

Hiko Springs Wash Outfall Improvements

for

Clark County Public Works

*Conditional Letter of Map
Revision (CLOMR)*

prepared by



BLACK & VEATCH

PN 31825





BLACK & VEATCH_{LLP}

1900 East Flamingo Road, Suite 295, Las Vegas, Nevada 89119, Tel: (702) 732-0448, Fax: (702) 732-7578

Clark County Public Works
Hiko Springs Wash Outfall Improvements

B&V Project 31825.300
B&V File 14
October 17, 1997

Mr. Roy Davis, P.E.
Project Engineer
Department of Public Works
500 S. Grand Central Parkway
P.O. Box 554000
Las Vegas, NV 89155-4000

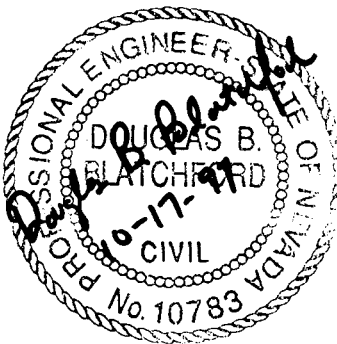
Subject: Conditional Letter of Map Revision

Dear Mr. Davis:

Request For

Enclosed is the Conditional Letter of Map Revision (CLOMR) for the Hiko Springs Wash Outfall Improvements from the Hiko Springs Wash Detention Basin to Laughlin Bay on the Colorado River.

Please contact me if you have any questions of if I can be of further assistance.



Very truly yours,

BLACK & VEATCH

Douglas B. Blatchford

Douglas B. Blatchford, P.E.
Project Engineer

Enclosure

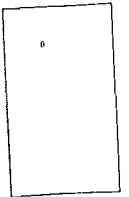
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HIKO SRPINGS WASH OUTFALL

This project is located in Laughlin, Nevada, located in the southern end of the state, in the Mojave Desert. The proposed construction will extend a closed conduit from the existing Hiko Springs Wash Detention Basin to Laughlin Bay, on the Colorado River. This closed conduit will consist primarily of 84-inch to 96-inch reinforced concrete pipe, tying directly to the detention basin outfall on the northern end, and discharging into Laughlin Bay through an energy dissipator on the southern end (outfall). Two collection points are proposed downstream of the existing box culverts at Needles Highway and El Mirage Way.

This CLOMR (and following LOMR) proposes the removal of the Zone AO floodplain immediately downstream of the Hiko Springs Wash Detention Basin. At present, the Hiko Springs Wash Detention Basin discharges directly onto the floodplain, however, upon completion of the outfall pipeline, the detention basin flows will be conveyed in a closed conduit to Laughlin Bay. A CLOMR is being ~~presented~~^{REQUESTED} for review at this time because the Hiko Springs Wash pre-design report has been accepted by Clark County Public Works, and final design of the outfall pipeline is underway. Upon completion of the Hiko Springs Wash Outfall, a LOMR^{request} will be filed by Clark County Public Works.



FORM 1

***Revision Requestor
and Community Official Form***

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 2.13 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden, to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

1. OVERVIEW

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

- ☒ Physical change
☐ Existing
☒ Proposed
☐ Improved methodology
☐ Improved data
☒ Floodway revision
☒ Other Predesign complete for confined conveyance system of Hiko Springs Wash Detention Basin discharge.
 Explain Detention basin discharge is confined from the basin to Laughlin Bay on the Colorado River.

2. Flooding Source: Hiko Springs Wash Detention Basin, Laughlin, Nevada

3. Project Name/Identifier: Hiko Springs Wash Outfall Improvement

4. FEMA zone designations affected: Zone AO

(example: A, AH, AO, A1-A30, A99, AE, V, V1-30, VE, B, C, D, X)

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

Community No.	Community Name	County	State	Map No.	Panel No.	Effective Date
EX: 480301	Katy, City	Harris, Fort Bend	TX	480301	0005D	02/08/83
480287	Harris County	Harris	TX	48201C	0220G	09/28/90
320003	Clark County,	Clark	NV	32003C	3995	8-16-95*
320003	Unincorporated	Clark	NV	32003C	4015	8-16-95*
320003	Areas	Clark	NV	32003C	4060	8-16-95*
320003		Clark	NV	32003C	4080	8-16-95*

* Maps revised to reflect LOMR dated 11-21-96

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

Types of Flooding

- ☐ Riverine
☐ Coastal
☒ Alluvial Fan
☐ Shallow Flooding (e.g. Zones AO and
☐ Lakes

Affected by
wind/wave action

- ☐ Yes
☒ No

Structures

- ☒ Channelization
☐ Levee/Floodwall
☐ Bridge/Culvert
☐ Dam
☐ Coastal
☐ Fill
☐ Pump Station
☐ None
☐ Channel Relocation
☐ Excavation
☐ Other (describe)

Disciplines*

- ☒ Water Resources
☒ Hydrology
☒ Hydraulics
☒ Sediment Transport
☐ Interior Drainage
☐ Structural
☐ Geotechnical
☐ Land Surveying
☐ Other (describe)

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

2. FLOODWAY INFORMATION

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

Attach copy of either a public notice distributed by the community stating the community's intent to revise the floodway or a statement by the community that it has notified all affected property owners and affected adjacent jurisdictions.

9. 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.

3. PROPOSED ENCROACHMENTS

10. With floodways:

1A. Does the revision request involve fill, new construction, substantial improvement, or other development in the floodway?

☒ Yes ☐ No

1B. If yes, does the development cause the 100-year water surface elevation to increase at any location by more than 0.000 feet? ☐ Yes ☒ No

11. Without floodways:

2A. Does the revision request involve fill, new construction, substantial improvement, or other development in the 100-year floodplain? ☐ Yes ☐ No

2B. If yes, does the cumulative effect of all development that has occurred since the effective SFHA was originally identified cause the 100-year water surface elevation to increase at any location by more than one foot (or other surcharge limit if community or state has adopted more stringent criteria)? ☐ Yes ☐ No

If the answer to either Items 1B or 2B is yes, please provide 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.

4. REVISION REQUESTOR ACKNOWLEDGEMENT

12. Having read NFIP Regulations, 44 CFR Ch. I, parts 59, 60, 61, and 72, I believe that the proposed revision ☒ is ☐ is not in compliance with the requirements of the aforementioned NFIP Regulations.

5. COMMUNITY OFFICIAL ACKNOWLEDGEMENT

13. Was this revision request reviewed by the community for compliance with the community's adopted floodplain management ordinances? ☒ Yes ☐ No

14. Does this revision request have the endorsement of the community? ☒ Yes ☐ No

If no to either of the above questions, please explain: _____

Please note that community acknowledgement and/or notification is required for all requests as outlined in Section 65.4(b) of the NFIP Regulations.

6. OPERATION AND MAINTENANCE

15. Does the physical change involve a flood control structure (e.g. levees, floodwalls, channelization, basins, dams)? ☒ Yes ☐ No

If yes, please provide the following information for each of the new flood control structures:

A. Inspection of the flood control project will be conducted periodically by Clark County Department of Public Works (entity) ~~AFTER~~

with a maximum interval of twelve months between inspections. ~~OR~~ EVENT

B. Based on the results of scheduled periodic inspections, appropriate maintenance of the flood control facilities will be conducted by Clark County Department of Public Works

(entity)

to ensure the integrity and degree of flood protection of the structure.

C. A formal plan of operation, including documentation of the flood warning system, specific actions and assignments of responsibility by individual name or title, and provisions for testing the plan at intervals not less than one year, ☐ has ☒ has not been prepared for the flood control structure.

- D. The community is willing to assume responsibility for ☒ performing ☐ overseeing compliance with the maintenance and operation plans of the Hiko Springs Wash Outfall Improvements
(Name)
flood control structure. If not performed promptly by an owner other than the community, the community will provide the necessary services without cost to the Federal government.

Attach operation and maintenance plans TO BE COMPLETED FOR LOMR

7. REQUESTED RESPONSE FROM FEMA

16. After examining the pertinent NFIP regulations and reviewing the document entitled "Appeals, Revisions, and Amendments to Flood Insurance Maps: A Guide for Community Officials," dated January 1990, this request is for a:

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

8. FORMS INCLUDED

17. Form 2 entitled "Certification by Registered Professional Engineer And/Or Land Surveyor" must be submitted.

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

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

9. INITIAL REVIEW FEE

18. The minimum initial review fee for the appropriate request category has been included. ☒ Yes ☐ No
 Initial fee amount: \$ \$5,000.00

METHOD OF PAYMENT (Check one box)

☐ PAYMENT ENCLOSURE ☐ VISA ☐ MASTERCARD ☐ CARD NUMBER

Check or money order only. ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Make payable to
 National Flood Insurance Program

EXP. Date ☐ ☐ ☐ ☐

Signature _____

or

19. This request is for a project that is for public benefit and is intended to reduce the flood hazard to existing development in identified flood hazard areas as opposed to planned floodplain development. ☒ Yes ☐ No

or

20. This request is to correct an error or to include the effects of natural changes within the areas of special flood hazards. ☐ Yes ☐ No

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

Douglas B. Blatchford
 Signature of Revision Requestor

Douglas B. Blatchford
 Printed Name and Title of Revision Requestor

Black & Veatch
 Company Name

(702)732-0448 10/10/97
 Date

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

 Signature of Community Official

 Printed Name and Title of Community Official

 Community Name

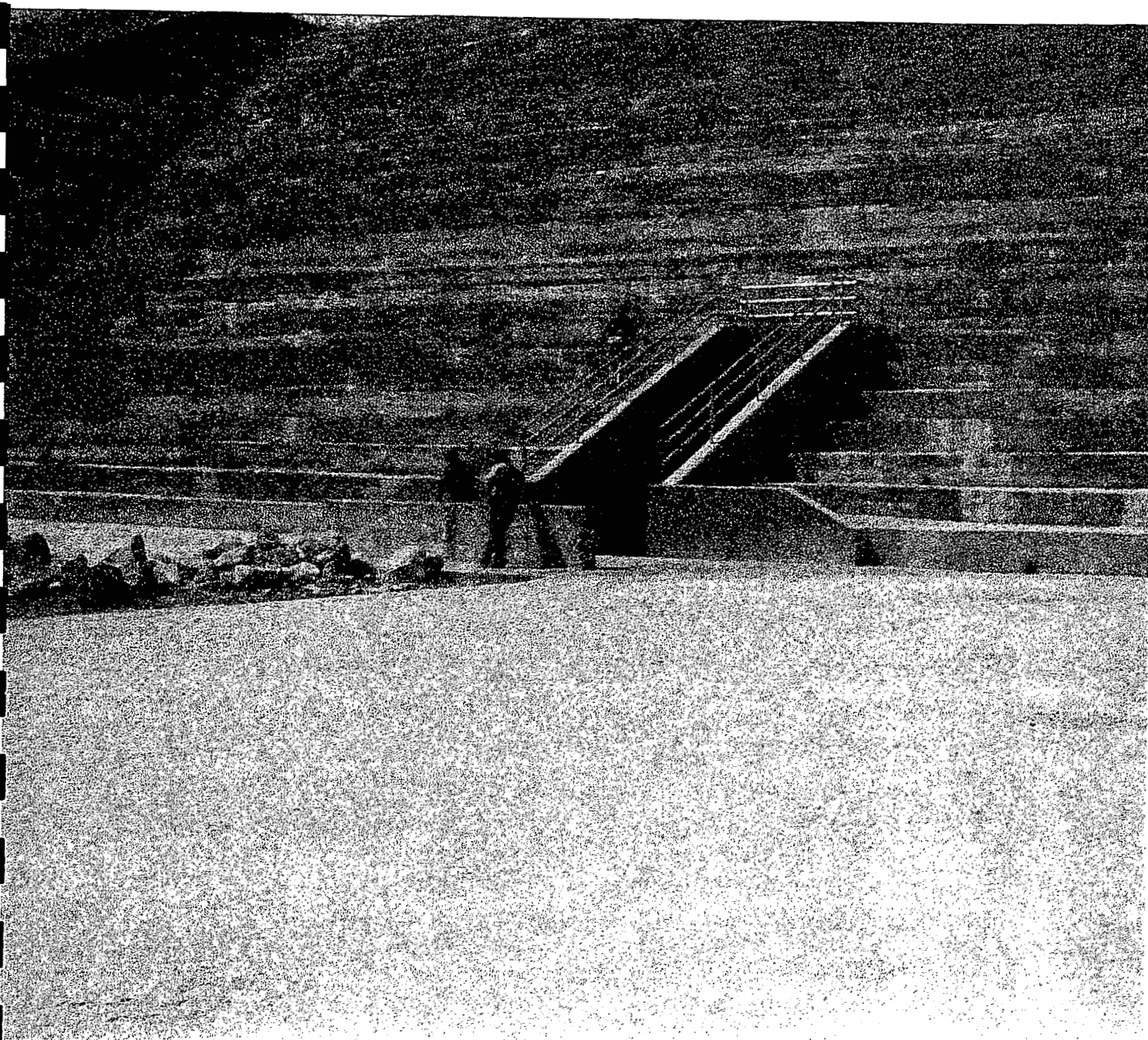
 Date

Does this request impact any other communities? ☐ Yes ☒ No

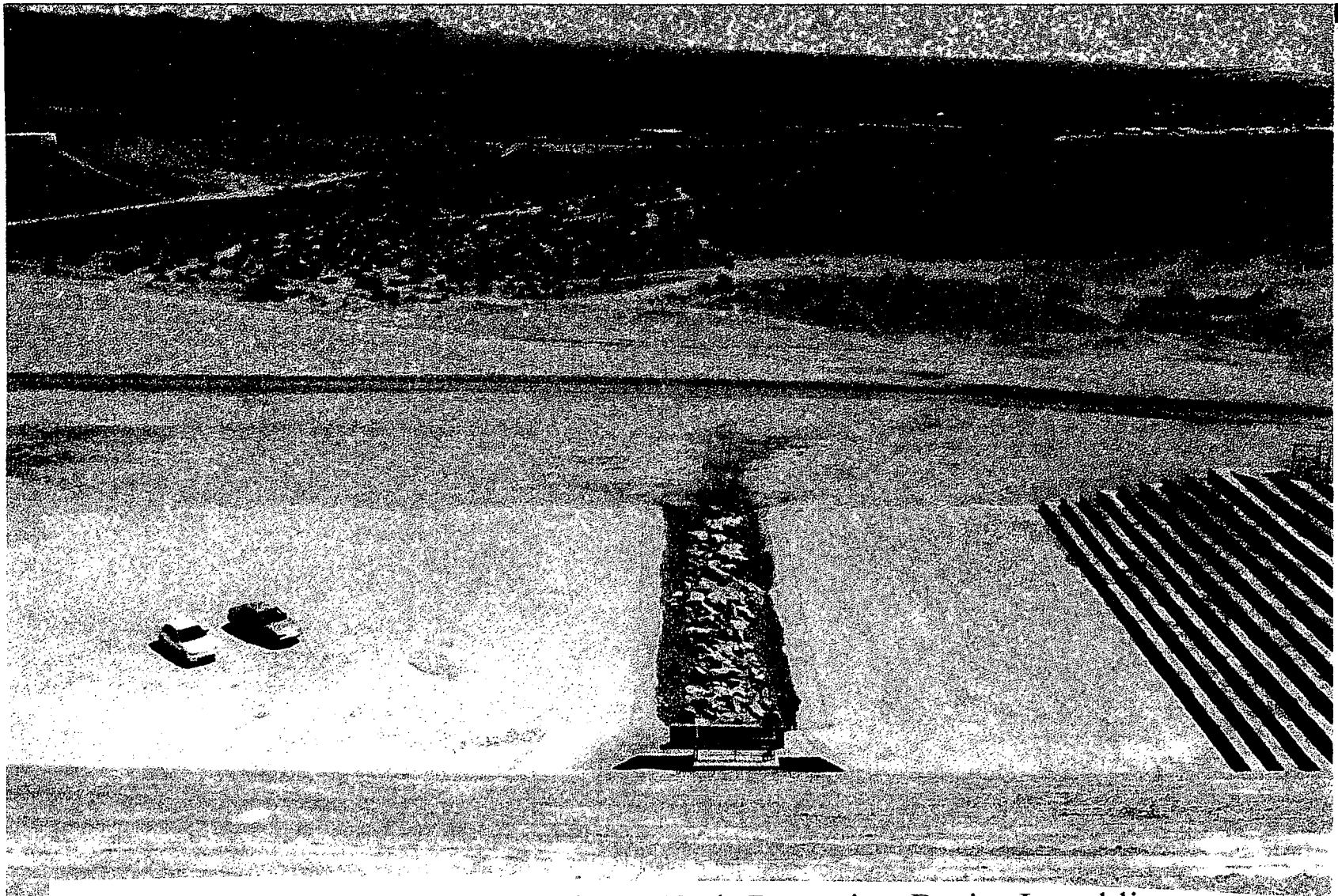
If yes, attach letters from all affected jurisdictions acknowledging revision request and approving changes to floodway, if applicable.



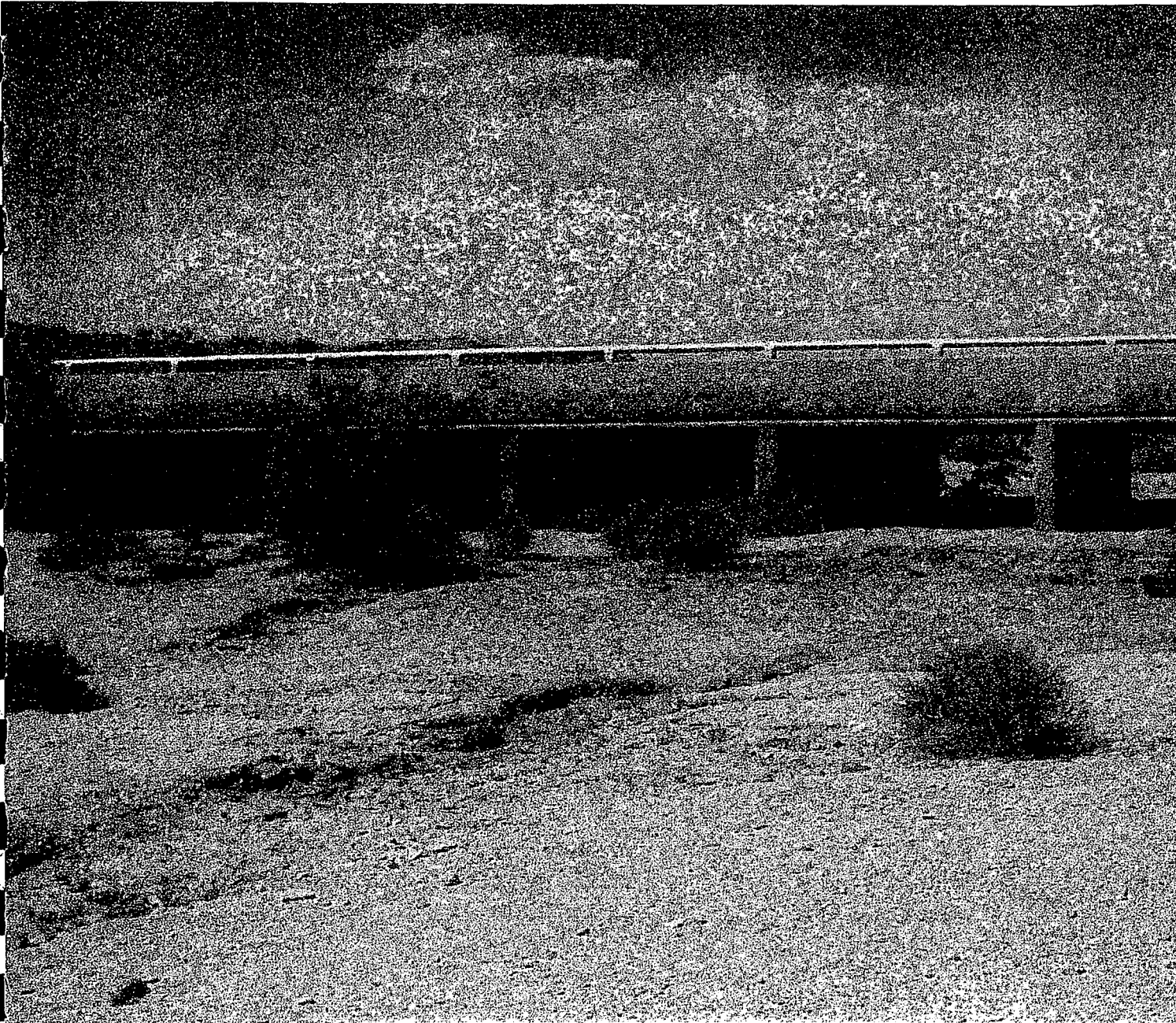
PHOTOGRAPH 1 -Hiko Springs Wash Detention Basin, Laughlin Nevada. View is looking north. Note the sediment berm at the basin floor and the primary culvert spillway entrance, center-right of photograph.



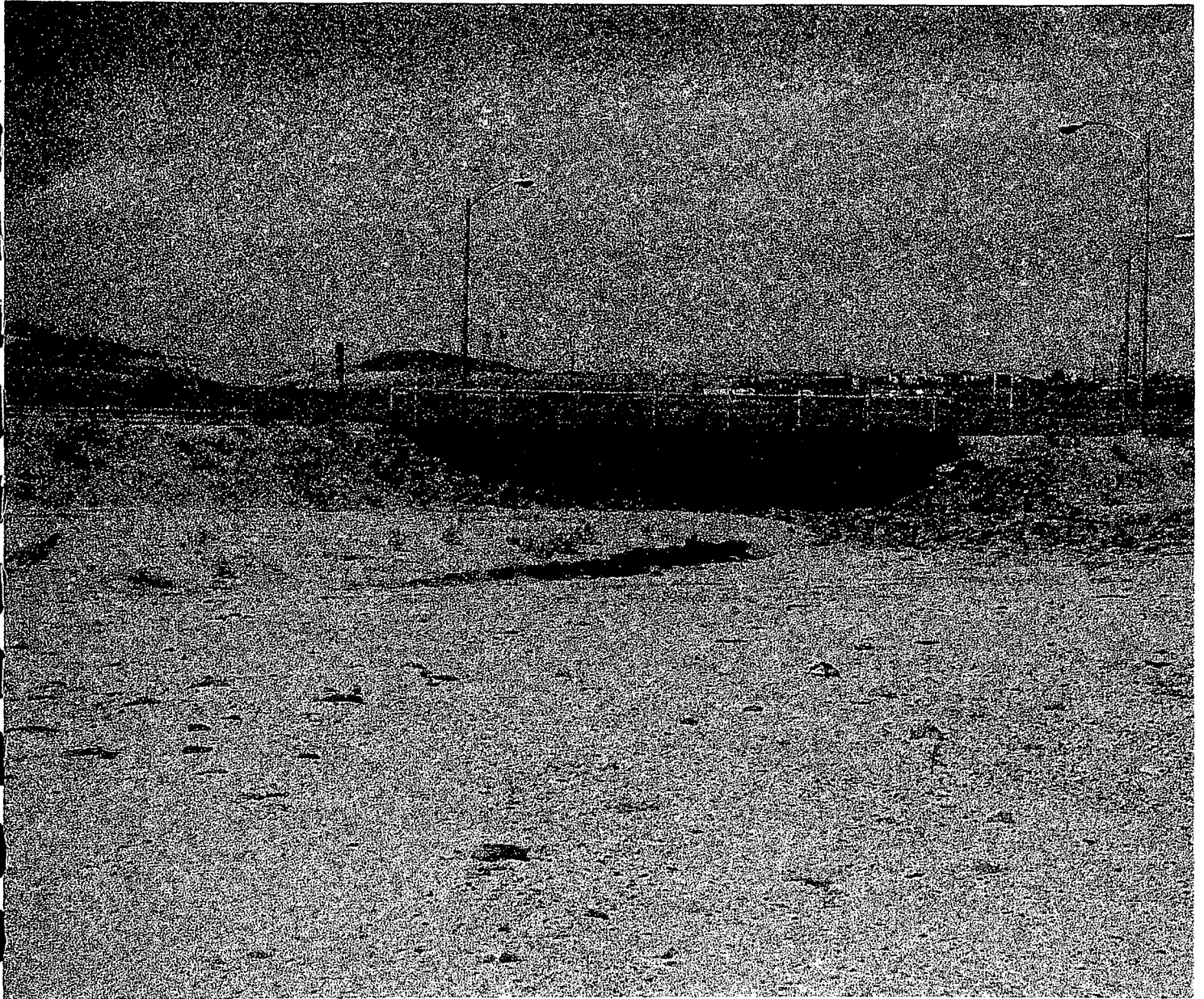
PHOTOGRAPH 2 -Hiko Springs Wash Detention Basin, Laughlin Nevada. View is looking northwest showing the primary spillway outfall.



PHOTOGRAPH 3 -Hiko Springs Wash Detention Basin, Laughlin Nevada. View is looking south towards Laughlin Bay, and the Colorado River. The Hiko Springs Wash Outfall will extend from the detention basin to Laughlin Bay as a buried conduit.



PHOTOGRAPH 4 -6, 6' x 12' reinforced box culverts at El Mirage Way. View is looking north. The Hiko Springs Wash Outfall will be bored and jacked under the culverts in an 84-inch reinforced concrete pipe.



PHOTOGRAPH 5 -4, 8' x 4' reinforced box culverts at Needles Highway. View is looking north. The Hiko Springs Wash Outfall will be bored and jacked under the culverts in a 96-inch reinforced concrete pipe.

FORM 2

***Certification by Registered
Professional Engineer and/or Land Surveyor Form***

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average .23 hour per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden, to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.
2. I am licensed with an expertise in Water Resources (hydrology and sediment transport)
[example: water resources (hydrology, hydraulics, sediment transport, interior drainage)*, structural, geotechnical, land surveying.]
3. I have 4 years experience in the expertise listed above.
4. I have ☒ prepared ☐ reviewed the attached supporting data and analyses related to my expertise.
5. I ☒ have ☐ have not visited and physically viewed the project.
6. In my opinion, the following analyses and/or designs, is/are being certified:
Hydrology and sediment transport analyses
7. Based upon the following review, the modifications in place have been constructed in general accordance with plans and specifications. N/A - Predesign completed only.

Basis for above statement: (check all that apply)

- a. ☐ Viewed all phases of actual construction.
 - b. ☐ Compared plans and specifications with as-built survey information.
 - c. ☐ Examined plans and specifications and compared with completed projects.
 - d. ☐ Other _____
8. All information submitted in support of this request is correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Name: Jill A. Reilly

(please print or type)

Title: Project Engineer

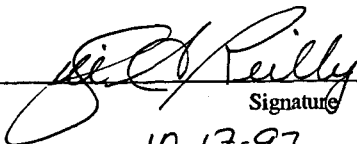
(please print or type)

Registration No. 11903

Expiration Date: 12/31/97

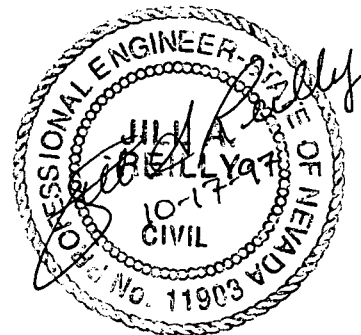
State Nevada

Type of License Professional Engineer - Civil


Signature

10-17-97

Date



Seal (Optional)

*Specify Subdiscipline

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

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

O.M.B. Burden No. 3067-0148
Expires July 31, 1994

FEMA USE ONLY

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average .23 hour per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden, to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.
2. I am licensed with an expertise in Water Resources (hydraulics)
[example: water resources (hydrology, hydraulics, sediment transport, interior drainage)*, structural, geotechnical, land surveying.]
3. I have 5 years experience in the expertise listed above.
4. I have ☒ prepared ☐ reviewed the attached supporting data and analyses related to my expertise.
5. I ☒ have ☐ have not visited and physically viewed the project.
6. In my opinion, the following analyses and/or designs, is/are being certified:
Hydraulic analyses
7. Based upon the following review, the modifications in place have been constructed in general accordance with plans and specifications. N/A - Predesign completed only.
Basis for above statement: (check all that apply)
 - a. ☐ Viewed all phases of actual construction.
 - b. ☐ Compared plans and specifications with as-built survey information.
 - c. ☐ Examined plans and specifications and compared with completed projects.
 - d. ☐ Other _____
8. All information submitted in support of this request is correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Name: Douglas B. Blatchford

(please print or type)

Title: Project Engineer

(please print or type)

Registration No. 10783

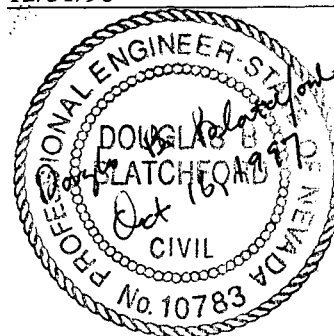
Expiration Date: 12/31/98

State Nevada

Type of License Professional Engineer - Civil

Douglas B. Blatchford
Signature

October 13, 1997
Date



*Specify Subdiscipline

Seal (Optional)

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

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

O.M.B. Burden No. 3067-0148
Expires July 31, 1994

FEMA USE ONLY

PUBLIC BURDEN DISCLOSURE NOTICE

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1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.
2. I am licensed with an expertise in Geotechnical Engineering
[example: water resources (*hydrology, hydraulics, sediment transport, interior drainage*)*, structural, geotechnical, land surveying.]
3. I have 4 years experience in the expertise listed above.
4. I have ☐ prepared ☒ reviewed the attached supporting data and analyses related to my expertise.
5. I ☒ have ☐ have not visited and physically viewed the project.
6. In my opinion, the following analyses and/or designs, is/are being certified:
Geotechnical analyses
7. Based upon the following review, the modifications in place have been constructed in general accordance with plans and specifications. N/A - Predesign completed only.
Basis for above statement: (check all that apply)
 - a. ☐ Viewed all phases of actual construction.
 - b. ☐ Compared plans and specifications with as-built survey information.
 - c. ☐ Examined plans and specifications and compared with completed projects.
 - d. ☐ Other _____
8. All information submitted in support of this request is correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Name: Douglas B. Blatchford

(please print or type)

Title: Project Engineer

(please print or type)

Registration No. 10783

Expiration Date: 12/31/98

State Nevada

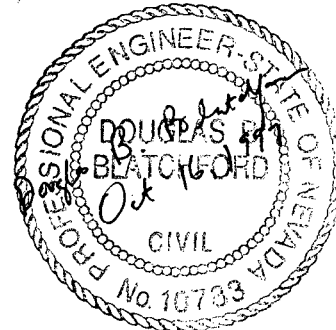
Type of License Professional Engineer - Civil

Douglas B. Blatchford

Signature

October 16, 1997

Date



*Specify Subdiscipline

Seal (Optional)

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

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average .23 hour per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden, to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.
2. I am licensed with an expertise in Land Surveying
[example: water resources (*hydrology, hydraulics, sediment transport, interior drainage*)*, structural, geotechnical, land surveying.]
3. I have 20 years experience in the expertise listed above.
4. I have ☐ prepared ☐ reviewed the attached supporting data and analyses related to my expertise.
5. I ☒ have ☐ have not visited and physically viewed the project.
6. In my opinion, the following analyses and/or designs, is/are being certified:
Topographic mapping
7. Based upon the following review, the modifications in place have been constructed in general accordance with plans and specifications. N/A - Predesign completed only.
Basis for above statement: (check all that apply)
 - a. ☐ Viewed all phases of actual construction.
 - b. ☐ Compared plans and specifications with as-built survey information.
 - c. ☐ Examined plans and specifications and compared with completed projects.
 - d. ☐ Other _____
8. All information submitted in support of this request is correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Name: Brett Jefferson

(please print or type)

Title: Professional Surveyor

(please print or type)

Registration No. 8421

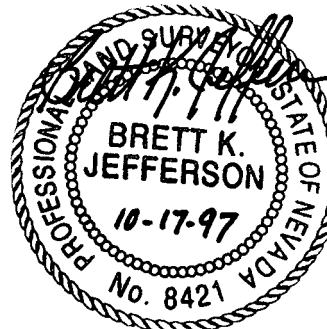
Expiration Date: 06-30-99

State Nevada

Type of License Professional Land Surveyor

Brett K. Jefferson
Signature

10-17-97
Date



Seal (Optional)

*Specify Subdiscipline

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

FORM 3

Hydrologic Analysis Form

Hydrologic Analysis

The attached hydrologic analysis was performed for the small basin downstream of the Hiko Springs Wash Detention Basin. A diagram of this basin and points of concentration are shown under the section titled "Hydrologic Analysis." This analysis is based upon the Clark County Regional Flood Control District guidelines established in the *Hydrologic Criteria and Drainage Design Manual*, 1990. The local storm distribution (SDN 3) was used with the Clark County correction factor to model the watershed downstream of the detention basin. This was necessary because the regional storm discharging from the Hiko Springs Wash Detention Basin had a lower peak discharge.

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.

Community Name: Clark County, Nevada

Flooding Source: Hiko Springs Wash Detention Basin
(One form for each flooding source)

Project Name/Identifier: Hiko Springs Wash Outfall Improvements

1. HYDROLOGIC ANALYSIS IN FIS

- ☐ Approximate study stream (Zone A)
- ☒ Detailed study stream (briefly explain methodology) HEC-1 Computer Model (See Case No. 96-09-1017P)

2. REASON FOR NEW HYDROLOGIC ANALYSIS

- ☐ No existing analysis
- ☐ Improved data (see data revision on page 3)
- ☐ Changed physical conditions of watershed (explain) _____
- ☐ Alternative methodology (justify why the revised model is better than model used in the effective FIS) _____
- ☒ Evaluation of proposed conditions (CLOMRs only) (explain) Discharge from the Hiko Springs Wash Detention Basin is being confined and conveyed to Laughlin Bay on the Colorado River. Runoff was also modeled for the small watershed downstream of the detention basin.
- ☐ Other _____

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

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

3. APPROVAL OF ANALYSIS

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

4. REVIEW OF RESULTS

Stream: Hiko Springs Wash Detention Basin (HSWDB) outfall (REGIONAL STORM)

Comparison of 100-year Discharges

Location: (Drainage area is cumulative)	Drainage area (Sq. mi.)	FIS (cfs):	Revised (cfs):
HSWDB Outfall (See LOMR Case No. 96-09-1017P)	19.2	850	850
El Mirage Way (underneath existing box culverts)	19.4	N/A	N/A
Needles Highway (underneath existing box culverts)	19.8	N/A	N/A
Laughlin Bay (new outfall)	20.0	850	850

Note: When revised discharges are not significantly different than FIS discharges, FEMA may require a confidence limits analysis on attachment D at a later date to complete the review.

As is often the case with revision requests, only a portion of a stream may actually be revised or be affected by a revision. Therefore, transition to the unrevised portion is important to maintain the continuity of the study. NFIP regulations stipulate that such a transition must be assured. What is the transition from the proposed discharges to the effective discharges? Please explain how the transition was made (*attach separate sheet if necessary*).

Upon acceptance of the LOMR (Case No. 96-09-1017P) for the HSWDB, the Hiko Springs alluvial fan apex was relocated to the detention basin outfall and the base flood discharge value was reduced to 850 cfs. The affected FIRMs were revised to modify the base flood (1% chance of occurrence) elevations, floodplain boundary delineations, and zone designations downstream of the HSWDB to Laughlin Bay on the Colorado River; the reach impacted by the proposed outfall improvements addressed herein. The existing regional hydrological analysis was not modified from the model presented in Case No. 96-09-1017P. A separate HEC-1 model was prepared to model a local storm centered over the watershed below the HSWDB, and the results are noted on Page 2a of this form.

ATTACH A COMPLETED REVIEW OF RESULTS PAGE FOR EACH FLOODING SOURCE.

Is the new hydrologic analysis being developed solely to revise the flow values in the FIS (*i.e. no changed hydraulic conditions*)?

☒ Yes ☐ No

If yes, does the 100-year water surface elevation change by 1.0 foot or more?

☒ Yes ☐ No (Proposed conveyance system will confine alluvial fan flow below grade.)

FEMA does not normally revise NFIP maps solely due to insignificant flow changes where changes in 100-year water surface elevation are less than 1.0 foot.

4. REVIEW OF RESULTS

Stream: Hiko Springs Wash Downstream of HSWDB (LOCAL STORM)

Comparison of 100-year Discharges

Location: (Drainage area is cumulative)	Drainage area (Sq. mi.)	FIS (cfs):	Revised (cfs):
HSWDB Outfall (See LOMR Case No. 96-09-1017P)	N/A	N/A	N/A
El Mirage Way (collection at existing box culverts)	0.214	N/A	647
Needles Highway (collection at existing box culverts)	0.591	N/A	1089
Laughlin Bay (new outfall)	0.745	N/A	1314

Note: When revised discharges are not significantly different than FIS discharges, FEMA may require a confidence limits analysis on attachment D at a later date to complete the review.

As is often the case with revision requests, only a portion of a stream may actually be revised or be affected by a revision. Therefore, transition to the unrevised portion is important to maintain the continuity of the study. NFIP regulations stipulate that such a transition must be assured. What is the transition from the proposed discharges to the effective discharges? Please explain how the transition was made (*attach separate sheet if necessary*).

As reported on Page 2 of this form, the regional storm generates discharge from the HSWDB. This discharge is confined and conveyed in an underground conduit from the basin to the outfall at Laughlin Bay on the Colorado River. The area downstream of the HSWDB was also modeled to account for local runoff. A new HEC-1 model was prepared to evaluate the runoff generated in the three small subbasins with points of interest at the existing box culverts crossing the Hiko Springs Wash (El Mirage Way and Needles Highway) and at Laughlin Bay. The storm was centered over the 0.745 square mile watershed downstream of the detention basin using a storm distribution number 3. The local storm generated greater peak discharges at the points of interest, and the times to peak were sooner than the regional storm by approximately 3 hours. Beginning at El Mirage Way, the HSWDB discharge conveyance system will be designed to collect and convey the greater local peak runoff values.

ATTACH A COMPLETED REVIEW OF RESULTS PAGE FOR EACH FLOODING SOURCE.

5. HISTORICAL FLOODING INFORMATION

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

If yes, provide the following:

Location along flooding source: _____

Maximum peak discharge: _____

cfs

Second highest peak discharge: _____

cfs

Source of information: _____

6. GAGE RECORD INFORMATION

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

N/A

Gaging Station: _____

Drainage area at gage: _____ mi²

Number of years of data: _____

7. DATA REVISION

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

Data Parameter	New	Revised	Data Source
LOCAL STORM ONLY	☐	☐	_____
Subbasin Delineation	☐	☒	Topographical Survey(aerial photography)
Subbasin Lag Times	☐	☒	CCRFGD HC&DDM, 1990
_____	☐	☐	_____
_____	☐	☐	_____

Data source can be from a Federal, State, or local government agency, or from a private source. Some State and local governments may have less strict data requirements than Federal agencies, in which case the hydrologic data may not be accepted by FEMA unless it is demonstrated that the data give a better estimate of the flood discharge.

Attach documentation corroborating each data source (i.e., *certified statement, report, bibliographical reference to a published document*). In the case of a published document or a government report, providing copies of the cover and pertinent pages may be helpful.

8. METHODOLOGY FOR NEW ANALYSIS

- ☐ Statistical Analysis of Gage Records (use Attachment A)
- ☐ Regional Regression Equations (use Attachment B)
- ☒ Precipitation/Runoff Model (use Attachment C)
- ☐ Other (specify; attach backup computations and supporting data) _____

ATTACHMENT A: STATISTICAL ANALYSIS OF GAGE RECORDS

Gaging Station: N/A

Gage Location (latitude and longitude): _____

FIS:

Revised:

1. Number of years of data
 Systematic
 Historical
2. Homogeneous data ☐ Yes ☐ No ☐ Yes ☐ No
3. Data adjustments ☐ Yes ☐ No ☐ Yes ☐ No
4. Number of high outliers
 Low outliers
 Zero events
5. Generalized skew
6. Station skew
7. Adopted skew
8. Probability distribution used (justify
 if log-Pearson III was not used)
9. Transfer equations to ungaged sites. ☐ Yes ☐ No
 If yes, specify method

10. Expected probability* ☐ Yes ☐ No
11. Comparison of results with other analyses. ☐ Yes ☐ No
 If yes, describe comparison

* FEMA does not accept expected probability analyses for the purpose of reflecting flood hazard information in a FIS.

If any data is not available, indicate by N/A.

Attach analysis including plot of flood frequency curve.

ATTACHMENT B: REGIONAL REGRESSION EQUATIONS

1. Bibliographical Reference:

N/A

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

2. Gaged or ungaged stream:

3. Hydrologic region(s):

Attach backup map.

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

FIS:

Revised:

5. Urbanized conditions calculations

☐ Yes ☐ No

☐ Yes ☐ No

6. Percent of watershed urbanization

7. Is the watershed controlled?

☐ Yes ☐ No

☐ Yes ☐ No

8. Comparison with other analyses

☐ Yes ☐ No

☐ Yes ☐ No

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

If data is not available, indicate by N/A.

Comments

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

ATTACHMENT C: PRECIPITATION/RUNOFF MODEL

	FIS: LOMR No.:	Revised:
1. Method or model used:	96-09-1017P	HEC-1
Version:	4.0	4.0
Date:	1990	1990
2. Source of rainfall depth:	LOMR Model	LOMR Model
3. Source of rainfall distribution:	CCRFGD Manual	CCRFGD Manual
4. Rainfall duration:	CCRFGD Manual (SDN 5)	CCRFGD Manual (SDN 3)
5. Areal adjustment to precipitation (%):	79% for 19.2 sq.mi.	98% for 0.75 sq.mi.
6. Hydrograph development method:	LOMR Model	LOMR Model
7. Loss rate method:	SCS Curve	SCS Curve
Source of soils information:	LOMR Model	Master Plan Model
Source of land use information:	LOMR Model	Zoning Maps
8. Channel routing method:	Kinematic Wave	Kinematic Wave
9. Reservoir routing:	☒ Yes ☐ No	☐ Yes ☒ No
10. Baseflow considerations:	☐ Yes ☒ No	☐ Yes ☒ No
If yes, explain how baseflow was determined:		
11. Snowmelt considerations:	☐ Yes ☒ No	☐ Yes ☒ No
12. Model calibration:	☐ Yes ☒ No	☐ Yes ☒ No

If yes, explain how calibration was performed

13. Future land use condition: ☒ Yes ☐ No
- If yes, explain why:

Local storm was modeled over existing and future land use conditions to account for runoff and sediment volumes. Laughlin Town zoning maps were used for future use considerations. Clark County Public Works requires that existing and future flows are accommodated downstream of the Hiko Springs Wash Detention Basin.

Note: FEMA policy is to base flooding on existing conditions.

If data is not available, indicate by N/A.

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.

ATTACHMENT D: CONFIDENCE LIMITS EVALUATION

Stream: N/A

Select one location for Confidence Limits Evaluation (*describe location*): _____

Discharges for selected location:

Exceedance Probability

FIS

Revised

10% (10-year) cfs _____ cfs _____

2% (50-year) cfs _____ cfs

1% (100-year) cfs _____ cfs _____

0.2% (500-year) cfs _____ cfs _____

1% (100-year) Flood Confidence Intervals

90% Confidence Interval:

5% limit _____ cfs

95% limit cfs

50% Confidence Interval:

25% limit _____ cfs

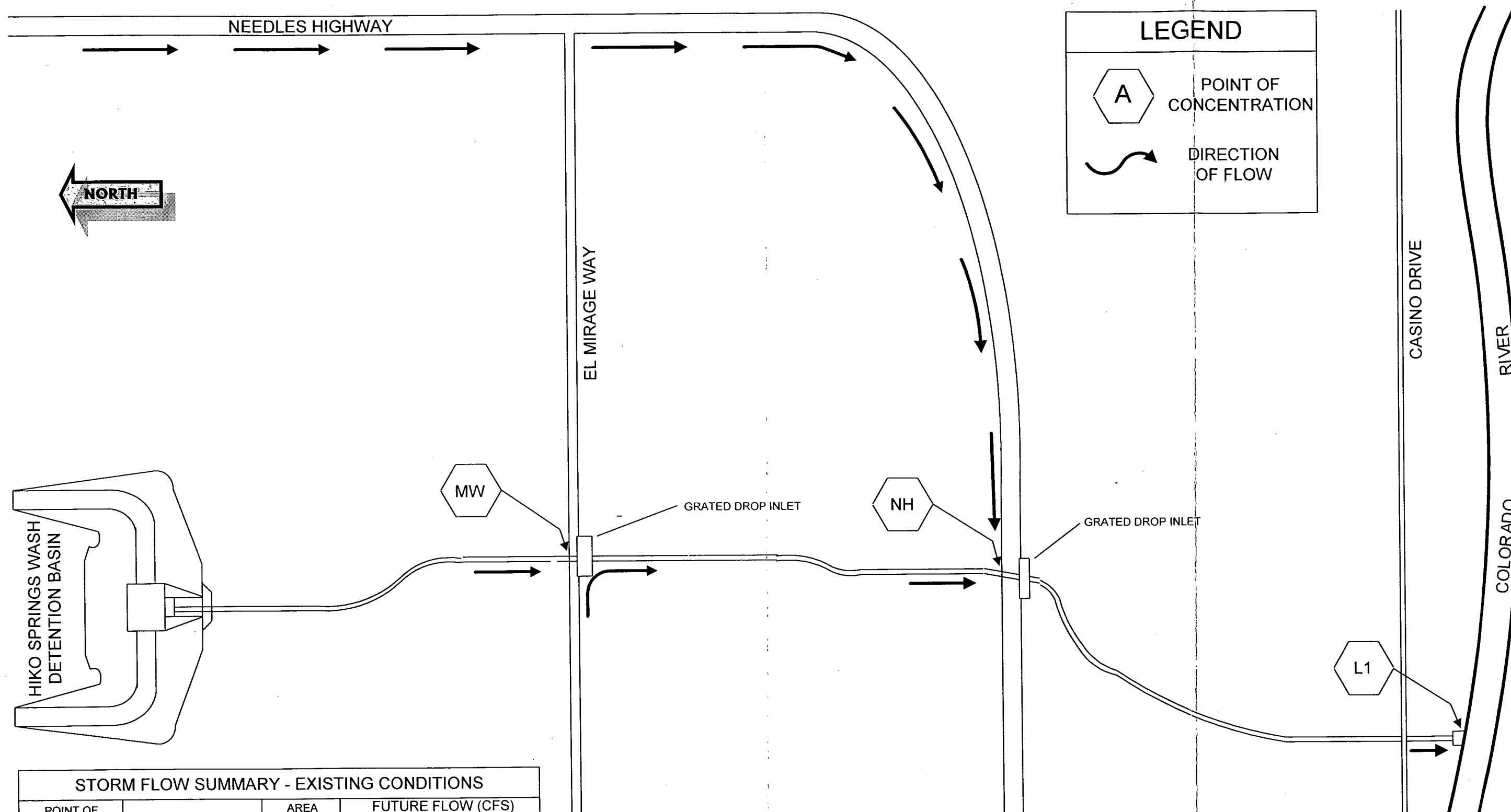
75% limit cfs

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

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

Attach Confidence Limits Analysis.

HYDROLOGIC ANALYSIS



STORM FLOW SUMMARY - EXISTING CONDITIONS				
POINT OF CONCENTRATION	DESCRIPTION	AREA (ACRE)	FUTURE FLOW (CFS)	
			10-YEAR	100-YEAR
MW	EL MIRAGE WAY	245	224	647
NH	NEEDLES HIGHWAY	380	436	1089
L1	LAUGHLIN BAY	480	524	1314

BLACK & VEATCH

Las Vegas, Nevada

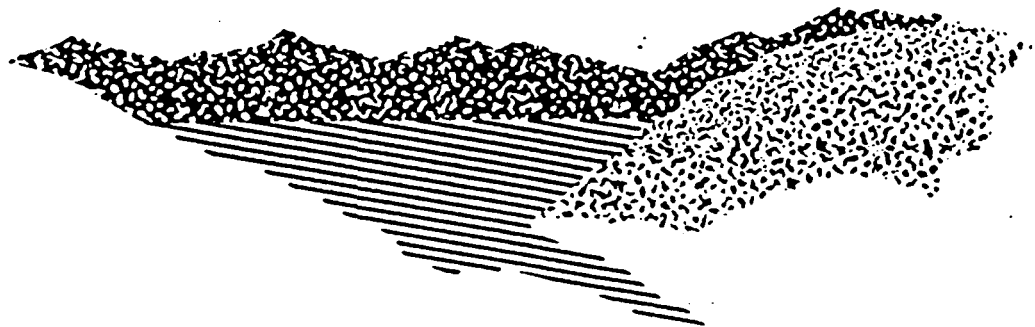
CLARK COUNTY DEPATMENT OF PUBLIC WORKS
LOWER HIKO SPRINGS WASH IMPROVEMENTS

ALIGNMENT AND ANTICIPATED FLOW MAP
HIKO SPRINGS DETENTION BASIN TO COLORADO RIVER

FIGURE

2-2

C L A R K C O U N T Y
REGIONAL FLOOD CONTROL DISTRICT



**HYDROLOGIC
CRITERIA
AND
DRAINAGE
DESIGN
MANUAL**

Prepared by:

WRC ENGINEERING, INC.



Where:

- 2-hr = 2-hr 'x'-yr estimated value (inches)
- 3-hr = 3-hr 'x'-yr estimated value (inches)
- 1-hr = 1-hr 'x'-yr previously determined (inches)
- 6-hr = 6-hr 'x'-yr previously determined (inches)

These point rainfall values shall be modified as stated in the following Section 502.4.

502.4 ADJUSTMENTS TO NOAA ATLAS 2

Recent analysis of rainfall data in the Clark County area (WRC, 1989 and USACE, 1988) indicates that the NOAA Atlas 2 values do not necessarily reflect the trend of observed and recorded rainfall values which have occurred following publication of the Atlas in 1973. Therefore, the rainfall values in Sections 502.2 and 502.3 are to be adjusted to reflect the current trend of rainfall values based on the latest available information for the Clark County area. This adjustment consists of increasing the rainfall depths for durations of 6-hours or less by multiplying the values previously obtained by the appropriate factors presented in Table 501.

The said adjustment shall not be used when developing the design rainfall for use with SCS TR-55. The 24-hour design rainfall for TR-55 shall be used directly as developed in Section 502.2.

503 DEPTH - AREA REDUCTION FACTORS

The NOAA Atlas 2 precipitation depths are related to rainfall frequency at an isolated point. Storms, however, cause rainfall to occur over extensive areas simultaneously, with more intense rainfall typically occurring near the center of the storm. Standard precipitation analysis methods require adjusting point precipitation depths downward in order to estimate the average depth of rainfall over the entire storm area. This is normally performed using depth-area reduction curves relating to a point precipitation reduction factor to storm area and duration.

In previous hydrologic studies in Southern Nevada, three methods have been used for adjusting point-precipitation depths to areally averaged depths. All early studies used the depth-area reduction curves presented in the NOAA Atlas 2 (NOAA, 1973). These curves were developed through investigations of storms throughout the Western United States. In fact, the NOAA Atlas 2 for each state in the West contains the same family of depth area reduction curves. Most of the recent studies have adopted depth-area reduction factors from a relatively new publication known as "Hydro 40" (NOAA, 1984), which developed factors applicable specifically to Arizona and New Mexico.

The Corps of Engineers (USACE, 1988) used slightly different depth-area reduction factors than those presented in "Hydro 40" for areas greater than 30 square miles. These factors were based on analysis of thunderstorms in the greater Las Vegas area. For areas up to 30 square miles the depth-area reduction factors are almost the same as those in "Hydro 40".

The six-hour Corps of Engineers (USACE, 1988) depth-area reduction factors are to be used for all rainfall analysis in the Clark County area. The Corps of Engineers depth-area reduction curve is shown in Figure 514. The depth-area reduction factors for the six-hour storm are also tabulated in Table 502.

For areas greater than 200 square miles, the ability of the thunderstorm generating mechanisms (i.e. available moisture, strong convective currents, etc.) to sustain a thunderstorm much greater than 200 square miles in diameter is greatly reduced. Therefore, only a portion of an entire drainage basin could be subject to precipitation from the thunderstorm event. Analysis of this effect on runoff peaks and volumes is complicated by the necessity to determine the "storm centering" which produces the greatest peak flow and/or volume at the selected design point. In order to obtain a consistent method of analysis for these areas, the designer shall consult the local entity (and/or the CCRFCD if suggested by the local entity) to determine the appropriate method of analysis and design rainfall area reduction factors for the specific location and basin under consideration.

504 DESIGN STORMS

504.1 GENERAL

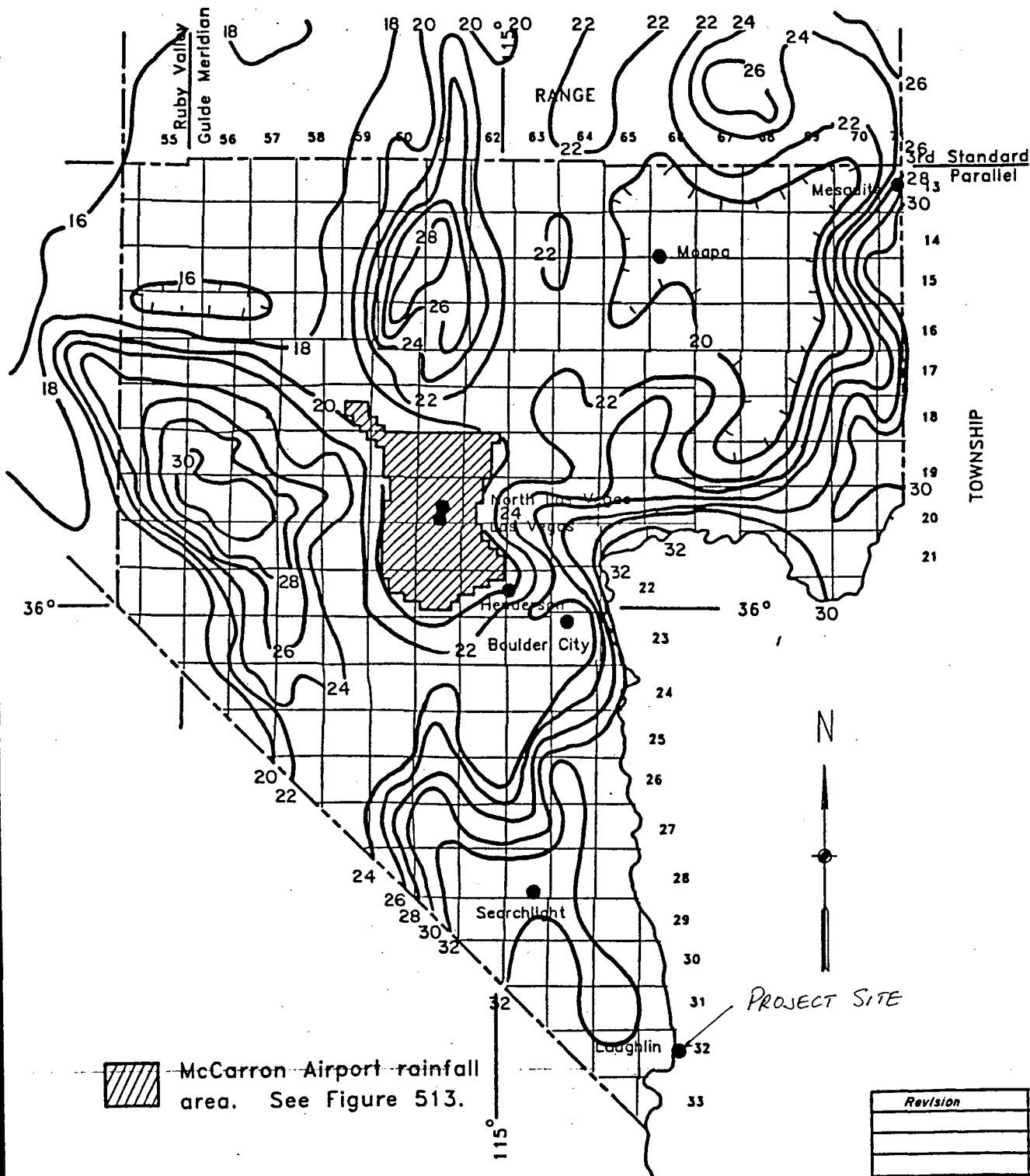
The design storm within the jurisdiction of the MANUAL shall be a 6-hour duration storm. The 6-hour duration storm is to be used for all HEC-1 runoff modeling in the Clark County area. The exception to the 6-hour design storm duration is when the SCS TR-55 method is used to compute runoff values. For SCS TR-55, a Type II rainfall distribution shall be used in conjunction with the 24-hour rainfall depth as described in TR-55.

504.2 SIX-HOUR DESIGN STORM DISTRIBUTION

Two different six-hour storm distributions are to be used as design storms in the Clark County area. The two design storm distributions, labeled SDN 3 and SDN 5, are graphically presented in Figure 515 and tabularized in Table 503. For drainage areas less than 10 square miles in size, use SDN 3. For drainage areas equal to or greater than 10 square miles in size, use SDN 5.

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

RAINFALL DEPTH-DURATION-FREQUENCY 100-YEAR, 6-HOUR (DEPTHS IN TENTHS OF INCHES)

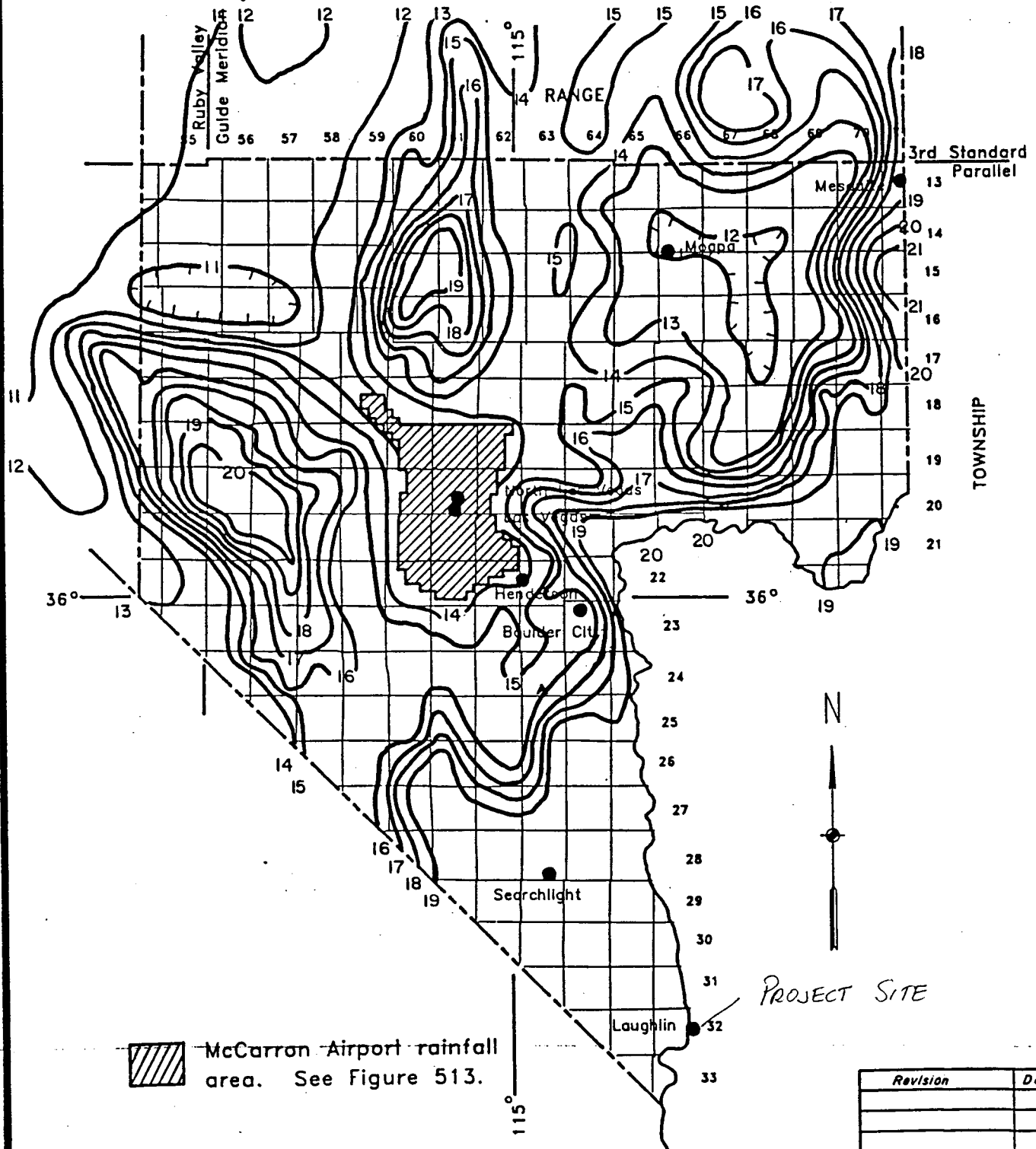


 McCarron Airport rainfall area. See Figure 513.

