.00 PER C=0.00 PER D=0.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN D
*
COMPUTE NM HYD       ID=4 HYD NO=100.4 AREA=0.000841 SQ MI
                     PER A=0.00 PER B=10.00 PER C=15.00 PER D=75.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN E
*
COMPUTE NM HYD       ID=5 HYD NO=100.5 AREA=0.009939 SQ MI
                     PER A=0.00 PER B=100.00 PER C=0.00 PER D=0.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN F
*
COMPUTE NM HYD       ID=6 HYD NO=100.6 AREA=0.000316 SQ MI
                     PER A=0.00 PER B=0.00 PER C=0.00 PER D=100.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN G
*
COMPUTE NM HYD       ID=7 HYD NO=100.7 AREA=0.003541 SQ MI
                     PER A=0.00 PER B=100.00 PER C=0.00 PER D=0.00
                     TP=-0.1333 HR MASS RAINFALL=-1
*
*****************************************************************
*                        10-YEAR,  6-HR STORM                   *
*****************************************************************
*
START                TIME=0.0
```

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RAINFALL            TYPE=1 RAIN QUARTER=0.0 IN
                    RAIN ONE=1.49 IN RAIN SIX=1.93 IN
                    RAIN DAY=2.43 IN DT=0.03333 HR
*
* BASIN A
*
COMPUTE NM HYD      ID=1 HYD NO=10.1 AREA=0.001295 SQ MI
                    PER A=0.00 PER B=0.00 PER C=0.00 PER D=100.00
                    TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN B
*
COMPUTE NM HYD      ID=2 HYD NO=10.2 AREA=0.004688 SQ MI
                    PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                    TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN C
*
COMPUTE NM HYD      ID=3 HYD NO=10.3 AREA=0.043490 SQ MI
                    PER A=0.00 PER B=100.00 PER C=0.00 PER D=0.00
                    TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN D
*
COMPUTE NM HYD      ID=4 HYD NO=10.4 AREA=0.000841 SQ MI
                    PER A=0.00 PER B=10.00 PER C=15.00 PER D=75.00
                    TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN E
*
COMPUTE NM HYD      ID=5 HYD NO=10.5 AREA=0.009939 SQ MI
                    PER A=0.00 PER B=100.00 PER C=0.00 PER D=0.00
                    TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN F
*
COMPUTE NM HYD      ID=6 HYD NO=10.6 AREA=0.000316 SQ MI
                    PER A=0.00 PER B=0.00 PER C=0.00 PER D=100.00
                    TP=-0.1333 HR MASS RAINFALL=-1
*
* BASIN G
*
COMPUTE NM HYD      ID=7 HYD NO=10.7 AREA=0.003541 SQ MI
                    PER A=0.00 PER B=100.00 PER C=0.00 PER D=0.00
                    TP=-0.1333 HR MASS RAINFALL=-1
*
**********************************************************************
FINISH
```

AHYMO SUMMARY TABLE (AHYMO194) - AMAFCA Hydrologic Model - January, 1994 RUN DATE (MON/DAY/YR) =06/10/1997

INPUT FILE = EX USER NO.= R_BOHANN.I01

| COMMAND | HYDROGRAPH IDENTIFICATION | FROM ID NO. | TO ID NO. | AREA (SQ MI) | PEAK DISCHARGE (CFS) | RUNOFF VOLUME (AC-FT) | RUNOFF (INCHES) | TIME TO PEAK (HOURS) | CFS PER ACRE | PAGE = 1 NOTATION |
|---|---|---|---|---|---|---|---|---|---|---|
| START | | | | | | | | | | TIME= .00 |
| RAINFALL TYPE= 1 | | | | | | | | | | RAIN6= 2.900 |
| COMPUTE NM HYD | 100.10 | - | 1 | .00130 | 4.35 | .182 | 2.64141 | 1.500 | 5.251 | PER IMP= 100.00 |
| COMPUTE NM HYD | 100.20 | - | 2 | .00469 | 15.05 | .621 | 2.48487 | 1.500 | 5.015 | PER IMP= 90.00 |
| COMPUTE NM HYD | 100.30 | - | 3 | .04349 | 81.22 | 2.496 | 1.07600 | 1.500 | 2.918 | PER IMP= .00 |
| COMPUTE NM HYD | 100.40 | - | 4 | .00084 | 2.59 | .103 | 2.30336 | 1.500 | 4.816 | PER IMP= 75.00 |
| COMPUTE NM HYD | 100.50 | - | 5 | .00994 | 18.57 | .570 | 1.07600 | 1.500 | 2.919 | PER IMP= .00 |
| COMPUTE NM HYD | 100.60 | - | 6 | .00032 | 1.07 | .045 | 2.64141 | 1.500 | 5.290 | PER IMP= 100.00 |
| COMPUTE NM HYD | 100.70 | - | 7 | .00354 | 6.62 | .203 | 1.07600 | 1.500 | 2.923 | PER IMP= .00 |
| START | | | | | | | | | | TIME= .00 |
| RAINFALL TYPE= 1 | | | | | | | | | | RAIN6= 1.930 |
| COMPUTE NM HYD | 10.10 | - | 1 | .00130 | 2.90 | .116 | 1.67988 | 1.500 | 3.493 | PER IMP= 100.00 |
| COMPUTE NM HYD | 10.20 | - | 2 | .00469 | 9.85 | .389 | 1.55658 | 1.500 | 3.284 | PER IMP= 90.00 |
| COMPUTE NM HYD | 10.30 | - | 3 | .04349 | 39.63 | 1.037 | .44688 | 1.500 | 1.424 | PER IMP= .00 |
| COMPUTE NM HYD | 10.40 | - | 4 | .00084 | 1.67 | .063 | 1.40745 | 1.500 | 3.108 | PER IMP= 75.00 |
| COMPUTE NM HYD | 10.50 | - | 5 | .00994 | 9.06 | .237 | .44688 | 1.500 | 1.425 | PER IMP= .00 |
| COMPUTE NM HYD | 10.60 | - | 6 | .00032 | .71 | .028 | 1.67988 | 1.500 | 3.520 | PER IMP= 100.00 |
| COMPUTE NM HYD | 10.70 | - | 7 | .00354 | 3.23 | .084 | .44688 | 1.500 | 1.426 | PER IMP= .00 |
| FINISH | | | | | | | | | | |

# Section IX

# INFRASTRUCTURE LIST

# INFRASTRUCTURE LISTING
# FOR
# STORM SEWER IMPROVEMENTS

## PHASE-I

| Size | Type Improvement | Location | From | To |
|---|---|---|---|---|
| 18" RCP | Storm Sewer | 30' Buffer Area | Lot 45 | Lot 24 |
| 42" RCP | Storm Sewer | 30' Buffer Area | Lot 24 | South Glenwood Channel |
| | Concrete Channel | 25' Buffer Area | Tot Lot 10 | South Glenwood Channel |

Catch basins, Manholes, and RCP included with Storm Sewer

South Glenwood Channel penetration with a 42" RCP

Existing 96" RCP penetration with a 18" RCP

Temporary Desilting Ponds

Certified Grading & Drainage with Private Retaining Walls & Private Drainage (Non-work order item) Required for SIA/Financial Release

**All of the storm sewer improvements will be built in Phase I.**

## PHASE-II

Certified Grading & Drainage with Private Retaining Walls & Private Drainage (Non-work order item) Required for SIA/Financial Release

# ALBUQUERQUE MASTER DRAINAGE STUDY

## CHANNEL AND CROSSING STRUCTURE INVENTORY SHEET

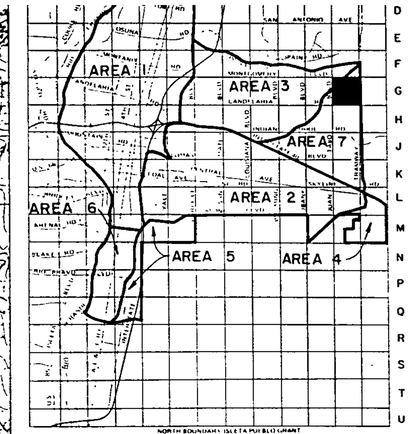
AREA 7

| Channel | Location | Description | HYDROLOGIC AND HYDRAULIC ANALYSES | | | | | | Existing Capacity (c.f.s.) | Required Capacity (c.f.s.) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 10-YEAR | | | 100-YEAR | | | | | |
| | | | Peak Discharge (c.f.s.) | Flow Depth (ft.) | Velocity (ft./sec.) | Peak Discharge (c.f.s.) | Flow Depth (ft.) | Velocity (ft./sec.) | | | Map |
| (AP501) SOUTH GLENWOOD HILLS | TRAMWAY BLVD. | EARTH DIP SECTION | 195 | 2.1 | 8.5 | 727 | 3.1 | 12.7 | 1860 | 727 | G-23 G-22 HYDRAULIC ANALYSI SECTION WILL CHA RENOVATION OF TR |
| | CHANNEL | EARTH CHANNEL | 195 | 1.2 | 9.0 | 727 | 2.6 | 13.2 | 2560 | 727 | G-23 G-22 |
| (AP403) | CANDELARIA RD. | 28' BOTTOM WIDTH 5' HIGH CONCRETE BOX | 301 | .8 | 13.0 | 844 | 1.6 | 19.9 | 5230 | 844 | G-22 H-22 30" RCP ENTERS C BELOW STRUCTURE |
| | CHANNEL | EARTH CHANNEL | 301 | 1.6 | 10.3 | 844 | 2.9 | 14.3 | 4045 | 844 | G-22 H-22 |
| (AP502A) | YOSEMITE DR. | EARTH CHANNEL | 208 | 1.2 | 9.0 | 719 | 2.6 | 13.2 | 2560 | 719 | * TRAPEZOIDAL BOX HAS SECTION WITH A VERT ON TOP. TRAP. HGT. TRAP. AND TOTAL HGT TOTAL HGT. OF STRUC |
| | | | | | | | | | | | |
| PIEDRA LISA | TRAMWAY BLVD. | EARTH DIP SECTION | 363 | 2.5 | 9.8 | 1011 | 3.2 | 11.4 | 11560 | 1011 | H-23 H-22 HYDRAULIC ANALYS SECTION WILL CHA RENOVATION OF TR |
| | CHANNEL | EARTH CHANNEL | 363 | 1.6 | 9.0 | 1011 | 2.4 | 9.6 | 2280 | 1011 | H-23 H-22 |
| | MARIE PARK DR. | 54" CMP | 341 | 4.5 | 13.4 | 904 | 4.5 | 13.4 | 230 | 904 | H-22 3' WIDE CHUTE EN BELOW STRUCTURE. STRUCTURE CAPAC |
| | CHANNEL | EARTH CHANNEL | 389 | 1.3 | 7.4 | 1038 | 1.9 | 9.6 | 7480 | 1038 | H-22 |
| | NAKOMIS DR. | 60" CMP | 366 | 5 | 13.2 | 915 | 5 | 13.2 | 275 | 915 | H-22 3' WIDE CHUTE EI BELOW STRUCTURE STRUCTURE CAPAC |
| | CHANNEL | EARTH CHANNEL | 416 | 1.2 | 7.9 | 1065 | 1.8 | 9.9 | 3230 | 1065 | H-22 |
| | CHELWOOD PARK BLVD. | TRAPEZOID 20' BOTTOM WIDTH 1.6:1 S.S. 5' HIGH | 686 | 1.7 | 17.5 | 1868 | 3.1 | 24.6 | 4290 | 1868 | H-22 2-54" RCP'S ENT BELOW STRUCTURE |
| | CHANNEL | EARTH CHANNEL | 686 | 2.0 | 11.9 | 1868 | 3.4 | 16.2 | 5830 | 1868 | H-22 |
| | ALGODONES ST. * | 10' B.W. 20.5 T.W. 1.5:1 S.S, 3.5 T.H. 5.5 TOT. H. | 752 | 2.3 | 24.4 | 2145 | 4.1 | 33.7 | 3650 | 2145 | H-22 |
| | CHANNEL | 10' BOTTOM WIDTH 1.25:1 S.S. 7.5' HIGH | 752 | 2.5 | 23.9 | 2145 | 4.5 | 32.3 | 5890 | 2145 | H-22 |
| | JUAN TABO BLVD. * | 10' B.W. 23.5' T.W. 1.5:1 S.S. 3.5 T.H. 6' TOT. H. | 817 | 2.3 | 24.6 | 2145 | 4.1 | 33.0 | 4460 | 2145 | H-22 H-21 54" RCP ENTERS BELOW STRUCTURE |

