Federal Emergency Management Agency

Washington, D.C. 20472

JUN 18 1999

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 99-06-1226R

The Honorable Tom Rutherford
Chairman, Bernalillo County
Board of Commissioners
2400 Broadway, Southeast
Albuquerque, NM 87102

Community: Bernalillo County, New Mexico
Community No.: 350001

104

Dear Mr. Rutherford:

This responds to a request that the Federal Emergency Management Agency (FEMA) comment on the effects that a proposed project would have on the effective Flood Insurance Rate Map (FIRM) for Bernalillo County, New Mexico and Incorporated Areas (the effective FIRM for your community), in accordance with Part 65 of the National Flood Insurance Program (NFIP) regulations. In a letter dated April 26, 1999, Ms. Susan M. Calongne, P.E., City/County Floodplain Administrator, Public Works Department, County of Bernalillo, requested that FEMA evaluate the effects that proposed placement of fill and construction of a retaining wall associated with construction of Tract A, Unit 16, Sandia Heights South subdivision, along an unnamed tributary to Arroyo Del Pino (unnamed tributary) would have on the flood hazard information shown on the effective FIRM. The proposed fill will be placed from approximately 120 feet upstream to approximately 345 feet upstream of Tramway Boulevard and from approximately 50 feet north to approximately 330 feet north of San Rafael Avenue Northeast. The proposed retaining wall will be constructed along the north easement line of the property from approximately 125 feet upstream to approximately 345 feet upstream of Tramway Boulevard. This request also included detailed hydrologic and hydraulic analysis that incorporated updated topographic information to reflect existing channel conditions along the unnamed tributary from just upstream to approximately 345 feet upstream of Tramway Boulevard.

All data required to complete our review of this request for a Conditional Letter of Map Revision (CLOMR) were submitted with letters from Mr. Shahab Biazar, P.E., Advanced Engineering and Consulting, LLC, and Ms. Calongne.

We have completed our review of the submitted data and the flood data used to prepare the effective FIRM for your community. The submitted existing conditions HEC-RAS hydraulic computer model, dated February 24, 1999, based on updated topographic information, was used as the base conditions model in our review of the proposed conditions model for this CLOMR request. We believe that, if the proposed project is constructed as described in the report entitled "CLOMR for Tract A, Unit 16, Sandia Heights South," dated February 1999, and as shown on the topographic work map entitled "Tract A, Sandia Heights South, Unit 16, Grading and Drainage Plan," dated January 25, 1999, both prepared by Advanced Engineering and Consulting, LLC, and the data listed below are received, a revision to the FIRM would be warranted.

As a result of the more detailed topographic information, the elevations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) along the unnamed tributary increased compared to the effective base flood elevations (BFEs). The maximum increase in BFE, 4.97 feet, occurred approximately 340 feet upstream of Tramway Boulevard.

As a result of the proposed project, the BFEs will increase compared to the existing conditions BFEs along the unnamed tributary. The maximum increase in BFE, approximately 0.16 foot, will occur approximately 240 feet upstream of Tramway Boulevard.

As a result of the more detailed topographic information and proposed project, the BFEs will increase compared to the effective BFEs along the unnamed tributary. The maximum increase in BFE, 5.12 feet, will occur approximately 340 feet upstream of Tramway Boulevard. The width of the Special Flood Hazard Area (SFHA), the area that would be inundated by the base flood, will decrease compared to the effective SFHA width. The base flood will be contained in the channel from approximately 340 feet upstream to approximately 125 feet upstream of Tramway Boulevard.

Upon completion of the project, your community may submit the data listed below and request that we make a final determination on revising the effective FIRM.

- Effective March 1, 1999, FEMA revised the fee schedule for reviewing and processing requests for conditional and final modifications to published flood information and maps. In accordance with this schedule, the fee for your map revision request will be $3,400 and must be received before we can begin processing your request. Payment of this fee shall be made in the form of a check or money order, made payable in U.S. funds to the National Flood Insurance Program, or by credit card. The payment must be forwarded to the following address:

  Federal Emergency Management Agency
  Fee-Collection System Administrator
  P.O. Box 3173
  Merrifield, VA 22116-3173

- As-built plans, certified by a registered professional engineer, of all proposed project elements

- Community acknowledgment of the map revision request

- Certification that all fill placed in the currently effective base floodplain and below the proposed BFE is compacted to 95 percent of the maximum density obtainable with the Standard Proctor Test method issued by the American Society for Testing and Materials (ASTM Standard D-698) or an acceptable equivalent method for all areas to be removed from the base floodplain

- Our review of the hydrologic analysis; the topographic map entitled "Tract A, Sandia Heights South, Unit 16, Grading and Drainage Plan"; and the undated basin map entitled "Exhibit 11, Hydrology Maps," prepared by Resource Technology, Inc., revealed that the flows from the 54-inch and 24-inch culverts discharge separately into a 60-inch storm drain. Because the flow from the two culverts does not drain into open space but into a pressurized storm drain, the orifice equations used to calculate the discharges for the 54-inch and 24-inch culverts are not applicable. Please revise the stage discharge relationship used in the hydrologic model reservoir routing to account for the pressure head and velocity head in the 60-inch storm drain. In addition, please revise the submitted HEC-RAS models to incorporate any required changes in hydrology.

- Please submit a topographic work map showing the revised floodplain boundary.

- Hydraulic analyses, for as-built conditions, of the base flood if they differ from the proposed conditions models

After receiving appropriate documentation to show that the project has been completed, FEMA will initiate a revision to the FIRM. Because the BFEs would change as a result of the project, a 90-day appeal period would be initiated, during which community officials and interested persons may appeal the revised BFEs based on scientific or technical data.

The basis of this CLOMR is, in whole or in part, a channel-modification/culvert project. NFIP regulations, as cited in Paragraph 60.3(b)(7), require that communities assure that the flood-carrying capacity within the altered or relocated portion of any watercourse is maintained. This provision is incorporated into your community's existing floodplain management regulations. Consequently, the ultimate responsibility for maintenance of the modified channel and culvert rests with your community.

This CLOMR is based on minimum floodplain management criteria established under the NFIP. Your community is responsible for approving all floodplain development, and for ensuring all necessary permits required by Federal or State law have been received. State, county, and community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction in the SFHA. If the State, county, or community has adopted more restrictive or comprehensive floodplain management criteria, these criteria take precedence over the minimum NFIP criteria.

If you have any questions regarding floodplain management regulations for your community or the NFIP in general, please contact the Consultation Coordination Officer (CCO) for your community. Information on the CCO for your community may be obtained by contacting the Director, Mitigation Division of FEMA in Denton, Texas, at (940) 898-5127. If you have any technical questions regarding this CLOMR, please contact Mr. Alan Johnson of our staff in Washington, DC, either by telephone at (202) 646-3403 or by facsimile at (202) 646-4596.

Sincerely,

Alan A. Johnson, P.E., Project Engineer
Hazards Study Branch
Mitigation Directorate

For: Matthew B. Miller, P.E., Chief
Hazards Study Branch
Mitigation Directorate

cc: Ms. Susan M. Calongne, P.E.
City/County Floodplain Administrator
Public Works Department
County of Bernalillo

Mr. Martin J. Garcia, P.E.
Director of Public Works Division
Bernalillo County

Mr. Shahab Biazar, P.E.
Advanced Engineering and Consulting, LLC

DRAINAGE INFORMATION SHEET

D-09-B - Unit 16

PROJECT TITLE: Tract A, Sandia Heights South, Unit 16 ZONE ATLAS/DRNG. FILE #: D23 / ~~D95~~, PWD-96-95

DRB #: _____ EPC #: _____ WORK ORDER #: _____

LEGAL DESCRIPTION: Tract A, Sandia Heights South, Unit 16

CITY ADDRESS: *NE corner of Tramway Blvd. & San Rafael Ave.*

ENGINEERING FIRM: Advanced Engineering and Consulting CONTACT: Shahab Biazar

ADDRESS: 10209 Snowflake Ct. NW Alb., NM 87114 PHONE: (505) 899-5570

OWNER: Don Maestas CONTACT: Don Maestas

ADDRESS: 5113 Comanche Road, NE PHONE: (505) 881-0464

ARCHITECT: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

SURVEYOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

CONTRACTOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

- X DRAINAGE REPORT
- X DRAINAGE PLAN
- _____ CONCEPTUAL GRADING & DRAINAGE PLAN
- X GRADING PLAN
- _____ EROSION CONTROL PLAN
- _____ ENGINEER'S CERTIFICATION
- _____ OTHER

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
- X FINAL PLAT APPROVAL
- _____ FOUNDATION PERMIT APPROVAL
- X BUILDING PERMIT APPROVAL
- _____ CERTIFICATE OF OCCUPANCY APPROVAL
- X GRADING PERMIT APPROVAL
- _____ PAVING PERMIT APPROVAL
- _____ S. A. D. DRAINAGE REPORT
- _____ DRAINAGE REQUIREMENTS
- _____ *OTHER*

RECEIVED
NOV 1 3 1998
HYDROLOGY SECTION

DATE SUBMITTED: *10 / 29 / 98*

BY: *SHAHAB BIAZAR*

Albuquerque Title Co.
T.I. 79,434RS

08873518

966

GRANT OF DRAINAGE EASEMENT

THIS GRANT OF DRAINAGE EASEMENT is made and executed this 5th day of August, 1988 ("Date Hereof"), by The Cornerstone Group, Inc. (hereinafter referred to as "Grantor"). Grantor, for good and valuable consideration paid, the receipt of which is hereby acknowledged, does grant, bargain, sell and convey unto QUAILWOOD PARTNERS, a New Mexico ~~limited~~ partnership (hereinafter referred to as "Grantee") and ~~its~~ successors and assigns, the right and non-exclusive easement to drain all waters from certain real estate described in Exhibit "A" (Grantee's Property) on, in, under, over and across the real estate described in Exhibit "B", which Grantor owns in fee simple, (Grantor's property) for drainage purposes for a period commencing on the Date Hereof and continuing in perpetuity. This Agreement shall run with the land and be binding upon and inure to the benefit of the successors in interest and assigns of Grantor and the successors in interest and assigns of Grantee.

TO HAVE AND TO HOLD the rights and easements for the uses and purposes aforesaid, unto the Grantee continuously from the Date Hereof and continuing in perpetuity.

THERE IS RESERVED to Grantor the right to use Grantor's property for purposes which will not interfere with the rights and easement hereby granted.

Grantor hereby expressly recognizes and acknowledges that, as a result of the rights and easement granted herein, waters in an amount beyond the natural and historic drainage flows ("Additional Waters") may flow in and upon Grantor's property. In addition to the rights and easement granted herein, Grantor hereby agrees to accept in and upon its property, such Additional Waters for the duration of the term of the rights and easement granted herein.

IN WITNESS WHEREOF, IT IS HEREBY UNDERSTOOD AND AGREED that this Grant of Drainage Easement or any provision hereof, or any covenant, condition or restriction contained herein, may be terminated, extended, modified or amended, as to the whole of the easement property or any portion thereof, only with the mutual consent of Grantor and Grantee, their successors in interest and assigns, expressed in writing. No such termination, extension, modification or amendment shall be effective until and unless a proper instrument in writing has been executed, acknowledged, and recorded in the Office of the County Clerk of Bernalillo County, New Mexico.

Rec 653A 966-970

IN WITNESS WHEREOF, the Grantor has set its hands and seals this 5th day of August, 1988.

GRANTOR: The Operating Form Inc.
Donald A. Maestas Pres.
By Don Maestas, Pres.
Date: 8-5-88

The Operating Form Inc.
By Barbara Ann Maestas, Sec-Treas
Date: 8-5-88

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

The foregoing instrument was acknowledged before me this 5th day of August, 1988, by Donald A. Maestas.

Yvonne T. Martinez
Notary Public

My commission expires:
2/21/91

OFFICIAL SEAL
Yvonne T. Martinez
NOTARY PUBLIC - STATE OF NEW MEXICO
Notary Public filed with Secretary of State
My Commission Expires

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

The foregoing instrument was acknowledged before me this 5th day of August, 1988, by Barbara Ann Maestas.

Yvonne T. Martinez
Notary Public

My commission expires:
2/21/91

OFFICIAL SEAL
Yvonne T. Martinez
NOTARY PUBLIC - STATE OF NEW MEXICO
Notary Public filed with Secretary of State
My Commission Expires

EXHIBIT "A"

Description of Grantee's Property

Tract 3B Unit 16 as shown in the Office of the County Clerk, Bernalillo County filed October 20, 1983 in Volume C22 Folio 79.

EXHIBIT "B"

An easement for discharge of run-off waters on and across Tract A of Sandia Heights south, Unit 19 being 5.00 feet either side of centerline and more particularly described as follows:

Beginning at a point which is the Southeast Corner of said Tract A, thence; South 00 deg. 08 min. 38 sec. E. a distance of 10.27 feet to a point which is on the centerline of said easement and being the TRUE POINT OF BEGINNING.

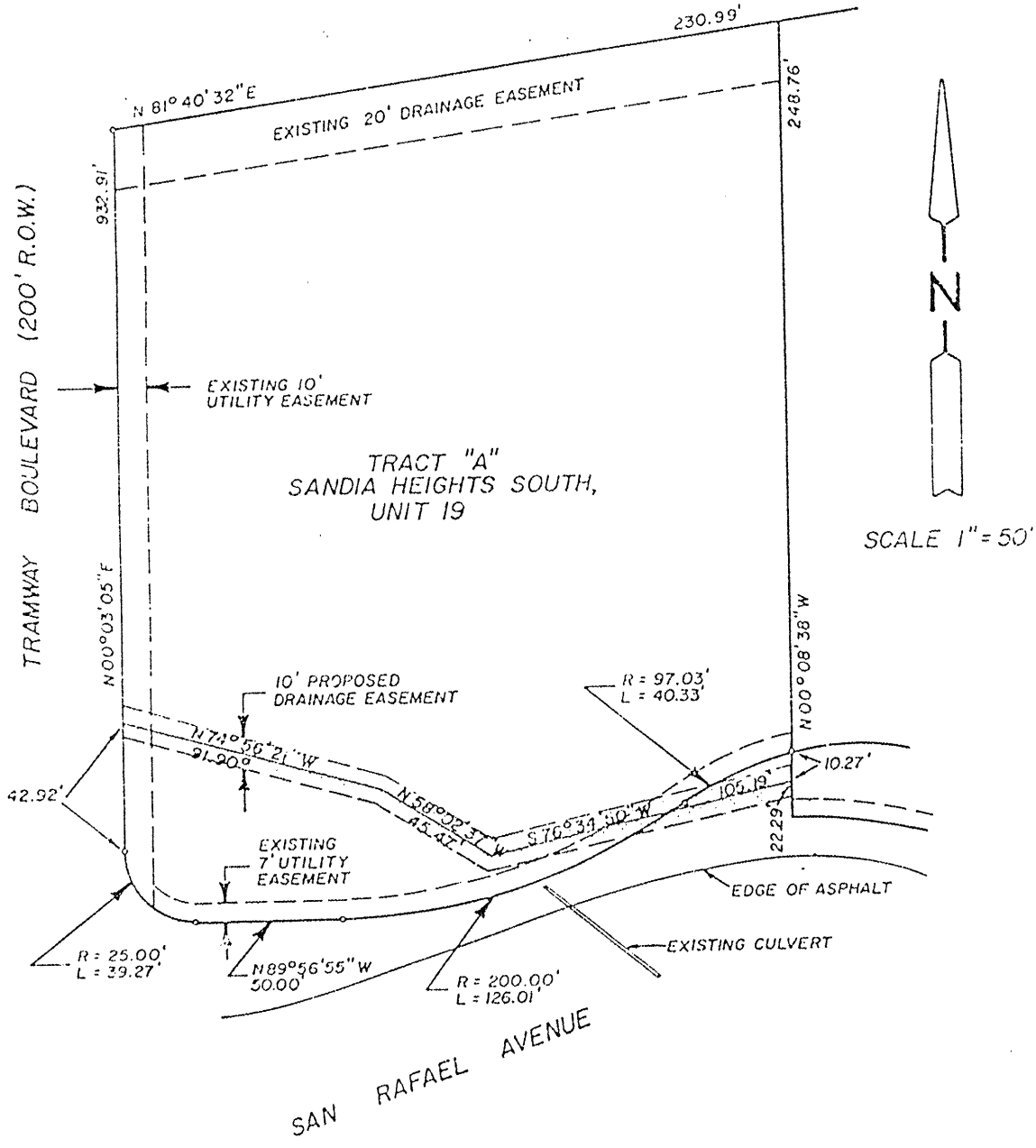
Thence S. 76 deg. 34 min. 50 sec. W. a distance of 105.19 feet;

Thence N. 58 deg. 02 min. 37 sec. W. a distance of 45.47 feet;

Thence N. 74 deg. 56 min. 21 sec. W. a distance of 91.90 feet to a point of terminus which is on the West Boundary of said Tract A and the East right-of-way line of Tramway Boulevard.

The above described easement contains 0.055 acres more or less.

970


230.99'
N 81° 40' 32" E
EXISTING 20' DRAINAGE EASEMENT
248.76'
932.91'
TRAMWAY BOULEVARD (200' R.O.W.)
EXISTING 10' UTILITY EASEMENT
TRACT "A"
SANDIA HEIGHTS SOUTH,
UNIT 19
N
SCALE 1" = 50'
N00°03'05"E
N00°08'38"W
10' PROPOSED DRAINAGE EASEMENT
R = 97.03'
L = 40.33'
N74°56'21"W
91.90'
42.92'
N58°02'37"W
45.47'
S76°34'40"W
105.19'
10.27'
222.93'
EXISTING 7' UTILITY EASEMENT
EDGE OF ASPHALT
EXISTING CULVERT
R = 25.00'
L = 39.27'
N89°56'55"W
50.00'
R = 200.00'
L = 126.01'
SAN RAFAEL AVENUE

County of Bernalillo

State of New Mexico

2400 BROADWAY, S.E.
ALBUQUERQUE, NEW MEXICO 87102
PUBLIC WORKS (505) 848-1500

April 26, 1999

Mr. Monther S. Madanat
Michael Baker Jr., Inc.
3601 Eisenhower Avenue, Suite 600
Alexandria, Virginia 22304-6439

RE: Request for a Conditional Letter of Map Revision for Tract A, Unit 16, Sandia Heights South, Bernalillo County, New Mexico, Community No. 350001, FIRM Panel 35001C0161D.

Dear Mr. Madanat:

The purpose of this submittal is to request a Conditional Letter of Map Revision for the above referenced site. The developer proposes to construct a flood wall along the north side of the property to remove the floodplain from the Tract.

Enclosed with this letter are the Application and Certification MT-2 forms for requesting revisions to the National Flood Insurance Program maps, along with the analyses and drawings for the improvements. A check in the amount of $3100.00 for the review is also included.

Bernalillo County has reviewed and approved the material provided with this submittal. Our Community would greatly appreciate your prompt response and approval for this Conditional Letter of Map Revision. If you have any questions concerning this submittal, please call me at (505) 924-3982.

Sincerely,

Susan Calongne

Susan M. Calongne, P.E.
City/County Floodplain Administrator

Attachments

c: Shahab Biazar, P.E., Advanced Engineering and Consulting (Letter only)
Alan Johnson, FEMA Headquarters (Letter only)
Jack Quarles, FEMA Region VI (Letter only)
Brad Catanach, Bernalillo County Public Works Division (Letter only)
File

County of Bernalillo

State of New Mexico

2400 BROADWAY, S.E.
ALBUQUERQUE, NEW MEXICO 87102
PUBLIC WORKS (505) 848-1500

April 2, 1999

Shahab Biazar, P.E.
Advanced Engineering and Consulting
10209 Snowflake Ct. NW
Albuquerque, New Mexico 87114

RE: CLOMR Request for Tract A, Sandia Heights South Unit 19 (D23/D9B) (PWD-96-95) Engineer's Stamp Dated 2/25/99.

Dear Shahab:

The above referenced CLOMR request is sufficient to be submitted to the Federal Emergency Management Agency (FEMA). However, I cannot submit this request without enclosing the review fee of $3100.00 which is required by FEMA.

Please provide the required review fee, so that I may forward the request to FEMA as soon as possible.

If you have any questions, please call me at 924-3982.

Sincerely,

Susan Calongne

Susan M. Calongne, P.E.
City/County Floodplain Administrator

c: Don Maestas, Owner
Lisa Ann Manwill, P.E., Albuquerque Metropolitan Arroyo Flood Control Authority
Brad Catanach, P.E., Bernalillo County Public Works Division
File

County of Bernalillo

State of New Mexico

2400 BROADWAY, S.E.
ALBUQUERQUE, NEW MEXICO 87102
PUBLIC WORKS (505) 848-1500

April 2, 1999

Shahab Biazar, P.E.
Advanced Engineering and Consulting
10209 Snowflake Ct. NW
Albuquerque, New Mexico 87114

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If you have any questions, please call me at 924-3982.

Sincerely,

Susan M. Calongne, P.E.
City/County Floodplain Administrator

c: Don Maestas, Owner
Lisa Ann Manwill, P.E., Albuquerque Metropolitan Arroyo Flood Control Authority
Brad Catanach, P.E., Bernalillo County Public Works Division
File

DRAINAGE INFORMATION SHEET

PROJECT TITLE: Tract A, Sandia Heights South, Unit 16 ZONE ATLAS/DRNG. FILE #: D23 / D9B, PWD-96-95

DRB #: _____ EPC #: _____ WORK ORDER #: _____

LEGAL DESCRIPTION: Tract A, Sandia Heights South, Unit 16

CITY ADDRESS: *NE corner of Tramway Blvd. & San Rafael Ave.*

ENGINEERING FIRM: Advanced Engineering and Consulting, LLC CONTACT: Shahab Biazar

ADDRESS: 10209 Snowflake Ct. NW Alb., NM 87114 PHONE: (505) 899-5570

OWNER: Don Maestas CONTACT: Don Maestas

ADDRESS: 5113 Comanche Road, NE PHONE: (505) 881-0464

ARCHITECT: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

SURVEYOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

CONTRACTOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

_____ DRAINAGE REPORT
_____ DRAINAGE PLAN
_____ CONCEPTUAL GRADING & DRAINAGE PLAN
X GRADING PLAN
_____ EROSION CONTROL PLAN
_____ ENGINEER'S CERTIFICATION
X CLOMR

PRE-DESIGN MEETING:

_____ YES
_____ NO
_____ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

_____ SKETCH PLAN APPROVAL
X PRELIMINARY PLAT APPROVAL
_____ S. DEV. PLAN FOR SUB'D. APPROVAL
_____ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
_____ SECTOR PLAN APPROVAL
X FINAL PLAT APPROVAL
_____ FOUNDATION PERMIT APPROVAL
X BUILDING PERMIT APPROVAL
_____ CERTIFICATE OF OCCUPANCY APPROVAL
X GRADING PERMIT APPROVAL
_____ PAVING PERMIT APPROVAL
_____ S. A. D. DRAINAGE REPORT
_____ DRAINAGE REQUIREMENTS
_____ *OTHER*

RECEIVED
FEB 26 1999
HYDROLOGY SECTION

DATE SUBMITTED: *02 / 25 / 99*

BY: *SHAHAB BIAZAR*

ADVANCED ENGINEERING and CONSULTING

Consulting
Design
Development
Management

February 25, 1999

Ms. Susan Calongne, P.E.
City/County Floodplain Administrator
600 Second Street NW
Albuquerque, New Mexico 87102

RE: REQUEST FOR CONDITIONAL LETTER OF MAP REVISION (CLOMR) FOR TRACT A, SANDIA HEIGHTS SOUTH, UNIT 16, BERNALILLO COUNTY, NEW MEXICO, COMMUNITY No. 350001, FIRM PANEL NUMBER 35001C0161 D, (D23/D9) (PWD 96-95)

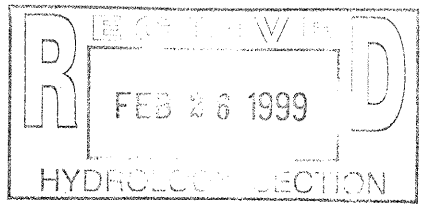
Dear Ms. Calongne:

Please find attached two copies of the CLOMR for Tract A, Sandia Heights South Unit 16, Bernalillo County, New Mexico for the submittal to the FEMA.

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

Sincerely yours,

Shahab Biazar, P.E.



10209 Snowflake Court N.E., Albuquerque, N.M. 87114 PH/FAX (505) 899-5570 PAGER (505) 460-2188

CLOMR
for
Tract A, Unit 16
Sandia Heights South

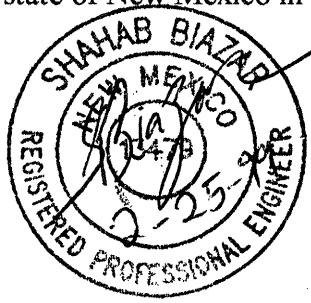
Prepared by:

ADVANCED
ENGINEERING
and CONSULTING, LLC

10205 Snowf lake Ct. NW
Albuquerque, New Mexico 87114

February, 1999

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.



Shahab Biazar
PE NO. 13479

TABLE OF CONTENTS

Form 1

Revision Requestor and Community Official Form

FEDERAL EMERGENCY MANAGEMENT AGENCY **REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM**	*FEMA USE ONLY*	*O.M.B. No. 3067-0148* *Expires July 31, 1997*

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 2.13 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden, to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472.

You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.

1. OVERVIEW

1. The basis for this revision request is (are): *(check all that apply)*
   - [X] Physical change
     - [X] Existing
     - [ ] Proposed
   - [ ] Improved methodology
   - [ ] Improved data
   - [ ] Floodway revision
   - [X] Other Revise of 100-Yr flood plain

   Explain See attached

2. Flooding Source: Upstream Basin, See attached

3. Project Name/Identifier: Tract A, Unit 16, Sandia Heights South

4. FEMA zone designations affected: Zone AE (Elevation 6057)
   (example: A, AH, AO, A1-A30, A99, AE, V, V1-30, VE, B, C, D, X)

5. The NFIP map panel(s) affected for all impacted communities is (are):

Community No.	Community Name	County	State	Map No.	Panel No.	Effective Date
EX: 480301	Katy,City	Harris, Fort Bend	TX	480301	0005D	02/08/83
480287	Harris County	Harris	TX	48201C	0220G	09/28/90
350001	N/A	Bernalillo	NM	35001C	0161D	09/20/96

6. The area of revision encompasses the following types of flooding, structures, and associated disciplines: *(check all that apply)*

Types of Flooding

- [ ] Riverine
- [ ] Coastal
- [ ] Alluvial Fan
- [X] Shallow Flooding *(e.g. Zones AO and AH)*
- [ ] Lakes

Affected by wind/wave action
- [ ] Yes
- [ ] No

Structures

- [ ] Channelization
- [X] Levee/Floodwall
- [ ] Bridge/Culvert
- [ ] Dam
- [ ] Coastal
- [X] Fill
- [ ] Pump Station
- [ ] None
- [ ] Channel Relocation
- [ ] Excavation
- [ ] Other *(describe)*

Disciplines*

- [ ] Water Resources
  - [X] Hydrology
  - [X] Hydraulics
  - [ ] Sediment Transport
  - [ ] Interior Drainage
- [ ] Structural
- [ ] Geotechnical
- [ ] Land Surveying
- [ ] Other *(describe)*

- [ ] Other(describe)

* **Attach completed "Certification by Registered Professional Engineer and/or Land Surveyor" Form for each discipline checked. (Form 2)**

2. FLOODWAY INFORMATION N/A

7. Does the affected flooding source have a floodway designated on the effective FIRM or FBFM? [ ] Yes [ ] No
8. Does the revised floodway delineation differ from that shown on the effective FIRM or FBFM [ ] Yes [ ] No
   If yes, give reason:

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

D. The community is willing to assume responsibility for ☒ performing ☒ overseeing compliance with the maintenance and operation plans of the Tract A, Unit 16, Sandia Heights South, Flood Wall (Name)

flood control structure. If not performed promptly by an owner other than the community, the community will provide the necessary services without cost to the Federal Government.

Attach operation and maintenance plans

7. REQUESTED RESPONSE FROM FEMA

16. After examining the pertinent NFIP regulations and reviewing the document entitled "Appeals, Revisions, and Amendments to National Flood Insurance Program Maps, A Guide for Community Officials," dated December 1993, this request is for a:

X a.	CLOMR	A letter from FEMA commenting on whether a proposed project, if built as proposed, would justify a map revision *(LOMR or PMR)*, or proposed hydrology changes *(see 44 CFR Ch. I, Parts 60, 65, and 72)*.
____ b.	LOMR	A letter from FEMA officially revising the current NFIP map to show changes to floodplains, floodways, or flood elevations. LOMRs typically depict decreased flood hazards. *(See 44 CFR Ch. I Parts 60 and 65.)*
____ c.	PMR	A reprinted NFIP map incorporating changes to floodplains, floodways, or flood elevations. Because of the time and cost involved to change, reprint, and redistribute an NFIP map, a PMR is usually processed when a revision reflects increased flood hazards or large-scope changes. *(See 44 CFR Ch. I, Parts 60 and 65.)*
____ d.	Other:	Describe_____

8. FORMS INCLUDED

17. Form 2 entitled, "Certification By Registered Professional Engineer and/or Land Surveyor" must be submitted.

The following forms should be included with this request if (check the included forms):

• Hydrologic analysis for flooding source differs from that used to develop FIRM	☒ Hydrologic Analysis Form (Form 3)
• Hydraulic analysis for riverine flooding differs from that used to develop FIRM	☒ Riverine Hydraulic Analysis Form (Form 4)
• The request is based on updated topographic information or a revised floodplain or floodway delineation is requested	☒ Riverine /Coastal Mapping Form (Form 5)
• The request involves any type of channel modification	☐ Channelization Form (Form 6)
• The request involves new bridge or culvert or revised analysis of an existing bridge or culvert	☐ Bridge/Culvert Form (Form 7)
• The request involves a new revised levee/floodwall system	☒ Levee/Floodwall System Analysis Form (Form 8)
• The request involves analysis of coastal flooding	☐ Coastal Analysis Form (Form 9)
• The request involves coastal structures credited as providing protection from the 100-year flood	☐ Coastal Structures (Form 10)
• The request involves an existing, proposed, or modified dam	☐ Dam Form (Form 11)
• The request involves structures credited as providing protection from the 100-year flood on an alluvial fan	☐ Alluvial Fan Flooding Form (Form 12)

Additional Information for Form 1

Basis for Revision Request

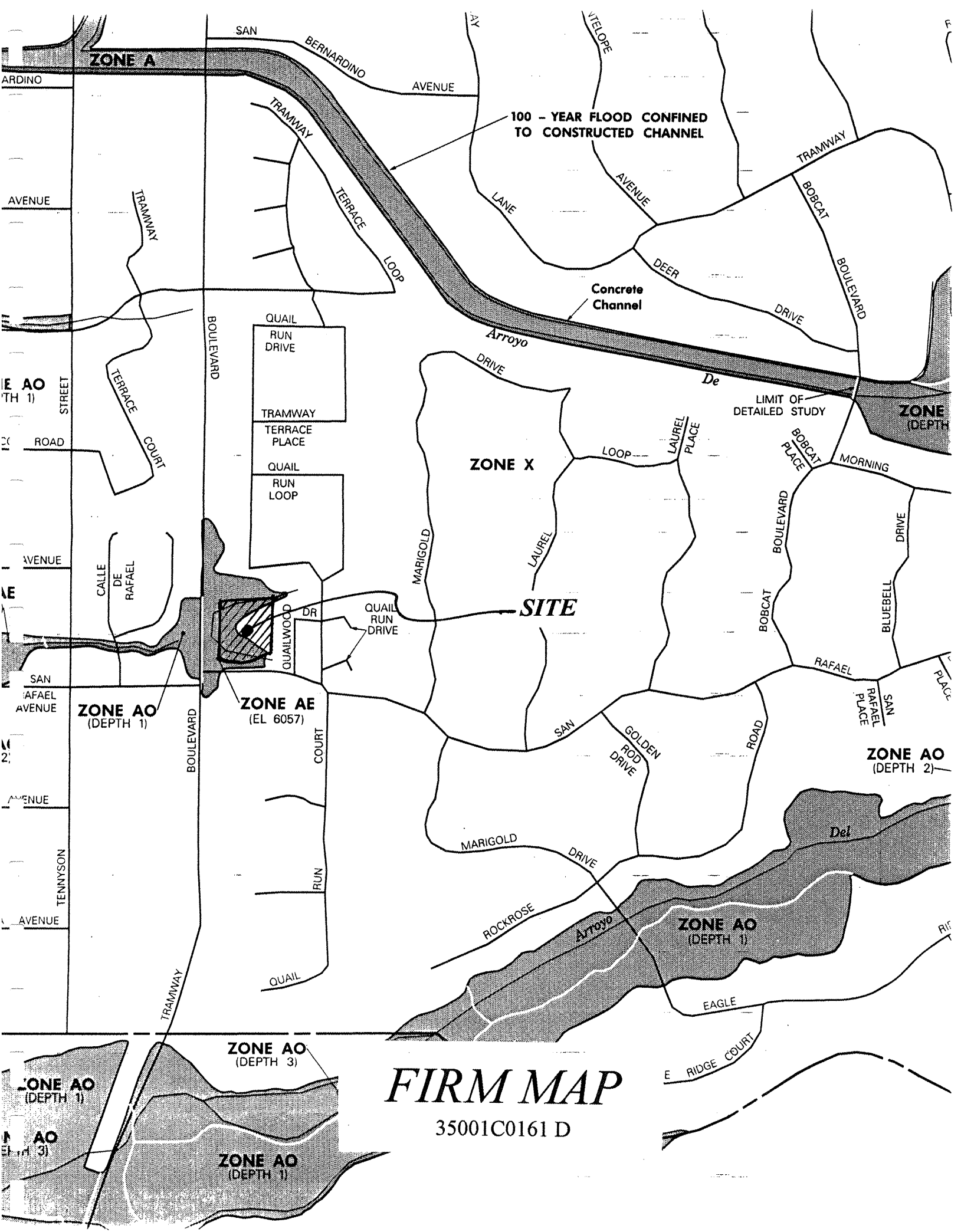
The general area considered for this Conditional Letters of Map Revision (CLOMR) includes the area immediately east of Tramway Boulevard. The following figure shows the area which is being proposed to be removed from the flood plain. A flood wall is being proposed along the easement line on the north side of the property. The site will also be raised to a minimum elevation of 6057 to the west to keep the site out of the flood plain. The AHYMO Model (AMAFCA Hydrologic Model) was used for hydrologic analysis of the upstream basins and routing of the runoff through the existing culverts (54" and 24"), and analyzing the proposed 100-year clear water surface elevation due to proposed improvements. The U.S. Army Corps of Engineering HEC-Ras hydraulic model was used to analyze the flow characteristics of the runoff within the existing channel located on the north side of the proposed Tract. The HEC-Ras output data was used to determine the height of the flood wall being proposed along the drainage easement line to the north. The basin map and the flow values were used from the Resource Technology basin mapping of this area. See the following sheets for the basin map and the AHYMO output file.

NFIP Map Panels Affected

The proposed CLOMR is for the FEMA map number 35001C0161 D, dated September 20, 1996. A small portion of the flood plain Zone AE (Elev 6057) is being proposed to be removed. See attached exhibit for the area that is being proposed for removal from the flood plain zoned AE.

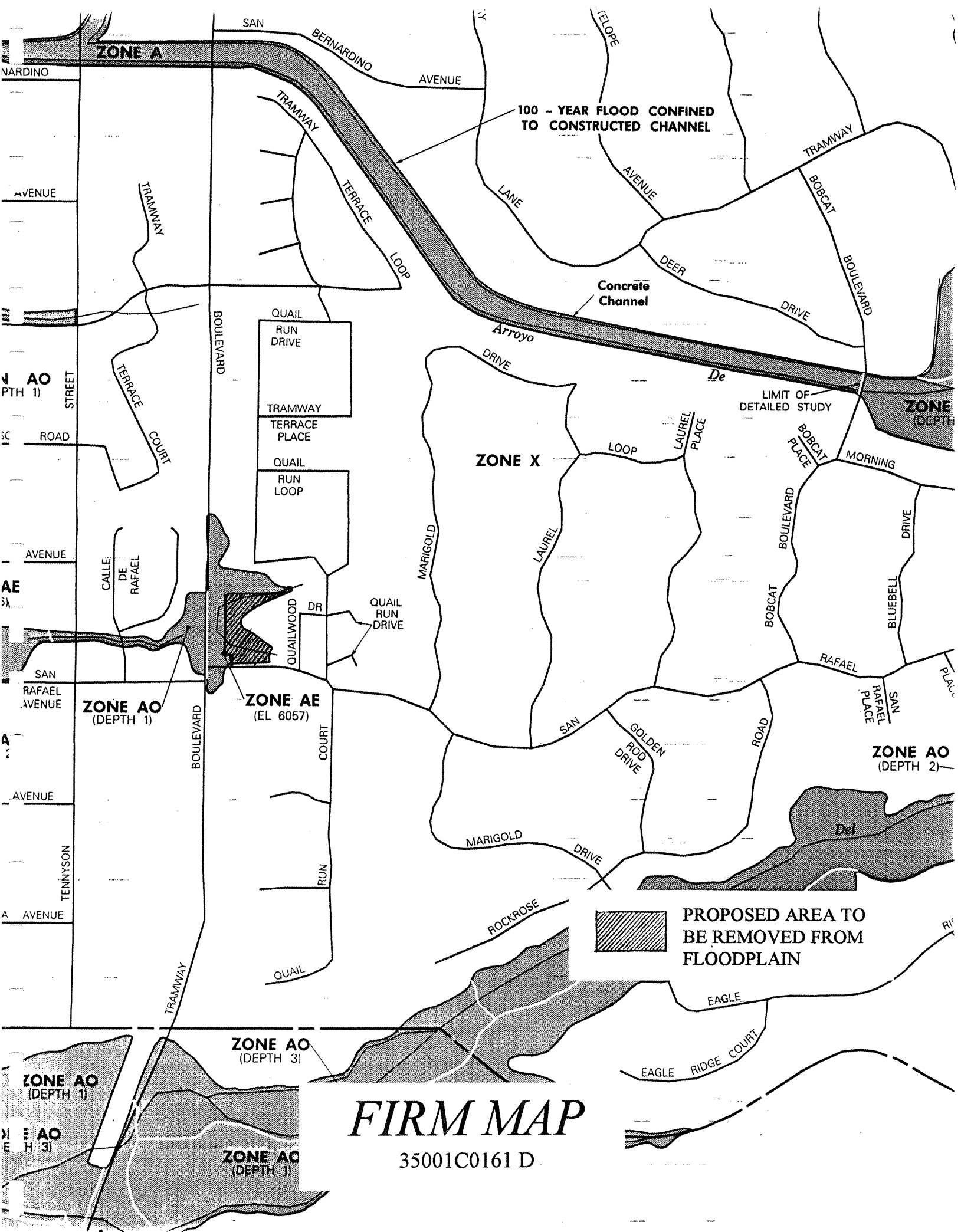
Operation and Maintenance of Flood Control Structure

The maintenance of the proposed flood wall has not been decided at this point. As part of the Letters of Map Revision (LOMR), once the flood wall is in place, the operation and maintenance of the structure will be clarified which would be either AMAFCA, Bernalillo County, or the owner of the property.



