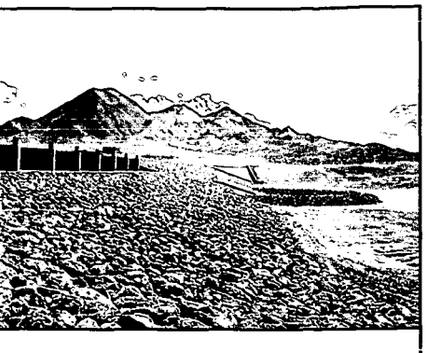
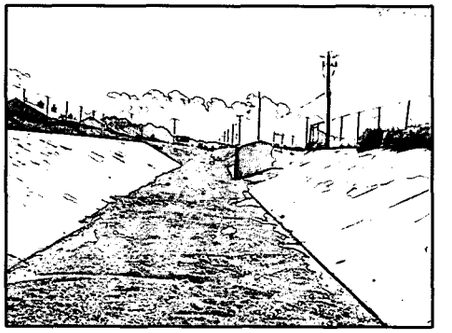
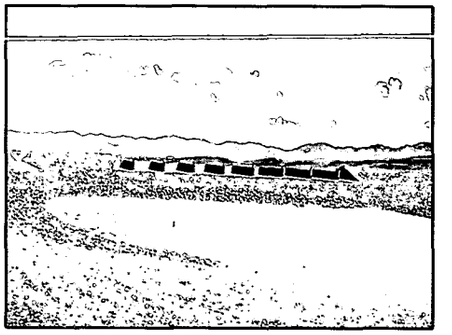
CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

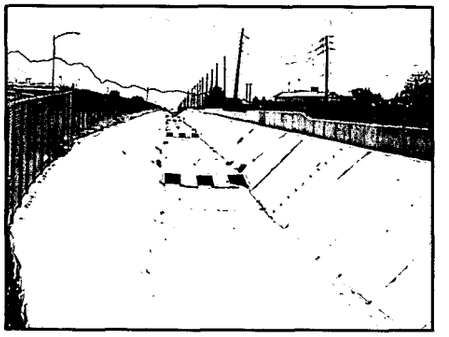


C-1 Channel System Flood Insurance Restudy



Technical Support Data Notebook





Vol. 1

Carter Burgess

Certification

This is to certify that all work accomplished in the conduct of this FIS was done in accordance with the Statement of Work and General Provisions of Contract titled "Agreement of Professional Services for C-1 Channel System Flood Insurance Restudy," dated December 13, 2001, and all amendments thereto, together with all such modifications, either written or oral, as the Regional PO and/or the Contracting Officer or their representatives have directed, as such modifications affect this contract, and that all such work has been accomplished in accordance with sound and accepted engineering practice within the contract provisions for respective phases of the work.

Signed Douglas B. Blatchford

Douglas B. Blatchford, PE.
RCE 10789, NV, EXP 12/31/02

APPENDIX

VOLUME 1

SECTION 1 GENERAL DOCUMENTATION

1.1 Response to Comments
1.2 Meeting Minutes
1.3 General Correspondence
1.4 Certification Forms

SECTION 2 ENGINEERING ANALYSIS

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- 2.1.2 Overall Storm HEC-1 Model
  - 2.1.2.1 SDN3
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- 2.2.1 Detailed Analysis
  - 2.2.1.1 C-1 Channel, Lake Mead Drive to Boulder Highway
  - 2.2.1.2 East C-1 Levee
- 2.2.2 Approximate Methods Analysis
  - 2.2.2.1 Reach 2
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2.3 Supporting Data
- 2.3.1 Curve Number Calculations
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- 2.3.3 Sedimentation Analysis

2.4 Key to Cross Section Labeling
- 2.4.1 Detailed Methods: C-1 Channel
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- 2.4.3 Approximate Methods --Reach 2
- 2.4.4 Approximate Methods – Reach 3
- 2.4.5 Approximate Methods – Reach 4

SECTION 3 DRAFT FLOOD INSURANCE RESTUDY

VOLUME 3

SECTION 4 MAPPING INFORMATION

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- 4.1.1 Effective FIRM
- 4.1.2 Annotated FIRM

4.2 Work Maps/Aerial Photographs – Approximate Methods
- 4.2.1 Work Maps (Effective)
- 4.2.2 Work Maps (Annotated)

VOLUME 4

4.3 Work Maps/Base Maps – Detailed Methods
- 4.3.1 C-1 Channel
- 4.3.2 East C-1 Levee

SECTION 5 MISCELLANEOUS REFERENCE MATERIAL

5.1 Photographs/Field Review

5.2 Survey Data
- 5.2.1 Point File
- 5.2.2 Survey Notes

5.3 Compact Discs

WO# 5244

☑001
WO. FILE
KCNG.
LVG

Federal Emergency Management Agency

Washington, D.C. 20472

MAY 25 1999

RECEIVED
MAY 27 1999

RECEIVED
OCT 22 2001

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 99-09-066R

The Honorable James B. Gibson
Mayor, City of Henderson
240 Water Street
Henderson, NV 89015

Post-it® Fax Note 7671	Date	# of pages ▶ 4
To DOUG BUATCHFORD	From KEVIN EUBANKS	
Co./Dept. C&B	Co. CCRFCD	
Phone #	Phone #	
Fax # 938-5454	Fax #	

Dear Mayor Gibson:

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 Clark County, Nevada 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 October 16, 1998, Ms. Lora V. Gookin, E.I., VTN Nevada, requested that FEMA evaluate the effects that proposed construction of the East C-1 Detention Basin and Levee would have on the flood hazard information shown on the effective FIRM.

All data required to complete our review of this request for a Conditional Letter of Map Revision (CLOMR) were submitted with letters from Ms. Gookin.

We have completed our review of the submitted data and the flood data used to prepare the effective FIRM for your community. We believe that, if the proposed project is constructed as shown on the plans entitled "East C-1 Detention Basin Flood Control Improvements," prepared by VTN Nevada, dated April 1998, and the data listed below are received, a revision to the FIRM would be warranted.

As a result of the proposed project, the width of the Special Flood Hazard Area (SFHA), the area that would be inundated by the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood), of an unnamed wash will increase in some areas and decrease in other areas compared to the SFHA width shown on the effective FIRM. The maximum increase in SFHA width, 100 feet, will occur along an unnamed wash approximately 3,000 feet downstream of the boundary between Sections 14 and 23 of Township 22 South, Range 63 East. The maximum decrease in SFHA width, 2,100 feet, will occur along the same unnamed wash approximately 1,000 feet east of the boundary between Sections 14 and 15 of Township 22 South, Range 63 East.

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.

- Detailed application and certification forms, which were used in processing this request, must be used for requesting final revisions to the maps. Therefore, when the map revision request for the area covered by this letter is submitted, Form 1, entitled "Revision Requester and Community Official Form," must be included. (A copy of this form is enclosed.)

- The detailed application and certification forms listed below may be required if as-built conditions differ from the preliminary plans. If required, please submit new forms (copies of which are enclosed) or annotated copies of the previously submitted forms showing the revised information.

  Form 3, entitled "Hydrologic Analysis Form"

  Form 4, entitled "Riverine Hydraulic Analysis Form"

  Form 5, entitled "Riverine/Coastal Mapping Form"

  Form 6, entitled "Channelization Form"

  Form 8, entitled "Levee/Floodwall System Form"

  Form 11, entitled "Dam Form"

  Form 12, entitled "Alluvial Fan Form"

  Hydraulic analyses, for as-built conditions, of the base flood must be submitted with Form 4, and a topographic work map showing the revised floodplain boundaries must be submitted with Form 5.

- 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. Under this schedule, FEMA did not change the initial fee for processing map revision requests involving structural measures on alluvial fans. The initial fee for your map revision request will be $5,000 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 base flood elevation 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

- An officially adopted maintenance and operation plan for the proposed detention basin and levee. This plan, which may be in the form of a written statement from the community Chief Executive Officer, an ordinance, or other legislation, must describe the nature of the maintenance activities, the frequency with which they will be performed, and the title of the local community official who will be responsible for ensuring that the maintenance activities are accomplished.

- Topographic information and a hydraulic analysis showing how flow is conveyed from the outlet of the East C-1 Detention Basin (basin) to the East C-1 Levee (levee) channel

- Our review of the submitted information revealed that the project may cause increases in SFHA width in some areas. Documentation must be submitted to show that all requirements of Section 65.12 of the NFIP regulations have been met, including but not limited to documentation of individual legal notice to all affected property owners explaining the impact of the proposed project on their property and certification that no insurable structures are located in the areas that would be affected by the increased SFHA.

- To avoid discontinuities between revised and effective flood data, the submitted hydraulic and hydrologic analyses must be extensive enough to ensure that a logical transition can be shown between the revised and effective base floodplain boundary delineations. The submitted maps do not show how the revised base floodplain boundary delineations tie into those shown on effective FIRM Panel 32003C2620 D. Specifically, the hydraulic analysis should provide floodplain widths that closely match those shown on the effective FIRM at both the upstream and downstream limits of the revised reach. Please submit information showing how the revised base floodplain boundary delineations tie into the effective base floodplain boundary delineations.

- Although sediment traps have been designed within the proposed basin, sediment transport downstream of the proposed basin has not been considered. Please submit information to demonstrate that the proposed levee along the proposed channel will meet the requirements of Section 65.10 of the NFIP regulations. The information must include, but is not limited to, an engineering analysis that quantifies the volume of erosion and sediment deposition associated with the base flood downstream of the basin and along the levee channel. The information must also include the characteristics of sediment, the effects of erosion and sediment deposition on capacity of the channel, the stability of the channel and levee, and the freeboard of the levee.

After receiving appropriate documentation to show that the project has been completed, FEMA will initiate a revision to the FIRM.

The basis of this CLOMR is, in whole or in part, a channel-modification 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 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 San Francisco, California, at (415) 923-7177. If you have any technical questions regarding this CLOMR, please contact Mr. Max Yuan of our staff in Washington, DC, either by telephone at (202) 646-3843 or by facsimile at (202) 646-4596.

Sincerely,

Max H. Yuan, P.E., Project Engineer
Hazards Study Branch
Mitigation Directorate

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

Enclosure(s)

cc: Mr. Kevin L. Eubanks, P.E.
Assistant General Manager
Clark County Regional Flood Control District

Mr. Curt Chandler, P.E.
Land Development Manager
Department of Public Works
City of Henderson

Ms. Lora V. Gookin, E.I.
VTN Nevada

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.

Comment:

- Detailed application and certification forms, which were used in processing this request, must be used for requesting final revisions to the maps. Therefore, when the map revision request for the area covered by this letter is submitted, Form 1, entitled "Revision Requestor and Community Official Form," must be included (A copy of this form is enclosed.)

Response:

All forms necessary for a revision request have been completed, including Form 1, and have been enclosed in Section 2.3 of this report.

Comment:

- The detailed application and certification forms listed below may be required if as-built conditions differ from the preliminary plans. If required, please submit new forms (copies of which are enclosed) or annotated copies of the previously submitted forms showing the revised information.

  Form 3, entitled "Hydrologic Analysis Form"

  Form 4, entitled "Riverine Hydraulic Analysis Form"

  Form 5, entitled "Riverine Coastal Mapping Form"

  Form 6, entitled "Channelization Form"

  Form 8, entitled "Levee/Floodwall System Form"

  Form 11, entitled "Dam Form"

  Form 12, entitled "Alluvial Fan Form"

  Hydraulic analysis for as-built conditions, of the base flood must be submitted with Form 4, and a topographic work map showing the revised floodplain boundaries must be submitted with Form 5.

Response:

All forms listed above, except Form 12, have been enclosed in Section 2.3. Form 12 is not applicable to this watershed because of the extensive structural controls built on the alluvial watershed. Record drawings for the East C-1 Detention Basin and Levee can be found in Section 5.

Detailed hydrologic analysis has been submitted with Form 3 for SDN3, SDN4, and SDN5 storms, located in Section 2.1.

Detailed hydraulic analysis for as-built conditions of the East C-1 Levee was performed using HEC-RAS, identified as Reach 2C in this report, ans submitted with Form 4. Base

maps from record drawings showing the 1 percent chance storm water surface elevations are located in Section 4.3. 400 scale topographic work maps also showing hydraulic cross section locations are located in Section 4.2.

Revised floodplain boundaries associated with Form 5 are shown on a 400 scale work map made part of Section 4.2. The revised floodplain boundaries are also shown on the Annotated FIRM, shown in Section 4.1.

Comment:

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. Under this schedule, FEMA did not change the initial fee for processing map revision requests involving structural measures on alluvial fans. The initial fee for your map revision request will be $5000 an 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 US funds to the National Flood Institute Program, or by credit card. The payment must be forwarded to the following address:

Federal Emergency Management Agency
Fee-Collection System Administrator
PO Box 3173
Merrifield, VA 22116-3173

Response:

This revision request is made part of the C-1 Channel System FIS Restudy, submitted by the Clark County Regional Flood Control District. According to District operating procedures, no fee can be paid until receipt of an invoice stating the amount and purpose. Fees will be paid in full immediately upon receipt of an invoice. The invoice may be in the form of a letter.

Comment:

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

Response:

  - As-built plans are enclosed electronically in Section 5.

Comment:

- Community acknowledgement of the map revision request

Response:

A signed community acknowledgement form (Form 1) is provided for both the civil engineering and the surveying, signed by Curt Chandler, PE of the City of Henderson Public Works Department.

Comment:

- Certification that the fill placed in the currently effective base flood floodplain and below the proposed base flood elevation is compacted to 95 percent of the maximum density obtainable with the Standard Proctor Test method issued by the American Society for

Testing Materials (ASTM Standard D-698) or an acceptable method for all areas to be removed from the base floodplain.

Response:

Compaction results verifying that the East C-1 Detention Basin and Levee were compacted to 95% are included with Form 8, in Section 2.3.

Comment:

- An officially adopted maintenance and operation plan for the proposed detention basin and levee. This plan, which may be in the form a written statement from the community Chief Executive Officer, an ordinance, or other legislation, must describe the nature of the maintenance activities, the frequency with which they will be performed, and the title of the local community official who be responsible for ensuring that the maintenance activities are accomplished.

Response:

The East C-1 Detention Basin and outfall is a Regional Master Plan Facility, therefore, it is eligible for operation and maintenance funding from the District. The Clark County Regional Flood Control District Operation and Maintenance Plan is made part of Section 2.3.

Comment:

- Topographic information and hydraulic analysis showing how flow is conveyed from the outlet of the East C-1 Detention Basin (basin) to the East C-1 Levee (levee) channel.

Response:

A 400 scale topographic work map based on 5' contour intervals provided by Clark County has been used to perform a hydraulic analysis for Reach 2C, which extends from the outlet of the East C-1 Detention Basin to the northern edge of the East C-1 Levee (see Section 2.2.1 and Section 2.2.2). A detailed hydraulic work map was prepared for the East C-1 Levee based on as-built drawings, and is located in Section 2.2.1.

Comment:

- Our review of the submitted information revealed that the project may cause increases in the SFHA width in some areas. Documentation must be submitted to show that all requirements of Section 65.12 of the NFIP regulations have been met, including but not limited to documentation of individual legal notice to all affected property owners explaining the impact of the proposed project on their property and certification that no insurable structures are located in the areas that would be affected by the increase SFHA.

Response:

No insurable structures are located within areas affected by a change in the SFHA. These areas are limited to the East C-1 Levee and Detention Basin outfall, located on lands controlled by the City of Henderson and the Southern Nevada Water Authority.

Comment:

- To avoid discontinuities between revised and effective flood data, the submitted hydraulic and hydrologic analysis must be extensive enough to ensure that a logical transition can

be shown between the revised and effective base floodplain boundary delineations. The submitted maps do not show how the revised base floodplain boundary delineations tie into those shown on the effective FIRM Panel 32303C2620D. Specifically, the hydraulic analysis should provide floodplain widths that closely match those shown on the effective FIRM at both the upstream and downstream limits of the revised reach. Please submit information showing how the revised base floodplain boundary delineations tie into the effective base floodplain boundary delineations.

Response:

Two unnamed washes in the vicinity of the East C-1 Levee drain west from the River Mountains that have been designated SFHA Zone A. These SFHA's have been transitioned to Reach 2 and shown on 400 scale hydraulic work maps at both the upstream and downstream ends, (Section 2.22). The transition and ties to existing SFHA are also shown on the Annotated FIRM, located in Section 4.1.2.

Comment:

- Although sediment traps have been designed within the proposed basin, sediment transport downstream of the proposed basin has not been considered. Please submit information to demonstrate that the proposed levee along the proposed channel will meet the requirements of Section 65.10 of the NFIP regulations. The information must include, but is not limited to, an engineering analysis that quantifies the volume of erosion and sediment deposition associated with the base flood downstream of the basin and along the levee channel. The information must also include the characteristics of sediment, the effects of erosion and sediment deposition on capacity of channel, the stability of the channel and levee, and the freeboard of the levee.

Response:

To measure wash load downstream of the detention basin, the Modified Uniform Soil Loss Equation (MUSLE) was used to estimate bulking factors. The entire Henderson Basin was analyzed, including the subbasins upstream of the East C-1 Detention Basin and East C-1 Levee. Results of the MUSLE showed that a 5% bulking factor is reasonable, however, a 10 % bulking factor was used as a conservative approach (Section 3). The 1 percent chance storm from the outfall of the East C-1 Detention Basin is 96.8 cfs (or 88 cfs, 10% bulked). Freeboard requirements were met along the entire reach of the East C-1 Levee, as outlined on Form 8.

A HEC-6 analysis was performed on the East C-1 Levee to show the affects of aggradation and degradation after the 1-percent chance storm, associated with a movable bed boundary. Results show that little change in capacity of the channel occurs (Section 3). The CCRFCD maintains the East C-1 Levee on an annual and as-needed basis after major storm events. Maintenance operations are intended to restore levee grades should long term bed boundary changes occur.

A local scour analysis is included with Form 8 that includes point scour, showing that the 5' soil cement cutoff wall is adequate for the levee flowrate. Velocities vary from 3 to 7 fps; the soil cement lining is therefore adequate as part of the levee erosion protection.

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT



C-1 Channel System Flood Insurance Restudy

Agenda
Progress Meeting No. 8

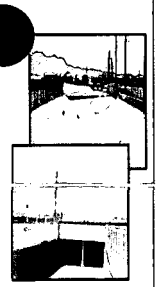
600 South Grand Central Parkway, Suite 300
Las Vegas, Nevada 89106

Tuesday, September 17th, 2002--1:00 pm



I. General Business

A. Schedule (attached)
B. Request for scanning of docs
C. As-built survey of Upper Reach of C-1
D. Cinnamon Ridge/Balboa



II. Data Collection and Review

A. Miscellaneous – as-builts

III. Floodplain Delineation

A. Hydraulic Models

IV. Final Products

cc: Kevin Eubanks, CCRFCD
Curt Chandler, COH
Jon Hayslip, COH
Janie Nihipali, COH
Shelley Cobau, SWFS
Douglas B. Blatchford, C&B, Inc
Craig Swengle, C&B, Inc

Carter Burgess

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

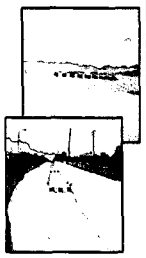


C-1 Channel System Flood Insurance Restudy

Agenda
Progress Meeting No. 7

600 South Grand Central Parkway, Suite 300
Las Vegas, Nevada 89106

Tuesday, August 13th, 2002--3:00 pm



I. General Business

A. Schedule (attached)
B. Next meeting date
C. Request for scanning of docs
D. As-built survey of Upper Reach of C-1
E. Cinnamon Ridge/Balboa



II. Data Collection and Review

A. Miscellaneous – as-builts

III. Floodplain Delineation

A. Hydraulic Models
   i. Detailed methods: Drake, C-1, and East C-1
   ii. Approximate methods: Reaches 1-4
   iii. Sedimentation Analysis – HEC-6, East C-1 Levee, MUSCLE
B. Annotated FIRM, Floodplain revisions- limited to removing floodplain
C. FEMA Forms
D. Draft of text

IV. Other Issues/Adjourn

cc: Kevin Eubanks, CCRFCD
Curt Chandler, COH
Jon Hayslip, COH
Janie Nihipali, COH
Shelley Cobau, SWFS
Douglas B. Blatchford, C&B, Inc
Craig Swengle, C&B, Inc

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT

Carter Burgess

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

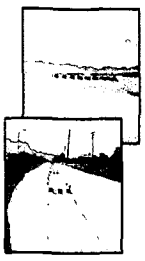


C-1 Channel System Flood Insurance Restudy

Agenda
Progress Meeting No. 6

600 South Grand Central Parkway, Suite 300
Las Vegas, Nevada 89106

Tuesday, July 9th, 2002--3:00 pm

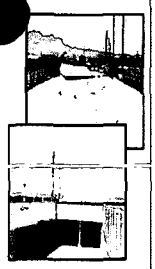


I. General Business

A. Schedule (attached)
B. Next meeting date
C. Survey of channel – delays
D. Scope/clarification on new floodplain delineation

II. Data Collection and Review

A. Miscellaneous/NDOT, SNWA records, Record drawings



III. Floodplain Delineation

A. Hydrologic Models – stage/discharge relationships digitized
B. Hydraulic Models
   i. Draft detailed methods: tie C-1 and Drake at confluence
   ii. Draft approximate methods: some floodplain to remain
   iii. Sedimentation Analysis – HEC-6, East C-1 Levee
C. Annotated FIRM, Floodplain revisions- limited to removing floodplain
D. FEMA Forms
E. Draft outline of text

IV. Other Issues/Adjourn

cc: Kevin Eubanks, CCRFCD
Curt Chandler, COH
Jon Hayslip, COH
Janie Nihipali, COH
Shelley Cobau, SWFS
Douglas B. Blatchford, C&B, Inc
Craig Swengle, C&B, Inc

Carter Burgess

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

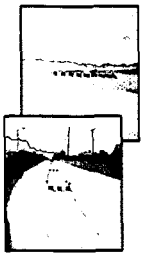


C-1 Channel System Flood Insurance Restudy

Agenda
Progress Meeting No. 5

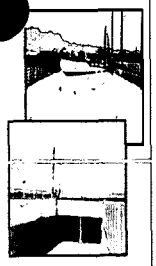
600 South Grand Central Parkway, Suite 300
Las Vegas, Nevada 89106

Tuesday, June 11th, 2002--3:00 pm



I. General Business

A. Schedule (attached)
B. Next meeting date
C. Survey to complete as-builts
D. Survey of Drake/Scope of work
E. Updated FEMA guidelines, Feb 2002



II. Data Collection and Review

A. Miscellaneous/NDOT records

III. Floodplain Delineation

A. Hydrologic Models – detailed for approximate methods
B. Hydraulic Models
   i. Draft detailed methods: Drake Channel west of Racetrack, C-1 at Lake Mead
   ii. Draft approximate methods: HEC-RAS updated
C. Sedimentation Analysis – MUSLE, HEC-6, Drake Channel bank erosion
D. Annotated FIRM, Floodplain revisions (Drake Zone AO)
E. East C-1 Levee/CLOMR response
F. FEMA Forms

IV. Other Issues/Adjourn

cc: Kevin Eubanks, CCRFCD
Curt Chandler, COH
Jon Hayslip, COH
Janie Nihipali, COH
Shelley Cobau, SWFS
Douglas B. Blatchford, C&B, Inc
Craig Swengle, C&B, Inc

Carter Burgess

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

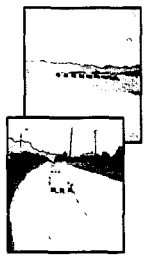


C-1 Channel System Flood Insurance Restudy

Agenda
Progress Meeting No. 4

600 South Grand Central Parkway, Suite 300
Las Vegas, Nevada 89106

Tuesday, May 14th, 2002--3:00 pm

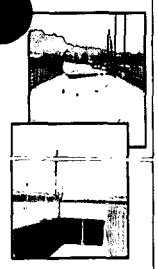


I. General Business

A. Schedule (attached)
B. Next meeting date

II. Data Collection and Review

A. Field Review
B. Miscellaneous



III. Floodplain Delineation

A. Hydrologic Model
B. Hydraulic Models
   i. Draft detailed methods: HEC-RAS for C-1 complete
   ii. Draft approximate methods: HEC-RAS substantially complete

IV. Other Issues/Adjourn

cc: Kevin Eubanks, CCRFCD
Curt Chandler, COH
Jon Hayslip, COH
Janie Nihipali, COH
Shelley Cobau, SWFS
Douglas B. Blatchford, C&B, Inc
Craig Swengle, C&B, Inc

Carter Burgess

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT



C-1 Channel System Flood Insurance Restudy

Agenda
Progress Meeting No. 3

600 South Grand Central Parkway, Suite 300
Las Vegas, Nevada 89106

Thursday, April 11th, 2002--3:00 pm

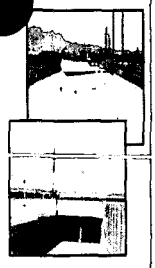


I. General Business

A. Schedule (attached)
B. Next meeting date
C. Drake Channel survey
D. Existing bridges survey\supplemental

II. Data Collection and Review

A. Field Review-entire system complete



III. Floodplain Delineation

A. Hydrologic Model
   i. GIS generated layouts for existing conditions land use, soils, and sub-basins
   ii. Soils coverage
   iii. Curve numbers
   iv. Lag times
   v. Draft HEC-1 model complete

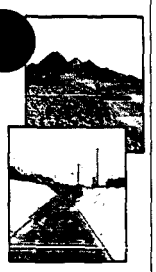
B. Hydraulic Models
   i. Draft detailed methods: HEC-RAS for C-1 complete
   ii. Approximate methods x-sections located

IV. Other Issues/Adjourn

cc: Kevin Eubanks, CCRFCD
Curt Chandler, COH
Jon Hayslip, COH
Janie Nihipali, COH
Shelley Cobau, SWFS
Douglas B. Blatchford, C&B, Inc
Craig Swengle, C&B, Inc

Carter Burgess

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT



C-1 Channel System Flood Insurance Restudy

Agenda

Progress Meeting No. 2

600 South Grand Central Parkway, Suite 300
Las Vegas, Nevada 89106

Tuesday, March 12th, 2002--3:00 pm

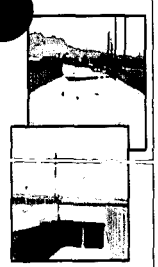


I. General Business

A. Schedule (attached)
B. Next meeting date

II. Data Collection and Review

A. Drake Channel
B. Draft Field Review Summary



III. Floodplain Delineation

A. Hydrologic Model
   i. GIS generated layouts for existing conditions land use, soils, and sub-basins
   ii. Draft Curve Numbers

B. Hydraulic Models
   i. Detailed methods: HEC-RAS x-sections for C1- in progress

IV. Other Issues/Adjourn

cc: Kevin Eubanks, CCRFCD
Curt Chandler, COH
Jon Hayslip, COH
Janie Nihipali, COH
Shelley Cobau, SWFS
Douglas B. Blatchford, C&B, Inc
Craig Swengle, C&B, Inc

Carter Burgess

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

C-1 Channel System Flood Insurance Restudy

Agenda

Progress Meeting No. 1

600 South Grand Central Parkway, Suite 300
Las Vegas, Nevada 89106

Tuesday, February 12th, 2002--3:00 pm

I. General Business

A. Schedule (attached)
B. Next meeting date

II. Data Collection and Review

A. Summary of documents gathered
B. Summary of documents outstanding
C. Field Review – February 11th & 12th

III. Floodplain Delineation

A. Hydrologic Model
   i. Storm Centering
   ii. Sub-basin layout
   iii. Curve numbers

B. Hydraulic Models
   i. Detailed methods: HEC-RAS x-sections for C1 Channel, East C1 Levee, Drake Channel
   ii. Approximate methods: 2' Contour plan sheets

IV. Other Issues/Adjourn

cc: Kevin Eubanks, CCRFCD
Curt Chandler, COH
Jon Hayslip, COH
Janie Nihipali, COH
Shelley Cobau, SWFS
Douglas B. Blatchford, C&B, Inc
Craig Swengle, C&B, Inc

Carter Burgess

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

C-1 Channel System Flood Insurance Restudy

Kickoff Meeting Agenda

600 South Grand Central Parkway, Suite 300
Las Vegas, Nevada 89106

Tuesday, January 8, 2002--3:30 pm

I. General Business

A. Introduction
B. FTP Site
C. Schedule
D. Action plan
E. Next meeting date

II. Data Collection and Review

A. Receive tentative request for documents
B. Detailed Field Review
   i. Set date for review
   ii. Set due date for written summary
   iii. Format
   iv. Approach

III. Floodplain Delineation

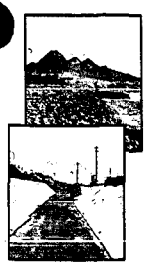
A. Prepare Hydrologic Model
   i. Soils
   ii. Land use
   iii. Lag times
   iv. FIS hydrology development

IV. Other Issues/Adjourn

cc: Kevin Eubanks, CCRFCD
Curt Chandler, COH
Joe Damiani, COH
Janie Nihipali, COH
Shelley Cobau, SWFS
Douglas B. Blatchford, C&B, Inc
Craig Swengle, C&B, Inc

Carter Burgess

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT



C-1 CHANNEL SYSTEM FLOOD INSURANCE RESTUDY

Progress Meeting No. 8

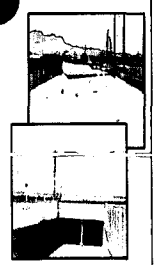
In Attendance:	Kevin Eubanks, CCRFCD	
	Jon Hayslip, COH	
	Janie Nihipali, COH	
	Doug Blatchford, C&B	
	Shelley Cobau, SFS	
Meeting Date:	9/17/02	1:00
Next Meeting:	**10/8/02**	**1:30**



Action/Discussion Items:

General Business

- The next meeting date was set for 10/8/02 at 1:30 at the RFCD
- Doug Blatchford (DB) presented 2 volumes of the draft report, these two volumes were Drake and C-1 hydraulics w/sections generated by HECRAS.
- DB presented project schedule and agenda and asked how many copies of the report were required for local submittal. Per Kevin Eubanks (KE): 1 copy for RFCD and 1 copy for COH.
- DB explained that the hydraulic analysis of the Drake Channel has been submitted to FEMA, along with the Cinnamon Ridge project.



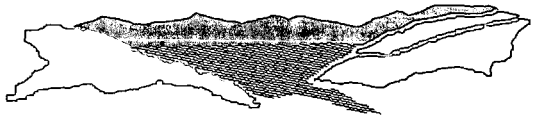
Cinnamon Ridge

- DB discussed difficulty in the Burkholder area, particularly with the berm/levee. Janie Nihipali (JN) asked if Db was able to find compaction certification on the berm. DB explained that the compaction results will be part of the LOMR submittal, and were not required at this time. The land developer will be required to obtain certification when required by FEMA. Jon Hayslip (JH) stated that the project may be held up in the future, and had recently met with the Cinnamon Ridge construction manager to explain FEMA levee criteria, and issues with finished floor elevations if levee is not approved. Db stated that FEMA's letter to Carter Burgess on the CLOMR comments stated that an optional analysis without the levee could be prepared, and that if this analysis indicated that without the levee the area would not be

inundated in the 100 year event, the structures could be removed from the floodplain. JH stated that the levee has considerable freeboard and this option could be a viable alternative. DB explained that the developer has already requested this analysis, in anticipation of FEMA not providing approval on levee stability. Both JH and JN stated that they would like to see the levee removed, and DB stated that it is unlikely the levee will meet FEMA criteria w/o some armoring of the toe. It was noted that the developer should be advised that they must adhere to FEMA criteria, as outlined in the previous correspondence from the RFCD and COH.

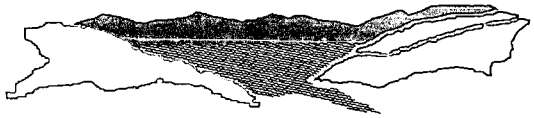
Drake Hydraulics

- DB explained hydraulic output on the Drake Channel, and went thru several 11"x17" exhibits of the cross-section locations. DB explained that the exhibits of the channel (plan and profile) have been plotted on scanned as-built drawings to aid in the review process. KE asked if any there was any certification on the plans proving they were as-builts. DB explained that the area did not have an actual as-built survey, and per COH staff present the drawings are recorded as as-builts, but are not field certified.
- DB explained that the flow rate quantified in the FIS restudy was considerably higher than the flow quantified by Summit, and that at drop structures the flow rate was in excess of channel capacity. KE stated that this being the case, FEMA will likely require an analysis demonstrating where the overflow goes, and what the impact is to areas downstream. KE added that extended cross-sections would create an issue with FEMA reviewers. DB explained that the channel has capacity to pass the flow east of Racetrack, but that there are areas where the flow leaves the channel at each drop upstream of Racetrack. KE asked about a split –flow analysis and stated he did not want to continue to pursue the Drake analysis because FEMA will not accept it.
- DB went through the approach used in the hydraulic analysis, explaining that the in-line weir function in HECRAS was utilized. JH suggested checking the analysis with hand computations in order to verify HECRAS output.
- KE asked for a comparison of flow rates, and DB explained that the difference in flow rates were a result of the hydrologic analysis using a different basin layout. The CB FIS has an additional 8 square miles not quantified by the Summit hydrology. This area is also affected by the C1 levee, which concentrates flow at the upstream end of Drake, where prior to its construction the flow spread across a wide area and was not tributary to the Drake. Per KE, FMEA will specifically want to know if the levee has affected



the existing floodplain. JN added that it appeared that if the levee were completed as shown in the RFCD MPU, that this flow would no longer reach the Drake, but would be directed to the detention facility planned.

- DB added that the profile shows flow in excess of the Drake Channel's capacity for long reaches. KE stated that this should not be submitted to FEMA. JN asked if the Racetrack road channel intercepted any of this overflow, and DB explained that the Racetrack channel did not, the flow would impact Racetrack road below the channel. Shelley Cobau (SC) added that if the flows cross Drake this could impact the approximate methods analysis, and that the subdivisions streets could possibly still have capacity to convey the flow, but an additional analysis would be necessary to determine. JH suggested submitting information to FMEA and seeing what the comments looked like, this would provide the COH with direction on how to handle the overflow.
- KE suggested CB use remainder of exiting budget to determine where the flood hazard is, and that this information could be used by the COH to establish local criteria in the area.
- DB stated that FEMA might require anything in excess of freeboard criteria on the Drake be considered overflow. KE stated that with a breakout analysis, the capacity on the lower portions of the channel would likely improve. Per JH the COH should have this information if residents are placed in a floodplain. JN concurred. Db stated that even if the breakout were shown, the resulting depth of flow might be less than 1'. He also added that this still wouldn't address the lack of lining, local scour, etc.
- KE presented the new MPU, which shows the Drake Channel as an existing facility with capacity of 1628 CFS. DB stated the CB analysis indicates a flow of 3000 cfs in the Drake. KE explained to COH that by showing the Drake as existing in the MPU, it would not allow the COH to obtain funding from the RFCD for any improvements. Ke advised COH staff that a MP amendment might be necessary. The MPU subbasins were compared to CB subbasins and it was noted that the MPU shows the 8 sq mi. directed north of the Drake, the CB hydrology shows flows to the Drake, and per KE it is likely that the CB analysis is more conservative and more likely to be approved.
- KE requested that CB quantify breakouts, then if FEMA wants sediment, bank stability, etc. analysed that would be addressed in the response to comment. KE would like to see the split flows analyzed, and is concerned with MPU basin delineations. KE added that the report should be organized in a manner which clearly separates the area upstream of the Drake, so FEMA could



issue a LOMR on the upstream areas. JN suggested contacting Pernille Busch-Peterson after the submittal to clarify concerns.

- Flow regime in the analysis was discussed. JN pointed out that FEMA will not accept a mixed regime analysis because the channel is unlined. DB stated he would run separate models.

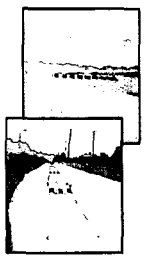
The meeting adjourned at 2:45.

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

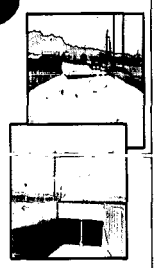


C-1 CHANNEL SYSTEM FLOOD INSURANCE RESTUDY

Progress Meeting No. 7



In Attendance:	Kevin Eubanks, CCRFCD	
	Jon Hayslip, COH	
	Janie Nihipali, COH	
	Doug Blatchford, C&B	
	Shelley Cobau, SFS (via conf. call)	
Meeting Date:	8/13/02	3:00
Next Meeting:	**9/17/02**	**1:00**



Action/Discussion Items:

I General Business

- The next meeting date was set for 9/17/02 at 1:00 at the RFCD
- Doug Blatchford (DB) requested an additional month in order to complete a thorough QA/QC of the project. This extra time was granted by the District, which will coincide with the publication of new FIRMs effective September 27, 2002.

II Data Collection/Review

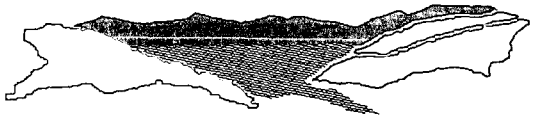
- DB asked Janie Nihipali (JN) about document scanning progress. JN stated that the scanning was well under way, and that she would provide Carter & Burgess a CD with the information when it was completed. JN asked that a deadline for the completion of the scanning be established, DB suggested August 31, 2002. Paper copies of the SNWA and NDOT facilities have been acquired by DB, he will take to JN in order for them to be scanned. The City will contract this scanning, as they do with all oversize documents. and will cover the cost as this information, since it is needed in their archives anyway. JN stated that some of the reports are very large, several volumes of information. For these large reports it may be necessary to divide them to two or more data CD's. Record drawings on the C-1 Channel, Middle and Upper Reach (LBG) are needed, Joe Damiani of the COH has told JN he will let her know when the channel is surveyed and drawings ready for scanning. Kevin Eubanks (KE) added that the report can be

submitted to FEMA w/o the as-builts on this section, as long as a letter of explanation is included. DB stated that areas where record drawing were not available, such as on the Drake Channel, C&B has ground surveyed these locations, and this information will be included in the report. DB is concerned however that FEMA may require some as-built documentation on cut-off wall configuration. However, the reach adjacent Cinnamon Ridge was not surveyed and will have to be submitted as part of the LOMR.

- DB will make sure Cinnamon Ridge and Balboa subdivisions match information used in the C-1 FIS on the LOMRs associated with each. KLE does not want to hold off submittal of the FIS restudy waiting for the subdivision construction to be completed. Because a portion of the Drake Channel adjacent to the Cinnamon Ridge subdivision is not as-built another letter of explanation to FEMA will be needed for this reach. Jon Hayslip (JH) reminded DB that C&B will need to request an extension of time from FEMA, to avoid the 90-day cutoff rule. KLE further explained FEMA submittal/response timing.
- DB discussed difficulty in the Burkholder area, particularly with the berm/levee. Per JH flow depth in the area of the berm is no more than 6" deep w/ three to five feet of freeboard. The C-1 channel is punched out at the confluence with the Burkholder. KLE stated that this will not be incorporated into the FIS Restudy.
- DB asked about the SNWA discharge and its affect on channel hydraulics, and whether or not this should be discussed in the FIS restudy. Because this is a temporary condition and the SNWA will pay for damages to any flood control facility, this will not be discussed in the report. The testing should be completed by late September.
- DB mentioned the FEMA comments in the Cinnamon Ridge/Balboa LOMR's. One comment indicated concern from the TEC as to how flow reaches the C-1 Channel. JH stated that the topography submitted should address this concern.

III Mapping /Floodplain Delineation

- DB presented all draft mapping completed to date. Areas being removed from the SFHA were discussed. The area adjacent to the Boulder Highway will remain in the SFHA, and some areas will be added to the maps, such as at detention ponds. The East C-1 detention basin will be added for clarification purposes only. The Drake Channel will be mapped as SFHA, and the maps will indicate the actual width of the channel.



- DB went over the annotated FIRMS. JN suggested some changes to line color, and location of information. KE would like abrupt changes smoothed out. DB was instructed to use the new maps, which will be effective by September. Mapping will be provided to the TEC in shape file format for them to incorporate onto the FIRMS.

Sedimentation Analysis

- KLE asked DB which sediment transport model he was using. DB explained he has used HEC-6, and that results closely math previous information prepared by both VTN and Poggemeyer. DB is coming up with approximately the same volumes. KE expressed concern with the top of the Drake Channel, and wants the report submitted as presented and discussed. DB stated that storm flows are contained in the mapped sections, and will adjust the section as directed to make them more comprehensive. A maintenance letter will be included in the report to address potential FEMA concerns with aggradation/degradation on the Drake. Because contour information was outdated in some locations (i.e. Foothill High School) DB interpreted information as well as possible. MUSCLE has indicated that a 5% bulking factor will be appropriate. DB asked if this would be acceptable. Per KE, 5% sounds in line with previous analysis performed in this area, and that using a bulking factor of 5% would be fine. DB added that based on his computations this amount of sediment load is very defensible.

FEMA forms

- DB discussed Drake Channel hydraulics and FEMA form content. KE suggested referencing .pdf files on the forms. DB stated that this will be done, and that the submittal will include digital/manual information. SC asked about MT2form 6, and the manual submittal box will be checked here, because the FEMA TEC will do the actual FIRM remap using shape files provided by C&B.

The meeting adjourned at 4:30.

cc: Kevin Eubanks, CCRFCD
Curt Chandler, COH
Jon Hayslip, COH
Janie Nihipali, COH
Shelley Cobau, SWFS
Douglas B. Blatchford, C&B, Inc
Craig Swengle, C&B, Inc

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

C-1 CHANNEL SYSTEM FLOOD INSURANCE RESTUDY

Progress Meeting No. 6

In Attendance:	Kevin Eubanks, CCRFCD Janie Nihipali, COH Doug Blatchford, C&B Shelley Cobau, SFS	
Meeting Date:	7/09/02	3:00
Next Meeting:	**8/13/02**	**3:00**

Action/Discussion Items:

I General Business

- The next meeting date was set for 8/13/02 at 3:00 at the RFCD
- A separate meeting was held to discuss the Boulder Highway/Racetrack intersection and adjacent floodplain, and the Wagonwheel Interchange area. This meeting was held at the District with Doug Blatchford (DB) and Kevin Eubanks (KLE) on Tuesday, July 2.
- Doug Blatchford (DB) stated that some changes to the schedule were anticipated, with submittal for review to occur at the end of August, per the attached schedule to the meeting agenda. These changes are needed due to the continuous discharge to the channel by the Southern Nevada Water Authority (SNWA), however, the revised schedule has reverted back to the original, contract schedule and is no longer accelerated. Due to this discharge, C&B surveyors cannot access the channel. Janie N. added she had heard the discharge would continue for some months. KLE will contact the SNWA Public Relations person (Robin Roukey) to discuss.

II Data Collection and Review

- DB advised that Carter Burgess staff has digitized the stage/storage discharge information off the record drawings for the major flood control detention basins in the study area. This will have little impact on the watershed hydrology. DB explained that the Carter-Burgess model has many notations for reference back to historical documents.

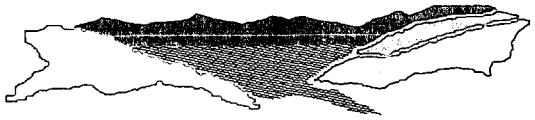
III Floodplain Delineation

- DB met separately with KLE to discuss the addition of floodplain along Boulder Highway and the Wagonwheel Interchange. This meeting was held at the District on Tuesday, July 2. Of concern were the addition of existing channels in the Wagonwheel Interchange within NDOT right-of-way, and the addition of a Zone A along the south side of Boulder Highway. It was decided that new floodplain in these locations should not be added and that this was out of scope.

- DB discussed the floodplain south of the Boulder Highway, adjacent the Racetrack intersection, and how the 1998 LOMR hydrologic model did not include all of culvert crossings on Boulder Highway. Per KLE, having the additional culverts surveyed to define the flow across Boulder Highway (in subbasins C1HB and C1HCB—in the vicinity of KMART) is not part of this scope. Further, there is not enough information to remove these zones at this time, since no Regional Flood Control District (RFCD) facilities have been added along Boulder Highway.

- Detention ponds were discussed. Facilities such as the Nevada Department of Transportation (NDOT) ponds and SNWA pond, will not be mapped as floodplain. Janie N. stated that the City of Henderson (COH) could potentially gain some Community Rating System (CRS) points if these areas were added, then developed as parks at a later date. KLE said to map the Black Mtn. DB, since all the needed information was readily available.

- DB outlined the remapping of the floodplain in Subbasin C1G2B2. He explained that while the majority of the effective floodplain could be removed, in the lower portions depths were exceeding one foot, and would be mapped as Zone A. The new Zone A will be much narrower and will follow the incised portion of the wash.



- Janie N. asked about the maps to be submitted to FEMA on the Zone A south of the Boulder highway. Per KLE this area will need to be submitted at a later time, following completion of the channel construction in this area.

- DB explained that annotated FIRMs will be submitted which will delineate the remapped area. This will also be submitted digitally, so conversion to State Plane Coordinates will be smoother. C&B will convert GIS coverages from the Clark County GIS coordinate system to State Plane Coordinates for Nevada. This conversion should make annotating the existing Digital Flood Insurance Rate Map (DFIRM) for Michael Baker Jr easier. The area on the Equestrian Outfall was not mapped correctly; Janie would like to see this cleaned up as part of this restudy. KLE stated that this area is not in the scope of the restudy, and that the work completed by for the 1998 LOMR will be looked at separately.

- DB will have effective and annotated workmaps, and will add a notation on the plans regarding the 100-yr Floodplain. The note will say: "100-yr Flood Contained in Channel." Other areas to be removed/remapped were discussed. For the most part, much of the floodplain in the subdivisions can be removed. Street capacity calculations will be performed to verify.

- KLE asked if VTN maps in the CLOMR had floodzone delineations. No maps were included in this report. Janie has questions about the Cinnamon Ridge area, the channel should be considered, so each lot does not have to be removed via a LOMR-F.

- DB stated that the next step in the process was report writing, and forms, and added that before the next meeting he will bring a map which depicts current vs. revised floodplain boundaries.

The meeting adjourned at 4:30.

cc: Kevin Eubanks, CCRFCD
Curt Chandler, COH
Jon Hayslip, COH
Janie Nihipali, COH
Shelley Cobau, SWFS
Douglas B. Blatchford, C&B, Inc
Craig Swengle, C&B, Inc

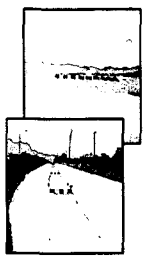
CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT



C-1 CHANNEL SYSTEM FLOOD INSURANCE RESTUDY

Progress Meeting No. 5

In Attendance:	Kevin Eubanks, CCRFCD	
	Jon Hayslip, COH	
	Janie Nihipali, COH	
	Doug Blatchford, C&B	
	Shelley Cobau, SFS	
Meeting Date:	6/11/02	3:00
Next Meeting:	**7/09/02**	**3:00**

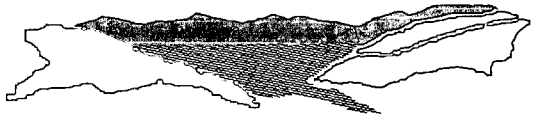


Action/Discussion Items:

I General Business

- The next meeting date was set for 7/09/02 at 3:00 at the RFCD
- Doug Blatchford (DB) stated that no changes to the schedule were anticipated yet, and that the two week review period to be provided to the RFCD as outlined on the previous schedule should remain to the best of our knowledge at this time.
- DB discussed the need for survey as-builts on specific areas of the study area, suggesting that funds targeted for surveying the Drake Channel in the supplemental services portion of the original contract be utilized for surveying roadway crossings and other specific areas on the main branch of the C-1. KE stated that the Drake funds could be utilized to obtain needed survey information in other areas.
- Jon Hayslip (JH) stated that he had spoken with Joe Damiani who indicated the COH should hold off on surveying the Drake. DB stated that based on hydraulic modeling, conveyance in the Drake will exceed 5 fps in velocity, which indicated the need for lining. JH stated that the COH will look into spending COH maintenance funds for channel improvements. Kevin Eubanks (KE) verified that the COH could use RFCD provided maintenance funds for necessary channel improvements, and the COH and RFCD will consult on this possibility.





- DB discussed the new guidelines and pointed out that FEMA has asked for the used of the new guidelines in recent LOMR comments. These guidelines outline the need for geomorphology etc. KE stated that the report should be submitted, and FEMA comments addressed following review. DB asked about submitting previous studies to FEMA by referencing the FEMA Case number, this should be acceptable.

II Data Collection and Review

Carter Burgess staff has attempted to obtain information on the NDOT basins from NDOT staff with little cooperation. DB will go to the NDOT office to see if as-builts are available for this location. Looking for as-built information on the pedestrian bridge also. KE has the report on the Western Interceptor, but no plans have been located on the Black Mountain Detention Basin.

III Floodplain Delineation

- DB outlined issues with the Drake Channel, and discussed the modeling of the 18 drop structures and channel velocities. DB discussed the potential for FEMA identifying new break-outs, and stated the area may be mapped as AO per the new FEMA guidelines. KE advised DB to pursue a Zone A designation initially, and to address to FEMA the fact that the Drake has the capacity to convey the flow which reaches it. He added that the analysis performed by VTN looked at peak flow in the northerly Zone A, and this will need to be addressed in the CLOMR response. DB stated that most of the questions posed by FEMA in the CLOMR have been addressed. The channel has capacity, and the FIS restudy will prorate the Q along the length of the channel. Flow is near zero at the top of the Drake, and approximately 1200 cfs at the bottom. KE suggested comparing the bank-full capacity of the Drake to the actual water surface elevation to show the channel has the capacity for sediment, then allow FEMA to comment. DB is preparing the sedimentation analysis, which may reduce the bulking for sediment to less than the original 10 percent. DB is also looking into the potential of a flow split above the Drake, KE suggested submitting and then addressing comments provided by FEMA.

- KE stated that the case should be made that the Drake can survive a single event, and that maintenance will remove accumulated sediment post event. Suggested modeling the northerly floodplain



above the Drake higher up to tie better into the newly delineated areas, below the SNWA facility the county topography may not accurately reflect conditions. Basin C4BA3 may be broken out to more sections, and DB will look at the area topography and disregard the way FEMA SFHA's have been previously mapped.

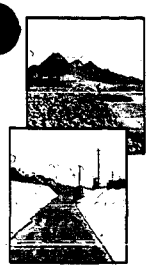
- Discussed the odd floodplain delineation in subbasin C3B1A. Janie Nihipali (JN) stated that this delineation was the result of a developer constructed temporary channel used to remove the subdivision. This temporary channel was then filled and houses placed.

- DB added that he had spoken to Ann Backstrom of Klienfelder regarding levee certifications and she does not anticipate any problems regarding slope stability given a 4:1 H:V side slope. Detailed methods hydraulics have been used to model the levee.

The meeting adjourned at 4:30.

cc: Kevin Eubanks, CCRFCD
Curt Chandler, COH
Jon Hayslip, COH
Janie Nihipali, COH
Shelley Cobau, SWFS
Douglas B. Blatchford, C&B, Inc
Craig Swengle, C&B, Inc

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT



C-1 CHANNEL SYSTEM FLOOD INSURANCE RESTUDY

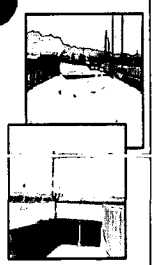
Progress Meeting No. 4

In Attendance:	Kevin Eubanks, CCRFCD	
	Jon Hayslip, COH	
	Doug Blatchford, C&B	
	Shelley Cobau, SFS	
Meeting Date:	5/14/02	3:00
Next Meeting:	**6/11/02**	**3:00**



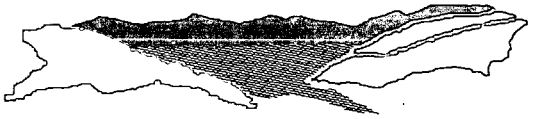
Action/Discussion Items:

1. **General Business**
   - Doug Blatchford (DB) discussed revisions to the project schedule, and presented a revised schedule for approval. The revised schedule notes that the draft report will be submitted for review on or about August 9th. The original target date will remain the same.
   - The next meeting date was set for 6/11/02 at 3:00 at the RFCD



2. **Floodplain Delineation**
   - DB advised that he would take new photos of the C-1, in the areas where the construction is now complete. Prior photos showed construction activity and are now out of date.
   - DB has run approximate methods hydraulics on nine reaches using HEC-RAS where existing special flood hazard zones (SFHA's) are located, labeled Reaches 1-9 on 400 scale aerial photographs. The 400 scale aerial photographs also have labeled contours with an interval of 5' and need to show the SFHA's for further clarification. Several reaches may have depths less than one foot already, including Reaches 3, 5 and 9. Reaches within developed areas may require further breakdown of subbasins, or a more detailed hydrology, to obtain better estimates of the 100-yr peak discharge. The following is a brief description of each reach:

      I. Reach 1: Subbasin C3B1C: It appears the SFHA's Zone A may be removed in this subbasin along Anchor Drive and other streets accepting offsite storm flows. A preliminary subcritical model shows less than 1 ft depth along Anchor Drive. The hydrology of



this subbasin should be broken into smaller pieces to better estimate storm flows;

II. Reach 2: Subbasin C3B1C: This SFHA Zone A may be removed but the hydrology needs to be broken out and hydraulics run in Emden Drive.

III. Reach 3: Subbasins C3B1D and C4BA1: A preliminary subcritical run indicates that the SFHA Zone A may be removed;

IV. Reach 4: Subbasin C4BA2 and all upstream contributing subbasins: This reach drains the East C-1 Detention Basin outfall and outlets into the Drake Channel. A subcritical hydraulic analysis shows depths greater than 1 ft and should be designated as a new SFHA Zone A.

V. Reach 5: Subbasin C1HB: A subcritical hydraulic analysis shows that most cross-sections are less than 1 ft in depth, and may require some adjustment for cross section greater than one foot depth;

VI. Reach 6: Subbasin C1HCB: A subcritical hydraulic analysis shows that most cross-sections are greater than one foot, however, further refinement of the cross sections will be required and may reduce this below one foot;

VII. Reach 7: Subbasins C161B and C161A: Detailed hydrology and normal depth cross sections will be required for this reach, however, the depths are probably less than one foot;

VIII. Reach 8: Subbasin C1NA : Detailed hydrology will be required, however, preliminary subcritical hydraulics indicates depths less than one foot;

IX. Reach 9: Subbains C1G2B1, C1G2B2, and C1G2A: A subcritical run of this reach shows depths less than one foot except for a few cross sections that should be corrected.

- Kevin Eubanks (KLE) suggested that the report detail historic basin inflow, and outline the drastic flow reductions in the area following construction on the RFCD facilities. Cross-sections will be truncated to the edge of the previously mapped floodplain.

- DB has completed a draft HEC-RAS model of the Drake Channel, which indicates some excessive velocities for unlined channels. The Drake Channel is broken into 18 reaches, each reach separated by a gabion drop structure. A review of the plans and channel



hydraulics was presented, indicating velocities between 5 and 10 fps for an unlined channel, subcritical regime. DB broke the channel hydraulics into 18 separate models for each reach, respectively, as each drop structure is considered a discontinuity that cannot be modeled in HEC-RAS.

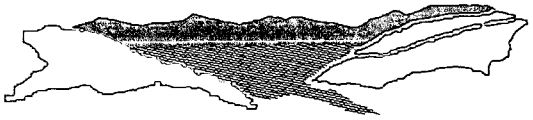
- The Drake Channel truncates existing SFHA Zone A's. Much attention was drawn to this area as to how to approach the Drake Channel. A sedimentation analysis will be required to address the Drake and its upstream watershed, using the Modified Universal Soil Loss Equation. It appears that a spit flow occurs at the top (east end) of the Drake, between the end of the Drake and the end of the East C-1 Detention Basin Levee. Storm flows approaching the drake channel from the south are directed west in the Drake Channel, however, these flows erode the south bank of the channel. This scour and erosion will have to be addressed, along with sediment and deposition transported from the upstream watershed. Previous indications that the East C-1 Detention Basin reduced flows to the Drake Channel appear to be unfounded after review of the hydrologic analysis. A 100-yr peak discharge of 1126 cfs was derived from an 8.61 sq mi watershed for the Drake Channel at Racetrack, however, this peak discharge should be prorated as storm flows approaching from the south reach the channel.

- Mapping requirements (FEMA's) will be reviewed to determine exact requirements for unlined channels such as the Drake. KLE suggested that if the report could show that the DRAKE could handle a single event, and then undergo maintenance repairs as needed, that FEMA might accept removal of the floodplain downstream. A bulking factor could be used on the Drake, which could be bulked in to show how much sediment load the channel could handle. Local accumulation must be addressed. The Drake analysis can be submitted for FMEA review, than comments addressed.

- Storm centerings were discussed, and KLE recommended showing basin wide storm. KLE added that FEMA now accepts electronic submittals of hydrologic input/output files.

- The Drake/C1 confluence was discussed. Due to flat channel grade in the confluence flow is nearing the channel top. KLE suggested review of the original VTN design report, which includes the HEC-RAS model of the confluence.

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT



The meeting adjourned at 4:30.

cc: Kevin Eubanks, CCRFCD
Curt Chandler, COH
Jon Hayslip, COH
Janie Nihipali, COH
Shelley Cobau, SWFS
Douglas B. Blatchford, C&B, Inc
Craig Swengle, C&B, Inc

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

C-1 CHANNEL SYSTEM FLOOD INSURANCE RESTUDY

Progress Meeting No. 3

In Attendance: Kevin Eubanks, CCRFCD
Jon Hayslip, COH
Janie Nihipali, COH
Doug Blatchford, C&B
Shelley Cobau, SFS

Meeting Date: 4/11/02 3:00
Next Meeting: 05/14/02 3:00

Action/Discussion Items:

1. **General Business**
   - Kevin Eubanks (KLE) asked if the project was on schedule, Doug Blatchford (DB) explained that Drake Channel survey and C-1 Channel survey were postponed, but the project was primarily on schedule.
   - The next meeting date was set for 5/14/02 at 3:00 at the RFCD

2. **Data Collection and Review**
   - KLE asked about the Drake Channel, discussed Drake hydraulics/ and the existing drop structures. DB has some concerns regarding the use of HEC-RAS to model the drops, due to their height, and will review model capabilities.
   - Hydrologic subbasin delineation above the Drake was discussed. KLE suggested a divide on the Drake alignment, which will eliminate computing a flow split, and direct the entire flow from the fan outlet to the Drake.
   - The Drake Channel survey, and bridge survey will be postponed for the time being. This information will be gathered once the hydraulic analysis and sedimentation analysis is done.
   - DB pointed out that the large subbasin areas depicted on the maps above the RFCD facilities would not be included in the models. These subbasins were included in previous FEMA submittals and are intended for reference only.
   - The SNWA WWTP detention pond was discussed. DB will contact Matt Baird to discuss. KLE stated that if the presence of this pond is not consequential, and to leave it out of the hydrologic model.

- DB presented field review info, exhibits and photos—the field reconnaissance is now completed.
- KLE asked about the Mission Hills interceptor inlets, and if this area could be a potential sediment collection point. DB provided photos of the inlet locations, and sediment did not appear to be a large factor, but will be monitored periodically.
- The sediment collecting at the Drake/C1 Channel confluence was discussed. Because the SNWA is discharging, getting clean photos for the report in this area is difficult, however, C&B will periodically monitor this confluence to obtain photographs without sediment, if possible.
- Soils information was discussed. DB obtained information from the NRCS, which includes a new breakdown for the previously unmapped areas. This information has been converted to GIS format.
- DB noted a draft of the approximate methods analysis for the Drake is still in progress.
- The hydrologic model was discussed. Shelley Cobau (SC) stated that a draft SDN5 model was complete. This model will be revised as needed, and used for the basis of the other storm distributions. The model indicates inflow to the Drake is quite large—this will be verified for accuracy.
- The HEC-RAS model for the C-1 is in progress. Initial cross sections in the area of Warm Springs indicate that the channel has capacity.
- Sedimentation analysis methodology was discussed. For the Mission hills interceptor, VTN used the 5-yr accumulation model to determine detention pond storage capacity. DB asked for a clarification of the use of a bulking factor, versus the use of specific methods such as the Revised Uniform Soil Loss Equation (RUSLE). KLE suggested that the sediment information could be provided in a reverse methodology, i.e. the channel has capacity for an additional load of 50%. For the Drake, an alternate method must be used. FEMA may want detailed information because it has not been presented to them before. The presence of the detention facility could potentially create "hungry water". DB will contact KLE prior to conducting the sediment transport analysis to discuss appropriate methodology.
- Janie Nihipali (JH) wondered about scheduling, and when the forms would be submitted to FEMA. DB stated that the forms would be submitted along with the report in September.



- Incised gullies on the Drake were discussed, and DB provided aerial photography. The gullying appears to have occurred prior to the completion of the upstream facilities.

The meeting adjourned at 4:00.

cc: Kevin Eubanks, CCRFCD
Curt Chandler, COH
Jon Hayslip, COH
Janie Nihipali, COH
Shelley Cobau, SWFS
Douglas B. Blatchford, C&B, Inc
Craig Swengle, C&B, Inc

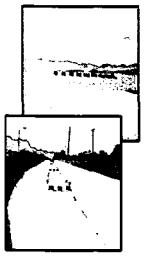
CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT



C-1 CHANNEL SYSTEM FLOOD INSURANCE RESTUDY

Progress Meeting No. 2

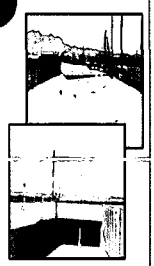
In Attendance: Kevin Eubanks, CCRFCD
Jon Hayslip, COH
Doug Blatchford, C&B
Shelley Cobau, SFS



Meeting Date: 3/12/02 3:00
Next Meeting: 04/09/02 3:00

Action/Discussion Items:

1. **General Business**
   - Project schedule still on track, hydrology and hydraulics have been started.
   - Next meeting date: April 9, 2002 at 3:00 pm at the CCRFCD. Monthly progress meetings will be held regularly on the second Tuesday of each month through project completion.



2. **Data Collection and Review**
   - Doug Blatchford (DB) discussed the soils mapping in the study watershed. He presented an exhibit prepared by C&B which covered the HSG's present in each subbasin area. Notably, not all the areas were mapped by the SCS (mountainous areas not covered). KLE suggested contacting Matt Baird at PBS&J to determine what the current MPU utilized in these areas. It was noted that a HSG D was likely used. KLE also suggested checking the FIS and STATSGO and SCURGO from the NRCS. The following is a list of possible soils information:
     1. NRCS data
     2. GISMO information
     3. FIS
     4. VTN hydrology
     5. 1996 and 2001 MPU data
   - DB presented a basin delineation exhibit, and noted that all subbasin areas have been based on existing/accepted hydrology in as much as possible.
   - CN values have not been finalized, but DB noted that the numbers are coming up somewhat high—in the mid 80's for developed



areas due to small lot sizes, and high 80's for Type D soils in the River Mountains.

- DB noted that the COH has nothing on the Drake Channel. Summit Engineering (Las Vegas) was contacted by C&B, and pulled their files on Drake—mylars were available, along with some general file information, however, no geotechnical report or as-built were found. DB then contacted the Reno office of Summit—they had no available info on the Drake. The Reno office indicated that a geotechnical report may not have been performed by Summit, and no as-built data could be located. This being the case—DB asked if the RFCD would like C&B to proceed with acquiring a geotech report for the Drake channel—because this would be outside the defined project scope. KLE stated that C&B should proceed with developing x-sections using 5' contours and the existing plans, but to hold off on the geotech. Stressed proceeding carefully on the Drake.
- Drake floodplain delineations were discussed; the existing berm redirects flow, and the study must show how the diversion affects the flow rate between the berm and the channel. Because FEMA must buy-off on the sediment analysis, the Drake Channel analysis should be taken one step at a time with RFCD involvement. Some small flows will impact the Drake, but the majority of the contributing watershed has been cutoff by upstream improvements.
- SC provided an update on hydraulics in progress on the C-1. The channel will be modeled to top of embankment, w/o including the floodwall. A Manning's n of .015 will be used.
- Survey and as-built information was discussed. It was noted that some areas may need to be resurveyed even though as-builts have been located, because the as-builts do not have sufficient information to complete the hydraulic analysis, or meet FEMA submittal requirements. DB will get a quote for survey to perform additional work—because this is outside the project's scope. KLE directed DB to determine the cost of all items beyond the existing scope and submit to him for approval/disapproval.
- DB presented field review info, exhibits and photos.
- JH stated that the sediment present at the confluence of the C-1 and the Drake will be removed by the SNWA, as this is a result of discharges by SNWA--COH maintenance will address.
- DB stated that the hydrology in the Mission Hills area has not yet been started. KLE pointed out that the Interceptor had an exhaustive sediment analysis prepared, and that this might be helpful. He added that FEMA has reviewed Mission Hills DB, but has not seen Black Mountain DB, or the Western Interceptor. DB will expand the field review to incorporate the Mission Hills area

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

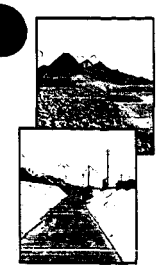


- Scott Woodbury w/COH provided land use information –DB showed attendees the exhibits with breakout of HSG's and land use.
- JH asked for update on what was coming next—DB explained that hydrology, detailed hydraulics, approximate methods hydraulics would proceed.
- DB explained that for the project's workmaps the DFIRMS would be modified. KLE stated that the RFCD will provide C&B digital DFIRMS.

The meeting adjourned at 4:30.

cc: Kevin Eubanks, CCRFCD
Curt Chandler, COH
Jon Hayslip, COH
Janie Nihipali, COH
Shelley Cobau, SWFS
Douglas B. Blatchford, C&B, Inc
Craig Swengle, C&B, Inc

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT



C-1 CHANNEL SYSTEM FLOOD INSURANCE RESTUDY

Progress Meeting No. 1

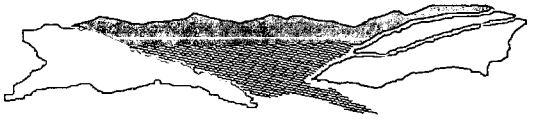
In Attendance: Kevin Eubanks, CCRFCD
Jon Hayslip, COH
Doug Blatchford, C&B
Shelley Cobau, SFS

Meeting Date: 02/12/02 3:00-4:00
Next Meeting: 03/12/02 3:00

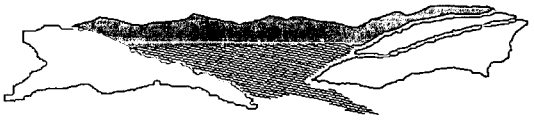
Action/Discussion Items:

1. **General Business**
   - Doug Blatchford (DB) discussed the project schedule and action item list. Carter & Burgess has made substantial progress in data collection on the C-1, and will continue to attempt to collect data on the Drake Channel. Per Fred Soriano at the COH no as-builts or geotechnical data are available for the Drake Channel. The plans from Summit Engineering on the Drake were prepared in April of 1994. At this point data collection is ahead of schedule.
   - DB stated that the project team would begin hydrologic and hydraulic analysis with the data collected.
   - Jon Hayslip (JH) requested a brief summary of the study area to familiarize him with the project limits. He stated that Janie Nihipali, COH was interested in the area below the Drake confluence.
   - Next meeting date: March 12, 2002 at 3:00 pm at the CCRFCD. Monthly progress meetings will be held regularly on the second Tuesday of each month through project completion.

2. **Data Collection and Review**
   - DB noted that the COH had provided the majority of the required documents on CD.
   - Electronic data (2'-5'contours) can be used to generate cross-sections for the approximate methods hydraulic analysis. This topographic data was provided by GISMO. Hydraulics cross-sections for the C-1 channel will be cut by hand where electronic information does not exist.



- DB presented a project punch list, and draft project report bibliography.
- Effective hydrologic models were discussed. Kevin Eubanks (KE) stated that the LOMRS/CLOMRS processed in the area would provide a good basis in determining which models (i.e. the Poggemeyer model), that FEMA had seen and previously accepted. KE also suggested reviewing the LOMR prepared by VTN on the Mission Hills Detention Basin. It was further suggested C&B carefully review all LOMRS/CLOMRS and historic information to determine which model would be easiest for FEMA's TEC to review. DB stated that the Louis Berger model would be modified, as this is the most recent.
- Storm centerings were discussed. It was determined that the worst-case storm distribution will be utilized for identified concentration points in the hydraulic model. Cross-referencing to the controlling hydrologic model will be provided in the report to ease FEMA TEC review.
- DB stated that the F5 DFIRM GIS data obtained from GISMO differs substantially from the paper DFIRM panels. The Poggemeyer Equestrian Detention Basin hydrology was compared to the Master Plan Update model, which showed substantially the same sub-basin layout. KE stated that the MPU model assumes that a street network is in place, and does not necessarily reflect exact existing conditions. The MPU sub-basin model should be modified to reflect existing conditions where streets do not exist.
- JH asked if GIS would be used in the report preparation. JH has some concern with GIS-generated CN's, because in some areas of Henderson the CN values had increased. JH stated that the cumulative effect of the CN values could increase quantified flows. C&B has obtained NRCS soils info digitally, and GIS will be used primarily to determine land use and soils, but will *not* be used for time of concentration or lag time computations.
- KE suggested that the map prepared by PBS&J could be used as an overall map showing existing facilities and hydrologic sub-basins. Prior to use, the facilities that are not constructed should be removed. C&B will obtain the digital file of the map, and modify as needed.



3. Field Inspection

- DB stated that field inspection of the channel reaches in the study area had been done on February 11th and 12th. In the field it was noted that a substantial amount of sediment was present at the C-1 Drake confluence. The revetments of the Drake Channel upstream of Racetrack have experienced severe gullying in some locations; this likely occurred prior to the construction of the East C-1 Detention facility upstream. The half channel section of the Drake between the C-1 Channel and Racetrack will be built by the developer of Cinnamon Ridge. Grading for this development has already begun.

Progress Meeting No. 1 adjourned at 4:00 pm.

cc: Kevin Eubanks, CCRFCD
Curt Chandler, COH
Jon Hayslip, COH
Janie Nihipali, COH
Shelley Cobau, SWFS
Douglas B. Blatchford, C&B, Inc
Craig Swengle, C&B, Inc

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

C-1 Channel System Flood Insurance Restudy

Kickoff Meeting Minutes

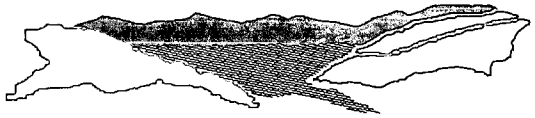
In Attendance: Kevin Eubanks, CCRFCD
Janie Nihipali, COH
Craig Swengle, C&B
Doug Blatchford, C&B
Shelley Cobau, SFS

Meeting Date: 01/08/02 3:30-4:30
Next Meeting: 02/12/02 3:00

Action/Discussion Items:

1. **General Business**
   - Doug Blatchford (DB) distributed information and usage instructions for the FTP site. The FTP site will be utilized for information exchange, and will simplify the file exchange process. When project participants place information on this site send C&B a notification email. Kevin Eubanks (KE) stated that the CCRFCD would only place information on the site upon request from C&B.
   - DB distributed and discussed the project schedule and action item list. This action item list will be presented and discussed at each monthly meeting. In addition the action item list will be attached to meeting minutes for review of attendees. KE suggested that the project schedule be attached to each month's meeting agenda.
   - DB distributed sign-in sheet with contact information for signature and review by each attendee. Primary/secondary agency contacts were discussed. Jon Hayslip will be the secondary contact for the COH. KE will be the sole contact for the CCRFCD. FEMA TEC contact will be Pernille Buch-Pedersen.
   - Next meeting date: February 11, 2002 at 3:00 pm at the CCRFCD. Monthly progress meetings will be held regularly on the second Tuesday of each month through project completion. Other meetings may be held as necessary at various milestones throughout the project.

2. **Data Collection and Review**
   - KE requested that an overall map be made available at meetings; the overall map from the Contractual Agreement is preferable.
   - DB distributed information request list for review/comment by KE and Janie Nehipali (JN). The list included the request for pertinent



information such as as-builts, hydrologic/hydraulic design reports, geotechnical reports, etc. for each of the listed facilities. The following items were discussed:

- C-1 as-built information

- Equestrian Detention Basin. A LOMR has removed a large portion of floodplain. C&B should use developed information, and match to report as much as possible, so as not to confuse FEMA's TEC review process. Sub areas in this report cannot be modified, because any modification will create problems with FEMA.

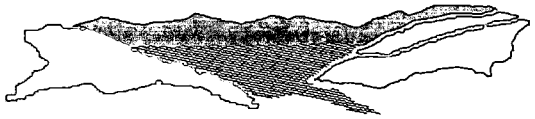
- Black Mountain Detention Basin & East C-1 Detention Basin. The recent hydrology and topo is available in the design report.

- VTN facility report. KE stated that VTN's facility report defines the contributing watershed, and should be used as a basis for the FIS restudy. DB pointed out that model routings and sub basin delineations would need to be reviewed. C&B will review VTN model and update as needed.

- Drake Channel CLOMR. FEMA comments /concerns will need to be addressed, hydraulic model in this report is inadequate.

- Land development projects. These projects will not have a large impact as CIP projects address majority of impacts on C-1 facility. Upon field review, if land development project information is needed JN will need name of subdivision in order to provide report. Hydrology and hydraulic model will be based on current (1-02) land development.

- FIS Restudy Base Maps. Workmaps will be prepared with hydraulic cross section locations, the effective FIRM will be used for annotation of proposed floodplain revisions. AE zones will not be proposed, so elevations will not be needed on annotated map. JN suggested that the annotated map be included in the front of the FIS Restudy for ease of review by FEMA. All other exhibits should be referenced, and included later in the report.



- JN requested a list of all information needed from COH; she will provide as much as possible this week, prior to absence. In her absence she will delegate data gathering. C&B can send staffer to COH to obtain any additional information that may be needed—in order to assist COH in data gathering if needed. JN stated she would place everything pertinent, which she can identify on a CD for pick-up. KE stated that the CCRFCD would fill in any blanks in needed information, because the COH does not have all design reports for CIP's. DB will meet with JN at COH on 1/9/02 in order to expedite data collection.

- Field review was discussed. KE suggested starting field review immediately, and DB added that field review would be ongoing throughout project duration. Shelley Cobau (SC) has developed a field hydrologic sub area verification/characteristic form. This form will be modified and used for C-1 field inspections. Photographs will be taken at pertinent locations. A C&B hand held GPS unit may be utilized.

- Hydrologic Model discussion, KE stated that FEMA has used the 1991 FIS hydrology, but that doesn't constitute the effective hydrologic model. The D-Firms are in the process of being updated, and will not be ready for inclusion in the C-1 FIS restudy. C&B will prepare draft request to FEMA library for effective hydrologic data using CCRFCD website for information.

3. Other Issues

- KE and JN stressed that the report should be kept as simple as possible to aid in FEMA TEC review. An example FIS Restudy was provided by the CCRFCD.

The kick-off meeting adjourned at 4:30.

cc: Kevin Eubanks, CCRFCD
Curt Chandler, COH
Jon Hayslip, COH
Janie Nihipali, COH
Shelley Cobau, SWFS
Douglas B. Blatchford, C&B, Inc
Craig Swengle, C&B, Inc

AGREEMENT FOR PROFESSIONAL SERVICES
CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT
AND
CARTER & BURGESS, INC.
C-1 CHANNEL SYSTEM FLOOD INSURANCE RESTUDY

THIS AGREEMENT is made and entered into this 13th day of December, 2001, by and between the CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT (hereinafter referred to as "DISTRICT") and CARTER & BURGESS, INC. (hereinafter referred to as "CONSULTANT"), for C-1 CHANNEL SYSTEM FLOOD INSURANCE RESTUDY (hereinafter referred to as the "PROJECT").

WITNESSETH

WHEREAS, the DISTRICT desires to complete a flood insurance study.

WHEREAS, the CONSULTANT is experienced and is knowledgeable in the completion of such works, and

WHEREAS, the CONSULTANT and the DISTRICT recognize the need to coordinate the PROJECT with the Technical Review Committee established by the DISTRICT for this project, and

WHEREAS, the CONSULTANT represents that it is properly registered and qualified in accordance with the Nevada Revised Statutes and has the personnel and facilities necessary to accomplish the PROJECT with the required time, and

WHEREAS, the parties desire to set forth the responsibilities, terms, and conditions of completing the PROJECT,

NOW, THEREFORE, in consideration of the premises and terms contained herein, the parties agree as follows:

Section I

RESPONSIBILITIES OF CONSULTANT

A. The CONSULTANT shall be responsible for the professional quality, technical accuracy, timely completion, and coordination of all services furnished by the CONSULTANT, its subcontractors and subconsultants and its and their principals, officers, employees, and agents under this AGREEMENT. In performing the specified services, CONSULTANT shall follow practices consistent with generally accepted current professional and technical engineering standards.

B. It shall be the duty of CONSULTANT to assure that all work products are technically sound and in conformance with all pertinent and current federal, state, and local statutes, codes ordinances, resolutions, and other regulations -- in particular, the federal Endangered Species Act. If, during the term of this contract, there are any changes or new laws, ordinances, statutes, rules or regulations not known or foreseeable at the time of signing this contract which become effective and which affect the cost or time of performance of the contract, CONSULTANT shall immediately notify DISTRICT in writing and submit detailed documentation of such effect in terms of both time and cost of performing the contract. Upon concurrence by DISTRICT as to the effect of such changes, and adjustment in time of performance and/or compensation for an increase or decrease in labor, materials, and equipment directly required to be in compliance will be made. Except for an extension of time, no payment or compensation of any kind shall be made to CONSULTANT for damages caused by such changes or new laws, ordinances, statutes, rules or regulations, including, but not limited to, those which may arise due to delay, disruption, acceleration, or inefficiency. If any discrepancy or inconsistency should be discovered between this contract and any law, ordinance, regulation, order, or decree, CONSULTANT shall immediately report the same in writing to DISTRICT, who will issue such instruction as may be necessary. The CONSULTANT shall, without additional compensation, correct or revise any errors or deficiencies in its recommended plans, policies, designs, drawings, and other sections of the PROJECT. It is also understood and agreed by both parties that if any

variation in measurements, calculations, or observations of a quantity due to mistakes, hereinafter referred to as "erroneous work" is found, the CONSULTANT will expeditiously perform the necessary work, at no expense to the DISTRICT, to correct the erroneous work. The reviewing process by the DISTRICT during the progress of the PROJECT will not relieve the CONSULTANT's obligation for erroneous work in the preparation of the different sections of the PROJECT. Any revisions or updates of the PROJECT after submittal would be considered outside the scope of services for this AGREEMENT.

C. The CONSULTANT will be responsible for holding monthly progress meetings with the DISTRICT. Minutes of these meetings and a summary of the PROJECT status will be submitted by the CONSULTANT to the DISTRICT monthly.

D. It is agreed that any and all documents prepared and submitted by the CONSULTANT to the DISTRICT, and all information required of the CONSULTANT by the AGREEMENT, become the property of the DISTRICT. The CONSULTANT may retain copies and reproducible copies of all documents produced as a result of the PROJECT. In the event of the termination of the AGREEMENT, all documents produced shall be and become the property of the DISTRICT. The CONSULTANT agrees to surrender all such documents to the DISTRICT.

E. The CONSULTANT agrees that its officers and employees will cooperate with the DISTRICT in the performance of services under this AGREEMENT and will be available for consultation with the DISTRICT at such reasonable times and with advance notice so as to not conflict with their other responsibilities.

F. The rights and remedies of the DISTRICT provided for under this section are in addition to any other rights and remedies provided by law or under other sections of the AGREEMENT.

Section II

DISTRICT'S RESPONSIBILITIES

A. The DISTRICT agrees that its officers and employees will cooperate with CONSULTANT in performance of services under this AGREEMENT and will be available for consultation with CONSULTANT at such reasonable times with advance notice as to not conflict with their other responsibilities.

B. The services performed by CONSULTANT under this AGREEMENT shall be subject to review and approval by DISTRICT General Manager. The DISTRICT General Manager may delegate any or all of the General Manager's responsibilities under this AGREEMENT to appropriate staff members, and shall so inform CONSULTANT by written notice before the effective date of each such delegation.

C. The services to be performed by the CONSULTANT under this AGREEMENT shall be subject to periodic review by DISTRICT's General Manager. The review comments of the DISTRICT's General Manager shall be reported in writing to the CONSULTANT by the DISTRICT's General Manager. To prevent an unreasonable delay in the CONSULTANT's work, the DISTRICT's General Manager will endeavor to examine all documents and will make authorizations in writing to the CONSULTANT to proceed with work within 10 working days of receipt of such documents. It is understood that the DISTRICT's representative's review comments do not relieve the CONSULTANT from the responsibility for professional and technical accuracy of all work delivered under this AGREEMENT.

D. DISTRICT shall, without charge, furnish to or make available for examination or use by the CONSULTANT as it may request, any relevant data which the DISTRICT has available, including as examples only and not as a limitation:

1. Copies of reports, maps, plans, surveys, records, and other documents pertinent to flooding, flood control facilities, public properties, property developments, and other physical features related to the PROJECT.

2. Copies of previously prepared reports, publications, design hydrologic and hydraulic data, flooding information, flooding data, rainfall/runoff data, representative local drainage requirements (i.e., subdivision, planning and zoning regulations, ordinances, codes criteria, and special agreements or procedures), analyses, and computation manuals, computer programs, other documents and information related to the PROJECT and services specified by this AGREEMENT. CONSULTANT shall return original data provided by the DISTRICT.

E. Upon written request from the CONSULTANT, the DISTRICT shall reasonably assist CONSULTANT in obtaining data and documents from public officers or agencies and from private citizens and business firms whenever the DISTRICT determines that such material is necessary for the completion of the services specified by the AGREEMENT. DISTRICT shall provide the CONSULTANT with a list of names of individuals, agencies, or any other parties that should receive written communication related to the PROJECT from the CONSULTANT.

F. CONSULTANT will not be responsible for accuracy of information or data supplied by the DISTRICT or other sources, but will use such data to the extent such information or data would be relied upon by a reasonably prudent professional engineer.

Section III

CONSULTANT SERVICES

A. The CONSULTANT shall perform Task 1 through Task 4 including services discussed in the "basic services" as specified in Exhibit A – SCOPE OF SERVICES, which is attached hereto, and by this reference made a part of this AGREEMENT. In addition, the CONSULTANT will perform Task 5, "Supplemental Services" described in Exhibit A if, as, and when requested in writing by the General Manager. Exhibit B – PROJECT STUDY AREA, and Exhibit C – PROJECT TIME SCHEDULE, are attached hereto and by this reference are also made a part of this agreement.

B. The DISTRICT may at any time, by written order, make changes within the general scope of this AGREEMENT and in the services or work to be performed by the CONSULTANT. If such changes cause an increase or decrease in the CONSULTANT's cost or time required for performance of any services under this AGREEMENT, an equitable adjustment shall be made and this AGREEMENT shall be modified in writing accordingly. Any claim of the CONSULTANT for adjustment under this clause must be asserted in writing within 30 days from the date of receipt by the CONSULTANT of notification of changes unless the DISTRICT grants a further period of time before the date of final payment under this AGREEMENT.

C. No services for which an additional compensation will be charged by the CONSULTANT shall be furnished without the written authorization of the DISTRICT.

Section IV

COMPENSATION AND TERMS OF PAYMENT

A. Once each month, the DISTRICT shall pay the CONSULTANT for services performed under Section III, CONSULTANT SERVICES. Invoices are prepared and submitted on a monthly basis and are due upon receipt. Payment is past due thirty (30) days from the invoice date. In the event the DISTRICT fails to make any payments, the CONSULTANT may cease work immediately until payment for the invoice and service charge is made. An additional charge at the rate of 1 ½ percent per month will be charged against invoices which are past due.

B. Compensation and Method of Payment for Engineering Services are:

1. The DISTRICT shall pay the CONSULTANT on a time and materials basis under the CONSULTANT'S Fee Schedule, which is attached hereto as Exhibit D and by this reference made a part of this AGREEMENT.

2. The maximum cost to the DISTRICT for Basic Services Task 1 through Task 4 including services discussed in Project Description accomplished under this AGREEMENT shall not exceed One Hundred Twenty Eight Thousand, Seven Hundred Dollars ($128,700) unless the DISTRICT receives a written request, with justification, and the DISTRICT approves a change in scope and an increase in compensation. If approved, a supplement to this AGREEMENT must be executed. An estimated cost based on a detailed breakdown of the cost by tasks, and direct costs is shown on Exhibit E, ESTIMATED COST BY TASK, which is attached hereto and by this reference made a part of this AGREEMENT. The cost figure presented in Exhibit E is a good faith estimate, and with approval from the DISTRICT compensation to be paid for an individual task may be adjusted from task to task so long as the total amount does not exceed One Hundred Twenty Eight Thousand, Seven Hundred Dollars ($128,700). Payments will be made to the CONSULTANT on a monthly basis upon receipt of a progress report and itemized

invoices for work accomplished.

3. Supplemental services will be performed only upon written authorization by the General Manager and at the discretion of the General Manager. Payment for Supplemental Services will be made according to the terms described in this section for basic professional services. While the maximum cost to the District for supplemental services shall not exceed Twenty Seven Thousand, Three Hundred Dollars ($27,300), the cost figures presented in Exhibit E are only estimates and are not intended to limit the compensation to be paid for an individual task. Payments will be made to the CONSULTANT on a monthly basis upon receipt of a progress report and itemized invoices for work accomplished.

Section V

TIME AND PERFORMANCE

A. The Project Time Schedule for work under this AGREEMENT is attached as Exhibit C and by this reference made a part of this AGREEMENT. The CONSULTANT will perform the work in accordance with said Project Time Schedule, and will provide the DISTRICT's representative a progress report in conjunction with the monthly invoice describing changes in schedule.

Work shall begin immediately upon receipt by the CONSULTANT of the Notice to Proceed by General Manager. All work necessary to prepare the project deliverables for submittal to the District for review and publication shall be completed 365 calendar days from notice to proceed. Supplemental services, if requested by the General Manager, will be completed within the time frame established for such services.

B. The DISTRICT and CONSULTANT recognize the scope of work as detailed in Exhibit A - SCOPE OF SERVICES and as outlined in Exhibit C - PROJECT TIME SCHEDULE can be altered by unforeseen events which may occur. Therefore, a supplement to this AGREEMENT will be prepared, negotiated, and executed when the CONSULTANT establishes, and the DISTRICT agrees, that there has been, or is to be a significant change, including but not limited to:

1. Scope, complexity, or character of the services to be performed such as additional meetings and coordination over those identified in Exhibit A, analysis of additional alternatives, or preparation of additional reports.

2. Conditions under which the work is required to be performed, such as a change in standards or a change in available base data which would require additional work.

3. Duration of work if the time period for completion of the work warrants such adjustment.

C. An alteration required by the DISTRICT which results in changes in the scope of work will also be specified in a supplemental AGREEMENT which will set forth the nature and scope thereof and payment therefore.

D. Neither party shall be considered in default in the performance of its obligations hereunder, or any of them, to the extent that performance of such obligations, or any of them is prevented or delayed by any cause, existing or future, which is beyond the reasonable control of such party. Delays arising from the actions or inactions of one or more of CONSULTANT's principals, officers, employees, agents, subcontractors, subconsultants, vendors, or suppliers are expressly recognized to be within the CONSULTANT's control.

Section VI

MISCELLANEOUS PROVISIONS

A. The CONSULTANT and its subconsultant(s) shall maintain all books, documents, papers, accounting reports, and other evidence pertaining to costs incurred and/or work performed and that such evidence shall be made available for inspection by the DISTRICT at all reasonable times during the AGREEMENT period for three (3) years from the date of final payment.

B. The DISTRICT has the right to terminate this AGREEMENT upon seven (7) days written notice to the CONSULTANT. This AGREEMENT may also be terminated by either party upon seven (7) calendar days written notice in the event of substantial failure to perform in accordance with the terms hereof by the one party through no fault of the other party. If said termination occurs prior to completion of the PROJECT, the CONSULTANT shall deliver to the DISTRICT all documents, calculations, and all other work performed whether complete or incomplete. Thereafter, the DISTRICT will reimburse the CONSULTANT for all services performed prior to such notice, provided the services performed are satisfactory to the DISTRICT. Termination shall be by written notice, which will be sent by certified mail or hand delivered. Such notice will be deemed effective after the third business day of the mailing post date, or hand delivered, in which case such notice will be deemed effective upon receipt of the written termination to the CONSULTANT or the DISTRICT.

C. The CONSULTANT does hereby agree to indemnify and save harmless the DISTRICT from loss, damage, liability, costs, or expense to the proportionate extent caused by the CONSULTANT, its employees, agents, or consultants and/or consultants arising out of the negligent acts, errors or omissions of the CONSULTANT, its employees, agents or consultants and/or subconsultants in connection with this AGREEMENT.

D. During the life of this AGREEMENT, the CONSULTANT shall not engage the services of any person or persons who are currently employed by the DISTRICT without the DISTRICT's prior approval.

E. The CONSULTANT shall at all times maintain control over and have complete responsibility for all work performed under the AGREEMENT. Any attempted assignment of rights or delegation of duties under this AGREEMENT, without the written consent of the DISTRICT, shall be void.

F. The CONSULTANT shall submit for review and documentation purposes copies of all subconsultant agreements.

G. The CONSULTANT shall place his professional engineer stamp on the final Submittal substantiating that the work has been accomplished under the direct supervision of a professional engineer and in accordance with acceptable professional standards.

H. The CONSULTANT, at his own expense, shall obtain and maintain, for the duration of the Contract, insurance against claims for injuries to persons or damages to property or other losses which may arise from or in connection with CONSULTANT sole negligence or fault in the performance of work hereunder of the CONSULTANT, his agents, representatives, employees or subcontractors of any tier.

The CONSULTANT will provide the DISTRICT with certificates of insurance for coverage as listed below and endorsements, establishing coverage required by the Contract within ten (10) calendar days after approval of this Agreement by the DISTRICT's Board. The certificate of endorsements for each insurance policy are to be signed by a person authorized by the insurer and licensed by the State of Nevada.

The CONSULTANT will:

1. Maintain commercial general liability coverage at limits of no less than $1,000,000 combined single limit per occurrence and $1,000,000 annual aggregate for bodily injury (including death), personal injury and property damages. The coverage shall be on an "occurrence" basis only and not on a "claims made" basis; and the coverage must be provided on ISO commercial liability or on ISO broad form comprehensive general liability forms with no exceptions to the coverage for bodily injury, personal injury, broad form property damages, premises operations, severability of interest, products and completed operations, contractual and independent contractors. The DISTRICT, its officers, and employees must be expressly covered as additional insureds.

2. Maintain automobile coverage at limits of no less than $1,000,000 combined single limit "per accident" for bodily injury and property damage for all owned automobiles, nonowned automobiles, hired automobiles, or any automobile. The DISTRICT, its officers and employees must be expressly covered as additional insureds.

3. Maintain professional liability insurance at limits of no less that $1,000,000 per claim and $1,000,000 annual aggregate to insure against claims for losses arising out of the services rendered by the CONSULTANT, it agents, representatives or employees pursuant to the CONSULTANT's Contract with the DISTRICT. "Claims made" insurance coverage will continue for a period of three (3) years beyond the term of the Contract. Any retroactive date must coincide with or predate the date of the Contract and may not be advanced without the DISTRICT's consent. The CONSULTANT's professional liability insurance must provide coverage for the CONSULTANT's subcontractor if the subcontractor does not maintain professional liability insurance in the same amounts and manner as required for the CONSULTANT.

All deductibles and self-insured retention shall be fully disclosed in the certificate of insurance. No deductible of self-insured retention may exceed $250,000 for commercial general liability, $250 for automobile, or $250,000 for professional liability without the written approval of the DISTRICT. If aggregate limits are imposed on bodily injury and property damage, then the amount of such limits must not be less than twice the amount of the limits required herein. All aggregate must be fully disclosed and the amount entered on the required certificate of insurance. Any notice given to the CONSULTANT with respect to exhaustion of limits of insurance shall also be sent to the DISTRICT. The adequacy of the insurance supplied by the CONSULTANT, including the rating and financial health of each insurance company providing coverage, is subject to the approval of the DISTRICT.

4. Maintain Nevada Industrial Insurance and occupational Disease Acts; such insurance will protect it and the DISTRICT from claims made by the CONSULTANT due to work-related injuries.

5. The CONSULTANT's insurance shall be primary as respects to the DISTRICT, its officers, employees, and volunteers.

The insurance requirements specified herein do not relieve the CONSULTANT of its responsibility or limit the amount of its liability to the DISTRICT or other persons, and the CONSULTANT is encouraged to purchase such additional insurance as it deems necessary.

6. The insurance certificate supplied by the CONSULTANT must provide for a 30-day notice to the DISTRICT before the implementation of a proposal to cancel the required insurance coverage. This notice requirement does not waive the insurance requirements contained herein. In addition, CONSULTANT shall notify DISTRICT within thirty (30) days of any reduction in coverage or limits.

7. If the CONSULTANT fails to maintain any of the insurance coverage required herein, then the DISTRICT will have the option to either terminate the Contract; declare the CONSULTANT in breach; purchase replacement insurance; or pay the premiums that are due on existing policies in order that the required coverage may be maintained. The CONSULTANT is responsible for any expenses paid by the DISTRICT to maintain such insurance, and the DISTRICT may collect the same from the CONSULTANT or deduct the amount paid from any sums due the CONSULTANT under this Contract.

I. Project Staffing

CONSULTANT shall provide the DISTRICT with a list of CONSULTANT's employees who will be performing work on the PROJECT. This list shall indicate the employee's name, classification, and hourly billing rate. This list will be used by the DISTRICT in reviewing and evaluating changes as a result of CONSULTANT's fiscal year increases (decreases).

J. Governing Law

Nevada law shall govern the interpretation of this AGREEMENT.

K. Notice

Any notice required to be given hereunder shall be deemed to have been given when received by the party to whom is directed by personal service, hand delivery, or U.S. mail at the following addresses:

To DISTRICT: Clark County Regional Flood Control District
600 South Grand Central Parkway, Suite 300
Las Vegas, Nevada 89106

To CONSULTANT: Carter & Burgess, Inc.
6655 Bermuda Road
Las Vegas, Nevada 89119
Attention: Craig S. Swengle, P.E.
Associate

IN WITNESS WHEREOF, the parties have caused this AGREEMENT to be executed the day and year first above written.

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT

By: Lawrence L Brown III Date: 12-11-01 13
LAWRENCE L. BROWN, III Chairman

CARTER & BURGESS, INC.

By: Craig S. Swengle Date: Dec. 18, 2001
Craig S. Swengle, P.E.
Associate

ATTEST:

By: Carolyn Frazier Date: December 13, 2001
Carolyn Frazier, Secretary

APPROVED AS TO LEGALITY ONLY:

By: Christopher Tayson Date: 12/13/01

EXHIBIT A

SCOPE OF SERVICES
C-1 CHANNEL SYSTEM
FLOOD INSURANCE RESTUDY

Task I Coordination

1.1 The Consultant will coordinate and participate in regular progress meetings with the District and/or the City of Henderson on at least a monthly basis, and at milestones in the development of the study. Consultant will prepare and distribute minutes of all meetings.

1.2 Through the District, the Consultant may submit maps, reports and technical data to all applicable government agency reviewers.

1.3 Throughout the restudy effort, the Consultant may coordinate with FEMA and FEMA's Technical Evaluation Contractor (TEC) in order to proceed in the most time efficient manner.

Task II Data Collection and Review

2.1 Collect and review studies, construction drawings, reports, mapping, etc. which pertain to the Special Flood Hazard Areas. Sources of such information may include, but are not limited to, technical reports in support of LOMRs, flood control facility plans and design reports, "as built" plans, hydrologic and hydraulic reports and drainage studies from:

1. Federal agencies- FEMA
2. State Agencies- NDOT
3. City of Henderson Public Works
   a. District funded flood control improvements
   b. Private development flood control improvements
      i. Detention basins
      ii. Storm drains
      iii. Open channels
4. District website – LOMR and CLOMR Case Numbers approved by FEMA

2.2 Perform a detailed field review and document with photos

1. Major hydraulic structures & bridges
2. Channel improvements
3. Natural channels
4. Finished floor elevations
5. Street conveyance patterns

2.3 Prepare written summary of field review and data collection. Include preliminary bibliography for final report.

2.4 Collect available mapping to develop study base map/work map. Review data to determine whether the development of any additional mapping and/or ground survey is warranted. Determine level of effort required to be performed under Task 5.2. Study work maps for the C-1 Channel between Lake Mead Drive and Boulder Highway, and/or the East C-1 Detention Basin Levee may be prepared from existing information. The District shall provide existing electronic files and other associated files and information to the Consultant.

2.5 Development Project Design Data Review

Review all land development designs within the study area. As directed by the District, and in coordination with the City of Henderson, determine a cutoff date for new development in study area to be considered part of this FIS Restudy. This date should be within 12 months following the completion of the draft FIS report.

Task III Floodplain Delineation

3.1 Prepare study base map from data gathered in Task 2.4 and 5.2

3.2 Hydrologic Modeling

Prepare an existing conditions hydrologic model to provide regulatory flow rates for hydraulic modeling and flood plain mapping. Hydrologic modeling shall be based on latest 2001 CCRFCD Master Plan Update information. The District shall supply electronic and/or hardcopy files necessary to produce a hydrologic model, including, but not limited to, HEC-1 files, and Geographic Information System (GIS) files. SCS curve number, lag time calculations, and routing subroutines may be modified from the 2001 CCRFCD Master Plan Update to current conditions. The model shall include, but is not limited to, the entire drainage area of the C-1 Channel upstream of Lake Mead Drive, generally defined by the limits of the Southwest C-1 Detention Basin, the Mission Hills Detention Basin, the Equestrian Detention Basin, the East C-1 Detention Basin, and the NE C-1 Detention Basin.

3.3 Response to CLOMR dated May 25, 1999, under FEMA Case No. 99-09-066R

Prepare a response to conditions presented in the CLOMR dated May 25, 1999 under FEMA Case No. 99-09-066R for the East C-1 Detention Basin and Levee. Prepare required forms as outlined in Task 3.5, including, but not limited to, as-built plans from the project owner, community acknowledgement, and construction inspection logs demonstrating required compaction of fill. The maintenance plan and fee shall be provided by the District. Review design documentation and prepare additional hydraulic analysis for the outflow from the East C-1 Detention Basin to the East C-1 Detention Basin Levee. Review effect of project on

existing flowrates and flood limits downstream from the project and identify requirements of Section 65.12 of the NFIP regulations, "Notification of Affected Properties." Prepare additional hydraulic and facility stability analyses as necessary along with an analysis of sediment impacts to conveyance capacity. Existing electronic hydraulic models shall be supplied by VTN Nevada. Demonstrate design compliance with Section 65.10, "Mapping of Areas Protected by Levee Systems." Prepare annotated Flood Insurance Rate Map (FIRM) and supporting analysis tying proposed flood limits to existing flood limits.

3.4 Prepare approximate methods hydraulic analyses.

1. Street conveyance and shallow flooding exceeding one foot in depth, as well as channel conveyance, will be delineated based on detailed and approximate method determinations deemed acceptable by the District and FEMA including, but not limited to, the U.S. Army Corps of Engineer's HEC-2/HECRAS backwater model. These delineations will simulate the effects of flow rate changes, bridges, culverts, storm drains, hydraulic roughness, effective flow limitations, split flows, and other considerations to most realistically represent flooding conditions. The consultant will prepare the study and maps according to the guidelines outlined in FEMA Document No. 37, based on Clark County 5' contours unless otherwise provided by the District. Special Flood Hazard Areas (SFHAs) associated with the Equestrian Detention Basin and outfall shall not be considered part of this scope.

2. The consultant will prepare work maps and models of the 100-year flood plain during the course of the hydraulic analysis for review by the District and entities during progress meetings.

3. Prepare final Technical Data and workmaps.

3.5 Complete all applicable FEMA Forms, including, but not limited to, Form 1, "Revision Requestor and Community Official Form", Form 3, "Hydrologic Analysis Form," Form 4, "Riverine Hydraulic Analysis Form," Form 5, "Riverine/Coastal Mapping Form," Form 6, "Channelization Form," Form 7, "Bridge/Culvert Form," Form 8, "Levee/Floodwall System Analysis," Form 11, "Dam Form," and Form 12 "Alluvial Fan Flooding Form."

3.6 Sedimentation Analysis

Compile sedimentation design calculations from major facility design reports to demonstrate compliance with the requirements of Section 65.10 of the NFIP regulations. These facilities include the Mission Hills Detention Basin, Black Mountain Detention Basin, Mission Hills Western Interceptor, East C-1 Detention Basin and Levee and the C-1 Channel. Prepare additional analysis as necessary for the reach between the East C-1 Detention Basin and the Levee.

3.7 The Consultant shall provide additional technical analyses for the Drake Channel, as determined by the District. Existing geotechnical reports for the Drake Channel shall be supplied by the District.

1. Provide ground control as described in Task 3.8

2. Provide sedimentation analysis as outlined in Task 3.6.

3. Provide hydraulic analysis as outlined in Task 3.5

4. Provide additional services to integrate the Drake Channel into the final report and documents, as outlined in Tasks II, III, IV, and V.

3.8 The Consultant shall provide ground survey services to supplement as-built elevations required by FEMA, including, but not limited to, cross sections of the Drake Channel at 100' intervals, gabion drop structures, and other services required to meet FEMA requirements for as-built submittals. District shall provide information for vertical and horizontal control used as a basis for as-built drawings for the Drake Channel.

3.9 Prepare a final flood plain mapping study to include the following draft outline. This outline is subject to modification as more information becomes available during the course of the study.

I. Introduction
   a. Purpose of Study
   b. Authority for Study
   c. Community Coordination and Acknowledgments
   d. Floodplain Management Application

II. Area Studied
   a. Scope of Study
   b. Community Description
   c. Principal Flood Problems
   d. Flood Protection Measures

III. Previous Studies and Reports
   a. Introduction
   b. East C-1 Detention Basin & Associated Levee
   c. Equestrian Detention Basin
   d. Mission Hills Detention Basin
   e. Southwest C-1 Detention Basin
   f. C-1 Channel
   g. Boulder Highway Channel
   h. FIS Hydrology Report
   i. Drake Channel

IV. Hydrologic Analysis
- a. Engineering Methods
  - i. Introduction
  - ii. Methodology
  - iii. Watershed Boundary
  - iv. Rainfall
  - v. Depth Area Reduction Factors
  - vi. Storm Distribution
  - vii. Curve Numbers
  - viii. Basin Lag
  - ix. Stream Routing
  - x. Reservoir Routing
  - xi. Diversions
- b. Study assumptions and modifications
  - i. Modifications made to Existing FIS
- c. Results

V. Sedimentation Analysis.
- a. Introduction
- b. Engineering Method
  - i. Methodology
  - ii. Bulking factors
  - iii. East C-1 Detention Basin Levee
  - iv. C-1 Channel
  - v. Results

VI. Hydraulics – Detailed Study Area
- a. Introduction
- b. Engineering Method
  - i. Methodology
  - ii. Cross-section description
  - iii. Manning's "n" Values
  - iv. Expansion and Contraction Coefficients
- c. C-1 Channel (Lake Mead to Boulder Highway)
- d. C-1 Channel (Southwest C-1 Detention Basin to Mission Hills Detention Basin
- e. Drake Channel
- f. East C-1 Detention Basin Levee
- g. Boulder Highway/Magic Way Breakout

VII. Hydraulics – Approximate Study Area
- a. Southwest C-1/Mission Hills/I-515 area
- b. C-1 Channel – Equestrian area
- c. Drake Channel area

d. Flood zones adjacent C-1 Channel

VIII. Insurance Applications

IX. Survey Control Report

X. Other Studies

XI. Bibliography

XII. Appendices

a. Appendix I. General Documents
b. Appendix II. Supporting Technical Data for Flood Control Facilities
c. Appendix III. Supporting Technical Data for Hydrologic Analysis
d. Appendix IV. Supporting Technical Data for Detailed Study Area Hydraulic Analysis
e. Appendix V. Supporting Technical Data for Approximate Study Area

Task IV Final Products

4.1 Mapping

1. Available topography identified as acceptable under Task 2.4 will be reproduced from their source and delivered to the District in a durable reproducible form acceptable to the District.

2. Additional topographic maps, contact prints, photo mylars, digital data, etc. will be delivered to the District as required by the Survey Services Task V and authorized per Task 2.4 and developed per Task 5.2.

4.2 Report

1. The consultant will produce a draft report to be delivered to the District for review and comment. Six (6) hard copies of the draft report and appendices (Technical Support Data Notebook) will be delivered.

2. The consultant will produce a final report incorporating all previous comments from the District, FEMA and other reviewers. Six (6) hard copies of the report and appendices will be delivered.

3. Report text in MS Word format digitally, compatible with IBM personal computers.

Task V Supplemental Services

These services will be completed only upon specific request by the consultant and authorization by the General Manager/Chief Engineer.

5.1 The District will obtain all necessary rights-of-entry for the study area.

5.2 The Consultant will provide the District with permanent non-erasable 24"X 36" topographic and/or mylar sheets. A cover sheet will be provided with project title, date of topography, and sheet index. Each sheet of topography and/or mylar will include at a minimum a north arrow, scale, photo date, section and quarter corners, street names, datum, major drainage features, corporate and town boundaries, cross section lines, channel centerline station, 100-year flood limits, description and elevation of control points and reference marks used in ground control.

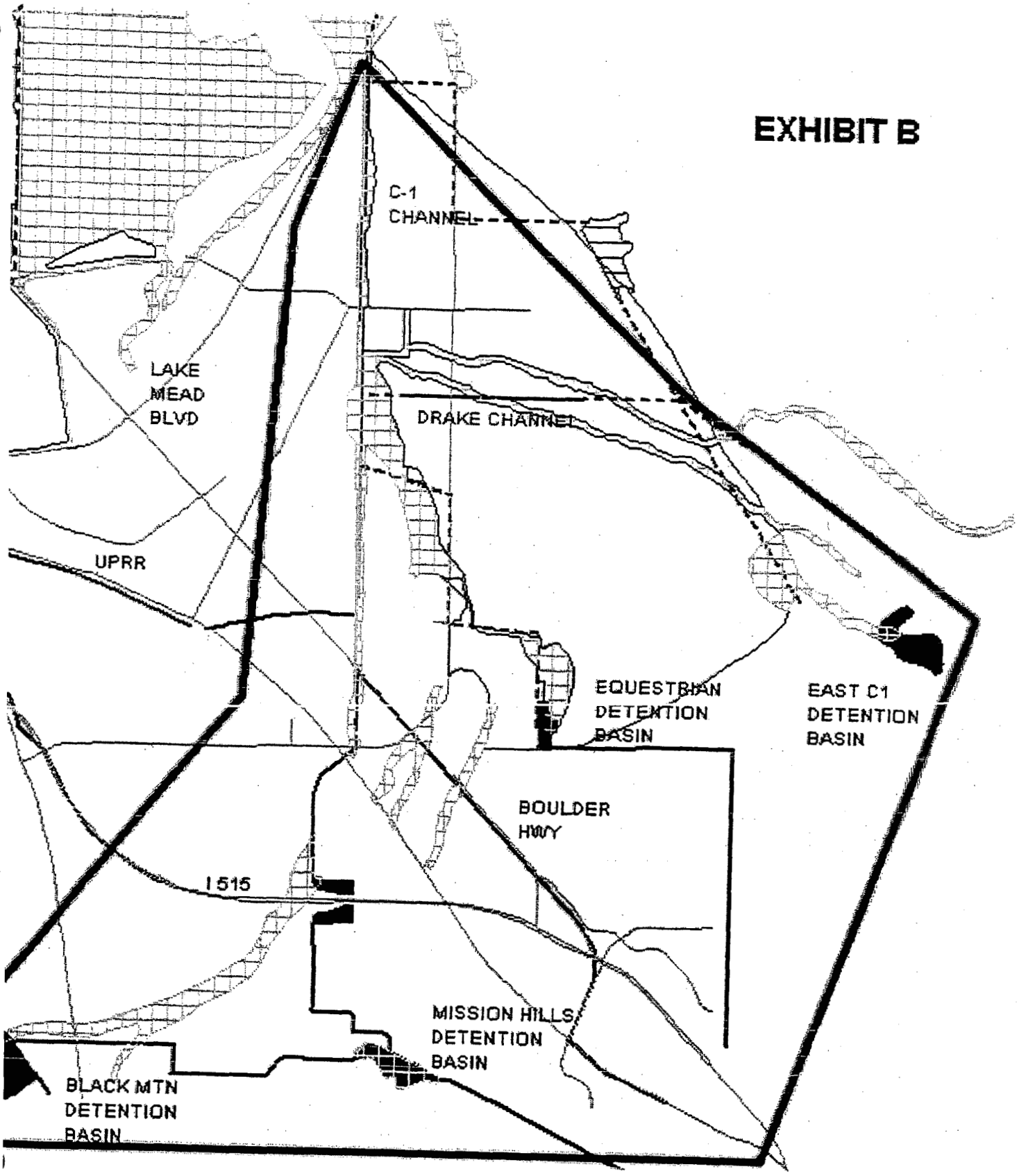
5.3 The consultant will participate in at most one (1) public information meeting with the City of Henderson and the District to report on goals, expectations, findings, and progress. Consultant shall prepare exhibits necessary for public display for public information meetings.

5.4 The Consultant will be responsible for responding to and interacting with FEMA's TEC throughout the review and community appeals process as outlined in FEMA Document No. 37.

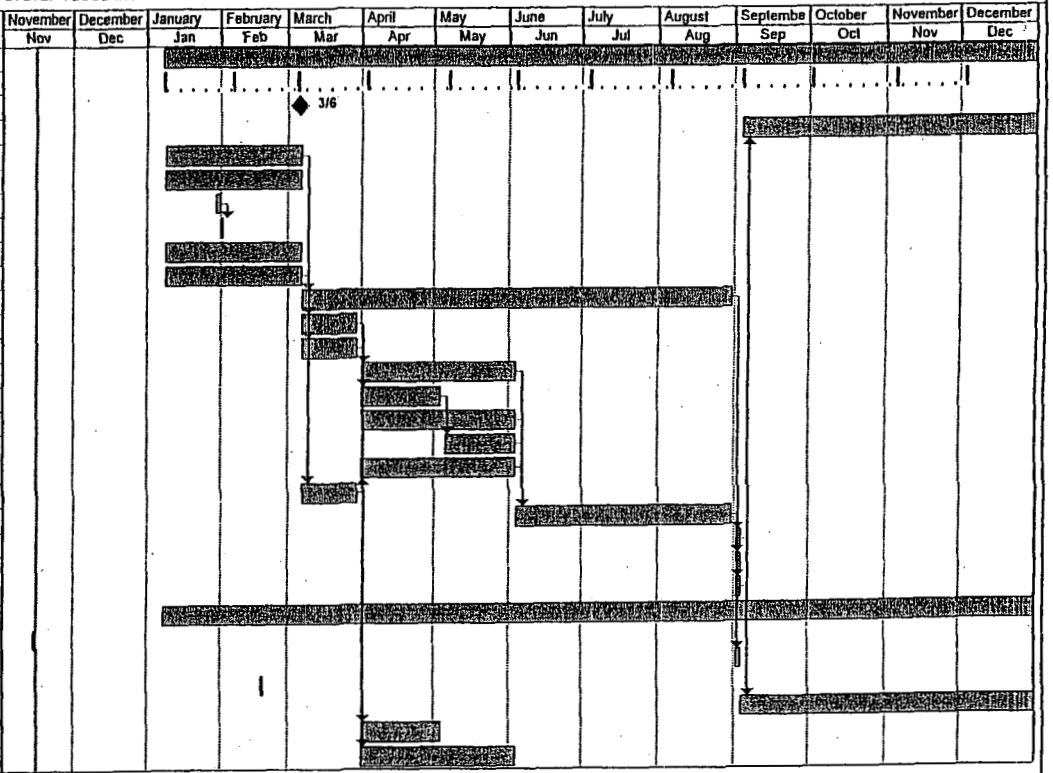
5.5 Provide geotechnical services necessary to certify the Drake Channel with FEMA. Boring logs shall be taken approximately 1000 feet apart adjacent the channel. Geotechnical evaluation may include, but is not limited to, existing compaction of the sidewalls and subgrade, sieve analysis, USC classifications, Atterberg Limits, consolidation tests, direct shear tests, blow counts, and field observations.

5.6 Other miscellaneous technical services shall be performed by the consultant, including, but not limited to, taking spot elevations to verify or supplement as-built information provided by the District, and coordinating and/or setting vertical and horizontal control.

EXHIBIT B


C-1
CHANNEL
LAKE
MEAD
BLVD
DRAKE CHANNEL
UPRR
EQUESTRIAN
DETENTION
BASIN
EAST C1
DETENTION
BASIN
BOULDER
HWY
I 515
MISSION HILLS
DETENTION
BASIN
BLACK MTN
DETENTION
BASIN

ID	Task Name	Duration	Start	Finish	Predecessors
1	I. Coordination	256 days	Tue 1/8/02	Tue 12/31/02	
2	1.1 Progress Meetings	12 days	Tue 1/8/02	Tue 12/3/02	
3	1.2 Submit Maps	0 days	Wed 3/6/02	Wed 3/6/02	
4	1.3 Coordinate with FEMA and TEC	85 days	Wed 9/4/02	Tue 12/31/02	23
5	II. Data Collection and Review	41 days	Wed 1/9/02	Wed 3/6/02	
6	2.1 Collect and Review Studies	41 days	Wed 1/9/02	Wed 3/6/02	
7	2.2 Detailed Field Review	2 days	Wed 1/30/02	Thu 1/31/02	
8	2.3 Written Summary of Field Review	1 day	Fri 2/1/02	Fri 2/1/02	7
9	2.4 Collect Available Mapping	41 days	Wed 1/9/02	Wed 3/6/02	
10	2.5 Development Projects Review	41 days	Wed 1/9/02	Wed 3/6/02	
11	III. Floodplain Delineation	127 days	Thu 3/7/02	Fri 8/30/02	10,5
12	3.1 Prepare Study Base Map	17 days	Thu 3/7/02	Fri 3/29/02	10
13	3.2 Hydrologic Modeling	17 days	Thu 3/7/02	Fri 3/29/02	10
14	3.3 CLOMR Response	46 days	Mon 4/1/02	Mon 6/3/02	13
15	3.4 Hydraulic Analysis	25 days	Mon 4/1/02	Fri 5/3/02	12
16	3.5 FEMA Forms	46 days	Mon 4/1/02	Mon 6/3/02	
17	3.6 Sedimentation Analysis	21 days	Mon 5/6/02	Mon 6/3/02	15
18	3.7 Drake Channel	46 days	Mon 4/1/02	Mon 6/3/02	16
19	3.8 Drake Channel As-Builts	17 days	Thu 3/7/02	Fri 3/29/02	10
20	3.9 Final Floodplain Mapping Study	64 days	Tue 6/4/02	Fri 8/30/02	18,16,17,14
21	IV. Final Products	2 days	Mon 9/2/02	Tue 9/3/02	20,11
22	4.1 Mapping	2 days	Mon 9/2/02	Tue 9/3/02	20
23	4.2 Report	2 days	Mon 9/2/02	Tue 9/3/02	20
24	V. Supplemental Services	256 days	Tue 1/8/02	Tue 12/31/02	
25	5.1 (Not used)	1 day	Wed 11/14/01	Wed 11/14/01	
26	5.2 Deliver Contour and Planimetric Data	2 days	Mon 9/2/02	Tue 9/3/02	20
27	5.3 Public Information Meeting	1 day	Mon 2/18/02	Mon 2/18/02	
28	5.4 Respond to TEC	85 days	Wed 9/4/02	Tue 12/31/02	21
29	5.5 Geotechnical Services	25 days	Mon 4/1/02	Fri 5/3/02	19
30	5.6 Additional Technical Analysis	46 days	Mon 4/1/02	Mon 6/3/02	12



Project: C1
Date: Thu 11/15/01

Task | Split | Progress | Milestone | Summary | Rolled Up Task | Rolled Up Split | Rolled Up Milestone | Rolled Up Progress | External Tasks | Project Summary | External Milestone | Deadline

EXHIBIT D

CONSULTANT'S FEE SCHEDULE

C-1 CHANNEL SYSTEM FLOOD INSURANCE RESTUDY

Classification	HOURLY SALARY RANGES Jan. 1, 2001 - Dec. 31, 2001	Jan. 1, 2002 - Dec. 31, 2002
Survey Crew, 2-Person	$ 35.00 to $ 50.00	$ 36.50 to $ 52.00
Director, Project	$ 48.00 to $ 55.00	$ 50.00 to $ 57.50
Senior Project Manager	$ 42.00 to $ 50.00	$ 43.50 to $ 52.00
Senior Planner	$ 20.00 to $ 30.00	$ 21.00 to $ 31.50
Landscape Architect	$ 25.00 to $ 35.00	$ 26.00 to $ 36.50
Project Manager	$ 38.00 to $ 45.00	$ 39.52 to $ 47.00
Professional Land Surveyor	$ 35.00 to $ 45.00	$ 36.50 to $ 47.00
Design Engineer III (Senior Designer)	$ 25.00 to $ 35.00	$ 26.00 to $ 36.50
Design Engineer II (Designer)	$ 20.00 to $ 26.00	$ 21.00 to $ 27.00
Technician II (CADD Technician)	$ 17.00 to $ 25.00	$ 17.50 to $ 26.00
Administrative Assistant	$ 13.00 to $ 17.00	$ 13.50 to $ 17.50

The above hourly rates shall be multiplied by 3.15 which includes Salary Cost, Overhead and a Fixed Fee.

EXHIBIT E

ESTIMATED COSTS BY TASK

C-1 CHANNEL SYSTEM FLOOD INSURANCE RESTUDY

BASIC SERVICES

TASK 1 - Coordination	$ 15,800
TASK 2 - Data Collection & Review	$ 14,500
TASK 3 - Floodplain Delineation	$ 87,600
TASK 4 - Final Products	$ 4,550
DIRECT COSTS	$ 6,250
SUBTOTAL - BASIC SERVICES	**$ 128,700**
TASK 5 - Supplemental Services	$ 27,300
TOTAL SERVICES	**$ 156,000**

SCOPE OF SERVICES
Southwest Fluvial Systems
C-1 CHANNEL SYSTEM
FLOOD INSURANCE RESTUDY

This scope is derived from the Agreement for Professional Services made between Carter & Burgess (C&B) and the Clark County Regional Flood Control District.

Task I Coordination

1.1 The Subconsultant will participate in regular progress meetings with the Carter & Burgess (C&B), the Clark County Regional Flood Control District (District) and/or the City of Henderson on a monthly basis, and at milestones in the development of the study.

Subconsultant hours per manpower estimate prepared by C&B: 32

1.2 Not a part of Subconsultant scope.

1.3 Throughout the restudy effort, the Subconsultant may be required by C & B to coordinate with FEMA and FEMA's Technical Evaluation Contractor (TEC) in order to proceed in the most time efficient manner.

Subconsultant hours per manpower estimate prepared by C&B: 12

Task II Data Collection and Review

2.1 Not a part of Subconsultant scope.

2.2 Subconsultant will participate in a detailed field review, provide a "field inspection form" for use by the Subconsultant and C&B, and assist C&B in documenting all field visits using this form and with photos.

1. Major hydraulic structures & bridges
2. Channel improvements
3. Natural channels
4. Finished floor elevations
5. Street conveyance patterns

Subconsultant hours per manpower estimate prepared by C&B: 16

2.3 Not a part of Subconsultant scope.

2.4 Not a part of Subconsultant scope.

2.5 Subconsultant shall review all land development designs within the study area as directed by

the Consultant and the District, and in coordination with the City of Henderson, determine a cutoff date for new development in study area to be considered part of this FIS Restudy. This date should be within 12 months following the completion of the draft FIS report.

Subconsultant hours per manpower estimate prepared by C&B: 40

Task III Floodplain Delineation

3.1 Not a part of Subconsultant scope.

3.2 Hydrologic Modeling

Subconsultant shall assist C&B in the preparation of an existing conditions hydrologic model to provide regulatory flow rates for hydraulic modeling and flood plain mapping. Hydrologic modeling shall be based on latest 2001 CCRFCD Master Plan Update information. The District shall supply C&B electronic and/or hardcopy files necessary to produce a hydrologic model, including, but not limited to, HEC-1 files, and Geographic Information System (GIS) files. SCS curve number, lag time calculations, and routing subroutines may be modified from the 2001 CCRFCD Master Plan Update to current conditions. The model shall include, but is not limited to, the entire drainage area of the C1 Channel upstream of Lake Mead Drive, generally defined by the limits of the Southwest C-1 Detention Basin, the Mission Hills Detention Basin, the Equestrian Detention Basin, the East C-1 Detention Basin, and the NE C-1 Detention Basin.

Subconsultant hours per manpower estimate prepared by C&B: 80

3.3 Response to CLOMR dated May 25, 1999, under FEMA Case No. 99-09-066R

Subconsultant shall assist C&B in the preparation of a response to conditions presented in the CLOMR dated May 25, 1999 under FEMA Case No. 99-09-066R for the East C-1 Detention Basin and Levee. Subconsultant shall assist C&B in the preparation of required forms as outlined in Task 3.5, including, but not limited to, as-built plans from the project owner, community acknowledgement, and construction inspection logs demonstrating required compaction of fill. The maintenance plan and fee shall be provided by the District. Subconsultant shall assist C&B in the review of design documentation and in the preparation of additional hydraulic analysis for the outflow from the East C-1 Detention Basin to the East C-1 Detention Basin Levee. Subconsultant shall assist C&B in reviewing the effect of existing flowrates and flood limits downstream from the project and identify requirements of Section 65.12 of the NFIP regulations, "Notification of Affected Properties." Subconsultant shall assist C&B in the preparation of additional hydraulic and facility stability analyses as necessary along with an analysis of sediment impacts to conveyance capacity. Existing electronic hydraulic models shall be supplied by VTN Nevada, and distributed by C&B to the Subconsultant as needed. Subconsultant shall assist C&B in demonstrating design compliance with Section 65.10, "Mapping of Areas Protected by Levee Systems." The Subconsultant shall provide quality assurance/quality control review of the C&B prepared annotated Flood Insurance Rate Map (FIRM) and assist in the preparation of supporting

analysis tying proposed flood limits to existing flood limits.
Subconsultant hours per manpower estimate prepared by C&B: 40

3.4 Subconsultant shall assist C&B in the preparation of an approximate methods hydraulic analyses.

1. Street conveyance and shallow flooding exceeding one foot in depth, as well as channel conveyance, will be delineated by C&B based on detailed and approximate method determinations prepared by C&B with assistance from the Subconsultant, as deemed acceptable by the District and FEMA including, but not limited to, the U.S. Army Corps of Engineer's HEC-2/HECRAS backwater model. These delineations will simulate the effects of flow rate changes, bridges, culverts, storm drains, hydraulic roughness, effective flow limitations, split flows, and other considerations to most realistically represent flooding conditions. The Subconsultant will assist C&B in preparing the study and will review the C&B prepared maps according to the guidelines outlined in FEMA Document No. 37, based on Clark County 5' contours unless otherwise provided by the District. Special Flood Hazard Areas (SFHAs) associated with the Equestrian Detention Basin and outfall shall not be considered part of this scope.

2. The Subconsultant will review work maps prepared by the C&B and will assist C&B in the preparation of models of the 100-year flood plain during the course of the hydraulic analysis for review by the District and entities during progress meetings.

3. The Subconsultant will assist in the preparation of final Technical Data and review the workmaps prepared by C&B.
Subconsultant hours per manpower estimate prepared by C&B: 120

3.5 Not a part of Subconsultant scope.

3.6 Sedimentation Analysis

The Subconsultant will provide technical support and review the C&B compiled sedimentation design calculations from major facility design reports to demonstrate compliance with the requirements of Section 65.10 of the NFIP regulations. These facilities include the Mission Hills Detention Basin, Black Mountain Detention Basin, Mission Hills Western Interceptor, East C-1 Detention Basin and Levee and the C-1 Channel. Prepare additional analysis as necessary for the reach between the East C-1 Detention Basin and the Levee.
Subconsultant hours per manpower estimate prepared by C&B: 24

3.7 The Subconsultant shall assist C&B in providing additional technical analyses for the Drake Channel, as determined by the District. Existing geotechnical reports for the Drake Channel shall be supplied to C&B by the District.

1. Not a part of Subconsultant scope.

2. Provide technical review of the C&B prepared sedimentation analysis as outlined in Task 3.6.

3. Assist C&B in providing a hydraulic analysis as outlined in Task 3.5

4. Assist C&B in providing additional services to integrate the Drake Channel into the final report and documents, as outlined in Tasks II, III, IV, and V of this Scope of Services.

Subconsultant hours per manpower estimate prepared by C&B: 40

3.8 Not a part of Subconsultant scope.

3.9 The Subconsultant will assist C&B in the preparation of a final flood plain mapping study to include the following draft outline. This outline is subject to modification as more information becomes available during the course of the study.

I. Introduction
   - a. Purpose of Study
   - b. Authority for Study
   - c. Community Coordination and Acknowledgments
   - d. Floodplain Management Application

II. Area Studied
   - a. Scope of Study
   - b. Community Description
   - c. Principal Flood Problems
   - d. Flood Protection Measures

III. Previous Studies and Reports
   - a. Introduction
   - b. East C-1 Detention Basin & Associated Levee
   - c. Equestrian Detention Basin
   - d. Mission Hills Detention Basin
   - e. Southwest C-1 Detention Basin
   - f. C-1 Channel
   - g. Boulder Highway Channel
   - h. FIS Hydrology Report
   - i. Drake Channel

IV. Hydrologic Analysis
   - a. Engineering Methods
     - i. Introduction

ii. Methodology
iii. Watershed Boundary
iv. Rainfall
v. Depth Area Reduction Factors
vi. Storm Distribution
vii. Curve Numbers
viii. Basin Lag
ix. Stream Routing
x. Reservoir Routing
xi. Diversions

b. Study assumptions and modifications
i. Modifications made to Existing FIS

c. Results

V. Sedimentation Analysis.
a. Introduction
b. Engineering Method
i. Methodology
ii. Bulking factors
iii. East C-1 Detention Basin Levee
iv. C-1 Channel
v. Results

VI. Hydraulics--Detailed Study Area
a. Introduction
b. Engineering Method
i. Methodology
ii. Cross-section description
iii. Manning's "n" Values
iv. Expansion and Contraction Coefficients
c. C-1 Channel (Lake Mead to Boulder Highway)
d. C-1 Channel (Southwest C-1 Detention Basin to Mission Hills Detention Basin
e. Drake Channel
f. East C-1 Detention Basin Levee
g. Boulder Highway/Magic Way Breakout

VII. Hydraulics—Approximate Study Area
a. Southwest C-1/Mission Hills/I515 area
b. C-1 Channel—Equestrian area
c. Drake Channel area
d. Flood zones adjacent C-1 Channel

IX. Insurance Applications

X. Survey Control Report

XI. Other Studies

XII. Bibliography

XIII. Appendices

a. Appendix I General Documents
b. Appendix II Supporting Technical Data for Flood Control Facilities
c. Appendix III. Supporting Technical Data for Hydrologic Analysis
d. Appendix IV. Supporting Technical Data for Detailed Study Area Hydraulic Analysis
e. Appendix V. Supporting Technical Data for Approximate Study Area

Subconsultant hours per manpower estimate prepared by C&B: 80

IV. Final Products

4.1 Not a part of Subconsultant scope. C&B will provide Subconsultant with a copy of the final report for archiving purposes.

V Supplemental Services

These services will be completed only upon specific request by C&B and authorization by the General Manager/Chief Engineer of the District.

5.1 Not a part of Subconsultant scope.

5.2 Not a part of Subconsultant scope.

5.3 Not a part of Subconsultant scope.

5.4 The Subconsultant will support C&B in developing responding to and interacting with FEMA's TEC throughout the review and community appeals process as outlined in FEMA Document No. 37.
Subconsultant hours per manpower estimate prepared by C&B: 20

5.5 Not a part of Subconsultant scope.

5.6 Other miscellaneous technical analyses shall be performed by the Subconsultant, as required by C&B.
Subconsultant hours per manpower estimate prepared by C&B: 24

November 13, 2001

Southwest Fluvial Systems
20 Star Vista Road
Santa Fe, New Mexico 87505

RE: Agreement for C-1 Channel Flood Insurance Restudy

This letter agreement formalizes the terms and conditions for C-1 Channel Flood Insurance Restudy subconsultant services (SERVICES) necessary for the Clark County Regional Flood Control District (OWNER).

The terms and conditions are as follows:

1. It is agreed that Carter & Burgess, Inc. (C&B), Inc. does employ Southwest Fluvial Systems (CONSULTANT) to provide the SERVICES as defined in the attached Scope of Work and within the timeframe shown on the attached schedule.

2. Fees for the SERVICES shall be compensated on a time and material basis not to exceed thirty-seven thousand, seven hundred fifty dollars ($37,750). Payments shall be made within thirty (30) calendar days after the date of invoice subject to receipt of payment from the OWNER. Upon negotiation with the OWNER for supplemental services, as outlined in Task V, fees for SERVICES and supplemental services shall not exceed forty-one thousand two hundred dollars ($41,200).

3. The CONSULTANT's originally proposed staff assigned to the project will perform the work, in its entirety, unless a change in staff is requested by C&B, a party to the original staff leaves the CONSULTANT'S employ, or other extraordinary circumstances prevent the proposed staff from performing the SERVICES. Any replacements must be approved by C&B.

4. The CONSULTANT agrees to comply with the following sections of the C&B/ OWNER contract (attached): Sections I.A, I.B, I.E, V.D, and VI.A.

5. The CONSULTANT will provide proof of current automobile insurance.

6. The CONSULTANT will provide, prior to the execution of this agreement, hourly labor and expense rates. These rates will be used to compensate the CONSULTANT in the event of an authorized revision to the scope and/or schedule of the SERVICES.

7. The CONSULTANT will provide SERVICES in a timely manner and / or as required by the agreement between the OWNER and C&B.

8. All documents prepared and submitted by the CONSULTANT will become the property of the OWNER. Documents will be submitted in the format requested by the OWNER. The CONSULTANT may retain reproducible copies. All documents are confidential and will not be released without written authorization from C&B.

9. The CONSULTANT shall maintain all books, documents, papers, accounting reports and other evidence pertaining to cost incurred and/or SERVICES performed and that such evidence shall be made available for inspection by C&B at all reasonable times for three (3) years from the date of this agreement.

10. The SERVICES provided by CONSULTANT will commence upon a written notice from C & B. CONSULTANT will make all corrections that are necessary due to CONSULTANT oversight at no additional charge.

11. Either C&B or CONSULTANT may terminate this agreement upon written notice to the other for substantial failure to comply with the terms thereof. Should C&B halt CONSULTANT'S SERVICES for more than thirty (30) calendar days, or abandon or terminate this project, CONSULTANT shall be paid, subject to receipt of payment from the OWNER, for all costs incurred to that date.

12. Neither C&B nor CONSULTANT shall assign their interest in this agreement without the written consent of the other.

13. CONSULTANT will hold harmless and indemnify C&B and the OWNER from loss, damage, liability, cost or expense resulting from error or negligent acts of the CONSULTANT or their agents.

14. C&B will hold harmless and indemnify CONSULTANT from loss, damage, liability, cost or expense resulting form error or negligent acts of C&B or their agents.

15. The governing law for this agreement shall be interpreted in accordance with the laws of the State of Nevada.

Two originals of this agreement are provided. On each we have provided a space for your signature, which indicates your agreement with the items, noted. Please return one (1) signed copy to C&B.

If you have any questions, please contact Douglas B. Blatchford at 702-938-5569.

Respectfully,

Carter::Burgess

Craig Swengle, PE
Associate

Dec. 24, 2001
Date

Southwest Fluvial Systems:

Shelley Cobau

12-9-01
Date

Enclosed: Scope of Work
Hours and Cost Breakdown
Schedule

GEICO GENERAL INSURANCE COMPANY

POLICY NUMBER: 415-04-63 DATE ISSUED: 07-06-01 PAGE

	VEHICLE		CLASS	RATED STATE
1	91 VOLVO	YV1AA8845M1446971	A-N - -L	NM
2	93 ISUZU	4S2CY58V3P4319807	A-L - -L	NM
3	88 FORD	1FTEF14N7JPA57515	A-N - -S	NM

COVERAGES Coverage applies where a premium or 0.00 is shown for the vehicle	LIMITS OR DEDUCTIBLES	PREMIUMS VEH 1	VEH 2	VEH
BODILY INJURY LIABILITY EACH PERSON/EACH OCCURRENCE	$25,000/$50,000	88.00	88.00	
PROPERTY DAMAGE LIABILITY	$25,000	56.90	56.90	
MEDICAL PAYMENTS	$10,000	18.50	24.60	
UNINSURED MOTORISTS BI&PD EACH PERSON/EACH ACCIDENT			30.90	
PROPERTY DAMAGE			0.00	

GEICO Phone Number: 1-800-841-3000

GEICO GENERAL INSURANCE COMPANY
THIS FORM MUST BE KEPT IN THE MOTOR VEHICLE WITH THE CERTIFICATE OF REGISTRATION.

NEW MEXICO Policy Identification Card

Policy Number	Effective Date	Expiration Date
415-04-63	08-10-01	02-10-02

Year/Make/Model/Vehicle Identification Number

91 VOLVO 240 YV1AA8845M1446971
Insured: SHELLEY AND EDWARD COBAU
20 STAR VISTA RD
SANTA FE NM 87505-4515

GEICO Phone Number: 1-800-841-3000

GEICO GENERAL INSURANCE COMPANY
THIS FORM MUST BE KEPT IN THE MOTOR VEHICLE WITH THE CERTIFICATE OF REGISTRATION.

NEW MEXICO Policy Identification Card

Policy Number	Effective Date	Expiration Date
415-04-63	08-10-01	02-10-02

Year/Make/Model/Vehicle Identification Number

88 FORD 1FTEF14N7JPA57515
Insured: SHELLEY AND EDWARD COBAU
20 STAR VISTA RD
SANTA FE NM 87505-4515

GEICO Phone Number: 1-800-841-3000

GEICO GENERAL INSURANCE COMPANY
THIS FORM MUST BE KEPT IN THE MOTOR VEHICLE WITH THE CERTIFICATE OF REGISTRATION.

NEW MEXICO Policy Identification Card

Policy Number	Effective Date	Expiration D
415-04-63	08-10-01	02-10-02

Year/Make/Model/Vehicle Identification Numbe

93 ISUZU RODEO 4S2CY58V3P4319807
Insured: SHELLEY AND EDWARD COBAU
20 STAR VISTA RD
SANTA FE NM 87505-4515

SIX MONTH PREMIUM PER VEHICLE	$ 194.30	$ 200.40	$

YOUR PREMIUMS ARE BASED ON THE FOLLOWING DISCOUNTS AND/OR SURCHARGES:

DISCOUNTS: 5 YEAR GOOD DRIVING (VEH 1,2,3); SEAT BELT (VEH 1,2,3); PASSIVE RESTRAINT/AIR BAG (VEH 1); MULTI-CAR (VEH 1,2,3)

LIENHOLDER VEHICLE 1 LIENHOLDER VEHICLE 2 LIENHOLDER VEHICL

INSURED COPY

U-31-DP



Southwest Fluvial Systems
Floodplain Management

Hourly Labor and Expense Rates

Client Name:		Carter & Burgess, Nevada
Project Name:		C-1 Flood Insurance Restudy
Hourly Rates:	Shelley Cobau, CFM	$71.50
New Mexico Gross Sales Receipts Tax Rate:		5.623%

NM CRS No. 02-446792-00-8
Federal Tax ID: 523-11-4030

20 Star Vista Road
Santa Fe, NM 87505
505.820.7455 or 505.670.4000
email:sfcobau@worldnet.att.net

FEDERAL EMERGENCY MANAGEMENT AGENCY **REVISION REQUESTER AND COMMUNITY OFFICIAL**	O.M.B No. 3067-0148 Expires April 30, 2001

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; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

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1. REQUESTED RESPONSE FROM FEMA

This request is for a:

☐ CLOMR A letter from FEMA commenting on whether a proposed project, if built as proposed, would justify a map revision, or proposed hydrology changes (See 44 CFR Ch. 1, Parts 60,65 & 72).

☒ LOMR A letter from FEMA officially revising the current NFIP map to show the changes to floodplains, floodway or flood elevations. LOMRs typically decrease flood hazards. (See 44 CFR Ch. 1 Parts 60 & 65.)

☐ Other Describe: _____

2. OVERVIEW

1. The basis for this revision request is (are): (check all that apply)

☒ Physical Change ☐ Improved Methodology/Data ☐ Floodway Revision

☐ Other Describe: _____

Note: A photograph is not required, but is very helpful during review.

2. Flooding Source: Henderson Basin

3. Project Name/Identifier: C-1 Channel System FIS Restudy

4. FEMA zone designations affected: A, X
(example: A, AH, AO, A1-A30, A99, AE, V, V1-V30, VE, B, C, D, X)

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

Community No.	Community Name	State	Map No.	Panel No.	Effective Date
Ex: 480301 480287	Katy, City Harris County	TX TX	480301 48201C	0005D 0220G	02/08/83 09/28/90
32003	Henderson, City of; Clark County, Unincorporated Areas	NV	320005	2955E	9/27/02

6. The area of revision encompasses the following types of flooding and structures. Check all that apply.

Types of Flooding	Structures
☐ Riverine	☒ Channelization
☐ Coastal	☒ Levee/Floodwall
☐ Alluvial fan	☐ Bridge/Culvert
☒ Shallow Flooding (e.g. Zones AO and AH)	☒ Dam
☐ Lakes	☐ Fill
☐ Other (describe)	☐ Other (describe)

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

4. ENCROACHMENT INFORMATION

1. *Does the State have jurisdiction over the floodway or its adoption by communities participating in the NFIP?*
   ☐ Yes ☒ No

If Yes, attach a copy of a letter notifying the appropriate State agency of the floodway revision and documentation of the approval of the revised floodway by the appropriate State agency.

2. Does the development in the floodway cause the 1% annual chance (base) elevation to increase at any location by more than 0.000 feet? ☐ Yes ☐ No ☒ N/A

3. Does the cumulative effect of all development that has occurred since the effective SFHA was originally identified cause the base flood elevation to increase at any location by more than one foot (or other increase limit if community or state has adopted more stringent criteria - even if a floodway has not been delineated by FEMA)? ☐ Yes ☒ No

If the answer to either items is Yes, please attach documentation that all requirements of Section 65.12 of the NFIP regulations have been met, regarding evaluation of alternatives, notice to individual legal property owners, concurrence of CEO, and certification that no insurable structures are impacted.

5. MAINTENANCE RESPONSIBILITY

The community is willing to assume responsibility for ☒ performing ☒ overseeing compliance with the maintenance and operation plans of the C-1 Channel
(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.

Operation and maintenance plans are attached. ☒ **Yes** ☐ **No** ☐ **N/A**

6. REVIEW FEE

The review fee for the appropriate request category has been included. ☐ Yes Fee amount: $_____

OR

This request is based on a federally sponsored flood-control project where 50 percent or more of the project's cost is federally sponsored, or the request is based on detailed hydrologic and hydraulic studies conducted by Federal, State, or local agencies to replace approximate studies conducted by FEMA and shown on the effective FIRM; thus the project is fee exempt. ☒ Yes

Please see Instructions for Fee Amounts

7. SIGNATURE

Note: **I understand that my signature indicates that all information submitted in support of this request is correct**

_____
Signature of Revision Requester

Kevin L. Eubanks, PE
Printed Name and Title of Revision Requester

Clark County Regional Flood Control District
Company Name

Telephone No.: 702-455-3139 Date: _____

Note: **Signature indicates that the community understands, from the revision requester, the impacts of the revision on flooding conditions in the community.**

_____
Signature of Community Official

Curt Chandler, PE
Printed Name and Title of Community Official

City of Henderson
Community Name

Telephone No.: 702-565-2329 Date: _____

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

This certification is in accordance with 44 CFR Ch. 1, Sect 65.2

_____
Signature

Douglas B. Blatchford, P.E.
Printed Name and Title of Revision Requester

Registr No. 10783 Expires (Date) 12/31/02 State NV

Type of License/Expertise: Civil

Check which forms have been included with this request

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32003	Henderson,City of; Clark County, Unincorporated Areas	NV	32003C	2605E	9/27/02

6. The area of revision encompasses the following types of flooding and structures. Check all that apply.

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4. ENCROACHMENT INFORMATION

1. Does the State have jurisdiction over the floodway or its adoption by communities participating in the NFIP?
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If Yes, attach a copy of a letter notifying the appropriate State agency of the floodway revision and documentation of the approval of the revised floodway by the appropriate State agency.

2. Does the development in the floodway cause the 1% annual chance (base) elevation to increase at any location by more than 0.000 feet? ☐ Yes ☐ No ☒ N/A

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If the answer to either items is Yes, please attach documentation that all requirements of Section 65.12 of the NFIP regulations have been met, regarding evaluation of alternatives, notice to individual legal property owners, concurrence of CEO, and certification that no insurable structures are impacted.

5. MAINTENANCE RESPONSIBILITY

The community is willing to assume responsibility for ☒ performing ☒ overseeing compliance with the maintenance and operation plans of the C-1 Channel
(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.

Operation and maintenance plans are attached. ☒ **Yes** ☐ **No** ☐ **N/A**

6. REVIEW FEE

The review fee for the appropriate request category has been included. ☐ Yes Fee amount: $_____

OR

This request is based on a federally sponsored flood-control project where 50 percent or more of the project's cost is federally sponsored, or the request is based on detailed hydrologic and hydraulic studies conducted by Federal, State, or local agencies to replace approximate studies conducted by FEMA and shown on the effective FIRM; thus the project is fee exempt. ☒ Yes

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Kevin L. Eubanks, PE
Printed Name and Title of Revision Requester

Clark County Regional Flood Control District
Company Name

Telephone No.: 702-455-3139 Date: _____

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Curt Chandler, PE
Printed Name and Title of Community Official

City of Henderson
Community Name

Telephone No.: 702-565-2329 Date: _____

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This certification is in accordance with 44 CFR Ch. 1, Sect 65.2

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Printed Name and Title of Revision Requester

Registr No. 10783 Expires (Date) 12/31/02 State NV

Type of License/Expertise: Civil

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☐ Other Describe: _____

2. OVERVIEW

1. The basis for this revision request is (are): (check all that apply)

☒ Physical Change ☐ Improved Methodology/Data ☐ Floodway Revision

☐ Other Describe: _____

Note: A photograph is not required, but is very helpful during review.

2. Flooding Source: Henderson Basin

3. Project Name/Identifier: C-1 Channel System FIS Restudy

4. FEMA zone designations affected: A, X
(example: A, AH, AO, A1-A30, A99, AE, V, V1-V30, VE, B, C, D, X)

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480287	Harris County	TX	48201C	0220G	09/28/90
32003	Henderson, City of; Clark County, Unincorporated Areas	NV	32003C	2615E	9/27/02

6. The area of revision encompasses the following types of flooding and structures. Check all that apply.

Types of Flooding	Structures
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2. Does the development in the floodway cause the 1% annual chance (base) elevation to increase at any location by more than 0.000 feet? ☐ Yes ☐ No ☒ N/A

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If the answer to either items is Yes, please attach documentation that all requirements of Section 65.12 of the NFIP regulations have been met, regarding evaluation of alternatives, notice to individual legal property owners, concurrence of CEO, and certification that no insurable structures are impacted.

5. MAINTENANCE RESPONSIBILITY

The community is willing to assume responsibility for ☒ performing ☒ overseeing compliance with the maintenance and operation plans of the C-1 Channel
(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.

Operation and maintenance plans are attached. ☒ **Yes** ☐ **No** ☐ **N/A**

6. REVIEW FEE

The review fee for the appropriate request category has been included. ☐ Yes Fee amount: $_____

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Company Name

Telephone No.: 702-455-3139 Date: _____

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Printed Name and Title of Community Official

City of Henderson
Community Name

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Registr No. 10783 Expires (Date) 12/31/02 State NV

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☐ Other Describe: _____

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3. Project Name/Identifier: C-1 Channel System FIS Restudy

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5. MAINTENANCE RESPONSIBILITY

The community is willing to assume responsibility for ☐ performing ☐ overseeing compliance with the maintenance and operation plans of the Mission Hills Interceptor; Black Mountain Detention Basin
(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.

Operation and maintenance plans are attached. ☐ **Yes** ☐ **No** ☒ **N/A**

6. REVIEW FEE

The review fee for the appropriate request category has been included. ☐ Yes Fee amount: $_____

OR

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Please see Instructions for Fee Amounts

7. SIGNATURE

Note: **I understand that my signature indicates that all information submitted in support of this request is correct**

_____
Signature of Revision Requester

Kevin L. Eubanks, PE.
Printed Name and Title of Revision Requester

Clark County Regional Flood Control District
Company Name

Telephone No.: 702-455-3139 Date: _____

Note: **Signature indicates that the community understands, from the revision requester, the impacts of the revision on flooding conditions in the community.**

_____
Signature of Community Official

Curt Chandler, PE
Printed Name and Title of Community Official

City of Henderson
Community Name

Telephone No.: 702-565-2329 Date: _____

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

This certification is in accordance with 44 CFR Ch. 1, Sect 65.2

_____
Signature

Todd Stovall PLS
Printed Name and Title of Revision Requester

gistr No. _____ Expires (Date) _____ State NV

Type of License/Expertise: PLS

Check which forms have been included with this request

Form Name and (Number)	Required if .....
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FEDERAL EMERGENCY MANAGEMENT AGENCY **REVISION REQUESTER AND COMMUNITY OFFICIAL**	O.M.B No. 3067-0148 Expires April 30, 2001

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☐ Other Describe: _____

2. OVERVIEW

1. The basis for this revision request is (are): (check all that apply)

☒ Physical Change ☐ Improved Methodology/Data ☐ Floodway Revision

☐ Other Describe: _____

Note: A photograph is not required, but is very helpful during review.

2. Flooding Source: Henderson Basin

3. Project Name/Identifier: C-1 Channel System FIS Restudy

4. FEMA zone designations affected: A,X
(example: A, AH, AO, A1-A30, A99, AE, V, V1-V30, VE, B, C, D, X)

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

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480287	Harris County	TX	48201C	0220G	09/28/90
32003	Henderson,City of; Clark County, Unincorporated Areas	NV	32003C	2605E	9/27/02

6. The area of revision encompasses the following types of flooding and structures. Check all that apply.

Types of Flooding		Structures	
☒	Riverine	☒	Channelization
☐	Coastal	☐	Levee/Floodwall
☐	Alluvial fan	☒	Bridge/Culvert
☒	Shallow Flooding (e.g. Zones AO and AH)	☐	Dam
☐	Lakes	☐	Fill
☐	Other (describe)	☐	Other (describe)

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

4. ENCROACHMENT INFORMATION

1. Does the State have jurisdiction over the floodway or its adoption by communities participating in the NFIP?
   ☐ Yes ☒ No

If Yes, attach a copy of a letter notifying the appropriate State agency of the floodway revision and documentation of the approval of the revised floodway by the appropriate State agency.

2. Does the development in the floodway cause the 1% annual chance (base) elevation to increase at any location by more than 0.000 feet? ☐ Yes ☒ No ☐ N/A

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If the answer to either items is Yes, please attach documentation that all requirements of Section 65.12 of the NFIP regulations have been met, regarding evaluation of alternatives, notice to individual legal property owners, concurrence of CEO, and certification that no insurable structures are impacted.

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Operation and maintenance plans are attached. ☐ Yes ☐ No ☒ N/A

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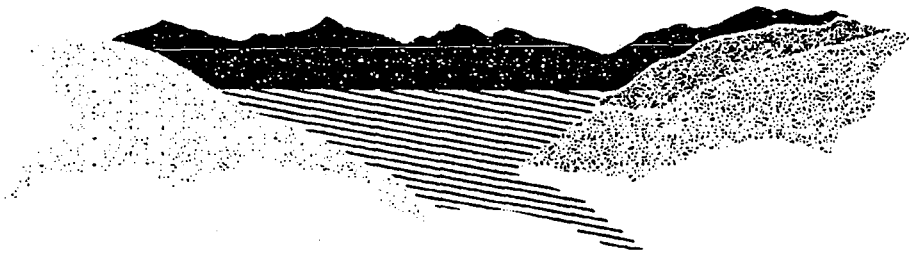
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C L A R K C O U N T Y

REGIONAL FLOOD CONTROL DISTRICT



OPERATIONS AND MAINTENANCE MANUAL

PRINTED
JANUARY 2000

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

OPERATIONS AND MAINTENANCE MANUAL

GALE WM. FRASER, II, P.E.
GENERAL MANAGER / CHIEF ENGINEER

The Operations and Maintenance Manual has been updated in accordance with Regional Flood Control District Board action on December 9, 1999. The Board adopted amendments to Sections 2.50, 3.20, 4.11, 4.22, 4.25, 4.34, added Chapter 5, updated forms and charts, and added sample forms.

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT
OPERATIONS AND MAINTENANCE MANUAL

CHAPTER 1
EXECUTIVE SUMMARY

1.10 EXECUTIVE SUMMARY

The Clark County Regional Flood Control District (District) was created under NRS 543 with responsibility to plan, construct and maintain drainage and flood control facilities throughout Clark County. In order to comply with NRS 543.340(4), this Operations and Maintenance Manual has been prepared through the cooperation and support of all of the affected Entities in the County. The document sets forth both policies and procedures by which the maintenance of the drainage and flood control facilities will be achieved to assure their proper working order at the time of need. The overall goal of the maintenance program as adopted by the District Board is as follows:

> COMPLY WITH THE PROVISIONS OF NRS 543.340(4) AND ASSURE THAT FACILITIES IN THE MASTER PLAN ARE MAINTAINED IN A MANNER THAT MAXIMIZES THEIR USEFUL LIFE AND ENSURES THEIR OPERATION AT DESIGN CAPACITY DURING A STORM EVENT.

Ten policy statements were also adopted supporting the above goal.

In order to achieve the goal, and to comply with the adopted policies, the following procedures have been developed in an open and very participatory manner.

Funding Procedure - Provides for a means by which the Entities can be reimbursed for activities associated with maintenance of drainage and flood control facilities on the Master Plan provided they meet criteria as set forth in the manual.

Administrative Procedure - Provides for establishing standards and levels of service by which maintenance will be achieved. This procedure includes the steps and schedule by which an annual work plan is established and adopted by the District Board. It also provides for the certification of performance by each Entity in accordance with the annual interlocal contract. The ability for the Entity to contract maintenance activities to private contractors is also authorized under this procedure.

Maintenance Procedures - This procedure provides the specific activities under which the maintenance program is to be carried out as listed below:

ACTIVITY NUMBER	ACTIVITY NAME	WORK MEASURE UNIT
05	Inspect Channels	Miles
10	Clean and Reshape Channels	Cubic Yards
15	Repair Lined Channel	Each
20	Provide/Maintain Erosion Control	Square Feet
25	Clean and Inspect Detention/Debris Basins	Cubic Yards
30	Erosion Repair	Cubic Yards
35	Fence Repair	Linear Feet
40	Vegetation Control - Chemical	Acres
45	Vegetation Control - Mechanical	Acres
50	Maintain Access Road	Miles
55	Clean and Inspect Inlet/Outlet Structures	Each
60	Repair Inlet/Outlet Structures	Each
65	Clean Storm Sewer Lines	Linear Feet
70	Storm Sewer Repair	Repairs
75	Clean/Flush Culverts & Bridges	Each
80	Miscellaneous Work Activities	Labor Hours
85	Engineering	Labor Hours

A specific performance standard has been developed for each activity setting forth the following elements :

- The most effective crew size.
- The kinds and number of equipment required.
- The major types of material that should be used.
- Recommended procedures for performing the work.
- An estimate of expected average daily accomplishment with standard crew size, equipment, and procedures.
- Authorization and scheduling criteria.

Inventory Procedures - A critical element of any maintenance program is the identification and condition of the overall drainage and flood control system. In the case of this program, the inventory also identifies those facilities that are "eligible" for reimbursement of maintenance activities, provided the work is a part of the annual plan. Facilities eligible are those identified in the Regional Flood Control District's Master Plan and any revisions, amendments, and/or changes subsequently approved. Only those facilities that exist as Master Plan facilities, or exist in the same alignment as a proposed Master Plan facility and appurtenant facilities are eligible.

Maintenance is an ongoing and very dynamic function of a successful drainage and flood control program. This Operations and Maintenance Manual sets forth an initial set of policies and procedures, including the various actions required to achieve the maintenance goal. The manual will need to be updated on a regular basis to reflect fiscal implications and the experience gained as the District continuous to grow and to serve the citizens and taxpayers of Clark County.

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT
OPERATIONS AND MAINTENANCE MANUAL

CHAPTER 2
INTRODUCTION

2.10 BACKGROUND

The Clark County Regional Flood Control District (District) was established in 1986 to plan, construct, and maintain drainage and flood control facilities. These responsibilities focused on alleviating the potential for flooding and protecting the lives and property of District residents. The initial phases of the District's program succeeded in preparing a Master Plan, uniform design criteria, regulatory standards, and constructing facilities. As these areas have progressed, the District, along with other agencies and Entities in the County, has oriented its efforts towards assuring adequate maintenance of flood control facilities and conveyance systems. This orientation is consistent with the vital role maintenance plays in all comprehensive flood control programs. This Operations and Maintenance Manual has been prepared through the District with the support and cooperation of each affected Entity. It represents a commitment to uniform flood control system standards and establishes a blueprint for a cost effective and consistent maintenance program throughout the District.

2.20 AUTHORITY

Nevada Revised Statute (NRS) 543 mandates that the District shall undertake programs for both construction and maintenance of flood control facilities. A commitment to building and maintaining flood control facilities within Clark County is reiterated in the District's Uniform Regulations for the Control of Drainage which states that capital improvements, operation, and maintenance are all interrelated parts of the District's overall flood control program. In accordance with NRS 543.340(4) and the Uniform Regulations, the District authorized URS Consultants to prepare a specific Operations and Maintenance Manual, which was adopted by the District Board on November 8, 1990. To reflect fiscal implications and experience gained, the manual was updated in 1995 and 1999.

2.30 RESPONSIBILITY

The District was formed, in part, to fund and coordinate the construction and maintenance of facilities to alleviate flooding and protect the life and property of citizens within the boundaries of the District. It is the responsibility of the District to prepare and update the Master Plan for the control of floods, and manage the Regional Fund for the Control of Floods in a manner consistent with NRS 543.

2.40 APPROACH

The maintenance program must assure that the flood control projects funded by the District are maintained at a level which maximizes their useful life and assures that facilities operate to design capacity. As an interconnected network of conveyances and structures, failure of any flood control facility to operate properly may affect the performance of the overall system within a specific watershed.

Flood control facilities require regular maintenance if they are to be functional, visually attractive, and last through their design life. Accordingly, the development of a maintenance program is just as critical to the overall success of a comprehensive flood control effort as basin planning and regulation enforcement. As stormwater and flood control programs begin to address nonpoint pollution/water quality issues, the maintenance program will play an even greater role by enabling cost effective reductions in pollutant loadings to receiving waters. Finally, visibility of the program to the public, which a comprehensive maintenance program affords, is an important factor in demonstrating that flood control management is truly a full-time commitment and not simply a priority only after a storm event. The primary objectives of the District's maintenance program are :

- To develop a complete physical feature inventory for the system.
- To establish overall policies and levels of service.
- To develop operating procedures.

It is also critical that ongoing inspection and reporting procedures continue to assure all systems are ready when needed.

Due to the multiple jurisdictions involved with maintenance of the flood control system, a commitment to this program from all Entities within the Flood Control District was essential. This commitment was made through the Maintenance Technical Committee during the development of the manual in 1990. It was also recognized that coordination of this maintenance program with state transportation programs was critical. The level and consistency of the long range commitment has a direct impact on how effective the resulting maintenance system becomes. This commitment begins with a credible Operations and Maintenance Manual.

An essential building block for a successful flood control maintenance program in Clark County is a complete physical feature inventory of the system. It is also important to note that no maintenance program is ever truly "complete". Rather, these programs are constantly evolving as inventories are defined and standards/costs are further refined. A similar evolution is anticipated for this program. The flexibility to adjust to this evolutionary process has been built into this manual.

2 SO DEFINITIONS

In addition to the definitions of terms and phrases set forth in other District documents, the following apply to operation and maintenance:

Acceptance for Maintenance: "Acceptance for Maintenance" means that a project funded by the District, Entity, or other public/private funds is a part of the Master Plan and has been constructed in accordance with District standards and therefore eligible for maintenance funding by the District.

Annual Budget: "Annual Budget" means the anticipated costs associated with completion of each activity outlined within the annual work plan submitted by each of the Entities, and ultimately approved by the District Board of Directors prior to the start of each fiscal year.

Annual Work Plan: "Annual Work Plan" means a plan submitted by each of the Entities setting forth the type and quantity of maintenance to be performed during the ensuing budget year in a form prescribed by the District specifically requesting funds for budgeting purposes.

Certification: "Certification" means the documentation which evidences that required maintenance by an Entity has been completed in accordance with established standards.

Maintenance Program : The "Maintenance Program" has been established by the Board to provide funding of, and establish performance standards and guidelines for, the maintenance of flood control facilities located throughout Clark County and the incorporated areas. The Program provides funding to entities to perform maintenance of eligible flood control facilities. Projects eligible for District maintenance funding are those identified in the Regional Flood Control District's Master Plan and any revisions, amendments, and/or changes subsequently approved. Only those facilities that exist as Master Plan Facilities or exist in the same alignment as a proposed Master Plan facility, and appurtenant facilities are eligible. Subsequently, the District works with the entities annually to develop Maintenance Work Plans. The work plans undertaken through the Maintenance Program and budgets are funded through the annual interlocal contracts between each Entity and the District. No matching funds are required, except in those cases where an arrangement has been made to cooperatively fund a particular field activity. Work is performed using a combination of private contractors and entity maintenance staff. The Maintenance Program contains three broad categories of work:

1. Routine and/or Preventive Maintenance: "Routine and/or Preventive Maintenance" means work on existing facilities to keep them in proper working condition, including but not limited to, debris/sedimentation removal, vegetative control, and reshaping.

2. Restoration: "Restoration" means the repair to existing facilities after a storm event including erosion repair, fence replacement, repairing/replacing trash racks, inlets, storm sewer systems, major debris removal and similar "one time" work activity.

3. Rehabilitation: "Rehabilitation" means rebuilding a facility and/or conveyance system after it is destroyed by an event or it has been determined that it is not operating according to the intent of the design documents on file at the District causing a safety or maintenance problem or it has deteriorated to the extent that it must be replaced "in kind" including replacing or modifying drop structures, reshaping channels, bank protection restoration, inlets etc. In general, the rehabilitative projects are designed by consultants and the construction contracts are awarded through a bid process.

Maintenance Program Exclusions : "Exclusions" typically include local drainageway maintenance such as curb and gutter work, inlet maintenance, and repairs to small piped storm sewer systems, unless otherwise constructed as part of a regional facility. Maintenance work exclusions also include repair or replacement of existing flood control Master Plan facilities which undergo catastrophic damage of more than one-half (½) mile. These types of catastrophic damages will generally be classified as capital improvements, and requests for capital improvement funds must be reprogrammed as a capital improvement project in accordance with District Policies and Procedures.

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT
OPERATIONS AND MAINTENANCE MANUAL

CHAPTER 3
POLICY STATEMENT

It is important that a maintenance policy statement be adopted which reflects the objectives of both the elected officials and the operations staff charged with its implementation. The initial policy document was prepared and reviewed by District staff and the Maintenance Committee. Following input from the group, it was reviewed by the respective Public Works Directors of all Entities and further revised to reflect their input. The document was then reviewed by the Technical Advisory Committee (TAC) and the Citizens Advisory Committee (CAC) before final adoption by the Board on November 8, 1990. The final adopted policy statement is as follows:

3.10 GOAL

Comply with the provisions of NRS 543.340 (4) and assure that facilities in the Master Plan are maintained in a manner that maximizes their useful life and ensures their operation at design capacity during a storm event.

3.20 POLICIES

1. Flood control facilities identified in the Master Plan are eligible for District maintenance funding.

2. As specified in the Uniform Regulations for the Control of Drainage Section 12.050, facilities funded through the District shall be inspected on an annual basis to assure proper maintenance has been provided.

3. In cases where funded maintenance by the lead Entity is not performed to the standards specified, the District shall perform or cause to be performed the maintenance necessary to assure proper operations of the facility. Costs incurred by the District shall be deducted from the amount authorized in the maintenance agreement between the lead Entity and the District.

4. Flood control facilities improved or constructed after adoption of this policy, must be designed in accordance with District criteria and standards to be eligible for maintenance funding.

5. Access to the facility must be guaranteed to the lead Entity and the District in order to be eligible for maintenance funding.

6. The maintenance requirements applied to these facilities shall be based on the standards contained in the District's Onerations and Maintenance Manual.

7. The lead Entity must develop an annual work plan to be eligible for maintenance funds. Upon completion of the work, the Entity must certify that the work was completed in accordance with the standards contained in the District's Operations and Maintenance Manual.

8. Maintenance funding is available only for repair, restoration, rehabilitation, or maintenance of existing facilities and is not intended to supplement the District's capital improvement program. For example, if the intent of the field activity is to increase the designed capacity of a facility or conveyance, then that function is capital in nature.

9. Expenditures for repair and replacement of existing flood control Master Plan facilities which undergo catastrophic damage of one-half (½) mile or less will be classified as maintenance. These expenditures will be made from funds budgeted in the Facilities Maintenance Fund.

10. Expenditures for repair and replacement of existing flood control Master Plan facilities which undergo catastrophic damage of more than one-half (½) mile will generally be classified as capital improvements. Requests for capital improvement funds must be reprogrammed as a capital improvement project in accordance with District Policies and Procedures.

11. Expenditures for removal of debris and sediment captured or deposited in a debris basin, detention basin or a linear flood control facility will be classified as maintenance. Necessary repairs to a debris or detention basin will also be classified as maintenance. These expenditures will be made from funds budgeted in the Facilities Maintenance Fund.

12. Expenditures for repair and replacement of non-improved or "earth lined" flood control facilities and features will be classified as maintenance. These expenditures will be made from funds budgeted in the Facilities Maintenance Fund.

13. An entity may consider another option in lieu of repairing or rehabilitating facilities that have not been improved to Master Plan design specifications. This option is to build/implement the long-term solution for the damaged facility. Expediting the implementation of the Master Plan may be a viable alternative that maximizes the use of available resources. This should be considered as an alternative if the long-term solution

can be implemented in a timely manner. Requests for capital improvement funds to implement a Master Plan project must be reprogrammed as a capital improvement project in accordance with District Policies and Procedures.

14. All facilities eligible for maintenance funding must be publicly owned.

15. Funds may be provided by the District for maintenance of Master Plan facilities by outside contractors under conditions when the use of such an approach is deemed the most efficient and cost effective by the lead Entity.

16. Bridge structures, generally speaking, are not eligible for District funding unless it can be shown that the flood carrying aspects of the regional facility causes a safety or maintenance problem.

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT
OPERATIONS AND MAINTENANCE MANUAL

CHAPTER 4
PROCEDURES

4.10 FUNDING PROCEDURES

4.11 Purpose

This element of the Operations and Maintenance Manual provides the Entities with procedures for the appropriation, expenditure and reimbursement of funds to perform maintenance activities. A principle role of the District shall be to manage and disburse payments to the Entities for maintenance that is performed in compliance with the approved plans. A diagram of the funding **flow** is shown on **Figure 4-l.**

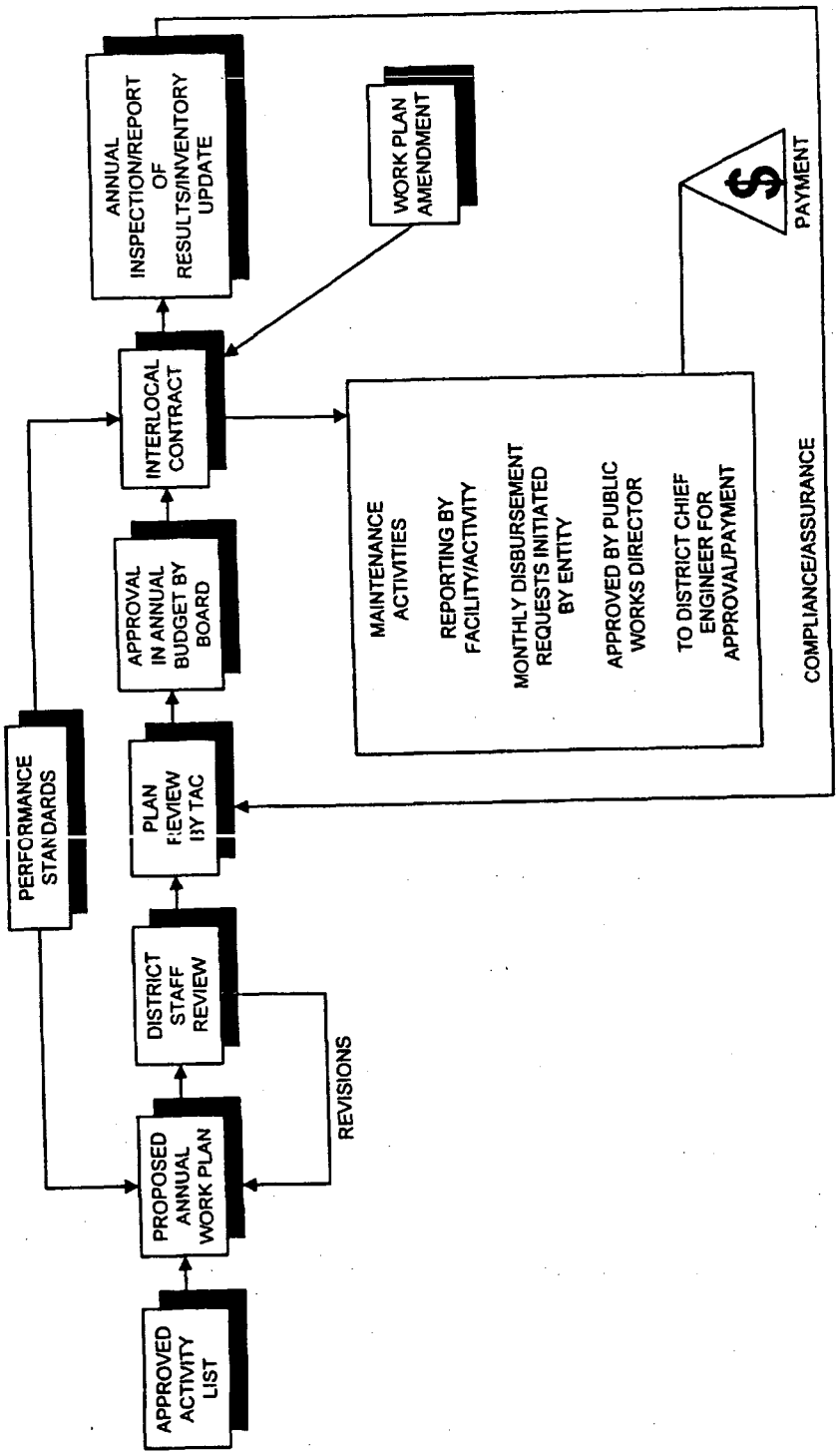
The District has authorized funding to assist the Entities with major drainageway maintenance in accordance with the priorities listed below:

- First priority: District owned facilities.
- Second priority: Facilities owned by other public agencies, but totally or partly financed by District funds. (Capital Improvement and Maintenance Project)
- Third priority: Facilities owned by others and constructed by others without District assistance.
- Fourth priority: Unimproved drainageways.

4.12 Payment Procedures

Payment for work performed will be made in accordance with the annual interlocal contract executed as part of the approved work plan and the payment procedures outlined herein. The primary mechanism for reimbursements shall occur through a purchase order established between the District and each Entity. In cases where the Entity directs the District to make payments to a contractor or supplier directly, the purchase orders will be established between the District and the contractor, consultant, or supplier, at the Entity's request. Unless otherwise contained within this manual, all District Policies and Procedures relating to disbursement of funds and reimbursement to Entities apply.

Figure 4-1 Funding Flow Diagram



Schedule

Disbursement requests (invoices) from each Entity may only be submitted for completed work activity and may not be submitted more than once in a 30-day period. Disbursement requests must be accompanied by a verification statement from the Entity that the work for which payment is due has been completed in accordance with the standards contained in this manual. The disbursement request must identify the Master Plan facility maintained, specific plan activity or activities for which reimbursement is sought, and separately identify personnel, equipment, and other related costs. **(Figure** 4-2 represents a sample of the reporting required, and can be obtained on diskette from the District.) Administrative costs incurred by the Entity in the management of the interlocal contract are not reimbursable. Examples include cost accounting work, secretarial/clerical work, the preparation of requests for payment, and certification statements for work performed under the contract.

All invoices from the Entities requesting reimbursement to the Entity or direct payment to the Entity contractor or vendor must first be submitted to and approved by the Entity's Public Works Director or other designated responsible person in charge of the project. The Chief Engineer or designated District staff will process and approve such payments within 30 days providing the required approval has been obtained and terms of the interlocal contract have been satisfied.

Direct payments to contractors must originate from the Entity and include the following:

1. Invoice to the Entity from the contractor.
2. Certification of work performed by the contractor signed by the Entity, if applicable.
3. Disbursement Request Form **(Figure 4-2).**

Reporting

Monthly and annual summaries of purchase order balances, budget status, and facility expenditures shall be prepared by the District as a part of the routine financial reporting procedures to the Board.

REGIONAL FLOOD CONTROL DISTRICT

MAINTENANCE WORK PROGRAM - FISCAL YEAR 20XX-XX

ENTITY: _____

[ ] Disbursement Request

Vendor Name: _____

Invoice Number: _____

Amount Requested: _____

RFCD Purchase Order #:

[ ] Amended Annual Budget Request

Approved: _____

General Manager/Chief Engineer Date

Clark County Regional Flood Control District

MWP Facility #:											
Facility Name:											
Master Plan Facility ID:											ACTIVITY TOTAL
05-Chnl Insp											0.00
10-Reshape Chnl											0.00
15-Chnl Repair											0.00
20-Erosion Control											0.00
25-Clean DB											0.00
30-Erosion Repair											0.00
35-Fence Repair											0.00
40-Vege Control - C											0.00
45-Vege Control - M											0.00
50-Access Rd											0.00
55-Clean In/Outlet											0.00
60-Repair In/Out											0.00
65-Clean Storm Drn											0.00
70-Sewer Repair											0.00
75-Clean Culverts											0.00
80-Misc Maint											0.00
85-Engr											0.00
Facility Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

I certify that the above described maintenance was/will be performed in accordance with the criteria/standards contained in the District's *Operations and Maintenance* Manual. Further, the information contained in this Request accurately reflects those costs incurred/to be incurred during the performance of this work.

_____

Project Manager Date

Figure 4-2 Disbursement / Amended Budget Request

4.20 ADMINISTRATIVE PROCEDURES

4.21 Purpose

The purpose of this element of the Operations and Maintenance Manual is to provide specific procedures for establishing standards and levels of service, preparing the annual work plan, administrating the planning, approval and enforcement elements, and updating the manual over time. The principal role of the District shall be to review and approve annual maintenance work plans and monitor the performance of work activities. The principal role of the Entities shall be development of annual work plans that are consistent with the District's approved maintenance activity list; performance of the maintenance work set forth in the approved work plans; and the submittal of quarterly reports that summarize work performance while certifying compliance with maintenance activity performance standards as set forth in the Operations and Maintenance Manual.

4.22 Annual Work Plans

In accordance with the schedule on the following page, each Entity shall submit a proposed annual maintenance work plan containing the following components:

Section 1:	Program Summary by Maintenance Project Including Cost for Each Project
Section 2:	Summary by Maintenance Activity
Section 3:	Individual Maintenance Projects Showing Narrative, Location Map, Work Activities, Results, Costs

District staff shall review the proposed plans and work with the Entities to resolve any discrepancies found with District maintenance standards and policy objectives. After the initial staff review, the plans shall be forwarded to the Technical Advisory Committee. Lastly, the plans will be incorporated in the annual District budget and submitted to the Board for final approval.

The activities in the work plan shall be consistent with the District's approved activity list for maintenance of flood control and drainage facilities. Work plans should also describe locally funded work activities that may be linked to the District maintenance work activities to show overlapping areas of responsibility for personnel and equipment. Where local personnel and equipment are going to be used to perform both District funded activities and locally funded activities, the Entity will describe how these resources are to be managed and the procedures for tracking costs related to both sets of activities.

Entities may contract for the performance of maintenance work activities. The proposed work plan must specify that a contractor is to be utilized and the time frame for selection of a contractor. In the event that maintenance work is performed under contract, the contract must specify that the District has the authority to inspect all work performed under the contract and approve or deny payments to contractors based on inspection findings.

All work performed must comply with District approved maintenance activity performance standards as set forth in subsequent sections of this Manual. The Entity is required to inspect Master Plan facilities annually, including any maintenance work performed by Entities on Master Plan Facilities, and shall notify the District prior to the annual inspection of completed maintenance work. Entities shall facilitate the inspection of maintenance work by the District. The District may withhold funding, require additional maintenance work, or seek repayment of disbursed funds when an inspection reveals that work activities were not performed in conformance with activity performance standards.

Schedule

February 1 -	Submittal of preliminary work plan proposal and tentative budget to District staff for review, recommendations, and coordination with entities. This is important for the following reasons: 1) Fiscal Year Budget Authority submittal and approval. 2) Prioritization of maintenance funding activities.
April 1 -	Submittal of tentative annual work plans, budgets, and interlocal contracts to District staff for review, recommendations, and coordination with entities.
May (TAC deadline)	Submittal of the Entities' final annual work plans, budgets, and interlocal contracts to the TAC and CAC for approval.
June	After receiving approval from the TAC and CAC, entities' final annual work plans, budgets, and interlocal contracts are submitted to the Board for approval.
July 1 -	Beginning of maintenance plan contract period, which ends June 30.

Reporting

Each Entity will submit quarterly reports indicating the status of the work completed under the current fiscal year's program (**Figure** 4-3). The reports are due 30 days after the close of the quarter, and will be submitted to the Board for review. Also, each Entity shall submit an annual certification to the District stating that all work contained in the work plan and reimbursed through the interlocal contract has been performed to the specifications established in this manual.

Figure 4-3 Quarterly Status Report

REGIONAL FLOOD CONTROL DISTRICT
MAINTENANCE WORK PROGRAM
QUARTERLY STATUS REPORT - FY 20XX-XX

MWP Facility #: _____ Entity: _____
Facility Name: _____ Date Prepared: _____
MP Facility ID: _____ Quarter: _____

Force Account/ Contract	Activity	Approved Work Plan Amount ($)	Amended Work Plan Amount ($)	Expended To Date ($)	Percent Complete	Scheduled Completion Date
	5 Inspect Channels					
	10 Clean and Reshape Channels					
	15 Repair Lined Channel					
	20 Provide/Maintain Erosion Control					
	25 Clean & Inspect Detention Debris Basins					
	30 Erosion Repair					
	35 Fence Repair					
	40 Vegetation Control - Chemical					
	45 Vegetation Control - Mechanical					
	50 Maintain Access Road					
	55 Clean & Inspect Inlet/Outlet Structures					
	60 Repair Inlet/Outlet Structures					
	65 Clean Storm Sewer Lines					
	70 Storm Sewer Repair					
	75 Clean/Flush Culverts & Bridges					
	80 Miscellaneous Work Activities					
	85 Engineering					
	TOTALS	$0.00	$0.00	$0.00	0%	

Delays or problem areas:

Work completed during current quarter:

Work to be completed during next quarter:

Consultant/ Contractor: _____
Project Manager: _____ Phone Number: _____

4.23 Approval of Annual Work Plan

The work plans received by the District will be reviewed and budget requests compiled into a summary showing the dollar amount by Entity for each of the priority areas set forth in **Section 4.11.** The Chief Engineer shall review the total maintenance budget requests against the District's proposed annual total budget for facility maintenance and make a recommendation to the District Board as to the amount of maintenance funds to be disbursed to each respective Entity based upon equity and need.

Once the Technical Advisory Committee has reviewed the maintenance work plans and budget appropriation recommendation, the Chief Engineer will forward the compiled summary to the Board for consideration and approval as a key element of the Annual District Budget.

Schedule

The Entities will submit the proposed work plan to the Chief Engineer as outlined in **Section 4.22.**

Reporting

The Chief Engineer's report to the District Board shall show both the budget requested by the Entity and the recommended amount to be appropriated, the report will also make comments on any adjustments made to the initial request.

4.24 Work Plan and Budget Amendments

Requests for amendments to approved work plans and budgets must be submitted to the Chief Engineer in writing. The amendment request must specify the work elements affected, describe the reasons for the amendment request, and describe the impact of the proposed amendment on the affected work plan objectives.

Formal approval of work plan and/or budget amendments requiring a reallocation of funds between facilities must be obtained from the Chief Engineer prior to submittal of payment requests. **(See Figure** 4-2.) The Entity shall also notify District staff of work plan and/or budget amendments within a facility. Requests requiring an increase in the overall work plan budget must be submitted to the Board for approval with a supplemental interlocal contract for the amended work in accordance with **Section 4.6** of the District Policies and Procedures Manual.

Schedule

Amendment requests shall be reviewed by District staff and responded to in writing within 15 days of receipt of the original request. Work plan amendments which require an increase in the Entity's annual budget will require submittal of an agenda item and supplemental interlocal contract for approval by the District Board of Directors.

Reporting

Annual certification of results will include addressing all amendments made to the annual work plan.

4.25 Certification of Compliance

It is the intent of the District to rely to the maximum extent possible on the Entities to carry out the maintenance activities and comply "voluntarily" with the procedures and standards set forth in this manual. The District shall from time to time inspect facilities funded by the District or those on the Master Plan to assure compliance with the interlocal contract. Each Entity shall submit an annual certification to the District stating that all work contained in the work plan and reimbursed through the interlocal contract has been performed to the specifications established in this manual. This certification shall be signed by the person executing the interlocal contract or designee. The certification should summarize proposed and actual plan accomplishments. It should also describe any major maintenance problems that have implications for the District as a whole, such as significant deterioration of major conveyance system components or the failure of system components to perform as intended, and suggest revisions to the activity list provisions.

Schedule

The certification and final payment requests shall be submitted to the District within 30 calendar days of the termination of the annual interlocal contract for maintenance funding.

Reporting

The certification shall be attested to on the Final Accounting Report **(Figure 4-4)**, and an attachment may be used to describe additional pertinent information.

Figure 4-4 Final Accounting Report

(ENTITY)
MAINTENANCE WORK PROGRAM
FINAL ACCOUNTING REPORT - FY 20XX-XX
As of (Current Date)

VENDOR	P.O. NUMBER	P.O. AMOUNT	TOTAL EXPENDED	P.O. BALANCE
Sample Vendor 1	123456 01	1,000.00	1,000.00	0.00
Sample Vendor 2	123456 02	1,000.00	500.00	500.00
Sample Vendor 3	123456 03	1,000.00	200.00	800.00
	Total	$3,000	$1,700	$1,300

FY XX-XX INTERLOCAL AMOUNT/BUDGET	4,000.00	Total Encumbered	3,000.00
Total Encumbered	3,000.00	Total Expended	1,700.00
Total Unencumbered	$1,000.00	Total Unexpended	$1,300.00

Total Authorized	**$4,000.00**
Expended	**$1,700.00**
RETURN TO FUND 286	**$2,300.00**

Regional Flood Control District **(Entity)**

RFCD Date Project Manager Date

I certify that the above described maintenance was performed in accordance with the criteria/standards contained in the District's Operations and Maintenance Manual. Further, the information contained in this Final Accounting Report accurately reflects those costs incurred during the performance of this work. *If there are any maintenance problems that have implications for the District as a whole, such as significant deterioration of major conveyence system components or failure of system components to perform as intended, a detailed description will accompany this report as an attachment.*

4.26 Interlocal Contract Document

The performance of work outlined in the approved maintenance plan shall be guided by an interlocal contract entered into annually between the District and each Entity. Sample contracts are contained in **Appendices B and C.** Major provisions of the contract include: the adoption of the Board approved work plan as the document outlining the work to be performed; references to the performance standards, reimbursement and payment procedures, and plan amendment procedures outlined in this manual for governing maintenance work performance evaluations, and contract amendments; and a requirement for submittal of an annual certification of results.

Schedule

All Entities will enter into an "annual" interlocal contract in conjunction with adoption of the District and respective Entity budgets.

Reporting

Reporting requirements will be as prescribed in the respective interlocal contracts.

4.27 Contract for Maintenance Performance

If, in the opinion of the Entity, it appears to be most cost effective (or due to an emergency) to utilize the services of private contractors to perform maintenance functions, the Entity shall solicit bids from qualified contractors in compliance with their statutory procedures for the necessary work. The Entity will provide the District with copies of bid specifications and bid tabulations as well as copies of the respective contract documents. All expenditures must comply with **NRS** 332, Local Government Purchasing Act, **NRS** 338, the Public Works Act, and all relevant statutes, rules, regulations, and policies.

Schedule

All contracts for maintenance services shall be bid on an annual basis or for a specific project location.

Reporting

The Entity shall advise the District in advance that they intend to utilize a private contractor (may be included as part of annual work plan). They shall also provide a summary of work performed and a statement of inspection as part of the request for reimbursement to the Entity or directly by the District to the contractor.

4.30 MAINTENANCE PROCEDURES

4.31 Purpose

As a part of the overall operations and maintenance procedures adopted by the District, an outline for specific maintenance procedures has been developed. The accepted maintenance procedures are centered around specific elements of a management system for field maintenance, and include defined maintenance activities, standards, scheduling, and reporting procedures.

Due to the diversity in physical features among the various agencies involved, and the varied resources employed in maintenance activities, it is essential to treat these procedures as general guidelines which must be tailored to meet the situation at hand. It is also essential that these procedures remain dynamic, be actively reviewed, and periodically updated. An annual review is recommended.

4.32 Activities

Maintenance work activities identify all major maintenance work and include all activities which are performed frequently and in amounts that make them a significant part of the total work program. Each activity must be clearly defined so maintenance personnel at all levels of management uniformly understand the operation to be performed and the type of deficiency to be corrected.

Personnel who plan, schedule, perform, report, or evaluate maintenance work must know what each work activity means. Work activities are used for the following purposes:

- Planned maintenance work is identified in the annual maintenance work plan by activity name and number.
- Activity names and numbers are used for authorizing, assigning, and reporting work.
- Activity names and numbers are used on work scheduling guides and work performance summaries.

Work measurement units are established for the major maintenance activities. For example, "Acres Covered" is the work measurement unit for vegetation control while "Cubic Yards Removed" is the work unit for cleaning and reshaping channels. These measurement units are used to describe how much work is planned and to report how much work is accomplished for each activity.

For some activities, specific work measurement units--other than labor hours--would not be meaningful. For example, the miscellaneous maintenance activity includes a number of different operations. This activity cannot be measured by a common unit other than labor hours.

Following is the accepted maintenance Activity List for the District including work measure units.

ACTIVITY NUMBER	ACTIVITY NAME	WORK MEASURE UNIT
05	Inspect Channels	Miles
10	Clean and Reshape Channels	Cubic Yards
15	Repair Lined Channel	Each
20	Provide/Maintain Erosion Control	Square Feet
25	Clean and Inspect Detention/Debris Basins	Cubic Yards
30	Erosion Repair	Cubic Yards
35	Fence Repair	Linear Feet
40	Vegetation Control - Chemical	Acres
45	Vegetation Control - Mechanical	Acres
50	Maintain Access Road	Miles
55	Clean and Inspect Inlet/Outlet Structures	Each
60	Repair Inlet/Outlet Structures	Each
65	Clean Storm Sewer Lines	Linear Feet
70	Storm Sewer Repair	Repairs
75	Clean/Flush Culverts & Bridges	Each
80	Miscellaneous Work Activities	Labor Hours
85	Engineering	Labor Hours

4.33 Standards

"Performance Standards" have been established for each of the major maintenance work activities. These performance standards specify:

- The most effective crew size.
- The kinds and number of equipment required.
- The major types of material that should be used.
- Recommended procedures for performing the work.
- An estimate of expected average daily accomplishment with standard crew size, equipment and procedures.
- Authorization and scheduling criteria.

Following is an item-by-item description of the format of the performance standards.

1. Activity Identification/Date. The activity number and name are shown as well as the "effective date" of the performance standard--to be used when updating or replacing performance standards.

2 Description and Purpose. The Description and Purpose section of the performance standards explains the work activity and the kinds of defects to be corrected or reasons for doing the work.

3 Authorized By and Work Control Category. The level of management responsible for authorizing the work is identified. Certain activities requiring special equipment, coordination, or expertise are Engineer-authorized activities and should not be scheduled or performed without the Engineer's approval. The type of control to be placed on the quantity of work performed is identified. This control is unlimited or limited in terms of the amount of work done (accomplishment) or the amount of labor input (crew-day).

4 Performance Criteria. This section includes important information for the "scheduler" about when to schedule the work and for the crew leader to identify the work to be done.

5 Crew Size. The crew size outlines the numbers of personnel needed to do the work. The crew size is based on average conditions. Sometimes, there will be a need to add or delete people to satisfy special traffic safety conditions or hauling requirements.

6. Equipment. The basic requirements for major pieces of equipment are listed. Situations such as the breakdown or unavailability of equipment or special materials hauling requirements may require the addition, deletion or substitution of equipment.

7. Materials. The materials section includes a list of the major materials to be used for the activity.

8. Work Method. The work method outlines, step-by-step, the recommended procedures for performing the work. Each step should be performed in order to correctly maintain the feature as well as provide the quality of work desired.

9. Average Dailv Production. The average daily production is an estimate of the amount of work a crew can accomplish during a day using the recommended crew size, equipment, materials and work method. This estimate is shown as a range and should be attainable over a period of time. Some days the accomplishment may be more or less than the estimate, but eventually, the average should fall in line.

10. Notes. Any other relevant, helpful information or instructions.

Use of Performance Standards

Maintenance supervisory personnel should become thoroughly familiar with these performance standards. It is important that the performance standards be used when making assignments and performing work. Some situations will require deviation from the performance standards--such as more or less flagmen or additional haul trucks. These situations are recognized, and crew leaders are expected to consider such situations when organizing and managing their activities.

Haul truck needs should be determined using factors such as haul distance and time estimates (spot, dump, load, and cycle times.)

The performance standards also provide guidance and a measure for supervisors to use when evaluating work in progress and completed.

Field personnel are in the best position to identify new or better work methods or difficulties with the current performance standards. These suggestions for improvements or questions should be directed to the crew leader or supervisor.

The performance standards should be reviewed and updated annually. If other changes occur that require more frequent review and update or development, the performance standards can be changed to suit these needs.

4.34 Scheduling

The objectives of work scheduling are:

- To do the planned amount of work.
- To perform the work when it should be done.
- To do the work where it should be done.
- To use the proper people, equipment and supplies to do the work.
- To ensure to the extent possible that all flood control facilities are functioning at design capacity during a storm event, noting that Flash Flood Season is July through September.

Three tools are available to help supervisors meet these objectives. The WORK PROGRAM defines the estimated amount of work and the estimated labor-days required for each activity to provide the desired levels of service; a WORK CALENDAR helps to establish when the various activities should be done; and the PERFORMANCE STANDARDS provide information about quantity standards, personnel requirements and how much work can be done in a given time.

The annual work program establishes the kinds and amount of work to be done during the year and the resources that will be required to do that work. This annual plan needs to be broken into a monthly plan for effective scheduling of work and to permit timely evaluations of work program performance.

The process of "distributing" the annual work load throughout the year is done by allocating a part of the work (in labor-hours, by activity) to specific months. Some types of work -- emergency or service activities -- must be done throughout the year as the need arises. Other types of work must be done on a regularly scheduled basis -- such as preventive maintenance work. Finally, some types of work can be done during certain periods but can be shifted from one month to the other, and still other work can be done almost any time during the year.

These factors must be considered when distributing the different types of work. Preventive maintenance and other types of work which must be performed on a regularly scheduled basis are distributed so as to level labor power needs as much as possible. Finally, work which can be performed any time is distributed to those months with the fewest labor-days. In this way, staffing needs are kept as uniform as possible resulting in more efficient use of available labor power.

A work calendar lists -- activity by activity -- the labor-hours for each month. These labor-hours are used in conjunction with the work program annual work quantities for work scheduling and

the preparation of periodic Activity Status Reports. A sample work calendar is included in **Figure** 4-5.

Once the work program and staffing levels have been set, the work load distribution can be finalized and the calendar prepared to summarize/communicate the planned monthly distribution of the work program.

Work scheduling is the process of using the Work Calendar and specific scheduling procedures to plan ahead, establish work priorities and accomplish the work.

The performance standards outlined in the previous sections apply to corrective and preventive maintenance activities. These procedures are not as rigid or foolproof as implied by the description. Equipment breakdowns, emergencies, or bad weather will disrupt a schedule -- but part of the scheduling process is to be aware that these situations will occur and to be prepared to respond with little or no difficulty. Because of these situations, supervisors should not expect to accomplish all of the work as scheduled. Generally, a supervisor can consider his scheduling efforts to be successful if 75 to 80 percent of the scheduled work is completed as planned.

REGIONAL FLOOD CONTROL DISTRICT
MAINTENANCE WORK PROGRAM
WORK CALENDAR

MWP Facility #: _____.
Facility Name: _____.
MP Facility ID: _____.

Entity: _____
Fiscal Year: _____
Date Prepared: _____

ACTIVITY No.	Description	Monthly Distribution of Time (in hours) JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Total Per Activity
5	Inspect Channels													-
10	Clean and Reshape Channels													-
15	Repair Lined Channel													-
20	Provide/Maintain Erosion Control													-
25	Clean & Inspect Detention/Debris Basins													-
30	Erosion Repair													-
35	Fence Repair													-
40	Vegetation Control - Chemical													-
45	Vegetation Control - Mechanical													-
50	Maintain Access Road													-
55	Clean & Inspect Inlet/Outlet Structures													-
60	Repair Inlet/Outlet Structures													-
65	Clean Storm Sewer Lines													-
70	Storm Sewer Repair													-
75	Clean/Flush Culverts & Bridges													-
80	Miscellaneous Work Activities													-
85	Engineering													-
	Total Per Month	-	-	-	-	-	-	-	-	-	-	-	-	-

I certify that the above described maintenance will be performed in accordance with the criteria/standards contained in the District's Operations and Maintenance Manual. Further the information contained in this Work Calendar accurately reflects the time expected to be incurred during the performance of this work.

_____
Project Manager Date

Figure 4-5 Work Calendar

Following are some additional hints or techniques to consider:

- It is not necessary to "formally schedule" the daily, routine activities. It is necessary, however, to regularly check the work reports and accomplishments to verify the distribution of work assignments. A periodic review and adjustment of the work assignments may be necessary to maintain a "balanced work load."

- It is usually best to prepare a schedule (and work assignments) assuming everything will work as planned -- no equipment breakdowns, no emergencies, etc. But make sure a backlog of "alternate" work is available so that little time is wasted when adjustments to the schedule must be made.

- Some guidelines for identifying alternate work:

  - Low priority work that needs to be done, but not necessarily during the next week or so.

  - Work that does not require special equipment or a lot of preparation time.

  - Preventive maintenance on light equipment.

- Take time to estimate the amount of work needed and the number of hours required to do the work. Good estimates will improve the scheduling process significantly. The performance standards, inspections and sound judgment based on experience all help the estimating process.

PERFORMANCE STANDARD

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
05	INSPECT CHANNELS	12/99

DESCRIPTION & PURPOSE

Inspect both improved and unimproved flood channels for proper cross-section, sedimentation, debris and erosion damage, in order to schedule cleaning or repairs as needed.

AUTHORIZED BY	LIMITS ON WORK
Maintenance Supervisor	

PERFORMANCE CRITERIA

Perform complete inspection of channels on an annual basis and after major storm events.

CREW SIZE	WORK METHOD
■ 1 Crew Supervisor ■ ■ ■ 1 TOTAL	1. Use safety devices, as required. 2. Visually inspect channels for cross-section, sediment, debris, erosion, and vegetation. 3. Prioritize a list of channels requiring maintenance. 4. Schedule cleaning of channels referring to prioritized list.
EQUIPMENT	
■ 1 Pickup ■ ■ ■	
MATERIAL	**AVERAGE DAILY PRODUCTION**
■ ■ ■ ■	8 miles/day

NOTES:

PERFORMANCE STANDARD

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
10	CLEAN & RESHAPE CHANNELS	12/99

DESCRIPTION & PURPOSE

Mechanical silt, vegetation, and debris removal, and reshaping of unlined channels to restore adequate flow.

AUTHORIZED BY	LIMITS ON WORK
Maintenance Supervisor	

PERFORMANCE CRITERIA

Improved earth channels should be scheduled for cleaning and reprofiling on an annual schedule, or as appropriate following a flood event. Natural channels on a 3-year cycle.

CREW SIZE

- 2 Equipment Operators
- 1 Truck Driver
- .5 Foreman

= 3.5 TOTAL

EQUIPMENT

- 1* 10-wheel Dump Truck
- 1 Scraper
- 1 Gradall

WORK METHOD

1. Set up safety devices as required.
2. Remove silt and vegetation.
3. Load and haul removed material to proper disposal site.
4. Reshape channel.
5. Clean up work site.
6. Remove safety devices.

MATERIAL

- Disposal Fees

AVERAGE DAILY PRODUCTION

300 Cubic Yards/day

NOTES:

*Schedule sufficient trucks to insure maximum utilization of excavation equipment.

PERFORMANCE STANDARD

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
15	REPAIR LINED CHANNELS	12/99

DESCRIPTION & PURPOSE

Repair of damaged concrete, rip rap, gabion, or other channel linings, retaining walls, etc., to restore to original condition and prevent further deterioration.

AUTHORIZED BY	LIMITS ON WORK
Maintenance Supervisor	

PERFORMANCE CRITERIA

Repairs of channel linings, retaining walls, and other structures critical to the protection of a facility are to be scheduled immediately upon detection of damage.

CREW SIZE

- 1 Maintenance Foreman
- 2 Maintenance Workers
-
- 3 TOTAL

EQUIPMENT

- Pickup
- Flatbed Dump
- Concrete Mixer
-

WORK METHOD

1. Obtain from storekeeper safety equipment, materials, tools necessary for the day's work.
2. Begin applicable safety procedures and/or traffic control.
3. Clean and prepare damaged area.
4. Build and place forms as necessary.
5. Place and finish concrete.
6. Remove forms and back fill.

MATERIAL

- Assorted lumber
- 6-30 bags sacked concrete
- 3-15 tons concrete gravel mix
- 2-10 CY ready-mix concrete

AVERAGE DAILY PRODUCTION

1Each/Day

NOTES:

Crew size and equipment may vary significantly depending on urgency, extent and complexity of repair.

PERFORMANCE STANDARD

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
20	PROVIDE / MAINTAIN EROSION CONTROL	12/99

DESCRIPTION & PURPOSE

Placement of rip rap, sand bags, or other erosion control materials and repair of damaged areas of erosion protection to restore material to original condition. This work is done to prevent further deterioration and eliminate potential erosion problems.

AUTHORIZED BY	LIMITS ON WORK
Maintenance Supervisor	

PERFORMANCE CRITERIA

Work is to be scheduled when damage or deterioration is severe enough to present potential erosion problems. Erosion undercutting roadways, sidewalks, or prepared embankments/improvements shall be repaired immediately. Repair of undermined stabilizers shall be scheduled immediately.

CREW SIZE

- 1 Foreman
- 2 Equipment Operators
- 2 Maintenance Workers
-
- 5 TOTAL

EQUIPMENT

- 1 Truck Crane
- -or- Backhoe
- 1 Dump Truck
- 1 Pickup

WORK METHOD

1. Obtain from storekeeper safety equipment, materials and tools necessary for the day's work.
2. Begin applicable safety procedures and/or traffic control.
3. Shape work area to receive riprap, or other erosion control materials.
4. Place material and grout where applicable.
5. Back fill as necessary.

MATERIAL

- 20-50 Tons Rock for riprap (delivered)
- 5-12 yards ready mix concrete (if needed)
- 5,000-15,000 gal Water

AVERAGE DAILY PRODUCTION

1300 Square Feet/day

NOTES:

PERFORMANCE STANDARD

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
25	CLEAN & INSPECT DETENTION/DEBRIS BASINS	12/99

DESCRIPTION & PURPOSE

Inspection and removal, by loader (including hauling and disposal), of sediment and debris deposited in detention and debris basins to restore full capacity and original shape.

AUTHORIZED BY	LIMITS ON WORK
Maintenance Supervisor	

PERFORMANCE CRITERIA

Remove sediment bi-annually or when debris basins or dams detention capacity is significantly reduced. Clean out is normally justified when the sedimentation reaches 1 to 2 feet in depth or as established by the design.

CREW SIZE

- 1 Foreman
- 3 Equipment Operators
- 1 Maintenance Worker
- 5 **TOTAL**

EQUIPMENT

- 1 Pickup
- 1 Loader
- 2* Dump Trucks

WORK METHOD

1. Obtain from storekeeper safety equipment, materials and tools necessary for the day's work.
2. Begin applicable safety procedures and/or traffic control.
3. Prepare removal and disposal sites for access.
4. Stockpile material for removal.
5. Load material and haul to designated disposal site.
6. Shape dam or basin to desired line and grade.
7. Grade disposal site as necessary.

MATERIAL

- Disposal Fees

AVERAGE DAILY PRODUCTION

1000 Cubic Yards/day

NOTES:

*Schedule sufficient trucks to insure maximum utilization of excavation equipment.

PERFORMANCE STANDARD

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
30	EROSION REPAIR	12/99

DESCRIPTION & PURPOSE

The replacement and compaction of material removed by erosion, using hand tools or other methods, to restore Flood Control channels, supporting embankments, levees or access roads.

AUTHORIZED BY	LIMITS ON WORK
Maintenance Supervisor	

PERFORMANCE CRITERIA

As needed when damage has occurred which has affected or will affect the structural integrity of a channel embankment, levee, or access road,at a location where mechanical methods cannot be used.

CREW SIZE

- 1 Foreman
- 2 Maintenance Workers
-
-
- 3 TOTAL

EQUIPMENT

- 1 1-Ton Dump -or- Flatbed
- 1 Air Compressor w/compactor
- 1 Pickup w/Water Tank
- -or- Auxiliary Spray Truck

WORK METHOD

1. Obtain from storekeeper safety equipment, materials, and tools necessary for the day's work.
2. Begin applicable safety procedures and/or traffic control.
3. Remove debris and growth from damage location.
4. Haul fill material from pre-determined source.
5. Place and compact fill material in lifts.
6. Shape repair area to conform to adjacent areas.
7. Clean up work area as necessary.

MATERIAL

- 15-30 Tons Select Fill Material
-
-
-

AVERAGE DAILY PRODUCTION

15 Cubic Yards

NOTES:

PERFORMANCE STANDARD

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
35	FENCE REPAIR	12/99

DESCRIPTION & PURPOSE

The repair and/or re-establishment of downed or damaged fences to restore fence to proper condition and to provide right-of-way control.

AUTHORIZED BY	LIMITS ON WORK
Maintenance Supervisor	

PERFORMANCE CRITERIA

Repair of downed or open fence areas to be performed upon detection. Repairs to damaged locations that remain partially functional are to be scheduled in priority with other work.

CREW SIZE

- 2 Maintenance Workers
- 2 **TOTAL**

EQUIPMENT

- 1 Fence Truck
- 1 Concrete Mixer (if needed)

WORK METHOD

1. Obtain from storekeeper safety equipment, materials and tools necessary for the day's work.
2. Begin applicable safety procedures and/or traffic control.
3. Perform necessary repairs to:
   - Posts
   - Fabric
   - Top rail

MATERIAL

- 40-50 Linear Ft Fence Fabric
- Miscellaneous Hardware
- 5 bags "Readycrete"

AVERAGE DAILY PRODUCTION

100 Linear Feet/day

NOTES:

PERFORMANCE STANDARD

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
40	VEGETATION CONTROL - CHEMICAL	12/99

DESCRIPTION & PURPOSE

The application of herbicides, to designated areas, with a boom-mounted spray bar to prevent new growth and/or control existing vegetation, for the purpose of insuring the capacity and integrity of Flood Control facilities.

AUTHORIZED BY	LIMITS ON WORK
Maintenance Supervisor	

PERFORMANCE CRITERIA

Spray pre-emergence herbicide and post-emergence herbicide annually to designated areas combining applications where possible.

CREW SIZE	WORK METHOD
▪ 2 Maintenance Workers ▪ ▪ ▪ 2 **TOTAL**	1. Set up safety devices as required. 2. Treat channel areas as required. 3. Remove safety devices.
EQUIPMENT	
▪ 1 Truck-mounted chemical tank with spray bar and hand sprayer ▪ ▪	

MATERIAL	AVERAGE DAILY PRODUCTION
▪ Pre 12.5-25 lb/Ac ▪ Emerg Contact: 12.5-25 lb/Ac ▪ Post Brush: 120 lb/Ac ▪ Emerg Grass: 30 lb/Ac ▪ Waterweed: 1 gal/Ac ▪ Spreader: 1 gal/Ac ▪ Water 200 gal/Ac	Acres

NOTES:

PERFORMANCE STANDARD

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
45	VEGETATION CONTROL - MECHANICAL	12/99

DESCRIPTION & PURPOSE

The mechanical removal of brush and weeds to maintain detention, debris basins, and channels free of vegetation.

AUTHORIZED BY	LIMITS ON WORK
Maintenance Supervisor	

PERFORMANCE CRITERIA

Work to be scheduled when weeds and willows grow up at unsprayable locations, or when growth is too high for effective spraying.

CREW SIZE

- 1 Equipment Operator
-
-
- 1 **TOTAL**

EQUIPMENT

- 1 Mower or Grader
- 1 Tilt Trailer (if needed)
- 1 Pickup
-

WORK METHOD

1. Obtain from storekeeper safety equipment, materials, and tools necessary for the day's work.
2. Begin applicable safety procedures and/or traffic control.
3. Mow, blade down, or turn under unwanted vegetation.

MATERIAL

-
-
-
-

AVERAGE DAILY PRODUCTION

4 Acres/day

NOTES:

PERFORMANCE STANDARD

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
50	MAINTAIN ACCESS ROADS	12/99

DESCRIPTION & PURPOSE

Mechanical grading of access roads to remove minor ruts and erosion,and restore normal shape and cross slope, for access to Flood Control facilities.

AUTHORIZED BY	LIMITS ON WORK
Maintenance Supervisor	

PERFORMANCE CRITERIA

As needed prior to rainy season, or when the weather affects the road condition. Plan to re-profile access roads on a bi-annual (two year) frequency.

CREW SIZE

- 2 Equipment Operators
- 1 Maintenance Workers
- 3 **TOTAL**

EQUIPMENT

- 1 Grader
- 0-1 Water Truck
- 0-1 Roller
- 1 Pickup

WORK METHOD

1. Obtain from storekeeper equipment and tools necessary for the day's work.
2. Begin applicable safety procedures and/or traffic control.
3. Grade access roads:
   - Restoring X-section shape
   - Filling potholes
   - Grading out ruts
   - Restoring ditches and drainage.
4. Roll and compact regraded.

MATERIAL

- 10,000 Gal Water (if needed)

AVERAGE DAILY PRODUCTION

.5 Mile/day

NOTES:

PERFORMANCE STANDARD

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
55	CLEAN & INSPECT INLET/OUTLET STRUCTURES	12/99

DESCRIPTION & PURPOSE

Cleaning and inspection of catch basins, inlets, sumps, grates, outflow and other structures to remove silt and debris and to inspect for structural integrity and proper functioning.

AUTHORIZED BY	LIMITS ON WORK
Maintenance Supervisor	

PERFORMANCE CRITERIA

Plan for structures to be inspected and cleaned a minimum of once per year. Annual cleaning shall be the major effort to allow thorough inspection of structure in order to schedule repairs.

CREW SIZE

- .25 Foreman
- 2 Maintenance Workers
-
-
- 2.25 **TOTAL**

EQUIPMENT

- 1 1-Ton Truck
- 1 Water Tanker (1500 gal)
- -or- High Pressure Vacuum (Vactor)
- Appropriate Hand Tools

WORK METHOD

1. Perform daily vehicle P.M. check and check equipment.
2. Place signs/traffic control devices as required.
3. Locate truck in the best working position and as far off roadway as practical.
4. Remove grate. Then remove debris, trash & sediment from grate.
5. Loosen solids with spade if necessary.
6. Flush/vacuum basin.
7. Inspect structure visually to determine if further cleaning or repair is necessary.
8. Dispose of debris at designated dump site.
9. Check and clean equipment after use.

MATERIAL

- Water
-
-
-

AVERAGE DAILY PRODUCTION

15 Each/day

NOTES:

Structures that cannot be cleaned shall be reported to the Maintenance Supervisor for initiation of corrective action.

PERFORMANCE STANDARD

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
60	REPAIR INLET / OUTLET STRUCTURES	12/99

DESCRIPTION & PURPOSE

Repair of catch basins, grates, inlets, control gates, outfalls, weirs, manholes, sumps, and other spot structures to restore elements to their original operational condition.

AUTHORIZED BY	LIMITS ON WORK
Maintenance Supervisor	

PERFORMANCE CRITERIA

Based on detailed inspection of repair, replace components, or entire structure as conditions warrant. Plan repair of five percent (5%) of system structures per year.

CREW SIZE

- 1 Foreman
- 2 Maintenance Workers
- =
- =
- = 3 TOTAL

EQUIPMENT

- 1 Pickup
- 1 Compressor w/accessories
- =
- =

WORK METHOD

1. Obtain necessary safety equipment, tools, and materials.
2. Initiate applicable safety procedures and traffic control.
3. Remove and clean area of damage/failure.
4. Repair as necessary to original condition and test operation as appropriate.

MATERIAL

- Concrete
- Aggregates
- Miscellaneous parts, as required
- =

AVERAGE DAILY PRODUCTION

1 Each/day

NOTES:

PERFORMANCE STANDARD

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
65	CLEAN STORM SEWER LINES	12/99

DESCRIPTION & PURPOSE

The removal of debris of any type from within conduits by: flushing with water; the use of a sewer cleaning machine; or by physically entering the conduit and manually removing debris, to restore full capacity.

AUTHORIZED BY	LIMITS ON WORK
Maintenance Supervisor	

PERFORMANCE CRITERIA

Plan cleaning of storm sewer lines on an average 5-year cycle. Specific areas may require annual cleaning while others will require less than 5-year cleaning.

CREW SIZE	WORK METHOD
▪ 1 Maintenance Foreman ▪ 2 Maintenance Workers ▪ ▪ 3 **TOTAL**	1. Obtain from storekeeper safety equipment and tools necessary for the day's work. 2. Begin applicable safety procedures and/or traffic control. 3. Remove debris from conduit. 4. Load debris and haul to designated disposal site if necessary. 5. Clean up work area as necessary.
EQUIPMENT	
▪ 1 Sewer Cleaner ▪ ▪ ▪	
MATERIAL	**AVERAGE DAILY PRODUCTION**
▪ 0-5,000 Gallons Water ▪ ▪ ▪	1500 linear feet/day

NOTES:

Work should be scheduled whenever possible, in conjunction with annual cleaning of adjacent structures.

PERFORMANCE STANDARD

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
70	STORM SEWER LINE REPAIR	12/99

DESCRIPTION & PURPOSE

Excavation and repair of storm sewer lines to eliminate blockages and repair failed pipes.

AUTHORIZED BY	LIMITS ON WORK
Maintenance Supervisor	

PERFORMANCE CRITERIA

Priority of repairs:
1. eliminate blockages and hazards to public safety;
2. remove flow restrictions and repair damaged/failed pipe sections.

CREW SIZE

- 1 Foreman
- 1 Equipment Operator
- 2 Maintenance Workers
- 4 **TOTAL**

EQUIPMENT

- 1 Dump Truck
- 1 Backhoe/Util Tractor
- 1 Air Compressor w/accessories
- Appropriate Hand Tools

WORK METHOD

1. Set up warning signs and traffic control devices.
2. Take necessary measures to control flow -- providing uninterrupted service whenever possible.
3. Cut pavement and/or excavate to the extent required to determine necessary scope of repairs.
4. Remove flow restrictions, as necessary.
5. Back fill and compact in lifts to within 10 inches of surface.
6. Place select material (rock or shell) and compact to within 2 inches of surface* (See Note below.)
7. Coordinate density test and request repaving as required.
8. Clean work area. Remove signs and warning devices.
9. Record work accomplishment.

MATERIAL

- Pipe/fittings
- Sand
- Cement
- Rock
- Asphalt, as required

AVERAGE DAILY PRODUCTION

1 Repair/day

NOTES:

Verify location of other utilities prior to excavation.

* Back fill specifications apply to paved areas. In easements and other unpaved areas, back fill and compact in 2-foot lifts to grade; re-sod as necessary. Install safety fence and secure job site at end of workday as required.

PERFORMANCE STANDARD

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
75	CLEAN / FLUSH CULVERTS & BRIDGES	12/99

DESCRIPTION & PURPOSE

Cleaning/flushing of culverts and bridges to remove silt and debris, and eliminate restriction to flow.

AUTHORIZED BY	LIMITS ON WORK
Maintenance Supervisor	

PERFORMANCE CRITERIA

Plan for all culverts to be cleaned/flushed annually.

CREW SIZE

- 1 Maintenance Supervisor
- 1 Maintenance Worker
-
-
- 2 **TOTAL**

EQUIPMENT

- 1 1-Ton Dump Truck
- 1 Water Tanker (1500 gal)
- -or- High Pressure/Vacuum cleaner/Vactor
- Safety Equipment
- Appropriate Hand Tools

WORK METHOD

1. Place signs and safety devices.
2. Locate truck in best working position and as far off roadway as possible.
3. Clean out ends of culvert.
4. Flush culverts until flow is unrestricted.
5. Load excess material/debris into truck for disposal at designated dump area.
6. Pick up signs and safety devices.

MATERIAL

- Water
-

AVERAGE DAILY PRODUCTION

5-7 Each/Day

NOTES:

1. Inform Maintenance Supervisor of any non-cleanable culverts or those that can only be partially cleaned.
2. Avoid damaging downstream property when flushing culverts.
3. Work should be scheduled, whenever possible, in conjunction with annual cleaning of adjacent structures.

PERFORMANCE STANDARD

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
80	MISCELLANEOUS WORK ACTIVITIES	12/99

DESCRIPTION & PURPOSE

All work performed that is not described in previous activities. This includes, among others, activities such as catwalk repair, rodent control, pump maintenance, concrete spalled area repair, painting, building and grounds maintenance, trash pickup*, graffiti abatement, sign installation and maintenance.

AUTHORIZED BY	LIMITS ON WORK
Maintenance Supervisor	

PERFORMANCE CRITERIA

Plan 8 labor hours per channel mile per year for miscellaneous maintenance work.

CREW SIZE

- 1 Maintenance Worker
- 1 **TOTAL**

EQUIPMENT

- 1 Pickup
- Hand tools

WORK METHOD

1. Obtain from storekeeper safety equipment, materials, and tools necessary for the day's work.
2. Begin applicable safety procedures and/or traffic control.

MATERIAL

- As required

AVERAGE DAILY PRODUCTION

8 Labor Hours

NOTES:

*Includes appliances, tires, car bodies, and other large objects dumped in channels/basins.

PERFORMANCE STANDARD

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
85	ENGINEERING	12/99

DESCRIPTION & PURPOSE

All work that is by nature engineering. This includes, among others, surveying and preparation of plans and specifications for maintenance work.

AUTHORIZED BY	LIMITS ON WORK
Director of Public Works for designee	

PERFORMANCE CRITERIA

CREW SIZE	WORK METHOD
▪ N/A ▪ ▪ ▪ TOTAL	1. As deemed most cost effective.
EQUIPMENT	
▪ N/A ▪ ▪ ▪	
MATERIAL	**AVERAGE DAILY PRODUCTION**
▪ N/A ▪ ▪ ▪	8 Hours/Day

NOTES:

4.35 Reporting

Comprehensive maintenance programs include procedures for reporting and summarizing work accomplished and labor-hours used for maintenance activities. This information enables managers and supervisors to compare actual performance with the planned work program. These planned-actual comparisons -- on a regular basis -- are essential for effective management and control of the work program.

The reporting procedures provide specific information:

- What Master Plan facility required work.
- What work was done by activity.
- How much of each activity was done.
- The labor-hours used to accomplish the work

This information is used by managers in their effort to:

- Make sure the right kinds and amounts of maintenance work are done.
- Identify the problem areas and related corrective actions.
- Develop future work programs and budgets.
- Identify opportunities for improved productivity.

The work reporting process can consist of a simple form as outlined in the following section.

Daily Work Activity Report

The Daily Work Activity Report may be used to record and summarize (1) the kinds and amounts of work performed by maintenance personnel, and (2) the number of labor-hours used to do that work. The report can be used to summarize all work activities. Each Entity may use its standard accounting/reporting procedures for the Daily Work Activity Report.

The Maintenance Supervisor or crew leader usually prepares the Daily Work Activity Report. Following are instructions for the completion of the sample report shown on **Figure 4-6.**

1. Identification Data - Fill in all blanks: the Entity, date, name of person preparing the report, and the names and employee numbers of all persons to perform work to be reported for the day. (The form provides for several combinations of activities and employees. If additional pages are needed, number the pages accordingly).

2. Master Plan Facility ID/Name Enter the specific 4 letter-4 digit Master Plan Facility number and reach, which indicates the "from" and "to," if applicable. This number directly corresponds to the specific Master Plan location as identified on current Master Plan maps. Also, indicate the Facility Name.

3. MWP Facility Number - Enter the identifying Maintenance Work Plan facility number. (This number directly corresponds to the budget approved for the facility and will typically include a range of Master Plan facilities and reach.)

4. Activity Number - Enter the number of each activity performed. Use the Work Activity Directory or Performance Standards to complete the blank.

5. Employee Number - Enter the employee number of the person working a specific activity at the specific facility.

6. Hours Worked by Each Employee - Record the number of hours worked by each employee, by the appropriate activity. Record the time spent to the nearest quarter-hour. For example, record 1 hour and 45 minutes as 1.75 hours and 3 hours and 20 minutes as 3.25 hours.

7. Equipment Number - Enter the assigned equipment number for any mechanical equipment on which work was performed for preventive and corrective maintenance only.

8. Work Performed - Enter the location and a brief description of the work performed.

9. Accomplishment - Measure and record the amount of work done for each activity. Use the correct measurement unit for each activity. (See the Activity List in **Section 4.32.)** Record the amount of work done to the nearest whole unit. Record labor-hours to the nearest hour. For activities with labor-hours as the unit of measure, the "quantity" will be exactly the same as "total hours" for the activity.

10. Notes/Comments - Record any additional relevant information that may be of use in summarizing and analyzing work activity data.

The completed reports can be used for monthly summarization and report preparation, and serve as completion certification backup for the monthly force account reimbursement billings.

REGIONAL FLOOD CONTROL DISTRICT
DAILY WORK ACTIVITY REPORT

ENTITY: _____

Date Work Performed: _____ 20____

Supervisor Name: _____

Employee Name: _____ No. _____

Employee Name: _____ No. _____

Employee Name: _____ No. _____

Employee Name: _____ No. _____

Employee Name: _____ No. _____

MWP Facility Number	Master Plan Facility ID/Facility Name	Activity Number Worked	Empl. Number	Hours Worked by Activity	Equip. Number Used	Work Performance (Location, Brief Description, Materials Used, Etc.)	Accomplishment	
							Amount	Unit of Measure

NOTES/COMMENTS: _____

_____

The undersigned hereby certifies that the above described maintenance was performed in accordance with the criteria/standards contained in the Districts Operations and Maintenance Manual. Further, the information contained herein accurately reflects the time and accomplishments reported during the performance of this work.

_____ _____ _____

Supervisor's Signature Date Title

Page ____ of ____

Figure 4-6 Daily Work Activity Report

4.40 INVENTORY PROCEDURES

4.41 Purpose

The purpose of this element of the Operations and Maintenance Manual is to provide a record of the existing physical flood control system that is eligible for maintenance funding assistance by the District. The physical facilities that make up the collection and conveyance system have in many instances been paid for in whole or in part by the District, however, they are not "owned, " operated, or maintained by the District. If, however, the total flood control system does not function properly when needed, it is ultimately the responsibility of the District to determine why and to take corrective action. A critical key to assuring the system functions properly is an up-to-date inventory of the physical system.

4.42 Physical System

In 1990, each Entity provided a list of the physical system that makes up the flood control system in their jurisdiction. Facilities eligible for maintenance funding are those identified in the Regional Flood Control District's Master Plan and any revisions, amendments, and/or changes subsequently approved. Only those facilities that exist as Master Plan facilities, or exist in the same alignment as a proposed Master Plan facility and appurtenant facilities are eligible.

Schedule

The inventory work sheets must be expanded to represent a true and accurate accounting of facilities on the Master Plan and tributary (drainage) systems and updated as part of the annual certification process.

Reporting

The Entities should submit annual updates of the physical system inventory on the form required by the District **(Figure C-l).**

4.43 Physical System Maps

Each Entity must have a map that shows the physical system for drainage and flood control. This map should reflect that portion that is on the Master Plan and also that portion that is eligible for maintenance funding by the District.

Schedule

The individual Entities should submit to the District updated maps annually, or more frequently as project completion dictates, reflecting the size, location and material elements of their drainage and flood control system. The update should show those systems that are eligible for Regional Flood Control District funding under the categories shown in **Section 4.11** of this manual.

Reporting

The physical system update with maps should be provided to the District and be in a form that is readily reproducible.

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT
OPERATIONS AND MAINTENANCE MANUAL

CHAPTER 5
EMERGENCY FUNDING PROCEDURES

5.10 EMERGENCY FUNDING PROCEDURES

5.11 Purpose

This element of the Operations and Maintenance Manual provides the Entities with procedures to perform emergency restoration and rehabilitation immediately following a flood event. A principal role of the District shall be to support the Entities' efforts to: (1) secure funding from state, federal, entity reserves and private sources; and (2) facilitate required immediate repairs to regional flood control facilities without delay.

Projects eligible for District emergency restoration and rehabilitation funding are those included in the Entity's approved or amended Maintenance Work Program.

5.12 Procedures

If the governing body elects to declare an emergency, then the District, in accordance with NRS 332.055 (Emergency Contracts: Competitive bidding not required; "emergency" defined.), will authorize and process emergency purchase orders to the maximum limit of unexpended funds upon written request by the Entity.

APPENDIX A

KEY STATUTORY, REGULATORY, AND POLICY REFERENCES

NEVADA REVISED STATUTES

1. CHAPTER 332 PURCHASING: LOCAL GOVERNMENTS
2. CHAPTER 338 PUBLIC WORKS PROJECTS
3. CHAPTER 543 CONTROL OF FLOODS

UNIFORM REGULATIONS FOR THE CONTROL OF DRAINAGE

1. SECTION 12 DESIGN/IMPROVEMENT STANDARDS
   a. 12.050 Construction/Operation/Maintenance

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

1. SECTION 300 DRAINAGE POLICY
   a. 303.10 Drainage Facilities Maintenance

REGIONAL FLOOD CONTROL DISTRICT POLICIES AND PROCEDURES MANUAL

1. CHAPTER 16.0 FACILITY MAINTENANCE
   a. 16.1 Annual Maintenance Work Program
   b. 16.2 Catastrophic Damage to Flood Control Facilities

APPENDIXB

SAMPLE AUTHORIZATION-TO-PROCEED INTERLOCAL CONTRACT

INTERLOCAL CONTRACT
ANNUAL MAINTENANCE WORK PROGRAM

THIS CONTRACT, made and entered into this ___ day of_____, 20____, by and between the [legal name of CITY or COUNTY], a political subdivision of the State of Nevada, hereinafter referred to as "CITY" (or "COUNTY"), and the CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT, hereinafter referred to as "DISTRICT".

WITNESSETH:

WHEREAS, pursuant to Chapter 543 of the Nevada Revised Statutes, the DISTRICT may approve and fund projects to maintain flood control improvements; and

WHEREAS, the CITY (or COUNTY) desires to maintain flood control improvements within the CITY (or COUNTY) in accordance with the maintenance program set forth herein, and hereinafter referred to as "Project"; and

WHEREAS, the facilities upon which maintenance will be done are facilities described in the District's Master Plan.

NOW, THEREFORE, in consideration of the covenants, conditions, agreements, and promises of the parties hereto, the DISTRICT authorizes the Project as it is mutually understood and agreed as follows:

SECTION I - SCOPE OF PROJECT

This Interlocal Contract applies to the maintenance of flood control facilities, which are identified in the District's Master Plan facilities including updates and amendments subsequently approved. The basic maintenance to the facilities will be in accordance with performance standards set forth in the current District *Operations and Maintenance Manual.*

The Project is more specifically described in Exhibit "A" which is attached hereto and by this reference incorporated herein.

SECTION II - PROJECT COSTS

The DISTRICT agrees to provide reimbursement for Project costs within the limits specified below:

1. The Projects costs shall not exceed $_____

The amounts allocated to each individual facility within the Project must be specified in **Exhibit "A".** Any changes to said allocated amounts must be approved by the DISTRICT's Chief Engineer in accordance with **Section** 4.24 of the District *Operations and Maintenance Manual.*

2. "Authorization to Proceed" is herein granted for maintenance of facilities in Exhibit "A" in an amount not to exceed _____, effective _____

3. A separate request for an "Authorization to Proceed" will be required for additional facility maintenance funds.

4. A written request must be made to the DISTRICT and a Supplemental Interlocal Contract approved to increase the amount noted above prior to payment of any additional funds.

5. The CITY (or COUNTY) and DISTRICT will comply with **Section 4.12** of the *Operations and Maintenance Manual.* In accordance with said manual the CITY (or COUNTY) shall submit invoices together with a detailed summary report of the maintenance service performed. The CITY (or COUNTY) shall submit an invoice voucher in the manner prescribed by the DISTRICT. The vouchers shall include such information as is necessary for the DISTRICT to determine the nature of all expenditures. Each voucher will clearly indicate that it is for services rendered in performance under this contract. Each voucher will also be accompanied by a written certification from the CITY (or COUNTY) stating that it is for performance of maintenance activities under this contract and is composed of completed elements set forth in the annual work program.

All invoices must be submitted for payment to:

Clark County Regional Flood Control District
Accounts Payable
600 S. Grand Central Parkway, Suite 300
Las Vegas, Nevada 89106-45 11

Payment shall be considered timely if made by the DISTRICT within 30 days. Pursuant to **Section IV, Paragraph** 6, the DISTRICT may, in its sole discretion, withhold payments to the CITY (or COUNTY) for services rendered if the CITY (or COUNTY) fails to satisfactorily comply with any term or condition of this contract and/or the District Operations and *Maintenance Manual.*

SECTION III - PROJECT TIME

The CITY (or COUNTY) agrees to perform the Project to the satisfaction of the DISTRICT on or before June 30, 20 . The DISTRICT may grant extensions or terminate this contract and require all sums advanced to the CITY (or COUNTY) to be repaid if the CITY (or COUNTY) fails to perform by said date.

SECTION IV GENERAL

1. The CITY (or COUNTY) will complete the Project as set forth in **Exhibit "A".** The CITY (or COUNTY) staff personnel responsible for coordination work under this contract are as listed below:

(list names and titles of CITY or COUNTY staff)

It is understood that staff named above will be responsible for work coordination throughout the period of this contract unless the DISTRICT is informed in writing of changes in these personnel assignments.

2. In addition to the specific terms set forth in this Contract, the parties hereto shall be subject to and governed by the District *Operations and Maintenance Manual,* and any applicable portions of the *Policies and Procedures* adopted by the DISTRICT.

3. It is the intent of the DISTRICT that scheduling of maintenance and repair of drainage and flood control facilities in general and Master Plan Facilities specifically be coordinated among entities. Therefore, in those cases where Master Plan approved, and District-funded projects have regional fund control significance impacting more than one entity, the CITY (or COUNTY) will allow all impacted entities an opportunity to review the maintenance schedule in order to coordinate maintenance efforts.

4. The Chief Engineer of the DISTRICT shall be responsible for monitoring the performance of the CITY (or COUNTY), approval for payment of billings and expenses submitted by the CITY (or COUNTY) and the acceptance of any report provided by the CITY (or COUNTY). The CITY (or COUNTY) shall be responsible for monitoring performance of CITY (or COUNTY) staff or private contractors, and the CITY (or COUNTY) shall maintain detailed records of all payments made to contractors and make such records available to the DISTRICT upon request.

5. The CITY (or COUNTY) shall provide right of access to its facilities to the DISTFUCT or Chief Engineer at all reasonable times, in order to monitor and evaluate performance, compliance, and/or quality assurance under this contract.

6. In the event the CITY (or COUNTY) fails to perform the maintenance according to the standards specified in this contract and in the District *Operations and Maintenance Manual,* the DISTRICT may perform or cause to be performed the maintenance necessary to assure proper operation of the facility. Cost incurred by the DISTRICT shall be reimbursed by the CITY (or COUNTY) or be deducted from the amount authorized by this contract. The DISTRICT may not exercise this right without giving the CITY (or COUNTY) specific written notice of the maintenance required and allowing the CITY (or COUNTY) 60 days within which to perform said maintenance. The notice required by this provision must be sent to:

(insert name of City or County staff)
(insert title)
[insert City or County mailing address)

7. The records of the CITY (or COUNTY) and/or private contractors pertaining to the subject matter of this contract shall at all reasonable times be subject to inspection and audit by the DISTRICT or an Agent of the DISTRICT.

8. If any provision of this contract shall be deemed in conflict with any statute or rule of law, such provision shall be deemed modified to be in conformance with said statute or rule of law.

9. All parties to this contract shall comply with applicable local, state, and federal laws.

10. Any costs found to be improperly allocated in the Project will be refunded by the CITY (or COUNTY) to the DISTRICT.

11. It is specifically understood and agreed to by and between the parties hereto that it is not intended by any of the provisions of any part of this contract to create in the public or any member thereof a third party beneficiary hereunder, or to authorize anyone not a party to this contract to maintain a suit for personal injuries or property damage pursuant to the terms or provisions of this contract.

12. The CITY (or COUNTY) hereby indemnifies and shall defend and hold harmless the DISTRICT, its representatives and their employees (or their authorized representatives) from and against any and all suits, actions, legal or administrative proceedings, claims, demands, damages, liabilities, interest, attorney's fees, costs and expenses whatsoever of any kind or nature whether arising before or after completion of the work hereunder and in any manner directly or indirectly caused, occasioned or contributed to in whole or in part, by reason of any act, omission, fault or negligence whether active or passive of the CITY (or COUNTY), of anyone acting under its direction or control, or on its behalf in connection with or incident to the performance of this Contract. The CITY'S (or COUNTY'S) aforesaid indemnity and hold harmless obligations, or portions or applications thereof, shall apply to the fullest extent permitted by law, but in no event shall they apply to liability caused by the sole negligence or willful misconduct of the party indemnified or held harmless.

IN WITNESS WHEREOF, the parties have caused this contract to be executed the day and year first above written.

Date of District Action:

REGIONAL FLOOD CONTROL DISTRICT

_____

ATTEST:

BY: _____
Chairman

_____
Secretary to the Board

Approved as to Form:

BY: _____
Deputy District Attorney

****

Date of Council Action:
(or Commission Action)

CITY (or COUNTY) OF _____

_____

ATTEST:

BY: _____
(Mayor or Board Chairman)

_____
City (or County Clerk)

APPENDIXC

SAMPLE INTERLOCAL CONTRACT

INTERLOCAL CONTRACT
ANNUAL MAINTENANCE WORK PROGRAM

THIS CONTRACT, made and entered into this ___ day of_____, 20____, by and between the [legal name of CITY or COUNTY], a political subdivision of the State of Nevada, hereinafter referred to as "CITY" (or "COUNTY"), and the CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT, hereinafter referred to as "DISTRICT".

WITNESSETH:

WHEREAS, pursuant to Chapter 543 of the Nevada Revised Statutes, the DISTRICT may approve and fund projects to maintain flood control improvements; and

WHEREAS, the CITY (or COUNTY) desires to maintain flood control improvements within the CITY (or COUNTY) in accordance with the maintenance program set forth herein, and hereinafter referred to as "Project"; and

WHEREAS, the facilities upon which maintenance will be done are facilities described in the District's Master Plan.

NOW, THEREFORE, in consideration of the covenants, conditions, agreements, and promises of the parties hereto, the DISTRICT authorizes the Project as it is mutually understood and agreed as follows:

SECTION I - SCOPE OF PROJECT

This Interlocal Contract applies to the maintenance of flood control facilities, which are identified in the District's Master Plan facilities including updates and amendments subsequently approved. The basic maintenance to the facilities will be in accordance with performance standards set forth in the current District *Operations and Maintenance Manual.*

The Project is more specifically described in Exhibit "A" which is attached hereto and by this reference incorporated herein.

SECTION II - PROJECT COSTS

The DISTRICT agrees to provide reimbursement for Project costs within the limits specified below:

1. The Projects costs shall not exceed $_____

The amounts allocated to each individual facility within the Project must be specified in **Exhibit "A".** Any changes to said allocated amounts must be approved by the DISTRICT's Chief Engineer in accordance with **Section** 4.24 of the District *Operations and Maintenance Manual.*

A written request must be made to the DISTRICT and a Supplemental Interlocal Contract approved to increase the amount noted above prior to payment of any additional funds.

2. The CITY (or COUNTY) and DISTRICT will comply with **Section 4.12** of the *Operations and Maintenance Manual.* In accordance with said manual the CITY (or COUNTY) shall submit invoices together with a detailed summary report of the maintenance service performed. The CITY (or COUNTY) shall submit an invoice voucher in the manner prescribed by the DISTRICT. The vouchers shall include such information as is necessary for the DISTRICT to determine the nature of all expenditures. Each voucher will clearly indicate that it is for services rendered in performance under this contract. Each voucher will also be accompanied by a written certification from the CITY (or COUNTY) stating that it is for performance of maintenance activities under this contract and is composed of completed elements set forth in the annual work program.

All invoices must be submitted for payment to:

Clark County Regional Flood Control District
Accounts Payable
600 S. Grand Central Parkway, Suite 300
Las Vegas, Nevada 89106-45 11

Payment shall be considered timely if made by the DISTRICT within 30 days. Pursuant to **Section IV, Paragraph** 6, the DISTRICT may, in its sole discretion, withhold payments to the CITY (or COUNTY) for services rendered if the CITY (or COUNTY) fails to satisfactorily comply with any term or condition of this contract and/or the District *Operations and Maintenance Manual.*

SECTION III - PROJECT TIME

The CITY (or COUNTY) agrees to perform the Project to the satisfaction of the DISTRICT on or before June 30, 20___. The DISTRICT may grant extensions or terminate this contract and require all sums advanced to the CITY (or COUNTY) to be repaid if the CITY (or COUNTY) fails to perform by said date.

SECTION IV - GENERAL

1. The CITY (or COUNTY) will complete the Project as set forth in **Exhibit "A".** The CITY (or COUNTY) staff personnel responsible for coordination work under this contract are as listed below:

(list names and titles of CITY or COUNTY staff)

It is understood that staff named above will be responsible for work coordination throughout the period of this contract unless the DISTRICT is informed in writing of changes in these personnel assignments.

2. In addition to the specific terms set forth in this Contract, the parties hereto shall be subject to and governed by the District *Operations and Maintenance Manual,* and any applicable portions of the *Policies and Procedures* adopted by the DISTRICT.

3. It is the intent of the DISTRICT that scheduling of maintenance and repair of drainage and flood control facilities in general and Master Plan Facilities specifically be coordinated among entities. Therefore, in those cases where Master Plan approved, and District-funded projects have regional fund control significance impacting more than one entity, the CITY (or COUNTY) will allow all impacted entities an opportunity to review the maintenance schedule in order to coordinate maintenance efforts.

4. The Chief Engineer of the DISTRICT shall be responsible for monitoring the performance of the CITY (or COUNTY), approval for payment of billings and expenses submitted by the CITY (or COUNTY) and the acceptance of any report provided by the CITY (or COUNTY). The CITY (or COUNTY) shall be responsible for monitoring performance of CITY (or COUNTY) staff or private contractors, and the CITY (or COUNTY) shall maintain detailed records of all payments made to contractors and make such records available to the DISTRICT upon request.

5. The CITY (or COUNTY) shall provide right of access to its facilities to the DISTRICT or Chief Engineer at all reasonable times, in order to monitor and evaluate performance, compliance, and/or quality assurance under this contract.

6. In the event the CITY (or COUNTY) fails to perform the maintenance according to the standards specified in this contract and in the District *Operations and Maintenance Manual,* the DISTRICT may perform or cause to be performed the maintenance necessary to assure proper operation of the facility. Cost incurred by the DISTRICT shall be reimbursed by the CITY (or COUNTY) or be deducted from the amount authorized by this contract. The DISTRICT may not exercise this right without giving the CITY (or COUNTY) specific written notice of the maintenance required and allowing the CITY (or COUNTY) 60 days within which to perform said maintenance. The notice required by this provision must be sent to:

(insert name of City or County staff)
(insert title)
(insert City or County mailing address)

7. The records of the CITY (or COUNTY) and/or private contractors pertaining to the subject matter of this contract shall at all reasonable times be subject to inspection and audit by the DISTRICT or an Agent of the DISTRICT.

8. If any provision of this contract shall be deemed in conflict with any statute or rule of law, such provision shall be deemed modified to be in conformance with said statute or rule of law.

9. All parties to this contract shall comply with applicable local, state, and federal laws.

10. Any costs found to be improperly allocated in the Project will be refunded by the CITY (or COUNTY) to the DISTRICT.

11. It is specifically understood and agreed to by and between the parties hereto that it is not intended by any of the provisions of any part of this contract to create in the public or any member thereof a third party beneficiary hereunder, or to authorize anyone not a party to this contract to maintain a suit for personal injuries or property damage pursuant to the terms or provisions of this contract.

12. The CITY (or COUNTY) hereby indemnifies and shall defend and hold harmless the DISTRICT, its representatives and their employees (or their authorized representatives) from and against any and all suits, actions, legal or administrative proceedings, claims, demands, damages, liabilities, interest, attorney ' s fees, costs and expenses whatsoever of any kind or nature whether arising before or after completion of the work hereunder and in any manner directly or indirectly caused, occasioned or contributed to in whole or in part, by reason of any act, omission, fault or negligence whether active or passive of the CITY (or COUNTY), of anyone acting under its direction or control, or on its behalf in connection with or incident to the performance of this Contract. The CITY'S (or COUNTY'S) aforesaid indemnity and hold harmless obligations, or portions or applications thereof, shall apply to the fullest extent permitted by law, but in no event shall they apply to liability caused by the sole negligence or willful misconduct of the party indemnified or held harmless.

IN WITNESS WHEREOF, the parties have caused this contract to be executed the day and year first above written.

Date of District Action:

REGIONAL FLOOD CONTROL DISTRICT

_____

ATTEST:

BY:_____
Chairman

_____
Secretary to the Board

Approved as to Form:

BY:_____
Deputy District Attorney

****

Date of Council Action:
(or Commission Action)

CITY (or COUNTY) OF _____

_____

ATTEST:

BY:_____
(Mayor or Board Chairman)

_____
City (or County Clerk)

SAMPLE EXHIBIT A

PART I

Summary of overall work plan listing specific projects and associated costs attributable to each. (See **Figure C-l)**

PART II

Facility map(s) which identify location of planned maintenance work by project.

PART III

Summary of work plan broken into maintenance activities to be completed, with associated budgeted costs, for all projects identified in Part I. (See **Figure C-2)**

Figure C-1 Maintenance Work Plan Summary

(ENTITY)
MAINTENANCE WORK PLAN SUMMARY
FISCAL YEAR 20XX-XX

Master Plan Facility ID	MWP Facility Number	Facility Description	Cost
		TOTAL	$ 0.00

Figure C-2 Annual Budget

REGIONAL FLOOD CONTROL DISTRICT
MAINTENANCE WORK PROGRAM
ANNUAL BUDGET - FY 20XX-XX

MWP Facility #: _____ Entity: _____
Facility Name: _____ Date Prepared: _____
MP Facility ID: _____

Force Account/ Contract	Activity	Requested Work Plan Amount ($)	Amended Work Plan Amount ($)	Percent Complete	Scheduled Completion Date
	5 Inspect Channels				
	10 Clean and Reshape Channels				
	15 Repair Lined Channel				
	20 Provide/Maintain Erosion Control				
	25 Clean & Inspect Detention Debris Basins				
	30 Erosion Repair				
	35 Fence Repair				
	40 Vegetation Control - Chemical				
	45 Vegetation Control - Mechanical				
	50 Maintain Access Road				
	55 Clean & Inspect Inlet/Outlet Structures				
	60 Repair Inlet/Outlet Structures				
	65 Clean Storm Sewer Lines				
	70 Storm Sewer Repair				
	75 Clean/Flush Culverts & Bridges				
	80 Miscellaneous Work Activities				
	85 Engineering				
	TOTALS	$0.00	$0.00		

Delays or problem areas:

Work completed during prior fiscal year:

Work to be completed during current fiscal year:

Consultant/ Contractor: _____
Project Manager: _____ Phone Number: _____

FEDERAL EMERGENCY MANAGEMENT AGENCY **HYDROLOGIC ANALYSIS**	O.M.B No. 3067-0148 Expires April 30, 2001

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; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

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.

Note: Fill out one form for each flooding source studied

Community Name: City of Henderson

Flooding Source: Henderson Basin

Project Name/Identifier: C-1 Channel System FIS Restudy

1. REASON FOR NEW HYDROLOGIC ANALYSIS

☐ No existing analysis ☐ Improved data ☒ Changed physical condition of watershed

☐ Alternative methodology ☐ Proposed Conditions (CLOMR) ☐ Other

For the reason stated above, please attach a detailed explanation. If a computer program/model was used in revising the hydrologic analysis, **please provide a diskette with the input files** for the same flood recurrence intervals contained in the FIS for that stream; and at least for the 1% annual chance (base) flood where no detailed study exists.

Explanation provided: ☒ Yes ☐ No **Diskettes provided:** ☒ Yes ☐ No

2. METHODOLOGY FOR NEW ANALYSIS

Indicate Method	Required Data	Data Included
☐ Statistical Analysis of Gage Records	Form 3 - Attachment A	☐ Yes ☒ No
☐ Regional Regression Equations	Form 3 - Attachment C	☐ Yes ☒ No
☒ Precipitation/Runoff Model	Form 3 - Attachment D	☒ Yes ☐ No
☒ Other	Back-up computations and supporting data	☒ Yes ☐ No

3. APPROVAL OF ANALYSIS

The hydrologic analysis has already been approved by a local, state, or Federal Agency. ☒ Yes ☐ No ☐ Not Required

If Yes, attach evidence of approval. ☒ **Approval attached.** If No, attach explanation. ☒ **Explanation attached.**

4. COMPARISON OF BASE FLOOD DISCHARGES

Location:	Drainage Area (SqMi)	FIS(cfs)	Revised (cfs)
C3A1-Lake Mead Blvd.	38.3 sq.mi.	N/A	5175(cts)

Note: When revised discharges are not significantly different than the FIS discharges, FEMA may require a confidence limits analysis (see attachment B) at a later date to complete the review.

If only a portion of a detailed study area was revised please attach an explanation describing the transition from the proposed discharges to the effective discharges. ☐ **Explanation Included** ☒ **Explanation Not Required**

5. HISTORICAL FLOODING INFORMATION

If historical data are available for the flooding source please provide: Location, peak discharges/water-surface elevations and dates, and source of information. ☐ **Data Attached** ☒ **Data Not Available**

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

ATTACHMENT D: PRECIPITATION/RUNOFF MODEL

		FIS:		Revised:	
1.	Method or model used:	HEC-1		HEC-1	
	Version:	5.20		4.1	
	Date:	8/2/88 (revised)		6/1998	
2.	Source of rainfall depth:	NOAA Atlas II		NOAA Atlas II	
3.	Source of rainfall distribution:	NOAA Atlas II		NOAA Atlas II	
4.	Rainfall duration:	6-Hr		6-Hr	
5.	Areal adjustment to precipitation (%):	87% to 71%		95% to 72.5%	
6.	Maximum overland flow length	Not Available		27,000 ft.	
7.	Hydrograph development method:	SCS Unit		SCS Unit	
8.	Loss rate method:	SCS		SCS	
	Source of soils information:	SCS		NRCS	
	Source of land use information:	Not Avalable		City of Henderson	
9.	Channel routing method:	Muskingum		Muskingum-Cunge	
10.	Reservoir routing:	☐ Yes	☒ No	☐ Yes	☒ No
11.	Baseflow considerations: **If Yes, explain below how baseflow was determined:**	☐ Yes	☒ No	☐ Yes	☒ No
12.	Snowmelt considerations:	☐ Yes	☒ No	☐ Yes	☒ No
13.	Model calibration: **If Yes, explain below how calibration was performed**	☐ Yes	☒ No	☐ Yes	☒ No
14.	Future land use condition: **If Yes, explain why below**	☐ Yes	☒ No	☐ Yes	☒ No

15. **Attach precipitation/runoff model, hydrologic model schematic, curve number calculations, time of concentration calculations, and supporting maps, delineating the watershed boundary and drainage area divides.**

Information and Maps provided? ☒ Yes ☐ No

NOTE: FEMA policy is to base flooding on existing conditions.

FEMA Form Supplemental Information

Form 3

Section 1:

Explanation for changed physical condition of watershed:

Significant improvements have been constructed in the Henderson watershed. These improvements include the Black Mountain Detention Basin, the Mission Hills Western Interceptor, the Equestrian Detention Basin, the East C-1 Detention Basin and Levee, and the C-1 Channel. For further details regarding physical changes to the watershed, refer to the text of this restudy.

The electronic submittals for the hydrologic models are enclosed on a compact disc, made a part of this FIS, located at:

\SECTION 2 ENGINEERING ANALYSIS\2.1 HYDROLOGIC ANALYSIS\2.1.2 OVERALL STORM HEC-1 MODEL

Section 3:

Upon review and approval of this FIS, the CCRFCD and the City of Henderson have approved the hydrology submitted herein.

Section 5, Item 15:

Both hard copy and electronic files have been submitted and are located in the following directories:

Precipitation/runoff model, and hydrologic model schematic:

\SECTION 2 ENGINEERING ANALYSIS\2.1 HYDROLOGIC ANALYSIS\2.1.2 OVERALL STORM HEC-1 MODEL

Curve Number calculations:

T:\240482 C1\Task IV - Final Products\SECTION 2 ENGINEERING ANALYSIS\2.3 SUPPORTING DATA_FEMA FORMS\2.3.2 CURVE NUMBER CALCS

FEMA Form Supplemental Information

Time of Concentration Calcs:

T:\240482 C1\Task IV - Final Products\SECTION 2 ENGINEERING ANALYSIS\2.3 SUPPORTING DATA_FEMA FORMS\2.3.3 TIME OF CONCENTRATION CALCS

FEDERAL EMERGENCY MANAGEMENT AGENCY **RIVERINE HYDRAULIC ANALYSIS**	O.M.B No. 3067-0148 Expires April 30, 2001

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; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

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Note: Fill out one form for each flooding source studied

Community Name: City of Henderson

Flooding Source: Henderson Basin

Project Name/Identifier: C-1 Channel System FIS Restudy

1. REACH TO BE REVISED

Describe the limits of the revision OR submit a copy of the FIRM with the revision area clearly highlighted.
Copy of FIRM(s) attached depicting area of the revision (highlighted, or circled)? ☒ Yes

Downstream Limit: X-Section 1, Reach 2A

Upstream Limit: X-Section 29, Reach 2C; X-Section 3, Reach 2B

2. MODELS SUBMITTED

Requirements: for areas which have detailed flooding:	**for areas which do not have detailed flooding:**
Full input and output listings along with files on diskette for each of the models listed below (items 1-4) and a summary of the source of input parameters used in the models must be provided. The summary must include a description of any changes made from model to model (e.g., Duplicate Effective model to Corrected Effective model). At a minimum, the Duplicate Effective (item 1) and the Revised or Post-Project Conditions (item 4) models must be submitted. See Instructions for directions on when other models may be required.	Only the 100-year (Base) flood profile is required. A hydraulic model is not required for areas which do not have detailed flooding; however, BFEs may not be added to the revised FIRM. If a hydraulic model is developed for the area, items 3 and 4 described below must be submitted.

If hydraulic models are not developed, hydraulic analyses (including all calculations) for existing or pre-project conditions and revised or post-project conditions must be submitted.

1. Duplicate Effective Model ☐ **Natural** **File Name** _____ ☐ **Floodway** **File Name** _____

Copies of the hydraulic analysis used in the effective FIS, referred to as the effective models (10-, 50-, 100-, and 500-year multi-profile runs and the floodway run) must be obtained and then reproduced on the requester's equipment to produce the Duplicate Effective model. This is required to assure that the effective models input data has been transferred correctly to the requester's equipment and to assure that the revised data will be integrated into the effective data to provide a continuous FIS model upstream and downstream of the revised reach.

2. Corrected Effective Model ☐ **Natural** **File Name** _____ ☐ **Floodway** **File Name** _____

The Corrected Effective model is the model that corrects any errors that occur in the Duplicate Effective model, adds any additional cross sections to the Duplicate Effective model, or incorporates more detailed topographic information than that used in the currently effective model. The Corrected Effective model must not reflect any man-made physical changes since the date of the effective model. An error could be a technical error in the modeling procedures, or any construction in the floodplain that occurred prior to the date of the effective model but was not incorporated into the effective model.

3. Existing or Pre-Project Conditions Model ☐ **Natural** **File Name** _____ ☐ **Floodway** **File Name** _____

The Duplicate Effective model or Corrective Effective model is modified to produce the Existing or Pre-Project Conditions model to reflect any modifications that have occurred within the floodplain since the date of the Effective model but prior to the construction of the project for which the revision is being requested. If no modification has occurred since the date of the effective model, then this model would be identical to the Corrected Effective model or Duplicate Effective model.

4. Revised or Post-Project Conditions Model ☐ **Natural** **File Name** _____ ☐ **Floodway** **File Name** _____

The Existing or Pre-Project Conditions model (or Duplicate Effective model or Corrected Effective model, as appropriate) is revised to reflect revised or post-project conditions. This model must incorporate any physical changes to the floodplain since the effective model was produced as well as the effects of the project. When the request is for the proposed project this model must reflect proposed conditions.

5. Other – Please attach a sheet describing all other models submitted along with the file names. ☒ **Natural** ☐ **Floodway**

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

3. STARTING WATER-SURFACE ELEVATIONS

Explain how they were determined. Explanation Attached? ☒ Yes ☐ No

NOTE: If the effective study is an approximate study, the slope/area method is recommended. For detailed analysis studies, using a known water-surface elevation is recommended.

4. RESULTS (from the model used to revise the 100-year water surface elevations)

If the results indicate any of the following, attach an explanation - to this form, or to the hydraulic model printout- as to the reasonableness of the situation.

☐ Supercritical depth ☒ Critical Depth ☐ Drawdowns ☐ Negative Floodway Surcharges

☐ Floodway Surcharges Greater Than Maximum Allowed by Community/State

☒ Water surface elevations higher than the end points of cross sections.

☐ Floodway discharge is different than the Natural 100-year (base) flood discharge.

☐ Project causes 100-year floodplain or floodway elevations to increase (state if increases are located off the requester's property)

Explanation attached with Form ☒ **Explanation provided on attached printout** ☐

If Hydraulic model used is HEC-2, has it been checked with FEMA'S CHECK-2 computer program? ☐ **Yes** ☒ **No**
(see instructions for information on how to obtain CHECK-2)

5. REVISED FIRM/FBFM AND FLOOD PROFILES

1. Profile Transition

a. 100-Year Water-Surface Elevations - indicate the difference in water surface elevations where the project 100-year elevations tie into the existing 100-year water surface elevations at each end of the project.

Downstream End N/A within N/A (feet) *Cross-Section #* Upstream End N/A within N/A (feet) *Cross-Section #*

b. Floodway Elevations - indicate the difference in water surface elevations where the project floodway elevations tie into the existing floodway water surface elevations at each end of the project.

Downstream End N/A within N/A (feet) *Cross-Section #* Upstream End N/A within N/A (feet) *Cross-Section #*

c. Floodway widths - indicate the difference in floodway widths where the project floodway widths tie into the existing floodway width at each end of the project.

Downstream End N/A within N/A (feet) *Cross-Section #* Upstream End N/A within N/A (feet) *Cross-Section #*

2. Profile Checklist (check box if information has been provided on profile)

The following information (unless in parentheses) must be included at the same scale as the existing profiles for this project:

☒ Stream Name ☐ Community Name ☐ Corporate Limits labeled ☒ Study limits labeled

☐ Confluences labeled ☐ Channel Stationing ☐ Streambed profiled ☒ Cross Sections labeled

☒ Horizontal/Vertical Scales indicated ☐ 100-year elevs profiled*

☐ Road Crossings ☐ Labeled ☐ Low Chord Elevations ☐ Top of Road Elevations

*All recurrence intervals in the effective study must also be profiled.

Floodway Data Table

Attach a Floodway Data Table for each cross section listed in the published Floodway Data table in the FIS report.

Floodway Data Table Attached ☐ **Yes** ☒ **Not Required**

FEDERAL EMERGENCY MANAGEMENT AGENCY **RIVERINE HYDRAULIC ANALYSIS**	O.M.B No. 3067-0148 Expires April 30, 2001

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; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

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.

Note: Fill out one form for each flooding source studied

Community Name: City of Henderson

Flooding Source: Henderson Basin

Project Name/Identifier: C-1 Channel System FIS Restudy

1. REACH TO BE REVISED

Describe the limits of the revision OR submit a copy of the FIRM with the revision area clearly highlighted.
Copy of FIRM(s) attached depicting area of the revision (highlighted, or circled)? ☒ Yes

Downstream Limit: X-Section 1, Reach 3A

Upstream Limit: X-Section 5, Reach 3A

2. MODELS SUBMITTED

Requirements: for areas which have detailed flooding:	**for areas which do not have detailed flooding:**
Full input and output listings along with files on diskette for each of the models listed below (items 1-4) and a summary of the source of input parameters used in the models must be provided. The summary must include a description of any changes made from model to model (e.g., Duplicate Effective model to Corrected Effective model). At a minimum, the Duplicate Effective (item 1) and the Revised or Post-Project Conditions (item 4) models must be submitted. See instructions for directions on when other models may be required.	Only the 100-year (Base) flood profile is required. A hydraulic model is not required for areas which do not have detailed flooding; however, BFEs may not be added to the revised FIRM. If a hydraulic model is developed for the area, items 3 and 4 described below must be submitted.

If hydraulic models are not developed, hydraulic analyses (including all calculations) for existing or pre-project conditions and revised or post-project conditions must be submitted.

1. Duplicate Effective Model ☐ **Natural** **File Name** _____ ☐ **Floodway** **File Name** _____

Copies of the hydraulic analysis used in the effective FIS, referred to as the effective models (10-, 50-, 100-, and 500-year multi-profile runs and the floodway run) must be obtained and then reproduced on the requester's equipment to produce the Duplicate Effective model. This is required to assure that the effective models input data has been transferred correctly to the requester's equipment and to assure that the revised data will be integrated into the effective data to provide a continuous FIS model upstream and downstream of the revised reach.

2. Corrected Effective Model ☐ **Natural** **File Name** _____ ☐ **Floodway** **File Name** _____

The Corrected Effective model is the model that corrects any errors that occur in the Duplicate Effective model, adds any additional cross sections to the Duplicate Effective model, or incorporates more detailed topographic information than that used in the currently effective model. The Corrected Effective model must not reflect any man-made physical changes since the date of the effective model. An error could be a technical error in the modeling procedures, or any construction in the floodplain that occurred prior to the date of the effective model but was not incorporated into the effective model.

3. Existing or Pre-Project Conditions Model ☐ **Natural** **File Name** _____ ☐ **Floodway** **File Name** _____

The Duplicate Effective model or Corrective Effective model is modified to produce the Existing or Pre-Project Conditions model to reflect any modifications that have occurred within the floodplain since the date of the Effective model but prior to the construction of the project for which the revision is being requested. If no modification has occurred since the date of the effective model, then this model would be identical to the Corrected Effective model or Duplicate Effective model.

4. Revised or Post-Project Conditions Model ☐ **Natural** **File Name** _____ ☐ **Floodway** **File Name** _____

The Existing or Pre-Project Conditions model (or Duplicate Effective model or Corrected Effective model, as appropriate) is revised to reflect revised or post-project conditions. This model must incorporate any physical changes to the floodplain since the effective model was produced as well as the effects of the project. When the request is for the proposed project this model must reflect proposed conditions.

5. Other – Please attach a sheet describing all other models submitted along with the file names. ☒ **Natural** ☐ **Floodway**

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

3. STARTING WATER-SURFACE ELEVATIONS

Explain how they were determined. Explanation Attached? ☒ Yes ☐ No

NOTE: If the effective study is an approximate study, the slope/area method is recommended. For detailed analysis studies, using a known water-surface elevation is recommended.

4. RESULTS (from the model used to revise the 100-year water surface elevations)

If the results indicate any of the following, attach an explanation - to this form, or to the hydraulic model printout- as to the reasonableness of the situation.

☐ Supercritical depth ☒ Critical Depth ☐ Drawdowns ☐ Negative Floodway Surcharges

☐ Floodway Surcharges Greater Than Maximum Allowed by Community/State

☒ Water surface elevations higher than the end points of cross sections.

☐ Floodway discharge is different than the Natural 100-year (base) flood discharge.

☐ Project causes 100-year floodplain or floodway elevations to increase (state if increases are located off the requester's property)

Explanation attached with Form ☒ **Explanation provided on attached printout** ☐

If Hydraulic model used is HEC-2, has it been checked with FEMA'S CHECK-2 computer program? ☐ **Yes** ☒ **No**
(see instructions for information on how to obtain CHECK-2)

5. REVISED FIRM/FBFM AND FLOOD PROFILES

1. Profile Transition

a. 100-Year Water-Surface Elevations - indicate the difference in water surface elevations where the project 100-year elevations tie into the existing 100-year water surface elevations at each end of the project.

Downstream End N/A within N/A (feet) *Cross-Section #* Upstream End N/A within N/A (feet) *Cross-Section #*

b. Floodway Elevations - indicate the difference in water surface elevations where the project floodway elevations tie into the existing floodway water surface elevations at each end of the project.

Downstream End N/A within N/A (feet) *Cross-Section #* Upstream End N/A within N/A (feet) *Cross-Section #*

c. Floodway widths - indicate the difference in floodway widths where the project floodway widths tie into the existing floodway width at each end of the project.

Downstream End N/A within N/A (feet) *Cross-Section #* Upstream End N/A within N/A (feet) *Cross-Section #*

2. Profile Checklist (check box if information has been provided on profile)

The following information (unless in parentheses) must be included at the same scale as the existing profiles for this project:

☒ Stream Name ☐ Community Name ☐ Corporate Limits labeled ☒ Study limits labeled

☐ Confluences labeled ☒ Channel Stationing ☐ Streambed profiled ☒ Cross Sections labeled

☒ Horizontal/Vertical Scales indicated ☐ 100-year elevs profiled*

☐ Road Crossings ☐ Labeled ☐ Low Chord Elevations ☐ Top of Road Elevations

*All recurrence intervals in the effective study must also be profiled.

Floodway Data Table

Attach a Floodway Data Table for each cross section listed in the published Floodway Data table in the FIS report.

Floodway Data Table Attached ☐ **Yes** ☒ **Not Required**

FEDERAL EMERGENCY MANAGEMENT AGENCY **RIVERINE HYDRAULIC ANALYSIS**	O.M.B No. 3067-0148 Expires April 30, 2001

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; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

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.

Note: Fill out one form for each flooding source studied

Community Name: City of Henderson

Flooding Source: Henderson Basin

Project Name/Identifier: C-1 Channel System FIS Restudy

1. REACH TO BE REVISED

Describe the limits of the revision OR submit a copy of the FIRM with the revision area clearly highlighted.
Copy of FIRM(s) attached depicting area of the revision (highlighted, or circled)? ☒ Yes

Downstream Limit: X-Section 1, Reach 4

Upstream Limit: X-Section 25, Reach 4

2. MODELS SUBMITTED

Requirements: for areas which have detailed flooding:	**for areas which do not have detailed flooding:**
Full input and output listings along with files on diskette for each of the models listed below (items 1-4) and a summary of the source of input parameters used in the models must be provided. The summary must include a description of any changes made from model to model (e.g., Duplicate Effective model to Corrected Effective model). At a minimum, the Duplicate Effective (item 1) and the Revised or Post-Project Conditions (item 4) models must be submitted. See instructions for directions on when other models may be required.	Only the 100-year (Base) flood profile is required. A hydraulic model is not required for areas which do not have detailed flooding; however, BFEs may not be added to the revised FIRM. If a hydraulic model is developed for the area, items 3 and 4 described below must be submitted.

If hydraulic models are not developed, hydraulic analyses (including all calculations) for existing or pre-project conditions and revised or post-project conditions must be submitted.

1. Duplicate Effective Model ☐ **Natural** **File Name** _____ ☐ **Floodway** **File Name** _____

Copies of the hydraulic analysis used in the effective FIS, referred to as the effective models (10-, 50-, 100-, and 500-year multi-profile runs and the floodway run) must be obtained and then reproduced on the requester's equipment to produce the Duplicate Effective model. This is required to assure that the effective models input data has been transferred correctly to the requester's equipment and to assure that the revised data will be integrated into the effective data to provide a continuous FIS model upstream and downstream of the revised reach.

2. Corrected Effective Model ☐ **Natural** **File Name** _____ ☐ **Floodway** **File Name** _____

The Corrected Effective model is the model that corrects any errors that occur in the Duplicate Effective model, adds any additional cross sections to the Duplicate Effective model, or incorporates more detailed topographic information than that used in the currently effective model. The Corrected Effective model must not reflect any man-made physical changes since the date of the effective model. An error could be a technical error in the modeling procedures, or any construction in the floodplain that occurred prior to the date of the effective model but was not incorporated into the effective model.

3. Existing or Pre-Project Conditions Model ☐ **Natural** **File Name** _____ ☐ **Floodway** **File Name** _____

The Duplicate Effective model or Corrective Effective model is modified to produce the Existing or Pre-Project Conditions model to reflect any modifications that have occurred within the floodplain since the date of the Effective model but prior to the construction of the project for which the revision is being requested. If no modification has occurred since the date of the effective model, then this model would be identical to the Corrected Effective model or Duplicate Effective model.

4. Revised or Post-Project Conditions Model ☐ **Natural** **File Name** _____ ☐ **Floodway** **File Name** _____

The Existing or Pre-Project Conditions model (or Duplicate Effective model or Corrected Effective model, as appropriate) is revised to reflect revised or post-project conditions. This model must incorporate any physical changes to the floodplain since the effective model was produced as well as the effects of the project. When the request is for the proposed project this model must reflect proposed conditions.

5. Other – Please attach a sheet describing all other models submitted along with the file names. ☒ **Natural** ☐ **Floodway**

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

3. STARTING WATER-SURFACE ELEVATIONS

Explain how they were determined. Explanation Attached? ☒ Yes ☐ No

NOTE: If the effective study is an approximate study, the slope/area method is recommended. For detailed analysis studies, using a known water-surface elevation is recommended.

4. RESULTS (from the model used to revise the 100-year water surface elevations)

If the results indicate any of the following, attach an explanation - to this form, or to the hydraulic model printout- as to the reasonableness of the situation.

☐ Supercritical depth ☒ Critical Depth ☐ Drawdowns ☐ Negative Floodway Surcharges

☐ Floodway Surcharges Greater Than Maximum Allowed by Community/State

☒ Water surface elevations higher than the end points of cross sections.

☐ Floodway discharge is different than the Natural 100-year (base) flood discharge.

☐ Project causes 100-year floodplain or floodway elevations to increase (state if increases are located off the requester's property)

Explanation attached with Form ☒ **Explanation provided on attached printout** ☐

If Hydraulic model used is HEC-2, has it been checked with FEMA'S CHECK-2 computer program? ☐ **Yes** ☒ **No**
(see instructions for information on how to obtain CHECK-2)

5. REVISED FIRM/FBFM AND FLOOD PROFILES

1. Profile Transition

a. 100-Year Water-Surface Elevations - indicate the difference in water surface elevations where the project 100-year elevations tie into the existing 100-year water surface elevations at each end of the project.

Downstream End N/A within N/A (feet) *Cross-Section #*
Upstream End N/A within N/A (feet) *Cross-Section #*

b. Floodway Elevations - indicate the difference in water surface elevations where the project floodway elevations tie into the existing floodway water surface elevations at each end of the project.

Downstream End N/A within N/A (feet) *Cross-Section #*
Upstream End N/A within N/A (feet) *Cross-Section #*

c. Floodway widths - indicate the difference in floodway widths where the project floodway widths tie into the existing floodway width at each end of the project.

Downstream End N/A within N/A (feet) *Cross-Section #*
Upstream End N/A within N/A (feet) *Cross-Section #*

2. Profile Checklist (check box if information has been provided on profile)

The following information (unless in parentheses) must be included at the same scale as the existing profiles for this project:

☒ Stream Name ☐ Community Name ☐ Corporate Limits labeled ☒ Study limits labeled

☐ Confluences labeled ☒ Channel Stationing ☐ Streambed profiled ☒ Cross Sections labeled

☒ Horizontal/Vertical Scales indicated ☐ 100-year elevs profiled*

☐ Road Crossings ☐ Labeled ☐ Low Chord Elevations ☐ Top of Road Elevations

*All recurrence intervals in the effective study must also be profiled.

Floodway Data Table

Attach a Floodway Data Table for each cross section listed in the published Floodway Data table in the FIS report.

Floodway Data Table Attached ☐ **Yes** ☒ **Not Required**

FEMA Form Supplemental Information

Form 4

Reach 2:

Section 2:

Electronic and hard copy files are located at:

\SECTION 2 ENGINEERING ANALYSIS\2.2 HYDRAULIC ANALYSIS\2.2.2 APPROX. METHODS ANALYSIS\2.2.2.1 REACH 2

Section 3:

Starting water surface elevations were based on normal depth calculations for the downstream section.

Section 4:

The model was run in the subcritical flow regime, as required for non-lined riverine hydraulic analysis. Critical depth (y_c) was achieved in all cross-sections such that the water surface elevations and critical water surface elevations were the same.

Reach 3:

Section 2:

Electronic and hard copy files are located at:

\SECTION 2 ENGINEERING ANALYSIS\2.2 HYDRAULIC ANALYSIS\2.2.2 APPROX. METHODS ANALYSIS\2.2.2.2 REACH 3

Section 3:

Starting water surface elevations were based on normal depth calculations for the downstream section.

Section 4:

The model was run in the subcritical flow regime, as required for non-lined riverine hydraulic analysis. Critical depth (y_c) was achieved in x-sections 1, 2, & 3 such that the water surface elevations and critical water surface elevations were the same.

FEMA Form Supplemental Information

Reach 4:

Section 2:

Electronic and hard copy files are located at:

\SECTION 2 ENGINEERING ANALYSIS\2.2 HYDRAULIC ANALYSIS\2.2.2 APPROX. METHODS ANALYSIS\2.2.2.3 REACH 4

Section 3:

Starting water surface elevations were based on normal depth calculations for the downstream section.

Section 4:

The model was run in the subcritical flow regime, as required for non-lined riverine hydraulic analysis. Critical depth (y_c) was achieved in all x-sections such that the water surface elevations and critical water surface elevations were the same.

FEDERAL EMERGENCY MANAGEMENT AGENCY **RIVERINE / COASTAL MAPPING**	O.M.B No. 3067-0148 Expires April 30, 2001

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 1.5 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; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

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.

Note: Fill out one form for each flooding source studied

Community Name: City of Henderson

Flooding Source: See attached exhibit

Project Name/Identifier: C-1 FIS Restudy

This is a ☒ Manual ☐ Digital submission. *Digital map submissions may be used to update digital FIRMs (DFIRMs). For updating DFIRMs, these submissions must be coordinated with FEMA Headquarters as far in advance as possible.*

1. MAPPING CHANGES

1. A topographic workmap must be submitted showing the following information (check N/A when not applicable):

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 floodway boundaries	☐ Yes	☐ No	☒ N/A
d. Location and alignment of all cross sections with stationing control indicated.	☒ Yes	☐ No	☐ N/A
e. Stream alignments, road alignments and dam alignments.	☒ Yes	☐ No	☐ N/A
f. Current community boundaries.	☒ Yes	☐ No	☐ N/A
g. Effective 100- year floodplain and floodway boundaries from FIRM/FBFM reduced or enlarged to the scale of the topographic workmap	☒ Yes	☐ No	☐ N/A
h. Tie-ins between the effective and revised 100-, 500-year and floodway boundaries	☒ Yes	☐ No	☐ N/A
i. The requester'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)	☒ 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 analyze	☐ Yes	☐ No	☒ N/A
o. V-zone has been delineated to extend landward to the heel of the primary frontal dune	☐ Yes	☐ No	☒ N/A

If any items are marked No or N/A please attach an explanation.

2. What is the source and date of the updated topographic information (example: orthophoto maps, July 1985; filed survey, May 1979, beach profile, June 1987 etc.)? _____

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

Effective FIS Scale _____ Contour Interval _____

Revision Request Scale 1" = 400' Contour Interval 5'

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

4. Attach an annotated FIRM/FBFM at the scale of the effective FIRM/FBFM showing the revised 100- and 500-year floodplain and the floodway boundaries and how they tie into those shown on the effective FIRM/FBFM downstream and upstream of the revisions or adjacent to the area of revision for coastal studies. **FIRM/FBFM attached?** ☒ **Yes** ☐ **No**

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

2. EARTH FILL PLACEMENT

The fill is: ☒ Existing ☐ Proposed

2. Has fill been/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 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, attach certification of fill compaction (item 3c. above) by the community's NFIP permit official, a registered professional engineer, or an accredited soils engineer in accordance with Subparagraph 65.5(a)(6) of the NFIP regulations.

Fill certification attached ☐ **Yes** ☐ **No**

4. Has fill been/will be placed in a V zone? ☐ 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 (Form 10).

FEMA Form Supplemental Information

Form 5

Section 1

Item (c):	There are no floodway boundaries to be revised
Item (i):	The requestor is a public entity that does not have property boundaries
Item (k):	ERM's are not required because the analysis is approximate Zone A only
Item (m):	This is not a coastal area
Item (n):	This is not a coastal area
Item (o):	This is not a coastal area

The annotated FIRM is located at:

\SECTION 4 MAPPING INFORMATION\4.1 FIRM, Clark County Map Index\4.1.2 Annotated FIRM

FEDERAL EMERGENCY MANAGEMENT AGENCY **CHANNELIZATION**	O.M.B. Burden No. 3067-0148 Expires April 30, 2001

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 1.75 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; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

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: City of Henderson

Flooding Source: Henderson Basin

Project Name/Identifier: C-1 Channel System FIS Restudy (C-1 Channel)

1. REACH TO BE REVISED

Describe the limits of the revision **OR** submit a copy of the FIRM with the revision area clearly highlighted.
Copy of FIRM(s) attached depicting area of the revision (highlighted, or circled)? ☒ Yes

Downstream Limit: Lake Mead Drive, River Sta 25+65

Upstream Limit: Boulder Highway, River Sta 210+00

2. CHANNEL DESCRIPTION

Attach the following information about the channel (check box if information has been provided):

☒ Description of the inlet and outlet

☒ Description of the shape of the channel *(both cross sectional and planimetric configuration)* and its lining *(channel bottom and sides)*:

3. ACCESSORY STRUCTURES

The channelization includes:

- ☐ Levees *(Attach Levee/Floodwall System Analysis Form - Form 8)*
- ☒ Drop structures
- ☐ Superelevated sections
- ☒ Transitions in cross sectional geometry
- ☐ Debris basin/detention basin
- ☒ Energy dissipater
- ☐ Other (Describe):

4. DRAWING CHECKLIST

Attach the plans of the channelization certified by a registered professional engineer. The plan detail and information should include (check box if information has been provided):

☒ Channel alignment and locations of inlet, outlet, and accessory structures

☒ Channel lining

☒ Typical cross sections and profiles of channel banks and invert

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

5. HYDRAULIC CONSIDERATIONS

1. The channel was designed to carry 1854 (cfs) and/or the 100-year flood.

2. The design elevation in the channel based on:

   ☒ Subcritical flow

   ☒ Critical flow

   ☒ Supercritical flow

   ☒ Energy grade line

3. **If there is the potential for a hydraulic jump at the following locations, check the box(es) that apply and attach an explanation of how the hydraulic jump is controlled without affecting the stability of the channel.**

Inlet to channel?	☐ Yes
Outlet of channel?	☐ Yes
At Drop Structures?	☒ Yes
At Transitions?	☒ Yes
Other locations?	☐ Yes

Explanation Attached? ☒ **Yes** ☐ **No** ☐ **N/A**

6. SEDIMENT TRANSPORT CONSIDERATIONS

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year (base flood) water-surface elevations; and/or based on the stream geomorphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including sewer and deposition) to affect the base flood water-surface elevations, then provide the following information **(Check the box if provided):**

☒ Estimated sediment load

☒ Method used to estimate sediment transport

☐ Method used to estimate scour and/or deposition

☒ Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport

FEDERAL EMERGENCY MANAGEMENT AGENCY **CHANNELIZATION**	O.M.B. Burden No. 3067-0148 Expires April 30, 2001

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 1.75 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; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

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: City of Henderson

Flooding Source: Henderson Basin

Project Name/Identifier: C-1 Channel System FIS Restudy (Drake Channel)

1. REACH TO BE REVISED

Describe the limits of the revision **OR** submit a copy of the FIRM with the revision area clearly highlighted.
Copy of FIRM(s) attached depicting area of the revision (highlighted, or circled)? ☒ Yes

Downstream Limit: C-1 Confluence, River Station 10+01

Upstream Limit: System Headworks, ~9000 ft east of C-1, River Station 13+28

2. CHANNEL DESCRIPTION

Attach the following information about the channel (check box if information has been provided):

☒ Description of the inlet and outlet

☒ Description of the shape of the channel *(both cross sectional and planimetric configuration)* and its lining *(channel bottom and sides)*:

3. ACCESSORY STRUCTURES

The channelization includes:

- ☐ Levees *(Attach Levee/Floodwall System Analysis Form - Form 8)*
- ☒ Drop structures
- ☒ Superelevated sections
- ☒ Transitions in cross sectional geometry
- ☐ Debris basin/detention basin
- ☒ Energy dissipater
- ☐ Other (Describe):

4. DRAWING CHECKLIST

Attach the plans of the channelization certified by a registered professional engineer. The plan detail and information should include (check box if information has been provided):

☒ Channel alignment and locations of inlet, outlet, and accessory structures

☒ Channel lining

☒ Typical cross sections and profiles of channel banks and invert

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

5. HYDRAULIC CONSIDERATIONS

1. The channel was designed to carry 634-1500 (cfs) and/or the 100-year flood.

2. The design elevation in the channel based on:

- ☒ Subcritical flow
- ☒ Critical flow
- ☒ Supercritical flow
- ☒ Energy grade line

3. **If there is the potential for a hydraulic jump at the following locations, check the box(es) that apply and attach an *explanation* of how the hydraulic jump is controlled without affecting the stability of the channel.**

Inlet to channel?	☐ Yes
Outlet of channel?	☐ Yes
At Drop Structures?	☒ Yes
At Transitions?	☒ Yes
Other locations?	☐ Yes

Explanation Attached? ☒ **Yes** ☐ **No** ☐ **N/A**

6. SEDIMENT TRANSPORT CONSIDERATIONS

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year (base flood) water-surface elevations; and/or based on the stream geomorphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including sewer and deposition) to affect the base flood water-surface elevations, then provide the following information **(Check the box if provided):**

- ☒ Estimated sediment load
- ☒ Method used to estimate sediment transport
- ☒ Method used to estimate scour and/or deposition
- ☒ Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport

FEDERAL EMERGENCY MANAGEMENT AGENCY **CHANNELIZATION**	O.M.B. Burden No. 3067-0148 Expires April 30, 2001

PUBLIC BURDEN DISCLOSURE NOTICE

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Community Name: City of Henderson

Flooding Source: Henderson Basin

Project Name/Identifier: C-1 Channel System FIS Restudy (Mission Hills Interceptor)

1. REACH TO BE REVISED

Describe the limits of the revision **OR** submit a copy of the FIRM with the revision area clearly highlighted.
Copy of FIRM(s) attached depicting area of the revision (highlighted, or circled)? ☒ Yes

Downstream Limit: Mission Hills Detention Basin

Upstream Limit: Black Mountain Detention Basin

2. CHANNEL DESCRIPTION

Attach the following information about the channel (check box if information has been provided):

☒ Description of the inlet and outlet

☒ Description of the shape of the channel *(both cross sectional and planimetric configuration)* and its lining *(channel bottom and sides)*:

3. ACCESSORY STRUCTURES

The channelization includes:

- ☐ Levees *(Attach Levee/Floodwall System Analysis Form - Form 8)*
- ☒ Drop structures
- ☐ Superelevated sections
- ☒ Transitions in cross sectional geometry
- ☐ Debris basin/detention basin
- ☒ Energy dissipater
- ☐ Other (Describe):

4. DRAWING CHECKLIST

Attach the plans of the channelization certified by a registered professional engineer. The plan detail and information should include (check box if information has been provided):

☒ Channel alignment and locations of inlet, outlet, and accessory structures

☒ Channel lining

☒ Typical cross sections and profiles of channel banks and invert

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

5. HYDRAULIC CONSIDERATIONS

1. The channel was designed to carry 171 to 1624 (cfs) and/or the 100-year flood.

2. The design elevation in the channel based on:

   ☒ Subcritical flow

   ☒ Critical flow

   ☒ Supercritical flow

   ☒ Energy grade line

3. **If there is the potential for a hydraulic jump at the following locations, check the box(es) that apply and attach an explanation of how the hydraulic jump is controlled without affecting the stability of the channel.**

Inlet to channel?	☐ Yes
Outlet of channel?	☐ Yes
At Drop Structures?	☒ Yes
At Transitions?	☒ Yes
Other locations?	☐ Yes

Explanation Attached? ☒ **Yes** ☐ **No** ☐ **N/A**

6. SEDIMENT TRANSPORT CONSIDERATIONS

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year (base flood) water-surface elevations; and/or based on the stream geomorphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including sewer and deposition) to affect the base flood water-surface elevations, then provide the following information **(Check the box if provided):**

☒ Estimated sediment load

☒ Method used to estimate sediment transport

☒ Method used to estimate scour and/or deposition

☒ Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport

Form 6

C-1 Channel

Section 2

Description of inlet and outlet:

Inlets for the C-1 Channel are located at the system headworks, at Boulder Highway (River Sta 205+50), at the confluence of the Drake Channel (River Sta 122+34), and at Regional Facility C1GW (River Sta 18+858.93).

At the system headworks, two concrete lined channels combine to form the main C-1 Channel immediately upstream of Boulder Highway. Defined as "Main 3" in the enclosed HEC-RAS hydraulic model, this channel is a rectangular, reinforced concrete channel 20 ft wide x 6 ft high which intercepts storm flows conveyed along the western right-of-way of Boulder Highway.

Defined as "Main 2" in the enclosed HEC-RAS hydraulic model, this channel is a rectangular, reinforced concrete channel 20 ft wide x 9.5 ft deep, which intercepts flows traveling north to Boulder Highway. Main 2 and Main 3 converge immediately upstream of Boulder Highway to form the remaining channel, also labeled as Main 2.

The inlet at Regional Facility C1GW (River Sta 18+858.92) enters the C-1 Channel from the west. The confluence is a reinforced concrete flow spread structure based on USACE design, as shown on the plans for construction.

The Drake Channel (River Sta 122+34) confluence is designed as a smooth, subcritical, 10^{o} junction, based on USACE design recommendations. The C-1 Channel at this location is 40 ft wide x 14 ft high.

Other inlets to the C-1 Channel exist at various location where residential subdivisions have been allowed to drain directly into the channel.

The outlet at Lake Mead Drive consists of a double, 12 ft wide x 6 ft high reinforced box culvert.

FEMA Form Supplemental Information

Channel configuration:

In general, the C-1 Channel is both a trapezoidal and rectangular, reinforced concrete channel in cross-section, with various transitions between the two configurations where confluences exist with other channels, or at the approach to bridge structures. A detailed cross-section and planimetric layout can be found at the following locations:

Cross-sections (HEC-RAS):

\SECTION 2 ENGINEERING ANALYSIS\2.2 HYDRAULIC ANALYSIS\2.2.1 DETAILED ANALYSIS\2.2.1.1 C-1 CHANNEL, LAKE MEAD DR TO BOULDER HWY

Planimetrics:

\SECTION 4 MAPPING INFORMATION\4.3 WORK MAPS-BASE MAPS-DETAILED METHODS\4.3.1 C-1 CHANNEL

Section 4

Plans for the C-1 Channel can be found at the following location:

\SECTION 5 MISC. REFERENCE MATERIAL\5.1a - Plans for Construction\ C-1 Channel

Section5

A hydraulic jump occurs upstream of the confluence with the Drake Channel, at River Sta 124+50. The jump is a designed energy dissipater entirely contained in the channel, as the channel is concrete lined, and has adequate freeboard.

Section 6

Sediment loads have been calculated using the Modified Uniform Soil Loss Equation (MUSLE). Although results of the MUSLCE show that a bulking factor of 5% is produced by the watershed, the 100-yr peak has been bulked by 10%. Long term aggradation or degradation of the channel is not applicable, because the channel is concrete lined. Refer to the FIS Restudy text regarding the MUSCLE.

FEMA Form Supplemental Information

Channel configuration:

In general, the C-1 Channel is both a trapezoidal and rectangular, reinforced concrete channel in cross-section, with various transitions between the two configurations where confluences exist with other channels, or at the approach to bridge structures. A detailed cross-section and planimetric layout can be found at the following locations:

Cross-sections (HEC-RAS):

\SECTION 2 ENGINEERING ANALYSIS\2.2 HYDRAULIC ANALYSIS\2.2.1 DETAILED ANALYSIS\2.2.1.1 C-1 CHANNEL, LAKE MEAD DR TO BOULDER HWY

Planimetrics:

\SECTION 4 MAPPING INFORMATION\4.3 WORK MAPS-BASE MAPS-DETAILED METHODS\4.3.1 C-1 CHANNEL

Section 4

Plans for the C-1 Channel can be found at the following location:

\SECTION 5 MISC. REFERENCE MATERIAL\5.1a - Plans for Construction\ C-1 Channel

Section5

A hydraulic jump occurs upstream of the confluence with the Drake Channel, at River Sta 124+50. The jump is a designed energy dissipater entirely contained in the channel, as the channel is concrete lined, and has adequate freeboard.

Section 6

Sediment loads have been calculated using the Modified Uniform Soil Loss Equation (MUSLE). Although results of the MUSLCE show that a bulking factor of 5% is produced by the watershed, the 100-yr peak has been bulked by 10%. Long term aggradation or degradation of the channel is not applicable, because the channel is concrete lined. Refer to the FIS Restudy text regarding the MUSCLE.

FEMA Form Supplemental Information

Mission Hills Western Interceptor

Description of inlet and outlet:

The Mission Hills Western Interceptor outlets into the Mission Hills Detention Basin, as a smooth, reinforced concrete lined, rectangular channel, and flume. The outlet channel is 22 ft wide x 6.5 ft high.

The Mission Hills Western Interceptor inlet is tied to the outlet of the Black Mountain Detention Basin, a 48" reinforced concrete pipe culvert primary spillway.

Channel configuration:

The Mission Hills Western Interceptor is comprised of an underground reinforced concrete box culvert, with various grated drop inlet structures located at low points where arroyos cross the interceptor alignment. A detailed cross-section and planimetric layout can be found at the following locations:

\SECTION 5 MISC. REFERENCE MATERIAL\5.1a - Plans for Construction\Mission Hills

Section 4

Plans for the Mission Hills Western Interceptor can be found at the following location:

\SECTION 5 MISC. REFERENCE MATERIAL\5.1a - Plans for Construction\Mission Hills

Section5

A hydraulic jump occurs upstream of the confluence with the C-1 Channel, at River Sta 24+61.47 at a drop inlet structure, however, it is important to note that the structure is enclosed and that the hydraulic jump occurs in the structure.

Section 6

Sediment loads for the Mission Hills Western Interceptor were calculated as part of the design report for that project. The design report can be located at:

\SECTION 5 MISC. REFERENCE MATERIAL\5.1b Reports\Mission Hills

FEDERAL EMERGENCY MANAGEMENT AGENCY **BRIDGE/CULVERT**	O.M.B. Burden No. 3067-0148 Expires April 30, 2001

PUBLIC BURDEN DISCLOSURE NOTICE

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Community Name: City of Henderson

Flooding Source: Henderson Basin

Project Name/Identifier: C-1 Channel FIS Restudy

1. IDENTIFIER

1. Name of structure (roadway, railroad, etc.): Race Track Bridge

2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier):

   River Station 10+46.5

3. This revision reflects (check one of the following):

   ☒ New bridge/culvert not modeled in the FIS

   ☐ Modified bridge/culvert previously modeled in the FIS

   ☐ New analysis of bridge/culvert previously modeled in the FIS

4. Hydraulic model used to analyze the structure *(e.g., HEC 2 with special bridge routine, WSPRO, HY8)*

   HECRAS

   If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structure(s). *(Attach justification)*

   Justification attached ☐ **Yes** ☐ **No** ☒ **N/A**

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

2. DRAWING CHECKLIST

Attach plans of the structure(s) certified by a registered professional engineer. The plan detail and information should include the following (check the boxes if the information has been provided):

- ☒ Dimensions (height, width, span, radius, length)
- ☒ Shape (culverts only)
- ☒ Material
- ☒ Beveling or Rounding
- ☒ Wing Wall Angle
- ☒ Low Chord Elevations - Upstream and Downstream
- ☒ Top of Road Elevations - Upstream and Downstream
- ☒ Structure Invert Elevations - Upstream and Downstream
- ☒ Stream Invert Elevations - Upstream and Downstream
- ☒ Skew Angle
- ☒ Cross-Section Locations
- ☒ Distances Between Cross Sections
- ☒ Erosion Protection

3. SEDIMENT TRANSPORT CONSIDERATIONS

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year (base flood) water-surface elevations; and/or based on the stream geomorphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including sewer and deposition) to affect the base flood elevations, then provide the following information **(Check the box if provided):**

- ☒ Estimated sediment load
- ☐ Method used to estimate sediment transport
- ☒ Method used to estimate scour and/or deposition
- ☒ Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport

FEMA Form Supplemental Information

Section 2

Plans for the bridge at Race Track Road can be found at the following location:

\SECTION 5 MISC. REFERENCE MATERIAL\5.1a - Plans for Construction\Drake Channel\CV04643, CV04696, and CV04781

Survey data for the bridge at Race Track Road can be found at the following location:

\SECTION 5 MISC. REFERENCE MATERIAL\5.2 SURVEY DATA\5.2.2 SURVEY NOTES (hard copy only)

FEDERAL EMERGENCY MANAGEMENT AGENCY **BRIDGE/CULVERT**	O.M.B. Burden No. 3067-0148 Expires April 30, 2001

PUBLIC BURDEN DISCLOSURE NOTICE

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Community Name: City of Henderson

Flooding Source: Henderson Basin

Project Name/Identifier: C-1 Channel FIS Restudy

1. IDENTIFIER

1. Name of structure (roadway, railroad, etc.): Lake Mead Drive 2, 12' x 6' RCB's

2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier):

   River Station 26+17

3. This revision reflects (check one of the following):

   ☒ New bridge/culvert not modeled in the FIS

   ☐ Modified bridge/culvert previously modeled in the FIS

   ☐ New analysis of bridge/culvert previously modeled in the FIS

4. Hydraulic model used to analyze the structure *(e.g., HEC-2 with special bridge routine, WSPRO, HY8)*

   HECRAS

   If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structure(s). *(Attach justification)*

   Justification attached ☐ **Yes** ☐ **No** ☒ **N/A**

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

2. DRAWING CHECKLIST

Attach plans of the structure(s) certified by a registered professional engineer. The plan detail and information should include the following (check the boxes if the information has been provided):

- ☒ Dimensions (height, width, span, radius, length)
- ☒ Shape (culverts only)
- ☒ Material
- ☒ Beveling or Rounding
- ☒ Wing Wall Angle
- ☒ Low Chord Elevations - Upstream and Downstream
- ☒ Top of Road Elevations - Upstream and Downstream
- ☒ Structure Invert Elevations - Upstream and Downstream
- ☒ Stream Invert Elevations - Upstream and Downstream
- ☒ Skew Angle
- ☒ Cross-Section Locations
- ☒ Distances Between Cross Sections
- ☒ Erosion Protection

3. SEDIMENT TRANSPORT CONSIDERATIONS

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year (base flood) water-surface elevations; and/or based on the stream geomorphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including sewer and deposition) to affect the base flood elevations, then provide the following information **(Check the box if provided):**

- ☒ Estimated sediment load
- ☒ Method used to estimate sediment transport
- ☐ Method used to estimate scour and/or deposition
- ☒ Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport

FEMA Form Supplemental Information

Section 2

Plans for the bridge at Lake Mead Drive can be found at the following location:

\SECTION 5 MISC. REFERENCE MATERIAL\5.1a - Plans for Construction\C-1 Channel\CVO4632

Survey data for the bridge at Lake Mead Drive can be found at the following location:

\SECTION 5 MISC. REFERENCE MATERIAL\5.2 SURVEY DATA\5.2.2 SURVEY NOTES (hard copy only)

FEDERAL EMERGENCY MANAGEMENT AGENCY **BRIDGE/CULVERT**	O.M.B. Burden No. 3067-0148 Expires April 30, 2001

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Community Name: City of Henderson

Flooding Source: Henderson Basin

Project Name/Identifier: C-1 Channel FIS Restudy

1. IDENTIFIER

1. Name of structure (roadway, railroad, etc.): Burkholder Boulevard Bridge

2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier):

   River Station 145+00

3. This revision reflects (check one of the following):

   ☒ New bridge/culvert not modeled in the FIS

   ☐ Modified bridge/culvert previously modeled in the FIS

   ☐ New analysis of bridge/culvert previously modeled in the FIS

4. Hydraulic model used to analyze the structure *(e.g., HEC-2 with special bridge routine, WSPRO, HY8)*

   HECRAS

   If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structure(s). *(Attach justification)*

   Justification attached ☐ **Yes** ☐ **No** ☒ **N/A**

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

2. DRAWING CHECKLIST

Attach plans of the structure(s) certified by a registered professional engineer. The plan detail and information should include the following (check the boxes if the information has been provided):

- ☒ Dimensions (height, width, span, radius, length)
- ☒ Shape (culverts only)
- ☒ Material
- ☒ Beveling or Rounding
- ☒ Wing Wall Angle
- ☒ Low Chord Elevations - Upstream and Downstream
- ☒ Top of Road Elevations - Upstream and Downstream
- ☒ Structure Invert Elevations - Upstream and Downstream
- ☒ Stream Invert Elevations - Upstream and Downstream
- ☒ Skew Angle
- ☒ Cross-Section Locations
- ☒ Distances Between Cross Sections
- ☒ Erosion Protection

3. SEDIMENT TRANSPORT CONSIDERATIONS

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year (base flood) water-surface elevations; and/or based on the stream geomorphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including sewer and deposition) to affect the base flood elevations, then provide the following information **(Check the box if provided):**

- ☒ Estimated sediment load
- ☒ Method used to estimate sediment transport
- ☐ Method used to estimate scour and/or deposition
- ☒ Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport

FEMA Form Supplemental Information

Form 7

Section 2

Plans for the bridge at Burkholder Blvd can be found at the following location:

\SECTION 5 MISC. REFERENCE MATERIAL\5.1a - Plans for Construction\C-1 Channel\CVO4601

Survey data for the bridge at Burkholder Blvd can be found at the following location:

\SECTION 5 MISC. REFERENCE MATERIAL\5.2 SURVEY DATA\5.2.2 SURVEY NOTES (hard copy only)

FEDERAL EMERGENCY MANAGEMENT AGENCY **BRIDGE/CULVERT**	O.M.B. Burden No. 3067-0148 Expires April 30, 2001

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Community Name: City of Henderson

Flooding Source: Henderson Basin

Project Name/Identifier: C-1 Channel FIS Restudy

1. IDENTIFIER

1. Name of structure (roadway, railroad, etc.): Warm Springs Road RCBC's

2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier):

   River Station 97+00

3. This revision reflects (check one of the following):

   ☒ New bridge/culvert not modeled in the FIS

   ☐ Modified bridge/culvert previously modeled in the FIS

   ☐ New analysis of bridge/culvert previously modeled in the FIS

4. Hydraulic model used to analyze the structure *(e.g., HEC-2 with special bridge routine, WSPRO, HY8)*

   HECRAS

   If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structure(s). *(Attach justification)*

   Justification attached ☐ **Yes** ☐ **No** ☒ **N/A**

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

2. DRAWING CHECKLIST

Attach plans of the structure(s) certified by a registered professional engineer. The plan detail and information should include the following (check the boxes if the information has been provided):

- ☒ Dimensions (height, width, span, radius, length)
- ☒ Shape (culverts only)
- ☒ Material
- ☒ Beveling or Rounding
- ☒ Wing Wall Angle
- ☒ Low Chord Elevations - Upstream and Downstream
- ☒ Top of Road Elevations - Upstream and Downstream
- ☒ Structure Invert Elevations - Upstream and Downstream
- ☒ Stream Invert Elevations - Upstream and Downstream
- ☒ Skew Angle
- ☒ Cross-Section Locations
- ☒ Distances Between Cross Sections
- ☒ Erosion Protection

3. SEDIMENT TRANSPORT CONSIDERATIONS

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year (base flood) water-surface elevations; and/or based on the stream geomorphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including sewer and deposition) to affect the base flood elevations, then provide the following information **(Check the box if provided):**

- ☒ Estimated sediment load
- ☐ Method used to estimate sediment transport
- ☒ Method used to estimate scour and/or deposition
- ☒ Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport

FEMA Form Supplemental Information

Section 2

Plans for the bridge at Warm Springs Road can be found at the following location:

\SECTION 5 MISC. REFERENCE MATERIAL\5.1a - Plans for Construction\C-1 Channel\CVO4632

Survey data for the bridge at Warm Springs Road can be found at the following location:

\SECTION 5 MISC. REFERENCE MATERIAL\5.2 SURVEY DATA\5.2.2 SURVEY NOTES (hard copy only)

FEDERAL EMERGENCY MANAGEMENT AGENCY **BRIDGE/CULVERT**	O.M.B. Burden No. 3067-0148 Expires April 30, 2001

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Community Name: City of Henderson

Flooding Source: Henderson Basin

Project Name/Identifier: C-1 Channel FIS Restudy

1. IDENTIFIER

1. Name of structure (roadway, railroad, etc.): Boulder Highway Bridge

2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier):

   River Station 20+475

3. This revision reflects (check one of the following):

   ☒ New bridge/culvert not modeled in the FIS

   ☐ Modified bridge/culvert previously modeled in the FIS

   ☐ New analysis of bridge/culvert previously modeled in the FIS

4. Hydraulic model used to analyze the structure *(e.g., HEC-2 with special bridge routine, WSPRO, HY8)*

   HECRAS

   If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structure(s). *(Attach justification)*

   Justification attached ☐ **Yes** ☐ **No** ☒ **N/A**

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

2. DRAWING CHECKLIST

Attach plans of the structure(s) certified by a registered professional engineer. The plan detail and information should include the following (check the boxes if the information has been provided):

- ☒ Dimensions (height, width, span, radius, length)
- ☒ Shape (culverts only)
- ☒ Material
- ☒ Beveling or Rounding
- ☒ Wing Wall Angle
- ☒ Low Chord Elevations - Upstream and Downstream
- ☒ Top of Road Elevations - Upstream and Downstream
- ☒ Structure Invert Elevations - Upstream and Downstream
- ☒ Stream Invert Elevations - Upstream and Downstream
- ☒ Skew Angle
- ☒ Cross-Section Locations
- ☒ Distances Between Cross Sections
- ☒ Erosion Protection

3. SEDIMENT TRANSPORT CONSIDERATIONS

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year (base flood) water-surface elevations; and/or based on the stream geomorphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including sewer and deposition) to affect the base flood elevations, then provide the following information **(Check the box if provided):**

- ☒ Estimated sediment load
- ☐ Method used to estimate sediment transport
- ☒ Method used to estimate scour and/or deposition
- ☒ Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport

FEMA Form Supplemental Information

Section 2

Plans for the bridge at Boulder Highway can be found at the following location:

\SECTION 5 MISC. REFERENCE MATERIAL\5.1a - Plans for Construction\C-1 Channel\CV05854

Survey data for the bridge at Boulder Highway can be found at the following location:

\SECTION 5 MISC. REFERENCE MATERIAL\5.2 SURVEY DATA\5.2.2 SURVEY NOTES (hard copy only)

FEDERAL EMERGENCY MANAGEMENT AGENCY **LEVEE/FLOODWALL SYSTEM ANALYSES**	O.M.B. Burden No. 3067-0148 Expires April 30, 2001

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; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

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: City of Henderson

Flooding Source: Henderson Basin

Project Name/Identifier: C-1 FIS Restudy, East C-1 Levee

1. REACH TO BE REVISED

Describe the limits of the revision **OR** submit a copy of the FIRM with the revision area clearly highlighted.
Copy of FIRM(s) attached depicting area of the revision (highlighted, or circled)? ☒ Yes

Downstream Limit: Sta 9+62.93, Reach 2C, X-Section N

Upstream Limit: Sta 48+55 Reach 2C, X-Section W

2. LEVEE/FLOODWALL SYSTEM ELEMENTS

1. This Levee/Floodwall analysis is based on:

   ☐ upgrading of an existing levee/floodwall system
   ☒ a newly constructed levee/floodwall system
   ☐ reanalysis of an existing levee/floodwall system

2. Levee elements and locations are:

☒ earthen embankment, dike, berm, etc.	Station 9+62.93 to 48+55
☐ structural floodwall	Station _____ to _____
☒ other (describe): Soil Cement Lined, Left Overbank	Station 9+62.93 to 48+55

3. Structural Type:

   ☐ monolithic cast-in place reinforced concrete
   ☐ reinforced concrete masonry block
   ☐ sheet piling
   ☒ other (describe): Soil Cement Lining

4. Has this levee/floodwall system been certified by a Federal agency to provide protection against the 1% annual chance (100-year) flood event? ☐ 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

2. LEVEE/FLOODWALL SYSTEM ELEMENTS (Cont'd)

5. Attach certified drawings containing the following information (indicate drawing sheet numbers):

a. Plan of the levee embankment and floodwall structures. Sheet Numbers 15 -16 of 41

b. A profile of the levee/floodwall system showing the 100-year water-surface (base flood) elevation, levee and/or wall crest and foundation, and closure locations for the total levee system. Sheet Numbers 15-16 of 41

c. A profile of the base flood elevation, closure opening outlet and inlet invert elevations, type and size of opening, and kind of closure device. Sheet Numbers 15-16 of 41

d. A layout detail for the embankment protection measures. Sheet Numbers 15-16 of 41

e. Location, layout, and size and shape of the levee embankment features, foundation treatment, floodwall structure, closure structures, and pump stations. Sheet Numbers 15-16 of 41

3. FREEBOARD

1. The minimum freeboard provided above the base flood elevation is:

Riverine

3.0 feet or more at the downstream end and throughout ☒ Yes ☐ No
3.5 feet or more at the upstream end ☒ Yes ☐ No
4.0 feet immediately upstream of all structures and constrictions ☒ Yes ☐ No

Coastal

1.0 foot above the height of the one percent wave for the 100-year stillwater surge elevation or maximum wave runup (whichever is greater). ☐ Yes ☐ No

2.0 feet above 100-year stillwater surge elevation ☐ Yes ☐ No

Please note, occasionally exceptions are made to the minimum freeboard requirement. If an exception is requested, attach documentation addressing Part 65.10(b)(1)(ii) of the National Flood Insurance Program regulations.

If No is answered to any of the above, please attach an explanation.

2. Is there an indication from historical records that ice-jamming can effect the base flood elevation? ☐ Yes ☒ No
If Yes, provide ice-jam analysis profile and evidence that the minimum freeboard discussed above still exists.

3. Tabulate the elevations at critical locations (tabulate values at each levee crest grade change, and where sediment may accumulate such as along bends in the channel.)

Station	Location	100-year Water Surface Elevation	Levee Crest	Freeboard (ft.)
Sta 9+62.93	Upper end			
Sta 18+50	Section 2V	2323.74	2330	6.26
Sta 32+00	Section 2S	2274.74	2283	8.26
Sta 39+00	Section 2Q	2255.97	2261	5.03
48+55	Lower end	2226.56	2232	5.44

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

4. SEDIMENT TRANSPORT CONSIDERATIONS

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year water-surface (base flood) elevations; and/or based on the stream geomorphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including sewer and deposition) to affect the base flood elevations, then provide the following information:

- ☒ Estimated sediment load
- ☒ Method used to estimate sediment transport
- ☒ Method used to estimate scour and/or deposition
- ☒ Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport

5. CLOSURES

1. Openings through the levee system:

☐ 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 needed and reference)

Note:
Geotechnical and geologic data

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

6. EMBANKMENT PROTECTION

1. The maximum levee slope landside is: 4:1
2. The maximum levee slope floodside is: 7:1
3. The range of 100-year (base) riverine flood velocities along the levee? 3.01 (min.) to 7.02 (max.)
4. Embankment material is protected by (describe the kind): Soil Cement
5. Riprap Design Parameters: (Include references) ☐ Velocity ☐ Tractive stress

Reach	Sideslope	Flow Depth	Velocity	Curve or Straight	Stone Riprap			Depth of Toedown
					D_{100}	D_{50}	Thickness	
Sta N/A to N/A								
Sta N/A to N/A								
Sta N/A to N/A								
Sta N/A to N/A								
Sta N/A to N/A								
Sta N/A to N/A								

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

6. Is a bedding/filter analysis and design attached? ☒ Yes ☐ No

7. Describe the analysis used for other kinds of protection used (include copies of the design analysis):

Riprap protection was not used to armor the sideslopes of the East C-1 Levee. Refer to the East C-1 Design Report, located at \SECTION 5 MISC. REFERENCE MATERIAL\5.1b Reports\East C-1 Detention Basin for details on the levee lining and the geotechnical analysis performed.

Note: Attach engineering analysis to support construction plans.

7. EMBANKMENT AND FOUNDATION STABILITY

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

   ☐ Overall height: Sta _____, height _____ ft.

   ☐ Limiting foundation soil strength:

   Sta _____, depth _____ to _____

   strength Ø = _____ degrees, c = _____ psf

   slope: SS = _____ (h) to _____ (v)

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

2. Specify the embankment stability analysis methodology used (e.g., circular arc, sliding block, infinite slope, etc.): No Sability analysis was performed because the side slopes are 4:1 landside and 7:1 floodside, an extremely shallow slope.

3. Summary of stability analysis results:

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 (USACE) EM-1110-2-1913 Table 6-1)

4. Was a seepage analysis for the embankment performed? ☐ Yes ☒ No

   If Yes, describe methodology used: _____

5. Was a seepage analysis for the foundation performed: ☐ Yes ☒ No

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

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

8. The duration of 100-year (base) flood hydrograph against the embankment is _____ Hours

Note: Attach engineering analysis to support construction plans.

8. FLOODWALL AND FOUNDATION STABILITY

1. Describe analysis submittal based on Code:

   ☐ UBC (1988) or ☐ Other (specify):

2. Stability analysis submitted provides for:

   ☐ Overturning ☐ Sliding; If not, explain: _____

3. Loading included in the analyses were:

   ☐ Lateral earth @ P_A = _____ psf; P_p = _____ psf

   ☐ Surcharge-Slope @ _____, ☐ surface _____ psf

   ☐ Wind @ P_w = _____ psf

   ☐ Seepage (Uplift); _____ ☐ Earthquake @ P_{eq} = _____ %g

   ☐ 100-year significant wave height _____ ft.

   ☐ 100-year significant wave period _____ sec.

4. Summary of Stability Analysis Results: Factors of Safety. Itemize for each range in site layout dimension and loading condition limitation for each respective reach.

Loading Condition	Criteria (Min)		Sta	To	Sta	To
	Overturn	Sliding	Overturn	Sliding	Overturn	Sliding
Dead & Wind	1.5	1.5				
Dead & Soil	1.5	1.5				
Dead, Soil, Flood, & Impact	1.5	1.5				
Dead, Soil, & Seismic	1.3	1.3				

(Ref: FEMA 114 Sept 1986; USACE EM 1110-2-2502)

(Note: Extend table on an added sheet as needed and reference)

5. Foundation bearing strength for each soil type:

Bearing Pressure	Sustained Load (psf)	Short Term Load (psf)
Computed design maximum		
Maximum allowable		

6. Foundation scour protection ☐ is, ☐ is not provided. Describe if provided:

_____

Note: Attach engineering analysis to support construction plans.

9. SETTLEMENT

1. Has anticipated potential settlement been determined and incorporated into the specified construction elevations to maintain the established freeboard margin? ☐ Yes ☒ No

2. The computed range of settlement is _____ ft. to _____ ft.

3. Settlement of the levee crest is determined to be primarily from:

   ☐ Foundation consolidation
   ☐ Embankment compression
   ☐ Other (describe):

4. Differential settlement of floodwalls

   ☐ has ☐ has not been accommodated in the structural design and construction.

Note: Attach engineering analysis to support construction plans.

10. INTERIOR DRAINAGE

1. Specify size of each interior watershed

   Draining to pressure conduit: n/a

   Draining to ponding area: n/a

2. Relationships Established

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 ☐ Yes ☒ No

4. Specify the discharge capacity of the head pressure conduit: n/a

5. Which Flooding Conditions Were Analyzed?

• 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 not: These conditions were not applicable

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. ☒ Yes ☐ No

   If No, explain why not: _____

7. The rate of seepage through the levee system for the 100-year (base) flood is zero cfs

10. INTERIOR DRAINAGE (Cont'd)

8. The length of levee system used to drive this seepage rate in item 7: _____ ft.

9. Will a pumping plant(s) be used for interior drainage? ☐ Yes ☒ No

If Yes, include the number of pumping plants: _____
For each pumping plant, list:

	Plant #1	Plant #2
The number of pumps		
The ponding storage capacity		
The maximum pumping rate		
The maximum pumping head		
The pumping starting elevation		
The pumping stopping elevation		
Is the discharge facility protected?		
Is there a flood warning plan?		
How much time is available between warning and flooding?		

Will the operations be automatic? ☐ Yes ☐ No

If the pumps are electric, are there backup power sources? ☐ Yes ☐ No

(Reference: U.S. Army Corps of Engineers EM-1110-2-3101, 3102, 3103, 3104, and 3105)

Note: Include a copy of supporting documentation of data and analysis. Provide a map showing the flooded area and maximum ponding elevations for all interior watersheds that result in flooding.

11. OTHER DESIGN CRITERIA

1. The following items have been addressed as stated:

   Liquefaction ☐ is ☒ is not a problem
   Hydrocompaction ☐ is ☒ is not a problem
   Heave differential movement due to soils of high shrink/swell ☐ is ☒ is not a problem

2. For each of these problems, state the basic facts and corrective action taken:

   Liquefaction, hydrocompaction, and heave are not relevant to the East C-1 Levee conditions

3. If the levee/floodwall is new or enlarged, will the structure adversely impact flood levels and/or flow velocities floodside of the structure? ☒ Yes ☐ No

Note: Attach supporting documentation

12. OPERATIONAL PLAN AND CRITERIA

1. Are the planned/installed works in full compliance with NFIP regulations, Section 44 CFR Ch. 1 1.65.10

   ☒ Yes ☐ No

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

   ☒ Yes ☐ No

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

   ☒ Yes ☐ No

If the answer is No to any of the above, please explain below.

_____

_____

_____

Form 8

The East C-1 Levee directs storm flows from the East C-1 Detention Basin northwest, cutting off the apex of the alluvial fan generated from the River Mountains escarpment. The levee has a trapezoidal cross section with 4:1ss land side and 7:1ss flood side, with a 10' top width, and 5' cutoff wall (see cross section on plans). A soil cement lining on the 7:1ss is 12" thick and approximately 35' wide; the channel right of the levee is earthen lined and approximately 50' wide. Velocities associated with the levee are range from 3.01 to 7.02 fps (see HEC-RAS output for Reach 2C, Sections N-N to W-W).

A geotechnical analysis for the levee was performed as part of the East C-1 Detention Basin. Results of the borings taken along the levee were used to perform a HEC-6 analysis to estimate long term aggradation and degradation of the levee channel. The levee has no interior drainage or gated/controlled openings.

A slope stability and seepage analysis for the levee was not necessary because of the mild side slopes (4:1 and 7:1), because of the short duration of the rainfall events in Clark County, and because of the soil cement lining (personal communication, Kleinfelder and Associates). Clays are not present in the soil borings, precluding issues regarding heave. Liquefaction is not an issue because the levee should not be saturated given the soil cement lining, and short duration rainfall events. Hydrocompaction is not an issue given compaction during construction.