AREA 7

# ALBUQUERQUE MASTER DRAINAGE STUDY
## SUMMARY OF HYDROLOGIC AND HYDRAULIC ANALYSES

| Location | 10 - YEAR | | | 100 - YEAR | | | Map | Comments |
|---|---|---|---|---|---|---|---|---|
| | Peak Discharge (c.f.s.) / Overland Flow | Flow Depth (ft.) | Velocity (ft./sec.) | Peak Discharge (c.f.s.) / Overland Flow | Flow Depth (ft.) | Velocity (ft./sec.) | | |
| MONTGOMERY BLVD. AT EMBUDITO CHANNEL (AP 101A) | 41 / 0 | 0 | 0 | 110 / 0 | 0 | 0 | F-22 G-22 | FLOW INTERCEPTED BY EMBUDITO C |
| DELAMAR AVE. AT TRACY ST. TO COMANCHE RD. AT HOLIDAY AVE. (AP 101B) | 97 / 14 | .27 | 3.2 | 274 / 102 | .56 | 5.5 | G-22 | |
| COMANCHE RD. AT EMBUDITO CHANNEL (AP 102) | 144 / 0 | 0 | 0 | 404 / 133 | .62 | 8.9 | G-21 | FLOW INTERCEPTED BY EMBUDITO C |
| EMBUDITO CHANNEL AT JUAN TABO BLVD. (AP 101) | 106 / NA* | NA | NA | 227 / NA | NA | NA | G-22 | CHANNEL FLOW |
| AT CONFLUENCE OF EMBUDITO AND N. GLENWOOD HILLS ARROYOS | 637 / NA | NA | NA | 1806 / NA | NA | NA | G-21 | CHANNEL FLOW |
| NORTH GLENWOOD HILLS ARROYO AT TRAMWAY BLVD. (AP 201) | 474 / NA * | NA | NA | 1337 / 0 | NA | NA | G-22 | TRAMWAY BLVD. IMPROVEMENTS WIL A STORM SEWER SYSTEM TO CONVEY THE NORTH GLENWOOD HILLS CHANN |
| NORTH GLENWOOD HILLS CHANNEL AT COMANCHE RD. (AP 202A) | 479 / NA* | NA | NA | 1366 / NA | NA | NA | G-22 | FLOW INTERCEPTED BY NORTH GLEN HILLS CHANNEL AT COMANCHE RD. |
| HOLIDAY AVE. INCLUDING NORTH GLENWOOD HILLS CHANNEL TO GOLDEN GATE AVE. (AP 202B) | 524 / 0 | 0 | 0 | 1465 / 60 | .63 | 5.0 | G-22 | OVERLAND FLOW AT GOLDEN GATE AVE. AND HOLIDAY A |
| SOUTH GLENWOOD HILLS CHANNEL AT CANDELARIA RD. (AP 403) | 301 / NA* | NA | NA | 844 / NA | NA | NA | G-22 | FLOW INTERCEPTED BY GLENWOOD H |
| SOUTH GLENWOOD HILLS CHANNEL AT TRAMWAY BLVD. (AP 501) | 195 / NA* | NA | NA | 727 / NA | NA | NA | G-22 | FLOW INTERCEPTED BY SOUTH GLENWOOD HILLS CHANNEL |
| YOSEMITE DR. FROM YELLOWSTONE RD. TO SOUTH GLENWOOD HILLS CHANNEL (AP 502A) | 12 / 12 | .34 | 3.3 | 32 / 32 | .48 | 4.2 | G-22 | FLOW INTERCEPTED BY SOUTH GLEN CHANNEL AT YOSEMITE DR. CHANNE |
| CHELWOOD PARK BLVD. AT CANDELARIA RD. (AP 502B) | 35 / 0 | 0 | 0 | 78 / 0 | 0 | 0 | H-22 | FLOW INTERCEPTED BY PIEDRA LISA CHANNEL AT CHELWOO |
| JUAN TABO BLVD. FROM GOLDEN GATE AVE. TO LEXINGTON AVE. (AP 601) | 79 / 0 | 0 | 0 | 198 / 78 | .41 | 4.4 | G-21 H-21 | G-22 H-22 |
| CANDELARIA RD. TO WOODLAND AVE. AT EMBUDITO CHANNEL (AP 602) | 63 / 0 | 0 | 0 | 193 / 0 | 0 | 0 | H-21 | SOME PONDING OCCURS ON CANDELA CHANNEL DUE TO RUNDOWN MALFUN |
| TRAMWAY BLVD. FROM PIEDRA LISA CHANNEL TO LOS ARBOLES AVE. (INCLUDES PIEDRA LISA CHANNEL) (AP 702) | 363 / 0 | 0 | 0 | 1011 / 0 | 0 | 0 | H-22 | FLOW INTERCEPTED BY PIEDRA LI AT CASA GRANDE DRAINAGE EASEM |
| CHELWOOD PARK BLVD. FROM LEXINGTON AVE. TO PHOENIX AVE. (AP 703) | 124 / 34 | .31 | 5.5 | 310 / 220 | .61 | 7.6 | H-22 | |
| PIEDRA LISA CHANNEL AT CHELWOOD PARK BLVD. | 686 / NA* | NA | NA | 1868 / NA | NA | NA | H-22 | CHANNEL FLOW |
| NAKOMIS DR. AT PIEDRA LISA CHANNEL (AP 703A) | 94 / 0 | 0 | 0 | 257 / 107 | .52 | 6.5 | H-22 | TRAMWAY BLVD. IMPROVEMENT WIL STORM SEWER SYSTEM TO CONVEY PIEDRA LISA CHANNEL |




Scale in Feet

150 50 0 200 400 600 800 200 100

AP 501

BOHANNAN HUSTON INC.

LEGEND

100 YEAR FLOOD HAZARD AREA

10 YEAR FLOOD HAZARD AREA

PROPOSED STORM DRAINAGE IMPROVEMENTS

ANALYSIS POINT (AP 136)

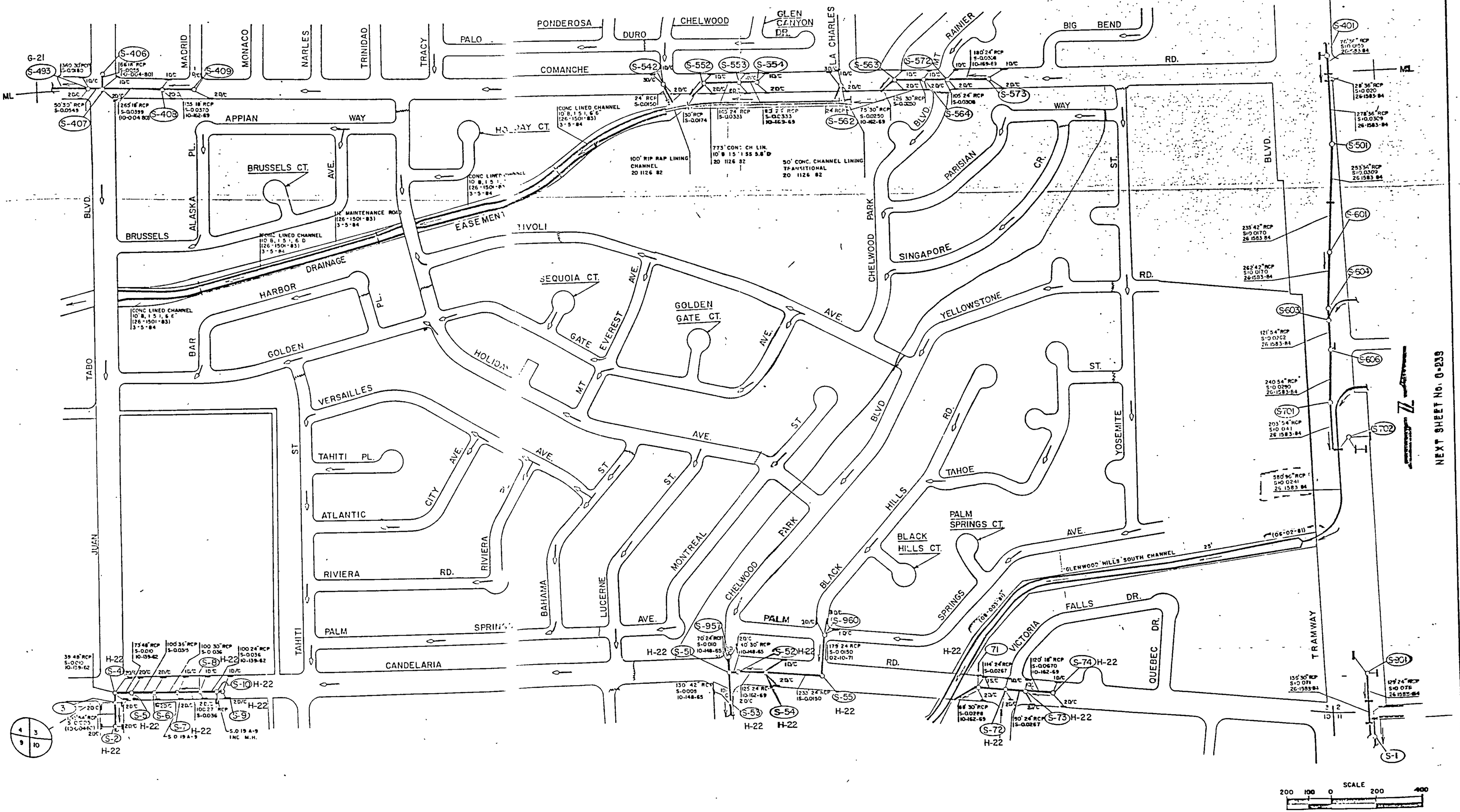
COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHS TAKEN DECEMBER 1972 & MARCH 1976, BY BOHANNAN WESTMAN HUSTON & ASSOCIATES, INC., ALBUQUERQUE, NEW MEXICO

# ALBUQUERQUE MASTER DRAINAGE STUDY

G-22

NEGATIVE COMPONENTS OF THIS SHEET UNAVAILABLE FOR REPRODUCTION.

NEXT SHEET No. G-22N




DRAINAGE FACILITY MAP

| LEGEND | NOTES | REVISIONS | MAP GRID |
|---|---|---|---|
| STORM SEWER LINE<br>MANHOLE<br>MANHOLE NUMBER | 1. MANHOLE IDENTIFICATION REQUIRES BOTH THE MAP GRID & MANHOLE No.<br>2. MANHOLE NUMBERS CARRIED FROM | DATE / REMARKS<br>3-29-84 / EAST SIDE AREA FLOOD PROTECTION SYSTEM PHASE V - 1502 | G-22S |

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

December 6, 1994

Mark Goodwin, P.E.
Mark Goodwin & Assoc
P.O. Box 90606
Albuquerque, N.M. 87199

RE: CONC GRADING & DRAINAGE PLAN FOR THE VISTAS (G-22/D15)
RECEIVED OCTOBER 27, 1994 FOR S DEV PLAN FOR BP APPROVAL
ENGINEER'S STAMP DATED 10/26/94

Dear Mr. Goodwin:

Based on the information included in the submittal referenced above, City Hydrology has the following comments that must be addressed prior to Site Development Plan for B.P. approval:

1. What is the DRB number for this project? Include a copy of the proposed Infrastructure List in the next submittal. Is the project required to widen Candelaria?

2. The erosion control plan must be included on the Plan. Label Candelaria & Comanche Road on the Vicinity Map. The property boundaries shown do not match those shown on the Zone Atlas Map. Is a platting action required.for this project. Is an easement required for the access to Comanche?

3. What is the capacity of South Glenwood Hills Channel? The proposed discharge of 189 cfs sounds like a significant amount of runoff when there is nothing to compare it to. Since this site is located on the upstream end of the channel, a short time to peak does not guaranty downstream capacity. While City Hydrology is not aware of any capacity problems with the South Glenwood Hills Channel, We do not believe that downstream capacity can be dismissed so simply.

4. Irrigated lawns with slopes steeper than 10h:1v are considered Land Treatment C. Based on the slopes shown on the Plan it appears that more than 5% of the site is Land Treatment C. Provide backup information to justify the percentages used.

If you have any questions about this project, You may contact me at 768-2727.