Revision	Date

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

RAINFALL DEPTH-DURATION-FREQUENCY 10-YEAR, 6-HOUR (DEPTHS IN TENTHS OF INCHES)



Revision	Date

WRC
ENGINEERING

REFERENCE:
NOAA ATLAS 2, VOLUME VII NEVADA, 1973

FIGURE 503

PRECIPITATION ADJUSTMENT RATIOS

<u>Recurrence Interval</u>	<u>Ratio to NOAA Atlas 2</u>
2-year	1.00
5-year	1.16
10-year	1.24
25-year	1.33
50-year	1.39
100-year	1.43

- NOTE: 1. Multiply the values obtained from the NOAA Atlas 2 by the above ratios to obtain the adjusted precipitation values.
2. NOAA Atlas 2 values for use with TR-55 shall not be adjusted by the above ratios.
3. Tables 505 and 506 require no adjustments.

<i>Revision</i>	<i>Date</i>

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

RUNOFF CURVE NUMBERS (SEMIARID RANGELANDS¹)

Cover description		Curve numbers for hydrologic soil group—			
Cover type	Hydrologic condition ²	A ³	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory.	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

¹Average runoff condition, and $I_a = 0.2S$.

²Poor: <30% ground cover (litter, grass, and brush overstory).

Fair: 30 to 70% ground cover.

Good: >70% ground cover.

³Curve numbers for group A have been developed only for desert shrub.

Revision	Date

Table 3. Summary of Discharges (Cont'd)

Flooding Source and Location	Drainage Area (square miles)	Peak Discharges (cfs)			
		10-Year	50-Year	100-Year	500-Year
Georgia Avenue Wash					
At Buchanan Boulevard	1.98	263	781	1,285	4,300
At Mendota Drive	0.95	177	459	727	2,000
At Cross Section E	0.45	68	189	310	1,000
Hemenway Wash					
At Cross Section C	2.86	290	635	815	1,380
At Cross Section E	1.06	80	195	260	420
Hiko Springs Wash					
At Apex	17.9	1,220	5,070	8,370	23,130
Below Hiko Springs Wash Detention Basin	19.2	448	778	850	11,956
Las Vegas Creek					
At Las Vegas Boulevard	13	640	1,280	1,570	2,420
At Confluence with Las Vegas Wash	14	660	1,300	1,600	2,450
Las Vegas Wash					
At Carey Avenue ¹	836	3,050	8,750	11,800	21,400
At Charleston Boulevard	858	3,180	9,000	12,100	21,800
At Losee Road	568	3,960	7,300	8,820	17,000
Below Union Pacific Railroad	-- ²	2,100	2,330	2,440	2,700
Below Interstate 15	-- ²	2,100	2,330	2,370	3,150
Below Confluence with Middle Overflow Area	-- ²	2,720	3,040	3,120	4,500
Below East Cheyenne Avenue	-- ²	2,300	2,560	2,610	3,500
Below Confluence with Unnamed Tributary	-- ²	3,940	7,580	9,220	17,200
Below Las Vegas Boulevard	-- ²	3,940	6,400	6,660	9,300
Below Cutoff Channel	-- ²	3,940	6,530	6,860	10,700
Below Carey Avenue	-- ²	3,940	6,530	6,860	9,700
Below Lake Mead Boulevard	-- ²	3,940	5,500	5,710	7,250
Middle Branch Blue Diamond Wash					
At Union Pacific Railroad	71.6	20	1,230	2,800	12,500
At Interstate 15	72.6	20	1,230	2,800	12,500

¹ Located outside corporate limits² Flow affected by upstream overflows, diversions, or obstructions; drainage area does not apply

REVISED TO
REFLECT LOMR
DATED NOV 21 1996

REVISED DATA

CHANGES ARE MADE IN DETERMINATIONS OF BASE FLOOD ELEVATIONS FOR THE UNINCORPORATED AREAS OF CLARK COUNTY, NEVADA, UNDER THE NATIONAL FLOOD INSURANCE PROGRAM

On August 16, 1995, the Federal Emergency Management Agency (FEMA) identified Special Flood Hazard Areas (SFHAs) in the unincorporated areas of Clark County, Nevada, through issuance of a Flood Insurance Rate Map (FIRM).

The Mitigation Directorate has determined that modification of the elevations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) for certain locations in the unincorporated areas of Clark County is appropriate. The modified base flood elevations (BFEs) revise the FEMA FIRM for the community.

The changes are being made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and are 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.

An analysis was performed to incorporate the construction of the Hiko Springs Wash Detention Basin (HSWDB) and has resulted in a revised delineation of the SFHA and revised BFEs from approximately 500 feet downstream of West Casino Drive to the HSWDB. The table below indicates the modified BFEs for selected locations along the affected length of Hiko Springs Fan.

Location	Existing BFE (feet)*	Modified BFE (feet)*
From approximately 500 feet downstream of West Casino Drive to Needles Highway	2#	1#
From Needles Highway to just downstream of the HSWDB	3#	1#
At the HSWDB	3#	1,076*

#Depth above ground

*National Geodetic Vertical Datum, rounded to nearest whole foot

Under the above-mentioned Acts of 1968 and 1973, the Mitigation Directorate must develop criteria for floodplain management. For the community to participate in the National Flood Insurance Program (NFIP), the community must use the modified BFEs to administer the floodplain management measures of the NFIP. These modified BFEs will also be used to calculate the appropriate flood insurance premium rates for new buildings and their contents and for the second layer of insurance on existing buildings and contents.

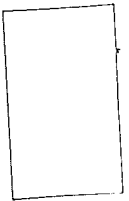
Upon the second publication of notice of these changes in this newspaper, any person has 90 days in which he or she can request, through the Chief Executive Officer of the community, that the Mitigation Directorate reconsider the determination. Any request for reconsideration must be based on knowledge of changed conditions or new scientific or technical data. All interested parties are on notice that until the 90-day period elapses, the Mitigation Directorate's determination to modify the BFEs may itself be changed.

Any person having knowledge or wishing to comment on these changes should immediately notify:

The Honorable Yvonne Atkinson Gates
Chairperson, Clark County Board
of Commissioners
225 East Bridger Avenue
Las Vegas, NV 89155

SURFACE Storm Flow Summary - Existing Conditions
(after construction of the outfall pipeline)

	Area(ac)	10-yr(cfs)	100 yr(cfs)
El Mirage Way	245	224	647
Needles Highway	380	436	1089
Laughlin Bay	480	524	1314



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*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* SEPTEMBER 1990 *
* VERSION 4.0 *
* RUN DATE 10/14/1997 TIME 15:20:56 *
*****

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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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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      LOWER HIKO SPRINGS WASH
2  ID      BELOW DETENTION BASIN
3  ID      Revised subbasins upstream of El Mirage Way and Needles Hwy
4  ID      to reflect drainage into wash under developed conditions.
5  ID      FILE : hiko1mw.dat
6  ID      EXISTING CONDITIONS
7  ID      SDN: 3
8  ID      DARFS: .975 .745 square miles
9  ID      .985 .377 " "
10 ID      .992 .214 " "
11 ID      *****
12 IT      5          300
13 IO      5
14 IN      5
15 JR      PREC .975 .985 .992 .851 .698 .516 .406 .262

16 KK      MW
17 KO      1
18 BA      .214
19 PB      4.58
20 PC      0 .02 .057 .07 .087 .108 .124 .13 .13 .13
21 PC      .13 .13 .13 .133 .14 .142 .148 .158 .172 .181
22 PC      .19 .197 .199 .200 .201 .204 .214 .229 .241 .249
23 PC      .251 .256 .270 .278 .281 .283 .295 .322 .352 .409
24 PC      .499 .590 .710 .744 .781 .812 .819 .835 .851 .856
25 PC      .860 .868 .876 .888 .910 .926 .937 .950 .970 .976

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26	PC	.982	.985	.987	.989	.990	.993	.993	.994	.995	.998
27	PC	.998	.999	1.0							
28	LS		68	70							
29	UD	.21									

30	KK	RMW									
31	KM	Route to El Mirage Way box culverts									
32	RK	5120 .0430 .015		TRAP	12	2					

33	KK	NH									
34	KO	1									
35	KM	Runoff below El Mirage Way									
36	BA	.377									
37	LS		68	30							
38	UD	.18									

39	KK	CMWNNH									
40	KM	Combine MW and NH at Needles Highway									
41	KO	1									
42	HC	2									

43	KK	RNH									
44	KM	Route NH from Needles Highway to Laughlin Bay									
45	RK	3800 .0348 .015		TRAP	12	2					

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HEC-1 INPUT

PAGE 2

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

46	KK	L1									
47	BA	.154									
48	LS		69	30							
49	UD	.16									

50	KK	Add									
51	HC	2									
52	ZZ										

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT

LINE (V) ROUTING (--->) DIVERSION OR PUMP FLOW

NO. (.) CONNECTOR (<---) RETURN OF DIVERTED OR PUMPED FLOW

16	MW										
	V										
	V										
30	RMW										
	.										
33	.	NH									
	.										
39	CMWN.....										
	V										
	V										
43	RNH										
	.										
46	.	L1									
	.										
50	Add										

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

 *
 * FLOOD HYDROGRAPH PACKAGE (HEC-1) *
 * SEPTEMBER 1990 *
 * VERSION 4.0 *
 *
 * RUN DATE 10/14/1997 TIME 15:20:56 *
 *

 * U.S. ARMY CORPS OF ENGINEERS *
 * HYDROLOGIC ENGINEERING CENTER *
 * 609 SECOND STREET *
 * DAVIS, CALIFORNIA 95616 *
 * (916) 756-1104 *

LOWER HIKO SPRINGS WASH
 BELOW DETENTION BASIN
 Revised subbasins upstream of El Mirage Way and Needles Hwy
 to reflect drainage into wash under developed conditions.
 FILE : hikolmw.dat
 EXISTING CONDITIONS
 SDN: 3
 DARFS: .975 .745 square miles
 .985 .377 " "
 .992 .214 " "

*** ERROR *** SPECIFIED START AND END DATES RESULT IN TOO MANY TIME PERIODS

13 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
 .98 .99 .99 .85 .70 .52 .41 .26

*** **

```

*****
.      *
16 KK  *  MW  *
.      *
*****

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17 KO      OUTPUT CONTROL VARIABLES
          IPRNT      1 PRINT CONTROL
          IPLOT      0 PLOT CONTROL
          QSCAL      0. HYDROGRAPH PLOT SCALE

```

```

14 IN      TIME DATA FOR INPUT TIME SERIES
          JXMIN      5 TIME INTERVAL IN MINUTES
          JXDATE     1  0 STARTING DATE
          JXTIME     0 STARTING TIME

```

SUBBASIN RUNOFF DATA

```

18 BA      SUBBASIN CHARACTERISTICS
          TAREA      .21 SUBBASIN AREA

```

PRECIPITATION DATA

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19 PB      STORM      4.58 BASIN TOTAL PRECIPITATION

```

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20 PI      INCREMENTAL PRECIPITATION PATTERN
          .02 .04 .01 .02 .02 .02 .01 .00 .00 .00
          .00 .00 .00 .01 .00 .01 .01 .01 .01 .01
          .01 .00 .00 .00 .00 .01 .02 .01 .01 .00
          .01 .01 .01 .00 .00 .01 .03 .03 .06 .09
          .09 .12 .03 .04 .03 .01 .02 .02 .00 .00
          .01 .01 .01 .02 .02 .01 .01 .02 .01 .01
          .00 .00 .00 .00 .00 .00 .00 .00 .00 .00
          .00 .00

```

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28 LS      SCS LOSS RATE
          STRTL      .94 INITIAL ABSTRACTION
          CRVNBR     68.00 CURVE NUMBER
          RTIMP      70.00 PERCENT IMPERVIOUS AREA

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29 UD      SCS DIMENSIONLESS UNITGRAPH
          TLAG       .21 LAG

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WARNING *** TIME INTERVAL IS GREATER THAN .29*LAG