Plans and reports for the East C-1 Levee can be found at the following locations:

Plans:

\SECTION 5 MISC. REFERENCE MATERIAL\5.1a - Plans for Construction\East C-1 DB and Levee\CV05596

Design (and geotechnical) report:

\SECTION 5 MISC. REFERENCE MATERIAL\5.1b Reports\East C-1 Detention Basin

HEC-6:

\SECTION 2 ENGINEERING ANALYSIS\2.3.4 SEDIMENTATION ANALYSIS

HEC-RAS:

\SECTION 2 ENGINEERING ANALYSIS\2.2 HYDRAULIC ANALYSIS\2.2.2 APPROX. METHODS ANALYSIS\2.2.2.1 REACH 2
Note: Reach 2C was also performed as a detailed analysis based on record drawings of the East C-1 Levee

FINAL SUMMARY REPORT FOR MATERIALS TESTING AND OBSERVATION SERVICES EAST C-1 DETENTION BASIN HENDERSON, NEVADA 31-312101

March 31, 2000

Prepared for:

Mr. Alan Hargraves
SNWA/Parsons Infrastructure
153 West Lake Mead Drive, Bldg. 1
Henderson, Nevada 89015

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FIELD DENSITY TEST SUMMARY

Test No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
1	12/03/98	Sta 16+00, 40' E of W Toe Slope	Base Grade	0	8.6	121.9	126.0	97	95
2	12/03/98	Sta 20+00, 60' E of W Toe Slope	Base Grade	0	10.6	120.6	126.0	96	95
3	12/03/98	Sta 12+30, 50' E of W Toe Slope	Base Grade	0	7.5	119.4	126.0	95	95
4	12/03/98	Sta 11+00, 40' E of W Toe Slope	Base Grade	0	9.1	119.7	126.0	95	95
5	12/03/98	Sta 23+00, 20' E of W Toe Slope	Base Grade	0	10.7	119.1	126.0	95	95
6	12/04/98	Sta 22+00, 30' E of W Toe Slope	Base Grade	0	11.8	119.7	126.0	95	95
7	12/04/98	Sta 29+00, 40' E of W Toe Slope	Base Grade	0	8.5	119.1	126.0	95	95
8	12/04/98	Sta 25+50, 45' E of W Toe Slope	Base Grade	0	8.8	123.8	126.0	98	95
9	12/04/98	Sta 32+85, 30' E of W Toe Slope	Base Grade	0	8.5	119.6	126.0	95	95
10	12/04/98	Sta 42+10, 25' E of W Toe Slope	Base Grade	0	8.9	119.2	126.0	95	95
[redacted]	12/04/98	Sta 46+00, 35' E of W Toe Slope	Base Grade	0	8.4	119.5	126.0	95	95
12	12/04/98	Sta 50+00, 15' E of W Toe Slope	Base Grade	0	10.3	119.4	126.0	95	95
13	12/04/98	Sta 36+00, 10' E of W Toe Slope	Base Grade	0	10.1	121.4	126.0	96	95
14	12/04/98	Sta 39+20, 25' E of W Toe Slope	Base Grade	0	11.0	119.8	126.0	95	95
15	12/16/98	On Levee, Sta 16+75, 5' E of Toe Slope	1st Lift	1.0	7.6	122.1	126.0	97	95
16	12/16/98	On Levee, Sta 20+00, 20' E of Toe Slope	1st Lift	1.0	6.8	121.5	126.0	96	95
17	12/16/98	On Levee, Sta 24+00, 12' E of Toe Slope	1st Lift	1.0	6.8	120.3	126.0	96	95
18	12/17/98	On Levee, Sta 25+75, 12' W of Toe Slope	1.0 Above Grade	1.0	6.8	119.4	126.0	95	95
19	12/17/98	On Levee, Sta 30+00, 6' W of Toe Slope	1.0 Above Grade	1.0	7.5	121.4	126.0	96	95
20	12/17/98	On Levee, Sta 33+00, 5' W of Toe Slope	1.0 Above Grade	1.0	7.8	125.0	126.0	99	95
21	12/17/98	On Levee, Sta 37+00, 20' W of Toe Slope	1.0 Above Grade	1.0	8.3	124.1	126.0	99	95
22	12/18/98	Sta 41+00, 12' E of Toe Slope	1.0 Above Grade	1.0	8.0	118.6	126.0	94 *	95
[redacted]	12/18/98	Sta 44+50, 6' E of Toe Slope	1.0 Above Grade	1.0	7.2	121.4	126.0	96	95

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FIELD DENSITY TEST SUMMARY

No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
24	12/18/98	Sta 47+30, 15' E of Toe Slope	1.0 Above Grade	1.0	5.5	121.4	126.0	96	95
25	12/18/98	Sta 16+75, 10' E of Toe Slope	2.0 Above Grade	2.0	9.6	122.2	126.0	97	95
26	12/21/98	Sta 21+00+, 12' E of Toe Slope	2.0 Above Grade	2.0	3.8	123.8	131.0	95	95
27	12/21/98	Sta 25+00+, 10' E of Toe Slope	2.0 Above Grade	2.0	4.5	124.8	131.0	95	95
28	12/21/98	Sta 27+25+, 15' E of Toe Slope	2.0 Above Grade	2.0	6.0	124.9	131.0	95	95
29	12/21/98	Sta 31+00+, 10' E of Toe Slope	2.0 Above Grade	2.0	6.8	124.1	131.0	95	95
30	12/29/98	Sta 35+20, 15' E of W Toe Slope, On Levee	3.0 Above Grade	3.0	5.8	124.5	131.0	95	95
31	12/29/98	Sta 38+75, 18' E of W Toe Slope, On Levee	3.0 Above Grade	3.0	6.8	123.8	131.0	95	95
32	12/29/98	Sta 42+00, 5' E of W Toe Slope, On Levee	3.0 Above Grade	3.0	7.8	124.0	131.0	95	95
33	12/29/98	Sta 45+50, 10' E of W Toe Slope, On Levee	3.0 Above Grade	3.0	7.3	124.8	131.0	95	95
[illegible]	12/29/98	Sta 49+25, 15' E of W Toe Slope, On Levee	3.0 Above Grade	3.0	5.9	126.9	131.0	97	95
35	12/30/98	Sta 18+10, 10' E of W Toe Slope	3.0 Above Grade	3.0	9.4	123.9	131.0	95	95
36	12/30/98	Sta 22+55, 12' E of W Toe Slope	3.0 Above Grade	3.0	7.2	123.8	131.0	95	95
37	12/30/98	Sta 26+00	3.0 Above Grade	3.0	6.8	124.0	131.0	95	95
38	12/31/98	Sta 17+70, 15' E of W Toe Slope		4.0	8.1	126.1	131.0	96	95
39	12/31/98	Sta 21+00, 20' E of W Toe Slope		4.0	6.7	125.4	131.0	96	95
40	01/06/99	Sta 32+75, 15' E of W Toe Slope	2278.0	4.0	7.9	124.0	131.0	95	95
41	01/06/99	Sta 13+50, 20' E of W Toe Slope	2339.0	1.0	7.6	120.0	126.0	95	95
42	01/06/99	Sta 11+00, 30' E of W Toe Slope		1.0	8.1	119.0	126.0	94 *	95
43	01/06/99	Sta 43+00, 20' E of W Toe Slope	2246.0	4.0	5.8	125.2	131.0	96	95
44	01/07/99	Sta 25+00, 30' E of W Toe Slope	2305.2	3.0	7.6	123.9	131.0	95	95
45	01/07/99	Sta 28+10, 20' E of W Toe Slope	2292.0	3.0	8.5	125.0	131.0	95	95
46	01/07/99	Sta 37+00, 25' E of W Toe Slope	2264.2	3.0	9.1	124.3	131.0	95	95

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FIELD DENSITY TEST SUMMARY

[redacted] No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	SPEC
47	01/07/99	Sta 40+00, 20' E of W Toe Slope	2251.3	3.0	5.9	123.8	131.0	95	95
48	01/07/99	Sta 48+50, 25' E of W Toe Slope	2226.1	2.0	8.7	123.9	131.0	95	95
49	01/07/99	Sta 12+50, 25' E of W Toe Slope	2342.0	2.0	7.6	128.1	131.0	98	95
50	01/07/99	Sta 17+50, 6' E of W Toe Slope	2331.2	1.0	8.1	121.0	126.0	96	95
51	01/07/99	Sta 21+00, 5' E of W Toe Slope	2319.5	1.0	9.0	120.1	126.0	95	95
52	01/07/99	Sta 23+00, 6' E of W Toe Slope	2313.2	1.0	7.7	119.2	126.0	95	95
53	01/08/99	On Levee, Sta 40+60, 30' E of W Toe Slope	2252.4	3.0	8.0	124.1	131.0	95	95
54	01/08/99	On Levee, Sta 44+50, 25' E of W Toe Slope	2239.7	3.0	10.1	123.7	131.0	94 *	95
55	01/08/99	On Levee, Sta 47+50, 15' E of W Toe Slope	2231.8	3.0	7.9	123.9	131.0	95	95
56	01/08/99	On Levee, Sta 39+50, 20' E of W Toe Slope	2257.2	4.0	10.4	125.9	131.0	96	95
[redacted]	01/08/99	On Levee, Sta 36+50, 15' E of W Toe Slope	2265.5	4.0	8.5	123.8	131.0	95	95
58	01/08/99	On Levee, Sta 33+50, 10' E of W Toe Slope	2275.5	4.0	7.4	124.3	131.0	95	95
59	01/08/99	On Levee, Sta 24+50, 12' E pof W Toe Slope	2308.2	4.0	7.9	126.8	131.0	97	95
60	01/08/99	On Levee, Sta 28+60, 18' E of W Toe Slope	2294.9	4.0	8.8	125.6	131.0	96	95
61	01/08/99	On Levee, Sta 31+00, 15' E of W Toe Slope	2284.8	4.0	8.8	123.6	131.0	94 *	95
62	01/11/99	On Levee, Sta 16+50, 9' E of W Toe Slope	2333.8	4.5	7.1	119.6	126.0	95	95
63	01/11/99	On Levee, Sta 20+00, 12' E of W Toe Slope	2323.7	4.5	5.1	119.2	126.0	95	95
64	01/11/99	On Levee, Sta 23+00, 10' E of W Toe Slope	2313.2	4.5	6.9	119.9	126.0	95	95
65	01/11/99	On Levee, Sta 27+00, 10' E of W Toe Slope	2296.3	4.5	7.1	120.3	126.0	96	95
66	01/11/99	On Levee, Sta 31+70, 12' E of W Toe Slope	2282.9	4.5	6.7	121.0	126.0	96	95
67	01/11/99	On Levee, Sta 35+00, 12' E of W Toe Slope	2270.5	3.5	7.3	120.2	126.0	95	95
68	01/13/99	On Levee, Sta 28+00, 12' E of W Toe Slope	2295.5	5.0	7.4	124.2	127.0	98	95
[redacted]	01/13/99	On Levee, Sta 31+25, 9' E of W Toe Slope	2284.2	5.0	7.8	122.5	127.0	97	95

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FIELD DENSITY TEST SUMMARY

T[redacted] No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	SPEC
70	01/13/99	On Levee, Sta 35+00, 15' E of W Toe Slope	2271.8	5.0	7.3	121.0	127.0	95	95
71	01/13/99	On Levee, Sta 38+60, 15' E of W Toe Slope	2260.4	4.0	8.5	123.1	127.0	97	95
72	01/13/99	On Levee, Sta 42+10, 6' E of W Toe Slope	2250.2	4.0	7.1	120.0	127.0	95	95
73	01/14/99	On Levee, Sta 45+50, 15' E of W Toe Slope	2239.2	3.5	7.4	123.8	127.0	98	95
74	01/14/99	On Levee, Sta 48+55, 18' E of W Toe Slope	2228.7	3.0	6.8	120.8	127.0	95	95
75	01/14/99	On Levee, Sta 25+00, 9' E of W Toe Slope	2306.4	5.0	6.2	121.8	127.0	96	95
76	01/14/99	On Levee, Sta 21+50, 10' E of W Toe Slope	2319.3	5.0	6.6	123.3	127.0	97	95
77	01/14/99	On Levee, Sta 17+70, 12' E of Toe Slope	2331.6	4.5	7.0	121.1	127.0	95	95
78	01/14/99	On Levee, Sta 14+00, 15' E of W Toe Slope	2341.4	2.0	8.1	120.2	127.0	95	95
79	01/14/99	On Levee, Sta 10+50, 25' E of W Toe Slope	2344.8	2.0	9.9	120.8	127.0	95	95
[redacted]	01/15/99	On Levee, Sta 33+00, 9' E of W Toe Slope	2279.0	5.5	8.0	120.2	127.0	95	95
81	01/15/99	On Levee, Sta 35+50, 18' E of W Toe Slope	2270.6	4.5	7.5	120.1	127.0	95	95
82	01/15/99	On Levee, Sta 37+80, 10' E of W Toe Slope	2263.1	4.5	10.2	120.8	127.0	95	95
83	01/18/99	Sta 39+50, 6' E of W Toe Slope	2258.2	4.0	6.7	120.9	127.0	95	95
84	01/18/99	Sta 42+75, 18' E of W Toe Slope	2248.9	4.0	7.3	120.7	127.0	95	95
85	01/18/99	Sta 45+75, 20' E of W Toe Slope	2238.8	4.0	8.0	121.3	127.0	96	95
86	01/18/99	Sta 47+50, 21' E of W Toe Slope	2233.1	3.0	8.5	120.3	127.0	95	95
87	01/18/99	Sta 39+00, 15' E of W Toe Slope	2260.2	4.5	6.5	121.5	127.0	96	95
88	01/18/99	Sta 35+50, 20' E of W Toe Slope	2271.4	5.0	6.4	120.4	127.0	95	95
89	01/18/99	Sta 33+00, 23' E of W Toe Slope	2279.0	5.0	7.7	120.1	127.0	95	95
90	01/18/99	Sta 41+00, 18' E of W Toe Slope	2254.1	4.5	9.6	121.1	127.0	95	95
91	01/18/99	Sta 48+00, 20' E of W Toe Slope	2232.1	4.5	8.2	120.8	127.0	95	95
[redacted]	01/18/99	Sta 44+50, 12' E of W Toe Slope	2242.2	4.5	9.5	121.0	127.0	95	95

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FIELD DENSITY TEST SUMMARY

No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
93	01/19/99	On Levee, Sta 17+70, 15' E of W Toe Slope	2332.4	4.0	6.2	120.7	127.0	95	95
94	01/19/99	On Levee, Sta 11+75, 25' E of W Toe Slope	2334.7	3.0	5.6	124.8	127.0	98	95
95	01/19/99	On Levee, Sta 16+75, 20' E of W Toe Slope	2335.0	4.5	6.3	121.7	127.0	96	95
96	01/20/99	On Levee, Sta 11+50, 25' E of W Toe Slope	2345.0	2.5	7.7	118.6	124.0	96	95
97	01/20/99	On Levee, Sta 13+00, 15' E of W Toe Slope	2343.5	2.5	9.7	119.0	124.0	96	95
98	01/20/99	On Levee, Sta 10+50, 10' E of W Toe Slope	2344.8	2.0	5.9	120.7	124.0	97	95
99	01/20/99	On Levee, Sta 10+75, 6' E of W Toe Slope	2345.6	2.5	5.7	118.9	124.0	96	95
100	01/20/99	On Levee, Sta 11+00, 15' E of W Toe Slope	2346.3	3.0	8.0	118.4	124.0	96	95
101	01/21/99	Sta 12+05, 25' E of W Toe Slope	2345.8	3.0	5.9	117.7	124.0	95	95
102	01/21/99	Sta 13+00, 20' E of W Toe Slope	2344.7	3.5	6.6	118.0	124.0	95	95
[illegible]	01/22/99	Sta 10+75, 25' E of W Toe Slope	2346.4	4.0	5.9	117.3	124.0	95	95
104	01/22/99	Sta 12+50, 20' E of W Toe Slope	2345.6	4.5	7.2	118.0	124.0	95	95
105	01/22/99	Sta 10+90, 18' E of W Toe Slope	2347.1	4.5	5.4	118.0	124.0	95	95
106	01/25/99	Sta 12+10, 20' W of CL Levee	2344.6	1.5	7.7	123.0	124.0	99	95
107	01/25/99	Sta 12+00, 25' W of CL Levee	2344.8	2.5	5.5	122.5	124.0	99	95
108	01/25/99	Sta 11+95, 25' W of CL Levee	2345.7	3.0	5.7	119.5	124.0	96	95
109	01/26/99	Access Ramp, Sta 11+90, 40' E of CL Levee	2345.0	2.0	9.3	120.9	124.0	98	95
110	01/28/99	At Dam, Sta 19+00, 150' W of Cutoff Trench	@ Base Grade	0	6.3	120.5	127.0	95	95
111	01/28/99	At Dam, Sta 19+50, 50' W of Cutoff Trench	2395.0	0	10.2	121.5	127.0	96	95
112	01/28/99	At Dam, Sta 19+75, 450' W of Cutoff Trench	2395.0	0	9.8	120.0	127.0	95	95
113	01/29/99	Cutoff Trench, Sta 19+55	2398.0	1.0	5.5	119.4	124.0	96	95
114	01/29/99	Cutoff Trench, Sta 19+50	2399.0	2.0	9.3	118.3	124.0	95	95
115	01/29/99	Cutoff Trench, Sta 19+60	2400.0	3.0	8.8	118.4	124.0	96	95

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[redacted] No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
116	01/29/99	Cutoff Trench, Sta 19+50	2400.5	2406.5	3.5	119.5	124.0	96	95
117	01/29/99	Cutoff Trench, Sta 19+70	2401.0	4.0	9.3	120.7	124.0	97	95
118	02/01/99	Cutoff Trench, Sta 19+25	2400.5	4.5	7.8	118.3	124.0	95	95
119	02/01/99	Cutoff Trench, Sta 19+35	2400.5	4.5	8.1	120.5	124.0	97	95
120	02/01/99	Cutoff Trench, Sta 19+00	2401.0	5.0	8.8	120.3	124.0	97	95
121	02/01/99	Cutoff Trench, Sta 19+70	2394.5	0.5	9.1	117.8	124.0	95	95
122	02/01/99	Cutoff Trench, Sta 19+75	2399.0	3.0	9.3	118.2	124.0	95	95
123	02/01/99	Cutoff Trench, Sta 19+50	2402.5	6.5	11.1	119.9	124.0	97	95
124	02/01/99	Cutoff Trench, Sta 19+60	2403.0	7.0	8.1	121.4	124.0	98	95
125	02/01/99	Cutoff Trench, Sta 19+75	2403.0	7.0	8.6	119.4	124.0	96	95
[redacted]	02/02/99	Cutoff Trench, Sta 19+25	2402.0	9.0	10.5	121.4	124.0	98	95
127	02/02/99	Cutoff Trench, Sta 19+50	2402.0	9.0	10.4	122.3	124.0	99	95
128	02/02/99	Cutoff Trench, Sta 19+75	2403.0	10.0	9.8	123.1	124.0	99	95
129	02/02/99	Cutoff Trench, Sta 19+90	2404.0	11.0	8.7	119.8	124.0	97	95
130	02/02/99	Cutoff Trench, Sta 19+50	2404.0	11.0	10.4	122.1	124.0	99	95
131	02/02/99	Cutoff Trench, Sta 19+25	2405.0	12.0	10.6	120.4	124.0	97	95
132	02/03/99	Cutoff Trench, Sta 19+65	2405.5	12.5	5.0	118.3	124.0	95	95
133	02/03/99	Cutoff Trench, Sta 19+40	2406.0	13.0	6.0	122.1	124.0	99	95
134	02/03/99	Cutoff Trench, Sta 19+95	2406.0	13.0	6.4	117.8	124.0	95	95
135	02/03/99	Cutoff Trench, Sta 19+50	2407.6	14.5	5.5	123.2	124.0	99	95
136	02/03/99	On Levee, Sta 11+25, 12' E of W Toe Slope	2348.0	6.0	8.1	121.4	124.0	98	95
137	02/03/99	Cutoff Trench, Sta 19+00	2408.7	15.5	6.1	118.0	124.0	95	95
[redacted]	02/03/99	Cutoff Trench, Sta 19+80	2409.5	16.0	5.7	123.0	124.0	99	95

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No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
139	02/03/99	Cutoff Trench, Sta 19+10	2409.5	16.0	7.5	119.1	124.0	96	95
140	02/03/99	Cutoff Trench, Sta 20+00	2410.3	17.0	8.1	120.0	124.0	97	95
141	02/04/99	Cutoff Trench, Sta 19+10	2410.0	17.0	7.8	117.8	124.0	95	95
142	02/04/99	Cutoff Trench, Sta 19+40	2410.0	17.0	7.9	122.1	124.0	99	95
143	02/04/99	Cutoff Trench, Sta 19+50	2410.6	17.5	5.6	120.3	124.0	97	95
144	02/04/99	Cutoff Trench, Sta 19+75	2410.5	17.5	7.3	120.1	124.0	97	95
145	02/04/99	Cutoff Trench, Sta 19+00	2411.2	18.0	6.0	117.9	124.0	95	95
146	02/04/99	Cutoff Trench, Sta 19+10	2411.5	18.5	8.3	119.3	124.0	96	95
147	02/04/99	Cutoff Trench, Sta 20+00	2411.3	19.0	8.1	120.8	124.0	97	95
148	02/04/99	Cutoff Trench, Sta 19+00	2412.0	20.0	7.8	121.3	124.0	98	95
149	02/04/99	Cutoff Trench, Sta 19+95	2413.8	22.0	6.2	118.3	124.0	95	95
150	02/04/99	Cutoff Trench, Sta 19+20	2413.6	22.0	8.3	119.0	124.0	96	95
151	02/04/99	Cutoff Trench, Sta 19+00	2413.5	22.0	7.6	121.2	124.0	98	95
152	02/05/99	Cutoff Trench, Sta 19+25	2414.3	23.0	7.3	118.4	124.0	96	95
153	02/05/99	Cutoff Trench, Sta 20+00	2414.0	23.0	7.8	120.1	124.0	97	95
154	02/05/99	Cutoff Trench, Sta 19+50	2414.8	24.0	7.8	118.4	124.0	96	95
155	02/05/99	Cutoff Trench, Sta 20+00	2415.0	24.0	8.0	118.9	124.0	96	95
156	02/05/99	Cutoff Trench, Sta 19+15	2415.9	25.0	7.5	119.0	124.0	96	95
157	02/05/99	Cutoff Trench, Sta 19+40	2416.0	25.0	8.1	123.1	124.0	99	95
158	02/05/99	Cutoff Trench, Sta 19+75	2416.8	26.0	9.1	120.3	124.0	97	95
159	02/05/99	Cutoff Trench, Sta 19+00	2417.3	26.0	8.3	119.8	124.0	97	95
160	02/08/99	Cutoff Trench, Sta 19+00	2417.5	27.0	6.4	119.8	124.0	97	95
161	02/08/99	Cutoff Trench, Sta 20+00	2417.5	27.0	7.1	121.1	124.0	98	95

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162	02/08/99	Cutoff Trench, Sta 19+60	2418.3	28.0	7.5	119.6	124.0	97	95
163	02/08/99	Existing Surface, Sta 20+50 @ 13+50, Drain Blanket	2438.0	0	10.1	117.8	124.0	95	95
164	02/08/99	Cutoff Trench, Sta 19+75	2419.5	29.0	8.1	117.6	124.0	95	95
165	02/08/99	Cutoff Trench, Sta 19+10	2420.5	30.0	8.1	118.2	124.0	95	95
166	02/08/99	Cutoff Trench, Sta 19+70	2420.5	30.0	7.9	117.9	124.0	95	95
167	02/08/99	Cutoff Trench, Sta 20+00	2421.5	31.0	8.3	118.5	124.0	96	95
168	02/08/99	Cutoff Trench, Sta 19+60	2421.5	31.0	9.9	122.1	124.0	99	95
169	02/08/99	Cutoff Trench, Sta 19+05	2422.3	32.0	8.1	120.0	124.0	97	95
170	02/09/99	Cutoff Trench, Sta 19+10	2422.4	32.0	7.5	118.7	124.0	96	95
171	02/09/99	Cutoff Trench, Sta 20+00	2423.3	33.0	7.3	118.3	124.0	95	95
[illegible]	02/09/99	Cutoff Trench, Sta 19+30	2423.5	33.0	8.4	121.9	124.0	98	95
173	02/09/99	Cutoff Trench, Sta 19+05	2424.2	34.0	7.3	121.3	124.0	98	95
174	02/09/99	Cutoff Trench, Sta 19+60	2425.3	35.0	7.5	119.6	124.0	97	95
175	02/09/99	Cutoff Trench, Sta 19+00	2425.5	35.0	12.1	121.2	124.0	98	95
176	02/09/99	Cutoff Trench, Sta 19+25	2426.5	36.0	10.3	119.3	124.0	96	95
177	02/09/99	Cutoff Trench, Sta 19+75	2426.5	36.0	9.8	122.2	124.0	99	95
178	02/16/99	Cutoff Trench, Sta 20+25	2429.3	39.0	11.5	108.5	113.0	96	95
179	02/16/99	Cutoff Trench, Sta 19+75	2429.4	39.0	8.3	107.3	113.0	95	95
180	02/16/99	Cutoff Trench, Sta 18+50	2430.5	10.0	8.0	111.2	113.0	98	95
181	02/16/99	Cutoff Trench, Sta 19+00	2430.5	40.0	7.1	107.6	113.0	95	95
182	02/16/99	Cutoff Trench, Sta 20+00	2431.3	41.0	10.5	108.6	113.0	96	95
183	02/16/99	Cutoff Trench, Sta 18+60	2431.6	41.0	9.1	109.0	113.0	97	95
184	02/17/99	Cutoff Trench, Sta 18+85	2424.5	27.0	8.3	109.4	113.0	97	95

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185	02/17/99	Cutoff Trench, Sta 19+75	2424.5	27.0	10.1	108.9	113.0	96	95
186	02/17/99	Cutoff Trench, Sta 20+25	2425.5	27.0	7.2	118.5	124.0	96	95
187	02/17/99	Cutoff Trench, Sta 18+75	2426.5	28.0	6.5	111.5	113.0	99	95
188	02/17/99	Cutoff Trench, Sta 19+00	2426.5	28.0	8.2	108.6	113.0	96	95
189	02/17/99	Cutoff Trench, Sta 21+00	2427.5	29.0	7.1	109.7	113.0	97	95
190	02/17/99	Cutoff Trench, Sta 19+50	2428.5	30.0	8.6	118.0	124.0	95	95
191	02/17/99	Cutoff Trench, Sta 20+50	2429.5	31.0	7.3	109.8	113.0	97	95
192	02/17/99	Base @ Inlet Structure, Sta 18+00 @ 15+80	2443.0	0	8.8	124.3	126.0	99	95
193	02/17/99	Cutoff Trench, Sta 19+75	2430.5	32.0	10.1	117.1	113.0	104	95
194	02/17/99	Cutoff Trench, Sta 21+00	2430.5	32.0	9.3	112.1	113.0	99	95
[redacted]	02/17/99	Cutoff Trench, Sta 20+25	2431.5	33.0	8.7	110.3	113.0	98	95
196	02/17/99	Cutoff Trench, Sta 18+75	2432.5	34.0	7.4	108.7	113.0	96	95
197	02/17/99	Cutoff Trench, Sta 20+50	2433.5	35.0	9.3	111.3	113.0	99	95
198	02/18/99	Sta 18+80	2434.5	40.0	9.6	107.6	113.0	95	95
199	02/18/99	Sta 20+25	2434.5	40.0	10.3	109.6	113.0	97	95
200	02/18/99	Sta 18+85	2435.5	41.0	12.5	111.5	113.0	99	95
201	02/18/99	Sta 20+00	2435.5	41.0	12.3	107.9	113.0	96	95
202	02/18/99	Sta 18+90	2436.5	42.0	10.0	111.0	113.0	98	95
203	02/18/99	Sta 20+00	2437.0	42.5	9.1	110.2	113.0	98	95
204	02/19/99	Sta 19+00	2437.5	--	7.4	109.1	113.0	97	95
205	02/19/99	Sta 21+25	2437.5	--	8.1	110.3	113.0	98	95
206	02/19/99	Sta 20+50	2438.5	--	10.3	111.0	113.0	98	95
207	02/19/99	Sta 21+00	2438.5	--	8.5	109.6	113.0	97	95

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FIELD DENSITY TEST SUMMARY

No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
208	02/22/99	Cutoff Trench, Sta 21+00 @ 14+20	2439.5	--	10.8	108.4	113.0	96	95
209	02/22/99	Cutoff Trench, Sta 18+80 @ 14+75	2440.5	--	9.1	107.6	113.0	95	95
210	02/22/99	Cutoff Trench, Sta 20+50 @ 14+15	2442.5	--	8.7	109.0	113.0	97	95
211	02/23/99	Sta 20+50 @ 14+20	2243.3	--	10.5	108.5	113.0	96	95
212	02/23/99	Sta 19+5 @ 15+00	2244.8	--	9.8	110.3	113.0	98	95
213	02/24/99	Sta 20+00 @ 15	2442.0	2.0	9.3	108.9	113.0	96	95
214	02/24/99	Sta 18+75 @ 14+75	2442.0	2.0	8.7	107.9	113.0	96	95
215	02/24/99	Sta 19+25 @ 14+50	2443.3	3.0	10.3	108.1	113.0	96	95
216	02/25/99	Within Low Levee Outlet Trench, Sta 16+30	2443.0	--	8.8	117.4	124.0	95	95
217	02/25/99	Within Low Levee Outlet Trench, Sta 15+00	2440.0	--	10.3	120.6	124.0	97	95
[illegible]	02/25/99	Within Low Levee Outlet Trench, Sta 12+50	2338.0	--	9.7	107.8	113.0	95	95
219	02/26/99	48" Pipe Bed @ Low Level Outlet, Sta 14+00	2436.0	6"	10.6	106.6	124.0	86 *	95
220	02/26/99	48" Pipe Bed @ Low Level Outlet, Sta 12+50	2431.0	6"	8.4	121.4	124.0	98	95
221	02/26/99	48" Pipe Bed @ Low Level Outlet, Sta 11+00	2427.0	6"	8.7	111.6	124.0	90 *	95
222	02/26/99	Retest of #219	2436.0	6"	10.4	117.2	124.0	95	95
223	02/26/99	Retest of #221	2427.0	6"	6.9	121.6	124.0	98	95
224	02/27/99	48" Low Level Outlet Pipe, Sta 14+00	2436.0	6"	11.2	117.8	124.0	95	95
225	02/27/99	48" Low Level Outlet Pipe, Sta 12+50	2431.0	6"	7.7	123.1	124.0	99	95
226	02/27/99	48" Low Level Outlet Pipe, Sta 11+00	2427.0	6"	5.0	121.0	124.0	98	95
227	03/08/99	On Levee, Sta 46+75, 25' E of W.T.S.	2237.0		8.9	118	124.0	95	95
228	03/08/99	On Levee, Sta 37+00, 20' E of W.T.S.	2266.0		9.2	118.9	124.0	96	95
229	03/08/99	On Levee, Sta 25+00, 25' E of W.T.S.	2306.0		8.8	122.9	124.0	99	95
230	03/08/99	On Levee, Sta 20+00, 20' E of W.T.S.	2324.0		8.6	119.1	124.0	96	95

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FIELD DENSITY TEST SUMMARY

No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
231	03/11/99	Sta 48+55 @ 7:1, 15' E of Top of 7:1	2229.4		7.7	123.8	126.0	98	95
232	03/11/99	Sta 46+00 @ 7:1, 21' E of Top of 7:1	2234.9		8.0	119.1	126.0	95	95
233	03/11/99	Sta 43+00 @ 7:1, 18' E of Top of 7:1	2244.2		7.9	119.5	126.0	95	95
234	03/11/99	Sta 40+50 @ 7:1, 9' E of Top of 7:1	2253.3		8.7	121.3	126.0	96	95
235	03/11/99	Sta 37+00 @ 7:1, 24' E of Top of 7:1	2262.8		8.1	119.8	126.0	95	95
236	03/11/99	Sta 32+75 @ 7:1, 15' E of Top of 7:1	2276.8		8.1	123.0	126.0	98	95
237	03/11/99	Sta 29+50 @ 7:1, 15' E of Top of 7:1	2287.3		7.8	124.3	126.0	99	95
238	03/11/99	Sta 25+00 @ 7:1, 20' E of Top of 7:1	2303.9		8.0	119.3	126.0	95	95
239	03/11/99	Sta 21+50 @ 7:1, 24' E of Top of 7:1	2315.1		8.0	119.5	126.0	95	95
240	03/11/99	Sta 18+20 @ 7:1, 9' E of Top of 7:1	2327.1		7.5	119.2	126.0	95	95
[redacted]	03/11/99	Sta 16+00 @ 7:1, 15' E of Top of 7:1	2333.5		7.4	119.3	126.0	95	95
242	03/11/99	Sta 11+00 @ 7:1, 10' E of Top of 7:1	2345.5		6.8	117.3	124.0	95	95
243	03/11/99	Sta 33+85 @ 4:1, 5' E of W.T.S.	2276.1		7.3	121.0	126.0	96	95
244	03/16/99	Bottom of Clay Collar, Sta 14+	2438.0		9.8	108.3	113.0	96	95
245	03/17/99	Sta 14+75, 6" N of 48" RCP	2445.0	8"	7.1	119.8	126.5	95	95
246	03/17/99	Sta 15+50, 5' S 48" RCP	2448.0	1.0	13.3	107.9	126.5	85 *	95
247	03/17/99	Sta 14+35, 6' N 48" RCP	2444.0	1.0	12.9	109.1	126.5	86 *	95
248	03/17/99	Sta 15+25, 6" N 48" RCP	2448.5	1.5	9.1	121.3	126.5	96	95
249	03/17/99	Sta 14+80, 8" S 48" RCP	2445.5	1.5	8.3	119.9	126.5	95	95
250	03/18/99	Low Level Outlet, Sta 15+00, 8" S 48" RCP	2444.5	2.0	13.5	119.8	126.5	95	95
251	03/18/99	Low Level Outlet, Sta 15+20, 8" N 48" RCP	2445.0	2.0	10.8	122.4	126.5	97	95
252	03/18/99	Low Level Outlet, Sta 15+50, 12' N 48" RCP	2446.5	2.0	13.3	107.7	113.0	95	95
253	03/18/99	Low Level Outlet, Sta 14+50, 6" N 48" RCP	2443.0	2.6	7.8	119.6	126.5	95	95

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FIELD DENSITY TEST SUMMARY

No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
254	03/18/99	Low Level Outlet, Sta 14+25, 6" S 48" RCP	2443.0	3.2	8.1	122.3	126.5	97	95
255	03/18/99	Low Level Outlet, Sta 14+10, 6" N 48" RCP	2442.0	3.2	11.2	122.9	126.5	97	95
256	03/19/99	Sta 14+00, Clay Collar, N	2336.0	1.0	13.1	114.6	121.0	95	95
257	03/19/99	Sta 15+70, 8" N 48" RCP	2448.5	2.5	8.6	119.9	126.5	95	95
258	03/19/99	Sta 15+25, 8" S 48" RCP	2446.5	2.5	7.8	121.1	126.5	96	95
259	03/19/99	Sta 14+00, Clay Collar, N	2336.5	1.5	12.8	114.7	121.0	95	95
260	03/19/99	Sta 14+50, 15' S 48" RCP	2444.5	3.5	13.5	110.3	114.5	96	95
261	03/19/99	Sta 15+60, 10' N 48" RCP	2448.0	3.5	12.9	109.8	114.5	96	95
262	03/19/99	Sta 14+00, Clay Collar, N	2436.9	2.0	12.3	114.8	121.0	95	95
263	03/19/99	Sta 14+00, Clay Collar, N	2437.5	2.5	13.4	117.6	121.0	97 #	95
2	03/19/99	Sta 15+00, 8' N 48" RCP	2447.0	3.5	13.5	111.3	114.5	97	95
265	03/19/99	Sta 15+60, 10' S 48" RCP	2448.0	3.5	13.8	108.8	114.5	95	95
266	03/22/99	Sta 14+00, Clay Collar, N	2438.0	3.0	14.0	117.7	121.0	97	95
267	03/22/99	Sta 14+80, 6" S 48" RCP	2446.0	4.5	11.0	123.1	126.5	97	95
268	03/22/99	Sta 14+90, 5' N 48" RCP	2446.0	4.5	9.9	109.6	114.5	96	95
269	03/22/99	Sta 15+25, 6' S 48" RCP	2448.5	4.5	9.7	109.9	114.5	96	95
270	03/22/99	Sta 15+00, 4' S 48" RCP	2448.5	5.5	14.1	108.6	114.5	95	95
271	03/22/99	Sta 15+50, 6" N 48" RCP	2449.0	5.5	10.5	122.0	126.5	96	95
272	03/22/99	Sta 14+00, Clay Collar, N	2438.5	3.5	13.1	116.0	121.0	96	95
273	03/22/99	Sta 14+00, Clay Collar, N	2439.0	4.0	14.2	114.7	121.0	95	95
274	03/23/99	Low Level Outlet Works, Sta 15+60, 8" S 48" RCP	2449.0		10.1	122.1	126.5	97	95
275	03/23/99	Low Level Outlet Works, Sta 14+00, Clay Collar, N	2443.0	4.8	13.0	114.5	121.0	95	95
276	03/23/99	Low Level Outlet Works, Sta 14+00, Clay Collar, N	2443.6	5.5	13.4	114.8	121.0	95	95

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FIELD DENSITY TEST SUMMARY

[redacted]	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
277	03/23/99	Low Level Outlet Works, Sta 15+00, 25' S 48" RCP	2445.3		11.3	108.3	114.5	95	95
278	03/24/99	Low Level Outlet Works, Sta 15+50 @ 19+00	2446.8		18.7	97.1	102.0	95	95
279	03/24/99	Low Level Outlet Works, Sta 14+50 @ 20+50	2444.5		20.1	99.0	102.0	97	95
280	03/24/99	Low Level Outlet Works, Sta 13+00 @ 18+75	2444.0		17.6	69.9	102.0	69 *	95
281	03/24/99	Low Level Outlet Works, Sta 12+00 @ 19+25	2442.5		18.8	98.2	102.0	96	95
282	03/24/99	Low Level Outlet Works, Sta 11+00 @ 17+50	2441.0		18.9	97.2	102.0	95	95
283	03/24/99	Low Level Outlet Works, Sta 14+00, Clay Collar (S)	2439.0	1.0	12.3	117.0	121.0	97	95
284	03/24/99	Low Level Outlet Works, Sta 14+00, Clay Collar (N)	2444.9	6.0	12.3	115.6	121.0	96	95
285	03/24/99	Low Level Outlet Works, Sta 11+00 @ 18+75	2440.0		16.9	98.8	102.0	97	95
286	03/24/99	Low Level Outlet Works, Sta 11+25 @ 19+10	2440.5		19.1	97.0	102.0	95	95
[redacted]	03/24/99	Low Level Outlet Works, Sta 14+50 @ 20+25	2447.0		17.7	96.6	102.0	95	95
[redacted]	03/24/99	Low Level Outlet Works, Sta 15+60 @ 18+60	2447.6		19.1	98.0	102.0	96	95
289	03/24/99	Low Level Outlet Works, Sta 15+00, C/L Pipe	2446.6		9.5	98.3	126.5	78 *	95
290	03/24/99	Low Level Outlet Works, Sta 13+50 2 19+00	2444.5		17.6	99.2	102.0	97	95
291	03/24/99	Low Level Outlet Works, Sta 14+00, Clay Collar (N)	2444.9	6.0	12.1	115.4	121.0	95	95
292	03/24/99	Low Level Outlet Works, Sta 14+00, Clay Collar (S)	2439.5	1.5	13.4	114.7	121.0	95	95
293	03/24/99	Low Level Outlet Works, Sta 14+00, Clay Collar (N)	2445.5	6.8	12.8	116.3	121.0	96	95
294	03/24/99	Low Level Outlet Works, Sta 15+90 @ 20+50	2446.2		14.7	100.4	102.0	98	95
295	03/24/99	Low Level Outlet Works, Sta 14+00, Clay Collar (S)	2440.0	2.0	13.0	114.8	121.0	95	95
296	03/24/99	Low Level Outlet Works, Sta 12+50 @ 20+00	2446.6		16.5	96.2	102.0	94 *	95
297	03/24/99	Low Level Outlet Works, Sta 14+80 2 18+00	2445.6		20.5	97.1	102.0	95	95
298	03/24/99	Low Level Outlet Works, Sta 14+00, Clay Collar (S)	2440.5	2.5	13.5	114.5	121.0	95	95
299	03/24/99	Low Level Outlet Works, Sta 12+00 @ 17+50	2447.5		17.3	98.3	102.0	96	95

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FIELD DENSITY TEST SUMMARY

No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
300	03/25/99	Low Level Outlet Works, Sta 14+00, Clay Collar (N)	2444.5		10.0	114.7	121.0	95	95
301	03/25/99	Low Level Outlet Works, Sta 15+85, C/L 48" RCP	2449.5		10.1	119.7	126.5	95	95
302	03/25/99	Low Level Outlet Works, Sta 11+00 @ 17+20	2446.0		13.1	108.7	114.5	95	95
303	03/25/99	Low Level Outlet Works, Sta 14, Clay Collar (S)	2440.5	2.5	14.0	117.6	121.0	97	95
304	03/25/99	Low Level Outlet Works, Sta 15+20 2 21+00	2449.0		11.0	108.9	114.5	95	95
305	03/25/99	Low Level Outlet Works, Sta 19+00, Clay Collar (N)	2445.0		12.3	116.3	121.0	96	95
306	03/25/99	Low Level Outlet Works, Sta 10+20 @ 18+90	2447.0		12.6	108.3	114.5	95	95
307	03/25/99	Low Level Outlet Works, Sta 14+40 @ 19+00	2447.8		10.3	108.4	114.5	95	95
308	03/25/99	Low Level Outlet Works, Sta 15+80, C/L 48" RCP	2451.1		11.4	121.7	126.5	96	95
309	03/25/99	Low Level Outlet Works, Sta 11+20 @ 18+60	2442.4		11.8	109.0	114.5	95	95
3[illegible]	03/26/99	Low Level Outlet Works, Sta 12+00, C/L 48" RCP	2443.0		11.9	108.6	114.5	95	95
311	03/26/99	Low Level Outlet Works, Sta 14+00 @ 19+75	2446.7		13.7	109.1	114.5	95	95
312	03/26/99	Low Level Outlet Works, Sta 14+00, Clay Collar (S)	2441.0	3.0	12.5	114.5	121.0	95	95
313	03/26/99	Low Level Outlet Works, Sta 11+50 @ 18+80	2442.0		11.5	108.9	114.5	95	95
314	03/26/99	Low Level Outlet Works, Sta 15+00 @ 19+00	2449.0		10.3	109.7	114.5	96	95
315	03/26/99	Low Level Outlet Works, Sta 11+00 @ 17+30	2449.5		11.8	108.6	114.5	95	95
316	03/26/99	Low Level Outlet Works, Sta 14+80 @ 18+00	2448.3		12.3	109.9	114.5	96	95
317	03/27/99	Low Level Outlet Works, Sta 14+00, Clay Collar (S)	2441.5	3.5	12.1	115.1	121.0	95	95
318	03/27/99	Low Level Outlet Works, Sta 14+00, Clay Collar (S)	2442.0	4.0	12.8	116.0	121.0	96	95
319	03/27/99	Low Level Outlet Works, Sta 14+00, Clay Collar (S)	2442.5	4.5	13.3	114.6	121.0	95	95
320	03/29/99	Low Level Outlet Works, Sta 13+50 @ 20+60	2449.6		12.1	108.4	114.5	95	95
321	03/29/99	Low Level Outlet Works, Sta 11+00 @ 17+50	2552.6		13.3	109.6	114.5	96	95
322	03/29/99	Low Level Outlet Works, Sta 10+00 @ 18+90	2436.3		14.0	108.3	114.5	95	95

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FIELD DENSITY TEST SUMMARY

[redacted]	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
323	03/29/99	Low Level Outlet Works, Sta 13+00 @ 17+25	2450.0		11.8	109.9	114.5	96	95
324	03/29/99	Low Level Outlet Works, Sta 13+25 @ 18+25	2449.7		12.8	109.0	114.5	95	95
325	03/29/99	Low Level Outlet Works, Sta 14+00, Clay Collar (S)	2443.0	5.0	12.6	114.5	121.0	95	95
326	03/29/99	Low Level Outlet Works, Sta 14+10 @ 20+40	2450.4		12.5	110.7	114.5	97	95
327	03/29/99	Low Level Outlet Works, Sta 12+00 @ 18+50	2449.8		11.8	113.7	114.5	99	95
328	03/29/99	Low Level Outlet Works, Sta 14+06, 1' S 48" RCP	2443.0		13.9	120.5	126.5	95	95
329	03/29/99	Low Level Outlet Works, Sta 14+00, Clay Collar (S)	2443.4	5.4	11.1	114.7	121.0	95	95
330	03/29/99	Low Level Outlet Works, Sta 13+50 @ 18+90	2448.6		12.1	108.7	114.5	95	95
331	03/29/99	Low Level Outlet Works, Sta 13+25 @ 17+35	2450.2		12.3	108.2	114.5	95	95
332	03/29/99	Low Level Outlet Works, Sta 13+50 @ 17+25	2450.4		12.5	108.8	114.5	95	95
333	03/30/99	Low Level Outlet Works, Sta 13+40 @ 19+75	2449.7		10.1	111.0	114.5	97	95
[redacted]	03/30/99	Low Level Outlet Works, Sta 14+00, Clay Collar (S)	2444.0	6.0	12.3	114.8	121.0	95	95
335	03/30/99	Low Level Outlet Works, Sta 11+50 @ 18+40	2448.7		11.1	108.5	114.5	95	95
336	03/30/99	Low Level Outlet Works, Sta 14+03, 4" S 48" RCP	2443.0	5.0	10.9	118.6	126.5	94 *	95
337	03/30/99	Low Level Outlet Works, Sta 14+00, Clay Collar (S)	2444.8	6.8	9.8	114.4	121.0	95	95
338	03/30/99	Low Level Outlet Works, Sta 12+00, Clay Collar (S)	2449.8		6.5	13.4	114.5	12 *	95
339	03/30/99	Low Level Outlet Works, Sta 14+00, Clay Collar (S)	2444.5	6.5	13.4	114.9	121.0	95	95
340	03/30/99	Low Level Outlet Works, Sta 14+00, Clay Collar (N)	2445.5	7.5	11.3	115.3	121.0	95	95
341	03/30/99	Low Level Outlet Works, Sta 14+00, Clay Collar (S)	2446.0	8.0	12.5	115.0	121.0	95	95
342	03/30/99	Low Level Outlet Works, Sta 14+00, Clay Collar (N)	2446.8	8.8	11.8	114.9	121.0	95	95
343	03/30/99	Low Level Outlet Works, Sta 14+03, 8" S 48" RCP	2445.0	7.0	11.3	121.3	126.5	96	95
344	03/30/99	Low Level Outlet Works, Sta 14+04, 8" S 48" RCP	2446.0	8.0	11.8	120.1	126.5	95	95
345	03/30/99	Low Level Outlet Works, Sta 14+00, Clay Collar	2447.5	9.0	12.3	115.2	121.0	95	95

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FIELD DENSITY TEST SUMMARY

[redacted]	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
346	03/30/99	Low Level Outlet Works, Sta 14+07, CL 48" RCP	2448.0	10.0	7.3	119.6	126.5	95	95
347	03/30/99	Low Level Outlet Works, Sta 13+95, 4" N 48" RCP	2448.0	1.0	9.3	109.0	114.5	95	95
348	03/30/99	Low Level Outlet Works, Sta 14+00, Clay Collar	2449.5	10.0	11.2	114.9	121.0	95	95
349	03/30/99	Low Level Outlet Works, Sta 14+00, Clay Collar	2449.5	10.5	9.5	115.3	121.0	95	95
350	03/30/99	Low Level Outlet Works, Sta 14+10, CL 48" RCP	2449.5	10.5	10.0	121.1	126.5	96	95
351	03/30/99	Low Level Outlet Works, Sta 13+90, CL 48" RCP	2449.6	10.5	9.8	119.8	114.5	105	95
352	03/31/99	Low Level Outlet Works, Sta 14+00, Clay Collar	2449.0	11.0	13.4	114.6	121.0	95	95
353	03/31/99	Low Level Outlet Works, Sta 13+95, CL 48" RCP	2449.0	11.0	11.5	108.9	114.5	95	95
354	03/31/99	Low Level Outlet Works, Sta 14+00, Clay Collar	2449.5	11.5	11.7	114.5	121.0	95	95
355	03/31/99	Low Level Outlet Works, Sta 13+95, 2' S CL 48" RCP	2449.5	11.5	8.7	109.3	114.5	96	95
356	03/31/99	Low Level Outlet Works, Sta 14+00, Clay Collar	2450.0	12.0	13.1	109.0	121.0	90 *	95
[redacted]	03/31/99	Low Level Outlet Works, Sta 13+80 @ 19+00	2450.0	12.0	12.9	119.1	114.5	104	95
358	03/31/99	Low Level Outlet Works, Sta 14+00, Clay Collar	2450.4	12.4	11.1	108.8	121.0	90 *	95
359	03/31/99	Low Level Outlet Works, Sta 14+00, Clay Collar	2450.8	12.8	13.4	114.3	121.0	95	95
360	04/06/99	Low Level Outlet Works, Sta 12+50 @ 19+00	2448.0		13.8	108.4	114.5	95	95
361	04/06/99	Low Level Outlet Works, Sta 13+00 @ 17+25	2450.0		12.3	109.0	114.5	95	95
362	04/06/99	Low Level Outlet Works, Sta 13+50 @ 18+50	2450.8		13.1	110.0	114.5	96	95
363	04/06/99	Low Level Outlet Works, Sta 14+00 @ 17+80	2451.0		11.9	108.3	114.5	95	95
364	04/07/99	Low Level Outlet Works, Sta 12+25 @ 17+25	2451.3		12.7	108.5	114.5	95	95
365	04/07/99	Low Level Outlet Works, Sta 14+75 @ 18+50	2451.9		7.4	118.2	124.0	95	95
366	04/07/99	Low Level Outlet Works, Sta 13+75 @ 19+00	2450.3		9.8	118.4	124.0	96	95
367	04/07/99	Low Level Outlet Works, Sta 15+80 @ 21+60	2451.2		7.8	119.5	124.0	96	95
368	04/07/99	Low Level Outlet Works, Sta 10+25 @ 19+10	2449.8		13.3	108.7	114.5	95	95

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FIELD DENSITY TEST SUMMARY

[redacted]	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
369	04/08/99	Low Level Outlet Works, Sta 13+80 @ 18+20	2451.0		12.0	108.5	114.5	95	95
370	04/08/99	Low Level Outlet Works, Sta 10+50 @ 18+50	2449.5		12.1	109.0	114.5	95	95
371	04/08/99	Low Level Outlet Works, Sta 11+00 @ 17+50	2451.4		12.4	109.9	114.5	96	95
372	04/08/99	Low Level Outlet Works, Sta 14+00 @ 19+50	2451.6		11.9	108.8	114.5	95	95
373	04/08/99	Low Level Outlet Works, Sta 13+00 @ 19+60	2452.0		6.8	120.0	124.0	97	95
374	04/08/99	Low Level Outlet Works, Sta 14+75 @ 18+00	2253.4		7.1	118.1	124.0	95	95
375	04/09/99	Low Level Outlet Works, Sta 13+00 @ 18+60	2453.0		12.3	117.2	124.0	95	95
376	04/09/99	Low Level Outlet Works, Sta 9+75 @ 18+90	2452.0		7.2	123.1	124.0	99	95
377	04/09/99	Low Level Outlet Works, Sta 12+50 @ 17+50	2452.3		7.4	118.1	124.0	95	95
378	04/09/99	Low Level Outlet Works, Sta 15+90 @ 20+50	2452.4		6.9	118.9	124.0	96	95
379	04/09/99	Low Level Outlet Works, Sta 10+50 @ 17+75	2452.4		7.9	119.3	124.0	96	95
[redacted]	04/09/99	Low Level Outlet Works, Sta 9+80 @ 19+00	2452.8		7.3	118.4	124.0	96	95
381	04/12/99	Low Level Outlet Works, Sta 15+50 @ 18+00	2457.5	7.0	10.1	118.5	124.0	96	95
382	04/12/99	Low Level Outlet Works, Sta 11+00 @ 19+00	2456.0	26.0	9.8	119.3	124.0	96	95
383	04/14/99	Sta 17+55, 25' R of CL	2456.9	18.0	7.8	118.6	124.0	96	95
384	04/14/99	Sta 18+00, 200' R of CL	2453.3	17.0	8.9	122.1	124.0	99	95
385	04/14/99	Sta 19+65, @ CL	2452.3	12.0	8.7	121.5	124.0	98	95
386	04/14/99	Sta 18+50, 400' R of CL	2445.0	15.0	8.0	120.9	124.0	98	95
387	04/14/99	Sta 21+50, 150' L of CL	2451.7	12.0	8.3	119.5	124.0	96	95
388	04/14/99	Sta 17+65, 50' R of CL	2457.3	17.0	10.1	107.7	113.0	95	95
389	04/14/99	Sta 20+55, 75' L of CL	2454.7	12.0	8.2	108.6	113.0	96	95
390	04/15/99	Sta 17+30, 200' R of CL	2453.5	9.0	11.3	106.8	113.0	95	95
391	04/15/99	Sta 18+50, 300' R of CL	2450.0	14.5	10.5	107.1	113.0	95	95

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FIELD DENSITY TEST SUMMARY

[redacted]	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	SPEC
392	04/15/99	Sta 20+50, 50' L of CL	2454.0	12.0	9.8	105.9	110.5	96	95
393	04/15/99	Sta 18+60, 100' L of CL	2453.0	11.0	11.0	105.4	110.5	95	95
394	04/15/99	Sta 19+50, 75' R of CL	2454.3	15.0	10.3	105.0	110.5	95	95
395	04/15/99	Sta 20+50, 10' L of CL	2454.6	14.0	9.9	106.9	110.5	97	95
396	04/15/99	Sta 19+00 @ CL	2454.0	14.0	11.2	104.5	110.5	95	95
397	04/16/99	Sta 17+70, 100' R of CL	2454.3	16.6	9.0	106.7	110.5	97	95
398	04/16/99	Sta 18+20, 125' R of CL	2451.1	18.5	11.8	105.0	110.5	95	95
399	04/16/99	Sta 18+75, 350' R of CL	2448.2	16.2	9.8	104.5	110.5	95	95
400	04/16/99	Sta 18+50, 150' L of CL	2457.0	13.0	8.9	106.1	110.5	96	95
401	04/19/99	Sta 18+50 @ CL	2458.3	18.0	9.5	108.4	113.0	96	95
[redacted]	04/19/99	Sta 18+00, 50' L of CL	2457.0	18.0	11.3	109.3	113.0	97	95
[redacted]	04/19/99	Sta 19+00, 200' R of CL	2454.0	19.0	8.6	108.1	113.0	96	95
404	04/19/99	Sta 18+60, 350' R of CL	2448.3	16.0	7.9	108.8	113.0	96	95
405	04/19/99	Sta 20+75, 100' L of CL	2458.9	16.0	12.2	107.9	113.0	96	95
406	04/19/99	Sta 20+00, 150' L of CL	2458.0	14.0	13.8	109.6	113.0	97	95
407	04/19/99	Sta 17+50, 100' R of CL	2457.2	19.0	10.9	107.8	113.0	95	95
408	04/19/99	Sta 19+20 @ CL	2457.8	17.5	10.1	107.3	113.0	95	95
409	04/19/99	Sta 18+50, 400' R of CL	2448.0	18.0	9.3	109.8	113.0	97	95
410	04/20/99	Sta 18+50, 200' R of CL	2455.6	20.4	7.5	107.5	113.0	95	95
411	04/20/99	Sta 20+45 @ CL	2453.5	13.5	6.9	117.5	124.0	95	95
412	04/20/99	Sta 18+60, 400' R of CL	2443.1	13.0	8.1	118.4	124.0	96	95
413	04/20/99	Sta 18+00, 150' L of CL	2460.0	5.0	9.3	107.4	113.0	95	95
414	04/20/99	Sta 18+40, 100' R of CL	2457.4	20.1	8.8	109.4	113.0	97	95

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FIELD DENSITY TEST SUMMARY

No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	SPEC
415	04/20/99	Sta 18+50, 400' L of CL	2448.2	18.0	8.7	107.5	113.0	95	95
416	04/20/99	Sta 20+60, 20' L of CL	2453.8	14.0	7.9	117.9	124.0	95	95
417	04/20/99	Sta 18+25, 150' R of CL	2457.5	21.0	11.2	107.2	113.0	95	95
418	04/20/99	Sta 20+25, 100' L of CL	2458.5	16.5	7.6	108.2	113.0	96	95
419	04/20/99	Sta 18+75, 425' R of CL	2444.6	14.0	9.1	119.4	124.0	96	95
420	04/21/99	Sta 18+50, 100' R of CL	2459.3	21.0	8.8	107.0	113.0	95	95
421	04/21/99	Sta 19+00 @ CL	2456.9	17.0	10.3	109.3	113.0	97	95
422	04/21/99	Sta 20+55 @ CL	2454.3	14.0	7.1	120.6	124.0	97	95
423	04/21/99	Sta 21+25, 50' L of CL	2455.5	13.5	8.6	118.3	124.0	95	95
424	04/21/99	Sta 17+25, 200' R of CL	2457.2		11.3	108.7	113.0	96	95
425	05/06/99	Sta 18+00, 50' R of CL	2459.5	21.0	10.4	110.8	113.0	98	95
426	05/07/99	Sta 16+50, 200' R of CL	2458.0	22.0	11.1	108.0	113.0	96	95
427	05/07/99	Sta 17+25, 100' R of CL	2460.0	22.0	12.2	106.0	113.0	94 *	95
428	05/07/99	Sta 18+00, 150' R of CL	2461.0	22.0	11.4	108.0	113.0	96	95
429	05/07/99	Sta 17+00, 50' R of CL	2459.0	22.0	11.3	107.0	113.0	95	95
430	05/07/99	Sta 18+25, 30' R of CL	2462.0	22.0	11.1	110.0	113.0	97	95
431	05/07/99	Sta 17+75, 25' L of CL	2463.0	22.0	12.1	109.0	113.0	97	95
432	05/07/99	Sta 16+80, 35' L of CL	2461.0	22.0	10.8	109.0	113.0	97	95
433	05/07/99	Sta 18+75, 20' L of CL	2460.0	22.0	11.1	110.0	113.0	97	95
434	05/07/99	Sta 19+25, 15' L of cL	2461.0	22.0	10.9	108.0	113.0	96	95
435	05/07/99	Sta 19+75, 20' R of CL	2460.0	22.0	11.3	109.0	113.0	97	95
436	05/10/99	Sta 16+75, 105' L of CL	2462.0	23.0	8.5	109.0	113.0	97	95
437	05/10/99	Sta 21+00, 35' L of CL		15.0	9.6	109.0	113.0	97	95

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FIELD DENSITY TEST SUMMARY

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438	05/10/99	Sta 20+00, 25' R of CL		15.0	9.9	108.0	113.0	96	95
439	05/10/99	Sta 19+00, 75' R of CL		15.0	10.1	107.0	113.0	95	95
440	05/10/99	Sta 18+75, 100' L of CL	2462.0	23.0	9.2	105.5	113.0	93 *	95
441	05/10/99	Sta 21+50, 30' R of CL		16.0	10.2	109.0	113.0	97	95
442	05/10/99	Sta 20+75, 10' L of cL		16.0	10.8	108.0	113.0	96	95
443	05/10/99	Sta 19+80, 90' L of CL		16.0	7.1	110.0	113.0	97	95
444	05/10/99	Sta 16+50, 125' L of CL	2461.0	23.0	13.0	113.0	113.0	100	95
440A	05/10/99	Retest of #440	2462.0	23.0	10.8	108.0	113.0	96	95
445	05/11/99	Sta 20+75, 115' L of CL	2465.0	24.0	8.3	107.3	113.0	95	95
446	05/11/99	Sta 17+25, 130' L of CL	2464.0	24.0	12.0	103.6	113.0	92 *	95
447	05/11/99	Sta 18+00, 140' L of CL	2463.0	24.0	12.0	95.5	113.0	85 *	95
[redacted]	05/11/99	Sta 18+50, 100' R of CL	2465.0	24.0	11.2	106.8	113.0	95	95
446A	05/11/99	Retest of #446	2464.0	24.0	11.1	107.0	113.0	95	95
447A	05/11/99	Retest of #447	2464.0	24.0	10.8	108.0	113.0	96	95
449	05/11/99	Sta 16+75, 100' R of CL	2465.0	24.0	9.9	108.0	113.0	96	95
450	05/11/99	Sta 18+50, 75' R of CL	2464.0	24.0	10.7	109.6	113.0	97	95
451	05/11/99	Sta 19+75, 120' R of CL	2463.0	24.0	11.2	107.0	113.0	95	95
452	05/11/99	Sta 19+00, 10' R of CL	2464.0	24.0	10.6	109.8	113.0	97	95
453	05/11/99	Sta 16+75, 15' L of CL	2465.0	24.0	9.5	107.0	113.0	95	95
454	05/11/99	Sta 17+80, 30' L of CL	2465.0	24.0	9.9	108.0	113.0	96	95
455	05/11/99	Sta 18+90, 60' L of CL	2465.0	24.0	10.1	108.0	113.0	96	95
456	05/12/99	Dam, Sta 18+50, 150' L of CL	2461.0	32.0	10.0	110.0	113.0	97	95
457	05/12/99	Dam, Sta 21+00, 100' R of CL	2456.0	27.0	10.0	108.2	113.0	96	95

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FIELD DENSITY TEST SUMMARY

No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
458	05/12/99	Dam, Sta 21+00, 100' L of CL	2456.0	27.0	10.2	107.6	113.0	95	95
459	05/12/99	Dam, Sta 18+00, 50' L of CL	2462.0	33.0	9.8	108.9	113.0	96	95
460	05/12/99	Dam, Sta 17+50, 50' R of CL	2462.0	33.0	10.4	108.4	113.0	96	95
461	05/12/99	Dam, Sta 19+00, 80' R of CL	2462.0	33.0	12.4	107.9	113.0	96	95
462	05/12/99	Dam, Sta 19+50, 140' L of CL	2462.0	33.0	9.9	109.2	113.0	97	95
463	05/12/99	Dam, Sta 20+00, 120' L of CL	2462.0	33.0	9.6	108.1	113.0	96	95
464	05/12/99	Dam, Sta 20+00 @ CL	2462.0	33.0	10.3	107.3	113.0	95	95
465	05/12/99	Dam, Sta 17+75 @ CL	2462.0	33.0	10.1	108.4	113.0	96	95
466	05/12/99	Dam, Sta 21+00, 20' L of CL	2457.0	28.0	9.5	109.2	113.0	97	95
467	05/12/99	Dam, Sta 19+50 @ CL	2462.0	33.0	11.4	107.6	113.0	95	95
468	05/17/99	Outlet Structure Floor, Sta 9+89, 5' R of FL	2425.0	0.7	11.9	117.6	124.0	95	95
469	05/18/99	Outlet Floor, Sta 9+90	Finished Subgrade	0.5	9.2	119.9	126.0	95	95
470	05/19/99	Outlet Pipe Wall Footing, Sta 9+69, 10' R of FL	Finished Subgrade	0.7	6.9	118.0	124.0	95	95
471	05/19/99	Outlet Pipe Wall Footing, Sta 9+69, 7' R of FL	Finished Subgrade	0.5	12.1	120.1	126.0	95	95
472	05/19/99	Dam, Sta 21+00 @ CL	2457.0	28.0	13.1	108.1	113.0	96	95
473	05/19/99	Dam, Sta 21+00, 400' L of CL	2447.0	0	7.6	118.6	124.0	96	95
474	05/19/99	Dam, Sta 21+00, 350' L of CL	2448.0	1.0	9.3	121.5	129.0	94 *	95
475	05/19/99	Dam, Sta 21+00, 50' R of CL	2458.0	29.0	9.7	121.8	129.0	94 *	95
474A	05/20/99	Retest of #474	2448.0	1.0	7.9	122.5	129.0	95	95
475A	05/20/99	Retest of #475	2458.0	29.0	7.4	122.1	129.0	95	95
476	05/20/99	Dam, Sta 18+25, 150' L of CL	2462.0	33.0	11.1	107.4	113.0	95	95
477	05/20/99	Dam, Sta 21+00, 50' R of CL	2458.0	29.0	6.8	122.5	129.0	95	95
478	05/21/99	Dam, Sta 17+00, 200' L of CL	2461.0	4.0	8.2	123.9	129.0	96	95

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FIELD DENSITY TEST SUMMARY

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479	05/21/99	Dam, Sta 21+00 @ CL	2459.0	30.0	6.8	122.9	129.0	95	95
480	05/24/99	Dam, Sta 18+50, 70' R of CL	2458.0	13.0	10.5	122.8	129.0	95	95
481	05/24/99	Dam, Sta 19+00, 75' R of CL	2461.0	18.0	7.8	122.1	129.0	95	95
482	05/24/99	Dam, Sta 20+00, 55' R of CL	2463.0	4.0	8.2	123.4	129.0	96	95
483	05/24/99	Dam, Sta 21+30, 10' L of CL	2465.0	5.0	9.9	120.1	129.0	93 *	95
483A	05/25/99	Retest of #483	2465.0	5.0	7.0	122.2	129.0	95	95
484	05/25/99	Dam, Sta 21+00, 60' L of CL	2466.0	15.0	7.3	123.8	129.0	96	95
485	05/25/99	Dam, Sta 17+00, 85' L of CL	2462.0	5.0	6.9	123.8	129.0	96	95
486	05/25/99	Dam, Sta 18+00, 40' L of CL	2470.0	6.0	13.1	106.9	113.0	95	95
487	05/25/99	Dam, Sta 16+50, 70' L of CL	2470.0	6.0	7.3	122.3	129.0	95	95
488	05/25/99	Dam, Sta 18+50, 50' R of CL	2462.0	16.0	12.8	107.1	113.0	95	95
[redacted]	05/26/99	Dam, Sta 21+30, 55' L of CL	2467.0	7.0	7.1	123.4	129.0	96	96
490	05/26/99	Dam, Sta 17+50, 25' L of CL	2470.0	17.0	6.8	122.6	129.0	95	95
491	05/26/99	Dam, Sta 17+00, 30' R of CL	2465.0	4.0	8.1	124.1	129.0	96	96
492	05/26/99	Dam, Sta 19+00, 50' R of CL	2464.0	22.0	8.4	123.4	129.0	96	96
493	05/26/99	Dam, Sta 19+50, 90' R of CL	2470.0	3.0	7.9	122.1	129.0	95	95
494	05/26/99	Dam, Sta 18+50, 60' R of CL	2464.0	19.0	7.1	123.7	129.0	96	96
495	05/26/99	Dam, Sta 19+00, 170' R of CL	2455.0	16.0	9.7	122.7	129.0	95	95
496	05/26/99	Dam, Sta 20+00, 70' R of CL	2465.0	3.0	7.6	124.0	129.0	96	96
497	05/26/99	Dam, Sta 21+00, 55' R of CL	2467.0	13.0	7.8	123.0	129.0	95	95
498	05/26/99	Dam, Sta 20+50, 20' R of CL	2469.0	4.0	7.4	122.3	129.0	95	95
499	05/27/99	Dam, Sta 20+50 @ CL	2469.0	13.0	6.6	125.5	129.0	97	95
500	05/27/99	Dam, Sta 19+50, 50' R of CL	2466.0	21.0	9.0	122.4	129.0	95	95

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FIELD DENSITY TEST SUMMARY

[redacted]	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
501	05/27/99	Dam, Sta 18+50, 60' R of CL	2464.0	17.0	8.4	122.7	129.0	95	95
502	05/27/99	Dam, Sta 17+50 @ CL	2471.0	20.0	6.9	125.2	129.0	97	95
503	05/27/99	Dam, Sta 19+00, 80' L of cL	2469.0	24.0	6.8	124.6	129.0	97	95
504	05/27/99	Dam, Sta 18+00, 70' R of CL	2454.0	7.0	8.4	124.9	129.0	97	95
505	05/27/99	Dam, Sta 19+00, 180' R of CL	2456.0	15.0	7.5	124.6	129.0	97	95
506	05/27/99	Dam, Sta 20+00, 45' R of CL	2465.0	8.0	8.0	125.2	129.0	97	95
507	05/27/99	Dam, Sta 19+50, 70' R of CL	2462.0	17.0	6.8	122.9	129.0	95	95
508	05/27/99	Dam, Sta 19+50, 140' R of CL	2463.0	5.0	7.8	125.1	129.0	97	95
509	05/27/99	Dam, Sta 17+00, 60' R of CL	2465.0	12.0	7.5	122.7	129.0	95	95
510	05/27/99	Dam, Sta 19+00, 25' R of CL	2465.0	19.0	9.0	124.6	129.0	97	95
511	05/28/99	Dam, Sta 18+00, 50' R of CL	2460.0	20.0	6.4	123.2	129.0	96	95
[redacted]	05/28/99	Dam, Sta 17+00, 50' R of CL	2466.0	11.0	14.8	106.8	113.0	95	95
513	05/28/99	Dam, Sta 19+00, 150' R of CL	2455.0	25.0	15.0	107.1	113.0	95	95
514	05/28/99	Dam, Sta 20+00, 25' R of CL	2466.0	15.0	13.0	107.0	113.0	95	95
515	05/28/99	Dam, Sta 17+50, 20' R of CL	2471.0	31.0	12.8	107.4	113.0	95	95
516	05/28/99	Dam, Sta 18+50, 45' R of CL	2466.0	22.0	13.9	106.9	113.0	95	95
517	06/01/99	Dam, Sta 17+00, 25' R of CL	2467.0	6.0	12.6	107.8	113.0	95	95
518	06/01/99	Dam, Sta 18+00, 40' R of CL	2466.0	15.0	13.2	106.9	113.0	95	95
519	06/01/99	Dam, Sta 19+00, 60' R of CL	2466.0	22.0	12.8	106.8	113.0	95	95
520	06/01/99	Dam, Sta 20+00, 70' R of CL	2467.0	5.0	12.4	107.9	113.0	96	95
521	06/01/99	Dam, Sta 21+00	2465.0	19.0	11.0	108.1	113.0	96	95
522	06/01/99	Dam, Sta 17+00, 25' R of CL	2468.0	7.0	13.5	107.0	113.0	95	95
523	06/01/99	Dam, Sta 18+00, 25' R of CL	2469.0	23.0	10.9	110.0	113.0	97	95

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FIELD DENSITY TEST SUMMARY

[redacted] No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
524	06/01/99	Dam, Sta 19+50, 60' R of CL	2468.0	22.0	15.7	106.9	113.0	95	95
525	06/01/99	Dam, Sta 18+50, 25' R of CL	2468.0	25.0	15.9	106.8	113.0	95	95
526	06/01/99	Dam, Sta 17+50, 50' R of CL	2469.0	35.0	12.5	107.1	113.0	95	95
527	06/01/99	Dam, Sta 19+00, 35' R of CL	2468.0	31.0	13.9	107.8	113.0	95	95
528	06/01/99	Dam, Sta 17+00, 45' R of CL	2469.0	14.0	13.3	108.1	113.0	96	95
529	06/02/99	Dam, Sta 17+50, 45' R of CL	2471.0	21.0	13.1	107.8	113.0	95	95
530	06/02/99	Dam, Sta 18+50, 50' L of CL	2470.0	24.0	9.6	107.4	113.0	95	95
531	06/02/99	Dam, Sta 19+50, 70' R of CL	2455.0	6.0	13.5	106.9	113.0	95	95
532	06/02/99	Dam, Sta 18+00, 20' L of CL	2470.0	23.0	13.5	106.8	113.0	95	95
533	06/02/99	Dam, Sta 19+00 @ CL	2470.0	30.0	13.3	107.3	113.0	95	95
[redacted]	06/02/99	Dam, Sta 17+00, 60' R of CL	2468.0	17.0	13.1	107.2	113.0	95	95
[redacted]35	06/02/99	Dam, Sta 20+00, 25' L of CL	2465.0	23.0	13.4	107.6	113.0	95	95
536	06/02/99	Dam, Sta 19+50, 25' L of CL	2467.0	27.0	13.5	107.0	113.0	95	95
537	06/03/99	Dam, Sta 19+00, 25' R of CL	2469.0	29.0	13.2	107.2	113.0	95	95
538	06/03/99	Dam, Sta 17+00, 60' L of CL	2468.0	9.0	6.1	124.1	129.0	96	95
539	06/03/99	Dam, Sta 18+00, 70' L of CL	2468.0	17.0	6.2	122.5	129.0	95	95
540	06/03/99	Dam, Sta 20+00, 75' L of CL	2456.0	12.0	6.6	125.6	129.0	97	95
541	06/03/99	Dam, Sta 16+50, 50' L of CL	2470.0	3.0	6.8	124.4	129.0	96	95
542	06/04/99	Dam, Sta 16+00, 70' L of CL	2470.0	1.0	6.6	125.9	129.0	98	95
543	06/04/99	Dam, Sta 20+00, 45' R of CL	2469.0	15.0	6.8	127.2	129.0	99	95
544	06/04/99	Dam, Sta 20+50, 10' R of CL	2469.0	20.0	6.4	124.2	129.0	96	95
545	06/07/99	Dam, Sta 18+00, 70' L of CL	2470.0	19.0	6.1	126.0	129.0	98	95
546	06/07/99	Dam, Sta 17+00, 35' R of CL	2470.0	10.0	6.9	125.6	129.0	97	95

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FIELD DENSITY TEST SUMMARY

[redacted]	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	SPEC
547	06/07/99	Dam, Sta 19+50, 75' R of CL	2465.0	15.0	6.2	126.8	129.0	98	95
548	06/07/99	Dam, Sta 18+50, 55' R of CL	2469.0	25.0	6.9	123.6	129.0	96	95
549	06/07/99	Dam, Sta 20+00, 20' L of CL	2470.0	25.0	7.1	122.8	129.0	95	95
550	06/07/99	Dam, Sta 19+00, 50' R of CL	2470.0	35.0	6.6	126.2	129.0	98	95
551	06/07/99	Dam, Sta 20+50, 70' L of CL	2465.0	14.0	6.3	123.1	129.0	95	95
552	06/07/99	Dam, Sta 17+50, 70' L of CL	2468.0	12.0	6.2	125.0	129.0	97	95
553	06/07/99	Dam, Sta 20+00, 75' L of CL	2463.0	18.0	6.8	125.5	129.0	97	95
554	06/07/99	Dam, Sta 18+50, 50' L of CL	2470.0	25.0	6.1	122.9	129.0	95	95
555	06/08/99	Dam, Sta 19+00, 20' L of CL	2471.0	30.0	6.9	125.1	129.0	97	95
556	06/08/99	Dam, Sta 17+00, 20' R of CL	2471.0	9.0	6.0	126.2	129.0	98	95
[redacted]	06/08/99	Dam, Sta 18+00, 30' L of CL	2471.0	26.0	4.1	122.7	129.0	95	95
[redacted]	06/08/99	Dam, Sta 20+00, 60' L of CL	2465.0	22.0	5.8	126.3	129.0	98	95
559	06/08/99	Dam, Sta 17+50, 50' L of CL	2471.0	17.0	4.9	122.1	129.0	95	95
560	06/08/99	Dam, Sta 18+50, 40' L of CL	2469.0	24.0	6.9	127.2	129.0	99	95
561	06/08/99	Dam, Sta 19+50, 70' L of CL	2467.0	22.0	8.6	123.1	129.0	95	95
562	06/08/99	Dam, Sta 20+50, 85' L of CL	2465.0	20.0	6.8	123.4	129.0	96	95
563	06/08/99	Dam, Sta 16+50, 40' L of CL	2471.0	2.0	7.5	126.1	129.0	98	95
564	06/08/99	Dam, Sta 20+00, 75' R of CL	2469.0	3.0	6.7	124.3	129.0	96	95
565	06/09/99	Dam, Sta 18+50, 25' R of CL	2471.0	29.0	6.1	123.0	129.0	95	95
566	06/09/99	Dam, Sta 17+50, 60' L of CL	2471.0	17.0	9.5	122.7	129.0	95	95
567	06/09/99	Dam, Sta 16+50, 70' L of CL	2471.0	3.0	6.1	127.7	129.0	99	95
568	06/09/99	Dam, Sta 19+50, 70' R of CL	2466.0	10.0	7.7	126.0	129.0	98	95
569	06/09/99	Dam, Sta 20+50, 60' L of CL	2466.0	21.0	7.4	124.2	129.0	96	95

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FIELD DENSITY TEST SUMMARY

No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
570	06/10/99	Ogee Crest Spillway Bottoms Floor Footings, SE	2492.5	0.5	6.5	123.4	129.0	96	95
571	06/10/99	Ogee Crest Spillway Bottoms Floor Footings, NE	2492.5	0.5	9.2	123.8	129.0	96	95
572	06/10/99	Ogee Crest Spillway Bottoms Floor Footings, NW	2492.5	0.5	6.8	124.1	129.0	96	95
573	06/10/99	Ogee Crest Spillway Bottoms Floor Footings, SW	2492.5	0.5	7.3	124.7	129.0	97	95
574	06/10/99	Ogee Crest Spillway Slope Floor, SE	Final Subgrade	0.5	6.8	123.1	129.0	95	95
575	06/10/99	Ogee Crest Spillway Slope Floor, Center	Final Subgrade	0.5	7.4	123.8	129.0	96	95
576	06/10/99	Ogee Crest Spillway Slope Floor, NW	Final Subgrade	0.5	7.8	124.2	129.0	96	95
577	06/10/99	Ogee Crest Spillway Bottom Floor	Final Subgrade	0.5	9.4	123.9	129.0	96	95
578	06/10/99	Ogee Crest Spillway Bottom Floor	Final Subgrade	0.5	8.5	124.1	129.0	96	95
579	06/10/99	Ogee Crest Spillway Bottom Floor	Final Subgrade	0.5	8.9	123.8	129.0	96	95
[illegible]	06/11/99	Dam, Sta 19+50, 120' R of CL	2469.0	19.0	7.3	126.1	129.0	98	95
581	06/11/99	Dam, Sta 20+50, 75' L of CL	2468.0	23.0	7.0	123.0	129.0	95	95
582	06/11/99	Dam, Sta 19+00, 135' R of CL	2458.0	28.0	6.5	125.4	129.0	97	95
583	06/11/99	Dam, Sta 20+00, 50' L of CL	2468.0	23.0	6.9	127.6	129.0	99	95
584	06/11/99	Dam, Sta 18+00, 35' R of CL	2471.0	33.0	6.0	123.0	129.0	95	95
585	06/11/99	Dam, Sta 18+00, 10' L of CL	2471.0	31.0	9.7	125.0	129.0	97	95
586	06/11/99	Dam, Sta 17+00, 50' L of CL	2469.0	9.0	8.4	124.8	129.0	97	95
587	06/14/99	Dam, Sta 17+00, 70' L of CL	2470.0	11.0	6.3	125.0	129.0	97	95
588	06/14/99	Dam, Sta 18+00, 60' L of CL	2470.0	20.0	6.1	126.1	129.0	98	95
589	06/14/99	Dam, Sta 19+00, 50' L of CL	2470.0	26.0	6.4	124.8	129.0	97	95
590	06/14/99	Dam, Sta 17+00, 50' R of CL	2471.0	16.0	7.0	125.7	129.0	97	95
591	06/14/99	Dam, Sta 18+00, 50' R of CL	2471.0	25.0	7.4	124.8	129.0	97	95
592	06/14/99	Dam, Sta 19+00, 40' R of CL	2471.0	27.0	7.5	125.7	129.0	97	95

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FIELD DENSITY TEST SUMMARY

No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
593	06/14/99	Dam, Sta 16+00, 50' L of CL	2472.0	3.0	7.3	126.0	129.0	98	95
594	06/14/99	Dam, Sta 17+50, 30' L of CL	2472.0	20.0	7.1	125.2	129.0	97	95
595	06/15/99	Spillway Ogee Crest Floor E Footing @ S	Footing Bottoms	0.5	6.6	123.6	129.0	96	95
596	06/15/99	Ogee Crest W Footing @ S	Footing Bottoms	0.5	6.9	124.1	129.0	96	95
597	06/15/99	Dam, Sta 16+50, 60' L of CL	2472.0	7.0	6.2	126.8	129.0	98	95
598	06/15/99	Dam, Sta 18+50, 30' L of CL	2472.0	28.0	6.4	125.9	129.0	98	95
599	06/15/99	Dam, Sta 20+00, 100' R of CL	2472.0	1.0	6.9	123.2	129.0	96	95
600	06/15/99	Dam, Sta 17+00, 50' R of CL	2473.0	13.0	6.8	124.2	129.0	96	95
601	06/15/99	Dam, Sta 19+00, 50' R of CL	2473.0	30.0	7.3	123.1	129.0	95	95
602	06/15/99	Dam, Sta 20+00, 65' R of CL	2472.0	28.0	6.9	124.9	129.0	97	95
[illegible]	06/15/99	Dam, Sta 18+00, 40' R of CL	2473.0	25.0	9.3	125.1	129.0	97	95
[illegible]	06/15/99	Dam, Sta 17+00, 25' R of CL	2473.0	13.0	8.9	124.8	129.0	97	95
605	06/16/99	Dam, Sta 16+00, 45' L of CL	2473.0	2.0	6.8	124.1	129.0	96	95
606	06/16/99	Dam, Sta 18+00, 50' L of CL	2473.0	23.0	6.3	124.8	129.0	97	95
607	06/16/99	Dam, Sta 20+50, 25' L of CL	2473.0	5.0	6.4	122.0	129.0	95	95
608	06/16/99	Dam, Sta 20+00, 10' L of CL	2473.0	33.0	6.6	123.8	129.0	96	95
609	06/16/99	Dam, Sta 19+50, 95' R of CL	2471.0	25.0	6.3	124.2	129.0	96	95
610	06/16/99	Dam, Sta 17+00, 40' R of CL	2474.0	15.0	6.8	125.1	129.0	97	95
611	06/16/99	Dam, Sta 16+50, 35' L of CL	2474.0	4.0	7.0	125.4	129.0	97	95
612	06/16/99	Dam, Sta 18+50, 50' L of CL	2474.0	24.0	6.1	123.9	129.0	96	95
613	06/16/99	Dam, Sta 20+00, 50' R of CL	2474.0	19.0	7.2	123.3	129.0	96	95
614	06/16/99	Dam, Sta 20+50, 55' L of CL	2472.0	28.0	7.5	124.9	129.0	97	95
615	06/16/99	Spillway Slope S End	Final Subgrade	0.5	7.2	127.0	129.0	98	95

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FIELD DENSITY TEST SUMMARY

[redacted]	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	SPEC
616	06/16/99	Spillway Cutoff Wall, NW	2468.0	1.5	7.0	119.8	120.0	100	95
617	06/16/99	Spillway Cutoff Wall, SW	2468.0	1.5	7.2	119.3	120.0	99	95
618	06/16/99	Spillway Cutoff Wall, NE	2468.0	1.5	7.5	119.9	120.0	100	95
619	06/16/99	Spillway Cutoff Wall, SE	2468.0	1.5	7.1	120.0	120.0	100	95
620	06/17/99	Spillway Cutoff Wall, NW	2469.0	2.0	9.7	117.1	120.0	98	95
621	06/17/99	Spillway Cutoff Wall, SW	2469.0	2.0	10.0	115.9	120.0	97	95
622	06/17/99	Spillway Cutoff Wall, SE	2469.0	2.0	10.5	116.5	120.0	97	95
623	06/17/99	Spillway Cutoff Wall, SE	2469.0	2.0	9.9	116.8	120.0	97	95
624	06/17/99	Spillway Cutoff Wall, SE	2469.0	2.0	7.9	123.2	129.0	96	95
625	06/17/99	Spillway Cutoff Wall, NE	2469.0	2.0	8.6	122.9	129.0	95	95
626	06/17/99	Spillway Cutoff Wall, NW	2470.0	3.0	11.8	117.8	120.0	98	95
[redacted]	06/17/99	Spillway Cutoff Wall, SW	2470.0	3.0	12.1	116.1	120.0	97	95
628	06/17/99	Spillway Cutoff Wall, NE	2470.0	3.0	13.2	115.4	120.0	96	95
629	06/17/99	Spillway Cutoff Wall, SE	2470.0	3.0	12.9	116.4	120.0	97	95
630	06/17/99	Dam, Sta 18+00, 40' R of CL	2474.0	31.0	7.5	124.9	129.0	97	95
631	06/17/99	Dam, Sta 18+50 @ CL	2474.0	25.0	7.8	124.5	129.0	97	95
632	06/17/99	Dam, Sta 19+50, 45' L of CL	2474.0	35.0	7.1	123.9	129.0	96	95
633	06/17/99	Dam, Sta 20+50, 50' L of CL	2474.0	32.0	7.4	124.0	129.0	96	95
634	06/17/99	Dam, Sta 16+00, 25' L of CL	2474.0	7.0	6.3	122.5	129.0	95	95
635	06/17/99	Dam, Sta 17+50, 50' L of CL	2475.0	21.0	6.5	123.1	129.0	95	95
636	06/17/99	Dam, Sta 19+50, 110' R of CL	2475.0	23.0	6.9	124.8	129.0	97	95
637	06/18/99	Dam, Sta 18+00, 20' L of CL	2475.0	29.0	6.4	123.6	129.0	96	95
638	06/18/99	Dam, Sta 20+00, 50' L of CL	2475.0	31.0	8.0	126.4	129.0	98	95

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FIELD DENSITY TEST SUMMARY

[redacted] No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	SPEC
639	06/18/99	Dam, Sta 15+50, 65' L of CL	2475.0	2.0	7.5	127.2	129.0	99	95
640	06/18/99	Dam, Sta 17+00, 55' L of CL	2475.0	16.0	7.1	124.8	129.0	97	95
641	06/18/99	Dam, Sta 19+00, 30' L of CL	2475.0	33.0	6.9	124.1	129.0	96	95
642	06/18/99	Dam, Sta 19+50, 40' R of CL	2475.0	30.0	7.2	125.6	129.0	97	95
643	06/18/99	Dam, Sta 14+50, 60' L of CL	2475.0	2.0	7.4	124.4	129.0	96	95
644	06/18/99	Dam, Sta 14+50, 60' L of CL	2476.0	3.0	6.9	125.9	129.0	98	95
645	06/18/99	Spillway Cutoff Wall, NW	2470.0	3.0	10.1	117.2	120.0	98	95
646	06/18/99	Spillway Cutoff Wall, SW	2470.0	3.0	9.8	116.7	120.0	97	95
647	06/21/99	Dam, Sta 17+00, 50' L of CL	2476.0	16.0	6.1	126.0	131.0	96	95
648	06/21/99	Dam, Sta 19+00, 55' L of CL	2476.0	31.0	6.4	127.2	131.0	97	95
[redacted]	06/21/99	Dam, Sta 20+00, 80' R of CL	2474.0	9.0	6.0	126.7	131.0	97	95
650	06/21/99	Dam, Sta 15+00, 60' L of CL	2476.0	3.0	7.2	127.0	131.0	97	95
651	06/21/99	Dam, Sta 16+00, 55' L of CL	2476.0	5.0	6.4	126.3	131.0	96	95
652	06/21/99	Dam, Sta 18+00, 20' R of CL	2476.0	30.0	7.4	127.9	131.0	98	95
653	06/21/99	Dam, Sta 14+50, 50' L of CL	2477.0	3.0	6.4	124.8	131.0	95	95
654	06/21/99	Dam, Sta 14+00, 55' L of CL	2482.0	1.0	6.6	125.0	131.0	95	95
655	06/21/99	Dam, Sta 19+50, 100' R of CL	2475.0	25.0	6.1	124.1	131.0	95	95
656	06/21/99	Dam, Sta 20+50, 30' L of CL	2476.0	33.0	6.8	125.9	131.0	96	95
657	06/21/99	Spillway S, 24" RCP Bed	2471.0	4.0	10.2	115.3	120.0	96	95
658	06/22/99	Dam, Sta 18+50, 25' R of CL	2478.0	35.0	6.8	127.1	131.0	97	95
659	06/22/99	Dam, Sta 20+00, 70' R of CL	2477.0	12.0	6.3	125.7	131.0	96	95
660	06/22/99	Dam, Sta 16+50, 50' L of CL	2475.0	7.0	6.1	124.4	131.0	95	95
661	06/22/99	Dam, Sta 14+00, 60' L of CL	2480.0	2.0	5.9	123.9	131.0	95	95

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FIELD DENSITY TEST SUMMARY

Test No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
662	06/22/99	Dam, Sta 13+50, 50' L of CL	2481.0	2.0	6.6	124.9	131.0	95	95
663	06/22/99	Dam, Sta 15+00, 55' L of CL	2479.0	2.0	7.0	127.2	131.0	97	95
664	06/22/99	Dam, Sta 17+00, 30' L of CL	2479.0	16.0	6.4	125.8	131.0	96	95
665	06/22/99	Dam, Sta 19+00, 40' L of CL	2479.0	35.0	7.1	126.2	131.0	96	95
666	06/22/99	Dam, Sta 14+00, 55' L of CL	2481.0	3.0	6.3	126.0	131.0	96	95
667	06/22/99	Dam, Sta 14+50, 50' L of CL	2481.0	2.0	6.4	125.9	131.0	96	95
668	06/22/99	Spillway Slope W of Cutoff	2475.0	1.0	7.9	126.0	131.0	96	95
669	06/22/99	Spillway Slope W of Cutoff	2476.0	2.0	8.4	125.4	131.0	96	95
670	06/23/99	Dam, Sta 18+50, 20' L of CL	2480.0	38.0	5.5	125.5	131.0	96	95
671	06/23/99	Dam, Sta 17+00, 20' L of CL	2480.0	20.0	5.3	126.3	131.0	96	95
[illegible]	06/23/99	Dam, Sta 20+50, 30' L of CL	2478.0	3.0	5.1	124.1	131.0	95	95
[illegible]	06/23/99	Dam, Sta 14+50, 55' R of CL	2478.0	3.0	7.3	127.0	131.0	97	95
674	06/23/99	Dam, Sta 19+00, 40' R of CL	2477.0	42.0	7.0	127.4	131.0	97	95
675	06/23/99	Dam, Sta 20+00, 95' R of CL	2475.0	5.0	5.2	126.5	131.0	97	95
676	06/23/99	Dam, Sta 16+50, 40' R of CL	2479.0	9.0	7.3	127.4	131.0	97	95
677	06/23/99	Dam, Sta 19+50 @ CL	2477.0	38.0	6.8	126.0	131.0	96	95
678	06/24/99	Dam, Sta 18+50 @ CL	2480.0	40.0	6.0	125.6	131.0	96	95
679	06/24/99	Dam, Sta 19+50, 25' R of CL	2479.0	39.0	5.9	128.9	131.0	98	95
680	06/24/99	Dam, Sta 20+50, 35' R of CL	2479.0	1.0	7.1	126.4	131.0	97	95
681	06/24/99	Dam, Sta 14+50, 45' L of CL	2479.0	4.0	7.3	127.1	131.0	97	95
682	06/24/99	Dam, Sta 15+50, 55' L of CL	2480.0	3.0	7.9	126.9	131.0	97	95
683	06/24/99	Dam, Sta 16+50, 50' L of CL	2481.0	13.0	7.4	127.0	131.0	97	95
684	06/24/99	Dam, Sta 17+00, 25' L of CL	2481.0	20.0	6.2	127.6	131.0	97	95

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FIELD DENSITY TEST SUMMARY

No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	SPEC
685	06/24/99	Dam, Sta 13+00, 35' R of CL	2481.0	1.0	7.2	126.6	131.0	97	95
686	06/24/99	Dam, Sta 16+50, 45' R of CL	2479.0	3.0	7.7	127.4	131.0	97	95
687	06/24/99	Dam, Sta 19+50, 30' R of CL	2480.0	42.0	7.4	127.8	131.0	98	95
688	06/25/99	Dam Embankment (Fill), Sta 20+50, 40' R of CL	2480.0	40.0	6.1	126.7	131.0	97	95
689	06/25/99	Dam Embankment (Fill), Sta 18+50, 10' R of CL	2481.0	41.0	5.0	126.5	131.0	97	95
690	06/25/99	Dam Embankment (Fill), Sta 16+70, 30' R of CL	2480.0	12.0	7.2	126.1	131.0	96	95
691	06/25/99	Dam Embankment (Fill), Sta 17+75, 110' L of CL	2481.0	40.0	6.8	125.3	131.0	96	95
692	06/25/99	Dam Embankment (Fill), Sta 14+50, 50' R of CL	2480.0	5.0	7.4	127.0	131.0	97	95
693	06/25/99	Dam Embankment (Fill), Sta 19+50, 40' R of CL	2481.0	42.0	6.2	127.8	131.0	98	95
694	06/25/99	Dam Embankment (Fill), Sta 13+50, 20' L of CL	2481.0	3.0	6.0	126.0	131.0	96	95
[redacted]	06/25/99	Dam Embankment (Fill), Sta 16+00, 10' L of CL	2480.0	12.0	5.9	125.9	131.0	96	95
696	06/25/99	Dam Embankment (Fill), Sta 18+00, 45' R of CL	2481.0	41.0	6.3	128.1	131.0	98	95
697	06/25/99	Dam Embankment (Fill), Sta 15+00, 40' L of CL	2480.0	8.0	6.7	126.6	131.0	97	95
698	06/28/99	Dam, Sta 13+50, 45' L of CL	2484.0	3.0	5.9	126.8	131.0	97	95
699	06/28/99	Dam, Sta 15+50, 50' L of CL	2484.0	6.0	6.8	124.0	131.0	95	95
700	06/28/99	Dam, Sta 17+50, 20' L of CL	2484.0	32.0	7.5	126.2	131.0	96	95
701	06/28/99	Dam, Sta 19+50, 15' R of CL	2484.0	43.0	7.1	125.8	131.0	96	95
702	06/28/99	Dam, Sta 20+50, 55' R of CL	2482.0	2.0	6.6	124.4	131.0	95	95
703	06/28/99	Dam, Sta 13+00, 35' L of CL	2492.0	2.0	7.7	125.4	131.0	96	95
704	06/28/99	Dam, Sta 16+00, 45' L of CL	2484.0	10.0	7.6	126.6	131.0	97	95
705	06/28/99	Dam, Sta 18+00, 35' R of CL	2483.0	45.0	7.1	125.6	131.0	96	95
706	06/28/99	Dam, Sta 20+00 @ CL	2482.0	40.0	6.3	124.9	131.0	95	95
707	06/28/99	Dam, Sta 14+00 @ CL	2484.0	3.0	6.7	125.4	131.0	96	95

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FIELD DENSITY TEST SUMMARY

[redacted]	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	SPEC
708	06/28/99	Dam, Sta 15+00, 50' L of CL	2484.0	7.0	6.3	126.2	131.0	96	95
709	06/28/99	Dam, Sta 20+00, 100' R of CL	2479.0	10.0	7.1	127.1	131.0	97	95
710	06/28/99	Dam, Sta 18+00, 20' L of CL	2483.0	37.0	7.4	126.8	131.0	97	95
711	06/28/99	Dam, Sta 19+00, 25' R of CL	2483.0	45.0	7.6	125.9	131.0	96	95
712	06/28/99	Spillway E Toe Wall, N End	2493.0	1.0	11.8	115.7	120.0	96	95
713	06/28/99	Spillway E Toe Wall, S End	2493.0	1.0	11.6	115.2	120.0	96	95
714	06/29/99	Spillway, W Ogee Crest Toe Wall, S End	2493.0	1.0	11.6	114.6	120.0	96	95
715	06/29/99	Spillway, W Ogee Crest Toe Wall, N End	2493.0	1.0	11.2	113.9	120.0	95	95
716	06/29/99	Dam, Sta 19+00 @ CL	2483.0	43.0	5.9	127.9	131.0	98	95
717	06/29/99	Dam, Sta 17+00, 30' R of CL	2484.0	24.0	6.1	127.2	131.0	97	95
718	06/29/99	Spillway E Ogee Crest Toe Wall, S End	2494.0	2.0	11.8	117.1	120.0	98	95
[redacted]	06/29/99	Spillway E Ogee Crest Toe Wall, N End	2494.0	2.0	11.4	116.3	120.0	97	95
720	06/29/99	W Ogee Crest Toe Wall, N End	2494.0	2.0	11.5	114.8	120.0	96	95
721	06/29/99	W Ogee Crest Toe Wall, S End	2494.0	2.0	11.1	115.2	120.0	96	95
722	06/29/99	Dam, Sta 16+50, 25' R of CL	2484.0	5.0	5.9	123.9	131.0	95	95
723	06/29/99	Dam, Sta 18+00, 20' R of CL	2484.0	45.0	5.6	124.4	131.0	95	95
724	06/29/99	Spillway W Ogee Crest Toe Wall, S End	2495.0	3.0	11.3	116.8	120.0	97	95
725	06/29/99	Spillway W Ogee Crest Toe Wall, N End	2495.0	3.0	11.5	117.4	120.0	98	95
726	06/29/99	Dam, Sta 20+00, 80' R of CL	2482.0	15.0	6.9	133.9	131.0	102	95
727	06/29/99	Dam, Sta 20+50, 60' R of CL	2484.0	1.0	7.3	134.2	131.0	102	95
728	06/29/99	Dam, Sta 19+50, 130' R of CL	2473.0	16.0	7.5	134.1	131.0	102	95
729	06/29/99	Dam, Sta 13+50, 40' L of CL	2485.0	2.0	7.2	123.9	129.0	96	95
730	06/29/99	Dam, Sta 15+50, 40' L of CL	2484.0	6.0	6.9	122.9	129.0	95	95

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FIELD DENSITY TEST SUMMARY

[redacted] No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
731	06/30/99	Dam, Sta 13+00, 35' L of CL	2493.0	2.0	6.1	125.8	131.0	96	95
732	06/30/99	Dam, Sta 15+00, 40' L of CL	2484.0	5.0	6.4	126.2	131.0	96	95
733	06/30/99	Dam, Sta 16+00, 40' L of CL	2486.0	10.0	6.1	124.9	131.0	95	95
734	06/30/99	Dam, Sta 17+50, 30' L of CL	2485.0	50.0	5.8	127.7	131.0	98	95
735	06/30/99	Dam, Sta 16+50, 10' L of CL	2485.0	5.0	5.9	125.5	131.0	96	95
736	06/30/99	Dam, Sta 18+50, 10' L of CL	2485.0	42.0	5.7	126.0	131.0	96	95
737	06/30/99	Dam, Sta 20+50, 20' L of CL	2485.0	20.0	6.0	126.8	131.0	97	95
738	06/30/99	Dam, Sta 16+00, 20' L of CL	2486.0	6.0	6.4	127.2	131.0	97	95
739	06/30/99	Dam, Sta 17+00, 20' R of CL	2485.0	18.0	8.5	125.0	131.0	95	95
740	06/30/99	Dam, Sta 18+00, 25' R of CL	2485.0	32.0	8.1	126.6	131.0	97	95
[redacted]	06/30/99	Dam, Sta 19+00, 35' R of CL	2484.0	50.0	7.9	127.4	131.0	97	95
[redacted]	06/30/99	Dam, Sta 20+00, 50' R of CL	2484.0	30.0	7.4	125.4	131.0	96	95
743	06/30/99	Dam, Sta 14+00, 40' L of CL	2485.0	3.0	7.2	127.0	131.0	97	95
744	07/01/99	Dam, Sta 17+00, 40' L of CL	2486.0	31.0	5.8	126.2	131.0	96	95
745	07/01/99	Dam, Sta 18+00, 35' L of CL	2486.0	40.0	5.5	125.8	131.0	96	95
746	07/01/99	Dam, Sta 19+00, 25' L of CL	2485.0	45.0	7.7	124.5	131.0	95	95
747	07/01/99	Dam, Sta 20+00, 40' L of CL	2485.0	43.0	7.5	125.0	131.0	95	95
748	07/01/99	Dam, Sta 20+50, 60' R of CL	2486.0	2.0	7.2	124.9	131.0	95	95
749	07/01/99	Dam, Sta 16+00, 10' L of CL	2487.0	4.0	8.4	125.1	131.0	96	95
750	07/01/99	Dam, Sta 17+50, 20' R of CL	2487.0	45.0	8.0	126.0	131.0	96	95
751	07/01/99	Dam, Sta 18+50, 25' R of CL	2486.0	44.0	8.6	125.2	131.0	96	95
752	07/01/99	Dam, Sta 19+50, 25' R of CL	2485.0	47.0	8.1	125.8	131.0	96	95
753	07/01/99	Dam, Sta 12+50, 30' L of CL	2495.0	2.0	9.0	124.0	131.0	95	95

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FIELD DENSITY TEST SUMMARY

No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	SPEC
754	07/01/99	Dam, Sta 13+00, 25' L of CL	2494.0	2.0	8.2	124.9	131.0	95	95
755	07/01/99	Dam, Sta 14+00, 40' L of CL	2486.0	6.0	8.8	125.4	131.0	96	95
756	07/01/99	Dam, Sta 15+00, 40' L of CL	2486.0	8.0	8.5	125.0	131.0	95	95
757	07/01/99	Dam, Sta 17+00, 20' L of CL	2487.0	25.0	8.9	125.6	131.0	96	95
758	07/01/99	Dam, Sta 19+00, 40' L of CL	2487.0	44.0	8.5	126.3	131.0	96	95
759	07/02/99	Dam, Sta 16+50, 25' R of CL	2488.0	10.0	8.1	126.0	131.0	96	95
760	07/02/99	Dam, Sta 17+50, 30' R of CL	2488.0	50.0	8.4	126.5	131.0	97	95
761	07/02/99	Dam, Sta 18+50, 30' R of CL	2487.0	40.0	8.8	125.8	131.0	96	95
762	07/02/99	Dam, Sta 19+50, 35' R of CL	2486.0	50.0	9.0	125.4	131.0	96	95
763	07/02/99	Dam, Sta 20+50, 25' L of CL	2486.0	43.0	8.1	126.8	131.0	97	95
[illegible]	07/02/99	Dam, Sta 12+00, 15' L of CL	2500.0	2.0	7.9	125.2	131.0	96	95
765	07/02/99	Dam, Sta 14+00, 20' L of CL	2486.0	2.0	8.0	125.9	131.0	96	95
766	07/02/99	Dam, Sta 16+00, 25' L of CL	2488.0	10.0	7.8	127.0	131.0	97	95
767	07/02/99	Dam, Sta 18+00, 25' L of cL	2487.0	42.0	7.4	126.2	131.0	96	95
768	07/02/99	Dam, Sta 20+00, 15' L of cL	2485.0	44.0	7.5	126.9	131.0	97	95
769	07/02/99	Dam, Sta 12+50, 30' L of CL	2496.0	2.0	7.8	126.4	131.0	97	95
770	07/02/99	Dam, Sta 14+50, 40' L of CL	2486.0	10.0	7.6	127.1	131.0	97	95
771	07/02/99	Dam, Sta 16+50, 35' L of CL	2488.0	19.0	8.0	126.7	131.0	97	95
772	07/02/99	Dam, Sta 18+50, 30' L of CL	2487.0	43.0	8.1	126.9	131.0	97	95
773	07/06/99	Dam, Sta 19+00 @ CL	2489.0	49.0	5.5	125.1	131.0	96	95
774	07/06/99	Dam, Sta 16+50, 15' L of CL	2489.0	15.0	7.6	126.3	131.0	96	95
775	07/06/99	Dam, Sta 18+00, 30' R of CL	2489.0	50.0	7.2	126.1	131.0	96	95
776	07/06/99	Dam, Sta 20+00, 25' R of CL	2488.0	48.0	7.7	125.9	131.0	96	95

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FIELD DENSITY TEST SUMMARY

No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
777	07/06/99	Dam, Sta 20+50, 65' R of CL	2488.0	2.0	6.6	126.3	131.0	96	95
778	07/06/99	Dam, Sta 14+00, 25' L of CL	2488.0	5.0	9.0	118.2	124.0	95	95
779	07/06/99	Dam, Sta 17+00, 30' L of CL	2489.0	28.0	9.3	118.8	124.0	96	95
780	07/06/99	Dam, Sta 18+50 @ CL	2489.0	49.0	8.9	117.9	124.0	95	95
781	07/06/99	Dam, Sta 20+00 @ CL	2488.0	48.0	8.5	117.4	124.0	95	95
782	07/07/99	Dam, Sta 13+50, 25' L of CL	2489.0	3.0	8.5	117.5	124.0	95	95
783	07/07/99	Dam, Sta 15+50, 40' L of CL	2489.0	11.0	8.7	117.9	124.0	95	95
784	07/07/99	Dam, Sta 16+50 @ CL	2490.0	12.0	9.0	117.3	124.0	95	95
785	07/07/99	Dam, Sta 18+50, 25' R of CL	2489.0	47.0	9.1	117.6	124.0	95	95
786	07/07/99	Dam, Sta 20+00, 40' L of CL	2488.0	47.0	9.3	118.4	124.0	96	95
787	07/07/99	Dam, Sta 20+50 @ CL	2487.0	39.0	9.8	118.2	124.0	95	95
788	07/07/99	Dam, Sta 14+00, 40' L of CL	2490.0	8.0	8.7	118.0	124.0	95	95
789	07/07/99	Dam, Sta 16+00, 20' L of CL	2490.0	9.0	9.0	118.8	124.0	96	95
790	07/07/99	Dam, Sta 18+00, 15' R of CL	2490.0	47.0	9.1	117.9	124.0	95	95
791	07/07/99	Dam, Sta 20+00, 25' R of CL	2489.0	49.0	9.4	119.0	124.0	96	95
792	07/07/99	Dam, Sta 13+00, 30' L of CL	2495.0	4.0	7.9	124.0	131.0	95	95
793	07/07/99	Dam, Sta 14+50, 40' L of CL	2490.0	8.0	8.1	125.2	131.0	96	95
794	07/07/99	Dam, Sta 17+00, 15' L of CL	2490.0	23.0	8.5	124.7	131.0	95	95
795	07/07/99	Dam, Sta 19+00, 30' R of CL	2489.0	45.0	7.6	124.8	131.0	95	95
796	07/07/99	Dam, Sta 19+50, 25' L of CL	2488.0	47.0	7.9	125.0	131.0	95	95
797	07/08/99	Dam, Sta 17+00, 20' R of CL	2490.0	30.0	5.5	124.6	131.0	95	95
798	07/08/99	Dam, Sta 19+00, 15' R of CL	2489.0	53.0	5.7	125.0	131.0	95	95
799	07/08/99	Dam, Sta 20+50, 40' R of CL	2488.0	8.0	5.8	124.8	131.0	95	95

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No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
800	07/08/99	Dam, Sta 15+50, 25' L of CL	2490.0	7.0	5.5	123.9	131.0	95	95
801	07/08/99	Dam, Sta 17+50, 30' L of CL	2490.0	37.0	7.2	123.8	131.0	95	95
802	07/08/99	Dam, Sta 19+50, 35' L of CL	2489.0	48.0	7.6	124.1	131.0	95	95
803	07/08/99	Dam, Sta 16+50, 15' R of CL	2491.0	10.0	7.9	124.0	131.0	95	95
804	07/08/99	Dam, Sta 18+50, 10' R of CL	2490.0	47.0	7.8	124.2	131.0	95	95
805	07/08/99	Dam, Sta 20+00, 10' R of CL	2490.0	50.0	7.3	125.5	131.0	96	95
806	07/09/99	Dam, Sta 17+00, 25' L of CL	2491.0	29.0	8.8	126.0	131.0	96	95
807	07/09/99	Dam, Sta 19+50, 15' L of cL	2489.0	50.0	8.5	125.2	131.0	96	95
808	07/09/99	Dam, Sta 20+50, 20' L of CL	2489.0	46.0	8.4	125.7	131.0	96	95
809	07/09/99	Dam, Sta 13+50, 20' L of CL	2493.0	5.0	8.5	124.9	131.0	95	95
[redacted]	07/09/99	Dam, Sta 15+50, 15' L of CL	2494.0	10.0	8.8	125.4	131.0	96	95
811	07/09/99	Dam, Sta 17+50 @ CL	2491.0	42.0	8.9	125.8	131.0	96	95
812	07/09/99	Dam, Sta 16+00 @ CL	2491.0	5.0	8.7	125.3	131.0	96	95
813	07/09/99	Dam, Sta 18+00, 25' R of CL	2490.0	22.0	8.9	125.0	131.0	95	95
814	07/10/99	Dam, Sta 13+00, 20' L of CL	2488.0	5.0	7.4	124.0	131.0	95	95
815	07/10/99	Dam, Sta 15+00, 25' L of CL	2489.0	8.0	7.6	125.5	131.0	96	95
816	07/10/99	Dam, Sta 17+00 @ CL	2492.0	30.0	7.0	124.9	131.0	95	95
817	07/10/99	Dam, Sta 19+00, 25' L of CL	2491.0	50.0	8.1	124.4	131.0	95	95
818	07/10/99	Dam, Sta 20+50, 70' L of CL	2489.0	2.0	7.5	125.0	131.0	95	95
819	07/10/99	Dam, Sta 14+00, 30' L of CL	2491.0	8.0	7.4	124.4	131.0	95	95
820	07/10/99	Dam, Sta 16+00, 25' L of CL	2493.0	15.0	8.0	125.2	131.0	96	95
821	07/10/99	Dam, Sta 18+00, 10' R of CL	2491.0	53.0	7.1	125.0	131.0	95	95
[redacted]	07/10/99	Dam, Sta 20+00, 30' R of CL	2490.0	50.0	7.0	124.1	131.0	95	95

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FIELD DENSITY TEST SUMMARY

Test No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
823	07/12/99	Dam, Sta 13+00, 10' L of CL	2497.0	4.0	7.2	124.9	131.0	95	95
824	07/12/99	Dam, Sta 15+00, 15' L of CL	2492.0	7.0	7.4	124.6	131.0	95	95
825	07/12/99	Dam, Sta 17+00, 15' R of CL	2493.0	30.0	7.5	125.0	131.0	95	95
826	07/12/99	Dam, Sta 14+00, 15' L of CL	2492.0	8.0	7.7	126.1	131.0	96	95
827	07/12/99	Dam, Sta 16+00, 15' L of CL	2494.0	10.0	7.4	125.4	131.0	96	95
828	07/12/99	Dam, Sta 21+00, 25' L of CL	2471.0	8.0	7.0	124.9	131.0	95	95
829	07/12/99	Dam, Sta 13+50, 5' L of CL	2494.0	4.0	7.5	124.3	131.0	95	95
830	07/12/99	Dam, Sta 15+00, 10' R of CL	2494.0	5.0	7.6	125.1	131.0	96	95
831	07/12/99	Dam, Sta 14+50, 15' L of CL	2492.0	10.0	7.2	124.9	131.0	95	95
832	07/12/99	Dam, Sta 15+50, 5' R of CL	2494.0	5.0	7.0	124.6	131.0	95	95
[illegible]	07/12/99	Dam, Sta 14+00, 10' R of CL	2494.0	5.0	7.5	125.0	131.0	95	95
834	07/12/99	Dam, Sta 15+50, 10' R of CL	2494.0	5.0	7.8	125.4	131.0	96	95
835	07/12/99	Dam, Sta 12+50, 20' L of CL	2498.0	2.0	7.6	123.9	131.0	95	95
836	07/13/99	Dam, Sta 13+00, 10' L of CL	2498.0	3.0	7.2	125.1	131.0	96	95
837	07/13/99	Dam, Sta 15+00 @ CL	2495.0	8.0	7.0	124.3	131.0	95	95
838	07/13/99	Dam, Sta 21+00, 55' L of CL	2472.0	22.0	8.0	126.0	131.0	96	95
839	07/13/99	Dam, Sta 12+00, 10' L of CL	2501.0	2.0	13.5	117.6	124.0	95	95
840	07/13/99	Dam, Sta 14+00, 10' L of CL	2494.0	10.0	13.2	118.1	124.0	95	95
841	07/13/99	Dam, Sta 16+00 @ CL	2496.0	9.0	13.0	117.4	124.0	95	95
842	07/13/99	Dam, Sta 18+00, 20' R of CL	2493.0	55.0	13.4	117.9	124.0	95	95
843	07/13/99	Dam, Sta 21+00, 45' L of CL	2472.0	22.0	7.0	125.0	131.0	95	95
844	07/13/99	Dam, Sta 19+00, 10' R of CL	2491.0	56.0	7.3	125.8	131.0	96	95
[illegible]	07/13/99	Dam, Sta 20+00, 10' L of CL	2491.0	51.0	7.5	124.7	131.0	95	95

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FIELD DENSITY TEST SUMMARY

No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	SPEC
846	07/13/99	Spillway, Cutoff Wall Backfill, SE	2471.0	1.0	11.3	114.1	120.0	95	95
847	07/13/99	Spillway, Baffel Black Floor	2470.0	0.5	10.1	120.7	126.0	96	95
848	07/13/99	Dam, Sta 13+50 @ CL	2495.0	2.0	7.5	125.0	131.0	95	95
849	07/13/99	Dam, Sta 15+50, 10' L of CL	2496.0	10.0	7.2	124.8	131.0	95	95
850	07/13/99	Dam, Sta 17+50, 15' R of CL	2494.0	50.0	7.5	125.7	131.0	96	95
851	07/13/99	Dam, Sta 18+50, 25' L of CL	2494.0	45.0	7.1	124.2	131.0	95	95
852	07/13/99	Dam, Sta 14+50, 10' R of CL	2495.0	6.0	6.8	124.7	131.0	95	95
853	07/13/99	Spillway, S Ogee Crest Wall	2495.0	0.5	7.7	121.6	126.0	97	95
854	07/14/99	Dam, Sta 17+00, 10' L of CL	2494.0	33.0	7.5	125.5	131.0	96	95
855	07/14/99	Dam, Sta 19+00, 15' L of CL	2492.0	52.0	7.2	125.1	131.0	96	95
[redacted]	07/14/99	Dam, Sta 14+00, 15' L of CL	2495.0	11.0	13.5	118.8	124.0	96	95
857	07/14/99	Dam, Sta 21+00, 40' L of CL	2473.0	13.0	7.8	125.7	131.0	96	95
858	07/14/99	Dam, Sta 13+00, 15' L of CL	2499.0	6.0	7.7	126.9	131.0	97	95
859	07/14/99	Dam, Sta 15+00, 10' L of CL	2496.0	9.0	7.5	126.0	131.0	96	95
860	07/14/99	Dam, Sta 17+00, 20' R of CL	2496.0	34.0	7.2	125.4	131.0	96	95
861	07/14/99	Dam, Sta 20+00, 25' R of CL	2492.0	52.0	7.7	124.9	131.0	95	95
862	07/14/99	Dam, Sta 12+50, 20' L of CL	2501.0	3.0	7.9	125.5	131.0	96	95
863	07/14/99	Dam, Sta 14+50, 20' R of CL	2496.0	6.0	8.1	125.9	131.0	96	95
864	07/14/99	Spillway S Wall @ 4:1 Slope	2484.0	0.5	7.2	121.1	126.0	96	95
865	07/14/99	Spillway S Wall @ Ogee Crest	2495.0	0.5	7.0	120.1	126.0	95	95
866	07/14/99	Dam, Sta 16+58, 15' R of CL	2495.0	15.0	7.3	125.2	131.0	96	95
867	07/14/99	Dam, Sta 18+50, 5' R of CL	2495.0	52.0	7.9	126.1	131.0	96	95
[redacted]	07/14/99	Dam, Sta 20+50, 25' R of CL	2491.0	21.0	7.4	125.4	131.0	96	95

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FIELD DENSITY TEST SUMMARY

No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
869	07/14/99	Dam, Sta 21+00, 25' L of CL	2473.0	13.0	6.4	124.3	131.0	95	95
870	07/15/99	Dam, Sta 13+00 @ CL	2500.0	2.0	8.2	126.8	131.0	97	95
871	07/15/99	Dam, Sta 15+00, 20' R of CL	2496.0	4.0	5.3	125.9	131.0	96	95
872	07/15/99	Dam, Sta 17+00, 25' L of CL	2496.0	34.0	5.9	126.7	131.0	97	95
873	07/15/99	Dam, Sta 19+00 @ CL	2492.0	55.0	5.4	125.7	131.0	96	95
874	07/15/99	Dam, Sta 20+00, 30' L of CL	2490.0	48.0	5.3	124.9	131.0	95	95
875	07/15/99	Dam, Sta 21+00, 40' L of CL	2474.0	14.0	5.8	125.2	131.0	96	95
876	07/15/99	Dam, Sta 12+00, 5' L of CL	2501.0	1.0	5.3	126.3	131.0	96	95
877	07/15/99	Dam, Sta 14+00, 5' R of CL	2497.0	7.0	5.8	124.2	131.0	95	95
878	07/15/99	Dam, Sta 16+00, 15' R of CL	2498.0	8.0	6.0	124.7	131.0	95	95
[redacted]	07/15/99	Dam, Sta 18+00 @ CL	2496.0	55.0	5.3	125.9	131.0	96	95
880	07/15/99	Dam, Sta 20+00, 25' L of CL	2491.0	50.0	5.3	125.2	131.0	96	95
881	07/15/99	Dam, Sta 12+50, 15' L of CL	2500.0	1.0	6.3	125.9	131.0	96	95
882	07/15/99	Dam, Sta 14+50, 5' L of CL	2497.0	12.0	5.9	124.1	131.0	95	95
883	07/15/99	Dam, Sta 16+50, 5' R of CL	2498.0	17.0	6.0	124.4	131.0	95	95
884	07/15/99	Dam, Sta 18+50, 15' R of CL	2497.0	54.0	6.3	124.7	131.0	95	95
885	07/15/99	Dam, Sta 20+50, 10' L of CL	2492.0	46.0	6.5	124.3	131.0	95	95
886	07/15/99	Dam, Sta 21+00, 20' L of CL	2474.0	4.0	6.1	124.1	131.0	95	95
887	07/15/99	Dam, Sta 21+00, 50' L of CL	2475.0	20.0	6.6	126.2	131.0	96	95
888	07/15/99	Dam, Sta 20+50, 50' R of CL	2490.0	10.0	7.4	127.1	131.0	97	95
889	07/15/99	Spillway, N Wall @ Ogee Crest	2495.0	0.5	10.1	118.1	120.0	98	95
890	07/16/99	Dam, Sta 13+00, 5' R of CL	2502.0	3.0	6.0	125.0	129.0	97	95
891	07/16/99	Dam, Sta 15+00, 20' L of CL	2498.0	13.0	7.6	122.5	129.0	95	95

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FIELD DENSITY TEST SUMMARY

No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
892	07/16/99	Dam, Sta 17+00, 10' R of CL	2498.0	35.0	7.2	122.2	129.0	95	95
893	07/16/99	Dam, Sta 19+00, 15' R of CL	2496.0	60.0	7.8	123.0	129.0	95	95
894	07/16/99	Dam, Sta 20+50, 60' R of CL	2491.0	6.0	8.1	122.8	129.0	95	95
895	07/16/99	Dam, Sta 21+00, 30' L of CL	2476.0	7.0	7.9	122.5	129.0	95	95
896	07/16/99	Dam, Sta 14+00, 10' L of CL	2499.0	15.0	8.3	125.1	129.0	97	95
897	07/16/99	Dam, Sta 16+00, 15' L of CL	2499.0	15.0	8.0	124.8	129.0	97	95
898	07/16/99	Dam, Sta 18+00, 15' R of CL	2498.0	60.0	7.8	123.9	129.0	96	95
899	07/16/99	Dam, Sta 20+00, 15' R of CL	2493.0	63.0	8.3	124.0	129.0	96	95
900	07/16/99	Spillway 4:1 Slope S Wall	2475.0	0.5	9.5	119.8	126.0	95	95
901	07/16/99	Dam, Sta 21+00, 25' L of CL	2777.0	10.0	6.4	125.4	129.0	97	95
[illegible]	07/16/99	Dam, Sta 12+50, 15' L of CL	2502.0	3.0	7.4	125.5	129.0	97	95
903	07/16/99	Dam, Sta 14+50, 10' R of CL	2499.0	12.0	7.6	125.2	129.0	97	95
904	07/16/99	Dam, Sta 16+50, 10' L of CL	2499.0	21.0	6.8	122.8	129.0	95	95
905	07/16/99	Dam, Sta 18+50, 15' L of CL	2498.0	56.0	7.0	123.4	129.0	96	95
906	07/16/99	Dam, Sta 21+00, 20' L of CL	2778.0	5.0	7.8	124.1	129.0	96	95
907	07/16/99	Dam, Sta 13+50, 15' L of CL	2503.0	13.0	7.6	123.0	129.0	95	95
908	07/16/99	Dam, Sta 15+50, 10' R of CL	2501.0	9.0	8.0	124.4	129.0	96	95
909	07/16/99	Dam, Sta 17+50 @ CL	2500.0	52.0	8.2	124.1	129.0	96	95
910	07/19/99	Dam, Sta 21+00, 35' L of CL	2779.0	10.0	7.3	124.3	129.0	96	95
911	07/19/99	Dam, Sta 12+00, 5' L of CL	2505.0	4.0	6.4	122.4	129.0	95	95
912	07/19/99	Dam, Sta 14+00, 10' L of CL	2504.0	15.0	7.0	123.8	129.0	96	95
913	07/19/99	Dam, Sta 16+00 @ CL	2502.0	15.0	6.9	122.2	129.0	95	95
914	07/19/99	Dam, Sta 18+00, 10' L of CL	2500.0	60.0	7.2	122.8	129.0	95	95

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FIELD DENSITY TEST SUMMARY

[redacted] No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
915	07/19/99	Dam, Sta 21+00, 25' L of CL	2279.0	10.0	8.4	123.1	129.0	95	95
916	07/19/99	Dam, Sta 13+00, 5' L of CL	2505.0	10.0	10.0	122.2	129.0	95	95
917	07/19/99	Dam, Sta 15+00, 10' R of CL	2503.0	10.0	9.8	123.0	129.0	95	95
918	07/19/99	Dam, Sta 17+00 @ CL	2500.0	38.0	9.9	122.4	129.0	95	95
919	07/19/99	Dam, Sta 19+00, 10' R of CL	2498.0	65.0	9.4	122.7	129.0	95	95
920	07/19/99	Spillway Cutoff Wall Center Section W Side	2471.0	5.0	10.2	116.7	120.0	97	95
921	07/19/99	Dam, Sta 21+00, 20' L of CL	2280.0	8.0	10.5	122.1	129.0	95	95
922	07/19/99	Dam, Sta 12+50, 10' L of CL	2505.0	6.0	9.3	123.0	129.0	95	95
923	07/19/99	Spillway Cutoff Wall Center Section W Side	2473.0	7.0	10.0	116.1	120.0	97	95
924	07/19/99	Dam, Sta 14+50 @ CL	2405.0	18.0	9.7	122.2	129.0	95	95
[redacted]	07/19/99	Spillway Cutoff Wall S End W Side	2472.0	6.0	10.2	116.4	120.0	97	95
926	07/20/99	Dam, Sta 17+00, 20' L of CL	2501.0	40.0	8.0	125.1	129.0	97	95
927	07/20/99	Dam, Sta 19+00, 5' L of CL	2499.0	60.0	7.8	124.4	129.0	96	95
928	07/20/99	Dam, Sta 13+00, 10' R of CL	2506.0	5.0	7.5	124.8	129.0	97	95
929	07/20/99	Dam, Sta 15+00 @ CL	2504.0	15.0	7.1	123.2	129.0	96	95
930	07/20/99	Dam, Sta 17+50, 15' L of CL	2501.0	50.0	8.0	124.0	129.0	96	95
931	07/20/99	Dam, Sta 19+50, 20' R of CL	2489.0	52.0	7.9	123.8	129.0	96	95
932	07/20/99	Dam, Sta 21+00, 25' L of CL	2480.0	10.0	7.5	123.5	129.0	96	95
933	07/20/99	Dam, Sta 12+00, 5' L of CL	2505.0	4.0	7.7	123.0	129.0	95	95
934	07/20/99	Dam, Sta 14+00, 5' R of CL	2505.0	15.0	7.9	123.7	129.0	96	95
935	07/20/99	Dam, Sta 16+00, 10' R of CL	2503.0	13.0	8.0	123.2	129.0	96	95
936	07/20/99	Dam, Sta 18+00, 10' R of CL	2501.0	63.0	7.7	123.5	129.0	96	95
[redacted]	07/20/99	Dam, Sta 21+00, 15' L of CL	2480.0	3.0	8.3	124.2	129.0	96	95

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FIELD DENSITY TEST SUMMARY

No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
938	07/20/99	Dam, Sta 20+00 @ CL	2495.0	55.0	7.9	123.1	129.0	95	95
939	07/20/99	Dam, Sta 12+50 @ CL	2507.0	5.0	7.3	123.3	129.0	96	95
940	07/20/99	Dam, Sta 14+50, 5' R of CL	2505.0	17.0	7.8	124.0	129.0	96	95
941	07/20/99	Dam, Sta 16+50, 10' L of CL	2504.0	23.0	7.7	123.0	129.0	95	95
942	07/20/99	Dam, Sta 18+50, 10' L of CL	2500.0	58.0	7.5	122.7	129.0	95	95
943	07/20/99	Outlet Structure, E End Floor	2444.0	0.5	6.5	123.1	129.0	95	95
944	07/20/99	Outlet Structure, E Floor	2444.0	0.5	8.0	122.1	129.0	95	95
945	07/20/99	Outlet Structure, N Wing Wall	2444.0	0.5	7.4	122.8	129.0	95	95
946	07/20/99	Dam, Sta 21+00, 20' L of CL	2481.0	15.0	7.5	122.1	129.0	95	95
947	07/21/99	Dam, Sta 21+00, 15' L of CL	2481.0	3.0	8.0	122.5	129.0	95	95
[illegible]	07/21/99	Dam, Sta 12+00, 2' L of CL	2508.0	7.0	8.3	122.6	129.0	95	95
949	07/21/99	Dam, Sta 14+00, 5' L of CL	2508.0	22.0	8.5	123.2	129.0	96	95
950	07/21/99	Dam, Sta 16+00, 5' L of CL	2508.0	18.0	8.2	122.9	129.0	95	95
951	07/21/99	Dam, Sta 18+00, 10' R of CL	2502.0	63.0	8.5	122.1	129.0	95	95
952	07/21/99	Dam, Sta 21+00, 20' L of CL	2482.0	5.0	8.4	123.4	129.0	96	95
953	07/21/99	Ogee Crest, N Wall	2495.0	0.5	8.6	121.6	126.0	97	95
954	07/21/99	Ogee Crest, N Center Floor	2495.0	0.5	8.9	123.4	126.0	98	95
955	07/21/99	Dam, Sta 13+00 @ CL	2509.0	11.0	8.7	122.7	129.0	95	95
956	07/21/99	Dam, Sta 15+00, 5' R of CL	2509.0	20.0	8.9	122.2	129.0	95	95
957	07/21/99	Dam, Sta 17+00, 3' R of CL	2504.0	40.0	8.5	123.0	129.0	95	95
958	07/21/99	Dam, Sta 21+00, 15' L of CL	2482.0	3.0	8.8	122.3	129.0	95	95
959	07/22/99	Dam, Sta 21+00, 10' R of CL	2480.0	3.0	8.8	122.1	129.0	95	95
960	07/22/99	Outlet Structure N Wing Wall, N End	2445.0	0.5	8.5	122.1	126.0	97	95

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FIELD DENSITY TEST SUMMARY

Test No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
961	07/22/99	Outlet Structure N Wing Wall, S End	2445.0	0.5	8.8	121.8	126.0	97	95
962	07/22/99	Dam, Sta 12+00, 5' R of CL	2510.0 Finished Subgrade	3.0	8.5	122.8	129.0	95	95
963	07/22/99	Dam, Sta 13+00, 5' L of CL	2510.0 Finished Subgrade	13.0	9.0	122.3	129.0	95	95
964	07/22/99	Dam, Sta 14+00 @ CL	2510.0 Finished Subgrade	19.0	9.3	122.5	129.0	95	95
965	07/22/99	Dam, Sta 15+00, 5' L of CL	2510.0 Finished Subgrade	23.0	9.0	122.7	129.0	95	95
966	07/22/99	Dam, Sta 16+00, 10' R of CL	2510.0 Finished Subgrade	21.0	8.9	123.0	129.0	95	95
967	07/22/99	Dam, Sta 21+00, 10' R of CL	2481.0	4.0	7.5	123.5	129.0	96	95
968	07/22/99	Spillway Cutoff Wall, E Center	2470.0	6.0	9.8	113.8	120.0	95	95
969	07/23/99	Dam, Sta 21+00 @ CL	2482.0	3.0	7.9	123.4	129.0	96	95
970	07/23/99	Dam, Sta 21+00, 10' R of CL	2482.0	3.0	8.1	122.3	129.0	95	95
[illegible]	07/23/99	Dam, Sta 21+00 @ CL	2483.0	5.0	8.4	122.0	129.0	95	95
972	07/23/99	Dam, Sta 21+00, 5' L of CL	2483.0	5.0	8.6	122.6	129.0	95	95
973	07/23/99	Dam, Sta 21+00, 20' L of CL	2483.0	15.0	9.0	123.0	129.0	95	95
974	07/23/99	Dam, Sta 21+00, 15' R of CL	2483.0	7.0	8.8	122.3	129.0	95	95
975	07/23/99	Spillway Cutoff Wall, SE	2471.0	7.0	9.6	119.6	120.0	100	95
976	07/23/99	Spillway Cutoff Wall, E Center	2471.0	7.0	9.5	119.4	120.0	100	95
977	07/23/99	Spillway Cutoff Wall, E Center	2472.0	8.0	11.3	117.4	120.0	98	95
978	07/23/99	Spillway Cutoff Wall, SE	2472.0	8.0	11.0	118.3	120.0	99	95
979	07/23/99	Spillway Cutoff Wall, E Center, 10' E of Wall	2471.0	1.0	8.5	122.0	129.0	95	95
980	07/23/99	Spillway Cutoff Wall, SE, 10' E of Wall	2471.0	1.0	8.8	122.4	129.0	95	95
981	07/23/99	Spillway Cutoff Wall, E Center, 15' E of Wall	2472.0	2.0	9.0	122.8	129.0	95	95
982	07/23/99	Spillway Cutoff Wall, SE, 15' E of Wall	2472.0	2.0	8.8	122.2	129.0	95	95
983	07/24/99	Spillway Cutoff Wall, E Center @ Wall	2472.0	7.0	10.2	118.3	123.5	96	95

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FIELD DENSITY TEST SUMMARY

[redacted] No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
984	07/24/99	Spillway Cutoff Wall, SE @ Wall	2472.0	7.0	10.0	118.9	123.5	96	95
985	07/24/99	Spillway Cutoff Wall, E Center, 5' E of Wall	2472.0	2.0	10.5	118.1	123.5	96	95
986	07/24/99	Spillway Cutoff Wall, W Center @ Wall	2473.0	8.0	10.0	119.2	123.5	97	95
987	07/24/99	Spillway Cutoff Wall, W Center @ Wall	2474.0	9.0	10.5	118.3	123.5	96	95
988	07/24/99	Spillway Cutoff Wall, SW @ Wall	2473.0	8.0	10.4	118.7	123.5	96	95
989	07/24/99	Spillway Cutoff Wall, E Center @ Wall	2473.0	8.0	10.6	118.9	123.5	96	95
990	07/24/99	Spillway Cutoff Wall, SE @ Wall	2474.0	9.0	10.9	119.6	123.5	97	95
991	07/24/99	Spillway Cutoff Wall, NE, 10' E of Wall	2471.0	1.0	10.2	118.6	123.5	96	95
992	07/24/99	Spillway Cutoff Wall, W Center @ Wall	2475.0	10.0	8.9	118.1	123.5	96	95
993	07/24/99	Spillway Cutoff Wall, SW @ Wall	2474.0	9.0	10.1	119.3	123.5	97	95
[redacted]	07/24/99	Spillway Cutoff Wall, SE, 10' E of Wall	2475.0	4.0	10.6	118.9	123.5	96	95
995	07/24/99	Spillway Cutoff Wall, SE @ Wall	2475.0	10.0	9.1	116.8	123.5	95	95
996	07/24/99	Spillway Cutoff Wall, SW @ Wall	2475.0	10.0	10.5	119.6	123.5	97	95
997	07/26/99	Dam, Sta 21+00 @ CL	2484.0	7.0	7.5	123.5	129.0	96	95
998	07/26/99	Dam, Sta 21+00, 40' L of CL	2484.0	20.0	7.8	123.2	129.0	96	95
999	07/26/99	Dam, Sta 21+00, 15' L of CL	2485.0	9.0	7.1	122.6	129.0	95	95
1000	07/26/99	Outlet Structure, Sump	2442.0	0.5	8.8	121.8	126.0	97	95
1001	07/26/99	Outlet Structure, Floor	2445.0	0.5	8.6	122.2	126.0	97	95
1002	07/26/99	Dam, Sta 21+00, 5' R of CL	2485.0	8.0	7.9	122.7	129.0	95	95
1003	07/26/99	Spillway Cutoff Wall, W Center @ Wall	2475.0	10.0	10.0	117.8	123.5	95	95
1004	07/26/99	Spillway Cutoff Wall, SW, 3' W of Wall	2475.0	10.0	7.5	122.4	129.0	95	95
1005	07/26/99	Spillway Cutoff Wall, W Center @ Wall	2476.0	11.0	10.3	118.3	123.5	96	95
1006	07/26/99	Spillway Cutoff Wall, E Center, 10' E of Wall	2475.0	10.0	8.2	122.4	129.0	95	95

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FIELD DENSITY TEST SUMMARY

No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
1007	07/26/99	Spillway Cutoff Wall, NE, 5' E of Wall	2473.0	8.0	7.8	123.0	129.0	95	95
1008	07/26/99	Spillway Cutoff Wall, NE @ Wall	2473.0	8.0	10.2	116.8	123.5	95	95
1009	07/26/99	Spillway Cutoff Wall, E Center @ Wall	2475.0	10.0	10.6	117.3	123.5	95	95
1010	07/26/99	Spillway Cutoff Wall, W Center @ Wall	2477.0	12.0	7.8	122.8	129.0	95	95
1011	07/27/99	Dam, Sta 21+00 @ CL	2484.0	2.0	8.1	122.8	129.0	95	95
1012	07/27/99	Dam, Sta 21+00 @ CL	2485.0	9.0	9.0	123.2	129.0	96	95
1013	07/27/99	Dam, Sta 21+00, 10' R of CL	2485.0	10.0	8.6	122.1	129.0	95	95
1014	07/27/99	Dam, Sta 21+00, 35' L of CL	2486.0	25.0	9.3	123.7	129.0	96	95
1015	07/27/99	Dam, Sta 21+00, 20' L of CL	2486.0	9.0	9.0	123.0	129.0	95	95
1016	07/27/99	Spillway Cutoff Wall, W Center, 15' W of Wall	2477.0	6.0	7.8	122.8	129.0	95	95
[illegible]	07/27/99	Spillway Cutoff Wall, SW @ Wall	2480.0	15.0	8.9	117.6	123.5	95	95
1018	07/27/99	Spillway Cutoff Wall, NE @ Wall	2472.0	7.0	10.1	118.1	123.5	96	95
1019	07/27/99	Spillway Cutoff Wall, SW @ Wall	2478.0	13.0	9.8	118.8	123.5	96	95
1020	07/27/99	Spillway Cutoff Wall, W Center, 8' W of Wall	2478.0	4.0	7.7	123.0	129.0	95	95
1021	07/27/99	Spillway Cutoff Wall, NW @ Wall	2474.0	9.0	10.4	116.8	123.5	95	95
1022	07/27/99	Spillway Cutoff Wall, E Center @ Wall	2477.0	12.0	10.1	118.6	123.5	96	95
1023	07/27/99	Spillway Cutoff Wall, SE, 7' E of Wall	2477.0	7.0	7.6	123.4	129.0	96	95
1024	07/27/99	Spillway Cutoff Wall, W Center @ Wall	2479.0	14.0	9.8	119.0	123.5	96	95
1025	07/27/99	Spillway Cutoff Wall, NE, 7' E of Wall	2473.0	3.0	7.7	122.8	129.0	95	95
1026	07/27/99	Spillway Cutoff Wall, NE @ Wall	2473.0	8.0	9.1	120.0	123.5	97	95
1027	07/27/99	Spillway Cutoff Wall, NW @ Wall	2475.0	10.0	9.4	119.8	123.5	97	95
1028	07/28/99	Spillway W End Wall, NE @ Wall	2476.0	12.0	9.8	117.2	123.5	95	95
1029	07/28/99	Spillway W End Wall, NW @ Wall	2478.0	14.0	10.1	117.8	123.5	95	95

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FIELD DENSITY TEST SUMMARY

No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
1030	07/28/99	Spillway W End Wall, NW, 10' W of Wall	2478.0	8.0	7.1	122.3	129.0	95	95
1031	07/28/99	Spillway W End Wall, E Center, 7' E of Wall	2480.0	10.0	8.1	122.7	129.0	95	95
1032	07/28/99	Spillway W End Wall, NW, 8' W of Wall	2479.0	9.0	7.9	122.1	129.0	95	95
1033	07/28/99	Spillway W End Wall, NE, 5' E of Wall	2477.0	7.0	8.2	122.3	129.0	95	95
1034	07/28/99	Spillway W End Wall, NW @ Wall	2480.0	16.0	11.9	119.8	123.5	97	95
1035	07/28/99	Spillway W End Wall, NE @ Wall	2478.0	14.0	11.1	118.2	123.5	96	95
1036	07/28/99	Spillway W End Wall, NE @ Wall	2479.0	15.0	11.3	117.2	123.5	95	95
1037	07/28/99	Spillway W End Wall, NE, 4' E of Wall	2479.0	9.0	11.0	117.4	123.5	95	95
1038	07/28/99	Dam, Sta 21+00, 25' L of CL	2486.0	16.0	7.9	123.4	129.0	96	95
1039	07/28/99	Dam, Sta 21+00, 10' R of CL	2486.0	10.0	7.6	122.9	129.0	95	95
[illegible]	07/28/99	Dam, Sta 21+00, 25' L of CL	2487.0	17.0	8.1	123.0	129.0	95	95
1041	07/28/99	Dam, Sta 21+00, 20' R of CL	2487.0	3.0	8.4	123.3	129.0	96	95
1042	07/28/99	Dam, Sta 21+00, 15' L of CL	2488.0	12.0	7.4	122.0	129.0	95	95
1043	07/28/99	Dam, Sta 21+00, 15' R of CL	2488.0	10.0	7.1	122.5	129.0	95	95
1044	07/29/99	Dam, Sta 20+50, 30' L of CL	2492.0	11.0	7.4	123.4	129.0	96	95
1045	07/29/99	Dam, Sta 21+00, 5' L of CL	2489.0	6.0	7.1	122.8	129.0	95	95
1046	07/29/99	Dam, Sta 21+00, 15' R of CL	2490.0	13.0	7.8	123.0	129.0	95	95
1047	07/29/99	Dam, Sta 20+50, 45' L of CL	2493.0	13.0	7.5	122.1	129.0	95	95
1048	07/29/99	Dam, Sta 21+00, 10' R of CL	2491.0	14.0	7.2	122.4	129.0	95	95
1049	07/29/99	Dam, Sta 20+ 50, 10' R of CL	2494.0	44.0	7.8	123.4	129.0	96	95
1050	07/29/99	Dam, Sta 21+00 @ CL	2493.0	15.0	7.5	123.2	129.0	96	95
1051	07/29/99	Spillway Cutoff Wall SE @ Wall	2480.0	15.0	11.0	118.1	123.5	96	95
1052	07/29/99	Spillway Cutoff Wall, SE @ Wall	2481.0	16.0	11.1	119.4	123.5	97	95

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FIELD DENSITY TEST SUMMARY

[redacted] No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
1053	07/29/99	Spillway Cutoff Wall, 4:1 N Slope Wall Footing	2475.0	0.5	11.0	124.0	126.0	98	95
1054	07/29/99	Spillway Cutoff Wall, 4:1 Slope NW Floor	2475.0	0.5	10.8	123.6	126.0	98	95
1055	07/30/99	Spillway Cutoff Wall, E Center	2482.0	18.0	9.8	122.1	123.5	99	95
1056	07/30/99	Dam, Sta 21+00, 25' R of CL	2491.0	5.0	6.1	123.7	129.0	96	95
1057	07/30/99	Dam, Sta 20+50, 55' R of CL	2492.0	12.0	7.0	124.0	129.0	96	95
1058	07/30/99	Dam, Sta 21+00, 5' R of CL	2492.0	15.0	7.7	125.2	129.0	97	95
1059	07/30/99	Dam, Sta 20+50, 40' R of CL	2493.0	10.0	7.3	123.5	129.0	96	95
1060	07/30/99	Dam, Sta 21+00, 20' R of CL	2493.0	9.0	7.6	122.5	129.0	95	95
1061	07/30/99	Dam, Sta 20+50, 30' R of CL	2494.0	17.0	6.9	122.9	129.0	95	95
1062	07/30/99	Spillway Cutoff Wall, SE, 3' E of Wall	2483.0	13.0	7.6	122.4	129.0	95	95
[redacted]	07/30/99	Dam, Sta 21+00, 5' R of CL	2493.0	16.0	7.4	122.1	129.0	95	95
1064	07/30/99	Dam, Sta 20+50, 15' R of CL	2494.0	34.0	7.8	122.7	129.0	95	95
1065	07/30/99	Dam, Sta 21+00, 5' L of CL	2394.0	11.0	7.5	123.6	129.0	96	95
1066	07/30/99	Dam, Sta 20+50, 60' R of CL	2394.0	9.0	7.8	124.1	129.0	96	95
1067	07/30/99	Dam, Sta 21+00, 10' R of CL	2394.0	18.0	7.7	122.9	129.0	95	95
1068	08/02/99	Dam, Sta 21+00, 20' R of CL	2495.0	3.0	6.8	123.2	129.0	96	95
1069	08/02/99	Dam, Sta 20+50, 50' R of CL	2495.0	15.0	8.4	122.7	129.0	95	95
1070	08/02/99	Dam, Sta 21+00 @ CL	2495.0	17.0	8.1	123.1	129.0	95	95
1071	08/02/99	Dam, Sta 21+00, 15' R of CL	2496.0	9.0	8.4	123.6	129.0	96	95
1072	08/02/99	Dam, Sta 20+50, 40' R of CL	2496.0	13.0	7.6	122.6	129.0	95	95
1073	08/02/99	Dam, Sta 21+00, 5' L of CL	2496.0	13.0	8.8	123.7	129.0	96	95
1074	08/02/99	Dam, Sta 21+00, 15' R of CL	2496.0	15.0	8.5	123.3	129.0	96	95
1075	08/03/99	Dam, Sta 21+00, 5' R of CL	2497.0	18.0	7.9	123.4	129.0	96	95

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FIELD DENSITY TEST SUMMARY

Test No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
1076	08/03/99	Dam, Sta 21+00, 25' R of CL	2497.0	3.0	10.3	117.8	124.0	95	95
1077	08/03/99	Dam, Sta 20+50, 50' R of CL	2498.0	18.0	10.5	118.2	124.0	95	95
1078	08/03/99	Dam, Sta 21+00, 20' R of CL	2498.0	5.0	8.4	122.8	129.0	95	95
1079	08/03/99	Dam, Sta 21+00, 10' R of CL	2498.0	20.0	9.9	117.6	124.0	95	95
1080	08/03/99	Dam, Sta 20+50, 45' R of CL	2499.0	19.0	7.6	123.0	129.0	95	95
1081	08/03/99	Dam, Sta 21+00 @ CL	2499.0	21.0	5.6	122.2	129.0	95	95
1082	08/03/99	Dam, Sta 21+00, 10' R of CL	2499.0	22.0	5.7	123.0	129.0	95	95
1083	08/03/99	Dam, Sta 21+00, 20' R of CL	2499.0	4.0	6.0	122.5	129.0	95	95
1084	08/04/99	Dam, Sta 21+00, 5' R of CL	2500.0	22.0	6.8	122.9	129.0	95	95
1085	08/04/99	Dam, Sta 21+00, 25' R of CL	2500.0	3.0	6.3	123.8	129.0	96	95
[illegible]	08/04/99	Dam, Sta 21+00, 15' R of CL	2500.0	10.0	7.1	122.6	129.0	95	95
1087	08/04/99	Dam, Sta 20+50, 50' R of CL	2500.0	20.0	6.9	123.4	129.0	96	95
1088	08/04/99	Levy Rip Rap Bottom, Sta 49+00, 10' L of CL	222.0 Finished Subgrade	0.5	9.1	119.8	126.0	95	95
1089	08/04/99	Levy Rip Rap Bottom, Sta 50+50, 5' R of CL	219.0 Finished Subgrade	0.5	9.7	120.3	126.0	96	95
1090	08/04/99	Dam, Sta 21+00, 10' R of CL	2501.0	24.0	7.3	123.5	129.0	96	95
1091	08/04/99	Dam, Sta 21+00, 20' R of CL	2501.0	6.0	7.1	122.3	129.0	95	95
1092	08/05/99	Dam, Sta 21+00, 15' R of CL	2502.0	12.0	6.1	123.8	129.0	96	95
1093	08/05/99	Dam, Sta 21+00 @ CL	2502.0	24.0	6.4	124.1	129.0	96	95
1094	08/05/99	Dam, Sta 21+00, 25' R of CL	2502.0	6.0	7.0	124.5	129.0	97	95
1095	08/05/99	Dam, Sta 18+50 @ CL	2502.0	60.0	7.4	123.0	129.0	95	95
1096	08/05/99	Dam, Sta 20+00, 5' R of CL	2502.0	62.0	6.9	124.2	129.0	96	95
1097	08/05/99	Dam, Sta 19+00, 5' R of CL	2503.0	68.0	7.1	122.8	129.0	95	95
[illegible]	08/05/99	Dam, Sta 20+00, 10' R of CL	2503.0	56.0	6.9	123.5	129.0	96	95

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FIELD DENSITY TEST SUMMARY

T[redacted] No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	SPEC
1099	08/05/99	Dam, Sta 21+00, 15' R of CL	2503.0	27.0	6.5	122.6	129.0	95	95
1100	08/06/99	Dam, Sta 18+50, 10' R of CL	2504.0	61.0	8.0	123.3	129.0	96	95
1101	08/06/99	Dam, Sta 21+00, 20' R of CL	2504.0	15.0	8.3	124.5	129.0	97	95
1102	08/06/99	Dam, Sta 20+50, 5' R of CL	2504.0	58.0	9.9	124.7	129.0	97	95
1103	08/06/99	Dam, Sta 19+00	2504.0	67.0	7.6	124.3	129.0	96	95
1104	08/06/99	Dam, Sta 21+00, 10' R of CL	2505.0	27.0	7.9	123.8	129.0	96	95
1105	08/06/99	Dam, Sta 18+50, 5' R of CL	2505.0	62.0	10.2	117.8	124.0	95	95
1106	08/06/99	Dam, Sta 20+00, 5' R of CL	2505.0	65.0	10.5	117.4	124.0	95	95
1107	08/09/99	Dam, Sta 19+50, 10' R of CL	2505.0	67.0	10.3	117.8	124.0	95	95
1108	08/09/99	Dam, Sta 20+50, 10' R of CL	2505.0	57.0	10.0	118.1	124.0	95	95
1[redacted]	08/09/99	Dam, Sta 19+00, 5' L of CL	2505.0	67.0	7.1	122.6	129.0	95	95
1110	08/09/99	Dam, Sta 21+00, 15' L of CL	2505.0	18.0	7.6	123.0	129.0	95	95
1111	08/09/99	Dam, Sta 18+00, 5' R of CL	2506.0	65.0	10.4	117.6	124.0	95	95
1112	08/09/99	Dam, Sta 20+50 @ CL	2506.0	58.0	10.5	118.0	124.0	95	95
1113	08/09/99	Dam, Sta 21+00, 5' L of CL	2506.0	27.0	7.9	123.6	129.0	96	95
1114	08/09/99	Dam, Sta 19+00, 5' L of CL	2506.0	67.0	8.1	124.2	129.0	96	95
1115	08/09/99	Dam, Sta 18+50, 5' R of CL	2507.0	63.0	7.8	123.1	129.0	95	95
1116	08/09/99	Dam, Sta 20+00 @ CL	2507.0	67.0	7.5	123.4	129.0	96	95
1117	08/10/99	Dam, Sta 18+00, 5' R of CL	2509.0	71.0	5.7	123.7	129.0	96	95
1118	08/10/99	Dam, Sta 20+00 @ CL	2509.0	69.0	6.1	124.9	129.0	97	95
1119	08/10/99	Spillway Cutoff Wall, NE @ Wall	2470.0	6.0	10.1	117.1	123.5	95	95
1120	08/10/99	Spillway Cutoff Wall, NW @ Wall	2471.0	7.0	10.4	117.5	123.5	95	95
1121	08/10/99	Spillway Cutoff Wall, NE @ Wall	2471.0	7.0	12.1	117.2	123.5	95	95

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FIELD DENSITY TEST SUMMARY

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1122	08/10/99	Spillway Cutoff Wall, NW @ Wall	2472.0	8.0	8.9	117.8	123.5	95	95
1123	08/10/99	Spillway Cutoff Wall, NE @ Wall	2472.0	8.0	9.8	118.0	123.5	96	95
1124	08/10/99	Spillway Cutoff Wall, NW @ Wall	2473.0	9.0	10.0	118.8	123.5	96	95
1125	08/10/99	Low Level Outlet Works, SE Wing Wall	2444.0	0.5	8.4	122.5	129.0	95	95
1126	08/10/99	Spillway Cutoff Wall, NE, 2' E of Wall	2473.0	9.0	7.5	123.8	129.0	96	95
1127	08/10/99	Spillway Cutoff Wall, NW, 2' W of Wall	2474.0	9.0	7.9	122.4	129.0	95	95
1128	08/10/99	Low Level Outlet Works, SE Wing Wall	2445.0	1.0	10.0	122.2	126.0	97	95
1129	08/10/99	Spillway Cutoff Wall, NW, 2' W of Wall	2475.0	10.0	5.6	124.0	129.0	96	95
1130	08/10/99	Spillway Cutoff Wall, NE @ Wall	2476.0	11.0	9.4	122.4	123.5	99	95
1131	08/10/99	Spillway Cutoff Wall, NW, 4' W of Wall	2476.0	11.0	9.1	122.8	129.0	95	95
[redacted]	08/11/99	Spillway Cutoff Wall, NE @ Wall	2477.0	13.0	10.2	119.0	123.5	96	95
[redacted]	08/11/99	Spillway Cutoff Wall, NW @ Wall	2477.0	13.0	9.4	117.2	123.5	95	95
1134	08/11/99	Spillway Cutoff Wall, NE, 4' E of Wall	2476.0	14.0	7.8	123.2	129.0	96	95
1135	08/11/99	Spillway Cutoff Wall, NW, 5' W of Wall	2477.0	13.0	8.1	124.0	129.0	96	95
1136	08/11/99	Low Level Outlet Works, Floor, S	Finished Subgrade 2444.0	0.5	9.3	123.0	129.0	95	95
1137	08/11/99	Low Level Outlet Works, Floor, N	Finished Subgrade 2444.0	0.5	9.0	122.8	129.0	95	95
1138	08/11/99	Spillway Cutoff Wall, NW @ Wall	2478.0	14.0	9.4	118.1	123.5	96	95
1139	08/11/99	Spillway Cutoff Wall, NW, 5' W of Wall	2478.0	14.0	8.8	123.1	129.0	95	95
1140	08/11/99	Spillway Cutoff Wall, NE @ Wall	2478.0	14.0	9.6	120.0	123.5	97	95
1141	08/11/99	Spillway Cutoff Wall, NE, 6' E of Wall	2478.0	14.0	8.5	123.8	129.0	96	95
1142	08/12/99	Spillway E End Wall, NW @ Wall	2478.0	14.0	9.6	117.8	123.5	95	95
1143	08/12/99	Spillway E End Wall, NW, 6' W of Wall	2478.0	14.0	9.0	123.2	129.0	96	95
1144	08/12/99	Low Level Outlet Works, Apron E	2445.0	0.5	8.6	119.2	126.0	95	95

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FIELD DENSITY TEST SUMMARY

[redacted] No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	SPEC
1145	08/12/99	Low Level Outlet Works, Apron W	2445.0	0.5	8.9	120.6	126.0	96	95
1146	08/12/99	Spillway Cutoff Wall, NE @ Wall	2479.0	15.0	9.5	119.4	123.5	97	95
1147	08/12/99	Spillway Cutoff Wall, 4' E of Wall	2479.0	15.0	8.4	123.0	129.0	95	95
1148	08/12/99	Spillway Bottom Floor NE Corner	2470.0	0.5	8.9	119.2	126.0	95	95
1149	08/13/99	Spillway Cutoff Wall, NW @ Wall	2479.0	16.0	9.5	117.5	123.5	95	95
1150	08/13/99	Spillway Cutoff Wall, 7' W of Wall	2479.0	16.0	6.6	124.0	129.0	96	95
1151	08/13/99	Spillway Cutoff Wall, NE @ Wall	2479.0	16.0	9.2	119.0	123.5	96	95
1152	08/13/99	Spillway Cutoff Wall, NE, 4' E of Wall	2479.0	16.0	7.9	122.8	129.0	95	95
1153	08/13/99	Spillway Cutoff Wall, NW @ Wall	2480.0	17.0	10.2	118.8	123.5	96	95
1154	08/13/99	Spillway Cutoff Wall, NW, 5' W of Wall	2480.0	17.0	8.9	123.6	129.0	96	95
[redacted]	08/13/99	Spillway Cutoff Wall, NE @ Wall	2480.0	17.0	10.0	118.2	123.5	96	95
1156	08/13/99	Spillway Cutoff Wall, NE, 3' E of Wall	2480.0	17.0	8.1	124.5	129.0	97	95
1157	08/13/99	Spillway Cutoff Wall, 4:1 Slope NE	2490.0	0.5	8.6	119.7	126.0	95	95
1158	08/13/99	Spillway Cutoff Wall, 4:1 Slope NE	2480.0	0.5	8.8	120.2	126.0	95	95
1159	08/16/99	Spillway W End Wall, NE @ Wall	2480.0	16.0	8.8	120.2	123.5	97	95
1160	08/16/99	Spillway W End Wall, 4:1 Slope NW	2475.0	6.0	9.1	120.6	126.0	96	95
1161	08/16/99	Spillway W End Wall, W Wall, NE @ Wall	2481.0	17.0	9.3	117.8	123.5	95	95
1162	08/16/99	Spillway W End Wall, NE, 3' E of Wall	2481.0	17.0	7.2	125.4	129.0	97	95
1163	08/17/99	Spillway Cutoff Wall, NE @ Wall	2482.0	18.0	8.8	120.7	123.5	98	95
1164	08/17/99	Spillway Cutoff Wall, NE , 2' E of Wall	2482.0	18.0	8.4	123.2	129.0	96	95
1165	08/17/99	Spillway Cutoff Wall, W N Wall Outlet Drop Structure	2426.0	1.0	9.1	117.3	123.5	95	95
1166	08/17/99	Spillway Cutoff Wall, W N Wall Outlet Drop Structure	2427.0	2.0	9.6	118.0	123.5	96	95
[redacted]	08/17/99	Spillway Cutoff Wall, W N Wall Outlet Drop Structure	2427.0	2.0	7.9	123.3	129.0	96	95

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FIELD DENSITY TEST SUMMARY

Test No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
1168	08/17/99	Spillway Cutoff Wall, W N Wall Outlet Drop Structure	2428.0	3.0	7.1	125.0	129.0	97	95
1169	08/17/99	Spillway Cutoff Wall, W N Wall Outlet Drop Structure	2428.0	3.0	9.9	118.1	123.5	96	95
1170	08/17/99	Spillway Cutoff Wall, W N Wall Outlet Drop Structure	2429.0	4.0	11.1	118.0	123.5	96	95
1171	08/17/99	Spillway Cutoff Wall, W N Wall Outlet Drop Structure	2429.0	4.0	7.4	125.7	129.0	97	95
1172	08/17/99	Spillway Cutoff Wall, W N Wall Outlet Drop Structure	2430.0	5.0	11.4	118.7	123.5	96	95
1173	08/18/99	Drop Outlet Structure, N Wall	2432.0	7.0	8.9	117.8	123.5	95	95
1174	08/18/99	Drop Outlet Structure, S Wall	2429.0	4.0	8.6	116.9	123.5	95	95
1175	08/18/99	Drop Outlet Structure, N Wall	2432.0	7.0	7.6	124.0	129.0	96	95
1176	08/18/99	Drop Outlet Structure, S Wall	2430.0	5.0	9.1	118.2	123.5	96	95
1177	08/18/99	Drop Outlet Structure, SE Wall	2430.0	1.0	11.1	120.0	123.5	97	95
[illegible]	08/18/99	Drop Outlet Structure, N Wall	2433.0	8.0	7.1	123.8	129.0	96	95
1179	08/18/99	Drop Outlet Structure, NE Wall	2433.0	3.0	9.6	117.6	123.5	95	95
1180	08/18/99	Drop Outlet Structure, S Wall	2431.0	6.0	9.3	117.1	123.5	95	95
1181	08/18/99	Drop Outlet Structure, N Wall	2434.0	9.0	9.8	118.0	123.5	96	95
1182	08/18/99	Drop Outlet Structure, SE Wall	2432.0	3.0	10.1	120.1	123.5	97	95
1183	08/19/99	Drop Outlet Structure, S Wall	2433.0	8.0	11.1	120.9	123.5	98	95
1184	08/19/99	Drop Outlet Structure, S Wall	2434.0	9.0	11.3	119.8	123.5	97	95
1185	08/19/99	Drop Outlet Structure, S Wall	2435.0	10.0	10.8	119.2	123.5	97	95
1186	08/19/99	Low Level Outlet Structure, NW Wall	2446.0	0	6.7	119.9	124.0	97	95
1187	08/20/99	Low Level Outlet Structure, N Wing Wall	2447.0	1.0	8.9	118.4	123.5	96	95
1188	08/20/99	Low Level Outlet Structure, NW Wall	2447.0	1.0	9.1	119.0	123.5	96	95
1189	08/20/99	Low Level Outlet Structure, SW Wall	2447.0	1.0	9.4	117.9	123.5	96	95
1190	08/20/99	Low Level Outlet Structure, S Wing Wall	2447.0	1.0	9.9	120.1	123.5	97	95

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FIELD DENSITY TEST SUMMARY

[redacted] No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
1191	08/20/99	Low Level Outlet Structure, NW Wall	2447.0	1.0	7.0	123.8	129.0	96	95
1192	08/20/99	Low Level Outlet Structure, SW Wall	2447.0	1.0	7.2	124.0	129.0	96	95
1193	08/23/99	Low Level Outlet Structure, SE Wing Wall	2446.0	0.5	8.7	119.9	126.0	95	95
1194	08/23/99	Low Level Outlet Structure, SE Wing Wall	2447.0	1.0	11.2	117.2	123.5	95	95
1195	08/23/99	Spillway Cutoff Wall, 1:1 Slope, S	2474.0	4.0	6.3	123.4	129.0	96	95
1196	08/23/99	Spillway Cutoff Wall, 1:1 Slope, Center	2475.0	5.0	7.0	123.9	129.0	96	95
1197	08/23/99	Spillway Cutoff Wall, 1:1 Slope, N	2475.0	5.0	6.8	124.2	129.0	96	95
1198	08/25/99	Spillway Bottom Floor, NW	2470.0 Finished Subgrade	0.5	7.1	125.0	126.0	99	95
1199	08/25/99	Spillway Bottom Floor, W Center	2470.0 Finished Subgrade	0.5	6.6	124.8	126.0	99	95
1200	08/25/99	Spillway Bottom Floor, NE	2470.0 Finished Subgrade	0.5	7.6	125.6	126.0	100	95
[redacted]	08/26/99	Low Level Outlet Structure, N Wing Wall/Epoxy Patched Crack	2447.0	1.0	8.9	119.0	123.5	96	95
1202	08/26/99	Low Level Outlet Structure, End of N Wing wall	2447.0	1.0	9.2	119.3	123.5	97	95
1203	08/26/99	Levy, Sta 13+50	2340.0	1.0	9.2	122.8	123.5	99	95
1204	08/26/99	Levy, Sta 15+00	2336.0	1.0	8.6	123.1	123.5	100	95
1205	08/26/99	Low Level Outlet Structure, N Wing Wall	2448.0	2.0	7.7	127.1	129.0	99	95
1206	08/27/99	Low Level Outlet Structure, N Wing Wall	2451.0	4.0	7.0	123.2	129.0	96	95
1207	08/27/99	Low Level Outlet Structure, N Wall	2451.0	4.0	8.8	120.3	123.5	97	95
1208	08/27/99	Low Level Outlet Structure, W Wall	2451.0	4.0	8.9	118.0	123.5	96	95
1209	08/27/99	Dam, Sta 21+50, 100' L of CL	2456.0	5.0	8.0	122.9	129.0	95	95
1210	08/27/99	Low Level Outlet Structure, W Wall	2449.0	2.0	8.8	119.1	123.5	96	95
1211	08/27/99	Low Level Outlet Structure, W Wall	2449.0	2.0	8.1	123.8	129.0	96	95
1212	08/27/99	Dam, Sta 22+00, 105' R of CL	2455.0	5.0	8.0	124.0	129.0	96	95
[redacted]13	08/30/99	Low Level Outlet Structure, N Wing Wall	2451.0	4.0	6.6	122.1	129.0	95	95

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FIELD DENSITY TEST SUMMARY

[redacted] No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
1214	08/30/99	Low Level Outlet Structure, S Wing Wall	2450.0	3.0	6.9	124.0	129.0	96	95
1215	08/30/99	Low Level Outlet Structure, S Wing Wall	2449.0	1.0	8.9	117.1	123.5	95	95
1216	08/30/99	Low Level Outlet Structure, N Wing Wall	2451.0	4.0	9.1	117.4	123.5	95	95
1217	08/30/99	Low Level Outlet Structure, N Wing Wall	2452.0	5.0	8.8	123.2	129.0	96	95
1218	08/30/99	Low Level Outlet Structure, W Wall	2451.0	4.0	8.6	116.9	123.5	95	95
1219	08/30/99	Low Level Outlet Structure, W Wall	2452.0	5.0	6.9	122.8	129.0	95	95
1220	08/30/99	Low Level Outlet Structure, S Wing Wall	2452.0	5.0	11.1	118.1	123.5	96	95
1221	08/30/99	Low Level Outlet Structure, N Wall	2454.0	7.0	9.2	124.8	129.0	97	95
1222	08/30/99	Low Level Outlet Structure, N Wall	2455.0	7.0	9.9	118.4	123.5	96	95
1223	08/30/99	Low Level Outlet Structure, W Wall	2454.0	6.0	11.0	118.3	123.5	96	95
[redacted]	08/30/99	Low Level Outlet Structure, S Wall	2453.0	5.0	10.9	118.1	123.5	96	95
1225	08/30/99	Low Level Outlet Structure, N Wall	2455.0	7.0	9.2	123.0	129.0	95	95
1226	08/30/99	Low Level Outlet Structure, W Wall	2455.0	7.0	9.4	122.8	129.0	95	95
1227	08/30/99	Low Level Outlet Structure, S Wall	2454.0	7.0	9.0	123.8	129.0	96	95
1228	08/30/99	Low Level Outlet Structure, N Wall	2456.0	8.0	10.0	117.8	123.5	95	95
1229	08/30/99	Low Level Outlet Structure, W Wall	2456.0	8.0	10.1	117.3	123.5	95	95
1230	08/30/99	Low Level Outlet Structure, S Wall	2455.0	8.0	9.9	116.8	123.5	95	95
1231	08/30/99	Low Level Outlet Structure, N Wall	2456.0	9.0	7.5	124.8	129.0	97	95
1232	08/30/99	Low Level Outlet Structure, S Wall	2455.0	8.0	7.7	124.1	129.0	96	95
1233	08/31/99	Low Level Outlet Structure, N Wall	2457.0	10.0	10.0	118.1	123.5	96	95
1234	08/31/99	Low Level Outlet Structure, W Wall	2457.0	10.0	10.3	117.8	123.5	95	95
1235	08/31/99	Low Level Outlet Structure, S Wall	2457.0	10.0	9.8	116.9	123.5	95	95
[redacted]36	08/31/99	Dam, Sta 19+00, 100' L of CL	2457.0	12.0	7.8	124.2	129.0	96	95

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FIELD DENSITY TEST SUMMARY

No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
1237	08/31/99	Dam, Sta 21+00, 100' L of CL	2455.0	10.0	8.0	124.6	129.0	97	95
1238	08/31/99	Dam, Sta 20+00	2457.0	10.0	7.0	122.1	129.0	95	95
1239	08/31/99	Low Level Outlet Structure, W Wall	2457.0	11.0	10.4	119.9	123.5	97	95
1240	08/31/99	Dam, Sta 19+50, 90' L of CL	2459.0	15.0	9.1	123.5	129.0	96	95
1241	08/31/99	Dam, Sta 18+50, 90' L of CL	2459.0	8.0	9.5	124.1	129.0	96	95
1242	08/31/99	Dam, Sta 23+00, 35' L of CL	2455.0	3.0	9.1	123.8	129.0	96	95
1243	09/01/99	Dam, Sta 19+00, 90' L of CL	2461.0	11.0	8.3	124.0	129.0	96	95
1244	09/01/99	Dam, Sta 20+00, 90' L of CL	2460.0	15.0	7.9	122.9	129.0	95	95
1245	09/01/99	Dam, Sta 18+50, 85' L of CL	2462.0	18.0	8.1	123.1	129.0	95	95
1246	09/01/99	Dam, Sta 20+50, 90' L of CL	2462.0	17.0	8.4	123.8	129.0	96	95
[illegible]	09/01/99	Dam, Sta 19+50, 80' L of CL	2465.0	22.0	8.5	123.2	129.0	96	95
1248	09/01/99	Dam, Sta 22+00, 100' L of CL	2457.0	9.0	8.0	123.9	129.0	96	95
1249	09/01/99	Dam, Sta 18+00, 80' L of CL	2461.0	10.0	9.0	124.2	129.0	96	95
1250	09/02/99	Dam, Sta 18+00, 65' L of CL	2471.0	20.0	7.5	123.4	129.0	96	95
1251	09/02/99	Dam, Sta 19+00, 65' L of CL	2471.0	26.0	7.3	122.9	129.0	95	95
1252	09/02/99	Dam, Sta 20+00, 70' L of CL	2470.0	27.0	7.6	124.0	129.0	96	95
1253	09/03/99	Sta 19+00, 100' L of CL	2490.0	60.0	6.5	124.1	126.0	99	95
1254	09/03/99	Sta 20+00, 100' L of CL	2490.0	60.0	6.9	124.7	126.0	99	95
1255	09/03/99	Sta 19+50, 75' L of CL	2490.0	60.0	7.1	119.6	126.0	95	95
1256	09/03/99	Sta 17+50, 100' L of CL	2491.0	61.0	7.4	121.2	126.0	96	95
1257	09/03/99	Sta 18+50, 60' L of CL	2491.0	61.0	7.2	122.2	126.0	97	95
1258	09/03/99	Sta 21+00, 50' L of CL	2491.0	61.0	8.0	123.5	126.0	98	95
1259	09/03/99	Sta 19+50, 100' L of CL	2493.0	63.0	7.9	122.7	126.0	97	95

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FIELD DENSITY TEST SUMMARY

No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	SPEC
1260	09/03/99	Sta 21+50, 75' L of CL	2493.0	63.0	7.8	120.0	126.0	95	95
1261	09/07/00	Sta 21+00, 65' L of CL	2510.0		7.5	122.4	129.0	95	95
1262	09/07/00	Sta 21+50, 80' L of CL	2510.0		7.2	122.2	129.0	95	95
1263	09/07/00	Sta 17+00, 50' L of CL	2510.0		7.6	123.3	129.0	96	95
1264	09/07/00	Sta 22+00, 100' L of CL	2511.0		9.2	123.2	129.0	96	95
1265	09/07/00	Sta 18+50, 80' L of CL	2511.0		9.9	126.8	129.0	98	95
1266	09/07/00	Sta 20+00, 45' L of CL	2511.0		6.5	122.2	129.0	95	95
1267	09/08/99	Dam, Sta 18+00, 50' L of CL	2483.0	38.0	7.7	124.0	129.0	96	95
1268	09/08/99	Dam, Sta 20+50, 50' L of CL	2481.0	37.0	7.5	123.4	129.0	96	95
1269	09/08/99	Dam, Sta 22+00, 60' L of CL	2480.0	5.0	7.2	124.4	129.0	96	95
[illegible]	09/08/99	Dam, Sta 18+50, 40' L of CL	2484.0	42.0	7.8	123.0	129.0	95	95
1271	09/08/99	Dam, Sta 20+00, 50' L of CL	2482.0	38.0	8.2	123.8	129.0	96	95
1272	09/08/99	Dam, Sta 22+50, 35' L of CL	2481.0	5.0	8.0	122.9	129.0	95	95
1273	09/08/99	Dam, Sta 19+00, 40' L of CL	2485.0	40.0	7.9	124.2	129.0	96	95
1274	09/08/99	Dam, Sta 21+00, 45' L of CL	2484.0	35.0	8.8	123.2	129.0	96	95
1275	09/08/99	Dam, Sta 23+00, 25' L of CL	2482.0	5.0	8.3	123.7	129.0	96	95
1276	09/09/99	Dam, Sta 21+00, 50' L of CL	2486.0	35.0	8.0	125.0	129.0	97	95
1277	09/09/99	Dam, Sta 19+00, 40' L of CL	2488.0	46.0	8.2	124.8	129.0	97	95
1278	09/09/99	Dam, Sta 22+00, 40' L of CL	2490.0	10.0	6.0	124.2	129.0	96	95
1279	09/09/99	Dam, Sta 23+00, 10' L of CL	2484.0	5.0	8.9	125.1	129.0	97	95
1280	09/09/99	Dam, Sta 21+00, 40' L of CL	2491.0	30.0	8.7	124.0	129.0	96	95
1281	09/10/99	Dam, Sediment Control Structure, W End		1.5	6.8	124.8	129.0	97	95
1282	09/10/99	Dam, Sediment Control Structure, E End		1.5	6.5	123.2	129.0	96	95

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FIELD DENSITY TEST SUMMARY

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1283	09/10/99	Dam, Sta 20+00, 25' L of CL	2495.0	53.0	6.9	123.9	129.0	96	95
1284	09/10/99	Dam, Sta 22+00, 40' L of CL	2492.0	9.0	7.2	124.5	129.0	97	95
1285	09/10/99	Dam, Sta 18+00, 25' L of CL	2495.0	50.0	7.5	124.1	129.0	96	95
1286	09/10/99	Dam, Sta 19+00, 40' L of CL	2488.0	49.0	8.0	123.4	129.0	96	95
1287	09/10/99	Dam, Sta 21+00, 50' L of CL	2489.0	40.0	7.8	123.7	129.0	96	95
1288	09/14/99	Dam, Sta 21+50, 20' R of CL	2496.0	0.7	7.2	123.2	129.0	96	95
1289	09/14/99	Dam, Sta 19+50, 15' L of CL	2498.0	0.7	7.0	123.7	129.0	96	95
1290	09/14/99	Dam, Sta 21+50, 23' L of CL	2499.0	0.7	6.8	124.2	129.0	96	95
1291	09/14/99	Pull Box, Sta 17+78.02	L 193.67	Trench Bottom	6.2	124.0	129.0	96	95
1292	09/14/99	Pull Box, Sta 16+53.70	L 160.37	Trench Bottom	6.6	123.9	129.0	96	95
[redacted]	09/14/99	Pull Box, Sta 15+43.17	L 112.96	Trench Bottom	6.8	123.4	129.0	96	95
1294	09/14/99	Pull Box, Sta 14+28.39	L 84.34	Trench Bottom	6.7	123.6	129.0	96	95
1295	09/14/99	Pull Box, Sta 13+18.87	L 51.57	Trench Bottom	6.4	124.2	129.0	96	95
1296	09/14/99	Pull Box, Sta 12+19.40	L 26.63	Trench Bottom	6.2	123.5	129.0	96	95
1297	09/15/99	Pull Box @ Trench Line to Metering System	L 11.23	Trench Bottom	7.2	123.7	129.0	96	95
1298	09/15/99	Dam, Sta 19+50	2498.0	0.7	6.4	123.8	129.0	96	95
1299	09/15/99	Dam, Sta 23+50	2500.0	0.7	7.3	123.6	129.0	96	95
1300	09/15/99	Dam, Sta 24+25	2502.0	0.7	8.6	124.9	129.0	97	95
1301	09/15/99	Dam, Sta 21+25	2502.0	0.7	8.4	124.3	129.0	96	95
1302	09/15/99	Dam, Sta 20+00	2504.0	0.7	7.5	123.7	129.0	96	95
1303	09/15/99	Dam, Sta 19+00	2504.0	0.7	7.3	123.9	129.0	96	95
1304	09/15/99	Dam, Sta 21+75	2504.0	0.7	7.7	124.0	129.0	96	95
[redacted]	09/15/99	Dam, Sta 24+00	2505.0	0.7	8.2	124.2	129.0	96	95

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1306	09/15/99	Dam, Sta 17+25	2505.0	0.7	7.8	123.7	129.0	96	95
1307	09/16/99	Dam Embankment, Sta 21+50	2505.0	0.7	9.7	121.0	126.0	96	95
1308	09/16/99	Dam Embankment, Sta 18+00	2506.0	0.7	8.6	121.5	126.0	96	95
1309	09/16/99	Dam Embankment, Sta 21+00	2506.0	0.7	8.7	120.4	126.0	96	95
1310	09/16/99	Dam Embankment, Sta 23+50	2507.0	0.7	9.8	119.8	126.0	95	95
1311	09/16/99	Dam Embankment, Sta 25+00	2506.0	0.7	10.4	121.0	126.0	96	95
1312	09/16/99	Dam Embankment, Sta 17+50	2506.0	0.7	9.6	121.4	126.0	96	95
1313	09/16/99	Dam Embankment, Sta 19+00	2507.0	0.7	8.6	121.5	126.0	96	95
1314	09/16/99	Dam Embankment, Sta 18+25	2507.0	0.7	9.3	121.3	126.0	96	95
1315	09/16/99	Dam Embankment, Sta 24+25	2506.0	0.7	9.7	120.7	126.0	96	95
[illegible]	09/17/99	Dam Embankment, Sta 21+25	2506.0	0.7	6.6	120.5	126.0	96	95
1317	09/17/99	Dam Embankment, Sta 17+50	2507.0	0.7	7.9	121.0	126.0	96	95
1318	09/17/99	Dam Embankment, Sta 24+50	2507.0	0.7	8.6	119.8	126.0	95	95
1319	09/17/99	Dam Embankment, Sta 25+00	2508.0	0.7	9.0	124.2	126.0	99	95
1320	09/17/99	Dam Embankment, Sta 17+00	2508.0	0.7	9.2	123.5	126.0	98	95
1321	09/17/99	Dam Embankment, Sta 18+50	2509.0	0.7	9.7	120.3	126.0	96	95
1322	09/17/99	Dam Embankment, Sta 23+25	2509.0	0.7	8.6	120.8	126.0	96	95
1323	09/17/99	Dam Embankment, Sta 22+00	2509.0	0.7	9.6	121.0	126.0	96	95
1324	09/22/99	Monitoring Station Conduit, Sta 16+50	2460.0	1.5	10.1	120.4	126.5	95	95
1325	09/22/99	Monitoring Station Conduit, Sta 16+00	2470.0	1.5	10.4	121.0	126.5	96	95
1326	09/22/99	Monitoring Station Conduit, Sta 15+50	2480.0	1.5	10.5	120.9	126.5	96	95
1327	09/22/99	Monitoring Station Conduit, E Basin, 20' W SP 37	2472.0	1.0	9.1	122.8	129.0	95	95
1328	09/23/99	Sediment Control Structure, 60' N of SP 37	2475.0	3.0	9.2	123.8	129.0	96	95

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FIELD DENSITY TEST SUMMARY

[redacted] No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	SPEC
1329	09/23/99	Sediment Control Structure, 40' S of SP 37	2477.0	5.0	9.0	124.2	129.0	96	95
1330	09/23/99	E Basin, 80' W of SP 27	2470.0	3.0	8.8	123.9	129.0	96	90
1331	09/24/99	Spillway Walls NW, G-8	2471.0	1.0	10.0	119.9	126.0	95	95
1332	09/24/99	Spillway Walls N Center, G-6	2474.0	1.0	10.2	120.6	126.0	96	95
1333	09/24/99	Spillway Walls N, G-6-7	2473.0	3.0	7.4	122.4	129.0	95	95
1334	09/24/99	E Basin, 150' W of SP 37	2464.0	4.0	8.4	123.8	129.0	96	90
1335	09/24/99	Spillway S Wall, G-8	2471.0	1.0	10.1	120.3	126.0	96	95
1336	09/24/99	Spillway S Wall, G-6	2474.0	1.0	9.8	120.9	126.0	96	95
1337	09/24/99	Spillway S Wall, G6-7	2473.0	3.0	7.6	123.2	129.0	96	95
1338	09/24/99	E Basin, 175' W of SP37	2468.0	8.0	7.9	123.5	129.0	96	90
[redacted]	09/25/99	Spillway Walls N, G-7	2472.0	2.0	7.6	122.8	129.0	95	95
1340	09/25/99	Spillway Walls N, G-8	2473.0	3.0	8.9	119.4	126.0	95	95
1341	09/25/99	Spillway Walls N, G-6	2474.0	4.0	8.2	123.6	129.0	96	95
1342	09/25/99	Pull Box, Sta 14+50	2485.0	2.0	7.8	123.0	129.0	95	95
1343	09/25/99	Spillway Walls N, G-7	2475.0	5.0	8.5	124.0	129.0	96	95
1344	09/25/99	Spillway Walls N, G-8	2476.0	6.0	8.2	123.5	129.0	96	95
1345	09/25/99	Spillway Walls N, G-7	2477.0	7.0	7.6	122.3	129.0	95	95
1346	09/25/99	Spillway Walls N, G-8	2478.0	8.0	7.3	122.5	129.0	95	95
1347	09/25/99	Spillway Walls N, G-3	2496.0	1.0	7.3	119.7	126.0	95	95
1348	09/25/99	Spillway Walls N, G-1	2497.0	2.0	7.8	122.2	129.0	95	95
1349	09/27/99	Spillway Walls S, A-1	2496.0	1.0	8.9	120.1	126.0	95	95
1350	09/27/99	Spillway Walls S, A-3	2496.0	1.0	9.1	119.9	126.0	95	95
1351	09/27/99	Spillway Walls S, A-8	2474.0	4.0	9.2	122.9	129.0	95	95

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FIELD DENSITY TEST SUMMARY

No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
1352	09/27/99	Spillway Walls S, A-7	2475.0	5.0	8.9	123.7	129.0	96	95
1353	09/27/99	Dam 4:1 Slope, Sta 13+00	2503.0	8.0	6.8	123.3	129.0	96	95
1354	09/27/99	Dam 4:1 Slope, Sta 15+00	2490.0	12.0	6.6	124.0	129.0	96	95
1355	09/27/99	E Basin	2470.0	10.0	7.9	123.8	129.0	96	95
1356	09/27/99	Spillway Walls, S A-8	2476.0	6.0	8.0	124.2	129.0	96	95
1357	09/27/99	Spillway Walls, S A-6	2477.0	7.0	7.8	123.1	129.0	95	95
1358	09/28/99	Spillway Wall N, G-6	2480.0	3.0	7.8	123.0	129.0	95	95
1359	09/28/99	Spillway Wall N, G-5	2490.0	4.0	8.0	122.8	129.0	95	95
1360	09/28/99	Spillway Wall N, G-6	2483.0	6.0	8.2	123.3	129.0	96	95
1361	09/28/99	Spillway Wall N, G-5	2491.0	5.0	7.9	123.6	129.0	96	95
[redacted]	09/28/99	Spillway Wall S, G-6	2478.0	3.0	8.1	124.0	129.0	96	95
1363	09/28/99	Spillway Wall S, G-5	2487.0	4.0	8.4	123.5	129.0	96	95
1364	09/29/99	E Basin, 70' E of SP100	2505.0	10.0	6.8	122.2	129.0	95	90
1365	09/29/99	E Basin, 50' E of SP108	2500.0	5.0	6.4	122.8	129.0	95	90
1366	09/29/99	Spillway Wall S, A-1	2497.0	3.0	7.8	124.8	129.0	97	95
1367	09/29/99	Spillway Wall S, A-2	2498.0	4.0	8.1	124.1	129.0	96	95
1368	09/29/99	Spillway Wall S, A-3	2499.0	5.0	8.3	123.8	129.0	96	95
1369	09/29/99	Spillway Wall S, A-4	2490.0	3.0	8.1	123.3	129.0	96	95
1370	09/29/99	Spillway Wall S, A-5	2482.0	4.0	8.0	123.5	129.0	96	95
1371	09/29/99	Spillway Wall N, G-5	2493.0	3.0	8.6	123.8	129.0	96	95
1372	09/30/99	Dam, Sta 14+00	2490.0	10.0	8.5	122.5	129.0	95	95
1373	09/30/99	Dam, Sta 21+00	2495.0	40.0	10.0	123.3	129.0	96	95
1374	10/01/99	E Slope, Dam, Sta 17+00	2500.0	37.0	8.3	125.5	129.0	97	95

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FIELD DENSITY TEST SUMMARY

Test No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
1375	10/01/99	E Slope, Dam, Sta 19+00	2480.0	35.0	7.0	126.7	129.0	98	95
1376	10/01/99	E Slope, Dam, Sta 21+00	2460.0	15.0	6.8	125.8	129.0	98	95
1377	10/04/99	Levy Slope Finished Subgrade, Sta 12+00, 15' LFL	2344.0	0.5	7.8	120.8	126.0	96	95
1378	10/04/99	Levy Slope Finished Subgrade, Sta 16+00, 10' LFL	2332.0	0.5	7.5	121.2	126.0	96	95
1379	10/04/99	Levy Slope Finished Subgrade, Sta 20+00, 20' LFL	2324.0	0.5	8.0	123.0	126.0	98	95
1380	10/04/99	Levy Slope Finished Subgrade, Sta 24+00, 5' LFL	2308.0	0.5	7.9	121.4	126.0	96	95
1381	10/04/99	Levy Slope Finished Subgrade, Sta 28+00, 25' LFL	2296.0	0.5	8.5	123.8	126.0	98	95
1382	10/04/99	Levy Slope Finished Subgrade, Sta 32+00, 10' LFL	2276.0	0.5	8.0	120.9	126.0	96	95
1383	10/04/99	Levy Slope Finished Subgrade, Sta 36+00, 20' LFL	2271.0	0.5	7.9	121.9	126.0	97	95
1384	10/04/99	Levy Slope Finished Subgrade, Sta 40+00, 15' LFL	2256.0	0.5	7.7	123.3	126.0	98	95
[redacted]	10/04/99	Levy Slope Finished Subgrade, Sta 44+00, 5' LFL	2240.0	0.5	7.9	122.9	126.0	98	95
1386	10/04/99	Levy Slope Finished Subgrade, Sta 48+00, 10' LFL	2228.0	0.5	8.1	120.8	126.0	96	95
1387	10/06/99	Levy, Sta 42+57, 22' R of Top of Levy	Finished Grade	0.8	11.5	120.2	122.3	98	95
1388	10/06/99	Levy, Sta 42+57, 22' R of Top of Levy	Finished Grade	0.7	12.3	118.8	122.3	97	95
1389	10/06/99	Levy, Sta 41+85, 25' R of Top of Levy	Finished Grade	0.8	12.7	118.5	122.3	97	95
1390	10/06/99	Levy, Sta 41+85, 25' R of Top of Levy	Finished Grade	0.7	13.2	118.6	122.3	97	95
1391	10/06/99	Levy, Sta 38+95, 10' R of Top of Levy	Finished Grade	0.7	12.3	117.8	122.3	96	95
1392	10/06/99	Levy, Sta 38+70, 32' R of Top of Levy	Finished Grade	0.8	12.1	118.0	122.3	97	95
1393	10/06/99	Levy, Sta 38+70, 32' R of Top of Levy	Finished Grade	0.7	12.1	119.1	122.3	97	95
1394	10/08/99	Spillway Walls S, A-9	2478.0	8.0	7.8	123.3	129.0	96	95
1395	10/08/99	Spillway Walls S, A-8	2478.0	8.0	8.1	122.9	129.0	95	95
1396	10/08/99	Spillway Walls S, A-7	2478.0	8.0	8.0	122.3	129.0	95	95
[redacted]	10/13/99	Spillway Walls S, A-9	2479.0	9.0	7.7	123.8	129.0	96	95

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FIELD DENSITY TEST SUMMARY

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1398	10/13/99	Spillway Walls S, A-7	2479.0	9.0	8.1	123.3	129.0	96	95
1399	10/13/99	Spillway Walls S, A-8	2480.0	10.0	7.6	122.7	129.0	95	95
1400	10/18/99	Spillway Walls N, G-8	2479.0	9.0	6.9	123.0	129.0	95	95
1401	10/18/99	Spillway Walls N, G-7	2480.0	10.0	8.3	126.6	129.0	98	95
1402	10/18/99	Spillway Walls N, G-9	2480.0	10.0	8.1	125.2	129.0	97	95
1403	10/18/99	Spillway Walls N, G-9	2481.0	11.0	8.3	124.6	129.0	97	95
1404	10/19/99	Spillway Walls N, 5-G	2485.0	3.0	8.0	124.1	129.0	96	95
1405	10/19/99	Spillway Walls N, 6-G	2483.0	4.0	8.3	124.8	129.0	97	95
1406	10/19/99	Spillway Walls N, 4-G	2490.0	5.0	7.7	123.6	129.0	96	95
1407	10/29/99	Spillway Walls S Wall A-8	2481.0	8.0	6.8	123.8	129.0	96	95
[redacted]	10/29/99	Spillway Walls N Wall G-5	2496.0	8.0	7.1	123.1	129.0	95	95
1409	11/01/99	Spillway, S Wall, A-7	2482.0	9.0	7.7	123.7	129.0	96	95
1410	11/01/99	Spillway, N Wall, G-4	2498.0	9.0	7.4	122.9	129.0	95	95
1411	11/01/99	Spillway, S Wall, A-9	2483.0	10.0	7.1	123.0	129.0	95	95
1412	11/01/99	Spillway, N Wall, G-6	2489.0	10.0	7.7	123.6	129.0	96	95
1413	11/01/99	Dam 2:1 Slope, Sta 22+00	Finished Subgrade	2.0	7.3	122.3	129.0	95	95
1414	11/01/99	Dam 2:1 Slope, Sta 23+00	Finished Subgrade	2.0	7.6	122.8	129.0	95	95
1415	11/01/99	Dam 2:1 Slope, Sta 24+00	Finished Subgrade	10.0	7.1	123.1	129.0	95	95
1416	11/05/99	Spillway Walls, S	2483.0	11.0	6.6	122.8	129.0	95	95
1417	11/05/99	Spillway Walls, N	2482.0	10.0	7.0	123.0	129.0	95	95
1418	11/05/99	Spillway Walls, N	2483.0	11.0	7.4	124.1	129.0	96	95
1419	11/08/99	Spillway Wall N G-8	2484.0	11.0	6.6	123.9	129.0	96	95
[redacted]	11/08/99	Spillway Wall N G-6	2487.0	11.0	7.4	124.2	129.0	96	95

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No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	SPEC
1421	11/09/99	Toe Wall E, Sediment Control Structure, S End	2477.0	0.5	9.8	122.2	129.0	95	95
1422	11/09/99	Toe Wall E, Sediment Control Structure, Center	2475.0	0.5	10.0	123.4	129.0	96	95
1423	11/09/99	Toe Wall E, Sediment Control Structure, N End	2477.0	0.5	9.5	122.9	129.0	95	95
1424	11/09/99	Toe Wall E, Sediment Control Structure, S End	2478.0	1.0	12.9	117.4	122.3	96	95
1425	11/09/99	Toe Wall E, Sediment Control Structure, Center	2476.0	1.0	13.3	116.2	122.3	95	95
1426	11/09/99	Toe Wall E, Sediment Control Structure, N End	2478.0	1.0	13.9	117.1	122.3	96	95
1427	11/09/99	Toe Wall E Sediment Control Structure, S End	2479.0	2.0	14.0	116.9	122.3	96	95
1428	11/09/99	Toe Wall E Sediment Control Structure, Center	2477.0	2.0	13.7	117.3	122.3	96	95
1429	11/09/99	Toe Wall E Sediment Control Structure, N End	2479.0	2.0	13.9	117.0	122.3	96	95
1430	11/09/99	Toe Wall E Sediment Control Structure, SW	2480.0	0.5	12.9	118.4	122.3	97	95
[illegible]	11/10/99	E Sediment Control Structure, S End	Finished Grade	0.5	10.5	122.3	122.3	100	95
1432	11/10/99	E Sediment Control Structure, Center	Finished Grade	0.5	10.8	119.4	122.3	98	95
1433	11/10/99	Spillway Walls	2484.0	11.0	6.8	124.0	129.0	96	95
1434	11/12/99	Spillway Walls, N Wall, G-8	2484.0	12.0	6.9	123.3	129.0	96	95
1435	11/12/99	Spillway Walls, N Wall, G-9	2485.0	13.0	6.6	122.9	129.0	95	95
1436	11/12/99	E Sediment Control Structure, Center	Finished Grade	0.5	11.3	119.6	122.3	98	95
1437	11/15/99	Dam Toe Wall, Sta 14+00	Finished Grade	2.0	10.4	116.0	129.0	90 *	95
1438	11/15/99	Dam Toe Wall, Sta 20+60	Finished Grade	3.0	10.5	117.5	129.0	91 *	95
1439	11/16/99	Dam Toe Wall, Sta 22+00	-2.0	1.0	12.4	119.8	122.3	98	95
1440	11/16/99	Dam Toe Wall, Sta 24+50	-2.0	1.0	13.5	116.8	122.3	96	95
1441	11/16/99	Dam Toe Wall, Sta 21+50	-1.0	2.0	12.2	118.7	122.3	97	95
1442	11/16/99	Dam Toe Wall, Sta 25+00	-1.0	2.0	12.5	116.1	122.3	95	95
[illegible]	11/16/99	Dam Toe Wall, Sta 21+50	Finished Grade	3.0	11.0	119.7	122.3	98	95

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1444	11/16/99	Dam Toe Wall, Sta 24+00	Finished Grade	3.0	10.3	120.4	122.3	98	95
1445	11/16/99	E Side of E Sediment Control Structure, Center	Subgrade	-3.0	11.0	123.8	129.0	96	95
1446	11/16/99	E Side of E Sediment Control Structure, S End	-2.0	1.0	11.3	117.4	122.3	96	95
1447	11/16/99	E Side of E Sediment Control Structure, Center	-2.0	1.0	11.8	118.1	122.3	97	95
1448	11/16/99	E Side of E Sediment Control Structure, N	-2.0	1.0	12.0	116.4	122.3	95	95
1449	11/16/99	E Side of E Sediment Control Structure, S End	-1.0	2.0	13.3	117.9	122.3	96	95
1450	11/16/99	E Side of E Sediment Control Structure, Center	-1.0	2.0	11.9	120.3	122.3	98	95
1451	11/16/99	E Side of E Sediment Control Structure, N End	-1.0	2.0	11.6	117.6	122.3	96	95
1452	11/16/99	N Spillway Wall	Finished Grade	14.0	6.7	123.8	129.0	96	95
1453	11/16/99	E Side of E Sediment Control Structure, S End	Finished Grade	3.0	11.8	121.3	122.3	99	95
[redacted]	11/16/99	E Side of E Sediment Control Structure, Center	Finished Grade	3.0	11.9	116.6	122.3	95	95
1455	11/16/99	E Side of E Sediment Control Structure, N	Finished Grade	3.0	11.4	119.1	122.3	97	95
1456	11/17/99	N Side of N Sediment Control Structure, Center	-1.5	1.0	11.3	115.8	122.3	95	95
1457	11/17/99	S Side of N Sediment Control Structure, Center	-1.5	1.0	11.7	116.4	122.3	95	95
1458	11/17/99	N Side of N Sediment Control Structure, N Side	Finished Grade	2.5	12.0	121.0	122.3	99	95
1459	11/17/99	S Side of N Sediment Control Structure, Center	-12.0	2.0	11.8	121.8	122.3	100	95
1460	11/17/99	S Side of N Sediment Control Structure, Center	Finished Grade	2.5	11.2	115.7	122.3	95	95
1461	11/17/99	Toe Wall Levee, Sta 12+50	-2.0	1.0	11.2	116.9	122.3	96	95
1462	11/17/99	Toe Wall Levee, Sta 13+50	-1.0	1.0	11.4	117.2	122.3	96	95
1463	11/17/99	Toe Wall Levee, Sta 15+00	-1.0	1.0	13.0	116.0	122.3	95	95
1464	11/17/99	Toe Wall Levee, Sta 16+50	-1.5	1.0	10.7	120.7	122.3	99	95
1465	11/17/99	Toe Wall Levee, Sta 13+00	-1.5	2.0	11.3	119.7	122.3	98	95
[redacted]	11/17/99	Toe Wall Levee, Sta 18+20	-4.0	1.0	10.2	116.5	122.3	95	95

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No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	SPEC
1467	11/17/99	Toe Wall Levee, Sta 12+50	-0.5	2.5	12.1	122.2	122.3	100	95
1468	11/17/99	Toe Wall Levee, Sta 14+50	-1.0	3.0	10.4	117.9	122.3	96	95
1469	11/17/99	Toe Wall Levee, Sta 16+50	-3.0	2.0	11.6	118.1	122.3	97	95
1470	11/17/99	Toe Wall Levee, Sta 18+15	-3.0	2.0	12.4	120.5	122.3	99	95
1471	11/17/99	Toe Wall Levee, Sta 14+25	Finished Grade	3.0	10.1	121.2	122.3	99	95
1472	11/20/99	S Spillway Wall, G-7	2483.0	11.0	6.6	126.3	129.0	98	95
1473	11/20/99	N Spillway Wall, G-3	2506.0	8.0	6.9	125.8	129.0	98	95
1474	11/24/99	Levee Overlay, Sta 41+50, 25' R of HP	Finished Grade	1.0	10.2	121.0	122.3	99	95
1475	11/24/99	Levee Overlay, Sta 42+15, 15' R of HP	Finished Grade	1.0	10.0	121.4	122.3	99	95
1476	11/30/99	Foundation of Monitoring Station, 12+30 D Sta	Finished Subgrade	1.0	9.6	116.3	120.0	97	95
[redacted]	11/30/99	S Spillway Wall A-3	2505.0	6.0	7.2	123.3	129.0	96	95
1478	11/30/99	S Spillway Wall A-3	2507.0	8.0	7.0	122.9	129.0	95	95
1479	11/30/99	Levee Overlay, Sta 45+50	Finished Grade	1.0	11.1	116.9	122.3	96	95
1480	12/01/99	S Spillway Wall A-3	2508.0	13.0	7.6	124.1	129.0	96	95
1481	12/01/99	Levee Overlay, Sta	Finished Grade	1.0	10.3	123.3	122.3	101	95
1482	12/01/99	Levee Toe Wall, Sta 24+75	-2.0	3.0	10.1	115.7	122.3	95	95
1483	12/01/99	Levee Toe Wall, Sta 26+00	-4.0	1.0	10.1	117.4	122.3	96	95
1484	12/01/99	Levee Toe Wall, Sta 28+00	-4.0	1.0	10.5	116.3	122.3	95	95
1485	12/01/99	Levee Toe Wall, Sta 30+00	-4.0	1.0	10.8	116.9	122.3	96	95
1486	12/01/99	Levee Toe Wall, Sta 32+00	-3.0	1.0	10.5	115.9	122.3	95	95
1487	12/01/99	Levee Toe Wall, Sta 25+00	-1.0	4.0	11.1	119.9	122.3	98	95
1488	12/01/99	Levee Toe Wall, Sta 27+25	-3.0	2.0	10.9	118.8	122.3	97	95
1489	12/01/99	Levee Toe Wall, Sta 29+00	-3.0	2.0	13.0	117.9	122.3	96	95

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FIELD DENSITY TEST SUMMARY

Test No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
1490	12/01/99	Levee Toe Wall, Sta 26+50	-2.0	3.0	13.9	118.1	122.3	97	95
1491	12/01/99	Levee Toe Wall, Sta 25+50	Finished Grade	5.0	12.9	117.0	122.3	96	95
1492	12/01/99	Levee Toe Wall, Sta 29+50	-2.0	3.0	13.1	117.6	122.3	96	95
1493	12/01/99	Levee Toe Wall, Sta 28+00	-1.0	4.0	13.4	118.8	122.3	97	95
1494	12/01/99	Levee Toe Wall, Sta 28+00	Finished Grade	5.0	13.3	117.9	122.3	96	95
1495	12/02/99	Levee Toe Wall, Sta 11+20	-3.0 Below Finished Grade	1.0	13.8	120.1	122.3	98	95
1496	12/02/99	Levee Toe Wall, Sta 11+50	-2.0 Below Finished Grade	1.0	13.6	116.2	122.3	95	95
1497	12/02/99	Levee Toe Wall, Sta 11+00	-1.0 Below Finished Grade	1.0	13.6	117.7	122.3	96	95
1498	12/02/99	Levee Toe Wall, Sta 33+00	-3.0 Below Finished Grade	1.0	13.9	116.3	122.3	95	95
1499	12/02/99	Levee Toe Wall, Sta 35+50	-4.0 Below Finished Grade	1.0	13.4	117.6	122.3	96	95
[illegible]	12/02/99	Levee Toe Wall, Sta 37+00	-3.0 Below Finished Grade	1.0	13.1	118.3	122.3	97	95
1501	12/02/99	Levee Toe Wall, Sta 31+00	-3.0 Below Finished Grade	1.0	13.4	121.2	122.3	99	95
1502	12/02/99	Levee Toe Wall, Sta 32+50	-2.0 Below Finished Grade	1.0	13.7	117.8	122.3	96	95
1503	12/02/99	Levee Toe Wall, Sta 34+50	-2.0 Below Finished Grade	1.0	13.2	120.5	122.3	99	95
1504	12/02/99	Levee Toe Wall, Sta 11+00	Finished Grade	1.0	12.8	121.3	122.3	99	95
1505	12/02/99	Levee Toe Wall, Sta 31+50	-1.0 Below Finished Grade	1.0	13.2	119.7	122.3	98	95
1506	12/02/99	Levee Toe Wall, Sta 34+00	-1.0 Below Finished Grade	1.0	13.0	117.5	122.3	96	95
1507	12/02/99	Levee Toe Wall, Sta 36+00	-2.0 Below Finished Grade	1.0	12.5	115.8	122.3	95	95
1508	12/02/99	Levee Toe Wall, Sta 32+00	Finished Grade	1.0	10.7	122.3	122.3	100	95
1509	12/02/99	Levee Toe Wall, Sta 39+50	-4.0 Below Finished Grade	1.0	10.2	120.1	122.3	98	95
1510	12/02/99	Levee Toe Wall, Sta 38+50	-3.0 Below Finished Grade	1.0	11.2	118.1	122.3	97	95
1511	12/02/99	Levee Toe Wall, Sta 35+50	-2.0 Below Finished Grade	1.0	10.9	120.0	122.3	98	95
[illegible]	12/02/99	Levee Toe Wall, Sta 38+00	-2.0 Below Finished Grade	1.0	11.0	121.1	122.3	99	95

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FIELD DENSITY TEST SUMMARY

[redacted] No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
1513	12/02/99	Levee Toe Wall, Sta 36+50	-1.0 Below Finished Grade	1.0	10.2	116.4	122.3	95	95
1514	12/02/99	Levee Toe Wall, Sta 37+50	-1.0 Below Finished Grade	1.0	10.4	121.0	122.3	99	95
1515	12/02/99	Levee Toe Wall, Sta 30+50	F	1.0	10.8	121.9	122.3	100	95
1516	12/02/99	Levee Toe Wall, Sta 37+00	F	1.0	10.1	119.2	122.3	98	95
1517	12/6/099	Levee Toe Wall, Sta 41+50	-4.0 Below Finished Grade	1.0	13.0	116.4	122.3	95	95
1518	12/6/099	Levee Toe Wall, Sta 43+50	-4.0 Below Finished Grade	1.0	12.7	117.2	122.3	96	95
1519	12/6/099	Levee Toe Wall, Sta 45+00	-4.0 Below Finished Grade	1.0	12.6	120.1	122.3	98	95
1520	12/6/099	Levee Toe Wall, Sta 47+50	-4.0 Below Finished Grade	1.0	12.7	118.0	122.3	97	95
1521	12/6/099	Levee Toe Wall, Sta 42+50	-3.0 Below Finished Grade	1.0	10.9	120.8	122.3	99	95
1522	12/6/099	Levee Toe Wall, Sta 46+00	-3.0 Below Finished Grade	1.0	11.2	119.9	122.3	98	95
[redacted]	12/6/099	Levee Toe Wall, Sta 41+50	-2.0 Below Finished Grade	1.0	10.6	118.8	122.3	97	95
1524	12/6/099	Levee Toe Wall, Sta 42+50	-1.0 Below Finished Grade	1.0	11.4	121.4	122.3	99	95
1525	12/07/00	Monitoring Station	-2.0 Finished Grade	5.0	7.2	122.9	129.0	95	95
1526	12/07/00	Levee Toe Wall, Sta 43+75	-2.0	3.0	12.4	122.7	122.3	100	95
1527	12/07/00	Levee Toe Wall, Sta 46+00	-2.0	3.0	11.9	121.8	122.3	100	95
1528	12/07/00	Levee Toe Wall, Sta 47+00	-4.0	1.0	12.1	121.2	122.3	99	95
1529	12/07/00	Levee Toe Wall, Sta 44+50	-1.0	5.0	11.7	120.9	122.3	99	95
1530	12/07/00	Levee Toe Wall, Sta 46+50	-2.0	5.0	11.4	120.1	122.3	98	95
1531	12/07/00	Levee Toe Wall, Sta 48+00	-3.0	3.0	11.8	119.9	122.3	98	95
1532	12/07/00	Levee Toe Wall, Sta 43+00	-1.0	5.0	11.1	120.4	122.3	98	95
1533	12/07/00	Levee Toe Wall, Sta 47+50	-2.0	4.0	12.0	121.0	122.3	99	95
1534	12/08/99	Levee Toe Wall, Sta 48+25	-3.0	2.0	10.8	118.0	122.3	97	95
[redacted]	12/08/99	Levee Toe Wall, Sta 44+00	Finished Grade	6.0	10.1	118.9	122.3	97	95

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FIELD DENSITY TEST SUMMARY

No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
1536	12/08/99	Levee Toe Wall, Sta 46+00	Finished Grade	6.0	10.4	116.8	122.3	96	95
1537	12/08/99	Levee Toe Wall, Sta 48+00	-2.0	4.0	10.6	117.4	122.3	96	95
1538	12/08/99	Levee Toe Wall, Sta 48+35	-1.0	5.0	10.1	117.0	122.3	96	95
1539	12/09/99	Monitoring Station, Wall Footing	2509.0	0.5	7.4	124.1	129.0	96	95
1540	12/09/99	Dam, Sta 12+50, 25' R of CL	2505.0	1.0	8.2	127.2	129.0	99	95
1541	12/09/99	Dam, Sta 12+65, 25' R of CL	2506.0	2.0	9.3	125.4	129.0	97	95
1542	12/09/99	Dam, Sta 12+75, 25' R of CL	2507.0	3.0	8.4	126.6	129.0	98	95
1543	12/10/99	Dam, Sta 12+75, 30' R of CL	2508.0	3.0	8.9	127.9	129.0	99	95
1544	12/10/99	Dam, Sta 12+50, 25' R of CL	2509.0	4.0	9.1	126.2	129.0	98	95
1545	12/16/99	Levee Overlay, Sta 19+00	Finished Grade	1.0	10.2	120.9	122.3	99	95
[illegible]	12/16/99	Levee Overlay, Sta 20+00	Finished Grade	1.0	10.3	121.1	122.3	99	95
1547	12/16/99	Levee Overlay, Sta 22+00	Finished Grade	1.0	11.3	119.3	122.3	98	95
1548	12/17/99	Levee Overlay, Sta 23+25	Finished Grade	1.0	10.8	119.6	122.3	98	95
1549	12/17/99	Levee Overlay, Sta 24+50	Finished Grade	1.0	11.3	119.1	122.3	97	95
1550	12/17/99	Levee Overlay, Sta 26+00	Finished Grade	1.0	10.9	117.3	122.3	96	95
1551	12/17/99	Levee Overlay, Sta 27+50	Finished Grade	1.0	10.5	118.0	122.3	97	95
1552	12/20/99	Levee Overlay, Sta 30+50	Finished Grade	1.0	10.3	118.8	122.3	97	95
1553	12/20/99	Levee Overlay, Sta 32+00	Finished Grade	1.0	10.8	119.3	122.3	98	95
1554	12/20/99	Levee Overlay, Sta 33+50	Finished Grade	1.0	11.0	119.8	122.3	98	95
1555	12/30/99	Levee Flow Line, Sta 47+00	Finished Grade	0.5	7.1	120.3	127.0	95	95
1556	12/30/99	Levee Flow Line, Sta 42+00	Finished Grade	0.5	6.6	119.1	127.0	94 *	95
1557	12/30/99	Levee Flow Line, Sta 37+00	Finished Grade	0.5	5.9	123.3	127.0	97	95
[illegible]	12/30/99	Levee Flow Line, Sta 32+00	Finished Grade	0.5	6.9	118.4	127.0	93 *	95

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FIELD DENSITY TEST SUMMARY

No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
1559	12/30/99	Levee Flow Line, Sta 27+00	Finished Grade	0.5	7.8	121.0	127.0	95	95
1560	12/30/99	Levee Flow Line, Sta 22+00	Finished Grade	0.5	6.3	122.8	127.0	97	95
1561	12/30/99	Levee Flow Line, Sta 17+00	Finished Grade	0.5	5.9	124.1	127.0	98	95
1562	12/30/99	Levee Flow Line, Sta 12+00	Finished Grade	0.5	6.8	120.9	127.0	95	95
1563	12/30/99	Retest of #1558	Finished Grade	0.5	7.2	120.1	127.0	95	95
1564	01/10/00	Disposal Area		20.0	6.3	116.3	129.0	90	90
1565	01/10/00	Disposal Area		20.0	6.0	116.9	129.0	91	90
1566	01/11/00	Disposal Area E		22.0	7.2	116.1	129.0	90	90
1567	01/11/00	Disposal Area W		22.0	7.8	117.1	129.0	91	90
1568	01/11/00	E Basin, 50' E of SP35	2483.0	1.0	7.2	122.9	129.0	95	95
1569	01/11/00	E Basin, 30' W of SP37	2484.0	1.0	7.0	123.6	129.0	96	95
1570	01/11/00	E Basin, 70' W of SP31	2470.0	1.0	6.6	123.0	129.0	95	95
1571	01/11/00	E Basin @ SP15	2454.0	1.0	6.9	122.6	129.0	95	95
1572	01/13/00	50' E of Spillway	Finished Grade	1.0	6.8	123.2	129.0	96	95
1573	01/13/00	185' E of Spillway	Finished Grade	1.0	6.4	122.1	129.0	95	95

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SOIL AND AGGREGATE LABORATORY REPORT

Project: C-1 Detention Basin
Project Number: 31312101
Phase: 001 Indian Springs H.S.

Date: 12/10/98
Sheet: 1 of 1
Date Sampled: 12/2/98
Sample No.: 17161

SNWA/Parsons Infrastructure
Alan Hargraves
153 W Lake Mead Dr, 201, Bdg 1
Henderson NV 89015-7046

Contractor: N/R
Sampled By: James Boisclair
Sample Loc.: Levee Base Between 18 + 11l/38 + 50l
Material Use: Type A

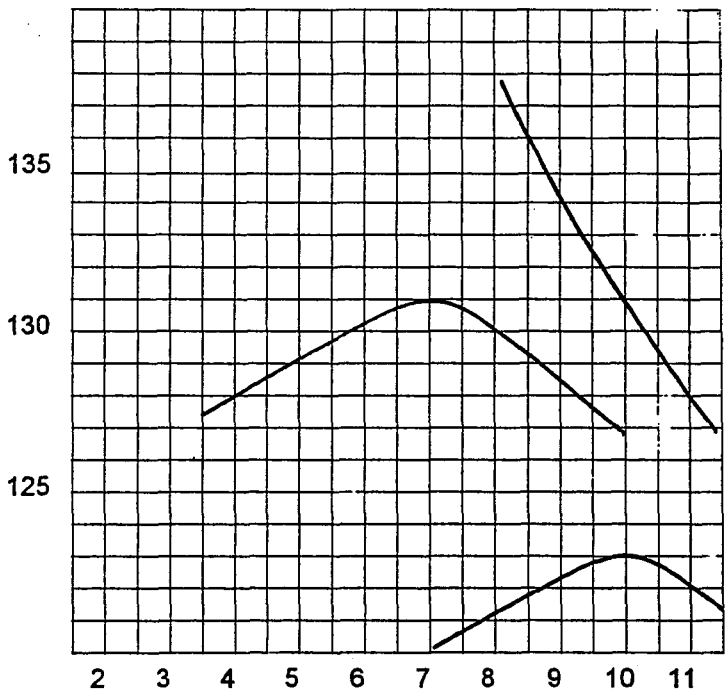
SIEVE ANALYSIS

Sieve or Screen Size	% Passing	CCPW 704.03.04 Min	CCPW 704.03.04 Max	P/F
6"	95	100	100	F
3"	87	80	100	P
2"	82			
1 1/2"	79			
1"	72			
3/4"	71			
1/2"	64			
3/8"	59			
No. 4	46			
No. 8	36			
No. 10				
No. 16	27			
No. 30	21			
No. 40				
No. 50	16			
No. 100	12			
No. 200	7.7			

Unified Soil Classification:

Test Description	Result	Spec. Range Min.	Spec. Range Max.	P/F
1 Poin Moisture Density Chk				
Moisture Content, (%)	8.2			
R-Value				
Liquid Limit	GRAN			
Plastic Limit				
Plasticity Index	N.P.			
Sand Equivalent				
Cleannes Value				
Fractured Faces, 1 or More				
L.A. Abrasion				
Sulfate Soundness, % Loss				
Organic Impurities				
Solubility, % Loss				
Clay Lumps & Friable Part's.				
Bulk Specific Gravity (dry)				
Absorption, %				
Fineness Modulus				
Chemical Soluble Sulfate, %				
Expansion Swell @ 60 psf, %				
Expansion Index				

Note: GRAN = Granular, NP = Non-Plastic, P/F = Pass / Fai



Test Procedure: ASTM D1557 **Method:** C
Rammer Type: Mechanical
Preparation Procedure: Wet
Specific Gravity: Measured **Value:** 2.57

Remarks:

Maximum Dry Density, (pcf): 131
Optimum Moisture Content, %: 7

Laboratory Supervisor: Robert Reed
Reviewed By: Lee L. Esther
Date: 12/10/98

SOIL AND AGGREGATE LABORATORY REPORT

Project: C-1 Detention Basin
Project Number: 31312101
Phase: 001 Materials Testing

Date: 1/21/99
Sheet: 1 of 1
Date Sampled: 1/19/99
Sample No.: 17491

SNWA/Parsons Infrastructure
Alan Hargraves
153 W Lake Mead Dr, 201, Bdg 1
Henderson NV 89015-7046

Contractor: N/R
Sampled By: James Boisclair
Sample Loc.: Spoils from Cutoff Trench; Sta 20 + 00
Material Use: Type A Revised

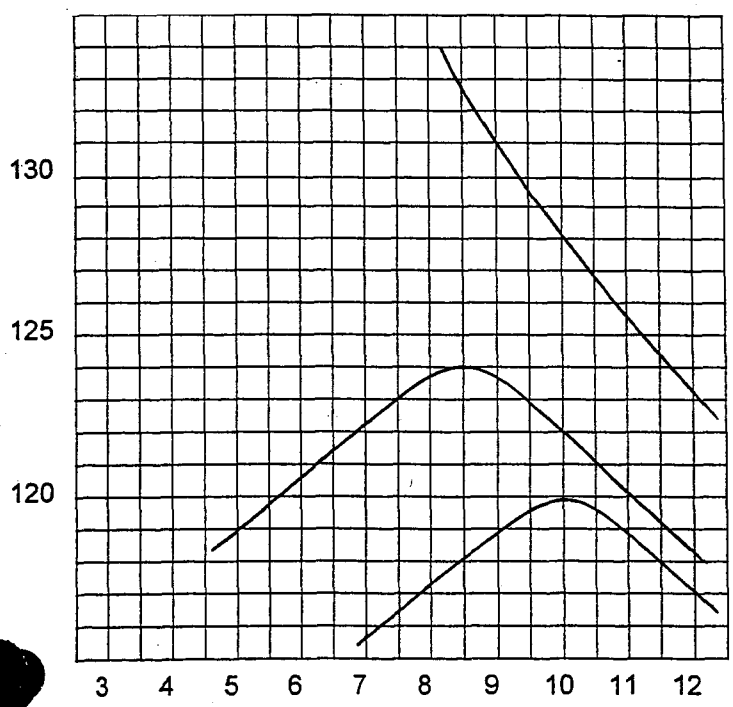
SIEVE ANALYSIS

Sieve or Screen Size	% Passing	Min.	Max.	P/F
6"	100	100	100	P
3"	87			
2"	86			
1 1/2"	83			
1"	79			
3/4"	75			
1/2"	67			
3/8"	61			
No. 4	44			
No. 8	28			
No. 10				
No. 16	18			
No. 30	12			
No. 40				
No. 50	9			
No. 100	6			
No. 200	4.6			

Unified Soil Classification:
Reddish Brown Silty Sand with Gravel

Test Description	Result	Spec. Range Min.	Spec. Range Max.	P/F
1 Point Moisture Density Chk				
Moisture Content, (%)				
R-Value				
Liquid Limit	28			
Plastic Limit	24			
Plasticity Index	4			
Sand Equivalent				
Cleannes Value				
Fractured Faces, 1 or More				
L.A. Abrasion				
Sulfate Soundness, % Loss				
Organic Impurities				
Solubility, % Loss				
Clay Lumps & Friable Part's.				
Bulk Specific Gravity (dry)				
Absorption, %				
Fineness Modulus				
Chemical Soluble Sulfate, %				
Expansion Swell @ 60 psf, %				
Expansion Index				

Note: GRAN = Granular, NP = Non-Plastic, P/F = Pass / Fail



Maximum Dry Density, (pcf): 124
Optimum Moisture Content, %: 8.5

Test Procedure: ASTM D1557 **Method:** C
Rammer Type: Mechanical
Preparation Procedure: Wet
Specific Gravity: Measured **Value:** 2.60

Remarks:
SNWA Spec. Structural Backfill;Type A; Revised

Laboratory Supervisor: Robert Kent
Reviewed By: Lori L. Esbeck
Date: 1/21/99

SOIL AND AGGREGATE LABORATORY REPORT

KLEINFELDER

Date: 2/3/99
Sheet: 1 of 1
Date Sampled: 1/28/99
Sample No.: 17554

Project: C-1 Detention Basin
Project Number: 31312101
Phase: 001 Materials Testing

SNWA/Parsons Infrastructure
Alan Hargraves
153 W Lake Mead Dr, 201, Bdg 1
Henderson NV 89015-7046

Contractor: N/R
Sampled By: James Boisclair
Sample Loc.: Crusher Plant on-site
Material Use: Structural Backfill

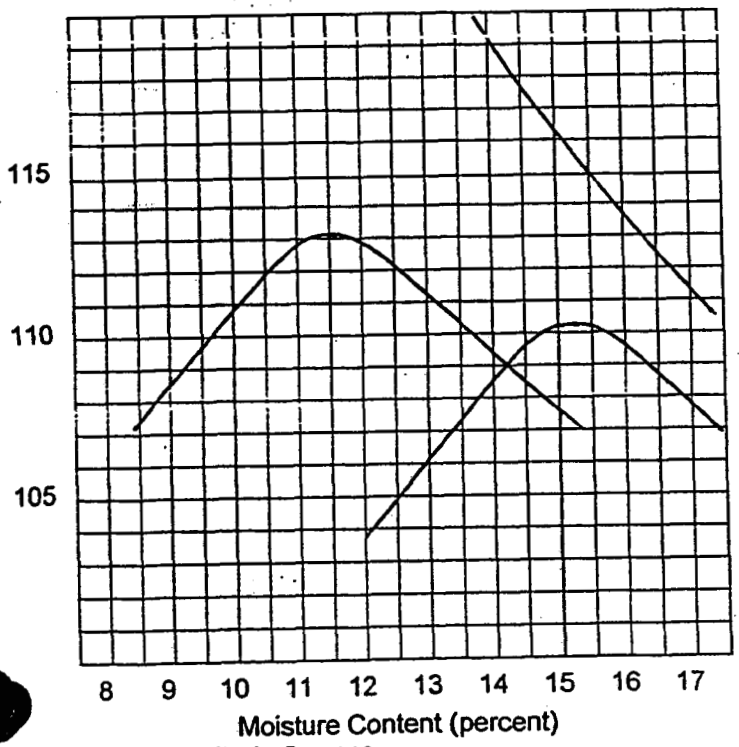
SIEVE ANALYSIS

Sieve or Screen Size	% Passing	SNWA Spec. Type A Min	Max	P/F
6"	100	100	100	P
3"	97			
2"	86			
1 1/2"	81			
1"	71			
3/4"	66			
1/2"	57			
3/8"	53			
No. 4	42			
No. 8	34			
No. 10				
No. 16	28			
No. 30	23			
No. 40				
No. 50	19			
No. 100	14			
No. 200	10.5			

Unified Soil Classification:
Light Brown Silty Sand with Gravel

Test Description	Result	Spec. Range Min.	Max.	P/F
1 Point Moisture Density Chk				
Moisture Content, (%)				
R-Value				
Liquid Limit	GRAN			P
Plastic Limit				
Plasticity Index	N.P.			P
Sand Equivalent				
Cleannes Value				
Fractured Faces, 1 or More				
L.A. Abrasion				
Sulfate Soundness, % Loss				
Organic Impurities				
Solubility, % Loss				
Clay Lumps & Friable Part's.				
Bulk Specific Gravity (dry)				
Absorption, %				
Fineness Modulus				
Chemical Soluble Sulfate, %	0.73		0.2	F
Expansion Swell @ 60 psf, %				
Expansion Index				

Note: GRAN = Granular, NP = Non-Plastic, P/F = Pass / Fail



Maximum Dry Density, (pcf): 113
Optimum Moisture Content, %: 11.5

Test Procedure: ASTM D1557 **Method:** C
Rammer Type: Mechanical
Preparation Procedure: Wet
Specific Gravity: Measured **Value:** 2.37

Remarks:

Laboratory Supervisor: Robert Kay
Reviewed By: Lori L. Ostler
Date: 2/3/99

SOIL AND AGGREGATE LABORATORY REPORT

KLEINFELDER

Project: C-1 Detention Basin
Project Number: 31312101
Phase: 001 Materials Testing

Date: 3/1/99
Sheet: 1 of 1
Date Sampled: 2/25/99
Sample No.: 17771

SNWA/Parsons Infrastructure
Alan Hargraves
153 W Lake Mead Dr, 201, Bdg 1
Henderson NV 89015-7046

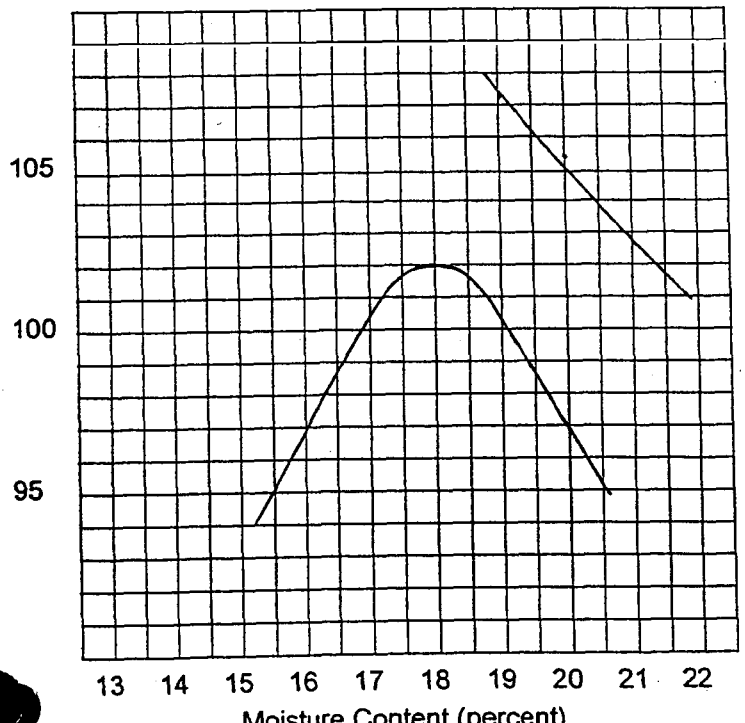
Contractor: N/R
Sampled By: James Boisclair
Sample Loc.: Beltcut at Crusher
Material Use: Soil Cement Agg.

SIEVE ANALYSIS				
Sieve or Screen Size	% Passing	Min.	Max.	P/F
6"				
3"				
2"				
1 1/2"				
1"				
3/4"				
1/2"				
3/8"				
No. 4				
No. 8				
No. 10				
No. 16				
No. 30				
No. 40				
No. 50				
No. 100				
No. 200				

Unified Soil Classification:
Light Gray Silty Sand with Gravel

Test Description	Result	Spec. Range Min.	Spec. Range Max.	P/F
1 Point Moisture Density Chk				
Moisture Content, (%)				
R-Value				
Liquid Limit				
Plastic Limit				
Plasticity Index				
Sand Equivalent				
Cleannes Value				
Fractured Faces, 1 or More				
L.A. Abrasion				
Sulfate Soundness, % Loss				
Organic Impurities				
Solubility, % Loss				
Clay Lumps & Friable Part's.				
Bulk Specific Gravity (dry)				
Absorption, %				
Fineness Modulus				
Chemical Soluble Sulfate, %				
Expansion Sweii @ 60 psf, %				
Expansion Index				

Note: GRAN = Granular, NP = Non-Plastic, P/F = Pass / Fail



Test Procedure: ASTM D1557 **Method:** B
Rammer Type: Mechanical
Preparation Procedure: Wet
Specific Gravity: **Value:**

Remarks:

Maximum Dry Density, (pcf): 102
Optimum Moisture Content, %: 18

Laboratory Supervisor:
Reviewed By: Jane L. Estler
Date: 3/1/99

SOIL AND AGGREGATE LABORATORY REPORT

KLEINFELDER

Project: C-1 Detention Basin
Project Number: 31312101
Phase: 001 Materials Testing

Date: 3/4/99
Sheet: 1 of 1
Date Sampled: 3/1/99
Sample No.: 17788

SNWA/Parsons Infrastructure
Alan Hargraves
153 W Lake Mead Dr, 201, Bdg 1
Henderson NV 89015-7046

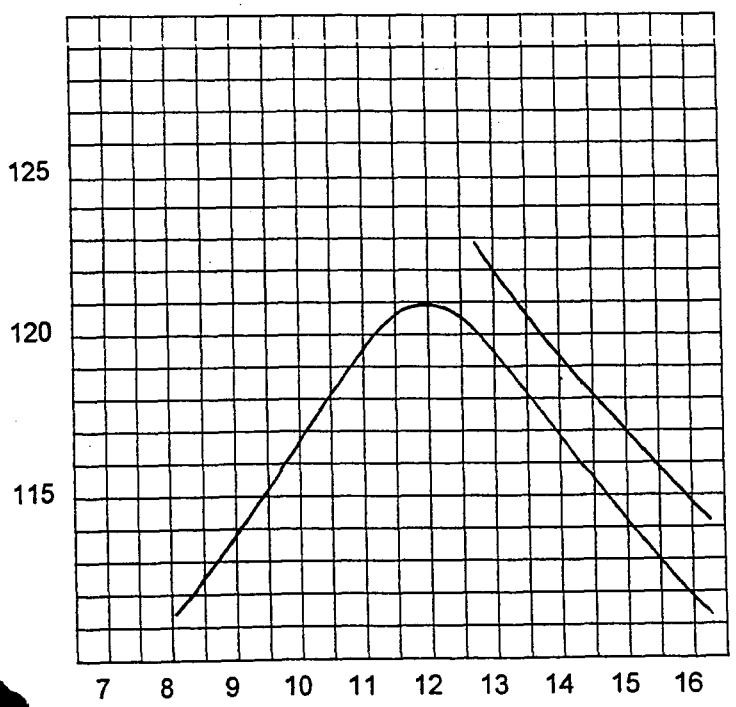
Contractor:
Sampled By: James Boisclair
Sample Loc.: Stockpile at 18+50 at 14+00
Material Use: Native

SIEVE ANALYSIS				
Sieve or Screen Size	% Passing	CCPW Min.	CCPW Max.	P/F
6"				
3"				
2"				
1 1/2"				
1"				
3/4"				
1/2"				
3/8"				
No. 4				
No. 8				
No. 10				
No. 16				
No. 30				
No. 40				
No. 50				
No. 100				
No. 200				

Unified Soil Classification:
Ligth gray clayey silt w/ gravel

Test Description	Result	Spec. Range Min.	Spec. Range Max.	P/F
1 Point Moisture Density Chk				
Moisture Content, (%)				
R-Value				
Liquid Limit				
Plastic Limit				
Plasticity Index				
Sand Equivalent				
Cleannes Value				
Fractured Faces, 1 or More				
L.A. Abrasion				
Sulfate Soundness, % Loss				
Organic Impurities				
Solubility, % Loss				
Clay Lumps & Friable Part's.				
Bulk Specific Gravity (dry)				
Absorption, %				
Fineness Modulus				
Chemical Soluble Sulfate, %				
Expansion Swell @ 60 psf, %				
Expansion Index				

Note: GRAN = Granular, NP = Non-Plastic, P/F = Pass / Fail



Test Procedure: ASTM D1557 **Method:** B
Rammer Type: Manual
Preparation Procedure: Wet
Specific Gravity: Assumed **Value:** 2.61

Remarks:

Maximum Dry Density, (pcf): 121
Optimum Moisture Content, %: 12

Laboratory Supervisor: Robert Kaup
Reviewed By: Lori L. Estler
Date: 3/4/99

SOIL AND AGGREGATE LABORATORY REPORT

KLEINFELDER

Project: C-1 Detention Basin
Project Number: 31312101
Phase: 001 Materials Testing

Date: 3/19/99
Sheet: 1 of 1
Date Sampled: 3/15/99
Sample No.: 17904

SNWA/Parsons Infrastructure
Alan Hargraves
153 W Lake Mead Dr, 201, Bdg 1
Henderson NV 89015-7046

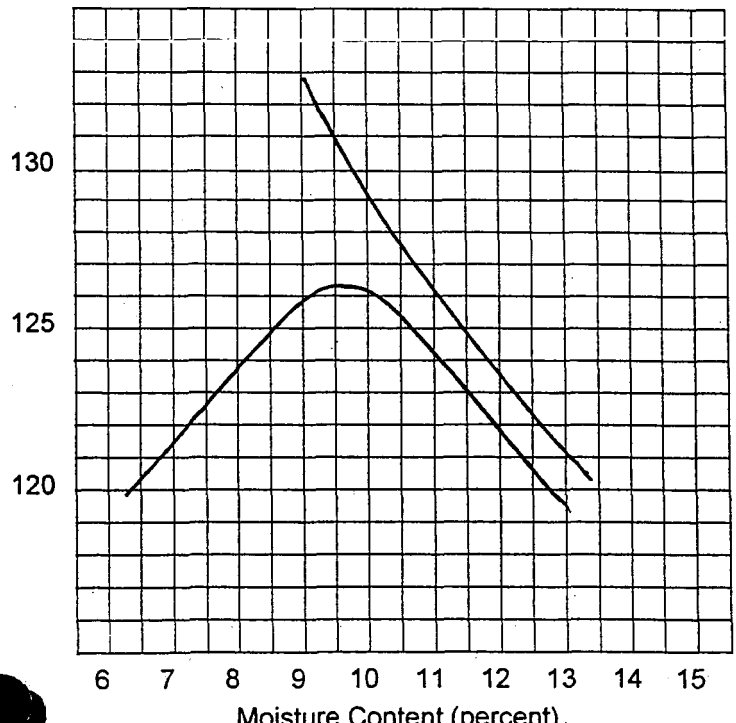
Contractor: Granite Const.
Sampled By: James Boisclair
Sample Loc.: Stockpile at Sta 16+00
Material Use: 1" Screened

SIEVE ANALYSIS				
Sieve or Screen Size	% Passing	ASTM Min	ASTM Max	P/F
6"				
3"				
2"				
1 1/2"				
1"				
3/4"				
1/2"				
3/8"				
No. 4				
No. 8				
No. 10				
No. 16				
No. 30				
No. 40				
No. 50				
No. 100				
No. 200				

Unified Soil Classification:
Lt. Brown silty sand w/ gravel

Test Description	Result	Spec. Range Min.	Spec. Range Max.	P/F
1 Point Moisture Density Chk				
Moisture Content, (%)				
R-Value				
Liquid Limit				
Plastic Limit				
Plasticity Index				
Sand Equivalent				
Cleannes Value				
Fractured Faces, 1 or More				
L.A. Abrasion				
Sulfate Soundness, % Loss				
Organic Impurities				
Solubility, % Loss				
Clay Lumps & Friable Part's.				
Bulk Specific Gravity (dry)				
Absorption, %				
Fineness Modulus				
Chemical Soluble Sulfate, %				
Expansion Swell @ 60 psf, %				
Expansion Index				

Note: GRAN = Granular, NP = Non-Plastic, P/F = Pass / Fail



Maximum Dry Density, (pcf): 126.5
Optimum Moisture Content, %: 9.5

Test Procedure: ASTM D1557 **Method:** C
Rammer Type: Mechanical
Preparation Procedure: Wet
Specific Gravity: Assumed **Value:** 2.60

Remarks:

Laboratory Supervisor: Robert Reed
Reviewed By: Tom L. Estes
Date: 3/19/99

SOIL AND AGGREGATE LABORATORY REPORT

KLEINFELDER

Project: C-1 Detention Basin
Project Number: 31312101
Phase: 001 Materials Testing

Date: 3/30/99
Sheet: 1 of 1
Date Sampled: 3/25/99
Sample No.: 18031

SNWA/Parsons Infrastructure
Alan Hargraves
153 W Lake Mead Dr, 201, Bdg 1
Henderson NV 89015-7046

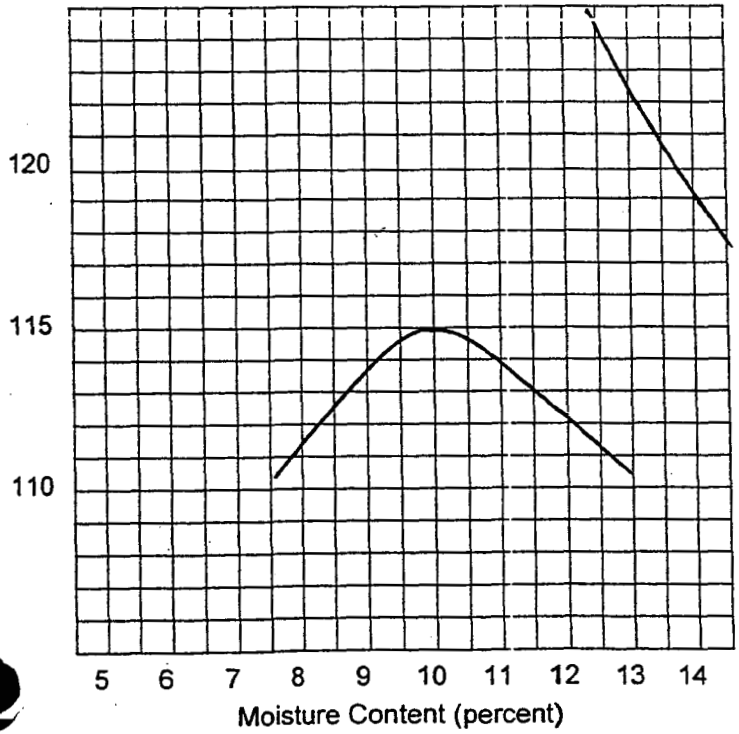
Contractor: N/R
Sampled By: James Boisclair
Sample Loc.: Crusher Beltcut
Material Use: Type 'A'

SIEVE ANALYSIS				
Sieve or Screen Size	% Passing	Min.	Max.	P/F
6"				
3"				
2"				
1 1/2"				
1"				
3/4"				
1/2"				
3/8"				
No. 4				
No. 8				
No. 10				
No. 16				
No. 30				
No. 40				
No. 50				
No. 100				
No. 200				

Unified Soil Classification:

Test Description	Result	Spec. Range Min.	Spec. Range Max.	P/F
1 Point Moisture Density Chk				
Moisture Content, (%)				
R-Value				
Liquid Limit				
Plastic Limit				
Plasticity Index				
Sand Equivalent				
Cleannes Value				
Fractured Faces, 1 or More				
L.A. Abrasion				
Sulfate Soundness, % Loss				
Organic Impurities				
Solubility, % Loss				
Clay Lumps & Friable Part's.				
Bulk Specific Gravity (dry)				
Absorption, %				
Fineness Modulus				
Chemical Soluble Sulfate, %				
Expansion Swell @ 60 psf, %				
Expansion Index				

Note: GRAN = Granular, NP = Non-Plastic, P/F = Pass / Fail



Maximum Dry Density, (pcf): 115
Optimum Moisture Content, %: 10

Test Procedure: ASTM D1557 Method: C
Rammer Type: Mechanical
Preparation Procedure: Wet
Specific Gravity: Measured Value: 2.37

Remarks:
Proctor Corrected for % Oversize, Refer to #17554 for Origina

Laboratory Supervisor: Robert Reed
Reviewed By: Lori L. Esther
Date: 3/31/99

SOIL AND AGGREGATE LABORATORY REPORT

KLEINFELDER

Project: C-1 Detention Basin
Project Number: 31312101
P[redacted]: 001 Materials Testing

Date: 5/19/99
Sheet: 1 of 1
Date Sampled: 5/12/99
Sample No.: 18464

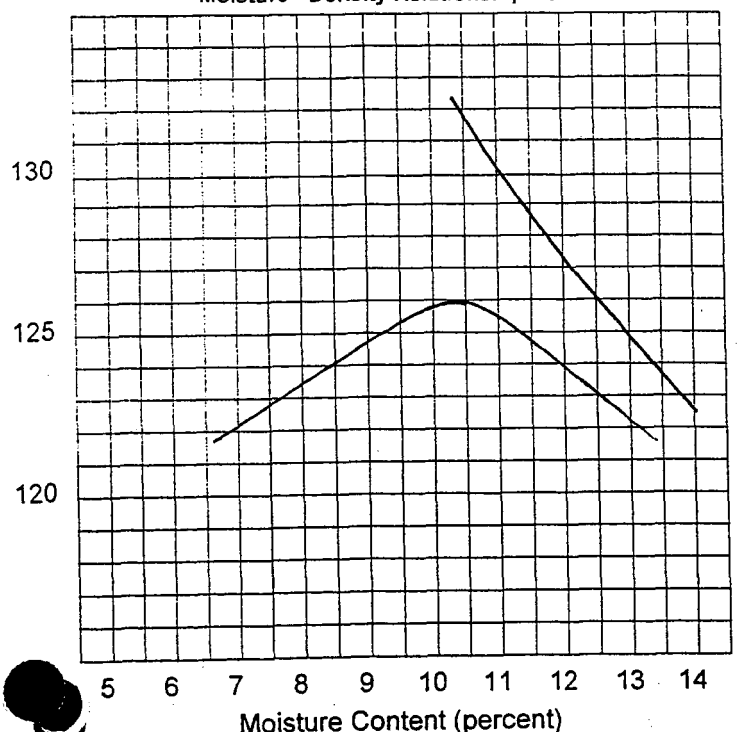
[redacted]NWA/Parsons Infrastructure
Alan Hargraves
153 W Lake Mead Dr 201 Bdg 1
Henderson NV 89015-7046

SIEVE ANALYSIS

Sieve or Screen Size	% Passing	SNWA Min.	SNWA Max.	P/F
6"				
3"				
2"				
1 1/2"				
1"	100	100	100	P
3/4"	98	90	100	P
1/2"	81			
3/8"	71			
No. 4	51	35	65	P
No. 8	35			
No. 10				
No. 16	25			
No. 30	19	15	40	P
No. 40				
No. 50	15			
No. 100	11			
No. 200	8.1	2	10	P

Unified Soil Classification:
Poorly Graded Gravel with Silt and Sand

Moisture - Density Relationship Curve



Maximum Dry Density, (pcf): 126.0
Optimum Moisture Content, %: 10.5

Contractor: Granite Const.
Sampled By: Mike Carter
Sample Loc.: On site stockpile
Material Use: Type G

Test Description	Result	Spec. Range Min.	Spec. Range Max.	P/F
1 Point Moisture Density Chk				
Moisture Content, (%)				
R-Value	84	78		P
Liquid Limit	GRAN		35	P
Plastic Limit	N.P.			P
Plasticity Index	N.P.		15	P
Sand Equivalent				
Cleannes Value				
Fractured Faces, 1 or More	89.0	50		P
L.A. Abrasion	20.3		45	P
Sulfate Soundness, % Loss				
Organic Impurities				
Solubility, % Loss				
Clay Lumps & Friable Part's.				
Bulk Specific Gravity (dry)				
Absorption, %				
Fineness Modulus				
Chemical Soluble Sulfate, %	0.08		0.3	P
Expansion Swell @ 60 psf, %				
Expansion Index				

Note: GRAN = Granular, NP = Non-Plastic, P/F = Pass / Fail

Test Procedure: ASTM D1557 **Method:** C
Rammer Type: Mechanical
Preparation Procedure: Wet
Specific Gravity: Assumed **Value:** 2.710

Remarks: Spillway

Laboratory Supervisor: Robert Kaufman
Reviewed By: Lori L. Ertter
Date: 5/19/99

SOIL AND AGGREGATE LABORATORY REPORT

KLEINFELDER

Project: C-1 Detention Basin
Project Number: 31312101
[redacted]: 001 Materials Testing

Date: 5/19/99
Sheet: 1 of 1
Date Sampled: 5/17/99
Sample No.: 18526

SNWA/Parsons Infrastructure
Alan Hargraves
153 W Lake Mead Dr 201 Bdg 1
Henderson NV 89015-7046

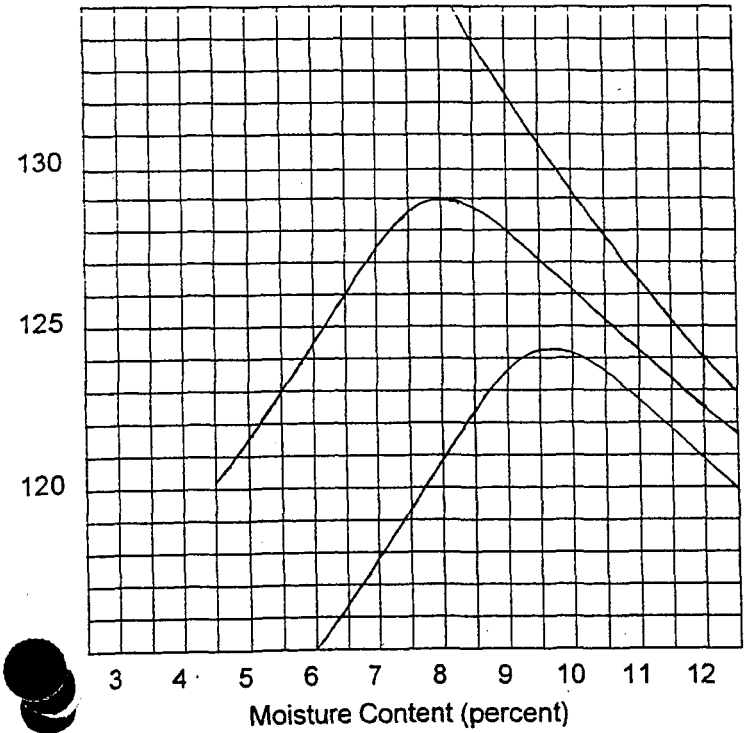
Contractor: Granite Const.
Sampled By: Mike Carter
Sample Loc.: Crusher Stockpile
Material Use:

SIEVE ANALYSIS

Sieve or Screen Size	% Passing	SNWA Spec. Type A Min.	Max.	P/F
6"	100	100	100	P
3"	100			
2"	100			
1 1/2"	100			
1"	97			
3/4"	94			
1/2"	86			
3/8"	81			
No. 4	65			
No. 8	49			
No. 10				
No. 16	36			
No. 30	27			
No. 40				
No. 50	20			
No. 100	15			
No. 200	11.3			

Unified Soil Classification:
Well Graded Sand with Silt and Gravel

Moisture - Density Relationship Curve



Maximum Dry Density, (pcf): 129.0
Optimum Moisture Content, %: 8.0

Test Description	Result	Spec. Range Min.	Max.	P/F
1 Point Moisture Density Chk				
Moisture Content, (%)				
R-Value				
Liquid Limit	Gran			P
Plastic Limit	NP			P
Plasticity Index	NP			P
Sand Equivalent				
Cleannes Value				
Fractured Faces, 1 or More				
L.A. Abrasion				
Sulfate Soundness, % Loss				
Organic Impurities				
Solubility, % Loss				
Clay Lumps & Friable Part's.				
Bulk Specific Gravity (dry)				
Absorption, %				
Fineness Modulus				
Chemical Soluble Sulfate, %	0.33		0.2	F
Expansion Swell @ 60 psf, %				
Expansion Index				

Note: GRAN = Granular, NP = Non-Plastic, P/F = Pass / Fail

Test Procedure: ASTM D1557 **Method:** C
Rammer Type: Mechanical
Preparation Procedure: Wet
Specific Gravity: Measured Value: 2.618

Remarks:

Laboratory Supervisor: Linda L. Coulter
Reviewed By: Tom L. Ertler
Date: 5/19/99

SOIL AND AGGREGATE LABORATORY REPORT

KLEINFELDER

Project: C-1 Detention Basin
Project Number: 31312101
P[redacted]:

Date: 5/24/99
Sheet: 1 of 1
Date Sampled: 5/20/99
Sample No.: 18574

[redacted]SNWA/Parsons Infrastructure
Alan Hargraves
153 W Lake Mead Dr 201 Bdg 1
Henderson NV 89015-7046

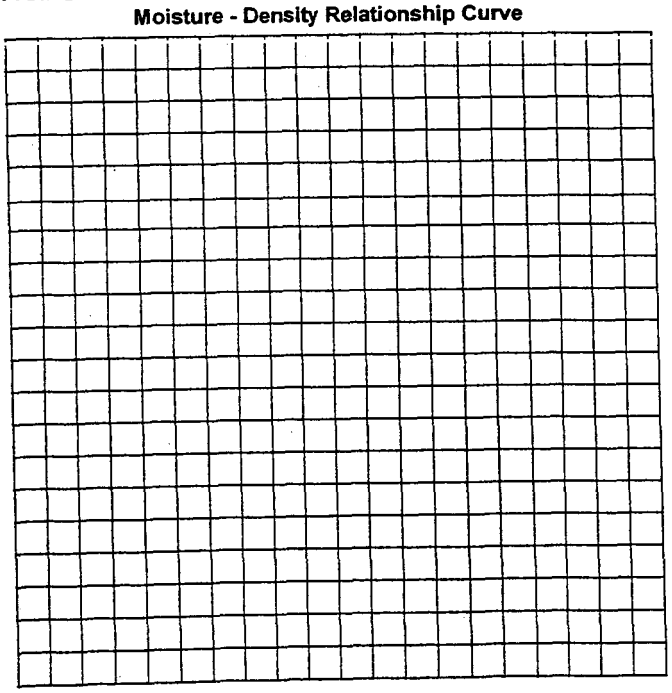
Contractor: Granite Const.
Sampled By: MC
Sample Loc.: On site crusher
Material Use: Type A

SIEVE ANALYSIS

Sieve or Screen Size	% Passing	SNWA Spec. Type A Min	Max	P/F
6"	100	100		P
3"	100			
2"	100			
1 1/2"	96			
1"	89			
3/4"	87			
1/2"	79			
3/8"	73			
No. 4	60			
No. 8	48			
No. 10				
No. 16	37			
No. 30	27			
No. 40				
No. 50	19			
No. 100	13			
No. 200	8.3			

Unified Soil Classification:
Well Graded Sand with Silt and Gravel

Moisture - Density Relationship Curve



Moisture Content (percent)

Maximum Dry Density, (pcf):
Optimum Moisture Content, %:

Test Description	Result	Spec. Range Min	Max	P/F
1 Point Moisture Density Chk	120.6			
Moisture Content, (%)	9.2			
R-Value				
Liquid Limit				
Plastic Limit				
Plasticity Index				
Sand Equivalent				
Cleannes Value				
Fractured Faces, 1 or More				
L.A. Abrasion				
Sulfate Soundness, % Loss				
Organic Impurities				
Solubility, % Loss				
Clay Lumps & Friable Part's.				
Bulk Specific Gravity (dry)				
Absorption, %				
Fineness Modulus				
Chemical Soluble Sulfate, %	0.03		0.2	P
Expansion Swell @ 60 psf, %				
Expansion Index				

Note: GRAN = Granular, NP = Non-Plastic, P/F = Pass / Fail

Test Procedure: ASTM D1557 **Method:** C
Rammer Type: Mechanical
Preparation Procedure: Wet
Specific Gravity: **Value:**

Remarks:

Laboratory Supervisor: Robert Kent
Reviewed By: Lois L. Estes
Date: 5/24/99

SOIL AND AGGREGATE LABORATORY REPORT

KLEINFELDER

Project: C-1 Detention Basin
Project Number: 31312101
Phase: 001 Materials Testing

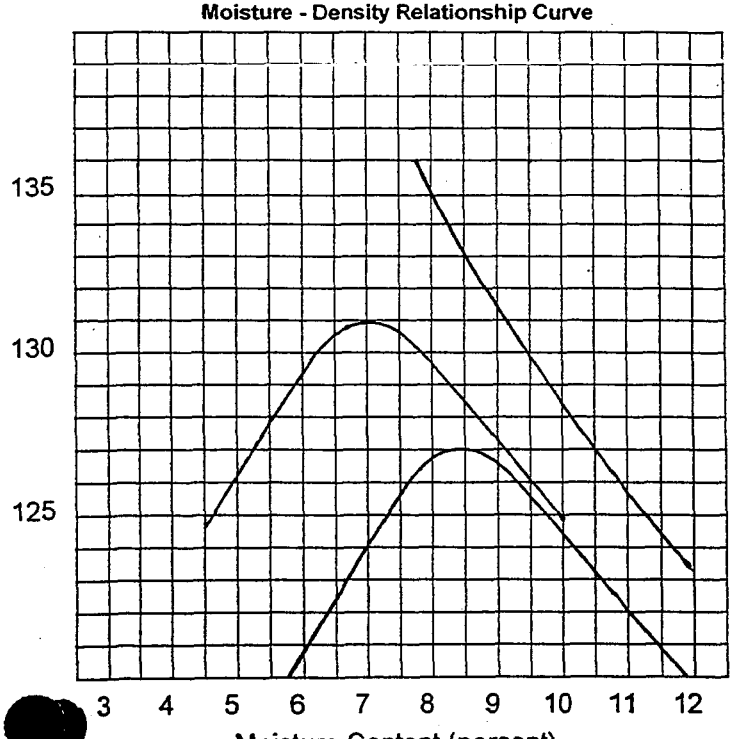
Date: 6/18/99
Sheet: 1 of 1
Date Sampled: 6/15/99
Sample No.: 18818

[redacted]NWA/Parsons Infrastructure
Alan Hargraves
153 W Lake Mead Dr 200 Bdg 1
Henderson NV 89015-7046

SIEVE ANALYSIS				
Sieve or Screen Size	% Passing	SNWA Spec. Type A Min.	Max.	P/F
6"	100	100	100	P
3"	100			
2"				
1 1/2"	97			
1"	86			
3/4"	78			
1/2"	68			
3/8"	61			
No. 4	47			
No. 8	35			
No. 10				
No. 16	27			
No. 30	21			
No. 40				
No. 50	17			
No. 100	12			
No. 200	8.7			

Unified Soil Classification:
Well Graded Sand with Silt and Sand

Moisture - Density Relationship Curve



Maximum Dry Density, (pcf): 131.0
Optimum Moisture Content, %: 7.0

Contractor: Granite Const.
Sampled By: Mike Carter
Sample Loc.: 20 + 00 20' RCL
Material Use: Structural Backfill

Test Description	Result	Spec. Range Min.	Max.	P/F
1 Point Moisture Density Chk				
Moisture Content, (%)				
R-Value				
Liquid Limit				
Plastic Limit				
Plasticity Index				
Sand Equivalent				
Cleannes Value				
Fractured Faces, 1 or More				
L.A. Abrasion				
Sulfate Soundness, % Loss				
Organic Impurities				
Solubility, % Loss				
Clay Lumps & Friable Part's.				
Bulk Specific Gravity (dry)				
Absorption, %				
Fineness Modulus				
Chemical Soluble Sulfate, %				
Expansion Swell @ 60 psf, %				
Expansion Index				

Note: GRAN = Granular, NP = Non-Plastic, P/F = Pass / Fail

Test Procedure: ASTM D1557 **Method:** C
Rammer Type: Mechanical
Preparation Procedure: Wet
Specific Gravity: Measured **Value:** 2.589

Remarks:

Laboratory Supervisor: Linda L. Cartier
Reviewed By: Lori L. Cartier
Date: 6/18/99

SOIL AND AGGREGATE LABORATORY REPORT

KLEINFELDER

Project: C-1 Detention Basin
Project Number: 31312101
P[redacted]: 001 Materials Testing

Date: 6/18/99
Sheet: 1 of 1
Date Sampled: 6/15/99
Sample No.: 18819

[redacted]NWA/Parsons Infrastructure
Alan Hargraves
153 W Lake Mead Dr 200 Bdg 1
Henderson NV 89015-7046

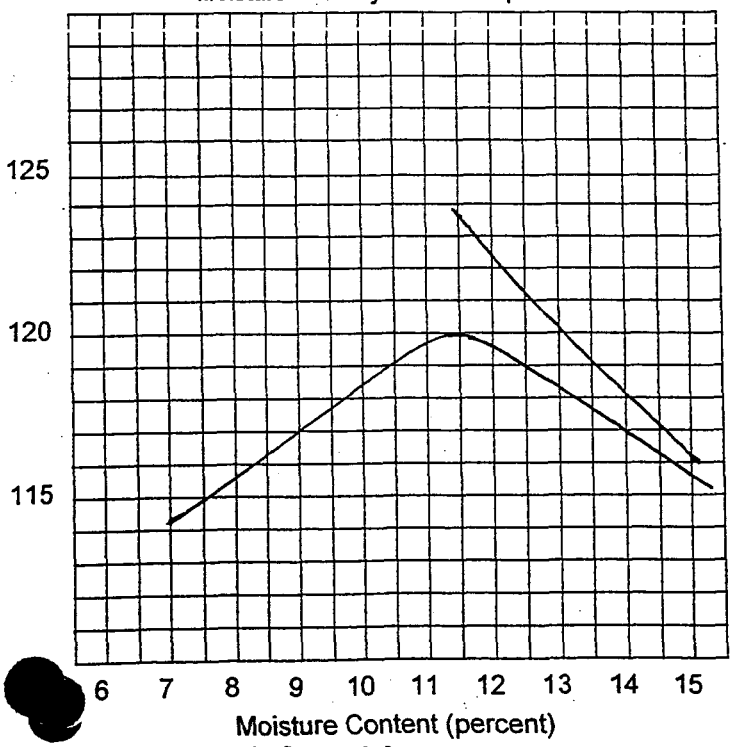
Contractor: Granite Const.
Sampled By: Mike Carter
Sample Loc.: On Site Stockpile
Material Use: Soil Cement Agg

SIEVE ANALYSIS

Sieve or Screen Size	% Passing	SNWA Min	SNWA Max	P/F
6"				
3"				
2"				
1 1/2"				
1"				
3/4"				
1/2"	100			
3/8"	95			
No. 4	75	70	100	P
No. 8	56	35	70	P
No. 10				
No. 16	38			
No. 30	25			
No. 40				
No. 50	16			
No. 100	11			
No. 200	6.3		25.0	P

Unified Soil Classification:
Well Graded Sand with Silty and Gravel

Moisture - Density Relationship Curve



Maximum Dry Density, (pcf): 120.0
Optimum Moisture Content, %: 11.5

Test Description	Result	Spec. Range Min	Spec. Range Max	P/F
1 Point Moisture Density Chk				
Moisture Content, (%)				
R-Value				
Liquid Limit				
Plastic Limit				
Plasticity Index				
Sand Equivalent				
Cleannes Value				
Fractured Faces, 1 or More				
L.A. Abrasion				
Sulfate Soundness, % Loss				
Organic Impurities				
Solubility, % Loss				
Clay Lumps & Friable Part's.				
Bulk Specific Gravity (dry)				
Absorption, %				
Fineness Modulus				
Chemical Soluble Sulfate, %				
Expansion Swell @ 60 psf, %				
Expansion Index				

Note: GRAN = Granular, NP = Non-Plastic, P/F = Pass / Fail

Test Procedure: ASTM D1557 **Method:** C
Rammer Type: Mechanical
Preparation Procedure: Wet
Specific Gravity: Assumed **Value:** 2.560

Remarks:

Laboratory Supervisor: Linda L. Coulter
Reviewed By: Lori L. Ritter
Date: 6/18/99

SOIL AND AGGREGATE LABORATORY REPORT

KLEINFELDER

Project: C-1 Detention Basin
Project Number: 31312101
[redacted]: 001 Materials Testing

Date: 7/21/99
Sheet: 1 of 1
Date Sampled: 7/14/99
Sample No.: 19069

SNWA/Parsons Infrastructure
Alan Hargraves
153 W Lake Mead Dr 201 Bdg 1
Henderson NV 89015-7046

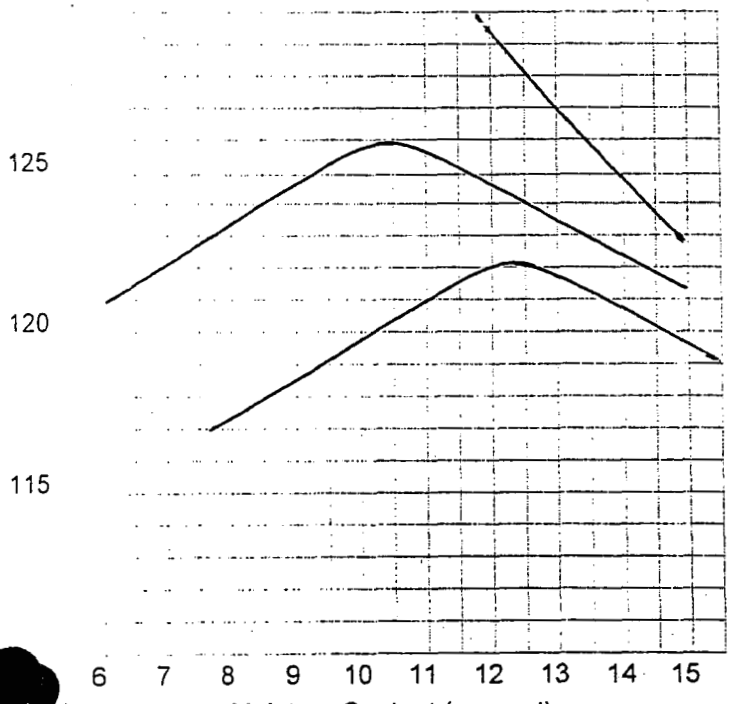
Contractor: SNWA
Sampled By: Mike Carter
Sample Loc.: Sta. 17+00 @ CL
Material Use: Type A

SIEVE ANALYSIS

Sieve or Screen Size	% Passing	CCPW Min.	CCPW Max.	P/F
6"	100	100	100	P
3"	88			
2"	85			
1 1/2"	83			
1"	79			
3/4"	75			
1/2"	67			
3/8"	63			
No. 4	49			
No. 8	36			
No. 10				
No. 16	24			
No. 30	15			
No. 40				
No. 50	9			
No. 100	6			
No. 200	4.2			

Unified Soil Classification:
Brown Silty Sand with Gravel

Moisture - Density Relationship Curve



Maximum Dry Density, (pcf): 126.0
Optimum Moisture Content, %: 10.5

Test Description	Result	Spec. Range Min.	Spec. Range Max.	P/F
1 Point Moisture Density Chk				
Moisture Content, (%)				
R-Value				
Liquid Limit				
Plastic Limit				
Plasticity Index				
Sand Equivalent				
Cleannes Value				
Fractured Faces, 1 or More				
L.A. Abrasion				
Sulfate Soundness, % Loss				
Organic Impurities				
Solubility, % Loss				
Clay Lumps & Friable Part's.				
Bulk Specific Gravity (dry)				
Absorption, %				
Fineness Modulus				
Chemical Soluble Sulfate. %				
Expansion Swell @ 60 psf, %				
Expansion Index				

Note: GRAN = Granular, NP = Non-Plastic, P/F = Pass / Fail

Test Procedure: ASTM D1557 **Method:** C
Rammer Type: Mechanical
Preparation Procedure: Wet
Specific Gravity: Measured **Value:** 2.471

Remarks:

Laboratory Supervisor: Linda L. Coulter
Reviewed By: Lori L. Arbin
Date: 7/21/99

SOIL AND AGGREGATE LABORATORY REPORT

KLEINFELDER

Project: C-1 Detention Basin
Project Number: 31312101
Phase: 001 Materials Testing

Date: 7/26/99
Sheet: 1 of 1
Date Sampled: 7/21/99
Sample No.: 19127

[redacted]
SNWA/Parsons Infrastructure
Alan Hargraves
153 W Lake Mead Dr 201 Bdg 1
Henderson NV 89015-7046

Contractor: SNWA
Sampled By: Mike Carter
Sample Loc.: On-Site Stockpile
Material Use: Structural Backfill

SIEVE ANALYSIS

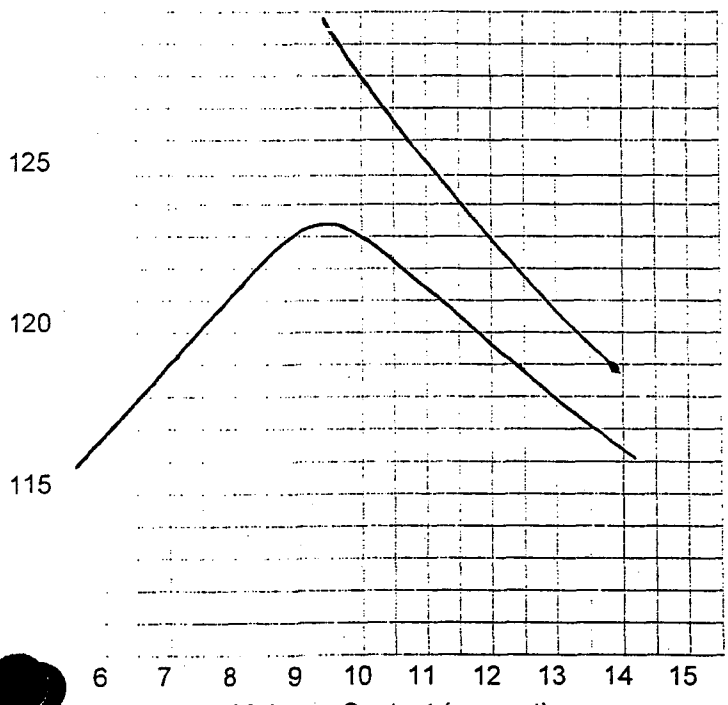
Sieve or Screen Size	% Passing	SNWA Spec Type A Min.	Max.	P/F
6"	100	100	100	P
3"	100			
2"				
1 1/2"				
1"	100			
3/4"	99			
1/2"	86			
3/8"	73			
No. 4	53			
No. 8	36			
No. 10				
No. 16	24			
No. 30	16			
No. 40				
No. 50	11			
No. 100	8			
No. 200	5.2			

Unified Soil Classification:
Brown silty sand w/ gravel

Test Description	Result	Spec. Range Min.	Max.	P/F
1 Point Moisture Density Chk				
Moisture Content, (%)				
R-Value				
Liquid Limit				
Plastic Limit				
Plasticity Index				
Sand Equivalent				
Cleannes Value				
Fractured Faces, 1 or More				
L.A. Abrasion				
Sulfate Soundness, % Loss				
Organic Impurities				
Solubility, % Loss				
Clay Lumps & Friable Part's.				
Bulk Specific Gravity (dry)				
Absorption, %				
Fineness Modulus				
Chemical Soluble Sulfate, %				
Expansion Swell @ 60 psf, %				
Expansion Index				

Note: GRAN = Granular, NP = Non-Plastic, P/F = Pass / Fail

Moisture - Density Relationship Curve



Maximum Dry Density, (pcf): 123.5
Optimum Moisture Content, %: 9.5

Test Procedure: ASTM D1557 **Method:** C
Rammer Type: Mechanical
Preparation Procedure: Wet
Specific Gravity: Assumed **Value:** 2.550

Remarks:

Laboratory Supervisor: Linda L. Cantlon
Reviewed By: Larry L. Estlin
Date: 7/26/99

SOIL AND AGGREGATE LABORATORY REPORT

KLEINFELDER

Project: C-1 Detention Basin
Project Number: 31312101
Phase: 001 Materials Testing

Date: 8/16/99
Sheet: 1 of 1
Date Sampled: 7/15/99
Sample No.: 19023

SNWA/Parsons Infrastructure
Alan Hargraves
153 W Lake Mead Dr 201 Bdg 1
Henderson NV 89015-7046

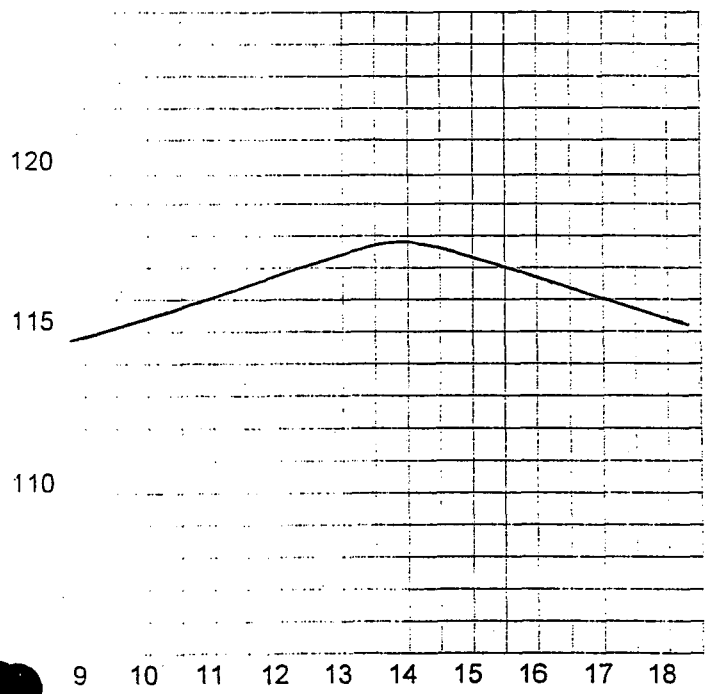
Contractor: SNWA
Sampled By: Mike Carter
Sample Loc.: Basin
Material Use: C33

SIEVE ANALYSIS

Sieve or Screen Size	% Passing	Job Specs Min	Job Specs Max	P/F
6"				
3"				
2"				
1 1/2"				
1"				
3/4"	100			
1/2"	99			
3/8"	96			
No. 4	78	70	100	P
No. 8	59	35	70	P
No. 10				
No. 16	40			
No. 30	26			
No. 40				
No. 50	18			
No. 100	11			
No. 200	6.9	0.0	25.0	P

Unified Soil Classification:
Well Graded Sand with Silt and Gravel

Moisture - Density Relationship Curve



Maximum Dry Density, (pcf): 116.9
Optimum Moisture Content, %: 14.0

Test Description	Result	Spec. Range Min	Spec. Range Max	P/F
1 Point Moisture Density Chk				
Moisture Content, (%)				
R-Value				
Liquid Limit	Gran			P
Plastic Limit	N.P.			P
Plasticity Index	N.P.			P
Sand Equivalent				
Cleannes Value				
Fractured Faces, 1 or More				
L.A. Abrasion	22		40	P
Sulfate Soundness, % Loss	10.4		12.0	P
Organic Impurities	1		3	P
Solubility, % Loss				
Clay Lumps & Friable Part's.	0.6		3	P
Bulk Specific Gravity (dry)				
Absorption, %				
Fineness Modulus				
Chemical Soluble Sulfate, %				
Expansion Swell @ 60 psf, %				
Expansion Index				

Note: GRAN = Granular, NP = Non-Plastic, P/F = Pass / Fail

Test Procedure: Other **Method:** B
Rammer Type: Manual
Preparation Procedure: Wet
Specific Gravity: Assumed **Value:** 2.710

Remarks:
Lightweight Pieces - 0.0% (Fine & Coarse)

Laboratory Supervisor: Linda S. Gouette
Reviewed By: Lori L. Cutler
Date: 8/16/99

SOIL AND AGGREGATE LABORATORY REPORT

KLEINFELDER

Project: C-1 Detention Basin
Project Number: 31312101
Phase:

Date: 9/20/99
Sheet: 1 of 1
Date Sampled: 9/10/99
Sample No.: 19557

SNWA/Parsons Infrastructure
Alan Hargraves
153 W Lake Mead Dr 201 Bdg 1
Henderson NV 89015-7046

Contractor: SNWA
Sampled By: Mike Carter
Sample Loc.: Sediment Conrtol Structure
Material Use: No Spec Required

SIEVE ANALYSIS

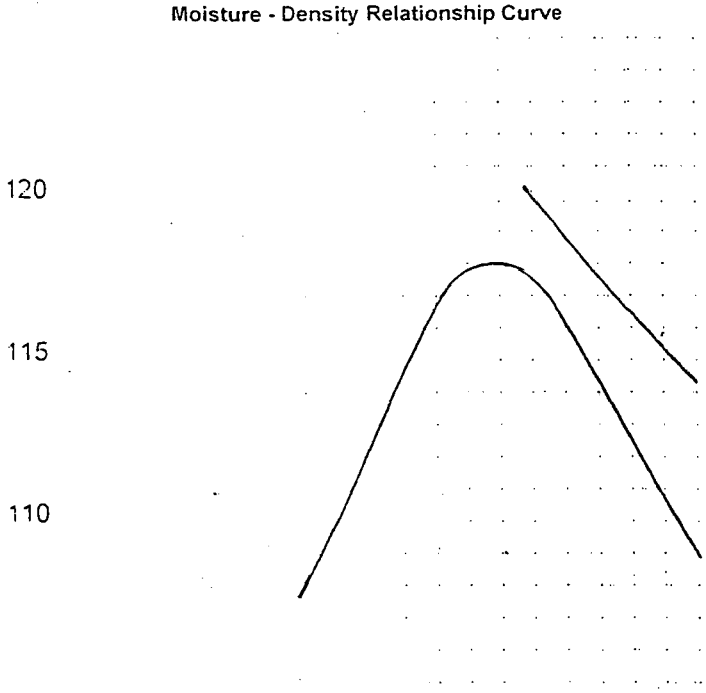
Sieve or Screen Size	% Passing	SNWA Min.	SNWA Max.	P/F
6"				
3"				
2"	100			
1 1/2"	99			
1"	97			
3/4"	95			
1/2"	90			
3/8"	85			
No. 4	71			
No. 8	56			
No. 10				
No. 16	40			
No. 30	28			
No. 40				
No. 50	17			
No. 100	10			
No. 200	5.2			

Unified Soil Classification:

Test Description	Result	Spec. Range Min.	Spec. Range Max.	P/F
1 Point Moisture Density Chk				
Moisture Content, (%)				
R-Value				
Liquid Limit				
Plastic Limit				
Plasticity Index				
Sand Equivalent				
Cleannes Value				
Fractured Faces, 1 or More				
L.A. Abrasion				
Sulfate Soundness, % Loss				
Organic Impurities				
Solubility, % Loss				
Clay Lumps & Friable Part's.				
Bulk Specific Gravity (dry)				
Absorption, %				
Fineness Modulus				
Chemical Soluble Sulfate, %				
Expansion Swell @ 60 psf, %				
Expansion Index				

Note: GRAN = Granular, NP = Non-Plastic, P/F = Pass / Fail

Moisture - Density Relationship Curve



Maximum Dry Density, (pcf): 118.0
Optimum Moisture Content, %: 13.5

Test Procedure: ASTM D1557 Method: C
Rammer Type: Mechanical
Preparation Procedure: Wet
Specific Gravity: Assumed Value: 2.640

Remarks:

Laboratory Supervisor: Linda L. Coulter
Reviewed By: Lori L. Cutler
Date: 9/20/99

FEDERAL EMERGENCY MANAGEMENT AGENCY **DAM**	O.M.B. Burden No. 3067-0148 Expires April 30, 2001

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 0.5 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; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

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: City of Henderson

Flooding Source: Henderson Basin

Project Name/Identifier: C-1 Channel System FIS Restudy

1. IDENTIFIER

1. **Name of Dam:** East C-1 Detention Basin

2. Location of dam along flood source (in terms of stream distance or cross section identifier):

   Reach 2C, X-Section 2AC

   _____

   _____

3. This request is for (check one of the following):

   ☒ Existing dam
   ☐ New dam
   ☐ Modifications of existing dam (describe modifications): _____

4. Was the dam designed by: ☐ Federal agency ☐ State agency ☒ Local government agency ☒ Private organization?

2. BACKGROUND

1. Does the dam have dedicated flood control storage? ☒ Yes ☐ No

2. Does the project involve revised hydrology? ☒ Yes ☐ No

   If Yes, complete Hydrologic Analysis Form (Form 3) and include calculations of the 100-year inflow flood hydrograph routed through the dam with the beginning pool at the normal pool elevation (spillway crest elevation for ungated spillway). Include any inflow hydrograph bulking by watershed sediment yield and provide necessary debris and sediment yield analysis.

3. Does the revised hydrology affect the 100-year water-surface (base flood) elevation behind the dam or downstream of the dam?

   ☒ Yes ☐ No

   If yes, complete the Riverine Hydraulic Analysis Form (Form 4) and complete the table shown on the following page.

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

3. RESULTS

	Stillwater Elevation Behind the Dam	
	FIS	REVISED
10-year	N/A	N/A
50-year	N/A	N/A
100-year	N/A	2497.6
500-year	N/A	N/A
Normal Pool Elevation	N/A	No normal pool elevation

1. Was long-term sediment accumulation taken into consideration in determining the normal pool elevation? ☒ Yes ☐ No

2. Was the dam designed to withstand the hydrostatic and hydrodynamic forces associated with floods greater than the base flood? ☒ Yes ☐ No

   If No, the dam should not be modeled as considering the attenuation effects from the dam.

3. Provide the following data on the dam:

   Dimensional Height: 59.04 ft

   Crest Elevation of top of dam: 2510 ft

   base flood storage capacity: 900 Ac-ft

   Freeboard (measured from base flood elevation): 12.4 ft

Spillway(s):

Type: ☐ gated ☒ ungated

Dimensional Width: 202.0ft

Dimensional Height: 13.81 ft

Crest Elevation of Top of Spillway: 2496.19

5. Outlet(s):

Type: ☐ gated ☒ ungated

Width: N/A

Height: N/A

Diameter: 48" RCP

Invert Elevation: 2431.06

6. Explain flow regulation plan: No flow regulation plan

7. Are the project features, including the emergency spillway, designed to accommodate the 100-year flood discharge without overtopping the dam? ☒ Yes ☐ No

8. Was the dam designed in accordance with all currently applicable local, State, and Federal regulations?
   ☒ Yes ☐ No

   If No, please attach an explanation. **Explanation attached** ☐ **Yes** ☐ **No**

   FEMA may request a list of regulations that have been complied with and supporting documentation demonstrating compliance with these regulations.

9. **Attach copy of formal operation and maintenance plan. Plan Attached?** ☒ Yes ☐ No

FEMA Form Supplemental Information

Form 11

East C-1 Detention Basin:

Plans for the East C-1 Detention Basin are located at:

SECTION 5 MISC. REFERENCE MATERIAL\5.1a - Plans for Construction\East C-1 DB and Levee

Reports for the East C-1 Detention Basin are located at:

\SECTION 5 MISC. REFERENCE MATERIAL\5.1b Reports\East C-1 Detention Basin

FEDERAL EMERGENCY MANAGEMENT AGENCY **DAM**	O.M.B. Burden No. 3067-0148 Expires April 30, 2001

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 0.5 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; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

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: City of Henderson

Flooding Source: Henderson Basin

Project Name/Identifier: C-1 Channel System FIS Restudy

1. IDENTIFIER

1. **Name of Dam:** Black Mountain Detention Basin
2. Location of dam along flood source (in terms of stream distance or cross section identifier):

   Reach 4, X-Section 4Y

   _____

   _____
3. This request is for (check one of the following):

   ☒ Existing dam
   ☐ New dam
   ☐ Modifications of existing dam (describe modifications): _____
4. Was the dam designed by: ☐ Federal agency ☐ State agency ☒ Local government agency ☒ Private organization?

2. BACKGROUND

1. Does the dam have dedicated flood control storage? ☒ Yes ☐ No
2. Does the project involve revised hydrology? ☒ Yes ☐ No

   If Yes, complete Hydrologic Analysis Form (Form 3) and include calculations of the 100-year inflow flood hydrograph routed through the dam with the beginning pool at the normal pool elevation (spillway crest elevation for ungated spillway). Include any inflow hydrograph bulking by watershed sediment yield and provide necessary debris and sediment yield analysis.
3. Does the revised hydrology affect the 100-year water-surface (base flood) elevation behind the dam or downstream of the dam?

   ☒ Yes ☐ No

   If yes, complete the Riverine Hydraulic Analysis Form (Form 4) and complete the table shown on the following page.

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

3. RESULTS

	Stillwater Elevation Behind the Dam	
	FIS	REVISED
10-year	N/A	N/A
50-year	N/A	N/A
100-year	N/A	2593.0
500-year	N/A	N/A
Normal Pool Elevation	N/A	No normal pool elevation

1. Was long-term sediment accumulation taken into consideration in determining the normal pool elevation? ☒ Yes ☐ No

2. Was the dam designed to withstand the hydrostatic and hydrodynamic forces associated with floods greater than the base flood? ☒ Yes ☐ No

   If No, the dam should not be modeled as considering the attenuation effects from the dam.

3. Provide the following data on the dam:

   Dimensional Height: 40 ft

   Crest Elevation of top of dam: 2598 ft

   base flood storage capacity: 375 Ac-ft

   Freeboard (measured from base flood elevation): 5 ft

Spillway(s):

Type: ☐ gated ☒ ungated

Dimensional Width: 300 ft

Dimensional Height: 15 ft

Crest Elevation of Top of Spillway: 2593

5. Outlet(s):

Type: ☐ gated ☒ ungated

Width: N/A

Height: N/A

Diameter: 54" RCP

Invert Elevation: 2558.0

6. Explain flow regulation plan: No flow regulation plan

7. Are the project features, including the emergency spillway, designed to accommodate the 100-year flood discharge without overtopping the dam? ☒ Yes ☐ No

8. Was the dam designed in accordance with all currently applicable local, State, and Federal regulations?
   ☒ Yes ☐ No

   If No, please attach an explanation. **Explanation attached** ☐ **Yes** ☐ **No**

   FEMA may request a list of regulations that have been complied with and supporting documentation demonstrating compliance with these regulations.

9. **Attach copy of formal operation and maintenance plan. Plan Attached?** ☒ Yes ☐ No

FEMA Form Supplemental Information

Black Mountain Detention Basin

Plans for the Black Mountain Detention Basin are located at:

SECTION 5 MISC. REFERENCE MATERIAL\5.1a - Plans for Construction\Black Mountain Detention Basin

Reports for the Black Mountain Detention Basin are located at:

\SECTION 5 MISC. REFERENCE MATERIAL\5.1b Reports\Black Mountain Detention Basin

FINAL SUMMARY REPORT
FOR MATERIALS TESTING
AND OBSERVATION SERVICES
BLACK MOUNTAIN DETENTION BASIN
HENDERSON, NEVADA
31-110026

March 3, 2000

Prepared for:

Mr. Ken Gilbreth, P.E.
VTN Nevada
2727 South Rainbow Boulevard
Las Vegas, Nevada 89102-5148

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FIELD DENSITY TEST SUMMARY

Test No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
1	7/15/99	Subgrade Prep Sta 18+50		0.0	10.2	125.1	130.5	96	95
2	7/15/99	Subgrade Prep Sta 14+00		0.0	10.5	124.8	130.5	96	95
3	7/15/99	Cut-off Trench Sta 15+00	5.0' Below Finished Grade	0.0	10.3	123.9	130.5	95	95
4	7/15/99	Cut-off Trench Sta 17+00	5.0' Below Finished Grade	0.0	10.2	124.6	130.5	96	95
5	7/15/99	Subgrade Prep Sta 17+22		0.0	10.9	125.2	130.5	96	95
6	7/16/99	Dam Embankment Fill Sta 14+50	3.0' Below Finished Grade	2.0	10.0	124.5	130.5	95	95
7	7/16/99	Dam Embankment Fill Sta 17+20	3.0' Below Finished Grade	1.0	12.6	125.4	130.5	96	95
8	7/19/99	Dam Embankment Fill Sta 18+70 West Side	1.5' Below Existing Grade	0.5	11.0	123.7	130.5	95	95
9	7/19/99	Dam Embankment Fill Sta 17+30 West Side	1.5' Below Existing Grade	0.5	13.3	123.9	130.5	95	95
10	7/19/99	Dam Embankment Fill Sta 14+50 West Side	1.5' Below Existing Grade	0.5	14.4	123.4	130.5	95	95
11	7/20/99	Cut-off Sta 11+00	3.0' Above Native	3.0	6.6	124.1	130.5	95	95
12	7/20/99	Cut-off Sta 13+00	3.0' Above Native	3.0	8.2	128.8	130.5	99	95
13	7/20/99	Cut-off Sta 18+00	3.0' Above Native	3.0	10.7	124.0	130.5	95	95
14	7/20/99	Cut-off Sta 19+00	3.0' Above Native	3.0	9.6	123.7	130.5	95	95
15	7/20/99	Dam Embankment Fill Sta 17+22 West Side	5' Above Existing	6.5	10.5	126.0	130.5	97	95
16	7/20/99	Dam Embankment Fill Sta 17+22 East Side	5' Above Existing	6.5	10.3	124.6	130.5	96	95
17	7/20/99	Dam Embankment Fill Sta 14+00 West Side	5' Above Existing	6.0	10.5	124.8	130.5	96	95
18	7/21/99	Sta 10+50	3' Above Existing	3.0	7.9	127.1	130.5	97	95
19	7/21/99	Top of Spillway Sta 18+00	3' Above Existing	3.0	9.6	125.4	130.5	96	95
20	7/26/99	Labyrinth Floor Subgrade Sta 19+00	12' Above Existing	12.0	7.4	121.2	127.5	95	95
21	7/26/99	Spillway Floor Subgrade Sta 19+00	8' Above Existing	8.0	7.3	124.7	127.5	98	95
22	7/26/99	Sta 14+50	5'	4.0	8.9	124.0	127.5	97	95
23	7/26/99	Sta 13+50	6'	5.0	9.6	122.8	127.5	96	95

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FIELD DENSITY TEST SUMMARY

[redacted] No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	SPEC
24	8/3/99	Labyrinth Slab Type II at Centerline	11' Above Native	0.5	5.3	118.0	124.0	95	95
25	8/3/99	Spillway Slab at Centerline	8' Above Native	0.5	7.1	120.0	124.0	97	95
26	8/3/99	Approach Slab	11' Above Native	0.5	7.2	119.1	124.0	96	95
27	08/24/9	Bedding of Trench Sta 12+25	13.0' Below	2.0	7.3	125.0	129.5	97	95
28	08/24/9	Bedding of Trench Sta 13+25	13.0' Below	2.0	8.1	124.3	129.5	96	95
29	9/3/99	54" Pipe Trench at Sta 51+00	15.0' Below Subgrade	3.0	11.5	125.9	129.5	97	95
30	9/3/99	54" Pipe Trench at Sta 50+00	15.0' Below Subgrade	3.0	10.2	122.8	129.5	95	95
31	9/7/99	Trench Backfill at Dam Embankment	12.0' Below	3.0	10.1	125.2	131.5	95	95
32	9/7/99	Trench Backfill near Dam Embankment, 500' south of 32.	12.0' Below	3.0	9.6	125.1	131.5	95	95
33	9/7/99	South side of MH #1	10.0' Below	1st lift	6.7	124.6	131.5	95	95
[redacted]	9/7/99	Trench at Dam Embankment		4.5	9.6	126.6	131.5	96	95
35	9/7/99	150' northside of MH #1		1.0	8.1	125.4	131.5	95	95
36	9/8/99	Sta 21+60 at centerline	5' above 54" pipe	5.0	5.7	122.5	129.5	95	95
37	9/8/99	Sta 13+00 South side of Pipe	1' above 54" pipe	5.0	9.4	129.4	129.5	100	95
38	9/8/99	Sta 22+10 North side of Pipe	8' above 54" pipe	8.0	7.9	109.3	129.5	84 *	95
39	9/9/99	Retest of #39	8' above 54" pipe	8.0	9.0	123.8	129.5	96	95
40	9/9/99	Sta 22+00 North side of Pipe	9' above Pipe	9.0	8.6	122.4	129.5	95	95
41	9/9/99	Sta 21+00 North side of Pipe	10' above Pipe	10.0	8.7	125.6	129.5	97	95
42	9/9/99	Sta 17+50, 15' east of centerline of Dam	2584.0	11.0	7.4	123.2	129.5	95	95
43	9/10/99	Sta 19+50 Embankment Dam	2586.0	13.0	10.1	126.0	129.5	97	95
44	9/10/99	Sta 12+30 South side of Pipe	2' above 54" Pipe	2.0	9.1	127.5	129.5	99	95
45	9/10/99	Sta 16+40 South side of Pipe	1' above 54" Pipe	1.0	8.3	122.8	129.5	95	95
[redacted]	9/10/99	Sta 21+00 Dam Embankment	2588.0	15.0	8.8	122.4	129.5	95	95

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FIELD DENSITY TEST SUMMARY

Test No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
47	9/10/99	Sta 20+50 Dam Embankment	2589.0	16.0	8.9	122.6	129.5	95	95
48	9/10/99	Sta 10+20 South side of Pipe	4' above Pipe	4.0	9.9	118.6	129.5	92 *	95
49	9/10/99	Retest of #48	3' above Pipe	3.0	10.2	122.9	127.5	96	95
50	9/10/99	54" RCP Pipe Sta 11+80	4' above Pipe	4.0	11.1	124.3	127.5	98	95
51	9/10/99	54" RCP Pipe Sta 13+90	5' above Pipe	5.0	10.7	122.8	127.5	96	95
52	9/10/99	Dam Embankment	12' Below		9.6	122.1	127.5	96	95
53	9/13/99	South Dam Embankment Sta 16+00 at centerline DI	2587.0	5.0	8.7	118.8	124.5	95	95
54	9/13/99	Sta 12+00 at centerline of Pipe	5' Below surface	10.0	7.6	123.2	129.5	95	95
55	9/13/99	Sta 14+00 North side of Pipe	5' Below surface	10.0	8.2	127.4	129.5	98	95
56	9/13/99	South Dam Embankment Sta 16+50, 20' left of centerline	2589.0	7.0	7.0	120.7	124.5	97	95
[redacted]	9/13/99	South Dam Embankment Sta 17+00, 15' right of centerline	2590.0	8.0	7.9	121.3	124.5	97	95
58	9/14/99	South Dam Embankment Sta 16+50 at centerline	2590.0	12.0	7.9	126.0	129.5	97	95
59	9/14/99	South Dam Embankment Sta 16+75, 10' left of centerline	2591.0	13.0	8.4	129.6	129.5	100	95
60	9/14/99	South Dam Embankment Sta 15+75 at centerline	2592.0	14.0	8.6	122.4	129.5	95	95
61	9/14/99	South Dam Embankment Sta 15+00, 5' right of centerline	2592.0	14.0	9.5	124.4	129.5	96	95
62	9/14/99	South Dam Embankment Sta 16+80, 5' right of centerline	2593.0	15.0	8.9	123.4	129.5	95	95
63	9/14/99	North Dam Embankment (Type II) Sta 20+10, at centerline	2583.0	1.0	7.1	124.3	131.0	95	95
64	9/14/99	North Dam Embankment Sta 20+50, 20' right of centerline	2584.0	2.0	8.8	123.8	129.5	96	95
65	9/14/99	North Dam Embankment Sta 20+75, 15' left of centerline	2585.0	3.0	8.0	124.8	129.5	96	95
66	9/15/99	North Retaining Wall Sta 21+00, 20' left of centerline of	2586.0	4.0	6.4	122.4	129.5	95	95
67	9/15/99	North Retaining Wall Sta 20+20, 30' left of centerline of	2587.0	5.0	8.4	126.1	129.5	97	95
68	9/15/99	North Retaining Wall Sta 20+80, 10' right of centerline	2588.0	6.0	13.2	122.4	129.5	95	95
[redacted]	9/15/99	North Retaining Wall Sta 20+50, 15' right of centerline	2589.0	7.0	9.0	128.5	129.5	99	95

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FIELD DENSITY TEST SUMMARY

No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
70	9/15/99	North Retaining Wall Sta 20+30, 10' left of centerline of	2590.0	8.0	7.8	126.0	129.5	97	95
71	9/15/99	North Retaining Wall Sta 20+85, 5' right of centerline of	2591.0	9.0	9.0	124.4	129.5	96	95
72	9/15/99	North Retaining Wall Sta 21+30 at centerline of DE	2592.0	10.0	9.3	125.3	129.5	97	95
73	9/16/99	North Dam Embankment Sta 20+50 at centerline of DE	2593.0	11.0	11.4	125.7	129.5	97	95
74	9/16/99	North Dam Embankment Sta 20+75, 5' right of centerline of	2594.0	12.0	8.0	124.0	129.5	96	95
75	9/16/99	North Dam Embankment Sta 20+10 at centerline of DE	2595.0	13.0	12.0	122.8	129.5	95	95
76	9/16/99	North Dam Embankment Sta 21+50 at centerline of DE	2596.0	14.0	7.3	125.4	129.5	97	95
77	9/17/99	North Dam Embankment Sta 20+80 at centerline of DE	2597.0	14.0	9.3	122.6	129.5	95	95
78	9/22/99	Sta 17+50 North side of Pipe	1' above Pipe	1.0	10.3	122.3	127.5	96	95
79	9/24/99	Sta 20+75 North side of Pipe	2' above Pipe	2.0	10.2	123.5	129.5	95	95
[redacted]	9/24/99	Sta 19+50 North side of Pipe	2' above Pipe	2.0	9.7	122.6	129.5	95	95
81	9/24/99	Sta 19+00 North side of Pipe	2' above Pipe	2.0	9.9	123.0	129.5	95	95
82	9/29/99	Sta 27+00	1' above Pipe	2.0	8.7	124.4	129.5	96	95
83	09/30/9	Sta 22+50	2' above Pipe	2.0	12.1	122.7	129.5	95	95
84	10/27/99	North side of Outelet Stucture	3' above outlet floor	3.0	12.2	118.5	124.5	95	95
85	10/27/99	South side of Outelet Stucture	4' above outlet floor	4.0	11.7	120.1	124.5	97	95
86	10/28/99	South side of Outelet Stucture	10' above outlet floor	10.0	10.8	117.9	124.5	95	95
87	10/28/99	North side of Outelet Stucture	10' above outlet floor	10.0	9.9	119.5	124.5	96	95
88	10/30/99	Sta 29+75	10' below FSG	1.0	8.8	125.6	129.5	97	95
89	10/30/99	Sta 33+75	10' below FSG	1.0	9.6	123.6	129.5	95	95
90	11/1/99	Sta 31+50	3' above 54" Pipe	3.0	11.2	117.7	124.5	95	95
91	11/4/99	Sta 36+00 Trench Backfill	1' above 54" Pipe	6.0	10.1	118.2	124.5	95	95
[redacted]	11/6/99	Sta 48+00	1' above Pipe	1.0	9.9	125.3	124.5	101	95

Copyright 2000 Kleinfelder, Inc.

FIELD DENSITY TEST SUMMARY

Test No.	Test Date	Test Location	Approx. Test Elevation, (ft.)	Approx. Depth of Fill, (ft.)	Moisture Content (% of dry wt.)	Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Percent Compaction ACT	Percent Compaction SPEC
93	11/6/99	Sta 32+50	3' above Pipe	3.0	8.4	122.9	124.5	99	95
94	11/6/99	Sta 31+00	4' above Pipe	4.0	9.1	123.0	124.5	99	95
95	11/12/99	Sta 44+25 Pipe Zone	1' above Pipe	1.0	8.5	126.3	129.5	98	95
96	11/12/99	Sta 48+10 Pipe Zone	1' above Pipe	1.0	12.4	122.9	129.5	95	95
97	11/12/99	Sta 35+50 Trench Zone	6' above Pipe	6.0	8.0	124.3	129.5	96	95
98	11/12/99	Sta 33+50 Trench Zone	10' above Pipe	10.0	9.6	125.1	129.5	97	95
99	11/22/99	Sta 32+60	7' Below surface	12.0	8.8	122.8	127.5	96	95
100	11/22/99	Sta 31+80	5' Below surface	16.0	7.6	122.1	127.5	96	95
101	11/22/99	Sta 31+20	1' Below surface	20.0	9.3	127.9	127.5	100	95
102	11/23/99	Sta 38+20	6' above Pipe	10.0	8.6	127.2	129.5	98	95
[illegible]	1/23/99	Sta 41+80	14' above Pipe	18.0	9.1	124.6	129.5	96	95
104	11/23/99	Sta 47+00	20' above top of Pipe	20.0	7.7	122.9	129.5	95	95
105	12/9/99	15' from Top of Inlet Structure	Finished Grade		6.8	122.9	127.5	96	95
106	12/9/99	Center of Inlet Structure	Finished Grade		7.0	126.8	127.5	100	95
107	12/9/99	Top of Inlet Structure	Finished Grade		8.7	125.2	127.5	98	95

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Federal Emergency Management Agency

Washington, D.C. 20472

RECEIVED
AUG 20 2001
MAYOR & COUNCIL
CITY OF HENDERSON

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 01-09-631P

The Honorable James Gibson
Mayor, City of Henderson
240 South Water Street
Henderson, NV 89015

Community: City of Henderson, NV
Community No.: 320005
Panel Affected: 32003C2615 D
Effective Date of This Revision: AUG 14 2001

102-D

Dear Mayor Gibson:

This responds to a request that the Federal Emergency Management Agency (FEMA) revise the effective Flood Insurance Rate Map (FIRM) for Clark County, Nevada 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 10, 2001, Mr. Pete Laas, P.E., Project Manager, Vpoint, requested that FEMA revise the FIRM to show the effects of placement of fill and street construction associated with the Eagleview Phase 1 project along an unnamed wash. The area along the unnamed wash is shown on the FIRM as a Special Flood Hazard Area (SFHA), the area that would be inundated by the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood), designated Zone A, with no Base Flood Elevations determined. This request follows up on a Conditional Letter of Map Revision issued on January 19, 2001.

All data required to complete our review of this request were submitted with letters from Mr. Laas.

We have completed our review of the submitted data and the flood data shown on the effective FIRM. We have revised the FIRM to remove the base floodplain boundary delineations along the unnamed wash. As a result of the modifications, the base flood for the unnamed wash is contained within the streets. The modifications are shown on the enclosed annotated copy of FIRM Panel 32003C2615 D. This Letter of Map Revision (LOMR) hereby revises the above-referenced panel of the effective FIRM dated August 16, 1995.

The modifications are effective as of the date shown above. The map panel listed above and as modified by this letter will be used for all flood insurance policies and renewals issued for your community.

A review of the determination made by this LOMR and any requests to alter this determination should be made within 30 days. Any request to alter the determination must be based on scientific or technical data.

We will physically revise and republish the previously cited FIRM panel and the Flood Insurance Study (FIS) report to reflect the modifications made by this LOMR, and issue Preliminary copies for community review. So that we may provide your community with the most up-to-date information possible, we request that your community review the effective FIRM panel referenced above and the effective FIS report to determine if any additional changes are warranted. Examples of possible changes include updates to corporate limits, new streets within or adjacent to designated SFHAs, and revised floodway boundary delineations.

To assist us in processing the revised FIRM and FIS report in a timely manner, we request that your community submit changes within 30 days of the date of this letter. We will review all information received during this 30-day period and incorporate it as appropriate into the Preliminary copies of the revised FIRM and FIS report. The Preliminary copies are scheduled to be delivered for review in approximately 4 months.

This LOMR 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.

Because this LOMR will not be printed and distributed to primary users, such as local insurance agents and mortgage lenders, your community will serve as a repository for these new data. We encourage you to disseminate the information reflected by this LOMR throughout the community, so that interested persons, such as property owners, local insurance agents, and mortgage lenders, may benefit from the information. We also encourage you to prepare an article for publication in your community's local newspaper. This article should describe the changes that have been made and the assistance that officials of your community will give to interested persons by providing these data and interpreting the NFIP maps.

This determination has been made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and is in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria are the minimum requirements and do not supersede any State or local requirements of a more stringent nature. This includes adoption of the effective FIRM to which the regulations apply and the modifications described in this LOMR.

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 calling the Chief, Community

Mitigation Programs Branch, Mitigation Division of FEMA in San Francisco, California, at (415) 923-7184. If you have any questions regarding this LOMR, please call our Map Assistance Center, toll free, at 1-877-FEMA MAP (1-877-336-2627).

Sincerely,

Max H. Yuan, P.E., Project Engineer
Hazards Study Branch
Hazard Mapping Division

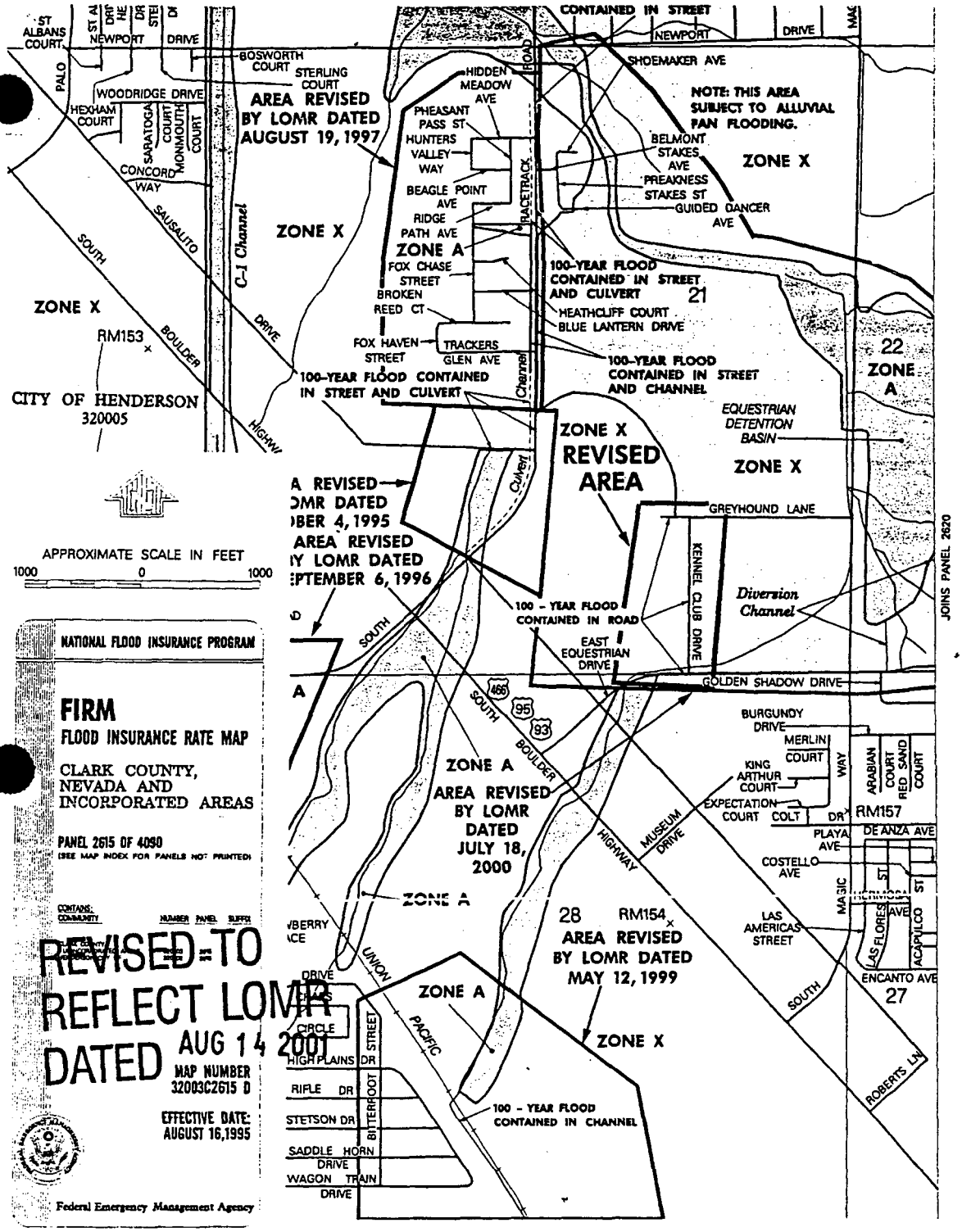
For: Matthew B. Miller, P.E., Chief
Hazards Study Branch
Hazard Mapping Division

Enclosure

cc: Mr. Curt Chandler, P.E.
Land Development Manager
Department of Public Works
City of Henderson

Mr. Kevin L. Eubanks, P.E.
Assistant General Manager
Clark County Regional Flood
Control District

Mr. Pete Laas, P.E.
Project Manager
Vpoint


ST ALBANS COURT
NEWPORT DRIVE
BOSWORTH COURT
STERLING COURT
AREA REVISED BY LOMR DATED AUGUST 19, 1997
WOODRIDGE DRIVE
HEXHAM COURT
SARATOGA COURT
MONMOUTH COURT
CONCORD WAY
SAUSALITO
SOUTH BOULDER DRIVE
HIGHWAY
C-1 Channel
ZONE X
RM153
CITY OF HENDERSON 320005
HIDDEN MEADOW AVE
PHEASANT PASS ST
HUNTERS VALLEY WAY
BEAGLE POINT AVE
RIDGE PATH AVE
ZONE A
FOX CHASE STREET
BROKEN REED CT
FOX HAVEN STREET
TRACKERS GLEN AVE
RACETRACK ROAD
100-YEAR FLOOD CONTAINED IN STREET AND CULVERT
CONTAINED IN STREET
NEWPORT DRIVE
SHOEMAKER AVE
NOTE: THIS AREA SUBJECT TO ALLUVIAL FAN FLOODING.
BELMONT STAKES AVE
PREAKNESS STAKES ST
GUIDED DANCER AVE
ZONE X
100-YEAR FLOOD CONTAINED IN STREET AND CULVERT
21
HEATHCLIFF COURT
BLUE LANTERN DRIVE
100-YEAR FLOOD CONTAINED IN STREET AND CHANNEL
22
ZONE A
EQUESTRIAN DETENTION BASIN
ZONE X
ZONE X REVISED AREA
A REVISED
OMR DATED
BER 4, 1995
AREA REVISED
Y LOMR DATED
PTEMBER 6, 1996
Culvert
GREYHOUND LANE
KENNEL CLUB DRIVE
Diversion Channel
100 - YEAR FLOOD CONTAINED IN ROAD
EAST EQUESTRIAN DRIVE
GOLDEN SHADOW DRIVE
JOINS PANEL 2620
APPROXIMATE SCALE IN FEET
1000 0 1000
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
CLARK COUNTY, NEVADA AND INCORPORATED AREAS
PANEL 2615 OF 4090
(SEE MAP INDEX FOR PANELS NOT PRINTED)
CONTAINS: COMMUNITY NUMBER PANEL SUFFIX
REVISED TO REFLECT LOMR DATED AUG 14 2001
MAP NUMBER 32003C2615 D
EFFECTIVE DATE: AUGUST 16,1995
Federal Emergency Management Agency
SOUTH BOULDER HIGHWAY
466
95
93
ZONE A
AREA REVISED BY LOMR DATED JULY 18, 2000
ZONE A
28
RM154
AREA REVISED BY LOMR DATED MAY 12, 1999
ZONE X
100 - YEAR FLOOD CONTAINED IN CHANNEL
BURGUNDY DRIVE
MERLIN COURT
KING ARTHUR COURT
EXPECTATION COURT
COLT DR
WAY
ARABIAN COURT
RED SAND COURT
RM157
PLAYA AVE
DE ANZA AVE
COSTELLO AVE
MAGIC
LAS AMERICAS STREET
LAS FLORES AVE
ACAPULCO ST
ENCANTO AVE
27
MUSEUM DRIVE
ROBERTS LN
UNION PACIFIC
HIGH PLAINS DR
RIFLE DR
STETSON DR
SADDLE HORN DRIVE
WAGON TRAIN DRIVE
BITTERROOT STREET

Federal Emergency Management Agency

Washington, D.C. 20472

RECEIVED
JUL 19 2001
MAYOR & COUNCIL
CITY OF HENDERSON

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 99-09-623P

The Honorable James Gibson
Mayor, City of Henderson
240 South Water Street
Henderson, NV 89015

Community: City of Henderson, NV
Community No.: 320005
Panels Affected: 32003C2615 D, 2620 D, and 2975 D
Effective Date of This Revision: JUL 18 2001

102-I-C

Dear Mayor Gibson:

This responds to a request that the Federal Emergency Management Agency (FEMA) revise the effective Flood Insurance Rate Map (FIRM) for Clark County, Nevada 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 March 18, 1999, Mr. Stephen L. Weatherman, P.E., Chief Flood Control Engineer, Poggemeyer Design Group, Inc., requested that FEMA revise the FIRM to show the effects of construction of the Equestrian Detention Basin (EDB) and a diversion channel that intercepts runoff from drainage areas to the north and east of the EDB. This request follows up on a Conditional Letter of Map Revision issued on February 19, 1997.

All data required to complete our review of this request were submitted with letters from Mr. Weatherman.

We have completed our review of the submitted data and the flood data shown on the effective FIRM. We have revised the FIRM to modify the floodplain boundary delineations and zone designations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) along an unnamed tributary to C-1 Channel from Newport Drive to East Horizon Drive. As a result of the modifications, the width of the Special Flood Hazard Area (SFHA), the area that would be inundated by the base flood, for the unnamed tributary increased in some areas and decreased in other areas. The modifications are shown on the enclosed annotated copies of FIRM Panels 32003C2615 D, 32003C2620 D, and 32003C2975 D. This Letter of Map Revision (LOMR) hereby revises the above-referenced panels of the effective FIRM dated August 16, 1995.

The modifications are effective as of the date shown above. The map panels as listed above and as modified by this letter will be used for all flood insurance policies and renewals issued for your community.

A review of the determination made by this LOMR and any requests to alter this determination should be made within 30 days. Any request to alter the determination must be based on scientific or technical data.

We are preparing a revised FIRM and Flood Insurance Study (FIS) report for Clark County; therefore, we will not physically revise and republish the FIRM and FIS report for your community to incorporate the modifications made by this LOMR at this time. Preliminary copies of the revised FIRM and FIS

report will be distributed for review in approximately 4 months. We will incorporate the modifications made by this LOMR into the Preliminary copies of the revised FIRM before it is distributed, and the modifications will be included when the revised FIRM become effective.

This LOMR 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.

The basis of this LOMR is, in whole or in part, a channel-modification project. NFIP regulations, as cited in Paragraph 60.3(b)(7), require that communities ensure 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 rests with your community.

Because this LOMR will not be printed and distributed to primary users, such as local insurance agents and mortgage lenders, your community will serve as a repository for these new data. We encourage you to disseminate the information reflected by this LOMR throughout the community, so that interested persons, such as property owners, local insurance agents, and mortgage lenders, may benefit from the information. We also encourage you to prepare a related article for publication in your community's local newspaper. This article should describe the changes that have been made and the assistance that officials of your community will give to interested persons by providing these data and interpreting the NFIP maps.

This determination has been made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and is in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed minimum NFIP criteria. These criteria are the minimum and do not supersede any State or local requirements of a more stringent nature. This includes adoption of the effective FIRM to which the regulations apply and the modifications made by this LOMR. Our records show that your community has met this requirement.

A Consultation Coordination Officer (CCO) has been designated to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Mr. Jack Eldridge
Chief, Community Mitigation Programs Branch
Federal Emergency Management Agency, Region IX
The Presidio of San Francisco, Building 105
San Francisco, CA 94129-1250
(415) 923-7184

If you have any questions regarding floodplain management regulations for your community or the NFIP in general, please call the CCO for your community at the telephone number cited above. If you have any questions regarding this LOMR, please call our Map Assistance Center, toll free, at 1-877-FEMA MAP (1-877-336-2627).

Sincerely,

Max H. Yuan, P.E., Project Engineer
Hazards Study Branch
Hazard Mapping Division

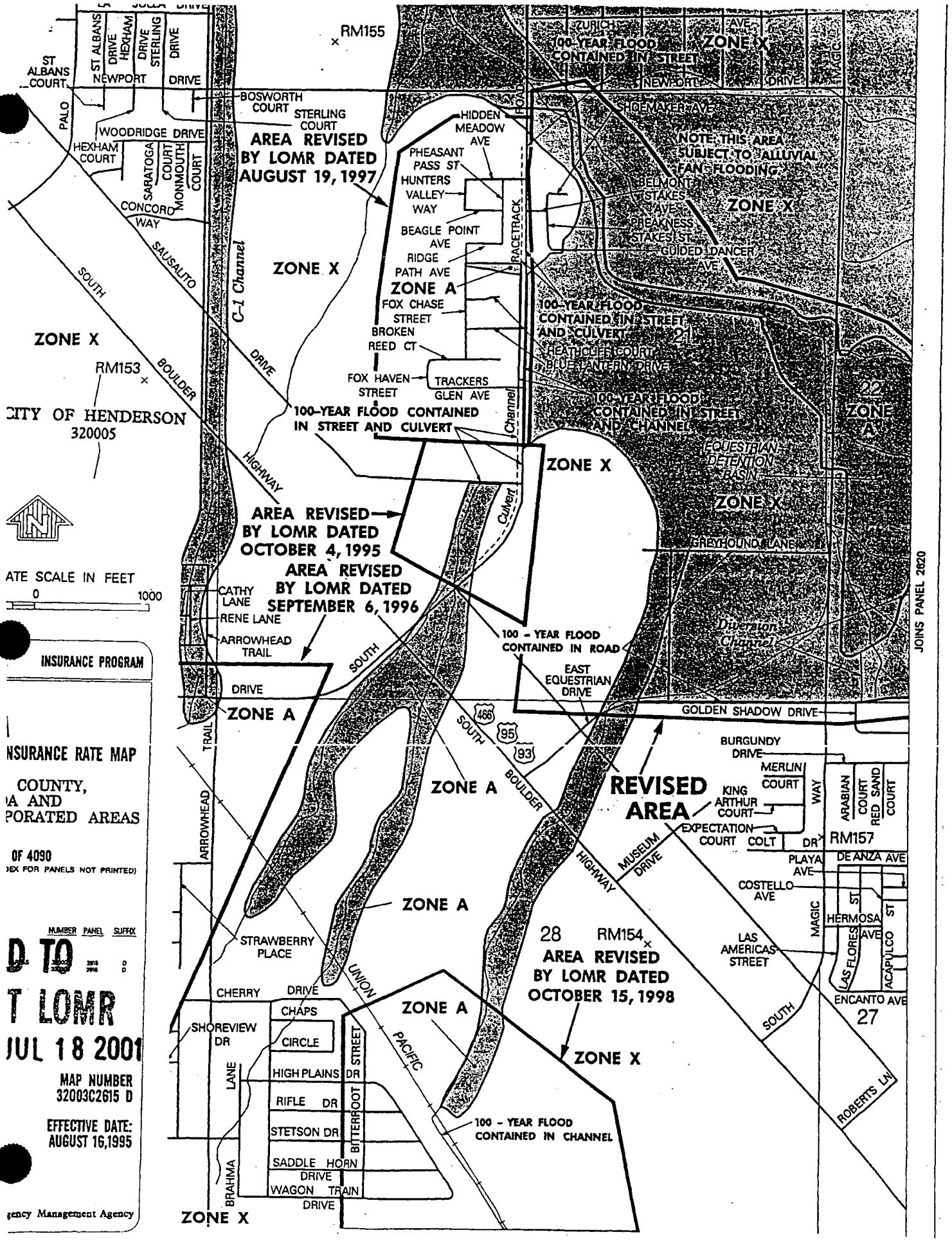
For: Matthew B. Miller, P.E., Chief
Hazards Study Branch
Hazard Mapping Division

Enclosures

cc: Mr. Curt Chandler, P.E.
Land Development Manager
Department of Public Works
City of Henderson

Mr. Kevin L. Eubanks, P.E.
Assistant General Manager
Clark County Regional Flood
Control District

Mr. Stephen L. Weatherman, P.E.
Chief Flood Control Engineer
Poggemeyer Design Group, Inc.


RM155
ZONE X
100-YEAR FLOOD CONTAINED IN STREET
ZURICH AVE
NEWPORT DRIVE
ST ALBANS COURT
ST ALBANS DRIVE
HEXHAM DRIVE
STERLING DRIVE
BOSWORTH COURT
STERLING COURT
PALO
WOODRIDGE DRIVE
HEXHAM COURT
SARATOGA COURT
MONMOUTH COURT
CONCORD WAY
SAUSALITO
SOUTH
BOULDER
DRIVE
HIGHWAY
AREA REVISED BY LOMR DATED AUGUST 19, 1997
HIDDEN MEADOW AVE
PHEASANT PASS ST
HUNTERS VALLEY WAY
BEAGLE POINT AVE
RIDGE PATH AVE
FOX CHASE STREET
BROKEN REED CT
FOX HAVEN STREET
TRACKERS GLEN AVE
ZONE A
ZONE X
C-1 Channel
RACETRACK ROAD
SHOEMAKER AVE
NOTE: THIS AREA SUBJECT TO ALLUVIAL FAN FLOODING
BELMONT STAKES AVE
PREAKNESS STAKES ST
GUIDED DANCER AVE
100-YEAR FLOOD CONTAINED IN STREET AND CULVERT
HEATHCLIFF COURT
BLUE LANTERN DRIVE
100-YEAR FLOOD CONTAINED IN STREET AND CHANNEL
22
ZONE A
EQUESTRIAN DETENTION BASIN
ZONE X
GREYHOUND LANE
100-YEAR FLOOD CONTAINED IN STREET AND CULVERT
Channel
Culvert
ZONE X
RM153
CITY OF HENDERSON
320005
AREA REVISED BY LOMR DATED OCTOBER 4, 1995
AREA REVISED BY LOMR DATED SEPTEMBER 6, 1996
CATHY LANE
RENE LANE
ARROWHEAD TRAIL
DRIVE
ZONE A
SOUTH
100 - YEAR FLOOD CONTAINED IN ROAD
EAST EQUESTRIAN DRIVE
GOLDEN SHADOW DRIVE
Diversion Channel
JOINS PANEL 2820
ATE SCALE IN FEET
0
1000
INSURANCE PROGRAM
NSURANCE RATE MAP
COUNTY,
IA AND
PORATED AREAS
OF 4090
DEX FOR PANELS NOT PRINTED)
NUMBER PANEL SUFFIX
D TO
T LOMR
JUL 18 2001
MAP NUMBER
32003C2615 D
EFFECTIVE DATE:
AUGUST 16,1995
gency Management Agency
ZONE A
TRAIL
ARROWHEAD
STRAWBERRY PLACE
CHERRY DRIVE
SHOREVIEW DR
CHAPS CIRCLE
HIGH PLAINS DR
RIFLE DR
STETSON DR
SADDLE HORN DRIVE
WAGON TRAIN DRIVE
BRAHMA LANE
BITTERROOT STREET
UNION PACIFIC
ZONE X
100 - YEAR FLOOD CONTAINED IN CHANNEL
ZONE A
ZONE X
REVISED AREA
BURGUNDY DRIVE
MERLIN COURT
KING ARTHUR COURT
EXPECTATION COURT
COLT WAY
ARABIAN COURT
RED SAND COURT
DR
RM157
PLAYA AVE
DE ANZA AVE
COSTELLO AVE
MAGIC ST
HERMOSA AVE
LAS FLORES ST
ACAPULCO ST
ENCANTO AVE
27
28
RM154
AREA REVISED BY LOMR DATED OCTOBER 15, 1998
LAS AMERICAS STREET
MUSEUM DRIVE
HIGHWAY
SOUTH
ROBERTS LN
466
95
93

Federal Emergency Management Agency

Washington, D.C. 20472

Canyon Count
+ Highland
Hills

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 96-09-678P

The Honorable Robert A. Groesbeck
Mayor, City of Henderson
240 Water Street
Henderson, Nevada 89015

Community: City of Henderson, Nevada
Community No.: 320005
Panel Affected: 32003C2615 D
Effective Date of
This Revision: SEP 06 1996

226

102-I-C

Dear Mayor Groesbeck:

This responds to a request for a revision to the effective Flood Insurance Study and National Flood Insurance Program (NFIP) map for your community. Specifically, this responds to a letter dated August 28, 1996, from Mr. David W. Trushaw, P.E., Project Engineer, VTN Nevada, regarding the effective Flood Insurance Rate Map (FIRM) for Clark County, Nevada and Incorporated Areas. With his letter, Mr. Trushaw provided additional information to support an April 2, 1996, request for a Letter of Map Revision (LOMR) from Mr. David C. Swallow, E.I.T., VTN Nevada. Mr. Swallow requested that the Federal Emergency Management Agency (FEMA) revise the effective FIRM to show the effects of modifications to C-1 Channel from just upstream to approximately 1,400 feet upstream of the Union Pacific Railroad (UPRR) and detailed topographic data for C-1 Channel from approximately 200 feet downstream of the UPRR to approximately 700 feet upstream of Vermillion Place.

All data required to complete our review of this request were submitted with Mr. Swallow's April 2 letter, and with letters dated May 20, June 11, June 12, June 28, July 25, and August 28, 1996, from Mr. Trushaw.

We have completed our review of the submitted data and the flood data shown on the effective FIRM, and have revised the FIRM to modify the floodplain boundary delineations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) along C-1 Channel from approximately 200 feet downstream of the UPRR to approximately 700 feet upstream of Vermillion Place. The base flood is contained within C-1 Channel from approximately 200 feet downstream of the UPRR to approximately 1,200 feet upstream of the UPRR and from approximately 1,400 feet downstream to approximately 600 feet downstream of Vermillion Place. The width of the Special Flood Hazard Area (SFHA) increased and decreased along the revised reach as a result of the modifications to C-1 Channel and more detailed topographic data. The maximum increase in SFHA width, approximately 75 feet, occurred approximately 1,500 feet upstream of the UPRR, and the maximum decrease in SFHA width, approximately 600 feet, occurred approximately 600 feet downstream of Vermillion Place.

The modifications are shown on the enclosed annotated copy of FIRM Panel 32003C2615 D. This LOMR hereby revises this panel of the effective FIRM dated August 16, 1995.

The revisions are effective as of the date of this letter; however, a review of the determination made by this LOMR and any requests to alter this determination should be made within 30 days. Any request to alter the determination must be based on scientific or technical data.

We will not physically revise and republish the FIRM for your community to reflect the modifications made by this LOMR at this time. However, when changes to FIRM Panel 32003C2615 D for your community warrant a physical revision and republication in the future, we will incorporate the modifications made by this LOMR at that time.

This response to Mr. Swallow's request is based on minimum floodplain management criteria established under the NFIP. Your community is responsible for approving all floodplain development, including this request, and for ensuring that necessary permits required by Federal or State law have been received. With knowledge of local conditions and in the interest of safety, State and community officials may set higher standards for construction, or may limit development in floodplain areas. If the State of Nevada or your community has adopted more restrictive or comprehensive floodplain management criteria, these criteria take precedence.

The basis of this LOMR 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.

Because this LOMR will not be printed and distributed to primary users, such as local insurance agents and mortgage lenders, your community will serve as a repository for these new data. We encourage you to disseminate the information reflected by this LOMR throughout the community, so that interested persons, such as property owners, local insurance agents, and mortgage lenders, may benefit from the information. We also encourage you to prepare an article for publication in your community's local newspaper. This article should describe the changes that have been made and the assistance that officials of your community will give to interested persons by providing these data and interpreting the NFIP maps.

The map panel as listed above and as revised by this letter will be used for all flood insurance policies and renewals issued for your community.

This determination has been made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and is in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria are the minimum requirements and do not supersede any State or local requirements of a more stringent nature. This includes adoption of the effective FIRM to which the regulations apply and the modifications described in this LOMR. Our records show that your community has met this requirement.

A Consultation Coordination Officer (CCO) has been designated to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Ms. Dorothy M. Lacey
Director, Mitigation Division
Federal Emergency Management Agency, Region IX
The Presidio of San Francisco, Building 105
San Francisco, California 94129-1250
(415) 923-7177

If you have any questions regarding floodplain management regulations for your community or the NFIP in general, please contact the CCO for your community at the telephone number cited above. If you have any technical questions regarding this LOMR, please contact Mr. Karl Mohr of our staff in Washington, DC, either by telephone at (202) 646-2770 or by facsimile at (202) 646-4596.