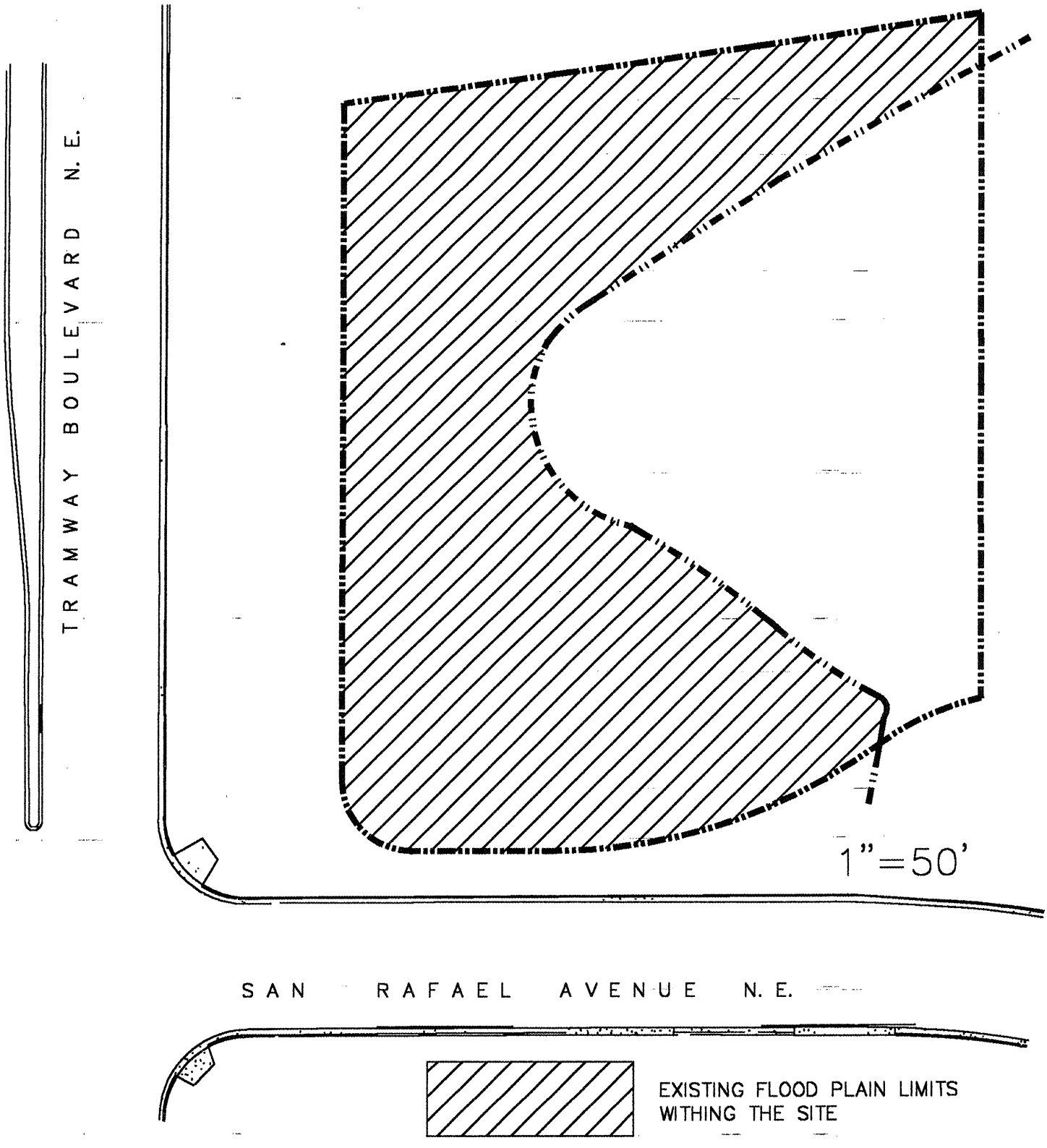
FIRM MAP

35001C0161 D



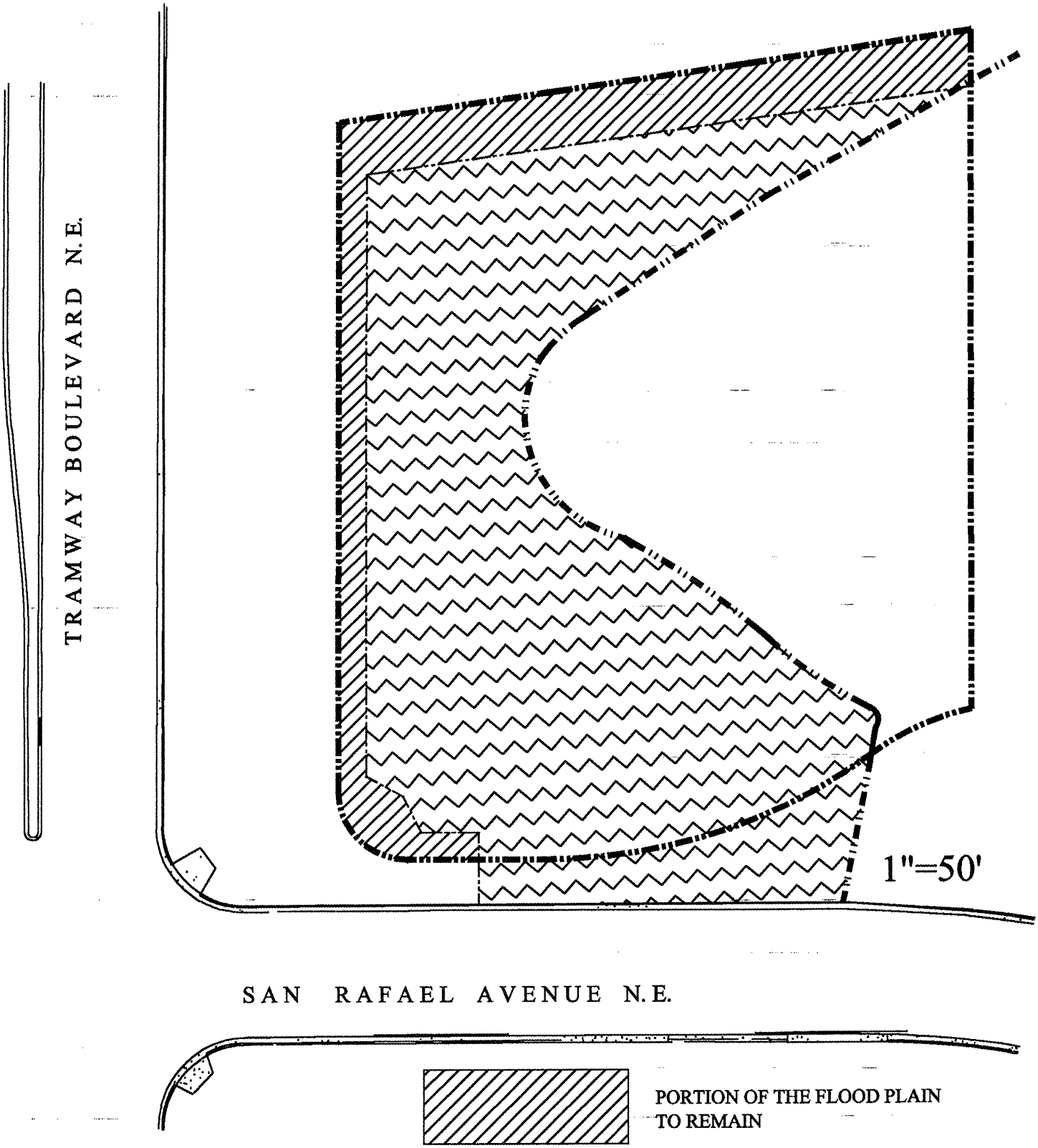
FIRM MAP

35001C0161 D



EXISTING FLOODPLAIN LIMITS WITHIN THE SITE

(SEE ALSO THE ACTUAL FIRM MAP FOR LOCATION)



PROPOSED FLOODPLAIN LIMITS WITHIN THE SITE

(SEE ALSO THE ACTUAL FIRM MAP FOR LOCATION)

Form 2

Certification by Registered Professional Engineer

FEDERAL EMERGENCY MANAGEMENT AGENCY
CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR FORM

FEMA USE ONLY

O.M.B. No. 3067-0148
Expires July 31, 1997

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average . 23 hour per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden, to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472.

You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.

1. **This certification is in accordance with 44 CFR Ch. I, Section 65.2**
2. **I am licensed with expertise in** Water resources (Hydrology, Hydrololics) **[example: water resources *(hydrology, hydraulics, sediment transport, interior drainage)** structural, geotechnical, land surveying.]**
3. **I have** 6 **years experience in the expertise listed above.**
4. **I have** ☒ **prepared** ☐ **reviewed the attached supporting data and analyses related to my expertise.**
5. **I** ☒ **have** ☐ **have not visited and physically viewed the project.**
6. **In my opinion, the following analyses and /or designs, is/are being certified:**

   Flood plain revision (Conditional)

7. **Based on the following review, the modifications in place have been constructed in general accordance with plans and specifications.** N/A

   Basis for above statement: (check all that apply)
   - a. ☐ **Viewed all phases of actual construction.**
   - b. ☐ **Compared plans and specifications with as-built survey information.**
   - c. ☐ **Examined plans and specifications and compared with completed projects.**
   - d. ☐ **Other *(Specify)*** _____

8. **All information submitted in support of this request is correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.**

Name: Shahab Biazar, P.E.
(please print or type)

Title: _____
(please print or type)

Registration No. 13479 **Expiration Date:** 12-31-99

State New Mexico

Type of License Profesional Engineer, Civil

Signature

02-01-99
Date

Seal
(Optional)

*Specify Subdiscipline

Note: Insert not applicable (N/A) if statement does not apply.

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

Form 3

Hydraulic Analysis Form

FEDERAL EMERGENCY MANAGEMENT AGENCY **HYDROLOGIC ANALYSIS FORM**	*FEMA USE ONLY*	*O.M.B. No. 3067-0148* *Expires July 31, 1997*

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 3.67 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden, to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472.

You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.

Community Name: Bernalillo County, New Mexico

Flooding Source: Upstream basin, see attached
(One form for each flooding source)

Project Name /Identifier: Tract A, Unit 16, Sandia Heights South

1. HYDROLOGIC ANALYSIS IN FIS

- ☐ Approximate study stream (Zone A)
- ☒ Detailed study stream (briefly explain methodology) Flooding Zone, AE (Elevation 6057)

2. REASON FOR NEW HYDROLOGIC ANALYSIS

- ☐ No existing analysis
- ☐ Improved data *(see data revision on page 3)*
- ☐ Changed physical conditions of watershed *(explain)* _____
- ☐ Alternative methodology *(justify why the revised model is better than model used in the effective FIS)*
- ☒ Evaluation of proposed conditions (CLOMRs only) (explain) See attached
- ☐ Other _____

If a computer program/model was used in revising the hydrologic analysis, please provide a diskette with the input files for the ~~10~~, ~~50~~, 100 - ~~and 500~~-year recurrence intervals. See attached

Only the 100-year recurrence interval need be included for SFHAs designated as Zone A.

3. APPROVAL OF ANALYSIS

- ☒ Approval of hydrologic analysis, including the resulting peak discharge value (s) has been provided by the appropriate local, state, or Federal Agency. (i.e., Bernalillo County, New Mexico)
  Attach evidence of approval.
- ☐ Approval of the hydrologic analysis is not required by any local, State, or Federal Agency.

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

5. HISTORICAL FLOODING INFORMATION

Is historical data available for the flooding source? ☐ Yes ☒ No

If yes, provide the following:

Location along flooding source: _____

Maximum peak discharge: _____ cfs

Second highest peak discharge: _____ cfs

Source of information: _____

6. GAGE RECORD INFORMATION

Location of nearest gage to project site *(along flooding source or similar watershed; specify)*

N/A

Gaging Station: _____

Drainage area at gage: _____ mi^2

Number of years of data: _____

7. DATA REVISION

Please use the following table to list all the data and/or parameters affected by this request and identify them as new data (*New*) or as revising existing data (*Revised*). *(If necessary, attach a separate sheet.)*

Data Parameter	New	Revised	Data Source
New Hydrologic Model	☒	☐	AHYMO-AMAFCA
	☐	☐	
	☐	☐	
	☐	☐	
	☐	☐	

- The data source can be a Federal, State, or local government agency, or a private source. Some State and local governments may have less strict data requirements than Federal agencies, in which case the hydrologic data may not be accepted by FEMA unless it is demonstrated that the data give a better estimate of the flood discharge.
- Attach documentation corroborating each data source *(i.e., certified statement, report, bibliographical reference to a published document)*. In the case of a published document or a government report, providing copies of the cover and pertinent pages may be helpful.

8. METHODOLOGY FOR NEW ANALYSIS

☐ Statistical Analysis of Gage Records (*use Attachment A*)

☐ Regional Regression Equations *(use Attachment B)*

☒ Precipitation/Runoff Model *(use Attachment C)*

☐ Other *(specify; attach backup computations and supporting data)* _____

1. Bibliographical Reference:

N/A

(Attach a copy of title page, table of contents, and pertinent pages including equations.)

2. Gaged or ungaged stream: _____

3. Hydrologic region(s): _____
Attach backup map.

4. Provide parameters, values, and source of data used to define parameters.

		FIS		Revised	
5.	Urbanized conditions calculations?	☐ Yes	☐ No	☐ Yes	☐ No
6.	Percent of watershed urbanization	_____		_____	
7.	Is the watershed controlled?	☐ Yes	☐ No	☐ Yes	☐ No
8.	Comparison with other analyses?	☐ Yes	☐ No	☐ Yes	☐ No

If the answer to questions 5, 7, or 8 is yes, explain methodology in Comments.

If data are not available, indicate with "N/A".

9. Comments

Attach computation and supporting maps delineating the watershed boundary and drainage area divides.

ATTACHMENT D: CONFIDENCE LIMITS EVALUATION

Stream: Upstream Basins

Selected location for Confidence Limits Evaluation (*describe location*): N/A

Discharges for selected location:

Exceedance Probability		FIS	Revised
10%	(10-year)	_____ cfs	_____ cfs
2%	(50-year)	_____ cfs	_____ cfs
1%	(100-year)	_____ cfs	_____ cfs
0.2%	(500-year)	_____ cfs	_____ cfs

1% (100-year) Flood Confidence Intervals

90% Confidence Interval: 5% limit _____ cfs

95% limit _____ cfs

50% Confidence Interval: 25% limit _____ cfs

75% limit _____ cfs

If the value of the 100-year frequency flood in the FIS is beyond the 50% confidence interval but within the 90% confidence interval, does the 100-year water surface elevation change by 1.0 foot or more? ☐ Yes ☐ No

Note: An example of confidence limits analysis can be found in Appendix 9 of Bulletin 17B.

Attach Confidence Limits Analysis.

Additional Information for Form 3
Hydrology Analysis Form

2. Reason For New Hydrologic Analysis

As part of the CLOMR, we are proposing to remove majority portion of the existing floodplain within the site. In order to accomplish this proposal, we will build a flood wall on the north side of the Tract (along the drainage easement line), and we also will raise the west end of the site (to a minimum elevation of 6057') in order to keep it above the 100-year water surface elevation. AHYMO (AMAFCA Hydrologic Model) Routing was used to calculate the flood elevation as the runoff backs up and ponds at the inlet of the existing 54" and 24" culverts. The AHYMO Model also was also used for hydrologic analysis of the upstream basins. The U.S. Army Corps of Engineering HEC-Ras hydraulic model was used to analyze the flow characteristics of the runoff within the existing channel located on the north side of the proposed Tract. The HEC-Ras output data was used to determine the height of the flood wall (which is being proposed along the drainage easement line to the north). See Appendix A for HEC-Ras calculations under the existing and the proposed conditions (with the floodwall in place). See Appendix B for AHYMO calculations. See Appendix C for summary output from AHYMO for the upstream basins prepared by Resource Technology Inc. Also, see the overall Basin Map in the Map Pocket prepared by Resource Technology Inc.

4. Review Of Results

The runoff numbers came from the recent basin studies that Resource Technology has prepared. A copy of this basin studies and AHYMO output summary is included as part of this submittal. There were no previous results in order to compare the runoff numbers under the proposed conditions.

Form 4

Reverine Hydraulic Analysis Form

FEDERAL EMERGENCY MANAGEMENT AGENCY RIVERINE HYDRAULIC ANALYSIS FORM	FEMA USE ONLY	O.M.B. No. 3067-0148 Expires July 31, 1997

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 2.25 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden, to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472.

You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.

Community Name: Bernalillo County, New Mexico

Flooding Source: Upstream Basins
(One form for each flooding source)

Project Name/Identifier: Tract A, Unit 16, Sandia Heights South

1. REACH TO BE REVISED

Downstream limit: Tramway Blvd.

Upstream limit: +/- 250' East of Tramway Blvd.

2. EFFECTIVE FIS

☐ **Not studied**

☒ **Studied by approximate methods**

Downstream limit of study West of Tramway Blvd.

Upstream limit of study Water shed in Sandia Heights

☐ **Studied by detailed methods**

Downstream limit of detailed study

Upstream limit of detailed study

☐ **Floodway delineated**

Downstream limit of Floodway

Upstream limit of Floodway

3. HYDRAULIC ANALYSIS

Why is the hydraulic analysis different from that used to develop the FIRM. ***(Check all that apply)***

☐ **Not studied in FIS**

☒ **Improved hydrologic data/analysis. Explain:** (CLOMR) The AHYMO model, which models the 100-Year hydrograph.

☒ **Improved hydraulic analysis. Explain:** Effective FIS only studies the area by approximate methods. This CLOMR uses the Army Corp of Engineering HEC-RAS hydralic model.

☒ **Flood control structure. Explain:** A flood wall will be built and fill material will be placed to keep the flood out of the site.

☐ **Other. Explain:**

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

5. MODEL PARAMETERS *(from model used to revise 100-year water surface elevation)*

1. **Discharges:** See Attached

	Upstream Limit	Downstream Limit
10-year ..... N/A		
50-year ..... N/A		
100-year	242.0 cfs	242.0 cfs
500-year ..... N/A		

Attach diagram showing changes in 100-year discharge

2. **Explain how the starting water surface elevations were determined** Based on the normal flood depth in the channel

3. **Give range of friction loss coefficients (*Manning's "N"*) Channel** 0.03

Overbanks 0.045

If friction loss coefficients are different anywhere along the revised reach from those used to develop the FIRM, give location, value used in the effective FIS, and revised values and an explanation as to how the revised values were determined.

N/A

Location	FIS	Revised

Explain:

4. **Describe how the cross section geometry data were determined *(e.g., field survey, topographic map, taken from previous study)* and list cross sections that were added.**

The cross-section geometry was developed using field survey. (See attached)

5. **Were natural channel banks selected as the location of the left and right channel banks in the model?**

☒ **Yes** ☐ **No** **If no, explain why not:**

6. Is the discharge value used to determine the floodway anywhere different from that used to determine the natural 100-year flood elevations? ..... ☐ Yes ☒ No

If Yes, explain:

7. Do 100-year water surface elevations increase at any location? ..... ☐ Yes ☒ No

If yes, please attach a list of the locations where the increases occur, state whether or not the increases are located on the requestor's property, and provide an explanation of the reason for the increases. *(For example: State if the increase is due to fill placed within the floodway fringe or placed within the currently adopted floodway limits)*

Attach a completed comparison table entitled: Water Surface Elevation Check (see page 6)

7. REVISED FIRM/FBFM AND FLOOD PROFILES

8. The revised water surface elevations tie into those computed by the effective FIS Model *(10-, 50-, 100-, and 500-year)*, downstream of the project at cross-section_____ within_____feet *(vertical)* and upstream of the project at cross section_____within_____feet *(vertical)*. N/A

9. The revised floodway elevations tie into those computed by the effective FIS model, dowstream of the project at cross section_____within_____feet *(vertical)* and upstream of the project at cross section_____ within_____feet *(vertical)*. N/A

10. Attach profiles, at the same vertical and horizontal scale as the profiles in the effective FIS report, showing stream bed and profiles of all floods studied (without encroachment). Also, label all cross sections, road crossings (including low chord and top-of-road data), culverts, tributaries, corporate limits, and study limits. If channel distance has changed, the stationing should be revised for all profile sheets. N/A

11. Attach a Floodway Data Table showing data for each cross section listed in the published Floodway Data Table in the FIS report. N/A

Proceed to Riverine /Coastal Mapping Form (Form 5)

Additional Information for Form 4
Riverine Hydraulic Analysis Form

5. Model Parameters

    1. Discharges:

        - We have used the 242 cfs flow value (from Resource Technology Inc. basin study for this area) to run the HEC-Ras calculations. The revised flow value, from Resource Technology Inc., is 224 cfs, but we have used the 242 cfs to be more conservative for the flood wall design. See Appendix A for HEC-Ras calculations. Also, see Appendix C for Resource Technology Inc. AHYMO summery output file.

        - In order to run the AHYMO program for ponding at the inlet of the 54" and the 24" culvert, we have used the Resource Technology Inc. flow values for Basins 500.10 and 500.20. Using trial and error, we have changed our treatment values to match Resource Technology's flow values. The new 100-year water surface elevation (6056.95') is almost the same as the existing flood elevation (6057.00'), but the number is based on all the improvements being in place (the floodwall to the north and the fill area to west). See Appendix B for AHYMO calculations. Also, see Appendix C for Resource Technology Inc. AHYMO summery output file.

    4. See Appendix A for the cross-sections used for HEC-Ras calculations

Form 5

Riverine Mapping Form

FEDERAL EMERGENCY MANAGEMENT AGENCY **RIVERINE/COASTAL MAPPING FORM**	*FEMA USE ONLY*	*O.M.B. No. 3067-0148* *Expires July 31, 1997*

PUBLIC BURDEN DISCLOSURE NOTICE

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You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.

Community Name: Bernalillo County, New Mexico

Flooding Source: Upstream Basins

Project Name/Identifier: Tract A, Unit 16, Sandia Heights South

1. MAPPING CHANGES

1. A topographic work map of suitable scale, contour interval, and planimetric definition must be submitted showing *(indicate N/A when not applicable)*:

		Included						
A.	Revised approximate 100-year floodplain boundaries (Zone A)?	☐	Yes	☐	No	☒	N/A
B.	Revised detailed 100- and 500-year floodplain boundaries?	☐	Yes	☐	No	☒	N/A
C.	Revised 100-year floodway boundaries?	☐	Yes	☐	No	☒	N/A
D.	Location and alignment of all cross sections used in the revised hydraulic model with stationing control indicated?	☒	Yes	☐	No	☐	N/A
E.	Stream alignments, road and dam alignments?	☒	Yes	☐	No	☐	N/A
F.	Current community boundaries?	☒	Yes	☐	No	☐	N/A
G.	Effective 100- and 500-year floodplain and 100-year floodway boundaries from the FIRM/FBFM reduced or enlarged to the scale of the topographic work map?	☒	Yes	☐	No	☐	N/A
H.	Tie-ins between the effective and revised 100- and 500-year floodplains and 100-year floodway boundaries?	☒	Yes	☐	No	☐	N/A
I.	The requestor's property boundaries and community easements?	☒	Yes	☐	No	☐	N/A
J.	The signed certification of a registered professional engineer?	☒	Yes	☐	No	☐	N/A
K.	Location and description of reference marks?	☒	Yes	☐	No	☐	N/A
L.	Vertical datum (example: NGVD, NAVD etc.)?	☒	Yes	☐	No	☐	N/A
M.	Coastal zone designations tie into adjacent areas not being revised?	☐	Yes	☐	No	☒	N/A
N.	Location and alignment of all coastal transects used to revise the coastal analyses?	☐	Yes	☐	No	☒	N/A

If any of the items above are marked no or N/A, please explain: See attachement

2. What is the source and date of the updated topographic information *(example: orthophoto maps, July 1985; field survey, May 1979, beach profiles, June 1987, etc.)*? Field Survey

3. What is the scale and contour interval of the following workmaps?

   a. Effective FIS 1"=500' & 1"=50' scale N/A Contour interval

   b. Revision Request 1"=50' scale N/A Contour interval
   See map pocket for full size grading plan. (1' contour interval)

NOTE: Revised topographic information must be of equal or greater detail.

4. Attach an annotated FIRM and FBFM at the scale of the effective FIRM and FBFM showing the revised 100- and 500-year floodplain and the 100-year floodway boundaries and how they tie into those shown on the effective FIRM and FBFM downstream and upstream of the revisions or adjacent to the area of revision for coastal studies Attach additional pages if needed

PLEASE REFER TO THE INSTRUCTION FOR THE APPROPRIATE MAILING ADDRESS

2. EARTH FILL PLACEMENT See attachment

1. The fill is: ☐ Existing ☒ Proposed

2. Has fill been placed/will be placed in the regulatory floodway? ..... ☐ Yes ☐ No
   If yes, please attach completed Riverine Hydraulic Analysis Form. (Form 4)

3. Has fill been/will be placed in floodway fringe *(area between the floodway and 100-year floodplain boundaries)*? ..... ☐ Yes ☐ No

   If yes, then complete A, B, C, and D below.

   a. Are fill slopes for granular materials steeper than one vertical on one-and-one-half horizontal? ..... ☐ Yes ☐ No

      If yes, justify steeper slopes_____

   b. Is adequate erosion protection provided for fill slopes exposed to moving flood waters? *(Slopes exposed to flows with velocities of up to 5 feet per second (fps) during the 100-year flood must, at a minimum, be protected by a cover of grass, vines, weeds, or similar vegetation; slopes exposed to flows with velocities greater than 5 fps during the 100-year flood must, at a minimum, be protected by stone or rock riprap.)* ..... ☐ Yes ☐ No

      If no, describe erosion protection provided_____

   c. Has all fill placed in the revised 100-year floodplain been compacted to 95 percent of the maximum density obtainable with the Standard Proctor Test Method or acceptable equivalent method? ☐ Yes ☐ No

   d. Can structures conceivably be constructed on the fill at any time in the future? ☐ Yes ☐ No

   If yes, provide certification of fill compaction (Item c. above) by the community's NFIP permit official, a registered professional engineer, or an accredited soils engineer.

4. Has fill been placed/will be placed in a V-zone? N/A ☐ Yes ☐ No

   If yes, is the fill protected from erosion by a flood control structure such as a revetment or seawall? ☐ Yes ☐ No

   If yes, attach the coastal structures form.

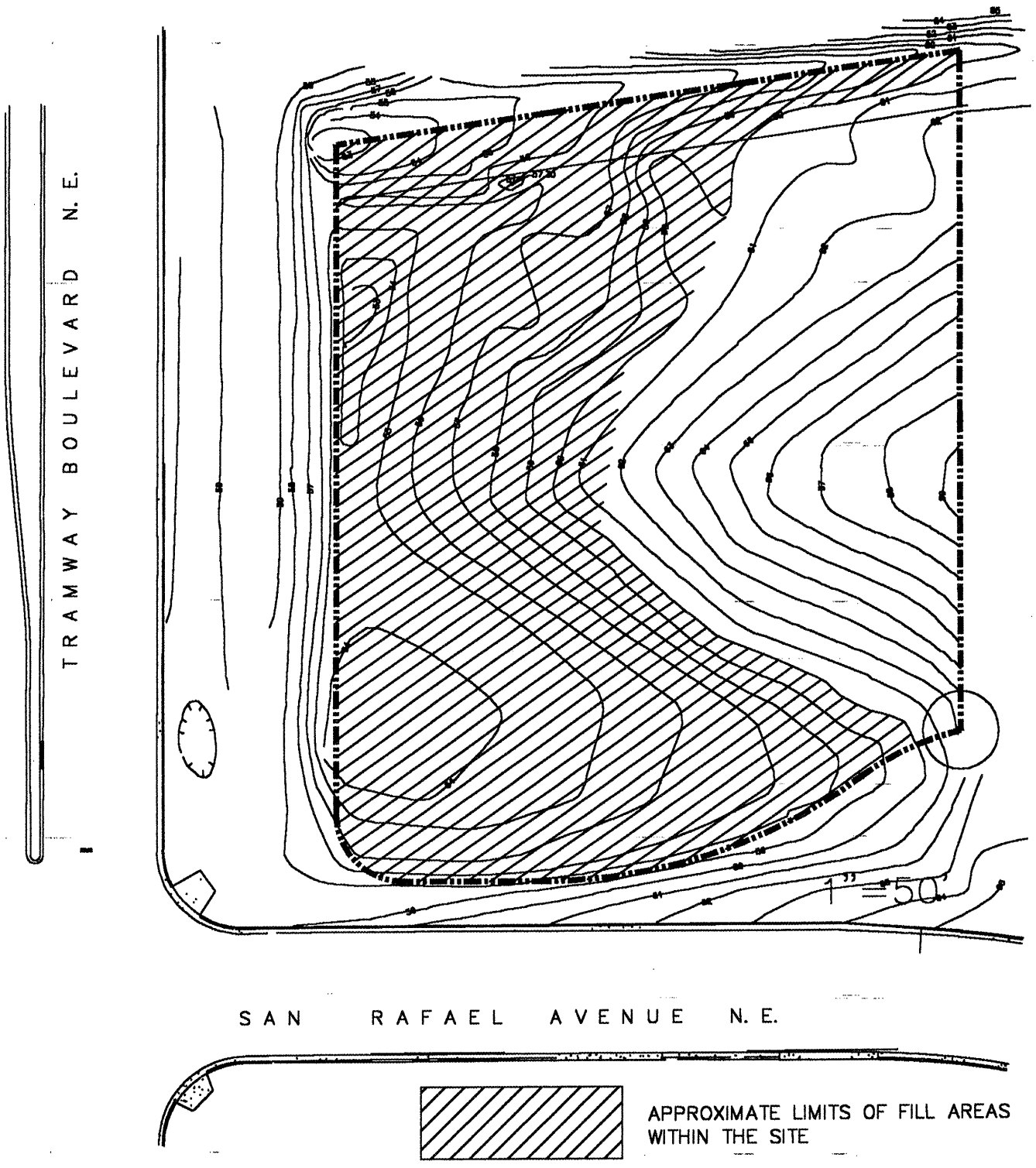
Additional Information for Form 5
Riverine Mapping Form

1. Mapping Changes

A. The site does not fall within Zone A
C. The site does not fall within a 100-year floodway
M. The site does not fall within a coastal Zone
N. There are no coastal alignments

2. Earth Fill Placement

The fill is being proposed (mainly) on the westerly portion of the site to raise the site above the flood plain elevations. The slopes will not exceed 3:1 (H:V) grade. All the fill material will be compacted to 95% compaction, and all the disturbed areas will be revegetated. Most of the erosion will be along the flood wall to the north where the runoff is flowing toward the existing culvert. The floodwall's footing is designed for the depth of the scour. The slope ties to the west will be under a ponding situation where the runoff will be stagnate, and erosion will not be happening. See attached drawing for the fill areas. Also, see the full grading plan in the map pocket.



APPROXIMATE LIMITS OF FILL AREAS WITHIN THE SITE

Form 8

Floodwall System Analysis

FEDERAL EMERGENCY MANAGEMENT AGENCY **LEVEE/FLOODWALL SYSTEM ANALYSES FORM**	**FEMA USE ONLY**	*O.M.B. No. 3067-0148* *Expires July 31, 1997*

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 3.0. hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden, to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472.

You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.

Community Name: Bernalillo County, New Mexico

Flooding Source: Upstream basins

Project Name/Identifier: Tract A, Unit 16, Sandia Heights South

1. REACH TO BE REVISED

Downstream limit: West of Tramway Blvd.

Upstream limit: Water shed in Sandia Heights

This Levee/Floodwall analysis is based on:

- ☐ upgrading of an existing levee/floodwall system
- ☒ a newly constructed levee/floodwall system (proposed flood wall) See attachment
- ☐ reanalysis of an existing levee/floodwall system

2. LEVEE/FLOODWALL SYSTEM ELEMENTS

1. Levee elements and locations:

☐ earthen embankment, dike, berm etc.	Station_____	to_____
☒ structural floodwall (See atachment)	Station_____	to_____
☐ other (describe)_____	Station_____	to_____

2. Structural Type:

- ☐ monolithic cast-in place reinforced concrete
- ☒ reinforced concrete masonry block
- ☐ sheet piling
- ☐ other (describe)_____

3. Has this levee/floodwall system been certified by a Federal agency to provide protection against the 100-year flood event?

(See attachment) ☐ Yes ☒ No

If yes, by which agency?_____

If yes, complete only the interior drainage section on pages 7 and 8 of this form and the operation and maintenance section of Revision Requestor and Community Official Form.

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

5. SEDIMENT TRANSPORT CONSIDERATIONS

1. a. Is there any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year water surface elevations?

☐ Yes ☒ No

b. Based on the conditions (such as geomorphology, vegetative cover and development of the watershed and stream bed, and bank conditions), is there a potential for debris and sediment transport (including scour and deposition) to affect the 100-year water surface elevations and/or the freeboard for the levee/floodwall?

☐ Yes ☒ No

2. If the answer to either 1a or 1b is yes: N/A

A. What is the estimated sediment (bed material) load?

_____cfs (attach gradation curve)

Explain method used to estimate the sediment transport and the depth of scour and/or deposition

_____

_____

_____

_____

_____

B. Will sediment accumulate anywhere along the levee/floodwall (such as along any bends in the channel)?

☐ Yes ☐ No

If yes, what is the minimum freeboard at these locations?_____feet.

6. CLOSURES

1. Openings through the levee system: N/A

☐ exist ☐ do not exist

If openings exist, list all closures:

Channel Station	Left or Right Bank	Opening Type	Highest Elevation for Opening Invert	Type of Closure Device

(Extend table on an added sheet as neded and reference)

Geotechnical and geologic data: N/A

In addition to the required detail analysis reports, data obtained during field and laboratory investigations and used in the design analysis must be submitted in a tabulated summary form for the following levee system features. (Reference U S. Army Corps of Engineers EM-1110-2-1906 Form 2086).

7. EMBANKMENT AND FOUNDATION STABILITY N/A

1. Identify locations and describe the basis for selection of critical locations for analyses: N/A

☐ Overall height: Sta_____, height_____ft.

☐ Limiting foundation soil strength:

Sta_____, depth_____to_____

strength $\emptyset$ = _____degrees, c = _____psf

☐ slope: SS = _____(h) to_____(v)

(Repeat as needed on an added sheet for additional slopes and locations)

2. Specify the embankment stability analyses methodology used (e.g. circular arc, sliding block, infinite slope, etc.): N/A

3. Summary of stability analysis results: N/A

Case	Loading Conditions	Critical Safety Factor	Criteria (Min.)
I	End of construction		1.3
II	Sudden drawdown		1.0
III	Critical flood stage		1.4
IV	Steady seepage at flood stage		1.4
VI	Earthquake (Case I)		1.0

(Reference: U.S. Army Corps of Engineers EM-1110-2-1913 Table 6-1)

4. Was a seepage analysis for the embankment performed? N/A ☐ Yes ☐ No

Describe methodology used: _____

5. Was a seepage analysis for the foundation performed? N/A ☐ Yes ☐ No

Were uplift pressures at the embankment landside toe checked? ☐ Yes ☐ No

Were seepage exit gradients checked for piping potential? ☐ Yes ☐ No

6. Duration of 100-year flood hydrograph against the embankment : N/A Hrs.

Note: Attach engineering analysis to support construction plans.

9. SETTLEMENT N/A

1. Has anticipated potential settlement been determined and incorporated into the specified construction elevations to maintain the established freeboard margin?
   ☐ Yes ☒ No
2. Computed range of settlement : N/A ft. to _____ ft.
3. Settlement of the levee crest is determined to be primarily from: N/A
   - ☐ Foundation consolidation
   - ☐ Embankment compression
   - ☐ Other (describe) _____
4. Differential settlement of floodwalls N/A
   ☐ has ☐ has not been accommodated in the structural design and construction.

Note: Attach engineering analysis to support construction plans.