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                                UNIT HYDROGRAPH
                                15 END-OF-PERIOD ORDINATES
          94.   313.   412.   346.   208.   118.   71.   41.   24.   14.
           8.    5.    3.    2.    0.

```

HYDROGRAPH AT STATION MW

DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP	Q	*	DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP	Q
1	0000	1	.00	.00	.00	0.	*	1	1230 151	.00	.00	.00	0.					
1	0005	2	.09	.03	.06	6.	*	1	1235 152	.00	.00	.00	0.					
1	0010	3	.17	.05	.12	31.	*	1	1240 153	.00	.00	.00	0.					
1	0015	4	.06	.02	.04	67.	*	1	1245 154	.00	.00	.00	0.					
1	0020	5	.08	.02	.05	89.	*	1	1250 155	.00	.00	.00	0.					
1	0025	6	.10	.03	.07	95.	*	1	1255 156	.00	.00	.00	0.					
1	0030	7	.07	.02	.05	95.	*	1	1300 157	.00	.00	.00	0.					
1	0035	8	.03	.01	.02	92.	*	1	1305 158	.00	.00	.00	0.					
1	0040	9	.00	.00	.00	78.	*	1	1310 159	.00	.00	.00	0.					
1	0045	10	.00	.00	.00	55.	*	1	1315 160	.00	.00	.00	0.					
1	0050	11	.00	.00	.00	35.	*	1	1320 161	.00	.00	.00	0.					
1	0055	12	.00	.00	.00	20.	*	1	1325 162	.00	.00	.00	0.					
1	0100	13	.00	.00	.00	12.	*	1	1330 163	.00	.00	.00	0.					
1	0105	14	.01	.00	.01	8.	*	1	1335 164	.00	.00	.00	0.					
1	0110	15	.03	.01	.02	9.	*	1	1340 165	.00	.00	.00	0.					
1	0115	16	.01	.00	.01	14.	*	1	1345 166	.00	.00	.00	0.					
1	0120	17	.03	.01	.02	18.	*	1	1350 167	.00	.00	.00	0.					
1	0125	18	.05	.01	.03	22.	*	1	1355 168	.00	.00	.00	0.					
1	0130	19	.06	.02	.04	31.	*	1	1400 169	.00	.00	.00	0.					
1	0135	20	.04	.01	.03	41.	*	1	1405 170	.00	.00	.00	0.					
1	0140	21	.04	.01	.03	48.	*	1	1410 171	.00	.00	.00	0.					
1	0145	22	.03	.01	.02	49.	*	1	1415 172	.00	.00	.00	0.					
1	0150	23	.01	.00	.01	45.	*	1	1420 173	.00	.00	.00	0.					
1	0155	24	.00	.00	.00	36.	*	1	1425 174	.00	.00	.00	0.					
1	0200	25	.00	.00	.00	26.	*	1	1430 175	.00	.00	.00	0.					
1	0205	26	.01	.00	.01	19.	*	1	1435 176	.00	.00	.00	0.					
1	0210	27	.05	.01	.03	17.	*	1	1440 177	.00	.00	.00	0.					
1	0215	28	.07	.02	.05	26.	*	1	1445 178	.00	.00	.00	0.					
1	0220	29	.05	.02	.04	40.	*	1	1450 179	.00	.00	.00	0.					
1	0225	30	.04	.01	.03	50.	*	1	1455 180	.00	.00	.00	0.					
1	0230	31	.01	.00	.01	51.	*	1	1500 181	.00	.00	.00	0.					
1	0235	32	.02	.01	.02	44.	*	1	1505 182	.00	.00	.00	0.					
1	0240	33	.06	.02	.05	39.	*	1	1510 183	.00	.00	.00	0.					
1	0245	34	.04	.01	.03	42.	*	1	1515 184	.00	.00	.00	0.					
1	0250	35	.01	.00	.01	45.	*	1	1520 185	.00	.00	.00	0.					
1	0255	36	.01	.00	.01	41.	*	1	1525 186	.00	.00	.00	0.					
1	0300	37	.05	.01	.04	35.	*	1	1530 187	.00	.00	.00	0.					
1	0305	38	.12	.03	.09	42.	*	1	1535 188	.00	.00	.00	0.					
1	0310	39	.14	.03	.10	69.	*	1	1540 189	.00	.00	.00	0.					
1	0315	40	.26	.06	.20	112.	*	1	1545 190	.00	.00	.00	0.					
1	0320	41	.41	.08	.33	183.	*	1	1550 191	.00	.00	.00	0.					
1	0325	42	.42	.07	.35	283.	*	1	1555 192	.00	.00	.00	0.					
1	0330	43	.55	.08	.47	397.	*	1	1600 193	.00	.00	.00	0.					
1	0335	44	.16	.02	.14	481.	*	1	1605 194	.00	.00	.00	0.					
1	0340	45	.17	.02	.15	475.	*	1	1610 195	.00	.00	.00	0.					
1	0345	46	.14	.02	.12	409.	*	1	1615 196	.00	.00	.00	0.					
1	0350	47	.03	.00	.03	324.	*	1	1620 197	.00	.00	.00	0.					
1	0355	48	.07	.01	.06	246.	*	1	1625 198	.00	.00	.00	0.					
1	0400	49	.07	.01	.06	187.	*	1	1630 199	.00	.00	.00	0.					
1	0405	50	.02	.00	.02	146.	*	1	1635 200	.00	.00	.00	0.					
1	0410	51	.02	.00	.02	114.	*	1	1640 201	.00	.00	.00	0.					
1	0415	52	.04	.00	.03	86.	*	1	1645 202	.00	.00	.00	0.					
1	0420	53	.04	.00	.03	67.	*	1	1650 203	.00	.00	.00	0.					
1	0425	54	.05	.01	.05	61.	*	1	1655 204	.00	.00	.00	0.					
1	0430	55	.10	.01	.09	68.	*	1	1700 205	.00	.00	.00	0.					
1	0435	56	.07	.01	.07	83.	*	1	1705 206	.00	.00	.00	0.					
1	0440	57	.05	.01	.05	95.	*	1	1710 207	.00	.00	.00	0.					

1	0445	58	.06	.01	.05	97.	*	1	1715	208	.00	.00	.00	0.
1	0450	59	.09	.01	.08	96.	*	1	1720	209	.00	.00	.00	0.
1	0455	60	.03	.00	.02	97.	*	1	1725	210	.00	.00	.00	0.
1	0500	61	.03	.00	.02	90.	*	1	1730	211	.00	.00	.00	0.
1	0505	62	.01	.00	.01	75.	*	1	1735	212	.00	.00	.00	0.
1	0510	63	.01	.00	.01	56.	*	1	1740	213	.00	.00	.00	0.
1	0515	64	.01	.00	.01	41.	*	1	1745	214	.00	.00	.00	0.
1	0520	65	.00	.00	.00	30.	*	1	1750	215	.00	.00	.00	0.
1	0525	66	.01	.00	.01	22.	*	1	1755	216	.00	.00	.00	0.
1	0530	67	.00	.00	.00	18.	*	1	1800	217	.00	.00	.00	0.
1	0535	68	.00	.00	.00	14.	*	1	1805	218	.00	.00	.00	0.
1	0540	69	.00	.00	.00	11.	*	1	1810	219	.00	.00	.00	0.
1	0545	70	.01	.00	.01	10.	*	1	1815	220	.00	.00	.00	0.
1	0550	71	.00	.00	.00	10.	*	1	1820	221	.00	.00	.00	0.
1	0555	72	.00	.00	.00	10.	*	1	1825	222	.00	.00	.00	0.
1	0600	73	.00	.00	.00	8.	*	1	1830	223	.00	.00	.00	0.
1	0605	74	.00	.00	.00	7.	*	1	1835	224	.00	.00	.00	0.
1	0610	75	.00	.00	.00	5.	*	1	1840	225	.00	.00	.00	0.
1	0615	76	.00	.00	.00	4.	*	1	1845	226	.00	.00	.00	0.
1	0620	77	.00	.00	.00	2.	*	1	1850	227	.00	.00	.00	0.
1	0625	78	.00	.00	.00	1.	*	1	1855	228	.00	.00	.00	0.
1	0630	79	.00	.00	.00	1.	*	1	1900	229	.00	.00	.00	0.
1	0635	80	.00	.00	.00	0.	*	1	1905	230	.00	.00	.00	0.
1	0640	81	.00	.00	.00	0.	*	1	1910	231	.00	.00	.00	0.
1	0645	82	.00	.00	.00	0.	*	1	1915	232	.00	.00	.00	0.
1	0650	83	.00	.00	.00	0.	*	1	1920	233	.00	.00	.00	0.
1	0655	84	.00	.00	.00	0.	*	1	1925	234	.00	.00	.00	0.
1	0700	85	.00	.00	.00	0.	*	1	1930	235	.00	.00	.00	0.
1	0705	86	.00	.00	.00	0.	*	1	1935	236	.00	.00	.00	0.
1	0710	87	.00	.00	.00	0.	*	1	1940	237	.00	.00	.00	0.
1	0715	88	.00	.00	.00	0.	*	1	1945	238	.00	.00	.00	0.
1	0720	89	.00	.00	.00	0.	*	1	1950	239	.00	.00	.00	0.
1	0725	90	.00	.00	.00	0.	*	1	1955	240	.00	.00	.00	0.
1	0730	91	.00	.00	.00	0.	*	1	2000	241	.00	.00	.00	0.
1	0735	92	.00	.00	.00	0.	*	1	2005	242	.00	.00	.00	0.
1	0740	93	.00	.00	.00	0.	*	1	2010	243	.00	.00	.00	0.
1	0745	94	.00	.00	.00	0.	*	1	2015	244	.00	.00	.00	0.
1	0750	95	.00	.00	.00	0.	*	1	2020	245	.00	.00	.00	0.
1	0755	96	.00	.00	.00	0.	*	1	2025	246	.00	.00	.00	0.
1	0800	97	.00	.00	.00	0.	*	1	2030	247	.00	.00	.00	0.
1	0805	98	.00	.00	.00	0.	*	1	2035	248	.00	.00	.00	0.
1	0810	99	.00	.00	.00	0.	*	1	2040	249	.00	.00	.00	0.
1	0815	100	.00	.00	.00	0.	*	1	2045	250	.00	.00	.00	0.
1	0820	101	.00	.00	.00	0.	*	1	2050	251	.00	.00	.00	0.
1	0825	102	.00	.00	.00	0.	*	1	2055	252	.00	.00	.00	0.
1	0830	103	.00	.00	.00	0.	*	1	2100	253	.00	.00	.00	0.
1	0835	104	.00	.00	.00	0.	*	1	2105	254	.00	.00	.00	0.
1	0840	105	.00	.00	.00	0.	*	1	2110	255	.00	.00	.00	0.
1	0845	106	.00	.00	.00	0.	*	1	2115	256	.00	.00	.00	0.
1	0850	107	.00	.00	.00	0.	*	1	2120	257	.00	.00	.00	0.
1	0855	108	.00	.00	.00	0.	*	1	2125	258	.00	.00	.00	0.
1	0900	109	.00	.00	.00	0.	*	1	2130	259	.00	.00	.00	0.
1	0905	110	.00	.00	.00	0.	*	1	2135	260	.00	.00	.00	0.
1	0910	111	.00	.00	.00	0.	*	1	2140	261	.00	.00	.00	0.
1	0915	112	.00	.00	.00	0.	*	1	2145	262	.00	.00	.00	0.
1	0920	113	.00	.00	.00	0.	*	1	2150	263	.00	.00	.00	0.
1	0925	114	.00	.00	.00	0.	*	1	2155	264	.00	.00	.00	0.
1	0930	115	.00	.00	.00	0.	*	1	2200	265	.00	.00	.00	0.
1	0935	116	.00	.00	.00	0.	*	1	2205	266	.00	.00	.00	0.
1	0940	117	.00	.00	.00	0.	*	1	2210	267	.00	.00	.00	0.
1	0945	118	.00	.00	.00	0.	*	1	2215	268	.00	.00	.00	0.
1	0950	119	.00	.00	.00	0.	*	1	2220	269	.00	.00	.00	0.
1	0955	120	.00	.00	.00	0.	*	1	2225	270	.00	.00	.00	0.
1	1000	121	.00	.00	.00	0.	*	1	2230	271	.00	.00	.00	0.
1	1005	122	.00	.00	.00	0.	*	1	2235	272	.00	.00	.00	0.

1	1010	123	.00	.00	.00	0.	*	1	2240	273	.00	.00	.00	0.
1	1015	124	.00	.00	.00	0.	*	1	2245	274	.00	.00	.00	0.
1	1020	125	.00	.00	.00	0.	*	1	2250	275	.00	.00	.00	0.
1	1025	126	.00	.00	.00	0.	*	1	2255	276	.00	.00	.00	0.
1	1030	127	.00	.00	.00	0.	*	1	2300	277	.00	.00	.00	0.
1	1035	128	.00	.00	.00	0.	*	1	2305	278	.00	.00	.00	0.
1	1040	129	.00	.00	.00	0.	*	1	2310	279	.00	.00	.00	0.
1	1045	130	.00	.00	.00	0.	*	1	2315	280	.00	.00	.00	0.
1	1050	131	.00	.00	.00	0.	*	1	2320	281	.00	.00	.00	0.
1	1055	132	.00	.00	.00	0.	*	1	2325	282	.00	.00	.00	0.
1	1100	133	.00	.00	.00	0.	*	1	2330	283	.00	.00	.00	0.
1	1105	134	.00	.00	.00	0.	*	1	2335	284	.00	.00	.00	0.
1	1110	135	.00	.00	.00	0.	*	1	2340	285	.00	.00	.00	0.
1	1115	136	.00	.00	.00	0.	*	1	2345	286	.00	.00	.00	0.
1	1120	137	.00	.00	.00	0.	*	1	2350	287	.00	.00	.00	0.
1	1125	138	.00	.00	.00	0.	*	1	2355	288	.00	.00	.00	0.
1	1130	139	.00	.00	.00	0.	*	2	0000	289	.00	.00	.00	0.
1	1135	140	.00	.00	.00	0.	*	2	0005	290	.00	.00	.00	0.
1	1140	141	.00	.00	.00	0.	*	2	0010	291	.00	.00	.00	0.
1	1145	142	.00	.00	.00	0.	*	2	0015	292	.00	.00	.00	0.
1	1150	143	.00	.00	.00	0.	*	2	0020	293	.00	.00	.00	0.
1	1155	144	.00	.00	.00	0.	*	2	0025	294	.00	.00	.00	0.
1	1200	145	.00	.00	.00	0.	*	2	0030	295	.00	.00	.00	0.
1	1205	146	.00	.00	.00	0.	*	2	0035	296	.00	.00	.00	0.
1	1210	147	.00	.00	.00	0.	*	2	0040	297	.00	.00	.00	0.
1	1215	148	.00	.00	.00	0.	*	2	0045	298	.00	.00	.00	0.
1	1220	149	.00	.00	.00	0.	*	2	0050	299	.00	.00	.00	0.
1	1225	150	.00	.00	.00	0.	*	2	0055	300	.00	.00	.00	0.

TOTAL RAINFALL = 4.58, TOTAL LOSS = .90, TOTAL EXCESS = 3.68

PEAK FLOW + (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
481.	3.58	84.	21.	20.	20.
	(INCHES)	3.670	3.682	3.682	3.682
	(AC-FT)	42.	42.	42.	42.

CUMULATIVE AREA = .21 SQ MI

WARNING *** TIME INTERVAL IS GREATER THAN .29*LAG

HYDROGRAPH AT STATION MW
PLAN 1, RATIO = .98

DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
1	0000	1	.00	.00	.00	0.	*	1	1230	151	.00	.00	.00	0.	
1	0005	2	.09	.03	.06	6.	*	1	1235	152	.00	.00	.00	0.	
1	0010	3	.17	.05	.12	30.	*	1	1240	153	.00	.00	.00	0.	
1	0015	4	.06	.02	.04	66.	*	1	1245	154	.00	.00	.00	0.	
1	0020	5	.08	.02	.05	87.	*	1	1250	155	.00	.00	.00	0.	
1	0025	6	.09	.03	.07	93.	*	1	1255	156	.00	.00	.00	0.	
1	0030	7	.07	.02	.05	93.	*	1	1300	157	.00	.00	.00	0.	
1	0035	8	.03	.01	.02	89.	*	1	1305	158	.00	.00	.00	0.	
1	0040	9	.00	.00	.00	76.	*	1	1310	159	.00	.00	.00	0.	
1	0045	10	.00	.00	.00	54.	*	1	1315	160	.00	.00	.00	0.	
1	0050	11	.00	.00	.00	34.	*	1	1320	161	.00	.00	.00	0.	
1	0055	12	.00	.00	.00	20.	*	1	1325	162	.00	.00	.00	0.	
1	0100	13	.00	.00	.00	12.	*	1	1330	163	.00	.00	.00	0.	
1	0105	14	.01	.00	.01	8.	*	1	1335	164	.00	.00	.00	0.	
1	0110	15	.03	.01	.02	9.	*	1	1340	165	.00	.00	.00	0.	
1	0115	16	.01	.00	.01	14.	*	1	1345	166	.00	.00	.00	0.	
1	0120	17	.03	.01	.02	17.	*	1	1350	167	.00	.00	.00	0.	
1	0125	18	.04	.01	.03	22.	*	1	1355	168	.00	.00	.00	0.	
1	0130	19	.06	.02	.04	30.	*	1	1400	169	.00	.00	.00	0.	
1	0135	20	.04	.01	.03	40.	*	1	1405	170	.00	.00	.00	0.	
1	0140	21	.04	.01	.03	47.	*	1	1410	171	.00	.00	.00	0.	
1	0145	22	.03	.01	.02	48.	*	1	1415	172	.00	.00	.00	0.	
1	0150	23	.01	.00	.01	44.	*	1	1420	173	.00	.00	.00	0.	
1	0155	24	.00	.00	.00	36.	*	1	1425	174	.00	.00	.00	0.	
1	0200	25	.00	.00	.00	26.	*	1	1430	175	.00	.00	.00	0.	
1	0205	26	.01	.00	.01	18.	*	1	1435	176	.00	.00	.00	0.	
1	0210	27	.04	.01	.03	17.	*	1	1440	177	.00	.00	.00	0.	
1	0215	28	.07	.02	.05	25.	*	1	1445	178	.00	.00	.00	0.	
1	0220	29	.05	.02	.04	38.	*	1	1450	179	.00	.00	.00	0.	
1	0225	30	.04	.01	.03	49.	*	1	1455	180	.00	.00	.00	0.	
1	0230	31	.01	.00	.01	50.	*	1	1500	181	.00	.00	.00	0.	
1	0235	32	.02	.01	.02	42.	*	1	1505	182	.00	.00	.00	0.	
1	0240	33	.06	.02	.05	37.	*	1	1510	183	.00	.00	.00	0.	
1	0245	34	.04	.01	.03	40.	*	1	1515	184	.00	.00	.00	0.	
1	0250	35	.01	.00	.01	43.	*	1	1520	185	.00	.00	.00	0.	
1	0255	36	.01	.00	.01	39.	*	1	1525	186	.00	.00	.00	0.	
1	0300	37	.05	.01	.04	34.	*	1	1530	187	.00	.00	.00	0.	
1	0305	38	.12	.03	.09	41.	*	1	1535	188	.00	.00	.00	0.	
1	0310	39	.13	.03	.10	67.	*	1	1540	189	.00	.00	.00	0.	
1	0315	40	.25	.06	.20	109.	*	1	1545	190	.00	.00	.00	0.	
1	0320	41	.40	.08	.32	178.	*	1	1550	191	.00	.00	.00	0.	
1	0325	42	.41	.07	.34	275.	*	1	1555	192	.00	.00	.00	0.	
1	0330	43	.54	.08	.46	385.	*	1	1600	193	.00	.00	.00	0.	
1	0335	44	.15	.02	.13	467.	*	1	1605	194	.00	.00	.00	0.	
1	0340	45	.17	.02	.14	461.	*	1	1610	195	.00	.00	.00	0.	
1	0345	46	.14	.02	.12	397.	*	1	1615	196	.00	.00	.00	0.	
1	0350	47	.03	.00	.03	315.	*	1	1620	197	.00	.00	.00	0.	
1	0355	48	.07	.01	.06	239.	*	1	1625	198	.00	.00	.00	0.	
1	0400	49	.07	.01	.06	182.	*	1	1630	199	.00	.00	.00	0.	
1	0405	50	.02	.00	.02	142.	*	1	1635	200	.00	.00	.00	0.	
1	0410	51	.02	.00	.02	110.	*	1	1640	201	.00	.00	.00	0.	
1	0415	52	.04	.00	.03	83.	*	1	1645	202	.00	.00	.00	0.	
1	0420	53	.04	.00	.03	65.	*	1	1650	203	.00	.00	.00	0.	
1	0425	54	.05	.01	.05	60.	*	1	1655	204	.00	.00	.00	0.	
1	0430	55	.10	.01	.09	66.	*	1	1700	205	.00	.00	.00	0.	
1	0435	56	.07	.01	.06	81.	*	1	1705	206	.00	.00	.00	0.	
1	0440	57	.05	.01	.04	93.	*	1	1710	207	.00	.00	.00	0.	

1	0445	58	.06	.01	.05	94.	*	1	1715	208	.00	.00	.00	0.
1	0450	59	.09	.01	.08	93.	*	1	1720	209	.00	.00	.00	0.
1	0455	60	.03	.00	.02	94.	*	1	1725	210	.00	.00	.00	0.
1	0500	61	.03	.00	.02	87.	*	1	1730	211	.00	.00	.00	0.
1	0505	62	.01	.00	.01	72.	*	1	1735	212	.00	.00	.00	0.
1	0510	63	.01	.00	.01	55.	*	1	1740	213	.00	.00	.00	0.
1	0515	64	.01	.00	.01	40.	*	1	1745	214	.00	.00	.00	0.
1	0520	65	.00	.00	.00	29.	*	1	1750	215	.00	.00	.00	0.
1	0525	66	.01	.00	.01	22.	*	1	1755	216	.00	.00	.00	0.
1	0530	67	.00	.00	.00	18.	*	1	1800	217	.00	.00	.00	0.
1	0535	68	.00	.00	.00	14.	*	1	1805	218	.00	.00	.00	0.
1	0540	69	.00	.00	.00	11.	*	1	1810	219	.00	.00	.00	0.
1	0545	70	.01	.00	.01	9.	*	1	1815	220	.00	.00	.00	0.
1	0550	71	.00	.00	.00	10.	*	1	1820	221	.00	.00	.00	0.
1	0555	72	.00	.00	.00	9.	*	1	1825	222	.00	.00	.00	0.
1	0600	73	.00	.00	.00	8.	*	1	1830	223	.00	.00	.00	0.
1	0605	74	.00	.00	.00	7.	*	1	1835	224	.00	.00	.00	0.
1	0610	75	.00	.00	.00	5.	*	1	1840	225	.00	.00	.00	0.
1	0615	76	.00	.00	.00	4.	*	1	1845	226	.00	.00	.00	0.
1	0620	77	.00	.00	.00	2.	*	1	1850	227	.00	.00	.00	0.
1	0625	78	.00	.00	.00	1.	*	1	1855	228	.00	.00	.00	0.
1	0630	79	.00	.00	.00	1.	*	1	1900	229	.00	.00	.00	0.
1	0635	80	.00	.00	.00	0.	*	1	1905	230	.00	.00	.00	0.
1	0640	81	.00	.00	.00	0.	*	1	1910	231	.00	.00	.00	0.
1	0645	82	.00	.00	.00	0.	*	1	1915	232	.00	.00	.00	0.
1	0650	83	.00	.00	.00	0.	*	1	1920	233	.00	.00	.00	0.
1	0655	84	.00	.00	.00	0.	*	1	1925	234	.00	.00	.00	0.
1	0700	85	.00	.00	.00	0.	*	1	1930	235	.00	.00	.00	0.
1	0705	86	.00	.00	.00	0.	*	1	1935	236	.00	.00	.00	0.
1	0710	87	.00	.00	.00	0.	*	1	1940	237	.00	.00	.00	0.
1	0715	88	.00	.00	.00	0.	*	1	1945	238	.00	.00	.00	0.
1	0720	89	.00	.00	.00	0.	*	1	1950	239	.00	.00	.00	0.
1	0725	90	.00	.00	.00	0.	*	1	1955	240	.00	.00	.00	0.
1	0730	91	.00	.00	.00	0.	*	1	2000	241	.00	.00	.00	0.
1	0735	92	.00	.00	.00	0.	*	1	2005	242	.00	.00	.00	0.
1	0740	93	.00	.00	.00	0.	*	1	2010	243	.00	.00	.00	0.
1	0745	94	.00	.00	.00	0.	*	1	2015	244	.00	.00	.00	0.
1	0750	95	.00	.00	.00	0.	*	1	2020	245	.00	.00	.00	0.
1	0755	96	.00	.00	.00	0.	*	1	2025	246	.00	.00	.00	0.
1	0800	97	.00	.00	.00	0.	*	1	2030	247	.00	.00	.00	0.
1	0805	98	.00	.00	.00	0.	*	1	2035	248	.00	.00	.00	0.
1	0810	99	.00	.00	.00	0.	*	1	2040	249	.00	.00	.00	0.
1	0815	100	.00	.00	.00	0.	*	1	2045	250	.00	.00	.00	0.
1	0820	101	.00	.00	.00	0.	*	1	2050	251	.00	.00	.00	0.
1	0825	102	.00	.00	.00	0.	*	1	2055	252	.00	.00	.00	0.
1	0830	103	.00	.00	.00	0.	*	1	2100	253	.00	.00	.00	0.
1	0835	104	.00	.00	.00	0.	*	1	2105	254	.00	.00	.00	0.
1	0840	105	.00	.00	.00	0.	*	1	2110	255	.00	.00	.00	0.
1	0845	106	.00	.00	.00	0.	*	1	2115	256	.00	.00	.00	0.
1	0850	107	.00	.00	.00	0.	*	1	2120	257	.00	.00	.00	0.
1	0855	108	.00	.00	.00	0.	*	1	2125	258	.00	.00	.00	0.
1	0900	109	.00	.00	.00	0.	*	1	2130	259	.00	.00	.00	0.
1	0905	110	.00	.00	.00	0.	*	1	2135	260	.00	.00	.00	0.
1	0910	111	.00	.00	.00	0.	*	1	2140	261	.00	.00	.00	0.
1	0915	112	.00	.00	.00	0.	*	1	2145	262	.00	.00	.00	0.
1	0920	113	.00	.00	.00	0.	*	1	2150	263	.00	.00	.00	0.
1	0925	114	.00	.00	.00	0.	*	1	2155	264	.00	.00	.00	0.
1	0930	115	.00	.00	.00	0.	*	1	2200	265	.00	.00	.00	0.
1	0935	116	.00	.00	.00	0.	*	1	2205	266	.00	.00	.00	0.
1	0940	117	.00	.00	.00	0.	*	1	2210	267	.00	.00	.00	0.
1	0945	118	.00	.00	.00	0.	*	1	2215	268	.00	.00	.00	0.
1	0950	119	.00	.00	.00	0.	*	1	2220	269	.00	.00	.00	0.
1	0955	120	.00	.00	.00	0.	*	1	2225	270	.00	.00	.00	0.
1	1000	121	.00	.00	.00	0.	*	1	2230	271	.00	.00	.00	0.
1	1005	122	.00	.00	.00	0.	*	1	2235	272	.00	.00	.00	0.

1	1010	123	.00	.00	.00	0.	*	1	2240	273	.00	.00	.00	0.
1	1015	124	.00	.00	.00	0.	*	1	2245	274	.00	.00	.00	0.
1	1020	125	.00	.00	.00	0.	*	1	2250	275	.00	.00	.00	0.
1	1025	126	.00	.00	.00	0.	*	1	2255	276	.00	.00	.00	0.
1	1030	127	.00	.00	.00	0.	*	1	2300	277	.00	.00	.00	0.
1	1035	128	.00	.00	.00	0.	*	1	2305	278	.00	.00	.00	0.
1	1040	129	.00	.00	.00	0.	*	1	2310	279	.00	.00	.00	0.
1	1045	130	.00	.00	.00	0.	*	1	2315	280	.00	.00	.00	0.
1	1050	131	.00	.00	.00	0.	*	1	2320	281	.00	.00	.00	0.
1	1055	132	.00	.00	.00	0.	*	1	2325	282	.00	.00	.00	0.
1	1100	133	.00	.00	.00	0.	*	1	2330	283	.00	.00	.00	0.
1	1105	134	.00	.00	.00	0.	*	1	2335	284	.00	.00	.00	0.
1	1110	135	.00	.00	.00	0.	*	1	2340	285	.00	.00	.00	0.
1	1115	136	.00	.00	.00	0.	*	1	2345	286	.00	.00	.00	0.
1	1120	137	.00	.00	.00	0.	*	1	2350	287	.00	.00	.00	0.
1	1125	138	.00	.00	.00	0.	*	1	2355	288	.00	.00	.00	0.
1	1130	139	.00	.00	.00	0.	*	2	0000	289	.00	.00	.00	0.
1	1135	140	.00	.00	.00	0.	*	2	0005	290	.00	.00	.00	0.
1	1140	141	.00	.00	.00	0.	*	2	0010	291	.00	.00	.00	0.
1	1145	142	.00	.00	.00	0.	*	2	0015	292	.00	.00	.00	0.
1	1150	143	.00	.00	.00	0.	*	2	0020	293	.00	.00	.00	0.
1	1155	144	.00	.00	.00	0.	*	2	0025	294	.00	.00	.00	0.
1	1200	145	.00	.00	.00	0.	*	2	0030	295	.00	.00	.00	0.
1	1205	146	.00	.00	.00	0.	*	2	0035	296	.00	.00	.00	0.
1	1210	147	.00	.00	.00	0.	*	2	0040	297	.00	.00	.00	0.
1	1215	148	.00	.00	.00	0.	*	2	0045	298	.00	.00	.00	0.
1	1220	149	.00	.00	.00	0.	*	2	0050	299	.00	.00	.00	0.
1	1225	150	.00	.00	.00	0.	*	2	0055	300	.00	.00	.00	0.

*

TOTAL RAINFALL = 4.47, TOTAL LOSS = .89, TOTAL EXCESS = 3.58

PEAK FLOW		TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+	(CFS)	(HR)				
		(CFS)				
+	467.	3.58	82.	21.	20.	20.
		(INCHES)	3.567	3.579	3.579	3.579
		(AC-FT)	41.	41.	41.	41.

CUMULATIVE AREA = .21 SQ MI

WARNING *** TIME INTERVAL IS GREATER THAN .29*LAG

HYDROGRAPH AT STATION MW
PLAN 1, RATIO = .99

DA	MON	HR	MIN	ORD	RAIN	LOSS	EXCESS	COMP	Q	DA	MON	HR	MIN	ORD	RAIN	LOSS	EXCESS	COMP	Q
1	0000	1	.00	.00	.00	0.	*	1	1230 151	.00	.00	.00	0.						
1	0005	2	.09	.03	.06	6.	*	1	1235 152	.00	.00	.00	0.						
1	0010	3	.17	.05	.12	31.	*	1	1240 153	.00	.00	.00	0.						
1	0015	4	.06	.02	.04	66.	*	1	1245 154	.00	.00	.00	0.						
1	0020	5	.08	.02	.05	88.	*	1	1250 155	.00	.00	.00	0.						
1	0025	6	.09	.03	.07	93.	*	1	1255 156	.00	.00	.00	0.						
1	0030	7	.07	.02	.05	94.	*	1	1300 157	.00	.00	.00	0.						
1	0035	8	.03	.01	.02	90.	*	1	1305 158	.00	.00	.00	0.						
1	0040	9	.00	.00	.00	77.	*	1	1310 159	.00	.00	.00	0.						
1	0045	10	.00	.00	.00	55.	*	1	1315 160	.00	.00	.00	0.						
1	0050	11	.00	.00	.00	34.	*	1	1320 161	.00	.00	.00	0.						
1	0055	12	.00	.00	.00	20.	*	1	1325 162	.00	.00	.00	0.						
1	0100	13	.00	.00	.00	12.	*	1	1330 163	.00	.00	.00	0.						
1	0105	14	.01	.00	.01	8.	*	1	1335 164	.00	.00	.00	0.						
1	0110	15	.03	.01	.02	9.	*	1	1340 165	.00	.00	.00	0.						
1	0115	16	.01	.00	.01	14.	*	1	1345 166	.00	.00	.00	0.						
1	0120	17	.03	.01	.02	17.	*	1	1350 167	.00	.00	.00	0.						
1	0125	18	.05	.01	.03	22.	*	1	1355 168	.00	.00	.00	0.						
1	0130	19	.06	.02	.04	30.	*	1	1400 169	.00	.00	.00	0.						
1	0135	20	.04	.01	.03	41.	*	1	1405 170	.00	.00	.00	0.						
1	0140	21	.04	.01	.03	47.	*	1	1410 171	.00	.00	.00	0.						
1	0145	22	.03	.01	.02	48.	*	1	1415 172	.00	.00	.00	0.						
1	0150	23	.01	.00	.01	44.	*	1	1420 173	.00	.00	.00	0.						
1	0155	24	.00	.00	.00	36.	*	1	1425 174	.00	.00	.00	0.						
1	0200	25	.00	.00	.00	26.	*	1	1430 175	.00	.00	.00	0.						
1	0205	26	.01	.00	.01	18.	*	1	1435 176	.00	.00	.00	0.						
1	0210	27	.05	.01	.03	17.	*	1	1440 177	.00	.00	.00	0.						
1	0215	28	.07	.02	.05	25.	*	1	1445 178	.00	.00	.00	0.						
1	0220	29	.05	.02	.04	39.	*	1	1450 179	.00	.00	.00	0.						
1	0225	30	.04	.01	.03	49.	*	1	1455 180	.00	.00	.00	0.						
1	0230	31	.01	.00	.01	50.	*	1	1500 181	.00	.00	.00	0.						
1	0235	32	.02	.01	.02	43.	*	1	1505 182	.00	.00	.00	0.						
1	0240	33	.06	.02	.05	38.	*	1	1510 183	.00	.00	.00	0.						
1	0245	34	.04	.01	.03	41.	*	1	1515 184	.00	.00	.00	0.						
1	0250	35	.01	.00	.01	44.	*	1	1520 185	.00	.00	.00	0.						
1	0255	36	.01	.00	.01	40.	*	1	1525 186	.00	.00	.00	0.						
1	0300	37	.05	.01	.04	34.	*	1	1530 187	.00	.00	.00	0.						
1	0305	38	.12	.03	.09	41.	*	1	1535 188	.00	.00	.00	0.						
1	0310	39	.14	.03	.10	67.	*	1	1540 189	.00	.00	.00	0.						
1	0315	40	.26	.06	.20	110.	*	1	1545 190	.00	.00	.00	0.						
1	0320	41	.41	.08	.33	180.	*	1	1550 191	.00	.00	.00	0.						
1	0325	42	.41	.07	.34	278.	*	1	1555 192	.00	.00	.00	0.						
1	0330	43	.54	.08	.46	390.	*	1	1600 193	.00	.00	.00	0.						
1	0335	44	.15	.02	.13	472.	*	1	1605 194	.00	.00	.00	0.						
1	0340	45	.17	.02	.15	467.	*	1	1610 195	.00	.00	.00	0.						
1	0345	46	.14	.02	.12	402.	*	1	1615 196	.00	.00	.00	0.						
1	0350	47	.03	.00	.03	318.	*	1	1620 197	.00	.00	.00	0.						
1	0355	48	.07	.01	.06	242.	*	1	1625 198	.00	.00	.00	0.						
1	0400	49	.07	.01	.06	184.	*	1	1630 199	.00	.00	.00	0.						
1	0405	50	.02	.00	.02	144.	*	1	1635 200	.00	.00	.00	0.						
1	0410	51	.02	.00	.02	112.	*	1	1640 201	.00	.00	.00	0.						
1	0415	52	.04	.00	.03	84.	*	1	1645 202	.00	.00	.00	0.						
1	0420	53	.04	.00	.03	66.	*	1	1650 203	.00	.00	.00	0.						
1	0425	54	.05	.01	.05	60.	*	1	1655 204	.00	.00	.00	0.						
1	0430	55	.10	.01	.09	67.	*	1	1700 205	.00	.00	.00	0.						
1	0435	56	.07	.01	.06	82.	*	1	1705 206	.00	.00	.00	0.						

1	0440	57	.05	.01	.04	94.	*	1	1710	207	.00	.00	.00	0.
1	0445	58	.06	.01	.05	95.	*	1	1715	208	.00	.00	.00	0.
1	0450	59	.09	.01	.08	94.	*	1	1720	209	.00	.00	.00	0.
1	0455	60	.03	.00	.02	95.	*	1	1725	210	.00	.00	.00	0.
1	0500	61	.03	.00	.02	88.	*	1	1730	211	.00	.00	.00	0.
1	0505	62	.01	.00	.01	73.	*	1	1735	212	.00	.00	.00	0.
1	0510	63	.01	.00	.01	55.	*	1	1740	213	.00	.00	.00	0.
1	0515	64	.01	.00	.01	40.	*	1	1745	214	.00	.00	.00	0.
1	0520	65	.00	.00	.00	29.	*	1	1750	215	.00	.00	.00	0.
1	0525	66	.01	.00	.01	22.	*	1	1755	216	.00	.00	.00	0.
1	0530	67	.00	.00	.00	18.	*	1	1800	217	.00	.00	.00	0.
1	0535	68	.00	.00	.00	14.	*	1	1805	218	.00	.00	.00	0.
1	0540	69	.00	.00	.00	11.	*	1	1810	219	.00	.00	.00	0.
1	0545	70	.01	.00	.01	9.	*	1	1815	220	.00	.00	.00	0.
1	0550	71	.00	.00	.00	10.	*	1	1820	221	.00	.00	.00	0.
1	0555	72	.00	.00	.00	9.	*	1	1825	222	.00	.00	.00	0.
1	0600	73	.00	.00	.00	8.	*	1	1830	223	.00	.00	.00	0.
1	0605	74	.00	.00	.00	7.	*	1	1835	224	.00	.00	.00	0.
1	0610	75	.00	.00	.00	5.	*	1	1840	225	.00	.00	.00	0.
1	0615	76	.00	.00	.00	4.	*	1	1845	226	.00	.00	.00	0.
1	0620	77	.00	.00	.00	2.	*	1	1850	227	.00	.00	.00	0.
1	0625	78	.00	.00	.00	1.	*	1	1855	228	.00	.00	.00	0.
1	0630	79	.00	.00	.00	1.	*	1	1900	229	.00	.00	.00	0.
1	0635	80	.00	.00	.00	0.	*	1	1905	230	.00	.00	.00	0.
1	0640	81	.00	.00	.00	0.	*	1	1910	231	.00	.00	.00	0.
1	0645	82	.00	.00	.00	0.	*	1	1915	232	.00	.00	.00	0.
1	0650	83	.00	.00	.00	0.	*	1	1920	233	.00	.00	.00	0.
1	0655	84	.00	.00	.00	0.	*	1	1925	234	.00	.00	.00	0.
1	0700	85	.00	.00	.00	0.	*	1	1930	235	.00	.00	.00	0.
1	0705	86	.00	.00	.00	0.	*	1	1935	236	.00	.00	.00	0.
1	0710	87	.00	.00	.00	0.	*	1	1940	237	.00	.00	.00	0.
1	0715	88	.00	.00	.00	0.	*	1	1945	238	.00	.00	.00	0.
1	0720	89	.00	.00	.00	0.	*	1	1950	239	.00	.00	.00	0.
1	0725	90	.00	.00	.00	0.	*	1	1955	240	.00	.00	.00	0.
1	0730	91	.00	.00	.00	0.	*	1	2000	241	.00	.00	.00	0.
1	0735	92	.00	.00	.00	0.	*	1	2005	242	.00	.00	.00	0.
1	0740	93	.00	.00	.00	0.	*	1	2010	243	.00	.00	.00	0.
1	0745	94	.00	.00	.00	0.	*	1	2015	244	.00	.00	.00	0.
1	0750	95	.00	.00	.00	0.	*	1	2020	245	.00	.00	.00	0.
1	0755	96	.00	.00	.00	0.	*	1	2025	246	.00	.00	.00	0.
1	0800	97	.00	.00	.00	0.	*	1	2030	247	.00	.00	.00	0.
1	0805	98	.00	.00	.00	0.	*	1	2035	248	.00	.00	.00	0.
1	0810	99	.00	.00	.00	0.	*	1	2040	249	.00	.00	.00	0.
1	0815	100	.00	.00	.00	0.	*	1	2045	250	.00	.00	.00	0.
1	0820	101	.00	.00	.00	0.	*	1	2050	251	.00	.00	.00	0.
1	0825	102	.00	.00	.00	0.	*	1	2055	252	.00	.00	.00	0.
1	0830	103	.00	.00	.00	0.	*	1	2100	253	.00	.00	.00	0.
1	0835	104	.00	.00	.00	0.	*	1	2105	254	.00	.00	.00	0.
1	0840	105	.00	.00	.00	0.	*	1	2110	255	.00	.00	.00	0.
1	0845	106	.00	.00	.00	0.	*	1	2115	256	.00	.00	.00	0.
1	0850	107	.00	.00	.00	0.	*	1	2120	257	.00	.00	.00	0.
1	0855	108	.00	.00	.00	0.	*	1	2125	258	.00	.00	.00	0.
1	0900	109	.00	.00	.00	0.	*	1	2130	259	.00	.00	.00	0.
1	0905	110	.00	.00	.00	0.	*	1	2135	260	.00	.00	.00	0.
1	0910	111	.00	.00	.00	0.	*	1	2140	261	.00	.00	.00	0.
1	0915	112	.00	.00	.00	0.	*	1	2145	262	.00	.00	.00	0.
1	0920	113	.00	.00	.00	0.	*	1	2150	263	.00	.00	.00	0.
1	0925	114	.00	.00	.00	0.	*	1	2155	264	.00	.00	.00	0.
1	0930	115	.00	.00	.00	0.	*	1	2200	265	.00	.00	.00	0.
1	0935	116	.00	.00	.00	0.	*	1	2205	266	.00	.00	.00	0.
1	0940	117	.00	.00	.00	0.	*	1	2210	267	.00	.00	.00	0.
1	0945	118	.00	.00	.00	0.	*	1	2215	268	.00	.00	.00	0.
1	0950	119	.00	.00	.00	0.	*	1	2220	269	.00	.00	.00	0.
1	0955	120	.00	.00	.00	0.	*	1	2225	270	.00	.00	.00	0.
1	1000	121	.00	.00	.00	0.	*	1	2230	271	.00	.00	.00	0.

1	1005	122	.00	.00	.00	0.	*	1	2235	272	.00	.00	.00	0.
1	1010	123	.00	.00	.00	0.	*	1	2240	273	.00	.00	.00	0.
1	1015	124	.00	.00	.00	0.	*	1	2245	274	.00	.00	.00	0.
1	1020	125	.00	.00	.00	0.	*	1	2250	275	.00	.00	.00	0.
1	1025	126	.00	.00	.00	0.	*	1	2255	276	.00	.00	.00	0.
1	1030	127	.00	.00	.00	0.	*	1	2300	277	.00	.00	.00	0.
1	1035	128	.00	.00	.00	0.	*	1	2305	278	.00	.00	.00	0.
1	1040	129	.00	.00	.00	0.	*	1	2310	279	.00	.00	.00	0.
1	1045	130	.00	.00	.00	0.	*	1	2315	280	.00	.00	.00	0.
1	1050	131	.00	.00	.00	0.	*	1	2320	281	.00	.00	.00	0.
1	1055	132	.00	.00	.00	0.	*	1	2325	282	.00	.00	.00	0.
1	1100	133	.00	.00	.00	0.	*	1	2330	283	.00	.00	.00	0.
1	1105	134	.00	.00	.00	0.	*	1	2335	284	.00	.00	.00	0.
1	1110	135	.00	.00	.00	0.	*	1	2340	285	.00	.00	.00	0.
1	1115	136	.00	.00	.00	0.	*	1	2345	286	.00	.00	.00	0.
1	1120	137	.00	.00	.00	0.	*	1	2350	287	.00	.00	.00	0.
1	1125	138	.00	.00	.00	0.	*	1	2355	288	.00	.00	.00	0.
1	1130	139	.00	.00	.00	0.	*	2	0000	289	.00	.00	.00	0.
1	1135	140	.00	.00	.00	0.	*	2	0005	290	.00	.00	.00	0.
1	1140	141	.00	.00	.00	0.	*	2	0010	291	.00	.00	.00	0.
1	1145	142	.00	.00	.00	0.	*	2	0015	292	.00	.00	.00	0.
1	1150	143	.00	.00	.00	0.	*	2	0020	293	.00	.00	.00	0.
1	1155	144	.00	.00	.00	0.	*	2	0025	294	.00	.00	.00	0.
1	1200	145	.00	.00	.00	0.	*	2	0030	295	.00	.00	.00	0.
1	1205	146	.00	.00	.00	0.	*	2	0035	296	.00	.00	.00	0.
1	1210	147	.00	.00	.00	0.	*	2	0040	297	.00	.00	.00	0.
1	1215	148	.00	.00	.00	0.	*	2	0045	298	.00	.00	.00	0.
1	1220	149	.00	.00	.00	0.	*	2	0050	299	.00	.00	.00	0.
1	1225	150	.00	.00	.00	0.	*	2	0055	300	.00	.00	.00	0.

TOTAL RAINFALL = 4.51, TOTAL LOSS = .89, TOTAL EXCESS = 3.62

PEAK FLOW		TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+	(CFS)	(HR)				
		(CFS)				
+	472.	3.58	83.	21.	20.	20.
		(INCHES)	3.608	3.620	3.620	3.620
		(AC-FT)	41.	41.	41.	41.

CUMULATIVE AREA = .21 SQ MI

WARNING *** TIME INTERVAL IS GREATER THAN .29*LAG

HYDROGRAPH AT STATION MW
PLAN 1, RATIO = .99

DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
1	0000	1	.00	.00	.00	0.	*	1	1230	151	.00	.00	.00	0.	
1	0005	2	.09	.03	.06	6.	*	1	1235	152	.00	.00	.00	0.	
1	0010	3	.17	.05	.12	31.	*	1	1240	153	.00	.00	.00	0.	
1	0015	4	.06	.02	.04	67.	*	1	1245	154	.00	.00	.00	0.	
1	0020	5	.08	.02	.05	88.	*	1	1250	155	.00	.00	.00	0.	
1	0025	6	.10	.03	.07	94.	*	1	1255	156	.00	.00	.00	0.	
1	0030	7	.07	.02	.05	94.	*	1	1300	157	.00	.00	.00	0.	
1	0035	8	.03	.01	.02	91.	*	1	1305	158	.00	.00	.00	0.	
1	0040	9	.00	.00	.00	77.	*	1	1310	159	.00	.00	.00	0.	
1	0045	10	.00	.00	.00	55.	*	1	1315	160	.00	.00	.00	0.	
1	0050	11	.00	.00	.00	34.	*	1	1320	161	.00	.00	.00	0.	
1	0055	12	.00	.00	.00	20.	*	1	1325	162	.00	.00	.00	0.	
1	0100	13	.00	.00	.00	12.	*	1	1330	163	.00	.00	.00	0.	
1	0105	14	.01	.00	.01	8.	*	1	1335	164	.00	.00	.00	0.	
1	0110	15	.03	.01	.02	9.	*	1	1340	165	.00	.00	.00	0.	
1	0115	16	.01	.00	.01	14.	*	1	1345	166	.00	.00	.00	0.	
1	0120	17	.03	.01	.02	17.	*	1	1350	167	.00	.00	.00	0.	
1	0125	18	.05	.01	.03	22.	*	1	1355	168	.00	.00	.00	0.	
1	0130	19	.06	.02	.04	30.	*	1	1400	169	.00	.00	.00	0.	
1	0135	20	.04	.01	.03	41.	*	1	1405	170	.00	.00	.00	0.	
1	0140	21	.04	.01	.03	48.	*	1	1410	171	.00	.00	.00	0.	
1	0145	22	.03	.01	.02	49.	*	1	1415	172	.00	.00	.00	0.	
1	0150	23	.01	.00	.01	45.	*	1	1420	173	.00	.00	.00	0.	
1	0155	24	.00	.00	.00	36.	*	1	1425	174	.00	.00	.00	0.	
1	0200	25	.00	.00	.00	26.	*	1	1430	175	.00	.00	.00	0.	
1	0205	26	.01	.00	.01	18.	*	1	1435	176	.00	.00	.00	0.	
1	0210	27	.05	.01	.03	17.	*	1	1440	177	.00	.00	.00	0.	
1	0215	28	.07	.02	.05	25.	*	1	1445	178	.00	.00	.00	0.	
1	0220	29	.05	.02	.04	39.	*	1	1450	179	.00	.00	.00	0.	
1	0225	30	.04	.01	.03	50.	*	1	1455	180	.00	.00	.00	0.	
1	0230	31	.01	.00	.01	51.	*	1	1500	181	.00	.00	.00	0.	
1	0235	32	.02	.01	.02	43.	*	1	1505	182	.00	.00	.00	0.	
1	0240	33	.06	.02	.05	38.	*	1	1510	183	.00	.00	.00	0.	
1	0245	34	.04	.01	.03	41.	*	1	1515	184	.00	.00	.00	0.	
1	0250	35	.01	.00	.01	44.	*	1	1520	185	.00	.00	.00	0.	
1	0255	36	.01	.00	.01	40.	*	1	1525	186	.00	.00	.00	0.	
1	0300	37	.05	.01	.04	34.	*	1	1530	187	.00	.00	.00	0.	
1	0305	38	.12	.03	.09	42.	*	1	1535	188	.00	.00	.00	0.	
1	0310	39	.14	.03	.10	68.	*	1	1540	189	.00	.00	.00	0.	
1	0315	40	.26	.06	.20	111.	*	1	1545	190	.00	.00	.00	0.	
1	0320	41	.41	.08	.33	181.	*	1	1550	191	.00	.00	.00	0.	
1	0325	42	.41	.07	.34	281.	*	1	1555	192	.00	.00	.00	0.	
1	0330	43	.55	.08	.46	393.	*	1	1600	193	.00	.00	.00	0.	
1	0335	44	.15	.02	.13	476.	*	1	1605	194	.00	.00	.00	0.	
1	0340	45	.17	.02	.15	470.	*	1	1610	195	.00	.00	.00	0.	
1	0345	46	.14	.02	.12	405.	*	1	1615	196	.00	.00	.00	0.	
1	0350	47	.03	.00	.03	321.	*	1	1620	197	.00	.00	.00	0.	
1	0355	48	.07	.01	.06	244.	*	1	1625	198	.00	.00	.00	0.	
1	0400	49	.07	.01	.06	186.	*	1	1630	199	.00	.00	.00	0.	
1	0405	50	.02	.00	.02	145.	*	1	1635	200	.00	.00	.00	0.	
1	0410	51	.02	.00	.02	113.	*	1	1640	201	.00	.00	.00	0.	
1	0415	52	.04	.00	.03	85.	*	1	1645	202	.00	.00	.00	0.	
1	0420	53	.04	.00	.03	67.	*	1	1650	203	.00	.00	.00	0.	
1	0425	54	.05	.01	.05	61.	*	1	1655	204	.00	.00	.00	0.	
1	0430	55	.10	.01	.09	67.	*	1	1700	205	.00	.00	.00	0.	
1	0435	56	.07	.01	.07	83.	*	1	1705	206	.00	.00	.00	0.	

1	0440	57	.05	.01	.04	94.	*	1	1710	207	.00	.00	.00	0.
1	0445	58	.06	.01	.05	96.	*	1	1715	208	.00	.00	.00	0.
1	0450	59	.09	.01	.08	95.	*	1	1720	209	.00	.00	.00	0.
1	0455	60	.03	.00	.02	96.	*	1	1725	210	.00	.00	.00	0.
1	0500	61	.03	.00	.02	89.	*	1	1730	211	.00	.00	.00	0.
1	0505	62	.01	.00	.01	74.	*	1	1735	212	.00	.00	.00	0.
1	0510	63	.01	.00	.01	56.	*	1	1740	213	.00	.00	.00	0.
1	0515	64	.01	.00	.01	41.	*	1	1745	214	.00	.00	.00	0.
1	0520	65	.00	.00	.00	30.	*	1	1750	215	.00	.00	.00	0.
1	0525	66	.01	.00	.01	22.	*	1	1755	216	.00	.00	.00	0.
1	0530	67	.00	.00	.00	18.	*	1	1800	217	.00	.00	.00	0.
1	0535	68	.00	.00	.00	14.	*	1	1805	218	.00	.00	.00	0.
1	0540	69	.00	.00	.00	11.	*	1	1810	219	.00	.00	.00	0.
1	0545	70	.01	.00	.01	10.	*	1	1815	220	.00	.00	.00	0.
1	0550	71	.00	.00	.00	10.	*	1	1820	221	.00	.00	.00	0.
1	0555	72	.00	.00	.00	9.	*	1	1825	222	.00	.00	.00	0.
1	0600	73	.00	.00	.00	8.	*	1	1830	223	.00	.00	.00	0.
1	0605	74	.00	.00	.00	7.	*	1	1835	224	.00	.00	.00	0.
1	0610	75	.00	.00	.00	5.	*	1	1840	225	.00	.00	.00	0.
1	0615	76	.00	.00	.00	4.	*	1	1845	226	.00	.00	.00	0.
1	0620	77	.00	.00	.00	2.	*	1	1850	227	.00	.00	.00	0.
1	0625	78	.00	.00	.00	1.	*	1	1855	228	.00	.00	.00	0.
1	0630	79	.00	.00	.00	1.	*	1	1900	229	.00	.00	.00	0.
1	0635	80	.00	.00	.00	0.	*	1	1905	230	.00	.00	.00	0.
1	0640	81	.00	.00	.00	0.	*	1	1910	231	.00	.00	.00	0.
1	0645	82	.00	.00	.00	0.	*	1	1915	232	.00	.00	.00	0.
1	0650	83	.00	.00	.00	0.	*	1	1920	233	.00	.00	.00	0.
1	0655	84	.00	.00	.00	0.	*	1	1925	234	.00	.00	.00	0.
1	0700	85	.00	.00	.00	0.	*	1	1930	235	.00	.00	.00	0.
1	0705	86	.00	.00	.00	0.	*	1	1935	236	.00	.00	.00	0.
1	0710	87	.00	.00	.00	0.	*	1	1940	237	.00	.00	.00	0.
1	0715	88	.00	.00	.00	0.	*	1	1945	238	.00	.00	.00	0.
1	0720	89	.00	.00	.00	0.	*	1	1950	239	.00	.00	.00	0.
1	0725	90	.00	.00	.00	0.	*	1	1955	240	.00	.00	.00	0.
1	0730	91	.00	.00	.00	0.	*	1	2000	241	.00	.00	.00	0.
1	0735	92	.00	.00	.00	0.	*	1	2005	242	.00	.00	.00	0.
1	0740	93	.00	.00	.00	0.	*	1	2010	243	.00	.00	.00	0.
1	0745	94	.00	.00	.00	0.	*	1	2015	244	.00	.00	.00	0.
1	0750	95	.00	.00	.00	0.	*	1	2020	245	.00	.00	.00	0.
1	0755	96	.00	.00	.00	0.	*	1	2025	246	.00	.00	.00	0.
1	0800	97	.00	.00	.00	0.	*	1	2030	247	.00	.00	.00	0.
1	0805	98	.00	.00	.00	0.	*	1	2035	248	.00	.00	.00	0.
1	0810	99	.00	.00	.00	0.	*	1	2040	249	.00	.00	.00	0.
1	0815	100	.00	.00	.00	0.	*	1	2045	250	.00	.00	.00	0.
1	0820	101	.00	.00	.00	0.	*	1	2050	251	.00	.00	.00	0.
1	0825	102	.00	.00	.00	0.	*	1	2055	252	.00	.00	.00	0.
1	0830	103	.00	.00	.00	0.	*	1	2100	253	.00	.00	.00	0.
1	0835	104	.00	.00	.00	0.	*	1	2105	254	.00	.00	.00	0.
1	0840	105	.00	.00	.00	0.	*	1	2110	255	.00	.00	.00	0.
1	0845	106	.00	.00	.00	0.	*	1	2115	256	.00	.00	.00	0.
1	0850	107	.00	.00	.00	0.	*	1	2120	257	.00	.00	.00	0.
1	0855	108	.00	.00	.00	0.	*	1	2125	258	.00	.00	.00	0.
1	0900	109	.00	.00	.00	0.	*	1	2130	259	.00	.00	.00	0.
1	0905	110	.00	.00	.00	0.	*	1	2135	260	.00	.00	.00	0.
1	0910	111	.00	.00	.00	0.	*	1	2140	261	.00	.00	.00	0.
1	0915	112	.00	.00	.00	0.	*	1	2145	262	.00	.00	.00	0.
1	0920	113	.00	.00	.00	0.	*	1	2150	263	.00	.00	.00	0.
1	0925	114	.00	.00	.00	0.	*	1	2155	264	.00	.00	.00	0.
1	0930	115	.00	.00	.00	0.	*	1	2200	265	.00	.00	.00	0.
1	0935	116	.00	.00	.00	0.	*	1	2205	266	.00	.00	.00	0.
1	0940	117	.00	.00	.00	0.	*	1	2210	267	.00	.00	.00	0.
1	0945	118	.00	.00	.00	0.	*	1	2215	268	.00	.00	.00	0.
1	0950	119	.00	.00	.00	0.	*	1	2220	269	.00	.00	.00	0.
1	0955	120	.00	.00	.00	0.	*	1	2225	270	.00	.00	.00	0.
1	1000	121	.00	.00	.00	0.	*	1	2230	271	.00	.00	.00	0.

1	1005	122	.00	.00	.00	0.	*	1	2235	272	.00	.00	.00	0.
1	1010	123	.00	.00	.00	0.	*	1	2240	273	.00	.00	.00	0.
1	1015	124	.00	.00	.00	0.	*	1	2245	274	.00	.00	.00	0.
1	1020	125	.00	.00	.00	0.	*	1	2250	275	.00	.00	.00	0.
1	1025	126	.00	.00	.00	0.	*	1	2255	276	.00	.00	.00	0.
1	1030	127	.00	.00	.00	0.	*	1	2300	277	.00	.00	.00	0.
1	1035	128	.00	.00	.00	0.	*	1	2305	278	.00	.00	.00	0.
1	1040	129	.00	.00	.00	0.	*	1	2310	279	.00	.00	.00	0.
1	1045	130	.00	.00	.00	0.	*	1	2315	280	.00	.00	.00	0.
1	1050	131	.00	.00	.00	0.	*	1	2320	281	.00	.00	.00	0.
1	1055	132	.00	.00	.00	0.	*	1	2325	282	.00	.00	.00	0.
1	1100	133	.00	.00	.00	0.	*	1	2330	283	.00	.00	.00	0.
1	1105	134	.00	.00	.00	0.	*	1	2335	284	.00	.00	.00	0.
1	1110	135	.00	.00	.00	0.	*	1	2340	285	.00	.00	.00	0.
1	1115	136	.00	.00	.00	0.	*	1	2345	286	.00	.00	.00	0.
1	1120	137	.00	.00	.00	0.	*	1	2350	287	.00	.00	.00	0.
1	1125	138	.00	.00	.00	0.	*	1	2355	288	.00	.00	.00	0.
1	1130	139	.00	.00	.00	0.	*	2	0000	289	.00	.00	.00	0.
1	1135	140	.00	.00	.00	0.	*	2	0005	290	.00	.00	.00	0.
1	1140	141	.00	.00	.00	0.	*	2	0010	291	.00	.00	.00	0.
1	1145	142	.00	.00	.00	0.	*	2	0015	292	.00	.00	.00	0.
1	1150	143	.00	.00	.00	0.	*	2	0020	293	.00	.00	.00	0.
1	1155	144	.00	.00	.00	0.	*	2	0025	294	.00	.00	.00	0.
1	1200	145	.00	.00	.00	0.	*	2	0030	295	.00	.00	.00	0.
1	1205	146	.00	.00	.00	0.	*	2	0035	296	.00	.00	.00	0.
1	1210	147	.00	.00	.00	0.	*	2	0040	297	.00	.00	.00	0.
1	1215	148	.00	.00	.00	0.	*	2	0045	298	.00	.00	.00	0.
1	1220	149	.00	.00	.00	0.	*	2	0050	299	.00	.00	.00	0.
1	1225	150	.00	.00	.00	0.	*	2	0055	300	.00	.00	.00	0.

TOTAL RAINFALL = 4.54, TOTAL LOSS = .89, TOTAL EXCESS = 3.65

PEAK FLOW + (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ 476.	3.58	84.	21.	20.	20.
	(INCHES)	3.637	3.649	3.649	3.649
	(AC-FT)	42.	42.	42.	42.

CUMULATIVE AREA = .21 SQ MI

WARNING *** TIME INTERVAL IS GREATER THAN .29*LAG

HYDROGRAPH AT STATION MW
PLAN 1, RATIO = .85

DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP	Q	DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP	Q
1	0000	1	.00	.00	.00	0.	*	1	1230	151	.00	.00	.00	0.			
1	0005	2	.08	.02	.05	5.	*	1	1235	152	.00	.00	.00	0.			
1	0010	3	.14	.04	.10	27.	*	1	1240	153	.00	.00	.00	0.			
1	0015	4	.05	.02	.04	57.	*	1	1245	154	.00	.00	.00	0.			
1	0020	5	.07	.02	.05	76.	*	1	1250	155	.00	.00	.00	0.			
1	0025	6	.08	.02	.06	81.	*	1	1255	156	.00	.00	.00	0.			
1	0030	7	.06	.02	.04	81.	*	1	1300	157	.00	.00	.00	0.			
1	0035	8	.02	.01	.02	78.	*	1	1305	158	.00	.00	.00	0.			
1	0040	9	.00	.00	.00	66.	*	1	1310	159	.00	.00	.00	0.			
1	0045	10	.00	.00	.00	47.	*	1	1315	160	.00	.00	.00	0.			
1	0050	11	.00	.00	.00	29.	*	1	1320	161	.00	.00	.00	0.			
1	0055	12	.00	.00	.00	17.	*	1	1325	162	.00	.00	.00	0.			
1	0100	13	.00	.00	.00	10.	*	1	1330	163	.00	.00	.00	0.			
1	0105	14	.01	.00	.01	7.	*	1	1335	164	.00	.00	.00	0.			
1	0110	15	.03	.01	.02	8.	*	1	1340	165	.00	.00	.00	0.			
1	0115	16	.01	.00	.01	12.	*	1	1345	166	.00	.00	.00	0.			
1	0120	17	.02	.01	.02	15.	*	1	1350	167	.00	.00	.00	0.			
1	0125	18	.04	.01	.03	19.	*	1	1355	168	.00	.00	.00	0.			
1	0130	19	.05	.02	.04	26.	*	1	1400	169	.00	.00	.00	0.			
1	0135	20	.04	.01	.02	35.	*	1	1405	170	.00	.00	.00	0.			
1	0140	21	.04	.01	.02	41.	*	1	1410	171	.00	.00	.00	0.			
1	0145	22	.03	.01	.02	42.	*	1	1415	172	.00	.00	.00	0.			
1	0150	23	.01	.00	.01	38.	*	1	1420	173	.00	.00	.00	0.			
1	0155	24	.00	.00	.00	31.	*	1	1425	174	.00	.00	.00	0.			
1	0200	25	.00	.00	.00	22.	*	1	1430	175	.00	.00	.00	0.			
1	0205	26	.01	.00	.01	16.	*	1	1435	176	.00	.00	.00	0.			
1	0210	27	.04	.01	.03	15.	*	1	1440	177	.00	.00	.00	0.			
1	0215	28	.06	.02	.04	22.	*	1	1445	178	.00	.00	.00	0.			
1	0220	29	.05	.01	.03	33.	*	1	1450	179	.00	.00	.00	0.			
1	0225	30	.03	.01	.02	42.	*	1	1455	180	.00	.00	.00	0.			
1	0230	31	.01	.00	.01	43.	*	1	1500	181	.00	.00	.00	0.			
1	0235	32	.02	.01	.01	36.	*	1	1505	182	.00	.00	.00	0.			
1	0240	33	.05	.02	.04	32.	*	1	1510	183	.00	.00	.00	0.			
1	0245	34	.03	.01	.02	35.	*	1	1515	184	.00	.00	.00	0.			
1	0250	35	.01	.00	.01	37.	*	1	1520	185	.00	.00	.00	0.			
1	0255	36	.01	.00	.01	34.	*	1	1525	186	.00	.00	.00	0.			
1	0300	37	.05	.01	.03	29.	*	1	1530	187	.00	.00	.00	0.			
1	0305	38	.11	.03	.08	35.	*	1	1535	188	.00	.00	.00	0.			
1	0310	39	.12	.03	.09	57.	*	1	1540	189	.00	.00	.00	0.			
1	0315	40	.22	.05	.17	93.	*	1	1545	190	.00	.00	.00	0.			
1	0320	41	.35	.08	.27	151.	*	1	1550	191	.00	.00	.00	0.			
1	0325	42	.35	.07	.29	234.	*	1	1555	192	.00	.00	.00	0.			
1	0330	43	.47	.08	.39	328.	*	1	1600	193	.00	.00	.00	0.			
1	0335	44	.13	.02	.11	398.	*	1	1605	194	.00	.00	.00	0.			
1	0340	45	.14	.02	.12	394.	*	1	1610	195	.00	.00	.00	0.			
1	0345	46	.12	.02	.10	339.	*	1	1615	196	.00	.00	.00	0.			
1	0350	47	.03	.00	.02	269.	*	1	1620	197	.00	.00	.00	0.			
1	0355	48	.06	.01	.05	205.	*	1	1625	198	.00	.00	.00	0.			
1	0400	49	.06	.01	.05	156.	*	1	1630	199	.00	.00	.00	0.			
1	0405	50	.02	.00	.02	121.	*	1	1635	200	.00	.00	.00	0.			
1	0410	51	.02	.00	.01	95.	*	1	1640	201	.00	.00	.00	0.			
1	0415	52	.03	.00	.03	71.	*	1	1645	202	.00	.00	.00	0.			
1	0420	53	.03	.00	.03	56.	*	1	1650	203	.00	.00	.00	0.			
1	0425	54	.05	.01	.04	51.	*	1	1655	204	.00	.00	.00	0.			
1	0430	55	.09	.01	.07	56.	*	1	1700	205	.00	.00	.00	0.			
1	0435	56	.06	.01	.05	69.	*	1	1705	206	.00	.00	.00	0.			
1	0440	57	.04	.01	.04	79.	*	1	1710	207	.00	.00	.00	0.			

1	0445	58	.05	.01	.04	81.	*	1	1715	208	.00	.00	.00	0.
1	0450	59	.08	.01	.07	80.	*	1	1720	209	.00	.00	.00	0.
1	0455	60	.02	.00	.02	80.	*	1	1725	210	.00	.00	.00	0.
1	0500	61	.02	.00	.02	75.	*	1	1730	211	.00	.00	.00	0.
1	0505	62	.01	.00	.01	62.	*	1	1735	212	.00	.00	.00	0.
1	0510	63	.01	.00	.01	47.	*	1	1740	213	.00	.00	.00	0.
1	0515	64	.01	.00	.01	34.	*	1	1745	214	.00	.00	.00	0.
1	0520	65	.00	.00	.00	25.	*	1	1750	215	.00	.00	.00	0.
1	0525	66	.01	.00	.01	19.	*	1	1755	216	.00	.00	.00	0.
1	0530	67	.00	.00	.00	15.	*	1	1800	217	.00	.00	.00	0.
1	0535	68	.00	.00	.00	12.	*	1	1805	218	.00	.00	.00	0.
1	0540	69	.00	.00	.00	9.	*	1	1810	219	.00	.00	.00	0.
1	0545	70	.01	.00	.01	8.	*	1	1815	220	.00	.00	.00	0.
1	0550	71	.00	.00	.00	8.	*	1	1820	221	.00	.00	.00	0.
1	0555	72	.00	.00	.00	8.	*	1	1825	222	.00	.00	.00	0.
1	0600	73	.00	.00	.00	7.	*	1	1830	223	.00	.00	.00	0.
1	0605	74	.00	.00	.00	6.	*	1	1835	224	.00	.00	.00	0.