Sincerely,

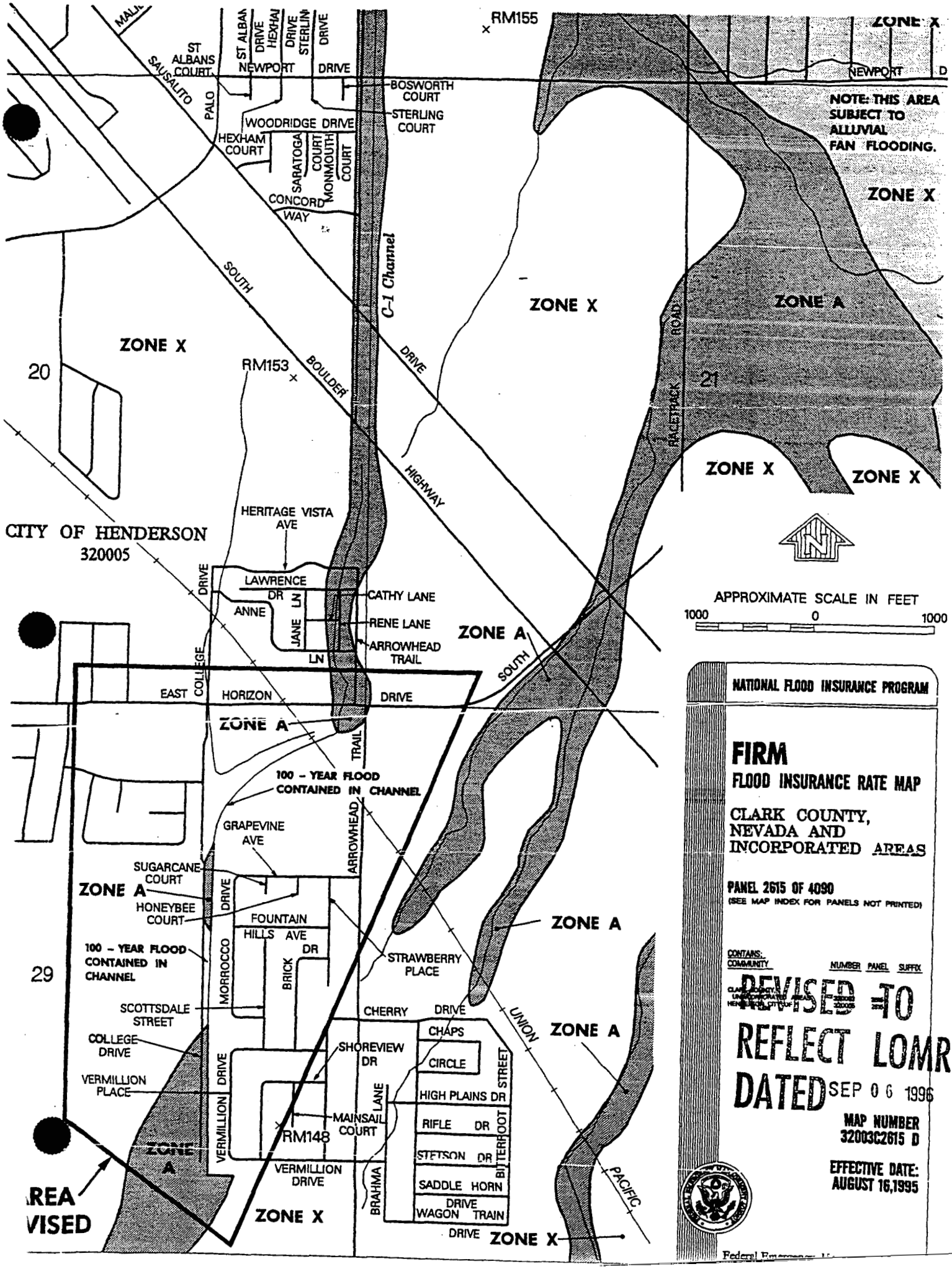
Michael K. Buckley, P.E., Chief
Hazard Identification Branch
Mitigation Directorate

Enclosure

cc: Mr. Curt Chandler, P.E.
Land Development Manager
Department of Public Works
City of Henderson

Mr. Kevin L. Eubanks, P.E.
Assistant General Manager
Clark County Regional Flood
Control District

Mr. David C. Swallow, E.I.T.
VTN Nevada


RM155
ZONE X
NEWPORT
D
NOTE: THIS AREA SUBJECT TO ALLUVIAL FAN FLOODING.
ZONE X
ST ALBANS COURT
NEWPORT DRIVE
BOSWORTH COURT
STERLING COURT
WOODRIDGE DRIVE
HEXHAM COURT
SARATOGA COURT
MONMOUTH COURT
CONCORD WAY
SAUSALITO
PALO
SOUTH BOULDER HIGHWAY
C-1 Channel
ZONE X
ZONE A
RACETRACK ROAD
20
21
RM153
ZONE X
ZONE X
ZONE X
CITY OF HENDERSON
320005
HERITAGE VISTA AVE
LAWRENCE DR
ANNE LN
JANE LN
CATHY LANE
RENE LANE
ARROWHEAD TRAIL
ZONE A
COLLEGE DRIVE
EAST HORIZON DRIVE
SOUTH
ZONE A
TRAIL
100 - YEAR FLOOD CONTAINED IN CHANNEL
GRAPEVINE AVE
ARROWHEAD
SUGARCANE COURT
ZONE A
HONEYBEE COURT
DRIVE
FOUNTAIN HILLS AVE
DR
100 - YEAR FLOOD CONTAINED IN CHANNEL
MORROCCO
BRICK
STRAWBERRY PLACE
ZONE A
29
SCOTTSDALE STREET
CHERRY DRIVE
COLLEGE DRIVE
SHOREVIEW DR
CHAPS CIRCLE
HIGH PLAINS DR
BITTERROOT STREET
VERMILLION PLACE
VERMILLION DRIVE
MAINSAIL COURT
RM148
RIFLE DR
STETSON DR
SADDLE HORN DRIVE
WAGON TRAIN
BRAHMA
VERMILLION DRIVE
ZONE A
ZONE X
UNION
ZONE A
PACIFIC
DRIVE
ZONE X
APPROXIMATE SCALE IN FEET
1000 0 1000
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
CLARK COUNTY, NEVADA AND INCORPORATED AREAS
PANEL 2615 OF 4090
(SEE MAP INDEX FOR PANELS NOT PRINTED)
CONTAINS:
COMMUNITY
NUMBER
PANEL
SUFFIX
REVISED TO REFLECT LOMR DATED SEP 06 1996
MAP NUMBER
32003C2615 D
EFFECTIVE DATE:
AUGUST 16,1995
Federal Emergency

WO# 5244

001
WO. FILE
LVG

Federal Emergency Management Agency

Washington, D.C. 20472

MAY 25 1999

RECEIVED
MAY 27 1999

RECEIVED
OCT 22 2001

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 99-09-066R

Post-it® Fax Note 7671	Date	# of pages ▶ 4
To DOUG BUATCHFORD	From KEVIN EUBANKS	
Co./Dept. C&B	Co. CCRFCD	
Phone #	Phone #	
Fax # 938-5454	Fax #	

The Honorable James B. Gibson
Mayor, City of Henderson
240 Water Street
Henderson, NV 89015

Dear Mayor Gibson:

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 Clark County, Nevada 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 October 16, 1998, Ms. Lora V. Gookin, E.I., VTN Nevada, requested that FEMA evaluate the effects that proposed construction of the East C-1 Detention Basin and Levee would have on the flood hazard information shown on the effective FIRM.

All data required to complete our review of this request for a Conditional Letter of Map Revision (CLOMR) were submitted with letters from Ms. Gookin.

We have completed our review of the submitted data and the flood data need to prepare the effective FIRM for your community. We believe that, if the proposed project is constructed as shown on the plans entitled "East C-1 Detention Basin Flood Control Improvements," prepared by VTN Nevada, dated April 1998, and the data listed below are received, a revision to the FIRM would be warranted.

As a result of the proposed project, the width of the Special Flood Hazard Area (SFHA), the area that would be inundated by the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood), of an unnamed wash will increase in some areas and decrease in other areas compared to the SFHA width shown on the effective FIRM. The maximum increase in SFHA width, 100 feet, will occur along an unnamed wash approximately 3,000 feet downstream of the boundary between Sections 14 and 23 of Township 22 South, Range 63 East. The maximum decrease in SFHA width, 2,100 feet, will occur along the same unnamed wash approximately 1,000 feet east of the boundary between Sections 14 and 15 of Township 22 South, Range 63 East.

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.

- Detailed application and certification forms, which were used in processing this request, must be used for requesting final revisions to the maps. Therefore, when the map revision request for the area covered by this letter is submitted, Form 1, entitled "Revision Requester and Community Official Form," must be included. (A copy of this form is enclosed.)

- The detailed application and certification forms listed below may be required if as-built conditions differ from the preliminary plans. If required, please submit new forms (copies of which are enclosed) or annotated copies of the previously submitted forms showing the revised information.

  Form 3, entitled "Hydrologic Analysis Form"

  Form 4, entitled "Riverine Hydraulic Analysis Form"

  Form 5, entitled "Riverine/Coastal Mapping Form"

  Form 6, entitled "Channelization Form"

  Form 8, entitled "Levee/Floodwall System Form"

  Form 11, entitled "Dam Form"

  Form 12, entitled "Alluvial Fan Form"

  Hydraulic analyses, for as-built conditions, of the base flood must be submitted with Form 4, and a topographic work map showing the revised floodplain boundaries must be submitted with Form 5.

- 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. Under this schedule, FEMA did not change the initial fee for processing map revision requests involving structural measures on alluvial fans. The initial fee for your map revision request will be $5,000 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 base flood elevation 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

- An officially adopted maintenance and operation plan for the proposed detention basin and levee. This plan, which may be in the form of a written statement from the community Chief Executive Officer, an ordinance, or other legislation, must describe the nature of the maintenance activities, the frequency with which they will be performed, and the title of the local community official who will be responsible for ensuring that the maintenance activities are accomplished.

- Topographic information and a hydraulic analysis showing how flow is conveyed from the outlet of the East C-1 Detention Basin (basin) to the East C-1 Levee (levee) channel

- Our review of the submitted information revealed that the project may cause increases in SFHA width in some areas. Documentation must be submitted to show that all requirements of Section 65.12 of the NFIP regulations have been met, including but not limited to documentation of individual legal notice to all affected property owners explaining the impact of the proposed project on their property and certification that no insurable structures are located in the areas that would be affected by the increased SFHA.

- To avoid discontinuities between revised and effective flood data, the submitted hydraulic and hydrologic analyses must be extensive enough to ensure that a logical transition can be shown between the revised and effective base floodplain boundary delineations. The submitted maps do not show how the revised base floodplain boundary delineations tie into those shown on effective FIRM Panel 32003C2620 D. Specifically, the hydraulic analysis should provide floodplain widths that closely match those shown on the effective FIRM at both the upstream and downstream limits of the revised reach. Please submit information showing how the revised base floodplain boundary delineations tie into the effective base floodplain boundary delineations.

- Although sediment traps have been designed within the proposed basin, sediment transport downstream of the proposed basin has not been considered. Please submit information to demonstrate that the proposed levee along the proposed channel will meet the requirements of Section 65.10 of the NFIP regulations. The information must include, but is not limited to, an engineering analysis that quantifies the volume of erosion and sediment deposition associated with the base flood downstream of the basin and along the levee channel. The information must also include the characteristics of sediment, the effects of erosion and sediment deposition on capacity of the channel, the stability of the channel and levee, and the freeboard of the levee.

After receiving appropriate documentation to show that the project has been completed, FEMA will initiate a revision to the FIRM.

The basis of this CLOMR is, in whole or in part, a channel-modification 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 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 San Francisco, California, at (415) 923-7177. If you have any technical questions regarding this CLOMR, please contact Mr. Max Yuan of our staff in Washington, DC, either by telephone at (202) 646-3843 or by facsimile at (202) 646-4596.

Sincerely,

Max H. Yuan, P.E., Project Engineer
Hazards Study Branch
Mitigation Directorate

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

Enclosure(s)

cc: Mr. Kevin L. Eubanks, P.E.
Assistant General Manager
Clark County Regional Flood Control District

Mr. Curt Chandler, P.E.
Land Development Manager
Department of Public Works
City of Henderson

Ms. Lora V. Gookin, E.I.
VTN Nevada

Federal Emergency Management Agency

Washington, D.C. 20472

AUG 19 1996

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 96-09-393R

The Honorable Robert A. Groesbeck
Mayor, City of Henderson
240 Water Street
Henderson, Nevada 89015

Community: City of Henderson, Nevada
Community No.: 320005

104

Dear Mayor Groesbeck:

This responds to a letter dated January 29, 1996, from Ms. Margaret C. Brake, P.E., Las Vegas Engineering Manager, Summit Engineering Corp., to the Federal Emergency Management Agency (FEMA) regarding the effective Flood Insurance Rate Map (FIRM) for Clark County, Nevada and Incorporated Areas. Ms. Brake requested that FEMA evaluate the effects that the construction of Drake Channel and proposed culverts along Drake Channel under Racetrack Road would have on the effective FIRM in the vicinity of the Sunset View Estates, River Landing, and Countrybrook Estates development sites.

Drake Channel and the development sites are affected by flooding designated Zone X (shaded), an area subject to alluvial fan flooding by the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) at an average depth of less than 1 foot, based on a detailed study of the Eastern Alluvial Fan. The channel and development sites are also affected by flooding from C-1 Channel and three unnamed washes, all designated Zone A, areas inundated by the base flood with no base flood elevations (BFEs) determined, based on approximate studies. The unnamed washes convey alluvial fan flooding from areas adjacent to, but independent of, the apex of the Eastern Alluvial Fan. The area from the apex of the Eastern Alluvial Fan to approximately 2,000 feet downstream is designated Zone AO, an area subject to base flooding at the average depths and velocities shown on the FIRM. Flood hazards in the area of Drake Channel and the development sites designated Zone X (shaded) may be just as severe as those in the areas designated Zone AO. The distinction between the Zone X (shaded) and Zone AO designations should be regarded as one of flooding potentials and not of the expected severity of flood damages.

Drake Channel originates approximately 6,500 feet east of Racetrack Road in the Zone X (shaded) area of the alluvial fan and intercepts the northern unnamed wash approximately 4,500 feet east of Racetrack Road, the central unnamed wash approximately 600 feet east of Racetrack Road, and the southern unnamed wash near its confluence with C-1 Channel. Drake Channel is trapezoidal and unlined with a series of gabion-lined drop structures from its entrance to Racetrack Road, where two 12-foot by 6-foot reinforced concrete box culverts are proposed. Drake Channel is trapezoidal and concrete-lined west of Racetrack Road and joins C-1 Channel approximately 2,500 feet west of Racetrack Road.

All data required by FEMA to evaluate this request were submitted with Ms. Brake's January 29 letter. We reviewed the data submitted and the flood data used to prepare the effective FIRM for Clark County, Nevada and Incorporated Areas. We believe that if the issues described in the following paragraphs can be addressed and if the proposed project is constructed as shown on the plans entitled "Construction Plans for Drake Channel Culvert of Racetrack Road," dated October 13, 1994, and "Construction Plans for

Drake Channel Improvements," dated July 8, 1994, both prepared by Summit Engineering Corp., a revision to the Zone A floodplain boundary delineations on the FIRM may be warranted. A final determination on revising the effective FIRM cannot be made until the issues described in the following paragraphs are addressed.

Because Drake Channel is in an area subject to alluvial fan flooding, there is a potential for sediment deposition to reduce its ability to collect and convey the base flood, particularly at its entrance, culvert crossings, and confluence with C-1 Channel. An engineering analysis must be provided that quantifies the volumes of debris flow and sediment movement associated with the base flood. The assessment should consider the characteristics and availability of sediment in the drainage basins for the unnamed washes and the effects of sediment deposition on the slope, stability, and capacity of the channel and culverts. An engineering analysis must be provided that verifies the entire reach of Drake Channel will accommodate the estimated peak discharges and volumes of water, debris, and sediment and will withstand the hydrodynamic forces associated with sediment and debris flow at the calculated velocities.

Based on the information submitted, it appears the left bank of Drake Channel where the unnamed washes enter the unlined portion of the channel east of Racetrack Road may be subject to erosion and head cutting that could jeopardize the structural integrity of the drop structures and the channel. Also, scour and sediment deposition may occur in the channel at these locations and could affect the channel's ability to convey the base flood. Rip-rap or other provisions may be required to protect the channel and maintain its stability at the locations where the washes enter the channel. An analysis must be provided that quantifies the amount of erosion, head cutting, and sediment deposition that could occur and the effects on the channel's ability to convey the base flood.

As stated in the submitted request, there is a potential for hydraulic jumps to occur at the drop structures along Drake Channel east of Racetrack Road, where velocities approach 30 feet per second (fps) under supercritical conditions. Documentation to show how the hydraulic jumps are controlled and the effects of the hydraulic jumps on the capacity and stability of the channel must be submitted. Documentation must also be submitted showing how erosion of the channel banks and scour of the channel bottom will be prevented in the unlined portion of the channel.

The velocities along the concrete-lined portion of Drake Channel west of Racetrack Road near its transition to C-1 Channel approach 40 fps based on the submitted hydraulic data. Based on the calculated velocity and depth of flow, if a hydraulic jump were to occur near the transition to C-1 Channel, the water-surface elevation along Drake Channel would increase by approximately 14 feet. Documentation to verify that supercritical flow can be maintained throughout the concrete-lined portion of Drake Channel west of Racetrack Road and through the transition to C-1 Channel or an analysis of the effects of a hydraulic jump must be provided.

A base flood discharge value of 1,479 cubic feet per second (cfs) is calculated for Drake Channel east of Racetrack Road in the hydrologic analysis from a report entitled "Supplement #2 to Addendum #1 to the Design Report for Drake Channel Extension," prepared by VTN Nevada, dated April 15, 1993. Our review of the submitted hydrologic analysis included a comparison of the suggested discharge value and drainage area with drainage area-discharge relationships in the Flood Insurance Study report and in a report by the U.S. Army Corps of Engineers entitled "Hydrologic Documentation for Feasibility Study, Las Vegas Wash and Tributaries, Clark County Nevada," dated April 1988. The submitted discharge value appears to be low based on this comparison and other discharge values previously calculated in the area. For example, in a report entitled "Technical Drainage Study, Lakeside Highland Development,"

prepared by Civiltec, dated February 6, 1992, submitted with this request, a base flood discharge value of 1,929 cfs is calculated for Drake Channel east of Racetrack Road. Documentation must be submitted to verify the submitted discharge value is superior to that obtained from the drainage area-discharge relationships cited above and from the 1992 Civiltec report.

The 1992 Civiltec report contains hydraulic data for Drake Channel west of Racetrack Road and a channel along Racetrack Road that joins Drake Channel; however, only a summary of depths and velocities at each cross section is given. Hydraulic models for each of the channels from their confluence to their upstream limit, including an analysis of the superelevation of flows at the bends in the channels, must be submitted. Because the channel along Racetrack Road is in an area subject to alluvial fan flooding, it may convey sediment during the base flood event that could affect Drake Channel at their confluence. An assessment of the effects of sediment deposition on the capacity of Drake Channel at its confluence with the channel along Racetrack Road must be provided.

The River Landing and Countrybrook Estates development sites are affected by flooding from C-1 Channel and the southern unnamed wash between C-1 Channel and Racetrack Road; however, hydraulic analyses for these flooding sources were not submitted with this request. Hydraulic analyses of C-1 Channel and the southern unnamed wash must be provided to verify the flooding effects on the River Landing and Countrybrook Estates development sites.

Our review of the submitted data and flood data used to prepare the effective FIRM is complete. Before a final determination can be made on revising the effective FIRM, FEMA must receive the data listed below.

- The items described in detail above.

- An annotated FIRM at the scale of the effective FIRM showing the revised base floodplain boundaries and how they tie into those shown on the effective FIRM downstream and upstream of the revision.

- Application/Certification Form 4, entitled "Riverine Hydraulic Analysis Form," submitted with this request has not been completed. Please submit a completed Form 4 and the necessary supporting data, as described in the package instructions.

- A diskette with full input and output listings of the HEC-1 and HEC-2 analyses submitted with the request.

- The HEC-1 output and other calculations in the Appendix of Addendum #1 to the Preliminary Design Report for the Drake Channel Extension, prepared by VTN Nevada, dated June 1992, and in the Technical Drainage Study for Lakeside Highlands Development, prepared by Civiltec, are not legible. Please submit new, legible copies of these analyses and calculations.

- Detailed Application/Certification forms, which were used in processing this request, must be used for requesting final revisions to the maps. Therefore, when the map revision request for the area covered by this letter is submitted, Form 1, entitled "Revision Requester and Community Official Form," Form 2, entitled "Certification by Registered Professional Engineer and/or Land Surveyor," and Form 12, entitled "Alluvial Fan Form," must be included. (Copies of these forms are enclosed.)

- The detailed Application/Certification forms listed below may be required if as-built conditions differ from the preliminary plans. If required, please submit new forms (copies enclosed) or annotated copies of the previously submitted forms showing the revised information.

  — Form 3, entitled "Hydrologic Analysis Form."

  — Form 6, entitled "Channelization Form."

  — Form 7, entitled "Bridge/Culvert Form."

- An initial fee of $225, which represents the minimum charges associated with a request of this type, must be submitted before we can process your revision request. Payment of this fee shall be made in the form of a check or money order made payable to the National Flood Insurance Program (NFIP), or by credit card payment. The payment must be forwarded to the following address:

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

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

- Certification that all fill placed in the currently effective base floodplain and below the 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.

- An officially adopted maintenance and operation plan for Drake Channel. This plan, which may be in the form of a written statement from the community Chief Executive Officer, an ordinance, or other legislation, must describe the nature of the maintenance activities, the frequency with which they will be performed, and the title of the local community official who will be responsible for ensuring that the maintenance activities are accomplished.

The basis of this Conditional Letter of Map Revision (CLOMR) is, in whole or in part, a proposed channel-modification and culvert project. Paragraph 60.3(b)(7) of the NFIP regulations requires 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, your community must agree to accept responsibility for the maintenance of the modified channel before allowing its construction.

This response to Ms. Brake's request is based on minimum floodplain management criteria established under the NFIP. Your community is responsible for approving all proposed floodplain development, including this request, and for assuring that the necessary permits required by Federal or State law have been received. State and community officials, based on knowledge of local conditions and in the interest of human safety, may set higher standards for construction or may limit development in floodplain areas. If the State of Nevada or your community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

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 San Francisco, California, at (415) 923-7177. If you have any technical questions regarding this CLOMR, please contact Mr. Karl Mohr of our staff in Washington, DC, either by telephone at (202) 646-2770 or by facsimile at (202) 646-4596.

Sincerely,

Michael K. Buckley, P.E., Chief
Hazard Identification Branch
Mitigation Directorate

Enclosure

cc: Mr. Curt Chandler, P.E.
Land Development Manager
Department of Public Works
City of Henderson

Mr. Kevin L. Eubanks, P.E.
Assistant General Manager
Clark County Regional Flood Control District

Ms. Margaret C. Brake, P.E.
Las Vegas Engineering Manager
Summit Engineering Corp.

will be incorporated

Federal Emergency Management Agency

Washington, D.C. 20472

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 95-09-934P

The Honorable Robert A. Groesbeck
Mayor, City of Henderson
240 Water Street
Henderson, Nevada 89015

Community: City of Henderson, Nevada
Community No.: 320005
Panels Affected: 32003C2955 D and 2975 D
Effective Date of
This Revision: OCT 06 1995

102-D

Dear Mayor Groesbeck:

This is in response to a letter dated August 18, 1995, from Mr. Curt Chandler, P.E., Land Development Manager, Department of Public Works, City of Henderson, regarding the reissuance of Letters of Map Revision (LOMRs) dated July 20, 1995 (Case No. 95-09-435P), and August 3, 1995 (Case No. 95-09-465P), for the City of Henderson, Nevada. The July 20 and August 3 LOMRs both revised Panel 320005 0020 B of the Flood Insurance Rate Map (FIRM) for the City of Henderson, Nevada, dated June 15, 1982. The FIRM has since been superseded by a FIRM for Clark County, Nevada and Incorporated Areas, dated August 16, 1995. The analyses used to amend the FIRM are still valid.

The July 20 LOMR was issued in response to a facsimile dated June 30, 1995, from Mr. W. Scott Wonders, E.I.T., VTN Nevada, regarding the effective FIRM for the City of Henderson, Nevada. With his letter, Mr. Wonders provided additional information to support his April 6, 1995, request for a LOMR. Mr. Wonders requested that the Federal Emergency Management Agency (FEMA) revise the effective FIRM to show the effects of the Mission Hills detention basin and on-site drainage improvements for the Black Mountain Ranch development site along an unnamed wash affecting the site. The July 20 LOMR followed up on a Conditional Letter of Map Revision, which was issued on December 19, 1994.

The August 3 LOMR was issued in response a letter dated July 25, 1995, from Mr. John P. Clark, P.E., VTN Nevada, regarding the effective FIRM for the City of Henderson, Nevada. With his letter, Mr. Clark provided additional information to support his April 17, 1995, request for a LOMR. Mr. Clark requested that FEMA revise the effective FIRM to show the effects of the Mission Hills detention basin and on-site drainage improvements for the Desert Highlands development site along an unnamed wash affecting the site.

All data required to complete our review of the July 20 LOMR were submitted with Mr. Wonders' letters dated April 6, June 12, and June 22, 1995, and his June 30 facsimile. All data required to complete our review of the August 3 LOMR were submitted with Mr. Clark's letters dated April 17, June 15, and July 25, 1995. Because this LOMR is a reissuance of the July 20 and August 3 LOMRs, fees were not assessed for the review.

We have completed our review of the submitted data and the flood data shown on the effective FIRM and have revised the FIRM to modify the floodplain boundary delineations of a flood having a 1-percent

chance of being equaled or exceeded in any given year (base flood) along the unnamed wash affecting the Black Mountain Ranch and Desert Highlands development sites, from I-515 to approximately 1,500 feet upstream of Arrowhead Trail. Construction of the Mission Hills detention basin significantly reduced the watershed area and base flows contributing to the Black Mountain Ranch and Desert Highlands development sites. The base flood is contained in the streets and on-site drainage facilities within the Black Mountain Ranch and Desert Highlands development sites. The Special Flood Hazard Area designated Zone A has been removed upstream of I-515 based on the reduced discharge values and on-site drainage improvements.

The modifications are shown on the enclosed annotated copies of FIRM Panels 32003C2955 D and 2975 D. This LOMR hereby revises these panels of the effective FIRM dated August 16, 1995.

A separate LOMR (copy enclosed) was issued on the same date as this LOMR to show the effects of the project described herein on the SFHA in the unincorporated areas of Clark County, Nevada.

The revisions are effective as of the date of this letter; however, a review of the determination made by this LOMR and any requests to alter this determination should be made within 30 days. Any request to alter the determination must be based on scientific or technical data.

Due to present funding constraints, we must limit the number of physical map revisions processed. Consequently, we will not republish the FIRM for your community to reflect the modifications described in this LOMR at this time. However, when changes to FIRM Panels 32003C2955 D and 2975 D for your community warrant a physical revision and republication in the future, we will incorporate the modifications described in this LOMR at that time.

This response to Mr. Chandler's request is based on minimum floodplain management criteria established under the National Flood Insurance Program (NFIP). Your community is responsible for approving all floodplain development, including this request, and for ensuring that necessary permits required by Federal or State law have been received. With knowledge of local conditions and in the interest of safety, State and community officials may set higher standards for construction, or may limit development in floodplain areas. If the State of Nevada or your community has adopted more restrictive or comprehensive floodplain management criteria, these criteria take precedence.

The basis of this LOMR is, in whole or in part, a channel-modification 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 channel modification rests with your community.

Because this LOMR will not be printed and distributed to primary users, such as local insurance agents and mortgage lenders, your community will serve as a repository for these new data. We encourage you to disseminate the information reflected by this LOMR throughout the community, so that interested persons, such as property owners, local insurance agents, and mortgage lenders, may benefit from the information. We also encourage you to prepare an article for publication in your community's local newspaper. This article should describe the changes that have been made and the assistance that officials of your community will give to interested persons by providing these data and interpreting the NFIP maps.

The map panels as listed above and as revised by this letter will be used for all flood insurance policies and renewals issued for your community.

This determination has been made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and is in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria are the minimum requirements and do not supersede any State or local requirements of a more stringent nature. This includes adoption of the effective FIRM to which the regulations apply and the modifications described in this LOMR.

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 San Francisco, California, at (415) 923-7177. If you have any technical questions regarding this LOMR, please contact Mr. John Magnotti of our staff in Washington, DC, either by telephone at (202) 646-3932 or by facsimile at (202) 646-4596.

Sincerely,

Michael K. Buckley, P.E., Chief
Hazard Identification Branch
Mitigation Directorate

Enclosures

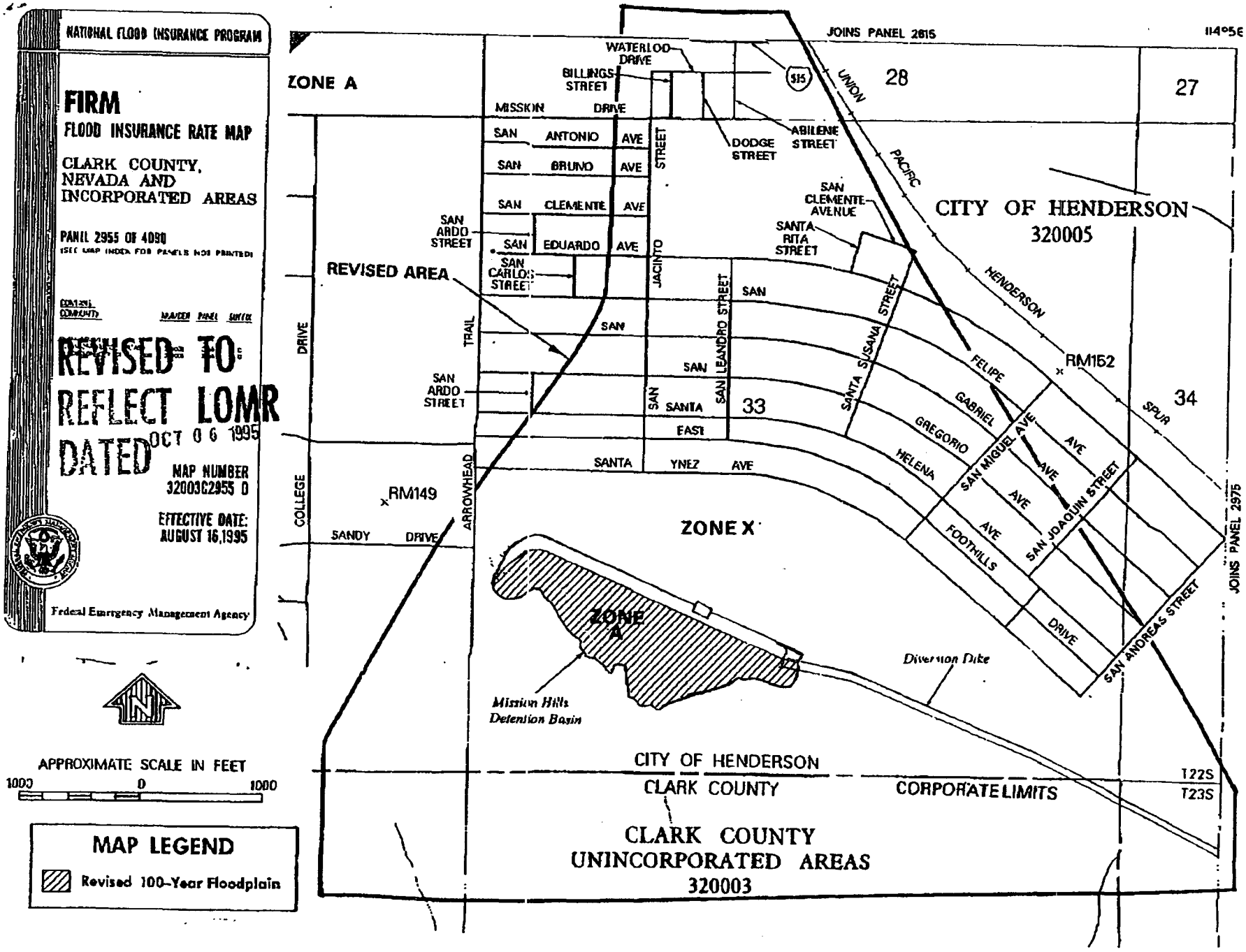
cc: The Honorable Yvonne Atkinson Gates
Chairperson, Clark County Board
of Commissioners

Mr. Curt Chandler, P.E.
Land Development Manager
Department of Public Works
City of Henderson

Mr. Kevin L. Eubanks, P.E.
Assistant General Manager
Clark County Regional Flood
Control District

Mr. David P. Swallow
VTN Nevada

Mr. John P. Clark, P.E.
VTN Nevada



09-26-2002 11:53am From-COH PW ENGINEERING +7025655687 T-606 P.005/009 F-786

Federal Emergency Management Agency

Washington, D.C. 20472

CC copy has different maps

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 95-09-934P

The Honorable Yvonne Atkinson Gates
Chairperson, Clark County Board
of Commissioners
225 Bridger Avenue
Las Vegas, Nevada 89155

Community: Clark County, Nevada
Community No.: 320003
Panel Affected: 32003C2955 D
Effective Date of
This Revision: OCT 06 1995

102-D

Dear Ms. Atkinson Gates:

This is in response to a request for a revision to the effective Flood Insurance Study and National Flood Insurance Program (NFIP) map for your community. Specifically, this responds to a facsimile dated June 30, 1995, from Mr. W. Scott Wonders, E.I.T., VTN Nevada, regarding the effective Flood Insurance Rate Map (FIRM) for Clark County, Nevada and Incorporated Areas. With his letter, Mr. Wonders provided additional information to support his April 6, 1995, request for a Letter of Map Revision (LOMR). Mr. Wonders requested that the Federal Emergency Management Agency (FEMA) revise the effective FIRM to show the effects of the Mission Hills detention basin along an unnamed wash affecting the Black Mountain Ranch development site. This request follows up on a Conditional Letter of Map Revision, which was issued on December 19, 1994.

All data required to complete our review of this request were submitted with Mr. Wonders' letters dated April 6, June 12, and June 22, 1995, and his June 30 facsimile. All fees necessary to process this LOMR, a total of $1,370, have been received.

We have completed our review of the submitted data and the flood data shown on the effective FIRM and have revised the FIRM to modify the floodplain boundary delineations of a flood having a 1-percent chance of being equaled or exceeded in any given year along the unnamed wash affecting the Black Mountain Ranch development site. The Special Flood Hazard Area (SFHA) designated Zone A has been removed from approximately 1,500 feet upstream of Arrowhead Trail to the upstream limit of the SFHA based on the hydrologic and hydraulic analyses completed in support of this request.

The modifications are shown on the enclosed annotated copy of FIRM Panel 32003C2955 D. This LOMR hereby revises this panel of the effective FIRM dated August 16, 1995.

In response to Mr. Wonders' request, a LOMR was issued for the City of Henderson, Nevada, on July 20, 1995, showing the revisions to the FIRM for that community. The July 20 LOMR was superseded by a FIRM for Clark County, Nevada and Incorporated Areas, dated August 16, 1995. The City of Henderson has requested that FEMA reissue the July 20 LOMR. A copy of the reissuance of that LOMR, with the reissuance of an August 3, 1995, LOMR for the area immediately downstream of the Black Mountain Ranch development site along the same unnamed wash, is enclosed.

The revisions are effective as of the date of this letter; however, a review of the determination made by this LOMR and any requests to alter this determination should be made within 30 days. Any request to alter the determination must be based on scientific or technical data.

Due to present funding constraints, we must limit the number of physical map revisions processed. Consequently, we will not republish the FIRM for your community to reflect the modifications described in this LOMR at this time. However, when changes to FIRM Panel 32003C2955 D for your community warrant a physical revision and republication in the future, we will incorporate the modifications described in this LOMR at that time.

This response to Mr. Wonders' request is based on minimum floodplain management criteria established under the NFIP. Your community is responsible for approving all floodplain development, including this request, and for ensuring that necessary permits required by Federal or State law have been received. With knowledge of local conditions and in the interest of safety, State and community officials may set higher standards for construction, or may limit development in floodplain areas. If the State of Nevada or your community has adopted more restrictive or comprehensive floodplain management criteria, these criteria take precedence.

The map panel as listed above and as revised by this letter will be used for all flood insurance policies and renewals issued for your community.

This determination has been made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and is in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria are the minimum requirements and do not supersede any State or local requirements of a more stringent nature. This includes adoption of the effective FIRM to which the regulations apply and the modifications described in this LOMR.

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 San Francisco, California, at (415) 923-7177. If you have any technical questions regarding this LOMR, please contact Mr. John Magnotti of our staff in Washington, DC, either by telephone at (202) 646-3932 or by facsimile at (202) 646-4596.

Sincerely,

Michael K. Buckley, P.E., Chief
for Hazard Identification Branch
Mitigation Directorate

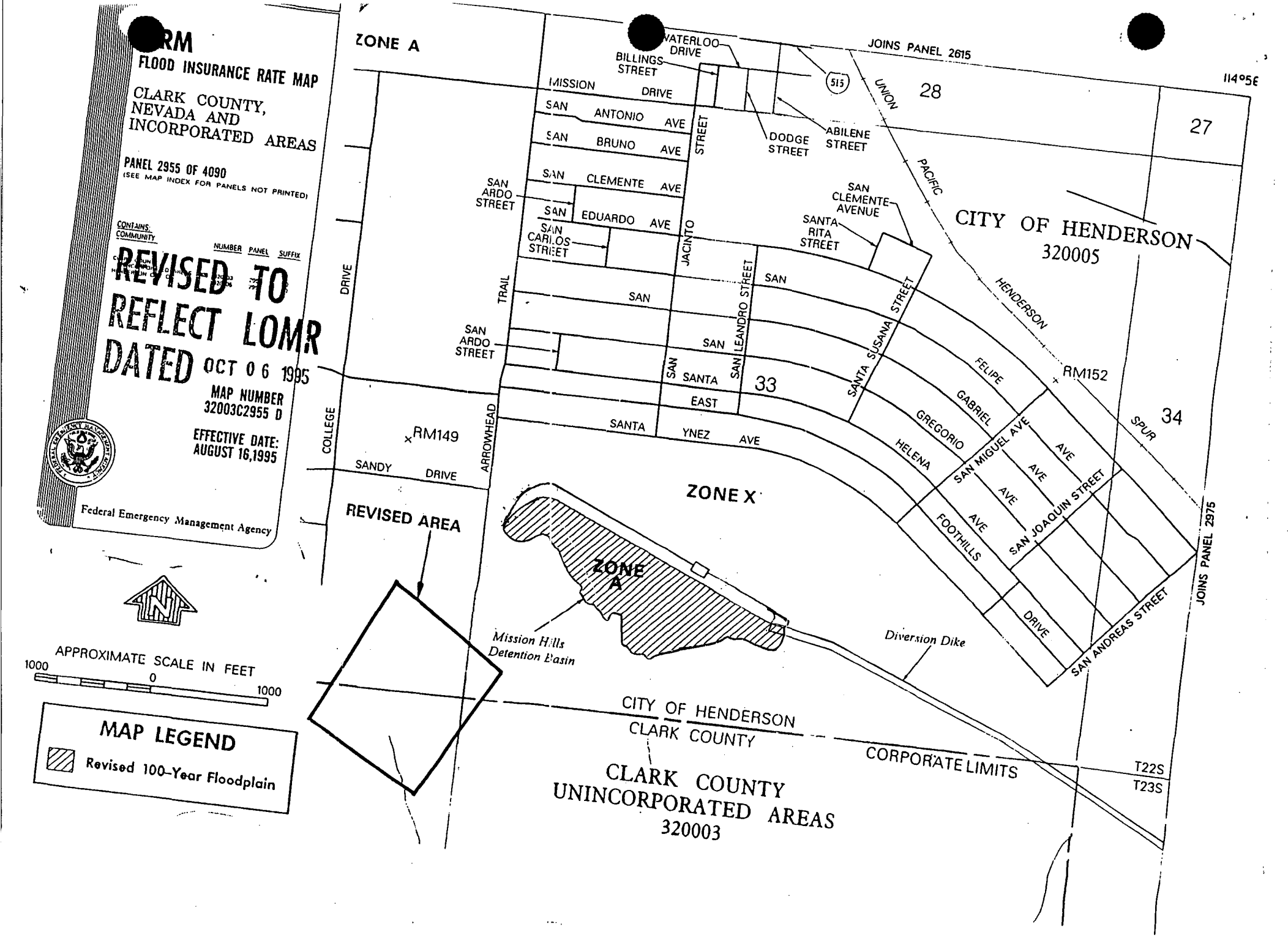
Enclosures

cc: The Honorable Robert A. Groesbeck
Mayor, City of Henderson

Mr. Robert B. Thompson, P.E.
Civil Engineer III
Clark County Department of Public Works

Mr. Kevin L. Eubanks, P.E.
Assistant General Manager
Clark County Regional Flood
Control District

Mr. David P. Swallow
VTN Nevada


RM
FLOOD INSURANCE RATE MAP
CLARK COUNTY, NEVADA AND INCORPORATED AREAS
PANEL 2955 OF 4090
(SEE MAP INDEX FOR PANELS NOT PRINTED)
CONTAINS:
COMMUNITY
NUMBER
PANEL
SUFFIX
REVISED TO REFLECT LOMR DATED OCT 0 6 1995
MAP NUMBER 32003C2955 D
EFFECTIVE DATE: AUGUST 16,1995
Federal Emergency Management Agency
ZONE A
WATERLOO DRIVE
BILLINGS STREET
MISSION DRIVE
SAN ANTONIO AVE
SAN BRUNO AVE
SAN CLEMENTE AVE
SAN EDUARDO AVE
SAN ARDO STREET
SAN CARLOS STREET
JACINTO STREET
DODGE STREET
ABILENE STREET
515
JOINS PANEL 2615
114°52'30"
28
27
UNION PACIFIC
SAN CLEMENTE AVENUE
SANTA RITA STREET
CITY OF HENDERSON
320005
HENDERSON
RM152
SPUR
34
SAN LEANDRO STREET
SANTA SUSANA STREET
FELIPE
GABRIEL
GREGORIO
HELENA
SAN MIGUEL AVE
SAN JOAQUIN STREET
FOOTHILLS
DRIVE
SAN ANDREAS STREET
JOINS PANEL 2975
33
SAN SANTA EAST
SANTA YNEZ AVE
TRAIL
DRIVE
COLLEGE
ARROWHEAD
RM149
SANDY DRIVE
ZONE X
ZONE A
REVISED AREA
Mission Hills Detention Basin
Diversion Dike
APPROXIMATE SCALE IN FEET
1000
0
1000
MAP LEGEND
Revised 100-Year Floodplain
CITY OF HENDERSON
CLARK COUNTY
CORPORATE LIMITS
T22S
T23S
CLARK COUNTY
UNINCORPORATED AREAS
320003

Federal Emergency Management Agency

Washington, D.C. 20472

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 95-09-938P

The Honorable Robert A. Groesbeck
Mayor, City of Henderson
240 Water Street
Henderson, Nevada 89015

Community: City of Henderson, Nevada
Community No.: 320005
Panel Affected: 32003C2615 D
Effective Date of
This Revision: OCT 04 1995

102-D

Dear Mayor Groesbeck:

This is in response to a letter dated August 18, 1995, from Mr. Curt Chandler, P.E., Land Development Manager, Department of Public Works, City of Henderson, regarding the reissuance of a Letter of Map Revision (LOMR) dated March 17, 1995, for the City of Henderson, Nevada. The March 17 LOMR revised Panel 0020 B of the Flood Insurance Rate Map (FIRM) for the City of Henderson, Nevada, dated May 15, 1982. The FIRM has since been superseded by a FIRM for Clark County, Nevada and Incorporated Areas, dated August 16, 1995. The analysis used to amend the FIRM is still valid.

The March 17 LOMR was issued in response to a letter dated March 3, 1995, from Mr. Larry R. Nelson, P.E., President, L.R. Nelson Consulting Engineers, Inc., regarding the effective FIRM for the City of Henderson, Nevada. With his letter, Mr. Nelson provided additional information to support an October 31, 1994, request from Mr. A. Nelson Stone II, P.E., Principal Engineer, FES Consulting Engineers, Inc., for a LOMR. Mr. Stone requested that the Federal Emergency Management Agency (FEMA) revise the effective FIRM to show the effects of channel and culvert improvements for the Country Hills Condominiums development site along an unnamed wash northwest of the intersection of Sausalito Drive and South Racetrack Road. The March 17 LOMR followed up on a Conditional Letter of Map Revision, which was issued on September 26, 1994.

All data required to complete our review of the March 17 LOMR were submitted with Mr. Nelson's letter dated March 3 and with Mr. Stone's letters dated October 31, 1994, and January 9 and January 30, 1995. Because this LOMR is a reissuance of the March 17 LOMR, fees were not assessed for the review.

We have completed our review of the submitted data and the flood data shown on the effective FIRM and have revised the FIRM to modify the floodplain boundary delineations of a flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) along the unnamed wash from Sausalito Drive to approximately 600 feet downstream of the northern property line for the Country Hills Condominiums development site along South Racetrack Road. The base flows upstream of the Country Hills Condominiums development site are partially contained in a 6-foot by 4-foot reinforced concrete box (RCB) culvert constructed for a K-Mart Shopping Center, and run along the western side of South Racetrack Road and under Sausalito Drive south of the project area. The base flows are diverted to the west into a 6-foot by 5-foot RCB culvert, constructed as part of this project, located along the western side of South Racetrack Road. Additional offsite flows affecting the Country Hills Condominiums development site are diverted eastward along Sausalito Drive, using the street and a triangular channel along the northern side of Sausalito Drive that discharges into the RCB culvert at South Racetrack Road.

The triangular channel extends approximately 200 feet beyond the western property line to eliminate the flood hazard for the northwestern portion of the site. The base flows are contained within these storm-drain systems, consisting of the triangular channel and the street along Sausalito Drive, and the RCB culvert and the street along South Racetrack Road. All onsite base flows are diverted into adjacent streets or channels.

The width of the Special Flood Hazard Area (SFHA) decreased by a maximum of approximately 300 feet along South Racetrack Road north of its intersection with Sausalito Drive because of site grading and the construction of the referenced storm-drain systems. The boundaries of the SFHA were also modified to show the base flow contained along Sausalito Drive and South Racetrack Road at the southeast corner of the project site.

The modifications are shown on the enclosed annotated copy of FIRM Panel 32003C2615 D for Clark County, Nevada and Incorporated Areas. This LOMR hereby revises this panel of the effective FIRM dated August 16, 1995.

The revisions are effective as of the date of this letter; however, a review of the determination made by this LOMR and any requests to alter this determination should be made within 30 days. Any request to alter the determination must be based on scientific or technical data.

Due to present funding constraints, we must limit the number of physical map revisions processed. Consequently, we will not republish the FIRM for your community to reflect the modifications described in this LOMR at this time. However, when changes to FIRM Panel 32003C2615 D for your community warrant a physical revision and republication in the future, we will incorporate the modifications described in this LOMR at that time.

This response to Mr. Chandler's request is based on minimum floodplain management criteria established under the National Flood Insurance Program (NFIP). Your community is responsible for approving all floodplain development, including this request, and for ensuring that necessary permits required by Federal or State law have been received. With knowledge of local conditions and in the interest of safety, State and community officials may set higher standards for construction, or may limit development in floodplain areas. If the State of Nevada or your community has adopted more restrictive or comprehensive floodplain management criteria, these criteria take precedence.

The basis of this LOMR 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 channel modification/culvert rests with your community.

Because this LOMR will not be printed and distributed to primary users, such as local insurance agents and mortgage lenders, your community will serve as a repository for these new data. We encourage you to disseminate the information reflected by this LOMR throughout the community, so that interested persons, such as property owners, local insurance agents, and mortgage lenders, may benefit from the information. We also encourage you to prepare an article for publication in your community's local newspaper. This article should describe the change that has been made and the assistance that officials of your community will give to interested persons by providing these data and interpreting the NFIP maps.

The map panel as listed above and as revised by this letter will be used for all flood insurance policies and renewals issued for your community.

This determination has been made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and is in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria are the minimum requirements and do not supersede any State or local requirements of a more stringent nature. This includes adoption of the effective FIRM to which the regulations apply and the modification made by this LOMR.

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 San Francisco, California, at (415) 923-7177. If you have any technical questions regarding this LOMR, please contact Mr. John Magnotti of our staff in Washington, DC, either by telephone at (202) 646-3932 or by facsimile at (202) 646-4596.

Sincerely,

Michael K. Buckley, P.E., Chief
Hazard Identification Branch
Mitigation Directorate

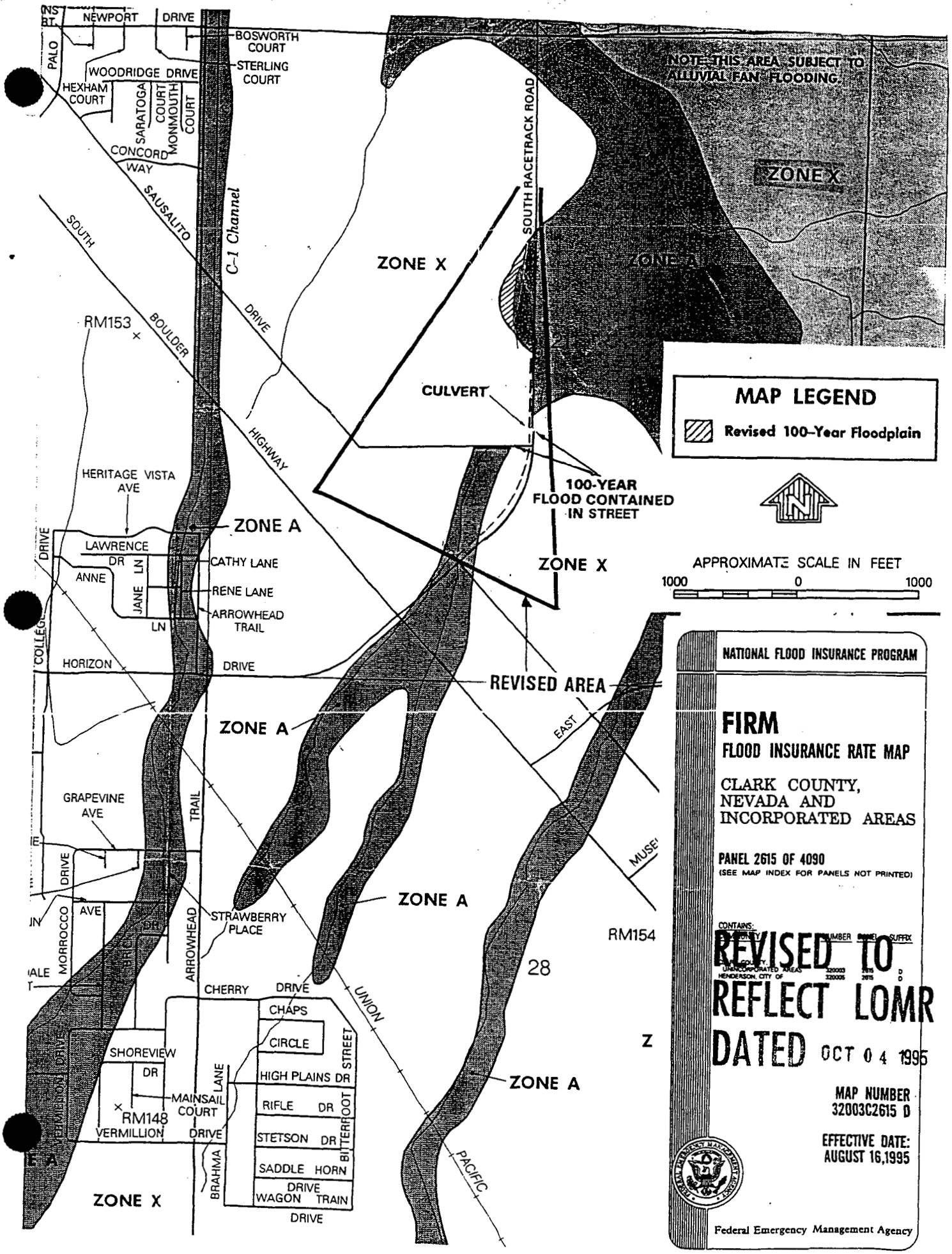
Enclosure

cc: Mr. Curt Chandler, P.E.
Land Development Manager
Department of Public Works
City of Henderson

Mr. Kevin L. Eubanks, P.E.
Assistant General Manager
Clark County Regional Flood Control District

Mr. Larry R. Nelson, P.E.
President
L.R. Nelson Consulting Engineers, Inc.

Mr. Tom Moss
R.V. Jones Development


NEWPORT DRIVE
BOSWORTH COURT
STERLING COURT
WOODRIDGE DRIVE
HEXHAM COURT
SARATOGA COURT
MONMOUTH COURT
CONCORD WAY
SAUSALITO
SOUTH BOULDER HIGHWAY
C-1 Channel
SOUTH RACETRACK ROAD
NOTE: THIS AREA SUBJECT TO ALLUVIAL FAN FLOODING.
ZONE X
ZONE A
ZONE X
CULVERT
100-YEAR FLOOD CONTAINED IN STREET
RM153
HERITAGE VISTA AVE
ZONE A
LAWRENCE DR
CATHY LANE
ANNE LN
JANE LN
RENE LANE
ARROWHEAD TRAIL
HORIZON DRIVE
REVISED AREA
ZONE A
EAST
GRAPEVINE AVE
STRAWBERRY PLACE
ZONE A
RM154
28
CHERRY DRIVE
CHAPS CIRCLE
SHOREVIEW DR
HIGH PLAINS DR
MAINSAIL COURT
RIFLE DR
RM148
VERMILLION DRIVE
STETSON DR
SADDLE HORN DRIVE
WAGON TRAIN DRIVE
BUTTERFOOT STREET
BRAHMA LANE
UNION
PACIFIC
ZONE A
ZONE X
MAP LEGEND
Revised 100-Year Floodplain
APPROXIMATE SCALE IN FEET
1000 0 1000
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
CLARK COUNTY, NEVADA AND INCORPORATED AREAS
PANEL 2615 OF 4090
(SEE MAP INDEX FOR PANELS NOT PRINTED)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
CLARK COUNTY UNINCORPORATED AREAS 320003 2615 D
HENDERSON, CITY OF 320005 2615 D
REVISED TO REFLECT LOMR DATED OCT 04 1995
MAP NUMBER 32003C2615 D
EFFECTIVE DATE: AUGUST 16,1995
Federal Emergency Management Agency

SC ✓ LOMR

Federal Emergency Management Agency

Washington, D.C. 20472

SEP 23 1996

96-09-1084A

The Honorable Robert A. Groesbeck
Mayor, City of Henderson
240 Water Street
Henderson, Nevada 89015

IN REPLY REFER TO:
Case No.: 96-09-1084A
Community: City of Henderson, Nevada
Community No.: 320005
Map Panel Affected: 2615 D

218-65-R-RS

Dear Mayor Groesbeck:

This responds to a letter dated August 19, 1996, from Mr. Alexander W. Kingston, Staff Hydrologist, L.R. Nelson Consulting Engineers, Inc., requesting that the Federal Emergency Management Agency determine whether the property described below is located in a Special Flood Hazard Area (SFHA), an area that would be inundated by the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood). This property has been elevated by the placement of fill after the date of the earliest National Flood Insurance Program (NFIP) map showing the area in the SFHA.

> Property Description: Lots 1 through 4, Block 1; Lots 1 through 4, Block 2; Lots 1 through 8, Block 7; Lots 1 through 8, Block 8; and the Clubhouse on the area labeled "Common Element," Newport Townhomes, as shown on the Plat recorded as Instrument No. 02239 in Book 69, Page 23, Official Records Book No. 950731, in the Office of the Recorder, Clark County, Nevada
>
> Community and State: City of Henderson, Nevada

On August 29, 1996, we received all information necessary to process this request. After comparing this information to the NFIP map for your community, we determined that the 24 lots on the property described above would not be inundated by the base flood. Therefore, this letter revises the NFIP map for Clark County, Nevada and Incorporated Areas (NFIP Map Number 32003C2615 D, dated August 16, 1995), to remove the 24 lots on the property from the SFHA. The property is now located in Zone X (unshaded), an area of minimal flooding outside the SFHA.

In addition, we determined that although portions of the area labeled "Common Element" on the property described above would be inundated by the base flood, the existing Clubhouse structure on the property would not be inundated. Therefore, this letter revises the NFIP map for Clark County, Nevada and Incorporated Areas (NFIP Map Number 32003C2615 D, dated August 16, 1995), to remove the structure from the SFHA. The structure is now located in Zone X (unshaded), an area of minimal flooding outside the SFHA. Because portions of the property are in the SFHA, any future construction or substantial improvement on the property remains subject to Federal, State, and local regulations for floodplain management.

You should note that this property could be inundated by a flood greater than the base flood or by local flooding conditions not shown on the NFIP map. Also, although we have based our determination on the flood data presently available, flood conditions may change or new information may be generated that would supersede this determination.

Even though this property is not included in an SFHA, it could be inundated by a flooding event of greater magnitude than the base flood. In fact, more than 25 percent of all losses in the NFIP occur to structures located outside the SFHA in Zones B, C, or X. More than 25 percent of all policies purchased under the NFIP protect structures located in these zones. This clearly illustrates that there is a risk of flooding in non-SFHAs. That risk is just not as great as the flood risk to structures located in SFHAs. To offer flood insurance protection to owners of such structures, the NFIP offers two types of flood insurance. Property owners should discuss their individual flood risk situation and insurance needs with their insurance agent or company before making a final decision regarding flood insurance coverage.

To ensure continued eligibility to participate in the NFIP, your community must enforce its floodplain management regulations using, at a minimum, the flood elevations and zone designations shown on the NFIP map for your community, including the revision effected by this letter. This response is based on the minimum criteria established by the NFIP. State and community officials, based on knowledge of local conditions and in the interest of public safety, may set higher standards for construction in the floodplain. If the State, County, or community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum Federal criteria.

This revision has been made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and is in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65.

Because this Letter of Map Revision (LOMR) will not be printed and distributed to primary map users, such as local insurance agents and mortgage lenders, your community will serve as a repository for these new data. We encourage you to disseminate the information reflected by this LOMR throughout your community so that interested persons, such as property owners, local insurance agents, and mortgage lenders, may benefit from the information. We also encourage you to prepare an article for publication in your community's local newspaper that would describe the changes that have been made and the assistance that officials of your community will give to interested persons by providing these data and interpreting the NFIP maps. When, in the future, a sufficient number of revisions have occurred on the affected pane, we will initiate a physical map revision to republish and distribute the panel to incorporate the changes that were made effective by letter.

A copy of this LOMR is being sent to your community's official NFIP map repository where, in accordance with regulations adopted by your community when it made application to join the NFIP, it should be attached to the community's official record copy of the NFIP map, which is available for public inspection.

If you have any questions or if we can be of further assistance, please contact Ms. Agnes De Coca of our staff in Washington, DC, either by telephone at (202) 646-2746 or by facsimile at (202) 646-4596.

Sincerely,

Michael Buckley

Michael K. Buckley, P.E., Chief
Hazard Identification Branch
Mitigation Directorate

cc: Community Map Repository
City of Henderson

Mr. Alexander Kingston
Staff Hydrologist
L. R. Nelson Consulting Engineers, Inc.

Mr. Kevin L. Eubanks, P.E.
Assistant General Manager
Clark County Regional Flood
Control District

LOMR DE

Federal Emergency Management Agency

Washington, D.C. 20472

96-09-678P

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Robert A. Groesbeck
Mayor, City of Henderson
240 Water Street
Henderson, Nevada 89015

IN REPLY REFER TO:
Case No.: 96-09-678P

Community: City of Henderson, Nevada
Community No.: 320005
Panel Affected: 32003C2615 D
Effective Date of
This Revision: SEP 06 1996

102-I-C

Dear Mayor Groesbeck:

This responds to a request for a revision to the effective Flood Insurance Study and National Flood Insurance Program (NFIP) map for your community. Specifically, this responds to a letter dated August 28, 1996, from Mr. David W. Trushaw, P.E., Project Engineer, VTN Nevada, regarding the effective Flood Insurance Rate Map (FIRM) for Clark County, Nevada and Incorporated Areas. With his letter, Mr. Trushaw provided additional information to support an April 2, 1996, request for a Letter of Map Revision (LOMR) from Mr. David C. Swallow, E.I.T., VTN Nevada. Mr. Swallow requested that the Federal Emergency Management Agency (FEMA) revise the effective FIRM to show the effects of modifications to C-1 Channel from just upstream to approximately 1,400 feet upstream of the Union Pacific Railroad (UPRR) and detailed topographic data for C-1 Channel from approximately 200 feet downstream of the UPRR to approximately 700 feet upstream of Vermillion Place.

All data required to complete our review of this request were submitted with Mr. Swallow's April 2 letter, and with letters dated May 20, June 11, June 12, June 28, July 25, and August 28, 1996, from Mr. Trushaw.

We have completed our review of the submitted data and the flood data shown on the effective FIRM, and have revised the FIRM to modify the floodplain boundary delineations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) along C-1 Channel from approximately 200 feet downstream of the UPRR to approximately 700 feet upstream of Vermillion Place. The base flood is contained within C-1 Channel from approximately 200 feet downstream of the UPRR to approximately 1,200 feet upstream of the UPRR and from approximately 1,400 feet downstream to approximately 600 feet downstream of Vermillion Place. The width of the Special Flood Hazard Area (SFHA) increased and decreased along the revised reach as a result of the modifications to C-1 Channel and more detailed topographic data. The maximum increase in SFHA width, approximately 75 feet, occurred approximately 1,500 feet upstream of the UPRR, and the maximum decrease in SFHA width, approximately 600 feet, occurred approximately 600 feet downstream of Vermillion Place.

The modifications are shown on the enclosed annotated copy of FIRM Panel 32003C2615 D. This LOMR hereby revises this panel of the effective FIRM dated August 16, 1995.

The revisions are effective as of the date of this letter; however, a review of the determination made by this LOMR and any requests to alter this determination should be made within 30 days. Any request to alter the determination must be based on scientific or technical data.

We will not physically revise and republish the FIRM for your community to reflect the modifications made by this LOMR at this time. However, when changes to FIRM Panel 32003C2615 D for your community warrant a physical revision and republication in the future, we will incorporate the modifications made by this LOMR at that time.

This response to Mr. Swallow's request is based on minimum floodplain management criteria established under the NFIP. Your community is responsible for approving all floodplain development, including this request, and for ensuring that necessary permits required by Federal or State law have been received. With knowledge of local conditions and in the interest of safety, State and community officials may set higher standards for construction, or may limit development in floodplain areas. If the State of Nevada or your community has adopted more restrictive or comprehensive floodplain management criteria, these criteria take precedence.

The basis of this LOMR 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.

Because this LOMR will not be printed and distributed to primary users, such as local insurance agents and mortgage lenders, your community will serve as a repository for these new data. We encourage you to disseminate the information reflected by this LOMR throughout the community, so that interested persons, such as property owners, local insurance agents, and mortgage lenders, may benefit from the information. We also encourage you to prepare an article for publication in your community's local newspaper. This article should describe the changes that have been made and the assistance that officials of your community will give to interested persons by providing these data and interpreting the NFIP maps.

The map panel as listed above and as revised by this letter will be used for all flood insurance policies and renewals issued for your community.

This determination has been made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and is in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria are the minimum requirements and do not supersede any State or local requirements of a more stringent nature. This includes adoption of the effective FIRM to which the regulations apply and the modifications described in this LOMR. Our records show that your community has met this requirement.

A Consultation Coordination Officer (CCO) has been designated to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Ms. Dorothy M. Lacey
Director, Mitigation Division
Federal Emergency Management Agency, Region IX
The Presidio of San Francisco, Building 105
San Francisco, California 94129-1250
(415) 923-7177

If you have any questions regarding floodplain management regulations for your community or the NFIP in general, please contact the CCO for your community at the telephone number cited above. If you have any technical questions regarding this LOMR, please contact Mr. Karl Mohr of our staff in Washington, DC, either by telephone at (202) 646-2770 or by facsimile at (202) 646-4596.

Sincerely,

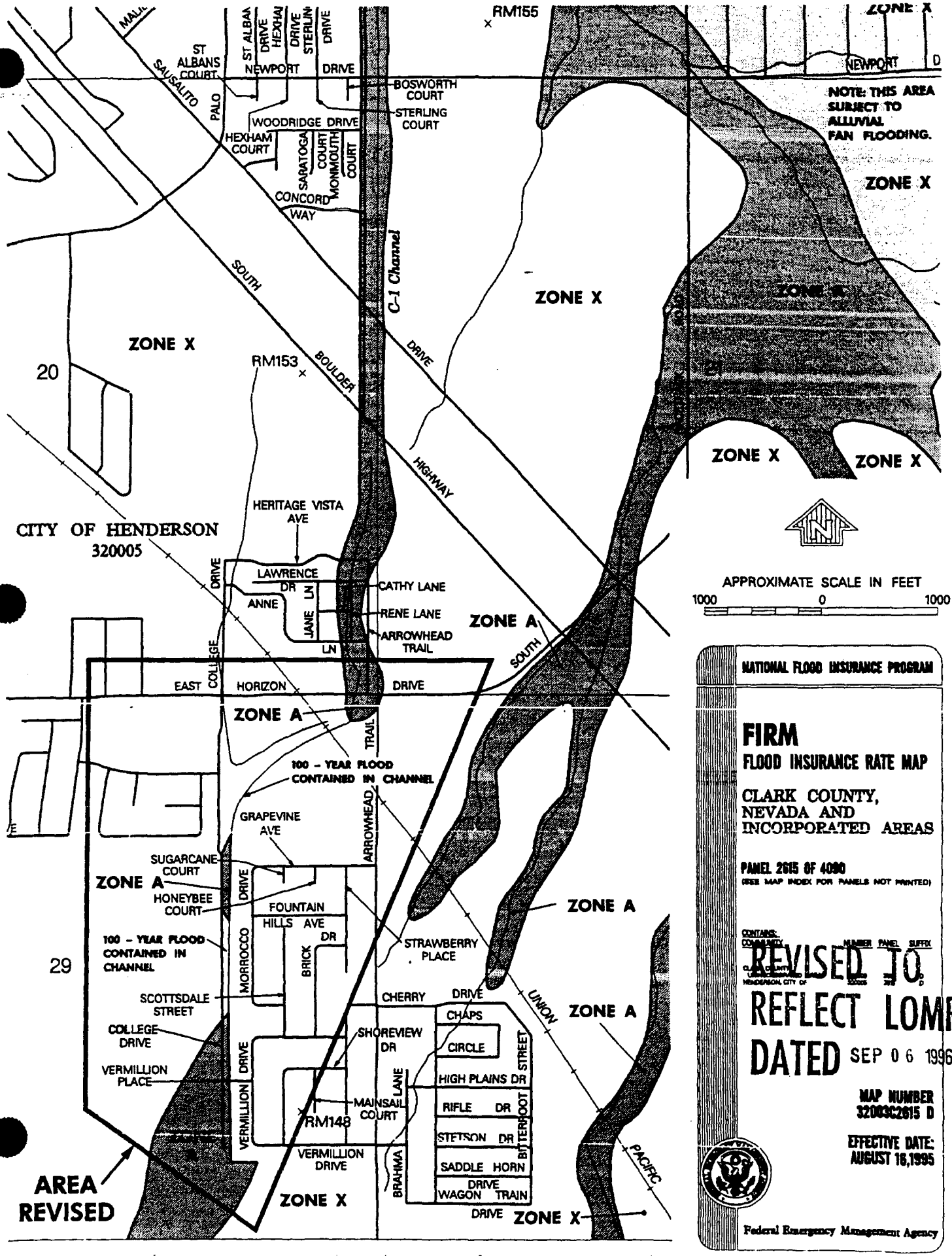
Michael K. Buckley, P.E., Chief
Hazard Identification Branch
Mitigation Directorate

Enclosure

cc: Mr. Curt Chandler, P.E.
Land Development Manager
Department of Public Works
City of Henderson

Mr. Kevin L. Eubanks, P.E.
Assistant General Manager
Clark County Regional Flood
Control District

Mr. David C. Swallow, E.I.T.
VTN Nevada


RM155
ZONE X
NEWPORT
NOTE: THIS AREA SUBJECT TO ALLUVIAL FAN FLOODING.
ZONE X
ST ALBANS COURT
NEWPORT DRIVE
BOSWORTH COURT
STERLING COURT
WOODRIDGE DRIVE
HEXHAM COURT
SARATOGA COURT
MONMOUTH COURT
CONCORD WAY
SAUSALITO
PALO
SOUTH BOULDER HIGHWAY
C-1 Channel
ZONE X
ZONE X
20
RM153
HERITAGE VISTA AVE
CITY OF HENDERSON
320005
LAWRENCE DR
ANNE LN
JANE LN
CATHY LANE
RENE LANE
ARROWHEAD TRAIL
ZONE A
EAST COLLEGE DRIVE
HORIZON DRIVE
ZONE A
100 - YEAR FLOOD CONTAINED IN CHANNEL
GRAPEVINE AVE
ARROWHEAD TRAIL
SUGARCANE COURT
ZONE A
HONEYBEE COURT
FOUNTAIN HILLS AVE
MORROCCO DR
BRICK DR
100 - YEAR FLOOD CONTAINED IN CHANNEL
29
STRAWBERRY PLACE
ZONE A
SCOTTSDALE STREET
CHERRY DRIVE
CHAPS CIRCLE
COLLEGE DRIVE
SHOREVIEW DR
VERMILLION PLACE
VERMILLION DRIVE
HIGH PLAINS DR
BUTTERFOOT STREET
MAINSAIL COURT
RM148
RIFLE DR
STETSON DR
SADDLE HORN DRIVE
WAGON TRAIN DRIVE
BRAHMA LANE
VERMILLION DRIVE
ZONE X
ZONE X
UNION PACIFIC
AREA REVISED
APPROXIMATE SCALE IN FEET
1000 0 1000
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
CLARK COUNTY, NEVADA AND INCORPORATED AREAS
PANEL 2615 OF 4080
(SEE MAP INDEX FOR PANELS NOT PRINTED)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
CLARK COUNTY 320003 2615 D
UNINCORPORATED AREAS
HENDERSON, CITY OF 320005 2615 D
REVISED TO REFLECT LOMR DATED SEP 06 1996
MAP NUMBER 32003C2615 D
EFFECTIVE DATE: AUGUST 18,1995
Federal Emergency Management Agency

95-09-941A

Federal Emergency Management Agency

Washington, D.C. 20472

SEP 28 1995

The Honorable Robert A. Groesbeck
Mayor, City of Henderson
240 Water Street
Henderson, Nevada 89015

IN REPLY REFER TO:
Case No.: 95-09-941A
Community: City of Henderson, Nevada
Community No.: 320005
Map Panel Affected: 2615 D

T-218-65-OS-RS (REI)

Dear Mayor Groesbeck:

This is in response to a letter dated August 21, 1995, from Mr. Cameron G. Hillstead, P.E., Civiltec, requesting that the Federal Emergency Management Agency determine whether the following property is located in a Special Flood Hazard Area (SFHA), an area that would be inundated by a flood having a 1-percent chance of being equaled or exceeded in any given year (base flood). This property has been elevated by the placement of fill. This letter also reissues previous Letters of Map Revision (LOMRs) dated January 4 and March 7, 1995, for Canyon Country Units One and Two.

Property Description: Lots 21 through 24, Block 1; Lots 8 and 9, Block 2; and Lots 6 through 10, Block 3, Canyon Country Unit One, as shown on the Plat recorded in Book 61 of Plats, Page 40, and Lots 11 and 20 through 24, Block 3, Canyon Country Unit Two, as shown on the Plat recorded in Book 65 of Plats, Page 32, in the Office of the Recorder, Clark County, Nevada

Community: City of Henderson

State: Nevada

The above-mentioned LOMRs that revised the National Flood Insurance Program (NFIP) map for the City of Henderson, Nevada, dated June 15, 1982, have been superseded by a new NFIP map dated August 16, 1995. Therefore, this letter issues a new determination based on the new map.

All fees necessary to process this LOMR, a total of $505, have been received.

On September 6, 1995, we received all information necessary to process Mr. Hillstead's request. After comparing this information to the NFIP map for your community, we determined that although portions of the property described above would be inundated by the base flood, the existing structures on Lots 21 and 24, Block 1, would not be inundated. These structures are correctly shown outside the SFHA on the current NFIP map and are located in Zone X (unshaded), an area of minimal flooding outside the SFHA. Because portions of the property are in the SFHA, any future construction or substantial improvement on this property remains subject to Federal, State, and local regulations for floodplain management.

If any current flood insurance policy issued under the NFIP covers a structure on this property and that policy was required by the mortgage company in conjunction with Federal flood insurance requirements, then flood insurance coverage is no longer required under the NFIP.

Accordingly, if a lender imposed the flood insurance requirement, that lender will have to determine whether or not to continue that requirement. The lender may determine, as a business decision, that it wishes to continue the flood insurance requirement in order to protect its collateral security on the loan. If the lender decides to release the borrower from the flood insurance requirement, and the insured decides to cancel the policy and seek a refund for the current policy year, the insured must obtain a written waiver of the flood insurance requirement from the lender to provide to their property insurance agent or company that is servicing their policy. The agent or company will then process the refund request for the insured.

We have also determined that although portions of the property described above would be inundated by the base flood, the existing structures on Lots 22 and 23, Block 1; Lots 8 and 9, Block 2; and Lots 6 through 10, Block 3, Canyon Country Unit One, and Lots 11 and 20 through 24, Block 3, Canyon Country Unit Two, would not be inundated. Therefore, this letter revises the NFIP map for Clark County, Nevada and Incorporated Areas (NFIP Map Number 32003C2615 D, dated August 16, 1995), to remove the structures from the SFHA. The structures are now located in Zone X (unshaded), an area of minimal flooding outside the SFHA. Because portions of the property are in the SFHA, any future construction or substantial improvement on the property remains subject to Federal, State, and local regulations for floodplain management.

You should note that this property could be inundated by a flood greater than the base flood or by local flooding conditions not shown on the NFIP map. Also, although we have based our determination on the flood data presently available, flood conditions may change or new information may be generated that would supersede this determination.

Even though this property is not included in an SFHA, it could be inundated by a flooding event of greater magnitude than the base flood. In fact, more than 25 percent of all losses in the NFIP occur to structures located outside the SFHA in Zones B, C, or X. More than 25 percent of all policies purchased under the NFIP protect structures located in these zones. This clearly illustrates that there is a risk of flooding in non-SFHAs. That risk is just not as great as the flood risk to structures located in SFHAs. In order to offer flood insurance protection to owners of such structures, the NFIP offers two types of flood insurance policies: the Standard Policy and the Preferred Risk Policy (PRP). The PRP is available at low cost for one- to four-family homes located outside the SFHA with little or no loss history. The Standard Policy is available for all other structures. Owners should discuss their individual flood risk situation and insurance needs with their insurance agent or company before making a final decision regarding flood insurance coverage.

To ensure continued eligibility to participate in the NFIP, your community must enforce its floodplain management regulations using, at a minimum, the flood elevations and zone designations shown on the NFIP map for your community, including the revision effected by this letter. This response is based on the minimum criteria established by the NFIP. State and community officials, based on knowledge of local conditions and in the interest of public safety, may set higher standards for construction in the floodplain. If the State of Nevada or your community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum Federal criteria.

This revision has been made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and is in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-488), 42 U.S.C. 4001-4128, and 44 CFR Part 65.

Because this LOMR will not be printed and distributed to primary map users, such as local insurance agents and mortgage lenders, your community will serve as a repository for these new data. We encourage you to disseminate the information reflected by this LOMR throughout your community so that interested persons, such as property owners, local insurance agents, and mortgage lenders, may benefit from the information. We also encourage you to prepare an article for publication in your community's local newspaper that would describe the changes that have been made and the assistance that officials of your community will give to interested persons by providing these data and interpreting the NFIP maps.

A copy of this LOMR is being sent to your community's official NFIP map repository where, in accordance with regulations adopted by your community when it made application to join the NFIP, it should be attached to the community's official record copy of the NFIP map, which is available for public inspection.

If you have any questions or if we can be of further assistance, please contact Ms. Agnes De Coca of our staff in Washington, DC, either by telephone at (202) 646-2746 or by facsimile at (202) 646-4596.

Sincerely,

Michael K. Buckley, P.E., Chief
FOR Hazard Identification Branch
Mitigation Directorate

cc: Community Map Repository

Mr. Cameron G. Hillistead, P.E.
Civiltec

√ Mr. Kevin L. Eubanks, P.E.
Assistant General Manager
Clark County Regional Flood Control District

Incorporated in new maps

Federal Emergency Management Agency

Washington, D.C. 20472

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Robert Groesbeck
Mayor, City of Henderson
240 Water Street
Henderson, Nevada 89015

IN REPLY REFER TO:
Case No.: 93-09-186P

Community: City of Henderson, Nevada
Community No.: 320005
Panel Affected: 0020 B
Effective Date of This Revision: MAR 29 1994

102-D

Dear Mayor Groesbeck:

254

This is in response to a request for a revision to the effective Flood Insurance Study and National Flood Insurance Program (NFIP) map for your community. Specifically, this responds to a letter dated November 24, 1993, from Mr. Robert H. Scott, Jr., P.E., SEA, Incorporated, regarding the effective Flood Insurance Rate Map (FIRM) for the City of Henderson, Nevada. With his letter, Mr. Scott provided additional data to support a December 10, 1992, request from Mr. Christopher McMahon, Project Coordinator, SEECON Financial & Construction Co., Inc. Mr. McMahon requested that we revise the effective FIRM to show the effects of a channelization project along the C-1 Channel from Warm Springs Road to approximately 1,500 feet upstream of Warm Springs Road.

All of the data required to complete our review of this request were submitted with letters dated October 20 and November 24, 1993, from Mr. Scott; letters dated May 20 and July 27, 1993, from Mr. Richard W. Arden, P.E., P.L.S., President, SEA, Incorporated; a letter dated June 29, 1993, from Mr. Curt Chandler, P.E., Land Development Manager, City of Henderson; and letters dated July 10 and December 10, 1992, and January 28, February 12, and May 13, 1993, from Mr. McMahon. All fees necessary to process this Letter of Map Revision (LOMR), a total of $2,170, have been received.

We have completed our review of the submitted data and the flood data shown on the effective FIRM and have revised the FIRM to modify the floodplain boundary delineations of a flood having a 1-percent probability of being equaled or exceeded in any given year (base flood) along the C-1 Channel. As a result of this revision, the base (100-year) flood will be contained within the C-1 Channel along the east bank through the Countrybrook Subdivision. In addition, a Special Flood Hazard Area designation has been added to the temporary channel along the south and east of the Countrybrook Subdivision.

The modification is shown on the enclosed annotated copy of FIRM Panel 0020 B for the City of Henderson, Nevada. This LOMR hereby revises this panel of the effective FIRM dated June 15, 1982. A preliminary copy of this panel was

issued on July 29, 1993, for review by your community. We will incorporate the modifications described in this LOMR into the FIRM for Clark County, Nevada and Incorporated Areas before it becomes effective.

The revisions are effective as of the date of this letter; however, a review of the determination made by this LOMR and any requests to alter this determination should be made within 30 days. Any request to alter the determination must be based on scientific or technical data.

This response is based on minimum floodplain management criteria established under the NFIP. Your community is responsible for approving all proposed floodplain developments, including this request, and for ensuring that necessary permits required by Federal or State law have been received. With knowledge of local conditions and in the interest of safety, State and community officials may set higher standards for construction, or may limit development in floodplain areas. If the State of Nevada or the City of Henderson has adopted more restrictive or comprehensive floodplain management criteria, these criteria take precedence.

The basis of this LOMR is a channel-modification 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 channel modification rests with your community.

Because this LOMR will not be printed and distributed to primary users, such as local insurance agents and mortgage lenders, your community will serve as a repository for the new data. We encourage you to disseminate the information reflected by this LOMR widely throughout the community, so that interested persons, such as property owners, insurance agents, and mortgage lenders, may benefit from the information. We also encourage you to give consideration to preparing an article for publication in your community's local newspaper. This article should describe the changes that have been made and the assistance your community will give in providing the data and interpreting the NFIP maps.

The map as listed above and as revised by this letter will be used for all flood insurance policies and renewals issued for your community.

This determination has been made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and is in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria are the minimum requirements and do not supersede any State or local requirements of a more stringent nature. This includes adoption of the effective FIRM to which the regulations apply and the modifications made by this LOMR.

Should you have any questions regarding this matter, please contact the Division Director, Mitigation Division of the Federal Emergency Management Agency in San Francisco, California, at (415) 923-7175, or Mr. John Magnotti of our staff in Washington, DC, either by telephone at (202) 646-3932 or by facsimile at (202) 646-3445.

Sincerely,

Michael K. Buckley, P.E., Chief
Hazard Identification Branch
Mitigation Directorate

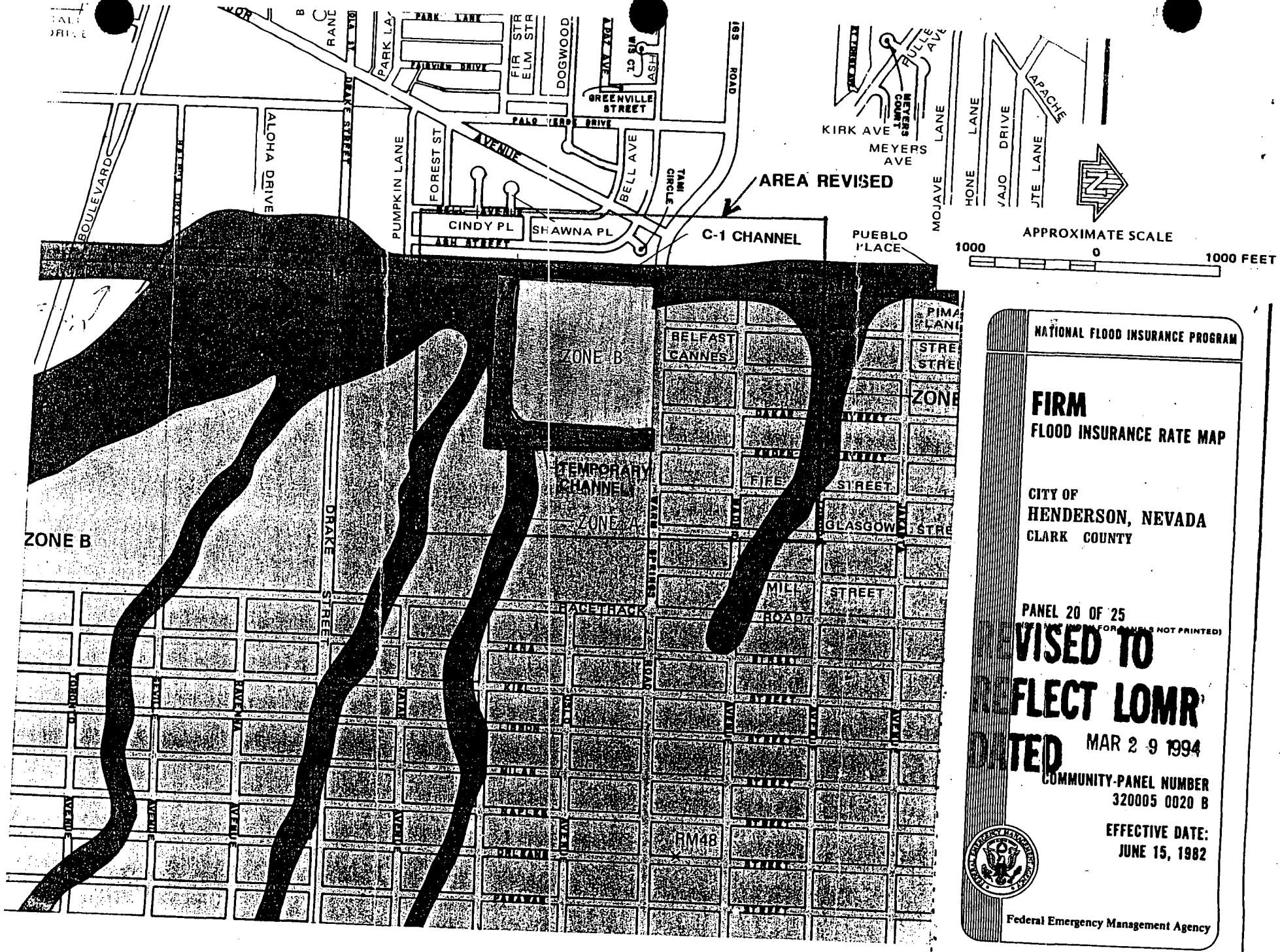
Enclosure

cc: Mr. Curt Chandler, P.E.
Land Development Manager
City of Henderson

Mr. Gale Wm. Fraser II, P.E.
General Manager/Chief Engineer
Clark County Regional Flood
Control District

Mr. Christopher McMahon
Project Coordinator
SEECON Financial & Construction
Co., Inc.

Mr. Richard W. Arden, P.E., P.L.S.
President
SEA, Incorporated



NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

CITY OF
HENDERSON, NEVADA
CLARK COUNTY

PANEL 20 OF 25
(MAP INDEX FOR PANELS NOT PRINTED)

REVISED TO REFLECT LOMR DATED MAR 2 9 1994

COMMUNITY-PANEL NUMBER
320005 0020 B

EFFECTIVE DATE:
JUNE 15, 1982

Federal Emergency Management Agency

Not reissued 9/26/95 - Alluvial fan

Federal Emergency Management Agency

Washington, D.C. 20472

May 15, 1990

Mr. Curt Chandler
Land Development Manager
City of Henderson
City Hall, 240 Water Street
Henderson, Nevada 89015-7200

IN REPLY REFER TO:
T-218-65-0-R-N

Map Panel Affected: 0020 B

Dear Mr. Chandler:

This is in reference to a letter dated August 25, 1989, from Mr. Elwyn G. Wilkinson of VTN Nevada, Las Vegas, Nevada, requesting that the Federal Emergency Management Agency determine whether the following property is located in a Special Flood Hazard Area (SFHA), an area that would be inundated by the 100-year (1-percent-annual-chance) flood. This property has been elevated by the placement of fill.

Property Description: Lots 111 through 141, Block 1, Lots 1 through 9, Block 2, Lots 1 through 19, Block 5, and Lots 1 through 12, Block 6, River Landing - Unit 4, as recorded in Book 43, Page 23 of Plats, Official Records Book No. 890713, in the Office of the Recorder, Clark County, Nevada

Community: City of Henderson

State: Nevada

On April 19, 1990, we received all information necessary to process the request. After comparing this information with the National Flood Insurance Program (NFIP) map for the City of Henderson, Nevada, we determined that Lots 1 through 9, Block 2, and Lots 18 and 19, Block 5, of the above-mentioned property would not be inundated by a 100-year flood and are correctly shown outside the SFHA on the current NFIP map.

If any structures on the above-mentioned lots are covered by a flood insurance policy, and if the mortgage company or lending institution agrees to waive the flood insurance requirement, then the NFIP will refund the premium paid on the policy during the current policy year. To receive a refund, a written waiver or certificate must be obtained from the mortgage company or lending institution. This written waiver or certificate must then be sent to the insurance agent, who will process the premium refund.

In addition, we determined that although portions of Lots 117 through 141, Block 1, Lots 1 through 17, Block 5, and Lots 1 through 9, Block 6, of the above-mentioned property would be inundated by a 100-year flood, the existing structures on these lots would not be inundated. Therefore, this letter revises the map for the City of Henderson, Nevada (NFIP Map Number 320005, Panel 0020 B, dated June 15, 1982), to remove these structures from the SFHA. Because portions of the lots are in the SFHA, any future construction or substantial improvement on the lots remains subject to Federal, State, and local regulations for floodplain management. In accordance with our

regulations, this letter must be attached to the copy of the NFIP map maintained in your files.

Please note that this property could be inundated by a flood greater than a 100-year flood or by local flooding conditions not shown on the NFIP map. Flood insurance is available at reduced cost for properties located outside the SFHA. Also, although we have based our determination on the flood information presently available, flood conditions may change or new information may be generated that could supersede this determination.

Finally, we determined that the structures on Lots 111 through 116, Block 1, and Lots 10, 11, and 12, Block 6, of the above-mentioned property would be inundated by a 100-year flood and are correctly shown on the current NFIP map as being in an SFHA, Zone A.

The elevations of both the lowest floor (including basement) and the lowest adjacent grade to the structure (the lowest ground touching the structure) must be at or above the 100-year flood elevation for the structure to be outside the SFHA. Because either the first floor elevation or the elevation of the lowest adjacent grade is lower than the estimated 100-year flood elevation as shown in the chart below, these structures are within the SFHA and flood insurance is required. These elevations are referenced to the National Geodetic Vertical Datum.

Lot	Block	First Floor Elevation	Lowest Adjacent Grade	100-Year Flood Elevation
111	1	79.8	78.8	81.2
112	1	79.1	78.1	78.4
113	1	78.7	77.7	78.4
114	1	78.1	77.1	77.8
115	1	77.5	76.5	77.2
116	1	76.7	75.7	76.1
10	6	76.6	75.6	76.1
11	6	77.5	76.5	77.2
12	6	78.1	77.1	77.8

This Letter of Map Revision (LOMR) will not be printed and distributed to primary map users such as local insurance agents and mortgage lenders; therefore, the community will serve as a repository for these new data. We encourage you to disseminate the information reflected by this LOMR widely throughout the community in order that interested persons such as property owners, insurance agents, and mortgage lenders may benefit from this information. We also encourage you to consider preparing an article for publication in the community's local newspaper that would describe the changes that have been made and the assistance the community will provide in serving as a clearinghouse for these data and interpreting NFIP maps.

In order to ensure continued eligibility to participate in the NFIP, your community must enforce its floodplain management regulations using, at a minimum, the flood elevations and zone designations shown on your community's NFIP map, including the revisions effected by this letter.

This revision has been made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 92-234) and is in accordance with the National

Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448) 42 U.S.C. 4001-4128, and 44 CFR Part 65.

This revision is effective as of the date of this letter. However, a request for reconsideration may be made within 30 days. Any requests for reconsideration must be based on scientific or technical data.

In the near future, we plan to conduct a restudy of the flood hazards in the Las Vegas Valley area and are now working with the Clark County Regional Flood Control District to obtain appropriate peak discharge values for use in the study. Therefore, our restudy may be based on discharge values other than those used in the hydraulic analysis for this project.

If you have any questions or if we can be of further assistance, please call us at (202) 646-2764.

Sincerely,

Charles A. Lindsey, Chief
Technical Operations Division
Federal Insurance Administration

cc: State Coordinator

Mr. Cameron G. Hillstead
VTN Nevada

Mr. Gale Wm. Fraser, II
Assistant General Manager
Clark County Regional Flood
Control District

not reissued 9/26/95 - Alluvial fan

Federal Emergency Management Agency

Washington, D.C. 20472

DEC 21 1989

Mr. Curt Chandler
Flood Control Administrator
City of Henderson
243 Water Street
Henderson, Nevada 89105

IN REPLY REFER TO:
IA-RA-TO (218-65)

Dear Mr. Chandler:

This is in response to a letter dated May 22, 1989, from Mr. Elwyn G. Wilkinson, P.E., VTN Nevada, Las Vegas, Nevada, requesting that the Federal Emergency Management Agency (FEMA) determine whether Lots 58 through 92, Block 1, and Lots 1 through 20, Block 7, River Landing Unit No. 3, as recorded in Book 41, Page 75 of Plats, Official Records Book No. 890206, in the Office of the Recorder, Clark County, Nevada, are located within the Special Flood Hazard Area (SFHA).

On November 20, 1989, we received all technical data necessary to process the request. We have reviewed the Flood Insurance Rate Map (FIRM), with respect to these data, and have determined that Lots 58 through 71 and 89 through 92, Block 1, and Lots 1 through 5 and 11 through 20, Block 7, of the above-mentioned property are not within the SFHA, Zone A, as shown on FEMA Map Number 320005, Panel 0020 B, dated June 15, 1982, but are located in Zone B, where flood insurance is available at low cost.

In addition, it has been determined that portions of Lots 78, 79, and 80, Block 1, of the above-mentioned property are located within a SFHA, Zone A, and would be inundated by a flood having a one-percent chance of occurrence each year. However, the existing structures on the lots are located in areas that have been filled to or above the base flood elevation and are no longer within the SFHA, but are located in Zone B, where flood insurance is available at low cost. Because portions of the lots are within the SFHA, Zone A, any new construction or substantial improvement on the lots remains subject to Federal, state, and local regulations for floodplain management. This determination is based on the best flood data available at the present time.

Lastly, it has been determined that Lots 72 through 77 and 81 through 88, Block 1, and Lots 6 through 10, Block 7, of the above-mentioned property are within the SFHA, Zone A, as shown on FEMA Map Number 320005, Panel 0020 B, dated June 15, 1982; therefore, flood insurance is required for the structures located on these lots.

The deciding factor in determining the requirement for the purchase of flood insurance is whether the elevations of both the lowest finished grade adjacent to the structures (the lowest ground elevation touching the structures) and the lowest floor (including basements) are at or above FEMA's estimate of a flood having a one-percent chance of occurrence each year (100-year base flood). Since the lowest adjacent grade is below the elevation of the 100-year flood (90.0 feet National Geodetic Vertical Datum (NGVD) for

Lots 81 and 82), and both the lowest finished adjacent grade and the lowest finished floor are below the elevation of the 100-year flood (95.9 feet NGVD for Lot 72, 95.0 feet NGVD for Lot 73, 94.3 feet NGVD for Lot 74, 93.5 feet NGVD for Lot 75, 92.8 feet NGVD for Lot 76, 92.6 feet NGVD for Lot 77, 90.0 feet NGVD for Lots 83 through 88, 93.6 feet NGVD for Lots 6 and 7, and 94.0 feet NGVD for Lots 8, 9, and 10), flood insurance is required.

As required by legislation, a community must adopt and enforce floodplain management measures in order to ensure continued eligibility to participate in the National Flood Insurance Program (NFIP). Therefore, the City of Henderson, Nevada, must enforce those regulations using, at a minimum, the elevations and zone designations in the SFHAs as shown on your community's FIRM, including the modification made by this Letter of Map Revision (LOMR).

This determination has the effect of revising FEMA Map Number 320005, Panel 0020 B, dated June 15, 1982. Mr. Wilkinson and the state coordinating agency are being provided with copies of this Letter of Determination.

This LOMR will not be printed and distributed to primary map users such as local insurance agents and mortgage lenders; therefore, the community will serve as a repository for these new data. We encourage you to disseminate the information reflected by this LOMR widely throughout the community in order that interested persons such as property owners, insurance agents, and mortgage lenders may benefit from this information. We also encourage you to consider preparing an article for publication in the community's local newspaper that would describe the changes that have been made and the assistance the community will provide in serving as a clearinghouse for these data and interpreting NFIP maps.

This modification has been made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and is in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448) 42 U.S.C. 4001-4128, and 44 CFR Part 65.

This modification is effective as of the date of this letter. However, a review of this determination and any requests for changes should be made within 30 days. Any requests for reconsideration must be based on scientific or technical data.

If you have any questions, or if we can be of further assistance, please contact the Office of Risk Assessment, Federal Insurance Administration, at (202) 646-2764.

Sincerely,

Charles A. Lindsey, Chief
Technical Operations Division
Federal Insurance Administration

cc: Mr. Elwyn G. Wilkinson
State Coordinating Agency

Not reissued 9/26/95 - Alluvial fan

Federal Emergency Management Agency

Washington, D.C. 20472

JAN 25 1989

IN REPLY REFER TO:
IA-RA-TO (218-70)

Mr. James A. Thomas
VTN Nevada
2300 Paseo Del Prado
Building A, Suite 100
Las Vegas, Nevada 89102

Dear Mr. Thomas:

This is in response to your letter dated October 10, 1988, requesting that the Federal Emergency Management Agency (FEMA) determine whether Lots 93 through 110, Block 1; Lots 20 through 38, Block 5; and Lots 13 through 24, Block 6, Riverlanding-Unit 2, as recorded in Book 36, Page 41 of Plats, Official Records Book, No. 870213, in the Office of the Recorder, Clark County, Nevada, are located within the Special Flood Hazard Area (SFHA). 254

On January 3, 1989, we received all technical data necessary to process your request. We have reviewed the Flood Insurance Rate Map (FIRM), with respect to these data, and have determined that Lots 93 and 94, Block 1; and Lots 20, 21, 31, 32, and 33, Block 5, of the above-mentioned property are not within the SFHA, Zone A, as shown on FEMA Map Number 320005, Panel 0020 B, dated June 15, 1982, but are located in Zone B, where flood insurance is available at low cost.

In addition, it has been determined that Lots 95 through 110, Block 1; Lots 22 through 30 and 34 through 38, Block 5; and Lots 13 through 24, Block 6 of the above-mentioned property are not within the SFHA, Zone A, as described in the Letter of Map Revision (IA-RA-RS(102A)), dated February 14, 1985, for the City of Henderson, Nevada, which amends the effective FEMA Map Number 320005, Panel 0020 B, dated June 15, 1982, for the City of Henderson, Nevada. The property is located in Zone B, where flood insurance is available at low cost.

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

In order to facilitate the procedure by which eligible property owners may obtain a refund of premium, a written waiver or certificate must be obtained from the lender that imposed the requirement. The certification will be required by your insurance agent to process the premium refund.

This response to your request is based on minimum criteria established by FEMA and is intended only to reflect your status in relation to the Federal requirement for the purchase of insurance. State and community officials, based on knowledge of local conditions and in the interest of human safety, may set higher standards for construction in the floodplain. If the State of Nevada or the City of Henderson has adopted more restrictive and comprehensive floodplain management criteria, these criteria take precedence over the minimum Federal criteria.

This determination has the effect of amending FEMA Map Number 320005, Panel 0020 B, dated June 15, 1982. The City of Henderson and the state coordinating agency are being provided with copies of this Letter of Determination.

If you have any questions, or if we can be of further assistance, please contact the Office of Risk Assessment, Federal Insurance Administration, at (202) 646-2764.

Sincerely,

Charles A. Lindsey, Chief
Technical Operations Division
Federal Insurance Administration

cc: Local Map Repository
State Coordinating Agency

Federal Emergency Management Agency

Washington, D.C. 20472

MAR 2 0 1985

IN REPLY REFER TO:
IA-RA-TO (218)

Mr. Sam C. Dunnam
VTN Nevada
2300 Paseo Del Prado
Building A, Suite 100
Las Vegas, Nevada 89102

Dear Mr. Dunnam:

This is in response to your letters of December 4, 1984, requesting that the Federal Emergency Management Agency (FEMA) determine whether River Landing Units 1 and 1A, as shown on the plats thereof, recorded in Book 32, Page 46 of Plats, Official Records Book No. 2033, and in Book 32, Page 38 of Plats, Official Records Book No. 2022, respectively, in the Office of the County Recorder, Clark County, Nevada, are located within the Special Flood Hazard Area (SFHA). 254

On February 21, 1985, we received all technical data necessary to process your request. We have reviewed the Flood Insurance Rate Map with respect to these data, and have determined that the above-mentioned property is not within SFHA Zone A, as described in the Letter of Map Revision (IA-RA-RS (102A)), dated February 14, 1985, for the City of Henderson, Nevada, which amends the effective FEMA Map Number 320005, Panel 0020 B, dated June 15, 1982, for the City of Henderson, Nevada; therefore, flood insurance is not required for any structures located on the property. The property is located outside the SFHA in Zone B, which is an area of moderate flood hazard, and, although flood insurance is not required in Zone B, it is available at low cost.

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

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

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

only to reflect your status in relation to the Federal requirement for the purchase of insurance. Community officials, based on knowledge of local conditions and in the interest of human safety, may set higher standards for construction in the flood plain than the minimum criteria established by FEMA. If the State of Nevada or the City of Henderson has adopted more restrictive and comprehensive flood plain management criteria, these criteria take precedence over the minimum Federal criteria for the purpose of regulating development in the flood plain. This policy is set forth in Section 60.1(d) of the NFIP.

If you have any questions, or if we can be of further assistance, please contact the Office of Risk Assessment, Federal Insurance Administration, at (202) 475-6284.

Sincerely,

Charles A. Lindsey

Charles A. Lindsey, Chief
Technical Operations Division
Federal Insurance Administration

Local Map Repository	
State Coordinator	
Richards	OP-IR-CM
Regional Director	R9-NT
Office Chron	IA-RA
✓Contractors Case File	IA-RA-TO

IA-RA-TO
Davis

Federal Emergency Management Agency

Washington, D.C. 20472

AUG 19 1996

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 96-09-393R

The Honorable Robert A. Groesbeck
Mayor, City of Henderson
240 Water Street
Henderson, Nevada 89015

Community: City of Henderson, Nevada
Community No.: 320005

104

Dear Mayor Groesbeck:

This responds to a letter dated January 29, 1996, from Ms. Margaret C. Brake, P.E., Las Vegas Engineering Manager, Summit Engineering Corp., to the Federal Emergency Management Agency (FEMA) regarding the effective Flood Insurance Rate Map (FIRM) for Clark County, Nevada and Incorporated Areas. Ms. Brake requested that FEMA evaluate the effects that the construction of Drake Channel and proposed culverts along Drake Channel under Racetrack Road would have on the effective FIRM in the vicinity of the Sunset View Estates, River Landing, and Countrybrook Estates development sites.

Drake Channel and the development sites are affected by flooding designated Zone X (shaded), an area subject to alluvial fan flooding by the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) at an average depth of less than 1 foot, based on a detailed study of the Eastern Alluvial Fan. The channel and development sites are also affected by flooding from C-1 Channel and three unnamed washes, all designated Zone A, areas inundated by the base flood with no base flood elevations (BFEs) determined, based on approximate studies. The unnamed washes convey alluvial fan flooding from areas adjacent to, but independent of, the apex of the Eastern Alluvial Fan. The area from the apex of the Eastern Alluvial Fan to approximately 2,000 feet downstream is designated Zone AO, an area subject to base flooding at the average depths and velocities shown on the FIRM. Flood hazards in the area of Drake Channel and the development sites designated Zone X (shaded) may be just as severe as those in the areas designated Zone AO. The distinction between the Zone X (shaded) and Zone AO designations should be regarded as one of flooding potentials and not of the expected severity of flood damages.

Drake Channel originates approximately 6,500 feet east of Racetrack Road in the Zone X (shaded) area of the alluvial fan and intercepts the northern unnamed wash approximately 4,500 feet east of Racetrack Road, the central unnamed wash approximately 600 feet east of Racetrack Road, and the southern unnamed wash near its confluence with C-1 Channel. Drake Channel is trapezoidal and unlined with a series of gabion-lined drop structures from its entrance to Racetrack Road, where two 12-foot by 6-foot reinforced concrete box culverts are proposed. Drake Channel is trapezoidal and concrete-lined west of Racetrack Road and joins C-1 Channel approximately 2,500 feet west of Racetrack Road.

All data required by FEMA to evaluate this request were submitted with Ms. Brake's January 29 letter. We reviewed the data submitted and the flood data used to prepare the effective FIRM for Clark County, Nevada and Incorporated Areas. We believe that if the issues described in the following paragraphs can be addressed and if the proposed project is constructed as shown on the plans entitled "Construction Plans for Drake Channel Culvert of Racetrack Road," dated October 13, 1994, and "Construction Plans for

Drake Channel Improvements," dated July 8, 1994, both prepared by Summit Engineering Corp., a revision to the Zone A floodplain boundary delineations on the FIRM may be warranted. A final determination on revising the effective FIRM cannot be made until the issues described in the following paragraphs are addressed.

Because Drake Channel is in an area subject to alluvial fan flooding, there is a potential for sediment deposition to reduce its ability to collect and convey the base flood, particularly at its entrance, culvert crossings, and confluence with C-1 Channel. An engineering analysis must be provided that quantifies the volumes of debris flow and sediment movement associated with the base flood. The assessment should consider the characteristics and availability of sediment in the drainage basins for the unnamed washes and the effects of sediment deposition on the slope, stability, and capacity of the channel and culverts. An engineering analysis must be provided that verifies the entire reach of Drake Channel will accommodate the estimated peak discharges and volumes of water, debris, and sediment and will withstand the hydrodynamic forces associated with sediment and debris flow at the calculated velocities.

Based on the information submitted, it appears the left bank of Drake Channel where the unnamed washes enter the unlined portion of the channel east of Racetrack Road may be subject to erosion and head cutting that could jeopardize the structural integrity of the drop structures and the channel. Also, scour and sediment deposition may occur in the channel at these locations and could affect the channel's ability to convey the base flood. Rip-rap or other provisions may be required to protect the channel and maintain its stability at the locations where the washes enter the channel. An analysis must be provided that quantifies the amount of erosion, head cutting, and sediment deposition that could occur and the effects on the channel's ability to convey the base flood.

As stated in the submitted request, there is a potential for hydraulic jumps to occur at the drop structures along Drake Channel east of Racetrack Road, where velocities approach 30 feet per second (fps) under supercritical conditions. Documentation to show how the hydraulic jumps are controlled and the effects of the hydraulic jumps on the capacity and stability of the channel must be submitted. Documentation must also be submitted showing how erosion of the channel banks and scour of the channel bottom will be prevented in the unlined portion of the channel.

The velocities along the concrete-lined portion of Drake Channel west of Racetrack Road near its transition to C-1 Channel approach 40 fps based on the submitted hydraulic data. Based on the calculated velocity and depth of flow, if a hydraulic jump were to occur near the transition to C-1 Channel, the water-surface elevation along Drake Channel would increase by approximately 14 feet. Documentation to verify that supercritical flow can be maintained throughout the concrete-lined portion of Drake Channel west of Racetrack Road and through the transition to C-1 Channel or an analysis of the effects of a hydraulic jump must be provided.

A base flood discharge value of 1,479 cubic feet per second (cfs) is calculated for Drake Channel east of Racetrack Road in the hydrologic analysis from a report entitled "Supplement #2 to Addendum #1 to the Design Report for Drake Channel Extension," prepared by VTN Nevada, dated April 15, 1993. Our review of the submitted hydrologic analysis included a comparison of the suggested discharge value and drainage area with drainage area-discharge relationships in the Flood Insurance Study report and in a report by the U.S. Army Corps of Engineers entitled "Hydrologic Documentation for Feasibility Study, Las Vegas Wash and Tributaries, Clark County Nevada," dated April 1988. The submitted discharge value appears to be low based on this comparison and other discharge values previously calculated in the area. For example, in a report entitled "Technical Drainage Study, Lakeside Highland Development,"

prepared by Civiltec, dated February 6, 1992, submitted with this request, a base flood discharge value of 1,929 cfs is calculated for Drake Channel east of Racetrack Road. Documentation must be submitted to verify the submitted discharge value is superior to that obtained from the drainage area-discharge relationships cited above and from the 1992 Civiltec report.

The 1992 Civiltec report contains hydraulic data for Drake Channel west of Racetrack Road and a channel along Racetrack Road that joins Drake Channel; however, only a summary of depths and velocities at each cross section is given. Hydraulic models for each of the channels from their confluence to their upstream limit, including an analysis of the superelevation of flows at the bends in the channels, must be submitted. Because the channel along Racetrack Road is in an area subject to alluvial fan flooding, it may convey sediment during the base flood event that could affect Drake Channel at their confluence. An assessment of the effects of sediment deposition on the capacity of Drake Channel at its confluence with the channel along Racetrack Road must be provided.

The River Landing and Countrybrook Estates development sites are affected by flooding from C-1 Channel and the southern unnamed wash between C-1 Channel and Racetrack Road; however, hydraulic analyses for these flooding sources were not submitted with this request. Hydraulic analyses of C-1 Channel and the southern unnamed wash must be provided to verify the flooding effects on the River Landing and Countrybrook Estates development sites.

Our review of the submitted data and flood data used to prepare the effective FIRM is complete. Before a final determination can be made on revising the effective FIRM, FEMA must receive the data listed below.

- The items described in detail above.

- An annotated FIRM at the scale of the effective FIRM showing the revised base floodplain boundaries and how they tie into those shown on the effective FIRM downstream and upstream of the revision.

- Application/Certification Form 4, entitled "Riverine Hydraulic Analysis Form," submitted with this request has not been completed. Please submit a completed Form 4 and the necessary supporting data, as described in the package instructions.

- A diskette with full input and output listings of the HEC-1 and HEC-2 analyses submitted with the request.

- The HEC-1 output and other calculations in the Appendix of Addendum #1 to the Preliminary Design Report for the Drake Channel Extension, prepared by VTN Nevada, dated June 1992, and in the Technical Drainage Study for Lakeside Highlands Development, prepared by Civiltec, are not legible. Please submit new, legible copies of these analyses and calculations.

- Detailed Application/Certification forms, which were used in processing this request, must be used for requesting final revisions to the maps. Therefore, when the map revision request for the area covered by this letter is submitted, Form 1, entitled "Revision Requester and Community Official Form," Form 2, entitled "Certification by Registered Professional Engineer and/or Land Surveyor," and Form 12, entitled "Alluvial Fan Form," must be included. (Copies of these forms are enclosed.)

- The detailed Application/Certification forms listed below may be required if as-built conditions differ from the preliminary plans. If required, please submit new forms (copies enclosed) or annotated copies of the previously submitted forms showing the revised information.

  — Form 3, entitled "Hydrologic Analysis Form."

  — Form 6, entitled "Channelization Form."

  — Form 7, entitled "Bridge/Culvert Form."

- An initial fee of $225, which represents the minimum charges associated with a request of this type, must be submitted before we can process your revision request. Payment of this fee shall be made in the form of a check or money order made payable to the National Flood Insurance Program (NFIP), or by credit card payment. The payment must be forwarded to the following address:

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

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

- Certification that all fill placed in the currently effective base floodplain and below the 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.

- An officially adopted maintenance and operation plan for Drake Channel. This plan, which may be in the form of a written statement from the community Chief Executive Officer, an ordinance, or other legislation, must describe the nature of the maintenance activities, the frequency with which they will be performed, and the title of the local community official who will be responsible for ensuring that the maintenance activities are accomplished.

The basis of this Conditional Letter of Map Revision (CLOMR) is, in whole or in part, a proposed channel-modification and culvert project. Paragraph 60.3(b)(7) of the NFIP regulations requires 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, your community must agree to accept responsibility for the maintenance of the modified channel before allowing its construction.

This response to Ms. Brake's request is based on minimum floodplain management criteria established under the NFIP. Your community is responsible for approving all proposed floodplain development, including this request, and for assuring that the necessary permits required by Federal or State law have been received. State and community officials, based on knowledge of local conditions and in the interest of human safety, may set higher standards for construction or may limit development in floodplain areas. If the State of Nevada or your community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

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 San Francisco, California, at (415) 923-7177. If you have any technical questions regarding this CLOMR, please contact Mr. Karl Mohr of our staff in Washington, DC, either by telephone at (202) 646-2770 or by facsimile at (202) 646-4596.

Sincerely,

Michael K. Buckley, P.E., Chief
Hazard Identification Branch
Mitigation Directorate

Enclosure

cc: Mr. Curt Chandler, P.E.
Land Development Manager
Department of Public Works
City of Henderson

Mr. Kevin L. Eubanks, P.E.
Assistant General Manager
Clark County Regional Flood Control District

Ms. Margaret C. Brake, P.E.
Las Vegas Engineering Manager
Summit Engineering Corp.

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1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN   1998                *
*           VERSION 4.1                 *
*                                       *
* RUN DATE   12NOV02  TIME  17:28:02    *
*                                       *
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*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
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X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X               X
XXXXXXX  XXXX     X         XXXXX   X
X     X  X        X                 X
X     X  X        X     X           X
X     X  XXXXXXX   XXXXX           XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 23 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

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LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

              *DIAGRAM
    1         ID       **************   C-1 WATERSHED FIS RESTUDY  ****************
    2         ID
    3         ID    ***** PREPARED FOR:  CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT *****
    4         ID                            **   CLARK COUNTY, NEVADA   ***
    5         ID
    6         ID    ***** PREPARED BY: CARTER BURGESS AND SOUTHWEST FLUVIAL SYSTEMS  *****
    7         ID
    8         ID    EXISTING CONDITIONS DRAINAGE SYSTEM
    9         ID    INPUT FILE =   SDN3.DAT
   10         ID    INPUT FILE DATE =  NOV   2002
   11         ID    DESIGN STORM = 100-YEAR 6-HR STORM
   12         ID    STORM DISTRIBUTION = SDN #3
   13         ID
   14         ID    REFERENCED HYDROLOGIC MODELS:
   15         ID    PREDESIGN REPORT FOR THE BLACK MOUNTAIN AND MISSION HILLS DETENTION BASINS
   16         ID    AND OUTFALL STRUCTURES (VTN 1992)
   17         ID    SNWA RIVER MOUNTAINS WATER TREATMENT FACILITY DRAFT TECHNICAL DRAINAGE STUDY
   18         ID    (MONTGOMERY WATSON/CH2MHILL 1997)
   19         ID    EAST C-1 DETENTION BASIN FINAL DESIGN (VTN 1998)
   20         ID    DESIGN MEMORANDUM FOR THE EQUESTRIAN DETENTION BASIN (POGGEMEYER 1994)
   21         ID    DESIGN CALCULATION NOTEBOOK FOR THE BLACK MOUNTAIN DETENTION BASIN
   22         ID    (VTN 1998)
   23         ID    CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT 2002 MASTER PLAN UPDATE (LBA)
   24         ID    1-515 BOULDER HIGHWAY TO LAKE MEAD DRIVE DRAINAGE STUDY (SVERDRUP, 1991)
   25         ID
   26         ID    JR CARDS CONTAINED DARFS BASED ON THE FOLLOWING VALUES:
   27         ID
   28         ID                          AREA     DARF
   29         ID                          SQ.MI.
   30         ID
   31         ID                          0 -  5   0.950
   32         ID                          5 - 12   0.880
   33         ID                         12 - 16   0.832
   34         ID                         16 - 20   0.804
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Community Name: Henderson, Nevada
Community No: 320005
Date: 25-11-02
Vertical Datum: 1988 NAVD
Control Grid: Nevada State Plane, East Zone
Flooding Source: Henderson Basin
Attached Panels: 2955E, 2605E, 2615E, 2620E

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35          ID                      20 - 30   0.765
36          ID                      30 - 40   0.725
37          ID
38          ID
39          ID
40          ID    THE FOLLOWING REDUCTION FACTORS ARE USED FOR  MODIFIED USLE COMPUTATIONS
41          ID
42          ID                        2-YR   0.260
43          ID                        5-YR   0.440
44          ID                       10-YR   0.570
45          ID                       25-YR   0.765
46          ID                       50-YR   0.880
47          ID
48          ID
49          ID
50          ID
51          ID
52          IT       5       0       0     300
53          IN       5       0       0
54          IO       5
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LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

55          JR    PREC   0.950   0.880   0.832   0.804    .765    .725    .570    .440    .260

56          KK     C1H
57          BA   4.007
58          PB    3.15
59          PC    .000    .020    .057    .070    .087    .108    .124    .130    .130    .130
60          PC    .130    .130    .130    .133    .140    .142    .148    .158    .172    .181
61          PC    .190    .197    .199    .200    .201    .204    .214    .229    .241    .249
62          PC    .251    .256    .270    .278    .281    .283    .295    .322    .352    .409
63          PC    .499    .590    .710    .744    .781    .812    .819    .835    .851    .856
64          PC    .860    .868    .876    .888    .910    .926    .937    .950    .970    .976
65          PC    .982    .985    .987    .989    .990    .993    .993    .994    .995    .998
66          PC    .998    .999   1.00
67          LS       0      85
68          UD    0.14
            *
            *
            *  THE BLACK MTN DETENTION BASIN STAGE/DISCHARGE AND STAGE/STORAGE RELATIONSHIPS
            *  WERE CHECKED AGAINST THE LATEST RECORD DRAWINGS AND PREDESIGN REPORTS.
            *  THE FOLLOWING INPUT  WAS DIGITIZED FROM RECORD DRAWINGS AS THE HEC-1 INPUT
            *  WAS NOT AVAILABLE. THE RECORD DRAWINGS DIFFERED SLIGHTLY FROM THE
            *  PRE-DESIGN REPORT.
            *
            *
            *

69          KK     DB1
70          KM   FACILITY = BLACK MOUNTAIN DETENTION BASIN
71          KM   FACILITY # = C1CH 0967
72          KM   STORAGE VOLUME = 400 AC-FT (100-YR PK STAGE  = 2593 WSE)
73          KM   OUTLET = 36" ORIFICE PLATE ON A 54" RCP
74          KO       3
75          RS       1    STOR      -1
76          SV       0    1.19    4.55   10.32   22.58   38.69   54.90   73.42   92.55  113.51
77          SV  135.16  158.22  183.23   208.1  234.67  262.55  292.02  325.32
78          SE    2556    2558    2560    2562    2564    2566    2568    2570    2572    2574
79          SE    2576    2578    2580    2582    2584    2586    2588    2590
80          SQ       0    1.28   27.31   57.88   77.52   95.42  108.73   120.5  131.87  141.78
81          SQ  150.74  159.67  168.97   176.6  183.71  190.74  197.77  204.93
82          SE    2556    2558    2560    2562    2564    2566    2568    2570    2572    2574
83          SE    2576    2578    2580    2582    2584    2586    2588    2590
            *

84          KK    RDB1
85          KM   ROUTE DB1 TO    C1HB1
86          KM   FACILITY = MISSION HILLS INTERCEPTOR
87          KM   FACILITY # C1CH 1012
88          KM   TYPE OF FACILITY = RCB
89          RD    5600   0.028   0.015            DEEP       8      50
```

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LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  90      KK   C1HB1
  91      KM   PART OF 2001 MPU C1-2
  92      BA   .4497
  93      PB    3.17
  94      LS      0      82
  95      UD    0.51
          *

  96      KK     CP2
  97      KM   COMBINE RCP1 AND C1HB1
  98      HC       2
          *

  99      KK    RCP2
 100      KM   ROUTE CP2 TO C1G3A
 101      KM   FACILITY = MISSION HILLS INTERCEPTOR
 102      KM   FACILITY # C1CH 0930
 103      KM   TYPE OF FACILITY = RCB
 104      RD    1000   0.028   0.015            DEEP       8      50
          *

 105      KK   C1G3A
 106      KM   2001 MPU C1-3
 107      BA   .2726
 108      PB    3.19
 109      LS      0      85
 110      UD    0.17
          *

 111      KK     CP3
 112      KM   COMBINE RCP2 AND C1G3A
 113      HC       2
          *

 114      KK    RCP3
 115      KM   ROUTE CP3 TO C1G3B
 116      KM   FACILITY = MISSION HILLS INTERCEPTOR
 117      KM   FACILITY # 0905
 118      KM   TYPE OF FACILITY = RCB
 119      RD    2900   0.028   0.015            DEEP       8      50
          *

 120      KK   C1G3B
 121      KM   2001 MPU C1-5
 122      BA   .7328
 123      PB    3.21
 124      LS      0      84
 125      UD    0.11
          *
```



```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 126      KK     CP4
 127      KM   COMBINE RCP3 AND C1G3B
 128      HC       2
          *

 129      KK    RCP4
 130      KM   ROUTE CP4 TO C1G3C
 131      KM   MISSION HILLS INTERCEPTOR
 132      KM   FACILITY # 0871
 133      KM   TYPE OF FACILTY = RCB
 134      RD    1300   0.025   0.015       0    DEEP      12     50
          *
```

```
135          KK   C1G3C
136          KM   2001 MPU C1-6
137          BA   1.048
138          PB    3.24
139          LS       0      85
140          UD    0.18
             *

141          KK     CP5
142          KM   COMBINE RCP4 AND C1G3C
143          KM   MISSION HILLS DETENTION BASIN
144          HC       2
             *

145          KK   C1G3D
146          KM   2001 MPU C1-7
147          BA   .8376
148          PB    3.28
149          LS       0      86
150          UD    0.15
             *

151          KK    CP6A
152          KM   COMBINE CP5 AND C1G3D
153          KM   MISSION HILLS DETENTION BASIN
154          HC       2
             *

155          KK   C5ICB
156          KM   PART OF 2001 C-8
157          BA   .7334
158          PB    3.37
159          LS       0      79
160          UD    0.15
             *
```

1 HEC-1 INPUT PAGE 5

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LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

161          KK   C5ICB
162          KM   ROUTE C5ICB TO MISSION HILLS DETENTION BASIN
163          KM   FACILITY # = C1CH 0882
164          KM   TYPE OF FACILITY = ROCK LEVEE
165          RD    2350   0.024   0.040       0    TRAP      50       2
             *

166          KK   C5I2A
167          KM   PART OF 2001 MPU C1-9
168          BA   1.400
169          PB    3.33
170          LS       0      80
171          UD    0.14
             *

172          KK    CP6B
173          KM   COMBINE RC5ICB AND C5I2A
174          HC       2
             *

175          KK     CP6
176          KM   COMBINE CP6A AND CP6B
177          KM   @ MISSION HILLS DETENTION BASIN
178          HC       2
             *
             *
             *  THE MISSION HILLS DETENTION BASIN STAGE/DISCHARGE AND STAGE/VOLUME RELATIONS
             *  WERE CHECKED AGAINST THE LATEST RECORD DRAWINGS AND PREDESIGN REPORTS.
             *  THE FOLLOWING INPUT REFLECTS RECORD DRAWING INFORMATION
             *

179          KK     DB2
180          KM    FACILITY = MISSION HILLS DETENTION BASIN
```

```
181          KM   FACILITY # C1CH 0854
182          KM   STORAGE VOLUME = 402 ACRE-FEET (100-YR WSE)
183          KM   OUTLET = 84" RCP
184          KO       3
185          RS       1    STOR      -1
186          SV       0    2.55   15.85   40.23   72.34   107.2   185.2   273.0   371.6   480.1
187          SV   598.5   630.2
188          SE    2323    2326    2328    2330    2332    2334    2333    2342    2346    2350
189          SE    2354    2355
190          SQ       0   56.78   108.7   142.9   170.4   193.9   234.1   268.4   298.7   326.1
191          SQ   351.6   357.6
192          SE    2323    2326    2328    2330    2332    2334    2333    2342    2346    2350
193          SE    2354    2355
             *

194          KK    RDB2
195          KM    ROUTE DB2 TO C1G2D
196          KM   FACILITY = MISSION HILLS DETENTION BASIN
197          KM   FACILITY # = 0757
198          KM   TYPE OF FACILITY = RCP
199          RD    6100   0.025   0.013       0    CIRC     7.0
             *
```

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```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

200          KK   C1G2C
201          KM   PART OF 2001 MPU C1-13
202          BA   .2925
203          PB    3.23
204          LS       0      76
205          UD    0.27
             *

206          KK   C1G2D
207          KM   PART OF 2001 MPU C1-21
208          BA   .2244
209          PB    3.27
210          LS       0      73
211          UD     .22
             *

212          KK    CP7A
213          KM   COMBINE RDB2, C1G2C, AND C1G2D
214          KM   NDOT DETENTION BASIN @ US95
215          HC       3
             *

216          KK  C1G2B1
217          KM   PART OF 2001 MPU C1-10
218          BA   .5231
219          PB    3.17
220          LS       0      74
221          UD     .42
             *

222          KK   RG2B1
223          KM   ROUTE C1G2B1 TO C1G2B2
224          KM   NO FACILITY - OVERLAND FLOW
225          RD    4400    .028    .030       0    TRAP     200
             *

226          KK  C1G2B2
227          KM   PART OF 2001 MPU C1-12
228          BA   .3097
229          PB    3.20
230          LS       0      77
231          UD     .27
             *

232          KK    CP7B
233          KM   COMBINE C1G2B1, C1G2B2
```

```
                KM   COLLEGE AT US95
                HC       2
                *
1                                        HEC-1 INPUT                                                    PAGE  7

LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


                KK   C1G2A
                KM   PART OF 2001 MPU C1-11
                BA   .3468
                PB    3.17
                LS       0      79
                UD    0.22
                *

                KK  RC1G2A
                KM   ROUTE C1G2A TO CP7C
                KM   NDOT FACILITY @US95
                RD    3800    .018    .030       0    TRAP     100
                *

                KK    CP7C
                KM   COMBINE CP7B AND C1G2A
                KM   COLLEGE AT US95
                HC       2
                *

                KK     CP7
                KM   COMBINE CP7B AND CP7C
                KM   NDOT FACILITY AT US95
                HC       2
                *
                *  NDOT DETENTION BASIN INPUT IS TAKEN FROM PREDESIGN REPORT AND DRAWINGS
                *  THIS DETENTION BASIN IS BROKEN INTO TWO DETENTION PONDS, NAMELY POND A AND
                *  POND B, ON THE UPPER AND LOWER SIDE OF THE INTERCHANGE, RESPECTIVELY. THE
                *  100-YR PEAK IS ATTENUATED THROUGH THE BASIN BY ROUTING OF THE HYDROGRAPH,
                *  FIRST THROUGH POND A AND SECOND THROUGH POND B. A DOUBLE 10X10  RCB CONNECTS
                *  THE TWO PONDS UNDER I-515, INV EL = 2230 (INLET) AND 2221 (OUTLET) WHEREAS
                *  A TRIPPLE RCB WAS DESIGNED AT THE OUTLET WITH INVERT EL = 2219.68, BUT IS NOT
                *  CONSTRUCTED TO DATE. THE FOLLOWING STAGE/STORAGE AND STAGE/DISCHARGE RELATION
                *  WERE TAKEN FROM THE NDOT PREDESIGN REPORT.
                *
                *

                KK   CP7DB
                KM   FACILITY = NDOT DETENTION BASIN
                KM   FACILITY # C1CH 0658
                KM   POND A
                KM   STORAGE VOLUME = 94 AC-FT AT WSE= 2248
                KM   OUTLET = DOUBLE 10 X 10 RCB
                KO       3
                RS       1    STOR      -1
                SV       0    .125    .660   1.852   3.904   6.967  11.155  16.146  21.506  27.208
                SV  33.219  39.589  46.369  53.528  61.032  68.877  77.055  85.507  94.163 102.957
                SE    2230    2231    2232    2233    2234    2235    2236    2237    2238    2239
                SE    2240    2241    2242    2243    2244    2245    2246    2247    2248    2249
                SQ       0    70.2   180.1   317.4   479.1   659.2   854.5  1068.1  1290.9  1525.9
                SQ  1776.1  2038.6  2256.8  2384.2  2511.7    2700  2887.3  3060.9  3225.7  3515.4
                SE    2230    2231    2232    2233    2234    2235    2236    2237    2238    2239
                SE    2240    2241    2242    2243    2244    2245    2246    2247    2248    2249
                *
1                                        HEC-1 INPUT                                                    PAGE  8

LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


                KK   CP7DB
                KM   FACILITY = NDOT DETENTION BASIN
                KM   FACILITY # C1CH 0658
                KM   POND B
                KM   STORAGE VOLUME = 94 AC-FT AT WSE= 2232
                KO       3
```

```
RS       1    STOR      -1
SV       0    .677   5.419  13.616  21.947  30.416  39.023  47.764  56.622  65.611
SV   74.74  84.018  93.457 103.051 112.794
SE    2220    2221    2222    2223    2224    2225    2226    2227    2228    2229
SE    2230    2231    2232    2233    2234
SQ       0    13.2    37.2   152.0   340.3   578.1   849.7  1155.1  1488.1  1845.5
SQ  2224.9  2481.1  2700.8  3035.5  3463.4
SE    2220    2221    2222    2223    2224    2225    2226    2227    2228    2229
SE    2230    2231    2232    2233    2234
*

KK    RCP7
KM   ROUTE CP7 TO CP8A
KM   PARTIALLY IMPROVED CHANNEL
KM   FACILITY # C1CH 0613, 0641, AND 0674
RD    3960    .025    .030       0    TRAP      20
*

KK    C1NA
KM    2001 MPU C1-14
BA   .4139
PB    3.18
LS       0      84
UD    0.03
*

KK   RC1NA
KM   ROUTE C1NA TO CP8A
KM   FACILITY = PARTIALLY IMPROVED CHANNEL
KM   FACILITY # C1CH 0613, 0641, AND 0674
RD    1980    .025    .030       0    TRAP      20
*

KK    CP8
KM   COMBINE C1NA AND CP8A
HC       2
*

KK   RCP8
KM   ROUTE CP8 TO C1HA
KM   C1 AND PUEBLO
RD    2500    .025    .030       0    TRAP      20
*  BEGIN POGGEMEYER DESIGN GROUP INPUT FROM 1998 LETTER OF MAP REVISION
*  FOR THE EQUESTRIAN DETENTION BASIN, CASE NO 99-09-623P. SOME SUBBASINS
*  IN THIS MODEL HAVE BEEN MODIFIED TO REFLECT POST 1998 DEVELOPMENT.
*  THE FOLLOWING TABLE CORRELATES 1998 LOMR SUBBASIN LABELS WITH LABELS IN
*  THIS MODEL.
*  ************************************************************************
*  *                                                                      *
*  *                     EQUIVALENT 1998 LOMR SUBBASIN LABELS             *
*  *                                                                      *
*  *                                                                      *
*  *                     1998 LOMR              THIS MODEL                *
*  *                                                                      *
*  *                       C5FD                   C5FD                  *
*  *                       C5FA                   C5FA                  *
*  *                       C5FB                   C5FB                  *
*  *                       C5FC                   C5FC                  *
*  *                       C5EA                   C5EA                  *
*  *                       C5EC                   C5EC                  *
*  *                       C5EB                   C5EB                  *
*  *                       C5ED                   C5ED                  *
*  *                       C5DA                   C5DA                  *
*  *                       C5DB                   C5DB                  *
*  *                       C5CAa                  N/A                   *
*  *                       C5CAb                  N/A                   *
*  *                       C5CB                   C5CB                  *
*  *                       C5DC                   N/A                   *
*  *                       OFF-2A                 N/A                   *
*  *                       OFF-2B                 N/A                   *
*  *                       OFF-2C                 C1HD                  *
*  *                       OFF-3                  C1HE                  *
*  *                       OFF-4                  C1HF                  *
```

```
*  *                    OFF-6                N/A                  *
*  *                    OFF-8                C5I1D                *
*  *                    OFF-9                C5I1E                *
*  *                    OFF-10               C5GD                 *
*  *                    OFF-11               N/A                  *
*  *                    OFF-12               C5I1C                *
*  *                    OFF-13               N/A                  *
*  *                    OFF-14               C5GA                 *
*  *                    OFF-15               C5GB                 *
*  *                    OFF-16               C5GC                 *
*  *                    OFF-21               N/A                  *
*  *                    OFF-23               N/A                  *
*  *                    OFF-24               N/A                  *
*  *                                                              *
*  ****************************************************************
*
```



```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  308     KK    C5GC
  309     KM   1998 LOMR OFF-16
  310     BA   .1107
  311     PB    3.43
  312     LS       0       84
  313     UD    0.04
          *

  314     KK   RC5GC
  315     KM   ROUTE C5GC TO C5GB
  316     RD    1000    .020    .030           TRAP     100
          *

  317     KK    C5GB
  318     KM   1998 LOMR OFF-15
  319     BA   .3249
  320     PB    3.43
  321     LS       0       83
  322     UD     .16
          *

  323     KK    CP9
  324     KM   COMBINE C5GB AND C5GC
  325     HC       2
          *

  326     KK   RCP9
  327     KM   ROUTE CP9 TO C5GA
  328     RD    2640    .035    .030           TRAP      40
          *

  329     KK    C5GA
  330     KM   1998 LOMR OFF-14
  331     BA   .2723
  332     PB    3.39
  333     LS       0       66
  334     UD     .30
          *

  335     KK    CP10
  336     KM    COMBINE RCP9 AND C5GA
  337     HC       2
          *

  338     KK   RCP10
  339     KM    ROUTE CP10 TO C5I1E
  340     RD    2200    .033    .030           TRAP     100
  341
```



```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
```

```
342          KK   RCP10
343          KM    ROUTE CP10 TO C5I1E
344          RD    2200    .030    .030            TRAP     100
             *

345          KK    C5GD
346          KM   1998 LOMR OFF-10
347          BA   .4447
348          PB    3.46
349          LS       0      67
350          UD    0.46
             *

351          KK  DIVER1
352          KM   DIVERT FLOWS CONVEYED INTO CULVERT "A" STA 296+24, ACROSS BOULDER HIGHWAY
353          DT  DIVER1
354          DI       0      37     126     260     502
355          DQ       0      10      20      30      40
             *

356          KK   RC5GD
357          KM   ROUTE C5GD TO C5I1E
358          RD    2200    .030    .030            TRAP     100
             *

359          KK   C5I1E
360          KM   1998 LOMR OFF-9
361          BA   .1634
362          PB    3.45
363          LS       0      79
364          UD     .05
             *

365          KK    CP11
366          KM   COMBINE RCP10, C5I1E, AND RC5GD
367          HC       3
             *

368          KK   RCP11
369          KM   ROUTE  CP11 TO C1HF
370          RD    1600     .04    .030            TRAP     100
             *

371          KK    C1HF
372          KM   1998 LOMR OFF-4
373          BA   .1008
374          PB    3.45
375          LS       0      78
376          UD    0.27
             *
```

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```
LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

377          KK    CP12
378          KM   COMBINE RCP11 AND C1HF
379          HC       2
             *

380          KK   RCP12
381          KM   ROUTE CP12 TO C1HE
382          RD    1800    .013    .030            TRAP     200
             *

383          KK   C5I1B
384          KM   MODIFIED 1998 LOMR SUBBASIN OFF-13
385          BA   .5185
386          PB    3.43
387          LS       0      71
388          UD    0.08
             *
```

```
389          KK  RC5I1B
390          KM   ROUTE C5I1B TO C5I1D
391          RD    1100    .018    .030           TRAP     100
             *

392          KK   C5I1D
393          KM   1998 LOMR OFF-8
394          BA   .1158
395          PB    3.43
396          LS       0      77
397          UD     .15
             *

398          KK    CP13
399          KM   COMBINE RC5I1B TO C5I1D
400          HC       2
             *

401          KK   RCP13
402          KM   ROUTE CP13 TO C1HE
403          RD    2100    .021    .030           TRAP     100
             *

404          KK    C1HE
405          KM   1998 LOMR OFF-3
406          BA   .1467
407          PB    3.29
408          LS       0      72
409          UD     .14
             *
1                                        HEC-1 INPUT                                        PAGE 12

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

410          KK    CP14
411          KM   COMBINE RCP12, RCP13, AND C1HE
412          HC       3
             *

413          KK  DIVER2
414          KM   DIVERT CULVERT AND BOULDER HIGHWAY OVERFLOWS INTO MAGIC WAY 844+00, 843+52,
415          KM   AND 840+46, TO SUBBASIN C5CC
416          DT  DIVER2
417          DI       0    1255    2000
418          DQ       0     116     900
             *

419          KK   RCP14
420          KM   ROUTE CP14 TO C1HD
421          RD     800    .010    .030           TRAP     100
             *

422          KK    C1HD
423          KM   1998 LOMR OFF-2C
424          BA   .0716
425          PB    3.29
426          LS       0      77
427          UD    0.15
             *

428          KK    CP15
429          KM   COMBINE RCP14 AND C1HD
430          HC       2
             *

431          KK   RCP15
432          KM   ROUTE CP15 TO C1HCB
433          RD    1700    .010    .030           TRAP     100
             *

434          KK  DIVER3
```

```
435          KM   DIVERT CULVERT FLOWS INTO SUBBASIN C5CC, STA 832+02, 825+52, AND 834+82
436          DT  DIVER3
437          DI       0    1171    2000
438          DQ       0     217     900
             *

439          KK    C5I1
440          KM   1998 LOMR OFF-11
441          BA   .2432
442          PB    3.43
443          LS       0      76
444          UD     .17
             *
1                                        HEC-1 INPUT                                        PAGE 13

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

445          KK   C5I1C
446          KM   1998 LOMR OFF-12
447          BA  0.0643
448          PB    3.43
449          LS       0      80
450          UD     .23
             *

451          KK  RC5I1C
452          KM   ROUTE C5I1C TO C5I1
453          RD     700    .014    .030            TRAP     100
             *

454          KK    CP16
455          KM   COMBINE RC5I1C AND C5I1
456          HC       2
             *

457          KK   RCP16
458          KM   ROUTE CP16 TO C1G1B
459          RD    1200    .018    .030            TRAP      50
             *

460          KK   C1G1B
461          KM   1998 LOMR OFF-6 IS PART OF THIS SUBBASIN
462          PB    3.21
463          BA   .1428
464          LS       0      87
465          UD     .18
             *

466          KK    CP17
467          KM   COMBINE RCP16 AND C1G1B
468          HC       2
             *

469          KK   RCP17
470          KM   ROUTE CP17 TO C1HCB
471          RD    1700    .010    .030            TRAP     100
             *

472          KK   C1HCB
473          KM   MODIFIED 1998 LOMR OFF-2B
474          BA   .1818
475          PB    3.29
476          LS       0      78
477          UD    0.06
             *
1                                        HEC-1 INPUT                                        PAGE 14

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

478          KK  CP18A
479          KM   COMBINE RCP17,AND C1HCB
```

```
480          HC       2
             *

481          KK    CP18
482          KM   COMBINE RCP15 AND CP18A
483          HC       2
             *

484          KK  DIVER4
485          KM   DIVERT CULVERT FLOWS AND BOULDER OVERFLOWS INTO SUBBASIN C5CC
486          KM   STA 816+22 AND 819+84, BOULDER HIGHWAY
487          DT  DIVER4
488          DI       0    1234    2000
489          DQ       0     111    1000
             *

490          KK   RCP18
491          KM   ROUTE CP18 TO C1HB
492          RD    1100    .007    .030            TRAP     100
             *

493          KK   C1G1A
494          KM   2001 MPU C1-15
495          BA   .2243
496          PB    3.20
497          LS       0      84
498          UD    0.22
             *

499          KK  RC1G1A
500          KM   ROUTE TO C1HB
501          KM   OVERLAND FLOW
502          RD    2600    .025    .030            TRAP     200
             *

503          KK    C1HB
504          KM   MODIFIED 1998 LOMR OFF-2A
505          BA   .1472
506          PB    3.21
507          LS       0      85
508          UD    0.03
             *

509          KK   CP19A
510          KM   COMBINE C1HB, RC1G1A
511          HC       2
             *
```



```
LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

512          KK    CP19
513          KM   COMBINE CP19A AND RCP18
514          HC       2
             *

515          KK  DIVER5
516          KM   DIVERT CULVERT FLOWS INTO SUBBASIN C4A1C, STA 807+37
517          DT  DIVER5
518          DI       0     798    2000
519          DQ       0      70     970
             *

520          KK   RCP19
521          KM   ROUTE CP19 TO BOULDER HIGHWAY AND PUEBLO
522          RD    2300    .013    .030            TRAP     100
             *

523          KK    C1HA
524          KM   SUBBASIN C1HA
525          KM   2001 MPU C1-24
526          BA   .0735
```

```
527          PB    3.13
528          LS       0      66
529          UD     .21
             *

530          KK   CP20A
531          KM   COMBINE C1HA AND RCP19
532          HC       2
             *

533          KK    CP20
534          KM   COMBINE CP20A AND RCP8
535          HC       2
             *

536          KK   RCP20
537          KM   ROUTE CP20 TO C1B
538          KM   FACILITY  = C-1 CHANNEL
539          KM   FACILITY # C1CH 0528
540          KM   TYPE OF FACILTIY  = CONCRETE CHANNEL
541          RD    1700    .027    .015            TRAP      25       1
             *

542          KK     C1D
543          KM   2001 MPU C1-26
544          BA   .4005
545          PB    3.14
546          LS       0      78
547          UD     .21
             *
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

548          KK    RC1D
549          KM   ROUTE C1D TO C1C
550          KM   UNION PACIFIC RAILROAD
551          RD    1600    .014    .030       0    TRAP       0      50
             *

552          KK     C1C
553          KM   2001 MPU C1-27
554          BA   .2307
555          PB    3.08
556          LS       0      80
557          UD     .19
             *

558          KK    CP21
559          KM   COMBINE RC1D AND C1C
560          HC       2
             *

561          KK   RCP21
562          KM   ROUTE CP21 TO C1B
563          RD    4600    .010    .015       0    TRAP       0      30
             *

564          KK     C1B
565          KM   2001 MPU C1-28
566          BA   .3773
567          PB    3.11
568          LS       0      86
569          UD     .21
             *

570          KK   C4A1D
571          KM   2001 MPU C1-25
572          BA   0.062
573          PB    3.11
574          LS       0      78
575          UD     .19
```

```
                *
576             KK  RC4A1D
577             KM   ROUTE C4A1D TO C1B
578             RD     700    .020    .015            TRAP      25       1
                *
579             KK    CP22
580             KM   COMBINE RCP19,RCP20, C1B, AND RC4A1D
581             HC       4
                *
```



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LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

582             KK   RCP22
583             KM   ROUTE CP21 TO C1A
584             KM   FACILITY = C-1 CHANNEL
585             KM   FACILTIY # = C1CH 0455, 0502
586             KM   TYPE OF FACILTIY = CONCRETE CHANNEL
587             RD    3200    .021    .015            TRAP      25       1
                *
588             KK     C1A
589             KM   2001 MPU C1-29
590             BA   .1456
591             PB    2.99
592             LS       0      84
593             UD     .22
                *
594             KK    CP23
595             KM   COMBINE CP22 AND C1A
596             HC       2
                *
597             KK   RCP23
598             KM   ROUTE CP23 TO C4A1B
599             KM   FACILITY = C-1 CHANNEL
600             KM   FACILITY # = C1CH 0455
601             KM   TYPE OF FACILITY  = CONCRETE CHANNEL
602             RD    1250    .025    .025            TRAP     25.       1
                *
603             KK    C5CC
604             KM   1998 LOMR OFF-21
605             PB    3.29
606             BA   .3346
607             LS       0      79
608             UD    0.28
                *
609             KK    RET4
610             KM   RETRIEVE FLOWS FROM C1HCB
611             DR  DIVER4
                *
612             KK   RDIV4
613             KM   ROUTE DIVERSION 4 TO CP24A
614             KM   TYPE OF FACILTIY = OVERLAND FLOW TO EQUESTRIAN
615             RD    1100    .027    .030            TRAP     100       1
                *
616             KK   RDIV4
617             KM   ROUTE DIVERSION 4 TO CP24A
618             KM   TYPE OF FACILTIY = STREET FLOW IN EQUESTRIAN
619             RD    1700    .009    .016            TRAP      80       1
                *
```



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LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

```
620          KK   CP24A
621          KM   COMBINE C5CC AND RDIV4
622          HC       2
             *

623          KK    RET3
624          KM   RETRIEVE DIVERSION 3 FROM C1HD
625          DR  DIVER3
             *

626          KK   RDIV3
627          KM   ROUTE DIVERSION 3 TO CP24A
628          KM   TYPE OF FACILTIY = OVERLAND FLOW TO EQUESTRIAN
629          RD    2000    .023    .030            TRAP     100       1
             *

630          KK   RDIV3
631          KM   ROUTE DIVERSION 3 TO CP24A
632          KM   TYPE OF FACILTIY = STREET FLOW IN EQUESTRIAN
633          RD    1100    .009    .016            TRAP      80       1
             *

634          KK   CP24B
635          KM   COMBINE CP24A AND RDIV4
636          HC       2
             *

637          KK    RET2
638          KM   RETRIEVE DIVERSION 2 FROM C1HE
639          DR  DIVER2
             *

640          KK   RDIV2
641          KM   ROUTE DIVERSION 2 TO CP24A
642          KM   TYPE OF FACILTIY = OVERLAND FLOW TO EQUESTRIAN
643          RD    2500    .024    .030            TRAP     100       1
             *

644          KK   RDIV2
645          KM   ROUTE DIVERSION 2 TO CP24A
646          KM   TYPE OF FACILTIY = STREET FLOW IN EQUESTRIAN
647          RD     600    .009    .016            TRAP      80       1
             *

648          KK   CP24C
649          KM   COMBINE CP24B AND RDIV2
650          HC       2
             *
```



```
LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

651          KK    C5CA
652          KM   PART OF 1998 LOMR C5CAb
653          KM   2001 MPU C1-30
654          BA   .2974
655          PB    3.41
656          LS       0      70
657          UD    0.22
             *

658          KK   RC5CA
659          KM   ROUTE C5CA TO C5CF
660          KM   APPALOOSA RD
661          RD    2000    .019    .016       0    TRAP       0      50
             *

662          KK    C5CF
663          KM   PART OF 1998 LOMR C5CA6
664          KM   2001 MPU C1-31
665          BA   .3233
```

```
666          PB    3.25
667          LS       0      68
668          UD    0.07
             *

669          KK    CP25
670          KM   COMBINE RC5CA AND C5CF
671          KM   APPALOOSA ROAD AND PALOMINO DRIVE
672          HC       2
             *

673          KK   RCP25
674          KM   ROUTE CP25 TO C5CE
675          KM   APPALOOSA ROAD
676          RD    2640    .020    .016            TRAP      50       (
             *

677          KK    C5CE
678          KM   PART OF 1998 LOMR C5CAb
679          BA   .3244
680          PB    3.29
681          LS       0      68
682          UD     .08
             *

683          KK    CP26
684          KM   COMBINE RCP25 AND C5CE
685          KM   APPALOOSA ROAD AND EQUESTRIAN
686          HC       2
             *
1                                        HEC-1 INPUT                                        PAGE 20

LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

687          KK   RCP26
688          KM   ROUTE CP26 TO C5CD
689          KM   EQUESTRIAN DRIVE
690          RD    1200    .016    .016            TRAP      50       0
             *

691          KK    C5CD
692          KM   PART OF 1998 LOMR C5CAa AND C5CAb
693          BA   .2668
694          PB    3.31
695          LS       0      73
696          UD     .34
             *

697          KK    RET1
698          KM   RETREIVE DIVERSION 1 FROM C5GD
699          DR  DIVER1
             *

700          KK   RDIV1
701          KM   ROUTE DIVERSION 1 TO CP27
702          KM   TYPE OF FACILTIY = OVERLAND FLOW TO EX CONC CHANNEL
703          RD    2600    .019    .030            TRAP     100       1
             *

704          KK   RDIV1
705          KM   ROUTE DIVERSION 1 TO CP27
706          KM   TYPE OF FACILTIY = CONCRETE CHANNEL
707          RD    1300    .014    .015            TRAP      20       1
             *

708          KK   RDIV1
709          KM   ROUTE DIVERSION 1 TO CP27
710          KM   TYPE OF FACILTIY = STREET TO EQUESTRIAN
711          RD    2000    .014    .016            TRAP      60       1
             *

712          KK    CP27
```

```
713          KM   COMBINE RCP26, C5CD, AND RDIV1
714          HC        3
             *

715          KK   RCP27
716          KM   ROUTE CP27 TO CP24C
717          RD    1450    .017    .017            TRAP     100
             *

718          KK   CP24D
719          KM   COMBINE CP24C AND RCP27
720          HC        2
             *
```



```
LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

721          KK    C5CB
722          KM   MODIFIED 1998 LOMR C5CB
723          KM   2001 MPU C1-47A
724          BA   .1409
725          PB    3.26
726          LS       0      81
727          UD     .30
             *

728          KK   CP24E
729          KM   COMBINE CP24D AND C5CB
730          HC        2
             *

731          KK    C5FD
732          KM   1998 LOMR C5FD
733          BA   .1706
734          PB    3.43
735          LS       0      83
736          UD     .07
             *

737          KK   RC5FD
738          KM   ROUTE C5FD TO C5FB
739          RD    2500     .02    .040       0    TRAP      50       2
             *

740          KK    C5FA
741          KM   1998 LOMR C5FA
742          BA   .5071
743          PB    3.43
744          LS       0      87
745          UD     .02
             *

746          KK   RC5FA
747          KM   ROUTE C5FA TO C5FB
748          RD    4600    .065    .040       0    TRAP     100       1
             *

749          KK    C5FB
750          KM   1998 LOMR C5FB
751          BA   .2592
752          PB    3.43
753          LS       0      69
754          UD     .17
             *

755          KK    CP28
756          KM   COMBINE RC5FD, RC5FA, AND C5FB
757          HC        3
             *
```



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LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
```

```
758          KK   RCP28
759          KM   ROUTE CP28 TO  C5FC
760          KM   FACILITY = C-1 CHANNEL - EQUESTRIAN LEVEE
761          KM   FACILITY # = C1EQ 0297
762          KM   TYPE OF FACILITY = ROCK LEVEE
763          RD    2000   0.019    .040       0    TRAP      50       3
             *

764          KK    C5FC
765          KM   1998 LOMR C5FC
766          KM   2001 MPU C1-37
767          BA   .2222
768          PB    3.43
769          LS       0      73
770          UD    0.16
             *

771          KK    CP29
772          KM   COMBINE RCP28 AND C5FC
773          HC       2
             *

774          KK   RCP29
775          KM   ROUTE CP29 TO C5EA
776          KM   FACILITY = C-1 CHANNEL - EQUESTRIAN LEVEE
777          KM   FACILITY # = C1EQ 0297
778          KM   TYPE OF FACILITY = ROCK LEVEE
779          RD    1900   0.018    .040       0    TRAP     100       3
             *

780          KK    C5EA
781          KM   1998 LOMR C5EA
782          KM   2001 MPU C1-38
783          BA   .4873
784          PB    3.43
785          LS       0      82
786          UD    0.12
             *

787          KK    CP30
788          KM   COMBINE RCP29 AND C5EA
789          HC       2
             *

790          KK   RCP30
791          KM   ROUTE CP30 TO C5EC
792          KM   FACILITY = C-1 CHANNEL - EQUESTRIAN LEVEE
793          KM   FACILITY # = C1EQ 0297
794          KM   TYPE OF FACILITY = ROCK LEVEE
795          RD    1600   0.017    .040       0    TRAP     100       3
             *
```



```
LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

796          KK    C5EB
797          KM    1998 LOMR C5EB
798          BA   .5469
799          PB    3.43
800          LS       0      88
801          UD     .21
             *

802          KK   RC5EB
803          KM   ROUTE C5EB  TO C5EC
804          RD    3500   0.040    .040       0    TRAP      50       3
             *

805          KK    C5EC
806          KM    1998 LOMR C5EC
```

```
807          BA   .2214
808          PB    3.43
809          LS       0      71
810          UD     .14
             *

811          KK    CP31
812          KM   COMBINE RC5EB, C5EC, AND RCP30
813          HC       3
             *

814          KK   RCP31
815          KM   ROUTE CP31 TO C5ED
816          KM   FACILITY = C-1 CHANNEL - EQUESTRIAN LEVEE
817          KM   FACILITY # = C1EQ 0297
818          KM   TYPE OF FACILITY = ROCK LEVEE
819          RD    2500   0.020    .040       0    TRAP      35       3
             *

820          KK    C5ED
821          KM   1998 LOMR C5ED
822          KM   2001 MPU C1-41
823          BA   .1578
824          PB    3.41
825          LS       0      79
826          UD    0.17
             *

827          KK    CP32
828          KM   COMBINE RCP31 AND C5ED
829          HC       2
             *

830          KK   RCP32
831          KM   ROUTE CP32 TO C5DA
832          KM   FACILITY = C-1 CHANNEL - EQUESTRIAN LEVEE
833          KM   FACILITY # = C1EQ 0349
834          KM   TYPE OF FACILITY = ROCK LEVEE
835          RD    1000   0.020    .040       0    TRAP      35       3
             *
1                                        HEC-1 INPUT                                                    PAGE 24

LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

836          KK    C5DA
837          KM   1998 LOMR C5DA
838          KM   2001 MPU C1-42
839          BA   1.063
840          PB    3.42
841          LS       0      86
842          UD    0.05
             *

843          KK    C5DB
844          KM   1998 LOMR C5DB
845          KM   2001 MPU C1-43
846          BA   .5321
847          PB    3.40
848          LS       0      88
849          UD    0.07
             *

850          KK    CP33
851          KM   COMBINE RCP32, C5DA, C5DB
852          HC       3
             *

853          KK   RCP33
854          KM   ROUTE CP33 TO C5CB
855          KM   FACILITY = C-1 CHANNEL - EQUESTRIAN CHANNEL
856          KM   FACILITY # = C1EQ 0297
857          KM   TYPE OF FACILITY = CONCRETE TRAP CHANNEL
```

```
858          RD    5000   0.027    .013       0    TRAP      20
             *

859          KK    CP24
860          KM   COMBINE RCP33 AND CP24E
861          HC       2
             *

862          KK   RCP24
863          KM   ROUTE CP24 TO CP34
864          KM   FACILITY = MAGIC WAY
865          KM   TYPE OF FACILITY = STEET
866          RD    3000   0.010    .016       0    TRAP      20
             *

867          KK    C5DC
868          KM   MODIFIED 1998 LOMR SUBBASIN C5DC
869          PB    3.31
870          BA   .3264
871          LS       0      83
872          UD     .02
             *
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9.....10

873          KK   RC5DC
874          KM   ROUTE C5DC TO C4BD
875          RD    6600    .024    .040       0    TRAP     100
             *
             *

876          KK    C4BD
877          KM   MODIFIED 1998 LOMR SUBBASIN C5DC
878          KM   2001 MPU C1-47
879          BA   .5243
880          PB    3.23
881          LS       0      82
882          UD    0.42
             *

883          KK   CP34A
884          KM   COMBINE RC4BF, C4BD, AND C5DC
885          HC       2
             *

886          KK   CP34B
887          KM   COMBINE  RCP24  AND CP34A
888          KM   EQUESTRIAN DETENTION BASIN
889          HC       2
             *
             *  THE EQUESTRIAN DETENTION BASIN STAGE/DISCHARGE AND STAGE/VOLUME RELATIONSHIPS
             *  WERE CHECKED AGAINST THE LATEST RECORD DRAWINGS AND PREDESIGN REPORTS.
             *  THE FOLLOWING INPUT REFLECTS RECORD DRAWING INFORMATION
             *

890          KK     DB4
891          KM    FACILITY = EQUESTRIAN DETENTION BASIN
892          KM    FACILITY # = C1EQ 0159
893          KM    STORAGE VOLUME = 409 AC-FT,(100-YR PEAK STAGE AT EL = 2069, W/O FREEBOARD)
894          KM    OUTLET = 48" RCP
895          KO       3
896          RS       1    STOR       0
897          SV       0       2      13      31      61      97     118     140     171     200
898          SV     229     261     290     315     344     379     409     437     470     504
899          SE    2048    2050    2052    2054    2056    2058    2059    2060    2061    2062
900          SE    2063    2064    2065    2066    2067    2068    2069    2070    2071    2072
901          SQ       0      37      80     117     142     163     173     182     191     198
902          SQ     206     213     221     228     235     242     248    2755    7761   14467
903          SS    2069     900     3.0     1.5                     -
             *
             *
```

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*              *****END OF 1998 LOMR INPUT******
*
*
*
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LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  904     KK    C4BF
  905     KM   PART OF 1998 LOMR SUBBASIN C5DC
  906     PB    3.21
  907     BA   .2776
  908     LS       0      81
  909     UD     .06
          *

  910     KK   RC4BF
  911     KM   ROUTE C4BF TO C4BC
  912     RD    3100    .020    .033       0    TRAP   100.0
          *

  913     KK    C4BC
  914     KM   SUBBASIN C4BC
  915     PB    3.15
  916     BA   .2402
  917     LS       0      82
  918     UD     .19
          *

  919     KK    CP34
  920     KM   COMBINE CP34B, C4BC,AND RC4BF
  921     HC       3
          *

  922     KK   RCP34
  923     KM   ROUTE CP34 TO C4A1C ALONG EQUESTRIAN OUTFALL
  924     KM   FACILITY = C-1 CHANNEL - EQUESTRIAN DETENTION BASIN OUTFALL
  925     KM   FACILITY # C1EQ 0078, 0112, 0139
  926     RD    3600    .018    .030       0    TRAP     100
          *

  927     KK   C4A1C
  928     KM   2001 MPU C1-49
  929     BA   .5200
  930     PB    3.07
  931     LS       0      82
  932     UD     .25
          *

  933     KK    RET5
  934     KM   RETRIEVE DIVERSION 5
  935     DR  DIVER5
          *

  936     KK   RDIV5
  937     KM   ROUTE DIV5 ALONG RACE TRACK ROAD TO NEWPORT
  938     KM   FACILITY = STREET
  939     RD    5000    .024    .016       0    TRAP     100
          *
```



```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  940     KK   CP35A
  941     KM   COMBINE RDIV5, RCP34, AND C4AIC
  942     KM   RACETRACK AND NEWPORT
  943     HC       3
          *

  944     KK    C4A1
  945     KM    2001 MPU C1-50
```

```
946          BA   .3493
947          PB    3.07
948          LS       0      79
949          UD     .32
             *

950          KK    CP35
951          KM   COMBINE CP35A AND C4A1
952          HC       2
             *

953          KK  RCP35
954          KM   ROUTE TO C4A1B
955          KM   OVERLAND FLOW
956          KM   C-1 CHANNEL AT BURKHOLDER
957          RD    3500     .02    .030            TRAP     100        3
             *

958          KK    C4BE
959          KM   NOT A PART OF THE 1998 LOMR
960          PB    3.17
961          BA   .2206
962          LS       0      85
963          UD    0.26
             *

964          KK   RC4BE
965          KM   ROUTE C4BE TO C4BB
966          RD    3400    .036    .030            TRAP     100
             *

967          KK    C4BB
968          BA   .3477
969          PB    3.09
970          LS       0      87
971          UD    0.29
             *

972          KK    CP36
973          KM   COMBINE RC4BE AND C4BB
974          HC       2
             *
```

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```
LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

975          KK   RCP36
976          KM   ROUTE CP36 TO C4A2B
977          KM   ROUTE TO BURKHOLDER AND RACETRACK
978          RD    2640   0.033   0.016       0    TRAP       0      50
             *

979          KK   C4A2B
980          KM   2001 MPU C1-52
981          BA   .2491
982          PB    3.03
983          LS       0      75
984          UD    0.10
             *

985          KK    CP37
986          KM   COMBINE RC4BB AND C4A2B
987          KM   RACETRACK ROAD @ BURKHOLDER BOULEVARD
988          HC       2
             *

989          KK   RCP37
990          KM   ROUTE CP37 TO C4A1B  ALONG BURKHOLDER
991          RD    2700   0.033   0.016       0    TRAP       0      50
             *

992          KK   CP38A
```

```
 993          KM   COMBINE CP35 AND RCP37 AT BURKHOLDER AND PUEBLO
 994          HC       2
              *

 995          KK   C4A1B
 996          KM   2001 MPU C1-53
 997          BA   .2492
 998          PB    2.98
 999          LS       0      72
1000          UD     .20
              *

1001          KK    CP38
1002          KM   COMBINE RCP22, CP38A, AND C4A1B @ BURKHOLDER AND PUEBLO
1003          HC       3
              *

1004          KK   RCP38
1005          KM   ROUTE CP38 TO CP45
1006          RD    2200   0.021   0.015       0    TRAP      10      02
              *

1007          KK    C4CB
1008          KM    2001 MPU C1-54
1009          BA   5.408
1010          PB    3.43
1011          LS       0      85
1012          UD    0.06
              *
              *
              *
              *  THE EAST C-1 DETENTION BASIN STAGE/STORAGE AND STAGE/DISCHARGE RELATIONSHIPS
              *  WERE CHECKED AGAINST THE LATEST RECORD DRAWINGS AND PREDESIGN REPORTS.
              *  THE FOLLOWING INPUT  WAS DIGITIZED FROM RECORD DRAWINGS AS THE HEC-1 INPUT
              *  WAS NOT AVAILABLE. THE RECORD DRAWINGS DIFFERED SLIGHTLY FROM THE
              *  PREDESIGN INPUT.
              *
              *
              *
```



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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1013          KK     DB5
1014          KM    FACILITY = EAST C-1 DETENTION BASIN
1015          KM    FACILITY # = C1IT 0492
1016          KM    STORAGE VOLUME = 400 AC-FT (100-YR PK STAGE WSE = 2485.3)
1017          KM    OUTLET = 48" RCP
1018          KO       3
1019          RS       1    STOR      -1
1020          SV     1.2     3.3    12.1    28.0    49.0    79.8   115.0   166.1   232.2   320.1
1021          SV   418.8   534.5   605.5   681.1   765.1   846.8   943.4  1044.8  1261.8  1426.1
1022          SE  2446.0  2450.0  2454.0  2458.0  2462.0  2466.0  2470.0  2474.0  2478.0  2482.0
1023          SE  2486.0  2490.0  2492.0  2494.0  2496.0  2498.0  2500.0    2502  2506.0  2510.0
1024          SQ     0.5    22.9    36.1    45.7    53.6    60.4    66.5    72.3    77.5    82.4
1025          SQ    87.0    91.2    93.5    95.6    97.6    99.5   101.4   103.4   107.2   110.7
1026          SE  2446.0  2450.0  2454.0  2458.0  2462.0  2466.0  2470.0  2474.0  2478.0  2482.0
1027          SE  2486.0  2490.0  2492.0  2494.0  2496.0  2498.0  2500.0    2502  2506.0  2510.0
              *

1028          KK    RDB5
1029          KM    ROUTE DB5 TO C4CA
1030          KM    FACILITY = EAST C-1 DETENTION BASIN LEVEE
1031          KM    FACILITY # = C1DK 0226
1032          KM    TYPE OF FACILTIY = SOIL CEMENT LEVEE
1033          RD    5300    .034    .025       0    TRAP      50       2
              *

1034          KK    C4CA
1035          KM    PART OF 2001 MPU C1-55
1036          BA   .1964
1037          PB    3.43
```

```
1038          LS       0      85
1039          UD    0.27
              *

1040          KK   C3B3E
1041          KM   PART OF 2001 MPU C1-55
1042          BA   .2225
1043          PB    3.43
1044          LS       0      90
1045          UD     .16
              *

1046          KK    CP39
1047          KM   COMBINE C4CA, C3B3E, AND RDB5
1048          HC       3
              *

1049          KK   RCP39
1050          KM   ROUTE CP39 TO C3B3D
1051          RD    2650    .023    .025       0    TRAP      50       2
              *
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1052          KK   C3B3D
1053          KM   PART OF 2001 MPU C1-55
1054          PB    3.43
1055          BA   .2554
1056          LS       0      89
1057          UD     .14
              *

1058          KK    CP40
1059          KM   COMBINE RCP39 AND C3B3D
1060          HC       2
              *

1061          KK   RCP40
1062          KM   ROUTE TO CP42
1063          RD    1400     .05    .025            TRAP      50       3
              *

1064          KK   C3B3C
1065          KM   PART OF 2001 MPU C1-65
1066          BA   1.238
1067          PB    3.50
1068          LS       0      88
1069          UD    0.07
              *

1070          KK  RC3B3C
1071          KM   ROUTE C3B3C TO C3B3B
1072          RD    2300    .024    .030            TRAP     100       3
              *

1073          KK   C3B3B
1074          KM   PART OF 2001 MPU C1-65
1075          BA   .3220
1076          PB    3.43
1077          LS       0      87
1078          UD    0.17
              *

1079          KK    CP41
1080          KM   COMBINE C3B3C AND C3B3B
1081          HC       2
              *

1082          KK   RCP41
1083          KM   ROUTE TO C3B3A
1084          RD    6300     .05    .030            TRAP     100       3
```

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

1085      KK   C3B3A
1086      BA   .5107
1087      PB    3.43
1088      LS       0      85
1089      UD    0.10
          *
1090      KK    CP42
1091      KM   COMBINE RCP41, RCP40, AND C3B3A
1092      HC       3
          *
1093      KK   RCP42
1094      KM   ROUTE CP42 TO CP43 @ MAGIC WAY AND DRAKE CHANNEL
1095      KM   OVERLAND FLOW THROUGH C4BA2
1096      RD    5300    .015    .030           TRAP     100       3
          *
1097      KK   C4BA2
1098      KM   PART OF 2001 MPU C1-46
1099      BA   .1351
1100      PB    3.43
1101      LS       0      74
1102      UD     .16
          *
1103      KK   CP43A
1104      KM   COMBINE C4BA2 AND RCP42
1105      HC       2
          *
1106      KK   RCP43
1107      KM   ROUTE CP43 TO C4A2A ALONG DRAKE CHANNEL
1108      KM   FACILTIY = C-1 CHANNEL - DRAKE CHANNEL
1109      KM   FACILTY # - C1DC 0051
1110      KM   TYPE OF FACILITY = EARTHEN W\ GABION DROPS
1111      RD   2640     .029    .030           TRAP      20       2
          *
1112      KK   C4BA3
1113      KM   PART OF 2001 MPU C1-46
1114      BA   .4069
1115      PB    3.43
1116      LS       0      78
1117      UD     .41
          *
1118      KK  RC4BA3
1119      KM   ROUTE C4BA3 TO C4A2A
1120      RD    2900    .031    .030           TRAP     200
1121      *
```



```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

1122      KK   C4A2A
1123      KM   2001 MPU C1-57
1124      BA   .2607
1125      PB    3.05
1126      LS       0      77
1127      UD     .04
          *
1128      KK    CP44
1129      KM   COMBINE C4A2A, RCP43, AND RC4BA3
1130      KM   DRAKE AND RACETRACK
```

```
1131          HC       3
              *

1132          KK   RCP44
1133          KM   ROUTE CP44 TO C4A1A
1134          KM   FACILITY = C-1 CHANNEL -DRAKE CHANNEL
1135          KM   TYPE OF FACILITY = CONCRETE CHANNEL
1136          RD    2640    .021    .015            TRAP      10       2
              *

1137          KK   C4A1A
1138          KM   2001 MPU C1-58
1139          BA   .2544
1140          PB    2.92
1141          LS       0      79
1142          UD     .66
              *

1143          KK    CP45
1144          KM   COMBINE RCP44, RCP38, AND C4A1A
1145          KM   CONFLUENCE OF C1 CHANNEL AND DRAKE CHANNEL
1146          HC       3
              *

1147          KK   RCP45
1148          KM   ROUTE CP45 TO C3B1C
1149          KM   FACILITY = C-1 CHANNEL
1150          KM   FACILITY # = C1CH 0321
1151          KM   TYPE OF FACILITY = CONCRETE CHANNEL
1152          RD    2640    .025    .015            TRAP      15       1
              *

1153          KK   C3A2B
1154          KM   PART OF 2001 MPU C1-65
1155          BA   .5139
1156          PB    3.23
1157          LS       0      86
1158          UD     .13
              *
1                                        HEC-1 INPUT                                                PAGE 33

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1159          KK  RC3A2B
1160          KM   ROUTE C3A2B TO CP46
1161          KM   FACILITY = OVERLAND FLOW
1162          RD    4100    .030    .030            TRAP     100       1
              *

1163          KK   C4BA1
1164          KM   PART OF 2001 MPU C1-62
1165          BA   .4758
1166          PB    2.99
1167          LS       0      74
1168          UD     .21
              *

1169          KK    CP46
1170          KM   COMBINE RC3A2B AND C4BA1
1171          HC       2
              *

1172          KK   RCP46
1173          KM   ROUTE CP46  TO C3B1D
1174          KM   OVERLAND FLOW TO RACETRACK
1175          RD    2640     .03     .03            TRAP     100       3
              *

1176          KK   C3B1D
1177          KM   2001 MPU C1-60
1178          BA   .2455
1179          PB    2.93
```

```
1180          LS       0      73
1181          UD     .05
              *

1182          KK    CP47
1183          KM   COMBINE RC4BA1 AND C3B1D
1184          KM   RACETRACK AND WARM SPRINGS
1185          HC       2
              *

1186          KK   RCP47
1187          KM   ROUTE CP47 TO C3B1C
1188          KM   WARM SPRINGS ROAD AND PUEBLO
1189          RD    2640    .025    .016            TRAP       0      50
              *

1190          KK   C3B1C
1191          KM   2001 MPU C1-61
1192          BA   .2434
1193          PB    2.87
1194          LS       0      84
1195          UD     .04
              *
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1196          KK    CP48
1197          KM   COMBINE RCP45, C3B1C, AND RCP46
1198          HC       3
              *

1199          KK   RCP48
1200          KM   ROUTE CP47 TO C3B1A
1201          KM   FACILITY = C-1 CHANNEL
1202          KM   FACILITY # C1CH 0284, 0340
1203          KM   TYPE OF FACILITY = CONCRETE CHANNEL
1204          RD    2640    .025    .015            TRAP      15       1
              *

1205          KK   C3B1B
1206          KM   PART OF 2001 MPU C1-67
1207          BA   .2094
1208          PB    2.92
1209          LS       0      76
1210          UD     .20
              *

1211          KK  RC3B1B
1212          KM   ROUTE C3B1B TO C3B1A
1213          KM   ITHACA AVENUE AND PUEBLO
1214          RD    2640    .025    .016            TRAP       0      50
              *

1215          KK   C3B1A
1216          KM   2001 MPU C1-63
1217          PB    2.85
1218          BA   .2435
1219          LS       0      78
1220          UD     .21
              *

1221          KK    CP49
1222          KM   COMBINE C3B1A, RC3B1B, AND RCP48
1223          HC       3
              *

1224          KK   RCP49
1225          KM   ROUTE CP49 TO C3A1A
1226          KM   FACILITY = C-1 CHANNEL
1227          KM   FACILITY # C1CH 0220, 0269
1228          KM   TYPE OF FACILITY = CONCRETE CHANNEL
```

```
1229          RD    3960    .025    .015           TRAP      15       1
              *

1230          KK   C3A2A
1231          KM   PART OF 2001 MPU C1-66
1232          BA   .4708
1233          PB    3.23
1234          LS       0      88
1235          UD     .09
              *
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1236          KK  RC3A2A
1237          KM   ROUTE C3A2A TO C3A1B
1238          KM   OVERLAND FLOW
1239          RD    7900     .03    .030           TRAP       0     100       3
              *

1240          KK   C3A1B
1241          KM   PART OF 2001 MPU C1-66
1242          BA   1.018
1243          PB    3.23
1244          LS       0      81
1245          UD     .08
              *

1246          KK    CP50
1247          KM   COMBINE C3A1B,RC3A2A, AND CP49
1248          HC       2
              *

1249          KK   RCP50
1250          KM   ROUTE CP50 TO C3A1A
1251          KM   ITHACA
1252          RD    2600     .019    .016           TRAP      50
              *

1253          KK   C3A1A
1254          KM   PART OF 2001 MPU C1-64
1255          BA   .3744
1256          PB    2.84
1257          LS       0      81
1258          UD     .07
              *

1259          KK    CP51
1260          KM   COMBINE C3A1A,RCP50,AND RCP49 - C-1 CHANNEL AND LAKE MEAD DRIVE
1261          HC       3
              *
1262          ZZ
```

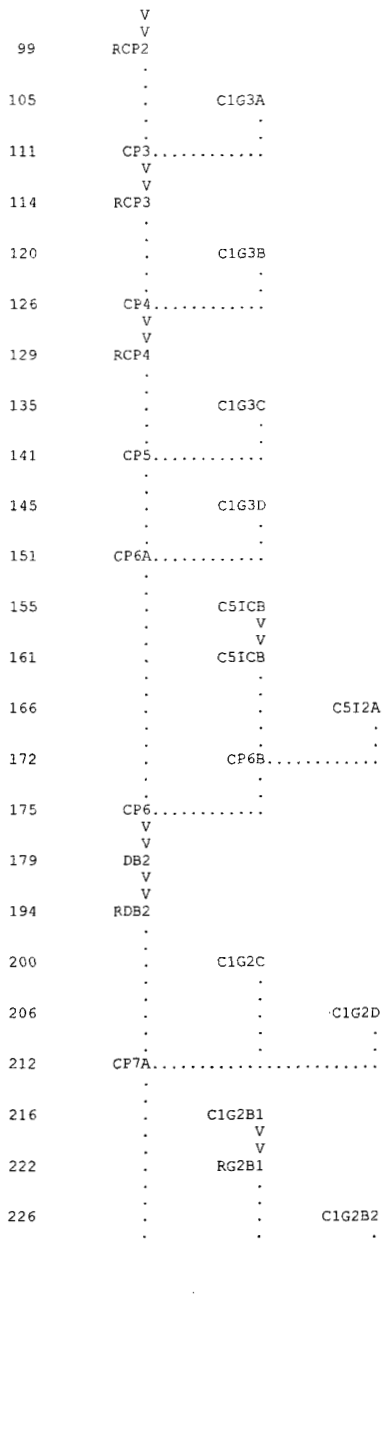
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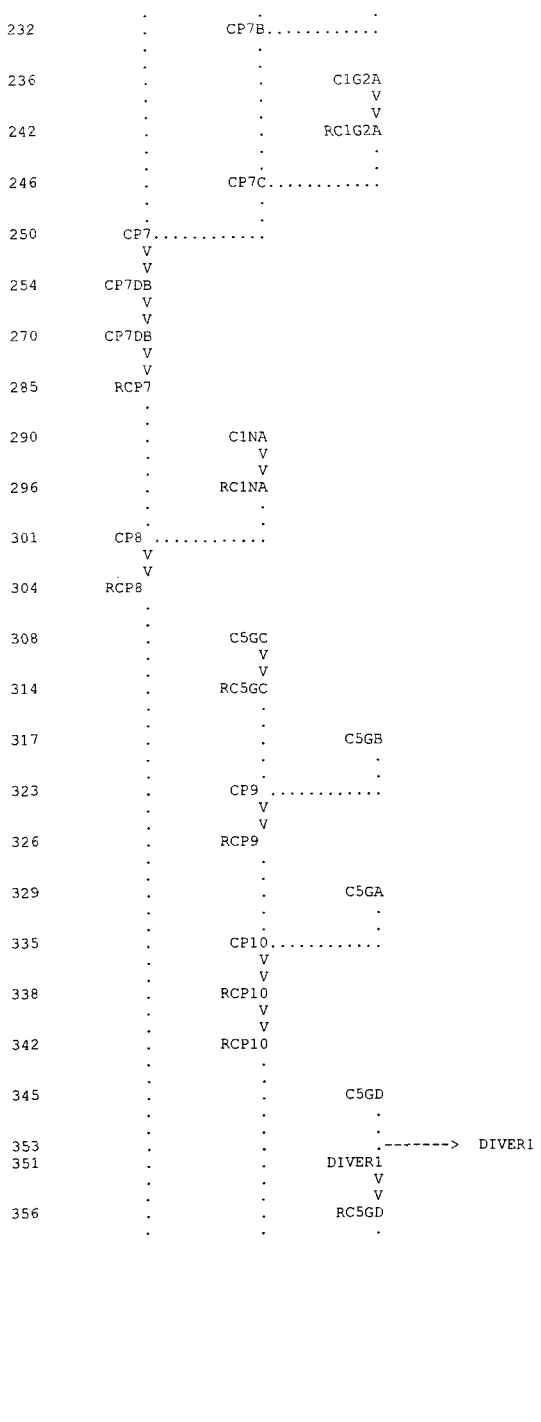
SCHEMATIC DIAGRAM OF STREAM NETWORK

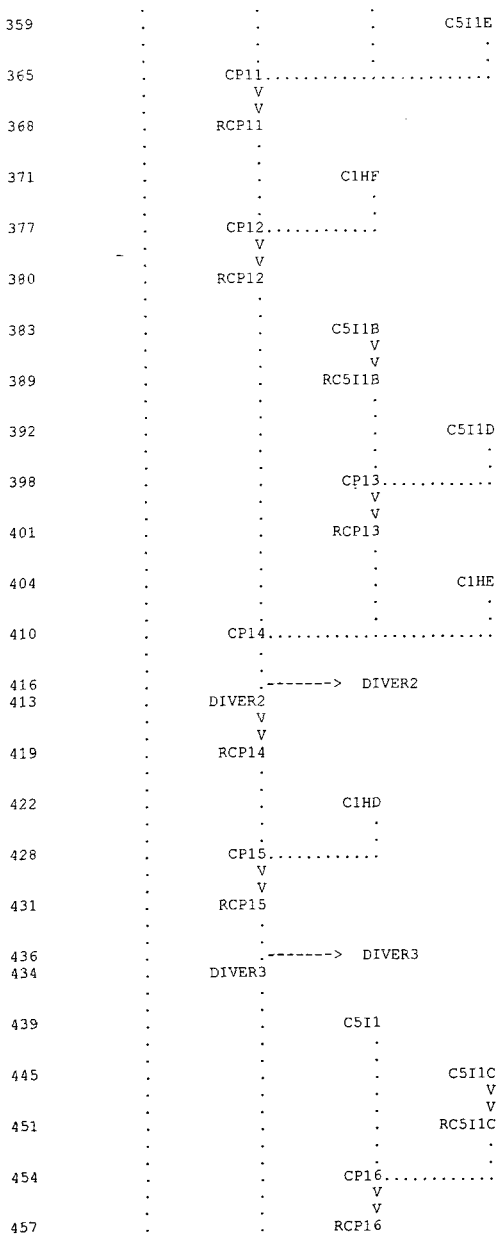
INPUT LINE NO.

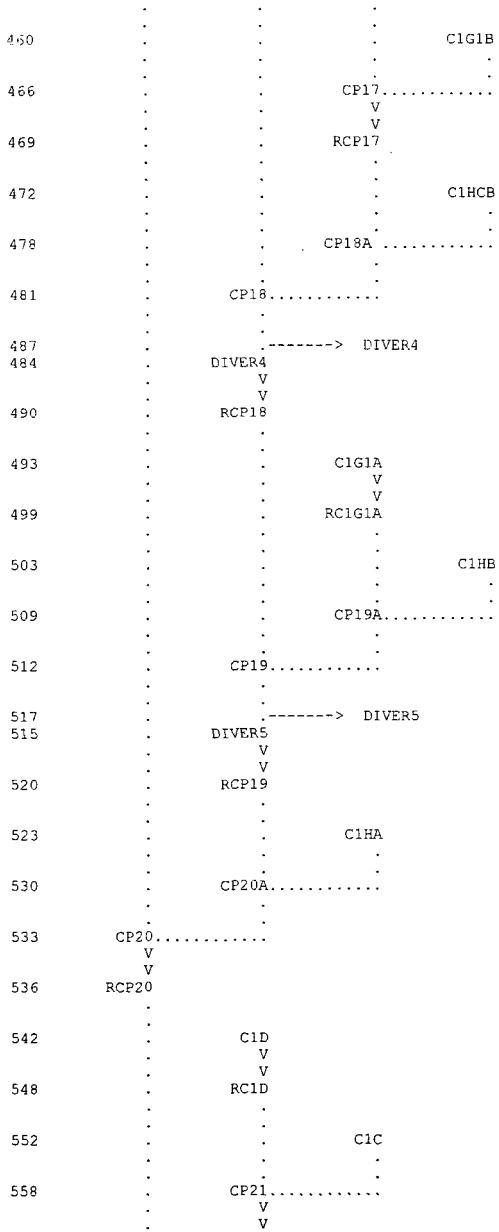
(V) ROUTING (---->) DIVERSION OR PUMP FLOW

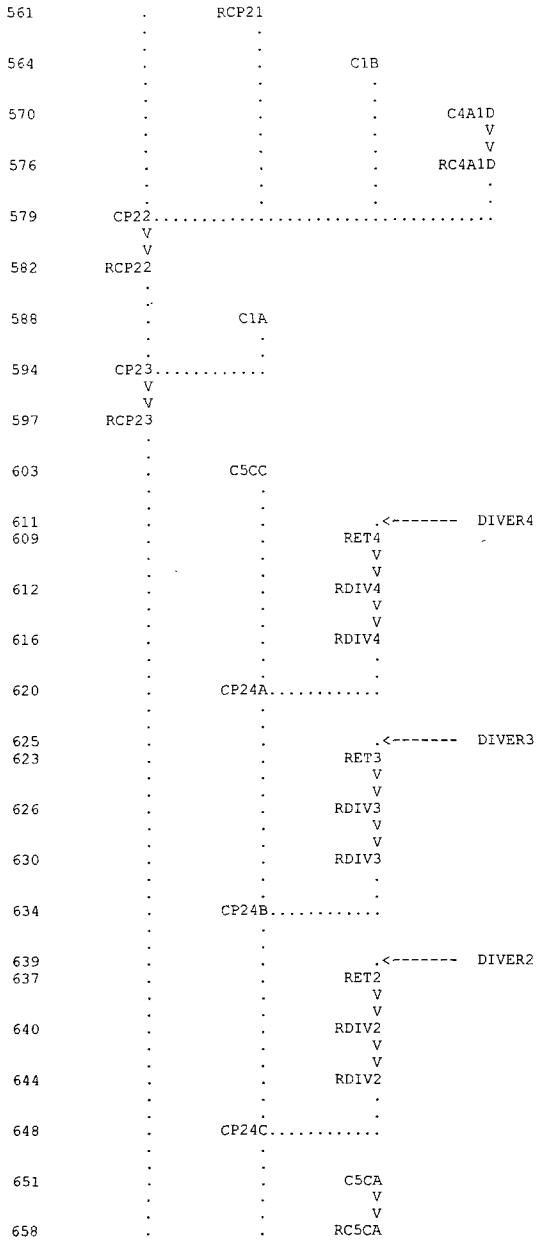
(.) CONNECTOR (<----) RETURN OF DIVERTED OR PUMPED FLOW

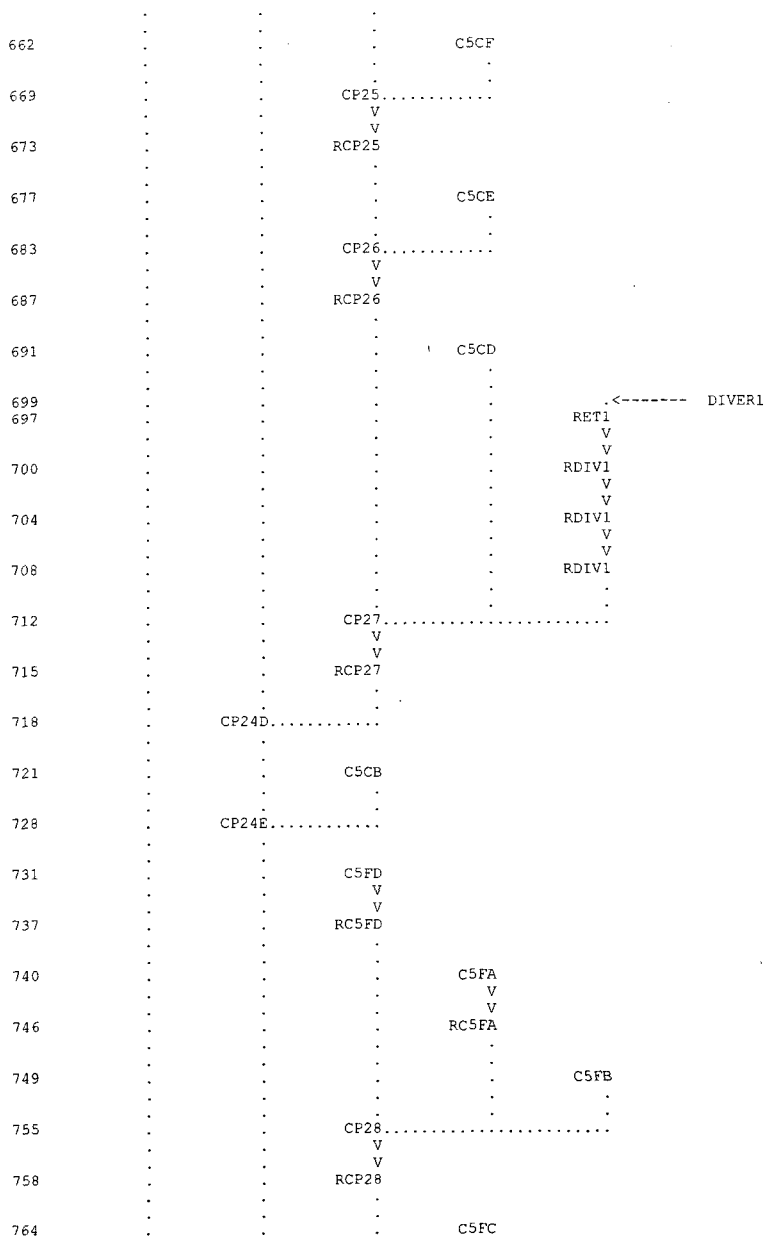

99 RCP2
105 C1G3A
111 CP3
114 RCP3
120 C1G3B
126 CP4
129 RCP4
135 C1G3C
141 CP5
145 C1G3D
151 CP6A
155 C5ICB
161 C5ICB
166 C5I2A
172 CP6B
175 CP6
179 DB2
194 RDB2
200 C1G2C
206 C1G2D
212 CP7A
216 C1G2B1
222 RG2B1
226 C1G2B2

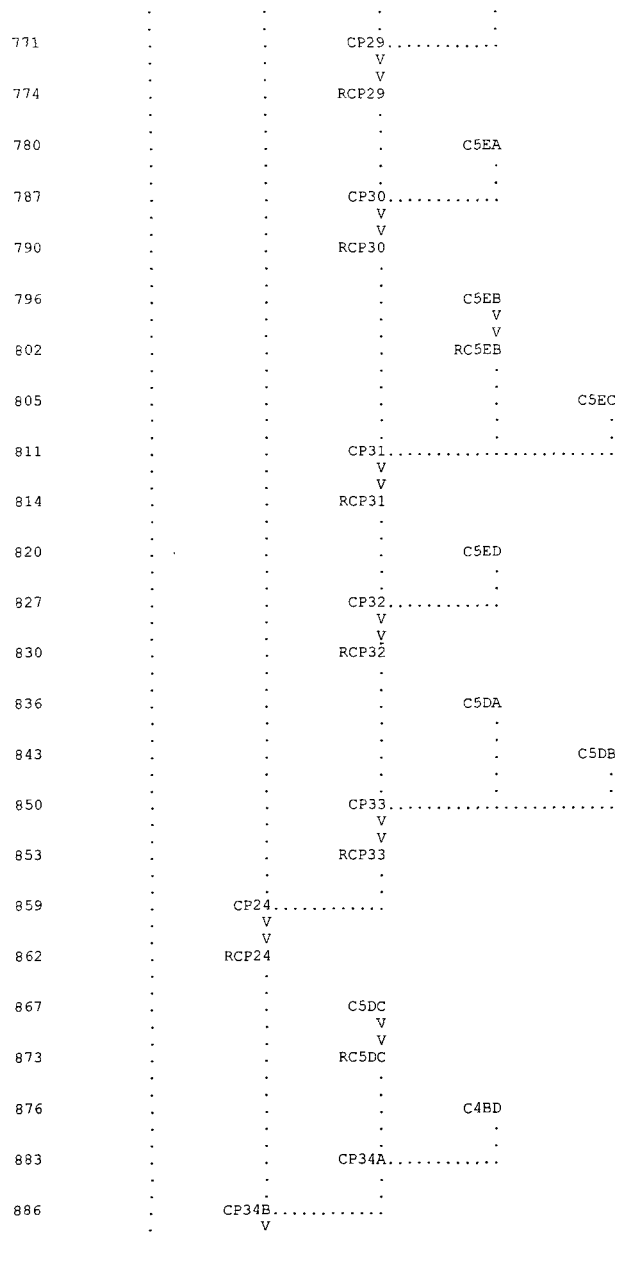

232 CP7B
236 C1G2A
242 RC1G2A
246 CP7C
250 CP7
254 CP7DB
270 CP7DB
285 RCP7
290 C1NA
296 RC1NA
301 CP8
304 RCP8
308 C5GC
314 RC5GC
317 C5GB
323 CP9
326 RCP9
329 C5GA
335 CP10
338 RCP10
342 RCP10
345 C5GD
353
351 DIVER1
356 RC5GD
DIVER1

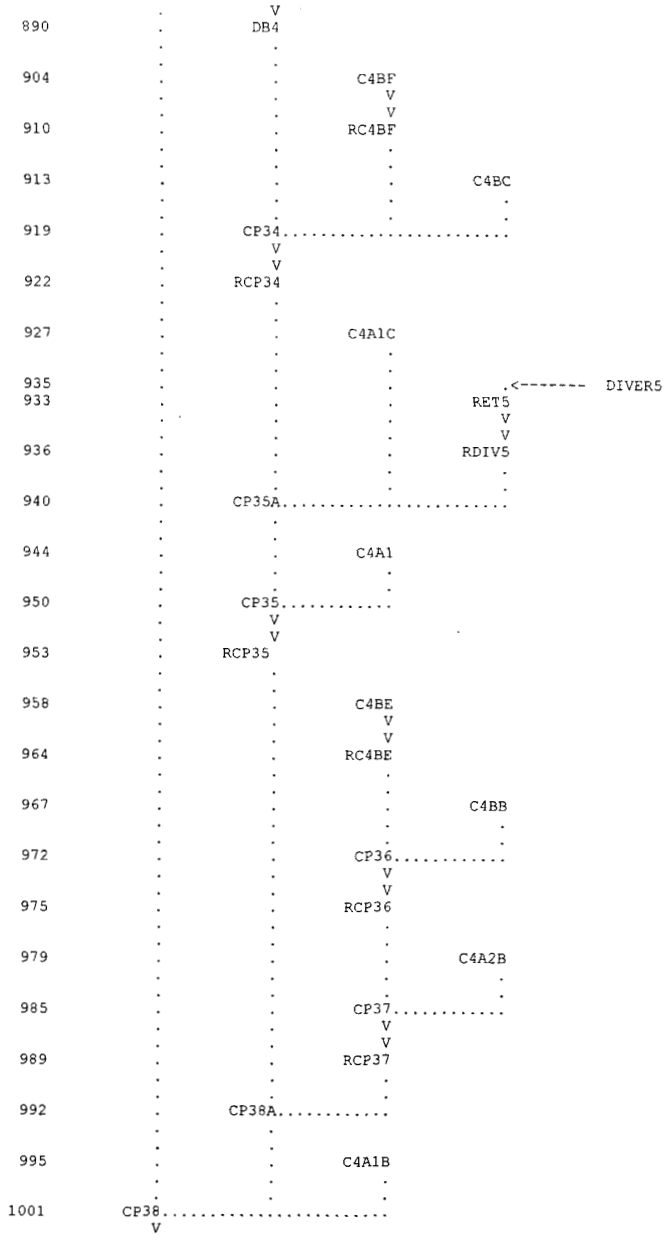

359
C5I1E
365
CP11
368
RCP11
371
C1HF
377
CP12
380
RCP12
383
C5I1B
389
RC5I1B
392
C5I1D
398
CP13
401
RCP13
404
C1HE
410
CP14
416
DIVER2
413
DIVER2
419
RCP14
422
C1HD
428
CP15
431
RCP15
436
DIVER3
434
DIVER3
439
C5I1
445
C5I1C
451
RC5I1C
454
CP16
457
RCP16

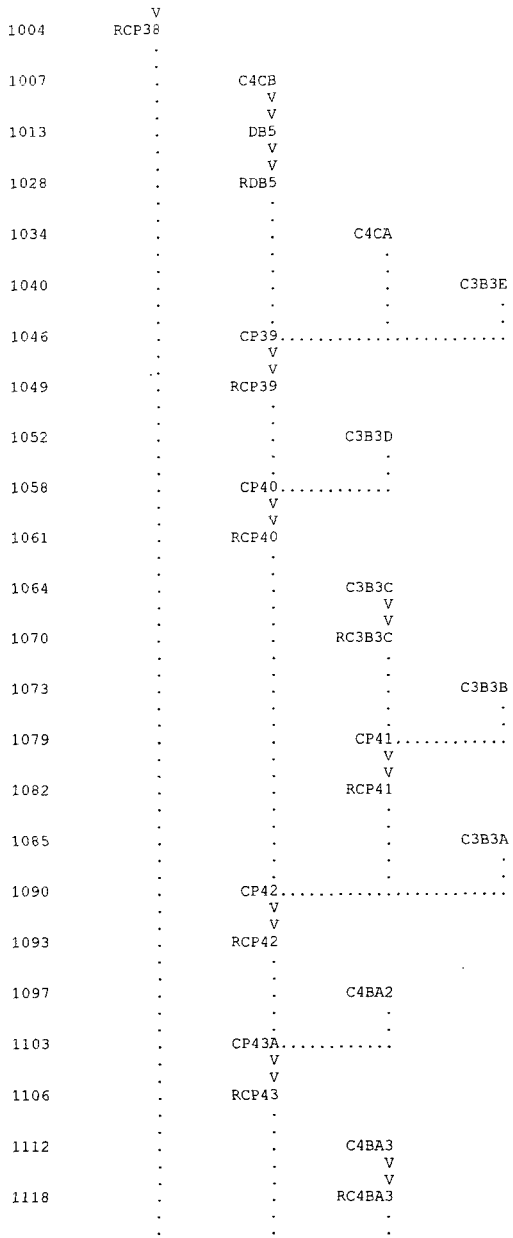

460
C1G1B
466
CP17
469
RCP17
472
C1HCB
478
CP18A
481
CP18
487
DIVER4
484
DIVER4
490
RCP18
493
C1G1A
499
RC1G1A
503
C1HB
509
CP19A
512
CP19
517
DIVER5
515
DIVER5
520
RCP19
523
C1HA
530
CP20A
533
CP20
536
RCP20
542
C1D
548
RC1D
552
C1C
558
CP21

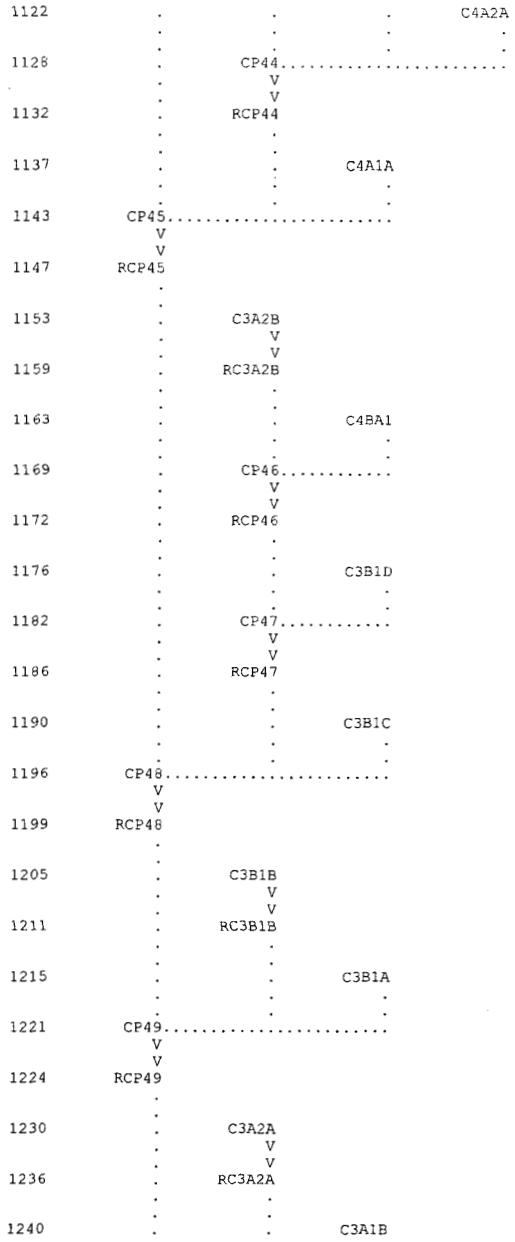

561 RCP21
564 C1B
570 C4A1D
576 RC4A1D
579 CP22
582 RCP22
588 C1A
594 CP23
597 RCP23
603 C5CC
611 DIVER4
609 RET4
612 RDIV4
616 RDIV4
620 CP24A
625 DIVER3
623 RET3
626 RDIV3
630 RDIV3
634 CP24B
639 DIVER2
637 RET2
640 RDIV2
644 RDIV2
648 CP24C
651 C5CA
658 RC5CA

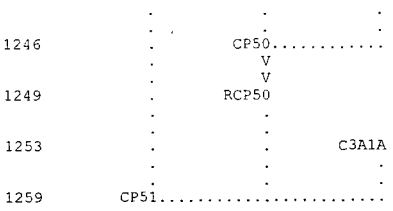

662 C5CF
669 CP25
673 RCP25
677 C5CE
683 CP26
687 RCP26
691 C5CD
699 .<------- DIVER1
697 RET1
700 RDIV1
704 RDIV1
708 RDIV1
712 CP27
715 RCP27
718 CP24D
721 C5CB
728 CP24E
731 C5FD
737 RC5FD
740 C5FA
746 RC5FA
749 C5FB
755 CP28
758 RCP28
764 C5FC


771
CP29
774
RCP29
780
C5EA
787
CP30
790
RCP30
796
C5EB
802
RC5EB
805
C5EC
811
CP31
814
RCP31
820
C5ED
827
CP32
830
RCP32
836
C5DA
843
C5DB
850
CP33
853
RCP33
859
CP24
862
RCP24
867
C5DC
873
RC5DC
876
C4BD
883
CP34A
886
CP34B


890 DB4
904 C4BF
910 RC4BF
913 C4BC
919 CP34
922 RCP34
927 C4A1C
935 .<------- DIVER5
933 RET5
936 RDIV5
940 CP35A
944 C4A1
950 CP35
953 RCP35
958 C4BE
964 RC4BE
967 C4BB
972 CP36
975 RCP36
979 C4A2B
985 CP37
989 RCP37
992 CP38A
995 C4A1B
1001 CP38


1004 RCP38
1007 C4CB
1013 DB5
1028 RDB5
1034 C4CA
1040 C3B3E
1046 CP39
1049 RCP39
1052 C3B3D
1058 CP40
1061 RCP40
1064 C3B3C
1070 RC3B3C
1073 C3B3B
1079 CP41
1082 RCP41
1085 C3B3A
1090 CP42
1093 RCP42
1097 C4BA2
1103 CP43A
1106 RCP43
1112 C4BA3
1118 RC4BA3


1122
C4A2A
1128
CP44
1132
RCP44
1137
C4A1A
1143
CP45
1147
RCP45
1153
C3A2B
1159
RC3A2B
1163
C4BA1
1169
CP46
1172
RCP46
1176
C3B1D
1182
CP47
1186
RCP47
1190
C3B1C
1196
CP48
1199
RCP48
1205
C3B1B
1211
RC3B1B
1215
C3B1A
1221
CP49
1224
RCP49
1230
C3A2A
1236
RC3A2A
1240
C3A1B



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN  1998                *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   12NOV02  TIME  17:28:02   *
*                                       *
*****************************************
```

```
*************************************
*                                   *
*   U.S. ARMY CORPS OF ENGINEERS    *
*   HYDROLOGIC ENGINEERING CENTER   *
*         609 SECOND STREET         *
*      DAVIS, CALIFORNIA 95616      *
*          (916) 756-1104           *
*                                   *
*************************************
```

********** C-1 WATERSHED FIS RESTUDY **********

***** PREPARED FOR: CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT *****
** CLARK COUNTY, NEVADA ***

***** PREPARED BY: CARTER BURGESS AND SOUTHWEST FLUVIAI SYSTEMS *****

EXISTING CONDITIONS DRAINAGE SYSTEM
INPUT FILE = SDN3.DAT
INPUT FILE DATE = NOV 2002
DESIGN STORM = 100-YEAR 6-HR STORM
STORM DISTRIBUTION = SDN #3

REFERENCED HYDROLOGIC MODELS:
PREDESIGN REPORT FOR THE BLACK MOUNTAIN AND MISSION HILLS DETENTION BASINS
AND OUTFALL STRUCTURES (VTN 1992)
SNWA RIVER MOUNTAINS WATER TREATMENT FACILITY DRAFT TECHNICAL DRAINAGE STUDY
(MONTGOMERY WATSON/CH2MHILL 1997)
EAST C-1 DETENTION BASIN FINAL DESIGN (VTN 1998)
DESIGN MEMORANDUM FOR THE EQUESTRIAN DETENTION BASIN (FOGGEMEYER 1994)
DESIGN CALCULATION NOTEBOOK FOR THE BLACK MOUNTAIN DETENTION BASIN
(VTN 1998)
CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT 2002 MASTER PLAN UPDATE (LBA)
I-515 BOULDER HIGHWAY TO LAKE MEAD DRIVE DRAINAGE STUDY (SVERDRUP, 1991)

JR CARDS CONTAINED DARFS BASED ON THE FOLLOWING VALUES:

AREA SQ.MI.	DARF
0 - 5	0.950
5 - 12	0.880
12 - 16	0.832
16 - 20	0.804
20 - 30	0.765
30 - 40	0.725

THE FOLLOWING REDUCTION FACTORS ARE USED FOR MODIFIED JSLE COMPUTATIONS

2-YR	0.260
5-YR	0.440
10-YR	0.570
25-YR	0.765

50-YR 0.880

```
54 IO          OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

   IT          HYDROGRAPH TIME DATA
                     NMIN           5  MINUTES IN COMPUTATION INTERVAL
                    IDATE      1    0  STARTING DATE
                    ITIME         0000  STARTING TIME
                       NQ          300  NUMBER OF HYDROGRAPH ORDINATES
                   NDDATE      2    0  ENDING DATE
                   NDTIME         0055  ENDING TIME
                   ICENT           19  CENTURY MARK

                COMPUTATION INTERVAL      .08 HOURS
                     TOTAL TIME BASE    24.92 HOURS

        ENGLISH UNITS
             DRAINAGE AREA          SQUARE MILES
             PRECIPITATION DEPTH    INCHES
             LENGTH, ELEVATION      FEET
             FLOW                   CUBIC FEET PER SECOND
             STORAGE VOLUME         ACRE-FEET
             SURFACE AREA           ACRES
             TEMPERATURE            DEGREES FAHRENHEIT

   JP          MULTI-PLAN OPTION
                    NPLAN           1  NUMBER OF PLANS

   JR          MULTI-RATIO OPTION
                   RATIOS OF PRECIPITATION
                   .95       .88       .83       .80       .76       .73       .57       .44       .26


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          *            *
69 KK     *       DB1  *
          *            *
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74 KO          OUTPUT CONTROL VARIABLES
                    IPRNT           3  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

               HYDROGRAPH ROUTING DATA

75 RS          STORAGE ROUTING
                    NSTPS           1  NUMBER OF SUBREACHES
                     ITYP        STOR  TYPE OF INITIAL CONDITION
                   RSVRIC       -1.00  INITIAL CONDITION
                        X         .00 WORKING R AND D COEFFICIENT

76 SV            STORAGE          .0       1.2       4.6      10.3      22.6      38.7      54.9      73.4      92.6     113.5
                               135.2     158.2     183.2     208.1     234.7     262.5     292.0     325.3

78 SE            ELEVATION   2556.00   2558.00   2560.00   2562.00   2564.00   2566.00   2568.00   2570.00   2572.00   2574.00
                             2576.00   2578.00   2580.00   2582.00   2584.00   2586.00   2588.00   2590.00

80 SQ            DISCHARGE        0.        1.       27.       58.       78.       95.      109.      121.      132.      142.
                               151.      160.      169.      177.      184.      191.      198.      205.
```

82 SE ELEVATION 2556.00 2558.00 2560.00 2562.00 2564.00 2566.00 2568.00 2570.00 2572.00 2574.00
2576.00 2578.00 2580.00 2582.00 2584.00 2586.00 2588.00 2590.00

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COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	.00	1.19	4.55	10.32	22.58	38.69	54.90	73.42	92.55	113.51
OUTFLOW	.00	1.28	27.31	57.88	77.52	95.42	108.73	120.50	131.87	141.78
ELEVATION	2556.00	2558.00	2560.00	2562.00	2564.00	2566.00	2568.00	2570.00	2572.00	2574.00

STORAGE	135.16	158.22	183.23	208.10	234.67	262.55	292.02	325.32
OUTFLOW	150.74	159.67	168.97	176.60	183.71	190.74	197.77	204.93
ELEVATION	2576.00	2578.00	2580.00	2582.00	2584.00	2586.00	2588.00	2590.00

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HYDROGRAPH AT STATION DB1
FOR PLAN 1, RATIO = .95

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 198.	5.33	191.	146.	141.	141.
		(INCHES) .443	1.356	1.356	1.356
		(AC-FT) 95.	290.	290.	290.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
294.	5.33	264.	152.	146.	146.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2588.10	5.33	2586.03	2576.45	2575.70	2575.70

CUMULATIVE AREA = 4.01 SQ MI

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

HYDROGRAPH AT STATION DB1
FOR PLAN 1, RATIO = .88

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 190.	5.33	182.	135.	130.	130.
		(INCHES) .423	1.256	1.256	1.256
		(AC-FT) 90.	268.	268.	268.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
258.	5.33	229.	126.	121.	121.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2585.67	5.33	2583.56	2574.20	2573.53	2573.53

CUMULATIVE AREA = 4.01 SQ MI

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

HYDROGRAPH AT STATION DB1
FOR PLAN 1, RATIO = .83

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW

			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 184.	5.33		176.	127.	123.	123.
		(INCHES)	.408	1.181	1.181	1.181
		(AC-FT)	87.	252.	252.	252.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
234.	5.33	206.	109.	105.	105.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2583.94	5.33	2581.82	2572.66	2572.05	2572.05

CUMULATIVE AREA = 4.01 SQ MI

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

HYDROGRAPH AT STATION DB1
FOR PLAN 1, RATIO = .80

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 180.	5.33	172.	122.	118.	118.
		(INCHES) .399	1.135	1.135	1.135
		(AC-FT) 85.	243.	243.	243.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
220.	5.33	193.	100.	96.	96.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2582.91	5.33	2580.80	2571.76	2571.18	2571.18

CUMULATIVE AREA = 4.01 SQ MI

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

HYDROGRAPH AT STATION DB1
FOR PLAN 1, RATIO = .76

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 175.	5.33	166.	115.	111.	111.
		(INCHES) .385	1.067	1.067	1.067
		(AC-FT) 82.	228.	228.	228.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
201.	5.33	176.	88.	85.	85.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2581.46	5.33	2579.38	2570.52	2569.98	2569.98

CUMULATIVE AREA = 4.01 SQ MI

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

HYDROGRAPH AT STATION DB1
FOR PLAN 1, RATIO = .73

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 169.	5.33		159.	106.	103.	103.
		(INCHES)	.370	.988	.988	.988
		(AC-FT)	79.	211.	211.	211.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
182.	5.33	158.	76.	73.	73.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2579.94	5.33	2577.91	2569.22	2568.74	2568.74

CUMULATIVE AREA = 4.01 SQ MI

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

HYDROGRAPH AT STATION DB1
FOR PLAN 1, RATIO = .57

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 142.	5.25		132.	69.	67.	67.
		(INCHES)	.306	.644	.644	.644
		(AC-FT)	65.	138.	138.	138.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
114.	5.25	94.	37.	36.	36.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2574.00	5.25	2572.05	2564.39	2564.08	2564.08

CUMULATIVE AREA = 4.01 SQ MI

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

HYDROGRAPH AT STATION DB1
FOR PLAN 1, RATIO = .44

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 114.	5.25		102.	41.	39.	39.
		(INCHES)	.237	.378	.378	.378
		(AC-FT)	51.	81.	81.	81.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
63.	5.25	48.	16.	15.	15.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2568.87	5.25	2567.11	2561.09	2560.90	2560.90

CUMULATIVE AREA = 4.01 SQ MI

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

HYDROGRAPH AT STATION DB1
FOR PLAN 1, RATIO = .26

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 61.	5.17		38.	10.	10.	10.
		(INCHES)	.088	.096	.096	.096
		(AC-FT)	19.	20.	20.	20.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
13.	5.17	7.	2.	2.	2.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2562.37	5.17	2560.66	2558.06	2557.99	2557.99

CUMULATIVE AREA = 4.01 SQ MI

*** *** *** *

STORAGE	598.50	630.20
OUTFLOW	351.60	357.60
ELEVATION	2354.00	2355.00

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

HYDROGRAPH AT STATION . DB2
FOR PLAN 1, RATIO = .95

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 308.	6.08		304.	258.	249.	249.
		(INCHES)	.298	1.013	1.013	1.013
		(AC-FT)	150.	512.	512.	512.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)					
408.	6.17		391.	286.	276.	276.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)					
2347.36	6.08		2346.70	2341.93	2341.23	2341.23

CUMULATIVE AREA = 9.48 SQ MI

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

HYDROGRAPH AT STATION DB2
FOR PLAN 1, RATIO = .88

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 294.	6.08		289.	243.	234.	234.
		(INCHES)	.283	.954	.954	.954
		(AC-FT)	143.	482.	482.	482.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)					
357.	6.08		340.	244.	235.	235.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)					
2345.41	6.08		2344.73	2340.11	2339.48	2339.48

CUMULATIVE AREA = 9.48 SQ MI

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HYDROGRAPH AT STATION DB2
FOR PLAN 1, RATIO = .83

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 284.	6.08		279.	232.	224.	224.
		(INCHES)	.273	.911	.911	.911
		(AC-FT)	138.	461.	461.	461.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)					

	323.	6.08		307.	216.	208.	208.

	PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.92-HR
+	(FEET)	(HR)				
	2344.03	6.08	2343.38	2338.85	2338.27	2338.27

CUMULATIVE AREA = 9.48 SQ MI

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HYDROGRAPH AT STATION DB2
FOR PLAN 1, RATIO = .80

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	24.92-HR
+	(CFS)	(HR)					
			(CFS)				
+	278.	6.08		273.	225.	217.	217.
			(INCHES)	.268	.884	.884	.884
			(AC-FT)	135.	447.	447.	447.

	PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	24.92-HR
+	(AC-FT)	(HR)				
	303.	6.08	287.	200.	192.	192.

	PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.92-HR
+	(FEET)	(HR)				
	2343.23	6.08	2342.58	2338.10	2337.54	2337.54

CUMULATIVE AREA = 9.48 SQ MI

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HYDROGRAPH AT STATION DB2
FOR PLAN 1, RATIO = .76

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	24.92-HR
+	(CFS)	(HR)					
			(CFS)				
+	269.	6.08		264.	216.	208.	208.
			(INCHES)	.259	.847	.847	.847
			(AC-FT)	131.	428.	428.	428.

	PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	24.92-HR
+	(AC-FT)	(HR)				
	276.	6.08	261.	178.	171.	171.

	PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.92-HR
+	(FEET)	(HR)				
	2342.13	6.08	2341.45	2337.05	2336.54	2336.54

CUMULATIVE AREA = 9.48 SQ MI

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HYDROGRAPH AT STATION DB2
FOR PLAN 1, RATIO = .73

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	24.92-HR
+	(CFS)	(HR)					
			(CFS)				
+	259.	6.08		253.	205.	198.	198.
			(INCHES)	.249	.805	.805	.805

		(AC-FT)	126.	407.	407.	407.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
249.	6.08	235.	156.	150.	150.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2340.92	6.08	2340.26	2335.97	2335.49	2335.49

CUMULATIVE AREA = 9.48 SQ MI

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HYDROGRAPH AT STATION DB2
FOR PLAN 1, RATIO = .57

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)	(CFS)			
+ 217.	6.00	211.	156.	150.	150.
		(INCHES) .207	.610	.610	.610
		(AC-FT) 105.	308.	308.	308.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
152.	6.00	140.	78.	75.	75.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2336.32	6.00	2335.69	2331.64	2331.32	2331.32

CUMULATIVE AREA = 9.48 SQ MI

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HYDROGRAPH AT STATION DB2
FOR PLAN 1, RATIO = .44

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)	(CFS)			
+ 177.	5.75	170.	91.	88.	88.
		(INCHES) .166	.357	.357	.357
		(AC-FT) 84.	180.	180.	180.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
82.	5.75	72.	30.	29.	29.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2332.56	5.75	2331.96	2327.63	2327.46	2327.46

CUMULATIVE AREA = 9.48 SQ MI

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HYDROGRAPH AT STATION DB2
FOR PLAN 1, RATIO = .26

PEAK FLOW TIME MAXIMUM AVERAGE FLOW

			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 101.	5.42		79.	22.	21.	21.
		(INCHES)	.078	.086	.086	.086
		(AC-FT)	39.	43.	43.	43.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
14.	5.42	9.	2.	2.	2.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2327.71	5.42	2326.85	2324.07	2324.04	2324.04

CUMULATIVE AREA = 9.48 SQ MI

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254 KK      *     CP7DB  *
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260 KO OUTPUT CONTROL VARIABLES
IPRNT 3 PRINT CONTROL
IPLOT 0 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

261 RS STORAGE ROUTING
NSTPS 1 NUMBER OF SUBREACHES
ITYP STOR TYPE OF INITIAL CONDITION
RSVRIC -1.00 INITIAL CONDITION
X .00 WORKING R AND D COEFFICIENT

262 SV	STORAGE	.0	.1	.7	1.9	3.9	7.0	11.2	16.1	21.5	27.2
		33.2	39.6	46.4	53.5	61.0	68.9	77.1	85.5	94.2	103.0
264 SE	ELEVATION	2230.00	2231.00	2232.00	2233.00	2234.00	2235.00	2236.00	2237.00	2238.00	2239.00
		2240.00	2241.00	2242.00	2243.00	2244.00	2245.00	2246.00	2247.00	2248.00	2249.00
266 SQ	DISCHARGE	0.	70.	180.	317.	479.	659.	855.	1068.	1291.	1526.
		1776.	2039.	2257.	2384.	2512.	2700.	2887.	3061.	3226.	3515.
268 SE	ELEVATION	2230.00	2231.00	2232.00	2233.00	2234.00	2235.00	2236.00	2237.00	2238.00	2239.00
		2240.00	2241.00	2242.00	2243.00	2244.00	2245.00	2246.00	2247.00	2248.00	2249.00

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COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	.00	.13	.66	1.85	3.90	6.97	11.16	16.15	21.51	27.21
OUTFLOW	.00	70.20	180.10	317.40	479.10	659.20	854.50	1068.10	1290.90	1525.90
ELEVATION	2230.00	2231.00	2232.00	2233.00	2234.00	2235.00	2236.00	2237.00	2238.00	2239.00
STORAGE	33.22	39.59	46.37	53.53	61.03	68.88	77.06	85.51	94.16	102.96
OUTFLOW	1776.10	2038.60	2256.80	2384.20	2511.70	2700.00	2887.00	3060.90	3225.70	3515.40
ELEVATION	2240.00	2241.00	2242.00	2243.00	2244.00	2245.00	2246.00	2247.00	2248.00	2249.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 0. TO 70.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .95

PEAK FLOW	TIME
(CFS)	(HR)
1009.	4.08

	MAXIMUM AVERAGE FLOW			
	6-HR	24-HR	72-HR	24.92-HR
(CFS)	474.	304.	293.	293.
(INCHES)	.394	1.012	1.012	1.012
(AC-FT)	235.	603.	603.	603.

PEAK STORAGE	TIME
(AC-FT)	(HR)
15.	4.08

	MAXIMUM AVERAGE STORAGE			
	6-HR	24-HR	72-HR	24.92-HR
	4.	2.	2.	2.

PEAK STAGE	TIME
(FEET)	(HR)
2236.72	4.08

	MAXIMUM AVERAGE STAGE			
	6-HR	24-HR	72-HR	24.92-HR
	2233.88	2232.80	2232.70	2232.70

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .88

PEAK FLOW	TIME
(CFS)	(HR)
886.	4.08

	MAXIMUM AVERAGE FLOW			
	6-HR	24-HR	72-HR	24.92-HR
(CFS)	435.	282.	272.	272.
(INCHES)	.362	.940	.940	.940
(AC-FT)	216.	560.	560.	560.

PEAK STORAGE	TIME
(AC-FT)	(HR)
12.	4.08

	MAXIMUM AVERAGE STORAGE			
	6-HR	24-HR	72-HR	24.92-HR
	4.	2.	2.	2.

PEAK STAGE	TIME
(FEET)	(HR)
2236.15	4.08

	MAXIMUM AVERAGE STAGE			
	6-HR	24-HR	72-HR	24.92-HR
	2233.67	2232.66	2232.56	2232.56

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .83

PEAK FLOW	TIME
(CFS)	(HR)
803.	4.08

	MAXIMUM AVERAGE FLOW			
	6-HR	24-HR	72-HR	24.92-HR
(CFS)	408.	267.	257.	257.
(INCHES)	.340	.889	.889	.889
(AC-FT)	202.	530.	530.	530.

PEAK STORAGE	TIME
(AC-FT)	(HR)
10.	4.08

	MAXIMUM AVERAGE STORAGE			
	6-HR	24-HR	72-HR	24.92-HR
	3.	2.	2.	2.

PEAK STAGE	TIME
(FEET)	(HR)

	MAXIMUM AVERAGE STAGE			
	6-HR	24-HR	72-HR	24.92-HR

2235.73	4.08	2233.51	2232.55	2232.46	2232.46

CUMULATIVE AREA = 11.18 SQ MI

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HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .80

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 757.	4.08	393.	258.	248.	248.
		(INCHES) .327	.858	.858	.858
		(AC-FT) 195.	512.	512.	512.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
9.	4.08	3.	2.	1.	1.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2235.50	4.08	2233.42	2232.49	2232.40	2232.40

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .76

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 695.	4.08	371.	245.	236.	236.
		(INCHES) .309	.815	.815	.815
		(AC-FT) 184.	486.	486.	486.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
8.	4.08	3.	1.	1.	1.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2235.18	4.08	2233.29	2232.40	2232.31	2232.31

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .73

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 629.	4.08	348.	231.	223.	223.
		(INCHES) .290	.769	.769	.769
		(AC-FT) 173.	458.	458.	458.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				

	6.	4.08	2.	1.	1.	1.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2234.83	4.08	2233.15	2232.30	2232.21	2232.21

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .57

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 393.	4.25	263.	170.	164.	164.
		(INCHES) .219	.566	.566	.566
		(AC-FT) 130.	337.	337.	337.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
3.	4.25	1.	1.	1.	1.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2233.47	4.25	2232.59	2231.83	2231.76	2231.76

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .44

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 243.	5.08	193.	98.	94.	94.
		(INCHES) .161	.326	.326	.326
		(AC-FT) 96.	194.	194.	194.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
1.	5.08	1.	0.	0.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2232.46	5.08	2232.09	2231.12	2231.08	2231.08

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .26

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 108.	5.58	82.	23.	22.	22.
		(INCHES) .068	.075	.075	.075

	(AC-FT)	40.	45.	45.	45.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
0.	5.58	0.	0.	0.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2231.34	5.58	2231.09	2230.30	2230.29	2230.29

CUMULATIVE AREA = 11.18 SQ MI

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            *            *
270 KK      *     CP7DB  *
            *            *
            **************

275 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          3  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE

                HYDROGRAPH ROUTING DATA

276 RS          STORAGE ROUTING
                     NSTPS          1  NUMBER OF SUBREACHES
                      ITYP       STOR  TYPE OF INITIAL CONDITION
                     RSVRIC      -1.00  INITIAL CONDITION
                         X         .00 WORKING R AND D COEFFICIENT

277 SV            STORAGE          .0        .7       5.4      13.6      21.9      30.4      39.0      47.8      56.6      65.6
                                  74.7      84.0      93.5     103.1     112.8

279 SE          ELEVATION     2220.00   2221.00   2222.00   2223.00   2224.00   2225.00   2226.00   2227.00   2228.00   2229.00
                              2230.00   2231.00   2232.00   2233.00   2234.00

281 SQ          DISCHARGE          0.       13.       37.      152.      340.      578.      850.     1155.     1488.     1846.
                                2225.     2481.     2701.     3036.     3463.

283 SE          ELEVATION     2220.00   2221.00   2222.00   2223.00   2224.00   2225.00   2226.00   2227.00   2228.00   2229.00
                              2230.00   2231.00   2232.00   2233.00   2234.00

                                                          ***

                                        COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

                STORAGE          .00       .68      5.42     13.62     21.95     30.42     39.03     47.76     56.62     65.61
                OUTFLOW          .00     13.20     37.20    152.00    340.30    578.10    849.70   1155.10   1488.10   1845.50
              ELEVATION     2220.00   2221.00   2222.00   2223.00   2224.00   2225.00   2226.00   2227.00   2228.00   2229.00

                STORAGE        74.74     84.02     93.46    103.05    112.79
                OUTFLOW      2224.90   2481.10   2700.80   3035.50   3463.40
              ELEVATION      2230.00   2231.00   2232.00   2233.00   2234.00

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                          HYDROGRAPH AT STATION    CP7DB
                            FOR PLAN 1, RATIO =  .95
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PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)	(CFS)			
+ 811.	4.50	460.	295.	284.	284.

	(INCHES)	.382	.982	.982	.982
	(AC-FT)	228.	585.	585.	585.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
38.	4.50	26.	19.	18.	18.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2225.86	4.50	2224.47	2223.59	2223.46	2223.46

CUMULATIVE AREA = 11.18 SQ MI

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HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .88

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 706.	4.50	420.	274.	264.	264.
		(INCHES) .349	.911	.911	.911
		(AC-FT) 208.	543.	543.	543.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
34.	4.50	25.	18.	17.	17.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2225.47	4.50	2224.30	2223.47	2223.35	2223.35

CUMULATIVE AREA = 11.18 SQ MI

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HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .83

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 635.	4.58	393.	259.	249.	249.
		(INCHES) .327	.861	.861	.861
		(AC-FT) 195.	513.	513.	513.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
32.	4.58	24.	18.	17.	17.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2225.21	4.58	2224.19	2223.39	2223.27	2223.27

CUMULATIVE AREA = 11.18 SQ MI

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HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .80

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 595.	4.58		378.	250.	241.	241.
		(INCHES)	.314	.831	.831	.831
		(AC-FT)	187.	496.	496.	496.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
31.	4.58	23.	17.	17.	17.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2225.06	4.58	2224.12	2223.34	2223.22	2223.22

CUMULATIVE AREA = 11.18 SQ MI

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HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .76

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 538.	4.58		356.	237.	228.	228.
		(INCHES)	.296	.789	.789	.789
		(AC-FT)	176.	470.	470.	470.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
29.	4.58	22.	17.	16.	16.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2224.83	4.58	2224.03	2223.27	2223.15	2223.15

CUMULATIVE AREA = 11.18 SQ MI

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HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .73

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 484.	4.67		333.	224.	215.	215.
		(INCHES)	.277	.744	.744	.744
		(AC-FT)	165.	443.	443.	443.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
27.	4.67	21.	16.	15.	15.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2224.61	4.67	2223.92	2223.19	2223.07	2223.07

CUMULATIVE AREA = 11.18 SQ MI

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HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .57

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 323.	5.42	248.	166.	160.	160.
		(INCHES) .207	.551	.551	.551
		(AC-FT) 123.	329.	329.	329.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
21.	5.42	18.	13.	13.	13.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2223.91	5.42	2223.51	2222.83	2222.73	2222.73

CUMULATIVE AREA = 11.18 SQ MI

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HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .44

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 217.	5.75	183.	98.	94.	94.
		(INCHES) .152	.325	.325	.325
		(AC-FT) 91.	194.	194.	194.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
16.	5.75	15.	9.	8.	8.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2223.35	5.75	2223.16	2222.12	2222.04	2222.04

CUMULATIVE AREA = 11.18 SQ MI

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HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .26

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 93.	6.83	72.	22.	22.	22.
		(INCHES) .060	.075	.075	.075
		(AC-FT) 36.	45.	45.	45.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
9.	6.75	8.	2.	2.	2.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				

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  2222.48       6.83              2222.30      2220.86      2220.83      2220.83

                        CUMULATIVE AREA =   11.18 SQ MI

*** HEC-1 ERROR 1 *** INVALID CARD IDENTIFICATION CODE OR CARD OUT OF SEQUENCE
    CARD NO.  341

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

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            *            *
 890 KK     *       DB4  *
            *            *
            **************

 895 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          3  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

               HYDROGRAPH ROUTING DATA

 896 RS          STORAGE ROUTING
                      NSTPS          1  NUMBER OF SUBREACHES
                       ITYP       STOR  TYPE OF INITIAL CONDITION
                     RSVRIC        .00  INITIAL CONDITION
                          X        .00 WORKING R AND D COEFFICIENT

 897 SV            STORAGE         .0       2.0      13.0      31.0      61.0      97.0     118.0     140.0     171.0     200.0
                                 229.0     261.0     290.0     315.0     344.0     379.0     409.0     437.0     470.0     504.0

 899 SE          ELEVATION    2048.00   2050.00   2052.00   2054.00   2056.00   2058.00   2059.00   2060.00   2061.00   2062.00
                              2063.00   2064.00   2065.00   2066.00   2067.00   2068.00   2069.00   2070.00   2071.00   2072.00

 901 SQ          DISCHARGE         0.       37.       80.      117.      142.      163.      173.      182.      191.      198.
                                 206.      213.      221.      228.      235.      242.      248.     2755.     7761.    14467.

 903 SS          SPILLWAY
                      CREL    2069.00  SPILLWAY CREST ELEVATION
                     SPWID     900.00  SPILLWAY WIDTH
                      COQW       3.00  WEIR COEFFICIENT
                      EXPW       1.50  EXPONENT OF HEAD

                                                  ***

                                  COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00      2.00     13.00     31.00     61.00     97.00    118.00    140.00    171.00    200.00
          OUTFLOW        .00     37.00     80.00    117.00    142.00    163.00    173.00    182.00    191.00    198.00
        ELEVATION    2048.00   2050.00   2052.00   2054.00   2056.00   2058.00   2059.00   2060.00   2061.00   2062.00

          STORAGE     229.00    261.00    290.00    315.00    344.00    379.00    409.00    437.00    470.00    504.00
          OUTFLOW     206.00    213.00    221.00    228.00    235.00    242.00    248.00   2755.00   7761.00  14467.00
        ELEVATION    2063.00   2064.00   2065.00   2066.00   2067.00   2068.00   2069.00   2070.00   2071.00   2072.00

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

                        HYDROGRAPH AT STATION      DB4
                          FOR PLAN 1, RATIO =  .95

  PEAK FLOW      TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR       72-HR      24.92-HR
+   (CFS)        (HR)
                                (CFS)
+    1713.       5.00                   454.        248.        239.        239.
                              (INCHES)   .629       1.374       1.375       1.375
                              (AC-FT)    225.        491.        492.        492.
```

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
425.	5.00	387.	233.	224.	224.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2069.58	5.00	2068.32	2062.57	2062.04	2062.04

CUMULATIVE AREA = 6.71 SQ MI

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HYDROGRAPH AT STATION DB4
FOR PLAN 1, RATIO = .88

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)	(CFS)			
+ 933.	5.42	304.	209.	201.	201.
		(INCHES) .422	1.159	1.160	1.160
		(AC-FT) 151.	415.	415.	415.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
417.	5.42	379.	229.	221.	221.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2069.27	5.42	2068.07	2062.41	2061.88	2061.88

CUMULATIVE AREA = 6.71 SQ MI

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

HYDROGRAPH AT STATION DB4
FOR PLAN 1, RATIO = .83

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)	(CFS)			
+ 245.	6.08	238.	190.	183.	183.
		(INCHES) .330	1.051	1.051	1.051
		(AC-FT) 118.	376.	376.	376.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
395.	6.08	361.	216.	208.	208.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2068.55	6.08	2067.48	2061.93	2061.42	2061.42

CUMULATIVE AREA = 6.71 SQ MI

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HYDROGRAPH AT STATION DB4
FOR PLAN 1, RATIO = .80

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				

		(CFS)				
+ 240.	6.00		233.	184.	177.	177.
		(INCHES)	.323	1.019	1.019	1.019
		(AC-FT)	115.	365.	365.	365.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
370.	6.00	337.	197.	190.	190.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2067.75	6.00	2066.70	2061.24	2060.75	2060.75

CUMULATIVE AREA = 6.71 SQ MI

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

HYDROGRAPH AT STATION DB4
FOR PLAN 1, RATIO = .76

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 233.	6.00	225.	175.	169.	169.
		(INCHES) .312	.973	.973	.973
		(AC-FT) 111.	348.	348.	348.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
336.	6.00	304.	173.	166.	166.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2066.73	6.00	2065.57	2060.27	2059.82	2059.82

CUMULATIVE AREA = 6.71 SQ MI

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

HYDROGRAPH AT STATION DB4
FOR PLAN 1, RATIO = .73

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 224.	6.00	216.	166.	160.	160.
		(INCHES) .300	.921	.921	.921
		(AC-FT) 107.	329.	329.	329.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
302.	6.00	271.	148.	142.	142.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2065.48	6.00	2064.39	2059.24	2058.82	2058.82

CUMULATIVE AREA = 6.71 SQ MI

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

HYDROGRAPH AT STATION DB4

FOR PLAN 1, RATIO = .57

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 193.	6.00		186.	114.	110.	110.
		(INCHES)	.257	.631	.631	.631
		(AC-FT)	92.	226.	226.	226.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
179.	6.00	154.	66.	64.	64.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2061.26	6.00	2060.42	2054.91	2054.66	2054.66

CUMULATIVE AREA = 6.71 SQ MI

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

HYDROGRAPH AT STATION DB4
FOR PLAN 1, RATIO = .44

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 160.	5.92		149.	65.	63.	63.
		(INCHES)	.207	.360	.360	.360
		(AC-FT)	74.	129.	129.	129.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
92.	5.92	74.	25.	24.	24.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2057.72	5.92	2056.69	2051.61	2051.48	2051.48

CUMULATIVE AREA = 6.71 SQ MI

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

HYDROGRAPH AT STATION DB4
FOR PLAN 1, RATIO = .26

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 83.	5.50		63.	16.	16.	16.
		(INCHES)	.087	.091	.091	.091
		(AC-FT)	31.	33.	33.	33.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
15.	5.50	9.	2.	2.	2.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2052.18	5.50	2051.20	2048.84	2048.81	2048.81

CUMULATIVE AREA = 6.71 SQ MI

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          *            *
1013 KK   *       DB5  *
          *            *
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1018 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          3  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

               HYDROGRAPH ROUTING DATA

1019 RS          STORAGE ROUTING
                      NSTPS          1  NUMBER OF SUBREACHES
                       ITYP       STOR  TYPE OF INITIAL CONDITION
                     RSVRIC      -1.00  INITIAL CONDITION
                          X        .00 WORKING R AND D COEFFICIENT

1020 SV            STORAGE        1.2        3.3       12.1       28.0       49.0       79.8      115.0      166.1      232.2      320.1
                                418.8      534.5      605.5      681.1      765.1      846.8      943.4     1044.8     1261.8     1426.1

1022 SE          ELEVATION     2446.00    2450.00    2454.00    2458.00    2462.00    2466.00    2470.00    2474.00    2478.00    2482.00
                               2486.00    2490.00    2492.00    2494.00    2496.00    2498.00    2500.00    2502.00    2506.00    2510.00

1024 SQ          DISCHARGE         1.         23.        36.        46.        54.        60.        67.        72.        78.        82.
                                  87.        91.        94.        96.        98.       100.       101.       103.       107.       111.

1026 SE          ELEVATION     2446.00    2450.00    2454.00    2458.00    2462.00    2466.00    2470.00    2474.00    2478.00    2482.00
                               2486.00    2490.00    2492.00    2494.00    2496.00    2498.00    2500.00    2502.00    2506.00    2510.00

                                                                    ***

                                        COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE       1.20       3.30      12.10      28.00      49.00      79.80     115.00     166.10     232.20     320.10
          OUTFLOW        .50      22.90      36.10      45.70      53.60      60.40      66.50      72.30      77.50      82.40
        ELEVATION     2446.00    2450.00    2454.00    2458.00    2462.00    2466.00    2470.00    2474.00    2478.00    2482.00

          STORAGE     418.80     534.50     605.50     681.10     765.10     846.80     943.40    1044.80    1261.80    1426.10
          OUTFLOW      87.00      91.20      93.50      95.60      97.60      99.50     101.40     103.40     107.20     110.70
        ELEVATION     2486.00    2490.00    2492.00    2494.00    2496.00    2498.00    2500.00    2502.00    2506.00    2510.00

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

                      HYDROGRAPH AT STATION      DB5
                        FOR PLAN 1, RATIO =  .95

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR     24.92-HR
+   (CFS)       (HR)
                          (CFS)
+      90.      6.00                    89.         82.         79.         79.
                         (INCHES)      .153        .562        .563        .563
                         (AC-FT)        44.        162.        162.        162.

 PEAK STORAGE   TIME                       MAXIMUM AVERAGE STORAGE
                                      6-HR       24-HR       72-HR     24.92-HR
+  (AC-FT)      (HR)
      496.      6.00                   481.        385.        371.        371.

  PEAK STAGE    TIME                       MAXIMUM AVERAGE STAGE
                                      6-HR       24-HR       72-HR     24.92-HR
+   (FEET)      (HR)
   2488.66      6.00                2488.14    2482.96    2481.62    2481.62
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CUMULATIVE AREA = 5.41 SQ MI

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HYDROGRAPH AT STATION DB5
FOR PLAN 1, RATIO = .88

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 88.	6.00		87.	79.	76.	76.
		(INCHES)	.150	.545	.545	.545
		(AC-FT)	43.	157.	157.	157.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)					
438.	6.00		424.	335.	323.	323.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)					
2486.67	6.00		2486.16	2480.94	2479.66	2479.66

CUMULATIVE AREA = 5.41 SQ MI

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HYDROGRAPH AT STATION DB5
FOR PLAN 1, RATIO = .83

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 86.	6.00		85.	77.	75.	75.
		(INCHES)	.147	.532	.532	.532
		(AC-FT)	42.	154.	154.	154.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)					
400.	6.00		386.	302.	291.	291.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)					
2485.22	6.00		2484.65	2479.48	2478.25	2478.25

CUMULATIVE AREA = 5.41 SQ MI

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

HYDROGRAPH AT STATION DB5
FOR PLAN 1, RATIO = .80

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 85.	5.92		84.	76.	73.	73.
		(INCHES)	.145	.525	.525	.525
		(AC-FT)	42.	151.	151.	151.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)					
377.	6.00		364.	283.	272.	272.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2484.32	6.00	2483.76	2478.62	2477.42	2477.42

CUMULATIVE AREA = 5.41 SQ MI

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HYDROGRAPH AT STATION DB5
FOR PLAN 1, RATIO = .76

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 84.	5.83	83.	75.	72.	72.
		(INCHES) .143	.514	.514	.514
		(AC-FT) 41.	148.	148.	148.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
347.	5.92	333.	256.	247.	247.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2483.07	5.92	2482.53	2477.40	2476.24	2476.24

CUMULATIVE AREA = 5.41 SQ MI

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

HYDROGRAPH AT STATION DB5
FOR PLAN 1, RATIO = .73

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 82.	5.83	81.	73.	70.	70.
		(INCHES) .140	.501	.502	.502
		(AC-FT) 40.	145.	145.	145.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
316.	5.83	303.	230.	222.	222.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2481.80	5.83	2481.20	2476.07	2474.97	2474.97

CUMULATIVE AREA = 5.41 SQ MI

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HYDROGRAPH AT STATION DB5
FOR PLAN 1, RATIO = .57

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 75.	5.50	74.	64.	62.	62.
		(INCHES) .128	.441	.441	.441
		(AC-FT) 37.	127.	127.	127.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
203.	5.50	191.	135.	130.	130.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2476.22	5.50	2475.51	2470.02	2469.14	2469.14

CUMULATIVE AREA = 5.41 SQ MI

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HYDROGRAPH AT STATION DB5
FOR PLAN 1, RATIO = .44

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 67.	5.42	65.	53.	51.	51.
		(INCHES) .112	.363	.363	.363
		(AC-FT) 32.	105.	105.	105.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
119.	5.42	109.	67.	64.	64.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2470.33	5.42	2469.24	2463.09	2462.46	2462.46

CUMULATIVE AREA = 5.41 SQ MI

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HYDROGRAPH AT STATION DB5
FOR PLAN 1, RATIO = .26

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 46.	5.17	43.	18.	18.	18.
		(INCHES) .073	.127	.127	.127
		(AC-FT) 21.	37.	37.	37.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
30.	5.17	23.	8.	8.	8.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2458.34	5.17	2456.75	2450.22	2450.07	2450.07

CUMULATIVE AREA = 5.41 SQ MI

*** HEC-1 ERROR 1 *** INVALID CARD IDENTIFICATION CODE OR CARD OUT OF SEQUENCE
CARD NO. 1121 *
1

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 .95	RATIO 2 .88	RATIO 3 .83	RATIO 4 .80	RATIO 5 .76	RATIO 6 .73	RATIO 7 .57	RATIO 8 .44	RATIO 9 .26
HYDROGRAPH AT													
+	C1H	4.01	1	FLOW	5490.	4881.	4468.	4229.	3899.	3563.	2311.	1350.	279.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO													
+	DB1	4.01	1	FLOW	198.	190.	184.	180.	175.	169.	142.	114.	61.
				TIME	5.33	5.33	5.33	5.33	5.33	5.33	5.25	5.25	5.17
			** PEAK STAGES IN FEET **										
			1	STAGE	2588.10	2585.67	2583.94	2582.91	2581.46	2579.94	2574.00	2568.87	2562.37
				TIME	5.33	5.33	5.33	5.33	5.33	5.33	5.25	5.25	5.17
ROUTED TO													
+	RDB1	4.01	1	FLOW	198.	190.	184.	180.	175.	169.	142.	114.	62.
				TIME	5.50	5.50	5.50	5.50	5.42	5.42	5.42	5.42	5.33
HYDROGRAPH AT													
+	C1HB1	.45	1	FLOW	305.	268.	243.	228.	208.	188.	114.	60.	9.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.17
2 COMBINED AT													
+	CP2	4.46	1	FLOW	481.	434.	403.	384.	360.	334.	236.	160.	70.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.08	4.08	5.17
ROUTED TO													
+	RCP2	4.46	1	FLOW	478.	432.	400.	382.	357.	331.	236.	159.	70.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.08	4.08	5.25
HYDROGRAPH AT													
+	C1G3A	.27	1	FLOW	358.	318.	291.	275.	253.	231.	149.	86.	19.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67
2 COMBINED AT													
+	CP3	4.73	1	FLOW	637.	571.	526.	500.	465.	428.	291.	186.	76.
				TIME	3.75	3.75	3.83	3.83	3.83	3.83	3.83	4.00	5.00
ROUTED TO													
+	RCP3	4.73	1	FLOW	635.	571.	525.	499.	462.	426.	291.	186.	76.
				TIME	3.75	3.83	3.83	3.83	3.83	3.92	3.92	4.08	5.08
HYDROGRAPH AT													
+	C1G3B	.73	1	FLOW	1014.	901.	824.	780.	719.	657.	425.	247.	49.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT													
+	CP4	5.46	1	FLOW	1517.	1343.	1226.	1156.	1063.	967.	595.	310.	95.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.92
ROUTED TO													
+	RCP4	5.46	1	FLOW	1497.	1287.	1173.	1156.	1073.	977.	600.	296.	94.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	5.00
HYDROGRAPH AT													
+	C1G3C	1.05	1	FLOW	1372.	1218.	1114.	1053.	970.	886.	571.	331.	76.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67	3.67
2 COMBINED AT													
+	CP5	6.51	1	FLOW	2792.	2442.	2232.	2159.	2000.	1826.	1158.	627.	127.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.75
HYDROGRAPH AT													
+	C1G3D	.84	1	FLOW	1246.	1113.	1022.	970.	897.	824.	546.	330.	82.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT													
+	CP6A	7.35	1	FLOW	4005.	3515.	3206.	3053.	2811.	2556.	1635.	922.	196.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67	3.67	3.75

HYDROGRAPH AT													
+	C5ICB	.73	1	FLOW	850.	741.	667.	625.	567.	509.	297.	144.	14.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.83
ROUTED TO													
+	C5ICB	.73	1	FLOW	799.	719.	652.	594.	539.	489.	291.	138.	18.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.75	4.00
HYDROGRAPH AT													
+	C5I2A	1.40	1	FLOW	1698.	1485.	1342.	1260.	1147.	1034.	618.	314.	35.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.75
2 COMBINED AT													
+	CP6B	2.13	1	FLOW	2448.	2133.	1921.	1790.	1629.	1459.	841.	421.	42.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67	4.92
2 COMBINED AT													
+	CP6	9.48	1	FLOW	6453.	5648.	5126.	4844.	4440.	4015.	2469.	1343.	231.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67	3.67	3.75
ROUTED TO													
+	DB2	9.48	1	FLOW	308.	294.	284.	278.	269.	259.	217.	177.	101.
				TIME	6.08	6.08	6.08	6.08	6.08	6.08	6.00	5.75	5.42
			** PEAK STAGES IN FEET **										
			1	STAGE	2347.36	2345.41	2344.03	2343.23	2342.13	2340.92	2336.32	2332.56	2327.71
				TIME	6.08	6.08	6.08	6.08	6.08	6.08	6.00	5.75	5.42
ROUTED TO													
+	RDB2	9.48	1	FLOW	308.	294.	284.	278.	269.	259.	217.	177.	101.
				TIME	6.17	6.17	6.17	6.17	6.08	6.08	6.00	5.83	5.50
HYDROGRAPH AT													
+	C1G2C	.29	1	FLOW	210.	180.	160.	149.	133.	117.	62.	26.	2.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.83	5.00
HYDROGRAPH AT													
+	C1G2D	.22	1	FLOW	153.	129.	113.	104.	91.	79.	38.	13.	1.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.83	5.00
3 COMBINED AT													
+	CP7A	10.00	1	FLOW	583.	518.	475.	450.	416.	381.	261.	194.	102.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83	5.00	5.42
HYDROGRAPH AT													
+	C1G2B1	.52	1	FLOW	260.	220.	193.	178.	157.	137.	67.	25.	1.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	4.00	4.08	5.17
ROUTED TO													
+	RG2B1	.52	1	FLOW	267.	219.	192.	173.	157.	132.	91.	34.	2.
				TIME	4.08	4.08	4.08	4.17	4.08	4.25	4.17	4.58	7.00
HYDROGRAPH AT													
+	C1G2B2	.31	1	FLOW	230.	198.	177.	165.	148.	131.	71.	31.	3.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.83	5.00
2 COMBINED AT													
+	CP7B	.83	1	FLOW	403.	325.	284.	263.	243.	211.	125.	46.	3.
				TIME	3.92	4.00	4.08	4.00	4.00	4.00	4.17	4.58	5.00
HYDROGRAPH AT													
+	C1G2A	.35	1	FLOW	309.	267.	240.	224.	203.	181.	103.	49.	5.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.75	4.92
ROUTED TO													
+	RC1G2A	.35	1	FLOW	308.	270.	234.	224.	199.	176.	105.	38.	5.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.92	4.17	5.50
2 COMBINED AT													
+	CP7C	1.18	1	FLOW	671.	560.	487.	438.	404.	357.	194.	65.	7.
				TIME	3.92	3.92	3.92	4.00	4.00	4.00	4.17	4.58	5.08

2 COMBINED AT												
+	CP7	11.18	1	FLOW	1188.	1026.	920.	848.	766.	695.	430.	245.	108.
				TIME	3.83	3.92	3.92	3.92	4.00	4.00	3.83	5.00	5.50
ROUTED TO													
+	CP7DB	11.18	1	FLOW	1009.	886.	803.	757.	695.	629.	393.	243.	108.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	4.25	5.08	5.58
			** PEAK STAGES IN FEET **										
			1	STAGE	2236.72	2236.15	2235.73	2235.50	2235.18	2234.83	2233.47	2232.46	2231.34
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	4.25	5.08	5.58
ROUTED TO													
+	CP7DB	11.18	1	FLOW	811.	706.	635.	595.	538.	484.	323.	217.	93.
				TIME	4.50	4.50	4.58	4.58	4.58	4.67	5.42	5.75	6.83
			** PEAK STAGES IN FEET **										
			1	STAGE	2225.86	2225.47	2225.21	2225.06	2224.83	2224.61	2223.91	2223.35	2222.48
				TIME	4.50	4.50	4.58	4.58	4.58	4.67	5.42	5.75	6.83
ROUTED TO													
+	RCP7	11.18	1	FLOW	809.	705.	634.	593.	538.	484.	323.	217.	93.
				TIME	4.50	4.58	4.58	4.58	4.67	4.75	5.42	5.83	6.92
HYDROGRAPH AT													
+	C1NA	.41	1	FLOW	744.	662.	606.	574.	530.	484.	315.	184.	38.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO													
+	RC1NA	.41	1	FLOW	675.	597.	542.	519.	469.	431.	264.	155.	36.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.58	3.58
2 COMBINED AT													
+	CP8	11.59	1	FLOW	948.	833.	753.	706.	643.	576.	367.	223.	93.
				TIME	4.58	4.58	4.58	4.58	4.58	4.58	4.92	5.83	6.92
ROUTED TO													
+	RCP8	11.59	1	FLOW	938.	821.	740.	695.	635.	572.	358.	221.	93.
				TIME	4.58	4.58	4.67	4.67	4.67	4.67	4.92	5.92	7.00
HYDROGRAPH AT													
+	C5GC	.11	1	FLOW	223.	199.	183.	173.	160.	147.	97.	58.	14.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO													
+	RC5GC	.11	1	FLOW	187.	164.	150.	142.	133.	123.	84.	55.	11.
				TIME	3.50	3.50	3.50	3.50	3.58	3.58	3.58	3.58	3.67
HYDROGRAPH AT													
+	C5GB	.32	1	FLOW	451.	399.	364.	344.	316.	287.	182.	103.	20.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67
2 COMBINED AT													
+	CP9	.44	1	FLOW	626.	558.	510.	485.	448.	410.	267.	158.	31.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67
ROUTED TO													
+	RCP9	.44	1	FLOW	598.	526.	481.	453.	414.	379.	248.	150.	31.
				TIME	3.58	3.58	3.58	3.58	3.58	3.67	3.67	3.67	3.75
HYDROGRAPH AT													
+	C5GA	.27	1	FLOW	109.	88.	75.	67.	57.	47.	17.	5.	0.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.92	5.00	.00
2 COMBINED AT													
+	CP10	.71	1	FLOW	665.	579.	527.	497.	456.	414.	257.	150.	31.
				TIME	3.58	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.75
ROUTED TO													
+	RCP10	.71	1	FLOW	660.	582.	529.	491.	452.	405.	255.	141.	22.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.75	4.25
ROUTED TO													

+	RCP10	.71	1	FLOW	642.	575.	518.	485.	437.	395.	273.	152.	26.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.83	4.33
HYDROGRAPH AT													
+	C5GD	.44	1	FLOW	163.	133.	113.	102.	88.	74.	29.	10.	0.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.08	5.08	.00
DIVERSION TO													
+	DIVER1	.44	1	FLOW	23.	20.	19.	17.	16.	14.	8.	3.	0.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.08	5.08	.00
HYDROGRAPH AT													
+	DIVER1	.44	1	FLOW	140.	112.	95.	85.	72.	60.	21.	7.	0.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.08	5.08	.00
ROUTED TO													
+	RC5GD	.44	1	FLOW	139.	112.	94.	85.	72.	59.	21.	7.	0.
				TIME	4.08	4.08	4.08	4.08	4.17	4.17	4.33	5.42	.00
HYDROGRAPH AT													
+	C5I1E	.16	1	FLOW	266.	233.	211.	199.	181.	163.	99.	51.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.75
3 COMBINED AT													
+	CP11	1.32	1	FLOW	798.	697.	618.	570.	509.	458.	313.	163.	28.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.83	4.33
ROUTED TO													
+	RCP11	1.32	1	FLOW	780.	671.	591.	552.	495.	441.	299.	151.	33.
				TIME	3.75	3.75	3.75	3.75	3.75	3.83	3.83	3.92	4.50
HYDROGRAPH AT													
+	C1HF	.10	1	FLOW	90.	79.	71.	66.	60.	54.	31.	15.	2.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	5.00
2 COMBINED AT													
+	CP12	1.42	1	FLOW	870.	750.	662.	619.	555.	494.	328.	164.	34.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83	3.92	4.50
ROUTED TO													
+	RCP12	1.42	1	FLOW	847.	728.	660.	615.	556.	499.	320.	175.	43.
				TIME	3.83	3.83	3.83	3.83	3.83	3.92	4.00	4.08	4.83
HYDROGRAPH AT													
+	C5I1B	.52	1	FLOW	479.	401.	350.	321.	281.	242.	109.	33.	1.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.58	3.58	4.92
ROUTED TO													
+	RC5I1B	.52	1	FLOW	447.	387.	333.	307.	272.	235.	110.	32.	1.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.75	5.42
HYDROGRAPH AT													
+	C5I1D	.12	1	FLOW	126.	109.	98.	91.	82.	73.	41.	18.	2.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67	4.92
2 COMBINED AT													
+	CP13	.63	1	FLOW	574.	496.	431.	398.	354.	308.	151.	49.	2.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67	4.92
ROUTED TO													
+	RCP13	.63	1	FLOW	548.	470.	404.	376.	334.	295.	139.	51.	2.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.83	5.25
HYDROGRAPH AT													
+	C1HE	.15	1	FLOW	115.	96.	84.	77.	68.	58.	26.	8.	0.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.75	4.92
3 COMBINED AT													
+	CP14	2.20	1	FLOW	1315.	1115.	995.	924.	825.	733.	433.	214.	44.
				TIME	3.75	3.75	3.75	3.75	3.83	3.83	3.92	4.08	4.83
DIVERSION TO													
+	DIVER2	2.20	1	FLOW	179.	103.	92.	85.	76.	68.	40.	20.	4.

				TIME	3.75	3.75	3.75	3.75	3.83	3.83	3.92	4.08	4.83
HYDROGRAPH AT													
+	DIVER2	2.20	1	FLOW	1136.	1012.	903.	839.	748.	665.	393.	194.	40.
				TIME	3.67	3.75	3.75	3.75	3.83	3.83	3.92	4.08	4.83
ROUTED TO													
+	RCP14	2.20	1	FLOW	1135.	999.	889.	828.	742.	652.	382.	185.	32.
				TIME	3.75	3.75	3.83	3.83	3.83	3.83	4.00	4.17	5.00
HYDROGRAPH AT													
+	C1HD	.07	1	FLOW	72.	62.	55.	52.	46.	41.	23.	10.	1.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67	4.92
2 COMBINED AT													
+	CP15	2.27	1	FLOW	1185.	1043.	920.	858.	768.	676.	391.	188.	32.
				TIME	3.75	3.75	3.75	3.83	3.83	3.83	4.00	4.17	5.00
ROUTED TO													
+	RCP15	2.27	1	FLOW	1176.	1033.	923.	858.	754.	666.	370.	180.	28.
				TIME	3.75	3.83	3.83	3.83	3.92	3.92	4.08	4.25	5.25
DIVERSION TO													
+	DIVER3	2.27	1	FLOW	221.	191.	171.	159.	140.	123.	69.	33.	5.
				TIME	3.75	3.83	3.83	3.83	3.92	3.92	4.08	4.25	5.25
HYDROGRAPH AT													
+	DIVER3	2.27	1	FLOW	955.	842.	752.	699.	614.	543.	302.	147.	22.
				TIME	3.75	3.83	3.83	3.83	3.92	3.92	4.08	4.25	5.25
HYDROGRAPH AT													
+	C5I1	.24	1	FLOW	238.	205.	182.	169.	152.	134.	73.	32.	3.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67	3.67	4.92
HYDROGRAPH AT													
+	C5I1C	.06	1	FLOW	68.	59.	54.	50.	46.	41.	25.	13.	2.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.83
ROUTED TO													
+	RC5I1C	.06	1	FLOW	66.	58.	53.	49.	44.	40.	24.	13.	2.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.83	4.08
2 COMBINED AT													
+	CP16	.31	1	FLOW	291.	251.	224.	209.	189.	168.	94.	42.	4.
				TIME	3.58	3.67	3.67	3.67	3.67	3.67	3.67	3.75	4.92
ROUTED TO													
+	RCP16	.31	1	FLOW	291.	252.	226.	210.	188.	166.	92.	42.	4.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.83	5.17
HYDROGRAPH AT													
+	C1G1B	.14	1	FLOW	200.	179.	164.	156.	144.	133.	88.	54.	15.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67
2 COMBINED AT													
+	CP17	.45	1	FLOW	478.	420.	381.	357.	325.	292.	173.	86.	15.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.67
ROUTED TO													
+	RCP17	.45	1	FLOW	472.	401.	380.	357.	326.	293.	167.	87.	16.
				TIME	3.67	3.75	3.75	3.75	3.75	3.75	3.75	3.83	3.92
HYDROGRAPH AT													
+	C1HCB	.18	1	FLOW	249.	217.	195.	182.	165.	148.	85.	40.	3.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	4.83
2 COMBINED AT													
+	CP18A	.63	1	FLOW	589.	495.	464.	434.	394.	355.	206.	98.	18.
				TIME	3.67	3.67	3.67	3.67	3.75	3.75	3.75	3.83	3.92
2 COMBINED AT													
+	CP18	2.90	1	FLOW	1522.	1306.	1159.	1075.	946.	820.	428.	194.	32.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	4.00	4.25	5.25

DIVERSION TO													
+	DIVER4	2.90	1	FLOW	446.	195.	104.	97.	85.	74.	39.	17.	3.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	4.00	4.25	5.25
HYDROGRAPH AT													
+	DIVER4	2.90	1	FLOW	1115.	1121.	1055.	978.	861.	747.	390.	176.	29.
				TIME	3.92	3.83	3.75	3.75	3.75	3.75	4.00	4.25	5.25
ROUTED TO													
+	RCP18	2.90	1	FLOW	1106.	1120.	1035.	966.	855.	747.	386.	165.	28.
				TIME	3.92	3.83	3.83	3.83	3.83	3.83	4.00	4.33	5.33
HYDROGRAPH AT													
+	C1G1A	.22	1	FLOW	255.	226.	206.	195.	179.	163.	104.	59.	12.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.75
ROUTED TO													
+	RC1G1A	.22	1	FLOW	258.	227.	198.	187.	178.	164.	102.	58.	14.
				TIME	3.75	3.75	3.75	3.83	3.83	3.83	3.83	3.83	4.17
HYDROGRAPH AT													
+	C1HB	.15	1	FLOW	278.	249.	228.	217.	200.	184.	122.	73.	18.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT													
+	CP19A	.37	1	FLOW	348.	308.	273.	257.	243.	221.	137.	73.	18.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.50	3.50
2 COMBINED AT													
+	CP19	3.27	1	FLOW	1431.	1412.	1281.	1186.	1061.	936.	491.	202.	35.
				TIME	3.75	3.75	3.75	3.75	3.83	3.83	4.00	4.17	5.33
DIVERSION TO													
+	DIVER5	3.27	1	FLOW	544.	530.	431.	360.	267.	173.	43.	18.	3.
				TIME	3.75	3.75	3.75	3.75	3.83	3.83	4.00	4.17	5.33
HYDROGRAPH AT													
+	DIVER5	3.27	1	FLOW	887.	882.	849.	825.	794.	763.	448.	185.	32.
				TIME	3.75	3.75	3.75	3.75	3.83	3.83	4.00	4.17	5.33
ROUTED TO													
+	RCP19	3.27	1	FLOW	890.	881.	844.	832.	823.	759.	454.	187.	32.
				TIME	3.83	3.83	3.83	3.83	3.83	3.92	4.08	4.33	5.58
HYDROGRAPH AT													
+	C1HA	.07	1	FLOW	27.	21.	18.	15.	13.	11.	3.	1.	0.
				TIME	3.67	3.67	3.75	3.75	3.75	3.75	3.83	4.92	.00
2 COMBINED AT													
+	CP20A	3.35	1	FLOW	913.	899.	860.	847.	835.	767.	457.	187.	32.
				TIME	3.83	3.83	3.83	3.83	3.83	3.92	4.08	4.33	5.58
2 COMBINED AT													
+	CP20	14.94	1	FLOW	1499.	1350.	1247.	1193.	1110.	1025.	601.	315.	105.
				TIME	4.33	4.17	4.08	4.08	4.08	4.08	4.08	5.25	6.83
ROUTED TO													
+	RCP20	14.94	1	FLOW	1498.	1349.	1245.	1187.	1106.	1020.	590.	314.	105.
				TIME	4.33	4.17	4.17	4.17	4.08	4.08	4.08	5.25	6.83
HYDROGRAPH AT													
+	C1D	.40	1	FLOW	338.	291.	261.	243.	219.	194.	107.	48.	5.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.75	4.92
ROUTED TO													
+	RC1D	.40	1	FLOW	341.	288.	257.	240.	216.	192.	104.	48.	4.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83	3.83	5.17
HYDROGRAPH AT													
+	C1C	.23	1	FLOW	213.	184.	166.	156.	141.	127.	74.	36.	4.
				TIME	3.58	3.67	3.67	3.67	3.67	3.67	3.67	3.67	4.92

2 COMBINED AT													
+	CP21	.63	1	FLOW	531.	447.	402.	375.	339.	303.	171.	77.	7.
				TIME	3.67	3.75	3.75	3.75	3.75	3.75	3.75	3.83	5.00
ROUTED TO													
+	RCP21	.63	1	FLOW	541.	459.	412.	384.	345.	294.	169.	77.	7.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.92	4.00	5.33
HYDROGRAPH AT													
+	C1B	.38	1	FLOW	450.	401.	368.	349.	322.	295.	194.	116.	27.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.75
HYDROGRAPH AT													
+	C4A1D	.06	1	FLOW	52.	45.	41.	38.	34.	30.	17.	7.	1.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	4.92
ROUTED TO													
+	RC4A1D	.06	1	FLOW	52.	45.	40.	37.	34.	30.	16.	7.	1.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.75	5.00
4 COMBINED AT													
+	CP22	16.01	1	FLOW	2296.	2072.	1889.	1804.	1693.	1502.	802.	375.	107.
				TIME	3.75	3.75	3.83	3.83	3.83	3.83	4.08	5.08	6.00
ROUTED TO													
+	RCP22	16.01	1	FLOW	2285.	2055.	1883.	1789.	1666.	1478.	801.	375.	107.
				TIME	3.75	3.83	3.83	3.83	3.83	3.92	4.08	5.08	5.75
HYDROGRAPH AT													
+	C1A	.15	1	FLOW	149.	131.	119.	112.	103.	94.	59.	32.	6.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.75
2 COMBINED AT													
+	CP23	16.15	1	FLOW	2419.	2166.	1973.	1875.	1745.	1535.	828.	384.	107.
				TIME	3.75	3.75	3.83	3.83	3.83	3.83	4.00	5.08	5.75
ROUTED TO													
+	RCP23	16.15	1	FLOW	2410.	2155.	1969.	1865.	1729.	1534.	825.	383.	107.
				TIME	3.75	3.83	3.83	3.83	3.83	3.92	4.00	5.08	6.17
HYDROGRAPH AT													
+	C5CC	.33	1	FLOW	286.	249.	224.	210.	190.	170.	99.	47.	5.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.83	5.00
HYDROGRAPH AT													
+	RET4	.00	1	FLOW	446.	195.	104.	97.	85.	74.	39.	17.	3.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	4.00	4.25	5.25
ROUTED TO													
+	RDIV4	.00	1	FLOW	416.	170.	103.	95.	86.	73.	39.	17.	3.
				TIME	3.75	3.83	3.83	3.83	3.83	3.83	4.00	4.25	5.50
ROUTED TO													
+	RDIV4	.00	1	FLOW	406.	149.	104.	96.	88.	74.	40.	18.	3.
				TIME	3.83	3.92	3.92	3.92	3.92	3.92	4.08	4.42	5.83
2 COMBINED AT													
+	CP24A	.33	1	FLOW	669.	371.	306.	283.	252.	217.	106.	47.	7.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83	4.75
HYDROGRAPH AT													
+	RET3	.00	1	FLOW	221.	191.	171.	159.	140.	123.	69.	33.	5.
				TIME	3.75	3.83	3.83	3.83	3.92	3.92	4.08	4.25	5.25
ROUTED TO													
+	RDIV3	.00	1	FLOW	222.	192.	169.	159.	138.	124.	69.	36.	7.
				TIME	3.83	3.92	4.00	3.83	4.00	3.92	4.08	4.33	5.67
ROUTED TO													
+	RDIV3	.00	1	FLOW	220.	189.	167.	158.	139.	119.	66.	35.	6.
				TIME	3.92	3.92	3.92	3.92	3.92	4.08	4.17	4.42	5.83
2 COMBINED AT													

+	CP24B	.33	1	FLOW	886.	549.	452.	420.	378.	326.	154.	68.	10.
				TIME	3.83	3.83	3.83	3.92	3.92	3.92	4.08	4.42	5.83
HYDROGRAPH AT													
+	RET2	.00	1	FLOW	179.	103.	92.	85.	76.	68.	40.	20.	4.
				TIME	3.75	3.75	3.75	3.75	3.83	3.83	3.92	4.08	4.83
ROUTED TO													
+	RDIV2	.00	1	FLOW	185.	104.	93.	89.	79.	68.	40.	20.	3.
				TIME	3.83	3.83	3.83	3.83	3.83	3.92	4.00	4.50	5.50
ROUTED TO													
+	RDIV2	.00	1	FLOW	173.	102.	90.	84.	74.	67.	39.	18.	3.
				TIME	3.83	3.92	3.92	3.92	4.00	3.92	4.08	4.50	5.67
2 COMBINED AT													
+	CP24C	.33	1	FLOW	1059.	650.	539.	504.	453.	393.	192.	85.	11.
				TIME	3.83	3.83	3.83	3.92	3.92	3.92	4.08	4.42	5.83
HYDROGRAPH AT													
+	C5CA	.30	1	FLOW	185.	153.	132.	121.	105.	89.	40.	12.	0.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.83	5.25
ROUTED TO													
+	RC5CA	.30	1	FLOW	182.	152.	131.	120.	104.	88.	40.	12.	0.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83	4.00	6.42
HYDROGRAPH AT													
+	C5CF	.32	1	FLOW	228.	185.	157.	142.	121.	100.	34.	9.	0.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.58	4.83	.00
2 COMBINED AT													
+	CP25	.62	1	FLOW	307.	249.	217.	199.	173.	149.	64.	19.	0.
				TIME	3.58	3.75	3.75	3.75	3.75	3.75	3.75	4.83	6.42
ROUTED TO													
+	RCP25	.62	1	FLOW	306.	247.	215.	196.	169.	144.	64.	18.	0.
				TIME	3.58	3.75	3.75	3.75	3.75	3.83	3.83	5.00	8.33
HYDROGRAPH AT													
+	C5CE	.32	1	FLOW	221.	180.	152.	137.	116.	96.	37.	9.	0.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.58	4.83	.00
2 COMBINED AT													
+	CP26	.95	1	FLOW	508.	408.	343.	307.	258.	209.	85.	23.	0.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.83	5.00	8.33
ROUTED TO													
+	RCP26	.95	1	FLOW	487.	385.	321.	290.	248.	206.	83.	23.	0.
				TIME	3.58	3.58	3.67	3.67	3.67	3.75	3.83	5.00	9.58
HYDROGRAPH AT													
+	C5CD	.27	1	FLOW	153.	130.	114.	105.	93.	81.	39.	14.	1.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.92	3.92	5.08
HYDROGRAPH AT													
+	RET1	.00	1	FLOW	23.	20.	19.	17.	16.	14.	8.	3.	0.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.08	5.08	.00
ROUTED TO													
+	RDIV1	.00	1	FLOW	23.	21.	20.	20.	20.	17.	9.	3.	0.
				TIME	4.08	4.25	4.25	4.17	4.08	4.33	4.33	5.75	.00
ROUTED TO													
+	RDIV1	.00	1	FLOW	23.	21.	20.	20.	23.	16.	8.	3.	0.
				TIME	4.17	4.33	4.25	4.25	4.17	4.33	4.42	5.83	.00
ROUTED TO													
+	RDIV1	.00	1	FLOW	26.	21.	23.	19.	23.	17.	8.	3.	0.
				TIME	4.25	4.50	4.33	4.42	4.33	4.58	4.67	6.00	.00
3 COMBINED AT													
+	CP27	1.21	1	FLOW	589.	483.	419.	382.	331.	282.	122.	34.	1.

				TIME	3.67	3.67	3.75	3.75	3.75	3.75	3.83	5.00	5.08
ROUTED TO													
+	RCP27	1.21	1	FLOW	588.	484.	421.	380.	332.	280.	121.	34.	1.
				TIME	3.67	3.75	3.75	3.75	3.75	3.83	3.92	4.17	5.42
2 COMBINED AT													
+	CP24D	1.55	1	FLOW	1599.	1107.	942.	852.	747.	650.	295.	111.	11.
				TIME	3.83	3.83	3.83	3.83	3.92	3.92	4.08	4.42	5.83
HYDROGRAPH AT													
+	C5CB	.14	1	FLOW	127.	111.	101.	95.	86.	78.	47.	24.	3.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.83	3.92
2 COMBINED AT													
+	CP24E	1.69	1	FLOW	1719.	1212.	1038.	941.	819.	716.	324.	119.	12.
				TIME	3.83	3.83	3.83	3.83	3.92	3.92	4.08	4.42	5.83
HYDROGRAPH AT													
+	C5FD	.17	1	FLOW	294.	261.	238.	225.	207.	189.	122.	70.	13.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO													
+	RC5FD	.17	1	FLOW	259.	228.	209.	200.	180.	167.	113.	68.	15.
				TIME	3.58	3.58	3.58	3.58	3.67	3.67	3.67	3.67	3.83
HYDROGRAPH AT													
+	C5FA	.51	1	FLOW	1125.	1013.	937.	893.	831.	769.	529.	338.	106.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO													
+	RC5FA	.51	1	FLOW	1021.	870.	812.	747.	694.	634.	442.	289.	122.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67	3.75
HYDROGRAPH AT													
+	C5FB	.26	1	FLOW	167.	137.	118.	108.	94.	80.	34.	9.	0.
				TIME	3.58	3.58	3.67	3.67	3.67	3.67	3.67	3.83	.00
3 COMBINED AT													
+	CP28	.94	1	FLOW	1447.	1235.	1137.	1053.	964.	876.	577.	364.	122.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67	3.67	3.75
ROUTED TO													
+	RCP28	.94	1	FLOW	1315.	1135.	1064.	1005.	932.	849.	575.	334.	85.
				TIME	3.58	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.92
HYDROGRAPH AT													
+	C5FC	.22	1	FLOW	191.	161.	142.	131.	116.	101.	50.	18.	1.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67	3.67	4.92
2 COMBINED AT													
+	CP29	1.16	1	FLOW	1506.	1285.	1197.	1130.	1042.	945.	624.	352.	85.
				TIME	3.58	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.92
ROUTED TO													
+	RCP29	1.16	1	FLOW	1497.	1266.	1192.	1080.	1007.	903.	625.	373.	65.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.83	4.08
HYDROGRAPH AT													
+	C5EA	.49	1	FLOW	690.	611.	557.	526.	483.	439.	278.	156.	25.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT													
+	CP30	1.65	1	FLOW	2023.	1733.	1619.	1484.	1379.	1243.	797.	451.	76.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.83	4.08
ROUTED TO													
+	RCP30	1.65	1	FLOW	2027.	1711.	1567.	1444.	1322.	1191.	743.	435.	79.
				TIME	3.67	3.67	3.67	3.67	3.75	3.75	3.75	3.92	4.25
HYDROGRAPH AT													
+	C5EB	.55	1	FLOW	806.	726.	671.	640.	596.	551.	379.	243.	77.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67

ROUTED TO													
+	RC5EB	.55	1	FLOW	781.	703.	652.	643.	600.	556.	387.	247.	74.
				TIME	3.67	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.83
HYDROGRAPH AT													
+	C5EC	.22	1	FLOW	179.	150.	131.	120.	105.	91.	41.	13.	0.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.75	4.92
3 COMBINED AT													
+	CP31	2.41	1	FLOW	2964.	2542.	2327.	2186.	1999.	1815.	1165.	639.	115.
				TIME	3.67	3.67	3.67	3.67	3.75	3.75	3.75	3.92	4.25
ROUTED TO													
+	RCP31	2.41	1	FLOW	2865.	2478.	2301.	2180.	1998.	1797.	1129.	598.	104.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83	3.92	4.42
HYDROGRAPH AT													
+	C5ED	.16	1	FLOW	178.	154.	139.	130.	118.	106.	61.	31.	3.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67	3.83
2 COMBINED AT													
+	CP32	2.57	1	FLOW	3001.	2597.	2409.	2281.	2091.	1881.	1171.	615.	105.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83	3.92	4.42
ROUTED TO													
+	RCP32	2.57	1	FLOW	2990.	2578.	2370.	2246.	2036.	1821.	1142.	606.	107.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83	4.00	4.00
HYDROGRAPH AT													
+	C5DA	1.06	1	FLOW	2210.	1984.	1830.	1740.	1616.	1489.	1009.	629.	179.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT													
+	C5DB	.53	1	FLOW	1079.	973.	900.	858.	800.	740.	511.	328.	105.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT													
+	CP33	4.17	1	FLOW	4356.	3797.	3411.	3193.	2920.	2638.	1651.	980.	285.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO													
+	RCP33	4.17	1	FLOW	4193.	3631.	3315.	3146.	2865.	2576.	1491.	857.	283.
				TIME	3.67	3.75	3.75	3.75	3.75	3.75	3.83	3.58	3.58
2 COMBINED AT													
+	CP24	5.85	1	FLOW	5742.	4748.	4227.	3948.	3545.	3142.	1756.	900.	284.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83	3.58	3.58
ROUTED TO													
+	RCP24	5.85	1	FLOW	5646.	4681.	4158.	3871.	3476.	3074.	1736.	870.	261.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83	3.58	3.67
HYDROGRAPH AT													
+	C5DC	.33	1	FLOW	601.	534.	488.	462.	425.	388.	251.	145.	28.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO													
+	RC5DC	.33	1	FLOW	515.	462.	405.	381.	355.	346.	192.	142.	22.
				TIME	3.67	3.67	3.75	3.75	3.75	3.75	3.75	3.92	4.50
HYDROGRAPH AT													
+	C4BD	.52	1	FLOW	409.	359.	325.	306.	280.	253.	156.	83.	13.
				TIME	3.83	3.83	3.92	3.92	3.92	3.92	3.92	3.92	4.08
2 COMBINED AT													
+	CP34A	.85	1	FLOW	843.	750.	705.	661.	610.	575.	339.	226.	30.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83	3.92	4.50
2 COMBINED AT													
+	CP34B	6.71	1	FLOW	6489.	5431.	4863.	4533.	4086.	3650.	2075.	1038.	265.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83	3.92	3.67

ROUTED TO													
+	DB4	6.71	1	FLOW	1713.	933.	245.	240.	233.	224.	193.	160.	83.
				TIME	5.00	5.42	6.08	6.00	6.00	6.00	6.00	5.92	5.50
			** PEAK STAGES IN FEET **										
			1	STAGE	2069.58	2069.27	2068.55	2067.75	2066.73	2065.48	2061.26	2057.72	2052.18
				TIME	5.00	5.42	6.08	6.00	6.00	6.00	6.00	5.92	5.50
HYDROGRAPH AT													
+	C4BF	.28	1	FLOW	417.	366.	332.	312.	285.	258.	158.	83.	8.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.75
ROUTED TO													
+	RC4BF	.28	1	FLOW	353.	314.	290.	276.	250.	233.	149.	70.	8.
				TIME	3.58	3.58	3.67	3.67	3.67	3.67	3.67	3.67	5.08
HYDROGRAPH AT													
+	C4BC	.24	1	FLOW	255.	223.	202.	190.	173.	156.	96.	51.	7.
				TIME	3.58	3.58	3.58	3.58	3.58	3.67	3.67	3.67	3.75
3 COMBINED AT													
+	CP34	7.22	1	FLOW	1841.	960.	657.	626.	577.	538.	366.	210.	94.
				TIME	5.00	5.42	3.67	3.67	3.67	3.67	3.67	3.67	5.08
ROUTED TO													
+	RCP34	7.22	1	FLOW	1822.	1057.	663.	633.	593.	552.	381.	234.	93.
				TIME	5.08	5.42	3.75	3.75	3.75	3.75	3.83	3.92	5.33
HYDROGRAPH AT													
+	C4A1C	.52	1	FLOW	481.	420.	380.	357.	325.	292.	175.	93.	13.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.75	3.83
HYDROGRAPH AT													
+	RET5	.00	1	FLOW	544.	530.	431.	360.	267.	173.	43.	18.	3.
				TIME	3.75	3.75	3.75	3.75	3.83	3.83	4.00	4.17	5.33
ROUTED TO													
+	RDIV5	.00	1	FLOW	584.	575.	492.	429.	295.	197.	46.	19.	3.
				TIME	3.83	3.83	3.92	3.92	4.00	4.00	4.17	4.58	5.08
3 COMBINED AT													
+	CP35A	7.74	1	FLOW	1977.	1541.	1285.	1143.	943.	861.	542.	307.	98.
				TIME	5.08	3.83	3.83	3.92	3.92	3.75	3.83	3.92	5.33
HYDROGRAPH AT													
+	C4A1	.35	1	FLOW	248.	214.	191.	178.	160.	143.	81.	38.	4.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83	3.83	5.00
2 COMBINED AT													
+	CP35	8.09	1	FLOW	2047.	1751.	1474.	1303.	1103.	1004.	623.	344.	101.
				TIME	5.08	3.83	3.83	3.92	3.75	3.75	3.83	3.92	5.33
ROUTED TO													
+	RCP35	8.09	1	FLOW	2078.	1669.	1440.	1282.	1126.	1018.	639.	341.	106.
				TIME	5.17	3.92	3.92	4.00	3.83	3.83	3.92	4.00	5.25
HYDROGRAPH AT													
+	C4BE	.22	1	FLOW	241.	214.	196.	185.	170.	155.	99.	58.	13.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.83
ROUTED TO													
+	RC4BE	.22	1	FLOW	241.	215.	197.	187.	173.	158.	101.	58.	18.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.92	4.08
HYDROGRAPH AT													
+	C4BB	.35	1	FLOW	377.	337.	309.	294.	272.	250.	166.	101.	26.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.83
2 COMBINED AT													
+	CP36	.57	1	FLOW	615.	546.	499.	472.	435.	396.	256.	152.	35.
				TIME	3.75	3.75	3.75	3 75	3.75	3.75	3.83	3.83	4.08
ROUTED TO													

+	RCP36	.57	1	FLOW	599.	535.	491.	463.	430.	396.	257.	154.	32.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.92	4.25
HYDROGRAPH AT													
+	C4A2B	.25	1	FLOW	203.	173.	153.	142.	126.	111.	56.	20.	1.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.92
2 COMBINED AT													
+	CP37	.82	1	FLOW	704.	616.	560.	527.	485.	445.	285.	163.	32.
				TIME	3.75	3.75	3.75	3.75	3.83	3.83	3.83	3.92	4.25
ROUTED TO													
+	RCP37	.82	1	FLOW	695.	614.	559.	527.	479.	432.	278.	161.	31.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.92	4.00	4.33
2 COMBINED AT													
+	CP38A	8.91	1	FLOW	2644.	2251.	1977.	1784.	1605.	1450.	917.	502.	122.
				TIME	3.83	3.92	3.92	3.83	3.83	3.83	3.92	4.00	5.25
HYDROGRAPH AT													
+	C4A1B	.25	1	FLOW	134.	110.	95.	87.	75.	64.	27.	7.	0.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.83	.00
3 COMBINED AT													
+	CP38	25.31	1	FLOW	5128.	4464.	3968.	3719.	3396.	3019.	1738.	851.	212.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.92	4.00	5.75
ROUTED TO													
+	RCP38	25.31	1	FLOW	5089.	4425.	3941.	3681.	3349.	2965.	1707.	836.	210.
				TIME	3.83	3.83	3.92	3.83	3.83	3.83	3.92	4.08	5.83
HYDROGRAPH AT													
+	C4CB	5.41	1	FLOW	10493.	9383.	8626.	8088.	7580.	6962.	4634.	2816.	710.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO													
+	DB5	5.41	1	FLOW	90.	88.	86.	85.	84.	82.	75.	67.	46.
				TIME	6.00	6.00	6.00	5.92	5.83	5.83	5.50	5.42	5.17
			** PEAK STAGES IN FEET **										
			1	STAGE	2488.66	2486.67	2485.22	2484.32	2483.07	2481.80	2476.22	2470.33	2458.34
				TIME	6.00	6.00	6.00	6.00	5.92	5.83	5.50	5.42	5.17
ROUTED TO													
+	RDB5	5.41	1	FLOW	90.	88.	86.	85.	84.	82.	75.	67.	47.
				TIME	6.08	6.08	6.08	6.08	6.08	6.08	5.67	5.50	4.08
HYDROGRAPH AT													
+	C4CA	.20	1	FLOW	237.	211.	193.	183.	169.	154.	101.	61.	15.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.75	3.83
HYDROGRAPH AT													
+	C3B3E	.22	1	FLOW	396.	359.	333.	318.	298.	277.	195.	130.	47.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT													
+	CP39	5.83	1	FLOW	670.	607.	563.	538.	502.	466.	329.	217.	81.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67	3.67	3.83
ROUTED TO													
+	RCP39	5.83	1	FLOW	667.	606.	556.	530.	504.	459.	321.	219.	83.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	4.00
HYDROGRAPH AT													
+	C3B3D	.26	1	FLOW	455.	411.	381.	364.	340.	315.	220.	144.	49.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT													
+	CP40	6.08	1	FLOW	1059.	953.	883.	841.	785.	721.	503.	340.	99.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67	3.67	4.00
ROUTED TO													
+	RCP40	6.08	1	FLOW	1043.	943.	869.	829.	780.	717.	498.	330.	94.

				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	4.08
HYDROGRAPH AT													
+	C3B3C	1.24	1	FLOW	2610.	2355.	2181.	2080.	1939.	1795.	1246.	805.	264.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO													
+	RC3B3C	1.24	1	FLOW	2331.	2090.	1918.	1839.	1720.	1604.	1142.	753.	254.
				TIME	3.50	3.50	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT													
+	C3B3B	.32	1	FLOW	508.	456.	420.	399.	371.	341.	231.	143.	41.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67
2 COMBINED AT													
+	CP41	1.56	1	FLOW	2788.	2529.	2338.	2238.	2090.	1945.	1373.	896.	294.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO													
+	RCP41	1.56	1	FLOW	2678.	2409.	2250.	2113.	2004.	1913.	1287.	811.	360.
				TIME	3.67	3.58	3.67	3.67	3.67	3.67	3.67	3.67	3.75
HYDROGRAPH AT													
+	C3B3A	.51	1	FLOW	838.	746.	684.	648.	598.	548.	359.	216.	56.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.58	3.58
3 COMBINED AT													
+	CP42	8.15	1	FLOW	4487.	4037.	3687.	3477.	3221.	3042.	2035.	1296.	492.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67	3.67	3.75
ROUTED TO													
+	RCP42	8.15	1	FLOW	4538.	4097.	3705.	3481.	3226.	3060.	2114.	1346.	467.
				TIME	3.67	3.67	3.67	3.67	3.75	3.75	3.75	3.83	4.00
HYDROGRAPH AT													
+	C4BA2	.14	1	FLOW	123.	104.	92.	85.	76.	66.	34.	13.	1.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67	3.67	4.92
2 COMBINED AT													
+	CP43A	8.29	1	FLOW	4651.	4194.	3791.	3561.	3291.	3113.	2143.	1357.	467.
				TIME	3.67	3.67	3.67	3.67	3.67	3.75	3.75	3.83	4.00
ROUTED TO													
+	RCP43	8.29	1	FLOW	5326.	4905.	4303.	3894.	3840.	3871.	2747.	1799.	660.
				TIME	3.92	3.92	3.92	4.00	4.00	4.00	4.08	4.25	4.67
HYDROGRAPH AT													
+	C4BA3	.41	1	FLOW	296.	256.	230.	216.	195.	175.	101.	48.	6.
				TIME	3.83	3.83	3.92	3.92	3.92	3.92	3.92	3.92	5.08
ROUTED TO													
+	RC4BA3	.41	1	FLOW	299.	260.	233.	218.	197.	176.	100.	45.	6.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.08	4.25	5.58
HYDROGRAPH AT													
+	C4A2A	.26	1	FLOW	322.	278.	249.	232.	208.	185.	102.	43.	3.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	4.83
3 COMBINED AT													
+	CP44	8.96	1	FLOW	5671.	5202.	4568.	4155.	4076.	4082.	2858.	1849.	662.
				TIME	3.92	3.92	3.92	4.00	4.00	4.00	4.08	4.25	4.67
ROUTED TO													
+	RCP44	8.96	1	FLOW	5372.	4754.	4232.	4134.	3964.	3787.	2539.	1708.	503.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	4.08	4.25	4.67
HYDROGRAPH AT													
+	C4A1A	.25	1	FLOW	109.	94.	83.	78.	70.	62.	34.	15.	2.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.25	4.25	5.25
3 COMBINED AT													
+	CP45	34.52	1	FLOW	10360.	9220.	8070.	7729.	7177.	6645.	4142.	2441.	664.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	4.08	4.25	4.67

ROUTED TO													
+	RCP45	34.52	1	FLOW	10134.	8908.	8064.	7461.	7065.	6431.	3923.	2303.	614.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	4.08	4.25	4.75
HYDROGRAPH AT													
+	C3A2B	.51	1	FLOW	769.	687.	632.	599.	555.	509.	339.	205.	52.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO													
+	RC3A2B	.51	1	FLOW	764.	683.	628.	595.	550.	481.	320.	196.	69.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.83
HYDROGRAPH AT													
+	C4BA1	.48	1	FLOW	289.	242.	211.	194.	170.	147.	69.	23.	1.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.83	5.00
2 COMBINED AT													
+	CP46	.99	1	FLOW	1052.	925.	839.	789.	721.	628.	387.	219.	69.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.83
ROUTED TO													
+	RCP46	.99	1	FLOW	1018.	879.	797.	755.	692.	608.	396.	229.	44.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.83	4.17
HYDROGRAPH AT													
+	C3B1D	.25	1	FLOW	215.	180.	157.	144.	127.	109.	48.	11.	0.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.75	5.75
2 COMBINED AT													
+	CP47	1.24	1	FLOW	1104.	953.	863.	816.	747.	657.	423.	234.	44.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.83	4.17
ROUTED TO													
+	RCP47	1.24	1	FLOW	1098.	935.	840.	789.	717.	634.	433.	220.	42.
				TIME	3.75	3.75	3.75	3.75	3.83	3.83	3.83	3.92	4.25
HYDROGRAPH AT													
+	C3B1C	.24	1	FLOW	374.	331.	302.	285.	262.	238.	151.	85.	13.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT													
+	CP48	36.00	1	FLOW	11007.	9699.	8664.	8235.	7601.	6932.	4194.	2427.	636.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	4.08	4.25	4.75
ROUTED TO													
+	RCP48	36.00	1	FLOW	10796.	9417.	8629.	8154.	7483.	6731.	4001.	2281.	605.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	4.08	4.25	4.75
HYDROGRAPH AT													
+	C3B1B	.21	1	FLOW	139.	118.	104.	96.	85.	74.	37.	14.	1.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.75	5.00
ROUTED TO													
+	RC3B1B	.21	1	FLOW	137.	117.	102.	94.	85.	73.	36.	14.	1.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83	3.92	5.25
HYDROGRAPH AT													
+	C3B1A	.24	1	FLOW	170.	146.	129.	120.	107.	94.	49.	21.	2.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.75	4.92
3 COMBINED AT													
+	CP49	36.46	1	FLOW	11001.	9594.	8756.	8273.	7590.	6827.	4046.	2297.	606.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	4.08	4.25	4.75
ROUTED TO													
+	RCP49	36.46	1	FLOW	10681.	9463.	8677.	8134.	7387.	6542.	3959.	2151.	564.
				TIME	3.92	4.00	4.00	4.00	4.00	4.00	4.17	4.33	4.83
HYDROGRAPH AT													
+	C3A2A	.47	1	FLOW	825.	741.	684.	651.	605.	558.	380.	239.	72.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.58

ROUTED TO													
+	RC3A2A	.47	1	FLOW	774.	702.	661.	622.	571.	523.	365.	235.	100.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.92	3.92	4.08
HYDROGRAPH AT													
+	C3A1B	1.02	1	FLOW	1403.	1230.	1114.	1047.	954.	861.	520.	269.	31.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.75
2 COMBINED AT													
+	CP50	1.49	1	FLOW	1434.	1259.	1139.	1074.	979.	884.	536.	306.	113.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.92	4.08
ROUTED TO													
+	RCP50	1.49	1	FLOW	1369.	1191.	1071.	1004.	913.	818.	514.	292.	122.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.00	4.17
HYDROGRAPH AT													
+	C3A1A	.37	1	FLOW	433.	377.	339.	317.	288.	258.	150.	72.	6.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	4.83
3 COMBINED AT													
+	CP51	38.32	1	FLOW	11769.	10276.	9440.	8873.	8089.	7200.	4232.	2290.	608.
				TIME	3.92	4.00	4.00	4.00	4.00	4.00	4.17	4.33	4.83

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR PLAN = 1 RATIO=		.00							
RDB1	MANE	5.00	198.15	330.00	1.35	5.00	198.15	330.00	1.35

CONTINUITY SUM

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1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN  1998                *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   12NOV02  TIME  17:29:05   *
*                                       *
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*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
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X     X  XXXXXXX   XXXXX           X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

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LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

              *DIAGRAM
    1         ID       **************   C-1 WATERSHED FIS RESTUDY  ***************
    2         ID
    3         ID    ***** PREPARED FOR:  CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT *****
    4         ID                              **   CLARK COUNTY, NEVADA   ***
    5         ID
    6         ID    ***** PREPARED BY: CARTER BURGESS AND SOUTHWEST FLUVIAL SYSTEMS  *****
    7         ID
    8         ID    EXISTING CONDITIONS DRAINAGE SYSTEM
    9         ID    INPUT FILE =   SDN4.DAT
   10         ID    INPUT FILE DATE =  NOV   2002
   11         ID    DESIGN STORM = 100-YEAR 6-HR STORM
   12         ID    STORM DISTRIBUTION = SDN #4
   13         ID
   14         ID    REFERENCED HYDROLOGIC MODELS:
   15         ID    PREDESIGN REPORT FOR THE BLACK MOUNTAIN AND MISSION HILLS DETENTION BASINS
   16         ID    AND OUTFALL STRUCTURES (VTN 1992)
   17         ID    SNWA RIVER MOUNTAINS WATER TREATMENT FACILITY DRAFT TECHNICAL DRAINAGE STUDY
   18         ID    (MONTGOMERY WATSON/CH2MHILL 1997)
   19         ID    EAST C-1 DETENTION BASIN FINAL DESIGN (VTN 1998)
   20         ID    DESIGN MEMORANDUM FOR THE EQUESTRIAN DETENTION BASIN (POGGEMEYER 1994)
   21         ID    DESIGN CALCULATION NOTEBOOK FOR THE BLACK MOUNTAIN DETENTION BASIN
   22         ID    (VTN 1998)
   23         ID    CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT 2002 MASTER PLAN UPDATE (LBA)
   24         ID    I-515 BOULDER HIGHWAY TO LAKE MEAD DRIVE DRAINAGE STUDY (SVERDRUP, 1991)
   25         ID
   26         ID    JR CARDS CONTAINED DARFS BASED ON THE FOLLOWING VALUES:
   27         ID
   28         ID                          AREA     DARF
   29         ID                          SQ.MI.
   30         ID
   31         ID                           0 -  5   0.950
   32         ID                           5 - 12   0.880
   33         ID                          12 - 16   0.832
   34         ID                          16 - 20   0.804
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Community Name: Henderson, Nevada
Community No: 320005
Date: 25-11-02
Vertical Datum: 1988 NAVD
Control Grid: Nevada State Plane, East Zone
Flooding Source: Henderson Basin
Attached Panels: 2955E, 2605E, 2615E, 2620E

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35          ID                      20 - 30   0.765
36          ID                      30 - 40   0.725
37          ID
38          ID
39          ID
40          ID    THE FOLLOWING REDUCTION FACTORS ARE USED FOR  MODIFIED USLE COMPUTATIONS
41          ID
42          ID                        2-YR   0.260
43          ID                        5-YR   0.440
44          ID                       10-YR   0.570
45          ID                       25-YR   0.765
46          ID                       50-YR   0.880
47          ID
48          ID
49          ID
50          ID
51          ID
52          IT       5       0       0     300
53          IN       5       0       0
54          IO       5
```



```
LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9.....10
55          JR    PREC   0.950   0.880   0.832   0.804    .765    .725    .570    .440    .260
56          KK     C1H
57          BA   4.007
58          PB    3.15
59          PC    .000    .020    .058    .075    .099    .126    .137    .145    .149    .151
60          PC    .155    .156    .159    .162    .169    .172    .179    .189    .201    .211
61          PC    .220    .228    .232    .240    .246    .252    .260    .269    .276    .283
62          PC    .286    .292    .302    .312    .321    .332    .352    .376    .415    .462
63          PC    .530    .610    .710    .732    .756    .782    .799    .813    .823    .830
64          PC    .835    .844    .851    .864    .885    .908    .924    .944    .968    .973
65          PC    .978    .982    .984    .986    .988    .991    .992    .993    .994    .997
66          PC    .998    .999   1.00
67          LS       0      85
68          UD    0.14
            *
            *
            *  THE BLACK MTN DETENTION BASIN STAGE/DISCHARGE AND STAGE/STORAGE RELATIONSHIPS
            *  WERE CHECKED AGAINST THE LATEST RECORD DRAWINGS AND PREDESIGN REPORTS.
            *  THE FOLLOWING INPUT  WAS DIGITIZED FROM RECORD DRAWINGS AS THE HEC-1 INPUT
            *  WAS NOT AVAILABLE. THE RECORD DRAWINGS DIFFERED SLIGHTLY FROM THE
            *  PRE-DESIGN REPORT.
            *
            *
            *
69          KK     DB1
70          KM   FACILITY = BLACK MOUNTAIN DETENTION BASIN
71          KM   FACILITY # = C1CH 0967
72          KM   STORAGE VOLUME = 400 AC-FT (100-YR PK STAGE  = 2593 MSE)
73          KM   OUTLET = 36" ORIFICE PLATE ON A 54" RCP
74          KO       3
75          RS       1    STOR      -1
76          SV       0    1.19    4.55   10.32   22.58   38.69   54.90   73.42   92.55  113.51
77          SV  135.16  158.22  183.23   208.1  234.67  262.55  292.02  325.32
78          SE    2556    2558    2560    2562    2564    2566    2568    2570    2572    2574
79          SE    2576    2578    2580    2582    2584    2586    2588    2590
80          SQ       0    1.28   27.31   57.88   77.52   95.42  108.73   120.5  131.87  141.78
81          SQ  150.74  159.67  168.97   176.6  183.71  190.74  197.77  204.93
82          SE    2556    2558    2560    2562    2564    2566    2568    2570    2572    2574
83          SE    2576    2578    2580    2582    2584    2586    2588    2590
            *
84          KK    RDB1
85          KM   ROUTE DB1 TO    C1HB1
86          KM   FACILITY = MISSION HILLS INTERCEPTOR
87          KM   FACILITY # C1CH 1012
88          KM   TYPE OF FACILITY = RCB
89          RD    5600   0.028   0.015            DEEP       8      50
```

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LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  90      KK   C1HB1
  91      KM   PART OF 2001 MPU C1-2
  92      BA   .4497
  93      PB    3.17
  94      LS       0      82
  95      UD    0.51
          *
  96      KK     CP2
  97      KM   COMBINE RCP1 AND C1HB1
  98      HC       2
          *
  99      KK    RCP2
 100      KM   ROUTE CP2 TO C1G3A
 101      KM   FACILITY = MISSION HILLS INTERCEPTOR
 102      KM   FACILITY # C1CH 0930
 103      KM   TYPE OF FACILITY = RCB
 104      RD    1000   0.028   0.015            DEEP       8      50
          *
 105      KK   C1G3A
 106      KM   2001 MPU C1-3
 107      BA   .2726
 108      PB    3.19
 109      LS       0      85
 110      UD    0.17
          *
 111      KK     CP3
 112      KM   COMBINE RCP2 AND C1G3A
 113      HC       2
          *
 114      KK    RCP3
 115      KM   ROUTE CP3 TO C1G3B
 116      KM   FACILITY = MISSION HILLS INTERCEPTOR
 117      KM   FACILITY # 0905
 118      KM   TYPE OF FACILITY = RCB
 119      RD    2900   0.028   0.015            DEEP       8      50
          *
 120      KK   C1G3B
 121      KM   2001 MPU C1-5
 122      BA   .7328
 123      PB    3.21
 124      LS       0      84
 125      UD    0.11
          *
```



```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 126      KK     CP4
 127      KM   COMBINE RCP3 AND C1G3B
 128      HC       2
          *
 129      KK    RCP4
 130      KM   ROUTE CP4 TO C1G3C
 131      KM   MISSION HILLS INTERCEPTOR
 132      KM   FACILITY # 0871
 133      KM   TYPE OF FACILTY = RCB
 134      RD    1300   0.025   0.015       0    DEEP      12     50
          *
```

```
135          KK   C1G3C
136          KM   2001 MPU C1-6
137          BA   1.048
138          PB    3.24
139          LS       0      85
140          UD    0.18
             *

141          KK     CP5
142          KM   COMBINE RCP4 AND C1G3C
143          KM   MISSION HILLS DETENTION BASIN
144          HC       2
             *

145          KK   C1G3D
146          KM   2001 MPU C1-7
147          BA   .8376
148          PB    3.28
149          LS       0      86
150          UD    0.15
             *

151          KK    CP6A
152          KM   COMBINE CP5 AND C1G3D
153          KM   MISSION HILLS DETENTION BASIN
154          HC       2
             *

155          KK   C5ICB
156          KM   PART OF 2001 C-8
157          BA   .7334
158          PB    3.37
159          LS       0      79
160          UD    0.15
             *
1                                        HEC-1 INPUT                                        PAGE  5

LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

161          KK   C5ICB
162          KM   ROUTE C5ICB TO MISSION HILLS DETENTION BASIN
163          KM   FACILITY # = C1CH 0882
164          KM   TYPE OF FACILITY = ROCK LEVEE
165          RD    2350   0.024   0.040       0    TRAP      50       2
             *

166          KK   C5I2A
167          KM   PART OF 2001 MPU C1-9
168          BA   1.400
169          PB    3.33
170          LS       0      80
171          UD    0.14
             *

172          KK    CP6B
173          KM   COMBINE RC5ICB AND C5I2A
174          HC       2
             *

175          KK     CP6
176          KM   COMBINE CP6A AND CP6B
177          KM   @ MISSION HILLS DETENTION BASIN
178          HC       2
             *
             *
             *  THE MISSION HILLS DETENTION BASIN STAGE/DISCHARGE AND STAGE/VOLUME RELATIONS
             *  WERE CHECKED AGAINST THE LATEST RECORD DRAWINGS AND PREDESIGN REPORTS.
             *  THE FOLLOWING INPUT REFLECTS RECORD DRAWING INFORMATION
             *

179          KK     DB2
180          KM   FACILITY = MISSION HILLS DETENTION BASIN
```

```
181          KM   FACILITY # C1CH 0854
182          KM   STORAGE VOLUME = 402 ACRE-FEET (100-YR WSE)
183          KM   OUTLET = 84" RCP
184          KO       3
185          RS       1    STOR      -1
186          SV       0    2.55   15.85   40.23   72.34   107.2   185.2   273.0   371.6   480.1
187          SV   598.5   630.2
188          SE    2323    2326    2328    2330    2332    2334    2338    2342    2346    2350
189          SE    2354    2355
190          SQ       0   56.78   108.7   142.9   170.4   193.9   234.1   268.4   298.7   326.1
191          SQ   351.6   357.6
192          SE    2323    2326    2328    2330    2332    2334    2338    2342    2346    2350
193          SE    2354    2355
             *
194          KK    RDB2
195          KM    ROUTE DB2 TO C1G2D
196          KM   FACILITY = MISSION HILLS DETENTION BASIN
197          KM   FACILITY # = 0757
198          KM   TYPE OF FACILITY = RCP
199          RD    6100   0.025   0.013       0    CIRC     7.0
             *
1                                      HEC-1 INPUT                                    PAGE  6

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

200          KK   C1G2C
201          KM   PART OF 2001 MPU C1-13
202          BA   .2925
203          PB    3.23
204          LS       0      76
205          UD    0.27
             *
206          KK   C1G2D
207          KM   PART OF 2001 MPU C1-21
208          BA   .2244
209          PB    3.27
210          LS       0      73
211          UD     .22
             *
212          KK    CP7A
213          KM   COMBINE RDB2, C1G2C, AND C1G2D
214          KM   NDOT DETENTION BASIN @ US95
215          HC       3
             *
216          KK  C1G2B1
217          KM   PART OF 2001 MPU C1-10
218          BA   .5231
219          PB    3.17
220          LS       0      74
221          UD     .42
             *
222          KK   RG2B1
223          KM   ROUTE C1G2B1 TO C1G2B2
224          KM   NO FACILITY - OVERLAND FLOW
225          RD    4400    .028    .030       0    TRAP     200
             *
226          KK  C1G2B2
227          KM   PART OF 2001 MPU C1-12
228          BA   .3097
229          PB    3.20
230          LS       0      77
231          UD     .27
             *
232          KK    CP7B
233          KM   COMBINE C1G2B1, C1G2B2
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234          KM   COLLEGE AT US95
235          HC       2
             *
1                                        HEC-1 INPUT                                                    PAGE  7

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


236          KK   C1G2A
237          KM   PART OF 2001 MPU C1-11
238          BA   .3468
239          PB    3.17
240          LS       0      79
241          UD    0.22
             *

242          KK  RC1G2A
243          KM   ROUTE C1G2A TO CP7C
244          KM   NDOT FACILITY @US95
245          RD    3800    .018    .030       0    TRAP     100
             *

246          KK    CP7C
247          KM   COMBINE CP7B AND C1G2A
248          KM   COLLEGE AT US95
249          HC       2
             *

250          KK     CP7
251          KM   COMBINE CP7B AND CP7C
252          KM   NDOT FACILITY AT US95
253          HC       2
             *
             *  NDOT DETENTION BASIN INPUT IS TAKEN FROM PREDESIGN REPORT AND DRAWINGS
             *  THIS DETENTION BASIN IS BROKEN INTO TWO DETENTION PONDS. NAMELY POND A AND
             *  POND B, ON THE UPPER AND LOWER SIDE OF THE INTERCHANGE, RESPECTIVELY. THE
             *  100-YR PEAK IS ATTENUATED THROUGH THE BASIN BY ROUTING OF THE HYDROGRAPH,
             *  FIRST THROUGH POND A AND SECOND THROUGH POND B. A DOUBLE 10X10  RCB CONNECTS
             *  THE TWO PONDS UNDER I-515,INV EL = 2230 (INLET) AND 2221 (OUTLET) WHEREAS
             *  A TRIPPLE RCB WAS DESIGNED AT THE OUTLET WITH INVERT EL = 2219.68, BUT IS NOT
             *  CONSTRUCTED TO DATE. THE FOLLOWING STAGE/STORAGE AND STAGE/DISCHARGE RELATION
             *  WERE TAKEN FROM THE NDOT PREDESIGN REPORT.
             *
             *

254          KK   CP7DB
255          KM   FACILITY = NDOT DETENTION BASIN
256          KM   FACILITY # C1CH 0658
257          KM   POND A
258          KM   STORAGE VOLUME = 94 AC-FT AT WSE= 2248
259          KM   OUTLET = DOUBLE 10 X 10 RCB
260          KO       3
261          RS       1    STOR      -1
262          SV       0    .125     .660   1.852   3.904   6.967  11.156  16.146  21.506  27.208
263          SV  33.219  39.589  46.369  53.528  61.032  68.877  77.056  85.507  94.163 102.957
264          SE    2230    2231    2232    2233    2234    2235    2236    2237    2238    2239
265          SE    2240    2241    2242    2243    2244    2245    2246    2247    2248    2249
266          SQ       0    70.2   180.1   317.4   479.1   659.2   854.5  1068.1  1290.9  1525.9
267          SQ  1776.1  2038.6  2256.8  2384.2  2511.7    2700  2887.0  3060.9  3225.7  3515.4
268          SE    2230    2231    2232    2233    2234    2235    2236    2237    2238    2239
269          SE    2240    2241    2242    2243    2244    2245    2246    2247    2248    2249
             *
1                                        HEC-1 INPUT                                                    PAGE  8

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


270          KK   CP7DB
271          KM   FACILITY = NDOT DETENTION BASIN
272          KM   FACILITY # C1CH 0658
273          KM   POND B
274          KM   STORAGE VOLUME = 94 AC-FT AT WSE= 2232
275          KO       3
```

```
RS       1    STOR      -1
SV       0    .677   5.419  13.616  21.947  30.416  39.025  47.764  56.622  65.611
SV   74.74  84.018  93.457 103.051 112.794
SE    2220    2221    2222    2223    2224    2225    2226    2227    2228    2229
SE    2230    2231    2232    2233    2234
SQ       0    13.2    37.2   152.0   340.3   578.1   849.7  1155.1  1488.1  1845.5
SQ  2224.9  2481.1  2700.8  3035.5  3463.4
SE    2220    2221    2222    2223    2224    2225    2226    2227    2228    2229
SE    2230    2231    2232    2233    2234
*

KK    RCP7
KM   ROUTE CP7 TO CP8A
KM   PARTIALLY IMPROVED CHANNEL
KM   FACILITY # C1CH 0613, 0641, AND 0674
RD    3960    .025    .030       0    TRAP      20
*

KK    C1NA
KM    2001 MPU C1-14
BA   .4139
PB    3.18
LS       0      84
UD    0.03
*

KK   RC1NA
KM   ROUTE C1NA TO CP8A
KM   FACILITY = PARTIALLY IMPROVED CHANNEL
KM   FACILITY # C1CH 0613, 0641, AND 0674
RD    1980    .025    .030       0    TRAP      20
*

KK    CP8
KM   COMBINE C1NA AND CP8A
HC       2
*

KK   RCP8
KM   ROUTE CP8 TO C1HA
KM   C1 AND PUEBLO
RD    2500    .025    .030       0    TRAP      20
*  BEGIN POGGEMEYER DESIGN GROUP INPUT FROM 1998 LETTER OF MAP REVISION
*  FOR THE EQUESTRIAN DETENTION BASIN, CASE NO 99-09-623P. SOME SUBBASINS
*  IN THIS MODEL HAVE BEEN MODIFIED TO REFLECT POST 1998 DEVELOPMENT.
*  THE FOLLOWING TABLE CORRELATES 1998 LOMR SUBBASIN LABELS WITH LABELS IN
*  THIS MODEL.
*  ***************************************************************************
*  *                                                                         *
*  *                    EQUIVALENT 1998 LOMR SUBBASIN LABELS                 *
*  *                                                                         *
*  *                                                                         *
*  *                    1998 LOMR              THIS MODEL                    *
*  *                                                                         *
*  *                      C5FD                   C5FD                       *
*  *                      C5FA                   C5FA                       *
*  *                      C5FB                   C5FB                       *
*  *                      C5FC                   C5FC                       *
*  *                      C5EA                   C5EA                       *
*  *                      C5EC                   C5EC                       *
*  *                      C5EB                   C5EB                       *
*  *                      C5ED                   C5ED                       *
*  *                      C5DA                   C5DA                       *
*  *                      C5DB                   C5DB                       *
*  *                      C5CAa                  N/A                        *
*  *                      C5CAb                  N/A                        *
*  *                      C5CB                   C5CB                       *
*  *                      C5DC                   N/A                        *
*  *                      OFF-2A                 N/A                        *
*  *                      OFF-2B                 N/A                        *
*  *                      OFF-2C                 C1HD                       *
*  *                      OFF-3                  C1HE                       *
*  *                      OFF-4                  C1HF                       *
```

```
*  *                    OFF-6                N/A                  *
*  *                    OFF-8                C5I1D                *
*  *                    OFF-9                C5I1E                *
*  *                    OFF-10               C5GD                 *
*  *                    OFF-11               N/A                  *
*  *                    OFF-12               C5I1C                *
*  *                    OFF-13               N/A                  *
*  *                    OFF-14               C5GA                 *
*  *                    OFF-15               C5GB                 *
*  *                    OFF-16               C5GC                 *
*  *                    OFF-21               N/A                  *
*  *                    OFF-23               N/A                  *
*  *                    OFF-24               N/A                  *
*  *                                                              *
*  ****************************************************************
*
```



```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  308     KK    C5GC
  309     KM   1998 LOMR OFF-16
  310     BA   .1107
  311     PB    3.43
  312     LS       0      84
  313     UD    0.04
          *

  314     KK   RC5GC
  315     KM   ROUTE C5GC TO C5GB
  316     RD    1000    .020    .030           TRAP     100
          *

  317     KK    C5GB
  318     KM   1998 LOMR OFF-15
  319     BA   .3249
  320     PB    3.43
  321     LS       0      83
  322     UD     .16
          *

  323     KK    CP9
  324     KM   COMBINE C5GB AND C5GC
  325     HC       2
          *

  326     KK   RCP9
  327     KM   ROUTE CP9 TO C5GA
  328     RD    2640    .035    .030           TRAP      40
          *

  329     KK    C5GA
  330     KM   1998 LOMR OFF-14
  331     BA   .2723
  332     PB    3.39
  333     LS       0      66
  334     UD     .30
          *

  335     KK    CP10
  336     KM    COMBINE RCP9 AND C5GA
  337     HC       2
          *

  338     KK   RCP10
  339     KM    ROUTE CP10 TO C5I1E
  340     RD    2200    .033    .030           TRAP     100
  341
```



```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
```

```
342          KK   RCP10
343          KM    ROUTE CP10 TO C5I1E
344          RD    2200    .030    .030           TRAP     100
             *

345          KK    C5GD
346          KM   1998 LOMR OFF-10
347          BA   .4447
348          PB    3.46
349          LS       0       67
350          UD    0.46
             *

351          KK  DIVER1
352          KM   DIVERT FLOWS CONVEYED INTO CULVERT "A" STA 296+24, ACROSS BOULDER HIGHWAY
353          DT  DIVER1
354          D1       0       37      126      260      502
355          DQ       0       10       20       30       40
             *

356          KK   RC5GD
357          KM   ROUTE C5GD TO C5I1E
358          RD    2200    .030    .030           TRAP     100
             *

359          KK   C5I1E
360          KM   1998 LOMR OFF-9
361          BA   .1634
362          PB    3.45
363          LS       0       79
364          UD     .05
             *

365          KK    CP11
366          KM   COMBINE RCP10, C5I1E, AND RC5GD
367          HC       3
             *

368          KK   RCP11
369          KM   ROUTE  CP11 TO C1HF
370          RD    1600     .04    .030           TRAP     100
             *

371          KK    C1HF
372          KM   1998 LOMR OFF-4
373          BA   .1008
374          PB    3.45
375          LS       0       78
376          UD    0.27
             *
```



```
LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

377          KK    CP12
378          KM   COMBINE RCP11 AND C1HF
379          HC       2
             *

380          KK   RCP12
381          KM   ROUTE CP12 TO C1HE
382          RD    1800    .013    .030           TRAP     200
             *

383          KK   C5I1B
384          KM   MODIFIED 1998 LOMR SUBBASIN OFF-13
385          BA   .5185
386          PB    3.43
387          LS       0       71
388          UD    0.08
             *
```

```
389          KK  RC5I1B
390          KM   ROUTE C5I1B TO C5I1D
391          RD    1100    .018    .030           TRAP     100
             *

392          KK   C5I1D
393          KM   1998 LOMR OFF-8
394          BA   .1158
395          PB    3.43
396          LS       0      77
397          UD     .15
             *

398          KK    CP13
399          KM   COMBINE RC5I1B TO C5I1D
400          HC       2
             *

401          KK   RCP13
402          KM   ROUTE CP13 TO C1HE
403          RD    2100    .021    .030           TRAP     100
             *

404          KK    C1HE
405          KM   1998 LOMR OFF-3
406          BA   .1467
407          PB    3.29
408          LS       0      72
409          UD     .14
             *
```



```
LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

410          KK    CP14
411          KM   COMBINE RCP12, RCP13, AND C1HE
412          HC       3
             *

413          KK  DIVER2
414          KM   DIVERT CULVERT AND BOULDER HIGHWAY OVERFLOWS INTO MAGIC WAY 844+00, 843+52,
415          KM   AND 840+46, TO SUBBASIN C5CC
416          DT  DIVER2
417          DI       0    1255    2000
418          DQ       0     116     900
             *

419          KK   RCP14
420          KM   ROUTE CP14 TO C1HD
421          RD     800    .010    .030           TRAP     100
             *

422          KK    C1HD
423          KM   1998 LOMR OFF-2C
424          BA   .0716
425          PB    3.29
426          LS       0      77
427          UD    0.15
             *

428          KK    CP15
429          KM   COMBINE RCP14 AND C1HD
430          HC       2
             *

431          KK   RCP15
432          KM   ROUTE CP15 TO C1HCB
433          RD    1700    .010    .030           TRAP     100
             *

434          KK  DIVER3
```

```
435          KM   DIVERT CULVERT FLOWS INTO SUBBASIN C5CC, STA 832+02, 825+52, AND 834+82
436          DT  DIVER3
437          DI        0    1171    2000
438          DQ        0     217     900
             *

439          KK    C5I1
440          KM   1998 LOMR OFF-11
441          BA   .2432
442          PB    3.43
443          LS       0      76
444          UD     .17
             *
1                                        HEC-1 INPUT                                        PAGE 13

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

445          KK   C5I1C
446          KM   1998 LOMR OFF-12
447          BA  0.0643
448          PB    3.43
449          LS       0      80
450          UD     .23
             *

451          KK  RC5I1C
452          KM   ROUTE C5I1C TO C5I1
453          RD     700    .014    .030           TRAP     100
             *

454          KK    CP16
455          KM   COMBINE RC5I1C AND C5I1
456          HC       2
             *

457          KK   RCP16
458          KM   ROUTE CP16 TO C1G1B
459          RD    1200    .018    .030           TRAP      50
             *

460          KK   C1G1B
461          KM   1998 LOMR OFF-6 IS PART OF THIS SUBBASIN
462          PB    3.21
463          BA   .1428
464          LS       0      87
465          UD     .18
             *

466          KK    CP17
467          KM   COMBINE RCP16 AND C1G1B
468          HC       2
             *

469          KK   RCP17
470          KM   ROUTE CP17 TO C1HCB
471          RD    1700    .010    .030           TRAP     100
             *

472          KK   C1HCB
473          KM   MODIFIED 1998 LOMR OFF-2B
474          BA   .1818
475          PB    3.29
476          LS       0      78
477          UD    0.06
             *
1                                        HEC-1 INPUT                                        PAGE 14

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

478          KK  CP18A
479          KM   COMBINE RCP17,AND C1HCB
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```
480          HC       2
             *

481          KK    CP18
482          KM   COMBINE RCP15 AND CP18A
483          HC       2
             *

484          KK  DIVER4
485          KM   DIVERT CULVERT FLOWS AND BOULDER OVERFLOWS INTO SUBBASIN C5CC
486          KM   STA 816+22 AND 819+84, BOULDER HIGHWAY
487          DT  DIVER4
488          DI       0    1234    2000
489          DQ       0     111    1000
             *

490          KK   RCP18
491          KM   ROUTE CP18 TO C1HB
492          RD    1100    .007    .030            TRAP     100
             *

493          KK   C1G1A
494          KM   2001 MPU C1-15
495          BA   .2243
496          PB    3.20
497          LS       0      84
498          UD    0.22
             *

499          KK  RC1G1A
500          KM   ROUTE TO C1HB
501          KM   OVERLAND FLOW
502          RD    2600    .025    .030            TRAP     200
             *

503          KK    C1HB
504          KM   MODIFIED 1998 LOMR OFF-2A
505          BA   .1472
506          PB    3.21
507          LS       0      85
508          UD    0.03
             *

509          KK   CP19A
510          KM   COMBINE C1HB, RC1G1A
511          HC       2
             *
```



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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

512          KK    CP19
513          KM   COMBINE CP19A AND RCP18
514          HC       2
             *

515          KK  DIVER5
516          KM   DIVERT CULVERT FLOWS INTO SUBBASIN C4A1C, STA 807+37
517          DT  DIVER5
518          DI       0     798    2000
519          DQ       0      70     970
             *

520          KK   RCP19
521          KM   ROUTE CP19 TO BOULDER HIGHWAY AND PUEBLO
522          RD    2300    .013    .030            TRAP     100
             *

523          KK    C1HA
524          KM   SUBBASIN C1HA
525          KM   2001 MPU C1-24
526          BA   .0735
```

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527          PB    3.13
528          LS       0      66
529          UD     .21
             *

530          KK   CP20A
531          KM   COMBINE C1HA AND RCP19
532          HC       2
             *

533          KK    CP20
534          KM   COMBINE CP20A AND RCP8
535          HC       2
             *

536          KK   RCP20
537          KM   ROUTE CP20 TO C1B
538          KM   FACILITY  = C-1 CHANNEL
539          KM   FACILITY # C1CH 0528
540          KM   TYPE OF FACILTIY  = CONCRETE CHANNEL
541          RD    1700    .027    .015            TRAP       25
             *

542          KK     C1D
543          KM   2001 MPU C1-26
544          BA   .4005
545          PB    3.14
546          LS       0      78
547          UD     .21
             *
```



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LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

548          KK    RC1D
549          KM   ROUTE C1D TO C1C
550          KM   UNION PACIFIC RAILROAD
551          RD    1600    .014    .030       0    TRAP       0       5(
             *

552          KK     C1C
553          KM   2001 MPU C1-27
554          BA   .2307
555          PB    3.08
556          LS       0      80
557          UD     .19
             *

558          KK    CP21
559          KM   COMBINE RC1D AND C1C
560          HC       2
             *

561          KK   RCP21
562          KM   ROUTE CP21 TO C1B
563          RD    4600    .010    .015       0    TRAP       0       30
             *

564          KK     C1B
565          KM   2001 MPU C1-28
566          BA   .3773
567          PB    3.11
568          LS       0      86
569          UD     .21
             *

570          KK   C4A1D
571          KM   2001 MPU C1-25
572          BA   0.062
573          PB    3.11
574          LS       0      78
575          UD     .19
```