10. INTERIOR DRAINAGE N/A

1. Specify size of each interior watershed N/A
   - Draining to pressure conduit _____
   - Draining to ponding area _____
2. Relationships Established N/A
   - Ponding elevation vs. storage ☐ Yes ☐ No
   - Ponding elevation vs. gravity flow ☐ Yes ☐ No
   - Differential head vs. gravity flow ☐ Yes ☐ No
3. The river flow duration curve is enclosed N/A ☐ Yes ☐ No
4. Specify the discharge capacity of the head pressure conduit N/A
5. Which Flooding Conditions Were Analyzed? N/A
   - Gravity flow (Interior Watershed) ☐ Yes ☐ No
   - Common storm (River Watershed) ☐ Yes ☐ No
   - Historical ponding probability ☐ Yes ☐ No
   - Coastal wave overtopping ☐ Yes ☐ No

   If no, explain why: _____
6. Interior drainage has been analyzed based on joint probability of interior and exterior flooding and the capacities of pumping and outlet facilities to provide the established level of flood protection.
   N/A ☐ Yes ☐ No
   If no, explain why: _____
7. The rate of seepage through the levee system for the 100-year flood is N/A cfs

OPERATIONAL PLAN AND CRITERIA N/A

1. Does the operation plan incorporate all the provisions for closure devices as required in Section 65.10 (c) (1), of the NFIP regulations? N/A

☐ Yes ☐ No

2. Does the operation plan incorporate all the provisions for interior drainage as required in Section 65.10 (c) (2), of the NFIP regulations? N/A

☐ Yes ☐ No

If the answer is no to either of the above, please explain below.

Additional Information for Form 8
Floodwall System Analysis Form

1. Reach to Be Revised

The floodwall is a new construction and is designed based on the HEC-Ras analysis. We are proposing to build this wall to keep the flood within the drainage easement to the north of the proposed Tract.

2. Floodwall System Elements

1. See the grading plan in the map pocket for the flood wall location.
3. Floodwall is being proposed with the CLOMR. Once the CLOMR is approved, the floodwall will be built, and then it will be certified by either the County floodplain administrator, County Hydrology, or AMAFCA.

3a. As part of the LOMR, we will submit the plan of the flood wall structure. The wall is not certified yet by any governmental agency, because is being merely proposed.

3b. As part of the LOMR, we will submit the profile of the floodwall system is attached showing the 100-year water surface elevations. The wall is not certified yet by any governmental agency, because is being merely proposed.

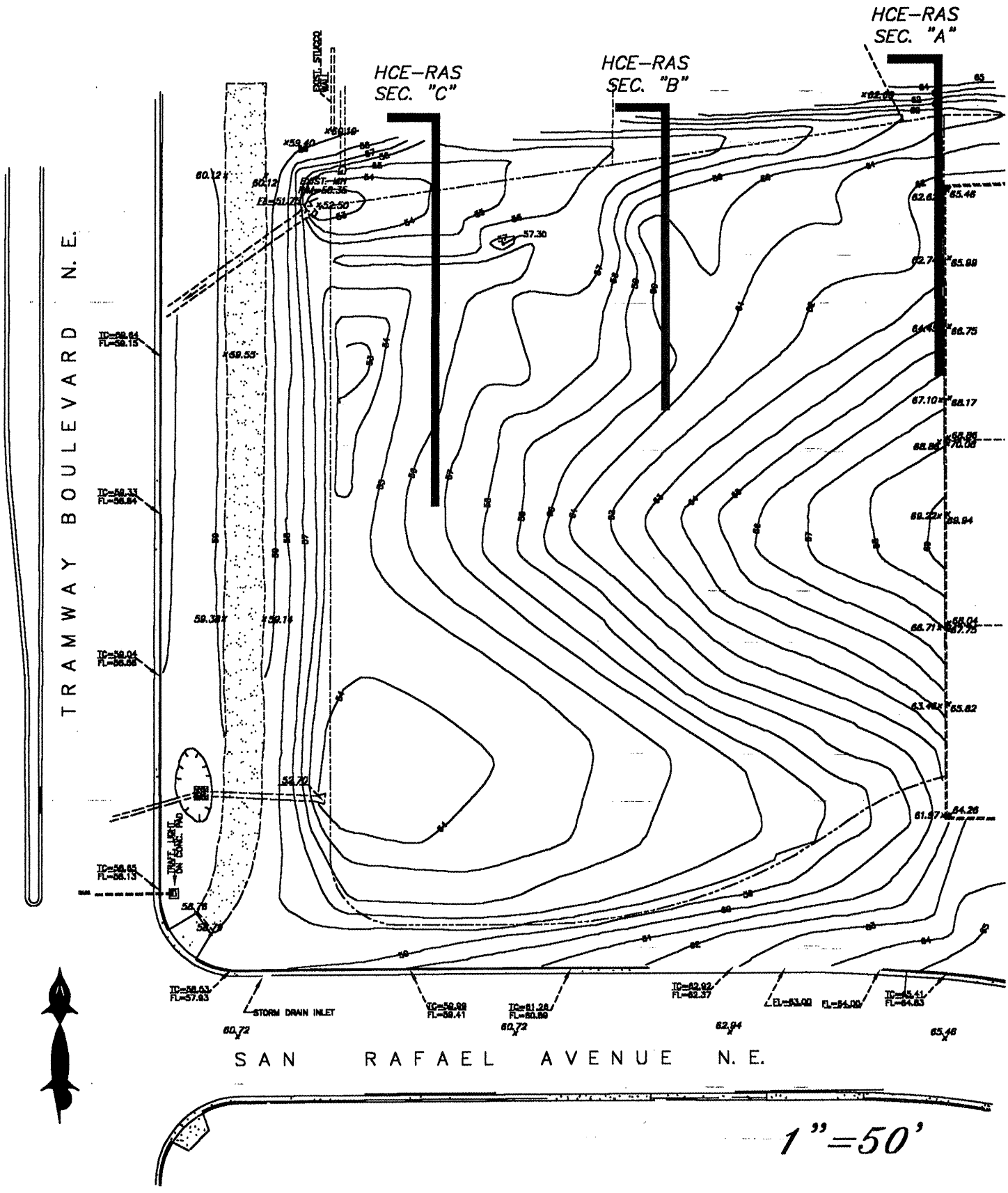
8. Floodwall and Foundation Stability

The floodwall and the foundation are not designed at the time. Once the CLOMR is approved, a floodwall will be designed and detailed before actual construction and submittal of LOMR.

APPENDIX A

HEC-RAS CALCULATIONS

UNDER EXISTING AND PROPOSED CONDITIONS



PROPOSED CROSS SECTIONS FOR HEC-RAS RUNS

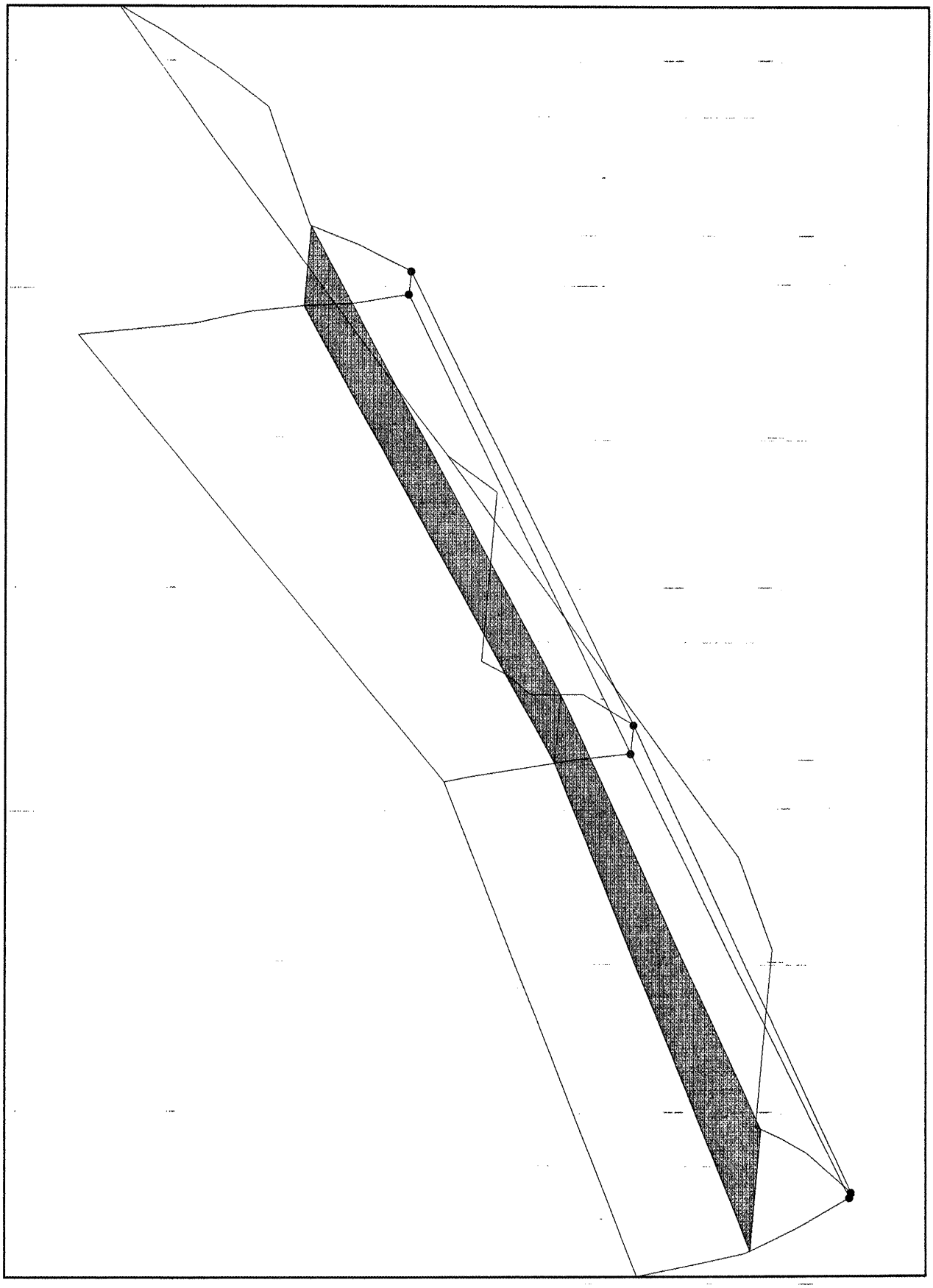
(EXISTING CONDITIONS)

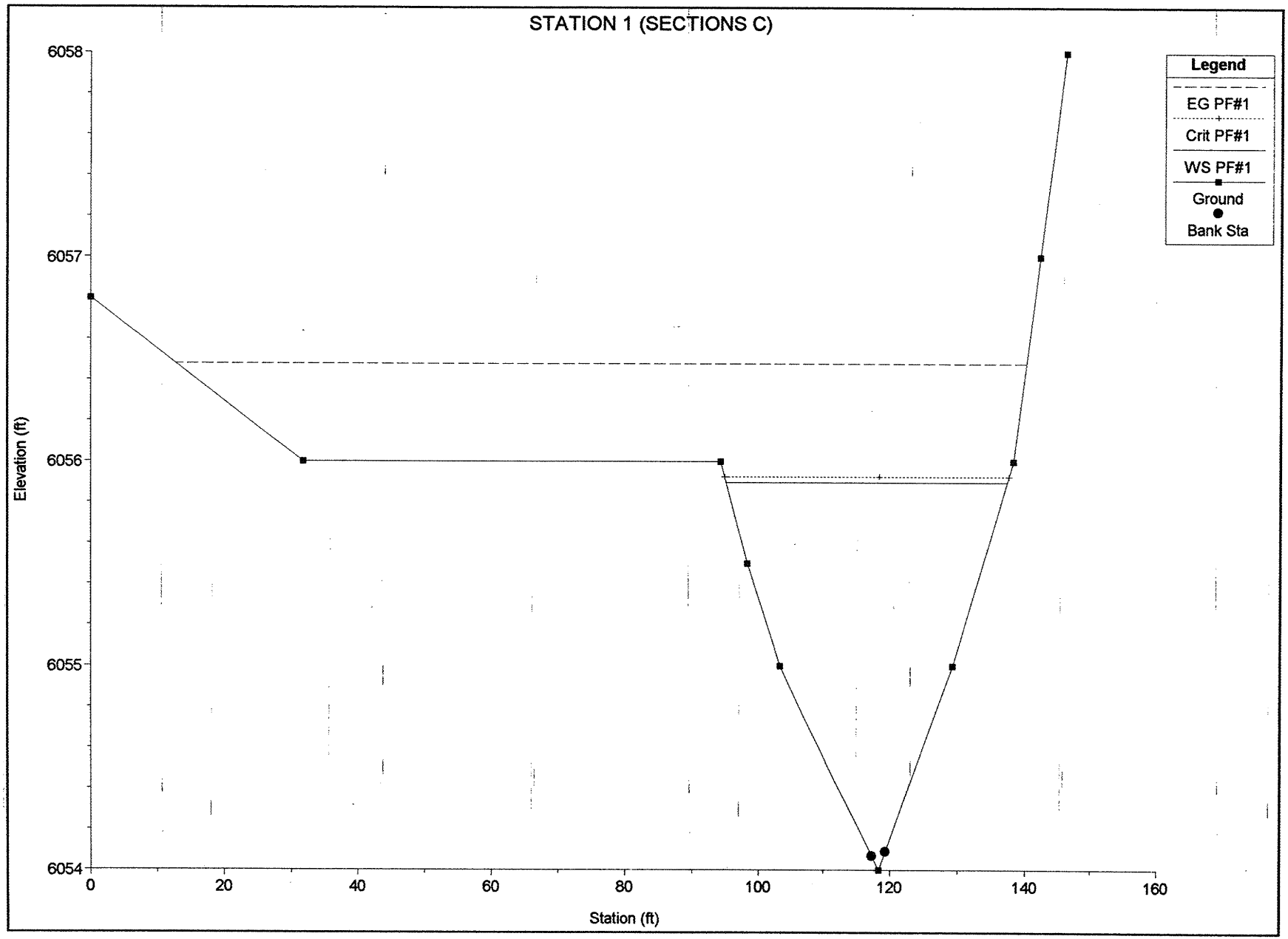
HEC-RAS OUTPUT FILE

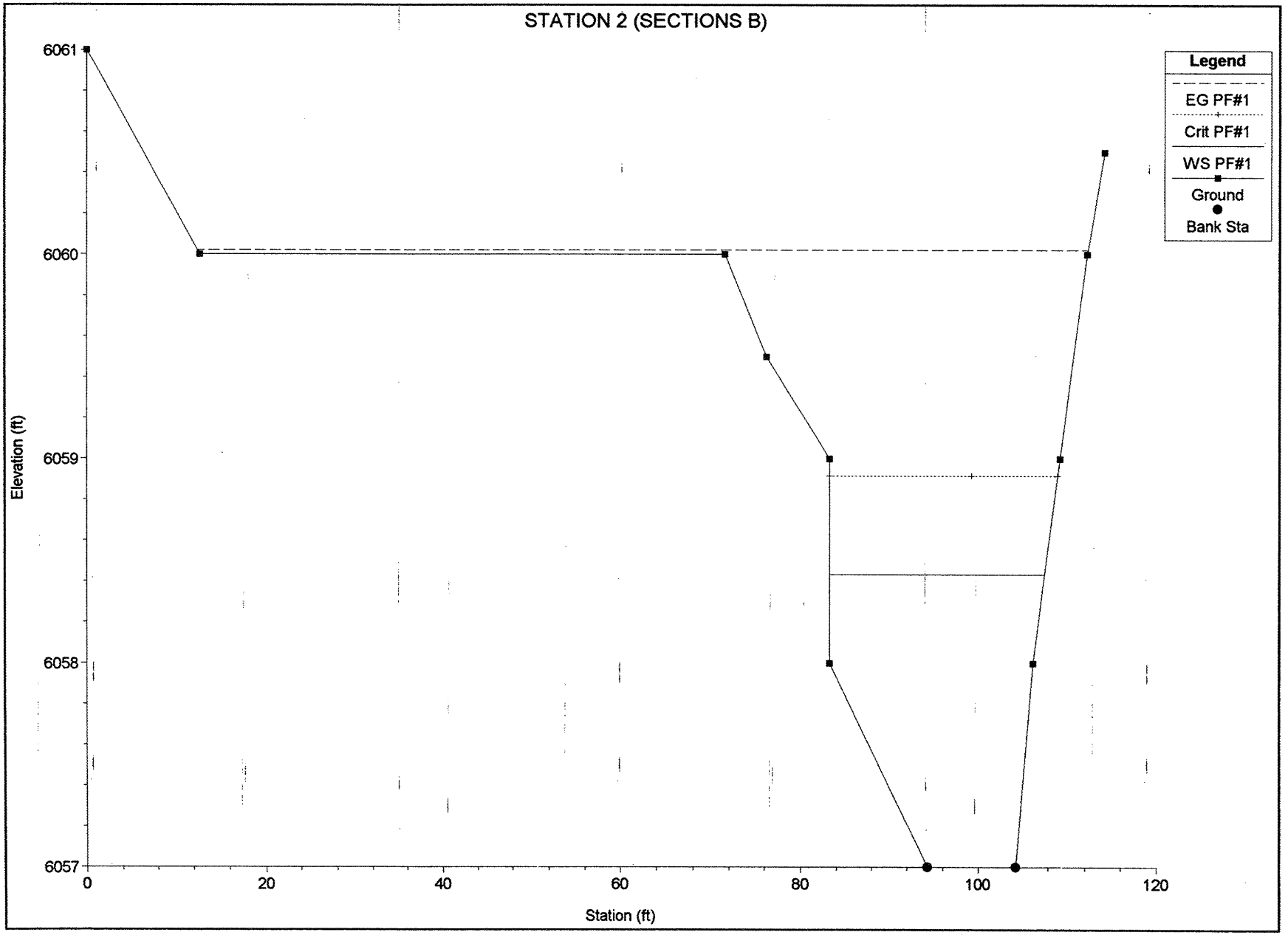
(UNDER EXISTIG CONDITIONS)

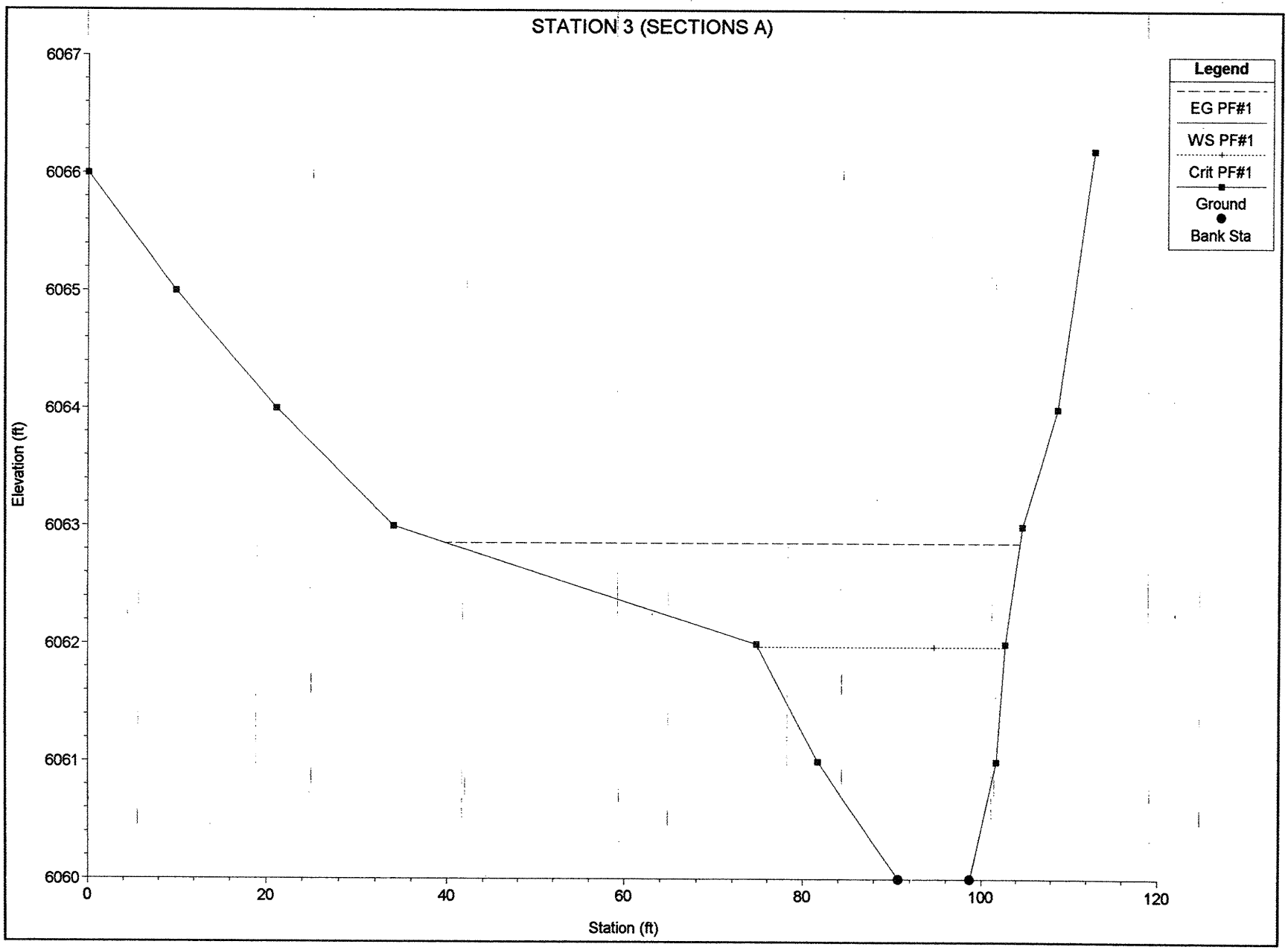
HEC-RAS Plan: UNIT-16 'River: UPSTREAM BASIN

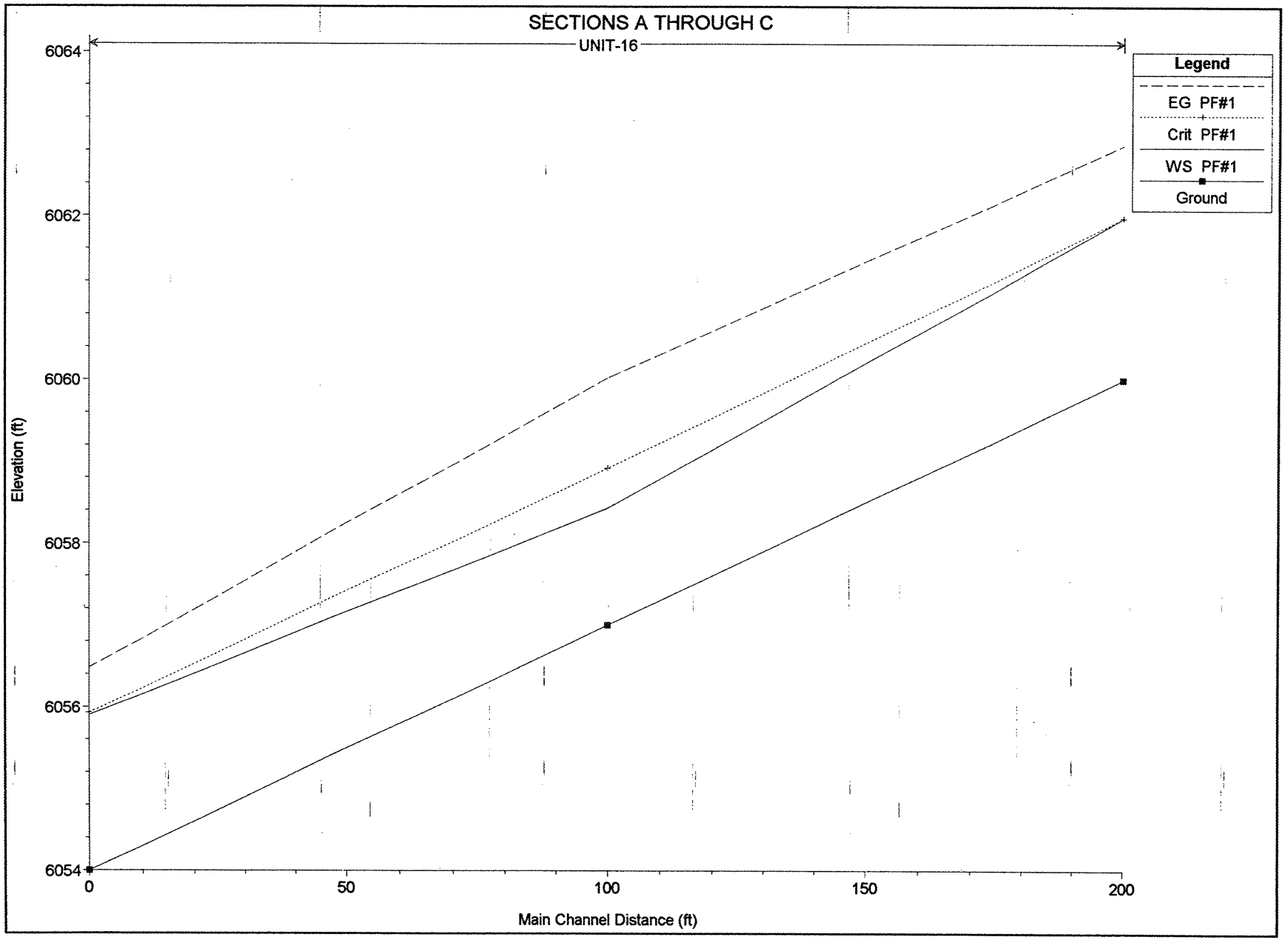
River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)
3	242	6060	6061.97	6061.97	6062.86	0.018308	9.04	37.29	27.8
2	242	6057	6058.43	6058.92	6060.02	0.045269	11.48	26.73	24.3
1	242	6054	6055.9	6055.93	6056.48	0.024236	9.96	43.8	42.28

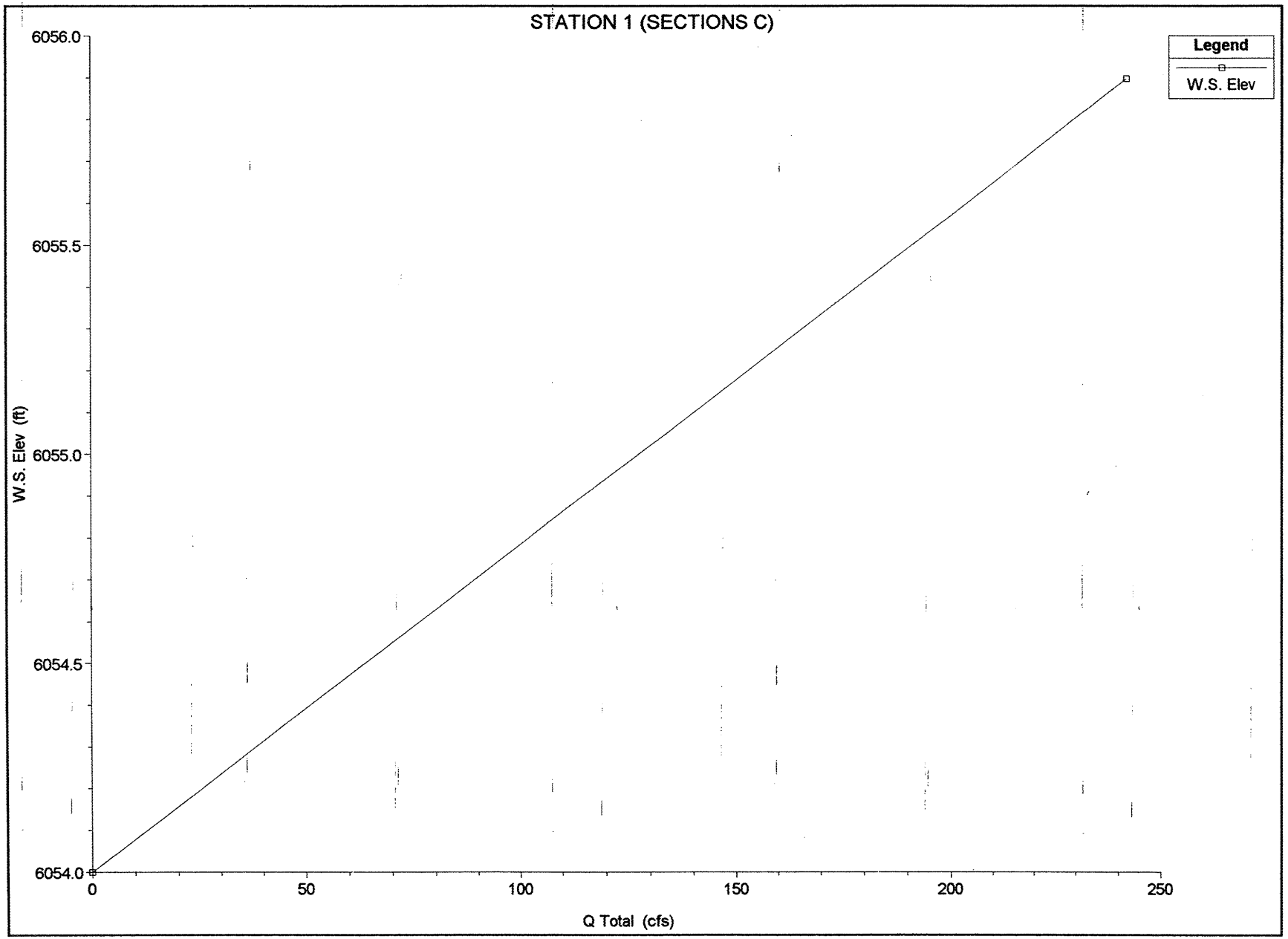


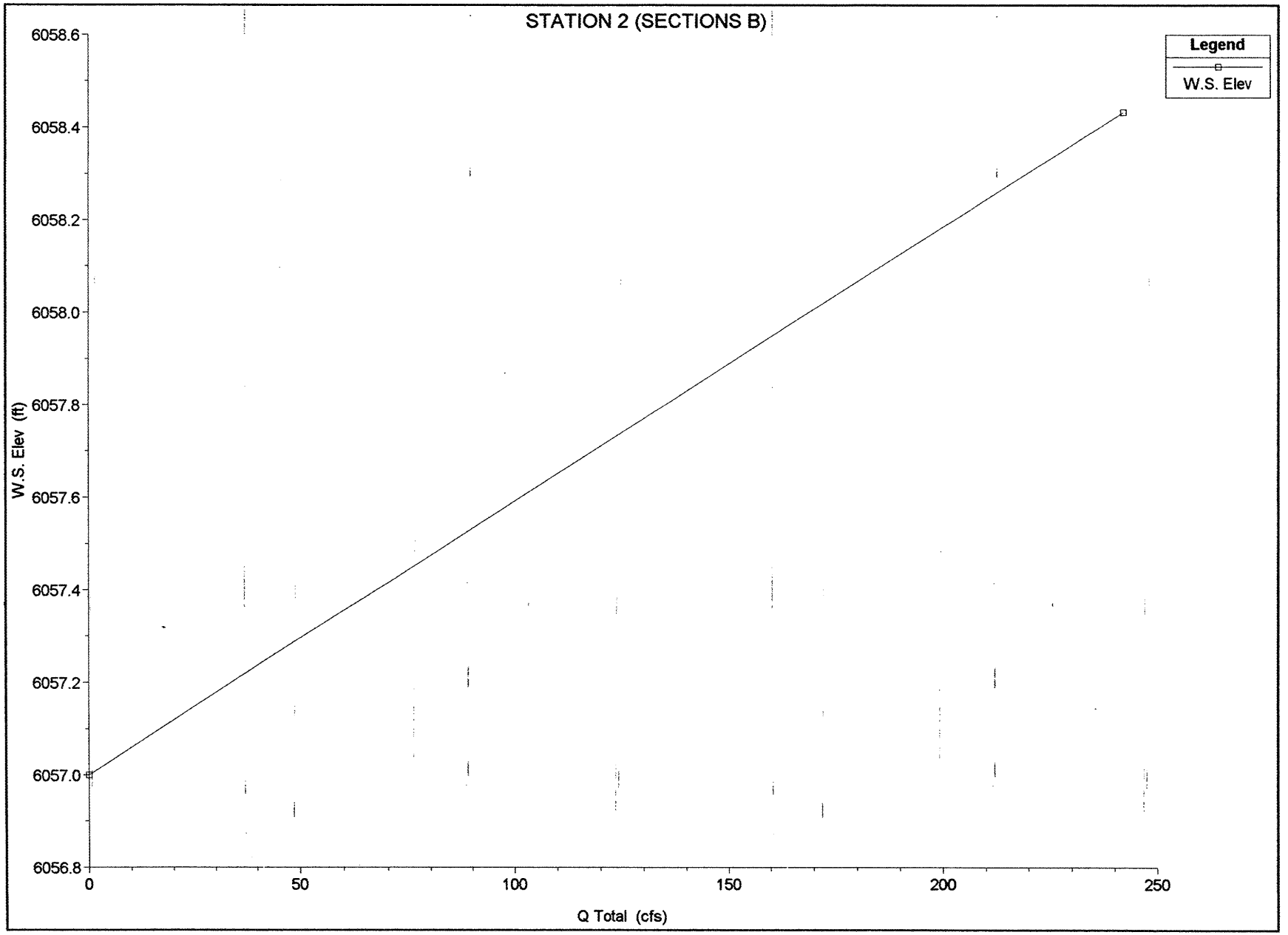

STATION 1 (SECTIONS C)
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
6058
6057
6056
6055
6054
0
20
40
60
80
100
120
140
160
Station (ft)

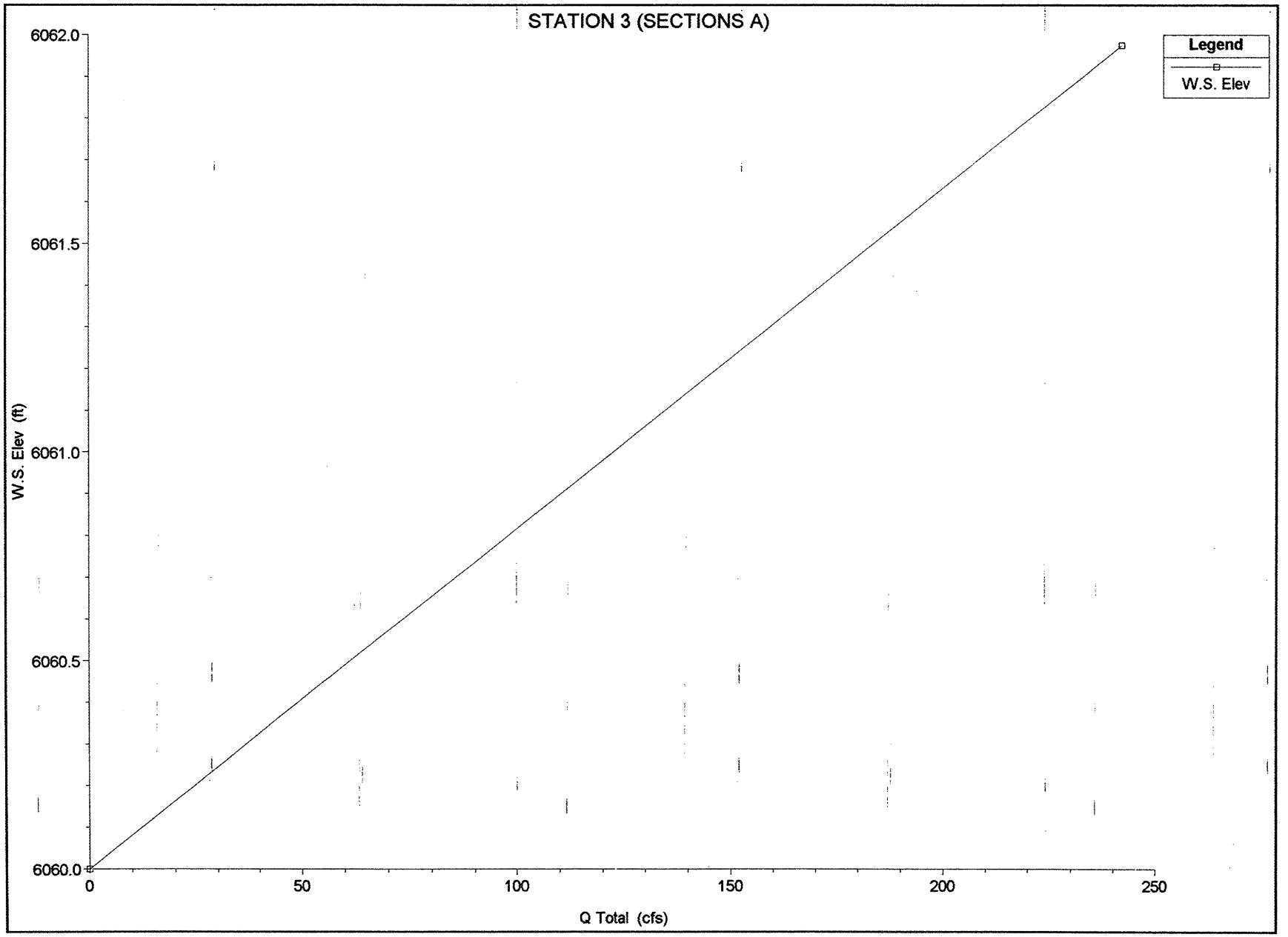

STATION 2 (SECTIONS B)
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Elevation (ft)
6061
6060
6059
6058
6057
0
20
40
60
80
100
120
Station (ft)