Sincerely,

John P. Curtin

John P. Curtin, P.E.
Civil Engineer/Hydrology

c: Andrew Garcia
Fred Aguirre

THE CITY OF ALBUQUERQUE IS AN EQUAL OPPORTUNITY/REASONABLE ACCOMMODATION EMPLOYER

```
START                       TIME=0.0
***** HYMOD:PAPI DOS: THE VISLAS ON-LINE
DATINPUT                    TYPE=1 DATA QUARTER=0.00 IN
                            PATH ONE=2.23 IN PATH SIX=2.90 IN
                            PATH TWO=3.65 IN DT=0.07333 HR
COMPUTE HYD HYD             ID=1 HYD NO=101.1 AREA=0.05730 SQ MI
                            PER A=00  PER B=19  PER C=5     PER D=7
                            TP=0.1333 HR MASS RAINFALL=1
PRINT HYD                   ID=1 CONTROL=1
FINISH
```

OCT 27 1994

ATLAS PROGRAM: ATLAS011741 - ATLAS Hydrologic Model - January, 1994
RUN DATE (MMDD/DAY/YR) -- 10/27/1994
START TIME (HR:MIN:SEC) = 10:13:44 USER NO.-- H.SMOOKE,PCI
INPUT FILE -- H.DAT

START TIME 0.0

**** HYDROGRAPH FOR THE VISTAS-ON-SITE

PARTIAL. TYPE=1 RAIN QUARTER=0.0 IN

RAIN ONE=2.23 IN RAIN SIX=2.90 IN

RAIN DAY=3.65 IN DT=0.033333 HR

COMPUTED 6-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2
- PEAK OF 1.40 HR.

| T1 | .033333 HOURS | | | END TIME -- | | 5.777400 HOURS | |
|---|---|---|---|---|---|---|---|
| .0000 | .0055 | .0110 | .0167 | .0225 | .0281 | .0345 | |
| .0404 | .0467 | .0534 | .0600 | .0668 | .0738 | .0809 | |
| .0882 | .0958 | .1035 | .1115 | .1197 | .1282 | .1370 | |
| .1461 | .1555 | .1653 | .1751 | .1860 | .1964 | .2086 | |
| .2217 | .2354 | .2460 | .2570 | .2707 | .2847 | .3018 | |
| .4154 | .4767 | .4425 | .5416 | .6702 | .8121 | 1.0679 | |
| 1.7728 | 1.5642 | 1.6650 | 1.7500 | 1.8257 | 1.8916 | 1.9578 | |
| 2.0106 | 2.0518 | 2.1375 | 2.1219 | 2.2176 | 2.2649 | 2.3012 | |
| 2.3105 | 2.3.[illegible] | 2.4122 | 2.4453 | 2.4767 | 2.4930 | 2.4927 | |
| 2.5002 | 2.5074 | 2.5142 | 2.5210 | 2.5275 | 2.5336 | 2.5400 | |
| 2.5459 | 2.5518 | 2.5575 | 2.5630 | 2.5685 | 2.5738 | 2.5790 | |
| 2.5841 | 2.5891 | 2.5940 | 2.5988 | 2.6036 | 2.6082 | 2.6129 | |
| 2.6175 | 2.6219 | 2.6262 | 2.6305 | 2.6347 | 2.6390 | 2.6431 | |
| 2.6471 | 2.6512 | 2.6552 | 2.6591 | 2.6630 | 2.6668 | 2.6706 | |
| 2.6743 | 2.6780 | 2.6817 | 2.6853 | 2.6887 | 2.6922 | 2.6960 | |
| 2.6995 | 2.7029 | 2.7063 | 2.7097 | 2.7131 | 2.7164 | 2.7197 | |
| 2.7230 | 2.7262 | 2.7294 | 2.7325 | 2.7357 | 2.7388 | 2.7419 | |
| 2.7450 | 2.7480 | 2.7511 | 2.7541 | 2.7570 | [illegible] | 2.7629 | |
| 2.7658 | 2.7687 | 2.7716 | 2.7745 | 2.7773 | 2.7801 | 2.7829 | |
| 2.7857 | 2.7885 | 2.7912 | 2.7939 | 2.7966 | 2.7993 | 2.8020 | |
| 2.8046 | 2.8073 | 2.8099 | 2.8125 | 2.8151 | 2.8177 | 2.8202 | |
| 2.8228 | 2.8253 | 2.8279 | 2.8304 | 2.8329 | 2.8353 | 2.8378 | |
| 2.8402 | 2.8427 | 2.8451 | 2.8475 | 2.8499 | 2.8523 | 2.8547 | |
| 2.8571 | 2.8594 | 2.8618 | 2.8641 | 2.8664 | 2.8687 | 2.8710 | |
| 2.8733 | 2.8756 | 2.8779 | 2.8801 | 2.8824 | 2.8846 | 2.8868 | |
| 2.8890 | 2.8912 | 2.8934 | 2.8956 | 2.8978 | 2.9000 | | |

COMPUTE HYDRO ID=1 HYD NO:101.1 AREA=0.057300 SQ.MI

PTP A=90 PER B=18 PER C=5 [illegible]

TP=.13330 HR MASS RAINFALL=1

OCT 27 1994

I = .0276PHR TP = .133300HR EXTP RATIO = .000000 SHAPE CONSTANT, N = 3.106430

UNIT PEAK = 1.19 CFS UNIT VOLUME = .9999 B = 526.28

PEAK = 3.7300

NOTES FOR [illegible]

PUMPED COMPUTED [illegible] INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .[illegible]

4 of

P = .[illegible] IF = .[illegible] RATIO = .[illegible] SHAPE CONSTANT, N = 3.6[illegible]

UNIT PEAK [illegible] CFS UNIT VOLUME = .[illegible] P = [illegible] TP = 2.[illegible]

PEAK = .[illegible] CFS TA = .46[illegible] INCHES LHF = 1.[illegible] INCHES FOR [illegible]

PUMPED COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .[illegible]

PRINT HYD [illegible] COMPUTED

PARTIAL HYDROGRAPH [illegible]

PUMPED VOLUME = 2.29910 INCHES = 7,0[illegible] ACRE-FEET
PEAK DISCHARGE RATE = [illegible]171.02 CFS AT 1.500 HOURS BASIN AREA = .0[illegible] SQ. MI.

FINISH

NORMAL PROGRAM FINISH END TIME (HR:MIN:SEC) = 1[illegible]:4[illegible]:5[illegible]

OCT 27 1984

There are 2 off-site areas @ north end that drain to this Project:

O.S. 1 — YMCA Property that is developed and will drain into entrance road
A = 1.96 Ac. = 0.0031 SM

O.S. 2 — Undeveloped Property A = 2.29 Ac. = 0.0036 SM

O.S. 1

Land Treatment:

A = 0
B = 10%
C = 0
D = 90%

Per Attached AHYMO:

$Q_{100}$ = 10 cfs
$V_{100}$ = .41 Ac-Ft

O.S. 2

A = 100%

$Q_{100}$ = 5 cfs
$V_{100}$ = .15 Ac-Ft

6 of

```
START                    TIME=0.0
***** HYDROGRAPH FOR THE VISTAS-OFFSITE 1
RAINFALL                 TYPE 1 RAIN QUARTER=0.0 IN
                         RAIN ONE=2.23 IN RAIN SIX=2.90 IN
                         DAM RAT= 7.45 IN DT=0.03333 HR
COMPUTE NM HYD           NUM HYD=101, AREA=0.007190 SQ MI
                         PRTP 6=0.0  PER P=10  PER C=0      PER U=0.0
                         TP=0.1333 HR UNITS RAINFALL=1
PRINT HYD                ID=1 CODE=1
FINISH!
```

DHYDRO PROGRAM (OCT/NOV1994) - ARMFCA Hydrologic Model -- January, 1994
RUN DATE (MOH/DAY/YR) - 10/25/1994
START RUN (HR:MIN:SEC) -- 11:44:27 USER NO.-- H GOODWILJ01
INPUT FILE = V.DAT

START TIME 0.0

**** HYDROGRAPH FOR THE VISTAS OFFSITE 1

RAINFALL TYPE=1 RAIN QUARTER=0.0 IN

RAIN ONE=2.25 IN RAIN SIX=3.00 IN

RAIN DAY 3.45 IN DT=0.033333 HR

CORRECTED 6 HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2
PAGE 61 1.40 IN.

| PT | .033330 HOURS | | END TIME = | | 5.000400 HOURS | |
|---|---|---|---|---|---|---|
| .0000 | .0055 | .0110 | .0167 | .0223 | .0294 | .0745 |
| .0476 | .0469 | .0534 | .0600 | .0666 | .0738 | .0809 |
| .0880 | .0958 | .1035 | .1115 | .1197 | .1282 | .1370 |
| .1461 | .1553 | .1653 | .1754 | .1860 | .1971 | .2086 |
| .2207 | .2334 | .2469 | .2530 | .2596 | .2667 | .2818 |
| .3176 | .3367 | .4427 | .5446 | .6192 | .8498 | 1.0629 |
| 1.2328 | 1.5642 | 1.6650 | 1.7500 | 1.8357 | 1.8916 | 1.9579 |
| 2.0168 | 2.0718 | 2.1227 | 2.1717 | 2.2174 | 2.2608 | 2.3018 |
| 2.3405 | 2.3773 | 2.4123 | 2.4453 | 2.4767 | 2.4950 | 2.4927 |
| 2.5000 | 2.5021 | 2.5143 | 2.5210 | 2.5275 | 2.5334 | 2.5400 |
| 2.5459 | 2.5518 | 2.5575 | 2.5629 | 2.5695 | 2.5735 | 2.5790 |
| 2.5841 | 2.5891 | 2.5940 | 2.5988 | 2.6036 | 2.6082 | 2.6128 |
| 2.6172 | 2.6219 | 2.6262 | 2.6305 | 2.6347 | 2.6385 | 2.6431 |
| 2.6471 | 2.6510 | 2.6550 | 2.6591 | 2.6630 | 2.6668 | 2.6706 |
| 2.6747 | 2.6780 | 2.6817 | 2.6853 | 2.6889 | 2.6925 | 2.6960 |
| 2.6995 | 2.7029 | 2.7063 | 2.7097 | 2.7131 | 2.7164 | 2.7197 |
| 2.7229 | 2.7262 | 2.7294 | 2.7325 | 2.7357 | 2.7388 | 2.7419 |
| 2.7450 | 2.7480 | 2.7511 | 2.7541 | 2.7570 | 2.7600 | 2.7629 |
| 2.7658 | 2.7687 | 2.7716 | 2.7745 | 2.7773 | 2.7801 | 2.7829 |
| 2.7857 | 2.7885 | 2.7912 | 2.7939 | 2.7966 | 2.7993 | 2.8020 |
| 2.8046 | 2.8073 | 2.8099 | 2.8125 | 2.8151 | 2.8177 | 2.8202 |
| 2.8228 | 2.8253 | 2.8279 | 2.8304 | 2.8329 | 2.8353 | 2.8378 |
| 2.8402 | 2.8427 | 2.8451 | 2.8475 | 2.8499 | 2.8523 | 2.8547 |
| 2.8571 | 2.8595 | 2.8618 | 2.8641 | 2.8664 | 2.8687 | 2.8710 |
| 2.8733 | 2.8756 | 2.8779 | 2.8801 | 2.8824 | 2.8846 | 2.8868 |
| 2.8890 | 2.8912 | 2.8934 | 2.8956 | 2.8978 | 3.0000 | |

COMPUTE HYDRO HYD 101.1 AREA=0.007100 SQ MI

EXP A=00 EXP B=10 EXP C=0

TP 0.1337 HR MASS RAINFALL=1

OCT 27

K = .0776491HR TP = .133300HR K/TP RATIO = .582000 SHAPE
CONSTANT N = 1.00000

[illegible]

SPLIT: .003 [illegible] SQ MI LA = .10000 CHEF THF = .04000 I
NCHES PER HOUR

RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD -- DT
= .07330

8 of

[illegible] RP = .1[illegible]HP RP = .1[illegible]00HP R TP RATIO = 1.01[illegible] SHAPE
CONSTANT, N = 5.4[illegible]

UNIT PEAK = .7444[illegible] CFS UNIT VOLUME = .9820 B = 19.56
RAD = 1.7700

AREA = .000510 SQ MI LA = .50000 INCHES TNF = 1.25000 I
NCHES PER HOUR

RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT
= .07[illegible]

FROM HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 101.10

RUNOFF VOLUME = 7.48487 INCHES = .4163 ACRE-FEET
PEAK DISCHARGE RATE = 0.96 CFS AT 1.500 HOURS BASIN AREA =
.0031 SQ. MI.

FINISH

NORMAL PROGRAM FINISH END TIME (HR:MIN:SEC) = 11:43:05

OCT 27 [illegible]

```
START                    TIME=0.0
***** HYDROGRAPH FOR THE VISTAS-OFFSITE 2
RAINFALL                 TYPE=1 RAIN QUARTER=0.0 IN
                         RAIN ONE=2.24 IN RAIN SIX=2.99 IN
                         RAIN DAY=7.65 IN DT=0.01773 HR
COMPUTE NM HYD           HYD NO=101.1 AREA=0.00260 SQ MI
                         PER A=100 PER B=00  PER C=00    PER D=00
                         TP=0.1532 HR MASS RAINFALL  1
PRINT HYD                IPH=1 IPRT=1
FINISH
```

OCT 27 1994

HEC-1 PROGRAM (JAN 1981) - AHAFCO Hydrologic Model - January, 1991
RUN DATE (MON/DAY/YR) = 10/25/1994
START TIME (HR:MIN:SEC) = 11:46:20 USER NO.= M_GOODWILL.101
INPUT FILE = V.DAT

START TIME=0.0

### HYDROGRAPH FOR THE VICTORIA OFFSITE C

MULTIPLE TYPE=1 RATIO QUARTER=0.0 IN

RATIO ONE=0.25 IN RATIO SIX=2.00 IN

RATIO TWO=0.65 IN DT=0.03333 HR

COMPUTED 6-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2
PEAK AT 1.40 HR.