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                *
          576   KK  RC4A1D
          577   KM   ROUTE C4A1D TO C1B
          578   RD     700    .020    .015            TRAP      25
                *
          579   KK    CP22
          580   KM   COMBINE RCP19,RCP20, C1B, AND RC4A1D
          581   HC       4
                *
```



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     LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          582   KK   RCP22
          583   KM   ROUTE CP21 TO C1A
          584   KM   FACILITY = C-1 CHANNEL
          585   KM   FACILTIY # = C1CH 0455, 0502
          586   KM   TYPE OF FACILTIY = CONCRETE CHANNEL
          587   RD    3200    .021    .015            TRAP      25
                *
          588   KK     C1A
          589   KM   2001 MPU C1-29
          590   BA   .1456
          591   PB    2.99
          592   LS       0      84
          593   UD     .22
                *
          594   KK    CP23
          595   KM   COMBINE CP22 AND C1A
          596   HC       2
                *
          597   KK   RCP23
          598   KM   ROUTE CP23 TO C4A1B
          599   KM   FACILITY = C-1 CHANNEL
          600   KM   FACILITY # = C1CH 0455
          601   KM   TYPE OF FACILITY  = CONCRETE CHANNEL
          602   RD    1250    .025    .025            TRAP     25.       1
                *
          603   KK    C5CC
          604   KM   1998 LOMR OFF-21
          605   PB    3.29
          606   BA   .3346
          607   LS       0      79
          608   UD    0.28
                *
          609   KK    RET4
          610   KM   RETRIEVE FLOWS FROM C1HCB
          611   DR  DIVER4
                *
          612   KK   RDIV4
          613   KM   ROUTE DIVERSION 4 TO CP24A
          614   KM   TYPE OF FACILTIY = OVERLAND FLOW TO EQUESTRIAN
          615   RD    1100    .027    .030            TRAP     100       1
                *
          616   KK   RDIV4
          617   KM   ROUTE DIVERSION 4 TO CP24A
          618   KM   TYPE OF FACILTIY = STREET FLOW IN EQUESTRIAN
          619   RD    1700    .009    .016            TRAP      80       1
                *
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     LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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```
620          KK   CP24A
621          KM   COMBINE C5CC AND RDIV4
622          HC        2
             *

623          KK    RET3
624          KM   RETRIEVE DIVERSION 3 FROM C1HD
625          DR  DIVER3
             *

626          KK   RDIV3
627          KM   ROUTE DIVERSION 3 TO CP24A
628          KM   TYPE OF FACILTIY = OVERLAND FLOW TO EQUESTRIAN
629          RD    2000    .023    .030            TRAP     100       1
             *

630          KK   RDIV3
631          KM   ROUTE DIVERSION 3 TO CP24A
632          KM   TYPE OF FACILTIY = STREET FLOW IN EQUESTRIAN
633          RD    1100    .009    .016            TRAP      80
             *

634          KK   CP24B
635          KM   COMBINE CP24A AND RDIV4
636          HC        2
             *

637          KK    RET2
638          KM   RETRIEVE DIVERSION 2 FROM C1HE
639          DR  DIVER2
             *

640          KK   RDIV2
641          KM   ROUTE DIVERSION 2 TO CP24A
642          KM   TYPE OF FACILTIY = OVERLAND FLOW TO EQUESTRIAN
643          RD    2500    .024    .030            TRAP     100       1
             *

644          KK   RDIV2
645          KM   ROUTE DIVERSION 2 TO CP24A
646          KM   TYPE OF FACILTIY = STREET FLOW IN EQUESTRIAN
647          RD     600    .009    .016            TRAP      80       1
             *

648          KK   CP24C
649          KM   COMBINE CP24B AND RDIV2
650          HC        2
             *
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LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

651          KK    C5CA
652          KM   PART OF 1998 LOMR C5CAb
653          KM   2001 MPU C1-30
654          BA   .2974
655          PB    3.41
656          LS       0      70
657          UD    0.22
             *

658          KK   RC5CA
659          KM   ROUTE C5CA TO C5CF
660          KM   APPALOOSA RD
661          RD    2000    .019    .016       0    TRAP       0      50
             *

662          KK    C5CF
663          KM   PART OF 1998 LOMR C5CA6
664          KM   2001 MPU C1-31
665          BA   .3233
```

```
666          PB    3.25
667          LS       0      68
668          UD    0.07
             *

669          KK    CP25
670          KM   COMBINE RC5CA AND C5CF
671          KM   APPALOOSA ROAD AND PALOMINO DRIVE
672          HC       2
             *

673          KK   RCP25
674          KM   ROUTE CP25 TO C5CE
675          KM   APPALOOSA ROAD
676          RD    2640    .020    .016            TRAP      50       (
             *

677          KK    C5CE
678          KM   PART OF 1998 LOMR C5CAb
679          BA   .3244
680          PB    3.29
681          LS       0      68
682          UD     .08
             *

683          KK    CP26
684          KM   COMBINE RCP25 AND C5CE
685          KM   APPALOOSA ROAD AND EQUESTRIAN
686          HC       2
             *
1                                        HEC-1 INPUT                                        PAGE 20

LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

687          KK   RCP26
688          KM   ROUTE CP26 TO C5CD
689          KM   EQUESTRIAN DRIVE
690          RD    1200    .016    .016            TRAP      50       0
             *

691          KK    C5CD
692          KM   PART OF 1998 LOMR C5CAa AND C5CAb
693          BA   .2668
694          PB    3.31
695          LS       0      73
696          UD     .34
             *

697          KK    RET1
698          KM   RETREIVE DIVERSION 1 FROM C5GD
699          DR  DIVER1
             *

700          KK   RDIV1
701          KM   ROUTE DIVERSION 1 TO CP27
702          KM   TYPE OF FACILTIY = OVERLAND FLOW TO EX CONC CHANNEL
703          RD    2600    .019    .030            TRAP     100       1
             *

704          KK   RDIV1
705          KM   ROUTE DIVERSION 1 TO CP27
706          KM   TYPE OF FACILTIY = CONCRETE CHANNEL
707          RD    1300    .014    .015            TRAP      20       1
             *

708          KK   RDIV1
709          KM   ROUTE DIVERSION 1 TO CP27
710          KM   TYPE OF FACILTIY = STREET TO EQUESTRIAN
711          RD    2000    .014    .016            TRAP      60       1
             *

712          KK    CP27
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```
713          KM   COMBINE RCP26, C5CD, AND RDIV1
714          HC        3
             *

715          KK   RCP27
716          KM   ROUTE CP27 TO CP24C
717          RD    1450    .017    .017            TRAP     100
             *

718          KK   CP24D
719          KM   COMBINE CP24C AND RCP27
720          HC        2
             *
1                                        HEC-1 INPUT                                        PAGE 21

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

721          KK    C5CB
722          KM   MODIFIED 1998 LOMR C5CB
723          KM   2001 MPU C1-47A
724          BA   .1409
725          PB    3.26
726          LS       0       81
727          UD     .30
             *

728          KK   CP24E
729          KM   COMBINE CP24D AND C5CB
730          HC        2
             *

731          KK    C5FD
732          KM   1998 LOMR C5FD
733          BA   .1706
734          PB    3.43
735          LS       0       83
736          UD     .07
             *

737          KK   RC5FD
738          KM   ROUTE C5FD TO C5FB
739          RD    2500     .02    .040       0    TRAP      50       2
             *

740          KK    C5FA
741          KM   1998 LOMR C5FA
742          BA   .5071
743          PB    3.43
744          LS       0       87
745          UD     .02
             *

746          KK   RC5FA
747          KM   ROUTE C5FA TO C5FB
748          RD    4600    .065    .040       0    TRAP     100       1
             *

749          KK    C5FB
750          KM   1998 LOMR C5FB
751          BA   .2592
752          PB    3.43
753          LS       0       69
754          UD     .17
             *

755          KK    CP28
756          KM   COMBINE RC5FD, RC5FA, AND C5FB
757          HC        3
             *
1                                        HEC-1 INPUT                                        PAGE 22

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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```
758          KK   RCP28
759          KM   ROUTE CP28 TO  C5FC
760          KM   FACILITY = C-1 CHANNEL - EQUESTRIAN LEVEE
761          KM   FACILITY # = C1EQ 0297
762          KM   TYPE OF FACILITY = ROCK LEVEE
763          RD    2000   0.019    .040       0    TRAP      50       3
             *

764          KK    C5FC
765          KM   1998 LOMR C5FC
766          KM   2001 MPU C1-37
767          BA   .2222
768          PB    3.43
769          LS       0      73
770          UD    0.16
             *

771          KK    CP29
772          KM   COMBINE RCP28 AND C5FC
773          HC       2
             *

774          KK   RCP29
775          KM   ROUTE CP29 TO C5EA
776          KM   FACILITY = C-1 CHANNEL - EQUESTRIAN LEVEE
777          KM   FACILITY # = C1EQ 0297
778          KM   TYPE OF FACILITY = ROCK LEVEE
779          RD    1900   0.018    .040       0    TRAP     100       3
             *

780          KK    C5EA
781          KM   1998 LOMR C5EA
782          KM   2001 MPU C1-38
783          BA   .4873
784          PB    3.43
785          LS       0      82
786          UD    0.12
             *

787          KK    CP30
788          KM   COMBINE RCP29 AND C5EA
789          HC       2
             *

790          KK   RCP30
791          KM   ROUTE CP30 TO C5EC
792          KM   FACILITY = C-1 CHANNEL - EQUESTRIAN LEVEE
793          KM   FACILITY # = C1EQ 0297
794          KM   TYPE OF FACILITY = ROCK LEVEE
795          RD    1600   0.017    .040       0    TRAP     100       3
             *
1                                  HEC-1 INPUT                                    PAGE 23

LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

796          KK    C5EB
797          KM    1998 LOMR C5EB
798          BA   .5469
799          PB    3.43
800          LS       0      88
801          UD     .21
             *

802          KK   RC5EB
803          KM   ROUTE C5EB  TO C5EC
804          RD    3500   0.040    .040       0    TRAP      50       3
             *

805          KK    C5EC
806          KM    1998 LOMR C5EC
```

```
807          BA   .2214
808          PB    3.43
809          LS       0      71
810          UD     .14
             *

811          KK    CP31
812          KM   COMBINE RC5EB, C5EC, AND RCP30
813          HC       3
             *

814          KK   RCP31
815          KM   ROUTE CP31 TO C5ED
816          KM   FACILITY = C-1 CHANNEL - EQUESTRIAN LEVEE
817          KM   FACILITY # = C1EQ 0297
818          KM   TYPE OF FACILITY = ROCK LEVEE
819          RD    2500   0.020    .040       0    TRAP      35       3
             *

820          KK    C5ED
821          KM   1998 LOMR C5ED
822          KM   2001 MPU C1-41
823          BA   .1578
824          PB    3.41
825          LS       0      79
826          UD    0.17
             *

827          KK    CP32
828          KM   COMBINE RCP31 AND C5ED
829          HC       2
             *

830          KK   RCP32
831          KM   ROUTE CP32 TO C5DA
832          KM   FACILITY = C-1 CHANNEL - EQUESTRIAN LEVEE
833          KM   FACILITY # = C1EQ 0349
834          KM   TYPE OF FACILITY = ROCK LEVEE
835          RD    1000   0.020    .040       0    TRAP      35       3
             *
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1 HEC-1 INPUT PAGE 24

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LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

836          KK    C5DA
837          KM   1998 LOMR C5DA
838          KM   2001 MPU C1-42
839          BA   1.063
840          PB    3.42
841          LS       0      86
842          UD    0.05
             *

843          KK    C5DB
844          KM   1998 LOMR C5DB
845          KM   2001 MPU C1-43
846          BA   .5321
847          PB    3.40
848          LS       0      88
849          UD    0.07
             *

850          KK    CP33
851          KM   COMBINE RCP32, C5DA, C5DB
852          HC       3
             *

853          KK   RCP33
854          KM   ROUTE CP33 TO C5CB
855          KM   FACILITY = C-1 CHANNEL - EQUESTRIAN CHANNEL
856          KM   FACILITY # = C1EQ 0297
857          KM   TYPE OF FACILITY = CONCRETE TRAP CHANNEL
```

```
858          RD    5000   0.027    .013       0    TRAP      20
             *

859          KK    CP24
860          KM   COMBINE RCP33 AND CP24E
861          HC       2
             *

862          KK   RCP24
863          KM   ROUTE CP24 TO CP34
864          KM   FACILITY = MAGIC WAY
865          KM   TYPE OF FACILITY = STEET
866          RD    3000   0.010    .016       0    TRAP      20
             *

867          KK    C5DC
868          KM   MODIFIED 1998 LOMR SUBBASIN C5DC
869          PB    3.31
870          BA   .3264
871          LS       0      83
872          UD     .02
             *
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

873          KK   RC5DC
874          KM   ROUTE C5DC TO C4BD
875          RD    6600    .024    .040       0    TRAP     100
             *

876          KK    C4BD
877          KM   MODIFIED 1998 LOMR SUBBASIN C5DC
878          KM   2001 MPU C1-47
879          BA   .5243
880          PB    3.23
881          LS       0      82
882          UD    0.42
             *

883          KK   CP34A
884          KM   COMBINE RC4BF, C4BD, AND C5DC
885          HC       2
             *

886          KK   CP34B
887          KM   COMBINE  RCP24  AND CP34A
888          KM   EQUESTRIAN DETENTION BASIN
889          HC       2
             *
             *  THE EQUESTRIAN DETENTION BASIN STAGE/DISCHARGE AND STAGE/VOLUME RELATIONSHIPS
             *  WERE CHECKED AGAINST THE LATEST RECORD DRAWINGS AND PREDESIGN REPORTS.
             *  THE FOLLOWING INPUT REFLECTS RECORD DRAWING INFORMATION
             *

890          KK     DB4
891          KM   FACILITY = EQUESTRIAN DETENTION BASIN
892          KM   FACILITY # = C1EQ 0159
893          KM   STORAGE VOLUME = 409 AC-FT,(100-YR PEAK STAGE AT EL = 2069, W/O FREEBOARD)
894          KM   OUTLET = 48" RCP
895          KO       3
896          RS       1    STOR       0
897          SV       0       2      13      31      61      97     118     140     171     200
898          SV     229     261     290     315     344     379     409     437     470     504
899          SE    2048    2050    2052    2054    2056    2058    2059    2060    2061    2062
900          SE    2063    2064    2065    2066    2067    2068    2069    2070    2071    2072
901          SQ       0      37      80     117     142     163     173     182     191     198
902          SQ     206     213     221     228     235     242     248    2755    7761   14467
903          SS    2069     900     3.0     1.5
             *
             *
             *              *****END OF 1998 LOMR INPUT******
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LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  904     KK    C4BF
  905     KM   PART OF 1998 LOMR SUBBASIN C5DC
  906     PB    3.21
  907     BA   .2776
  908     LS       0      81
  909     UD     .06
          *

  910     KK   RC4BF
  911     KM   ROUTE C4BF TO C4BC
  912     RD    3100    .020    .033       0    TRAP   100.0
          *

  913     KK    C4BC
  914     KM   SUBBASIN C4BC
  915     PB    3.15
  916     BA   .2402
  917     LS       0      82
  918     UD     .19
          *

  919     KK    CP34
  920     KM   COMBINE RC4BF,C4BC, AND RCP24
  921     HC       3
          *

  922     KK   RCP34
  923     KM   ROUTE CP34 TO C4A1C ALONG EQUESTRIAN OUTFALL
  924     KM   FACILITY = C-1 CHANNEL - EQUESTRIAN DETENTION BASIN OUTFALL
  925     KM   FACILITY # C1EQ 0078, 0112, 0139
  926     RD    3600    .018    .030       0    TRAP     100
          *

  927     KK   C4A1C
  928     KM   2001 MPU C1-49
  929     BA   .5200
  930     PB    3.07
  931     LS       0      82
  932     UD     .25
          *

  933     KK    RET5
  934     KM   RETRIEVE DIVERSION 5
  935     DR  DIVER5
          *

  936     KK   RDIV5
  937     KM   ROUTE DIV5 ALONG RACE TRACK ROAD TO NEWPORT
  938     KM   FACILITY = STREET
  939     RD    5000    .024    .016       0    TRAP     100
          *
```



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LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  940     KK   CP35A
  941     KM   COMBINE RDIV5, RCP34, AND C4AIC
  942     KM   RACETRACK AND NEWPORT
  943     HC       3
          *

  944     KK    C4A1
  945     KM    2001 MPU C1-50
  946     BA   .3493
```

```
947          PB    3.07
948          LS       0      79
949          UD     .32
             *

950          KK    CP35
951          KM   COMBINE CP35A AND C4A1
952          HC       2
             *

953          KK  RCP35
954          KM   ROUTE TO C4A1B
955          KM   OVERLAND FLOW
956          KM   C-1 CHANNEL AT BURKHOLDER
957          RD    3500     .02    .030           TRAP     100       3
             *

958          KK    C4BE
959          KM   NOT A PART OF THE 1998 LOMR
960          PB    3.17
961          BA   .2206
962          LS       0      85
963          UD    0.26
             *

964          KK   RC4BE
965          KM   ROUTE C4BE TO C4BB
966          RD    3400    .036    .030           TRAP     100
             *

967          KK    C4BB
968          BA   .3477
969          PB    3.09
970          LS       0      87
971          UD    0.29
             *

972          KK    CP36
973          KM   COMBINE RC4BE AND C4BB
974          HC       2
             *
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LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

975          KK   RCP36
976          KM   ROUTE CP36 TO C4A2B
977          KM   ROUTE TO BURKHOLDER AND RACETRACK
978          RD    2640   0.033   0.016       0    TRAP       0      50
             *

979          KK   C4A2B
980          KM   2001 MPU C1-52
981          BA   .2491
982          PB    3.03
983          LS       0      75
984          UD    0.10
             *

985          KK    CP37
986          KM   COMBINE RC4BB AND C4A2B
987          KM   RACETRACK ROAD @ BURKHOLDER BOULEVARD
988          HC       2
             *

989          KK   RCP37
990          KM   ROUTE CP37 TO C4A1B  ALONG BURKHOLDER
991          RD    2700   0.033   0.016       0    TRAP       0      50
             *

992          KK   CP38A
993          KM   COMBINE CP35 AND RCP37 AT BURKHOLDER AND PUEBLO
```

```
 994          HC       2
              *

 995          KK   C4A1B
 996          KM   2001 MPU C1-53
 997          BA   .2492
 998          PB    2.98
 999          LS       0      72
1000          UD     .20
              *

1001          KK    CP38
1002          KM   COMBINE RCP22, CP38A, AND C4A1B @ BURKHOLDER AND PUEBLO
1003          HC       3
              *

1004          KK   RCP38
1005          KM   ROUTE CP38 TO CP45
1006          RD    2200   0.021   0.015       0    TRAP      10      02
              *

1007          KK    C4CB
1008          KM    2001 MPU C1-54
1009          BA   5.408
1010          PB    3.43
1011          LS       0      85
1012          UD    0.06
              *
              *
              *
              *  THE EAST C-1 DETENTION BASIN STAGE/STORAGE AND STAGE/DISCHARGE RELATIONSHIPS
              *  WERE CHECKED AGAINST THE LATEST RECORD DRAWINGS AND PREDESIGN REPORTS.
              *  THE FOLLOWING INPUT  WAS DIGITIZED FROM RECORD DRAWINGS AS THE HEC-1 INPUT
              *  WAS NOT AVAILABLE. THE RECORD DRAWINGS DIFFERED SLIGHTLY FROM THE
              *  PREDESIGN INPUT.
              *
              *
              *
```



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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9.....10

1013          KK     DB5
1014          KM    FACILITY = EAST C-1 DETENTION BASIN
1015          KM    FACILITY # = C1IT 0492
1016          KM    STORAGE VOLUME = 400 AC-FT (100-YR PK STAGE WSE = 24(5.3)
1017          KM    OUTLET = 48" RCP
1018          KO       3
1019          RS       1    STOR      -1
1020          SV     1.2     3.3    12.1    28.0    49.0    79.8   115.(   166.1   232.2   320.1
1021          SV   418.8   534.5   605.5   681.1   765.1   846.8   943.(  1044.8  1261.8  1426.1
1022          SE  2446.0  2450.0  2454.0  2458.0  2462.0  2466.0  2470.(  2474.0  2478.0  2482.0
1023          SE  2486.0  2490.0  2492.0  2494.0  2496.0  2498.0  2500.(    2502  2506.0  2510.0
1024          SQ     0.5    22.9    36.1    45.7    53.6    60.4    66.9    72.3    77.5    82.4
1025          SQ    87.0    91.2    93.5    95.6    97.6    99.5   101.4   103.4   107.2   110.7
1026          SE  2446.0  2450.0  2454.0  2458.0  2462.0  2466.0  2470.(  2474.0  2478.0  2482.0
1027          SE  2486.0  2490.0  2492.0  2494.0  2496.0  2498.0  2500.(    2502  2506.0  2510.0
              *

1028          KK    RDB5
1029          KM   ROUTE DB5 TO C4CA
1030          KM   FACILITY = EAST C-1 DETENTION BASIN LEVEE
1031          KM   FACILITY # = C1DK 0226
1032          KM   TYPE OF FACILTIY = SOIL CEMENT LEVEE
1033          RD    5300    .034    .025       0    TRAP      50       2
              *

1034          KK    C4CA
1035          KM    PART OF 2001 MPU C1-55
1036          BA   .1964
1037          PB    3.43
1038          LS       0      85
```

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1039          UD    0.27
              *

1040          KK   C3B3E
1041          KM   PART OF 2001 MPU C1-55
1042          BA   .2225
1043          PB    3.43
1044          LS       0      90
1045          UD     .16
              *

1046          KK    CP39
1047          KM   COMBINE C4CA, C3B3E, AND RDB5
1048          HC       3
              *

1049          KK   RCP39
1050          KM   ROUTE CP39 TO C3B3D
1051          RD    2650    .023    .025       0    TRAP      50       2
              *
1                                      HEC-1 INPUT                                        PAGE 30

              LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

1052          KK   C3B3D
1053          KM   PART OF 2001 MPU C1-55
1054          PB    3.43
1055          BA   .2554
1056          LS       0      89
1057          UD     .14
              *

1058          KK    CP40
1059          KM   COMBINE RCP39 AND C3B3D
1060          HC       2
              *

1061          KK   RCP40
1062          KM   ROUTE TO CP42
1063          RD    1400     .05    .025           TRAP      50       3
              *

1064          KK   C3B3C
1065          KM   PART OF 2001 MPU C1-65
1066          BA   1.238
1067          PB    3.50
1068          LS       0      88
1069          UD    0.07
              *

1070          KK  RC3B3C
1071          KM   ROUTE C3B3C TO C3B3B
1072          RD    2300    .024    .030           TRAP     100       3
              *

1073          KK   C3B3B
1074          KM   PART OF 2001 MPU C1-65
1075          BA   .3220
1076          PB    3.43
1077          LS       0      87
1078          UD    0.17
              *

1079          KK    CP41
1080          KM   COMBINE C3B3C AND C3B3B
1081          HC       2
              *

1082          KK   RCP41
1083          KM   ROUTE TO C3B3A
1084          RD    6300     .05    .030           TRAP     100       3
              *
```

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LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

1085      KK   C3B3A
1086      BA   .5107
1087      PB    3.43
1088      LS       0      85
1089      UD    0.10
          *

1090      KK    CP42
1091      KM   COMBINE RCP41, RCP40, AND C3B3A
1092      HC       3
          *

1093      KK   RCP42
1094      KM   ROUTE CP42 TO CP43 @ MAGIC WAY AND DRAKE CHANNEL
1095      KM   OVERLAND FLOW THROUGH C4BA2
1096      RD    5300    .015    .030            TRAP     100       3
          *

1097      KK   C4BA2
1098      KM   PART OF 2001 MPU C1-46
1099      BA   .1351
1100      PB    3.43
1101      LS       0      74
1102      UD     .16
          *

1103      KK   CP43A
1104      KM   COMBINE C4BA2 AND RCP42
1105      HC       2
          *

1106      KK   RCP43
1107      KM   ROUTE CP43 TO C4A2A ALONG DRAKE CHANNEL
1108      KM   FACILTIY = C-1 CHANNEL - DRAKE CHANNEL
1109      KM   FACILTY # - C1DC 0051
1110      KM   TYPE OF FACILITY = EARTHEN W\ GABION DROPS
1111      RD   2640     .029    .030            TRAP      20       2
          *

1112      KK   C4BA3
1113      KM   PART OF 2001 MPU C1-46
1114      BA   .4069
1115      PB    3.43
1116      LS       0      78
1117      UD     .41
          *

1118      KK  RC4BA3
1119      KM   ROUTE C4BA3 TO C4A2A
1120      RD    2900    .031    .030            TRAP     200
1121       *
```



```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

1122      KK   C4A2A
1123      KM   2001 MPU C1-57
1124      BA   .2607
1125      PB    3.05
1126      LS       0      77
1127      UD     .04
          *

1128      KK    CP44
1129      KM   COMBINE C4A2A, RCP43, AND RC4BA3
1130      KM   DRAKE AND RACETRACK
1131      HC       3
```

```
          *
1132      KK   RCP44
1133      KM   ROUTE CP44 TO C4A1A
1134      KM   FACILITY = C-1 CHANNEL -DRAKE CHANNEL
1135      KM   TYPE OF FACILITY = CONCRETE CHANNEL
1136      RD    2640    .021    .015           TRAP      10       2
          *
1137      KK   C4A1A
1138      KM   2001 MPU C1-58
1139      BA   .2544
1140      PB    2.92
1141      LS       0      79
1142      UD     .66
          *
1143      KK    CP45
1144      KM   COMBINE RCP44, RCP38, AND C4A1A
1145      KM   CONFLUENCE OF C1 CHANNEL AND DRAKE CHANNEL
1146      HC       3
          *
1147      KK   RCP45
1148      KM   ROUTE CP45 TO C3B1C
1149      KM   FACILITY = C-1 CHANNEL
1150      KM   FACILITY # = C1CH 0321
1151      KM   TYPE OF FACILITY = CONCRETE CHANNEL
1152      RD    2640    .025    .015           TRAP      15       1
          *
1153      KK   C3A2B
1154      KM   PART OF 2001 MPU C1-65
1155      BA   .5139
1156      PB    3.23
1157      LS       0      86
1158      UD     .13
          *
1                                        HEC-1 INPUT                                        PAGE 33

LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1159      KK  RC3A2B
1160      KM   ROUTE C3A2B TO CP46
1161      KM   FACILITY = OVERLAND FLOW
1162      RD    4100    .030    .030           TRAP     100       .
          *
1163      KK   C4BA1
1164      KM   PART OF 2001 MPU C1-62
1165      BA   .4758
1166      PB    2.99
1167      LS       0      74
1168      UD     .21
          *
1169      KK    CP46
1170      KM   COMBINE RC3A2B AND C4BA1
1171      HC       2
          *
1172      KK   RCP46
1173      KM   ROUTE CP46  TO C3B1D
1174      KM   OVERLAND FLOW TO RACETRACK
1175      RD    2640     .03     .03           TRAP     100       3
          *
1176      KK   C3B1D
1177      KM   2001 MPU C1-60
1178      BA   .2455
1179      PB    2.93
1180      LS       0      73
```

```
1181          UD     .05
              *

1182          KK    CP47
1183          KM   COMBINE RC4BA1 AND C3B1D
1184          KM   RACETRACK AND WARM SPRINGS
1185          HC       2
              *

1186          KK   RCP47
1187          KM   ROUTE CP47 TO C3B1C
1188          KM   WARM SPRINGS ROAD AND PUEBLO
1189          RD    2640    .025    .016            TRAP       0       50
              *

1190          KK   C3B1C
1191          KM   2001 MPU C1-61
1192          BA   .2434
1193          PB    2.87
1194          LS       0      84
1195          UD     .04
              *
```



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LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

1196          KK    CP48
1197          KM   COMBINE RCP45, C3B1C, AND RCP46
1198          HC       3
              *

1199          KK   RCP48
1200          KM   ROUTE CP47 TO C3B1A
1201          KM   FACILITY = C-1 CHANNEL
1202          KM   FACILITY # C1CH 0284, 0340
1203          KM   TYPE OF FACILITY = CONCRETE CHANNEL
1204          RD    2640    .025    .015            TRAP      15       1
              *

1205          KK   C3B1B
1206          KM   PART OF 2001 MPU C1-67
1207          BA   .2094
1208          PB    2.92
1209          LS       0      76
1210          UD     .20
              *

1211          KK  RC3B1B
1212          KM   ROUTE C3B1B TO C3B1A
1213          KM   ITHACA AVENUE AND PUEBLO
1214          RD    2640    .025    .016            TRAP       0       50
              *

1215          KK   C3B1A
1216          KM   2001 MPU C1-63
1217          PB    2.85
1218          BA   .2435
1219          LS       0      78
1220          UD     .21
              *

1221          KK    CP49
1222          KM   COMBINE C3B1A, RC3B1B, AND RCP48
1223          HC       3
              *

1224          KK   RCP49
1225          KM   ROUTE CP49 TO C3A1A
1226          KM   FACILITY = C-1 CHANNEL
1227          KM   FACILITY # C1CH 0220, 0269
1228          KM   TYPE OF FACILITY = CONCRETE CHANNEL
1229          RD    3960    .025    .015            TRAP      15       1
```

```
                *
1230            KK   C3A2A
1231            KM   PART OF 2001 MPU C1-66
1232            BA   .4708
1233            PB    3.23
1234            LS       0      88
1235            UD     .09
                *
```



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LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1236            KK  RC3A2A
1237            KM   ROUTE C3A2A TO C3A1B
1238            KM   OVERLAND FLOW
1239            RD    7900     .03    .030            TRAP       0     100       3
                *

1240            KK   C3A1B
1241            KM   PART OF 2001 MPU C1-66
1242            BA   1.018
1243            PB    3.23
1244            LS       0      81
1245            UD     .08
                *

1246            KK    CP50
1247            KM   COMBINE C3A1B,RC3A2A, AND CP49
1248            HC       2
                *

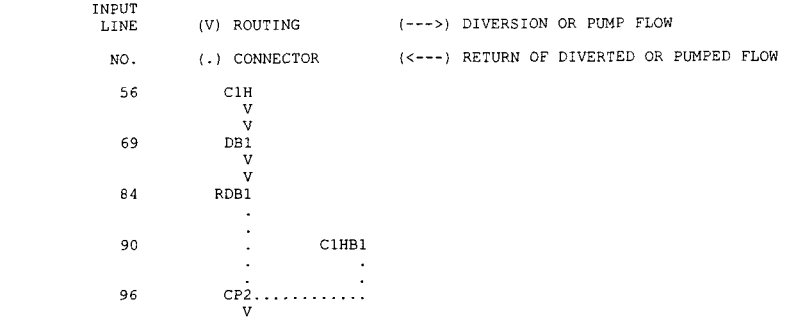
1249            KK   RCP50
1250            KM   ROUTE CP50 TO C3A1A
1251            KM   ITHACA
1252            RD    2600    .019    .016            TRAP      50
                *

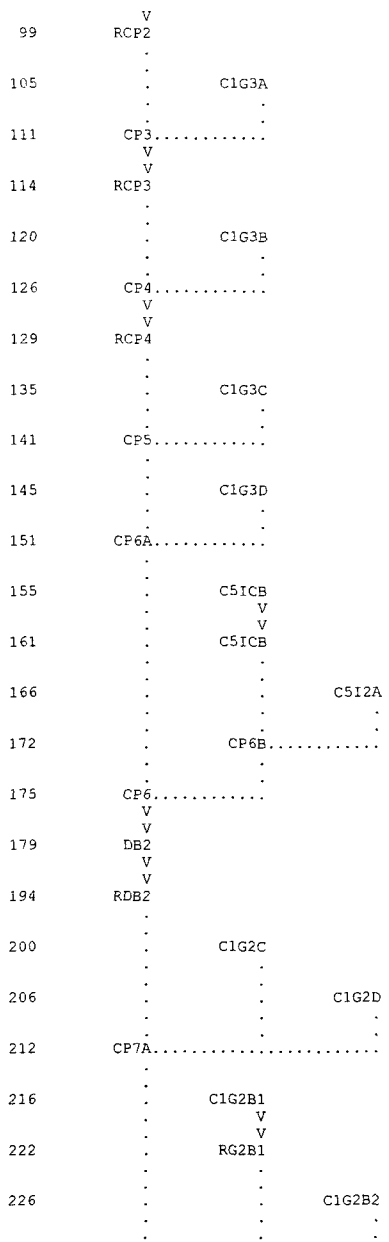
1253            KK   C3A1A
1254            KM   PART OF 2001 MPU C1-64
1255            BA   .3744
1256            PB    2.84
1257            LS       0      81
1258            UD     .07
                *

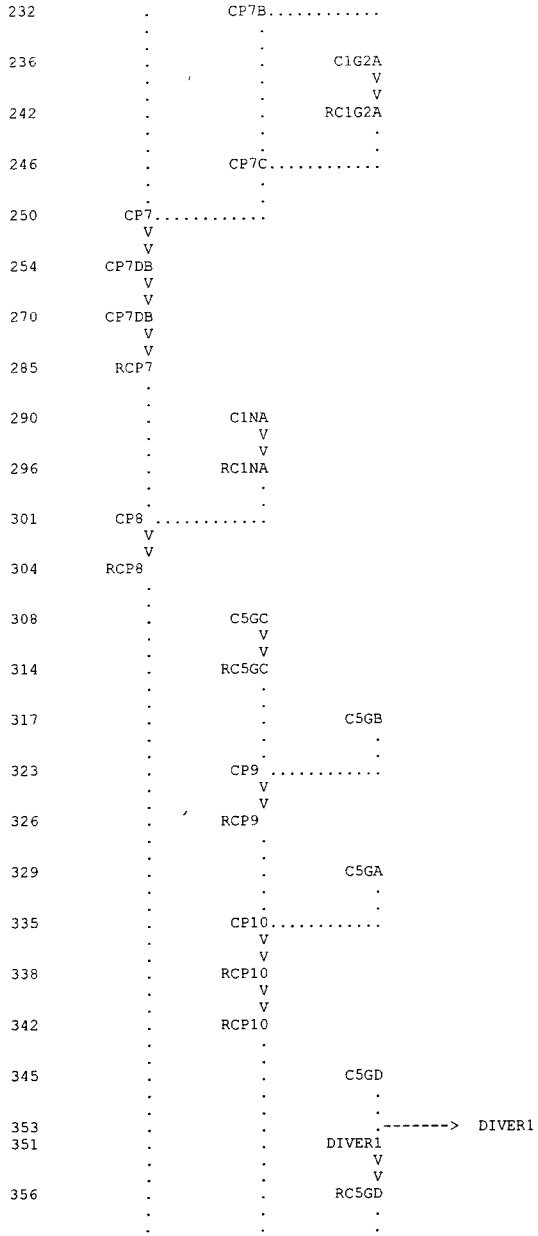
1259            KK    CP51
1260            KM   COMBINE C3A1A,RCP50,AND RCP49 - C-1 CHANNEL AND LAKE MEAD DRIVE
1261            HC       3
                *
1262            ZZ
```

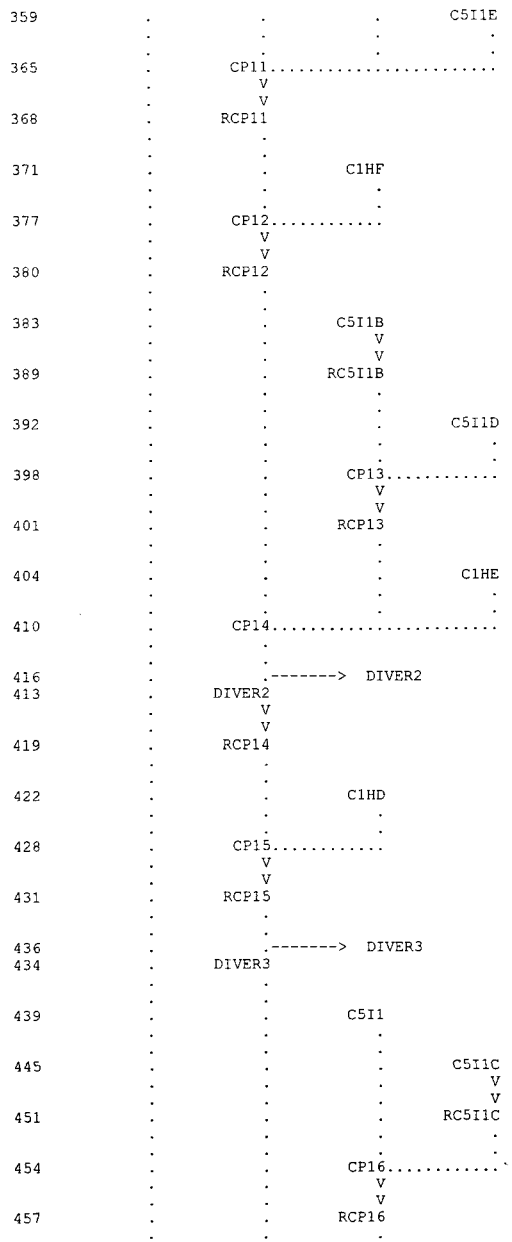
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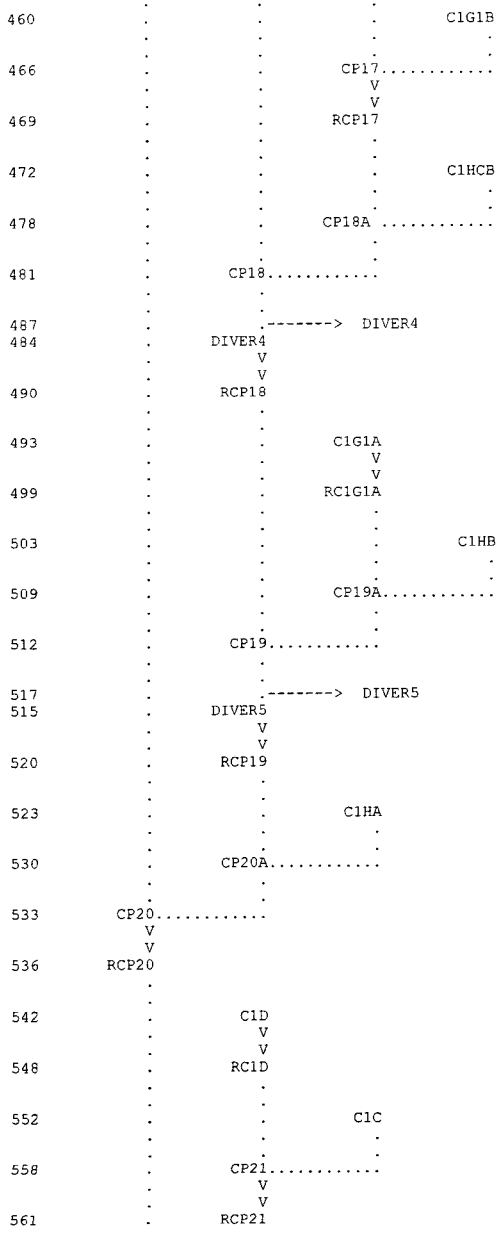
SCHEMATIC DIAGRAM OF STREAM NETWORK

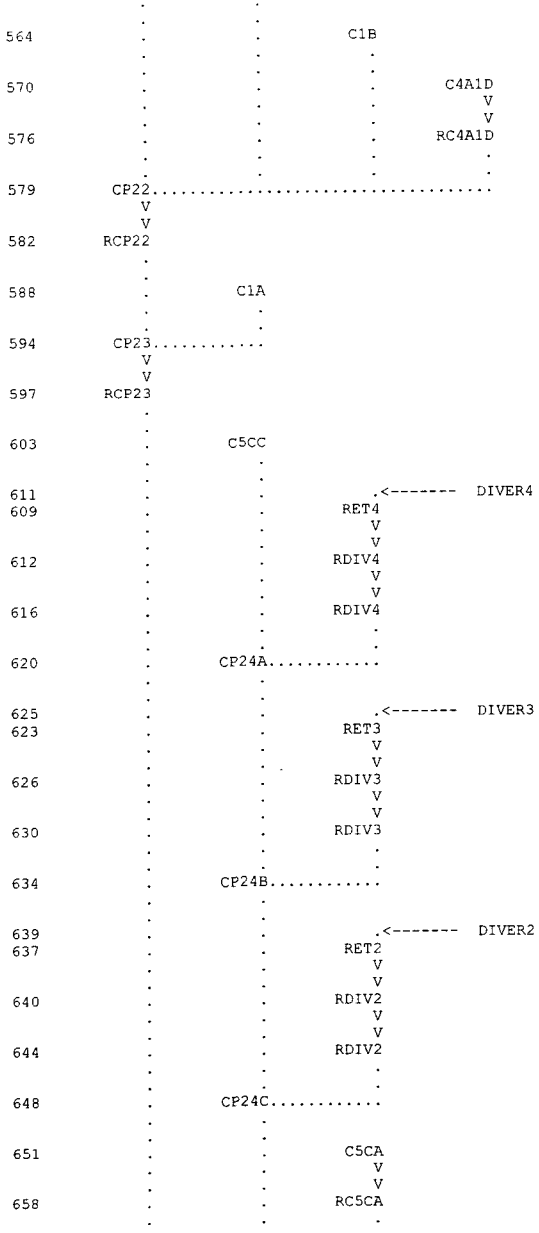


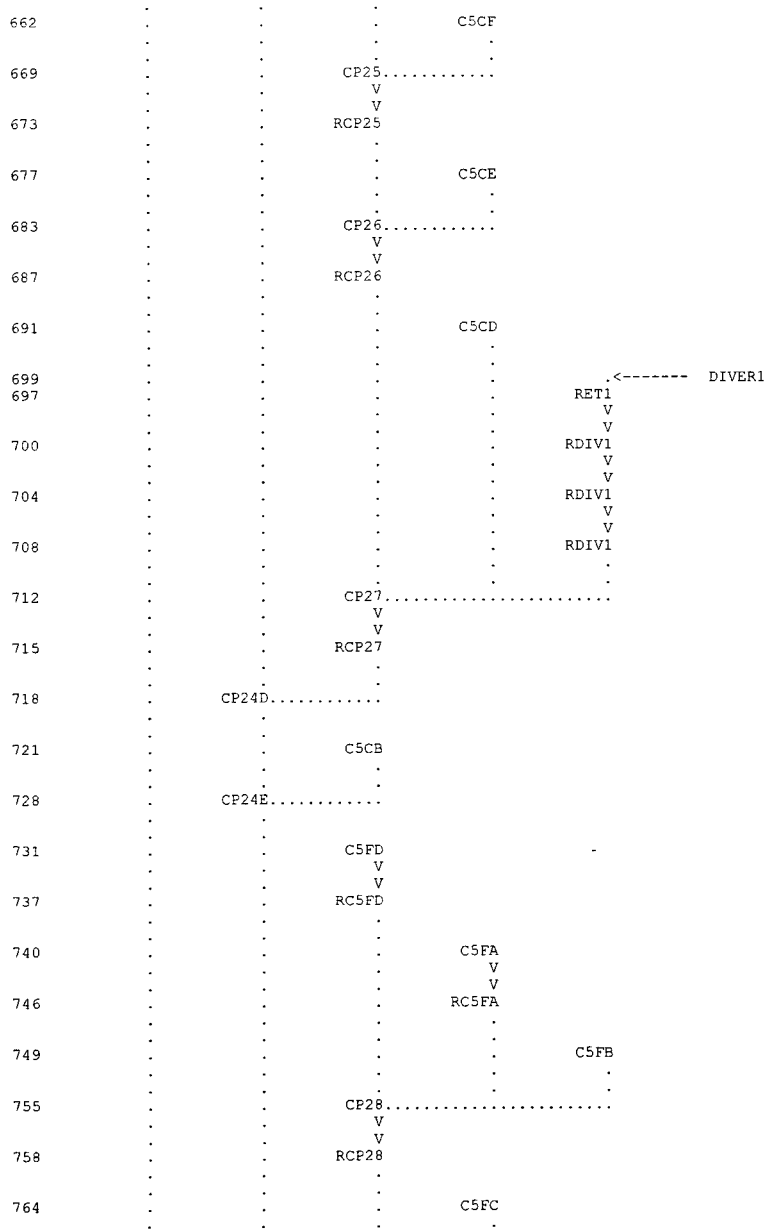

99 RCP2
105 C1G3A
111 CP3
114 RCP3
120 C1G3B
126 CP4
129 RCP4
135 C1G3C
141 CP5
145 C1G3D
151 CP6A
155 C5ICB
161 C5ICB
166 C5I2A
172 CP6B
175 CP6
179 DB2
194 RDB2
200 C1G2C
206 C1G2D
212 CP7A
216 C1G2B1
222 RG2B1
226 C1G2B2

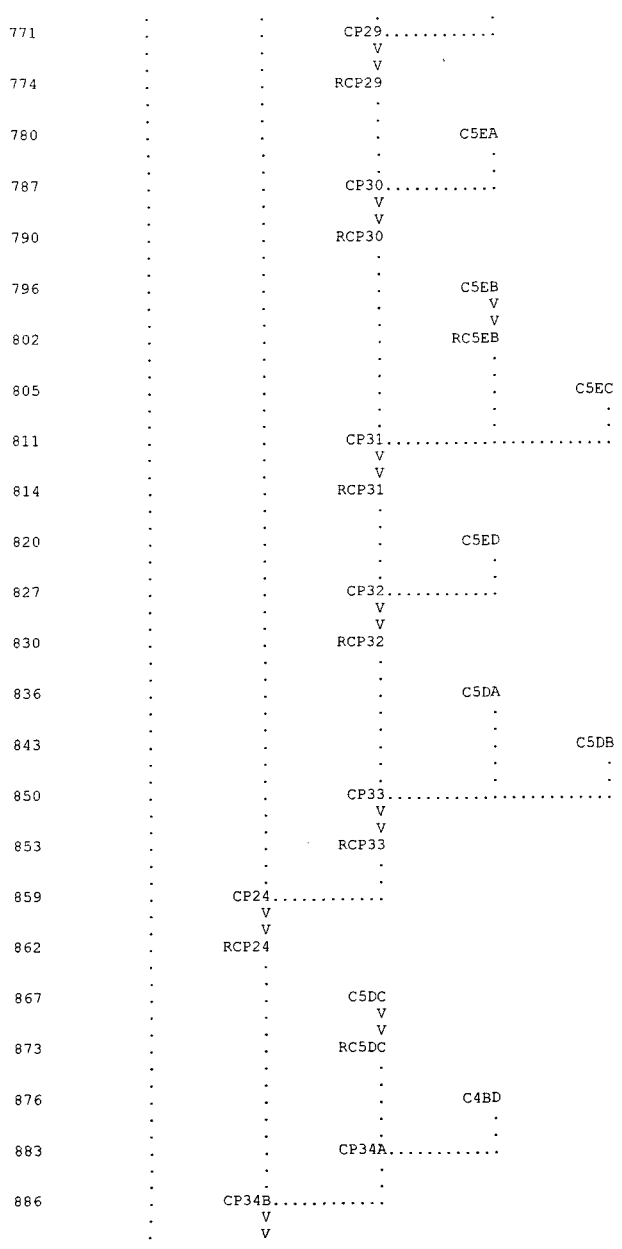

232 CP7B
236 C1G2A
242 RC1G2A
246 CP7C
250 CP7
254 CP7DB
270 CP7DB
285 RCP7
290 C1NA
296 RC1NA
301 CP8
304 RCP8
308 C5GC
314 RC5GC
317 C5GB
323 CP9
326 RCP9
329 C5GA
335 CP10
338 RCP10
342 RCP10
345 C5GD
353 DIVER1
351 DIVER1
356 RC5GD

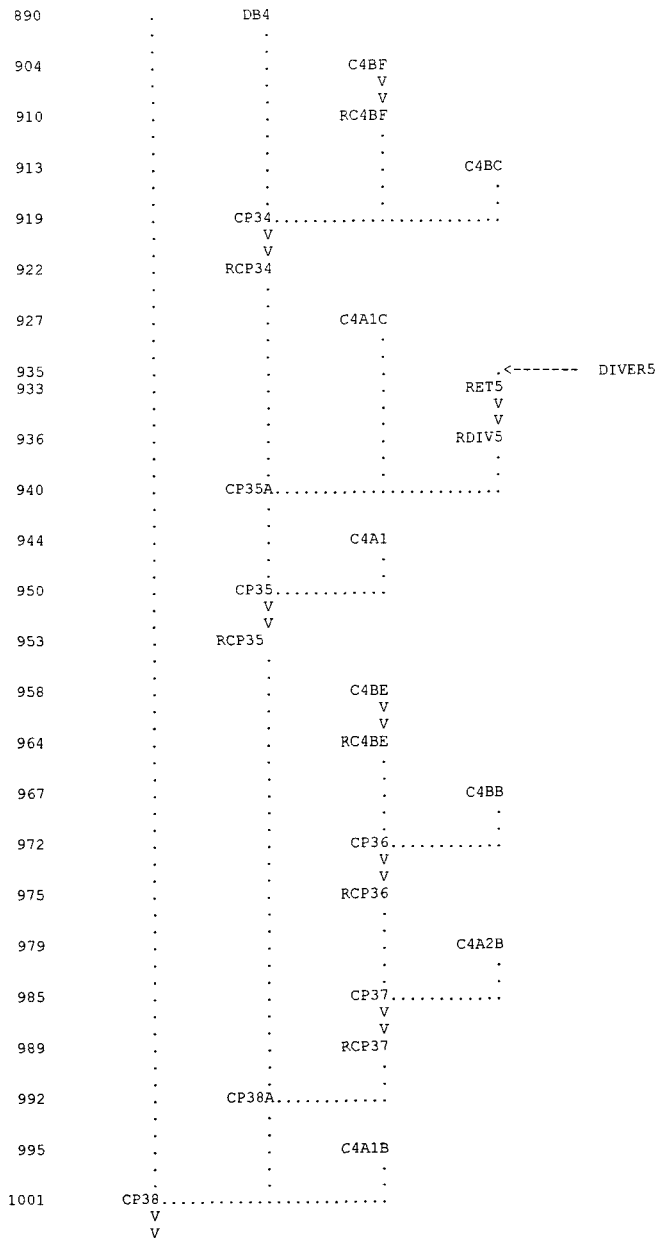

359
C5I1E
365
CP11
368
RCP11
371
C1HF
377
CP12
380
RCP12
383
C5I1B
389
RC5I1B
392
C5I1D
398
CP13
401
RCP13
404
C1HE
410
CP14
416
DIVER2
413
DIVER2
419
RCP14
422
C1HD
428
CP15
431
RCP15
436
DIVER3
434
DIVER3
439
C5I1
445
C5I1C
451
RC5I1C
454
CP16
457
RCP16

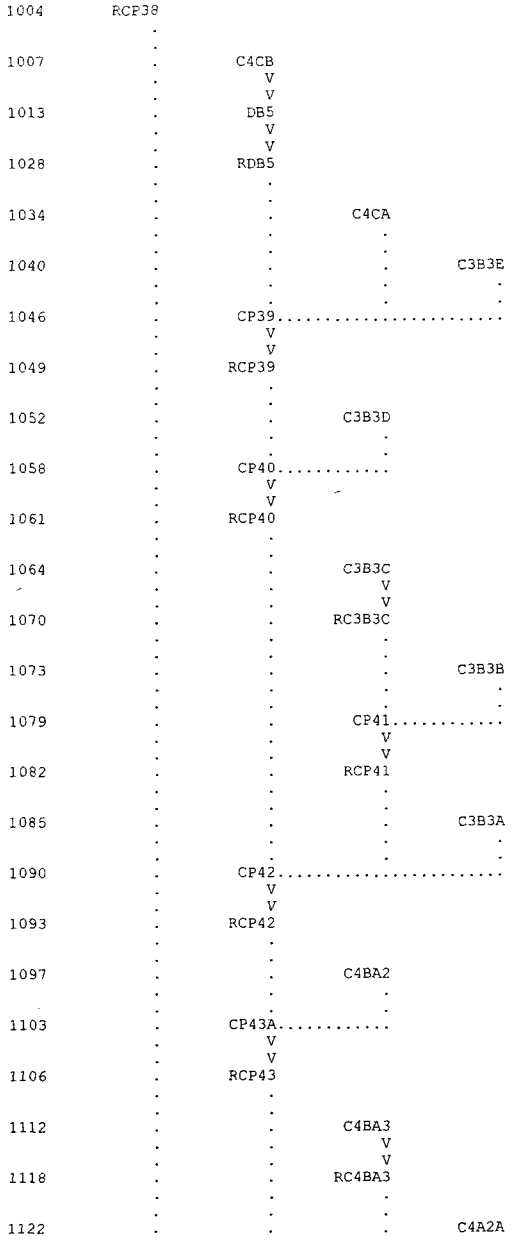

460
C1G1B
466
CP17
469
RCP17
472
C1HCB
478
CP18A
481
CP18
487
DIVER4
484
DIVER4
490
RCP18
493
C1G1A
499
RC1G1A
503
C1HB
509
CP19A
512
CP19
517
DIVER5
515
DIVER5
520
RCP19
523
C1HA
530
CP20A
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CP20
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RCP20
542
C1D
548
RC1D
552
C1C
558
CP21
561
RCP21

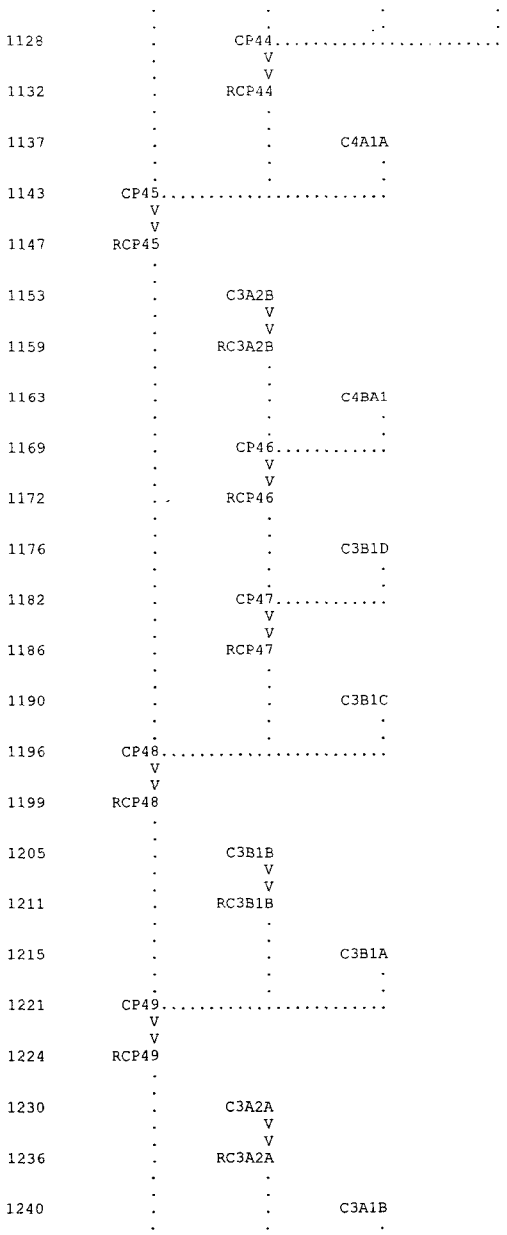

564
C1B
570
C4A1D
V
V
576
RC4A1D
579
CP22
V
V
582
RCP22
588
C1A
594
CP23
V
V
597
RCP23
603
C5CC
611
.<------- DIVER4
609
RET4
V
V
612
RDIV4
V
V
616
RDIV4
620
CP24A
625
.<------- DIVER3
623
RET3
V
V
626
RDIV3
V
V
630
RDIV3
634
CP24B
639
.<------- DIVER2
637
RET2
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RDIV2
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644
RDIV2
648
CP24C
651
C5CA
V
V
658
RC5CA

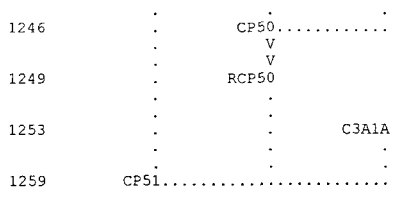

662
C5CF
669
CP25
673
RCP25
677
C5CE
683
CP26
687
RCP26
691
C5CD
699
DIVER1
697
RET1
700
RDIV1
704
RDIV1
708
RDIV1
712
CP27
715
RCP27
718
CP24D
721
C5CB
728
CP24E
731
C5FD
737
RC5FD
740
C5FA
746
RC5FA
749
C5FB
755
CP28
758
RCP28
764
C5FC


771
CP29
774
RCP29
780
C5EA
787
CP30
790
RCP30
796
C5EB
802
RC5EB
805
C5EC
811
CP31
814
RCP31
820
C5ED
827
CP32
830
RCP32
836
C5DA
843
C5DB
850
CP33
853
RCP33
859
CP24
862
RCP24
867
C5DC
873
RC5DC
876
C4BD
883
CP34A
886
CP34B


890
DB4
904
C4BF
910
RC4BF
913
C4BC
919
CP34
922
RCP34
927
C4A1C
935
DIVER5
933
RET5
936
RDIV5
940
CP35A
944
C4A1
950
CP35
953
RCP35
958
C4BE
964
RC4BE
967
C4BB
972
CP36
975
RCP36
979
C4A2B
985
CP37
989
RCP37
992
CP38A
995
C4A1B
1001
CP38


1004 RCP38
1007 C4CB
1013 DB5
1028 RDB5
1034 C4CA
1040 C3B3E
1046 CP39
1049 RCP39
1052 C3B3D
1058 CP40
1061 RCP40
1064 C3B3C
1070 RC3B3C
1073 C3B3B
1079 CP41
1082 RCP41
1085 C3B3A
1090 CP42
1093 RCP42
1097 C4BA2
1103 CP43A
1106 RCP43
1112 C4BA3
1118 RC4BA3
1122 C4A2A


1128
CP44
1132
RCP44
1137
C4A1A
1143
CP45
1147
RCP45
1153
C3A2B
1159
RC3A2B
1163
C4BA1
1169
CP46
1172
RCP46
1176
C3B1D
1182
CP47
1186
RCP47
1190
C3B1C
1196
CP48
1199
RCP48
1205
C3B1B
1211
RC3B1B
1215
C3B1A
1221
CP49
1224
RCP49
1230
C3A2A
1236
RC3A2A
1240
C3A1B



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN   1998               *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   12NOV02  TIME  17:29:05   *
*                                       *
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*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
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********** C-1 WATERSHED FIS RESTUDY **********

***** PREPARED FOR: CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT *****
** CLARK COUNTY, NEVADA ***

***** PREPARED BY: CARTER BURGESS AND SOUTHWEST FLUVIAL SYSTEMS *****

EXISTING CONDITIONS DRAINAGE SYSTEM
INPUT FILE = SDN4.DAT
INPUT FILE DATE = NOV 2002
DESIGN STORM = 100-YEAR 6-HR STORM
STORM DISTRIBUTION = SDN #4

REFERENCED HYDROLOGIC MODELS:
PREDESIGN REPORT FOR THE BLACK MOUNTAIN AND MISSION HILLS DETENTION BASINS
AND OUTFALL STRUCTURES (VTN 1992)
SNWA RIVER MOUNTAINS WATER TREATMENT FACILITY DRAFT TECHNICAL DRAINAGE STUDY
(MONTGOMERY WATSON/CH2MHILL 1997)
EAST C-1 DETENTION BASIN FINAL DESIGN (VTN 1998)
DESIGN MEMORANDUM FOR THE EQUESTRIAN DETENTION BASIN (POGGEMEYER 1994)
DESIGN CALCULATION NOTEBOOK FOR THE BLACK MOUNTAIN DETENTION BASIN
(VTN 1998)
CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT 2002 MASTER PLAN UPDATE (LBA)
I-515 BOULDER HIGHWAY TO LAKE MEAD DRIVE DRAINAGE STUDY (SVERDRUP, 1991)

JR CARDS CONTAINED DARFS BASED ON THE FOLLOWING VALUES:

AREA SQ.MI.	DARF
0 - 5	0.950
5 - 12	0.880
12 - 16	0.832
16 - 20	0.804
20 - 30	0.765
30 - 40	0.725

THE FOLLOWING REDUCTION FACTORS ARE USED FOR MODIFIED USLE COMPUTATIONS

2-YR	0.260
5-YR	0.440
10-YR	0.570
25-YR	0.765
50-YR	0.880

```
54 IO          OUTPUT CONTROL VARIABLES
                     IPRNT           5  PRINT CONTROL
                     IPLOT           0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE

   IT          HYDROGRAPH TIME DATA
                     NMIN            5  MINUTES IN COMPUTATION INTERVAL
                    IDATE      1    0  STARTING DATE
                    ITIME         0000  STARTING TIME
                       NQ          300  NUMBER OF HYDROGRAPH ORDINATES
                   NDDATE      2    0  ENDING DATE
                   NDTIME         0055  ENDING TIME
                    ICENT           19  CENTURY MARK

                 COMPUTATION INTERVAL      .08 HOURS
                      TOTAL TIME BASE   24.92 HOURS

        ENGLISH UNITS
             DRAINAGE AREA          SQUARE MILES
             PRECIPITATION DEPTH    INCHES
             LENGTH, ELEVATION      FEET
             FLOW                   CUBIC FEET PER SECOND
             STORAGE VOLUME         ACRE-FEET
             SURFACE AREA           ACRES
             TEMPERATURE            DEGREES FAHRENHEIT

   JP          MULTI-PLAN OPTION
                     NPLAN           1  NUMBER OF PLANS

   JR          MULTI-RATIO OPTION
                   RATIOS OF PRECIPITATION
                   .95       .88       .83       .80       .76       .73       .57       .44       .26


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


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          *            *
69 KK     *       DB1  *
          *            *
          **************

74 KO          OUTPUT CONTROL VARIABLES
                     IPRNT           3  PRINT CONTROL
                     IPLOT           0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE

             HYDROGRAPH ROUTING DATA

75 RS          STORAGE ROUTING
                     NSTPS           1  NUMBER OF SUBREACHES
                      ITYP        STOR  TYPE OF INITIAL CONDITION
                    RSVRIC       -1.00  INITIAL CONDITION
                         X         .00 WORKING R AND D COEFFICIENT

76 SV            STORAGE          .0       1.2       4.6      10.3      22.6      38.7      54.9      73.4      92.6     113.5
                               135.2     158.2     183.2     208.1     234.7     262.5     292.0     325.3

78 SE          ELEVATION     2556.00   2558.00   2560.00   2562.00   2564.00   2566.00   2568.00   2570.00   2572.00   2574.00
                             2576.00   2578.00   2580.00   2582.00   2584.00   2586.00   2588.00   2590.00

80 SQ          DISCHARGE        0.        1.       27.       58.       78.       95.      109.      121.      132.      142.
                              151.      160.      169.      177.      184.      191.      198.      205.

82 SE          ELEVATION     2556.00   2558.00   2560.00   2562.00   2564.00   2566.00   2568.00   2570.00   2572.00   2574.00
```

2576.00 2578.00 2580.00 2582.00 2584.00 2586.00 2588.00 2590.00

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COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	.00	1.19	4.55	10.32	22.58	38.69	54.90	73.42	92.55	113.51
OUTFLOW	.00	1.28	27.31	57.88	77.52	95.42	108.73	120.50	131.87	141.78
ELEVATION	2556.00	2558.00	2560.00	2562.00	2564.00	2566.00	2568.00	2570.00	2572.00	2574.00
STORAGE	135.16	158.22	183.23	208.10	234.67	262.55	292.02	325.32		
OUTFLOW	150.74	159.67	168.97	176.60	183.71	190.74	197.77	204.93		
ELEVATION	2576.00	2578.00	2580.00	2582.00	2584.00	2586.00	2588.00	2590.00		

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

HYDROGRAPH AT STATION DB1
FOR PLAN 1, RATIO = .95

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 197.	5.42	190.	147.	141.	141.
		(INCHES) .440	1.362	1.362	1.362
		(AC-FT) 94.	291.	291.	291.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
290.	5.42	259.	150.	144.	144.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2587.83	5.42	2585.72	2576.41	2575.68	2575.68

CUMULATIVE AREA = 4.01 SQ MI

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

HYDROGRAPH AT STATION DB1
FOR PLAN 1, RATIO = .88

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 189.	5.42	181.	136.	131.	131.
		(INCHES) .420	1.261	1.261	1.261
		(AC-FT) 90.	269.	269.	269.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
254.	5.42	225.	124.	120.	120.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2585.39	5.42	2583.26	2574.16	2573.50	2573.50

CUMULATIVE AREA = 4.01 SQ MI

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

HYDROGRAPH AT STATION DB1
FOR PLAN 1, RATIO = .83

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR

+ (CFS)	(HR)					
		(CFS)				
+ 183.	5.42		175.	128.	123.	123.
		(INCHES)	.405	1.186	1.186	1.186
		(AC-FT)	87.	253.	253.	253.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
230.	5.42	202.	108.	104.	104.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2583.67	5.42	2581.52	2572.62	2572.01	2572.01

CUMULATIVE AREA = 4.01 SQ MI

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

HYDROGRAPH AT STATION DB1
FOR PLAN 1, RATIO = .80

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 179.	5.33	171.	123.	118.	118.
		(INCHES) .396	1.139	1.139	1.139
		(AC-FT) 85.	243.	243.	243.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
217.	5.33	190.	99.	95.	95.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2582.64	5.33	2580.50	2571.72	2571.14	2571.14

CUMULATIVE AREA = 4.01 SQ MI

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

HYDROGRAPH AT STATION DB1
FOR PLAN 1, RATIO = .76

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 174.	5.33	165.	115.	111.	111.
		(INCHES) .382	1.070	1.070	1.070
		(AC-FT) 82.	229.	229.	229.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
198.	5.33	172.	86.	83.	83.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2581.19	5.33	2579.09	2570.47	2569.94	2569.94

CUMULATIVE AREA = 4.01 SQ MI

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

HYDROGRAPH AT STATION DB1
FOR PLAN 1, RATIO = .73

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 168.	5.33		158.	107.	103.	103.
		(INCHES)	.367	.989	.989	.989
		(AC-FT)	78.	211.	211.	211.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)					
179.	5.33		154.	74.	72.	72.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)					
2579.69	5.33		2577.63	2569.18	2568.69	2568.69

CUMULATIVE AREA = 4.01 SQ MI

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

HYDROGRAPH AT STATION DB1
FOR PLAN 1, RATIO = .57

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 141.	5.25		131.	69.	67.	67.
		(INCHES)	.303	.644	.644	.644
		(AC-FT)	65.	138.	138.	138.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)					
112.	5.25		92.	37.	35.	35.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)					
2573.83	5.25		2571.85	2564.38	2564.07	2564.07

CUMULATIVE AREA = 4.01 SQ MI

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

HYDROGRAPH AT STATION DB1
FOR PLAN 1, RATIO = .44

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 113.	5.25		102.	41.	39.	39.
		(INCHES)	.236	.378	.378	.378
		(AC-FT)	50.	81.	81.	81.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)					
62.	5.25		47.	16.	15.	15.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)					
2568.79	5.25		2567.00	2561.10	2560.91	2560.91

CUMULATIVE AREA = 4.01 SQ MI

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HYDROGRAPH AT STATION DB1
FOR PLAN 1, RATIO = .26

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 62.	5.17		38.	10.	10.	10.
		(INCHES)	.087	.096	.096	.096
		(AC-FT)	19.	20.	20.	20.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
13.	5.17	7.	2.	2.	2.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2562.39	5.17	2560.65	2558.07	2557.99	2557.99

CUMULATIVE AREA = 4.01 SQ MI

*** *** *** *

STORAGE	598.50	630.20
OUTFLOW	351.60	357.60
ELEVATION	2354.00	2355.00

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

HYDROGRAPH AT STATION DB2
FOR PLAN 1, RATIO = .95

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 307.	6.17		303.	260.	250.	250.
		(INCHES)	.297	1.018	1.019	1.019
		(AC-FT)	150.	515.	515.	515.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)					
406.	6.17		388.	284.	274.	274.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)					
2347.27	6.17		2346.60	2341.93	2341.24	2341.24

CUMULATIVE AREA = 9.48 SQ MI

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

HYDROGRAPH AT STATION DB2
FOR PLAN 1, RATIO = .88

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 294.	6.17		289.	245.	236.	236.
		(INCHES)	.283	.960	.960	.960
		(AC-FT)	143.	485.	485.	485.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)					
356.	6.17		338.	243.	234.	234.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)					
2345.35	6.17		2344.65	2340.13	2339.50	2339.50

CUMULATIVE AREA = 9.48 SQ MI

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HYDROGRAPH AT STATION DB2
FOR PLAN 1, RATIO = .83

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 283.	6.17		278.	233.	225.	225.
		(INCHES)	.273	.916	.916	.916
		(AC-FT)	138.	463.	463.	463.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)					
321.	6.17		305.	214.	206.	206.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR	
+ (FEET)	(HR)					
2343.96	6.17	2343.29	2338.85	2338.27	2338.27	

CUMULATIVE AREA = 9.48 SQ MI

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HYDROGRAPH AT STATION DB2
FOR PLAN 1, RATIO = .80

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR	
+ (CFS)	(HR)					
		(CFS)				
+ 277.	6.17	272.	227.	218.	218.	
		(INCHES) .267	.889	.889	.889	
		(AC-FT) 135.	450.	450.	450.	

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR	
+ (AC-FT)	(HR)					
302.	6.17	286.	198.	191.	191.	

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR	
+ (FEET)	(HR)					
2343.16	6.17	2342.51	2338.11	2337.55	2337.55	

CUMULATIVE AREA = 9.48 SQ MI

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HYDROGRAPH AT STATION DB2
FOR PLAN 1, RATIO = .76

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR	
+ (CFS)	(HR)					
		(CFS)				
+ 269.	6.17	263.	217.	209.	209.	
		(INCHES) .258	.851	.851	.851	
		(AC-FT) 130.	430.	430.	430.	

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR	
+ (AC-FT)	(HR)					
275.	6.17	259.	176.	170.	170.	

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR	
+ (FEET)	(HR)					
2342.07	6.17	2341.37	2337.06	2336.54	2336.54	

CUMULATIVE AREA = 9.48 SQ MI

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HYDROGRAPH AT STATION DB2
FOR PLAN 1, RATIO = .73

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR	
+ (CFS)	(HR)					
		(CFS)				
+ 259.	6.17	253.	206.	199.	199.	
		(INCHES) .248	.809	.809	.809	
		(AC-FT) 125.	409.	409.	409.	

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
248.	6.17	233.	155.	149.	149.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2340.86	6.08	2340.19	2335.98	2335.50	2335.50

CUMULATIVE AREA = 9.48 SQ MI

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HYDROGRAPH AT STATION DB2
FOR PLAN 1, RATIO = .57

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 217.	6.08	210.	156.	150.	150.
		(INCHES) .206	.611	.611	.611
		(AC-FT) 104.	309.	309.	309.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
151.	6.08	139.	77.	74.	74.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2336.26	6.08	2335.63	2331.63	2331.31	2331.31

CUMULATIVE AREA = 9.48 SQ MI

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HYDROGRAPH AT STATION DB2
FOR PLAN 1, RATIO = .44

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 176.	5.92	169.	91.	88.	88.
		(INCHES) .166	.357	.357	.357
		(AC-FT) 84.	180.	180.	180.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
81.	5.92	71.	29.	28.	28.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2332.51	5.92	2331.91	2327.62	2327.45	2327.45

CUMULATIVE AREA = 9.48 SQ MI

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HYDROGRAPH AT STATION DB2
FOR PLAN 1, RATIO = .26

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR

+ (CFS)	(HR)					
		(CFS)				
+ 100.	5.50		79.	22.	21.	21.
		(INCHES)	.077	.086	.086	.086
		(AC-FT)	39.	43.	43.	43.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
14.	5.50	8.	2.	2.	2.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2327.67	5.50	2326.83	2324.08	2324.04	2324.04

CUMULATIVE AREA = 9.48 SQ MI

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*     CP7DB  *
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254 KK

260 KO OUTPUT CONTROL VARIABLES

IPRNT	3	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

261 RS STORAGE ROUTING

NSTPS	1	NUMBER OF SUBREACHES
ITYP	STOR	TYPE OF INITIAL CONDITION
RSVRIC	-1.00	INITIAL CONDITION
X	.00	WORKING R AND D COEFFICIENT

262 SV STORAGE	.0	.1	.7	1.9	3.9	7.0	11.2	16.1	21.5	27.2
	33.2	39.6	46.4	53.5	61.0	68.9	77.1	85.5	94.2	103.0
264 SE ELEVATION	2230.00	2231.00	2232.00	2233.00	2234.00	2235.00	2236.00	2237.00	2238.00	2239.00
	2240.00	2241.00	2242.00	2243.00	2244.00	2245.00	2246.00	2247.00	2248.00	2249.00
266 SQ DISCHARGE	0.	70.	180.	317.	479.	659.	855.	1068.	1291.	1526.
	1776.	2039.	2257.	2384.	2512.	2700.	2887.	3061.	3226.	3515.
268 SE ELEVATION	2230.00	2231.00	2232.00	2233.00	2234.00	2235.00	2236.00	2237.00	2238.00	2239.00
	2240.00	2241.00	2242.00	2243.00	2244.00	2245.00	2246.00	2247.00	2248.00	2249.00

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COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	.00	.13	.66	1.85	3.90	6.97	11.16	16.15	21.51	27.21
OUTFLOW	.00	70.20	180.10	317.40	479.10	659.20	854.50	1068.10	1290.90	1525.90
ELEVATION	2230.00	2231.00	2232.00	2233.00	2234.00	2235.00	2236.00	2237.00	2238.00	2239.00
STORAGE	33.22	39.59	46.37	53.53	61.03	68.88	77.06	85.51	94.16	102.96
OUTFLOW	1776.10	2038.60	2256.80	2384.20	2511.70	2700.00	2887.00	3060.90	3225.70	3515.40
ELEVATION	2240.00	2241.00	2242.00	2243.00	2244.00	2245.00	2246.00	2247.00	2248.00	2249.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 0. TO 70.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .95

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 917.	4.08		469.	306.	294.	294.
		(INCHES)	.391	1.017	1.017	1.017
		(AC-FT)	233.	606.	606.	606.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
13.	4.08	4.	2.	2.	2.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2236.29	4.08	2233.87	2232.83	2232.72	2232.72

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .88

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 809.	4.08		431.	284.	273.	273.
		(INCHES)	.359	.945	.945	.945
		(AC-FT)	214.	563.	563.	563.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
10.	4.08	4.	2.	2.	2.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2235.77	4.08	2233.65	2232.68	2232.58	2232.58

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .83

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 736.	4.08		405.	268.	259.	259.
		(INCHES)	.337	.893	.893	.893
		(AC-FT)	201.	532.	532.	532.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
9.	4.08	3.	2.	2.	2.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2235.39	4.08	2233.50	2232.57	2232.48	2232.48

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .80

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 695.	4.08		390.	259.	250.	250.
		(INCHES)	.324	.862	.862	.862
		(AC-FT)	193.	514.	514.	514.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
8.	4.08	3.	2.	1.	1.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2235.18	4.08	2233.41	2232.51	2232.42	2232.42

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .76

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 637.	4.08		368.	246.	237.	237.
		(INCHES)	.306	.818	.818	.818
		(AC-FT)	183.	488.	488.	488.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
7.	4.08	3.	1.	1.	1.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2234.88	4.08	2233.28	2232.42	2232.33	2232.33

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .73

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 580.	4.08		346.	232.	224.	224.
		(INCHES)	.288	.772	.772	.772
		(AC-FT)	172.	460.	460.	460.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
6.	4.08	2.	1.	1.	1.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2234.56	4.08	2233.14	2232.32	2232.23	2232.23

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .57

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 363.	4.25	262.	170.	164.	164.
		(INCHES) .218	.566	.566	.566
		(AC-FT) 130.	338.	338.	338.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
2.	4.25	1.	1.	1.	1.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2233.28	4.25	2232.58	2231.64	2231.77	2231.77

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .44

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 247.	5.17	193.	98.	94.	94.
		(INCHES) .160	.326	.326	.326
		(AC-FT) 96.	194.	194.	194.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
1.	5.17	1.	0.	0.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2232.49	5.17	2232.08	2231.12	2231.08	2231.08

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .26

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 108.	5.58	81.	22.	22.	22.
		(INCHES) .067	.075	.075	.075
		(AC-FT) 40.	45.	45.	45.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
0.	5.58	0.	0.	0.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2231.34	5.58	2231.08	2230.30	2230.29	2230.29

CUMULATIVE AREA = 11.18 SQ MI

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            **************
            *            *
270 KK      *     CP7DB  *
            *            *
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275 KO OUTPUT CONTROL VARIABLES

IPRNT	3	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

276 RS STORAGE ROUTING

NSTPS	1	NUMBER OF SUBREACHES
ITYP	STOR	TYPE OF INITIAL CONDITION
RSVRIC	-1.00	INITIAL CONDITION
X	.00	WORKING R AND D COEFFICIENT

277 SV	STORAGE	.0	.7	5.4	13.6	21.9	30.4	39.0	47.8	56.6	65.6
		74.7	84.0	93.5	103.1	112.8					
279 SE	ELEVATION	2220.00	2221.00	2222.00	2223.00	2224.00	2225.00	2226.00	2227.00	2228.00	2229.00
		2230.00	2231.00	2232.00	2233.00	2234.00					
281 SQ	DISCHARGE	0.	13.	37.	152.	340.	578.	850.	1155.	1488.	1846.
		2225.	2481.	2701.	3036.	3463.					
283 SE	ELEVATION	2220.00	2221.00	2222.00	2223.00	2224.00	2225.00	2226.00	2227.00	2228.00	2229.00
		2230.00	2231.00	2232.00	2233.00	2234.00					

***

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	.00	.68	5.42	13.62	21.95	30.42	39.03	47.76	56.62	65.61
OUTFLOW	.00	13.20	37.20	152.00	340.30	578.10	849.70	1155.10	1488.10	1845.50
ELEVATION	2220.00	2221.00	2222.00	2223.00	2224.00	2225.00	2226.00	2227.00	2228.00	2229.00
STORAGE	74.74	84.02	93.46	103.05	112.79					
OUTFLOW	2224.90	2481.10	2700.80	3035.50	3463.40					
ELEVATION	2230.00	2231.00	2232.00	2233.00	2234.00					

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .95

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 754.	4.50	458.	297.	286.	286.
		(INCHES) .381	.987	.987	.987

	(AC-FT)	227.	588.	588.	588.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
36.	4.50	26.	19.	19.	19.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2225.65	4.50	2224.47	2223.64	2223.50	2223.50

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .88

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 660.	4.50	419.	275.	265.	265.
		(INCHES) .349	.916	.916	.916
		(AC-FT) 208.	546.	546.	546.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
33.	4.50	25.	18.	18.	18.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2225.30	4.50	2224.31	2223.52	2223.39	2223.39

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .83

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 594.	4.50	393.	260.	251.	251.
		(INCHES) .327	.865	.865	.865
		(AC-FT) 195.	516.	516.	516.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
31.	4.50	24.	18.	17.	17.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2225.06	4.50	2224.19	2223.43	2223.30	2223.30

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .80

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW

			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 556.	4.58		377.	251.	242.	242.
		(INCHES)	.314	.835	.835	.835
		(AC-FT)	187.	498.	498.	498.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
30.	4.58	23.	17.	17.	17.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2224.91	4.58	2224.12	2223.38	2223.26	2223.26

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .76

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 509.	5.25	356.	238.	229.	229.
		(INCHES) .296	.792	.792	.792
		(AC-FT) 176.	472.	472.	472.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
28.	5.25	22.	17.	16.	16.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2224.71	5.25	2224.03	2223.31	2223.18	2223.18

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .73

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 472.	5.33	333.	225.	216.	216.
		(INCHES) .277	.747	.747	.747
		(AC-FT) 165.	446.	446.	446.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
27.	5.33	21.	16.	16.	16.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2224.55	5.33	2223.92	2223.23	2223.11	2223.11

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .57

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)	(CFS)				
+ 327.	5.50		249.	166.	160.	160.
		(INCHES)	.207	.552	.552	.552
		(AC-FT)	123.	329.	329.	329.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
21.	5.50	18.	13.	13.	13.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2223.93	5.50	2223.51	2222.86	2222.75	2222.75

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .44

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)	(CFS)				
+ 220.	5.75		183.	98.	94.	94.
		(INCHES)	.152	.326	.326	.326
		(AC-FT)	91.	194.	194.	194.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
17.	5.75	15.	9.	8.	8.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2223.36	5.75	2223.16	2222.13	2222.05	2222.05

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .26

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)	(CFS)				
+ 92.	6.83		72.	22.	22.	22.
		(INCHES)	.060	.075	.075	.075
		(AC-FT)	36.	45.	45.	45.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
9.	6.83	8.	2.	2.	2.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2222.48	6.83	2222.30	2220.87	2220.84	2220.84

CUMULATIVE AREA = 11.18 SQ MI

*** HEC-1 ERROR 1 *** INVALID CARD IDENTIFICATION CODE OR CARD OUT OF SEQUENCE
CARD NO. 341

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          **************
          *            *
890 KK    *       DB4  *
          *            *
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895 KO OUTPUT CONTROL VARIABLES

IPRNT	3	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

896 RS STORAGE ROUTING

NSTPS	1	NUMBER OF SUBREACHES
ITYP	STOR	TYPE OF INITIAL CONDITION
RSVRIC	.00	INITIAL CONDITION
X	.00	WORKING R AND D COEFFICIENT

897 SV	STORAGE	.0	2.0	13.0	31.0	61.0	97.0	118.0	140.0	171.0	200.0
		229.0	261.0	290.0	315.0	344.0	379.0	409.0	437.0	470.0	504.0
899 SE	ELEVATION	2048.00	2050.00	2052.00	2054.00	2056.00	2058.00	2059.00	2060.00	2061.00	2062.00
		2063.00	2064.00	2065.00	2066.00	2067.00	2068.00	2069.00	2070.00	2071.00	2072.00
901 SQ	DISCHARGE	0.	37.	80.	117.	142.	163.	173.	182.	191.	198.
		206.	213.	221.	228.	235.	242.	248.	2755.	7761.	14467.

903 SS SPILLWAY

CREL	2069.00	SPILLWAY CREST ELEVATION
SPWID	900.00	SPILLWAY WIDTH
COQW	3.00	WEIR COEFFICIENT
EXPW	1.50	EXPONENT OF HEAD

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COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	.00	2.00	13.00	31.00	61.00	97.00	118.00	140.00	171.00	200.00
OUTFLOW	.00	37.00	80.00	117.00	142.00	163.00	173.00	182.00	191.00	198.00
ELEVATION	2048.00	2050.00	2052.00	2054.00	2056.00	2058.00	2059.00	2060.00	2061.00	2062.00
STORAGE	229.00	261.00	290.00	315.00	344.00	379.00	409.00	437.00	470.00	504.00
OUTFLOW	206.00	213.00	221.00	228.00	235.00	242.00	248.00	2755.00	7761.00	14467.00
ELEVATION	2063.00	2064.00	2065.00	2066.00	2067.00	2068.00	2069.00	2070.00	2071.00	2072.00

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

HYDROGRAPH AT STATION DB4
FOR PLAN 1, RATIO = .95

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)	(CFS)			
+ 1823.	5.17	431.	244.	235.	235.
		(INCHES) .597	1.353	1.354	1.354
		(AC-FT) 213.	484.	484.	484.

PEAK STORAGE TIME MAXIMUM AVERAGE STORAGE

		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
427.	5.17	386.	234.	225.	225.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2069.63	5.17	2068.27	2062.68	2062.15	2062.15

CUMULATIVE AREA = 6.71 SQ MI

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

HYDROGRAPH AT STATION DB4
FOR PLAN 1, RATIO = .88

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 828.	5.50	292.	208.	200.	200.
		(INCHES) .404	1.152	1.153	1.153
		(AC-FT) 145.	412.	412.	412.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
415.	5.50	378.	229.	221.	221.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2069.23	5.50	2068.03	2062.50	2061.97	2061.97

CUMULATIVE AREA = 6.71 SQ MI

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

HYDROGRAPH AT STATION DB4
FOR PLAN 1, RATIO = .83

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 244.	6.17	237.	190.	183.	183.
		(INCHES) .329	1.055	1.055	1.055
		(AC-FT) 118.	377.	377.	377.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
390.	6.17	356.	213.	205.	205.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2068.37	6.17	2067.31	2061.89	2061.39	2061.39

CUMULATIVE AREA = 6.71 SQ MI

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

HYDROGRAPH AT STATION DB4
FOR PLAN 1, RATIO = .80

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			

+ 239.	6.17		232.	184.	178.	178.
		(INCHES)	.321	1.022	1.023	1.023
		(AC-FT)	115.	366.	366.	366.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
365.	6.17	332.	194.	187.	187.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2067.60	6.17	2066.52	2061.19	2060.71	2060.71

CUMULATIVE AREA = 6.71 SQ MI

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

HYDROGRAPH AT STATION DB4
FOR PLAN 1, RATIO = .76

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 232.	6.08	224.	176.	169.	169.
		(INCHES) .310	.976	.976	.976
		(AC-FT) 111.	349.	349.	349.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
332.	6.08	300.	170.	164.	164.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2066.57	6.08	2065.40	2060.23	2059.78	2059.78

CUMULATIVE AREA = 6.71 SQ MI

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

HYDROGRAPH AT STATION DB4
FOR PLAN 1, RATIO = .73

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 223.	6.08	215.	166.	160.	160.
		(INCHES) .298	.922	.922	.922
		(AC-FT) 107.	330.	330.	330.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
297.	6.08	267.	145.	140.	140.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2065.28	6.08	2064.23	2059.19	2058.78	2058.78

CUMULATIVE AREA = 6.71 SQ MI

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

HYDROGRAPH AT STATION DB4
FOR PLAN 1, RATIO = .57

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 192.	6.08		184.	113.	109.	109.
		(INCHES)	.256	.629	.629	.629
		(AC-FT)	91.	225.	225.	225.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
175.	6.08	150.	65.	62.	62.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2061.14	6.08	2060.28	2054.85	2054.60	2054.60

CUMULATIVE AREA = 6.71 SQ MI

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

HYDROGRAPH AT STATION DB4
FOR PLAN 1, RATIO = .44

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 159.	6.00		148.	65.	62.	62.
		(INCHES)	.205	.359	.359	.359
		(AC-FT)	73.	128.	128.	128.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
90.	6.00	72.	24.	23.	23.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2057.63	6.00	2056.59	2051.59	2051.45	2051.45

CUMULATIVE AREA = 6.71 SQ MI

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

HYDROGRAPH AT STATION DB4
FOR PLAN 1, RATIO = .26

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 83.	5.75		63.	17.	16.	16.
		(INCHES)	.087	.092	.092	.092
		(AC-FT)	31.	33.	33.	33.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
14.	5.75	9.	2.	2.	2.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2052.17	5.75	2051.21	2048.85	2048.82	2048.82

CUMULATIVE AREA = 6.71 SQ MI

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          **************
          *            *
1013 KK   *     DB5    *
          *            *
          **************

1018 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          3  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

                 HYDROGRAPH ROUTING DATA

1019 RS          STORAGE ROUTING
                      NSTPS          1  NUMBER OF SUBREACHES
                       ITYP       STOR  TYPE OF INITIAL CONDITION
                     RSVRIC      -1.00  INITIAL CONDITION
                          X        .00 WORKING R AND D COEFFICIENT

1020 SV            STORAGE        1.2       3.3      12.1      28.0      49.0      79.8     115.0     166.1     232.2     320.1
                                418.8     534.5     605.5     681.1     765.1     846.8     943.4    1044.8    1261.8    1426.1

1022 SE            ELEVATION   2446.00   2450.00   2454.00   2458.00   2462.00   2466.00   2470.00   2474.00   2478.00   2482.00
                               2486.00   2490.00   2492.00   2494.00   2496.00   2498.00   2500.00   2502.00   2506.00   2510.00

1024 SQ            DISCHARGE        1.       23.       36.       46.       54.       60.       67.       72.       78.       82.
                                   87.       91.       94.       96.       98.      100.      101.      103.      107.      111.

1026 SE            ELEVATION   2446.00   2450.00   2454.00   2458.00   2462.00   2466.00   2470.00   2474.00   2478.00   2482.00
                               2486.00   2490.00   2492.00   2494.00   2496.00   2498.00   2500.00   2502.00   2506.00   2510.00
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COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	1.20	3.30	12.10	28.00	49.00	79.80	115.00	166.10	232.20	320.10
OUTFLOW	.50	22.90	36.10	45.70	53.60	60.40	66.50	72.30	77.50	82.40
ELEVATION	2446.00	2450.00	2454.00	2458.00	2462.00	2466.00	2470.00	2474.00	2478.00	2482.00
STORAGE	418.80	534.50	605.50	681.10	765.10	846.80	943.40	1044.80	1261.80	1426.10
OUTFLOW	87.00	91.20	93.50	95.60	97.60	99.50	101.40	103.40	107.20	110.70
ELEVATION	2486.00	2490.00	2492.00	2494.00	2496.00	2498.00	2500.00	2502.00	2506.00	2510.00

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

HYDROGRAPH AT STATION DB5
FOR PLAN 1, RATIO = .95

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 90.	6.00	89.	82.	80.	80.
		(INCHES) .153	.567	.570	.570
		(AC-FT) 44.	164.	164.	164.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
494.	6.00	478.	384.	370.	370.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2488.58	6.00	2488.06	2483.15	2481.84	2481.84

CUMULATIVE AREA = 5.41 SQ MI

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

HYDROGRAPH AT STATION DB5
FOR PLAN 1, RATIO = .88

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)	(CFS)				
+ 88.	6.00		87.	80.	77.	77.
		(INCHES)	.150	.550	.552	.552
		(AC-FT)	43.	159.	159.	159.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
436.	6.00	422.	334.	322.	322.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2486.60	6.00	2486.08	2481.11	2479.85	2479.85

CUMULATIVE AREA = 5.41 SQ MI

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

HYDROGRAPH AT STATION DB5
FOR PLAN 1, RATIO = .83

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)	(CFS)				
+ 86.	6.00		85.	78.	75.	75.
		(INCHES)	.147	.537	.538	.538
		(AC-FT)	42.	155.	155.	155.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
398.	6.00	383.	301.	290.	290.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2485.15	6.00	2484.57	2479.65	2478.42	2478.42

CUMULATIVE AREA = 5.41 SQ MI

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HYDROGRAPH AT STATION DB5
FOR PLAN 1, RATIO = .80

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)	(CFS)				
+ 85.	6.00		84.	77.	74.	74.
		(INCHES)	.145	.529	.530	.530
		(AC-FT)	42.	153.	153.	153.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
376.	6.00	361.	281.	271.	271.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2484.25	6.00	2483.68	2478.77	2477.58	2477.58

CUMULATIVE AREA = 5.41 SQ MI

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HYDROGRAPH AT STATION DB5
FOR PLAN 1, RATIO = .76

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 84.	6.00	83.	75.	73.	73.
		(INCHES) .143	.518	.518	.518
		(AC-FT) 41.	149.	150.	150.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
345.	6.00	331.	255.	246.	246.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2483.01	6.00	2482.45	2477.54	2476.38	2476.38

CUMULATIVE AREA = 5.41 SQ MI

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

HYDROGRAPH AT STATION DB5
FOR PLAN 1, RATIO = .73

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 82.	6.00	81.	74.	71.	71.
		(INCHES) .140	.506	.506	.506
		(AC-FT) 40.	146.	146.	146.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
314.	6.00	301.	229.	220.	220.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2481.73	6.00	2481.13	2476.20	2475.09	2475.09

CUMULATIVE AREA = 5.41 SQ MI

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HYDROGRAPH AT STATION DB5
FOR PLAN 1, RATIO = .57

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 75.	5.92	74.	65.	62.	62.
		(INCHES) .127	.444	.445	.445
		(AC-FT) 37.	128.	128.	128.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
201.	5.92	189.	133.	129.	129.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2476.13	5.92	2475.41	2470.07	2469.18	2469.18

CUMULATIVE AREA = 5.41 SQ MI

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HYDROGRAPH AT STATION DB5
FOR PLAN 1, RATIO = .44

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 67.	5.50	65.	53.	51.	51.
		(INCHES) .112	.365	.365	.365
		(AC-FT) 32.	105.	105.	105.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
118.	5.50	108.	66.	64.	64.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2470.23	5.50	2469.13	2463.07	2462.44	2462.44

CUMULATIVE AREA = 5.41 SQ MI

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HYDROGRAPH AT STATION DB5
FOR PLAN 1, RATIO = .26

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 46.	5.17	42.	18.	18.	18.
		(INCHES) .073	.127	.127	.127
		(AC-FT) 21.	37.	37.	37.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
29.	5.17	23.	8.	8.	8.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2458.28	5.17	2456.66	2450.21	2450.05	2450.05

CUMULATIVE AREA = 5.41 SQ MI

*** HEC-1 ERROR 1 *** INVALID CARD IDENTIFICATION CODE OR CARD OUT OF SEQUENCE
CARD NO. 1121
1

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 .95	RATIO 2 .88	RATIO 3 .83	RATIO 4 .80	RATIO 5 .76	RATIO 6 .73	RATIO 7 .57	RATIO 8 .44	RATIO 9 .26
HYDROGRAPH AT													
+	C1H	4.01	1	FLOW	4659.	4150.	3803.	3503.	3325.	3043.	1989.	1175.	255.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO													
+	DB1	4.01	1	FLOW	197.	189.	183.	179.	174.	168.	141.	113.	62.
				TIME	5.42	5.42	5.42	5.33	5.33	5.33	5.25	5.25	5.17
			** PEAK STAGES IN FEET **										
			1	STAGE	2587.83	2585.39	2583.67	2582.64	2581.19	2579.69	2573.83	2568.79	2562.39
				TIME	5.42	5.42	5.42	5.33	5.33	5.33	5.25	5.25	5.17
ROUTED TO													
+	RDB1	4.01	1	FLOW	197.	189.	183.	179.	174.	168.	141.	113.	62.
				TIME	5.50	5.50	5.50	5.50	5.50	5.50	5.42	5.42	5.33
HYDROGRAPH AT													
+	C1HB1	.45	1	FLOW	265.	232.	210.	198.	180.	163.	100.	53.	10.
				TIME	3.92	3.92	3.92	3.92	3.92	4.00	4.00	4.00	5.17
2 COMBINED AT													
+	CP2	4.46	1	FLOW	435.	394.	366.	350.	328.	305.	218.	148.	71.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.08	4.08	5.25
ROUTED TO													
+	RCP2	4.46	1	FLOW	434.	393.	365.	349.	326.	304.	218.	148.	71.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.08	4.17	5.25
HYDROGRAPH AT													
+	C1G3A	.27	1	FLOW	307.	273.	250.	237.	219.	200.	130.	76.	16.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67
2 COMBINED AT													
+	CP3	4.73	1	FLOW	574.	514.	473.	448.	417.	385.	269.	174.	77.
				TIME	3.67	3.67	3.67	3.67	3.83	3.83	3.92	4.00	5.00
ROUTED TO													
+	RCP3	4.73	1	FLOW	571.	515.	475.	448.	416.	384.	267.	175.	77.
				TIME	3.75	3.75	3.75	3.75	3.92	3.92	4.00	4.08	5.08
HYDROGRAPH AT													
+	C1G3B	.73	1	FLOW	867.	768.	701.	663.	609.	555.	358.	210.	44.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.58	3.58	3.58
2 COMBINED AT													
+	CP4	5.46	1	FLOW	1334.	1184.	1082.	1025.	943.	860.	550.	278.	98.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.83
ROUTED TO													
+	RCP4	5.46	1	FLOW	1264.	1133.	1089.	1031.	950.	867.	556.	271.	98.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.75	5.00
HYDROGRAPH AT													
+	C1G3C	1.05	1	FLOW	1180.	1050.	961.	910.	840.	768.	500.	294.	65.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67
2 COMBINED AT													
+	CP5	6.51	1	FLOW	2390.	2121.	1969.	1862.	1718.	1571.	1020.	542.	139.
				TIME	3.58	3.58	3.58	3.67	3.67	3.67	3.67	3.67	4.92
HYDROGRAPH AT													
+	C1G3D	.84	1	FLOW	1059.	947.	871.	827.	766.	704.	470.	287.	74.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT													
+	CP6A	7.35	1	FLOW	3449.	3068.	2840.	2695.	2470.	2252.	1434.	783.	180.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.92

HYDROGRAPH AT	C5ICB	.73	1	FLOW	731.	639.	576.	541.	491.	442.	262.	130.	17.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.92
ROUTED TO	C5ICB	.73	1	FLOW	676.	610.	538.	513.	454.	440.	248.	121.	17.
+				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	5.08
HYDROGRAPH AT	C5I2A	1.40	1	FLOW	1451.	1272.	1152.	1082.	987.	891.	539.	279.	37.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.92
2 COMBINED AT	CP6B	2.13	1	FLOW	2102.	1848.	1657.	1556.	1403.	1275.	742.	355.	52.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67	4.92
2 COMBINED AT	CP6	9.48	1	FLOW	5551.	4916.	4497.	4241.	3873.	3528.	2176.	1137.	232.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67	4.92
ROUTED TO	DB2	9.48	1	FLOW	307.	294.	283.	277.	269.	259.	217.	176.	100.
+				TIME	6.17	6.17	6.17	6.17	6.17	6.17	6.08	5.92	5.50
			** PEAK STAGES IN FEET **										
			1	STAGE	2347.27	2345.35	2343.96	2343.16	2342.07	2340.86	2336.26	2332.51	2327.67
				TIME	6.17	6.17	6.17	6.17	6.17	6.08	6.08	5.92	5.50
ROUTED TO	RDB2	9.48	1	FLOW	307.	294.	283.	277.	269.	259.	217.	176.	100.
+				TIME	6.25	6.25	6.17	6.17	6.17	6.17	6.08	6.00	5.58
HYDROGRAPH AT	C1G2C	.29	1	FLOW	181.	155.	137.	127.	114.	100.	53.	22.	3.
+				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.75	5.00
HYDROGRAPH AT	C1G2D	.22	1	FLOW	132.	111.	98.	90.	80.	69.	33.	12.	1.
+				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	4.92	5.00
3 COMBINED AT	CP7A	10.00	1	FLOW	526.	469.	432.	410.	381.	351.	259.	197.	101.
+				TIME	3.67	3.75	3.75	3.75	3.75	3.75	5.00	5.00	5.50
HYDROGRAPH AT	C1G2B1	.52	1	FLOW	224.	190.	167.	154.	136.	119.	58.	23.	1.
+				TIME	3.83	3.92	3.92	3.92	3.92	3.92	3.92	5.08	5.17
ROUTED TO	RG2B1	.52	1	FLOW	227.	194.	169.	155.	135.	125.	82.	30.	3.
+				TIME	4.08	4.08	4.08	4.17	4.17	4.00	4.17	4.50	7.00
HYDROGRAPH AT	C1G2B2	.31	1	FLOW	199.	171.	152.	141.	127.	112.	61.	26.	4.
+				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.75	5.00
2 COMBINED AT	CP7B	.83	1	FLOW	344.	287.	251.	234.	206.	198.	113.	41.	4.
+				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.17	4.83	5.00
HYDROGRAPH AT	C1G2A	.35	1	FLOW	263.	228.	205.	192.	174.	156.	90.	42.	6.
+				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	4.92
ROUTED TO	RC1G2A	.35	1	FLOW	263.	231.	209.	196.	179.	160.	88.	35.	7.
+				TIME	3.75	3.83	3.83	3.83	3.83	3.83	3.92	4.17	5.50
2 COMBINED AT	CP7C	1.18	1	FLOW	570.	484.	430.	391.	338.	319.	172.	60.	8.
+				TIME	3.83	3.92	3.92	3.92	4.00	4.00	4.17	4.50	5.50
2 COMBINED AT													

+	CP7	11.18	1	FLOW	1068.	915.	825.	769.	679.	636.	397.	251.	109.
				TIME	3.83	3.83	3.92	3.92	3.92	4.00	4.17	5.00	5.50
ROUTED TO													
+	CP7DB	11.18	1	FLOW	917.	809.	736.	695.	637.	580.	363.	247.	108.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	4.25	5.17	5.58
			** PEAK STAGES IN FEET **										
			1	STAGE	2236.29	2235.77	2235.39	2235.18	2234.88	2234.56	2233.28	2232.49	2231.34
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	4.25	5.17	5.58
ROUTED TO													
+	CP7DB	11.18	1	FLOW	754.	660.	594.	556.	509.	472.	327.	220.	92.
				TIME	4.50	4.50	4.50	4.58	5.25	5.33	5.50	5.75	6.83
			** PEAK STAGES IN FEET **										
			1	STAGE	2225.65	2225.30	2225.06	2224.91	2224.71	2224.55	2223.93	2223.36	2222.48
				TIME	4.50	4.50	4.50	4.58	5.25	5.33	5.50	5.75	6.83
ROUTED TO													
+	RCP7	11.18	1	FLOW	753.	658.	593.	555.	509.	472.	327.	220.	92.
				TIME	4.50	4.58	4.58	4.58	5.33	5.33	5.50	5.83	7.00
HYDROGRAPH AT													
+	C1NA	.41	1	FLOW	632.	563.	516.	489.	451.	413.	270.	159.	34.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO													
+	RC1NA	.41	1	FLOW	578.	511.	463.	436.	402.	369.	229.	128.	32.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.58	3.58
2 COMBINED AT													
+	CP8	11.59	1	FLOW	908.	799.	724.	680.	625.	570.	366.	225.	92.
				TIME	4.58	4.58	4.58	4.58	4.83	4.83	4.92	5.83	7.00
ROUTED TO													
+	RCP8	11.59	1	FLOW	899.	796.	723.	680.	624.	565.	364.	225.	92.
				TIME	4.67	4.67	4.67	4.67	4.67	4.67	4.92	5.92	7.08
HYDROGRAPH AT													
+	C5GC	.11	1	FLOW	189.	169.	155.	147.	136.	125.	83.	50.	12.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO													
+	RC5GC	.11	1	FLOW	162.	142.	131.	123.	114.	103.	66.	41.	11.
				TIME	3.50	3.50	3.50	3.50	3.50	3.58	3.58	3.58	3.67
HYDROGRAPH AT													
+	C5GB	.32	1	FLOW	386.	342.	313.	296.	272.	248.	159.	91.	17.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67
2 COMBINED AT													
+	CP9	.44	1	FLOW	534.	474.	437.	415.	385.	352.	225.	133.	27.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67
ROUTED TO													
+	RCP9	.44	1	FLOW	514.	454.	416.	394.	362.	329.	218.	124.	30.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67	3.67	3.75
HYDROGRAPH AT													
+	C5GA	.27	1	FLOW	94.	76.	63.	57.	48.	40.	16.	6.	0.
				TIME	3.75	3.75	3.75	3.75	3.83	3.83	5.00	5.00	.00
2 COMBINED AT													
+	CP10	.71	1	FLOW	582.	506.	458.	430.	391.	355.	226.	124.	30.
				TIME	3.58	3.58	3.58	3.58	3.58	3.67	3.67	3.67	3.75
ROUTED TO													
+	RCP10	.71	1	FLOW	573.	504.	459.	426.	393.	358.	225.	126.	40.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.75	4.00
ROUTED TO													
+	RCP10	.71	1	FLOW	544.	483.	444.	415.	380.	360.	224.	139.	50.

				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83	3.83	4.25
HYDROGRAPH AT													
+	C5GD	.44	1	FLOW	141.	115.	98.	89.	76.	64.	27.	11.	0.
				TIME	3.92	4.00	4.00	4.00	4.00	4.00	5.08	5.08	.00
DIVERSION TO													
+	DIVER1	.44	1	FLOW	21.	19.	17.	16.	14.	13.	7.	3.	0.
				TIME	3.92	4.00	4.00	4.00	4.00	4.00	5.08	5.08	.00
HYDROGRAPH AT													
+	DIVER1	.44	1	FLOW	120.	96.	81.	73.	62.	51.	20.	8.	0.
				TIME	3.92	4.00	4.00	4.00	4.00	4.00	5.08	5.08	.00
ROUTED TO													
+	RC5GD	.44	1	FLOW	120.	97.	81.	73.	61.	50.	20.	8.	0.
				TIME	4.08	4.08	4.08	4.08	4.08	4.17	5.25	5.42	.00
HYDROGRAPH AT													
+	C5I1E	.16	1	FLOW	228.	200.	181.	170.	156.	141.	86.	45.	5.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	4.83
3 COMBINED AT													
+	CP11	1.32	1	FLOW	681.	591.	533.	493.	441.	408.	248.	152.	51.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83	3.83	4.25
ROUTED TO													
+	RCP11	1.32	1	FLOW	668.	573.	514.	482.	434.	401.	243.	140.	30.
				TIME	3.75	3.83	3.83	3.83	3.83	3.83	3.83	3.92	4.33
HYDROGRAPH AT													
+	C1HF	.10	1	FLOW	78.	68.	61.	57.	52.	46.	27.	13.	2.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.75	5.00
2 COMBINED AT													
+	CP12	1.42	1	FLOW	744.	636.	567.	532.	479.	441.	267.	151.	31.
				TIME	3.75	3.75	3.83	3.83	3.83	3.83	3.83	3.92	4.33
ROUTED TO													
+	RCP12	1.42	1	FLOW	726.	633.	572.	538.	486.	450.	272.	155.	33.
				TIME	3.83	3.92	3.92	3.92	3.92	3.92	4.00	4.08	4.67
HYDROGRAPH AT													
+	C5I1B	.52	1	FLOW	424.	357.	312.	287.	253.	219.	100.	31.	1.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	4.83	4.92
ROUTED TO													
+	RC5I1B	.52	1	FLOW	383.	331.	292.	268.	247.	208.	100.	31.	1.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67	5.42
HYDROGRAPH AT													
+	C5I1D	.12	1	FLOW	109.	94.	85.	79.	72.	64.	36.	17.	2.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.92
2 COMBINED AT													
+	CP13	.63	1	FLOW	492.	425.	376.	347.	318.	272.	137.	46.	2.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67	4.92
ROUTED TO													
+	RCP13	.63	1	FLOW	469.	393.	361.	345.	316.	253.	133.	42.	2.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.83	5.42
HYDROGRAPH AT													
+	C1HE	.15	1	FLOW	100.	84.	74.	68.	60.	52.	24.	7.	0.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.83	4.92
3 COMBINED AT													
+	CP14	2.20	1	FLOW	1144.	960.	846.	776.	694.	606.	353.	189.	33.
				TIME	3.67	3.67	3.67	3.67	3.67	3.92	4.00	4.08	4.67
DIVERSION TO													
+	DIVER2	2.20	1	FLOW	106.	89.	78.	72.	64.	56.	33.	17.	3.
				TIME	3.67	3.67	3.67	3.67	3.67	3.92	4.00	4.08	4.67

HYDROGRAPH AT	DIVER2	2.20	1	FLOW	1038.	871.	768.	704.	630.	550.	320.	171.	30.
+				TIME	3.67	3.67	3.67	3.67	3.67	3.92	4.00	4.08	4.67
ROUTED TO	RCP14	2.20	1	FLOW	1002.	856.	758.	697.	627.	548.	320.	169.	27.
+				TIME	3.67	3.75	3.75	3.75	3.75	3.92	4.00	4.17	4.83
HYDROGRAPH AT	C1HD	.07	1	FLOW	62.	54.	48.	45.	41.	36.	20.	9.	1.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.92
2 COMBINED AT	CP15	2.27	1	FLOW	1053.	890.	789.	726.	653.	566.	328.	171.	28.
+				TIME	3.67	3.75	3.75	3.75	3.75	3.83	4.00	4.17	4.83
ROUTED TO	RCP15	2.27	1	FLOW	1049.	878.	780.	720.	640.	564.	329.	161.	26.
+				TIME	3.75	3.83	3.83	3.83	3.83	3.92	4.08	4.33	5.08
DIVERSION TO	DIVER3	2.27	1	FLOW	194.	163.	144.	133.	119.	105.	61.	30.	5.
+				TIME	3.75	3.83	3.83	3.83	3.83	3.92	4.08	4.33	5.08
HYDROGRAPH AT	DIVER3	2.27	1	FLOW	855.	716.	635.	586.	521.	460.	268.	131.	21.
+				TIME	3.75	3.83	3.83	3.83	3.83	3.92	4.08	4.33	5.08
HYDROGRAPH AT	C5I1	.24	1	FLOW	208.	179.	160.	149.	134.	119.	65.	28.	4.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67	4.92
HYDROGRAPH AT	C5I1C	.06	1	FLOW	58.	51.	46.	43.	39.	36.	21.	11.	2.
+				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	4.92
ROUTED TO	RC5I1C	.06	1	FLOW	56.	48.	44.	41.	38.	34.	21.	11.	2.
+				TIME	3.67	3.75	3.75	3.75	3.75	3.75	3.75	3.75	5.17
2 COMBINED AT	CP16	.31	1	FLOW	255.	220.	196.	183.	164.	145.	80.	36.	5.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67	3.67	4.92
ROUTED TO	RCP16	.31	1	FLOW	249.	215.	194.	181.	162.	144.	78.	36.	5.
+				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.75	5.08
HYDROGRAPH AT	C1G1B	.14	1	FLOW	171.	153.	141.	134.	124.	114.	77.	47.	13.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67
2 COMBINED AT	CP17	.45	1	FLOW	404.	354.	322.	302.	275.	248.	149.	76.	13.
+				TIME	3.58	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67
ROUTED TO	RCP17	.45	1	FLOW	400.	357.	322.	302.	276.	250.	152.	79.	16.
+				TIME	3.67	3.67	3.67	3.75	3.75	3.75	3.75	3.83	3.83
HYDROGRAPH AT	C1HCB	.18	1	FLOW	215.	187.	169.	158.	143.	129.	75.	36.	4.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	4.83
2 COMBINED AT	CP18A	.63	1	FLOW	481.	429.	387.	362.	328.	297.	181.	92.	17.
+				TIME	3.67	3.67	3.67	3.67	3.67	3.75	3.75	3.83	3.83
2 COMBINED AT	CP18	2.90	1	FLOW	1318.	1130.	1009.	937.	833.	711.	375.	172.	32.
+				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83	4.25	5.08

DIVERSION TO												
+	DIVER4	2.90	1	FLOW	209.	102.	91.	84.	75.	64.	34.	15.	3.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83	4.25	5.08
HYDROGRAPH AT													
+	DIVER4	2.90	1	FLOW	1118.	1028.	918.	353.	758.	647.	342.	157.	29.
				TIME	3.67	3.75	3.75	3.75	3.75	3.75	3.83	4.25	5.08
ROUTED TO													
+	RCP18	2.90	1	FLOW	1115.	1000.	887.	829.	742.	645.	340.	156.	28.
				TIME	3.75	3.75	3.83	3.83	3.83	3.83	3.92	4.42	5.25
HYDROGRAPH AT													
+	C1G1A	.22	1	FLOW	215.	191.	174.	165.	152.	138.	89.	51.	10.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.75
ROUTED TO													
+	RC1G1A	.22	1	FLOW	221.	195.	177.	167.	152.	140.	92.	51.	16.
				TIME	3.75	3.75	3.75	3.75	3.75	3.83	3.83	3.83	4.17
HYDROGRAPH AT													
+	C1HB	.15	1	FLOW	236.	211.	194.	184.	170.	157.	104.	63.	16.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT													
+	CP19A	.37	1	FLOW	313.	272.	245.	229.	207.	185.	116.	66.	17.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.83	3.83	4.17
2 COMBINED AT													
+	CP19	3.27	1	FLOW	1406.	1258.	1117.	1039.	932.	821.	442.	187.	36.
				TIME	3.75	3.75	3.75	3.75	3.83	3.83	3.92	4.42	5.25
DIVERSION TO													
+	DIVER5	3.27	1	FLOW	525.	414.	309.	250.	170.	87.	39.	16.	3.
				TIME	3.75	3.75	3.75	3.75	3.83	3.83	3.92	4.42	5.25
HYDROGRAPH AT													
+	DIVER5	3.27	1	FLOW	881.	844.	808.	788.	762.	734.	404.	171.	33.
				TIME	3.75	3.75	3.75	3.75	3.83	3.83	3.92	4.42	5.25
ROUTED TO													
+	RCP19	3.27	1	FLOW	885.	840.	804.	808.	762.	723.	406.	163.	34.
				TIME	3.83	3.83	3.83	3.83	3.83	3.92	4.00	4.33	5.50
HYDROGRAPH AT													
+	C1HA	.07	1	FLOW	24.	19.	16.	14.	11.	9.	4.	1.	0.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	4.92	4.92	.00
2 COMBINED AT													
+	CP20A	3.35	1	FLOW	904.	855.	817.	819.	772.	730.	408.	164.	34.
				TIME	3.83	3.83	3.83	3.83	3.83	3.92	4.00	4.33	5.50
2 COMBINED AT													
+	CP20	14.94	1	FLOW	1440.	1301.	1208.	1155.	1072.	994.	569.	330.	107.
				TIME	4.17	4.08	4.08	4.00	4.00	3.92	5.00	5.42	6.75
ROUTED TO													
+	RCP20	14.94	1	FLOW	1438.	1299.	1206.	1151.	1071.	986.	569.	330.	106.
				TIME	4.17	4.08	4.08	4.00	4.00	3.92	5.00	5.42	6.75
HYDROGRAPH AT													
+	C1D	.40	1	FLOW	287.	248.	222.	207.	187.	167.	93.	41.	6.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	4.92
ROUTED TO													
+	RC1D	.40	1	FLOW	290.	252.	226.	211.	191.	170.	92.	41.	5.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.83	5.17
HYDROGRAPH AT													
+	C1C	.23	1	FLOW	186.	162.	145.	136.	123.	110.	63.	31.	4.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67	4.92
2 COMBINED AT													

+	CP21	.63	1	FLOW	458.	395.	353.	328.	294.	261.	145.	66.	9.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.75	5.00
ROUTED TO													
+	RCP21	.63	1	FLOW	459.	399.	358.	334.	300.	267.	144.	65.	9.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.92	4.00	5.33
HYDROGRAPH AT													
+	C1B	.38	1	FLOW	384.	342.	313.	296.	273.	250.	164.	99.	24.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67	3.67	3.67
HYDROGRAPH AT													
+	C4A1D	.06	1	FLOW	46.	40.	35.	33.	30.	26.	14.	6.	1.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67	3.67	4.92
ROUTED TO													
+	RC4A1D	.06	1	FLOW	44.	38.	34.	32.	29.	26.	14.	6.	1.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	5.00
4 COMBINED AT													
+	CP22	16.01	1	FLOW	2109.	1894.	1743.	1673.	1530.	1395.	752.	393.	107.
				TIME	3.83	3.83	3.83	3.83	3.83	3.92	4.00	5.00	6.75
ROUTED TO													
+	RCP22	16.01	1	FLOW	2107.	1888.	1732.	1653.	1516.	1391.	742.	391.	107.
				TIME	3.83	3.83	3.83	3.83	3.92	3.92	4.00	5.08	6.83
HYDROGRAPH AT													
+	C1A	.15	1	FLOW	126.	111.	101.	95.	88.	80.	50.	28.	5.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.75
2 COMBINED AT													
+	CP23	16.15	1	FLOW	2207.	1967.	1804.	1721.	1568.	1438.	768.	403.	107.
				TIME	3.75	3.83	3.83	3.83	3.92	3.92	4.00	5.00	6.83
ROUTED TO													
+	RCP23	16.15	1	FLOW	2204.	1967.	1799.	1712.	1567.	1431.	758.	402.	107.
				TIME	3.75	3.83	3.83	3.83	3.92	3.92	4.08	5.00	6.92
HYDROGRAPH AT													
+	C5CC	.33	1	FLOW	245.	213.	191.	179.	161.	144.	84.	41.	6.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.75	5.00
HYDROGRAPH AT													
+	RET4	.00	1	FLOW	209.	102.	91.	84.	75.	64.	34.	15.	3.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83	4.25	5.08
ROUTED TO													
+	RDIV4	.00	1	FLOW	176.	99.	88.	84.	73.	63.	34.	15.	3.
				TIME	3.75	3.83	3.83	3.83	3.83	3.83	3.92	4.42	5.33
ROUTED TO													
+	RDIV4	.00	1	FLOW	175.	99.	89.	84.	73.	63.	36.	16.	3.
				TIME	3.83	3.92	3.92	3.92	3.92	4.00	4.08	4.50	5.75
2 COMBINED AT													
+	CP24A	.33	1	FLOW	391.	292.	256.	237.	211.	183.	90.	41.	7.
				TIME	3.83	3.75	3.75	3.83	3.83	3.83	3.83	3.75	5.00
HYDROGRAPH AT													
+	RET3	.00	1	FLOW	194.	163.	144.	133.	119.	105.	61.	30.	5.
				TIME	3.75	3.83	3.83	3.83	3.83	3.92	4.08	4.33	5.08
ROUTED TO													
+	RDIV3	.00	1	FLOW	197.	164.	146.	135.	119.	104.	61.	28.	6.
				TIME	3.83	3.83	3.83	3.83	3.92	3.92	4.25	4.58	5.58
ROUTED TO													
+	RDIV3	.00	1	FLOW	192.	163.	146.	135.	120.	103.	58.	33.	6.
				TIME	3.92	3.92	3.92	3.92	3.92	4.08	4.17	4.50	5.83
2 COMBINED AT													
+	CP24B	.33	1	FLOW	581.	441.	386.	357.	318.	274.	138.	62.	9.

				TIME	3.83	3.83	3.83	3.92	3.92	3.92	4.08	4.50	5.83
HYDROGRAPH AT													
+	RET2	.00	1	FLOW	106.	89.	78.	72.	64.	56.	33.	17.	3.
				TIME	3.67	3.67	3.67	3.67	3.67	3.92	4.00	4.08	4.67
ROUTED TO													
+	RDIV2	.00	1	FLOW	108.	91.	81.	75.	70.	57.	35.	18.	3.
				TIME	3.83	3.83	3.83	3.83	3.83	3.92	4.00	4.50	5.42
ROUTED TO													
+	RDIV2	.00	1	FLOW	105.	88.	79.	73.	67.	57.	33.	15.	3.
				TIME	3.83	3.92	3.92	3.92	3.92	3.92	4.08	4.58	5.58
2 COMBINED AT													
+	CP24C	.33	1	FLOW	687.	529.	462.	430.	385.	332.	171.	77.	11.
				TIME	3.83	3.83	3.83	3.92	3.92	3.92	4.08	4.50	5.83
HYDROGRAPH AT													
+	C5CA	.30	1	FLOW	160.	133.	116.	106.	92.	79.	33.	13.	0.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	4.92	5.92
ROUTED TO													
+	RC5CA	.30	1	FLOW	159.	130.	114.	104.	90.	77.	33.	13.	0.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83	5.00	5.92
HYDROGRAPH AT													
+	C5CF	.32	1	FLOW	203.	166.	142.	128.	110.	92.	31.	12.	0.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	4.83	.00
2 COMBINED AT													
+	CP25	.62	1	FLOW	276.	221.	185.	167.	141.	121.	52.	22.	0.
				TIME	3.50	3.50	3.58	3.58	3.58	3.75	3.75	4.83	5.92
ROUTED TO													
+	RCP25	.62	1	FLOW	275.	222.	188.	172.	140.	121.	51.	22.	0.
				TIME	3.58	3.58	3.58	3.58	3.67	3.83	3.92	5.00	8.50
HYDROGRAPH AT													
+	C5CE	.32	1	FLOW	199.	163.	139.	125.	107.	89.	31.	12.	0.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.58	4.83	.00
2 COMBINED AT													
+	CP26	.95	1	FLOW	442.	360.	307.	281.	232.	195.	70.	28.	0.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.83	4.92	8.50
ROUTED TO													
+	RCP26	.95	1	FLOW	431.	347.	292.	263.	217.	176.	69.	28.	0.
				TIME	3.58	3.58	3.58	3.58	3.58	3.67	3.92	4.92	9.50
HYDROGRAPH AT													
+	C5CD	.27	1	FLOW	132.	111.	97.	90.	79.	69.	34.	13.	1.
				TIME	3.75	3.75	3.83	3.83	3.83	3.83	3.83	5.00	5.08
HYDROGRAPH AT													
+	RET1	.00	1	FLOW	21.	19.	17.	16.	14.	13.	7.	3.	0.
				TIME	3.92	4.00	4.00	4.00	4.00	4.00	5.08	5.08	.00
ROUTED TO													
+	RDIV1	.00	1	FLOW	21.	20.	18.	17.	15.	14.	9.	3.	0.
				TIME	4.25	4.25	4.17	4.17	4.33	4.08	4.50	5.67	.00
ROUTED TO													
+	RDIV1	.00	1	FLOW	21.	19.	19.	17.	14.	14.	8.	3.	0.
				TIME	4.17	4.33	4.25	4.25	4.42	4.33	4.58	5.75	.00
ROUTED TO													
+	RDIV1	.00	1	FLOW	24.	22.	21.	20.	17.	15.	11.	4.	0.
				TIME	4.25	4.33	4.33	4.33	4.42	4.42	4.75	6.08	.00
3 COMBINED AT													
+	CP27	1.21	1	FLOW	526.	425.	359.	324.	279.	236.	102.	40.	1.
				TIME	3.58	3.58	3.58	3.58	3.67	3.67	3.92	5.00	5.08

ROUTED TO												
+	RCP27	1.21	1	FLOW	511.	418.	360.	326.	279.	232.	101.	40.	1.
				TIME	3.67	3.67	3.67	3.67	3.67	3.75	3.92	5.08	5.58
2 COMBINED AT													
+	CP24D	1.55	1	FLOW	1141.	909.	797.	727.	638.	554.	261.	100.	12.
				TIME	3.83	3.83	3.83	3.83	3.92	3.92	4.08	5.00	5.83
HYDROGRAPH AT													
+	C5CB	.14	1	FLOW	108.	94.	86.	80.	73.	66.	40.	21.	3.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	5.00
2 COMBINED AT													
+	CP24E	1.69	1	FLOW	1240.	996.	876.	801.	698.	608.	286.	113.	12.
				TIME	3.83	3.83	3.83	3.83	3.92	3.92	4.08	5.00	5.83
HYDROGRAPH AT													
+	C5FD	.17	1	FLOW	253.	225.	206.	194.	179.	164.	106.	62.	12.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO													
+	RC5FD	.17	1	FLOW	232.	204.	185.	174.	160.	148.	99.	56.	19.
				TIME	3.58	3.58	3.58	3.58	3.67	3.67	3.67	3.67	3.83
HYDROGRAPH AT													
+	C5FA	.51	1	FLOW	951.	858.	794.	757.	705.	652.	451.	289.	93.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO													
+	RC5FA	.51	1	FLOW	797.	719.	665.	683.	634.	583.	381.	257.	85.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67	3.67	3.75
HYDROGRAPH AT													
+	C5FB	.26	1	FLOW	149.	123.	106.	96.	83.	70.	29.	11.	0.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67	4.92	.00
3 COMBINED AT													
+	CP28	.94	1	FLOW	1178.	1046.	956.	953.	876.	797.	509.	319.	85.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67	3.67	3.75
ROUTED TO													
+	RCP28	.94	1	FLOW	1082.	981.	910.	906.	841.	772.	476.	312.	77.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.83
HYDROGRAPH AT													
+	C5FC	.22	1	FLOW	167.	142.	125.	116.	103.	90.	44.	15.	1.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67	4.92
2 COMBINED AT													
+	CP29	1.16	1	FLOW	1242.	1105.	1020.	1008.	932.	853.	518.	325.	77.
				TIME	3.58	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.83
ROUTED TO													
+	RCP29	1.16	1	FLOW	1225.	1081.	968.	932.	882.	789.	521.	332.	74.
				TIME	3.67	3.67	3.67	3.67	3.75	3.75	3.75	3.83	4.17
HYDROGRAPH AT													
+	C5EA	.49	1	FLOW	581.	515.	470.	444.	408.	372.	237.	134.	23.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT													
+	CP30	1.65	1	FLOW	1636.	1447.	1302.	1249.	1156.	1037.	649.	397.	81.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.83	4.17
ROUTED TO													
+	RCP30	1.65	1	FLOW	1643.	1429.	1280.	1209.	1123.	1014.	627.	424.	72.
				TIME	3.67	3.67	3.67	3.67	3.75	3.75	3.83	3.92	4.25
HYDROGRAPH AT													
+	C5EB	.55	1	FLOW	690.	621.	574.	546.	508.	469.	322.	206.	67.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67	3.67

ROUTED TO													
+	RC5EB	.55	1	FLOW	692.	621.	573.	544.	505.	470.	329.	213.	66.
				TIME	3.67	3.67	3.67	3.67	3.75	3.75	3.75	3.75	3.83
HYDROGRAPH AT													
+	C5EC	.22	1	FLOW	156.	131.	115.	105.	93.	80.	37.	12.	0.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.83	4.92
3 COMBINED AT													
+	CP31	2.41	1	FLOW	2460.	2157.	1946.	1840.	1687.	1536.	974.	590.	105.
				TIME	3.67	3.67	3.67	3.67	3.75	3.75	3.75	3.92	4.25
ROUTED TO													
+	RCP31	2.41	1	FLOW	2375.	2092.	1913.	1819.	1681.	1520.	968.	541.	102.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83	4.00	4.42
HYDROGRAPH AT													
+	C5ED	.16	1	FLOW	154.	134.	121.	114.	103.	93.	55.	27.	4.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.92
2 COMBINED AT													
+	CP32	2.57	1	FLOW	2480.	2185.	1998.	1898.	1753.	1586.	1001.	553.	104.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83	4.00	4.42
ROUTED TO													
+	RCP32	2.57	1	FLOW	2477.	2173.	1980.	1873.	1721.	1540.	974.	545.	100.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83	4.00	4.42
HYDROGRAPH AT													
+	C5DA	1.06	1	FLOW	1876.	1686.	1556.	1480.	1376.	1269.	863.	542.	158.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT													
+	C5DB	.53	1	FLOW	921.	831.	770.	734.	685.	634.	440.	285.	94.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT													
+	CP33	4.17	1	FLOW	3967.	3464.	3112.	2920.	2664.	2407.	1496.	871.	252.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO													
+	RCP33	4.17	1	FLOW	3625.	3150.	2828.	2626.	2410.	2143.	1305.	755.	226.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.58	3.58	3.58
2 COMBINED AT													
+	CP24	5.85	1	FLOW	4562.	3916.	3505.	3261.	2947.	2625.	1525.	799.	227.
				TIME	3.75	3.75	3.75	3.75	3.83	3.83	3.83	3.58	3.58
ROUTED TO													
+	RCP24	5.85	1	FLOW	4532.	3886.	3459.	3215.	2935.	2609.	1502.	781.	202.
				TIME	3.75	3.75	3.75	3.83	3.83	3.83	3.92	3.58	3.67
HYDROGRAPH AT													
+	C5DC	.33	1	FLOW	510.	454.	415.	393.	363.	331.	215.	125.	25.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO													
+	RC5DC	.33	1	FLOW	438.	396.	362.	342.	315.	289.	212.	137.	13.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83	3.92	4.58
HYDROGRAPH AT													
+	C4BD	.52	1	FLOW	354.	311.	282.	265.	242.	219.	134.	72.	13.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.92	3.92	5.08
2 COMBINED AT													
+	CP34A	.85	1	FLOW	776.	693.	630.	594.	544.	495.	346.	209.	21.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83	3.92	4.58
2 COMBINED AT													
+	CP34B	6.71	1	FLOW	5308.	4579.	4089.	3809.	3454.	3088.	1817.	936.	206.
				TIME	3.75	3.75	3.75	3.75	3.83	3.83	3.83	3.92	3.67

ROUTED TO

+	DB4	6.71	1	FLOW	1823.	828.	244.	239.	232.	223.	192.	159.	83.
				TIME	5.17	5.50	6.17	5.17	6.08	6.08	6.08	6.00	5.75
			** PEAK STAGES IN FEET **										
			1	STAGE	2069.63	2069.23	2068.37	2067.60	2066.57	2065.28	2061.14	2057.63	2052.17
				TIME	5.17	5.50	6.17	5.17	6.08	6.08	6.08	6.00	5.75
HYDROGRAPH AT													
+	C4BF	.28	1	FLOW	358.	315.	286.	269.	246.	223.	138.	74.	9.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	4.83
ROUTED TO													
+	RC4BF	.28	1	FLOW	315.	275.	255.	242.	223.	204.	122.	66.	10.
				TIME	3.58	3.67	3.67	3.67	3.67	3.67	3.67	3.75	4.17
HYDROGRAPH AT													
+	C4BC	.24	1	FLOW	222.	195.	176.	166.	151.	137.	83.	44.	7.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67	4.92
3 COMBINED AT													
+	CP34	7.22	1	FLOW	1940.	951.	591.	564.	525.	485.	326.	201.	94.
				TIME	5.08	5.58	3.67	3.67	3.67	3.67	3.67	3.75	5.08
ROUTED TO													
+	RCP34	7.22	1	FLOW	1912.	919.	601.	572.	529.	485.	329.	214.	94.
				TIME	5.17	5.58	3.75	3.75	3.75	3.75	3.83	3.92	5.33
HYDROGRAPH AT													
+	C4A1C	.52	1	FLOW	413.	362.	328.	308.	281.	254.	153.	80.	13.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	4.92
HYDROGRAPH AT													
+	RET5	.00	1	FLOW	525.	414.	309.	250.	170.	87.	39.	16.	3.
				TIME	3.75	3.75	3.75	3.75	3.83	3.83	3.92	4.42	5.25
ROUTED TO													
+	RDIV5	.00	1	FLOW	536.	435.	357.	263.	191.	83.	42.	17.	3.
				TIME	3.83	3.92	3.92	3.92	4.00	4.08	4.17	4.67	6.08
3 COMBINED AT													
+	CP35A	7.74	1	FLOW	2066.	1241.	999.	910.	827.	747.	462.	274.	101.
				TIME	5.17	3.83	3.83	3.75	3.75	3.75	3.83	3.92	5.33
HYDROGRAPH AT													
+	C4A1	.35	1	FLOW	213.	184.	165.	154.	139.	124.	69.	32.	5.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.83	5.00
2 COMBINED AT													
+	CP35	8.09	1	FLOW	2140.	1417.	1157.	1064.	966.	871.	530.	305.	103.
				TIME	5.17	3.83	3.83	3.75	3.75	3.75	3.83	3.92	5.33
ROUTED TO													
+	RCP35	8.09	1	FLOW	2144.	1389.	1154.	1069.	969.	877.	543.	300.	102.
				TIME	5.17	3.92	3.83	3.83	3.83	3.83	3.92	4.08	5.58
HYDROGRAPH AT													
+	C4BE	.22	1	FLOW	207.	184.	168.	159.	147.	134.	86.	50.	11.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.75
ROUTED TO													
+	RC4BE	.22	1	FLOW	205.	182.	167.	159.	147.	135.	88.	50.	15.
				TIME	3.75	3.83	3.83	3.83	3.83	3.83	3.83	3.92	4.08
HYDROGRAPH AT													
+	C4BB	.35	1	FLOW	321.	287.	264.	250.	231.	212.	140.	86.	23.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.75	3.75
2 COMBINED AT													
+	CP36	.57	1	FLOW	520.	463.	424.	401.	370.	338.	216.	126.	30.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.83	4.08
ROUTED TO													
+	RCP36	.57	1	FLOW	509.	454.	418.	396.	366.	331.	216.	127.	29.

				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.92	4.25
HYDROGRAPH AT													
+	C4A2B	.25	1	FLOW	178.	151.	133.	122.	108.	94.	48.	17.	1.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.58	3.58	4.83
2 COMBINED AT													
+	CP37	.82	1	FLOW	587.	520.	475.	450.	414.	374.	240.	136.	29.
				TIME	3.75	3.75	3.83	3.83	3.83	3.83	3.83	3.92	4.25
ROUTED TO													
+	RCP37	.82	1	FLOW	583.	518.	469.	443.	404.	368.	239.	136.	27.
				TIME	3.83	3.83	3.83	3.83	3.83	3.92	3.92	4.00	4.33
2 COMBINED AT													
+	CP38A	8.91	1	FLOW	2349.	1887.	1623.	1512.	1374.	1244.	782.	432.	120.
				TIME	5.17	3.92	3.83	3.83	3.83	3.83	3.92	4.00	5.25
HYDROGRAPH AT													
+	C4A1B	.25	1	FLOW	114.	95.	82.	75.	65.	56.	23.	9.	0.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	4.92	.00
3 COMBINED AT													
+	CP38	25.31	1	FLOW	4521.	3898.	3482.	3279.	2972.	2668.	1503.	751.	213.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.92	4.08	5.67
ROUTED TO													
+	RCP38	25.31	1	FLOW	4490.	3872.	3458.	3250.	2939.	2665.	1494.	747.	213.
				TIME	3.83	3.92	3.83	3.83	3.83	3.92	4.00	4.08	5.75
HYDROGRAPH AT													
+	C4CB	5.41	1	FLOW	8952.	8015.	7376.	7005.	6491.	5968.	3995.	2447.	642.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO													
+	DB5	5.41	1	FLOW	90.	88.	86.	85.	84.	82.	75.	67.	46.
				TIME	6.00	6.00	6.00	6.00	6.00	6.00	5.92	5.50	5.17
			** PEAK STAGES IN FEET **										
			1	STAGE	2488.58	2486.60	2485.15	2484.25	2483.01	2481.73	2476.13	2470.23	2458.28
				TIME	6.00	6.00	6.00	6.00	6.00	6.00	5.92	5.50	5.17
ROUTED TO													
+	RDB5	5.41	1	FLOW	90.	88.	86.	85.	84.	82.	75.	67.	46.
				TIME	6.17	6.17	6.17	6.17	6.17	6.17	6.08	5.75	5.50
HYDROGRAPH AT													
+	C4CA	.20	1	FLOW	204.	182.	167.	158.	146.	134.	88.	52.	13.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.75
HYDROGRAPH AT													
+	C3B3E	.22	1	FLOW	335.	304.	282.	270.	253.	235.	167.	111.	41.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT													
+	CP39	5.83	1	FLOW	590.	536.	498.	476.	446.	415.	295.	197.	81.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.83
ROUTED TO													
+	RCP39	5.83	1	FLOW	575.	522.	493.	472.	437.	402.	285.	198.	79.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	4.00
HYDROGRAPH AT													
+	C3B3D	.26	1	FLOW	383.	347.	322.	307.	287.	266.	187.	123.	43.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT													
+	CP40	6.08	1	FLOW	922.	832.	770.	737.	684.	634.	439.	295.	94.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67	4.00
ROUTED TO													
+	RCP40	6.08	1	FLOW	889.	802.	746.	715.	663.	612.	431.	291.	86.
				TIME	3.58	3.58	3.67	3.67	3.67	3.67	3.67	3.67	4.00

HYDROGRAPH AT													
+	C3B3C	1.24	1	FLOW	2226.	2011.	1864.	1779.	1660.	1538.	1073.	698.	235.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO													
+	RC3B3C	1.24	1	FLOW	1965.	1756.	1618.	1554.	1454.	1351.	951.	632.	211.
				TIME	3.50	3.50	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT													
+	C3B3B	.32	1	FLOW	433.	389.	359.	342.	318.	293.	199.	125.	37.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT													
+	CP41	1.56	1	FLOW	2352.	2122.	1977.	1896.	1771.	1644.	1150.	757.	248.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO													
+	RCP41	1.56	1	FLOW	2230.	2138.	1991.	1913.	1781.	1658.	1145.	723.	219.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.83
HYDROGRAPH AT													
+	C3B3A	.51	1	FLOW	723.	646.	593.	562.	520.	477.	315.	189.	48.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.58
3 COMBINED AT													
+	CP42	8.15	1	FLOW	3767.	3427.	3148.	2991.	2765.	2548.	1765.	1118.	325.
				TIME	3.58	3.58	3.58	3.58	3.58	3.67	3.67	3.67	3.75
ROUTED TO													
+	RCP42	8.15	1	FLOW	3774.	3402.	3124.	2998.	2798.	2595.	1774.	1130.	376.
				TIME	3.67	3.67	3.75	3.75	3.75	3.75	3.75	3.83	4.08
HYDROGRAPH AT													
+	C4BA2	.14	1	FLOW	107.	91.	81.	75.	67.	59.	30.	11.	1.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67	4.92
2 COMBINED AT													
+	CP43A	8.29	1	FLOW	3867.	3482.	3186.	3049.	2844.	2636.	1796.	1139.	376.
				TIME	3.67	3.67	3.67	3.75	3.75	3.75	3.75	3.83	4.08
ROUTED TO													
+	RCP43	8.29	1	FLOW	4049.	3647.	3290.	3123.	3048.	2879.	2109.	1415.	521.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	4.08	4.25	4.75
HYDROGRAPH AT													
+	C4BA3	.41	1	FLOW	257.	223.	200.	187.	169.	151.	87.	42.	7.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.92	3.92	5.08
ROUTED TO													
+	RC4BA3	.41	1	FLOW	256.	223.	201.	188.	170.	152.	86.	41.	7.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.08	4.25	5.50
HYDROGRAPH AT													
+	C4A2A	.26	1	FLOW	276.	239.	214.	199.	180.	160.	89.	39.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	4.83
3 COMBINED AT													
+	CP44	8.96	1	FLOW	4358.	3914.	3524.	3411.	3245.	3056.	2206.	1462.	523.
				TIME	3.92	3.92	3.92	4.00	4.00	4.00	4.08	4.25	4.75
ROUTED TO													
+	RCP44	8.96	1	FLOW	4180.	3743.	3534.	3397.	3182.	2912.	2022.	1386.	388.
				TIME	3.92	4.00	4.00	4.00	4.00	4.00	4.08	4.25	4.75
HYDROGRAPH AT													
+	C4A1A	.25	1	FLOW	96.	83.	74.	69.	62.	55.	30.	13.	2.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.25	5.33
3 COMBINED AT													
+	CP45	34.52	1	FLOW	8656.	7609.	6900.	6535.	6018.	5478.	3472.	2039.	538.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	4.08	4.25	4.75

ROUTED TO												
+	RCP45	34.52	1	FLOW	8529.	7480.	6878.	6193.	5947.	5375.	3343.	1956.	513.
				TIME	3.92	4.00	4.00	4.00	4.00	4.00	4.08	4.25	4.83
HYDROGRAPH AT													
+	C3A2B	.51	1	FLOW	648.	580.	534.	507.	470.	432.	289.	177.	46.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO													
+	RC3A2B	.51	1	FLOW	654.	585.	538.	511.	472.	432.	278.	178.	56.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.75	3.83
HYDROGRAPH AT													
+	C4BA1	.48	1	FLOW	247.	208.	182.	168.	148.	128.	59.	21.	1.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	4.92	5.00
2 COMBINED AT													
+	CP46	.99	1	FLOW	902.	794.	721.	678.	620.	560.	337.	195.	56.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.83
ROUTED TO													
+	RCP46	.99	1	FLOW	868.	743.	680.	638.	615.	563.	337.	199.	66.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.83	4.08
HYDROGRAPH AT													
+	C3B1D	.25	1	FLOW	186.	157.	137.	126.	111.	96.	44.	12.	0.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	4.83	5.75
2 COMBINED AT													
+	CP47	1.24	1	FLOW	933.	798.	730.	684.	656.	599.	356.	205.	66.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.83	4.08
ROUTED TO													
+	RCP47	1.24	1	FLOW	912.	788.	693.	652.	626.	576.	357.	230.	56.
				TIME	3.75	3.75	3.75	3.83	3.83	3.83	3.83	3.92	4.25
HYDROGRAPH AT													
+	C3B1C	.24	1	FLOW	318.	282.	257.	243.	224.	204.	130.	74.	12.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT													
+	CP48	36.00	1	FLOW	9290.	8106.	7370.	6966.	6386.	5777.	3563.	2058.	537.
				TIME	3.92	3.92	4.00	4.00	4.00	4.00	4.08	4.25	4.83
ROUTED TO													
+	RCP48	36.00	1	FLOW	9164.	8022.	7342.	6925.	6309.	5682.	3438.	1953.	507.
				TIME	3.92	4.00	4.00	4.00	4.00	4.00	4.08	4.25	4.83
HYDROGRAPH AT													
+	C3B1B	.21	1	FLOW	118.	100.	89.	82.	73.	64.	32.	11.	1.
				TIME	3.58	3.67	3.67	3.67	3.67	3.67	3.67	3.67	4.92
ROUTED TO													
+	RC3B1B	.21	1	FLOW	120.	103.	87.	82.	73.	63.	31.	11.	1.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.83	5.25
HYDROGRAPH AT													
+	C3B1A	.24	1	FLOW	145.	124.	111.	103.	92.	81.	43.	17.	2.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	4.92
3 COMBINED AT													
+	CP49	36.46	1	FLOW	9332.	8143.	7451.	7027.	6402.	5765.	3478.	1967.	509.
				TIME	3.92	4.00	4.00	4.00	4.00	4.00	4.08	4.25	4.83
ROUTED TO													
+	RCP49	36.46	1	FLOW	9137.	8140.	7398.	6954.	6282.	5601.	3442.	1884.	482.
				TIME	3.92	4.00	4.00	4.00	4.00	4.00	4.17	4.33	4.92
HYDROGRAPH AT													
+	C3A2A	.47	1	FLOW	708.	637.	589.	561.	522.	482.	331.	210.	65.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO													

+	RC3A2A	.47	1	FLOW	650.	606.	558.	527.	486.	444.	316.	196.	82.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.92	3.92	4.08
HYDROGRAPH AT													
+	C3A1B	1.02	1	FLOW	1217.	1069.	970.	912.	833.	754.	461.	244.	32.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	4.83
2 COMBINED AT													
+	CP50	1.49	1	FLOW	1334.	1153.	1039.	975.	887.	799.	482.	272.	93.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.92	4.08
ROUTED TO													
+	RCP50	1.49	1	FLOW	1239.	1072.	966.	913.	822.	744.	454.	262.	79.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.00	4.17
HYDROGRAPH AT													
+	C3A1A	.37	1	FLOW	375.	327.	295.	276.	251.	226.	133.	65.	8.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	4.83
3 COMBINED AT													
+	CP51	38.32	1	FLOW	10146.	8876.	8091.	7627.	6918.	6201.	3681.	2001.	532.
				TIME	3.92	4.00	4.00	4.00	4.00	4.00	4.17	4.33	4.92

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR PLAN = 1 RATIO= .00									
RDB1	MANE	5.00	197.18	330.00	1.35	5.00	197.18	330.00	1.35

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2914E+03 EXCESS= .0000E+00 OUTFLOW= .2896E+03 BASIN STORAGE= .1910E+01 PERCENT ERROR= .0

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1**********************************
*                                *
*  FLOOD HYDROGRAPH PACKAGE (HEC-1)  *
*           JUN  1998            *
*         VERSION 4.1            *
*                                *
*  RUN DATE  12NOV02  TIME  17:29:32  *
*                                *
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*                                *
*  U.S. ARMY CORPS OF ENGINEERS  *
*  HYDROLOGIC ENGINEERING CENTER *
*       609 SECOND STREET        *
*     DAVIS, CALIFORNIA 95616    *
*         (916) 756-1104         *
*                                *
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X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

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LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

              *DIAGRAM
    1         ID       **************   C-1 WATERSHED FIS RESTUDY  ****************
    2         ID
    3         ID    ***** PREPARED FOR:  CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT *****
    4         ID                            **    CLARK COUNTY, NEVADA   ***
    5         ID
    6         ID    ***** PREPARED BY: CARTER BURGESS AND SOUTHWEST FLUVIAL SYSTEMS  *****
    7         ID
    8         ID    EXISTING CONDITIONS DRAINAGE SYSTEM
    9         ID    INPUT FILE =   SDN5.DAT
   10         ID    INPUT FILE DATE =  NOV   2002
   11         ID    DESIGN STORM = 100-YEAR 6-HR STORM
   12         ID    STORM DISTRIBUTION = SDN #5
   13         ID
   14         ID    REFERENCED HYDROLOGIC MODELS:
   15         ID    PREDESIGN REPORT FOR THE BLACK MOUNTAIN AND MISSION HILLS DETENTION BASINS
   16         ID    AND OUTFALL STRUCTURES (VTN 1992)
   17         ID    SNWA RIVER MOUNTAINS WATER TREATMENT FACILITY DRAFT TECHNICAL DRAINAGE STUDY
   18         ID    (MONTGOMERY WATSON/CH2MHILL 1997)
   19         ID    EAST C-1 DETENTION BASIN FINAL DESIGN (VTN 1998)
   20         ID    DESIGN MEMORANDUM FOR THE EQUESTRIAN DETENTION BASIN (POGGEMEYER 1994)
   21         ID    DESIGN CALCULATION NOTEBOOK FOR THE BLACK MOUNTAIN DETENTION BASIN
   22         ID    (VTN 1998)
   23         ID    CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT 2002 MASTER PLAN UPDATE (LBA)
   24         ID    1-515 BOULDER HIGHWAY TO LAKE MEAD DRIVE DRAINAGE STUDY (SVERDRUP, 1991)
   25         ID
   26         ID    JR CARDS CONTAINED DARFS BASED ON THE FOLLOWING VALUES:
   27         ID
   28         ID                        AREA     DARF
   29         ID                        SQ.MI.
   30         ID
   31         ID                         0 -  5   0.950
   32         ID                         5 - 12   0.880
   33         ID                        12 - 16   0.832
   34         ID                        16 - 20   0.804
   35         ID                        20 - 30   0.765
   36         ID                        30 - 40   0.725
   37         ID
   38         ID
   39         ID
   40         ID    THE FOLLOWING REDUCTION FACTORS ARE USED FOR  MODIFIED USLE COMPUTATIONS
   41         ID
   42         ID                          2-YR   0.260
   43         ID                          5-YR   0.440
   44         ID                         10-YR   0.570
   45         ID                         25-YR   0.765
```

Community Name: Henderson, Nevada
Community No: 320005
Date: 25-11-02
Vertical Datum: 1988 NAVD
Control Grid: Nevada State Plane, East Zone
Flooding Source: Henderson Basin
Attached Panels: 2955E, 2605E, 2615E, 2620E

```
46          ID                          50-YR   0.880
47          ID
48          ID
49          ID
50          ID
51          ID
52          IT       5       0       0     300
53          IN       5       0       0
54          IO       5
```



```
LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

55          JR    PREC   0.950   0.880   0.832   0.804    .765    .725    .570    .440    .260

56          KK     C1H
57          BA   4.007
58          PB    3.15
59          PC    .000    .020    .059    .080    .110    .144    .150    .160    .168    .171
60          PC    .180    .182    .187    .190    .197    .202    .210    .220    .230    .241
61          PC    .250    .259    .265    .280    .290    .300    .305    .309    .310    .317
62          PC    .321    .327    .333    .346    .361    .381    .408    .430    .477    .514
63          PC    .561    .630    .710    .720    .731    .752    .779    .790    .795    .804
64          PC    .810    .820    .826    .840    .859    .889    .910    .938    .966    .970
65          PC    .974    .979    .981    .983    .985    .989    .990    .992    .993    .996
66          PC    .997    .999   1.00
67          LS       0      85
68          UD    0.14
            *
            *
            *  THE BLACK MTN DETENTION BASIN STAGE/DISCHARGE AND STAGE/STORAGE RELATIONSHIPS
            *  WERE CHECKED AGAINST THE LATEST RECORD DRAWINGS AND PREDESIGN REPORTS.
            *  THE FOLLOWING INPUT  WAS DIGITIZED FROM RECORD DRAWINGS AS THE HEC-1 INPUT
            *  WAS NOT AVAILABLE. THE RECORD DRAWINGS DIFFERED SLIGHTLY FROM THE
            *  PRE-DESIGN REPORT.
            *
            *
            *

69          KK     DB1
70          KM   FACILITY = BLACK MOUNTAIN DETENTION BASIN
71          KM   FACILITY # = C1CH 0967
72          KM   STORAGE VOLUME = 400 AC-FT (100-YR PK STAGE  = 2593 WSE)
73          KM   OUTLET = 36" ORIFICE PLATE ON A 54" RCP
74          KO       3
75          RS       1     STOR       -1
76          SV       0     1.19     4.55    10.32    22.58    33.69    54.90    73.42    92.55   113.51
77          SV  135.16   158.22   183.23    208.1   234.67   262.55   292.02   325.32
78          SE    2556     2558     2560     2562     2564     2566     2568     2570     2572     2574
79          SE    2576     2578     2580     2582     2584     2586     2588     2590
80          SQ       0     1.28    27.31    57.88    77.52    95.42   108.73    120.5   131.87   141.78
81          SQ  150.74   159.67   168.97    176.6   183.71   190.74   197.77   204.93
82          SE    2556     2558     2560     2562     2564     2566     2568     2570     2572     2574
83          SE    2576     2578     2580     2582     2584     2586     2588     2590
            *

84          KK    RDB1
85          KM   ROUTE DB1 TO    C1HB1
86          KM   FACILITY = MISSION HILLS INTERCEPTOR
87          KM   FACILITY # C1CH 1012
88          KM   TYPE OF FACILITY = RCB
89          RD    5600   0.028   0.015            DEEP       8      50
            *
```



```
LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

90          KK   C1HB1
91          KM   PART OF 2001 MPU C1-2
92          BA   .4497
93          PB    3.17
94          LS       0      82
95          UD    0.51
            *

96          KK     CP2
97          KM   COMBINE RCP1 AND C1HB1
98          HC       2
            *

99          KK    RCP2
100         KM   ROUTE CP2 TO C1G3A
101         KM   FACILITY = MISSION HILLS INTERCEPTOR
```

```
102          KM   FACILITY # C1CH 0930
103          KM   TYPE OF FACILITY = RCB
104          RD    1000   0.028   0.015            DEEP       8      50
             *

105          KK   C1G3A
106          KM   2001 MPU C1-3
107          BA   .2726
108          PB    3.19
109          LS       0      85
110          UD    0.17
             *

111          KK     CP3
112          KM   COMBINE RCP2 AND C1G3A
113          HC       2
             *

114          KK    RCP3
115          KM   ROUTE CP3 TO C1G3B
116          KM   FACILITY = MISSION HILLS INTERCEPTOR
117          KM   FACILITY # 0905
118          KM   TYPE OF FACILITY = RCB
119          RD    2900   0.028   0.015            DEEP       8      50
             *

120          KK   C1G3B
121          KM   2001 MPU C1-5
122          BA   .7328
123          PB    3.21
124          LS       0      84
125          UD    0.11
             *
1                                          HEC-1 INPUT                                          PAGE  4

LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

126          KK     CP4
127          KM   COMBINE RCP3 AND C1G3B
128          HC       2
             *

129          KK    RCP4
130          KM   ROUTE CP4 TO C1G3C
131          KM   MISSION HILLS INTERCEPTOR
132          KM   FACILITY # 0871
133          KM   TYPE OF FACILTY = RCB
134          RD    1300   0.025   0.015       0    DEEP      12     50
             *

135          KK   C1G3C
136          KM   2001 MPU C1-6
137          BA   1.048
138          PB    3.24
139          LS       0      85
140          UD    0.18
             *

141          KK     CP5
142          KM   COMBINE RCP4 AND C1G3C
143          KM   MISSION HILLS DETENTION BASIN
144          HC       2
             *

145          KK   C1G3D
146          KM   2001 MPU C1-7
147          BA   .8376
148          PB    3.28
149          LS       0      86
150          UD    0.15
             *

151          KK    CP6A
152          KM   COMBINE CP5 AND C1G3D
153          KM   MISSION HILLS DETENTION BASIN
154          HC       2
             *

155          KK   C5ICB
156          KM   PART OF 2001 C-8
157          BA   .7334
158          PB    3.37
159          LS       0      79
```

```
 160          UD    0.15
              *
1                                        HEC-1 INPUT                                                    PAGE  5

 LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 161          KK   C5ICB
 162          KM   ROUTE C5ICB TO MISSION HILLS DETENTION BASIN
 163          KM   FACILITY # = C1CH 0882
 164          KM   TYPE OF FACILITY = ROCK LEVEE
 165          RD    2350   0.024   0.040       0    TRAP      50       2
              *

 166          KK   C5I2A
 167          KM   PART OF 2001 MPU C1-9
 168          BA   1.400
 169          PB    3.33
 170          LS       0      80
 171          UD    0.14
              *

 172          KK    CP6B
 173          KM   COMBINE RC5ICB AND C5I2A
 174          HC       2
              *

 175          KK     CP6
 176          KM   COMBINE CP6A AND CP6B
 177          KM   @ MISSION HILLS DETENTION BASIN
 178          HC       2
              *
              *
              *  THE MISSION HILLS DETENTION BASIN STAGE/DISCHARGE AND STAGE/VOLUME RELATIONS
              *  WERE CHECKED AGAINST THE LATEST RECORD DRAWINGS AND PREDESIGN REPORTS.
              *  THE FOLLOWING INPUT REFLECTS RECORD DRAWING INFORMATION
              *

 179          KK     DB2
 180          KM    FACILITY = MISSION HILLS DETENTION BASIN
 181          KM    FACILITY # C1CH 0854
 182          KM    STORAGE VOLUME = 402 ACRE-FEET (100-YR WSE)
 183          KM    OUTLET = 84" RCP
 184          KO       3
 185          RS       1     STOR      -1
 186          SV       0     2.55    15.85    40.23    72.34    107.2    185.2    273.0    371.6    480.1
 187          SV   598.5    630.2
 188          SE    2323     2326     2328     2330     2332     2334     2338     2342     2346     2350
 189          SE    2354     2355
 190          SQ       0    56.78    108.7    142.9    170.4    193.9    234.1    268.4    298.7    326.1
 191          SQ   351.6    357.6
 192          SE    2323     2326     2328     2330     2332     2334     2338     2342     2346     2350
 193          SE    2354     2355
              *

 194          KK    RDB2
 195          KM    ROUTE DB2 TO C1G2D
 196          KM    FACILITY = MISSION HILLS DETENTION BASIN
 197          KM    FACILITY # = 0757
 198          KM    TYPE OF FACILITY = RCP
 199          RD    6100   0.025   0.013       0    CIRC      7.0
              *
1                                        HEC-1 INPUT                                                    PAGE  6

 LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 200          KK   C1G2C
 201          KM   PART OF 2001 MPU C1-13
 202          BA   .2925
 203          PB    3.23
 204          LS       0      76
 205          UD    0.27
              *

 206          KK   C1G2D
 207          KM   PART OF 2001 MPU C1-21
 208          BA   .2244
 209          PB    3.27
 210          LS       0      73
 211          UD     .22
              *

 212          KK    CP7A
```

```
213          KM   COMBINE RDB2, C1G2C, AND C1G2D
214          KM   NDOT DETENTION BASIN @ US95
215          HC       3
             *
216          KK  C1G2B1
217          KM   PART OF 2001 MPU C1-10
218          BA   .5231
219          PB    3.17
220          LS       0      74
221          UD     .42
             *
222          KK   RG2B1
223          KM   ROUTE C1G2B1 TO C1G2B2
224          KM   NO FACILITY - OVERLAND FLOW
225          RD    4400    .028    .030       0    TRAP     200
             *
226          KK  C1G2B2
227          KM   PART OF 2001 MPU C1-12
228          BA   .3097
229          PB    3.20
230          LS       0      77
231          UD     .27
             *
232          KK    CP7B
233          KM   COMBINE C1G2B1, C1G2B2
234          KM   COLLEGE AT US95
235          HC       2
             *
1                                        HEC-1 INPUT                                        PAGE  7

LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

236          KK   C1G2A
237          KM   PART OF 2001 MPU C1-11
238          BA   .3468
239          PB    3.17
240          LS       0      79
241          UD    0.22
             *
242          KK  RC1G2A
243          KM   ROUTE C1G2A TO CP7C
244          KM   NDOT FACILITY @US95
245          RD    3800    .018    .030       0    TRAP     100
             *
246          KK    CP7C
247          KM   COMBINE CP7B AND C1G2A
248          KM   COLLEGE AT US95
249          HC       2
             *
250          KK     CP7
251          KM   COMBINE CP7B AND CP7C
252          KM   NDOT FACILITY AT US95
253          HC       2
             *
             *  NDOT DETENTION BASIN INPUT IS TAKEN FROM PREDESIGN REPORT AND DRAWINGS
             *  THIS DETENTION BASIN IS BROKEN INTO TWO DETENTION PONDS, NAMELY POND A AND
             *  POND B, ON THE UPPER AND LOWER SIDE OF THE INTERCHANGE, RESPECTIVELY. THE
             *  100-YR PEAK IS ATTENUATED THROUGH THE BASIN BY ROUTING OF THE HYDROGRAPH,
             *  FIRST THROUGH POND A AND SECOND THROUGH POND B. A DOUBLE 10X10  RCB CONNECTS
             *  THE TWO PONDS UNDER I-515,INV EL = 2230 (INLET) AND 2221 (OUTLET) WHEREAS
             *  A TRIPPLE RCB WAS DESIGNED AT THE OUTLET WITH INVERT EL = 2219.68, BUT IS NOT
             *  CONSTRUCTED TO DATE. THE FOLLOWING STAGE/STORAGE AND STAGE/DISCHARGE RELATION
             *  WERE TAKEN FROM THE NDOT PREDESIGN REPORT.
             *
             *
254          KK   CP7DB
255          KM   FACILITY = NDOT DETENTION BASIN
256          KM   FACILITY # C1CH 0658
257          KM   POND A
258          KM   STORAGE VOLUME = 94 AC-FT AT WSE= 2248
259          KM   OUTLET = DOUBLE 10 X 10 RCB
260          KO       3
261          RS       1    STOR      -1
262          SV       0    .125    .660   1.852   3.904   6.967  11.156  16.146  21.506  27.208
263          SV  33.219  39.589  46.369  53.528  61.032  68.877  77.056  85.507  94.163 102.957
```

```
264          SE    2230    2231    2232    2233    2234    2235    2236    2237    2238    2239
265          SE    2240    2241    2242    2243    2244    2245    2246    2247    2248    2249
266          SQ       0    70.2   180.1   317.4   479.1   659.2   854.5  1068.1  1290.9  1525.9
267          SQ  1776.1  2038.6  2256.8  2384.2  2511.7  2700  2887.0  3060.9  3225.7  3515.4
268          SE    2230    2231    2232    2233    2234    2235    2236    2237    2238    2239
269          SE    2240    2241    2242    2243    2244    2245    2246    2247    2248    2249
             *
1                                        HEC-1 INPUT                                        PAGE  8

LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10


270          KK   CP7DB
271          KM   FACILITY = NDOT DETENTION BASIN
272          KM   FACILITY # C1CH 0658
273          KM   POND B
274          KM   STORAGE VOLUME = 94 AC-FT AT WSE= 2232
275          KO       3
276          RS       1    STOR      -1
277          SV       0    .677   5.419  13.616  21.947  30.416  39.025  47.764  56.622  65.611
278          SV   74.74  84.018  93.457 103.051 112.794
279          SE    2220    2221    2222    2223    2224    2225    2226    2227    2228    2229
280          SE    2230    2231    2232    2233    2234
281          SQ       0    13.2    37.2   152.0   340.3   576.1   849.7  1155.1  1488.1  1845.5
282          SQ  2224.9  2481.1  2700.8  3035.5  3463.4
283          SE    2220    2221    2222    2223    2224    2225    2226    2227    2228    2229
284          SE    2230    2231    2232    2233    2234
             *

285          KK    RCP7
286          KM   ROUTE CP7 TO CP8A
287          KM   PARTIALLY IMPROVED CHANNEL
288          KM   FACILITY # C1CH 0613, 0641, AND 0674
289          RD    3960    .025    .030       0    TRAP      20
             *

290          KK    C1NA
291          KM    2001 MPU C1-14
292          BA   .4139
293          PB    3.18
294          LS       0      84
295          UD    0.03
             *

296          KK   RC1NA
297          KM   ROUTE C1NA TO CP8A
298          KM   FACILITY = PARTIALLY IMPROVED CHANNEL
299          KM   FACILITY # C1CH 0613, 0641, AND 0674
300          RD    1980    .025    .030       0    TRAP      20
             *

301          KK    CP8
302          KM   COMBINE C1NA AND CP8A
303          HC       2
             *

304          KK   RCP8
305          KM   ROUTE CP8 TO C1HA
306          KM   C1 AND PUEBLO
307          RD    2500    .025    .030       0    TRAP      20
             *  BEGIN POGGEMEYER DESIGN GROUP INPUT FROM 1998 LETTER OF MAP REVISION
             *  FOR THE EQUESTRIAN DETENTION BASIN, CASE NO 98-09-623P. SOME SUBBASINS
             *  IN THIS MODEL HAVE BEEN MODIFIED TO REFLECT POST 1998 DEVELOPMENT.
             *  THE FOLLOWING TABLE CORRELATES 1998 LOMR SUBBASIN LABELS WITH LABELS IN
             *  THIS MODEL.
             *  ************************************************************************
             *  *                                                                      *
             *  *                    EQUIVALENT 1998 LOMR SUBBASIN LABELS              *
             *  *                                                                      *
             *  *                                                                      *
             *  *                    1998 LOMR              THIS MODEL                 *
             *  *                                                                      *
             *  *                      C5FD                   C5FD                    *
             *  *                      C5FA                   C5FA                    *
             *  *                      C5FB                   C5FB                    *
             *  *                      C5FC                   C5FC                    *
             *  *                      C5EA                   C5EA                    *
             *  *                      C5EC                   C5EC                    *
             *  *                      C5EB                   C5EB                    *
             *  *                      C5ED                   C5ED                    *
             *  *                      C5DA                   C5DA                    *
             *  *                      C5DB                   C5DB                    *
             *  *                      C5CAa                  N/A                     *
             *  *                      C5CAb                  N/A                     *
```

```
*  *                    C5CB                C5CB                *
*  *                    C5DC                N/A                 *
*  *                    OFF-2A              N/A                 *
*  *                    OFF-2B              N/A                 *
*  *                    OFF-2C              C1HD                *
*  *                    OFF-3               C1HE                *
*  *                    OFF-4               C1HF                *
*  *                    OFF-6               N/A                 *
*  *                    OFF-8               C5I1D               *
*  *                    OFF-9               C5I1E               *
*  *                    OFF-10              C5GD                *
*  *                    OFF-11              N/A                 *
*  *                    OFF-12              C5I1C               *
*  *                    OFF-13              N/A                 *
*  *                    OFF-14              C5GA                *
*  *                    OFF-15              C5GB                *
*  *                    OFF-16              C5GC                *
*  *                    OFF-21              N/A                 *
*  *                    OFF-23              N/A                 *
*  *                    OFF-24              N/A                 *
*  *                                                            *
*  ************************************************************
*
```



```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  308     KK    C5GC
  309     KM   1998 LOMR OFF-16
  310     BA   .1107
  311     PB    3.43
  312     LS       0      84
  313     UD    0.04
          *

  314     KK   RC5GC
  315     KM   ROUTE C5GC TO C5GB
  316     RD    1000    .020    .030           TRAP     100
          *

  317     KK    C5GB
  318     KM   1998 LOMR OFF-15
  319     BA   .3249
  320     PB    3.43
  321     LS       0      83
  322     UD     .16
          *

  323     KK    CP9
  324     KM   COMBINE C5GB AND C5GC
  325     HC       2
          *

  326     KK   RCP9
  327     KM   ROUTE CP9 TO C5GA
  328     RD    2640    .035    .030           TRAP      40
          *

  329     KK    C5GA
  330     KM   1998 LOMR OFF-14
  331     BA   .2723
  332     PB    3.39
  333     LS       0      66
  334     UD     .30
          *

  335     KK    CP10
  336     KM    COMBINE RCP9 AND C5GA
  337     HC       2
          *

  338     KK   RCP10
  339     KM    ROUTE CP10 TO C5I1E
  340     RD    2200    .033    .030           TRAP     100
  341
```



```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  342     KK   RCP10
  343     KM    ROUTE CP10 TO C5I1E
  344     RD    2200    .030    .030           TRAP     100
```

```
                *
345             KK    C5GD
346             KM   1998 LOMR OFF-10
347             BA   .4447
348             PB    3.46
349             LS       0       67
350             UD    0.46
                *
351             KK  DIVER1
352             KM   DIVERT FLOWS CONVEYED INTO CULVERT "A" STA 296+24, ACROSS BOULDER HIGHWAY
353             DT  DIVER1
354             DI       0      37     126     260     502
355             DQ       0      10      20      30      40
                *
356             KK   RC5GD
357             KM   ROUTE C5GD TO C5I1E
358             RD    2200    .030    .030            TRAP     100
                *
359             KK   C5I1E
360             KM   1998 LOMR OFF-9
361             BA   .1634
362             PB    3.45
363             LS       0       79
364             UD     .05
                *
365             KK    CP11
366             KM   COMBINE RCP10, C5I1E, AND RC5GD
367             HC       3
                *
368             KK   RCP11
369             KM   ROUTE  CP11 TO C1HF
370             RD    1600     .04    .030            TRAP     100
                *
371             KK    C1HF
372             KM   1998 LOMR OFF-4
373             BA   .1008
374             PB    3.45
375             LS       0       78
376             UD    0.27
                *
1                                          HEC-1 INPUT                                          PAGE 11

LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

377             KK    CP12
378             KM   COMBINE RCP11 AND C1HF
379             HC       2
                *
380             KK   RCP12
381             KM   ROUTE CP12 TO C1HE
382             RD    1800    .013    .030            TRAP     200
                *
383             KK   C5I1B
384             KM   MODIFIED 1998 LOMR SUBBASIN OFF-13
385             BA   .5185
386             PB    3.43
387             LS       0       71
388             UD    0.08
                *
389             KK  RC5I1B
390             KM   ROUTE C5I1B TO C5I1D
391             RD    1100    .018    .030            TRAP     100
                *
392             KK   C5I1D
393             KM   1998 LOMR OFF-8
394             BA   .1158
395             PB    3.43
396             LS       0       77
397             UD     .15
                *
398             KK    CP13
```

```
399          KM   COMBINE RC5I1B TO C5I1D
400          HC       2
             *

401          KK   RCP13
402          KM   ROUTE CP13 TO C1HE
403          RD    2100    .021    .030           TRAP     100
             *

404          KK    C1HE
405          KM   1998 LOMR OFF-3
406          BA   .1467
407          PB    3.29
408          LS       0      72
409          UD     .14
             *
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

410          KK    CP14
411          KM   COMBINE RCP12, RCP13, AND C1HE
412          HC       3
             *

413          KK  DIVER2
414          KM   DIVERT CULVERT AND BOULDER HIGHWAY OVERFLOWS INTO MAGIC WAY 844+00, 843+52,
415          KM   AND 840+46, TO SUBBASIN C5CC
416          DT  DIVER2
417          DI       0    1255    2000
418          DQ       0     116     900
             *

419          KK   RCP14
420          KM   ROUTE CP14 TO C1HD
421          RD     800    .010    .030           TRAP     100
             *

422          KK    C1HD
423          KM   1998 LOMR OFF-2C
424          BA   .0716
425          PB    3.29
426          LS       0      77
427          UD    0.15
             *

428          KK    CP15
429          KM   COMBINE RCP14 AND C1HD
430          HC       2
             *

431          KK   RCP15
432          KM   ROUTE CP15 TO C1HCB
433          RD    1700    .010    .030           TRAP     100
             *

434          KK  DIVER3
435          KM   DIVERT CULVERT FLOWS INTO SUBBASIN C5CC, AT 832+02, 825+52, AND 834+82
436          DT  DIVER3
437          DI       0    1171    2000
438          DQ       0     217     900
             *

439          KK    C5I1
440          KM   1998 LOMR OFF-11
441          BA   .2432
442          PB    3.43
443          LS       0      76
444          UD     .17
             *
```



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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

445          KK   C5I1C
446          KM   1998 LOMR OFF-12
447          BA  0.0643
448          PB    3.43
449          LS       0      80
450          UD     .23
             *
```

```
451          KK  RC5I1C
452          KM   ROUTE C5I1C TO C5I1
453          RD     700    .014    .030            TRAP     100
             *

454          KK    CP16
455          KM   COMBINE RC5I1C AND C5I1
456          HC       2
             *

457          KK   RCP16
458          KM   ROUTE CP16 TO C1G1B
459          RD    1200    .018    .030            TRAP      50
             *

460          KK   C1G1B
461          KM   1998 LOMR OFF-6 IS PART OF THIS SUBBASIN
462          PB    3.21
463          BA   .1428
464          LS       0      87
465          UD     .18
             *

466          KK    CP17
467          KM   COMBINE RCP16 AND C1G1B
468          HC       2
             *

469          KK   RCP17
470          KM   ROUTE CP17 TO C1HCB
471          RD    1700    .010    .030            TRAP     100
             *

472          KK   C1HCB
473          KM   MODIFIED 1998 LOMR OFF-2B
474          BA   .1818
475          PB    3.29
476          LS       0      78
477          UD    0.06
             *
1                                        HEC-1 INPUT                                        PAGE 14

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

478          KK  CP18A
479          KM   COMBINE RCP17,AND C1HCB
480          HC       2
             *

481          KK    CP18
482          KM   COMBINE RCP15 AND CP18A
483          HC       2
             *

484          KK  DIVER4
485          KM   DIVERT CULVERT FLOWS AND BOULDER OVERFLOWS INTO SUBBASIN C5CC
486          KM   STA 816+22 AND 819+84, BOULDER HIGHWAY
487          DT  DIVER4
488          DI       0    1234    2000
489          DQ       0     111    1000
             *

490          KK   RCP18
491          KM   ROUTE CP18 TO C1HB
492          RD    1100    .007    .030            TRAP     100
             *

493          KK   C1G1A
494          KM   2001 MPU C1-15
495          BA   .2243
496          PB    3.20
497          LS       0      84
498          UD    0.22
             *

499          KK  RC1G1A
500          KM   ROUTE TO C1HB
501          KM   OVERLAND FLOW
502          RD    2600    .025    .030            TRAP     200
             *

503          KK    C1HB
504          KM   MODIFIED 1998 LOMR OFF-2A
```

```
505          BA   .1472
506          PB    3.21
507          LS       0      85
508          UD    0.03
             *

509          KK   CP19A
510          KM   COMBINE C1HB, RC1G1A
511          HC       2
             *
```



```
LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

512          KK    CP19
513          KM   COMBINE CP19A AND RCP18
514          HC       2
             *

515          KK  DIVER5
516          KM   DIVERT CULVERT FLOWS INTO SUBBASIN C4A1C, STA 807+37
517          DT  DIVER5
518          DI       0     798    2000
519          DQ       0      70     970
             *

520          KK   RCP19
521          KM   ROUTE CP19 TO BOULDER HIGHWAY AND PUEBLO
522          RD    2300    .013    .030            TRAP     100
             *

523          KK    C1HA
524          KM   SUBBASIN C1HA
525          KM   2001 MPU C1-24
526          BA   .0735
527          PB    3.13
528          LS       0      66
529          UD     .21
             *

530          KK   CP20A
531          KM   COMBINE C1HA AND RCP19
532          HC       2
             *

533          KK    CP20
534          KM   COMBINE CP20A AND RCP8
535          HC       2
             *

536          KK   RCP20
537          KM   ROUTE CP20 TO C1B
538          KM   FACILITY  = C-1 CHANNEL
539          KM   FACILITY # C1CH 0528
540          KM   TYPE OF FACILTIY  = CONCRETE CHANNEL
541          RD    1700    .027    .015            TRAP      25       1
             *

542          KK     C1D
543          KM   2001 MPU C1-26
544          BA   .4005
545          PB    3.14
546          LS       0      78
547          UD     .21
             *
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LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

548          KK    RC1D
549          KM   ROUTE C1D TO C1C
550          KM   UNION PACIFIC RAILROAD
551          RD    1600    .014    .030       0    TRAP       0      50
             *

552          KK     C1C
553          KM   2001 MPU C1-27
554          BA   .2307
555          PB    3.08
556          LS       0      80
557          UD     .19
             *
```

```
558          KK    CP21
559          KM   COMBINE RC1D AND C1C
560          HC       2
             *

561          KK   RCP21
562          KM   ROUTE CP21 TO C1B
563          RD    4600    .010    .015       0    TRAP       0      30
             *

564          KK     C1B
565          KM   2001 MPU C1-28
566          BA   .3773
567          PB    3.11
568          LS       0      86
569          UD     .21
             *

570          KK   C4A1D
571          KM   2001 MPU C1-25
572          BA   0.062
573          PB    3.11
574          LS       0      78
575          UD     .19
             *

576          KK  RC4A1D
577          KM   ROUTE C4A1D TO C1B
578          RD     700    .020    .015            TRAP      25       1
             *

579          KK    CP22
580          KM   COMBINE RCP19,RCP20, C1B, AND RC4A1D
581          HC       4
             *
1                                        HEC-1 INPUT                                                    PAGE 17

LINE         ID.......1.......2.......3.......4.......5..... .6.......7.......8.......9......10

582          KK   RCP22
583          KM   ROUTE CP21 TO C1A
584          KM   FACILITY = C-1 CHANNEL
585          KM   FACILTIY # = C1CH 0455, 0502
586          KM   TYPE OF FACILTIY = CONCRETE CHANNEL
587          RD    3200    .021    .015            TRAP      25       1
             *

588          KK     C1A
589          KM   2001 MPU C1-29
590          BA   .1456
591          PB    2.99
592          LS       0      84
593          UD     .22
             *

594          KK    CP23
595          KM   COMBINE CP22 AND C1A
596          HC       2
             *

597          KK   RCP23
598          KM   ROUTE CP23 TO C4A1B
599          KM   FACILITY = C-1 CHANNEL
600          KM   FACILITY # = C1CH 0455
601          KM   TYPE OF FACILITY  = CONCRETE CHANNEL
602          RD    1250    .025    .025            TRAP      25.      1
             *

603          KK    C5CC
604          KM   1998 LOMR OFF-21
605          PB    3.29
606          BA   .3346
607          LS       0      79
608          UD    0.28
             *

609          KK    RET4
610          KM   RETRIEVE FLOWS FROM C1HCB
611          DR  DIVER4
             *

612          KK   RDIV4
```

```
613          KM   ROUTE DIVERSION 4 TO CP24A
614          KM   TYPE OF FACILTIY = OVERLAND FLOW TO EQUESTRIAN
615          RD    1100    .027    .030            TRAP     100       1
             *

616          KK   RDIV4
617          KM   ROUTE DIVERSION 4 TO CP24A
618          KM   TYPE OF FACILTIY = STREET FLOW IN EQUESTRIAN
619          RD    1700    .009    .016            TRAP      80       1
             *
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

620          KK   CP24A
621          KM   COMBINE C5CC AND RDIV4
622          HC       2
             *

623          KK    RET3
624          KM   RETRIEVE DIVERSION 3 FROM C1HD
625          DR  DIVER3
             *

626          KK   RDIV3
627          KM   ROUTE DIVERSION 3 TO CP24A
628          KM   TYPE OF FACILTIY = OVERLAND FLOW TO EQUESTRIAN
629          RD    2000    .023    .030            TRAP     100       1
             *

630          KK   RDIV3
631          KM   ROUTE DIVERSION 3 TO CP24A
632          KM   TYPE OF FACILTIY = STREET FLOW IN EQUESTRIAN
633          RD    1100    .009    .016            TRAP      80       1
             *

634          KK   CP24B
635          KM   COMBINE CP24A AND RDIV4
636          HC       2
             *

637          KK    RET2
638          KM   RETRIEVE DIVERSION 2 FROM C1HE
639          DR  DIVER2
             *

640          KK   RDIV2
641          KM   ROUTE DIVERSION 2 TO CP24A
642          KM   TYPE OF FACILTIY = OVERLAND FLOW TO EQUESTRIAN
643          RD    2500    .024    .030            TRAP     100       1
             *

644          KK   RDIV2
645          KM   ROUTE DIVERSION 2 TO CP24A
646          KM   TYPE OF FACILTIY = STREET FLOW IN EQUESTRIAN
647          RD     600    .009    .016            TRAP      80       1
             *

648          KK   CP24C
649          KM   COMBINE CP24B AND RDIV2
650          HC       2
             *
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LINE         ID.......1.......2.......3.......4.......5..... 6.......7.......8.......9......10

651          KK    C5CA
652          KM   PART OF 1998 LOMR C5CAb
653          KM   2001 MPU C1-30
654          BA   .2974
655          PB    3.41
656          LS       0      70
657          UD    0.22
             *

658          KK   RC5CA
659          KM   ROUTE C5CA TO C5CF
660          KM   APPALOOSA RD
661          RD    2000    .019    .016       0    TRAP       0      50
             *

662          KK    C5CF
```

```
663          KM   PART OF 1998 LOMR C5CA6
664          KM   2001 MPU C1-31
665          BA   .3233
666          PB    3.25
667          LS      0       68
668          UD    0.07
             *

669          KK    CP25
670          KM   COMBINE RC5CA AND C5CF
671          KM   APPALOOSA ROAD AND PALOMINO DRIVE
672          HC       2
             *

673          KK   RCP25
674          KM   ROUTE CP25 TO C5CE
675          KM   APPALOOSA ROAD
676          RD    2640    .020    .016            TRAP      50       0
             *

677          KK    C5CE
678          KM   PART OF 1998 LOMR C5CAb
679          BA   .3244
680          PB    3.29
681          LS      0       68
682          UD     .08
             *

683          KK    CP26
684          KM   COMBINE RCP25 AND C5CE
685          KM   APPALOOSA ROAD AND EQUESTRIAN
686          HC       2
             *
```



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LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

687          KK   RCP26
688          KM   ROUTE CP26 TO C5CD
689          KM   EQUESTRIAN DRIVE
690          RD    1200    .016    .016            TRAP      50       0
             *

691          KK    C5CD
692          KM   PART OF 1998 LOMR C5CAa AND C5CAb
693          BA   .2668
694          PB    3.31
695          LS      0       73
696          UD     .34
             *

697          KK    RET1
698          KM   RETREIVE DIVERSION 1 FROM C5GD
699          DR  DIVER1
             *

700          KK   RDIV1
701          KM   ROUTE DIVERSION 1 TO CP27
702          KM   TYPE OF FACILTIY = OVERLAND FLOW TO EX CONC CHANNEL
703          RD    2600    .019    .030            TRAP     100       1
             *

704          KK   RDIV1
705          KM   ROUTE DIVERSION 1 TO CP27
706          KM   TYPE OF FACILTIY = CONCRETE CHANNEL
707          RD    1300    .014    .015            TRAP      20       1
             *

708          KK   RDIV1
709          KM   ROUTE DIVERSION 1 TO CP27
710          KM   TYPE OF FACILTIY = STREET TO EQUESTRIAN
711          RD    2000    .014    .016            TRAP      50       1
             *

712          KK    CP27
713          KM   COMBINE RCP26, C5CD, AND RDIV1
714          HC       3
             *

715          KK   RCP27
716          KM   ROUTE CP27 TO CP24C
717          RD    1450    .017    .017            TRAP     100
             *
```

```
718          KK   CP24D
719          KM   COMBINE CP24C AND RCP27
720          HC       2
             *
1                                        HEC-1 INPUT                                        PAGE 21

LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

721          KK    C5CB
722          KM   MODIFIED 1998 LOMR C5CB
723          KM   2001 MPU C1-47A
724          BA   .1409
725          PB    3.26
726          LS       0      81
727          UD     .30
             *
728          KK   CP24E
729          KM   COMBINE CP24D AND C5CB
730          HC       2
             *
731          KK    C5FD
732          KM   1998 LOMR C5FD
733          BA   .1706
734          PB    3.43
735          LS       0      83
736          UD     .07
             *
737          KK   RC5FD
738          KM   ROUTE C5FD TO C5FB
739          RD    2500     .02    .040       0    TRAP      50       2
             *
740          KK    C5FA
741          KM   1998 LOMR C5FA
742          BA   .5071
743          PB    3.43
744          LS       0      87
745          UD     .02
             *
746          KK   RC5FA
747          KM   ROUTE C5FA TO C5FB
748          RD    4600    .065    .040       0    TRAP     100       1
             *
749          KK    C5FB
750          KM   1998 LOMR C5FB
751          BA   .2592
752          PB    3.43
753          LS       0      69
754          UD     .17
             *
755          KK    CP28
756          KM   COMBINE RC5FD, RC5FA, AND C5FB
757          HC       3
             *
1                                        HEC-1 INPUT                                        PAGE 22

LINE         ID.....1.....2.....3.....4.....5..... 6.....7.....8.....9.....10

758          KK   RCP28
759          KM   ROUTE CP28 TO  C5FC
760          KM   FACILITY = C-1 CHANNEL - EQUESTRIAN LEVEE
761          KM   FACILITY # = C1EQ 0297
762          KM   TYPE OF FACILITY = ROCK LEVEE
763          RD    2000   0.019    .040       0    TRAP      50       3
             *
764          KK    C5FC
765          KM   1998 LOMR C5FC
766          KM   2001 MPU C1-37
767          BA   .2222
768          PB    3.43
769          LS       0      73
770          UD    0.16
             *
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```
771          KK    CP29
772          KM    COMBINE RCP28 AND C5FC
773          HC       2
             *
774          KK    RCP29
775          KM    ROUTE CP29 TO C5EA
776          KM    FACILITY = C-1 CHANNEL - EQUESTRIAN LEVEE
777          KM    FACILITY # = C1EQ 0297
778          KM    TYPE OF FACILITY = ROCK LEVEE
779          RD     1900   0.018    .040       0    TRAP     100       3
             *
780          KK    C5EA
781          KM    1998 LOMR C5EA
782          KM    2001 MPU C1-38
783          BA    .4873
784          PB     3.43
785          LS       0      82
786          UD     0.12
             *
787          KK    CP30
788          KM    COMBINE RCP29 AND C5EA
789          HC       2
             *
790          KK    RCP30
791          KM    ROUTE CP30 TO C5EC
792          KM    FACILITY = C-1 CHANNEL - EQUESTRIAN LEVEE
793          KM    FACILITY # = C1EQ 0297
794          KM    TYPE OF FACILITY = ROCK LEVEE
795          RD     1600   0.017    .040       0    TRAP     100       3
             *
1                                        HEC-1 INPUT                                        PAGE 23

LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

796          KK    C5EB
797          KM    1998 LOMR C5EB
798          BA    .5469
799          PB     3.43
800          LS       0      88
801          UD      .21
             *
802          KK    RC5EB
803          KM    ROUTE C5EB  TO C5EC
804          RD     3500   0.040    .040       0    TRAP      50       3
             *
805          KK    C5EC
806          KM    1998 LOMR C5EC
807          BA    .2214
808          PB     3.43
809          LS       0      71
810          UD      .14
             *
811          KK    CP31
812          KM    COMBINE RC5EB, C5EC, AND RCP30
813          HC       3
             *
814          KK    RCP31
815          KM    ROUTE CP31 TO C5ED
816          KM    FACILITY = C-1 CHANNEL - EQUESTRIAN LEVEE
817          KM    FACILITY # = C1EQ 0297
818          KM    TYPE OF FACILITY = ROCK LEVEE
819          RD     2500   0.020    .040       0    TRAP      35       3
             *
820          KK    C5ED
821          KM    1998 LOMR C5ED
822          KM    2001 MPU C1-41
823          BA    .1578
824          PB     3.41
825          LS       0      79
826          UD     0.17
             *
827          KK    CP32
828          KM    COMBINE RCP31 AND C5ED
```

```
 829          HC       2
              *

 830          KK   RCP32
 831          KM   ROUTE CP32 T0 C5DA
 832          KM   FACILITY = C-1 CHANNEL - EQUESTRIAN LEVEE
 833          KM   FACILITY # = C1EQ 0349
 834          KM   TYPE OF FACILITY = ROCK LEVEE
 835          RD    1000   0.020    .040       0    TRAP      35       3
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 836          KK    C5DA
 837          KM   1998 LOMR C5DA
 838          KM   2001 MPU C1-42
 839          BA   1.063
 840          PB    3.42
 841          LS       0      86
 842          UD    0.05
              *

 843          KK    C5DB
 844          KM   1998 LOMR C5DB
 845          KM   2001 MPU C1-43
 846          BA   .5321
 847          PB    3.40
 848          LS       0      88
 849          UD    0.07
              *

 850          KK    CP33
 851          KM   COMBINE RCP32, C5DA, C5DB
 852          HC       3
              *

 853          KK   RCP33
 854          KM   ROUTE CP33 TO C5CB
 855          KM   FACILITY = C-1 CHANNEL - EQUESTRIAN CHANNEL
 856          KM   FACILITY # = C1EQ 0297
 857          KM   TYPE OF FACILITY = CONCRETE TRAP CHANNEL
 858          RD    5000   0.027    .013       0    TRAP      20       1
              *

 859          KK    CP24
 860          KM   COMBINE RCP33 AND CP24E
 861          HC       2
              *

 862          KK   RCP24
 863          KM   ROUTE CP24 TO CP34
 864          KM   FACILITY = MAGIC WAY
 865          KM   TYPE OF FACILITY = STEET
 866          RD    3000   0.010    .016       0    TRAP      20       1
              *

 867          KK    C5DC
 868          KM   MODIFIED 1998 LOMR SUBBASIN C5DC
 869          PB    3.31
 870          BA   .3264
 871          LS       0      83
 872          UD     .02
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 873          KK   RC5DC
 874          KM   ROUTE C5DC TO C4BD
 875          RD    6600    .024    .040       0    TRAP     100
              *
              *

 876          KK    C4BD
 877          KM   MODIFIED 1998 LOMR SUBBASIN C5DC
 878          KM   2001 MPU C1-47
 879          BA   .5243
 880          PB    3.23
 881          LS       0      82
 882          UD    0.42
              *
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883          KK   CP34A
884          KM   COMBINE RC4BF, C4BD, AND C5DC
885          HC       2
             *
886          KK   CP34B
887          KM   COMBINE  RCP24  AND CP34A
888          KM   EQUESTRIAN DETENTION BASIN
889          HC       2
             *
             *  THE EQUESTRIAN DETENTION BASIN STAGE/DISCHARGE AND STAGE/VOLUME RELATIONSHIPS
             *  WERE CHECKED AGAINST THE LATEST RECORD DRAWINGS AND PREDESIGN REPORTS.
             *  THE FOLLOWING INPUT REFLECTS RECORD DRAWING INFORMATION
             *
890          KK     DB4
891          KM   FACILITY = EQUESTRIAN DETENTION BASIN
892          KM   FACILITY # = C1EQ 0159
893          KM   STORAGE VOLUME = 409 AC-FT,(100-YR PEAK STAGE AT EL = 2069, W/O FREEBOARD)
894          KM   OUTLET = 48" RCP
895          KO       3
896          RS       1    STOR       0
897          SV       0       2      13      31      61      97     118     140     171     200
898          SV     229     261     290     315     344     379     409     437     470     504
899          SE    2048    2050    2052    2054    2056    2058    2059    2060    2061    2062
900          SE    2063    2064    2065    2066    2067    2068    2069    2070    2071    2072
901          SQ       0      37      80     117     142     163     173     182     191     198
902          SQ     206     213     221     228     235     242     248    2755    7761   14467
903          SS    2069     900     3.0     1.5
             *
             *
             *              *****END OF 1998 LOMR INPUT******
             *
             *
             *
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

904          KK    C4BF
905          KM   PART OF 1998 LOMR SUBBASIN C5DC
906          PB    3.21
907          BA   .2776
908          LS       0      81
909          UD     .06
             *
910          KK   RC4BF
911          KM   ROUTE C4BF TO C4BC
912          RD    3100    .020    .033       0    TRAP   100.0
             *
913          KK    C4BC
914          KM   SUBBASIN C4BC
915          PB    3.15
916          BA   .2402
917          LS       0      82
918          UD     .19
             *
919          KK    CP34
920          KM   COMBINE RC4BF, C4BC, AND CP34B
921          HC       3
             *
922          KK   RCP34
923          KM   ROUTE CP34 TO C4A1C ALONG EQUESTRIAN OUTFALL
924          KM   FACILITY = C-1 CHANNEL - EQUESTRIAN DETENTION BASIN OUTFALL
925          KM   FACILITY # C1EQ 0078, 0112, 0139
926          RD    3600    .018    .030       0    TRAP     100
             *
927          KK   C4A1C
928          KM   2001 MPU C1-49
929          BA   .5200
930          PB    3.07
931          LS       0      82
932          UD     .25
             *
933          KK    RET5
934          KM   RETRIEVE DIVERSION 5
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```
935          DR  DIVER5
             *
936          KK   RDIV5
937          KM   ROUTE DIV5 ALONG RACE TRACK ROAD TO NEWPORT
938          KM   FACILITY = STREET
939          RD    5000    .024    .016       0    TRAP     100
             *
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LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

940          KK   CP35A
941          KM   COMBINE RDIV5, RCP34, AND C4AIC
942          KM   RACETRACK AND NEWPORT
943          HC       3
             *
944          KK    C4A1
945          KM    2001 MPU C1-50
946          BA   .3493
947          PB    3.07
948          LS       0      79
949          UD     .32
             *
950          KK    CP35
951          KM   COMBINE CP35A AND C4A1
952          HC       2
             *
953          KK  RCP35
954          KM   ROUTE TO C4A1B
955          KM   OVERLAND FLOW
956          KM   C-1 CHANNEL AT BURKHOLDER
957          RD    3500     .02    .030            TRAP     100       3
             *
958          KK    C4BE
959          KM   NOT A PART OF THE 1998 LOMR
960          PB    3.17
961          BA   .2206
962          LS       0      85
963          UD    0.26
             *
964          KK   RC4BE
965          KM   ROUTE C4BE TO C4BB
966          RD    3400    .036    .030            TRAP     100
             *
967          KK    C4BB
968          BA   .3477
969          PB    3.09
970          LS       0      87
971          UD    0.29
             *
972          KK    CP36
973          KM   COMBINE RC4BE AND C4BB
974          HC       2
             *
```



```
LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

975          KK   RCP36
976          KM   ROUTE CP36 TO C4A2B
977          KM   ROUTE TO BURKHOLDER AND RACETRACK
978          RD    2640   0.033   0.016       0    TRAP       )      50
             *
979          KK   C4A2B
980          KM   2001 MPU C1-52
981          BA   .2491
982          PB    3.03
983          LS       0      75
984          UD    0.10
             *
985          KK    CP37
986          KM   COMBINE RC4BB AND C4A2B
```

```
 987          KM   RACETRACK ROAD @ BURKHOLDER BOULEVARD
 988          HC       2
              *

 989          KK   RCP37
 990          KM   ROUTE CP37 TO C4A1B  ALONG BURKHOLDER
 991          RD    2700   0.033   0.016       0    TRAP       0      50
              *

 992          KK   CP38A
 993          KM   COMBINE CP35 AND RCP37 AT BURKHOLDER AND PUEBLO
 994          HC       2
              *

 995          KK   C4A1B
 996          KM   2001 MPU C1-53
 997          BA   .2492
 998          PB    2.98
 999          LS       0      72
1000          UD     .20
              *

1001          KK    CP38
1002          KM   COMBINE RCP22, CP38A, AND C4A1B @ BURKHOLDER AND PUEBLO
1003          HC       3
              *

1004          KK   RCP38
1005          KM   ROUTE CP38 TO CP45
1006          RD    2200   0.021   0.015       0    TRAP      10      02
              *

1007          KK    C4CB
1008          KM    2001 MPU C1-54
1009          BA   5.408
1010          PB    3.43
1011          LS       0      85
1012          UD    0.06
              *
              *
              *
              *  THE EAST C-1 DETENTION BASIN STAGE/STORAGE AND STAGE/DISCHARGE RELATIONSHIPS
              *  WERE CHECKED AGAINST THE LATEST RECORD DRAWINGS AND PREDESIGN REPORTS.
              *  THE FOLLOWING INPUT  WAS DIGITIZED FROM RECORD DRAWINGS AS THE HEC-1 INPUT
              *  WAS NOT AVAILABLE. THE RECORD DRAWINGS DIFFERED SLIGHTLY FROM THE
              *  PREDESIGN INPUT.
              *
              *
              *
```



```
 LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1013          KK     DB5
1014          KM    FACILITY = EAST C-1 DETENTION BASIN
1015          KM    FACILITY # = C1IT 0492
1016          KM    STORAGE VOLUME = 400 AC-FT (100-YR PK STAGE WSE = 2485.3)
1017          KM    OUTLET = 48" RCP
1018          KO       3
1019          RS       1    STOR      -1
1020          SV     1.2      3.3    12.1    28.0    49.0    79.8   115.0   166.1   232.2   320.1
1021          SV   418.8    534.5   605.5   681.1   765.1   846.8   943.4  1044.8  1261.8  1426.1
1022          SE  2446.0   2450.0  2454.0  2458.0  2462.0  2466.0  2470.0  2474.0  2478.0  2482.0
1023          SE  2486.0   2490.0  2492.0  2494.0  2496.0  2498.0  2500.0    2502  2506.0  2510.0
1024          SQ     0.5     22.9    36.1    45.7    53.6    60.4    66.5    72.3    77.5    82.4
1025          SQ    87.0     91.2    93.5    95.6    97.6    99.5   101.4   103.4   107.2   110.7
1026          SE  2446.0   2450.0  2454.0  2458.0  2462.0  2466.0  2470.0  2474.0  2478.0  2482.0
1027          SE  2486.0   2490.0  2492.0  2494.0  2496.0  2498.0  2500.0    2502  2506.0  2510.0
              *

1028          KK    RDB5
1029          KM    ROUTE DB5 TO C4CA
1030          KM    FACILITY = EAST C-1 DETENTION BASIN LEVEE
1031          KM    FACILITY # = C1DK 0226
1032          KM    TYPE OF FACILTIY = SOIL CEMENT LEVEE
1033          RD    5300    .034    .025       0    TRAP      50       2
              *

1034          KK    C4CA
1035          KM    PART OF 2001 MPU C1-55
1036          BA   .1964
1037          PB    3.43
1038          LS       0      85
```

```
1039          UD    0.27
              *

1040          KK   C3B3E
1041          KM   PART OF 2001 MPU C1-55
1042          BA   .2225
1043          PB    3.43
1044          LS       0      90
1045          UD     .16
              *

1046          KK    CP39
1047          KM   COMBINE C4CA, C3B3E, AND RDB5
1048          HC       3
              *

1049          KK   RCP39
1050          KM   ROUTE CP39 TO C3B3D
1051          RD    2650    .023    .025       0    TRAP      50       2
              *
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1052          KK   C3B3D
1053          KM   PART OF 2001 MPU C1-55
1054          PB    3.43
1055          BA   .2554
1056          LS       0      89
1057          UD     .14
              *

1058          KK    CP40
1059          KM   COMBINE RCP39 AND C3B3D
1060          HC       2
              *

1061          KK   RCP40
1062          KM   ROUTE TO CP42
1063          RD    1400     .05    .025            TRAP      50       3
              *

1064          KK   C3B3C
1065          KM   PART OF 2001 MPU C1-65
1066          BA   1.238
1067          PB    3.50
1068          LS       0      88
1069          UD    0.07
              *

1070          KK  RC3B3C
1071          KM   ROUTE C3B3C TO C3B3B
1072          RD    2300    .024    .030            TRAP     100       3
              *

1073          KK   C3B3B
1074          KM   PART OF 2001 MPU C1-65
1075          BA   .3220
1076          PB    3.43
1077          LS       0      87
1078          UD    0.17
              *

1079          KK    CP41
1080          KM   COMBINE C3B3C AND C3B3B
1081          HC       2
              *

1082          KK   RCP41
1083          KM   ROUTE TO C3B3A
1084          RD    6300     .05    .030            TRAP     100       3
              *
```



```
LINE          ID.......1.......2.......3.......4.......5.. ....6.......7.......8.......9......10

1085          KK   C3B3A
1086          BA   .5107
1087          PB    3.43
1088          LS       0      85
1089          UD    0.10
              *
```

```
1090          KK    CP42
1091          KM   COMBINE RCP41, RCP40, AND C3B3A
1092          HC       3
              *

1093          KK   RCP42
1094          KM   ROUTE CP42 TO CP43 @ MAGIC WAY AND DRAKE CHANNEL
1095          KM   OVERLAND FLOW THROUGH C4BA2
1096          RD    5300    .015    .030            TRAP     100       3
              *

1097          KK   C4BA2
1098          KM   PART OF 2001 MPU C1-46
1099          BA   .1351
1100          PB    3.43
1101          LS       0      74
1102          UD     .16
              *

1103          KK   CP43A
1104          KM   COMBINE C4BA2 AND RCP42
1105          HC       2
              *

1106          KK   RCP43
1107          KM   ROUTE CP43 TO C4A2A ALONG DRAKE CHANNEL
1108          KM   FACILTIY = C-1 CHANNEL - DRAKE CHANNEL
1109          KM   FACILTY # - C1DC 0051
1110          KM   TYPE OF FACILITY = EARTHEN W\ GABION DROPS
1111          RD   2640     .029    .030            TRAP      20       2
              *

1112          KK   C4BA3
1113          KM   PART OF 2001 MPU C1-46
1114          BA   .4069
1115          PB    3.43
1116          LS       0      78
1117          UD     .41
              *

1118          KK  RC4BA3
1119          KM   ROUTE C4BA3 TO C4A2A
1120          RD    2900    .031    .030            TRAP     200
1121           *
1                                        HEC-1 INPUT                                                    PAGE 32

              LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

1122          KK   C4A2A
1123          KM   2001 MPU C1-57
1124          BA   .2607
1125          PB    3.05
1126          LS       0      77
1127          UD     .04
              *

1128          KK    CP44
1129          KM   COMBINE C4A2A, RCP43, AND RC4BA3
1130          KM   DRAKE AND RACETRACK
1131          HC       3
              *

1132          KK   RCP44
1133          KM   ROUTE CP44 TO C4A1A
1134          KM   FACILITY = C-1 CHANNEL -DRAKE CHANNEL
1135          KM   TYPE OF FACILITY = CONCRETE CHANNEL
1136          RD    2640    .021    .015            TRAP      10       2
              *

1137          KK   C4A1A
1138          KM   2001 MPU C1-58
1139          BA   .2544
1140          PB    2.92
1141          LS       0      79
1142          UD     .66
              *

1143          KK    CP45
1144          KM   COMBINE RCP44, RCP38, AND C4A1A
1145          KM   CONFLUENCE OF C1 CHANNEL AND DRAKE CHANNEL
1146          HC       3
              *
```

```
1147          KK   RCP45
1148          KM   ROUTE CP45 TO C3B1C
1149          KM   FACILITY = C-1 CHANNEL
1150          KM   FACILITY # = C1CH 0321
1151          KM   TYPE OF FACILITY = CONCRETE CHANNEL
1152          RD    2640    .025    .015           TRAP      15       1
              *

1153          KK   C3A2B
1154          KM   PART OF 2001 MPU C1-65
1155          BA   .5139
1156          PB    3.23
1157          LS      0      86
1158          UD    .13
              *
1                                      HEC-1 INPUT                                        PAGE 33

              LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

1159          KK  RC3A2B
1160          KM   ROUTE C3A2B TO CP46
1161          KM   FACILITY = OVERLAND FLOW
1162          RD    4100    .030    .030           TRAP     100       1
              *

1163          KK   C4BA1
1164          KM   PART OF 2001 MPU C1-62
1165          BA   .4758
1166          PB    2.99
1167          LS      0      74
1168          UD    .21
              *

1169          KK    CP46
1170          KM   COMBINE RC3A2B AND C4BA1
1171          HC      2
              *

1172          KK   RCP46
1173          KM   ROUTE CP46  TO C3B1D
1174          KM   OVERLAND FLOW TO RACETRACK
1175          RD    2640     .03     .03           TRAP     100       3
              *

1176          KK   C3B1D
1177          KM   2001 MPU C1-60
1178          BA   .2455
1179          PB    2.93
1180          LS      0      73
1181          UD    .05
              *

1182          KK    CP47
1183          KM   COMBINE RC4BA1 AND C3B1D
1184          KM   RACETRACK AND WARM SPRINGS
1185          HC      2
              *

1186          KK   RCP47
1187          KM   ROUTE CP47 TO C3B1C
1188          KM   WARM SPRINGS ROAD AND PUEBLO
1189          RD    2640    .025    .016           TRAP       0      50
              *

1190          KK   C3B1C
1191          KM   2001 MPU C1-61
1192          BA   .2434
1193          PB    2.87
1194          LS      0      84
1195          UD    .04
              *
1                                      HEC-1 INPUT                                        PAGE 34

              LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

1196          KK    CP48
1197          KM   COMBINE RCP45, C3B1C, AND RCP46
1198          HC      3
              *

1199          KK   RCP48
```

```
1200          KM   ROUTE CP47 TO C3B1A
1201          KM   FACILITY = C-1 CHANNEL
1202          KM   FACILITY # C1CH 0284, 0340
1203          KM   TYPE OF FACILITY = CONCRETE CHANNEL
1204          RD    2640    .025    .015            TRAP      15       1
              *

1205          KK   C3B1B
1206          KM   PART OF 2001 MPU C1-67
1207          BA   .2094
1208          PB    2.92
1209          LS       0      76
1210          UD     .20
              *

1211          KK  RC3B1B
1212          KM   ROUTE C3B1B TO C3B1A
1213          KM   ITHACA AVENUE AND PUEBLO
1214          RD    2640    .025    .016            TRAP       0      50
              *

1215          KK   C3B1A
1216          KM   2001 MPU C1-63
1217          PB    2.85
1218          BA   .2435
1219          LS       0      78
1220          UD     .21
              *

1221          KK    CP49
1222          KM   COMBINE C3B1A, RC3B1B, AND RCP48
1223          HC       3
              *

1224          KK   RCP49
1225          KM   ROUTE CP49 TO C3A1A
1226          KM   FACILITY = C-1 CHANNEL
1227          KM   FACILITY # C1CH 0220, 0269
1228          KM   TYPE OF FACILITY = CONCRETE CHANNEL
1229          RD    3960    .025    .015            TRAP      15       1
              *

1230          KK   C3A2A
1231          KM   PART OF 2001 MPU C1-66
1232          BA   .4708
1233          PB    3.23
1234          LS       0      88
1235          UD     .09
              *
```



```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

1236          KK  RC3A2A
1237          KM   ROUTE C3A2A TO C3A1B
1238          KM   OVERLAND FLOW
1239          RD    7900     .03    .030            TRAP       0     100       3
              *

1240          KK   C3A1B
1241          KM   PART OF 2001 MPU C1-66
1242          BA   1.018
1243          PB    3.23
1244          LS       0      81
1245          UD     .08
              *

1246          KK    CP50
1247          KM   COMBINE C3A1B,RC3A2A, AND CP49
1248          HC       2
              *

1249          KK   RCP50
1250          KM   ROUTE CP50 TO C3A1A
1251          KM   ITHACA
1252          RD    2600    .019    .016            TRAP      50
              *

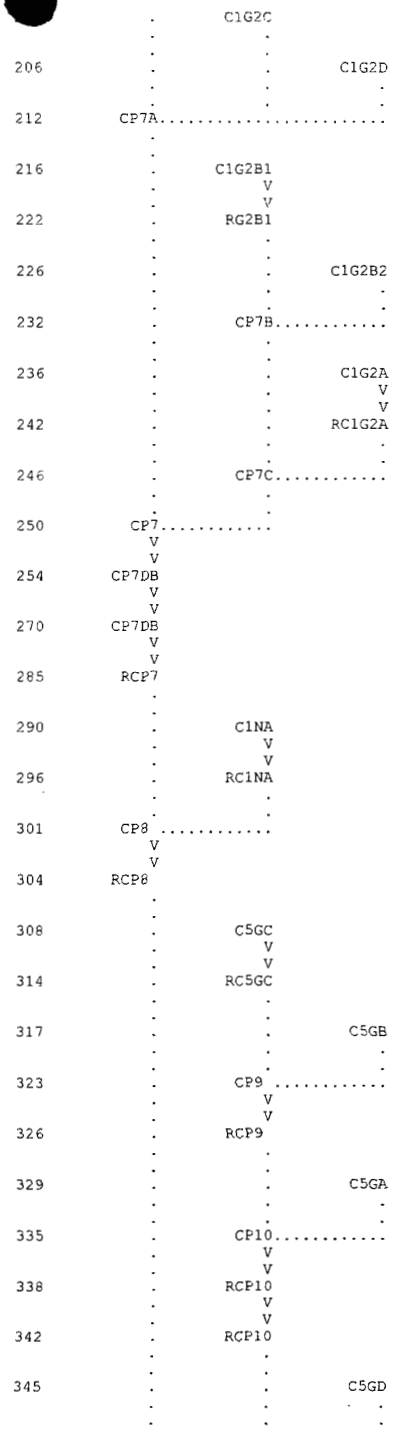
1253          KK   C3A1A
1254          KM   PART OF 2001 MPU C1-64
1255          BA   .3744
1256          PB    2.84
1257          LS       0      81
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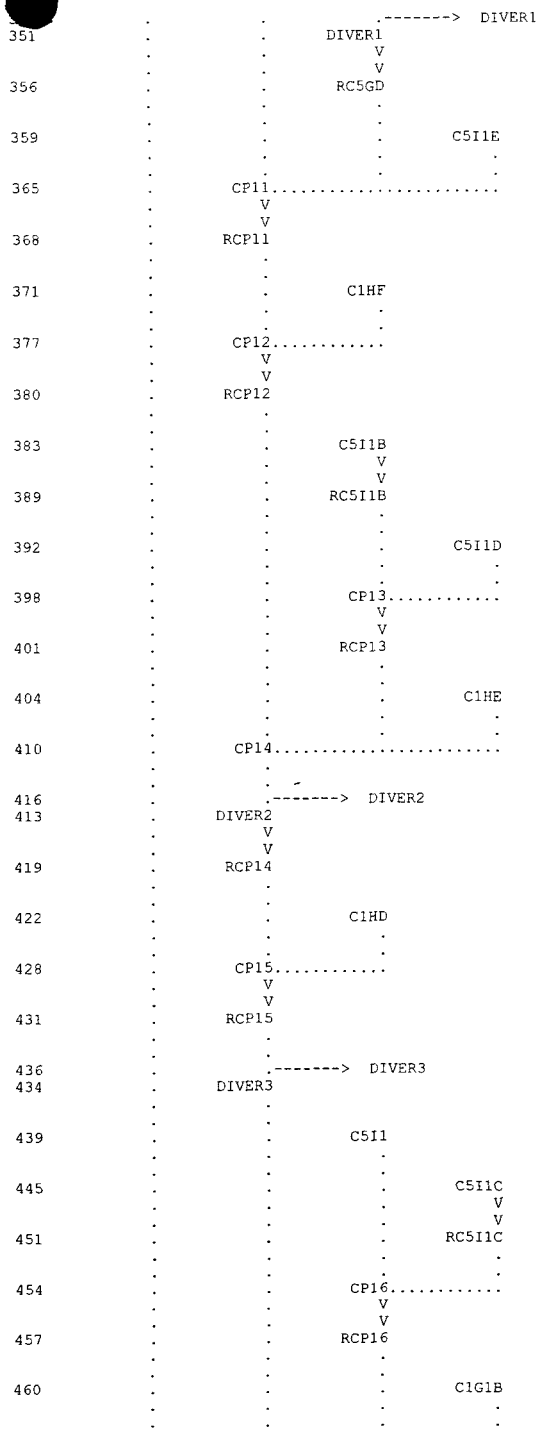
```
1258           UD     .07
               *
1259           KK    CP51
1260           KM    COMBINE C3A1A,RCP50,AND RCP49 - C-1 CHANNEL AND LAKE MEAD DRIVE
1261           HC       3
               *
1262           ZZ
1
                    SCHEMATIC DIAGRAM OF STREAM NETWORK

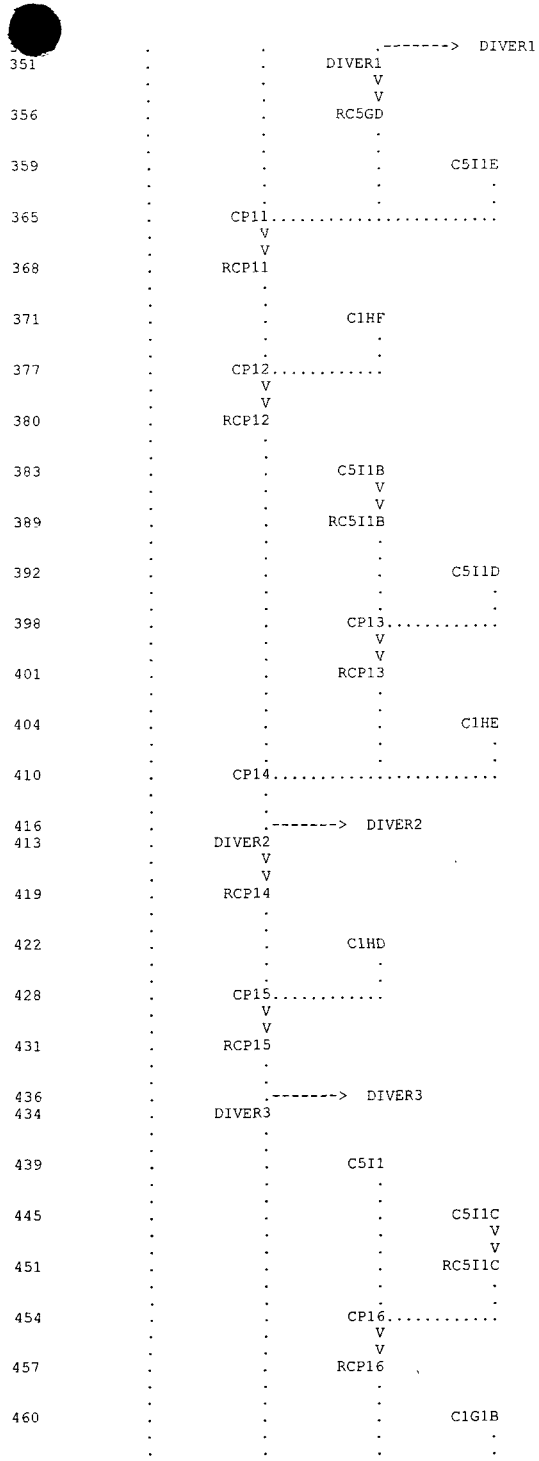
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

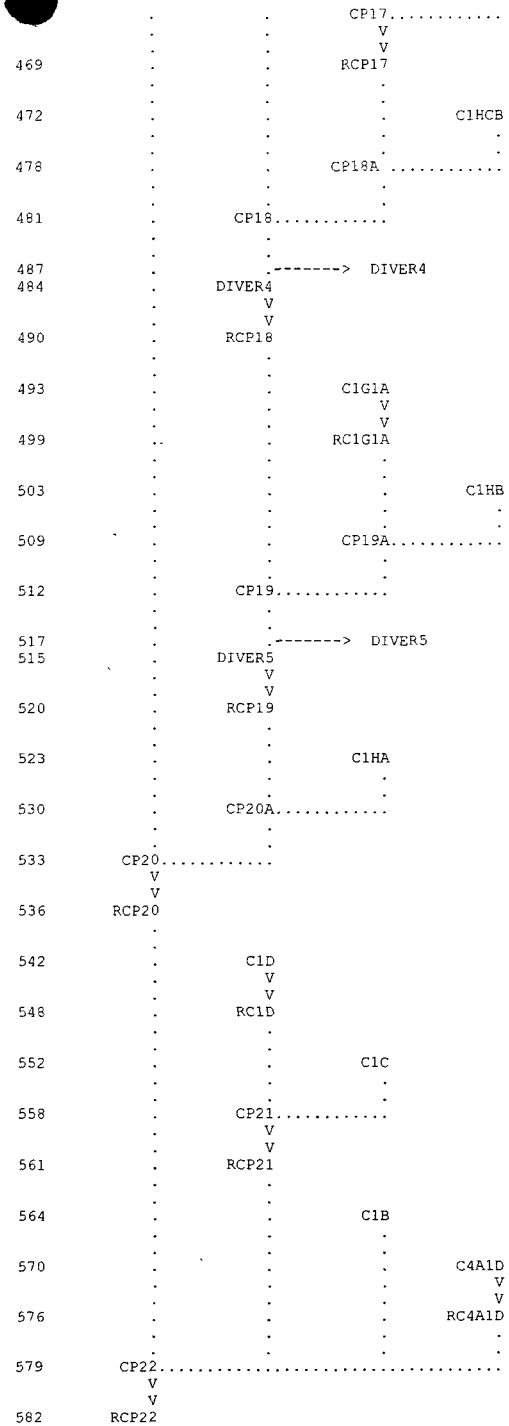
  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

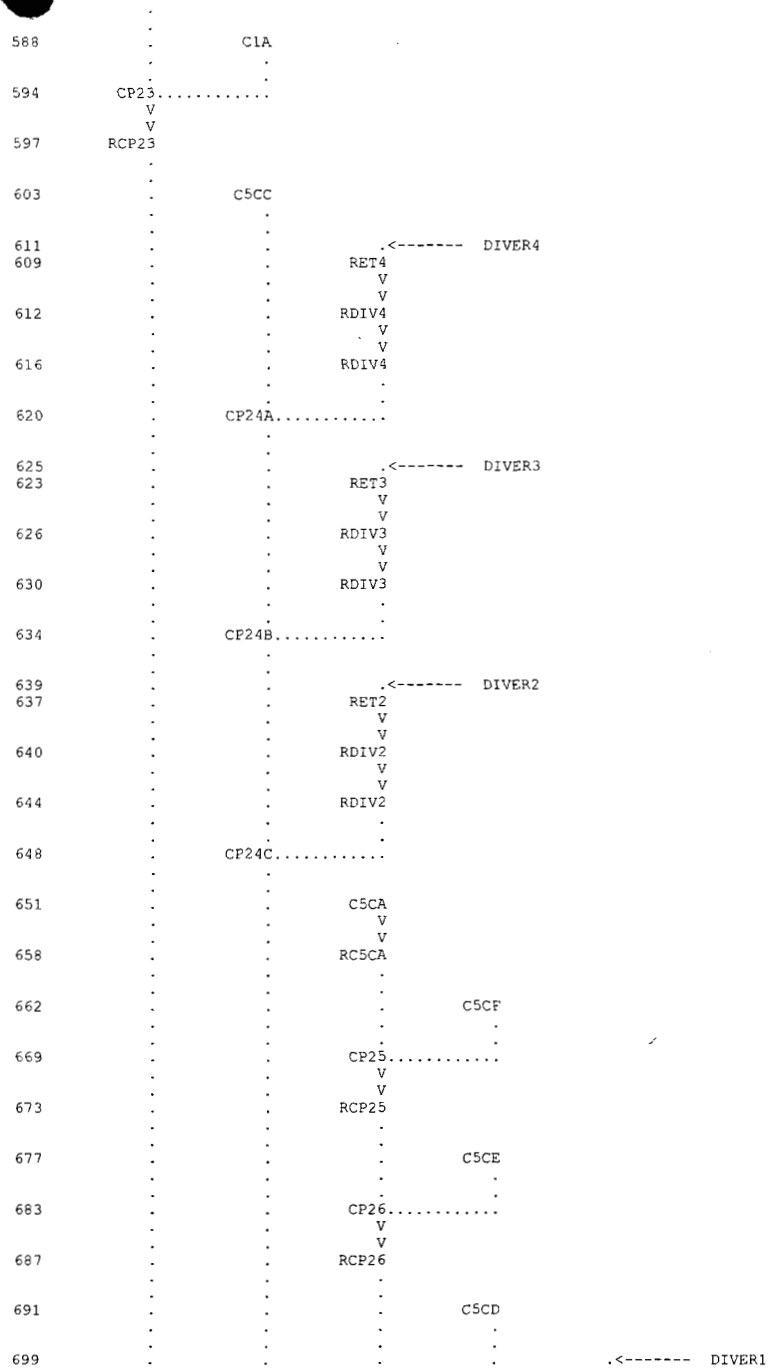
   56          C1H
                 V
                 V
   69          DB1
                 V
                 V
   84         RDB1
                 .
                 .
   90            .       C1HB1
                 .           .
                 .           .
   96          CP2............
                 V
                 V
   99         RCP2
                 .
                 .
  105            .       C1G3A
                 .           .
                 .           .
  111          CP3............
                 V
                 V
  114         RCP3
                 .
                 .
  120            .       C1G3B
                 .           .
                 .           .
  126          CP4............
                 V
                 V
  129         RCP4
                 .
                 .
  135            .       C1G3C
                 .           .
                 .           .
  141          CP5............
                 .
                 .
  145            .       C1G3D
                 .           .
                 .           .
  151         CP6A............
                 .
                 .
  155            .       C5ICB
                 .           V
                 .           V
  161            .       C5ICB
                 .           .
                 .           .
  166            .           .       C5I2A
                 .           .           .
                 .           .           .
  172            .        CP6B............
                 .           .
                 .           .
  175          CP6............
                 V
                 V
  179          DB2
                 V
                 V
  194         RDB2
                 .
                 .
```

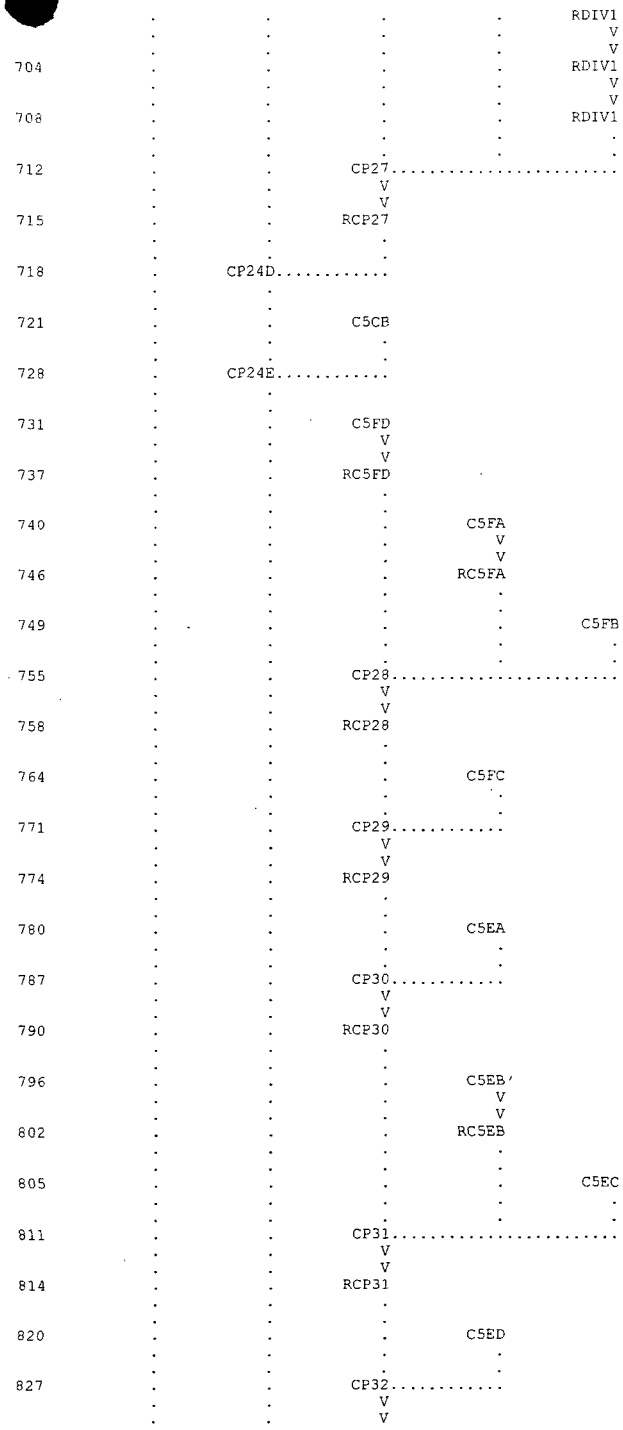

C1G2C
206
C1G2D
212
CP7A
216
C1G2B1
222
RG2B1
226
C1G2B2
232
CP7B
236
C1G2A
242
RC1G2A
246
CP7C
250
CP7
254
CP7DB
270
CP7DB
285
RCP7
290
C1NA
296
RC1NA
301
CP8
304
RCP8
308
C5GC
314
RC5GC
317
C5GB
323
CP9
326
RCP9
329
C5GA
335
CP10
338
RCP10
342
RCP10
345
C5GD

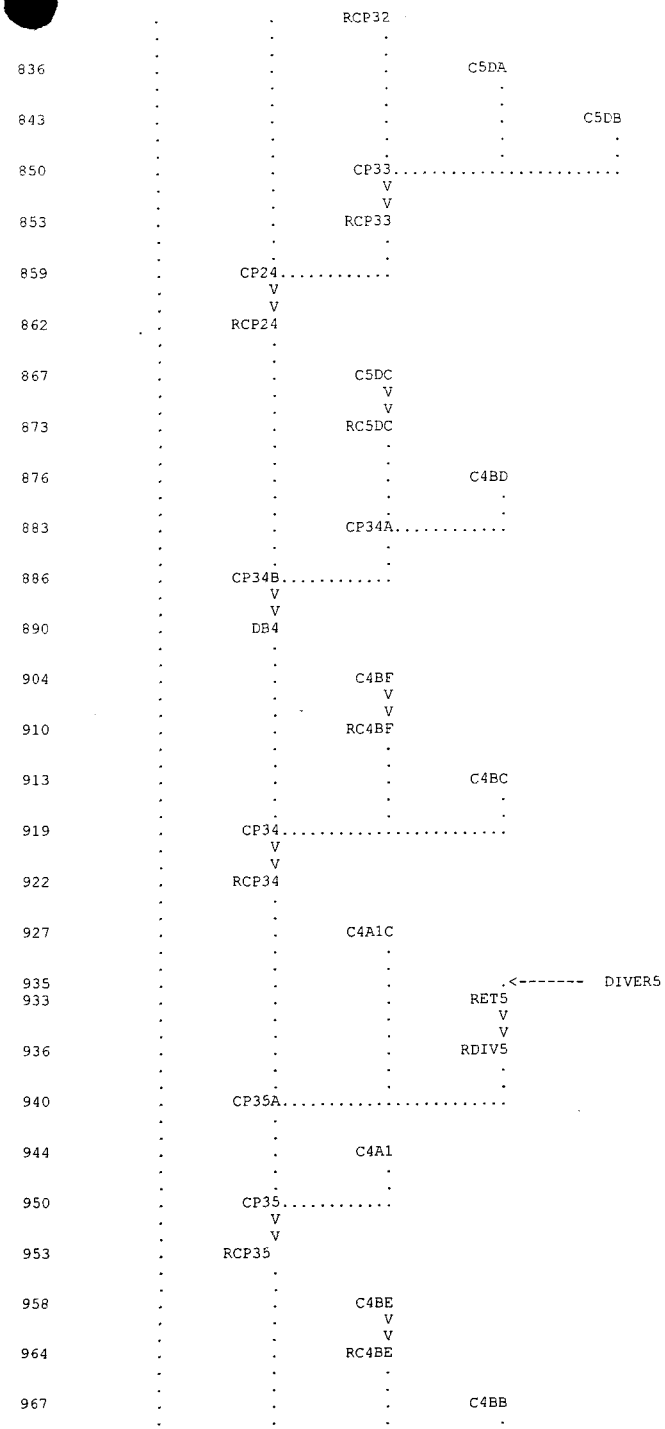

DIVER1
DIVER1
RC5GD
C5I1E
CP11
RCP11
C1HF
CP12
RCP12
C5I1B
RC5I1B
C5I1D
CP13
RCP13
C1HE
CP14
DIVER2
DIVER2
RCP14
C1HD
CP15
RCP15
DIVER3
DIVER3
C5I1
C5I1C
RC5I1C
CP16
RCP16
C1G1B

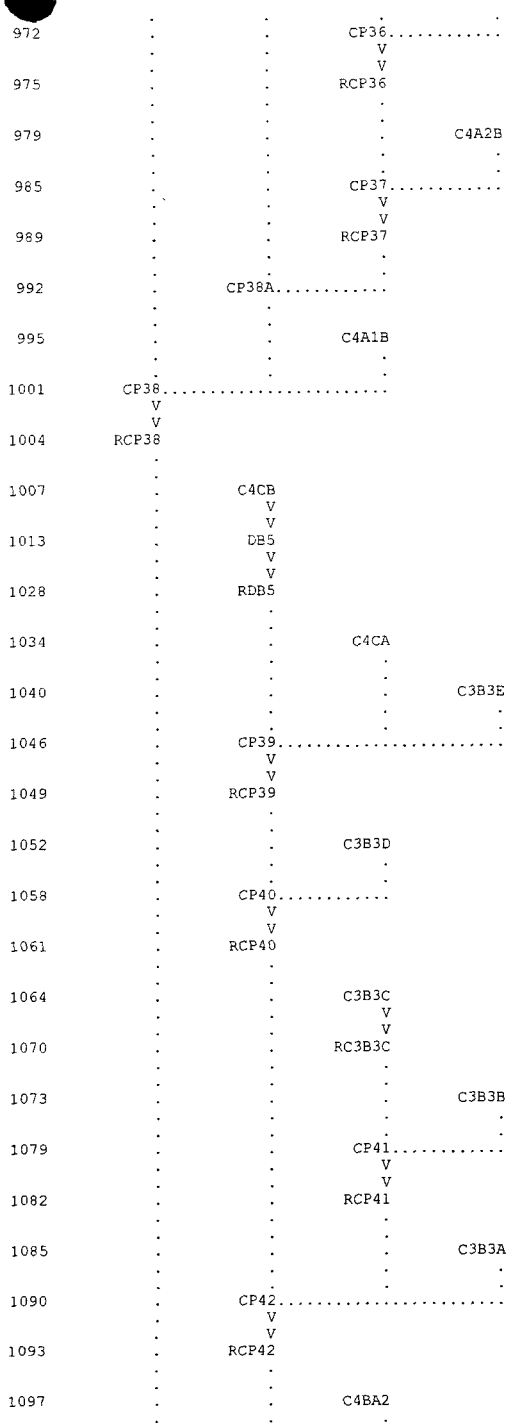

DIVER1
351
DIVER1
356
RC5GD
359
C5I1E
365
CP11
368
RCP11
371
C1HF
377
CP12
380
RCP12
383
C5I1B
389
RC5I1B
392
C5I1D
398
CP13
401
RCP13
404
C1HE
410
CP14
416
DIVER2
413
DIVER2
419
RCP14
422
C1HD
428
CP15
431
RCP15
436
DIVER3
434
DIVER3
439
C5I1
445
C5I1C
451
RC5I1C
454
CP16
457
RCP16
460
C1G1B

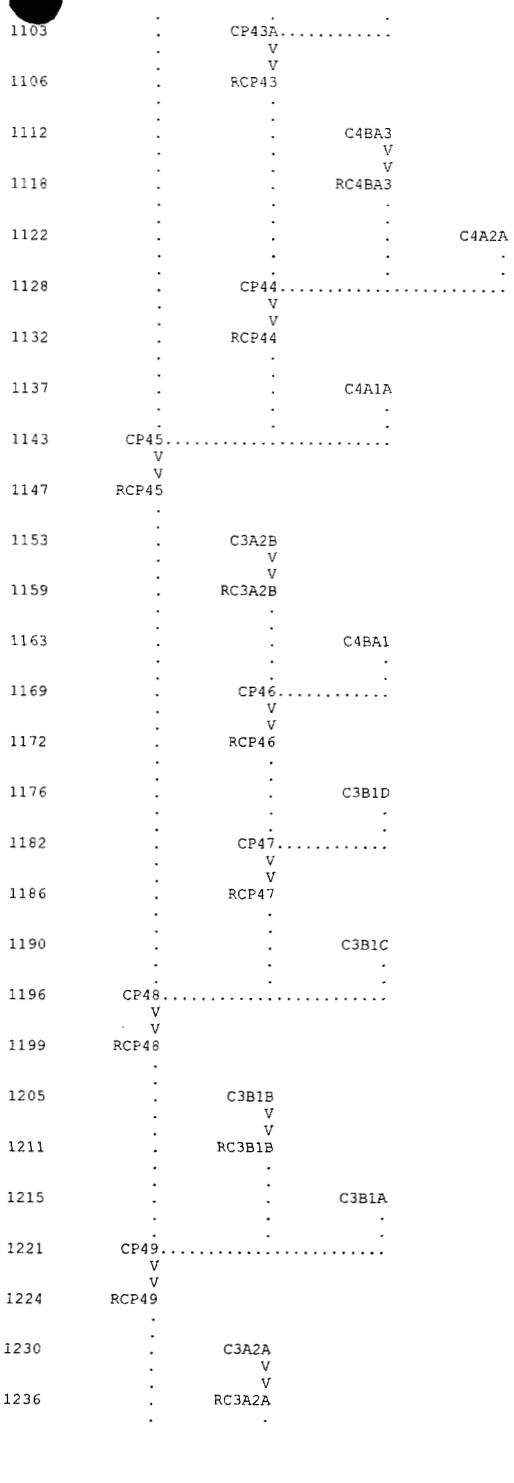

CP17
RCP17
C1HCB
CP18A
CP18
DIVER4
RCP18
C1G1A
RC1G1A
C1HB
CP19A
CP19
DIVER5
RCP19
C1HA
CP20A
CP20
RCP20
C1D
RC1D
C1C
CP21
RCP21
C1B
C4A1D
RC4A1D
CP22
RCP22

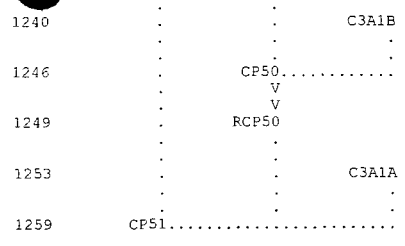

588 C1A
594 CP23
597 RCP23
603 C5CC
611 DIVER4
609 RET4
612 RDIV4
616 RDIV4
620 CP24A
625 DIVER3
623 RET3
626 RDIV3
630 RDIV3
634 CP24B
639 DIVER2
637 RET2
640 RDIV2
644 RDIV2
648 CP24C
651 C5CA
658 RC5CA
662 C5CF
669 CP25
673 RCP25
677 C5CE
683 CP26
687 RCP26
691 C5CD
699 DIVER1
697 RET1


RDIV1
V
V
704
RDIV1
V
V
708
RDIV1
712
CP27
V
V
715
RCP27
718
CP24D
721
C5CB
728
CP24E
731
C5FD
V
V
737
RC5FD
740
C5FA
V
V
746
RC5FA
749
C5FB
755
CP28
V
V
758
RCP28
764
C5FC
771
CP29
V
V
774
RCP29
780
C5EA
787
CP30
V
V
790
RCP30
796
C5EB'
V
V
802
RC5EB
805
C5EC
811
CP31
V
V
814
RCP31
820
C5ED
827
CP32
V
V


RCP32
836
C5DA
843
C5DB
850
CP33
853
RCP33
859
CP24
862
RCP24
867
C5DC
873
RC5DC
876
C4BD
883
CP34A
886
CP34B
890
DB4
904
C4BF
910
RC4BF
913
C4BC
919
CP34
922
RCP34
927
C4A1C
935
DIVER5
933
RET5
936
RDIV5
940
CP35A
944
C4A1
950
CP35
953
RCP35
958
C4BE
964
RC4BE
967
C4BB


972
CP36
975
RCP36
979
C4A2B
985
CP37
989
RCP37
992
CP38A
995
C4A1B
1001
CP38
1004
RCP38
1007
C4CB
1013
DB5
1028
RDB5
1034
C4CA
1040
C3B3E
1046
CP39
1049
RCP39
1052
C3B3D
1058
CP40
1061
RCP40
1064
C3B3C
1070
RC3B3C
1073
C3B3B
1079
CP41
1082
RCP41
1085
C3B3A
1090
CP42
1093
RCP42
1097
C4BA2


1103
CP43A
1106
RCP43
1112
C4BA3
1118
RC4BA3
1122
C4A2A
1128
CP44
1132
RCP44
1137
C4A1A
1143
CP45
1147
RCP45
1153
C3A2B
1159
RC3A2B
1163
C4BA1
1169
CP46
1172
RCP46
1176
C3B1D
1182
CP47
1186
RCP47
1190
C3B1C
1196
CP48
1199
RCP48
1205
C3B1B
1211
RC3B1B
1215
C3B1A
1221
CP49
1224
RCP49
1230
C3A2A
1236
RC3A2A



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*               JUN  1998               *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   12NOV02  TIME  17:29:32   *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```

********** C-1 WATERSHED FIS RESTUDY **********

***** PREPARED FOR: CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT *****
** CLARK COUNTY, NEVADA ***

***** PREPARED BY: CARTER BURGESS AND SOUTHWEST FLUVIAL SYSTEMS *****

EXISTING CONDITIONS DRAINAGE SYSTEM
INPUT FILE = SDN5.DAT
INPUT FILE DATE = NOV 2002
DESIGN STORM = 100-YEAR 6-HR STORM
STORM DISTRIBUTION = SDN #5

REFERENCED HYDROLOGIC MODELS:
PREDESIGN REPORT FOR THE BLACK MOUNTAIN AND MISSION HILLS DETENTION BASINS
AND OUTFALL STRUCTURES (VTN 1992)
SNWA RIVER MOUNTAINS WATER TREATMENT FACILITY DRAFT TECHNICAL DRAINAGE STUDY
(MONTGOMERY WATSON/CH2MHILL 1997)
EAST C-1 DETENTION BASIN FINAL DESIGN (VTN 1998)
DESIGN MEMORANDUM FOR THE EQUESTRIAN DETENTION BASIN (POGGEMEYER 1994)
DESIGN CALCULATION NOTEBOOK FOR THE BLACK MOUNTAIN DETENTION BASIN
(VTN 1998)
CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT 2002 MASTER PLAN UPDATE (LBA)
I-515 BOULDER HIGHWAY TO LAKE MEAD DRIVE DRAINAGE STUDY (SVERDRUP, 1991)

JR CARDS CONTAINED DARFS BASED ON THE FOLLOWING VALUES:

AREA SQ.MI.	DARF
0 - 5	0.950
5 - 12	0.880
12 - 16	0.832
16 - 20	0.804
20 - 30	0.765
30 - 40	0.725

THE FOLLOWING REDUCTION FACTORS ARE USED FOR MODIFIED USLE COMPUTATIONS

2-YR	0.260
5-YR	0.440
10-YR	0.570
25-YR	0.765
50-YR	0.880

```
 54 IO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
```

```
                IPLOT           0  PLOT CONTROL
                QSCAL           0.  HYDROGRAPH PLOT SCALE

  IT        HYDROGRAPH TIME DATA
                NMIN            5  MINUTES IN COMPUTATION INTERVAL
               IDATE      1     0  STARTING DATE
               ITIME         0000  STARTING TIME
                  NQ          300  NUMBER OF HYDROGRAPH ORDINATES
              NDDATE      2     0  ENDING DATE
              NDTIME         0055  ENDING TIME
               ICENT           19  CENTURY MARK

          COMPUTATION INTERVAL      .08 HOURS
              TOTAL TIME BASE    24.92 HOURS

      ENGLISH UNITS
           DRAINAGE AREA          SQUARE MILES
           PRECIPITATION DEPTH    INCHES
           LENGTH, ELEVATION      FEET
           FLOW                   CUBIC FEET PER SECOND
           STORAGE VOLUME         ACRE-FEET
           SURFACE AREA           ACRES
           TEMPERATURE            DEGREES FAHRENHEIT

  JP        MULTI-PLAN OPTION
                NPLAN           1  NUMBER OF PLANS

  JR        MULTI-RATIO OPTION
              RATIOS OF PRECIPITATION
              .95       .88       .83       .80       .76       .73       .57       .44       .26


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


          **************
          *            *
 69 KK    *       DB1  *
          *            *
          **************

  74 KO       OUTPUT CONTROL VARIABLES
                IPRNT           3  PRINT CONTROL
                IPLOT           0  PLOT CONTROL
                QSCAL           0.  HYDROGRAPH PLOT SCALE

            HYDROGRAPH ROUTING DATA

  75 RS       STORAGE ROUTING
                NSTPS           1  NUMBER OF SUBREACHES
                 ITYP        STOR  TYPE OF INITIAL CONDITION
               RSVRIC       -1.00  INITIAL CONDITION
                    X         .00 WORKING R AND D COEFFICIENT

  76 SV         STORAGE          .0       1.2       4.6      10.3      22.6      38.7      54.9      73.4      92.6     113.5
                              135.2     158.2     183.2     208.1     234.7     262.5     292.0     325.3

  78 SE         ELEVATION   2556.00   2558.00   2560.00   2562.00   2564.00   2566.00   2568.00   2570.00   2572.00   2574.00
                            2576.00   2578.00   2580.00   2582.00   2584.00   2586.00   2588.00   2590.00

  80 SQ         DISCHARGE        0.        1.       27.       58.       78.       95.      109.      121.      132.      142.
                              151.      160.      169.      177.      184.      191.      198.      205.

  82 SE         ELEVATION   2556.00   2558.00   2560.00   2562.00   2564.00   2566.00   2568.00   2570.00   2572.00   2574.00
                            2576.00   2578.00   2580.00   2582.00   2584.00   2586.00   2588.00   2590.00

                                                      ***

                                    COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00      1.19      4.55     10.32     22.58     38.69     54.90     73.42     92.55    113.51
          OUTFLOW        .00      1.28     27.31     57.88     77.52     95.42    108.73    120.50    131.87    141.78
        ELEVATION    2556.00   2558.00   2560.00   2562.00   2564.00   2566.00   2568.00   2570.00   2572.00   2574.00

          STORAGE     135.16    158.22    183.23    208.10    234.67    262.55    292.02    325.32
          OUTFLOW     150.74    159.67    168.97    176.60    183.71    190.74    197.77    204.93
        ELEVATION    2576.00   2578.00   2580.00   2582.00   2584.00   2586.00   2588.00   2590.00

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

                      HYDROGRAPH AT STATION      DB1
                        FOR PLAN 1, RATIO =  .95
```

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 196.	5.58		189.	147.	142.	142.
		(INCHES)	.438	1.368	1.368	1.368
		(AC-FT)	94.	292.	292.	292.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
285.	5.58	255.	148.	143.	143.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2587.55	5.58	2585.44	2576.35	2575.63	2575.63

CUMULATIVE AREA = 4.01 SQ MI

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

HYDROGRAPH AT STATION DB1
FOR PLAN 1, RATIO = .88

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 188.	5.50		180.	136.	131.	131.
		(INCHES)	.418	1.266	1.266	1.266
		(AC-FT)	89.	270.	271.	271.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
250.	5.50	221.	123.	118.	118.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2585.11	5.50	2582.97	2574.11	2573.46	2573.46

CUMULATIVE AREA = 4.01 SQ MI

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

HYDROGRAPH AT STATION DB1
FOR PLAN 1, RATIO = .83

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 182.	5.50		173.	128.	123.	123.
		(INCHES)	.402	1.189	1.190	1.190
		(AC-FT)	86.	254.	254.	254.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
227.	5.50	199.	106.	103.	103.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2583.40	5.50	2581.24	2572.57	2571.98	2571.98

CUMULATIVE AREA = 4.01 SQ MI

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

HYDROGRAPH AT STATION DB1
FOR PLAN 1, RATIO = .80

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 178.	5.42		169.	123.	119.	119.
		(INCHES)	.393	1.142	1.142	1.142

		(AC-FT)	84.	244.	244.	244.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
213.	5.42	186.	97.	94.	94.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2582.38	5.42	2580.23	2571.68	2571.11	2571.11

CUMULATIVE AREA = 4.01 SQ MI

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

HYDROGRAPH AT STATION DB1
FOR PLAN 1, RATIO = .76

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 172.	5.42	163.	116.	111.	111.
		(INCHES) .379	1.072	1.072	1.072
		(AC-FT) 81.	229.	229.	229.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
195.	5.42	169.	85.	82.	82.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2580.92	5.42	2578.80	2570.43	2569.90	2569.90

CUMULATIVE AREA = 4.01 SQ MI

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

HYDROGRAPH AT STATION DB1
FOR PLAN 1, RATIO = .73

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 166.	5.33	157.	107.	103.	103.
		(INCHES) .364	.991	.991	.991
		(AC-FT) 78.	212.	212.	212.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
176.	5.33	151.	73.	71.	71.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2579.44	5.33	2577.35	2569.13	2568.65	2568.65

CUMULATIVE AREA = 4.01 SQ MI

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

HYDROGRAPH AT STATION DB1
FOR PLAN 1, RATIO = .57

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 140.	5.33	129.	69.	67.	67.
		(INCHES) .300	.644	.644	.644
		(AC-FT) 64.	138.	138.	138.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
110.	5.33	89.	36.	35.	35.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2573.63	5.33	2571.62	2564.36	2564.06	2564.06

CUMULATIVE AREA = 4.01 SQ MI

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

HYDROGRAPH AT STATION DB1
FOR PLAN 1, RATIO = .44

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
	(CFS)				
+ 113.	5.25	101.	41.	39.	39.
	(INCHES)	.234	.378	.378	.378
	(AC-FT)	50.	81.	81.	81.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
61.	5.25	46.	15.	15.	15.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2568.68	5.25	2566.86	2561.11	2560.92	2560.92

CUMULATIVE AREA = 4.01 SQ MI

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

HYDROGRAPH AT STATION DB1
FOR PLAN 1, RATIO = .26

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
	(CFS)				
+ 62.	5.17	37.	10.	10.	10.
	(INCHES)	.087	.096	.096	.096
	(AC-FT)	19.	20.	20.	20.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
13.	5.17	7.	2.	2.	2.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2562.42	5.17	2560.64	2558.08	2558.00	2558.00

CUMULATIVE AREA = 4.01 SQ MI

*** *** *** *

186 SV	STORAGE	.0 598.5	2.5 630.2	15.9	40.2	72.3	107.2	185.2	273.0	371.6	480.1
188 SE	ELEVATION	2323.00 2354.00	2326.00 2355.00	2328.00	2330.00	2332.00	2334.00	2338.00	2342.00	2346.00	2350.00
190 SQ	DISCHARGE	0. 352.	57. 358.	109.	143.	170.	194.	234.	268.	299.	326.
192 SE	ELEVATION	2323.00 2354.00	2326.00 2355.00	2328.00	2330.00	2332.00	2334.00	2338.00	2342.00	2346.00	2350.00

***

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	.00	2.55	15.85	40.23	72.34	107.20	185.20	273.00	371.60	480.10
OUTFLOW	.00	56.78	108.70	142.90	170.40	193.90	234.10	268.40	298.70	326.10
ELEVATION	2323.00	2326.00	2328.00	2330.00	2332.00	2334.00	2338.00	2342.00	2346.00	2350.00

STORAGE	598.50	630.20
OUTFLOW	351.60	357.60
ELEVATION	2354.00	2355.00

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

HYDROGRAPH AT STATION DB2
FOR PLAN 1, RATIO = .95

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 307.	6.25		302.	261.	252.	252.
		(INCHES)	.297	1.025	1.026	1.026
		(AC-FT)	150.	518.	519.	519.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)					
405.	6.25		386.	284.	273.	273.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)					
2347.22	6.25		2346.54	2341.97	2341.29	2341.29

CUMULATIVE AREA = 9.48 SQ MI

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

HYDROGRAPH AT STATION DB2
FOR PLAN 1, RATIO = .88

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 293.	6.17		288.	246.	237.	237.
		(INCHES)	.282	.965	.965	.965
		(AC-FT)	143.	488.	488.	488.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)					
353.	6.17		336.	241.	232.	232.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)					
2345.26	6.17		2344.56	2340.13	2339.51	2339.51

CUMULATIVE AREA = 9.48 SQ MI

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

HYDROGRAPH AT STATION DB2
FOR PLAN 1, RATIO = .83

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR

+ (CFS)	(HR)					
		(CFS)				
+ 283.	6.17		278.	235.	226.	226.
		(INCHES)	.272	.921	.921	.921
		(AC-FT)	138.	466.	466.	466.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
319.	6.17	303.	213.	205.	205.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2343.88	6.17	2343.21	2338.86	2338.28	2338.28

CUMULATIVE AREA = 9.48 SQ MI

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

HYDROGRAPH AT STATION DB2
FOR PLAN 1, RATIO = .80

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 277.	6.17	272.	228.	220.	220.
		(INCHES) .266	.894	.894	.894
		(AC-FT) 135.	452.	452.	452.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
300.	6.17	284.	197.	190.	190.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2343.09	6.17	2342.43	2338.12	2337.56	2337.56

CUMULATIVE AREA = 9.48 SQ MI

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

HYDROGRAPH AT STATION DB2
FOR PLAN 1, RATIO = .76

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 269.	6.17	262.	218.	210.	210.
		(INCHES) .257	.855	.856	.856
		(AC-FT) 130.	432.	433.	433.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
273.	6.17	258.	175.	169.	169.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2342.01	6.17	2341.30	2337.07	2336.55	2336.55

CUMULATIVE AREA = 9.48 SQ MI

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

HYDROGRAPH AT STATION DB2
FOR PLAN 1, RATIO = .73

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 258.	6.17	252.	207.	200.	200.
		(INCHES) .247	.813	.813	.813
		(AC-FT) 125.	411.	411.	411.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
247.	6.17	232.	153.	148.	148.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2340.80	6.17	2340.12	2335.98	2335.51	2335.51

CUMULATIVE AREA = 9.48 SQ MI

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

HYDROGRAPH AT STATION DB2
FOR PLAN 1, RATIO = .57

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 216.	6.17		210.	156.	150.	150.
		(INCHES)	.206	.612	.612	.612
		(AC-FT)	104.	309.	309.	309.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
150.	6.17	138.	76.	73.	73.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2336.20	6.17	2335.56	2331.61	2331.29	2331.29

CUMULATIVE AREA = 9.48 SQ MI

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

HYDROGRAPH AT STATION DB2
FOR PLAN 1, RATIO = .44

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24 92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 176.	6.00		168.	91.	88.	88.
		(INCHES)	.165	.357	.357	.357
		(AC-FT)	83.	180.	180.	180.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
81.	6.00	70.	29.	28.	28.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2332.48	6.00	2331.86	2327.61	2327.44	2327.44

CUMULATIVE AREA = 9.48 SQ MI

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

HYDROGRAPH AT STATION DB2
FOR PLAN 1, RATIO = .26

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 99.	5.58		78.	22.	21.	21.
		(INCHES)	.077	.086	.086	.086
		(AC-FT)	39.	43.	43.	43.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
13.	5.58	8.	2.	2.	2.

PEAK STAGE TIME MAXIMUM AVERAGE STAGE

+ (FEET)	(HR)	6-HR	24-HR	72-HR	24.92-HR
2327.63	5.58	2326.81	2324.08	2324.04	2324.04

CUMULATIVE AREA = 9.48 SQ MI

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          **************
          *            *
254 KK    *     CP7DB  *
          *            *
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260 KO OUTPUT CONTROL VARIABLES

IPRNT	3	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

261 RS STORAGE ROUTING

NSTPS	1	NUMBER OF SUBREACHES
ITYP	STOR	TYPE OF INITIAL CONDITION
RSVRIC	-1.00	INITIAL CONDITION
X	.00	WORKING R AND D COEFFICIENT

262 SV	STORAGE	.0	.1	.7	1.9	3.9	7.0	11.2	16.1	21.5	27.2
		33.2	39.6	46.4	53.5	61.0	68.9	77.1	85.5	94.2	103.0
264 SE	ELEVATION	2230.00	2231.00	2232.00	2233.00	2234.00	2235.00	2236.00	2237.00	2238.00	2239.00
		2240.00	2241.00	2242.00	2243.00	2244.00	2245.00	2246.00	2247.00	2248.00	2249.00
266 SQ	DISCHARGE	0.	70.	180.	317.	479.	659.	855.	1068.	1291.	1526.
		1776.	2039.	2257.	2384.	2512.	2700.	2887.	3061.	3226.	3515.
268 SE	ELEVATION	2230.00	2231.00	2232.00	2233.00	2234.00	2235.00	2236.00	2237.00	2238.00	2239.00
		2240.00	2241.00	2242.00	2243.00	2244.00	2245.00	2246.00	2247.00	2248.00	2249.00

***

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	.00	.13	.66	1.85	3.90	6.97	11.16	16.15	21.51	27.21
OUTFLOW	.00	70.20	180.10	317.40	479.10	659.20	854.50	1068.10	1290.90	1525.90
ELEVATION	2230.00	2231.00	2232.00	2233.00	2234.00	2235.00	2236.00	2237.00	2238.00	2239.00
STORAGE	33.22	39.59	46.37	53.53	61.03	68.88	77.06	85.51	94.16	102.96
OUTFLOW	1776.10	2038.60	2256.80	2384.20	2511.70	2700.00	2887.00	3060.90	3225.70	3515.40
ELEVATION	2240.00	2241.00	2242.00	2243.00	2244.00	2245.00	2246.00	2247.00	2248.00	2249.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 0. TO 70.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .95

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 818.	4.00		465.	307.	296.	296.
		(INCHES)	.386	1.022	1.023	1.023
		(AC-FT)	230.	609.	610.	610.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
10.	4.00	4.	2.	2.	2.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2235.81	4.00	2233.85	2232.85	2232.75	2232.75

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .88

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 723.	4.08		427.	285.	275.	275.
		(INCHES)	.355	.949	.949	.949
		(AC-FT)	212.	566.	566.	566.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)					
8.	4.08		4.	2.	2.	2.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)					
2235.33	4.08		2233.63	2232.70	2232.61	2232.61

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .83

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 663.	4.08		401.	270.	260.	260.
		(INCHES)	.333	.897	.897	.897
		(AC-FT)	199.	535.	535.	535.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)					
7.	4.08		3.	2.	2.	2.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)					
2235.02	4.08		2233.48	2232.59	2232.50	2232.50

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .80

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 625.	4.08		386.	260.	251.	251.
		(INCHES)	.321	.866	.866	.866
		(AC-FT)	191.	516.	517.	517.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)					
6.	4.08		3.	2.	1.	1.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)					
2234.81	4.08		2233.39	2232.53	2232.44	2232.44

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .76

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 573.	4.08		365.	247.	238.	238.
		(INCHES)	.304	.822	.822	.822
		(AC-FT)	181.	490.	490.	490.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
6.	4.08	3.	1.	1.	1.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2234.52	4.08	2233.26	2232.44	2232.35	2232.35

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .73

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 520.	4.08		343.	233.	225.	225.
		(INCHES)	.285	.776	.776	.776
		(AC-FT)	170.	462.	462.	462.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
5.	4.08	2.	1.	1.	1.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2234.23	4.08	2233.12	2232.34	2232.25	2232.25

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .57

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 366.	5.17		259.	170.	164.	164.
		(INCHES)	.216	.567	.567	.567
		(AC-FT)	129.	338.	338.	338.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
2.	5.17	1.	1.	1.	1.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2233.30	5.17	2232.57	2231.85	2231.78	2231.78

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .44

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 253.	5.17		192.	98.	94.	94.

(INCHES)	.159	.326	.326	.326
(AC-FT)	95.	194.	194.	194.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
1.	5.17	1.	0.	0.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2232.53	5.17	2232.07	2231.12	2231.08	2231.08

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .26

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24 92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 108.	5.58	80.	22.	22.	22.
		(INCHES) .067	.075	.075	.075
		(AC-FT) 40.	45.	45.	45.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
0.	5.58	0.	0.	0.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2231.34	5.58	2231.08	2230.30	2230.29	2230.29

CUMULATIVE AREA = 11.18 SQ MI

*** *** *** *

ELEVATION	2220.00	2221.00	2222.00	2223.00	2224.00	2225.00	2226.00	2227.00	2228.00	2229.00
STORAGE	74.74	84.02	93.46	103.05	112.79					
OUTFLOW	2224.90	2481.10	2700.80	3035.50	3463.40					
ELEVATION	2230.00	2231.00	2232.00	2233.00	2234.00					

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .95

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)	(CFS)				
+ 690.	4.42		456.	298.	287.	287.
		(INCHES)	.379	.993	.993	.993
		(AC-FT)	226.	592.	592.	592.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
34.	4.42	26.	19.	19.	19.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2225.41	4.42	2224.46	2223.67	2223.54	2223.54

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .88

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)	(CFS)				
+ 622.	5.33		417.	277.	267.	267.
		(INCHES)	.347	.921	.921	.921
		(AC-FT)	207.	549.	549.	549.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
32.	5.33	25.	18.	18.	18.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2225.16	5.33	2224.30	2223.56	2223.43	2223.43

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .83

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)	(CFS)				
+ 574.	5.33		391.	261.	252.	252.
		(INCHES)	.325	.870	.870	.870
		(AC-FT)	194.	519.	519.	519.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
30.	5.33	24.	18.	17.	17.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2224.98	5.33	2224.19	2223.47	2223.34	2223.34

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .80

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 548.	5.42		376.	252.	243.	243.
		(INCHES)	.313	.840	.840	.840
		(AC-FT)	186.	500.	501.	501.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
29.	5.42	23.	17.	17.	17.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2224.88	5.42	2224.12	2223.42	2223.29	2223.29

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .76

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24 92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 513.	5.42		355.	239.	231.	231.
		(INCHES)	.295	.796	.796	.796
		(AC-FT)	176.	475.	475.	475.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
28.	5.42	22.	17.	16.	16.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2224.73	5.42	2224.02	2223.34	2223.22	2223.22

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .73

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 477.	5.42		333.	226.	217.	217.
		(INCHES)	.277	.751	.751	.751
		(AC-FT)	165.	448.	448.	448.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
27.	5.42	21.	16.	16.	16.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2224.58	5.42	2223.92	2223.26	2223.14	2223.14

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .57

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW

			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 332.	5.50		249.	166.	160.	160.
		(INCHES)	.207	.553	.553	.553
		(AC-FT)	123.	330.	330.	330.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
22.	5.50	18.	13.	13.	13.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2223.95	5.50	2223.51	2222.88	2222.78	2222.78

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .44

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 223.	5.75	183.	98.	94.	94.
		(INCHES) .153	.326	.326	.326
		(AC-FT) 91.	194.	194.	194.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24 92-HR
+ (AC-FT)	(HR)				
17.	5.75	15.	9.	8.	8.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2223.38	5.75	2223.17	2222.14	2222.06	2222.06

CUMULATIVE AREA = 11.18 SQ MI

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

HYDROGRAPH AT STATION CP7DB
FOR PLAN 1, RATIO = .26

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 92.	7.00	71.	22.	22.	22.
		(INCHES) .059	.075	.075	.075
		(AC-FT) 35.	45.	45.	45.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
9.	6.92	8.	2.	2.	2.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2222.47	7.00	2222.29	2220.87	2220.84	2220.84

CUMULATIVE AREA = 11.18 SQ MI

*** HEC-1 ERROR 1 *** INVALID CARD IDENTIFICATION CODE OR CARD OUT OF SEQUENCE
CARD NO. 341

*** *** *** *

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895 KO OUTPUT CONTROL VARIABLES

IPRNT	3	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

896 RS STORAGE ROUTING

NSTPS	1	NUMBER OF SUBREACHES
ITYP	STOR	TYPE OF INITIAL CONDITION
RSVRIC	.00	INITIAL CONDITION
X	.00	WORKING R AND D COEFFICIENT

897 SV STORAGE	.0	2.0	13.0	31.0	61.0	97.0	118.0	140.0	171.0	200.0
	229.0	261.0	290.0	315.0	344.0	379.0	409.0	437.0	470.0	504.0
899 SE ELEVATION	2048.00	2050.00	2052.00	2054.00	2056.00	2058.00	2059.00	2060.00	2061.00	2062.00
	2063.00	2064.00	2065.00	2066.00	2067.00	2068.00	2069.00	2070.00	2071.00	2072.00
901 SQ DISCHARGE	0.	37.	80.	117.	142.	163.	173.	182.	191.	198.
	206.	213.	221.	228.	235.	242.	248.	2755.	7761.	14467.

903 SS SPILLWAY

CREL	2069.00	SPILLWAY CREST ELEVATION
SPWID	900.00	SPILLWAY WIDTH
COQW	3.00	WEIR COEFFICIENT
EXPW	1.50	EXPONENT OF HEAD

***

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	.00	2.00	13.00	31.00	61.00	97.00	118.00	140.00	171.00	200.00
OUTFLOW	.00	37.00	80.00	117.00	142.00	163.00	173.00	182.00	191.00	198.00
ELEVATION	2048.00	2050.00	2052.00	2054.00	2056.00	2058.00	2059.00	2060.00	2061.00	2062.00
STORAGE	229.00	261.00	290.00	315.00	344.00	379.00	409.00	437.00	470.00	504.00
OUTFLOW	206.00	213.00	221.00	228.00	235.00	242.00	248.00	2755.00	7761.00	14467.00
ELEVATION	2063.00	2064.00	2065.00	2066.00	2067.00	2068.00	2069.00	2070.00	2071.00	2072.00

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HYDROGRAPH AT STATION DB4
FOR PLAN 1, RATIO = .95

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 1864.	5.25		417.	243.	234.	234.
		(INCHES)	.579	1.345	1.348	1.348
		(AC-FT)	207.	481.	482.	482.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)					
427.	5.25		384.	235.	226.	226.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)					
2069.64	5.25		2068.22	2062.79	2062.26	2062.26

CUMULATIVE AREA = 6.71 SQ MI

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

HYDROGRAPH AT STATION DB4
FOR PLAN 1, RATIO = .88

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 709.	5.67		281.	207.	200.	200.
		(INCHES)	.390	1.147	1.149	1.149
		(AC-FT)	139.	410.	411.	411.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	24.92-HR

+ [illegible]FT)	(HR)					
414.	5.67		378.	230.	222.	222.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)					
2069.18	5.67		2068.01	2062.60	2062.07	2062.07

CUMULATIVE AREA = 6.71 SQ MI

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

HYDROGRAPH AT STATION DB4
FOR PLAN 1, RATIO = .83

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 243.	6.25		236.	191.	184.	184.
		(INCHES)	.328	1.060	1.061	1.061
		(AC-FT)	117.	379.	379.	379.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)					
386.	6.25		352.	211.	203.	203.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)					
2068.23	6.25		2067.18	2061.88	2061.38	2061.38

CUMULATIVE AREA = 6.71 SQ MI

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

HYDROGRAPH AT STATION DB4
FOR PLAN 1, RATIO = .80

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 238.	6.17		231.	185.	178.	178.
		(INCHES)	.320	1.027	1.027	1.027
		(AC-FT)	114.	367.	367.	367.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)					
360.	6.17		328.	192.	185.	185.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)					
2067.47	6.17		2066.38	2061.17	2060.70	2060.70

CUMULATIVE AREA = 6.71 SQ MI

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

HYDROGRAPH AT STATION DB4
FOR PLAN 1, RATIO = .76

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 231.	6.17		222.	176.	170.	170.
		(INCHES)	.308	.978	.979	.979
		(AC-FT)	110.	350.	350.	350.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)					
326.	6.17		295.	167.	161.	161.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)					

[illegible].39	6.17	2065.23	2060.18	2059.74	2059.74

CUMULATIVE AREA = 6.71 SQ MI

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

HYDROGRAPH AT STATION DB4
FOR PLAN 1, RATIO = .73

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 222.	6.17	214.	167.	161.	161.
		(INCHES) .297	.925	.925	.925
		(AC-FT) 106.	331.	331.	331.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
293.	6.17	262.	143.	137.	137.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2065.10	6.17	2064.08	2059.15	2058.74	2058.74

CUMULATIVE AREA = 6.71 SQ MI

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

HYDROGRAPH AT STATION DB4
FOR PLAN 1, RATIO = .57

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 191.	6.17	183.	113.	109.	109.
		(INCHES) .254	.628	.628	.628
		(AC-FT) 91.	225.	225.	225.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
172.	6.17	147.	63.	61.	61.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2061.04	6.17	2060.16	2054.82	2054.57	2054.57

CUMULATIVE AREA = 6.71 SQ MI

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

HYDROGRAPH AT STATION DB4
FOR PLAN 1, RATIO = .44

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 158.	6.08	147.	65.	62.	62.
		(INCHES) .203	.359	.359	.359
		(AC-FT) 73.	128.	128.	128.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
89.	6.08	70.	24.	23.	23.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2057.53	6.08	2056.47	2051.57	2051.44	2051.44

CUMULATIVE AREA = 6.71 SQ MI

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HYDROGRAPH AT STATION DB4
FOR PLAN 1, RATIO = .26

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 83.	6.00		62.	17.	16.	16.
		(INCHES)	.086	.092	.092	.092
		(AC-FT)	31.	33.	33.	33.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
14.	6.00	9.	2.	2.	2.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2052.15	6.00	2051.18	2048.85	2048.82	2048.82

CUMULATIVE AREA = 6.71 SQ MI

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1013 KK     **************
            *            *
            *     DB5    *
            *            *
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1018 KO OUTPUT CONTROL VARIABLES
IPRNT 3 PRINT CONTROL
IPLOT 0 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

1019 RS STORAGE ROUTING
NSTPS 1 NUMBER OF SUBREACHES
ITYP STOR TYPE OF INITIAL CONDITION
RSVRIC -1.00 INITIAL CONDITION
X .00 WORKING R AND D COEFFICIENT

1020 SV	STORAGE	1.2	3.3	12.1	28.0	49.0	79.8	115.0	166.1	232.2	320.1
		418.8	534.5	605.5	681.1	765.1	846.8	943.4	1044.8	1261.8	1426.1
1022 SE	ELEVATION	2446.00	2450.00	2454.00	2458.00	2462.00	2466.00	2470.00	2474.00	2478.00	2482.00
		2486.00	2490.00	2492.00	2494.00	2496.00	2498.00	2500.00	2502.00	2506.00	2510.00
1024 SQ	DISCHARGE	1.	23.	36.	46.	54.	60.	67.	72.	78.	82.
		87.	91.	94.	96.	98.	100.	101.	103.	107.	111.
1026 SE	ELEVATION	2446.00	2450.00	2454.00	2458.00	2462.00	2466.00	2470.00	2474.00	2478.00	2482.00
		2486.00	2490.00	2492.00	2494.00	2496.00	2498.00	2500.00	2502.00	2506.00	2510.00

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COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	1.20	3.30	12.10	28.00	49.00	79.80	115.00	166.10	232.20	320.10
OUTFLOW	.50	22.90	36.10	45.70	53.60	60.40	66.50	72.30	77.50	82.40
ELEVATION	2446.00	2450.00	2454.00	2458.00	2462.00	2466.00	2470.00	2474.00	2478.00	2482.00
STORAGE	418.80	534.50	605.50	681.10	765.10	846.80	943.40	1044.80	1261.80	1426.10
OUTFLOW	87.00	91.20	93.50	95.60	97.60	99.50	101.40	103.40	107.20	110.70
ELEVATION	2486.00	2490.00	2492.00	2494.00	2496.00	2498.00	2500.00	2502.00	2506.00	2510.00

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HYDROGRAPH AT STATION DB5
FOR PLAN 1, RATIO = .95

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 90.	6.08		89.	83.	80.	80.

		(INCHES)	.153	.571	.574	.574
		(AC-FT)	44.	165.	166.	166.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
492.	6.08	477.	383.	369.	369.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2488.53	6.08	2488.00	2483.34	2482.05	2482.05

CUMULATIVE AREA = 5.41 SQ MI

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

HYDROGRAPH AT STATION DB5
FOR PLAN 1, RATIO = .88

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 88.	6.08	87.	81.	78.	78.
		(INCHES) .150	.554	.557	.557
		(AC-FT) 43.	160.	161.	161.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
435.	6.08	420.	333.	321.	321.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2486.55	6.08	2486.01	2481.28	2480.05	2480.05

CUMULATIVE AREA = 5.41 SQ MI

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

HYDROGRAPH AT STATION DB5
FOR PLAN 1, RATIO = .83

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24 92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 86.	6.08	85.	79.	76.	76.
		(INCHES) .147	.541	.543	.543
		(AC-FT) 42.	156.	157.	157.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
396.	6.08	382.	300.	289.	289.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2485.08	6.08	2484.49	2479.80	2478.61	2478.61

CUMULATIVE AREA = 5.41 SQ MI

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HYDROGRAPH AT STATION DB5
FOR PLAN 1, RATIO = .80

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)				
		(CFS)			
+ 85.	6.08	84.	78.	75.	75.
		(INCHES) .145	.533	.535	.535
		(AC-FT) 42.	154.	154.	154.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				

74.	6.08		360.	280.	270.	270.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)					
2484.18	6.08		2483.60	2478.92	2477.75	2477.75

CUMULATIVE AREA = 5.41 SQ MI

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HYDROGRAPH AT STATION DB5
FOR PLAN 1, RATIO = .76

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 83.	6.00		83.	76.	73.	73.
		(INCHES)	.142	.522	.524	.524
		(AC-FT)	41.	151.	151.	151.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
343.	6.00	329.	254.	245.	245.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)					
2482.94	6.00		2482.37	2477.68	2476.54	2476.54

CUMULATIVE AREA = 5.41 SQ MI

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HYDROGRAPH AT STATION DB5
FOR PLAN 1, RATIO = .73

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 82.	6.00		81.	74.	72.	72.
		(INCHES)	.140	.510	.510	.510
		(AC-FT)	40.	147.	147.	147.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
313.	6.00	299.	228.	219.	219.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)					
2481.66	6.00		2481.04	2476.33	2475.22	2475.22

CUMULATIVE AREA = 5.41 SQ MI

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HYDROGRAPH AT STATION DB5
FOR PLAN 1, RATIO = .57

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 75.	6.00		74.	65.	63.	63.
		(INCHES)	.127	.448	.448	.448
		(AC-FT)	37.	129.	129.	129.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
200.	6.00	188.	132.	128.	128.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)					
2476.06	6.00		2475.33	2470.13	2469.24	2469.24

CUMULATIVE AREA = 5.41 SQ MI

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HYDROGRAPH AT STATION DB5
FOR PLAN 1, RATIO = .44

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 67.	5.92		65.	53.	51.	51.
		(INCHES)	.112	.367	.367	.367
		(AC-FT)	32.	106.	106.	106.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)					
117.	5.92		106.	65.	63.	63.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)					
2470.13	5.92		2469.01	2463.05	2462.43	2462.43

CUMULATIVE AREA = 5.41 SQ MI

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HYDROGRAPH AT STATION DB5
FOR PLAN 1, RATIO = .26

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 46.	5.17		42.	18.	18.	18.
		(INCHES)	.073	.127	.127	.127
		(AC-FT)	21.	37.	37.	37.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)					
29.	5.17		22.	8.	8.	8.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)					
2458.22	5.17		2456.57	2450.19	2450.04	2450.04

CUMULATIVE AREA = 5.41 SQ MI

*** HEC-1 ERROR 1 *** INVALID CARD IDENTIFICATION CODE OR CARD OUT OF SEQUENCE
CARD NO. 1121 *
1

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 .95	RATIO 2 .88	RATIO 3 .83	RATIO 4 .80	RATIO 5 .76	RATIO 6 .73	RATIO 7 .57	RATIO 8 .44	RATIO 9 .26
HYDROGRAPH AT													
+	C1H	4.01	1	FLOW	3789.	3380.	3101.	2940.	2716.	2489.	1637.	977.	224.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO													
+	DB1	4.01	1	FLOW	196.	188.	182.	178.	172.	166.	140.	113.	62.
				TIME	5.58	5.50	5.50	5.42	5.42	5.33	5.33	5.25	5.17
			** PEAK STAGES IN FEET **										
			1	STAGE	2587.55	2585.11	2583.40	2582.38	2580.92	2579.44	2573.63	2568.68	2562.42
				TIME	5.58	5.50	5.50	5.42	5.42	5.33	5.33	5.25	5.17
ROUTED TO													
+	RDB1	4.01	1	FLOW	196.	188.	182.	178.	172.	166.	140.	113.	62.
				TIME	5.67	5.58	5.58	5.50	5.58	5.50	5.50	5.42	5.33

HYDROGRAPH AT													
+	C1HB1	.45	1	FLOW	224.	197.	176.	168.	153.	138.	84.	45.	11.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92	4.00	5.17
2 COMBINED AT													
+	CP2	4.46	1	FLOW	388.	352.	328.	314.	294.	274.	202.	151.	72.
				TIME	3.92	3.92	3.92	3.92	3.92	4.00	5.17	5.17	5.25
ROUTED TO													
+	RCP2	4.46	1	FLOW	386.	351.	327.	313.	294.	274.	201.	150.	72.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	5.17	5.17	5.25
HYDROGRAPH AT													
+	C1G3A	.27	1	FLOW	253.	225.	207.	196.	181.	166.	109.	65.	14.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT													
+	CP3	4.73	1	FLOW	518.	464.	427.	406.	376.	348.	246.	177.	77.
				TIME	3.58	3.58	3.58	3.58	3.67	3.92	4.92	4.92	5.08
ROUTED TO													
+	RCP3	4.73	1	FLOW	520.	458.	422.	407.	378.	348.	245.	177.	77.
				TIME	3.67	3.75	3.75	3.67	3.67	3.67	5.00	5.00	5.17
HYDROGRAPH AT													
+	C1G3B	.73	1	FLOW	726.	645.	590.	558.	514.	469.	303.	175.	38.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	4.83
2 COMBINED AT													
+	CP4	5.46	1	FLOW	1140.	1013.	928.	880.	812.	744.	484.	278.	101.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.83	4.83
ROUTED TO													
+	RCP4	5.46	1	FLOW	1140.	1016.	934.	888.	821.	753.	494.	273.	101.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	5.00	5.00
HYDROGRAPH AT													
+	C1G3C	1.05	1	FLOW	974.	869.	797.	755.	698.	639.	420.	250.	56.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT													
+	CP5	6.51	1	FLOW	2086.	1850.	1690.	1599.	1471.	1341.	860.	491.	151.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67	3.67	4.92
HYDROGRAPH AT													
+	C1G3D	.84	1	FLOW	863.	774.	712.	677.	628.	577.	388.	239.	65.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT													
+	CP6A	7.35	1	FLOW	2949.	2623.	2402.	2276.	2098.	1918.	1244.	688.	202.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.92
HYDROGRAPH AT													
+	C5ICB	.73	1	FLOW	602.	527.	477.	448.	408.	367.	220.	112.	21.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.92
ROUTED TO													
+	C5ICB	.73	1	FLOW	572.	487.	457.	431.	403.	365.	206.	107.	21.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	5.08
HYDROGRAPH AT													
+	C5I2A	1.40	1	FLOW	1187.	1043.	946.	890.	813.	735.	449.	237.	46.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.83
2 COMBINED AT													
+	CP6B	2.13	1	FLOW	1745.	1513.	1375.	1290.	1178.	1059.	622.	309.	61.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.92
2 COMBINED AT													
+	CP6	9.48	1	FLOW	4695.	4137.	3778.	3566.	3276.	2977.	1866.	997.	263.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.92
ROUTED TO													
+	DB2	9.48	1	FLOW	307.	293.	283.	277.	269.	258.	216.	176.	99.
				TIME	6.25	6.17	6.17	6.17	6.17	6.17	6.17	6.00	5.58
			**	PEAK STAGES IN FEET **									
			1	STAGE	2347.22	2345.26	2343.88	2343.09	2342.01	2340.80	2336.20	2332.48	2327.63
				TIME	6.25	6.17	6.17	6.17	6.17	6.17	6.17	6.00	5.58
ROUTED TO													
+	RDB2	9.48	1	FLOW	307.	293.	283.	277.	268.	258.	216.	176.	99.
				TIME	6.25	6.25	6.25	6.25	6.25	6.25	6.17	6.08	5.67

HYDROGRAPH AT												
+	C1G2C	.29	1	FLOW	152.	131.	116.	108.	97.	85.	45.	22.	3.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	4.92	5.00
HYDROGRAPH AT												
+	C1G2D	.22	1	FLOW	108.	92.	81.	74.	66.	58.	28.	14.	1.
				TIME	3.58	3.67	3.67	3.67	3.67	3.67	3.67	4.92	5.00
3 COMBINED AT												
+	CP7A	10.00	1	FLOW	479.	429.	401.	387.	367.	347.	267.	200.	100.
				TIME	3.67	3.67	4.92	4.92	4.92	4.92	4.92	5.00	5.58
HYDROGRAPH AT												
+	C1G2B1	.52	1	FLOW	189.	160.	140.	129.	114.	99.	51.	26.	1.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	5.08	5.08	5.17
ROUTED TO												
+	RG2B1	.52	1	FLOW	189.	161.	141.	131.	117.	103.	55.	27.	1.
				TIME	4.08	4.08	4.08	4.08	4.08	4.17	4.33	5.50	7.00
HYDROGRAPH AT												
+	C1G2B2	.31	1	FLOW	167.	144.	128.	119.	107.	95.	52.	24.	4.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	4.92	5.00
2 COMBINED AT												
+	CP7B	.83	1	FLOW	290.	246.	216.	199.	175.	154.	80.	40.	4.
				TIME	4.00	4.00	4.00	4.00	4.08	4.00	4.17	4.75	5.00
HYDROGRAPH AT												
+	C1G2A	.35	1	FLOW	217.	189.	169.	158.	143.	128.	74.	36.	7.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67	3.67	4.92
ROUTED TO												
+	RC1G2A	.35	1	FLOW	217.	190.	173.	163.	148.	133.	77.	36.	8.
				TIME	3.75	3.83	3.83	3.83	3.83	3.83	3.92	3.92	5.50
2 COMBINED AT												
+	CP7C	1.18	1	FLOW	482.	407.	356.	326.	292.	250.	127.	61.	10.
				TIME	3.83	3.83	3.83	3.83	3.92	3.92	4.17	5.08	5.50
2 COMBINED AT												
+	CP7	11.18	1	FLOW	923.	802.	724.	678.	613.	551.	377.	259.	109.
				TIME	3.75	3.83	3.83	3.83	3.92	3.92	5.00	5.08	5.50
ROUTED TO												
+	CP7DB	11.18	1	FLOW	818.	723.	663.	625.	573.	520.	366.	253.	108.
				TIME	4.00	4.08	4.08	4.08	4.08	4.08	5.17	5.17	5.58
				** PEAK STAGES IN FEET **									
			1	STAGE	2235.81	2235.33	2235.02	2234.81	2234.52	2234.23	2233.30	2232.53	2231.34
				TIME	4.00	4.08	4.08	4.08	4.08	4.08	5.17	5.17	5.58
ROUTED TO												
+	CP7DB	11.18	1	FLOW	690.	622.	574.	548.	513.	477.	332.	223.	92.
				TIME	4.42	5.33	5.33	5.42	5.42	5.42	5.50	5.75	7.00
				** PEAK STAGES IN FEET **									
			1	STAGE	2225.41	2225.16	2224.98	2224.88	2224.73	2224.58	2223.95	2223.38	2222.47
				TIME	4.42	5.33	5.33	5.42	5.42	5.42	5.50	5.75	7.00
ROUTED TO												
+	RCP7	11.18	1	FLOW	690.	620.	574.	548.	512.	476.	332.	223.	92.
				TIME	4.50	5.42	5.42	5.42	5.42	5.42	5.58	5.83	7.08
HYDROGRAPH AT												
+	C1NA	.41	1	FLOW	516.	460.	422.	400.	370.	339.	222.	132.	30.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO												
+	RC1NA	.41	1	FLOW	471.	425.	383.	362.	335.	304.	191.	110.	28.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.58
2 COMBINED AT												
+	CP8	11.59	1	FLOW	873.	779.	714.	679.	628.	574.	373.	227.	92.
				TIME	4.83	4.83	4.83	4.83	4.83	4.83	4.83	5.83	7.08
ROUTED TO												
+	RCP8	11.59	1	FLOW	867.	773.	707.	673.	621.	567.	369.	228.	92.
				TIME	4.83	4.83	4.83	4.83	4.83	4.83	4.92	5.92	7.17
HYDROGRAPH AT												
+	C5GC	.11	1	FLOW	154.	138.	127.	120.	111.	102.	68.	41.	10.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50

ROUTED TO													
+	RC5GC	.11	1	FLOW	137.	117.	106.	101.	92.	84.	55.	35.	9.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.58	3.58	3.67
HYDROGRAPH AT													
+	C5GB	.32	1	FLOW	317.	282.	258.	244.	225.	205.	133.	77.	16.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.92
2 COMBINED AT													
+	CP9	.44	1	FLOW	437.	386.	354.	338.	310.	288.	187.	112.	23.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.92
ROUTED TO													
+	RCP9	.44	1	FLOW	428.	375.	341.	324.	293.	269.	169.	112.	24.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67	3.67	3.75
HYDROGRAPH AT													
+	C5GA	.27	1	FLOW	78.	63.	53.	48.	41.	36.	19.	7.	0.
				TIME	3.75	3.75	3.75	3.75	5.00	5.00	5.00	5.00	.00
2 COMBINED AT													
+	CP10	.71	1	FLOW	493.	426.	383.	361.	323.	296.	177.	112.	24.
				TIME	3.58	3.58	3.58	3.58	3.58	3.67	3.67	3.67	3.75
ROUTED TO													
+	RCP10	.71	1	FLOW	471.	407.	366.	347.	310.	297.	178.	105.	32.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.75	4.00
ROUTED TO													
+	RCP10	.71	1	FLOW	450.	389.	351.	332.	311.	298.	179.	106.	37.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83	3.92	4.25
HYDROGRAPH AT													
+	C5GD	.44	1	FLOW	119.	97.	83.	74.	64.	57.	31.	12.	0.
				TIME	3.92	3.92	3.92	3.92	5.08	5.08	5.08	5.17	.00
DIVERSION TO													
+	DIVER1	.44	1	FLOW	19.	17.	15.	14.	13.	12.	8.	3.	0.
				TIME	3.92	3.92	3.92	3.92	5.08	5.08	5.08	5.17	.00
HYDROGRAPH AT													
+	DIVER1	.44	1	FLOW	100.	80.	67.	60.	51.	45.	22.	9.	0.
				TIME	3.92	3.92	3.92	3.92	5.08	5.08	5.08	5.17	.00
ROUTED TO													
+	RC5GD	.44	1	FLOW	100.	80.	67.	60.	51.	44.	22.	9.	0.
				TIME	4.00	4.00	4.08	4.08	5.25	5.25	5.33	5.42	.00
HYDROGRAPH AT													
+	C5I1E	.16	1	FLOW	187.	165.	150.	141.	129.	117.	72.	38.	6.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	4.83
3 COMBINED AT													
+	CP11	1.32	1	FLOW	568.	481.	426.	400.	368.	352.	207.	116.	38.
				TIME	3.75	3.75	3.75	3.83	3.83	3.83	3.83	3.92	4.25
ROUTED TO													
+	RCP11	1.32	1	FLOW	554.	478.	427.	401.	369.	345.	196.	129.	25.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.92	3.92	4.42
HYDROGRAPH AT													
+	C1HF	.10	1	FLOW	66.	57.	51.	48.	44.	39.	23.	11.	2.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	5.00
2 COMBINED AT													
+	CP12	1.42	1	FLOW	607.	523.	468.	439.	404.	376.	213.	138.	25.
				TIME	3.75	3.83	3.83	3.83	3.83	3.83	3.92	3.92	4.42
ROUTED TO													
+	RCP12	1.42	1	FLOW	604.	525.	471.	443.	406.	378.	220.	145.	25.
				TIME	3.83	3.92	3.92	3.92	3.92	3.92	4.00	4.08	5.83
HYDROGRAPH AT													
+	C5I1B	.52	1	FLOW	361.	305.	268.	247.	218.	190.	90.	38.	1.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	4.83	4.92
ROUTED TO													
+	RC5I1B	.52	1	FLOW	316.	271.	241.	222.	198.	174.	88.	37.	1.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.92	5.42
HYDROGRAPH AT													
+	C5I1D	.12	1	FLOW	90.	78.	70.	66.	60.	53.	31.	15.	3.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.92

2 COMBINED AT												
+	CP13	.63	1	FLOW	406.	349.	311.	288.	258.	227.	119.	49.	3.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.92	4.92
ROUTED TO													
+	RCP13	.63	1	FLOW	368.	345.	310.	287.	259.	211.	103.	46.	3.
				TIME	3.58	3.67	3.67	3.67	3.67	3.67	3.75	5.00	5.33
HYDROGRAPH AT													
+	C1HE	.15	1	FLOW	83.	70.	62.	57.	50.	44.	21.	9.	0.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.83	4.92
3 COMBINED AT													
+	CP14	2.20	1	FLOW	965.	848.	747.	686.	611.	511.	281.	170.	26.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	4.00	4.08	5.83
DIVERSION TO													
+	DIVER2	2.20	1	FLOW	89.	78.	69.	63.	56.	47.	26.	16.	2.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	4.00	4.08	5.83
HYDROGRAPH AT													
+	DIVER2	2.20	1	FLOW	876.	770.	678.	623.	554.	464.	255.	154.	23.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	4.00	4.08	5.83
ROUTED TO													
+	RCP14	2.20	1	FLOW	857.	743.	649.	591.	516.	452.	244.	147.	22.
				TIME	3.67	3.67	3.67	3.67	3.75	3.75	4.00	4.17	6.00
HYDROGRAPH AT													
+	C1HD	.07	1	FLOW	52.	45.	40.	37.	34.	30.	17.	8.	1.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.92
2 COMBINED AT													
+	CP15	2.27	1	FLOW	896.	777.	680.	619.	541.	467.	251.	150.	22.
				TIME	3.67	3.67	3.67	3.67	3.67	3.75	4.00	4.17	6.00
ROUTED TO													
+	RCP15	2.27	1	FLOW	872.	750.	659.	605.	527.	460.	247.	140.	23.
				TIME	3.75	3.75	3.75	3.75	3.75	3.83	4.08	4.33	6.25
DIVERSION TO													
+	DIVER3	2.27	1	FLOW	162.	139.	122.	112.	98.	85.	46.	26.	4.
				TIME	3.75	3.75	3.75	3.75	3.75	3.83	4.08	4.33	6.25
HYDROGRAPH AT													
+	DIVER3	2.27	1	FLOW	710.	611.	537.	493.	429.	374.	201.	114.	19.
				TIME	3.75	3.75	3.75	3.75	3.75	3.83	4.08	4.33	6.25
HYDROGRAPH AT													
+	C5I1	.24	1	FLOW	174.	150.	135.	126.	113.	101.	56.	25.	4.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.92
HYDROGRAPH AT													
+	C5I1C	.06	1	FLOW	47.	41.	38.	35.	32.	29.	18.	9.	2.
				TIME	3.58	3.67	3.67	3.67	3.67	3.67	3.67	3.67	4.92
ROUTED TO													
+	RC5I1C	.06	1	FLOW	48.	41.	36.	34.	33.	29.	18.	9.	2.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.75	5.08
2 COMBINED AT													
+	CP16	.31	1	FLOW	215.	186.	166.	155.	140.	125.	69.	30.	6.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67	4.92
ROUTED TO													
+	RCP16	.31	1	FLOW	205.	176.	159.	148.	135.	121.	67.	30.	5.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.75	5.08
HYDROGRAPH AT													
+	C1G1B	.14	1	FLOW	141.	126.	117.	111.	103.	95.	64.	40.	11.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT													
+	CP17	.45	1	FLOW	341.	297.	268.	251.	230.	207.	123.	64.	13.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67	3.67	4.92
ROUTED TO													
+	RCP17	.45	1	FLOW	343.	297.	268.	251.	228.	206.	127.	64.	13.
				TIME	3.67	3.67	3.67	3.67	3.67	3.75	3.75	3.83	5.17
HYDROGRAPH AT													
+	C1HCB	.18	1	FLOW	178.	156.	140.	132.	120.	108.	63.	31.	5.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	4.83

2 COMBINED AT												
+	CP18A	.63	1	FLOW	393.	338.	304.	285.	261.	237.	146.	78.	13.
				TIME	3.50	3.67	3.67	3.67	3.75	3.75	3.75	3.83	5.17
2 COMBINED AT													
+	CP18	2.90	1	FLOW	1081.	938.	835.	774.	690.	596.	321.	151.	31.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83	4.25	5.25
DIVERSION TO													
+	DIVER4	2.90	1	FLOW	97.	84.	75.	70.	62.	54.	29.	14.	3.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83	4.25	5.25
HYDROGRAPH AT													
+	DIVER4	2.90	1	FLOW	984.	853.	760.	705.	628.	542.	292.	137.	28.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83	4.25	5.25
ROUTED TO													
+	RCP18	2.90	1	FLOW	986.	848.	747.	682.	611.	537.	286.	136.	27.
				TIME	3.75	3.75	3.75	3.75	3.83	3.83	3.92	4.42	5.42
HYDROGRAPH AT													
+	C1G1A	.22	1	FLOW	179.	159.	145.	137.	126.	115.	73.	42.	10.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67	4.92
ROUTED TO													
+	RC1G1A	.22	1	FLOW	182.	161.	145.	137.	125.	115.	76.	44.	10.
				TIME	3.75	3.75	3.75	3.75	3.75	3.83	3.83	3.92	5.33
HYDROGRAPH AT													
+	C1HB	.15	1	FLOW	193.	172.	159.	151.	139.	128.	86.	52.	13.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT													
+	CP19A	.37	1	FLOW	284.	249.	225.	212.	193.	174.	107.	60.	13.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.83	3.83	4.83
2 COMBINED AT													
+	CP19	3.27	1	FLOW	1218.	1054.	935.	862.	785.	697.	372.	166.	38.
				TIME	3.75	3.75	3.75	3.83	3.83	3.83	3.92	4.42	5.42
DIVERSION TO													
+	DIVER5	3.27	1	FLOW	385.	261.	172.	118.	69.	61.	33.	15.	3.
				TIME	3.75	3.75	3.75	3.83	3.83	3.83	3.92	4.42	5.42
HYDROGRAPH AT													
+	DIVER5	3.27	1	FLOW	834.	792.	762.	744.	716.	636.	340.	151.	34.
				TIME	3.75	3.75	3.75	3.83	3.83	3.83	3.92	4.42	5.42
ROUTED TO													
+	RCP19	3.27	1	FLOW	838.	795.	766.	747.	701.	632.	345.	144.	32.
				TIME	3.83	3.83	3.83	3.83	3.83	3.92	4.00	4.50	5.67
HYDROGRAPH AT													
+	C1HA	.07	1	FLOW	20.	16.	13.	12.	10.	9.	5.	1.	0.
				TIME	3.67	3.67	3.67	4.92	4.92	4.92	4.92	4.92	.00
2 COMBINED AT													
+	CP20A	3.35	1	FLOW	852.	806.	775.	755.	708.	637.	347.	145.	32.
				TIME	3.83	3.83	3.83	3.83	3.83	3.92	4.00	4.50	5.67
2 COMBINED AT													
+	CP20	14.94	1	FLOW	1455.	1292.	1178.	1128.	1049.	942.	582.	347.	108.
				TIME	4.92	4.92	3.92	3.92	3.92	3.92	4.92	5.33	6.75
ROUTED TO													
+	RCP20	14.94	1	FLOW	1447.	1283.	1169.	1119.	1037.	925.	580.	345.	108.
				TIME	4.92	4.92	3.92	3.92	3.92	3.92	5.25	5.33	6.75
HYDROGRAPH AT													
+	C1D	.40	1	FLOW	242.	209.	187.	174.	157.	139.	77.	35.	7.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67	4.92
ROUTED TO													
+	RC1D	.40	1	FLOW	238.	206.	186.	174.	157.	141.	78.	34.	6.
				TIME	3.67	3.75	3.75	3.75	3.75	3.75	3.75	3.75	5.17
HYDROGRAPH AT													
+	C1C	.23	1	FLOW	156.	136.	123.	115.	104.	94.	55.	27.	5.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.92
2 COMBINED AT													
+	CP21	.63	1	FLOW	378.	327.	292.	272.	245.	218.	119.	54.	10.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.75	5.00

BOULDER HWY AND C-1 CHANNEL

ROUTED TO													
+	RCP21	.63	1	FLOW	374.	325.	291.	272.	246.	219.	120.	53.	10.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.92	5.17	5.33
HYDROGRAPH AT													
+	C1B	.38	1	FLOW	320.	286.	262.	249.	230.	211.	139.	83.	20.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67
HYDROGRAPH AT													
+	C4A1D	.06	1	FLOW	39.	34.	30.	28.	25.	22.	13.	5.	1.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.92
ROUTED TO													
+	RC4A1D	.06	1	FLOW	37.	32.	28.	26.	24.	21.	12.	5.	1.
				TIME	3.58	3.58	3.58	3.58	3.58	3.67	3.67	3.67	5.00
4 COMBINED AT													
+	CP22	16.01	1	FLOW	1909.	1711.	1584.	1511.	1398.	1253.	736.	408.	109.
				TIME	3.67	3.83	3.92	3.92	3.92	3.92	5.00	4.92	6.75
ROUTED TO													
+	RCP22	16.01	1	FLOW	1900.	1710.	1581.	1504.	1385.	1226.	734.	407.	109.
				TIME	3.67	3.92	3.92	3.92	3.92	3.92	5.00	5.00	6.83
HYDROGRAPH AT													
+	C1A	.15	1	FLOW	104.	92.	84.	79.	73.	66.	41.	23.	5.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.67	4.92
2 COMBINED AT													
+	CP23	16.15	1	FLOW	2001.	1774.	1628.	1549.	1427.	1264.	758.	422.	109.
				TIME	3.67	3.67	3.92	3.92	3.92	3.92	5.00	5.00	6.83
ROUTED TO													
+	RCP23	16.15	1	FLOW	1985.	1764.	1625.	1543.	1416.	1249.	754.	420.	108.
				TIME	3.67	3.75	3.92	3.92	3.92	3.92	5.00	5.00	6.83
HYDROGRAPH AT													
+	C5CC	.33	1	FLOW	206.	179.	161.	151.	137.	123.	71.	34.	7.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	5.00
HYDROGRAPH AT													
+	RET4	.00	1	FLOW	97.	84.	75.	70.	62.	54.	29.	14.	3.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83	4.25	5.25
ROUTED TO													
+	RDIV4	.00	1	FLOW	96.	83.	73.	68.	62.	55.	30.	13.	3.
				TIME	3.75	3.83	3.83	3.83	3.83	3.83	3.92	4.42	5.50
ROUTED TO													
+	RDIV4	.00	1	FLOW	96.	83.	73.	68.	61.	54.	31.	14.	3.
				TIME	3.83	3.92	3.92	3.92	3.92	4.00	4.08	4.50	5.92
2 COMBINED AT													
+	CP24A	.33	1	FLOW	282.	240.	212.	196.	173.	150.	75.	41.	8.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	5.00	4.92
HYDROGRAPH AT													
+	RET3	.00	1	FLOW	162.	139.	122.	112.	98.	85.	46.	26.	4.
				TIME	3.75	3.75	3.75	3.75	3.75	3.83	4.08	4.33	6.25
ROUTED TO													
+	RDIV3	.00	1	FLOW	164.	142.	124.	113.	99.	86.	47.	24.	5.
				TIME	3.83	3.83	3.83	3.83	3.92	3.92	4.00	4.58	5.75
ROUTED TO													
+	RDIV3	.00	1	FLOW	161.	136.	122.	112.	97.	85.	47.	28.	6.
				TIME	3.83	3.92	3.92	3.92	3.92	4.00	4.17	4.50	6.00
2 COMBINED AT													
+	CP24B	.33	1	FLOW	424.	363.	316.	287.	257.	223.	116.	56.	8.
				TIME	3.83	3.83	3.83	3.92	3.92	3.92	4.08	4.67	6.00
HYDROGRAPH AT													
+	RET2	.00	1	FLOW	89.	78.	69.	63.	56.	47.	26.	16.	2.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	4.00	4.08	5.83
ROUTED TO													
+	RDIV2	.00	1	FLOW	90.	79.	70.	64.	56.	48.	28.	16.	3.
				TIME	3.83	3.83	3.83	3.83	3.83	3.92	4.00	4.50	5.67
ROUTED TO													
+	RDIV2	.00	1	FLOW	89.	77.	66.	62.	56.	48.	26.	13.	3.
				TIME	3.83	3.83	3.83	3.92	3.92	3.92	4.08	4.50	5.83

+ 2 COMBINED AT	CP24C	.33	1	FLOW	513.	439.	382.	349.	312.	271.	142.	69.	10.
				TIME	3.83	3.83	3.83	3.92	3.92	3.92	4.08	4.50	6.00
+ HYDROGRAPH AT	C5CA	.30	1	FLOW	132.	110.	96.	88.	77.	66.	33.	16.	0.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	4.92	4.92	5.92
+ ROUTED TO	RC5CA	.30	1	FLOW	128.	110.	93.	87.	75.	65.	32.	15.	0.
				TIME	3.67	3.75	3.75	3.75	3.75	3.75	5.00	5.00	6.50
+ HYDROGRAPH AT	C5CF	.32	1	FLOW	174.	143.	123.	111.	96.	81.	34.	14.	0.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	4.83	4.83	.00
+ 2 COMBINED AT	CP25	.62	1	FLOW	249.	201.	172.	155.	131.	108.	59.	25.	0.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	4.83	4.83	6.50
+ ROUTED TO	RCP25	.62	1	FLOW	242.	189.	162.	150.	129.	105.	56.	24.	0.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	4.92	5.00	8.33
+ HYDROGRAPH AT	C5CE	.32	1	FLOW	171.	141.	121.	110.	95.	80.	34.	15.	0.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	4.83	4.83	.00
+ 2 COMBINED AT	CP26	.95	1	FLOW	371.	296.	254.	235.	202.	167.	81.	33.	0.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	4.83	4.92	8.33
+ ROUTED TO	RCP26	.95	1	FLOW	367.	293.	251.	228.	195.	159.	81.	32.	0.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	4.92	4.92	9.50
+ HYDROGRAPH AT	C5CD	.27	1	FLOW	110.	93.	82.	75.	67.	58.	29.	15.	1.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	5.00	5.00	5.08
+ HYDROGRAPH AT	RET1	.00	1	FLOW	19.	17.	15.	14.	13.	12.	8.	3.	0.
				TIME	3.92	3.92	3.92	3.92	5.08	5.08	5.08	5.17	.00
+ ROUTED TO	RDIV1	.00	1	FLOW	20.	17.	16.	15.	13.	14.	8.	3.	0.
				TIME	4.17	4.17	4.25	4.25	4.08	4.25	5.50	5.67	.00
+ ROUTED TO	RDIV1	.00	1	FLOW	19.	17.	15.	15.	13.	14.	8.	4.	0.
				TIME	4.25	4.33	4.33	4.33	4.17	4.33	5.58	5.75	.00
+ ROUTED TO	RDIV1	.00	1	FLOW	21.	21.	18.	19.	15.	14.	9.	5.	0.
				TIME	4.17	4.25	4.25	4.33	4.33	4.42	4.83	6.00	.00
+ 3 COMBINED AT	CP27	1.21	1	FLOW	456.	368.	316.	287.	247.	203.	112.	47.	1.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	4.92	5.00	5.08
+ ROUTED TO	RCP27	1.21	1	FLOW	439.	351.	304.	280.	241.	201.	110.	46.	1.
				TIME	3.58	3.67	3.67	3.67	3.67	3.67	5.00	5.08	5.58
+ 2 COMBINED AT	CP24D	1.55	1	FLOW	879.	741.	640.	585.	523.	452.	220.	107.	10.
				TIME	3.75	3.83	3.83	3.92	3.92	3.92	4.08	5.00	6.00
+ HYDROGRAPH AT	C5CB	.14	1	FLOW	90.	79.	72.	67.	61.	55.	33.	17.	4.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.75	5.00
+ 2 COMBINED AT	CP24E	1.69	1	FLOW	966.	809.	702.	643.	570.	494.	243.	122.	12.
				TIME	3.75	3.83	3.83	3.83	3.92	3.92	5.00	5.00	4.92
+ HYDROGRAPH AT	C5FD	.17	1	FLOW	209.	186.	171.	162.	149.	136.	89.	52.	11.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
+ ROUTED TO	RC5FD	.17	1	FLOW	190.	166.	151.	144.	135.	125.	77.	44.	17.
				TIME	3.58	3.58	3.67	3.67	3.67	3.67	3.67	3.67	3.83

HYDROGRAPH AT												
+	C5FA	.51	1	FLOW	774.	699.	647.	617.	575.	532.	369.	238.	78.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO													
+	RC5FA	.51	1	FLOW	688.	625.	577.	549.	487.	456.	303.	202.	79.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67	3.67	3.75
HYDROGRAPH AT													
+	C5FB	.26	1	FLOW	127.	105.	91.	83.	72.	62.	28.	13.	0.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	4.92	4.92	.00
3 COMBINED AT													
+	CP28	.94	1	FLOW	1005.	897.	818.	773.	687.	632.	403.	251.	79.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67	3.67	3.75
ROUTED TO													
+	RCP28	.94	1	FLOW	911.	819.	754.	714.	657.	585.	366.	242.	76.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.75	3.92
HYDROGRAPH AT													
+	C5FC	.22	1	FLOW	140.	119.	106.	98.	87.	76.	39.	17.	2.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.92	4.92
2 COMBINED AT													
+	CP29	1.16	1	FLOW	1023.	915.	840.	794.	727.	648.	396.	251.	76.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.92
ROUTED TO													
+	RCP29	1.16	1	FLOW	1001.	868.	795.	753.	666.	602.	398.	243.	100.
				TIME	3.67	3.67	3.75	3.75	3.75	3.75	3.75	3.83	4.08
HYDROGRAPH AT													
+	C5EA	.49	1	FLOW	474.	419.	382.	360.	331.	301.	193.	111.	23.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.58	3.58	4.83
2 COMBINED AT													
+	CP30	1.65	1	FLOW	1305.	1140.	1034.	965.	866.	775.	481.	294.	107.
				TIME	3.58	3.58	3.67	3.67	3.67	3.67	3.75	3.83	4.08
ROUTED TO													
+	RCP30	1.65	1	FLOW	1301.	1136.	1024.	959.	862.	766.	470.	292.	88.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.83	3.92	4.25
HYDROGRAPH AT													
+	C5EB	.55	1	FLOW	572.	516.	477.	455.	424.	392.	271.	173.	55.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO													
+	RC5EB	.55	1	FLOW	569.	512.	472.	449.	417.	384.	269.	176.	56.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.75	3.83
HYDROGRAPH AT													
+	C5EC	.22	1	FLOW	129.	109.	96.	88.	78.	68.	32.	14.	0.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.83	4.92
3 COMBINED AT													
+	CP31	2.41	1	FLOW	1965.	1727.	1566.	1472.	1337.	1200.	747.	421.	118.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.92	4.25
ROUTED TO													
+	RCP31	2.41	1	FLOW	1892.	1666.	1533.	1450.	1322.	1193.	736.	417.	109.
				TIME	3.67	3.75	3.75	3.75	3.75	3.75	3.83	4.00	4.42
HYDROGRAPH AT													
+	C5ED	.16	1	FLOW	128.	112.	101.	95.	86.	78.	47.	24.	5.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.92
2 COMBINED AT													
+	CP32	2.57	1	FLOW	1998.	1742.	1593.	1506.	1374.	1240.	761.	429.	110.
				TIME	3.67	3.67	3.75	3.75	3.75	3.75	3.83	4.00	4.42
ROUTED TO													
+	RCP32	2.57	1	FLOW	1971.	1733.	1584.	1494.	1357.	1220.	757.	427.	95.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83	4.00	4.42
HYDROGRAPH AT													
+	C5DA	1.06	1	FLOW	1534.	1380.	1274.	1213.	1128.	1041.	711.	449.	134.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT													
+	C5DB	.53	1	FLOW	758.	685.	635.	606.	565.	524.	366.	238.	80.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50

3 COMBINED AT													
+	CP33	4.17	1	FLOW	3520.	3097.	2808.	2639.	2402.	2169.	1335.	769.	215.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO													
+	RCP33	4.17	1	FLOW	3252.	2838.	2579.	2395.	2170.	1946.	1169.	655.	179.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.58	3.58
2 COMBINED AT													
+	CP24	5.85	1	FLOW	3871.	3324.	2986.	2768.	2475.	2219.	1271.	698.	186.
				TIME	3.50	3.50	3.50	3.58	3.58	3.58	3.83	3.58	4.83
ROUTED TO													
+	RCP24	5.85	1	FLOW	3838.	3307.	2962.	2760.	2467.	2207.	1263.	697.	185.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.92	3.58	4.92
HYDROGRAPH AT													
+	C5DC	.33	1	FLOW	417.	371.	340.	322.	297.	272.	177.	104.	22.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO													
+	RC5DC	.33	1	FLOW	334.	293.	275.	249.	243.	225.	138.	93.	14.
				TIME	3.75	3.75	3.83	3.75	3.83	3.83	3.83	3.92	5.67
HYDROGRAPH AT													
+	C4BD	.52	1	FLOW	295.	259.	235.	222.	203.	183.	113.	60.	15.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83	5.08
2 COMBINED AT													
+	CP34A	.85	1	FLOW	626.	550.	511.	468.	445.	408.	251.	153.	24.
				TIME	3.75	3.75	3.83	3.75	3.83	3.83	3.83	3.92	5.00
2 COMBINED AT													
+	CP34B	6.71	1	FLOW	4286.	3687.	3311.	3089.	2816.	2529.	1506.	799.	208.
				TIME	3.58	3.58	3.83	3.83	3.83	3.83	3.92	3.92	4.92
ROUTED TO													
+	DB4	6.71	1	FLOW	1864.	709.	243.	238.	231.	222.	191.	158.	83.
				TIME	5.25	5.67	6.25	6.17	6.17	6.17	6.17	6.08	6.00
			** PEAK STAGES IN FEET **										
			1	STAGE	2069.64	2069.18	2068.23	2067.47	2066.39	2065.10	2061.04	2057.53	2052.15
				TIME	5.25	5.67	6.25	6.17	6.17	6.17	6.17	6.08	6.00
HYDROGRAPH AT													
+	C4BF	.28	1	FLOW	296.	261.	237.	224.	205.	186.	116.	63.	11.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	4.83
ROUTED TO													
+	RC4BF	.28	1	FLOW	259.	242.	222.	211.	194.	176.	97.	56.	10.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.75	5.25
HYDROGRAPH AT													
+	C4BC	.24	1	FLOW	185.	163.	148.	139.	127.	115.	71.	38.	8.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.92
3 COMBINED AT													
+	CP34	7.22	1	FLOW	1925.	728.	528.	503.	469.	433.	286.	208.	93.
				TIME	5.25	5.67	3.67	3.67	3.67	3.67	3.67	4.92	5.25
ROUTED TO													
+	RCP34	7.22	1	FLOW	1886.	766.	516.	490.	454.	418.	286.	209.	93.
				TIME	5.25	5.75	3.75	3.75	3.75	3.75	3.83	5.08	5.42
HYDROGRAPH AT													
+	C4A1C	.52	1	FLOW	340.	298.	271.	255.	233.	210.	129.	68.	15.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	4.92
HYDROGRAPH AT													
+	RET5	.00	1	FLOW	385.	261.	172.	118.	69.	61.	33.	15.	3.
				TIME	3.75	3.75	3.75	3.83	3.83	3.83	3.92	4.42	5.42
ROUTED TO													
+	RDIV5	.00	1	FLOW	380.	286.	180.	123.	69.	63.	35.	14.	3.
				TIME	3.92	3.92	4.00	4.00	4.08	4.08	4.17	4.67	6.17
3 COMBINED AT													
+	CP35A	7.74	1	FLOW	2031.	908.	313.	764.	697.	633.	392.	262.	98.
				TIME	5.25	3.75	3.75	3.75	3.75	3.75	3.83	5.08	5.50
HYDROGRAPH AT													
+	C4A1	.35	1	FLOW	176.	152.	136.	127.	115.	103.	58.	27.	6.
				TIME	3.67	3.75	3.75	3.75	3.75	3.75	3.75	5.00	5.00

2 COMBINED AT													
+	CP35	8.09	1	FLOW	2100.	1059.	949.	892.	812.	735.	449.	287.	101.
				TIME	5.25	3.75	3.75	3.75	3.75	3.75	3.75	5.08	5.33
ROUTED TO													
+	RCP35	8.09	1	FLOW	2078.	1066.	950.	893.	815.	734.	453.	287.	102.
				TIME	5.33	3.83	3.83	3.83	3.83	3.83	3.92	5.17	5.50
HYDROGRAPH AT													
+	C4BE	.22	1	FLOW	170.	151.	139.	131.	121.	111.	72.	42.	10.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	4.92
ROUTED TO													
+	RC4BE	.22	1	FLOW	170.	150.	137.	130.	121.	111.	73.	43.	11.
				TIME	3.75	3.75	3.75	3.83	3.83	3.83	3.83	3.92	4.25
HYDROGRAPH AT													
+	C4BB	.35	1	FLOW	268.	240.	220.	209.	194.	178.	119.	72.	19.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.75
2 COMBINED AT													
+	CP36	.57	1	FLOW	422.	376.	345.	326.	301.	275.	177.	103.	24.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.83	4.08
ROUTED TO													
+	RCP36	.57	1	FLOW	413.	371.	338.	320.	296.	272.	174.	102.	22.
				TIME	3.75	3.75	3.83	3.75	3.83	3.83	3.83	3.92	5.08
HYDROGRAPH AT													
+	C4A2B	.25	1	FLOW	152.	130.	115.	106.	94.	83.	41.	18.	1.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	4.83	4.83
2 COMBINED AT													
+	CP37	.82	1	FLOW	474.	422.	387.	365.	338.	309.	195.	111.	22.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.92	5.08
ROUTED TO													
+	RCP37	.82	1	FLOW	469.	418.	379.	359.	330.	300.	191.	112.	22.
				TIME	3.83	3.83	3.83	3.83	3.83	3.92	3.92	3.92	5.17
2 COMBINED AT													
+	CP38A	8.91	1	FLOW	2262.	1484.	1329.	1252.	1145.	1032.	644.	363.	121.
				TIME	5.33	3.83	3.83	3.83	3.83	3.83	3.92	4.00	5.50
HYDROGRAPH AT													
+	C4A1B	.25	1	FLOW	97.	81.	70.	63.	55.	47.	23.	11.	0.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	4.92	4.92	.00
3 COMBINED AT													
+	CP38	25.31	1	FLOW	3797.	3294.	2982.	2802.	2546.	2286.	1303.	776.	212.
				TIME	3.83	3.83	3.83	3.83	3.92	3.92	4.00	5.17	5.75
ROUTED TO													
+	RCP38	25.31	1	FLOW	3782.	3284.	2968.	2784.	2544.	2276.	1294.	775.	211.
				TIME	3.83	3.83	3.83	3.83	3.92	3.92	4.00	5.17	5.83
HYDROGRAPH AT													
+	C4CB	5.41	1	FLOW	7360.	6597.	6077.	5775.	5356.	4929.	3316.	2047.	556.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO													
+	DB5	5.41	1	FLOW	90.	88.	86.	85.	83.	82.	75.	67.	46.
				TIME	6.08	6.08	6.08	6.08	6.00	6.00	6.00	5.92	5.17
			** PEAK STAGES IN FEET **										
			1	STAGE	2488.53	2486.55	2485.08	2484.18	2482.94	2481.66	2476.06	2470.13	2458.22
				TIME	6.08	6.08	6.08	6.08	6.00	6.00	6.00	5.92	5.17
ROUTED TO													
+	RDB5	5.41	1	FLOW	90.	88.	86.	85.	83.	82.	75.	67.	46.
				TIME	6.25	6.25	6.25	6.25	6.25	6.25	6.17	6.08	5.25
HYDROGRAPH AT													
+	C4CA	.20	1	FLOW	168.	150.	138.	131.	121.	111.	73.	44.	11.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	4.92
HYDROGRAPH AT													
+	C3B3E	.22	1	FLOW	272.	247.	230.	220.	206.	192.	137.	92.	35.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT													
+	CP39	5.83	1	FLOW	504.	460.	429.	411.	385.	359.	259.	176.	74.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.92

BURKHOLDER AND C1 CHANNEL

ROUTED TO													
+	RCP39	5.83	1	FLOW	491.	441.	421.	397.	378.	352.	260.	176.	73.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	5.00
HYDROGRAPH AT													
+	C3B3D	.26	1	FLOW	309.	280.	260.	249.	232.	216.	152.	101.	36.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT													
+	CP40	6.08	1	FLOW	779.	702.	655.	624.	585.	541.	384.	251.	93.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.92
ROUTED TO													
+	RCP40	6.08	1	FLOW	755.	681.	633.	602.	564.	522.	373.	251.	91.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67	3.67	4.92
HYDROGRAPH AT													
+	C3B3C	1.24	1	FLOW	1632.	1657.	1537.	1467.	1370.	1271.	890.	583.	201.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO													
+	RC3B3C	1.24	1	FLOW	1626.	1428.	1321.	1256.	1198.	1080.	783.	545.	169.
				TIME	3.50	3.50	3.50	3.58	3.50	3.58	3.58	3.58	3.58
HYDROGRAPH AT													
+	C3B3B	.32	1	FLOW	355.	320.	295.	281.	261.	241.	165.	105.	32.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT													
+	CP41	1.56	1	FLOW	1941.	1725.	1600.	1537.	1442.	1322.	949.	650.	201.
				TIME	3.50	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO													
+	RCP41	1.56	1	FLOW	1840.	1659.	1666.	1595.	1508.	1372.	935.	622.	197.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.83
HYDROGRAPH AT													
+	C3B3A	.51	1	FLOW	602.	539.	495.	470.	436.	400.	267.	162.	41.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT													
+	CP42	8.15	1	FLOW	3069.	2692.	2514.	2399.	2264.	2074.	1435.	910.	284.
				TIME	3.58	3.58	3.67	3.67	3.67	3.67	3.67	3.75	3.83
ROUTED TO													
+	RCP42	8.15	1	FLOW	3028.	2672.	2488.	2370.	2240.	2049.	1417.	900.	303.
				TIME	3.67	3.67	3.75	3.75	3.75	3.75	3.75	3.83	4.08
HYDROGRAPH AT													
+	C4BA2	.14	1	FLOW	89.	77.	68.	63.	57.	50.	26.	11.	1.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.92	4.92
2 COMBINED AT													
+	CP43A	8.29	1	FLOW	3099.	2734.	2527.	2406.	2272.	2077.	1433.	907.	303.
				TIME	3.67	3.67	3.75	3.75	3.75	3.75	3.75	3.83	4.08
ROUTED TO													
+	RCP43	8.29	1	FLOW	3056.	2762.	2594.	2451.	2271.	2058.	1439.	1051.	429.
				TIME	4.00	4.00	4.00	4.00	4.00	4.08	4.08	4.17	4.75
HYDROGRAPH AT													
+	C4BA3	.41	1	FLOW	214.	186.	167.	156.	141.	127.	73.	35.	8.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.92	5.08
ROUTED TO													
+	RC4BA3	.41	1	FLOW	216.	187.	167.	156.	142.	127.	73.	35.	8.
				TIME	3.92	3.92	3.92	3.92	4.00	4.00	4.00	5.33	5.58
HYDROGRAPH AT													
+	C4A2A	.26	1	FLOW	227.	197.	176.	165.	149.	133.	75.	33.	4.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	4.83
3 COMBINED AT													
+	CP44	8.96	1	FLOW	3292.	2969.	2780.	2626.	2430.	2198.	1523.	1088.	432.
				TIME	4.00	4.00	4.00	4.00	4.00	4.08	4.08	4.17	4.75
ROUTED TO													
+	RCP44	8.96	1	FLOW	3290.	2934.	2734.	2574.	2379.	2192.	1476.	996.	337.
				TIME	4.00	4.00	4.00	4.00	4.08	4.08	4.08	4.25	4.83
HYDROGRAPH AT													
+	C4A1A	.25	1	FLOW	82.	71.	63.	59.	53.	47.	26.	13.	2.
				TIME	4.08	4.08	4.08	4.08	4.08	4.17	4.17	5.25	5.33

3 COMBINED AT	CP45	34.52	1	FLOW	6995.	6110.	5575.	5248.	4832.	4380.	2756.	1580.	490.
+				TIME	3.92	4.00	4.00	4.00	4.00	4.00	4.08	4.25	4.83
ROUTED TO	RCP45	34.52	1	FLOW	6928.	6098.	5557.	5229.	4804.	4342.	2717.	1566.	464.
+				TIME	3.92	4.00	4.00	4.00	4.00	4.00	4.08	4.25	4.83
HYDROGRAPH AT	C3A2B	.51	1	FLOW	523.	469.	432.	410.	381.	350.	235.	145.	39.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO	RC3A2B	.51	1	FLOW	538.	482.	442.	419.	383.	350.	232.	146.	53.
+				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.75	3.83
HYDROGRAPH AT	C4BA1	.48	1	FLOW	207.	174.	152.	140.	123.	106.	51.	26.	1.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	4.92	4.92	5.00
2 COMBINED AT	CP46	.99	1	FLOW	740.	652.	592.	557.	505.	456.	275.	159.	53.
+				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75	3.75	3.83
ROUTED TO	RCP46	.99	1	FLOW	701.	626.	554.	550.	498.	449.	275.	153.	57.
+				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83	3.83	4.08
HYDROGRAPH AT	C3B1D	.25	1	FLOW	155.	131.	115.	106.	93.	81.	38.	14.	0.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	4.83	5.75
2 COMBINED AT	CP47	1.24	1	FLOW	746.	665.	588.	581.	526.	474.	293.	160.	57.
+				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83	3.83	4.08
ROUTED TO	RCP47	1.24	1	FLOW	729.	627.	559.	549.	513.	456.	272.	157.	46.
+				TIME	3.75	3.75	3.83	3.83	3.83	3.83	3.92	3.92	4.25
HYDROGRAPH AT	C3B1C	.24	1	FLOW	260.	231.	211.	199.	183.	167.	107.	62.	11.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
3 COMBINED AT	CP48	36.00	1	FLOW	7554.	6552.	5944.	5589.	5146.	4660.	2898.	1648.	490.
+				TIME	3.92	3.92	4.00	4.00	4.00	4.00	4.08	4.25	4.83
ROUTED TO	RCP48	36.00	1	FLOW	7509.	6510.	5940.	5584.	5129.	4633.	2851.	1607.	446.
+				TIME	3.92	4.00	4.00	4.00	4.00	4.00	4.08	4.25	6.00
HYDROGRAPH AT	C3B1B	.21	1	FLOW	101.	86.	76.	70.	62.	54.	27.	13.	1.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.92	4.92
ROUTED TO	RC3B1B	.21	1	FLOW	99.	84.	72.	70.	62.	52.	27.	13.	1.
+				TIME	3.67	3.75	3.75	3.75	3.75	3.75	3.75	5.08	5.25
HYDROGRAPH AT	C3B1A	.24	1	FLOW	122.	104.	93.	86.	77.	68.	36.	17.	2.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.67	4.92	4.92
3 COMBINED AT	CP49	36.46	1	FLOW	7639.	6614.	6031.	5668.	5205.	4702.	2885.	1619.	446.
+				TIME	3.92	3.92	4.00	4.00	4.00	4.00	4.08	4.25	6.00
ROUTED TO	RCP49	36.46	1	FLOW	7556.	6617.	6022.	5649.	5172.	4649.	2863.	1581.	445.
+				TIME	3.92	4.00	4.00	4.00	4.00	4.00	4.17	4.33	4.92
HYDROGRAPH AT	C3A2A	.47	1	FLOW	586.	528.	489.	466.	434.	401.	277.	177.	56.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO	RC3A2A	.47	1	FLOW	508.	453.	412.	409.	384.	357.	246.	159.	54.
+				TIME	3.83	3.83	3.83	3.92	3.92	3.92	3.92	4.00	4.08
HYDROGRAPH AT	C3A1B	1.02	1	FLOW	1016.	895.	813.	766.	701.	635.	393.	212.	39.
+				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	4.83