1	0610	75	.00	.00	.00	4.	*	1	1840	225	.00	.00	.00	0.
1	0615	76	.00	.00	.00	3.	*	1	1845	226	.00	.00	.00	0.
1	0620	77	.00	.00	.00	2.	*	1	1850	227	.00	.00	.00	0.
1	0625	78	.00	.00	.00	1.	*	1	1855	228	.00	.00	.00	0.
1	0630	79	.00	.00	.00	1.	*	1	1900	229	.00	.00	.00	0.
1	0635	80	.00	.00	.00	0.	*	1	1905	230	.00	.00	.00	0.
1	0640	81	.00	.00	.00	0.	*	1	1910	231	.00	.00	.00	0.
1	0645	82	.00	.00	.00	0.	*	1	1915	232	.00	.00	.00	0.
1	0650	83	.00	.00	.00	0.	*	1	1920	233	.00	.00	.00	0.
1	0655	84	.00	.00	.00	0.	*	1	1925	234	.00	.00	.00	0.
1	0700	85	.00	.00	.00	0.	*	1	1930	235	.00	.00	.00	0.
1	0705	86	.00	.00	.00	0.	*	1	1935	236	.00	.00	.00	0.
1	0710	87	.00	.00	.00	0.	*	1	1940	237	.00	.00	.00	0.
1	0715	88	.00	.00	.00	0.	*	1	1945	238	.00	.00	.00	0.
1	0720	89	.00	.00	.00	0.	*	1	1950	239	.00	.00	.00	0.
1	0725	90	.00	.00	.00	0.	*	1	1955	240	.00	.00	.00	0.
1	0730	91	.00	.00	.00	0.	*	1	2000	241	.00	.00	.00	0.
1	0735	92	.00	.00	.00	0.	*	1	2005	242	.00	.00	.00	0.
1	0740	93	.00	.00	.00	0.	*	1	2010	243	.00	.00	.00	0.
1	0745	94	.00	.00	.00	0.	*	1	2015	244	.00	.00	.00	0.
1	0750	95	.00	.00	.00	0.	*	1	2020	245	.00	.00	.00	0.
1	0755	96	.00	.00	.00	0.	*	1	2025	246	.00	.00	.00	0.
1	0800	97	.00	.00	.00	0.	*	1	2030	247	.00	.00	.00	0.
1	0805	98	.00	.00	.00	0.	*	1	2035	248	.00	.00	.00	0.
1	0810	99	.00	.00	.00	0.	*	1	2040	249	.00	.00	.00	0.
1	0815	100	.00	.00	.00	0.	*	1	2045	250	.00	.00	.00	0.
1	0820	101	.00	.00	.00	0.	*	1	2050	251	.00	.00	.00	0.
1	0825	102	.00	.00	.00	0.	*	1	2055	252	.00	.00	.00	0.
1	0830	103	.00	.00	.00	0.	*	1	2100	253	.00	.00	.00	0.
1	0835	104	.00	.00	.00	0.	*	1	2105	254	.00	.00	.00	0.
1	0840	105	.00	.00	.00	0.	*	1	2110	255	.00	.00	.00	0.
1	0845	106	.00	.00	.00	0.	*	1	2115	256	.00	.00	.00	0.
1	0850	107	.00	.00	.00	0.	*	1	2120	257	.00	.00	.00	0.
1	0855	108	.00	.00	.00	0.	*	1	2125	258	.00	.00	.00	0.
1	0900	109	.00	.00	.00	0.	*	1	2130	259	.00	.00	.00	0.
1	0905	110	.00	.00	.00	0.	*	1	2135	260	.00	.00	.00	0.
1	0910	111	.00	.00	.00	0.	*	1	2140	261	.00	.00	.00	0.
1	0915	112	.00	.00	.00	0.	*	1	2145	262	.00	.00	.00	0.
1	0920	113	.00	.00	.00	0.	*	1	2150	263	.00	.00	.00	0.
1	0925	114	.00	.00	.00	0.	*	1	2155	264	.00	.00	.00	0.
1	0930	115	.00	.00	.00	0.	*	1	2200	265	.00	.00	.00	0.
1	0935	116	.00	.00	.00	0.	*	1	2205	266	.00	.00	.00	0.
1	0940	117	.00	.00	.00	0.	*	1	2210	267	.00	.00	.00	0.
1	0945	118	.00	.00	.00	0.	*	1	2215	268	.00	.00	.00	0.
1	0950	119	.00	.00	.00	0.	*	1	2220	269	.00	.00	.00	0.
1	0955	120	.00	.00	.00	0.	*	1	2225	270	.00	.00	.00	0.
1	1000	121	.00	.00	.00	0.	*	1	2230	271	.00	.00	.00	0.
1	1005	122	.00	.00	.00	0.	*	1	2235	272	.00	.00	.00	0.

1	1010	123	.00	.00	.00	0.	*	1	2240	273	.00	.00	.00	0.
1	1015	124	.00	.00	.00	0.	*	1	2245	274	.00	.00	.00	0.
1	1020	125	.00	.00	.00	0.	*	1	2250	275	.00	.00	.00	0.
1	1025	126	.00	.00	.00	0.	*	1	2255	276	.00	.00	.00	0.
1	1030	127	.00	.00	.00	0.	*	1	2300	277	.00	.00	.00	0.
1	1035	128	.00	.00	.00	0.	*	1	2305	278	.00	.00	.00	0.
1	1040	129	.00	.00	.00	0.	*	1	2310	279	.00	.00	.00	0.
1	1045	130	.00	.00	.00	0.	*	1	2315	280	.00	.00	.00	0.
1	1050	131	.00	.00	.00	0.	*	1	2320	281	.00	.00	.00	0.
1	1055	132	.00	.00	.00	0.	*	1	2325	282	.00	.00	.00	0.
1	1100	133	.00	.00	.00	0.	*	1	2330	283	.00	.00	.00	0.
1	1105	134	.00	.00	.00	0.	*	1	2335	284	.00	.00	.00	0.
1	1110	135	.00	.00	.00	0.	*	1	2340	285	.00	.00	.00	0.
1	1115	136	.00	.00	.00	0.	*	1	2345	286	.00	.00	.00	0.
1	1120	137	.00	.00	.00	0.	*	1	2350	287	.00	.00	.00	0.
1	1125	138	.00	.00	.00	0.	*	1	2355	288	.00	.00	.00	0.
1	1130	139	.00	.00	.00	0.	*	2	0000	289	.00	.00	.00	0.
1	1135	140	.00	.00	.00	0.	*	2	0005	290	.00	.00	.00	0.
1	1140	141	.00	.00	.00	0.	*	2	0010	291	.00	.00	.00	0.
1	1145	142	.00	.00	.00	0.	*	2	0015	292	.00	.00	.00	0.
1	1150	143	.00	.00	.00	0.	*	2	0020	293	.00	.00	.00	0.
1	1155	144	.00	.00	.00	0.	*	2	0025	294	.00	.00	.00	0.
1	1200	145	.00	.00	.00	0.	*	2	0030	295	.00	.00	.00	0.
1	1205	146	.00	.00	.00	0.	*	2	0035	296	.00	.00	.00	0.
1	1210	147	.00	.00	.00	0.	*	2	0040	297	.00	.00	.00	0.
1	1215	148	.00	.00	.00	0.	*	2	0045	298	.00	.00	.00	0.
1	1220	149	.00	.00	.00	0.	*	2	0050	299	.00	.00	.00	0.
1	1225	150	.00	.00	.00	0.	*	2	0055	300	.00	.00	.00	0.

TOTAL RAINFALL = 3.90, TOTAL LOSS = .83, TOTAL EXCESS = 3.07

PEAK FLOW + (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
398.	3.58	70.	18.	17.	17.
(INCHES)		3.060	3.071	3.071	3.071
(AC-FT)		35.	35.	35.	35.

CUMULATIVE AREA = .21 SQ MI

WARNING *** TIME INTERVAL IS GREATER THAN .29*LAG

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*****
HYDROGRAPH AT STATION    MW
PLAN 1.  RATIO =   .70
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DA MON HRMN ORD RAIN LOSS EXCESS COMP Q *									DA MON HRMN ORD RAIN LOSS EXCESS COMP Q					
1	0000	1	.00	.00	.00	0.	*	1	1230	151	.00	.00	.00	0.
1	0005	2	.06	.02	.04	4.	*	1	1235	152	.00	.00	.00	0.
1	0010	3	.12	.04	.08	22.	*	1	1240	153	.00	.00	.00	0.
1	0015	4	.04	.01	.03	47.	*	1	1245	154	.00	.00	.00	0.
1	0020	5	.05	.02	.04	62.	*	1	1250	155	.00	.00	.00	0.
1	0025	6	.07	.02	.05	66.	*	1	1255	156	.00	.00	.00	0.
1	0030	7	.05	.02	.04	66.	*	1	1300	157	.00	.00	.00	0.
1	0035	8	.02	.01	.01	64.	*	1	1305	158	.00	.00	.00	0.
1	0040	9	.00	.00	.00	54.	*	1	1310	159	.00	.00	.00	0.
1	0045	10	.00	.00	.00	39.	*	1	1315	160	.00	.00	.00	0.
1	0050	11	.00	.00	.00	24.	*	1	1320	161	.00	.00	.00	0.
1	0055	12	.00	.00	.00	14.	*	1	1325	162	.00	.00	.00	0.
1	0100	13	.00	.00	.00	8.	*	1	1330	163	.00	.00	.00	0.
1	0105	14	.01	.00	.01	5.	*	1	1335	164	.00	.00	.00	0.
1	0110	15	.02	.01	.02	6.	*	1	1340	165	.00	.00	.00	0.
1	0115	16	.01	.00	.00	10.	*	1	1345	166	.00	.00	.00	0.
1	0120	17	.02	.01	.01	12.	*	1	1350	167	.00	.00	.00	0.
1	0125	18	.03	.01	.02	15.	*	1	1355	168	.00	.00	.00	0.
1	0130	19	.04	.01	.03	21.	*	1	1400	169	.00	.00	.00	0.
1	0135	20	.03	.01	.02	29.	*	1	1405	170	.00	.00	.00	0.
1	0140	21	.03	.01	.02	34.	*	1	1410	171	.00	.00	.00	0.
1	0145	22	.02	.01	.02	34.	*	1	1415	172	.00	.00	.00	0.
1	0150	23	.01	.00	.00	31.	*	1	1420	173	.00	.00	.00	0.
1	0155	24	.00	.00	.00	25.	*	1	1425	174	.00	.00	.00	0.
1	0200	25	.00	.00	.00	18.	*	1	1430	175	.00	.00	.00	0.
1	0205	26	.01	.00	.01	13.	*	1	1435	176	.00	.00	.00	0.
1	0210	27	.03	.01	.02	12.	*	1	1440	177	.00	.00	.00	0.
1	0215	28	.05	.01	.03	18.	*	1	1445	178	.00	.00	.00	0.
1	0220	29	.04	.01	.03	27.	*	1	1450	179	.00	.00	.00	0.
1	0225	30	.03	.01	.02	35.	*	1	1455	180	.00	.00	.00	0.
1	0230	31	.01	.00	.00	35.	*	1	1500	181	.00	.00	.00	0.
1	0235	32	.02	.00	.01	30.	*	1	1505	182	.00	.00	.00	0.
1	0240	33	.04	.01	.03	26.	*	1	1510	183	.00	.00	.00	0.
1	0245	34	.03	.01	.02	28.	*	1	1515	184	.00	.00	.00	0.
1	0250	35	.01	.00	.01	30.	*	1	1520	185	.00	.00	.00	0.
1	0255	36	.01	.00	.00	27.	*	1	1525	186	.00	.00	.00	0.
1	0300	37	.04	.01	.03	23.	*	1	1530	187	.00	.00	.00	0.
1	0305	38	.09	.03	.06	28.	*	1	1535	188	.00	.00	.00	0.
1	0310	39	.10	.03	.07	45.	*	1	1540	189	.00	.00	.00	0.
1	0315	40	.18	.05	.13	73.	*	1	1545	190	.00	.00	.00	0.
1	0320	41	.29	.07	.22	120.	*	1	1550	191	.00	.00	.00	0.
1	0325	42	.29	.06	.23	186.	*	1	1555	192	.00	.00	.00	0.
1	0330	43	.38	.07	.31	260.	*	1	1600	193	.00	.00	.00	0.
1	0335	44	.11	.02	.09	316.	*	1	1605	194	.00	.00	.00	0.
1	0340	45	.12	.02	.10	312.	*	1	1610	195	.00	.00	.00	0.
1	0345	46	.10	.02	.08	269.	*	1	1615	196	.00	.00	.00	0.
1	0350	47	.02	.00	.02	213.	*	1	1620	197	.00	.00	.00	0.
1	0355	48	.05	.01	.04	162.	*	1	1625	198	.00	.00	.00	0.
1	0400	49	.05	.01	.04	124.	*	1	1630	199	.00	.00	.00	0.
1	0405	50	.02	.00	.01	97.	*	1	1635	200	.00	.00	.00	0.
1	0410	51	.01	.00	.01	75.	*	1	1640	201	.00	.00	.00	0.
1	0415	52	.03	.00	.02	57.	*	1	1645	202	.00	.00	.00	0.
1	0420	53	.03	.00	.02	45.	*	1	1650	203	.00	.00	.00	0.
1	0425	54	.04	.01	.03	41.	*	1	1655	204	.00	.00	.00	0.
1	0430	55	.07	.01	.06	45.	*	1	1700	205	.00	.00	.00	0.
1	0435	56	.05	.01	.04	55.	*	1	1705	206	.00	.00	.00	0.

1	0440	57	.04	.01	.03	63.	*	1	1710	207	.00	.00	.00	0.
1	0445	58	.04	.01	.04	64.	*	1	1715	208	.00	.00	.00	0.
1	0450	59	.06	.01	.05	64.	*	1	1720	209	.00	.00	.00	0.
1	0455	60	.02	.00	.02	64.	*	1	1725	210	.00	.00	.00	0.
1	0500	61	.02	.00	.02	60.	*	1	1730	211	.00	.00	.00	0.
1	0505	62	.01	.00	.01	50.	*	1	1735	212	.00	.00	.00	0.
1	0510	63	.01	.00	.01	37.	*	1	1740	213	.00	.00	.00	0.
1	0515	64	.01	.00	.01	27.	*	1	1745	214	.00	.00	.00	0.
1	0520	65	.00	.00	.00	20.	*	1	1750	215	.00	.00	.00	0.
1	0525	66	.01	.00	.01	15.	*	1	1755	216	.00	.00	.00	0.
1	0530	67	.00	.00	.00	12.	*	1	1800	217	.00	.00	.00	0.
1	0535	68	.00	.00	.00	9.	*	1	1805	218	.00	.00	.00	0.
1	0540	69	.00	.00	.00	7.	*	1	1810	219	.00	.00	.00	0.
1	0545	70	.01	.00	.01	6.	*	1	1815	220	.00	.00	.00	0.
1	0550	71	.00	.00	.00	7.	*	1	1820	221	.00	.00	.00	0.
1	0555	72	.00	.00	.00	6.	*	1	1825	222	.00	.00	.00	0.
1	0600	73	.00	.00	.00	6.	*	1	1830	223	.00	.00	.00	0.
1	0605	74	.00	.00	.00	5.	*	1	1835	224	.00	.00	.00	0.
1	0610	75	.00	.00	.00	4.	*	1	1840	225	.00	.00	.00	0.
1	0615	76	.00	.00	.00	2.	*	1	1845	226	.00	.00	.00	0.
1	0620	77	.00	.00	.00	1.	*	1	1850	227	.00	.00	.00	0.
1	0625	78	.00	.00	.00	1.	*	1	1855	228	.00	.00	.00	0.
1	0630	79	.00	.00	.00	0.	*	1	1900	229	.00	.00	.00	0.
1	0635	80	.00	.00	.00	0.	*	1	1905	230	.00	.00	.00	0.
1	0640	81	.00	.00	.00	0.	*	1	1910	231	.00	.00	.00	0.
1	0645	82	.00	.00	.00	0.	*	1	1915	232	.00	.00	.00	0.
1	0650	83	.00	.00	.00	0.	*	1	1920	233	.00	.00	.00	0.
1	0655	84	.00	.00	.00	0.	*	1	1925	234	.00	.00	.00	0.
1	0700	85	.00	.00	.00	0.	*	1	1930	235	.00	.00	.00	0.
1	0705	86	.00	.00	.00	0.	*	1	1935	236	.00	.00	.00	0.
1	0710	87	.00	.00	.00	0.	*	1	1940	237	.00	.00	.00	0.
1	0715	88	.00	.00	.00	0.	*	1	1945	238	.00	.00	.00	0.
1	0720	89	.00	.00	.00	0.	*	1	1950	239	.00	.00	.00	0.
1	0725	90	.00	.00	.00	0.	*	1	1955	240	.00	.00	.00	0.
1	0730	91	.00	.00	.00	0.	*	1	2000	241	.00	.00	.00	0.
1	0735	92	.00	.00	.00	0.	*	1	2005	242	.00	.00	.00	0.
1	0740	93	.00	.00	.00	0.	*	1	2010	243	.00	.00	.00	0.
1	0745	94	.00	.00	.00	0.	*	1	2015	244	.00	.00	.00	0.
1	0750	95	.00	.00	.00	0.	*	1	2020	245	.00	.00	.00	0.
1	0755	96	.00	.00	.00	0.	*	1	2025	246	.00	.00	.00	0.
1	0800	97	.00	.00	.00	0.	*	1	2030	247	.00	.00	.00	0.
1	0805	98	.00	.00	.00	0.	*	1	2035	248	.00	.00	.00	0.
1	0810	99	.00	.00	.00	0.	*	1	2040	249	.00	.00	.00	0.
1	0815	100	.00	.00	.00	0.	*	1	2045	250	.00	.00	.00	0.
1	0820	101	.00	.00	.00	0.	*	1	2050	251	.00	.00	.00	0.
1	0825	102	.00	.00	.00	0.	*	1	2055	252	.00	.00	.00	0.
1	0830	103	.00	.00	.00	0.	*	1	2100	253	.00	.00	.00	0.
1	0835	104	.00	.00	.00	0.	*	1	2105	254	.00	.00	.00	0.
1	0840	105	.00	.00	.00	0.	*	1	2110	255	.00	.00	.00	0.
1	0845	106	.00	.00	.00	0.	*	1	2115	256	.00	.00	.00	0.
1	0850	107	.00	.00	.00	0.	*	1	2120	257	.00	.00	.00	0.
1	0855	108	.00	.00	.00	0.	*	1	2125	258	.00	.00	.00	0.
1	0900	109	.00	.00	.00	0.	*	1	2130	259	.00	.00	.00	0.
1	0905	110	.00	.00	.00	0.	*	1	2135	260	.00	.00	.00	0.
1	0910	111	.00	.00	.00	0.	*	1	2140	261	.00	.00	.00	0.
1	0915	112	.00	.00	.00	0.	*	1	2145	262	.00	.00	.00	0.
1	0920	113	.00	.00	.00	0.	*	1	2150	263	.00	.00	.00	0.
1	0925	114	.00	.00	.00	0.	*	1	2155	264	.00	.00	.00	0.
1	0930	115	.00	.00	.00	0.	*	1	2200	265	.00	.00	.00	0.
1	0935	116	.00	.00	.00	0.	*	1	2205	266	.00	.00	.00	0.
1	0940	117	.00	.00	.00	0.	*	1	2210	267	.00	.00	.00	0.
1	0945	118	.00	.00	.00	0.	*	1	2215	268	.00	.00	.00	0.
1	0950	119	.00	.00	.00	0.	*	1	2220	269	.00	.00	.00	0.
1	0955	120	.00	.00	.00	0.	*	1	2225	270	.00	.00	.00	0.
1	1000	121	.00	.00	.00	0.	*	1	2230	271	.00	.00	.00	0.

1	1005	122	.00	.00	.00	0.	*	1	2235	272	.00	.00	.00	0.
1	1010	123	.00	.00	.00	0.	*	1	2240	273	.00	.00	.00	0.
1	1015	124	.00	.00	.00	0.	*	1	2245	274	.00	.00	.00	0.
1	1020	125	.00	.00	.00	0.	*	1	2250	275	.00	.00	.00	0.
1	1025	126	.00	.00	.00	0.	*	1	2255	276	.00	.00	.00	0.
1	1030	127	.00	.00	.00	0.	*	1	2300	277	.00	.00	.00	0.
1	1035	128	.00	.00	.00	0.	*	1	2305	278	.00	.00	.00	0.
1	1040	129	.00	.00	.00	0.	*	1	2310	279	.00	.00	.00	0.
1	1045	130	.00	.00	.00	0.	*	1	2315	280	.00	.00	.00	0.
1	1050	131	.00	.00	.00	0.	*	1	2320	281	.00	.00	.00	0.
1	1055	132	.00	.00	.00	0.	*	1	2325	282	.00	.00	.00	0.
1	1100	133	.00	.00	.00	0.	*	1	2330	283	.00	.00	.00	0.
1	1105	134	.00	.00	.00	0.	*	1	2335	284	.00	.00	.00	0.
1	1110	135	.00	.00	.00	0.	*	1	2340	285	.00	.00	.00	0.
1	1115	136	.00	.00	.00	0.	*	1	2345	286	.00	.00	.00	0.
1	1120	137	.00	.00	.00	0.	*	1	2350	287	.00	.00	.00	0.
1	1125	138	.00	.00	.00	0.	*	1	2355	288	.00	.00	.00	0.
1	1130	139	.00	.00	.00	0.	*	2	0000	289	.00	.00	.00	0.
1	1135	140	.00	.00	.00	0.	*	2	0005	290	.00	.00	.00	0.
1	1140	141	.00	.00	.00	0.	*	2	0010	291	.00	.00	.00	0.
1	1145	142	.00	.00	.00	0.	*	2	0015	292	.00	.00	.00	0.
1	1150	143	.00	.00	.00	0.	*	2	0020	293	.00	.00	.00	0.
1	1155	144	.00	.00	.00	0.	*	2	0025	294	.00	.00	.00	0.
1	1200	145	.00	.00	.00	0.	*	2	0030	295	.00	.00	.00	0.
1	1205	146	.00	.00	.00	0.	*	2	0035	296	.00	.00	.00	0.
1	1210	147	.00	.00	.00	0.	*	2	0040	297	.00	.00	.00	0.
1	1215	148	.00	.00	.00	0.	*	2	0045	298	.00	.00	.00	0.
1	1220	149	.00	.00	.00	0.	*	2	0050	299	.00	.00	.00	0.
1	1225	150	.00	.00	.00	0.	*	2	0055	300	.00	.00	.00	0.

TOTAL RAINFALL = 3.20, TOTAL LOSS = .74, TOTAL EXCESS = 2.46

PEAK FLOW + (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ 316.	3.58	56.	14.	14.	14.
	(INCHES)	2.449	2.457	2.457	2.457
	(AC-FT)	28.	28.	28.	28.

CUMULATIVE AREA = .21 SQ MI

WARNING *** TIME INTERVAL IS GREATER THAN .29*LAG

HYDROGRAPH AT STATION MW
PLAN 1, RATIO = .52

DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
1	0000	1	.00	.00	.00	0.	*	1	1230	151	.00	.00	.00	0.	
1	0005	2	.05	.01	.03	3.	*	1	1235	152	.00	.00	.00	0.	
1	0010	3	.09	.03	.06	16.	*	1	1240	153	.00	.00	.00	0.	
1	0015	4	.03	.01	.02	35.	*	1	1245	154	.00	.00	.00	0.	
1	0020	5	.04	.01	.03	46.	*	1	1250	155	.00	.00	.00	0.	
1	0025	6	.05	.01	.03	49.	*	1	1255	156	.00	.00	.00	0.	
1	0030	7	.04	.01	.03	49.	*	1	1300	157	.00	.00	.00	0.	
1	0035	8	.01	.00	.01	47.	*	1	1305	158	.00	.00	.00	0.	
1	0040	9	.00	.00	.00	40.	*	1	1310	159	.00	.00	.00	0.	
1	0045	10	.00	.00	.00	29.	*	1	1315	160	.00	.00	.00	0.	
1	0050	11	.00	.00	.00	18.	*	1	1320	161	.00	.00	.00	0.	
1	0055	12	.00	.00	.00	10.	*	1	1325	162	.00	.00	.00	0.	
1	0100	13	.00	.00	.00	6.	*	1	1330	163	.00	.00	.00	0.	
1	0105	14	.01	.00	.00	4.	*	1	1335	164	.00	.00	.00	0.	
1	0110	15	.02	.00	.01	5.	*	1	1340	165	.00	.00	.00	0.	
1	0115	16	.00	.00	.00	7.	*	1	1345	166	.00	.00	.00	0.	
1	0120	17	.01	.00	.01	9.	*	1	1350	167	.00	.00	.00	0.	
1	0125	18	.02	.01	.02	11.	*	1	1355	168	.00	.00	.00	0.	
1	0130	19	.03	.01	.02	16.	*	1	1400	169	.00	.00	.00	0.	
1	0135	20	.02	.01	.01	21.	*	1	1405	170	.00	.00	.00	0.	
1	0140	21	.02	.01	.01	25.	*	1	1410	171	.00	.00	.00	0.	
1	0145	22	.02	.00	.01	25.	*	1	1415	172	.00	.00	.00	0.	
1	0150	23	.00	.00	.00	23.	*	1	1420	173	.00	.00	.00	0.	
1	0155	24	.00	.00	.00	19.	*	1	1425	174	.00	.00	.00	0.	
1	0200	25	.00	.00	.00	14.	*	1	1430	175	.00	.00	.00	0.	
1	0205	26	.01	.00	.00	10.	*	1	1435	176	.00	.00	.00	0.	
1	0210	27	.02	.01	.02	9.	*	1	1440	177	.00	.00	.00	0.	
1	0215	28	.04	.01	.02	13.	*	1	1445	178	.00	.00	.00	0.	
1	0220	29	.03	.01	.02	20.	*	1	1450	179	.00	.00	.00	0.	
1	0225	30	.02	.01	.01	26.	*	1	1455	180	.00	.00	.00	0.	
1	0230	31	.00	.00	.00	26.	*	1	1500	181	.00	.00	.00	0.	
1	0235	32	.01	.00	.01	22.	*	1	1505	182	.00	.00	.00	0.	
1	0240	33	.03	.01	.02	19.	*	1	1510	183	.00	.00	.00	0.	
1	0245	34	.02	.01	.01	21.	*	1	1515	184	.00	.00	.00	0.	
1	0250	35	.01	.00	.00	22.	*	1	1520	185	.00	.00	.00	0.	
1	0255	36	.00	.00	.00	20.	*	1	1525	186	.00	.00	.00	0.	
1	0300	37	.03	.01	.02	17.	*	1	1530	187	.00	.00	.00	0.	
1	0305	38	.06	.02	.04	21.	*	1	1535	188	.00	.00	.00	0.	
1	0310	39	.07	.02	.05	33.	*	1	1540	189	.00	.00	.00	0.	
1	0315	40	.13	.04	.09	53.	*	1	1545	190	.00	.00	.00	0.	
1	0320	41	.21	.06	.15	86.	*	1	1550	191	.00	.00	.00	0.	
1	0325	42	.22	.06	.16	131.	*	1	1555	192	.00	.00	.00	0.	
1	0330	43	.28	.07	.22	183.	*	1	1600	193	.00	.00	.00	0.	
1	0335	44	.08	.02	.06	222.	*	1	1605	194	.00	.00	.00	0.	
1	0340	45	.09	.02	.07	219.	*	1	1610	195	.00	.00	.00	0.	
1	0345	46	.07	.02	.06	189.	*	1	1615	196	.00	.00	.00	0.	
1	0350	47	.02	.00	.01	150.	*	1	1620	197	.00	.00	.00	0.	
1	0355	48	.04	.01	.03	114.	*	1	1625	198	.00	.00	.00	0.	
1	0400	49	.04	.01	.03	87.	*	1	1630	199	.00	.00	.00	0.	
1	0405	50	.01	.00	.01	68.	*	1	1635	200	.00	.00	.00	0.	
1	0410	51	.01	.00	.01	53.	*	1	1640	201	.00	.00	.00	0.	
1	0415	52	.02	.00	.02	40.	*	1	1645	202	.00	.00	.00	0.	
1	0420	53	.02	.00	.02	31.	*	1	1650	203	.00	.00	.00	0.	
1	0425	54	.03	.01	.02	29.	*	1	1655	204	.00	.00	.00	0.	
1	0430	55	.05	.01	.04	32.	*	1	1700	205	.00	.00	.00	0.	
1	0435	56	.04	.01	.03	39.	*	1	1705	206	.00	.00	.00	0.	

1	0440	57	.03	.00	.02	45.	*	1	1710	207	.00	.00	.00	0.
1	0445	58	.03	.01	.03	45.	*	1	1715	208	.00	.00	.00	0.
1	0450	59	.05	.01	.04	45.	*	1	1720	209	.00	.00	.00	0.
1	0455	60	.01	.00	.01	45.	*	1	1725	210	.00	.00	.00	0.
1	0500	61	.01	.00	.01	42.	*	1	1730	211	.00	.00	.00	0.
1	0505	62	.01	.00	.01	35.	*	1	1735	212	.00	.00	.00	0.
1	0510	63	.00	.00	.00	26.	*	1	1740	213	.00	.00	.00	0.
1	0515	64	.00	.00	.00	19.	*	1	1745	214	.00	.00	.00	0.
1	0520	65	.00	.00	.00	14.	*	1	1750	215	.00	.00	.00	0.
1	0525	66	.01	.00	.01	11.	*	1	1755	216	.00	.00	.00	0.
1	0530	67	.00	.00	.00	9.	*	1	1800	217	.00	.00	.00	0.
1	0535	68	.00	.00	.00	7.	*	1	1805	218	.00	.00	.00	0.
1	0540	69	.00	.00	.00	5.	*	1	1810	219	.00	.00	.00	0.
1	0545	70	.01	.00	.01	5.	*	1	1815	220	.00	.00	.00	0.
1	0550	71	.00	.00	.00	5.	*	1	1820	221	.00	.00	.00	0.
1	0555	72	.00	.00	.00	4.	*	1	1825	222	.00	.00	.00	0.
1	0600	73	.00	.00	.00	4.	*	1	1830	223	.00	.00	.00	0.
1	0605	74	.00	.00	.00	3.	*	1	1835	224	.00	.00	.00	0.
1	0610	75	.00	.00	.00	3.	*	1	1840	225	.00	.00	.00	0.
1	0615	76	.00	.00	.00	2.	*	1	1845	226	.00	.00	.00	0.
1	0620	77	.00	.00	.00	1.	*	1	1850	227	.00	.00	.00	0.
1	0625	78	.00	.00	.00	1.	*	1	1855	228	.00	.00	.00	0.
1	0630	79	.00	.00	.00	0.	*	1	1900	229	.00	.00	.00	0.
1	0635	80	.00	.00	.00	0.	*	1	1905	230	.00	.00	.00	0.
1	0640	81	.00	.00	.00	0.	*	1	1910	231	.00	.00	.00	0.
1	0645	82	.00	.00	.00	0.	*	1	1915	232	.00	.00	.00	0.
1	0650	83	.00	.00	.00	0.	*	1	1920	233	.00	.00	.00	0.
1	0655	84	.00	.00	.00	0.	*	1	1925	234	.00	.00	.00	0.
1	0700	85	.00	.00	.00	0.	*	1	1930	235	.00	.00	.00	0.
1	0705	86	.00	.00	.00	0.	*	1	1935	236	.00	.00	.00	0.
1	0710	87	.00	.00	.00	0.	*	1	1940	237	.00	.00	.00	0.
1	0715	88	.00	.00	.00	0.	*	1	1945	238	.00	.00	.00	0.
1	0720	89	.00	.00	.00	0.	*	1	1950	239	.00	.00	.00	0.
1	0725	90	.00	.00	.00	0.	*	1	1955	240	.00	.00	.00	0.
1	0730	91	.00	.00	.00	0.	*	1	2000	241	.00	.00	.00	0.
1	0735	92	.00	.00	.00	0.	*	1	2005	242	.00	.00	.00	0.
1	0740	93	.00	.00	.00	0.	*	1	2010	243	.00	.00	.00	0.
1	0745	94	.00	.00	.00	0.	*	1	2015	244	.00	.00	.00	0.
1	0750	95	.00	.00	.00	0.	*	1	2020	245	.00	.00	.00	0.
1	0755	96	.00	.00	.00	0.	*	1	2025	246	.00	.00	.00	0.
1	0800	97	.00	.00	.00	0.	*	1	2030	247	.00	.00	.00	0.
1	0805	98	.00	.00	.00	0.	*	1	2035	248	.00	.00	.00	0.
1	0810	99	.00	.00	.00	0.	*	1	2040	249	.00	.00	.00	0.
1	0815	100	.00	.00	.00	0.	*	1	2045	250	.00	.00	.00	0.
1	0820	101	.00	.00	.00	0.	*	1	2050	251	.00	.00	.00	0.
1	0825	102	.00	.00	.00	0.	*	1	2055	252	.00	.00	.00	0.
1	0830	103	.00	.00	.00	0.	*	1	2100	253	.00	.00	.00	0.
1	0835	104	.00	.00	.00	0.	*	1	2105	254	.00	.00	.00	0.
1	0840	105	.00	.00	.00	0.	*	1	2110	255	.00	.00	.00	0.
1	0845	106	.00	.00	.00	0.	*	1	2115	256	.00	.00	.00	0.
1	0850	107	.00	.00	.00	0.	*	1	2120	257	.00	.00	.00	0.
1	0855	108	.00	.00	.00	0.	*	1	2125	258	.00	.00	.00	0.
1	0900	109	.00	.00	.00	0.	*	1	2130	259	.00	.00	.00	0.
1	0905	110	.00	.00	.00	0.	*	1	2135	260	.00	.00	.00	0.
1	0910	111	.00	.00	.00	0.	*	1	2140	261	.00	.00	.00	0.
1	0915	112	.00	.00	.00	0.	*	1	2145	262	.00	.00	.00	0.
1	0920	113	.00	.00	.00	0.	*	1	2150	263	.00	.00	.00	0.
1	0925	114	.00	.00	.00	0.	*	1	2155	264	.00	.00	.00	0.
1	0930	115	.00	.00	.00	0.	*	1	2200	265	.00	.00	.00	0.
1	0935	116	.00	.00	.00	0.	*	1	2205	266	.00	.00	.00	0.
1	0940	117	.00	.00	.00	0.	*	1	2210	267	.00	.00	.00	0.
1	0945	118	.00	.00	.00	0.	*	1	2215	268	.00	.00	.00	0.
1	0950	119	.00	.00	.00	0.	*	1	2220	269	.00	.00	.00	0.
1	0955	120	.00	.00	.00	0.	*	1	2225	270	.00	.00	.00	0.
1	1000	121	.00	.00	.00	0.	*	1	2230	271	.00	.00	.00	0.

1	1005	122	.00	.00	.00	0.	•	1	2235	272	.00	.00	.00	0.
1	1010	123	.00	.00	.00	0.	•	1	2240	273	.00	.00	.00	0.
1	1015	124	.00	.00	.00	0.	•	1	2245	274	.00	.00	.00	0.
1	1020	125	.00	.00	.00	0.	•	1	2250	275	.00	.00	.00	0.
1	1025	126	.00	.00	.00	0.	*	1	2255	276	.00	.00	.00	0.
1	1030	127	.00	.00	.00	0.	*	1	2300	277	.00	.00	.00	0.
1	1035	128	.00	.00	.00	0.	*	1	2305	278	.00	.00	.00	0.
1	1040	129	.00	.00	.00	0.	*	1	2310	279	.00	.00	.00	0.
1	1045	130	.00	.00	.00	0.	•	1	2315	280	.00	.00	.00	0.
1	1050	131	.00	.00	.00	0.	•	1	2320	281	.00	.00	.00	0.
1	1055	132	.00	.00	.00	0.	*	1	2325	282	.00	.00	.00	0.
1	1100	133	.00	.00	.00	0.	•	1	2330	283	.00	.00	.00	0.
1	1105	134	.00	.00	.00	0.	*	1	2335	284	.00	.00	.00	0.
1	1110	135	.00	.00	.00	0.	*	1	2340	285	.00	.00	.00	0.
1	1115	136	.00	.00	.00	0.	•	1	2345	286	.00	.00	.00	0.
1	1120	137	.00	.00	.00	0.	•	1	2350	287	.00	.00	.00	0.
1	1125	138	.00	.00	.00	0.	*	1	2355	288	.00	.00	.00	0.
1	1130	139	.00	.00	.00	0.	*	2	0000	289	.00	.00	.00	0.
1	1135	140	.00	.00	.00	0.	•	2	0005	290	.00	.00	.00	0.
1	1140	141	.00	.00	.00	0.	•	2	0010	291	.00	.00	.00	0.
1	1145	142	.00	.00	.00	0.	*	2	0015	292	.00	.00	.00	0.
1	1150	143	.00	.00	.00	0.	*	2	0020	293	.00	.00	.00	0.
1	1155	144	.00	.00	.00	0.	*	2	0025	294	.00	.00	.00	0.
1	1200	145	.00	.00	.00	0.	*	2	0030	295	.00	.00	.00	0.
1	1205	146	.00	.00	.00	0.	•	2	0035	296	.00	.00	.00	0.
1	1210	147	.00	.00	.00	0.	•	2	0040	297	.00	.00	.00	0.
1	1215	148	.00	.00	.00	0.	*	2	0045	298	.00	.00	.00	0.
1	1220	149	.00	.00	.00	0.	*	2	0050	299	.00	.00	.00	0.
1	1225	150	.00	.00	.00	0.	•	2	0055	300	.00	.00	.00	0.

*

TOTAL RAINFALL = 2.36, TOTAL LOSS = .61, TOTAL EXCESS = 1.75

PEAK FLOW		TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+	(CFS)	(HR)				
+	222.	3.58	40.	10.	10.	10.
		(INCHES)	1.747	1.753	1.753	1.753
		(AC-FT)	20.	20.	20.	20.

CUMULATIVE AREA = .21 SQ MI

WARNING *** TIME INTERVAL IS GREATER THAN .29*LAG

HYDROGRAPH AT STATION MW
PLAN I, RATIO = .41

DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
1	0000	1	.00	.00	.00	0.	*	1	1230	151	.00	.00	.00	0.	
1	0005	2	.04	.01	.03	2.	*	1	1235	152	.00	.00	.00	0.	
1	0010	3	.07	.02	.05	13.	*	1	1240	153	.00	.00	.00	0.	
1	0015	4	.02	.01	.02	27.	*	1	1245	154	.00	.00	.00	0.	
1	0020	5	.03	.01	.02	36.	*	1	1250	155	.00	.00	.00	0.	
1	0025	6	.04	.01	.03	39.	*	1	1255	156	.00	.00	.00	0.	
1	0030	7	.03	.01	.02	39.	*	1	1300	157	.00	.00	.00	0.	
1	0035	8	.01	.00	.01	37.	*	1	1305	158	.00	.00	.00	0.	
1	0040	9	.00	.00	.00	32.	*	1	1310	159	.00	.00	.00	0.	
1	0045	10	.00	.00	.00	23.	*	1	1315	160	.00	.00	.00	0.	
1	0050	11	.00	.00	.00	14.	*	1	1320	161	.00	.00	.00	0.	
1	0055	12	.00	.00	.00	8.	*	1	1325	162	.00	.00	.00	0.	
1	0100	13	.00	.00	.00	5.	*	1	1330	163	.00	.00	.00	0.	
1	0105	14	.01	.00	.00	3.	*	1	1335	164	.00	.00	.00	0.	
1	0110	15	.01	.00	.01	4.	*	1	1340	165	.00	.00	.00	0.	
1	0115	16	.00	.00	.00	6.	*	1	1345	166	.00	.00	.00	0.	
1	0120	17	.01	.00	.01	7.	*	1	1350	167	.00	.00	.00	0.	
1	0125	18	.02	.01	.01	9.	*	1	1355	168	.00	.00	.00	0.	
1	0130	19	.03	.01	.02	12.	*	1	1400	169	.00	.00	.00	0.	
1	0135	20	.02	.01	.01	17.	*	1	1405	170	.00	.00	.00	0.	
1	0140	21	.02	.01	.01	20.	*	1	1410	171	.00	.00	.00	0.	
1	0145	22	.01	.00	.01	20.	*	1	1415	172	.00	.00	.00	0.	
1	0150	23	.00	.00	.00	18.	*	1	1420	173	.00	.00	.00	0.	
1	0155	24	.00	.00	.00	15.	*	1	1425	174	.00	.00	.00	0.	
1	0200	25	.00	.00	.00	11.	*	1	1430	175	.00	.00	.00	0.	
1	0205	26	.01	.00	.00	8.	*	1	1435	176	.00	.00	.00	0.	
1	0210	27	.02	.01	.01	7.	*	1	1440	177	.00	.00	.00	0.	
1	0215	28	.03	.01	.02	10.	*	1	1445	178	.00	.00	.00	0.	
1	0220	29	.02	.01	.02	16.	*	1	1450	179	.00	.00	.00	0.	
1	0225	30	.01	.00	.01	20.	*	1	1455	180	.00	.00	.00	0.	
1	0230	31	.00	.00	.00	20.	*	1	1500	181	.00	.00	.00	0.	
1	0235	32	.01	.00	.01	17.	*	1	1505	182	.00	.00	.00	0.	
1	0240	33	.03	.01	.02	15.	*	1	1510	183	.00	.00	.00	0.	
1	0245	34	.01	.00	.01	16.	*	1	1515	184	.00	.00	.00	0.	
1	0250	35	.01	.00	.00	17.	*	1	1520	185	.00	.00	.00	0.	
1	0255	36	.00	.00	.00	16.	*	1	1525	186	.00	.00	.00	0.	
1	0300	37	.02	.01	.02	13.	*	1	1530	187	.00	.00	.00	0.	
1	0305	38	.05	.02	.04	16.	*	1	1535	188	.00	.00	.00	0.	
1	0310	39	.06	.02	.04	26.	*	1	1540	189	.00	.00	.00	0.	
1	0315	40	.11	.03	.07	42.	*	1	1545	190	.00	.00	.00	0.	
1	0320	41	.17	.05	.12	67.	*	1	1550	191	.00	.00	.00	0.	
1	0325	42	.17	.05	.12	102.	*	1	1555	192	.00	.00	.00	0.	
1	0330	43	.22	.06	.16	141.	*	1	1600	193	.00	.00	.00	0.	
1	0335	44	.06	.02	.05	169.	*	1	1605	194	.00	.00	.00	0.	
1	0340	45	.07	.02	.05	166.	*	1	1610	195	.00	.00	.00	0.	
1	0345	46	.06	.01	.04	143.	*	1	1615	196	.00	.00	.00	0.	
1	0350	47	.01	.00	.01	113.	*	1	1620	197	.00	.00	.00	0.	
1	0355	48	.03	.01	.02	86.	*	1	1625	198	.00	.00	.00	0.	
1	0400	49	.03	.01	.02	66.	*	1	1630	199	.00	.00	.00	0.	
1	0405	50	.01	.00	.01	51.	*	1	1635	200	.00	.00	.00	0.	
1	0410	51	.01	.00	.01	40.	*	1	1640	201	.00	.00	.00	0.	
1	0415	52	.01	.00	.01	30.	*	1	1645	202	.00	.00	.00	0.	
1	0420	53	.01	.00	.01	24.	*	1	1650	203	.00	.00	.00	0.	
1	0425	54	.02	.01	.02	22.	*	1	1655	204	.00	.00	.00	0.	
1	0430	55	.04	.01	.03	24.	*	1	1700	205	.00	.00	.00	0.	
1	0435	56	.03	.01	.02	29.	*	1	1705	206	.00	.00	.00	0.	
1	0440	57	.02	.00	.02	34.	*	1	1710	207	.00	.00	.00	0.	

1	0445	58	.02	.01	.02	34.	*	1	1715	208	.00	.00	.00	0.
1	0450	59	.04	.01	.03	34.	*	1	1720	209	.00	.00	.00	0.
1	0455	60	.01	.00	.01	34.	*	1	1725	210	.00	.00	.00	0.
1	0500	61	.01	.00	.01	32.	*	1	1730	211	.00	.00	.00	0.
1	0505	62	.01	.00	.00	26.	*	1	1735	212	.00	.00	.00	0.
1	0510	63	.00	.00	.00	20.	*	1	1740	213	.00	.00	.00	0.
1	0515	64	.00	.00	.00	15.	*	1	1745	214	.00	.00	.00	0.
1	0520	65	.00	.00	.00	11.	*	1	1750	215	.00	.00	.00	0.
1	0525	66	.01	.00	.00	8.	*	1	1755	216	.00	.00	.00	0.
1	0530	67	.00	.00	.00	6.	*	1	1800	217	.00	.00	.00	0.
1	0535	68	.00	.00	.00	5.	*	1	1805	218	.00	.00	.00	0.
1	0540	69	.00	.00	.00	4.	*	1	1810	219	.00	.00	.00	0.
1	0545	70	.01	.00	.00	3.	*	1	1815	220	.00	.00	.00	0.
1	0550	71	.00	.00	.00	4.	*	1	1820	221	.00	.00	.00	0.
1	0555	72	.00	.00	.00	3.	*	1	1825	222	.00	.00	.00	0.
1	0600	73	.00	.00	.00	3.	*	1	1830	223	.00	.00	.00	0.
1	0605	74	.00	.00	.00	2.	*	1	1835	224	.00	.00	.00	0.
1	0610	75	.00	.00	.00	2.	*	1	1840	225	.00	.00	.00	0.
1	0615	76	.00	.00	.00	1.	*	1	1845	226	.00	.00	.00	0.
1	0620	77	.00	.00	.00	1.	*	1	1850	227	.00	.00	.00	0.
1	0625	78	.00	.00	.00	0.	*	1	1855	228	.00	.00	.00	0.
1	0630	79	.00	.00	.00	0.	*	1	1900	229	.00	.00	.00	0.
1	0635	80	.00	.00	.00	0.	*	1	1905	230	.00	.00	.00	0.
1	0640	81	.00	.00	.00	0.	*	1	1910	231	.00	.00	.00	0.
1	0645	82	.00	.00	.00	0.	*	1	1915	232	.00	.00	.00	0.
1	0650	83	.00	.00	.00	0.	*	1	1920	233	.00	.00	.00	0.
1	0655	84	.00	.00	.00	0.	*	1	1925	234	.00	.00	.00	0.
1	0700	85	.00	.00	.00	0.	*	1	1930	235	.00	.00	.00	0.
1	0705	86	.00	.00	.00	0.	*	1	1935	236	.00	.00	.00	0.
1	0710	87	.00	.00	.00	0.	*	1	1940	237	.00	.00	.00	0.
1	0715	88	.00	.00	.00	0.	*	1	1945	238	.00	.00	.00	0.
1	0720	89	.00	.00	.00	0.	*	1	1950	239	.00	.00	.00	0.
1	0725	90	.00	.00	.00	0.	*	1	1955	240	.00	.00	.00	0.
1	0730	91	.00	.00	.00	0.	*	1	2000	241	.00	.00	.00	0.
1	0735	92	.00	.00	.00	0.	*	1	2005	242	.00	.00	.00	0.
1	0740	93	.00	.00	.00	0.	*	1	2010	243	.00	.00	.00	0.
1	0745	94	.00	.00	.00	0.	*	1	2015	244	.00	.00	.00	0.
1	0750	95	.00	.00	.00	0.	*	1	2020	245	.00	.00	.00	0.
1	0755	96	.00	.00	.00	0.	*	1	2025	246	.00	.00	.00	0.
1	0800	97	.00	.00	.00	0.	*	1	2030	247	.00	.00	.00	0.
1	0805	98	.00	.00	.00	0.	*	1	2035	248	.00	.00	.00	0.
1	0810	99	.00	.00	.00	0.	*	1	2040	249	.00	.00	.00	0.
1	0815	100	.00	.00	.00	0.	*	1	2045	250	.00	.00	.00	0.
1	0820	101	.00	.00	.00	0.	*	1	2050	251	.00	.00	.00	0.
1	0825	102	.00	.00	.00	0.	*	1	2055	252	.00	.00	.00	0.
1	0830	103	.00	.00	.00	0.	*	1	2100	253	.00	.00	.00	0.
1	0835	104	.00	.00	.00	0.	*	1	2105	254	.00	.00	.00	0.
1	0840	105	.00	.00	.00	0.	*	1	2110	255	.00	.00	.00	0.
1	0845	106	.00	.00	.00	0.	*	1	2115	256	.00	.00	.00	0.
1	0850	107	.00	.00	.00	0.	*	1	2120	257	.00	.00	.00	0.
1	0855	108	.00	.00	.00	0.	*	1	2125	258	.00	.00	.00	0.
1	0900	109	.00	.00	.00	0.	*	1	2130	259	.00	.00	.00	0.
1	0905	110	.00	.00	.00	0.	*	1	2135	260	.00	.00	.00	0.
1	0910	111	.00	.00	.00	0.	*	1	2140	261	.00	.00	.00	0.
1	0915	112	.00	.00	.00	0.	*	1	2145	262	.00	.00	.00	0.
1	0920	113	.00	.00	.00	0.	*	1	2150	263	.00	.00	.00	0.
1	0925	114	.00	.00	.00	0.	*	1	2155	264	.00	.00	.00	0.
1	0930	115	.00	.00	.00	0.	*	1	2200	265	.00	.00	.00	0.
1	0935	116	.00	.00	.00	0.	*	1	2205	266	.00	.00	.00	0.
1	0940	117	.00	.00	.00	0.	*	1	2210	267	.00	.00	.00	0.
1	0945	118	.00	.00	.00	0.	*	1	2215	268	.00	.00	.00	0.
1	0950	119	.00	.00	.00	0.	*	1	2220	269	.00	.00	.00	0.
1	0955	120	.00	.00	.00	0.	*	1	2225	270	.00	.00	.00	0.
1	1000	121	.00	.00	.00	0.	*	1	2230	271	.00	.00	.00	0.
1	1005	122	.00	.00	.00	0.	*	1	2235	272	.00	.00	.00	0.

1	1010	123	.00	.00	.00	0.	*	1	2240	273	.00	.00	.00	0.
1	1015	124	.00	.00	.00	0.	*	1	2245	274	.00	.00	.00	0.
1	1020	125	.00	.00	.00	0.	*	1	2250	275	.00	.00	.00	0.
1	1025	126	.00	.00	.00	0.	*	1	2255	276	.00	.00	.00	0.
1	1030	127	.00	.00	.00	0.	*	1	2300	277	.00	.00	.00	0.
1	1035	128	.00	.00	.00	0.	*	1	2305	278	.00	.00	.00	0.
1	1040	129	.00	.00	.00	0.	*	1	2310	279	.00	.00	.00	0.
1	1045	130	.00	.00	.00	0.	*	1	2315	280	.00	.00	.00	0.
1	1050	131	.00	.00	.00	0.	*	1	2320	281	.00	.00	.00	0.
1	1055	132	.00	.00	.00	0.	*	1	2325	282	.00	.00	.00	0.
1	1100	133	.00	.00	.00	0.	*	1	2330	283	.00	.00	.00	0.
1	1105	134	.00	.00	.00	0.	*	1	2335	284	.00	.00	.00	0.
1	1110	135	.00	.00	.00	0.	*	1	2340	285	.00	.00	.00	0.
1	1115	136	.00	.00	.00	0.	*	1	2345	286	.00	.00	.00	0.
1	1120	137	.00	.00	.00	0.	*	1	2350	287	.00	.00	.00	0.
1	1125	138	.00	.00	.00	0.	*	1	2355	288	.00	.00	.00	0.
1	1130	139	.00	.00	.00	0.	*	2	0000	289	.00	.00	.00	0.
1	1135	140	.00	.00	.00	0.	*	2	0005	290	.00	.00	.00	0.
1	1140	141	.00	.00	.00	0.	*	2	0010	291	.00	.00	.00	0.
1	1145	142	.00	.00	.00	0.	*	2	0015	292	.00	.00	.00	0.
1	1150	143	.00	.00	.00	0.	*	2	0020	293	.00	.00	.00	0.
1	1155	144	.00	.00	.00	0.	*	2	0025	294	.00	.00	.00	0.
1	1200	145	.00	.00	.00	0.	*	2	0030	295	.00	.00	.00	0.
1	1205	146	.00	.00	.00	0.	*	2	0035	296	.00	.00	.00	0.
1	1210	147	.00	.00	.00	0.	*	2	0040	297	.00	.00	.00	0.
1	1215	148	.00	.00	.00	0.	*	2	0045	298	.00	.00	.00	0.
1	1220	149	.00	.00	.00	0.	*	2	0050	299	.00	.00	.00	0.
1	1225	150	.00	.00	.00	0.	*	2	0055	300	.00	.00	.00	0.

*

TOTAL RAINFALL = 1.86, TOTAL LOSS = .51, TOTAL EXCESS = 1.35

PEAK FLOW		TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+	(CFS)	(HR)				
		(CFS)				
+	169.	3.58	31.	8.	7.	7.
		(INCHES)	1.342	1.347	1.347	1.347
		(AC-FT)	15.	15.	15.	15.

CUMULATIVE AREA = .21 SQ MI

WARNING *** TIME INTERVAL IS GREATER THAN .29*LAG

HYDROGRAPH AT STATION MW
PLAN 1, RATIO = .26

* DA MON HRMN ORD RAIN LOSS EXCESS COMP Q								* DA MON HRMN ORD RAIN LOSS EXCESS COMP Q							
1	0000	1	.00	.00	.00	0.	*	1	1230	151	.00	.00	.00	0.	
1	0005	2	.02	.01	.02	2.	*	1	1235	152	.00	.00	.00	0.	
1	0010	3	.04	.01	.03	8.	*	1	1240	153	.00	.00	.00	0.	
1	0015	4	.02	.00	.01	18.	*	1	1245	154	.00	.00	.00	0.	
1	0020	5	.02	.01	.01	23.	*	1	1250	155	.00	.00	.00	0.	
1	0025	6	.03	.01	.02	25.	*	1	1255	156	.00	.00	.00	0.	
1	0030	7	.02	.01	.01	25.	*	1	1300	157	.00	.00	.00	0.	
1	0035	8	.01	.00	.01	24.	*	1	1305	158	.00	.00	.00	0.	
1	0040	9	.00	.00	.00	20.	*	1	1310	159	.00	.00	.00	0.	
1	0045	10	.00	.00	.00	15.	*	1	1315	160	.00	.00	.00	0.	
1	0050	11	.00	.00	.00	9.	*	1	1320	161	.00	.00	.00	0.	
1	0055	12	.00	.00	.00	5.	*	1	1325	162	.00	.00	.00	0.	
1	0100	13	.00	.00	.00	3.	*	1	1330	163	.00	.00	.00	0.	
1	0105	14	.00	.00	.00	2.	*	1	1335	164	.00	.00	.00	0.	
1	0110	15	.01	.00	.01	2.	*	1	1340	165	.00	.00	.00	0.	
1	0115	16	.00	.00	.00	4.	*	1	1345	166	.00	.00	.00	0.	
1	0120	17	.01	.00	.01	5.	*	1	1350	167	.00	.00	.00	0.	
1	0125	18	.01	.00	.01	6.	*	1	1355	168	.00	.00	.00	0.	
1	0130	19	.02	.01	.01	8.	*	1	1400	169	.00	.00	.00	0.	
1	0135	20	.01	.00	.01	11.	*	1	1405	170	.00	.00	.00	0.	
1	0140	21	.01	.00	.01	13.	*	1	1410	171	.00	.00	.00	0.	
1	0145	22	.01	.00	.01	13.	*	1	1415	172	.00	.00	.00	0.	
1	0150	23	.00	.00	.00	12.	*	1	1420	173	.00	.00	.00	0.	
1	0155	24	.00	.00	.00	10.	*	1	1425	174	.00	.00	.00	0.	
1	0200	25	.00	.00	.00	7.	*	1	1430	175	.00	.00	.00	0.	
1	0205	26	.00	.00	.00	5.	*	1	1435	176	.00	.00	.00	0.	
1	0210	27	.01	.00	.01	5.	*	1	1440	177	.00	.00	.00	0.	
1	0215	28	.02	.01	.01	7.	*	1	1445	178	.00	.00	.00	0.	
1	0220	29	.01	.00	.01	10.	*	1	1450	179	.00	.00	.00	0.	
1	0225	30	.01	.00	.01	13.	*	1	1455	180	.00	.00	.00	0.	
1	0230	31	.00	.00	.00	13.	*	1	1500	181	.00	.00	.00	0.	
1	0235	32	.01	.00	.00	11.	*	1	1505	182	.00	.00	.00	0.	
1	0240	33	.02	.01	.01	10.	*	1	1510	183	.00	.00	.00	0.	
1	0245	34	.01	.00	.01	11.	*	1	1515	184	.00	.00	.00	0.	
1	0250	35	.00	.00	.00	11.	*	1	1520	185	.00	.00	.00	0.	
1	0255	36	.00	.00	.00	10.	*	1	1525	186	.00	.00	.00	0.	
1	0300	37	.01	.00	.01	9.	*	1	1530	187	.00	.00	.00	0.	
1	0305	38	.03	.01	.02	10.	*	1	1535	188	.00	.00	.00	0.	
1	0310	39	.04	.01	.03	17.	*	1	1540	189	.00	.00	.00	0.	
1	0315	40	.07	.02	.05	27.	*	1	1545	190	.00	.00	.00	0.	
1	0320	41	.11	.03	.08	43.	*	1	1550	191	.00	.00	.00	0.	
1	0325	42	.11	.03	.08	66.	*	1	1555	192	.00	.00	.00	0.	
1	0330	43	.14	.04	.10	90.	*	1	1600	193	.00	.00	.00	0.	
1	0335	44	.04	.01	.03	107.	*	1	1605	194	.00	.00	.00	0.	
1	0340	45	.04	.01	.03	104.	*	1	1610	195	.00	.00	.00	0.	
1	0345	46	.04	.01	.03	89.	*	1	1615	196	.00	.00	.00	0.	
1	0350	47	.01	.00	.01	70.	*	1	1620	197	.00	.00	.00	0.	
1	0355	48	.02	.01	.01	53.	*	1	1625	198	.00	.00	.00	0.	
1	0400	49	.02	.01	.01	40.	*	1	1630	199	.00	.00	.00	0.	
1	0405	50	.01	.00	.00	31.	*	1	1635	200	.00	.00	.00	0.	
1	0410	51	.00	.00	.00	24.	*	1	1640	201	.00	.00	.00	0.	
1	0415	52	.01	.00	.01	18.	*	1	1645	202	.00	.00	.00	0.	
1	0420	53	.01	.00	.01	14.	*	1	1650	203	.00	.00	.00	0.	
1	0425	54	.01	.00	.01	13.	*	1	1655	204	.00	.00	.00	0.	
1	0430	55	.03	.01	.02	14.	*	1	1700	205	.00	.00	.00	0.	
1	0435	56	.02	.01	.01	18.	*	1	1705	206	.00	.00	.00	0.	
1	0440	57	.01	.00	.01	20.	*	1	1710	207	.00	.00	.00	0.	

1	0445	58	.02	.00	.01	20.	*	1	1715	208	.00	.00	.00	0.
1	0450	59	.02	.01	.02	20.	•	1	1720	209	.00	.00	.00	0.
1	0455	60	.01	.00	.01	20.	•	1	1725	210	.00	.00	.00	0.
1	0500	61	.01	.00	.01	19.	•	1	1730	211	.00	.00	.00	0.
1	0505	62	.00	.00	.00	16.	*	1	1735	212	.00	.00	.00	0.
1	0510	63	.00	.00	.00	12.	•	1	1740	213	.00	.00	.00	0.
1	0515	64	.00	.00	.00	9.	•	1	1745	214	.00	.00	.00	0.
1	0520	65	.00	.00	.00	6.	*	1	1750	215	.00	.00	.00	0.
1	0525	66	.00	.00	.00	5.	•	1	1755	216	.00	.00	.00	0.
1	0530	67	.00	.00	.00	4.	*	1	1800	217	.00	.00	.00	0.
1	0535	68	.00	.00	.00	3.	•	1	1805	218	.00	.00	.00	0.
1	0540	69	.00	.00	.00	2.	•	1	1810	219	.00	.00	.00	0.
1	0545	70	.00	.00	.00	2.	*	1	1815	220	.00	.00	.00	0.
1	0550	71	.00	.00	.00	2.	•	1	1820	221	.00	.00	.00	0.
1	0555	72	.00	.00	.00	2.	•	1	1825	222	.00	.00	.00	0.
1	0600	73	.00	.00	.00	2.	*	1	1830	223	.00	.00	.00	0.
1	0605	74	.00	.00	.00	1.	•	1	1835	224	.00	.00	.00	0.
1	0610	75	.00	.00	.00	1.	*	1	1840	225	.00	.00	.00	0.
1	0615	76	.00	.00	.00	1.	*	1	1845	226	.00	.00	.00	0.
1	0620	77	.00	.00	.00	0.	•	1	1850	227	.00	.00	.00	0.
1	0625	78	.00	.00	.00	0.	*	1	1855	228	.00	.00	.00	0.
1	0630	79	.00	.00	.00	0.	•	1	1900	229	.00	.00	.00	0.
1	0635	80	.00	.00	.00	0.	*	1	1905	230	.00	.00	.00	0.
1	0640	81	.00	.00	.00	0.	•	1	1910	231	.00	.00	.00	0.
1	0645	82	.00	.00	.00	0.	•	1	1915	232	.00	.00	.00	0.
1	0650	83	.00	.00	.00	0.	*	1	1920	233	.00	.00	.00	0.
1	0655	84	.00	.00	.00	0.	*	1	1925	234	.00	.00	.00	0.
1	0700	85	.00	.00	.00	0.	*	1	1930	235	.00	.00	.00	0.
1	0705	86	.00	.00	.00	0.	*	1	1935	236	.00	.00	.00	0.
1	0710	87	.00	.00	.00	0.	*	1	1940	237	.00	.00	.00	0.
1	0715	88	.00	.00	.00	0.	*	1	1945	238	.00	.00	.00	0.
1	0720	89	.00	.00	.00	0.	*	1	1950	239	.00	.00	.00	0.
1	0725	90	.00	.00	.00	0.	*	1	1955	240	.00	.00	.00	0.
1	0730	91	.00	.00	.00	0.	*	1	2000	241	.00	.00	.00	0.
1	0735	92	.00	.00	.00	0.	*	1	2005	242	.00	.00	.00	0.
1	0740	93	.00	.00	.00	0.	•	1	2010	243	.00	.00	.00	0.
1	0745	94	.00	.00	.00	0.	*	1	2015	244	.00	.00	.00	0.
1	0750	95	.00	.00	.00	0.	•	1	2020	245	.00	.00	.00	0.
1	0755	96	.00	.00	.00	0.	*	1	2025	246	.00	.00	.00	0.
1	0800	97	.00	.00	.00	0.	*	1	2030	247	.00	.00	.00	0.
1	0805	98	.00	.00	.00	0.	•	1	2035	248	.00	.00	.00	0.
1	0810	99	.00	.00	.00	0.	*	1	2040	249	.00	.00	.00	0.
1	0815	100	.00	.00	.00	0.	•	1	2045	250	.00	.00	.00	0.
1	0820	101	.00	.00	.00	0.	•	1	2050	251	.00	.00	.00	0.
1	0825	102	.00	.00	.00	0.	•	1	2055	252	.00	.00	.00	0.
1	0830	103	.00	.00	.00	0.	•	1	2100	253	.00	.00	.00	0.
1	0835	104	.00	.00	.00	0.	*	1	2105	254	.00	.00	.00	0.
1	0840	105	.00	.00	.00	0.	•	1	2110	255	.00	.00	.00	0.
1	0845	106	.00	.00	.00	0.	*	1	2115	256	.00	.00	.00	0.
1	0850	107	.00	.00	.00	0.	•	1	2120	257	.00	.00	.00	0.
1	0855	108	.00	.00	.00	0.	*	1	2125	258	.00	.00	.00	0.
1	0900	109	.00	.00	.00	0.	•	1	2130	259	.00	.00	.00	0.
1	0905	110	.00	.00	.00	0.	•	1	2135	260	.00	.00	.00	0.
1	0910	111	.00	.00	.00	0.	•	1	2140	261	.00	.00	.00	0.
1	0915	112	.00	.00	.00	0.	*	1	2145	262	.00	.00	.00	0.
1	0920	113	.00	.00	.00	0.	*	1	2150	263	.00	.00	.00	0.
1	0925	114	.00	.00	.00	0.	•	1	2155	264	.00	.00	.00	0.
1	0930	115	.00	.00	.00	0.	•	1	2200	265	.00	.00	.00	0.
1	0935	116	.00	.00	.00	0.	•	1	2205	266	.00	.00	.00	0.
1	0940	117	.00	.00	.00	0.	*	1	2210	267	.00	.00	.00	0.
1	0945	118	.00	.00	.00	0.	*	1	2215	268	.00	.00	.00	0.
1	0950	119	.00	.00	.00	0.	*	1	2220	269	.00	.00	.00	0.
1	0955	120	.00	.00	.00	0.	*	1	2225	270	.00	.00	.00	0.
1	1000	121	.00	.00	.00	0.	*	1	2230	271	.00	.00	.00	0.
1	1005	122	.00	.00	.00	0.	*	1	2235	272	.00	.00	.00	0.

1	1010	123	.00	.00	.00	0.	*	1	2240	273	.00	.00	.00	0.
1	1015	124	.00	.00	.00	0.	*	1	2245	274	.00	.00	.00	0.
1	1020	125	.00	.00	.00	0.	*	1	2250	275	.00	.00	.00	0.
1	1025	126	.00	.00	.00	0.	*	1	2255	276	.00	.00	.00	0.
1	1030	127	.00	.00	.00	0.	*	1	2300	277	.00	.00	.00	0.
1	1035	128	.00	.00	.00	0.	*	1	2305	278	.00	.00	.00	0.
1	1040	129	.00	.00	.00	0.	*	1	2310	279	.00	.00	.00	0.
1	1045	130	.00	.00	.00	0.	*	1	2315	280	.00	.00	.00	0.
1	1050	131	.00	.00	.00	0.	*	1	2320	281	.00	.00	.00	0.
1	1055	132	.00	.00	.00	0.	*	1	2325	282	.00	.00	.00	0.
1	1100	133	.00	.00	.00	0.	*	1	2330	283	.00	.00	.00	0.
1	1105	134	.00	.00	.00	0.	*	1	2335	284	.00	.00	.00	0.
1	1110	135	.00	.00	.00	0.	*	1	2340	285	.00	.00	.00	0.
1	1115	136	.00	.00	.00	0.	*	1	2345	286	.00	.00	.00	0.
1	1120	137	.00	.00	.00	0.	*	1	2350	287	.00	.00	.00	0.
1	1125	138	.00	.00	.00	0.	*	1	2355	288	.00	.00	.00	0.
1	1130	139	.00	.00	.00	0.	*	2	0000	289	.00	.00	.00	0.
1	1135	140	.00	.00	.00	0.	*	2	0005	290	.00	.00	.00	0.
1	1140	141	.00	.00	.00	0.	*	2	0010	291	.00	.00	.00	0.
1	1145	142	.00	.00	.00	0.	*	2	0015	292	.00	.00	.00	0.
1	1150	143	.00	.00	.00	0.	*	2	0020	293	.00	.00	.00	0.
1	1155	144	.00	.00	.00	0.	*	2	0025	294	.00	.00	.00	0.
1	1200	145	.00	.00	.00	0.	*	2	0030	295	.00	.00	.00	0.
1	1205	146	.00	.00	.00	0.	*	2	0035	296	.00	.00	.00	0.
1	1210	147	.00	.00	.00	0.	*	2	0040	297	.00	.00	.00	0.
1	1215	148	.00	.00	.00	0.	*	2	0045	298	.00	.00	.00	0.
1	1220	149	.00	.00	.00	0.	*	2	0050	299	.00	.00	.00	0.
1	1225	150	.00	.00	.00	0.	*	2	0055	300	.00	.00	.00	0.

TOTAL RAINFALL = 1.20, TOTAL LOSS = .36, TOTAL EXCESS = .84

PEAK FLOW + (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ 107.	3.58	19.	5.	5.	5.
	(INCHES)	.841	.844	.844	.844
	(AC-FT)	10.	10.	10.	10.

CUMULATIVE AREA = .21 SQ MI

33 KK * NH *

34 KO OUTPUT CONTROL VARIABLES

IPRNT 1 PRINT CONTROL

IPLOT 0 PLOT CONTROL

QSCAL 0. HYDROGRAPH PLOT SCALE

Runoff below El Mirage Way

SUBBASIN RUNOFF DATA

36 BA SUBBASIN CHARACTERISTICS

TAREA .38 SUBBASIN AREA

PRECIPITATION DATA

19 PB STORM 4.58 BASIN TOTAL PRECIPITATION

20 PI INCREMENTAL PRECIPITATION PATTERN

.02	.04	.01	.02	.02	.02	.01	.00	.00	.00
.00	.00	.00	.01	.00	.01	.01	.01	.01	.01
.01	.00	.00	.00	.00	.01	.02	.01	.01	.00
.01	.01	.01	.00	.00	.01	.03	.03	.06	.09
.09	.12	.03	.04	.03	.01	.02	.02	.00	.00
.01	.01	.01	.02	.02	.01	.01	.02	.01	.01
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00								

37 LS SCS LOSS RATE

STRTL .94 INITIAL ABSTRACTION

CRVNBR 68.00 CURVE NUMBER

RTIMP 30.00 PERCENT IMPERVIOUS AREA

38 UD SCS DIMENSIONLESS UNITGRAPH

TLAG .18 LAG