| DT = | .0333 HOURS | | | END TIME = | | 7.99400 HOURS | |
|---|---|---|---|---|---|---|---|
| .0000 | .0055 | .0110 | .0167 | .0225 | .0284 | .0345 | |
| .0406 | .0469 | .0534 | .0600 | .0668 | .0738 | .0809 | |
| .0882 | .0958 | .1035 | .1115 | .1197 | .1282 | .1370 | |
| .1461 | .1555 | .1652 | .1754 | .1860 | .1971 | .2086 | |
| .2207 | .2334 | .2466 | .2530 | .2596 | .2667 | .2818 | |
| .2156 | .3672 | .4422 | .5146 | .6287 | .8158 | 1.0029 | |
| 1.5225 | 1.5642 | 1.6650 | 1.7500 | 1.9257 | 1.9316 | 1.7579 | |
| 2.0168 | 2.0215 | 2.1231 | 2.1719 | 2.2126 | 2.2600 | 2.3019 | |
| 2.3405 | 2.3773 | 2.4127 | 2.4453 | 2.4767 | 2.4850 | 2.4927 | |
| 2.5002 | 2.5074 | 2.5142 | 2.5210 | 2.5275 | 2.5335 | 2.5400 | |
| 2.5460 | 2.5518 | 2.5575 | 2.5630 | 2.5685 | 2.5736 | 2.5790 | |
| 2.5841 | 2.5891 | 2.5940 | 2.5988 | 2.6034 | 2.6082 | 2.6128 | |
| 2.6173 | 2.6216 | 2.6263 | 2.6305 | 2.6347 | 2.6387 | 2.6431 | |
| 2.6471 | 2.6512 | 2.6553 | 2.6591 | 2.6630 | 2.6668 | 2.6706 | |
| 2.6743 | 2.6780 | 2.6817 | 2.6853 | 2.6889 | 2.6925 | 2.6960 | |
| 2.6995 | 2.7029 | 2.7063 | 2.7097 | 2.7131 | 2.7164 | 2.7197 | |
| 2.7229 | 2.7262 | 2.7294 | 2.7325 | 2.7357 | 2.7388 | 2.7419 | |
| 2.7450 | 2.7480 | 2.7511 | 2.7541 | 2.7570 | 2.7600 | 2.7629 | |
| 2.7658 | 2.7687 | 2.7716 | 2.7745 | 2.7773 | 2.7801 | 2.7829 | |
| 2.7857 | 2.7885 | 2.7912 | 2.7939 | 2.7966 | 2.7992 | 2.8020 | |
| 2.8046 | 2.8073 | 2.8099 | 2.8125 | 2.8151 | 2.8177 | 2.8203 | |
| 2.8229 | 2.8253 | 2.8278 | 2.8304 | 2.8329 | 2.8353 | 2.8378 | |
| 2.8402 | 2.8427 | 2.8451 | 2.8475 | 2.8499 | 2.8523 | 2.8547 | |
| 2.8571 | 2.8594 | 2.8618 | 2.8641 | 2.8664 | 2.8687 | 2.8710 | |
| 2.8733 | 2.8756 | 2.8779 | 2.8801 | 2.8824 | 2.8846 | 2.8868 | |
| 2.8890 | 2.8912 | 2.8934 | 2.8956 | 2.8978 | 2.9000 | | |

COMPUTE HM HYD HYD NO=101.1 AREA=0.003600 SQ MI

TRP 0=100 REP P=00 PRR 0=00 PRP 0.00

DT 0.1333 HR MASS RAINFALL=1

OCT 27 1994

E = .0372560HP TP = .1333300HP RATIO = 1.000000 SHAPE
PARAMETER, N = 3.000000
UNIT PEAK = 2.5100 CFS UNIT VOLUME = .9970 T = 279.21

[illegible]

[illegible] INITIAL ABSTRACTION [illegible] OF [illegible]

[illegible] 16-1 [illegible]

11 of

PARTIAL HYDROGRAPH [illegible]

RUNOFF VOLUME = .75328 INCHES = .1534 ACRE-FEET
PEAK DISCHARGE RATE = 2.09 CFS AT 1.500 HOURS BASIN AREA = .0036 SQ. MI.

FINISH

NORMAL PROGRAM EXITED END TIME (HR:MIN:SEC) 11:46:17.4

We now need to size open channel we will use as outfall.

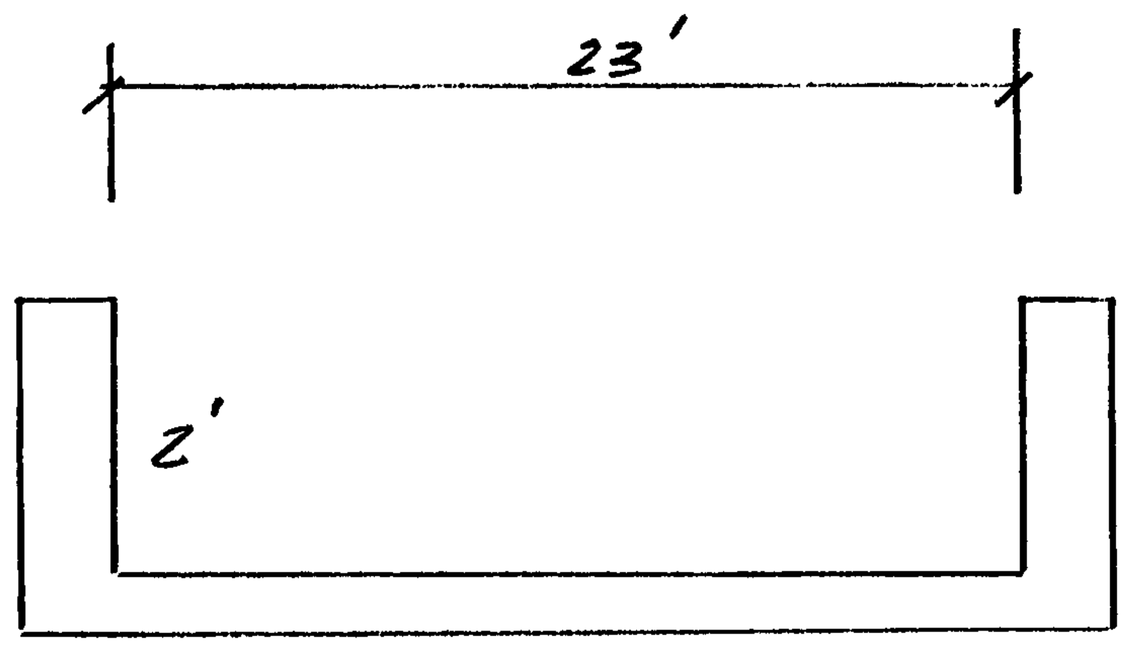
$Q = 174 + 10 + 5 = 189$ cfs

Entrance will act as weir:

$Q = CLH^{3/2}$

$L = \frac{Q}{CH^{3/2}}$ $C = 2.90$

Using $H = 2'$ $\longrightarrow$ $L = 23'$



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

January 4, 1995

Mark Goodwin, P.E.
Mark Goodwin & Assoc.
P. O. Box 90606
Albuquerque, N.M. 87199

RE: CONC. GRADING & DRAINAGE PLAN FOR THE VISTAS (G-22/D15)
RECEIVED DECEMBER 13, 1994 FOR SITE DEV. PLAN FOR B.P. APPROVAL
ENGINEER'S STAMP DATED 12/12/94

Dear Mr. Goodwin:

Based on the information included in the submittal referenced above, City Hydrology accepts the Concept and approves this project for Site Dev. Plan for B.P.

The following comments must be addressed prior to Building Permit approval:

1. On Sheet 1, 8 out of 11 slopes indicated are steeper than 10:1. On Sheet 2 3 out of 3 slopes indicated are steeper than 10:1. If approximately 78% of the pervious are is flatter than 10:1, then indicate where these flatter areas are. A more detailed Grading Plan will be required for Building Permit approval.

2. The Infrastructure List and property boundaries must be established prior to Preliminary Plat approval.

If you have any questions about this project, You may contact me at 768-2727.

Sincerely,

John P. Curtin

John P. Curtin, P.E.
Civil Engineer/Hydrology

c: Andrew Garcia
Fred Aguirre, EPC Z-94-154

CITY OF
Albuquerque

Martin J. Chávez, Mayor

September 2, 1997

Shahab Biazar, P.E.
Tierra West, LLC
4421 McCleod Rd. NE
Suite D
Albuquerque, NE 87110

*RE: TRAMWAY HIGHLANDS (G22-D15). DRAINAGE AND GRADING PLAN FOR PRELIMINARY PLAT AND SITE DEVELOPMENT FOR SUBDIVISION APPROVAL. ENGINEER'S STAMP DATED AUGUST 27, 1997.*

Dear Mr. Biazar:

Based on the information provided on your August 28, 1997 submittal, the above referenced submittal is approved for Preliminary Plat, Site Development Plan for Subdivision, and Grading Permit.

Prior to Final Plat approval, a Drainage Covenant for the sediment ponds will be required.

If I can be of further assistance, please feel free to contact me at 924-3984.

Sincerely,

Lisa Ann Manwill, P.E.
Hydrology

c: Andrew Garcia
File

PRIVATE FACILITY
DRAINAGE COVENANT

RECEIVED
OCT 07 1997
HYDROLOGY SECTION

This Drainage Covenant, between [state the name of the present real property owner exactly as shown on the real estate document conveying title to the present owner and state the legal status of the owner, for example, "single person," "husband and wife," "corporation of the State of _____," "partnership":] Kaufman & Broad of New Mexico, Inc. ("Owner"), whose address is 7850 Jefferson NE Suite 110, Alb., NM, 87109, and the City of Albuquerque, a New Mexico municipal corporation ("City"), whose address is P. O. Box 1293, Albuquerque, New Mexico 87103, is made in Albuquerque, Bernalillo County, New Mexico and is entered into as of the date Owner signs this Covenant.

1. Recital. The Owner is the owner of the following described real property located at [give legal description, and street address:] Tract C, Tinin Subdivision, west of Tramway Blvd. Between Candelaria Rd. and Comanche Rd. in Bernalillo County, New Mexico (the "Property").

Pursuant to City ordinances, regulations and other applicable laws, the Owner is required to construct and maintain certain drainage facilities on the Property, and the parties wish to enter into this Covenant to establish the obligations and responsibilities of the parties.

2. Description and Construction of Drainage Facility. The Owner shall construct the following "Drainage Facility" within the Property at the Owner's sole expense in accordance with the standards, plans and specifications approved by the City:

Two Temporary Desilting Ponds

The Drainage Facility is more particularly described in Exhibit A attached hereto and made a part hereof.

3. Maintenance of Drainage Facility. The Owner shall maintain the Drainage Facility at the Owner's sole cost in accordance with the approved Drainage Report and plans.

4. Benefit to Property. The Owner acknowledges and understands that the Drainage Facility required herein to be constructed on the Owner's property is for the private benefit



APPROVED AS TO FORM
LEGAL DEPT. 8/19/88

and protection of the Owner's property and that failure to maintain such facility could result in damage or loss to the Property.

5. Inspection of Drainage Facility. The City shall have no duty or obligation whatsoever to perform any inspection, maintenance or repair of the Drainage Facility, it being the duty of the Owner, its heirs, successors and assigns to construct and maintain the facility in accordance with approved plans and specifications.

6. Liability of City. The Owner understands and agrees that the City shall not be liable to the Owner, its heirs, successors or assigns, or to any third parties for any damages resulting from the Owner's failure to construct, maintain or repair the Drainage Facility.

7. Indemnification. The Owner owns and controls the Drainage Facility and shall not permit the Drainage Facility to constitute a hazard to the health or safety of the general public. The Owner agrees to indemnify, defend and hold harmless the City, its officials, agents and employees, from any claims, actions, suits or other proceedings arising from or out of the negligent acts or omissions of the Owner, its agents, representatives, contractors or subcontractors or arising from the failure of the Owner, its agents, representatives, contractors or subcontractors to perform any act or duty required of the Owner herein; provided, however, to the extent, if at all, Section 56-7-1 NMSA 1978 is applicable to this Agreement, this Agreement to indemnify will not extend to liability, claims, damages, losses or expenses, including attorney's fees, arising out of (1) the preparation or approval of maps, drawings, opinions, reports, surveys, change orders, designs or specifications by the respective indemnitee, or the agents or employees of the respective indemnitee; or (2) the giving of or the failure to give direction or instructions by the respective indemnitee, where such giving or failure to give directions or instructions is the primary cause of bodily injury to persons or damage to property.

8. Assessment. Nothing in this Covenant shall be construed to relieve the Owner, its heirs, assigns and successors from an assessment against the Owner's Property for improvements to the Property under a duly authorized and approved Special Assessment District. The parties specifically agree that the value of the Drainage Facility will not reduce the amount assessed by the City.

9. Binding on Owner's Property. The covenants and obligations of the Owner set forth herein shall be binding on the Owner, its heirs, assigns and successors and on the Owner's Property and constitute covenants running with the Owner's

## LEGAL DESCRIPTION POND "A":

SAID DRAINAGE FACILITY SITUATED WITHIN TRACT C, SECTION 3, T10N, R4E N.M.P.M. CITY OF ALNUQUERQUE, BERNALILLO COUNTY, NEW MEXICO, TININ SUBDIVISION, UNIT 1 AS THE SAME IS SHOWN AND DESIGNATED ON SAID PLAT FILED FOR RECORD IN THE OFFICE OF THE COUNTY CLERK OF BERNALILLO COUNTY, NEW MEXICO ON APRIL 27, 1983 IN VOLUME C21, FOLIO 50, AND BEING MORE PARTICULARLY DESCRIDED AS FOLLOWS:

BEGINNING AT ACS MONUMENT "2-G23" (NEW MEXICO STATE PLANE COORIDINATES FOR CENTRAL ZONE: X=426140.55, Y=1497438.88) BEARS N 25°57'37" W, A DISTANCE OF 1562.17 FEET TO THE POINT OF BEGINNING;

THENCE N 89°56'47" W, A DISTANCE OF 70.00 FEET TO A POINT;

THENCE N 00°03'13" E, A DISTANCE OF 70.00 FEET TO A POINT;

THENCE S 89°56'47" E, A DISTANCE OF 70.00 FEET TO A POINT;

THENCE S 00°03'13" W, A DISTANCE OF 70.00 FEET TO A POINT; BEGINNING AND CONTAINING 0.1125 ACRES (4900 SQUARE FEET) MORE OR LESS.