DRAKE & C-1 CONFLUENCE

WARM SPRINGS & C-1 CHANNEL

2 COMBINED AT													
+	CP50	1.49	1	FLOW	1211.	1060.	959.	901.	821.	739.	434.	228.	63.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.92	4.08
ROUTED TO													
+	RCP50	1.49	1	FLOW	1094.	955.	857.	815.	740.	674.	408.	221.	59.
				TIME	3.50	3.50	3.58	3.58	3.58	3.58	3.58	4.00	4.25
HYDROGRAPH AT													
+	C3A1A	.37	1	FLOW	313.	274.	247.	232.	211.	190.	113.	57.	10.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	4.83
3 COMBINED AT													
+	CP51	38.32	1	FLOW	8476.	7358.	6628.	6238.	5733.	5175.	3081.	1677.	500.
				TIME	3.92	3.92	3.92	4.00	4.00	4.00	4.08	4.33	4.92

LAKE MEAD DRIVE & C-1 CHANNEL

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN   1998               *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   28JUN02  TIME  10:47:17   *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

              *DIAGRAM
    1         ID       **************   C-1 WATERSHED FIS RESTUDY  ****************
    2         ID
    3         ID    ***** PREPARED FOR:  CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT *****
    4         ID                            **   CLARK COUNTY, NEVADA   ***
    5         ID
    6         ID    ***** PREPARED BY: CARTER BURGESS AND SOUTHWEST FLUVIAL SYSTEMS  *****
    7         ID
    8         ID    EXISTING CONDITIONS DRAINAGE SYSTEM
    9         ID    INPUT FILE = C1DN3AM.DAT
   10         ID    INPUT FILE DATE =  MARCH 2002
   11         ID    DESIGN STORM = 100-YEAR 6-HR STORM
   12         ID    STORM DISTRIBUTION = SDN #3
   13         ID    SUBASIN C4A1
   14         ID
   15         IT       5       0       0     300
   16         IN       5       0       0
   17         IO       5
   18         JR    PREC   0.832   0.804   0.765   0.725   0.695
              *
   19         KK      X11
   20         KM   SUDIVISION DRAINS TO EASEMENT ON NORTH END
   21         BA     .01
   22         PB    3.05
```

```
 23          PC    .000    .020    .057    .070    .087    .108    .124    .130    .130    .130
 24          PC    .130    .130    .130    .133    .140    .142    .148    .158    .172    .181
 25          PC    .190    .197    .199    .200    .201    .204    .214    .229    .241    .249
 26          PC    .251    .256    .270    .278    .281    .283    .295    .322    .352    .409
 27          PC    .499    .590    .710    .744    .781    .812    .819    .835    .851    .856
 28          PC    .860    .868    .876    .888    .910    .926    .937    .950    .970    .976
 29          PC    .982    .985    .987    .989    .990    .993    .993    .994    .995    .998
 30          PC    .998    .999   1.00
 31          LS      0      82
 32          UD   0.29
             *

 33          KK    RX11
 34          RK    680    .020    .025           TRAP      40       2
             *

 35          KK     X12
 36          KM     DRAINS TO PARK AT NORTH SIDE
 37          BA   0.01
 38          PB   3.05
 39          LS      0      82
 40          UD   0.20
             *

 41          KK    CP1
 42          KM   COMBINE BASINS X11 AND X12 RUN THROUGH PARK ON NORTH SIDE
 43          HC      2
             *
```

1 HEC-1 INPUT PAGE 2

```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 44          KK    X13
 45          BA    .03
 46          PB   3.05
 47          LS      0      77
 48          UD   0.26
             *

 49          KK    CP2
 50          KM   COMBINE FLOW FROM CP1 WITH X13
 51          HC      2
             *

 52          KK   RCP2
 53          KM   ROUTE CP2 TO NEWPORT DRIVE
 54          RK   1086    .020    .035           TRAP      20       2
             *

 55          KK    X17
 56          BA    .01
 57          PB   3.04
 58          LS      0      72
 59          UD   0.26
             *

 60          KK    CP3
 61          KM   COMBINE BASINS X17 AND ROUTED CP2 AT NEWPORT
 62          HC      2
             *

 63          KK    X14
```

```
          64          BA    0.02
          65          PB    3.04
          66          LS       0       82
          67          UD    0.31
                      *

          68          KK     X15
          69          BA   0.001
          70          PB    3.04
          71          LS       0       72
          72          UD    0.25
                      *

          73          KK     CP4
          74          KM   COMBINE BASINS X14 AND X15
          75          HC       2
                      *

          76          KK    RCP4
          77          KM   ROUTE CP4 FLOW DOWN FOX CHASE TO CULVERT ALONG RACETRACK
          78          RK    1520     2.3    .025            TRAP      50        2
                      *
1                                                HEC-1 INPUT                                                PAGE  3

        LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          79          KK     X16
          80          BA    0.02
          81          PB    3.04
          82          LS       0       82
          83          UD    0.26
                      *

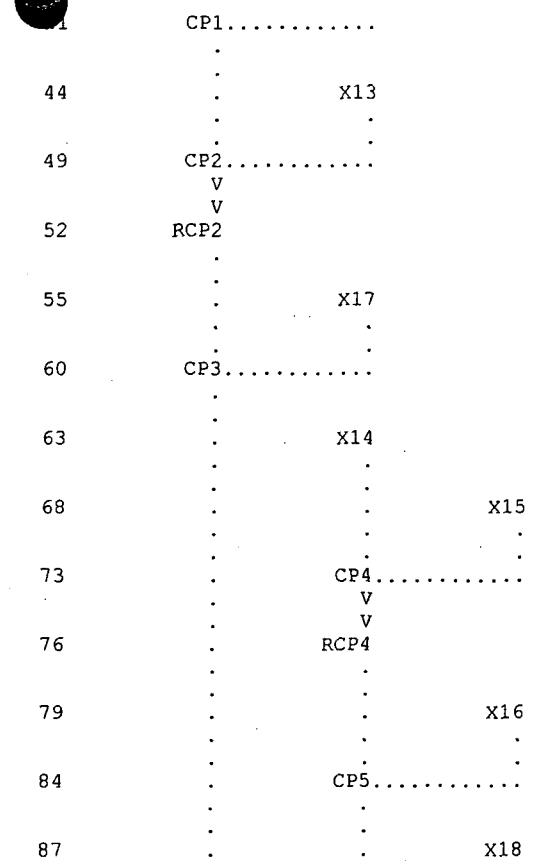
          84          KK     CP5
          85          KM   COMBINE ROUTED CP4 AND X16 AT RACETRACK ROAD CHANNEL
          86          HC       2
                      *

          87          KK     X18
          88          KM   NEWPORT TOWNHOMES, NO CONTRIBUTING OFFSITES
          89          BA    0.02
          90          PB    3.04
          91          LS       0       87
          92          UD    0.24
                      *
          93          ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK

 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    19          X1
                 V
                 V
    33          RX1
                  .
                  .
    35            .          X1
                  .           .
                  .           .
```



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

1**********

* *

* FLOOD HYDROGRAPH PACKAGE (HEC-1) *

* JUN 1998 *

* VERSION 4.1 *

* *

* RUN DATE 28JUN02 TIME 10:47:17 *

* *

****

****

* *

* U.S. ARMY CORPS OF ENGINEERS *

* HYDROLOGIC ENGINEERING CENTER *

* 609 SECOND STREET *

* DAVIS, CALIFORNIA 95616 *

* (916) 756-1104 *

* *

****

********** C-1 WATERSHED FIS RESTUDY **********

***** PREPARED FOR: CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT *****
** CLARK COUNTY, NEVADA ***

***** PREPARED BY: CARTER BURGESS AND SOUTHWEST FLUVIAL SYSTEMS *****

EXISTING CONDITIONS DRAINAGE SYSTEM
INPUT FILE = C1DN3AM.DAT
INPUT FILE DATE = MARCH 2002

DESIGN STORM = 100-YEAR 6-HR STORM
STORM DISTRIBUTION = SDN #3
SUBASIN C4A1

17 IO OUTPUT CONTROL VARIABLES

IPRNT	5	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

NMIN	5	MINUTES IN COMPUTATION INTERVAL
IDATE	1 0	STARTING DATE
ITIME	0000	STARTING TIME
NQ	300	NUMBER OF HYDROGRAPH ORDINATES
NDDATE	2 0	ENDING DATE
NDTIME	0055	ENDING TIME
ICENT	19	CENTURY MARK

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 24.92 HOURS

ENGLISH UNITS

DRAINAGE AREA	SQUARE MILES
PRECIPITATION DEPTH	INCHES
LENGTH, ELEVATION	FEET
FLOW	CUBIC FEET PER SECOND
STORAGE VOLUME	ACRE-FEET
SURFACE AREA	ACRES
TEMPERATURE	DEGREES FAHRENHEIT

JP MULTI-PLAN OPTION
NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
.83 .80 .76 .73 .69

1

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 .83	RATIO 2 .80	RATIO 3 .76	RATIO 4 .73	RATIO 5 .69
HYDROGRAPH AT									
+	X1	.01	1	FLOW	7.	6.	6.	5.	5.
				TIME	3.75	3.75	3.75	3.75	3.75
ROUTED TO									
+	RX1	.01	1	FLOW	7.	6.	6.	5.	5.
				TIME	3.75	3.75	3.75	3.83	3.83
HYDROGRAPH AT									
+	X1	.01	1	FLOW	8.	7.	7.	6.	6.
				TIME	3.67	3.67	3.67	3.67	3.67
2 COMBINED AT									
+	CP1	.02	1	FLOW	14.	13.	12.	10.	10.
				TIME	3.67	3.67	3.67	3.75	3.75

HYDROGRAPH AT									
+	X13	.03	1	FLOW	16.	15.	13.	12.	10.
				TIME	3.75	3.75	3.75	3.75	3.75
2 COMBINED AT									
+	CP2	.05	1	FLOW	29.	27.	25.	22.	20.
				TIME	3.75	3.75	3.75	3.75	3.75
ROUTED TO									
+	RCP2	.05	1	FLOW	29.	27.	24.	22.	20.
				TIME	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT									
+	X17	.01	1	FLOW	4.	3.	3.	2.	2.
				TIME	3.75	3.75	3.75	3.75	3.75
2 COMBINED AT									
+	CP3	.06	1	FLOW	33.	31.	27.	24.	22.
				TIME	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT									
+	X14	.02	1	FLOW	13.	12.	11.	10.	9.
				TIME	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT									
+	X15	.00	1	FLOW	0.	0.	0.	0.	0.
				TIME	3.75	3.75	3.75	3.75	3.75
2 COMBINED AT									
+	CP4	.02	1	FLOW	13.	13.	11.	10.	9.
				TIME	3.75	3.75	3.75	3.75	3.75
ROUTED TO									
+	RCP4	.02	1	FLOW	13.	12.	11.	10.	9.
				TIME	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT									
+	X16	.02	1	FLOW	14.	13.	12.	11.	10.
				TIME	3.67	3.67	3.67	3.75	3.75
2 COMBINED AT									
+	CP5	.04	1	FLOW	27.	25.	23.	21.	19.
				TIME	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT									
+	X18	.02	1	FLOW	19.	18.	17.	15.	14.
				TIME	3.67	3.67	3.67	3.67	3.67

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

						INTERPOLATED TO COMPUTATION INTERVAL			
ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR PLAN = 1 RATIO= .83									
RX1	MANE	1.34	6.73	226.95	1.03	5.00	6.64	225.00	1.03

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5470E+00 EXCESS= .0000E+00 OUTFLOW= .5477E+00 BASIN STORAGE= .1436E-05 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .80

RX1	MANE	1.36	6.34	227.92	.96	5.00	6.23	225.00	.96

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5136E+00 EXCESS= .0000E+00 OUTFLOW= .5141E+00 BASIN STORAGE= .1306E-05 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .76

RX1	MANE	1.39	5.78	227.60	.88	5.00	5.66	225.00	.88

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4680E+00 EXCESS= .0000E+00 OUTFLOW= .4683E+00 BASIN STORAGE= .1483E-05 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .73

RX1	MANE	1.41	5.22	227.87	.79	5.00	5.10	230.00	.79

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4222E+00 EXCESS= .0000E+00 OUTFLOW= .4228E+00 BASIN STORAGE= .1526E-05 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .69

RX1	MANE	1.53	4.77	227.16	.73	5.00	4.70	230.00	.73

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3887E+00 EXCESS= .0000E+00 OUTFLOW= .3891E+00 BASIN STORAGE= .1332E-05 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .83

RCP2	MANE	1.33	29.18	226.29	.87	5.00	29.17	225.00	.87

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2317E+01 EXCESS= .0000E+00 OUTFLOW= .2318E+01 BASIN STORAGE= .4821E-05 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .80

RCP2	MANE	1.33	27.22	225.76	.81	5.00	27.20	225.00	.81

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2164E+01 EXCESS= .0000E+00 OUTFLOW= .2166E+01 BASIN STORAGE= .4925E-05 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .76

RCP2	MANE	1.34	24.58	226.83	.73	5.00	24.49	225.00	.73

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1957E+01 EXCESS= .0000E+00 OUTFLOW= .1958E+01 BASIN STORAGE= .4104E-05 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .73

RCP2	MANE	1.44	21.90	227.26	.66	5.00	21.78	225.00	.66

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1750E+01 EXCESS= .0000E+00 OUTFLOW= .1752E+01 BASIN STORAGE= .5234E-05 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .69

RCP2	MANE	1.49	19.97	227.75	.60	5.00	19.80	225.00	.60

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1600E+01 EXCESS= .0000E+00 OUTFLOW= .1601E+01 BASIN STORAGE= .5225E-05 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .83

RCP4	MANE	.55	13.42	226.30	1.00	5.00	13.25	225.00	1.00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1117E+01 EXCESS= .0000E+00 OUTFLOW= .1117E+01 BASIN STORAGE= .3060E-06 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .80

RCP4	MANE	.55	12.59	226.30	.94	5.00	12.42	225.00	.94

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1048E+01 EXCESS= .0000E+00 OUTFLOW= .1048E+01 BASIN STORAGE= .3217E-06 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .76

RCP4	MANE	.56	11.44	226.39	.85	5.00	11.28	225.00	.85

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9536E+00 EXCESS= .0000E+00 OUTFLOW= .9541E+00 BASIN STORAGE= .3173E-06 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .73

RCP4	MANE	.73	10.29	226.42	.77	5.00	10.13	225.00	.77

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8595E+00 EXCESS= .0000E+00 OUTFLOW= .8599E+00 BASIN STORAGE= .4270E-06 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .69

RCP4	MANE	.72	9.45	226.50	.71	5.00	9.28	225.00	.71

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7906E+00 EXCESS= .0000E+00 OUTFLOW= .7910E+00 BASIN STORAGE= .3053E-06 PERCENT ERROR= -.1

*** NORMAL END OF HEC-1 ***

C1 CHANNEL FIS RESTUDY
TIME OF CONCENTRATION

SUBBASIN DATA				INITIAL/OVERLAND TIME (Ti)							TOC Total/TLAG		
Number	Area (acres)	K value	CN	Length	Slope %	Ti min.	Length	Slope	Velocity	Tt min	Total min	Tlag	Basins over 1 sq. mi.
X1	22.66	0.015	75	200	2	21.92	1791	3.3	2.5	11.94	33.86	0.34	
X2	18.13	0.015	68	100	2	15.50	1307	1	2.5	8.71	24.21	0.24	
X3	43.60	0.015	72	400	3	27.08	3730	3	2.5	24.87	51.95	0.52	
X4	16.86	0.015	77	400	2.5	28.78	1285	2.5	2.5	8.57	37.35	0.37	
X5	58.15	0.015	67	150	2.7	17.18	6420	2.7	2.5	42.80	59.98	0.60	
X6	18.60	0.015	78	200	2.7	19.84	2628	2.7	4	10.95	30.79	0.31	
X7	41.69	0.015	82	100	2	15.50	2439	1.6	4	10.16	25.66	0.26	
X8	3.28	0.015	98	50	2.5	10.18	1279	2.5	2.5	8.53	18.70	0.19	
X9	37.55	0.015	82	100	2	15.50	2410	1.8	2.5	16.07	31.57	0.32	
X10	58.65	0.015	85	100	2	15.50	2510	2.3	2.5	16.73	32.23	0.32	

C1 CHANNEL HS RESTUDY
COMPOSITE CN COMPUTATIONS

COMPOSITE cn VALUES								
Subbasin	Area (sq. mi.)	Area (acres)	% HSG A	% HSG B	%HSG C	% HSG D	Land Use Description	Composite CN
X1	0.04	22.66		100%			25% rural residential/75% undeveloped	75
X2	0.14	18.13		100%			100% residential	68
X3	0.07	43.60		100%			100% undeveloped	72
X4	0.03	16.86		100%			100% undeveloped	77
X5	0.09	58.15	50%	50%			50% undeveloped/50% rural residential	67
X6	0.03	18.60		100%			90% undeveloped/10% rural residential	78
X7	0.07	41.69	30%	70%			100% residential	82
X8	0.01	3.28		100%			roadway	98
X9	0.06	37.55	30%	70%			100% residential	82
X10	0.09	58.65		85%	15%		100% residential	85

Newport Townhomes 100yr Q Approx. Method
Worksheet for Irregular Channel

Project Description	
Worksheet	Newport Townhomes Appr
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Slope	005000	ft/ft
Discharg	19.00	cfs

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.017	
Water Surface Elev	0.53	ft
Elevation Range	.00 to 0.50	
Flow Area	7.6	ft²
Wetted Perimeter	29.16	ft
Top Width	28.00	ft
Actual Depth	0.53	ft
Critical Elevation	0.51	ft
Critical Slope	0.007110	ft/ft
Velocity	2.51	ft/s
Velocity Head	0.10	ft
Specific Energy	0.63	ft
Froude Number	0.85	
Flow Type	Subcritical	

Calculation Messages:
Water elevation exceeds lowest end station by 0.34856484e-1 ft.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+28.0	0.017

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	0.50
0+00.5	0.50
0+00.5	0.00
0+02.0	0.13
0+02.0	0.17
0+14.0	0.39
0+26.0	0.17
0+26.0	0.13
0+27.5	0.00
0+27.5	0.50

Newport Townhomes 100yr Q Approx. Method
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+28.0	0.50

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Carter & Burgess
37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666

Fox Chase 100yr Q Approx. Method
Worksheet for Irregular Channel

Project Description	
Worksheet	Fox Chase
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Input Data		
Slope	005000	ft/ft
Dischargı	13.00	cfs

Options	
Current Roughness Methc	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.017	
Water Surface Elev	0.50	ft
Elevation Range	.00 to 0.60	
Flow Area	6.6	ft²
Wetted Perimeter	36.43	ft
Top Width	35.34	ft
Actual Depth	0.50	ft
Critical Elevation	0.47	ft
Critical Slope	0.007904	ft/ft
Velocity	1.98	ft/s
Velocity Head	0.06	ft
Specific Energy	0.56	ft
Froude Number	0.81	
Flow Type	Subcritical	

Calculation Messages:
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+51.0	0.017

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.13
0+07.0	0.17
0+25.5	0.54
0+44.0	0.17
0+44.0	0.13
0+45.5	0.00

Fox Chase 100yr Q Approx. Method
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+45.5	0.50
0+46.0	0.50
0+51.0	0.60

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Carter & Burgess
37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666

Carter & Burgess

1027 S. Carson Street
Carson City, Nevada 89701
Phone: 775.841.9600
Fax. 775.841.9622
www.c-b.com

June 12, 2003

Sacha Tohme
Michael Baker Jr., Inc.
3601 Eisenhower Avenue
Alexandria, VA 23304
(703) 960-8800

RE: Case No. 03-09-0270P, C-1 Channel FIS

Dear Sacha,

We have received your comments regarding the above-mentioned project, dated April 17, 2003. The following are responses to accompany the information needed.

1. WSPG models for Mission Hills have been revised to show the correct rise and span for the culverts. These models are included in this transmittal. (see included C-1 Channel CD)

2. Plans for Horizon Drive to Boulder Highway have recently been submitted to the City of Henderson, by Louis Berger & Associates. These plans are included in this transmittal and show existing topography with an existing grade profile for the existing channel in this area. Carter & Burgess, Inc. has confirmed that the topography on these plans represents the existing condition. A HEC-RAS model is included in this transmittal using the existing grade topography for the channel, from upstream of Horizon Drive to upstream of Boulder Highway. (see included plans SD-1, 4, 5, & 6 and C-1 Channel CD)

3. The HEC-RAS model has been revised to represent the correct datum correlation and the most accurate existing conditions along the C-1 Channel. Carter & Burgess, Inc. has confirmed that all the cross sections in the model accurately depict the C-1 Channel in its existing condition. This revised HEC-RAS model is included in this transmittal. HEC-RAS is a riverine modeling program; therefore, a WSPG model of the culvert bridge crossing at Lake Mead Drive is included in this transmittal to demonstrate the hydraulics of the culverts more accurately. The WSPG model shows that the flow will not overtop Lake Mead Drive and will be conveyed through the culverts. The upstream water surface elevation of the WSPG model matches the upstream water surface elevation of the HEC-RAS model, station 29+14, elevation = 1736.95. (see included C-1 Channel CD)

4. The revised HEC-RAS model shows that there are no walls along the C-1 Channel that will act as floodwalls and there is no overtopping of the C-1 Channel's banks. (see included C-1 Channel CD)

5. Revised annotated Work Maps for this area are included in this transmittal, showing SFHA boundary delineations for the Drake Channel and the East C-1 Levee. An AutoCAD drawing file for the revised floodplain is included in this transmittal along with plot files for the annotated Work Maps. (see included annotated Work Maps, Sheets 1, 5, 6 & 9)

6. The revised annotated Work Maps now show the SFHA boundary delineation for the Drake Channel. No changes to the flood zone delineations north of the Drake Channel are proposed at this time. A study recently commenced will address the Drake Channel overflow. (see included annotated Work Maps, Sheets 1, 5, 6 &9)

7. Flow at the confluence of the Drake Channel and the C-1 Channel is sub-critical for both merging channels; therefore, maximum wave height is not a factor. The Froude number of the Drake Channel at the confluence is 0.66, and the Froude number at the C-1 Channel is 0.36. U.S. Army Corps of Engineers, "Maximum Wave Height" exhibits included to support this discussion. (see included USACOE Plate B-54)

8. The "Riverine Structures Form" needs to be completed by the Black Mountain and East C-1 Levee designing engineer (VTN Nevada & Kleinfelder). Documentation for the Black Mountain and East C-1 Levees is included in this transmittal. In discussing the design with the geotechnical engineer (Kleinfelder), we concur that stability was not an issue due to the shallow 4:1 slope used on the levees and seepage is minimal due to the soil cement used in the design of the levees. (see included C-1 Channel CD)

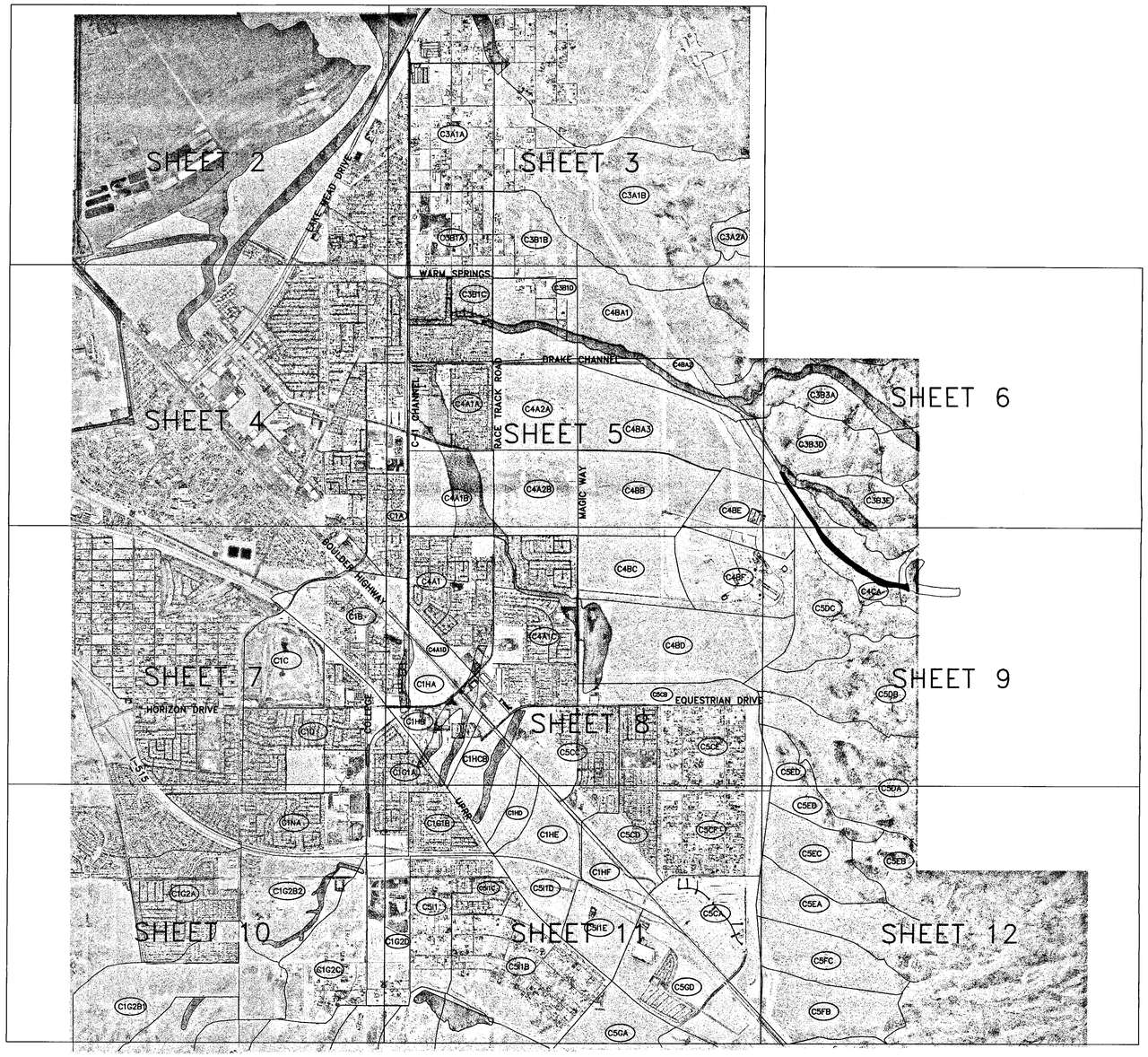
If you have questions or need more information, please contact either of the undersigned at (775) 841-9600.

Sincerely,
Carter & Burgess, Inc.

Paul Pettersen
Water Resources Group Leader

David Hagen, EI, LSI
Project Engineer

CC: Kevin Eubanks, P.E.
Clark County Regional Flood Control District



GRAPHIC SCALE

2000 0 1000 2000 4000 8000

(IN FEET)
1 inch = 2000ft.

LEGEND

- SUBBASIN BOUNDARY
- C3B3D — SUBBASIN LABEL
- SPECIAL FLOOD HAZARD AREA (SFHA)

REVISIONS

No.	Date	CHKD	APPD

DESIGNED: DB
DRAWN: SCC
CHECKED: DB
JOB No: 84048
HORIZ: 1"=400'
VERT: NONE
DATE: 10/04/04

Carter Burgess
Consultants in Planning, Engineering,
Construction Management, and Related Services
8655 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: APPROXIMATE METHODS HYDRAULICS ANNOTATED WORK MAP

SHEET 1 OF 12

GRAPHIC SCALE

400 0 200 400 800 1600

(IN FEET)
1 inch = 400 ft.

MATCHLINE SEE SHEET 3

MATCHLINE SEE SHEET 4

MATCHLINE SEE SHEET 6

MATCHLINE SEE SHEET 8

WARM SPRINGS RD

C3B1C

C3B1D

FLOW CONTAINED IN CHANNEL

C4BA1

ZONE A

LIMITS OF STUDY

C4BA2

DRAKE CHANNEL

REACH 2B

ZONE A

C4A1A

C4A2A

RAGETRACK RD

MAGIC WAY

LIMITS OF STUDY

REACH 2A

C4BA3

REACH 2C

BURKHOLDER BLVD

C4A2B

C4BB

C4A1B

ZONE A

C1A

C4BE

REVISIONS

No.	Date	CHKD	APPD

DESIGNED:	DB
DRAWN:	SCC
CHECKED:	DB
JOB No:	240482
HORIZ:	1"=400'
VERT:	NONE
DATE:	02/05/02

Carter Burgess

Consultants in Planning, Engineering,
Construction Management, and Related Services

6665 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: APPROXIMATE METHODS HYDRAULICS
ANNOTATED WORK MAP

SHEET 5 OF 12

MATCHLINE SEE SHEET 5



MATCHLINE SEE SHEET 9

GRAPHIC SCALE
(IN FEET)
1 inch = 400 ft.
400 0 200 400 800 1600

Carter Burgess

SHEET	6 OF 12
PROJECT:	C-1 CHANNEL SYSTEM FIS RESTUDY
DESCRIPTION:	APPROXIMATE METHODS HYDRAULICS ANNOTATED WORK MAP

Carter Burgess
Consultants in Planning, Engineering, Construction Management, and Related Services
8655 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

DESIGNED:	DB
DRAWN:	SCC
CHECKED:	DB
JOB No:	240482
HORIZ:	1"=400'
VERT:	NONE
DATE:	10/04/02

REVISIONS

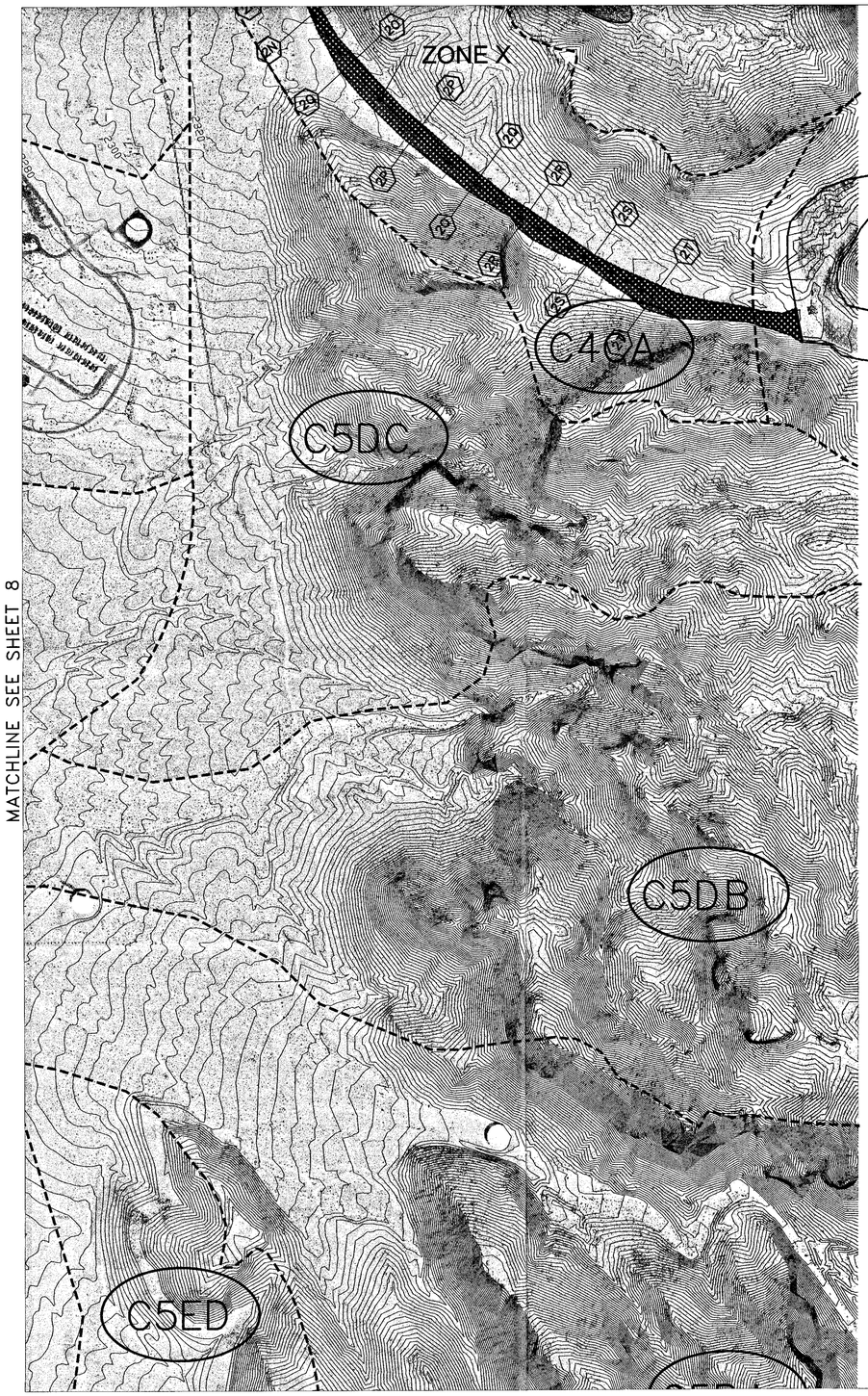
No.	Date		CHKD	APPD

GRAPHIC SCALE

400 0 200 400 800 1600

(IN FEET)
1 inch = 400 ft.

MATCHLINE SEE SHEET 6



MATCHLINE SEE SHEET 8

MATCHLINE SEE SHEET 12

N Carter Burgess

REVISIONS

No.	Date	CHKD	APPD

DESIGNED: DB
DRAWN: SCC
CHECKED: DB
JOB No. 240482
HORIZ: 1"=400'
VERT: NONE
DATE: 02/05/02

Carter Burgess
Consultants in Planning, Engineering,
Construction Management, and Related Services
6655 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: APPROXIMATE METHODS HYDRAULICS ANNOTATED WORK MAP

SHEET 9

9 OF 12

GRAPHIC SCALE

2000 0 1000 2000 4000 8000

(IN FEET)
1 inch = 2000ft.

LEGEND

- SUBBASIN BOUNDARY
- C3B3D — SUBBASIN LABEL
- SPECIAL FLOOD HAZARD AREA (SFHA)

RFCD

2003 NOV 13 PM 2:13

REVISIONS

No.	Date	CHKD	APPD

DESIGNED: DB
DRAWN: SCC
CHECKED: DB
JOB No: 240462
HORIZ: 1"=400'
VERT: NONE
DATE: 10/04/02

Carter Burgess
Consultants in Planning, Engineering,
Construction Management, and Related Services
6655 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: APPROXIMATE METHODS HYDRAULICS
ANNOTATED WORK MAP

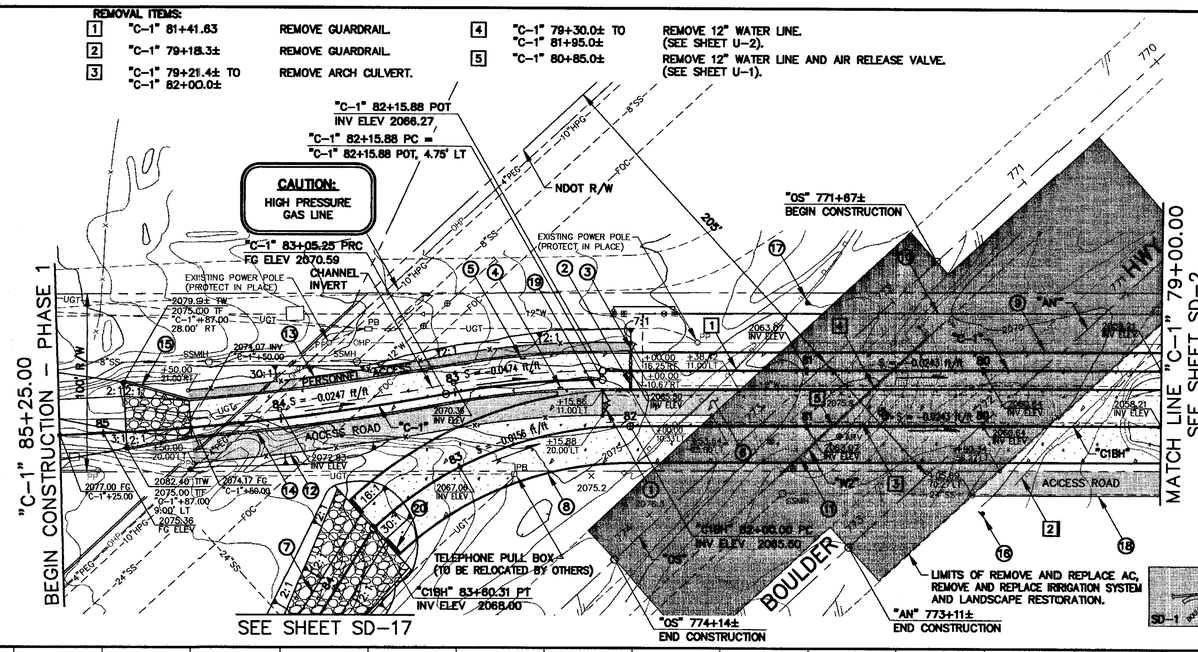
SHEET 1 OF 12

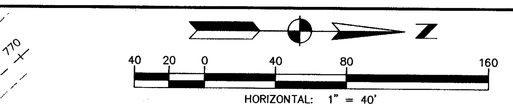
CONSTRUCTION ITEMS:

①	"C-1" 82+00.00	CONSTRUCT 14.00' WIDE, 6' HIGH DOUBLE-SWING CHAIN LINK ACCESS GATE, PER CCASD NO 253.
②	"C-1" 82+00.00 TO "C-1" 82+15.88	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252. MOUNT ON HEADWALL. (SEE DETAIL 3, SHEET SD-11).
③	"C-1" 82+00.00	CONSTRUCT 6' WIDE, 6' HIGH SINGLE-SWING CHAIN LINK ACCESS GATE, PER CCASD NO 253.
④	"C-1" 82+40.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9).
⑤	"C-1" 82+60.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9).
⑥	"C-1" 81+38.42 TO "C-1" 82+00.00	CONSTRUCT 14' WIDE ACCESS ROAD (6" TYPE II AGGREGATE BASE COMPACTED TO 95%).
⑦	"C1BH" 83+60.31 TO "C1BH" 85+66.55	CONSTRUCT RIPRAP CHANNEL. (SEE SHEET SD-17).
⑧	"C1BH" 82+00.00 TO "C1BH" 83+60.31	CONSTRUCT 2 – 20' X 7' X 160.31' RCB. (SEE SHEET SD-15).
⑨	"C-1" 79+00.00 TO "C-1" 82+00.00	CONSTRUCT 3 – 20' X 7' X 300.00' RCB. (SEE SHEET SD-15).
⑩	"C-1" 78+84.00 TO "C-1" 81+93.00	CONSTRUCT 12" X 309.00' DIP WATER LINE. CONNECT TO EXISTING WATER LINE. (SEE SHEET U-2).
⑪	"W2" 10+50.00 TO "W2" 11+98.00	CONSTRUCT 12" X 148.00' DIP WATER LINE. CONNECT TO EXISTING WATER LINE. (SEE SHEET U-1).
⑫	"C-1" 82+15.88 TO "C-1" 84+50.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.
⑬	"C-1" 82+00.00 TO "C-1" 84+50.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.
⑭	"C-1" 82+00.00 TO "C-1" 84+50.00	CONSTRUCT RECTANGULAR CONCRETE CHANNEL. (SEE DETAIL A, SHEET SD-12).
⑮	"C-1" 84+50.00 TO "C-1" 84+87.00	CONSTRUCT RIP RAP CHANNEL TRANSITION WITH CONCRETE WINGWALLS. (SEE SHEET SD-17).
⑯	"C-1" 80+00.00	INSTALL "C-1 CHANNEL" SIGN, 80.00' LT. (SEE DETAIL A, SHEET SD-9).
⑰	"C-1" 81+00.00	INSTALL "C-1 CHANNEL" SIGN, 38.00' RT. (SEE DETAIL A, SHEET SD-9).
⑱	"C-1" 78+50.00 TO "C-1" 80+05.89	CONSTRUCT 14' WIDE ACCESS ROAD (6" TYPE II AGGREGATE BASE COMPACTED TO 95%).
⑲	"C-1" 82+00.00 TO "C-1" 82+41.91	CONSTRUCT WALL JUNCTION (SEE DETAIL F, SHEET SD-9).
⑳	"C1BH" 83+60.31	CONSTRUCT SAFETY FENCE, 20.83' LT TO 20.83' RT. MOUNT ON HEADWALL. (SEE DETAIL F, SHEET SD-11).

REMOVAL ITEMS:

1	"C-1" 81+41.63	REMOVE GUARDRAIL.
2	"C-1" 79+18.3±	REMOVE GUARDRAIL.
3	"C-1" 79+21.4± TO "C-1" 82+00.0±	REMOVE ARCH CULVERT.
4	"C-1" 79+30.0± TO "C-1" 81+95.0±	REMOVE 12" WATER LINE. (SEE SHEET U-2).
5	"C-1" 80+85.0±	REMOVE 12" WATER LINE AND AIR RELEASE VALVE. (SEE SHEET U-1).





SAFETY ALERT

Call Before You Overhead
1-702-593-6111

Avoid cutting underground utility lines. It's costly.
Call Before You Dig
1-800-227-2600

NOTES:

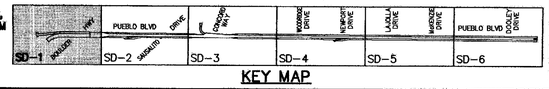
1. ALL EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL UTILITIES ARE SHOWN HEREON.
2. CONTRACTOR TO KEEP IN SERVICE AND PROTECT ALL UTILITIES.
3. SCARP AREAS AND EARTHWORK SHALL NOT PLACE SOIL AGAINST EXISTING BLOCK WALLS SUCH AS TO CREATE A RETAINING SITUATION.
4. FOR ADDITIONAL GRADING NOT SHOWN, SEE SHEET SD-17.
5. GROUND CHAIN LINK FENCE PER SPECIFICATION SECTION 616.

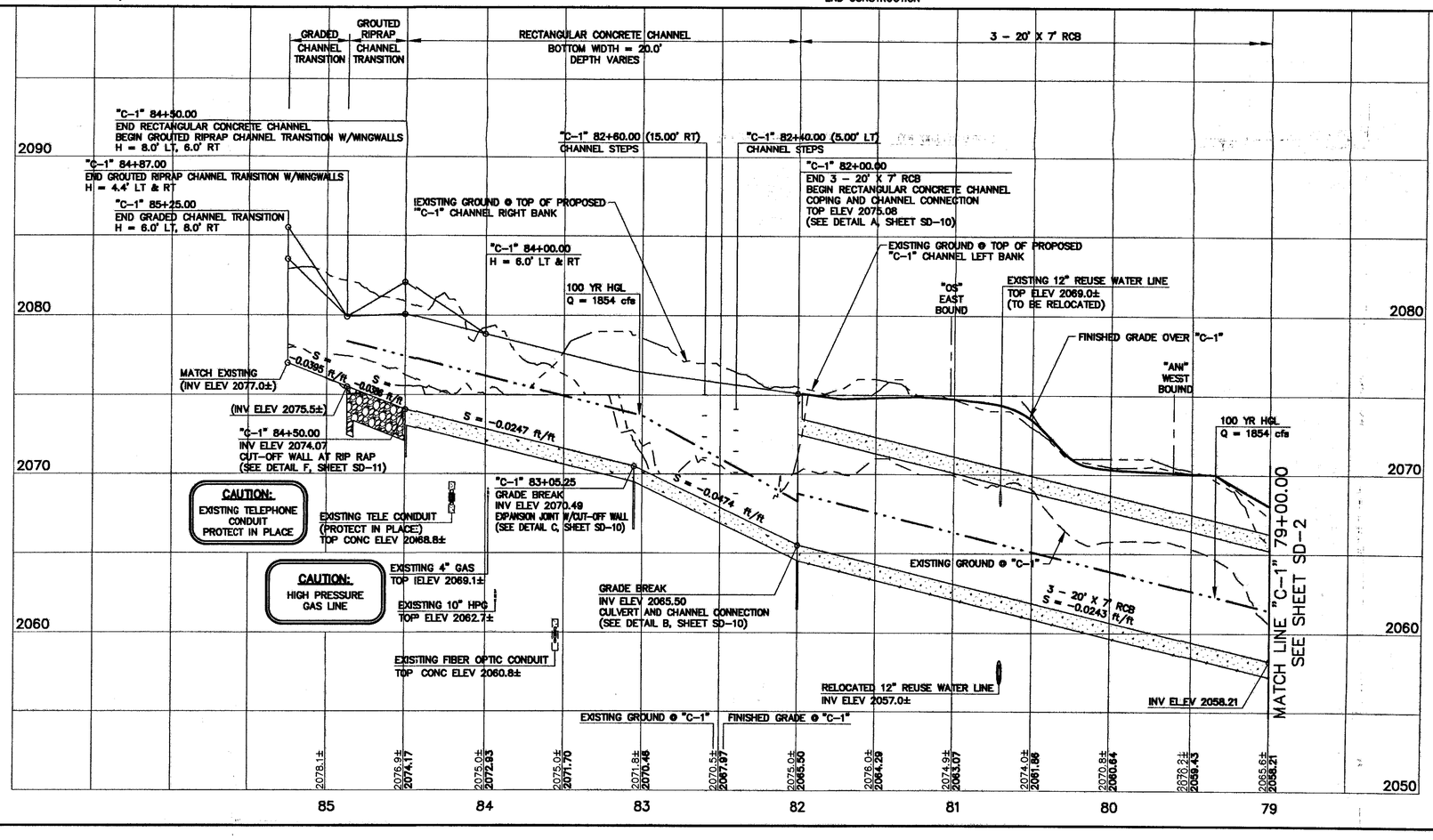
BASIS OF BEARING

N 89°24'41" E BEING THE NORTH LINE OF THE NE 1/4 OF THE NE 1/4 OF SECTION 29, T 22 S, R 63 E, MDM, CITY OF HENDERSON, NEVADA, PER PARCEL MAP ON FILE WITH CLARK COUNTY RECORDER IN FILE 61, PAGE 70.

BENCHMARK

CITY OF HENDERSON BENCHMARK #18, BEING A BOLT AND WASHER IN THE NORTH LEG OF A STEEL TRANSMISSION TOWER #8-4, 0.2 MILES +/- NORTHWEST OF HORIZON DR ON THE WEST SIDE OF HIGHWAY 93.
ELEV = 639.258 METERS (2097.30 FEET) NAVD 88





THE LOUIS BERGER GROUP, INC
LAS VEGAS, NEVADA

REV NO	DATE	DESCRIPTION	APPROVED

UPPER AND MIDDLE REACHES OF THE C-1 CHANNEL - PHASE 1
GRADING & DRAINAGE PLAN & PROFILE
"C-1" 85+25.00 TO "C-1" 79+00.00
HENDERSON NEVADA, DEPARTMENT OF PUBLIC WORKS

CITY OF HENDERSON

LYNDI FLIPPIN-DUDLEY
CIVIL
No. 11070
STATE OF NEVADA
PROFESSIONAL ENGINEER
7/5/01

PROJECT NO:	839
DRAWN BY:	ARB
DESIGNED BY:	SRF
CHECKED BY:	SJD
APPROVED BY:	TDL
SCALE	
HORIZ:	1" = 40'
VERT:	1" = 4'

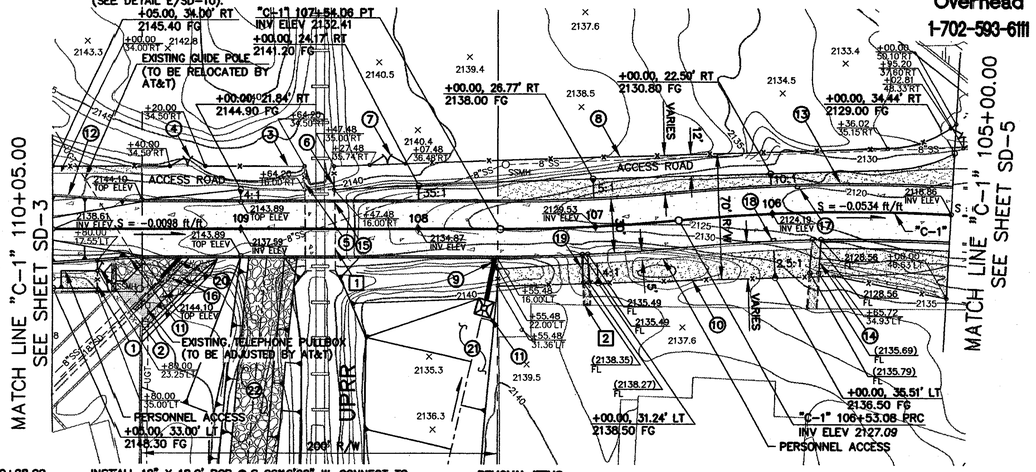
DRAWING NO
SD-1
SHEET 7 OF 34

05854

U:\839C1-CHANNEL\DRAINAGE\839C1-PHIMASTER.DWG v1 7/3/2001 10:55:43 pm pst arb

CONSTRUCTION ITEMS:

①	"C-1" 109+80.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.
②	"C-1" 109+80.00	CONSTRUCT 4' WIDE, 6' HIGH SINGLE-SWING CHAIN LINK ACCESS GATE, PER CCASD NO 253.
③	"C-1" 108+84.20 TO "C-1" 110+05.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.
④	"C-1" 109+20.00 TO "C-1" 109+40.00	CONSTRUCT 20' WIDE, 6' HIGH DOUBLE-SWING CHAIN LINK ACCESS GATE, PER CCASD NO 253.
⑤	"C-1" 108+64.20	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.
⑥	"C-1" 108+47.48	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.
⑦	"C-1" 108+07.48 TO "C-1" 108+27.48	CONSTRUCT 20' WIDE, 6' HIGH DOUBLE-SWING CHAIN LINK ACCESS GATE, PER CCASD NO 253.
⑧	"C-1" 105+00.00 TO "C-1" 108+27.48	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.
⑨	"C-1" 107+55.48	CONSTRUCT 6' WIDE, 6' HIGH SINGLE-SWING CHAIN LINK ACCESS GATE, PER CCASD NO 253.
⑩	"C-1" 105+00.00 TO "C-1" 107+46.56	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252. CONNECT TO EXISTING CHAIN LINK FENCE.
⑪	"C-1" 107+60.00	CONSTRUCT TYPE 2 DI WITH CONCRETE APRON. INSTALL 18" X 23' RCP (SEE SHEET SD-7).
⑫	"C-1" 109+55.48 TO "C-1" 110+05.00	CONSTRUCT TRAPEZOIDAL CONCRETE CHANNEL TRANSITION. (SEE DETAIL A/SD-13).
⑬	"C-1" 105+00.00 "C-1" 109+55.48	CONSTRUCT RECTANGULAR CONCRETE CHANNEL. (SEE DETAIL A/SD-11).
⑭	"C-1" 105+72.96 TO "C-1" 105+78.06	CONSTRUCT 18.68' U-CHANNEL. CONNECT TO RECTANGULAR CONCRETE CHANNEL AND EXISTING CHANNEL. (SEE DETAIL E/SD-10).
⑮	"C-1" 108+63.9±	CONSTRUCT TRESTLE MODIFICATIONS. (SEE DETAIL A/SD-10).
⑯	"C-1" 109+13.05 TO "C-1" 109+70.88	CONSTRUCT RIPRAP CHANNEL, VALLEY GUTTER AND AC PAVEMENT. (SEE SHEET SD-17).
⑰	"C-1" 105+70.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL B/SD-8).
⑱	"C-1" 106+00.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL B/SD-8).
⑲	"C-1" 107+03.00 TO "C-1" 107+08.00	CONSTRUCT 15.69' U-CHANNEL. CONNECT TO RECTANGULAR CHANNEL AND EXISTING CHANNEL. (SEE DETAIL E/SD-10).
⑳	"C-1" 109+28.00	INSTALL 18" X 18.0' RCP @ S 06°16'28" W. CONNECT TO EXISTING PVC PIPE AND RECTANGULAR CONCRETE CHANNEL TRAINSITION. (SEE SHEET SD-7).
㉑	"C-1" 107+46.6± TO "C-1" 108+42.2±	CONSTRUCT GRADED CHANNEL. (SEE SHEET SD-17).
㉒	"C-1" 108+85.5± TO "C-1" 109+71.0±	CONSTRUCT RIPRAP CHANNEL. (SEE SHEET SD-17).
㉓	"C-1" 104+95.20 TO "C-1" 105+02.81	CONSTRUCT 13' WIDE, 6' HIGH DOUBLE-SWING CHAIN LINK ACCESS GATE, PER CCASD NO 253.



REMOVAL ITEMS:

1	"C-1" 108+63.9± TO "C-1" 108+47.1±	REMOVE CONCRETE SLAB.
2	"C-1" 107+03.37 TO "C-1" 107+07.93	REMOVE 17.0± LF OF U-CHANNEL.

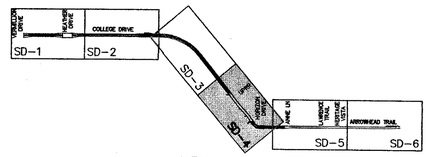
SAFETY ALERT

Call Before You Overhead
1-702-593-6111

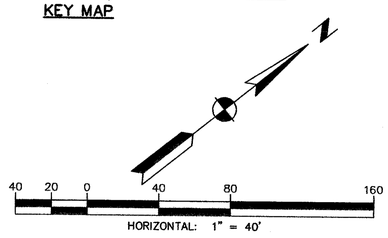
Avoid cutting underground utility lines. It's costly.
Call Before You Dig
1-800-227-2600

NOTES:

1. ALL EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL UTILITIES ARE SHOWN HEREON.
2. CONTRACTOR TO KEEP IN SERVICE AND PROTECT ALL UTILITIES.
3. SCARP AREAS AND EARTHWORK SHALL NOT PLACE SOIL AGAINST EXISTING BLOCK WALLS SUCH AS TO CREATE A RETAINING SITUATION.



KEY MAP

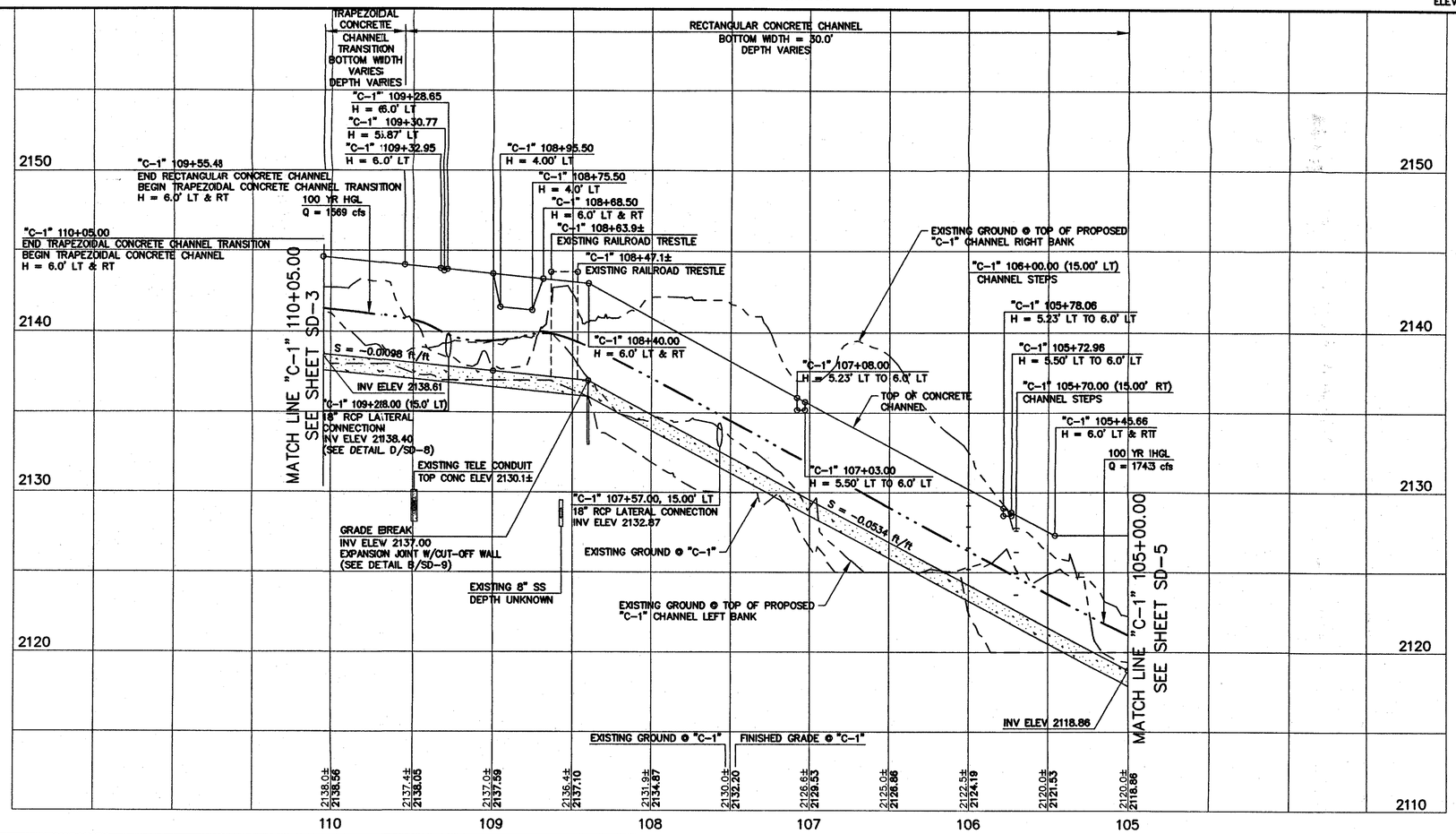


BASIS OF BEARING

N 89°24'41" E BEING THE NORTH LINE OF THE NE 1/4 OF THE NE 1/4 OF SECTION 29, T 22 S, R 63 E, MDM, CITY OF HENDERSON, NEVADA, PER PARCEL MAP ON FILE WITH CLARK COUNTY RECORDER IN FILE 61, PAGE 70.

BENCHMARK

CITY OF HENDERSON BENCH MARK #18, BEING A BOLT AND WASHER IN THE NORTH LEG OF A STEEL TRANSMISSION TOWER #9-4, 0.2 MILES +/- NORTHWEST OF HORIZON DR ON THE WEST SIDE OF HIGHWAY 93.
ELEV = 639.258 METERS (2097.30 FEET) NAVD 88



(06181)

THE LOUIS BERGER GROUP, INC
LAS VEGAS, NEVADA

REV NO	DATE	DESCRIPTION	APPROVED

UPPER AND MIDDLE REACHES OF THE C-1 CHANNEL - PHASE 2
GRADING & DRAINAGE PLAN & PROFILE
"C-1" 110+05.00 TO "C-1" 105+00.00
HENDERSON NEVADA, DEPARTMENT OF PUBLIC WORKS

CITY OF HENDERSON

REGISTERED PROFESSIONAL ENGINEER STATE OF NEVADA STEVEN J. DUDLEY EXP. 03/31/03 No. 11141 4/9/03

PROJECT NO:	839
DRAWN BY:	ARB
DESIGNED BY:	SRF
CHECKED BY:	SJD
APPROVED BY:	TDL
SCALE	
HORIZ:	1" = 40'
VERT:	1" = 4'

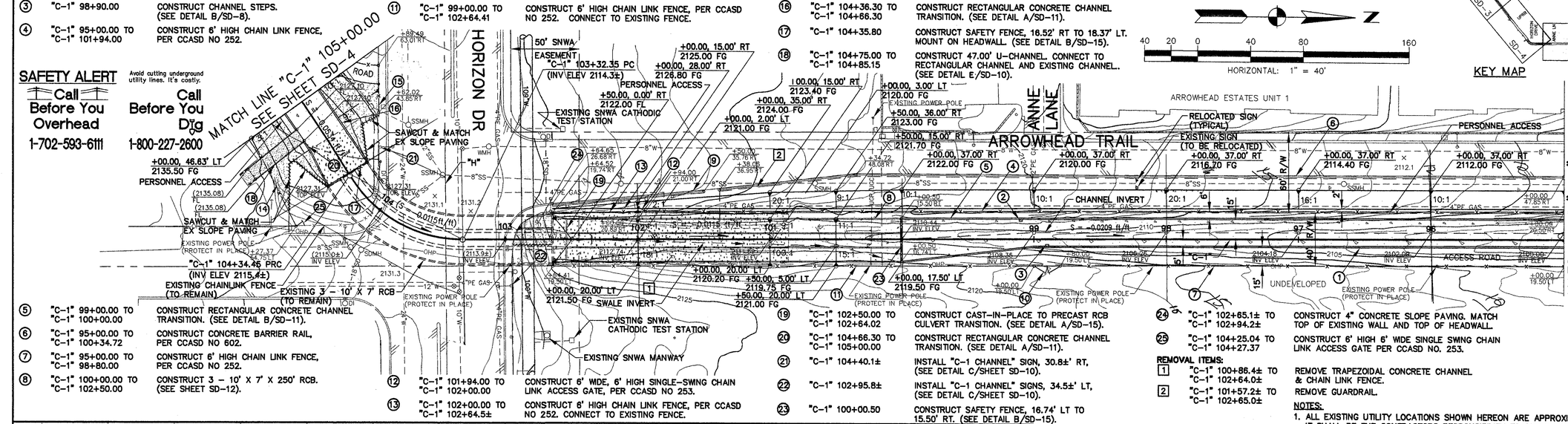
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SD-4
SHEET 10 OF 27

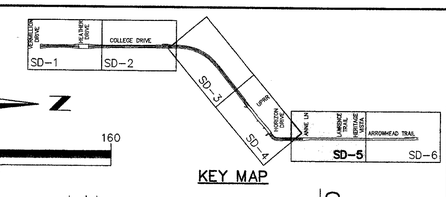
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L:\3C-1\dwg\sd-4.dwg, 05/05/2003 01:34:47 PM, LeoY

CONSTRUCTION ITEMS:

①	"C-1" 95+00.00 TO "C-1" 99+00.00	CONSTRUCT RECTANGULAR CONCRETE CHANNEL. (SEE DETAIL B/SD-11).	⑨	"C-1" 100+47.21 TO "C-1" 102+64.57	CONSTRUCT CONCRETE BARRIER RAIL, PER CCASD NO 602.	⑭	"C-1" 104+27.37 "C-1" 105+00.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252. CONNECT TO EXISTING FENCE.
②	"C-1" 99+10.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL B/SD-8).	⑩	"C-1" 98+80.00 TO "C-1" 99+00.00	CONSTRUCT 20' WIDE, 6' HIGH CHAIN LINK ACCESS GATE PER CCASD NO 253.	⑮	"C-1" 104+62.02 TO "C-1" 104+78.53	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252. CONNECT TO EXISTING FENCE.
③	"C-1" 98+90.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL B/SD-8).	⑪	"C-1" 99+00.00 TO "C-1" 102+64.41	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252. CONNECT TO EXISTING FENCE.	⑯	"C-1" 104+36.30 "C-1" 104+66.30	CONSTRUCT RECTANGULAR CONCRETE CHANNEL TRANSITION. (SEE DETAIL A/SD-11).
④	"C-1" 95+00.00 TO "C-1" 101+94.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.				⑰	"C-1" 104+35.80	CONSTRUCT SAFETY FENCE, 16.52' RT TO 18.37' LT. MOUNT ON HEADWALL. (SEE DETAIL B/SD-15).
						⑱	"C-1" 104+75.00 TO "C-1" 104+85.15	CONSTRUCT 47.00' U-CHANNEL. CONNECT TO RECTANGULAR CHANNEL AND EXISTING CHANNEL. (SEE DETAIL E/SD-10).





⑤	"C-1" 99+00.00 TO "C-1" 100+00.00	CONSTRUCT RECTANGULAR CONCRETE CHANNEL TRANSITION. (SEE DETAIL B/SD-11).	⑫	"C-1" 101+94.00 TO "C-1" 102+00.00	CONSTRUCT 6' WIDE, 6' HIGH SINGLE-SWING CHAIN LINK ACCESS GATE, PER CCASD NO 253.
⑥	"C-1" 95+00.00 TO "C-1" 100+34.72	CONSTRUCT CONCRETE BARRIER RAIL, PER CCASD NO 602.	⑬	"C-1" 102+00.00 TO "C-1" 102+64.5±	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252. CONNECT TO EXISTING FENCE.
⑦	"C-1" 95+00.00 TO "C-1" 98+80.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.			
⑧	"C-1" 100+00.00 TO "C-1" 102+50.00	CONSTRUCT 3 – 10' X 7' X 250' RCB. (SEE SHEET SD-12).			

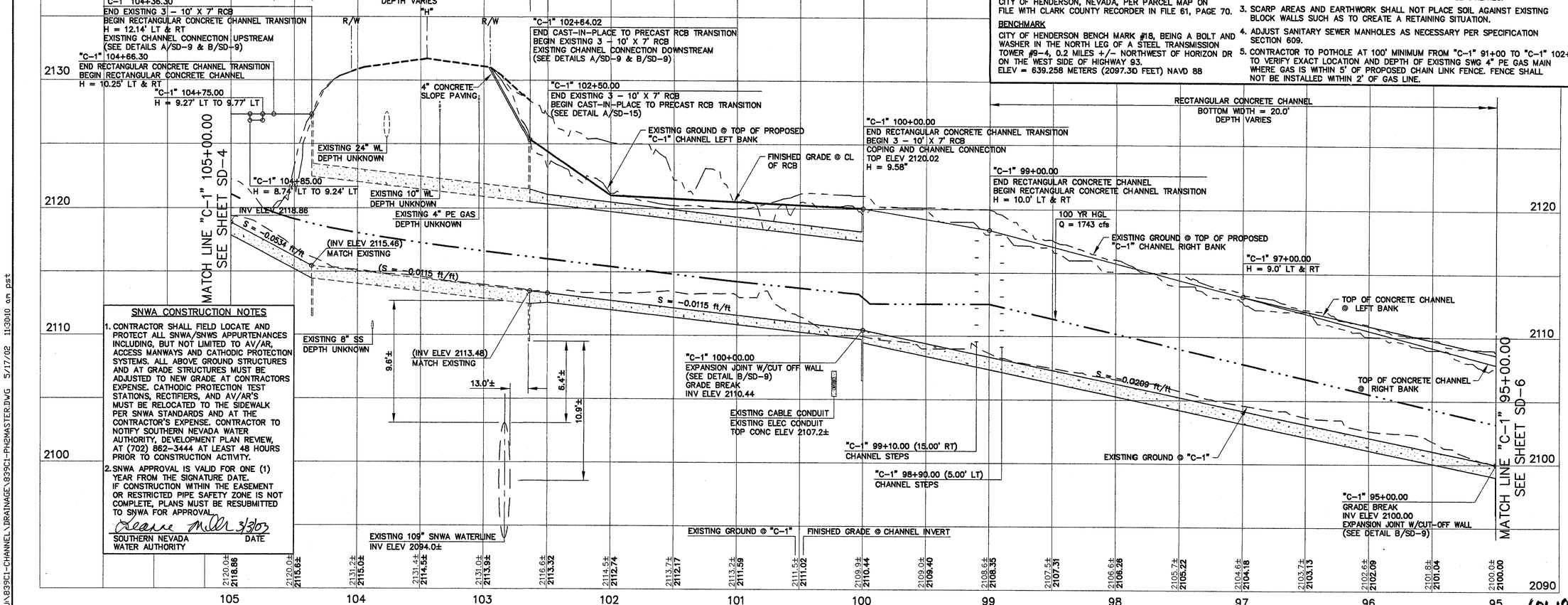
⑲	"C-1" 102+50.00 TO "C-1" 102+64.02	CONSTRUCT CAST-IN-PLACE TO PRECAST RCB CULVERT TRANSITION. (SEE DETAIL A/SD-15).	㉔	"C-1" 102+65.1± TO "C-1" 102+94.2±	CONSTRUCT 4" CONCRETE SLOPE PAVING. MATCH TOP OF EXISTING WALL AND TOP OF HEADWALL.
⑳	"C-1" 104+66.30 TO "C-1" 105+00.00	CONSTRUCT RECTANGULAR CONCRETE CHANNEL TRANSITION. (SEE DETAIL A/SD-11).	㉕	"C-1" 104+25.04 TO "C-1" 104+27.37	CONSTRUCT 6' HIGH 6' WIDE SINGLE SWING CHAIN LINK ACCESS GATE PER CCASD NO. 253.
㉑	"C-1" 104+40.1±	INSTALL "C-1 CHANNEL" SIGN, 30.8±' RT, (SEE DETAIL C/SHEET SD-10).	**REMOVAL ITEMS:**		
㉒	"C-1" 102+95.8±	INSTALL "C-1 CHANNEL" SIGNS, 34.5±' LT, (SEE DETAIL C/SHEET SD-10).	1	"C-1" 100+86.4± TO "C-1" 102+64.0±	REMOVE TRAPEZOIDAL CONCRETE CHANNEL & CHAIN LINK FENCE.
㉓	"C-1" 100+00.50	CONSTRUCT SAFETY FENCE, 16.74' LT TO 15.50' RT. (SEE DETAIL B/SD-15).	2	"C-1" 101+57.2± TO "C-1" 102+65.0±	REMOVE GUARDRAIL.

SAFETY ALERT

Call Before You Overhead 1-702-593-6111

Call Before You Dig 1-800-227-2600

Avoid cutting underground utility lines. It's costly.



SNWA CONSTRUCTION NOTES

1. CONTRACTOR SHALL FIELD LOCATE AND PROTECT ALL SNWA/SNWS APPURTENANCES INCLUDING, BUT NOT LIMITED TO AV/AR, ACCESS MANWAYS AND CATHODIC PROTECTION SYSTEMS. ALL ABOVE GROUND STRUCTURES AND AT GRADE STRUCTURES MUST BE ADJUSTED TO NEW GRADE AT CONTRACTORS EXPENSE. CATHODIC PROTECTION TEST STATIONS, RECTIFIERS, AND AV/AR'S MUST BE RELOCATED TO THE SIDEWALK PER SNWA STANDARDS AND AT THE CONTRACTOR'S EXPENSE. CONTRACTOR TO NOTIFY SOUTHERN NEVADA WATER AUTHORITY, DEVELOPMENT PLAN REVIEW, AT (702) 862-3444 AT LEAST 48 HOURS PRIOR TO CONSTRUCTION ACTIVITY.
2. SNWA APPROVAL IS VALID FOR ONE (1) YEAR FROM THE SIGNATURE DATE. IF CONSTRUCTION WITHIN THE EASEMENT OR RESTRICTED PIPE SAFETY ZONE IS NOT COMPLETE, PLANS MUST BE RESUBMITTED TO SNWA FOR APPROVAL.

Deanne Miller 3/3/03
SOUTHERN NEVADA WATER AUTHORITY — DATE

BASIS OF BEARING

N 89°24'41" E BEING THE NORTH LINE OF THE NE 1/4 OF THE NE 1/4 OF SECTION 29, T 22 S, R 63 E, MDM, CITY OF HENDERSON, NEVADA, PER PARCEL MAP ON FILE WITH CLARK COUNTY RECORDER IN FILE 61, PAGE 70.

BENCHMARK

CITY OF HENDERSON BENCH MARK #18, BEING A BOLT AND WASHER IN THE NORTH LEG OF A STEEL TRANSMISSION TOWER #9-4, 0.2 MILES +/- NORTHWEST OF HORIZON DR ON THE WEST SIDE OF HIGHWAY 93. ELEV = 639.258 METERS (2097.30 FEET) NAVD 88

NOTES:

1. ALL EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL UTILITIES ARE SHOWN HEREON.
2. CONTRACTOR TO KEEP IN SERVICE AND PROTECT ALL UTILITIES.
3. SCARP AREAS AND EARTHWORK SHALL NOT PLACE SOIL AGAINST EXISTING BLOCK WALLS SUCH AS TO CREATE A RETAINING SITUATION.
4. ADJUST SANITARY SEWER MANHOLES AS NECESSARY PER SPECIFICATION SECTION 609.
5. CONTRACTOR TO POTHOLE AT 100' MINIMUM FROM "C-1" 91+00 TO "C-1" 102+00 TO VERIFY EXACT LOCATION AND DEPTH OF EXISTING SWG 4" PE GAS MAIN WHERE GAS IS WITHIN 5' OF PROPOSED CHAIN LINK FENCE. FENCE SHALL NOT BE INSTALLED WITHIN 2' OF GAS LINE.

REV NO	DATE	DESCRIPTION	APPROVED

THE LOUIS BERGER GROUP, INC
LAS VEGAS, NEVADA

UPPER AND MIDDLE REACHES OF THE C-1 CHANNEL - PHASE 2
GRADING & DRAINAGE PLAN & PROFILE
"C-1" 105+00.00 TO "C-1" 95+00.00
HENDERSON NEVADA, DEPARTMENT OF PUBLIC WORKS

RYNDI FLIPPIN-DUDLEY — No. 11070 — 2/21/03

PROJECT NO:	839
DRAWN BY:	ARB
DESIGNED BY:	SRF
CHECKED BY:	SJD
APPROVED BY:	TDL
SCALE	
HORIZ:	1" = 40'
VERT:	1" = 4'

DRAWING NO

SD-5

SHEET 11 OF 27

(06181)

U:\839C1-CHANNEL\DRAINAGE\839C1-PHZMASTER.DWG 5/17/02 11:30:10 am pst

J:\Projects 3\Drawing1.dwg, 05/02/2003 05:08:06 PM, LeeJr

CONSTRUCTION ITEMS:

①	"C-1" 84+50.00 TO "C-1" 95+00.00	CONSTRUCT RECTANGULAR CONCRETE CHANNEL. (SEE DETAIL B/SD-11)
②	"C-1" 84+50.00 TO "C-1" 95+00.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252. CONNECT TO EXISTING FENCE.
③	"C-1" 84+50.00 TO "C-1" 86+50.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.
④	"C-1" 86+50.00 TO "C-1" 86+64.00	CONSTRUCT 14' WIDE, 6' HIGH DOUBLE-SWING CHAIN LINK ACCESS GATE, PER CCASD NO 253.
⑤	"C-1" 86+64.00 TO "C-1" 95+00.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.
⑥	"C-1" 88+00.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL B/SD-8)
⑦	"C-1" 88+20.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL B/SD-8)
⑧	"C-1" 84+65.00 TO "C-1" 86+36.00	CONSTRUCT RECTANGULAR CONCRETE CHANNEL WITH ACCESS RAMP. (SEE SHEET SD-16).
⑨	"C-1" 85+50.00 TO "C-1" 86+26.20	CONSTRUCT CONCRETE SLOPE PAVING. (SEE DETAIL D/SD-10)
⑩	"C-1" 92+10.21	INSTALL 18" X 12.8' RCP @ N 89°46'03" E. CONNECT TO EXISTING 18" STORM DRAIN AND RECTANGULAR CHANNEL. (SEE SHEET SD-7).
⑪	"C-1" 90+27.58 TO "C-1" 95+00.00	CONSTRUCT CONCRETE BARRIER RAIL, PER CCASD NO 602.
⑫	"C-1" 94+00.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL B/SD-8)
⑬	"C-1" 94+20.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL B/SD-8)
⑭	"C-1" 84+72.00	CONNECT EXISTING 36" RCP TO RECTANGULAR CHANNEL (SEE SD-7).

REMOVAL ITEMS:

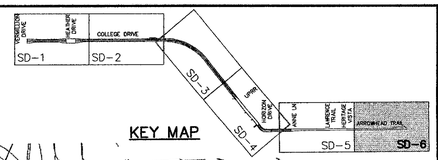
1	"C-1" 86+26.2± TO "C-1" 86+64.0±	REMOVE BLOCK WALL.
2	"C-1" 84+50.0± TO "C-1" 84+87.0±	REMOVE RIP RAP AND WING WALLS
3	"C-1" 85+50.7± TO "C-1" 85+63.0±	REMOVE U-CHANNEL.
4	"C-1" 85+50.0± TO "C-1" 86+26.2±	REMOVE CHAIN LINK FENCE.

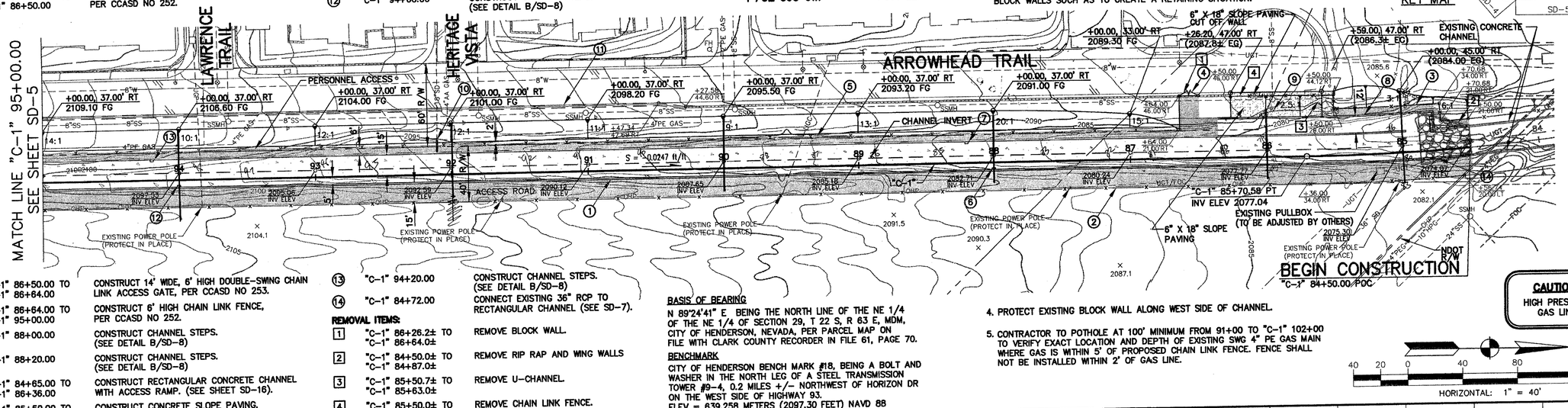
SAFETY ALERT
Call Before You Overhead
1-702-593-6111

Avoid cutting underground utility lines. It's costly.
Call Before You Dig
1-800-227-2600

NOTES:
1. ALL EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL UTILITIES ARE SHOWN HEREON.
2. CONTRACTOR TO KEEP IN SERVICE AND PROTECT ALL UTILITIES.
3. SCARP AREAS AND EARTHWORK SHALL NOT PLACE SOIL AGAINST EXISTING BLOCK WALLS SUCH AS TO CREATE A RETAINING SITUATION.

KEY MAP





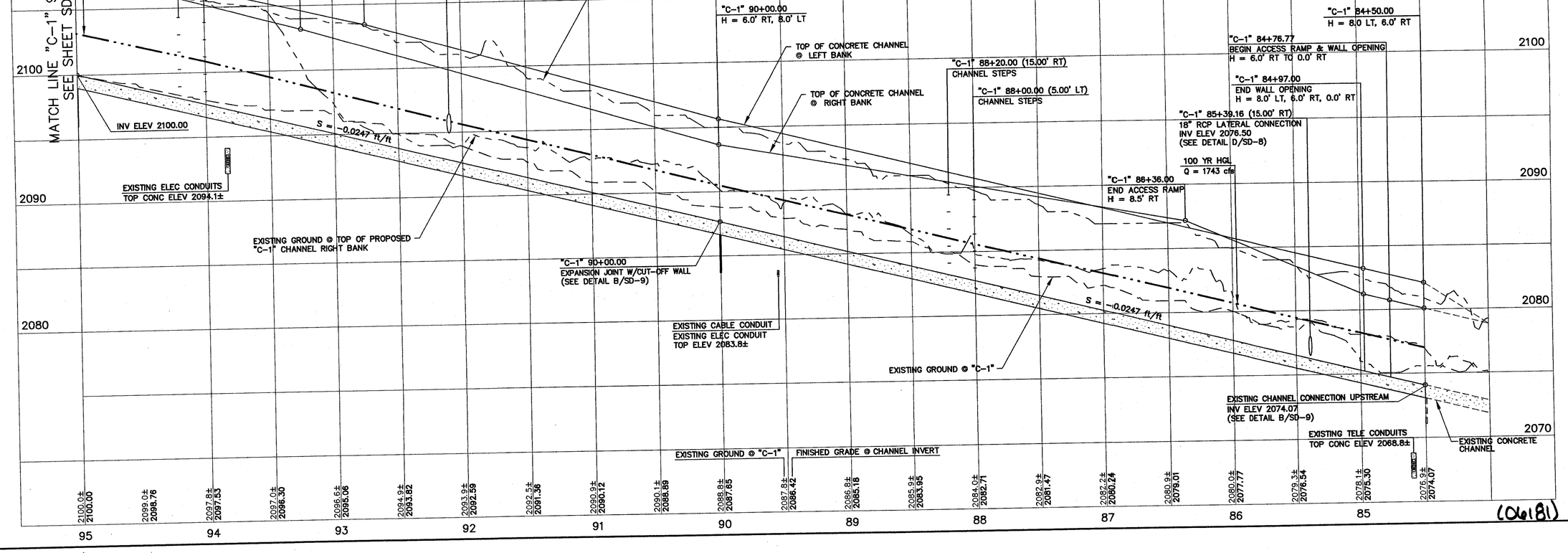
BASIS OF BEARING
N 89°24'41" E, BEING THE NORTH LINE OF THE NE 1/4 OF THE NE 1/4 OF SECTION 29, T 22 S, R 63 E, MDM, CITY OF HENDERSON, NEVADA, PER PARCEL MAP ON FILE WITH CLARK COUNTY RECORDER IN FILE 61, PAGE 70.

BENCHMARK
CITY OF HENDERSON BENCH MARK #18, BEING A BOLT AND WASHER IN THE NORTH LEG OF A STEEL TRANSMISSION TOWER #9-4, 0.2 MILES +/- NORTHWEST OF HORIZON DR ON THE WEST SIDE OF HIGHWAY 93.
ELEV = 639.258 METERS (2097.30 FEET) NAVD 88

4. PROTECT EXISTING BLOCK WALL ALONG WEST SIDE OF CHANNEL.
5. CONTRACTOR TO POTHOLE AT 100' MINIMUM FROM 91+00 TO "C-1" 102+00 TO VERIFY EXACT LOCATION AND DEPTH OF EXISTING SWG 4" PE GAS MAIN WHERE GAS IS WITHIN 5' OF PROPOSED CHAIN LINK FENCE. FENCE SHALL NOT BE INSTALLED WITHIN 2' OF GAS LINE.

CAUTION: HIGH PRESSURE GAS LINE

HORIZONTAL: 1" = 40'



(06181)

U:\839C1-CHANNEL\DRAINAGE\839C1-PH2MASTER.DWG 4/8/03 2:30:10 pm pst RR

C:\dwg\pd15.dwg, 03/02/2003 05:10:27 PM, LeeY

THE LOUIS BERGER GROUP, INC
LAS VEGAS, NEVADA

REV NO	DATE	DESCRIPTION	APPROVED

UPPER AND MIDDLE REACHES OF THE C-1 CHANNEL - PHASE 2
GRADING & DRAINAGE PLAN & PROFILE
"C-1" 95+00.00 TO "C-1" 84+50.00
HENDERSON NEVADA, DEPARTMENT OF PUBLIC WORKS

CITY OF HENDERSON

REGISTERED PROFESSIONAL ENGINEER
SYNDI L. FLIPPIN-DOOLEY
No. 11070
CIVIL
4/7/03

PROJECT NO:	839
DRAWN BY:	ARB
DESIGNED BY:	SRF
CHECKED BY:	SJD
APPROVED BY:	TDL
SCALE	
HORIZ:	1" = 40'
VERT:	1" = 4'

DRAWING NO
SD-6
SHEET 12 OF 27

GRAPHIC SCALE

400 0 200 400 800 1600

(IN FEET)
1 inch = 400 ft.

MATCHLINE SEE SHEET 3

MATCHLINE SEE SHEET 4

MATCHLINE SEE SHEET 6

MATCHLINE SEE SHEET 8

WARM SPRINGS RD

C3B1C

C3B1D

FLOW CONTAINED IN CHANNE

C4BA1

ZONE A

LIMITS OF STUDY

C4BA2

REACH 2B

DRAKE CHANNEL

PABCO RD

ZONE A

C4A1A

RACETRACK RD

C4A2A

LIMITS OF STUDY

REACH 2A

MAGIC WAY

C4BA3

REACH 2C

BURKHOLDER BLVD

C4A2B

C4BB

C4A1B

C1A

ZONE A

C4BE

REVISIONS

No.	Date	CHKD	APPD

DESIGNED: DB
DRAWN: SCC
CHECKED: DB
JOB No: 240482
HORIZ: 1"=400'
VERT: NONE
DATE: 02/05/02

Carter Burgess

Consultants in Planning, Engineering, Construction Management, and Related Services
6655 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: APPROXIMATE METHODS HYDRAULICS ANNOTATED WORK MAP

SHEET 5

5 OF 12



GRAPHIC SCALE
(IN FEET)
1 inch = 200 ft.
200 0 100 200 400 600

Carter Burgess

N

SHEET	1	1	
OF	1		

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: NEWPORT TOWNHOME BASIN LAYOUT

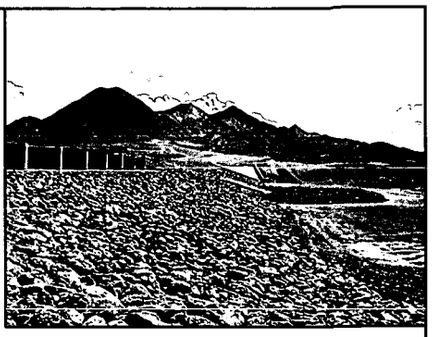
Carter Burgess
Consultants in Planning, Engineering,
Construction Management, and Related Services
6655 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

DESIGNED:	DB
DRAWN:	JDP
CHECKED:	DB
JOB No:	240482
HORIZ:	1"=200'
VERT:	NONE
DATE:	08/09/02

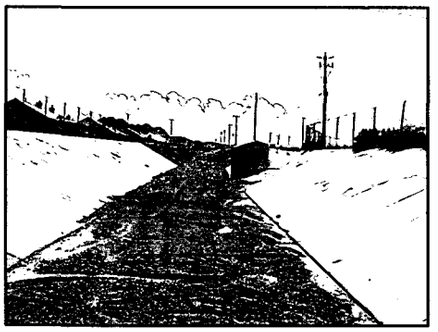
REVISIONS

No.	Date		CHKD	APPD

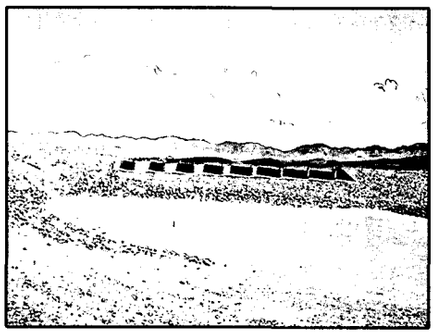
CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT



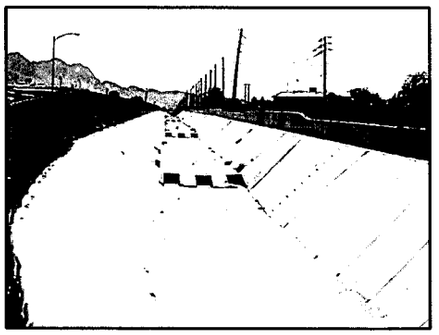
C-1 Channel System Flood Insurance Restudy



Technical Support Data Notebook



Vol. 2



Carter::Burgess

APPENDIX

VOLUME 1

SECTION 1 GENERAL DOCUMENTATION

1.1 Response to Comments
1.2 Meeting Minutes
1.3 General Correspondence
1.4 Certification Forms

SECTION 2 ENGINEERING ANALYSIS

2.1 Hydrologic Analysis
- 2.1.1 Previous Letter of Map Revisions
- 2.1.2 Overall Storm HEC-1 Model
  - 2.1.2.1 SDN3
  - 2.1.2.2 SDN4
  - 2.1.2.3 SDN5
- 2.1.3 Local Hydrology
  - 2.1.3.1 Newport Townhomes

VOLUME 2

2.2 Hydraulic Analysis
- 2.2.1 Detailed Analysis
  - 2.2.1.1 C-1 Channel, Lake Mead Drive to Boulder Highway
  - 2.2.1.2 East C-1 Levee
- 2.2.2 Approximate Methods Analysis
  - 2.2.2.1 Reach 2
  - 2.2.2.2 Reach 3
  - 2.2.2.3 Reach 4

2.3 Supporting Data
- 2.3.1 Curve Number Calculations
- 2.3.2 Time of Concentration Calculations Curve No. Calculations
- 2.3.3 Sedimentation Analysis

2.4 Key to Cross Section Labeling
- 2.4.1 Detailed Methods: C-1 Channel
- 2.4.2 Detailed Methods: East C-1 Levee
- 2.4.3 Approximate Methods --Reach 2
- 2.4.4 Approximate Methods – Reach 3
- 2.4.5 Approximate Methods – Reach 4

SECTION 3 DRAFT FLOOD INSURANCE RESTUDY

VOLUME 3

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4.1 FIRM, Clark County, Nevada Map Index
- 4.1.1 Effective FIRM
- 4.1.2 Annotated FIRM

4.2 Work Maps/Aerial Photographs – Approximate Methods
- 4.2.1 Work Maps (Effective)
- 4.2.2 Work Maps (Annotated)

VOLUME 4

4.3 Work Maps/Base Maps – Detailed Methods
- 4.3.1 C-1 Channel
- 4.3.2 East C-1 Levee

SECTION 5 **MISCELLANEOUS REFERENCE MATERIAL**

5.1 Photographs/Field Review

5.2 Survey Data
- 5.2.1 Point File
- 5.2.2 Survey Notes

5.3 Compact Discs

HEC-RAS Plan: X-Section

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MAIN3	21000	464.20	2074.07	2076.62	2076.62	2077.91	0.003285	9.11	50.98	20.00	1.01
MAIN3	20855.25	464.20	2070.49	2071.82	2073.04	2076.54	0.024963	17.43	26.63	20.00	2.66
HDWORKS	20710.41	830.50	2068.00	2070.37	2070.37	2071.56	0.003301	8.77	94.67	40.00	1.00
HDWORKS	20550.1	830.50	2065.50	2066.90	2067.87	2070.31	0.017018	14.82	56.03	40.00	2.21
DRAKE	18	3227.40	1886.08	1897.95	1897.96	1902.24	0.003081	16.63	194.12	22.72	1.00
DRAKE	17	3227.40	1885.04	1891.73	1894.71	1901.45	0.009669	25.02	129.01	21.08	1.78
DRAKE	16	3227.40	1884.00	1888.65	1892.02	1900.62	0.015424	27.76	116.26	25.00	2.27
DRAKE	15	3227.40	1882.96	1887.56	1890.98	1899.80	0.015961	28.08	114.93	25.00	2.31
DRAKE	14	3227.40	1878.91	1882.99	1886.93	1898.53	0.022784	31.63	102.03	25.00	2.76
DRAKE	13	3227.40	1874.86	1878.62	1882.88	1896.96	0.029269	34.37	93.90	25.00	3.13
DRAKE	12	3227.40	1871.59	1875.18	1879.61	1895.23	0.033473	35.93	89.83	25.00	3.34
DRAKE	11	3227.40	1866.76	1870.12	1874.78	1893.08	0.041174	38.46	83.92	25.00	3.70
DRAKE	10	3227.40	1862.48	1865.71	1870.51	1890.58	0.046514	40.02	80.64	25.00	3.93
DRAKE	9	3227.40	1862.43	1865.88	1870.46	1887.68	0.038050	37.47	86.12	25.00	3.56
DRAKE	8	3227.40	1862.38	1866.06	1870.41	1885.16	0.031108	35.07	92.03	25.00	3.22
DRAKE	7	3227.40	1862.33	1866.25	1870.35	1883.06	0.025654	32.90	98.09	25.00	2.93
DRAKE	6	3227.40	1862.29	1866.41	1870.31	1881.67	0.022181	31.35	102.95	25.00	2.72
DRAKE	5	3227.40	1862.29	1866.42	1870.31	1881.59	0.021971	31.25	103.27	25.00	2.71
DRAKE	4	3227.40	1862.23	1866.68	1870.25	1879.77	0.017631	29.04	111.15	25.00	2.43
DRAKE	3	3227.40	1862.18	1866.90	1870.20	1878.53	0.014783	27.37	117.94	25.00	2.22
DRAKE	2	3227.40	1862.13	1867.14	1870.15	1877.46	0.012393	25.78	125.17	25.00	2.03
DRAKE	1	3227.40	1862.10	1867.26	1870.12	1876.97	0.011313	25.00	129.10	25.00	1.94
MAIN2	20550.1	464.20	2065.50	2066.57		2073.92	0.050674	21.76	21.33	20.00	3.71
MAIN2	20550	1295.80	2065.50	2066.47	2067.89	2073.90	0.053326	21.89	59.20	61.33	3.93
MAIN2	20475	Culvert									
MAIN2	20400	1295.80	2057.00	2058.00	2059.39	2064.98	0.048055	21.21	61.11	61.33	3.93
MAIN2	20280	1295.80	2052.66	2053.74	2055.05	2059.65	0.036496	19.50	66.44	61.33	3.30
MAIN2	20180	1295.80	2050.93	2053.65	2054.83	2057.46	0.008619	15.68	82.66	35.87	1.82
MAIN2	20150	1295.80	2050.42	2053.05	2054.32	2057.16	0.009617	16.27	79.67	35.53	1.91
MAIN2	19950	1295.80	2046.99	2049.34	2050.89	2054.71	0.014342	18.60	69.67	34.39	2.30
MAIN2	19786.49	1295.80	2042.36	2044.42	2046.26	2051.63	0.022310	21.54	60.15	33.26	2.82
MAIN2	19750	1295.80	2041.33	2043.35	2045.20	2050.77	0.023691	21.85	59.30	33.66	2.90
MAIN2	19600	1295.80	2037.09	2039.05	2040.96	2046.98	0.026208	22.60	57.34	33.41	3.04
MAIN2	19450	1295.80	2032.84	2034.78	2036.71	2042.94	0.027377	22.93	56.52	33.31	3.10
MAIN2	19237	1295.80	2025.00	2026.82	2028.87	2036.30	0.034357	24.71	52.44	32.78	3.44
MAIN2	19137.00	1295.80	2021.23	2022.56	2024.47	2032.26	0.047505	24.99	51.86	38.99	3.82

HEC-RAS Plan: X-Section (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MAIN2	19059.85	1295.80	2018.37	2019.76	2021.61	2028.60	0.040920	23.86	54.30	39.00	3.56
MAIN2	19020.51	1295.80	2017.64	2019.13	2020.90	2026.84	0.032709	22.27	58.17	38.99	3.21
MAIN2	18858.93	1662.10	2014.56	2016.71	2018.40	2022.84	0.016719	19.87	83.63	38.99	2.39
MAIN2	18850	1662.10	2014.42	2016.57	2018.24	2022.69	0.016706	19.87	83.67	39.00	2.39
MAIN2	18750	1662.10	2012.72	2014.86	2016.54	2021.01	0.016804	19.90	83.51	39.00	2.40
MAIN2	18650	1662.10	2011.03	2013.46	2015.16	2019.37	0.014791	19.51	85.19	40.25	2.36
MAIN2	18550	1662.10	2009.33	2011.72	2013.45	2017.83	0.015540	19.83	83.81	40.10	2.42
MAIN2	18400	1662.10	2005.59	2008.14	2010.08	2015.26	0.017440	21.42	77.61	35.92	2.57
MAIN2	18200	1662.10	2000.59	2002.98	2005.08	2011.26	0.021799	23.09	72.00	35.24	2.85
MAIN2	18050	1662.10	1996.85	1999.20	2001.34	2007.84	0.023246	23.59	70.46	35.06	2.93
MAIN2	18000	1662.10	1995.56	1997.89	2000.05	2006.65	0.023720	23.75	69.98	35.00	2.96
MAIN2	17800	1662.10	1990.42	1992.72	1994.91	2001.76	0.024873	24.13	68.88	34.86	3.03
MAIN2	17675	1662.10	1987.20	1989.49	1991.69	1998.62	0.025239	24.25	68.54	34.82	3.05
MAIN2	17650	1662.10	1986.56	1988.87	1991.08	1998.00	0.024763	24.24	68.56	34.26	3.02
MAIN2	17600	1662.10	1985.27	1987.58	1989.79	1996.75	0.024954	24.31	68.38	34.24	3.03
MAIN2	17400	1662.10	1980.12	1982.42	1984.64	1991.70	0.025421	24.46	67.96	34.19	3.06
MAIN2	17200	1662.10	1974.98	1977.27	1979.50	1986.59	0.025557	24.50	67.84	34.17	3.06
MAIN2	17000	1662.10	1969.83	1972.12	1974.36	1981.46	0.025652	24.53	67.76	34.16	3.07
MAIN2	16800	1662.10	1964.68	1966.97	1969.20	1976.33	0.025732	24.56	67.69	34.15	3.07
MAIN2	16600	1662.10	1959.53	1961.82	1964.05	1971.18	0.025732	24.56	67.69	34.15	3.07
MAIN2	16400	1662.10	1954.39	1956.68	1958.91	1966.04	0.025732	24.56	67.69	34.15	3.07
MAIN2	16200	1662.10	1949.24	1951.53	1953.76	1960.89	0.025732	24.56	67.69	34.15	3.07
MAIN2	16000	1662.10	1944.09	1946.38	1948.61	1955.74	0.025732	24.56	67.69	34.15	3.07
MAIN2	15800	1662.10	1938.95	1941.24	1943.47	1950.60	0.025732	24.56	67.69	34.15	3.07
MAIN2	15700	1703.90	1936.37	1938.71	1940.97	1948.06	0.025068	24.54	69.42	34.36	3.04
MAIN2	15500	1703.90	1931.76	1934.14	1936.35	1943.09	0.023464	24.01	70.97	34.54	2.95
MAIN2	15300	1703.90	1927.68	1930.14	1932.27	1938.47	0.021070	23.16	73.58	34.84	2.81
MAIN2	15260.78	1703.90	1926.76	1929.14	1931.25	1937.60	0.022724	23.34	73.01	36.41	2.90
MAIN2	15200	1703.90	1925.38	1927.83	1929.97	1936.25	0.021399	23.28	73.18	34.77	2.83
MAIN2	15199.9	1703.90	1925.38	1927.83	1929.97	1936.24	0.059030	23.28	73.21	34.79	2.83
MAIN2	15100	2800.60	1921.88	1925.97	1928.01	1932.58	0.022972	20.63	135.78	41.37	2.01
MAIN2	15000	2800.60	1918.38	1922.23	1924.53	1929.90	0.028941	22.22	126.05	40.42	2.22
MAIN2	14900	2800.60	1914.88	1918.63	1921.03	1926.81	0.031981	22.94	122.07	40.02	2.32
MAIN2	14890	2800.60	1914.75	1918.54	1920.89	1926.58	0.012498	22.76	123.06	39.97	2.29
MAIN2	14800	2800.60	1913.63	1917.42	1919.77	1925.45	0.012488	22.75	123.12	39.99	2.28
MAIN2	14600	2800.60	1911.13	1914.92	1917.27	1922.95	0.012488	22.75	123.12	39.99	2.28

HEC-RAS Plan: X-Section (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MAIN2	14550	2800.60	1910.45	1914.22	1916.58	1922.32	0.012680	22.84	122.62	40.07	2.30
MAIN2	14500	Bridge									
MAIN2	14450	2800.60	1909.23	1915.36	1915.36	1917.69	0.002151	12.26	228.45	49.52	1.01
MAIN2	14360	2800.60	1908.10	1912.97	1914.23	1917.22	0.005021	16.54	169.29	44.49	1.49
MAIN2	14350	2800.60	1908.00	1912.86	1914.13	1917.14	0.011731	16.59	168.79	44.44	1.50
MAIN2	14300	2800.60	1906.25	1910.60	1912.38	1916.27	0.018161	19.12	146.49	42.39	1.81
MAIN2	14200	2800.60	1902.75	1906.69	1908.88	1913.94	0.026530	21.61	129.62	40.77	2.14
MAIN2	14100	2800.60	1899.25	1903.04	1905.38	1911.02	0.030775	22.66	123.58	40.17	2.28
MAIN2	14090	2800.60	1898.99	1902.67	1905.02	1910.81	0.013285	22.90	122.28	41.47	2.35
MAIN2	14000	2800.60	1897.87	1901.68	1904.03	1909.60	0.012202	22.58	124.06	40.04	2.26
MAIN2	13800	2800.60	1895.50	1899.23	1901.53	1907.10	0.012646	22.52	124.37	41.68	2.30
MAIN2	13664.86	2800.60	1893.81	1897.65	1899.96	1905.41	0.011909	22.36	125.23	40.27	2.23
MAIN2	13601	2800.60	1893.01	1896.83	1899.16	1904.65	0.012029	22.43	124.87	40.30	2.25
MAIN2	13600	2800.60	1893.00	1896.83	1899.15	1904.63	0.029744	22.41	124.94	40.31	2.24
MAIN2	13500	2800.60	1889.50	1893.24	1895.65	1901.48	0.032371	23.03	121.59	39.97	2.33
MAIN2	13400	2800.60	1886.00	1889.70	1892.15	1898.16	0.033694	23.33	120.04	39.82	2.37
MAIN2	13300	2800.60	1882.50	1886.19	1888.65	1894.74	0.034352	23.48	119.30	39.74	2.39
MAIN2	13200	2800.60	1881.25	1885.16	1887.39	1892.60	0.011158	21.88	127.98	40.45	2.17
MAIN2	13000	2800.60	1878.75	1882.61	1884.89	1890.29	0.011685	22.23	125.96	40.26	2.22
MAIN2	12800	2800.60	1876.25	1880.08	1882.40	1887.90	0.012007	22.44	124.78	40.14	2.24
MAIN2	12691	2800.60	1874.89	1878.70	1881.02	1886.58	0.012197	22.53	124.32	40.29	2.26
MAIN2	12591	2800.60	1873.64	1876.72	1879.05	1885.17	0.015056	23.33	120.06	39.00	2.34
MAIN2	12512.76	2800.60	1867.34	1869.80	1872.75	1883.06	0.030735	29.22	95.84	39.00	3.28
MAIN2	12450	2800.60	1862.28	1874.81	1867.69	1875.32	0.000223	5.73	488.62	39.00	0.29
MAIN2	12400	2800.60	1862.24	1874.81		1875.31	0.000221	5.71	490.06	39.00	0.28
MAIN2	12344.58	2800.60	1862.19	1874.80		1875.30	0.000217	5.68	493.03	39.18	0.28
MAIN2	12300	2800.60	1862.15	1874.80		1875.30	0.000217	5.68	493.32	39.00	0.28
MAIN2	12234.51	2800.60	1862.09	1874.81	1867.41	1875.28	0.000201	5.50	508.75	40.00	0.41
MAIN1	12060.97	4818.00	1861.93	1874.35		1875.28	0.000366	7.76	620.76	50.00	0.39
MAIN1	11950	4818.00	1861.83	1874.31		1875.24	0.000360	7.72	624.21	50.00	0.38
MAIN1	11850	4818.00	1860.76	1873.75		1875.14	0.000592	9.49	507.58	54.17	0.55
MAIN1	11800	4818.00	1860.22	1870.99	1870.99	1874.85	0.002177	15.76	305.68	40.00	1.00
MAIN1	11750	4818.00	1859.69	1867.37	1869.61	1874.37	0.005776	21.23	226.91	44.11	1.65
MAIN1	11550	4818.00	1857.54	1864.68	1867.32	1872.94	0.007405	23.07	208.85	43.54	1.86
MAIN1	11300	4818.00	1854.87	1861.55	1864.37	1870.81	0.008974	24.42	197.32	44.10	2.03
MAIN1	11022.25	4818.00	1851.89	1859.17	1861.99	1868.45	0.008044	24.44	197.13	39.12	1.92

HEC-RAS Plan: X-Section (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MAIN1	10843	4818.00	1850.77	1857.93	1860.61	1866.93	0.007978	24.07	200.15	40.91	1.92
MAIN1	10700	4818.00	1849.53	1856.98	1859.67	1865.76	0.007427	23.78	202.64	39.37	1.85
MAIN1	10500	4818.00	1847.86	1855.04	1857.77	1864.18	0.008068	24.26	198.61	40.34	1.93
MAIN1	10300	4818.00	1846.13	1853.48	1856.26	1862.59	0.007832	24.22	198.90	39.16	1.89
MAIN1	10149	4818.00	1844.88	1851.90	1854.67	1861.32	0.008540	24.63	195.60	40.74	1.98
MAIN1	10135	4818.00	1844.82	1851.81	1854.55	1861.19	0.008544	24.57	196.07	41.09	1.98
MAIN1	10000	4818.00	1844.16	1851.48	1853.96	1859.82	0.007215	23.16	208.00	41.80	1.83
MAIN1	9880	4818.00	1843.74	1851.20	1853.41	1858.77	0.006442	22.08	218.22	43.48	1.74
MAIN1	9800	4818.00	1843.37	1848.88	1851.82	1858.01	0.009135	24.25	198.71	38.03	1.87
MAIN1	9756	5126.00	1842.96	1846.95	1849.91	1857.39	0.013202	25.93	197.68	49.50	2.29
MAIN1	9703	Culvert									
MAIN1	9654	5126.00	1841.92	1846.19	1848.83	1855.34	0.010731	24.28	211.15	49.50	2.29
MAIN1	9550	5126.00	1841.59	1845.39	1847.87	1854.00	0.011968	23.55	217.69	63.87	2.25
MAIN1	9500	5126.00	1841.43	1845.50	1847.78	1853.19	0.009675	22.26	230.29	62.02	2.04
MAIN1	9339.55	5126.00	1840.97	1848.56	1848.55	1851.49	0.001954	13.74	373.16	63.35	1.00
MAIN1	9146.20	5126.00	1840.64	1847.81	1847.81	1851.07	0.002094	14.49	353.79	54.75	1.00
MAIN1	9000	5126.00	1840.10	1845.03	1846.48	1850.39	0.005212	18.58	275.84	56.01	1.48
MAIN1	8822	5126.00	1839.24	1844.25	1845.62	1849.43	0.004934	18.26	280.70	56.01	1.44
MAIN1	8821.99	5126.00	1837.35	1841.46	1843.72	1849.17	0.009246	22.29	229.92	56.01	1.94
MAIN1	8783	5126.00	1836.36	1846.69	1842.73	1847.91	0.000541	8.86	578.29	56.02	0.49
MAIN1	8768	5126.00	1835.64	1844.07	1844.07	1847.66	0.002037	15.21	337.02	47.17	1.00
MAIN1	8746	5126.00	1833.24	1840.48	1842.48	1847.27	0.005097	20.92	245.05	43.04	1.54
MAIN1	8730	5126.00	1831.80	1839.71	1841.90	1847.13	0.005932	21.86	234.51	44.32	1.67
MAIN1	8713	5126.00	1831.31	1838.98	1841.33	1846.97	0.006610	22.68	225.97	43.95	1.76
MAIN1	8695	5126.00	1831.18	1838.97	1841.26	1846.80	0.006345	22.45	228.28	43.58	1.73
MAIN1	8500	5126.00	1828.34	1835.41	1838.25	1845.16	0.008813	25.06	204.56	42.86	2.02
MAIN1	8383	5126.00	1826.76	1833.60	1836.58	1844.01	0.009782	25.89	197.96	42.87	2.12
MAIN1	8215	5126.00	1824.06	1830.72	1833.94	1842.17	0.011064	27.15	188.78	41.72	2.25
MAIN1	8200	5126.00	1823.80	1830.45	1833.69	1841.98	0.011158	27.25	188.08	41.59	2.26
MAIN1	8000	5126.00	1820.72	1827.18	1830.55	1839.55	0.012364	28.23	181.60	41.24	2.37
MAIN1	7800	5126.00	1817.79	1824.17	1827.62	1836.97	0.012950	28.71	178.55	40.94	2.42
MAIN1	7600	5126.00	1814.89	1821.22	1824.72	1834.31	0.013351	29.03	176.57	40.75	2.46
MAIN1	7400	5126.00	1811.91	1818.20	1821.74	1831.57	0.013753	29.35	174.66	40.55	2.49
MAIN1	7196	5172.20	1808.78	1815.07	1818.66	1828.72	0.014031	29.65	174.46	40.49	2.52
MAIN1	7000	5172.20	1805.32	1811.50	1815.19	1825.81	0.014982	30.35	170.40	40.12	2.60
MAIN1	6800	5172.20	1801.65	1807.74	1811.52	1822.66	0.015857	30.99	166.90	39.77	2.67

HEC-RAS Plan: X-Section (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MAIN1	6679	5172.20	1799.41	1805.52	1809.39	1820.71	0.016045	31.27	165.41	39.11	2.68
MAIN1	6600	5172.20	1798.27	1804.34	1808.14	1819.40	0.016064	31.14	166.11	39.69	2.68
MAIN1	6400	5172.20	1795.39	1801.60	1805.37	1816.13	0.015100	30.59	169.08	39.45	2.60
MAIN1	6200	5172.20	1793.00	1799.28	1802.87	1812.96	0.014093	29.68	174.25	40.51	2.52
MAIN1	6000	5172.20	1790.76	1797.18	1800.63	1810.01	0.012914	28.75	179.91	41.08	2.42
MAIN1	5800	5172.20	1788.12	1794.53	1797.99	1807.42	0.012988	28.81	179.53	41.04	2.43
MAIN1	5600	5172.20	1784.02	1790.21	1793.89	1804.49	0.014952	30.33	170.52	40.14	2.59
MAIN1	5462	5172.20	1782.76	1788.83	1792.32	1802.20	0.014476	29.35	176.24	43.09	2.56
MAIN1	5396	5172.20	1781.46	1787.78	1791.34	1801.24	0.013766	29.45	175.65	40.59	2.49
MAIN1	5362	5172.20	1780.69	1786.95	1790.56	1800.73	0.014234	29.79	173.62	40.45	2.53
MAIN1	5196	5172.20	1777.86	1784.10	1787.80	1798.30	0.014706	30.24	171.04	39.85	2.57
MAIN1	5082.67	5172.20	1775.66	1782.19	1786.15	1796.64	0.014066	30.50	169.56	36.91	2.51
MAIN1	4820	5172.20	1770.57	1776.87	1780.97	1792.59	0.015941	31.82	162.52	36.62	2.66
MAIN1	4800	5172.20	1770.21	1776.49	1780.60	1792.27	0.016036	31.88	162.26	36.66	2.67
MAIN1	4600	5172.20	1766.55	1772.74	1776.89	1788.95	0.016738	32.31	160.10	36.70	2.73
MAIN1	4400	5172.20	1762.98	1769.01	1773.10	1785.49	0.017606	32.58	158.76	37.66	2.80
MAIN1	4312.10	5172.20	1761.43	1767.39	1771.44	1783.91	0.017946	32.63	158.53	38.23	2.82
MAIN1	4312	5172.20	1759.39	1765.43	1769.92	1783.74	0.019332	34.34	150.64	34.89	2.91
MAIN1	4298	5172.20	1759.34	1765.24	1769.60	1783.43	0.019825	34.23	151.12	36.26	2.95
MAIN1	4200	5172.20	1757.55	1763.24	1767.43	1781.43	0.020800	34.23	151.12	38.08	3.03
MAIN1	4000	5172.20	1753.87	1759.64	1763.75	1777.18	0.019799	33.62	153.86	38.37	2.96
MAIN1	3810	5172.20	1750.47	1756.51	1760.70	1773.41	0.017971	32.99	156.79	36.92	2.82
MAIN1	3800	5172.20	1750.29	1756.11	1760.17	1773.20	0.019098	33.18	155.89	38.59	2.91
MAIN1	3600	5172.20	1746.67	1752.52	1756.55	1769.34	0.018683	32.91	157.15	38.72	2.88
MAIN1	3513.01	5172.20	1745.08	1750.98	1755.03	1767.70	0.018382	32.82	157.61	38.45	2.86
MAIN1	3513	5172.20	1743.08	1749.16	1753.71	1767.54	0.019262	34.41	150.33	34.47	2.90
MAIN1	3500	5172.20	1742.91	1748.99	1753.52	1767.27	0.019140	34.31	150.77	34.58	2.90
MAIN1	3300	5172.20	1739.47	1745.41	1749.74	1763.30	0.019343	33.94	152.37	36.29	2.92
MAIN1	3290	5172.20	1739.29	1745.21	1749.52	1763.10	0.019440	33.94	152.38	36.49	2.93
MAIN1	3112.1	5172.20	1736.02	1741.81	1745.99	1759.56	0.019891	33.81	152.98	37.85	2.96
MAIN1	3112	5172.20	1734.13	1740.09	1744.74	1759.41	0.020658	35.27	146.65	34.19	3.00
MAIN1	3097	5692.50	1734.01	1740.48	1745.04	1758.83	0.018033	34.38	165.58	36.20	2.83
MAIN1	2914	5692.50	1730.62	1736.95	1741.44	1755.46	0.018686	34.52	164.88	37.12	2.89
MAIN1	2900	5692.50	1730.15	1736.67	1741.22	1755.20	0.018017	34.55	164.77	35.56	2.83
MAIN1	2799	5692.50	1726.76	1732.90	1737.50	1753.08	0.021002	36.04	157.93	36.43	3.05
MAIN1	2767	5692.50	1725.90	1731.87	1736.46	1752.35	0.022107	36.32	156.73	37.50	3.13

HEC-RAS Plan: X-Section (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MAIN1	2700	5692.50	1723.40	1728.66	1733.58	1750.65	0.024328	37.64	151.25	36.56	3.26
MAIN1	2669	5692.50	1722.22	1728.46	1734.23	1749.99	0.012302	37.24	152.87	39.58	2.63
MAIN1	2617	Culvert									
MAIN1	2565	5692.50	1720.14	1731.98		1737.96	0.003580	19.62	290.17	24.50	2.63

HEC-RAS Plan: Reach 2 River: Reach 2C Reach: C4CA--C3B3D Profile: PF 1

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
C4CA--C3B3D	29	96.80	2420.00	2420.32	2420.32	2420.43	0.021656	2.69	36.00	160.61	1.00
C4CA--C3B3D	28	96.80	2405.72	2406.25	2406.25	2406.45	0.017939	3.57	27.10	68.59	1.00
C4CA--C3B3D	27	96.80	2392.13	2392.74	2392.74	2392.88	0.022034	2.99	32.42	125.21	1.03
C4CA--C3B3D	26	96.80	2380.25	2380.82	2380.82	2380.96	0.019731	3.01	32.21	113.38	0.99
C4CA--C3B3D	25	96.80	2367.28	2367.72	2367.72	2367.85	0.020434	2.88	33.61	129.49	1.00
C4CA--C3B3D	24	96.80	2353.23	2353.88	2353.88	2354.01	0.018385	2.87	33.72	120.67	0.96
C4CA--C3B3D	23	96.80	2335.00	2335.74	2335.74	2335.98	0.017288	3.95	24.57	52.89	1.01
C4CA--C3B3D	22	96.80	2323.00	2323.74	2323.74	2323.98	0.016884	3.95	24.58	51.93	1.00
C4CA--C3B3D	21	96.80	2306.00	2306.74	2306.74	2306.97	0.017382	3.86	25.18	56.39	1.01
C4CA--C3B3D	20	96.80	2291.00	2291.74	2291.74	2291.98	0.017127	3.92	24.77	53.70	1.01
C4CA--C3B3D	19	96.80	2274.00	2274.74	2274.74	2274.97	0.017237	3.84	25.29	56.57	1.00
C4CA--C3B3D	18	96.80	2265.00	2265.74	2265.74	2265.98	0.017244	3.93	24.71	53.46	1.01
C4CA--C3B3D	17	667.70	2254.00	2255.97	2255.97	2256.73	0.010984	7.09	95.69	63.50	0.99
C4CA--C3B3D	16	667.70	2242.00	2243.96	2243.96	2244.71	0.011119	7.02	96.59	65.53	0.99
C4CA--C3B3D	15	667.70	2232.00	2233.96	2233.96	2234.71	0.010752	7.03	97.17	66.05	0.98
C4CA--C3B3D	14	1048.30	2221.00	2223.37	2223.37	2224.16	0.011513	7.15	146.65	93.82	1.01
C4CA--C3B3D	13	1048.30	2209.00	2209.95	2209.95	2210.38	0.014654	5.23	200.56	246.39	1.02
C4CA--C3B3D	12	1048.30	2199.00	2200.35	2200.35	2200.79	0.014109	5.33	196.51	227.33	1.01

HEC-RAS Plan: Reach 2 Profile: PF 1

River	Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 2A	C4BA2	2	3769.70	2185.00	2188.11	2188.11	2188.89	0.011348	7.08	532.25	342.19	1.00
Reach 2A	C4BA2	1	3769.70	2175.00	2177.93	2177.93	2178.53	0.012418	6.22	606.04	506.50	1.00
Reach 2B	C3B3A	3	3769.70	2225.00	2228.64	2228.64	2230.31	0.009006	10.36	363.98	109.97	1.00
Reach 2B	C3B3A	2	3769.70	2210.00	2213.97	2213.97	2215.84	0.008868	10.96	343.96	93.24	1.01
Reach 2B	C3B3A	1	3769.70	2199.00	2201.85	2201.85	2202.96	0.010370	8.44	446.53	205.87	1.01
Reach 2C	C4CA--C3B3D	20	96.80	2420.00	2420.32	2420.32	2420.43	0.021656	2.69	36.00	160.61	1.00
Reach 2C	C4CA--C3B3D	19	96.80	2405.72	2406.25	2406.25	2406.45	0.017939	3.57	27.10	68.59	1.00
Reach 2C	C4CA--C3B3D	18	96.80	2392.13	2392.74	2392.74	2392.88	0.022034	2.99	32.42	125.21	1.03
Reach 2C	C4CA--C3B3D	17	96.80	2380.25	2380.82	2380.82	2380.96	0.019731	3.01	32.21	113.38	0.99
Reach 2C	C4CA--C3B3D	16	96.80	2367.28	2367.72	2367.72	2367.85	0.020434	2.88	33.61	129.49	1.00
Reach 2C	C4CA--C3B3D	15	96.80	2353.23	2353.88	2353.88	2354.01	0.018385	2.87	33.72	120.67	0.96
Reach 2C	C4CA--C3B3D	14	96.80	2335.00	2335.74	2335.74	2335.98	0.017288	3.95	24.57	52.89	1.01
Reach 2C	C4CA--C3B3D	13	96.80	2323.00	2323.74	2323.74	2323.98	0.016884	3.95	24.58	51.93	1.00
Reach 2C	C4CA--C3B3D	12	96.80	2306.00	2306.74	2306.74	2306.97	0.017382	3.86	25.18	56.39	1.01
Reach 2C	C4CA--C3B3D	11	96.80	2291.00	2291.74	2291.74	2291.98	0.017127	3.92	24.77	53.70	1.01
Reach 2C	C4CA--C3B3D	10	96.80	2274.00	2274.74	2274.74	2274.97	0.017237	3.84	25.29	56.57	1.00
Reach 2C	C4CA--C3B3D	9	96.80	2265.00	2265.74	2265.74	2265.98	0.017244	3.93	24.71	53.46	1.01
Reach 2C	C4CA--C3B3D	8	667.70	2254.00	2255.97	2255.97	2256.73	0.010984	7.09	95.69	63.50	0.99
Reach 2C	C4CA--C3B3D	7	667.70	2242.00	2243.96	2243.96	2244.71	0.011119	7.02	96.59	65.53	0.99
Reach 2C	C4CA--C3B3D	6	667.70	2232.00	2233.96	2233.96	2234.71	0.010752	7.03	97.17	66.05	0.98
Reach 2C	C4CA--C3B3D	5	1048.30	2221.00	2223.37	2223.37	2224.16	0.011513	7.15	146.65	93.82	1.01
Reach 2C	C4CA--C3B3D	4	1048.30	2209.00	2209.95	2209.95	2210.38	0.014654	5.23	200.56	246.39	1.02
Reach 2C	C4CA--C3B3D	3	1048.30	2199.00	2200.35	2200.35	2200.79	0.014109	5.33	196.51	227.33	1.01

HEC-RAS Plan: Reach 5 River: Reach 5 Reach: C1NA Profile: PF 1

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
C1NA	5	1006.50	2235.00	2236.42	2236.42	2237.06	0.011955	6.40	157.26	120.94	0.99
C1NA	4	1006.50	2225.00	2229.84		2230.30	0.000566	5.46	184.24	50.32	0.50
C1NA	3	1006.50	2225.00	2228.50	2228.50	2229.79	0.002503	9.13	110.23	42.99	1.00
C1NA	2	1006.50	2215.00	2218.51	2218.51	2219.82	0.002512	9.17	109.77	42.52	1.01
C1NA	1	1006.50	2210.00	2213.57	2213.57	2214.91	0.002494	9.31	108.15	40.60	1.00

HEC-RAS Plan: Reach 6 River: Reach 4 Reach: C1G2B1 TO C1G2B2 Profile: PF 1

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
C1G2B1 TO C1G2B2	25	286.00	2570.20	2571.34	2571.34	2571.64	0.015979	4.34	65.83	113.81	1.01
C1G2B1 TO C1G2B2	24	286.00	2553.80	2554.55	2554.55	2554.76	0.017628	3.75	76.29	177.26	1.01
C1G2B1 TO C1G2B2	23	286.00	2544.10	2544.68	2544.68	2544.88	0.018204	3.63	78.89	199.53	1.01
C1G2B1 TO C1G2B2	22	286.00	2534.10	2534.89	2534.89	2535.10	0.018293	3.69	77.56	189.93	1.02
C1G2B1 TO C1G2B2	21	286.00	2523.80	2524.37	2524.37	2524.57	0.018756	3.55	80.52	212.49	1.02
C1G2B1 TO C1G2B2	20	286.00	2509.90	2510.44	2510.44	2510.65	0.017889	3.63	78.89	194.84	1.00
C1G2B1 TO C1G2B2	19	286.00	2493.90	2494.91	2494.91	2495.00	0.006242	2.74	153.76	807.88	0.63
C1G2B1 TO C1G2B2	18	286.00	2477.40	2478.59	2478.59	2478.90	0.015925	4.43	64.56	108.18	1.01
C1G2B1 TO C1G2B2	17	286.00	2465.00	2465.60	2465.60	2465.77	0.014097	3.47	93.07	295.09	0.91
C1G2B1 TO C1G2B2	16	286.00	2452.10	2453.08	2453.08	2453.38	0.015929	4.40	64.98	109.97	1.01
C1G2B1 TO C1G2B2	15	286.00	2440.00	2440.60	2440.60	2440.84	0.016917	3.93	72.79	152.83	1.00
C1G2B1 TO C1G2B2	14	286.00	2429.70	2430.47	2430.47	2430.65	0.018458	3.43	83.39	229.15	1.00
C1G2B1 TO C1G2B2	13	286.00	2410.00	2410.80	2410.80	2411.09	0.015952	4.32	66.15	115.09	1.01
C1G2B1 TO C1G2B2	12	286.00	2398.60	2399.08	2399.08	2399.25	0.019361	3.27	87.45	267.49	1.01
C1G2B1 TO C1G2B2	11	490.00	2383.00	2384.06	2384.06	2384.34	0.016006	4.29	114.29	201.95	1.00
C1G2B1 TO C1G2B2	10	490.00	2370.00	2371.37	2371.37	2371.72	0.014980	4.71	104.05	151.92	1.00
C1G2B1 TO C1G2B2	9	490.00	2352.90	2354.75	2354.75	2355.28	0.013162	5.85	83.74	80.02	1.01
C1G2B1 TO C1G2B2	8	490.00	2341.40	2343.49	2343.49	2344.17	0.012078	6.63	73.88	54.70	1.01
C1G2B1 TO C1G2B2	7	490.00	2330.70	2332.66	2332.66	2333.20	0.012883	5.88	83.33	77.77	1.00
C1G2B1 TO C1G2B2	6	799.00	2320.00	2322.87	2322.87	2323.47	0.012682	6.19	129.00	109.94	1.01
C1G2B1 TO C1G2B2	5	799.00	2310.00	2311.85	2311.85	2312.52	0.012111	6.59	121.25	91.08	1.01
C1G2B1 TO C1G2B2	4	799.00	2298.30	2300.86	2300.86	2301.18	0.016227	4.54	176.06	288.40	1.02
C1G2B1 TO C1G2B2	3	799.00	2288.00	2290.74	2290.74	2291.14	0.006852	5.92	186.20	220.96	0.79
C1G2B1 TO C1G2B2	2	799.00	2275.00	2277.68	2277.68	2278.52	0.011367	7.35	108.65	65.81	1.01
C1G2B1 TO C1G2B2	1	799.00	2263.60	2265.56	2265.56	2265.95	0.014663	5.02	159.13	207.58	1.01

SUBBASIN_NAME	Soil Type	Areas (sq ft)	Areas (acres)	Total Subbasin Area (Ac)	CN's x Subbasin Areas (Sq ft)	Total CN's x Subbasin Areas (Sq ft)	Total CN's x Subbasin Areas (Ac)	Subbasin CN's	Subbasin Area (Sq mi)	SUBBASIN_NAME
C1A	B	4059939.28	93.20	93.20	342426162.78	342426162.780	7861.023	**84.3**	**0.1456**	C1A
C1B	A	644195.79	14.79		53901730.98					
C1B	B	9875583.17	226.71	241.50	845980720.03	899882451.010	20658.458	**85.5**	**0.3773**	C1B
C1C	B	6432041.22	147.66	147.66	515938312.15	515938312.153	11844.314	**80.2**	**0.2307**	C1C
C1D	B	11164958.70	256.31	256.31	873197202.32	873197202.316	20045.849	**78.2**	**0.4005**	C1D
C1G1A	A	1651955.57	37.92		129198078.65					
C1G1A	B	4599953.56	105.60	143.52	395333204.93	524531283.581	12041.581	**83.9**	**0.2243**	C1G1A
C1G1B	B	3947619.31	90.62	90.62	343428765.46	343428765.460	7884.040	**87.0**	**0.1416**	C1G1B
C1G2A	A	5816888.54	133.54		445694076.73					
C1G2A	B	3852402.27	88.44	221.98	321329299.18	767023375.911	17608.434	**79.3**	**0.3468**	C1G2A
C1G2B1	A	5218154.18	119.79		319310374.92					
C1G2B1	B	4634496.65	106.39		345865866.26					
C1G2B1	C	956035.77	21.95		81263040.80					
C1G2B1	D	3773846.04	86.64	334.77	330971680.65	1077410962.634	24733.952	**73.9**	**0.5231**	C1G2B1
C1G2B2	A	960365.20	22.05		61638357.28					
C1G2B2	B	7667855.94	176.03		601109109.41					
C1G2B2	D	4628.58	0.11	198.13	411339.40	663158806.090	15224.031	**76.8**	**0.3097**	C1G2B2
C1G2C	A	1427388.66	32.77		90688950.32					
C1G2C	B	5469762.59	125.57		419918442.16					
C1G2C	D	1257934.74	28.88	187.22	111395543.01	622002935.496	14279.223	**76.3**	**0.2925**	C1G2C
C1G2D	A	1011521.07	23.22		63778690.70					
C1G2D	B	4990597.05	114.57		369398592.45					
C1G2D	D	254569.70	5.84	143.63	21610040.49	454787323.638	10440.480	**72.7**	**0.2244**	C1G2D
C1G3A	B	1283713.40	29.47		98755011.73					
C1G3A	C	4092157.78	93.94		347833410.95					
C1G3A	D	2223506.44	51.04	174.45	195668566.29	642256988.974	14744.192	**84.5**	**0.2726**	C1G3A
C1G3B	A	596210.79	13.69		38211820.32					
C1G3B	B	1088711.49	24.99		83759254.64					
C1G3B	C	16236081.89	372.73		1380066960.56					
C1G3B	D	2507943.71	57.57	468.98	220741414.46	1722779449.980	39549.574	**84.3**	**0.7328**	C1G3B
C1G3C	B	458693.08	10.53		36182343.17					
C1G3C	C	25636898.93	588.54		2179136408.66					
C1G3C	D	3127706.96	71.80	670.87	275538320.77	2490857072.593	57182.210	**85.2**	**1.0482**	C1G3C
C1G3D	B	507702.19	11.66		38839217.88					
C1G3D	C	15915204.15	365.36		1352792352.41					
C1G3D	D	6927420.44	159.03	536.05	610002417.73	2001633988.013	45951.193	**85.7**	**0.8376**	C1G3D
C1H	A	2041029.33	46.86		128615832.67					
C1H	C	106142710.58	2436.70		9022130399.72					
C1H	D	3515330.68	80.70	2564.26	309349100.04	9460095332.432	217173.906	**84.7**	**4.0067**	C1H
C1HA	A	1949852.71	44.76		128064218.31					
C1HA	B	99141.06	2.28	47.04	8016361.39	136080579.704	3123.980	**66.4**	**0.0735**	C1HA
C1HB	A	953762.53	21.90		80119723.71					
C1HB	B	3149696.43	72.31	94.20	267417038.41	347536762.119	7978.346	**84.7**	**0.1472**	C1HB
C1HB1	A	1599191.31	36.71		101498078.61					
C1HB1	B	1214351.12	27.88		93759736.99					
C1HB1	C	8300151.65	190.55		705512890.20					
C1HB1	D	1422843.05	32.66	287.80	125386396.67	1026157102.464	23557.326	**81.9**	**0.4497**	C1HB1
C1HCB	B	5067518.80	116.33	116.33	393305687.01	393305687.009	9029.056	**77.6**	**0.1818**	C1HCB
C1HD	B	1995360.84	45.81	45.81	154360614.69	154360614.687	3543.632	**77.4**	**0.0716**	C1HD
C1HE	A	2018109.44	46.33		133028729.48					
C1HE	B	2072639.57	47.58	93.91	162090076.47	295118805.952	6774.996	**72.1**	**0.1467**	C1HE
C1HF	A	552577.09	12.69		38505741.60					
C1HF	B	2257218.24	51.82	64.50	181120597.13	219626338.735	5041.927	**78.2**	**0.1008**	C1HF
C1NA	A	1773795.95	40.72		128159916.86					
C1NA	B	9764315.60	224.16	264.88	844687403.46	972847320.322	22333.501	**84.3**	**0.4139**	C1NA
C3A1A	A	1394182.83	32.01		105840135.28					
C3A1A	B	9026287.69	207.22		740356458.80					
C3A1A	D	18339.67	0.42	239.64	1672948.86	847869542.936	19464.406	**81.2**	**0.3744**	C3A1A

C3A1B	A	7456670.99	171.18		49250338					
C3A1B	B	4265253.66	97.92		330032559.38					
C3A1B	D	16667784.52	382.64	651.74	1469747594.07	2292283537.330	52623.589	80.7	1.0183	C3A1B
C3A2A	D	13126362.50	301.34	301.34	1155119900.18	1155119900.177	26517.904	88.0	0.4708	C3A2A
C3A2B	A	1661004.09	38.13		108388397.50					
C3A2B	D	12665323.75	290.76	328.89	1120828177.17	1229216574.665	28218.930	85.8	0.5139	C3A2B
C3B1A	A	4333.63	0.10		290922.06					
C3B1A	B	6784128.92	155.74	155.84	527155266.78	527446188.841	12108.498	77.7	0.2435	C3B1A
C3B1B	A	537073.82	12.33		32744111.96					
C3B1B	B	5301200.65	121.70	134.03	413499755.16	446243867.120	10244.350	76.4	0.2094	C3B1B
C3B1C	A	1248859.96	28.67		99217714.76					
C3B1C	B	5315474.63	122.03		450912441.63					
C3B1C	C	222295.03	5.10	155.80	19883851.91	570014008.304	13085.721	84.0	0.2434	C3B1C
C3B1D	A	2144761.47	49.24		137302787.52					
C3B1D	B	8212703.50	188.54		626012149.13					
C3B1D	C	27650.93	0.63	238.41	2350329.14	765665265.789	17577.256	73.7	0.3725	C3B1D
C3B3A	A	1641791.89	37.69		103432888.90					
C3B3A	B	27011.16	0.62		2066353.78					
C3B3A	D	12568784.32	288.54	326.85	1106053020.51	1211552263.192	27813.413	85.1	0.5107	C3B3A
C3B3B	A	470966.36	10.81		29670880.96					
C3B3B	D	8504660.75	195.24	206.05	748410146.39	778081027.352	17862.283	86.7	0.3220	C3B3B
C3B3C	A	381319.69	8.75		24023140.19					
C3B3C	B	2557134.51	58.70		198237620.74					
C3B3C	D	31580967.09	725.00	792.45	2827342410.00	3049603170.932	70009.256	88.3	1.2382	C3B3C
C3B3D	A	2380.16	0.05		149950.21					
C3B3D	B	774823.13	17.79		64423673.32					
C3B3D	D	6343269.00	145.62	163.46	570915797.70	635489421.240	14588.830	89.2	0.2554	C3B3D
C3B3E	D	6203725.92	142.42	142.42	560823502.44	560823502.437	12874.736	90.4	0.2225	C3B3E
C4A1	A	3456139.30	79.34		248154985.67					
C4A1	B	6280495.15	144.18	223.52	517465339.82	765620325.491	17576.224	78.6	0.3493	C4A1
C4A1A	A	2318907.90	53.23		153252695.69					
C4A1A	B	4328991.09	99.38		365128553.44					
C4A1A	C	444155.72	10.20	162.81	38567244.15	556948493.282	12785.778	78.5	0.2544	C4A1A
C4A1B	A	2201672.00	50.54		138705336.11					
C4A1B	B	4745354.55	108.94	159.48	363019623.43	501724959.538	11518.020	72.2	0.2492	C4A1B
C4A1C	A	7382277.85	169.47		573714757.04					
C4A1C	B	7113351.99	163.30	332.77	609282634.81	1182997391.854	27157.883	81.6	0.5200	C4A1C
C4A1D	A	1169557.72	26.85	190.15	90476433.13	699759067.939	16064.258			
C4A1D	B	559954.54	12.85	39.70	45114910.39	135591343.522	3112.749	78.4	0.0620	C4A1D
C4A2A	B	7267384.82	166.84	166.84	555957692.04	555957692.039	12763.032	76.5	0.2607	C4A2A
C4A2B	A	558792.47	12.83		35304758.58					
C4A2B	B	6386337.38	146.61	159.44	488598155.30	523902913.872	12027.156	75.4	0.2491	C4A2B
C4BA1	A	4409968.85	101.24		277828037.26					
C4BA1	B	6082117.40	139.63		465281980.74					
C4BA1	D	2773277.53	63.67	304.53	244048422.62	987158440.621	22662.040	74.4	0.4758	C4BA1
C4BA2	A	1202316.16	27.60		78451890.94					
C4BA2	B	2536216.58	58.22		197537434.73					
C4BA2	D	27650.93	0.63	86.46	2433281.94	278422607.607	6391.704	73.9	0.1351	C4BA2
C4BA3	A	631880.38	14.51		39808464.07					
C4BA3	B	10713045.09	245.94	260.44	841370941.36	881179405.426	20229.096	77.7	0.4069	C4BA3
C4BB	A	176062.66	4.04		14261075.12					
C4BB	B	9517260.12	218.49	222.53	833236123.65	847497198.770	19455.859	87.4	0.3477	C4BB
C4BC	A	6090590.95	139.82		493325750.78					
C4BC	B	606933.45	13.93	153.75	53137023.94	546462774.717	12545.059	81.6	0.2402	C4BC
C4BD	A	13563763.19	311.38		1098573651.78					
C4BD	B	1052887.43	24.17	335.55	92159386.22	1190733038.003	27335.469	81.5	0.5243	C4BD
C4BE	A	2288250.82	52.53		185348316.75					
C4BE	B	3862104.57	88.66	141.19	338127255.32	523475572.068	12017.346	85.1	0.2206	C4BE
C4BF	A	7560646.58	173.57		612412372.83					
C4BF	B	179552.01	4.12	177.69	15719778.44	628132151.270	14419.930	81.2	0.2776	C4BF
C4CA	A	952391.64	21.86		64675527.12					

C4CA	B	712791.86	16.36		6240492						
C4CA	D	3809479.76	87.45	125.68	340703344.14	467783798.713	10738.838	85.4	0.1964	C4CA	
C4CB	A	3854852.43	88.50		280568010.66						
C4CB	B	70427241.56	1616.79		5626371258.34						
C4CB	D	76488152.69	1755.93	3461.21	6858319990.25	12765259259.250	293050.029	84.7	5.4081	C4CB	
C5CA	A	5951215.03	136.62		380487728.35						
C5CA	B	499649.59	11.47		38716060.82						
C5CA	C	1841164.23	42.27	190.36	157019805.73	576223594.897	13228.274	69.5	0.2974	C5CA	
C5CB	A	3788112.15	86.96		306220484.03						
C5CB	B	138904.19	3.19	90.15	12139335.38	318359819.411	7308.536	81.1	0.1409	C5CB	
C5CC	A	3498996.07	80.33		262386619.13						
C5CC	B	5828758.83	133.81	214.14	476812159.77	739198778.897	16969.669	79.2	0.3346	C5CC	
C5CD	A	6154787.47	141.29		439835440.51						
C5CD	B	1283937.90	29.48	170.77	103854519.65	543689960.161	12481.404	73.1	0.2668	C5CD	
C5CE	A	9044710.94	207.64	207.64	616638669.88	616638669.885	14156.076	68.2	0.3244	C5CE	
C5CF	A	9003084.38	206.68		612922315.77						
C5CF	C	9043.06	0.21	206.89	800542.89	613722858.656	14089.138	68.1	0.3233	C5CF	
C5DA	A	2683943.94	61.61		175621995.65						
C5DA	B	33111.59	0.76		2898920.11						
C5DA	D	26925569.63	618.13	680.50	2374394452.04	2552915367.800	58606.873	86.1	1.0633	C5DA	
C5DB	A	950447.09	21.82		76683967.04						
C5DB	B	605302.01	13.90		52833847.64						
C5DB	D	13278344.24	304.83	340.54	1172445245.82	1301963060.489	29888.959	87.8	0.5321	C5DB	
C5DC	A	959046.02	22.02		60419899.47						
C5DC	B	1984228.79	45.55		151793502.52						
C5DC	D	6155896.47	141.32	208.89	541718889.50	753932291.482	17307.904	82.9	0.3264	C5DC	
C5EA	A	2533922.62	58.17		159637125.00						
C5EA	B	2119356.68	48.65		162130785.75						
C5EA	D	8930709.87	205.02	311.85	785902468.92	1107670379.665	25428.613	81.5	0.4873	C5EA	
C5EB	D	15247308.53	350.03	350.03	1346878916.00	1346878915.997	30920.085	88.3	0.5469	C5EB	
C5EC	A	3786853.58	86.93		238571775.31						
C5EC	B	968606.76	22.24		74098416.93						
C5EC	D	1415691.97	32.50	141.67	124580893.42	437251085.656	10037.904	70.9	0.2214	C5EC	
C5ED	A	1627422.86	37.36		102527640.06						
C5ED	D	2772463.72	63.65	101.01	243976807.08	346504447.143	7954.648	78.8	0.1578	C5ED	
C5FA	A	459674.04	10.55		28959464.60						
C5FA	C	2445260.01	56.14		208450675.96						
C5FA	D	11231301.64	257.84	324.52	992307752.42	1229717892.985	28230.438	87.0	0.5071	C5FA	
C5FB	A	4586452.55	105.29		288946510.55						
C5FB	B	2214461.56	50.84		169406309.42						
C5FB	D	424718.40	9.75	165.83	37375219.20	495728039.170	11380.350	68.6	0.2592	C5FB	
C5FC	A	1971407.06	45.26		124198644.93						
C5FC	B	3946738.32	90.60		301925481.39						
C5FC	D	277562.68	6.37	142.23	24425515.42	450549641.742	10343.197	72.7	0.2222	C5FC	
C5FD	A	415025.74	9.53		26146621.83						
C5FD	B	1507302.13	34.60		115308612.63						
C5FD	D	2834031.98	65.06	109.19	251022416.75	392477651.223	9010.047	82.5	0.1706	C5FD	
C5GA	A	6580218.29	151.06		420292805.82						
C5GA	B	1001927.40	23.00		77918641.10						
C5GA	D	8935.15	0.21	174.27	786293.35	498997740.274	11455.412	65.7	0.2723	C5GA	
C5GB	A	1035295.33	23.77		69939165.91						
C5GB	B	2299023.41	52.78		175993606.08						
C5GB	D	5723979.78	131.40	207.95	503710220.32	749642992.304	17209.435	82.8	0.3249	C5GB	
C5GC	B	1049187.18	24.09		80262818.90						
C5GC	D	2038342.22	46.79	70.88	179374115.19	259636934.091	5960.444	84.1	0.1107	C5GC	
C5GD	A	7074738.55	162.41		423980100.78						
C5GD	B	5085050.45	116.74		390544764.24						
C5GD	C	238469.70	5.47	284.62	20124731.49	834649596.515	19160.918	67.3	0.4447	C5GD	
C5I1	B	6780503.30	155.66	155.66	514869991.74	514869991.741	11819.789	75.9	0.2432	C5I1	
C5I1B	A	673254.31	15.46		40762977.17						
C5I1B	B	13418775.97	308.05		950978128.07						

C5I1B	D	361915.81	8.31	331.82	3150163[illegible]	1023242736.358	23490.421	**70.8**	**0.5185**	C5I1B
C5I1C	B	1792979.54	41.16	41.16	144179964.46	144179964.458	3309.917	**80.4**	**0.0643**	C5I1C
C5I1D	A	507095.78	11.64		34123255.54					
C5I1D	B	2721742.31	62.48	74.12	215668486.72	249791742.259	5734.429	**77.4**	**0.1158**	C5I1D
C5I1E	A	44873.18	1.03		2827010.51					
C5I1E	B	4509455.26	103.52	104.55	357734087.12	360561097.634	8277.344	**79.2**	**0.1634**	C5I1E
C5I2A	A	9431996.94	216.53		594215807.17					
C5I2A	B	2271392.39	52.14		173761517.75					
C5I2A	C	23758072.56	545.41		2019436167.42					
C5I2A	D	3572742.09	82.02	896.10	314401303.69	3101814796.021	71207.870	**79.5**	**1.4002**	C5I2A
C5ICB	A	4855689.73	111.47		305908452.75					
C5ICB	B	5763761.57	132.32		440927759.83					
C5ICB	C	454913.89	10.44		38667680.89					
C5ICB	D	9372035.67	215.15	469.38	824739138.68	1610243032.150	36966.093	**78.8**	**0.7334**	C5ICB

SUBBASIN_NAME	Soil Type	Streets	Apartments	Commercial	Condominiums	Duplex	Fourplex	Industrial	Mobile Homes	Open Space	Public Faciliti	Single Family	Townhomes	Triplex	Utilities	Vacant
C1A	B	95	88	92	88	88	88	88	88	79	88	82	87	87	88	77
C1B	A	95	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C1B	B	95	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C1C	B	82	88	92	88	88	88	88	88	79	88	82	87	87	88	77
C1D	B	75	88	92	88	88	88	88	88	79	88	75	87	87	88	77
C1G1A	A	95	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C1G1A	B	95	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C1G1B	B	95	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C1G2A	A	95	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C1G2A	B	95	88	92	88	88	88	88	88	79	88	82	87	87	88	77
C1G2B1	A	51	81	89	81	81	81	81	81	68	81	51	80	80	81	63
C1G2B1	B	68	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	68	86.55	86.55	87.55	76.5
C1G2B1	C	79	91	94	91	91	91	91	91	86	91	79	90	91	91	85
C1G2B1	D	84	93	95	93	93	93	93	93	89	93	84	92	92	93	88
C1G2B2	A	95	81	89	81	81	81	81	81	68	81	51	80	80	81	63
C1G2B2	B	95	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	68	86.55	86.55	87.55	76.5
C1G2B2	D	95	93	95	93	93	93	93	93	89	93	84	92	92	93	88
C1G2C	A	95	81	89	81	81	81	81	81	68	81	46	80	80	81	63
C1G2C	B	95	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	65	86.55	86.55	87.55	76.5
C1G2C	D	95	93	95	93	93	93	93	93	89	93	82	92	92	93	88
C1G2D	A	46	81	89	81	81	81	81	81	68	81	46	80	80	81	63
C1G2D	B	65	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	65	86.55	86.55	87.55	76.5
C1G2D	D	82	93	95	93	93	93	93	93	89	93	82	92	92	93	88
C1G3A	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C1G3A	C	88	91	94	91	91	91	91	91	86	91	88	90	91	91	85
C1G3A	D	90	93	95	93	93	93	93	93	89	93	90	92	92	93	88
C1G3B	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C1G3B	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C1G3B	C	88	91	94	91	91	91	91	91	86	91	88	90	91	91	85
C1G3B	D	90	93	95	93	93	93	93	93	89	93	90	92	92	93	88
C1G3C	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C1G3C	C	88	91	94	91	91	91	91	91	86	91	88	90	91	91	85
C1G3C	D	90	93	95	93	93	93	93	93	89	93	90	92	92	93	88
C1G3D	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C1G3D	C	88	91	94	91	91	91	91	91	86	91	88	90	91	91	85
C1G3D	D	90	93	95	93	93	93	93	93	89	93	90	92	92	93	88
C1H	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C1H	C	88	91	94	91	91	91	91	91	86	91	88	90	91	91	85
C1H	D	90	93	95	93	93	93	93	93	89	93	90	92	92	93	88
C1HA	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C1HA	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C1HB	A	95	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C1HB	B	95	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C1HB1	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C1HB1	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C1HB1	C	88	91	94	91	91	91	91	91	86	91	88	90	91	91	85
C1HB1	D	90	93	95	93	93	93	93	93	89	93	90	92	92	93	88
C1HCB	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C1HD	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C1HE	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C1HE	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C1HF	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C1HF	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C1NA	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C1NA	B	95	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C3A1A	A	95	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C3A1A	B	95	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C3A1A	D	95	93	95	93	93	93	93	93	89	93	90	92	92	93	88
C3A1B	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C3A1B	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C3A1B	D	90	93	95	93	93	93	93	93	89	93	90	92	92	93	88
C3A2A	D	90	93	95	93	93	93	93	93	89	93	90	92	92	93	88
C3A2B	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C3A2B	D	90	93	95	93	93	93	93	93	89	93	90	92	92	93	88
C3B1A	A	95	81	89	81	81	81	81	81	68	81	54	80	80	81	63
C3B1A	B	95	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	70	86.55	86.55	87.55	76.5
C3B1B	A	95	81	89	81	81	81	81	81	68	81	51	80	80	81	63
C3B1B	B	95	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C3B1C	A	95	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C3B1C	B	95	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C3B1C	C	95	91	94	91	91	91	91	91	86	91	88	90	91	91	85
C3B1D	A	95	81	89	81	81	81	81	81	68	81	51	80	80	81	63
C3B1D	B	95	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	68	86.55	86.55	87.55	76.5

C3B1D	C	95	91	94	91	91	91	91	91	86	91	88	90	91	91	85
C3B3A	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C3B3A	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C3B3A	D	90	93	95	93	93	93	93	93	89	93	90	92	92	93	88
C3B3B	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C3B3B	D	90	93	95	93	93	93	93	93	89	93	90	92	92	93	88
C3B3C	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C3B3C	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C3B3C	D	90	93	95	93	93	93	93	93	89	93	90	92	92	93	88
C3B3D	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C3B3D	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C3B3D	D	90	93	95	93	93	93	93	93	89	93	90	92	92	93	88
C3B3E	D	90	93	95	93	93	93	93	93	89	93	90	92	92	93	88
C4A1	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C4A1	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C4A1A	A	95	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C4A1A	B	95	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C4A1A	C	95	91	94	91	91	91	91	91	86	91	88	90	91	91	85
C4A1B	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C4A1B	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C4A1C	A	95	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C4A1C	B	95	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C4A1D	A	95	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C4A1D	B	95	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C4A2A	B	95	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	68	86.55	86.55	87.55	76.5
C4A2B	A	51	81	89	81	81	81	81	81	68	81	51	80	80	81	63
C4A2B	B	68	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	68	86.55	86.55	87.55	76.5
C4BA1	A	73	81	89	81	81	81	81	81	68	81	73	80	80	63	63
C4BA1	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	76.5	76.5
C4BA1	D	90	93	95	93	93	93	93	93	89	93	90	92	92	88	88
C4BA2	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C4BA2	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C4BA2	D	90	93	95	93	93	93	93	93	89	93	90	92	92	93	88
C4BA3	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C4BA3	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C4BB	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C4BB	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C4BC	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C4BC	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C4BD	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C4BD	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C4BE	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C4BE	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C4BF	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C4BF	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C4CA	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C4CA	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C4CA	D	90	93	95	93	93	93	93	93	89	93	90	92	92	93	88
C4CB	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C4CB	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C4CB	D	90	93	95	93	93	93	93	93	89	93	90	92	92	93	88
C5CA	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C5CA	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C5CA	C	88	91	94	91	91	91	91	91	86	91	88	90	91	91	85
C5CB	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C5CB	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C5CC	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C5CC	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C5CD	A	95	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C5CD	B	95	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C5CE	A	95	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C5CF	A	95	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C5CF	C	95	91	94	91	91	91	91	91	86	91	88	90	91	91	85
C5DA	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C5DA	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C5DA	D	90	93	95	93	93	93	93	93	89	93	90	92	92	93	88
C5DB	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C5DB	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C5DB	D	90	93	95	93	93	93	93	93	89	93	90	92	92	93	88
C5DC	A	73	81	89	81	81	81	81	81	68	81	73	80	80	63	63
C5DC	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	76.5	76.5
C5DC	D	90	93	95	93	93	93	93	93	89	93	90	92	92	88	88
C5EA	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C5EA	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5

C5EA	D	90	93	95	93	93	93	93	93	89	93	90	92	92	93	88
C5EB	D	90	93	95	93	93	93	93	93	89	93	90	92	92	93	88
C5EC	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C5EC	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C5EC	D	90	93	95	93	93	93	93	93	89	93	90	92	92	93	88
C5ED	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C5ED	D	90	93	95	93	93	93	93	93	89	93	90	92	92	93	88
C5FA	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C5FA	C	88	91	94	91	91	91	91	91	86	91	88	90	91	91	85
C5FA	D	90	93	95	93	93	93	93	93	89	93	90	92	92	93	88
C5FB	A	95	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C5FB	B	95	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C5FB	D	95	93	95	93	93	93	93	93	89	93	90	92	92	93	88
C5FC	A	95	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C5FC	B	95	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C5FC	D	95	93	95	93	93	93	93	93	89	93	90	92	92	93	88
C5FD	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C5FD	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C5FD	D	90	93	95	93	93	93	93	93	89	93	90	92	92	93	88
C5GA	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C5GA	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C5GA	D	90	93	95	93	93	93	93	93	89	93	90	92	92	93	88
C5GB	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C5GB	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C5GB	D	90	93	95	93	93	93	93	93	89	93	90	92	92	93	88
C5GC	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C5GC	D	90	93	95	93	93	93	93	93	89	93	90	92	92	93	88
C5GD	A	46	81	89	81	81	81	81	81	68	81	46	80	80	81	63
C5GD	B	65	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	65	86.55	86.55	87.55	76.5
C5GD	C	77	91	94	91	91	91	91	91	86	91	77	90	91	91	85
C5I1	B	95	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	68	86.55	86.55	87.55	76.5
C5I1B	A	51	81	89	81	81	81	81	81	68	81	51	80	80	81	63
C5I1B	B	68	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	68	86.55	86.55	87.55	76.5
C5I1B	D	84	93	95	93	93	93	93	93	89	93	84	92	92	93	88
C5I1C	B	95	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	75	86.55	86.55	87.55	76.5
C5I1D	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C5I1D	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C5I1E	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C5I1E	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C5I2A	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C5I2A	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C5I2A	C	88	91	94	91	91	91	91	91	86	91	88	90	91	91	85
C5I2A	D	90	93	95	93	93	93	93	93	89	93	90	92	92	93	88
C5ICB	A	73	81	89	81	81	81	81	81	68	81	73	80	80	81	63
C5ICB	B	82	87.55	91.95	87.55	87.55	87.55	87.55	87.55	78.75	87.55	81.85	86.55	86.55	87.55	76.5
C5ICB	C	88	91	94	91	91	91	91	91	86	91	88	90	91	91	85
C5ICB	D	90	93	95	93	93	93	93	93	89	93	90	92	92	93	88

SUBBASIN_NAME	Soil Type	Streets	Apartments	Commercial	Condominiums	Duplex	Fourplex	Industrial	Mobile Homes	Open Space	Public Faciliti	Single Family	Townhomes	Triplex	Utilities	Vacant
C1A	B	86651064.9	0	0	0	0	0	0	0	0	0	219640964.3	0	0	0	36134133.56
C1B	A	34209379.44	0	0	3716800.526	0	0	0	0	4114205.998	0	0	3133017.427	0	0	8728327.59
C1B	B	225037112.3	63961486.83	32026535.22	47851576.8	0	0	0	139635195.1	16193475.94	0	47098176.28	18392046.52	0	30751786.12	225033328.9
C1C	B	16829830.38	0	0	0	0	0	0	0	428793251.2	70315230.53	0	0	0	0	0
C1D	B	208981551.4	21473978.36	41852138.81	0	0	0	0	0	746492.6172	159152593.3	388226786	0	0	0	52763661.82
C1G1A	A	44597665.79	0	0	0	0	0	0	0	0	0	73748296.4	0	0	0	10852116.46
C1G1A	B	150524411.9	0	0	0	0	0	0	0	0	0	216085666.3	0	0	0	28723126.74
C1G1B	B	139824361.3	0	0	0	0	0	0	0	0	14768144.89	188836259.3	0	0	0	0
C1G2A	A	116114821.9	0	0	0	0	0	0	0	0	3193414.8	287679054.7	0	0	0	38706785.33
C1G2A	B	75057556.32	0	0	0	0	0	0	0	0	6145369.501	159157437.4	0	0	0	80968935.99
C1G2B1	A	39428136.98	0	0	0	0	0	0	0	0	0	663551.349	0	0	0	279218686.6
C1G2B1	B	48449487.95	0	0	0	0	0	0	0	0	0	20935533.3	0	0	0	276480845
C1G2B1	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	81263040.8
C1G2B1	D	23662183.51	0	0	0	0	0	0	0	0	0	0	0	0	0	307309497.1
C1G2B2	A	8274523.215	0	0	0	0	0	0	0	0	0	7020398.243	0	0	0	46343435.82
C1G2B2	B	117417356.4	0	0	0	0	0	0	0	0	13498245.94	80408140.21	0	0	0	389785366.9
C1G2B2	D	54619.23397	0	0	0	0	0	0	0	0	0	0	0	0	0	356720.1675
C1G2C	A	27906380.7	0	0	0	0	0	0	0	0	0	23369567.34	0	0	0	39413002.28
C1G2C	B	64838505.9	0	0	0	0	0	0	0	0	4303477.31	66062604.58	0	0	0	284713854.4
C1G2C	D	9463166.678	0	0	0	0	0	0	0	0	0	0	0	0	0	101932376.3
C1G2D	A	8233451.526	0	0	0	0	0	0	0	42100981.1	0	0	0	0	0	13444258.07
C1G2D	B	59329350.93	0	0	0	0	0	0	0	151053462.7	0	35050057.63	0	0	0	123965721.2
C1G2D	D	134715.9158	0	0	0	0	0	0	0	0	0	10690555.9	0	0	0	10784768.68
C1G3A	B	8213969.75	0	0	0	0	0	0	0	0	0	0	0	0	0	90541041.98
C1G3A	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	347833411
C1G3A	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	195668566.3
C1G3B	A	4606324.224	0	0	0	0	0	0	0	0	0	142623.4506	0	0	0	33462872.64
C1G3B	B	6002480.259	0	0	0	0	0	0	0	0	0	1074299.836	0	0	0	76682474.55
C1G3B	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1380066961
C1G3B	D	1906542.542	0	0	0	0	0	0	0	0	0	0	0	0	0	218834871.9
C1G3C	B	9194245.734	0	0	0	0	0	0	0	0	0	7276770.436	0	0	0	19711327
C1G3C	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2179136409
C1G3C	D	5402095.241	0	0	0	0	0	0	0	0	0	8102787.644	0	0	0	262033437.9
C1G3D	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38839217.88
C1G3D	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1352792352
C1G3D	D	0	0	0	0	0	0	0	0	0	0	17523852.87	0	0	0	592478564.9
C1H	A	226190.3969	0	0	0	0	0	0	0	0	0	0	0	0	0	128389642.3
C1H	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9022130400
C1H	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	309349100
C1HA	A	38131531.28	0	0	0	0	0	0	0	0	0	0	0	0	0	89932687.03
C1HA	B	6441773.395	0	0	0	0	0	0	0	0	0	0	0	0	0	1574587.999
C1HB	A	21695062.74	0	120991.5421	0	0	0	51106255.52	0	0	5996621.267	0	0	0	0	1200792.636
C1HB	B	57041062.99	33316595.8	8174340.043	0	0	0	77468811.44	0	0	9020.895839	0	0	0	0	91407207.25
C1HB1	A	5467888.251	0	0	0	0	0	0	0	0	0	0	0	0	0	96030190.36
C1HB1	B	12849793.52	0	0	0	0	0	0	0	0	0	0	0	0	0	80909943.46
C1HB1	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	705512890.2
C1HB1	D	7929388.629	0	0	0	0	0	0	0	0	0	0	0	0	0	117457008
C1HCB	B	61188192.34	12173113.41	0	0	0	0	0	0	0	0	0	0	0	0	319944381.3
C1HD	B	25576696.61	0	0	0	0	0	0	0	0	0	0	0	0	0	128783918.1
C1HE	A	42981194.98	0	0	0	0	0	0	0	0	0	0	0	0	0	90047534.5
C1HE	B	52676042.98	0	0	0	0	0	0	0	0	0	0	0	0	0	109414033.5
C1HF	A	26961711.56	0	0	0	0	0	0	0	0	0	0	0	0	0	11544030.05
C1HF	B	125883440.9	0	0	0	0	0	0	0	0	0	0	0	0	0	55237156.28
C1NA	A	24792049.88	0	0	0	0	0	0	0	0	0	95006587.34	0	0	0	8361279.645
C1NA	B	195107774.4	0	0	0	0	0	0	0	0	320387168.4	295048182.6	0	0	0	34144280.02
C3A1A	A	32977045.01	0	0	0	0	0	0	0	0	0	50359485.01	0	0	0	22503605.25
C3A1A	B	153059284.1	0	19894330.6	0	0	0	14747997.7	0	0	3107250.047	220961756.1	0	0	0	328585840.2
C3A1A	D	734800.6889	0	0	0	0	0	0	0	0	0	221152.8985	0	0	0	716995.2749
C3A1B	A	30459394.81	0	0	0	0	0	0	0	0	0	62601889.81	0	0	44932396.06	354509603.2
C3A1B	B	21467140.68	0	0	0	0	0	0	0	0	0	35199857.95	0	0	0	273365560.7
C3A1B	D	30629980.18	0	0	0	0	0	0	0	0	0	37931217.65	0	0	27136924.98	1374049471
C3A2A	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1155119900
C3A2B	A	0	0	0	0	0	0	0	0	0	0	0	0	0	16853128.86	91535268.64
C3A2B	D	90	0	0	0	0	0	0	0	0	0	0	0	0	116800507.2	1004027580
C3B1A	A	55151.99193	0	0	0	0	0	0	0	0	0	4043.314579	0	0	0	231726.7538
C3B1A	B	79377367.78	0	0	0	0	0	0	0	34411968.82	38092314.14	140853574.5	0	0	0	234420041.6
C3B1B	A	0	0	0	0	0	0	0	0	0	0	4639038.332	0	0	0	28105073.63
C3B1B	B	19372623.21	0	0	0	0	0	0	0	0	0	64031819.69	0	0	0	330095312.3
C3B1C	A	35449698.43	0	0	0	0	0	0	0	0	0	62769677.72	0	0	0	998338.6104
C3B1C	B	123584300.8	0	0	0	0	0	0	0	1472292.102	0	308584452.5	0	0	0	17271396.16
C3B1C	C	4368493.959	0	0	0	0	0	0	0	0	0	15515357.95	0	0	0	0
C3B1D	A	1397371.99	0	0	0	0	0	0	0	0	0	4223870.225	0	0	12176878.69	119504666.6
C3B1D	B	7566661.761	0	0	0	0	0	0	0	0	0	58000343.52	0	0	27864401.65	532580742.2
C3B1D	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2350329.143
C3B3A	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	103432888.9
C3B3A	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2066353.781
C3B3A	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1106053021
C3B3B	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29670880.98
C3B3B	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	748410146.4
C3B3C	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24023140.19
C3B3C	B	39014568.61	0	0	0	0	0	0	0	0	0	0	0	0	0	159223052.1
C3B3C	D	2169778761	0	0	0	0	0	0	0	0	0	0	0	0	0	657563649.1
C3B3D	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	149950.2136

C3B3D	B	0	0	0	0	0	0	0	0	0	0	0	0	40801498.68	23622174.64	
C3B3D	D	0	0	0	0	0	0	0	0	0	0	0	0	236371143.8	334544653.9	
C3B3E	D	0	0	0	0	0	0	0	0	0	0	0	0	277058560.7	283764941.8	
C4A1	A	67428632.45	0	5761743.935	1955914.323	0	0	0	0	0	139163967.6	0	0	0	33844727.34	
C4A1	B	151776885	0	30402497.37	31997847.69	0	0	0	0	986815.4917	0	209106753.8	34311602.29	0	0	58862938.17
C4A1A	A	20091961.89	0	0	0	0	0	0	0	0	0	2873859.057	0	0	0	130286874.7
C4A1A	B	109850312	0	0	0	0	0	0	0	0	0	192291382.4	0	0	0	62986859.06
C4A1A	C	7090733.59	0	0	0	0	0	0	0	0	0	1983367.666	0	0	0	29493142.68
C4A1B	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	138705336.1
C4A1B	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	363019623.4
C4A1C	A	191077469.8	0	2205680.677	624065.0027	0	0	0	0	0	0	315551320.9	0	0	1165813.287	63090407.37
C4A1C	B	209040474.6	0	5546844.12	0	0	0	24641557.59	0	0	0	183106114.5	0	0	36405.0432	136989438.8
C4A1D	A	47605425.68	0	2597380.131	0	0	0	0	0	0	0	0	0	0	0	40273627.31
C4A1D	B	11345275.35	0	410917.5832	0	0	0	0	0	0	0	0	0	0	0	33358717.46
C4A2A	B	12334824.04	0	0	0	0	0	0	0	0	0	19199264.82	0	0	4884.434744	524418718.7
C4A2B	A	0	0	0	0	0	0	0	0	0	0	0	0	0	453748.9259	34851009.65
C4A2B	B	0	0	0	0	0	0	0	0	0	0	2207713.114	0	0	2529818.138	483860524
C4BA1	A	0	0	0	0	0	0	0	0	0	0	0	0	0	238086781.4	39741255.91
C4BA1	B	0	0	0	0	0	0	0	0	0	0	0	0	0	415987541.2	49294439.56
C4BA1	D	0	0	0	0	0	0	0	0	0	0	0	0	0	170427544.2	73620878.41
C4BA2	A	0	0	0	0	0	0	0	0	0	0	0	0	0	12176878.69	66275012.25
C4BA2	B	0	0	0	0	0	0	0	0	0	0	0	0	0	27864401.65	169673033.1
C4BA2	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2433281.936
C4BA3	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39808464.07
C4BA3	B	0	0	0	0	0	0	0	0	0	0	0	0	0	172905244.2	668465697.2
C4BB	A	0	0	0	0	0	0	0	0	0	0	0	0	0	14261075.12	0
C4BB	B	0	0	0	0	0	0	0	0	0	0	0	0	0	833236123.6	0
C4BC	A	110560.2963	0	0	0	0	0	0	0	0	0	0	0	0	493215190.5	0
C4BC	B	0	0	0	0	0	0	0	0	0	0	0	0	0	53137023.94	0
C4BD	A	831895.8961	0	0	0	0	0	0	0	0	0	0	0	0	1097741756	0
C4BD	B	308911.1706	0	0	0	0	0	0	0	0	0	0	0	0	91850475.05	0
C4BE	A	0	0	0	0	0	0	0	0	0	0	0	0	0	185348316.7	0
C4BE	B	0	0	0	0	0	0	0	0	0	0	0	0	0	338127255.3	0
C4BF	A	0	0	0	0	0	0	0	0	0	0	0	0	0	612412372.8	0
C4BF	B	0	0	0	0	0	0	0	0	0	0	0	0	0	15719778.44	0
C4CA	A	0	0	0	0	0	0	0	0	0	0	0	0	0	21036841.52	43638685.6
C4CA	B	0	0	0	0	0	0	0	0	0	0	0	0	0	62404927.46	0
C4CA	D	0	0	0	0	0	0	0	0	0	0	0	0	0	101725721.9	238977622.2
C4CB	A	275299844.4	0	0	0	0	0	0	0	0	0	0	0	0	0	5268166.307
C4CB	B	355861034	0	0	0	0	0	0	0	0	0	0	0	0	0	2067760914
C4CB	D	5731314914	0	0	0	0	0	0	0	0	0	0	0	0	0	1127005077
C5CA	A	40594020.51	0	0	0	0	0	0	0	0	0	0	2606.220094	0	0	339891101.6
C5CA	B	7348196.836	0	0	0	0	0	0	0	0	0	0	0	0	0	31367863.98
C5CA	C	15278161.21	0	0	0	0	0	0	0	0	0	0	0	0	0	141741644.5
C5CB	A	0	0	0	0	0	0	0	0	0	0	0	0	0	304062383.3	2158100.732
C5CB	B	97302.83962	0	0	0	0	0	0	0	0	0	0	0	0	11937214.87	104817.6669
C5CC	A	12941411.22	0	14214938.11	0	0	0	0	0	111853334	2078174.931	0	80411608.42	0	0	40887152.48
C5CC	B	77488714.49	0	4625426.452	0	0	0	0	0	63914506.3	0	100768122.5	63526572.07	0	0	166488818
C5CD	A	20904639.57	0	14018871.55	0	0	0	0	0	2835214.147	22042322.36	29546123.85	234502578.8	0	29760.42497	115955929.8
C5CD	B	27227523.28	0	0	0	0	0	0	0	0	0	1379661.18	2400977.996	0	0	72846357.19
C5CE	A	0	0	0	0	0	0	0	0	0	4447791.301	0	339248147.3	0	101197.6284	272841533.6
C5CF	A	3366899.674	0	0	0	0	0	0	0	0	0	0	325535369.4	0	0	284020046.6
C5CF	C	302886.0429	0	0	0	0	0	0	0	0	0	0	0	0	0	497656.8463
C5DA	A	0	0	0	0	0	0	0	0	0	0	0	0	0	29400873.9	146221121.7
C5DA	B	0	0	0	0	0	0	0	0	0	0	0	0	0	2898920.107	0
C5DA	D	222494619.8	0	0	0	0	0	0	0	0	0	0	0	0	0	2151899832
C5DB	A	0	0	0	0	0	0	0	0	0	0	0	0	0	75626103.03	1057864.011
C5DB	B	0	0	0	0	0	0	0	0	0	0	0	0	0	51723775.64	1110071.998
C5DB	D	0	0	0	0	0	0	0	0	0	0	0	0	0	73487720.6	1098957525
C5DC	A	0	0	0	0	0	0	0	0	0	0	0	0	0	60419899.47	0
C5DC	B	0	0	0	0	0	0	0	0	0	0	0	0	0	140463630.6	11309671.89
C5DC	D	0	0	0	0	0	0	0	0	0	0	0	0	0	171238472.2	370480417.3
C5EA	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	159637125
C5EA	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	162130785.7
C5EA	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	785902468.9
C5EB	D	230209422.2	0	0	0	0	0	0	0	0	0	0	0	0	0	1116669494
C5EC	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	238571775.3
C5EC	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	74098416.93
C5EC	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	124580893.4
C5ED	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	102527640.1
C5ED	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	243976807.1
C5FA	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28959464.6
C5FA	C	17704867.8	0	0	0	0	0	0	0	0	0	0	0	0	0	190745808.2
C5FA	D	177894364.8	0	0	0	0	0	0	0	0	0	0	0	0	0	814413387.6
C5FB	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	288946510.5
C5FB	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	169406309.4
C5FB	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37375219.2
C5FC	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	124198644.9
C5FC	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	301925481.4
C5FC	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24425515.42
C5FD	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26146621.83
C5FD	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	115308612.6
C5FD	D	73242102.73	0	0	0	0	0	0	0	0	0	0	0	0	0	177780314
C5GA	A	41805342.17	0	0	0	0	0	55324.29968	0	0	0	0	0	0	0	378432139.4

C5GA	B	6511749.511	0	0	0	0	0	6472212.781	0	0	0	268500.2929	0	0	0	64666178.51
C5GA	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	786293.3531
C5GB	A	14237974.16	0	9465331.355	0	0	0	0	0	0	0	0	0	0	0	46235860.39
C5GB	B	1737867.589	0	10422.04609	0	0	0	0	0	0	0	0	0	0	0	174245316.4
C5GB	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	509710220.3
C5GC	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80262818.9
C5GC	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	179374115.2
C5GD	A	84628981.67	0	32681826.43	0	0	0	0	0	0	0	0	0	0	0	306669292.7
C5GD	B	46608901.57	0	58232591.58	0	0	0	0	0	0	0	0	0	0	0	285703271.1
C5GD	C	1397485.241	0	0	0	0	0	0	0	0	0	0	0	0	0	18727246.25
C5I1	B	146847336.5	0	0	0	0	0	0	0	1464369.35	0	259815489.4	0	0	0	106742796.5
C5I1B	A	3188275.001	0	0	0	0	0	0	0	0	0	3832914.595	0	0	0	33741787.57
C5I1B	B	133862602.3	0	0	0	3395888.591	0	0	0	0	0	474032124.2	0	0	0	339687513.1
C5I1B	D	0	0	0	0	0	0	0	0	0	0	7286163.444	0	0	0	24215467.68
C5I1C	B	46039080.26	0	0	0	0	0	0	0	0	0	97423790.99	0	0	0	717093.2163
C5I1D	A	7676899.024	0	0	0	0	0	5060661.153	0	0	0	0	0	0	0	21385695.37
C5I1D	B	58609237.05	0	0	0	0	0	2071971.87	0	0	0	0	0	0	7149682.412	129137595.4
C5I1E	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2827010.513
C5I1E	B	82460419.71	0	0	0	0	0	57282879.66	0	0	0	0	0	0	0	217990787.7
C5I2A	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	594215807.2
C5I2A	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	173761517.7
C5I2A	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2019436167
C5I2A	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	314401303.7
C5ICB	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	305908452.7
C5ICB	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	440927759.8
C5ICB	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38667680.89
C5ICB	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	824739138.7
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

SUBBASIN_NAME	SOIL_TYPE	STREETS	Apartments	Commercial	Condominiums	Duplex	Fourplex	Industrial	Mobile Homes	Open Space	Public Faciliti	Single Family	Townhomes	Triplex	Utilities	Vacant
C1A	B	912116.473	0	0	0	0	0	0	0	0	0	2678548.345	0	0	0	469274.4618
C1B	A	360098.731	0	0	45886.42625	0	0	0	0	60503.0294	0	0	39162.7178	0	0	138544.8824
C1B	B	2368811.71	730570.952	348303.809	546562.8418	0	0	0	1594919.419	205631.441	0	575420.6021	212501.982	0	351248.271	2941612.142
C1C	B	205241.834	0	0	0	0	0	0	0	5427762.67	799036.7106	0	0	0	0	0
C1D	B	2786420.69	244022.481	454914.552	0	0	0	0	0	9449.27364	1808552.197	5176357.146	0	0	0	685242.3613
C1G1A	A	469449.114	0	0	0	0	0	0	0	0	0	1010250.636	0	0	0	172255.8169
C1G1A	B	1584467.49	0	0	0	0	0	0	0	0	0	2640020.358	0	0	0	375465.7091
C1G1B	B	1471835.38	0	0	0	0	0	0	0	0	168682.4088	2307101.518	0	0	0	0
C1G2A	A	1222261.28	0	0	0	0	0	0	0	0	39424.87408	3940808.969	0	0	0	614393.418
C1G2A	B	790079.54	0	0	0	0	0	0	0	0	69833.74433	1940944.358	0	0	0	1051544.623
C1G2B1	A	773100.725	0	0	0	0	0	0	0	0	0	13010.81076	0	0	0	4432042.644
C1G2B1	B	712492.47	0	0	0	0	0	0	0	0	0	307875.4897	0	0	0	3614128.693
C1G2B1	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	956035.7741
C1G2B1	D	281692.661	0	0	0	0	0	0	0	0	0	0	0	0	0	3492153.377
C1G2B2	A	87100.2444	0	0	0	0	0	0	0	0	0	137654.8675	0	0	0	735610.0924
C1G2B2	B	1235972.17	0	0	0	0	0	0	0	0	154177.5664	1182472.65	0	0	0	5095233.554
C1G2B2	D	574.939305	0	0	0	0	0	0	0	0	0	0	0	0	0	4053.638268
C1G2C	A	293751.376	0	0	0	0	0	0	0	0	0	508034.0725	0	0	0	625603.2108
C1G2C	B	682510.588	0	0	0	0	0	0	0	0	49154.50954	1016347.763	0	0	0	3721749.73
C1G2C	D	99612.2808	0	0	0	0	0	0	0	0	0	0	0	0	0	1158322.458
C1G2D	A	178988.077	0	0	0	0	0	0	0	619132.075	0	0	0	0	0	213400.9218
C1G2D	B	912759.245	0	0	0	0	0	0	0	1918139.21	0	539231.6558	0	0	0	1620466.944
C1G2D	D	1642.87702	0	0	0	0	0	0	0	0	0	130372.6329	0	0	0	122554.1895
C1G3A	B	100170.363	0	0	0	0	0	0	0	0	0	0	0	0	0	1183543.032
C1G3A	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4092157.776
C1G3A	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2223506.435
C1G3B	A	63100.3318	0	0	0	0	0	0	0	0	0	1953.745899	0	0	0	531156.7086
C1G3B	B	73200.9788	0	0	0	0	0	0	0	0	0	13125.22708	0	0	0	1002385.288
C1G3B	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16236081.89
C1G3B	D	21183.806	0	0	0	0	0	0	0	0	0	0	0	0	0	2486759.908
C1G3C	B	112124.948	0	0	0	0	0	0	0	0	0	88903.73166	0	0	0	257664.4052
C1G3C	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25636898.93
C1G3C	D	60023.2805	0	0	0	0	0	0	0	0	0	90030.97382	0	0	0	2977652.703
C1G3D	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	507702.1945
C1G3D	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15915204.15
C1G3D	D	0	0	0	0	0	0	0	0	0	0	194709.4764	0	0	0	6732710.964
C1H	A	3098.49859	0	0	0	0	0	0	0	0	0	0	0	0	0	2037930.83
C1H	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	106142710.6
C1H	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3515330.682
C1HA	A	522349.744	0	0	0	0	0	0	0	0	0	0	0	0	0	1427502.969
C1HA	B	78558.2121	0	0	0	0	0	0	0	0	0	0	0	0	0	20582.84965
C1HB	A	228369.081	0	1359.45553	0	0	0	630941.426	0	0	74032.36132	0	0	0	0	19060.20057
C1HB	B	600432.242	380543.641	88899.8373	0	0	0	884852.215	0	0	103.0370741	0	0	0	0	1194865.454
C1HB1	A	74902.5788	0	0	0	0	0	0	0	0	0	0	0	0	0	1524288.736
C1HB1	B	156704.799	0	0	0	0	0	0	0	0	0	0	0	0	0	1057646.32
C1HB1	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8300151.649
C1HB1	D	88104.3181	0	0	0	0	0	0	0	0	0	0	0	0	0	1334738.728
C1HCB	B	746197.468	139041.844	0	0	0	0	0	0	0	0	0	0	0	0	4182279.494
C1HD	B	311910.934	0	0	0	0	0	0	0	0	0	0	0	0	0	1683449.91
C1HE	A	588783.493	0	0	0	0	0	0	0	0	0	0	0	0	0	1429325.944
C1HE	B	642390.768	0	0	0	0	0	0	0	0	0	0	0	0	0	1430248.804
C1HF	A	369338.514	0	0	0	0	0	0	0	0	0	0	0	0	0	183238.5722
C1HF	B	1535163.91	0	0	0	0	0	0	0	0	0	0	0	0	0	722054.3305
C1NA	A	339617.122	0	0	0	0	0	0	0	0	0	1301460.101	0	0	0	132718.7245
C1NA	B	2053766.05	0	0	0	0	0	0	0	0	3659476.486	3604742.61	0	0	0	446330.4578
C3A1A	A	347126.79	0	0	0	0	0	0	0	0	0	689855.9591	0	0	0	357200.0834
C3A1A	B	1611150.36	0	216360.311	0	0	0	168452.287	0	0	35491.14845	2699593.844	0	0	0	4295239.741
C3A1A	D	7734.74409	0	0	0	0	0	0	0	0	0	2457.254428	0	0	0	8147.673579
C3A1B	A	417251.984	0	0	0	0	0	0	0	0	0	857561.5042	0	0	554720.939	5627136.559
C3A1B	B	261794.399	0	0	0	0	0	0	0	0	0	430053.2432	0	0	0	3573406.023
C3A1B	D	340333.113	0	0	0	0	0	0	0	0	0	421457.9739	0	0	291794.892	15614198.54

C3A2A	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13126362.5
C3A2B	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	208063.319	1452940.772
C3A2B	D		0	0	0	0	0	0	0	0	0	0	0	0	0	1255919.43	11409404.32
C3B1A	A	580.547283	0	0	0	0	0	0	0	0	0	74.87619591	0	0	0	0	3678.202441
C3B1A	B	835551.24	0	0	0	0	0	0	0	436977.382	435092.1089	2012193.921	0	0	0	0	3064314.269
C3B1B	A	0	0	0	0	0	0	0	0	0	0	90961.53593	0	0	0	0	446112.2799
C3B1B	B	203922.35	0	0	0	0	0	0	0	0	0	782306.899	0	0	0	0	4314971.402
C3B1C	A	373154.72	0	0	0	0	0	0	0	0	0	859858.5988	0	0	0	0	15846.64461
C3B1C	B	1300887.38	0	0	0	0	0	0	0	18695.7727	0	3770121.595	0	0	0	0	225769.8845
C3B1C	C	45984.1469	0	0	0	0	0	0	0	0	0	176310.8858	0	0	0	0	0
C3B1D	A	14709.1788	0	0	0	0	0	0	0	0	0	82820.98481	0	0	150331.836	1896899.47	
C3B1D	B	79649.0712	0	0	0	0	0	0	0	0	0	852946.2282	0	0	318268.437	6961839.767	
C3B1D	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27650.93109	
C3B3A	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1641791.887	
C3B3A	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27011.16053	
C3B3A	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12568784.32	
C3B3B	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	470966.3644	
C3B3B	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8504660.754	
C3B3C	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	381319.6855	
C3B3C	B	475787.422	0	0	0	0	0	0	0	0	0	0	0	0	0	2081347.087	
C3B3C	D	24108652.9	0	0	0	0	0	0	0	0	0	0	0	0	0	7472314.195	
C3B3D	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2380.162121	
C3B3D	B	0	0	0	0	0	0	0	0	0	0	0	0	0	466036.536	308786.5966	
C3B3D	D	0	0	0	0	0	0	0	0	0	0	0	0	0	2541625.2	3801643.795	
C3B3E	D	0	0	0	0	0	0	0	0	0	0	0	0	0	2979124.31	3224601.611	
C4A1	A	923679.897	0	64738.6959	24147.09041	0	0	0	0	0	0	1906355.721	0	0	0	537217.8943	
C4A1	B	1850937.62	0	330641.625	365480.8417	0	0	0	0	12530.9904	0	2554755.697	396436.768	0	0	769711.61	
C4A1A	A	211494.336	0	0	0	0	0	0	0	0	0	39367.93228	0	0	0	2068045.631	
C4A1A	B	1156319.07	0	0	0	0	0	0	0	0	0	2349314.364	0	0	0	823357.6348	
C4A1A	C	74639.3009	0	0	0	0	0	0	0	0	0	22538.27146	0	0	0	346978.1491	
C4A1B	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2201672.002	
C4A1B	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4745354.555	
C4A1C	A	2011341.79	0	24782.929	7704.506206	0	0	0	0	0	0	4322620.835	0	0	14392.7566	1001435.038	
C4A1C	B	2200426.05	0	603247.897	0	0	0	281456.968	0	0	0	2237093.641	0	0	415.820025	1790711.618	
C4A1D	A	501109.744	0	29184.0464	0	0	0	0	0	0	0	0	0	0	0	639263.9256	
C4A1D	B	119423.951	0	4468.92423	0	0	0	0	0	0	0	0	0	0	0	436061.6662	
C4A2A	B	129840.253	0	0	0	0	0	0	0	0	0	282342.1297	0	0	55.7902312	6855146.65	
C4A2B	A	0	0	0	0	0	0	0	0	0	0	0	0	0	5601.83859	553190.6294	
C4A2B	B	0	0	0	0	0	0	0	0	0	0	32466.36932	0	0	28896.8377	6324974.171	
C4BA1	A	0	0	0	0	0	0	0	0	0	0	0	0	0	3779155.26	630813.5859	
C4BA1	B	0	0	0	0	0	0	0	0	0	0	0	0	0	5437745.64	644371.759	
C4BA1	D	0	0	0	0	0	0	0	0	0	0	0	0	0	1936676.64	836600.891	
C4BA2	A	0	0	0	0	0	0	0	0	0	0	0	0	0	150331.836	1051984.321	
C4BA2	B	0	0	0	0	0	0	0	0	0	0	0	0	0	318268.437	2217948.145	
C4BA2	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27650.93109	
C4BA3	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	631880.382	
C4BA3	B	0	0	0	0	0	0	0	0	0	0	0	0	0	1974931.4	8738113.688	
C4BB	A	0	0	0	0	0	0	0	0	0	0	0	0	0	176062.656	0	
C4BB	B	0	0	0	0	0	0	0	0	0	0	0	0	0	9517260.12	0	
C4BC	A	1514.52461	0	0	0	0	0	0	0	0	0	0	0	0	6089076.43	0	
C4BC	B	0	0	0	0	0	0	0	0	0	0	0	0	0	606933.454	0	
C4BD	A	11395.8342	0	0	0	0	0	0	0	0	0	0	0	0	13552367.4	0	
C4BD	B	3767.2094	0	0	0	0	0	0	0	0	0	0	0	0	1049120.22	0	
C4BE	A	0	0	0	0	0	0	0	0	0	0	0	0	0	2288250.82	0	
C4BE	B	0	0	0	0	0	0	0	0	0	0	0	0	0	3862104.57	0	
C4BF	A	0	0	0	0	0	0	0	0	0	0	0	0	0	7560646.58	0	
C4BF	B	0	0	0	0	0	0	0	0	0	0	0	0	0	179552.01	0	
C4CA	A	0	0	0	0	0	0	0	0	0	0	0	0	0	259714.093	692677.5492	
C4CA	B	0	0	0	0	0	0	0	0	0	0	0	0	0	712791.861	0	
C4CA	D	0	0	0	0	0	0	0	0	0	0	0	0	0	1093824.97	2715654.798	
C4CB	A	3771230.74	0	0	0	0	0	0	0	0	0	0	0	0	0	83621.68741	
C4CB	B	43397687.1	0	0	0	0	0	0	0	0	0	0	0	0	0	27029554.43	

C4CB	D	63681276.8	0	0	0	0	0	0	0	0	0	0	0	0	0	12806875.87
C5CA	A	556082.473	0	0	0	0	0	0	0	0	0	35.70164512	0	0	0	5395096.851
C5CA	B	89612.1565	0	0	0	0	0	0	0	0	0	0	0	0	0	410037.4377
C5CA	C	173615.468	0	0	0	0	0	0	0	0	0	0	0	0	0	1667548.759
C5CB	A	0	0	0	0	0	0	0	0	0	0	0	0	0	3753856.58	34255.56717
C5CB	B	1186.62	0	0	0	0	0	0	0	0	0	0	0	0	136347.4	1370.16558
C5CC	A	177279.606	0	159718.406	0	0	0	0	1380905.358	30561.396	0	1101528.882	0	0	0	649002.4203
C5CC	B	944984.323	0	50303.7135	0	0	0	0	730034.3381	0	1150977.984	776134.0509	0	0	0	2176324.418
C5CD	A	220048.838	0	157515.411	0	0	0	0	35002.64378	324151.799	364766.9611	3212364.093	0	0	367.412654	1840570.315
C5CD	B	286605.508	0	0	0	0	0	0	0	0	15758.55146	29333.879	0	0	0	952239.9633
C5CE	A	0	0	0	0	0	0	0	0	65408.6956	0	4647234.895	0	0	1249.35344	4330817.994
C5CF	A	35441.0492	0	0	0	0	0	0	0	0	0	4459388.623	0	0	0	4508254.709
C5CF	C	3188.27414	0	0	0	0	0	0	0	0	0	0	0	0	0	5854.786427
C5DA	A	0	0	0	0	0	0	0	0	0	0	0	0	0	362973.752	2320970.186
C5DA	B	0	0	0	0	0	0	0	0	0	0	0	0	0	33111.5946	0
C5DA	D	2472162.44	0	0	0	0	0	0	0	0	0	0	0	0	0	24453407.18
C5DB	A	0	0	0	0	0	0	0	0	0	0	0	0	0	933655.593	16791.49224
C5DB	B	0	0	0	0	0	0	0	0	0	0	0	0	0	590791.269	14510.74507
C5DB	D	0	0	0	0	0	0	0	0	0	0	0	0	0	790190.544	12488153.7
C5DC	A	0	0	0	0	0	0	0	0	0	0	0	0	0	959046.023	0
C5DC	B	0	0	0	0	0	0	0	0	0	0	0	0	0	1836389.94	147838.8482
C5DC	D	0	0	0	0	0	0	0	0	0	0	0	0	0	1945891.73	4210004.742
C5EA	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2533922.619
C5EA	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2119356.676
C5EA	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8930709.874
C5EB	D	2557882.47	0	0	0	0	0	0	0	0	0	0	0	0	0	12689426.07
C5EC	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3786853.576
C5EC	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	968606.7573
C5EC	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1415691.971
C5ED	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1627422.858
C5ED	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2772463.717
C5FA	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	459674.0413
C5FA	C	201191.68	0	0	0	0	0	0	0	0	0	0	0	0	0	2244068.331
C5FA	D	1976604.05	0	0	0	0	0	0	0	0	0	0	0	0	0	9254697.587
C5FB	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4586452.548
C5FB	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2214461.561
C5FB	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	424718.4
C5FC	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1971407.062
C5FC	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3946738.319
C5FC	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	277562.6752
C5FD	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	415025.7434
C5FD	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1507302.126
C5FD	D	813801.141	0	0	0	0	0	0	0	0	0	0	0	0	0	2020230.841
C5GA	A	572675.92	0	0	0	0	0	683.016045	0	0	0	0	0	0	0	6006859.355
C5GA	B	79411.5794	0	0	0	0	0	73925.9027	0	0	0	3280.394538	0	0	0	845309.523
C5GA	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8935.15174
C5GB	A	195040.742	0	106352.038	0	0	0	0	0	0	0	0	0	0	0	733902.5458
C5GB	B	21193.5072	0	113.34471	0	0	0	0	0	0	0	0	0	0	0	2277716.555
C5GB	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5723979.776
C5GC	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1049187.175
C5GC	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2038342.218
C5GD	A	1839760.47	0	367211.533	0	0	0	0	0	0	0	0	0	0	0	4867766.551
C5GD	B	717060.024	0	633307.141	0	0	0	0	0	0	0	0	0	0	0	3734683.282
C5GD	C	18149.159	0	0	0	0	0	0	0	0	0	0	0	0	0	220320.5441
C5I1	B	1545761.44	0	0	0	0	0	0	0	18595.1663	0	3820816.021	0	0	0	1395330.673
C5I1B	A	62515.1961	0	0	0	0	0	0	0	0	0	75155.18813	0	0	0	535583.9297
C5I1B	B	1968567.68	0	0	0	38787.991	0	0	0	0	0	6971060.649	0	0	0	4440359.648
C5I1B	D	0	0	0	0	0	0	0	0	0	0	86740.041	0	0	0	275175.7691
C5I1C	B	484621.897	0	0	0	0	0	0	0	0	0	1298983.88	0	0	0	9373.767533
C5I1D	A	105163	0	0	0	0	0	62477.2982	0	0	0	0	0	0	0	339455.482
C5I1D	B	714746.793	0	0	0	0	0	237258.388	0	0	0	0	0	0	81663.991	1688073.142
C5I1E	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44873.18274

C5I1E	B	1005614.87	0	0	0	0	0	654287.603	0	0	0	0	0	0	0	2849552.781
C5I2A	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9431996.939
C5I2A	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2271392.389
C5I2A	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23758072.56
C5I2A	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3572742.087
C5ICB	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4855689.726
C5ICB	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5763761.566
C5ICB	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	454913.8929
C5ICB	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9372035.667

STANDARD FORM 4
C-1 CHANNEL FIS RESTUDY

SUB-BASIN DATA					INITIAL/OVERLAND TIME (Ti)			TRAVEL TIME (Tt)				Tc CHECK (URBANIZED BASINS)		FINAL Tc	UD VALUE	
DESIG. (1)	Cn	K (2)	AREA Ac. (3)	AREA Mi^2	LENGTH Ft (4)	SLOPE % (5)	Ti Min. (6)	LENGTH Ft. (7)	SLOPE % (8)	VEL fps (9)	Tt Min. (10)	TOTAL LENGTH (11)	Tc Min. (12)	Min.		DESIG.
C1A	81	0.685	93.21	0.1456	250	0.5	14.89	2200	2.0	5.5	6.67	2450	23.61	21.56	0.2156	C1A
C1B	82	0.691	241.53	0.3774	400	2.0	11.70	3800	2.0	7.1	8.92	4200	33.33	20.62	0.2062	C1B
C1C	80	0.669	147.65	0.2307	400	2.0	12.32	2100	3.5	5.2	6.73	2500	23.89	19.05	0.1905	C1C
C1D	78	0.642	256.28	0.4004	300	2.0	11.32	4700	2.0	7.8	10.04	5000	37.78	21.37	0.2137	C1D
C1G1A	79	0.652	143.57	0.2243	500	2.2	13.86	3500	2.5	6.8	8.58	4000	32.22	22.44	0.2244	C1G1A
C1G1B	82	0.694	91.40	0.1428	200	1.0	10.33	2100	1.3	4.6	7.61	2300	22.78	17.93	0.1793	C1G1B
C1G2A	75	0.606	222.00	0.3469	200	1.0	12.57	5000	3.8	9.0	9.26	5200	38.89	21.83	0.2183	C1G2A
C1G2B1	74	0.590	322.15	0.5034	500	1.5	17.93	6000	3.6	4.1	24.39	6500	46.11	42.32	0.4232	C1G2B1
C1G2B2	73	0.567	198.19	0.3097	500	1.5	18.74	3800	2.3	7.4	8.56	4300	33.89	27.30	0.2730	C1G2B2
C1G2C	72	0.558	187.24	0.2926	100	1.0	9.75	5300	3.3	5.2	16.99	5400	40.00	26.74	0.2674	C1G2C
C1G2D	73	0.569	143.62	0.2244	150	1.0	11.70	4700	3.3	7.5	10.44	4850	36.94	22.14	0.2214	C1G2D
C1G3A	85	0.726	174.46	0.2726	500	20.0	5.55	1100	20.0	11.1	1.65					
								4300	4.0	4.1	17.48	5900	42.78	17.48	0.1748	C1G3A
C1G3B	84	0.723	468.97	0.7328	500	20.0	5.59	1400	20.0	11.1	2.10					
								3000	8.0	6.4	7.81					
								4800	4.6	7.5	10.67	9700	63.89	10.67	0.1067	C1G3B
C1G3C	85	0.735	670.89	1.0483	500	20.0	5.41	1700	20.0	11.1	2.55					
								2300	11.0	9.5	4.04					
								8500	3.6	7.9	17.93	13000	82.22	17.93	0.1793	C1G3C
C1G3D	86	0.742	536.07	0.8376	500	20.0	5.32	4000	7.5	8.7	7.66					
								5800	3.0	6.5	14.87	10300	67.22	14.87	0.1487	C1G3D
C1H	85	0.728	2564.12	4.0064	500	20.0	5.52	1200	20.0	11.1	1.80					
								4500	6.7	8.0	9.38					
								3500	4.0	6.3	9.26					
								5900	3.4	7.0	14.05	15600	96.67	14.05	0.1405	C1H
C1HA	66	0.487	47.04	0.0735	200	2.0	12.39	2100	1.2	4.3	8.14	2300	22.78	20.53	0.2053	C1HA
C1HB	82	0.687	94.22	0.1472	100	1.0	7.44	2300	2.5	3.1	12.37					
								500	1.0	3.2	2.60	2900	26.11	2.60	0.0260	C1HB
C1HCB	78	0.634	115.59	0.1806	300	0.7	16.60	2000	2.3	3.3	10.10					
								1500	1.2	4.2	5.95	3800	31.11	5.95	0.0595	C1HCB
C1HD	77	0.631	45.69	0.0714	60	2.0	5.19	2100	2.3	3.5	10.00	2160	22.00	15.19	0.1519	C1HD
C1HE	72	0.562	93.93	0.1468	100	2.0	7.68	2200	2.3	5.4	6.79	2300	22.78	14.47	0.1447	C1HE
C1HF	78	0.638	56.42	0.0882	210	1.0	12.06	2800	1.3	3.2	14.58	3010	26.72	26.64	0.2664	C1HF
C1NA	82	0.692	264.88	0.4139	200	2.5	7.64	6000	1.6	6.9	14.49					
								1300	2.5	7.9	2.74	7500	51.67	2.74	0.0274	C1NA
C3A1A	78	0.646	239.67	0.3745	400	1.0	16.35	3000	2.2	5.0	10.00					
								3300	2.0	7.6	7.24	6700	47.22	7.24	0.0724	C3A1A
C3A1B	81	0.678	673.92	1.0530	500	20.0	6.26	3700	3.6	5.2	11.86					
								4800	2.9	9.8	8.16	9000	60.00	8.16	0.0816	C3A1B
C3A2A	88	0.772	303.33	0.4739	500	20.0	4.87	1400	15.0	9.8	2.38					
								4200	6.3	7.7	9.09	6100	43.89	9.09	0.0909	C3A2A
C3A2B	86	0.742	327.96	0.5124	500	20.0	5.30	2000	15.0	9.8	3.40					
								5000	5.2	6.4	13.02	7500	51.67	13.02	0.1302	C3A2B
C3B1A	74	0.593	160.90	0.2514	125	1.0	10.20	5000	2.0	7.4	11.26	5125	38.47	21.46	0.2146	C3B1A
C3B1B	76	0.607	132.49	0.2070	200	1.5	10.96	3700	3.3	6.9	8.94	3900	31.67	19.90	0.1990	C3B1B
C3B1C	80	0.670	159.80	0.2497	150	1.0	9.47	3700	2.8	8.0	7.71					
								1300	1.4	5.7	3.80	5150	38.61	3.80	0.0380	C3B1C
C3B1D	73	0.579	157.10	0.2455	100	1.0	9.37	2800	3.3	7.2	6.48					
								1300	0.6	4.5	4.81	4200	33.33	4.81	0.0481	C3B1D
C3B3A	85	0.733	328.28	0.5129	500	20.0	5.45	3000	10.0	10.7	4.67					

								5500	4.3	9.3	9.86	9000	60.00	9.86	0.0986	C3B3A
C3B3B	87	0.754	207.03	0.3235	500	20.0	5.13	5800	5.6	8.4	11.51	6300	45.00	16.63	0.1663	C3B3B
C3B3C	88	0.776	792.47	1.2382	500	20.0	4.80	2800	12.0	9.4	4.96					
								3600	7.2	10.3	5.83					
								4300	4.9	10.4	6.89	11200	72.22	6.89	0.0689	C3B3C
C3B3D	89	0.787	159.25	0.2488	500	20.0	4.64	4100	4.9	7.3	9.36	4600	35.56	14.00	0.1400	C3B3D
C3B3E	90	0.804	144.08	0.2251	500	20.0	4.39	3800	3.6	5.7	11.11	4300	33.89	15.50	0.1550	C3B3E
C4A1	79	0.648	223.41	0.3491	500	0.6	21.57	4400	2.0	7.0	10.48	4900	37.22	32.05	0.3205	C4A1
C4A1B	72	0.558	170.21	0.2659	50	2.0	5.47	3100	1.6	3.6	14.35	3150	27.50	19.82	0.1982	C4A1B
C4A1C	77	0.621	333.37	0.5209	500	2.0	15.31	4500	2.0	8.0	9.38	5000	37.78	24.68	0.2468	C4A1C
C4A1D	75	0.601	189.34	0.2958	50	2.0	5.04	3100	0.7	3.6	14.35	3150	27.50	19.39	0.1939	C4A1D
C4A2A	76	0.614	157.88	0.2467	200	1.0	12.36	2800	3.3	5.7	8.19					
								1300	1.0	5.3	4.09	4300	33.89	4.09	0.0409	C4A2A
C4A2B	75	0.606	160.09	0.2501	400	1.5	15.54	2500	3.1	5.6	7.44					
								2500	0.4	4.0	10.42	5400	40.00	10.42	0.1042	C4A2B
C4BA1	74	0.593	295.56	0.4618	500	20.0	7.52	1000	14.0	9.9	1.68					
								4500	3.1	3.5	21.43	6000	43.33	21.43	0.2143	C4BA1
C4BA2	72	0.564	72.39	0.1131	50	2.5	5.03	4900	3.6	7.7	10.61	4950	37.50	15.64	0.1564	C4BA2
C4BA3	78	0.635	260.39	0.4069	500	1.0	18.71	6400	3.6	4.7	22.70	6900	48.33	41.40	0.4140	C4BA3
C4BB	87	0.764	222.53	0.3477	500	0.5	17.03	3300	3.8	4.5	12.22	3800	31.11	29.26	0.2926	C4BB
C4BC	82	0.687	153.75	0.2402	200	2.0	8.34	2800	3.7	4.5	10.37	3000	26.67	18.71	0.1871	C4BC
C4BD	81	0.685	335.55	0.5243	500	1.0	16.69	6300	2.5	4.1	25.61	6800	47.78	42.30	0.4230	C4BD
C4BE	85	0.733	141.20	0.2206	500	1.0	14.75	2800	3.7	4.3	10.85	3300	28.33	25.60	0.2560	C4BE
C4BF	81	0.681	177.69	0.2776	500	1.0	16.86	1500	5.0	4.9	5.10					
								2400	2.2	7.0	5.71	4400	34.44	5.71	0.0571	C4BF
C4CA	86	0.739	128.26	0.2004	500	20.0	5.35	4800	3.3	3.7	21.62	5300	39.44	26.97	0.2697	C4CA
C4CB	85	0.728	3460.20	5.4066	500	20.0	5.52	1500	15.0	10.1	2.48					
								2600	5.8	9.6	4.51					
								9300	4.1	9.3	16.67					
								3700	3.8	10.0	6.17	17600	107.78	6.17	0.0617	C4CB
C5CA	69	0.527	190.32	0.2974	200	1.0	14.58	3400	2.7	7.5	7.56	3600	30.00	22.14	0.2214	C5CA
C5CB	81	0.681	89.95	0.1405	200	1.0	10.68	5000	2.5	4.3	19.38	5200	38.89	30.06	0.3006	C5CB
C5CC	79	0.656	214.28	0.3348	500	0.5	22.52	2700	2.2	7.2	6.25	3200	27.78	27.78	0.2778	C5CC
C5CD	72	0.560	170.92	0.2671	500	1.0	21.75	5900	2.6	8.1	12.14	6400	45.56	33.89	0.3389	C5CD
C5CE	68	0.510	207.61	0.3244	250	1.0	16.79	2600	2.5	5.2	8.33					
								2600	1.0	5.4	8.02	5450	40.28	8.02	0.0802	C5CE
C5CF	68	0.508	206.91	0.3233	300	1.7	15.47	2600	3.0	6.2	6.99					
								2600	1.7	6.5	6.67	5500	40.56	6.67	0.0667	C5CF
C5DA	86	0.746	650.64	1.0166	500	20.0	5.25	1500	20.0	11.1	2.25					
								4100	8.8	7.8	8.76					
								5300	5.7	7.7	11.47					
								2600	4.7	8.5	5.10	14000	87.78	5.10	0.0510	C5DA
C5DB	88	0.769	346.57	0.5415	500	20.0	4.91	4500	8.9	6.9	10.87					
								2700	3.7	6.2	7.26	7700	52.78	7.26	0.0726	C5DB
C5DC	83	0.703	206.50	0.3226	500	20.0	5.89	2000	8.8	7.3	4.57					
								800	3.8	6.7	1.99	3300	28.33	1.99	0.0199	C5DC
C5EA	82	0.686	311.47	0.4867	500	20.0	6.13	3800	11.0	8.1	7.82					
								5200	5.8	7.5	11.56	9500	62.78	11.56	0.1156	C5EA
C5EB	88	0.776	369.71	0.5777	500	20.0	4.81	8200	10.9	8.7	15.71	8700	58.33	20.52	0.2052	C5EB
C5EC	71	0.549	144.08	0.2251	100	2.0	7.87	2800	5.6	7.3	6.39	2900	26.11	14.26	0.1426	C5EC
C5ED	79	0.653	103.65	0.1620	500	20.0	6.63	4000	5.8	6.6	10.10	4500	35.00	16.73	0.1673	C5ED
C5FA	87	0.759	335.17	0.5237	500	20.0	5.06	4000	11.0	8.4	7.94					
								1300	9.2	9.0	2.41	5800	42.22	2.41	0.0241	C5FA
C5FB	68	0.503	157.84	0.2466	100	2.0	8.53	4000	6.5	8.0	8.33	4100	32.78	16.87	0.1687	C5FB
C5FC	73	0.570	142.08	0.2220	100	2.0	7.58	4000	6.6	7.5	8.89	4100	32.78	16.47	0.1647	C5FC
C5FD	82	0.697	112.66	0.1760	500	20.0	5.98	2000	9.0	6.8	4.90					
								2400	7.0	5.4	7.41	4900	37.22	7.41	0.0741	C5FD
C5GA	66	0.478	174.25	0.2723	300	1.0	19.40	4000	4.5	6.6	10.10	4300	33.89	29.50	0.2950	C5GA

C5GB	83	0.702	207.94	0.3249	500	20.0	5.90	1100	16.3	10.3	1.78					
								4000	4.5	4.1	16.26	5600	41.11	16.26	0.1626	C5GB
C5GC	84	0.720	70.90	0.1108	500	20.0	5.63	800	20.0	9.4	1.42					
								1300	12.0	5.2	4.17	2600	24.44	4.17	0.0417	C5GC
C5GD	67	0.495	289.24	0.4519	300	0.8	20.32	6700	2.4	4.3	25.97	7000	48.89	46.29	0.4629	C5GD
C5I1	70	0.531	154.71	0.2417	150	6.6	6.68	5100	3.0	8.2	10.37	5250	39.17	17.05	0.1705	C5I1
C5I1B	71	0.544	337.77	0.5278	500	1.6	19.14	2400	3.5	6.5	6.15					
								3800	1.5	8.3	7.63	6700	47.22	7.63	0.0763	C5I1B
C5I1C	75	0.600	33.04	0.0516	250	0.5	17.93	2000	1.8	3.9	8.55	2250	22.50	22.50	0.2250	C5I1C
C5I1D	78	0.634	77.25	0.1207	100	1.0	8.39	2100	1.3	5.0	7.00	2200	22.22	15.39	0.1539	C5I1D
C5I1E	79	0.655	104.52	0.1633	50	2.0	4.50	1600	3.2	5.0	5.33					
								1800	1.3	5.6	5.36	3450	29.17	5.36	0.0536	C5I1E
C5I2A	79	0.659	896.09	1.4001	500	20.0	6.54	2100	20.0	11.1	3.15					
								3400	7.6	7.6	7.46					
								4600	4.8	5.6	13.69	10600	68.89	13.69	0.1369	C5I2A
C5ICB	79	0.650	469.41	0.7334	500	20.0	6.68	2400	7.3	5.0	8.00					
								4700	7.9	5.1	15.36	7600	52.22	15.36	0.1536	C5ICB

*ALLUVIAL CHANNELS WERE ESTIMATED TO OCCUR AT ABOUT EVERY 500' LATERALLY ACROSS THE DISCHARGE PLAIN IN MOST WATERSHEDS. TO ESTIMATE FLOW Q IN INDIVIDUAL CHANNELS, THE EST. TOTAL FLOW WAS DIVIDED BY THE EST. NUMBER OF CHANNELS.

**VELOCITY BASED ON NORMAL DEPTH AS DETERMINED BY FLOWMASTER COMPUTER PROGRAM.

***TOTAL FLOW Q, IN CFS, WAS ESTIMATED AS 1.3 TIMES THE WATERSHED AREA, IN ACRES.

									120	100' R/W	STREET		
									310	100' R/W	STREET		
									190	100' TRAP;20:1 SS	GRASS		
									330	80' R/W	STREET		
									190	100' R/W	STREET		
									120	80' R/W	STREET		
									290	80' R/W	STREET		
									80	80' TRAP;2:1 SS	NATURAL	5	16
									260	80' R/W	STREET		
									240	60' TRAP;2:1 SS	NATURAL	2	120
									190	100' R/W	STREET		
									230	5' TRAP;1:1 SS	NATURAL	MANY	20
									230	80' TRAP;2:1 SS	NATURAL	3	77
									610	5' TRAP;1:1 SS	NATURAL	MANY	20
									610	60' TRAP;2:1 SS	NATURAL	6	102
									610	80' TRAP;2:1 SS	NATURAL	3	203
									870	5' TRAP;1:1 SS	NATURAL	MANY	20
									870	60' TRAP;2:1 SS	NATURAL	4	218
									870	60' TRAP;2:1 SS	NATURAL	2	435
									700	60' TRAP;2:1 SS	NATURAL	3	233
									700	60' TRAP;2:1 SS	NATURAL	3	233
									3330	5' TRAP;1:1 SS	NATURAL	MANY	20
									3330	60' TRAP;2:1 SS	NATURAL	16	208
									3330	60' TRAP;2:1 SS	NATURAL	20	167
									3330	80' TRAP;2:1 SS	NATURAL	10	333
									60	20' TRAP;5:1 SS	ROAD DITCH		
									120	60' TRAP;2:1 SS	NATURAL	3	40
									120	80' TRAP;5:1 SS	ROAD DITCH		
									150	60' TRAP;2:1 SS	NATURAL	3	50
									150	20' TRAP;5:1 SS	ROAD DITCH		
									60	60' TRAP;2:1 SS	NATURAL	1	60
									120	40' TRAP;2:1 SS	NATURAL	1	120
									70	60' TRAP;2:1 SS	NATURAL	1	70
									280	80' R/W	STREET		
									340	100' R/W	STREET		
									100	80' R/W	STREET		
									310	80' R/W	STREET		
									880	60' TRAP;2:1 SS	NATURAL	8	110
									880	80' TRAP;2:1 SS	NATURAL	1	880
									390	5' TRAP;1:1 SS	NATURAL	MANY	20
									390	60' TRAP;2:1 SS	NATURAL	2	195
									430	5' TRAP;1:1 SS	NATURAL	MANY	20
									430	60' TRAP;2:1 SS	NATURAL	3	143
									210	60' R/W	STREET		
									170	40' TRAP;2:1 SS	NATURAL	1	170
									100	60' R/W	STREET		
									200	40' TRAP;2:1 SS	CONC		
									200	20' TRAP;5:1 SS	NATURAL	2	100
									200	80' R/W	STREET		
									430	40' TRAP;2:1 SS	NATURAL	2	215

									430	60' TRAP;2:1 SS	NATURAL	1	430
									270	60' TRAP;2:1 SS	NATURAL	1	270
									1030	5' TRAP;1:1 SS	NATURAL	MANY	20
									1030	40' TRAP;2:1 SS	NATURAL	4	258
									1030	60' TRAP;2:1 SS	NATURAL	2	515
									210	60' TRAP;2:1 SS	NATURAL	1	210
									190	80' TRAP;2:1 SS	NATURAL	1	190
									290	100' R/W	STREET		
									220	80' TRAP;2:1 SS	NATURAL	2	110
									430	100' R/W	STREET		
									110	40' TRAP;2:1 SS	NATURAL	1	110
									210	20' TRAP;5:1 SS	NATURAL	4	53
									210	80' R/W	STREET		
									210	20' TRAP;5:1 SS	NATURAL	4	53
									210	80' R/W	STREET		
									380	5' TRAP;1:1 SS	NATURAL	MANY	20
									380	80' TRAP;2:1 SS	NATURAL	6	63
									200	80' R/W	STREET		
									340	80' TRAP;2:1 SS	NATURAL	3	113
									290	80' TRAP;2:1 SS	NATURAL	3	97
									200	80' TRAP;2:1 SS	NATURAL	2	100
									440	80' TRAP;2:1 SS	NATURAL	4	110
									180	80' TRAP;2:1 SS	NATURAL	2	90
									100	80' TRAP;2:1 SS	NATURAL	1	100
									230	80' R/W	STREET		
									170	200' TRAP;2:1 SS	NATURAL	1	170
									4500	5' TRAP;1:1 SS	NATURAL	MANY	20
									4500	40' TRAP;2:1 SS	NATURAL	18	250
									4500	60' TRAP;2:1 SS	NATURAL	10	450
									4500	80' TRAP;2:1 SS	NATURAL	6	750
									250	100' R/W	STREET		
									120	80' TRAP;2:1 SS	NATURAL	1	120
									280	100' R/W	STREET		
									220	60' R/W	STREET		
									100	80' R/W	STREET		
									270	100' R/W	STREET		
									100	60' R/W	STREET		
									270	100' R/W	STREET		
									850	5' TRAP;1:1 SS	NATURAL	MANY	20
									850	40' TRAP;5:1 SS	NATURAL	8	106
									850	60' TRAP;2:1 SS	NATURAL	4	213
									850	80' TRAP;2:1 SS	NATURAL	2	425
									450	60' TRAP;2:1 SS	NATURAL	4	113
									450	80' TRAP;2:1 SS	NATURAL	2	225
									270	60' TRAP;2:1 SS	NATURAL	2	135
									270	80' TRAP;2:1 SS	NATURAL	1	270
									400	40' TRAP;5:1 SS	NATURAL	4	100
									400	60' TRAP;2:1 SS	NATURAL	2	200
									480	40' TRAP;5:1 SS	NATURAL	4	120
									190	60' TRAP;2:1 SS	NATURAL	1	190
									140	60' TRAP;2:1 SS	NATURAL	1	140
									440	40' TRAP;5:1 SS	NATURAL	4	110
									440	60' TRAP;2:1 SS	NATURAL	2	220
									210	60' TRAP;2:1 SS	NATURAL	1	210
									180	60' TRAP;2:1 SS	NATURAL	1	180
									150	40' TRAP;5:1 SS	NATURAL	2	75
									150	60' TRAP;2:1 SS	NATURAL	2	75
									230	80' TRAP;2:1 SS	NATURAL	1	230

									270	40' TRAP;5:1 SS	NATURAL	2	135
									270	80' TRAP;2:1 SS	NATURAL	4	68
									90	40' TRAP;5:1 SS	NATURAL	1	90
									90	60' TRAP;2:1 SS	NATURAL	2	45
									380	80' TRAP;2:1 SS	NATURAL	3	127
									200	60' R/W	STREET		
									100	60' R/W	STREET		
									440	20' TRAP;5:1 SS	ROAD DITCH		
									40	60' R/W	STREET		
									100	20' TRAP;5:1 SS	ROAD DITCH		
									60	80' R/W	STREET		
									140	20' TRAP;5:1 SS	ROAD DITCH		
									1170	5' TRAP;1:1 SS	NATURAL	MANY	20
									1170	40' TRAP;5:1 SS	NATURAL	10	117
									1170	80' TRAP;2:1 SS	NATURAL	8	146
									610	40' TRAP;5:1 SS	NATURAL	6	102
									610	80' TRAP;2:1 SS	NATURAL	8	76

Modified Uniform Soil Loss Equation (MUSLE) - 100-yr event								
Subbasin	Area (sq mi)	LS	K	C	P	Peak Discharge (cfs)	Flow Volume (ac-ft)	Overland Sediment Yield (tons)
C1G1A	0.22	0.508997	0.15	0.32	0.4	255	19	107.5238874
C1G1B	0.14	0.65511	0.15	0.32	0.4	200	14	101.79995
C1G2C	0.29	2.017485	0.15	0.32	1	210	17	897.9853817
C1G2D	0.22	0.317023	0.15	0.32	1	153	11	92.61098244
C1G3B	0.73	2.632201	0.15	0.32	1	1014	61	5786.951036
C1G3C	1.05	1.033341	0.15	0.32	1	1372	92	3387.255776
C1G3D	0.84	2.409793	0.15	0.32	1	1246	79	6872.360657
C1A	0.14	0.444188	0.15	0.32	0.4	149	11	51.13939445
C1B	0.38	0.35292	0.15	0.32	1	450	33	348.985783
C1C	0.23	0.40757	0.15	0.32	1	213	15	170.4790441
C1D	0.40	0.438269	0.15	0.32	0.4	338	24	123.5596921
C1G2A	0.35	0.708991	0.15	0.32	0.4	309	22	181.0501844
C1G2B1	0.50	0.551874	0.15	0.32	1	260	26	351.2168289
C1G2B2	0.31	0.47974	0.15	0.32	1	230	18	232.0017864
C1G3A	0.27	9.933006	0.15	0.32	1	358	23	7059.722402
C1H	4.00	2.747359	0.15	0.32	1	5490	338	40572.71593
C1HA	0.07	0.315183	0.15	0.32	1	27	2	13.41740829
C1HB	0.15	0.359005	0.15	0.32	1	278	13	160.8936838
C1HB1	0.45	15.01031	0.15	0.32	1	305	33	11937.96585
C1HCB	0.18	0.283176	0.15	0.32	1	249	12	114.0864367
C1HD	0.07	0.804639	0.15	0.32	1	72	4	87.4632211
C1HE	0.15	1.260801	0.15	0.32	1	115	7	243.7008038
C1HF	0.09	1.921343	0.15	0.32	1	90	7	323.7429974
C1NA	0.41	0.443604	0.15	0.32	0.4	744	34	236.4443567
C3A1A	0.37	0.345944	0.15	0.32	0.8	433	22	213.4274816
C3A1B	1.05	3.400003	0.15	0.32	1	1403	74	9990.017569
C3A2A	0.47	1.790164	0.15	0.32	1	825	47	3030.028997
C3A2B	0.51	2.308445	0.15	0.32	1	769	47	3756.45287
C3B1A	0.25	0.28262	0.15	0.32	0.8	170	12	73.56153754
C3B1B	0.20	0.333352	0.15	0.32	0.8	139	10	69.99171641
C3B1C	0.24	0.492359	0.15	0.32	0.4	374	17	121.1061785
C3B1D	0.25	0.452747	0.15	0.32	1	215	10	151.7001884
C3B3A	0.51	6.070774	0.15	0.32	1	838	49	10610.48855
C3B3B	0.32	2.488635	0.15	0.32	1	508	34	2678.168419
C3B3C	1.24	10.12478	0.15	0.32	1	2610	139	59945.63822
C3B3D	0.25	1.264955	0.15	0.32	1	455	29	1170.763397
C3B3E	0.23	6.266014	0.15	0.32	1	396	20	5047.201110
C4A1	0.35	0.246608	0.15	0.32	0.6	248	21	81.36905983
C4A1A	0.30	0.2645	0.15	0.32	0.9	109	14	65.82995331
C4A1B	0.27	0.197293	0.15	0.32	1	134	9	47.82233411
C4A1C	0.52	0.462687	0.15	0.32	0.6	481	36	299.180709
C4A1D	0.06	0.087736	0.15	0.32	1	52	4	7.948013337
C4A2A	0.25	0.326168	0.15	0.32	1	322	14	165.4389357
C4A2B	0.25	0.279542	0.15	0.32	1	203	12	100.4501176
C4BA1	0.46	5.253597	0.15	0.32	1	289	21	3147.510425
C4BA2	0.11	0.488052	0.15	0.32	1	92	6	76.36889885
C4BA3	0.41	0.4217	0.15	0.32	1	296	29	306.7852052
C4BB	0.35	0.332096	0.15	0.32	1	377	31	287.1721032
C4BC	0.24	0.23921	0.15	0.32	1	255	18	122.5628048
C4BD	0.52	0.236141	0.15	0.32	1	409	40	246.5215347
C4BE	0.22	0.326778	0.15	0.32	1	241	19	167.2048322
C4BF	0.26	0.410554	0.15	0.32	1	417	20	293.8921852
C4CA	0.20	9.205443	0.15	0.32	1	237	19	4666.278225
C4CB	5.40	3.430295	0.15	0.32	1	10493	521	92774.63628
C5GA	0.27	0.978879	0.15	0.32	1	109	9	211.3628609
C5GB	0.32	9.548245	0.15	0.32	1	451	29	8793.669127
C5GC	0.11	4.690875	0.15	0.32	1	223	10	1604.240319
C5GD	0.45	1.187818	0.15	0.32	1	163	17	458.7660116
C5CA	0.30	0.619996	0.15	0.32	1	185	14	230.5693328
C5CB	0.14	0.276433	0.15	0.32	1	127	10	68.97384659
C5CC	0.34	0.333774	0.15	0.32	1	286	23	209.1942652
C5CD	0.27	0.222046	0.15	0.32	0.6	153	13	42.73611757
C5CE	0.32	2.224422	0.15	0.32	0.6	221	12	502.9612007
C5CF	0.32	0.554977	0.15	0.32	0.6	228	12	127.6955493
C5DA	1.02	7.268587	0.15	0.32	1	2210	106	33685.71848

C5DB	0.54	3.810896	0.15	0.32	1	1079	57	8351.679997
C5DC	0.32	6.153385	0.15	0.32	1	601	27	6394.585124
C5EA	0.49	3.512041	0.15	0.32	1	690	41	4982.402588
C5EB	0.58	11.98917	0.15	0.32	1	806	60	22964.99783
C5EC	0.22	2.423291	0.15	0.32	1	179	11	772.9438317
C5ED	0.16	2.977416	0.15	0.32	1	178	12	993.9878019
C5FA	0.52	8.408833	0.15	0.32	1	1125	53	18110.91813
C5FB	0.25	0.687279	0.15	0.32	1	167	11	210.8623203
C5FC	0.22	1.141899	0.15	0.32	1	191	12	396.5633632
C5FD	0.18	6.663801	0.15	0.32	1	294	15	3338.662265
C5I1	0.24	0.526465	0.15	0.32	0.6	238	15	140.5983019
C5I1B	0.53	0.584297	0.15	0.32	0.8	479	25	409.7537938
C5I1C	0.05	0.436284	0.15	0.32	0.4	68	5	20.81718365
C5I1D	0.11	0.574245	0.15	0.32	1	126	8	125.8925323
C5I1E	0.16	0.629577	0.15	0.32	1	266	12	263.2020306
C5I2A	1.40	5.118254	0.15	0.32	1	1698	103	20139.1249
C5ICB	0.73	4.393979	0.15	0.32	1	850	52	8003.119039
							TOTAL (TONS)	420726.5895

Modified Uniform Soil Loss Equation (MUSLE) - 50-yr event

Subbasin	Area (sq mi)	LS	K	C	P	Peak Discharge (cfs)	Flow Volume (ac-ft)	Overland Sediment Yield (tons)
C1G1A	0.22	0.508997	0.15	0.32	0.4	226	16	91.27426746
C1G1B	0.14	0.65511	0.15	0.32	0.4	179	12	87.75629155
C1G2C	0.29	2.017485	0.15	0.32	1	180	14	738.8552586
C1G2D	0.22	0.317023	0.15	0.32	1	129	9	75.22486715
C1G3B	0.73	2.632201	0.15	0.32	1	901	54	5059.064703
C1G3C	1.05	1.033341	0.15	0.32	1	1218	82	2971.028003
C1G3D	0.84	2.409793	0.15	0.32	1	1113	70	6028.883094
C1A	0.15	0.444188	0.15	0.32	0.4	131	9	42.52448846
C1B	0.38	0.35292	0.15	0.32	1	401	29	304.3299177
C1C	0.23	0.40757	0.15	0.32	1	184	13	144.9684772
C1D	0.40	0.438269	0.15	0.32	0.4	291	21	105.4357881
C1G2A	0.35	0.708991	0.15	0.32	0.4	267	19	153.6787589
C1G2B1	0.50	0.551874	0.15	0.32	1	220	22	291.2853014
C1G2B2	0.31	0.47974	0.15	0.32	1	198	16	199.715069
C1G3A	0.27	9.933006	0.15	0.32	1	318	21	6278.379069
C1H	4.01	2.747359	0.15	0.32	1	4881	299	35466.71891
C1HA	0.07	0.315183	0.15	0.32	1	21	2	11.65595152
C1HB	0.15	0.359005	0.15	0.32	1	249	11	137.7581083
C1HB1	0.45	15.01031	0.15	0.32	1	268	29	10328.87399
C1HCB	0.18	0.283176	0.15	0.32	1	217	10	95.37583093
C1HD	0.07	0.804639	0.15	0.32	1	62	4	80.43750952
C1HE	0.15	1.260801	0.15	0.32	1	96	6	202.0448846
C1HF	0.09	1.921343	0.15	0.32	1	79	6	276.0613116
C1NA	0.41	0.443604	0.15	0.32	0.4	662	30	206.4848974
C3A1A	0.37	0.345944	0.15	0.32	0.8	377	19	181.9338832
C3A1B	1.05	3.400003	0.15	0.32	1	1230	65	8630.233284
C3A2A	0.47	1.790164	0.15	0.32	1	741	42	2679.017633
C3A2B	0.51	2.308445	0.15	0.32	1	687	42	3311.309454
C3B1A	0.25	0.28262	0.15	0.32	0.8	146	10	60.99517807
C3B1B	0.21	0.333352	0.15	0.32	0.8	118	8	56.35632598
C3B1C	0.25	0.492359	0.15	0.32	0.4	331	15	105.4439311
C3B1D	0.25	0.452747	0.15	0.32	1	180	8	121.2002674
C3B3A	0.51	6.070774	0.15	0.32	1	746	44	9360.006677
C3B3B	0.00	2.488635	0.15	0.32	1	456	30	2350.35913
C3B3C	1.24	10.12478	0.15	0.32	1	2355	125	53325.52425
C3B3D	0.25	1.264955	0.15	0.32	1	411	26	1040.342571
C3B3E	0.42	6.266014	0.15	0.32	1	359	24	4568.013913
C4A1	0.35	0.246608	0.15	0.32	0.6	214	18	68.72391114
C4A1A	0.30	0.2645	0.15	0.32	0.9	94	12	55.58096772
C4A1B	0.28	0.197293	0.15	0.32	1	110	8	40.08543246
C4A1C	0.52	0.462687	0.15	0.32	0.6	420	32	259.6011036
C4A1D	0.06	0.087736	0.15	0.32	1	45	3	6.239216128
C4A2A	0.25	0.326168	0.15	0.32	1	278	12	139.7697933
C4A2B	0.25	0.279542	0.15	0.32	1	173	10	82.93101645
C4BA1	0.46	5.253597	0.15	0.32	1	242	17	2531.684491
C4BA2	0.11	0.488052	0.15	0.32	1	77	5	62.41495384
C4BA3	0.41	0.4217	0.15	0.32	1	256	25	260.2729055
C4BB	0.35	0.332096	0.15	0.32	1	337	28	254.7474152
C4BC	0.24	0.23921	0.15	0.32	1	223	15	102.6609824
C4BD	0.52	0.236141	0.15	0.32	1	359	35	212.6508931
C4BE	0.22	0.326778	0.15	0.32	1	214	17	146.9942589
C4BF	0.28	0.410554	0.15	0.32	1	366	17	249.4226295
C4CA	0.14	9.205443	0.15	0.32	1	211	17	4108.271252
C4CB	5.41	3.430295	0.15	0.32	1	9383	463	81570.48315
C5GA	0.27	0.978879	0.15	0.32	1	88	8	175.5232791
C5GB	0.33	9.548245	0.15	0.32	1	399	25	7555.785232
C5GC	0.11	4.690875	0.15	0.32	1	199	9	1418.901448
C5GD	0.45	1.187818	0.15	0.32	1	133	14	367.2006147
C5CA	0.30	0.619996	0.15	0.32	1	153	11	181.1176522

C5CB	0.14	0.276433	0.15	0.32	1	111	9	60.29912865
C5CC	0.34	0.333774	0.15	0.32	1	249	20	179.005197
C5CD	0.27	0.222046	0.15	0.32	0.6	130	11	35.52611914
C5CE	0.32	2.224422	0.15	0.32	0.6	180	10	404.8423302
C5CF	0.32	0.554977	0.15	0.32	0.6	185	10	102.566826
C5DA	1.02	7.268587	0.15	0.32	1	1984	95	29823.82964
C5DB	0.54	3.810896	0.15	0.32	1	973	51	7405.841389
C5DC	0.32	6.153385	0.15	0.32	1	534	24	5602.996615
C5EA	0.49	3.512041	0.15	0.32	1	611	36	4327.497683
C5EB	0.58	11.98917	0.15	0.32	1	726	54	20418.27733
C5EC	0.23	2.423291	0.15	0.32	1	150	9	625.6871634
C5ED	0.16	2.977416	0.15	0.32	1	154	10	827.5913817
C5FA	0.52	8.408833	0.15	0.32	1	1013	47	15966.75487
C5FB	0.25	0.687279	0.15	0.32	1	137	9	168.6697404
C5FC	0.22	1.141899	0.15	0.32	1	161	10	325.3980127
C5FD	0.18	6.663801	0.15	0.32	1	261	13	2882.795529
C5I1	0.69	0.526465	0.15	0.32	0.6	205	13	119.3648107
C5I1B	0.53	0.584297	0.15	0.32	0.8	401	21	336.4281633
C5I1C	0.58	0.436284	0.15	0.32	0.4	59	4	16.96775957
C5I1D	0.12	0.574245	0.15	0.32	1	109	7	107.7149075
C5I1E	0.16	0.629577	0.15	0.32	1	233	11	232.762622
C5I2A	1.40	5.118254	0.15	0.32	1	1485	89	17215.1917
C5ICB	0.73	4.393979	0.15	0.32	1	741	46	6919.351419
							TOTAL (TONS)	369124.9744

Modified Uniform Soil Loss Equation (MUSLE) - 25-yr event								
Subbasin	Area (sq mi)	LS	K	C	P	Peak Discharge (cfs)	Flow Volume (ac-ft)	Overland Sediment Yield (tons)
C1G1A	0.22	0.508997	0.15	0.32	0.4	179	13	71.30933961
C1G1B	0.14	0.65511	0.15	0.32	0.4	144	10	70.14909342
C1G2C	0.29	2.017485	0.15	0.32	1	133	11	544.8938277
C1G2D	0.22	0.317023	0.15	0.32	1	91	7	53.74938117
C1G3B	0.73	2.632201	0.15	0.32	1	719	42	3873.215192
C1G3C	1.05	1.033341	0.15	0.32	1	970	65	2296.318672
C1G3D	0.84	2.409793	0.15	0.32	1	897	56	4715.130654
C1A	0.14	0.444188	0.15	0.32	0.4	103	7	32.28755176
C1B	0.38	0.35292	0.15	0.32	1	322	23	236.3784047
C1C	0.23	0.40757	0.15	0.32	1	141	10	107.8276206
C1D	0.40	0.438269	0.15	0.32	0.4	219	15	74.47748096
C1G2A	0.35	0.708991	0.15	0.32	0.4	203	15	115.4713938
C1G2B1	0.50	0.551874	0.15	0.32	1	157	16	201.7512171
C1G2B2	0.31	0.47974	0.15	0.32	1	148	12	144.4305936
C1G3A	0.27	9.933006	0.15	0.32	1	253	16	4743.514401
C1H	4.00	2.747359	0.15	0.32	1	3899	237	27458.26554
C1HA	0.07	0.315183	0.15	0.32	1	13	1	6.04416633
C1HB	0.15	0.359005	0.15	0.32	1	200	9	108.8975817
C1HB1	0.45	15.01031	0.15	0.32	1	208	23	7871.140625
C1HCB	0.18	0.283176	0.15	0.32	1	165	8	72.2008458
C1HD	0.07	0.804639	0.15	0.32	1	46	3	57.9292576
C1HE	0.15	1.260801	0.15	0.32	1	68	4	132.7302324
C1HF	0.09	1.921343	0.15	0.32	1	60	5	213.6769019
C1NA	0.41	0.443604	0.15	0.32	0.4	530	23	157.1021001
C3A1A	0.37	0.345944	0.15	0.32	0.8	288	14	131.8717925
C3A1B	1.05	3.400003	0.15	0.32	1	954	50	6462.707278
C3A2A	0.47	1.790164	0.15	0.32	1	605	34	2124.559881
C3A2B	0.51	2.308445	0.15	0.32	1	555	33	2567.179704
C3B1A	0.25	0.28262	0.15	0.32	0.8	107	8	45.23173143
C3B1B	0.20	0.333352	0.15	0.32	0.8	85	6	39.92065463
C3B1C	0.24	0.492359	0.15	0.32	0.4	262	11	77.75627265
C3B1D	0.25	0.452747	0.15	0.32	1	127	6	84.86241104
C3B3A	0.51	6.070774	0.15	0.32	1	598	35	7275.112165
C3B3B	0.32	2.488635	0.15	0.32	1	371	24	1847.96481
C3B3C	1.24	10.12478	0.15	0.32	1	1939	101	42443.79013
C3B3D	0.25	1.264955	0.15	0.32	1	340	21	830.0626522
C3B3E	0.23	6.266014	0.15	0.32	1	298	19	3610.932382
C4A1	0.35	0.246608	0.15	0.32	0.6	160	14	50.72971728
C4A1A	0.30	0.2645	0.15	0.32	0.9	70	9	40.11102092
C4A1B	0.27	0.197293	0.15	0.32	1	75	6	27.53437891
C4A1C	0.52	0.462687	0.15	0.32	0.6	325	25	195.8411862
C4A1D	0.06	0.087736	0.15	0.32	1	34	2	4.249600561
C4A2A	0.25	0.326168	0.15	0.32	1	208	9	101.1341927
C4A2B	0.25	0.279542	0.15	0.32	1	126	7	56.86873637
C4BA1	0.46	5.253597	0.15	0.32	1	170	12	1709.284971
C4BA2	0.11	0.488052	0.15	0.32	1	54	4	45.15696505
C4BA3	0.41	0.4217	0.15	0.32	1	195	19	191.6415054
C4BB	0.35	0.332096	0.15	0.32	1	272	22	197.3984925
C4BC	0.24	0.23921	0.15	0.32	1	173	12	78.59427332
C4BD	0.52	0.236141	0.15	0.32	1	280	27	159.9957404
C4BE	0.22	0.326778	0.15	0.32	1	170	13	111.1928693
C4BF	0.26	0.410554	0.15	0.32	1	285	13	186.5762881
C4CA	0.20	9.205443	0.15	0.32	1	169	13	3122.010587
C4CB	5.40	3.430295	0.15	0.32	1	7580	369	63744.95792
C5GA	0.27	0.978879	0.15	0.32	1	57	5	105.7808753
C5GB	0.32	9.548245	0.15	0.32	1	316	20	5851.806302
C5GC	0.11	4.690875	0.15	0.32	1	160	7	1090.889588
C5GD	0.45	1.187818	0.15	0.32	1	88	10	241.3376486
C5CA	0.30	0.619996	0.15	0.32	1	105	8	122.7298138
C5CB	0.14	0.276433	0.15	0.32	1	86	7	45.40758433
C5CC	0.34	0.333774	0.15	0.32	1	190	15	130.9574861
C5CD	0.27	0.222046	0.15	0.32	0.6	93	8	24.63998453
C5CE	0.32	2.224422	0.15	0.32	0.6	116	7	259.2296595
C5CF	0.32	0.554977	0.15	0.32	0.6	121	7	66.22248264

C5DA	1.02	7.268587	0.15	0.32	1	1616	76	23463.7611
C5DB	0.54	3.810896	0.15	0.32	1	800	42	5953.082657
C5DC	0.32	6.153385	0.15	0.32	1	425	19	4325.922933
C5EA	0.49	3.512041	0.15	0.32	1	483	28	3295.666494
C5EB	0.58	11.98917	0.15	0.32	1	596	43	16092.90048
C5EC	0.22	2.423291	0.15	0.32	1	105	7	445.1344889
C5ED	0.16	2.977416	0.15	0.32	1	118	8	629.19994
C5FA	0.52	8.408833	0.15	0.32	1	831	38	12686.91281
C5FB	0.25	0.687279	0.15	0.32	1	94	7	118.6600027
C5FC	0.22	1.141899	0.15	0.32	1	116	8	239.0117613
C5FD	0.18	6.663801	0.15	0.32	1	207	10	2185.899909
C5I1	0.24	0.526465	0.15	0.32	0.6	152	10	87.16021314
C5I1B	0.53	0.584297	0.15	0.32	0.8	281	15	228.3364976
C5I1C	0.05	0.436284	0.15	0.32	0.4	46	3	12.56394621
C5I1D	0.11	0.574245	0.15	0.32	1	82	5	76.07133384
C5I1E	0.16	0.629577	0.15	0.32	1	181	8	169.0613824
C5I2A	1.40	5.118254	0.15	0.32	1	1147	69	12918.0705
C5ICB	0.73	4.393979	0.15	0.32	1	567	35	5111.018155
							TOTAL (TONS)	286901.5584

Modified Uniform Soil Loss Equation (MUSLE) - 10-yr event								
Subbasin	Area (sq mi)	LS	K	C	P	Peak Discharge (cfs)	Flow Volume (ac-ft)	Overland Sediment Yield (tons)
C1G1A	0.22	0.508997	0.15	0.32	0.4	104	7	37.19923531
C1G1B	0.14	0.65511	0.15	0.32	0.4	88	6	39.99577014
C1G2C	0.29	2.017485	0.15	0.32	1	62	5	228.5270505
C1G2D	0.22	0.317023	0.15	0.32	1	38	3	20.50794307
C1G3B	0.73	2.632201	0.15	0.32	1	425	24	2109.113452
C1G3C	1.05	1.033341	0.15	0.32	1	571	38	1263.582321
C1G3D	0.84	2.409793	0.15	0.32	1	546	34	2700.229897
C1A	0.15	0.444188	0.15	0.32	0.4	59	4	17.27516041
C1B	0.38	0.35292	0.15	0.32	1	194	14	134.7850083
C1C	0.23	0.40757	0.15	0.32	1	74	5	50.97535795
C1D	0.40	0.438269	0.15	0.32	0.4	107	8	35.07118805
C1G2A	0.35	0.708991	0.15	0.32	0.4	103	8	55.53729974
C1G2B1	0.50	0.551874	0.15	0.32	1	67	7	78.8246334
C1G2B2	0.31	0.47974	0.15	0.32	1	71	6	64.92926899
C1G3A	0.27	9.933006	0.15	0.32	1	149	10	2710.377925
C1H	4.01	2.747359	0.15	0.32	1	2311	139	15194.85195
C1HA	0.07	0.315183	0.15	0.32	1	3	0	0
C1HB	0.15	0.359005	0.15	0.32	1	122	5	59.4087398
C1HB1	0.45	15.01031	0.15	0.32	1	114	13	4083.472261
C1HCB	0.18	0.283176	0.15	0.32	1	85	4	33.77917802
C1HD	0.07	0.804639	0.15	0.32	1	23	1	21.23896076
C1HE	0.15	1.260801	0.15	0.32	1	26	2	52.5500509
C1HF	0.09	1.921343	0.15	0.32	1	31	3	110.897084
C1NA	0.41	0.443604	0.15	0.32	0.4	315	14	88.90077064
C3A1A	0.37	0.345944	0.15	0.32	0.8	150	8	66.89627173
C3A1B	1.05	3.400003	0.15	0.32	1	520	27	3258.140239
C3A2A	0.47	1.790164	0.15	0.32	1	380	21	1250.199705
C3A2B	0.51	2.308445	0.15	0.32	1	339	20	1471.543221
C3B1A	0.25	0.28262	0.15	0.32	0.8	49	4	19.81167998
C3B1B	0.21	0.333352	0.15	0.32	0.8	37	3	16.99570655
C3B1C	0.25	0.492359	0.15	0.32	0.4	151	6	40.67228741
C3B1D	0.25	0.452747	0.15	0.32	1	48	2	26.60066372
C3B3A	0.51	6.070774	0.15	0.32	1	359	21	4106.810104
C3B3B	0.00	2.488635	0.15	0.32	1	231	15	1089.330907
C3B3C	1.24	10.12478	0.15	0.32	1	1246	63	25437.32434
C3B3D	0.25	1.264955	0.15	0.32	1	220	13	497.2844208
C3B3E	0.42	6.266014	0.15	0.32	1	195	13	2302.416512
C4A1	0.35	0.246608	0.15	0.32	0.6	81	7	23.50336606
C4A1A	0.30	0.2645	0.15	0.32	0.9	34	5	19.26124716
C4A1B	0.28	0.197293	0.15	0.32	1	27	2	8.39879116
C4A1C	0.52	0.462687	0.15	0.32	0.6	175	14	100.0773855
C4A1D	0.06	0.087736	0.15	0.32	1	17	1	1.955214978
C4A2A	0.25	0.326168	0.15	0.32	1	102	4	43.08999371
C4A2B	0.25	0.279542	0.15	0.32	1	56	3	22.46903229
C4BA1	0.46	5.253597	0.15	0.32	1	69	6	699.7481699
C4BA2	0.11	0.488052	0.15	0.32	1	23	2	18.99218932
C4BA3	0.41	0.4217	0.15	0.32	1	101	10	92.55249785
C4BB	0.35	0.332096	0.15	0.32	1	166	13	111.5057725
C4BC	0.24	0.23921	0.15	0.32	1	96	7	41.78980842
C4BD	0.52	0.236141	0.15	0.32	1	156	15	82.965416
C4BE	0.22	0.326778	0.15	0.32	1	99	8	62.58977143
C4BF	0.28	0.410554	0.15	0.32	1	158	7	94.80645784
C4CA	0.14	9.205443	0.15	0.32	1	101	8	1783.035137
C4CB	5.41	3.430295	0.15	0.32	1	4634	220	36223.332
C5GA	0.27	0.978879	0.15	0.32	1	17	2	32.16045824
C5GB	0.33	9.548245	0.15	0.32	1	182	12	3227.526773
C5GC	0.11	4.690875	0.15	0.32	1	97	4	602.5102923
C5GD	0.45	1.187818	0.15	0.32	1	29	4	77.5909831
C5CA	0.30	0.619996	0.15	0.32	1	40	3	41.27576896
C5CB	0.14	0.276433	0.15	0.32	1	47	4	23.66370587

C5CC	0.34	0.333774	0.15	0.32	1	99	8	63.92979468
C5CD	0.27	0.222046	0.15	0.32	0.6	39	4	10.2732856
C5CE	0.32	2.224422	0.15	0.32	0.6	37	3	85.05780696
C5CF	0.32	0.554977	0.15	0.32	0.6	34	3	20.23982926
C5DA	1.02	7.268587	0.15	0.32	1	1009	46	13606.24528
C5DB	0.54	3.810896	0.15	0.32	1	511	26	3540.729067
C5DC	0.32	6.153385	0.15	0.32	1	251	11	2371.789535
C5EA	0.49	3.512041	0.15	0.32	1	278	16	1768.058546
C5EB	0.58	11.98917	0.15	0.32	1	379	27	9624.003021
C5EC	0.23	2.423291	0.15	0.32	1	41	3	163.575101
C5ED	0.16	2.977416	0.15	0.32	1	61	4	294.9461003
C5FA	0.52	8.408833	0.15	0.32	1	529	24	7616.475328
C5FB	0.25	0.687279	0.15	0.32	1	34	3	41.77475868
C5FC	0.22	1.141899	0.15	0.32	1	50	4	101.1973647
C5FD	0.18	6.663801	0.15	0.32	1	122	6	1221.273923
C5I1	0.69	0.526465	0.15	0.32	0.6	73	5	39.20756566
C5I1B	0.53	0.584297	0.15	0.32	0.8	109	7	87.68038179
C5I1C	0.58	0.436284	0.15	0.32	0.4	25	2	7.115689394
C5I1D	0.12	0.574245	0.15	0.32	1	41	3	38.76224604
C5I1E	0.16	0.629577	0.15	0.32	1	99	4	81.79435374
C5I2A	1.40	5.118254	0.15	0.32	1	618	37	6445.151896
C5ICB	0.73	4.393979	0.15	0.32	1	297	19	2527.367718
							TOTAL (TONS)	161967.5054

Modified Uniform Soil Loss Equation (MUSLE) - 5-yr event								
Subbasin	Area (sq mi)	LS	K	C	P	Peak Discharge (cfs)	Flow Volume (ac ft)	Overland Sediment Yield (tons)
C1G1A	0.22	0.508997	0.15	0.32	0.4	59	4	19.79571358
C1G1B	0.14	0.65511	0.15	0.32	0.4	54	4	24.24561294
C1G2C	0.29	2.017485	0.15	0.32	1	26	2	84.08856444
C1G2D	0.22	0.317023	0.15	0.32	1	13	1	6.079441218
C1G3B	0.73	2.632201	0.15	0.32	1	247	14	1150.86886
C1G3C	1.05	1.033341	0.15	0.32	1	331	23	702.8777101
C1G3D	0.84	2.409793	0.15	0.32	1	330	20	1513.175399
C1A	0.15	0.444188	0.15	0.32	0.4	32	2	8.318636601
C1B	0.38	0.35292	0.15	0.32	1	116	8	73.86994705
C1C	0.23	0.40757	0.15	0.32	1	36	3	25.57906242
C1D	0.40	0.438269	0.15	0.32	0.4	48	4	15.18496719
C1G2A	0.35	0.708991	0.15	0.32	0.4	49	4	24.85014468
C1G2B1	0.50	0.551874	0.15	0.32	1	25	3	28.2383603
C1G2B2	0.31	0.47974	0.15	0.32	1	31	3	27.68991286
C1G3A	0.27	9.933006	0.15	0.32	1	86	6	1496.681444
C1H	4.01	2.747359	0.15	0.32	1	1350	82	8367.637988
C1HA	0.07	0.315183	0.15	0.32	1	1	0	0
C1HB	0.15	0.359005	0.15	0.32	1	73	3	33.47451834
C1HB1	0.45	15.01031	0.15	0.32	1	60	7	2015.460163
C1HCB	0.18	0.283176	0.15	0.32	1	40	2	15.02281352
C1HD	0.07	0.804639	0.15	0.32	1	10	1	13.32188482
C1HE	0.15	1.260801	0.15	0.32	1	8	1	18.42220714
C1HF	0.09	1.921343	0.15	0.32	1	15	1	39.91910362
C1NA	0.41	0.443604	0.15	0.32	0.4	184	8	48.08928159
C3A1A	0.37	0.345944	0.15	0.32	0.8	72	4	30.0829353
C3A1B	1.05	3.400003	0.15	0.32	1	269	15	1620.752033
C3A2A	0.47	1.790164	0.15	0.32	1	239	13	737.1720742
C3A2B	0.51	2.308445	0.15	0.32	1	205	12	834.0806647
C3B1A	0.25	0.28262	0.15	0.32	0.8	21	2	8.361371252
C3B1B	0.21	0.333352	0.15	0.32	0.8	14	1	5.330771359
C3B1C	0.25	0.492359	0.15	0.32	0.4	85	4	23.49281186
C3B1D	0.25	0.452747	0.15	0.32	1	11	1	7.906795131
C3B3A	0.51	6.070774	0.15	0.32	1	216	12	2258.627045
C3B3B	0.00	2.488635	0.15	0.32	1	143	9	625.5902887
C3B3C	1.24	10.12478	0.15	0.32	1	805	40	15443.64835
C3B3D	0.25	1.264955	0.15	0.32	1	144	9	319.2263086
C3B3E	0.42	6.266014	0.15	0.32	1	130	8	1397.960503
C4A1	0.35	0.246608	0.15	0.32	0.6	38	4	11.24490941
C4A1A	0.30	0.2645	0.15	0.32	0.9	15	2	7.291567673
C4A1B	0.28	0.197293	0.15	0.32	1	7	1	2.675045537
C4A1C	0.66	0.462687	0.15	0.32	0.6	93	7	47.64400894
C4A1D	0.06	0.087736	0.15	0.32	1	7	1	1.189591965
C4A2A	0.25	0.326168	0.15	0.32	1	43	2	18.0188003
C4A2B	0.25	0.279542	0.15	0.32	1	20	1	6.823197907
C4BA1	0.46	5.253597	0.15	0.32	1	23	2	204.4400441
C4BA2	0.11	0.488052	0.15	0.32	1	8	1	7.131174074
C4BA3	0.41	0.4217	0.15	0.32	1	48	5	41.38914645
C4BB	0.35	0.332096	0.15	0.32	1	101	8	64.32486837
C4BC	0.24	0.23921	0.15	0.32	1	51	4	21.4356413
C4BD	0.52	0.236141	0.15	0.32	1	83	8	40.9779605
C4BE	0.22	0.326778	0.15	0.32	1	58	5	35.65825962
C4BF	0.28	0.410554	0.15	0.32	1	83	4	48.32505718
C4CA	0.14	9.205443	0.15	0.32	1	61	5	1033.278635
C4CB	5.41	3.430295	0.15	0.32	1	2816	132	20587.89783
C5GA	0.27	0.978879	0.15	0.32	1	5	1	10.99302554
C5GB	0.33	9.548245	0.15	0.32	1	103	7	1735.130431
C5GC	0.11	4.690875	0.15	0.32	1	58	2	306.4186379
C5GD	0.45	1.187818	0.15	0.32	1	10	1	19.6659432
C5CA	0.30	0.619996	0.15	0.32	1	12	1	11.36829076
C5CB	0.14	0.276433	0.15	0.32	1	24	2	11.01664756

C5CC	0.34	0.333774	0.15	0.32	1	47	4	28.57232646
C5CD	0.27	0.222046	0.15	0.32	0.6	14	2	3.926160817
C5CE	0.32	2.224422	0.15	0.32	0.6	9	1	20.83095201
C5CF	0.32	0.554977	0.15	0.32	0.6	9	1	5.197165582
C5DA	1.02	7.268587	0.15	0.32	1	629	28	7908.019216
C5DB	0.54	3.810896	0.15	0.32	1	328	16	2104.691563
C5DC	0.32	6.153385	0.15	0.32	1	145	6	1242.252108
C5EA	0.49	3.512041	0.15	0.32	1	156	9	926.93642
C5EB	0.58	11.98917	0.15	0.32	1	243	17	5790.885718
C5EC	0.23	2.423291	0.15	0.32	1	13	1	46.47063554
C5ED	0.16	2.977416	0.15	0.32	1	31	2	136.9442185
C5FA	0.52	8.408833	0.15	0.32	1	338	15	4555.174568
C5FB	0.25	0.687279	0.15	0.32	1	9	1	10.72688584
C5FC	0.22	1.141899	0.15	0.32	1	18	2	38.73662739
C5FD	0.18	6.663801	0.15	0.32	1	70	3	606.9175325
C5I1	0.69	0.526465	0.15	0.32	0.6	32	2	14.78926735
C5I1B	0.53	0.584297	0.15	0.32	0.8	33	3	27.94115792
C5I1C	0.58	0.436284	0.15	0.32	0.4	13	1	3.34658652
C5I1D	0.12	0.574245	0.15	0.32	1	18	1	13.2134028
C5I1E	0.16	0.629577	0.15	0.32	1	51	2	38.26750234
C5I2A	1.40	5.118254	0.15	0.32	1	314	20	3125.676632
C5ICB	0.73	4.393979	0.15	0.32	1	144	10	1176.266697
							TOTAL (TONS)	91165.24574

Modified Uniform Soil Loss Equation (MUSLE) - 2-yr event								
Subbasin	Area (sq mi)	LS	K	C	P	Peak Discharge (cfs)	Flow Volume (ac-ft)	Overland Sediment Yield (tons)
C1G1A	0.22	0.508997	0.15	0.32	0.4	12	1	3.73320585
C1G1B	0.14	0.65511	0.15	0.32	0.4	15	1	5.444401842
C1G2C	0.29	2.017485	0.15	0.32	1	2	0	0
C1G2D	0.22	0.317023	0.15	0.32	1	1	0	0
C1G3B	0.73	2.632201	0.15	0.32	1	49	3	196.3276883
C1G3C	1.05	1.033341	0.15	0.32	1	76	6	145.2876898
C1G3D	0.84	2.409793	0.15	0.32	1	82	6	353.5453468
C1A	0.14	0.444188	0.15	0.32	0.4	6	1	2.209815764
C1B	0.38	0.35292	0.15	0.32	1	1	0	0
C1C	0.23	0.40757	0.15	0.32	1	4	0	0
C1D	0.40	0.438269	0.15	0.32	0.4	5	0	0
C1G2A	0.35	0.708991	0.15	0.32	0.4	5	1	3.184848103
C1G2B1	0.50	0.551874	0.15	0.32	1	1	0	0
C1G2B2	0.31	0.47974	0.15	0.32	1	3	0	0
C1G3A	0.27	9.933006	0.15	0.32	1	19	1	235.5849582
C1H	4.00	2.747359	0.15	0.32	1	279	21	1613.843339
C1HA	0.07	0.315183	0.15	0.32	1	0	0	0
C1HB	0.15	0.359005	0.15	0.32	1	18	1	8.260726343
C1HB1	0.45	15.01031	0.15	0.32	1	9	1	234.2774137
C1HCB	0.18	0.283176	0.15	0.32	1	3	0	0
C1HD	0.07	0.804639	0.15	0.32	1	1	0	0
C1HE	0.15	1.260801	0.15	0.32	1	0	0	0
C1HF	0.09	1.921343	0.15	0.32	1	2	0	0
C1NA	0.41	0.443604	0.15	0.32	0.4	38	2	9.146933618
C3A1A	0.37	0.345944	0.15	0.32	0.8	6	1	3.442112946
C3A1B	1.05	3.400003	0.15	0.32	1	31	3	196.2432124
C3A2A	0.47	1.790164	0.15	0.32	1	72	4	194.5886774
C3A2B	0.51	2.308445	0.15	0.32	1	52	3	178.0058064
C3B1A	0.25	0.28262	0.15	0.32	0.8	2	0	0
C3B1B	0.20	0.333352	0.15	0.32	0.8	1	0	0
C3B1C	0.24	0.492359	0.15	0.32	0.4	13	1	3.776722576
C3B1D	0.25	0.452747	0.15	0.32	1	0	0	0
C3B3A	0.51	6.070774	0.15	0.32	1	56	3	487.9576413
C3B3B	0.32	2.488635	0.15	0.32	1	41	3	167.985917
C3B3C	1.24	10.12478	0.15	0.32	1	264	13	4408.157391
C3B3D	0.25	1.264955	0.15	0.32	1	49	3	94.34906106
C3B3E	0.23	6.266014	0.15	0.32	1	47	3	456.582156
C4A1	0.35	0.246608	0.15	0.32	0.6	4	0	0
C4A1A	0.30	0.2645	0.15	0.32	0.9	2	0	0
C4A1B	0.27	0.197293	0.15	0.32	1	0	0	0
C4A1C	0.52	0.462687	0.15	0.32	0.6	13	1	5.323671155
C4A1D	0.06	0.087736	0.15	0.32	1	1	0	0
C4A2A	0.25	0.326168	0.15	0.32	1	3	0	0
C4A2B	0.25	0.279542	0.15	0.32	1	1	0	0

C4BA1	0.46	5.253597	0.15	0.32	1	1	0	0
C4BA2	0.11	0.488052	0.15	0.32	1	0	0	0
C4BA3	0.41	0.4217	0.15	0.32	1	6	1	5.24484762
C4BB	0.35	0.332096	0.15	0.32	1	26	2	13.84173137
C4BC	0.24	0.23921	0.15	0.32	1	7	1	3.243384894
C4BD	0.52	0.236141	0.15	0.32	1	13	2	6.676076275
C4BE	0.22	0.326778	0.15	0.32	1	13	1	6.266507174
C4BF	0.26	0.410554	0.15	0.32	1	8	1	5.998814636
C4CA	0.20	9.205443	0.15	0.32	1	15	1	191.2584556
C4CB	5.40	3.430295	0.15	0.32	1	710	36	4597.591638
C5GA	0.27	0.978879	0.15	0.32	1	0	0	0
C5GB	0.32	9.548245	0.15	0.32	1	20	2	343.5911536
C5GC	0.11	4.690875	0.15	0.32	1	14	1	93.76708257
C5GD	0.45	1.187818	0.15	0.32	1	0	0	0
C5CA	0.30	0.619996	0.15	0.32	1	0	0	0
C5CB	0.14	0.276433	0.15	0.32	1	3	0	0
C5CC	0.34	0.333774	0.15	0.32	1	5	1	3.748352367
C5CD	0.27	0.222046	0.15	0.32	0.6	1	0	0
C5CE	0.32	2.224422	0.15	0.32	0.6	0	0	0
C5CF	0.32	0.554977	0.15	0.32	0.6	0	0	0
C5DA	1.02	7.268587	0.15	0.32	1	179	8	1939.737434
C5DB	0.54	3.810896	0.15	0.32	1	105	5	579.8038933
C5DC	0.32	6.153385	0.15	0.32	1	28	1	181.3374308
C5EA	0.49	3.512041	0.15	0.32	1	25	2	143.2015004
C5EB	0.58	11.98917	0.15	0.32	1	77	6	1698.062188
C5EC	0.22	2.423291	0.15	0.32	1	0	0	0
C5ED	0.16	2.977416	0.15	0.32	1	3	0	0
C5FA	0.52	8.408833	0.15	0.32	1	106	5	1286.160166
C5FB	0.25	0.687279	0.15	0.32	1	0	0	0
C5FC	0.22	1.141899	0.15	0.32	1	1	0	0
C5FD	0.18	6.663801	0.15	0.32	1	13	1	127.7894955
C5I1	0.24	0.526465	0.15	0.32	0.6	3	0	0
C5I1B	0.53	0.584297	0.15	0.32	0.8	1	0	0
C5I1C	0.05	0.436284	0.15	0.32	0.4	2	0	0
C5I1D	0.11	0.574245	0.15	0.32	1	2	0	0
C5I1E	0.16	0.629577	0.15	0.32	1	4	0	0
C5I2A	1.40	5.118254	0.15	0.32	1	35	3	316.1932926
C5ICB	0.73	4.393979	0.15	0.32	1	14	2	129.4885308
							TOTAL (TONS)	20680.26071

morphology given by Li, Simons, and Stevens (*9*).

$$D = 100\left(\frac{K_1 K_2 \nu}{8g}\right) \frac{i \times S_o^2}{d_{84}^3} \quad [16]$$

where D is the rill density in percent area; K_1 is the parameter describing boundary roughness; K_2 is a constant depending on angle of friction and lift to drag ratio of sediment particle; ν is the kinematic viscosity; g is the gravitational acceleration; i is the rainfall intensity; d_{84} is the size of sediment on the bed of which 84 percent is finer by weight.

According to Meyer and associates (*10*) the extent of rilling and type of rill pattern that develops on sloping land depends on soil properties, slope steepness, and runoff rate. They also suggested that the rill density increases as slope steepness increases, runoff rate increases, and particle size decreases (increase soil erodibility). Equation 16 reflects all of these phenomena. It shows that rill density is directly proportional to flow rate and slope steepness, but is inversely proportional to particle size. A further study to validate equation is necessary.

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Determining the universal soil loss equation's length-slope factor for watersheds

J. R. Williams and H. D. Berndt

Techniques for determining the average slope length and gradient of a watershed were developed for use in calculating the length-slope (LS) factor of the universal soil loss equation (USLE) (*7*). The LS factor is one of the most important factors in the USLE because it accounts for more variation in gross erosion than any other factor, except possibly the cropping-management factor. Little research has been done to develop methods for determining slope length and gradient because the USLE was designed for use on field-size areas. For these relatively small areas with simple topography, LS can be determined practically by rapid survey methods. Field surveys are not practical for watershed planning because the areas are usually large with complex topography. Usually, sample areas of a watershed are surveyed. Soils maps are often used to determine the average watershed slope length and gradient. This method can cause considerable error in calculating LS. The LS is particularly sensitive to errors in measuring average slope because these errors are magnified in calculating LS for slopes above about 3 percent. Errors in measuring the average slope length are not as critical because they are reduced by half or more in calculating LS.

The slope length and gradient can be measured quickly and accurately from USGS topographic maps. We investigated three methods, two existing (*1, 4*) and one new, for measuring the average watershed slope and two methods one existing (*3*) and one new, for measuring the slope length. These techniques were tested on 53 watersheds, located in Texas, Oklahoma, Idaho, Mississippi, Tennessee, and North Carolina. The average watershed slopes ranged from 1.5 to 47 percent. Their lengths ranged from 24 to 150 meters (80-500 ft). Their areas ranged from 1.3 to 54.4 square kilometers (0.5-21 mi^2).

Determining Average Watershed Slope

Accurately estimating average watershed slope is essential in calculating LS for sediment yield prediction. Besides being accurate, procedures for

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measuring average watershed slope must be rapid. This is particularly true in Soil Conservation Service (SCS) watershed planning because sediment yield is predicted for many complex watersheds that drain into reservoir sites.

Contour-Length Method

The contour-length method, used by Horton (*1*) and described in detail by Wisler and Brater (*8*), was suggested by Williams and Berndt (*6*) for determining average watershed slope to use in calculating LS. Average slope between each contour is computed by

$$S_i = [H\ (LC_j + LC_{j+1})/2DA_i] \times 100 \quad [1]$$

where S_i is the average percent slope for area i, between contours j and j+1; H is the difference in elevation between contours; LC_j is the length of contour j; and DA_i is the drainage area between contours j and j+1.

Average watershed slope is computed by weighting the slopes between contours according to the area between contours:

$$S = (\sum_{i=1}^{n} S_i \times DA_i)/DA \quad [2]$$

where S is the average percent slope of the watershed; DA is the drainage area of the watershed, and n is the number of areas between contours within a watershed. The DA_i term is canceled when equations 1 and 2 are combined to yield:

$$S = H[1/2(LC_1 + LC_{n+1}) + \sum_{i=2}^{n} LC_i]/DA \quad [3]$$

Equation 3 is much easier to use because only the contour lengths and total drainage area are needed. However, on large steep watersheds there may be 100 or more contours to measure. This laborious task can be reduced greatly with little loss of accuracy. Three contours located at 25, 50 and 75 percent of the total watershed relief are usually adequate to determine the slope. By assuming the lowest and highest contours have zero length, equation 3 becomes

$$S = .25\ \mathcal{H}\ (LC_{25} + LC_{50} + LC_{75})/DA \quad [4]$$

where $\mathcal{H}$ is total watershed height, and LC_{25}, LC_{50}, LC_{75} is contour length at 25, 50, and 75 percent of $\mathcal{H}$.

Grid-Contour Method

A grid-contour method was described by Linsley and associates (*4*). The length of each grid line within the watershed is measured, and the contours crossing or tangent to the line are counted. The land slope in any direction is computed by the equation:

$$S_d = N_d H/D_d \quad [5]$$

where N_d is total number of contour crossings for all lines in one direction, and D_d is total length of lines in that direction. The average watershed slope can be determined by computing the slope in both grid directions with equation 5 and calculating the resultant:

$$S = \sqrt{S_L^2 + S_w^2} \quad [6]$$

where S_L is the average percent slope of the watershed along its length, and S_w is the average percent slope of the watershed along its width. The grid is placed on the watershed so that one direction is parallel to a line (direction line) from the watershed outlet to the highest elevation in the watershed. The maximum watershed width (distance between two lines that are parallel to the direction line and tangent to the watershed boundary) is divided by four to determine the grid spacing. Thus, three lines are placed along the length of the watershed. Lines perpendicular to these three lines are placed across the watershed according to the grid interval.

Grid-Function Method

The grid-function technique uses a mathematical function fitted to each line of a grid. A third order natural spline function (*5*) was chosen to fit points defined by distances and elevations of contours that crossed a grid line. The spline function is designed to pass through each data point along the grid line and to be continuous in first and second derivatives. Slope in the direction of the line is determined by differentiating the spline function at each grid line intersection. The actual slope at each grid intersection is the resultant of the slopes in both directions. Average watershed slope is the mean of all grid intersection slopes.

Determining Average Watershed Slope Length

Accurate and rapid methods are also needed for determining average watershed slope length, although in calculating LS, slope length is less important than slope gradient.

Drainage Density Method

The drainage density of a watershed is determined by dividing the total length of all channels by the watershed area. Horton (*3*) showed that the average overland flow length in a watershed can be estimated by half of the reciprocal of the drainage density. Williams and Berndt (*6*) suggested that the average overland flow length is equivalent to the average slope length. Thus, λ was computed by the equation:

$$\lambda = 0.5\ DA/LCH \quad [7]$$

where LCH is the total length of channels in a watershed. Equation 7 underestimates slope length, because overland flow is assumed to be perpendicular to the channel, that is the channel slope is zero. Horton (*3*) attempted to account for the channel slope by considering a ratio of channel to land slope. Horton's adjustment yields:

$$\lambda = \frac{0.5\ DA}{LCH\ \sqrt{1 - S_c/S_g}} \quad [8]$$

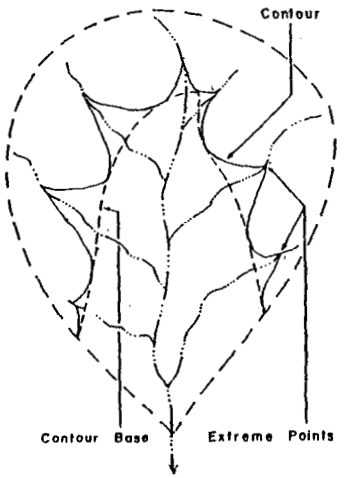


Figure 1. Example watershed showing contour extreme points and base.

where S_c is the channel slope, and S_g is the average ground slope in the area.

Equation 8 is only an approximation of λ and requires knowledge of channel slopes. This method is time-consuming and subject to considerable measurement error because of meandering channels. Also, various values of λ can be obtained for the same watershed, depending upon the map scale and how the measurer defines a channel.

Contour-Extreme Point Method

The average watershed slope length can be computed by considering contour length and number of extreme points on the contour. When a channel crosses a contour, the contour comes to a point generally in the direction of the watershed divide (Figure 1). Because these points are local maximums in an uphill direction, they are called extreme points.

The average watershed slope length can be approximated by dividing the contour length by twice the number of extreme points.

$$\lambda = LC/2EP \qquad [9]$$

where EP is the number of extreme points on the contours, and LC is the total length of all contours. Equation 9 computes the correct slope length if the land slope is about 1.4 times as great as the channel slope. Figure 2 shows a simple watershed made of two planes with 14 percent land slopes and 10 percent channel slope. Because the slopes along and across the watershed are equal, the contour intersects the channel at a 45° angle. The slope length vector also intersects the channel at a 45° angle because it is perpendicular to the contour. Because there is one extreme point, $\lambda = LC/2$. This is obviously correct because λ and LC/2 cross half the watershed at a 45° angle. For any other angle, equation 9 is incorrect.

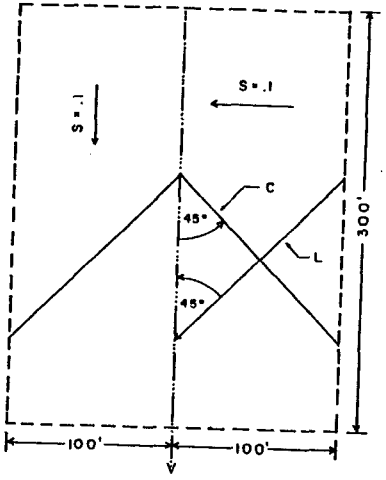


Figure 2. Watershed made of two planes sloping 10 percent toward the channel and 10 percent along the channel.

The correct slope length can be computed for any combination of watershed and channel slopes on a linear surface, like that shown in figure 2. The same watershed is shown in figure 3, but the channel and land slopes vary according to the contour angle β. The line C is half of the contour length, and W/2 is half of the watershed width. The slope length, λ, is expressed as

$$\lambda = \frac{W/2}{\cos \beta} \qquad [10]$$

To obtain λ in terms of watershed width and contour length, $\cos \beta$ is replaced by:

$$\cos \beta = (Y/C) = [\sqrt{C^2 - (W/2)^2}]/C$$

Thus, equation 10 becomes:

$$\lambda = W\,C/[2\sqrt{C^2 - (W/2)^2}] \qquad [11]$$

This is appropriate for a single extreme point.

For use on a complete contour, the contour length, LC, must be measured and divided by twice the number of extreme points. Also, the length around the base of the contour, LB (Figure 1), must be measured and divided by twice the number of extreme points. Thus W/2 = LB/2EP and C = LC/2EP. Substituting these variables into equation 11 yields the equation:

$$\lambda = \frac{\frac{LC}{2EP} \times \frac{LB}{2EP}}{\sqrt{\left(\frac{LC}{2EP}\right)^2 - \left(\frac{LB}{2EP}\right)^2}} \qquad [12]$$

Finally, the equation for real watersheds is:

$$\lambda = \frac{(LC \times LB)}{(2EP\sqrt{LC^2 - LB^2})} \qquad [13]$$

Discussion

Comparing Techniques

The contour-length method (Equation 3) is accurate, but laborious, when all contours are considered. Little accuracy is lost when only three contours are considered (Equation 4), and the method is more rapid. The grid-contour method is also accurate and rapid. To show that all three methods agree closely, we used linear regression to relate slopes computed with equation 4 to those computed with equation 3 and the grid-contour method. Slopes computed with 3 and 4 for 19 watersheds related with a regression coefficient of 0.98, R^2 of 0.99, and a standard error of 5 percent of the mean. Slopes computed with 4 for 29 watersheds related to those of the grid-contour method with a regression coefficient of 1.01, R^2 of 0.99, and a standard error of 10 percent of the mean.

The grid-function method is accurate, but more laborious than either the contour-length or the grid-contour methods. Also, a computer is required to fit the spline function to the grid lines. However, the grid function method has one advantage over the other methods. It provides a slope-frequency distribution. Because the slope is determined at every grid intersection, these points can be used to plot the slope-frequency distribution. Future refinements in sediment yield prediction for watersheds may include the use of the slope-frequency distribution, as well as average

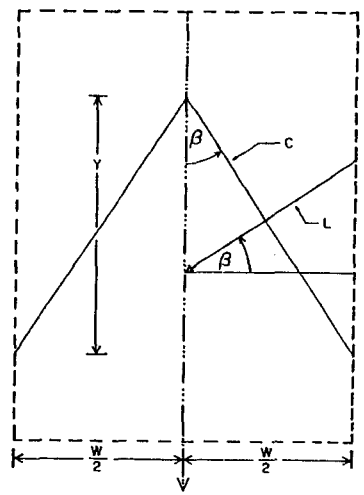


Figure 3. Watershed made of two planes with slopes varying according to contour angle β.

slope. To demonstrate the importance of the slope frequency distribution, figure 4 shows distributions for two watersheds with the same average slope. However, watershed A may have greater erosion potential because it has much steeper slopes in some areas.

Of course the erosion potential also depends upon the location of the steep slopes within the watershed.

The contour-extreme point method for determining the average watershed slope length is faster, more accurate, and less subjective than the drainage density method. There are two important reasons why the contour-extreme point method is more accurate. First, Equation 13 accounts for differences in channel and land slope, and equation 7 and 8 do not. For example, the watershed, shown in figure 2, has a slope length of 43.1 meters (141.4 ft) but equation 7 yields a value of 30.5 meters (100 ft) and equation 8 yields a value of 56.4 meters (185 ft). Other combinations of channel and land slope for the watershed shown in figure 2 were assumed and their slope lengths were computed using equation 7 and 8 and compared with the actual slope length (Table 1).

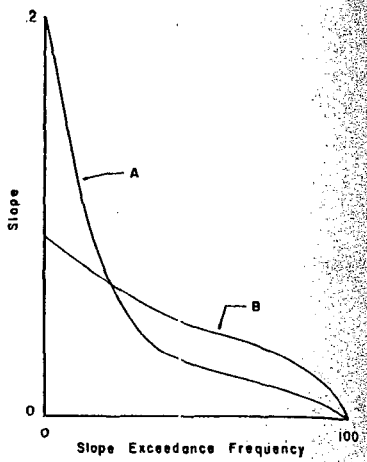


Figure 4. Slope exceedance frequency distributions for two watersheds with the same average slope.

Second, the contour-extreme point method is more accurate than the drainage-density method because the extreme points are easier to define on a topographic map than are channels. Usually only well-defined channels are shown on the map, and it is difficult to determine how far to extend the channels. If only the well-defined channels are considered, the slope length is usually overestimated. The estimate can be improved by extending the channels through contour extreme points to the watershed divide.

The contour-extreme point method is more efficient than the drainage-density method because only three contours, well-distributed across a watershed, are needed to compute the slope length. Slope lengths determined for 12 watersheds with three contours and with all contours were related by linear regression. The regression coefficient was 0.96, R^2 was 0.96, and the standard error was 8 percent of the mean. If the slope has been determined with the modified contour length method (Equation 4), the contour-extreme point method is rapid to use because the same three contours can be used for both determinations.

An advantage of the drainage-density method is that it can be used with areal photographs when topographic maps are not available.

Importance of Slope Length and Gradient in the USLE

The equation for computing LS for the USLE (7) can be written

$$LS = (\lambda/72.6)^M(0.065 + 0.0454S + 0.0065S^2) \quad [14]$$

where M is 0.5 for slopes greater than 3 percent and 0.3 for flatter slopes.[1] To show the importance of λ and S in equation 14, the partial derivatives were obtained.

$$\frac{\partial LS}{\partial \lambda} = M(\lambda/72.6)^{M-1}(0.065 + 0.0454S + 0.0065S^2)/72.6 \quad [15]$$

$$\frac{\partial LS}{\partial S} = (\lambda/72.6)^M(0.0454 + 0.013S) \quad [16]$$

The percent error in LS, caused by an error in determining λ, can be computed by multiplying the partial derivative by the error in λ and dividing by LS.

$$PERLS_\lambda = \frac{ER\ \lambda \times \frac{\partial LS}{\partial \lambda} \times 100}{LS} \quad [17]$$

where $PERLS_\lambda$ is percent error in LS caused by error in λ and ER is magnitude of error in determining λ. Similarly for S

$$PERLS_S = \frac{ERS \times \frac{\partial LS}{\partial S} \times 100}{LS} \quad [18]$$

where $PERLS_S$ is percent error in LS caused by error in S and ERS is magnitude of error in determining S.

The magnitude of the errors in determining λ and S can be expressed as percent error times the values of λ and S.

$$ER = PER_\lambda \times \lambda$$

$$ERS = PER_S \times S$$

where PER_λ is percent error in determining λ, and PER_S is percent error in determining S.

Substituting equation 14 and 15 into equation 17 yields

$$PERLS_\lambda = \frac{PER\lambda \times \lambda \times M(\lambda/72.6)^{M-1}\ (0.065 + 0.0454S + 0.0065S^2)}{72.6\ (\lambda/72.6)^M\ (0.065 + 0.0454S + 0.0065S^2)} \quad [19]$$

Equation 19 reduces to

$$PERLS_\lambda = PER_\lambda \times M \quad [20]$$

[1] 72.6 is the unit plot length in feet. If λ is in metric units, use 22.1 meters in place of 72.6 feet.

Table 1. Slope lengths computed by the drainage density method compared to actual slope lengths for various channel and land slopes.

Slope		Slope Length		
			Drainage Density Method	
Land	Channel	Actual	Equation 7	Equation 8
(%)		ft		
10.05	10	1,005	100	1,420
14.14	10	141.4	100	185
22.36	10	111.8	100	134.5
30	1	100.1	100	101.7

Thus, the percent error in LS, caused by error in measuring λ, depends upon M. Because the largest value of M is 0.5, all errors in LS caused by errors in λ are decreased 50 percent or more. Substituting equation 14 and 16 into equation 18 reduces similarly to

$$PERLS_S = \frac{PER_S\ (0.0454S + 0.013S^2)}{0.065 + 0.0454S + 0.0065S^2} \quad [21]$$

Thus, the percent error in LS caused by error in measuring S is dependent upon S. For slopes less than 3.16 percent $PERLS_S$ is less than PER_S. This can be shown by noting that $PERLS_S = PER_S$ when

$$0.013S^2 = 0.0065S^2 + 0.065$$

or

$$S = 3.16$$

$PERLS_S$ is greater than PER_S for slopes greater than 3.16 percent. For example, $PERLS_S$ is 1.8 times greater than PER_S for 30 percent slopes. Thus, accurate estimates are much more important for percent slope than for slope length, especially for steep slopes.

Summary

We modified two methods for determining average watershed slope and developed a new method. The contour-length method is an accurate and reliable technique, but it is laborious when all contours are considered. Modifying the method to consider only three contours greatly increased efficiency with little loss of accuracy. The grid-contour method was also modified to compute the average watershed slope by taking the resultant of the average slopes of the length and width grid lines. Three grid lines along the watershed length dictate a grid spacing that provides enough data for efficient and accurate slope determination with the grid-contour method. The grid-function method, developed here, is accurate but more laborious than the other two methods and it is computer dependent. However, its one advantage over the other methods is that it provides a slope-frequency distribution. Future refinements in sediment yield prediction may include the use of the slope frequency distribution.

We also investigated a method for determining the average watershed slope length and developed a new method. The new technique, the contour-extreme point method, is faster, more accurate, and less subjective than the drainage-density method. Because only three contours are needed to determine the slope length with the contour-extreme point method, it is very efficient when used with the modified contour-length method for determining slope (the same contours are used for both methods). One advantage of the drainage density method is that it can be used with aerial photographs, if topographic maps are not available.

It is much more important to accurately estimate slope gradient than length in applying the USLE. Errors in determining slope are magnified in calculating LS for slopes greater than 3.16 percent. Errors in determining slope length are decreased by 50 percent or more in calculating LS.

The modified contour-length, contour-grid, and contour-extreme point methods should be useful in predicting gross erosion for watersheds using the USLE. Future needs for slope frequency distributions may require the grid-function method.

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*************************************************     ***********************************
*  SCOUR AND DEPOSITION IN RIVERS AND RESERVOIRS  *     *  U.S. ARMY CORPS OF ENGINEERS   *
*       Version: 4.1.00 -  OCTOBER 1993           *     *  HYDROLOGIC ENGINEERING CENTER  *
*  INPUT FILE:  Reach_2c.dat                      *     *  609 SECOND STREET              *
*  OUTPUT FILE: Reach_2c.out                      *     *  DAVIS, CALIFORNIA 95616-4687   *
*  RUN DATE: 29 AUG 02    RUN TIME: 16:29:40      *     *  (916) 756-1104                 *
*************************************************     ***********************************

                     X     X  XXXXXXX   XXXXX           XXXXX
                     X     X  X        X     X         X     X
                     X     X  X        X               X
                     XXXXXXX  XXXX     X        XXXXX  XXXXXX
                     X     X  X        X               X     X
                     X     X  X        X     X         X     X
                     X     X  XXXXXXX   XXXXX           XXXXX

        ***************************************************************************
        *  MAXIMUM LIMITS FOR THIS VERSION ARE:                                   *
        *       10  Stream Segments (Main Stem + Tributaries)                     *
        *      150  Cross Sections                                                *
        *      100  Elevation/Station Points per Cross Section                    *
        *       20  Grain Sizes                                                   *
        *       10  Control Points                                                *
        ***************************************************************************

T1      C-1 SYSTEM FIS RESTUDY
T2      SEDIMENT TRANSPORT ANALYSIS - REACH 2B
T3      CARTER & BURGESS  JULY, 2002

N values...  Left    Channel    Right     Contraction     Expansion
             .0300     .0300     .0300        1.1000        .7000

SECTION NO.     14.000
...DEPTH of the Bed Sediment Control Volume =      .00 ft.

SECTION NO.     15.000
...DEPTH of the Bed Sediment Control Volume =      .00 ft.

SECTION NO.     16.000
...DEPTH of the Bed Sediment Control Volume =      .00 ft.

SECTION NO.     17.000
...DEPTH of the Bed Sediment Control Volume =      .00 ft.

SECTION NO.     18.000
...DEPTH of the Bed Sediment Control Volume =      .00 ft.

SECTION NO.     19.000
...DEPTH of the Bed Sediment Control Volume =      .00 ft.

SECTION NO.     20.000
...DEPTH of the Bed Sediment Control Volume =      .00 ft.

SECTION NO.     21.000
...DEPTH of the Bed Sediment Control Volume =      .00 ft.

SECTION NO.     22.000
...DEPTH of the Bed Sediment Control Volume =      .00 ft.

SECTION NO.     23.000
...DEPTH of the Bed Sediment Control Volume =      .00 ft.

SECTION NO.     24.000
```

...EPTH of the Bed Sediment Control Volume = .00 ft.

SECTION NO. 25.000
...DEPTH of the Bed Sediment Control Volume = .00 ft.

SECTION NO. 26.000
...DEPTH of the Bed Sediment Control Volume = .00 ft.

SECTION NO. 27.000
...DEPTH of the Bed Sediment Control Volume = .00 ft.

SECTION NO. 28.000
...DEPTH of the Bed Sediment Control Volume = .00 ft.

SECTION NO. 29.000
...DEPTH of the Bed Sediment Control Volume = .00 ft.

NO. OF CROSS SECTIONS IN STREAM SEGMENT= 16
NO. OF INPUT DATA MESSAGES = 0

TOTAL NO. OF CROSS SECTIONS IN THE NETWORK = 16
TOTAL NO. OF STREAM SEGMENTS IN THE NETWORK= 1
END OF GEOMETRIC DATA

==========

T4 EAST C-1 LEVEE - REACH 2B
T5 LOAD CURVE FROM GEOTECHNICAL REPORT
T6 BORING B-24, LOCATED ALONG THE LEVEE, GRAIN SIZE SAMPLE 5 FT DEEP
T7 USE FULL RANGE OF SANDS AND GRAVELS
T8 SEDIMENT TRANSPORT BY YANGS STREAM POWER

C-1 SYSTEM FIS RESTUDY
SEDIMENT TRANSPORT ANALYSIS - REACH 2B
CARTER & BURGESS JULY, 2002

SEDIMENT PROPERITES AND PARAMETERS

	SPI	IBG	MNQ	SPGF	ACGR	NFALL	IBSHER
I1	5.	0	1	1.000	32.174	2	1

SANDS - BOULDERS ARE PRESENT

	MTC	IASA	LASA	SPGS	GSF	BSAE	PSI	UWDLB
I4	4	1	10	2.650	.667	.500	30.000	93.000

USING TRANSPORT CAPACITY RELATIONSHIP # 4, YANG
GRAIN SIZES UTILIZED (mean diameter - mm)

VERY FINE SAND....	.088	VERY FINE GRAVEL..	2.828
FINE SAND.....	.177	FINE GRAVEL.....	5.657
MEDIUM SAND.....	.354	MEDIUM GRAVEL.....	11.314
COARSE SAND.....	.707	COARSE GRAVEL.....	22.627
VERY COARSE SAND..	1.414	VERY COARSE GRAVEL	45.255

SEDIMENT LOAD TABLE FOR STREAM SEGMENT # 1
LOAD BY GRAIN SIZE CLASS (tons/day)

LQ		1.00000	200.000	400.000	600.000	800.000
LF	VFS	.100000E-19	.100000E-19	.100000E-19	.100000E-19	.100000E-19

LF	FS	.210000E-02	840.000	1218.00	1512.00	279[illegible]0
LF	MS	.240000E-02	960.000	1392.00	1728.00	3192.00
LF	CS	.900000E-03	360.000	522.000	648.000	1197.00
LF	VCS	.900000E-03	360.000	522.000	648.000	1197.00
LF	VFG	.700000E-03	280.000	406.000	504.000	931.000
LF	FG	.700000E-03	280.000	406.000	504.000	931.000
LF	MG	.700000E-03	280.000	406.000	504.000	931.000
LF	CG	.700000E-03	280.000	406.000	504.000	931.000
LF	VCG	.700000E-03	280.000	406.000	504.000	931.000
	TOTAL	.980000E-02	3920.00	5684.00	7056.00	13034.0

REACH GEOMETRY FOR STREAM SEGMENT 1

CROSS SECTION NO.	REACH LENGTH (ft)	MOVABLE BED WIDTH	INITIAL BED-ELEVATIONS LEFT SIDE (ft)	THALWEG (ft)	RIGHT SIDE (ft)	ACCUMULATED CHANNEL DISTANCE FROM DOWNSTREAM (ft)	(miles)
	380.000						
14.000		160.000	2226.000	2221.000	2230.000	.000	.000
	350.000						
15.000		150.000	2237.500	2232.000	2245.000	350.000	.066
	350.000						
16.000		160.000	2250.000	2242.000	2255.000	700.000	.133
	400.000						
17.000		210.000	2262.000	2254.000	2265.000	1100.000	.208
	375.000						
18.000		130.000	2273.000	2265.000	2270.000	1475.000	.279
	325.000						
19.000		210.000	2282.000	2274.000	2280.000	1800.000	.341
	400.000						
20.000		210.000	2297.000	2291.000	2305.000	2200.000	.417
	450.000						
21.000		160.000	2313.000	2306.000	2310.000	2650.000	.502
	475.000						
22.000		160.000	2331.000	2323.000	2345.000	3125.000	.592
	450.000						
23.000		130.000	2342.000	2335.000	2342.000	3575.000	.677
	360.000						
24.000		470.000	2386.500	2353.200	2360.900	3935.000	.745
	600.000						
25.000		345.000	2385.100	2367.300	2388.200	4535.000	.859
	400.000						
26.000		420.000	2420.400	2380.300	2395.800	4935.000	.935
	400.000						
27.000		420.000	2413.500	2392.100	2408.500	5335.000	1.010
	420.000						
28.000		420.000	2417.200	2405.700	2416.300	5755.000	1.090
	400.000						
29.000		370.000	2436.600	2420.000	2425.300	6155.000	1.166

BED MATERIAL GRADATION

SECNO	SAE	DMAX (ft)	DXPI (ft)	XPI	TOTAL BED	BED MATERIAL FRACTIONS per grain size					
14.000	.670	.164	.164	1.000	1.000	VF SAND	.088	VC SAND	.142	M GRVL	.091
						F SAND	.078	VF GRVL	.129	C GRVL	.163
						M SAND	.073	F GRVL	.122	VC GRVL	.027
						C SAND	.087				
15.000	.670	.164	.164	1.000	1.000	VF SAND	.088	VC SAND	.142	M GRVL	.091

						F SAND	.078	VF GRVL	.129	C GRVL	.163
						M SAND	.073	F GRVL	.122	VC GRVL	.027
						C SAND	.087				
16.000	.670	.164	.164	1.000	1.000	VF SAND	.088	VC SAND	.142	M GRVL	.091
						F SAND	.078	VF GRVL	.129	C GRVL	.163
						M SAND	.073	F GRVL	.122	VC GRVL	.027
						C SAND	.087				
17.000	.670	.164	.164	1.000	1.000	VF SAND	.088	VC SAND	.142	M GRVL	.091
						F SAND	.078	VF GRVL	.129	C GRVL	.163
						M SAND	.073	F GRVL	.122	VC GRVL	.027
						C SAND	.087				
18.000	.670	.164	.164	1.000	1.000	VF SAND	.088	VC SAND	.142	M GRVL	.091
						F SAND	.078	VF GRVL	.129	C GRVL	.163
						M SAND	.073	F GRVL	.122	VC GRVL	.027
						C SAND	.087				
19.000	.670	.164	.164	1.000	1.000	VF SAND	.088	VC SAND	.142	M GRVL	.091
						F SAND	.078	VF GRVL	.129	C GRVL	.163
						M SAND	.073	F GRVL	.122	VC GRVL	.027
						C SAND	.087				
20.000	.670	.164	.164	1.000	1.000	VF SAND	.088	VC SAND	.142	M GRVL	.091
						F SAND	.078	VF GRVL	.129	C GRVL	.163
						M SAND	.073	F GRVL	.122	VC GRVL	.027
						C SAND	.087				
21.000	.670	.164	.164	1.000	1.000	VF SAND	.088	VC SAND	.142	M GRVL	.091
						F SAND	.078	VF GRVL	.129	C GRVL	.163
						M SAND	.073	F GRVL	.122	VC GRVL	.027
						C SAND	.087				
22.000	.670	.164	.164	1.000	1.000	VF SAND	.088	VC SAND	.142	M GRVL	.091
						F SAND	.078	VF GRVL	.129	C GRVL	.163
						M SAND	.073	F GRVL	.122	VC GRVL	.027
						C SAND	.087				
23.000	.670	.164	.164	1.000	1.000	VF SAND	.088	VC SAND	.142	M GRVL	.091
						F SAND	.078	VF GRVL	.129	C GRVL	.163
						M SAND	.073	F GRVL	.122	VC GRVL	.027
						C SAND	.087				
24.000	.670	.164	.164	1.000	1.000	VF SAND	.088	VC SAND	.142	M GRVL	.091
						F SAND	.078	VF GRVL	.129	C GRVL	.163
						M SAND	.073	F GRVL	.122	VC GRVL	.027
						C SAND	.087				
25.000	.670	.164	.164	1.000	1.000	VF SAND	.088	VC SAND	.142	M GRVL	.091
						F SAND	.078	VF GRVL	.129	C GRVL	.163
						M SAND	.073	F GRVL	.122	VC GRVL	.027
						C SAND	.087				
26.000	.670	.164	.164	1.000	1.000	VF SAND	.088	VC SAND	.142	M GRVL	.091
						F SAND	.078	VF GRVL	.129	C GRVL	.163
						M SAND	.073	F GRVL	.122	VC GRVL	.027
						C SAND	.087				
27.000	.670	.164	.164	1.000	1.000	VF SAND	.088	VC SAND	.142	M GRVL	.091
						F SAND	.078	VF GRVL	.129	C GRVL	.163
						M SAND	.073	F GRVL	.122	VC GRVL	.027
						C SAND	.087				

28.000	.670	.164	.164	1.000	1.000	VF SAND	.088	VC SAND	.142	M GRVL	.091
						F SAND	.078	VF GRVL	.129	C GRVL	.163
						M SAND	.073	F GRVL	.122	VC GRVL	.027
						C SAND	.087				
29.000	.670	.164	.164	1.000	1.000	VF SAND	.088	VC SAND	.142	M GRVL	.091
						F SAND	.078	VF GRVL	.129	C GRVL	.163
						M SAND	.073	F GRVL	.122	VC GRVL	.027
						C SAND	.087				

BED SEDIMENT CONTROL VOLUMES

STREAM SEGMENT # 1: C-1 SYSTEM FIS RESTUDY

SECTION NUMBER	LENGTH (ft)	WIDTH (ft)	DEPTH (ft)	VOLUME (cu.ft)	VOLUME (cu.yd)
14.000	175.000	156.667	.000	.000000	.000000
15.000	350.000	153.333	.000	.000000	.000000
16.000	375.000	167.333	.000	.000000	.000000
17.000	387.500	188.495	.000	.000000	.000000
18.000	350.000	156.667	.000	.000000	.000000
19.000	362.500	198.046	.000	.000000	.000000
20.000	425.000	201.176	.000	.000000	.000000
21.000	462.500	168.108	.000	.000000	.000000
22.000	462.500	155.135	.000	.000000	.000000
23.000	405.000	185.926	.000	.000000	.000000
24.000	480.000	401.458	.000	.000000	.000000
25.000	500.000	380.000	.000	.000000	.000000
26.000	400.000	407.500	.000	.000000	.000000
27.000	410.000	420.000	.000	.000000	.000000
28.000	410.000	411.870	.000	.000000	.000000
29.000	200.000	386.667	.000	.000000	.000000

NO. OF INPUT DATA MESSAGES= 0
END OF SEDIMENT DATA

==========

$HYD
BEGIN COMPUTATIONS.

==========

TIME STEP # 1
* AB PROFILE IS 1 % CHANCE STORM

- -

C-1 SYSTEM FIS RESTUDY
ACCUMULATED TIME (yrs)..... .000

--- Downstream Boundary Condition Data for STREAM SEGMENT NO. 1 at Control Point # 1 ---

DISCHARGE (cfs)	TEMPERATURE (deg F)	WATER SURFACE (ft)
762.000	.00	2223.000

**** DISCHARGE (CFS)	WATER SURFACE	ENERGY LINE	VELOCITY HEAD	ALPHA	TOP WIDTH	AVG BED	AVG VEL (by subsection) 1	2	3
SECTION NO. 14.000									
** CRITICAL WATER SURFACE USED AT SECTION NO. 14.000 AT TIME = 1.000 DAYS.**									**ELOEQ**
**** 762.000	2223.042	2223.739	.697	1.000	85.190	2221.707	.000	6.699	.000
				FLOW DISTRIBUTION (%) =			.000	100.000	.000

```
SECTION NO.      15.000
** SUPERCRITICAL **  Using Critical Water Surface +
SECTION NO.      15.000 TIME =      1.000 DAYS.
TRIAL     TRIAL        COMPUTED      CRITICAL
 NO.        WS            WS            WS
  0.    2234.067      2227.130
  1.    2234.156      2226.853      2234.106
****     762.000  2234.156  2234.924     .768     1.037     68.213  2232.376    4.277    7.155     .000
                                                  FLOW DISTRIBUTION (%) =     5.386   94.614     .000

SECTION NO.      16.000
** SUPERCRITICAL **  Using Critical Water Surface +
SECTION NO.      16.000 TIME =      1.000 DAYS.
TRIAL     TRIAL        COMPUTED      CRITICAL
 NO.        WS            WS            WS
  0.    2245.000      2236.332
  1.    2244.092      2237.764      2244.136
****     762.000  2244.092  2244.920     .828     1.023     66.980  2242.418    4.436    7.380     .000
                                                  FLOW DISTRIBUTION (%) =     3.442   96.558     .000

SECTION NO.      17.000
** SUPERCRITICAL **  Using Critical Water Surface +
SECTION NO.      17.000 TIME =      1.000 DAYS.
TRIAL     TRIAL        COMPUTED      CRITICAL
 NO.        WS            WS            WS
  0.    2256.090      2248.581
  1.    2256.184      2248.290      2256.134
****     762.000  2256.184  2256.952     .768     1.025     65.511  2254.395    4.251    7.116     .000
                                                  FLOW DISTRIBUTION (%) =     3.690   96.310     .000

SECTION NO.      18.000
** SUPERCRITICAL **  Using Critical Water Surface +
SECTION NO.      18.000 TIME =      1.000 DAYS.
TRIAL     TRIAL        COMPUTED      CRITICAL
 NO.        WS            WS            WS
  0.    2267.024      2260.215
  1.    2267.118      2259.949      2267.068
****     762.000  2267.118  2267.844     .726     1.020     73.726  2265.509    4.308    6.910     .000
                                                  FLOW DISTRIBUTION (%) =     3.452   96.548     .000

SECTION NO.      19.000
** SUPERCRITICAL **  Using Critical Water Surface +
SECTION NO.      19.000 TIME =      1.000 DAYS.
TRIAL     TRIAL        COMPUTED      CRITICAL
 NO.        WS            WS            WS
  0.    2276.218      2270.223
  1.    2275.949      2270.899      2275.993
****     762.000  2275.949  2276.656     .707     1.013     89.699  2274.637    4.510    6.799     .000
                                                  FLOW DISTRIBUTION (%) =     2.900   97.100     .000

SECTION NO.      20.000
** SUPERCRITICAL **  Using Critical Water Surface +
SECTION NO.      20.000 TIME =      1.000 DAYS.
TRIAL     TRIAL        COMPUTED      CRITICAL
 NO.        WS            WS            WS
  0.    2293.046      2280.813
  1.    2293.140      2280.441      2293.090
****     762.000  2293.140  2293.835     .695     1.027     75.618  2291.499    4.243    6.786     .000
                                                  FLOW DISTRIBUTION (%) =     4.764   95.236     .000

SECTION NO.      21.000
** SUPERCRITICAL **  Using Critical Water Surface +
SECTION NO.      21.000 TIME =      1.000 DAYS.
TRIAL     TRIAL        COMPUTED      CRITICAL
 NO.        WS            WS            WS
  0.    2311.793      2294.075
  1.    2307.949      2298.173      2307.993
****     762.000  2307.949  2308.665     .716     1.015     88.857  2306.623    4.531    6.853     .000
                                                  FLOW DISTRIBUTION (%) =     3.362   96.638     .000
```

```
SECTION NO.      22.000
** SUPERCRITICAL **  Using Critical Water Surface +
SECTION NO.      22.000 TIME =      1.000 DAYS.
TRIAL     TRIAL        COMPUTED      CRITICAL
 NO.        WS            WS            WS
  0.    2325.101      2313.521
  1.    2325.195      2313.104      2325.145
****     762.000  2325.195  2325.975     .780    1.027     63.825  2323.366    4.244    7.172     .000
                                                 FLOW DISTRIBUTION (%) =      3.734   96.266     .000

SECTION NO.      23.000
** SUPERCRITICAL **  Using Critical Water Surface +
SECTION NO.      23.000 TIME =      1.000 DAYS.
TRIAL     TRIAL        COMPUTED      CRITICAL
 NO.        WS            WS            WS
  0.    2340.808      2326.339
  1.    2337.048      2329.921      2337.092
****     762.000  2337.048  2337.893     .845    1.025     69.052  2335.431    4.521    7.463     .000
                                                 FLOW DISTRIBUTION (%) =      3.828   96.172     .000

SECTION NO.      24.000
** SUPERCRITICAL **  Using Critical Water Surface +
SECTION NO.      24.000 TIME =      1.000 DAYS.
TRIAL     TRIAL        COMPUTED      CRITICAL
 NO.        WS            WS            WS
  0.    2354.673      2341.313
  1.    2354.676      2341.293      2354.626
****     762.000  2354.676  2355.015     .339    1.000    190.094  2353.818     .000    4.673     .000
                                                 FLOW DISTRIBUTION (%) =       .000  100.000     .000

SECTION NO.      25.000
** SUPERCRITICAL **  Using Critical Water Surface +
SECTION NO.      25.000 TIME =      1.000 DAYS.
TRIAL     TRIAL        COMPUTED      CRITICAL
 NO.        WS            WS            WS
  0.    2384.608      2355.051
  1.    2368.447      2362.208      2368.491
****     762.000  2368.447  2368.913     .466    1.000    161.752  2367.587     .000    5.477     .000
                                                 FLOW DISTRIBUTION (%) =       .000  100.000     .000

SECTION NO.      26.000
** SUPERCRITICAL **  Using Critical Water Surface +
SECTION NO.      26.000 TIME =      1.000 DAYS.
TRIAL     TRIAL        COMPUTED      CRITICAL
 NO.        WS            WS            WS
  0.    2381.513      2374.785
  1.    2381.589      2373.942      2381.539
****     762.000  2381.589  2381.942     .353    1.000    196.078  2380.773     .000    4.768     .000
                                                 FLOW DISTRIBUTION (%) =       .000  100.000     .000

SECTION NO.      27.000
** SUPERCRITICAL **  Using Critical Water Surface +
SECTION NO.      27.000 TIME =      1.000 DAYS.
TRIAL     TRIAL        COMPUTED      CRITICAL
 NO.        WS            WS            WS
  0.    2394.560      2383.067
  1.    2393.481      2386.890      2393.524
****     762.000  2393.481  2393.955     .474    1.000    159.029  2392.613     .000    5.526     .000
                                                 FLOW DISTRIBUTION (%) =       .000  100.000     .000

SECTION NO.      28.000
** SUPERCRITICAL **  Using Critical Water Surface +
SECTION NO.      28.000 TIME =      1.000 DAYS.
TRIAL     TRIAL        COMPUTED      CRITICAL
 NO.        WS            WS            WS
  0.    2407.216      2399.043
  1.    2407.224      2398.973      2407.174
****     762.000  2407.224  2407.607     .383    1.000    164.509  2406.291     .000    4.965     .000
                                                 FLOW DISTRIBUTION (%) =       .000  100.000     .000
```

SECTION NO. 29.000
** SUPERCRITICAL ** Using Critical Water Surface +
SECTION NO. 29.000 TIME = 1.000 DAYS.

TRIAL NO.	TRIAL WS	COMPUTED WS	CRITICAL WS						
0.	2421.003	2411.814							
1.	2421.006	2411.792	2420.956						
****	762.000	2421.006	2421.278	.272	1.000	263.947	2420.316	.000	4.184	.000
					FLOW DISTRIBUTION (%) =			.000	100.000	.000

C-1 SYSTEM FIS RESTUDY
ACCUMULATED TIME (yrs).... .003
FLOW DURATION (days)..... 1.000

UPSTREAM BOUNDARY CONDITIONS

Stream Segment # 1 / Section No. 29.000	DISCHARGE (cfs)	SEDIMENT LOAD (tons/day)	TEMPERATURE (deg F)
INFLOW	762.00	11748.77	.00

TABLE SA-1. TRAP EFFICIENCY ON STREAM SEGMENT # 1
C-1 SYSTEM FIS RESTUDY
ACCUMULATED AC-FT ENTERING AND LEAVING THIS STREAM SEGMENT

TIME DAYS	ENTRY POINT	SAND INFLOW	SAND OUTFLOW	SAND TRAP EFF
1.00	29.000	5.80		
TOTAL=	14.000	5.80	.34	.94

TABLE SB-1: SEDIMENT LOAD PASSING THE BOUNDARIES OF STREAM SEGMENT # 1

SEDIMENT INFLOW at the Upstream Boundary:

GRAIN SIZE	LOAD (tons/day)	GRAIN SIZE	LOAD (tons/day)
VERY FINE SAND....	.00	VERY FINE GRAVEL..	839.20
FINE SAND.....	2517.59	FINE GRAVEL.....	839.20
MEDIUM SAND.....	2877.25	MEDIUM GRAVEL.....	839.20
COARSE SAND.....	1078.97	COARSE GRAVEL.....	839.20
VERY COARSE SAND..	1078.97	VERY COARSE GRAVEL	839.20
		TOTAL =	11748.77

SEDIMENT OUTFLOW from the Downstream Boundary

GRAIN SIZE	LOAD (tons/day)	GRAIN SIZE	LOAD (tons/day)
VERY FINE SAND....	.00	VERY FINE GRAVEL..	142.02
FINE SAND.....	163.70	FINE GRAVEL.....	89.71
MEDIUM SAND.....	80.99	MEDIUM GRAVEL.....	72.09
COARSE SAND.....	30.37	COARSE GRAVEL.....	71.43
VERY COARSE SAND..	30.37	VERY COARSE GRAVEL	6.73
		TOTAL =	687.40

TABLE SB-2: STATUS OF THE BED PROFILE AT TIME = 1.000 DAYS

SECTION NUMBER	BED CHANGE (ft)	WS ELEV (ft)	THALWEG (ft)	Q (cfs)	TRANSPORT RATE (tons/day) SAND
29.000	1.02	2421.01	2421.02	762.	9519.
28.000	.35	2407.22	2406.05	762.	8311.
27.000	.32	2393.48	2392.42	762.	7317.
26.000	.28	2381.59	2380.58	762.	6364.