WARNING *** TIME INTERVAL IS GREATER THAN .29*LAG

UNIT HYDROGRAPH 13 END-OF-PERIOD ORDINATES

231.	720.	799.	554.	281.	156.	84.	45.	25.	13.
8.	4.	1.							

HYDROGRAPH AT STATION NH

DA	MON	HR	MIN	ORD	RAIN	LOSS	EXCESS	COMP	Q	DA	MON	HR	MIN	ORD	RAIN	LOSS	EXCESS	COMP	Q
1	0000	1	.00	.00	.00	0.	*	1	1230 151	.00	.00	.00	0.						
1	0005	2	.09	.06	.03	6.	*	1	1235 152	.00	.00	.00	0.						
1	0010	3	.17	.12	.05	32.	*	1	1240 153	.00	.00	.00	0.						
1	0015	4	.06	.04	.02	63.	*	1	1245 154	.00	.00	.00	0.						
1	0020	5	.08	.05	.02	74.	*	1	1250 155	.00	.00	.00	0.						
1	0025	6	.10	.07	.03	74.	*	1	1255 156	.00	.00	.00	0.						
1	0030	7	.07	.05	.02	73.	*	1	1300 157	.00	.00	.00	0.						
1	0035	8	.03	.02	.01	69.	*	1	1305 158	.00	.00	.00	0.						
1	0040	9	.00	.00	.00	54.	*	1	1310 159	.00	.00	.00	0.						
1	0045	10	.00	.00	.00	35.	*	1	1315 160	.00	.00	.00	0.						
1	0050	11	.00	.00	.00	20.	*	1	1320 161	.00	.00	.00	0.						
1	0055	12	.00	.00	.00	11.	*	1	1325 162	.00	.00	.00	0.						
1	0100	13	.00	.00	.00	6.	*	1	1330 163	.00	.00	.00	0.						
1	0105	14	.01	.01	.00	4.	*	1	1335 164	.00	.00	.00	0.						
1	0110	15	.03	.02	.01	7.	*	1	1340 165	.00	.00	.00	0.						
1	0115	16	.01	.01	.00	12.	*	1	1345 166	.00	.00	.00	0.						
1	0120	17	.03	.02	.01	14.	*	1	1350 167	.00	.00	.00	0.						
1	0125	18	.05	.03	.01	18.	*	1	1355 168	.00	.00	.00	0.						
1	0130	19	.06	.04	.02	26.	*	1	1400 169	.00	.00	.00	0.						
1	0135	20	.04	.03	.01	35.	*	1	1405 170	.00	.00	.00	0.						
1	0140	21	.04	.03	.01	38.	*	1	1410 171	.00	.00	.00	0.						
1	0145	22	.03	.02	.01	38.	*	1	1415 172	.00	.00	.00	0.						
1	0150	23	.01	.01	.00	33.	*	1	1420 173	.00	.00	.00	0.						
1	0155	24	.00	.00	.00	25.	*	1	1425 174	.00	.00	.00	0.						
1	0200	25	.00	.00	.00	17.	*	1	1430 175	.00	.00	.00	0.						
1	0205	26	.01	.01	.00	12.	*	1	1435 176	.00	.00	.00	0.						
1	0210	27	.05	.03	.01	13.	*	1	1440 177	.00	.00	.00	0.						
1	0215	28	.07	.05	.02	22.	*	1	1445 178	.00	.00	.00	0.						
1	0220	29	.05	.04	.02	36.	*	1	1450 179	.00	.00	.00	0.						
1	0225	30	.04	.02	.01	44.	*	1	1455 180	.00	.00	.00	0.						
1	0230	31	.01	.01	.00	42.	*	1	1500 181	.00	.00	.00	0.						
1	0235	32	.02	.01	.01	34.	*	1	1505 182	.00	.00	.00	0.						
1	0240	33	.06	.04	.02	31.	*	1	1510 183	.00	.00	.00	0.						
1	0245	34	.04	.02	.01	38.	*	1	1515 184	.00	.00	.00	0.						
1	0250	35	.01	.01	.01	41.	*	1	1520 185	.00	.00	.00	0.						
1	0255	36	.01	.01	.00	35.	*	1	1525 186	.00	.00	.00	0.						
1	0300	37	.05	.03	.02	30.	*	1	1530 187	.00	.00	.00	0.						
1	0305	38	.12	.07	.05	43.	*	1	1535 188	.00	.00	.00	0.						
1	0310	39	.14	.08	.06	78.	*	1	1540 189	.00	.00	.00	0.						
1	0315	40	.26	.13	.13	132.	*	1	1545 190	.00	.00	.00	0.						
1	0320	41	.41	.19	.22	231.	*	1	1550 191	.00	.00	.00	0.						
1	0325	42	.42	.17	.25	375.	*	1	1555 192	.00	.00	.00	0.						
1	0330	43	.55	.19	.36	543.	*	1	1600 193	.00	.00	.00	0.						
1	0335	44	.16	.05	.11	662.	*	1	1605 194	.00	.00	.00	0.						
1	0340	45	.17	.05	.12	625.	*	1	1610 195	.00	.00	.00	0.						
1	0345	46	.14	.04	.10	517.	*	1	1615 196	.00	.00	.00	0.						
1	0350	47	.03	.01	.02	402.	*	1	1620 197	.00	.00	.00	0.						
1	0355	48	.07	.02	.05	299.	*	1	1625 198	.00	.00	.00	0.						
1	0400	49	.07	.02	.05	226.	*	1	1630 199	.00	.00	.00	0.						
1	0405	50	.02	.01	.02	181.	*	1	1635 200	.00	.00	.00	0.						
1	0410	51	.02	.00	.01	140.	*	1	1640 201	.00	.00	.00	0.						
1	0415	52	.04	.01	.03	102.	*	1	1645 202	.00	.00	.00	0.						
1	0420	53	.04	.01	.03	84.	*	1	1650 203	.00	.00	.00	0.						
1	0425	54	.05	.01	.04	83.	*	1	1655 204	.00	.00	.00	0.						
1	0430	55	.10	.03	.08	101.	*	1	1700 205	.00	.00	.00	0.						
1	0435	56	.07	.02	.06	132.	*	1	1705 206	.00	.00	.00	0.						
1	0440	57	.05	.01	.04	148.	*	1	1710 207	.00	.00	.00	0.						

1	0445	58	.06	.01	.05	145.	*	1	1715	208	.00	.00	.00	0.
1	0450	59	.09	.02	.07	143.	*	1	1720	209	.00	.00	.00	0.
1	0455	60	.03	.01	.02	146.	*	1	1725	210	.00	.00	.00	0.
1	0500	61	.03	.01	.02	130.	*	1	1730	211	.00	.00	.00	0.
1	0505	62	.01	.00	.01	102.	*	1	1735	212	.00	.00	.00	0.
1	0510	63	.01	.00	.01	73.	*	1	1740	213	.00	.00	.00	0.
1	0515	64	.01	.00	.01	52.	*	1	1745	214	.00	.00	.00	0.
1	0520	65	.00	.00	.00	37.	*	1	1750	215	.00	.00	.00	0.
1	0525	66	.01	.00	.01	28.	*	1	1755	216	.00	.00	.00	0.
1	0530	67	.00	.00	.00	24.	*	1	1800	217	.00	.00	.00	0.
1	0535	68	.00	.00	.00	18.	*	1	1805	218	.00	.00	.00	0.
1	0540	69	.00	.00	.00	14.	*	1	1810	219	.00	.00	.00	0.
1	0545	70	.01	.00	.01	13.	*	1	1815	220	.00	.00	.00	0.
1	0550	71	.00	.00	.00	15.	*	1	1820	221	.00	.00	.00	0.
1	0555	72	.00	.00	.00	14.	*	1	1825	222	.00	.00	.00	0.
1	0600	73	.00	.00	.00	12.	*	1	1830	223	.00	.00	.00	0.
1	0605	74	.00	.00	.00	10.	*	1	1835	224	.00	.00	.00	0.
1	0610	75	.00	.00	.00	7.	*	1	1840	225	.00	.00	.00	0.
1	0615	76	.00	.00	.00	4.	*	1	1845	226	.00	.00	.00	0.
1	0620	77	.00	.00	.00	2.	*	1	1850	227	.00	.00	.00	0.
1	0625	78	.00	.00	.00	1.	*	1	1855	228	.00	.00	.00	0.
1	0630	79	.00	.00	.00	1.	*	1	1900	229	.00	.00	.00	0.
1	0635	80	.00	.00	.00	0.	*	1	1905	230	.00	.00	.00	0.
1	0640	81	.00	.00	.00	0.	*	1	1910	231	.00	.00	.00	0.
1	0645	82	.00	.00	.00	0.	*	1	1915	232	.00	.00	.00	0.
1	0650	83	.00	.00	.00	0.	*	1	1920	233	.00	.00	.00	0.
1	0655	84	.00	.00	.00	0.	*	1	1925	234	.00	.00	.00	0.
1	0700	85	.00	.00	.00	0.	*	1	1930	235	.00	.00	.00	0.
1	0705	86	.00	.00	.00	0.	*	1	1935	236	.00	.00	.00	0.
1	0710	87	.00	.00	.00	0.	*	1	1940	237	.00	.00	.00	0.
1	0715	88	.00	.00	.00	0.	*	1	1945	238	.00	.00	.00	0.
1	0720	89	.00	.00	.00	0.	*	1	1950	239	.00	.00	.00	0.
1	0725	90	.00	.00	.00	0.	*	1	1955	240	.00	.00	.00	0.
1	0730	91	.00	.00	.00	0.	*	1	2000	241	.00	.00	.00	0.
1	0735	92	.00	.00	.00	0.	*	1	2005	242	.00	.00	.00	0.
1	0740	93	.00	.00	.00	0.	*	1	2010	243	.00	.00	.00	0.
1	0745	94	.00	.00	.00	0.	*	1	2015	244	.00	.00	.00	0.
1	0750	95	.00	.00	.00	0.	*	1	2020	245	.00	.00	.00	0.
1	0755	96	.00	.00	.00	0.	*	1	2025	246	.00	.00	.00	0.
1	0800	97	.00	.00	.00	0.	*	1	2030	247	.00	.00	.00	0.
1	0805	98	.00	.00	.00	0.	*	1	2035	248	.00	.00	.00	0.
1	0810	99	.00	.00	.00	0.	*	1	2040	249	.00	.00	.00	0.
1	0815	100	.00	.00	.00	0.	*	1	2045	250	.00	.00	.00	0.
1	0820	101	.00	.00	.00	0.	*	1	2050	251	.00	.00	.00	0.
1	0825	102	.00	.00	.00	0.	*	1	2055	252	.00	.00	.00	0.
1	0830	103	.00	.00	.00	0.	*	1	2100	253	.00	.00	.00	0.
1	0835	104	.00	.00	.00	0.	*	1	2105	254	.00	.00	.00	0.
1	0840	105	.00	.00	.00	0.	*	1	2110	255	.00	.00	.00	0.
1	0845	106	.00	.00	.00	0.	*	1	2115	256	.00	.00	.00	0.
1	0850	107	.00	.00	.00	0.	*	1	2120	257	.00	.00	.00	0.
1	0855	108	.00	.00	.00	0.	*	1	2125	258	.00	.00	.00	0.
1	0900	109	.00	.00	.00	0.	*	1	2130	259	.00	.00	.00	0.
1	0905	110	.00	.00	.00	0.	*	1	2135	260	.00	.00	.00	0.
1	0910	111	.00	.00	.00	0.	*	1	2140	261	.00	.00	.00	0.
1	0915	112	.00	.00	.00	0.	*	1	2145	262	.00	.00	.00	0.
1	0920	113	.00	.00	.00	0.	*	1	2150	263	.00	.00	.00	0.
1	0925	114	.00	.00	.00	0.	*	1	2155	264	.00	.00	.00	0.
1	0930	115	.00	.00	.00	0.	*	1	2200	265	.00	.00	.00	0.
1	0935	116	.00	.00	.00	0.	*	1	2205	266	.00	.00	.00	0.
1	0940	117	.00	.00	.00	0.	*	1	2210	267	.00	.00	.00	0.
1	0945	118	.00	.00	.00	0.	*	1	2215	268	.00	.00	.00	0.
1	0950	119	.00	.00	.00	0.	*	1	2220	269	.00	.00	.00	0.
1	0955	120	.00	.00	.00	0.	*	1	2225	270	.00	.00	.00	0.
1	1000	121	.00	.00	.00	0.	*	1	2230	271	.00	.00	.00	0.
1	1005	122	.00	.00	.00	0.	*	1	2235	272	.00	.00	.00	0.

1	1010	123	.00	.00	.00	0.	*	1	2240	273	.00	.00	.00	0.
1	1015	124	.00	.00	.00	0.	*	1	2245	274	.00	.00	.00	0.
1	1020	125	.00	.00	.00	0.	*	1	2250	275	.00	.00	.00	0.
1	1025	126	.00	.00	.00	0.	*	1	2255	276	.00	.00	.00	0.
1	1030	127	.00	.00	.00	0.	*	1	2300	277	.00	.00	.00	0.
1	1035	128	.00	.00	.00	0.	*	1	2305	278	.00	.00	.00	0.
1	1040	129	.00	.00	.00	0.	*	1	2310	279	.00	.00	.00	0.
1	1045	130	.00	.00	.00	0.	*	1	2315	280	.00	.00	.00	0.
1	1050	131	.00	.00	.00	0.	*	1	2320	281	.00	.00	.00	0.
1	1055	132	.00	.00	.00	0.	*	1	2325	282	.00	.00	.00	0.
1	1100	133	.00	.00	.00	0.	*	1	2330	283	.00	.00	.00	0.
1	1105	134	.00	.00	.00	0.	*	1	2335	284	.00	.00	.00	0.
1	1110	135	.00	.00	.00	0.	*	1	2340	285	.00	.00	.00	0.
1	1115	136	.00	.00	.00	0.	*	1	2345	286	.00	.00	.00	0.
1	1120	137	.00	.00	.00	0.	*	1	2350	287	.00	.00	.00	0.
1	1125	138	.00	.00	.00	0.	*	1	2355	288	.00	.00	.00	0.
1	1130	139	.00	.00	.00	0.	*	2	0000	289	.00	.00	.00	0.
1	1135	140	.00	.00	.00	0.	*	2	0005	290	.00	.00	.00	0.
1	1140	141	.00	.00	.00	0.	*	2	0010	291	.00	.00	.00	0.
1	1145	142	.00	.00	.00	0.	*	2	0015	292	.00	.00	.00	0.
1	1150	143	.00	.00	.00	0.	*	2	0020	293	.00	.00	.00	0.
1	1155	144	.00	.00	.00	0.	*	2	0025	294	.00	.00	.00	0.
1	1200	145	.00	.00	.00	0.	*	2	0030	295	.00	.00	.00	0.
1	1205	146	.00	.00	.00	0.	*	2	0035	296	.00	.00	.00	0.
1	1210	147	.00	.00	.00	0.	*	2	0040	297	.00	.00	.00	0.
1	1215	148	.00	.00	.00	0.	*	2	0045	298	.00	.00	.00	0.
1	1220	149	.00	.00	.00	0.	*	2	0050	299	.00	.00	.00	0.
1	1225	150	.00	.00	.00	0.	*	2	0055	300	.00	.00	.00	0.

TOTAL RAINFALL = 4.58, TOTAL LOSS = 2.10, TOTAL EXCESS = 2.48

PEAK FLOW + (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ 662.	3.58	100.	25.	24.	24.
	(INCHES)	2.476	2.485	2.485	2.485
	(AC-FT)	50.	50.	50.	50.

CUMULATIVE AREA = .38 SQ MI

WARNING *** TIME INTERVAL IS GREATER THAN .29*LAG

HYDROGRAPH AT STATION NH
PLAN 1, RATIO = .98

DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	*	DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
1	0000	1	.00	.00	.00	0.	*	1	1230	151	.00	.00	.00	0.		
1	0005	2	.09	.06	.03	6.	*	1	1235	152	.00	.00	.00	0.		
1	0010	3	.17	.12	.05	31.	*	1	1240	153	.00	.00	.00	0.		
1	0015	4	.06	.04	.02	61.	*	1	1245	154	.00	.00	.00	0.		
1	0020	5	.08	.05	.02	72.	*	1	1250	155	.00	.00	.00	0.		
1	0025	6	.09	.07	.03	72.	*	1	1255	156	.00	.00	.00	0.		
1	0030	7	.07	.05	.02	71.	*	1	1300	157	.00	.00	.00	0.		
1	0035	8	.03	.02	.01	67.	*	1	1305	158	.00	.00	.00	0.		
1	0040	9	.00	.00	.00	53.	*	1	1310	159	.00	.00	.00	0.		
1	0045	10	.00	.00	.00	34.	*	1	1315	160	.00	.00	.00	0.		
1	0050	11	.00	.00	.00	19.	*	1	1320	161	.00	.00	.00	0.		
1	0055	12	.00	.00	.00	10.	*	1	1325	162	.00	.00	.00	0.		
1	0100	13	.00	.00	.00	6.	*	1	1330	163	.00	.00	.00	0.		
1	0105	14	.01	.01	.00	4.	*	1	1335	164	.00	.00	.00	0.		
1	0110	15	.03	.02	.01	7.	*	1	1340	165	.00	.00	.00	0.		
1	0115	16	.01	.01	.00	11.	*	1	1345	166	.00	.00	.00	0.		
1	0120	17	.03	.02	.01	14.	*	1	1350	167	.00	.00	.00	0.		
1	0125	18	.04	.03	.01	18.	*	1	1355	168	.00	.00	.00	0.		
1	0130	19	.06	.04	.02	25.	*	1	1400	169	.00	.00	.00	0.		
1	0135	20	.04	.03	.01	34.	*	1	1405	170	.00	.00	.00	0.		
1	0140	21	.04	.03	.01	38.	*	1	1410	171	.00	.00	.00	0.		
1	0145	22	.03	.02	.01	37.	*	1	1415	172	.00	.00	.00	0.		
1	0150	23	.01	.01	.00	32.	*	1	1420	173	.00	.00	.00	0.		
1	0155	24	.00	.00	.00	24.	*	1	1425	174	.00	.00	.00	0.		
1	0200	25	.00	.00	.00	16.	*	1	1430	175	.00	.00	.00	0.		
1	0205	26	.01	.01	.00	11.	*	1	1435	176	.00	.00	.00	0.		
1	0210	27	.04	.03	.01	12.	*	1	1440	177	.00	.00	.00	0.		
1	0215	28	.07	.05	.02	21.	*	1	1445	178	.00	.00	.00	0.		
1	0220	29	.05	.04	.02	34.	*	1	1450	179	.00	.00	.00	0.		
1	0225	30	.04	.02	.01	42.	*	1	1455	180	.00	.00	.00	0.		
1	0230	31	.01	.01	.00	40.	*	1	1500	181	.00	.00	.00	0.		
1	0235	32	.02	.01	.01	32.	*	1	1505	182	.00	.00	.00	0.		
1	0240	33	.06	.04	.02	30.	*	1	1510	183	.00	.00	.00	0.		
1	0245	34	.04	.02	.01	36.	*	1	1515	184	.00	.00	.00	0.		
1	0250	35	.01	.01	.01	39.	*	1	1520	185	.00	.00	.00	0.		
1	0255	36	.01	.01	.00	33.	*	1	1525	186	.00	.00	.00	0.		
1	0300	37	.05	.03	.02	28.	*	1	1530	187	.00	.00	.00	0.		
1	0305	38	.12	.07	.05	41.	*	1	1535	188	.00	.00	.00	0.		
1	0310	39	.13	.07	.06	75.	*	1	1540	189	.00	.00	.00	0.		
1	0315	40	.25	.13	.12	127.	*	1	1545	190	.00	.00	.00	0.		
1	0320	41	.40	.19	.22	221.	*	1	1550	191	.00	.00	.00	0.		
1	0325	42	.41	.16	.24	360.	*	1	1555	192	.00	.00	.00	0.		
1	0330	43	.54	.19	.35	522.	*	1	1600	193	.00	.00	.00	0.		
1	0335	44	.15	.05	.10	637.	*	1	1605	194	.00	.00	.00	0.		
1	0340	45	.17	.05	.12	602.	*	1	1610	195	.00	.00	.00	0.		
1	0345	46	.14	.04	.10	498.	*	1	1615	196	.00	.00	.00	0.		
1	0350	47	.03	.01	.02	387.	*	1	1620	197	.00	.00	.00	0.		
1	0355	48	.07	.02	.05	288.	*	1	1625	198	.00	.00	.00	0.		
1	0400	49	.07	.02	.05	218.	*	1	1630	199	.00	.00	.00	0.		
1	0405	50	.02	.01	.02	175.	*	1	1635	200	.00	.00	.00	0.		
1	0410	51	.02	.00	.01	135.	*	1	1640	201	.00	.00	.00	0.		
1	0415	52	.04	.01	.03	99.	*	1	1645	202	.00	.00	.00	0.		
1	0420	53	.04	.01	.03	81.	*	1	1650	203	.00	.00	.00	0.		
1	0425	54	.05	.01	.04	81.	*	1	1655	204	.00	.00	.00	0.		
1	0430	55	.10	.03	.07	97.	*	1	1700	205	.00	.00	.00	0.		
1	0435	56	.07	.02	.05	127.	*	1	1705	206	.00	.00	.00	0.		

1	0440	57	.05	.01	.04	143.	*	1	1710	207	.00	.00	.00	0.
1	0445	58	.06	.01	.04	140.	*	1	1715	208	.00	.00	.00	0.
1	0450	59	.09	.02	.07	138.	*	1	1720	209	.00	.00	.00	0.
1	0455	60	.03	.01	.02	141.	*	1	1725	210	.00	.00	.00	0.
1	0500	61	.03	.01	.02	126.	*	1	1730	211	.00	.00	.00	0.
1	0505	62	.01	.00	.01	99.	*	1	1735	212	.00	.00	.00	0.
1	0510	63	.01	.00	.01	71.	*	1	1740	213	.00	.00	.00	0.
1	0515	64	.01	.00	.01	51.	*	1	1745	214	.00	.00	.00	0.
1	0520	65	.00	.00	.00	36.	*	1	1750	215	.00	.00	.00	0.
1	0525	66	.01	.00	.01	27.	*	1	1755	216	.00	.00	.00	0.
1	0530	67	.00	.00	.00	23.	*	1	1800	217	.00	.00	.00	0.
1	0535	68	.00	.00	.00	18.	*	1	1805	218	.00	.00	.00	0.
1	0540	69	.00	.00	.00	14.	*	1	1810	219	.00	.00	.00	0.
1	0545	70	.01	.00	.01	13.	*	1	1815	220	.00	.00	.00	0.
1	0550	71	.00	.00	.00	15.	*	1	1820	221	.00	.00	.00	0.
1	0555	72	.00	.00	.00	13.	*	1	1825	222	.00	.00	.00	0.
1	0600	73	.00	.00	.00	11.	*	1	1830	223	.00	.00	.00	0.
1	0605	74	.00	.00	.00	9.	*	1	1835	224	.00	.00	.00	0.
1	0610	75	.00	.00	.00	7.	*	1	1840	225	.00	.00	.00	0.
1	0615	76	.00	.00	.00	4.	*	1	1845	226	.00	.00	.00	0.
1	0620	77	.00	.00	.00	2.	*	1	1850	227	.00	.00	.00	0.
1	0625	78	.00	.00	.00	1.	*	1	1855	228	.00	.00	.00	0.
1	0630	79	.00	.00	.00	1.	*	1	1900	229	.00	.00	.00	0.
1	0635	80	.00	.00	.00	0.	*	1	1905	230	.00	.00	.00	0.
1	0640	81	.00	.00	.00	0.	*	1	1910	231	.00	.00	.00	0.
1	0645	82	.00	.00	.00	0.	*	1	1915	232	.00	.00	.00	0.
1	0650	83	.00	.00	.00	0.	*	1	1920	233	.00	.00	.00	0.
1	0655	84	.00	.00	.00	0.	*	1	1925	234	.00	.00	.00	0.
1	0700	85	.00	.00	.00	0.	*	1	1930	235	.00	.00	.00	0.
1	0705	86	.00	.00	.00	0.	*	1	1935	236	.00	.00	.00	0.
1	0710	87	.00	.00	.00	0.	*	1	1940	237	.00	.00	.00	0.
1	0715	88	.00	.00	.00	0.	*	1	1945	238	.00	.00	.00	0.
1	0720	89	.00	.00	.00	0.	*	1	1950	239	.00	.00	.00	0.
1	0725	90	.00	.00	.00	0.	*	1	1955	240	.00	.00	.00	0.
1	0730	91	.00	.00	.00	0.	*	1	2000	241	.00	.00	.00	0.
1	0735	92	.00	.00	.00	0.	*	1	2005	242	.00	.00	.00	0.
1	0740	93	.00	.00	.00	0.	*	1	2010	243	.00	.00	.00	0.
1	0745	94	.00	.00	.00	0.	*	1	2015	244	.00	.00	.00	0.
1	0750	95	.00	.00	.00	0.	*	1	2020	245	.00	.00	.00	0.
1	0755	96	.00	.00	.00	0.	*	1	2025	246	.00	.00	.00	0.
1	0800	97	.00	.00	.00	0.	*	1	2030	247	.00	.00	.00	0.
1	0805	98	.00	.00	.00	0.	*	1	2035	248	.00	.00	.00	0.
1	0810	99	.00	.00	.00	0.	*	1	2040	249	.00	.00	.00	0.
1	0815	100	.00	.00	.00	0.	*	1	2045	250	.00	.00	.00	0.
1	0820	101	.00	.00	.00	0.	*	1	2050	251	.00	.00	.00	0.
1	0825	102	.00	.00	.00	0.	*	1	2055	252	.00	.00	.00	0.
1	0830	103	.00	.00	.00	0.	*	1	2100	253	.00	.00	.00	0.
1	0835	104	.00	.00	.00	0.	*	1	2105	254	.00	.00	.00	0.
1	0840	105	.00	.00	.00	0.	*	1	2110	255	.00	.00	.00	0.
1	0845	106	.00	.00	.00	0.	*	1	2115	256	.00	.00	.00	0.
1	0850	107	.00	.00	.00	0.	*	1	2120	257	.00	.00	.00	0.
1	0855	108	.00	.00	.00	0.	*	1	2125	258	.00	.00	.00	0.
1	0900	109	.00	.00	.00	0.	*	1	2130	259	.00	.00	.00	0.
1	0905	110	.00	.00	.00	0.	*	1	2135	260	.00	.00	.00	0.
1	0910	111	.00	.00	.00	0.	*	1	2140	261	.00	.00	.00	0.
1	0915	112	.00	.00	.00	0.	*	1	2145	262	.00	.00	.00	0.
1	0920	113	.00	.00	.00	0.	*	1	2150	263	.00	.00	.00	0.
1	0925	114	.00	.00	.00	0.	*	1	2155	264	.00	.00	.00	0.
1	0930	115	.00	.00	.00	0.	*	1	2200	265	.00	.00	.00	0.
1	0935	116	.00	.00	.00	0.	*	1	2205	266	.00	.00	.00	0.
1	0940	117	.00	.00	.00	0.	*	1	2210	267	.00	.00	.00	0.
1	0945	118	.00	.00	.00	0.	*	1	2215	268	.00	.00	.00	0.
1	0950	119	.00	.00	.00	0.	*	1	2220	269	.00	.00	.00	0.
1	0955	120	.00	.00	.00	0.	*	1	2225	270	.00	.00	.00	0.
1	1000	121	.00	.00	.00	0.	*	1	2230	271	.00	.00	.00	0.

1	1005	122	.00	.00	.00	0.	*	1	2235	272	.00	.00	.00	0.
1	1010	123	.00	.00	.00	0.	*	1	2240	273	.00	.00	.00	0.
1	1015	124	.00	.00	.00	0.	*	1	2245	274	.00	.00	.00	0.
1	1020	125	.00	.00	.00	0.	*	1	2250	275	.00	.00	.00	0.
1	1025	126	.00	.00	.00	0.	*	1	2255	276	.00	.00	.00	0.
1	1030	127	.00	.00	.00	0.	*	1	2300	277	.00	.00	.00	0.
1	1035	128	.00	.00	.00	0.	*	1	2305	278	.00	.00	.00	0.
1	1040	129	.00	.00	.00	0.	*	1	2310	279	.00	.00	.00	0.
1	1045	130	.00	.00	.00	0.	*	1	2315	280	.00	.00	.00	0.
1	1050	131	.00	.00	.00	0.	*	1	2320	281	.00	.00	.00	0.
1	1055	132	.00	.00	.00	0.	*	1	2325	282	.00	.00	.00	0.
1	1100	133	.00	.00	.00	0.	*	1	2330	283	.00	.00	.00	0.
1	1105	134	.00	.00	.00	0.	*	1	2335	284	.00	.00	.00	0.
1	1110	135	.00	.00	.00	0.	*	1	2340	285	.00	.00	.00	0.
1	1115	136	.00	.00	.00	0.	*	1	2345	286	.00	.00	.00	0.
1	1120	137	.00	.00	.00	0.	*	1	2350	287	.00	.00	.00	0.
1	1125	138	.00	.00	.00	0.	*	1	2355	288	.00	.00	.00	0.
1	1130	139	.00	.00	.00	0.	*	2	0000	289	.00	.00	.00	0.
1	1135	140	.00	.00	.00	0.	*	2	0005	290	.00	.00	.00	0.
1	1140	141	.00	.00	.00	0.	*	2	0010	291	.00	.00	.00	0.
1	1145	142	.00	.00	.00	0.	*	2	0015	292	.00	.00	.00	0.
1	1150	143	.00	.00	.00	0.	*	2	0020	293	.00	.00	.00	0.
1	1155	144	.00	.00	.00	0.	*	2	0025	294	.00	.00	.00	0.
1	1200	145	.00	.00	.00	0.	*	2	0030	295	.00	.00	.00	0.
1	1205	146	.00	.00	.00	0.	*	2	0035	296	.00	.00	.00	0.
1	1210	147	.00	.00	.00	0.	*	2	0040	297	.00	.00	.00	0.
1	1215	148	.00	.00	.00	0.	*	2	0045	298	.00	.00	.00	0.
1	1220	149	.00	.00	.00	0.	*	2	0050	299	.00	.00	.00	0.
1	1225	150	.00	.00	.00	0.	*	2	0055	300	.00	.00	.00	0.

TOTAL RAINFALL = 4.47, TOTAL LOSS = 2.07, TOTAL EXCESS = 2.40

PEAK FLOW + (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ 637.	3.58	97.	24.	23.	23.
	(INCHES)	2.388	2.396	2.396	2.396
	(AC-FT)	48.	48.	48.	48.

CUMULATIVE AREA = .38 SQ MI

WARNING *** TIME INTERVAL IS GREATER THAN .29*LAG

HYDROGRAPH AT STATION NH
PLAN I, RATIO = .99

DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
1	0000	1	.00	.00	.00	0.	1 1230 151	.00	.00	.00	0.				
1	0005	2	.09	.06	.03	6.	1 1235 152	.00	.00	.00	0.				
1	0010	3	.17	.12	.05	31.	1 1240 153	.00	.00	.00	0.				
1	0015	4	.06	.04	.02	62.	1 1245 154	.00	.00	.00	0.				
1	0020	5	.08	.05	.02	73.	1 1250 155	.00	.00	.00	0.				
1	0025	6	.09	.07	.03	73.	1 1255 156	.00	.00	.00	0.				
1	0030	7	.07	.05	.02	72.	1 1300 157	.00	.00	.00	0.				
1	0035	8	.03	.02	.01	68.	1 1305 158	.00	.00	.00	0.				
1	0040	9	.00	.00	.00	54.	1 1310 159	.00	.00	.00	0.				
1	0045	10	.00	.00	.00	34.	1 1315 160	.00	.00	.00	0.				
1	0050	11	.00	.00	.00	19.	1 1320 161	.00	.00	.00	0.				
1	0055	12	.00	.00	.00	10.	1 1325 162	.00	.00	.00	0.				
1	0100	13	.00	.00	.00	6.	1 1330 163	.00	.00	.00	0.				
1	0105	14	.01	.01	.00	4.	1 1335 164	.00	.00	.00	0.				
1	0110	15	.03	.02	.01	7.	1 1340 165	.00	.00	.00	0.				
1	0115	16	.01	.01	.00	12.	1 1345 166	.00	.00	.00	0.				
1	0120	17	.03	.02	.01	14.	1 1350 167	.00	.00	.00	0.				
1	0125	18	.05	.03	.01	18.	1 1355 168	.00	.00	.00	0.				
1	0130	19	.06	.04	.02	25.	1 1400 169	.00	.00	.00	0.				
1	0135	20	.04	.03	.01	34.	1 1405 170	.00	.00	.00	0.				
1	0140	21	.04	.03	.01	38.	1 1410 171	.00	.00	.00	0.				
1	0145	22	.03	.02	.01	37.	1 1415 172	.00	.00	.00	0.				
1	0150	23	.01	.01	.00	32.	1 1420 173	.00	.00	.00	0.				
1	0155	24	.00	.00	.00	25.	1 1425 174	.00	.00	.00	0.				
1	0200	25	.00	.00	.00	17.	1 1430 175	.00	.00	.00	0.				
1	0205	26	.01	.01	.00	11.	1 1435 176	.00	.00	.00	0.				
1	0210	27	.05	.03	.01	12.	1 1440 177	.00	.00	.00	0.				
1	0215	28	.07	.05	.02	22.	1 1445 178	.00	.00	.00	0.				
1	0220	29	.05	.04	.02	35.	1 1450 179	.00	.00	.00	0.				
1	0225	30	.04	.02	.01	43.	1 1455 180	.00	.00	.00	0.				
1	0230	31	.01	.01	.00	41.	1 1500 181	.00	.00	.00	0.				
1	0235	32	.02	.01	.01	33.	1 1505 182	.00	.00	.00	0.				
1	0240	33	.06	.04	.02	30.	1 1510 183	.00	.00	.00	0.				
1	0245	34	.04	.02	.01	37.	1 1515 184	.00	.00	.00	0.				
1	0250	35	.01	.01	.01	40.	1 1520 185	.00	.00	.00	0.				
1	0255	36	.01	.01	.00	34.	1 1525 186	.00	.00	.00	0.				
1	0300	37	.05	.03	.02	29.	1 1530 187	.00	.00	.00	0.				
1	0305	38	.12	.07	.05	42.	1 1535 188	.00	.00	.00	0.				
1	0310	39	.14	.08	.06	76.	1 1540 189	.00	.00	.00	0.				
1	0315	40	.26	.13	.12	129.	1 1545 190	.00	.00	.00	0.				
1	0320	41	.41	.19	.22	225.	1 1550 191	.00	.00	.00	0.				
1	0325	42	.41	.16	.25	366.	1 1555 192	.00	.00	.00	0.				
1	0330	43	.54	.19	.35	530.	1 1600 193	.00	.00	.00	0.				
1	0335	44	.15	.05	.11	647.	1 1605 194	.00	.00	.00	0.				
1	0340	45	.17	.05	.12	611.	1 1610 195	.00	.00	.00	0.				
1	0345	46	.14	.04	.10	506.	1 1615 196	.00	.00	.00	0.				
1	0350	47	.03	.01	.02	393.	1 1620 197	.00	.00	.00	0.				
1	0355	48	.07	.02	.05	293.	1 1625 198	.00	.00	.00	0.				
1	0400	49	.07	.02	.05	221.	1 1630 199	.00	.00	.00	0.				
1	0405	50	.02	.01	.02	177.	1 1635 200	.00	.00	.00	0.				
1	0410	51	.02	.00	.01	137.	1 1640 201	.00	.00	.00	0.				
1	0415	52	.04	.01	.03	100.	1 1645 202	.00	.00	.00	0.				
1	0420	53	.04	.01	.03	83.	1 1650 203	.00	.00	.00	0.				
1	0425	54	.05	.01	.04	82.	1 1655 204	.00	.00	.00	0.				
1	0430	55	.10	.03	.07	99.	1 1700 205	.00	.00	.00	0.				
1	0435	56	.07	.02	.05	129.	1 1705 206	.00	.00	.00	0.				

1	0440	57	.05	.01	.04	145.	*	1	1710	207	.00	.00	.00	0.
1	0445	58	.06	.01	.04	142.	*	1	1715	208	.00	.00	.00	0.
1	0450	59	.09	.02	.07	140.	*	1	1720	209	.00	.00	.00	0.
1	0455	60	.03	.01	.02	143.	*	1	1725	210	.00	.00	.00	0.
1	0500	61	.03	.01	.02	128.	*	1	1730	211	.00	.00	.00	0.
1	0505	62	.01	.00	.01	100.	*	1	1735	212	.00	.00	.00	0.
1	0510	63	.01	.00	.01	72.	*	1	1740	213	.00	.00	.00	0.
1	0515	64	.01	.00	.01	51.	*	1	1745	214	.00	.00	.00	0.
1	0520	65	.00	.00	.00	36.	*	1	1750	215	.00	.00	.00	0.
1	0525	66	.01	.00	.01	28.	*	1	1755	216	.00	.00	.00	0.
1	0530	67	.00	.00	.00	23.	*	1	1800	217	.00	.00	.00	0.
1	0535	68	.00	.00	.00	18.	*	1	1805	218	.00	.00	.00	0.
1	0540	69	.00	.00	.00	14.	*	1	1810	219	.00	.00	.00	0.
1	0545	70	.01	.00	.01	13.	*	1	1815	220	.00	.00	.00	0.
1	0550	71	.00	.00	.00	15.	*	1	1820	221	.00	.00	.00	0.
1	0555	72	.00	.00	.00	14.	*	1	1825	222	.00	.00	.00	0.
1	0600	73	.00	.00	.00	11.	*	1	1830	223	.00	.00	.00	0.
1	0605	74	.00	.00	.00	9.	*	1	1835	224	.00	.00	.00	0.
1	0610	75	.00	.00	.00	7.	*	1	1840	225	.00	.00	.00	0.
1	0615	76	.00	.00	.00	4.	*	1	1845	226	.00	.00	.00	0.
1	0620	77	.00	.00	.00	2.	*	1	1850	227	.00	.00	.00	0.
1	0625	78	.00	.00	.00	1.	*	1	1855	228	.00	.00	.00	0.
1	0630	79	.00	.00	.00	1.	*	1	1900	229	.00	.00	.00	0.
1	0635	80	.00	.00	.00	0.	*	1	1905	230	.00	.00	.00	0.
1	0640	81	.00	.00	.00	0.	*	1	1910	231	.00	.00	.00	0.
1	0645	82	.00	.00	.00	0.	*	1	1915	232	.00	.00	.00	0.
1	0650	83	.00	.00	.00	0.	*	1	1920	233	.00	.00	.00	0.
1	0655	84	.00	.00	.00	0.	*	1	1925	234	.00	.00	.00	0.
1	0700	85	.00	.00	.00	0.	*	1	1930	235	.00	.00	.00	0.
1	0705	86	.00	.00	.00	0.	*	1	1935	236	.00	.00	.00	0.
1	0710	87	.00	.00	.00	0.	*	1	1940	237	.00	.00	.00	0.
1	0715	88	.00	.00	.00	0.	*	1	1945	238	.00	.00	.00	0.
1	0720	89	.00	.00	.00	0.	*	1	1950	239	.00	.00	.00	0.
1	0725	90	.00	.00	.00	0.	*	1	1955	240	.00	.00	.00	0.
1	0730	91	.00	.00	.00	0.	*	1	2000	241	.00	.00	.00	0.
1	0735	92	.00	.00	.00	0.	*	1	2005	242	.00	.00	.00	0.
1	0740	93	.00	.00	.00	0.	*	1	2010	243	.00	.00	.00	0.
1	0745	94	.00	.00	.00	0.	*	1	2015	244	.00	.00	.00	0.
1	0750	95	.00	.00	.00	0.	*	1	2020	245	.00	.00	.00	0.
1	0755	96	.00	.00	.00	0.	*	1	2025	246	.00	.00	.00	0.
1	0800	97	.00	.00	.00	0.	*	1	2030	247	.00	.00	.00	0.
1	0805	98	.00	.00	.00	0.	*	1	2035	248	.00	.00	.00	0.
1	0810	99	.00	.00	.00	0.	*	1	2040	249	.00	.00	.00	0.
1	0815	100	.00	.00	.00	0.	*	1	2045	250	.00	.00	.00	0.
1	0820	101	.00	.00	.00	0.	*	1	2050	251	.00	.00	.00	0.
1	0825	102	.00	.00	.00	0.	*	1	2055	252	.00	.00	.00	0.
1	0830	103	.00	.00	.00	0.	*	1	2100	253	.00	.00	.00	0.
1	0835	104	.00	.00	.00	0.	*	1	2105	254	.00	.00	.00	0.
1	0840	105	.00	.00	.00	0.	*	1	2110	255	.00	.00	.00	0.
1	0845	106	.00	.00	.00	0.	*	1	2115	256	.00	.00	.00	0.
1	0850	107	.00	.00	.00	0.	*	1	2120	257	.00	.00	.00	0.
1	0855	108	.00	.00	.00	0.	*	1	2125	258	.00	.00	.00	0.
1	0900	109	.00	.00	.00	0.	*	1	2130	259	.00	.00	.00	0.
1	0905	110	.00	.00	.00	0.	*	1	2135	260	.00	.00	.00	0.
1	0910	111	.00	.00	.00	0.	*	1	2140	261	.00	.00	.00	0.
1	0915	112	.00	.00	.00	0.	*	1	2145	262	.00	.00	.00	0.
1	0920	113	.00	.00	.00	0.	*	1	2150	263	.00	.00	.00	0.
1	0925	114	.00	.00	.00	0.	*	1	2155	264	.00	.00	.00	0.
1	0930	115	.00	.00	.00	0.	*	1	2200	265	.00	.00	.00	0.
1	0935	116	.00	.00	.00	0.	*	1	2205	266	.00	.00	.00	0.
1	0940	117	.00	.00	.00	0.	*	1	2210	267	.00	.00	.00	0.
1	0945	118	.00	.00	.00	0.	*	1	2215	268	.00	.00	.00	0.
1	0950	119	.00	.00	.00	0.	*	1	2220	269	.00	.00	.00	0.
1	0955	120	.00	.00	.00	0.	*	1	2225	270	.00	.00	.00	0.
1	1000	121	.00	.00	.00	0.	*	1	2230	271	.00	.00	.00	0.

HYDROGRAPH AT STATION CMWN
SUM OF 2 HYDROGRAPHS
PLAN 1, RATIO = .99

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1	0000	1	0.	* 1	0615	76	10.	* 1	1230	151	0.	* 1	1845	226	0.				
1	0005	2	6.	* 1	0620	77	7.	* 1	1235	152	0.	* 1	1850	227	0.				
1	0010	3	33.	* 1	0625	78	4.	* 1	1240	153	0.	* 1	1855	228	0.				
1	0015	4	95.	* 1	0630	79	3.	* 1	1245	154	0.	* 1	1900	229	0.				
1	0020	5	147.	* 1	0635	80	2.	* 1	1250	155	0.	* 1	1905	230	0.				
1	0025	6	163.	* 1	0640	81	1.	* 1	1255	156	0.	* 1	1910	231	0.				
1	0030	7	165.	* 1	0645	82	1.	* 1	1300	157	0.	* 1	1915	232	0.				
1	0035	8	160.	* 1	0650	83	1.	* 1	1305	158	0.	* 1	1920	233	0.				
1	0040	9	139.	* 1	0655	84	0.	* 1	1310	159	0.	* 1	1925	234	0.				
1	0045	10	104.	* 1	0700	85	0.	* 1	1315	160	0.	* 1	1930	235	0.				
1	0050	11	69.	* 1	0705	86	0.	* 1	1320	161	0.	* 1	1935	236	0.				
1	0055	12	43.	* 1	0710	87	0.	* 1	1325	162	0.	* 1	1940	237	0.				
1	0100	13	26.	* 1	0715	88	0.	* 1	1330	163	0.	* 1	1945	238	0.				
1	0105	14	17.	* 1	0720	89	0.	* 1	1335	164	0.	* 1	1950	239	0.				
1	0110	15	16.	* 1	0725	90	0.	* 1	1340	165	0.	* 1	1955	240	0.				
1	0115	16	20.	* 1	0730	91	0.	* 1	1345	166	0.	* 1	2000	241	0.				
1	0120	17	27.	* 1	0735	92	0.	* 1	1350	167	0.	* 1	2005	242	0.				
1	0125	18	35.	* 1	0740	93	0.	* 1	1355	168	0.	* 1	2010	243	0.				
1	0130	19	48.	* 1	0745	94	0.	* 1	1400	169	0.	* 1	2015	244	0.				
1	0135	20	66.	* 1	0750	95	0.	* 1	1405	170	0.	* 1	2020	245	0.				
1	0140	21	80.	* 1	0755	96	0.	* 1	1410	171	0.	* 1	2025	246	0.				
1	0145	22	85.	* 1	0800	97	0.	* 1	1415	172	0.	* 1	2030	247	0.				
1	0150	23	80.	* 1	0805	98	0.	* 1	1420	173	0.	* 1	2035	248	0.				
1	0155	24	67.	* 1	0810	99	0.	* 1	1425	174	0.	* 1	2040	249	0.				
1	0200	25	51.	* 1	0815	100	0.	* 1	1430	175	0.	* 1	2045	250	0.				
1	0205	26	37.	* 1	0820	101	0.	* 1	1435	176	0.	* 1	2050	251	0.				
1	0210	27	32.	* 1	0825	102	0.	* 1	1440	177	0.	* 1	2055	252	0.				
1	0215	28	40.	* 1	0830	103	0.	* 1	1445	178	0.	* 1	2100	253	0.				
1	0220	29	61.	* 1	0835	104	0.	* 1	1450	179	0.	* 1	2105	254	0.				
1	0225	30	84.	* 1	0840	105	0.	* 1	1455	180	0.	* 1	2110	255	0.				
1	0230	31	91.	* 1	0845	106	0.	* 1	1500	181	0.	* 1	2115	256	0.				
1	0235	32	81.	* 1	0850	107	0.	* 1	1505	182	0.	* 1	2120	257	0.				
1	0240	33	72.	* 1	0855	108	0.	* 1	1510	183	0.	* 1	2125	258	0.				
1	0245	34	75.	* 1	0900	109	0.	* 1	1515	184	0.	* 1	2130	259	0.				
1	0250	35	81.	* 1	0905	110	0.	* 1	1520	185	0.	* 1	2135	260	0.				
1	0255	36	77.	* 1	0910	111	0.	* 1	1525	186	0.	* 1	2140	261	0.				
1	0300	37	67.	* 1	0915	112	0.	* 1	1530	187	0.	* 1	2145	262	0.				
1	0305	38	77.	* 1	0920	113	0.	* 1	1535	188	0.	* 1	2150	263	0.				
1	0310	39	124.	* 1	0925	114	0.	* 1	1540	189	0.	* 1	2155	264	0.				
1	0315	40	211.	* 1	0930	115	0.	* 1	1545	190	0.	* 1	2200	265	0.				
1	0320	41	368.	* 1	0935	116	0.	* 1	1550	191	0.	* 1	2205	266	0.				
1	0325	42	600.	* 1	0940	117	0.	* 1	1555	192	0.	* 1	2210	267	0.				
1	0330	43	875.	* 1	0945	118	0.	* 1	1600	193	0.	* 1	2215	268	0.				
1	0335	44	1089.	* 1	0950	119	0.	* 1	1605	194	0.	* 1	2220	269	0.				
1	0340	45	1080.	* 1	0955	120	0.	* 1	1610	195	0.	* 1	2225	270	0.				
1	0345	46	932.	* 1	1000	121	0.	* 1	1615	196	0.	* 1	2230	271	0.				
1	0350	47	745.	* 1	1005	122	0.	* 1	1620	197	0.	* 1	2235	272	0.				
1	0355	48	568.	* 1	1010	123	0.	* 1	1625	198	0.	* 1	2240	273	0.				
1	0400	49	433.	* 1	1015	124	0.	* 1	1630	199	0.	* 1	2245	274	0.				
1	0405	50	342.	* 1	1020	125	0.	* 1	1635	200	0.	* 1	2250	275	0.				
1	0410	51	266.	* 1	1025	126	0.	* 1	1640	201	0.	* 1	2255	276	0.				
1	0415	52	201.	* 1	1030	127	0.	* 1	1645	202	0.	* 1	2300	277	0.				
1	0420	53	160.	* 1	1035	128	0.	* 1	1650	203	0.	* 1	2305	278	0.				
1	0425	54	146.	* 1	1040	129	0.	* 1	1655	204	0.	* 1	2310	279	0.				
1	0430	55	161.	* 1	1045	130	0.	* 1	1700	205	0.	* 1	2315	280	0.				

1	0430	55	159.	*	1	1045	130	0.	*	1	1700	205	0.	*	1	2315	280	0.
1	0435	56	198.	*	1	1050	131	0.	*	1	1705	206	0.	*	1	2320	281	0.
1	0440	57	229.	*	1	1055	132	0.	*	1	1710	207	0.	*	1	2325	282	0.
1	0445	58	233.	*	1	1100	133	0.	*	1	1715	208	0.	*	1	2330	283	0.
1	0450	59	232.	*	1	1105	134	0.	*	1	1720	209	0.	*	1	2335	284	0.
1	0455	60	235.	*	1	1110	135	0.	*	1	1725	210	0.	*	1	2340	285	0.
1	0500	61	217.	*	1	1115	136	0.	*	1	1730	211	0.	*	1	2345	286	0.
1	0505	62	180.	*	1	1120	137	0.	*	1	1735	212	0.	*	1	2350	287	0.
1	0510	63	138.	*	1	1125	138	0.	*	1	1740	213	0.	*	1	2355	288	0.
1	0515	64	101.	*	1	1130	139	0.	*	1	1745	214	0.	*	2	0000	289	0.
1	0520	65	74.	*	1	1135	140	0.	*	1	1750	215	0.	*	2	0005	290	0.
1	0525	66	56.	*	1	1140	141	0.	*	1	1755	216	0.	*	2	0010	291	0.
1	0530	67	45.	*	1	1145	142	0.	*	1	1800	217	0.	*	2	0015	292	0.
1	0535	68	36.	*	1	1150	143	0.	*	1	1805	218	0.	*	2	0020	293	0.
1	0540	69	28.	*	1	1155	144	0.	*	1	1810	219	0.	*	2	0025	294	0.
1	0545	70	24.	*	1	1200	145	0.	*	1	1815	220	0.	*	2	0030	295	0.
1	0550	71	25.	*	1	1205	146	0.	*	1	1820	221	0.	*	2	0035	296	0.
1	0555	72	23.	*	1	1210	147	0.	*	1	1825	222	0.	*	2	0040	297	0.
1	0600	73	21.	*	1	1215	148	0.	*	1	1830	223	0.	*	2	0045	298	0.
1	0605	74	18.	*	1	1220	149	0.	*	1	1835	224	0.	*	2	0050	299	0.
1	0610	75	14.	*	1	1225	150	0.	*	1	1840	225	0.	*	2	0055	300	0.

PEAK FLOW + (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
1073.	3.58	179.	45.	43.	43.
	(INCHES)	2.813	2.825	2.825	2.825
	(AC-FT)	89.	89.	89.	89.

CUMULATIVE AREA = .59 SQ MI

HYDROGRAPH AT STATION CMWN
SUM OF 2 HYDROGRAPHS
PLAN 1, RATIO = .98

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1	0000	1	0.	* 1	0615	76	10.	* 1	1230	151	0.	* 1	1845	226	0.				
1	0005	2	6.	* 1	0620	77	7.	* 1	1235	152	0.	* 1	1850	227	0.				
1	0010	3	33.	* 1	0625	78	4.	* 1	1240	153	0.	* 1	1855	228	0.				
1	0015	4	94.	* 1	0630	79	3.	* 1	1245	154	0.	* 1	1900	229	0.				
1	0020	5	145.	* 1	0635	80	2.	* 1	1250	155	0.	* 1	1905	230	0.				
1	0025	6	161.	* 1	0640	81	1.	* 1	1255	156	0.	* 1	1910	231	0.				
1	0030	7	164.	* 1	0645	82	1.	* 1	1300	157	0.	* 1	1915	232	0.				
1	0035	8	159.	* 1	0650	83	1.	* 1	1305	158	0.	* 1	1920	233	0.				
1	0040	9	137.	* 1	0655	84	0.	* 1	1310	159	0.	* 1	1925	234	0.				
1	0045	10	103.	* 1	0700	85	0.	* 1	1315	160	0.	* 1	1930	235	0.				
1	0050	11	68.	* 1	0705	86	0.	* 1	1320	161	0.	* 1	1935	236	0.				
1	0055	12	42.	* 1	0710	87	0.	* 1	1325	162	0.	* 1	1940	237	0.				
1	0100	13	26.	* 1	0715	88	0.	* 1	1330	163	0.	* 1	1945	238	0.				
1	0105	14	17.	* 1	0720	89	0.	* 1	1335	164	0.	* 1	1950	239	0.				
1	0110	15	16.	* 1	0725	90	0.	* 1	1340	165	0.	* 1	1955	240	0.				
1	0115	16	20.	* 1	0730	91	0.	* 1	1345	166	0.	* 1	2000	241	0.				
1	0120	17	27.	* 1	0735	92	0.	* 1	1350	167	0.	* 1	2005	242	0.				
1	0125	18	35.	* 1	0740	93	0.	* 1	1355	168	0.	* 1	2010	243	0.				
1	0130	19	47.	* 1	0745	94	0.	* 1	1400	169	0.	* 1	2015	244	0.				
1	0135	20	65.	* 1	0750	95	0.	* 1	1405	170	0.	* 1	2020	245	0.				
1	0140	21	79.	* 1	0755	96	0.	* 1	1410	171	0.	* 1	2025	246	0.				
1	0145	22	84.	* 1	0800	97	0.	* 1	1415	172	0.	* 1	2030	247	0.				
1	0150	23	79.	* 1	0805	98	0.	* 1	1420	173	0.	* 1	2035	248	0.				
1	0155	24	66.	* 1	0810	99	0.	* 1	1425	174	0.	* 1	2040	249	0.				
1	0200	25	50.	* 1	0815	100	0.	* 1	1430	175	0.	* 1	2045	250	0.				
1	0205	26	37.	* 1	0820	101	0.	* 1	1435	176	0.	* 1	2050	251	0.				
1	0210	27	31.	* 1	0825	102	0.	* 1	1440	177	0.	* 1	2055	252	0.				
1	0215	28	39.	* 1	0830	103	0.	* 1	1445	178	0.	* 1	2100	253	0.				
1	0220	29	60.	* 1	0835	104	0.	* 1	1450	179	0.	* 1	2105	254	0.				
1	0225	30	83.	* 1	0840	105	0.	* 1	1455	180	0.	* 1	2110	255	0.				
1	0230	31	89.	* 1	0845	106	0.	* 1	1500	181	0.	* 1	2115	256	0.				
1	0235	32	80.	* 1	0850	107	0.	* 1	1505	182	0.	* 1	2120	257	0.				
1	0240	33	71.	* 1	0855	108	0.	* 1	1510	183	0.	* 1	2125	258	0.				
1	0245	34	74.	* 1	0900	109	0.	* 1	1515	184	0.	* 1	2130	259	0.				
1	0250	35	80.	* 1	0905	110	0.	* 1	1520	185	0.	* 1	2135	260	0.				
1	0255	36	76.	* 1	0910	111	0.	* 1	1525	186	0.	* 1	2140	261	0.				
1	0300	37	66.	* 1	0915	112	0.	* 1	1530	187	0.	* 1	2145	262	0.				
1	0305	38	76.	* 1	0920	113	0.	* 1	1535	188	0.	* 1	2150	263	0.				
1	0310	39	122.	* 1	0925	114	0.	* 1	1540	189	0.	* 1	2155	264	0.				
1	0315	40	208.	* 1	0930	115	0.	* 1	1545	190	0.	* 1	2200	265	0.				
1	0320	41	362.	* 1	0935	116	0.	* 1	1550	191	0.	* 1	2205	266	0.				
1	0325	42	591.	* 1	0940	117	0.	* 1	1555	192	0.	* 1	2210	267	0.				
1	0330	43	863.	* 1	0945	118	0.	* 1	1600	193	0.	* 1	2215	268	0.				
1	0335	44	1073.	* 1	0950	119	0.	* 1	1605	194	0.	* 1	2220	269	0.				
1	0340	45	1065.	* 1	0955	120	0.	* 1	1610	195	0.	* 1	2225	270	0.				
1	0345	46	920.	* 1	1000	121	0.	* 1	1615	196	0.	* 1	2230	271	0.				
1	0350	47	735.	* 1	1005	122	0.	* 1	1620	197	0.	* 1	2235	272	0.				
1	0355	48	561.	* 1	1010	123	0.	* 1	1625	198	0.	* 1	2240	273	0.				
1	0400	49	427.	* 1	1015	124	0.	* 1	1630	199	0.	* 1	2245	274	0.				
1	0405	50	337.	* 1	1020	125	0.	* 1	1635	200	0.	* 1	2250	275	0.				
1	0410	51	263.	* 1	1025	126	0.	* 1	1640	201	0.	* 1	2255	276	0.				
1	0415	52	198.	* 1	1030	127	0.	* 1	1645	202	0.	* 1	2300	277	0.				
1	0420	53	158.	* 1	1035	128	0.	* 1	1650	203	0.	* 1	2305	278	0.				
1	0425	54	144.	* 1	1040	129	0.	* 1	1655	204	0.	* 1	2310	279	0.				

H • NAWN * NY 6E

CUMULATIVE AREA = .38 SQ MI

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW	(CFS)	(HR)	(CFS)	(INCHES)	(AC-FT)
1.20, TOTAL LOSS =	6-HR	24-HR	15	87	3.58	7.368	7.369
.83, TOTAL EXCESS =	72-HR	24-HR	4	4	4	7.369	7.369
	24-HR	24-HR	4			7.369	7.369

1	1005	122	.00	.00	.00	0.	*	1	2235	272	.00	.00	.00	.00	0.
1	1010	123	.00	.00	.00	0.	•	1	2240	273	.00	.00	.00	.00	0.
1	1015	124	.00	.00	.00	0.	•	1	2245	274	.00	.00	.00	.00	0.
1	1020	125	.00	.00	.00	0.	*	1	2250	275	.00	.00	.00	.00	0.
1	1025	126	.00	.00	.00	0.	*	1	2255	276	.00	.00	.00	.00	0.
1	1030	127	.00	.00	.00	0.	*	1	2300	277	.00	.00	.00	.00	0.
1	1035	128	.00	.00	.00	0.	*	1	2305	278	.00	.00	.00	.00	0.
1	1040	129	.00	.00	.00	0.	*	1	2310	279	.00	.00	.00	.00	0.
1	1045	130	.00	.00	.00	0.	*	1	2315	280	.00	.00	.00	.00	0.
1	1050	131	.00	.00	.00	0.	•	1	2320	281	.00	.00	.00	.00	0.
1	1055	132	.00	.00	.00	0.	•	1	2325	282	.00	.00	.00	.00	0.
1	1100	133	.00	.00	.00	0.	•	1	2330	283	.00	.00	.00	.00	0.
1	1105	134	.00	.00	.00	0.	*	1	2335	284	.00	.00	.00	.00	0.
1	1110	135	.00	.00	.00	0.	•	1	2340	285	.00	.00	.00	.00	0.
1	1115	136	.00	.00	.00	0.	*	1	2345	286	.00	.00	.00	.00	0.
1	1120	137	.00	.00	.00	0.	*	1	2350	287	.00	.00	.00	.00	0.
1	1125	138	.00	.00	.00	0.	*	1	2355	288	.00	.00	.00	.00	0.
1	1130	139	.00	.00	.00	0.	*	2	0000	289	.00	.00	.00	.00	0.
1	1135	140	.00	.00	.00	0.	*	2	0005	290	.00	.00	.00	.00	0.
1	1140	141	.00	.00	.00	0.	*	2	0010	291	.00	.00	.00	.00	0.
1	1145	142	.00	.00	.00	0.	*	2	0015	292	.00	.00	.00	.00	0.
1	1150	143	.00	.00	.00	0.	•	2	0020	293	.00	.00	.00	.00	0.
1	1155	144	.00	.00	.00	0.	*	2	0025	294	.00	.00	.00	.00	0.
1	1200	145	.00	.00	.00	0.	*	2	0030	295	.00	.00	.00	.00	0.
1	1205	146	.00	.00	.00	0.	*	2	0035	296	.00	.00	.00	.00	0.
1	1210	147	.00	.00	.00	0.	*	2	0040	297	.00	.00	.00	.00	0.
1	1215	148	.00	.00	.00	0.	*	2	0045	298	.00	.00	.00	.00	0.
1	1220	149	.00	.00	.00	0.	*	2	0050	299	.00	.00	.00	.00	0.
1	1225	150	.00	.00	.00	0.	*	2	0055	300	.00	.00	.00	.00	0.

1	0440	57	.01	.01	.00	18.	*	1	1710	207	.00	.00	.00	0.
1	0445	58	.02	.01	.01	17.	*	1	1715	208	.00	.00	.00	0.
1	0450	59	.02	.02	.01	17.	*	1	1720	209	.00	.00	.00	0.
1	0455	60	.01	.00	.00	18.	*	1	1725	210	.00	.00	.00	0.
1	0500	61	.01	.00	.00	16.	*	1	1730	211	.00	.00	.00	0.
1	0505	62	.00	.00	.00	12.	*	1	1735	212	.00	.00	.00	0.
1	0510	63	.00	.00	.00	9.	*	1	1740	213	.00	.00	.00	0.
1	0515	64	.00	.00	.00	6.	*	1	1745	214	.00	.00	.00	0.
1	0520	65	.00	.00	.00	5.	*	1	1750	215	.00	.00	.00	0.
1	0525	66	.00	.00	.00	3.	*	1	1755	216	.00	.00	.00	0.
1	0530	67	.00	.00	.00	3.	*	1	1800	217	.00	.00	.00	0.
1	0535	68	.00	.00	.00	2.	*	1	1805	218	.00	.00	.00	0.
1	0540	69	.00	.00	.00	2.	*	1	1810	219	.00	.00	.00	0.
1	0545	70	.00	.00	.00	2.	*	1	1815	220	.00	.00	.00	0.
1	0550	71	.00	.00	.00	2.	*	1	1820	221	.00	.00	.00	0.
1	0555	72	.00	.00	.00	2.	*	1	1825	222	.00	.00	.00	0.
1	0600	73	.00	.00	.00	1.	*	1	1830	223	.00	.00	.00	0.
1	0605	74	.00	.00	.00	1.	*	1	1835	224	.00	.00	.00	0.
1	0610	75	.00	.00	.00	1.	*	1	1840	225	.00	.00	.00	0.
1	0615	76	.00	.00	.00	1.	*	1	1845	226	.00	.00	.00	0.
1	0620	77	.00	.00	.00	0.	*	1	1850	227	.00	.00	.00	0.
1	0625	78	.00	.00	.00	0.	*	1	1855	228	.00	.00	.00	0.
1	0630	79	.00	.00	.00	0.	*	1	1900	229	.00	.00	.00	0.
1	0635	80	.00	.00	.00	0.	*	1	1905	230	.00	.00	.00	0.
1	0640	81	.00	.00	.00	0.	*	1	1910	231	.00	.00	.00	0.
1	0645	82	.00	.00	.00	0.	*	1	1915	232	.00	.00	.00	0.
1	0650	83	.00	.00	.00	0.	*	1	1920	233	.00	.00	.00	0.
1	0655	84	.00	.00	.00	0.	*	1	1925	234	.00	.00	.00	0.
1	0700	85	.00	.00	.00	0.	*	1	1930	235	.00	.00	.00	0.
1	0705	86	.00	.00	.00	0.	*	1	1935	236	.00	.00	.00	0.
1	0710	87	.00	.00	.00	0.	*	1	1940	237	.00	.00	.00	0.
1	0715	88	.00	.00	.00	0.	*	1	1945	238	.00	.00	.00	0.
1	0720	89	.00	.00	.00	0.	*	1	1950	239	.00	.00	.00	0.
1	0725	90	.00	.00	.00	0.	*	1	1955	240	.00	.00	.00	0.
1	0730	91	.00	.00	.00	0.	*	1	2000	241	.00	.00	.00	0.
1	0735	92	.00	.00	.00	0.	*	1	2005	242	.00	.00	.00	0.
1	0740	93	.00	.00	.00	0.	*	1	2010	243	.00	.00	.00	0.
1	0745	94	.00	.00	.00	0.	*	1	2015	244	.00	.00	.00	0.
1	0750	95	.00	.00	.00	0.	*	1	2020	245	.00	.00	.00	0.
1	0755	96	.00	.00	.00	0.	*	1	2025	246	.00	.00	.00	0.
1	0800	97	.00	.00	.00	0.	*	1	2030	247	.00	.00	.00	0.
1	0805	98	.00	.00	.00	0.	*	1	2035	248	.00	.00	.00	0.
1	0810	99	.00	.00	.00	0.	*	1	2040	249	.00	.00	.00	0.
1	0815	100	.00	.00	.00	0.	*	1	2045	250	.00	.00	.00	0.
1	0820	101	.00	.00	.00	0.	*	1	2050	251	.00	.00	.00	0.
1	0825	102	.00	.00	.00	0.	*	1	2055	252	.00	.00	.00	0.
1	0830	103	.00	.00	.00	0.	*	1	2100	253	.00	.00	.00	0.
1	0835	104	.00	.00	.00	0.	*	1	2105	254	.00	.00	.00	0.
1	0840	105	.00	.00	.00	0.	*	1	2110	255	.00	.00	.00	0.
1	0845	106	.00	.00	.00	0.	*	1	2115	256	.00	.00	.00	0.
1	0850	107	.00	.00	.00	0.	*	1	2120	257	.00	.00	.00	0.
1	0855	108	.00	.00	.00	0.	*	1	2125	258	.00	.00	.00	0.
1	0900	109	.00	.00	.00	0.	*	1	2130	259	.00	.00	.00	0.
1	0905	110	.00	.00	.00	0.	*	1	2135	260	.00	.00	.00	0.
1	0910	111	.00	.00	.00	0.	*	1	2140	261	.00	.00	.00	0.
1	0915	112	.00	.00	.00	0.	*	1	2145	262	.00	.00	.00	0.
1	0920	113	.00	.00	.00	0.	*	1	2150	263	.00	.00	.00	0.
1	0925	114	.00	.00	.00	0.	*	1	2155	264	.00	.00	.00	0.
1	0930	115	.00	.00	.00	0.	*	1	2200	265	.00	.00	.00	0.
1	0935	116	.00	.00	.00	0.	*	1	2205	266	.00	.00	.00	0.
1	0940	117	.00	.00	.00	0.	*	1	2210	267	.00	.00	.00	0.
1	0945	118	.00	.00	.00	0.	*	1	2215	268	.00	.00	.00	0.
1	0950	119	.00	.00	.00	0.	*	1	2220	269	.00	.00	.00	0.
1	0955	120	.00	.00	.00	0.	*	1	2225	270	.00	.00	.00	0.
1	1000	121	.00	.00	.00	0.	*	1	2230	271	.00	.00	.00	0.

HYDROGRAPH AT STATION NH
PLAN 1, RATIO = .26

DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
1	0000	1	.00	.00	.00	0.	*	1	1230	151	.00	.00	.00	0.	
1	0005	2	.02	.02	.01	2.	*	1	1235	152	.00	.00	.00	0.	
1	0010	3	.04	.03	.01	8.	*	1	1240	153	.00	.00	.00	0.	
1	0015	4	.02	.01	.00	16.	*	1	1245	154	.00	.00	.00	0.	
1	0020	5	.02	.01	.01	19.	*	1	1250	155	.00	.00	.00	0.	
1	0025	6	.03	.02	.01	19.	*	1	1255	156	.00	.00	.00	0.	
1	0030	7	.02	.01	.01	19.	*	1	1300	157	.00	.00	.00	0.	
1	0035	8	.01	.01	.00	18.	*	1	1305	158	.00	.00	.00	0.	
1	0040	9	.00	.00	.00	14.	*	1	1310	159	.00	.00	.00	0.	
1	0045	10	.00	.00	.00	9.	*	1	1315	160	.00	.00	.00	0.	