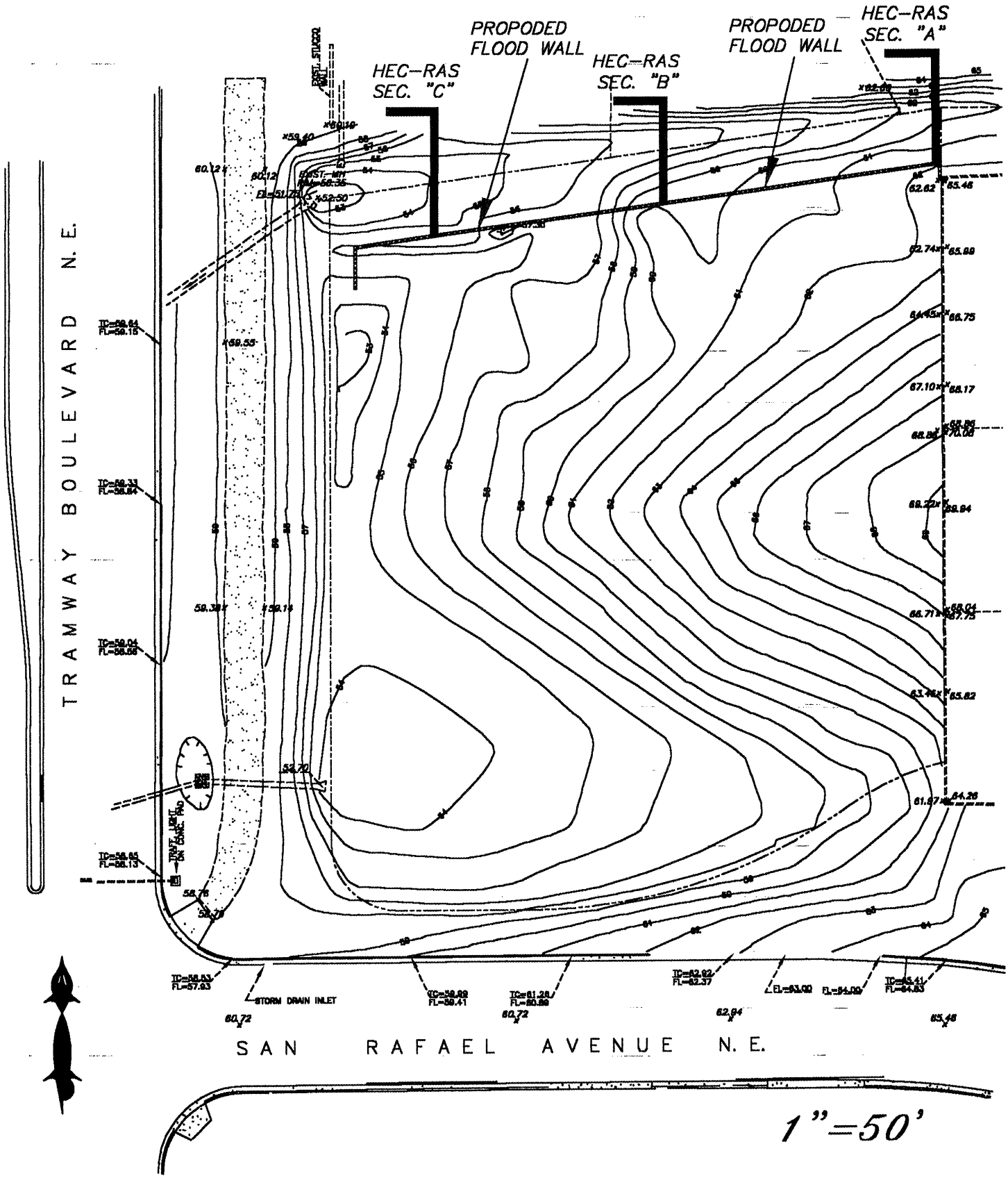

STATION 3 (SECTIONS A)
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Bank Sta
Elevation (ft)
6067
6066
6065
6064
6063
6062
6061
6060
0
20
40
60
80
100
120
Station (ft)


SECTIONS A THROUGH C
UNIT-16
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
6064
6062
6060
6058
6056
6054
Elevation (ft)
0
50
100
150
200
Main Channel Distance (ft)


STATION 1 (SECTIONS C)
Legend
W.S. Elev
6056.0
6055.5
6055.0
6054.5
6054.0
W.S. Elev (ft)
0
50
100
150
200
250
Q Total (cfs)


STATION 2 (SECTIONS B)
Legend
W.S. Elev
6058.6
6058.4
6058.2
6058.0
6057.8
6057.6
6057.4
6057.2
6057.0
6056.8
W.S. Elev (ft)
0
50
100
150
200
250
Q Total (cfs)


STATION 3 (SECTIONS A)
Legend
W.S. Elev
6062.0
6061.5
6061.0
6060.5
6060.0
W.S. Elev (ft)
0
50
100
150
200
250
Q Total (cfs)



PROPOSED CROSS SECTIONS FOR HEC-RAS RUNS

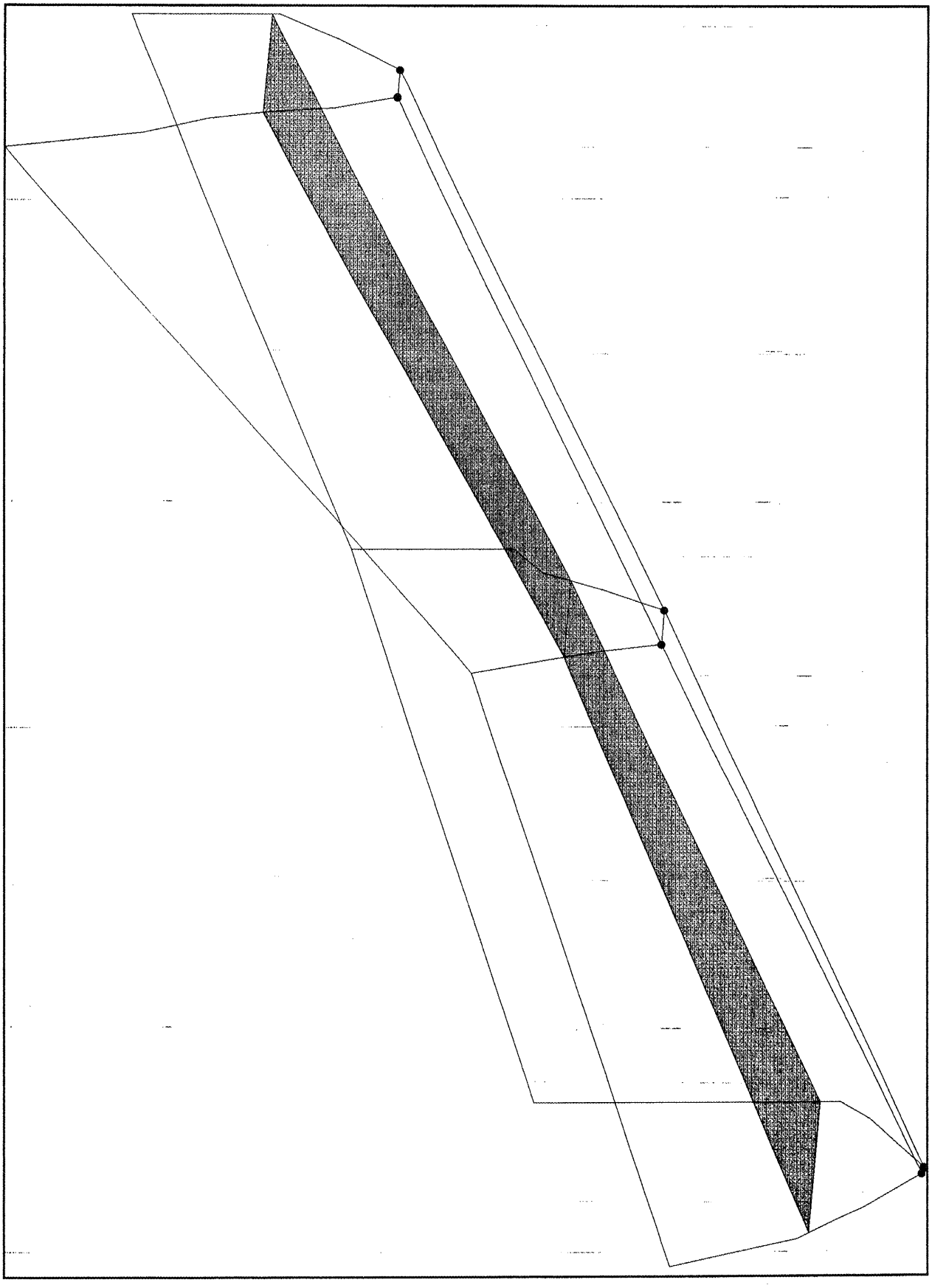
(PROPOSED CONDITIONS)

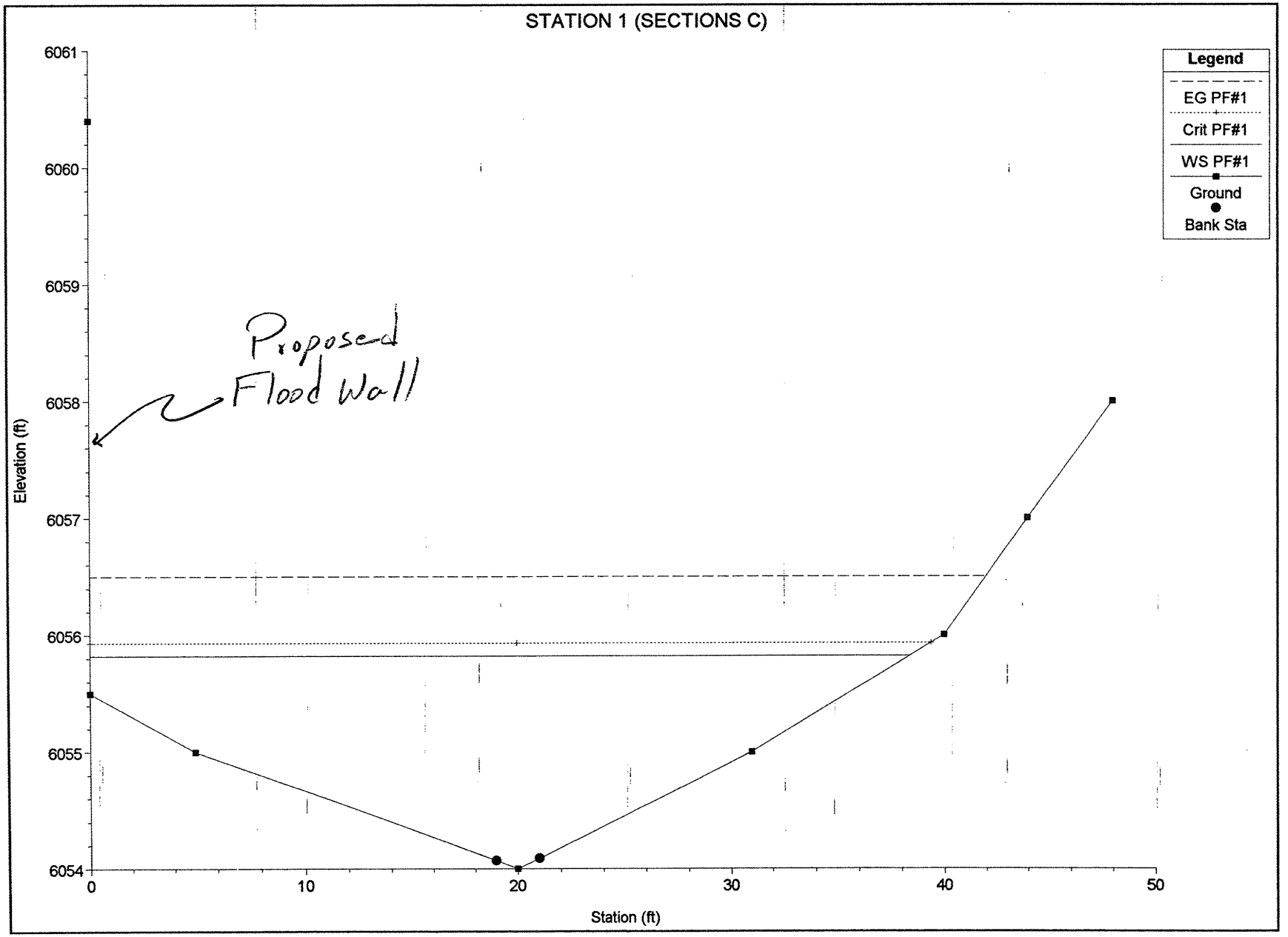
HEC-RAS OUTPUT FILE

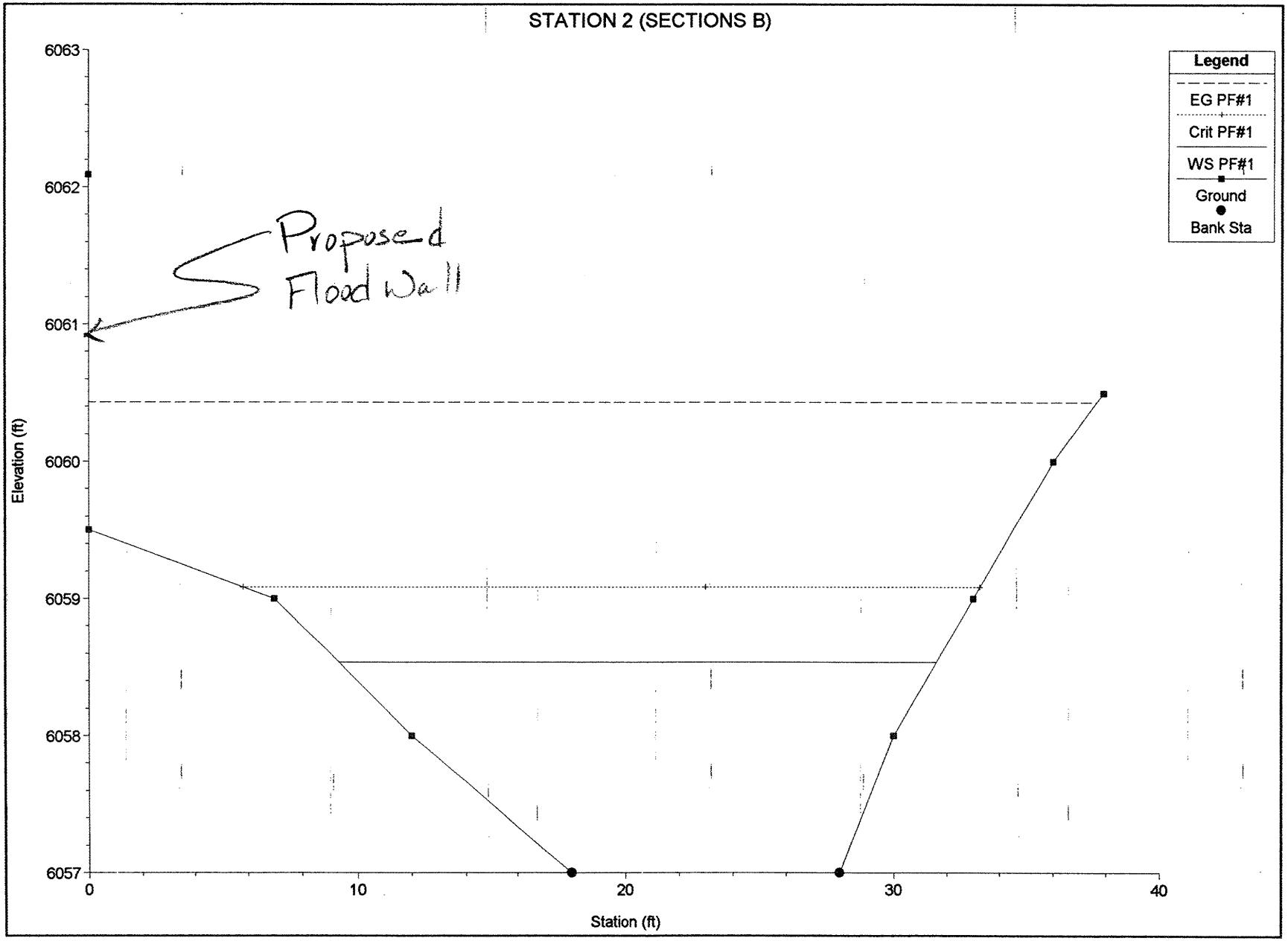
(UNDER PROPOSED CONDITIONS)

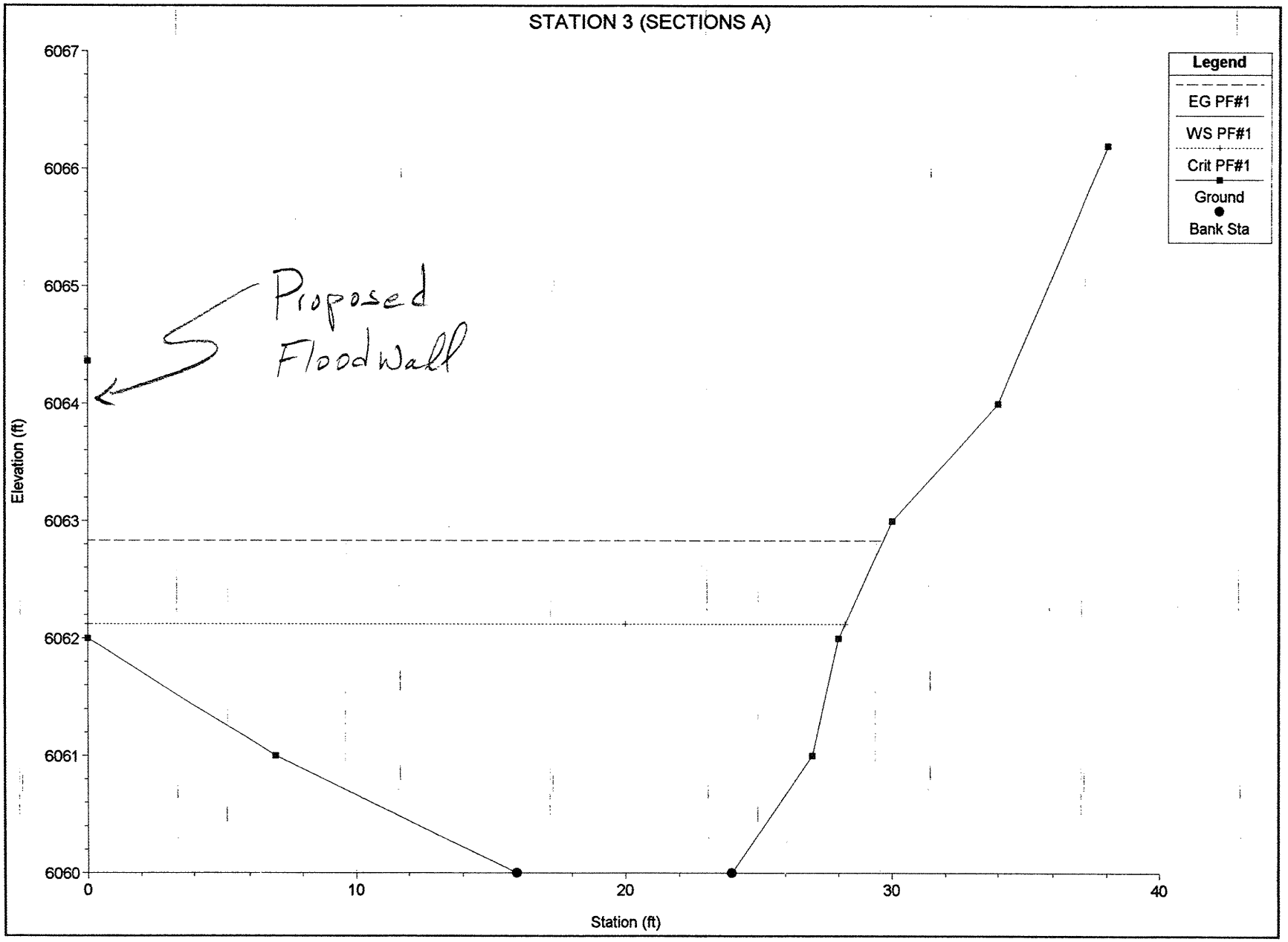
HEC-RAS Plan: UNIT-16 'River: UPSTREAM BASIN

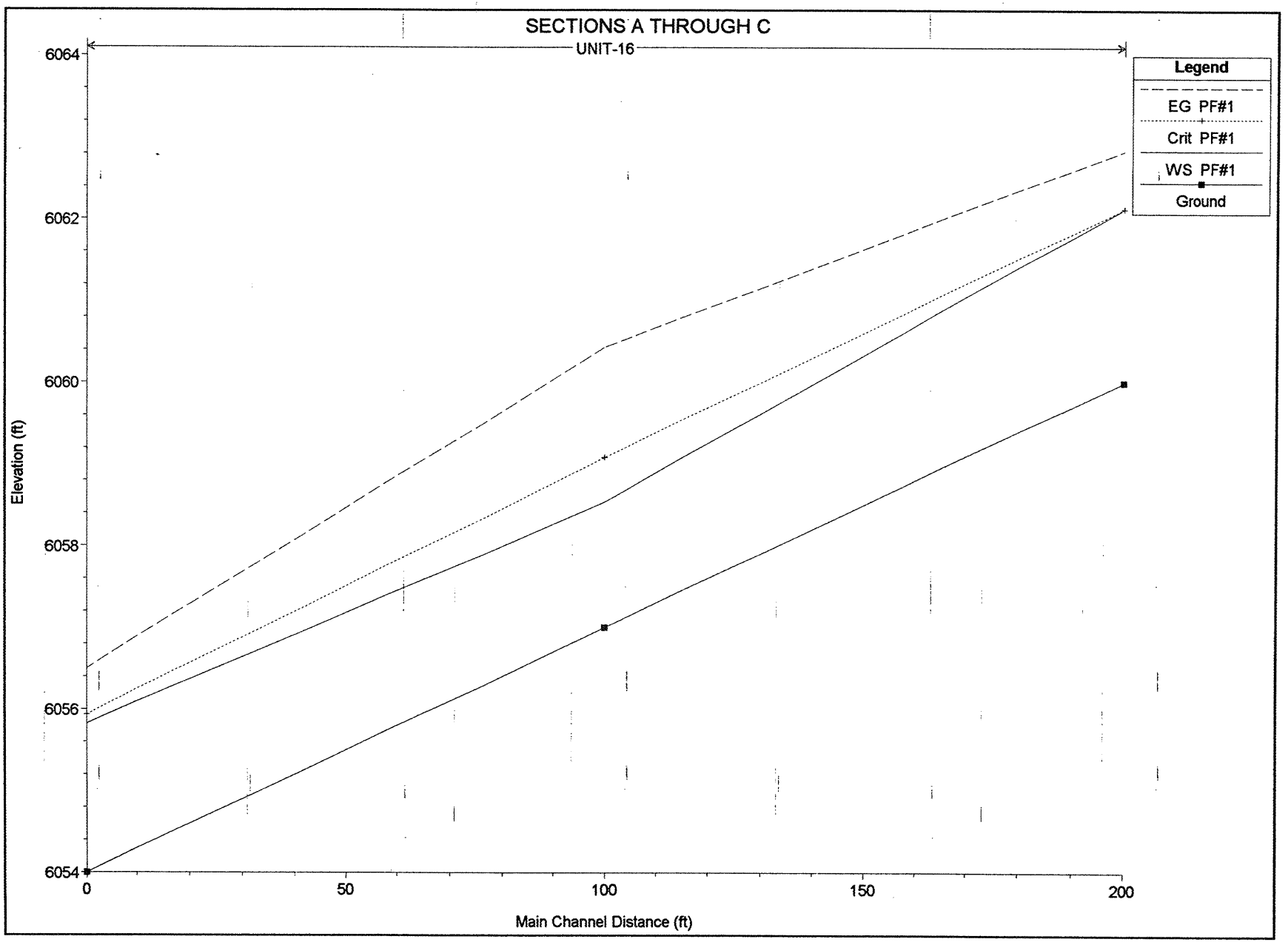
River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)
3	242	6060.00	6062.12	6062.12	6062.83	0.013505	8.15	41.45	28.25
2	242	6057.00	6058.54	6059.08	6060.43	0.046252	12.16	24.81	22.29
1	242	6054.00	6055.82	6055.93	6056.50	0.028427	10.50	40.26	38.40

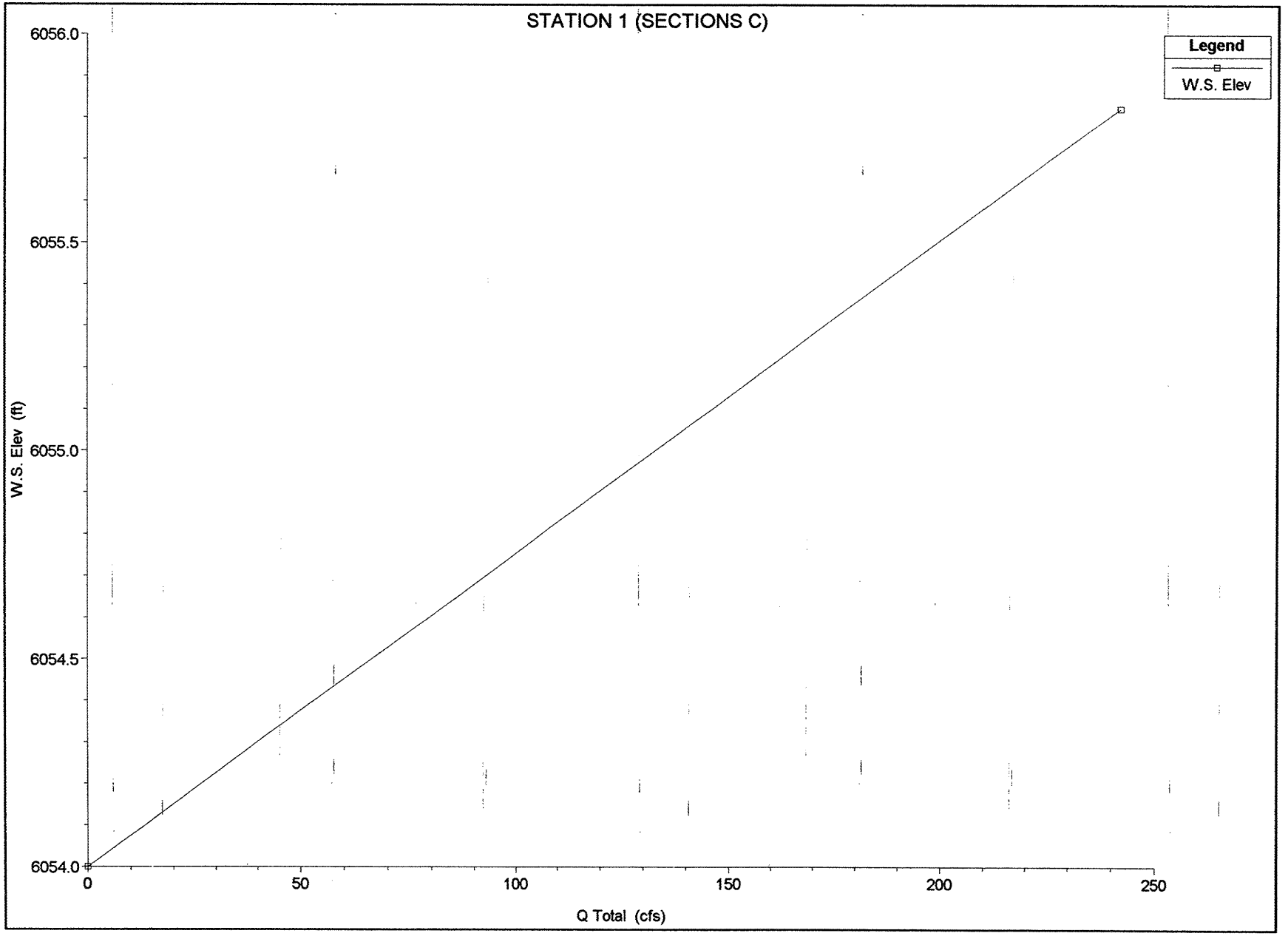


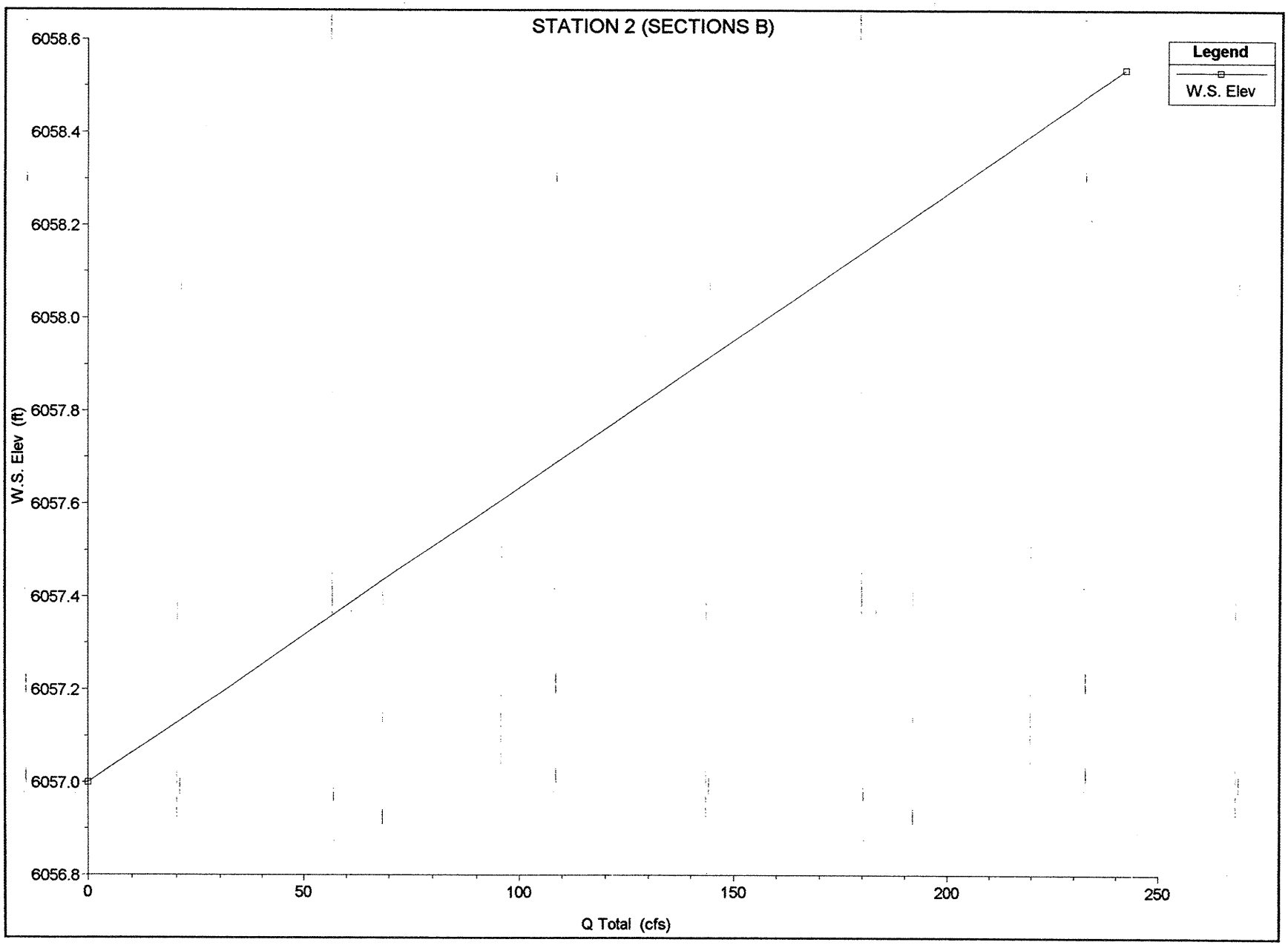

STATION 1 (SECTIONS C)
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Proposed
Flood Wall
Elevation (ft)
6061
6060
6059
6058
6057
6056
6055
6054
0
10
20
30
40
50
Station (ft)

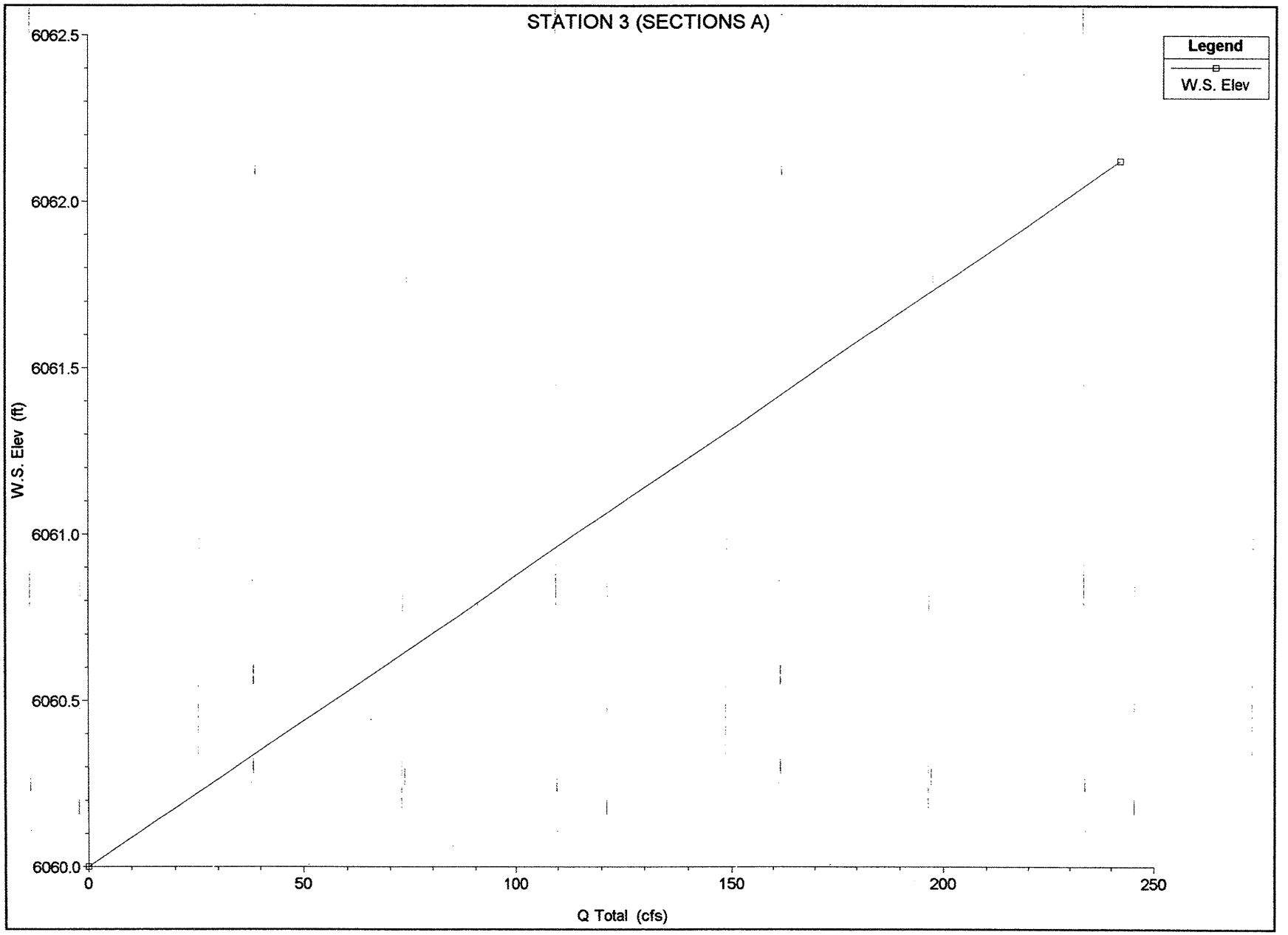

STATION 2 (SECTIONS B)
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
Bank Sta
Proposed
Flood Wall
Elevation (ft)
6063
6062
6061
6060
6059
6058
6057
0
10
20
30
40
Station (ft)


STATION 3 (SECTIONS A)
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Bank Sta
Proposed
Floodwall
Elevation (ft)
6067
6066
6065
6064
6063
6062
6061
6060
0
10
20
30
40
Station (ft)


SECTIONS A THROUGH C
UNIT-16
Legend
EG PF#1
Crit PF#1
WS PF#1
Ground
6064
6062
6060
6058
6056
6054
Elevation (ft)
0
50
100
150
200
Main Channel Distance (ft)

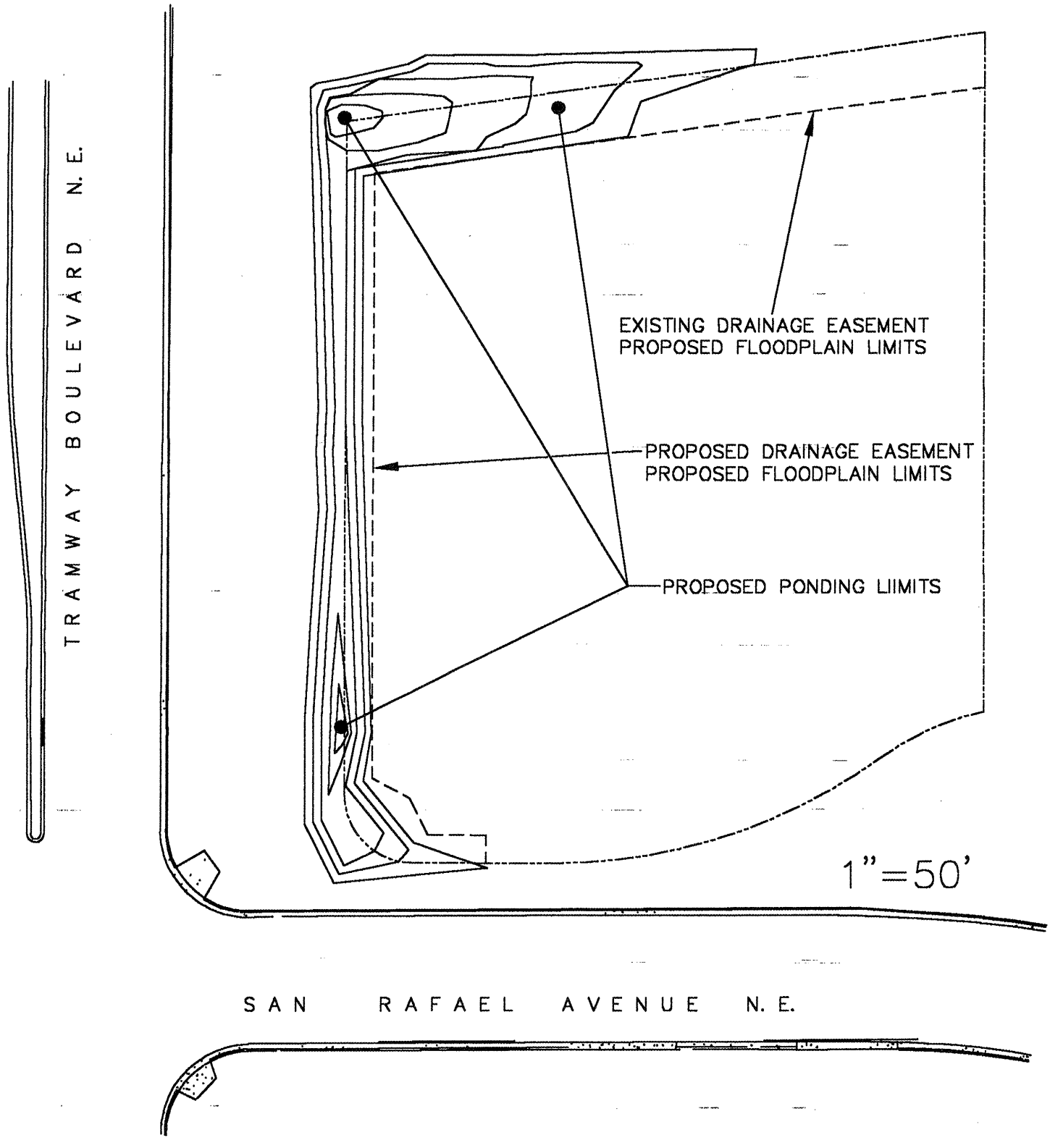

STATION 1 (SECTIONS C)
Legend
W.S. Elev
6056.0
6055.5
6055.0
6054.5
6054.0
W.S. Elev (ft)
0
50
100
150
200
250
Q Total (cfs)