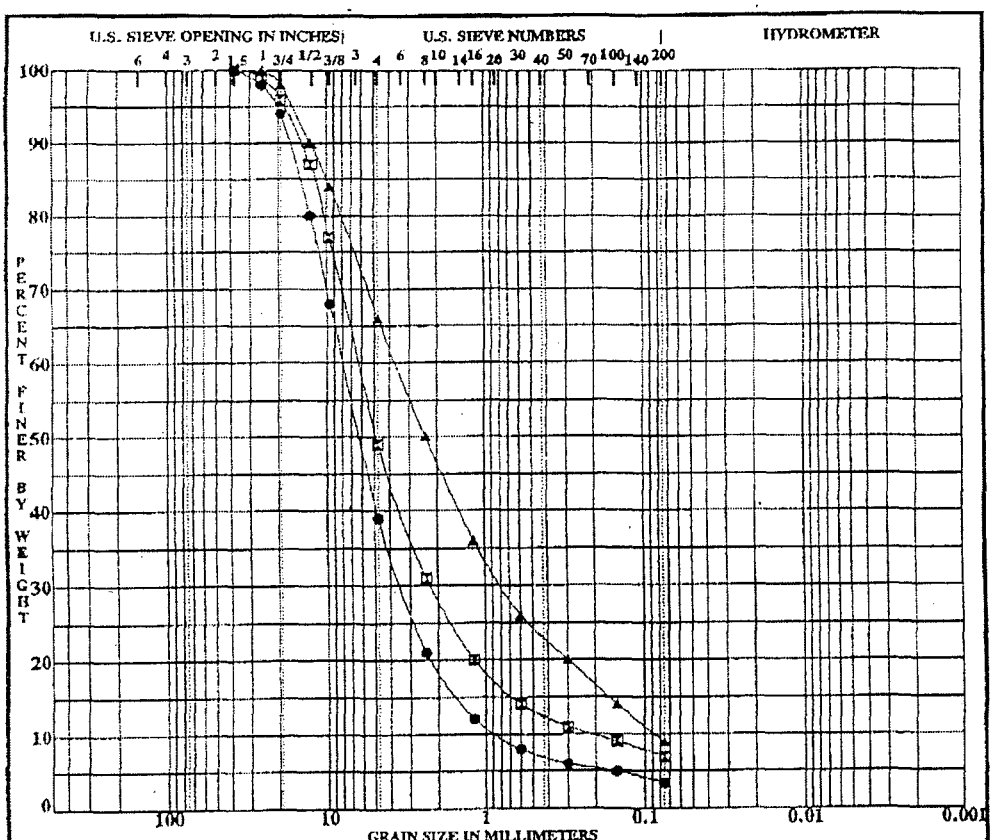
25.000	.20	2368.45	2367.50	762.	5553.
24.000	.29	2354.68	2353.49	762.	4443.
23.000	.24	2337.05	2335.24	762.	3948.
22.000	.29	2325.20	2323.29	762.	3299.
21.000	.23	2307.95	2306.23	762.	2756.
20.000	.21	2293.14	2291.21	762.	2227.
19.000	.20	2275.95	2274.20	762.	1800.
18.000	.22	2267.12	2265.22	762.	1463.
17.000	.18	2256.18	2254.18	762.	1190.
16.000	.13	2244.09	2242.13	762.	970.
15.000	.13	2234.16	2232.13	762.	794.
14.000	.15	2223.04	2221.15	762.	687.

$$END

0 DATA ERRORS DETECTED.

TOTAL NO. OF TIME STEPS READ = 1
TOTAL NO. OF WS PROFILES = 1
ITERATIONS IN EXNER EQ = 80

COMPUTATIONS COMPLETED
RUN TIME = 0 HOURS, 0 MINUTES & .00 SECONDS



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Exploration No.	Depth(ft)	Classification	LL	PL	PI	Cc	Cu
●	B-1	0.0	WELL GRADED GRAVEL, with SAND (GW)	NP	NP	NP	1.69	9.3
■	B-1	25.0	POORLY GRADED GRAVEL, with SILT and SAND (GP-GM)	NP	NP	NP	3.71	29.4
▲	B-2	0.0	WELL GRADED SAND with SILT and GRAVEL (SW-SM)	NP	NP	NP	1.94	42.0

	Exploration No.	Depth(ft)	D100 (mm)	D60 (mm)	D30 (mm)	D10 (mm)	%Gravel	%Sand	%Silt	%Clay
●	B-1	0.0	38.10	7.87	3.348	0.8414	61.0	35.6	3.4	
■	B-1	25.0	38.10	6.24	2.216	0.2121	51.0	42.0	7.0	
▲	B-2	0.0	25.40	3.65	0.786	0.0871	34.0	57.1	8.9	

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-110021-001

PROJECT: East C-1 Detention Basin

GRAIN SIZE ANALYSES

PLATE
B-1

Figure 8 – Typical Grain Size Distribution

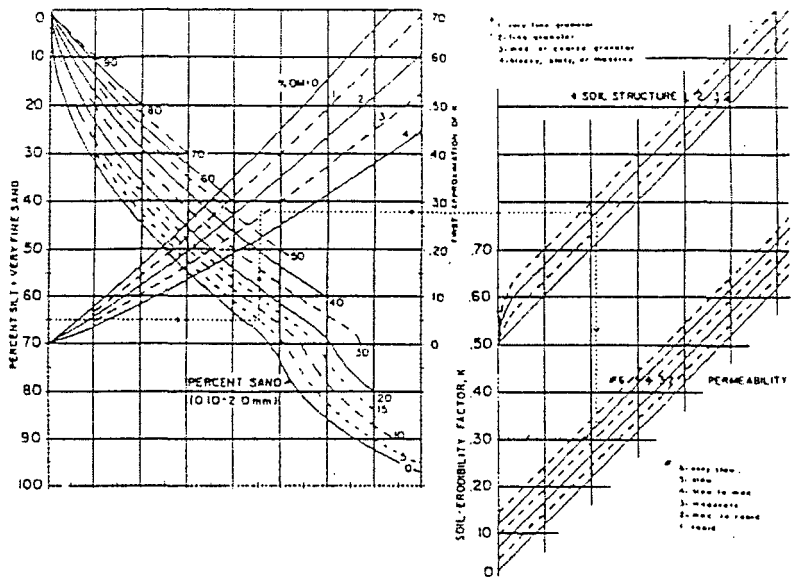


Figure 9 – Soil Erodibility Nomograph Used to Determine Factor K (tons/acre) for Specific Topsoils or Subsoil Horizons (Wishmeier et al, 1971)

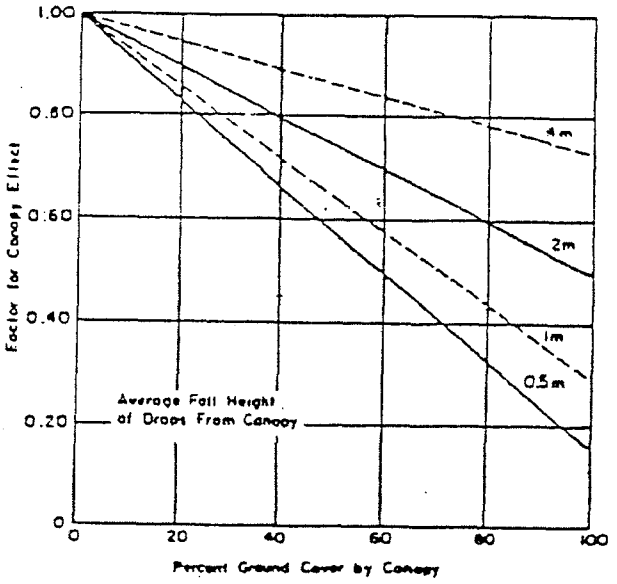


Figure 10 – Influence of Vegetal Canopy (Wishmeier, 1971)

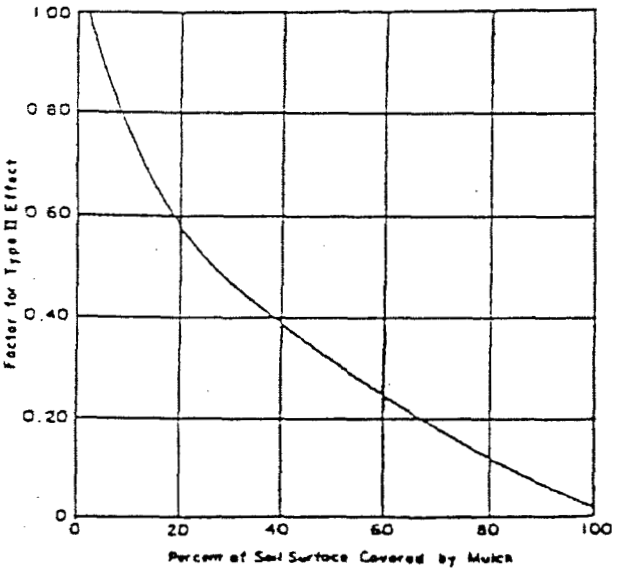


Figure 11 – Effect of Plant Residues of Close-Growing Stems at the Soil Surface (Wishmeier, 1972)

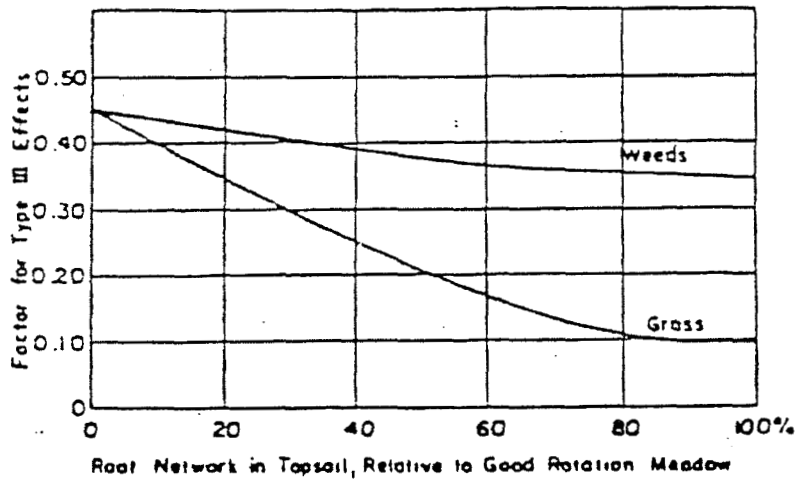


Figure 12 – Type III Effects on Undisturbed Land Areas (Wishmeier, 1972)

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CITY OF HENDERSON, NEVADA

C-1 CHANNEL SYSTEM FIS RESTUDY

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DATE PREPARED 11/02 RUN DATE: 11/02

FIELD SURVEY SECTION NO. (plans)	CROSS SECTION LETTER IN DRAFT FIS REPORT	COMPUTER STATIONING
8450.00	21000	MAIN3 8450
8305.25	20855.3	MAIN3 8305.25
8160.41	20710.4	HDWORI 8160.41
8000.10	20550.1	HDWORI 8000.1
1950	18	DRAKE 1950
1900	17	DRAKE 1900
1850	16	DRAKE 1850
1800	15	DRAKE 1800
1750	14	DRAKE 1750
1700	13	DRAKE 1700
1650	12	DRAKE 1650

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FIELD SURVEY SECTION NO. (plans)	CROSS SECTION LETTER IN DRAFT FIS REPORT	COMPUTER STATIONING
1600	11	DRAKE 11
1547.13	10	DRAKE 10
1500	9	DRAKE 9
1450	8	DRAKE 8
1400	7	DRAKE 7
1361	6	DRAKE 6
1361	5	DRAKE 5
1350	4	DRAKE 4
1250	3	DRAKE 3
1200	2	DRAKE 2
1174.76	1	DRAKE 1

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FIELD SURVEY SECTION NO. (plans)	CROSS SECTION LETTER IN DRAFT FIS REPORT	COMPUTER STATIONING
8000.1	20550.1	MAIN2 20550.1
8000	20550	MAIN2 20550
7925	20475	MAIN2 20475
7850	20400	MAIN2 20400
7730	20280	MAIN2 20280
7630	20180	MAIN2 20180
7600	20150	MAIN2 20150
7400	19950	MAIN2 19950
7236.49	19786.5	MAIN2 19786.49
7200	19750	MAIN2 19750
7050	19600	MAIN2 19600

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C-1 CHANNEL SYSTEM FIS RESTUDY

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FIELD SURVEY SECTION NO. (plans)	CROSS SECTION LETTER IN DRAFT FIS REPORT	COMPUTER STATIONING	
6900	19450	MAIN2	19450
6687	19237	MAIN2	19237
6587	19137	MAIN2	19137
6509.85	19059.9	MAIN2	19059.9
6470.51	19020.5	MAIN2	19020.5
6308.93	18858.9	MAIN2	18858.9
6300	18850	MAIN2	18850
6200	18750	MAIN2	18750
6100	18650	MAIN2	18650
6000	18550	MAIN2	18550
5850	18400	MAIN2	18400

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FIELD SURVEY SECTION NO. (plans)	CROSS SECTION LETTER IN DRAFT FIS REPORT	COMPUTER STATIONING	
5500	18050	MAIN2	18050
5450	18000	MAIN2	18000
5250	17800	MAIN2	17800
5125	17675	MAIN2	17675
5100	17650	MAIN2	17650
5050	17600	MAIN2	17600
4850	17400	MAIN2	17400
4650	17200	MAIN2	17200
4450	17000	MAIN2	17000
4250	16800	MAIN2	16800
4050	16600	MAIN2	16600

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FIELD SURVEY SECTION NO. (plans)	CROSS SECTION LETTER IN DRAFT FIS REPORT	COMPUTER STATIONING
3250	16400	MAIN2 16400
3250	16200	MAIN2 16200
3250	16000	MAIN2 16000
3250	15800	MAIN2 15800
3150	15700	MAIN2 15700
2950	15500	MAIN2 15500
2750	15300	MAIN2 15300
2710.78	15260.8	MAIN2 15260.8
2637.35	15200	MAIN2 15200
15199.9	15199.9	MAIN2 15199.9
15100	15100	MAIN2 15100

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FIELD SURVEY SECTION NO. (plans)	CROSS SECTION LETTER IN DRAFT FIS REPORT	COMPUTER STATIONING
15000	15000	MAIN2 15000
14900	14900	MAIN2 14900
14890	14890	MAIN2 14890
14800	14800	MAIN2 14800
14600	14600	MAIN2 14600
14550	14550	MAIN2 14550
14500	14500	MAIN2 14500
14450	14450	MAIN2 14450
14360	14360	MAIN2 14360
14350	14350	MAIN2 14350
14300	14300	MAIN2 14300

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DATE PREPARED 11/02 RUN DATE: 11/02

FIELD SURVEY SECTION NO. (plans)	CROSS SECTION LETTER IN DRAFT FIS REPORT	COMPUTER STATIONING
14300	14300	MAIN2 14300
14200	14200	MAIN2 14200
14100	14100	MAIN2 14100
14090	14090	MAIN2 14090
14000	14000	MAIN2 14000
13800	13800	MAIN2 13800
13664.9	13664.9	MAIN2 13664.9
13601	13601	MAIN2 13601
13600	13600	MAIN2 13600
13500	13500	MAIN2 13500
13400	13400	MAIN2 13400

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C-1 CHANNEL SYSTEM FIS RESTUDY

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DATE PREPARED 11/02 RUN DATE: 11/02

FIELD SURVEY SECTION NO. (plans)	CROSS SECTION LETTER IN DRAFT FIS REPORT	COMPUTER STATIONING
13300	13300	MAIN2 13300
13200	13200	MAIN2 13200
13000	13000	MAIN2 13000
12800	12800	MAIN2 12800
12691	12691	MAIN2 12691
12591	12591	MAIN2 12591
12512.8	12512.8	MAIN2 12512.8
12450	12450	MAIN2 12450
12400	12400	MAIN2 12400
12344.6	12344.6	MAIN2 12344.6
12300	12300	MAIN2 12300

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C-1 CHANNEL SYSTEM FIS RESTUDY

PREPARED BY: C&B, INC FLOODING SOURCE: HENDERSON BASIN

DATE PREPARED 11/02 RUN DATE: 11/02

FIELD SURVEY SECTION NO. (plans)	CROSS SECTION LETTER IN DRAFT FIS REPORT	COMPUTER STATIONING	
12234.5	12234.5	MAIN2	12234.5
12061	12061	MAIN1	12061
11950	11950	MAIN1	11950
11850	11850	MAIN1	11850
11800	11800	MAIN1	11800
11750	11750	MAIN1	11750
11550	11550	MAIN1	11550
11300	11300	MAIN1	11300
11022.3	11022.3	MAIN1	11022.3
10843	10843	MAIN1	10843
10700	10700	MAIN1	10700

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CITY OF HENDERSON, NEVADA

C-1 CHANNEL SYSTEM FIS RESTUDY

PREPARED BY: C&B, INC FLOODING SOURCE: HENDERSON BASIN

DATE PREPARED 11/02 RUN DATE: 11/02

FIELD SURVEY SECTION NO. (plans)	CROSS SECTION LETTER IN DRAFT FIS REPORT	COMPUTER STATIONING	
9550	9550	MAIN1	9550
9500	9500	MAIN1	9500
9339.55	9339.55	MAIN1	9339.55
9146.2	9146.2	MAIN1	9146.2
9000	9000	MAIN1	9000
8822	8822	MAIN1	8822
8821.99	8821.99	MAIN1	8821.99
8783	8783	MAIN1	8783
8768	8768	MAIN1	8768
8746	8746	MAIN1	8746
8730	8730	MAIN1	8730

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CITY OF HENDERSON, NEVADA

C-1 CHANNEL SYSTEM FIS RESTUDY

PREPARED BY: C&B, INC FLOODING SOURCE: HENDERSON BASIN

DATE PREPAREI 11/02 RUN DATE: 11/02

FIELD SURVEY SECTION NO. (plans)	CROSS SECTION LETTER IN DRAFT FIS REPORT	COMPUTER STATIONING	
8713	8713	MAIN1	8713
8695	8695	MAIN1	8695
8500	8500	MAIN1	8500
8383	8383	MAIN1	8383
8215	8215	MAIN1	8215
8200	8200	MAIN1	8200
8000	8000	MAIN1	8000
7800	7800	MAIN1	7800
7600	7600	MAIN1	7600
7400	7400	MAIN1	7400
7196	7196	MAIN1	7196

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CITY OF HENDERSON, NEVADA

C-1 CHANNEL SYSTEM FIS RESTUDY

PREPARED BY: C&B, INC FLOODING SOURCE: HENDERSON BASIN

DATE PREPARED 11/02 RUN DATE: 11/02

FIELD SURVEY SECTION NO. (plans)	CROSS SECTION LETTER IN DRAFT FIS REPORT	COMPUTER STATIONING	
7000	7000	MAIN1	7000
6800	6800	MAIN1	6800
6679	6679	MAIN1	6679
6600	6600	MAIN1	6600
6400	6400	MAIN1	6400
6200	6200	MAIN1	6200
6000	6000	MAIN1	6000
5800	5800	MAIN1	5800
5600	5600	MAIN1	5600
5462	5462	MAIN1	5462
5396	5396	MAIN1	5396

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KEY TO CROSS SECTION LABELING

CITY OF HENDERSON, NEVADA

C-1 CHANNEL SYSTEM FIS RESTUDY

PREPARED BY: C&B, INC FLOODING SOURCE: HENDERSON BASIN

DATE PREPARED 11/02 RUN DATE: 11/02

FIELD SURVEY SECTION NO. (plans)	CROSS SECTION LETTER IN DRAFT FIS REPORT	COMPUTER STATIONING	
5362	5362	MAIN1	5362
5196	5196	MAIN1	5196
5082.67	5082.67	MAIN1	5082.67
4820	4820	MAIN1	4820
4800	4800	MAIN1	4800
4600	4600	MAIN1	4600
4400	4400	MAIN1	4400
4312.1	4312.1	MAIN1	4312.1
4312	4312	MAIN1	4312
4298	4298	MAIN1	4298
4200	4200	MAIN1	4200

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PREPARED BY: C&B, INC FLOODING SOURCE: HENDERSON BASIN

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FIELD SURVEY SECTION NO. (plans)	CROSS SECTION LETTER IN DRAFT FIS REPORT	COMPUTER STATIONING
4000	4000	MAIN1 4000
3810	3810	MAIN1 3810
3800	3800	MAIN1 3800
3600	3600	MAIN1 3600
3513.01	3513.01	MAIN1 3513.01
3513	3513	MAIN1 3513
3500	3500	MAIN1 3500
3300	3300	MAIN1 3300
3290	3290	MAIN1 3290
3112.1	3112.1	MAIN1 3112.1
3112	3112	MAIN1 3112

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DATE PREPARED 11/02 RUN DATE: 11/02

FIELD SURVEY SECTION NO. (plans)	CROSS SECTION LETTER IN DRAFT FIS REPORT	COMPUTER STATIONING
3097	3097	MAIN1 3097
2914	2914	MAIN1 2914
2900	2900	MAIN1 2900
2799	2799	MAIN1 2799
2767	2767	MAIN1 2767
2700	2700	MAIN1 2700
2669	2669	MAIN1 2669
2617	2617	MAIN1 2617
2565	2565	MAIN1 2565

Submitted by:

KEY TO CROSS SECTION LABELING

CITY OF HENDERSON, NEVADA

C-1 CHANNEL SYSTEM FIS RESTUDY

PREPARED BY: C&B, INC

DATE PREPARED 11/02

FIELD SURVEY SECTION NO.		CROSS SECTION LETTER IN DRAFT FIS REPORT	COMPUTER STATIONING
O	EAST C-1 LEVEE	O	15 C4CA--C3B3D
N	EAST C-1 LEVEE	N	14 C4CA--C3B3D
M	EAST C-1 LEVEE	M	13 C4CA--C3B3D
L	EAST C-1 LEVEE	L	12 C4CA--C3B3D
K	EAST C-1 LEVEE	K	11 C4CA--C3B3D
J	EAST C-1 LEVEE	J	10 C4CA--C3B3D
I	EAST C-1 LEVEE	I	9 C4CA--C3B3D
H	EAST C-1 LEVEE	H	8 C4CA--C3B3D
G	EAST C-1 LEVEE	G	7 C4CA--C3B3D
F	EAST C-1 LEVEE	F	6 C4CA--C3B3D
E	EAST C-1 LEVEE	E	5 C4CA--C3B3D

Submitted by:

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PREPARED BY: C&B, INC

FLOODING SOURCE: HENDERSON BASIN

DATE PREPARED: 11/02

RUN DATE: 11/02

FIELD SURVEY SECTION NO. (plans)		CROSS SECTION LETTER IN DRAFT FIS REPORT	COMPUTER STATIONING
B		B	2 2A
A		A	1 2A
C		C	3 2B
B		B	2 2B
A		A	1 2B
T		T	20 2C
S		S	19 2C
R		R	18 2C
Q		Q	17 2C
P		P	16 2C
O	EAST C-1 LEVEE	O	15 2C

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FIELD SURVEY SECTION NO. (plans)	CROSS SECTION LETTER IN DRAFT FIS REPORT	COMPUTER STATIONING
N	N	14 2C
M	M	13 2C
L	L	12 2C
K	K	11 2C
J	J	10 2C
I	I	9 2C
H	H	8 2C
G	G	7 2C
F	F	6 2C
E	E	5 2C
D	D	4 2C
C	C	3 2C

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DATE PREPARED 11/02 RUN DATE: 11/02

FIELD SURVEY SECTION NO. (plans)	CROSS SECTION LETTER IN DRAFT FIS REPORT	COMPUTER STATIONING
E	E	5 C1NA
D	D	4 C1NA
C	C	3 C1NA
B	B	2 C1NA
A	A	1 C1NA

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CITY OF HENDERSON, NEVADA

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PREPARED BY: C&B, INC FLOODING SOURCE: HENDERSON BASIN

DATE PREPARED 11/02 RUN DATE: 11/02

FIELD SURVEY SECTION NO. (plans)	CROSS SECTION LETTER IN DRAFT FIS REPORT	COMPUTER STATIONING
N	N	14 C1G2B1
M	M	13 C1G2B1
L	L	12 C1G2B1
K	K	11 C1G2B1
J	J	10 C1G2B1
I	I	9 C1G2B1
H	H	8 C1G2B1
G	G	7 C1G2B1
F	F	6 C1G2B1
E	E	5 C1G2B1
D	D	4 C1G2B1

Submitted by:

KEY TO CROSS SECTION LABELING

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PREPARED BY: C&B, INC FLOODING SOURCE: HENDERSON BASIN

DATE PREPARED 11/02 RUN DATE: 11/02

FIELD SURVEY SECTION NO. (plans)	CROSS SECTION LETTER IN DRAFT FIS REPORT	COMPUTER STATIONING
Y	Y	25 C1G2B1
X	X	24 C1G2B1
W	W	23 C1G2B1
V	V	22 C1G2B1
U	U	21 C1G2B1
T	T	20 C1G2B1
S	S	19 C1G2B1
R	R	18 C1G2B1
Q	Q	17 C1G2B1
P	P	16 C1G2B1
O	O	15 C1G2B1

Submitted by:

KEY TO CROSS SECTION LABELING

CITY OF HENDERSON, NEVADA

C-1 CHANNEL SYSTEM FIS RESTUDY

PREPARED BY: C&B, INC FLOODING SOURCE: HENDERSON BASIN

DATE PREPARED 11/02 RUN DATE: 11/02

FIELD SURVEY SECTION NO. (plans)	CROSS SECTION LETTER IN DRAFT FIS REPORT	COMPUTER STATIONING
C	C	3 C1G2B1
B	B	2 C1G2B1
A	A	1 C1G2B1

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT

DRAFT

C-1 CHANNEL SYSTEM FLOOD INSURANCE RESTUDY

DECEMBER, 2002

Prepared by Carter & Burgess, Inc.

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SECTION 1.0 INTRODUCTION

Section 1.1 Purpose of Study

This Flood Insurance Study (FIS) has been prepared to revise and update a previous FIS report/flood Insurance Rate Map (FIRM) for the City of Henderson, Clark County, Nevada. This information will be used by the City of Henderson to update existing floodplain regulations as part of the regular phase of the National Flood Insurance Program (NFIP). The information will also be used by local and regional planners to further promote sound land use and floodplain development. Changes to the floodplain are the result of the construction of structural flood control facilities funded by the Clark County Regional Flood Control District (CCRFCD). Figure 1 is a general vicinity map illustrating the watershed location in relation to the Las Vegas Valley.

Section 1.2 Authority and Acknowledgements

The sources of authority for this Flood Insurance Restudy are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

Carter & Burgess, Inc. (C&B) prepared the hydrologic and hydraulic analyses performed for this restudy in cooperation with the CCRFCD. C&B was authorized by the CCFRCD to perform this study for these portions of the City of Henderson under contract, "Agreement of Professional Services for C-1 Channel System Flood Insurance Restudy," dated December 13, 2001. This restudy has been prepared in accordance with the Federal Emergency Management Agency's (FEMA) "Guidelines and Specifications for Flood Hazard Mapping Partners," dated February 2002.

This Flood Insurance restudy was completed in October 2002.

Section 1.3 Coordination

The area of study was outlined by the CCRFCD and coordinated with the City of Henderson. These agencies provided available hydrologic and hydraulic data, including the draft 2001 Flood Control Master Plan Update for the Las Vegas Valley.

Coordination with the CCRFCD and the City of Henderson began on January 8, 2002. Regular monthly progress meetings were conducted and attended by representatives of C&B, CCRFCD, and City of Henderson. Coordination with FEMA's Technical Evaluation Contractor, Michael Baker Jr, Inc. was initiated by C&B on January 21, 2002. Both the CCRFCD and the City of Henderson have provided a technical review of this report, and concur with the results presented herein. Letters of concurrence, correspondence, written comments, progress meeting agendas and progress meeting minutes are included in Section 1, Volume 1 of the Appendix, titled "General Documentation."

SECTION 2.0 AREA STUDIED

Section 2.1 Scope of Study

This Flood Insurance Restudy has been performed in order to reflect physical changes that impact the effective floodplain in Township 22 South, and Range 63 East, and Township 23 South, Range 63 East, Mount Diablo Base & Meridian, City of Henderson, Clark County, Nevada. Portions of the following Flood Insurance Rate Map (FIRM) Community Panels with an effective date of September 27, 2002 are included in the study area:

- Community Panel 32003 2615E
- Community Panel 32003 2955E
- Community Panel 32003 2620E
- Community Panel 32003 2605E

The total area studied includes approximately 38 square miles, bounded by the McCullough Range on the south and west, the River Mountains on the east, Lake Mead Drive on the north, and C-1 Channel on the west. The C-1 watershed is divided into three basins, namely:

- **Upper C-1,** including the Black Mountain (Southwest C-1) Detention Basin, the Mission Hills Western Interceptor, the Mission Hills Detention Basin and NDOT Detention Ponds;
- **Central C-1,** including the Equestrian Detention Basin, the Equestrian Levee, and the Equestrian Outfall;
- **Lower C-1** including the East C-1 Detention Basin, and the East C-1 Detention Basin Levee;

Figure 2 illustrates the overall study area, including existing flood control facilities in the watershed. Figure 3 illustrates the location of Detailed Methods Hydraulics and existing FEMA Case Nos., whereas Figure 4 illustrates the location of Approximate Methods Hydraulics.

This restudy utilizes existing information wherever possible, including facility as-built survey information, Letters of Map Revision (LOMR's) and Conditional Letters of Map Revision (CLOMR's) previously issued by the Federal Emergency Management Agency (FEMA), and as-built channel improvement plans for specific reaches of the C-1 Channel. Refer to the Bibliography for a complete list of previous hydrologic models in the restudy area.

Several Special Flood Hazard Areas (SFHAs) were not studied because structural controls do not exist at this time. These areas are generally located between Boulder Highway and the Union Pacific Railroad, north of Interstate 515, as illustrated on Figure 4. The SFHA Zone A bounded by Newport Drive, Race Track Road, the C-1 Channel, and Burkholder Drive was not studied as this area will become a future park. Other areas not studied include previous, accepted cases submitted to FEMA, such as the Equestrian Detention Basin and Levee (Case No. 99-09-628P), and the Mission Hills Detention Basin and Levee (Case No. 95-09-934P).

Potential SFHAs associated with existing channels and detention basins were also not part of this study. These areas are currently not mapped as a SFHA in the latest Digital Flood Insurance Rate Maps (DFIRM's). Specifically, these areas include the NDOT detention basins at I-515 and College Drive, the NDOT channels associated with the Wagon Wheel Interchange, the Boulder Highway channel along the south right-of-way of Boulder Highway, and the SNWA detention basin.

A CLOMR was issued on May 25, 1999 under Case No. 99-09-066R for the East C-1 Detention Basin Flood Control Improvements. An address of the conditions that must be met before a final determination can be made on revising the effective FIRM is included in Section 2.1.2. It is hereby requested that a final determination be made in this case.

Annotated FIRM's have been prepared to indicate areas of change to the 100-year floodplain. These maps can be found in Volume III, Section 4 of the Appendix. Technical back-up data have been provided in both hard copy and digital format to aid in the review and archive process.

Section 2.2 Community Description

The City of Henderson is located in southern Nevada in Clark County, approximately 15 miles southeast of the City of Las Vegas, in the Mojave Desert (Figures 1 and 2). The City of Henderson has a population of approximately 207,640, as of April 2002. The total area contained within the restudy area is approximately 38 square miles. Land use in the study area is primarily residential, and includes limited commercial and industrial development.

The climate of the City of Henderson is arid, with an average annual precipitation of less than 6-inches. Rainfall is characterized by two distinct meteorological events in the summer and winter. Monsoonal activity delivers high intensity, short-duration thunderstorms typically from July to September. During winter months, however, precipitation from frontal and Pacific storm movements have longer storm durations, lowered intensities, and larger aerial extent.

Section 2.3 Principal Flood Problems

Most flood problems in the watershed have been mitigated by the construction of flood control facilities, as indicated in previous sections of this report. Detention basins and conveyance facilities form a ring around the northern and western perimeter of the McCullough Range and the River Mountains, intercepting storm flows approaching from

the south and east. The Black Mountain (Southwest C-1) Detention Basin—Mission Hills Western Interceptor—Mission Hills Detention Basin and Levee intercept storm flows from the south, whereas the Equestrian Detention Basin and Levee, and the East C-1 Detention Basin and Levee intercept storm flows from the east (Figure 2). These facilities provide adequate protection from potential flood hazards. It is important to note that the C-1 watershed no longer functions as an alluvial system because of the construction of flood control facilities.

2.3.1 Drake Channel

A preliminary analysis of its ability to meet FEMA standards and reduce flood hazard areas. The Drake Channel east of Race Track Road exists as an earthen trapezoidal channel with a series of 18 gabion drop structures. The Drake Channel is expected to accept a good portion of the 100-year flow from its tributary watersheds. However, although the completion of the East C-1 Detention Basin and Levee have significantly reduced the 100-year flow rate to the Drake Channel, until future planned flood control facilities are completed some flow can be expected to continue north past the channel.

The following issues concern the Drake Channel east of Rack Track Road:

- As-built and geotechnical information could not be located;
- The southern bank shows signs of rill and gully erosion. Much of this erosion appears to have occurred before the construction of the East C-1 Detention Basin and Levee and is no longer an issue. However, storm flows draining west and north of the East C-1 Levee still drain over the south bank at some locations, which may cause future rill and gully erosion.
- The Drake Channel does not meet minimum hydraulic standards. Velocities exceed 5 fps without riprap armoring, and minimum freeboard requirements for subcritical flow are exceeded. In some locations the 100-year water surface elevation is slightly higher than the channel left and right overbanks.

Because of the above issues with the Drake Channel, the CCRFCD has decided not to certify the channel until the East C-1 Levee is extended north to further cut-off and significantly reduce storm flows from reaching the Drake. For this report, an assumption was made that the 100-year peak discharge flows west in the Drake to the C-1 Channel. No attempt is made to remove existing SFHAs north of Drake Channel at this time.

Section 2.4 Flood Protection Measures

The City of Henderson is a rapidly developing community, and has adopted strict local development regulations in order to mitigate storm-related losses. In addition, the CCRFCD has developed specific criteria for floodplain development in their Hydrologic Criteria and Drainage Design Manual, dated December 1991, and revised August 1999. The CCRFCD has constructed numerous major flood control facilities to protect the City of Henderson from flood related damages. New facilities are planned for construction in

the City of Henderson as part of the Clark County Regional Flood Control District's Flood Control Master Plan, however, this study is based on existing facilities as of January 2002 (Figure 2). Photographs of flood control facilities in the study area are located in the field review, located in Section 5.1, Volume IV.

Because existing LOMR's have been filed for the Equestrian Detention Basin and Levee, and the Mission Hills Detention Basin and Levee, record drawings and supporting information will not be submitted as part of this study. However, record information and supporting documentation will be submitted for all facilities not approved by FEMA at this time.

The following flood control facilities are included in the study area:

Upper C-1 Basin:

- Black Mountain (Southwest C-1) Detention Basin (CCRFCD Facility No. C1CH 0167)
  - 247 acre-feet of storage
  - Inflow of 2261 cfs
  - Outflow of 184 cfs
  - Record Drawings
  - Construction Complete

- Mission Hills Western Interceptor (CCRFCD Facility No. C1CH 0871 to 1012).
  - Record drawings
  - Construction complete

- Mission Hills Detention Basin (CCRFCD Facility No. C1CH 0737)
  - FEMA Case No. 95-09-934P
  - 403 acre-feet of storage
  - Inflow of 3923 cfs
  - Outflow of 323 cfs
  - Record Drawings
  - Construction complete

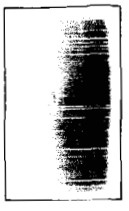
- Mission Hills Levee (CCRFCD Facility No. C1CH 0737).
  - FEMA Case No. 95-09-934P
  - Record Drawings
  - Construction complete

- NDOT Detention Ponds (CCRFCD Facility No. C1CH 0658)
  - 188 of storage (Pond A, 94 acre-feet; Pond B, 94 acre-feet) of storage
  - Inflow of 915 cfs
  - Outflow of 658 cfs
  - Record Drawings (personal communication, NDOT)
  - Construction complete

Central C-1 Basin:

- Equestrian Levee (CCRFCD Facility No. C1EQ 0301 to 0349)
  - FEMA Case No. 99-09-628P
  - Record Drawings
  - Construction complete

- Equestrian Detention Basin (CCRFCD Facility No. C1EQ 0246)
  - FEMA Case No. 99-09-628P
  - 389 acre-feet of storage
  - Inflow of 4219 cfs
  - Outflow of 223 cfs
  - Record drawings
  - Construction complete



- C-1 Channel, Middle Reach (CCRFCD Facility No. C1CH 0412 to 0520)
  - Drawings dated 6/26/01
  - Construction complete May, 2002.
  - As-built survey yet to be completed by Contractor
  - Record Drawings

Lower C-1 Basin:

- East C-1 Detention Basin (CCRFCD Facility No. C1IT 0492)
  - FEMA Case No. 99-09-~~628P~~ 066
  - 271 acre-feet of storage
  - Inflow of 2391 cfs
  - Outflow of 408 cfs
  - Record Drawings
  - Construction complete

- East C-1 Levee (CCRFCD Facility No. C1IT 0246)
  - FEMA Case No. 99-09-066R
  - Record drawings
  - Construction complete

- C-1 Channel (CCRFCD Facility No. C1CH 0174 to C1CH 0365)
  - Record drawings
  - Construction complete

Aren't these the same?

SECTION 3.0 ENGINEERING METHODS

Section 3.1 Hydrologic Analysis

Hydrologic modeling was conducted pursuant to the criteria outlined in the CCRFCD's Hydrologic Criteria and Drainage Design Manual, and the U.S. Army Corps of Engineer's HEC-1 Flood Hydrograph Package Users Manual (HEC, 1990) for the Natural Resource Conservation Service (NRCS) Unit Hydrograph Option. The hydrologic models performed for this FIS restudy can be found in Section 2.1, Volumes 1 and 2, "Hydrologic Analysis."

3.1.1 Methodology

Input parameters for the HEC-1 models utilized basin area, soils classification, land use, run-off curve numbers, basin topography, point precipitation, rainfall duration and distribution, time of concentration, and hydrograph lag times. Subbasin delineations were based on the 2001 CCRFCD Master Plan Update to the greatest extent possible. However, substantial changes were made to reflect existing conditions, Clark County 5-foot contour data, and field reconnaissance. These changes were centered upstream of the Drake Channel in the River Mountains, and upstream of the Equestrian Detention Basin. Subbasin delineations used in the Equestrian Detention Basin LOMR (Case No. 99-09-628P) were used as much as practical, however, these also were modified to reflect existing conditions. Infiltration and storage characteristics of the subbasins were simulated in the model using runoff curve numbers. Composite curve numbers were developed for each subbasin based upon land use, soil type, vegetation type, and antecedent moisture content (AMC) Type II. Point rainfall depths used in the CCRFCD's 1996 Master Plan Update were applied to the subbasins and adjusted according to local depth-area reduction factors (DARFs) for storms of 6-hour duration. Recurrence intervals of 2, 10, 25, 50 and 100-year events were simulated over the entire study area using three separate storm distribution patterns. The SDN3, SDN4, and SDN5 storm distributions were modeled, and results are tabulated in Section 2.1.4 "Overall Storm HEC-1 Model," Volume II. Time of concentration (t_c) calculations for each subbasin were developed using the criteria outlined in the CCRFCD's Hydrologic Criteria and Drainage Design Manual. The lag times for subbasins were based on the following equation: TLAG = 0.6t. Time of concentration calculations used for model input are presented in Section 2.3.3 and 2.3.4 "Curve Number Calculations," and "Time of Concentration Calculations," Volume II. Figure 5 illustrates existing soil conditions. Figure 6 illustrates existing land use; Figure 7 illustrates an overall watershed map.

3.1.2 Regional Analysis

Figure 7 illustrates the C-1 watershed subbasin layout and routing of storm flows. Refer to this figure and Figure 2 during the following discussion.

The hydrologic analysis begins in the **Upper C-1 Basin**, and quantifies flow from subbasins contributing to CCRFCD facilities in that region. Runoff from subbasin C1H begins at the top of the McCullough Range and is intercepted by the Black Mountain (Southwest C-1) Detention Basin. The outfall structure from this detention basin drains

east through the Mission Hills Western Interceptor, which picks up runoff from subbasins C1HB1, C1G3A, C1G3B, C1G3C, and C1G3D. This facility directs flow to the Mission Hills Detention Basin, which also intercepts flow from subbasins C5ICB and C5I2A. Quantified outflow from the Mission Hills Detention Basin is then routed via an 84-inch pipe to the NDOT Detention Basin at I-515 and College Drive, and is routed to the upper C-1 Channel. Subbasins contributing flow in this area include C1G2B1, C1G2A, C1G2B, C1G2C, C1G2D, C5I1 and C5I1C. Subbasins in the Mission Hills Range include C5GB and C5GC, which are routed to subbasin C5GA. Runoff from these basins is routed south along Boulder Highway, where a future facility will convey stormwater to the C-1 Channel. A series of five small culverts under the Boulder Highway divert flow from subbasins C5I1B, C5GD, C5I1E, C5I1D, C1HF, C1HE, C1HD, C1HCB, and C1HB into the Central C-1 Basin, which were described in detail in a previous LOMR for the Equestrian Detention Basin, Case No. 95-09-934P. At least three other culverts cross Boulder Highway in the vicinity of the Race Track Road intersection, however, these were not included as part of this study (Figure 3). Land use in this drainage area is primarily residential, which is bisected by the existing railroad, I-515, and the Boulder Highway. Pertinent concentration points have been identified, and flows at these locations are tabulated on Figure 7. Please refer to the HEC-1 schematic and Figure 7 for model details on hydrograph routing parameters.

In the **Central C-1 Basin**, stormwater runoff from the southeastern portion of the region begins in the River Mountains in subbasins C5FA, C5FD, C5FB, C5FC, C5EA, C5EB, C5EC, C5ED, and C5DA. Flows quantified in these areas are routed along the Equestrian Levee to the Equestrian Detention Basin. Flows crossing through culverts under the Boulder Highway (Upper C-1 Basin), are routed through basins C5CA, C5CD, C5CC, C5CF, and C5CE to the Equestrian Detention Basin. Flow from basin C5DC, and C4BD are also directed to the Equestrian Detention Basin. The Southern Nevada Water Authority constructed a water treatment facility to treat raw water from Lake Mead before distribution to the Las Vegas Valley. Associated with this treatment facility is an onsite detention basin with a 48-inch pipeline outfall. This outfall drains subbasin C4BF to the Equestrian Detention Basin through subbasin C4BD. Flows discharging from the Equestrian Detention Basin are routed to the future Burkholder Channel. This outfall--the Equestrian Detention Basin Outfall-- intercepts flow from subbasins C4A1C and C4A1B and directs these flows to the C-1 Channel. The C-1 Channel intercepts all flow from the Upper and Central C-1 basins at Burkholder Road. Pertinent concentration points have been identified and flows at these locations are tabulated on Figure 7. Refer to the HEC-1 schematic and Figure 7 for details on hydrograph routing parameters.

The **Lower C-1 Basin** includes hydrologic subbasins which begin in the River Mountains. Storm water runoff from subbasin C4CB is intercepted by the East C-1 Detention Basin. Outflow from this detention basin, as well as flow from subbasins C4CA, C3B3E and C3B3D are routed along the East C-1 Levee to the Drake Channel. The Drake Channel also intercepts flow from subbasin C4BA2, C3B3C, C3B3B, and C3B3A. Storm water runoff from subbasins C4BA3, C4A2A and C4A1A is then routed to the C-1 Channel. Below the Drake Channel, flow from subbasins C3A2B, C3A2A, C4BA1, C3B1D, C3B1C, C3B1B, C3B1A, C3A1B, and C3A1A are also routed to the C-1 Channel. Pertinent concentration points have been identified, and flows at these

locations are tabulated in Tables 1 & 2, and on Figure 7. Please refer to the HEC-1 schematic and Figure 7 for details on hydrograph routing parameters.

3.1.3 Local Analysis

Detailed, local hydrologic analysis was necessary to quantify storm flows in subbasin C4A1. A SFHA Zone A adjacent to Newport Townhomes was removed by Approximate Methods Hydraulics. The hydrologic analysis, and associated exhibits, are located in Section 2.1.5. "Local Hydrology"—Volume II.

3.1.4 Study Assumptions and Modifications made to the existing Flood Insurance Study

Several assumptions have been made in development of this hydrology. For one, the study assumes that alluvial processes no longer apply to the C-1 system. This assumption is reasonable given the extensive construction of structural controls. The East C-1 Levee and East C-1 Detention Basin truncate the apex of an alluvial fan spreading west from the River Mountains. The Equestrian and Mission Hills flood control facilities further cutoff storm runoff and direct storm flows into detention basins with controlled outflow. Given this level of construction, Section "G" of the latest regulations for study contractors, titled "Flood Insurance Study Guidelines and Specifications for Study Contractors" does not apply. A newly created SFHA draining northwest from the East C-1 Levee is therefore categorized as a Zone A.

Another assumption has been made about the Drake Channel. Although the Drake Channel does not meet CCRFCD hydraulic criteria, it is assumed that the Drake Channel intercepts the 100-year peak discharge and conveys the flow to the C-1 Channel.

3.1.5 Results

Results from the hydrologic model were used to establish existing stormwater flows throughout the study area, and specific points of concentration were identified for input to the hydraulic model of the C-1 Channel in specific reaches. Table 1 is a storm flow summary for each subbasin based on an SDN3 storm distribution for the 1 percent chance storm event. Table 2 is a storm flow summary for each point of concentration based on SDN3, SDN4, and SDN5 for 1 percent chance storm event. SDN3 controls where the watershed is less than 8 square miles, whereas, SDN4 and SDN5 control where the watershed is between 8 and 12 square miles, and greater than 12 square miles, respectively.

Table 1 – Storm Flow Summary (SDN3)

Subbasin Number	Area (acres)	Area (sq mi)	100-yr pk discharge (cfs)
C1G1A	143.36	0.22	255
C1G1B	90.88	0.14	200
C1G2C	187.52	0.29	210
C1G2D	143.36	0.22	153
C1G3B	469.12	0.73	1014
C1G3C	670.72	1.05	1372
C1G3D	535.68	0.84	1246
C1A	89.60	0.14	149
C1B	241.28	0.38	450
C1C	147.20	0.23	213
C1D	256.00	0.40	338
C1G2A	221.44	0.35	309
C1G2B1	321.92	0.50	260
C1G2B2	197.76	0.31	230
C1G3A	174.72	0.27	358
C1H	2559.99	4.00	5490
C1HA	46.72	0.07	27
C1HB	94.08	0.15	278
C1HB1	288.00	0.45	305
C1HCB	115.84	0.18	249
C1HD	46.72	0.07	72
C1HE	94.08	0.15	115
C1HF	56.32	0.09	90
C1NA	264.96	0.41	744
C3A1A	239.36	0.37	433
C3A1B	673.92	1.05	1403
C3A2A	303.36	0.47	825
C3A2B	327.68	0.51	769
C3B1A	160.64	0.25	170
C3B1B	128.00	0.20	139
C3B1C	153.60	0.24	374
C3B1D	156.80	0.25	215
C3B3A	327.68	0.51	838
C3B3B	204.80	0.32	508
C3B3C	793.60	1.24	2610
C3B3D	160.00	0.25	455
C3B3E	147.20	0.23	396
C4A1	223.36	0.35	248
C4A1A	189.44	0.30	109
C4A1B	172.80	0.27	134

Subbasin Number	Area (acres)	Area sq (mi)	100-yr pk discharge (cfs)
C4A1C	332.80	0.52	481
C4A1D	38.40	0.06	52
C4A2A	160.00	0.25	322
C4A2B	160.00	0.25	203
C4BA1	294.40	0.46	289
C4BA2	72.32	0.11	92
C4BA3	260.48	0.41	296
C4BB	222.72	0.35	377
C4BC	153.60	0.24	255
C4BD	335.36	0.52	409
C4BE	140.80	0.22	241
C4BF	166.40	0.26	417
C4CA	128.00	0.20	237
C4CB	3455.99	5.40	10493
C5GA	174.08	0.27	109
C5GB	204.80	0.32	451
C5GC	70.85	0.11	223
C5GD	289.28	0.45	163
C5CA	190.08	0.30	185
C5CB	89.60	0.14	127
C5CC	214.40	0.34	286
C5CD	170.88	0.27	153
C5CE	207.36	0.32	221
C5CF	206.72	0.32	228
C5DA	650.24	1.02	2210
C5DB	346.24	0.54	1079
C5DC	206.08	0.32	601
C5EA	311.68	0.49	690
C5EB	369.28	0.58	806
C5EC	140.80	0.22	179
C5ED	103.68	0.16	178
C5FA	334.72	0.52	1125
C5FB	158.08	0.25	167
C5FC	142.08	0.22	191
C5FD	112.64	0.18	294
C5I1	153.60	0.24	238
C5I1B	337.92	0.53	479
C5I1C	32.00	0.05	68
C5I1D	71.04	0.11	126
C5I1E	104.32	0.16	266
C5I2A	896.00	1.40	1698
C5ICB	469.12	0.73	850

Table 2 – Storm Flow Summary (SDN3 – SDN5)

Concentration Point	Area (acres)	Area sq (mi)	100-yr pk discharge (cfs)
1			
2	2854.39	4.46	481
3	3027.19	4.73	637
4	3494.39	5.46	1343
5	4166.38	6.51	2442
6	6067.18	9.48	4916
7	7155.17	11.18	915
8	7417.57	11.59	799
9	281.60	0.44	626
10	454.40	0.71	665
11	844.80	1.32	798
12	908.80	1.42	870
13	403.20	0.63	574
14	1407.99	2.20	1315
15	1452.79	2.27	1185
16	198.40	0.31	291
17	288.00	0.45	478
18	1855.99	2.90	1522
19	2092.79	3.27	1431
20	9561.56	14.94	1178
21	403.20	0.63	531
22	10246.36	16.01	1511
23	10335.96	16.15	1549
24	3743.99	5.85	4748
25	396.80	0.62	307
26	608.00	0.95	508
27	774.40	1.21	589
28	601.60	0.94	1447
29	742.40	1.16	1506
30	1056.00	1.65	2023
31	1542.39	2.41	2964
32	1644.79	2.57	3001
33	2668.79	4.17	4356
34	4620.78	7.22	960
35	5177.58	8.09	1417
36	364.80	0.57	615
37	524.80	0.82	704
38	16198.34	25.31	2546
39	3731.19	5.83	607
40	3891.18	6.08	953
41	998.40	1.56	2788
42	5215.98	8.15	3427
43	5305.58	8.29	3482
44	5734.38	8.96	3914
45	22092.71	34.52	4380
46	633.60	0.99	1052
47	793.60	1.24	1104
48	23039.91	36.00	4660
49	23334.31	36.46	4702
50	953.60	1.49	1434
51	24524.70	38.32	5175

Section 3.2 Hydraulic Analysis

Hydraulic modeling was performed using the U.S. Army Corps of Engineer's HEC-RAS hydraulic modeling program. This program performs steady flow calculations, intended for calculating water surface profiles for steady or gradually varied flow. HEC-RAS includes a culvert analysis routing adapted from the Federal Highway Administration's Hydraulic Design of Highway Culverts Publication HDS No. 5 (FHWA 1985). The computational procedure is based on the solution of the one-dimensional energy equation. Energy losses are evaluated by friction (Manning's Equation), and contraction/expansion (coefficient multiplied by the change in velocity head). The momentum equation is utilized in situations where the water surface profile is rapidly varied, as in hydraulic jumps, or at junction structures.

3.2.1 Detailed Zone A Analysis

Cross sections for the C-1 Channel detailed hydraulic analysis were developed using as-built facility construction plans, and were supplemented with ground survey information and field reconnaissance. Hydraulic structures were detailed using these same plans, and also supplemented with field reconnaissance and ground surveys. Two separate facilities were studied to this level of detail, namely 1) the C-1 Channel from Lake Mead Drive to Boulder Highway, and 2) the East C-1 Levee.

3.2.1.1 C-1 Channel, Lake Mead Drive to Boulder Highway

Base maps for C-1 Channel hydraulics were assembled using three sets of existing plans for the lower and middle reaches. The model on the lower reach was based on plans prepared by VTN Nevada, titled "C-1 Channel, Lake Mead Drive to the Drake Confluence," dated 1993, and "C-1 Channel Phase II, Drake Confluence to Burkholder Boulevard" dated 1994. The datum for these plans was based on 1929 National Geodetic Vertical Datum (NGVD). The model on the middle reach was based on plans prepared by the LBG, titled "Upper and Middle Reaches of the C-1 Channel, Phase 1," dated 2001. The LBG plans were based on 1988 North American Vertical Datum (NAVD), therefore, the VTN plans were adjusted vertically to conform to the 1988 NAVD by adding 1.86 feet to match LBG plan elevations. Base maps from the three sets of plans were tied together to form one continuous hydraulic base map from Lake Mead Drive to Boulder Highway, which is located in Section 2.2.1.1 " C-1 Channel, Lake Mead Drive to Boulder Highway." in Volume II.

In general, the C-1 Channel is concrete lined, varying in cross section configuration from trapezoidal to rectangular, and slopes at ~ 2 % to the north. Velocities range from 37.46 fps to 15.63 fps under supercritical flow conditions, with one notable exception at the Drake Channel confluence. Immediately upstream of the Drake Channel confluence a drop structure/energy dissipater forces a hydraulic jump to subcritical flow conditions at the confluence. Downstream of the Drake confluence channel flow resumes at 1.07 % slope and the flow regime becomes supercritical once again. Transition structures are located at various bridge crossings, such that the trapezoidal cross section transitions to a rectangular section upstream and downstream of the bridge. The following is a list of bridge structures modeled between Lake Mead Drive and Boulder Highway:

- Lake Mead Drive
- Warm Springs Road Crossing
- Pedestrian Crossing
- Burkholder Boulevard
- Boulder Highway

Channel roughness coefficients were derived from the Clark County Regional Flood Control District's Hydrologic Criteria and Drainage Design Manual, Table 702, which assigns Manning's Roughness Coefficients to different types of channel lining. Cross sections were placed at changes in channel geometry, and at all hydraulic structures as recommended in the HEC-RAS User's Manual. Cross section locations are depicted on the hydraulic base maps, as shown in Section 4.3.3 "C-1 Channel" in Volume III.

The report entitled *Alternatives Summary memorandum for the Upper & Middle Reaches of the C-1 Channel*, prepared by the LBG, dated December 22, 1999, included an analysis of the potential for roll waves formulation in the C-1 Channel. Because of the relative steepness of the channel, and resulting supercritical flow regime; the potential for roll wave formulation was analyzed by LBG. Based on the results of this report, which was reviewed and approved by the CCRFCD and the City of Henderson, LBG concluded that sufficient length between major hydraulic structures (transition structures and culverts) would prevent the formation of roll waves (slug flow). This being the case, the study contractor has not included a roll wave analysis in this FIS restudy, as the conditions computed by the LBG are representative of the reach of the C-1 Channel being studied herein by detailed methods.

Photographs of all hydraulic structures in the C-1 Channel have been taken, and are included in 5.1 "Field Review/Photographs," in Volume IV. Figure 3 illustrates the sections of the C-1 Channel studied by detailed methods hydraulics.

3.2.1.2 East C-1 Levee

The East C-1 Levee was constructed as part of the East C-1 Detention Basin in April, 1998. Both the detention basin and the levee were constructed to protect the Southern Nevada Water Authority (SNWA) River Mountains Treatment Plant, effectively truncating the apex of the alluvial fan spreading west from the River Mountains escarpment. The levee has a 7:1ss floodside, lined with 12-inches of soil cement, whereas the landward side has 4:1ss. The 100-year storm flows leaving the detention basin are 96.8 cfs, (bulked 10%; see Section 3.4.1, Sedimentation Analysis, for bulking factor determination), with slow velocities (< 5 fps) and shallow depth of flow (<1 foot). Flows increase to 667.7 cfs (10% bulked) where an unnamed wash drains west from the River Mountains. Detailed Methods Hydraulics were done for the East C-1 Levee but combined with Reach 2C using Approximate Methods Hydraulics. A hydraulic work map for the levee is located in Section 4.3.3, Volume IV. Further information such as plans, design reports, and getechnical information is provided electronically in Section 5, "Miscellaneous Reference Material," Volume IV.

3.2.2 Approximate Zone A Analysis

An approximate analysis was performed for three reaches in order to re-define the SFHA Zone A for the specific reach. These reaches have been named Reach 2, Reach 3, and Reach 4, as described below.

3.2.2.1 Reach 2

Reach 2 is broken into three segments: Reach 2A, 2B, and 2C. The intent of the Approximate Methods Hydraulics for Reach 2 is to define the SFHA associated with the storm flows leaving the East C-1 Levee and River Mountains.

Storm flows from Reach 2B and Reach 2C combine to form Reach 2A immediately north of the East C-1 Levee (3830 cfs, 10% bulked). Velocities for this reach range from 6.2 to 8 fps with depths greater than 1-foot, therefore defining a SFHA Zone A, as shown on the annotated FIRM and 400 scale approximate methods work maps.

Reach 2C was modeled using the plans from the East C-1 Levee, as described in Section 3.2.1.2. A SFHA Zone A was defined where storm flows increased to 667.7 cfs (10% bulked) because depths were greater than 1-foot. The newly defined SFHA ties to the existing SFHA Zone A upstream in the River Mountains. Where the 100-year peak drops to 96.8 cfs, depths are less than 1-foot and therefore the SFHA Zone A has been removed up to the Black Mountain(Southwest C-1) Detention Basin.

Reach 2B models 3769 cfs (10% bulked) draining west from the River Mountains. A SFHA Zone A is necessary as depths of flow are greater than 1-foot. This newly created SFHA ties into an existing SFHA Zone A located in the River Mountains. Velocities for this reach range from 10.4 to 10.9 fps.

3.2.2.2 Reach 3

Reach 3 is located on the eastern edge of subbasin C1NA, at the location of Foothills High School. The intent of this model is to demonstrate the 100-year peak discharge is contained in the existing channel immediately downstream (north) of the NDOT Detention Basins. Velocities for this reach range from 5.4 to 9.3 fps, conveying 1006 cfs (10% bulked), greater than 1-foot in depth. The SFHA Zone A is therefore modified to the existing channel.

3.2.2.3 Reach 4

Reach 4 is located immediately downstream of the Black Mountain (Southwest C-1) Detention and Mission Hills Western Interceptor. The intent of this model is to reduce or eliminate the SFHA Zone A located in subbasins C1G2B1 and C1G2B2. The model reach upstream of cross section 12 shows flow depths less than 1-foot, with velocities less than 5 fps, at a flow rate of 286 cfs (10% bulked) therefore allowing for the removal of the SFHA Zone A in C1G2B1. The lower half of Reach 4 (cross sections 1-12) shows flows depths greater than 1-foot, with velocities ranging from 4.3 to 7.3 fps, and a flow

rate of 490 to 799 cfs (10% bulked). The SFHA Zone A was redefined based on the 100-year water surface elevations, but not entirely removed.

Section 3.3 Vertical Datum

All base flood elevations shown in the FIS Restudy have been referenced to NAVD88. Because the community and some of the as-built information utilized was referenced to NGVD29, a vertical adjustment factor of 1.86 feet and 2.31 feet, was applied to NGVD29 elevations at various locations. Survey notes and electronic files are located in Section 5, Volume IV.

Section 3.4 Sedimentation Analysis

Prior to the placement of flood control facilities the C-1 system comprised a typical alluvial watershed found in the arid southwest. Storm runoff flowed north and west from the McCullough Range and River Mountains to form alluvial bajadas that coalesced in the vicinity of the present C-1 Channel. Converging contours forming a continuous low point along the present day C-1 Channel that can still be seen under the existing, developed watershed.

The lithology of the River Mountains and McCullough Range contributes to sediment laden runoff that forms the alluvial depositional surface. The River Mountains generally consist of a reddish-orange volcanic rock (dacite) supporting little or no vegetation, whereas the McCullough Range consists (generally) of a black volcanic rock (basalt) also supporting little or no vegetation. Both mountain ranges provide sediment laden silt, sands, and gravels transported downstream as both wash load and bed load. A normal fault of tectonic origin—typical of the basin and range physiographic province—strikes north-south along the base of the River Mountains forming a mountain block escarpment. This escarpment—combined with a sediment laden watershed---forms the basis of the River Mountain alluvial fan and bajada.

Superimposed on the River Mountain—McCullough Range alluvial system are flood control facilities that greatly diminish sediment transport, truncating the alluvial depositional environment. Facilities that act as barriers to sediment transport include the:

- Black Mountain (Southwest C-1) Detention Basin
- Mission Hills Western Interceptor
- Mission Hills Detention Basin
- Equestrian Detention Basin
- Equestrian Levee
- East C-1 Detention Basin
- East C-1 Levee

Sediment transport analysis has been performed for the Mission Hills and Equestrian System, and the Black Mountain (Southwest C-1) and East C-1 Detention Basins. These analyses are made a part of this study as supporting documentation to this sediment transport analysis, and may be found electronically under Section 5, "Miscellaneous Reference Material" on the enclosed compact disk.

The existing structural controls not only trap sediment, but also remove the River Mountain-McCullough bajadas from consideration as active alluvial fans. The East C-1 Levee truncates the apex of the River Mountains alluvial fan, allowing for removal of SFHAs Zones A and AO associated with River Mountains runoff.

Section 3.4.1 Sediment Transport

The Modified Uniform Soil Loss Equation (MUSCLE) was used to determine wash load bulking factors for various detailed and approximate methods hydraulic analysis. The US Army Corp of Engineers' HEC-6 "Scour and Deposition in Rivers and Reservoirs" sediment transport program was utilized for the East C-1 Levee to analyze long term aggradation and/or degradation. Other bed load analyses were not performed because bed load sediment transport is intercepted at the various flood control facilities. Therefore, this analysis is limited to wash load determination using the MUSCLE, following guidelines set forth in the CCRFCD's Hydrologic Criteria and Drainage Design Manual.

The entire C-1 watershed was analyzed by subbasin for SDN3 to estimate sediment yields. The Uniform Soil Loss Equation (USLE) is defined as:

$A = RKLSCP$

where:

A = estimated annual soil loss in ton/acre
R = rainfall/erosivity factor
K = soil erodability factor
L = slope-length factor
S = slope steepness factor
C = cropping factor
P = conservation practice factor

Because sediment yield is strongly related to flow characteristics and less to rainfall characteristics, William and Berndt (1972) modified the USLE to by replacing R with a runoff factor applicable to short-term, high intensity events. The USLE is therefore modified as

$Y_s = 95(VQ_p)^{0.56}KLSCP$

where:

Y_s = storm event sediment yield in tons
Q_p = storm event peak flow in cfs
V = storm event runoff volume in acre-feet

Using the above methodology, a bulking factor was determined at approximately 5% for estimating wash load in the watershed. However, a conservative approach was taken to estimating wash load, such that 10% was used as a bulking factor on hydraulic models. HEC-6 was used to estimate long-term aggradation and degradation of the East C-1 Levee; results for the East C-1 Levee show no significant degradation for the East C-1 Levee.

3.4.1.1 Determination of Sediment Yield due to Overland Erosion

The MUSLE was used to determine estimated sediment yields for the entire Henderson Basin. Figure 8 shows grain size distribution curves taken closest to the surface from soils borings located in various sections of the watershed. Although these samples were taken from logs of test borings, an assumption was made that these distributions applied to sediment load in washes found throughout the Henderson Basin. Using the grain size distributions, the soil erodibility factor K was determined from the nomograph shown in Figure 9 (Wischmeier, 1971). The soil erodibility factor is a function of the percent silt, percent coarse sand, soil structure, permeability, and percent of organic matter.

The contour-length method developed by Williams and Berndt (1976) was used to determine the slope steepness factor, S, of the MUSLE, defined as follows:

$$S = 0.25Z(LC_{25} + LC_{50} + LC_{75})/DA$$

where:

Z	=	total watershed height (ft)
LC_{25}	=	contour length at 25% of Z (ft)
LC_{50}	=	contour length at 50% of Z (ft)
LC_{75}	=	contour length at 75% of Z (ft)
DA	=	drainage area (ft^2)

The slope-length factor L was determined using the contour-extreme point method (Williams and Berndt, 1976):

$$\lambda = \frac{(LC \times LB)}{(2EP\sqrt{LC^2 - LB^2})}$$

where:

λ	=	slope length
LC	=	total length of contours
LB	=	length around the base of the contour
EP	=	number of extreme points on the contour

The topographic factor LS was determined by the equation:

$$LS = (\lambda/72.6)^{0.5}\, 0.065 + 0.0454S + 0.0065S^2)$$

where:

S = slope in percentage

The cropping management factor C, ranging from 0 to 1, was determined by the following equation (Wishmeier, 1972):

$$C = C_I C_{II} C_{III}$$

where:

C_I = Effect of Canopy Cover
C_{II} = Effect of mulch or close-growing vegetation
C_{III} = Tillage and residential effect of the land use

Figures 10, 11 and 12 show the influence of vegetal canopy, effect of plant residues or close-growing stems at the soil surface, and the type III effects on undisturbed land areas.

The effect of conservation practices on erosion control such as contouring, strip cropping, and terracing is measured by erosion control factor P. For wildland areas this factor is set at 1.0, since these erosion control practices do not apply. For developed areas, P can be estimated from aerial photographs.

The values of LS, K, C, and P factors for all subbasins were estimated using the above methodologies and tabulated. The MUSLE was then applied to estimate the sediment yields due to overland flow for the 2-year, 5-year, 10-year, 25-year, and 100-year storm events. Runoff peak discharges and volumes of hydrographs were generated from HEC-1 and tabulated to estimate wash load. It was assumed in this analysis that wash load was transmitted directly through the detention basins, or that no sediment was trapped.

Section 4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and Local governments to adopt sound floodplain management programs. Therefore, each FIS provides 1-percent-annual-chance (100-year) flood elevations and delineations of the 1- and 0.2- percent-annual-chance (500-year) floodplain boundaries. The 1-percent-annual-chance floodway is also provided to assist communities in developing floodplain management measures. This information is present on the FIRM and in many components of the FIS report, including Flood Profiles, Floodway Data Table and Summary of Stillwater Elevations Table. Users should reference the data presented in the FIS report as well as additional information that may be available at the local map repository before making flood elevation and/or floodplain boundary determinations.

Section 4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent-annual-chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2- (500-year) flood is employed to indicate additional areas of flood risk in the community. For this FIS restudy, each stream reach that has been studied by detailed methods, the 1-percent-annual-chance floodplain boundaries have been delineated using the flood elevations determined by detailed hydraulic analysis.

The 1-percent-annual-chance floodplain boundaries are shown on the annotated FIRM, Section 4.1, Volume III. On this map, the 1-percent-annual-chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zone A). As directed by the community, only the 1-percent-annual chance floodplain boundary has been shown, and delineation of the 0.2 percent-annual-chance floodplain is outside the scope of this study. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitation of the map scale and/or lack of detailed topographic data. For the stream reaches studied by approximate methods (Reaches 2, 3, & 4), the 1-percent-annual-chance floodplain boundary is also shown on the annotated FIRM.

Section 4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in area beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 1-percent-annual-chance floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 1-percent-annual-chance flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0-foot, provided that hazardous velocities are not produced.

This FIS restudy does not delineate regulatory floodways. The 1-percent-annual-chance flood is conveyed by or contained in the publicly owned and maintained facilities as indicated on the annotated FIRM and associated work maps.

Section 5.0 INSURANCE APPLICATIONS

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. The zones delineated in this FIS restudy are as follows:

Zone A

Zone A is the flood insurance risk zone that corresponds to the 1-percent-annual-chance floodplains that are determined in this FIS restudy by approximate and detailed methods. Base Flood Elevations (BFEs) are not shown within this zone on the annotated FIRM in Section 4.1.2, Volume III.

Zone X

Zone X is the flood insurance risk zone that corresponds to areas outside the 0.2-percent-annuyal chance floodplain, areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1-percent-annual-chance flood by levees. No BFEs are shown within this zone.

Section 6.0 FLOOD INSURANCE RATE MAP

The FIRM is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance risk zones as described in Section 5.0. Insurance agents use the zones in conjunction with information on structures and their contents to assign premium rates for flood insurance policies. For floodplain management applications, the map shows by tints, screens, and symbols, the 1- and 0.2-percent-annual chance floodplain, and the locations of selected cross sections used in the hydraulic analyses.

Section 7.0 OTHER STUDIES

Previous Studies and Reports:

- Black Mountain Detention Basin: VTN Nevada, *Black Mountain Detention Basin,* April 1999
- C-1 Channel: LBG, *Upper and Middle Reaches of the C-1 Channel – Phase 1,* June 2001
- C-1 Channel: VTN Nevada, *C-1 Channel Flood Control System Facilities Report*, September 1992
- East C-1 Detention Basin and Levee: VTN Nevada, *East C-1 Detention Basin,* June 1998
- Equestrian Detention Basin: Poggemeyer Design Group, Letter of Map Revision for the Equestrian Detention Basin, 1998
- FIS Hydrology Report: James M. Montgomery, *Las Vegas Valley Flood Insurance Study,* September 1991
- Mission Hills Detention Basin: VTN Nevada, *Mission Hills Detention Basin,* April 1993
- Mission Hills Western Interceptor: VTN Nevada, *Design Calculation Notebook for the Mission Hills Western Interceptor*, July 1993

This FIS restudy either supersedes or is compatible with previous studies on streams studied in this report and should be considered authoritative for purposes of the NFIP.

Section 8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this FIS restudy can be obtained by contacting the Flood Insurance and Mitigation Division, Federal Emergency Management Agency, the Clark County Regional Flood Control District, or the City of Henderson.

Section 9.0 BIBLIOGRAPHY

Plans

Century West Engineering, *Construction Plans for Drake Channel Improvements,* August 1992

City of Henderson, *C-1A Channel,* January 1979

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City of Henderson, *C-1 Channel Pedestrian Bridge @ London Ave.,* February 1985

Hunsaker & Associates, *C-1 Channel Sausalito Dr. to Newport Dr.,* 1995

Louis Berger Group, *Upper and Middle Reaches of the C-1 Channel – Phase 1,* June 2001

VTN Nevada, *C-1 Channel at Lake Mead Drive (HWY. 146) Channel Repairs,* 1992

VTN Nevada, *C-1 Channel Phase II Drake Confluence to Burkholder Blvd,* 1994

VTN Nevada, *C-1 Channel Lake Mead Dr. to the Drake/C-1 Confluence,* 1994

VTN Nevada, *Improvement Plans for Drake Channel,* August 1992

VTN Nevada, *East C-1 Detention Basin Flood Control Improvements,* April 1998

VTN Nevada, *Mission Hills Detention Basin and Outfall Structure,* 1993

VTN Nevada, *Mission Hills Western Interceptor Channel,* 1996

VTN Nevada, *Black Mountain Detention Basin,* April 1999

Reports

Hunsaker & Associates, *C-1 Channel – Sausalito to Newport,* October 1994

L.R. Nelson, *C-1 Channel – Newport to Sausalito Channel Design,* February 1996

Louis Berger Group, *Upper and Middle Reaches of the C-1 Channel – Phase 1,* June 2001

Montgomery Watson, *C-1 Channel Improvements Lake Mead Drive,* November 1997

Orion Engineering, *Drainage Study for Sunset View Estates Unit 4,* March 2001

Poggemeyer Design Group, *Letter of Map Revision for the Equestrian Detention Basin,* 1998

VTN Nevada, *C-1 Channel Flood Control System Facilities Report,* September 1992

VTN Nevada, *C-1 Channel Burkholder to Lake Mead,* February 1994

VTN Nevada, *East C-1 Detention Basin,* June 1998

VTN Nevada, *Mission Hills Detention Basin,* April 1993

VTN Nevada, *Design Report for the Black Mountain Detention Basin,* April 1999

Section 10.0 REVISIONS DESCRIPTION

This section has been added to provide information regarding significant revisions made since the original FIS restudy and FIRM were printed. All users are advised to contact the Community Map Repository at the address below to obtain the most up-to-date flood hazard data.

City of Henderson
240 Water Street
Henderson, Nevada 89015

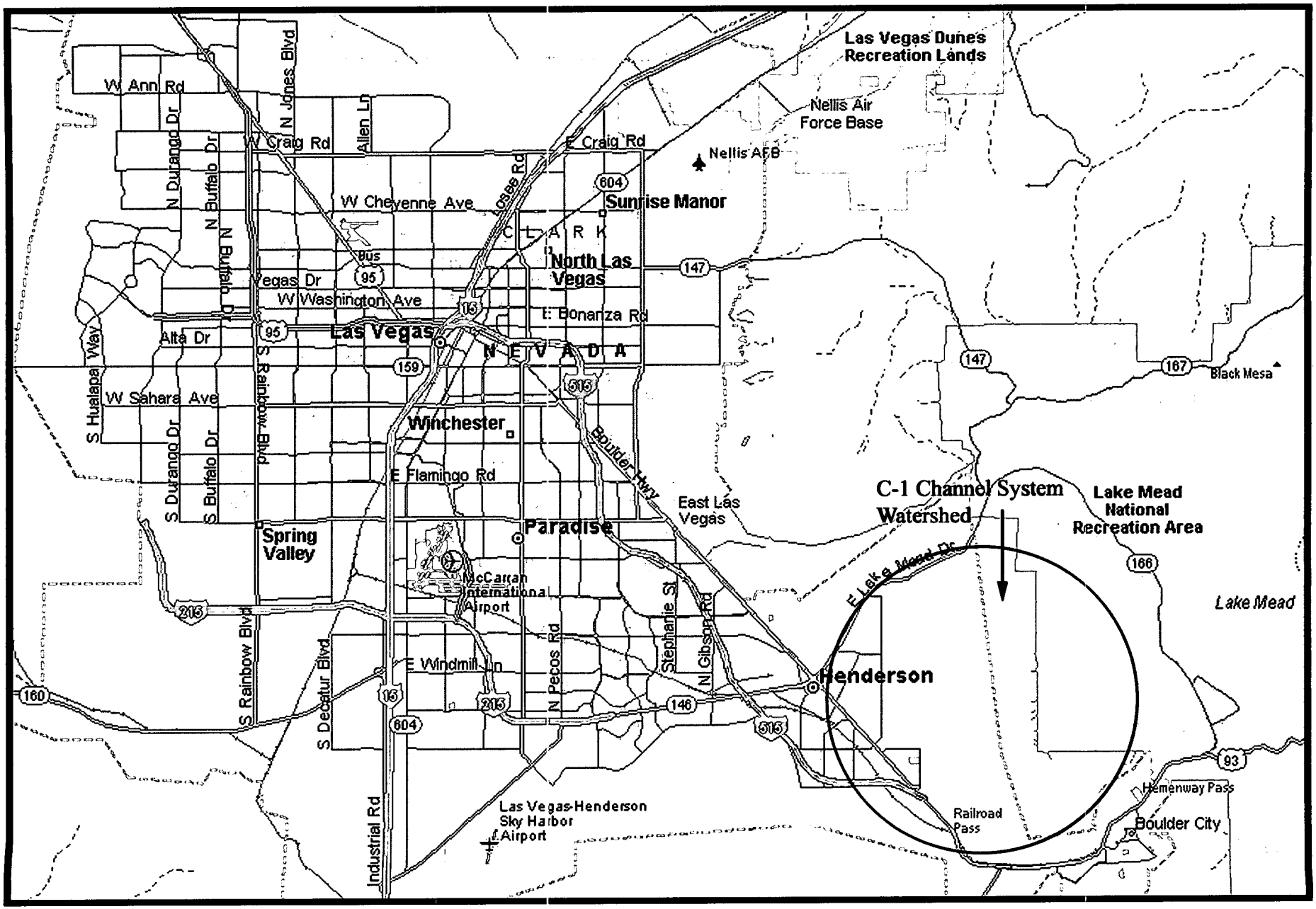
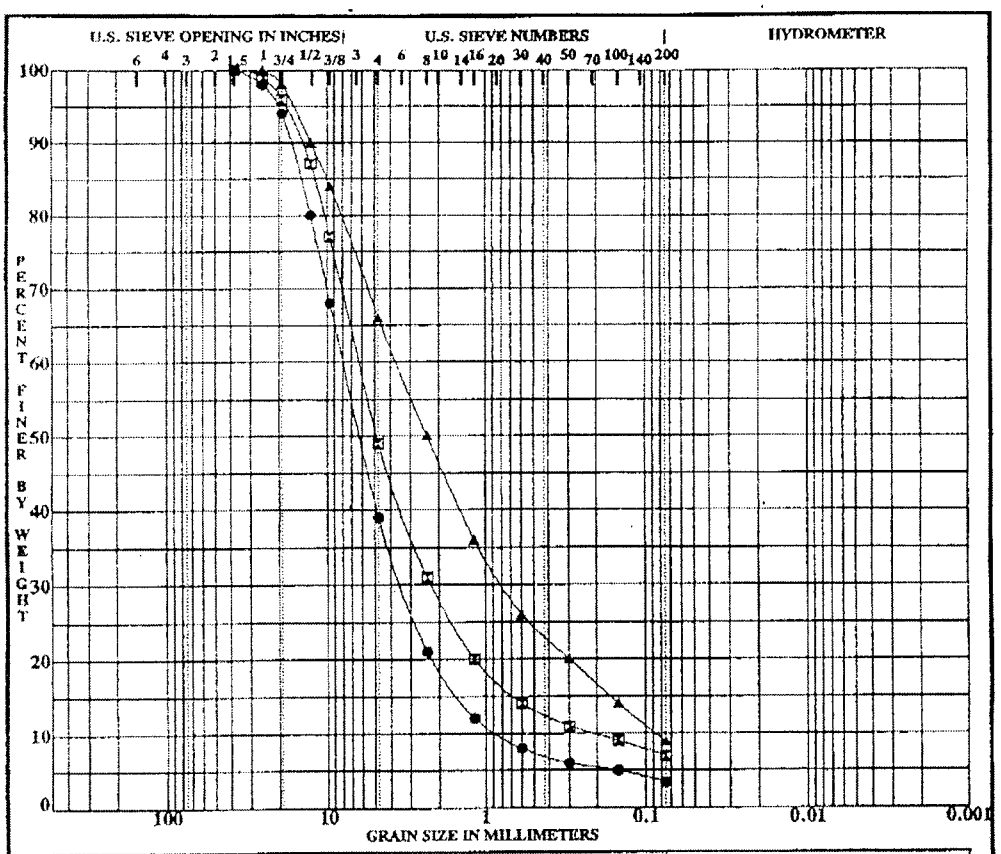


Figure 1 - Vicinity Map



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Exploration No.	Depth(ft)	Classification	LL	PL	PI	Cc	Cu
●	B-1	0.0	WELL GRADED GRAVEL with SAND (GW)	NP	NP	NP	1.69	9.3
■	B-1	25.0	POORLY GRADED GRAVEL with SILT and SAND (GP-GM)	NP	NP	NP	3.71	29.4
▲	B-2	0.0	WELL GRADED SAND with SILT and GRAVEL (SW-SM)	NP	NP	NP	1.94	42.0

	Exploration No.	Depth(ft)	D100 (mm)	D60 (mm)	D30 (mm)	D10 (mm)	%Gravel	%Sand	%Silt	%Clay
●	B-1	0.0	38.10	7.87	3.348	0.8414	61.0	35.6	3.4	
■	B-1	25.0	38.10	6.24	2.216	0.2121	51.0	42.0	7.0	
▲	B-2	0.0	25.40	3.65	0.786	0.0871	34.0	57.1	8.9	

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NO. 31-110021-001

PROJECT: East C-1 Detention Basin

GRAIN SIZE ANALYSES

PLATE B-1

Figure 8 – Typical Grain Size Distribution

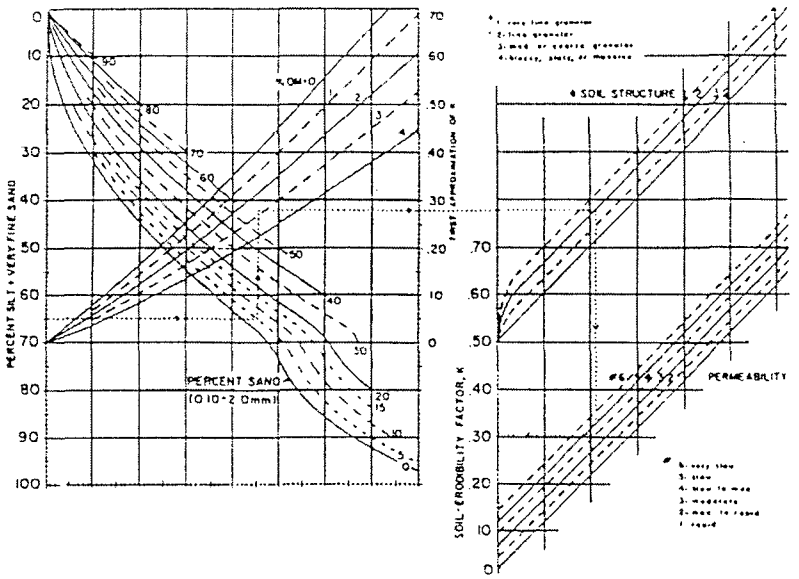


Figure 9 – Soil Erodibility Nomograph Used to Determine Factor K (tons/acre) for Specific Topsoils or Subsoil Horizons (Wishmeier et al, 1971)

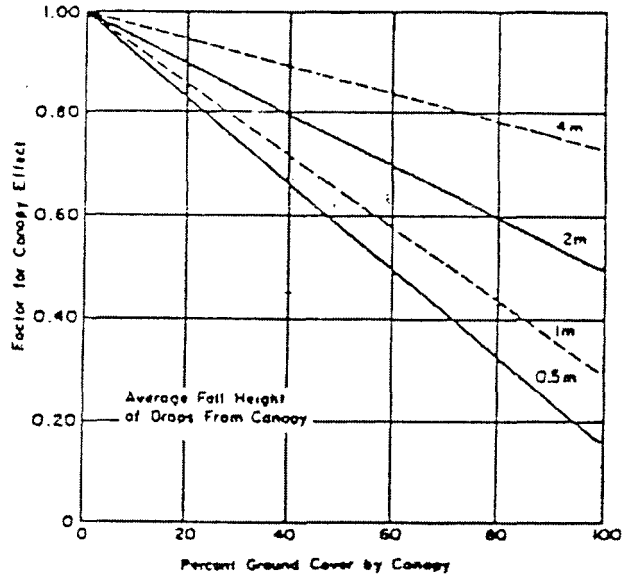


Figure 10 – Influence of Vegetal Canopy (Wishmeier, 1971)

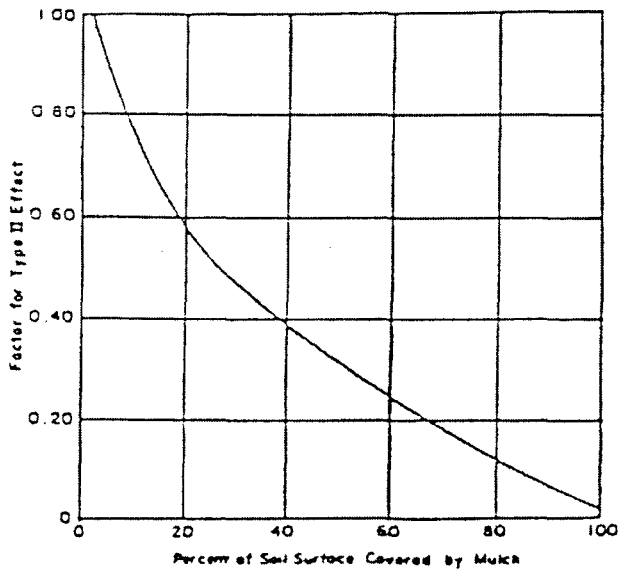


Figure 11 – Effect of Plant Residues of Close-Growing Stems at the Soil Surface (Wishmeier, 1972)

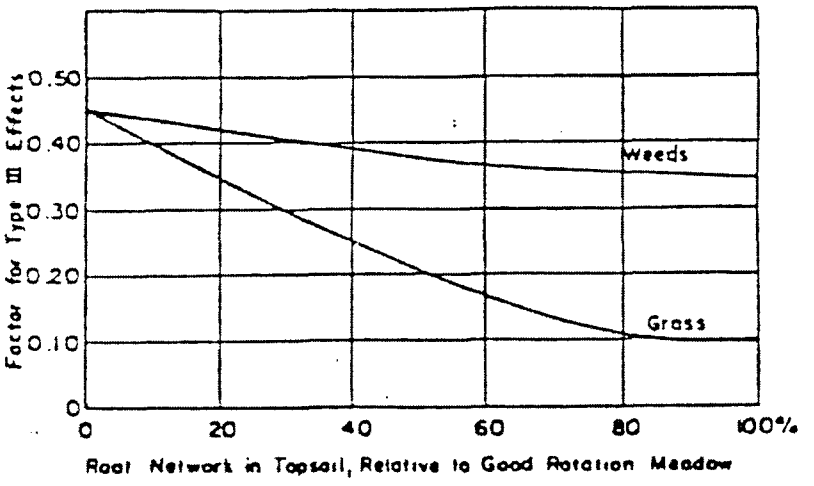
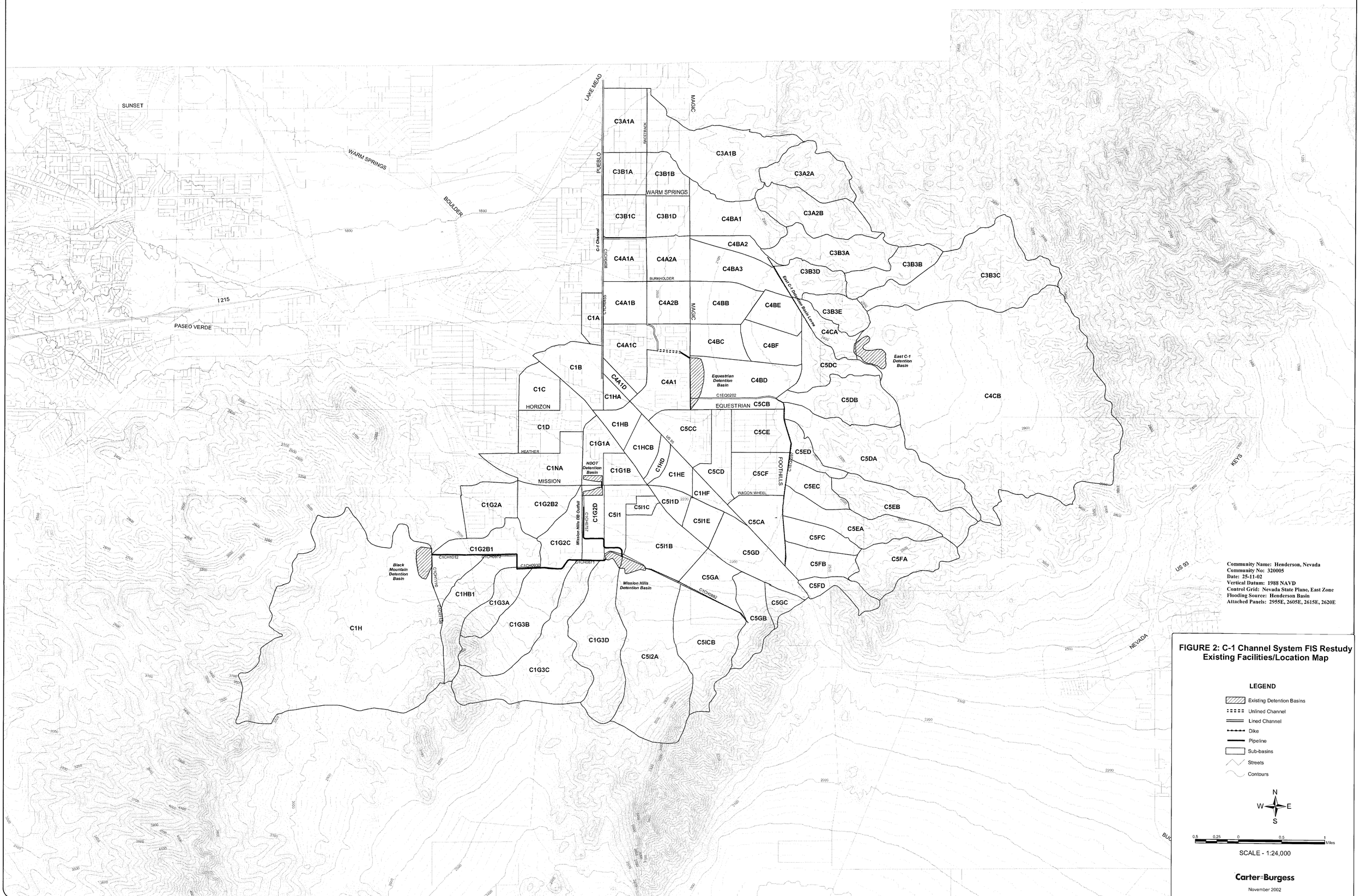


Figure 12 – Type III Effects on Undisturbed Land Areas (Wishmeier, 1972)

FIGURE 2: C-1 Channel System FIS Restudy Existing Facilities/Location Map



Community Name: Henderson, Nevada
Community No: 320005
Date: 25-11-02
Vertical Datum: 1988 NAVD
Control Grid: Nevada State Plane, East Zone
Flooding Source: Henderson Basin
Attached Panels: 2955E, 2605E, 2615E, 2620E

FIGURE 2: C-1 Channel System FIS Restudy Existing Facilities/Location Map

LEGEND

- Existing Detention Basins
- Unlined Channel
- Lined Channel
- Dike
- Pipeline
- Sub-basins
- Streets
- Contours

N
W E
S

0.5 0.25 0 0.5 1 Miles

SCALE - 1:24,000

Carter Burgess

November 2002

FIGURE 5: C-1 System Flood Insurance Restudy Soils Map

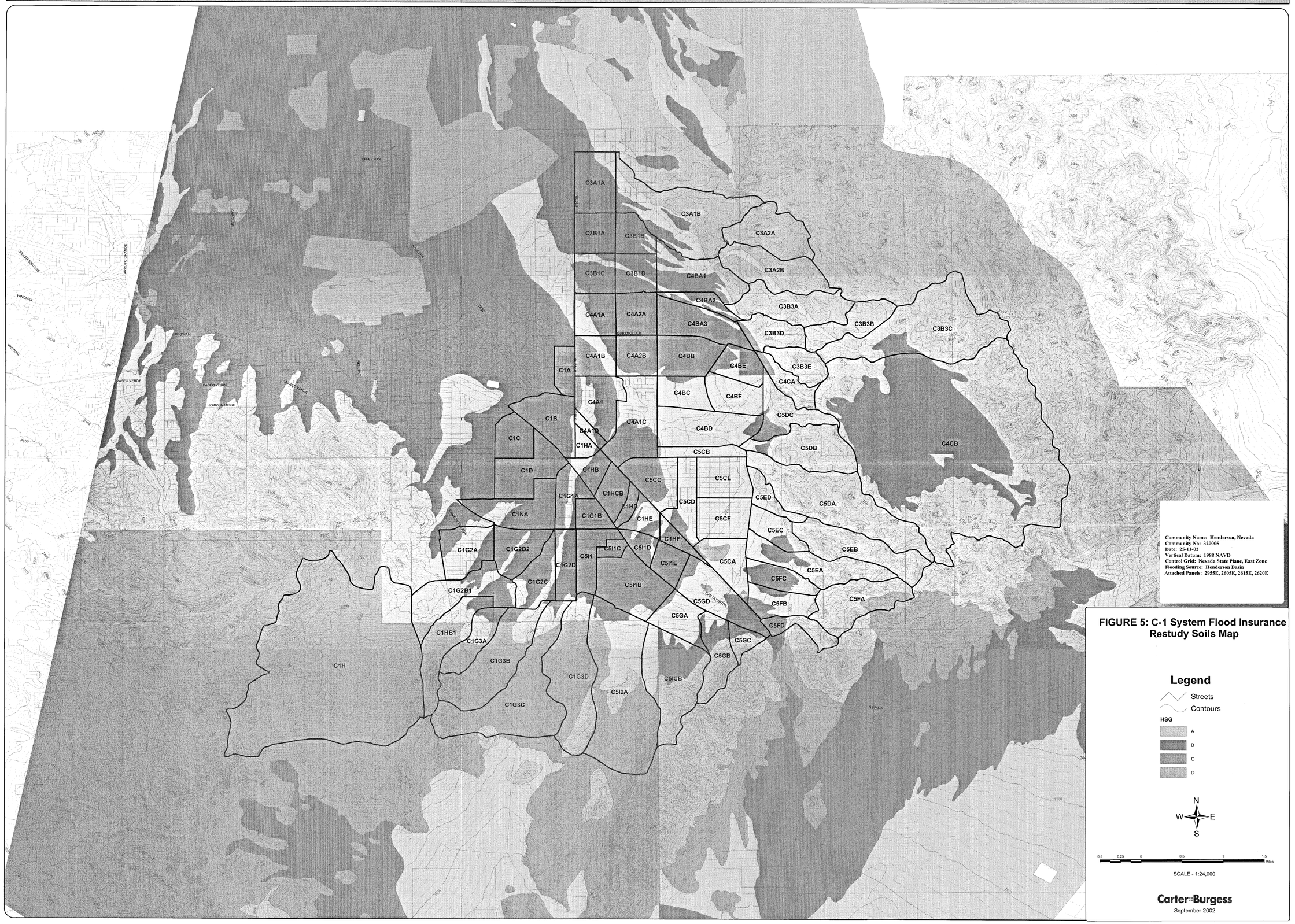


FIGURE 5: C-1 System Flood Insurance Restudy Soils Map

Legend

- Streets
- Contours

HSG

- A
- B
- C
- D

N
W E
S

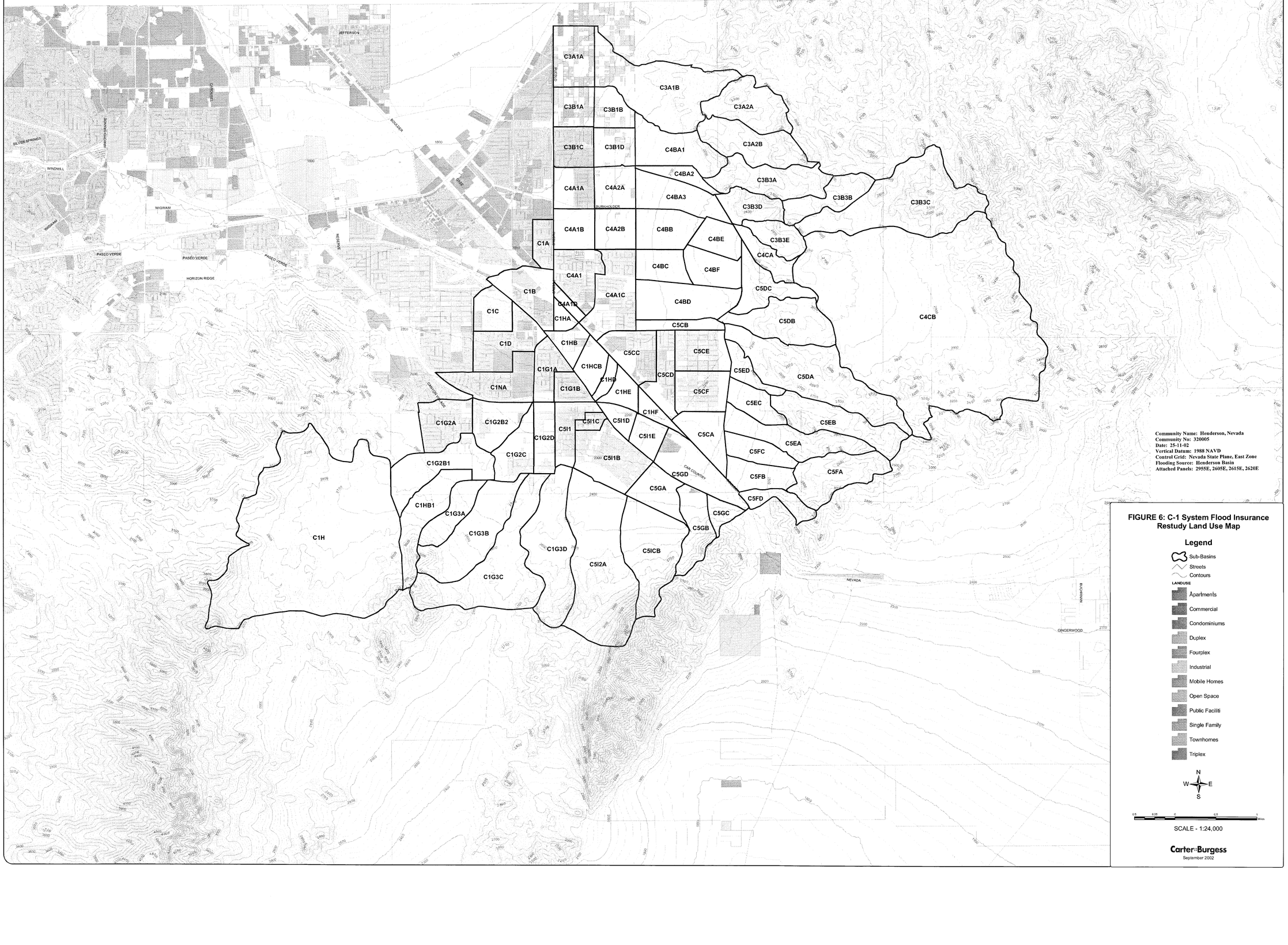
0.5 0.25 0 0.5 1 1.5 Miles

SCALE - 1:24,000

Carter & Burgess

September 2002

FIGURE 6: C-1 System Flood Insurance Restudy Land Use Map



Community Name: Henderson, Nevada
Community No: 320005
Date: 25-11-02
Vertical Datum: 1988 NAVD
Control Grid: Nevada State Plane, East Zone
Flooding Source: Henderson Basin
Attached Panels: 2955E, 2605E, 2615E, 2620E

FIGURE 6: C-1 System Flood Insurance Restudy Land Use Map

Legend

- Sub-Basins
- Streets
- Contours

LANDUSE

- Apartments
- Commercial
- Condominiums
- Duplex
- Fourplex
- Industrial
- Mobile Homes
- Open Space
- Public Faciliti
- Single Family
- Townhomes
- Triplex

N
W E
S

0.5 0.25 0 0.5 1 Miles

SCALE - 1:24,000

Carter Burgess

September 2002

FIGURE 7: C-1 System Flood Insurance Restudy Watershed Map

STORM FLOW SUMMARIES

Point of Concentration Summary

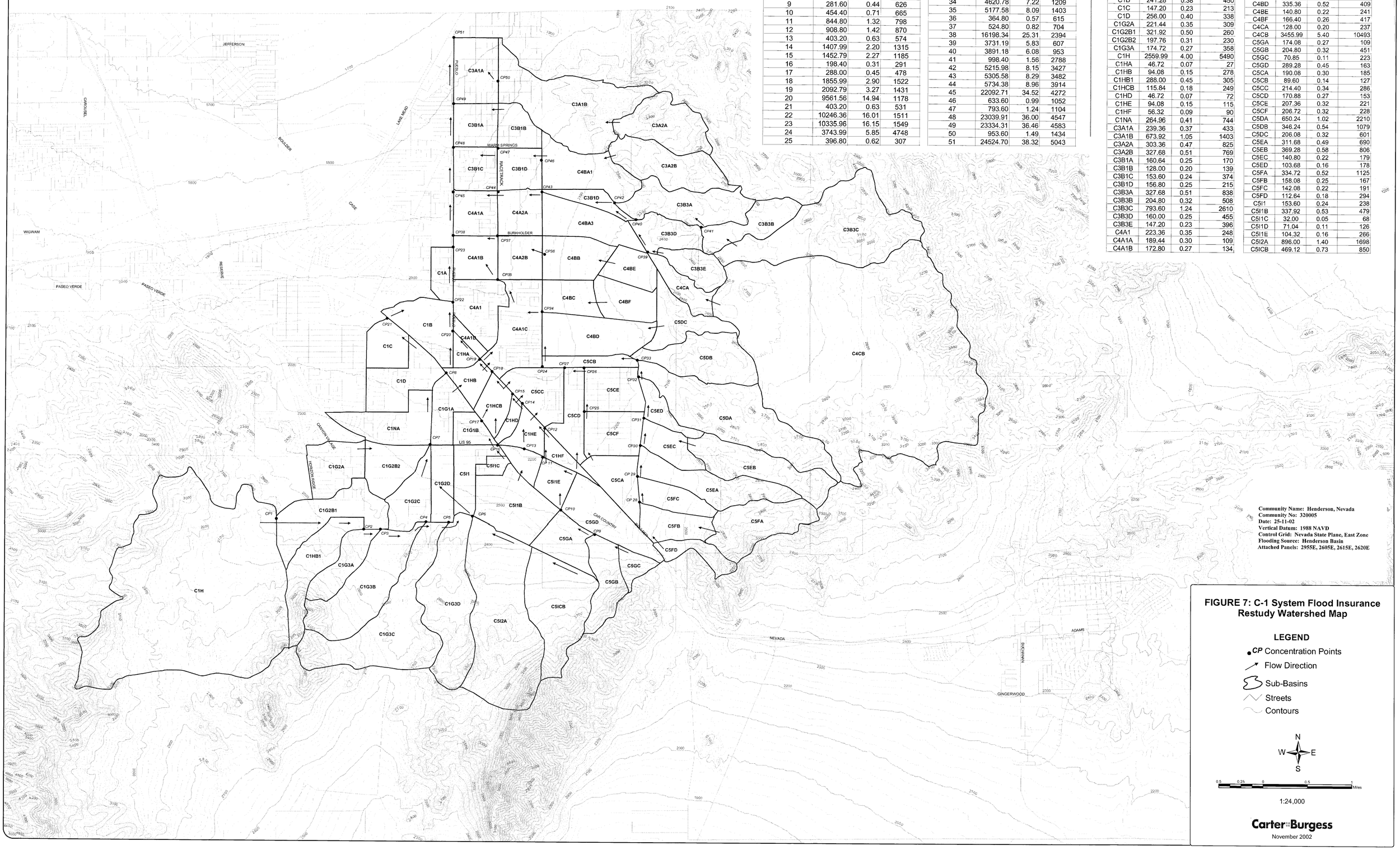
Concentration Point	Area (acres)	Area (sq. mi.)	100-yr Pk. Discharge (cfs)
1	2566.40	4.01	198
2	2854.39	4.46	481
3	3027.19	4.73	637
4	3494.39	5.46	1343
5	4166.38	6.51	2442
6	6067.18	9.48	4916
7	7155.17	11.18	915
8	7417.57	11.59	799
9	281.60	0.44	626
10	454.40	0.71	665
11	844.80	1.32	798
12	908.80	1.42	870
13	403.20	0.63	574
14	1407.99	2.20	1315
15	1452.79	2.27	1185
16	198.40	0.31	291
17	288.00	0.45	478
18	1855.99	2.90	1522
19	2092.79	3.27	1431
20	9561.56	14.94	1178
21	403.20	0.63	531
22	10246.36	16.01	1511
23	10335.96	16.15	1549
24	3743.99	5.85	4748
25	396.80	0.62	307

Concentration Point	Area (acres)	Area (sq. mi.)	100-yr Pk. Discharge (cfs)
26	608.00	0.95	508
27	774.40	1.21	589
28	601.60	0.94	1447
29	742.40	1.16	1506
30	1056.00	1.65	2023
31	1542.39	2.41	2964
32	1644.79	2.57	3001
33	2668.79	4.17	4356
34	4620.78	7.22	1209
35	5177.58	8.09	1403
36	364.80	0.57	615
37	524.80	0.82	704
38	16198.34	25.31	2394
39	3731.19	5.83	607
40	3891.18	6.08	953
41	998.40	1.56	2788
42	5215.98	8.15	3427
43	5305.58	8.29	3482
44	5734.38	8.96	3914
45	22092.71	34.52	4272
46	633.60	0.99	1052
47	793.60	1.24	1104
48	23039.91	36.00	4547
49	23334.31	36.46	4583
50	953.60	1.49	1434
51	24524.70	38.32	5043

Subbasin Summary (SDN3)

Subbasin Number	Area (acres)	Area (sq. mi.)	100-yr Pk. Discharge (cfs)
C1G1A	143.36	0.22	255
C1G1B	90.88	0.14	200
C1G2C	187.52	0.29	210
C1G2D	143.36	0.22	153
C1G3B	469.12	0.73	1014
C1G3C	670.72	1.05	1372
C1G3D	535.68	0.84	1246
C1A	89.60	0.14	149
C1B	241.28	0.38	450
C1C	147.20	0.23	213
C1D	256.00	0.40	338
C1G2A	221.44	0.35	309
C1G2B1	321.92	0.50	260
C1G2B2	197.76	0.31	230
C1G3A	174.72	0.27	358
C1H	2559.99	4.00	5490
C1HA	46.72	0.07	27
C1HB	94.08	0.15	278
C1HB1	288.00	0.45	305
C1HCB	115.84	0.18	249
C1HD	46.72	0.07	72
C1HE	94.08	0.15	115
C1HF	56.32	0.09	90
C1NA	264.96	0.41	744
C3A1A	239.36	0.37	433
C3A1B	673.92	1.05	1403
C3A2A	303.36	0.47	825
C3A2B	327.68	0.51	769
C3B1A	160.64	0.25	170
C3B1B	128.00	0.20	139
C3B1C	153.60	0.24	374
C3B1D	156.80	0.25	215
C3B3A	327.68	0.51	838
C3B3B	204.80	0.32	508
C3B3C	793.60	1.24	2610
C3B3D	160.00	0.25	455
C3B3E	147.20	0.23	396
C4A1	223.36	0.35	248
C4A1A	189.44	0.30	109
C4A1B	172.80	0.27	134

Subbasin Number	Area (acres)	Area (sq. mi.)	100-yr Pk. Discharge (cfs)
C4A1C	332.80	0.52	481
C4A1D	38.40	0.06	52
C4A2A	160.00	0.25	322
C4A2B	160.00	0.25	203
C4BA1	294.40	0.46	289
C4BA2	72.32	0.11	92
C4BA3	260.48	0.41	296
C4BB	222.72	0.35	377
C4BC	153.60	0.24	255
C4BD	335.36	0.52	409
C4BE	140.80	0.22	241
C4BF	166.40	0.26	417
C4CA	128.00	0.20	237
C4CB	3455.99	5.40	10493
C5GA	174.08	0.27	109
C5GB	204.80	0.32	451
C5GC	70.85	0.11	223
C5GD	289.28	0.45	163
C5CA	190.08	0.30	185
C5CB	89.60	0.14	127
C5CC	214.40	0.34	286
C5CD	170.88	0.27	153
C5CE	207.36	0.32	221
C5CF	206.72	0.32	228
C5DA	650.24	1.02	2210
C5DB	346.24	0.54	1079
C5DC	206.08	0.32	601
C5EA	311.68	0.49	690
C5EB	369.28	0.58	806
C5EC	140.80	0.22	179
C5ED	103.68	0.16	178
C5FA	334.72	0.52	1125
C5FB	158.08	0.25	167
C5FC	142.08	0.22	191
C5FD	112.64	0.18	294
C5I1	153.60	0.24	238
C5I1B	337.92	0.53	479
C5I1C	32.00	0.05	68
C5I1D	71.04	0.11	126
C5I1E	104.32	0.16	266
C5I2A	896.00	1.40	1698
C5ICB	469.12	0.73	850



Community Name: Henderson, Nevada
Community No: 320005
Date: 25-11-02
Vertical Datum: 1988 NAVD
Control Grid: Nevada State Plane, East Zone
Flooding Source: Henderson Basin
Attached Panels: 2955E, 2605E, 2615E, 2620E

FIGURE 7: C-1 System Flood Insurance Restudy Watershed Map

LEGEND

- ***CP*** Concentration Points
- Flow Direction
- Sub-Basins
- Streets
- Contours

N
W E
S

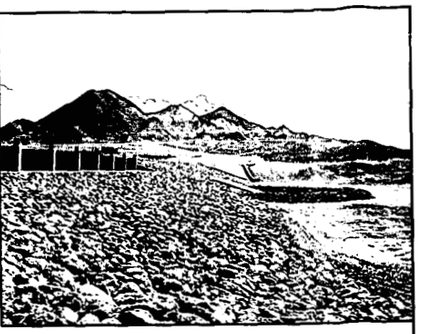
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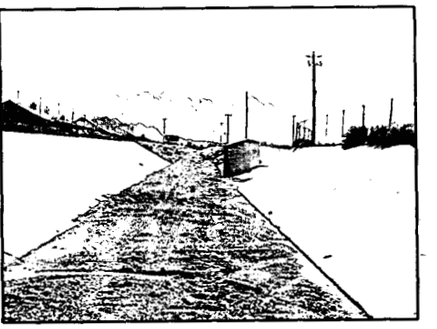
Carter Burgess

November 2002

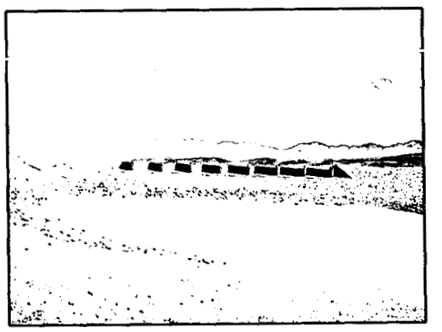
CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT



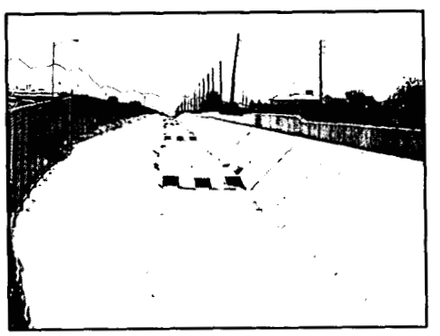
C-1 Channel System Flood Insurance Restudy



Technical Support Data Notebook



Vol. 3



Carter Burgess

APPENDIX

VOLUME 1

SECTION 1 GENERAL DOCUMENTATION

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- 1.2 Meeting Minutes
- 1.3 General Correspondence
- 1.4 Certification Forms

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  - 2.1.1 Previous Letter of Map Revisions
  - 2.1.2 Overall Storm HEC-1 Model
    - 2.1.2.1 SDN3
    - 2.1.2.2 SDN4
    - 2.1.2.3 SDN5
  - 2.1.3 Local Hydrology
    - 2.1.3.1 Newport Townhomes

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    - 2.2.1.2 East C-1 Levee
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  - 2.3.3 Sedimentation Analysis

- 2.4 Key to Cross Section Labeling
  - 2.4.1 Detailed Methods: C-1 Channel
  - 2.4.2 Detailed Methods: East C-1 Levee
  - 2.4.3 Approximate Methods --Reach 2
  - 2.4.4 Approximate Methods – Reach 3
  - 2.4.5 Approximate Methods – Reach 4

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VOLUME 3

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- 4.1.1 Effective FIRM
- 4.1.2 Annotated FIRM

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- 4.2.1 Work Maps (Effective)
- 4.2.2 Work Maps (Annotated)

VOLUME 4

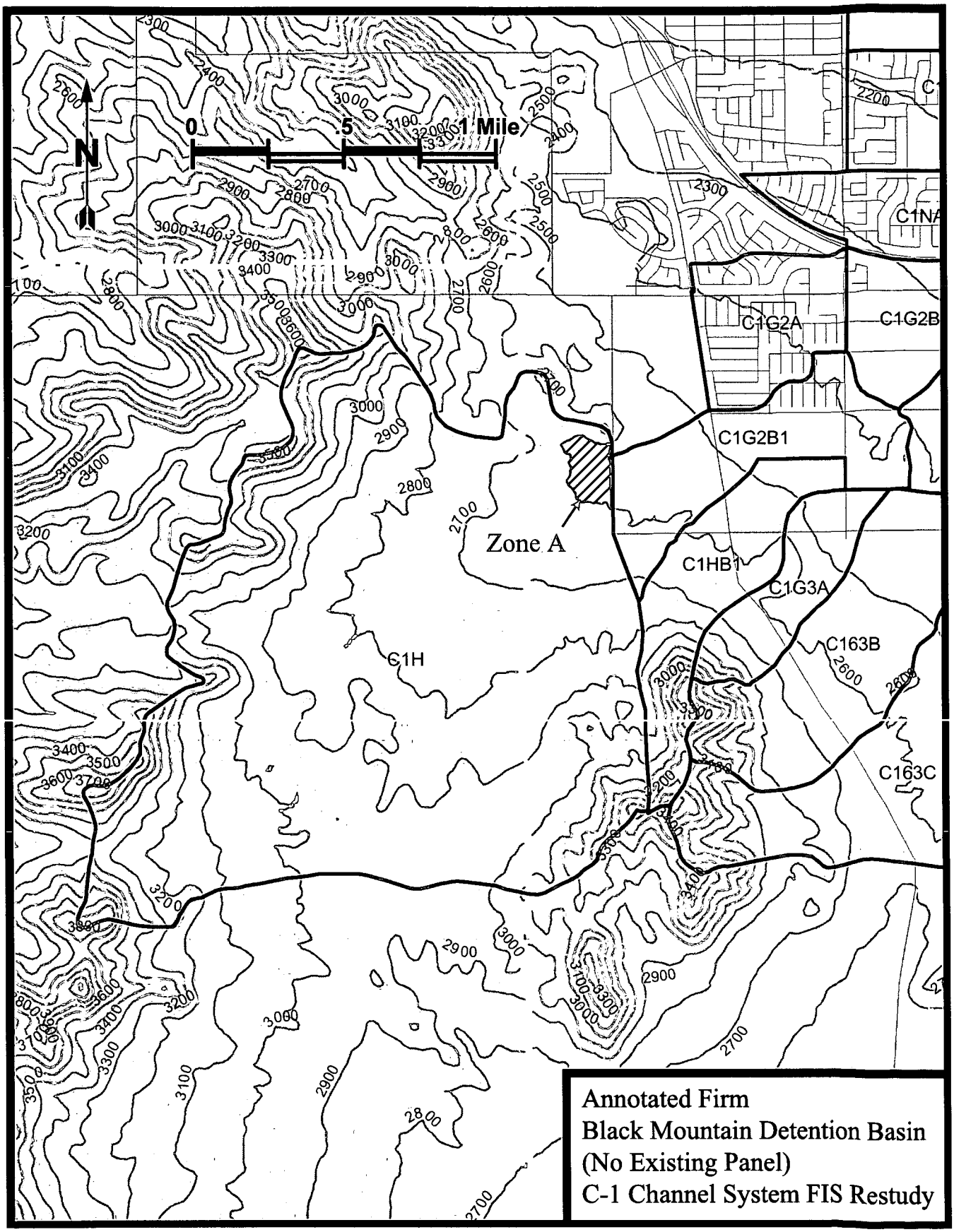
4.3 Work Maps/Base Maps – Detailed Methods
- 4.3.1 C-1 Channel
- 4.3.2 East C-1 Levee

SECTION 5 MISCELLANEOUS REFERENCE MATERIAL

5.1 Photographs/Field Review

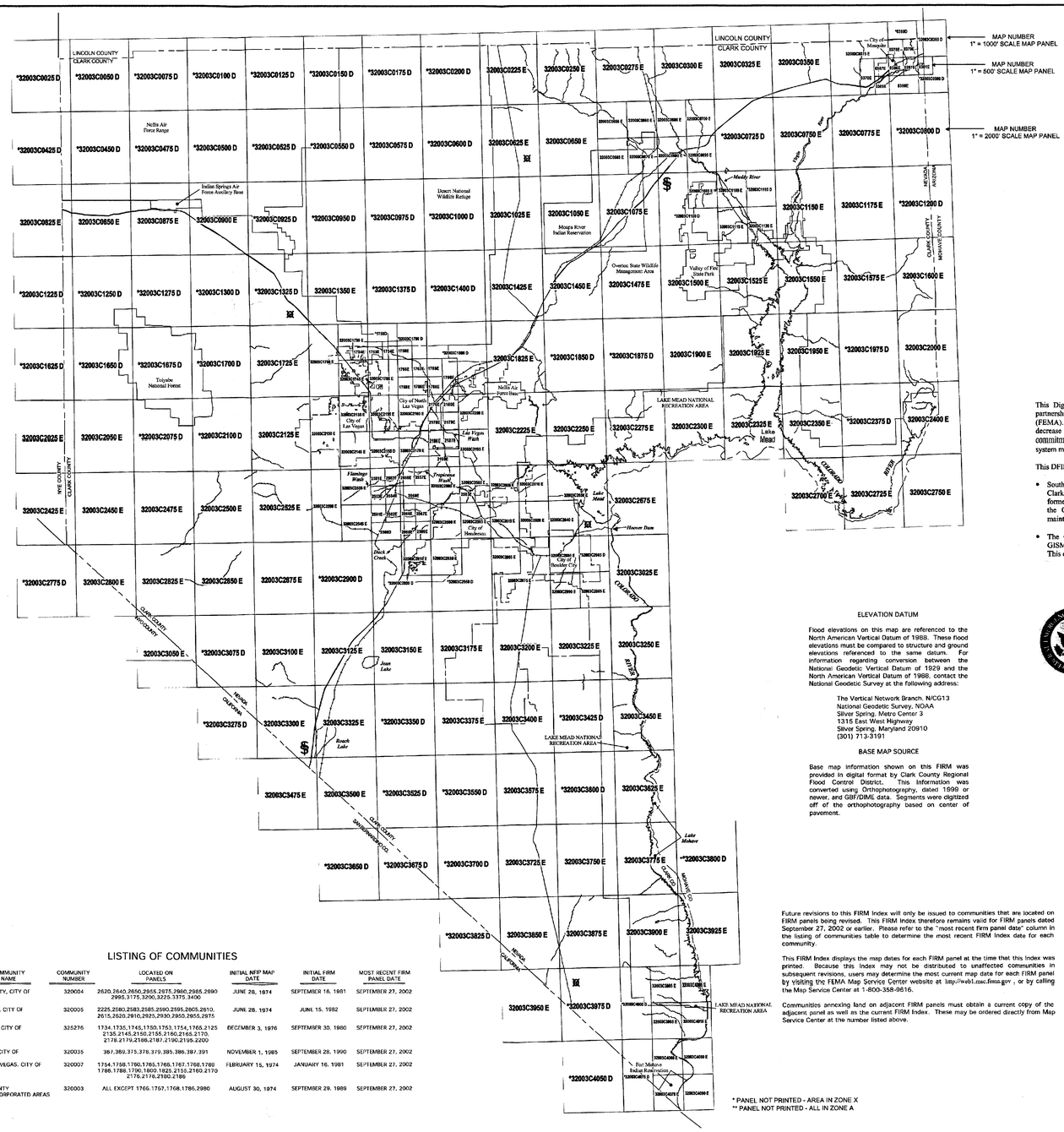
5.2 Survey Data
- 5.2.1 Point File
- 5.2.2 Survey Notes

5.3 Compact Discs


N
0
.5
1 Mile
C1NA
C1G2A
C1G2B
C1G2B1
C1HB1
C1G3A
C163B
C163C
C1H
Zone A
Annotated Firm
Black Mountain Detention Basin
(No Existing Panel)
C-1 Channel System FIS Restudy

CURRENT PANEL DATE

32003C0225E	09/27/02	32003C2225E	09/27/02
32003C0250E	09/27/02	32003C2250E	09/27/02
32003C0275E	09/27/02	32003C2275E	09/27/02
32003C0300E	09/27/02	32003C2300E	09/27/02
32003C0325E	09/27/02	32003C2325E	09/27/02
32003C0350E	09/27/02	32003C2350E	09/27/02
32003C0367E	09/27/02	32003C2400E	09/27/02
32003C0369E	09/27/02	32003C2425E	09/27/02
32003C0370E	09/27/02	32003C2450E	09/27/02
32003C0375E	09/27/02	32003C2475E	09/27/02
32003C0378E	09/27/02	32003C2500E	09/27/02
32003C0379E	09/27/02	32003C2525E	09/27/02
32003C0386E	09/27/02	32003C2535E	09/27/02
32003C0387E	09/27/02	32003C2545E	09/27/02
32003C0390E	09/27/02	32003C2550E	09/27/02
32003C0391E	09/27/02	32003C2551E	09/27/02
32003C0625E	09/27/02	32003C2552E	09/27/02
32003C0650E	09/27/02	32003C2553E	09/27/02
32003C0655E	09/27/02	32003C2554E	09/27/02
32003C0660E	09/27/02	32003C2556E	09/27/02
32003C0665E	09/27/02	32003C2557E	09/27/02
32003C0670E	09/27/02	32003C2560E	09/27/02
32003C0680E	09/27/02	32003C2561E	09/27/02
32003C0690E	09/27/02	32003C2562E	09/27/02
32003C0695E	09/27/02	32003C2566E	09/27/02
32003C0700E	09/27/02	32003C2567E	09/27/02
32003C0750E	09/27/02	32003C2568E	09/27/02
32003C0775E	09/27/02	32003C2569E	09/27/02
32003C0825E	09/27/02	32003C2580E	09/27/02
32003C0850E	09/27/02	32003C2583E	09/27/02
32003C0875E	09/27/02	32003C2585E	09/27/02
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32003C1050E	09/27/02	32003C2605E	09/27/02
32003C1075E	09/27/02	32003C2610E	09/27/02
32003C1085E	09/27/02	32003C2615E	09/27/02
32003C1105E	09/27/02	32003C2620E	09/27/02
32003C1115E	09/27/02	32003C2640E	09/27/02
32003C1120E	09/27/02	32003C2650E	09/27/02
32003C1150E	09/27/02	32003C2675E	09/27/02
32003C1175E	09/27/02	32003C2700E	09/27/02
32003C1350E	09/27/02	32003C2725E	09/27/02
32003C1425E	09/27/02	32003C2750E	09/27/02
32003C1450E	09/27/02	32003C2800E	09/27/02
32003C1475E	09/27/02	32003C2825E	09/27/02
32003C1500E	09/27/02	32003C2850E	09/27/02
32003C1525E	09/27/02	32003C2875E	09/27/02
32003C1550E	09/27/02	32003C2910E	09/27/02
32003C1575E	09/27/02	32003C2930E	09/27/02
32003C1600E	09/27/02	32003C2955E	09/27/02
32003C1725E	09/27/02	32003C2975E	09/27/02
32003C1734E	09/27/02	32003C2980E	09/27/02
32003C1735E	09/27/02	32003C2990E	09/27/02
32003C1745E	09/27/02	32003C2995E	09/27/02
32003C1750E	09/27/02	32003C3025E	09/27/02
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32003C1758E	09/27/02	32003C3125E	09/27/02
32003C1765E	09/27/02	32003C3150E	09/27/02
32003C1766E	09/27/02	32003C3175E	09/27/02
32003C1767E	09/27/02	32003C3200E	09/27/02
32003C1768E	09/27/02	32003C3225E	09/27/02
32003C1769E	09/27/02	32003C3250E	09/27/02
32003C1786E	09/27/02	32003C3300E	09/27/02
32003C1788E	09/27/02	32003C3325E	09/27/02
32003C1790E	09/27/02	32003C3375E	09/27/02
32003C1825E	09/27/02	32003C3400E	09/27/02
32003C1900E	09/27/02	32003C3450E	09/27/02
32003C1925E	09/27/02	32003C3475E	09/27/02
32003C1950E	09/27/02	32003C3500E	09/27/02
32003C2000E	09/27/02	32003C3575E	09/27/02
32003C2025E	09/27/02	32003C3625E	09/27/02
32003C2050E	09/27/02	32003C3725E	09/27/02
32003C2125E	09/27/02	32003C3750E	09/27/02
32003C2135E	09/27/02	32003C3775E	09/27/02
32003C2145E	09/27/02	32003C3850E	09/27/02
32003C2150E	09/27/02	32003C3875E	09/27/02
32003C2155E	09/27/02	32003C3900E	09/27/02
32003C2160E	09/27/02	32003C3925E	09/27/02
32003C2170E	09/27/02	32003C3950E	09/27/02
32003C2176E	09/27/02	32003C3985E	09/27/02
32003C2178E	09/27/02	32003C3995E	09/27/02
32003C2179E	09/27/02	32003C4005E	09/27/02
32003C2180E	09/27/02	32003C4015E	09/27/02
32003C2186E	09/27/02	32003C4060E	09/27/02
32003C2187E	09/27/02	32003C4070E	09/27/02
32003C2190E	09/27/02	32003C4080E	09/27/02
32003C2195E	09/27/02	32003C4090E	09/27/02
32003C2200E	09/27/02		



MAP REPOSITORIES
(Maps available for reference only, not for distribution.)

City of Boulder City
Engineering Department
401 California Avenue
Boulder City, Nevada 89005

City of Henderson
Public Works Department
240 Water Street
Henderson, Nevada 89015

City of Las Vegas
Public Works Department
400 East Stewart Avenue, 4th Floor
Las Vegas, Nevada 89101

City of Mesquite
Mesquite City Hall
10 East Mesquite Boulevard
Mesquite, Nevada 89027

City of North Las Vegas
Public Works Department
2200 Civic Center Drive
North Las Vegas, Nevada 89030

Clark County
Office of the Director of Public Works
500 Grand Central Parkway
Las Vegas, Nevada 89106

This Digital Flood Insurance Rate Map (DFIRM) was produced through a unique partnership between Clark County and the Federal Emergency Management Agency (FEMA). Clark County has developed a long-term approach of floodplain management to decrease the costs associated with flooding. This is demonstrated by Clark County's commitment to share and maintain floodplain layers within their geographic information system management office (GISMO).

This DFIRM reflects several innovative features. These include:

- Southern Nevada GIS -- Cooperation among local governmental agencies throughout Clark County. The foundation of cooperation is the GIS Interlocal Agreements formed between fourteen regional participants. In part, the agreements specify that the Clark County GIS Management Office (GISMO) will be responsible for maintaining a GIS data warehouse and associated Southern Nevada GIS Metadata.
- The GISMO's responsibilities go beyond maintaining the GIS data warehouse. GISMO also maintains the Street Centerline Database used by 911 dispatch services. This centerline database serves as the base map for this DFIRM.

DIGITAL DATA AVAILABILITY:
http://www.co.clark.nv.us/ceit/gismo/gismo.htm

ELEVATION DATUM

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, contact the National Geodetic Survey at the following address:

The Vertical Network Branch, N/CG13
National Geodetic Survey, NOAA
Silver Spring, Metro Center 3
1315 East West Highway
Silver Spring, Maryland 20910
(301) 713-3191

BASE MAP SOURCE

Base map information shown on this FIRM was provided in digital format by Clark County Regional Flood Control District. This information was converted using Orthophotography, dated 1999 or newer, and GBF/DIME data. Segments were digitized off of the orthophotography based on center of pavement.

Future revisions to this FIRM Index will only be issued to communities that are located on FIRM panels being revised. This FIRM Index therefore remains valid for FIRM panels dated September 27, 2002 or earlier. Please refer to the "most recent firm panel date" column in the listing of communities table to determine the most recent FIRM Index date for each community.

This FIRM Index displays the map dates for each FIRM panel at the time that this Index was printed. Because this Index may not be distributed to unaffected communities in subsequent revisions, users may determine the most current map date for each FIRM panel by visiting the FEMA Map Service Center website at http://msc.fema.gov , or by calling the Map Service Center at 1-800-358-9616.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from Map Service Center at the number listed above.

LISTING OF COMMUNITIES

COMMUNITY NAME	COMMUNITY NUMBER	LOCATED ON PANELS	INITIAL NFIP MAP DATE	INITIAL FIRM DATE	MOST RECENT FIRM PANEL DATE
BOULDER CITY, CITY OF	320004	2620,2640,2650,2955,2975,2980,2985,2990 2995,3175,3200,3225,3375,3400	JUNE 26, 1974	SEPTEMBER 16, 1981	SEPTEMBER 27, 2002
HENDERSON, CITY OF	320005	2225,2580,2583,2585,2590,2595,2605,2610, 2615,2620,2910,2925,2930,2950,2955,2975	JUNE 28, 1974	JUNE 15, 1982	SEPTEMBER 27, 2002
LAS VEGAS, CITY OF	325276	1734,1735,1745,1750,1753,1754,1765,2125 2135,2145,2150,2155,2160,2165,2170, 2178,2179,2186,2187,2190,2195,2200	DECEMBER 3, 1976	SEPTEMBER 30, 1980	SEPTEMBER 27, 2002
MESQUITE, CITY OF	320035	367,369,375,378,379,385,386,387,391	NOVEMBER 1, 1985	SEPTEMBER 28, 1990	SEPTEMBER 27, 2002
NORTH LAS VEGAS, CITY OF	320007	1754,1758,1760,1765,1768,1767,1768,1769 1786,1788,1790,1800,1825,2150,2160,2170 2176,2178,2180,2186	FEBRUARY 15, 1974	JANUARY 16, 1981	SEPTEMBER 27, 2002
CLARK COUNTY UNINCORPORATED AREAS	320003	ALL EXCEPT 1766,1767,1768,1786,2980	AUGUST 30, 1974	SEPTEMBER 29, 1989	SEPTEMBER 27, 2002

* PANEL NOT PRINTED - AREA IN ZONE X
** PANEL NOT PRINTED - ALL IN ZONE A

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP
CLARK COUNTY, NEVADA AND INCORPORATED AREAS

(SEE TABLE SHOWN ON LEFT FOR LISTING OF COMMUNITIES)

MAP INDEX

PANELS PRINTED:
225,250,275,300,325,350,367,369,370,375,378, 379,386,387,390,391,825,850,855,860,865,870, 880,890,895,900,750,775,825,850,875,900,1025, 1050,1075,1085,1105,1115,1120,1150,1175,1350, 1425,1450,1475,1500,1525,1550,1575,1600,1725, 1734,1735,1745,1750,1753,1754,1758,1765,1766, 1767,1768,1769,1786,1788,1790,1825,1900,1925, 1950,2000,2025,2050,2125,2135,2145,2150,2155, 2160,2170,2175,2178,2179,2180,2186,2187,2190, 2195,2200,2225,2250,2275,2300,2325,2350,2400, 2425,2450,2475,2500,2525,2535,2545,2550,2551, 2552,2553,2554,2555,2557,2560,2561,2562,2568, 2567,2568,2569,2580,2583,2585,2590,2595,2605, 2610,2615,2620,2640,2650,2675,2700,2725,2750, 2800,2825,2850,2875,2910,2930,2955,2975,2980, 2990,2995,3025,3050,3100,3125,3150,3175,3200, 3225,3250,3300,3325,3375,3400,3450,3475,3500, 3575,3625,3725,3750,3775,3850,3875,3900,3925, 3950,3985,3995,4005,4015,4060,4070,4080,4090

MAP NUMBER
32003CIND0

MAP REVISED:
SEPTEMBER 27, 2002

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevation** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevation (BFEs) shown on this map apply only landward of 0.0' North American Vertical Datum (NAVD). Users of this FIRM should be aware that coastal flood elevations may also be provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this community. Elevations shown in the Summary of Stillwater Elevations table should be used for construction, and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures.** Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures in this jurisdiction.

The **projection** used in the preparation of this map is Universal Tranverse Mercator (UTM) Zone 11. The **horizontal** datum is NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum.** For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

Vertical Network Branch, N/CG13
National Geodetic Survey, NOAA
Silver Spring Metro Center 3
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242,** or visit their website at www.ngs.noaa.gov.

Base map information shown on this FIRM was provided in digital format by Clark County Regional Flood Control District. This information was converted using Orthophotography, dated 1999 or newer, and GBF/DIME data. Segments were digitized off of the orthophotography based on center of pavement.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

An accompanying Flood Insurance Study report, Letters of Map Revision or Letters of Map Amendment revising portions of this panel, and digital versions of this PANEL may be available. Contact the **FEMA Map Service Center** at the following phone numbers and Internet address for information on all related products available from FEMA:

Phone: 800-358-9616
FAX: 800-358-9620
www.fema.gov/msc

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA-MAP** (1-877-336-2627) or visit the FEMA website at www.fema.gov.

This map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report may reflect stream channel distances that differ from what is shown on this map.

This Digital Flood Insurance Rate Map (DFIRM) was produced through a unique partnership between Clark County and the Federal Emergency Management Agency (FEMA). Clark County has developed a long-term approach of floodplain management to decrease the costs associated with flooding. This is demonstrated by the Clark County commitment to share and maintain floodplain layers within their Geographic Information System Management Office (GISMO).

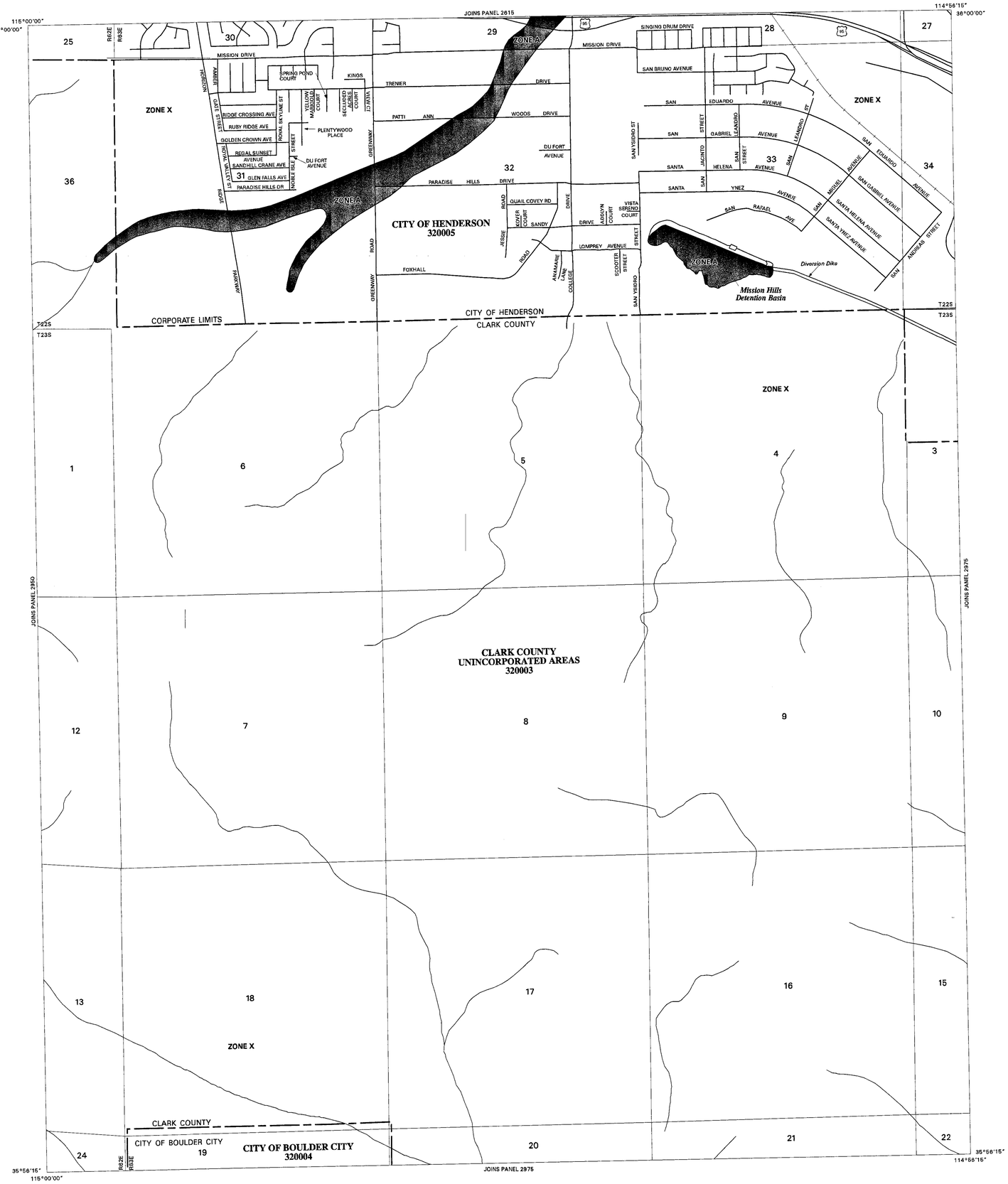
This DFIRM reflects several innovative features. These include:
+ Southern Nevada GIS – Cooperation among local governmental agencies throughout Clark County. The foundation of cooperation is the GIS Interlocal Agreements formed between fourteen regional participants. In part, the agreements specify that the Clark County GIS Management Office (GISMO) will be responsible for maintaining a GIS data warehouse and associated Southern Nevada GIS Metadata.

+ The GISMO's responsibilities go beyond maintaining the GIS data warehouse. GISMO also maintains the Street Centerline Database used by 911 dispatch services. This centerline database serves as the base map for this DFIRM.

DIGITAL DATA AVAILABILITY: http://www.co.clark.nv.us/ceit/gismo/gismo.htm

REGIONAL FLOOD CONTROL DISTRICT

CLARK COUNTY NEVADA



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD EVENT

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood.

ZONE A	No base flood elevations determined.
ZONE AE	Base flood elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Area of special flood hazard formerly protected from the 1% annual chance flood event by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood event.
ZONE A99	Area to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no base flood elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no base flood elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	Floodplain Boundary
	Floodway Boundary
	Zone D Boundary
	Coastal Barrier Boundary
	Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A — A	Cross Section Line
23 — 23	Transect Line
97°07'30", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4276000M	1000-meter Universal Transverse Mercator grid values, zone 11
600000 FT	5000-foot grid ticks
DX5510	Bench mark (see explanation in Notes to Users section of this FIRM panel).
M1.5	River Mile

MAP REPOSITORY
Refer to Repository Listing on Index Map

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
AUGUST 16, 1995

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
September 27, 2002: to update corporate limits, to change base flood elevations, to add base flood elevations, to add special flood hazard areas, to change special flood hazard areas, to delete special flood hazard areas, to change zone designations, to add roads and road names, to incorporate previously issued letters of map revision, to incorporate previously issued letters of map amendment, and to change floodway.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at (800) 638-6620.

MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
300 0 300 600 METERS

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2955 E

FIRM
FLOOD INSURANCE RATE MAP
CLARK COUNTY, NEVADA AND INCORPORATED AREAS

PANEL 2955 OF 4090

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
HENDERSON, CITY OF	320005	2955	E
BOULDER CITY, CITY OF	320004	2955	E
CLARK COUNTY, UNINCORPORATED AREAS	320003	2955	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
32003C2955 E

MAP REVISED:
SEPTEMBER 27, 2002

Federal Emergency Management Agency

NOTES TO USERS

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Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum.** For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

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Silver Spring Metro Center 3
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242,** or visit their website at www.ngs.noaa.gov.

Base map information shown on this FIRM was provided in digital format by Clark County Regional Flood Control District. This information was converted using Orthophotography, dated 1999 or newer, and GBF/DIME data. Segments were digitized off of the orthophotography based on center of pavement.

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FAX: 800-358-9620
www.fema.gov/msc

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA-MAP** (1-877-336-2627) or visit the FEMA website at www.fema.gov.

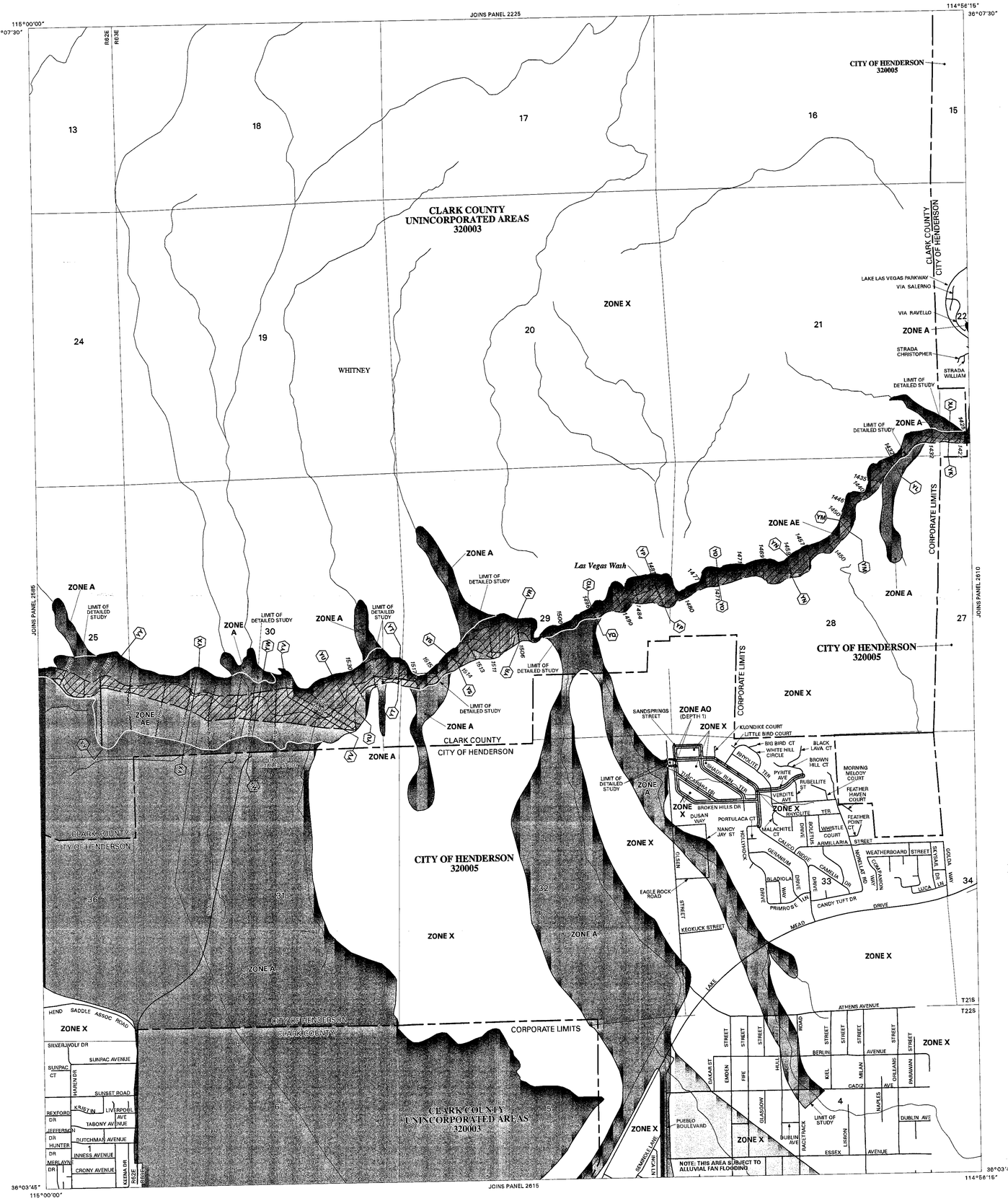
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DIGITAL DATA AVAILABILITY: http://www.co.clark.nv.us/ceit/gismo/gismo.htm



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD EVENT

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood.

ZONE A	No base flood elevations determined.
ZONE AE	Base flood elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Area of special flood hazard formerly protected from the 1% annual chance flood event by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood event.
ZONE A99	Area to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no base flood elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no base flood elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	Floodplain Boundary
	Floodway Boundary
	Zone D Boundary
	Coastal Barrier Boundary
	Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*
*Referenced to the North American Vertical Datum of 1988	
A — A	Cross Section Line
23 — 23	Transect Line
97°07'30", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4276000M	1000-meter Universal Transverse Mercator grid values, zone 11
600000 FT	5000-foot grid ticks
DX5510	Bench mark (see explanation in Notes to Users section of this FIRM panel).
M1.5	River Mile

MAP REPOSITORY
Refer to Repository Listing on Index Map

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
AUGUST 16, 1995

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
September 27, 2002: to update corporate limits, to change base flood elevations, to add base flood elevations, to add special flood hazard areas, to change special flood hazard areas, to delete special flood hazard areas, to change zone designations, to add roads and road names, to incorporate previously issued letters of map revision, to incorporate previously issued letters of map amendment, and to change floodway.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at (800) 638-6620.

MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
300 0 300 600 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2605 E

FIRM
FLOOD INSURANCE RATE MAP
CLARK COUNTY,
NEVADA AND
INCORPORATED AREAS

PANEL 2605 OF 4090
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
HENDERSON, CITY OF	320005	2605	E
CLARK COUNTY, UNINCORPORATED AREAS	320003	2605	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
32003C2605 E

MAP REVISED:
SEPTEMBER 27, 2002

Federal Emergency Management Agency

NOTES TO USERS

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To obtain more detailed information in areas where **Base Flood Elevation** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

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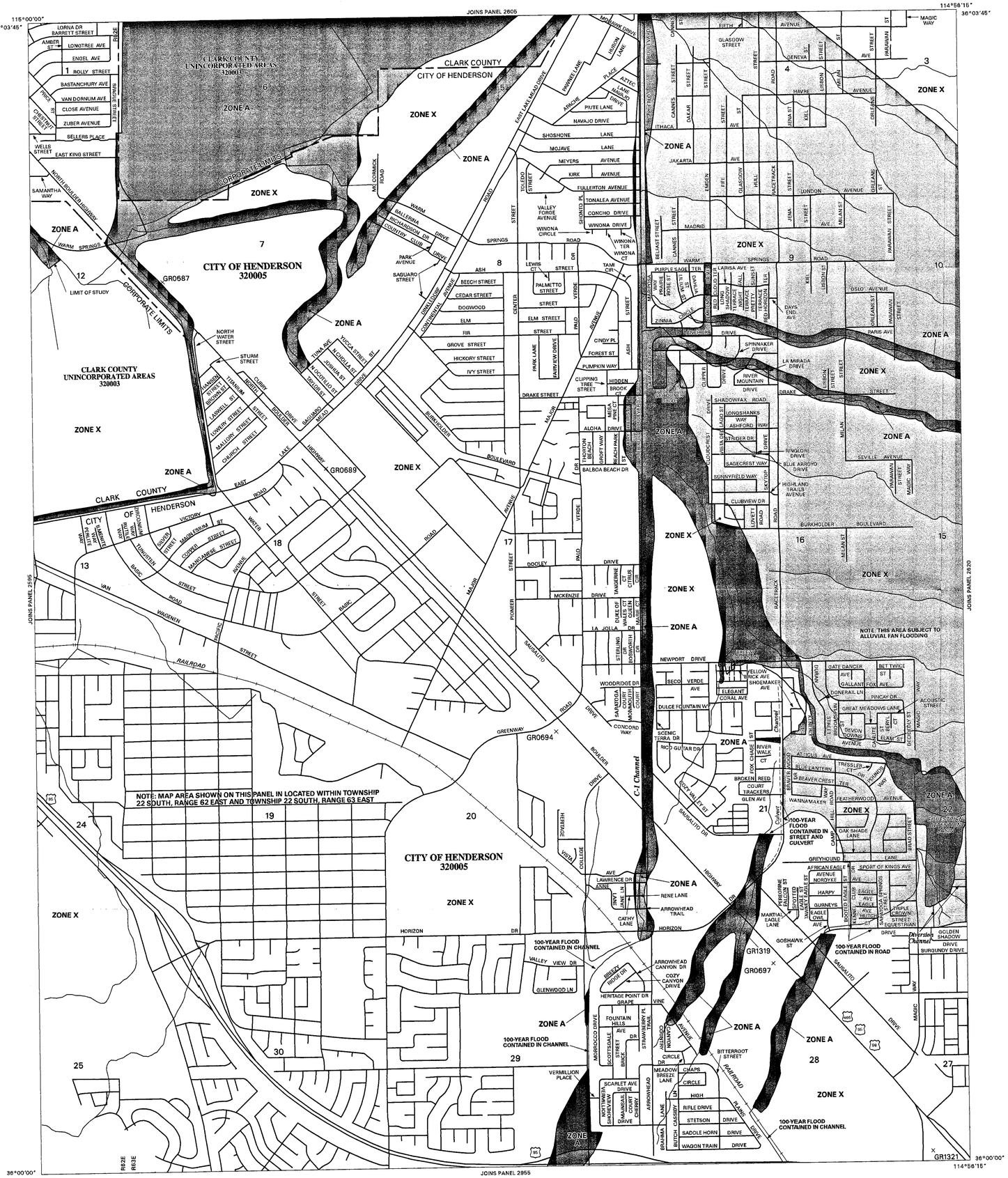
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LEGEND

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- **ZONE A** No base flood elevations determined.
- **ZONE AE** Base flood elevations determined.
- **ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
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- **ZONE A99** Area to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no base flood elevations determined.
- **ZONE V** Coastal flood zone with velocity hazard (wave action); no base flood elevations determined.
- **ZONE VE** Coastal flood zone with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

- **ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

- **ZONE X** Areas determined to be outside the 0.2% annual chance floodplain.
- **ZONE D** Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- Floodplain Boundary
- Floodway Boundary
- Zone D Boundary
- Coastal Barrier Boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

- (A) (A) — Cross Section Line
- (23) (23) — Transect Line
- 97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4276000M — 1000-meter Universal Transverse Mercator grid values, zone 11
- 600000 FT — 5000-foot grid ticks
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel).
- M1.5 — River Mile

MAP REPOSITORY
Refer to Repository Listing on Index Map

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
AUGUST 16, 1995

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

September 27, 2002: to update corporate limits, to change base flood elevations, to add base flood elevations, to add special flood hazard areas, to change special flood hazard areas, to change zone designations, to add roads and road names, to incorporate previously issued letters of map revision, to incorporate previously issued letters of map amendment, and to change floodway.

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MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

300 0 300 600 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2615 E

FIRM
FLOOD INSURANCE RATE MAP
CLARK COUNTY, NEVADA AND INCORPORATED AREAS

PANEL 2615 OF 4090
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
HENDERSON, CITY OF	320005	2615	E
CLARK COUNTY, UNINCORPORATED AREAS	320003	2615	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
32003C2615 E

MAP REVISED:
SEPTEMBER 27, 2002

Federal Emergency Management Agency

NOTES TO USERS

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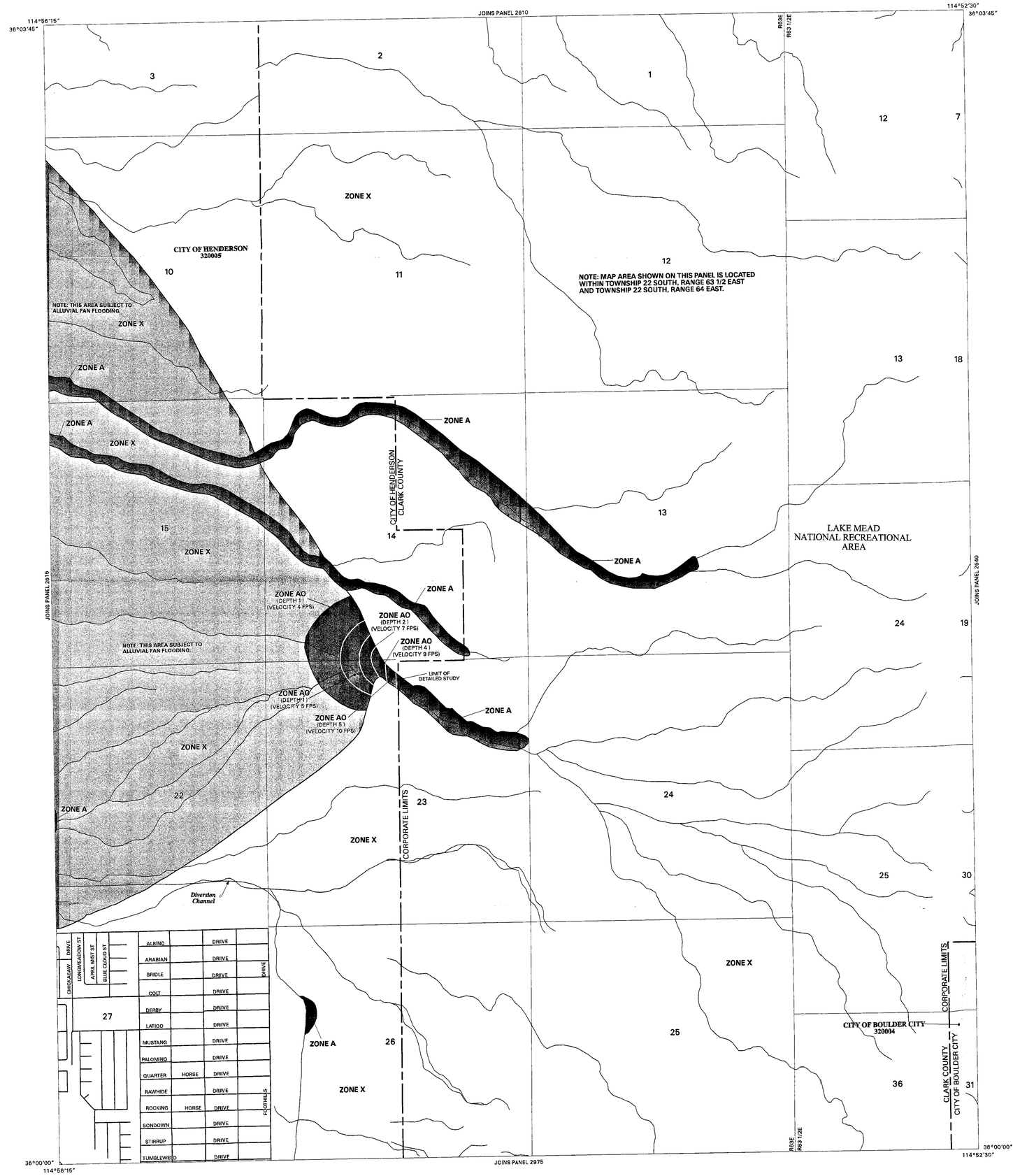
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FLOODWAY AREAS IN ZONE AE

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OTHER FLOOD AREAS

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COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

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Floodplain Boundary
Floodway Boundary
Zone D Boundary
Coastal Barrier Boundary
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or velocities.
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M1.5 River Mile

MAP REPOSITORY
Refer to Repository Listing on Index Map

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
AUGUST 16, 1995

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
September 27, 2002: to update corporate limits, to change base flood elevations, to add base flood elevations, to add special flood hazard areas, to change special flood hazard areas, to delete special flood hazard areas, to change zone designations, to add roads and road names, to incorporate previously issued letters of map revision, to incorporate previously issued letters of map amendment, and to change floodway.

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MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
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NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2620 E

FIRM
FLOOD INSURANCE RATE MAP
CLARK COUNTY, NEVADA AND INCORPORATED AREAS

PANEL 2620 OF 4090

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CLARK COUNTY, UNINCORPORATED AREAS	320003	2620	E
HENDERSON, CITY OF	320005	2620	E
BOULDER CITY, CITY OF	320004	2620	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
32003C2620 E

MAP REVISED:
SEPTEMBER 27, 2002

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

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Coastal Base Flood Elevation (BFEs) shown on this map apply only landward of 0.0' North American Vertical Datum (NAVD). Users of this FIRM should be aware that coastal flood elevations may also be provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this community. Elevations shown in the Summary of Stillwater Elevations table should be used for construction, and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures in this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 11. The **horizontal** datum was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

Vertical Network Branch, N/CG13
National Geodetic Survey, NOAA
Silver Spring Metro Center 3
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

To obtain current elevation, description, and/or location information for **benchmarks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit their website at www.ngs.noaa.gov.

Base map information shown on this FIRM was provided in digital format by Clark County Regional Flood Control District. This information was converted using Orthophotography, dated 1999 or newer, and GBF/DIME data. Segments were digitized off of the orthophotography based on correct of pavement.

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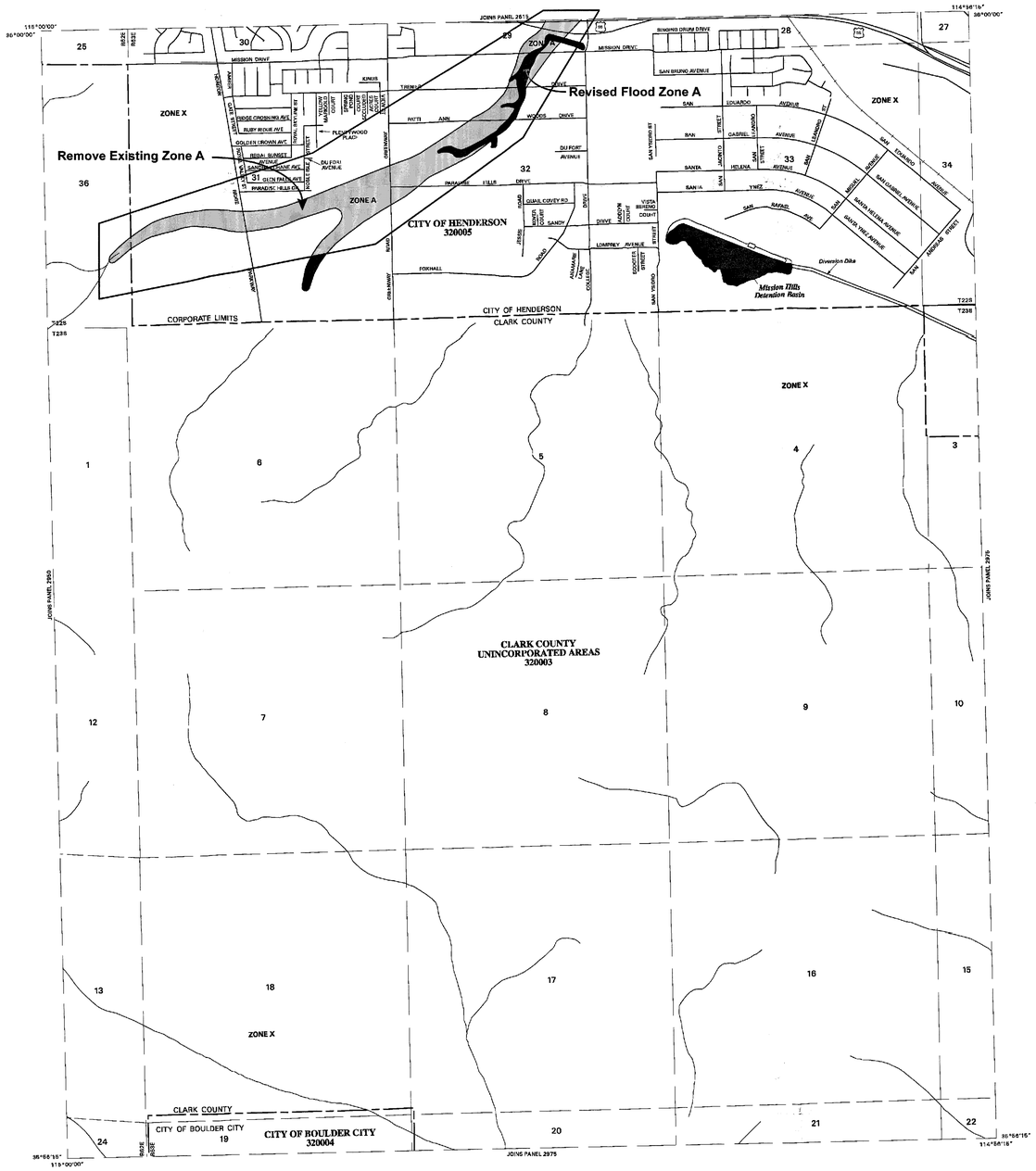
Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

An accompanying Flood Insurance Study report, Letters of Map Revision or Letters of Map Amendment revising portions of this panel, and digital versions of this PANEL may be available. Contact the **FEMA Map Service Center** at the following phone numbers and Internet address for information on all related products available from FEMA:

Phone: 800-358-9616
FAX: 800 358 9620
www.fema.gov/mac

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA-MAP** (1-877-336-2627) or visit the FEMA website at www.fema.gov.

This map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report may reflect stream channel distances that differ from what is shown on this map.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD EVENT

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood.

ZONE A No base flood elevations determined.

ZONE AE Base flood elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR Area of special flood hazard formerly protected from the 1% annual chance flood event by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood event.

ZONE A99 Area to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no base flood elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no base flood elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- Floodplain Boundary
- Floodway Boundary
- Zone D Boundary
- Coastal Barrier Boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or velocities.
- 513 Base Flood Elevation line and value; elevation in feet*
- (EL 987) Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

- (A)—(A) Cross Section Line
- (23)—(23) Transect Line
- 97°07'30", 32°22'30" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4276000M 1000-meter Universal Transverse Mercator grid values, zone 11
- 600000 FT 5000-foot grid ticks
- DX5510 Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 River Mile

MAP REPOSITORY
Refer to Repository Listing on Index Map

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
AUGUST 16, 1995

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

_____ to update corporate limits, to change base flood elevations, to add base flood elevations, to add special flood hazard areas, to change special flood hazard areas, to delete special flood hazard areas, to change zone designations, to add roads and road names, to incorporate previously issued letters of map revision, to incorporate previously issued letters of map amendment, and to change floodway.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at (800) 638-6620.

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

300 0 300 600 METERS

PANEL 2955 E

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY,
NEVADA AND
INCORPORATED AREAS

PANEL 2955 OF 4090

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
HENDERSON, CITY OF	320005	2955	E
CLARK COUNTY, UNINCORPORATED AREAS	320003	2955	E
BOULDER CITY, CITY OF	320004	2955	E

ANNOTATED FIRM

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
32003C2955 E

MAP REVISED:
September 27, 2002

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

NOTES TO USERS

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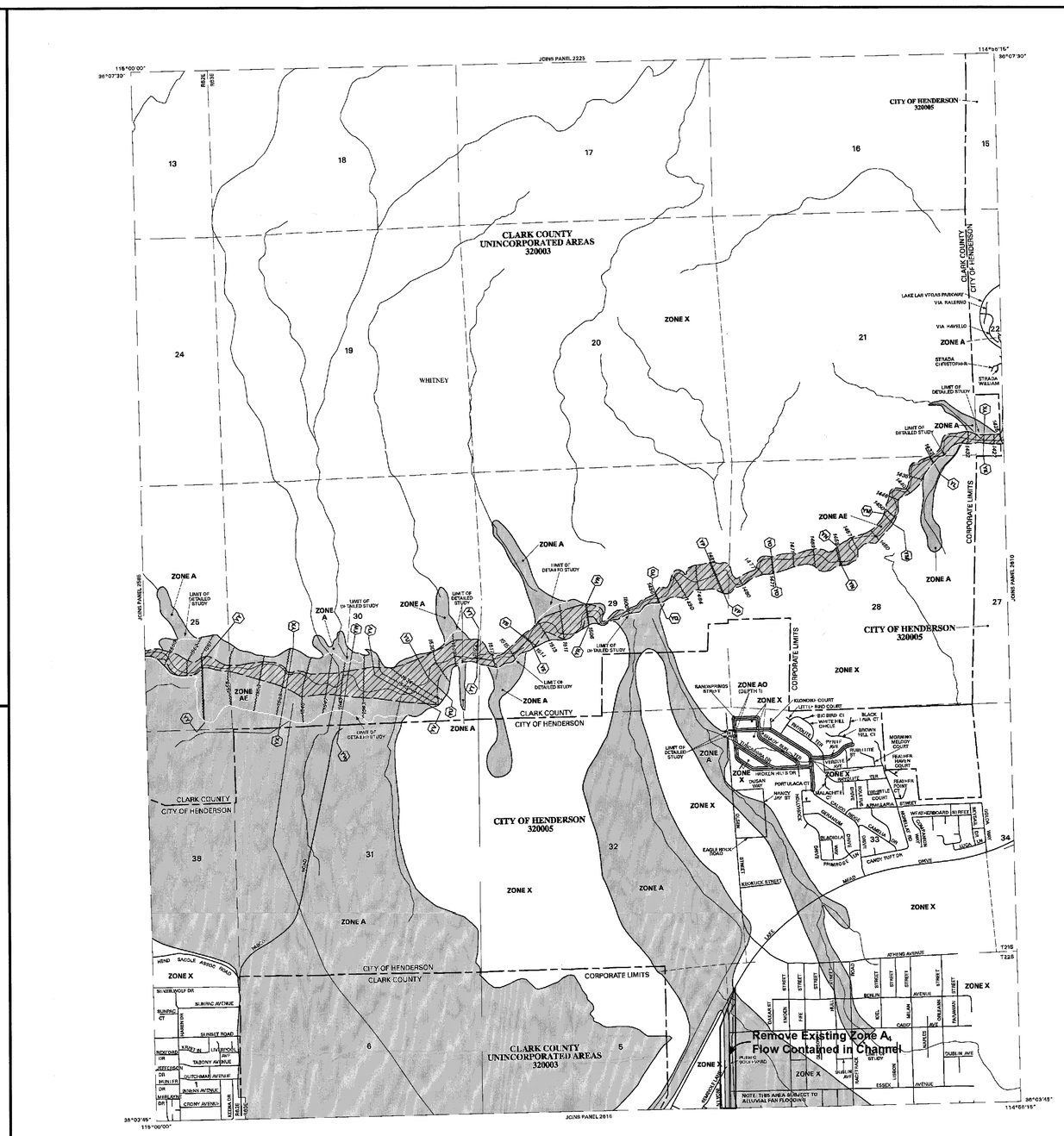
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LEGEND

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ZONE A No base flood elevations determined.

ZONE AE Base flood elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR Area of special flood hazard formerly protected from the 1% annual chance flood event by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood event.

ZONE A99 Area to be protected from 1% annual chance flood event by a federal flood protection system under construction; no base flood elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no base flood elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- Floodplain Boundary
- Floodway Boundary
- Zone D Boundary
- Coastal Barrier Boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

- (A) — (A) Cross Section Line
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- 97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
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- 500000 FT — 5000-foot grid ticks
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel).
- M1.5 — River Mile

MAP REPOSITORY
Refer to Repository Listing on Index Map

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
AUGUST 16, 1990

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
_____ to update corporate limits, to change base flood elevations, to add base flood elevations, to add special flood hazard areas, to change special flood hazard areas, to delete special flood hazard areas, to change zone designations, to add roads and road names, to incorporate previously issued letters of map revision, to incorporate previously issued letters of map amendment, and to change floodway.

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MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
300 0 300 600 METERS

PANEL 2605 E

FIRM
FLOOD INSURANCE RATE MAP

CLARK COUNTY, NEVADA AND INCORPORATED AREAS

PANEL 2605 OF 4090

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
HENDERSON, CITY OF	320005	2605	E
CLARK COUNTY UNINCORPORATED AREAS	320003	2605	E

ANNOTATED FIRM

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
32003C2605 E

MAP REVISED:
September 27, 2002

Federal Emergency Management Agency

NOTES TO USERS

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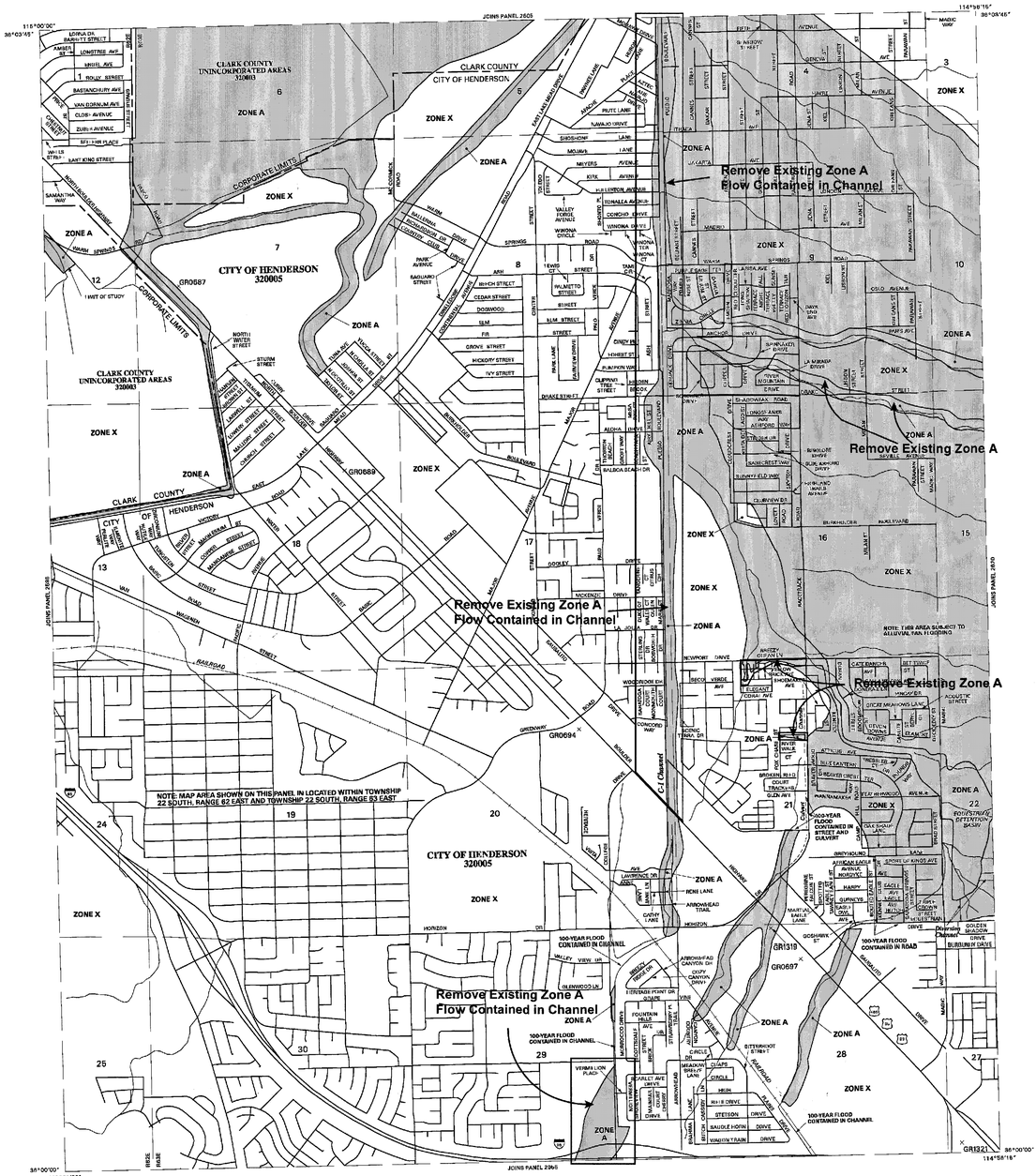
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LEGEND

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ZONE A No base flood elevations determined.

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ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.

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ZONE AR Area of special flood hazard formerly protected from the 1% annual chance flood event by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood event.

ZONE A99 Area to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no base flood elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no base flood elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

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COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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- 513 — Base Flood Elevation line and value; elevation in feet*
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MAP REPOSITORY
Refer to Repository Listing on Index Map

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
AUGUST 16, 1995

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
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MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
300 0 300 600 METERS

PANEL 2615 E

FIRM
FLOOD INSURANCE RATE MAP
CLARK COUNTY, NEVADA AND INCORPORATED AREAS

PANEL 2615 OF 4090

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
HENDERSON, CITY OF	320005	2615	E
CLARK COUNTY UNINCORPORATED AREAS	320003	2615	E

ANNOTATED FIRM

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
32003C2615 E

MAP REVISED:
September 27, 2002

Federal Emergency Management Agency

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Coastal Base Flood Elevation (BFEs) shown on this map apply only landward of 0.0° North American Vertical Datum (NAVD). Users of this FIRM should be aware that coastal flood elevations may also be provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this community. Elevations shown in the Summary of Stillwater Elevations table should be used for construction, and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain **areas** not in Special Flood Hazard Areas may be protected by **flood control structures.** Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures in this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 11. The **horizontal** datum was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum.** For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

Vertical Network Branch, N/CG13
National Geodetic Survey, NOAA
Silver Spring Metro Center 3
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242,** or visit their website at www.ngs.noaa.gov.

Base map information shown on this FIRM was provided in digital format by Clark County Regional Flood Control District. This information was converted using Orthophotography, dated 1999 or newer, and GRF/DIME data. Segments were digitized off of the orthophotography based on center of pavement.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

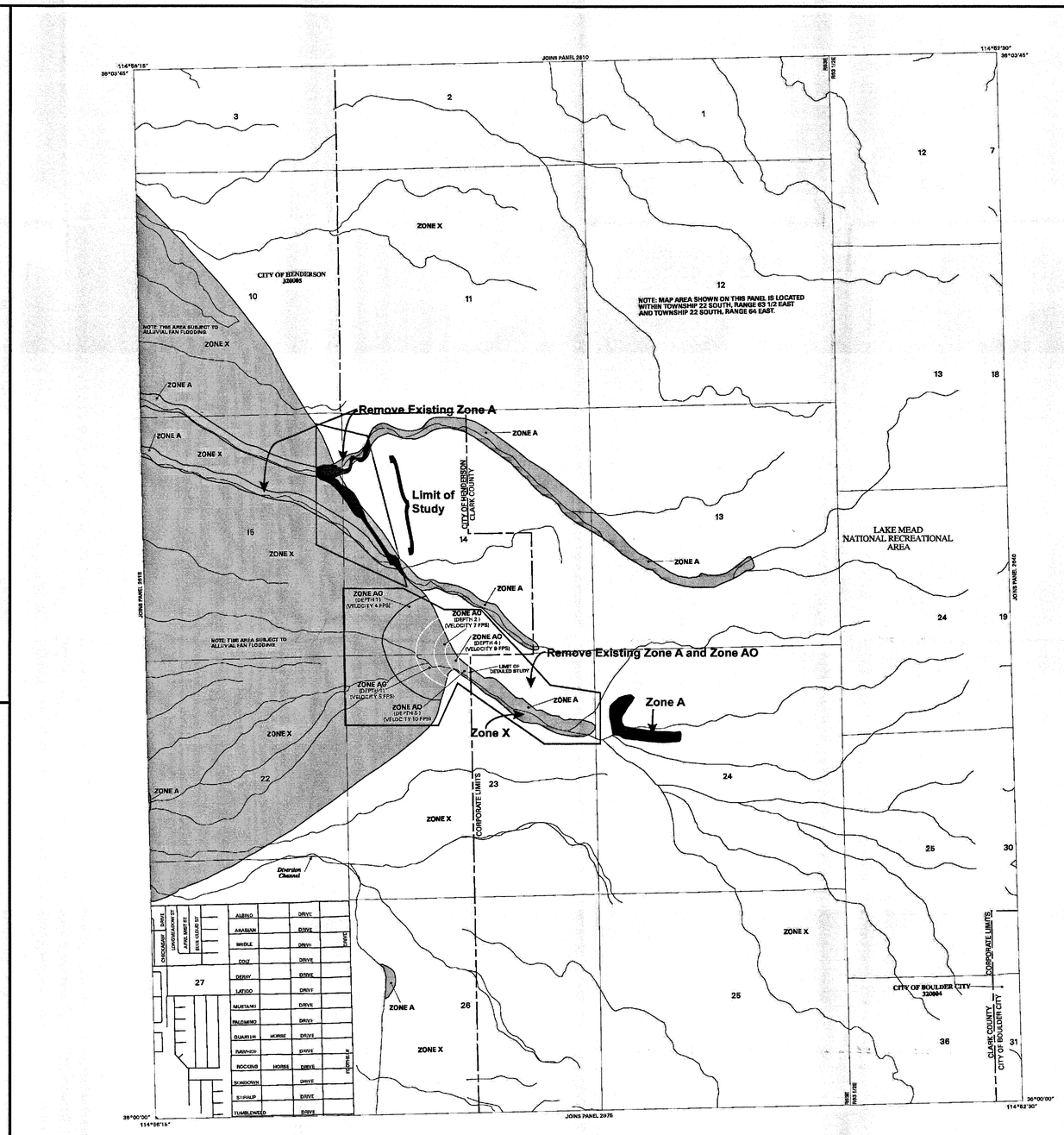
Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

An accompanying Flood Insurance Study report, Letters of Map Revision or Letters of Map Amendment revising portions of this panel, and digital versions of this PANEL may be available. Contact the **FEMA Map Service Center** at the following phone numbers and Internet address for information on all related products available from FEMA:

Phone: 800-358-9616
FAX: 800 358 9620
www.fema.gov/mac

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA-MAP** (1-877-336-2627) or visit the FEMA website at www.fema.gov.

This **map** reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous **FIRM** may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report may reflect stream channel distances that differ from what is shown on this map.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD EVENT

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood.

ZONE A	No base flood elevations determined.
ZONE AE	Base flood elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Area of special flood hazard formerly protected from the 1% annual chance flood event by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood event.
ZONE A99	Area to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no base flood elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no base flood elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- Floodplain Boundary
- Floodway Boundary
- Zone D Boundary
- Coastal Barrier Boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

- (A)—(A) Cross Section Line
- (23)—(23) Transect Line
- 97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4276000m — 1000-meter Universal Transverse Mercator grid values, zone 11
- 500000 FT — 5000-foot grid ticks
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel).
- M1.5 — River Mile

MAP REPOSITORY
Refer to Repository Listing on Index Map

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
AUGUST 16, 1999

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For the purpose of this map, the following changes have been made: to update corporate limits, to change base flood elevations, to add base flood elevations, to add special flood hazard areas, to change special flood hazard areas, to delete special flood hazard areas, to change zone designations, to add roads and road names, to incorporate previously issued letters of map revision, to incorporate previously issued letters of map amendment, and to change floodway.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at (800) 638-6620.

MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
300 0 300 600 METERS

PANEL 2620 E

FIRM
FLOOD INSURANCE RATE MAP
CLARK COUNTY,
NEVADA AND
INCORPORATED AREAS

PANEL 2620 OF 4090

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
HENDERSON, CITY OF	320005	2620	E
CLARK COUNTY, UNINCORPORATED AREAS	320003	2620	E
BOULDER CITY, CITY OF	320004	2620	E

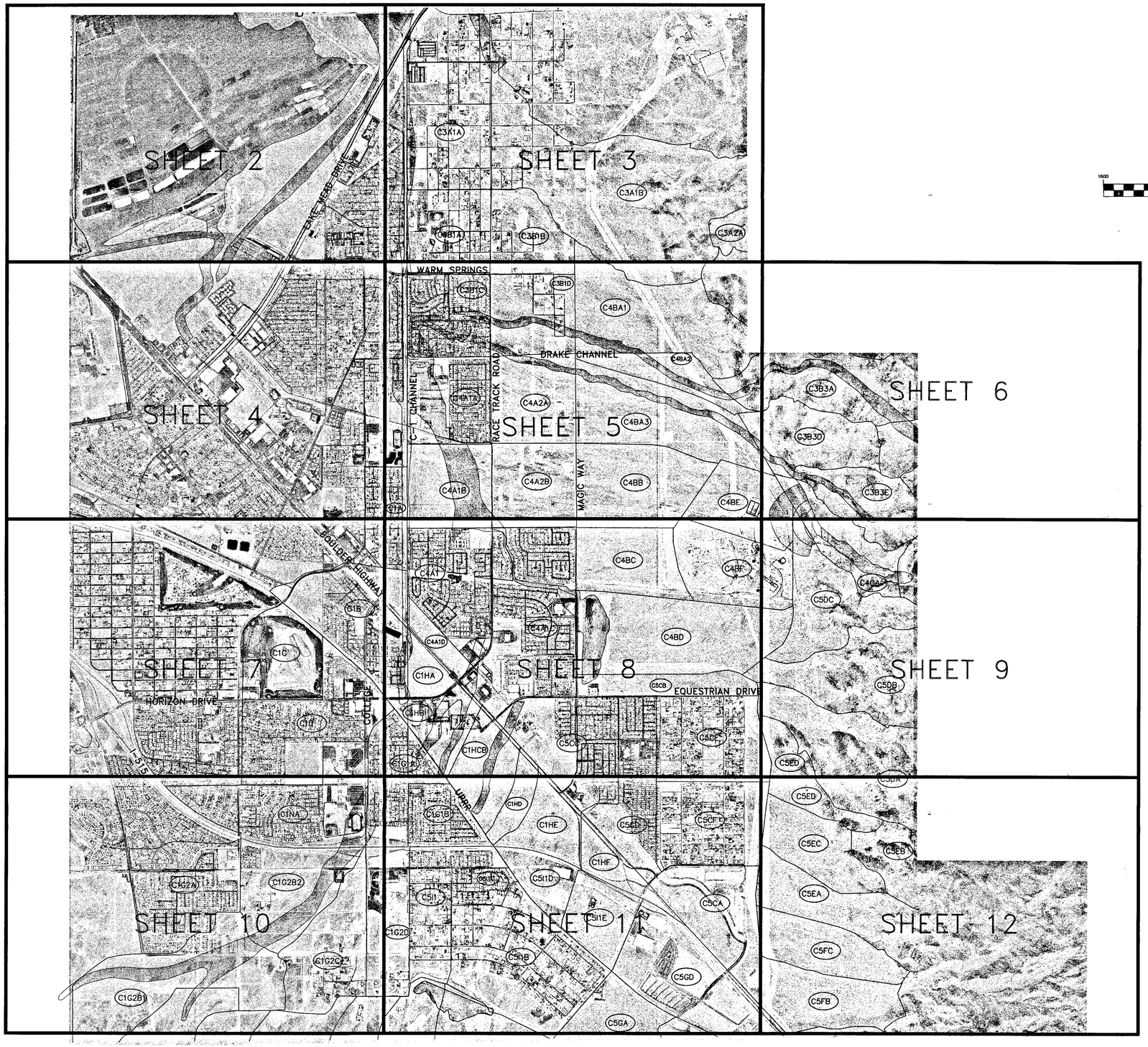
ANNOTATED FIRM

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
32003C2620 E

MAP REVISED:
September 22, 2002

Federal Emergency Management Agency



GRAPHIC SCALE

1600 0 800 1600 3200 6400

(IN FEET)
1 inch = 1600 ft.

LEGEND

- SUBBASIN BOUNDARY
- C3B3D — SUBBASIN LABEL
- SPECIAL FLOOD HAZARD AREA (SFHA)

Community Name: Henderson, Nevada
Community No: 320005
Date: 25-11-02
Vertical Datum: 1988 NAVD
Control Grid: Nevada State Plane, East Zone
Flooding Source: Henderson Basin
Attached Panels: 2955E, 2605E, 2615E, 2620E

REVISIONS

No.	Date	CHKD	APPD

DESIGNED: DB
DRAWN: SCC
CHECKED: DB
JOB No: 240482
HORIZ: 1"=400'
VERT: NONE
DATE: 10/04/02

Carter Burgess
Consultants in Planning, Engineering,
Construction Management, and Related Services
6855 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: APPROXIMATE METHODS HYDRAULICS EFFECTIVE WORK MAP

SHEET 1

1 OF 12

GRAPHIC SCALE

2000 0 1000 2000 4000 8000

(IN FEET)
1 inch = 2000ft.

LEGEND

- SUBBASIN BOUNDARY
- C3B3D — SUBBASIN LABEL
- SPECIAL FLOOD HAZARD AREA (SFHA)
- LIMITS OF APPROXIMATE METHODS ANALYSIS

Community Name: Henderson, Nevada
Community No: 320005
Date: 25-11-02
Vertical Datum: 1988 NAVD
Control Grid: Nevada State Plane, East Zone
Flooding Source: Henderson Basin
Attached Panels: 2955E, 2605E, 2615E, 2620E

REVISIONS

No.	Date	CHKD	APPD

DESIGNED: DB
DRAWN: SCC
CHECKED: DB
JOB No: 240482
HORIZ: 1"=400'
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DATE: 02/05/02

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PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY
FIGURE 4

DESCRIPTION: APPROXIMATE METHOD ANALYSIS

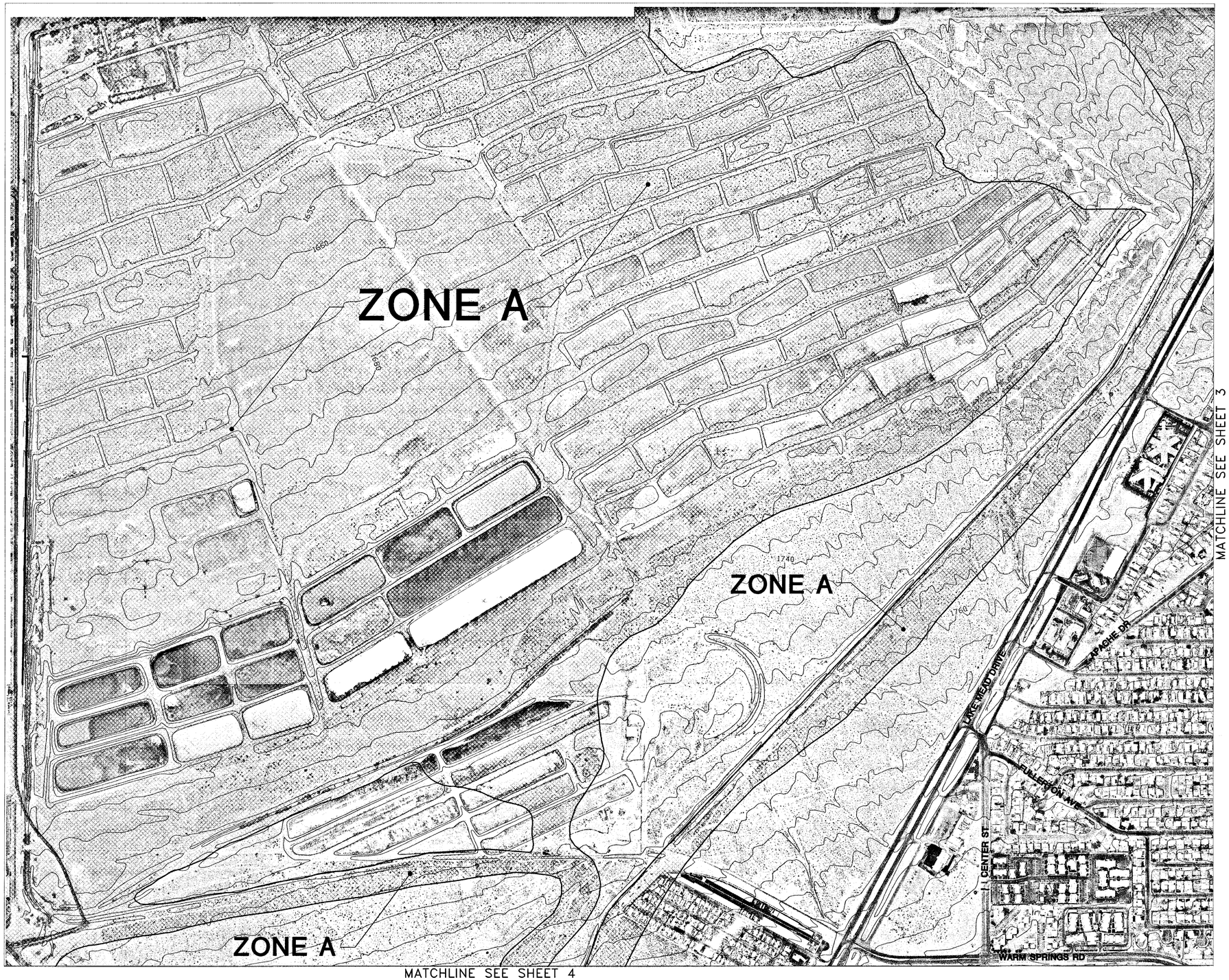
SHEET 1 OF 1

GRAPHIC SCALE

400 0 200 400 800 1600

(IN FEET)
1 inch = 400 ft.

N (Carter Burgess)



REVISIONS

No.	Date	CHKD	APPD

DESIGNED: DB
DRAWN: SCC
CHECKED: DB
JOB No: 240482
HORIZ: 1"=400'
VERT: NONE
DATE: 10/04/02

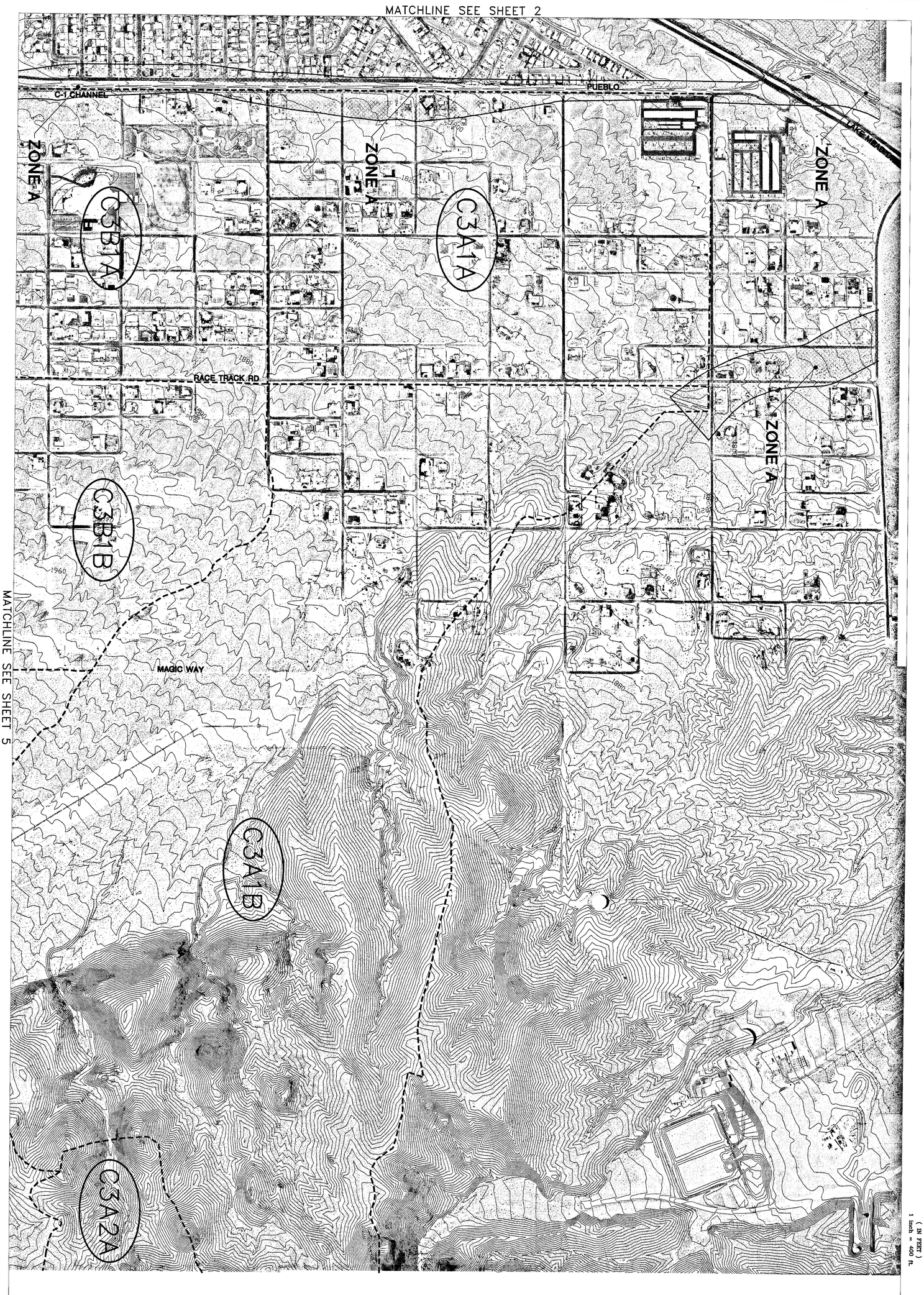
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PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: APPROXIMATE METHODS HYDRAULICS
EFFECTIVE WORK MAP

SHEET 2

2 OF 12



GRAPHIC SCALE
(IN FEET)
1 inch = 400 ft.
0 200 400 800 1600

Carter Burgess

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: APPROXIMATE METHODS HYDRAULICS EFFECTIVE WORK MAP

SHEET 3 OF 12

Carter Burgess
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DESIGNED:	DB
DRAWN:	SCC
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HORIZ:	1"=400'
VERT:	NONE
DATE:	10/04/02

REVISIONS

No.	Date		CHKD	APPD



SHEET 4 OF 12

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

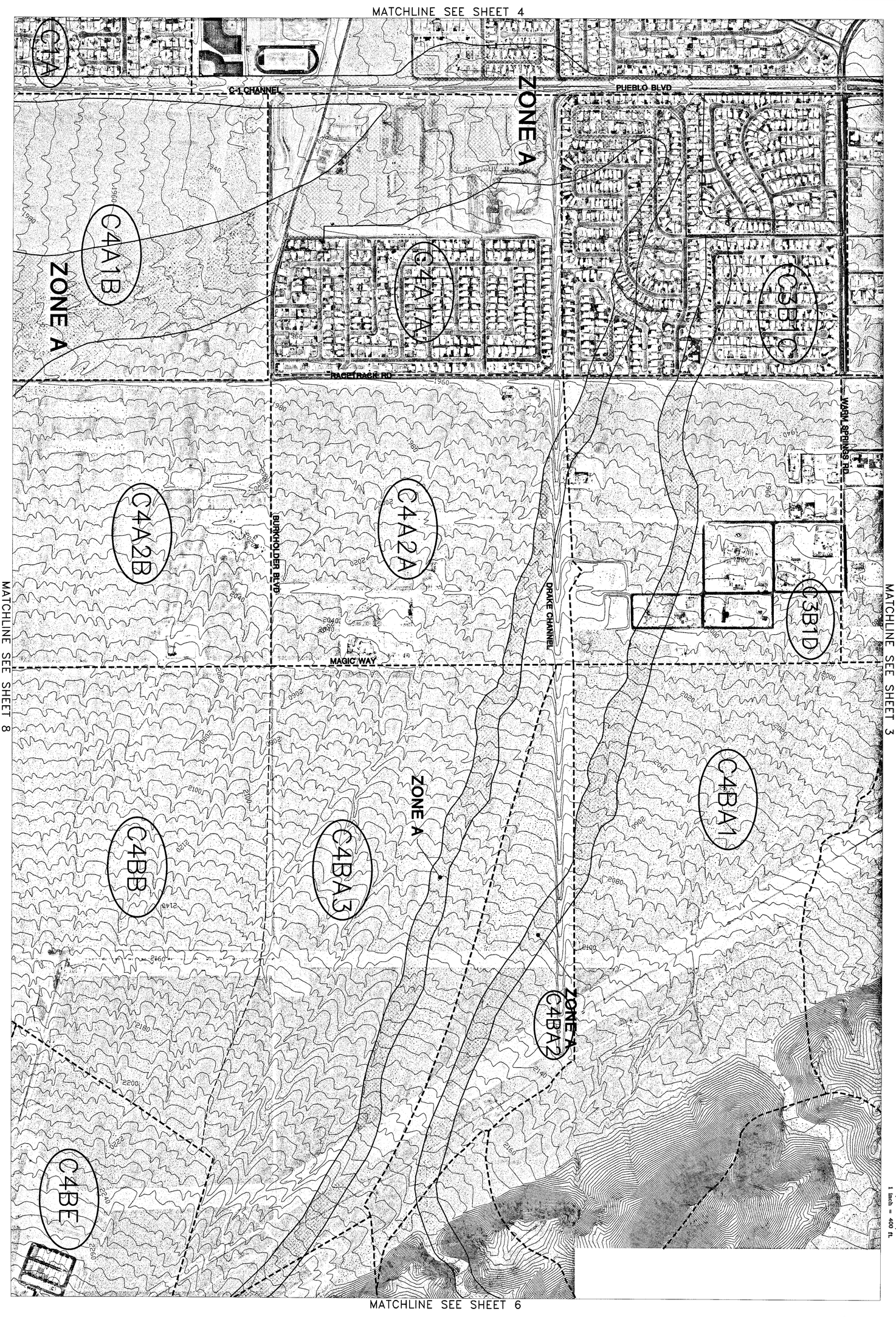
DESCRIPTION: APPROXIMATE METHODS HYDRAULICS EFFECTIVE WORK MAP

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(702) 938-5400 Fax (702) 938-5454

DESIGNED:	DB
DRAWN:	SCC
CHECKED:	DB
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HORIZ:	1"=400'
VERT:	NONE
DATE:	10/04/02

REVISIONS

No.	Date		CHKD	APPD



SHEET 5 OF 12

PROJECT:
C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION:
APPROXIMATE METHODS HYDRAULICS
EFFECTIVE WORK MAP

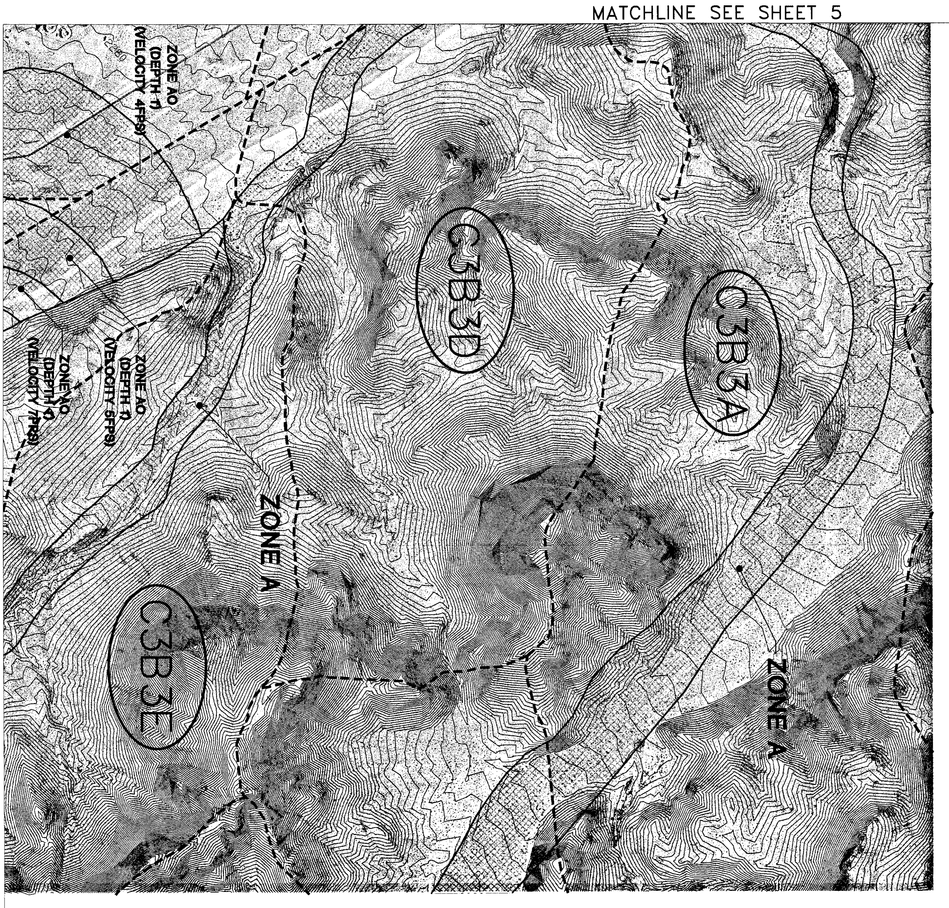
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6655 Bermuda Road
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(702) 938-5400 Fax (702) 938-5454

DESIGNED:	DB
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JOB No:	240482
HORIZ:	1"=400'
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DATE:	10/04/02

REVISIONS

No.	Date		CHKD	APPD

MATCHLINE SEE SHEET 5



MATCHLINE SEE SHEET 9

GRAPHIC SCALE
(IN FEET)
1 inch = 400 ft.
0
200
400
800
1600

Carter Burgess

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: APPROXIMATE METHODS HYDRAULICS EFFECTIVE WORK MAP

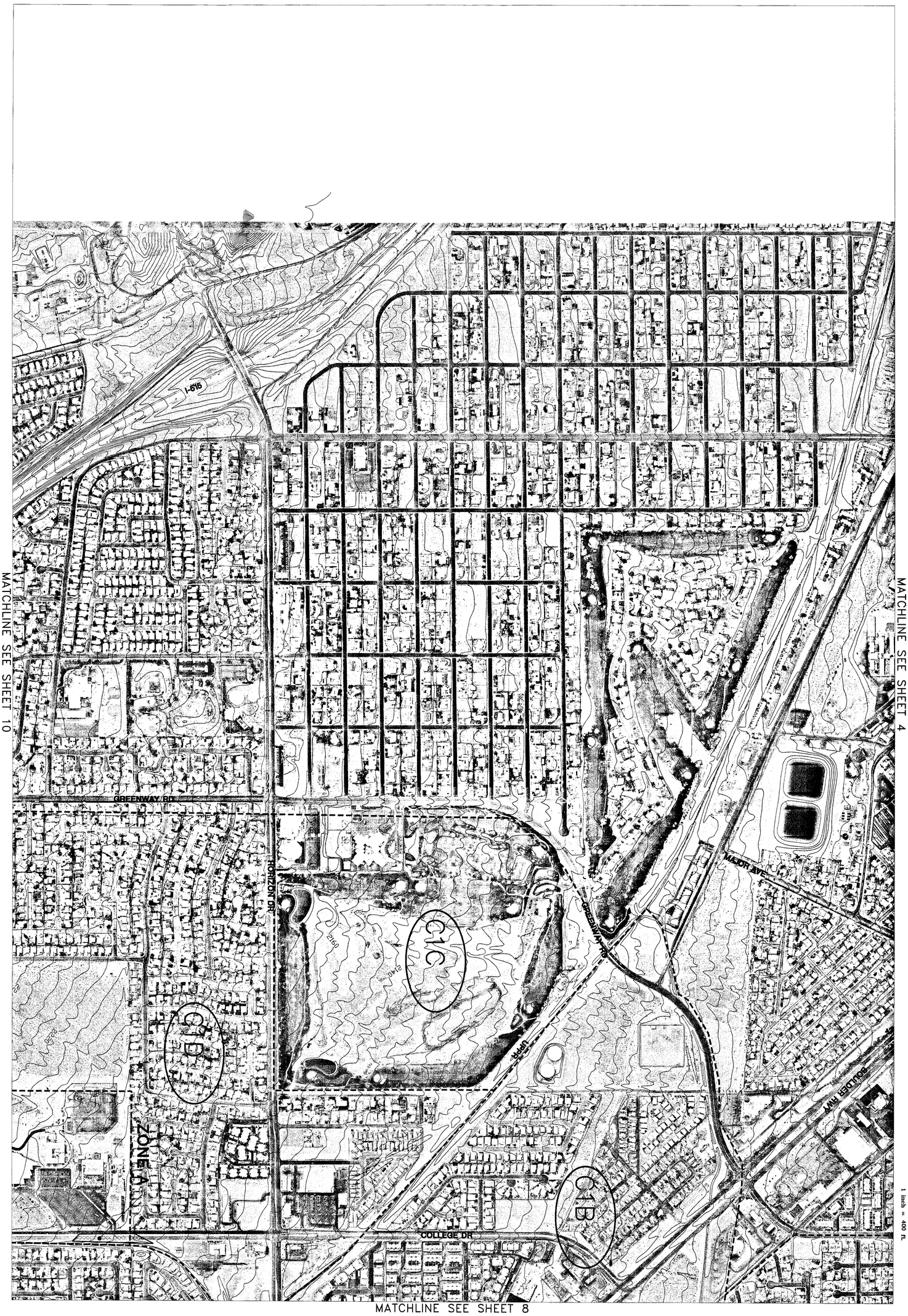
SHEET 6 OF 12

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JOB No:	240482
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No.	Date		CHKD	APPD



GRAPHIC SCALE
(IN FEET)
1 inch = 400 ft.

Carter Burgess

SHEET 7 OF 12

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

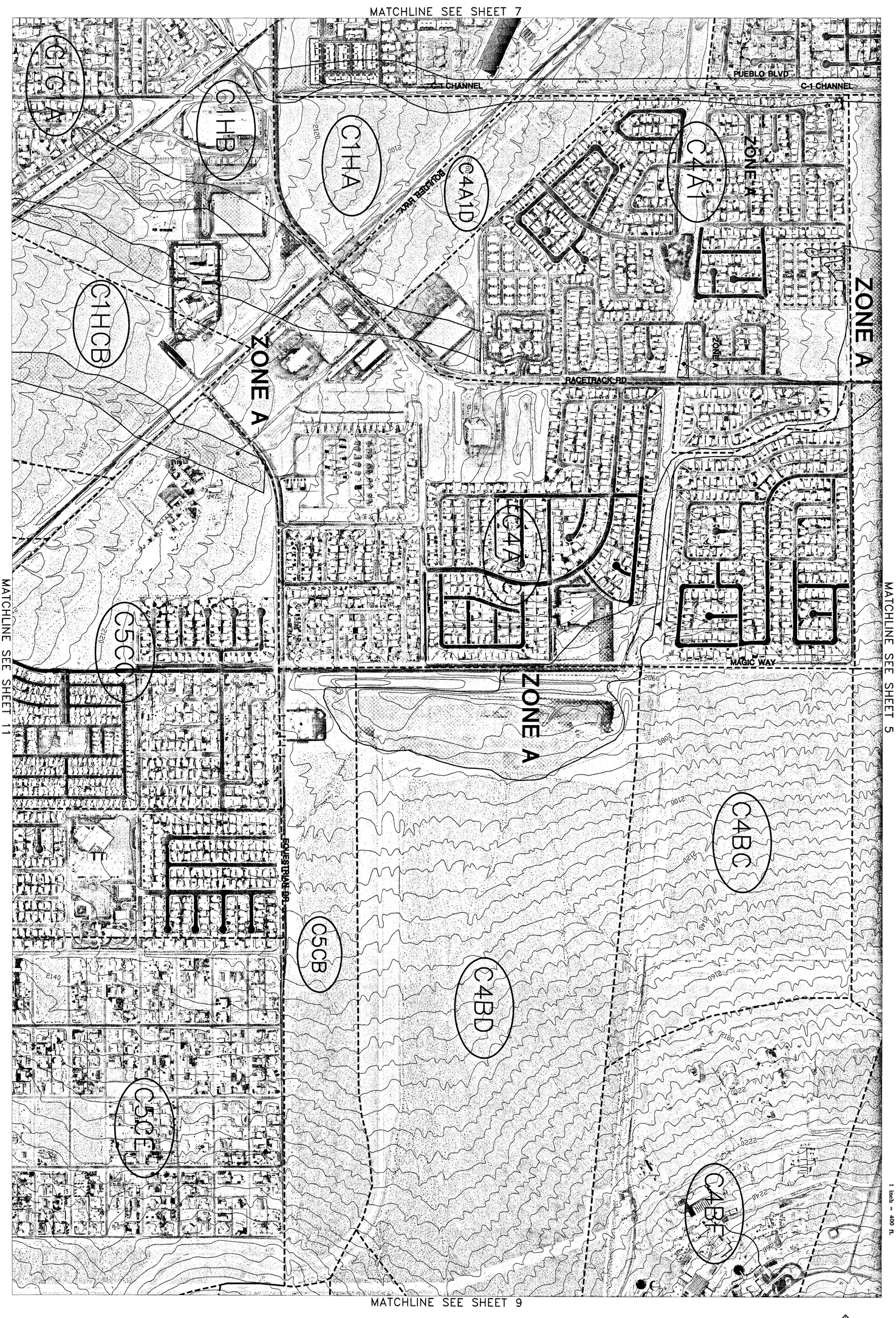
DESCRIPTION: APPROXIMATE METHODS HYDRAULICS EFFECTIVE WORK MAP

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Consultants in Planning, Engineering, Construction Management, and Related Services
6655 Bermuda Road
Las Vegas, Nevada 89119
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DATE:	10/04/02

REVISIONS

No.	Date		CHKD	APPD



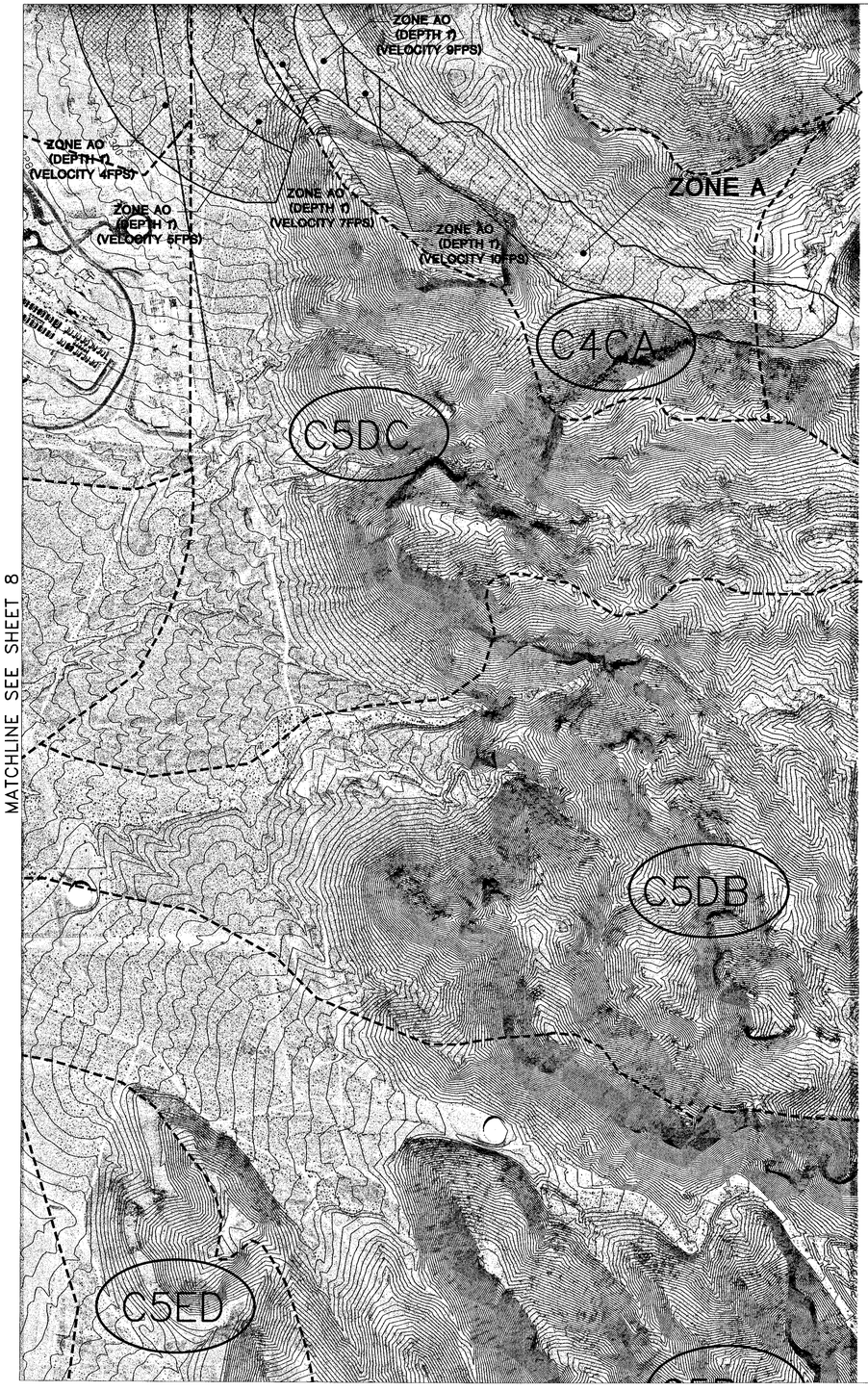
SHEET 8 OF 12	PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY	Carter Burgess Consultants in Planning, Engineering, Construction Management, and Related Services 6655 Bermuda Road Las Vegas, Nevada 89119 (702) 938-5400 Fax (702) 938-5454	DESIGNED: DB DRAWN: SCC CHECKED: DB JOB No: 240482 HORIZ: 1"=400' VERT: NONE DATE: 10/04/02	REVISIONS
	DESCRIPTION: APPROXIMATE METHODS HYDRAULICS EFFECTIVE WORK MAP			No. / Date / CHKD / APPD

MATCHLINE SEE SHEET 6

GRAPHIC SCALE

400 0 200 400 800 1600

(IN FEET)
1 inch = 400 ft.



MATCHLINE SEE SHEET 8

MATCHLINE SEE SHEET 12

N

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REVISIONS

No.	Date	CHKD	APPD

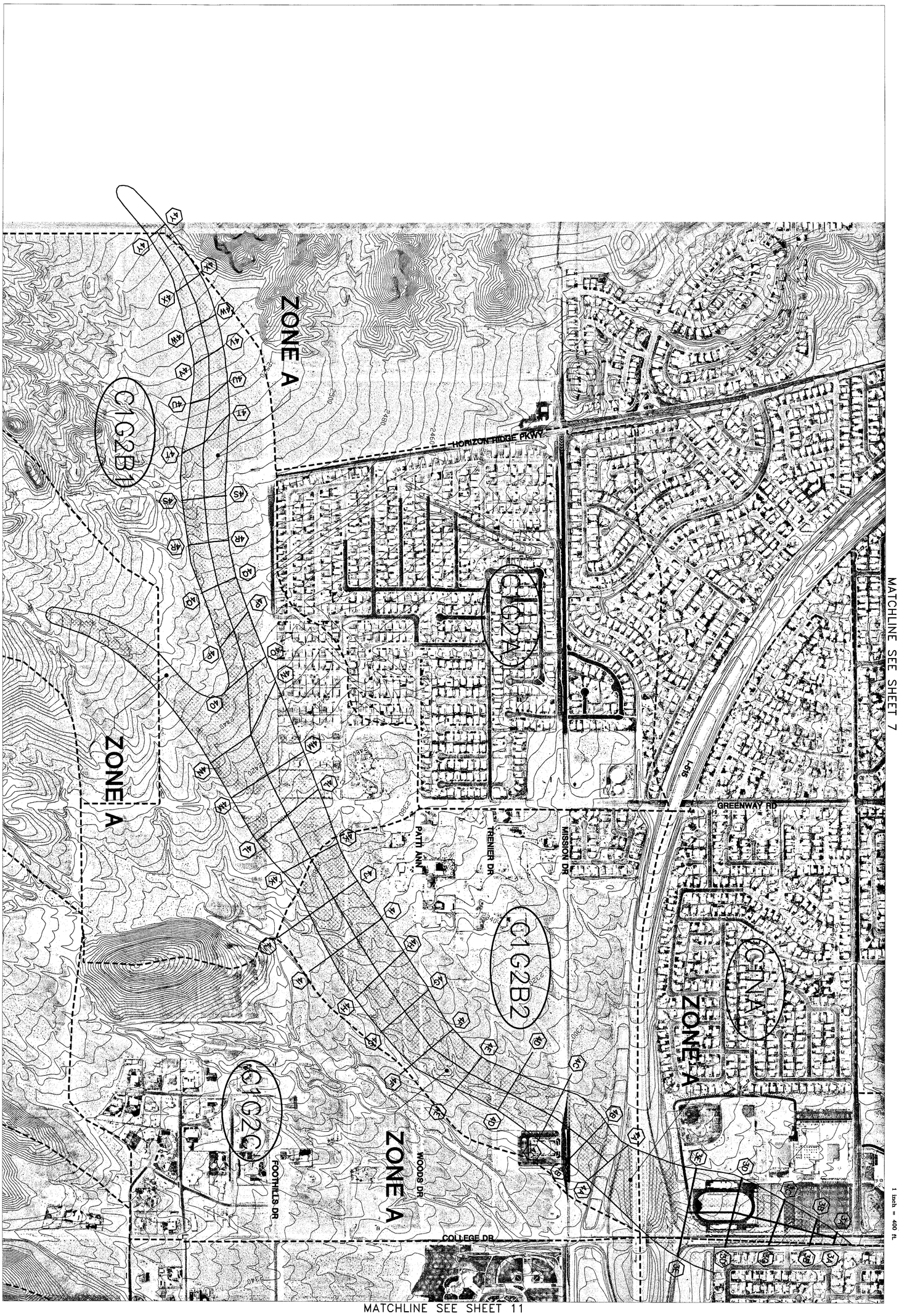
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HORIZ: 1"=400'
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DATE: 10/04/02

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PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION:
APPROXIMATE METHODS HYDRAULICS EFFECTIVE WORK MAP

SHEET
9
9 OF 12



SHEET 10 OF 12

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

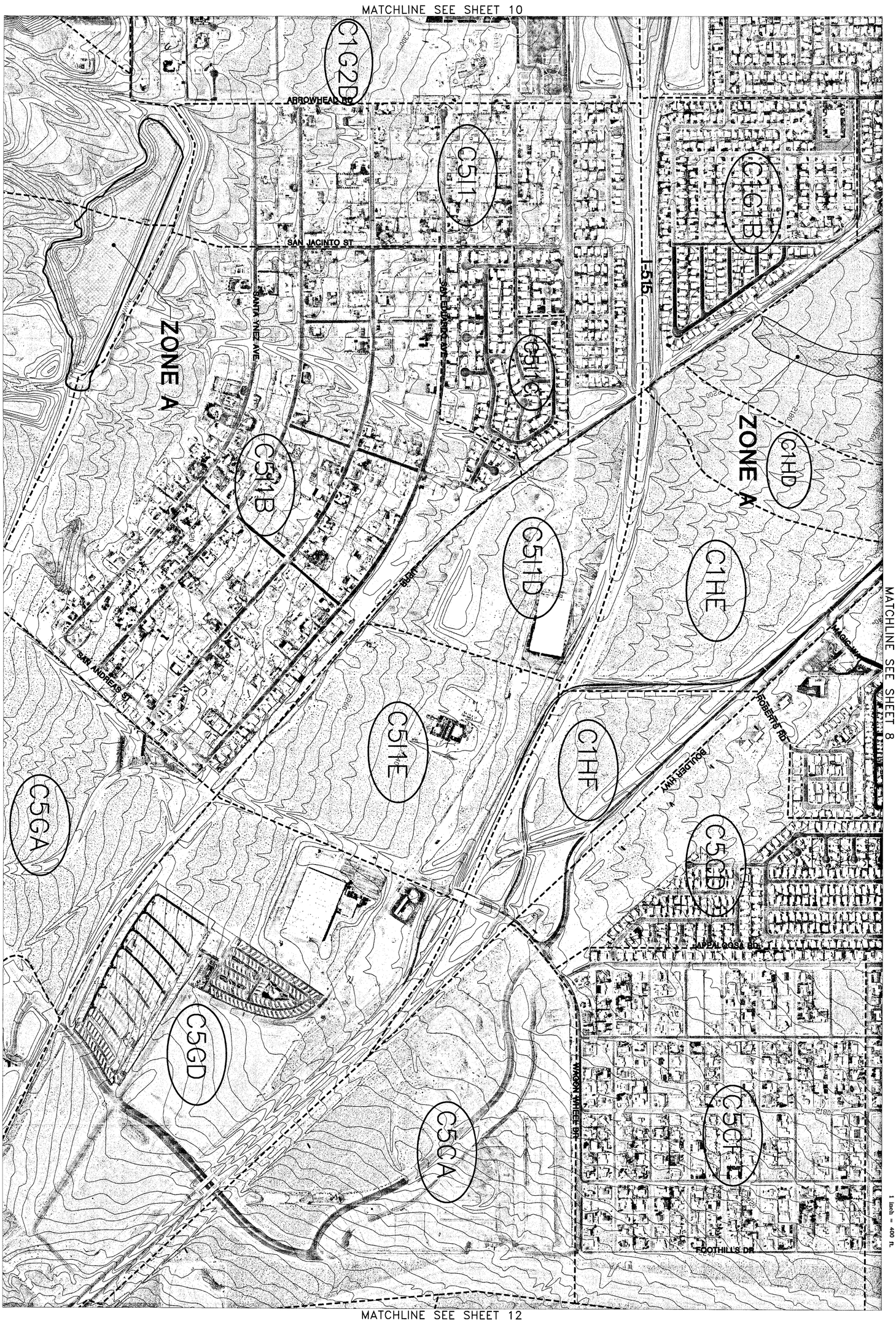
DESCRIPTION: APPROXIMATE METHODS HYDRAULICS EFFECTIVE WORK MAP

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Las Vegas, Nevada 89119
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CHECKED:	DB
JOB No:	240482
HORIZ:	1"=400'
VERT:	NONE
DATE:	02/05/02

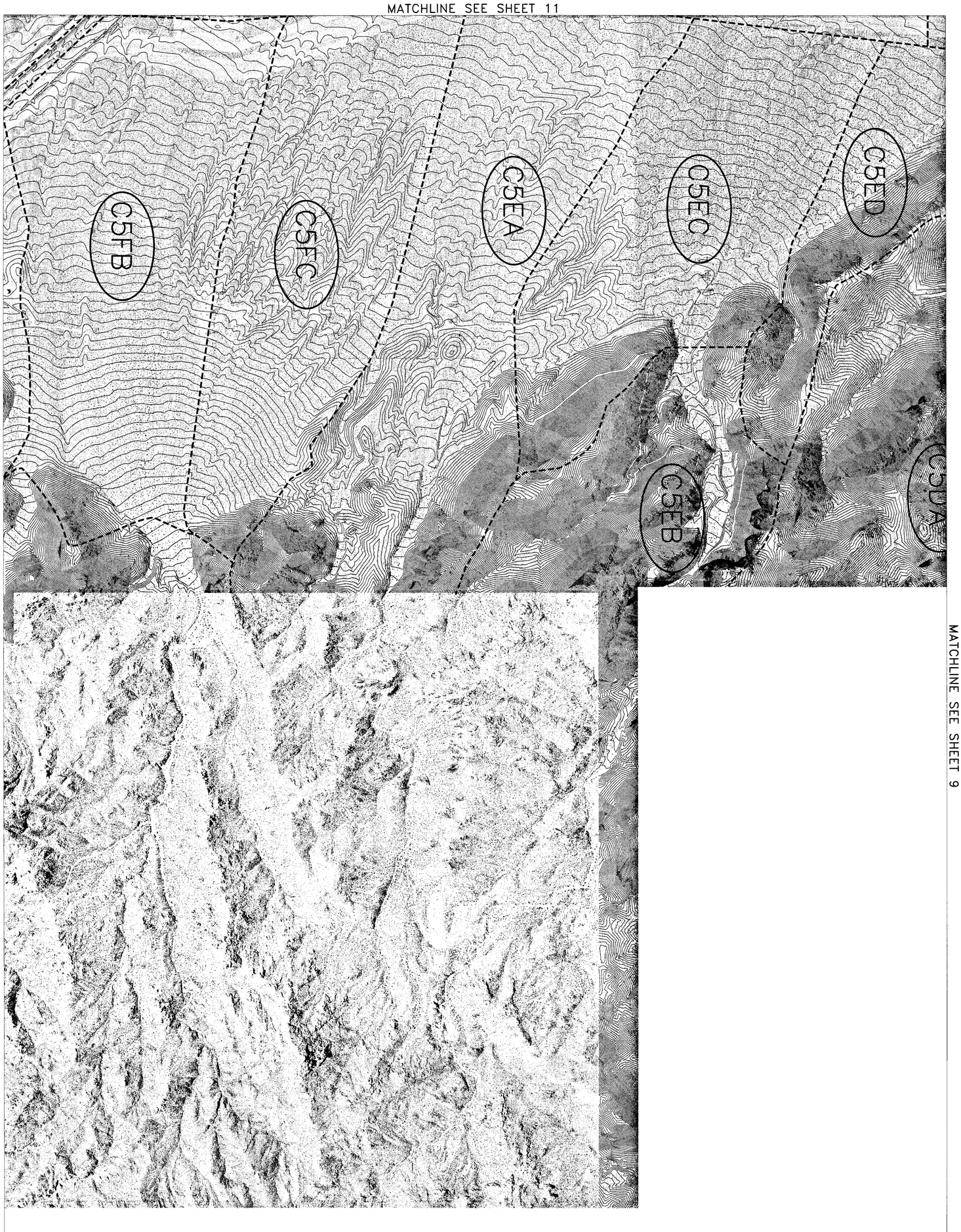
REVISIONS

No.	Date		CHKD	APPD



SHEET 11 OF 12	PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY	Carter Burgess Consultants in Planning, Engineering, Construction Management, and Related Services 6655 Bermuda Road Las Vegas, Nevada 89119 (702) 938-5400 Fax (702) 938-5454	DESIGNED: DB DRAWN: SCC CHECKED: DB JOB No: 240482 HORIZ: 1"=400' VERT: NONE DATE: 10/04/02	REVISIONS
	DESCRIPTION: APPROXIMATE METHODS HYDRAULICS EFFECTIVE WORK MAP			No. / Date / CHKD / APPD

MATCHLINE SEE SHEET 11



MATCHLINE SEE SHEET 9

GRAPHIC SCALE
(IN FEET)
1 inch = 400 ft.
400 0 200 400 800 1600

Carter Burgess

SHEET 12 OF 12

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

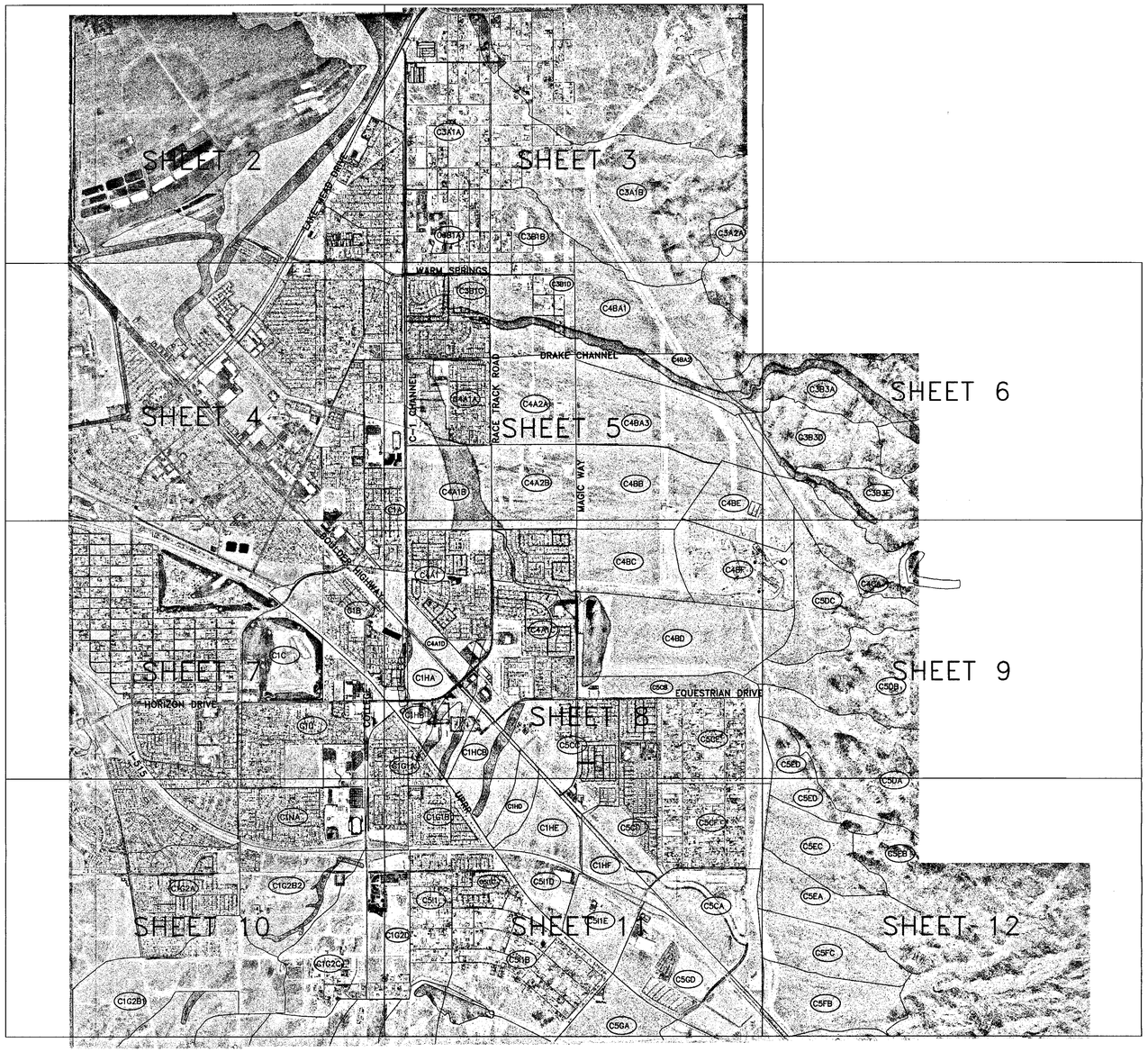
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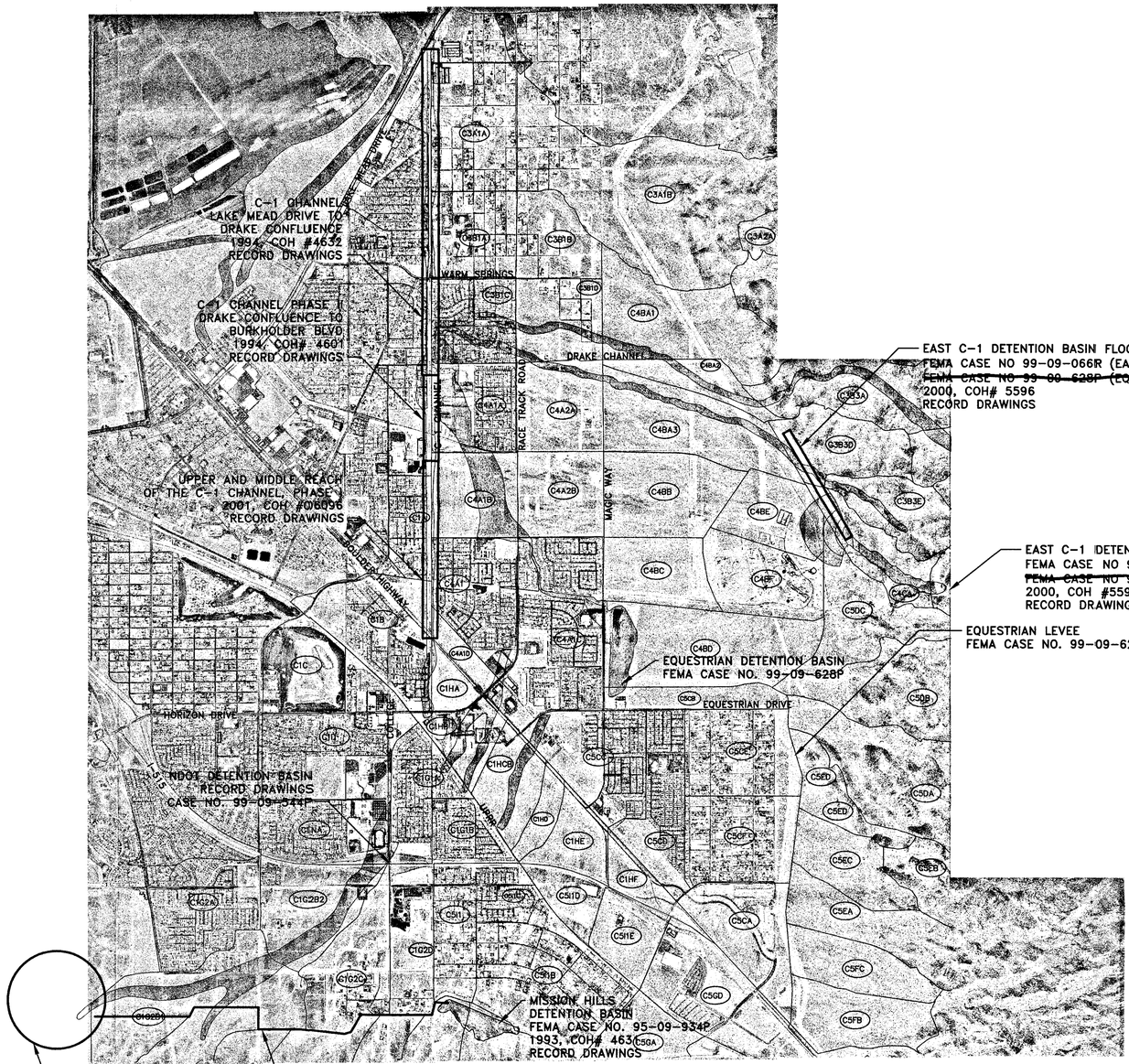
Carter Burgess
Consultants in Planning, Engineering, Construction Management, and Related Services
6655 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

DESIGNED:	DB
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CHECKED:	DB
JOB No:	240482
HORIZ:	1"=400'
VERT:	NONE
DATE:	10/04/02

REVISIONS

No.	Date		CHKD	APPD


SHEET 2
SHEET 3
SHEET 4
SHEET 5
SHEET 6
SHEET 7
SHEET 8
SHEET 9
SHEET 10
SHEET 11
SHEET 12
C3A1A
C3A1B
C3B1B
C3A2A
C3B1C
C3B1D
C4BA1
C4BA2
C4BA3
C4A2A
C4A2B
C4A1B
C4BB
C4BE
C3B3A
C3B3D
C3B3E
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C5FR
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EAST C-1 DETENTION BASIN FLOOD CONTROL IMPROVEMENTS
FEMA CASE NO 99-09-066R (EAST C-1 CLOMR)
~~FEMA CASE NO 99-09-628P (EQUESTRIAN DETENTION BASIN)~~
2000, COH# 5596
RECORD DRAWINGS

EAST C-1 DETENTION BASIN FLOOD CONTROL IMPROVEMENTS
FEMA CASE NO 99-09-066R (EAST C-1 CLOMR)
~~FEMA CASE NO 99-09-628P (EQUESTRIAN DETENTION BASIN)~~
2000, COH# 5596
RECORD DRAWINGS

EQUESTRIAN LEVEE
FEMA CASE NO. 99-09-628P

EQUESTRIAN DETENTION BASIN
FEMA CASE NO. 99-09-628P

NDOT DETENTION BASIN
RECORD DRAWINGS
CASE NO. 99-09-544P

MISSION HILLS DETENTION BASIN
FEMA CASE NO. 95-09-934P
1993, COH# 4635
RECORD DRAWINGS

MISSION HILLS WESTERN INTERCEPTOR CHANNEL
1996, COH# 4943
RECORD DRAWINGS

BLACK MOUNTAIN DETENTION BASIN
1999, COH #5799
RECORD DRAWINGS

GRAPHIC SCALE

2000 0 1000 2000 4000 8000

(IN FEET)
1 inch = 2000ft.

LEGEND

- SUBBASIN BOUNDARY
- C3B3D — SUBBASIN LABEL
- SPECIAL FLOOD HAZARD AREA (SFHA)
- LIMITS OF DETAILED ANALYSIS

Community Name: Henderson, Nevada
Community No: 320005
Date: 25-11-02
Vertical Datum: 1988 NAVD
Control Grid: Nevada State Plane, East Zone
Flooding Source: Henderson Basin
Attached Panels: 2955E, 2605E, 2615E, 2620E

REVISIONS

No.	Date	CHKD	APPD

DESIGNED: DB
DRAWN: SCC
CHECKED: DB
JOB No: 240482
HORIZ: 1"=400'
VERT: NONE
DATE: 02/05/02

Carter Burgess
Consultants in Planning, Engineering, Construction Management, and Related Services
6655 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY
FIGURE 3

DESCRIPTION: DETAILED METHOD ANALYSIS

SHEET 1 OF 1

GRAPHIC SCALE

400 0 200 400 800 1600

(IN FEET)
1 inch = 400 ft.

N

Carter Burgess

ZONE A

ZONE A

ZONE A

1680

1660

1640

1740

1760

APACHE DR

LAKE MEAD DRIVE

FULLERTON AVE

CENTER ST

WARM SPRINGS RD

MATCHLINE SEE SHEET 3

MATCHLINE SEE SHEET 4

REVISIONS

No.	Date	CHKD	APPD

DESIGNED: DB
DRAWN: SCC
CHECKED: DB
JOB No: 240482
HORIZ. 1"=400'
VERT: NONE
DATE: 10/04/02

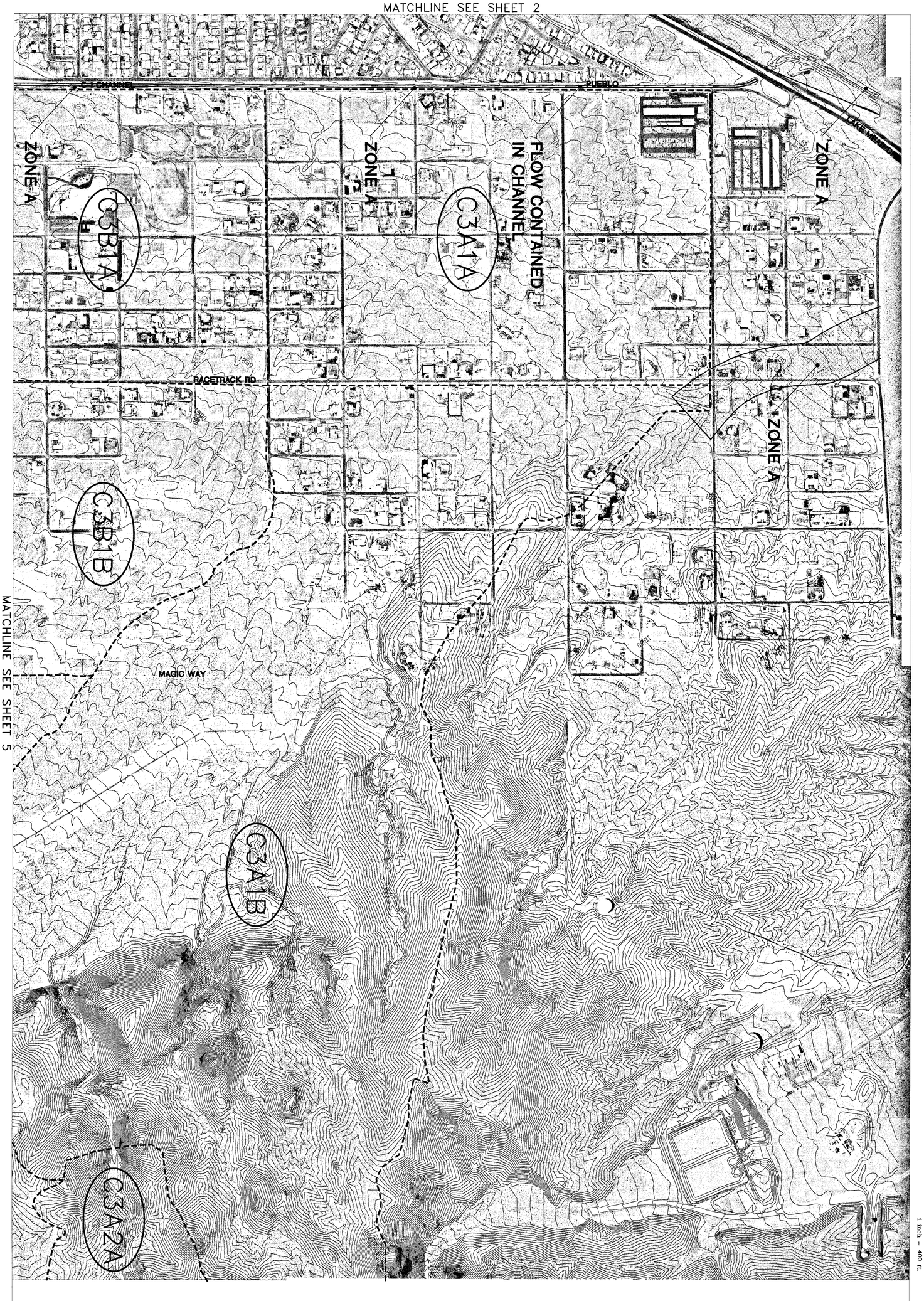
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Las Vegas, Nevada
(702) 938-5400 Fax (702) 938-5454

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: APPROXIMATE METHODS HYDRAULICS
ANNOTATED WORK MAP

SHEET 2 OF 12



GRAPHIC SCALE
(IN FEET)
1 inch = 400 ft.

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SHEET 3 OF 12

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

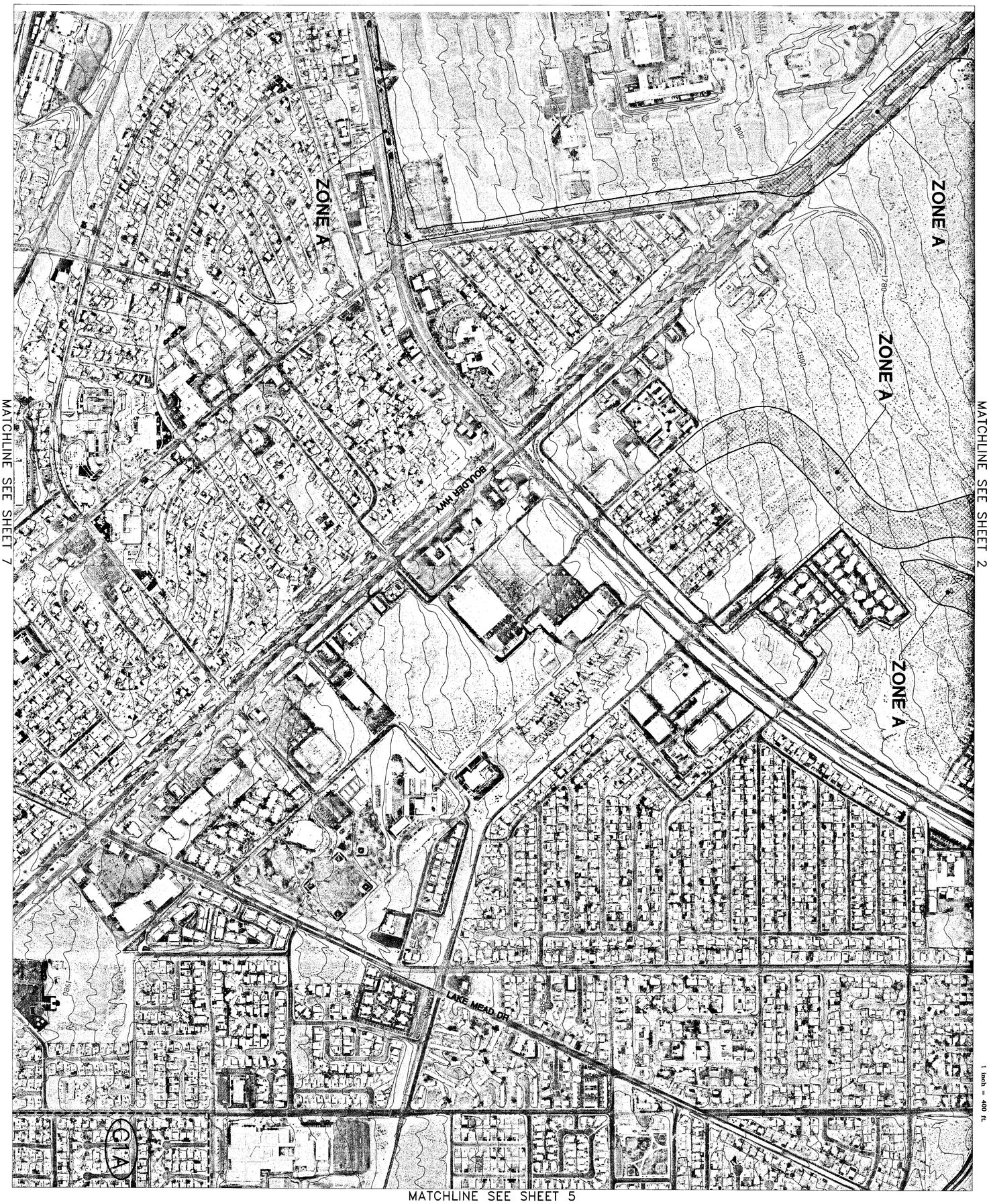
DESCRIPTION: APPROXIMATE METHODS HYDRAULICS ANNOTATED WORK MAP

Carter Burgess
Consultants in Planning, Engineering, Construction Management, and Related Services
6655 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

DESIGNED:	DB
DRAWN:	SCC
CHECKED:	DB
JOB No:	240482
HORIZ:	1"=400'
VERT:	NONE
DATE:	10/04/02

REVISIONS

No.	Date		CHKD	APPD


ZONE A
ZONE A
ZONE A
ZONE A
BOULDER HWY
LAKE MEAD DR
1800
1780
1820
1860
1880
1900
1920
1940
1960
1980
2000
2020
2040
2060
2080
2100
2120
2140
2160
2180
2200
2220
2240
2260
2280
2300
2320
2340
2360
2380
2400
2420
2440
2460
2480
2500
2520
2540
2560
2580
2600
2620
2640

GRAPHIC SCALE

400 0 200 400 800 1600

(IN FEET)
1 inch = 400 ft.

MATCHLINE SEE SHEET 3

MATCHLINE SEE SHEET 4

MATCHLINE SEE SHEET 6

MATCHLINE SEE SHEET 8

C3B1C

C3B1D

C4BA1

C4BA2

C4BA3

C4A1A

C4A2A

C4A2B

C4A1B

C1A

C4BB

C4BE

FLOW CONTAINED IN CHANNEL

ZONE A

ZONE A

ZONE A

LIMITS OF STUDY

LIMITS OF STUDY

REACH 2B

REACH 2A

REACH 2C

WARM SPRINGS RD

PUEBLO BLVD

DRAKE CHANNEL

MAGIC WAY

BURKHOLDER BLVD

REVISIONS

No.	Date	CHKD	APPD

DESIGNED: DB
DRAWN: SCC
CHECKED: DB
JOB No: 240482
HORIZ: 1"=400'
VERT: NONE
DATE: 02/06/02

Carter Burgess

Consultants in Planning, Engineering,
Construction Management, and Related Services

6655 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: APPROXIMATE METHODS HYDRAULICS ANNOTATED WORK MAP

SHEET 5

5 OF 12

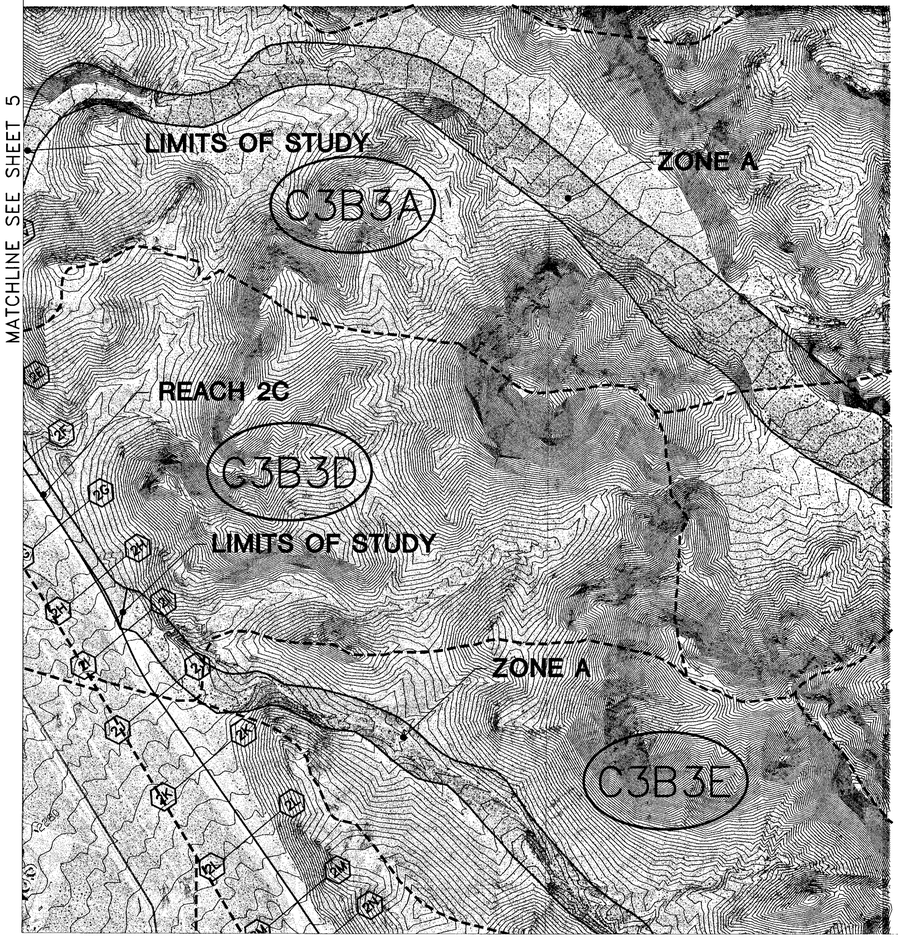
GRAPHIC SCALE

400 0 200 400 800 1600

(IN FEET)
1 inch = 400 ft.

N

Carter Burgess



MATCHLINE SEE SHEET 5

MATCHLINE SEE SHEET 9

REVISIONS

No.	Date	CHKD	APPD

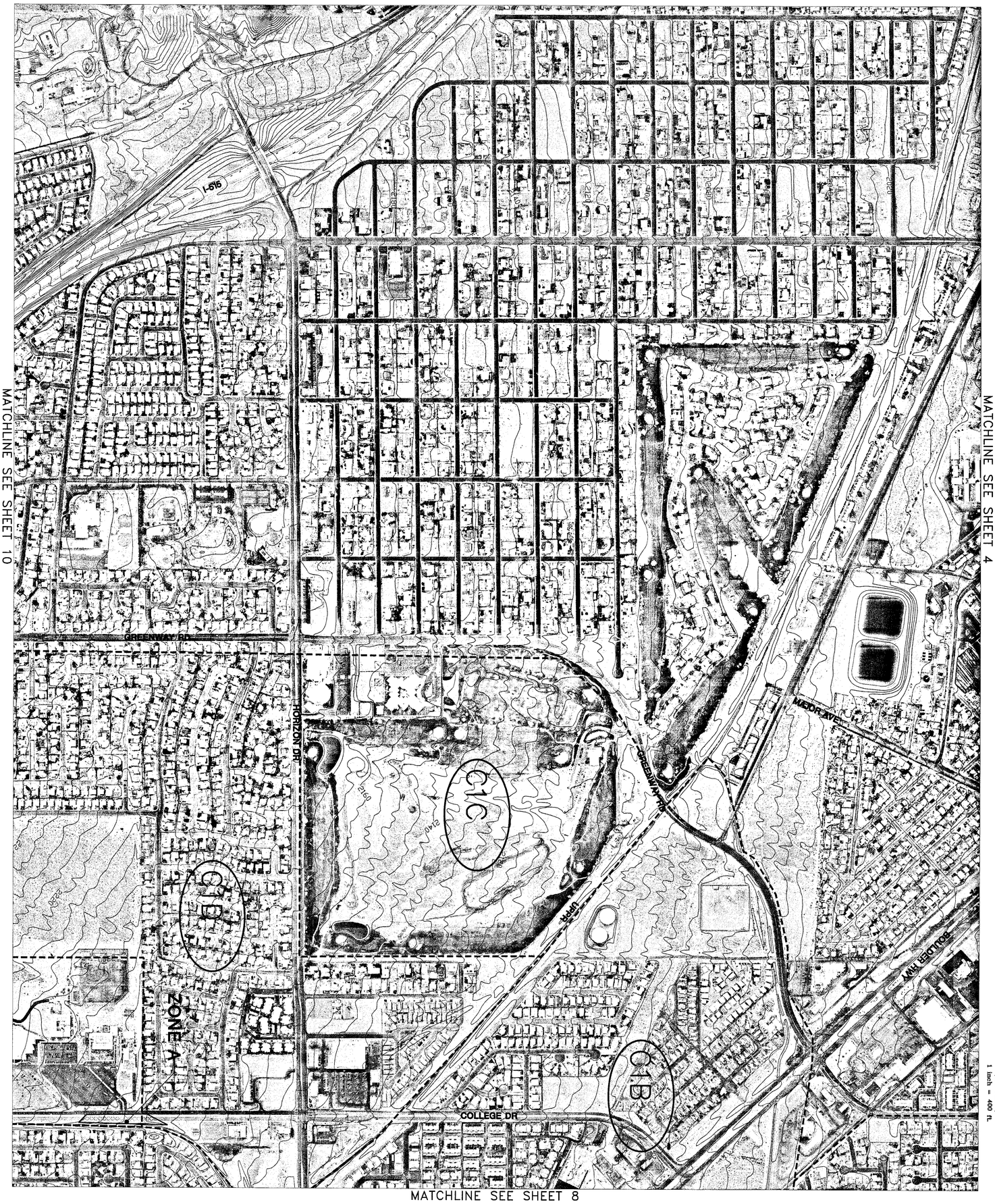
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DRAWN: SCC
CHECKED: DB
JOB No: 240482
HORIZ: 1"=400'
VERT: NONE
DATE: 10/04/02

Carter Burgess
Consultants in Planning, Engineering,
Construction Management, and Related Services
6655 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: APPROXIMATE METHODS HYDRAULICS ANNOTATED WORK MAP

SHEET 6 OF 12



GRAPHIC SCALE
(IN FEET)
1 inch = 400 ft.
0 200 400 800

Carter Burgess

SHEET 7 OF 12

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

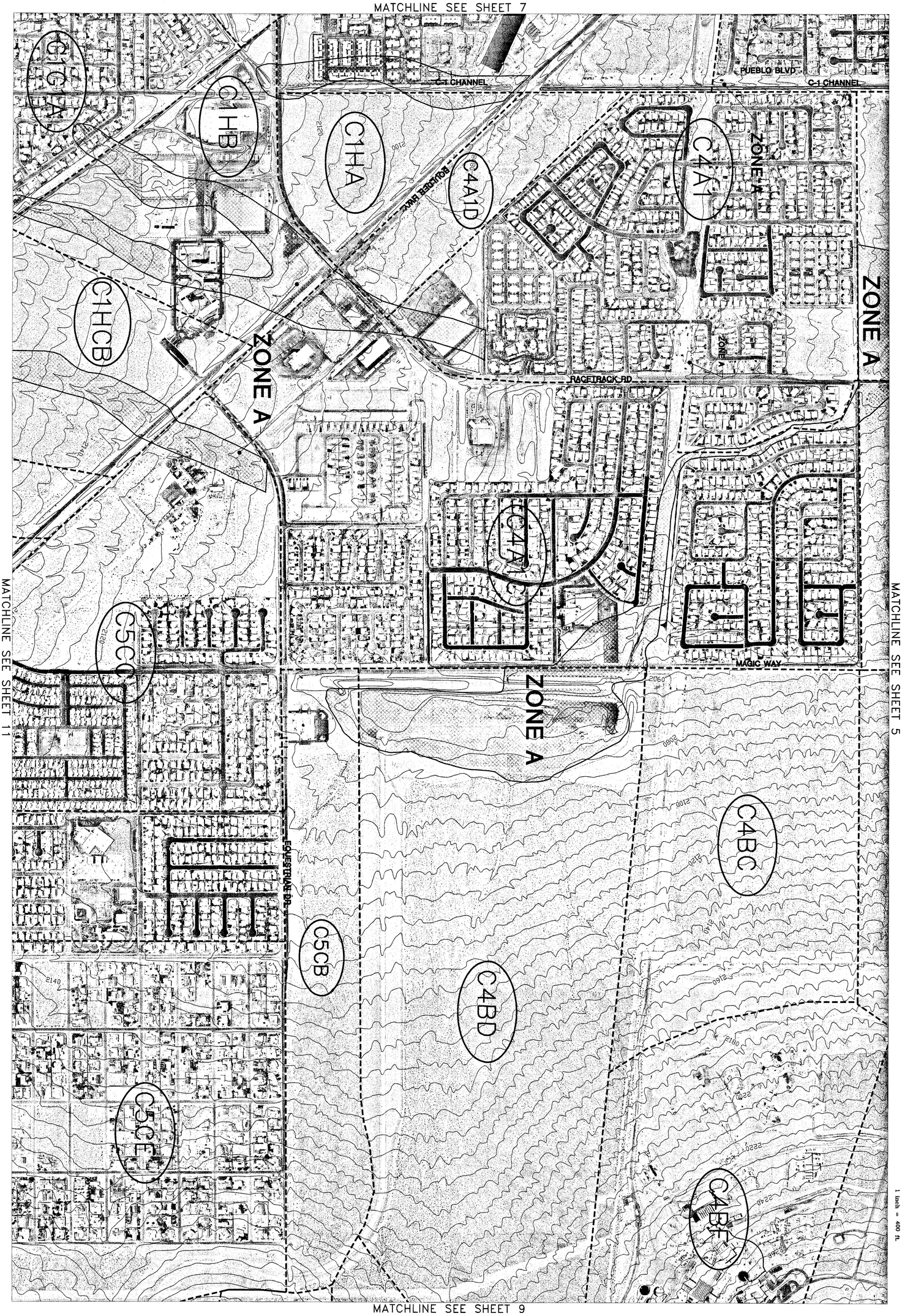
DESCRIPTION:
APPROXIMATE METHODS HYDRAULICS ANNOTATED WORK MAP

Carter Burgess
Consultants in Planning, Engineering, Construction Management, and Related Services
6655 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

DESIGNED:	DB
DRAWN:	SCC
CHECKED:	DB
JOB No:	240482
HORIZ:	1"=400'
VERT:	NONE
DATE:	10/04/02

REVISIONS

No.	Date		CHKD	APPD



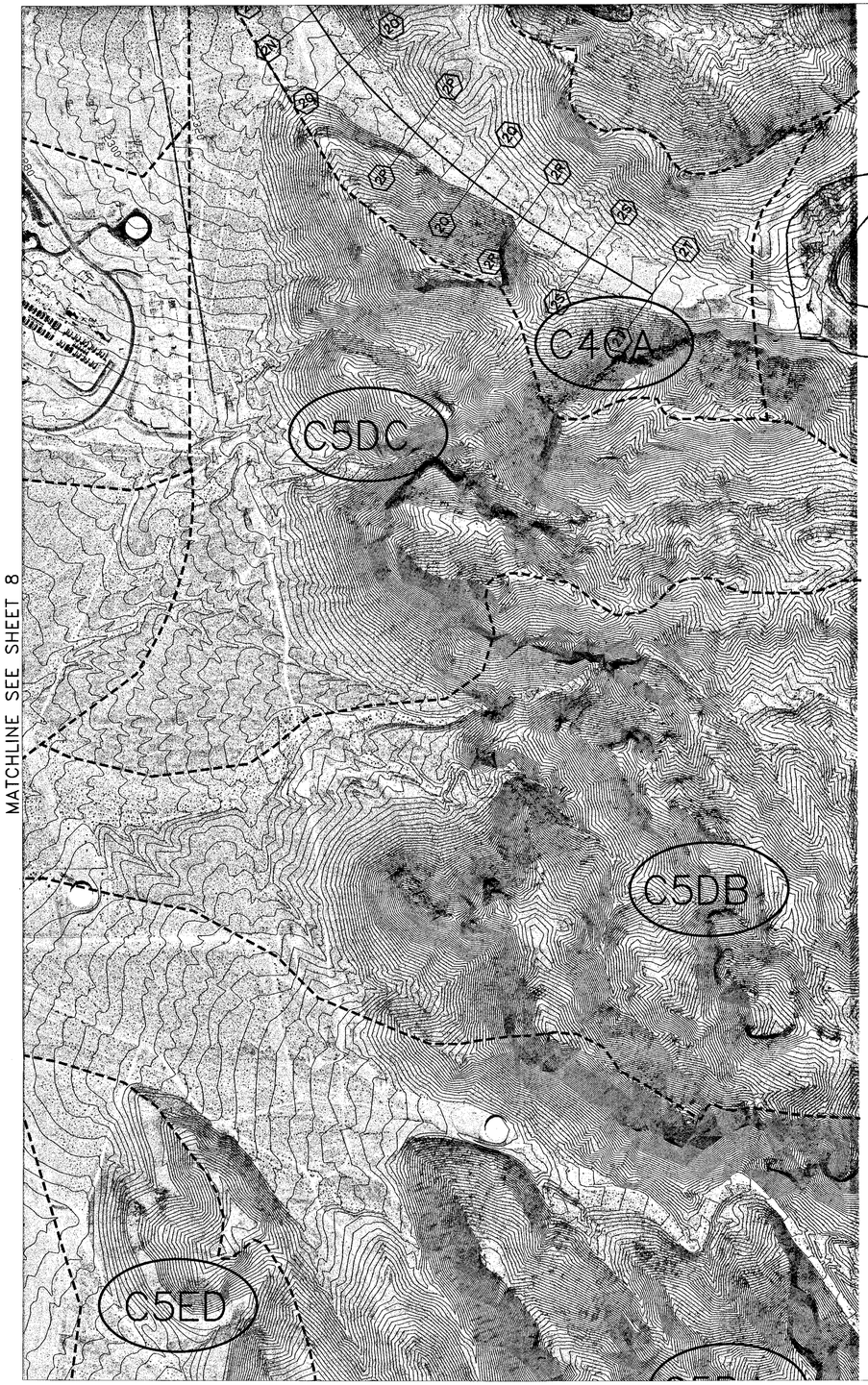
SHEET 8 OF 12	PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY	**Carter Burgess** Consultants in Planning, Engineering, Construction Management, and Related Services 6655 Bermuda Road Las Vegas, Nevada 89119 (702) 938-5400 Fax (702) 938-5454	DESIGNED: DB DRAWN: SCC CHECKED: DB JOB No: 240482 HORIZ: 1"=400' VERT: NONE DATE: 10/04/02	REVISIONS
	DESCRIPTION: APPROXIMATE METHODS HYDRAULICS ANNOTATED WORK MAP			No. / Date / CHKD / APPD

GRAPHIC SCALE

400 0 200 400 800 1600

(IN FEET)
1 inch = 400 ft.

MATCHLINE SEE SHEET 6



MATCHLINE SEE SHEET 8

MATCHLINE SEE SHEET 12

N

Carter Burgess

REVISIONS

No.	Date	CHKD	APPD

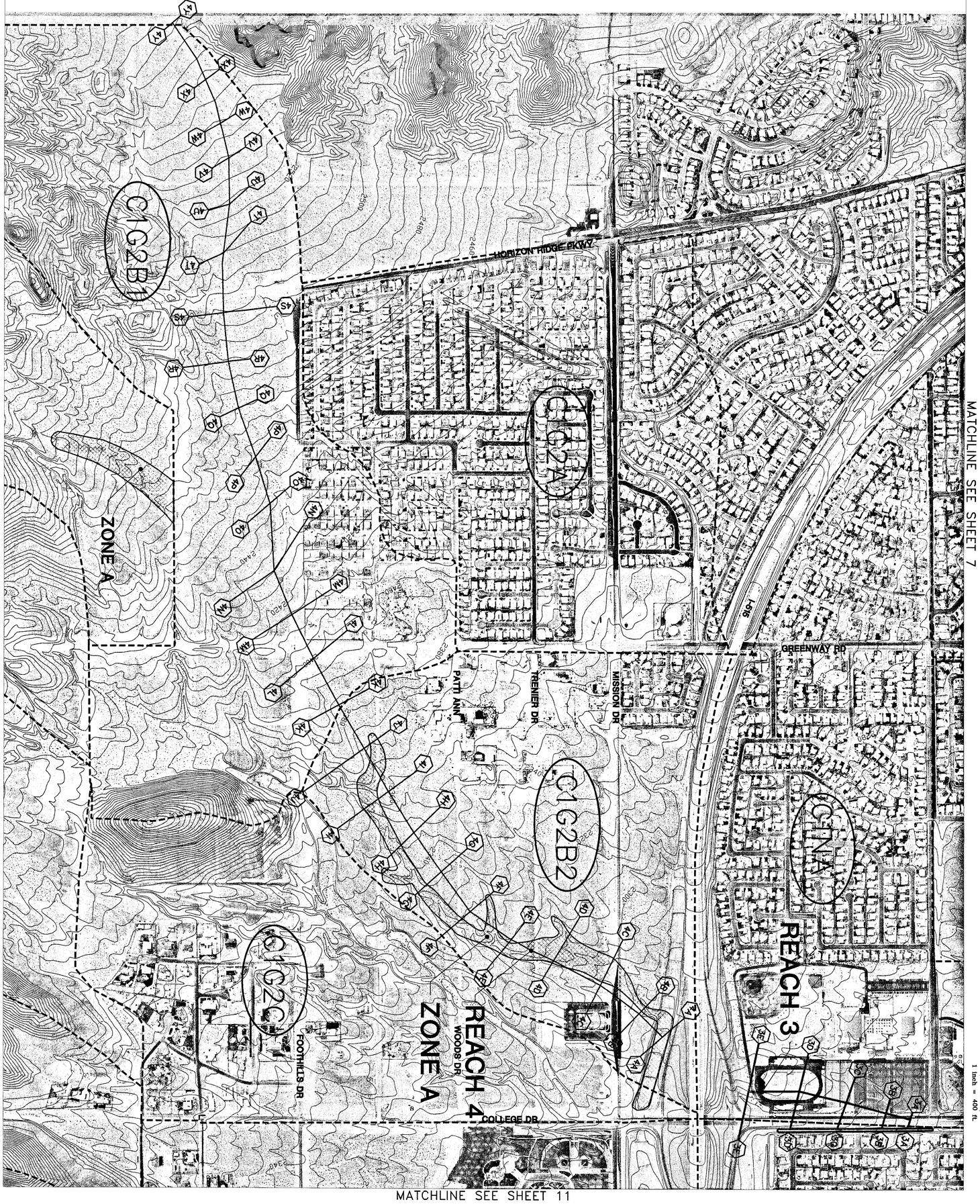
DESIGNED: DB
DRAWN: SCC
CHECKED: DB
JOB No: 340482
HORIZ: 1"=400'
VERT: NONE
DATE: 02/05/02

Carter Burgess
Consultants in Planning, Engineering,
Construction Management, and Related Services
6655 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: APPROXIMATE METHODS HYDRAULICS ANNOTATED WORK MAP

SHEET 9 OF 12



SHEET 10 OF 12

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION:

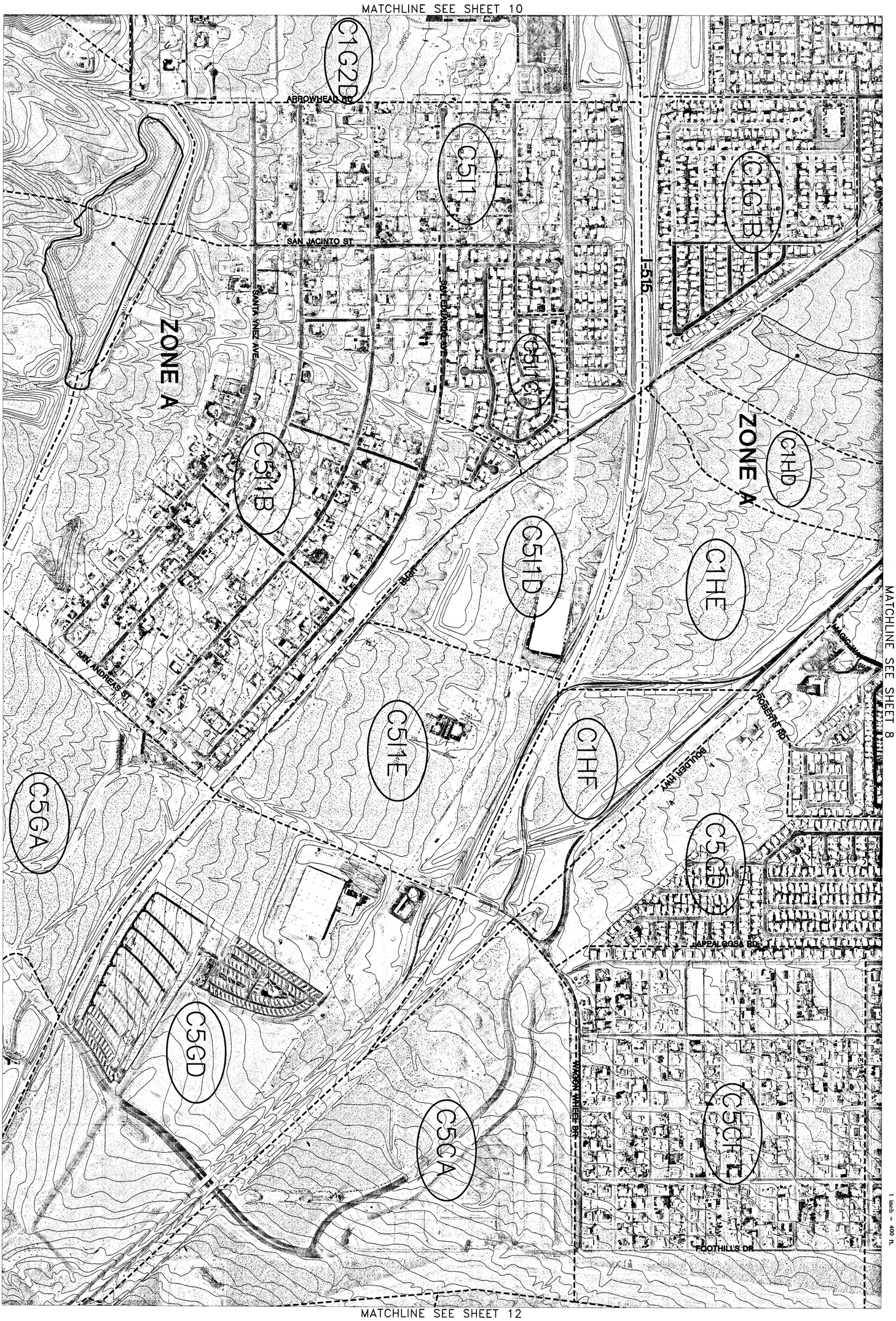
APPROXIMATE METHODS HYDRAULICS ANNOTATED WORK MAP

Carter Burgess
Consultants in Planning, Engineering, Construction Management, and Related Services
6655 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

DESIGNED:	DB
DRAWN:	SCC
CHECKED:	DB
JOB No:	240482
HORIZ:	1"=400'
VERT:	NONE
DATE:	10/04/02

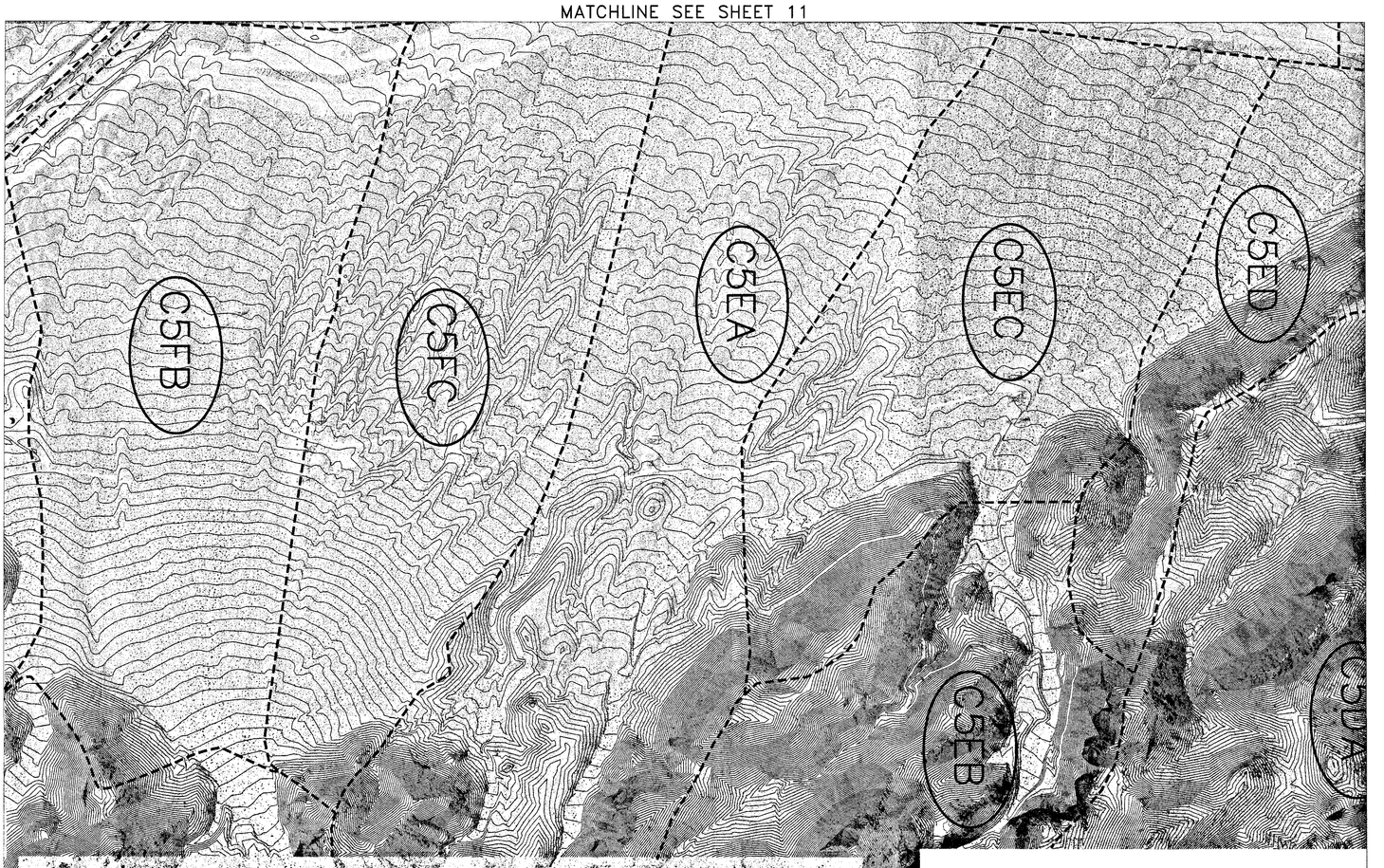
REVISIONS

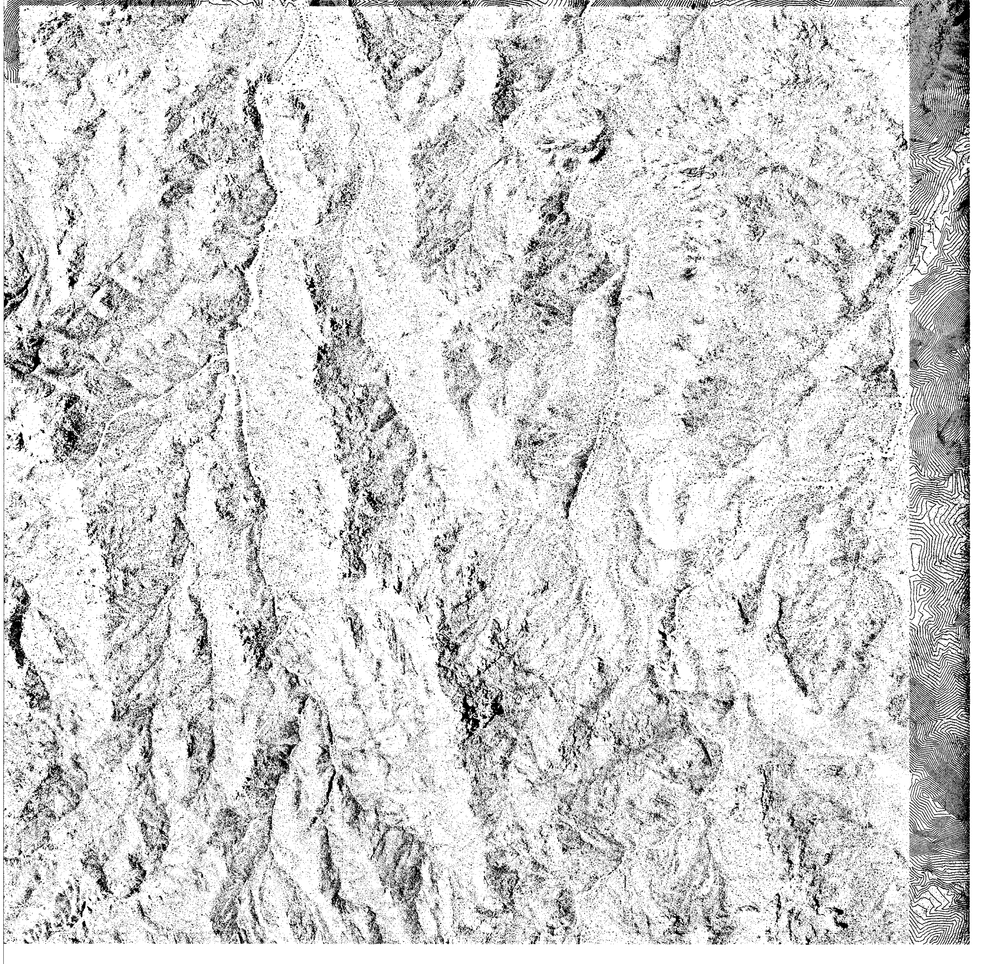
No.	Date		CHKD	APPD



SHEET 11 OF 12	PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY	**Carter Burgess** Consultants in Planning, Engineering, Construction Management, and Related Services 6655 Bermuda Road Las Vegas, Nevada 89119 (702) 938-5400 Fax (702) 938-5454	DESIGNED: DB DRAWN: SCC CHECKED: DB JOB No: 240482 HORIZ: 1"=400' VERT: NONE DATE: 10/04/02	REVISIONS
	DESCRIPTION: APPROXIMATE METHODS HYDRAULICS ANNOTATED WORK MAP			No. / Date / CHKD / APPD

MATCHLINE SEE SHEET 11





MATCHLINE SEE SHEET 9

GRAPHIC SCALE
(IN FEET)
1 inch = 400 ft.
400 0 200 400 800 1600

Carter Burgess

SHEET 12 OF 12

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: APPROXIMATE METHODS HYDRAULICS ANNOTATED WORK MAP

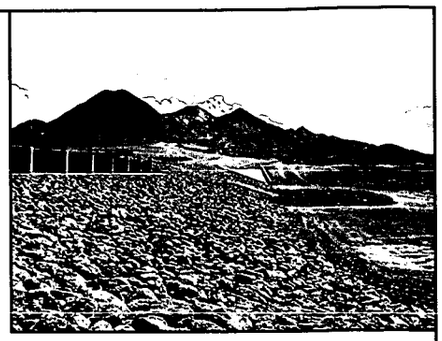
Carter Burgess
Consultants in Planning, Engineering, Construction Management, and Related Services
6855 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

DESIGNED:	DB
DRAWN:	SCC
CHECKED:	DB
JOB No:	240482
HORIZ:	1"=400'
VERT:	NONE
DATE:	10/04/02

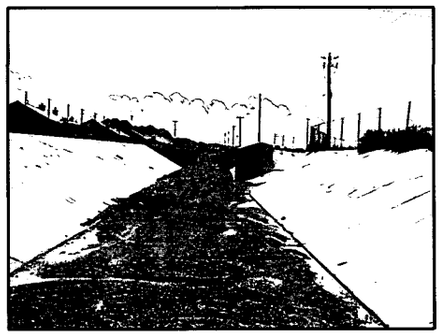
REVISIONS

No.	Date		CHKD	APPD

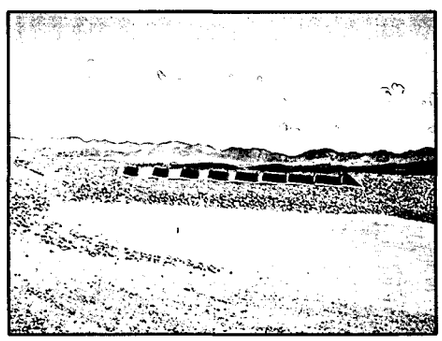
CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

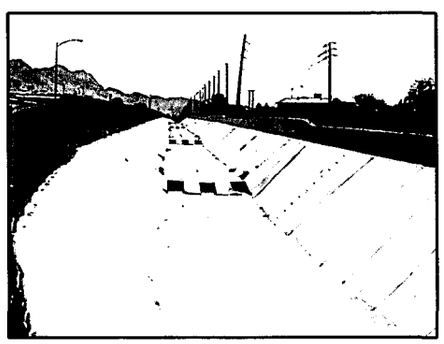


C-1 Channel System Flood Insurance Restudy



Technical Support Data Notebook





Vol. 4

Carter::Burgess

APPENDIX

VOLUME 1

SECTION 1 GENERAL DOCUMENTATION

1.1 Response to Comments
1.2 Meeting Minutes
1.3 General Correspondence
1.4 Certification Forms

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2.1 Hydrologic Analysis
- 2.1.1 Previous Letter of Map Revisions
- 2.1.2 Overall Storm HEC-1 Model
  - 2.1.2.1 SDN3
  - 2.1.2.2 SDN4
  - 2.1.2.3 SDN5
- 2.1.3 Local Hydrology
  - 2.1.3.1 Newport Townhomes

VOLUME 2

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- 2.2.1 Detailed Analysis
  - 2.2.1.1 C-1 Channel, Lake Mead Drive to Boulder Highway
  - 2.2.1.2 East C-1 Levee
- 2.2.2 Approximate Methods Analysis
  - 2.2.2.1 Reach 2
  - 2.2.2.2 Reach 3
  - 2.2.2.3 Reach 4

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- 2.3.1 Curve Number Calculations
- 2.3.2 Time of Concentration Calculations Curve No. Calculations
- 2.3.3 Sedimentation Analysis

2.4 Key to Cross Section Labeling
- 2.4.1 Detailed Methods: C-1 Channel
- 2.4.2 Detailed Methods: East C-1 Levee
- 2.4.3 Approximate Methods --Reach 2
- 2.4.4 Approximate Methods – Reach 3
- 2.4.5 Approximate Methods – Reach 4

SECTION 3 DRAFT FLOOD INSURANCE RESTUDY

VOLUME 3

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4.1 FIRM, Clark County, Nevada Map Index
- 4.1.1 Effective FIRM
- 4.1.2 Annotated FIRM

4.2 Work Maps/Aerial Photographs – Approximate Methods
- 4.2.1 Work Maps (Effective)
- 4.2.2 Work Maps (Annotated)

VOLUME 4

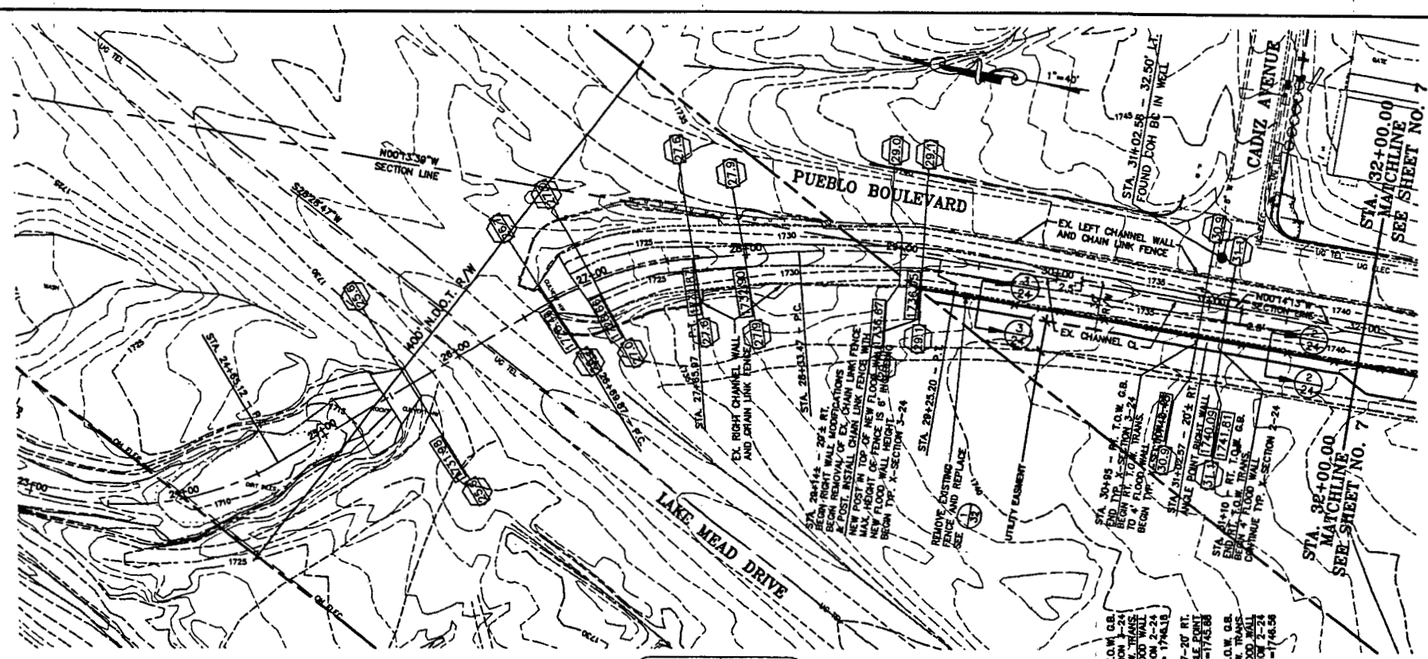
4.3 Work Maps/Base Maps – Detailed Methods
- 4.3.1 C-1 Channel
- 4.3.2 East C-1 Levee

SECTION 5 MISCELLANEOUS REFERENCE MATERIAL

5.1 Photographs/Field Review

5.2 Survey Data
- 5.2.1 Point File
- 5.2.2 Survey Notes

5.3 Compact Discs



Community Name: Henderson, Nevada
Community No: 320005
Date: 25-11-02
Vertical Datum: 1988 NAVD
Control Grid: Nevada State Plane, East Zone
Flooding Source: Henderson Basin
Attached Panels: 2955E, 2605E, 2615E, 2620E

CITY OF HENDERSON
CLARK COUNTY, NEVADA

vtn nevada

TITLE: C1 CHANNEL IMPROVEMENTS STA. 29+14 TO STA. 32+00

PROJECT: C1 CHANNEL
LAKE MEAD DR. TO THE DRAKE/C1 CONFLUENCE

SEAL

WO NO. 4468
BY JC, TMM
DATE 1/26/94
SCALE HORIZ. 1"=40' VERT. 1"=5'
SHEET 6 OF 34 SHEETS

AS-BUILT

04632

CITY OF HENDERSON
CLARK COUNTY, NEVADA

vtn nevada

CONSULTING ENGINEERS ● PLANNERS ● LAND SURVEYORS
2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89102-5148 PHONE (702) 873-7550 FAX (702) 362-2597

REV	DATE	BY	REVISION

TITLE
PLAN & PROFILE
C1 CHANNEL IMPROVEMENTS
STA. 32+00 TO STA. 43+00

PROJECT
C1 CHANNEL
LAKE MEAD DR. TO THE DRAKE/C1 CONFLUENCE

SEAL
PROFESSIONAL ENGINEER STATE OF NEVADA
KEVIN L. MURPHY
CIVIL
9177

WO NO. 4468
BY JC, TMM
DATE 1/26/94
SCALE HORIZ. 1"=40'
VERT. 1"=5'
SHEET 7 OF 34 SHEETS

AS-BUILT
04632

NOTE:
CONTRACTOR MUST VERIFY ALL HORIZONTAL AND VERTICAL LOCATIONS OF EXISTING UTILITIES PRIOR TO CONSTRUCTION.

NOTE:
SEE DETAIL 6/32 FOR EXPANSION JOINT, AND CONTRACTION JOINT SPACING.

AS-BUILT
04632

CITY OF HENDERSON
CLARK COUNTY, NEVADA

REV	DATE	BY	REVISION

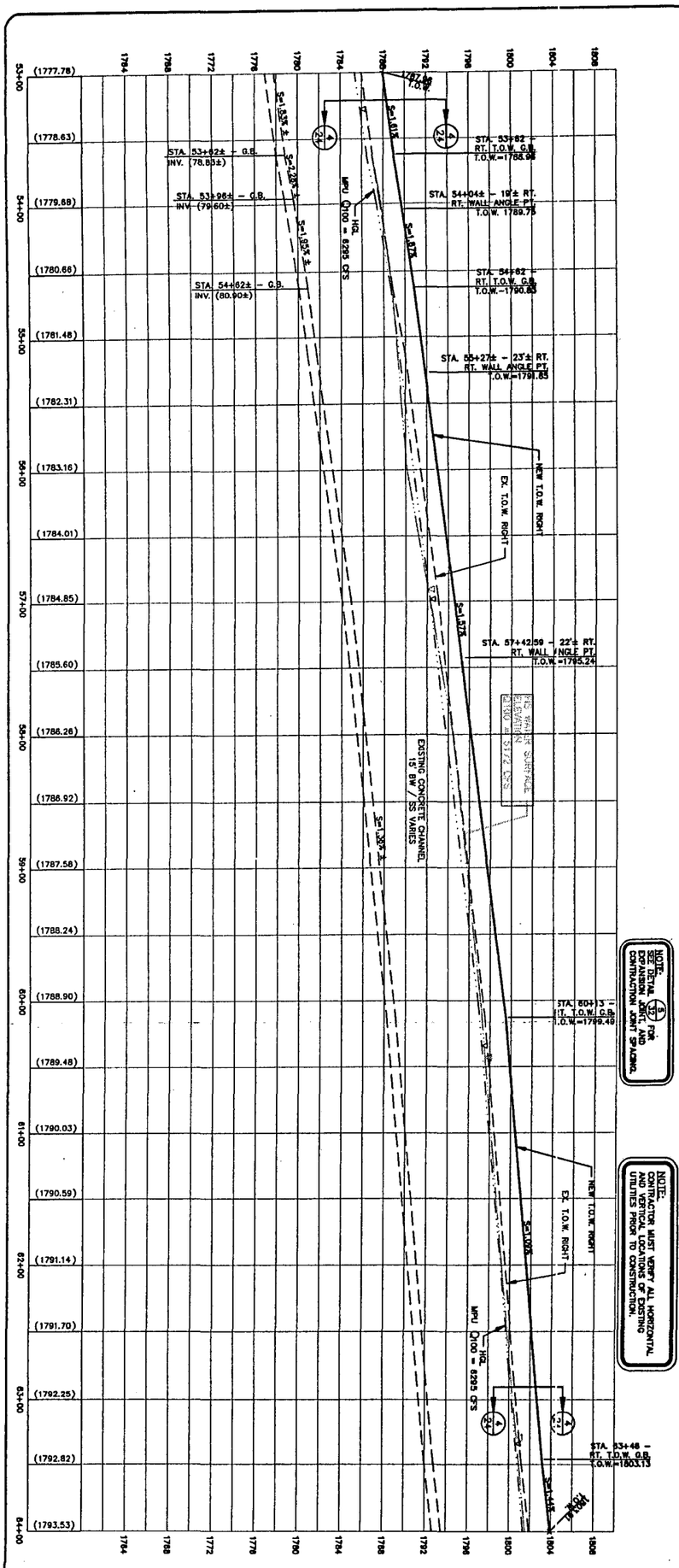
vtn nevada
CONSULTING ENGINEERS • PLANNERS • LAND SURVEYORS
2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89102-5148 PHONE (702) 873-7500 FAX (702) 362-2597

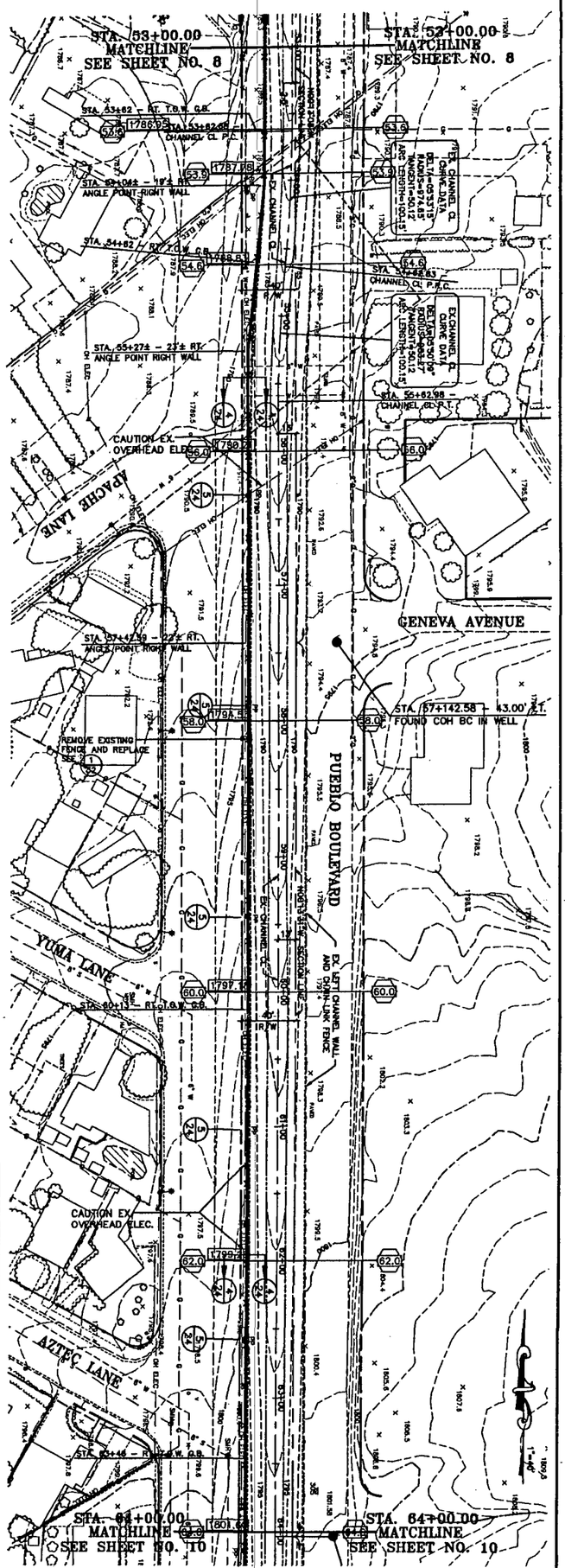
TITLE: PLAN & PROFILE
C1 CHANNEL IMPROVEMENTS
STA. 43+00 TO STA. 53+00

PROJECT: C1 CHANNEL
LAKE MEAD DR. TO THE DRAKE/C1 CONFLUENCE

SEAL

JOB NO. 4468
BY JC, TMM
DATE 1/28/94
SCALE HORIZ. 1"=40'
VERT. 1"=8'
SHEET 8 OF 34 SHEETS





AS-BUILT

04632

PLAN & PROFILE
C1 CHANNEL IMPROVEMENTS
STA. 53+00 TO STA. 64+00

C1 CHANNEL
LAKE MEAD DR. TO THE DRAKE/C1 CONFLUENCE

CITY OF HENDERSON
CLARK COUNTY, NEVADA

REV	DATE	BY	REVISION

vtn nevada
CONSULTING ENGINEERS • PLANNERS • LAND SURVEYORS
2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89102-5148 PHONE (702) 873-7550 FAX (702) 362-2597

SHEET 9 OF 34 SHEETS
SCALE: HORIZ. 1"=40' VERT. 1"=5'
DATE 1/26/94
BY JC, TMM
JOB NO. 4468

CONSULTING ENGINEERS • PLANNERS • LAND SURVEYORS
2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89102-5148 PHONE (702) 873-7550 FAX (702) 362-2597

REV	DATE	BY	REVISION

CITY OF HENDERSON
CLARK COUNTY, NEVADA

TITLE: PLAN & PROFILE
C1 CHANNEL IMPROVEMENTS
STA. 64+00 TO STA. 75+00

PROJECT: C1 CHANNEL
LAKE MEAD DR. TO THE DRAKE/C1 CONFLUENCE

SEAL: PROFESSIONAL ENGINEER STATE OF NEVADA 9177 CIVIL 1-24-94

JOB NO. 4468
BY JC, TMM
DATE 1/26/94
SCALE HORIZ. 1"=40'
VERT. 1"=5'
SHEET 10 OF 34 SHEETS

04632

AS-BUILT

CITY OF HENDERSON
CLARK COUNTY, NEVADA

PLAN & PROFILE
C1 CHANNEL IMPROVEMENTS
STA. 75+00 TO STA. 86+00
C1 CHANNEL
LAKE MEAD DR. TO THE DRAKE/C1 CONFLUENCE

vtn nevada
CONSULTING ENGINEERS ● PLANNERS ● LAND SURVEYORS
2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89102-5148 PHONE (702) 873-7500 FAX (702) 362-2597

NO.	DATE	BY	REVISION

SEAL

WO NO. 4466
BY JC, TMOA
DATE 1/26/94
SCALE HORIZ 1"=40'
VERT 1"=5'
SHEET 11 OF 34 SHEETS

NOTE:
CONTRACTOR MUST VERIFY ALL HORIZONTAL AND VERTICAL LOCATIONS OF EXISTING UTILITIES PRIOR TO CONSTRUCTION.

NOTE:
SEE DETAIL 9/32 FOR EXPANSION JOINT, AND CONTRACTION JOINT SPACING.

STA. 75+00.00
MATCHLINE
SEE SHEET NO. 10

STA. 86+00.00
MATCHLINE
SEE SHEET NO. 12

EX. C1 CHANNEL

EXISTING CONCRETE CHANNEL
15' BW / 8S VARIES

NEW T.O.W. RIGHT

EX. T.O.W. RIGHT

MPU Q100 = 8995 CFS

HGL

EX. GAS

EX. 8"S

STA. 77+22.87 - 22½ RT.
RT. WALL ANGLE POINT
T.O.W.=1822.93

STA. 84+10.79± - LT. T.O.W.@ BEGIN RT. T.O.W. TRANS
T.O.W.=1824.18

STA. 84+15± RT. T.O.W. @ BEGIN RT. T.O.W. TRANS
END RT. T.O.W. TRANS
BEGIN LT. FLOOD WALL
CONT. TYP. X-SECTION 1-24
T.O.W.=1824.64

STA. 84+40± - RT. T.O.W. @ END TYP. X-SECTION 4-24
BEGIN RT. T.O.W. TRANS
BEGIN TYP. TOP OF SECTION 3-24
T.O.W.=1825.16

STA. 84+11± - GB. INV. (25.16')

STA. 83+93± - GB. INV. (24.99')

STA. 83+83± - GB. INV. (24.99')

WESTERN END OF EX. FOOT BRIDGE TO REMAIN SEE DETAILS ON SHEET NO. 31

STA. 83+83± - LT. T.O.W.@ BEGIN LT. FLOOD WALL
T.O.W.=1824.18

S=1.32%

S=1.45%±

S=0.74%±

S=1.19%±

S=1.03%

S=1.42%

S=1.42%

MATCHLINE
SEE SHEET NO. 12

STA. 86+00.00
MATCHLINE
SEE SHEET NO. 12

PUEBLO BOULEVARD

KIRK AVENUE

MYERS AVENUE

FULLERTON AVENUE

TOMILEA AVENUE

EX. CHANNEL C.L.

EX. LOT-CHANNEL WALL AND CHAIN LINK FENCE

N00°43'58"W SECTION LINE

EXISTING FENCE AND REPLACE

CAUTION OVERHEAD ELEC.

CAUTION UNDERGROUND ELEC.

CAUTION GAS LINE

CONSTRUCT NEW 5' SIDEWALK TO EX. SIDEWALK, SEE DETAILS ON SHEET 31

EX. 5' SIDEWALK TO REMAIN SEE DETAILS ON SHEET 31

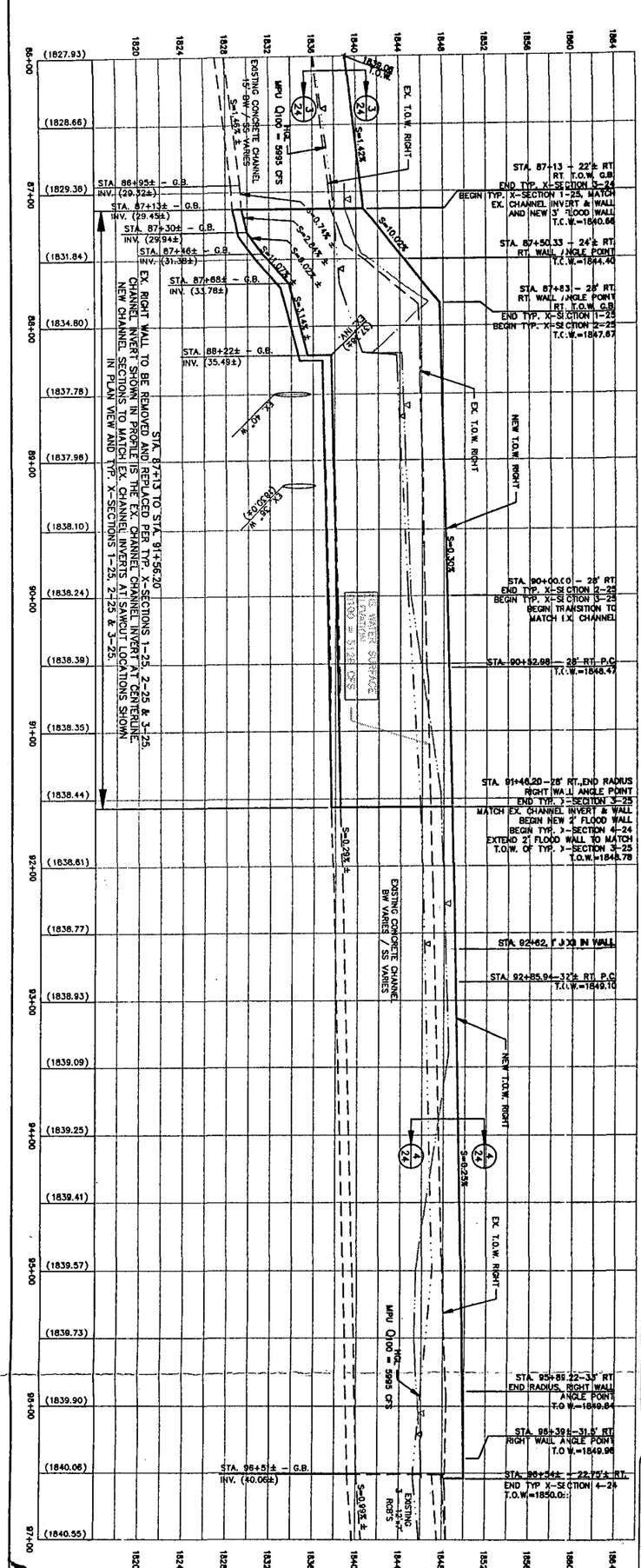
EX. FOOT BRIDGE TO REMAIN NEAT LINE TO BE RAISED SEE DETAILS ON SHEET 31

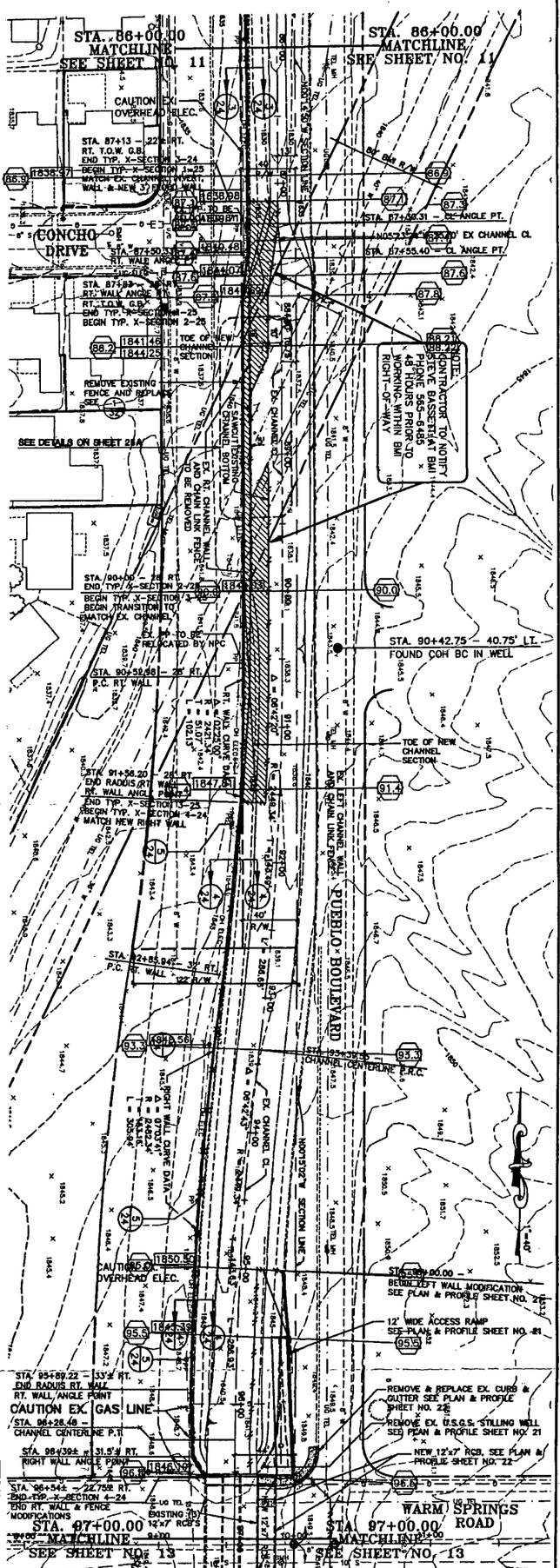
NEW HANDICAP ACCESS RAMP SEE DETAILS ON SHEET 31

STA. 83+62.85 - 43.00' LT
FOUND CGH BC IN WELL

STA. 77+22.87 - 43.00' LT
FOUND CGH BC IN WELL

EX. FOOT BRIDGE TO REMAIN NEAT LINE TO BE RAISED SEE DETAILS ON SHEET 31




STA. 86+00.00
MATCHLINE
SEE SHEET NO. 11
CONCHO DRIVE
CAUTION OVERHEAD ELEC.
STA. 87+13 - 22'± RT.
RT. T.O.W. G.B.
END TYP. X-SECTION 1-24
BEGIN TYP. X-SECTION 1-25
MATCH EX. CHANNEL INVERT,
WALL & NEW 3' FLOOD WALL
STA. 87+38.31 - 55'± ANGLE PT.
STA. 87+55.40 - CL ANGLE PT.
STA. 87+83 - 25' RT.
RT. WALL ANGLE PT.
RT. T.O.W. G.B.
END TYP. X-SECTION 1-25
BEGIN TYP. X-SECTION 2-25
TOE OF NEW CHANNEL SECTION
REMOVE EXISTING FENCE AND REPLACE SEE
SEE DETAILS ON SHEET 24
EX. CHANNEL BOTTOM
EX. CHANNEL SIDEWALL TO BE REMOVED
NOTE: CONTRACTOR TO NOTIFY SOUTHWEST GAS CORP. AT LEAST 48 HOURS PRIOR TO WORKING WITHIN RIGHT-OF-WAY
STA. 90+00.00 - 25' RT.
END TYP. X-SECTION 2-25
BEGIN TYP. X-SECTION 3-25
BEGIN TRANSITION TO
MATCH EX. CHANNEL
FENCE TO BE RELOCATED BY NCC
STA. 90+42.75 - 40.75' LT.
FOUND COH BC IN WELL
STA. 90+52.98 - 25' RT.
P.C. RT. WALL
TOE OF NEW CHANNEL SECTION
STA. 91+46.20
END RADIUS RT. WALL
RT. WALL ANGLE POINT
END TYP. X-SECTION 3-25
BEGIN TYP. X-SECTION 4-24
MATCH NEW RIGHT WALL
EX. CHANNEL SIDEWALL
PUEBLO BOULEVARD
STA. 92+85.94 - 32'± RT.
P.C. RT. WALL
CENTERLINE P.R.C.
EX. CHANNEL CL
STA. 95+89.22 - 33'± RT.
END RADIUS RT. WALL
RT. WALL ANGLE POINT
CAUTION EX. GAS LINE
STA. 96+28.48 - CHANNEL CENTERLINE P.T.
STA. 98+39± - 31.5'± RT.
RIGHT WALL ANGLE POINT
STA. 96+54± - 22.75'± RT.
END TYP. X-SECTION 4-24
END RT. WALL & FENCE MODIFICATIONS
EXISTING 30" RCP
EXISTING 12'x7' RCB'S
STA. 97+00.00
MATCHLINE
SEE SHEET NO. 13
STA. 97+00.00
MATCHLINE
SEE SHEET NO. 13
STA. 94+00.00
BEGIN LEFT WALL MODIFICATION
SEE PLAN & PROFILE SHEET NO. 23
12' WIDE ACCESS RAMP
SEE PLAN & PROFILE SHEET NO. 21
REMOVE & REPLACE EX. CURB & GUTTER SEE PLAN & PROFILE SHEET NO. 23
REMOVE EX. U.S.G.S. STILLING WELL SEE PLAN & PROFILE SHEET NO. 21
NEW 12'x7' RCB, SEE PLAN & PROFILE SHEET NO. 22
WARM SPRINGS ROAD
CAUTION OVERHEAD ELEC.
N00°15'52"W
N00°15'52"W SECTION LINE
CURVE DATA
Δ = 06°42'42"
R = 2482.34'
L = 290.66'
T = 145.51'
(638A.58)
(638A.58)
(638A.58)

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LAS VEGAS, NEVADA 89102-5148 PHONE (702) 873-7550 FAX (702) 362-2597

REV.	DATE	BY	REVISION

CITY OF HENDERSON
CLARK COUNTY, NEVADA

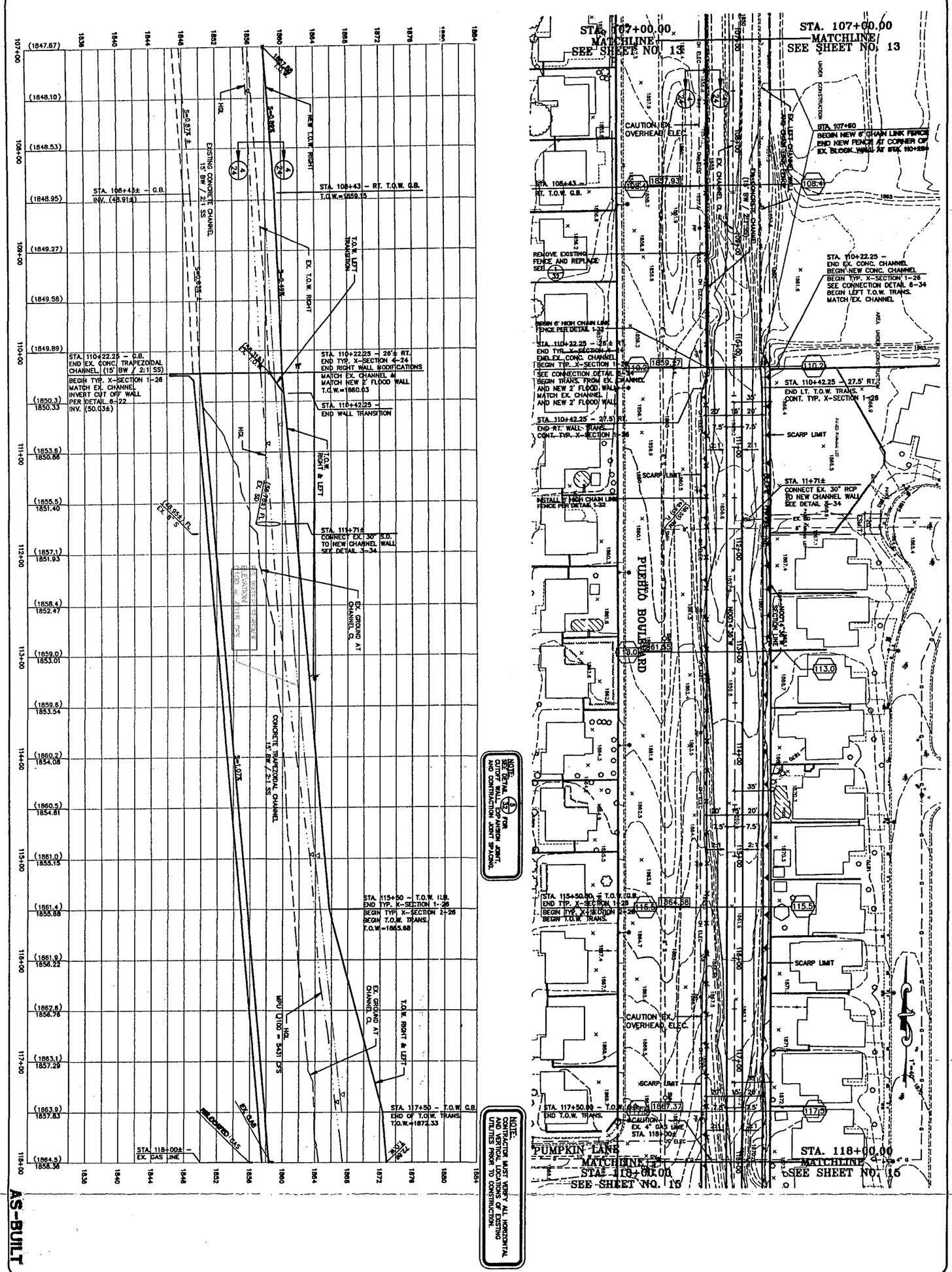
TITLE
PLAN & PROFILE
C1 CHANNEL IMPROVEMENTS
STA. 97+00 TO STA. 107+00

PROJECT
C1 CHANNEL
LAKE MEAD DR. TO THE DRAKE/C1 CONFLUENCE

SEAL
PROFESSIONAL ENGINEER STATE OF NEBRASKA KENT M. SMITH CIVIL 9177
1-31-94

WO NO.	4468
BY	JC, TMM
DATE	1/26/94
SCALE HORIZ.	1"=40'
SCALE VERT.	1"=5'
SHEET	13 OF 34 SHEETS

04632


STA. 107+00.00
MATCHLINE
SEE SHEET NO. 13
STA. 107+00.00
MATCHLINE
SEE SHEET NO. 13
STA. 118+00.00
MATCHLINE
SEE SHEET NO. 15
STA. 118+00.00
MATCHLINE
SEE SHEET NO. 15
PUEBLO BOULEVARD
PUMPKIN LANE
STA. 108+43 – RT. T.O.W. C.B.
T.O.W.=1859.15
STA. 108+43± – C.B.
INV. (49.91±)
STA. 110+22.25 – C.B.
END EX. CONC. TRAPEZOIDAL CHANNEL (15' BW / 2:1 SS)
BEGIN TYP. X-SECTION 1-26
MATCH EX. CHANNEL
INVERT CUT OFF WALL
PER DETAIL 6-22
INV. (50.03±)
STA. 110+22.25 – 26'± RT.
END TYP. X-SECTION 4-24
END RIGHT WALL MODIFICATIONS
MATCH EX. CHANNEL W
MATCH NEW 2' FLOOD WALL
T.O.W.=1860.03
STA. 110+42.25 –
END WALL TRANSITION
STA. 111+71±
CONNECT EX. 30" R.C.
TO NEW CHANNEL WALL
SEE DETAIL 1-34
STA. 115+50 – T.O.W. I.E.
END TYP. K-SECTION 1-26
BEGIN TYP X-SECTION 2-26
BEGIN T.O.W. TRANS.
T.O.W.=1865.68
STA. 117+50 – T.O.W. C.B.
END OF T.O.W. TRANS.
T.O.W.=1872.33
STA. 118+00± –
EX. GAS LINE
EXISTING CONCRETE CHANNEL 15' BW / 2:1 SS
CONCRETE TRAPEZOIDAL CHANNEL 15' BW / 2:1 SS
EX. GROUND AT CHANNEL CL
T.O.W. LEFT TRANSITION
T.O.W. RIGHT & LEFT
NEW T.O.W. RIGHT
EX. T.O.W. RIGHT
HGL
MPU Q100 = 5431 CFS
EX. 30" R.C.P.
EX. 48" R.C.P.
EX. 60" R.C.P.
EX. 66" R.C.P.
EX. 72" R.C.P.
EX. 84" R.C.P.
EX. 96" R.C.P.
EX. 108" R.C.P.
EX. 120" R.C.P.
EX. 132" R.C.P.
EX. 144" R.C.P.
EX. 156" R.C.P.
EX. 168" R.C.P.
EX. 180" R.C.P.
EX. 192" R.C.P.
EX. 204" R.C.P.
EX. 216" R.C.P.
EX.

NOTES:

1.) SEE SHEET NO. 19 FOR DRAKE CHANNEL PLAN & PROFILE.

2.) SEE SHEET NO. 20 FOR 1"=20' PLAN VIEW OF CHANNEL CONFLUENCE AREA.

3.) EXISTING CONCRETE CHANNEL CONFLUENCE STRUCTURE TO BE REMOVED.

NOTE:
SEE DETAIL (5/32) FOR CUTOFF WALL, EXPANSION JOINT, AND CONTRACTION JOINT SPACING.

NOTE:
CONTRACTOR MUST VERIFY ALL HORIZONTAL AND VERTICAL LOCATIONS OF EXISTING UTILITIES PRIOR TO CONSTRUCTION.

AS-BUILT

REV	DATE	BY	REVISION
	5/19/94	WBM	PER ADDENDUM #1

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CITY OF HENDERSON
CLARK COUNTY, NEVADA

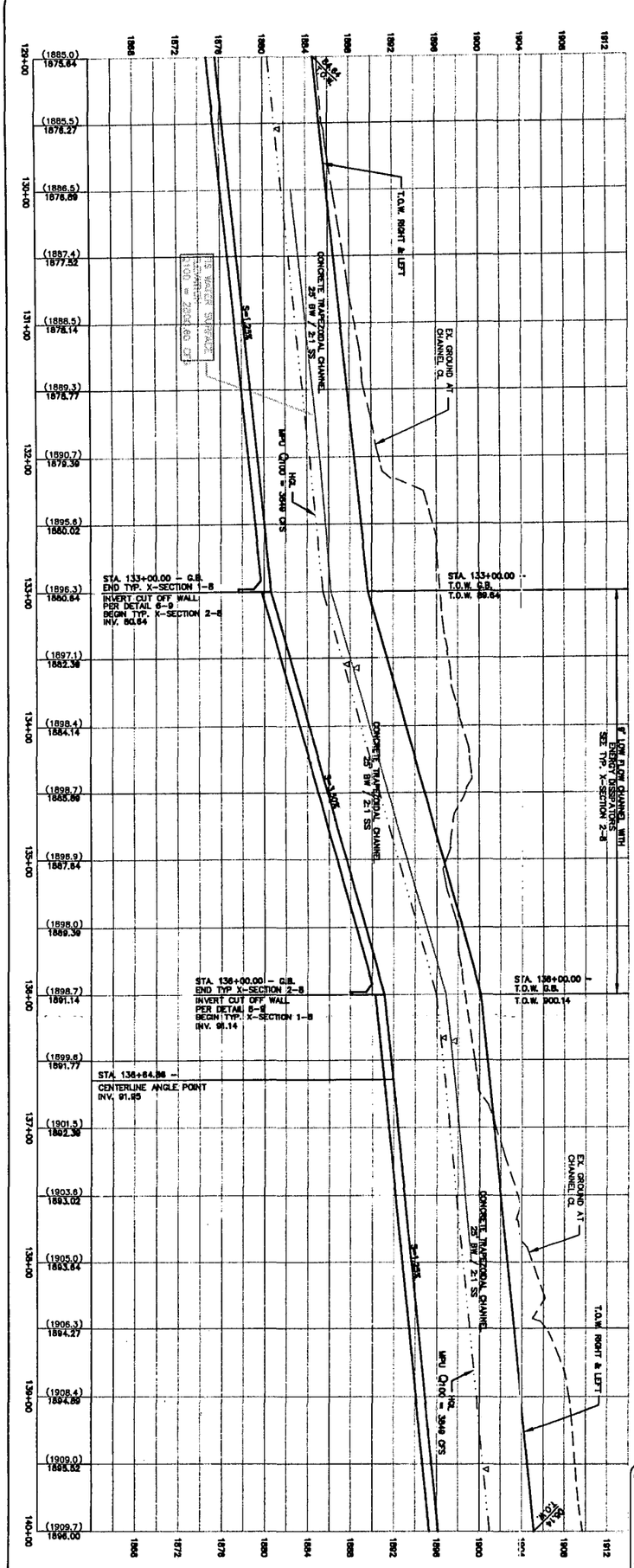
TITLE: PLAN & PROFILE
C1 CHANNEL IMPROVEMENTS
STA. 118+00 TO STA. 129+00
C1 CHANNEL

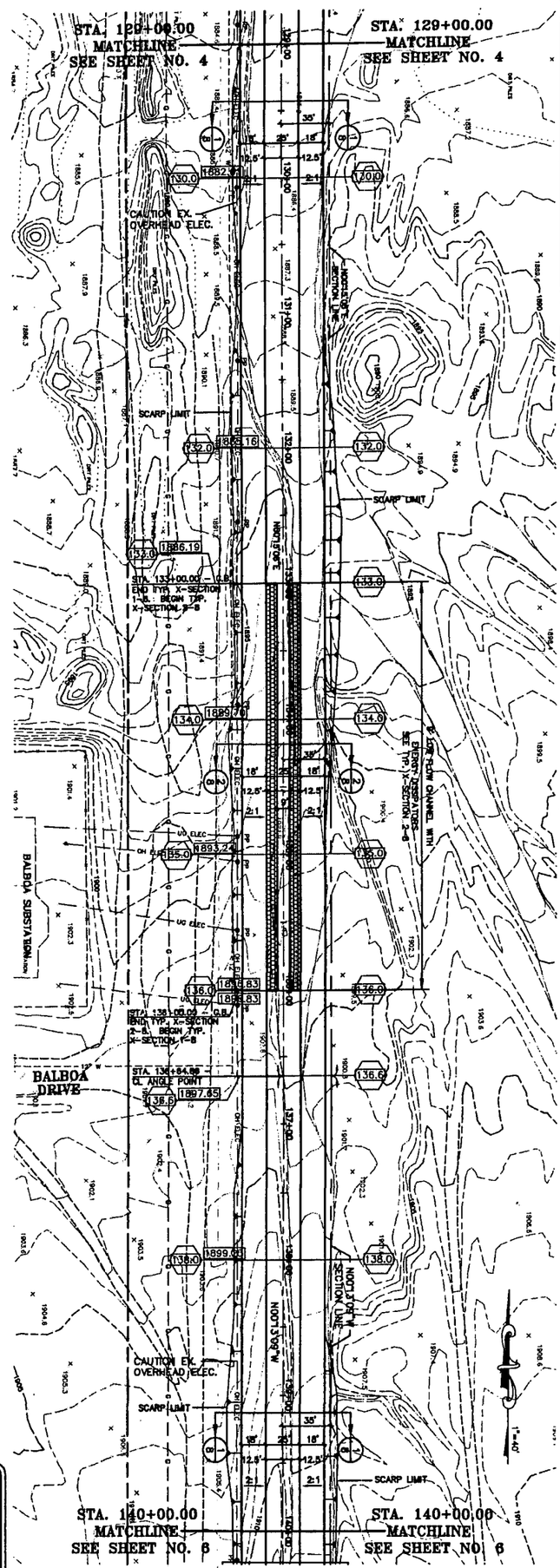
PROJECT: LAKE MEAD DR. TO THE DRAKE/C1 CONFLUENCE

SEAL

WO NO.	4468
BY	JC, TMM
DATE	1/26/94
SCALE HORIZ.	1"=40'
VERT.	1"=5'
SHEET	15 OF 34 SHEETS

04632





NOTE:
CONTRACTOR MUST VERIFY ALL HORIZONTAL AND VERTICAL LOCATIONS OF EXISTING UTILITIES PRIOR TO CONSTRUCTION.

0401
RECORD
DRAWING

SHEET 5 OF 10 SHEETS

SCALE: HOR. 1"=40'
VERT. 1"=4'

DATE 10/13/94

BY TDM, SJF

DR. NO. 448-B

10-5-94

TITLE
PLAN & PROFILE
C1 CHANNEL IMPROVEMENTS
STA. 129+00 TO STA. 140+00

PROJECT
C1 CHANNEL – PHASE II
DRAKE CONFLUENCE TO BURKHOLDER BLVD.

CITY OF HENDERSON
CLARK COUNTY, NEVADA

REV	DATE	BY	REVISION

vtn nevada
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LAS VEGAS, NEVADA 89102-5148 PHONE (702) 873-7550 FAX (702) 362-2597

NOTE:
CONTRACTOR MUST VERIFY ALL HORIZONTAL AND VERTICAL LOCATIONS OF EXISTING UTILITIES PRIOR TO CONSTRUCTION.