## LEGAL DESCRIPTION POND "B":

SAID DRAINAGE FACILITY SITUATED WITHIN TRACT C, SECTION 3, T10N, R4E N.M.P.M. CITY OF ALNUQUERQUE, BERNALILLO COUNTY, NEW MEXICO, TININ SUBDIVISION, UNIT 1 AS THE SAME IS SHOWN AND DESIGNATED ON SAID PLAT FILED FOR RECORD IN THE OFFICE OF THE COUNTY CLERK OF BERNALILLO COUNTY, NEW MEXICO ON APRIL 27, 1983 IN VOLUME C21, FOLIO 50, AND BEING MORE PARTICULARLY DESCRIDED AS FOLLOWS:

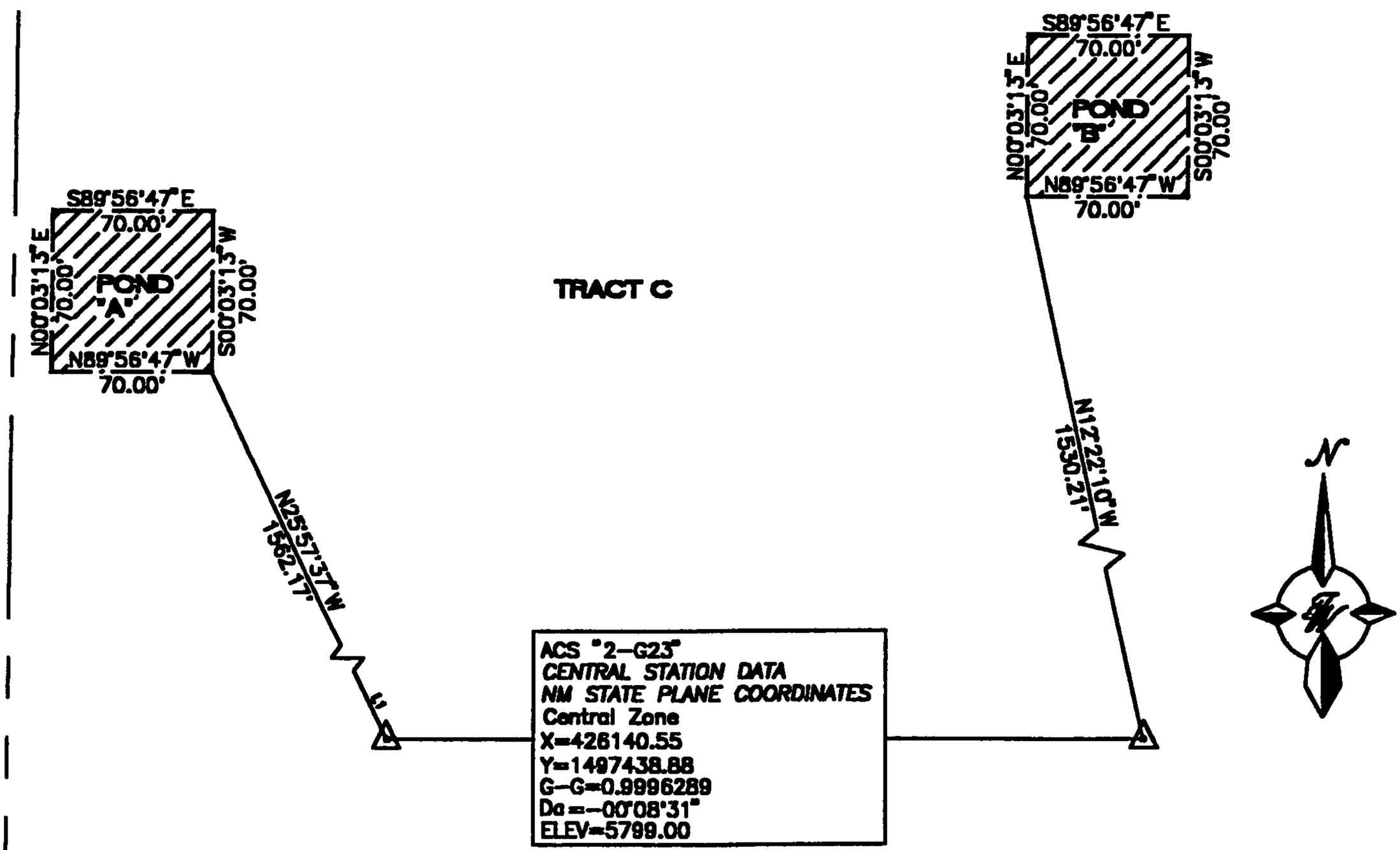
BEGINNING AT ACS MONUMENT "2-G23" (NEW MEXICO STATE PLANE COORIDINATES FOR CENTRAL ZONE: X=426140.55, Y=1497438.88) BEARS N 12°22'10" W, A DISTANCE OF 1530.21 FEET TO THE POINT OF BEGINNING;

THENCE N 89°56'47" W, A DISTANCE OF 70.00 FEET TO A POINT;

THENCE N 00°03'13" E, A DISTANCE OF 70.00 FEET TO A POINT;

THENCE S 89°56'47" E, A DISTANCE OF 70.00 FEET TO A POINT;

THENCE S 00°03'13" W, A DISTANCE OF 70.00 FEET TO A POINT; BEGINNING AND CONTAINING 0.1125 ACRES (4900 SQUARE FEET) MORE OR LESS.




# EXHIBIT "A"

# DRAINAGE FACILITY DESCRIPTION

Property until released by the City. This Covenant can only be released by the City's Chief Administrative Officer with the concurrence of the City Engineer.

10. Entire Covenant. This Covenant contains the entire agreement of the parties and supersedes any and all other agreements or understandings, oral or written, whether previous to the execution hereof or contemporaneous herewith.

11. Changes to Covenant. Changes to this Covenant are not binding unless made in writing, signed by both parties.

12. Effective Date of Covenant. This Covenant shall be effective as of the date of signature of the Owner.

OWNER:

By: [signature]
Its: Dir. Forward Planning/Land acquistion
Dated: 7 Oct 97

STATE OF New Mexico )
) ss
COUNTY OF Bernalillo )

~~The foregoing~~ This instrument was acknowledged before me ~~this~~ on 7th day of October, 19~~8~~97, by [name of person signing:] Jeff R. Dorwart, [title or capacity, for instance, "President" or "Owner":] Director of Land of [name of the entity which owns the Property if other than the individual signing, for instance, the name of the corporation, partnership, or joint venture:] Kaufman & Broad of N.M., Inc.

Marie McCleskey
Notary Public

My Commission Expires:
5/31/99

CITY OF ALBUQUERQUE:

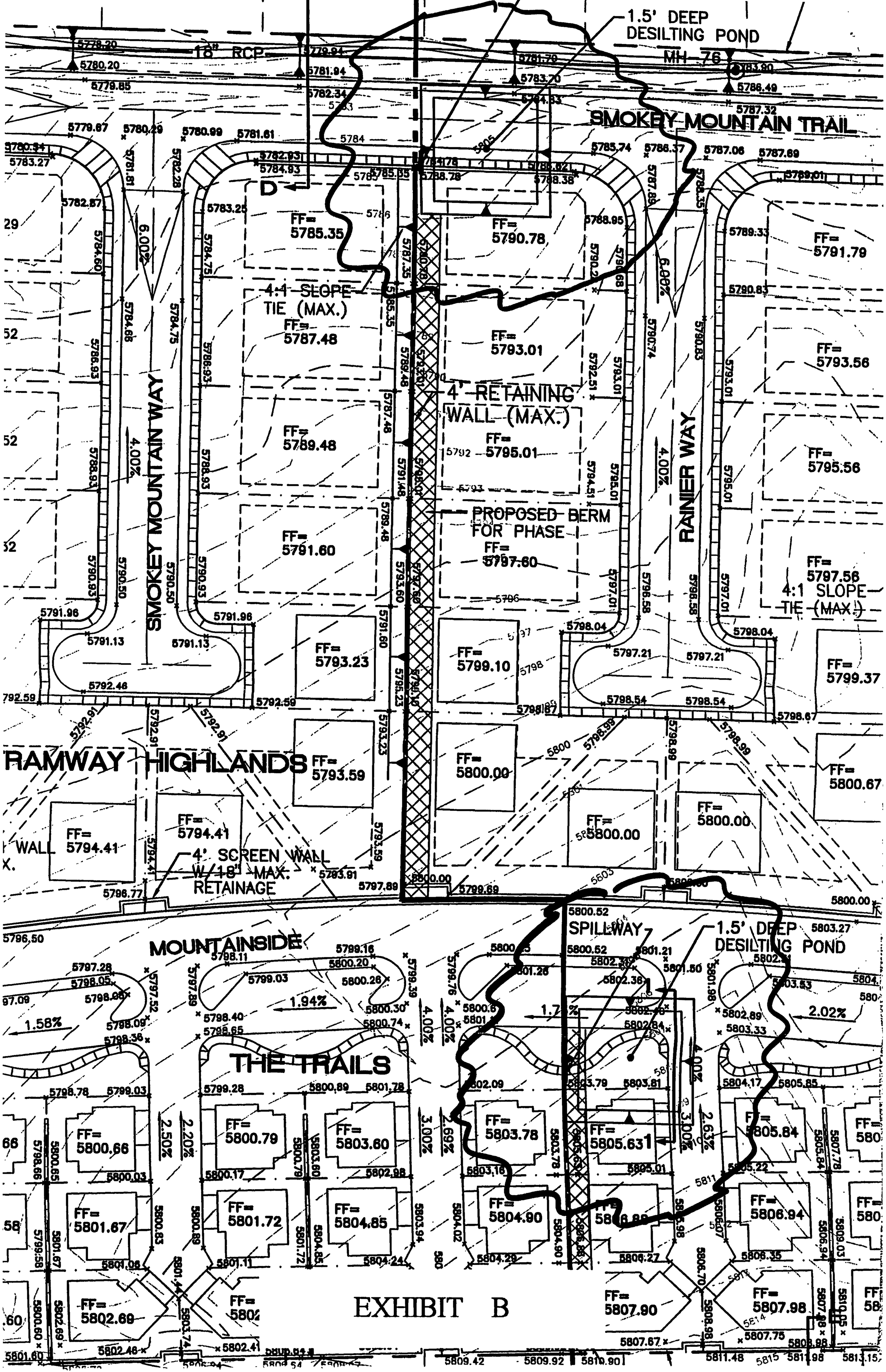
Accepted:

By: _____
Title: _____
Dated: _____

[EXHIBIT A ATTACHED]



APPROVED AS TO FORM
LEGAL DEPT. 8/19/88


1.5' DEEP DESILTING POND
18" RCP
MH 76
SMOKEY MOUNTAIN TRAIL
D
FF= 5785.35
FF= 5790.78
FF= 5791.79
4:1 SLOPE TIE (MAX.)
FF= 5787.48
FF= 5793.01
FF= 5793.56
4' RETAINING WALL (MAX.)
FF= 5789.48
FF= 5795.01
FF= 5795.56
PROPOSED BERM FOR PHASE
FF= 5791.60
FF= 5797.60
FF= 5797.56
4:1 SLOPE TIE (MAX.)
SMOKEY MOUNTAIN WAY
RAINIER WAY
FF= 5793.23
FF= 5799.10
FF= 5799.37
RAMWAY HIGHLANDS
FF= 5793.59
FF= 5800.00
FF= 5800.67
FF= 5794.41
4' SCREEN WALL W/18" MAX. RETAINAGE
SPILLWAY
1.5' DEEP DESILTING POND
MOUNTAINSIDE
THE TRAILS
FF= 5800.66
FF= 5800.79
FF= 5803.60
FF= 5803.78
FF= 5805.631
FF= 5805.84
FF= 5801.67
FF= 5801.72
FF= 5804.85
FF= 5804.90
FF= 5806.94
FF= 5802.69
FF= 5807.90
FF= 5807.98
EXHIBIT B

CITY OF
Albuquerque

October 27, 1997

Martin J. Chávez, Mayor

Shahab Biazar, P.E.
Tierra West, LLC
4421 McLeod Road NE
Suite D
Albuquerque, NM 87109

*RE: TRAMWAY HIGHLANDS SUBDIVISION (G22-D15). GRADING AND DRAINAGE PLAN SUBMITTAL FOR FINAL PLAT APPOVAL. ENGINEER'S STAMP DATED 10-2-97.*

Dear Mr. Biazar:

Based on the information provided on your October 8, 1997 submittal, the above referenced project is approved for Final Plat.

If I can be of further assistance, please feel free to contact me at 924-3984.