STATION 2 (SECTIONS B)
Legend
W.S. Elev
6058.6
6058.4
6058.2
6058.0
6057.8
6057.6
6057.4
6057.2
6057.0
6056.8
W.S. Elev (ft)
0
50
100
150
200
250
Q Total (cfs)


STATION 3 (SECTIONS A)
Legend
W.S. Elev
6062.5
6062.0
6061.5
6061.0
6060.5
6060.0
W.S. Elev (ft)
0
50
100
150
200
250
Q Total (cfs)

APPENDIX B

AHYMO CALCULATIONS



PROPOSED PONDING LIMITS

DISCHARGE TABLE

24" CULVERT DISCHARGE TABLE

ACTUAL ELEV.	DEPTH (FT)	Q (CFS)
6052.70	0	0.0000
6053.00	0.3	8.2852
6054.00	1.3	17.2471
6055.00	2.3	22.9408
6056.00	3.3	27.4790
6057.00	4.3	31.3674

Orifice Equation
Q = CA SQRT(2gH)

C = 0.6
Diameter (i 24
Area (ft^2) 3.14159
g = 32.2
H (Ft) = Depth of water above center of orifice
Q (CFS)= Flow

54" CULVERT DISCHARGE TABLE

ACTUAL ELEV.	DEPTH (FT)	Q (CFS)
6051.75	0	0.0000
6053.00	1.25	85.6178
6054.00	2.25	114.8683
6055.00	3.25	138.0546
6056.00	4.25	157.8714
6057.00	5.25	175.4643

Orifice Equation
Q = CA SQRT(2gH)

C = 0.6
Diameter (i 54
Area (ft^2) 15.9043
g = 32.2
H (Ft) = Depth of water above center of orifice
Q (CFS)= Flow

TOTAL DISCHARGE (24"+54")

ACTUAL ELEV.	DEPTH (FT)	Q (CFS)
6051.75	0	0.0000
6053.00	1.25	93.9030
6054.00	2.25	132.1154
6055.00	3.25	160.9953
6056.00	4.25	185.3504
6057.00	5.25	206.8317

VOLUME CALCULATIONS

ACTUAL ELEV.	SURFACE AREA (SF)	VOLUME (CF)	VOLUME (AC-FT)
6051.75	0.00	0.00	0.00000
6053.00	229.55	143.47	0.00329
6054.00	1,065.86	791.17	0.01816
6055.00	3,826.94	3,237.57	0.07432
6056.00	6,757.27	8,529.68	0.19581
6057.00	10,037.94	16,927.28	0.38860

```
*
* ZONE 4
*
*********************************************************************
*        100-YEAR,  24-HR STORM (UNDER PROPOSED CONDITIONS)         *
*********************************************************************
*
START
RAINFALL            TYPE=2 RAIN QUARTER=0.0 IN
                    RAIN ONE=2.23 IN RAIN SIX=2.90 IN
                    RAIN DELAY=3.65 IN DT=0.03333 HR
*
* BASIN 500.10
*
COMPUTE NM HYD      ID=1 HYD NO=101.0 AREA=0.054900 SQ MI
                    PER A=12.00 PER B=63.45 PER C=2.55 PER D=22.00
                    TP=0.1333 HR MASS RAINFALL=-1
*
* BAISIN 500.20
*
COMPUTE NM HYD      ID=2 HYD NO=102.0 AREA=0.050800 SQ MI
                    PER A=10.00 PER B=55.15 PER C=4.85 PER D=30.00
                    TP=0.1333 HR MASS RAINFALL=-1
*
ADD HYD             ID=3 HYD NO=103.00 ID=1 ID=2
*
ROUTE RESERVOIR     ID=4 HYD NO=501.0 INFLOW ID=3 CODE=24
                    OUTFLOW(CFS)      STORAGE(AC-FT)  ELEVATION(FT)
                       0.00               0.00000       6051.75
                      93.90               0.00329       6053.00
                     132.12               0.01816       6054.00
                     161.00               0.07432       6055.00
                     185.35               0.19581       6056.00
                     206.83               0.38860       6057.00
*
*********************************************************************
*
FINISH
```

AHYMO SUMMARY TABLE (AHYMO194) - AMAFCA Hydrologic Model - January, 1994 RUN DATE (MON/DAY/YR) =01/26/1999
INPUT FILE = 9847

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= 2										RAIN24= 3.650
COMPUTE NM HYD	101.00	-	1	.05490	118.02	4.470	1.52654	1.500	3.359	PER IMP= 22.00
COMPUTE NM HYD	102.00	-	2	.05080	116.28	4.645	1.71463	1.500	3.576	PER IMP= 30.00
ADD HYD	103.00	1& 2	3	.10570	234.30	9.115	1.61693	1.500	3.463	
ROUTE RESERVOIR	501.00	3	4	.10570	205.68	9.115	1.61693	1.567	3.040	AC-FT= .378
FINISH										

```
    AHYMO PROGRAM (AHYMO194) - AMAFCA Hydrologic Model - January, 1994
         RUN DATE (MON/DAY/YR) = 01/26/1999
         START TIME (HR:MIN:SEC) = 22:45:23
         INPUT FILE = 9847

*
* ZONE 4
*
*********************************************************************
*        100-YEAR,  24-HR STORM (UNDER PROPOSED CONDITIONS)         *
*********************************************************************
*
START
RAINFALL            TYPE=2 RAIN QUARTER=0.0 IN
                    RAIN ONE=2.23 IN RAIN SIX=2.90 IN
                    RAIN DELAY=3.65 IN DT=0.03333 HR

                COMPUTED 24-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2 - PEAK AT 1.40 HR.
                DT =     .033330 HOURS       END TIME =     19.964670 HOURS
                   .0000   .0055   .0110   .0167   .0225   .0284   .0345
                   .0406   .0469   .0534   .0600   .0668   .0738   .0809
                   .0882   .0958   .1035   .1115   .1197   .1282   .1370
                   .1461   .1555   .1653   .1754   .1860   .1971   .2086
                   .2207   .2334   .2469   .2530   .2596   .2667   .2818
                   .3156   .3677   .4425   .5446   .6787   .8498  1.0629
                  1.3228  1.5642  1.6650  1.7500  1.8257  1.8946  1.9579
                  2.0168  2.0718  2.1233  2.1719  2.2176  2.2608  2.3018
                  2.3405  2.3773  2.4122  2.4453  2.4767  2.4850  2.4927
                  2.5002  2.5074  2.5143  2.5210  2.5275  2.5338  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  2.6128
                  2.6173  2.6218  2.6262  2.6305  2.6347  2.6389  2.6431
                  2.6471  2.6512  2.6552  2.6591  2.6630  2.6668  2.6706
                  2.6743  2.6780  2.6817  2.6853  2.6889  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  2.8594  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  2.9021
                  2.9042  2.9063  2.9083  2.9104  2.9125  2.9146  2.9166
                  2.9187  2.9208  2.9228  2.9249  2.9269  2.9290  2.9310
                  2.9330  2.9351  2.9371  2.9391  2.9411  2.9431  2.9451
                  2.9471  2.9491  2.9511  2.9531  2.9551  2.9571  2.9591
                  2.9610  2.9630  2.9650  2.9669  2.9689  2.9708  2.9728
                  2.9747  2.9766  2.9786  2.9805  2.9824  2.9844  2.9863
                  2.9882  2.9901  2.9920  2.9939  2.9958  2.9977  2.9996
                  3.0015  3.0034  3.0052  3.0071  3.0090  3.0109  3.0127
                  3.0146  3.0164  3.0183  3.0201  3.0220  3.0238  3.0257
                  3.0275  3.0293  3.0312  3.0330  3.0348  3.0366  3.0384
                  3.0402  3.0420  3.0439  3.0457  3.0474  3.0492  3.0510
                  3.0528  3.0546  3.0564  3.0582  3.0599  3.0617  3.0635
                  3.0652  3.0670  3.0687  3.0705  3.0722  3.0740  3.0757
                  3.0775  3.0792  3.0809  3.0827  3.0844  3.0861  3.0878
```

3.0896 3.0913 3.0930 3.0947 3.0964 3.0981 3.0998
3.1015 3.1032 3.1049 3.1066 3.1082 3.1099 3.1116
3.1133 3.1149 3.1166 3.1183 3.1199 3.1216 3.1233
3.1249 3.1266 3.1282 3.1299 3.1315 3.1331 3.1348
3.1364 3.1381 3.1397 3.1413 3.1429 3.1446 3.1462
3.1478 3.1494 3.1510 3.1526 3.1542 3.1558 3.1574
3.1590 3.1606 3.1622 3.1638 3.1654 3.1670 3.1685
3.1701 3.1717 3.1733 3.1748 3.1764 3.1780 3.1795
3.1811 3.1827 3.1842 3.1858 3.1873 3.1889 3.1904
3.1919 3.1935 3.1950 3.1966 3.1981 3.1996 3.2012
3.2027 3.2042 3.2057 3.2072 3.2088 3.2103 3.2118
3.2133 3.2148 3.2163 3.2178 3.2193 3.2208 3.2223
3.2238 3.2253 3.2268 3.2283 3.2297 3.2312 3.2327
3.2342 3.2357 3.2371 3.2386 3.2401 3.2415 3.2430
3.2445 3.2459 3.2474 3.2488 3.2503 3.2517 3.2532
3.2546 3.2561 3.2575 3.2590 3.2604 3.2618 3.2633
3.2647 3.2661 3.2676 3.2690 3.2704 3.2718 3.2732
3.2747 3.2761 3.2775 3.2789 3.2803 3.2817 3.2831
3.2845 3.2859 3.2873 3.2887 3.2901 3.2915 3.2929
3.2943 3.2957 3.2971 3.2984 3.2998 3.3012 3.3026
3.3040 3.3053 3.3067 3.3081 3.3094 3.3108 3.3122
3.3135 3.3149 3.3163 3.3176 3.3190 3.3203 3.3217
3.3230 3.3244 3.3257 3.3271 3.3284 3.3297 3.3311
3.3324 3.3338 3.3351 3.3364 3.3378 3.3391 3.3404
3.3417 3.3431 3.3444 3.3457 3.3470 3.3483 3.3496
3.3510 3.3523 3.3536 3.3549 3.3562 3.3575 3.3588
3.3601 3.3614 3.3627 3.3640 3.3653 3.3666 3.3679
3.3691 3.3704 3.3717 3.3730 3.3743 3.3756 3.3768
3.3781 3.3794 3.3807 3.3819 3.3832 3.3845 3.3857
3.3870 3.3883 3.3895 3.3908 3.3921 3.3933 3.3946
3.3958 3.3971 3.3983 3.3996 3.4008 3.4021 3.4033
3.4046 3.4058 3.4070 3.4083 3.4095 3.4108 3.4120
3.4132 3.4145 3.4157 3.4169 3.4181 3.4194 3.4206
3.4218 3.4230 3.4243 3.4255 3.4267 3.4279 3.4291
3.4303 3.4315 3.4328 3.4340 3.4352 3.4364 3.4376
3.4388 3.4400 3.4412 3.4424 3.4436 3.4448 3.4460
3.4472 3.4484 3.4495 3.4507 3.4519 3.4531 3.4543
3.4555 3.4567 3.4578 3.4590 3.4602 3.4614 3.4625
3.4637 3.4649 3.4661 3.4672 3.4684 3.4696 3.4707
3.4719 3.4731 3.4742 3.4754 3.4765 3.4777 3.4788
3.4800 3.4812 3.4823 3.4835 3.4846 3.4858 3.4869
3.4880 3.4892 3.4903 3.4915 3.4926 3.4938 3.4949
3.4960 3.4972 3.4983 3.4994 3.5006 3.5017 3.5028
3.5040 3.5051 3.5062 3.5073 3.5085 3.5096 3.5107
3.5118 3.5129 3.5141 3.5152 3.5163 3.5174 3.5185
3.5196 3.5207 3.5218 3.5229 3.5241

*
* BASIN 500.10
*
COMPUTE NM HYD ID=1 HYD NO=101.0 AREA=0.054900 SQ MI
PER A=12.00 PER B=63.45 PER C=2.55 PER D=22.00
TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 47.685 CFS UNIT VOLUME = .9991 B = 526.28 P60 = 2.2300
AREA = .012078 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

```
    K =   .137748HR    TP =   .133300HR    K/TP RATIO =  1.033368     SHAPE CONSTANT, N =  3.416036
    UNIT PEAK =   100.92   CFS   UNIT VOLUME =    1.000       B =   314.15      P60 = 2.2300
    AREA =      .042822 SQ MI    IA =    .51817 INCHES    INF =   1.30088 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033330

*
* BAISIN 500.20
*
COMPUTE NM HYD       ID=2 HYD NO=102.0 AREA=0.050800 SQ MI
                     PER A=10.00 PER B=55.15 PER C=4.85 PER D=30.00
                     TP=0.1333 HR MASS RAINFALL=-1

    K =   .072649HR    TP =   .133300HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =   60.168    CFS   UNIT VOLUME =    .9992       B =   526.28      P60 = 2.2300
    AREA =      .015240 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033330


    K =   .136567HR    TP =   .133300HR    K/TP RATIO =  1.024511     SHAPE CONSTANT, N =  3.445461
    UNIT PEAK =   84.386    CFS   UNIT VOLUME =    1.000       B =   316.33      P60 = 2.2300
    AREA =      .035560 SQ MI    IA =    .51104 INCHES    INF =   1.28090 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033330

*
ADD HYD              ID=3 HYD NO=103.00 ID=1 ID=2
*
ROUTE RESERVOIR      ID=4 HYD NO=501.0 INFLOW ID=3 CODE=24
                     OUTFLOW(CFS)      STORAGE(AC-FT)  ELEVATION(FT)
                        0.00              0.00000       6051.75
                       93.90              0.00329       6053.00
                      132.12              0.01816       6054.00
                      161.00              0.07432       6055.00
                      185.35              0.19581       6056.00
                      206.83              0.38860       6057.00

  * * * * * * * * * * * * * * * * * *

    TIME      INFLOW    ELEV      VOLUME    OUTFLOW
    (HRS)     (CFS)     (FEET)    (AC-FT)   (CFS)

      .00        .00   6051.75       .000       .00
      .80       3.42   6051.80       .000      3.42
     1.60     175.09   6056.74       .339    201.28
     2.40       9.78   6051.84       .000      6.68
     3.20       2.28   6051.77       .000      1.37
     4.00       1.28   6051.76       .000      1.01
     4.80       1.10   6051.76       .000      1.02
     5.60       1.10   6051.76       .000      1.08
     6.40       1.10   6051.76       .000      1.09
     7.20       1.04   6051.76       .000      1.04
     8.00        .99   6051.76       .000       .99
     8.80        .95   6051.76       .000       .95
     9.60        .90   6051.76       .000       .90
    10.40        .87   6051.76       .000       .87
    11.20        .83   6051.76       .000       .83
    12.00        .80   6051.76       .000       .80
    12.80        .77   6051.76       .000       .77
    13.60        .74   6051.76       .000       .74
    14.40        .72   6051.76       .000       .72
    15.20        .70   6051.76       .000       .70
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    16.00        .68   6051.76        .000        .68
    16.80        .66   6051.76        .000        .66
    17.60        .64   6051.76        .000        .64
    18.40        .62   6051.76        .000        .62
    19.20        .60   6051.76        .000        .60
 PEAK DISCHARGE =       205.679 CFS - PEAK OCCURS AT HOUR     1.57
 MAXIMUM WATER SURFACE ELEVATION =      6056.946
 MAXIMUM STORAGE =          .3783 AC-FT      INCREMENTAL TIME=      .033330HRS

*
**********************************************************************
*
FINISH

    NORMAL PROGRAM FINISH          END TIME (HR:MIN:SEC) = 22:45:23
```

APPENDIX C

RESOURCE TECHNOLOGY INC., AHYMO SUMMERY FILES

COPY

HYDROLOGY REPORT
FOR
NORTH ALBUQUERQUE ACRES/SANDIA HEIGHTS
DRAINAGE STUDY
PHASES I & II

Prepared For:

Bernalillo County
Public Works Division

Prepared By:

Resource Technology, Inc.

1720-B Randolph Road SE
Albuquerque, NM 87106
(505) 243-7300 - (505) 243-7400 fax
rti@nmia.com

November 1998
(Revised)

. PINO SYS. FUTURE COND. 100-YR

AHYMO SUMMARY TABLE (AHYMO194) - AMAFCA Hydrologic Model - January, 1994 RUN DATE (MON/DAY/YR) =10/19/1998
INPUT FILE = pino100.fut USER NO.= RSTECHNM.STE

CLEAR WATER FLOW RATES

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	NOTATION

PAGE = 1

```
*S*************************************************************************
*S          NORTH PINO ARROYO (N. OF SAN ANTONIO DR. AND MAIN PINO ARROYO
*S          FUTURE CONDITIONS, 100-YR RETURN PERIOD, 24-HR STORM
*S*************************************************************************
START                                                                TIME=      .00
*S BEGIN ANALYSIS OF N. PINO WATERSHED EAST OF TRAMWAY (N. OF MAIN PINO)
*S SUBBASIN 500.0=(FLOW E. OF TRAMWAY N.OF POND N.OF SAN RAFAEL)
RAINFALL  TYPE= 2                                                    RAIN24=  3.500
COMPUTE NM HYD       500.00   -    1       .06350      145.38      6.026    1.77931   1.500   3.577 PER IMP=  35.00
COMPUTE NM HYD       500.10   -    2       .05490      118.02      5.210    1.77931   1.500   3.359 PER IMP=  35.00
COMPUTE NM HYD       500.20   -    3       .05080      116.28      4.821    1.77931   1.500   3.577 PER IMP=  35.00
*S ROUTE 500.1 THROUGH 500.2 - (NATURAL CHANNEL WEST OF QUAIL RUN LOOP)
ROUTE MCUNGE         500.82   2    7       .05490      117.38      5.209    1.77898   1.500   3.341 CCODE =    .2
*S COMBINE ROUTED 500.1 WITH 500.2 AT AP 500.91
*S (FLOW E. OF TRAMWAY COLLECTED AT POND NORTH OF SAN RAFAEL)
ADD HYD              500.91  3& 7  11       .10570      233.66      10.030   1.77913   1.500   3.454
*S DEVELOP HYDROGRAPH 500.3
*S (FLOW E. OF TRAMWAY BETWEEN SAN RAFAEL AND QUAIL RUN COURT)
COMPUTE NM HYD       500.30   -    2       .05320      108.06      5.048    1.77931   1.550   3.174 PER IMP=  35.00
*S DEVELOP HYDROGRAPH 500.4
*S (FLOW E. OF TRAMWAY NEAR QUAIL RUN COURT)
COMPUTE NM HYD       500.40   -    3       .02090      47.85       1.983    1.77931   1.500   3.577 PER IMP=  35.00
*S COMBINE FLOWS TO ESTIMATE CONTRIBUTION STORM DRAIN AND PINO DAM
*S (500.94=COMBINED FLOW AT POND N. OF SAN RAFAEL)
ADD HYD              500.94 11& 1  12       .16920      379.04      16.055   1.77920   1.500   3.500
*S (500.95=COMBINED FLOW AT TRAMWAY BETWEEN SAN RAFAEL AND QUAIL RUN COURT)
ADD HYD              500.95 12& 2  13       .22240      486.50      21.104   1.77922   1.500   3.418
*S (500.96 = ESTIMATED FLOW TO DAM)
ADD HYD              500.96 13& 3  19       .24330      534.36      23.087   1.77923   1.500   3.432
*S END OF ANALYSIS OF WATERSHED EAST OF TRAMWAY
*S ***************************************************************
*S BEGIN ANALYSIS OF WATERSHED WEST OF TRAMWAY
RAINFALL  TYPE= 2                                                    RAIN24=  3.300
COMPUTE NM HYD       501.00   -    1       .01392      29.99       1.067    1.43773   1.500   3.367 PER IMP=  17.00
*S (SUBBASIN 501.0=FLOW AT LOWELL STREET BETWEEN CORONADO AND SAN RAFAEL)
*S ROUTE 501.0 THROUGH 501.1
ROUTE MCUNGE         501.80   1    6       .01392      27.74       1.045    1.40707   1.650   3.113 CCODE =    .1
COMPUTE NM HYD       501.10   -    2       .03920      84.43       3.006    1.43773   1.500   3.365 PER IMP=  17.00
*S COMBINE 501.80 WITH 501.1 AS 501.91
*S (501.91=FLOW AT BROWNING BETWEEN CORONADO AND SAN RAFAEL)
ADD HYD              501.91  6& 2  11       .05312      88.83       4.050    1.42968   1.500   2.613
*S ROUTE 501.91 THROUGH 501.2
ROUTE MCUNGE         501.81   11   6       .05312      86.72       4.012    1.41607   1.700   2.551 CCODE =    .1
RAINFALL  TYPE= 2                                                    RAIN24=  3.200
COMPUTE NM HYD       501.20   -    2       .05010      104.03      3.661    1.37021   1.500   3.245 PER IMP=  17.00
*S COMBINE 501.81 WITH 501.2 AS 501.99
*S (501.99=FLOW AT EUBANK BETWEEN SAN RAFAEL AND DEL REY)
ADD HYD              501.99  6& 2  11       .10322      151.70      7.673    1.39380   1.600   2.296
*S ***************************************************************
```

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	NOTATION
RAINFALL TYPE= 2										RAIN24= 3.300
COMPUTE NM HYD	508.00	-	1	.02590	68.75	2.903	2.10174	1.500	4.147	PER IMP= 50.00
*S (508.0=INFLOW FROM SANDIA HEIGHTS SOUTH UNITS 23 AND 24 TO SUBBASIN 502)										
*S ROUTE 508.0 THROUGH 502.0										
ROUTE MCUNGE	508.80	1	6	.02590	62.86	2.875	2.08108	1.650	3.792	CCODE = .1
COMPUTE NM HYD	502.00	-	1	.06295	135.59	4.827	1.43773	1.500	3.366	PER IMP= 17.00
*S COMBINE RP 508.0 WITH 502.0 AS 502.91										
*S (502.91=FLOW AT LOWELL BETWEEN SAN RAFAEL AND DEL REY)										
ADD HYD	502.91	1& 6	12	.08885	165.36	7.702	1.62526	1.550	2.908	
COMPUTE NM HYD	502.10	-	1	.07500	162.06	5.751	1.43773	1.500	3.376	PER IMP= 17.00
*S (502.1=FLOW AT LOWELL IN NORTH 1/2 OF BLOCK BETWEEN DEL REY AND SANTA MONICA)										
*S COMBINE 502.91 WITH 502.1 AS 502.92										
*S (502.92=COMBINED FLOW IN ARROYO JUNCTION W.OF LOWELL BETWEEN										
*S DEL REY AND SAN RAFAEL)										
ADD HYD	502.92	12& 1	13	.16385	322.27	13.452	1.53942	1.500	3.073	
*S ROUTE 502.92 THROUGH 502.3										
ROUTE MCUNGE	502.80	13	6	.16385	319.44	13.432	1.53710	1.550	3.046	CCODE = .1
COMPUTE NM HYD	502.20	-	1	.03390	63.93	2.599	1.43773	1.550	2.947	PER IMP= 17.00
*S (502.2=FLOW AT LOWELL IN SOUTH 1/2 OF BLOCK BETWEEN DEL REY AND SANTA MONICA)										
*S ROUTE 502.2 THROUGH 502.3										
ROUTE MCUNGE	502.81	1	7	.03390	62.31	2.596	1.43576	1.600	2.872	CCODE = .1
*S COMBINE 502.81 WITH 502.80 AS 502.93										
ADD HYD	502.93	6& 7	12	.19775	376.26	16.028	1.51973	1.550	2.973	
COMPUTE NM HYD	502.30	-	1	.03950	85.08	3.029	1.43773	1.500	3.365	PER IMP= 17.00
*S COMBINE 502.3 WITH 502.93 AS 502.99										
*S (502.99=FLOW TO PINO DIVERSION DROP STRUCTURE)										
ADD HYD	502.99	12& 1	13	.23725	453.90	19.057	1.50607	1.550	2.989	
*S **********										
COMPUTE NM HYD	503.00	-	1	.05610	120.82	4.302	1.43773	1.500	3.365	PER IMP= 17.00
*S (503.0=FLOW AT BROWNING BETWEEN DEL REY AND SANTA MONICA)										
COMPUTE NM HYD	503.10	-	2	.02200	45.41	1.687	1.43773	1.500	3.225	PER IMP= 17.00
*S (503.1=FLOW AT BROWNING AT BETWEEN SAN RAFAEL AND DEL REY)										
*S COMBIINE 503.0 AND 503.1 AS 503.91										
ADD HYD	503.91	1& 2	12	.07810	166.23	5.989	1.43772	1.500	3.326	
*S (503.91=FLOW AT ARROYO JUNCTION W. OF BROWNING BETWEEN DEL REY										
*S AND SANTA MONICA)										
*S ROUTE 503.91 THROUGH 503.2										
ROUTE MCUNGE	503.81	12	7	.07810	163.66	5.970	1.43321	1.600	3.274	CCODE = .2
RAINFALL TYPE= 2										RAIN24= 3.200
COMPUTE NM HYD	503.20	-	1	.04940	102.58	3.610	1.37021	1.500	3.245	PER IMP= 17.00
*S COMBINE 503.2 AND 503.91 AS 503.99										
*S (503.99=FLOW AT EUBANK BETWEEN DEL REY AND SANTA MONICA)										
ADD HYD	503.99	7& 1	20	.12750	254.92	9.580	1.40879	1.550	3.124	
*S **********										
*S MISCELLANEOUS BASINS THAT FLOW TO EAST SIDE OF EUBANK										
COMPUTE NM HYD	504.00	-	1	.03720	77.25	2.718	1.37021	1.500	3.245	PER IMP= 17.00
*S (504.0=FLOW AT EUBANK NORTH OF CORONADO BELOW SAN FRANCISCO)										
COMPUTE NM HYD	505.00	-	2	.02870	59.60	2.097	1.37021	1.500	3.245	PER IMP= 17.00
*S (505.0=FLOW AT EUBANK FROM SMALL SUBBASIN THAT STRADDLES SAN RAFAEL)										
COMPUTE NM HYD	506.00	-	3	.04840	73.61	3.537	1.37021	1.600	2.376	PER IMP= 17.00
*S (506.0=FLOW AT EUBANK NORTH OF SAN ANTONIO SOUTH OF SANTA MONICA)										
COMPUTE NM HYD	509.00	-	5	.02590	66.74	2.793	2.02208	1.500	4.026	PER IMP= 50.00
*S (509.0=SANDIA HEIGHTS SOUTH UNITS 21 & 23 SD OUTFALL TO PINO DAM)										
*S **********										
*S HYDROGRAPHS AT QUINTESSENCE STORM DRAINS										

```
*S ROUTE 504.0 THROUGH CHANNEL ON EAST SIDE OF EUBANK
*S (511.80=FLOW TO MH#4 AT CORONADO AND EUBANK)
                                FROM  TO                    PEAK        RUNOFF                TIME TO   CFS      PAGE =   3
                    HYDROGRAPH   ID   ID        AREA      DISCHARGE     VOLUME     RUNOFF      PEAK     PER
COMMAND          IDENTIFICATION  NO.  NO.     (SQ MI)      (CFS)      (AC-FT)   (INCHES)   (HOURS)   ACRE     NOTATION

ROUTE MCUNGE          511.80     1    7        .03720       74.98       2.722     1.37175     1.500   3.149 CCODE =      .2
*S
*S (511.91= FLOW TO MH#3 AT SAN RAFAEL)
ADD HYD               511.91   2& 7  13        .06590      134.58       4.819     1.37107     1.500   3.191
*S (511.92=FLOW TO MH#2 AT SANTA MONICA)
ADD HYD               511.92  13&11  21        .16912      275.04      12.492     1.38494     1.550   2.541
*S (511.99=FLOW AT OUTFALL WEST OF EUBANK AT SANTA MONICA)
ADD HYD               511.99  21&20  22        .29662      529.96      22.072     1.39519     1.550   2.792
*S END OF ANALYSIS OF N. PINO WATERSHED EAST OF TRAMWAY
*S*************************************************************************
*S         MAIN PINO ARROYO
*S         FUTURE CONDITIONS, 100-YR RETURN PERIOD, 24-HR STORM
*S*************************************************************************
*S         BEGIN MAIN PINO ARROYO BASINS
RAINFALL  TYPE= 2                                                                                          RAIN24=   4.100
COMPUTE NM HYD        510.00    -    1        3.17800     3292.83     228.752     1.34962     1.833   1.619 PER IMP=    .00
*S  ROUTE 510.0 THRU 510.2 (PA-1 THRU BASIN PA-16)
ROUTE MCUNGE          510.80    1    6        3.17800     3278.95     228.382     1.34744     1.900   1.612 CCODE =      .1
COMPUTE NM HYD        510.10    -    1        .46400       869.97      33.399     1.34962     1.567   2.930 PER IMP=    .00
*S   ROUTE 510.1 THRU 510.2 (PA-2 THROUGH BASIN PA-15)
ROUTE MCUNGE          510.81    1    5        .46400       852.72      33.322     1.34652     1.633   2.871 CCODE =      .1
*S ADD 510.81 AND 510.80
ADD HYD               510.90  6& 5  11        3.64200     3701.81     261.704     1.34732     1.866   1.588
*S   ROUTE 510.90 THRU 510.2
ROUTE MCUNGE          510.82   11    7        3.64200     3696.06     261.540     1.34648     1.900   1.586 CCODE =      .1
COMPUTE NM HYD        510.20    -    1        .27000       448.49      12.184      .84608     1.500   2.595 PER IMP=    .00
*S    ADD 510.9 AND 510.2 (ROUTED PA-1 TO PA-16)
ADD HYD               510.91  1& 7  12        3.91200     3745.17     273.724     1.31194     1.900   1.496
*S   ROUTE SUM OF 510.0 TO 510.2 THRU 510.3(PA-1 & PA-16 THROUGH BASIN PA-17)
ROUTE MCUNGE          510.83   12    7        3.91200     3723.21     273.118     1.30904     2.000   1.487 CCODE =      .1
RAINFALL  TYPE= 2                                                                                          RAIN24=   3.650
COMPUTE NM HYD        510.30    -    1        .27800       513.58      15.171     1.02326     1.500   2.887 PER IMP=   6.00
*S SEPARATE 510.3 (PA-17) INTO NORTH AND SOUTH DRAINAGE
DIVIDE HYD            510.3N    1   11        .16124       297.88       8.799     1.02326     1.500   2.887
                      510.3S  AND   12        .11676       215.70       6.372     1.02326     1.500   2.887
*S SEPARATE 510.3S INTO A (FLOW TO S. EAGLE RIDGE DR.) AND B (FLOW TO CV-D23-47)
DIVIDE HYD           510.3SA   12   13        .06422       118.64       3.505     1.02326     1.500   2.887
                     510.3SB  AND   14        .05254        97.07       2.867     1.02326     1.500   2.887
*S ADD FLOW TO CV-D23-47 BACK TO P17N (DS FROM N. EAGLE RIDGE DR.)
ADD HYD               510.3N 14&11  11        .21378       394.94      11.667     1.02326     1.500   2.887
*S    TOTAL DRAINAGE AT END OF BASIN 510.3 (PA-17) IN MAIN ARROYO
ADD HYD               510.92 11& 7  11       4.12578      3762.44     284.812     1.29435     2.000   1.425
*S SEPARATE 510.3SA(P17A) INTO FLOW TO 510.3SC (CV-D23-49) AND 510.3SD (DS-D23-1
DIVIDE HYD           510.3SC   13   14        .04559        84.23       2.488     1.02326     1.500   2.887
                     510.3SD  AND   15        .01862        34.40       1.016     1.02326     1.500   2.887
*S ADD FLOW DS FROM EAGLE ROCK PLACE
ADD HYD               510.93 14&15  14        .06422       118.64       3.505     1.02326     1.500   2.887
*S ROUTE 510.93(P17C&D) THROUGH NATURAL CHANNEL TO CONF. W/MAIN PINO
ROUTE MCUNGE          510.84   14    7        .06422       111.75       3.448     1.00673     1.667   2.719 CCODE =      .1
*S    ROUTE SUMS 510.92(PA-1 THRU PA-17) THROUGH BASIN 510.4(PA-19)
ROUTE MCUNGE          510.85   11    8       4.12578      3741.54      284.503     1.29295     2.100   1.417 CCODE =      .1
COMPUTE NM HYD        510.40    -    1        .22100       530.73      21.147     1.79410     1.500   3.752 PER IMP=   35.00
*S    ADD ROUTED FLOWS TO 510.4
```

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	NOTATION
ADD HYD	510.94	1& 8	19	4.34678	3806.63	305.650	1.31843	2.067	1.368	
*S	510.99=TOTAL MAIN PINO FLOW AT TRAMWAY LANE									
ADD HYD	510.99	19& 7	20	4.41100	3824.12	309.098	1.31389	2.067	1.355	
FINISH										

DRAINAGE REPORT
FOR

Tract A
Unit 19
Sandia Heights South

Prepared by:

ADVANCED
ENGINEERING
and CONSULTING

10209 Snowf lake Ct. NW
Albuquerque, New Mexico 87114

August, 1998

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.

SHAHAB BIAZAR
NEW MEXICO
13479
REGISTERED PROFESSIONAL ENGINEER

Shahab Biazar
PE NO. 13479

County of Bernalillo

State of New Mexico

BOARD OF COUNTY COMMISSIONERS
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DISTRICT 2
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ORLANDO VIGIL, TREASURER

2400 BROADWAY, S.E.
ALBUQUERQUE, NEW MEXICO 87102
PUBLIC WORKS (505) 848-1500

September 11, 1998

Shahab Biazar, P.E.
Advanced Engineering and Consulting
10209 Snowflake Ct. NW
Albuquerque, New Mexico 87114

RE: Drainage Report and Grading and Drainage Plan for Tract A, Sandia Heights South Unit 19 (D23/D9B) (PWD-96-95) Engineer's Stamp Dated 8/30/98.

Dear Shahab:

This letter is a compilation of comments from my office as well as from County Public Works and AMAFCA. Prior to approval for Plat action or Building Permit release for the above referenced site, the following comments must be addressed:

1. Because this site is to be subdivided, a Letter of Map Revision must be obtained from FEMA to remove the existing floodplain. The Plat must show the existing floodplain limits and must contain the standard floodplain note.

2. Is this Tract in Unit 16 or Unit 19 of Sandia Heights South? The City's AGIS identifies this as Unit 16. This must be correct on the Plat.

3. Is the existing 10' drainage easement public or private?

4. It appears that the proposed floodwall encroaches into the existing 20' drainage easement. Does this easement belong to the County or AMAFCA? Is an encroachment license required?

5. Please show the site correctly on the flood map. It appears that the FEMA floodplain encroaches more into the site. Revise the floodplain limits. (See map attached)

6. North arrows should be added to the Vicinity map and the FEMA map since these are not oriented the same way.

7. Per the legend, is the bold Boundary Line the property line, or a drainage basin boundary?

8. Why is the proposed desilting pond located outside of the property within the public right-of-way? Elevations must be provided in and around the pond. It appears that the pond will encroach into the existing valve box, waterline and sewer line. What are the elevations of these facilities?

9. Provide the off-site drainage basin map. Is the pond intercepting public or private water? Is the proposed 8" pipe to be publicly or privately maintained?

10. Call out what is proposed at the end of the 8" pipe. Is an energy dissipator proposed? Why is a curb opening proposed at that location?

11. At the concrete rundown, why is a 42.92 contour line shown?

12. Provide cross sections at the perimeter of the site, especially on the south and west sides to show the proposed slopes. Adjacent to Tramway, why are the flow arrows shown within the slope and how do the proposed spot elevations relate to the existing ground elevations?

13. Provide existing elevations on the east side of the site to show the grade differences between your site and the existing Lots.