04601
RECORD DRAWING

CITY OF HENDERSON
CLARK COUNTY, NEVADA

REV	DATE	BY	REVISION

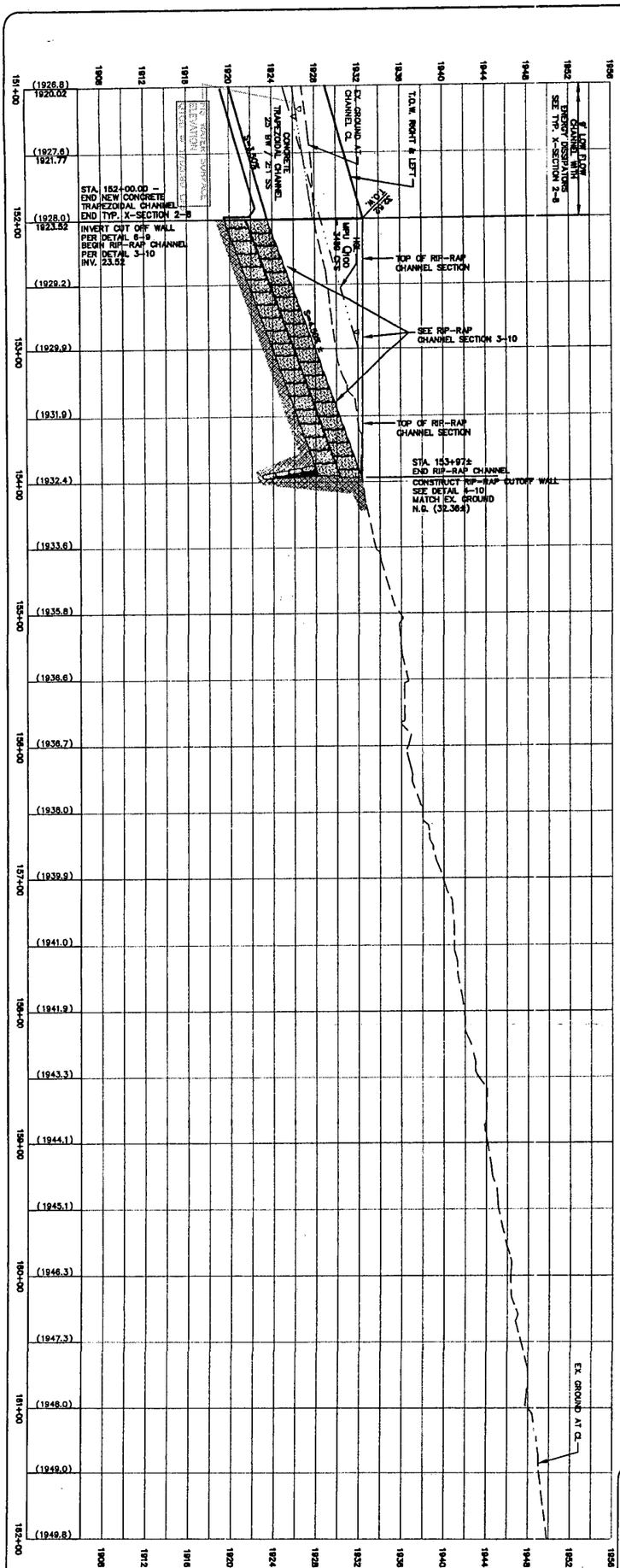
vtn nevada
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LAS VEGAS, NEVADA 89102-5148 PHONE (702) 873-7550 FAX (702) 362-2597

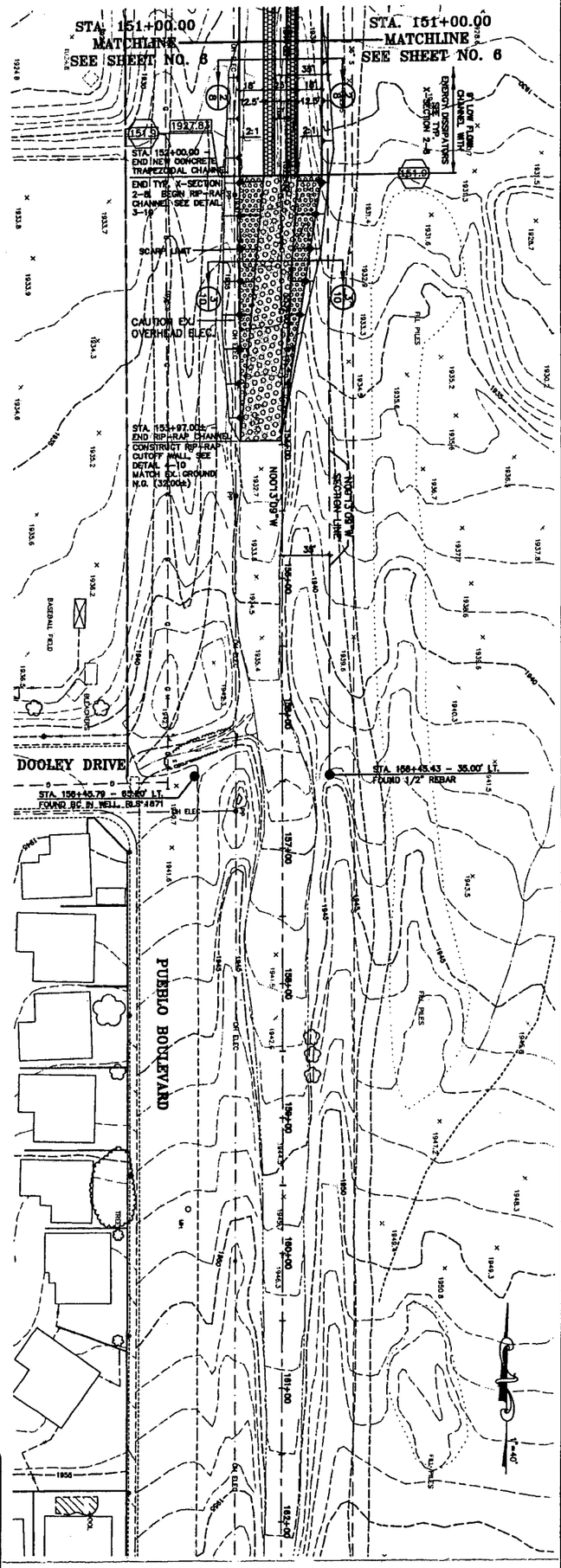
TITLE: PLAN & PROFILE
C1 CHANNEL IMPROVEMENTS
STA. 140+00 TO STA. 151+00

PROJECT: C1 CHANNEL – PHASE II
DRAKE CONFLUENCE TO BURKHOLDER BLVD.

SEAL OF PROFESSIONAL ENGINEER — STATE OF NEVADA — 9878 — ROBERT C. OTT
10-7-94

WO NO.	4468-B
BY	TMM,SJF
DATE	10/13/94
SCALE	HORZ. 1"=40' VERT. 1"=5'
SHEET	6 OF 10 SHEETS





NOTE: CONTRACTOR MUST VERIFY ALL HORIZONTAL AND VERTICAL LOCATIONS OF EXISTING UTILITIES PRIOR TO CONSTRUCTION.

0460 RECORD DRAWING

SHEET	7 of 10 SHEETS
SCALE HORIZ.	1"=40'
VERT.	1"=4'
DATE	10/13/94
BY	TMM/SJP
W.O. NO.	4468-B

10-15-94

TITLE
PLAN & PROFILE
C1 CHANNEL IMPROVEMENTS
STA. 151+00 TO STA. 153+97

PROJECT
C1 CHANNEL – PHASE II
DRAKE CONFLUENCE TO BURKHOLDER BLVD.

CITY OF HENDERSON
CLARK COUNTY, NEVADA

REV	DATE	BY	REVISION

vtn nevada
CONSULTING ENGINEERS • PLANNERS • LAND SURVEYORS
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LAS VEGAS, NEVADA 89102-5148 PHONE (702) 873-7550 FAX (702) 362-2597

CONSTRUCTION ITEMS:

①	"C-1" 28+37.35 TO "C-1" 35+00.00	CONSTRUCT TRAPEZOIDAL CONCRETE CHANNEL. (SEE DETAIL B, SHEET SD-12).
②	"C-1" 26+37.35	CONSTRUCT 6' WIDE, 6' HIGH SINGLE-SWING CHAIN LINK ACCESS GATE. CONNECT TO EXISTING FENCE, PER CCASD NO 253.
③	"C-1" 28+37.35 TO "C-1" 35+00.00	CONSTRUCT 8' HIGH CHAIN LINK FENCE, PER CCASD NO 252.
④	"C-1" 28+37.35 TO "C-1" 35+00.00	CONSTRUCT 8' HIGH CHAIN LINK FENCE, PER CCASD NO 252. CONNECT TO EXISTING FENCE.
⑤	"C-1" 26+37.35	CONSTRUCT 14' WIDE, 6' HIGH DOUBLE-SWING CHAIN LINK ACCESS GATE. PER CCASD NO 253.
⑥	"C-1" 30+35.00 TO "C-1" 30+75.00	CONSTRUCT AC PAVEMENT DIP SECTION. (SEE SHEET SD-18).
⑨	"C-1" 19+07.33 TO "C-1" 34+05.06	CONSTRUCT 8" X 1480' PVC SANITARY SEWER. (SEE SHEETS U-4 & U-5).
⑩	"C-1" 28+27.35 TO "C-1" 28+70.00	CONSTRUCT CHANNEL INVERT TRANSITION. (SEE SHEET SD-18).
⑪	"C-1" 28+37.35	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.
⑧	"C-1" 30+00.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9).
⑦	"C-1" 29+75.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9).

REMOVAL ITEMS:

1	"C-1" 34+04.0±	REMOVE 8" ACP SANITARY SEWER. (SEE SHEET U-4).
2	"C-1" 30+75.0±	REMOVE 8" ACP SANITARY SEWER. (SEE SHEET U-4).

NOTES:

1. ALL EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL UTILITIES ARE SHOWN HEREON.
2. CONTRACTOR TO KEEP IN SERVICE AND PROTECT ALL UTILITIES.
3. SCARP AREAS AND EARTHWORK SHALL NOT PLACE SOIL AGAINST EXISTING BLOCK WALLS SUCH AS TO CREATE A RETAINING SITUATION.
4. FOR ADDITIONAL GRADING NOT SHOWN, SEE SHEET SD-18.
5. GROUND CHAIN LINK FENCE PER SPECIFICATION SECTION 618.

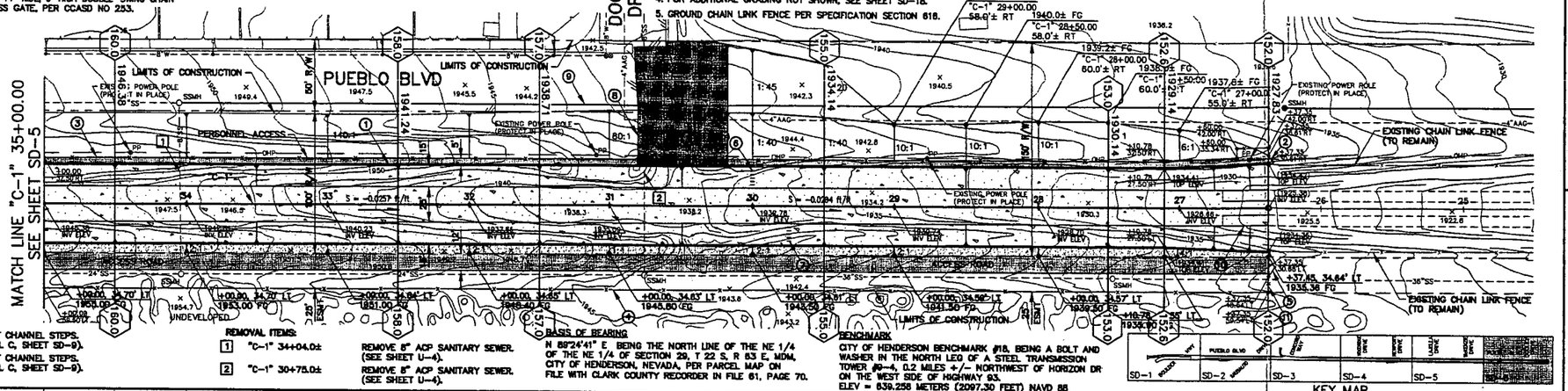
SAFETY ALERT

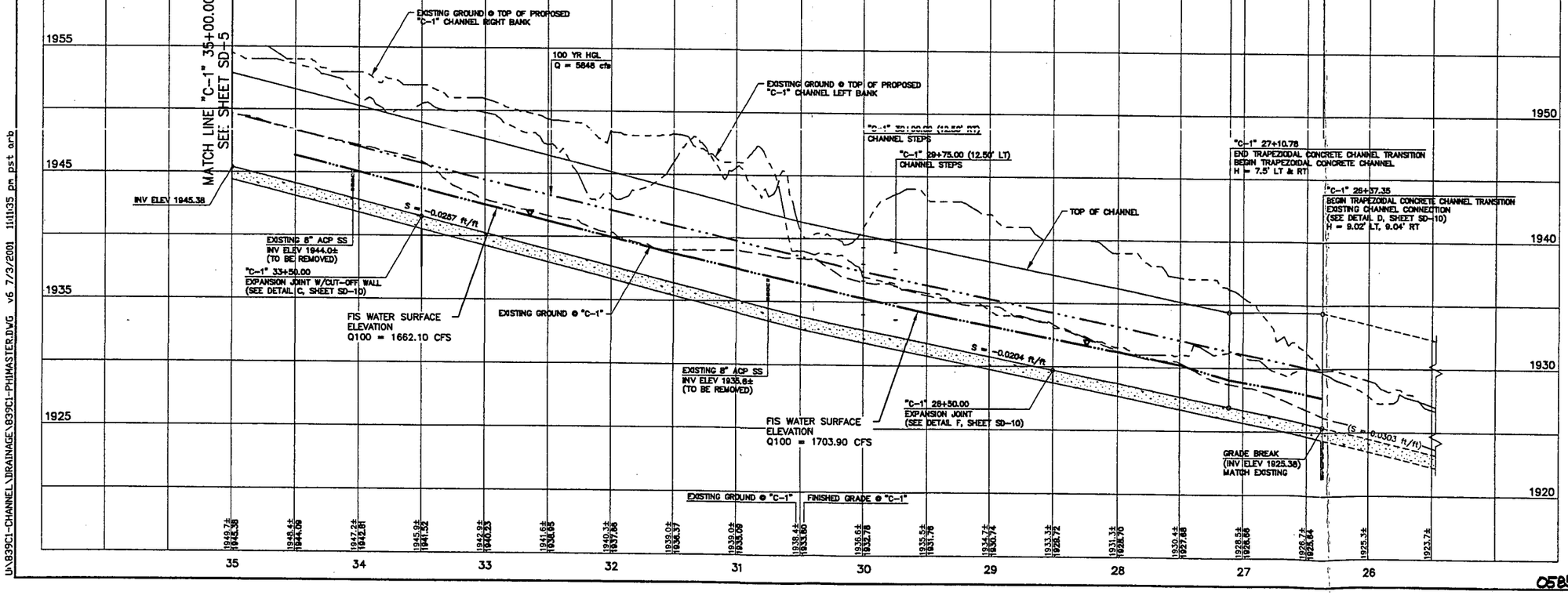
Call Before You Overhead
1-702-593-6111

Avoid cutting underground utility lines. It's costly.
Call Before You Dig
1-800-227-2600

BASIS OF BEARING
N 89°24'41" E, BEING THE NORTH LINE OF THE NE 1/4 OF THE NE 1/4 OF SECTION 29, T 22 S, R 63 E, MDM, CITY OF HENDERSON, NEVADA, PER PARCEL MAP ON FILE WITH CLARK COUNTY RECORDER IN FILE 61, PAGE 70.

BENCHMARK
CITY OF HENDERSON BENCHMARK #18, BEING A BOLT AND WASHER IN THE NORTH LEG OF A STEEL TRANSMISSION TOWER #0-4, 0.2 MILES +/- NORTHWEST OF HORIZON DR ON THE WEST SIDE OF HIGHWAY 93.
ELEV = 639.258 METERS (2097.30 FEET) NAVD 88





HORIZONTAL: 1" = 40'

REV NO.	DATE	DESCRIPTION	APPROVED

THE LOUIS BERGER GROUP, INC
LAS VEGAS, NEVADA

UPPER AND MIDDLE REACHES OF THE C-1 CHANNEL - PHASE 1
GRADING & DRAINAGE PLAN & PROFILE
"C-1" 35+00.00 TO "C-1" 26+15.39
HENDERSON NEVADA, DEPARTMENT OF PUBLIC WORKS

PROJECT NO:	839
DRAWN BY:	ARB
DESIGNED BY:	SRF
CHECKED BY:	SJD
APPROVED BY:	TDL
SCALE	
HORIZ:	1" = 40'
VERT:	1" = 4'

DRAWING NO
SD-6
SHEET 12 OF 34

05854

U:\839C1-CHANNEL\DRAINAGE\839C1-PHMASTER.DWG v6 7/3/2001 11:11:35 pm pst arb

CONSTRUCTION ITEMS:

①	"C-1" 35+00.00 TO "C-1" 37+50.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.
②	"C-1" 37+50.00 TO "C-1" 37+56.00	CONSTRUCT 8.00' WIDE, 6' HIGH SINGLE-SWING CHAIN LINK ACCESS GATE, PER CCASD NO 253.
③	"C-1" 37+56.00 TO "C-1" 46+00.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.
④	"C-1" 37+84.00 TO "C-1" 46+00.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.
⑤	"C-1" 37+50.00 TO "C-1" 37+84.00	CONSTRUCT 14' WIDE, 6' HIGH DOUBLE-SWING CHAIN LINK ACCESS GATE, PER CCASD NO 253.
⑥	"C-1" 35+00.00 TO "C-1" 37+50.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.
⑦	"C-1" 35+00.00 TO "C-1" 46+00.00	CONSTRUCT TRAPEZOIDAL CONCRETE CHANNEL. (SEE DETAIL B, SHEET SD-12).
⑧	"C-1" 36+25.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9).
⑨	"C-1" 36+00.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9)
⑩	"C-1" 42+25.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9).
⑪	"C-1" 42+00.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9).

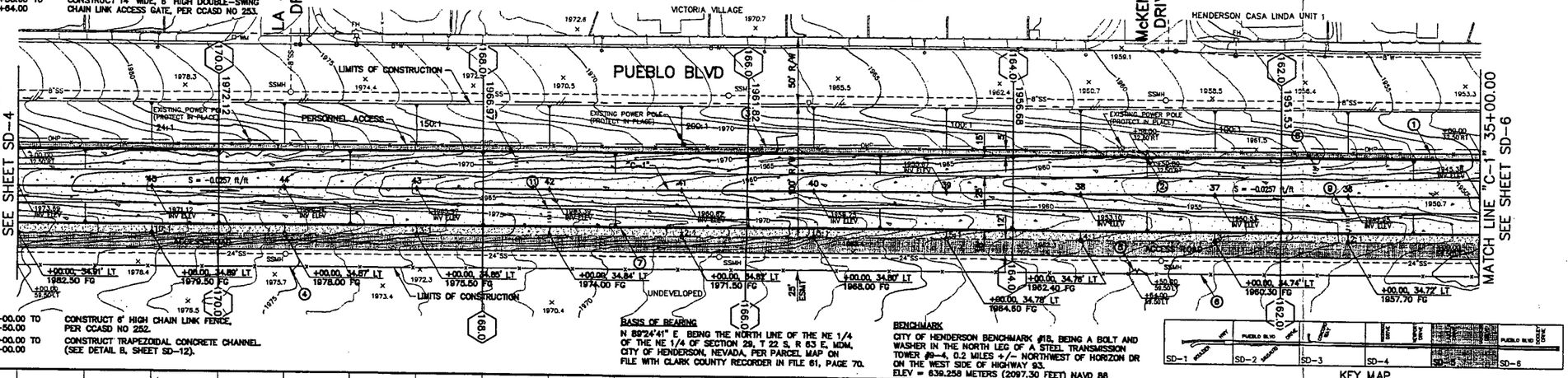
NOTES:

1. ALL EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL UTILITIES ARE SHOWN HEREON.
2. CONTRACTOR TO KEEP IN SERVICE AND PROTECT ALL UTILITIES.
3. SCARP AREAS AND EARTHWORK SHALL NOT PLACE SOIL AGAINST EXISTING BLOCK WALLS SUCH AS TO CREATE A RETAINING SITUATION.

SAFETY ALERT
Call Before You Overhead
1-702-593-6111

Avoid cutting underground utility lines. It's costly.
Call Before You Dig
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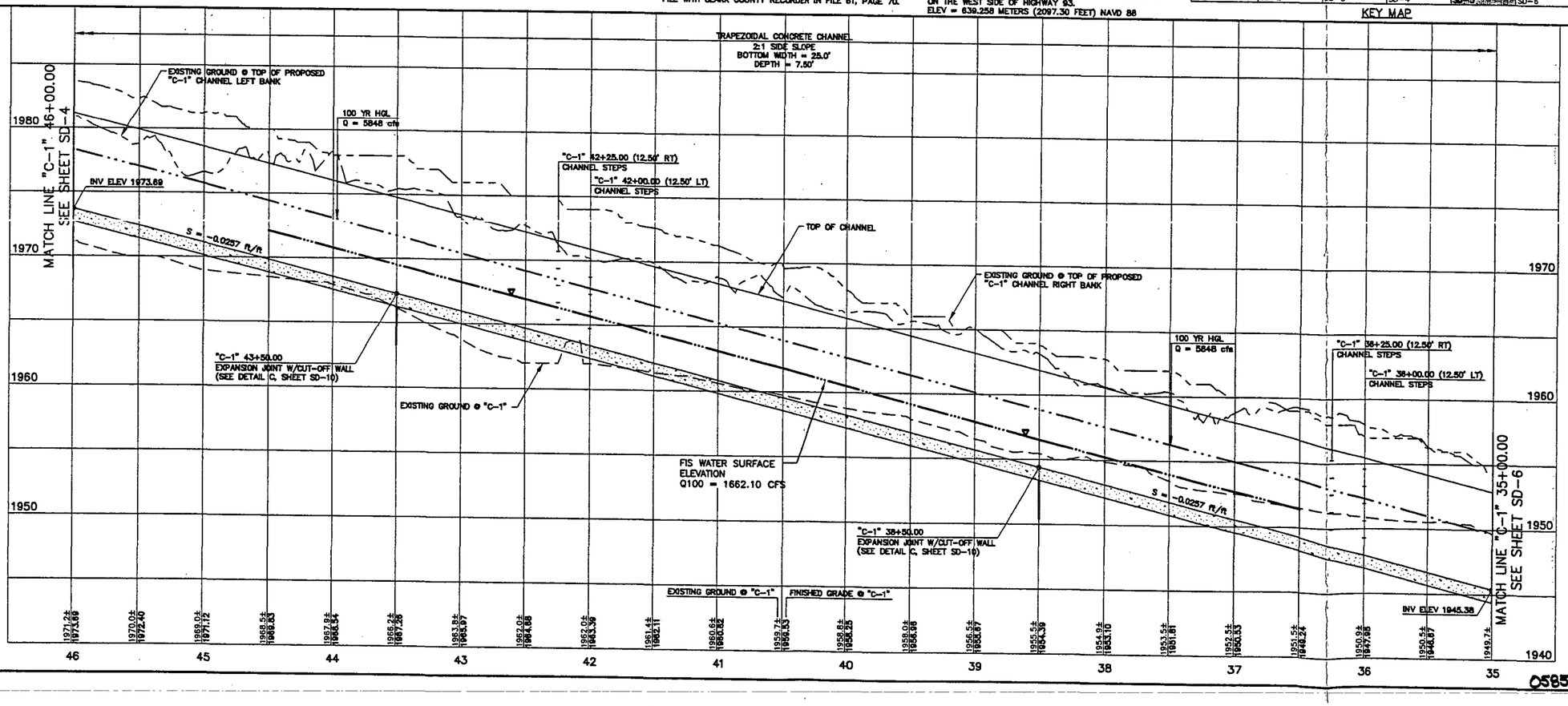
HORIZONTAL: 1" = 40'



BASIS OF BEARING
N 89°24'41" E, BEING THE NORTH LINE OF THE NE 1/4 OF THE NE 1/4 OF SECTION 29, T 22 S, R 63 E, MDM, CITY OF HENDERSON, NEVADA, PER PARCEL MAP ON FILE WITH CLARK COUNTY RECORDER IN FILE 61, PAGE 70.

BENCHMARK
CITY OF HENDERSON BENCHMARK #18, BEING A BOLT AND WASHER IN THE NORTH LEG OF A STEEL TRANSMISSION TOWER #0-4, 0.2 MILES +/- NORTHWEST OF HORIZON DR ON THE WEST SIDE OF HIGHWAY 93.
ELEV = 639.258 METERS (2097.30 FEET) NAVD 88

KEY MAP



U:\839C1-CHANNEL\DRAINAGE\839C1-PHIMASTER.DWG v5 6/23/2001 63602 pm pst orb

05854

THE LOUIS BERGER GROUP, INC
LAS VEGAS, NEVADA

REV NO	DATE	DESCRIPTION	APPROVED

UPPER AND MIDDLE REACHES OF THE C-1 CHANNEL - PHASE 1
GRADING & DRAINAGE PLAN & PROFILE
"C-1" 46+00.00 TO "C-1" 35+00.00
HENDERSON NEVADA, DEPARTMENT OF PUBLIC WORKS

PROJECT NO:	839
DRAWN BY:	ARB
DESIGNED BY:	SRF
CHECKED BY:	SJD
APPROVED BY:	TDL

SCALE	
HORIZ:	1" = 40'
VERT:	1" = 4'

DRAWING NO
SD-5
SHEET 11 OF 34

CONSTRUCTION ITEMS:

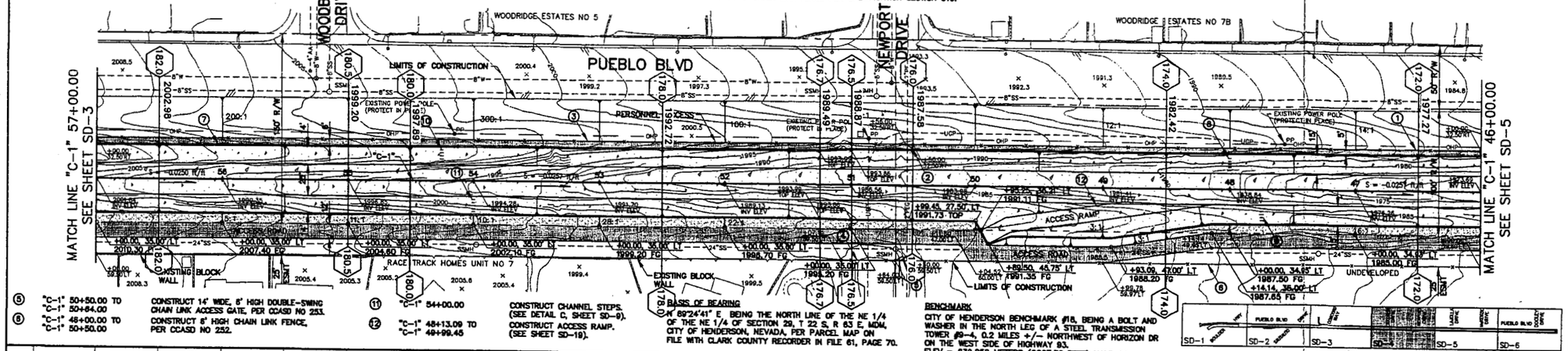
①	"C-1" 48+00.00 TO "C-1" 50+50.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.	⑦	"C-1" 46+00.00 TO "C-1" 57+00.00	CONSTRUCT TRAPEZOIDAL CONCRETE CHANNEL. (SEE DETAIL B, SHEET SD-12).
②	"C-1" 50+50.00 TO "C-1" 50+56.00	CONSTRUCT 8.00' WIDE, 6' HIGH SINGLE-SWING CHAIN LINK ACCESS GATE, PER CCASD NO 253.	⑧	"C-1" 48+00.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9).
③	"C-1" 50+56.00 TO "C-1" 57+00.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.	⑨	"C-1" 47+75.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9).
④	"C-1" 50+64.00 TO "C-1" 51+07.10	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.	⑩	"C-1" 54+25.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9).
⑤	"C-1" 50+50.00 TO "C-1" 50+64.00	CONSTRUCT 14' WIDE, 6' HIGH DOUBLE-SWING CHAIN LINK ACCESS GATE, PER CCASD NO 253.	⑪	"C-1" 54+00.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9).
⑥	"C-1" 48+00.00 TO "C-1" 50+50.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.	⑫	"C-1" 48+13.09 TO "C-1" 49+99.45	CONSTRUCT ACCESS RAMP. (SEE SHEET SD-19).

NOTES:
1. ALL EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL UTILITIES ARE SHOWN HEREON.
2. CONTRACTOR TO KEEP IN SERVICE AND PROTECT ALL UTILITIES.
3. SCARP AREAS AND EARTHWORK SHALL NOT PLACE SOIL AGAINST EXISTING BLOCK WALLS SUCH AS TO CREATE A RETAINING SITUATION.
4. GROUND CHAIN LINK FENCE PER SPECIFICATION SECTION 616.

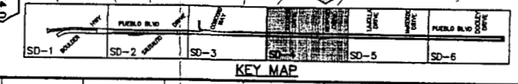
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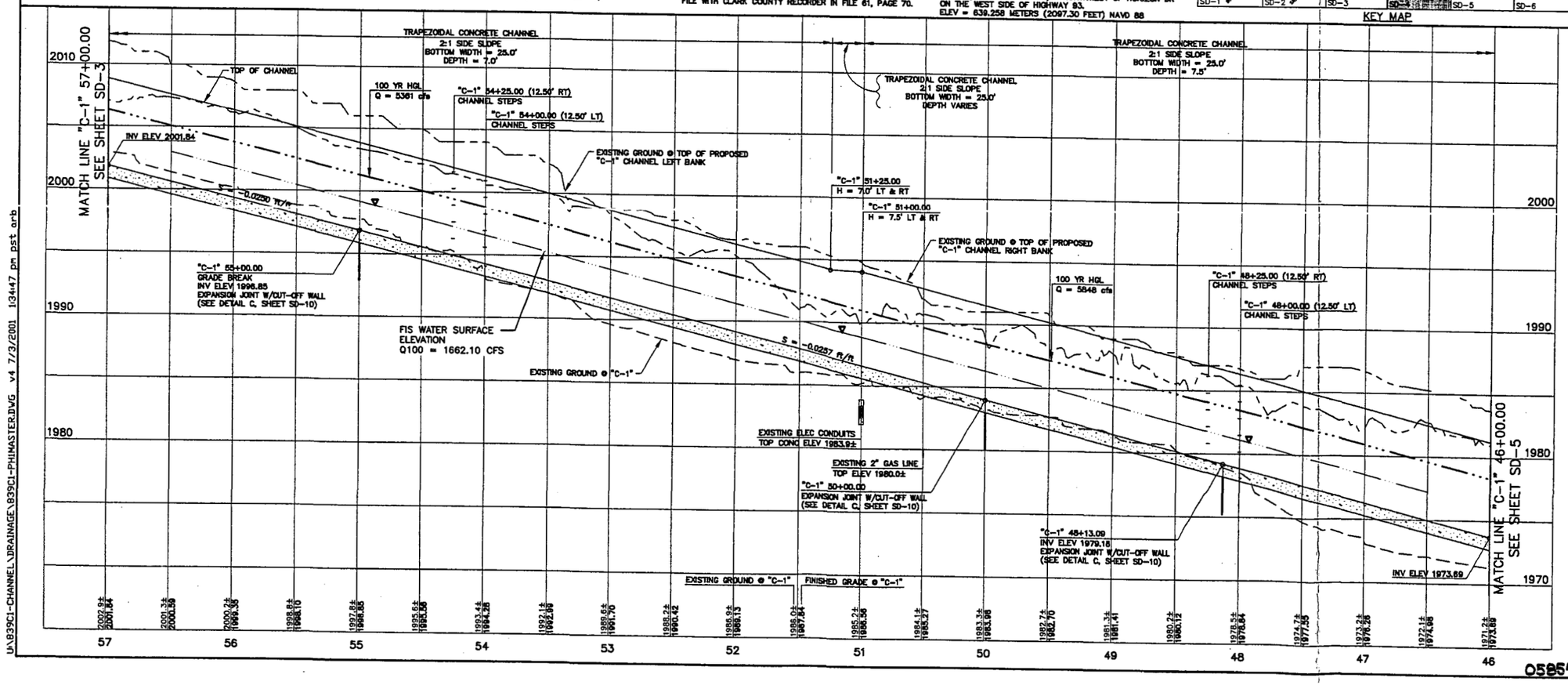
Avoid cutting underground utility lines. It's costly.
Call Before You Dig
1-800-227-2600

HORIZONTAL: 1" = 40'



KEY MAP





U:\B39C1-CHANNEL\DRAINAGE\B39C1-PHMASTER.DWG v4 7/3/2001 13:47 pm pst arb

05854

THE LOUIS BERGER GROUP, INC
LAS VEGAS, NEVADA

REV NO	DATE	DESCRIPTION	APPROVED

UPPER AND MIDDLE REACHES OF THE C-1 CHANNEL - PHASE I
GRADING & DRAINAGE PLAN & PROFILE
"C-1" 57+00.00 TO "C-1" 46+00.00
HENDERSON NEVADA, DEPARTMENT OF PUBLIC WORKS

REGISTERED PROFESSIONAL ENGINEER
CYNDI J. TUBBSCOTT
No. 11076

PROJECT NO:	839
DRAWN BY:	ARB
DESIGNED BY:	SRF
CHECKED BY:	SJD
APPROVED BY:	TDL
SCALE	
HORIZ:	1" = 40'
VERT:	1" = 4'
DRAWING NO	SD-4
	SHEET 10 OF 34

CONSTRUCTION ITEMS:

①	"C-1" 65+56.00 TO "C-1" 68+00.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.
②	"C-1" 65+50.00 TO "C-1" 65+56.00	CONSTRUCT 8.00' WIDE, 6' HIGH SINGLE-SWING CHAIN LINK ACCESS GATE, PER CCASD NO 253.
③	"C-1" 63+58.00 TO "C-1" 65+50.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.
④	"C1GW" 11+87.71	CONSTRUCT SAFETY FENCE, 8.00' LT TO 8.00' RT. MOUNT ON HEADWALL. (SEE DETAIL D, SHEET SD-11).
⑤	"C-1" 64+88.48 TO "C-1" 65+50.00	CONSTRUCT SAFETY FENCE, 34.72' RT TO 22.85' RT. MOUNT ON HEADWALL. (SEE DETAIL D, SHEET SD-11)
⑥	"C-1" 63+50.00 TO "C-1" 63+58.00	CONSTRUCT 8.00' WIDE, 6' HIGH SINGLE-SWING CHAIN LINK ACCESS GATE, PER CCASD NO 253.
⑦	"C-1" 57+00.00 TO "C-1" 63+50.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.
⑧	"C-1" 63+71.00 TO "C-1" 65+48.50	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.
⑨	"C-1" 63+57.00 TO "C-1" 63+71.00	CONSTRUCT 14' WIDE, 6' HIGH DOUBLE-SWING CHAIN LINK ACCESS GATE, PER CCASD NO 253.
⑩	"C-1" 63+47.00 TO "C-1" 63+57.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.
⑪	"C-1" 60+25.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9).
⑫	"C-1" 60+00.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9).
⑬	"C-1" 65+81.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9).
⑭	"C-1" 65+25.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9).
⑮	"C-1" 67+00.00 TO "C-1" 68+00.00	CONSTRUCT TRAPEZOIDAL CONCRETE CHANNEL. (SEE DETAIL B, SHEET SD-12).
⑯	"C-1" 66+00.00 TO "C-1" 67+00.00	CONSTRUCT TRAPEZOIDAL CONCRETE CHANNEL TRANSITION. (SEE DETAIL A, SHEET SD-13).
⑰	"C-1" 62+00.00 TO "C-1" 66+00.00	CONSTRUCT RECTANGULAR CONCRETE CHANNEL. (SEE DETAIL B, SHEET SD-13).
⑱	"C-1" 61+00.00 TO "C-1" 62+00.00	CONSTRUCT TRAPEZOIDAL CONCRETE CHANNEL TRANSITION. (SEE DETAIL A, SHEET SD-13).
⑲	"C-1" 57+00.00 TO "C-1" 61+00.00	CONSTRUCT TRAPEZOIDAL CONCRETE CHANNEL. (SEE DETAIL B, SHEET SD-12).
⑳	"C-1" 62+80.18 TO "C-1" 64+90.18	CONSTRUCT WEIR SECTION. (SEE SHEET SD-7).
㉑	"C1GW" 10+86.91 TO "C1GW" 11+87.71	CONSTRUCT 16' X 6' X 100.80' RCB. (SEE SHEET SD-7).
㉒	"C1GW" 11+87.71 TO "C1GW" 12+22.85	CONSTRUCT TRAPEZOIDAL CONCRETE CHANNEL TRANSITION. (SEE DETAIL A, SHEET SD-13).

REMOVAL ITEMS:

[1]	"C1GW" 10+86.9± TO "C1GW" 12+22.9±	REMOVE TRAPEZOIDAL CONCRETE CHANNEL.
[2]	"C-1" 63+31.5± TO "C-1" 65+19.0±	REMOVE TRAPEZOIDAL CONCRETE CHANNEL AND CONCRETE WALL.

BASIS OF BEARING

N 89°24'41" E, BEING THE NORTH LINE OF THE NE 1/4 OF THE NE 1/4 OF SECTION 29, T 22 S, R 63 E, MDM, CITY OF HENDERSON, NEVADA, PER PARCEL MAP ON FILE WITH CLARK COUNTY RECORDER IN FILE 61, PAGE 70.

BENCHMARK

CITY OF HENDERSON BENCHMARK #15, BEING A BOLT AND WASHER IN THE NORTH LEG OF A STEEL TRANSMISSION TOWER #6-4, 0.2 MILES +/- NORTHWEST OF HORIZON DR ON THE WEST SIDE OF NEVADA WAY 93. ELEV = 639.258 METERS (2097.30 FEET) NAVD 88

NOTES:

1. ALL EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL UTILITIES ARE SHOWN HEREON.
2. CONTRACTOR TO KEEP IN SERVICE AND PROTECT ALL UTILITIES.
3. SCARP AREAS AND EARTHWORK SHALL NOT PLACE SOIL AGAINST EXISTING BLOCK WALLS SUCH AS TO CREATE A RETAINING SITUATION.
4. GROUND CHAIN LINK FENCE PER SPECIFICATION SECTION 816.

HORIZONTAL: 1" = 40'

SAFETY ALERT

Call Before You Overhead 1-702-593-6111

Call Before You Dig 1-800-227-2600

Avoid cutting underground utility lines. It's costly.

KEY MAP

SD-1 SD-2 SD-3 SD-4 SD-5 SD-6

MATCH LINE "C-1" 68+00.00 SEE SHEET SD-2

MATCH LINE "C-1" 57+00.00 SEE SHEET SD-4

TRAPEZOIDAL CONCRETE CHANNEL 2:1 SIDE SLOPE BOTTOM WIDTH = 25.0' DEPTH VARIES

TRAPEZOIDAL CONCRETE CHANNEL TRANSITION BOTTOM WIDTH VARIES DEPTH VARIES

RECTANGULAR CONCRETE CHANNEL BOTTOM WIDTH = 39.0' DEPTH VARIES

TRAPEZOIDAL CONCRETE CHANNEL TRANSITION 2:1 SIDE SLOPE BOTTOM WIDTH VARIES DEPTH VARIES

TRAPEZOIDAL CONCRETE CHANNEL 2:1 SIDE SLOPE BOTTOM WIDTH 25.0' DEPTH = 7.1'

TRAPEZOIDAL CONCRETE CHANNEL 2:1 SIDE SLOPE BOTTOM WIDTH 25.0' DEPTH = 7.0'

TRAPEZOIDAL CONCRETE CHANNEL 2:1 SIDE SLOPE BOTTOM WIDTH 25.0' DEPTH VARIES

"C-1" 68+00.00 H = 7.0' LT & RT — TOP OF CHANNEL

"C-1" 67+13.00 (28.50' RT) END STEM WALL H = 7.0' LT & RT

"C-1" 67+03.00 (28.50' RT) STEM WALL H = 9.0' RT

"C-1" 66+97.00 (28.50' RT) STEM WALL H = 9.0' RT

"C-1" 66+87.00 (28.50' RT) BEGIN STEM WALL H = 7.0' LT & RT (SEE DETAIL B, SHEET SD-11)

"C-1" 65+81.28 H = 8.0' LT & RT

"C-1" 66+87.00 END TRAPEZOIDAL CONCRETE CHANNEL TRANSITION BEGIN TRAPEZOIDAL CONCRETE CHANNEL

"C-1" 65+87.00 END RECTANGULAR CONCRETE CHANNEL BEGIN TRAPEZOIDAL CONCRETE CHANNEL TRANSITION

"C-1" 65+09.85 INV ELEV 2018.37 EXPANSION JOINT W/CUT-OFF WALL (SEE DETAIL C, SHEET SD-10)

"C-1" 64+90.18 GRADE BREAK INV ELEV 2017.84

100 YR HGL Q = 4599 cfs

"C-1" 65+81.00 (19.50' RT) CHANNEL STEPS

"C-1" 65+25.00 (19.50' LT) CHANNEL STEPS

"C-1" 65+09.85 END WEIR SECTION H = 8.0' LT, H = 4.20' TO 10.65' RT

"C-1" 63+10.93 (19.50' RT) H = 2.70' TO 4.20' RT

"C-1" 63+08.93 (19.50' RT) BEGIN WEIR SECTION H = 8.0' LT & RT

EXISTING GROUND @ TOP OF PROPOSED "C-1" CHANNEL RIGHT BANK

FIS WATER SURFACE ELEVATION Q100 = 1295.80 CFS

TOP OF WEIR WALL

EXISTING ELEC CONDUITS TOP CONC ELEV 2015.2± (TO BE RELOCATED BY OTHERS)

"C-1" 63+07.93 INV ELEV 2014.55 EXPANSION JOINT W/CUT-OFF WALL (SEE DETAIL C, SHEET SD-10)

FIS WATER SURFACE ELEVATION Q100 = 1662.10 CFS

EXISTING GROUND @ "C-1"

"C-1" 62+00.00 END TRAPEZOIDAL CONCRETE CHANNEL TRANSITION BEGIN RECTANGULAR CHANNEL

"C-1" 61+00.00 END TRAPEZOIDAL CONCRETE CHANNEL BEGIN TRAPEZOIDAL CONCRETE CHANNEL TRANSITION H = 7.1' LT & RT

"C-1" 60+25.00 (12.50' RT) CHANNEL STEPS

"C-1" 60+00.00 (12.50' LT) CHANNEL STEPS

GRADE BREAK INV ELEV 2009.33 EXPANSION JOINT W/CUT-OFF WALL (SEE DETAIL C, SHEET SD-10)

EXISTING GROUND @ TOP OF PROPOSED "C-1" CHANNEL LEFT BANK

"C-1" 58+90.00 H = 7.0' LT & RT

100 YR HGL Q = 5361 cfs

"C-1" 59+90.00 H = 7.1' LT & RT

INV ELEV 2001.84

EXISTING GROUND @ "C-1" | FINISHED GRADE @ "C-1"

2032.0± 2029.13 | 2030.4± 2027.28 | 2028.4± 2025.42 | 2026.5± 2023.67 | 2025.4± 2021.71 | 2024.7± 2019.98 | 2022.7± 2016.00 | 2021.2± 2016.98 | 2019.7± 2016.11 | 2018.9± 2015.26 | 2017.7± 2014.42 | 2016.7± 2013.57 | 2015.7± 2012.72 | 2014.0± 2011.87 | 2012.7± 2011.03 | 2011.5± 2010.18 | 2009.8± 2009.33 | 2008.8± 2008.08 | 2007.5± 2006.83 | 2006.4± 2006.59 | 2005.0± 2004.34 | 2004.7± 2003.09 | 2002.9±

68 67 66 65 64 63 62 61 60 59 58 57

THE LOUIS BERGER GROUP, INC
LAS VEGAS, NEVADA

REV NO	DATE	DESCRIPTION	APPROVED

UPPER AND MIDDLE REACHES OF THE C-1 CHANNEL - PHASE 1
GRADING & DRAINAGE PLAN & PROFILE
"C-1" 68+00.00 TO "C-1" 57+00.00
HENDERSON NEVADA, DEPARTMENT OF PUBLIC WORKS

PROJECT NO:	839
DRAWN BY:	ARB
DESIGNED BY:	SRF
CHECKED BY:	SJD
APPROVED BY:	TDL
SCALE	
HORIZ:	1" = 40'
VERT:	1" = 4'

DRAWING NO **SD-3**

SHEET 9 OF 34

05854

U:\839C1-CHANNEL\DRAINAGE\839C1-PHIMASTER.DWG v3 7/3/2001 11:11:35 pm pst arb

CONSTRUCTION ITEMS:

①	"C-1" 68+00.00 TO "C-1" 70+94.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.	⑪	"C-1" 78+00.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9).
②	"C-1" 78+50.00	CONSTRUCT 6' WIDE, 6' HIGH SINGLE-SWING CHAIN LINK ACCESS GATE, PER CCASD NO 253.	⑫	"C-1" 69+75.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9).
③	"C-1" 71+00.00 TO "C-1" 78+50.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.	⑬	"C-1" 69+50.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9).
④	"C-1" 78+50.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252. MOUNT ON HEADWALL. (SEE DETAIL 3, SHEET SD-11).	⑭	"C-1" 68+00.00 TO "C-1" 76+30.00	CONSTRUCT TRAPEZOIDAL CONCRETE CHANNEL. (SEE DETAIL B, SHEET SD-12).
⑤	"C-1" 78+50.00	CONSTRUCT 14' WIDE, 6' HIGH DOUBLE-SWING CHAIN LINK ACCESS GATE, PER CCASD NO 253.	⑮	"C-1" 72+36.49 TO "C-1" 74+60.32	CONSTRUCT ACCESS RAMP. (SEE SHEET SD-19).
⑥	"C-1" 78+50.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.	⑯	"C-1" 78+30.00 TO "C-1" 77+30.00	CONSTRUCT TRAPEZOIDAL CONCRETE CHANNEL TRANSITION. (SEE DETAIL A, SHEET SD-13).
⑦	"C-1" 71+74.00 TO "C-1" 78+50.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.	⑰	"C-1" 78+50.00 TO "C-1" 79+00.00	CONSTRUCT 3 - 20' X 7' X 50.00' RCB. (SEE SHEET SD-15).
⑧	"C-1" 71+80.00 TO "C-1" 71+74.00	CONSTRUCT 14' WIDE, 6' HIGH DOUBLE-SWING CHAIN LINK ACCESS GATE, PER CCASD NO 253.	⑱	"C-1" 70+00.00	CONSTRUCT FLOW METERING STATION. (SEE SHEET SD-16).
⑨	"C-1" 70+87.80 TO "C-1" 71+80.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.	⑲	"C-1" 70+94.00 TO "C-1" 71+00.00	CONSTRUCT 6' WIDE, 6' HIGH SINGLE-SWING CHAIN LINK ACCESS GATE, PER CCASD NO 253. INSTALL FLOW DEPTH GAGE (SEE DETAIL D, SHEET SD-16).
⑩	"C-1" 76+25.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9).	⑳	"C-1" 70+00.00	

REMOVAL ITEMS:

[1] "C-1" 70+47.5± TO "C-1" 71+38.0± — REMOVE 8" WATER LINE (SEE SHEET U-3).

NOTES:

1. ALL EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL UTILITIES ARE SHOWN HEREON.
2. CONTRACTOR TO KEEP IN SERVICE AND PROTECT ALL UTILITIES.
3. SCARP AREAS AND EARTHWORK SHALL NOT PLACE SOIL AGAINST EXISTING BLOCK WALLS SUCH AS TO CREATE A RETAINING SITUATION.
4. GROUND CHAIN LINK FENCE PER SPECIFICATION SECTION 816.

BASIS OF BEARING

N 89°24'41" E, BEING THE NORTH LINE OF THE NE 1/4 OF THE NE 1/4 OF SECTION 29, T 22 S, R 63 E, MDM, CITY OF HENDERSON, NEVADA, PER PARCEL MAP ON FILE WITH CLARK COUNTY RECORDER IN FILE 61, PAGE 70.

BENCHMARK

CITY OF HENDERSON BENCHMARK #15, BEING A BOLT AND WASHER IN THE NORTH LEG OF A STEEL TRANSMISSION TOWER #6-4, 0.2 MILES +/- NORTHWEST OF HORIZON DR ON THE WEST SIDE OF HIGHWAY 93. ELEV = 639.256 METERS (2097.30 FEET) NAVD 88

HORIZONTAL: 1" = 40'

SAFETY ALERT

Call Before You Overhead 1-702-593-6111

Avoid cutting underground utility lines. It's costly. Call Before You Dig 1-800-227-2600

KEY MAP

SD-1 SD-2 SD-3 SD-4 SD-5 SD-6

MATCH LINE "C-1" 79+00.00 SEE SHEET SD-1

MATCH LINE "C-1" 68+00.00 SEE SHEET SD-3

PUEBLO BLVD

UNDEVELOPED

EXISTING BLOCK WALL

EXISTING POWER POLE (PROTECT IN PLACE)

PERSONNEL ACCESS

ACCESS RAMP

LIMITS OF CONSTRUCTION

NDOT R/W

EXISTING 8" WATER LINE (TO BE RELOCATED) TOP CONC ELEV 2037.1±

EXISTING TELE CONDUIT TOP CONC ELEV 2051.0±

EXISTING TELE CONDUIT TOP ELEV 2049.2±

EXISTING GROUND @ "C-1"

EXISTING GROUND @ TOP OF PROPOSED "C-1" CHANNEL LEFT BANK

EXISTING GROUND @ TOP OF PROPOSED "C-1" CHANNEL RIGHT BANK

TOP OF CHANNEL

FINISHED GRADE @ "C-1"

FIS WATER SURFACE ELEVATION Q100 = 1295.80 CFS

RELOCATED 8" WATER LINE INV ELEV 2035.0±

INV ELEV 2029.13

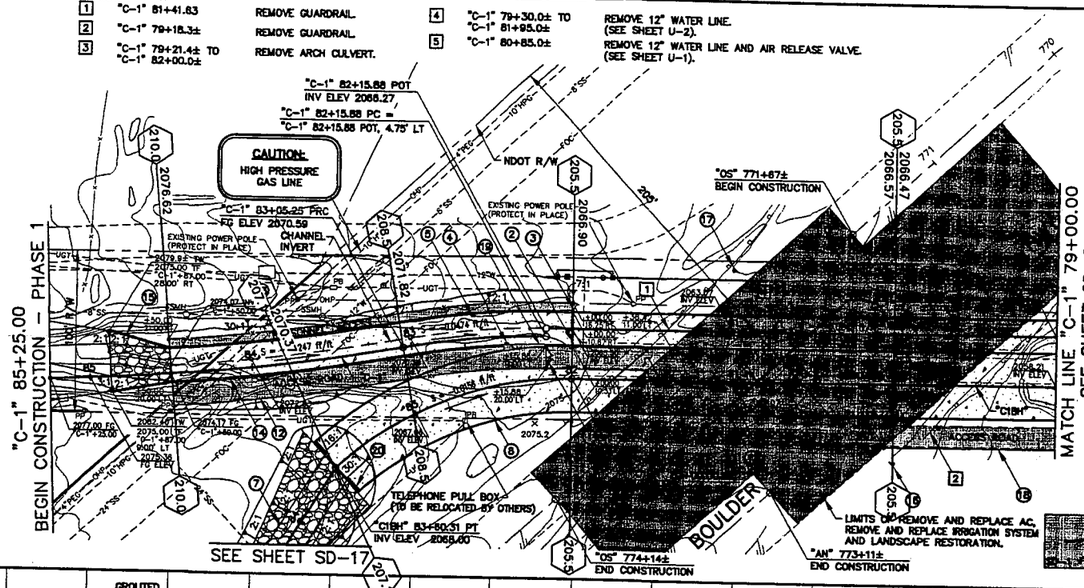
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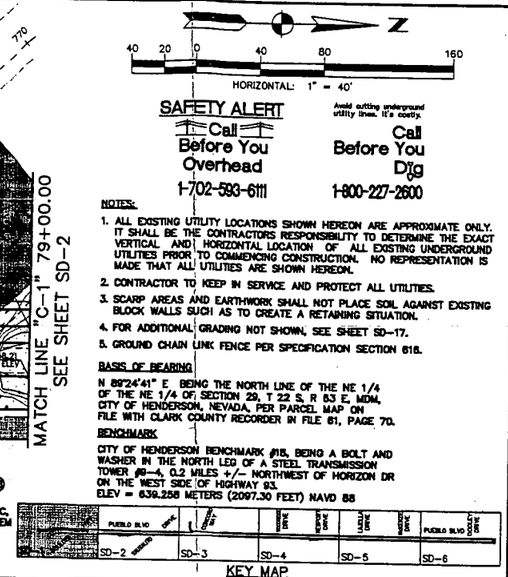
CONSTRUCTION ITEMS:

①	"C-1" 82+00.00	CONSTRUCT 14.00' WIDE, 6' HIGH DOUBLE-SWING CHAIN LINK ACCESS GATE, PER CCASD NO 253.
②	"C-1" 82+00.00 TO "C-1" 82+15.88	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252. MOUNT ON HEADWALL. (SEE DETAIL 3, SHEET SD-11).
③	"C-1" 82+00.00	CONSTRUCT 6' WIDE, 6' HIGH SINGLE-SWING CHAIN LINK ACCESS GATE, PER CCASD NO 253.
④	"C-1" 82+40.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9).
⑤	"C-1" 82+60.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9).
⑥	"C-1" 81+38.42 TO "C-1" 82+00.00	CONSTRUCT 14' WIDE ACCESS ROAD (6" TYPE II AGGREGATE BASE COMPACTED TO 95%).
⑦	"C1BH" 83+60.31 TO "C1BH" 85+66.55	CONSTRUCT RIPRAP CHANNEL. (SEE SHEET SD-17).
⑧	"C1BH" 82+00.00 TO "C1BH" 83+60.31	CONSTRUCT 2 - 20' X 7' X 180.31' RCB. (SEE SHEET SD-15).
⑨	"C-1" 79+00.00 TO "C-1" 82+00.00	CONSTRUCT 3 - 20' X 7' X 300.00' RCB. (SEE SHEET SD-15).
⑩	"C-1" 78+84.00 TO "C-1" 81+93.00	CONSTRUCT 12" X 309.00' DIP WATER LINE. CONNECT TO EXISTING WATER LINE. (SEE SHEET U-2).
⑪	"WZ" 10+50.00 TO "WZ" 11+98.00	CONSTRUCT 12" X 148.00' DIP WATER LINE. CONNECT TO EXISTING WATER LINE. (SEE SHEET U-1).
⑫	"C-1" 82+15.88 TO "C-1" 84+50.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.
⑬	"C-1" 82+00.00 TO "C-1" 84+50.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.
⑭	"C-1" 82+00.00 TO "C-1" 84+50.00	CONSTRUCT RECTANGULAR CONCRETE CHANNEL. (SEE DETAIL A, SHEET SD-12).
⑮	"C-1" 84+50.00 TO "C-1" 84+87.00	CONSTRUCT RIP RAP CHANNEL TRANSITION WITH CONCRETE WINGWALLS. (SEE SHEET SD-17).
⑯	"C-1" 80+00.00	INSTALL "C-1 CHANNEL" SIGN, 80.00' LT. (SEE DETAIL A, SHEET SD-9).
⑰	"C-1" 81+00.00	INSTALL "C-1 CHANNEL" SIGN, 38.00' RT. (SEE DETAIL A, SHEET SD-9).
⑱	"C-1" 78+50.00 TO "C-1" 80+05.69	CONSTRUCT 14' WIDE ACCESS ROAD (6" TYPE II AGGREGATE BASE COMPACTED TO 95%).
⑲	"C-1" 82+00.00 TO "C-1" 82+41.91	CONSTRUCT WALL JUNCTION (SEE DETAIL F, SHEET SD-9).
⑳	"C1BH" 83+80.31	CONSTRUCT SAFETY FENCE, 20.83' LT TO 20.83' RT. MOUNT ON HEADWALL. (SEE DETAIL F, SHEET SD-11).

REMOVAL ITEMS:

1	"C-1" 81+41.83	REMOVE GUARDRAIL.
2	"C-1" 79+18.3±	REMOVE GUARDRAIL.
3	"C-1" 79+21.4± TO "C-1" 82+00.0±	REMOVE ARCH CULVERT.
4	"C-1" 79+30.0± TO "C-1" 81+95.0±	REMOVE 12" WATER LINE. (SEE SHEET U-2).
5	"C-1" 80+85.0±	REMOVE 12" WATER LINE AND AIR RELEASE VALVE. (SEE SHEET U-1).





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NOTES:

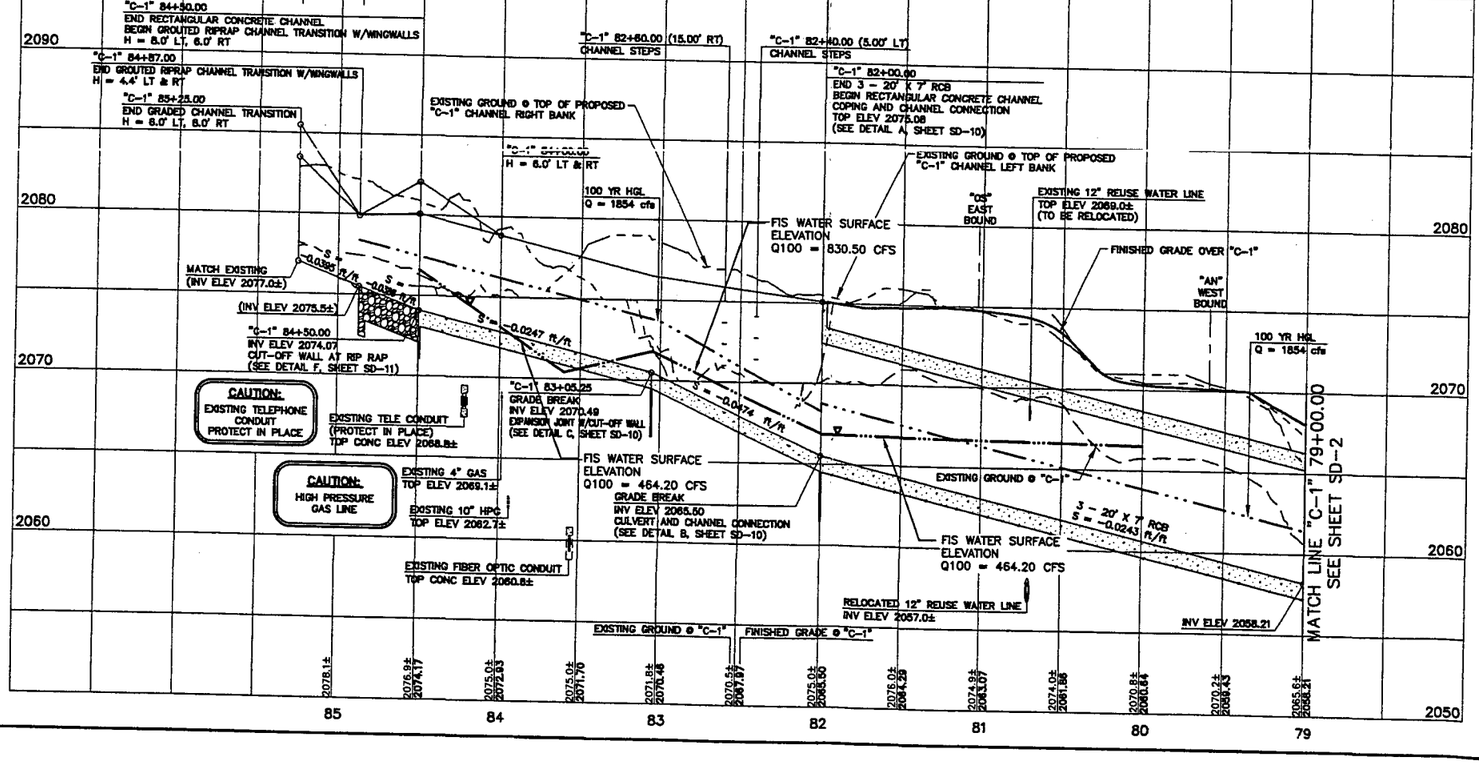
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2. CONTRACTOR TO KEEP IN SERVICE AND PROTECT ALL UTILITIES.
3. SCARP AREAS AND EARTHWORK SHALL NOT PLACE SOIL AGAINST EXISTING BLOCK WALLS SUCH AS TO CREATE A RETAINING SITUATION.
4. FOR ADDITIONAL GRADING NOT SHOWN, SEE SHEET SD-17.
5. GROUND CHAIN LINK FENCE PER SPECIFICATION SECTION 618.

BASIS OF BEARING

N 89°24'41" E, BEING THE NORTH LINE OF THE NE 1/4 OF THE NE 1/4 OF SECTION 29, T 22 S, R 63 E, MDM, CITY OF HENDERSON, NEVADA, PER PARCEL MAP ON FILE WITH CLARK COUNTY RECORDER IN FILE 61, PAGE 70.

BENCHMARK

CITY OF HENDERSON BENCHMARK #15, BEING A BOLT AND WASHER IN THE NORTH LEG OF A STEEL TRANSMISSION TOWER #9-4, 0.2 MILES +/- NORTHWEST OF HORIZON DR ON THE WEST SIDE OF HIGHWAY 93.
ELEV = 639.258 METERS (2097.30 FEET) NAVD 88



REV NO	DATE	DESCRIPTION	APPROVED

THE LOUIS BERGER GROUP, INC
LAS VEGAS, NEVADA

UPPER AND MIDDLE REACHES OF THE C-1 CHANNEL - PHASE 1
GRADING & DRAINAGE PLAN & PROFILE
"C-1" 85+25.00 TO "C-1" 79+00.00
HENDERSON NEVADA, DEPARTMENT OF PUBLIC WORKS

PROJECT NO:	839
DRAWN BY:	ARB
DESIGNED BY:	SRF
CHECKED BY:	SJD
APPROVED BY:	TDL
SCALE	
HORIZ:	1" = 40'
VERT:	1" = 4'
DRAWING NO	SD-1
SHEET 7 OF 34	

05854

U:\839C1-CHANNEL\DRAINAGE\839C1-PHINASTER.DWG v1 7/3/2001 10:55:43 pm pst art

CONSTRUCTION ITEMS:

①	"C-1" 68+00.00 TO "C-1" 70+94.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.
②	"C-1" 78+50.00	CONSTRUCT 6' WIDE, 6' HIGH SINGLE-SWING CHAIN LINK ACCESS GATE, PER CCASD NO 253.
③	"C-1" 71+00.00 TO "C-1" 78+50.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.
④	"C-1" 78+50.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252. MOUNT ON HEADWALL. (SEE DETAIL 3, SHEET SD-11).
⑤	"C-1" 78+50.00	CONSTRUCT 14' WIDE, 6' HIGH DOUBLE-SWING CHAIN LINK ACCESS GATE, PER CCASD NO 253.
⑥	"C-1" 78+50.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.
⑦	"C-1" 71+74.00 TO "C-1" 78+50.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.
⑧	"C-1" 71+80.00 TO "C-1" 71+74.00	CONSTRUCT 14' WIDE, 6' HIGH DOUBLE-SWING CHAIN LINK ACCESS GATE, PER CCASD NO 253.
⑨	"C-1" 70+97.60 TO "C-1" 71+80.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.
⑩	"C-1" 76+25.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9).
⑪	"C-1" 76+00.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9).
⑫	"C-1" 69+75.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9).
⑬	"C-1" 69+50.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9).
⑭	"C-1" 68+00.00 TO "C-1" 76+30.00	CONSTRUCT TRAPEZOIDAL CONCRETE CHANNEL (SEE DETAIL B, SHEET SD-12).
⑮	"C-1" 72+36.49 TO "C-1" 74+60.32	CONSTRUCT ACCESS RAMP. (SEE SHEET SD-19).
⑯	"C-1" 76+30.00 TO "C-1" 77+30.00	CONSTRUCT TRAPEZOIDAL CONCRETE CHANNEL TRANSITION. (SEE DETAIL A, SHEET SD-13).
⑰	"C-1" 78+50.00 TO "C-1" 79+00.00	CONSTRUCT 3 - 20' X 7' X 50.00' RCB. (SEE SHEET SD-15).
⑱	"C-1" 70+00.00	CONSTRUCT FLOW METERING STATION. (SEE SHEET SD-16).
⑲	"C-1" 70+94.00 TO "C-1" 71+00.00	CONSTRUCT 6' WIDE, 6' HIGH SINGLE-SWING CHAIN LINK ACCESS GATE, PER CCASD NO 253.
⑳	"C-1" 70+00.00	INSTALL FLOW DEPTH GAGE (SEE DETAIL D, SHEET SD-16).

REMOVAL ITEMS:

1	"C-1" 70+47.5± TO "C-1" 71+38.0±	REMOVE 8" WATER LINE (SEE SHEET U-3).

NOTES:

1. ALL EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL UTILITIES ARE SHOWN HEREON.
2. CONTRACTOR TO KEEP IN SERVICE AND PROTECT ALL UTILITIES.
3. SCARP AREAS AND EARTHWORK SHALL NOT PLACE SOIL AGAINST EXISTING BLOCK WALLS SUCH AS TO CREATE A RETAINING SITUATION.
4. GROUND CHAIN LINK FENCE PER SPECIFICATION SECTION 616.

BASIS OF BEARING

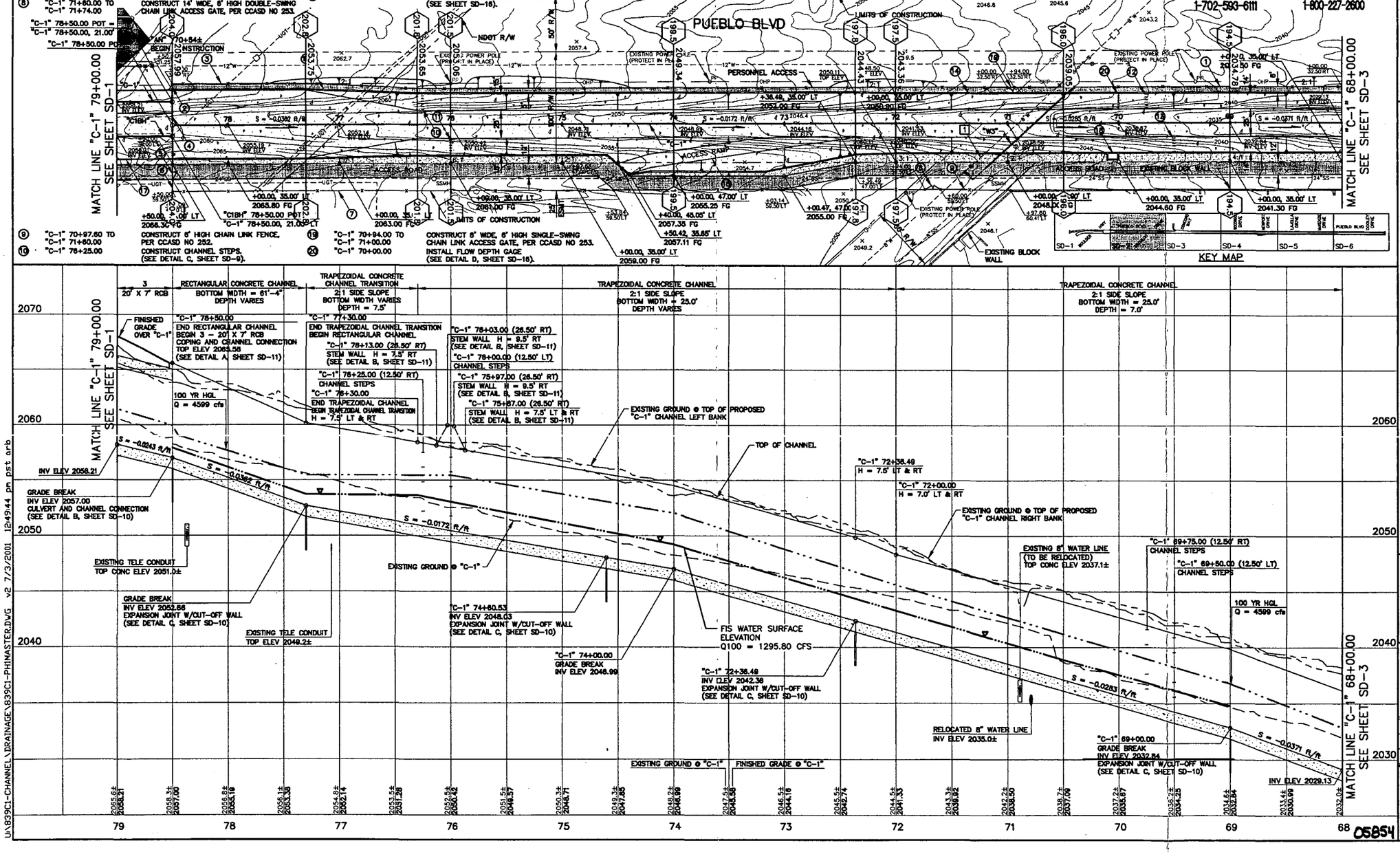
N 89°24'41" E BEING THE NORTH LINE OF THE NE 1/4 OF THE NE 1/4 OF SECTION 29, T 22 S, R 63 E, MDM, CITY OF HENDERSON, NEVADA, PER PARCEL MAP ON FILE WITH CLARK COUNTY RECORDER IN FILE 81, PAGE 70.

BENCHMARK

CITY OF HENDERSON BENCHMARK #18, BEING A BOLT AND WASHER IN THE NORTH LEG OF A STEEL TRANSMISSION TOWER #8-4, 0.2 MILES +/- NORTHWEST OF HORIZON DR ON THE WEST SIDE OF HIGHWAY 93.
ELEV = 630.258 METERS (2097.30 FEET) NAVD 88

HORIZONTAL: 1" = 40'

SAFETY ALERT
Call Before You Overhead 1-702-593-6111
Avoid cutting underground utility lines. It's costly.
Call Before You Dig 1-800-227-2600


MATCH LINE "C-1" 79+00.00 SEE SHEET SD-1
MATCH LINE "C-1" 68+00.00 SEE SHEET SD-3
PUEBLO BLVD
NDOT R/W
LIMITS OF CONSTRUCTION
EXISTING POWER POLE (PROTECT IN PLACE)
PERSONNEL ACCESS
ACCESS ROAD
EXISTING BLOCK WALL
EXISTING POWER POLE (PROTECT IN PLACE)
EXISTING BLOCK WALL
"C-1" ACCESS RAMP
"C1SH" 78+50.00 POT
"C-1" 78+50.00, 21.00' LT
"C-1" 78+50.00 POT
"C1SH"
"W3"
+00.00, 35.00' LT 2065.80 FG
+00.00, 35.00' LT 2063.00 FG
+00.00, 47.00' LT 2055.25 FG
+00.00, 48.05' LT 2057.35 FG
+00.00, 35.00' LT 2059.00 FG
+00.47, 47.00' LT 2055.00 FG
+00.00, 90' LT 2048.00 FG
+00.00, 35.00' LT 2044.60 FG
+00.00, 35.00' LT 2041.30 FG
+38.40, 35.00' LT 2052.00 FG
+00.00, 35.00' LT 2050.80 FG
+00.00 32.50 RT
+94.00 32.50 RT
+00.00 32.50 RT
+94.00 32.50 RT
+00.00, 35.00' LT 2034.70 FG
+00.00, 35.00' LT 2036.05 FG

CONSTRUCTION ITEMS:

①	"C-1" 65+56.00 TO "C-1" 68+00.00	CONSTRUCT 8' HIGH CHAIN LINK FENCE, PER CCASD NO 252.	⑫	"C-1" 60+00.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9).
②	"C-1" 65+50.00 TO "C-1" 68+00.00	CONSTRUCT 8.00' WIDE, 6' HIGH SINGLE-SWING CHAIN LINK ACCESS GATE, PER CCASD NO 253.	⑬	"C-1" 65+61.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9).
③	"C-1" 63+56.00 TO "C-1" 65+50.00	CONSTRUCT 8' HIGH CHAIN LINK FENCE, PER CCASD NO 252.	⑰	"C-1" 62+00.00 TO "C-1" 66+00.00	CONSTRUCT RECTANGULAR CONCRETE CHANNEL. (SEE DETAIL B, SHEET SD-13).
④	"C1GW" 11+87.71	CONSTRUCT SAFETY FENCE, 8.00' LT TO 8.00' RT. MOUNT ON HEADWALL. (SEE DETAIL D, SHEET SD-11).	⑱	"C-1" 61+00.00 TO "C-1" 62+00.00	CONSTRUCT TRAPEZOIDAL CONCRETE CHANNEL TRANSITION. (SEE DETAIL A, SHEET SD-13).
⑤	"C-1" 64+88.49 TO "C-1" 65+50.00	CONSTRUCT SAFETY FENCE, 34.72' RT TO 22.85' RT. MOUNT ON HEADWALL. (SEE DETAIL D, SHEET SD-11)	⑲	"C-1" 57+00.00 TO "C-1" 61+00.00	CONSTRUCT TRAPEZOIDAL CONCRETE CHANNEL. (SEE DETAIL B, SHEET SD-12).
⑥	"C-1" 63+50.00 TO "C-1" 63+56.00	CONSTRUCT 8.00' WIDE, 6' HIGH SINGLE-SWING CHAIN LINK ACCESS GATE, PER CCASD NO 253.	⑳	"C-1" 62+80.18 TO "C-1" 64+90.18	CONSTRUCT WIER SECTION. (SEE SHEET SD-7).
⑦	"C-1" 57+00.00 TO "C-1" 63+50.00	CONSTRUCT 8' HIGH CHAIN LINK FENCE, PER CCASD NO 252.	㉑	"C1GW" 10+86.91 TO "C1GW" 11+87.71	CONSTRUCT 16' X 8' X 100.80' RCB. (SEE SHEET SD-7).
⑧	"C-1" 63+71.00 TO "C-1" 65+48.50	CONSTRUCT 8' HIGH CHAIN LINK FENCE, PER CCASD NO 252.	㉒	"C-1" 64+31.33 POT TO "C1GW" 12+22.85	CONSTRUCT TRAPEZOIDAL CONCRETE CHANNEL TRANSITION. (SEE DETAIL A, SHEET SD-13).
⑨	"C-1" 63+57.00 TO "C-1" 63+71.00	CONSTRUCT 14' WIDE, 6' HIGH DOUBLE-SWING CHAIN LINK ACCESS GATE, PER CCASD NO 253.			
⑩	"C-1" 63+47.00 TO "C-1" 63+57.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.			
⑪	"C-1" 60+25.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9).			

REMOVAL ITEMS:

1	"C1GW" 10+86.9± TO "C1GW" 12+22.9±	REMOVE TRAPEZOIDAL CONCRETE CHANNEL.
2	"C-1" 63+31.5± TO "C-1" 65+19.0±	REMOVE TRAPEZOIDAL CONCRETE CHANNEL AND CONCRETE WALL.

BASIS OF BEARING

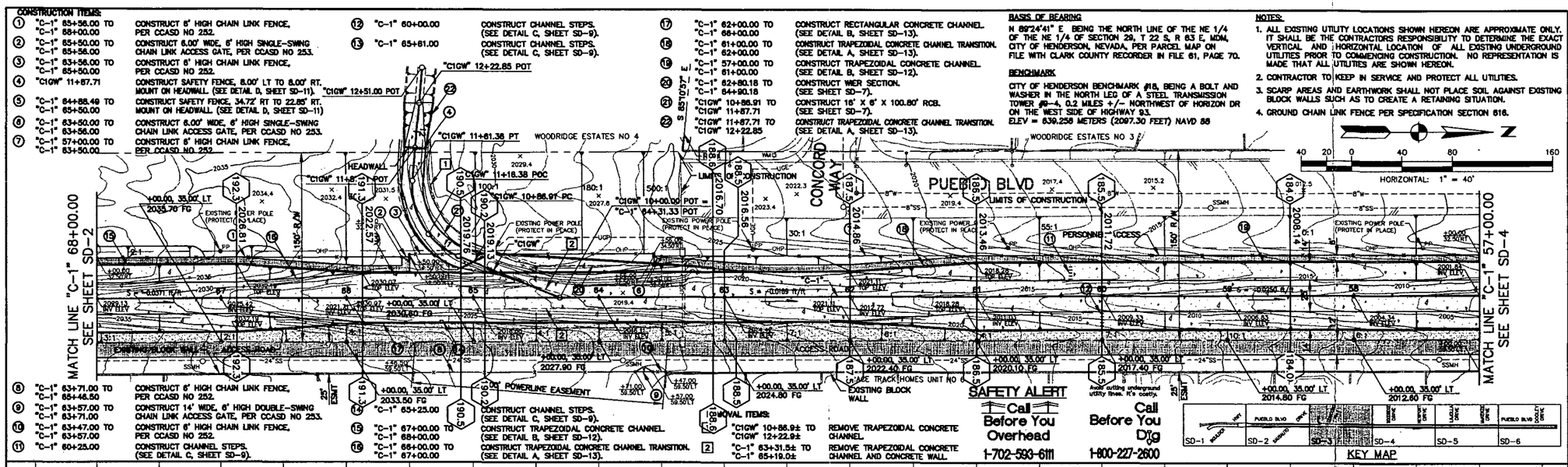
N 89°24'41" E BEING THE NORTH LINE OF THE NE 1/4 OF THE NE 1/4 OF SECTION 29, T 22 S, R 63 E, MDM, CITY OF HENDERSON, NEVADA, PER PARCEL MAP ON FILE WITH CLARK COUNTY RECORDER IN FILE 61, PAGE 70.

BENCHMARK

CITY OF HENDERSON BENCHMARK #18, BEING A BOLT AND WASHER IN THE NORTH LEG OF A STEEL TRANSMISSION TOWER #8-4, 0.2 MILES +/- NORTHWEST OF HORIZON DR ON THE WEST SIDE OF HIGHWAY 93.
ELEV = 639.258 METERS (2097.30 FEET) NAVD 88

NOTES:

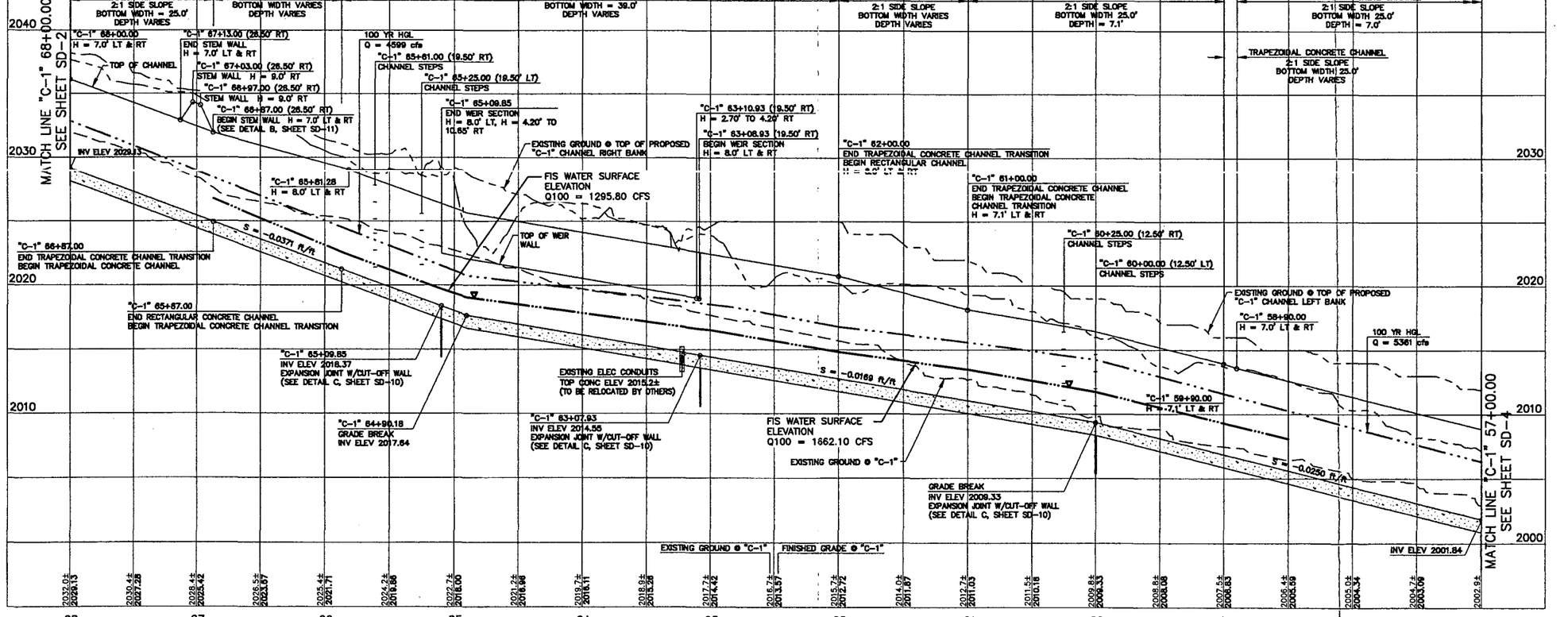
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4. GROUND CHAIN LINK FENCE PER SPECIFICATION SECTION 616.



SAFETY ALERT

Call Before You Overhead 1-702-593-6111

Call Before You Dig 1-800-227-2600



05854

THE LOUIS BERGER GROUP, INC
LAS VEGAS, NEVADA

REV NO	DATE	DESCRIPTION	APPROVED

UPPER AND MIDDLE REACHES OF THE C-1 CHANNEL - PHASE 1
GRADING & DRAINAGE PLAN & PROFILE
"C-1" 68+00.00 TO "C-1" 57+00.00
HENDERSON NEVADA, DEPARTMENT OF PUBLIC WORKS

PROJECT NO:	839
DRAWN BY:	ARB
DESIGNED BY:	SRF
CHECKED BY:	SJD
APPROVED BY:	TDL
SCALE	
HORIZ:	1" = 40'
VERT:	1" = 4'

DRAWING NO

SD-3

SHEET 9 OF 34

U:\839C1-CHANNEL\DRAINAGE\839C1-PHIMASTER.DWG v3 7/3/2001 11:11:35 pm pst arb

CONSTRUCTION ITEMS:

①	"C-1" 48+00.00 TO "C-1" 50+50.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.	
②	"C-1" 50+50.00 TO "C-1" 50+56.00	CONSTRUCT 6.00' WIDE, 6' HIGH SINGLE-SWING CHAIN LINK ACCESS GATE, PER CCASD NO 253.	
③	"C-1" 50+56.00 TO "C-1" 57+00.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.	
④	"C-1" 50+84.00 TO "C-1" 51+07.10	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.	
⑤	"C-1" 50+50.00 TO "C-1" 50+84.00	CONSTRUCT 14' WIDE, 6' HIGH DOUBLE-SWING CHAIN LINK ACCESS GATE, PER CCASD NO 253.	
⑥	"C-1" 48+00.00 TO "C-1" 50+50.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.	
⑦	"C-1" 46+00.00 TO "C-1" 57+00.00	CONSTRUCT TRAPEZOIDAL CONCRETE CHANNEL. (SEE DETAIL B, SHEET SD-12).	
⑧	"C-1" 48+00.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9).	
⑨	"C-1" 47+75.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9).	
⑩	"C-1" 54+25.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9).	
⑪	"C-1" 54+00.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9).	
⑫	"C-1" 48+13.09 TO "C-1" 49+99.45	CONSTRUCT ACCESS RAMP. (SEE SHEET SD-19).	

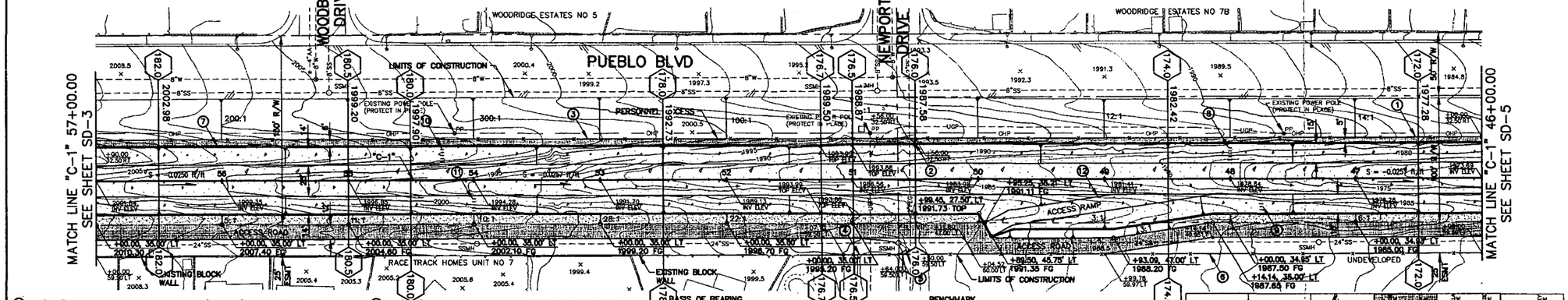
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4. GROUND CHAIN LINK FENCE PER SPECIFICATION SECTION 816.

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HORIZONTAL: 1" = 40'

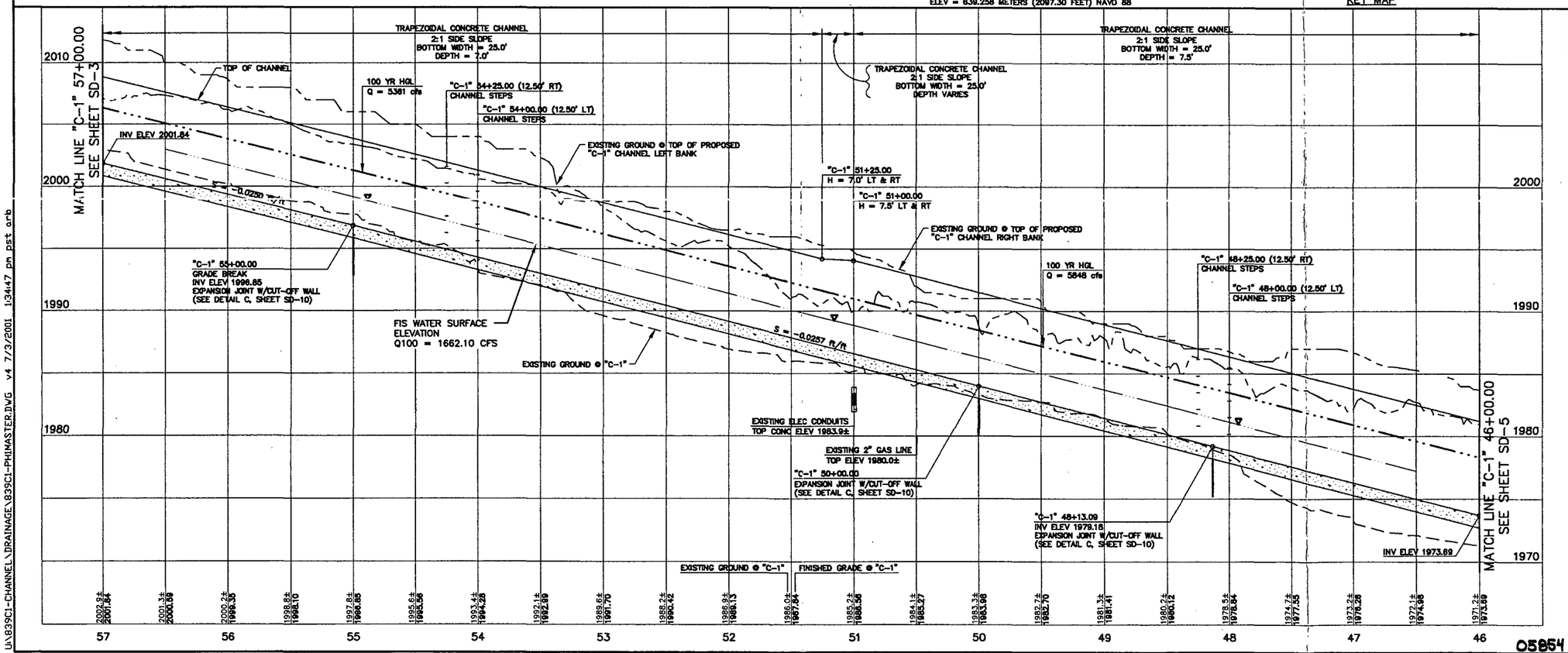


BASIS OF BEARING
S 89°24'41" E BEING THE NORTH LINE OF THE NE 1/4 OF THE NE 1/4 OF SECTION 29, T 22 S, R 63 E, MDM, CITY OF HENDERSON, NEVADA, PER PARCEL MAP ON FILE WITH CLARK COUNTY RECORDER IN FILE 61, PAGE 70.

BENCHMARK
CITY OF HENDERSON BENCHMARK #18, BEING A BOLT AND WASHER IN THE NORTH LEG OF A STEEL TRANSMISSION TOWER #9-4, 0.2 MILES +/- NORTHWEST OF HORIZON DR ON THE WEST SIDE OF HIGHWAY 93.
ELEV = 639.258 METERS (2097.30 FEET) NAVD 88



KEY MAP



05854

THE LOUIS BERGER GROUP, INC
LAS VEGAS, NEVADA

REV NO	DATE	DESCRIPTION	APPROVED

UPPER AND MIDDLE REACHES OF THE C-1 CHANNEL - PHASE 1
GRADING & DRAINAGE PLAN & PROFILE
"C-1" 57+00.00 TO "C-1" 46+00.00
HENDERSON NEVADA, DEPARTMENT OF PUBLIC WORKS

FINDLAY CIVIL ENGINEER No. 11070 (1SP)

PROJECT NO:	839
DRAWN BY:	ARB
DESIGNED BY:	SRF
CHECKED BY:	SJD
APPROVED BY:	TDL
SCALE	
HORIZ:	1" = 40'
VERT:	1" = 4'

DRAWING NO
SD-4
SHEET 10 OF 34

U:\839C1-CHANNEL\DRAINAGE\839C1-PHIMASTER.DVG v4 7/3/2001 1:34:47 pm pst arb

CONSTRUCTION ITEMS:

①	"C-1" 35+00.00 TO "C-1" 37+50.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.	⑧	"C-1" 36+25.00	CONSTRUCT CHANNEL STEPS, (SEE DETAIL C, SHEET SD-9).
②	"C-1" 37+50.00 TO "C-1" 37+56.00	CONSTRUCT 8.00' WIDE, 6' HIGH SINGLE-SWING CHAIN LINK ACCESS GATE, PER CCASD NO 253.	⑨	"C-1" 36+00.00	CONSTRUCT CHANNEL STEPS, (SEE DETAIL C, SHEET SD-9)
③	"C-1" 37+56.00 TO "C-1" 48+00.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.	⑩	"C-1" 42+25.00	CONSTRUCT CHANNEL STEPS, (SEE DETAIL C, SHEET SD-9).
④	"C-1" 37+84.00 TO "C-1" 48+00.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.	⑪	"C-1" 42+00.00	CONSTRUCT CHANNEL STEPS, (SEE DETAIL C, SHEET SD-9).
⑤	"C-1" 37+50.00 TO "C-1" 37+64.00	CONSTRUCT 14' WIDE, 6' HIGH DOUBLE-SWING CHAIN LINK ACCESS GATE, PER CCASD NO 253.			

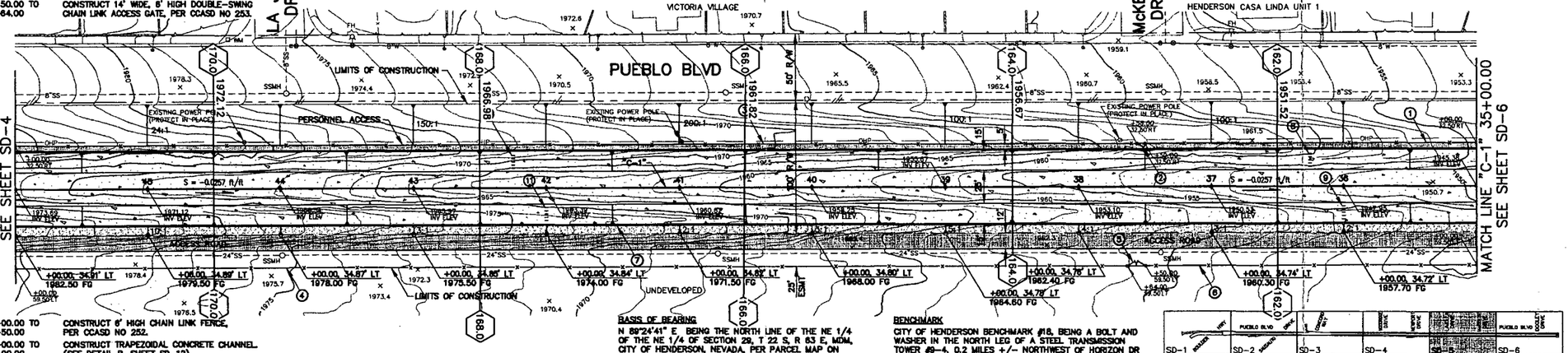
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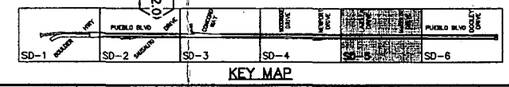
HORIZONTAL: 1" = 40'



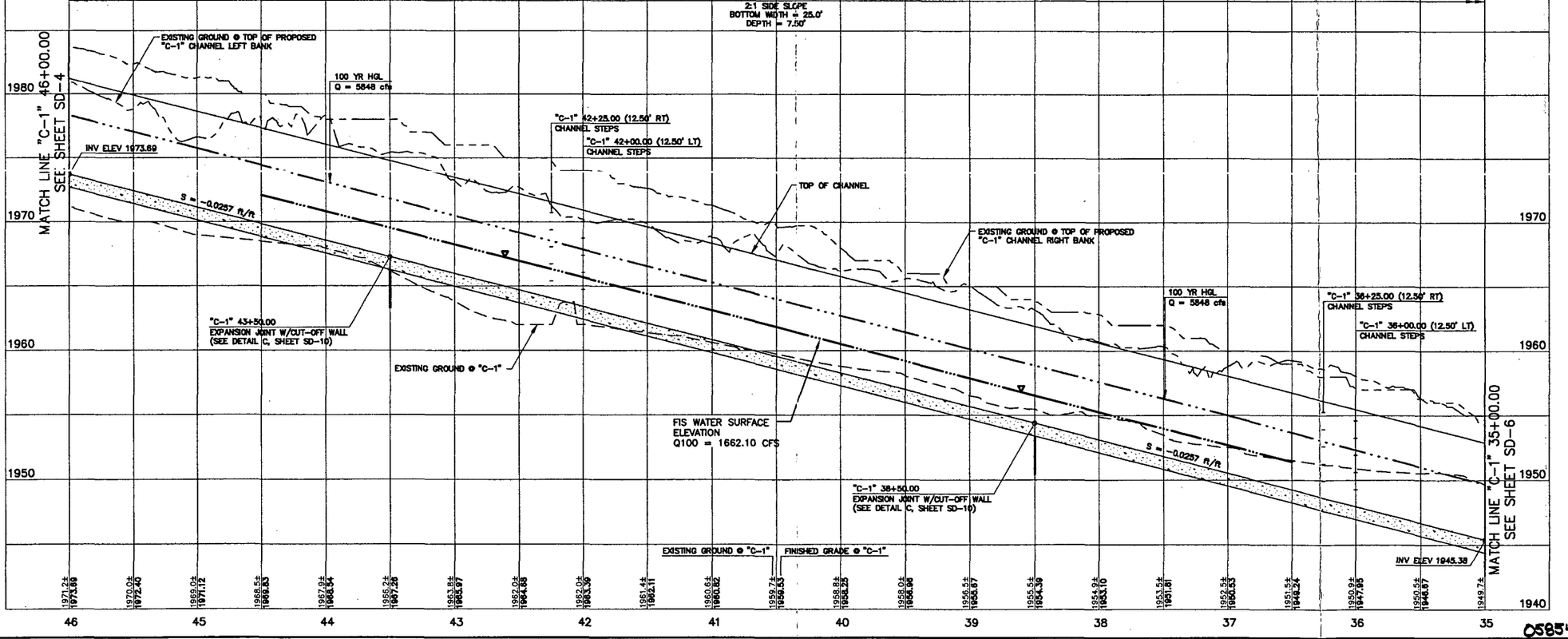
⑥	"C-1" 35+00.00 TO "C-1" 37+50.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.			
⑦	"C-1" 35+00.00 TO "C-1" 48+00.00	CONSTRUCT TRAPEZOIDAL CONCRETE CHANNEL. (SEE DETAIL B, SHEET SD-12).			

BASIS OF BEARING
N 89°24'41" E BEING THE NORTH LINE OF THE NE 1/4 OF THE NE 1/4 OF SECTION 29, T 22 S, R 63 E, MDM, CITY OF HENDERSON, NEVADA, PER PARCEL MAP ON FILE WITH CLARK COUNTY RECORDER IN FILE 61, PAGE 70.

BENCHMARK
CITY OF HENDERSON BENCHMARK #18, BEING A BOLT AND WASHER IN THE NORTH LEG OF A STEEL TRANSMISSION TOWER #9-4, 0.2 MILES +/- NORTHWEST OF HORIZON DR ON THE WEST SIDE OF HIGHWAY 93.
ELEV = 639.258 METERS (2097.30 FEET) NAVD 88



KEY MAP



LA\839C1-CHANNEL\DRAINAGE\839C1-PHIMASTER.DWG v5 6/23/2001 6:36:02 pm pst arb

REV NO	DATE	DESCRIPTION	APPROVED

THE LOUIS BERGER GROUP, INC
LAS VEGAS, NEVADA

UPPER AND MIDDLE REACHES OF THE C-1 CHANNEL - PHASE 1
GRADING & DRAINAGE PLAN & PROFILE
"C-1" 46+00.00 TO "C-1" 35+00.00
HENDERSON NEVADA, DEPARTMENT OF PUBLIC WORKS

PROJECT NO:	839
DRAWN BY:	ARB
DESIGNED BY:	SRF
CHECKED BY:	SJD
APPROVED BY:	TDL
SCALE	
HORIZ:	1" = 40'
VERT:	1" = 4'

DRAWING NO
SD-5
SHEET 11 OF 34

05854

CONSTRUCTION ITEMS:

①	"C-1" 26+37.35 TO "C-1" 35+00.00	CONSTRUCT TRAPEZOIDAL CONCRETE CHANNEL. (SEE DETAIL B, SHEET SD-12).
②	"C-1" 28+37.35	CONSTRUCT 6' WIDE, 6' HIGH SINGLE-SWING CHAIN LINK ACCESS GATE, CONNECT TO EXISTING FENCE, PER CCASD NO 253.
③	"C-1" 28+37.35 TO "C-1" 35+00.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.
④	"C-1" 28+37.35 TO "C-1" 35+00.00	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252. CONNECT TO EXISTING FENCE.
⑤	"C-1" 28+37.35	CONSTRUCT 14' WIDE, 6' HIGH DOUBLE-SWING CHAIN LINK ACCESS GATE, PER CCASD NO 253.
⑥	"C-1" 30+00.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9).
⑦	"C-1" 29+75.00	CONSTRUCT CHANNEL STEPS. (SEE DETAIL C, SHEET SD-9).
⑧	"C-1" 30+35.00 TO "C-1" 30+75.00	CONSTRUCT AC PAVEMENT DIP SECTION. (SEE SHEET SD-18).
⑨	"C-1" 19+07.33 TO "C-1" 34+05.08	CONSTRUCT 8" X 1480' PVC SANITARY SEWER. (SEE SHEETS U-4 & U-5).
⑩	"C-1" 28+27.35 TO "C-1" 28+70.00	CONSTRUCT CHANNEL INVERT TRANSITION. (SEE SHEET SD-18).
⑪	"C-1" 28+37.35	CONSTRUCT 6' HIGH CHAIN LINK FENCE, PER CCASD NO 252.

NOTES:

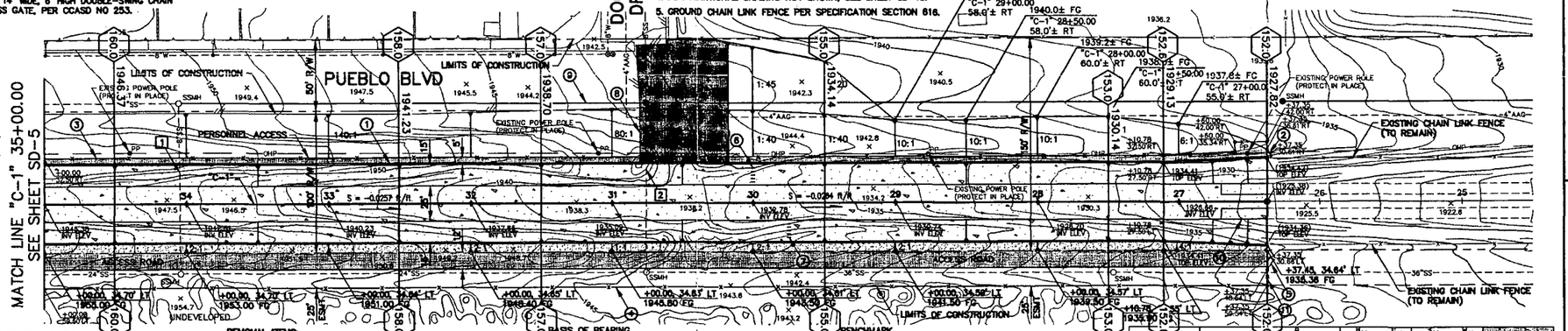
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4. FOR ADDITIONAL GRADING NOT SHOWN, SEE SHEET SD-18.
5. GROUND CHAIN LINK FENCE PER SPECIFICATION SECTION 618.

SAFETY ALERT

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HORIZONTAL: 1" = 40'

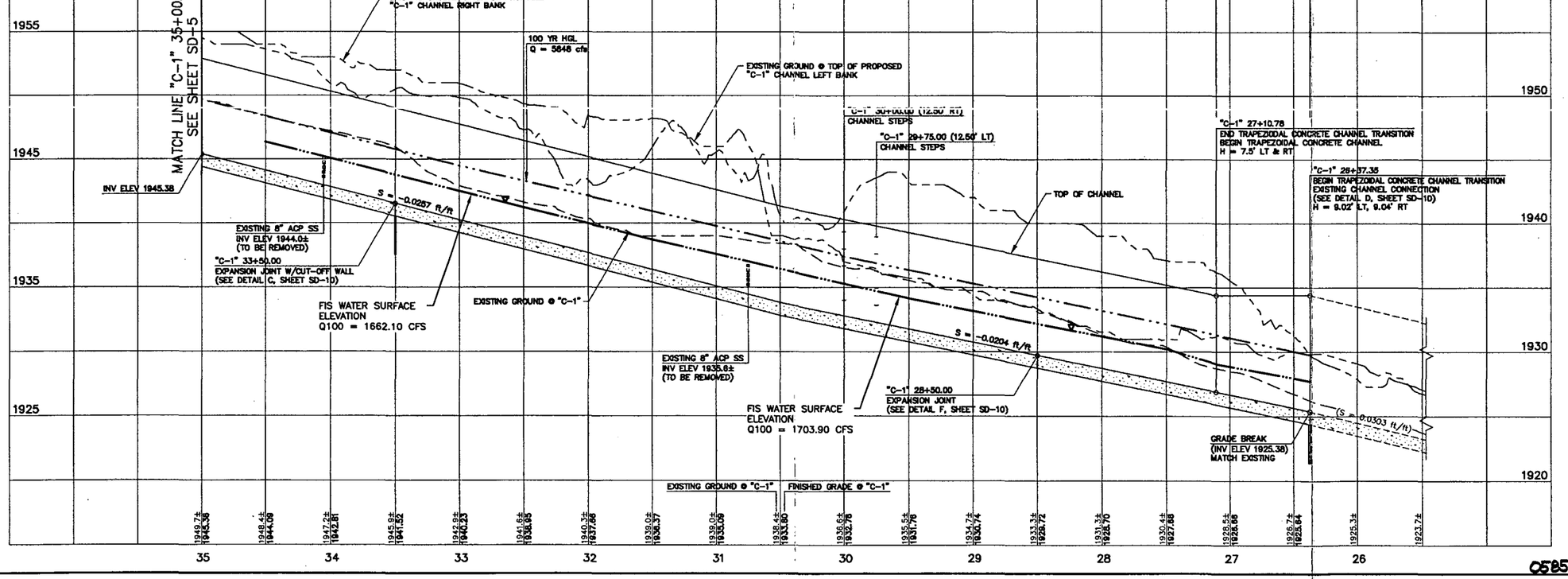


REMOVAL ITEMS:

1	"C-1" 34+04.0±	REMOVE 8" ACP SANITARY SEWER. (SEE SHEET U-4).
2	"C-1" 30+75.0±	REMOVE 8" ACP SANITARY SEWER. (SEE SHEET U-4).

BASIS OF BEARING
N 89°24'41" E, BEING THE NORTH LINE OF THE NE 1/4 OF THE NE 1/4 OF SECTION 29, T 22 S, R 63 E, MDM, CITY OF HENDERSON, NEVADA, PER PARCEL MAP ON FILE WITH CLARK COUNTY RECORDER IN FILE 61, PAGE 70.

BENCHMARK
CITY OF HENDERSON BENCHMARK #18, BEING A BOLT AND WASHER IN THE NORTH LEG OF A STEEL TRANSMISSION TOWER #9-4, 0.2 MILES +/- NORTHWEST OF HORIZON DR ON THE WEST SIDE OF HIGHWAY 93.
ELEV = 639.258 METERS (2097.30 FEET) NAVD 88



UN\839C1-CHANNEL\DRAINAGE\839C1-PHIMASTER.DWG v6 7/3/2001 11:11:35 pm pst orb

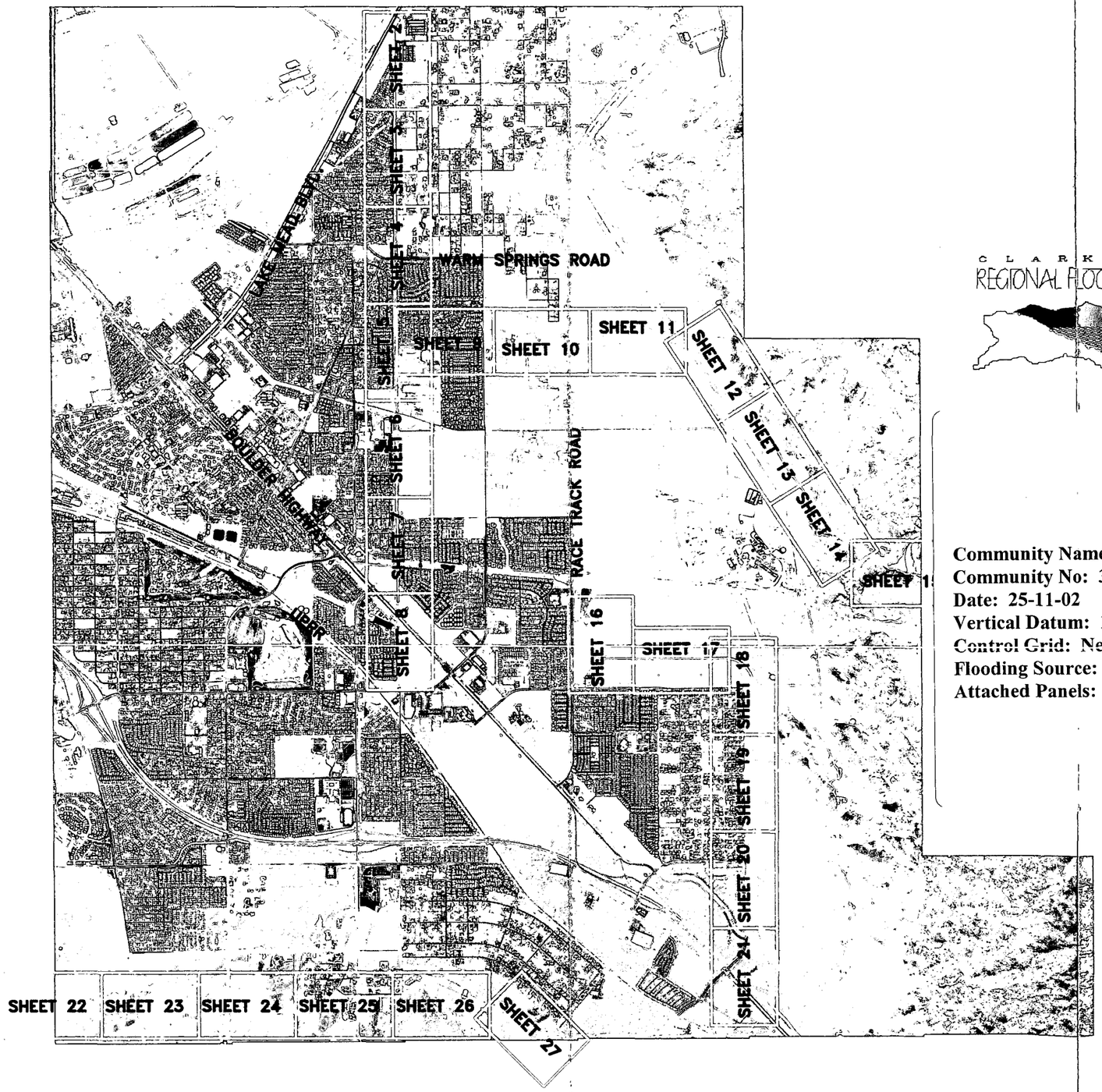
05854

THE LOUIS BERGER GROUP, INC
LAS VEGAS, NEVADA

REV NO	DATE	DESCRIPTION	APPROVED

UPPER AND MIDDLE REACHES OF THE C-1 CHANNEL - PHASE 1
GRADING & DRAINAGE PLAN & PROFILE
"C-1" 35+00.00 TO "C-1" 26+15.39
HENDERSON NEVADA, DEPARTMENT OF PUBLIC WORKS

PROJECT NO:	839
DRAWN BY:	ARB
DESIGNED BY:	SRF
CHECKED BY:	SJD
APPROVED BY:	TDL
SCALE	
HORIZ:	1" = 40'
VERT:	1" = 4'
DRAWING NO	SD-6
SHEET 12 OF 34	



CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

Community Name: Henderson, Nevada
Community No: 320005
Date: 25-11-02
Vertical Datum: 1988 NAVD
Control Grid: Nevada State Plane, East Zone
Flooding Source: Henderson Basin
Attached Panels: 2955E, 2605E, 2615E, 2620E

AERIAL PHOTOGRAPHY DATE: FALL 2001
FIELD REVIEW PHOTOGRAPHY DATE: FEB 2002

REVISIONS

No.	Date	CHKD	APPD

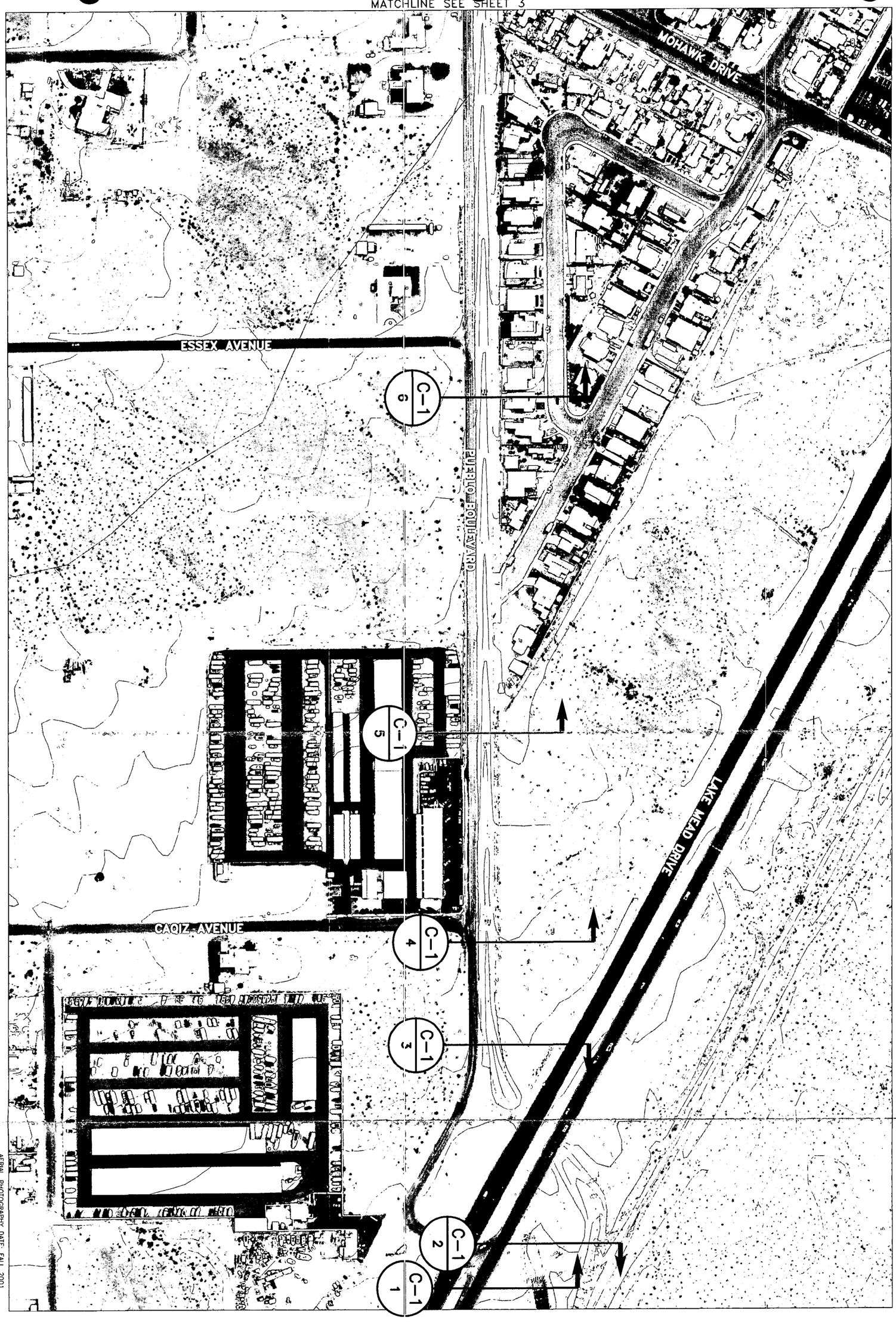
DESIGNED: DB
DRAWN: SCC
CHECKED: DB
JOB No: 240482
HORIZ: 1"=400'
VERT: NONE
DATE: 02/05/02

Carter Burgess
Consultants in Planning, Engineering,
Construction Management, and Related Services
8155 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: FIELD REVIEW

SHEET 1 OF 27



AERIAL PHOTOGRAPHY DATE: FALL 2001
FIELD REVIEW PHOTOGRAPHY DATE: FEB 2002

SHEET 2 OF 27

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

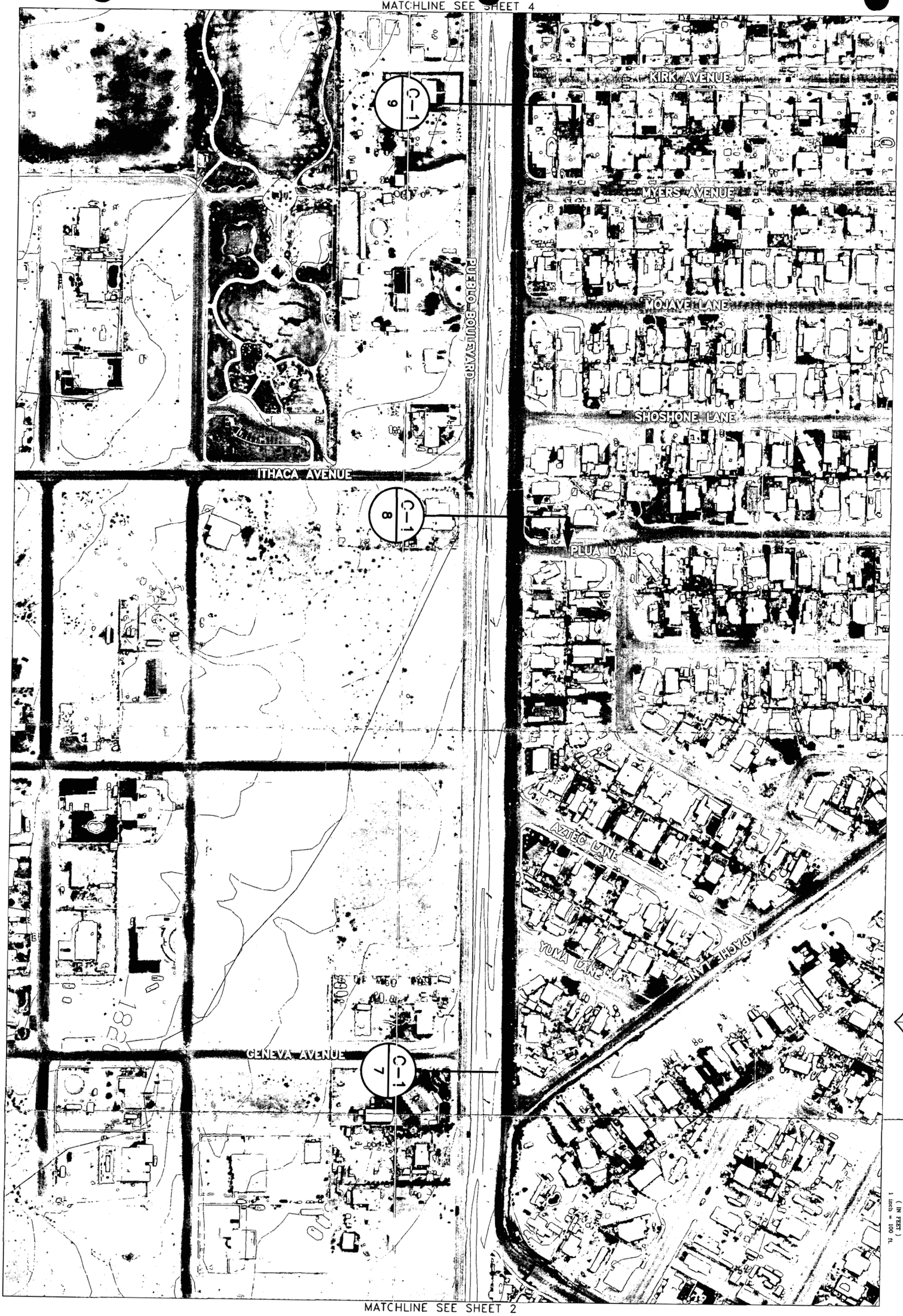
DESCRIPTION: FIELD REVIEW

Carter Burgess
Consultants in Planning, Engineering,
Construction Management, and Related Services
6655 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

DESIGNED:	DB
DRAWN:	SCC
CHECKED:	DB
JOB No:	240482
HORIZ:	1"=400'
VERT:	NONE
DATE:	02/05/02

REVISIONS

No.	Date		CHKD	APPD



AERIAL PHOTOGRAPHY DATE: FALL 2001
FIELD REVIEW PHOTOGRAPHY DATE: FEB 2002

SHEET 3 OF 27

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: FIELD REVIEW

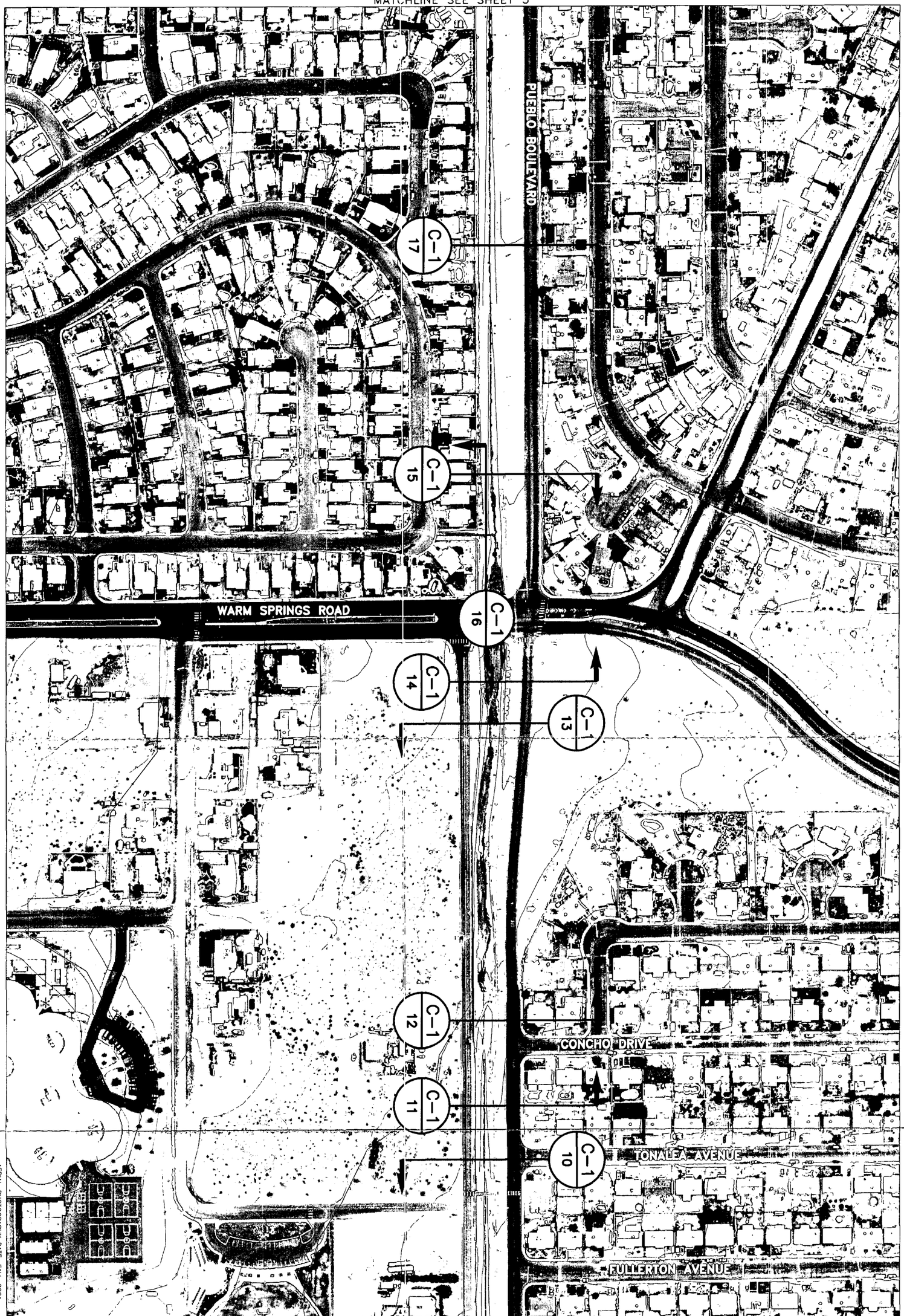
Carter Burgess
Consultants in Planning, Engineering, Construction Management, and Related Services
6855 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

DESIGNED:	DB
DRAWN:	SCC
CHECKED:	DB
JOB No:	240482
HORIZ:	1"=400'
VERT:	NONE
DATE:	02/05/02

REVISIONS

No.	Date		CHKD	APPD

MATCHLINE SEE SHEET 5



MATCHLINE SEE SHEET 3

AERIAL PHOTOGRAPHY DATE: FALL 2001
FIELD REVIEW PHOTOGRAPHY DATE: FEB 2002

SHEET 4 OF 27

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

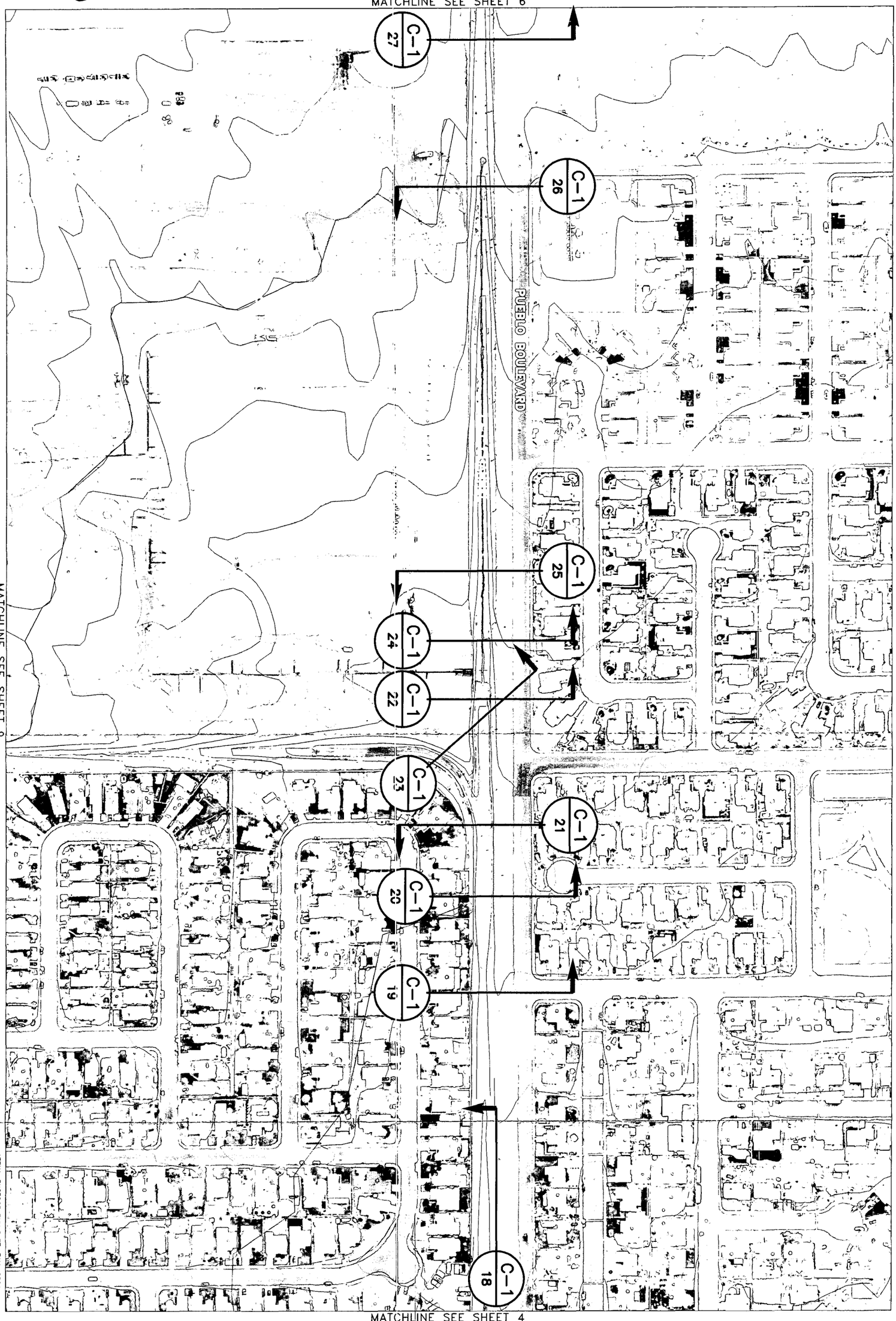
DESCRIPTION: FIELD REVIEW

Carter Burgess
Consultants in Planning, Engineering, Construction Management, and Related Services
6655 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

DESIGNED:	DB
DRAWN:	SCC
CHECKED:	DB
JOB No:	240482
HORIZ:	1"=400'
VERT:	NONE
DATE:	02/05/02

REVISIONS

No.	Date		CHKD	APPD



AERIAL PHOTOGRAPHY DATE: FALL 2001
FIELD REVIEW PHOTOGRAPHY DATE: FEB 2002

SHEET 5 OF 27

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: FIELD REVIEW

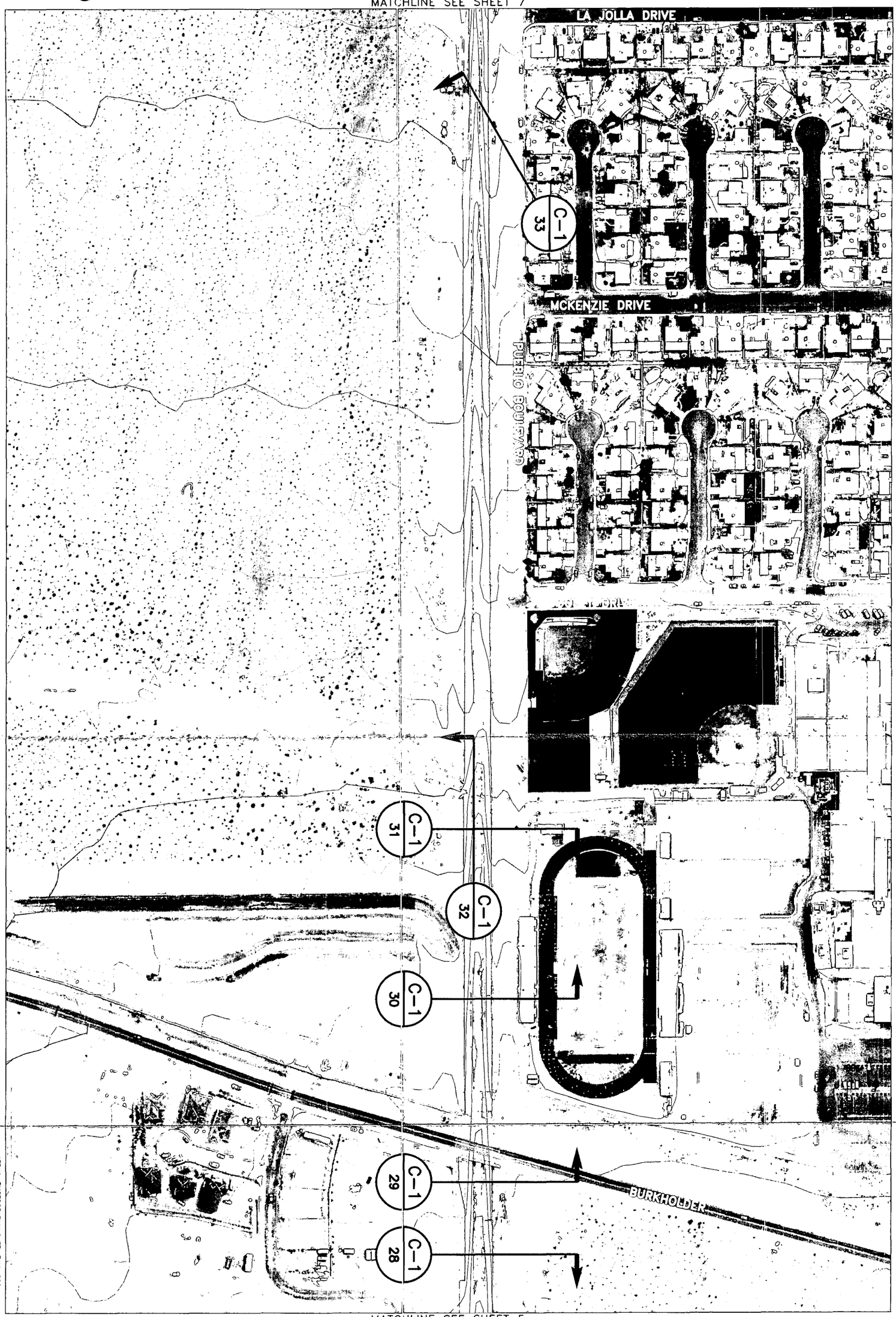
Carter Burgess
Consultants in Planning, Engineering, Construction Management, and Related Services
6355 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

DESIGNED:	DB
DRAWN:	SCC
CHECKED:	DB
JOB No:	240482
HORIZ:	1"=400'
VERT:	NONE
DATE:	02/05/02

REVISIONS

No.	Date		CHKD	APPD

MATCHLINE SEE SHEET 7



MATCHLINE SEE SHEET 5

AERIAL PHOTOGRAPHY DATE: FALL 2001
FIELD REVIEW PHOTOGRAPHY DATE: FEB 2002

GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.

SHEET 6 OF 14	PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY	Carter Burgess Consultants in Planning, Engineering, Construction Management, and Related Services 6855 Bermuda Road Las Vegas, Nevada 89119 (702) 938-5400 Fax (702) 938-5454	DESIGNED: DB DRAWN: SCC CHECKED: DB JOB No: 240482 HORIZ: 1"=400' VERT: NONE DATE: 02/05/02	REVISIONS No. / Date / CHKD / APPD
	DESCRIPTION: FIELD REVIEW			

GRAPHIC SCALE

(IN FEET)
1 inch = 100 ft.

100 0 50 100 200 400

Carter Burgess

CONCORD WAY

WOODBRIDGE

NEWPORT

PUEBLO BOULEVARD

C-1 / 40

C-1 / 42

C-1 / 41

C-1 / 39

C-1 / 38

C-1 / 37

C-1 / 36

C-1 / 35

C-1 / 34

MATCHLINE SEE SHEET 8

MATCHLINE SEE SHEET 6

AERIAL PHOTOGRAPHY DATE: FALL 2001
FIELD REVIEW PHOTOGRAPHY DATE: FEB 2002

REVISIONS

No.	Date	CHKD	APPD

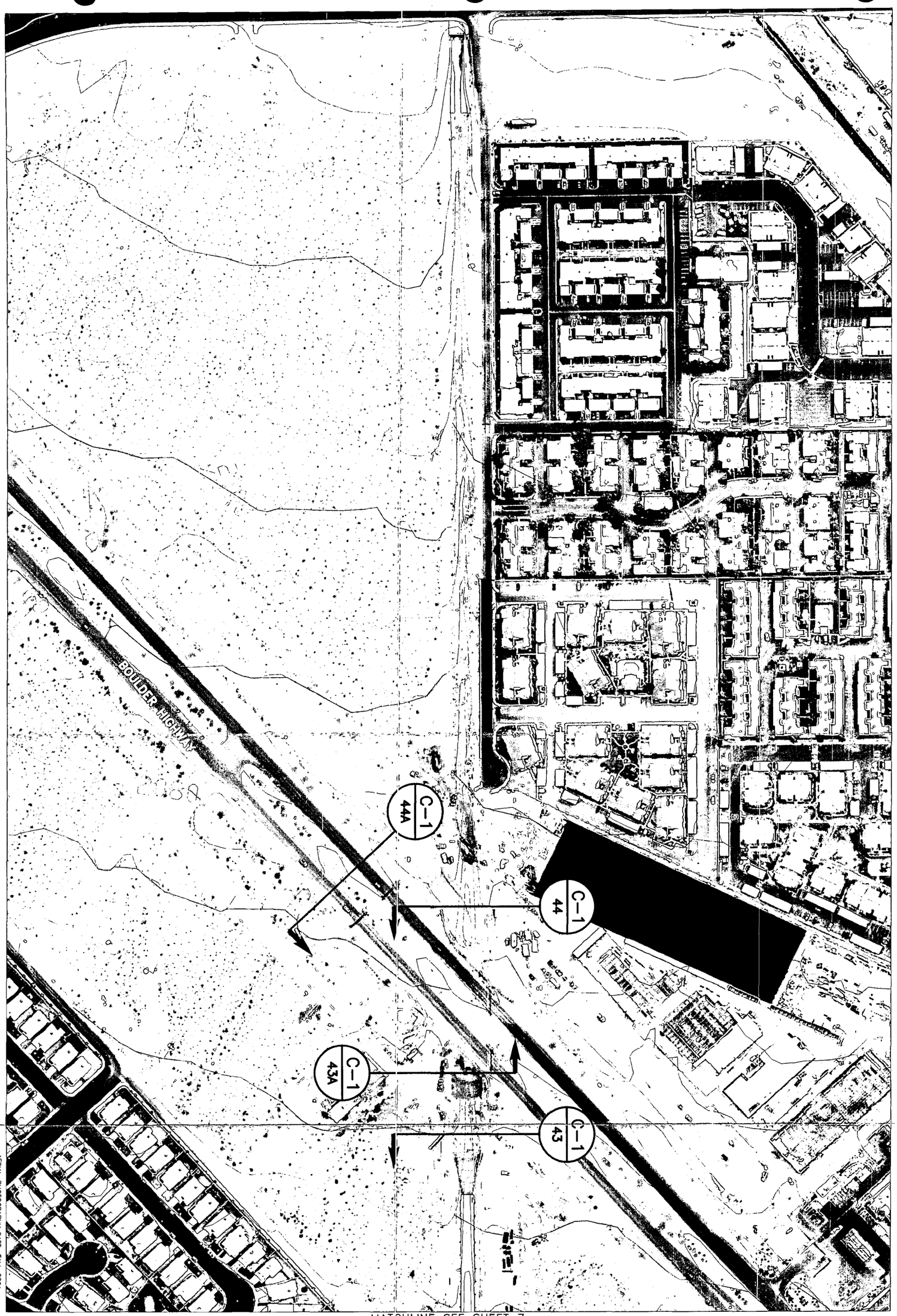
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DRAWN: SCC
CHECKED: DB
JOB No: 240482
HORIZ: 1"=400'
VERT: NONE
DATE: 02/05/02

Carter Burgess
Consultants in Planning, Engineering,
Construction Management, and Related Services
6815 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: FIELD REVIEW

SHEET 7



MATCHLINE SEE SHEET 7

Carter Burgess N

GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.
100 0 50 100 200 400

AERIAL PHOTOGRAPHY DATE: FALL 2001
FIELD REVIEW PHOTOGRAPHY DATE: FEB 2002

SHEET 8 OF 27

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: FIELD REVIEW

Carter Burgess
Consultants in Planning, Engineering,
Construction Management, and Related Services
6655 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

DESIGNED:	DB
DRAWN:	SCC
CHECKED:	DB
JOB No:	240482
HORIZ:	1"=400'
VERT:	NONE
DATE:	02/05/02

REVISIONS

No.	Date		CHKD	APPD

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch = 100 ft.

MATCHLINE SEE SHEET 5

MATCHLINE SEE SHEET 5

MATCHLINE SEE SHEET 10

DR 1
DR 2
DR 3
DR 4
DR 5
DR 6
DR 7
DR 8
DR 9
DR 10
DR 11
DR 12
DR 13

MATCHLINE SEE SHEET 5

AERIAL PHOTOGRAPHY DATE: FALL 2001
FIELD REVIEW PHOTOGRAPHY DATE: FEB 2002

REVISIONS			
No.	Date	CHKD	APPD

DESIGNED:	DB
DRAWN:	SVC
CHECKED:	DB
JOB No:	240482
HORIZ:	1"=400'
VERT:	NONE
DATE:	02/05/02

Carter Burgess
Consultants in Planning, Engineering,
Construction Management, and Related Services
6610 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

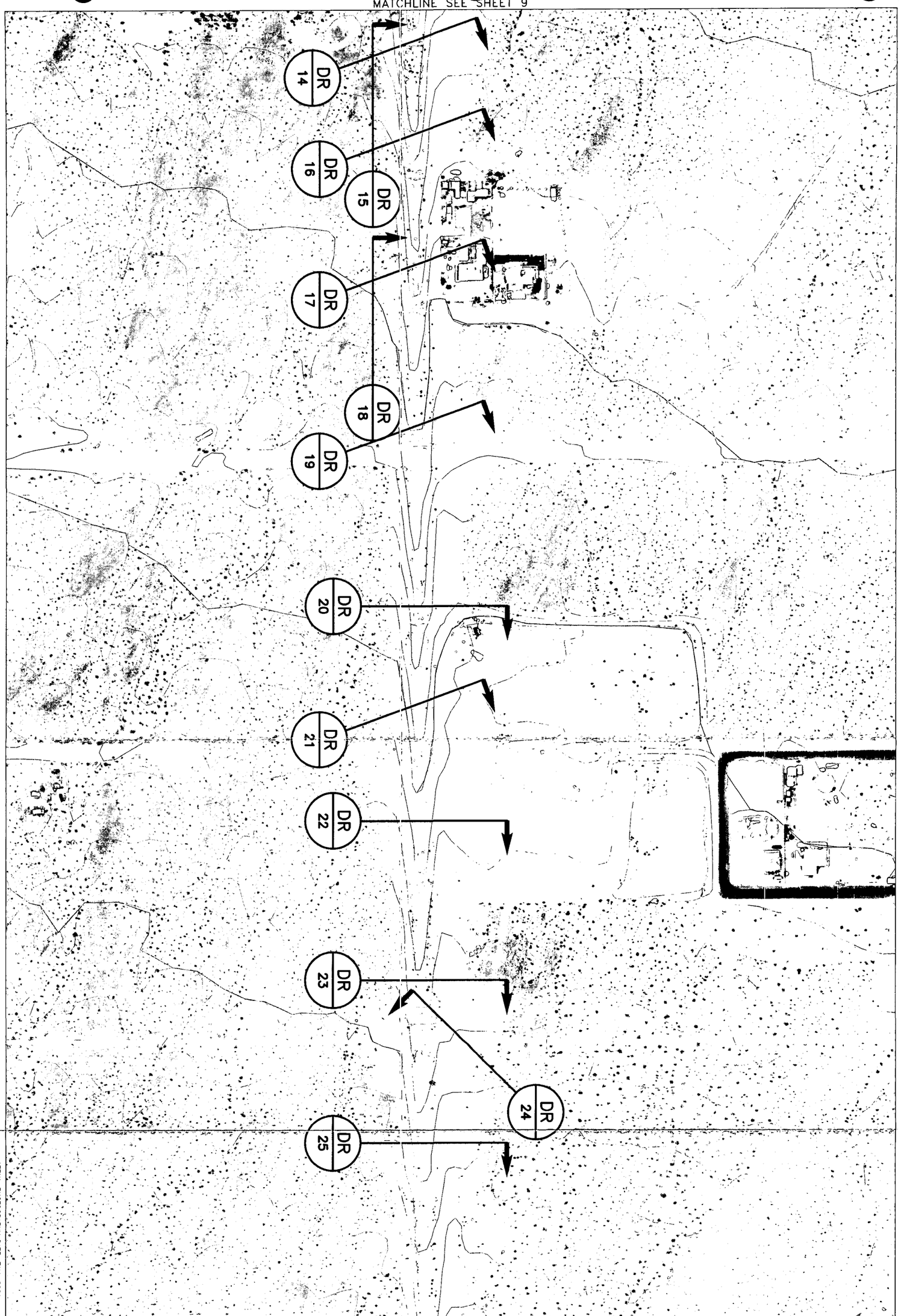
PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: FIELD REVIEW

SHEET 9

9 OF 27

MATCHLINE SEE SHEET 9



MATCHLINE SEE SHEET 12

GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.

AERIAL PHOTOGRAPHY DATE: FALL 2001
FIELD REVIEW PHOTOGRAPHY DATE: FEB 2002

Carter Burgess

SHEET 10 OF 27

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: FIELD REVIEW

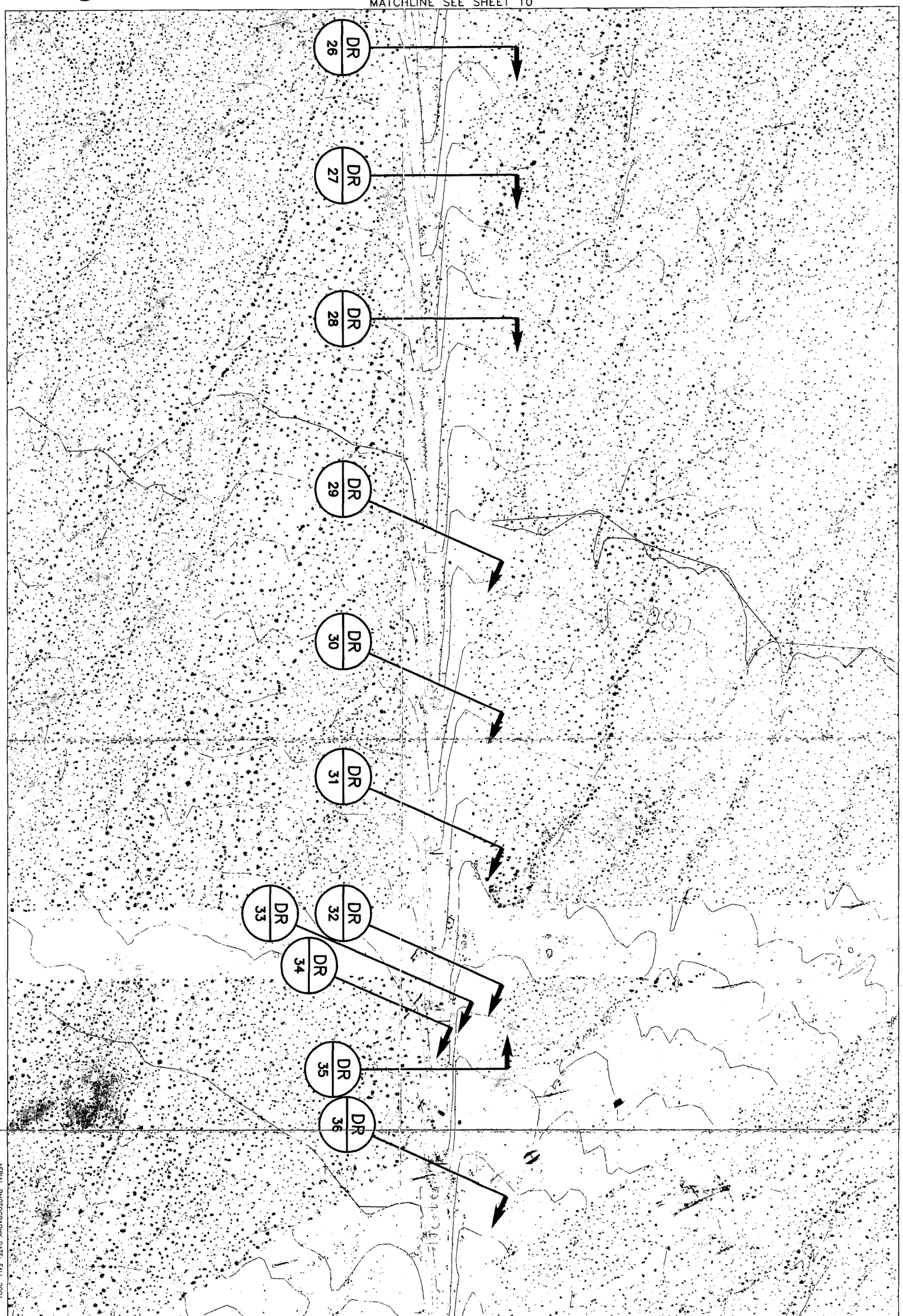
Carter Burgess
Consultants in Planning, Engineering, Construction Management, and Related Services
6655 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

DESIGNED:	DB
DRAWN:	SCC
CHECKED:	DB
JOB No:	240482
HORIZ:	1"=400'
VERT:	NONE
DATE:	02/05/02

REVISIONS

No.	Date		CHKD	APPD

MATCHLINE SEE SHEET 10



MATCHLINE SEE SHEET 12

GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.
100 0 50 100 200 400

AERIAL PHOTOGRAPHY DATE: FALL 2001
FIELD REVIEW PHOTOGRAPHY DATE: FEB 2002

Carter Burgess

SHEET 11 OF 27

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: FIELD REVIEW

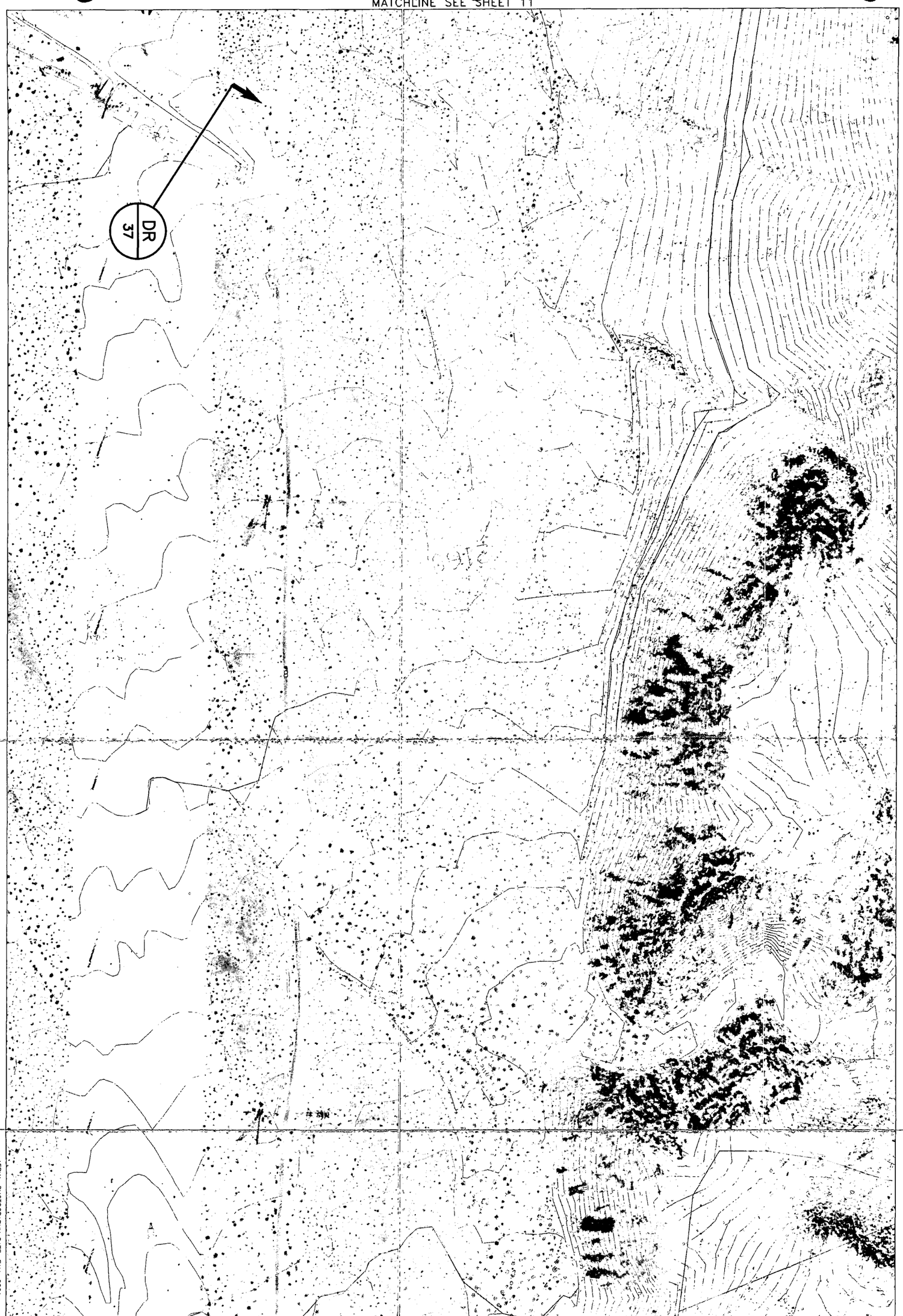
Carter Burgess
Consultants in Planning, Engineering,
Construction Management, and Related Services
6655 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

DESIGNED:	DB
DRAWN:	SCC
CHECKED:	DB
JOB No:	240482
HORIZ:	1"=400'
VERT:	NONE
DATE:	02/05/02

REVISIONS

No.	Date		CHKD	APPD

MATCHLINE SEE SHEET 11



MATCHLINE SEE SHEET 13

GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.

AERIAL PHOTOGRAPHY DATE: FALL 2001
FIELD REVIEW PHOTOGRAPHY DATE: FEB 2002

SHEET 12 OF 27

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: FIELD REVIEW

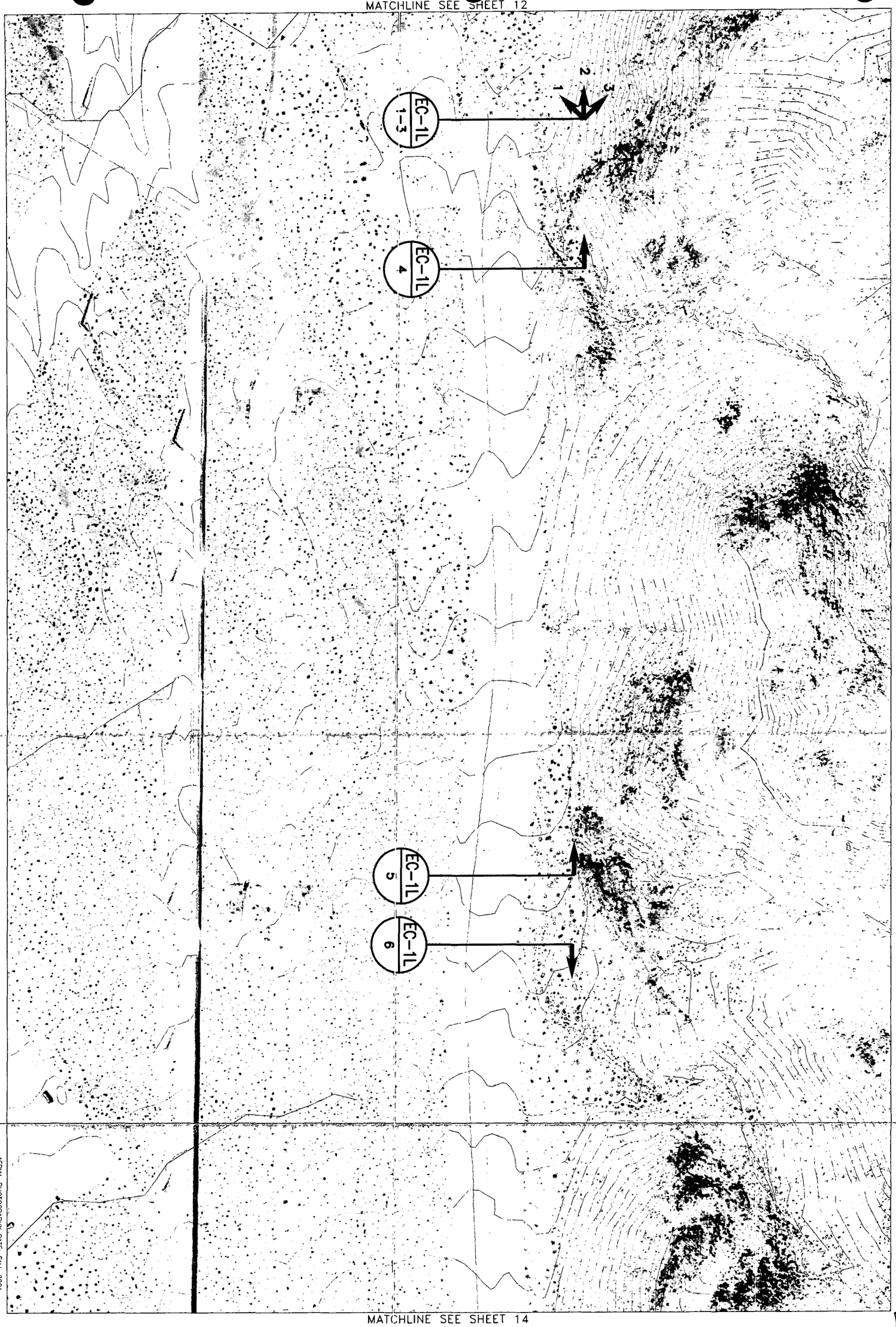
Carter Burgess
Consultants in Planning, Engineering,
Construction Management, and Related Services
6855 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

DESIGNED:	DB
DRAWN:	SCC
CHECKED:	DB
JOB No:	240482
HORIZ:	1"=400'
VERT:	NONE
DATE:	02/05/02

REVISIONS

No.	Date		CHKD	APPD

MATCHLINE SEE SHEET 12



MATCHLINE SEE SHEET 14

GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.
100 0 50 100 200 400

Carter Burgess

AERIAL PHOTOGRAPHY DATE: FALL 2001
FIELD REVIEW PHOTOGRAPHY DATE: FEB 2002

SHEET 13 OF 27

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: FIELD REVIEW

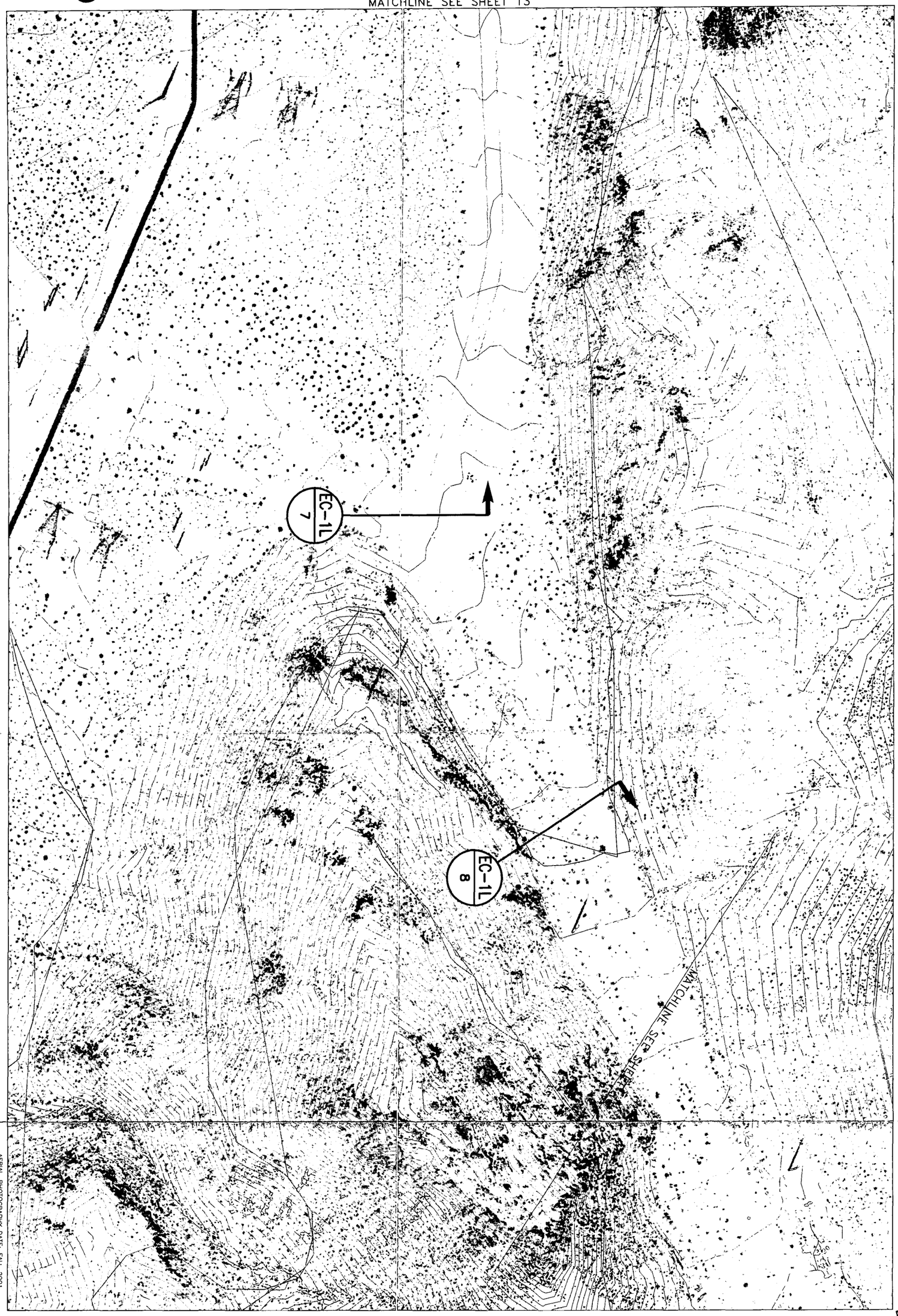
Carter Burgess
Consultants in Planning, Engineering, Construction Management, and Related Services
5655 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

DESIGNED:	DB
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CHECKED:	DB
JOB No:	240482
HORIZ:	1"=400'
VERT:	NONE
DATE:	02/05/02

REVISIONS

No.	Date		CHKD	APPD

MATCHLINE SEE SHEET 13



GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.

AERIAL PHOTOGRAPHY DATE: FALL 2001
FIELD REVIEW PHOTOGRAPHY DATE: FEB 2002

SHEET 14 OF 27

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: FIELD REVIEW

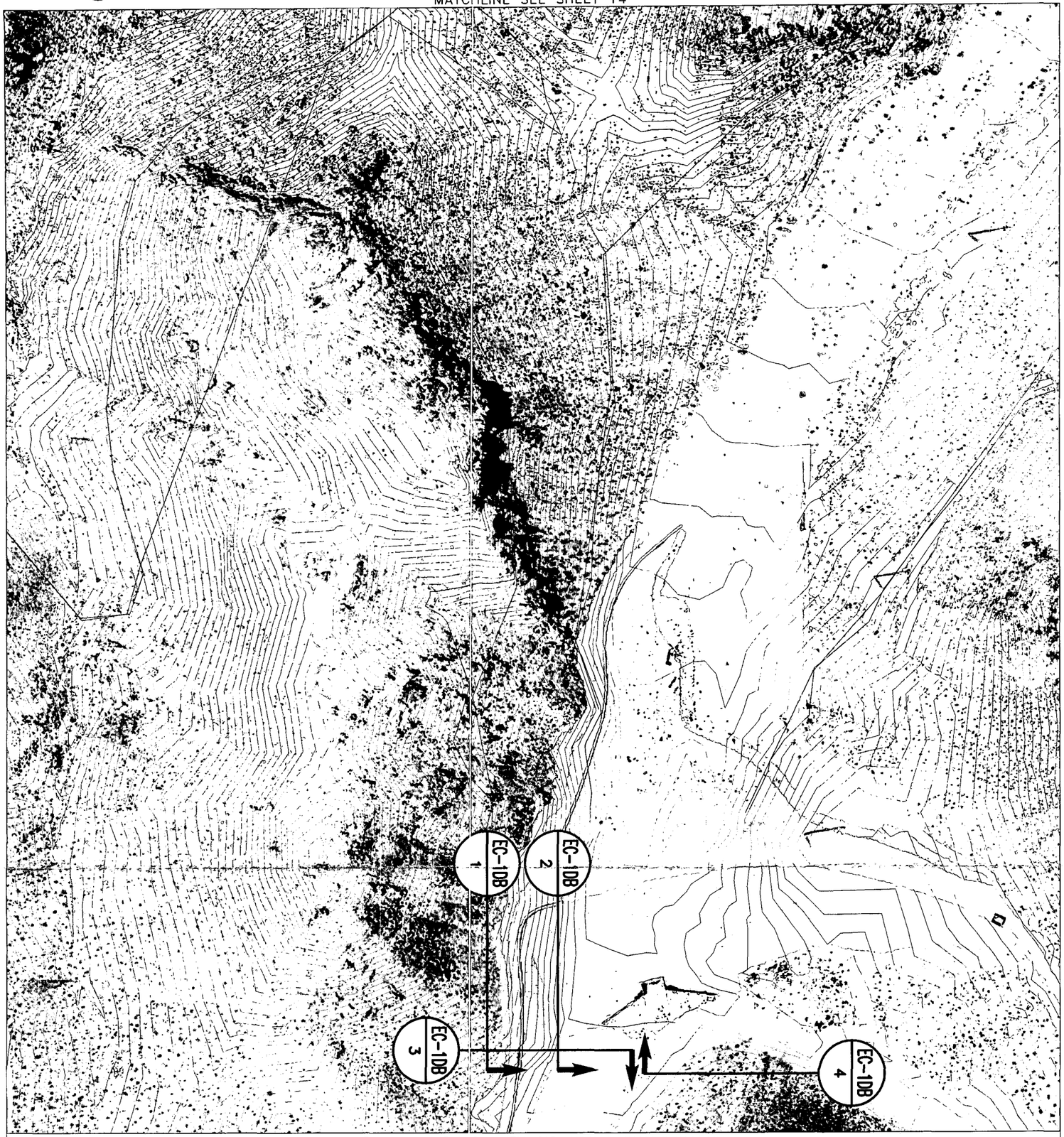
Carter Burgess
Consultants in Planning, Engineering,
Construction Management, and Related Services
6655 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

DESIGNED:	DB
DRAWN:	SCC
CHECKED:	DB
JOB No:	240482
HORIZ:	1"=400'
VERT:	NONE
DATE:	02/05/02

REVISIONS

No.	Date		CHKD	APPD

MATCHLINE SEE SHEET 14



LIMITS OF CLARK COUNTY GIS AERIAL PHOTOGRAPHY.

GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.
100 0 50 100 200 400

AERIAL PHOTOGRAPHY DATE: FALL 2001
FIELD REVIEW PHOTOGRAPHY DATE: FEB 2002

Carter Burgess

SHEET 15 OF 27

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: FIELD REVIEW

Carter Burgess
Consultants in Planning, Engineering,
Construction Management, and Related Services
3655 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

DESIGNED:	DB
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CHECKED:	DB
JOB No:	240482
HORIZ:	1"=400'
VERT:	NONE
DATE:	02/05/02

REVISIONS

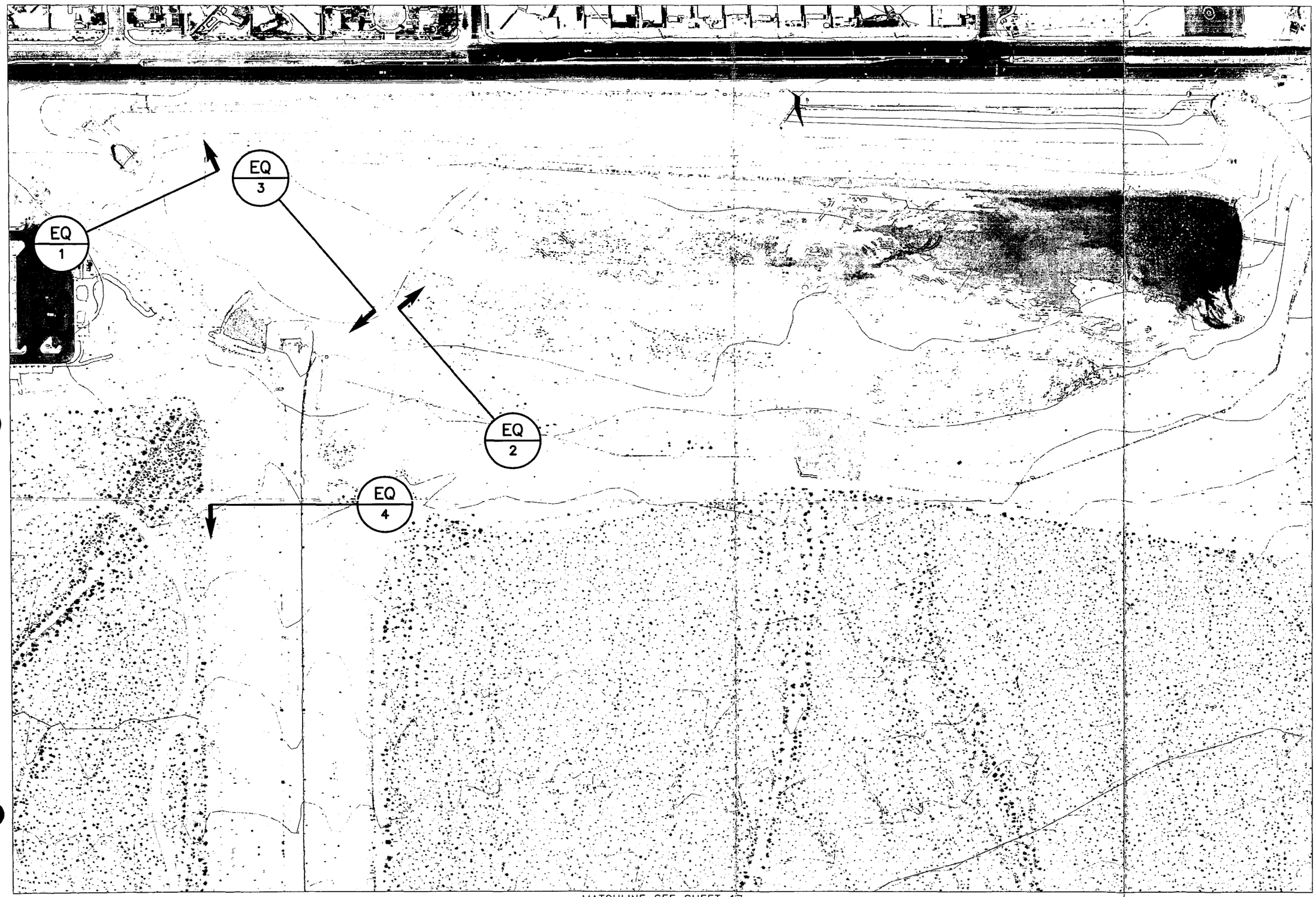
No.	Date		CHKD	APPD

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch = 100 ft.

Carter Burgess



MATCHLINE SEE SHEET 17

AERIAL PHOTOGRAPHY DATE: FALL 2001
FIELD REVIEW PHOTOGRAPHY DATE: FEB 2002

REVISIONS

No.	Date	CHKD	APPD

DESIGNED:	DB
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CHECKED:	DB
JOB No:	240482
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VERT:	NONE
DATE:	02/05/02

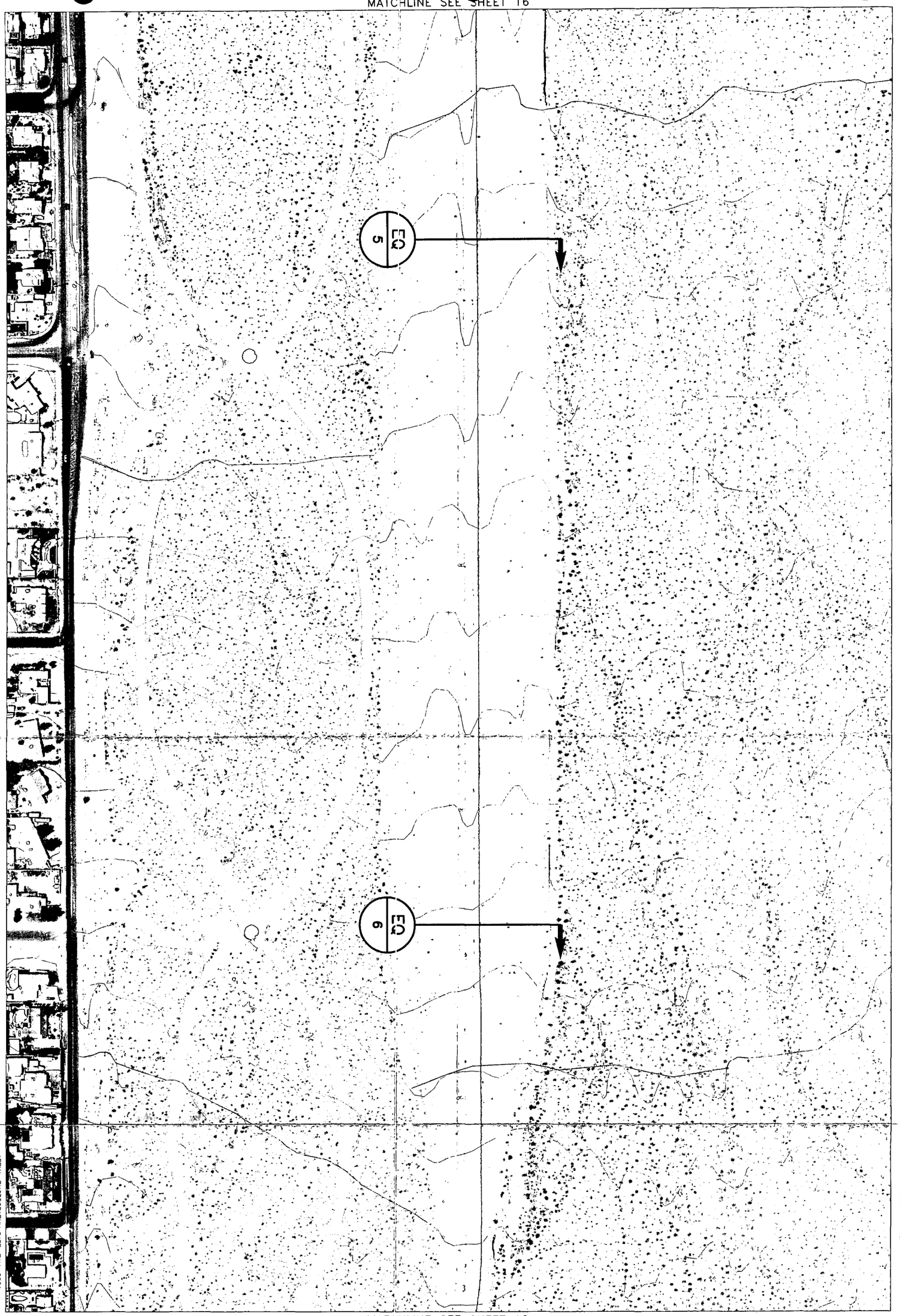
Carter Burgess
Consultants in Planning, Engineering,
Construction Management, and Related Services
9655 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: FIELD REVIEW

SHEET 16

MATCHLINE SEE SHEET 16



MATCHLINE SEE SHEET 18

GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.
100 0 50 100 200 400

AERIAL PHOTOGRAPHY DATE: FALL 2001
FIELD REVIEW PHOTOGRAPHY DATE: FEB 2002

Carter Burgess

SHEET 17 OF 27

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: FIELD REVIEW

Carter Burgess
Consultants in Planning, Engineering,
Construction Management, and Related Services
6655 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

DESIGNED:	DB
DRAWN:	SCC
CHECKED:	DB
JOB No:	240482
HORIZ:	1"=400'
VERT:	NONE
DATE:	02/05/02

REVISIONS

No.	Date		CHKD	APPD

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch = 100 ft.

Carter Burgess

MATCHLINE SEE SHEET 19

MATCHLINE SEE SHEET 17

EQ 9

EQ 8

EQ 11

EQ 10

EQ 7

AERIAL PHOTOGRAPHY DATE: FALL 2001
FIELD REVIEW PHOTOGRAPHY DATE: FEB 2002

REVISIONS

No.	Date	CHKD	APPD

DESIGNED: DB
DRAWN: SCC
CHECKED: DB
JOB No: 240482
HORIZ: 1"=400'
VERT: NONE
DATE: 02/05/02

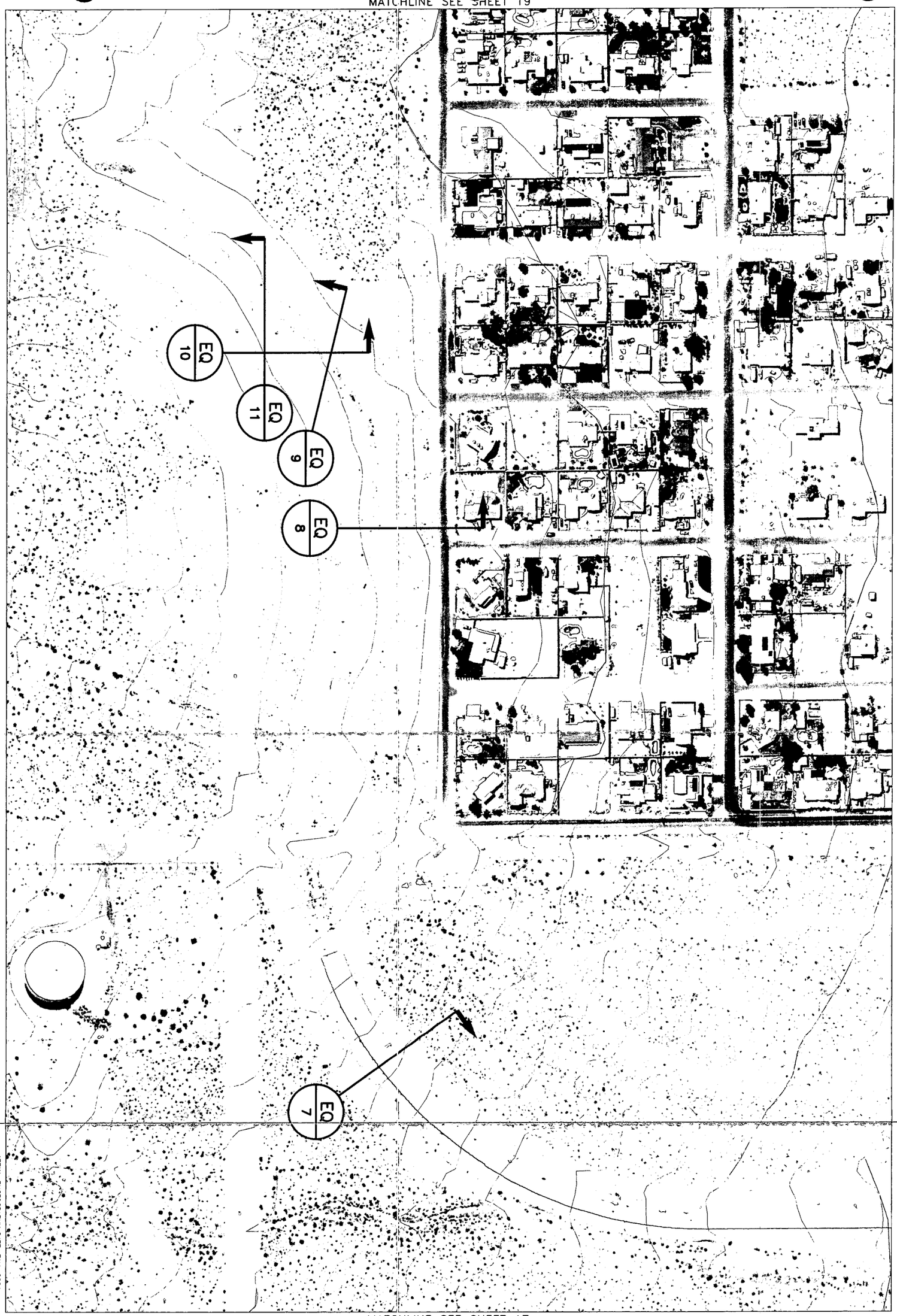
Carter Burgess
Consultants in Planning, Engineering,
Construction Management, and Related Services
6555 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: FIELD REVIEW

SHEET 18

MATCHLINE SEE SHEET 19



MATCHLINE SEE SHEET 17

GRAPHIC SCALE
(IN FEET)
1 inch = 400 ft

AERIAL PHOTOGRAPHY DATE: FALL 2001
FIELD REVIEW PHOTOGRAPHY DATE: FEB 2002

SHEET 18 OF 27

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: FIELD REVIEW

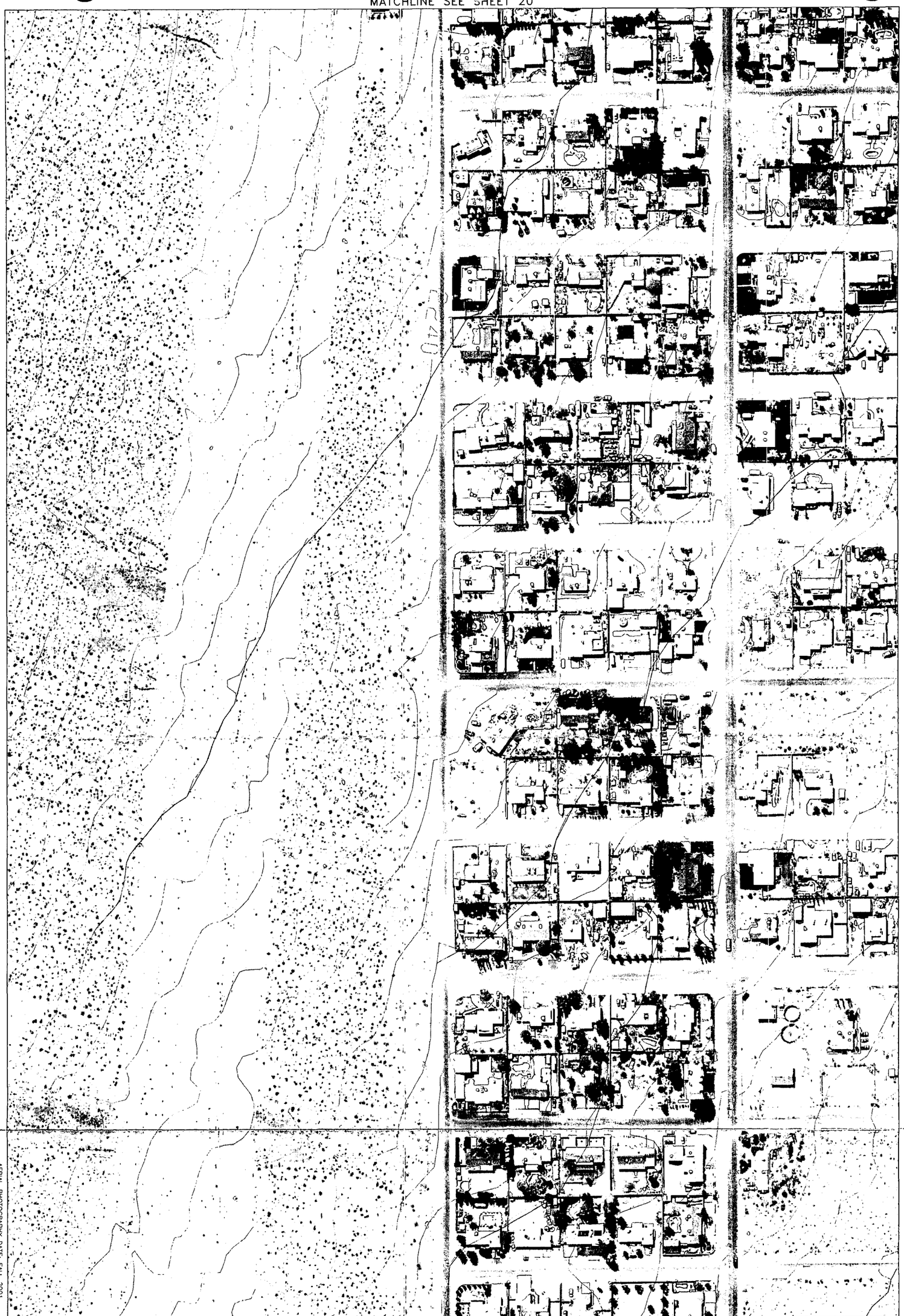
Carter Burgess
Consultants in Planning, Engineering,
Construction Management, and Related Services
6355 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

DESIGNED:	DB
DRAWN:	SCC
CHECKED:	DB
JOB No:	240482
HORIZ:	1"=400'
VERT:	NONE
DATE:	02/05/02

REVISIONS

No.	Date		CHKD	APPD

MATCHLINE SEE SHEET 20



MATCHLINE SEE SHEET 18

GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.
100 0 50 100 200 400

Center Burgess N

AERIAL PHOTOGRAPHY DATE: FALL 2001
FIELD REVIEW PHOTOGRAPHY DATE: FEB 2002

SHEET 19 OF 27

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: FIELD REVIEW

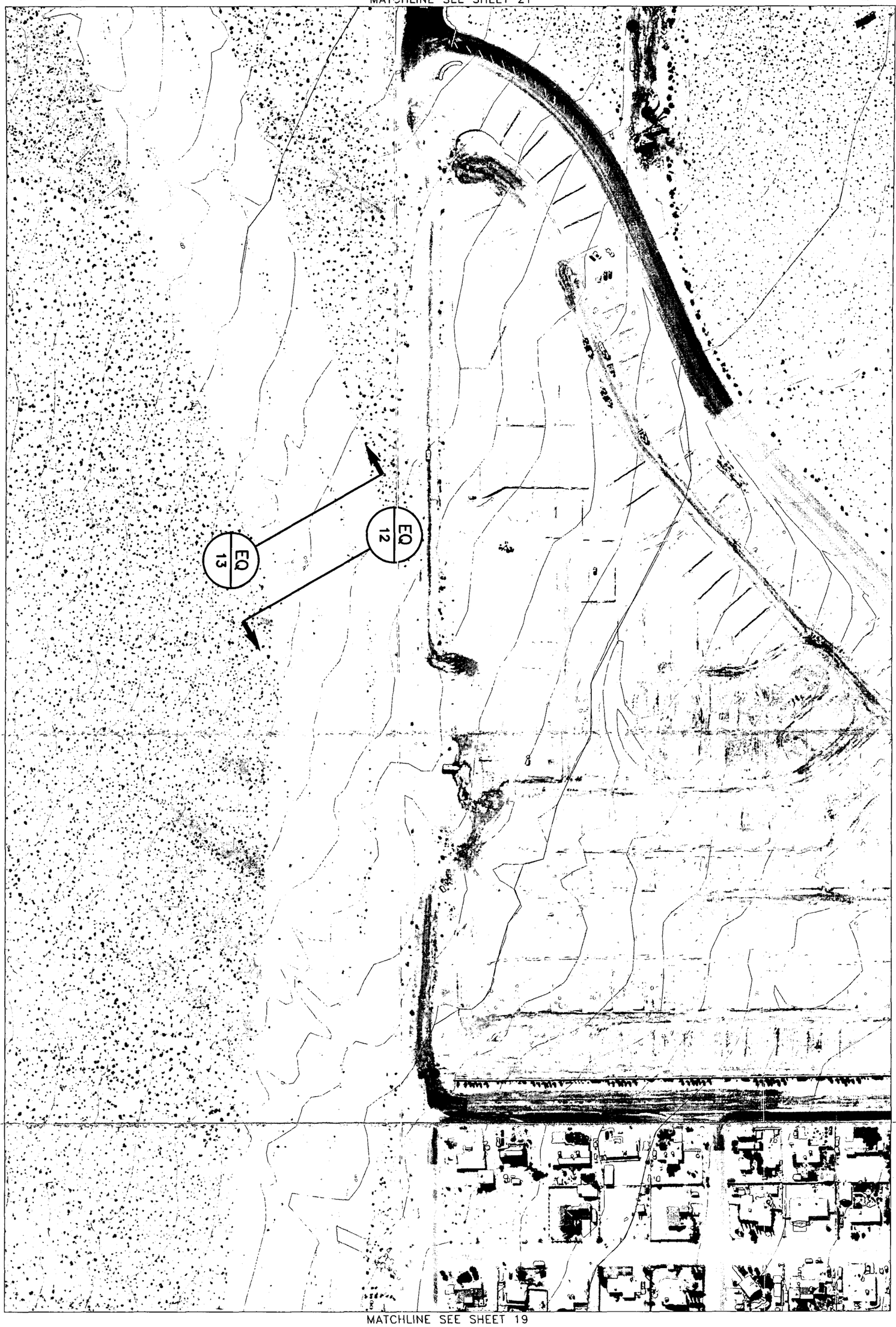
Carter Burgess
Consultants in Planning, Engineering, Construction Management, and Related Services
6655 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

DESIGNED:	DB
DRAWN:	SCC
CHECKED:	DB
JOB No:	240482
HORIZ:	1"=400'
VERT:	NONE
DATE:	02/05/02

REVISIONS

No.	Date		CHKD	APPD

MATCHLINE SEE SHEET 21



MATCHLINE SEE SHEET 19

GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.
100 0 50 100 200 400

AERIAL PHOTOGRAPHY DATE: FALL 2001
FIELD REVIEW PHOTOGRAPHY DATE: FEB 2002

SHEET 20 OF 27

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

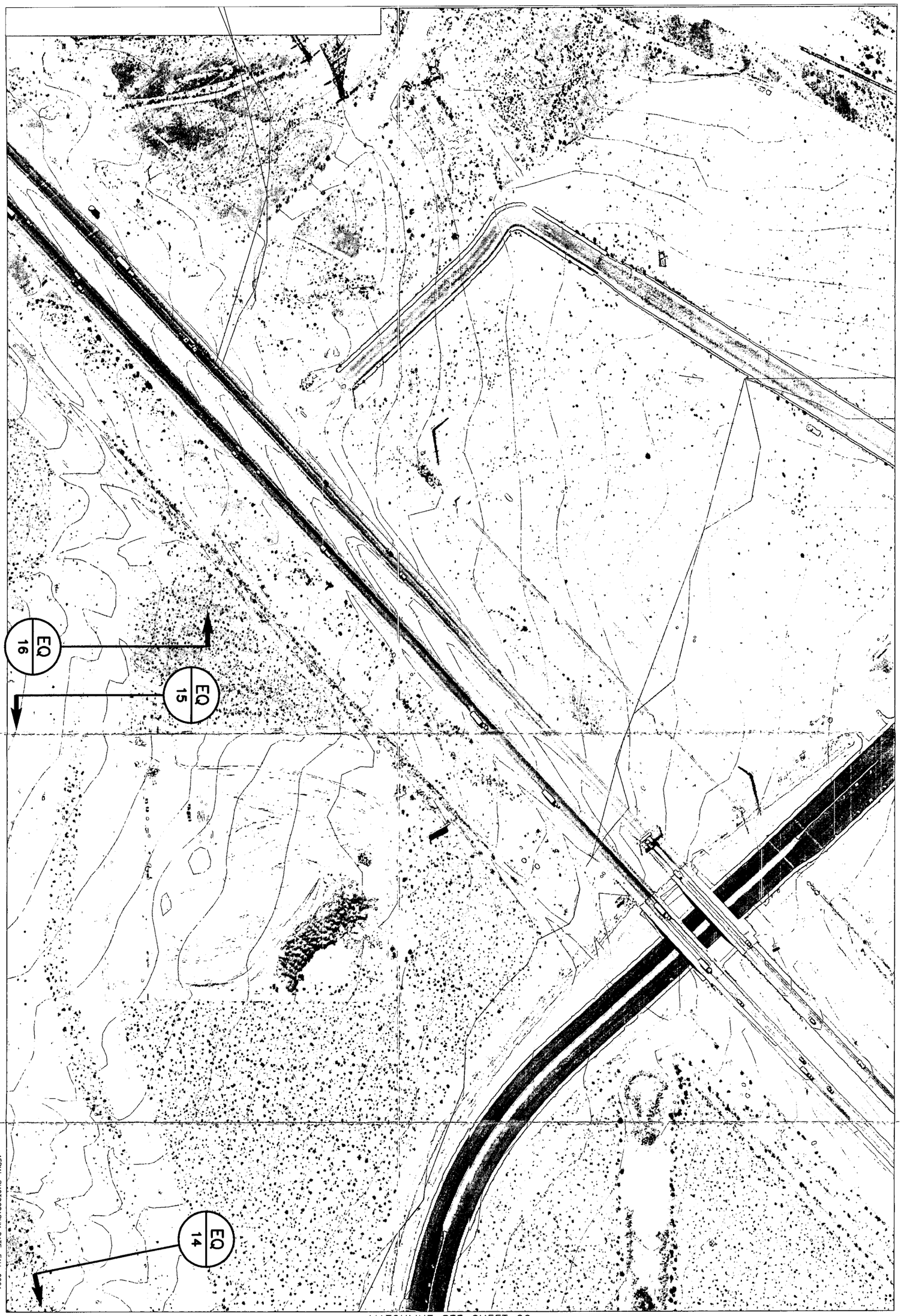
DESCRIPTION: FIELD REVIEW

Carter Burgess
Consultants in Planning, Engineering, Construction Management, and Related Services
6655 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

DESIGNED:	DB
DRAWN:	SCC
CHECKED:	DB
JOB No:	240482
HORIZ:	1"=400'
VERT:	NONE
DATE:	02/05/02

REVISIONS

No.	Date		CHKD	APPD



MATCHLINE SEE SHEET 20

GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft

AERIAL PHOTOGRAPHY DATE: FALL 2001
FIELD REVIEW PHOTOGRAPHY DATE: FEB 2002

SHEET 21 OF 27

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

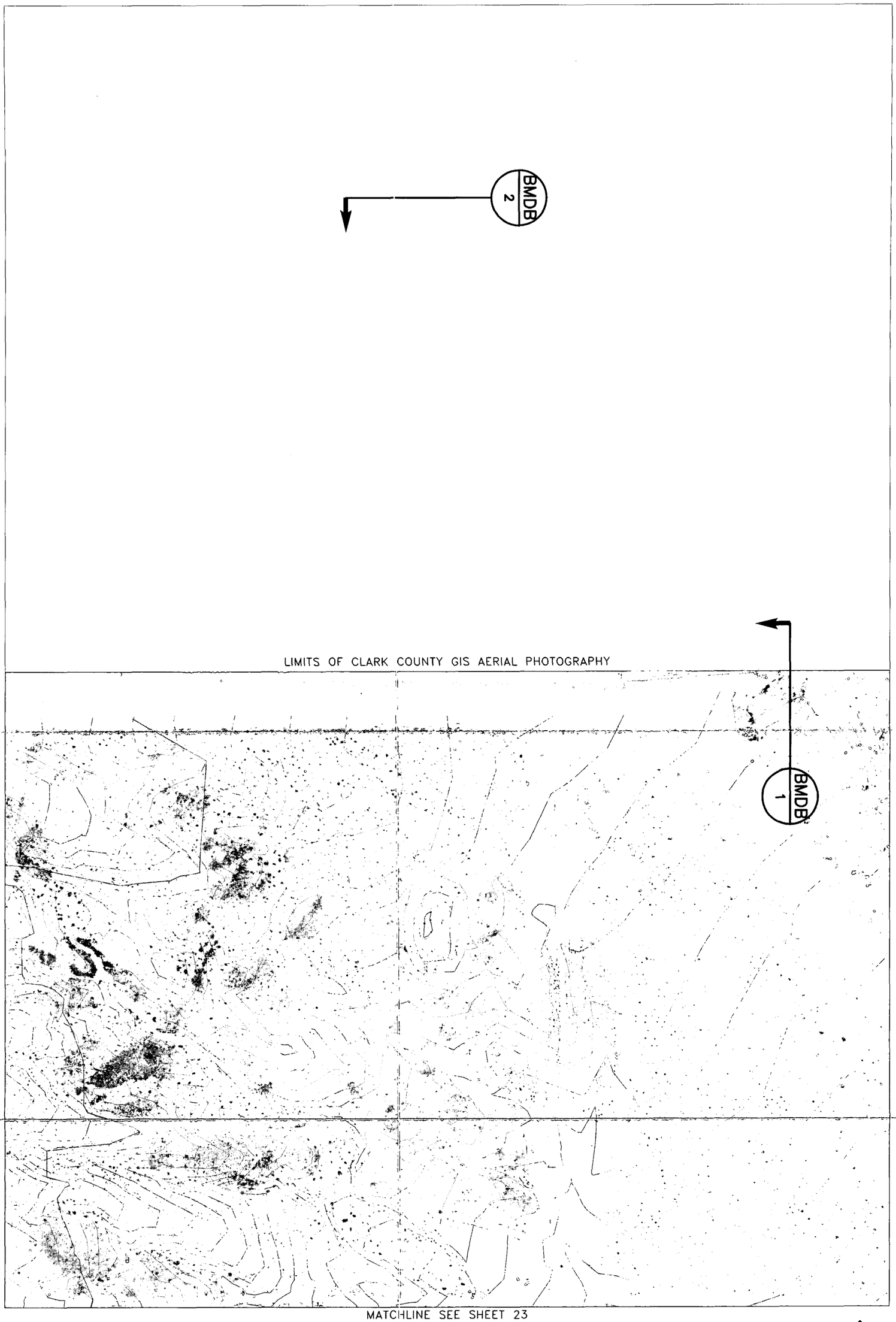
DESCRIPTION: FIELD REVIEW

Carter Burgess
Consultants in Planning, Engineering,
Construction Management, and Related Services
6855 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

DESIGNED:	DB
DRAWN:	SCC
CHECKED:	DB
JOB No:	240482
HORIZ:	1"=400'
VERT:	NONE
DATE:	02/05/02

REVISIONS

No.	Date		CHKD	APPD



GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.

AERIAL PHOTOGRAPHY DATE: FALL 2001
FIELD REVIEW PHOTOGRAPHY DATE: FEB 2002

Carter Burgess

SHEET 22 OF 27

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: FIELD REVIEW

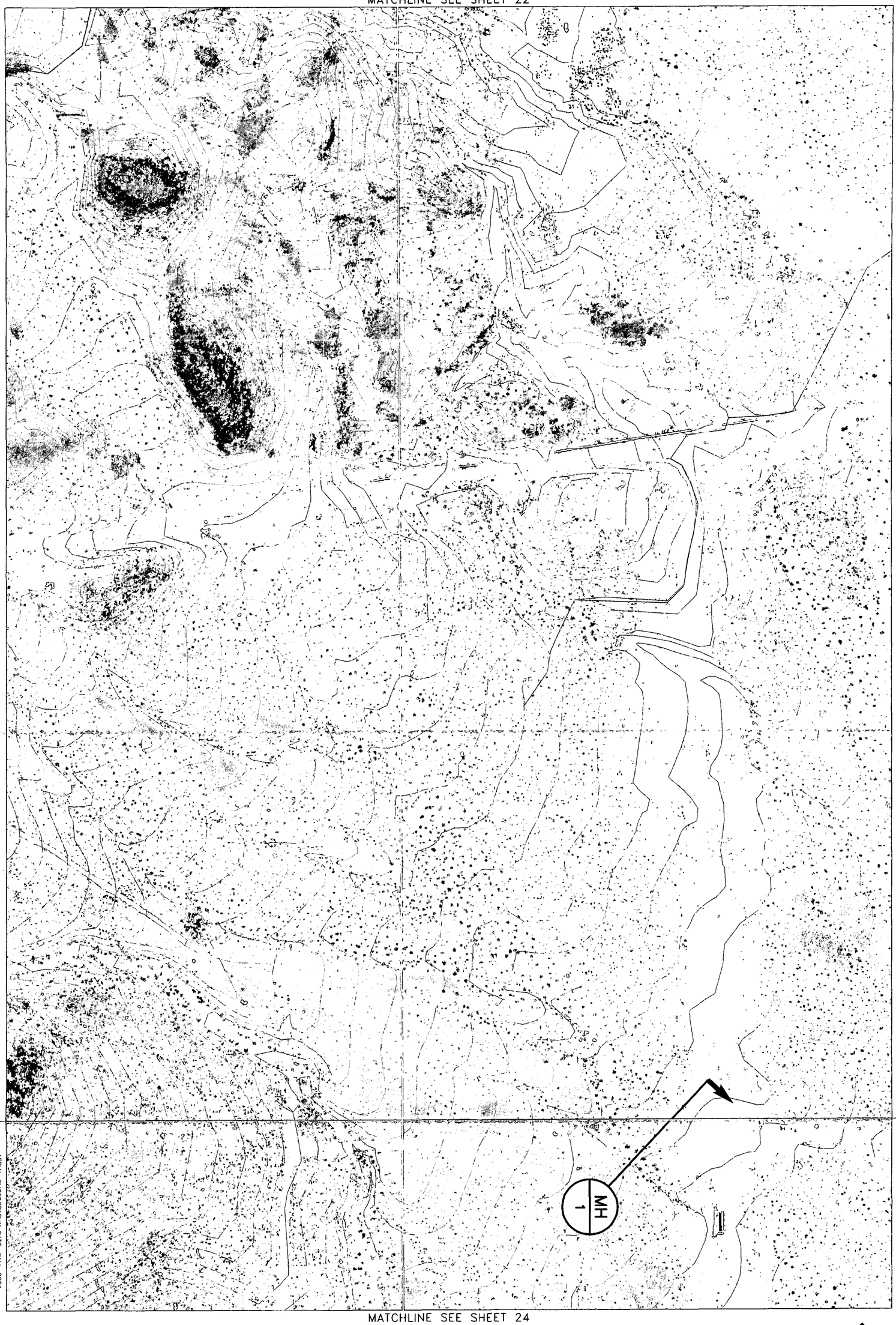
Carter Burgess
Consultants in Planning, Engineering,
Construction Management, and Related Services
6655 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

DESIGNED:	DB
DRAWN:	SCC
CHECKED:	DB
JOB No:	240482
HORIZ:	1"=400'
VERT:	NONE
DATE:	02/05/02

REVISIONS

No.	Date		CHKD	APPD

MATCHLINE SEE SHEET 22



MATCHLINE SEE SHEET 24

GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.
100 0 50 100 200 400

AERIAL PHOTOGRAPHY DATE: FALL 2001
FIELD REVIEW PHOTOGRAPHY DATE: FEB 2002

Carter Burgess

SHEET 23 OF 27

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: FIELD REVIEW

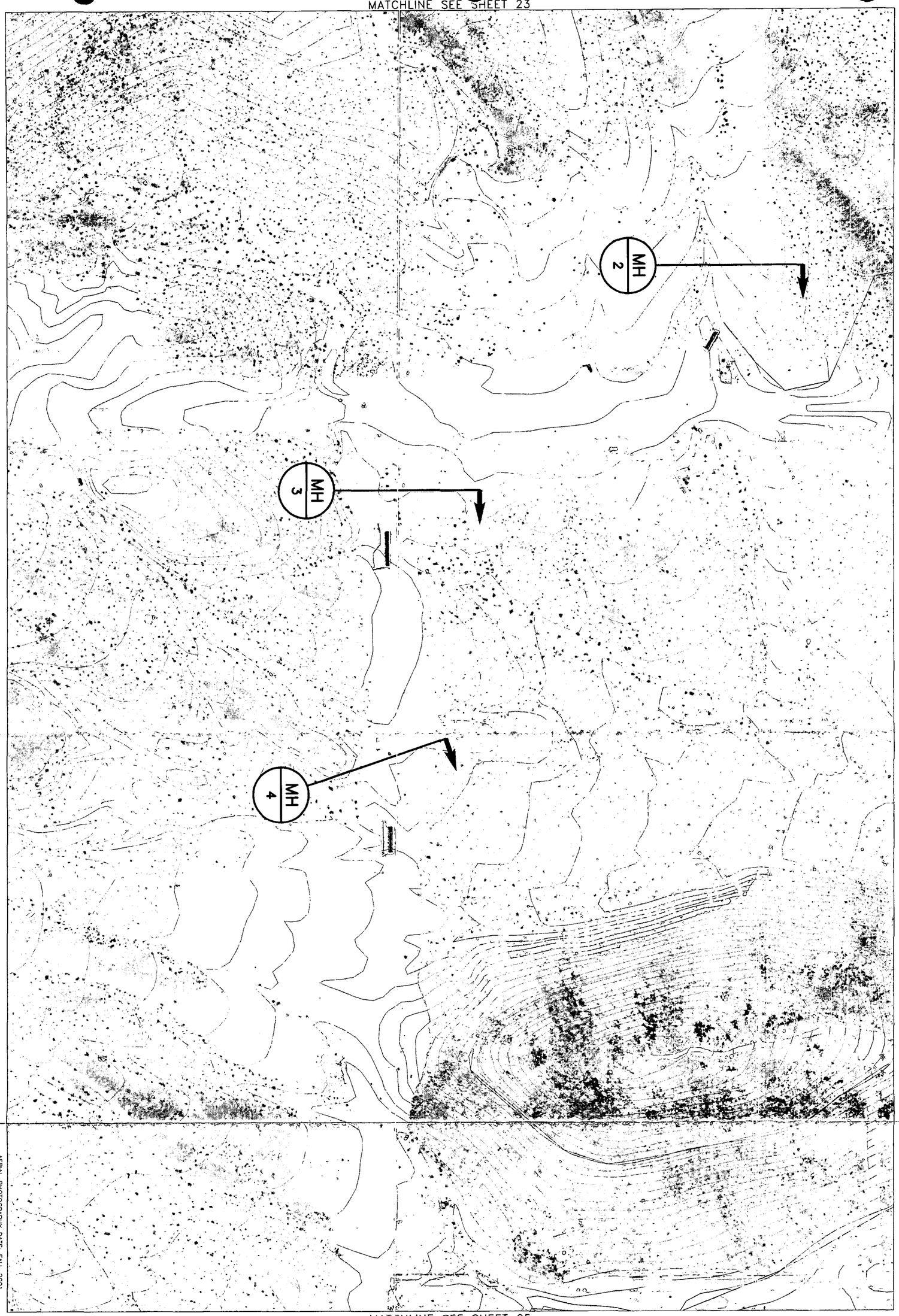
Carter Burgess
Consultants in Planning, Engineering,
Construction Management, and Related Services
6615 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

DESIGNED:	DB
DRAWN:	SCC
CHECKED:	DB
JOB No:	240482
HORIZ:	1"=400'
VERT:	NONE
DATE:	02/05/02

REVISIONS

No.	Date		CHKD	APPD

MATCHLINE SEE SHEET 23



MATCHLINE SEE SHEET 25

GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.
100 0 50 100 200 400

AERIAL PHOTOGRAPHY DATE: FALL 2001
FIELD REVIEW PHOTOGRAPHY DATE: FEB 2002

Carter Burgess

SHEET 24 OF 27

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: FIELD REVIEW

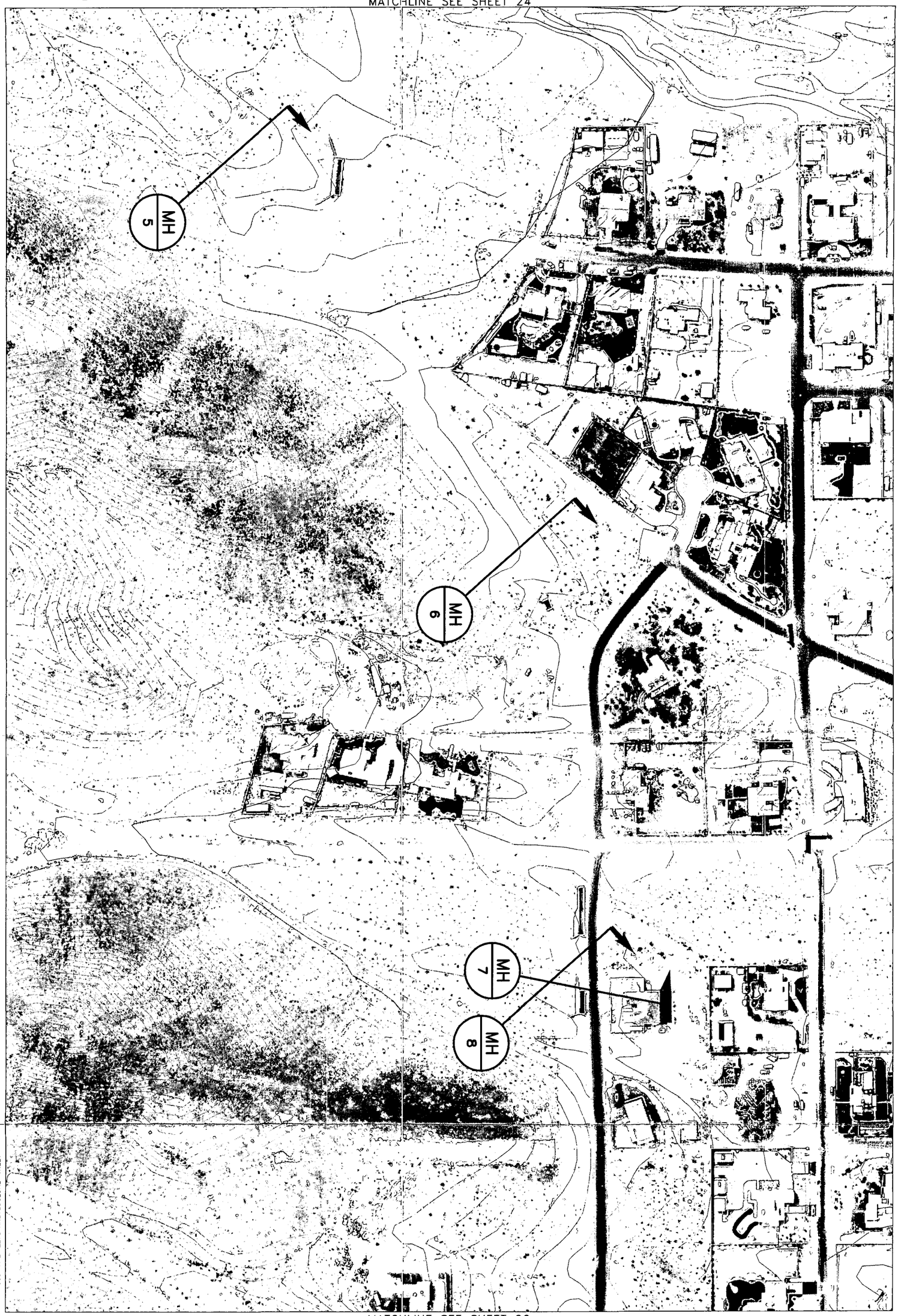
Carter Burgess
Consultants in Planning, Engineering,
Construction Management, and Related Services
8655 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

DESIGNED:	DB
DRAWN:	SCC
CHECKED:	DB
JOB No:	240482
HORIZ:	1"=400'
VERT:	NONE
DATE:	02/05/02

REVISIONS

No.	Date		CHKD	APPD

MATCHLINE SEE SHEET 24



MATCHLINE SEE SHEET 26

GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.
100 0 50 100 200 400

AERIAL PHOTOGRAPHY DATE: FALL 2001
FIELD REVIEW PHOTOGRAPHY DATE: FEB 2002

Carter Burgess

SHEET 25 OF 27

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: FIELD REVIEW

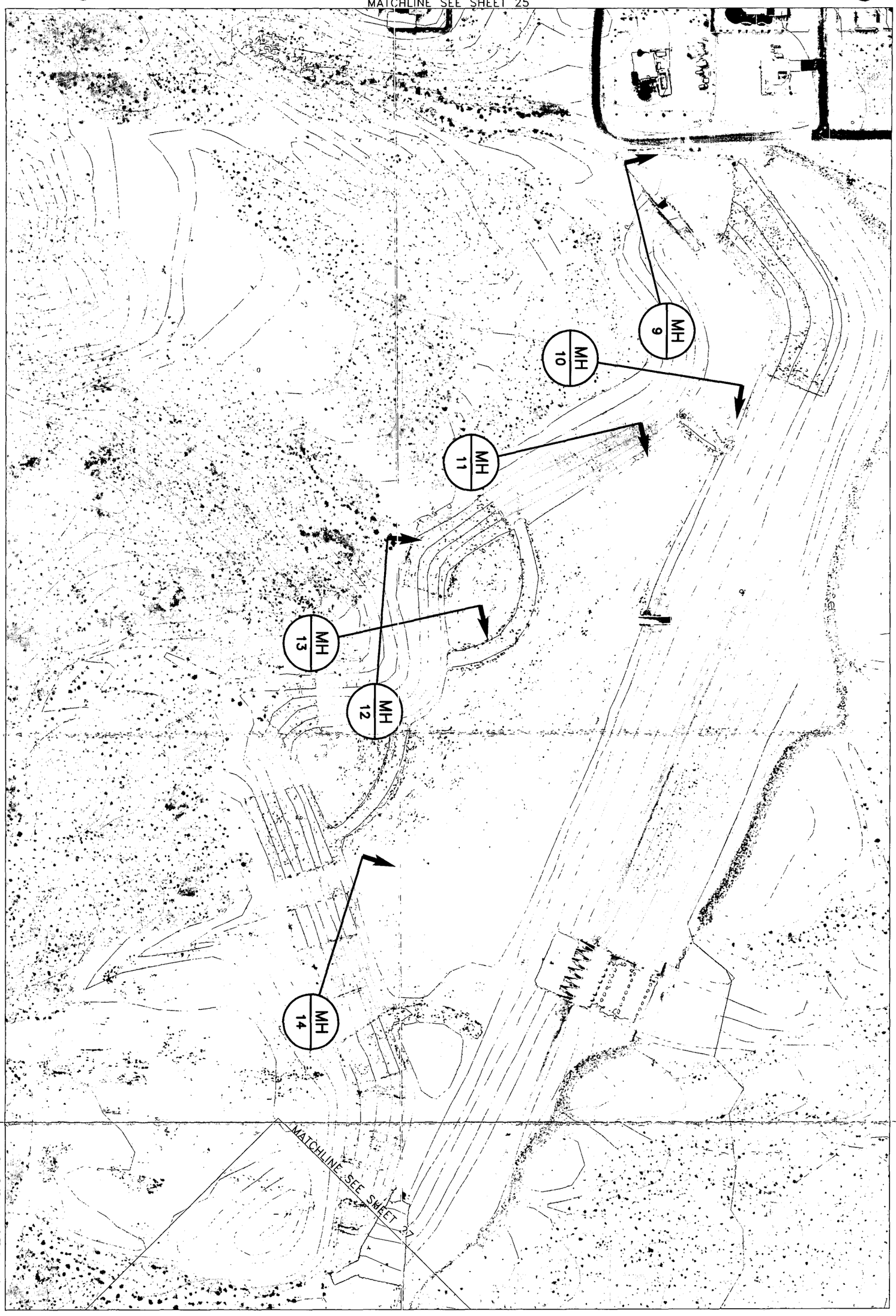
Carter Burgess
Consultants in Planning, Engineering, Construction Management, and Related Services
6655 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

DESIGNED:	DB
DRAWN:	SCC
CHECKED:	DB
JOB No:	240482
HORIZ:	1"=400'
VERT:	NONE
DATE:	02/05/02

REVISIONS

No.	Date		CHKD	APPD

MATCHLINE SEE SHEET 25



GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.
100 0 50 100 200 400

AERIAL PHOTOGRAPHY DATE: FALL 2001
FIELD REVIEW PHOTOGRAPHY DATE: FEB 2002

Carter Burgess

SHEET 26 OF 27

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: FIELD REVIEW

Carter Burgess
Consultants in Planning, Engineering, Construction Management, and Related Services
6855 Bermuda Road
Las Vegas, Nevada 89119
(702) 938-5400 Fax (702) 938-5454

DESIGNED:	DB
DRAWN:	SCC
CHECKED:	DB
JOB No:	240482
HORIZ:	1"=400'
VERT:	NONE
DATE:	02/05/02

REVISIONS

No.	Date		CHKD	APPD

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch = 100 ft.

Lake Mojave

MATCHLINE SEE SHEET 26

MH 15

MH 16

LIMITS OF CLARK COUNTY GIS AERIAL PHOTOGRAPHY

AERIAL PHOTOGRAPHY DATE: FALL 2001
FIELD REVIEW PHOTOGRAPHY DATE: FEB 2002

REVISIONS

No.	Date	CHKD	APPD

DESIGNED:	DB
DRAWN:	SCC
CHECKED:	DB
JOB No:	240482
HORIZ:	1"=400'
VERT:	NONE
DATE:	02/05/02

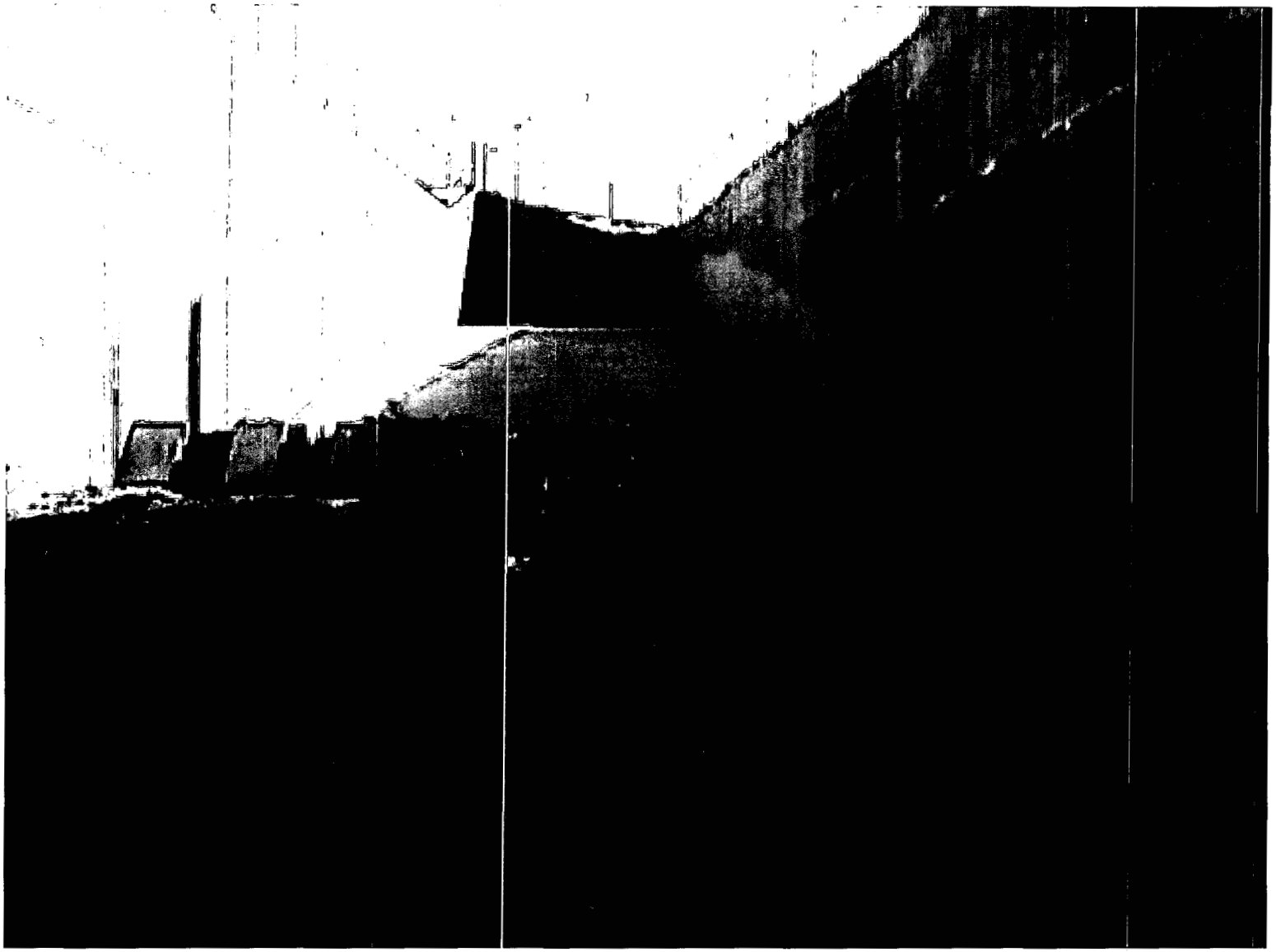
Carter Burgess
Consultants in Planning, Engineering,
Construction Management, and Related Services
8655 Bermuda Road
Las Vegas, Nevada 89119
(702) 936-5400 Fax (702) 938-5454

PROJECT: C-1 CHANNEL SYSTEM FIS RESTUDY

DESCRIPTION: FIELD REVIEW

SHEET 27

27 OF 27



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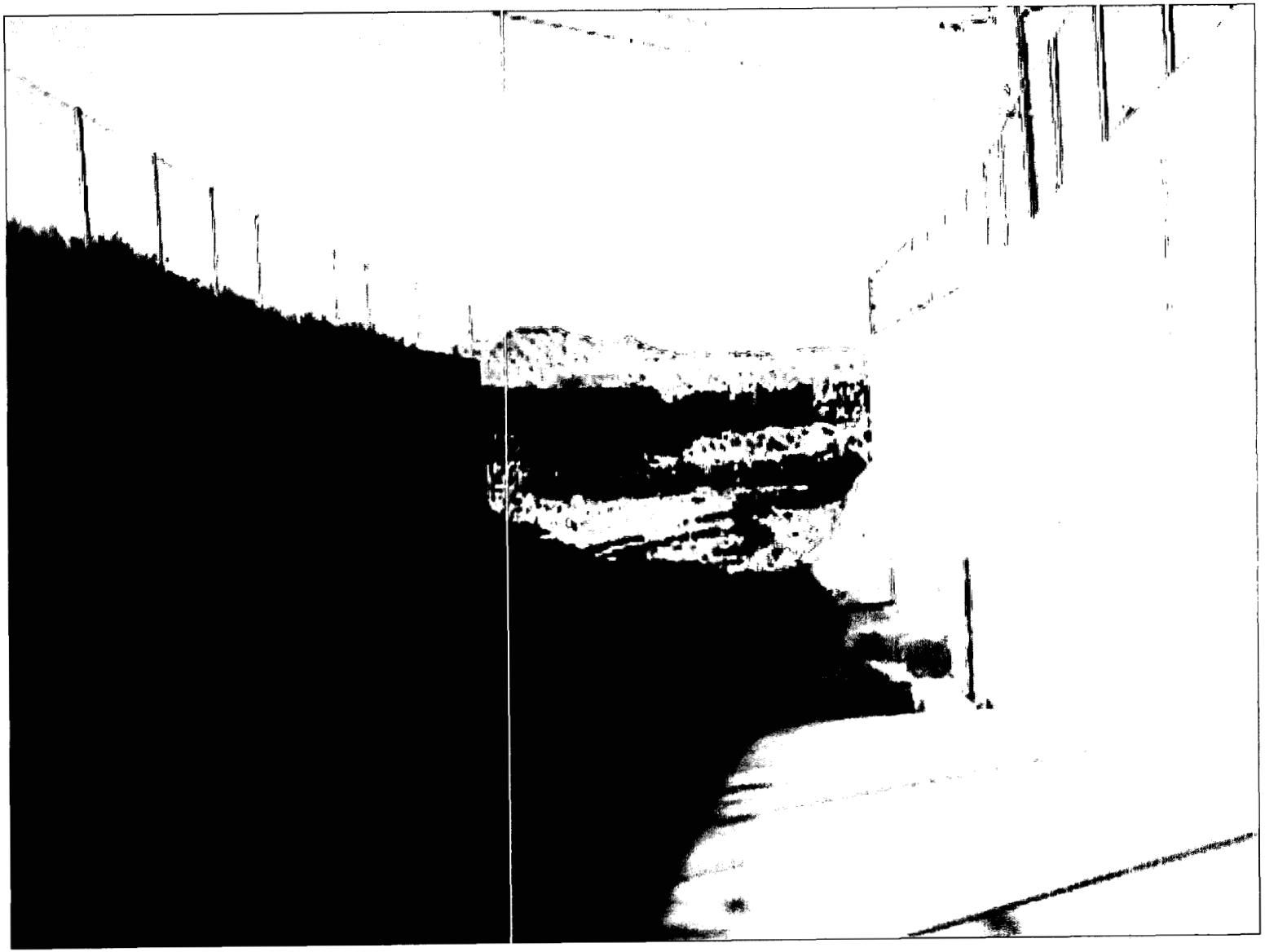
C-1 Channel System

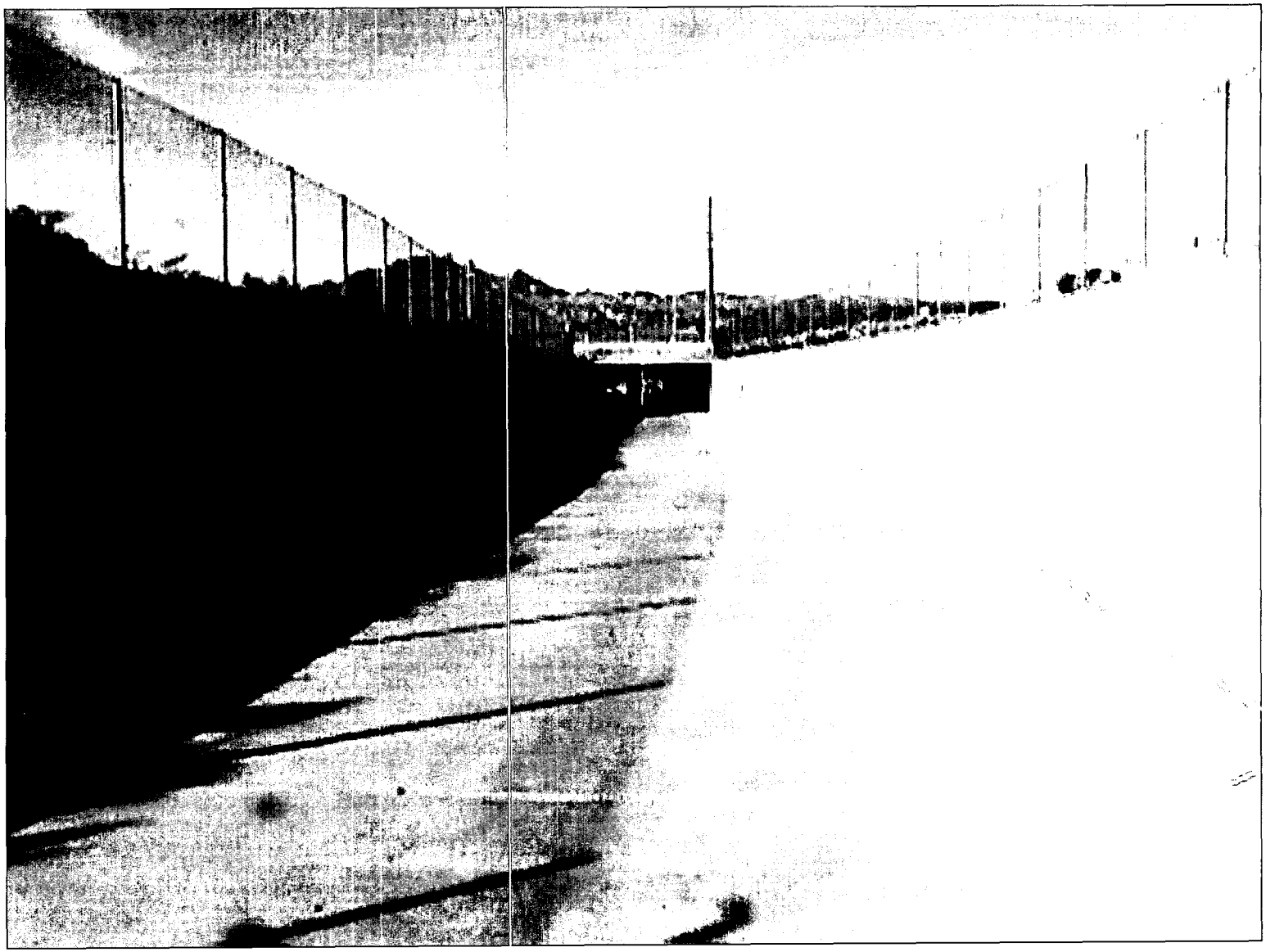
Flood Insurance Restudy

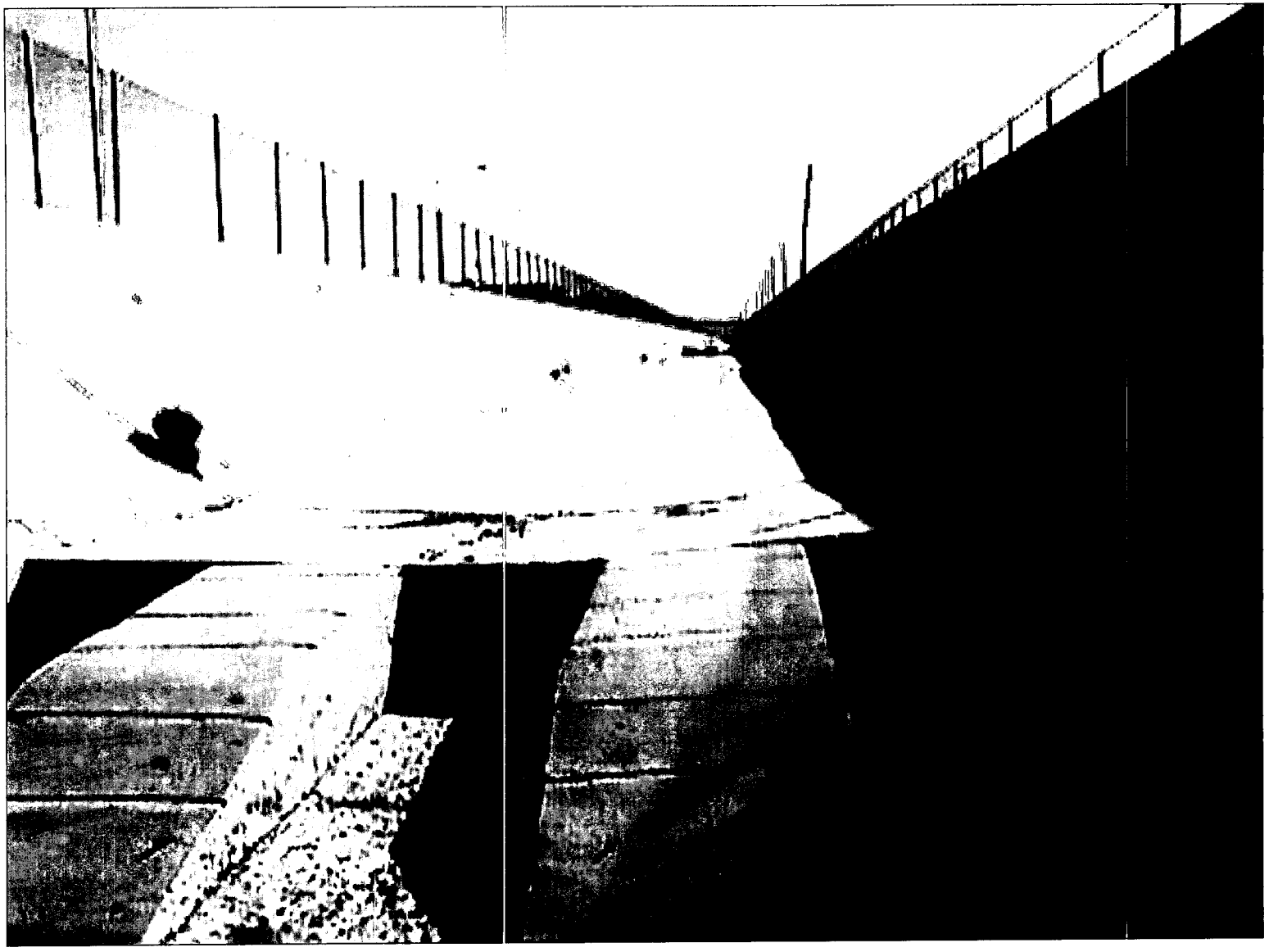
Photograph

C-1
1

HARRIS COUNTY
REGIONAL FLOOD CONTROL DISTRICT







Carter::Burgess

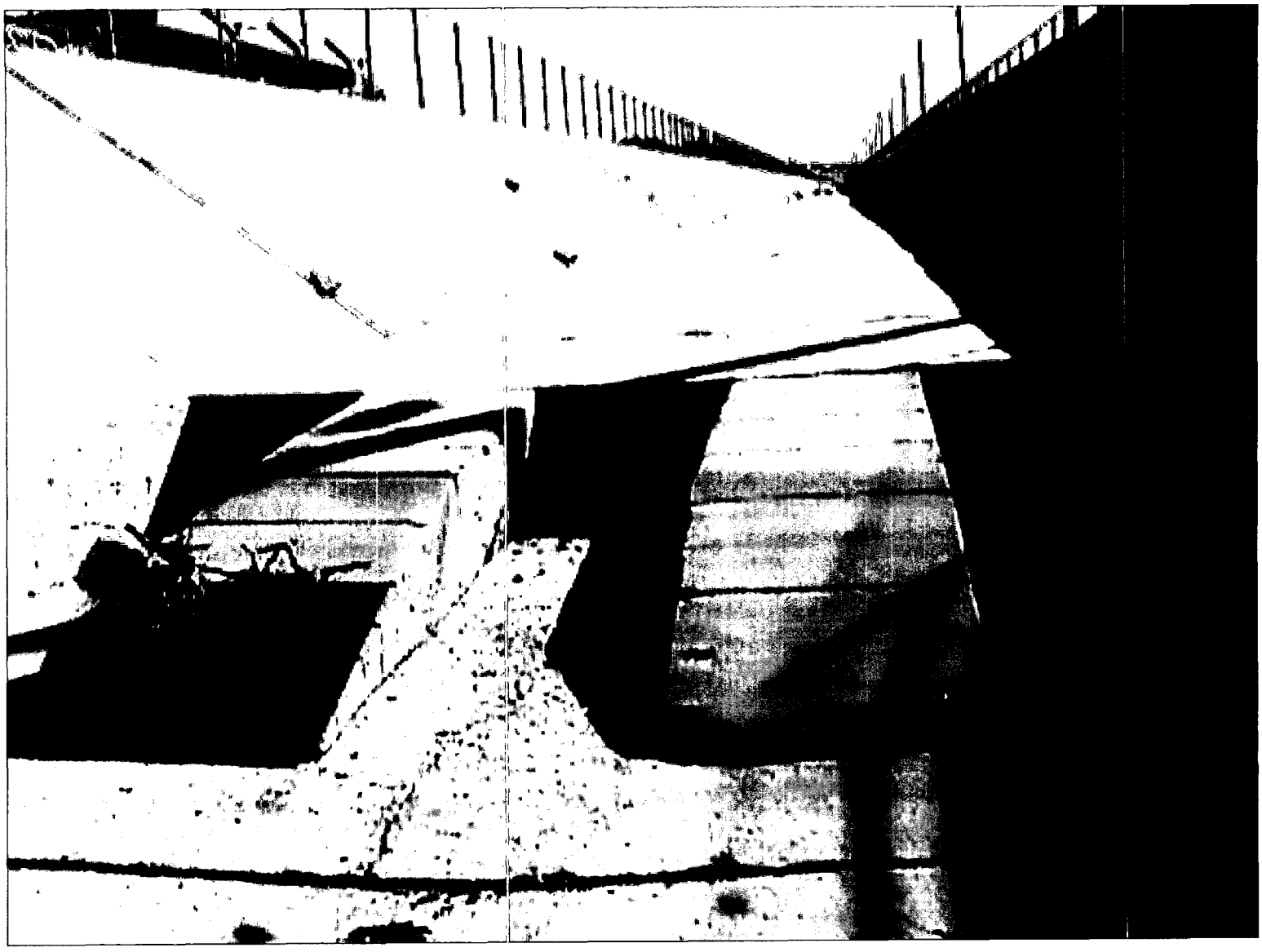
C-1 Channel System

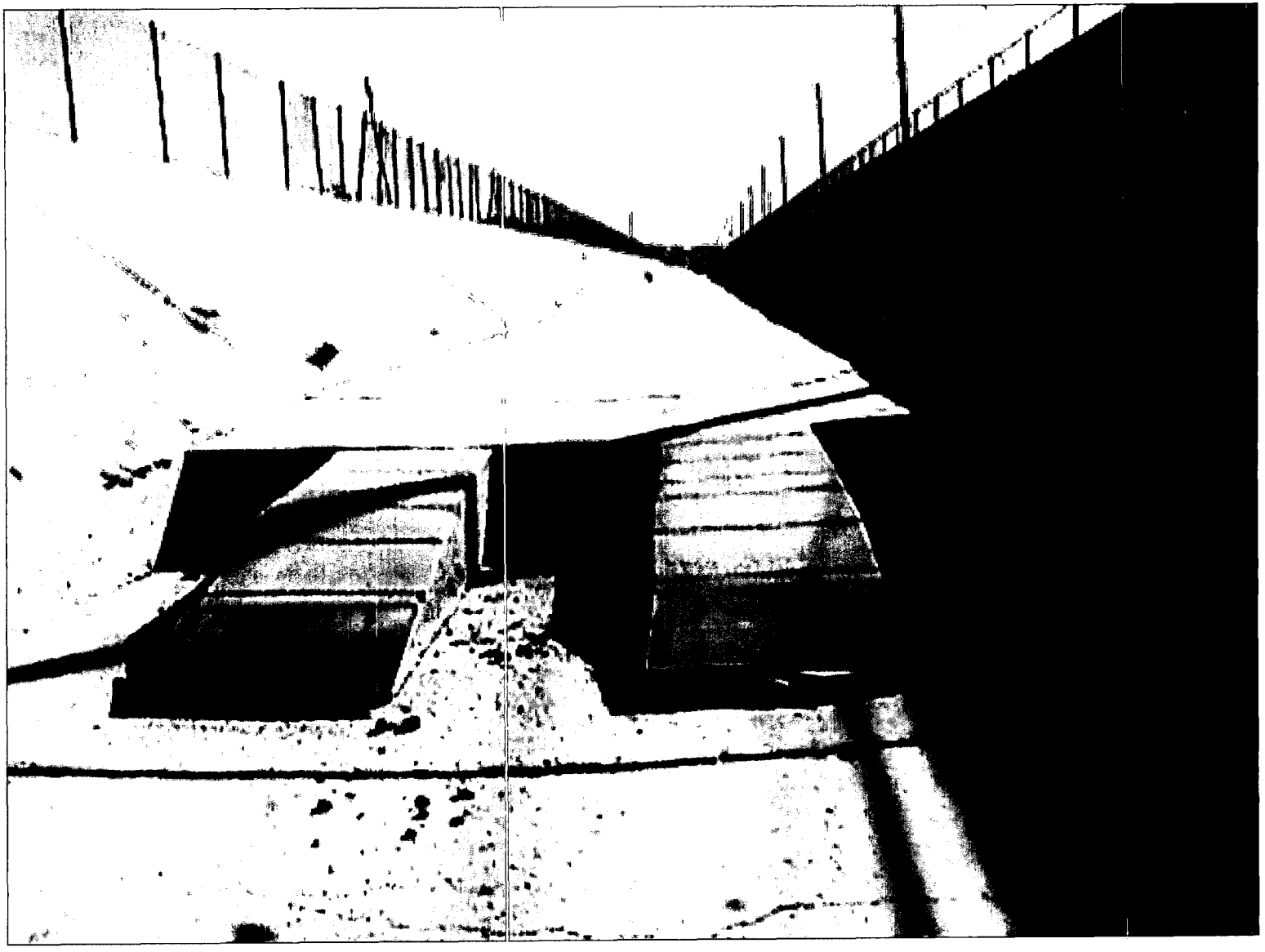
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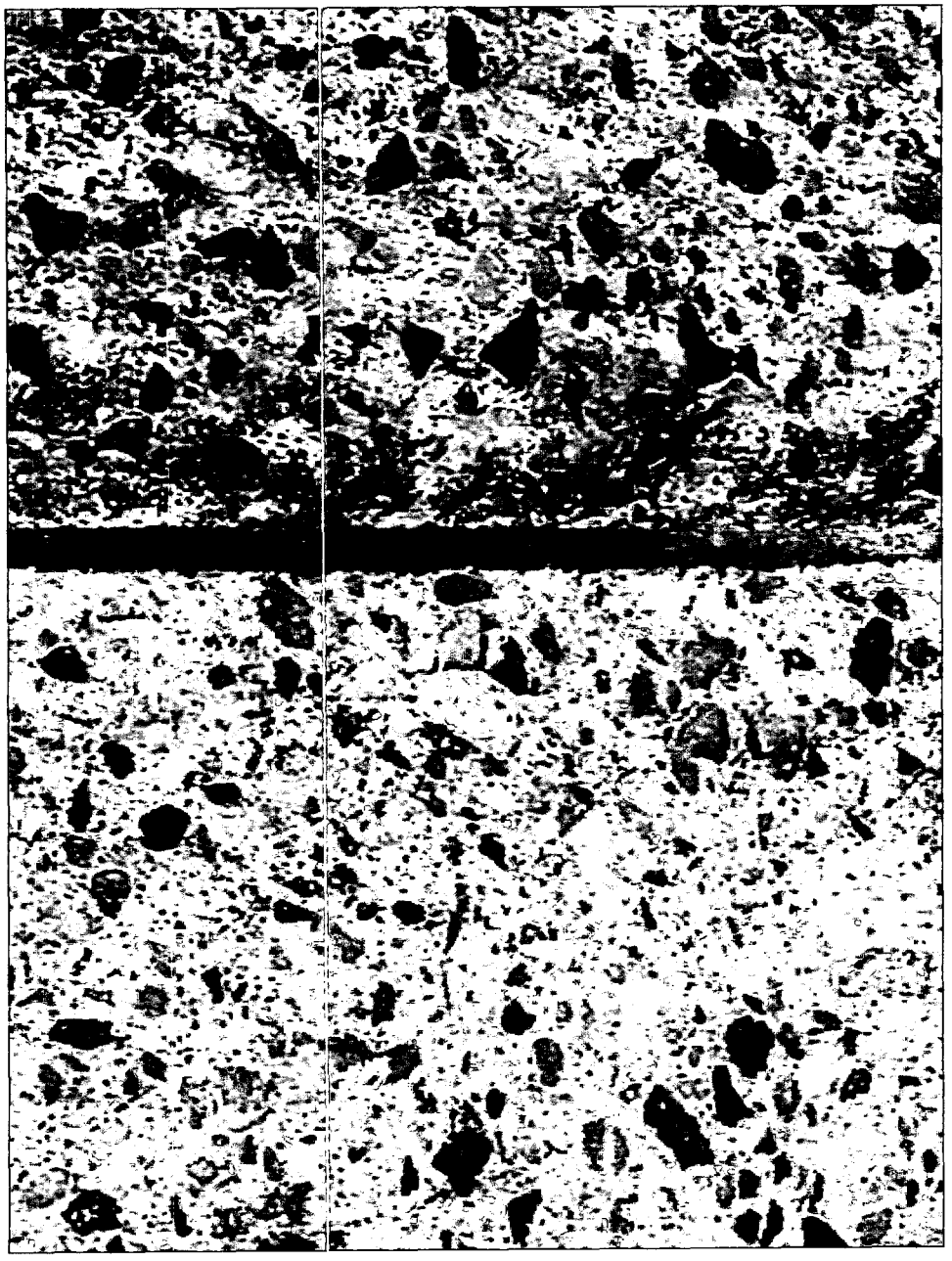
Photograph

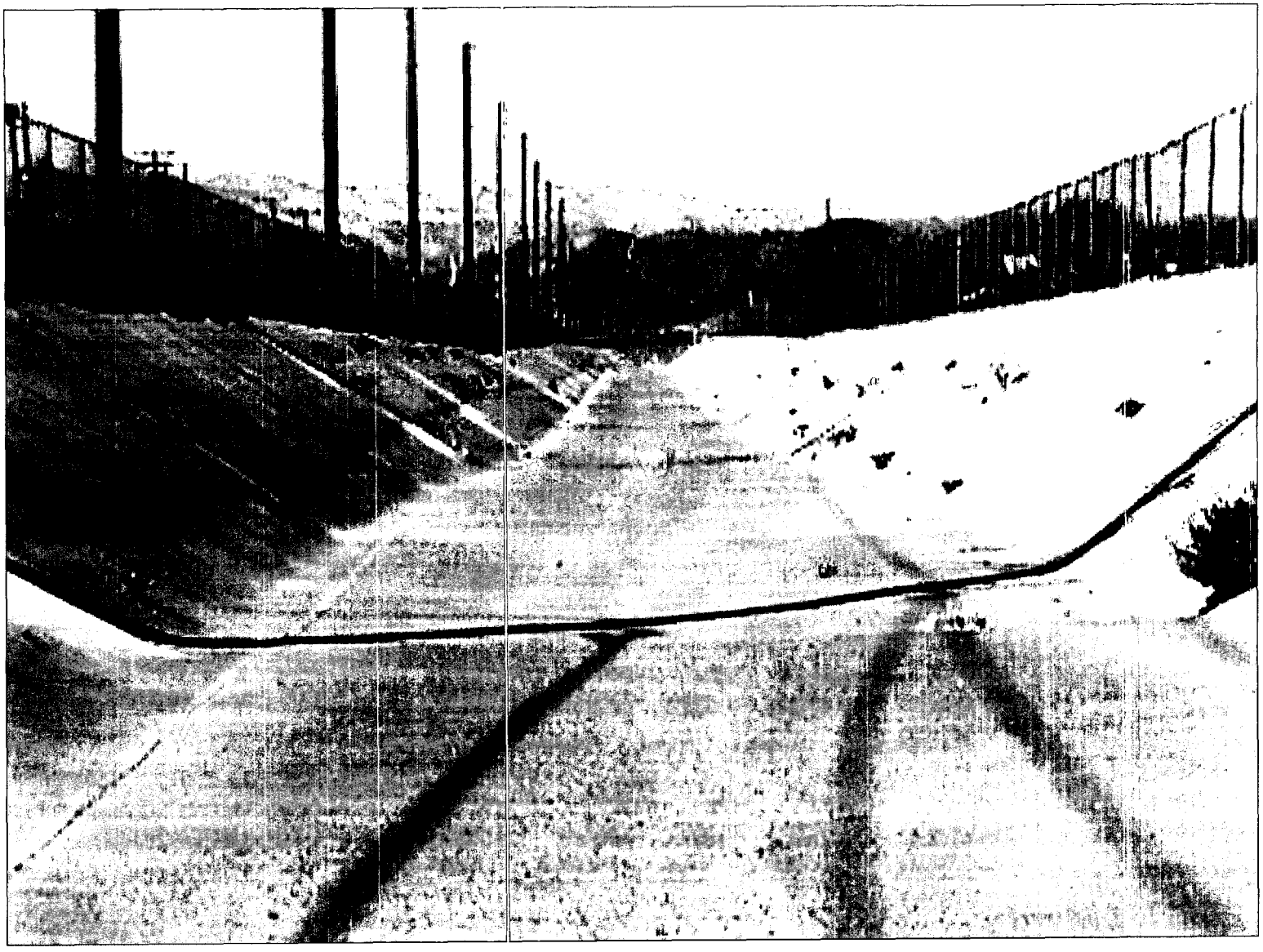
C-1
4

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT



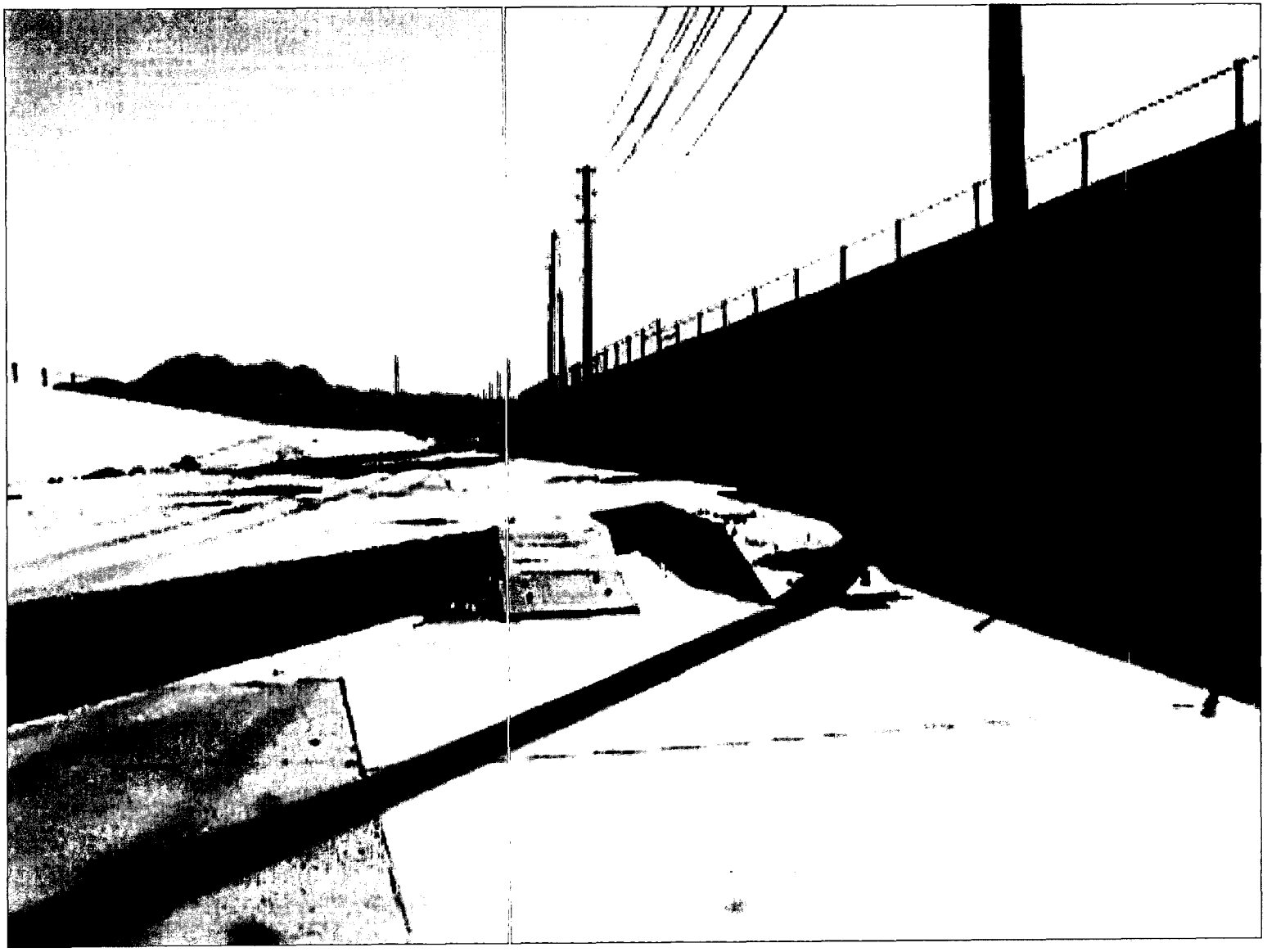




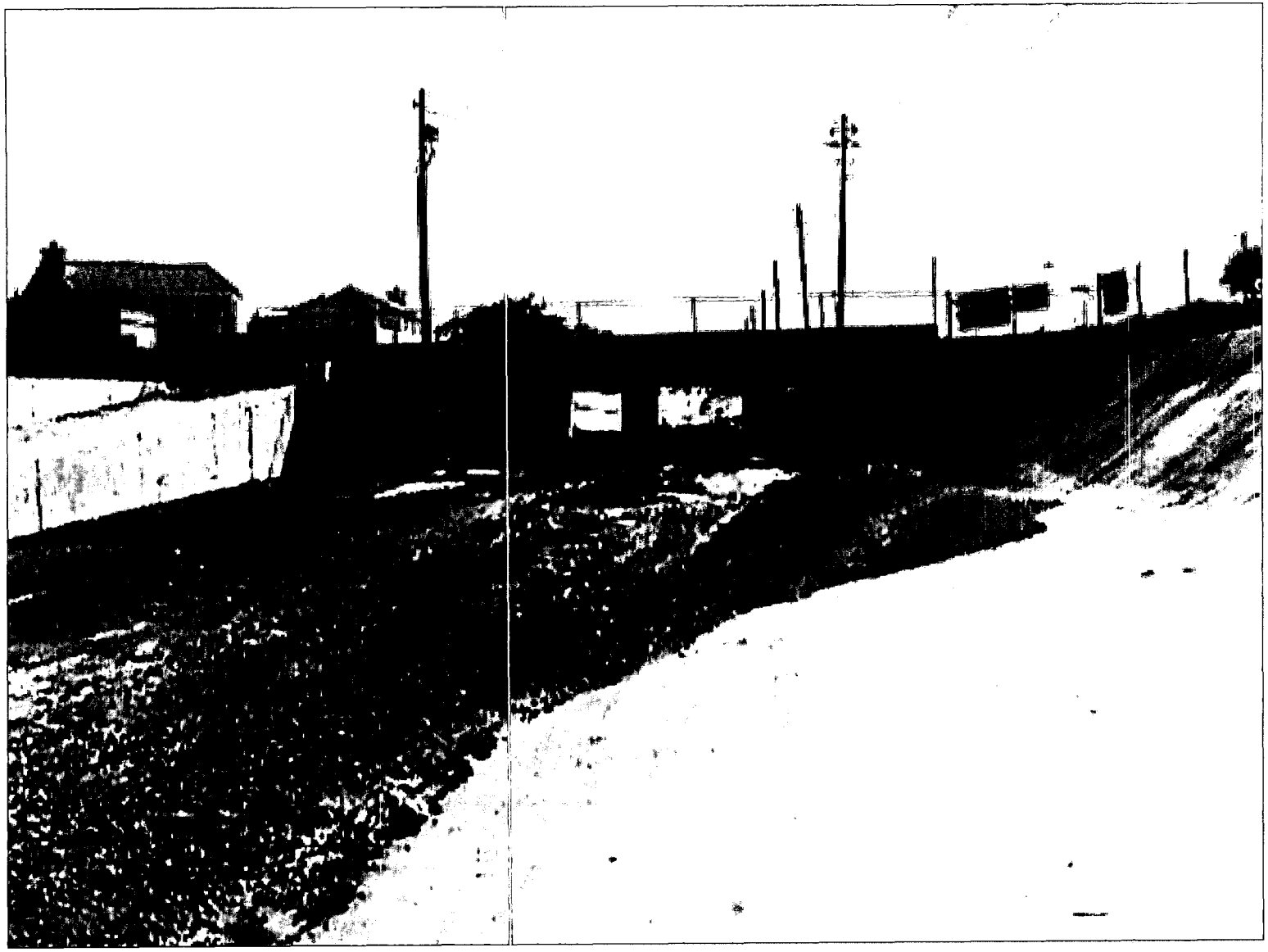




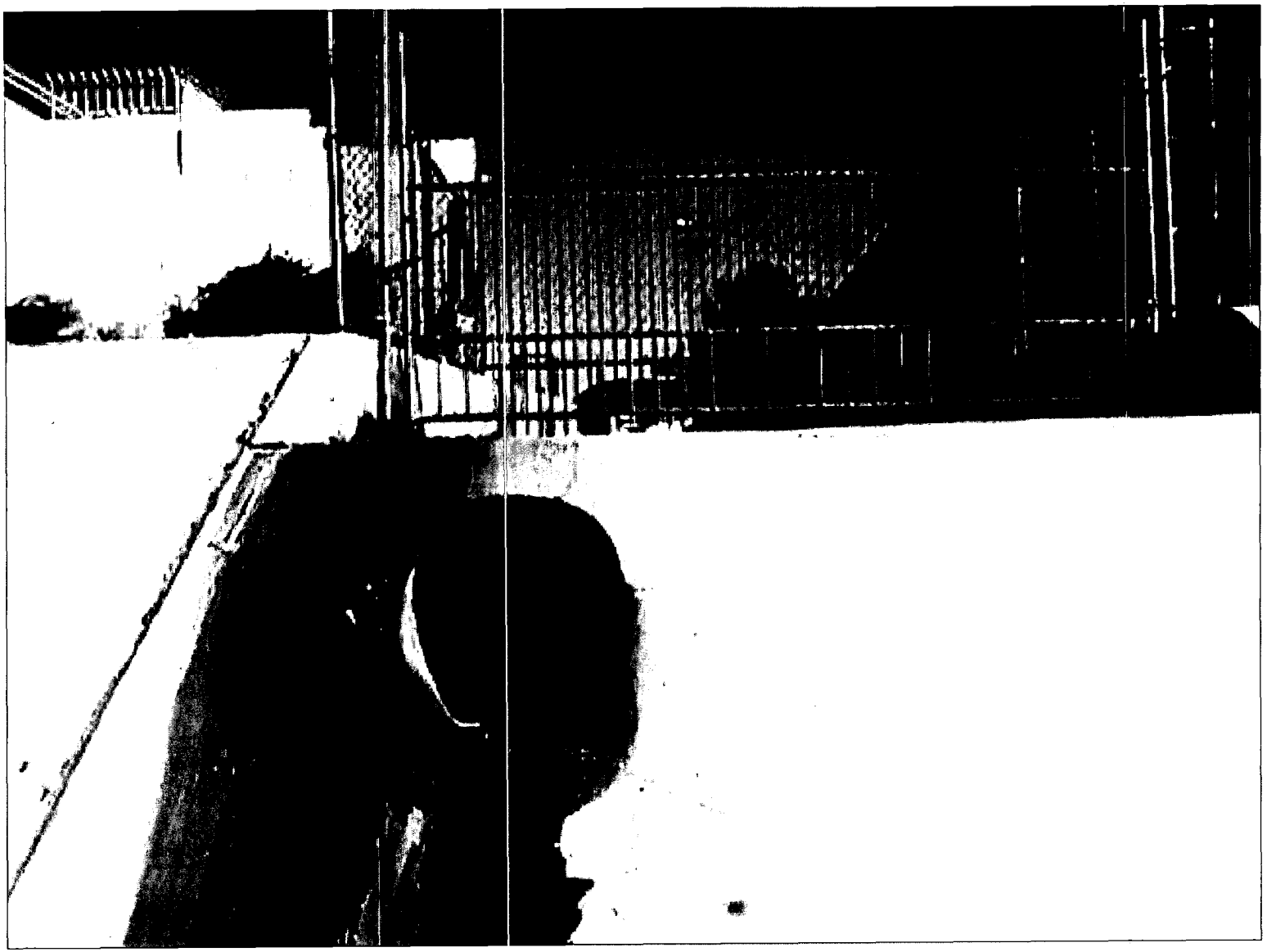






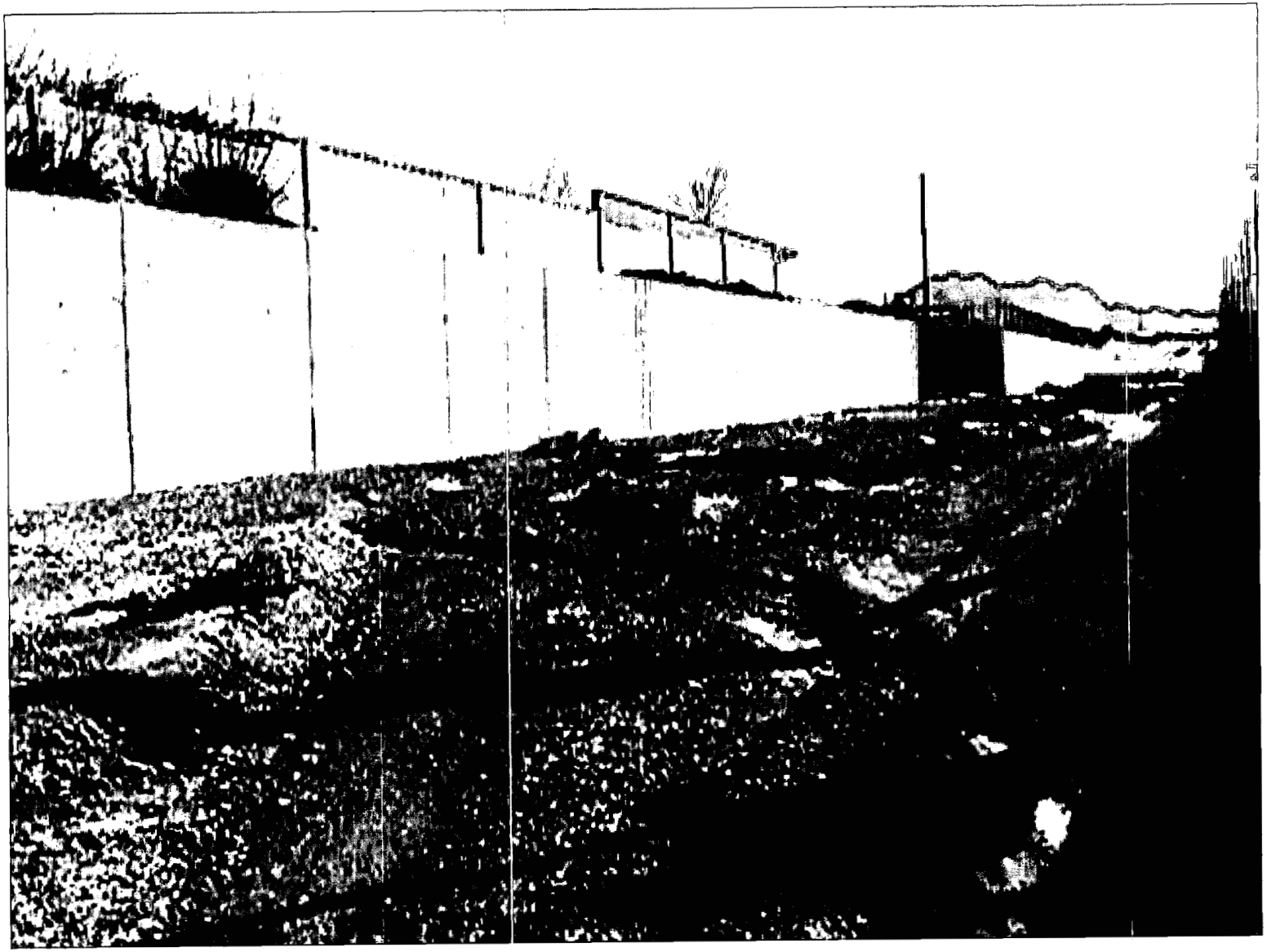


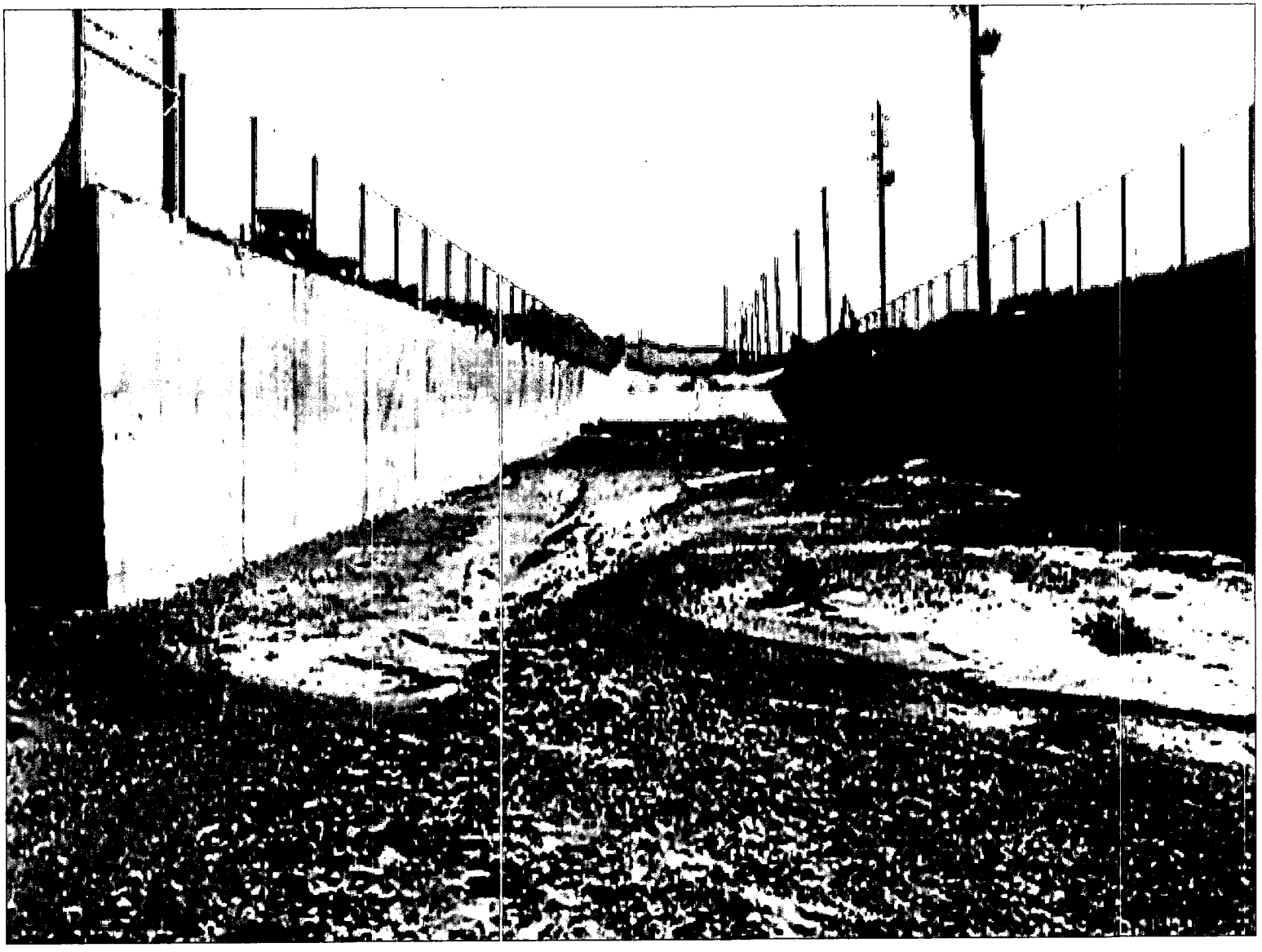




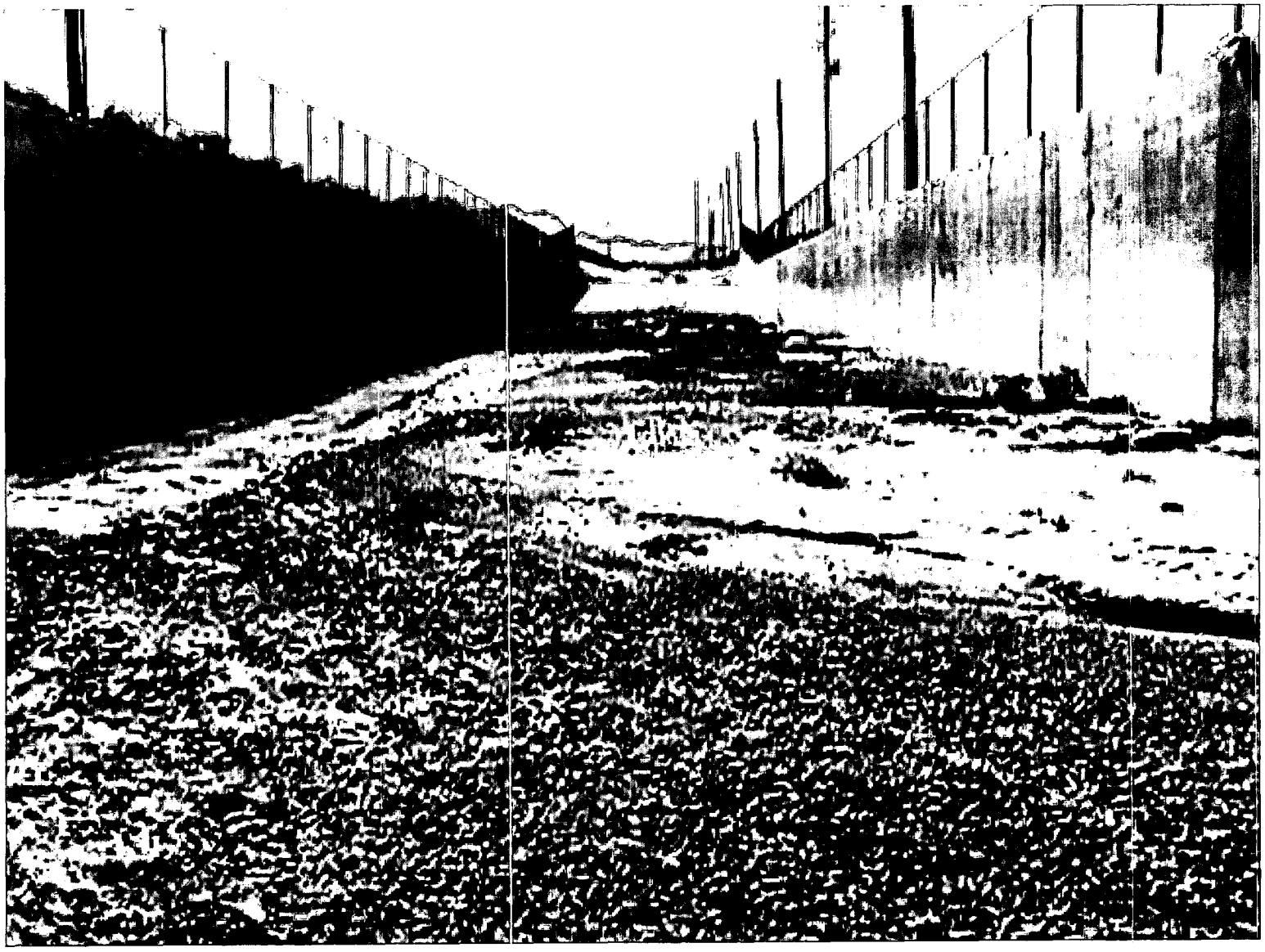




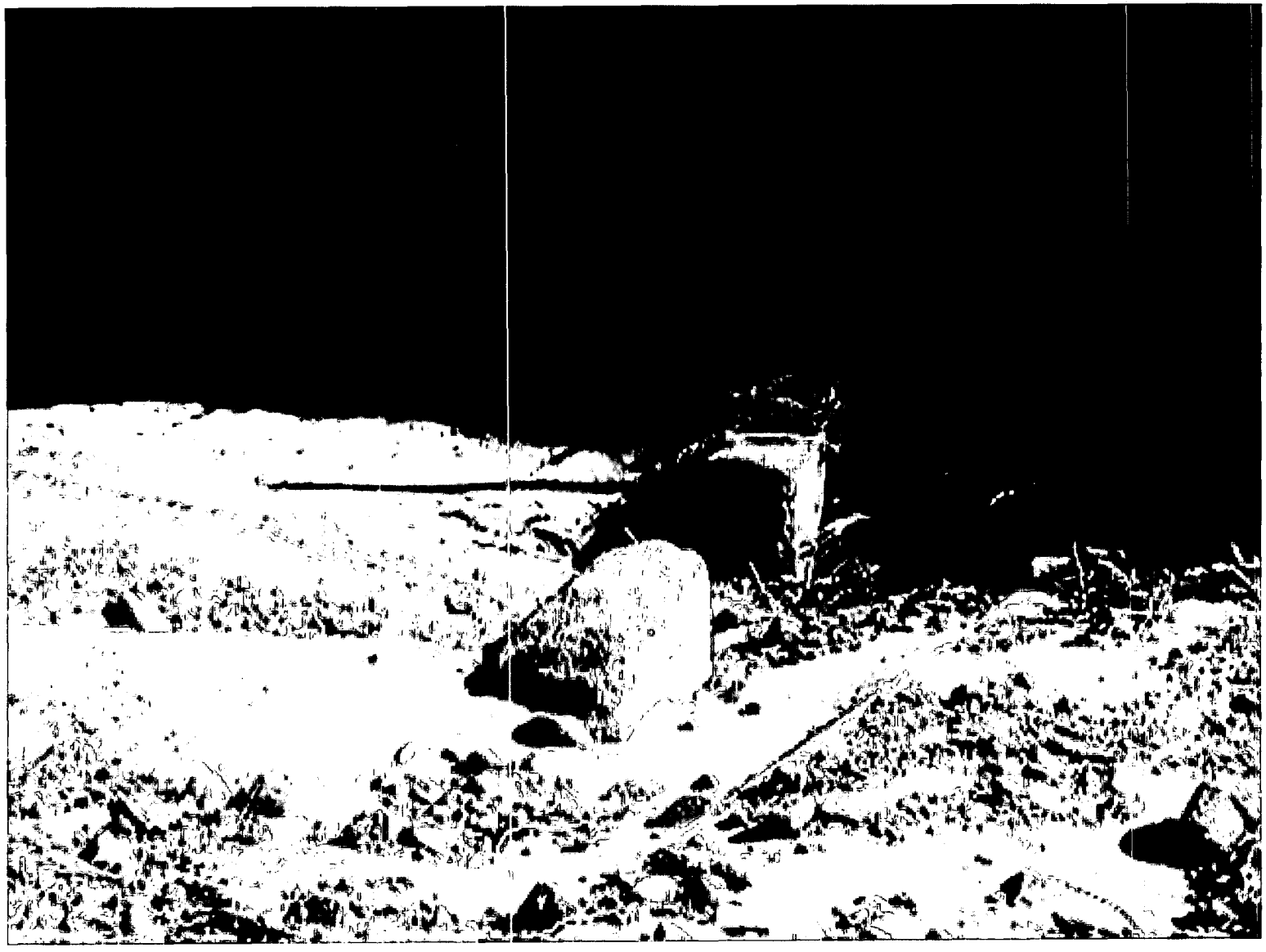


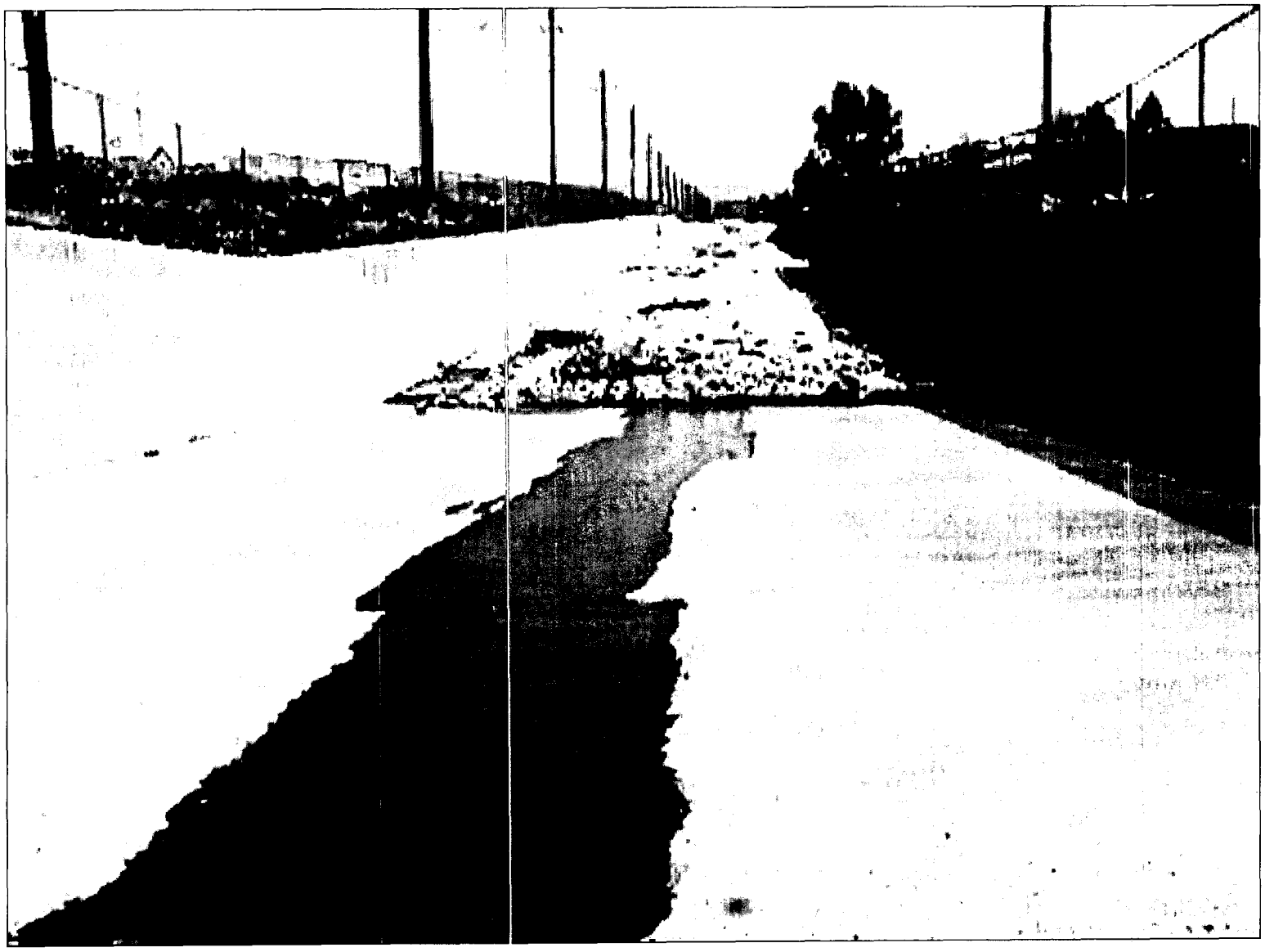




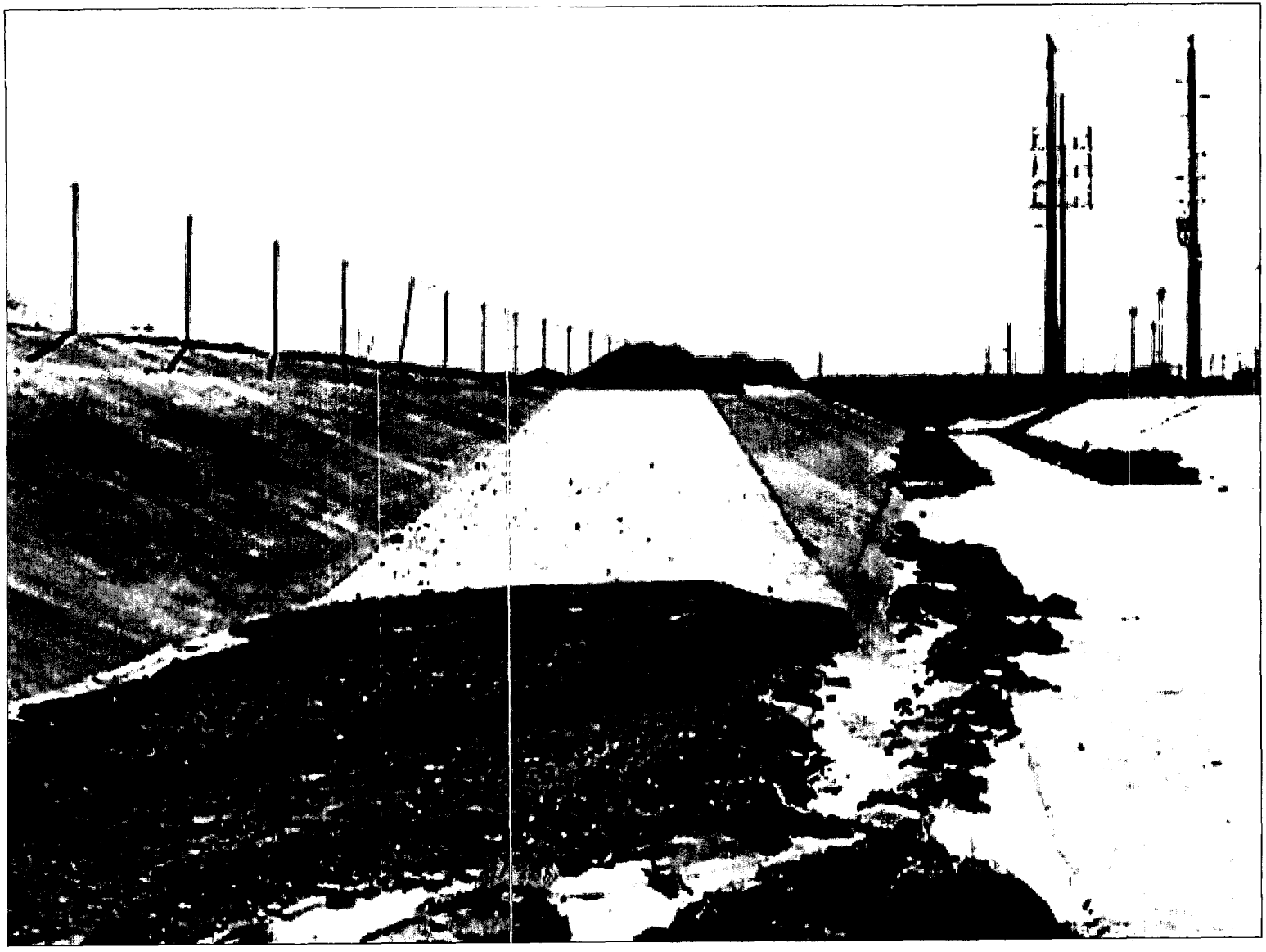




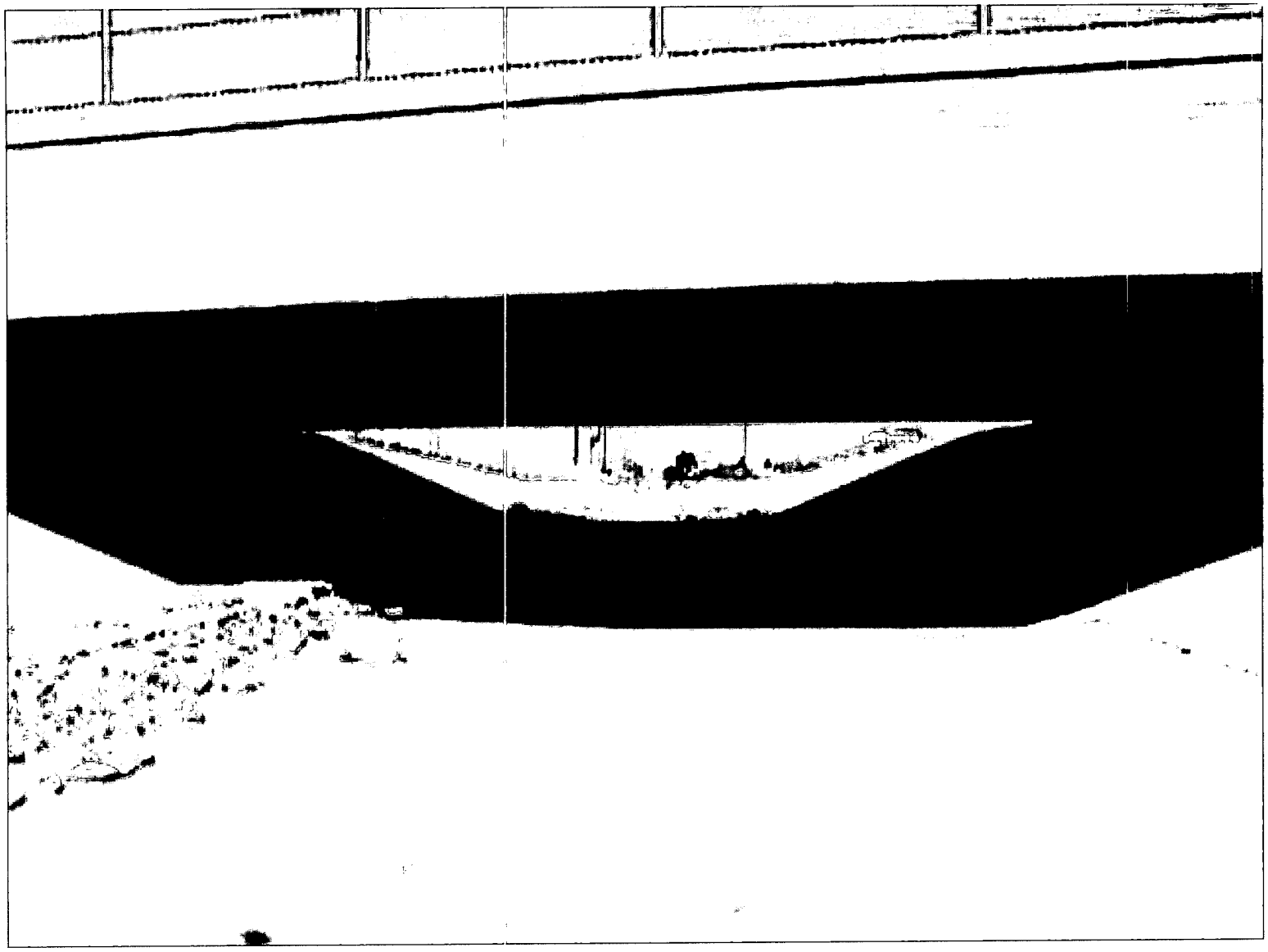


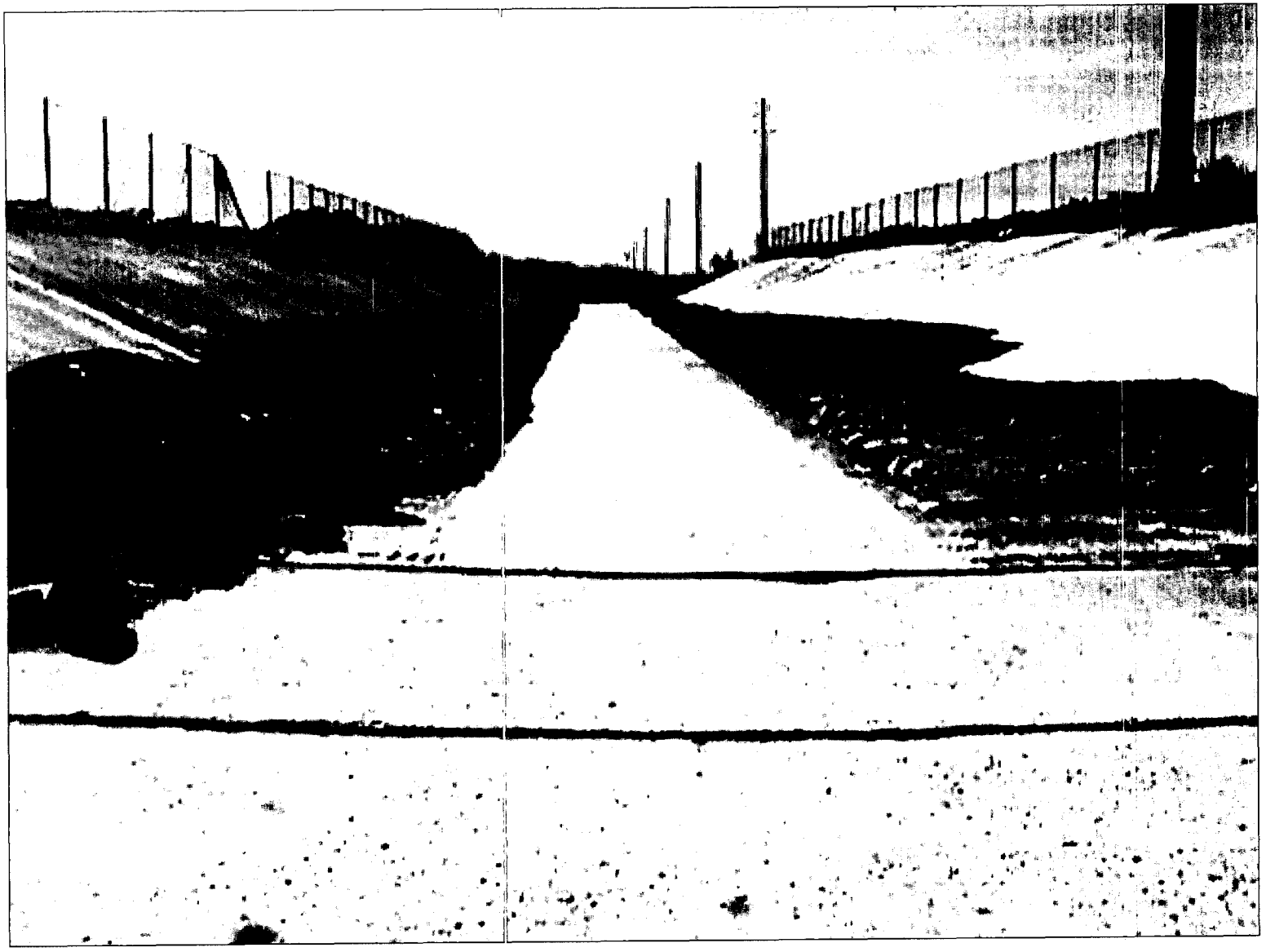




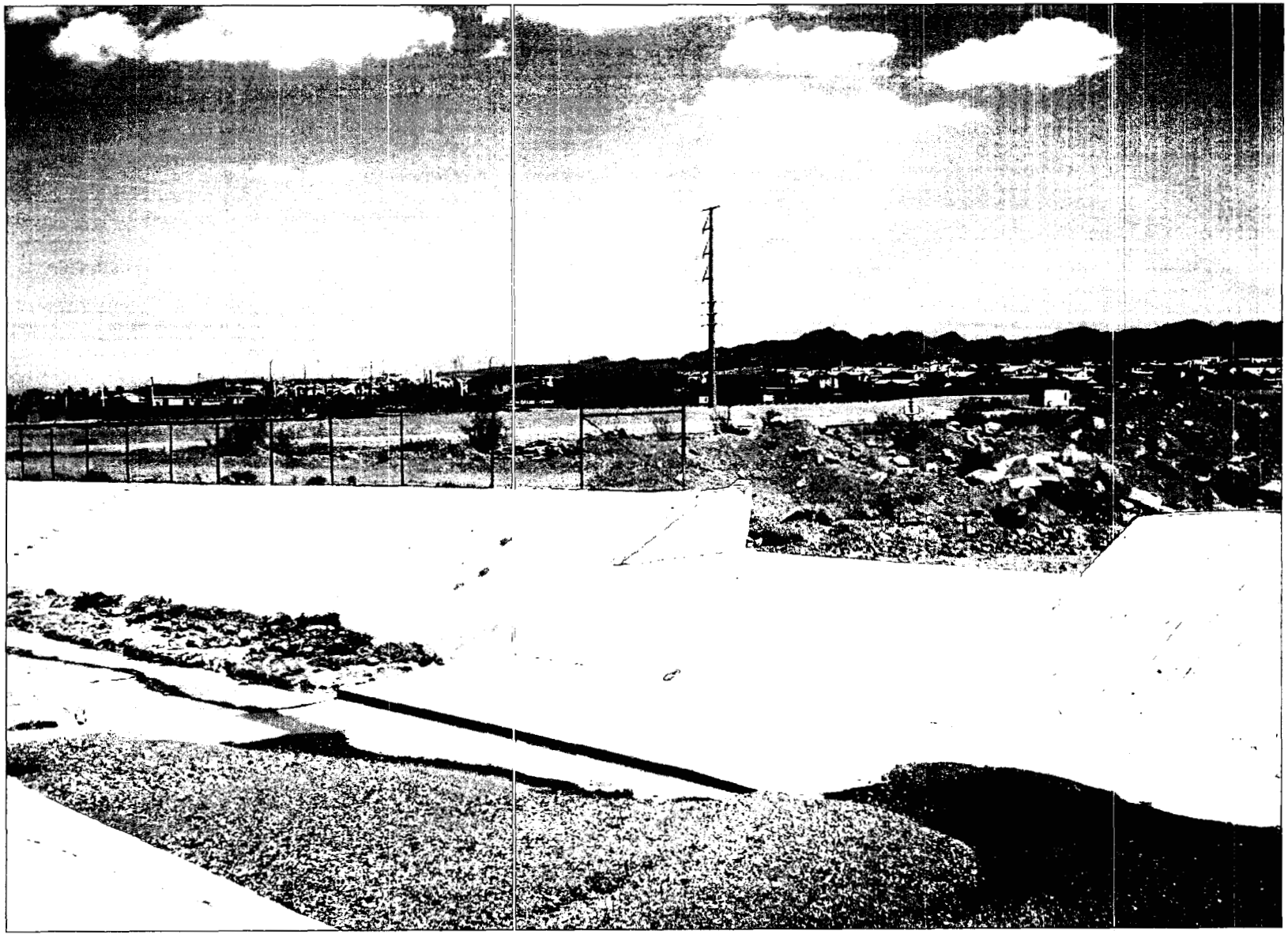


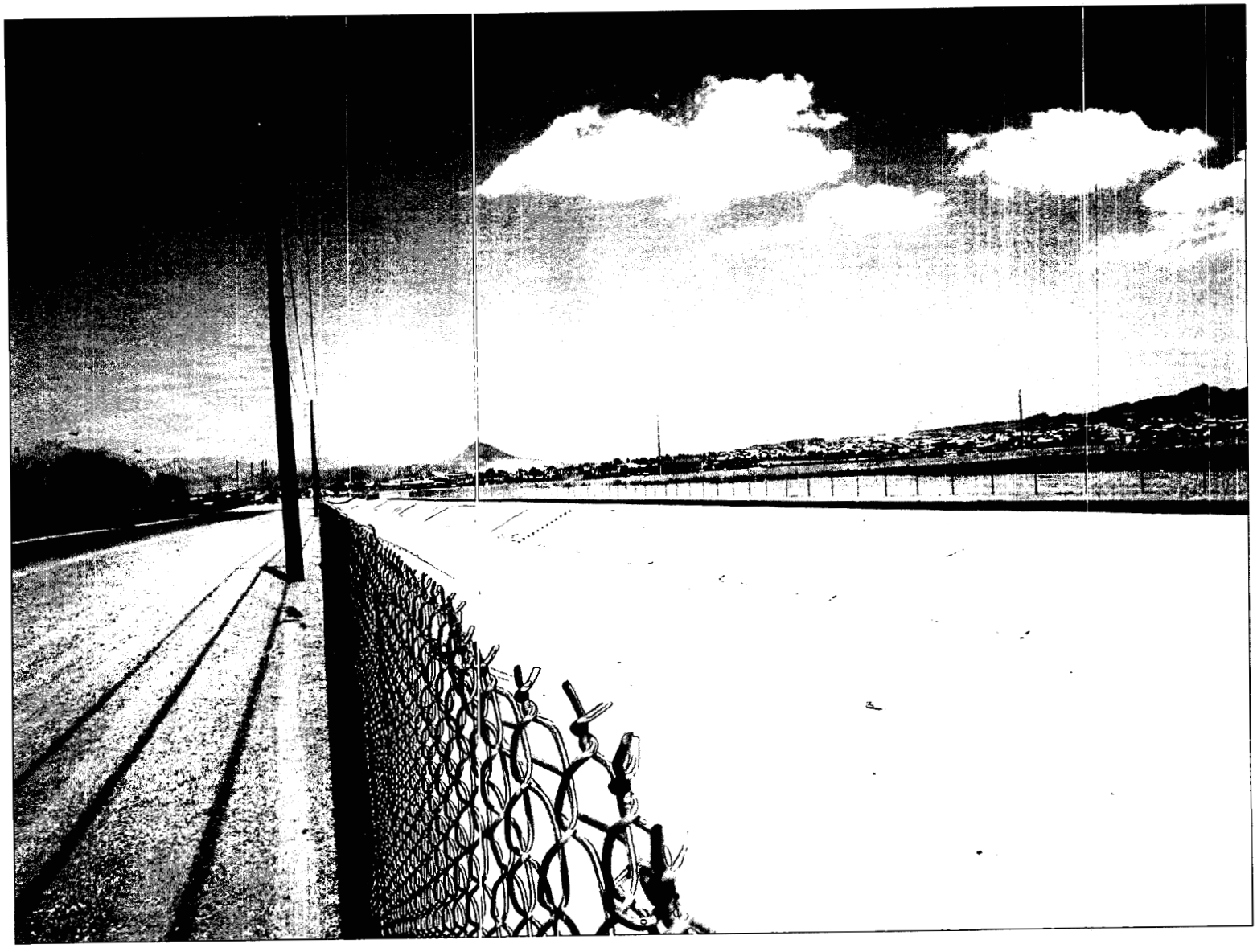


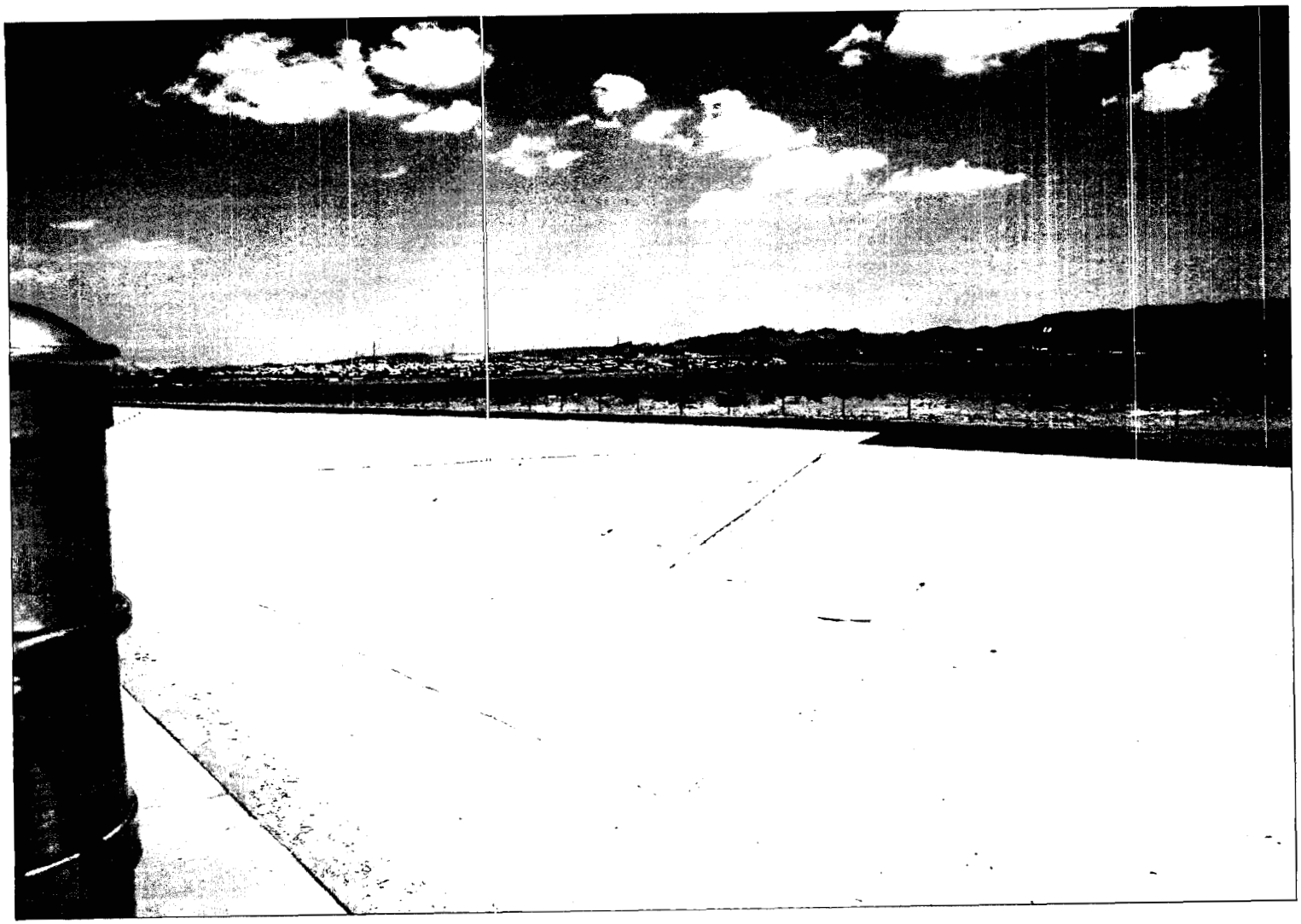


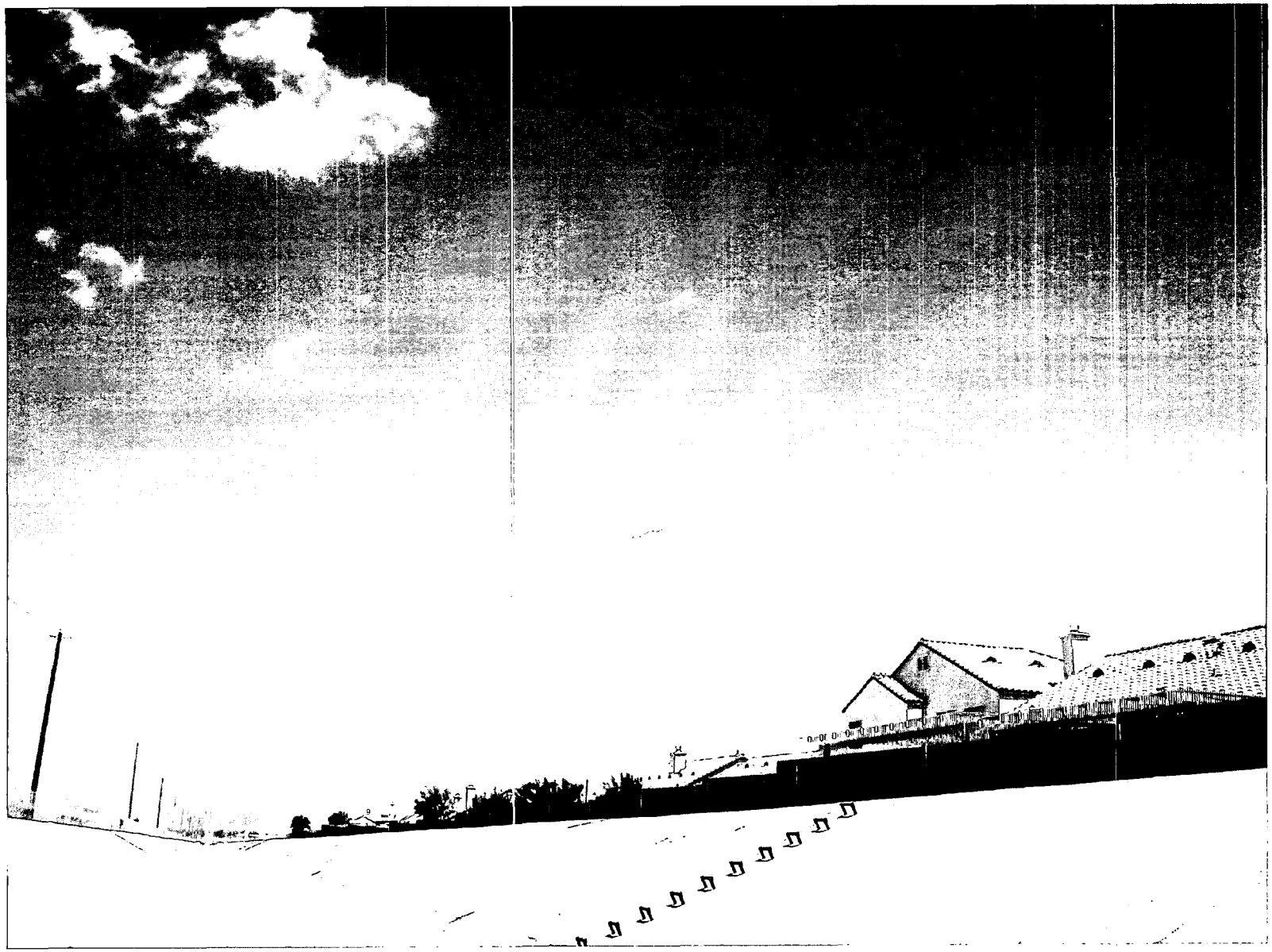


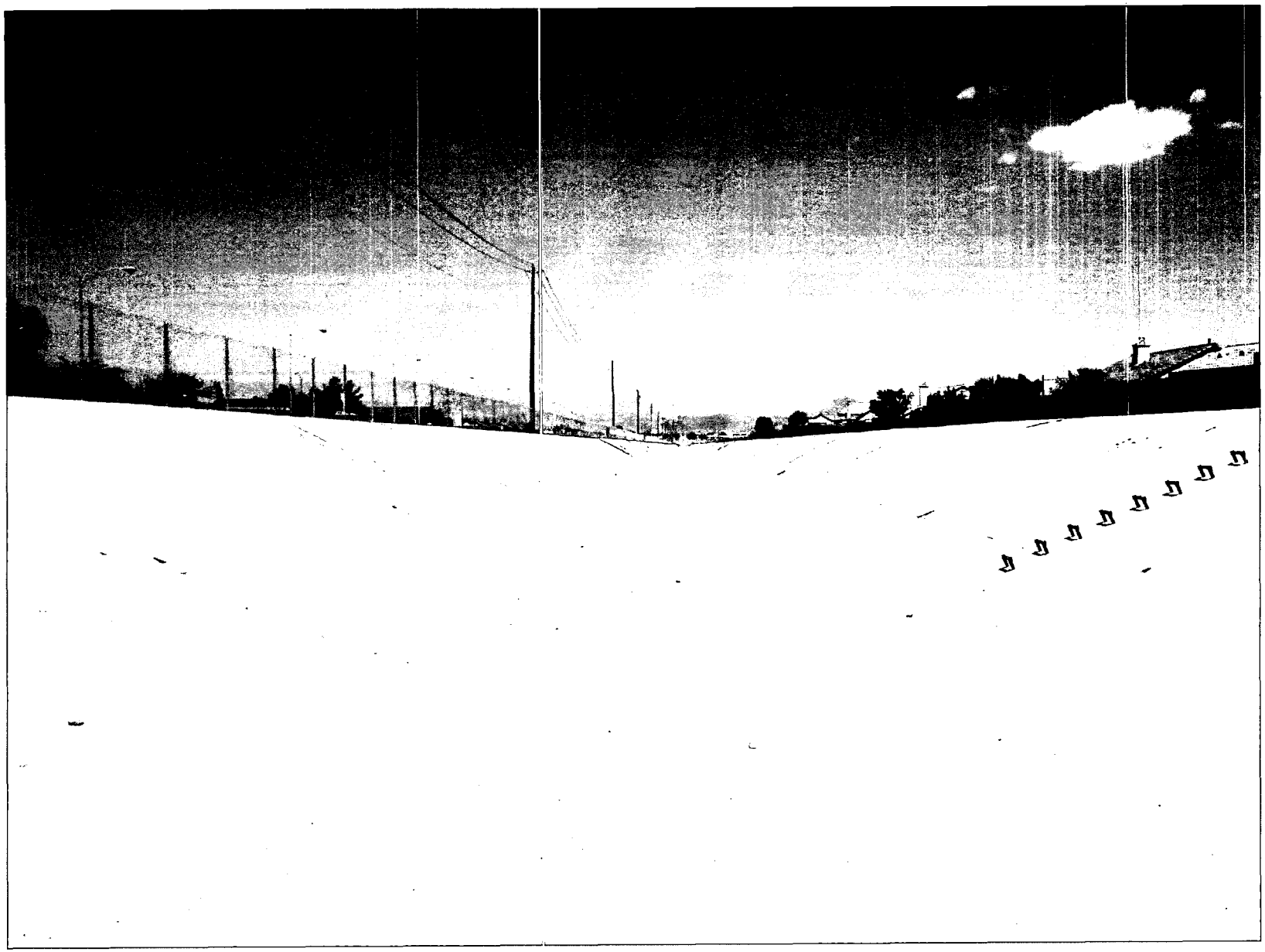


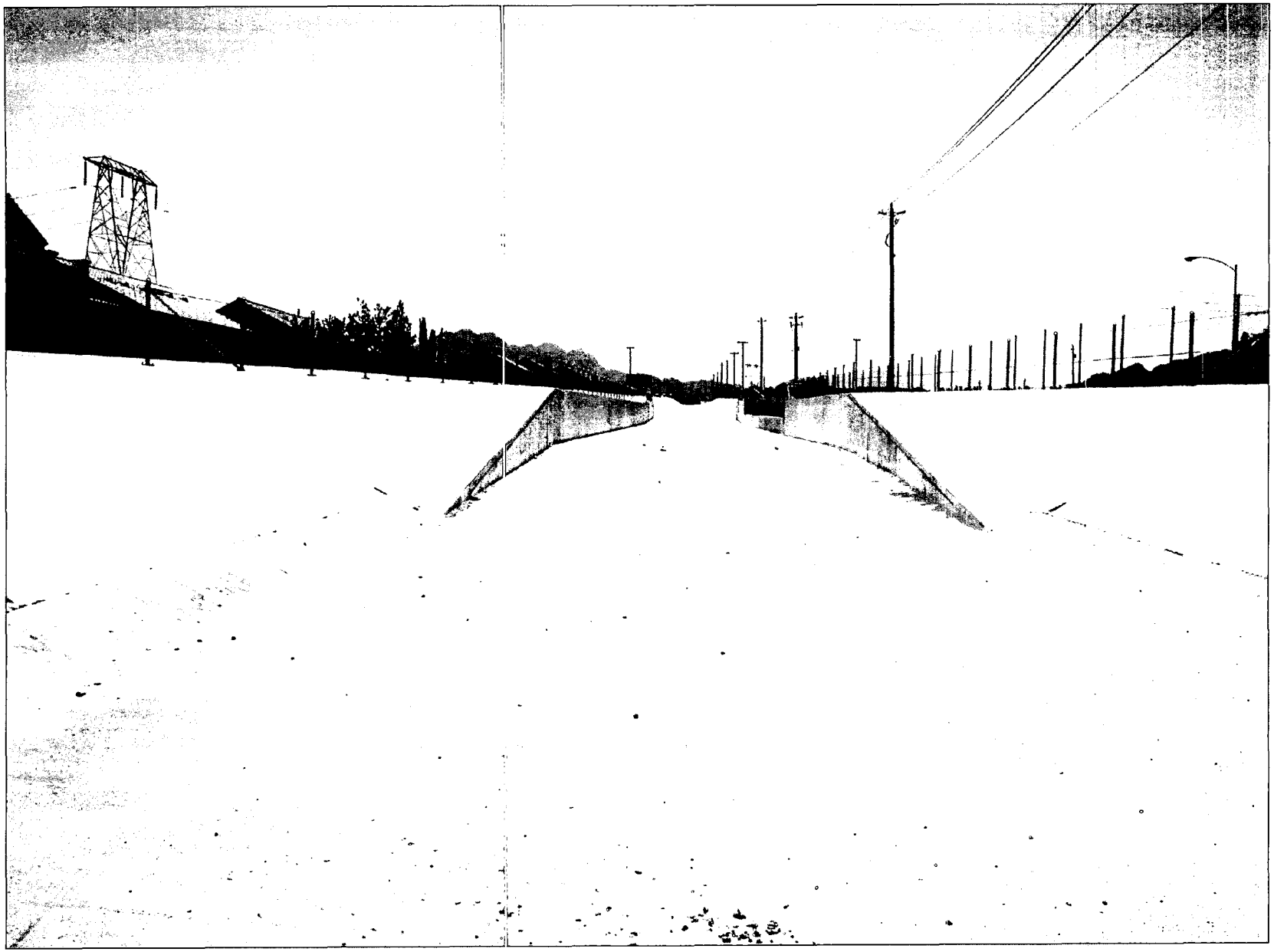












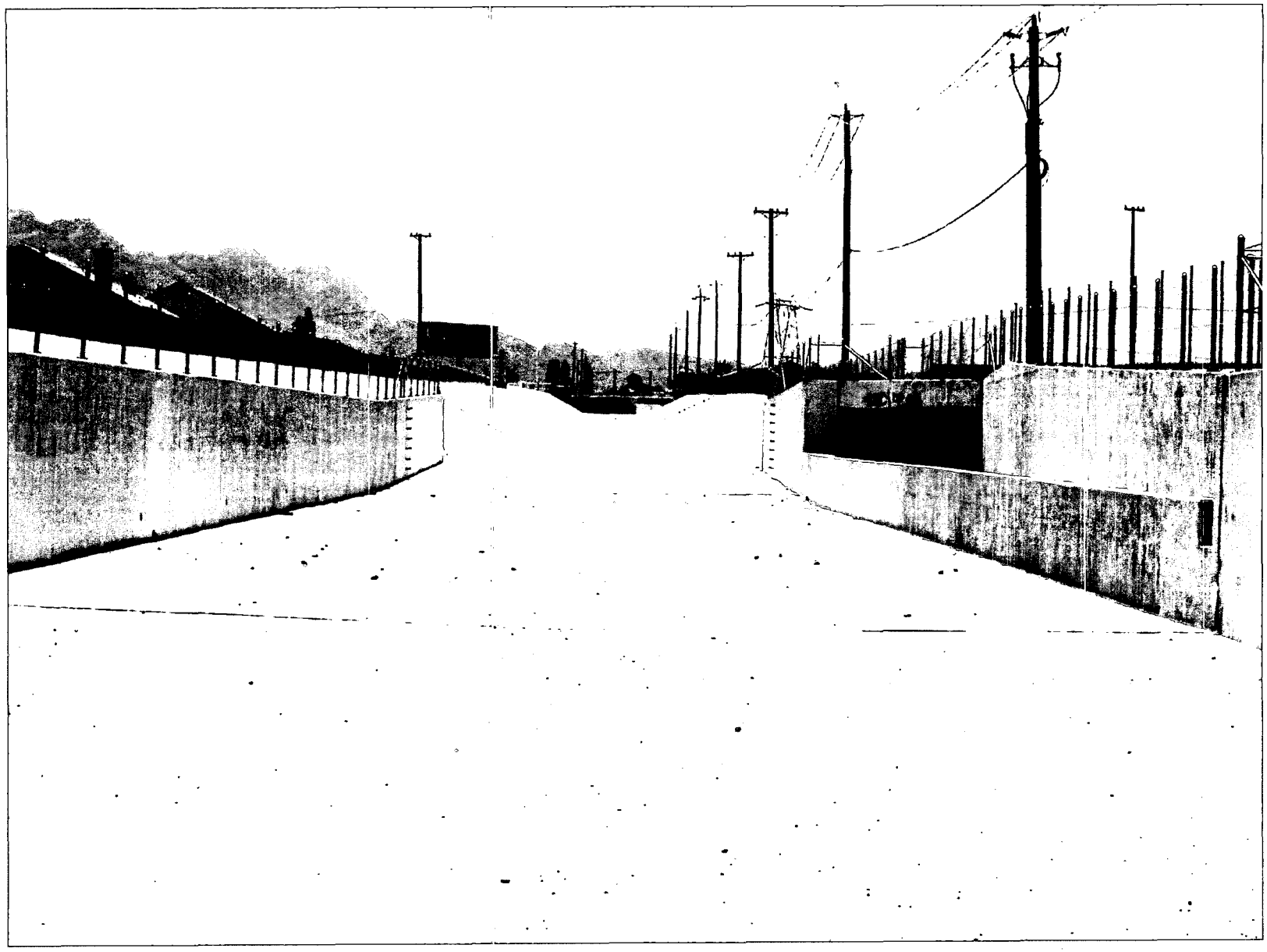
Carter::Burgess

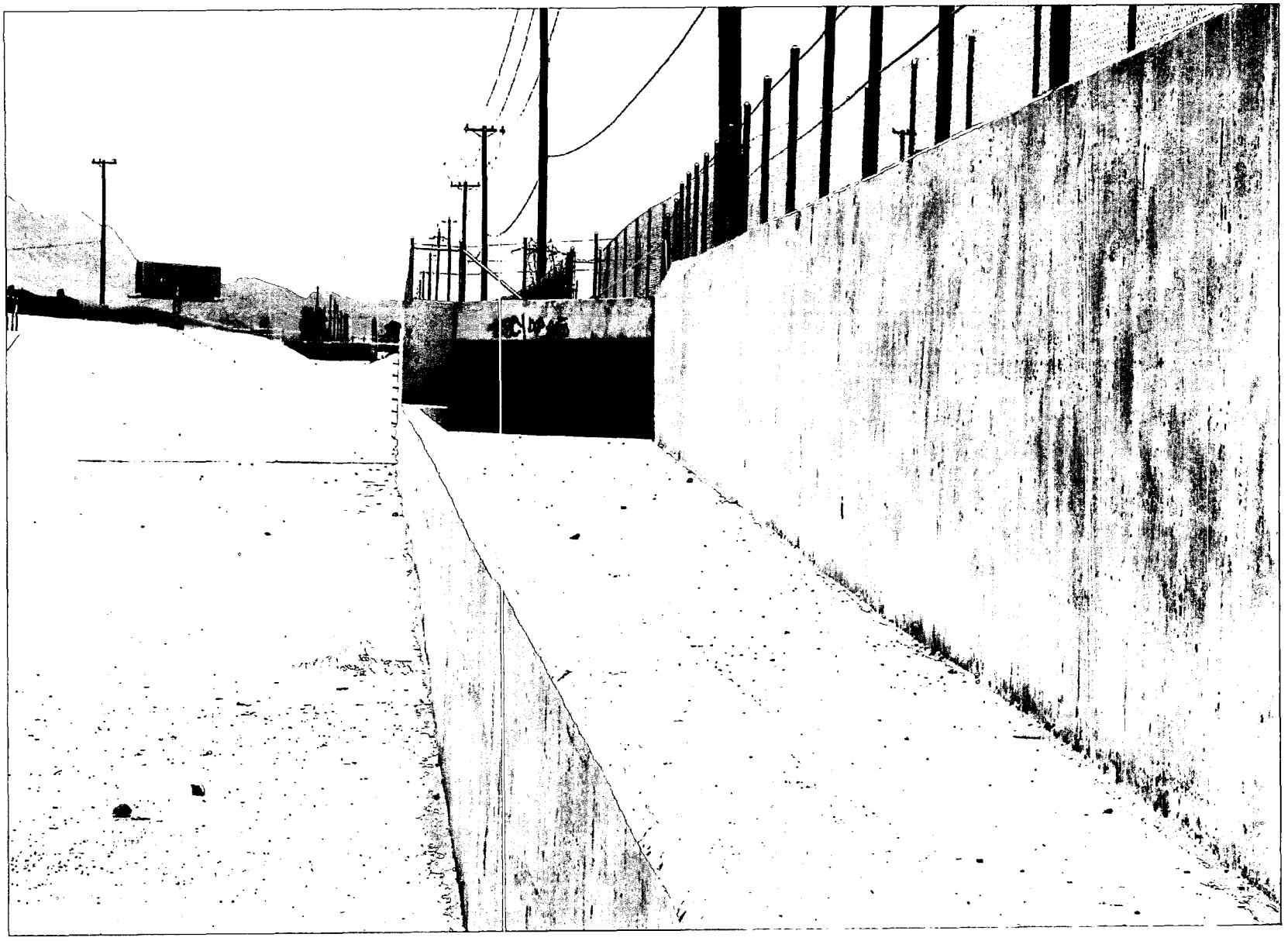
C-1 Channel System
Flood Insurance Restudy