Sincerely,

Lisa Ann Manwill, P.E.
Hydrology

c: Andrew Garcia
File

CY 4/27/98
from Corresp. File

# City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

January 8, 1998

Shahab Biazar, P.E.
Tierra West, LLC
4421 McLeod Road NE
Suite D
Albuquerque, NM 87109

***RE: TRAMWAY HIGHLANDS SUBDIVISION (G22-D15). GRADING AND DRAINAGE PLAN SUBMITTAL FOR FINAL PLAT APPOVAL. ENGINEER'S STAMP DATED 12-2-97.***

Dear Mr. Biazar:

Based on the information provided on your January 5, 1997 submittal, the above referenced project is approved for Final Plat.

If I can be of further assistance, please feel free to contact me at 924-3984.

Sincerely,

Lisa Ann Manwill, P.E.
Hydrology

c: Andrew Garcia
File

Tierra West, LLC

November 5, 1997

Mr. Fred Aguirre, P.E.
City of Albuquerque
Hydrology Department
Post Office Box 1293
Albuquerque, NM 87103

RE: Tramway Highlands Subdivision (G-22/D15), Storm Inlet Maintenance

Dear Mr. Aguirre:

The New Mexico State Highway Department is requesting that we obtain a letter from City of Albuquerque Hydrology Department indicating that they will be maintaining the storm sewer inlet at the above referenced project within City drainage easement and State Highway right-of-way (See the attached exhibit for location of the inlet). This inlet intercepts all the storm runoff within State Highway right-of-way, and drains the runoff into the existing 96" RCP.

Please contact me if there are any questions or concerns regarding this submittal.

Sincerely yours,

Shahab Biazar, P.E.

Agreed and Accepted this 12 day of November 1997.
City of Albuquerque, Hydrology Section

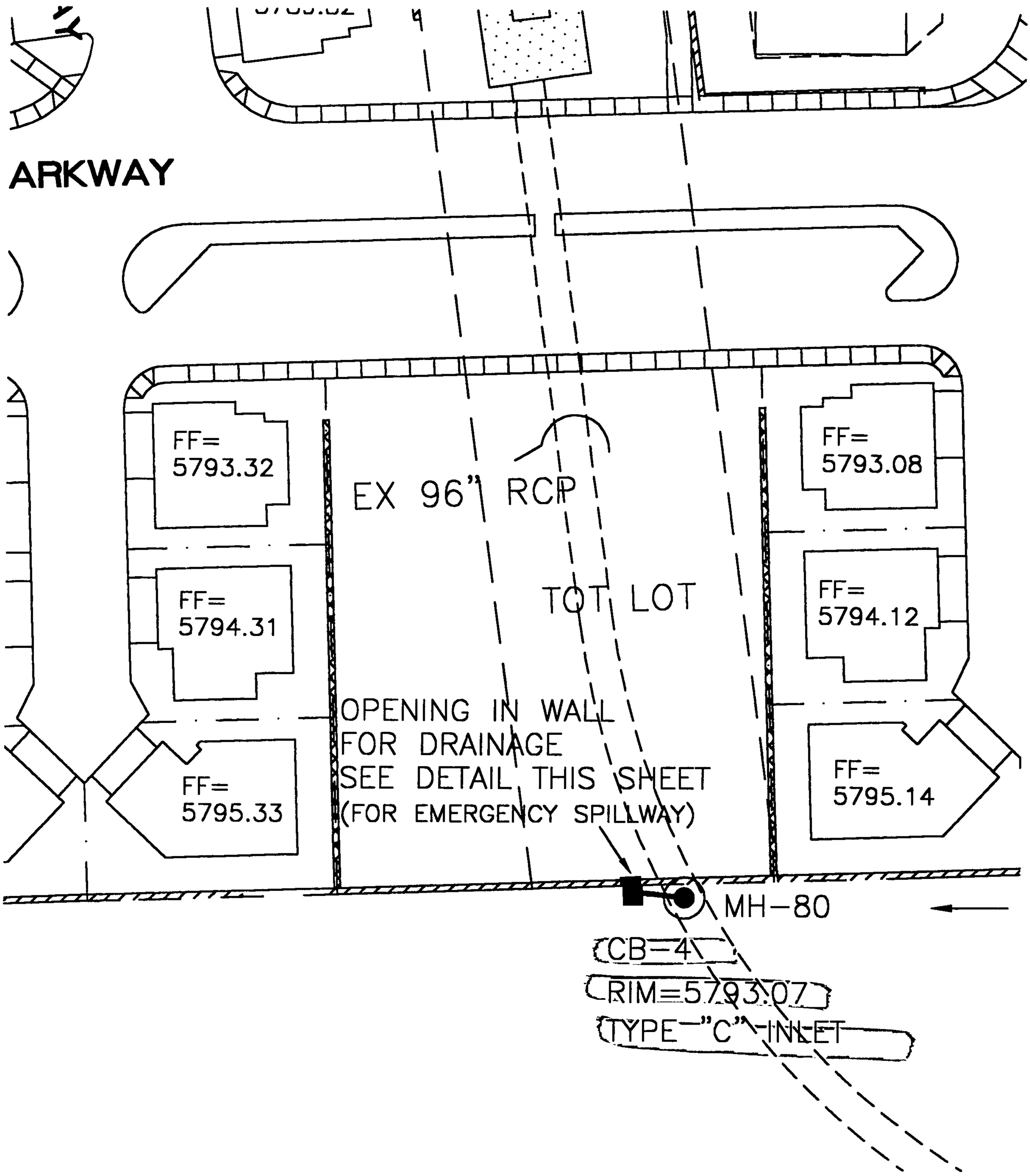
By: Fred Aguirre City Hydrologist
Name Title

Enclosure

Job No. 960054
sb

D:\960054\hydlet~1.wpd

4421 McLeod Rd. NE, Suite D • Albuquerque, NM 87109 • (505) 883-7592
fax (505) 883-7034 • e-mail: twdms@aol


ARKWAY
FF=
5793.32
FF=
5794.31
FF=
5795.33
EX 96" RCP
TOT LOT
OPENING IN WALL
FOR DRAINAGE
SEE DETAIL THIS SHEET
(FOR EMERGENCY SPILLWAY)
FF=
5793.08
FF=
5794.12
FF=
5795.14
MH-80
CB=4
RIM=5793.07
TYPE "C" INLET

CY
12/24/98

| | |
|---|---|
| DRB Case No: | 97-140 |
| Project Number: | |
| Date Submitted: | 08/27/97 |
| Prelim. Plat Approved: | |
| Prelim. Plat Expires: | |

9/3/97
REVISED 10/28/97

EXHIBIT "A"
TO SUBDIVISION IMPROVEMENTS AGREEMENTS
DEVELOPMENT REVIEW BOARD (DRB) REQUIRED INFRASTRUCTURE LISTING
FOR: TRAMWAY HIGHLANDS SUBDIVISION
**(SITE PLAN AND PLAT)** Phase I & II

Following is a summary of Public/Private Infrastructure required to be constructed or financially guaranteed for the above development. This summary is not necessarily a complete listing During CPC, BCC, the design process and/or in the preparation of the construction drawings, if the City, County, and/or AMAFCA determines that appurtenant items have not been included in the summary, those items will be included in the listing and related financial guarantee, if the items normally are the Subdivider's responsibility. In addition, any unforeseen items which arise during construction which are necessary to complete the project and which normally are the Subdivider's responsibility are the responsibility of the Subdivider and will be included in the financial guarantee provided to the City, County, and/or AMAFCA.

## Phase-I, Public Improvements

| Size | Type Improvement | Location | From | To |
|---|---|---|---|---|
| | | **WATERLINE** | | |
| | **WATER ZONE 7E** | | | |
| 8" | Water PVC Line | Mountainside Pkwy. | Candelana Road | Comanche Road |
| 8" | Water PVC Line | Moab Lane | Appalachian Way | Mountainside Pkwy. |
| 6" | Water PVC Line | ~~Appalachian Way~~ Hiawatha Way | Mountainside Pkwy | West End of Street, Lot 21 |
| 8" | Water PVC Line | Henry's Mountain Way | Mountainside Pkwy | West End of Cul-de-Sac |
| 8" | Water PVC Line | Tularosa Trail | Mountainside Pkwy | Smokey Mountain Trail |
| 8" | Water PVC Line | Smokey Mountain Trail | Tularosa Trail | North End of PL Lot 45 |
| 6" | Water PVC Line | Smokey Mountain Way | Smokey Mountain Trail | East End of Hammer Head, Lot 38 |
| 4" | Water PVC Line | Mountainside Pkwy., Cluster Units | Cluster Unit 1 | Cluster Unit 4 |
| 4" | Water PVC Line | Mountainside Pkwy., Cluster Units | Cluster Unit 5 | Cluster Unit 9 |
| 4" | Water PVC Line | Moab Lane, Cluster Units | Cluster Unit 10 | Cluster Unit 12 |
| 4" | Water PVC Line | Moab Lane, Cluster Units | Cluster Unit 13 | Cluster Unit 18 |
| 4" | Water PVC Line | Mountainside Pkwy., Cluster Units | Cluster Unit 28 | Cluster Unit 30 |
| 4" | Water PVC Line | Moab Lane, Cluster Units | Cluster Unit 31 | Cluster Unit 36 |
| 4" | Water PVC Line | Mountainside Pkwy., Cluster Units | Cluster Unit 37 | Cluster Unit 42 |
| 4" | Water PVC Line | Mountainside Pkwy., Cluster Units | Cluster Unit 43 | Cluster Unit 48 |
| 4" | Water PVC Line | Mountainside Pkwy., Cluster Units | Cluster Unit 49 | Cluster Unit 54 |
| 4" | Water PVC Line | Mountainside Pkwy., Cluster Units | Cluster Unit 55 | Cluster Unit 60 |
| 4" | Water PVC Line | Mountainside Pkwy., Cluster Units | Cluster Unit 61 | Cluster Unit 66 |
| 4" | Water PVC Line | Mountainside Pkwy., Cluster Units | Cluster Unit 67 | Cluster Unit 72 |
| 4" | Water PVC Line | Mountainside Pkwy., Cluster Units | Cluster Unit 73 | Cluster Unit 78 |
| 4" | Water PVC Line | Mountainside Pkwy., Cluster Units | Cluster Unit 79 | Cluster Unit 84 |
| | **WATER ZONE 8E** | | | |
| 8" | Water PVC Line | South Side of Comanche ROW | Mountainside Pkwy | Tramway ROW |
| 8" | Water PVC Line | Mountainside Pkwy | Comanche Road | Mogollon Way |
| | Water infrastructure to include Valves, Fittings, Valve Boxes, Fire Hydrant as required | | | |

# Phase-I, Public Improvements

| Size | Type Improvement | Location | From | To |
|---|---|---|---|---|
| | | **SEWER LINE** | | |
| 8" | SAS Gravity Line | Mountainside Pkwy | Candelana Road | Appalachian Way |
| 8" | SAS Gravity Line | Mountainside Pkwy | Cluster Unit 49 | North End of PL Unit 82 |
| 8" | SAS Gravity Line | Moab Lane | Appalachian Way | Cluster Unit 15 |
| 8" | SAS Gravity Line | Moab Lane | Cluster Unit 13 | Cluster Unit 18 |
| 8" | SAS Gravity Line | Moab Lane | Cluster Unit 31 | Cluster Unit 36 |
| 8" | SAS Gravity Line | Himalayan Way ~~Appalachian~~ Way | Mountainside Pkwy | West End of Street, Cluster Unit 21 |
| 8" | SAS Gravity Line | Henry's Mountain Way | Mountainside Pkwy | Palm Springs Avenue |
| 8" | SAS Gravity Line | Along W. of PL Lots 9 & 24 | Tularosa Trail | Palm Springs Avenue |
| 8" | SAS Gravity Line | Tularosa Trail | Lot 31 | Smokey Mountain Trail |
| 8" | SAS Gravity Line | Smokey Mountain Trail | Tularosa Trail | North End of PL Lot 45 |
| 8" | SAS Gravity Line | Smokey Mountain Way | Smokey Mountain Trail | East End of Hammer Head, Lot 38 |
| 8" | SAS Gravity Line | Mountainside Pkwy , Cluster Units | Cluster Unit 1 | Cluster Unit 4 |
| 8" | SAS Gravity Line | Mountainside Pkwy., Cluster Units | Cluster Unit 5 | Cluster Unit 9 |
| 8" | SAS Gravity Line | Moab Lane, Cluster Units | Cluster Unit 10 | Cluster Unit 12 |
| 8" | SAS Gravity Line | Moab Lane, Cluster Units | Cluster Unit 13 | Cluster Unit 16 |
| 8" | SAS Gravity Line | Mountainside Pkwy., Cluster Units | Cluster Unit 28 | Cluster Unit 30 |
| 8" | SAS Gravity Line | Mountainside Pkwy , Cluster Units | Cluster Unit 37 | Cluster Unit 42 |
| 8" | SAS Gravity Line | Mountainside Pkwy , Cluster Units | Cluster Unit 43 | Cluster Unit 48 |
| 8" | SAS Gravity Line | Mountainside Pkwy , Cluster Units | Cluster Unit 49 | Cluster Unit 54 |
| 8" | SAS Gravity Line | Mountainside Pkwy., Cluster Units | Cluster Unit 55 | Cluster Unit 60 |
| 8" | SAS Gravity Line | Mountainside Pkwy , Cluster Units | Cluster Unit 61 | Cluster Unit 66 |
| 8" | SAS Gravity Line | Mountainside Pkwy , Cluster Units | Cluster Unit 67 | Cluster Unit 72 |
| 8" | SAS Gravity Line | Mountainside Pkwy , Cluster Units | Cluster Unit 73 | Cluster Unit 78 |
| 8" | SAS Gravity Line | Mountainside Pkwy , Cluster Units | Cluster Unit 79 | Cluster Unit 84 |
| 8" | SAS Gravity Line | Mountainside Pkwy | Alps Way | Mogollon Way |
| | Sanitary Sewer to include Manholes and Service Connection as required | | | |
| | | **PAVING** | | |
| 150' x 12' | Median Modification, Left Turn Lane | Candelana Road @ North Entrance | | |
| 100' x 12' | Median Modification, Left Turn Lane | Comanche Road @ South Entrance | | |
| | Residential Street Lights Per DPM | | | |