14. Please provide a detail for the floodwall on the plan.

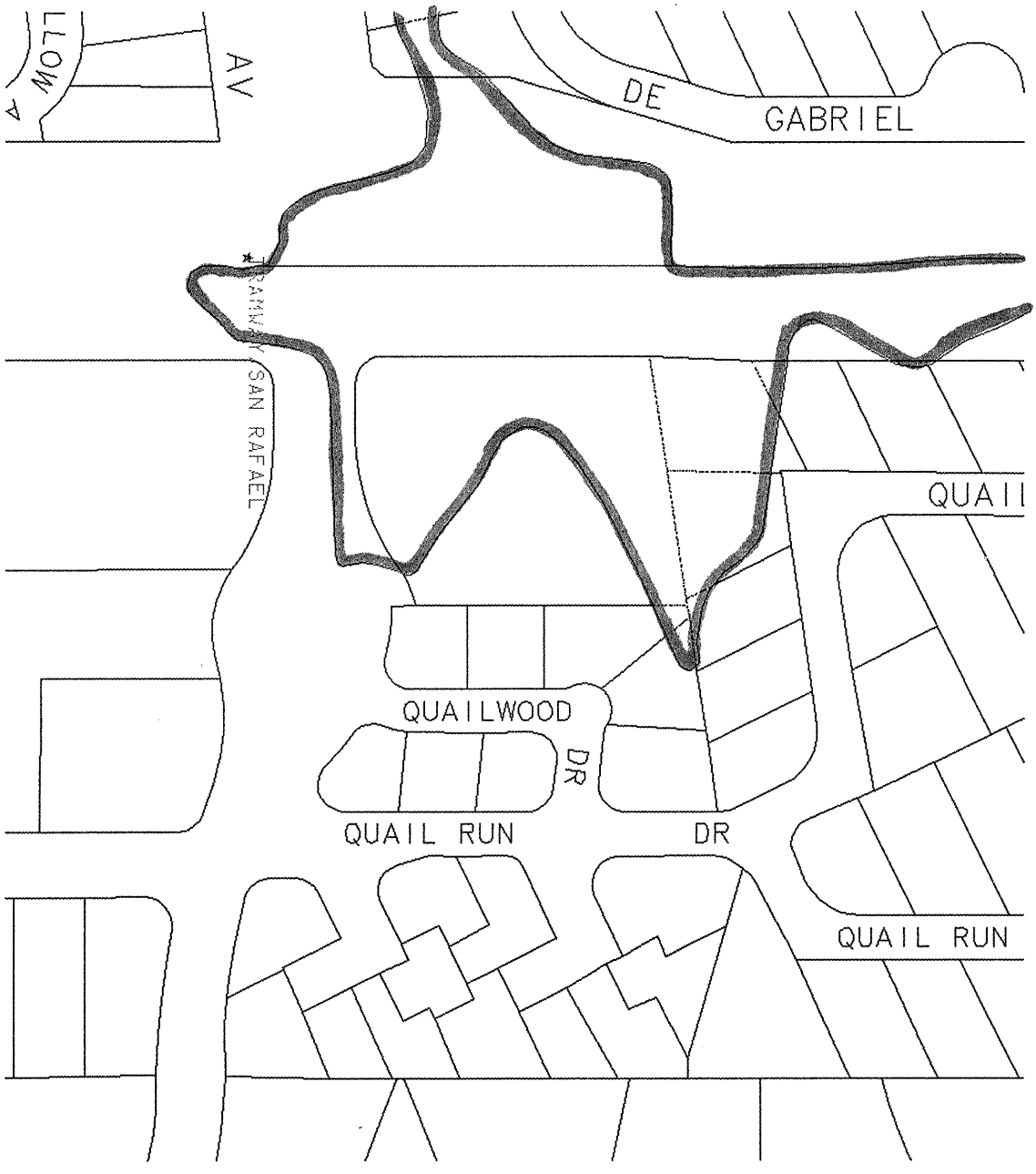
If you have any questions regarding these comments, please call me at 924-3982, or contact Brad Catanach at the County.

Sincerely,

Susan Calongne

Susan M. Calongne, P.E.
City/County Floodplain Administrator

c: Andrew Garcia, City Hydrology
Lisa Ann Manwill, P.E., Albuquerque Metropolitan Arroyo Flood Control Authority
Brad Catanach, P.E., Bernalillo County Public Works Division
File


LLOW
AV
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GABRIEL
SAN RAFAEL
QUAI
QUAILWOOD
DR
QUAIL RUN
DR
QUAIL RUN

Case Routing Slip

01-Sep-98	pwd - 96 - 95	Category:	Resubmitt

Applicant Name:	Advanced Engineering & Cons	**Application Date:**	01-Sep-98
Applicant Category:	Drainage Engineer	**Due Date:**	22-Sep-98

	Owner Info	Agent Info	Egr/Svy Info
Name	Don Maestas	Advanced Engineering & C	
Address	5113 Comanche Rd NE	10209 Snowflake Ct NW	
City	Albuquerque	Albuquerque	
State	NM	NM	
ZIP	87110	87114	
Ph	881-0464	899-5570	

Legal Description:	TR A UNIT 19 SANDIA HEIGHTS SOUTH		
UPC:	1-023-063-077-185-305-13	**Zone Map**	D-23
Street Address:	Tramway & San Rafael		
Submittal Type:	Grading & Drainage Plan		

Comments Required From:

DRAN ☑ **DRE** ☐ **ENGA** ☐ **INSP** ☐ **TRAF** ☐ **UTIL** ☐ **OTHE** ☐

Brad

Amafca 9/1/98

FP 9/1/98

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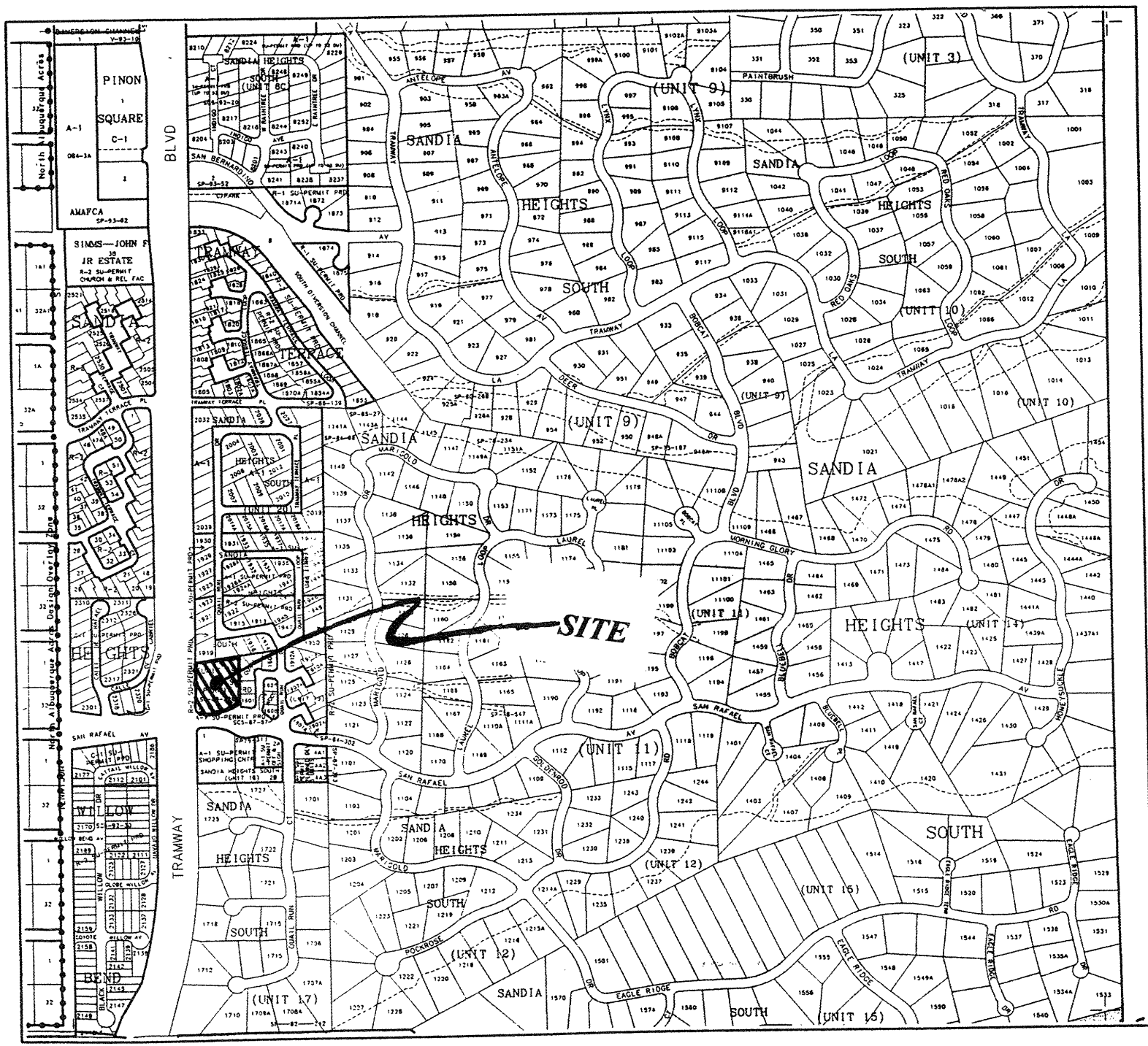
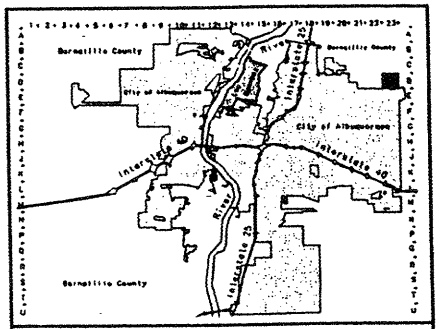




Location map

N

SCALE IN FEET

250 0 500 1000

1" = 500'

BERNALILLO COUNTY
STATE OF NEW MEXICO

LEGAL DESCRIPTION

T11N
R4E
SEC 23

UNIFORM PROPERTY CODE

1-023-063

D-23-Z

Bernalillo County

Map Amended by AGIS through May 05, 1995

Location

Tract A, Unit 19, of Sandia Heights South is a 1.43 acre site which is located at the northeast corner of Tramway Boulevard and San Rafael Avenue. See attached vicinity map for location.

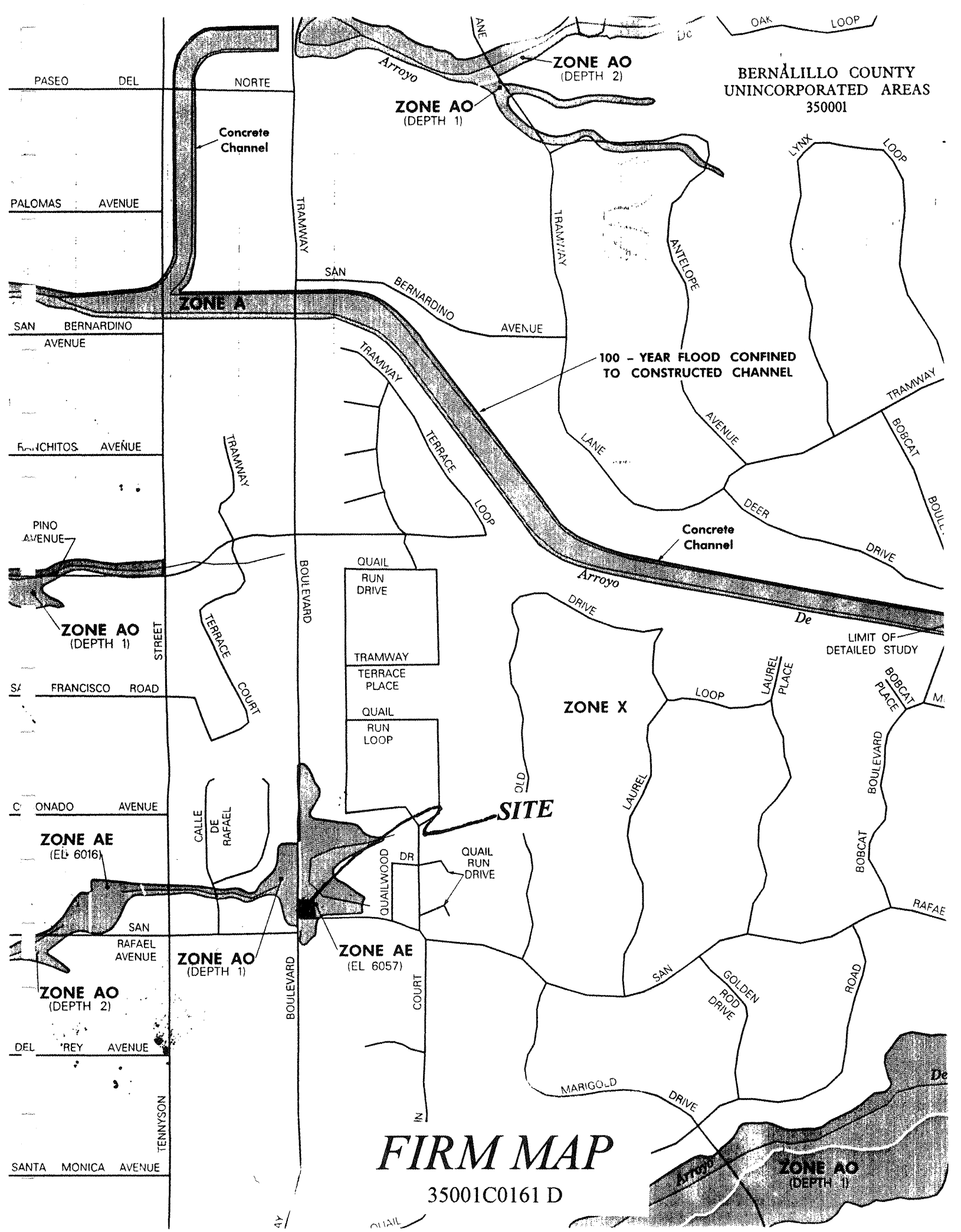
Purpose

Advanced Engineering and Consulting on behalf of J. Arsenio Martinez, P.E. and the owner has prepared this grading and drainage solution for the proposed use of this site. The owner is proposing to build an apartment complex and subdivide the remaining of the tract into a three-lot subdivision.

Existing Drainage Conditions

The site consists of mainly native grasses and desert annuals on a one to 10% grades. The site drains from east to west and the runoff, at an existing flow rate of 3.53 cfs, to an existing 24" culvert at the southwest corner of the lot. The runoff inside the 20' existing public drainage easement (along the northerly boundary) will drain to an existing 54" culvert located on the northeast corner of the site.

As shown on FIRM Map number 35001C0161-D the site falls within a 100-year flood plain, Zone AE, with a flood elevation of 6057.00'. The limits of the flood plain elevation are shown on the grading plan.


BERNALILLO COUNTY
UNINCORPORATED AREAS
350001
ZONE AO
(DEPTH 2)
ZONE AO
(DEPTH 1)
Arroyo
Concrete Channel
PASEO DEL NORTE
PALOMAS AVENUE
SAN BERNARDINO AVENUE
ZONE A
TRAMWAY
ANTELOPE
LYNX LOOP
100 - YEAR FLOOD CONFINED TO CONSTRUCTED CHANNEL
TERRACE LOOP
BOBCAT
DEER DRIVE
LANE
AVENUE
PINO AVENUE
ZONE AO
(DEPTH 1)
QUAIL RUN DRIVE
TERRACE PLACE
QUAIL RUN LOOP
TERRACE COURT
BOULEVARD
STREET
FRANCISCO ROAD
ZONE X
LAUREL
LOOP
PLACE
BOBCAT PLACE
SITE
OLD
CALLE DE RAFAEL
ONADO AVENUE
ZONE AE
(EL 6016)
QUAILWOOD DR
QUAIL RUN DRIVE
SAN RAFAEL AVENUE
ZONE AO
(DEPTH 1)
ZONE AE
(EL 6057)
ZONE AO
(DEPTH 2)
COURT
SAN GOLDEN ROD DRIVE
ROAD
MARIGOLD DRIVE
DEL REY AVENUE
TENNYSON
SANTA MONICA AVENUE
LIMIT OF DETAILED STUDY
ZONE AO
(DEPTH 1)
FIRM MAP
35001C0161 D

There is an existing channel along the northerly property line which drains to an existing 54" culvert located on the northwest corner of the lot. According to exhibit "D" attached to the response letter (from Resource Technology Inc. AHYMO runs) the flow in this channel shows a runoff of 230.6 cfs. The channel just upstream of this Lot (to the east) has been lined with rocks. But the rocks do not have any kind of support which would hold them in place during the 100-year storm. The channel along this property line consists of trees, large boulders, and lots of native vegetation.

There is also an existing offsite drainage basin which drains to this site form the south east corner of the site at a flow rate of 0.81 cfs.

Proposed Conditions and On-Site/Offsite Drainage Management Plan

The drainage patterns, for on-site and offsite, will remain the same. The runoff from the site, at a developed flow rate of 6.97 cfs, will drain west to an existing 24" culvert located at the southwest corner of the Tract. The runoff inside the 20' public drainage easement will drain to the existing 54" culvert located on the northeast corner of the site. We have set the finished floor elevation of the buildings at a much higher elevation (from 6061.00' to 6063.50') than existing flood plain elevation (6057.00'). An HEC-RAS analysis was prepared to analyze the flow depth into the channel. We also calculated the extent of the erosion setback into the lot. See this report for the HEC-RAS and erosion setback calculations. The limits of the existing flood plain, erosion setback, hydraulic grade line, and energy grade line are shown on the grading and drainage plan.

Due to extent of the erosion setback into this tract, we are proposing to construct a flood wall along the drainage easement line. A scour depth of 3.69' was calculated. We also calculated a freeboard of 1.51' at section A and 1.71' at section B. Since Section C is away from any building, a freeboard was not calculated.

The offsite runoff of 0.81 cfs will be routed to a proposed desilting pond. From there the pond will drain via an 8" pipe to the west (day lighted into the landscaping area), and from there to an existing inlet at the southwest corner. We have shown the location of the desilting pond in the grading and drainage plan.

Calculations

City of Albuquerque, Development Process Manuel, Section 22.2, Hydrology Section, revised January 1993, was used for the runoff calculations. A treatment of D=4%, B=19%, and A=77% was used for on site existing conditions. A treatment of D=70%, C=15%, and B=15% was used for proposed site conditions. The site falls under Zone 4 based on Figure A-1 of page A-1.

We used HEC-Ras program to calculate the hydraulics in the channel. We also used "Sediment and Erosion Design Guide" prepared by AMAFCA to calculate the erosion set back into the tract.

RUNOFF CALCULATIONS / AHYMO INPUT DATA

The site is @ Zone 4

LAND TREATMENT

D = 80 %, B = 10 %, C = 10 %

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.

RUNOFF SUMMARY TABLE

DRAINAGE BASINS

BASIN	AREA (SF)	AREA (AC)	AREA (MI^2)
ON-SITE	62358.84	1.4316	0.002237
OFFSITE	12000.00	0.2755	0.000430

BASINS RUNOFF CALCULATION RESULTS UNDER PROPOSED CONDITIONS

BASIN	Q-100 CFS	Q-10 CFS
ON-SITE	6.97	4.52
OFFSITE	0.81	0.40

BASINS RUNOFF CALCULATION RESULTS UNDER EXISTING CONDITIONS

BASIN	Q-100 CFS	Q-10 CFS
ON-SITE	3.53	1.45
OFFSITE	0.81	0.40

EROSION SETBACK

Erosion setback per Sediment & Erosion Design Guide Section 3.4.5:

Q_d = Dominant Discharge

$Q_d = 0.2\ Q_{100}$ Equation 3.77

$Q_d = 0.2(230.6) = 46.12$ cfs

Sc =Critical Slope
$Sc = 0.037Q_d - 0.133$ Equation 3.80

$Sc = 0.037(46.12) - 0.133 = 0.0222$

$Wd = 4.6Q_d^{0.4} =$ Equation 3.78

$Wd = 4.6(46.12)^{0.4} = 21.30$ feet

For $Q_d \leq 200$cfs
Use $Y/Wd = 10.0$ $Y = 10(21.30) = 213$ feet

Lateral Erosion Distance Lv = *y*/2

Lv =213/2 = 106.5 feet
Max = Lv/2 106.5/2 = 53.25 feet

$S \geq Sc$
(BSB) max = 11.5Qd .04
= 11.5(46.12).04 =53.24 'feet Bankline setback

(CBS) max +0.5Wd

53.24' + 10.65 = 63.89' feet Centerline Setback Use Larger

TOTAL SCOUR (SECTIONS A, B, & C)

Average depth = 1.59'
Average Velocity = 9.97 fps
Average Froude No. = 1.66

Antidune Scour
Ant Scour = ½ ha

Therefore **ha = 0.14 (2 v/2g)** = 0.14(6.28)(99.40) =1.36'

Anti.Scour = ½ ha = ½(1.36) = .68'

FLOOD WALL SCOUR DEPTH

Ys/Y = 0.68 + 0.14 Fr^2 (Formula 3.89)

Y = 1.59'

Ys = (.068 + 1.21)(1.59) = 3.01'

Ys = 3.01'

TOTAL SCOUR

3.01' + .68' = 3.69'

CROSS SECTION	CHANNEL ELEVATION	BOTTOM OF FLOOD WALL
A	6060.00-3.69	6056.31
B	6057.00-3.69	6053.31
C	6054.00-3.69	6050.31

CROSS SECTION	EGL ELEV.-BOTTOM FLOODWALL	MIN. WALL HT.
A	6062.65-6056.31	6.34'
B	6060.64-6053.31	7.33'
C	6056.69-6050.31	6.38'

FREEBOARD

Add freeboard to EGL to Establish Top of Flood Wall Elevation

@ HEC- RAS Sections A & B

Fb = 0.7(2+.025Vd1/3)

Section "A"

EGL Elevation-WS Elevation V= 7.58 fps
6062.65-6062.0= .65' d= .65'

Fb= 0.7(2+.025(7.58).65)1/3
0.7(2.1642) = 1.51'

Therefore Minimum Flood Wall Elevation = EGL+Fb = 6062.65+1.51 = **6064.16**

Section "B"

EGL Elevation-WS Elevation V= 13.30 fps
6064.64-6058.31 = 2.33' d= 2.33'

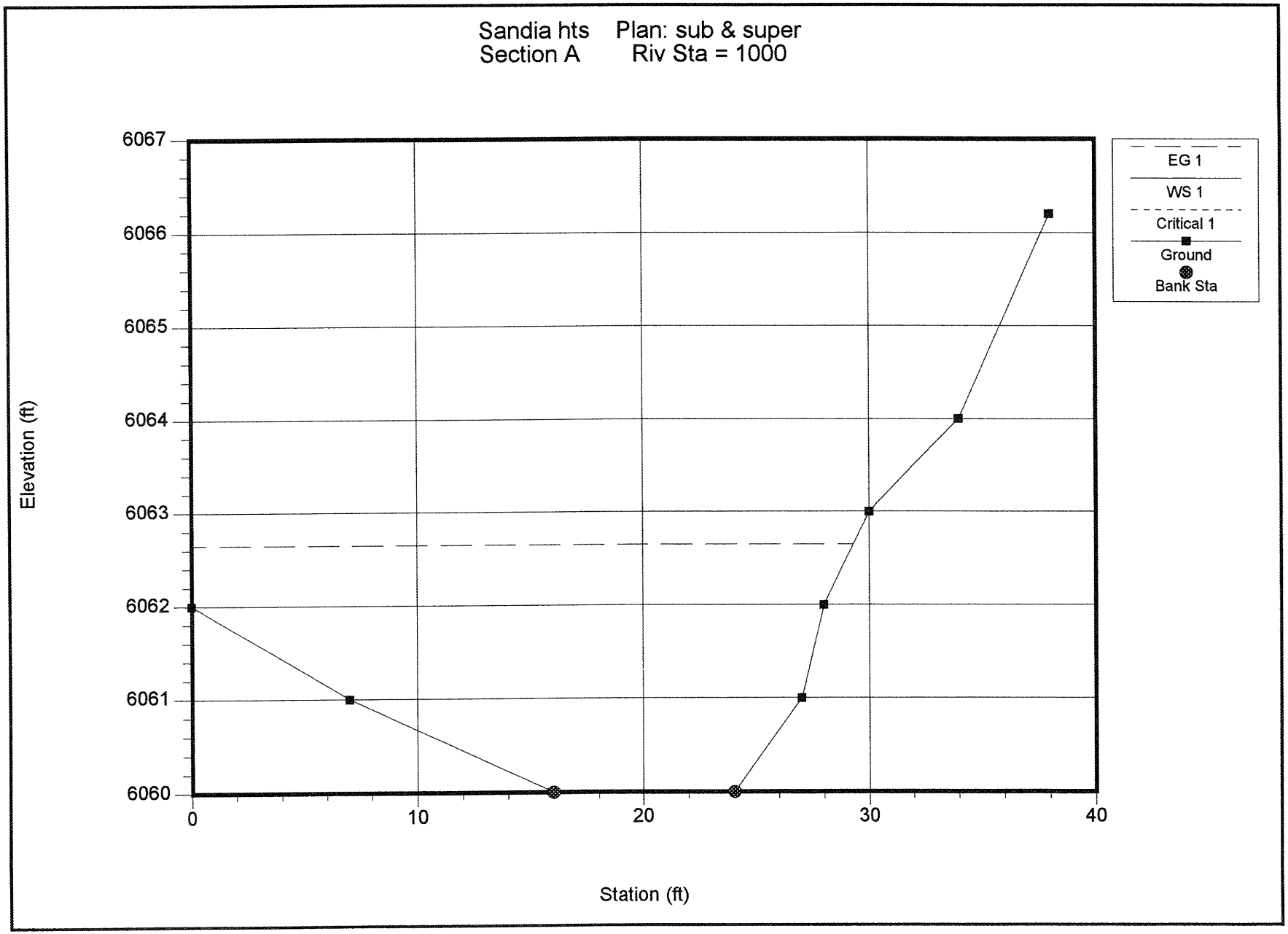
Fb= 0.7(2+.025(13.30)(2.33)1/3
= 0.7(2.4407)
= 1.71'

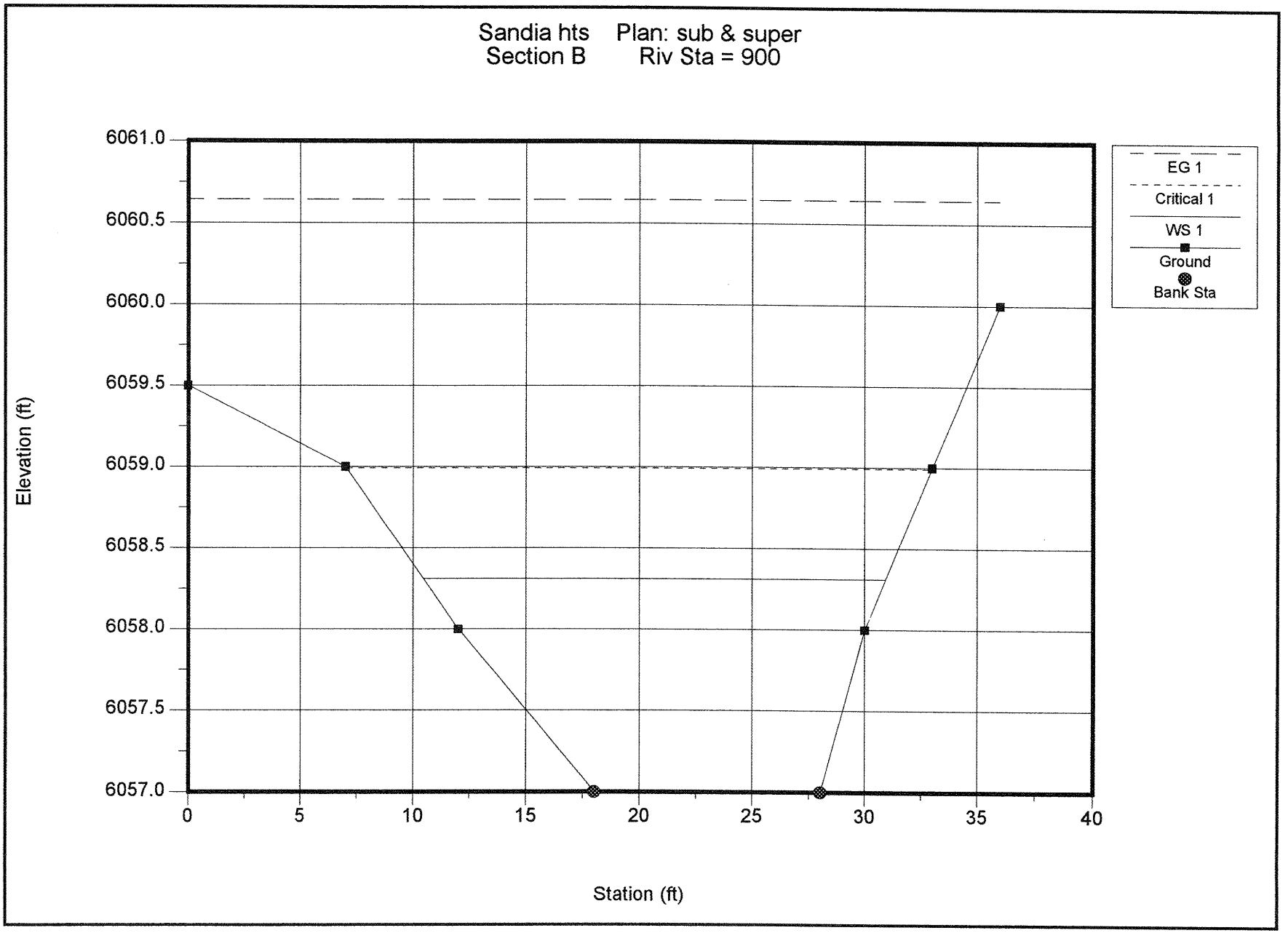
Therefore Minimum Flood Wall Elevation = EGL+Fb = 6060.64+1.71'= **6062.35**

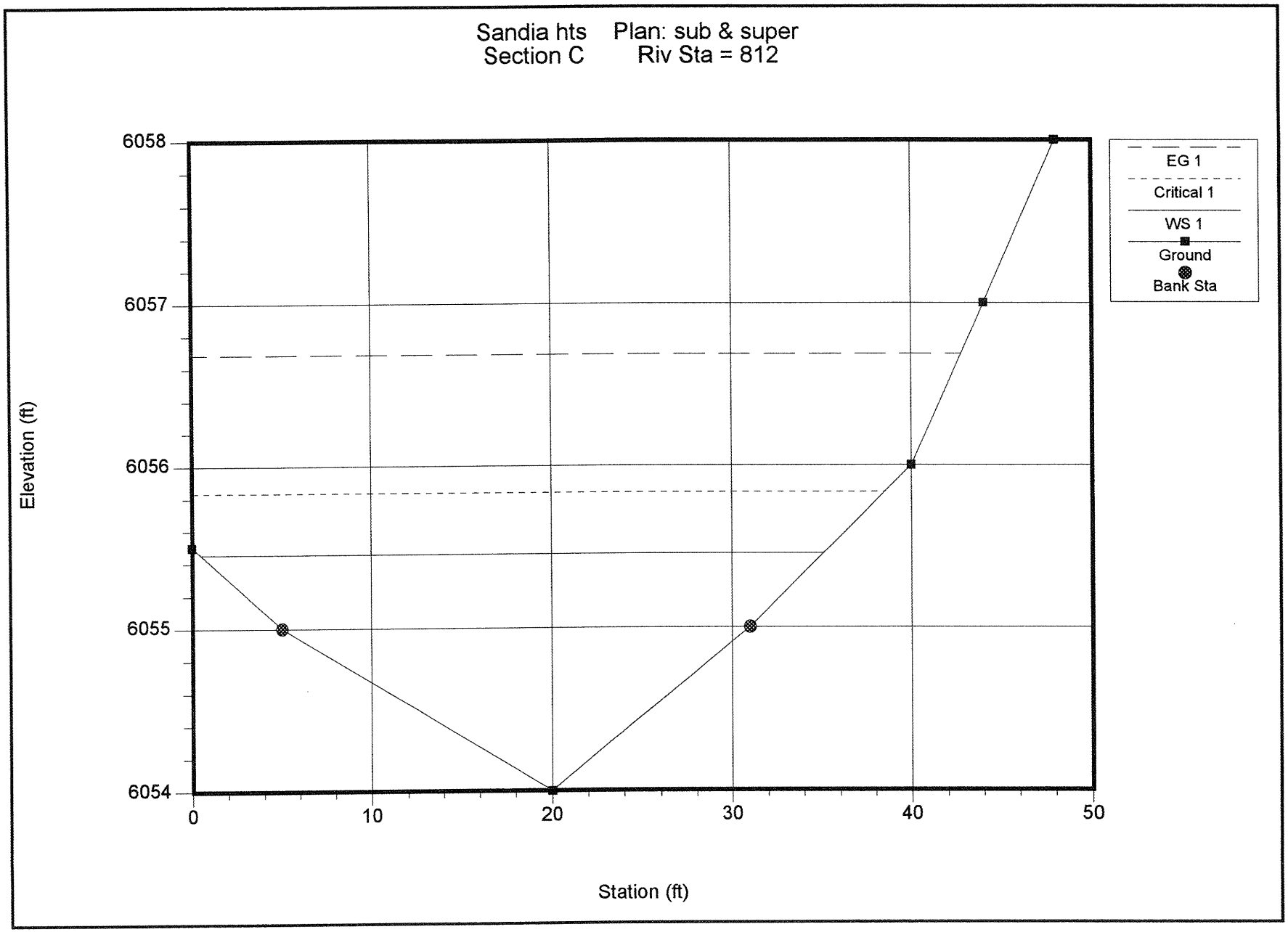
Section "C" Is away from any building

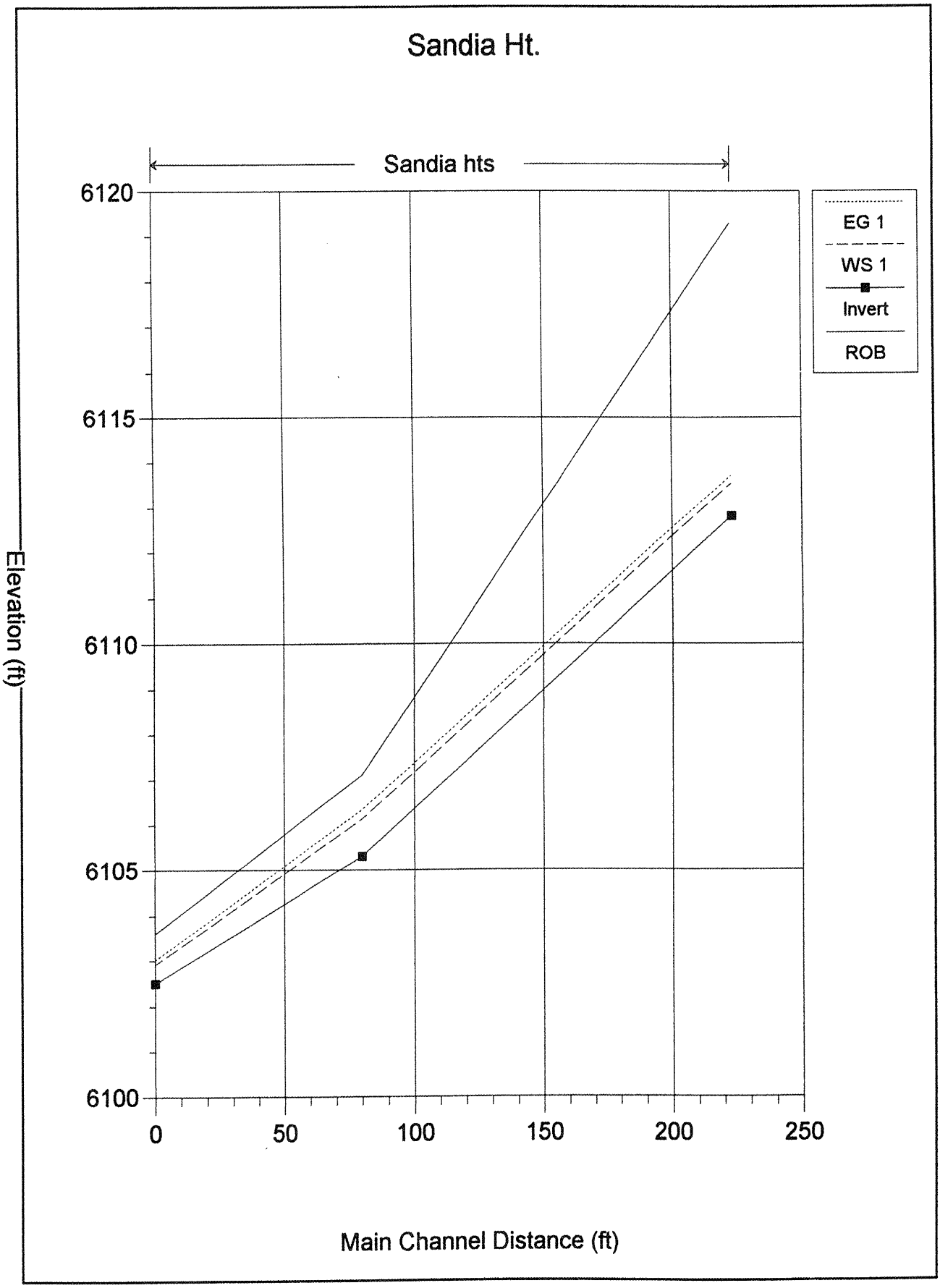
HEC-RAS Plan: sub & super Reach: Arroyo

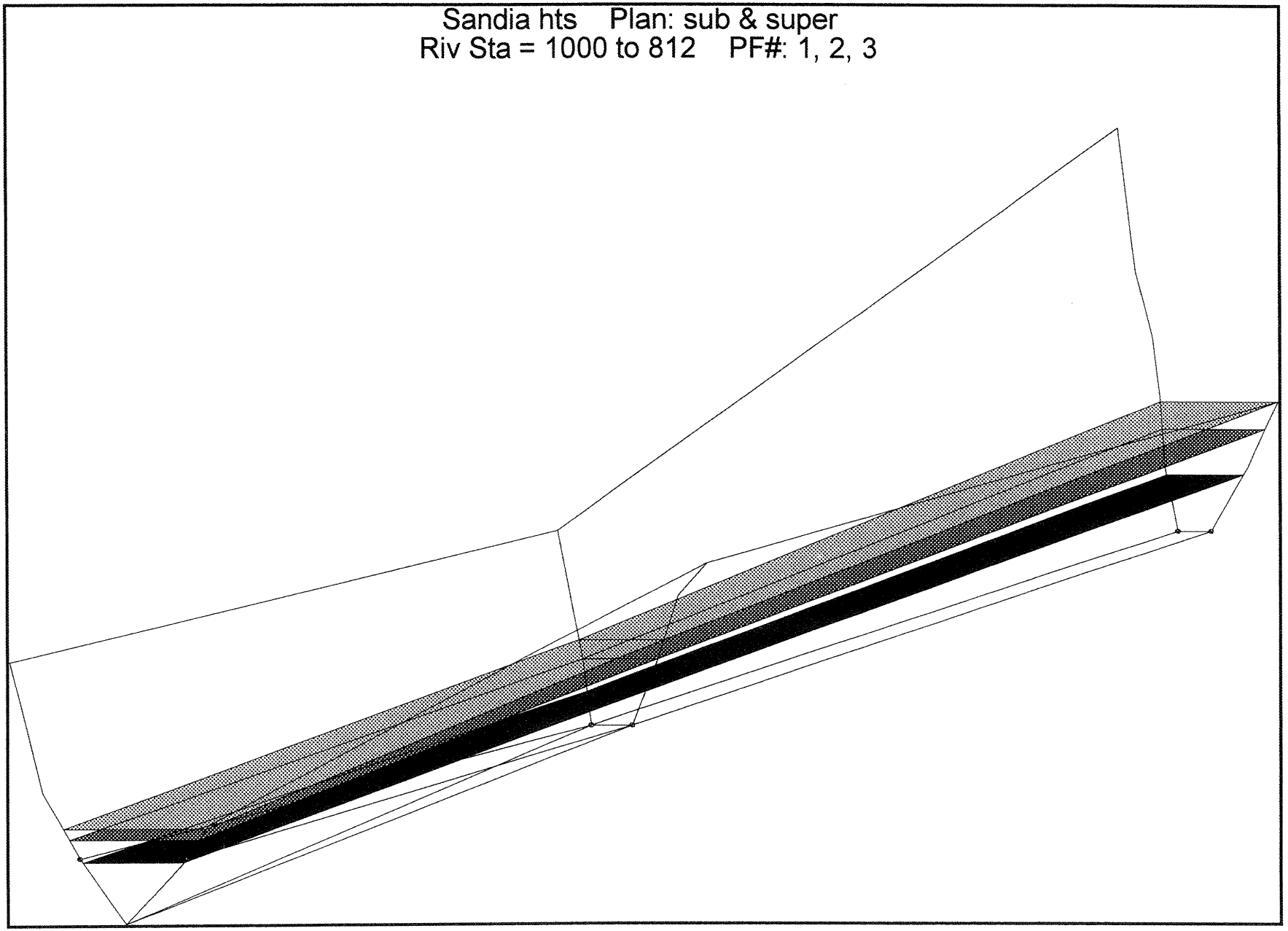
River Sta.	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)
1000	50.00	6060.00	6060.87	6060.87	6061.20	0.012579	5.08	11.58	18.49
1000	150.00	6060.00	6061.58	6061.58	6062.13	0.010436	6.85	26.83	24.60
1000	230.60	6060.00	6062.00	6062.00	6062.65	0.009287	7.58	38.00	28.00
900	50.00	6057.00	6057.52	6057.83	6058.58	0.072532	8.59	6.23	14.13
900	150.00	6057.00	6058.01	6058.59	6059.93	0.056785	11.89	14.19	18.09
900	230.60	6057.00	6058.31	6058.99	6060.64	0.050244	13.30	19.98	20.48
812	50.00	6054.00	6054.94	6054.98	6055.23	0.021227	4.35	11.49	24.44
812	150.00	6054.00	6055.29	6055.53	6056.09	0.029209	7.22	21.32	31.50
812	230.60	6054.00	6055.45	6055.83	6056.69	0.035537	9.03	26.75	34.62