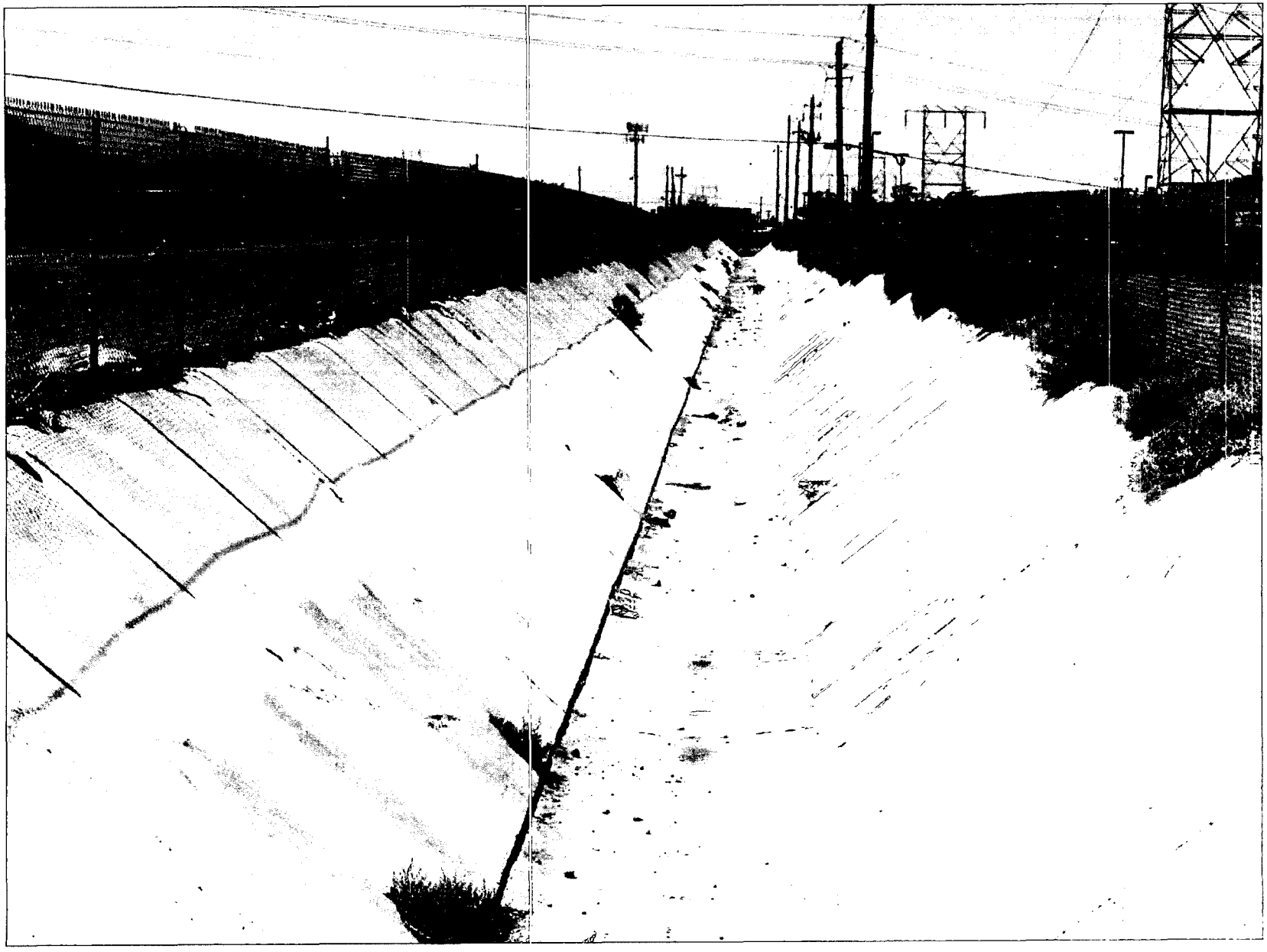
Photograph

C-1
37

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT









Carter::Burgess

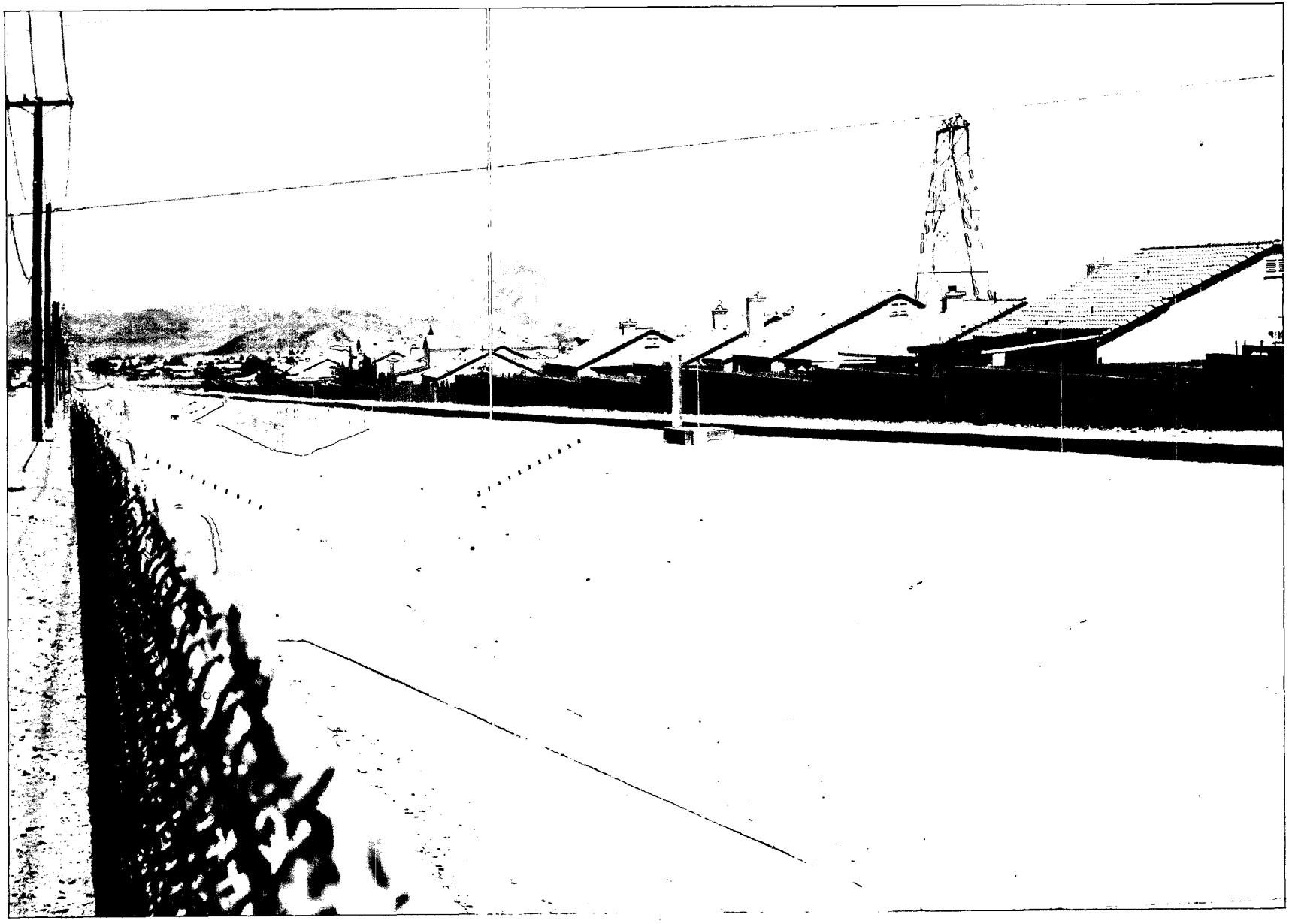
C-1 Channel System

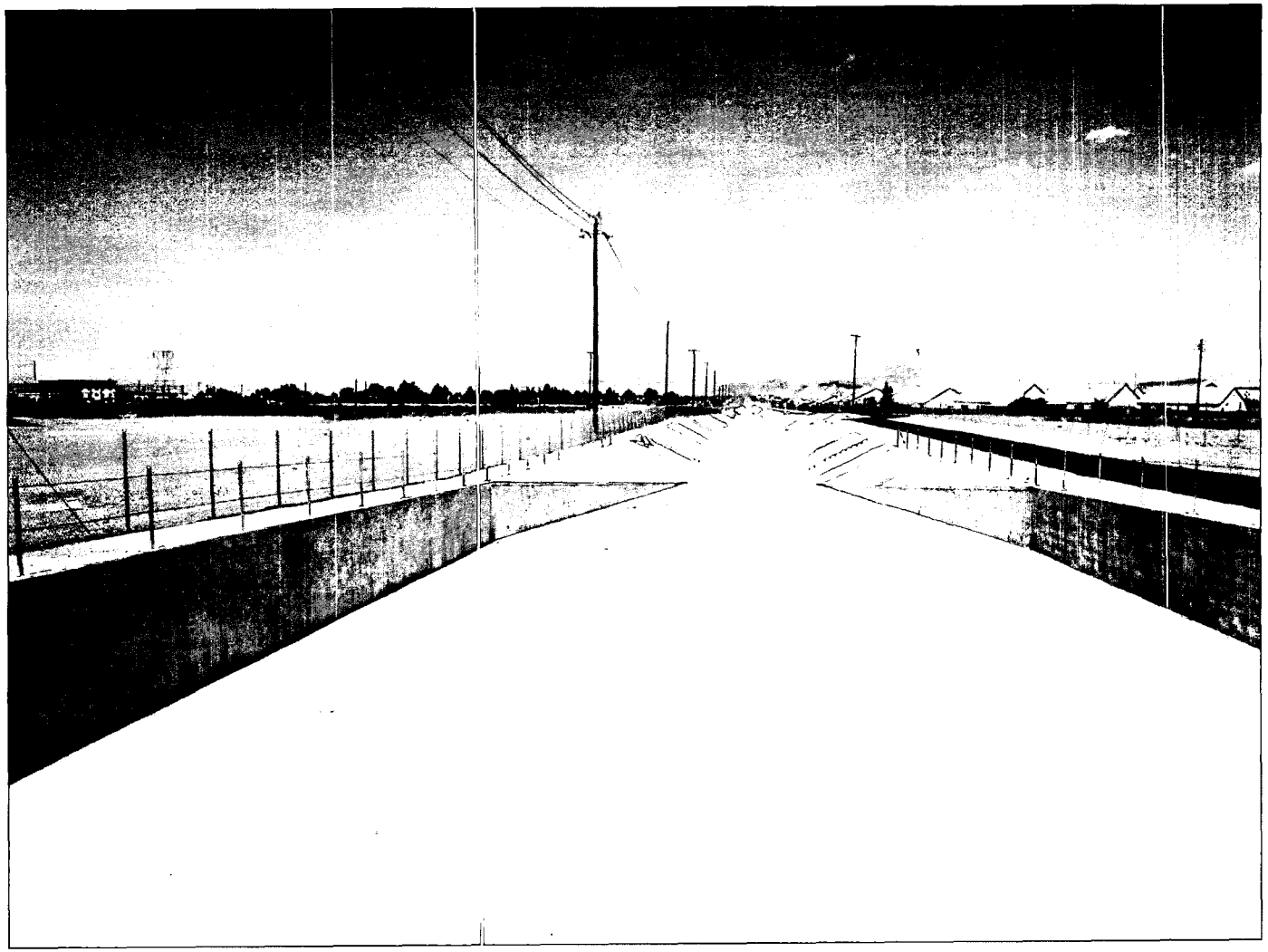
Flood Insurance Restudy

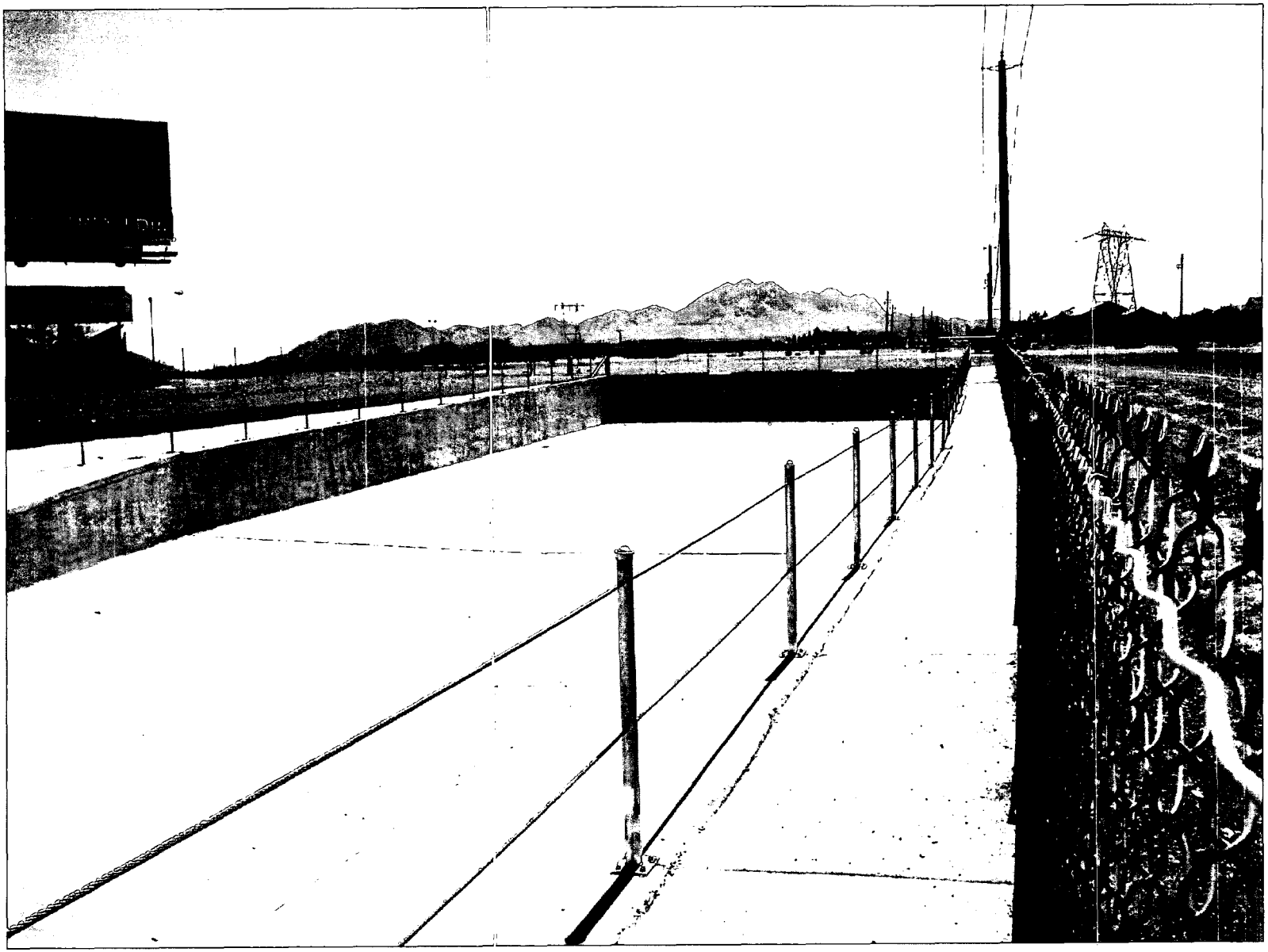
Photograph

C-1
41

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT







Carter::Burgess

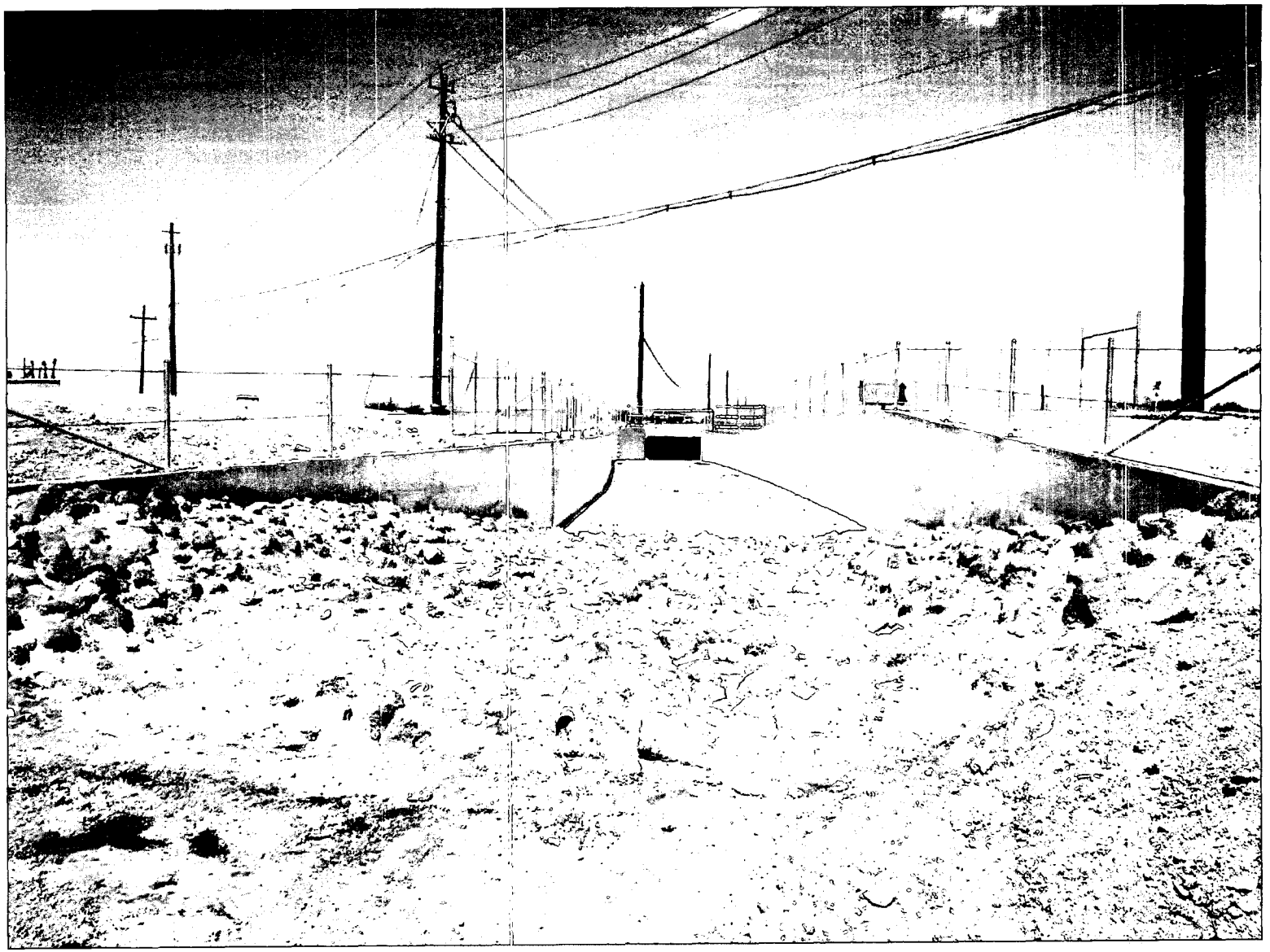
C-1 Channel System

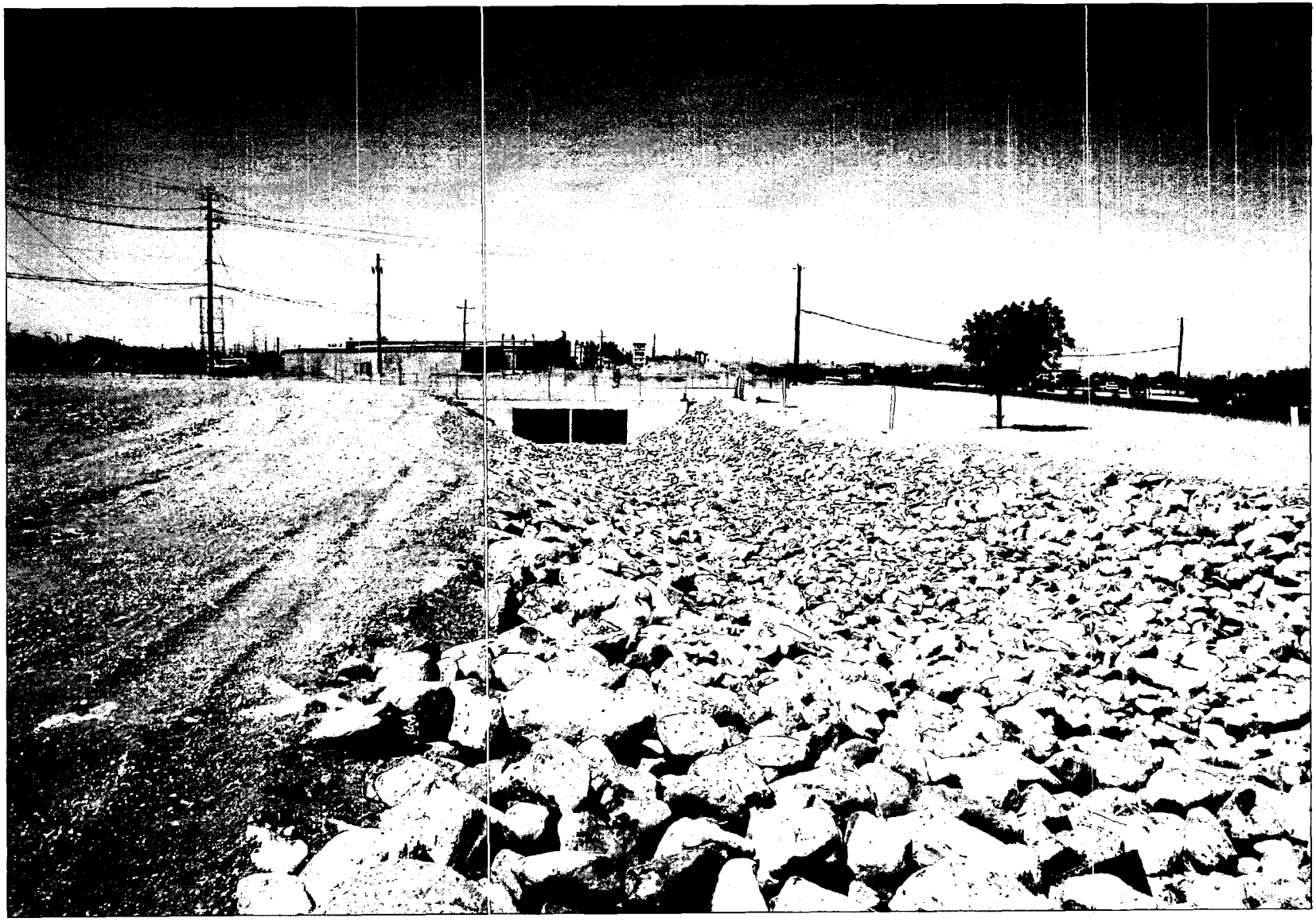
Flood Insurance Restudy

Photograph

C-1
43A

HARRIS COUNTY FLOOD CONTROL DISTRICT





Carter::Burgess

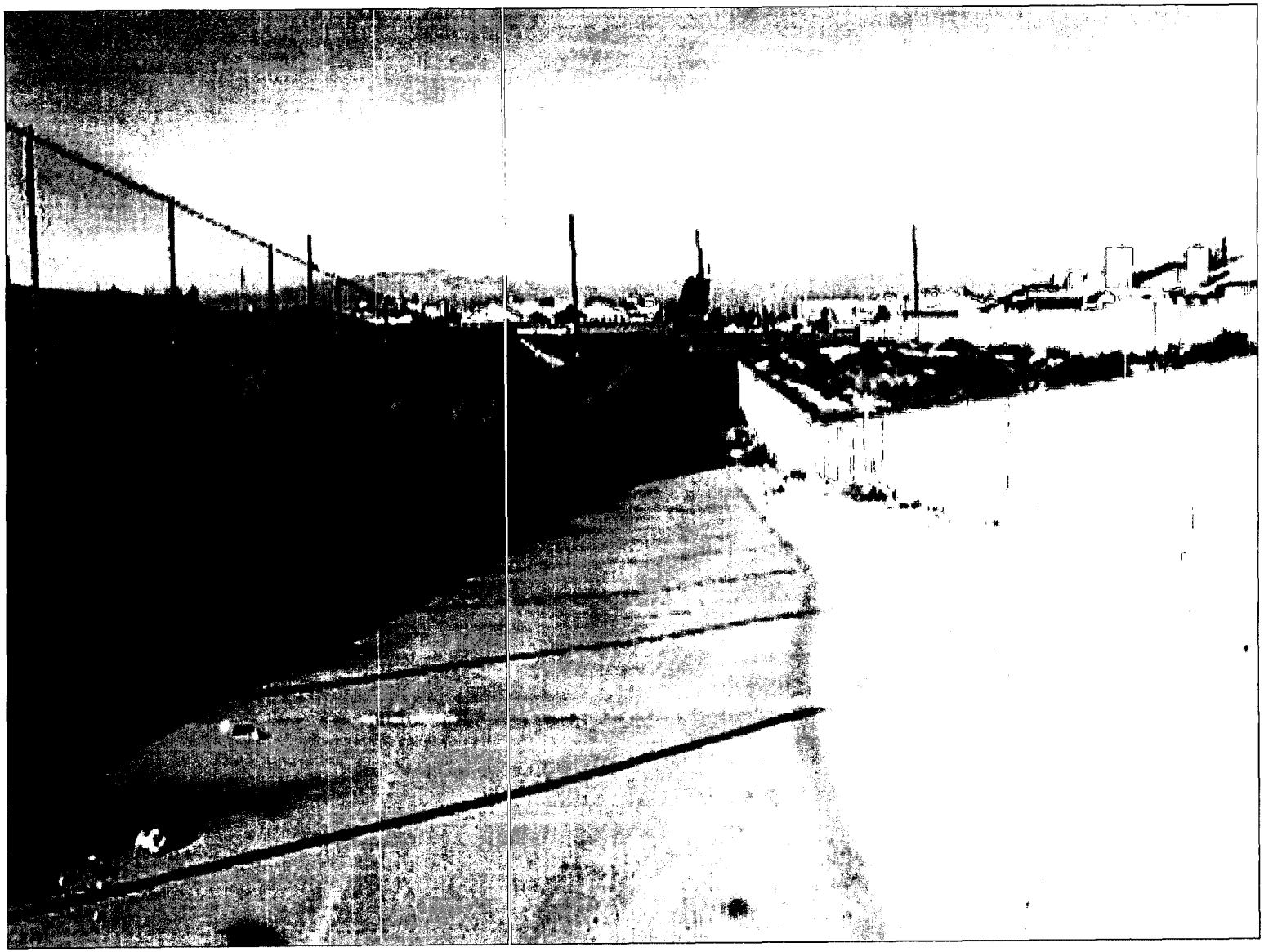
C-1 Channel System

Flood Insurance Restudy

Photograph

C-1
44A

REGIONAL FLOOD CONTROL DISTRICT



Carter::Burgess

C-1 Channel System
Flood Insurance Restudy

Photograph

DR
1

REGIONAL FLOOD CONTROL DISTRICT



Carter::Burgess

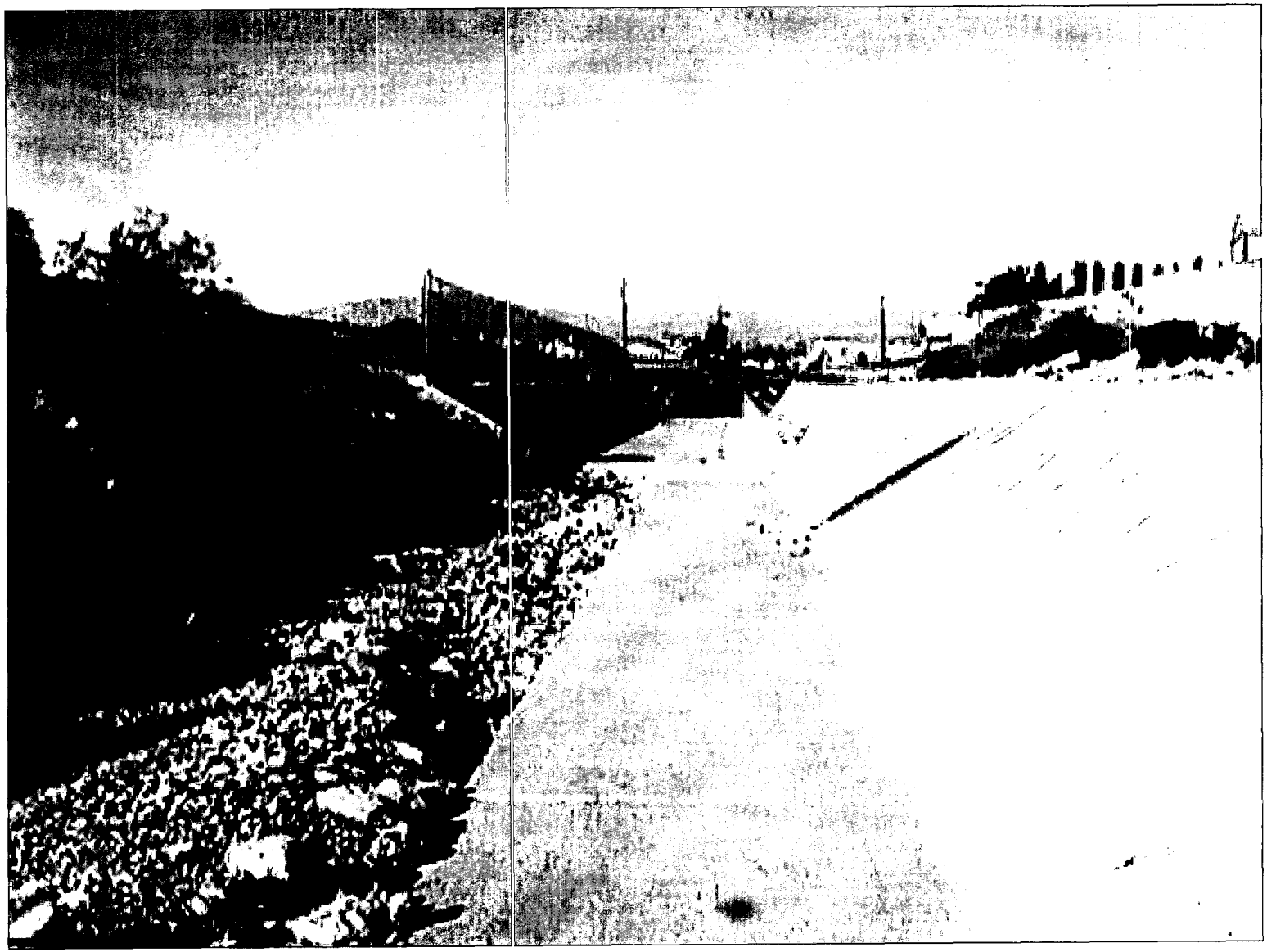
C-1 Channel System
Flood Insurance Restudy

Photograph

DR
2

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT





Carter::Burgess

C-1 Channel System
Flood Insurance Restudy

Photograph

DR
4

REGIONAL FLOOD CONTROL DISTRICT



Carter::Burgess

C-1 Channel System

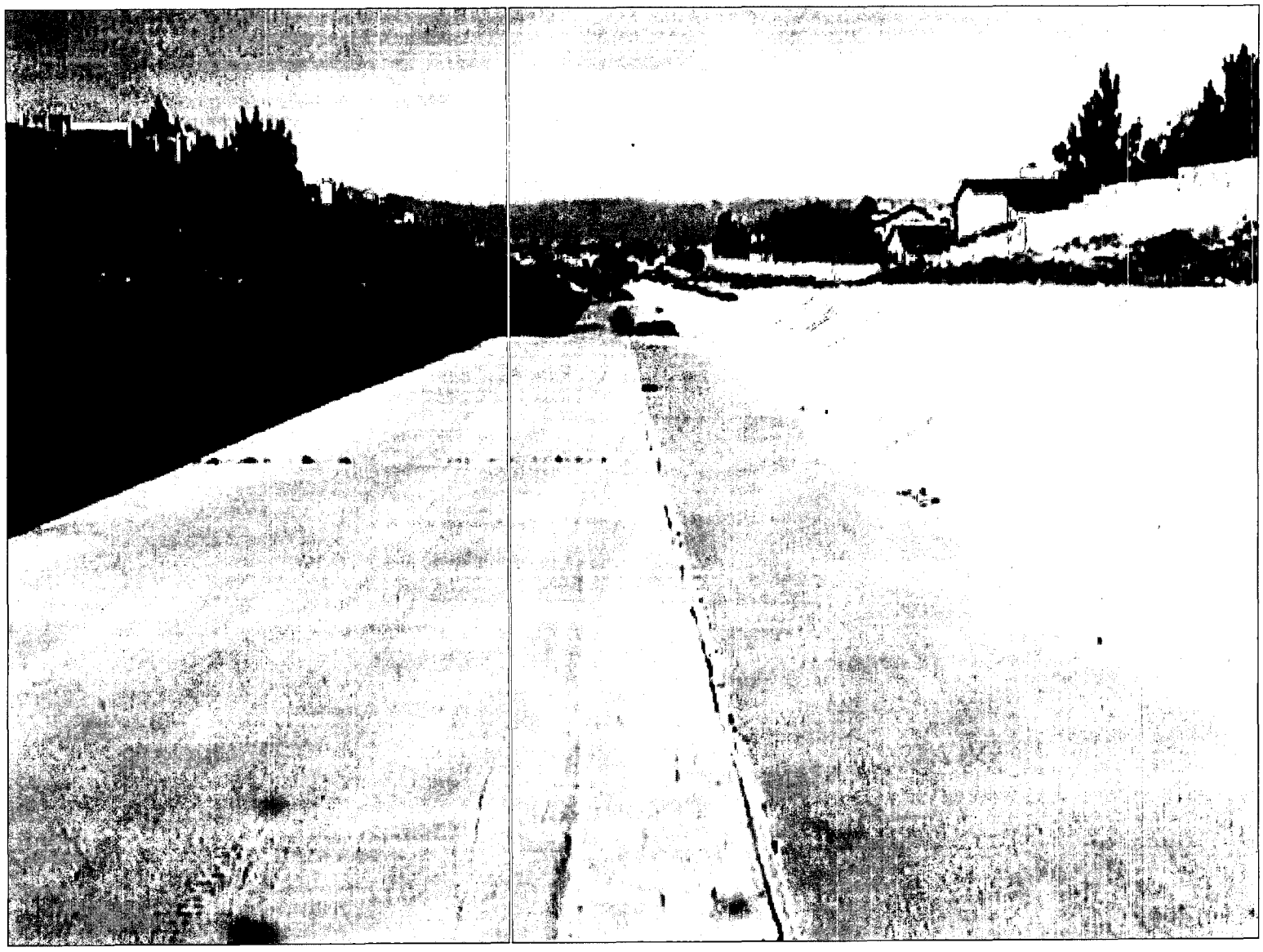
Flood Insurance Restudy

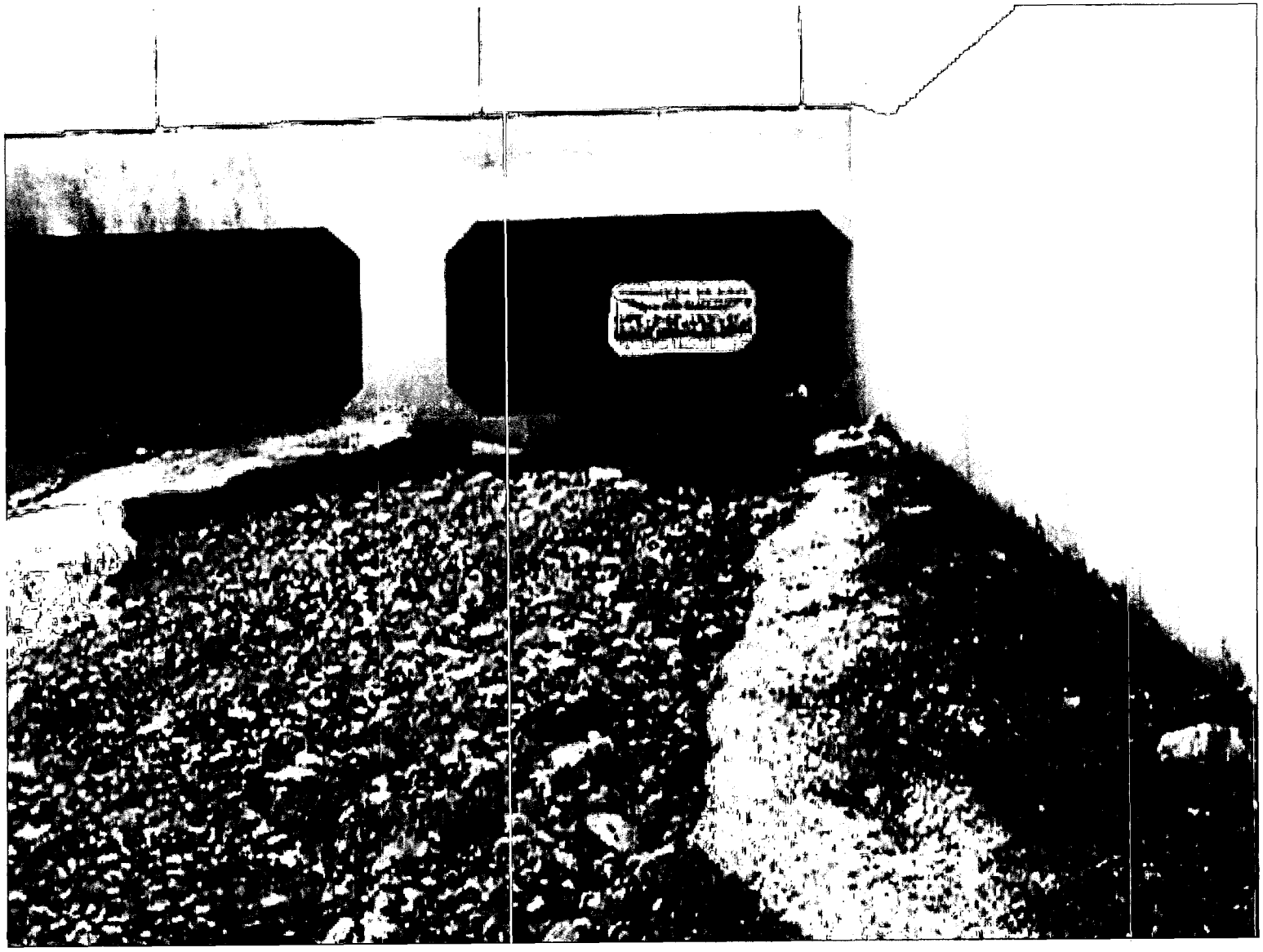
Photograph

DR 5

REGIONAL FLOOD CONTROL DISTRICT







Carter::Burgess

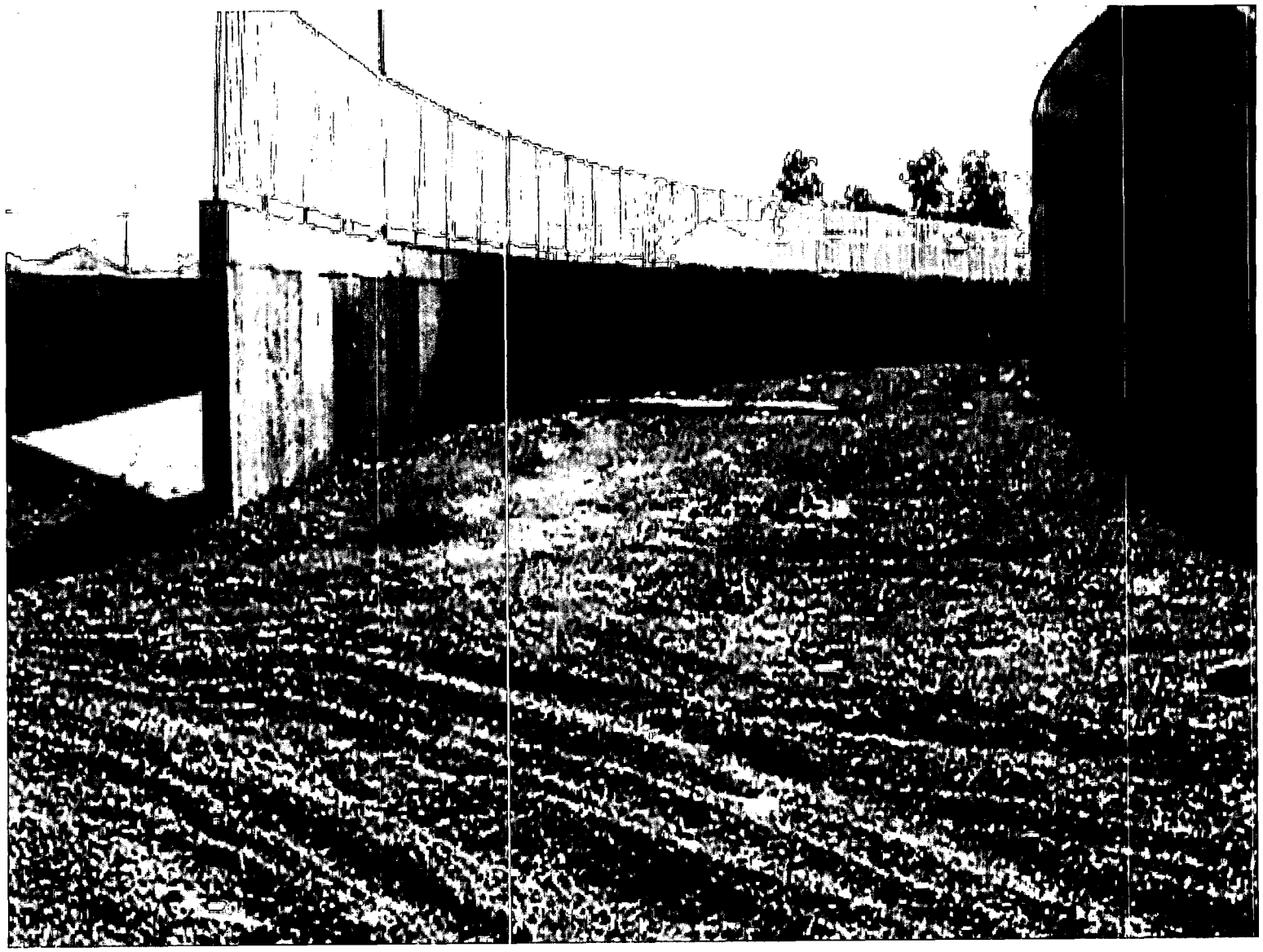
C-1 Channel System

Flood Insurance Restudy

Photograph

DR 8

REGIONAL FLOOD CONTROL DISTRICT



Carter::Burgess

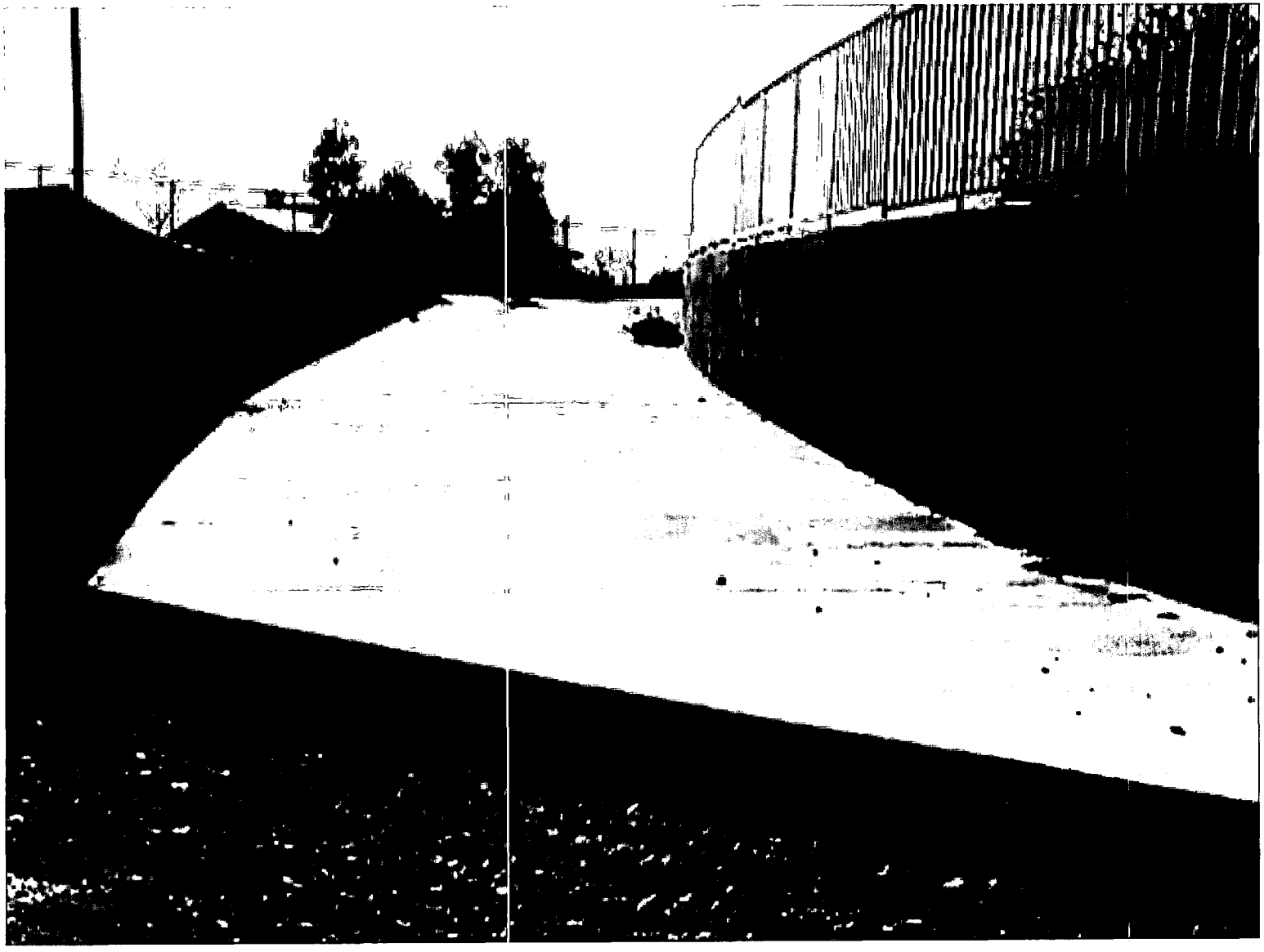
C-1 Channel System

Flood Insurance Restudy

Photograph

DR 9

REGIONAL FLOOD CONTROL DISTRICT



Carter::Burgess

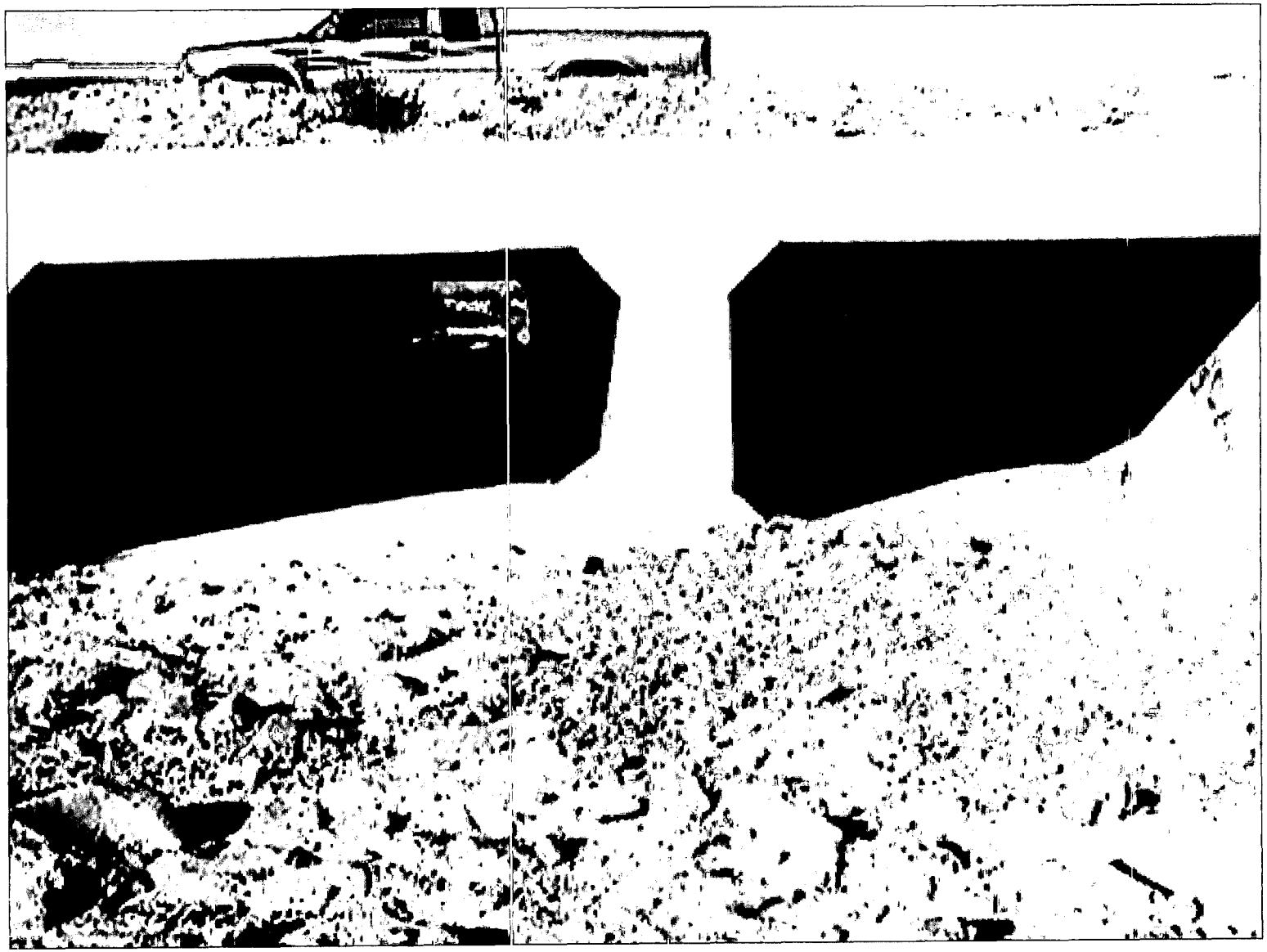
C-1 Channel System

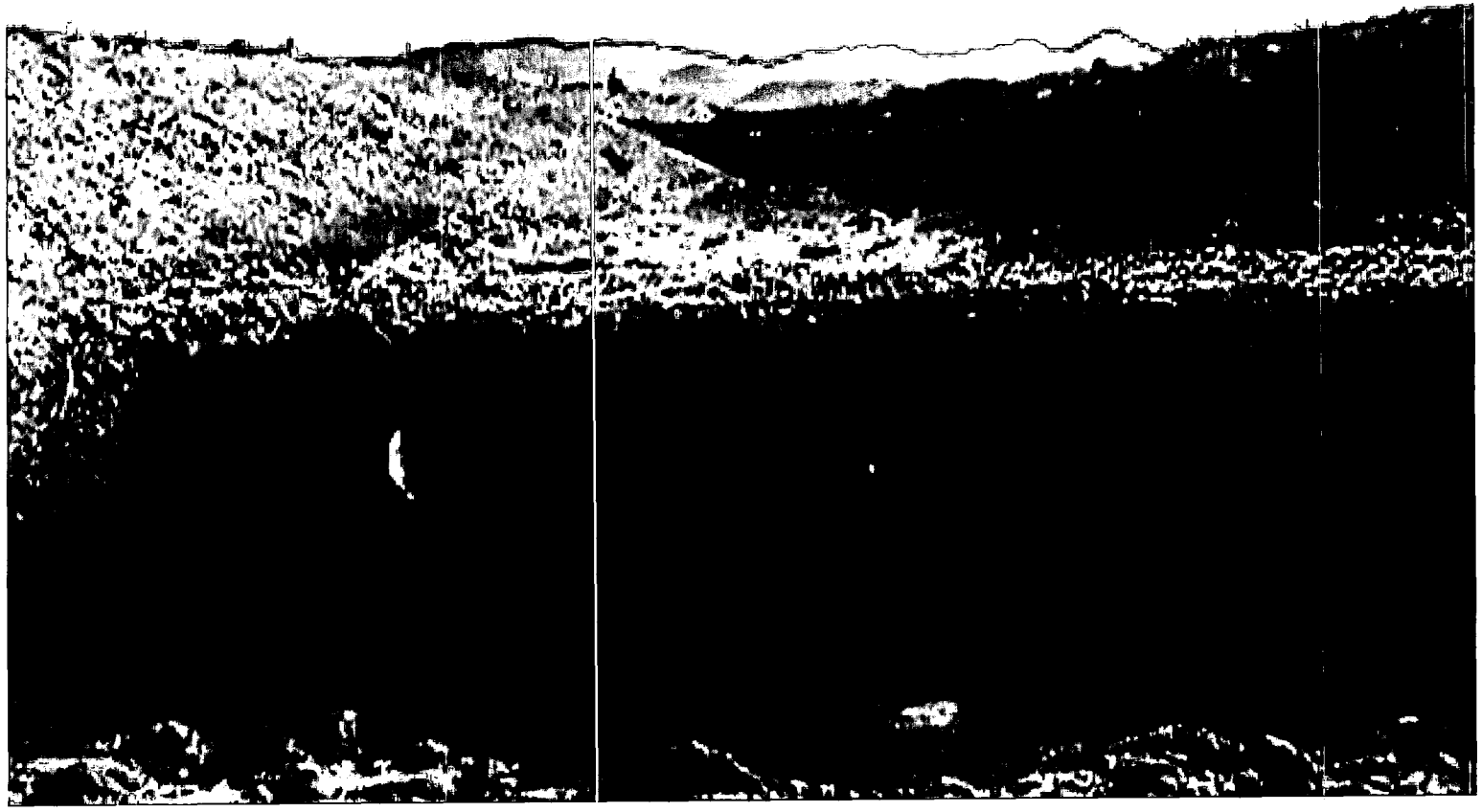
Flood Insurance Restudy

Photograph

DR
10

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT





Carter::Burgess

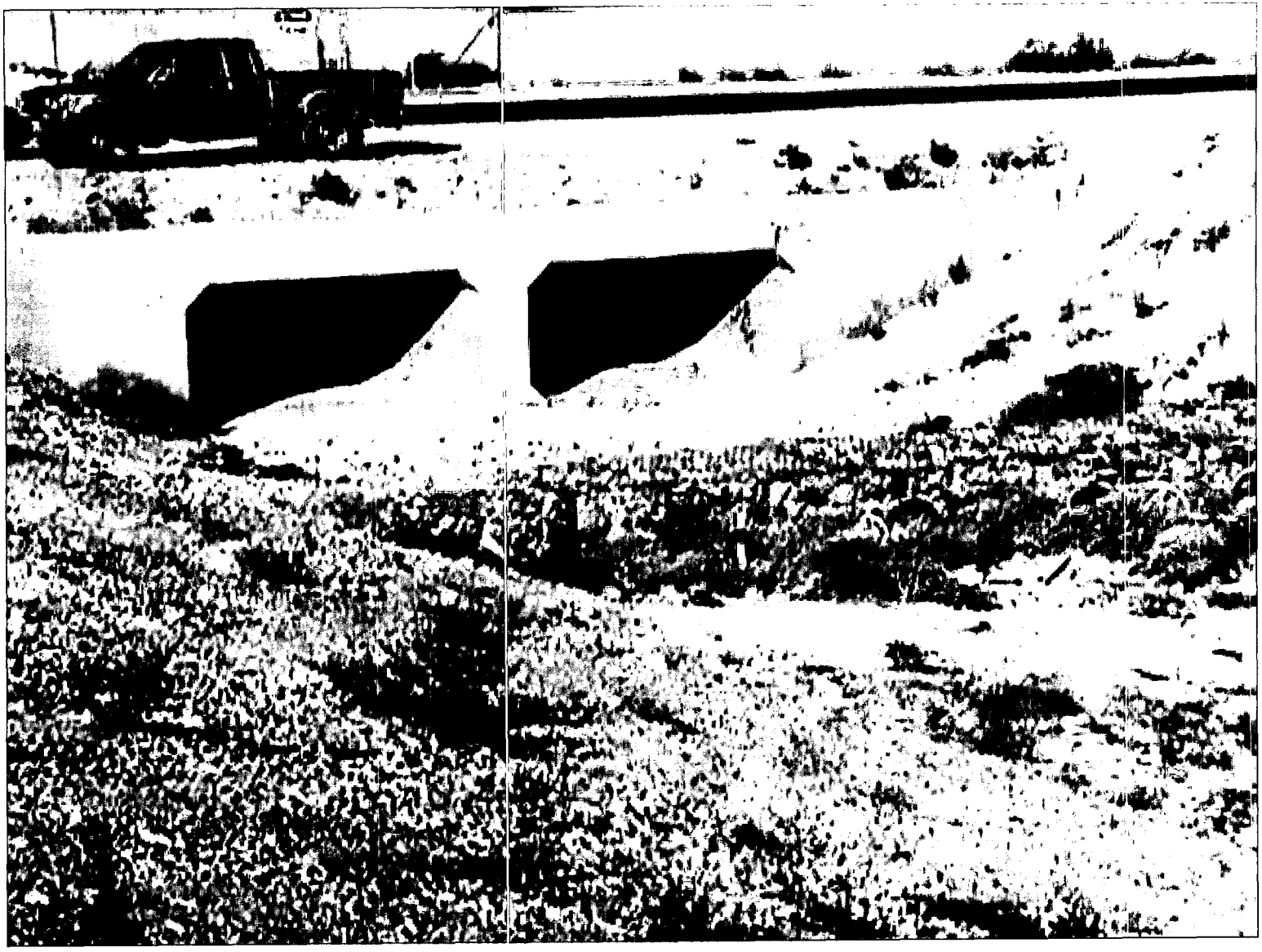
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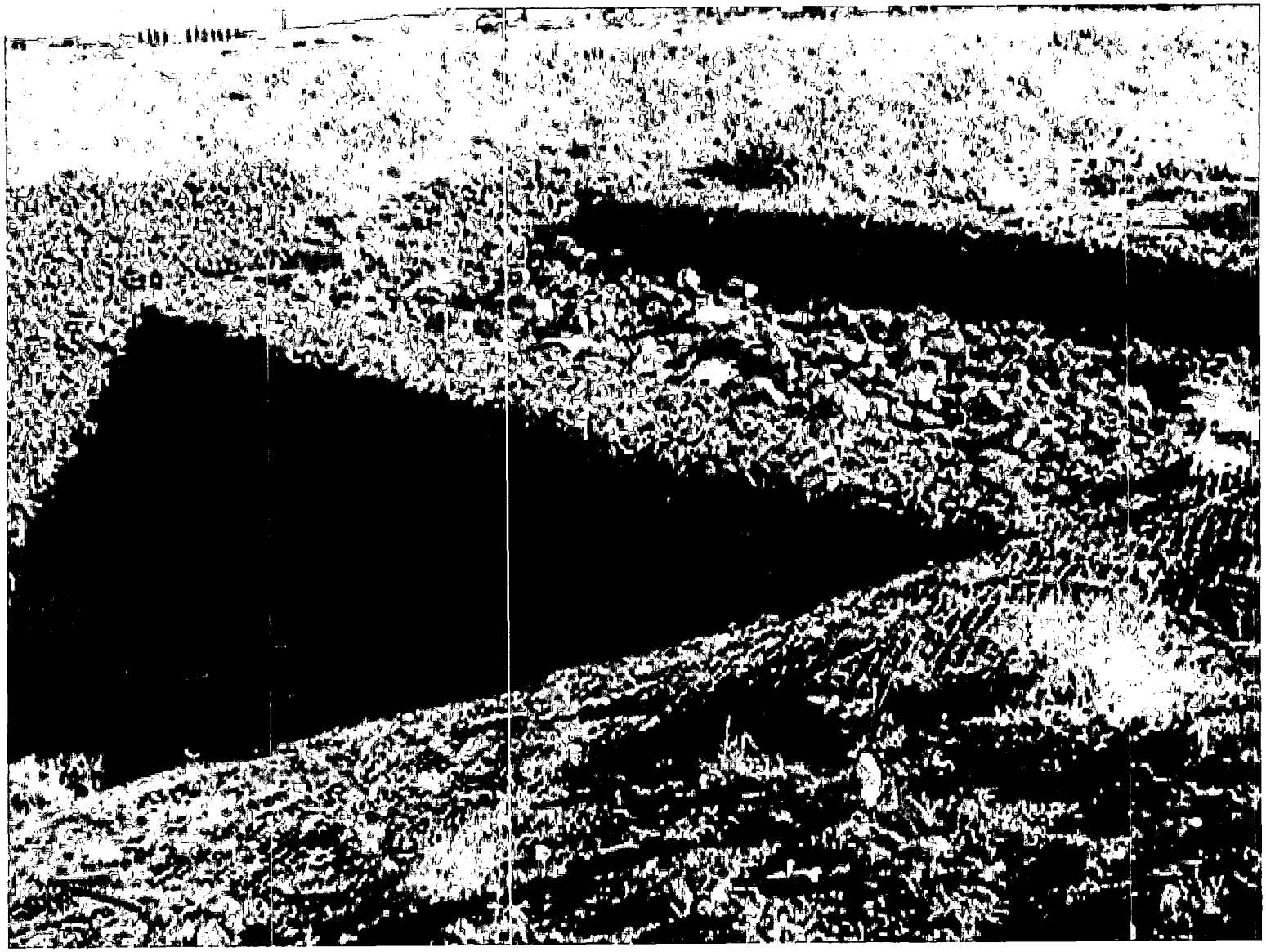
Flood Insurance Restudy

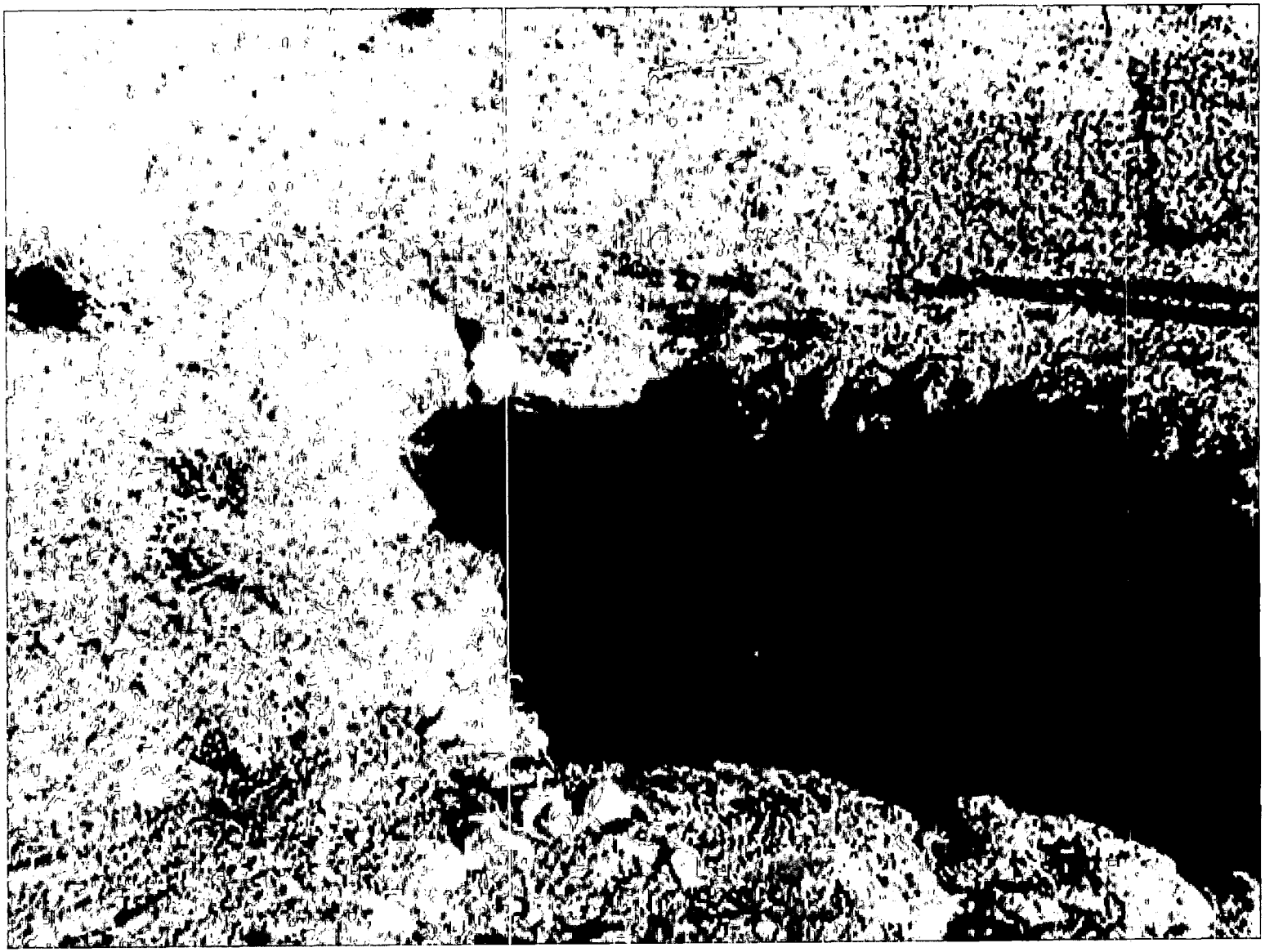
Photograph

DR 12

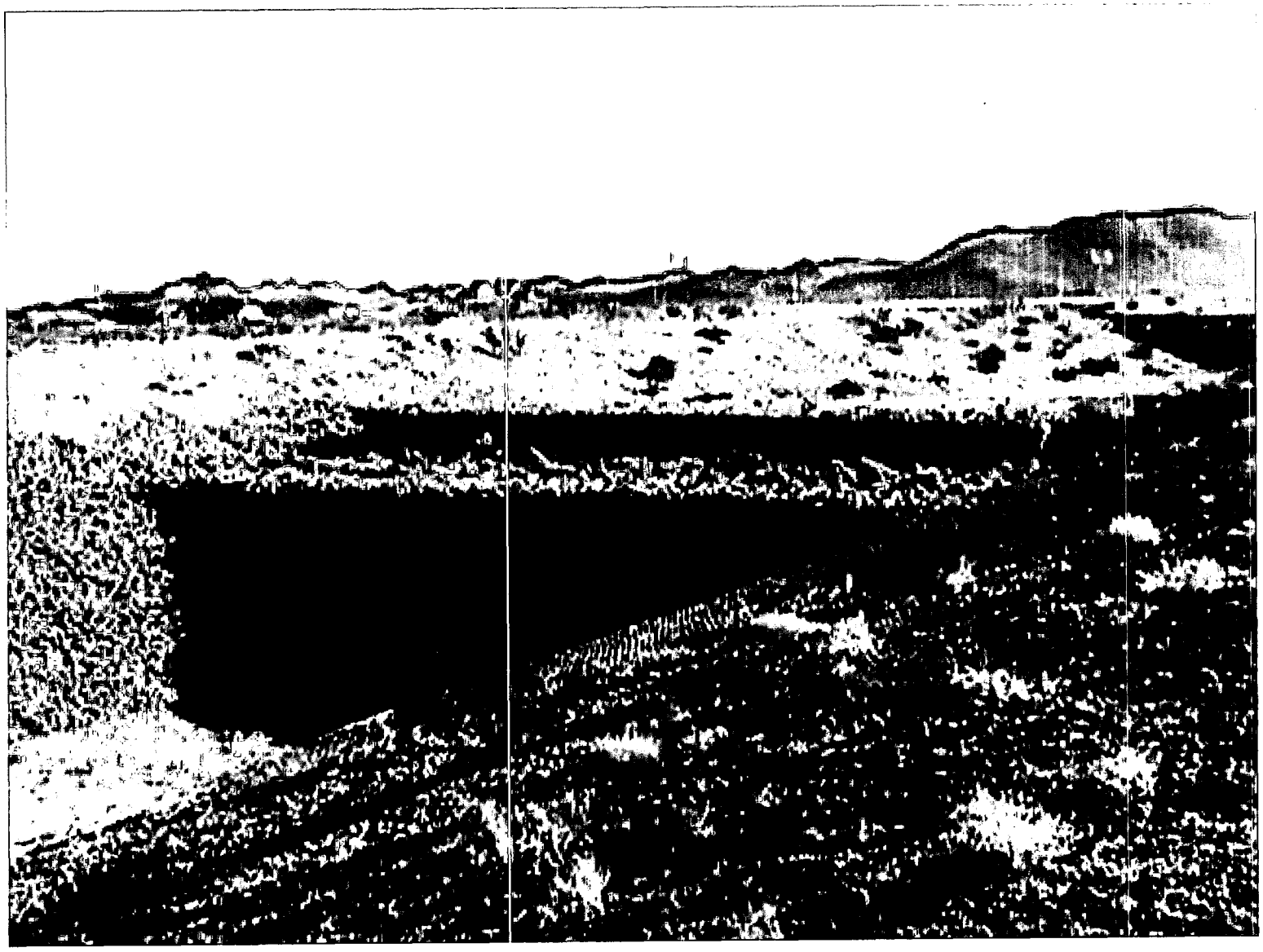
REGIONAL FLOOD CONTROL DISTRICT



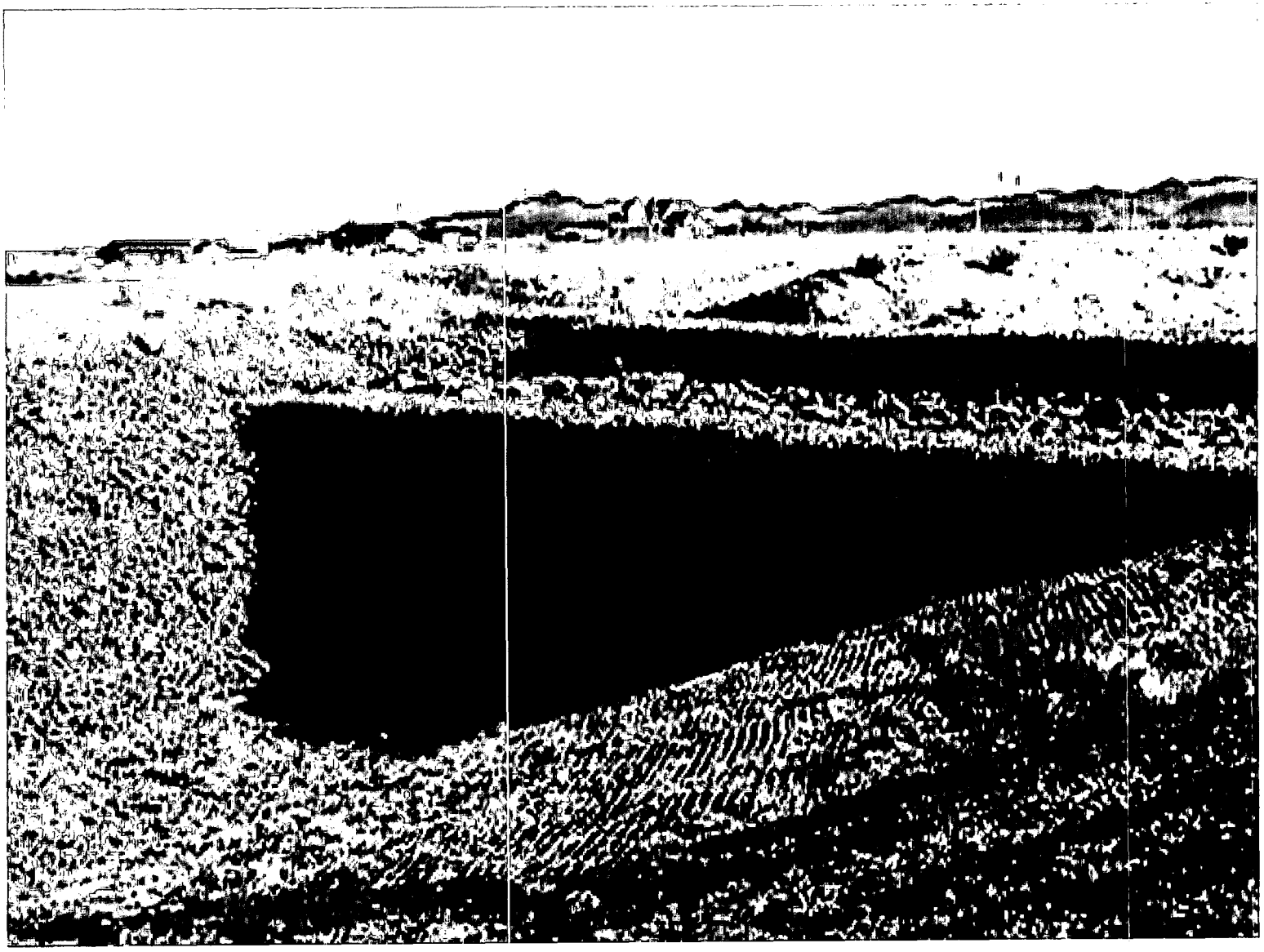


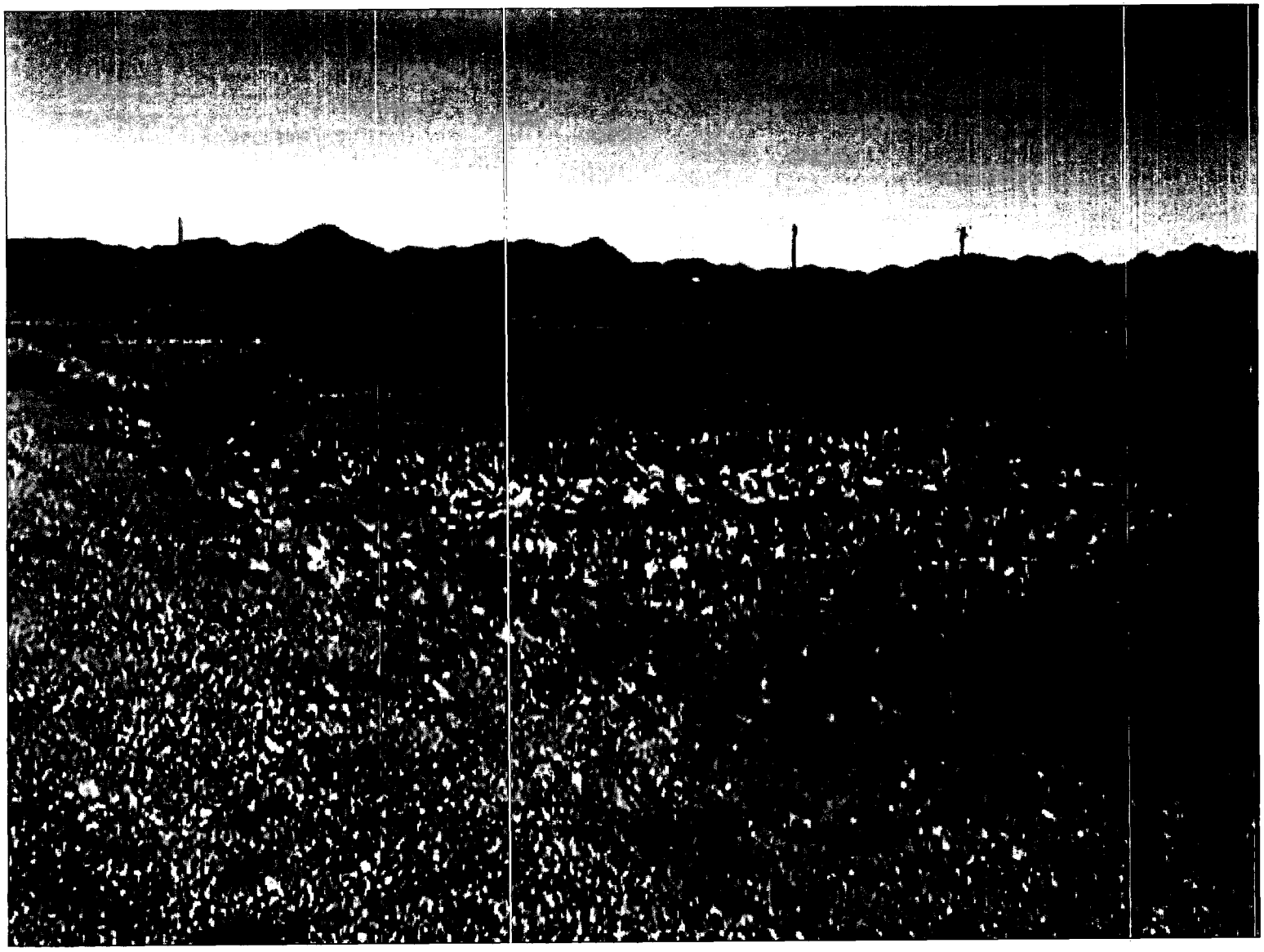


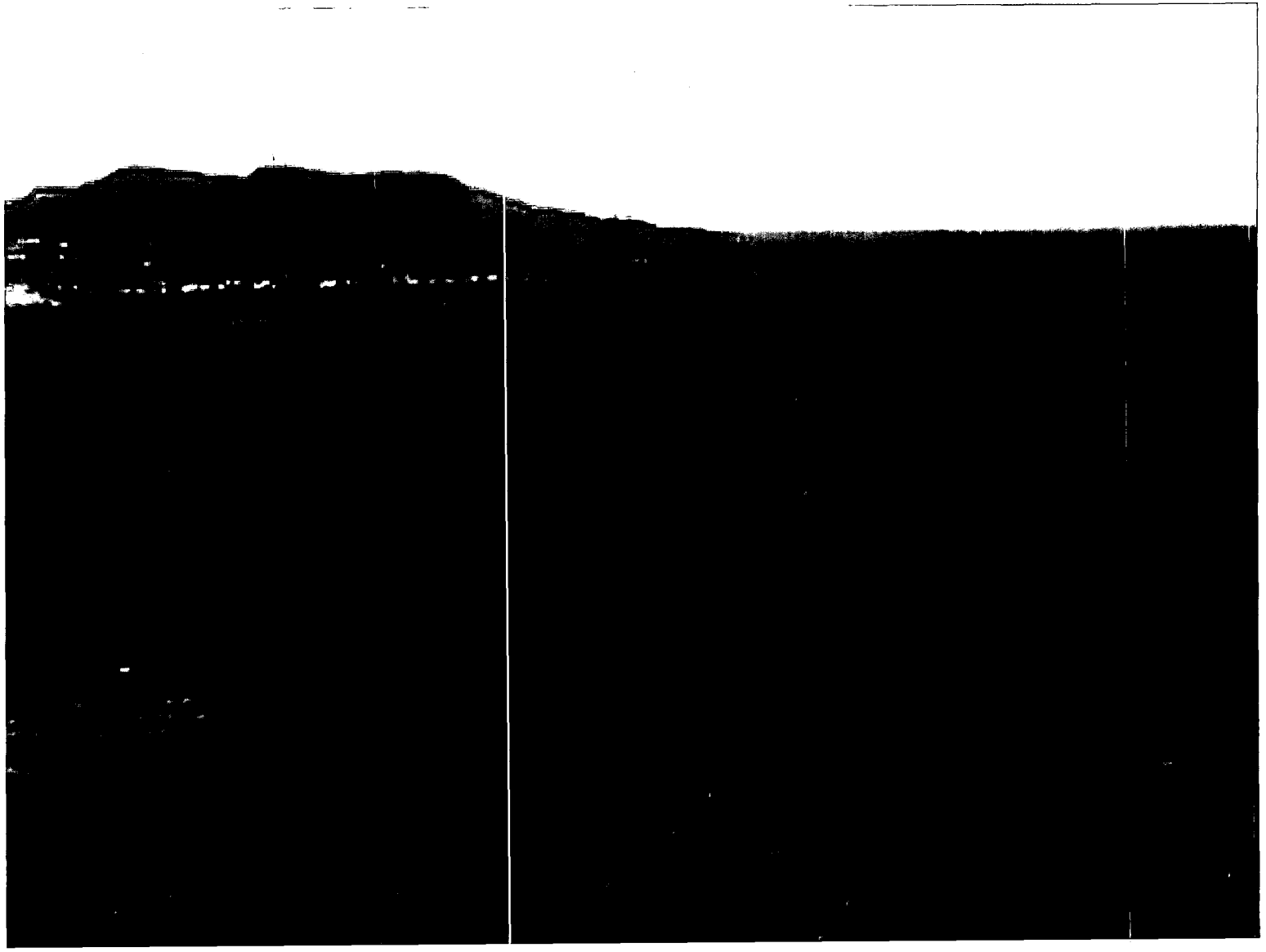












Carter::Burgess

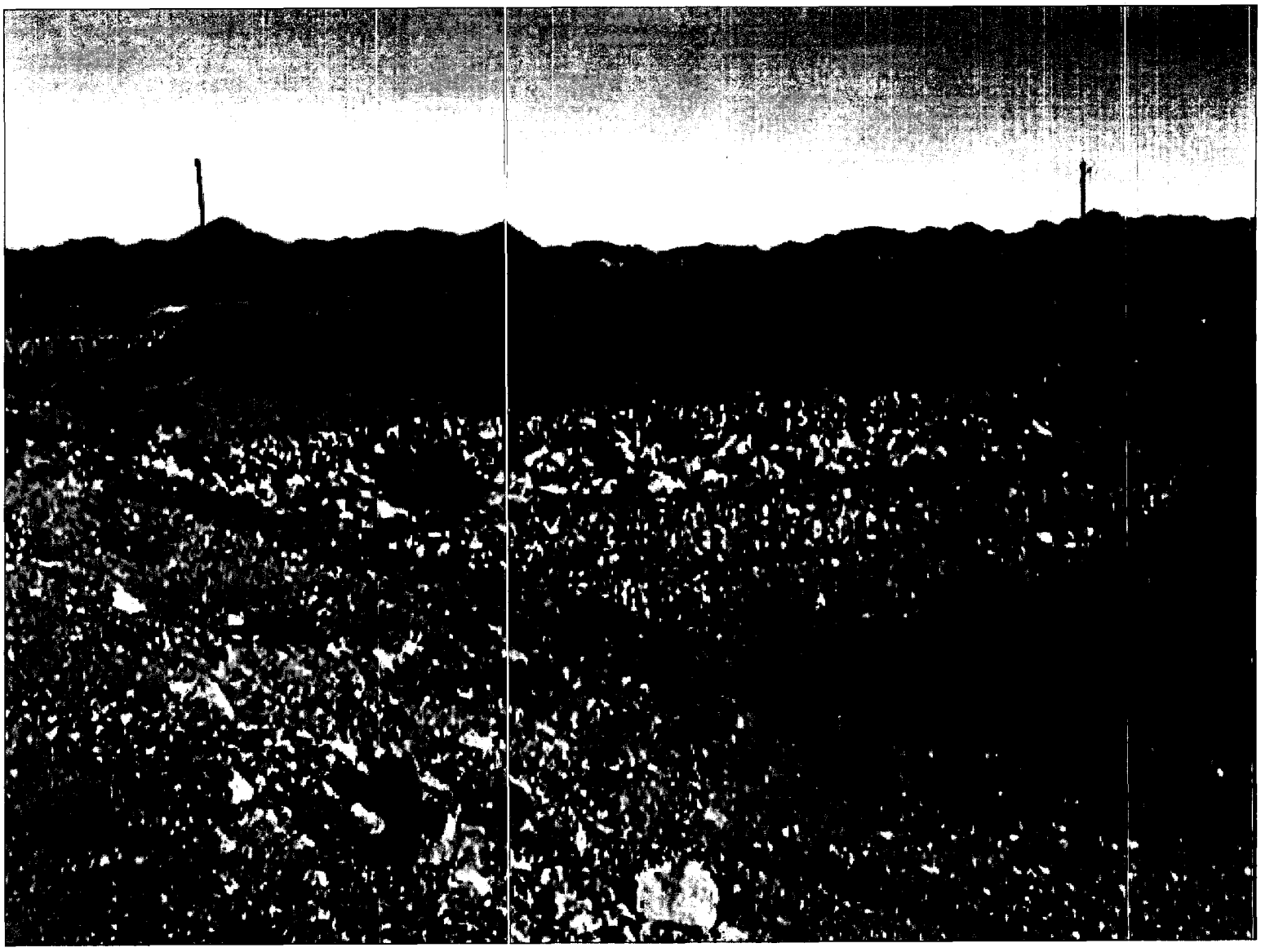
C-1 Channel System

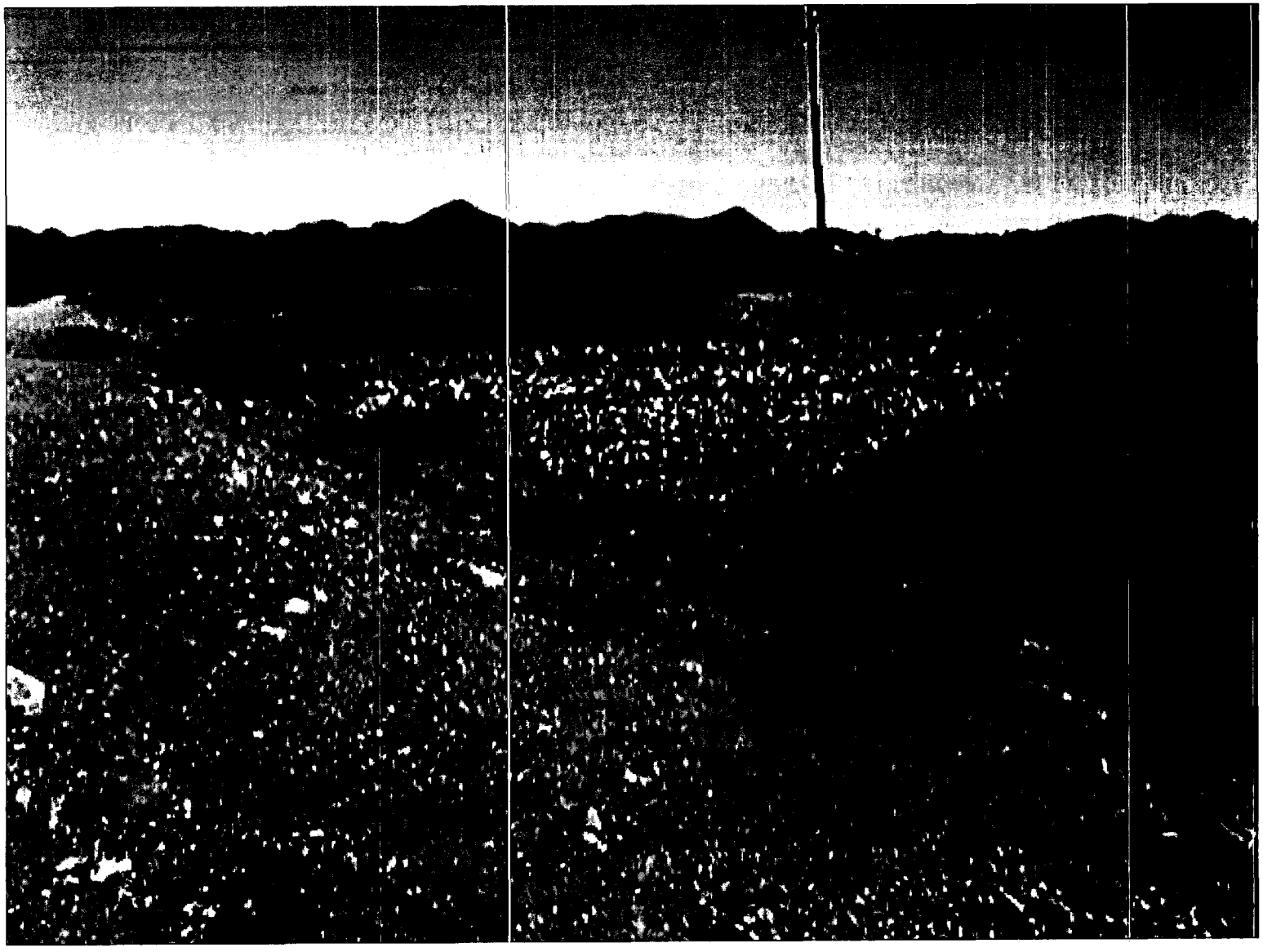
Flood Insurance Restudy

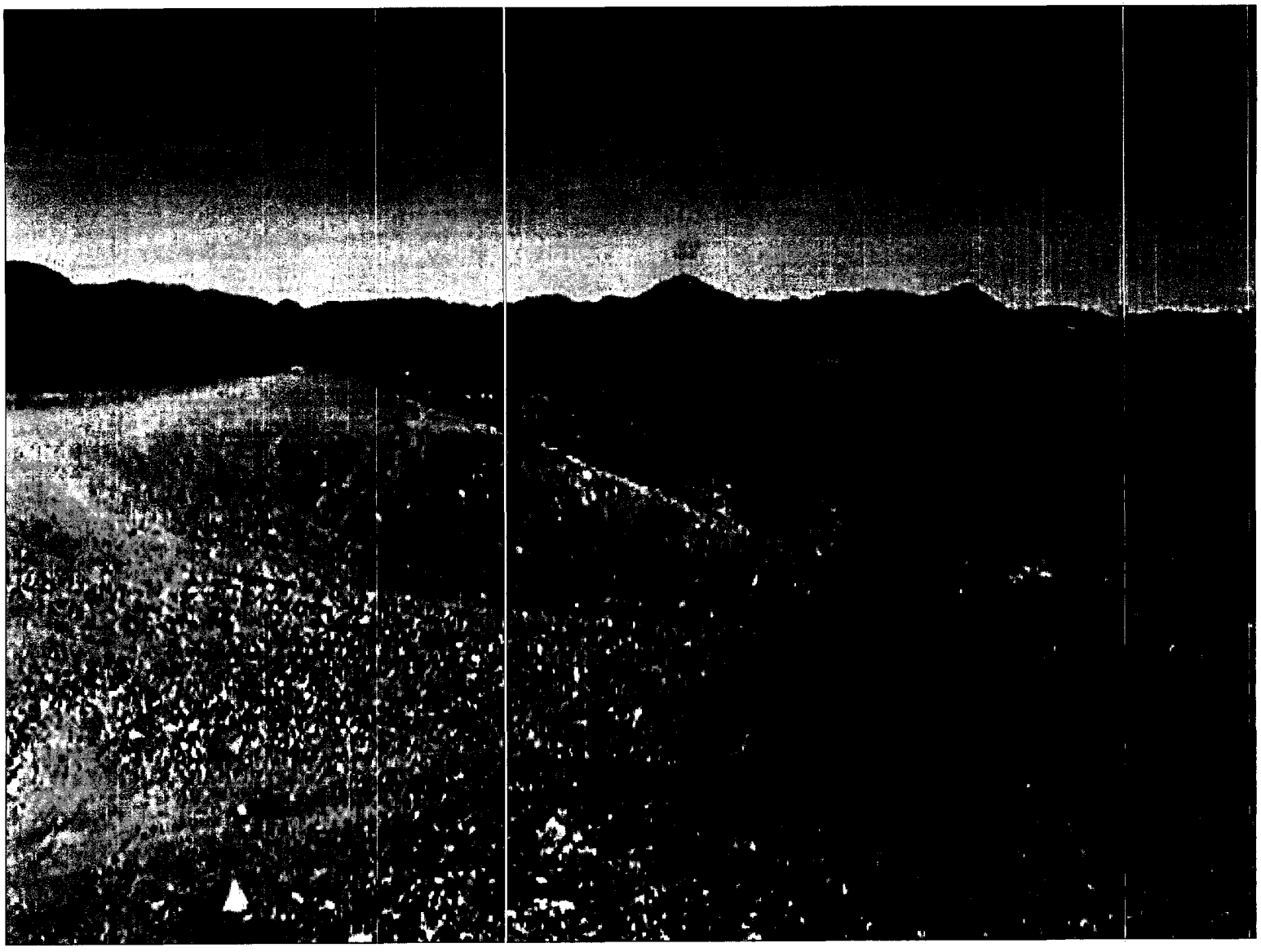
Photograph

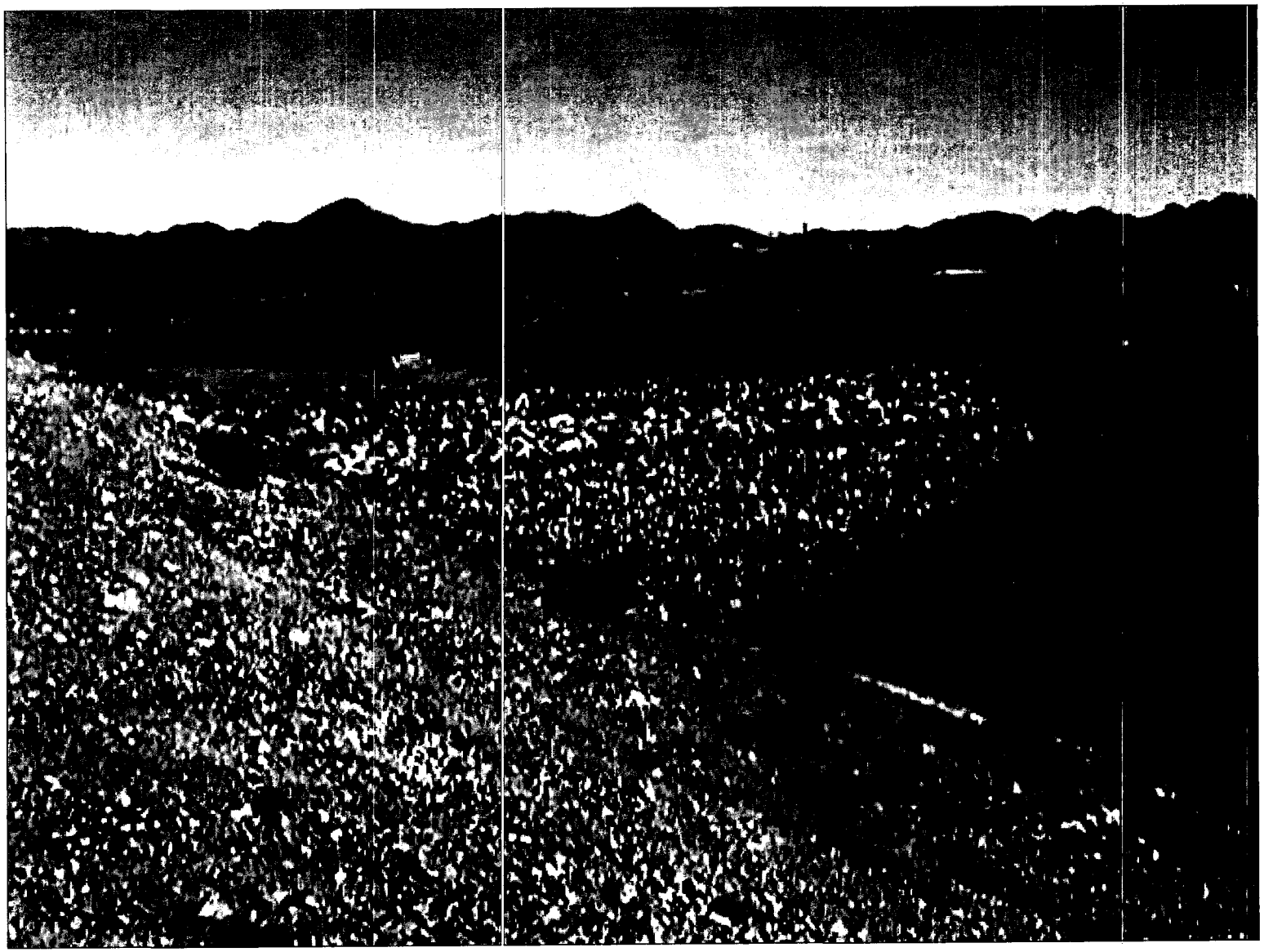
DR 21

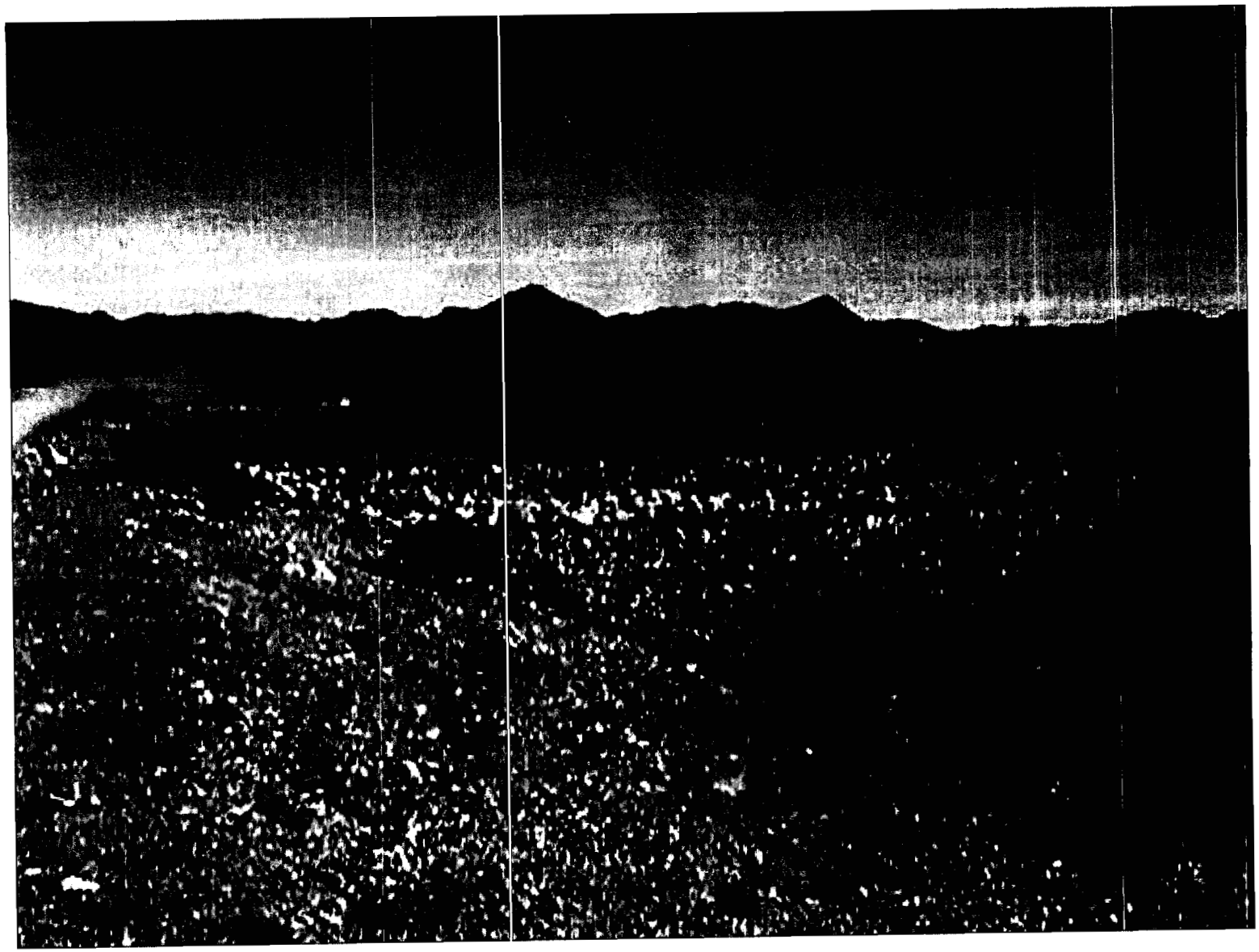
CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT

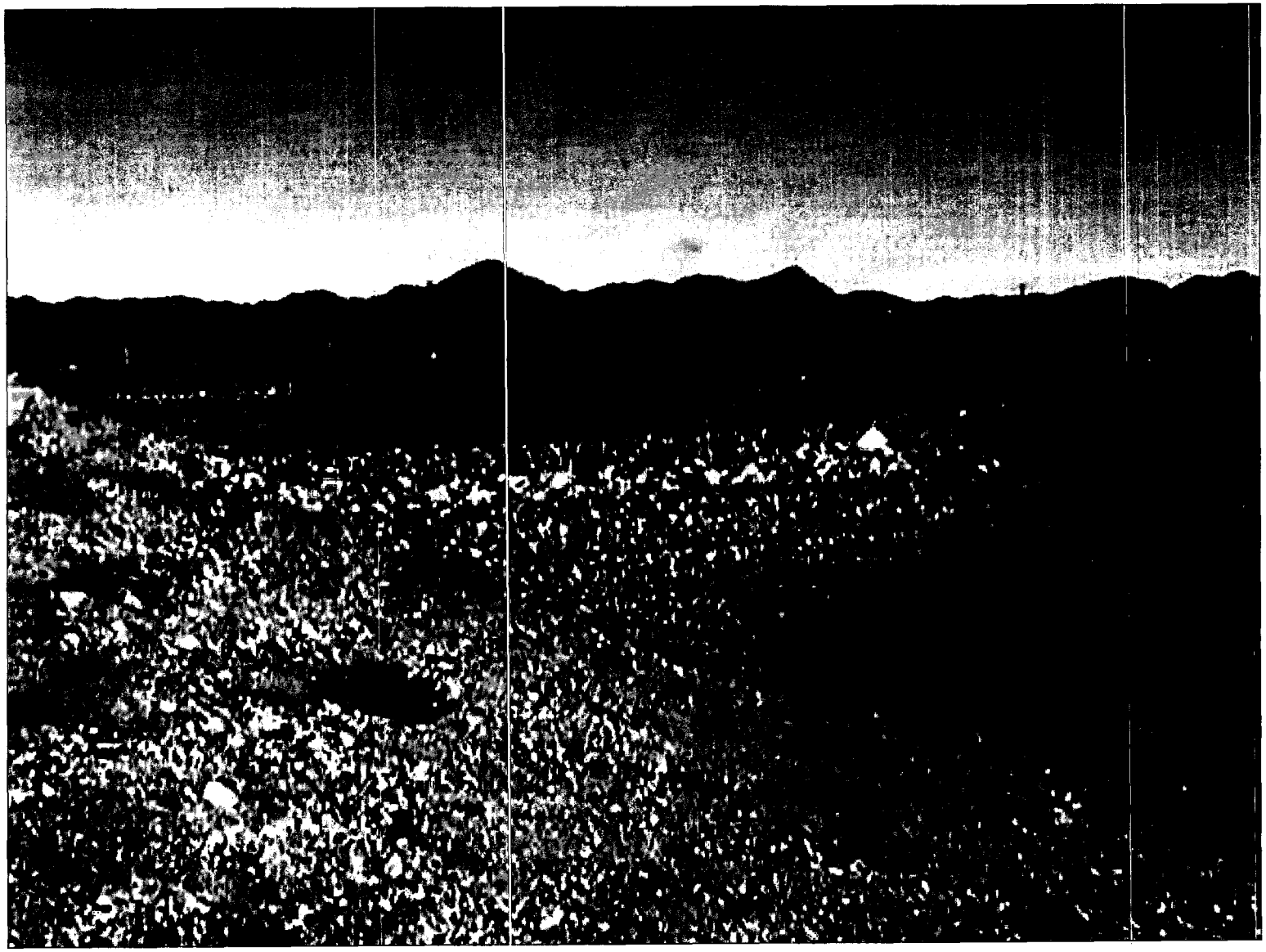


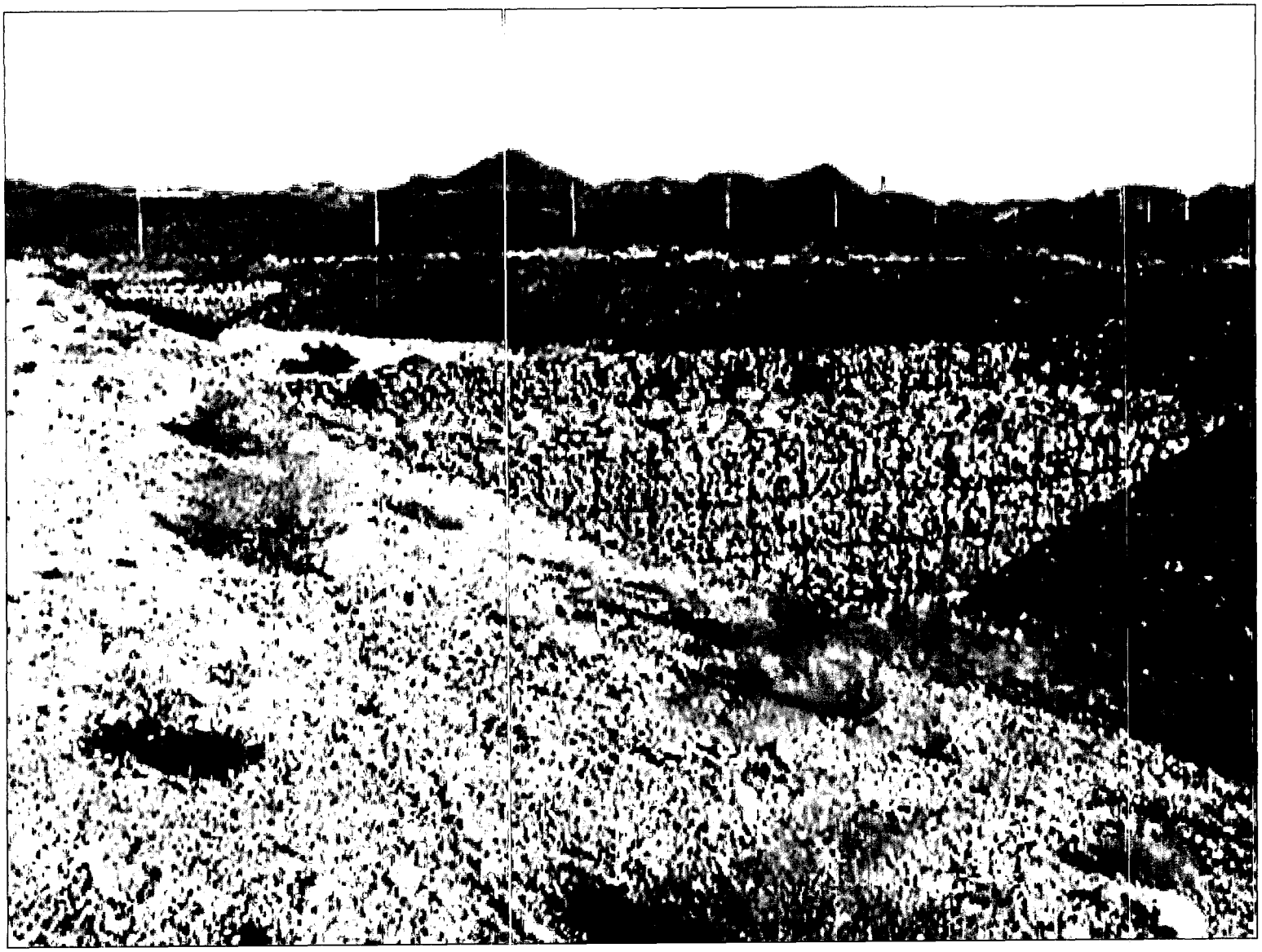


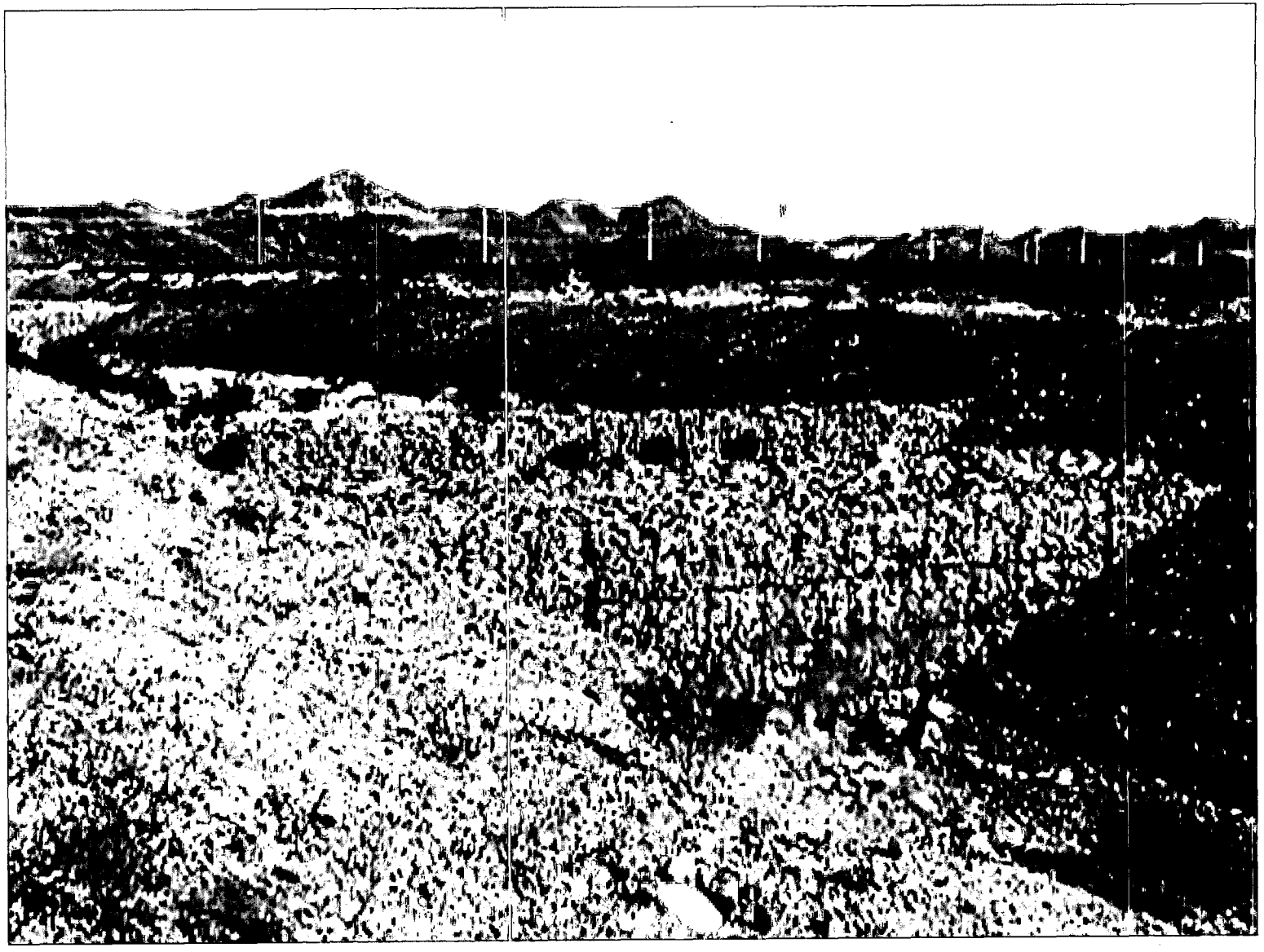


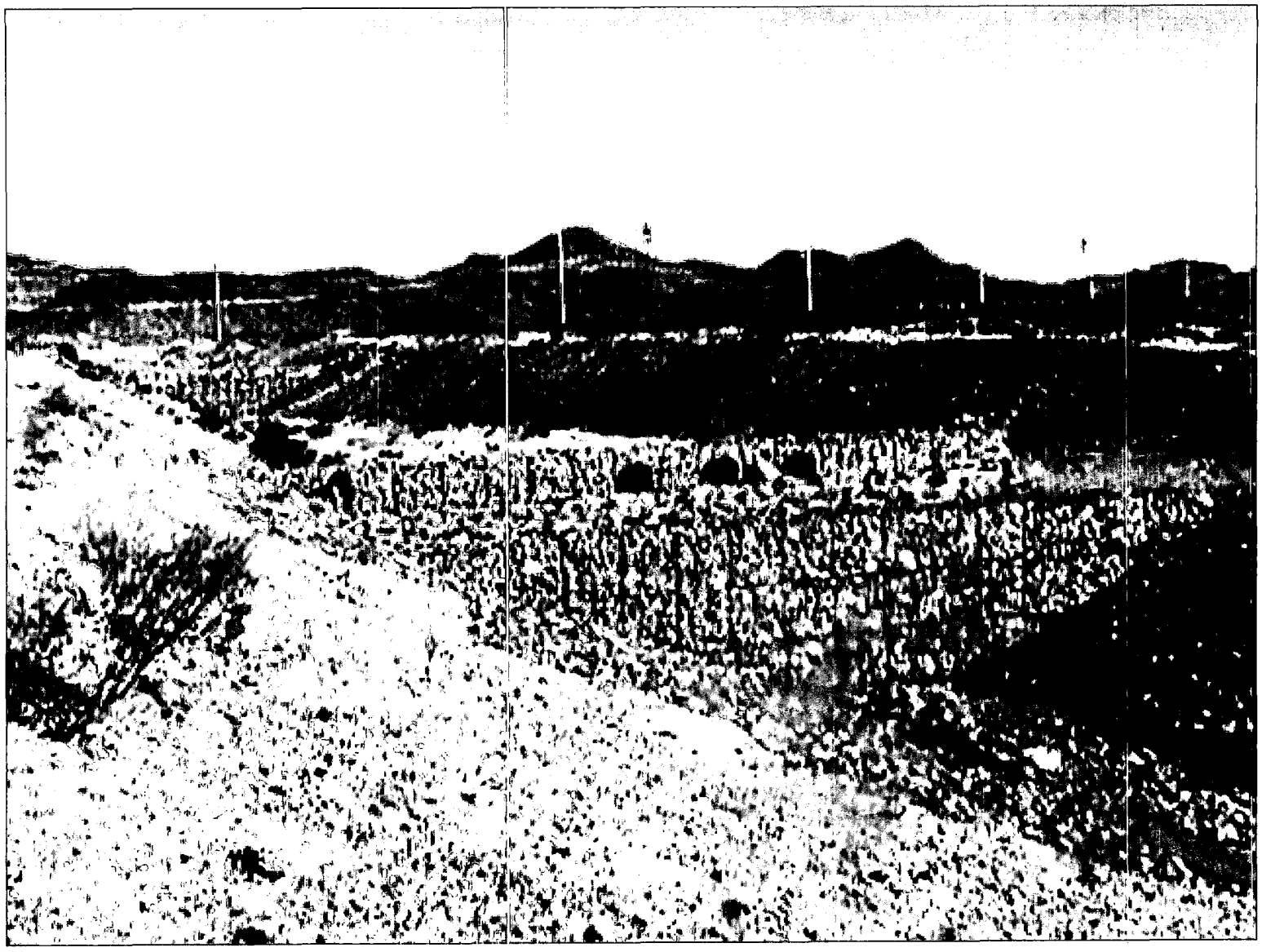


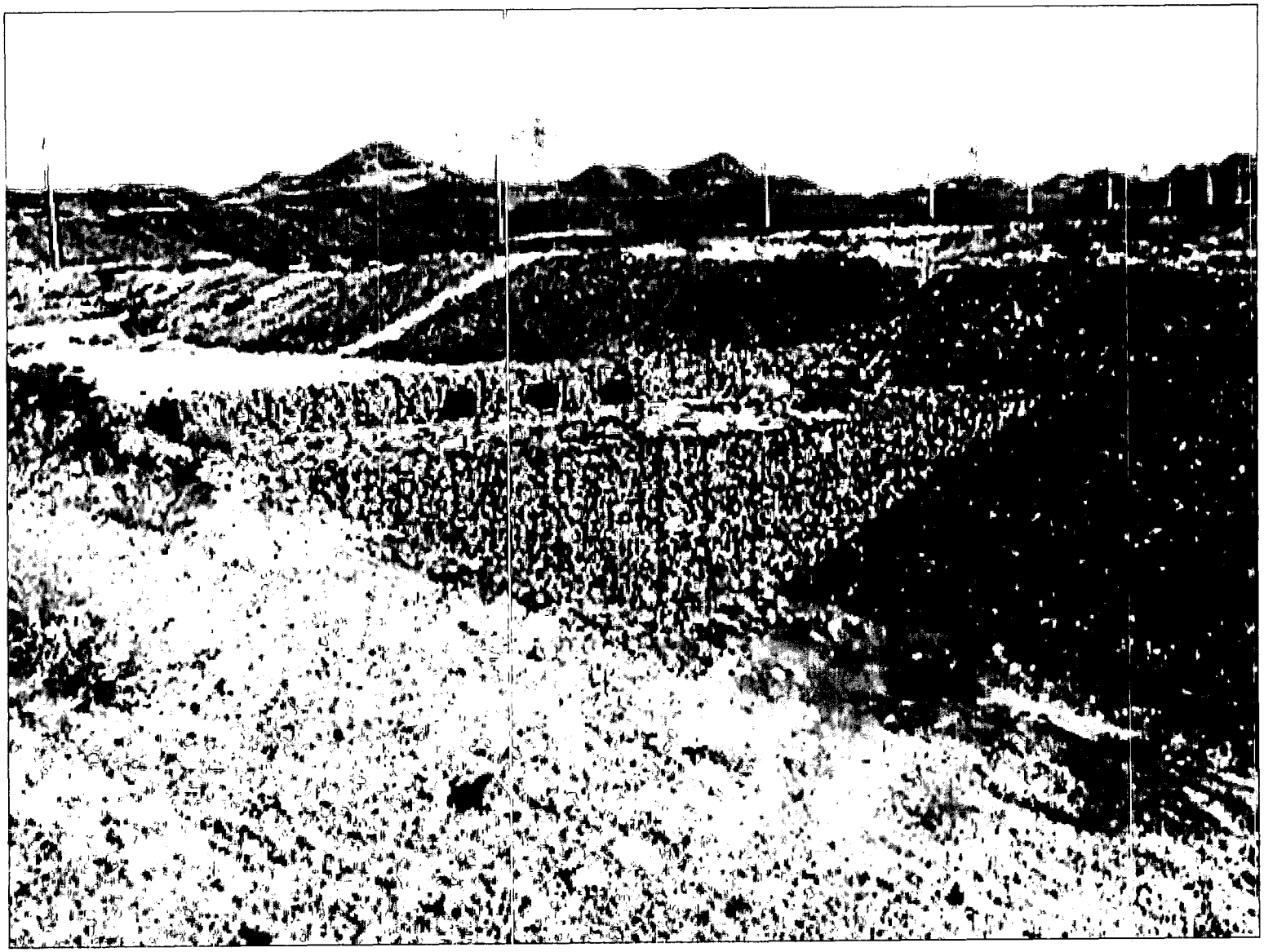


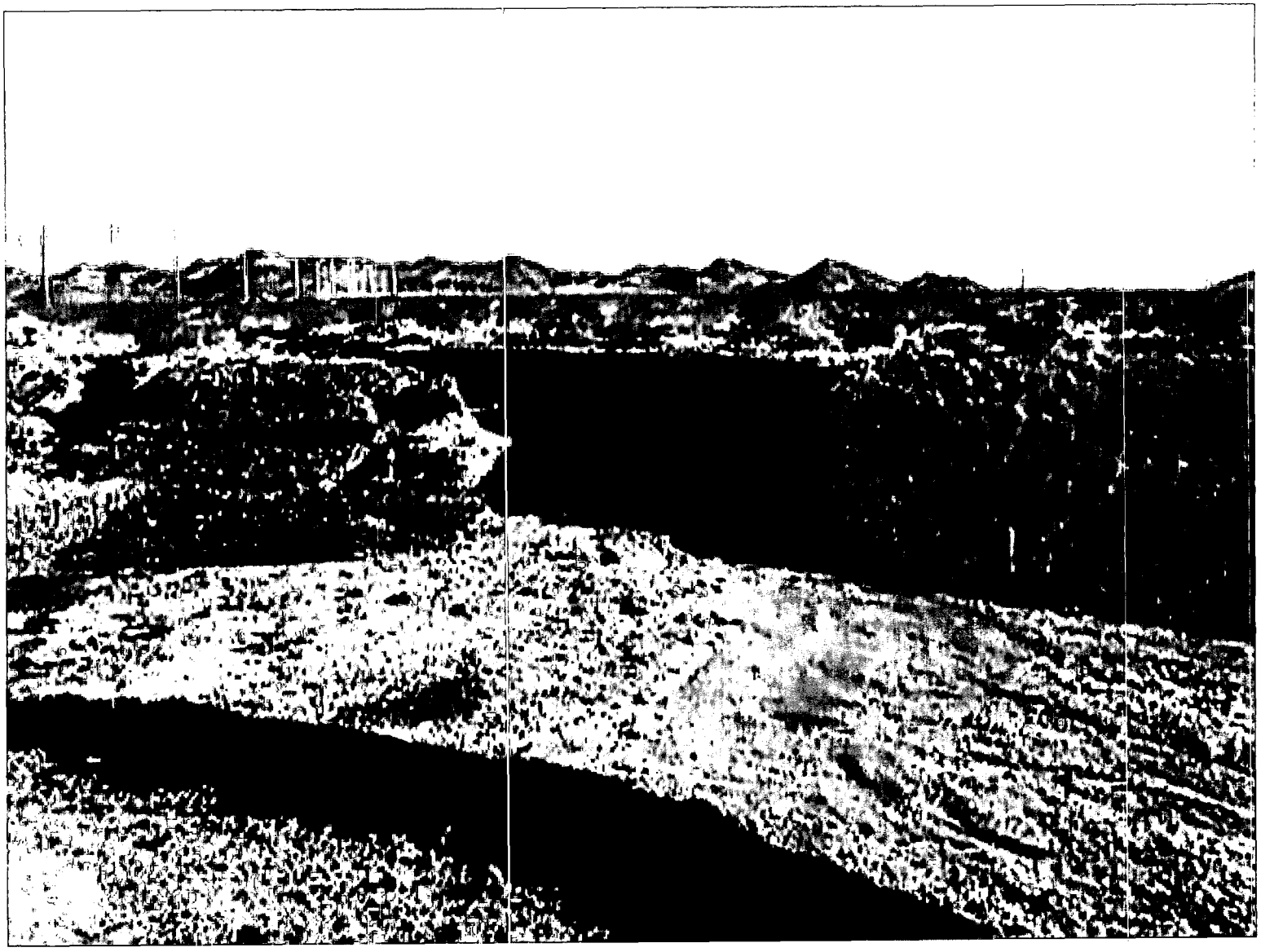


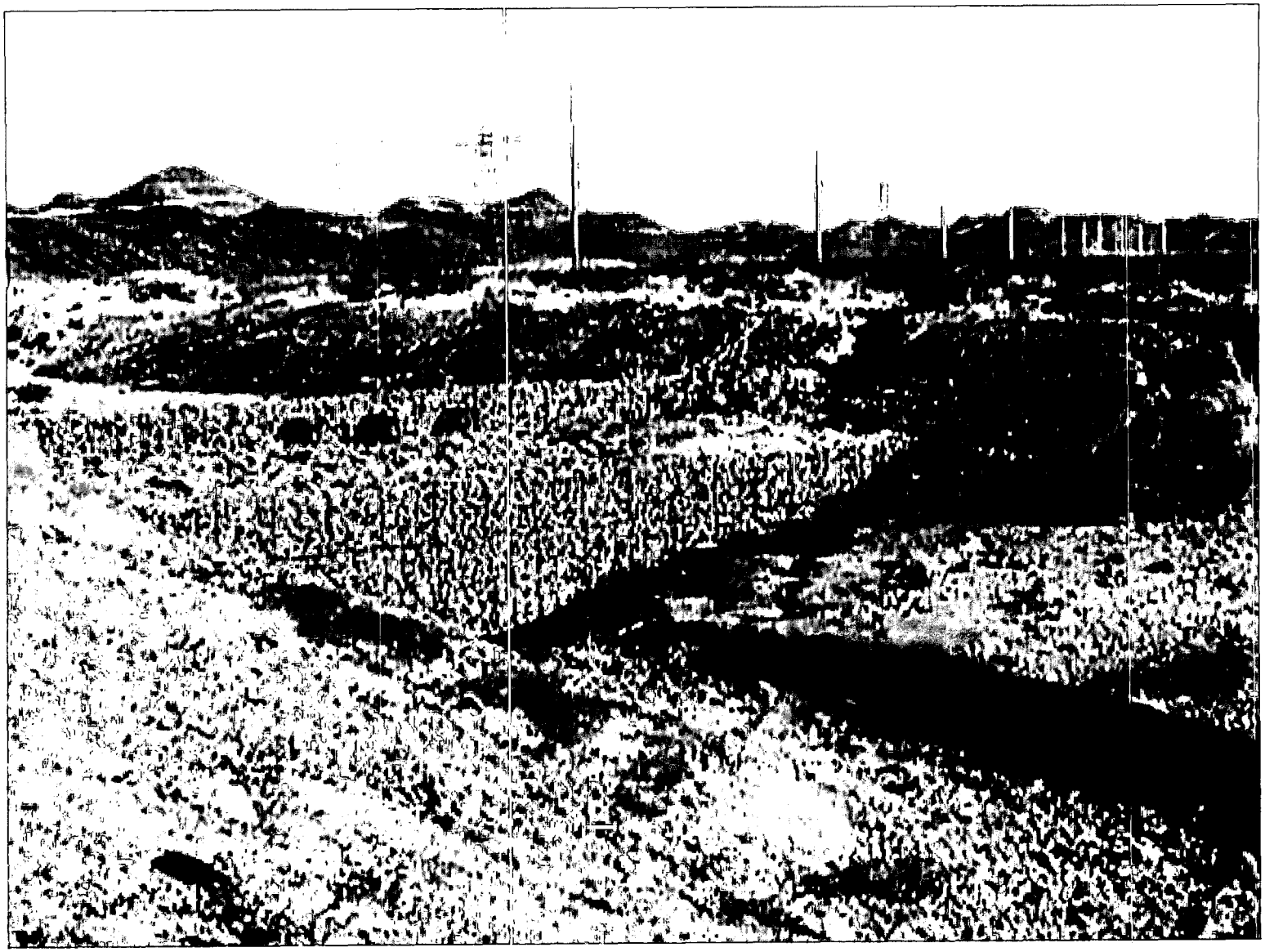


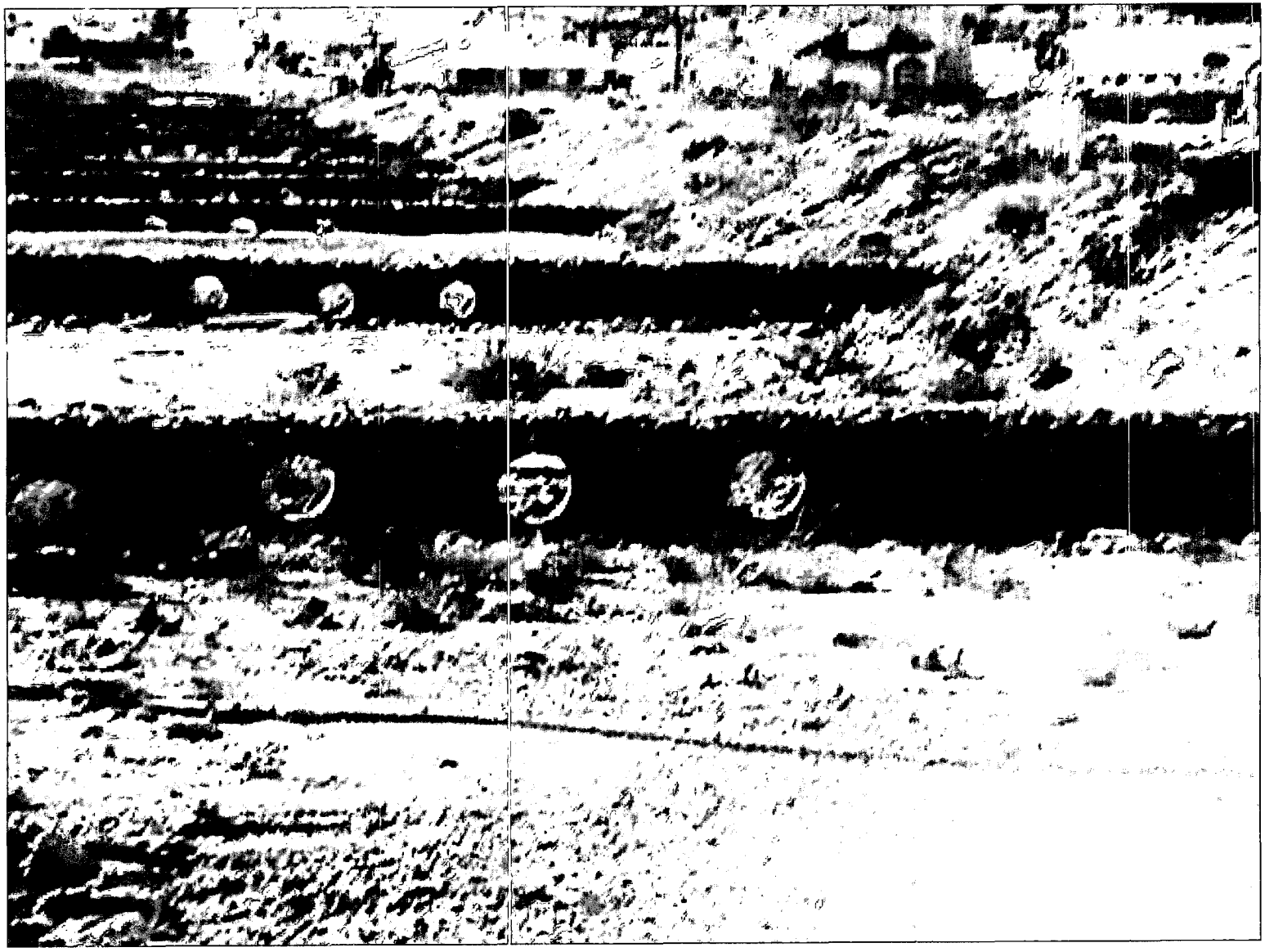


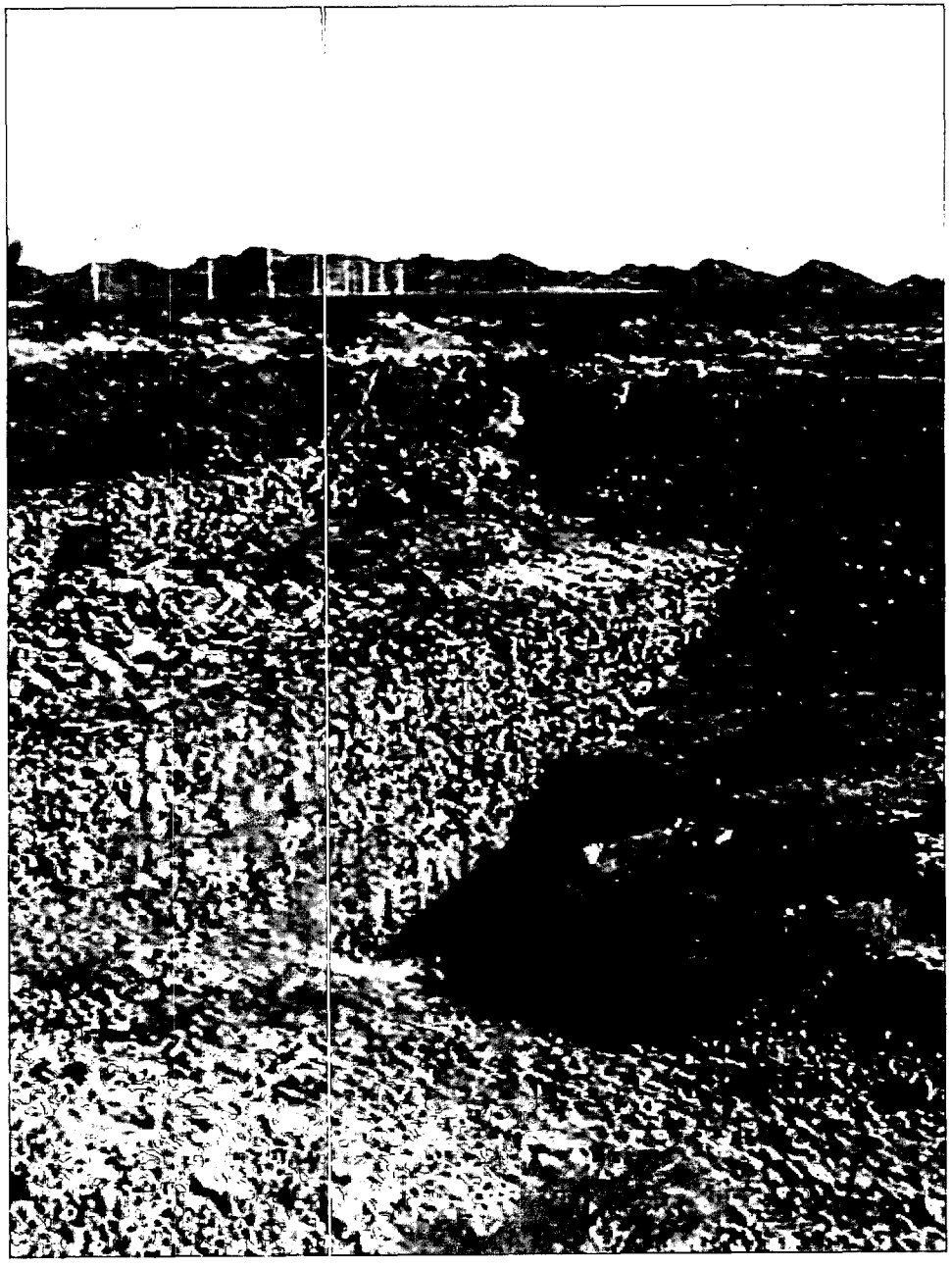


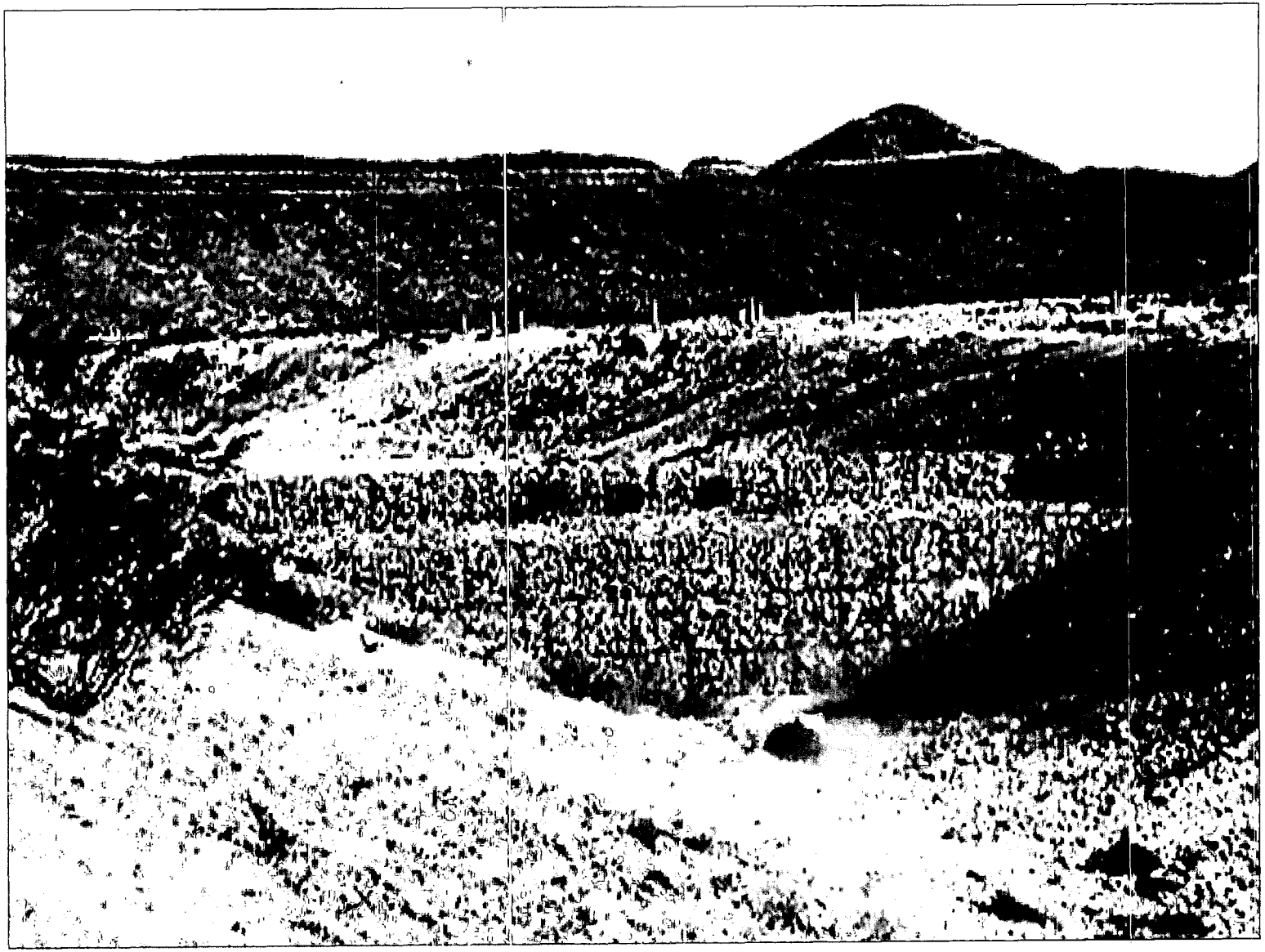


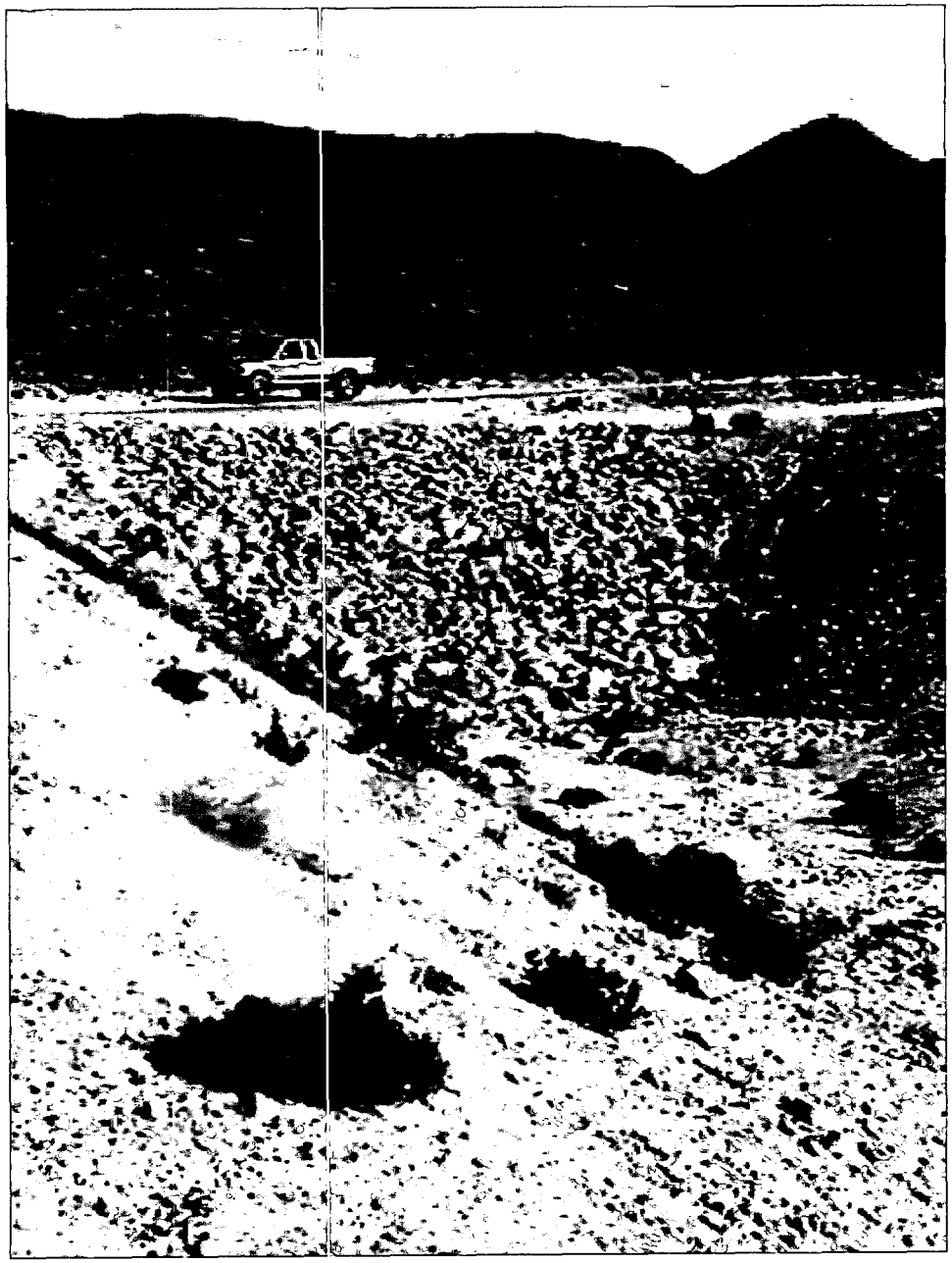


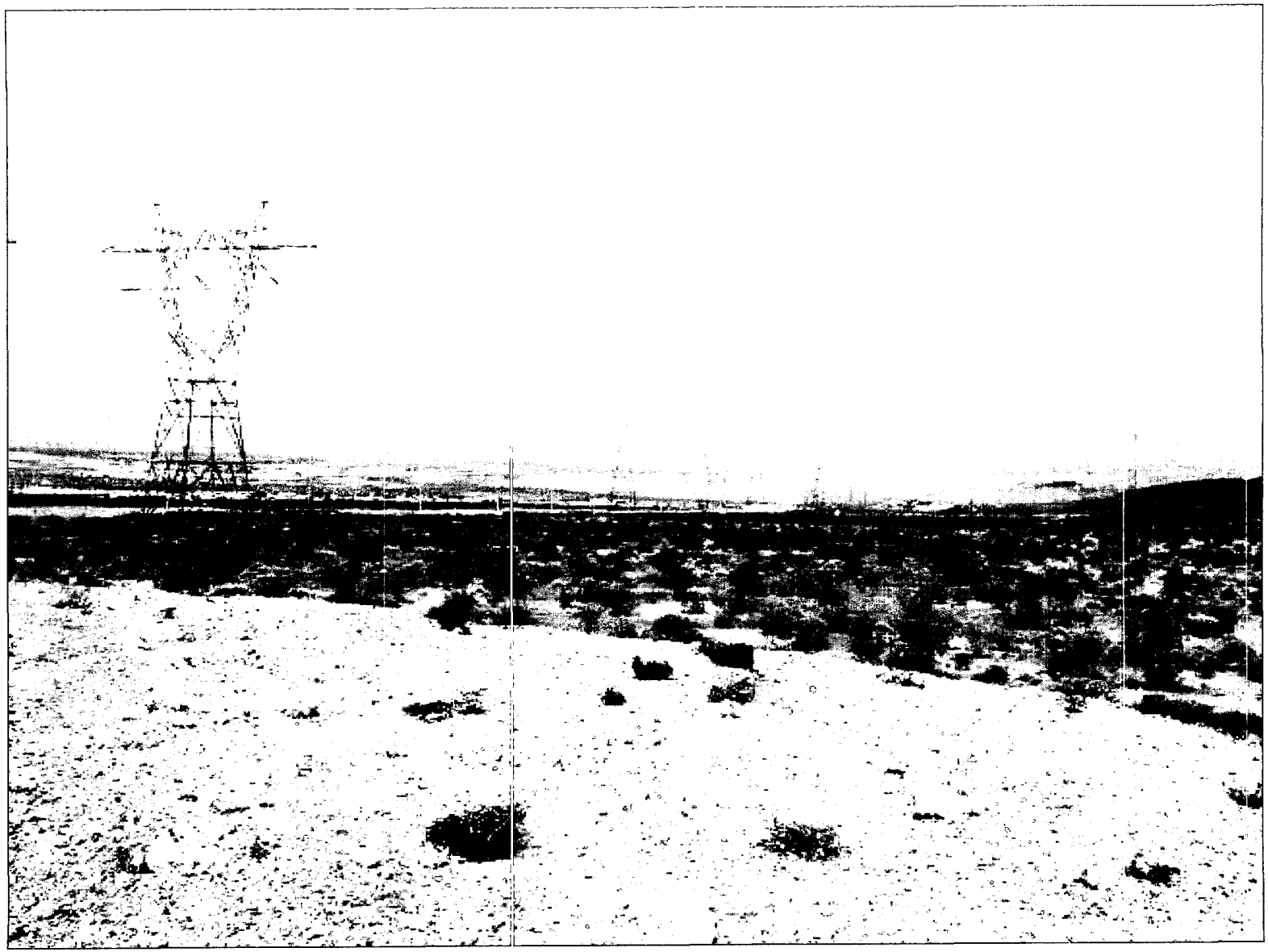












Carter::Burgess

C-1 Channel System

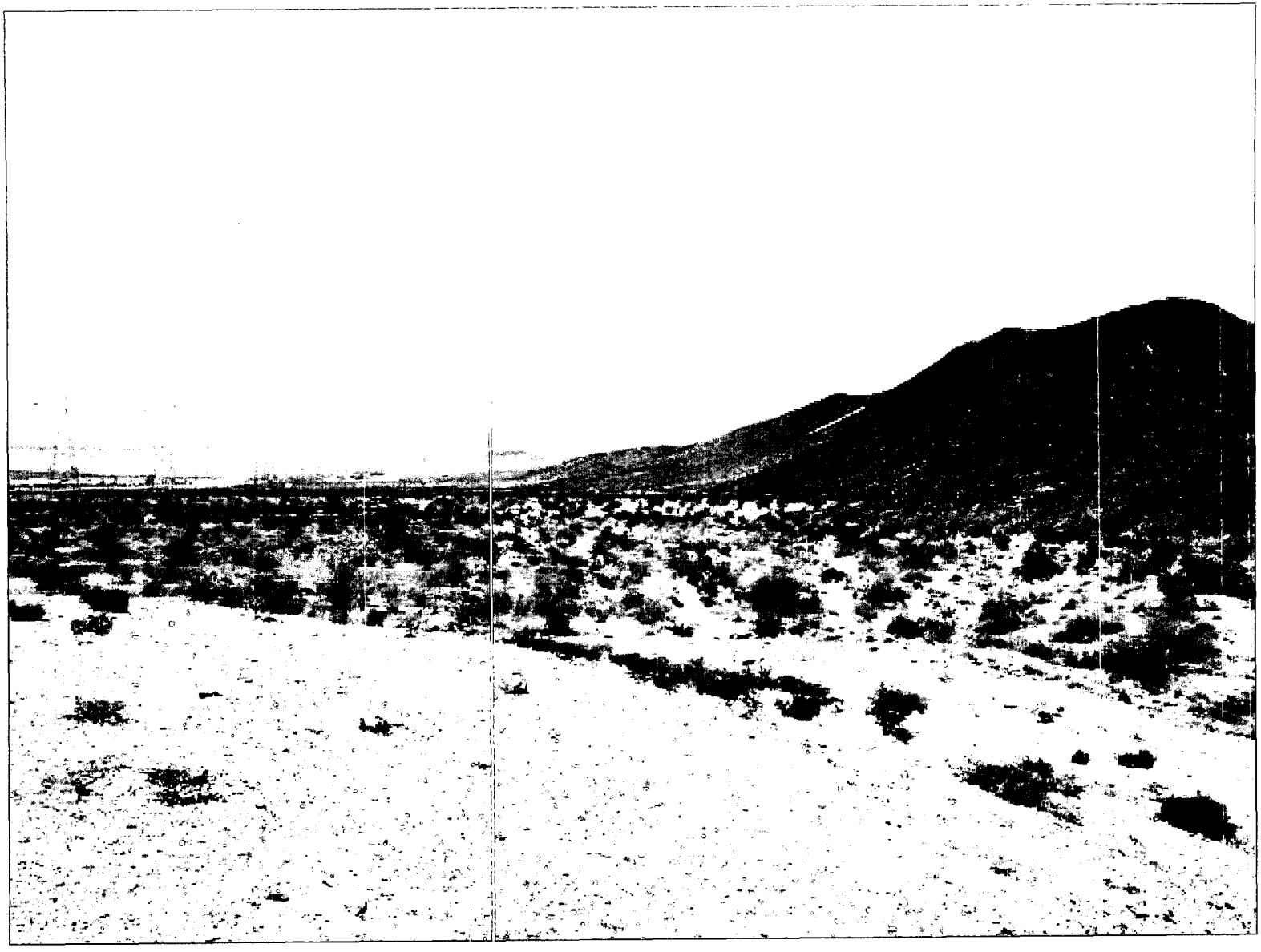
Flood Insurance Restudy

Photograph

EC-1L

1

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT



Carter::Burgess

C-1 Channel System

Flood Insurance Restudy

Photograph

EC-1L

2

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT



Carter::Burgess

C-1 Channel System

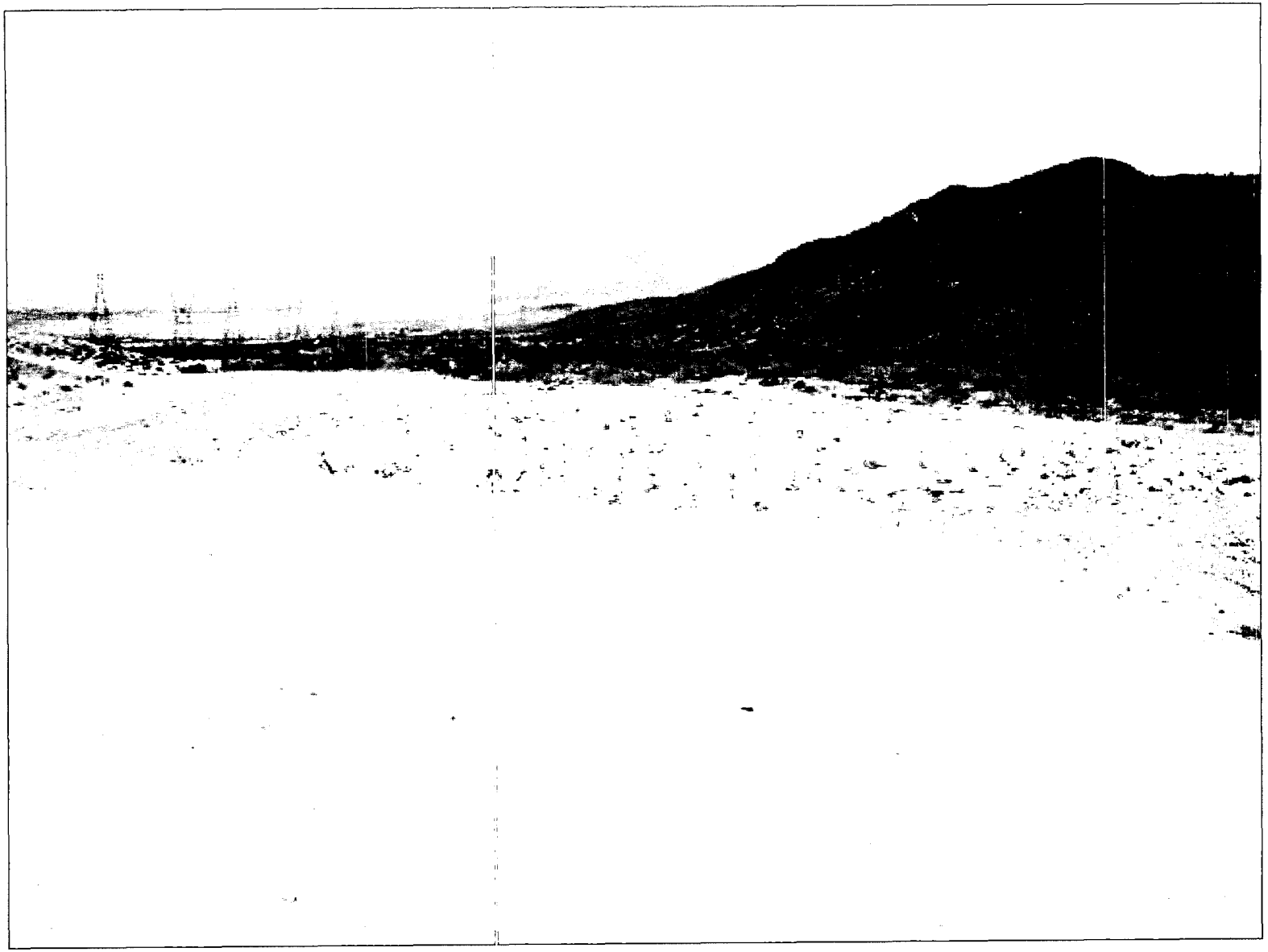
Flood Insurance Restudy

Photograph

EC-1L

3

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT



Carter::Burgess

C-1 Channel System

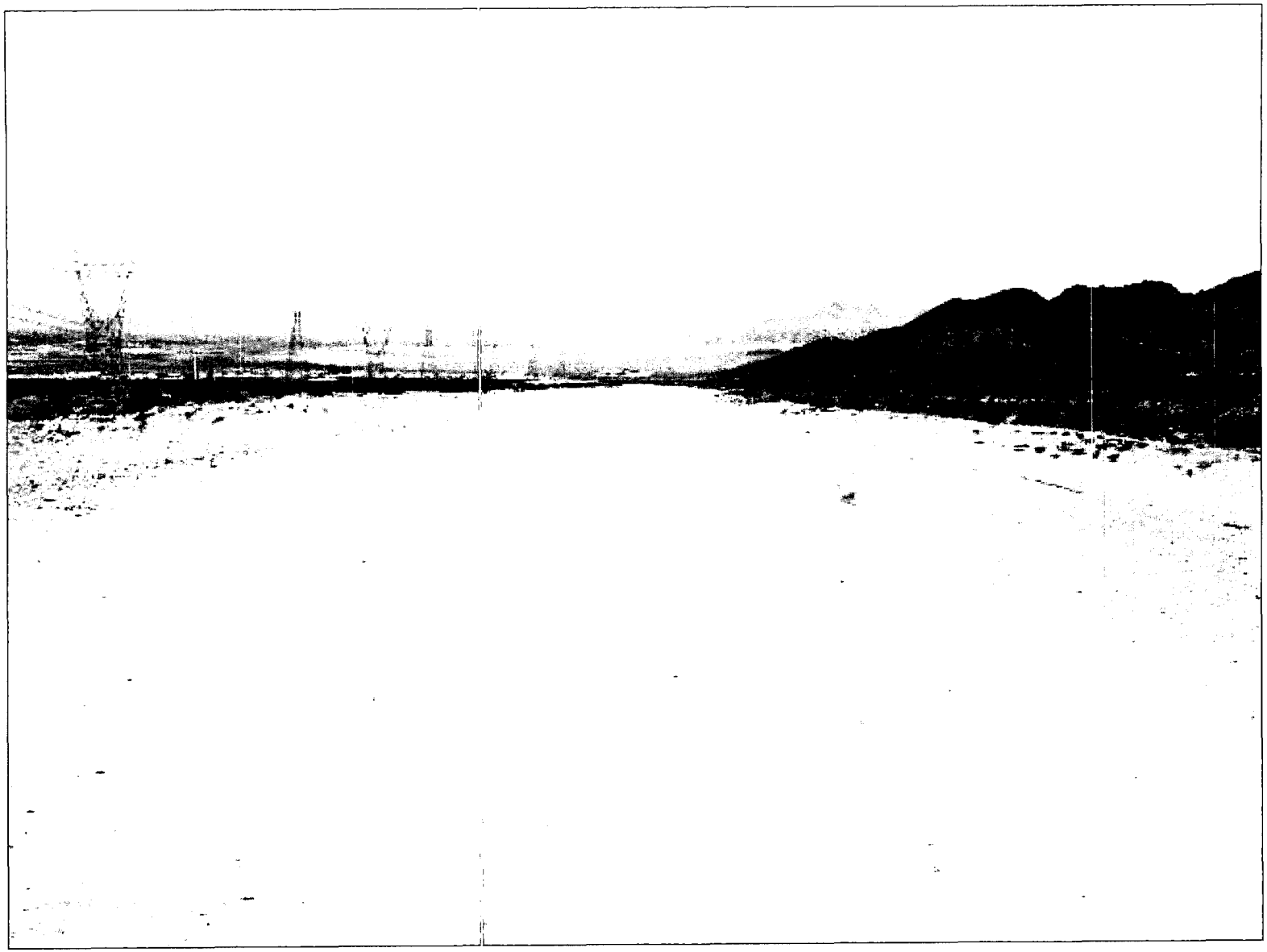
Flood Insurance Restudy

Photograph

EC-1L

4

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT



Carter::Burgess

C-1 Channel System
Flood Insurance Restudy

Photograph

EC-1L
5

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT



Carter::Burgess

C-1 Channel System

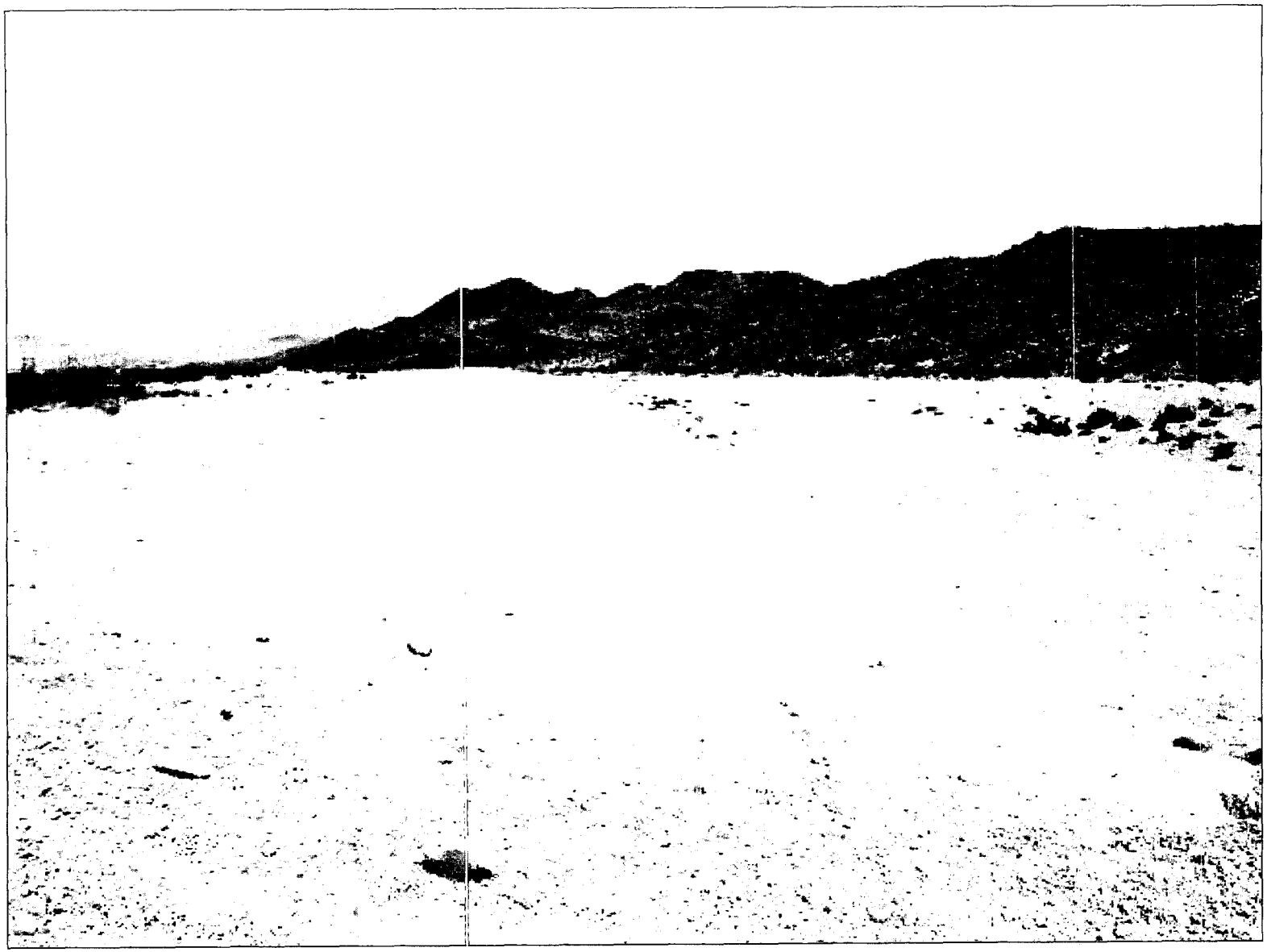
Flood Insurance Restudy

Photograph

EC-1L

6

REGIONAL FLOOD CONTROL DISTRICT



Carter::Burgess

C-1 Channel System

Flood Insurance Restudy

Photograph

EC-1L

7

REGIONAL FLOOD CONTROL DISTRICT



Carter::Burgess

C-1 Channel System

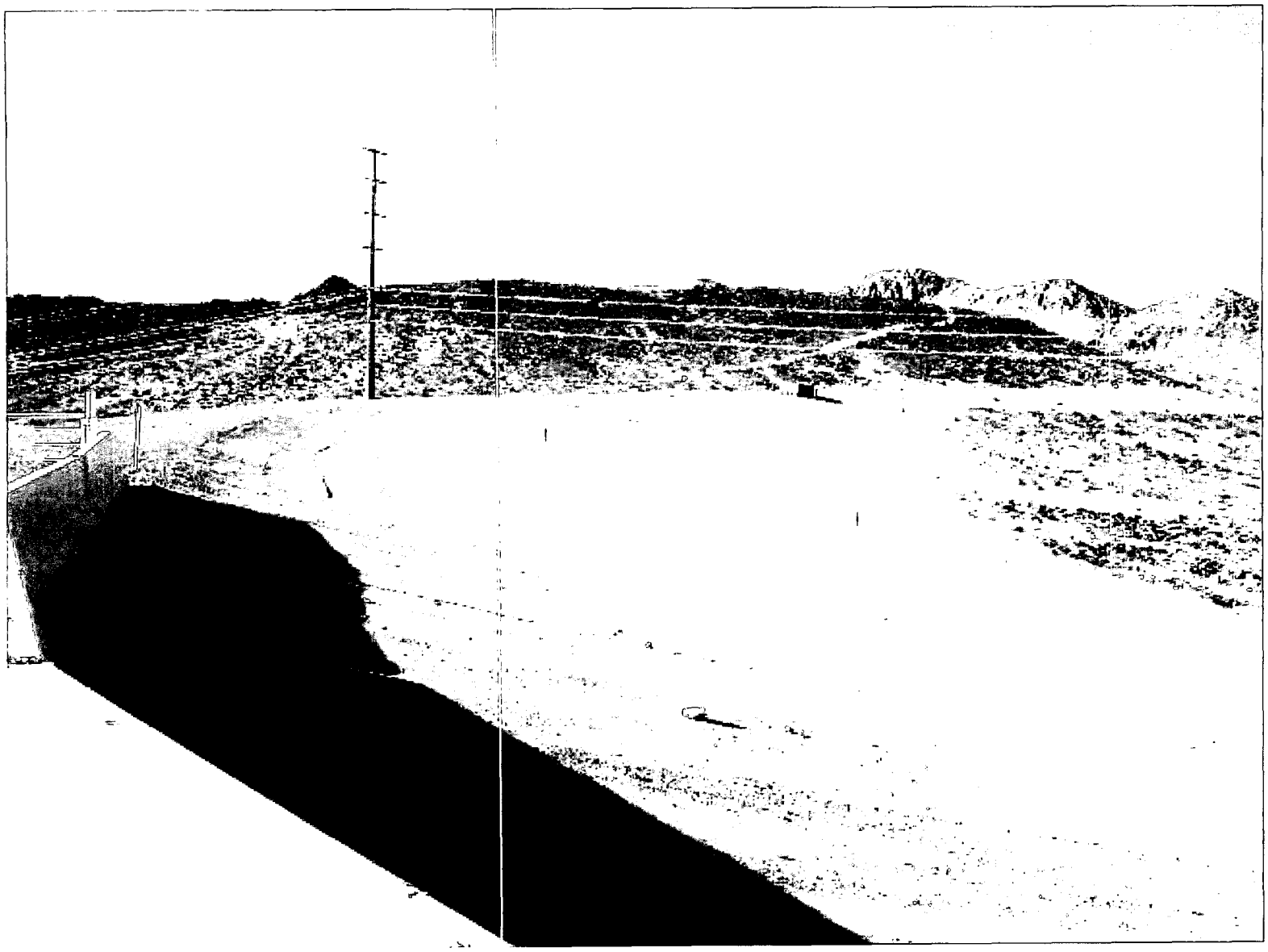
Flood Insurance Restudy

Photograph

EC-1L

8

REGIONAL FLOOD CONTROL DISTRICT



Carter::Burgess

C-1 Channel System
Flood Insurance Restudy

Photograph

EC-1DB
1

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT



Carter::Burgess

C-1 Channel System

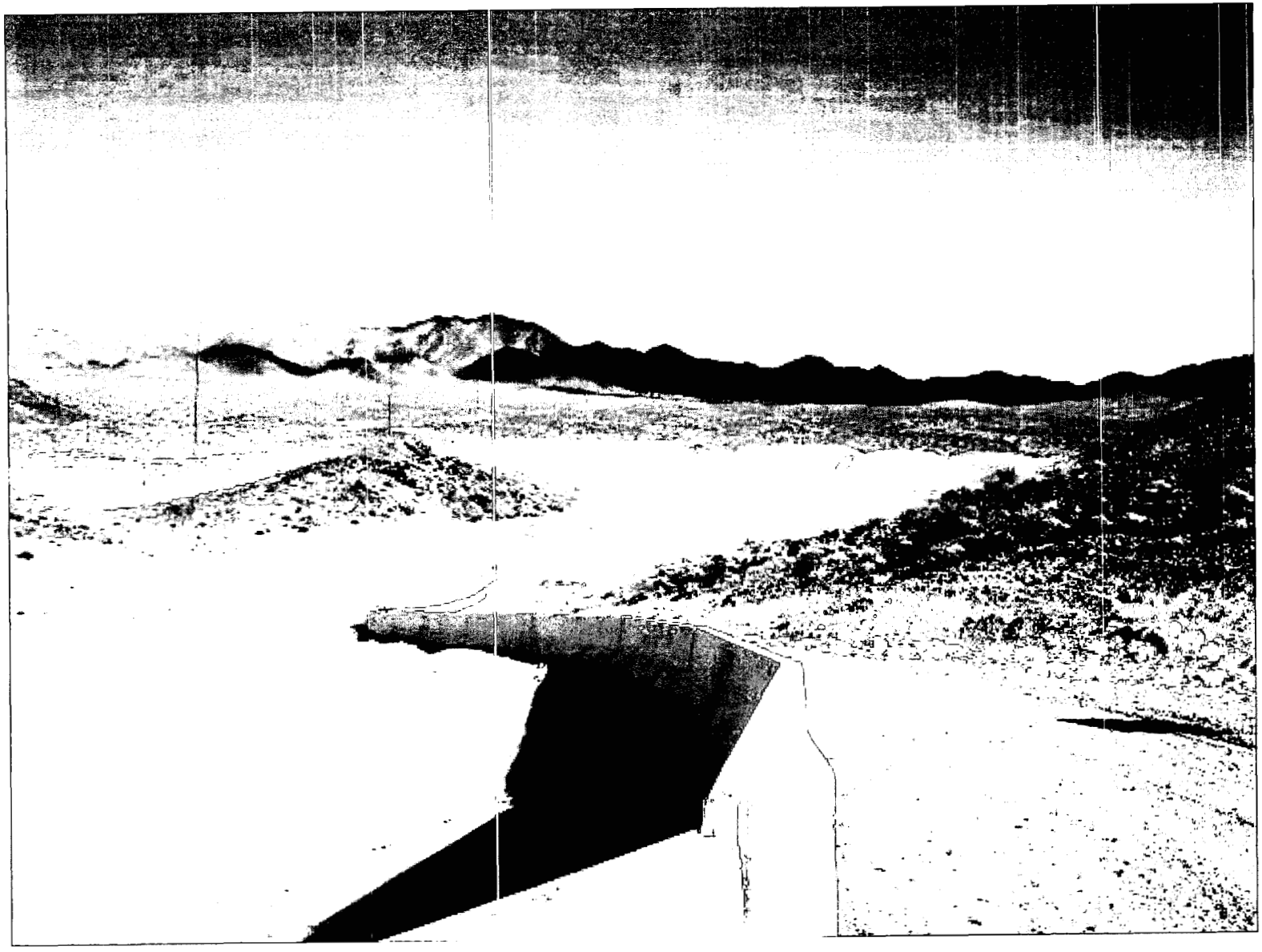
Flood Insurance Restudy

Photograph

EC-1DB

2

REGIONAL FLOOD CONTROL DISTRICT



Carter::Burgess

C-1 Channel System

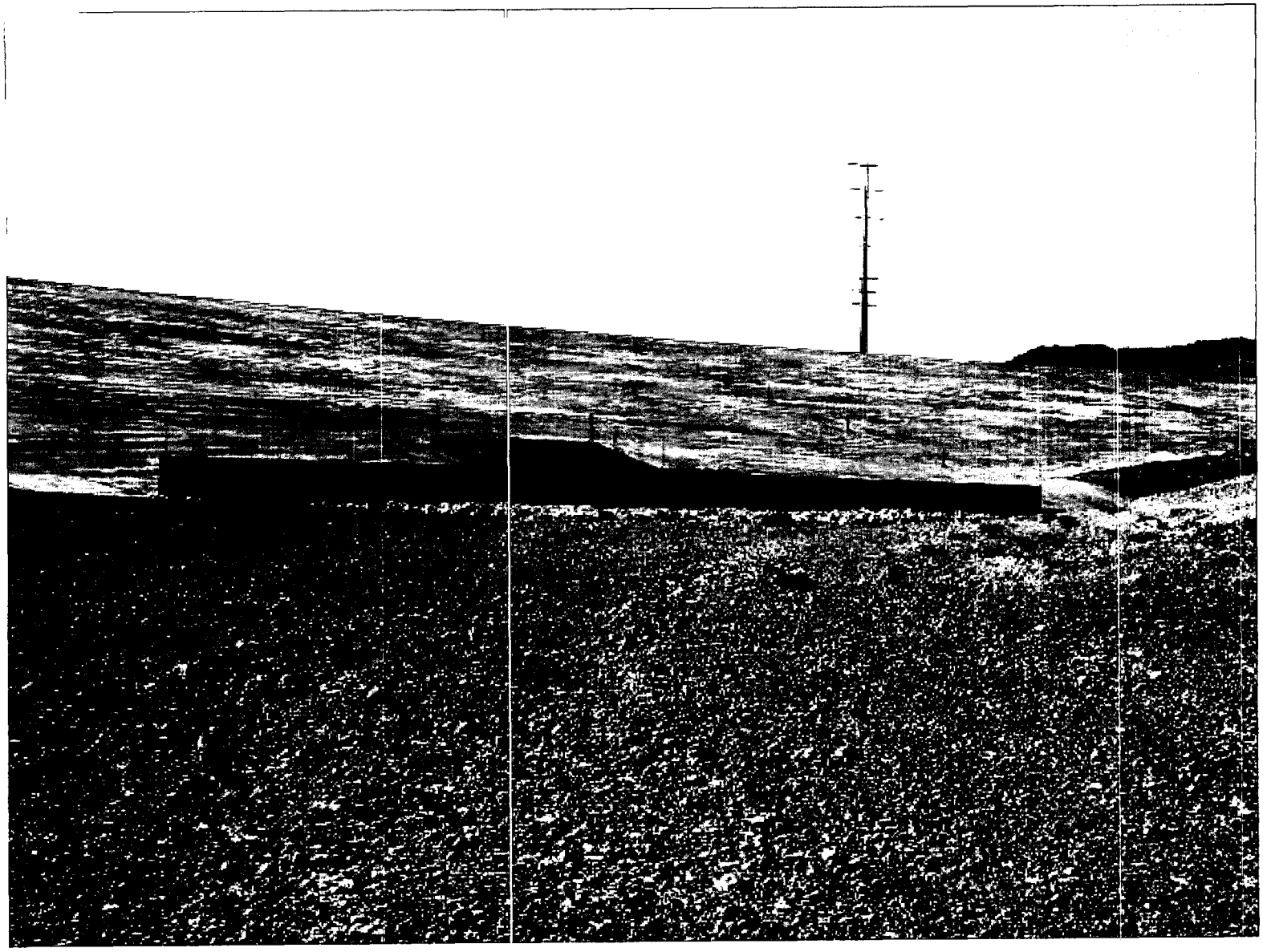
Flood Insurance Restudy

Photograph

EC-1DB

3

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT



Carter::Burgess

C-1 Channel System

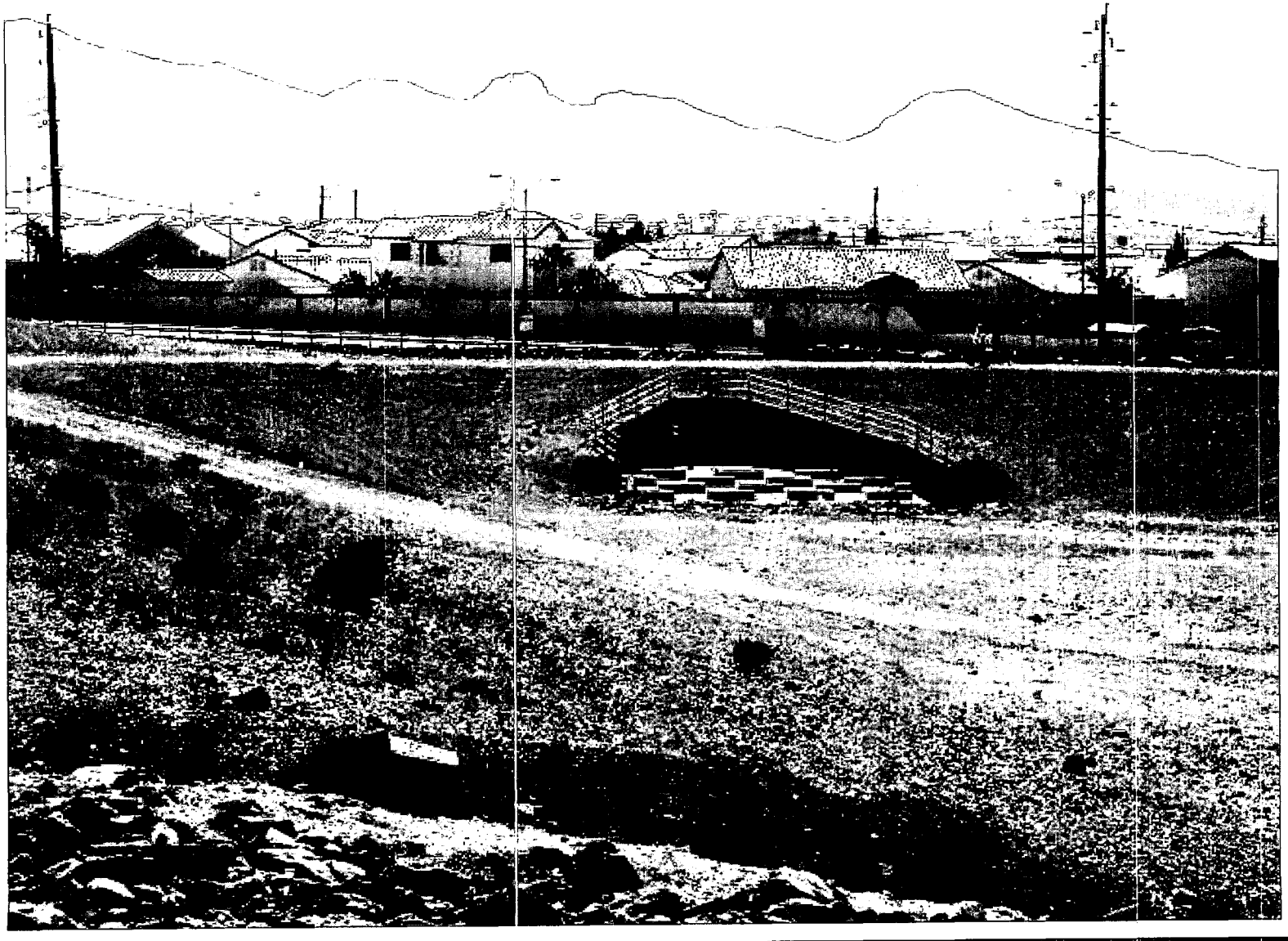
Flood Insurance Restudy

Photograph

EC-1DB

4

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT



Carter::Burgess

C-1 Channel System

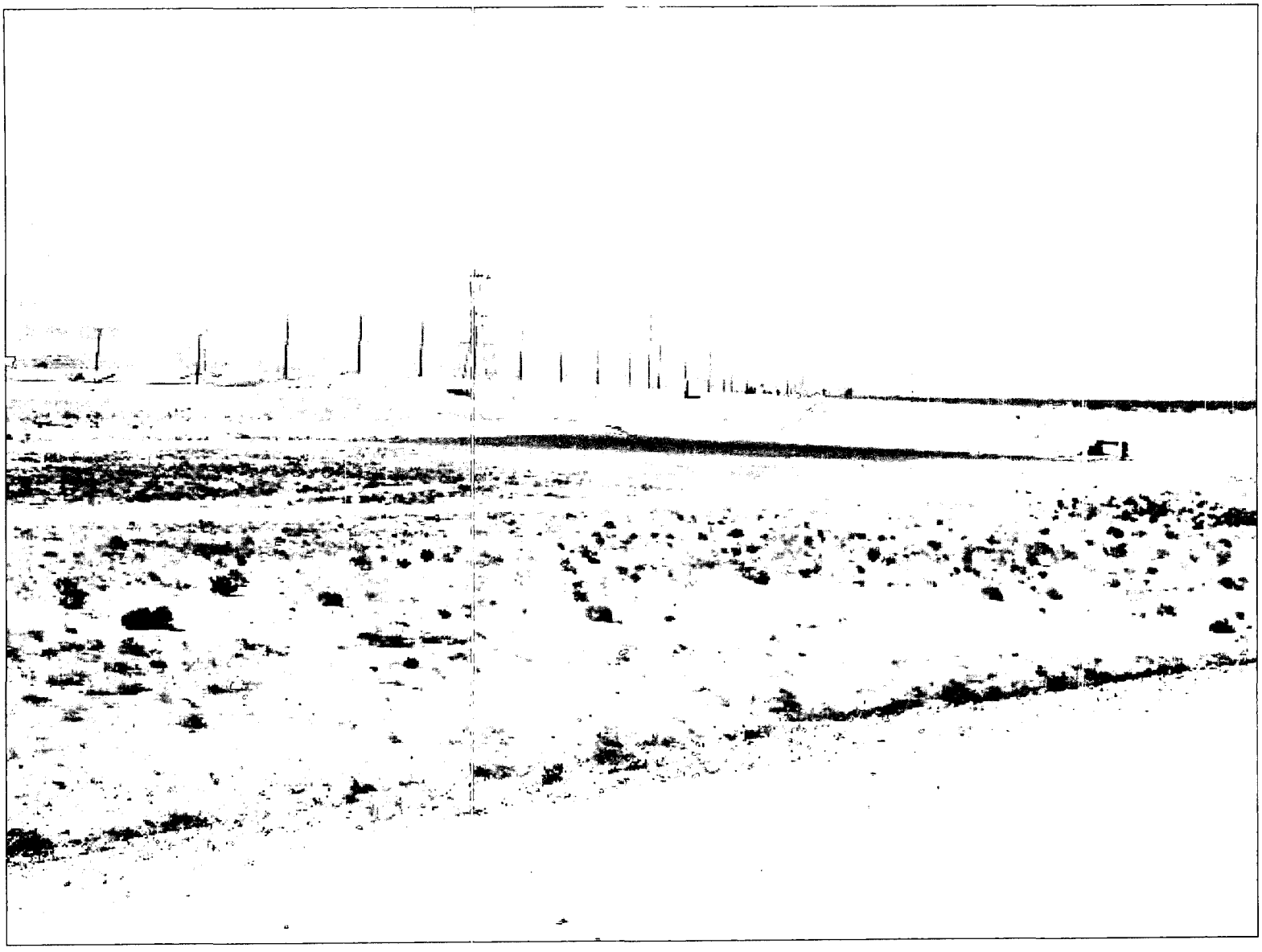
Flood Insurance Restudy

Photograph

EQ

1

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT



Carter::Burgess

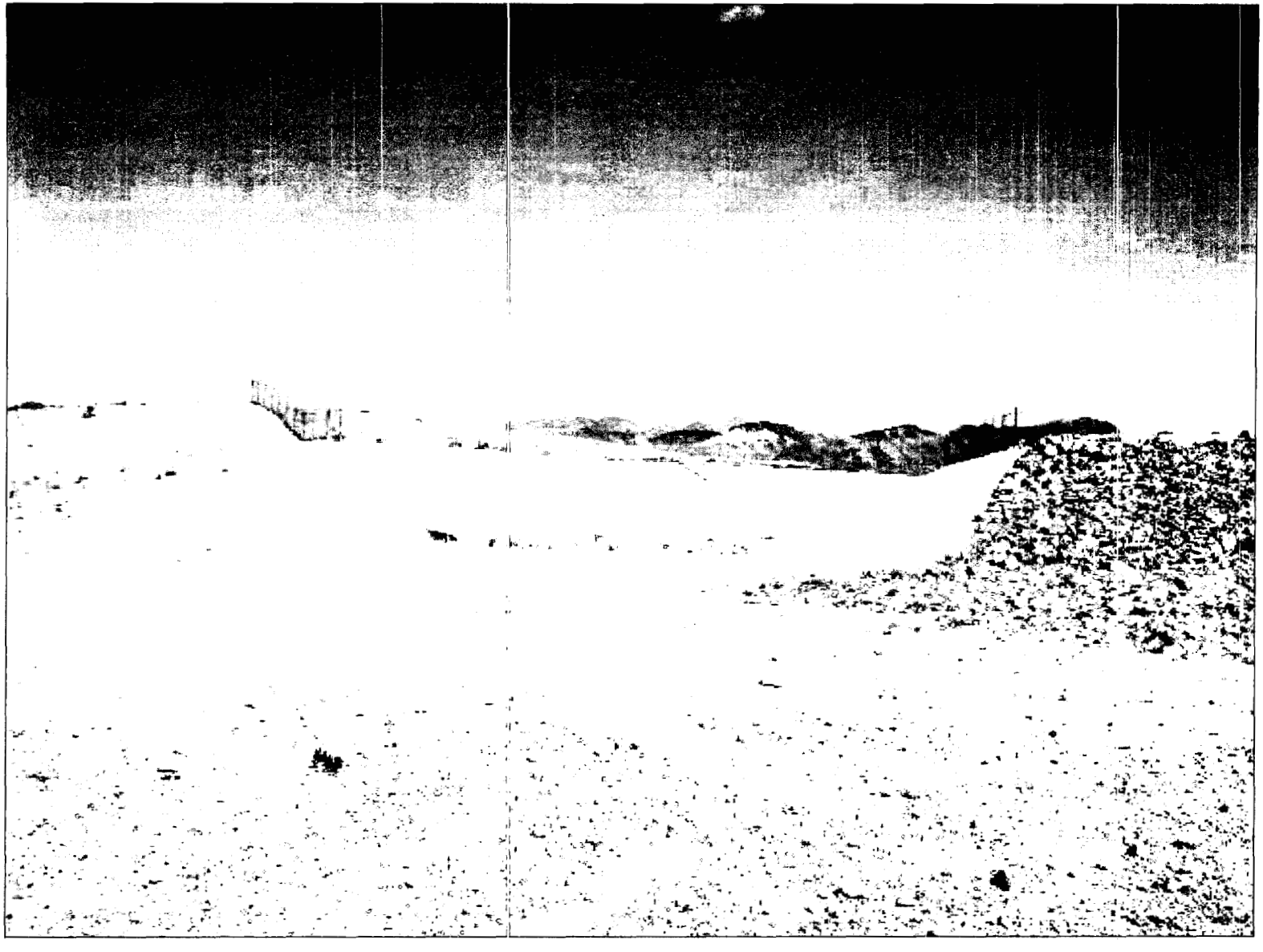
C-1 Channel System

Flood Insurance Restudy

Photograph

EQ
2

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT



Carter::Burgess

C-1 Channel System

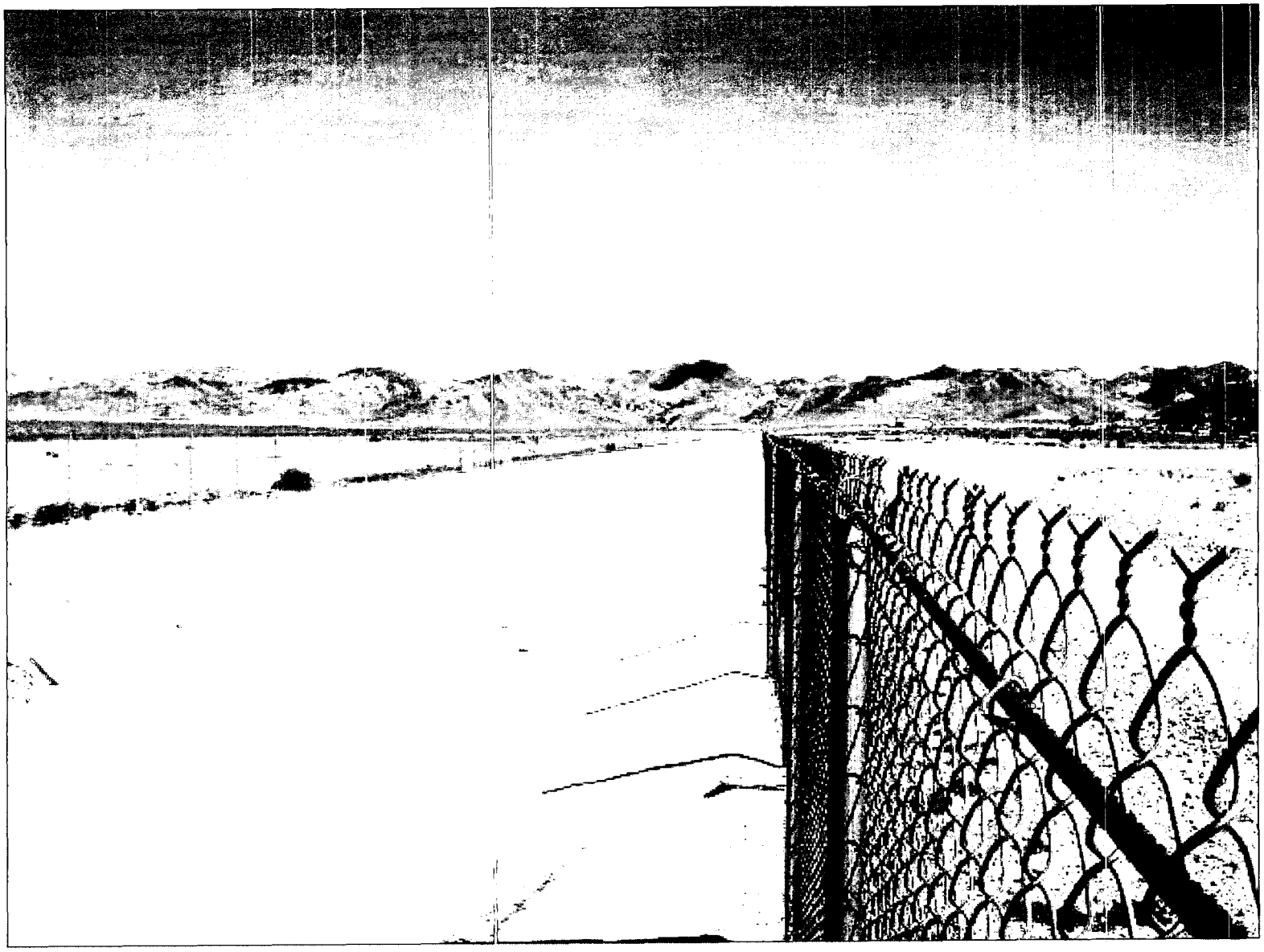
Flood Insurance Restudy

Photograph

EQ

3

REGIONAL FLOOD CONTROL DISTRICT



Carter::Burgess

C-1 Channel System

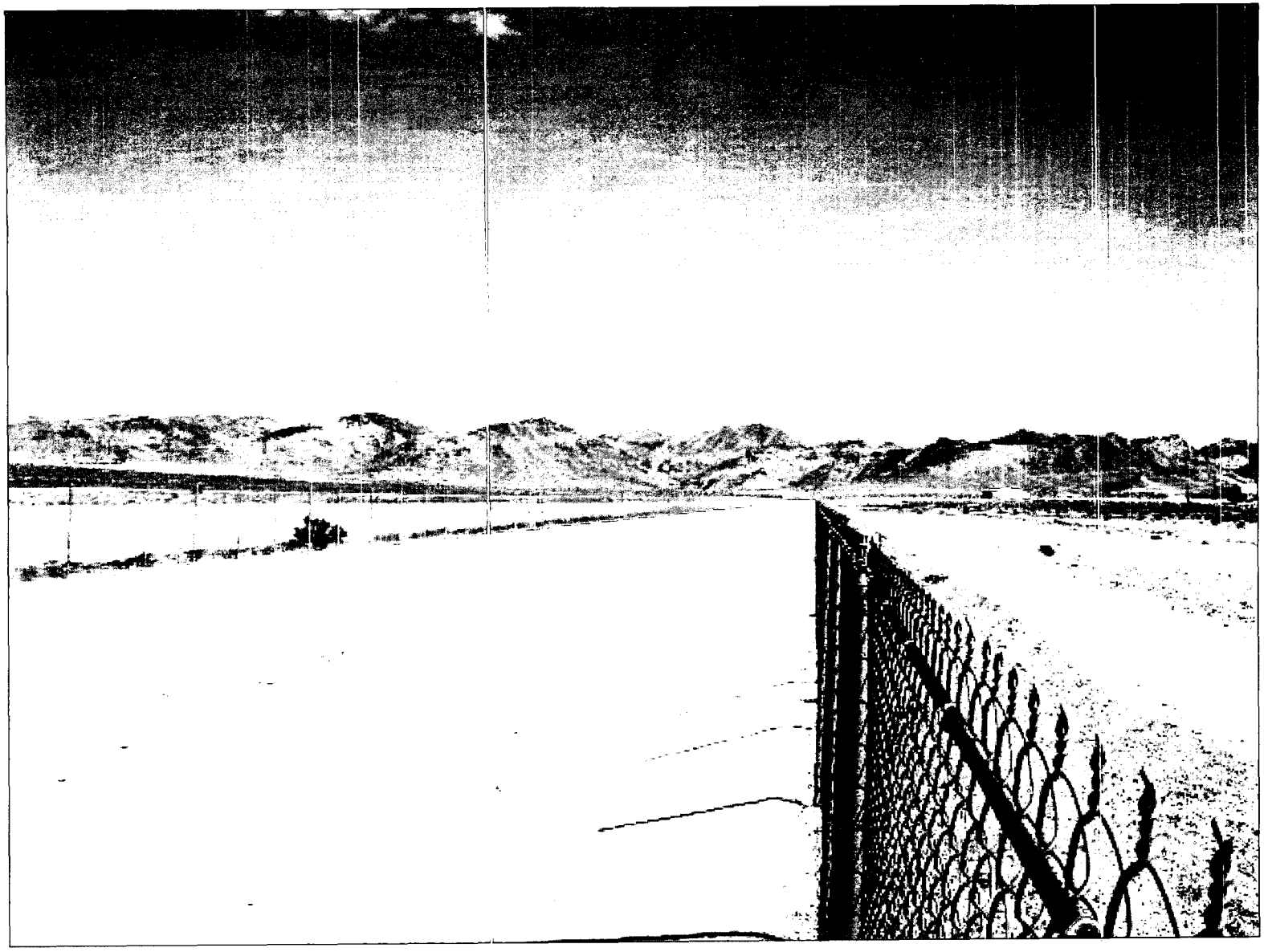
Flood Insurance Restudy

Photograph

EQ

4

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT



Carter::Burgess

C-1 Channel System

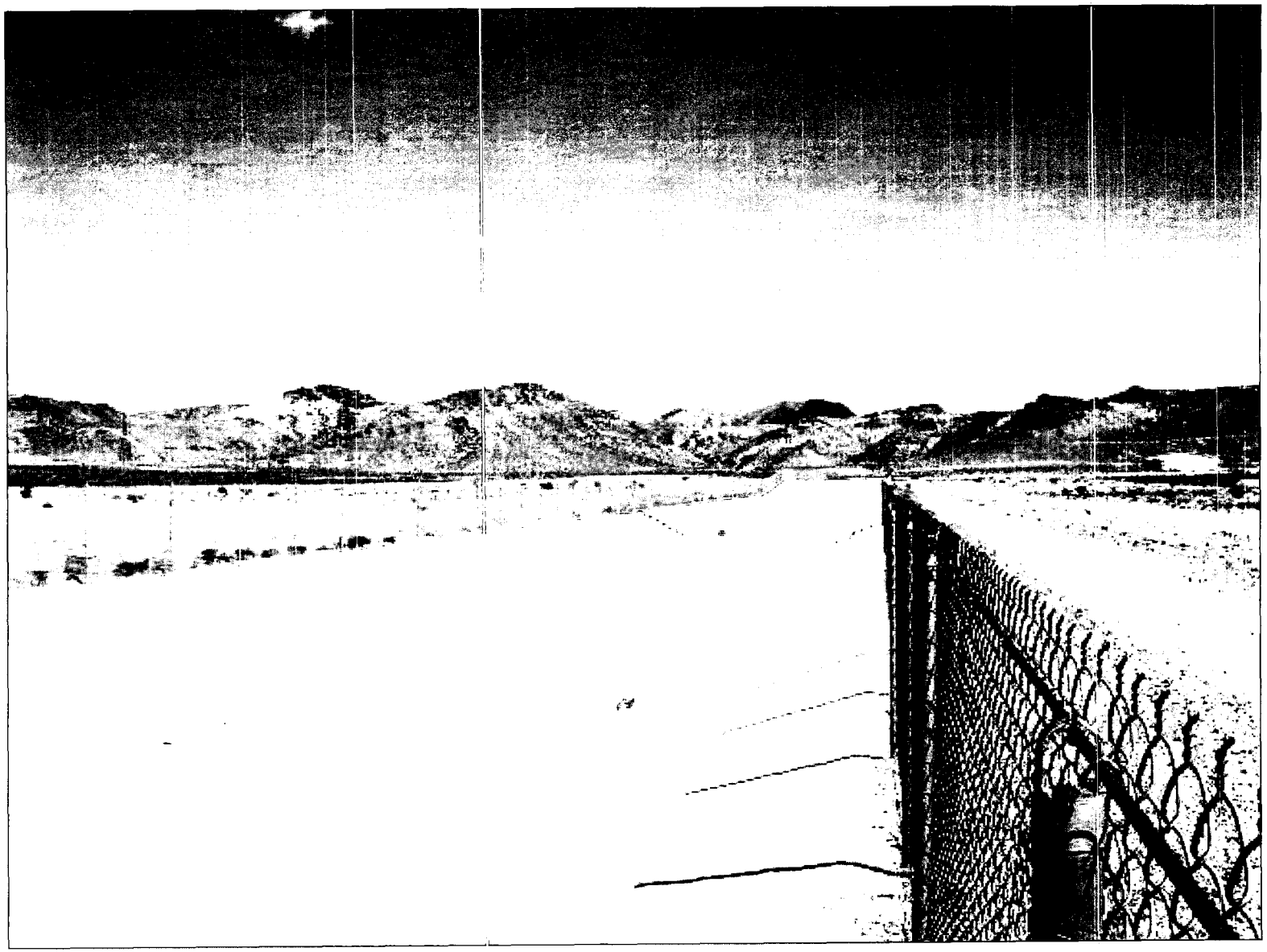
Flood Insurance Restudy

Photograph

EQ

5

REGIONAL FLOOD CONTROL DISTRICT





Carter::Burgess

C-1 Channel System

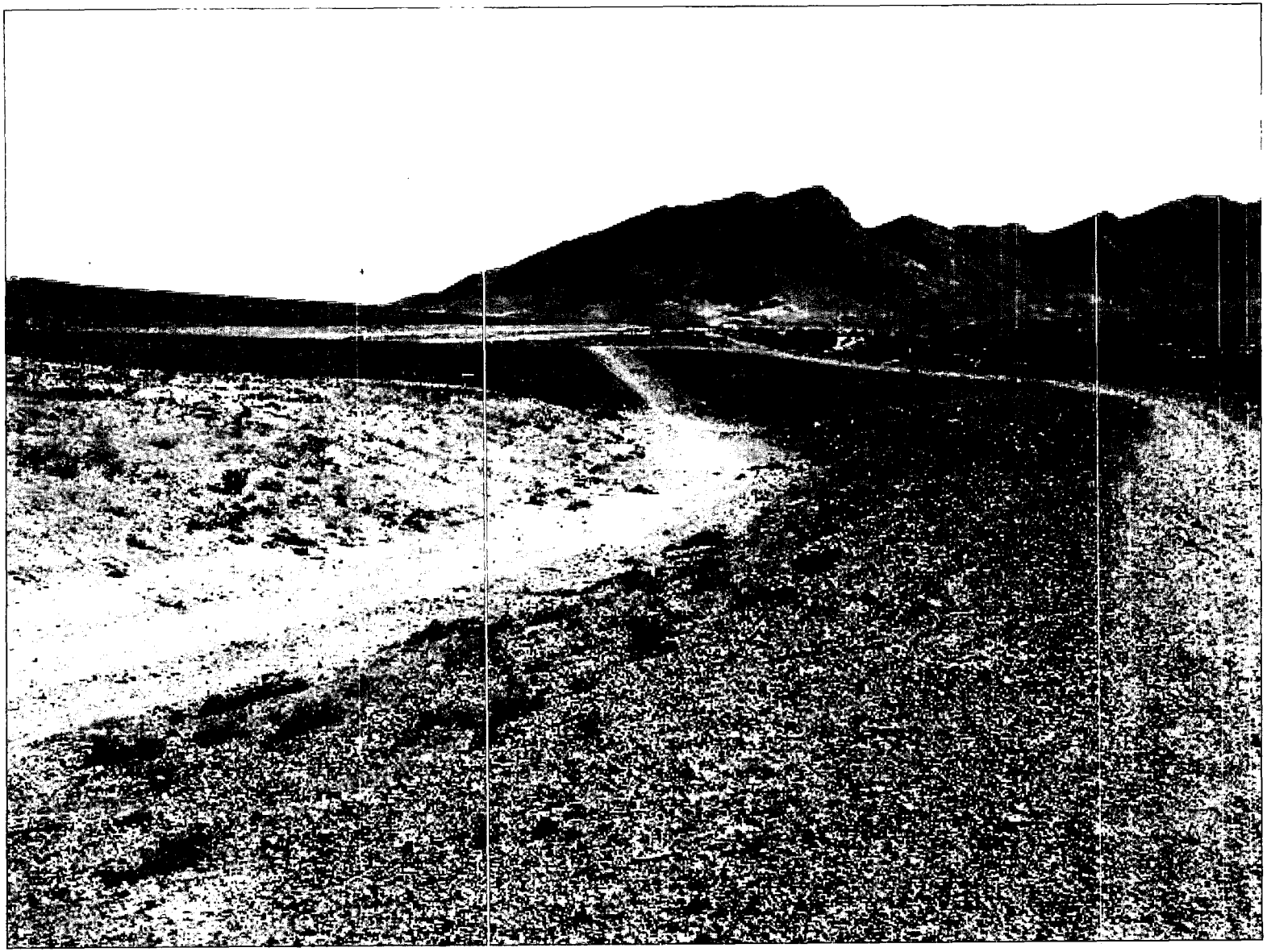
Flood Insurance Restudy

Photograph

EQ

7

HARRIS COUNTY REGIONAL FLOOD CONTROL DISTRICT



Carter::Burgess

C-1 Channel System

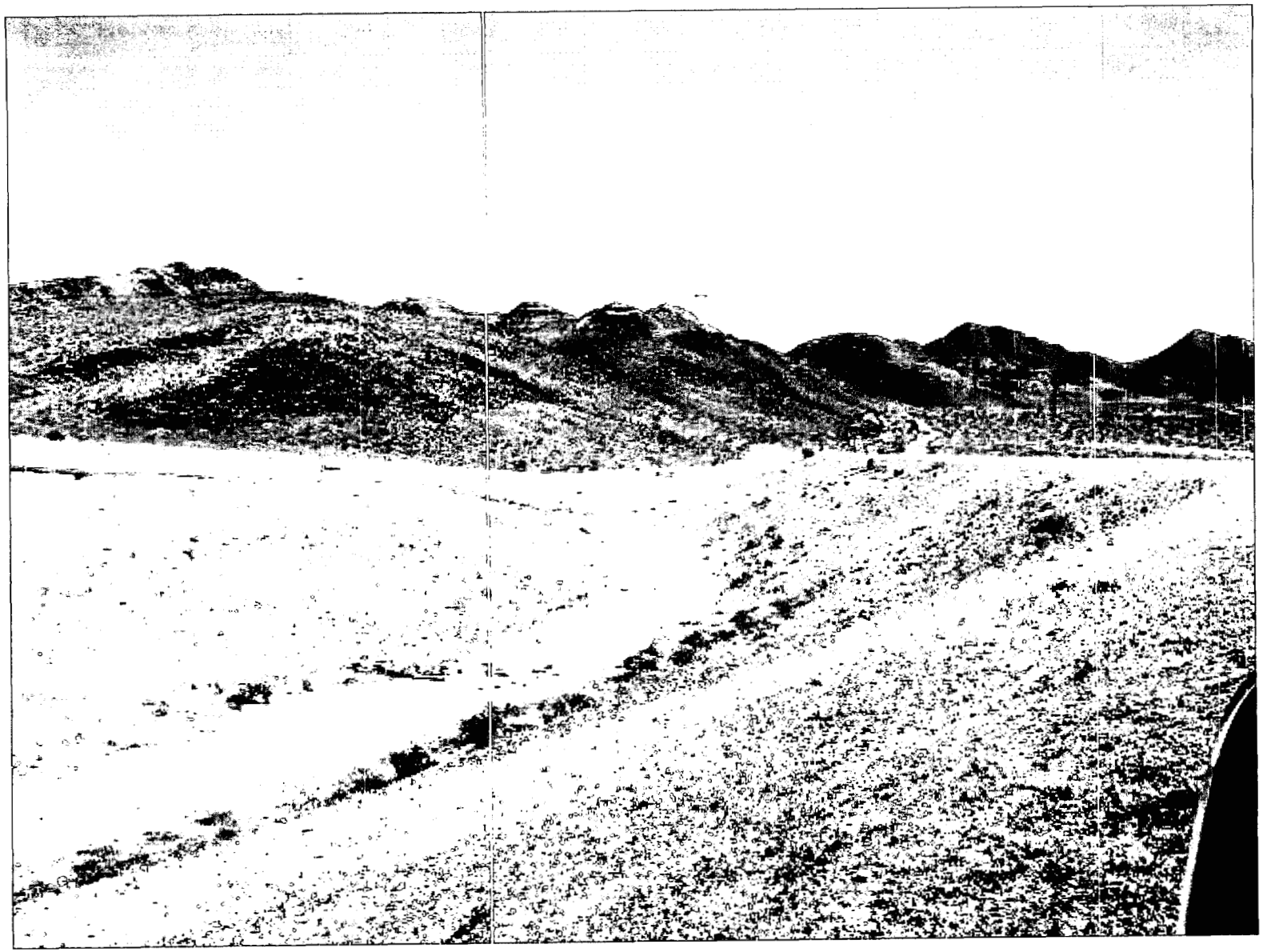
Flood Insurance Restudy

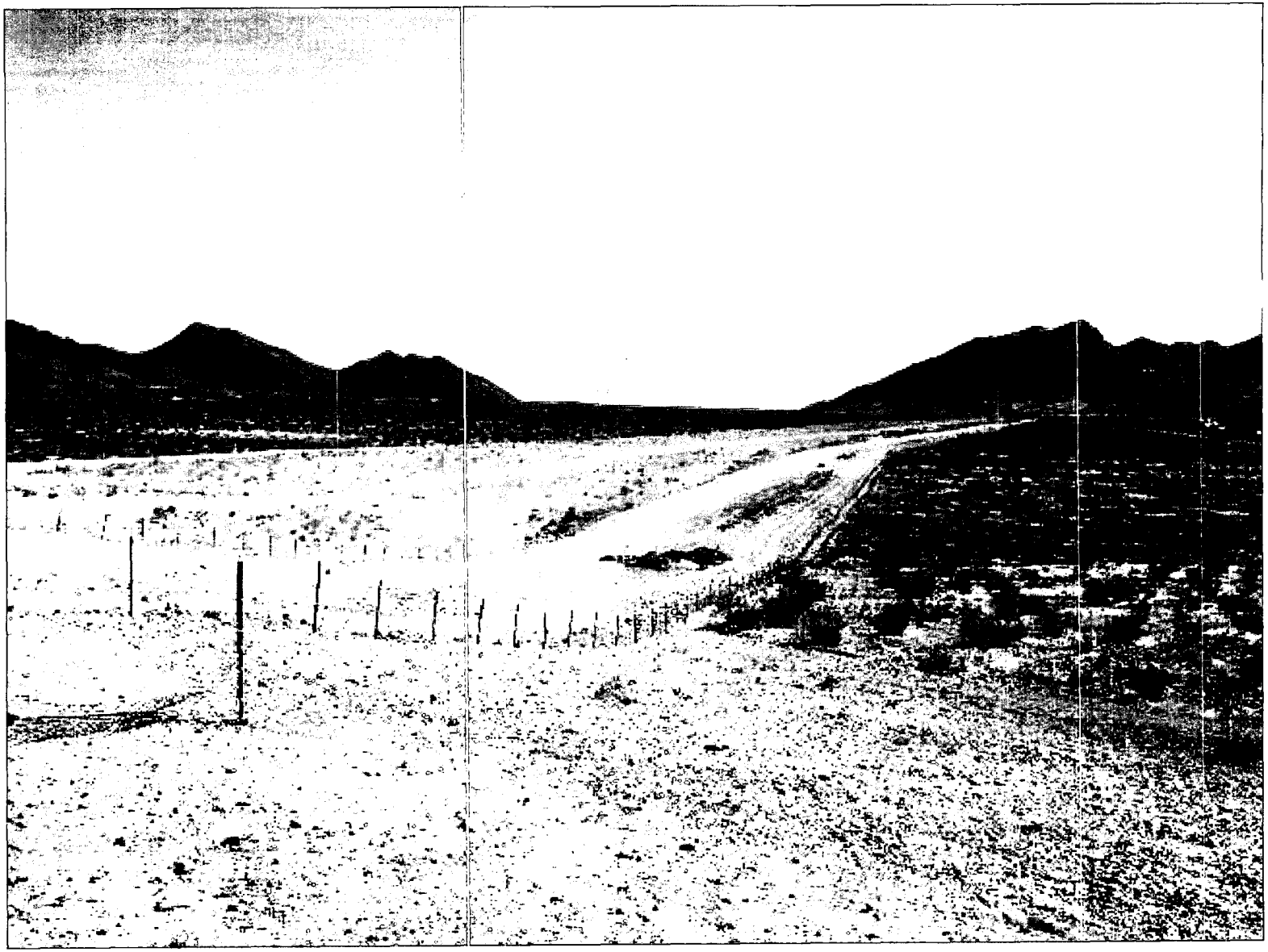
Photograph

EQ

8

REGIONAL FLOOD CONTROL DISTRICT





Carter::Burgess

C-1 Channel System

Flood Insurance Restudy

Photograph

EQ

10

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT



Carter::Burgess

C-1 Channel System

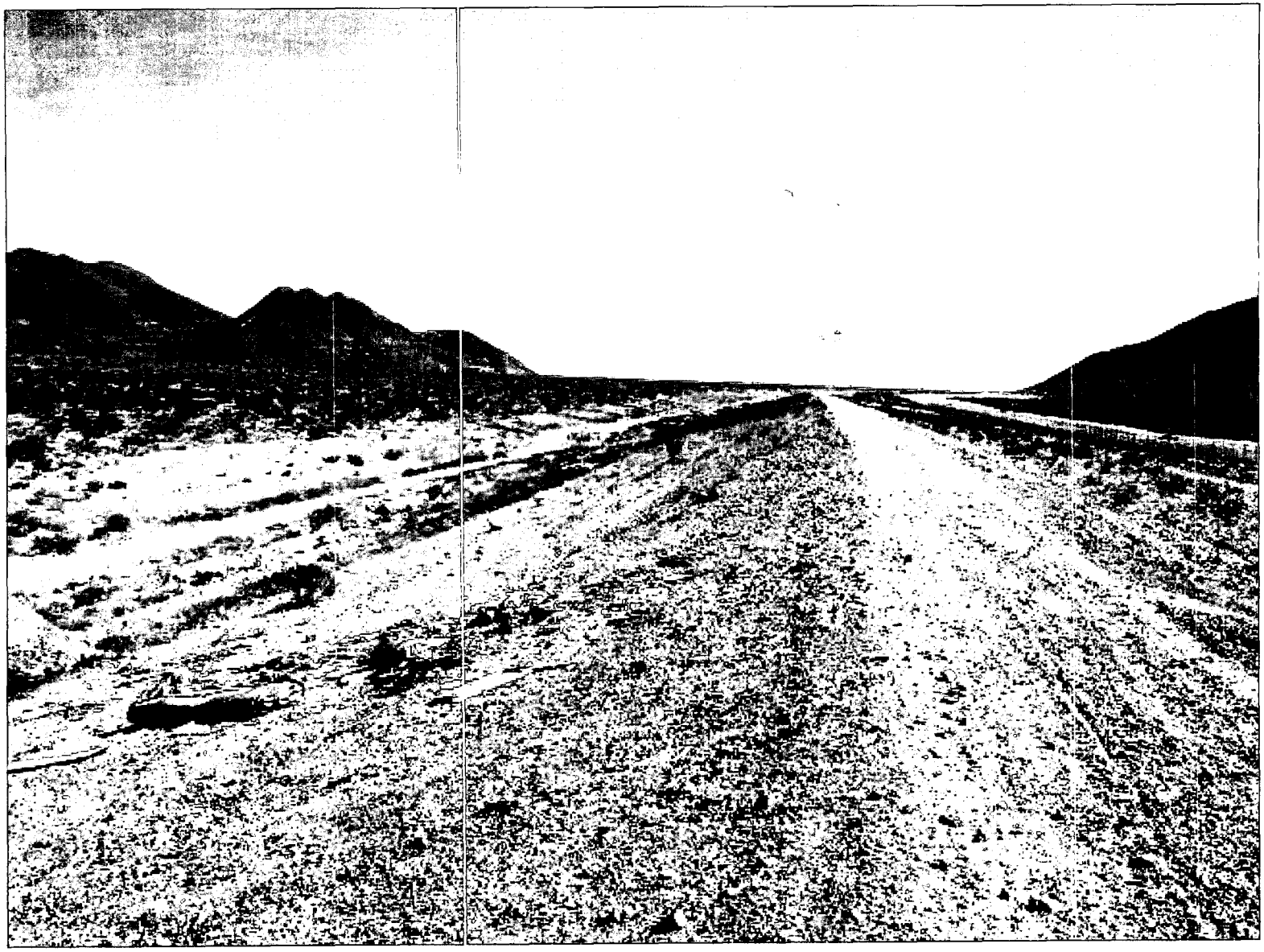
Flood Insurance Restudy

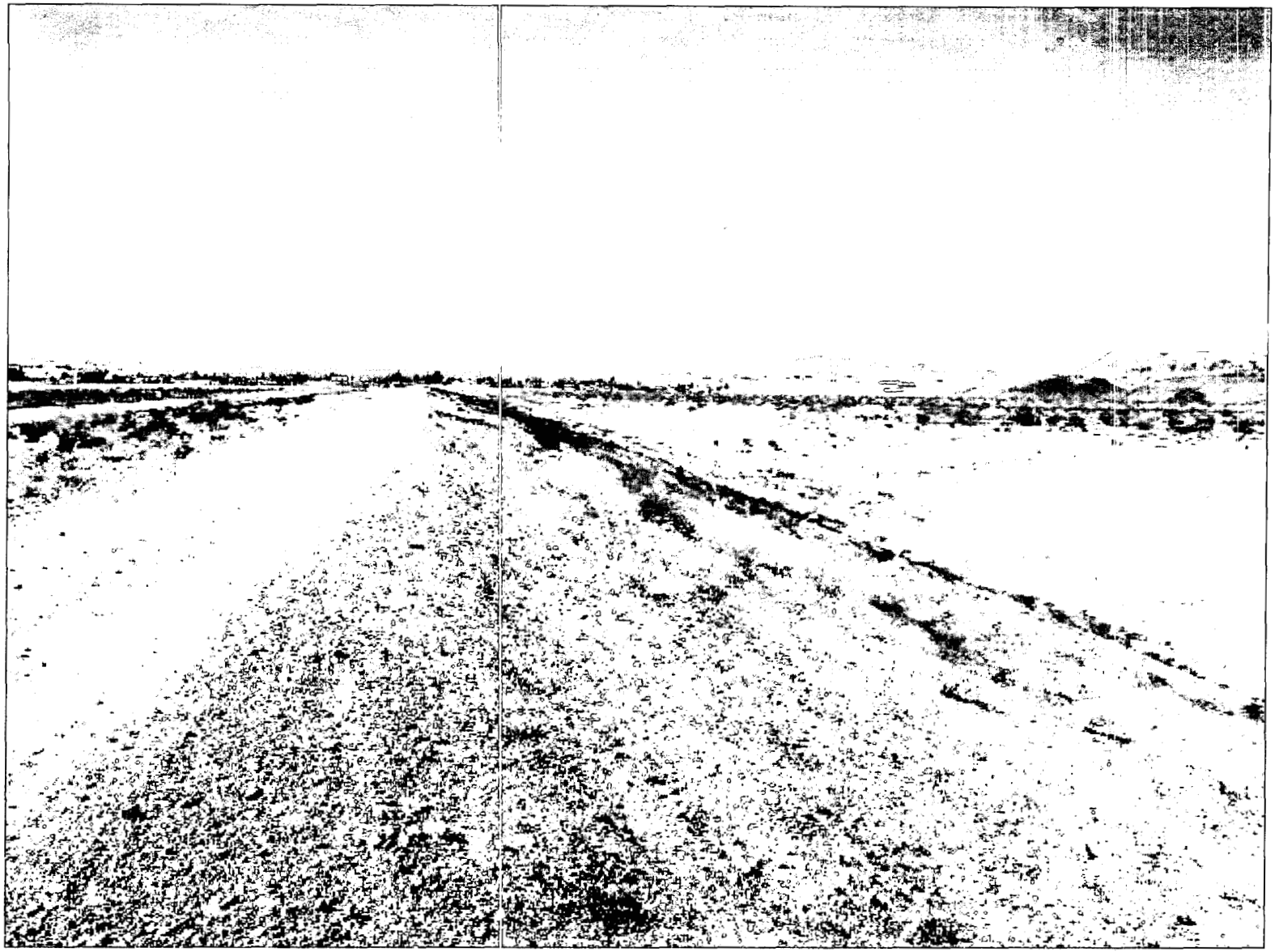
Photograph

EQ
11

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT







Carter::Burgess

C-1 Channel System

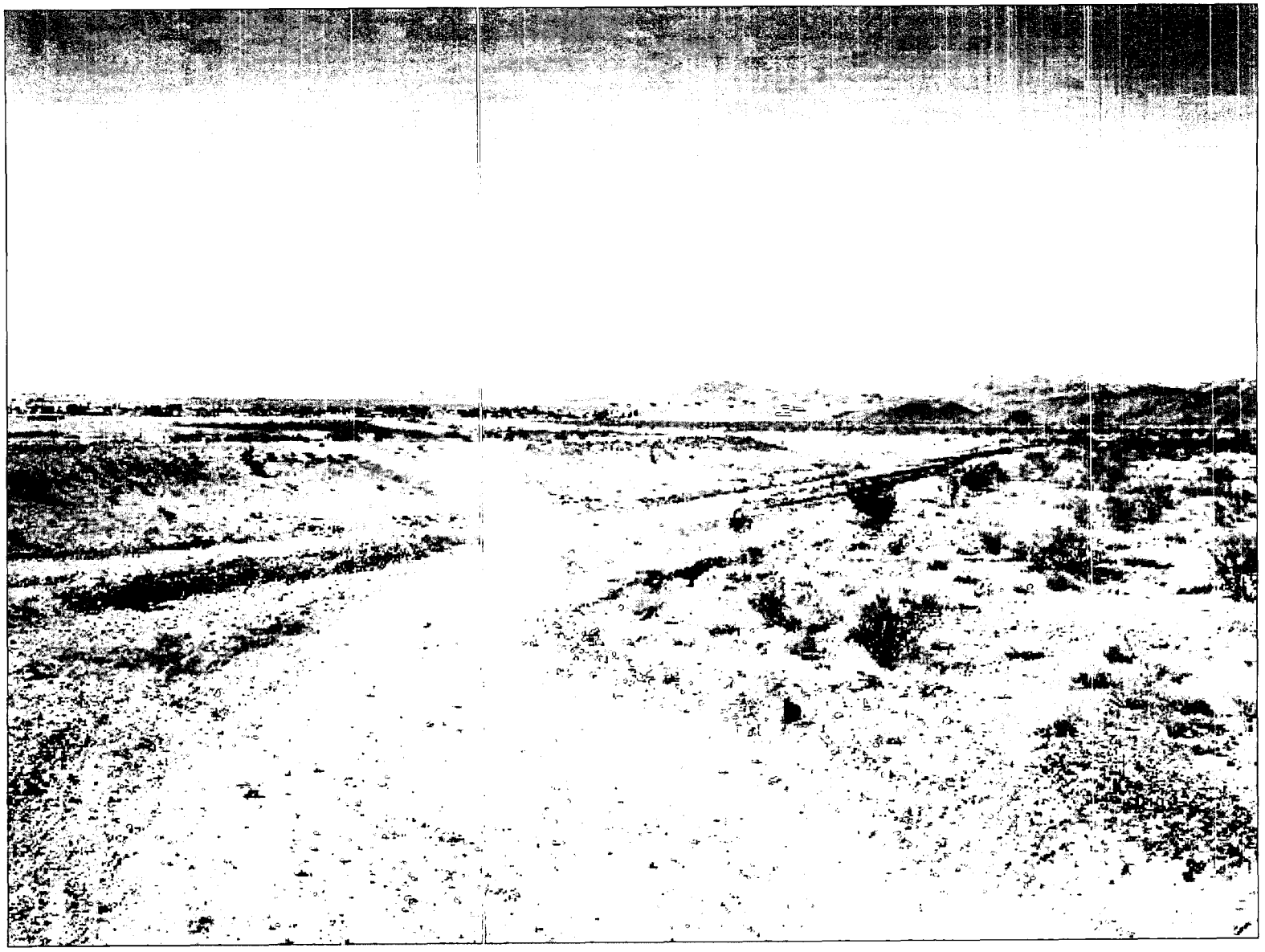
Flood Insurance Restudy

Photograph

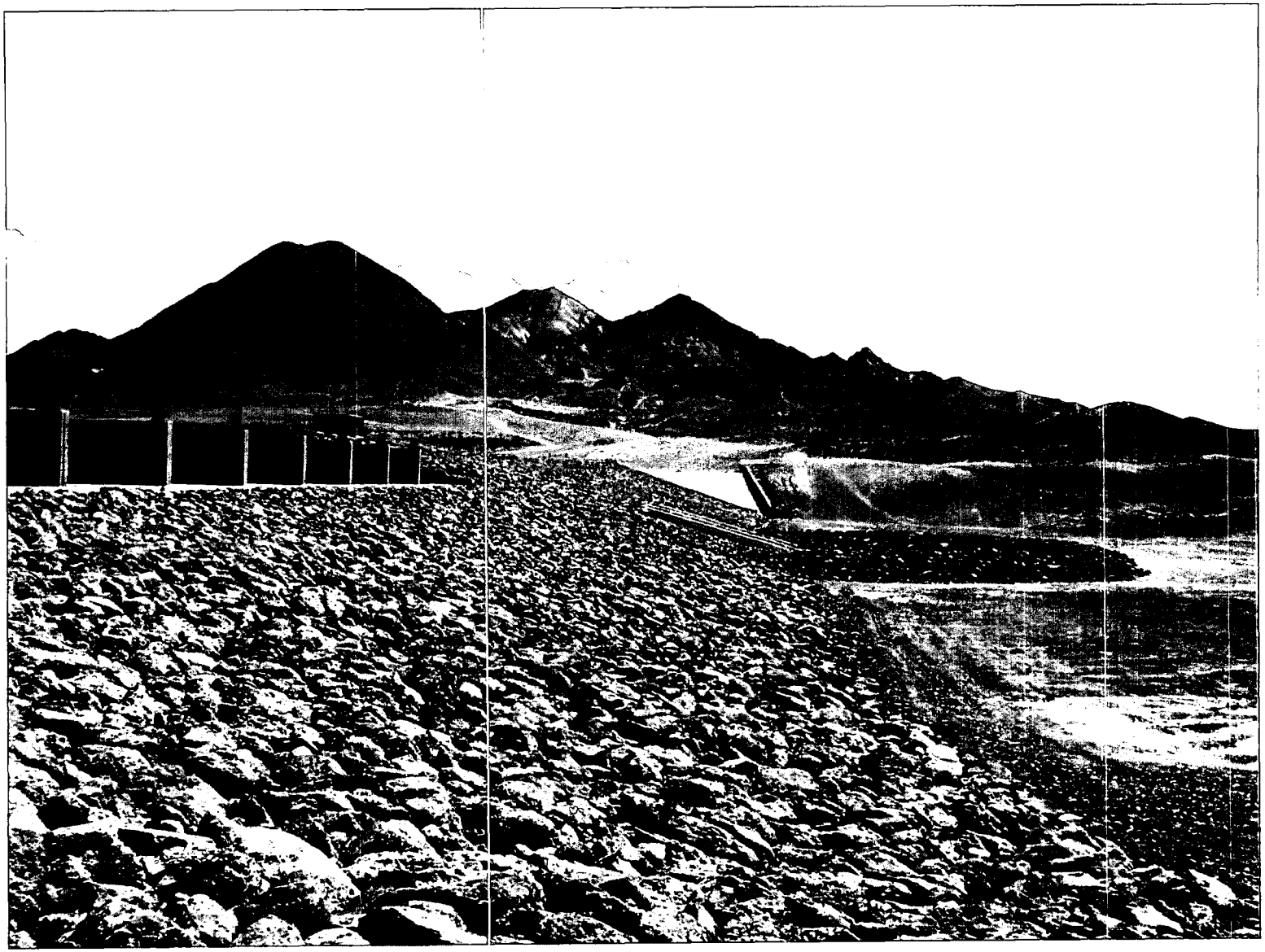
EQ

14

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT







Carter::Burgess

C-1 Channel System

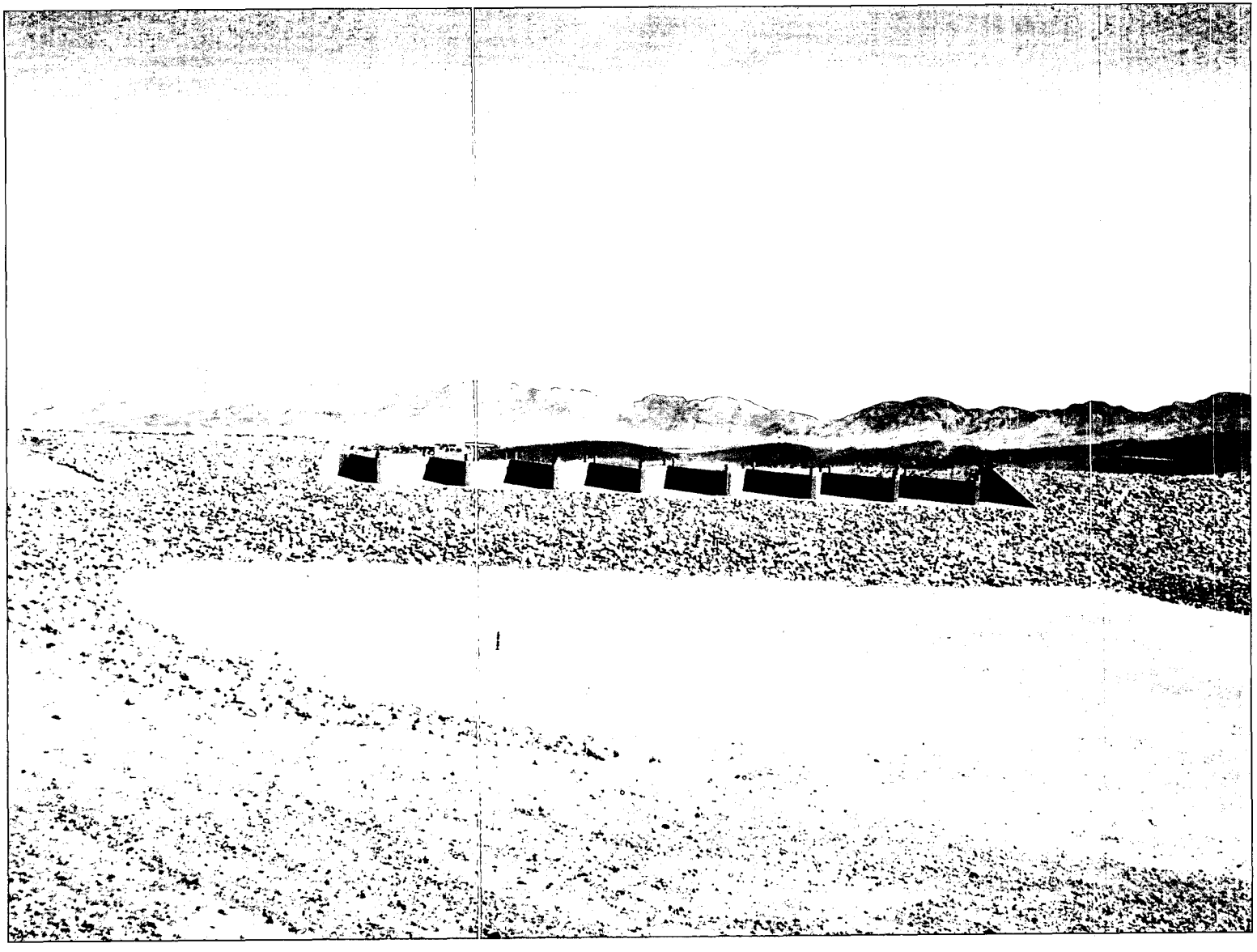
Flood Insurance Restudy

Photograph

BMDB

1

CLEARK COUNTY REGIONAL FLOOD CONTROL DISTRICT



Carter::Burgess

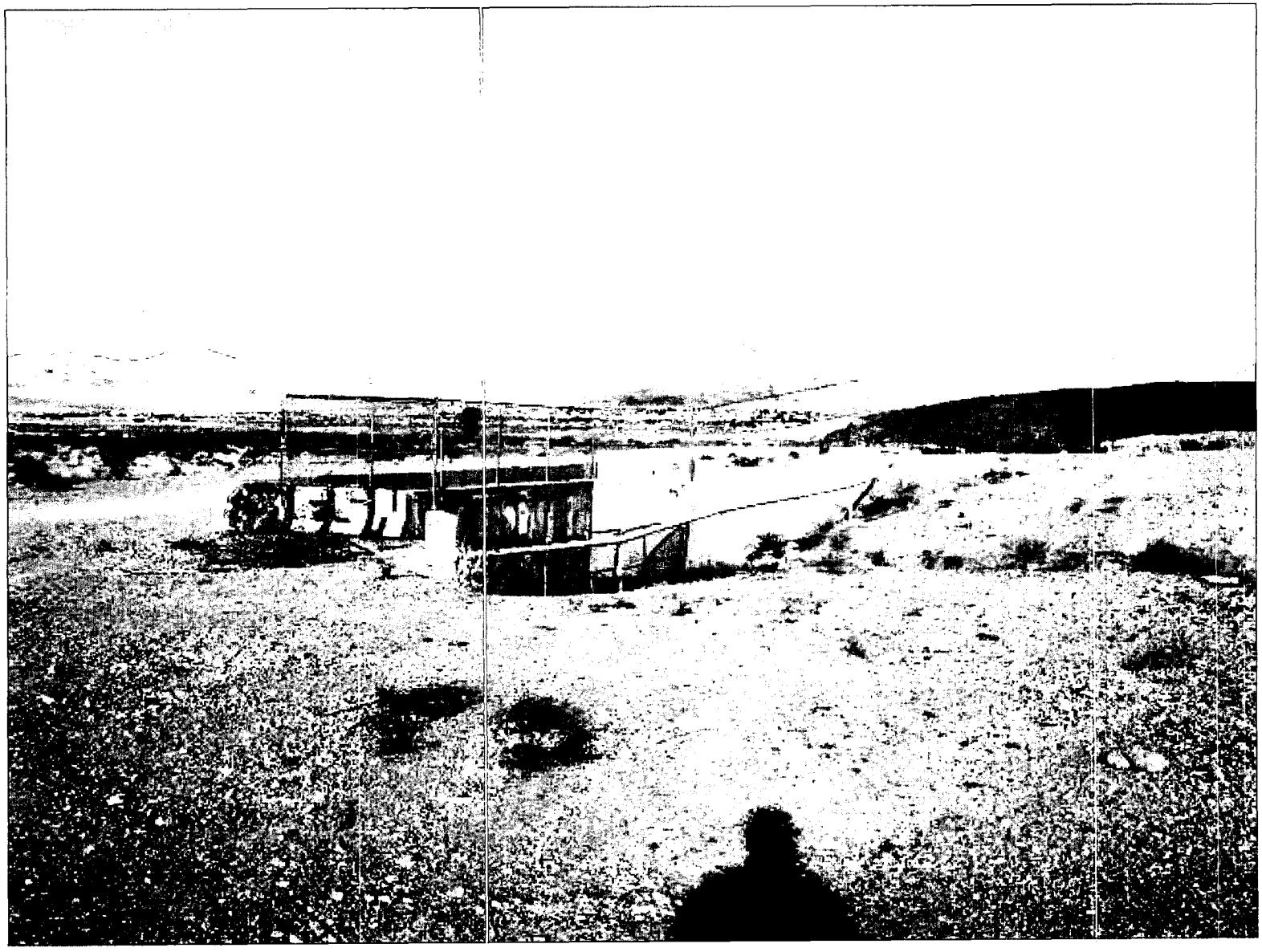
C-1 Channel System

Flood Insurance Restudy

Photograph

BMDB
2

REGIONAL FLOOD CONTROL DISTRICT



Carter::Burgess

C-1 Channel System

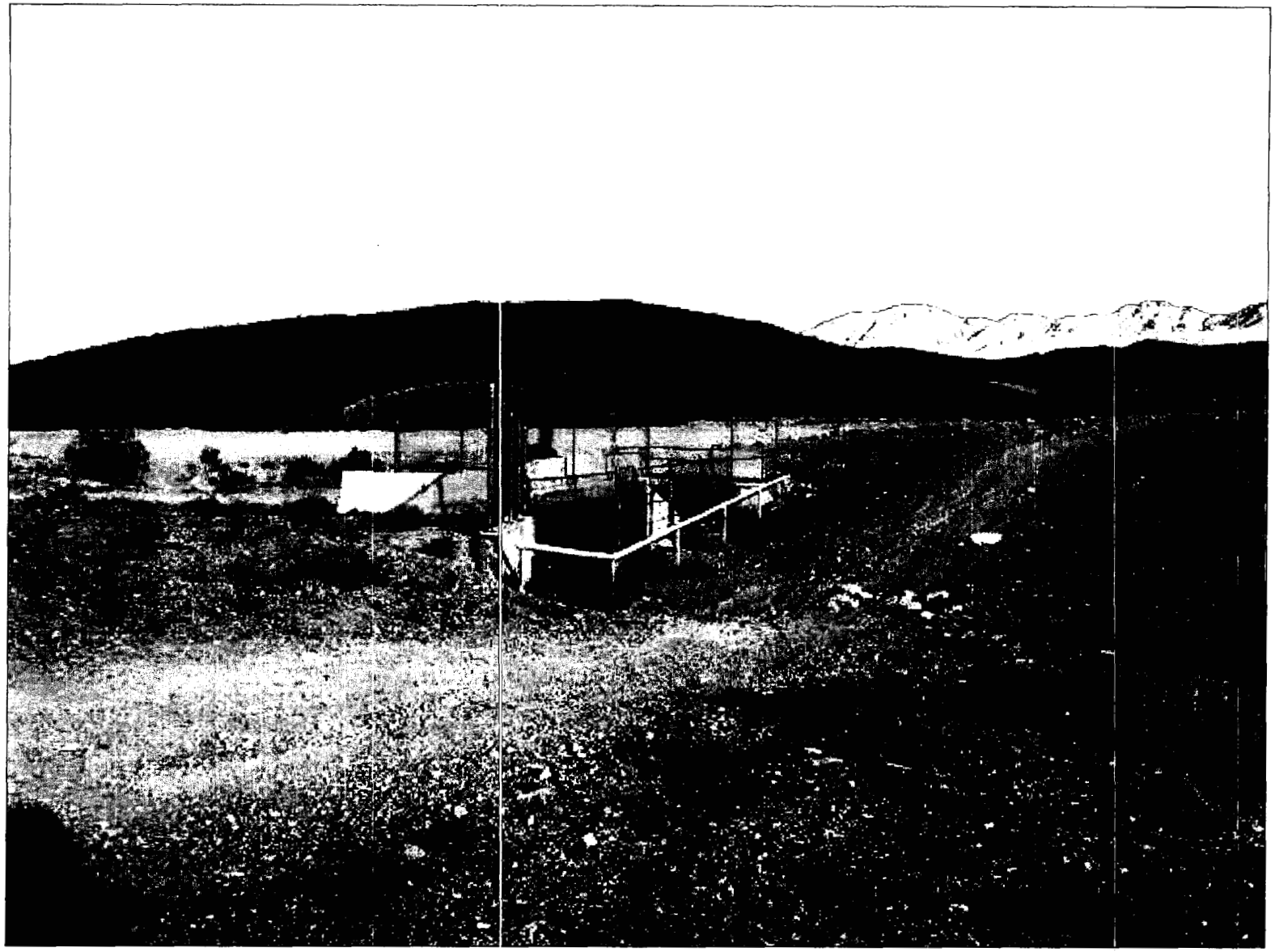
Flood Insurance Restudy

Photograph

MH

1

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT



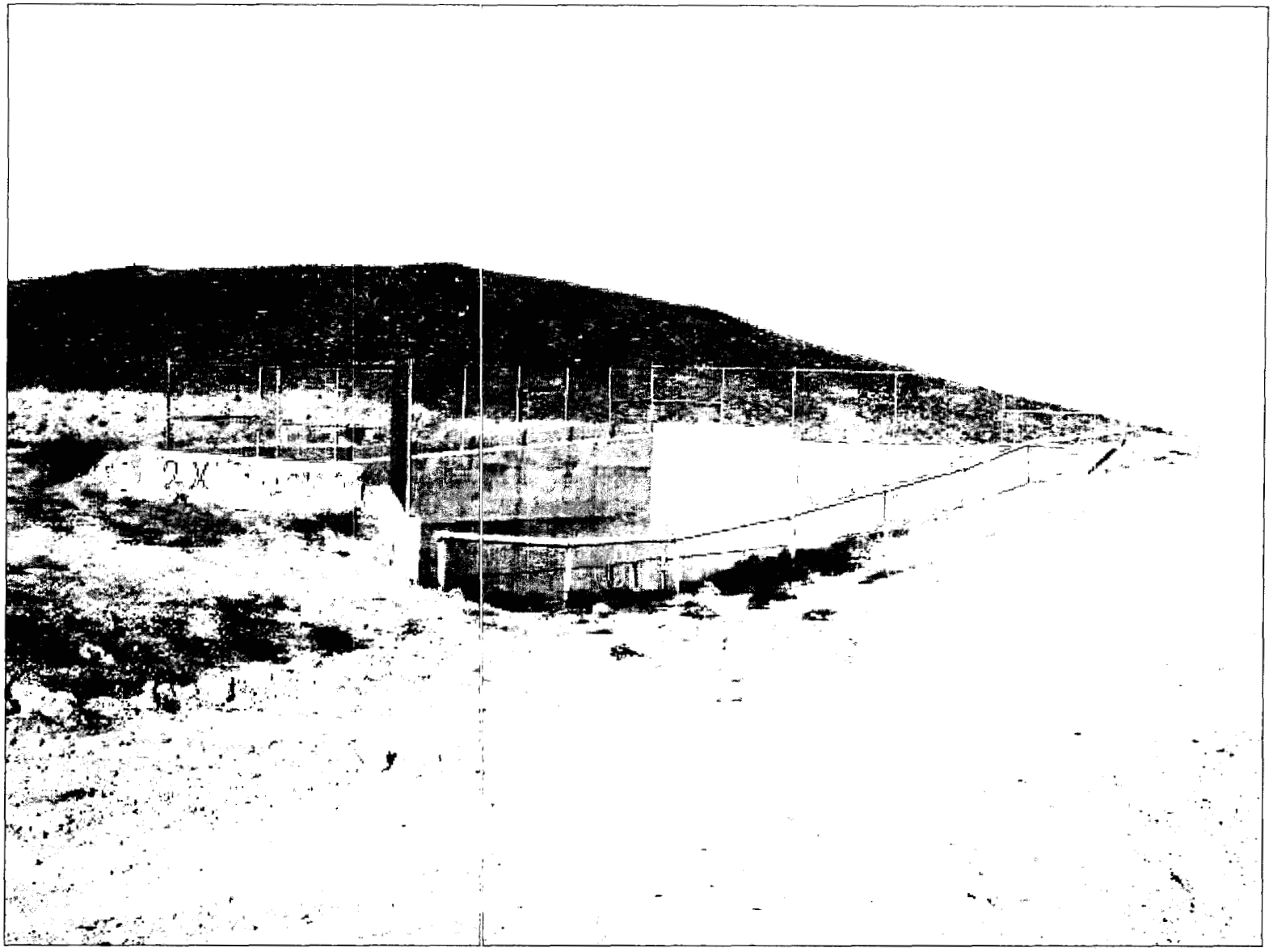
Carter::Burgess

C-1 Channel System
Flood Insurance Restudy

Photograph

MH
2

HARRIS COUNTY REGIONAL FLOOD CONTROL DISTRICT



Carter::Burgess

C-1 Channel System

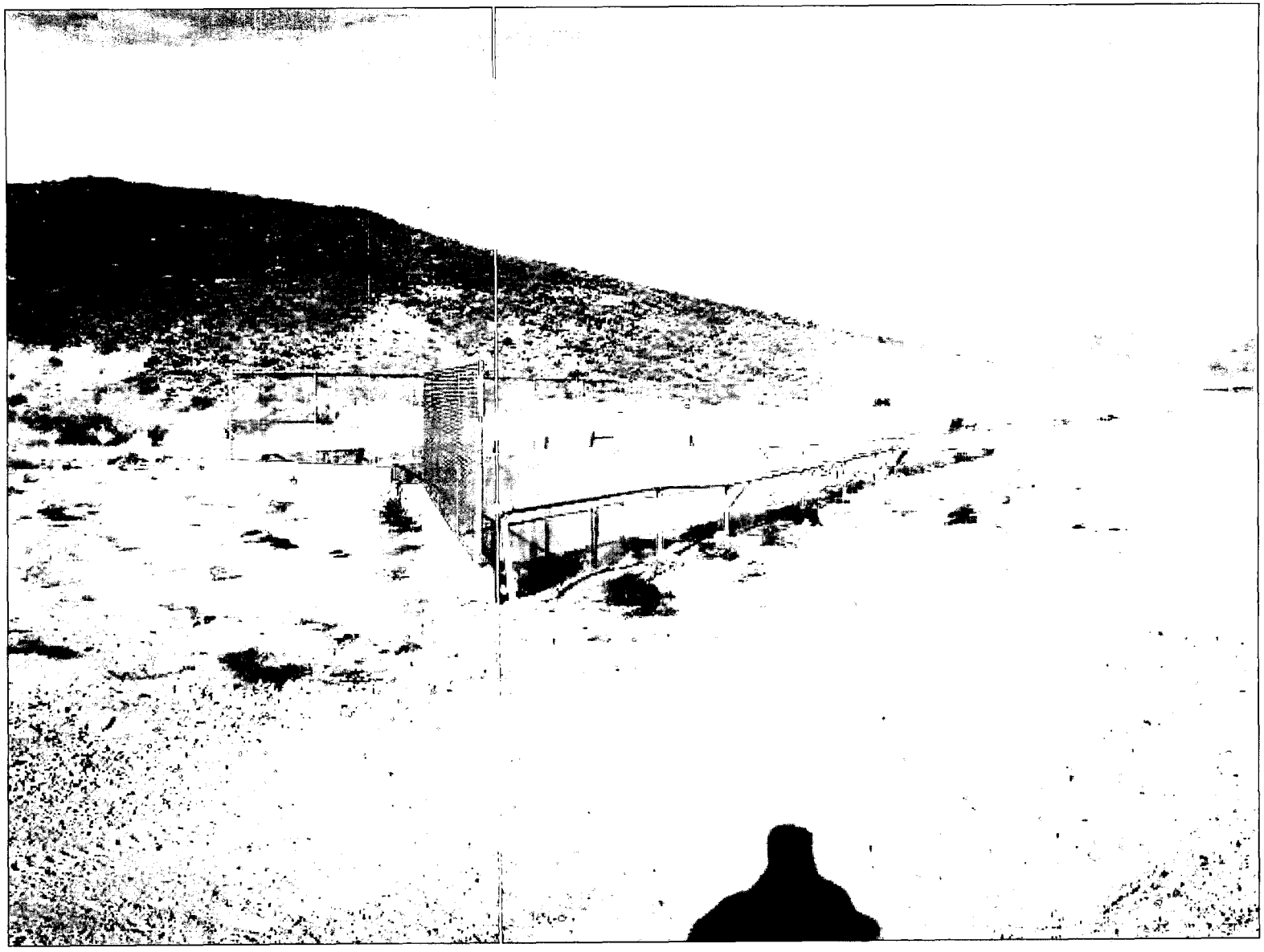
Flood Insurance Restudy

Photograph

MH

3

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT



Carter::Burgess

C-1 Channel System

Flood Insurance Restudy

Photograph

MH

4

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT



Carter::Burgess

C-1 Channel System

Flood Insurance Restudy

Photograph

MH

5

CLEARWATER COUNTY REGIONAL FLOOD CONTROL DISTRICT



Carter::Burgess

C-1 Channel System

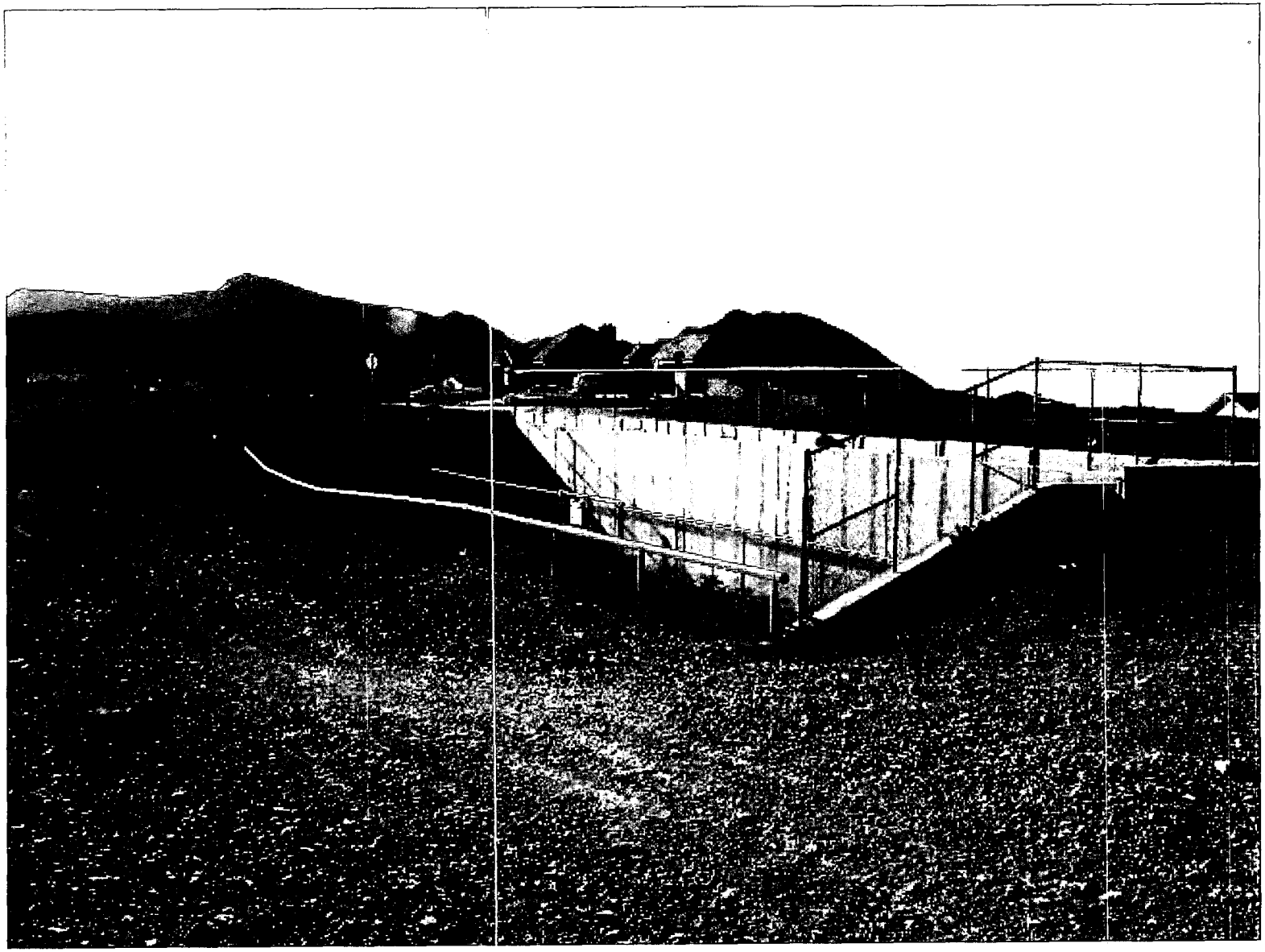
Flood Insurance Restudy

Photograph

MH

6

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT



Carter::Burgess

C-1 Channel System

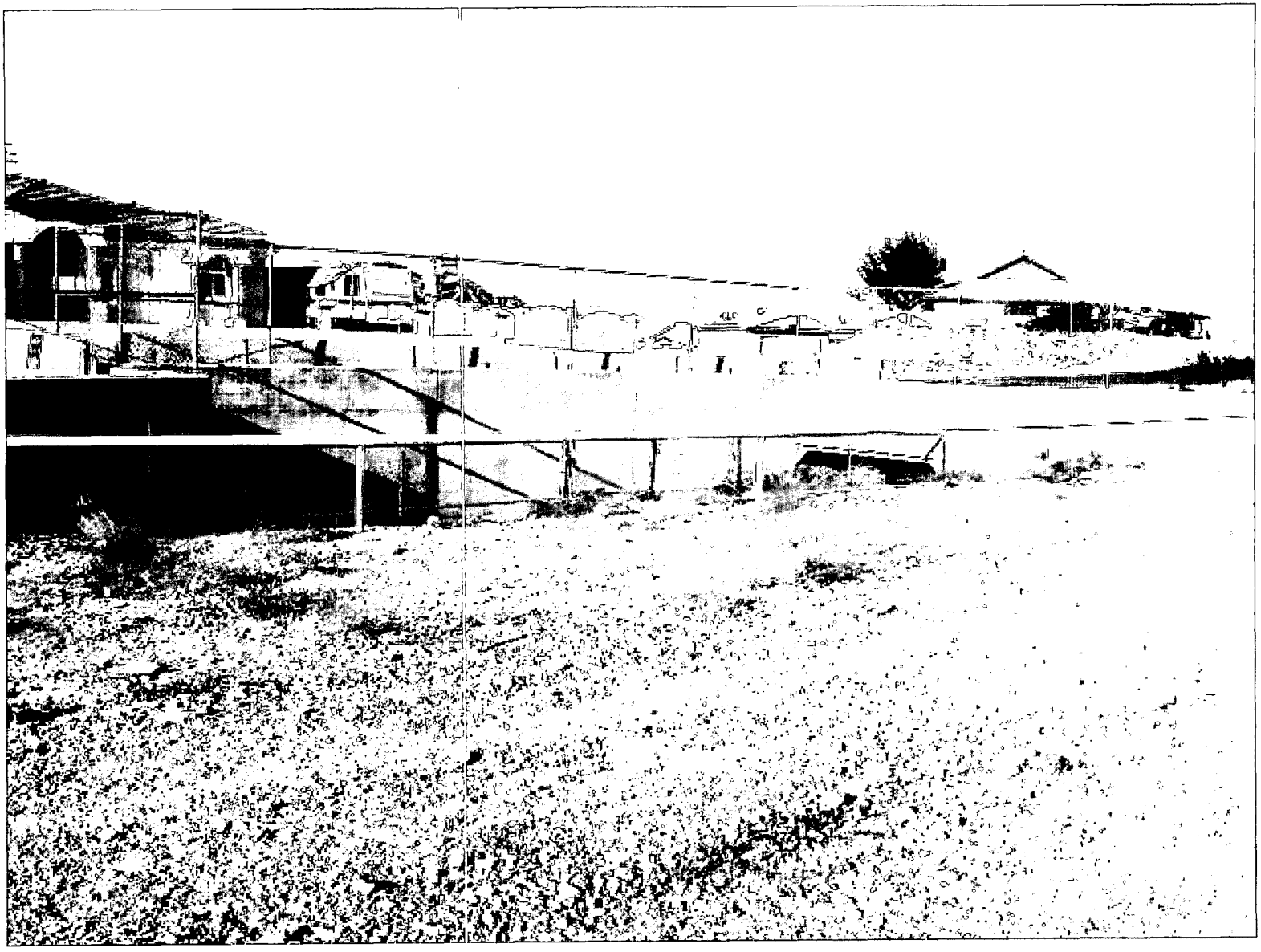
Flood Insurance Restudy

Photograph

MH

7

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT



Carter::Burgess

C-1 Channel System

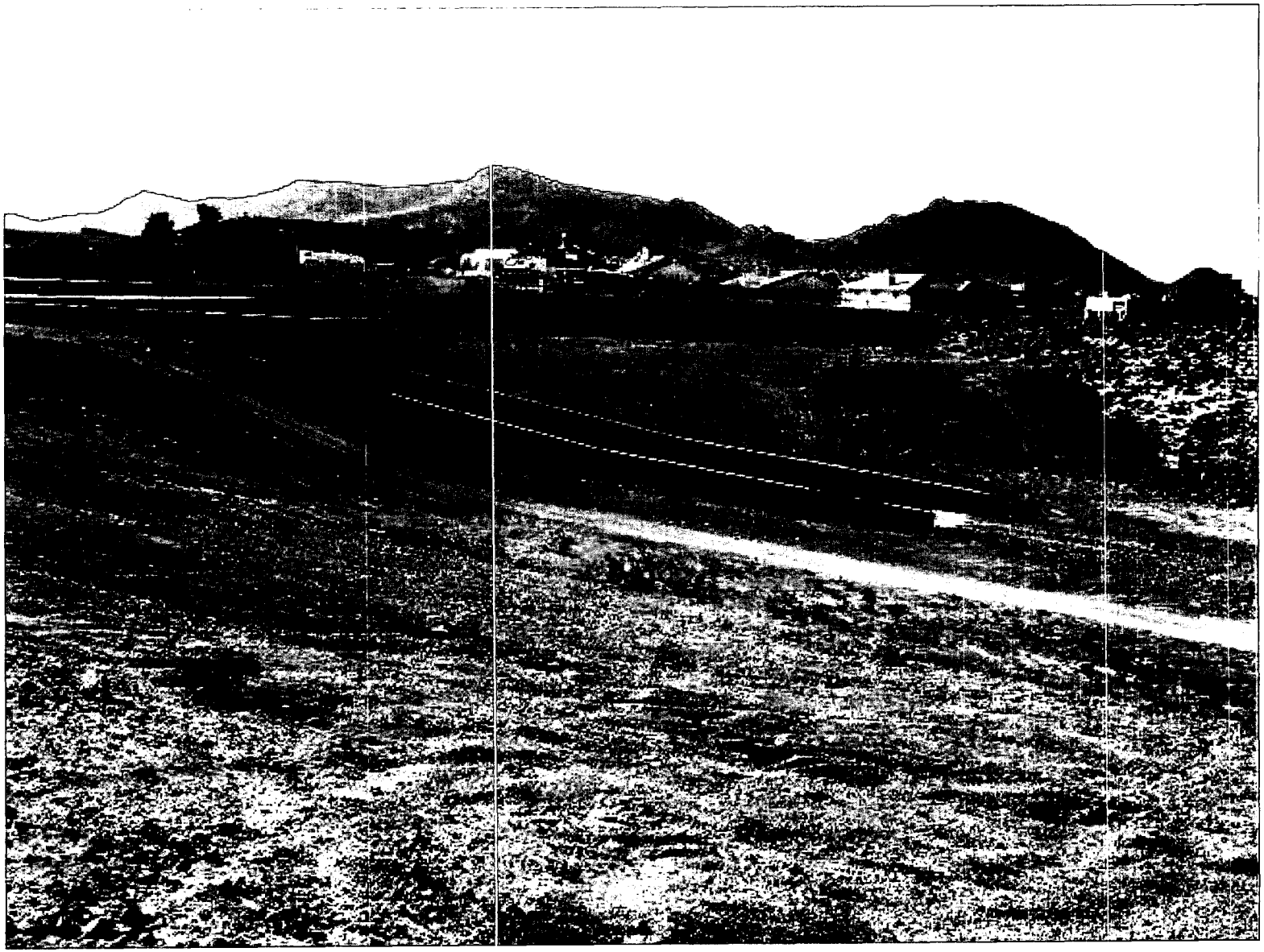
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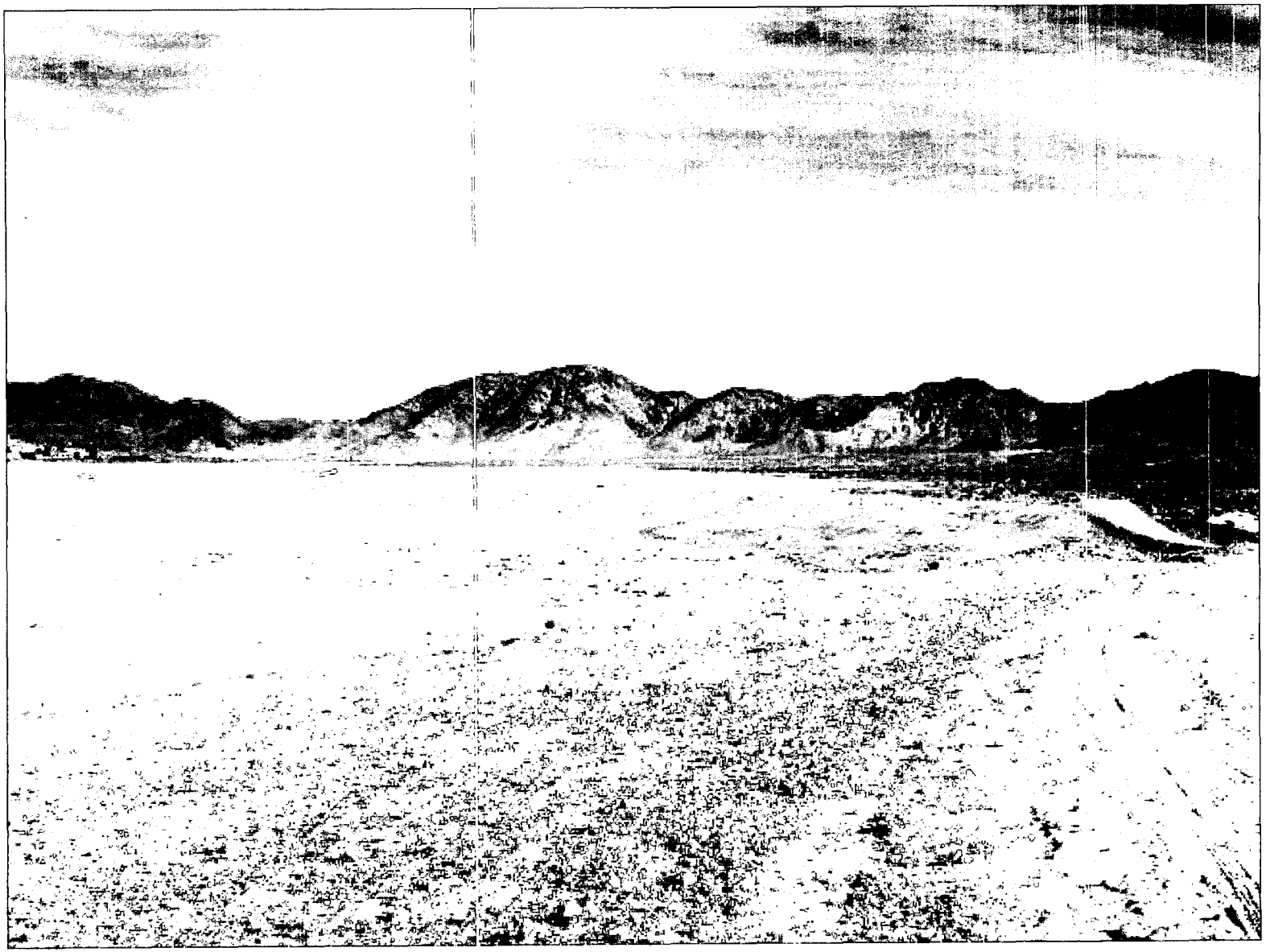
Photograph

MH

8

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT





Carter::Burgess

C-1 Channel System

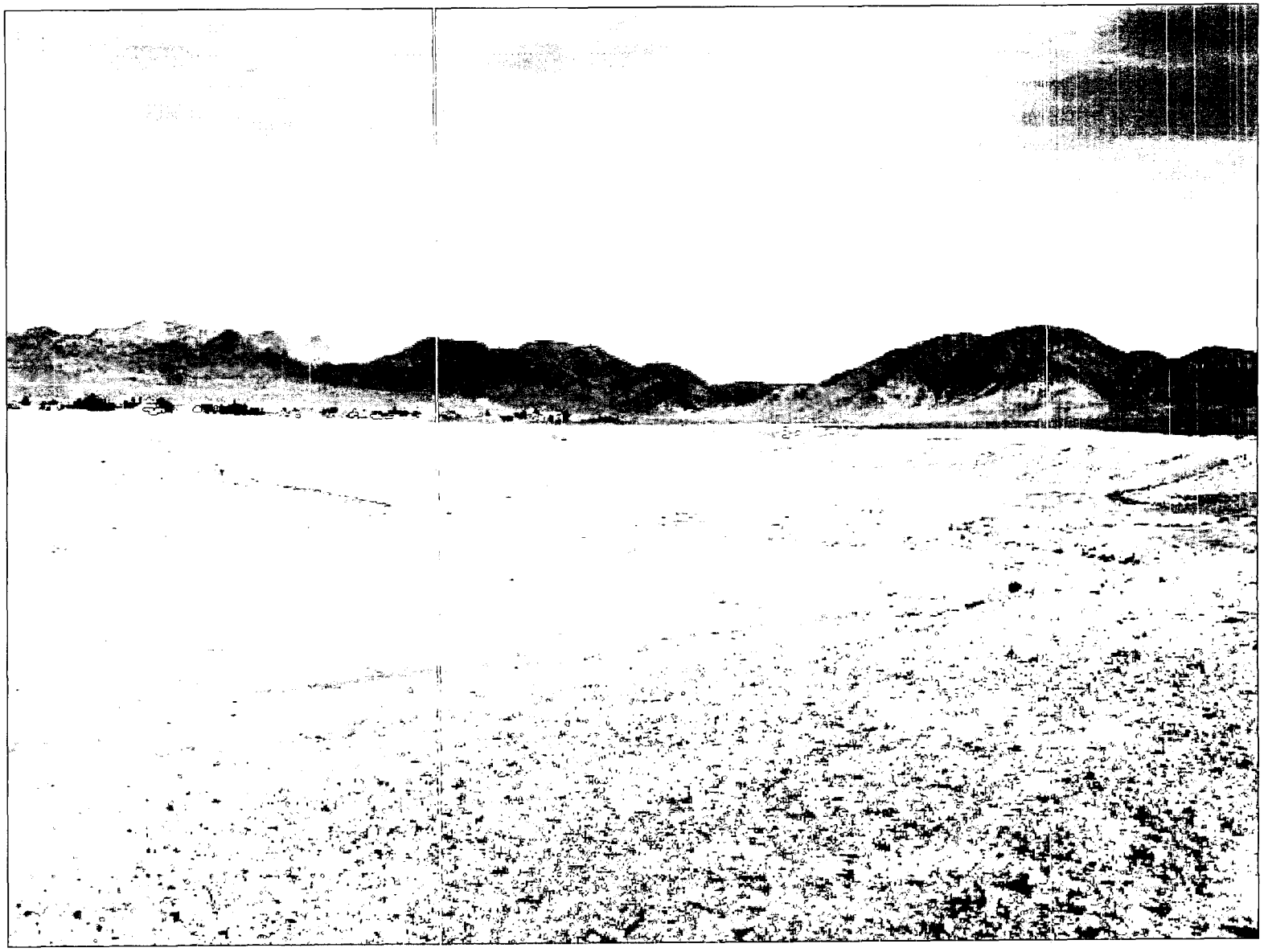
Flood Insurance Restudy

Photograph

MH

10

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT



Carter::Burgess

C-1 Channel System
Flood Insurance Restudy

Photograph

MH
11

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT



Carter::Burgess

C-1 Channel System

Flood Insurance Restudy

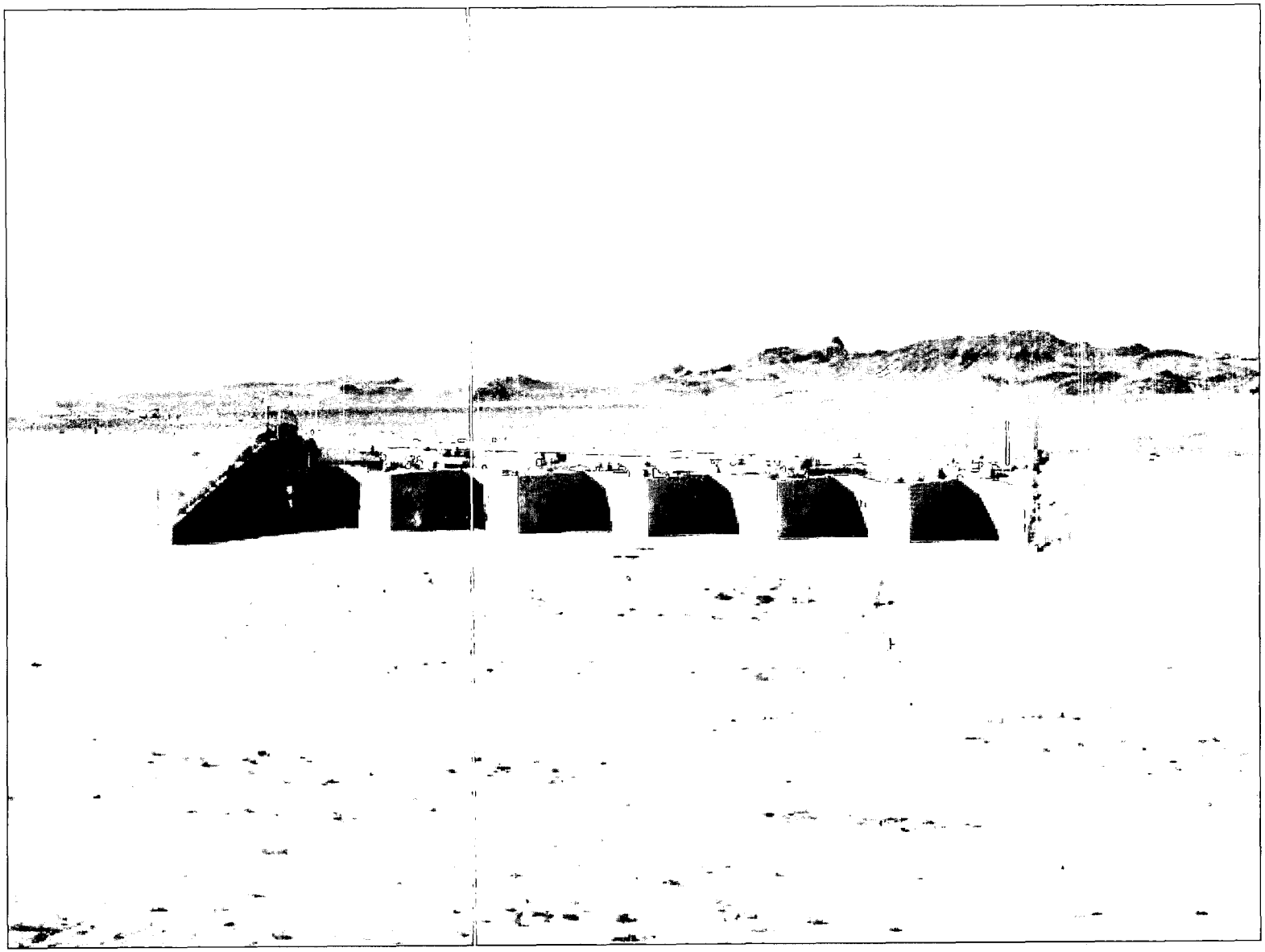
Photograph

MH

12

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT





Carter::Burgess

C-1 Channel System

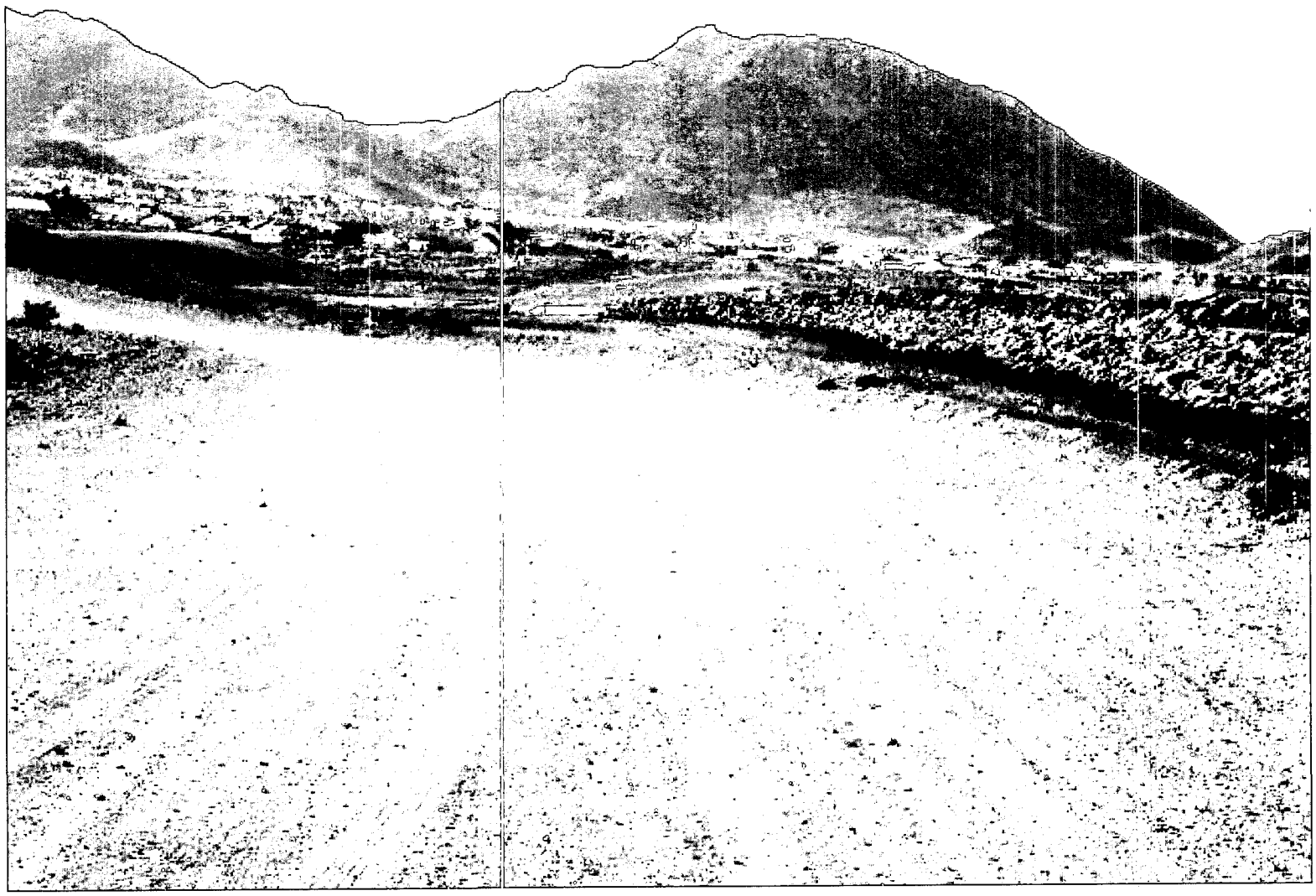
Flood Insurance Restudy

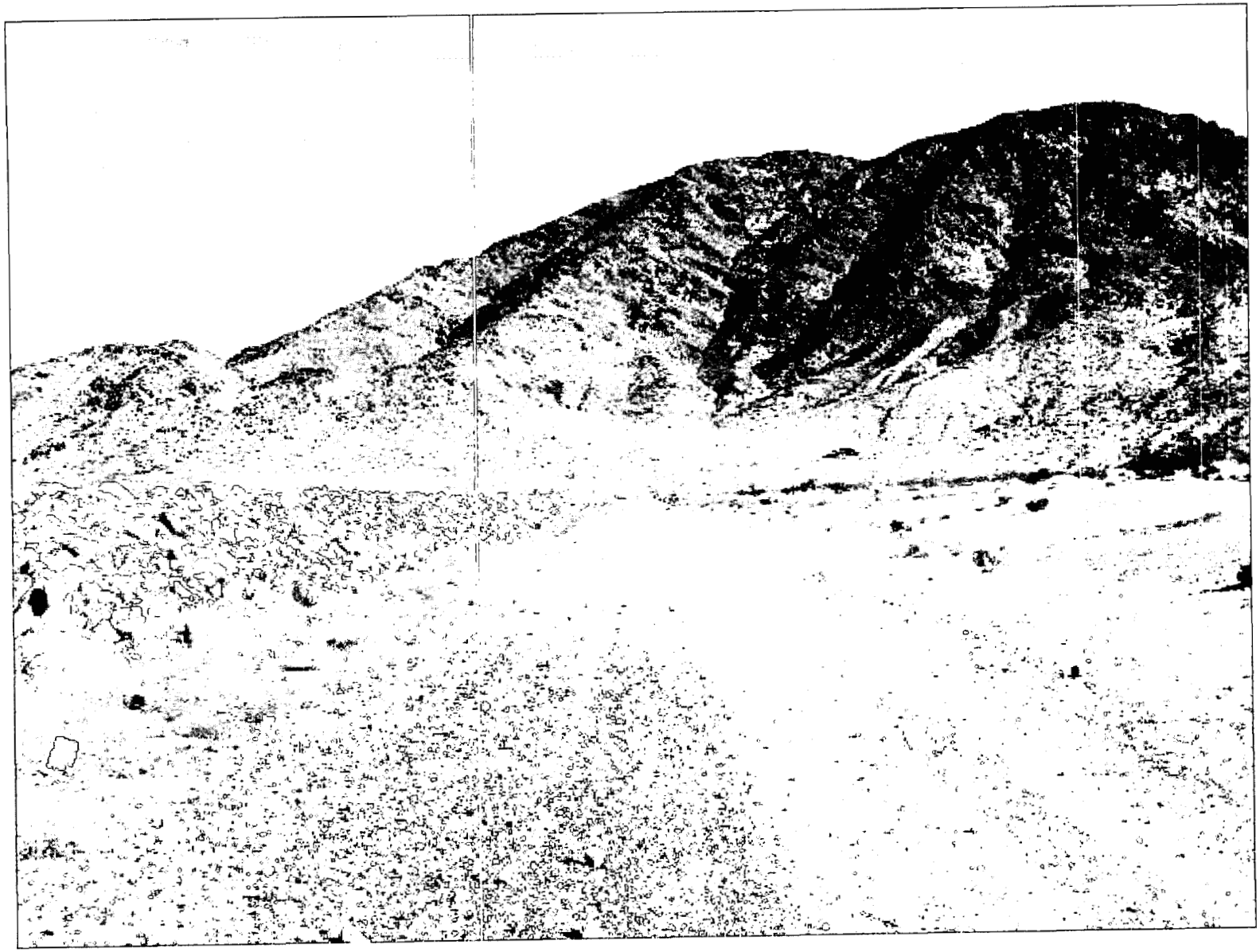
Photograph

MH

14

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT





Carter::Burgess

C-1 Channel System

Flood Insurance Restudy

Photograph

MH

16

HARRIS COUNTY FLOOD CONTROL DISTRICT

1,18394.3730,7504.7880,1809.7930,60-D W/FEATHER/B
2,10016.9221,10016.5107,1969.0300,BM COH#321
3,9885.1068,6123.4238,1931.0500,BM COH#67
4,12552.9520,7399.1150,1879.7830,ALCAP
5,11961.4145,10011.0381,1952.3280,COH BM#322
6,15159.9300,8658.1656,1883.1280,COH BM#325
7,15239.2459,7476.1023,1853.0760,RM 73.96/99.41
8,15237.3796,7375.0923,1850.3080,RM 61.36/46.00
9,15148.7198,7376.0194,1851.4990,RM 46.04/61.32
10,15148.8852,7409.6950,1852.1140,RM 49.39/PLS9047
11,13716.7742,7292.2433,1861.1610,N EDGE SSMH
12,15853.3217,7415.0306,1845.6250,WELL MON
13,16513.1260,7412.1626,1836.4560,WELL MON
14,17172.9502,7409.2894,1827.3210,WELL MON
15,17832.7015,7406.4267,1815.6170,WELL MON
16,18493.0250,7403.9043,1804.3670,REBAR
17,19153.3538,7401.4118,1796.2510,WELL MON
18,19812.8468,7398.9668,1785.9940,WELL MON
19,20473.0263,7396.4413,1772.6640,WELL MON
20,21132.9301,7393.8056,1759.3860,WELL MON
21,21792.9594,7391.1011,1744.6340,WELL MON
22,24861.2375,7716.7708,1667.2960,COH BM#220
23,19139.1801,5673.5234,1759.6990,COH BM#36
24,17299.5804,4789.4248,1780.7180,COH BM#35
25,15678.5950,4793.9979,1809.9860,COH BM#208
26,22662.1761,7259.9719,1723.5770,SET 60-D
27,22635.1645,7217.4173,1723.5750,SET 60-D
28,10218.6621,7410.2452,1921.2410,SET 60-D
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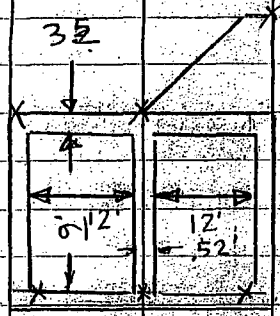
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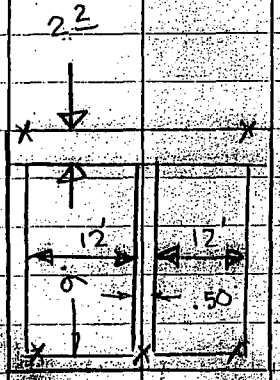
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Steady Qubau

LAKE MEAD CROSSING



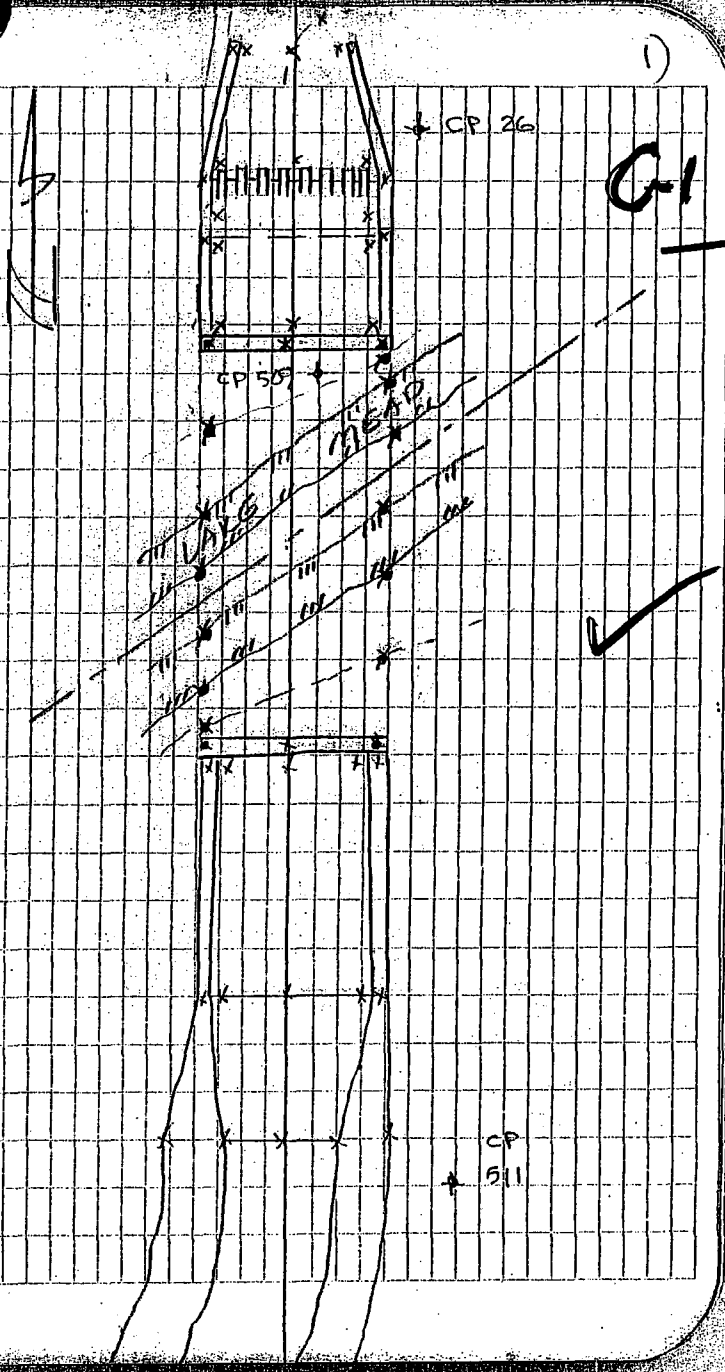
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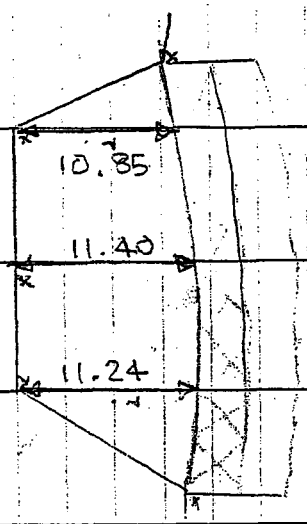


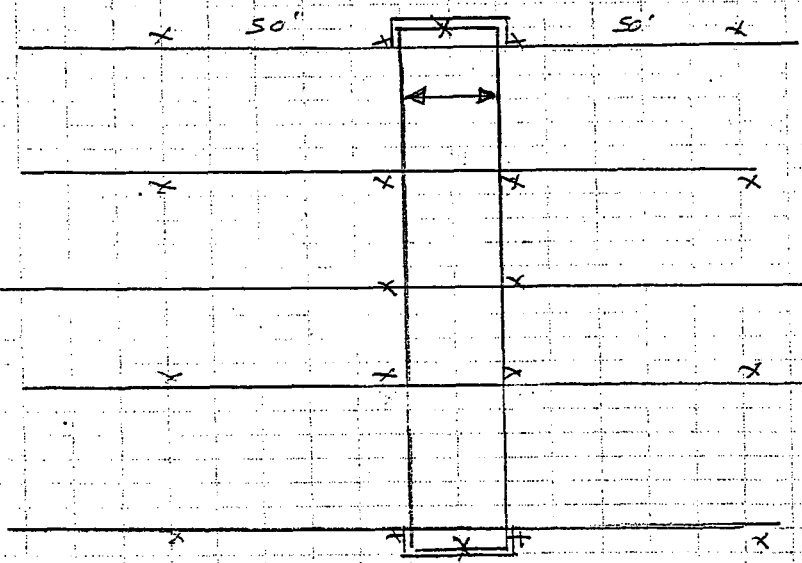
SOUTH

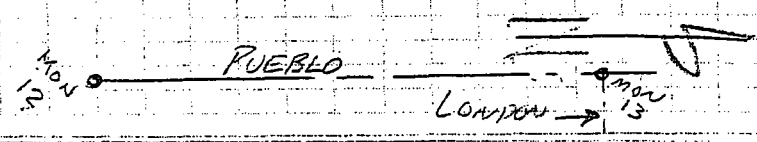
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G-1 SURVEY

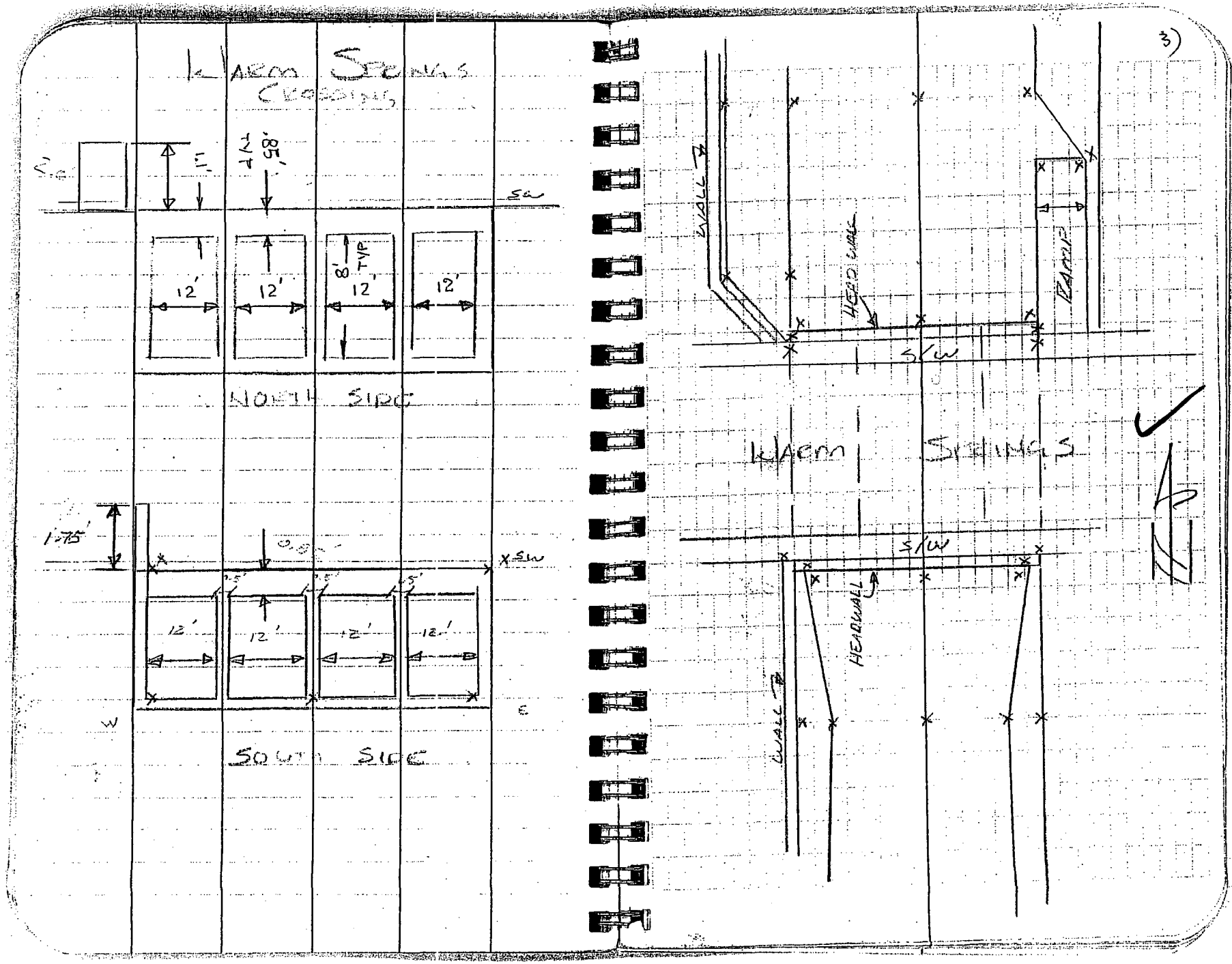


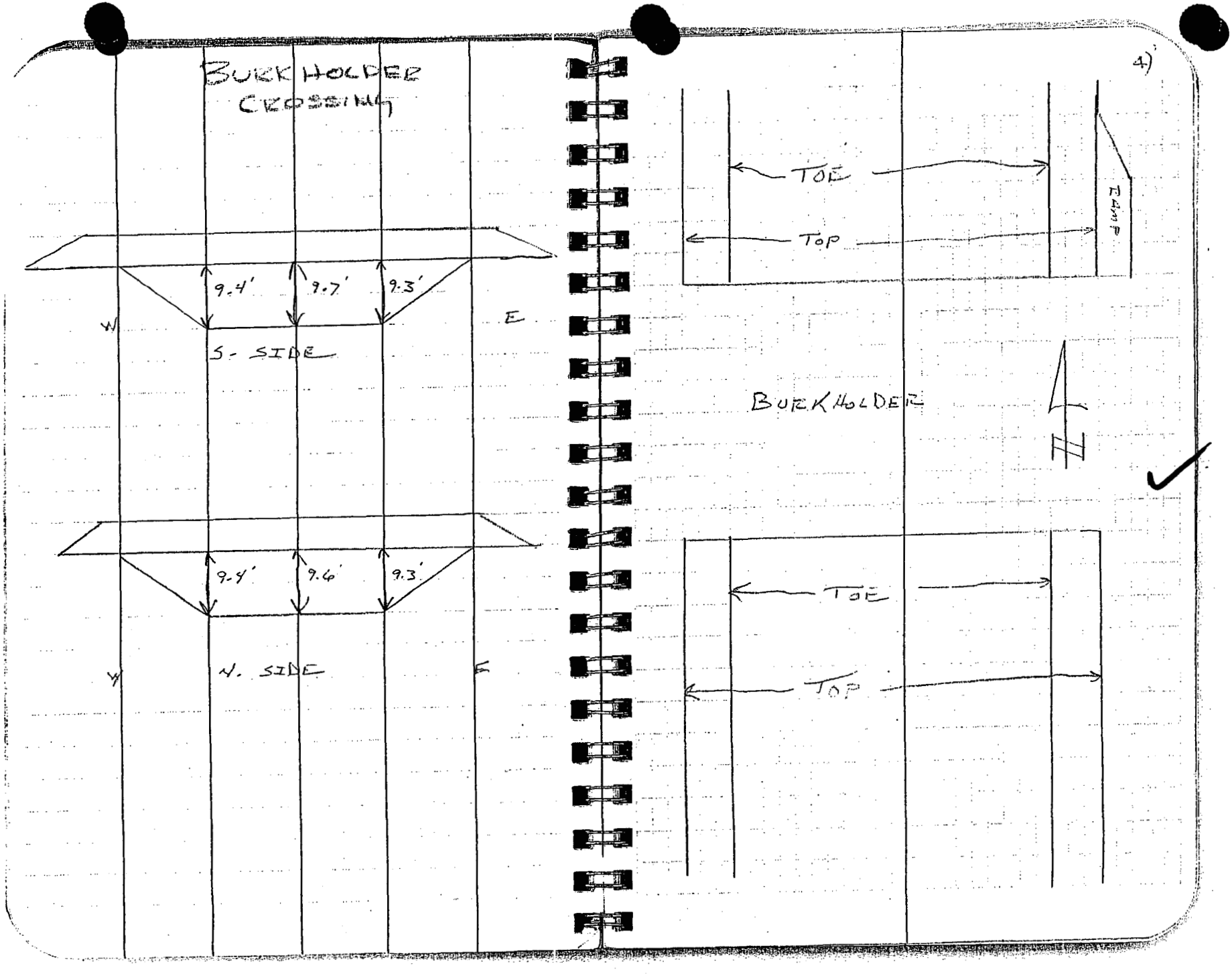




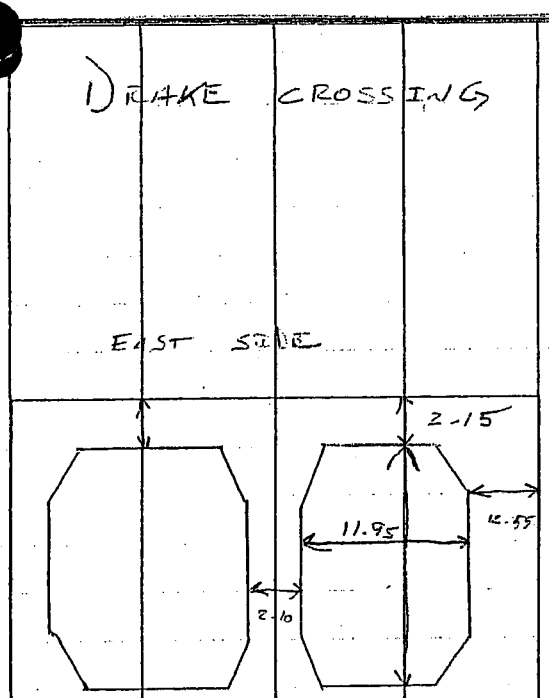


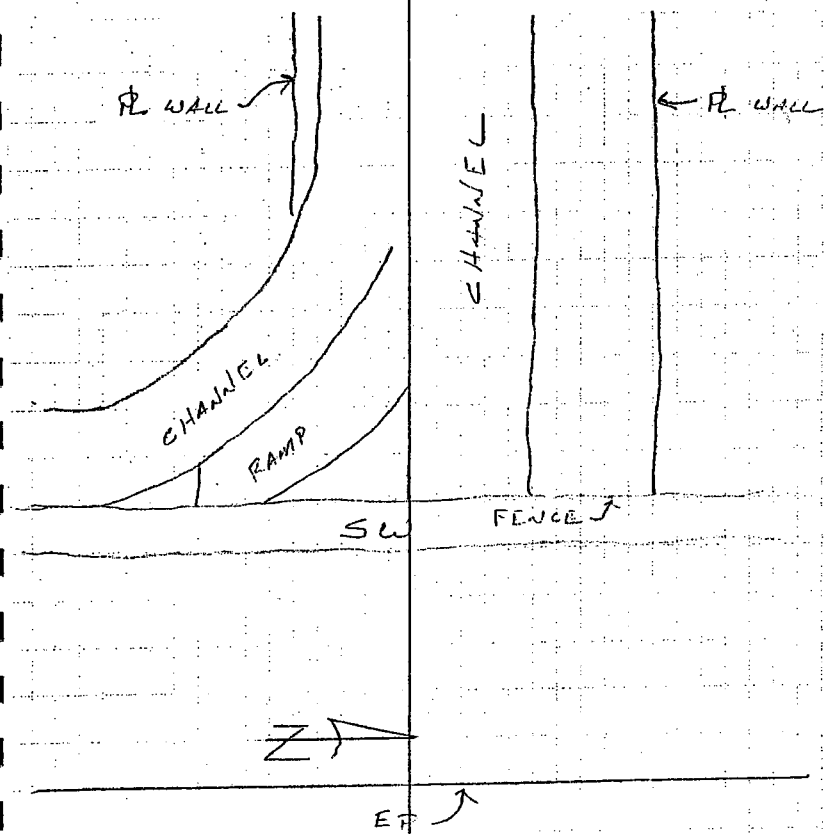
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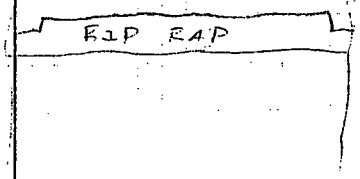

Warm Springs
Crossing
11'
14'-5 1/2"
58'
S.W.
12'
12'
8' TYP
12'
12'
NORTH SIDE
11'-7 1/2"
O.S.
X.S.W.
12'
12'
12'
12'
SOUTH SIDE
E
W
3)
Warm Springs
S/W
HEADWALL
CURB
HEADWALL
CURB
S/W


BUCK HOLDER CROSSING
9.4'
9.7'
9.3'
W
E
S - SIDE
9.4'
9.6'
9.3'
W
E
N. SIDE
4)
TOE
TOP
RAMP
BUCK HOLDER
N
TOE
TOP

1) RAKE CROSSING







7-11-02

WARM SPRINGS CROSSING
240462

TC cp 477 RESECT FROM 8 & 447
BS cp 447

TOPO PT
430 - 508

NOTE: SEE PG 3 FOR SKETCH

7-12-02

LAKE MEAD CROSSING

TC cp 509 RESECT FROM 26 & 21
BS cp 26

TOPO PTS
512 - 567

NOTE: SEE PG 1 FOR SKETCH

7-12-02

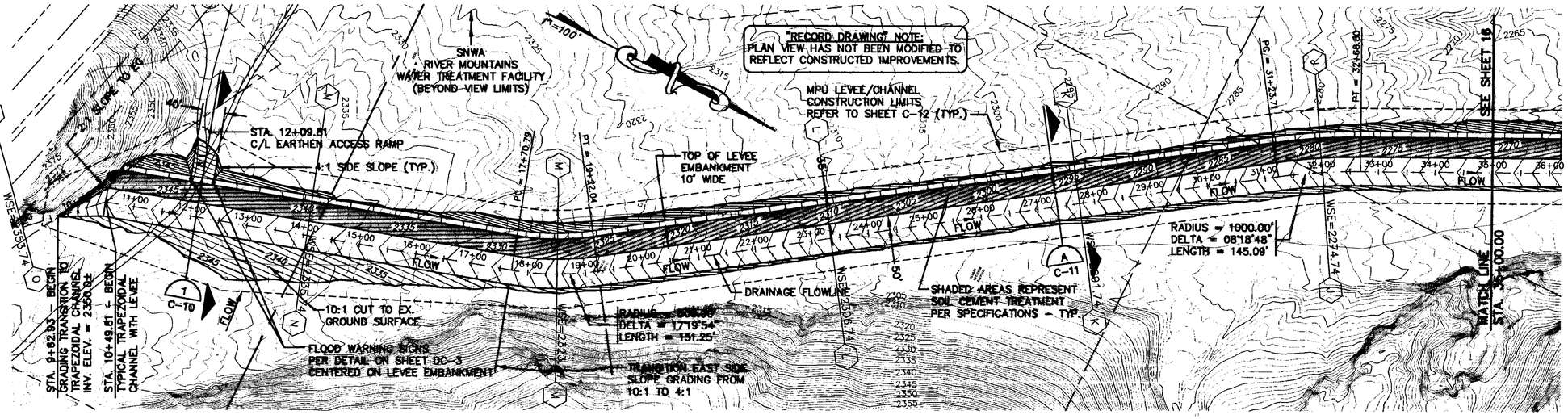
PED CROSSING
240482

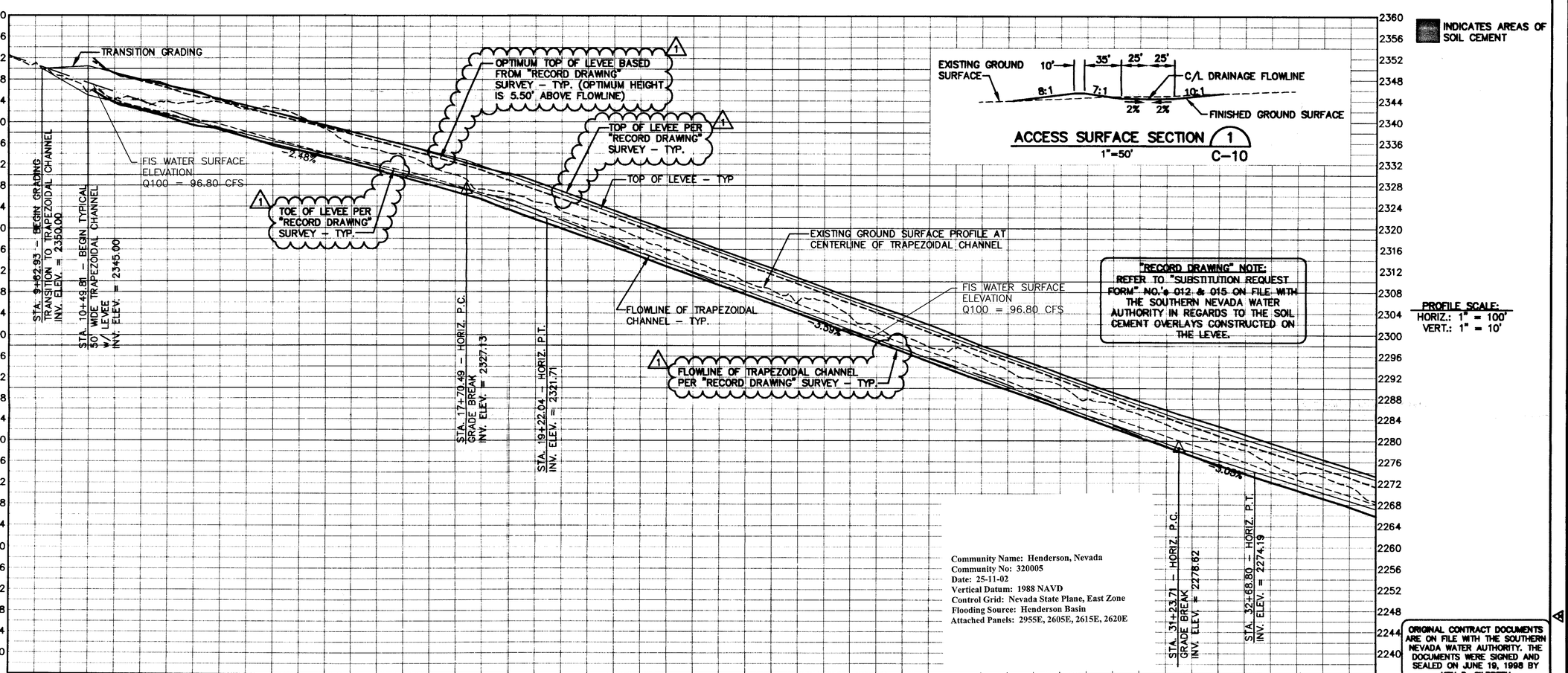
TO CP 13
BS CP 12

TOPO - PTS

568 - 583

NOTE: SEE PG 2 FOR SKETCH





ACCESS SURFACE SECTION 1
1"=50'
C-10

INDICATES AREAS OF SOIL CEMENT

"RECORD DRAWING" NOTE:
REFER TO "SUBSTITUTION REQUEST FORM" NO.'s 012 & 015 ON FILE WITH THE SOUTHERN NEVADA WATER AUTHORITY IN REGARDS TO THE SOIL CEMENT OVERLAYS CONSTRUCTED ON THE LEVEE.

PROFILE SCALE:
HORIZ.: 1" = 100'
VERT.: 1" = 10'

Community Name: Henderson, Nevada
Community No: 320005
Date: 25-11-02
Vertical Datum: 1988 NAVD
Control Grid: Nevada State Plane, East Zone
Flooding Source: Henderson Basin
Attached Panels: 2955E, 2605E, 2615E, 2620E

ORIGINAL CONTRACT DOCUMENTS ARE ON FILE WITH THE SOUTHERN NEVADA WATER AUTHORITY. THE DOCUMENTS WERE SIGNED AND SEALED ON JUNE 19, 1998 BY KEN D. GILBRETH UNDER NEVADA LICENSE NO. 9177

SOUTHERN NEVADA
WATER AUTHORITY
1900 E. FLAMINGO ROAD SUITE 170
LAS VEGAS, NEVADA 89119
(702) 862-3400

VERIFY SCALE
1/2 0 1/2 1
BAR REPRESENTS ONE AND ONE-HALF INCHES ON ORIGINAL

EAST C-1 DETENTION BASIN
MPU LEVEE - PLAN & PROFILE
STA. 9+00 TO STA. 35+00

1	"RECORD DRAWING"	DJB	6/12/00
	C-10.DWG Plot @ 06/12/98 10:40 A.M.		

SCALE: AS NOTED
DSGN: EH,DJB
DR: DJB
CHK: DWB
APVD: KDG

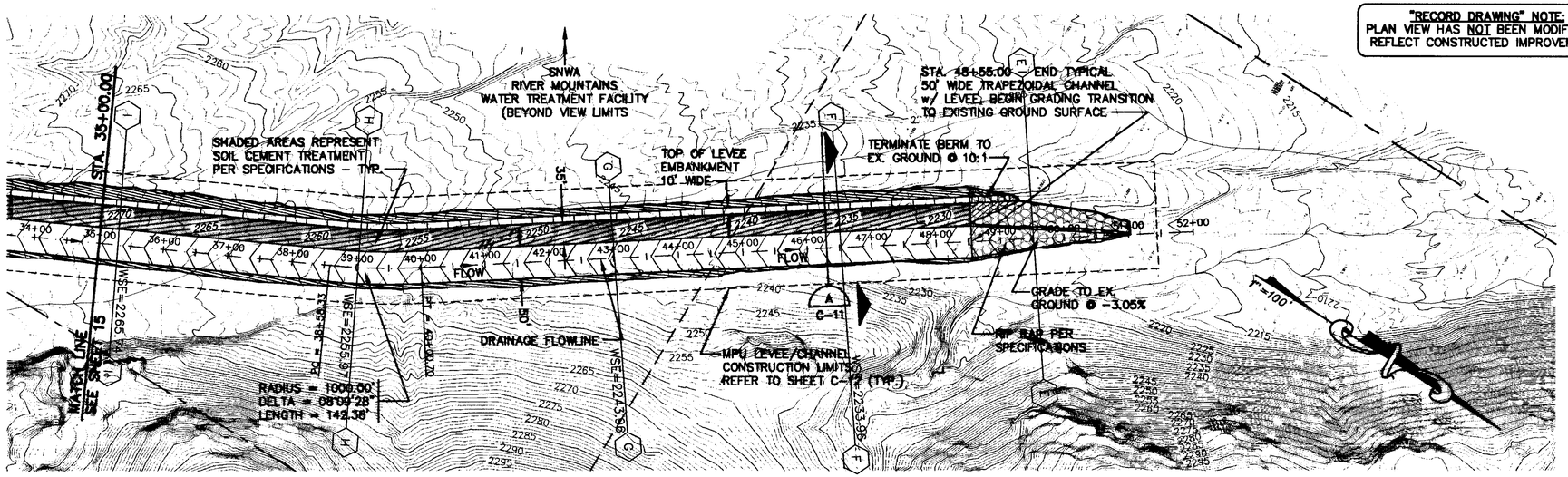
vtn nevada
2727 S. RAINBOW BOULEVARD
LAS VEGAS, NEVADA - 89102
PHONE: (702) 873-7550
FAX: (702) 362-2997

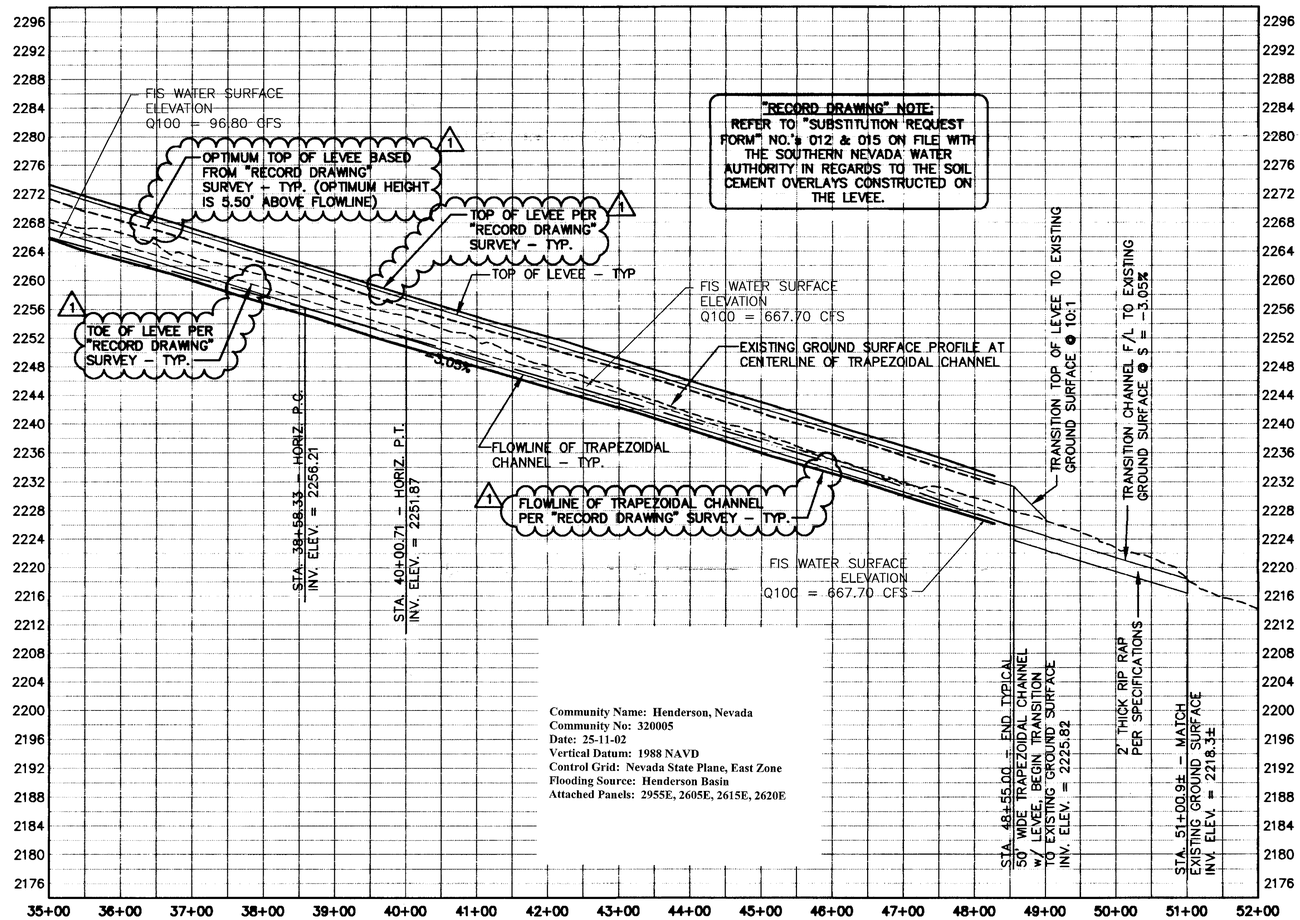
CONTRACT NO.
080-K
DRAWING NO.
C-10
SHEET 15 OF 41

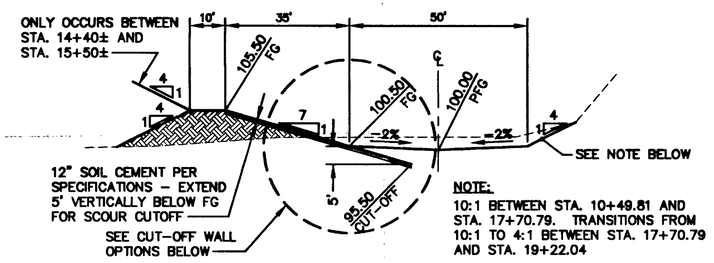
RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR - MARCH 2000

05596

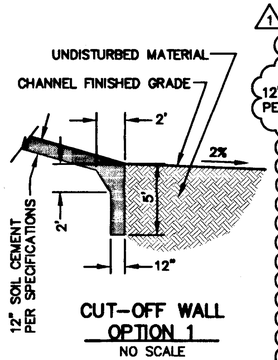
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REORDER BY NUMBER 07348
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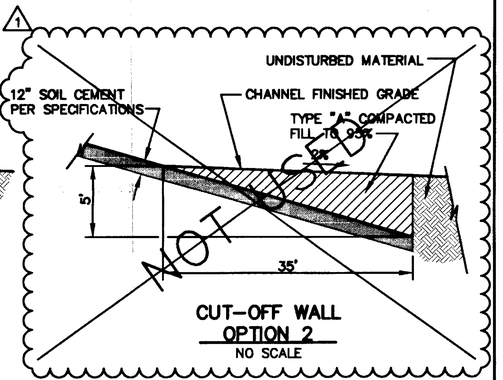




TYPICAL CROSS-SECTION
TRAPEZOIDAL CHANNEL
WITH LEVEE
NO SCALE — A / C-11



CUT-OFF WALL
OPTION 1
NO SCALE



CUT-OFF WALL
OPTION 2
NO SCALE

PROFILE SCALE:
HORIZ.: 1" = 100'
VERT.: 1" = 10'

ORIGINAL CONTRACT DOCUMENTS ARE ON FILE WITH THE SOUTHERN NEVADA WATER AUTHORITY. THE DOCUMENTS WERE SIGNED AND SEALED ON JUNE 19, 1998 BY KEN D. GILBRETH UNDER NEVADA LICENSE NO. 9177

SOUTHERN NEVADA
WATER AUTHORITY
1900 E. FLAMINGO ROAD SUITE 170
LAS VEGAS, NEVADA 89119
(702) 862-3400

VERIFY SCALE
1/2 0 1/2
BAR REPRESENTS ONE AND ONE-HALF INCHES ON ORIGINAL

EAST C-1 DETENTION BASIN
MPU LEVEE – PLAN & PROFILE
STA. 35+00 TO STA. 52+00

SCALE: AS NOTED
DUB 3/23/00 KDG
"RECORD DRAWINGS"
C-11.DWG Plot @ 06/12/98 10:40 A.M.

vtn nevada
2727 S. RAINBOW BOULEVARD
LAS VEGAS, NEVADA – 89102
PHONE: (702) 873-7550
FAX: (702) 362-2597

DSGN: EH,DJB
DR: DJB
CHK: DWB
APVD: KDG

CONTRACT NO.
080-K
DRAWING NO.
C-11
SHEET 16 OF 41

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR – MARCH 2000

05596

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