# Phase-I, Public Improvements

| Size | Type Improvement | Location | From | To |
|---|---|---|---|---|
| | | STORM LINE | | |
| 42" | Storm Sewer, RCP Pipe | Along West P.L , Pedestrian Corridor | South Glenwood Channel | North End of Lot 24 |
| 18" | Storm Sewer, RCP Pipe | Along West P.L , Pedestrian Corridor | Smokey Mountain Way | South PL of YMCA |
| | Channel Connection | | | |
| | Desilting Ponds | | | |
| | Catch Basins and RCP Included with Storm Sewer | | | |
| | 96" Pipe Penetration | | | |

# Phase-II, Public Improvements

| Size | Type Improvement | Location | From | To |
|---|---|---|---|---|
| | | **WATERLINE** | | |
| | **WATER ZONE 7E** | | | |
| 8" | Water PVC Line | Smokey Mountain Trail | North End of PL Lot 45 | Cascade Trail |
| 6" | Water PVC Line | Rainier Way | Smokey Mountain Trail | East End of Hammer Head, Lot 52 |
| 6" | Water PVC Line | Fountain Hill lane | Smokey Mountain Trail | Mountainside Pkwy |
| 6" | Water PVC Line | Mountainside Way | Smokey Mountain Trail | East End of Hammer Head, Lot 79 |
| 8" | Water PVC Line | Mangas Trail | Smokey Mountain Trail | Mountainside Pkwy. |
| 4" | Water PVC Line | Mountainside Pkwy , Cluster Units | Cluster Unit 85 | Cluster Unit 90 |
| 4" | Water PVC Line | Mountainside Pkwy., Cluster Units | Cluster Unit 91 | Cluster Unit 96 |
| 4" | Water PVC Line | Mountainside Pkwy , Cluster Units | Cluster Unit 97 | Cluster Unit 102 |
| 4" | Water PVC Line | Mountainside Pkwy , Cluster Units | Cluster Unit 103 | Cluster Unit 108 |
| 4" | Water PVC Line | Mountainside Pkwy , Cluster Units | Cluster Unit 109 | Cluster Unit 114 |
| 4" | Water PVC Line | Mountainside Pkwy , Cluster Units | Cluster Unit 115 | Cluster Unit 120 |
| | **WATER ZONE 8E** | | | |
| 8" | Water PVC Line | Mountainside Pkwy | Unit 137 | Unit 121 |
| 6" | Water PVC Line | Alps Way, Cluster Units | Mountainside Pkwy | Cluster Unit 148/152 |
| 6" | Water PVC Line | Mogollon Way, Cluster Units | Mountainside Pkwy | Cluster Unit 140/144 |
| 6" | Water PVC Line | Snowmass Way, Cluster Units | Mountainside Pkwy | Cluster Unit 132/136 |
| 6" | Water PVC Line | Catskill Way, Cluster Units | Mountainside Pkwy | Cluster Unit 124/128 |
| | Water infrastructure to include Valves, Fittings, Valve Boxes, Fire Hydrant as required | | | |
| | | **SEWER LINE** | | |
| 8" | SAS Gravity Line | Mountainside Pkwy | North End of PL Unit 82 | Mogollon Way |
| 8" | SAS Gravity Line | Smokey Mountain Trail | North End of PL Lot 45 | Mangas Trail |
| 8" | SAS Gravity Line | Rainier Way | Smokey Mountain Trail | East End of Hammer Head, Lot 52 |
| 8" | SAS Gravity Line | Fountain Hill Lane | Smokey Mountain Trail | Lot 65 |
| 8" | SAS Gravity Line | Mountainside Way | Smokey Mountain Trail | East End of Hammer Head, Lot 79 |
| 8" | SAS Gravity Line | Cascade Trail | Smokey Mountain Trail | Lot 92 |
| 8" | SAS Gravity Line | Mountainside Pkwy , Cluster Units | Cluster Unit 85 | Cluster Unit 90 |
| 8" | SAS Gravity Line | Mountainside Pkwy , Cluster Units | Cluster Unit 91 | Cluster Unit 96 |
| 8" | SAS Gravity Line | Mountainside Pkwy , Cluster Units | Cluster Unit 97 | Cluster Unit 102 |
| 8" | SAS Gravity Line | Mountainside Pkwy , Cluster Units | Cluster Unit 103 | Cluster Unit 108 |
| 8" | SAS Gravity Line | Mountainside Pkwy , Cluster Units | Cluster Unit 109 | Cluster Unit 114 |
| 8" | SAS Gravity Line | Mountainside Pkwy , Cluster Units | Cluster Unit 115 | Cluster Unit 120 |

# Phase-I, Public Improvements

| Size | Type Improvement | Location | From | To |
|---|---|---|---|---|
| | | **SEWER LINE** | | |
| 8" | SAS Gravity Line | Alps Way, Cluster Units | Mountainside Pkwy | Cluster Unit 148/152 |
| 8" | SAS Gravity Line | Mogollon Way, Cluster Units | Mountainside Pkwy | Cluster Unit 140/144 |
| 8" | SAS Gravity Line | Snowmass Way, Cluster Units | Mountainside Pkwy | Cluster Unit 132/136 |
| 8" | SAS Gravity Line | Catskill Way, Cluster Units | Mountainside Pkwy | Cluster Unit 124/128 |
| | Sanitary Sewer to include Manholes and Service Connection as required | | | |
| | | **OTHER** | | |
| | Residential Street Lights Per DPM | | | |

# Phase-~~II~~ I Private Improvements

| Size | Type Improvement | Location | From | To |
|---|---|---|---|---|
| | | PAVING | | |
| 36'/ F-F | Residential Street | Mountainside Pkwy | Candelaria Road | 100' North of Moab Lane |
| 16' la | Curb & Gutter (On Both Sides) | | | |
| | Sidewalks 4' (West Side Only) | | | |
| 20' Ra | Per Site Plan | | | |
| 36'/ F-F | Residential Street | Mountainside Pkwy. | Comanche Road | 100' South |
| | Curb & Gutter (On Both Sides) | | | |
| | Sidewalks 4' (East Side Only) | | | |
| | Per Site Plan | | | |
| 24'/ F-F | Residential Street | Mountainside Pkwy. | Appalachian Way | North Property Line Of Unit 82 |
| | Curb & Gutter (On Both Sides) | | | |
| | Sidewalks 4' (East Side Only) | | | |
| | With Transition From 36' to 24' | | | |
| | With Off Street Parking | | | |
| | Per Site Plan | | | |
| 28'/ F-F | Residential Street | Henry's Mountain Way | Mountainside Pkwy | West End of Cul-de-Sac |
| | Curb & Gutter, | | | |
| | Sidewalks 4' (Both Side)* | | | |
| 28'/ F-F | Residential Street | Tularosa Trail | Mountainside Pkwy | Smokey Mountain Trail |
| | Curb & Gutter, | | | |
| | Sidewalks 4' (Both Side)* | | | |
| 26' ~~28'~~/ F-F | Residential Street | Smokey Mountain Trail | Tularosa Trail | North End of PL Lot 45 |
| | Curb & Gutter, △1 | | | |
| | Sidewalks 4' (Both Side)* | | | |
| 28'/ F-F | Residential Street | Smokey Mountain Way | Smokey Mountain Trail | East End of Hammer Head, Lot 38 |
| | Curb & Gutter, | | | |
| | Sidewalks 4' (Both Side)* | | | |
| 28'/ F-F | Residential Street | Moab Lane | Appalachian Way | Mountainside Pkwy. |
| | Curb & Gutter, | | | |
| | Sidewalks 4' (Both Side)* | | | |
| 24'/ F-F | Residential Street | Himalayan Way ~~Appalachian Way~~ | Mountainside Pkwy | East End of Road Unit 21 |
| | Curb & Gutter, | | | |
| | Sidewalks 4' (Both Side)* | | | |
| 24'/ F-F | Residential Street | For 4 Cluster Stub Streets | Cluster Unit 1 | Cluster Unit 16 |
| | Curb & Gutter | Per Site Plan | | |
| 24'/ F-F | Residential Street | For 10 Cluster Stub Streets | Cluster Unit 29 | Cluster Unit 84 |
| | Curb & Gutter | Per Site Plan | | |

△1 Sidewalks deferred on East Side Only

# Phase-II Private Improvements

| Size | Type Improvement | Location | From | To |
|---|---|---|---|---|
| | | PAVING | | |
| 24'/ F-F | Residential Street | Mountainside Pkwy. | N End of Unit 82 | South End of Property Line Unit 145 |
| | Curb & Gutter (On Both Sides) | | | |
| | Sidewalks 4' (East Side Only) | | | |
| | With Transition From 36' to 24' | | | |
| | With Off Street Parking | | | |
| | Per Site Plan | | | |
| 26' ~~28'~~/ F-F | Residential Street | Smokey Mountain Trail | North End of PL Lot 45 | Mangas Trail |
| | Curb & Gutter, | | | |
| | Sidewalks 4' (Both Side)* 1 | | | |
| 28'/ F-F | Residential Street | Rainier Way | Smokey Mountain Trail | East End of Hammer Head, Lot 52 |
| | Curb & Gutter, | | | |
| | Sidewalks 4' (Both Side)* | | | |
| 28'/ F-F | Residential Street | Fountain Hill Lane | Smokey Mountain Trail | Mountainside Pkwy. |
| | Curb & Gutter, | | | |
| | Sidewalks 4' (Both Side)* | | | |
| 28'/ F-F | Residential Street | Mountainside Way | Smokey Mountain Trail | East End of Hammer Head, Lot 79 |
| | Curb & Gutter, | | | |
| | Sidewalks 4' (Both Side)* | | | |
| 28'/ F-F | Residential Street | Mangas Trail | Smokey Mountain Trail | Mountainside Pkwy. |
| | Curb & Gutter, | | | |
| | Sidewalks 4' (Both Side)* | | | |
| 24'/ F-F | Residential Street | For 6 Cluster Stub Streets | Cluster Unit 85 | Cluster Unit 120 |
| | Curb & Gutter | Per Site Plan | | |
| 24'/ F-F | Residential Street | Catskill Way, Stub Street | Mountainside Pkwy. | East End The Street |
| | Curb & Gutter | Per Site Plan | | |
| 24'/ F-F | Residential Street | Snowmass Way, Stub Street | Mountainside Pkwy | East End The Street |
| | Curb & Gutter | Per Site Plan | | |
| 24'/ F-F | Residential Street | Mogollon Way, Stub Street | Mountainside Pkwy. | East End The Street |
| | Curb & Gutter | Per Site Plan | | |
| 24'/ F-F | Residential Street | Alps Way, Stub Street | Mountainside Pkwy. | East End The Street |
| | Curb & Gutter | Per Site Plan | | |
| * | Internal Sidewalks Deferred | | | |
| | ~~Residential Street Lights Per DPM~~ | | | |
| | Certified Grading & Drainage with Private Walls & Private Drainage (Non-work order item) Required for SIA/Financial Release | | | |
| | 1 Sidewalks deferred on East side only | | | |

Prepared By: _____

Print Name: Ronald R. Bohannan, P.E.

Firm: Tierra West LLC

**********

Development Review Board Member Approvals

10-28-97

9-03-97
Transportation Dev. Date

EJS 10-28-97

9-3-97
Design & Development, CIP Date

9/3/97
City Engineer/AMAFCA Date

9/3/97
Utility Dev. Date

10/28/97

10/28/97
DRB Chairman Date

10/28/97

CITY OF
Albuquerque

October 6, 1998

Shahab Biazar, P.E.
Tierra West, LLC
4421 McLeod Road NE
Suite D
Albuquerque, NM 87109

*RE: TRAMWAY HIGHLANDS SUBDIVISION (G22-D15). APPROVAL FOR RETAINING WALL ADDITION ALONG GLENWOOD CHANNEL. NO ENGINEER'S STAMP.*

Dear Mr. Biazar:

Based on the information provided on your September 16, 1998 submittal, City Hydrology has the following comment:

The proposed new retaining wall appears in order; however, the plan needs to be stamped and dated by the Engineer.

If I can be of further assistance, please feel free to contact me at 924-3984.