Sandia hts Plan: sub & super
Section A Riv Sta = 1000
Elevation (ft)
6067
6066
6065
6064
6063
6062
6061
6060
0
10
20
30
40
Station (ft)
EG 1
WS 1
Critical 1
Ground
Bank Sta


Sandia hts Plan: sub & super
Section B Riv Sta = 900
Elevation (ft)
6061.0
6060.5
6060.0
6059.5
6059.0
6058.5
6058.0
6057.5
6057.0
0
5
10
15
20
25
30
35
40
Station (ft)
EG 1
Critical 1
WS 1
Ground
Bank Sta


Sandia hts Plan: sub & super
Section C Riv Sta = 812
6058
6057
6056
6055
6054
Elevation (ft)
0
10
20
30
40
50
Station (ft)
EG 1
Critical 1
WS 1
Ground
Bank Sta


Sandia Ht.
Sandia hts
6120
6115
6110
6105
6100
0
50
100
150
200
250
EG 1
WS 1
Invert
ROB
Elevation (ft)
Main Channel Distance (ft)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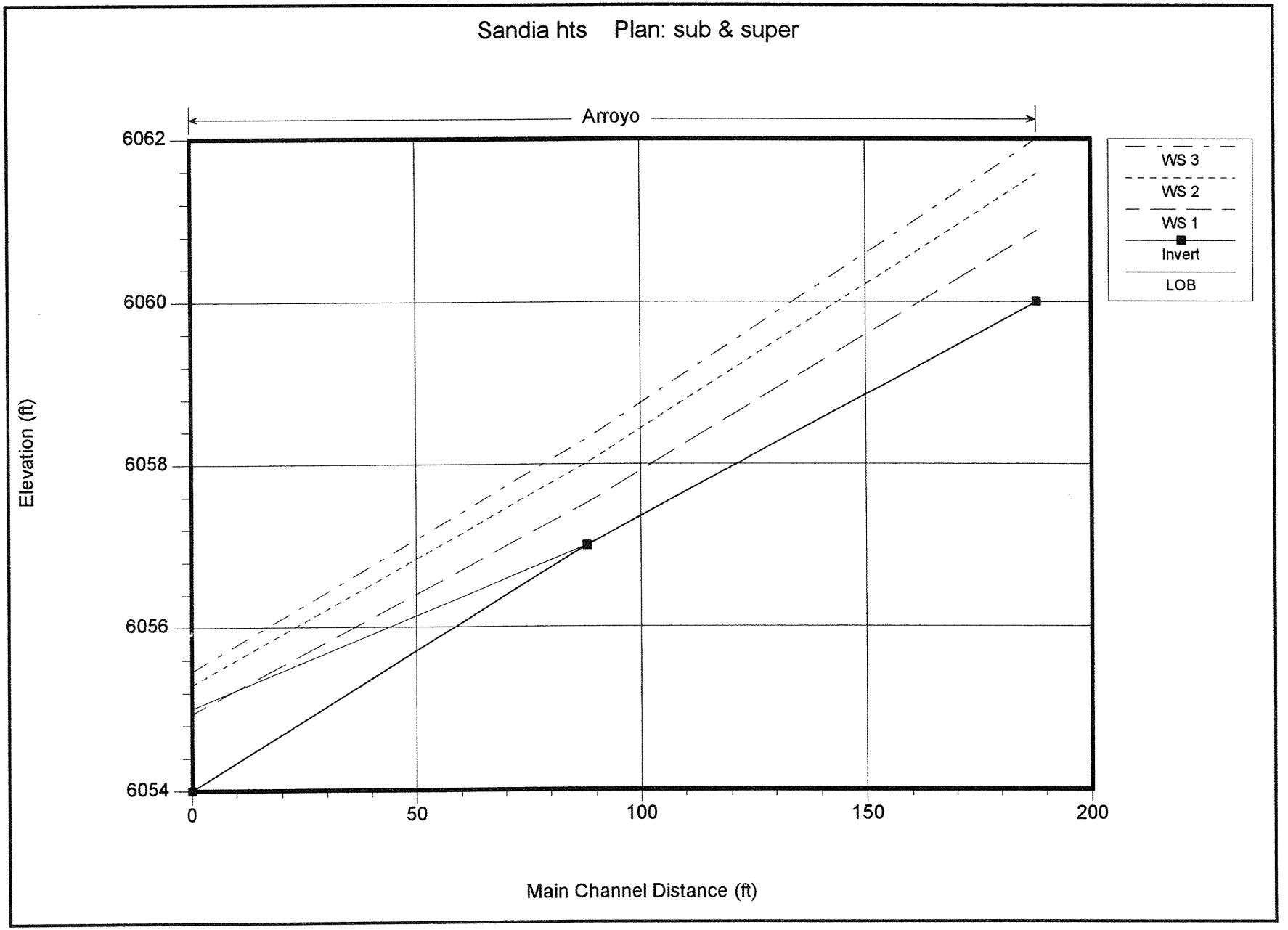
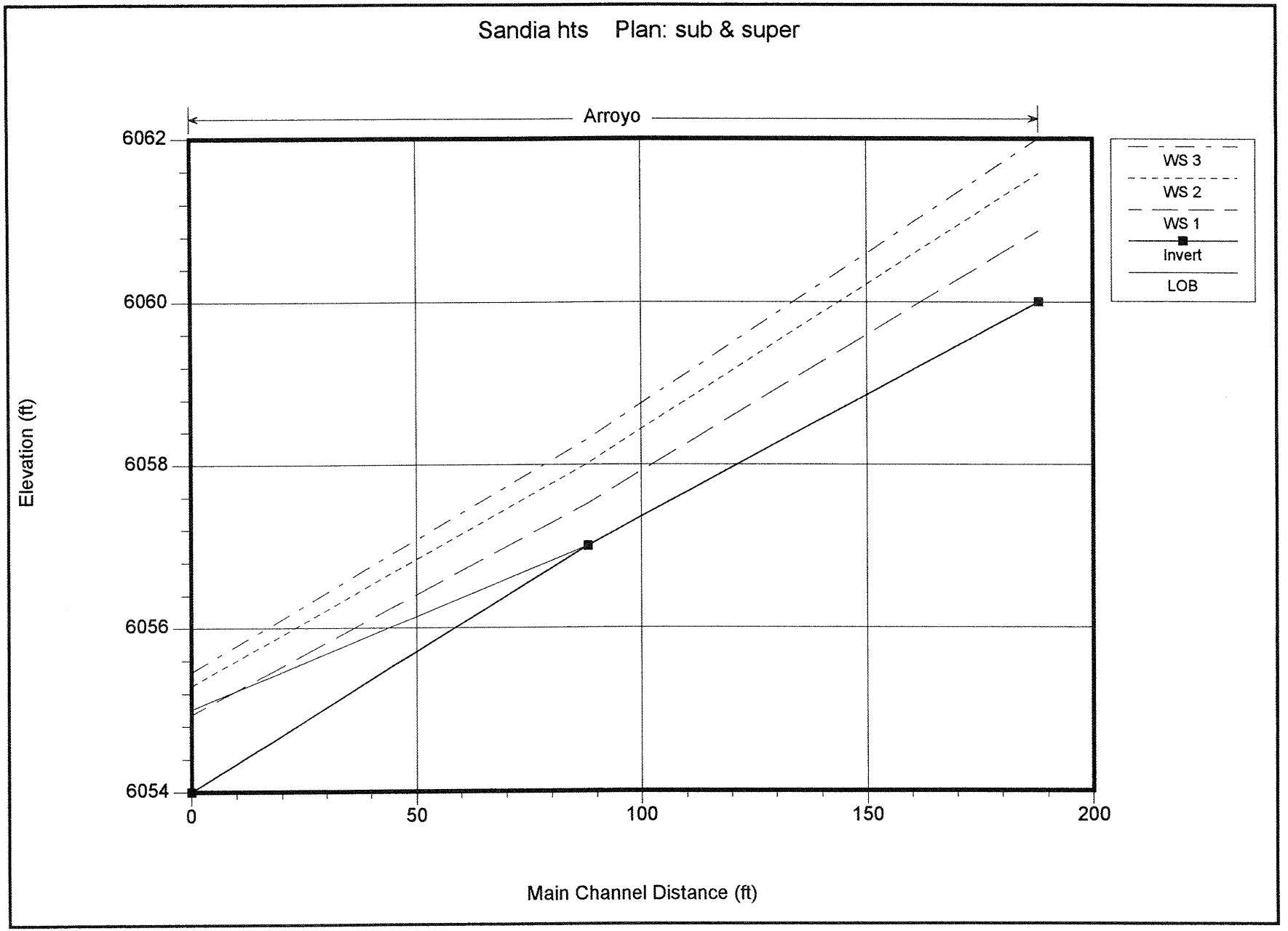
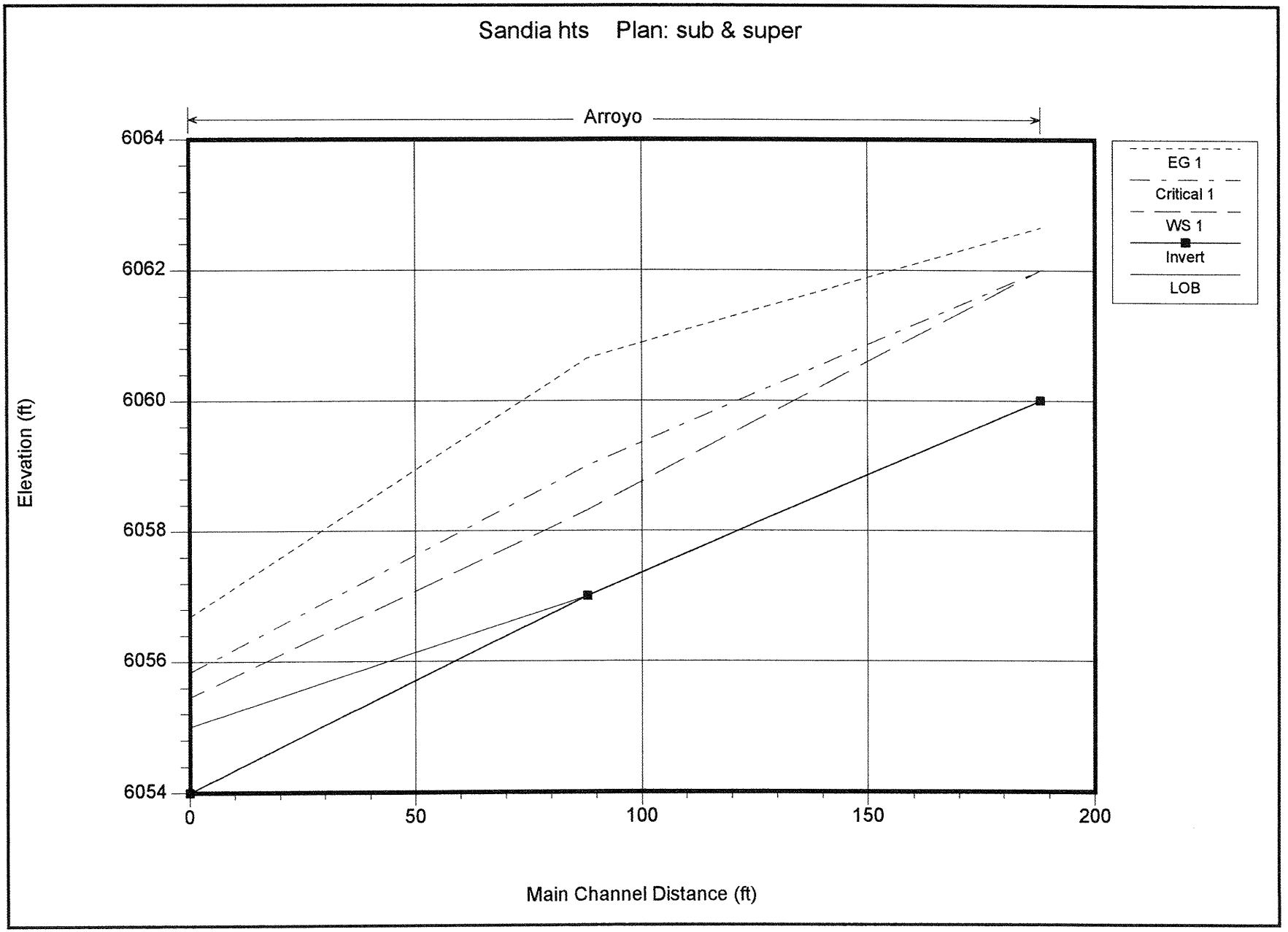
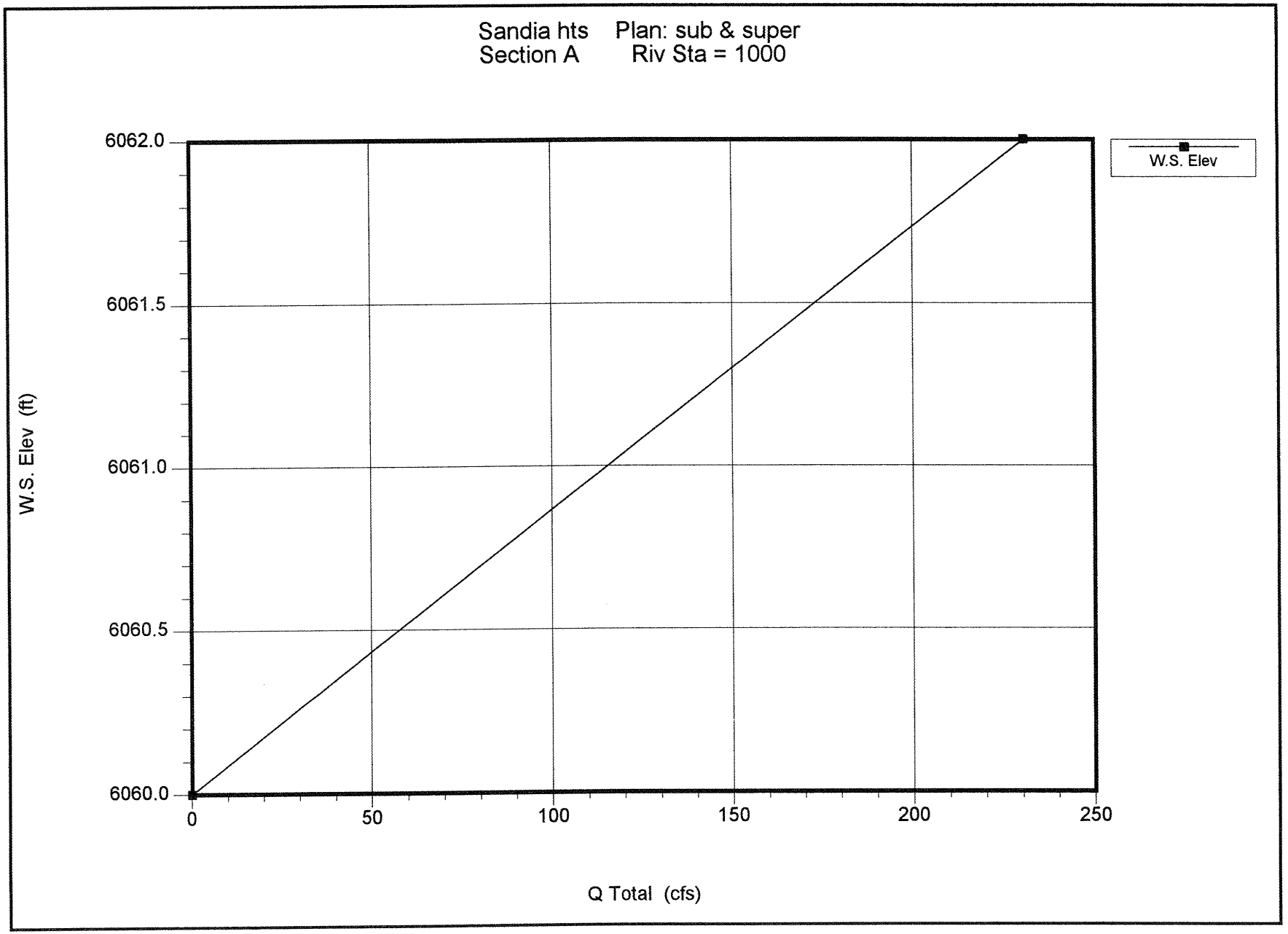
Riv Sta = 1000 to 812 PF#: 1, 2, 3


Sandia hts Plan: sub & super
Arroyo
6062
6060
6058
6056
6054
0
50
100
150
200
Elevation (ft)
Main Channel Distance (ft)
WS 3
WS 2
WS 1
Invert
LOB


Sandia hts Plan: sub & super
Arroyo
6062
6060
6058
6056
6054
0
50
100
150
200
Elevation (ft)
Main Channel Distance (ft)
WS 3
WS 2
WS 1
Invert
LOB


Sandia hts Plan: sub & super
Arroyo
6064
6062
6060
6058
6056
6054
0
50
100
150
200
Elevation (ft)
Main Channel Distance (ft)
EG 1
Critical 1
WS 1
Invert
LOB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Section A Riv Sta = 1000
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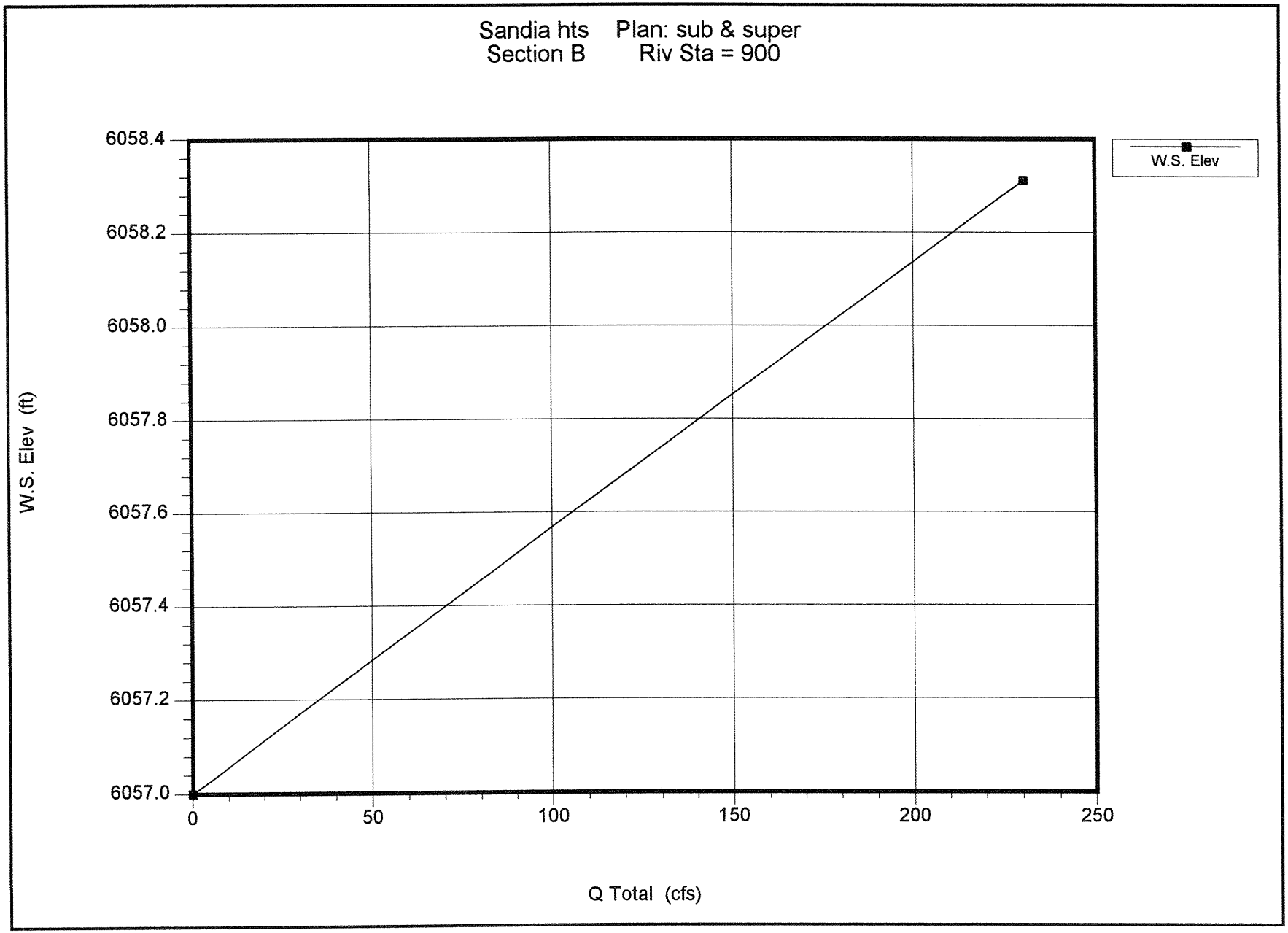
6061.5
6061.0
6060.5
6060.0
W.S. Elev (ft)
0
50
100
150
200
250
Q Total (cfs)
W.S. Elev


Sandia hts Plan: sub & super
Section B Riv Sta = 900
W.S. Elev
W.S. Elev (ft)
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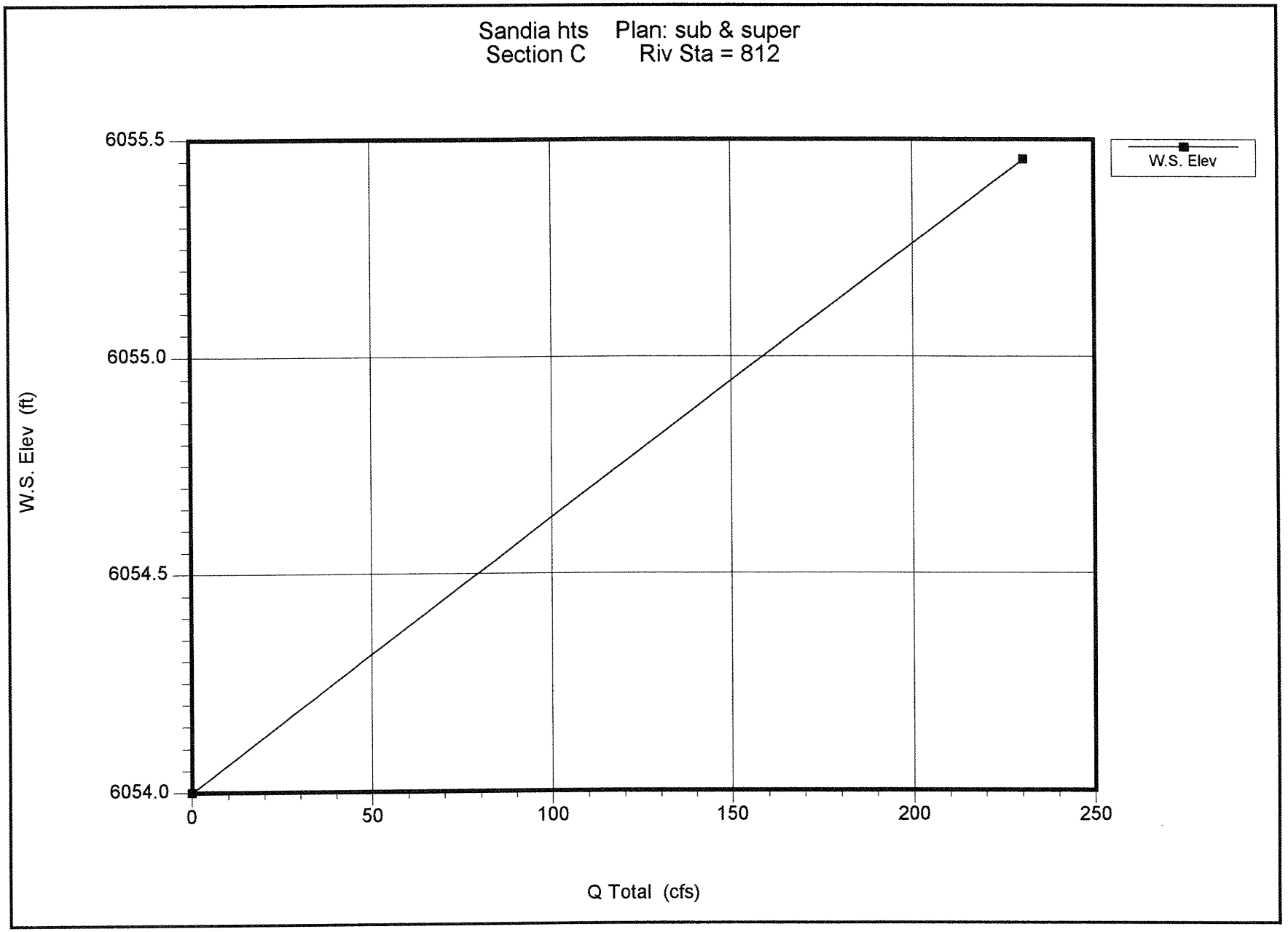
6058.2
6058.0
6057.8
6057.6
6057.4
6057.2
6057.0
0
50
100
150
200
250
Q Total (cfs)


Sandia hts Plan: sub & super
Section C Riv Sta = 812
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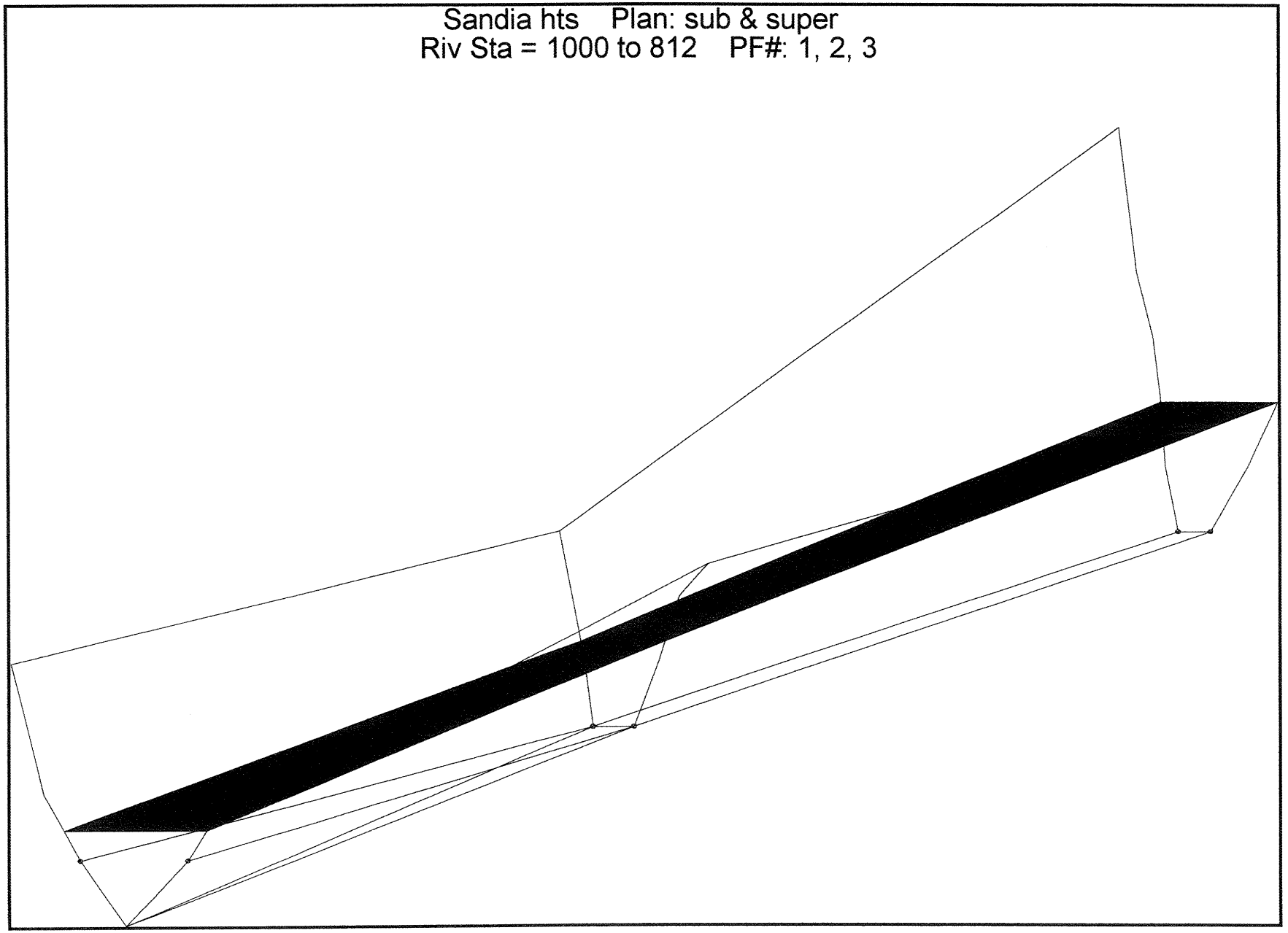
6055.0
6054.5
6054.0
W.S. Elev (ft)
0
50
100
150
200
250
Q Total (cfs)
W.S. Elev


Sandia hts Plan: sub & super
Riv Sta = 1000 to 812 PF#: 1, 2, 3

```
**********************************************************************
*                        LOT-A,  UNIT 16                             *
*                                                                    *
*                         ON-SITE BASIN                              *
**********************************************************************
*       100-YEAR,  6-HR STORM (UNDER PROPOSED CONDITIONS)            *
 *********************************************************************
START               TIME=0.0
*
 INFALL             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

 MPUTE NM HYD       ID=1 HYD NO=101.0 AREA=0.002237 SQ MI
                    PER A=0.00 PER B=10.00 PER C=10.00 PER D=80.00
                    TP=-0.1333 HR MASS RAINFALL=-1

**********************************************************************
*        10-YEAR,  6-HR STORM (UNDER PROPOSED CONDITIONS)            *
 *********************************************************************
 ART                TIME=0.0
*
 INFALL             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
*
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                    PER A=0.00 PER B=10.00 PER C=10.00 PER D=80.00
                    TP=-0.1333 HR MASS RAINFALL=-1

 *********************************************************************
*        100-YEAR,  6-HR STORM (UNDER EXISTING CONDITIONS)           *
**********************************************************************
 ART                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
*
 MPUTE NM HYD       ID=1 HYD NO=102.0 AREA=0.002237 SQ MI
                    PER A=77.00 PER B=19.00 PER C=0.00 PER D=4.00
                    TP=-0.1333 HR MASS RAINFALL=-1
*
 *********************************************************************
*        10-YEAR,  6-HR STORM (UNDER EXISTING CONDITIONS)            *
**********************************************************************
 ART                TIME=0.0

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=112.0 AREA=0.002237 SQ MI
                    PER A=77.00 PER B=19.00 PER C=0.00 PER D=4.00
                    TP=-0.1333 HR MASS RAINFALL=-1
*
 INISH
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AHYMO SUMMARY TABLE (AHYMO194) - AMAFCA Hydrologic Model - January, 1994 RUN DATE (MON/DAY/YR) =08/26/1998

INPUT FILE = 9847

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	NOTATION	
START										TIME=	.00
RAINFALL TYPE= 1										RAIN6=	2.900
COMPUTE NM HYD	101.00	-	1	.00224	6.97	.282	2.36336	1.500	4.868	PER IMP=	80.00
START										TIME=	.00
RAINFALL TYPE= 1										RAIN6=	1.930
COMPUTE NM HYD	111.00	-	1	.00224	4.52	.174	1.45667	1.500	3.158	PER IMP=	80.00
START										TIME=	.00
RAINFALL TYPE= 1										RAIN6=	2.900
COMPUTE NM HYD	102.00	-	1	.00224	3.53	.110	.91845	1.500	2.464	PER IMP=	4.00
START										TIME=	.00
RAINFALL TYPE= 1										RAIN6=	1.930
COMPUTE NM HYD	112.00	-	1	.00224	1.45	.042	.35595	1.500	1.010	PER IMP=	4.00
FINISH											

```
**********************************************************************
*                        LOT-?   UNIT 16                             *
*                                                                    *
*                         OFFSITE BASIN                              *
**********************************************************************
*    100-YEAR,  6-HR STORM (UNDER PROPOSED/EXISING CONDITIONS)       *
**********************************************************************
START               TIME=0.0
*
.INFALL             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

)MPUTE NM HYD       ID=1 HYD NO=101.0 AREA=0.000430 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  (UNDER PROPOSED/EXISING CONDITIONS)        *
**********************************************************************
 'ART               TIME=0.0
*
\INFALL             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
*
)MPUTE NM HYD       ID=1 HYD NO=111.0 AREA=0.000430 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

!NISH
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AHYMO SUMMARY TABLE (AHYMO194) - AMAFCA Hydrologic Model - January, 1994 RUN DATE (MON/DAY/YR) =08/26/1998

INPUT FILE = 9847OF 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	NOTATION	
START										TIME=	.00
RAINFALL TYPE= 1										RAIN6=	2.900
COMPUTE NM HYD	101.00	-	1	.00043	.81	.025	1.07600	1.500	2.957	PER IMP=	.00
START										TIME=	.00
RAINFALL TYPE= 1										RAIN6=	1.930
COMPUTE NM HYD	111.00	-	1	.00043	.40	.010	.44688	1.500	1.444	PER IMP=	.00
FINISH											

DRAINAGE INFORMATION SHEET

PROJECT TITLE: Tract A, Sandia Heights South, Unit 16 ZONE ATLAS/DRNG. FILE #: D23 / D9B, PWD-96-95

DRB #: _____ EPC #: _____ WORK ORDER #: _____

LEGAL DESCRIPTION: Tract A, Sandia Heights South, Unit 16

CITY ADDRESS: *NE corner of Tramway Blvd. & San Rafael Ave.*

ENGINEERING FIRM: Advanced Engineering and Consulting, LLC CONTACT: Shahab Biazar

ADDRESS: 10209 Snowflake Ct. NW Alb., NM 87114 PHONE: (505) 899-5570

OWNER: Don Maestas CONTACT: Don Maestas

ADDRESS: 5113 Comanche Road, NE PHONE: (505) 881-0464

ARCHITECT: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

SURVEYOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

CONTRACTOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

- ____ DRAINAGE REPORT
- ____ DRAINAGE PLAN
- ____ CONCEPTUAL GRADING & DRAINAGE PLAN
- X GRADING PLAN
- ____ EROSION CONTROL PLAN
- ____ ENGINEER'S CERTIFICATION
- X CLOMR

PRE-DESIGN MEETING:

- ____ YES
- ____ NO
- ____ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

- ____ SKETCH PLAN APPROVAL
- X PRELIMINARY PLAT APPROVAL
- ____ S. DEV. PLAN FOR SUB'D. APPROVAL
- ____ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- ____ SECTOR PLAN APPROVAL
- X FINAL PLAT APPROVAL
- ____ FOUNDATION PERMIT APPROVAL
- X BUILDING PERMIT APPROVAL
- ____ CERTIFICATE OF OCCUPANCY APPROVAL
- X GRADING PERMIT APPROVAL
- ____ PAVING PERMIT APPROVAL
- ____ S. A. D. DRAINAGE REPORT
- ____ DRAINAGE REQUIREMENTS
- ____ *OTHER*

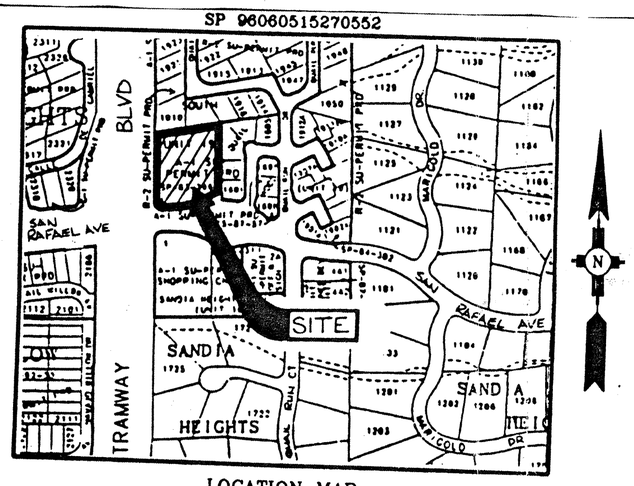
RECEIVED
FEB 02 1999
HYDROLOGY SECTION

DATE SUBMITTED: *1 / 26 / 99*

BY: *SHAHAB BIAZAR*

SP 96060515270552

97C-15(1)



LOCATION MAP
ZONE ATLAS INDEX MAP No. D-23-Z
NOT TO SCALE

SUBDIVISION DATA

1. DRB No. 96-482
2. Zone Atlas Index No. D-23-Z.
3. Gross Subdivision Acreage: 1.4316 Acres.
4. Total Number of Tracts created: 1 Tract.
5. Total Mileage of full width Streets created: 0.00 mile.
6. Total Mileage of partial width Streets created: 0.00 mile.
7. Date of Survey: June, 1996
8. Plat is located within the Elena Gallegos Grant, within projected Section 23, T11N, R4E, NMPM.