1	0050	11	.00	.00	.00	5.	*	1	1320	161	.00	.00	.00	0.	
1	0055	12	.00	.00	.00	3.	*	1	1325	162	.00	.00	.00	0.	
1	0100	13	.00	.00	.00	2.	*	1	1330	163	.00	.00	.00	0.	
1	0105	14	.00	.00	.00	1.	*	1	1335	164	.00	.00	.00	0.	
1	0110	15	.01	.01	.00	2.	*	1	1340	165	.00	.00	.00	0.	
1	0115	16	.00	.00	.00	3.	*	1	1345	166	.00	.00	.00	0.	
1	0120	17	.01	.01	.00	4.	*	1	1350	167	.00	.00	.00	0.	
1	0125	18	.01	.01	.00	5.	*	1	1355	168	.00	.00	.00	0.	
1	0130	19	.02	.01	.01	7.	*	1	1400	169	.00	.00	.00	0.	
1	0135	20	.01	.01	.00	9.	*	1	1405	170	.00	.00	.00	0.	
1	0140	21	.01	.01	.00	10.	*	1	1410	171	.00	.00	.00	0.	
1	0145	22	.01	.01	.00	10.	*	1	1415	172	.00	.00	.00	0.	
1	0150	23	.00	.00	.00	9.	*	1	1420	173	.00	.00	.00	0.	
1	0155	24	.00	.00	.00	7.	*	1	1425	174	.00	.00	.00	0.	
1	0200	25	.00	.00	.00	4.	*	1	1430	175	.00	.00	.00	0.	
1	0205	26	.00	.00	.00	3.	*	1	1435	176	.00	.00	.00	0.	
1	0210	27	.01	.01	.00	3.	*	1	1440	177	.00	.00	.00	0.	
1	0215	28	.02	.01	.01	6.	*	1	1445	178	.00	.00	.00	0.	
1	0220	29	.01	.01	.00	9.	*	1	1450	179	.00	.00	.00	0.	
1	0225	30	.01	.01	.00	11.	*	1	1455	180	.00	.00	.00	0.	
1	0230	31	.00	.00	.00	10.	*	1	1500	181	.00	.00	.00	0.	
1	0235	32	.01	.00	.00	8.	*	1	1505	182	.00	.00	.00	0.	
1	0240	33	.02	.01	.01	7.	*	1	1510	183	.00	.00	.00	0.	
1	0245	34	.01	.01	.00	8.	*	1	1515	184	.00	.00	.00	0.	
1	0250	35	.00	.00	.00	9.	*	1	1520	185	.00	.00	.00	0.	
1	0255	36	.00	.00	.00	7.	*	1	1525	186	.00	.00	.00	0.	
1	0300	37	.01	.01	.00	6.	*	1	1530	187	.00	.00	.00	0.	
1	0305	38	.03	.02	.01	8.	*	1	1535	188	.00	.00	.00	0.	
1	0310	39	.04	.03	.01	15.	*	1	1540	189	.00	.00	.00	0.	
1	0315	40	.07	.05	.02	24.	*	1	1545	190	.00	.00	.00	0.	
1	0320	41	.11	.08	.03	38.	*	1	1550	191	.00	.00	.00	0.	
1	0325	42	.11	.08	.03	57.	*	1	1555	192	.00	.00	.00	0.	
1	0330	43	.14	.10	.04	76.	*	1	1600	193	.00	.00	.00	0.	
1	0335	44	.04	.03	.01	87.	*	1	1605	194	.00	.00	.00	0.	
1	0340	45	.04	.03	.01	78.	*	1	1610	195	.00	.00	.00	0.	
1	0345	46	.04	.03	.01	63.	*	1	1615	196	.00	.00	.00	0.	
1	0350	47	.01	.01	.00	47.	*	1	1620	197	.00	.00	.00	0.	
1	0355	48	.02	.01	.01	35.	*	1	1625	198	.00	.00	.00	0.	
1	0400	49	.02	.01	.01	26.	*	1	1630	199	.00	.00	.00	0.	
1	0405	50	.01	.00	.00	21.	*	1	1635	200	.00	.00	.00	0.	
1	0410	51	.00	.00	.00	16.	*	1	1640	201	.00	.00	.00	0.	
1	0415	52	.01	.01	.00	12.	*	1	1645	202	.00	.00	.00	0.	
1	0420	53	.01	.01	.00	10.	*	1	1650	203	.00	.00	.00	0.	
1	0425	54	.01	.01	.00	10.	*	1	1655	204	.00	.00	.00	0.	
1	0430	55	.03	.02	.01	12.	*	1	1700	205	.00	.00	.00	0.	
1	0435	56	.02	.01	.01	15.	*	1	1705	206	.00	.00	.00	0.	

1	1010	123	.00	.00	.00	0.	*	1	2240	273	.00	.00	.00	0.
1	1015	124	.00	.00	.00	0.	*	1	2245	274	.00	.00	.00	0.
1	1020	125	.00	.00	.00	0.	*	1	2250	275	.00	.00	.00	0.
1	1025	126	.00	.00	.00	0.	*	1	2255	276	.00	.00	.00	0.
1	1030	127	.00	.00	.00	0.	*	1	2300	277	.00	.00	.00	0.
1	1035	128	.00	.00	.00	0.	*	1	2305	278	.00	.00	.00	0.
1	1040	129	.00	.00	.00	0.	*	1	2310	279	.00	.00	.00	0.
1	1045	130	.00	.00	.00	0.	*	1	2315	280	.00	.00	.00	0.
1	1050	131	.00	.00	.00	0.	*	1	2320	281	.00	.00	.00	0.
1	1055	132	.00	.00	.00	0.	*	1	2325	282	.00	.00	.00	0.
1	1100	133	.00	.00	.00	0.	*	1	2330	283	.00	.00	.00	0.
1	1105	134	.00	.00	.00	0.	*	1	2335	284	.00	.00	.00	0.
1	1110	135	.00	.00	.00	0.	*	1	2340	285	.00	.00	.00	0.
1	1115	136	.00	.00	.00	0.	*	1	2345	286	.00	.00	.00	0.
1	1120	137	.00	.00	.00	0.	*	1	2350	287	.00	.00	.00	0.
1	1125	138	.00	.00	.00	0.	*	1	2355	288	.00	.00	.00	0.
1	1130	139	.00	.00	.00	0.	*	2	0000	289	.00	.00	.00	0.
1	1135	140	.00	.00	.00	0.	*	2	0005	290	.00	.00	.00	0.
1	1140	141	.00	.00	.00	0.	*	2	0010	291	.00	.00	.00	0.
1	1145	142	.00	.00	.00	0.	*	2	0015	292	.00	.00	.00	0.
1	1150	143	.00	.00	.00	0.	*	2	0020	293	.00	.00	.00	0.
1	1155	144	.00	.00	.00	0.	*	2	0025	294	.00	.00	.00	0.
1	1200	145	.00	.00	.00	0.	*	2	0030	295	.00	.00	.00	0.
1	1205	146	.00	.00	.00	0.	*	2	0035	296	.00	.00	.00	0.
1	1210	147	.00	.00	.00	0.	*	2	0040	297	.00	.00	.00	0.
1	1215	148	.00	.00	.00	0.	*	2	0045	298	.00	.00	.00	0.
1	1220	149	.00	.00	.00	0.	*	2	0050	299	.00	.00	.00	0.
1	1225	150	.00	.00	.00	0.	*	2	0055	300	.00	.00	.00	0.

TOTAL RAINFALL = 1.86, TOTAL LOSS = 1.20, TOTAL EXCESS = .66

PEAK FLOW + (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
	(CFS)				
+ 150.	3.58	27.	7.	6.	6.
	(INCHES)	.660	.663	.663	.663
	(AC-FT)	13.	13.	13.	13.

CUMULATIVE AREA = .38 SQ MI

WARNING *** TIME INTERVAL IS GREATER THAN .29*LAG

1	0445	58	.02	.01	.01	37.	*	1	1715	208	.00	.00	.00	0.
1	0450	59	.04	.02	.02	37.	*	1	1720	209	.00	.00	.00	0.
1	0455	60	.01	.01	.01	38.	*	1	1725	210	.00	.00	.00	0.
1	0500	61	.01	.01	.01	34.	*	1	1730	211	.00	.00	.00	0.
1	0505	62	.01	.00	.00	27.	*	1	1735	212	.00	.00	.00	0.
1	0510	63	.00	.00	.00	19.	*	1	1740	213	.00	.00	.00	0.
1	0515	64	.00	.00	.00	14.	*	1	1745	214	.00	.00	.00	0.
1	0520	65	.00	.00	.00	10.	*	1	1750	215	.00	.00	.00	0.
1	0525	66	.01	.00	.00	7.	*	1	1755	216	.00	.00	.00	0.
1	0530	67	.00	.00	.00	6.	*	1	1800	217	.00	.00	.00	0.
1	0535	68	.00	.00	.00	5.	*	1	1805	218	.00	.00	.00	0.
1	0540	69	.00	.00	.00	4.	*	1	1810	219	.00	.00	.00	0.
1	0545	70	.01	.00	.00	4.	*	1	1815	220	.00	.00	.00	0.
1	0550	71	.00	.00	.00	4.	*	1	1820	221	.00	.00	.00	0.
1	0555	72	.00	.00	.00	4.	*	1	1825	222	.00	.00	.00	0.
1	0600	73	.00	.00	.00	3.	*	1	1830	223	.00	.00	.00	0.
1	0605	74	.00	.00	.00	3.	*	1	1835	224	.00	.00	.00	0.
1	0610	75	.00	.00	.00	2.	*	1	1840	225	.00	.00	.00	0.
1	0615	76	.00	.00	.00	1.	*	1	1845	226	.00	.00	.00	0.
1	0620	77	.00	.00	.00	1.	*	1	1850	227	.00	.00	.00	0.
1	0625	78	.00	.00	.00	0.	*	1	1855	228	.00	.00	.00	0.
1	0630	79	.00	.00	.00	0.	*	1	1900	229	.00	.00	.00	0.
1	0635	80	.00	.00	.00	0.	*	1	1905	230	.00	.00	.00	0.
1	0640	81	.00	.00	.00	0.	*	1	1910	231	.00	.00	.00	0.
1	0645	82	.00	.00	.00	0.	*	1	1915	232	.00	.00	.00	0.
1	0650	83	.00	.00	.00	0.	*	1	1920	233	.00	.00	.00	0.
1	0655	84	.00	.00	.00	0.	*	1	1925	234	.00	.00	.00	0.
1	0700	85	.00	.00	.00	0.	*	1	1930	235	.00	.00	.00	0.
1	0705	86	.00	.00	.00	0.	*	1	1935	236	.00	.00	.00	0.
1	0710	87	.00	.00	.00	0.	*	1	1940	237	.00	.00	.00	0.
1	0715	88	.00	.00	.00	0.	*	1	1945	238	.00	.00	.00	0.
1	0720	89	.00	.00	.00	0.	*	1	1950	239	.00	.00	.00	0.
1	0725	90	.00	.00	.00	0.	*	1	1955	240	.00	.00	.00	0.
1	0730	91	.00	.00	.00	0.	*	1	2000	241	.00	.00	.00	0.
1	0735	92	.00	.00	.00	0.	*	1	2005	242	.00	.00	.00	0.
1	0740	93	.00	.00	.00	0.	*	1	2010	243	.00	.00	.00	0.
1	0745	94	.00	.00	.00	0.	*	1	2015	244	.00	.00	.00	0.
1	0750	95	.00	.00	.00	0.	*	1	2020	245	.00	.00	.00	0.
1	0755	96	.00	.00	.00	0.	*	1	2025	246	.00	.00	.00	0.
1	0800	97	.00	.00	.00	0.	*	1	2030	247	.00	.00	.00	0.
1	0805	98	.00	.00	.00	0.	*	1	2035	248	.00	.00	.00	0.
1	0810	99	.00	.00	.00	0.	*	1	2040	249	.00	.00	.00	0.
1	0815	100	.00	.00	.00	0.	*	1	2045	250	.00	.00	.00	0.
1	0820	101	.00	.00	.00	0.	*	1	2050	251	.00	.00	.00	0.
1	0825	102	.00	.00	.00	0.	*	1	2055	252	.00	.00	.00	0.
1	0830	103	.00	.00	.00	0.	*	1	2100	253	.00	.00	.00	0.
1	0835	104	.00	.00	.00	0.	*	1	2105	254	.00	.00	.00	0.
1	0840	105	.00	.00	.00	0.	*	1	2110	255	.00	.00	.00	0.
1	0845	106	.00	.00	.00	0.	*	1	2115	256	.00	.00	.00	0.
1	0850	107	.00	.00	.00	0.	*	1	2120	257	.00	.00	.00	0.
1	0855	108	.00	.00	.00	0.	*	1	2125	258	.00	.00	.00	0.
1	0900	109	.00	.00	.00	0.	*	1	2130	259	.00	.00	.00	0.
1	0905	110	.00	.00	.00	0.	*	1	2135	260	.00	.00	.00	0.
1	0910	111	.00	.00	.00	0.	*	1	2140	261	.00	.00	.00	0.
1	0915	112	.00	.00	.00	0.	*	1	2145	262	.00	.00	.00	0.
1	0920	113	.00	.00	.00	0.	*	1	2150	263	.00	.00	.00	0.
1	0925	114	.00	.00	.00	0.	*	1	2155	264	.00	.00	.00	0.
1	0930	115	.00	.00	.00	0.	*	1	2200	265	.00	.00	.00	0.
1	0935	116	.00	.00	.00	0.	*	1	2205	266	.00	.00	.00	0.
1	0940	117	.00	.00	.00	0.	*	1	2210	267	.00	.00	.00	0.
1	0945	118	.00	.00	.00	0.	*	1	2215	268	.00	.00	.00	0.
1	0950	119	.00	.00	.00	0.	*	1	2220	269	.00	.00	.00	0.
1	0955	120	.00	.00	.00	0.	*	1	2225	270	.00	.00	.00	0.
1	1000	121	.00	.00	.00	0.	*	1	2230	271	.00	.00	.00	0.
1	1005	122	.00	.00	.00	0.	*	1	2235	272	.00	.00	.00	0.

HYDROGRAPH AT STATION NH
PLAN 1, RATIO = .41

DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
1	0000	1	.00	.00	.00	0.	*	1	1230	151	.00	.00	.00	0.	
1	0005	2	.04	.03	.01	3.	*	1	1235	152	.00	.00	.00	0.	
1	0010	3	.07	.05	.02	13.	*	1	1240	153	.00	.00	.00	0.	
1	0015	4	.02	.02	.01	25.	*	1	1245	154	.00	.00	.00	0.	
1	0020	5	.03	.02	.01	30.	*	1	1250	155	.00	.00	.00	0.	
1	0025	6	.04	.03	.01	30.	*	1	1255	156	.00	.00	.00	0.	
1	0030	7	.03	.02	.01	30.	*	1	1300	157	.00	.00	.00	0.	
1	0035	8	.01	.01	.00	28.	*	1	1305	158	.00	.00	.00	0.	
1	0040	9	.00	.00	.00	22.	*	1	1310	159	.00	.00	.00	0.	
1	0045	10	.00	.00	.00	14.	*	1	1315	160	.00	.00	.00	0.	
1	0050	11	.00	.00	.00	8.	*	1	1320	161	.00	.00	.00	0.	
1	0055	12	.00	.00	.00	4.	*	1	1325	162	.00	.00	.00	0.	
1	0100	13	.00	.00	.00	2.	*	1	1330	163	.00	.00	.00	0.	
1	0105	14	.01	.00	.00	2.	*	1	1335	164	.00	.00	.00	0.	
1	0110	15	.01	.01	.00	3.	*	1	1340	165	.00	.00	.00	0.	
1	0115	16	.00	.00	.00	5.	*	1	1345	166	.00	.00	.00	0.	
1	0120	17	.01	.01	.00	6.	*	1	1350	167	.00	.00	.00	0.	
1	0125	18	.02	.01	.01	7.	*	1	1355	168	.00	.00	.00	0.	
1	0130	19	.03	.02	.01	10.	*	1	1400	169	.00	.00	.00	0.	
1	0135	20	.02	.01	.01	14.	*	1	1405	170	.00	.00	.00	0.	
1	0140	21	.02	.01	.01	16.	*	1	1410	171	.00	.00	.00	0.	
1	0145	22	.01	.01	.00	15.	*	1	1415	172	.00	.00	.00	0.	
1	0150	23	.00	.00	.00	13.	*	1	1420	173	.00	.00	.00	0.	
1	0155	24	.00	.00	.00	10.	*	1	1425	174	.00	.00	.00	0.	
1	0200	25	.00	.00	.00	7.	*	1	1430	175	.00	.00	.00	0.	
1	0205	26	.01	.00	.00	5.	*	1	1435	176	.00	.00	.00	0.	
1	0210	27	.02	.01	.01	5.	*	1	1440	177	.00	.00	.00	0.	
1	0215	28	.03	.02	.01	9.	*	1	1445	178	.00	.00	.00	0.	
1	0220	29	.02	.02	.01	14.	*	1	1450	179	.00	.00	.00	0.	
1	0225	30	.01	.01	.00	17.	*	1	1455	180	.00	.00	.00	0.	
1	0230	31	.00	.00	.00	15.	*	1	1500	181	.00	.00	.00	0.	
1	0235	32	.01	.01	.00	12.	*	1	1505	182	.00	.00	.00	0.	
1	0240	33	.03	.02	.01	11.	*	1	1510	183	.00	.00	.00	0.	
1	0245	34	.01	.01	.00	13.	*	1	1515	184	.00	.00	.00	0.	
1	0250	35	.01	.00	.00	13.	*	1	1520	185	.00	.00	.00	0.	
1	0255	36	.00	.00	.00	11.	*	1	1525	186	.00	.00	.00	0.	
1	0300	37	.02	.02	.01	9.	*	1	1530	187	.00	.00	.00	0.	
1	0305	38	.05	.04	.02	13.	*	1	1535	188	.00	.00	.00	0.	
1	0310	39	.06	.04	.02	23.	*	1	1540	189	.00	.00	.00	0.	
1	0315	40	.11	.07	.03	37.	*	1	1545	190	.00	.00	.00	0.	
1	0320	41	.17	.12	.05	59.	*	1	1550	191	.00	.00	.00	0.	
1	0325	42	.17	.11	.05	89.	*	1	1555	192	.00	.00	.00	0.	
1	0330	43	.22	.14	.08	124.	*	1	1600	193	.00	.00	.00	0.	
1	0335	44	.06	.04	.03	150.	*	1	1605	194	.00	.00	.00	0.	
1	0340	45	.07	.04	.03	143.	*	1	1610	195	.00	.00	.00	0.	
1	0345	46	.06	.03	.03	120.	*	1	1615	196	.00	.00	.00	0.	
1	0350	47	.01	.01	.01	95.	*	1	1620	197	.00	.00	.00	0.	
1	0355	48	.03	.02	.01	72.	*	1	1625	198	.00	.00	.00	0.	
1	0400	49	.03	.02	.01	55.	*	1	1630	199	.00	.00	.00	0.	
1	0405	50	.01	.01	.00	44.	*	1	1635	200	.00	.00	.00	0.	
1	0410	51	.01	.00	.00	35.	*	1	1640	201	.00	.00	.00	0.	
1	0415	52	.01	.01	.01	25.	*	1	1645	202	.00	.00	.00	0.	
1	0420	53	.01	.01	.01	21.	*	1	1650	203	.00	.00	.00	0.	
1	0425	54	.02	.01	.01	21.	*	1	1655	204	.00	.00	.00	0.	
1	0430	55	.04	.02	.02	26.	*	1	1700	205	.00	.00	.00	0.	
1	0435	56	.03	.02	.01	34.	*	1	1705	206	.00	.00	.00	0.	
1	0440	57	.02	.01	.01	38.	*	1	1710	207	.00	.00	.00	0.	

1	1005	122	.00	.00	.00	0.	*	1	2235	272	.00	.00	.00	0.
1	1010	123	.00	.00	.00	0.	*	1	2240	273	.00	.00	.00	0.
1	1015	124	.00	.00	.00	0.	*	1	2245	274	.00	.00	.00	0.
1	1020	125	.00	.00	.00	0.	*	1	2250	275	.00	.00	.00	0.
1	1025	126	.00	.00	.00	0.	*	1	2255	276	.00	.00	.00	0.
1	1030	127	.00	.00	.00	0.	*	1	2300	277	.00	.00	.00	0.
1	1035	128	.00	.00	.00	0.	*	1	2305	278	.00	.00	.00	0.
1	1040	129	.00	.00	.00	0.	*	1	2310	279	.00	.00	.00	0.
1	1045	130	.00	.00	.00	0.	*	1	2315	280	.00	.00	.00	0.
1	1050	131	.00	.00	.00	0.	*	1	2320	281	.00	.00	.00	0.
1	1055	132	.00	.00	.00	0.	*	1	2325	282	.00	.00	.00	0.
1	1100	133	.00	.00	.00	0.	*	1	2330	283	.00	.00	.00	0.
1	1105	134	.00	.00	.00	0.	*	1	2335	284	.00	.00	.00	0.
1	1110	135	.00	.00	.00	0.	*	1	2340	285	.00	.00	.00	0.
1	1115	136	.00	.00	.00	0.	*	1	2345	286	.00	.00	.00	0.
1	1120	137	.00	.00	.00	0.	*	1	2350	287	.00	.00	.00	0.
1	1125	138	.00	.00	.00	0.	*	1	2355	288	.00	.00	.00	0.
1	1130	139	.00	.00	.00	0.	*	2	0000	289	.00	.00	.00	0.
1	1135	140	.00	.00	.00	0.	*	2	0005	290	.00	.00	.00	0.
1	1140	141	.00	.00	.00	0.	*	2	0010	291	.00	.00	.00	0.
1	1145	142	.00	.00	.00	0.	*	2	0015	292	.00	.00	.00	0.
1	1150	143	.00	.00	.00	0.	*	2	0020	293	.00	.00	.00	0.
1	1155	144	.00	.00	.00	0.	*	2	0025	294	.00	.00	.00	0.
1	1200	145	.00	.00	.00	0.	*	2	0030	295	.00	.00	.00	0.
1	1205	146	.00	.00	.00	0.	*	2	0035	296	.00	.00	.00	0.
1	1210	147	.00	.00	.00	0.	*	2	0040	297	.00	.00	.00	0.
1	1215	148	.00	.00	.00	0.	*	2	0045	298	.00	.00	.00	0.
1	1220	149	.00	.00	.00	0.	*	2	0050	299	.00	.00	.00	0.
1	1225	150	.00	.00	.00	0.	*	2	0055	300	.00	.00	.00	0.

TOTAL RAINFALL = 2.36, TOTAL LOSS = 1.42, TOTAL EXCESS = .94

PEAK FLOW + (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ 224.	3.58	38.	10.	9.	9.
	(INCHES)	.937	.940	.940	.940
	(AC-FT)	19.	19.	19.	19.

CUMULATIVE AREA = .38 SQ MI

WARNING *** TIME INTERVAL IS GREATER THAN .29*LAG

1	0440	57	.03	.01	.01	56.	*	1	1710	207	.00	.00	.00	0.
1	0445	58	.03	.01	.02	55.	*	1	1715	208	.00	.00	.00	0.
1	0450	59	.05	.02	.03	55.	*	1	1720	209	.00	.00	.00	0.
1	0455	60	.01	.01	.01	56.	*	1	1725	210	.00	.00	.00	0.
1	0500	61	.01	.01	.01	50.	*	1	1730	211	.00	.00	.00	0.
1	0505	62	.01	.00	.00	39.	*	1	1735	212	.00	.00	.00	0.
1	0510	63	.00	.00	.00	28.	*	1	1740	213	.00	.00	.00	0.
1	0515	64	.00	.00	.00	20.	*	1	1745	214	.00	.00	.00	0.
1	0520	65	.00	.00	.00	14.	*	1	1750	215	.00	.00	.00	0.
1	0525	66	.01	.00	.00	11.	*	1	1755	216	.00	.00	.00	0.
1	0530	67	.00	.00	.00	9.	*	1	1800	217	.00	.00	.00	0.
1	0535	68	.00	.00	.00	7.	*	1	1805	218	.00	.00	.00	0.
1	0540	69	.00	.00	.00	5.	*	1	1810	219	.00	.00	.00	0.
1	0545	70	.01	.00	.00	5.	*	1	1815	220	.00	.00	.00	0.
1	0550	71	.00	.00	.00	6.	*	1	1820	221	.00	.00	.00	0.
1	0555	72	.00	.00	.00	5.	*	1	1825	222	.00	.00	.00	0.
1	0600	73	.00	.00	.00	5.	*	1	1830	223	.00	.00	.00	0.
1	0605	74	.00	.00	.00	4.	*	1	1835	224	.00	.00	.00	0.
1	0610	75	.00	.00	.00	3.	*	1	1840	225	.00	.00	.00	0.
1	0615	76	.00	.00	.00	2.	*	1	1845	226	.00	.00	.00	0.
1	0620	77	.00	.00	.00	1.	*	1	1850	227	.00	.00	.00	0.
1	0625	78	.00	.00	.00	0.	*	1	1855	228	.00	.00	.00	0.
1	0630	79	.00	.00	.00	0.	*	1	1900	229	.00	.00	.00	0.
1	0635	80	.00	.00	.00	0.	*	1	1905	230	.00	.00	.00	0.
1	0640	81	.00	.00	.00	0.	*	1	1910	231	.00	.00	.00	0.
1	0645	82	.00	.00	.00	0.	*	1	1915	232	.00	.00	.00	0.
1	0650	83	.00	.00	.00	0.	*	1	1920	233	.00	.00	.00	0.
1	0655	84	.00	.00	.00	0.	*	1	1925	234	.00	.00	.00	0.
1	0700	85	.00	.00	.00	0.	*	1	1930	235	.00	.00	.00	0.
1	0705	86	.00	.00	.00	0.	*	1	1935	236	.00	.00	.00	0.
1	0710	87	.00	.00	.00	0.	*	1	1940	237	.00	.00	.00	0.
1	0715	88	.00	.00	.00	0.	*	1	1945	238	.00	.00	.00	0.
1	0720	89	.00	.00	.00	0.	*	1	1950	239	.00	.00	.00	0.
1	0725	90	.00	.00	.00	0.	*	1	1955	240	.00	.00	.00	0.
1	0730	91	.00	.00	.00	0.	*	1	2000	241	.00	.00	.00	0.
1	0735	92	.00	.00	.00	0.	*	1	2005	242	.00	.00	.00	0.
1	0740	93	.00	.00	.00	0.	*	1	2010	243	.00	.00	.00	0.
1	0745	94	.00	.00	.00	0.	*	1	2015	244	.00	.00	.00	0.
1	0750	95	.00	.00	.00	0.	*	1	2020	245	.00	.00	.00	0.
1	0755	96	.00	.00	.00	0.	*	1	2025	246	.00	.00	.00	0.
1	0800	97	.00	.00	.00	0.	*	1	2030	247	.00	.00	.00	0.
1	0805	98	.00	.00	.00	0.	*	1	2035	248	.00	.00	.00	0.
1	0810	99	.00	.00	.00	0.	*	1	2040	249	.00	.00	.00	0.
1	0815	100	.00	.00	.00	0.	*	1	2045	250	.00	.00	.00	0.
1	0820	101	.00	.00	.00	0.	*	1	2050	251	.00	.00	.00	0.
1	0825	102	.00	.00	.00	0.	*	1	2055	252	.00	.00	.00	0.
1	0830	103	.00	.00	.00	0.	*	1	2100	253	.00	.00	.00	0.
1	0835	104	.00	.00	.00	0.	*	1	2105	254	.00	.00	.00	0.
1	0840	105	.00	.00	.00	0.	*	1	2110	255	.00	.00	.00	0.
1	0845	106	.00	.00	.00	0.	*	1	2115	256	.00	.00	.00	0.
1	0850	107	.00	.00	.00	0.	*	1	2120	257	.00	.00	.00	0.
1	0855	108	.00	.00	.00	0.	*	1	2125	258	.00	.00	.00	0.
1	0900	109	.00	.00	.00	0.	*	1	2130	259	.00	.00	.00	0.
1	0905	110	.00	.00	.00	0.	*	1	2135	260	.00	.00	.00	0.
1	0910	111	.00	.00	.00	0.	*	1	2140	261	.00	.00	.00	0.
1	0915	112	.00	.00	.00	0.	*	1	2145	262	.00	.00	.00	0.
1	0920	113	.00	.00	.00	0.	*	1	2150	263	.00	.00	.00	0.
1	0925	114	.00	.00	.00	0.	*	1	2155	264	.00	.00	.00	0.
1	0930	115	.00	.00	.00	0.	*	1	2200	265	.00	.00	.00	0.
1	0935	116	.00	.00	.00	0.	*	1	2205	266	.00	.00	.00	0.
1	0940	117	.00	.00	.00	0.	*	1	2210	267	.00	.00	.00	0.
1	0945	118	.00	.00	.00	0.	*	1	2215	268	.00	.00	.00	0.
1	0950	119	.00	.00	.00	0.	*	1	2220	269	.00	.00	.00	0.
1	0955	120	.00	.00	.00	0.	*	1	2225	270	.00	.00	.00	0.
1	1000	121	.00	.00	.00	0.	*	1	2230	271	.00	.00	.00	0.

HYDROGRAPH AT STATION NH
PLAN 1, RATIO = .52

DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
1	0000	1	.00	.00	.00	0.	*	1	1230	151	.00	.00	.00	0.	
1	0005	2	.05	.03	.01	3.	*	1	1235	152	.00	.00	.00	0.	
1	0010	3	.09	.06	.03	16.	*	1	1240	153	.00	.00	.00	0.	
1	0015	4	.03	.02	.01	32.	*	1	1245	154	.00	.00	.00	0.	
1	0020	5	.04	.03	.01	38.	*	1	1250	155	.00	.00	.00	0.	
1	0025	6	.05	.03	.01	38.	*	1	1255	156	.00	.00	.00	0.	
1	0030	7	.04	.03	.01	38.	*	1	1300	157	.00	.00	.00	0.	
1	0035	8	.01	.01	.00	36.	*	1	1305	158	.00	.00	.00	0.	
1	0040	9	.00	.00	.00	28.	*	1	1310	159	.00	.00	.00	0.	
1	0045	10	.00	.00	.00	18.	*	1	1315	160	.00	.00	.00	0.	
1	0050	11	.00	.00	.00	10.	*	1	1320	161	.00	.00	.00	0.	
1	0055	12	.00	.00	.00	5.	*	1	1325	162	.00	.00	.00	0.	
1	0100	13	.00	.00	.00	3.	*	1	1330	163	.00	.00	.00	0.	
1	0105	14	.01	.00	.00	2.	*	1	1335	164	.00	.00	.00	0.	
1	0110	15	.02	.01	.00	3.	*	1	1340	165	.00	.00	.00	0.	
1	0115	16	.00	.00	.00	6.	*	1	1345	166	.00	.00	.00	0.	
1	0120	17	.01	.01	.00	7.	*	1	1350	167	.00	.00	.00	0.	
1	0125	18	.02	.02	.01	9.	*	1	1355	168	.00	.00	.00	0.	
1	0130	19	.03	.02	.01	13.	*	1	1400	169	.00	.00	.00	0.	
1	0135	20	.02	.01	.01	18.	*	1	1405	170	.00	.00	.00	0.	
1	0140	21	.02	.01	.01	20.	*	1	1410	171	.00	.00	.00	0.	
1	0145	22	.02	.01	.00	19.	*	1	1415	172	.00	.00	.00	0.	
1	0150	23	.00	.00	.00	17.	*	1	1420	173	.00	.00	.00	0.	
1	0155	24	.00	.00	.00	13.	*	1	1425	174	.00	.00	.00	0.	
1	0200	25	.00	.00	.00	9.	*	1	1430	175	.00	.00	.00	0.	
1	0205	26	.01	.00	.00	6.	*	1	1435	176	.00	.00	.00	0.	
1	0210	27	.02	.02	.01	7.	*	1	1440	177	.00	.00	.00	0.	
1	0215	28	.04	.02	.01	11.	*	1	1445	178	.00	.00	.00	0.	
1	0220	29	.03	.02	.01	17.	*	1	1450	179	.00	.00	.00	0.	
1	0225	30	.02	.01	.01	21.	*	1	1455	180	.00	.00	.00	0.	
1	0230	31	.00	.00	.00	20.	*	1	1500	181	.00	.00	.00	0.	
1	0235	32	.01	.01	.00	15.	*	1	1505	182	.00	.00	.00	0.	
1	0240	33	.03	.02	.01	14.	*	1	1510	183	.00	.00	.00	0.	
1	0245	34	.02	.01	.01	16.	*	1	1515	184	.00	.00	.00	0.	
1	0250	35	.01	.00	.00	17.	*	1	1520	185	.00	.00	.00	0.	
1	0255	36	.00	.00	.00	14.	*	1	1525	186	.00	.00	.00	0.	
1	0300	37	.03	.02	.01	12.	*	1	1530	187	.00	.00	.00	0.	
1	0305	38	.06	.04	.02	17.	*	1	1535	188	.00	.00	.00	0.	
1	0310	39	.07	.05	.02	29.	*	1	1540	189	.00	.00	.00	0.	
1	0315	40	.13	.09	.04	47.	*	1	1545	190	.00	.00	.00	0.	
1	0320	41	.21	.14	.07	77.	*	1	1550	191	.00	.00	.00	0.	
1	0325	42	.22	.13	.08	122.	*	1	1555	192	.00	.00	.00	0.	
1	0330	43	.28	.16	.13	180.	*	1	1600	193	.00	.00	.00	0.	
1	0335	44	.08	.04	.04	224.	*	1	1605	194	.00	.00	.00	0.	
1	0340	45	.09	.04	.04	216.	*	1	1610	195	.00	.00	.00	0.	
1	0345	46	.07	.04	.04	181.	*	1	1615	196	.00	.00	.00	0.	
1	0350	47	.02	.01	.01	143.	*	1	1620	197	.00	.00	.00	0.	
1	0355	48	.04	.02	.02	108.	*	1	1625	198	.00	.00	.00	0.	
1	0400	49	.04	.02	.02	82.	*	1	1630	199	.00	.00	.00	0.	
1	0405	50	.01	.01	.01	66.	*	1	1635	200	.00	.00	.00	0.	
1	0410	51	.01	.00	.01	52.	*	1	1640	201	.00	.00	.00	0.	
1	0415	52	.02	.01	.01	38.	*	1	1645	202	.00	.00	.00	0.	
1	0420	53	.02	.01	.01	31.	*	1	1650	203	.00	.00	.00	0.	
1	0425	54	.03	.01	.02	31.	*	1	1655	204	.00	.00	.00	0.	
1	0430	55	.05	.02	.03	38.	*	1	1700	205	.00	.00	.00	0.	
1	0435	56	.04	.02	.02	50.	*	1	1705	206	.00	.00	.00	0.	

1	1005	122	.00	.00	.00	0.	*	1	2235	272	.00	.00	.00	0.
1	1010	123	.00	.00	.00	0.	*	1	2240	273	.00	.00	.00	0.
1	1015	124	.00	.00	.00	0.	*	1	2245	274	.00	.00	.00	0.
1	1020	125	.00	.00	.00	0.	*	1	2250	275	.00	.00	.00	0.
1	1025	126	.00	.00	.00	0.	*	1	2255	276	.00	.00	.00	0.
1	1030	127	.00	.00	.00	0.	*	1	2300	277	.00	.00	.00	0.
1	1035	128	.00	.00	.00	0.	*	1	2305	278	.00	.00	.00	0.
1	1040	129	.00	.00	.00	0.	*	1	2310	279	.00	.00	.00	0.
1	1045	130	.00	.00	.00	0.	*	1	2315	280	.00	.00	.00	0.
1	1050	131	.00	.00	.00	0.	*	1	2320	281	.00	.00	.00	0.
1	1055	132	.00	.00	.00	0.	*	1	2325	282	.00	.00	.00	0.
1	1100	133	.00	.00	.00	0.	*	1	2330	283	.00	.00	.00	0.
1	1105	134	.00	.00	.00	0.	*	1	2335	284	.00	.00	.00	0.
1	1110	135	.00	.00	.00	0.	*	1	2340	285	.00	.00	.00	0.
1	1115	136	.00	.00	.00	0.	*	1	2345	286	.00	.00	.00	0.
1	1120	137	.00	.00	.00	0.	*	1	2350	287	.00	.00	.00	0.
1	1125	138	.00	.00	.00	0.	*	1	2355	288	.00	.00	.00	0.
1	1130	139	.00	.00	.00	0.	*	2	0000	289	.00	.00	.00	0.
1	1135	140	.00	.00	.00	0.	*	2	0005	290	.00	.00	.00	0.
1	1140	141	.00	.00	.00	0.	*	2	0010	291	.00	.00	.00	0.
1	1145	142	.00	.00	.00	0.	*	2	0015	292	.00	.00	.00	0.
1	1150	143	.00	.00	.00	0.	*	2	0020	293	.00	.00	.00	0.
1	1155	144	.00	.00	.00	0.	*	2	0025	294	.00	.00	.00	0.
1	1200	145	.00	.00	.00	0.	*	2	0030	295	.00	.00	.00	0.
1	1205	146	.00	.00	.00	0.	*	2	0035	296	.00	.00	.00	0.
1	1210	147	.00	.00	.00	0.	*	2	0040	297	.00	.00	.00	0.
1	1215	148	.00	.00	.00	0.	*	2	0045	298	.00	.00	.00	0.
1	1220	149	.00	.00	.00	0.	*	2	0050	299	.00	.00	.00	0.
1	1225	150	.00	.00	.00	0.	*	2	0055	300	.00	.00	.00	0.

*

TOTAL RAINFALL = 3.20, TOTAL LOSS = 1.73, TOTAL EXCESS = 1.47

PEAK FLOW		TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+	(CFS)	(HR)				
		(CFS)				
+	374.	3.58	59.	15.	14.	14.
		(INCHES)	1.466	1.471	1.471	1.471
		(AC-FT)	29.	30.	30.	30.

CUMULATIVE AREA = .38 SQ MI

WARNING *** TIME INTERVAL IS GREATER THAN .29*LAG

1	0440	57	.04	.01	.02	89.	*	1	1710	207	.00	.00	.00	0.
1	0445	58	.04	.01	.03	87.	•	1	1715	208	.00	.00	.00	0.
1	0450	59	.06	.02	.04	86.	•	1	1720	209	.00	.00	.00	0.
1	0455	60	.02	.01	.01	89.	•	1	1725	210	.00	.00	.00	0.
1	0500	61	.02	.01	.01	79.	•	1	1730	211	.00	.00	.00	0.
1	0505	62	.01	.00	.01	62.	•	1	1735	212	.00	.00	.00	0.
1	0510	63	.01	.00	.00	45.	*	1	1740	213	.00	.00	.00	0.
1	0515	64	.01	.00	.00	32.	*	1	1745	214	.00	.00	.00	0.
1	0520	65	.00	.00	.00	23.	•	1	1750	215	.00	.00	.00	0.
1	0525	66	.01	.00	.01	17.	•	1	1755	216	.00	.00	.00	0.
1	0530	67	.00	.00	.00	14.	*	1	1800	217	.00	.00	.00	0.
1	0535	68	.00	.00	.00	11.	*	1	1805	218	.00	.00	.00	0.
1	0540	69	.00	.00	.00	9.	*	1	1810	219	.00	.00	.00	0.
1	0545	70	.01	.00	.01	8.	*	1	1815	220	.00	.00	.00	0.
1	0550	71	.00	.00	.00	9.	•	1	1820	221	.00	.00	.00	0.
1	0555	72	.00	.00	.00	8.	*	1	1825	222	.00	.00	.00	0.
1	0600	73	.00	.00	.00	7.	*	1	1830	223	.00	.00	.00	0.
1	0605	74	.00	.00	.00	6.	•	1	1835	224	.00	.00	.00	0.
1	0610	75	.00	.00	.00	4.	*	1	1840	225	.00	.00	.00	0.
1	0615	76	.00	.00	.00	3.	*	1	1845	226	.00	.00	.00	0.
1	0620	77	.00	.00	.00	1.	*	1	1850	227	.00	.00	.00	0.
1	0625	78	.00	.00	.00	1.	*	1	1855	228	.00	.00	.00	0.
1	0630	79	.00	.00	.00	0.	*	1	1900	229	.00	.00	.00	0.
1	0635	80	.00	.00	.00	0.	*	1	1905	230	.00	.00	.00	0.
1	0640	81	.00	.00	.00	0.	*	1	1910	231	.00	.00	.00	0.
1	0645	82	.00	.00	.00	0.	*	1	1915	232	.00	.00	.00	0.
1	0650	83	.00	.00	.00	0.	•	1	1920	233	.00	.00	.00	0.
1	0655	84	.00	.00	.00	0.	*	1	1925	234	.00	.00	.00	0.
1	0700	85	.00	.00	.00	0.	*	1	1930	235	.00	.00	.00	0.
1	0705	86	.00	.00	.00	0.	*	1	1935	236	.00	.00	.00	0.
1	0710	87	.00	.00	.00	0.	*	1	1940	237	.00	.00	.00	0.
1	0715	88	.00	.00	.00	0.	*	1	1945	238	.00	.00	.00	0.
1	0720	89	.00	.00	.00	0.	*	1	1950	239	.00	.00	.00	0.
1	0725	90	.00	.00	.00	0.	*	1	1955	240	.00	.00	.00	0.
1	0730	91	.00	.00	.00	0.	*	1	2000	241	.00	.00	.00	0.
1	0735	92	.00	.00	.00	0.	*	1	2005	242	.00	.00	.00	0.
1	0740	93	.00	.00	.00	0.	*	1	2010	243	.00	.00	.00	0.
1	0745	94	.00	.00	.00	0.	*	1	2015	244	.00	.00	.00	0.
1	0750	95	.00	.00	.00	0.	•	1	2020	245	.00	.00	.00	0.
1	0755	96	.00	.00	.00	0.	*	1	2025	246	.00	.00	.00	0.
1	0800	97	.00	.00	.00	0.	•	1	2030	247	.00	.00	.00	0.
1	0805	98	.00	.00	.00	0.	•	1	2035	248	.00	.00	.00	0.
1	0810	99	.00	.00	.00	0.	*	1	2040	249	.00	.00	.00	0.
1	0815	100	.00	.00	.00	0.	*	1	2045	250	.00	.00	.00	0.
1	0820	101	.00	.00	.00	0.	*	1	2050	251	.00	.00	.00	0.
1	0825	102	.00	.00	.00	0.	*	1	2055	252	.00	.00	.00	0.
1	0830	103	.00	.00	.00	0.	•	1	2100	253	.00	.00	.00	0.
1	0835	104	.00	.00	.00	0.	•	1	2105	254	.00	.00	.00	0.
1	0840	105	.00	.00	.00	0.	•	1	2110	255	.00	.00	.00	0.
1	0845	106	.00	.00	.00	0.	•	1	2115	256	.00	.00	.00	0.
1	0850	107	.00	.00	.00	0.	*	1	2120	257	.00	.00	.00	0.
1	0855	108	.00	.00	.00	0.	•	1	2125	258	.00	.00	.00	0.
1	0900	109	.00	.00	.00	0.	*	1	2130	259	.00	.00	.00	0.
1	0905	110	.00	.00	.00	0.	•	1	2135	260	.00	.00	.00	0.
1	0910	111	.00	.00	.00	0.	*	1	2140	261	.00	.00	.00	0.
1	0915	112	.00	.00	.00	0.	*	1	2145	262	.00	.00	.00	0.
1	0920	113	.00	.00	.00	0.	*	1	2150	263	.00	.00	.00	0.
1	0925	114	.00	.00	.00	0.	*	1	2155	264	.00	.00	.00	0.
1	0930	115	.00	.00	.00	0.	*	1	2200	265	.00	.00	.00	0.
1	0935	116	.00	.00	.00	0.	*	1	2205	266	.00	.00	.00	0.
1	0940	117	.00	.00	.00	0.	*	1	2210	267	.00	.00	.00	0.
1	0945	118	.00	.00	.00	0.	•	1	2215	268	.00	.00	.00	0.
1	0950	119	.00	.00	.00	0.	*	1	2220	269	.00	.00	.00	0.
1	0955	120	.00	.00	.00	0.	•	1	2225	270	.00	.00	.00	0.
1	1000	121	.00	.00	.00	0.	•	1	2230	271	.00	.00	.00	0.

HYDROGRAPH AT STATION NH
PLAN 1. RATIO = .70

DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
1	0000	1	.00	.00	.00	0.	1 1230 151	.00	.00	.00	0.				
1	0005	2	.06	.04	.02	4.	1 1235 152	.00	.00	.00	0.				
1	0010	3	.12	.08	.04	22.	1 1240 153	.00	.00	.00	0.				
1	0015	4	.04	.03	.01	44.	1 1245 154	.00	.00	.00	0.				
1	0020	5	.05	.04	.02	52.	1 1250 155	.00	.00	.00	0.				
1	0025	6	.07	.05	.02	51.	1 1255 156	.00	.00	.00	0.				
1	0030	7	.05	.04	.02	51.	1 1300 157	.00	.00	.00	0.				
1	0035	8	.02	.01	.01	48.	1 1305 158	.00	.00	.00	0.				
1	0040	9	.00	.00	.00	38.	1 1310 159	.00	.00	.00	0.				
1	0045	10	.00	.00	.00	24.	1 1315 160	.00	.00	.00	0.				
1	0050	11	.00	.00	.00	14.	1 1320 161	.00	.00	.00	0.				
1	0055	12	.00	.00	.00	7.	1 1325 162	.00	.00	.00	0.				
1	0100	13	.00	.00	.00	4.	1 1330 163	.00	.00	.00	0.				
1	0105	14	.01	.01	.00	3.	1 1335 164	.00	.00	.00	0.				
1	0110	15	.02	.02	.01	5.	1 1340 165	.00	.00	.00	0.				
1	0115	16	.01	.00	.00	8.	1 1345 166	.00	.00	.00	0.				
1	0120	17	.02	.01	.01	10.	1 1350 167	.00	.00	.00	0.				
1	0125	18	.03	.02	.01	13.	1 1355 168	.00	.00	.00	0.				
1	0130	19	.04	.03	.01	18.	1 1400 169	.00	.00	.00	0.				
1	0135	20	.03	.02	.01	24.	1 1405 170	.00	.00	.00	0.				
1	0140	21	.03	.02	.01	27.	1 1410 171	.00	.00	.00	0.				
1	0145	22	.02	.02	.01	26.	1 1415 172	.00	.00	.00	0.				
1	0150	23	.01	.00	.00	23.	1 1420 173	.00	.00	.00	0.				
1	0155	24	.00	.00	.00	17.	1 1425 174	.00	.00	.00	0.				
1	0200	25	.00	.00	.00	12.	1 1430 175	.00	.00	.00	0.				
1	0205	26	.01	.01	.00	8.	1 1435 176	.00	.00	.00	0.				
1	0210	27	.03	.02	.01	9.	1 1440 177	.00	.00	.00	0.				
1	0215	28	.05	.03	.01	15.	1 1445 178	.00	.00	.00	0.				
1	0220	29	.04	.03	.01	24.	1 1450 179	.00	.00	.00	0.				
1	0225	30	.03	.02	.01	28.	1 1455 180	.00	.00	.00	0.				
1	0230	31	.01	.00	.00	27.	1 1500 181	.00	.00	.00	0.				
1	0235	32	.02	.01	.00	21.	1 1505 182	.00	.00	.00	0.				
1	0240	33	.04	.03	.01	19.	1 1510 183	.00	.00	.00	0.				
1	0245	34	.03	.02	.01	22.	1 1515 184	.00	.00	.00	0.				
1	0250	35	.01	.01	.00	23.	1 1520 185	.00	.00	.00	0.				
1	0255	36	.01	.00	.00	19.	1 1525 186	.00	.00	.00	0.				
1	0300	37	.04	.03	.01	16.	1 1530 187	.00	.00	.00	0.				
1	0305	38	.09	.06	.03	23.	1 1535 188	.00	.00	.00	0.				
1	0310	39	.10	.06	.03	41.	1 1540 189	.00	.00	.00	0.				
1	0315	40	.18	.11	.07	70.	1 1545 190	.00	.00	.00	0.				
1	0320	41	.29	.16	.12	123.	1 1550 191	.00	.00	.00	0.				
1	0325	42	.29	.15	.14	204.	1 1555 192	.00	.00	.00	0.				
1	0330	43	.38	.17	.21	302.	1 1600 193	.00	.00	.00	0.				
1	0335	44	.11	.05	.06	374.	1 1605 194	.00	.00	.00	0.				
1	0340	45	.12	.05	.07	357.	1 1610 195	.00	.00	.00	0.				
1	0345	46	.10	.04	.06	299.	1 1615 196	.00	.00	.00	0.				
1	0350	47	.02	.01	.01	234.	1 1620 197	.00	.00	.00	0.				
1	0355	48	.05	.02	.03	175.	1 1625 198	.00	.00	.00	0.				
1	0400	49	.05	.02	.03	133.	1 1630 199	.00	.00	.00	0.				
1	0405	50	.02	.01	.01	107.	1 1635 200	.00	.00	.00	0.				
1	0410	51	.01	.00	.01	83.	1 1640 201	.00	.00	.00	0.				
1	0415	52	.03	.01	.02	61.	1 1645 202	.00	.00	.00	0.				
1	0420	53	.03	.01	.02	50.	1 1650 203	.00	.00	.00	0.				
1	0425	54	.04	.01	.02	50.	1 1655 204	.00	.00	.00	0.				
1	0430	55	.07	.02	.05	60.	1 1700 205	.00	.00	.00	0.				
1	0435	56	.05	.02	.03	79.	1 1705 206	.00	.00	.00	0.				

1	1010	123	.00	.00	.00	0.	*	1	2240	273	.00	.00	.00	0.
1	1015	124	.00	.00	.00	0.	*	1	2245	274	.00	.00	.00	0.
1	1020	125	.00	.00	.00	0.	*	1	2250	275	.00	.00	.00	0.
1	1025	126	.00	.00	.00	0.	*	1	2255	276	.00	.00	.00	0.
1	1030	127	.00	.00	.00	0.	*	1	2300	277	.00	.00	.00	0.
1	1035	128	.00	.00	.00	0.	*	1	2305	278	.00	.00	.00	0.
1	1040	129	.00	.00	.00	0.	*	1	2310	279	.00	.00	.00	0.
1	1045	130	.00	.00	.00	0.	*	1	2315	280	.00	.00	.00	0.
1	1050	131	.00	.00	.00	0.	*	1	2320	281	.00	.00	.00	0.
1	1055	132	.00	.00	.00	0.	*	1	2325	282	.00	.00	.00	0.
1	1100	133	.00	.00	.00	0.	*	1	2330	283	.00	.00	.00	0.
1	1105	134	.00	.00	.00	0.	*	1	2335	284	.00	.00	.00	0.
1	1110	135	.00	.00	.00	0.	*	1	2340	285	.00	.00	.00	0.
1	1115	136	.00	.00	.00	0.	*	1	2345	286	.00	.00	.00	0.
1	1120	137	.00	.00	.00	0.	*	1	2350	287	.00	.00	.00	0.
1	1125	138	.00	.00	.00	0.	*	1	2355	288	.00	.00	.00	0.
1	1130	139	.00	.00	.00	0.	*	2	0000	289	.00	.00	.00	0.
1	1135	140	.00	.00	.00	0.	*	2	0005	290	.00	.00	.00	0.
1	1140	141	.00	.00	.00	0.	*	2	0010	291	.00	.00	.00	0.
1	1145	142	.00	.00	.00	0.	*	2	0015	292	.00	.00	.00	0.
1	1150	143	.00	.00	.00	0.	*	2	0020	293	.00	.00	.00	0.
1	1155	144	.00	.00	.00	0.	*	2	0025	294	.00	.00	.00	0.
1	1200	145	.00	.00	.00	0.	*	2	0030	295	.00	.00	.00	0.
1	1205	146	.00	.00	.00	0.	*	2	0035	296	.00	.00	.00	0.
1	1210	147	.00	.00	.00	0.	*	2	0040	297	.00	.00	.00	0.
1	1215	148	.00	.00	.00	0.	*	2	0045	298	.00	.00	.00	0.
1	1220	149	.00	.00	.00	0.	*	2	0050	299	.00	.00	.00	0.
1	1225	150	.00	.00	.00	0.	*	2	0055	300	.00	.00	.00	0.

TOTAL RAINFALL = 3.90, TOTAL LOSS = 1.93, TOTAL EXCESS = 1.97

PEAK FLOW + (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ 516.	3.58	80.	20.	19.	19.
	(INCHES)	1.961	1.968	1.968	1.968
	(AC-FT)	39.	40.	40.	40.

CUMULATIVE AREA = .38 SQ MI

WARNING *** TIME INTERVAL IS GREATER THAN .29*LAG

1	0445	58	.05	.01	.04	116.	*	1	1715	208	.00	.00	.00	0.
1	0450	59	.08	.02	.06	114.	*	1	1720	209	.00	.00	.00	0.
1	0455	60	.02	.01	.02	117.	*	1	1725	210	.00	.00	.00	0.
1	0500	61	.02	.01	.02	105.	*	1	1730	211	.00	.00	.00	0.
1	0505	62	.01	.00	.01	82.	*	1	1735	212	.00	.00	.00	0.
1	0510	63	.01	.00	.01	59.	*	1	1740	213	.00	.00	.00	0.
1	0515	64	.01	.00	.01	42.	*	1	1745	214	.00	.00	.00	0.
1	0520	65	.00	.00	.00	30.	*	1	1750	215	.00	.00	.00	0.
1	0525	66	.01	.00	.01	23.	*	1	1755	216	.00	.00	.00	0.
1	0530	67	.00	.00	.00	19.	*	1	1800	217	.00	.00	.00	0.
1	0535	68	.00	.00	.00	15.	*	1	1805	218	.00	.00	.00	0.
1	0540	69	.00	.00	.00	11.	*	1	1810	219	.00	.00	.00	0.
1	0545	70	.01	.00	.01	11.	*	1	1815	220	.00	.00	.00	0.
1	0550	71	.00	.00	.00	12.	*	1	1820	221	.00	.00	.00	0.
1	0555	72	.00	.00	.00	11.	*	1	1825	222	.00	.00	.00	0.
1	0600	73	.00	.00	.00	9.	*	1	1830	223	.00	.00	.00	0.
1	0605	74	.00	.00	.00	8.	*	1	1835	224	.00	.00	.00	0.
1	0610	75	.00	.00	.00	6.	*	1	1840	225	.00	.00	.00	0.
1	0615	76	.00	.00	.00	3.	*	1	1845	226	.00	.00	.00	0.
1	0620	77	.00	.00	.00	2.	*	1	1850	227	.00	.00	.00	0.
1	0625	78	.00	.00	.00	1.	*	1	1855	228	.00	.00	.00	0.
1	0630	79	.00	.00	.00	1.	*	1	1900	229	.00	.00	.00	0.
1	0635	80	.00	.00	.00	0.	*	1	1905	230	.00	.00	.00	0.
1	0640	81	.00	.00	.00	0.	*	1	1910	231	.00	.00	.00	0.
1	0645	82	.00	.00	.00	0.	*	1	1915	232	.00	.00	.00	0.
1	0650	83	.00	.00	.00	0.	*	1	1920	233	.00	.00	.00	0.
1	0655	84	.00	.00	.00	0.	*	1	1925	234	.00	.00	.00	0.
1	0700	85	.00	.00	.00	0.	*	1	1930	235	.00	.00	.00	0.
1	0705	86	.00	.00	.00	0.	*	1	1935	236	.00	.00	.00	0.
1	0710	87	.00	.00	.00	0.	*	1	1940	237	.00	.00	.00	0.
1	0715	88	.00	.00	.00	0.	*	1	1945	238	.00	.00	.00	0.
1	0720	89	.00	.00	.00	0.	*	1	1950	239	.00	.00	.00	0.
1	0725	90	.00	.00	.00	0.	*	1	1955	240	.00	.00	.00	0.
1	0730	91	.00	.00	.00	0.	*	1	2000	241	.00	.00	.00	0.
1	0735	92	.00	.00	.00	0.	*	1	2005	242	.00	.00	.00	0.
1	0740	93	.00	.00	.00	0.	*	1	2010	243	.00	.00	.00	0.
1	0745	94	.00	.00	.00	0.	*	1	2015	244	.00	.00	.00	0.
1	0750	95	.00	.00	.00	0.	*	1	2020	245	.00	.00	.00	0.
1	0755	96	.00	.00	.00	0.	*	1	2025	246	.00	.00	.00	0.
1	0800	97	.00	.00	.00	0.	*	1	2030	247	.00	.00	.00	0.
1	0805	98	.00	.00	.00	0.	*	1	2035	248	.00	.00	.00	0.
1	0810	99	.00	.00	.00	0.	*	1	2040	249	.00	.00	.00	0.
1	0815	100	.00	.00	.00	0.	*	1	2045	250	.00	.00	.00	0.
1	0820	101	.00	.00	.00	0.	*	1	2050	251	.00	.00	.00	0.
1	0825	102	.00	.00	.00	0.	*	1	2055	252	.00	.00	.00	0.
1	0830	103	.00	.00	.00	0.	*	1	2100	253	.00	.00	.00	0.
1	0835	104	.00	.00	.00	0.	*	1	2105	254	.00	.00	.00	0.
1	0840	105	.00	.00	.00	0.	*	1	2110	255	.00	.00	.00	0.
1	0845	106	.00	.00	.00	0.	*	1	2115	256	.00	.00	.00	0.
1	0850	107	.00	.00	.00	0.	*	1	2120	257	.00	.00	.00	0.
1	0855	108	.00	.00	.00	0.	*	1	2125	258	.00	.00	.00	0.
1	0900	109	.00	.00	.00	0.	*	1	2130	259	.00	.00	.00	0.
1	0905	110	.00	.00	.00	0.	*	1	2135	260	.00	.00	.00	0.
1	0910	111	.00	.00	.00	0.	*	1	2140	261	.00	.00	.00	0.
1	0915	112	.00	.00	.00	0.	*	1	2145	262	.00	.00	.00	0.
1	0920	113	.00	.00	.00	0.	*	1	2150	263	.00	.00	.00	0.
1	0925	114	.00	.00	.00	0.	*	1	2155	264	.00	.00	.00	0.
1	0930	115	.00	.00	.00	0.	*	1	2200	265	.00	.00	.00	0.
1	0935	116	.00	.00	.00	0.	*	1	2205	266	.00	.00	.00	0.
1	0940	117	.00	.00	.00	0.	*	1	2210	267	.00	.00	.00	0.
1	0945	118	.00	.00	.00	0.	*	1	2215	268	.00	.00	.00	0.
1	0950	119	.00	.00	.00	0.	*	1	2220	269	.00	.00	.00	0.
1	0955	120	.00	.00	.00	0.	*	1	2225	270	.00	.00	.00	0.
1	1000	121	.00	.00	.00	0.	*	1	2230	271	.00	.00	.00	0.
1	1005	122	.00	.00	.00	0.	*	1	2235	272	.00	.00	.00	0.

HYDROGRAPH AT STATION NH
PLAN 1. RATIO = .85

DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP	Q	*	DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP	Q
1	0000	1	.00	.00	.00	0.	*	1	1230 151	.00	.00	.00	0.					
1	0005	2	.08	.05	.02	5.	*	1	1235 152	.00	.00	.00	0.					
1	0010	3	.14	.10	.04	27.	*	1	1240 153	.00	.00	.00	0.					
1	0015	4	.05	.04	.02	53.	*	1	1245 154	.00	.00	.00	0.					
1	0020	5	.07	.05	.02	63.	*	1	1250 155	.00	.00	.00	0.					
1	0025	6	.08	.06	.02	63.	*	1	1255 156	.00	.00	.00	0.					
1	0030	7	.06	.04	.02	62.	*	1	1300 157	.00	.00	.00	0.					
1	0035	8	.02	.02	.01	59.	*	1	1305 158	.00	.00	.00	0.					
1	0040	9	.00	.00	.00	46.	*	1	1310 159	.00	.00	.00	0.					
1	0045	10	.00	.00	.00	30.	*	1	1315 160	.00	.00	.00	0.					
1	0050	11	.00	.00	.00	17.	*	1	1320 161	.00	.00	.00	0.					
1	0055	12	.00	.00	.00	9.	*	1	1325 162	.00	.00	.00	0.					
1	0100	13	.00	.00	.00	5.	*	1	1330 163	.00	.00	.00	0.					
1	0105	14	.01	.01	.00	3.	*	1	1335 164	.00	.00	.00	0.					
1	0110	15	.03	.02	.01	6.	*	1	1340 165	.00	.00	.00	0.					
1	0115	16	.01	.01	.00	10.	*	1	1345 166	.00	.00	.00	0.					
1	0120	17	.02	.02	.01	12.	*	1	1350 167	.00	.00	.00	0.					
1	0125	18	.04	.03	.01	15.	*	1	1355 168	.00	.00	.00	0.					
1	0130	19	.05	.04	.02	22.	*	1	1400 169	.00	.00	.00	0.					
1	0135	20	.04	.02	.01	30.	*	1	1405 170	.00	.00	.00	0.					
1	0140	21	.04	.02	.01	33.	*	1	1410 171	.00	.00	.00	0.					
1	0145	22	.03	.02	.01	32.	*	1	1415 172	.00	.00	.00	0.					
1	0150	23	.01	.01	.00	28.	*	1	1420 173	.00	.00	.00	0.					
1	0155	24	.00	.00	.00	21.	*	1	1425 174	.00	.00	.00	0.					
1	0200	25	.00	.00	.00	14.	*	1	1430 175	.00	.00	.00	0.					
1	0205	26	.01	.01	.00	10.	*	1	1435 176	.00	.00	.00	0.					
1	0210	27	.04	.03	.01	11.	*	1	1440 177	.00	.00	.00	0.					
1	0215	28	.06	.04	.02	18.	*	1	1445 178	.00	.00	.00	0.					
1	0220	29	.05	.03	.01	29.	*	1	1450 179	.00	.00	.00	0.					
1	0225	30	.03	.02	.01	35.	*	1	1455 180	.00	.00	.00	0.					
1	0230	31	.01	.01	.00	33.	*	1	1500 181	.00	.00	.00	0.					
1	0235	32	.02	.01	.01	26.	*	1	1505 182	.00	.00	.00	0.					
1	0240	33	.05	.04	.02	24.	*	1	1510 183	.00	.00	.00	0.					
1	0245	34	.03	.02	.01	28.	*	1	1515 184	.00	.00	.00	0.					
1	0250	35	.01	.01	.00	30.	*	1	1520 185	.00	.00	.00	0.					
1	0255	36	.01	.01	.00	26.	*	1	1525 186	.00	.00	.00	0.					
1	0300	37	.05	.03	.02	22.	*	1	1530 187	.00	.00	.00	0.					
1	0305	38	.11	.07	.04	32.	*	1	1535 188	.00	.00	.00	0.					
1	0310	39	.12	.07	.05	58.	*	1	1540 189	.00	.00	.00	0.					
1	0315	40	.22	.13	.10	100.	*	1	1545 190	.00	.00	.00	0.					
1	0320	41	.35	.18	.17	175.	*	1	1550 191	.00	.00	.00	0.					
1	0325	42	.35	.16	.20	288.	*	1	1555 192	.00	.00	.00	0.					
1	0330	43	.47	.18	.28	420.	*	1	1600 193	.00	.00	.00	0.					
1	0335	44	.13	.05	.09	516.	*	1	1605 194	.00	.00	.00	0.					
1	0340	45	.14	.05	.09	489.	*	1	1610 195	.00	.00	.00	0.					
1	0345	46	.12	.04	.08	406.	*	1	1615 196	.00	.00	.00	0.					
1	0350	47	.03	.01	.02	317.	*	1	1620 197	.00	.00	.00	0.					
1	0355	48	.06	.02	.04	237.	*	1	1625 198	.00	.00	.00	0.					
1	0400	49	.06	.02	.04	179.	*	1	1630 199	.00	.00	.00	0.					
1	0405	50	.02	.01	.01	144.	*	1	1635 200	.00	.00	.00	0.					
1	0410	51	.02	.00	.01	111.	*	1	1640 201	.00	.00	.00	0.					
1	0415	52	.03	.01	.02	81.	*	1	1645 202	.00	.00	.00	0.					
1	0420	53	.03	.01	.02	67.	*	1	1650 203	.00	.00	.00	0.					
1	0425	54	.05	.01	.03	67.	*	1	1655 204	.00	.00	.00	0.					
1	0430	55	.09	.03	.06	80.	*	1	1700 205	.00	.00	.00	0.					
1	0435	56	.06	.02	.04	105.	*	1	1705 206	.00	.00	.00	0.					
1	0440	57	.04	.01	.03	119.	*	1	1710 207	.00	.00	.00	0.					

1	1005	122	.00	.00	.00	0.	*	1	2235	272	.00	.00	.00	0.
1	1010	123	.00	.00	.00	0.	*	1	2240	273	.00	.00	.00	0.
1	1015	124	.00	.00	.00	0.	*	1	2245	274	.00	.00	.00	0.
1	1020	125	.00	.00	.00	0.	*	1	2250	275	.00	.00	.00	0.
1	1025	126	.00	.00	.00	0.	*	1	2255	276	.00	.00	.00	0.
1	1030	127	.00	.00	.00	0.	*	1	2300	277	.00	.00	.00	0.
1	1035	128	.00	.00	.00	0.	*	1	2305	278	.00	.00	.00	0.
1	1040	129	.00	.00	.00	0.	*	1	2310	279	.00	.00	.00	0.
1	1045	130	.00	.00	.00	0.	*	1	2315	280	.00	.00	.00	0.
1	1050	131	.00	.00	.00	0.	*	1	2320	281	.00	.00	.00	0.
1	1055	132	.00	.00	.00	0.	*	1	2325	282	.00	.00	.00	0.
1	1100	133	.00	.00	.00	0.	*	1	2330	283	.00	.00	.00	0.
1	1105	134	.00	.00	.00	0.	*	1	2335	284	.00	.00	.00	0.
1	1110	135	.00	.00	.00	0.	*	1	2340	285	.00	.00	.00	0.
1	1115	136	.00	.00	.00	0.	*	1	2345	286	.00	.00	.00	0.
1	1120	137	.00	.00	.00	0.	*	1	2350	287	.00	.00	.00	0.
1	1125	138	.00	.00	.00	0.	*	1	2355	288	.00	.00	.00	0.
1	1130	139	.00	.00	.00	0.	*	2	0000	289	.00	.00	.00	0.
1	1135	140	.00	.00	.00	0.	*	2	0005	290	.00	.00	.00	0.
1	1140	141	.00	.00	.00	0.	*	2	0010	291	.00	.00	.00	0.
1	1145	142	.00	.00	.00	0.	*	2	0015	292	.00	.00	.00	0.
1	1150	143	.00	.00	.00	0.	*	2	0020	293	.00	.00	.00	0.
1	1155	144	.00	.00	.00	0.	*	2	0025	294	.00	.00	.00	0.
1	1200	145	.00	.00	.00	0.	*	2	0030	295	.00	.00	.00	0.
1	1205	146	.00	.00	.00	0.	*	2	0035	296	.00	.00	.00	0.
1	1210	147	.00	.00	.00	0.	*	2	0040	297	.00	.00	.00	0.
1	1215	148	.00	.00	.00	0.	*	2	0045	298	.00	.00	.00	0.
1	1220	149	.00	.00	.00	0.	*	2	0050	299	.00	.00	.00	0.
1	1225	150	.00	.00	.00	0.	*	2	0055	300	.00	.00	.00	0.

TOTAL RAINFALL = 4.54, TOTAL LOSS = 2.09, TOTAL EXCESS = 2.46

PEAK FLOW + (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
654.	3.58	99.	25.	24.	24.
	(INCHES)	2.448	2.456	2.456	2.456
	(AC-FT)	49.	49.	49.	49.

CUMULATIVE AREA = .38 SQ MI

WARNING *** TIME INTERVAL IS GREATER THAN .29*LAG

1	0440	57	.05	.01	.04	147.	*	1	1710	207	.00	.00	.00	0.
1	0445	58	.06	.01	.04	143.	*	1	1715	208	.00	.00	.00	0.
1	0450	59	.09	.02	.07	141.	*	1	1720	209	.00	.00	.00	0.
1	0455	60	.03	.01	.02	145.	*	1	1725	210	.00	.00	.00	0.
1	0500	61	.03	.01	.02	129.	*	1	1730	211	.00	.00	.00	0.
1	0505	62	.01	.00	.01	101.	*	1	1735	212	.00	.00	.00	0.
1	0510	63	.01	.00	.01	72.	*	1	1740	213	.00	.00	.00	0.
1	0515	64	.01	.00	.01	52.	*	1	1745	214	.00	.00	.00	0.
1	0520	65	.00	.00	.00	37.	*	1	1750	215	.00	.00	.00	0.
1	0525	66	.01	.00	.01	28.	*	1	1755	216	.00	.00	.00	0.