Sincerely,

John P. Murray, P.E.
Hydrology

c: Andrew Garcia
File
Glen Jurgensen

# *DRAINAGE INFORMATION SHEET*

PROJECT TITLE: *Tramway Highlands Subdivision* ZONE ATLAS/DRNG. FILE #: G22 / D15

DRB #: *97-140* EPC #: WORK ORDER #:

LEGAL DESCRIPTION: Tract A, B, C, D, E, & F LANDS OF RP TINNIN

CITY ADDRESS: *Southwest corner of Tramway Boulevard and Comanche Road*

ENGINEERING FIRM: TIERRA WEST, LLC CONTACT: RONALD R. BOHANNAN OR SHAHAB BIAZAR

ADDRESS: 4421 McLeod Rd. NE Suite D, 87109 PHONE: (505) 883-7592

OWNER: Argus Development Co. CONTACT: Ben Spencer

ADDRESS: 6400 Uptown Blvd., NE Suite 200-W 87110 PHONE: (505) 889-3061

ARCHITECT: CONTACT:

ADDRESS: PHONE:

SURVEYOR: Aldrich Land Surveying Inc. CONTACT: Tim Aldrich

ADDRESS: 4109 Montgomery Blvd. NE, 87109 PHONE: (505) 884-1990

CONTRACTOR: CONTACT:

ADDRESS: PHONE:

TYPE OF SUBMITTAL:

- ____ DRAINAGE REPORT
- ____ DRAINAGE PLAN
- ____ CONCEPTUAL GRADING & DRAINAGE PLAN
- ____ GRADING PLAN
- ____ EROSION CONTROL PLAN
- ____ ENGINEER'S CERTIFICATION
- X *Retaining Wall Addition*

PRE-DESIGN MEETING:

- ____ YES
- ____ NO
- ____ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

- ____ SKETCH PLAN APPROVAL
- ____ PRELIMINARY PLAT APPROVAL
- ____ S. DEV. PLAN FOR SUB'D. APPROVAL
- ____ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- ____ SECTOR PLAN APPROVAL
- ____ FINAL PLAT APPROVAL
- ____ FOUNDATION PERMIT APPROVAL
- ____ BUILDING PERMIT APPROVAL
- ____ CERTIFICATE OF OCCUPANCY APPROVAL
- ____ GRADING PERMIT APPROVAL
- ____ PAVING PERMIT APPROVAL
- ____ S. A. D. DRAINAGE REPORT
- ____ DRAINAGE REQUIREMENTS
- X *Addition of Retaining Wall Along Glenwood Channel*

RECEIVED
SEP 16 1998
HYDROLOGY SECTION

DATE SUBMITTED: *09 / 16 / 98*

BY: *SHAHAB BIAZAR, P.E.*

Tierra West, LLC

September 16, 1998

Mr. John P. Murray, PE
City of Albuquerque
Hydrology Department
PO Box 1293
Albuquerque, NM 87103

RE: TRAMWAY HIGHLANDS SUBDIVISION (G22-D15) RETAINING WALL ADDITION

Dear Mr. Murray:

Ron Wright, from our office, talked to you regarding the retaining wall addition along the Glenwood Channel. Based on his conversation with you, it was decided that we will build the wall and as-built it. We are adding the wall to lessen the steepness of the slopes along the side of the channel for maintenance purposes. Glen Jerguson requested this the last time we met with him-on site. Attached is map showing the retaining wall addition.

Please contact me if you have any questions or concerns.

Sincerely,

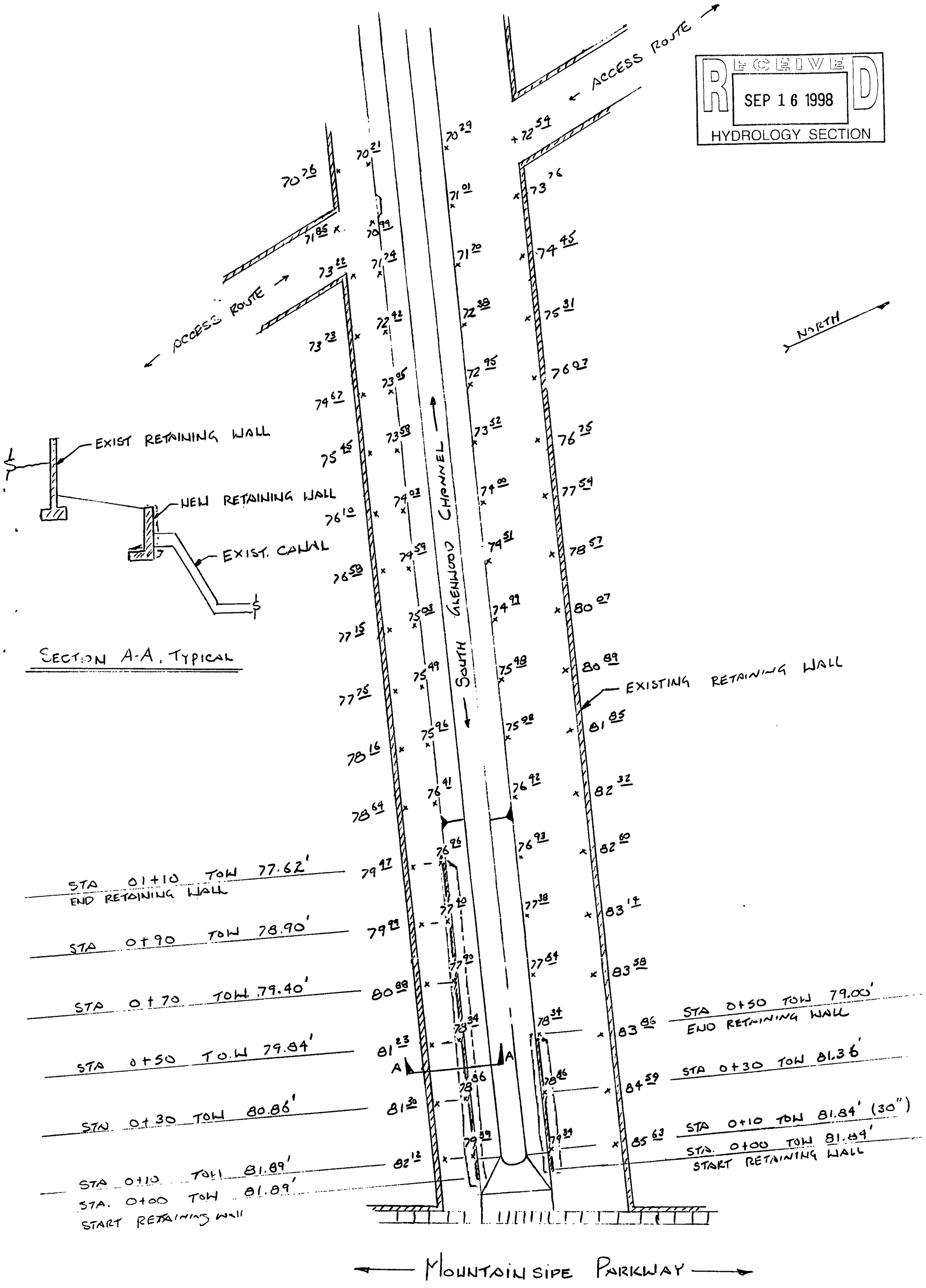
Shahab Biazar, PE

JN 960054
SB

RECEIVED
SEP 16 1998
HYDROLOGY SECTION

4421 McLeod Rd. NE, Suite D • Albuquerque, NM 87109 • (505) 883-7592
fax (505) 883-7034 • e-mail: twdms@aol

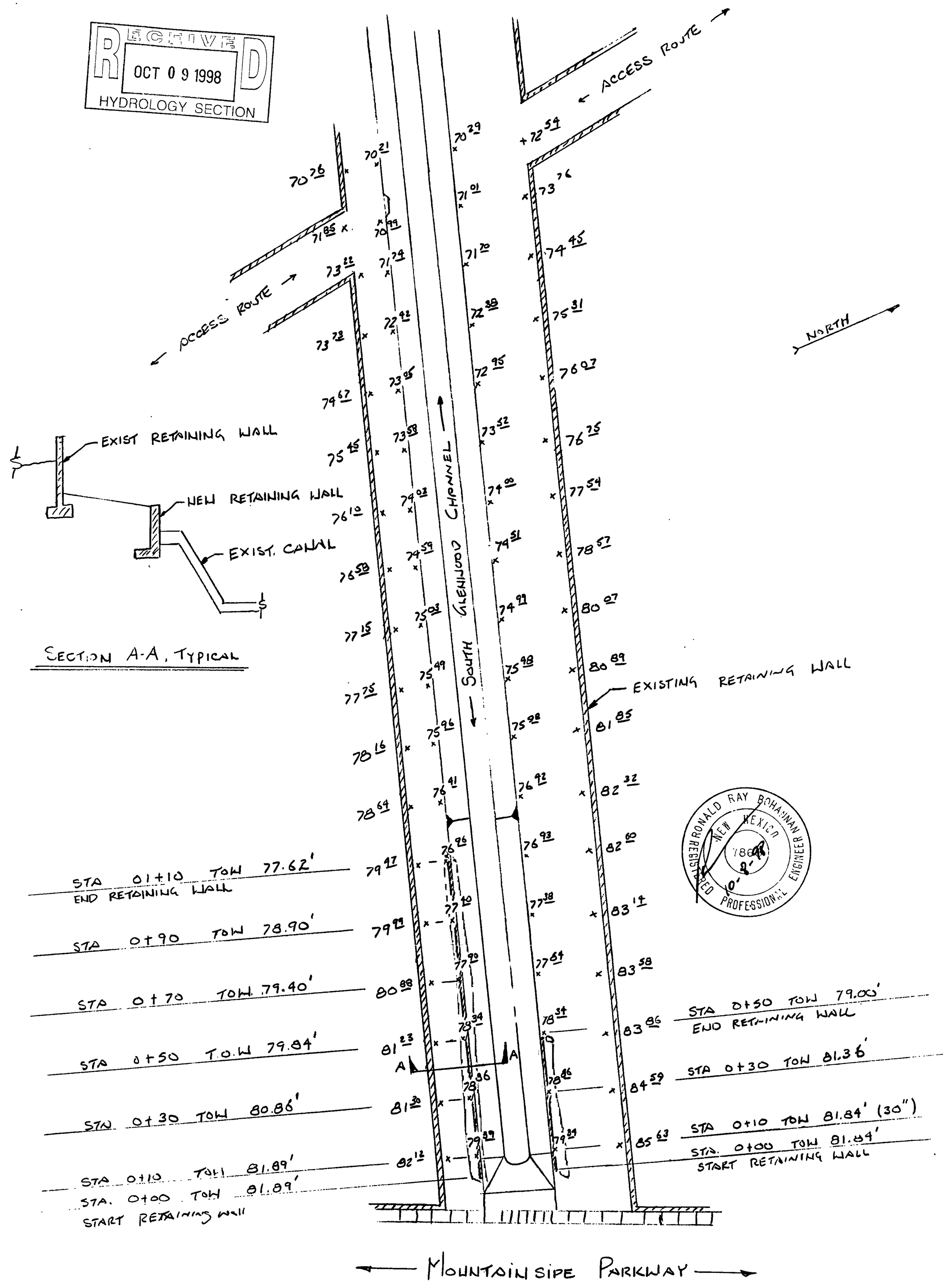
TRAMWAY HIGHLANDS, DETAIL OF C.O.A. STORM MAINTENANCE, ADDITIONAL RETAINING WALL REQUEST JN: 960054, 9-14-98




RECEIVED
SEP 16 1998
HYDROLOGY SECTION

TRAMWAY HIGHLANDS, DETAIL OF C.O.A. STORM MAINTENANCE, ADDITIONAL RETAINING WALL REQUEST JN: 960054, 9-14-98

RECEIVED
OCT 09 1998
HYDROLOGY SECTION




RONALD RAY BOHANNAN
NEW MEXICO
7868
REGISTERED PROFESSIONAL ENGINEER

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

December 28, 1998

Ronald R. Bohannan, P.E.
Tierra West, LLC
4421 McLeod Road NE
Suite D
Albuquerque, NM 87109

*RE: TRAMWAY HIGHLANDS SUBDIVISION, UNITS 1 and 2 (G22-D15). GRADING CERTIFICATION FOR RELEASE OF FINANCIAL GUARANTEES. ENGINEER'S STAMP DATED DECEMBER 7, 1998.*

Dear Mr. Bohannon:

Based on the information provided on your submittal, the above referenced plan is adequate to satisfy the requirements for Subdivision Certification for release of Financial Guarantees for the subdivision per the Infrastructure List dated August 27, 1997, and revised October 28, 1997.

This letter is to confirm that C.O.A. Letter of December 24, 1998 was intended to cover both Units 1 and 2 of the Tramway Highlands Subdivision.

If I can be of further assistance, please feel free to contact me at 924-3984.

Sincerely,

John P. Murray, P.E.
Hydrology

c: Terri Martin, City Projects No. 5781.81 & 5781.82
File

THE CITY OF ALBUQUERQUE IS AN EQUAL OPPORTUNITY/REASONABLE ACCOMMODATION EMPLOYER