DISCLOSURE STATEMENT

The purpose of this plat is to correct the legal description of Tract A, Sandia Heights South, Unit 19, Bernalillo County, New Mexico, recorded October 20, 1983 in Volume C22, Folio 79 as Document No. 83-72068, the correct legal description is Tract A, Sandia Heights South Unit 16. There are no other changes or corrections from the original Tract A, Sandia Heights South, Unit 19, Bernalillo County, New Mexico, recorded October 20, 1983 in Volume C22, Folio 79 as Document No. 83-72068

NOTES

1. Basis of Bearings: New Mexico State Plane Grid Bearings (Central Zone NAD27 Datum) also being the same as Bearings shown on Subdivision Plat For SANDIA HEIGHTS SOUTH, UNIT 19, Filed: October 20, 1983 in Volume C22, Folio 79
2. Distances are Ground Distances.
3. All easements of record are shown.
4. This Property is within the Sandia Peak Utility Company (SPU Co.) and Sandia Peak Services, Inc. (SPS, Inc.) Franchise Area. Water, Fire Protection and Sanitary Sewer System Capabilities are based on the SPU, Co. and SPS, Inc. Facilities, not the City of Albuquerque. Water and Sanitary Sewer Services for this Property will be provided by these Franchise Companies.

In approving this plat [illegible] Electric Services and Gas Services (PNM) [illegible] conduct a Title Search of the property [illegible] tion. Consequently PNM does not [illegible] the any easements or [illegible] have been granted by prior plat [illegible] or document which are not shown [illegible]

DESCRIPTION

A certain tract of land situate within the Elena Gallegos Grant in the West one-half (W1/2) of projected Section 23, Township 11 North, Range 4 East, New Mexico Principal Meridian, Bernalillo County, New Mexico, being and comprising all of Tract "A" of SANDIA HEIGHTS SOUTH, UNIT 19, Bernalillo County, New Mexico as the same is shown and designated on the plat thereof, recorded in the office of the County Clerk of Bernalillo County, New Mexico on October 20, 1983 in Volume C22, Folio 79 as Document No. 83-72068 and being more particularly described by New Mexico State Plane grid bearings (Central Zone NAD27 Datum) and ground distances as follows:

BEGINNING at the southwest corner of said Tract "A", a point on the easterly right-of-way line of Tramway Boulevard, whence the City of Albuquerque Station "TUMBLE" a standard USCGS brass tablet set in concrete having New Mexico State Plane Coordinates, Central Zone NAD27 Datum of X=425,465.55 and Y=1,513,470.01 bears S35°57'49"W, a distance of 2048.69 feet and from said point of beginning running thence along the westerly boundary line of said Tract "A" and also along said right-of-way line,
N00°03'05"E, a distance of 245.00 feet to the northwest corner of said Tract "A", thence leaving said right-of-way line and running thence along the northerly boundary line of said Tract "A",
N81°40'32"E, a distance of 230.99 feet to the northeast corner of said Tract "A", thence running along the easterly boundary line of said Tract "A",
S00°08'26"E, a distance of 248.84 feet to the southeast corner of said Tract "A", a point on a curve on the northerly right-of-way line of San Rafael Avenue, thence running along the southerly boundary line of said Tract "A" and also along said right-of-way line,
40.33 feet along the arc of a curve to the left having a radius of 97.03 feet and a chord which bears S65°51'40"W, a distance of 40.04 feet to a point of reverse curvature; thence,
126.01 feet along the arc of a curve to the right having a radius of 200.00 feet and a chord which bears S72°00'08"W, a distance of 123.93 feet to a point of tangency; thence,
N89°56'55"W, a distance of 50.00 feet to a point of curvature; thence,
39.27 feet along the arc of a curve to the right having a radius 25.00 feet and a chord which bears N44°56'55"W, a distance of 35.36 feet to the point and place of beginning.

Tract contains 1.4316 acres, more or less

FREE CONSENT AND DEDICATION

The foregoing Plat of that certain tract of land situate within the Elena Gallegos Grant, within Projected Section 23, Township 11 North Range 4 East, New Mexico Principal Meridian, Bernalillo County, New Mexico, being and comprising all Tract A, of SANDIA HEIGHTS SOUTH, UNIT 19, Bernalillo County, New Mexico as the same is shown and designated on the plat thereof, recorded in the office of the County Clerk of Bernalillo County, New Mexico on October 20, 1983 as Document No. 83-72068 in Volume C22, Folio 79, now comprising Tract A, SANDIA HEIGHTS SOUTH, UNIT 16 is with the free consent and in accordance with the desires of the undersigned owner(s) and/or proprietor(s) thereof and said owner(s) and/or proprietor(s) do hereby consent to all of the foregoing and do hereby certify that this subdivision is with their free act and deed.

Donald A. Maestas and Barbara A. Maestas
952 Deer Drive, NE
Albuquerque, NM 87122

BY: Donald A. Maestas — Barbara Ann Maestas
Donald A. Maestas — Barbara A. Maestas

State of New Mexico)
SS
County of Bernalillo)

This instrument was acknowledged before me on 24th day of June 1996, by Donald A. Maestas and Barbara A. Maestas.

My Commission Expires: 10-11-96

Notary Public

97002536

PLAT OF

TRACT "A"
SANDIA HEIGHTS SOUTH, UNIT 16
(REPLAT OF TRACT "A" SANDIA HEIGHTS SOUTH, UNIT 19)
BERNALILLO COUNTY, NEW MEXICO
JUNE, 1996

State of New Mexico) SS
County of Bernalillo)
This instrument was filed for record

8:14 JAN 09 1997 97C
15

APPROVALS

PLAT NUMBER 96-97-12

PLANNING DIRECTOR — DATE 1-8-97
CITY ENGINEER — DATE 11-20-96
COUNTY PUBLIC WORKS — DATE 12-30-96
A.M.A.F.C.A. — DATE 1-6-97
TRAFFIC ENGINEER — DATE 10-8-96
CITY SURVEYOR — DATE 062596
PROPERTY MANAGEMENT — DATE 11.20.96
UTILITY DEVELOPMENT DEPARTMENT — DATE 10-8-96
PARKS AND GENERAL SERVICES DEPARTMENT — DATE 10-8-96
U.S. WEST COMMUNICATIONS — DATE 7-10-96
PNM ELECTRIC SERVICES — DATE 7-10-96
PNM GAS SERVICES — DATE 7-10-96

THIS IS TO CERTIFY THAT TAXES ARE CURRENT AND PAID ON UPC 1 033 063 027 32 105 3

PROPERTY OWNER OF RECORD: Maestas, Donald A & Barbara

BERNALILLO COUNTY TREASURER'S OFFICE — DATE 1.9.97
BERNALILLO COUNTY PLANNING/ZONING DIRECTOR — DATE 10/8/96
SANDIA PEAK UTILITY CO. — DATE 10/4/96
SANDIA PEAK SERVICES INC. — DATE 10/4/96

SURVEYOR'S CERTIFICATION

I, A Dwain Weaver, a registered Professional New Mexico Surveyor, certify that I am responsible for this survey and that this plat was prepared by me or under my supervision, shows all easements of record, and conforms to the Minimum Requirements of the Board of Registration for Professional Engineers and Professional Surveyors in February 1994 and meets the minimum requirements for monumentation and surveys contained in the Albuquerque Subdivision Ordinance, and is true and accurate to the best of my knowledge and belief.

A. Dwain Weaver
New Mexico Professional Surveyor 6544
Date: June 24, 1996

Bohannan-Huston Inc
Courtyard I
7500 Jefferson Street, N.E
Albuquerque, New Mexico 87109

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HYDROLOGY SECTION

SHEET 1 OF 2
JOB NO 96-266B-3212

BOHANNAN-HUSTON INC.
ENGINEERS • PLANNERS • PHOTOGRAMMETRISTS • SURVEYORS • LANDSCAPE ARCHITECTS
ALBUQUERQUE LAS CRUCES SANTA FE

97C-15(1)

C:\ADCADD\CIVIL\P\S96266B\SHEET1.DWG 5/22/1996

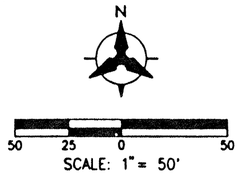
97C-15(1)

(C) 91-276

97002536

PLAT OF
TRACT "A"
SANDIA HEIGHTS SOUTH, UNIT 16
(REPLAT OF TRACT "A" SANDIA HEIGHTS SOUTH, UNIT 19)

BERNALILLO COUNTY NEW MEXICO
JUNE, 1996



LEGEND
- SUBDIVISION BOUNDARY LINE
- NEW LOT LINE
- ADJOINING PROPERTY LINE
- MONUMENT TIE LINE
- EXISTING EASEMENT LINE
- ▲ CITY OF ALBUQUERQUE SURVEY CONTROL MONUMENT
- ● SET 5/8"CAPPED REBAR STAMPED "WEAVER LS 6544"

SANDIA HEIGHTS SOUTH
UNIT 23
FILED: NOVEMBER 4, 1992
(92C-247)

SAN RAFAEL AVENUE

TRAMWAY BOULEVARD
(R.O.W. VARIES FROM 200' TO 258.52')

LOT 1919

LOT 1918

LOT 1917

SANDIA HEIGHTS SOUTH, UNIT 19
FILED: OCTOBER 20, 1983
(C22-79)

EXISTING 20' PUBLIC DRAINAGE EASEMENT FILED: OCTOBER 20, 1983 (C22-79)

N81°40'32"E 230.99'

245.00'

N00°03'05"E

EXISTING 10' PUBLIC UTILITY EASEMENT FILED: SEPTEMBER 30, 1975 (C10-172)

TRACT "A"
1.4316 AC.

248.84'

S00°08'26"E

LOT 1603

LOT 1602

LOT 1601

QUAIL RUN DRIVE
(R.O.W. = 40')

QUAILWOOD SUBDIVISION
FILED SEPTEMBER 29, 1988
(C37-109)

EXISTING 10' DRAINAGE EASEMENT FILED AUGUST 12, 1986 BK. 653-A, PGS. 966-970 DOC NO. 08873518

S76°56'41"E 91.80'

S76°56'50"W 61.39'

C1

C2

C3

50.00'

N89°56'55"W

EXISTING 7' PUBLIC UTILITY EASEMENT FILED: SEPTEMBER 30, 1975 (C10-172)

SAN RAFAEL AVENUE
(R.O.W. WIDTH VARIES)

(TIE) S56°56'41"E
4767.18'

ACS Brass Tablet stamped "1-D24"
Geographic Position (NAD 1927)
N.M. State Plane Coordinates (Central Zone)
X= 431,318.50 Y= 1,513,365.05
Ground-to-Grid Factor = 0.9996059
Δα = -00°07'56"

(TIE) S35°57'49"W
2048.69'

PLAT OF
WILLOW BEND SUBDIVISION
FILED: MAY 21, 1993
(93C-145)

USC & GS Brass Tablet stamped "TUMBLE"
Geographic Position (NAD 1927)
N.M. State Plane Coordinates (Central Zone)
X= 425,465.55 Y= 1,513,470.01
Ground-to-Grid Factor = 0.9996197
Δα = -00°08'37"
NGVD 1929 Elevation = 6009.155

TRACT 1

SANDIA HEIGHTS SOUTH
UNIT 16
FILED: SEPTEMBER 30, 1975
(C10-172)

TRACT 2B

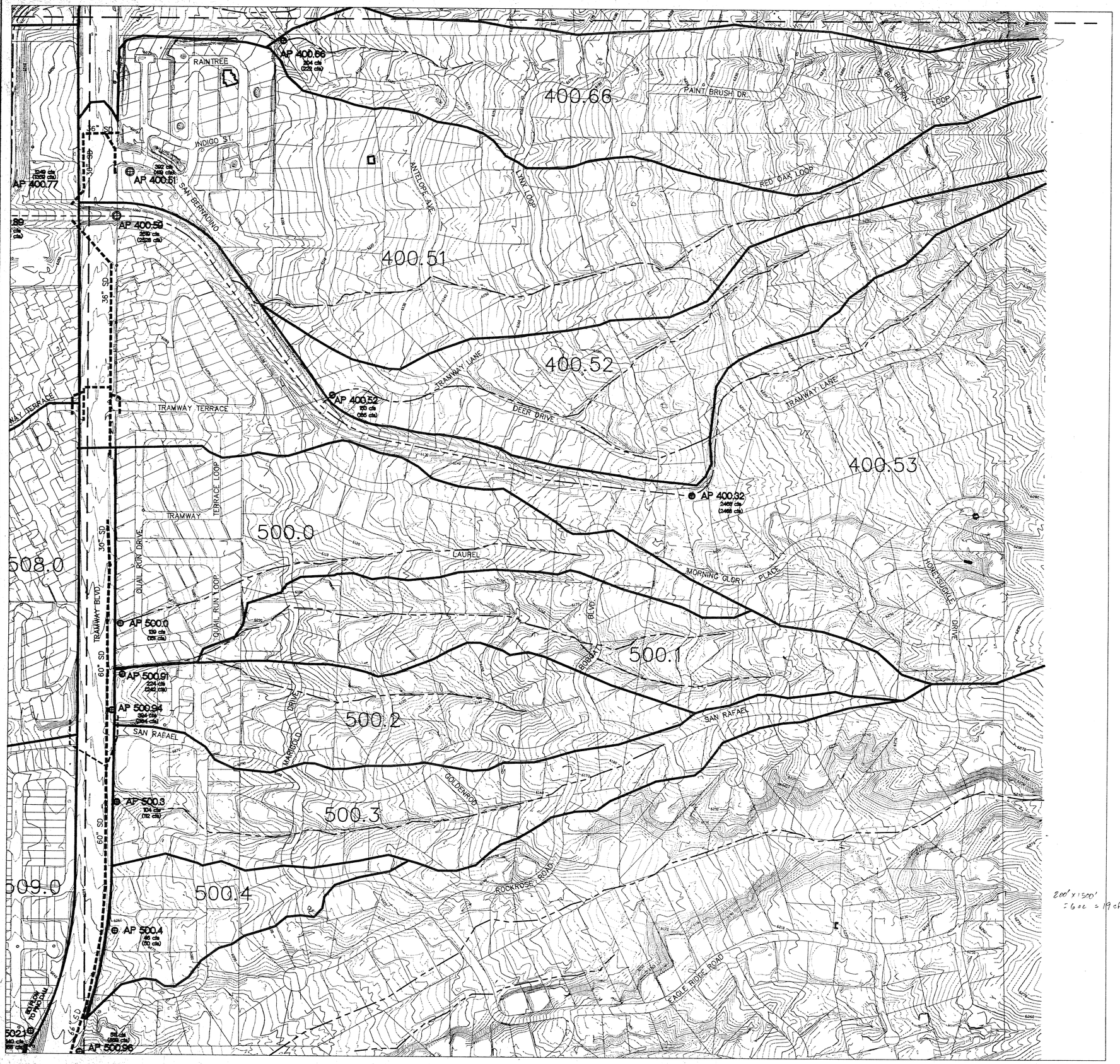
TRACT 2A

REPLAT OF TRACT 2
SANDIA HEIGHTS SOUTH
UNIT 16
FILED: APRIL 26, 1979
(C14-182)

CURVE DATA						
CURVE	RADIUS	LENGTH	TANGENT	CHORD	CHORD BEARING	DELTA
C1	97.03'	40.33'	20.46'	40.04'	S65°51'40"W	23°48'58"
C2	200.00'	126.01'	65.17'	123.93'	S72°00'08"W	36°05'54"
C3	25.00'	39.27'	25.00'	35.36'	N44°56'55"W	90°00'00"

SHEET 2 OF 2
JOB NO. 96-266B-3212

BOHANNAN-HUSTON INC.
ENGINEERS • PLANNERS • PHOTOGRAMMETRISTS • SURVEYORS • LANDSCAPE ARCHITECTS
ALBUQUERQUE LAS CRUCES SANTA FE



800' x 1500'
= 6 ac = 11 cfs

LEGEND

502.1	SUBBASIN DESIGNATION
AP 502.1 140 cfs (168 cfs)	ANALYSIS POINT AND FLOW RATES
	EXISTING SUBBASIN BOUNDARY
	FUTURE SUBBASIN BOUNDARY
	EXISTING MAJOR ARROYO FLOW PATH
	EXISTING MINOR ARROYO FLOW PATH
	EXISTING STORM DRAIN
	PROPOSED STORM DRAIN
# 2	AVULSION NUMBER
	POTENTIAL AVULSION
1 / 17 / 32	EXISTING PLATTING
	AMAFCA OR APS PROPERTY

N

200 0 100 200 400
(IN FEET)

SCALE: 1" = 200' HORIZ.

RECEIVED
FEB 26 1999
HYDROLOGY SECTION

Resource Technology, Inc.
ENGINEERS AND ENVIRONMENTAL SCIENTISTS
1720-B Randolph Rd. SE Albuquerque, New Mexico 87106
Telephone: (505) 243 - 7300
CIVIL - ENVIRONMENTAL - WATER RESOURCES - IRRIGATION - PLANNING

BERNALILLO COUNTY
PUBLIC WORKS DEPARTMENT

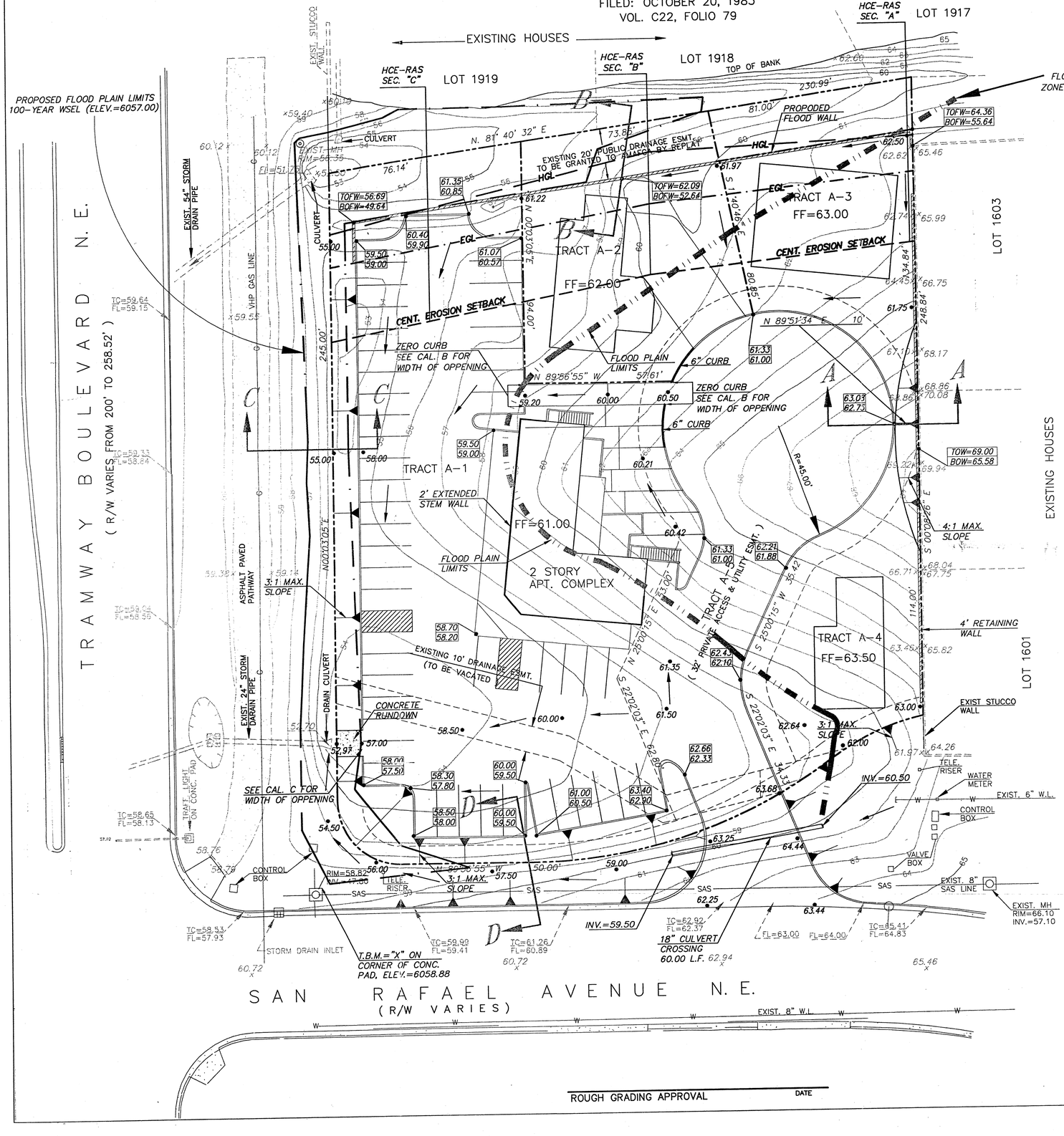
EXHIBIT 11

HYDROLOGY MAPS

Project No.	Zone Map No.	Sheet	Of
97-050	D-23		

D:\data to \97-050\050023 9-25-97 1:14:36 pm EST

SANDIA HEIGHTS SOUTH, UNIT 19
FILED: OCTOBER 20, 1983
VOL. C22, FOLIO 79



ROUGH GRADING APPROVAL DATE

BENCHMARK

ACS "3-D22"
CENTRAL STATION DATA
NM STATE PLANE COORDINATES
CENTRAL ZONE
ELEV=6003.74

CALCULATION A

$Q=CLH^{3/2}$
$L=0.81/2.95*(0.50)^{3/2}$
$L=0.78$, USE $L=1.00'$

CALCULATION B

$Q=CLH^{3/2}$
$L=3.5/2.95*(0.33)^{3/2}$
$L=6.26$, USE $L=6.50'$

CALCULATION C

$Q=CLH^{3/2}$
$L=7.78/2.95*(0.50)^{3/2}$
$L=7.46'$, USE $L=8.00'$

GRAPHIC SCALE
20 10 0 10 20
SCALE: 1"=20'

LEGEND

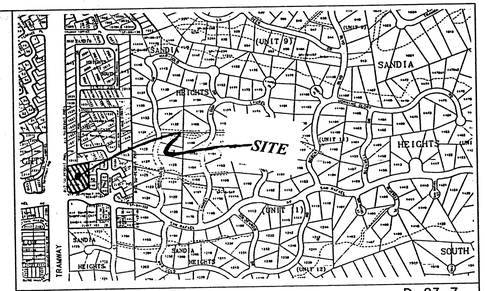
- EXISTING FENCE
- EXISTING POWER LINES
- EXISTING CURB & GUTTER
- BOUNDARY LINE
- EASEMENT
- PROPOSED SIDEWALK
- PROPOSED GRADE (e.g. 65.52 / 65.02)
- EXISTING GRADE (e.g. x94.15)
- EXISTING MANHOLE
- PROPOSED CURB
- PROPOSED FLOOD WALL
- PROPOSED SPOT ELEVATION (e.g. 62.64)
- EXIST. WATER LINE
- PROPOSED RETAINING WALL

EXISTING CONDITIONS

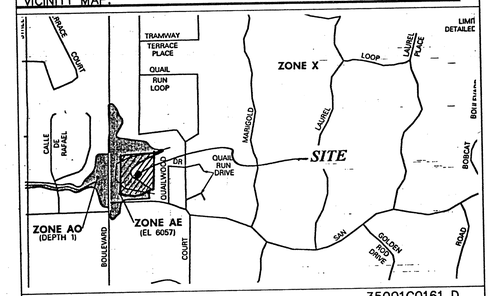
THE ENGINEER HAS PERSONALLY INSPECTED THE LAND, AND NO GRADING, FILLING, OR EXCAVATION HAS OCCURRED THEREON SINCE THE EXISTING CONTOUR MAP WAS PREPARED.

SHAHAB BIAZAR, P.E. DATE

20/9847/9847GR.DWG/SBB/1-25-99



VICINITY MAP: D-23-Z



FIRM MAP: 35001C0161 D

LEGAL DESCRIPTION:
TRACT A, SANDIA HEIGHTS SOUTH, UNIT 16, 1.4316 ACRES

RECEIVED
JUL 02 1999
HYDROLOGY SECTION

NOTES:
1. ALL SPOT ELEVATIONS PRESENT THE FLOWLINE ELEVATION UNLESS OTHERWISE NOTED
2. ADD 6000 TO ALL THE SPOT ELEVATIONS.
3. SEE SHEET 2 OF 2 FOR CROSS-SECTION A, B, C, & D.

NOTICE TO CONTRACTORS

1. AN EXCAVATION/CONSTRUCTION PERMIT WILL BE REQUIRED BEFORE BEGINNING ANY WORK WITHIN CITY RIGHT-OF-WAY. AN APPROVED COPY OF THESE PLANS MUST BE SUBMITTED AT THE TIME OF APPLICATION FOR THIS PERMIT.
2. ALL WORK DETAILED ON THESE PLANS TO BE PERFORMED, EXCEPT AS OTHERWISE STATED OR PROVIDED HEREON, SHALL BE CONSTRUCTED IN ACCORDANCE WITH CITY OF ALBUQUERQUE INTERIM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, 1985.
3. TWO WORKING DAYS PRIOR TO ANY EXCAVATION, CONTRACTOR MUST CONTACT LINE LOCATING SERVICE, 765-1234, FOR LOCATION OF EXISTING UTILITIES.
4. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL EXCAVATE AND VERIFY THE HORIZONTAL AND VERTICAL LOCATIONS OF ALL CONSTRUCTIONS. SHOULD A CONFLICT EXIST, THE CONTRACTOR SHALL NOTIFY THE ENGINEER SO THAT THE CONFLICT CAN BE RESOLVED WITH A MINIMUM AMOUNT OF DELAY.
5. BACKFILL COMPACTION SHALL BE ACCORDING TO RESIDENTIAL STREET USE.
6. MAINTENANCE OF THESE FACILITIES SHALL BE THE RESPONSIBILITY OF THE OWNER OF THE PROPERTY SERVED.
7. WORK ON ARTERIAL STREETS SHALL BE PERFORMED ON A 24-HOUR BASIS.

EROSION CONTROL PLAN AND POLLUTION PREVENTION NOTES

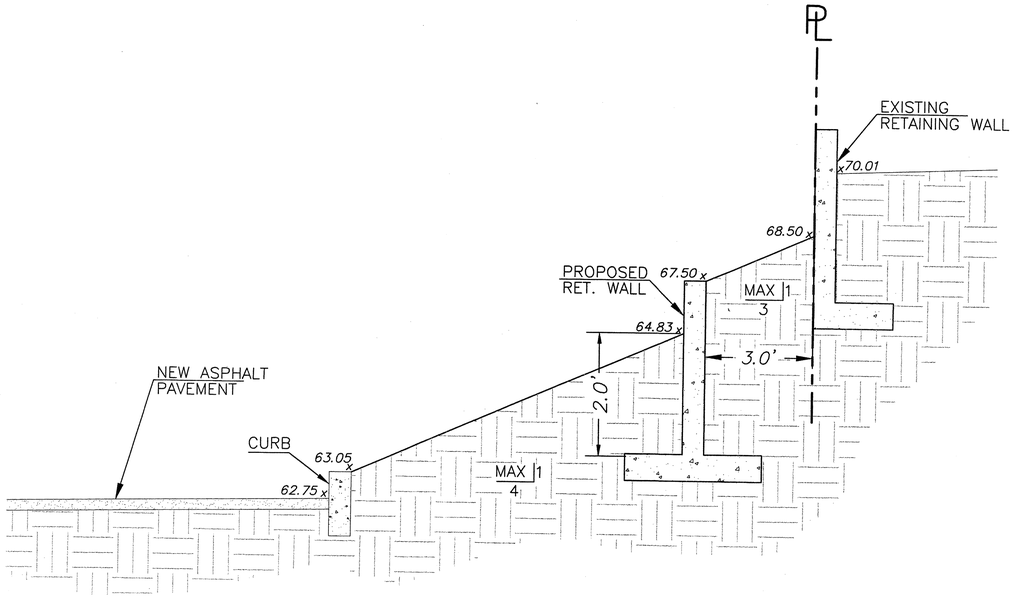
1. CONTRACTOR IS RESPONSIBLE FOR OBTAINING A TOPSOIL DISTURBANCE PERMIT PRIOR TO BEGINNING WORK.
2. CONTRACTOR IS RESPONSIBLE FOR CLEANING ALL SEDIMENT OUT OF EXISTING RIGHT-OF-WAY.
3. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ALL STORM RUN OFF ON SITE.
4. REPAIR OF DAMAGED FACILITIES AND CLEAN-UP OF SEDIMENT ACCUMULATION ON ADJACENT PROPERTIES AND IN PUBLIC FACILITIES IS THE RESPONSIBILITY OF THE CONTRACTOR.
5. ALL EXPOSED EARTH SURFACES MUST BE PROTECTED FROM WIND AND WATER EROSION PRIOR TO FINAL ACCEPTANCE OF ANY PROJECT.

TRACT A, SANDIA HEIGHTS SOUTH, UNIT 16 GRADING AND DRAINAGE PLAN

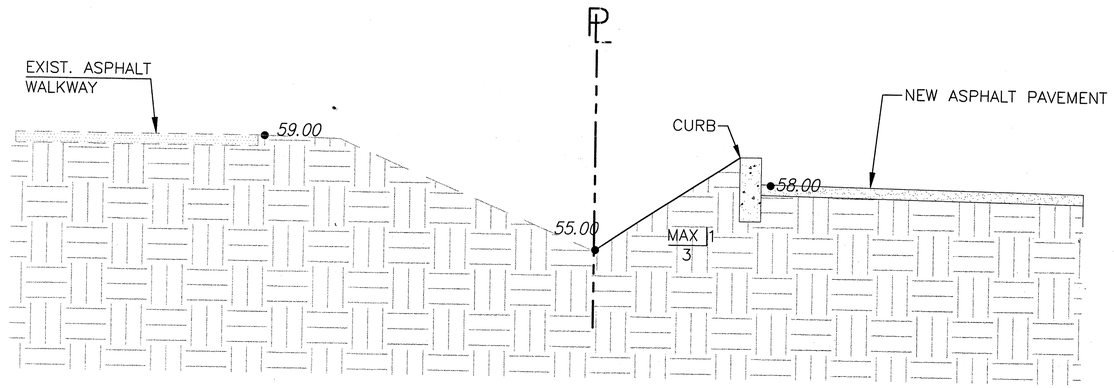
ENGINEER'S SEAL
SHAHAB BIAZAR NEW MEXICO 13479 REGISTERED PROFESSIONAL ENGINEER
SHAHAB BIAZAR P.E. #13479

ADVANCED ENGINEERING and CONSULTING
10209 SNOWFLAKE CT., NW
ALBUQUERQUE, NEW MEXICO 87114
(505)899-5570

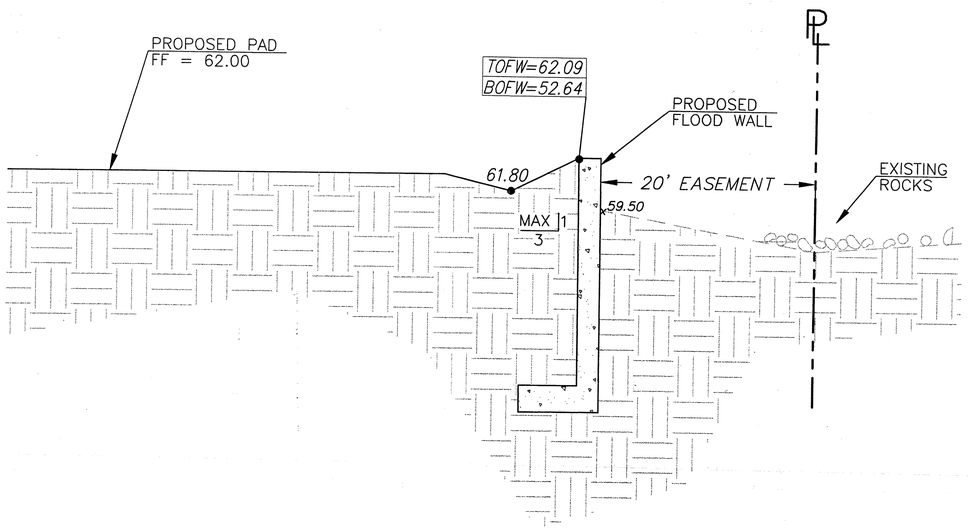
DRAWN BY SH.B
DATE 8-30-98
9847GR.DWG
SHEET # 1 OF 2
JOB # 9847



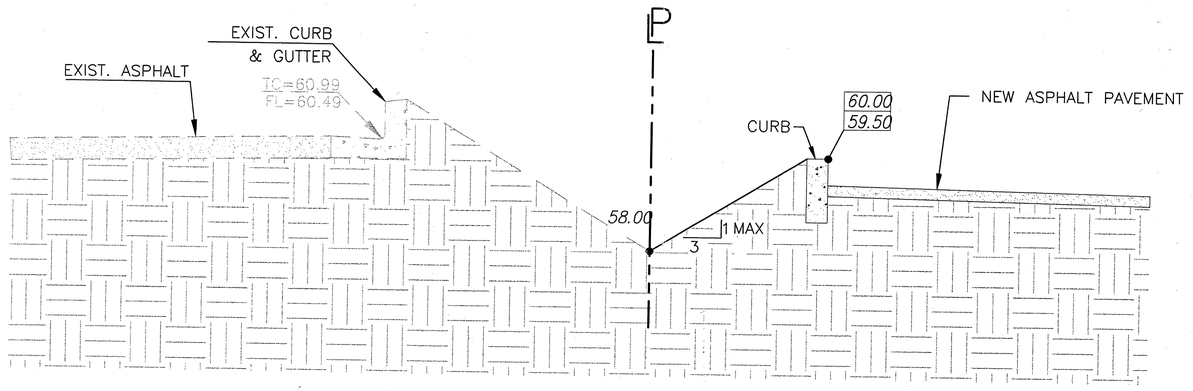
SECTION A–A
NTS



SECTION C–C
NTS



SECTION B–B
NTS



SECTION D–D
NTS

TRACT A, SANDIA HEIGHTS SOUTH, UNIT 16 DETAILS

ENGINEER'S SEAL

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13479
REGISTERED PROFESSIONAL ENGINEER

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P.E. #13479

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DATE 8-30-98

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SHEET # 2 OF 2

JOB # 9847

10/9847/9847DETAIL.DWG/SBB/1-25-99