1	0530	67	.00	.00	.00	23.	*	1	1800	217	.00	.00	.00	0.
1	0535	68	.00	.00	.00	18.	*	1	1805	218	.00	.00	.00	0.
1	0540	69	.00	.00	.00	14.	*	1	1810	219	.00	.00	.00	0.
1	0545	70	.01	.00	.01	13.	*	1	1815	220	.00	.00	.00	0.
1	0550	71	.00	.00	.00	15.	*	1	1820	221	.00	.00	.00	0.
1	0555	72	.00	.00	.00	14.	*	1	1825	222	.00	.00	.00	0.
1	0600	73	.00	.00	.00	12.	*	1	1830	223	.00	.00	.00	0.
1	0605	74	.00	.00	.00	10.	*	1	1835	224	.00	.00	.00	0.
1	0610	75	.00	.00	.00	7.	*	1	1840	225	.00	.00	.00	0.
1	0615	76	.00	.00	.00	4.	*	1	1845	226	.00	.00	.00	0.
1	0620	77	.00	.00	.00	2.	*	1	1850	227	.00	.00	.00	0.
1	0625	78	.00	.00	.00	1.	*	1	1855	228	.00	.00	.00	0.
1	0630	79	.00	.00	.00	1.	*	1	1900	229	.00	.00	.00	0.
1	0635	80	.00	.00	.00	0.	*	1	1905	230	.00	.00	.00	0.
1	0640	81	.00	.00	.00	0.	*	1	1910	231	.00	.00	.00	0.
1	0645	82	.00	.00	.00	0.	*	1	1915	232	.00	.00	.00	0.
1	0650	83	.00	.00	.00	0.	*	1	1920	233	.00	.00	.00	0.
1	0655	84	.00	.00	.00	0.	*	1	1925	234	.00	.00	.00	0.
1	0700	85	.00	.00	.00	0.	*	1	1930	235	.00	.00	.00	0.
1	0705	86	.00	.00	.00	0.	*	1	1935	236	.00	.00	.00	0.
1	0710	87	.00	.00	.00	0.	*	1	1940	237	.00	.00	.00	0.
1	0715	88	.00	.00	.00	0.	*	1	1945	238	.00	.00	.00	0.
1	0720	89	.00	.00	.00	0.	*	1	1950	239	.00	.00	.00	0.
1	0725	90	.00	.00	.00	0.	*	1	1955	240	.00	.00	.00	0.
1	0730	91	.00	.00	.00	0.	*	1	2000	241	.00	.00	.00	0.
1	0735	92	.00	.00	.00	0.	*	1	2005	242	.00	.00	.00	0.
1	0740	93	.00	.00	.00	0.	*	1	2010	243	.00	.00	.00	0.
1	0745	94	.00	.00	.00	0.	*	1	2015	244	.00	.00	.00	0.
1	0750	95	.00	.00	.00	0.	*	1	2020	245	.00	.00	.00	0.
1	0755	96	.00	.00	.00	0.	*	1	2025	246	.00	.00	.00	0.
1	0800	97	.00	.00	.00	0.	*	1	2030	247	.00	.00	.00	0.
1	0805	98	.00	.00	.00	0.	*	1	2035	248	.00	.00	.00	0.
1	0810	99	.00	.00	.00	0.	*	1	2040	249	.00	.00	.00	0.
1	0815	100	.00	.00	.00	0.	*	1	2045	250	.00	.00	.00	0.
1	0820	101	.00	.00	.00	0.	*	1	2050	251	.00	.00	.00	0.
1	0825	102	.00	.00	.00	0.	*	1	2055	252	.00	.00	.00	0.
1	0830	103	.00	.00	.00	0.	*	1	2100	253	.00	.00	.00	0.
1	0835	104	.00	.00	.00	0.	*	1	2105	254	.00	.00	.00	0.
1	0840	105	.00	.00	.00	0.	*	1	2110	255	.00	.00	.00	0.
1	0845	106	.00	.00	.00	0.	*	1	2115	256	.00	.00	.00	0.
1	0850	107	.00	.00	.00	0.	*	1	2120	257	.00	.00	.00	0.
1	0855	108	.00	.00	.00	0.	*	1	2125	258	.00	.00	.00	0.
1	0900	109	.00	.00	.00	0.	*	1	2130	259	.00	.00	.00	0.
1	0905	110	.00	.00	.00	0.	*	1	2135	260	.00	.00	.00	0.
1	0910	111	.00	.00	.00	0.	*	1	2140	261	.00	.00	.00	0.
1	0915	112	.00	.00	.00	0.	*	1	2145	262	.00	.00	.00	0.
1	0920	113	.00	.00	.00	0.	*	1	2150	263	.00	.00	.00	0.
1	0925	114	.00	.00	.00	0.	*	1	2155	264	.00	.00	.00	0.
1	0930	115	.00	.00	.00	0.	*	1	2200	265	.00	.00	.00	0.
1	0935	116	.00	.00	.00	0.	*	1	2205	266	.00	.00	.00	0.
1	0940	117	.00	.00	.00	0.	*	1	2210	267	.00	.00	.00	0.
1	0945	118	.00	.00	.00	0.	*	1	2215	268	.00	.00	.00	0.
1	0950	119	.00	.00	.00	0.	*	1	2220	269	.00	.00	.00	0.
1	0955	120	.00	.00	.00	0.	*	1	2225	270	.00	.00	.00	0.
1	1000	121	.00	.00	.00	0.	*	1	2230	271	.00	.00	.00	0.

HYDROGRAPH AT STATION NH
PLAN 1. RATIO = .99

DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP	Q	DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP	Q
1	0000	1	.00	.00	.00	0.	*	1	1230	151	.00	.00	.00	0.			
1	0005	2	.09	.06	.03	6.	*	1	1235	152	.00	.00	.00	0.			
1	0010	3	.17	.12	.05	31.	*	1	1240	153	.00	.00	.00	0.			
1	0015	4	.06	.04	.02	62.	*	1	1245	154	.00	.00	.00	0.			
1	0020	5	.08	.05	.02	73.	*	1	1250	155	.00	.00	.00	0.			
1	0025	6	.10	.07	.03	73.	*	1	1255	156	.00	.00	.00	0.			
1	0030	7	.07	.05	.02	72.	*	1	1300	157	.00	.00	.00	0.			
1	0035	8	.03	.02	.01	68.	*	1	1305	158	.00	.00	.00	0.			
1	0040	9	.00	.00	.00	54.	*	1	1310	159	.00	.00	.00	0.			
1	0045	10	.00	.00	.00	35.	*	1	1315	160	.00	.00	.00	0.			
1	0050	11	.00	.00	.00	19.	*	1	1320	161	.00	.00	.00	0.			
1	0055	12	.00	.00	.00	10.	*	1	1325	162	.00	.00	.00	0.			
1	0100	13	.00	.00	.00	6.	*	1	1330	163	.00	.00	.00	0.			
1	0105	14	.01	.01	.00	4.	*	1	1335	164	.00	.00	.00	0.			
1	0110	15	.03	.02	.01	7.	*	1	1340	165	.00	.00	.00	0.			
1	0115	16	.01	.01	.00	12.	*	1	1345	166	.00	.00	.00	0.			
1	0120	17	.03	.02	.01	14.	*	1	1350	167	.00	.00	.00	0.			
1	0125	18	.05	.03	.01	18.	*	1	1355	168	.00	.00	.00	0.			
1	0130	19	.06	.04	.02	26.	*	1	1400	169	.00	.00	.00	0.			
1	0135	20	.04	.03	.01	35.	*	1	1405	170	.00	.00	.00	0.			
1	0140	21	.04	.03	.01	38.	*	1	1410	171	.00	.00	.00	0.			
1	0145	22	.03	.02	.01	37.	*	1	1415	172	.00	.00	.00	0.			
1	0150	23	.01	.01	.00	33.	*	1	1420	173	.00	.00	.00	0.			
1	0155	24	.00	.00	.00	25.	*	1	1425	174	.00	.00	.00	0.			
1	0200	25	.00	.00	.00	17.	*	1	1430	175	.00	.00	.00	0.			
1	0205	26	.01	.01	.00	12.	*	1	1435	176	.00	.00	.00	0.			
1	0210	27	.05	.03	.01	13.	*	1	1440	177	.00	.00	.00	0.			
1	0215	28	.07	.05	.02	22.	*	1	1445	178	.00	.00	.00	0.			
1	0220	29	.05	.04	.02	35.	*	1	1450	179	.00	.00	.00	0.			
1	0225	30	.04	.02	.01	43.	*	1	1455	180	.00	.00	.00	0.			
1	0230	31	.01	.01	.00	42.	*	1	1500	181	.00	.00	.00	0.			
1	0235	32	.02	.01	.01	33.	*	1	1505	182	.00	.00	.00	0.			
1	0240	33	.06	.04	.02	31.	*	1	1510	183	.00	.00	.00	0.			
1	0245	34	.04	.02	.01	37.	*	1	1515	184	.00	.00	.00	0.			
1	0250	35	.01	.01	.01	40.	*	1	1520	185	.00	.00	.00	0.			
1	0255	36	.01	.01	.00	34.	*	1	1525	186	.00	.00	.00	0.			
1	0300	37	.05	.03	.02	29.	*	1	1530	187	.00	.00	.00	0.			
1	0305	38	.12	.07	.05	42.	*	1	1535	188	.00	.00	.00	0.			
1	0310	39	.14	.08	.06	77.	*	1	1540	189	.00	.00	.00	0.			
1	0315	40	.26	.13	.13	130.	*	1	1545	190	.00	.00	.00	0.			
1	0320	41	.41	.19	.22	227.	*	1	1550	191	.00	.00	.00	0.			
1	0325	42	.41	.16	.25	371.	*	1	1555	192	.00	.00	.00	0.			
1	0330	43	.55	.19	.36	536.	*	1	1600	193	.00	.00	.00	0.			
1	0335	44	.15	.05	.11	654.	*	1	1605	194	.00	.00	.00	0.			
1	0340	45	.17	.05	.12	617.	*	1	1610	195	.00	.00	.00	0.			
1	0345	46	.14	.04	.10	511.	*	1	1615	196	.00	.00	.00	0.			
1	0350	47	.03	.01	.02	397.	*	1	1620	197	.00	.00	.00	0.			
1	0355	48	.07	.02	.05	296.	*	1	1625	198	.00	.00	.00	0.			
1	0400	49	.07	.02	.05	223.	*	1	1630	199	.00	.00	.00	0.			
1	0405	50	.02	.01	.02	179.	*	1	1635	200	.00	.00	.00	0.			
1	0410	51	.02	.00	.01	138.	*	1	1640	201	.00	.00	.00	0.			
1	0415	52	.04	.01	.03	101.	*	1	1645	202	.00	.00	.00	0.			
1	0420	53	.04	.01	.03	83.	*	1	1650	203	.00	.00	.00	0.			
1	0425	54	.05	.01	.04	83.	*	1	1655	204	.00	.00	.00	0.			
1	0430	55	.10	.03	.07	100.	*	1	1700	205	.00	.00	.00	0.			
1	0435	56	.07	.02	.05	130.	*	1	1705	206	.00	.00	.00	0.			

1	1005	122	.00	.00	.00	0.	*	1	2235	272	.00	.00	.00	0.
1	1010	123	.00	.00	.00	0.	*	1	2240	273	.00	.00	.00	0.
1	1015	124	.00	.00	.00	0.	*	1	2245	274	.00	.00	.00	0.
1	1020	125	.00	.00	.00	0.	*	1	2250	275	.00	.00	.00	0.
1	1025	126	.00	.00	.00	0.	*	1	2255	276	.00	.00	.00	0.
1	1030	127	.00	.00	.00	0.	*	1	2300	277	.00	.00	.00	0.
1	1035	128	.00	.00	.00	0.	*	1	2305	278	.00	.00	.00	0.
1	1040	129	.00	.00	.00	0.	*	1	2310	279	.00	.00	.00	0.
1	1045	130	.00	.00	.00	0.	*	1	2315	280	.00	.00	.00	0.
1	1050	131	.00	.00	.00	0.	*	1	2320	281	.00	.00	.00	0.
1	1055	132	.00	.00	.00	0.	*	1	2325	282	.00	.00	.00	0.
1	1100	133	.00	.00	.00	0.	*	1	2330	283	.00	.00	.00	0.
1	1105	134	.00	.00	.00	0.	*	1	2335	284	.00	.00	.00	0.
1	1110	135	.00	.00	.00	0.	*	1	2340	285	.00	.00	.00	0.
1	1115	136	.00	.00	.00	0.	*	1	2345	286	.00	.00	.00	0.
1	1120	137	.00	.00	.00	0.	*	1	2350	287	.00	.00	.00	0.
1	1125	138	.00	.00	.00	0.	*	1	2355	288	.00	.00	.00	0.
1	1130	139	.00	.00	.00	0.	*	2	0000	289	.00	.00	.00	0.
1	1135	140	.00	.00	.00	0.	*	2	0005	290	.00	.00	.00	0.
1	1140	141	.00	.00	.00	0.	*	2	0010	291	.00	.00	.00	0.
1	1145	142	.00	.00	.00	0.	*	2	0015	292	.00	.00	.00	0.
1	1150	143	.00	.00	.00	0.	*	2	0020	293	.00	.00	.00	0.
1	1155	144	.00	.00	.00	0.	*	2	0025	294	.00	.00	.00	0.
1	1200	145	.00	.00	.00	0.	*	2	0030	295	.00	.00	.00	0.
1	1205	146	.00	.00	.00	0.	*	2	0035	296	.00	.00	.00	0.
1	1210	147	.00	.00	.00	0.	*	2	0040	297	.00	.00	.00	0.
1	1215	148	.00	.00	.00	0.	*	2	0045	298	.00	.00	.00	0.
1	1220	149	.00	.00	.00	0.	*	2	0050	299	.00	.00	.00	0.
1	1225	150	.00	.00	.00	0.	*	2	0055	300	.00	.00	.00	0.

TOTAL RAINFALL = 4.51, TOTAL LOSS = 2.08, TOTAL EXCESS = 2.43

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ 647.	3.58	98.	25.	24.	24.
	(INCHES)	2.423	2.431	2.431	2.431
	(AC-FT)	49.	49.	49.	49.

CUMULATIVE AREA = .38 SQ MI

WARNING *** TIME INTERVAL IS GREATER THAN .29*LAG

1	0435	56	201.	*	1	1050	131	0.	*	1	1705	206	0.	#	1	2320	281	0.
1	0440	57	232.	*	1	1055	132	0.	*	1	1710	207	0.	#	1	2325	282	0.
1	0445	58	236.	*	1	1100	133	0.	*	1	1715	208	0.	#	1	2330	283	0.
1	0450	59	234.	*	1	1105	134	0.	*	1	1720	209	0.	*	1	2335	284	0.
1	0455	60	238.	*	1	1110	135	0.	*	1	1725	210	0.	#	1	2340	285	0.
1	0500	61	220.	*	1	1115	136	0.	*	1	1730	211	0.	#	1	2345	286	0.
1	0505	62	183.	*	1	1120	137	0.	*	1	1735	212	0.	#	1	2350	287	0.
1	0510	63	139.	*	1	1125	138	0.	*	1	1740	213	0.	#	1	2355	288	0.
1	0515	64	103.	*	1	1130	139	0.	*	1	1745	214	0.	*	2	0000	289	0.
1	0520	65	75.	*	1	1135	140	0.	*	1	1750	215	0.	#	2	0005	290	0.
1	0525	66	56.	*	1	1140	141	0.	*	1	1755	216	0.	*	2	0010	291	0.
1	0530	67	46.	*	1	1145	142	0.	*	1	1800	217	0.	#	2	0015	292	0.
1	0535	68	36.	*	1	1150	143	0.	*	1	1805	218	0.	*	2	0020	293	0.
1	0540	69	28.	*	1	1155	144	0.	*	1	1810	219	0.	*	2	0025	294	0.
1	0545	70	25.	*	1	1200	145	0.	*	1	1815	220	0.	#	2	0030	295	0.
1	0550	71	25.	*	1	1205	146	0.	*	1	1820	221	0.	*	2	0035	296	0.
1	0555	72	23.	*	1	1210	147	0.	*	1	1825	222	0.	*	2	0040	297	0.
1	0600	73	21.	*	1	1215	148	0.	*	1	1830	223	0.	#	2	0045	298	0.
1	0605	74	18.	*	1	1220	149	0.	*	1	1835	224	0.	#	2	0050	299	0.
1	0610	75	14.	*	1	1225	150	0.	*	1	1840	225	0.	*	2	0055	300	0.

PEAK FLOW + (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ 1089.	3.58	181.	45.	44.	44.
	(INCHES)	2.851	2.863	2.863	2.863
	(AC-FT)	90.	90.	90.	90.

CUMULATIVE AREA = .59 SQ MI

HYDROGRAPH AT STATION CMWN
SUM OF 2 HYDROGRAPHS
PLAN I, RATIO = .99

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1	0000	1	0.	1	0615	76	10.	1	1230	151	0.	1	1845	226	0.				
1	0005	2	6.	1	0620	77	7.	1	1235	152	0.	1	1850	227	0.				
1	0010	3	33.	1	0625	78	4.	1	1240	153	0.	1	1855	228	0.				
1	0015	4	96.	1	0630	79	3.	1	1245	154	0.	1	1900	229	0.				
1	0020	5	148.	1	0635	80	2.	1	1250	155	0.	1	1905	230	0.				
1	0025	6	164.	1	0640	81	1.	1	1255	156	0.	1	1910	231	0.				
1	0030	7	167.	1	0645	82	1.	1	1300	157	0.	1	1915	232	0.				
1	0035	8	161.	1	0650	83	1.	1	1305	158	0.	1	1920	233	0.				
1	0040	9	140.	1	0655	84	0.	1	1310	159	0.	1	1925	234	0.				
1	0045	10	104.	1	0700	85	0.	1	1315	160	0.	1	1930	235	0.				
1	0050	11	69.	1	0705	86	0.	1	1320	161	0.	1	1935	236	0.				
1	0055	12	43.	1	0710	87	0.	1	1325	162	0.	1	1940	237	0.				
1	0100	13	26.	1	0715	88	0.	1	1330	163	0.	1	1945	238	0.				
1	0105	14	17.	1	0720	89	0.	1	1335	164	0.	1	1950	239	0.				
1	0110	15	16.	1	0725	90	0.	1	1340	165	0.	1	1955	240	0.				
1	0115	16	21.	1	0730	91	0.	1	1345	166	0.	1	2000	241	0.				
1	0120	17	27.	1	0735	92	0.	1	1350	167	0.	1	2005	242	0.				
1	0125	18	35.	1	0740	93	0.	1	1355	168	0.	1	2010	243	0.				
1	0130	19	48.	1	0745	94	0.	1	1400	169	0.	1	2015	244	0.				
1	0135	20	66.	1	0750	95	0.	1	1405	170	0.	1	2020	245	0.				
1	0140	21	81.	1	0755	96	0.	1	1410	171	0.	1	2025	246	0.				
1	0145	22	85.	1	0800	97	0.	1	1415	172	0.	1	2030	247	0.				
1	0150	23	80.	1	0805	98	0.	1	1420	173	0.	1	2035	248	0.				
1	0155	24	68.	1	0810	99	0.	1	1425	174	0.	1	2040	249	0.				
1	0200	25	51.	1	0815	100	0.	1	1430	175	0.	1	2045	250	0.				
1	0205	26	37.	1	0820	101	0.	1	1435	176	0.	1	2050	251	0.				
1	0210	27	32.	1	0825	102	0.	1	1440	177	0.	1	2055	252	0.				
1	0215	28	40.	1	0830	103	0.	1	1445	178	0.	1	2100	253	0.				
1	0220	29	62.	1	0835	104	0.	1	1450	179	0.	1	2105	254	0.				
1	0225	30	85.	1	0840	105	0.	1	1455	180	0.	1	2110	255	0.				
1	0230	31	92.	1	0845	106	0.	1	1500	181	0.	1	2115	256	0.				
1	0235	32	82.	1	0850	107	0.	1	1505	182	0.	1	2120	257	0.				
1	0240	33	73.	1	0855	108	0.	1	1510	183	0.	1	2125	258	0.				
1	0245	34	76.	1	0900	109	0.	1	1515	184	0.	1	2130	259	0.				
1	0250	35	82.	1	0905	110	0.	1	1520	185	0.	1	2135	260	0.				
1	0255	36	78.	1	0910	111	0.	1	1525	186	0.	1	2140	261	0.				
1	0300	37	68.	1	0915	112	0.	1	1530	187	0.	1	2145	262	0.				
1	0305	38	78.	1	0920	113	0.	1	1535	188	0.	1	2150	263	0.				
1	0310	39	125.	1	0925	114	0.	1	1540	189	0.	1	2155	264	0.				
1	0315	40	215.	1	0930	115	0.	1	1545	190	0.	1	2200	265	0.				
1	0320	41	372.	1	0935	116	0.	1	1550	191	0.	1	2205	266	0.				
1	0325	42	607.	1	0940	117	0.	1	1555	192	0.	1	2210	267	0.				
1	0330	43	884.	1	0945	118	0.	1	1600	193	0.	1	2215	268	0.				
1	0335	44	1099.	1	0950	119	0.	1	1605	194	0.	1	2220	269	0.				
1	0340	45	1090.	1	0955	120	0.	1	1610	195	0.	1	2225	270	0.				
1	0345	46	941.	1	1000	121	0.	1	1615	196	0.	1	2230	271	0.				
1	0350	47	752.	1	1005	122	0.	1	1620	197	0.	1	2235	272	0.				
1	0355	48	573.	1	1010	123	0.	1	1625	198	0.	1	2240	273	0.				
1	0400	49	437.	1	1015	124	0.	1	1630	199	0.	1	2245	274	0.				
1	0405	50	345.	1	1020	125	0.	1	1635	200	0.	1	2250	275	0.				
1	0410	51	269.	1	1025	126	0.	1	1640	201	0.	1	2255	276	0.				
1	0415	52	203.	1	1030	127	0.	1	1645	202	0.	1	2300	277	0.				
1	0420	53	162.	1	1035	128	0.	1	1650	203	0.	1	2305	278	0.				
1	0425	54	148.	1	1040	129	0.	1	1655	204	0.	1	2310	279	0.				
1	0430	55	162.	1	1045	130	0.	1	1700	205	0.	1	2315	280	0.				

1	0435	56	203.	*	1	1050	131	0.	*	1	1705	206	0.	*	1	2320	281	0.
1	0440	57	234.	*	1	1055	132	0.	*	1	1710	207	0.	*	1	2325	282	0.
1	0445	58	238.	*	1	1100	133	0.	*	1	1715	208	0.	*	1	2330	283	0.
1	0450	59	237.	*	1	1105	134	0.	*	1	1720	209	0.	*	1	2335	284	0.
1	0455	60	240.	*	1	1110	135	0.	*	1	1725	210	0.	*	1	2340	285	0.
1	0500	61	222.	*	1	1115	136	0.	*	1	1730	211	0.	*	1	2345	286	0.
1	0505	62	184.	*	1	1120	137	0.	*	1	1735	212	0.	*	1	2350	287	0.
1	0510	63	140.	*	1	1125	138	0.	*	1	1740	213	0.	*	1	2355	288	0.
1	0515	64	104.	*	1	1130	139	0.	*	1	1745	214	0.	*	2	0000	289	0.
1	0520	65	75.	*	1	1135	140	0.	*	1	1750	215	0.	*	2	0005	290	0.
1	0525	66	57.	*	1	1140	141	0.	*	1	1755	216	0.	*	2	0010	291	0.
1	0530	67	46.	*	1	1145	142	0.	*	1	1800	217	0.	*	2	0015	292	0.
1	0535	68	36.	*	1	1150	143	0.	*	1	1805	218	0.	*	2	0020	293	0.
1	0540	69	28.	*	1	1155	144	0.	*	1	1810	219	0.	*	2	0025	294	0.
1	0545	70	25.	*	1	1200	145	0.	*	1	1815	220	0.	*	2	0030	295	0.
1	0550	71	25.	*	1	1205	146	0.	*	1	1820	221	0.	*	2	0035	296	0.
1	0555	72	24.	*	1	1210	147	0.	*	1	1825	222	0.	*	2	0040	297	0.
1	0600	73	21.	*	1	1215	148	0.	*	1	1830	223	0.	*	2	0045	298	0.
1	0605	74	18.	*	1	1220	149	0.	*	1	1835	224	0.	*	2	0050	299	0.
1	0610	75	14.	*	1	1225	150	0.	*	1	1840	225	0.	*	2	0055	300	0.

PEAK FLOW		TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+	(CFS)	(HR)				
		(CFS)				
+	1099.	3.58	183.	46.	44.	44.
		(INCHES)	2.877	2.889	2.889	2.889
		(AC-FT)	91.	91.	91.	91.

CUMULATIVE AREA = .59 SQ MI

HYDROGRAPH AT STATION CMWN
SUM OF 2 HYDROGRAPHS
PLAN 1, RATIO = .85

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1	0000	1	0.	* 1	0615	76	9.	* 1	1230	151	0.	* 1	1845	226	0.				
1	0005	2	5.	* 1	0620	77	6.	* 1	1235	152	0.	* 1	1850	227	0.				
1	0010	3	28.	* 1	0625	78	4.	* 1	1240	153	0.	* 1	1855	228	0.				
1	0015	4	80.	* 1	0630	79	3.	* 1	1245	154	0.	* 1	1900	229	0.				
1	0020	5	126.	* 1	0635	80	2.	* 1	1250	155	0.	* 1	1905	230	0.				
1	0025	6	140.	* 1	0640	81	1.	* 1	1255	156	0.	* 1	1910	231	0.				
1	0030	7	143.	* 1	0645	82	1.	* 1	1300	157	0.	* 1	1915	232	0.				
1	0035	8	138.	* 1	0650	83	1.	* 1	1305	158	0.	* 1	1920	233	0.				
1	0040	9	120.	* 1	0655	84	0.	* 1	1310	159	0.	* 1	1925	234	0.				
1	0045	10	90.	* 1	0700	85	0.	* 1	1315	160	0.	* 1	1930	235	0.				
1	0050	11	60.	* 1	0705	86	0.	* 1	1320	161	0.	* 1	1935	236	0.				
1	0055	12	38.	* 1	0710	87	0.	* 1	1325	162	0.	* 1	1940	237	0.				
1	0100	13	23.	* 1	0715	88	0.	* 1	1330	163	0.	* 1	1945	238	0.				
1	0105	14	15.	* 1	0720	89	0.	* 1	1335	164	0.	* 1	1950	239	0.				
1	0110	15	14.	* 1	0725	90	0.	* 1	1340	165	0.	* 1	1955	240	0.				
1	0115	16	18.	* 1	0730	91	0.	* 1	1345	166	0.	* 1	2000	241	0.				
1	0120	17	23.	* 1	0735	92	0.	* 1	1350	167	0.	* 1	2005	242	0.				
1	0125	18	30.	* 1	0740	93	0.	* 1	1355	168	0.	* 1	2010	243	0.				
1	0130	19	41.	* 1	0745	94	0.	* 1	1400	169	0.	* 1	2015	244	0.				
1	0135	20	57.	* 1	0750	95	0.	* 1	1405	170	0.	* 1	2020	245	0.				
1	0140	21	69.	* 1	0755	96	0.	* 1	1410	171	0.	* 1	2025	246	0.				
1	0145	22	73.	* 1	0800	97	0.	* 1	1415	172	0.	* 1	2030	247	0.				
1	0150	23	69.	* 1	0805	98	0.	* 1	1420	173	0.	* 1	2035	248	0.				
1	0155	24	58.	* 1	0810	99	0.	* 1	1425	174	0.	* 1	2040	249	0.				
1	0200	25	44.	* 1	0815	100	0.	* 1	1430	175	0.	* 1	2045	250	0.				
1	0205	26	32.	* 1	0820	101	0.	* 1	1435	176	0.	* 1	2050	251	0.				
1	0210	27	27.	* 1	0825	102	0.	* 1	1440	177	0.	* 1	2055	252	0.				
1	0215	28	33.	* 1	0830	103	0.	* 1	1445	178	0.	* 1	2100	253	0.				
1	0220	29	51.	* 1	0835	104	0.	* 1	1450	179	0.	* 1	2105	254	0.				
1	0225	30	69.	* 1	0840	105	0.	* 1	1455	180	0.	* 1	2110	255	0.				
1	0230	31	75.	* 1	0845	106	0.	* 1	1500	181	0.	* 1	2115	256	0.				
1	0235	32	67.	* 1	0850	107	0.	* 1	1505	182	0.	* 1	2120	257	0.				
1	0240	33	59.	* 1	0855	108	0.	* 1	1510	183	0.	* 1	2125	258	0.				
1	0245	34	61.	* 1	0900	109	0.	* 1	1515	184	0.	* 1	2130	259	0.				
1	0250	35	65.	* 1	0905	110	0.	* 1	1520	185	0.	* 1	2135	260	0.				
1	0255	36	62.	* 1	0910	111	0.	* 1	1525	186	0.	* 1	2140	261	0.				
1	0300	37	55.	* 1	0915	112	0.	* 1	1530	187	0.	* 1	2145	262	0.				
1	0305	38	62.	* 1	0920	113	0.	* 1	1535	188	0.	* 1	2150	263	0.				
1	0310	39	98.	* 1	0925	114	0.	* 1	1540	189	0.	* 1	2155	264	0.				
1	0315	40	168.	* 1	0930	115	0.	* 1	1545	190	0.	* 1	2200	265	0.				
1	0320	41	293.	* 1	0935	116	0.	* 1	1550	191	0.	* 1	2205	266	0.				
1	0325	42	481.	* 1	0940	117	0.	* 1	1555	192	0.	* 1	2210	267	0.				
1	0330	43	708.	* 1	0945	118	0.	* 1	1600	193	0.	* 1	2215	268	0.				
1	0335	44	886.	* 1	0950	119	0.	* 1	1605	194	0.	* 1	2220	269	0.				
1	0340	45	885.	* 1	0955	120	0.	* 1	1610	195	0.	* 1	2225	270	0.				
1	0345	46	767.	* 1	1000	121	0.	* 1	1615	196	0.	* 1	2230	271	0.				
1	0350	47	616.	* 1	1005	122	0.	* 1	1620	197	0.	* 1	2235	272	0.				
1	0355	48	471.	* 1	1010	123	0.	* 1	1625	198	0.	* 1	2240	273	0.				
1	0400	49	359.	* 1	1015	124	0.	* 1	1630	199	0.	* 1	2245	274	0.				
1	0405	50	284.	* 1	1020	125	0.	* 1	1635	200	0.	* 1	2250	275	0.				
1	0410	51	221.	* 1	1025	126	0.	* 1	1640	201	0.	* 1	2255	276	0.				
1	0415	52	167.	* 1	1030	127	0.	* 1	1645	202	0.	* 1	2300	277	0.				
1	0420	53	134.	* 1	1035	128	0.	* 1	1650	203	0.	* 1	2305	278	0.				
1	0425	54	121.	* 1	1040	129	0.	* 1	1655	204	0.	* 1	2310	279	0.				
1	0430	55	133.	* 1	1045	130	0.	* 1	1700	205	0.	* 1	2315	280	0.				

1	0435	56	166.	*	1	1050	131	0.	*	1	1705	206	0.	*	1	2320	281	0.
1	0440	57	192.	*	1	1055	132	0.	*	1	1710	207	0.	*	1	2325	282	0.
1	0445	58	196.	*	1	1100	133	0.	*	1	1715	208	0.	*	1	2330	283	0.
1	0450	59	195.	*	1	1105	134	0.	*	1	1720	209	0.	*	1	2335	284	0.
1	0455	60	197.	*	1	1110	135	0.	*	1	1725	210	0.	*	1	2340	285	0.
1	0500	61	183.	*	1	1115	136	0.	*	1	1730	211	0.	*	1	2345	286	0.
1	0505	62	153.	*	1	1120	137	0.	*	1	1735	212	0.	*	1	2350	287	0.
1	0510	63	117.	*	1	1125	138	0.	*	1	1740	213	0.	*	1	2355	288	0.
1	0515	64	86.	*	1	1130	139	0.	*	1	1745	214	0.	*	2	0000	289	0.
1	0520	65	63.	*	1	1135	140	0.	*	1	1750	215	0.	*	2	0005	290	0.
1	0525	66	47.	*	1	1140	141	0.	*	1	1755	216	0.	*	2	0010	291	0.
1	0530	67	38.	*	1	1145	142	0.	*	1	1800	217	0.	*	2	0015	292	0.
1	0535	68	30.	*	1	1150	143	0.	*	1	1805	218	0.	*	2	0020	293	0.
1	0540	69	24.	*	1	1155	144	0.	*	1	1810	219	0.	*	2	0025	294	0.
1	0545	70	21.	*	1	1200	145	0.	*	1	1815	220	0.	*	2	0030	295	0.
1	0550	71	21.	*	1	1205	146	0.	*	1	1820	221	0.	*	2	0035	296	0.
1	0555	72	19.	*	1	1210	147	0.	*	1	1825	222	0.	*	2	0040	297	0.
1	0600	73	17.	*	1	1215	148	0.	*	1	1830	223	0.	*	2	0045	298	0.
1	0605	74	15.	*	1	1220	149	0.	*	1	1835	224	0.	*	2	0050	299	0.
1	0610	75	12.	*	1	1225	150	0.	*	1	1840	225	0.	*	2	0055	300	0.

PEAK FLOW + (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
886.	3.58	150.	38.	36.	36.
	(INCHES)	2.356	2.367	2.367	2.367
	(AC-FT)	74.	75.	75.	75.

CUMULATIVE AREA = .59 SQ MI

HYDROGRAPH AT STATION CMWN
SUM OF 2 HYDROGRAPHS
PLAN 1. RATIO = .70

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1	0000	1	0.	* 1	0615	76	7.	* 1	1230	151	0.	* 1	1845	226	0.				
1	0005	2	4.	* 1	0620	77	5.	* 1	1235	152	0.	* 1	1850	227	0.				
1	0010	3	23.	* 1	0625	78	3.	* 1	1240	153	0.	* 1	1855	228	0.				
1	0015	4	64.	* 1	0630	79	2.	* 1	1245	154	0.	* 1	1900	229	0.				
1	0020	5	103.	* 1	0635	80	1.	* 1	1250	155	0.	* 1	1905	230	0.				
1	0025	6	115.	* 1	0640	81	1.	* 1	1255	156	0.	* 1	1910	231	0.				
1	0030	7	117.	* 1	0645	82	1.	* 1	1300	157	0.	* 1	1915	232	0.				
1	0035	8	114.	* 1	0650	83	0.	* 1	1305	158	0.	* 1	1920	233	0.				
1	0040	9	99.	* 1	0655	84	0.	* 1	1310	159	0.	* 1	1925	234	0.				
1	0045	10	75.	* 1	0700	85	0.	* 1	1315	160	0.	* 1	1930	235	0.				
1	0050	11	50.	* 1	0705	86	0.	* 1	1320	161	0.	* 1	1935	236	0.				
1	0055	12	31.	* 1	0710	87	0.	* 1	1325	162	0.	* 1	1940	237	0.				
1	0100	13	20.	* 1	0715	88	0.	* 1	1330	163	0.	* 1	1945	238	0.				
1	0105	14	13.	* 1	0720	89	0.	* 1	1335	164	0.	* 1	1950	239	0.				
1	0110	15	12.	* 1	0725	90	0.	* 1	1340	165	0.	* 1	1955	240	0.				
1	0115	16	14.	* 1	0730	91	0.	* 1	1345	166	0.	* 1	2000	241	0.				
1	0120	17	19.	* 1	0735	92	0.	* 1	1350	167	0.	* 1	2005	242	0.				
1	0125	18	24.	* 1	0740	93	0.	* 1	1355	168	0.	* 1	2010	243	0.				
1	0130	19	33.	* 1	0745	94	0.	* 1	1400	169	0.	* 1	2015	244	0.				
1	0135	20	46.	* 1	0750	95	0.	* 1	1405	170	0.	* 1	2020	245	0.				
1	0140	21	56.	* 1	0755	96	0.	* 1	1410	171	0.	* 1	2025	246	0.				
1	0145	22	60.	* 1	0800	97	0.	* 1	1415	172	0.	* 1	2030	247	0.				
1	0150	23	57.	* 1	0805	98	0.	* 1	1420	173	0.	* 1	2035	248	0.				
1	0155	24	48.	* 1	0810	99	0.	* 1	1425	174	0.	* 1	2040	249	0.				
1	0200	25	36.	* 1	0815	100	0.	* 1	1430	175	0.	* 1	2045	250	0.				
1	0205	26	27.	* 1	0820	101	0.	* 1	1435	176	0.	* 1	2050	251	0.				
1	0210	27	23.	* 1	0825	102	0.	* 1	1440	177	0.	* 1	2055	252	0.				
1	0215	28	28.	* 1	0830	103	0.	* 1	1445	178	0.	* 1	2100	253	0.				
1	0220	29	42.	* 1	0835	104	0.	* 1	1450	179	0.	* 1	2105	254	0.				
1	0225	30	56.	* 1	0840	105	0.	* 1	1455	180	0.	* 1	2110	255	0.				
1	0230	31	61.	* 1	0845	106	0.	* 1	1500	181	0.	* 1	2115	256	0.				
1	0235	32	55.	* 1	0850	107	0.	* 1	1505	182	0.	* 1	2120	257	0.				
1	0240	33	48.	* 1	0855	108	0.	* 1	1510	183	0.	* 1	2125	258	0.				
1	0245	34	49.	* 1	0900	109	0.	* 1	1515	184	0.	* 1	2130	259	0.				
1	0250	35	52.	* 1	0905	110	0.	* 1	1520	185	0.	* 1	2135	260	0.				
1	0255	36	49.	* 1	0910	111	0.	* 1	1525	186	0.	* 1	2140	261	0.				
1	0300	37	43.	* 1	0915	112	0.	* 1	1530	187	0.	* 1	2145	262	0.				
1	0305	38	47.	* 1	0920	113	0.	* 1	1535	188	0.	* 1	2150	263	0.				
1	0310	39	72.	* 1	0925	114	0.	* 1	1540	189	0.	* 1	2155	264	0.				
1	0315	40	122.	* 1	0930	115	0.	* 1	1545	190	0.	* 1	2200	265	0.				
1	0320	41	215.	* 1	0935	116	0.	* 1	1550	191	0.	* 1	2205	266	0.				
1	0325	42	356.	* 1	0940	117	0.	* 1	1555	192	0.	* 1	2210	267	0.				
1	0330	43	528.	* 1	0945	118	0.	* 1	1600	193	0.	* 1	2215	268	0.				
1	0335	44	667.	* 1	0950	119	0.	* 1	1605	194	0.	* 1	2220	269	0.				
1	0340	45	671.	* 1	0955	120	0.	* 1	1610	195	0.	* 1	2225	270	0.				
1	0345	46	586.	* 1	1000	121	0.	* 1	1615	196	0.	* 1	2230	271	0.				
1	0350	47	473.	* 1	1005	122	0.	* 1	1620	197	0.	* 1	2235	272	0.				
1	0355	48	363.	* 1	1010	123	0.	* 1	1625	198	0.	* 1	2240	273	0.				
1	0400	49	277.	* 1	1015	124	0.	* 1	1630	199	0.	* 1	2245	274	0.				
1	0405	50	219.	* 1	1020	125	0.	* 1	1635	200	0.	* 1	2250	275	0.				
1	0410	51	171.	* 1	1025	126	0.	* 1	1640	201	0.	* 1	2255	276	0.				
1	0415	52	130.	* 1	1030	127	0.	* 1	1645	202	0.	* 1	2300	277	0.				
1	0420	53	104.	* 1	1035	128	0.	* 1	1650	203	0.	* 1	2305	278	0.				
1	0425	54	94.	* 1	1040	129	0.	* 1	1655	204	0.	* 1	2310	279	0.				
1	0430	55	102.	* 1	1045	130	0.	* 1	1700	205	0.	* 1	2315	280	0.				
1	0435	56	127.	* 1	1050	131	0.	* 1	1705	206	0.	* 1	2320	281	0.				

1	0440	57	147.	*	1	1055	132	0.	*	1	1710	207	0.	*	1	2325	282	0.
1	0445	58	151.	*	1	1100	133	0.	*	1	1715	208	0.	*	1	2330	283	0.
1	0450	59	150.	*	1	1105	134	0.	*	1	1720	209	0.	*	1	2335	284	0.
1	0455	60	152.	*	1	1110	135	0.	*	1	1725	210	0.	*	1	2340	285	0.
1	0500	61	142.	*	1	1115	136	0.	*	1	1730	211	0.	*	1	2345	286	0.
1	0505	62	119.	*	1	1120	137	0.	*	1	1735	212	0.	*	1	2350	287	0.
1	0510	63	91.	*	1	1125	138	0.	*	1	1740	213	0.	*	1	2355	288	0.
1	0515	64	68.	*	1	1130	139	0.	*	1	1745	214	0.	*	2	0000	289	0.
1	0520	65	49.	*	1	1135	140	0.	*	1	1750	215	0.	*	2	0005	290	0.
1	0525	66	37.	*	1	1140	141	0.	*	1	1755	216	0.	*	2	0010	291	0.
1	0530	67	30.	*	1	1145	142	0.	*	1	1800	217	0.	*	2	0015	292	0.
1	0535	68	24.	*	1	1150	143	0.	*	1	1805	218	0.	*	2	0020	293	0.
1	0540	69	19.	*	1	1155	144	0.	*	1	1810	219	0.	*	2	0025	294	0.
1	0545	70	16.	*	1	1200	145	0.	*	1	1815	220	0.	*	2	0030	295	0.
1	0550	71	16.	*	1	1205	146	0.	*	1	1820	221	0.	*	2	0035	296	0.
1	0555	72	15.	*	1	1210	147	0.	*	1	1825	222	0.	*	2	0040	297	0.
1	0600	73	14.	*	1	1215	148	0.	*	1	1830	223	0.	*	2	0045	298	0.
1	0605	74	12.	*	1	1220	149	0.	*	1	1835	224	0.	*	2	0050	299	0.
1	0610	75	9.	*	1	1225	150	0.	*	1	1840	225	0.	*	2	0055	300	0.

PEAK FLOW		TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+	(CFS)	(HR)				
		(CFS)				
+	671.	3.67	116.	29.	28.	28.
		(INCHES)	1.821	1.829	1.829	1.829
		(AC-FT)	57.	58.	58.	58.

CUMULATIVE AREA = .59 SQ MI

HYDROGRAPH AT STATION CMWN

SUM OF 2 HYDROGRAPHS
PLAN 1, RATIO = .52

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1	0000	1	0.	* 1	0615	76	5.	* 1	1230	151	0.	* 1	1845	226	0.				
1	0005	2	3.	* 1	0620	77	3.	* 1	1235	152	0.	* 1	1850	227	0.				
1	0010	3	16.	* 1	0625	78	2.	* 1	1240	153	0.	* 1	1855	228	0.				
1	0015	4	44.	* 1	0630	79	2.	* 1	1245	154	0.	* 1	1900	229	0.				
1	0020	5	75.	* 1	0635	80	1.	* 1	1250	155	0.	* 1	1905	230	0.				
1	0025	6	85.	* 1	0640	81	1.	* 1	1255	156	0.	* 1	1910	231	0.				
1	0030	7	87.	* 1	0645	82	1.	* 1	1300	157	0.	* 1	1915	232	0.				
1	0035	8	84.	* 1	0650	83	0.	* 1	1305	158	0.	* 1	1920	233	0.				
1	0040	9	74.	* 1	0655	84	0.	* 1	1310	159	0.	* 1	1925	234	0.				
1	0045	10	56.	* 1	0700	85	0.	* 1	1315	160	0.	* 1	1930	235	0.				
1	0050	11	38.	* 1	0705	86	0.	* 1	1320	161	0.	* 1	1935	236	0.				
1	0055	12	24.	* 1	0710	87	0.	* 1	1325	162	0.	* 1	1940	237	0.				
1	0100	13	15.	* 1	0715	88	0.	* 1	1330	163	0.	* 1	1945	238	0.				
1	0105	14	10.	* 1	0720	89	0.	* 1	1335	164	0.	* 1	1950	239	0.				
1	0110	15	9.	* 1	0725	90	0.	* 1	1340	165	0.	* 1	1955	240	0.				
1	0115	16	11.	* 1	0730	91	0.	* 1	1345	166	0.	* 1	2000	241	0.				
1	0120	17	13.	* 1	0735	92	0.	* 1	1350	167	0.	* 1	2005	242	0.				
1	0125	18	18.	* 1	0740	93	0.	* 1	1355	168	0.	* 1	2010	243	0.				
1	0130	19	24.	* 1	0745	94	0.	* 1	1400	169	0.	* 1	2015	244	0.				
1	0135	20	34.	* 1	0750	95	0.	* 1	1405	170	0.	* 1	2020	245	0.				
1	0140	21	41.	* 1	0755	96	0.	* 1	1410	171	0.	* 1	2025	246	0.				
1	0145	22	44.	* 1	0800	97	0.	* 1	1415	172	0.	* 1	2030	247	0.				
1	0150	23	42.	* 1	0805	98	0.	* 1	1420	173	0.	* 1	2035	248	0.				
1	0155	24	36.	* 1	0810	99	0.	* 1	1425	174	0.	* 1	2040	249	0.				
1	0200	25	27.	* 1	0815	100	0.	* 1	1430	175	0.	* 1	2045	250	0.				
1	0205	26	20.	* 1	0820	101	0.	* 1	1435	176	0.	* 1	2050	251	0.				
1	0210	27	17.	* 1	0825	102	0.	* 1	1440	177	0.	* 1	2055	252	0.				
1	0215	28	21.	* 1	0830	103	0.	* 1	1445	178	0.	* 1	2100	253	0.				
1	0220	29	30.	* 1	0835	104	0.	* 1	1450	179	0.	* 1	2105	254	0.				
1	0225	30	41.	* 1	0840	105	0.	* 1	1455	180	0.	* 1	2110	255	0.				
1	0230	31	45.	* 1	0845	106	0.	* 1	1500	181	0.	* 1	2115	256	0.				
1	0235	32	41.	* 1	0850	107	0.	* 1	1505	182	0.	* 1	2120	257	0.				
1	0240	33	36.	* 1	0855	108	0.	* 1	1510	183	0.	* 1	2125	258	0.				
1	0245	34	36.	* 1	0900	109	0.	* 1	1515	184	0.	* 1	2130	259	0.				
1	0250	35	38.	* 1	0905	110	0.	* 1	1520	185	0.	* 1	2135	260	0.				
1	0255	36	36.	* 1	0910	111	0.	* 1	1525	186	0.	* 1	2140	261	0.				
1	0300	37	32.	* 1	0915	112	0.	* 1	1530	187	0.	* 1	2145	262	0.				
1	0305	38	35.	* 1	0920	113	0.	* 1	1535	188	0.	* 1	2150	263	0.				
1	0310	39	51.	* 1	0925	114	0.	* 1	1540	189	0.	* 1	2155	264	0.				
1	0315	40	83.	* 1	0930	115	0.	* 1	1545	190	0.	* 1	2200	265	0.				
1	0320	41	140.	* 1	0935	116	0.	* 1	1550	191	0.	* 1	2205	266	0.				
1	0325	42	227.	* 1	0940	117	0.	* 1	1555	192	0.	* 1	2210	267	0.				
1	0330	43	337.	* 1	0945	118	0.	* 1	1600	193	0.	* 1	2215	268	0.				
1	0335	44	428.	* 1	0950	119	0.	* 1	1605	194	0.	* 1	2220	269	0.				
1	0340	45	436.	* 1	0955	120	0.	* 1	1610	195	0.	* 1	2225	270	0.				
1	0345	46	385.	* 1	1000	121	0.	* 1	1615	196	0.	* 1	2230	271	0.				
1	0350	47	313.	* 1	1005	122	0.	* 1	1620	197	0.	* 1	2235	272	0.				
1	0355	48	241.	* 1	1010	123	0.	* 1	1625	198	0.	* 1	2240	273	0.				
1	0400	49	185.	* 1	1015	124	0.	* 1	1630	199	0.	* 1	2245	274	0.				
1	0405	50	147.	* 1	1020	125	0.	* 1	1635	200	0.	* 1	2250	275	0.				
1	0410	51	115.	* 1	1025	126	0.	* 1	1640	201	0.	* 1	2255	276	0.				
1	0415	52	88.	* 1	1030	127	0.	* 1	1645	202	0.	* 1	2300	277	0.				
1	0420	53	70.	* 1	1035	128	0.	* 1	1650	203	0.	* 1	2305	278	0.				
1	0425	54	62.	* 1	1040	129	0.	* 1	1655	204	0.	* 1	2310	279	0.				
1	0430	55	67.	* 1	1045	130	0.	* 1	1700	205	0.	* 1	2315	280	0.				
1	0435	56	83.	* 1	1050	131	0.	* 1	1705	206	0.	* 1	2320	281	0.				

1	0440	57	96.	*	1	1055	132	0.	*	1	1710	207	0.	*	1	2325	282	0.
1	0445	58	100.	*	1	1100	133	0.	*	1	1715	208	0.	*	1	2330	283	0.
1	0450	59	100.	*	1	1105	134	0.	*	1	1720	209	0.	*	1	2335	284	0.
1	0455	60	101.	*	1	1110	135	0.	*	1	1725	210	0.	*	1	2340	285	0.
1	0500	61	95.	*	1	1115	136	0.	*	1	1730	211	0.	*	1	2345	286	0.
1	0505	62	80.	*	1	1120	137	0.	*	1	1735	212	0.	*	1	2350	287	0.
1	0510	63	62.	*	1	1125	138	0.	*	1	1740	213	0.	*	1	2355	288	0.
1	0515	64	46.	*	1	1130	139	0.	*	1	1745	214	0.	*	2	0000	289	0.
1	0520	65	34.	*	1	1135	140	0.	*	1	1750	215	0.	*	2	0005	290	0.
1	0525	66	26.	*	1	1140	141	0.	*	1	1755	216	0.	*	2	0010	291	0.
1	0530	67	20.	*	1	1145	142	0.	*	1	1800	217	0.	*	2	0015	292	0.
1	0535	68	16.	*	1	1150	143	0.	*	1	1805	218	0.	*	2	0020	293	0.
1	0540	69	13.	*	1	1155	144	0.	*	1	1810	219	0.	*	2	0025	294	0.
1	0545	70	11.	*	1	1200	145	0.	*	1	1815	220	0.	*	2	0030	295	0.
1	0550	71	11.	*	1	1205	146	0.	*	1	1820	221	0.	*	2	0035	296	0.
1	0555	72	10.	*	1	1210	147	0.	*	1	1825	222	0.	*	2	0040	297	0.
1	0600	73	9.	*	1	1215	148	0.	*	1	1830	223	0.	*	2	0045	298	0.
1	0605	74	8.	*	1	1220	149	0.	*	1	1835	224	0.	*	2	0050	299	0.
1	0610	75	6.	*	1	1225	150	0.	*	1	1840	225	0.	*	2	0055	300	0.

PEAK FLOW		TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+	(CFS)	(HR)				
		(CFS)				
+	436.	3.67	78.	20.	19.	19.
		(INCHES)	1.229	1.235	1.235	1.235
		(AC-FT)	39.	39.	39.	39.

CUMULATIVE AREA = .59 SQ MI

HYDROGRAPH AT STATION CMWN
SUM OF 2 HYDROGRAPHS
PLAN I. RATIO = .41

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1	0000	1	0.	* 1	0615	76	4.	* 1	1230	151	0.	* 1	1845	226	0.				
1	0005	2	3.	* 1	0620	77	3.	* 1	1235	152	0.	* 1	1850	227	0.				
1	0010	3	13.	* 1	0625	78	2.	* 1	1240	153	0.	* 1	1855	228	0.				
1	0015	4	32.	* 1	0630	79	1.	* 1	1245	154	0.	* 1	1900	229	0.				
1	0020	5	58.	* 1	0635	80	1.	* 1	1250	155	0.	* 1	1905	230	0.				
1	0025	6	66.	* 1	0640	81	1.	* 1	1255	156	0.	* 1	1910	231	0.				
1	0030	7	68.	* 1	0645	82	0.	* 1	1300	157	0.	* 1	1915	232	0.				
1	0035	8	66.	* 1	0650	83	0.	* 1	1305	158	0.	* 1	1920	233	0.				
1	0040	9	58.	* 1	0655	84	0.	* 1	1310	159	0.	* 1	1925	234	0.				
1	0045	10	44.	* 1	0700	85	0.	* 1	1315	160	0.	* 1	1930	235	0.				
1	0050	11	30.	* 1	0705	86	0.	* 1	1320	161	0.	* 1	1935	236	0.				
1	0055	12	19.	* 1	0710	87	0.	* 1	1325	162	0.	* 1	1940	237	0.				
1	0100	13	12.	* 1	0715	88	0.	* 1	1330	163	0.	* 1	1945	238	0.				
1	0105	14	8.	* 1	0720	89	0.	* 1	1335	164	0.	* 1	1950	239	0.				
1	0110	15	7.	* 1	0725	90	0.	* 1	1340	165	0.	* 1	1955	240	0.				
1	0115	16	8.	* 1	0730	91	0.	* 1	1345	166	0.	* 1	2000	241	0.				
1	0120	17	10.	* 1	0735	92	0.	* 1	1350	167	0.	* 1	2005	242	0.				
1	0125	18	14.	* 1	0740	93	0.	* 1	1355	168	0.	* 1	2010	243	0.				
1	0130	19	19.	* 1	0745	94	0.	* 1	1400	169	0.	* 1	2015	244	0.				
1	0135	20	26.	* 1	0750	95	0.	* 1	1405	170	0.	* 1	2020	245	0.				
1	0140	21	32.	* 1	0755	96	0.	* 1	1410	171	0.	* 1	2025	246	0.				
1	0145	22	35.	* 1	0800	97	0.	* 1	1415	172	0.	* 1	2030	247	0.				
1	0150	23	33.	* 1	0805	98	0.	* 1	1420	173	0.	* 1	2035	248	0.				
1	0155	24	28.	* 1	0810	99	0.	* 1	1425	174	0.	* 1	2040	249	0.				
1	0200	25	22.	* 1	0815	100	0.	* 1	1430	175	0.	* 1	2045	250	0.				
1	0205	26	16.	* 1	0820	101	0.	* 1	1435	176	0.	* 1	2050	251	0.				
1	0210	27	14.	* 1	0825	102	0.	* 1	1440	177	0.	* 1	2055	252	0.				
1	0215	28	16.	* 1	0830	103	0.	* 1	1445	178	0.	* 1	2100	253	0.				
1	0220	29	23.	* 1	0835	104	0.	* 1	1450	179	0.	* 1	2105	254	0.				
1	0225	30	32.	* 1	0840	105	0.	* 1	1455	180	0.	* 1	2110	255	0.				
1	0230	31	35.	* 1	0845	106	0.	* 1	1500	181	0.	* 1	2115	256	0.				
1	0235	32	32.	* 1	0850	107	0.	* 1	1505	182	0.	* 1	2120	257	0.				
1	0240	33	28.	* 1	0855	108	0.	* 1	1510	183	0.	* 1	2125	258	0.				
1	0245	34	29.	* 1	0900	109	0.	* 1	1515	184	0.	* 1	2130	259	0.				
1	0250	35	30.	* 1	0905	110	0.	* 1	1520	185	0.	* 1	2135	260	0.				
1	0255	36	28.	* 1	0910	111	0.	* 1	1525	186	0.	* 1	2140	261	0.				
1	0300	37	25.	* 1	0915	112	0.	* 1	1530	187	0.	* 1	2145	262	0.				
1	0305	38	27.	* 1	0920	113	0.	* 1	1535	188	0.	* 1	2150	263	0.				
1	0310	39	39.	* 1	0925	114	0.	* 1	1540	189	0.	* 1	2155	264	0.				
1	0315	40	65.	* 1	0930	115	0.	* 1	1545	190	0.	* 1	2200	265	0.				
1	0320	41	107.	* 1	0935	116	0.	* 1	1550	191	0.	* 1	2205	266	0.				
1	0325	42	169.	* 1	0940	117	0.	* 1	1555	192	0.	* 1	2210	267	0.				
1	0330	43	243.	* 1	0945	118	0.	* 1	1600	193	0.	* 1	2215	268	0.				
1	0335	44	305.	* 1	0950	119	0.	* 1	1605	194	0.	* 1	2220	269	0.				
1	0340	45	311.	* 1	0955	120	0.	* 1	1610	195	0.	* 1	2225	270	0.				
1	0345	46	275.	* 1	1000	121	0.	* 1	1615	196	0.	* 1	2230	271	0.				
1	0350	47	225.	* 1	1005	122	0.	* 1	1620	197	0.	* 1	2235	272	0.				
1	0355	48	174.	* 1	1010	123	0.	* 1	1625	198	0.	* 1	2240	273	0.				
1	0400	49	134.	* 1	1015	124	0.	* 1	1630	199	0.	* 1	2245	274	0.				
1	0405	50	106.	* 1	1020	125	0.	* 1	1635	200	0.	* 1	2250	275	0.				
1	0410	51	83.	* 1	1025	126	0.	* 1	1640	201	0.	* 1	2255	276	0.				
1	0415	52	64.	* 1	1030	127	0.	* 1	1645	202	0.	* 1	2300	277	0.				
1	0420	53	51.	* 1	1035	128	0.	* 1	1650	203	0.	* 1	2305	278	0.				
1	0425	54	45.	* 1	1040	129	0.	* 1	1655	204	0.	* 1	2310	279	0.				
1	0430	55	47.	* 1	1045	130	0.	* 1	1700	205	0.	* 1	2315	280	0.				
1	0435	56	58.	* 1	1050	131	0.	* 1	1705	206	0.	* 1	2320	281	0.				

1	0440	57	68.	*	1	1055	132	0.	*	1	1710	207	0.	*	1	2325	282	0.
1	0445	58	71.	*	1	1100	133	0.	*	1	1715	208	0.	*	1	2330	283	0.
1	0450	59	71.	*	1	1105	134	0.	*	1	1720	209	0.	*	1	2335	284	0.
1	0455	60	72.	*	1	1110	135	0.	*	1	1725	210	0.	*	1	2340	285	0.
1	0500	61	68.	*	1	1115	136	0.	*	1	1730	211	0.	*	1	2345	286	0.
1	0505	62	58.	*	1	1120	137	0.	*	1	1735	212	0.	*	1	2350	287	0.
1	0510	63	45.	*	1	1125	138	0.	*	1	1740	213	0.	*	1	2355	288	0.
1	0515	64	34.	*	1	1130	139	0.	*	1	1745	214	0.	*	2	0000	289	0.
1	0520	65	25.	*	1	1135	140	0.	*	1	1750	215	0.	*	2	0005	290	0.
1	0525	66	19.	*	1	1140	141	0.	*	1	1755	216	0.	*	2	0010	291	0.
1	0530	67	15.	*	1	1145	142	0.	*	1	1800	217	0.	*	2	0015	292	0.
1	0535	68	12.	*	1	1150	143	0.	*	1	1805	218	0.	*	2	0020	293	0.
1	0540	69	9.	*	1	1155	144	0.	*	1	1810	219	0.	*	2	0025	294	0.
1	0545	70	8.	*	1	1200	145	0.	*	1	1815	220	0.	*	2	0030	295	0.
1	0550	71	8.	*	1	1205	146	0.	*	1	1820	221	0.	*	2	0035	296	0.
1	0555	72	7.	*	1	1210	147	0.	*	1	1825	222	0.	*	2	0040	297	0.
1	0600	73	7.	*	1	1215	148	0.	*	1	1830	223	0.	*	2	0045	298	0.
1	0605	74	6.	*	1	1220	149	0.	*	1	1835	224	0.	*	2	0050	299	0.
1	0610	75	5.	*	1	1225	150	0.	*	1	1840	225	0.	*	2	0055	300	0.

PEAK FLOW + (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
311.	3.67	58.	14.	14.	14.
	(INCHES)	.906	.911	.911	.911
	(AC-FT)	29.	29.	29.	29.

CUMULATIVE AREA = .59 SQ MI

HYDROGRAPH AT STATION CMWN

SUM OF 2 HYDROGRAPHS
PLAN 1, RATIO = .26

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1	0000	1	0.	* 1	0615	76	2.	* 1	1230	151	0.	* 1	1845	226	0.				
1	0005	2	2.	* 1	0620	77	2.	* 1	1235	152	0.	* 1	1850	227	0.				
1	0010	3	8.	* 1	0625	78	1.	* 1	1240	153	0.	* 1	1855	228	0.				
1	0015	4	19.	* 1	0630	79	1.	* 1	1245	154	0.	* 1	1900	229	0.				
1	0020	5	35.	* 1	0635	80	1.	* 1	1250	155	0.	* 1	1905	230	0.				
1	0025	6	42.	* 1	0640	81	0.	* 1	1255	156	0.	* 1	1910	231	0.				
1	0030	7	44.	* 1	0645	82	0.	* 1	1300	157	0.	* 1	1915	232	0.				
1	0035	8	43.	* 1	0650	83	0.	* 1	1305	158	0.	* 1	1920	233	0.				
1	0040	9	38.	* 1	0655	84	0.	* 1	1310	159	0.	* 1	1925	234	0.				
1	0045	10	29.	* 1	0700	85	0.	* 1	1315	160	0.	* 1	1930	235	0.				
1	0050	11	20.	* 1	0705	86	0.	* 1	1320	161	0.	* 1	1935	236	0.				
1	0055	12	13.	* 1	0710	87	0.	* 1	1325	162	0.	* 1	1940	237	0.				
1	0100	13	8.	* 1	0715	88	0.	* 1	1330	163	0.	* 1	1945	238	0.				
1	0105	14	6.	* 1	0720	89	0.	* 1	1335	164	0.	* 1	1950	239	0.				
1	0110	15	5.	* 1	0725	90	0.	* 1	1340	165	0.	* 1	1955	240	0.				
1	0115	16	5.	* 1	0730	91	0.	* 1	1345	166	0.	* 1	2000	241	0.				
1	0120	17	6.	* 1	0735	92	0.	* 1	1350	167	0.	* 1	2005	242	0.				
1	0125	18	9.	* 1	0740	93	0.	* 1	1355	168	0.	* 1	2010	243	0.				
1	0130	19	12.	* 1	0745	94	0.	* 1	1400	169	0.	* 1	2015	244	0.				
1	0135	20	16.	* 1	0750	95	0.	* 1	1405	170	0.	* 1	2020	245	0.				
1	0140	21	20.	* 1	0755	96	0.	* 1	1410	171	0.	* 1	2025	246	0.				
1	0145	22	22.	* 1	0800	97	0.	* 1	1415	172	0.	* 1	2030	247	0.				
1	0150	23	21.	* 1	0805	98	0.	* 1	1420	173	0.	* 1	2035	248	0.				
1	0155	24	19.	* 1	0810	99	0.	* 1	1425	174	0.	* 1	2040	249	0.				
1	0200	25	14.	* 1	0815	100	0.	* 1	1430	175	0.	* 1	2045	250	0.				
1	0205	26	11.	* 1	0820	101	0.	* 1	1435	176	0.	* 1	2050	251	0.				
1	0210	27	9.	* 1	0825	102	0.	* 1	1440	177	0.	* 1	2055	252	0.				
1	0215	28	11.	* 1	0830	103	0.	* 1	1445	178	0.	* 1	2100	253	0.				
1	0220	29	15.	* 1	0835	104	0.	* 1	1450	179	0.	* 1	2105	254	0.				
1	0225	30	20.	* 1	0840	105	0.	* 1	1455	180	0.	* 1	2110	255	0.				
1	0230	31	23.	* 1	0845	106	0.	* 1	1500	181	0.	* 1	2115	256	0.				
1	0235	32	21.	* 1	0850	107	0.	* 1	1505	182	0.	* 1	2120	257	0.				
1	0240	33	19.	* 1	0855	108	0.	* 1	1510	183	0.	* 1	2125	258	0.				
1	0245	34	18.	* 1	0900	109	0.	* 1	1515	184	0.	* 1	2130	259	0.				
1	0250	35	19.	* 1	0905	110	0.	* 1	1520	185	0.	* 1	2135	260	0.				
1	0255	36	18.	* 1	0910	111	0.	* 1	1525	186	0.	* 1	2140	261	0.				
1	0300	37	16.	* 1	0915	112	0.	* 1	1530	187	0.	* 1	2145	262	0.				
1	0305	38	18.	* 1	0920	113	0.	* 1	1535	188	0.	* 1	2150	263	0.				
1	0310	39	25.	* 1	0925	114	0.	* 1	1540	189	0.	* 1	2155	264	0.				
1	0315	40	40.	* 1	0930	115	0.	* 1	1545	190	0.	* 1	2200	265	0.				
1	0320	41	67.	* 1	0935	116	0.	* 1	1550	191	0.	* 1	2205	266	0.				
1	0325	42	106.	* 1	0940	117	0.	* 1	1555	192	0.	* 1	2210	267	0.				
1	0330	43	150.	* 1	0945	118	0.	* 1	1600	193	0.	* 1	2215	268	0.				
1	0335	44	183.	* 1	0950	119	0.	* 1	1605	194	0.	* 1	2220	269	0.				
1	0340	45	184.	* 1	0955	120	0.	* 1	1610	195	0.	* 1	2225	270	0.				
1	0345	46	161.	* 1	1000	121	0.	* 1	1615	196	0.	* 1	2230	271	0.				
1	0350	47	129.	* 1	1005	122	0.	* 1	1620	197	0.	* 1	2235	272	0.				
1	0355	48	99.	* 1	1010	123	0.	* 1	1625	198	0.	* 1	2240	273	0.				
1	0400	49	76.	* 1	1015	124	0.	* 1	1630	199	0.	* 1	2245	274	0.				
1	0405	50	59.	* 1	1020	125	0.	* 1	1635	200	0.	* 1	2250	275	0.				
1	0410	51	46.	* 1	1025	126	0.	* 1	1640	201	0.	* 1	2255	276	0.				
1	0415	52	36.	* 1	1030	127	0.	* 1	1645	202	0.	* 1	2300	277	0.				
1	0420	53	28.	* 1	1035	128	0.	* 1	1650	203	0.	* 1	2305	278	0.				
1	0425	54	25.	* 1	1040	129	0.	* 1	1655	204	0.	* 1	2310	279	0.				
1	0430	55	25.	* 1	1045	130	0.	* 1	1700	205	0.	* 1	2315	280	0.				
1	0435	56	30.	* 1	1050	131	0.	* 1	1705	206	0.	* 1	2320	281	0.				

1	0440	57	35.	*	1	1055	132	0.	*	1	1710	207	0.	*	1	2325	282	0.
1	0445	58	37.	*	1	1100	133	0.	*	1	1715	208	0.	*	1	2330	283	0.
1	0450	59	37.	*	1	1105	134	0.	*	1	1720	209	0.	*	1	2335	284	0.
1	0455	60	38.	*	1	1110	135	0.	*	1	1725	210	0.	*	1	2340	285	0.
1	0500	61	36.	*	1	1115	136	0.	*	1	1730	211	0.	*	1	2345	286	0.
1	0505	62	31.	*	1	1120	137	0.	*	1	1735	212	0.	*	1	2350	287	0.
1	0510	63	25.	*	1	1125	138	0.	*	1	1740	213	0.	*	1	2355	288	0.
1	0515	64	19.	*	1	1130	139	0.	*	1	1745	214	0.	*	2	0000	289	0.
1	0520	65	14.	*	1	1135	140	0.	*	1	1750	215	0.	*	2	0005	290	0.
1	0525	66	11.	*	1	1140	141	0.	*	1	1755	216	0.	*	2	0010	291	0.
1	0530	67	9.	*	1	1145	142	0.	*	1	1800	217	0.	*	2	0015	292	0.
1	0535	68	7.	*	1	1150	143	0.	*	1	1805	218	0.	*	2	0020	293	0.
1	0540	69	5.	*	1	1155	144	0.	*	1	1810	219	0.	*	2	0025	294	0.
1	0545	70	5.	*	1	1200	145	0.	*	1	1815	220	0.	*	2	0030	295	0.
1	0550	71	4.	*	1	1205	146	0.	*	1	1820	221	0.	*	2	0035	296	0.
1	0555	72	4.	*	1	1210	147	0.	*	1	1825	222	0.	*	2	0040	297	0.
1	0600	73	4.	*	1	1215	148	0.	*	1	1830	223	0.	*	2	0045	298	0.
1	0605	74	3.	*	1	1220	149	0.	*	1	1835	224	0.	*	2	0050	299	0.
1	0610	75	3.	*	1	1225	150	0.	*	1	1840	225	0.	*	2	0055	300	0.

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ 184.	3.67	34.	9.	8.	8.
	(INCHES)	.539	.542	.542	.542
	(AC-FT)	17.	17.	17.	17.

CUMULATIVE AREA = .59 SQ MI

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	RATIO 2	RATIO 3	RATIO 4	RATIO 5	RATIO 6	RATIO 7	RATIO 8
				.98	.99	.99	.85	.70	.52	.41	.26

HYDROGRAPH AT

+	MW	.21	1 FLOW	467.	472.	476.	398.	316.	222.	169.	107.
			TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58

ROUTED TO

+	RMW	.21	1 FLOW	463.	469.	472.	395.	314.	220.	168.	106.
			TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67

HYDROGRAPH AT

+	NH	.38	1 FLOW	637.	647.	654.	516.	374.	224.	150.	87.
			TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58

2 COMBINED AT

+	CMWN	.59	1 FLOW	1073.	1089.	1099.	886.	671.	436.	311.	184.
			TIME	3.58	3.58	3.58	3.58	3.67	3.67	3.67	3.67

ROUTED TO

+	RNH	.59	1 FLOW	1067.	1082.	1092.	885.	670.	433.	309.	184.
			TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67

HYDROGRAPH AT

+	L1	.15	1 FLOW	280.	284.	287.	228.	166.	100.	66.	37.
			TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58

2 COMBINED AT

+	Add	.75	1 FLOW	1314.	1333.	1346.	1087.	818.	524.	368.	215.
			TIME	3.67	3.67	3.67	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 PEAK	TIME TO PEAK	VOLUME PEAK	DT	PEAK PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)

FOR PLAN = 1 RATIO= .98

RMW	MANE	.95	465.93	217.52	3.58	5.00	463.15	220.00	3.58
-----	------	-----	--------	--------	------	------	--------	--------	------

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4084E+02 EXCESS= .0000E+00 OUTFLOW= .4089E+02 BASIN STORAGE= .5127E-05 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .99

RMW	MANE	.95	471.70	217.33	3.62	5.00	468.66	220.00	3.62
-----	------	-----	--------	--------	------	------	--------	--------	------

CONTINUITY SUMMARY (AC-FT)- INFLOW= .4132E+02 EXCESS= .0000E+00 OUTFLOW= .4136E+02 BASIN STORAGE= .4331E-05 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .99

RMW	MANE	1.07	474.84	217.99	3.65	5.00	472.49	220.00	3.65
-----	------	------	--------	--------	------	------	--------	--------	------

CONTINUITY SUMMARY (AC-FT)- INFLOW= .4165E+02 EXCESS= .0000E+00 OUTFLOW= .4169E+02 BASIN STORAGE= .3931E-05 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .85

RMW	MANE	.97	398.14	216.96	3.07	5.00	395.37	220.00	3.07
-----	------	-----	--------	--------	------	------	--------	--------	------

CONTINUITY SUMMARY (AC-FT)- INFLOW= .3504E+02 EXCESS= .0000E+00 OUTFLOW= .3508E+02 BASIN STORAGE= .3403E-05 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .70

RMW	MANE	1.14	315.40	217.31	2.46	5.00	313.53	220.00	2.46
-----	------	------	--------	--------	------	------	--------	--------	------

CONTINUITY SUMMARY (AC-FT)- INFLOW= .2804E+02 EXCESS= .0000E+00 OUTFLOW= .2809E+02 BASIN STORAGE= .3621E-05 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .52

RMW	MANE	1.30	221.01	217.51	1.76	5.00	220.24	220.00	1.76
-----	------	------	--------	--------	------	------	--------	--------	------

CONTINUITY SUMMARY (AC-FT)- INFLOW= .2001E+02 EXCESS= .0000E+00 OUTFLOW= .2005E+02 BASIN STORAGE= .4383E-05 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .41

RMW	MANE	1.33	168.59	218.07	1.35	5.00	167.54	220.00	1.35
-----	------	------	--------	--------	------	------	--------	--------	------

CONTINUITY SUMMARY (AC-FT)- INFLOW= .1537E+02 EXCESS= .0000E+00 OUTFLOW= .1539E+02 BASIN STORAGE= .3524E-05 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .26

RMW	MANE	1.61	106.66	218.54	.85	5.00	105.85	220.00	.85
-----	------	------	--------	--------	-----	------	--------	--------	-----

CONTINUITY SUMMARY (AC-FT)- INFLOW= .9633E+01 EXCESS= .0000E+00 OUTFLOW= .9650E+01 BASIN STORAGE= .4442E-05 PERCENT ERROR= -.

FOR PLAN = 1 RATIO= .98

RNH	MANE	.62	1072.87	216.45	2.83	5.00	1066.78	220.00	2.83
-----	------	-----	---------	--------	------	------	---------	--------	------

CONTINUITY SUMMARY (AC-FT)- INFLOW= .8904E+02 EXCESS= .0000E+00 OUTFLOW= .8909E+02 BASIN STORAGE= .1054E-04 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .99

RNH	MANE	.63	1087.89	216.59	2.86	5.00	1081.65	220.00	2.87
-----	------	-----	---------	--------	------	------	---------	--------	------

CONTINUITY SUMMARY (AC-FT)- INFLOW= .9024E+02 EXCESS= .0000E+00 OUTFLOW= .9028E+02 BASIN STORAGE= .8636E-05 PERCENT ERROR= -.0

FOR PLAN = 1 RATIO= .99

RNH	MANE	.62	1098.14	216.79	2.89	5.00	1092.06	220.00	2.89
-----	------	-----	---------	--------	------	------	---------	--------	------

CONTINUITY SUMMARY (AC-FT)- INFLOW= .9107E+02 EXCESS= .0000E+00 OUTFLOW= .9112E+02 BASIN STORAGE= .8993E-05 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .85

RNH	MANE	.71	886.06	216.91	2.37	5.00	884.90	220.00	2.37
-----	------	-----	--------	--------	------	------	--------	--------	------

CONTINUITY SUMMARY (AC-FT)- INFLOW= .7461E+02 EXCESS= .0000E+00 OUTFLOW= .7465E+02 BASIN STORAGE= .8298E-05 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .70

RNH	MANE	.79	669.80	220.17	1.83	5.00	669.68	220.00	1.83
-----	------	-----	--------	--------	------	------	--------	--------	------

CONTINUITY SUMMARY (AC-FT)- INFLOW= .5765E+02 EXCESS= .0000E+00 OUTFLOW= .5768E+02 BASIN STORAGE= .1033E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .52

RNH	MANE	.88	434.03	221.26	1.24	5.00	433.45	220.00	1.24
-----	------	-----	--------	--------	------	------	--------	--------	------

CONTINUITY SUMMARY (AC-FT)- INFLOW= .3894E+02 EXCESS= .0000E+00 OUTFLOW= .3897E+02 BASIN STORAGE= .8405E-05 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .41

RNH	MANE	.95	309.36	220.62	.91	5.00	308.66	220.00	.91
-----	------	-----	--------	--------	-----	------	--------	--------	-----

CONTINUITY SUMMARY (AC-FT)- INFLOW= .2871E+02 EXCESS= .0000E+00 OUTFLOW= .2874E+02 BASIN STORAGE= .8725E-05 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .26

RNH	MANE	1.09	183.96	220.68	.54	5.00	183.89	220.00	.54
-----	------	------	--------	--------	-----	------	--------	--------	-----

CONTINUITY SUMMARY (AC-FT)- INFLOW= .1708E+02 EXCESS= .0000E+00 OUTFLOW= .1709E+02 BASIN STORAGE= .8966E-05 PERCENT ERROR= -.1

*** NORMAL END OF HEC-1 ***

FORM 6

Channelization Form

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.

Community Name: Unincorporated Areas of Clark County, Nevada

Flooding Source: Hiko Springs Wash Detention Basin (HSWDB)

Project Name/Identifier: Hiko Springs Wash Outfall Improvements

1. EXTENT OF CHANNELIZATION

Downstream limit: Laughlin Bay on the Colorado River

Upstream limit: Hiko Springs Wash Detention Basin

2. CHANNEL DESCRIPTION

1. Describe the inlet to the channel connect to existing HSWDB low flow box culvet.
2. Briefly describe the shape of the channel (*both cross sectional and planimetric configuration*) and its lining (*channel bottom and sides*) Circular, RCP concrete, pipe, size varies 84" to 96" transitions to 8'h x 12w RCB.
3. Describe the outlet from the channel Contra Costa Reinf. Conc. FHA V111-A-1 dissipating structure RCB → dissipator (75' long x 12' w bottom; 1:1 side slopes) → 12" dumped rip rap → Laughlin Bay.
4. The channelization includes:
 - ☐ Levees (*Attach Levee Form*)
 - ☐ Drop structures
 - ☐ Superelevated sections
 - ☒ Transitions in cross sectional geometry
 - ☐ Debris basin/detention basin
 - ☒ Energy dissipater
 - ☐ Other Load runoff grated inlets @ El Mirage & Needles.
5. Attach the following:
 - a. Certified engineering drawings showing channel alignment and locations of inlet, outlet, and items checked in Item 4
 - b. Typical cross sections and profiles of channel banks and invert

3. HYDRAULIC CONSIDERATIONS

1. What is the 100-year discharge? 850 cfs
2. Do the cross sections in the hydraulic model match the typical cross sections in the plans? ☒ Yes ☐ No
3. Are the channel banks higher than the 100-year flood elevations everywhere? ☒ Yes ☐ No
4. Are the channel banks higher than the 100-year flood energy grade lines everywhere? ☐ Yes ☒ No
5. Is the land on both sides of the channel above the adjacent 100-year flood elevation at all points along the channel? underground ☐ Yes ☒ No
6. What is the range of freeboard? not applicable - feet
7. What is the range of the 100-year flood velocities? 2.32-39.2 ft/sec
8. What is the lining type? (both bottom and sides) reinforced concrete pipe
 Explain how the channel lining prevents erosion and maintains channel stability (*attach documentation*)
concrete
9. What is the design elevation in the channel based on?
☐ Subcritical flow
☐ Critical flow
☐ Supercritical flow
☒ Energy grade line
 Is 100-year flood profile based on the above type of flow? ☒ Yes ☐ No
 If no, explain: _____
10. Is there the potential for a hydraulic jump at the following locations?
 Inlet to channel ☐ Yes ☒ No
 Outlet of channel ☒ Yes ☐ No
 At Drop Structures ☐ Yes ☐ No
 At Transitions ☐ Yes ☒ No
 Other locations. Explain: No
 If the answer to any of the above is yes, please explain how the hydraulic jump is controlled and the effects of the hydraulic jump on the stability of the channel.
 Explain: Controlled by size & dimensions, rip rap, baffles @ energy dissipating structure.

4. SEDIMENT TRANSPORT CONSIDERATIONS

1. A. Is there any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year water surface elevations and/or the capacity of the channel? ☐ Yes ☒ No

B. Based on the conditions of the watershed and stream bed, is there a potential for sediment transport (including scour and deposition) to affect the 100-year water surface elevations and/or the capacity of the channel? ☒ Yes ☐ No

2. If the answer to either 1A or 1B is yes:

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

76 cfs (attach gradation curve)-refer to sedimentation analysis, attached

Explain method used to estimate load The Uniform Soil Loss Equation was used to estimate sediment load. A conservative estimate of 7% was used to bulk storm drain flows. The attached sedimentation analysis provides calculations using the USLE methodology.

B. Is the 100-year flood velocity anywhere within the channel less than the 100-year flood velocity of the inlet? ☒ Yes ☐ No

C. Will sediment accumulate anywhere within the channel? 14fps @ outlet ☐ Yes ☒ No

D. Will deposition or scour occur at or near the inlet? Conc. ☐ Yes ☒ No

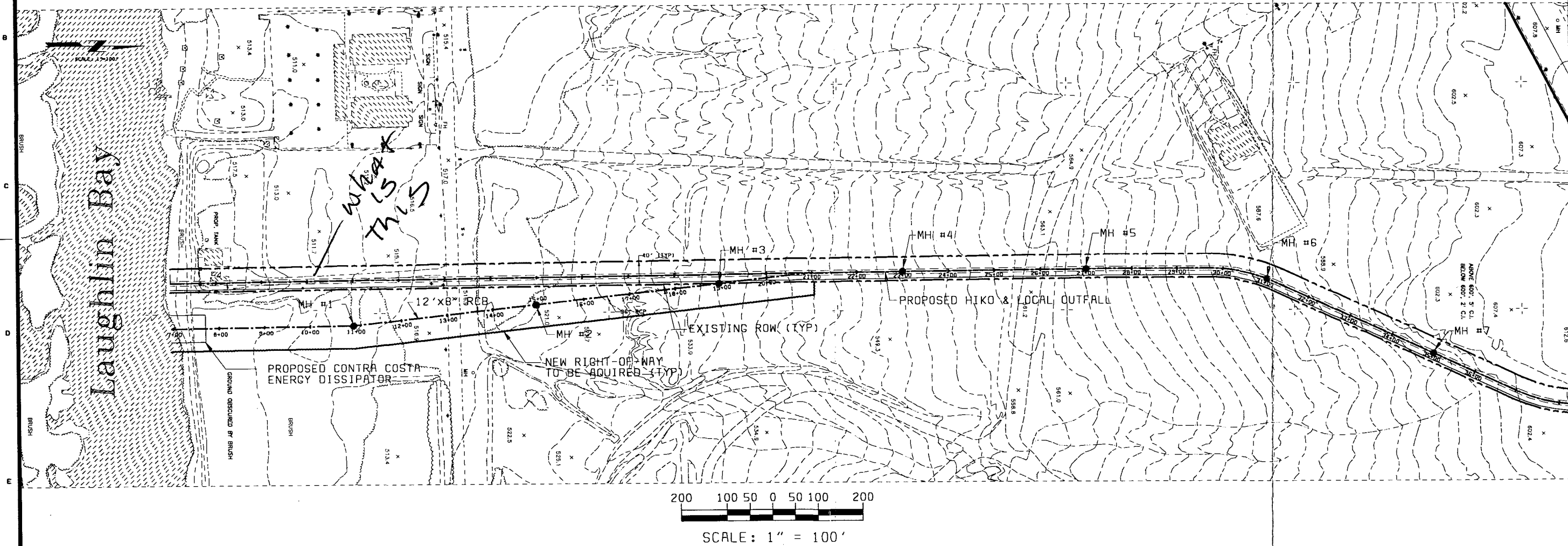
E. Will deposition or scour occur at or near the outlet? ☐ Yes ☒ No

Attach documentation showing affects on the Hydrologic and Hydraulic analyses

The WSPG hydraulic model provides documentation for the existing conditions flow bulked at 7%. This shows the effects of the sedimentation bulking on the hydraulics of the closed conveyence system. The 100-year peak flow rates and volumes were used based the HEC-1 model (proposed conditions) hydrology. Gradation curves have been included in the sedimentation analysis based off the geotechnical report, enclosed.

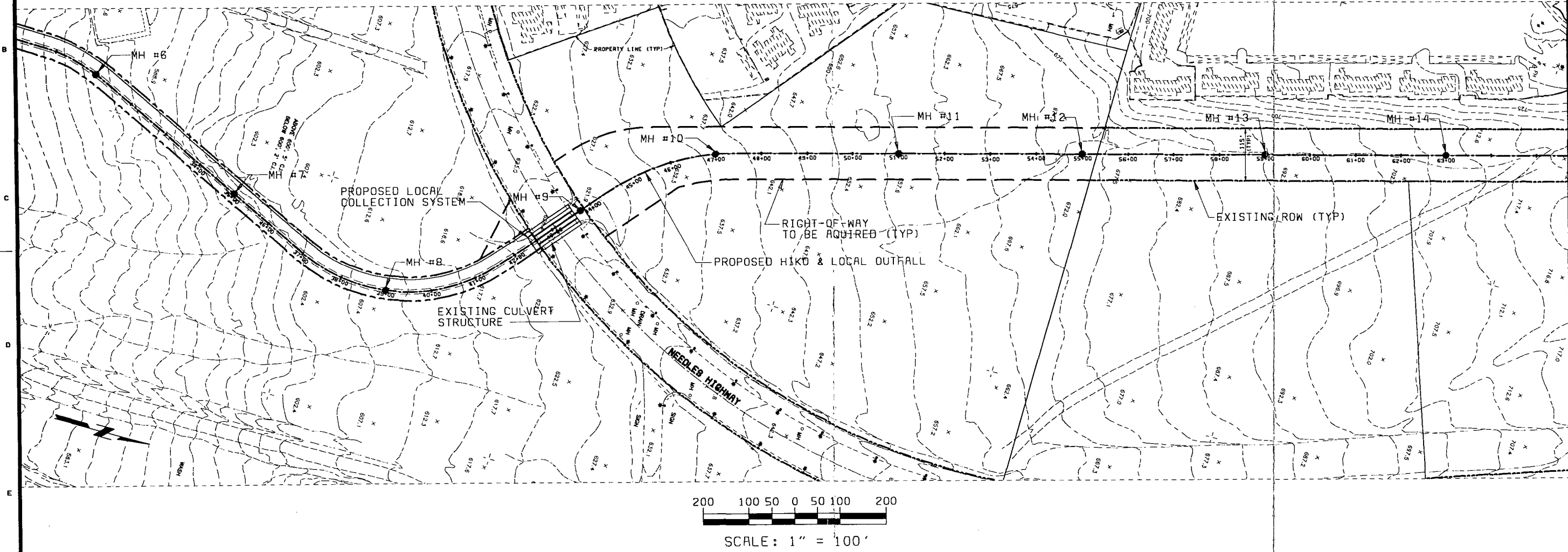
PRELIMINARY ALIGNMENT

RECOMMENDED ALTERNATIVE OPTION 1: - RCP		
REACH	LENGTH	CHANNEL TYPE & SIZE
6+95.00 - 7+70.28	75.28'	12'W x 75'L ENERGY DISSIPATOR
7+70.28 - 18+00.00	1029.72'	12'W x 8'H RCB
18+00.00 - 18+15.00	15.00'	TRANSITION TO 15'W x 8'H RCB
18+15.00 - 18+35.00	20.00'	8'W x 15'L RCB
18+35.00 - 18+75.00	40.00'	TRANSITION FROM 15' RCB TO 96" TCP
18+75.00 - 42+50.00	2375'	96" RCP



DESIGNED JAR/OBB DETAILED JML/PAT CHECKED X APPROVED _____ DATE _____	 Black & Veatch Las Vegas, Nevada	PROJECT NO. 31825	HIKO OUTFALL CHANNEL EXHIBIT C	MAP NO. C1 SHEET 1 OF 6
			ALTERNATIVE 3 PROPOSED ALIGNMENT	

OPTION 1 & 2		- RCP / STEEL PIPE
REACH	LENGTH	CHANNEL TYPE & SIZE
36+00 - 42+50.00	650.00'	96" RCP
42+50.00 - 43+50.00	100.00'	JACK & BORE 84" RCP
43+50.00 - 64+00.00	2050'	96" RCP



DATE	REVISIONS AND RECORD OF ISSUE	NO.	BY	CK	APP

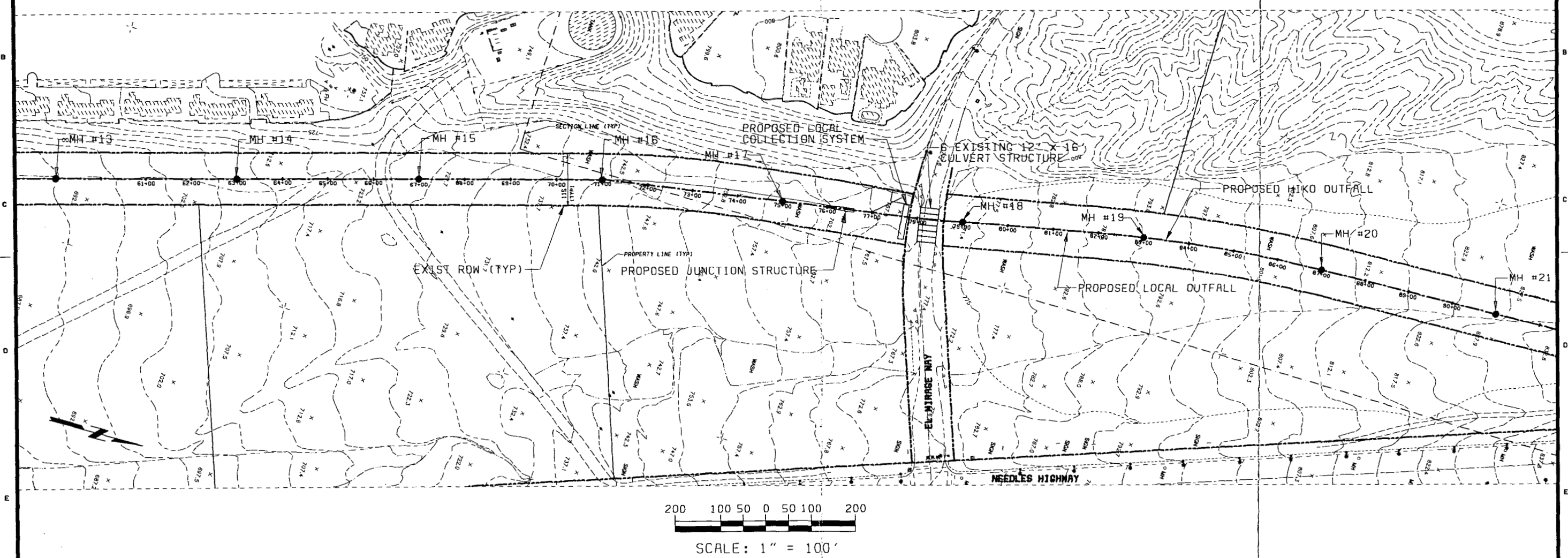
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DETAILED	JML/PAT
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APPROVED	
DATE	



PROJECT NO.	31825
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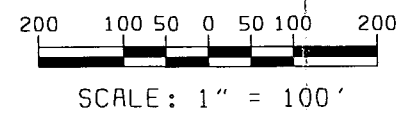
HIKO OUTFALL CHANNEL EXHIBIT C		MAP NO. C2 SHEET 2 OF 6
ALTERNATIVE 3 PROPOSED ALIGNMENT		

RECOMMENDED OPTION		
REACH	LENGTH	SIZE
64+00.00 - 76+00.00	1200.00'	96" RCP
76+00.00 - 76+40.00	40.00'	TRANSITION TO 15' RCB
76+40.00 - 76+60.00	20.00'	15' x 8' W RCB
76+60.00 - 78+00.00	140.00'	84" RCP
78+00.00 - 78+75.00	75.00'	JACK & BORE 84" RCP
78+75.00 - 91+00.00	1225.00'	84" RCP



DESIGNED: JAR/DBB DETAILED: JML/PAT CHECKED: X APPROVED: [Signature] DATE: [Blank]	 Black & Veatch Las Vegas, Nevada	PROJECT NO. 31825	HIKO OUTFALL CHANNEL EXHIBIT C		MAP NO. C3 SHEET 3 OF 6
			ALTERNATIVE 3 PROPOSED ALIGNMENT		
DATE: [Blank] REVISIONS AND RECORD OF ISSUE: [Blank] NO. BY CK APP					

RECOMMENDED OPTION		
REACH	LENGTH	SIZE
91+00 - 118+00	2700.00'	84" RCP



DESIGNED	JAR/OBB
DETAILED	JML/PAT
CHECKED	X
APPROVED	
DATE	

NO.	DATE	REVISIONS AND RECORD OF ISSUE	NO.	BY	CHK	APP

DESIGNED	JAR/OBB
DETAILED	JML/PAT
CHECKED	X
APPROVED	
DATE	



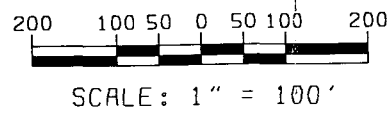
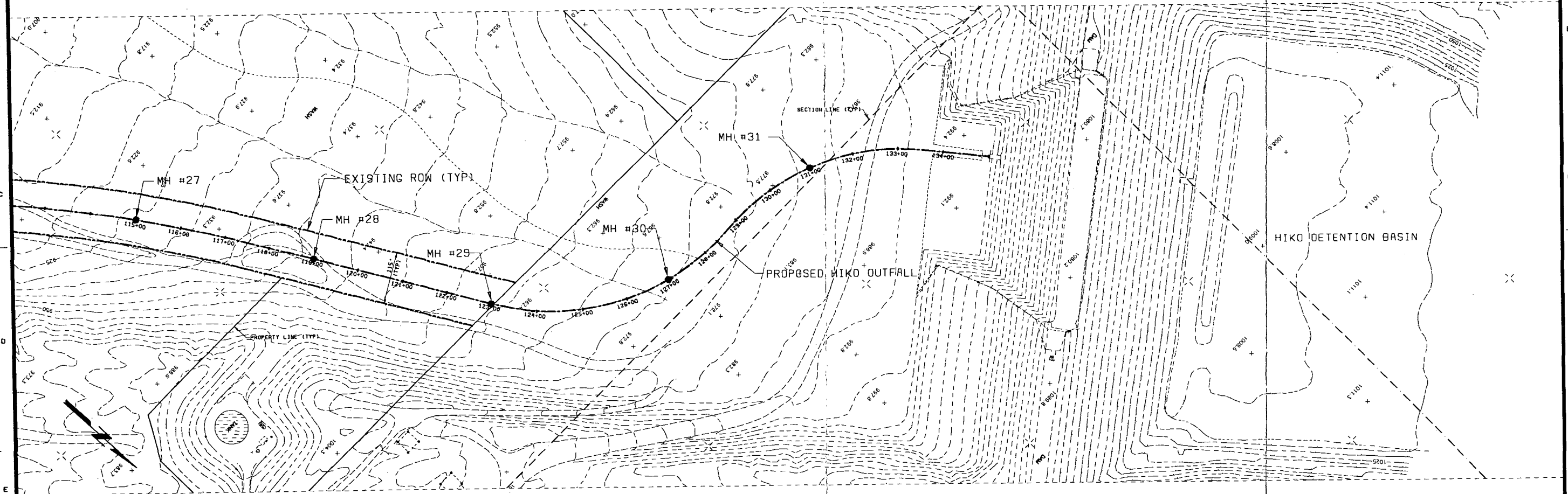
PROJECT NO.
31825

HIKO OUTFALL CHANNEL
EXHIBIT C

ALTERNATIVE 3
PROPOSED ALIGNMENT

NAP NO.
C4
SHEET
4 OF 6

RECOMMENDED OPTION		
REACH	LENGTH	SIZE
118+00 - 134+00	1600.00'	84" RCP



DATE	REVISIONS AND RECORD OF ISSUE	NO.	BY	CHK	APP

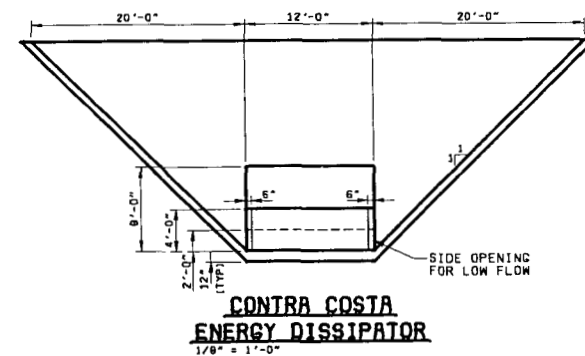
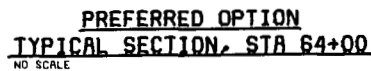
DESIGNED	JAR/DOB
DETAILED	JML/PAT
CHECKED	X
APPROVED	
DATE	



Black & Veatch
 Las Vegas, Nevada

PROJECT NO.
31825

HIKO OUTFALL CHANNEL EXHIBIT C		MAP NO. C5 SHEET 5 OF 6
ALTERNATIVE 3 PROPOSED ALIGNMENT		

[illegible]

DESIGNED JAR/OBB
 DETAILED JWL/PAT
 CHECKED X
 APPROVED _____
 DATE _____



Black & Veatch
Las Vegas, Nevada

PROJECT NO.
31825

HIKID OUTFALL CHANNEL
EXHIBIT C

ENERGY DISSIPATOR, DROP STRUCTURE & TYPICAL OUTFALL SECTION

MAP NO.

C6

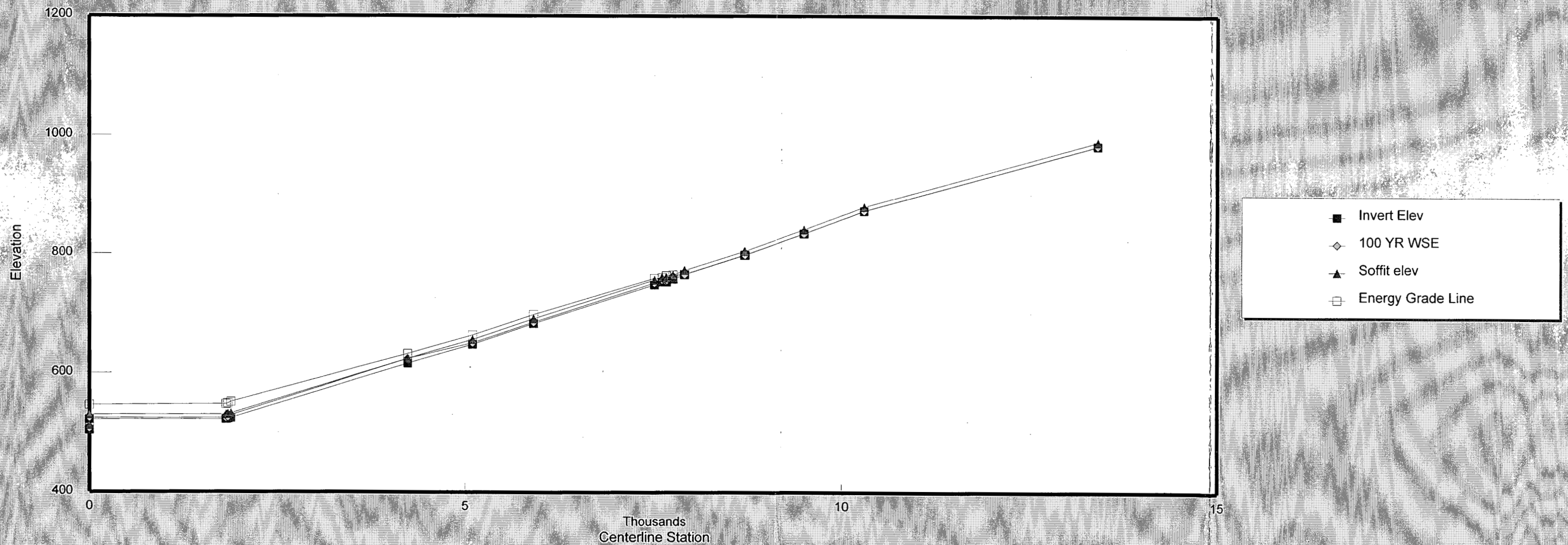
SHEET

3 OF 6

PRELIMINARY PROFILE

HIKO SPRINGS WASH OUTFALL

WSPG OUTPUT



HYDRAULIC ANALYSIS

Hydraulics

The attached hydraulic program is WSPG (Water Surface Pressure Gradient). This program was used to model the Hiko Springs Wash Outfall from Laughlin Bay to the Hiko Springs Wash Detention Basin. This program works by computing the water surface elevation based on the energy grade line. Results of the model indicate that the local storm will flow open channel for the entire reach. Station input relates directly to the stationing as shown on the plan view of the pipeline alignment in the previous section. The attached flows have been bulked for 7% sedimentation, therefore the hydrologic output, in addition to 7% is the model input. Please note that flow from Needles Highway to Laughlin Bay is sheet flow and is not intercepted by this system. The pipeline Q is the intercepted flow at Needles Highway that has been bulked by 7%.

TIME: 15:14

F0515P

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

PAGE 1

Y(10)

CODE	NO	TYPE	PIERS	WIDTH	DIAMETER	WIDTH	DROP
------	----	------	-------	-------	----------	-------	------

CD	50	4			8.00					
CD	100	1	0	0.00	30.00	12.00	1.00	1.00	0.00	
CD	110	3	0	0.00	8.00	12.00	0.00	0.00	0.00	
CD	120	4			4.50					
CD	130	3	0	0.00	8.00	15.00	0.00	0.00	0.00	
CD	140	3	0	0.00	8.00	8.00	0.00	0.00	0.00	
CD	150	3	0	0.00	16.00	8.00	0.00	0.00	0.00	
CD	160	4			7.00					
CD	200	4			4.00					

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

HIKO SPRINGS WASH OUTFALL

HEADING LINE NO 2 IS -

LAUGHLIN BAY TO HIKO SPRINGS WASH DETENTION BASIN

HEADING LINE NO 3 IS -

LOCAL STORM SDN3 CENTERED OVER DOWNSTREAM WATERSHED-7% BULKING FOR SEDIMEN

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *														
U/S DATA	STATION	INVERT	SECT											
	733.55	503.85	100										W S ELEV	0.00
ELEMENT NO 2 IS A REACH * * *														
U/S DATA	STATION	INVERT	SECT										RADIUS	ANGLE
	813.00	504.00	100		0.013	N							0.00	0.00
													ANG PT	MAN H
													0	
ELEMENT NO 3 IS A TRANSITION * * *														
U/S DATA	STATION	INVERT	SECT											
	813.01	504.01	110		0.013	N								
ELEMENT NO 4 IS A REACH * * *														
U/S DATA	STATION	INVERT	SECT										RADIUS	ANGLE
	1800.00	522.00	110		0.013	N							0.00	0.00
													0.00	0.00
													ANG PT	MAN H
													0	
ELEMENT NO 5 IS A TRANSITION * * *														
U/S DATA	STATION	INVERT	SECT											
	1815.00	522.01	130		0.013	N								
ELEMENT NO 6 IS A JUNCTION * * * * *														
U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4		
	1820.00	522.02	130	0	0	0.013	0.0	0.0	0.00	0.00	0.00	0.00		
ELEMENT NO 7 IS A REACH * * *														
U/S DATA	STATION	INVERT	SECT										RADIUS	ANGLE
	1835.00	523.00	130		0.013	N							0.00	0.00
													0.00	0.00
													ANG PT	MAN H
													0	
ELEMENT NO 8 IS A TRANSITION * * *														
U/S DATA	STATION	INVERT	SECT											
	1875.00	524.00	50		0.013	N								
ELEMENT NO 9 IS A REACH * * *														
U/S DATA	STATION	INVERT	SECT										RADIUS	ANGLE
	4240.00	615.00	50		0.013	N							0.00	0.00
													0.00	0.00
													ANG PT	MAN H
													0	
ELEMENT NO 10 IS A JUNCTION * * * * *														
U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4		
	4250.00	615.05	50	200	0	0.013	795.0	0.0	615.10	0.00	0.01	0.00		
ELEMENT NO 11 IS A REACH * * *														
U/S DATA	STATION	INVERT	SECT										RADIUS	ANGLE
	5100.00	647.00	50		0.013	N							0.00	0.00
													0.00	0.00
													ANG PT	MAN H
													0	
ELEMENT NO 12 IS A JUNCTION * * * * *														
U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4		
	5105.00	647.01	50	0	0	0.013	0.0	0.0	0.00	0.00	0.00	0.00		

ELEMENT NO 13 IS A REACH														*	*	*		
U/S DATA		STATION	INVERT	SECT					N	RADIUS					ANGLE	ANG PT	MAN H	
		5900.00	682.00	50	0.013						0.00	0.00	0.00	0				
ELEMENT NO 14 IS A JUNCTION														*	*	*	*	
U/S DATA		STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4					
		5905.00	682.01	50	0	0	0.013	0.0	0.0	0.00	0.00	0.00	0.00					
ELEMENT NO 15 IS A REACH														*	*	*		
U/S DATA		STATION	INVERT	SECT					N	RADIUS					ANGLE	ANG PT	MAN H	
		7500.00	747.40	50	0.013						0.00	0.00	0.00	0				
ELEMENT NO 16 IS A JUNCTION														*	*	*	*	
U/S DATA		STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4					
		7505.00	747.46	50	0	0	0.013	0.0	0.0	0.00	0.00	0.00	0.00					
ELEMENT NO 17 IS A REACH														*	*	*		
U/S DATA		STATION	INVERT	SECT					N	RADIUS					ANGLE	ANG PT	MAN H	
		7600.00	752.00	50	0.013						0.00	0.00	0.00	0				
ELEMENT NO 18 IS A TRANSITION														*	*	*		
U/S DATA		STATION	INVERT	SECT					N									
		7640.00	752.03	130	0.013													
ELEMENT NO 19 IS A REACH														*	*	*		
U/S DATA		STATION	INVERT	SECT					N	RADIUS					ANGLE	ANG PT	MAN H	
		7660.00	752.05	130	0.013						0.00	0.00	0.00	0				
ELEMENT NO 20 IS A JUNCTION														*	*	*	*	
U/S DATA		STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4					
		7665.00	752.06	130	0	0	0.013	0.0	0.0	0.00	0.00	0.00	0.00					
ELEMENT NO 21 IS A TRANSITION														*	*	*		
U/S DATA		STATION	INVERT	SECT					N									
		7665.50	752.07	160	0.013													
ELEMENT NO 22 IS A REACH														*	*	*		
U/S DATA		STATION	INVERT	SECT					N	RADIUS					ANGLE	ANG PT	MAN H	
		7750.00	757.00	160	0.013						0.00	0.00	0.00	0				
ELEMENT NO 23 IS A JUNCTION														*	*	*	*	
U/S DATA		STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4					
		7760.00	757.01	160	200	0	0.013	370.0	0.0	757.02	0.00	0.01	0.00					

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 24 IS A REACH														
U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H		
	7900.00	764.60	160			0.013			0.00	0.00	0.00	0		
ELEMENT NO 25 IS A JUNCTION														
U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4		
	7905.00	764.61	160	0	0	0.013	0.0	0.0	0.00	0.00	0.00	0.00		
ELEMENT NO 26 IS A REACH														
U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H		
	8700.00	797.00	160			0.013			0.00	0.00	0.00	0		
ELEMENT NO 27 IS A JUNCTION														
U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4		
	8705.00	797.20	160	0	0	0.013	0.0	0.0	0.00	0.00	0.00	0.00		
ELEMENT NO 28 IS A REACH														
U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H		
	9500.00	833.49	160			0.013			0.00	0.00	0.00	0		
ELEMENT NO 29 IS A JUNCTION														
U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4		
	9505.00	833.50	160	0	0	0.013	0.0	0.0	0.00	0.00	0.00	0.00		
ELEMENT NO 30 IS A REACH														
U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H		
	10300.00	871.80	160			0.013			0.00	0.00	0.00	0		
ELEMENT NO 31 IS A JUNCTION														
U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4		
	10305.00	871.85	160	0	0	0.013	0.0	0.0	0.00	0.00	0.00	0.00		
ELEMENT NO 32 IS A REACH														
U/S DATA	STATION	INVERT	SECT			N			RADIUS	ANGLE	ANG PT	MAN H		
	11500.00	916.00	160			0.013			0.00	0.00	0.00	0		
ELEMENT NO 33 IS A JUNCTION														
U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4		
	11505.00	916.01	160	0	0	0.013	0.0	0.0	0.00	0.00	0.00	0.00		

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 34 IS A REACH * * *
U/S DATA STATION INVERT SECT N
13400.00 982.00 160 0.013
RADIUS ANGLE ANG PT MAN H
0.00 0.00 0.00 0

ELEMENT NO 35 IS A SYSTEM HEADWORKS * *
U/S DATA STATION INVERT SECT W S ELEV
13400.00 982.00 160 0.00

NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING

** WARNING NO. 2 ** - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS,
W.S.ELEV = INV + DC

F0515P

PAGE 1

WATER SURFACE PROFILE LISTING

HIKO SPRINGS WASH OUTFALL

LAUGHLIN BAY TO HIKO SPRINGS WASH DETENTION BASIN

LOCAL STORM SDN3 CENTERED OVER DOWNSTREAM WATERSHED-7% BULKING FOR SEDIMEN

STATION NO	INVERT AVBPR	DEPTH	W.S. ELEV	Q	VEL	VEL GRD.EL.	ENERGY ELEV	SUPER DEPTH	CRITICAL	HGT/ DIA	BASE/ ID NO.	ZL PIER
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L/ELEM	SO	SF AVE	HF	NORM DEPTH	ZR
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733.55	503.85	2.973	506.823	1166.0	26.19	10.651	517.474	0.00	5.638	30.00	12.00	1.00 0 0.00
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27.94	0.00189				.019251	0.54			5.678	1.00		
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761.49	503.90	2.912	506.815	1166.0	26.85	11.198	518.013	0.00	5.638	30.00	12.00	1.00 0 0.00
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51.51	0.00189				.021413	1.10			5.678	1.00		
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813.00	504.00	2.798	506.798	1166.0	28.17	12.318	519.116	0.00	5.638	30.00	12.00	1.00 0 0.00
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TRANS STR	1.00000				.021272	0.00				1.00		
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813.01	504.01	3.551	507.561	1166.0	27.36	11.628	519.189	0.00	6.645	8.00	12.00	0.00 0 0.00
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244.89	0.01823				.020434	5.00			3.647	0.00		
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1057.90	508.47	3.458	511.932	1166.0	28.10	12.262	524.194	0.00	6.645	8.00	12.00	0.00 0 0.00
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235.59	0.01823				.022749	5.36			3.647	0.00		
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1293.49	512.77	3.297	516.065	1166.0	29.47	13.488	529.553	0.00	6.645	8.00	12.00	0.00 0 0.00
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152.38	0.01823				.026072	3.97			3.647	0.00		
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1445.87	515.54	3.143	518.688	1166.0	30.91	14.837	533.525	0.00	6.645	8.00	12.00	0.00 0 0.00
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114.57	0.01823				.029901	3.43			3.647	0.00		
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1560.44	517.63	2.997	520.631	1166.0	32.42	16.321	536.952	0.00	6.645	8.00	12.00	0.00 0 0.00
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92.78	0.01823				.034315	3.18			3.647	0.00		
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1653.22	519.33	2.858	522.183	1166.0	34.00	17.954	540.137	0.00	6.645	8.00	12.00	0.00 0 0.00
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78.48	0.01823				.039408	3.09			3.647	0.00		
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1731.70	520.75	2.725	523.480	1166.0	35.66	19.748	543.228	0.00	6.645	8.00	12.00	0.00 0 0.00
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68.30	0.01823				.045285	3.09			3.647	0.00		
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1800.00	522.00	2.598	524.598	1166.0	37.40	21.723	546.321	0.00	6.645	8.00	12.00	0.00 0 0.00
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TRANS STR	0.00067				.055760	0.84				0.00		
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WATER SURFACE PROFILE LISTING

HIKO SPRINGS WASH OUTFALL

LAUGHLIN BAY TO HIKO SPRINGS WASH DETENTION BASIN

LOCAL STORM SDN3 CENTERED OVER DOWNSTREAM WATERSHED-7% BULKING FOR SEDIMEN

STATION NO	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL HEAD	VEL GRD.EL.	ENERGY ELEV	SUPER DEPTH	CRITICAL DIA	HGT/ ID NO.	BASE/ PIER	ZL
L/ELEM	SO			SF AVE	HF		NORM DEPTH		ZR			

1815.00	522.01	1.998	524.008	1166.0	38.91	23.507	547.515	0.00	5.727	8.00	15.00	0.00 0 0.00
JUNCT STR	0.00200				.063730	0.32				0.00		
1820.00	522.02	1.985	524.005	1166.0	39.17	23.821	547.826	0.00	5.727	8.00	15.00	0.00 0 0.00
15.00	0.06533				.064375	0.97		1.975		0.00		
1835.00	523.00	1.985	524.985	1166.0	39.17	23.821	548.806	0.00	5.727	8.00	15.00	0.00 0 0.00
TRANS STR	0.02500				.051430	2.06				0.00		
1875.00	524.00	4.706	528.706	1166.0	37.92	22.325	551.031	0.00	7.726	8.00	0.00	0.00 0 0.00
110.86	0.03848				.038485	4.27		4.706		0.00		
1985.86	528.26	4.706	532.971	1166.0	37.92	22.325	555.296	0.00	7.726	8.00	0.00	0.00 0 0.00
841.34	0.03848				.038281	32.21		4.706		0.00		
2827.20	560.64	4.721	565.359	1166.0	37.76	22.143	587.502	0.00	7.726	8.00	0.00	0.00 0 0.00
704.04	0.03848				.035893	25.27		4.706		0.00		
3531.24	587.73	4.914	592.642	1166.0	36.01	20.130	612.772	0.00	7.726	8.00	0.00	0.00 0 0.00
243.39	0.03848				.031797	7.74		4.706		0.00		
3774.63	597.09	5.118	602.211	1166.0	34.33	18.301	620.512	0.00	7.726	8.00	0.00	0.00 0 0.00
140.91	0.03848				.028219	3.98		4.706		0.00		
3915.54	602.52	5.336	607.852	1166.0	32.73	16.637	624.489	0.00	7.726	8.00	0.00	0.00 0 0.00
95.63	0.03848				.025098	2.40		4.706		0.00		
4011.17	606.20	5.569	611.764	1166.0	31.21	15.124	626.888	0.00	7.726	8.00	0.00	0.00 0 0.00
69.78	0.03848				.022385	1.56		4.706		0.00		
4080.95	608.88	5.821	614.701	1166.0	29.76	13.750	628.451	0.00	7.726	8.00	0.00	0.00 0 0.00
52.93	0.03848				.020040	1.06		4.706		0.00		

WATER SURFACE PROFILE LISTING

HIKO SPRINGS WASH OUTFALL

LAUGHLIN BAY TO HIKO SPRINGS WASH DETENTION BASIN

LOCAL STORM SDN3 CENTERED OVER DOWNSTREAM WATERSHED-7% BULKING FOR SEDIMEN

STATION NO	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL HEAD	VEL GRD.EL.	ENERGY ELEV	SUPER DEPTH	CRITICAL DIA	HGT/ ID NO.	BASE/ PIER	ZL
L/ELEM	SO			SF AVE	HF		NORM DEPTH		ZR			
4133.88	610.92	6.095	617.012	1166.0	28.37	12.499	629.511	0.00	7.726	8.00	0.00	0 0.00
40.71	0.03848			.018031	0.73		4.706		0.00			
4174.59	612.48	6.399	618.882	1166.0	27.05	11.363	630.245	0.00	7.726	8.00	0.00	0 0.00
31.18	0.03848			.016351	0.51		4.706		0.00			
4205.77	613.68	6.742	620.425	1166.0	25.79	10.330	630.755	0.00	7.726	8.00	0.00	0 0.00
22.61	0.03848			.015031	0.34		4.706		0.00			
4228.38	614.55	7.151	621.704	1166.0	24.59	9.391	631.095	0.00	7.726	8.00	0.00	0 0.00
11.62	0.03848			.014393	0.17		4.706		0.00			
4240.00	615.00	7.726	622.726	1166.0	23.45	8.536	631.262	0.00	7.726	8.00	0.00	0 0.00
JUNCT STR	0.00500								0.00			
4250.00	615.05	2.487	617.537	371.0	27.84	12.039	629.576	0.00	4.890	8.00	0.00	0 0.00
193.03	0.03759			.037602	7.26		2.487		0.00			
4443.03	622.31	2.487	624.793	371.0	27.84	12.039	636.832	0.00	4.890	8.00	0.00	0 0.00
245.21	0.03759			.037618	9.22		2.487		0.00			
4688.24	631.52	2.486	634.009	371.0	27.85	12.048	646.057	0.00	4.890	8.00	0.00	0 0.00
411.76	0.03759			.040310	16.60		2.487		0.00			
5100.00	647.00	2.402	649.402	371.0	29.21	13.253	662.655	0.00	4.890	8.00	0.00	0 0.00
JUNCT STR	0.00200			.043488	0.22				0.00			
5105.00	647.01	2.388	649.398	371.0	29.46	13.473	662.871	0.00	4.890	8.00	0.00	0 0.00
384.66	0.04401			.043990	16.92		2.388		0.00			
5489.66	663.94	2.388	666.328	371.0	29.46	13.473	679.801	0.00	4.890	8.00	0.00	0 0.00
410.34	0.04401			.042037	17.25		2.388		0.00			

WATER SURFACE PROFILE LISTING

HIKO SPRINGS WASH OUTFALL

LAUGHLIN BAY TO HIKO SPRINGS WASH DETENTION BASIN

LOCAL STORM SDN3 CENTERED OVER DOWNSTREAM WATERSHED-7% BULKING FOR SEDIMEN

STATION NO	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL HEAD	VEL GRD.EL.	ENERGY ELEV	SUPER DEPTH	CRITICAL DIA	HGT/ ID NO.	BASE/ PIER	ZL
L/ELEM	SO			SF AVE	HF			NORM DEPTH		ZR		
5900.00	682.00	2.446	684.446	371.0	28.49	12.604	697.050	0.00	4.890	8.00	0.00	0 0.00
JUNCT STR	0.00200			.040536	0.20					0.00		
5905.00	682.01	2.432	684.442	371.0	28.72	12.808	697.250	0.00	4.890	8.00	0.00	0 0.00
599.39	0.04100			.040989	24.57			2.432		0.00		
6504.39	706.58	2.432	709.015	371.0	28.72	12.808	721.823	0.00	4.890	8.00	0.00	0 0.00
409.22	0.04100			.040544	16.59			2.432		0.00		
6913.61	723.36	2.445	725.805	371.0	28.50	12.610	738.415	0.00	4.890	8.00	0.00	0 0.00
312.86	0.04100			.037608	11.77			2.432		0.00		
7226.47	736.19	2.531	738.717	371.0	27.17	11.464	750.181	0.00	4.890	8.00	0.00	0 0.00
118.26	0.04100			.032938	3.90			2.432		0.00		
7344.73	741.03	2.620	743.654	371.0	25.91	10.421	754.075	0.00	4.890	8.00	0.00	0 0.00
70.36	0.04100			.028854	2.03			2.432		0.00		
7415.09	743.92	2.713	746.632	371.0	24.70	9.474	756.106	0.00	4.890	8.00	0.00	0 0.00
48.70	0.04100			.025284	1.23			2.432		0.00		
7463.79	745.91	2.809	748.724	371.0	23.55	8.613	757.337	0.00	4.890	8.00	0.00	0 0.00
36.21	0.04100			.022162	0.80			2.432		0.00		
7500.00	747.40	2.910	750.310	371.0	22.45	7.830	758.140	0.00	4.890	8.00	0.00	0 0.00
JUNCT STR	0.01200			.020796	0.10					0.00		
7505.00	747.46	2.903	750.363	371.0	22.52	7.878	758.241	0.00	4.890	8.00	0.00	0 0.00
12.51	0.04779			.020153	0.25			2.337		0.00		
7517.51	748.06	2.960	751.018	371.0	21.94	7.474	758.492	0.00	4.890	8.00	0.00	0 0.00
19.40	0.04779			.018226	0.35			2.337		0.00		

WATER SURFACE PROFILE LISTING
 HIKO SPRINGS WASH OUTFALL
 LAUGHLIN BAY TO HIKO SPRINGS WASH DETENTION BASIN
 LOCAL STORM SDN3 CENTERED OVER DOWNSTREAM WATERSHED-7% BULKING FOR SEDIMEN

STATION NO	INVERT AVBPR	DEPTH	W.S. ELEV	Q	VEL	VEL GRD.EL.	ENERGY ELEV	SUPER DEPTH	CRITICAL	HGT/ DIA	BASE/ ID NO.	ZL PIER
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L/ELEM	SO	SF AVE	HF	NORM DEPTH	ZR
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7536.91	748.99	3.066	752.051	371.0	20.92	6.794	758.845	0.00	4.890	8.00	0.00	0 0.00
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15.94	0.04779				.015988	0.25			2.337	0.00		
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7552.85	749.75	3.177	752.924	371.0	19.95	6.177	759.101	0.00	4.890	8.00	0.00	0 0.00
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13.19	0.04779				.014032	0.19			2.337	0.00		
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7566.04	750.38	3.293	753.670	371.0	19.02	5.616	759.286	0.00	4.890	8.00	0.00	0 0.00
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11.01	0.04779				.012319	0.14			2.337	0.00		
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7577.05	750.90	3.413	754.316	371.0	18.13	5.105	759.421	0.00	4.890	8.00	0.00	0 0.00
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9.15	0.04779				.010820	0.10			2.337	0.00		
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7586.20	751.34	3.539	754.879	371.0	17.29	4.641	759.520	0.00	4.890	8.00	0.00	0 0.00
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7.57	0.04779				.009510	0.07			2.337	0.00		
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7593.77	751.70	3.671	755.373	371.0	16.48	4.219	759.592	0.00	4.890	8.00	0.00	0 0.00
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6.23	0.04779				.008363	0.05			2.337	0.00		
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7600.00	752.00	3.809	755.809	371.0	15.72	3.835	759.644	0.00	4.890	8.00	0.00	0 0.00
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TRANS STR	0.00075				.027681	1.11				0.00		
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7640.00	752.03	1.049	753.079	371.0	23.58	8.632	761.711	0.00	2.669	8.00	15.00	0 0.00
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4.04	0.00100				.048435	0.20			3.725	0.00		
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7644.04	752.03	1.037	753.071	371.0	23.86	8.838	761.909	0.00	2.669	8.00	15.00	0 0.00
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15.96	0.00100				.053365	0.85			3.725	0.00		
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7660.00	752.05	0.988	753.038	371.0	25.02	9.722	762.760	0.00	2.669	8.00	15.00	0 0.00
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JUNCT STR	0.00200				.058806	0.29				0.00		
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7665.00	752.06	0.974	753.034	371.0	25.40	10.020	763.054	0.00	2.669	8.00	15.00	0 0.00
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TRANS STR	0.02000				.040824	0.02				0.00		
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WATER SURFACE PROFILE LISTING

HIKO SPRINGS WASH OUTFALL

LAUGHLIN BAY TO HIKO SPRINGS WASH DETENTION BASIN

LOCAL STORM SDN3 CENTERED OVER DOWNSTREAM WATERSHED-7% BULKING FOR SEDIMEN

STATION NO	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL AVE	VEL HF	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH	HGT/ DIA	BASE/ ID NO.	ZL PIER
L/ELEM	SO			SF	AVE	HF		NORM	DEPTH			ZR

7665.50	752.07	3.065	755.135	371.0	22.90	8.141	763.276	0.00	5.078	7.00	0.00	0.00
14.18	0.05834				.020312	0.29			2.337	0.00		
7679.68	752.90	3.161	756.058	371.0	21.99	7.505	763.563	0.00	5.078	7.00	0.00	0.00
14.00	0.05834				.018035	0.25			2.337	0.00		
7693.68	753.71	3.279	756.993	371.0	20.96	6.823	763.816	0.00	5.078	7.00	0.00	0.00
11.71	0.05834				.015863	0.19			2.337	0.00		
7705.39	754.40	3.402	757.799	371.0	19.99	6.202	764.001	0.00	5.078	7.00	0.00	0.00
9.77	0.05834				.013962	0.14			2.337	0.00		
7715.16	754.97	3.532	758.499	371.0	19.06	5.639	764.138	0.00	5.078	7.00	0.00	0.00
8.18	0.05834				.012300	0.10			2.337	0.00		
7723.34	755.45	3.668	759.113	371.0	18.17	5.126	764.239	0.00	5.078	7.00	0.00	0.00
6.82	0.05834				.010842	0.07			2.337	0.00		
7730.16	755.84	3.810	759.653	371.0	17.32	4.660	764.313	0.00	5.078	7.00	0.00	0.00
5.59	0.05834				.009567	0.05			2.337	0.00		
7735.75	756.17	3.961	760.130	371.0	16.52	4.236	764.366	0.00	5.078	7.00	0.00	0.00
4.56	0.05834				.008450	0.04			2.337	0.00		
7740.31	756.43	4.119	760.553	371.0	15.75	3.851	764.404	0.00	5.078	7.00	0.00	0.00
3.58	0.05834				.007474	0.03			2.337	0.00		
7743.89	756.64	4.287	760.930	371.0	15.02	3.501	764.431	0.00	5.078	7.00	0.00	0.00
2.71	0.05834				.006620	0.02			2.337	0.00		
7746.60	756.80	4.465	761.267	371.0	14.32	3.183	764.450	0.00	5.078	7.00	0.00	0.00
1.91	0.05834				.005874	0.01			2.337	0.00		

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WATER SURFACE PROFILE LISTING

HIKO SPRINGS WASH OUTFALL

LAUGHLIN BAY TO HIKO SPRINGS WASH DETENTION BASIN

LOCAL STORM SDN3 CENTERED OVER DOWNSTREAM WATERSHED-7% BULKING FOR SEDIMEN

STATION NO	INVERT AVBPR	DEPTH ELEV	W.S. ELEV	Q	VEL	VEL HEAD	VEL GRD.EL.	ENERGY ELEV	SUPER DEPTH	CRITICAL DIA	HGT/ ID NO.	BASE/ PIER	ZL
L/ELEM	SO			SF AVE	HF			NORM DEPTH			ZR		
7748.51	756.91	4.654	761.567	371.0	13.65	2.894	764.461	0.00	5.078	7.00	0.00	0.00	0 0.00
1.11	0.05834			.005224	0.01			2.337		0.00			
7749.62	756.98	4.858	761.836	371.0	13.02	2.631	764.467	0.00	5.078	7.00	0.00	0.00	0 0.00
0.38	0.05834			.004658	0.00			2.337		0.00			
7750.00	757.00	5.078	762.078	371.0	12.41	2.390	764.468	0.00	5.078	7.00	0.00	0.00	0 0.00
JUNCT STR	0.00100									0.00			
7760.00	757.01	0.140	757.150	1.0	5.43	0.459	757.609	0.00	0.248	7.00	0.00	0.00	0 0.00
116.74	0.05421			.054273	6.34			0.140		0.00			
7876.74	763.34	0.140	763.479	1.0	5.43	0.459	763.938	0.00	0.248	7.00	0.00	0.00	0 0.00
10.93	0.05421			.052330	0.57			0.140		0.00			
7887.67	763.93	0.142	764.074	1.0	5.32	0.439	764.513	0.00	0.248	7.00	0.00	0.00	0 0.00
4.96	0.05421			.047191	0.23			0.140		0.00			
7892.63	764.20	0.147	764.347	1.0	5.05	0.396	764.743	0.00	0.248	7.00	0.00	0.00	0 0.00
2.45	0.05421			.041106	0.10			0.140		0.00			
7895.08	764.33	0.151	764.484	1.0	4.83	0.362	764.846	0.00	0.248	7.00	0.00	0.00	0 0.00
1.51	0.05421			.035770	0.05			0.140		0.00			
7896.59	764.41	0.156	764.571	1.0	4.61	0.330	764.901	0.00	0.248	7.00	0.00	0.00	0 0.00
1.08	0.05421			.031181	0.03			0.140		0.00			
7897.67	764.47	0.161	764.635	1.0	4.39	0.299	764.934	0.00	0.248	7.00	0.00	0.00	0 0.00
0.79	0.05421			.027214	0.02			0.140		0.00			
7898.46	764.52	0.167	764.683	1.0	4.18	0.272	764.955	0.00	0.248	7.00	0.00	0.00	0 0.00
0.64	0.05421			.023741	0.02			0.140		0.00			

WATER SURFACE PROFILE LISTING
HIKO SPRINGS WASH OUTFALL
LAUGHLIN BAY TO HIKO SPRINGS WASH DETENTION BASIN
LOCAL STORM SDN3 CENTERED OVER DOWNSTREAM WATERSHED-7% BULKING FOR SEDIMEN

STATION NO	INVERT AVBPR	DEPTH	W.S. ELEV	Q	VEL	VEL HEAD	VEL GRD.EL.	ENERGY ELEV	SUPER DEPTH	CRITICAL	HGT/ DIA	BASE/ ID NO.	ZL PIER
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L/ELEM	SO	SF AVE	HF	NORM DEPTH	ZR

7899.10	764.55	0.172	764.723	1.0	3.98
		0.246	764.969	0.00	0.248
		7.00	0.00	0.00	0 0.00
0.49	0.05421		.020691	0.01	0.140
					0.00
7899.59	764.58	0.178	764.756	1.0	3.80
		0.224	764.980	0.00	0.248
		7.00	0.00	0.00	0 0.00
0.41	0.05421		.018048	0.01	0.140
					0.00
7900.00	764.60	0.184	764.784	1.0	3.62
		0.204	764.988	0.00	0.248
		7.00	0.00	0.00	0 0.00
JUNCT STR	0.00200		.028563	0.14	0.00
7905.00	764.61	0.150	764.760	1.0	4.90
		0.373	765.133	0.00	0.248
		7.00	0.00	0.00	0 0.00
781.69	0.04074		.040318	31.52	0.150
					0.00
8686.69	796.46	0.150	796.608	1.0	4.90
		0.373	796.981	0.00	0.248
		7.00	0.00	0.00	0 0.00
13.31	0.04074		.042812	0.57	0.150
					0.00
8700.00	797.00	0.146	797.146	1.0	5.10
		0.404	797.550	0.00	0.248
		7.00	0.00	0.00	0 0.00
JUNCT STR	0.04000		.049790	0.25	0.00
8705.00	797.20	0.140	797.340	1.0	5.43
		0.459	797.799	0.00	0.248
		7.00	0.00	0.00	0 0.00
650.13	0.04565		.054273	35.28	0.140
					0.00
9355.13	826.88	0.140	827.017	1.0	5.43
		0.459	827.476	0.00	0.248
		7.00	0.00	0.00	0 0.00
4.52	0.04565		.051705	0.23	0.140
					0.00
9359.65	827.08	0.143	827.226	1.0	5.26
		0.430	827.656	0.00	0.248
		7.00	0.00	0.00	0 0.00
128.91	0.04565		.045920	5.92	0.140
					0.00
9488.56	832.97	0.147	833.115	1.0	5.03
		0.392	833.507	0.00	0.248
		7.00	0.00	0.00	0 0.00
5.39	0.04565		.039981	0.22	0.140
					0.00
9493.95	833.21	0.152	833.366	1.0	4.78
		0.355	833.721	0.00	0.248
		7.00	0.00	0.00	0 0.00
2.53	0.04565		.034871	0.09	0.140
					0.00

WATER SURFACE PROFILE LISTING

HIKO SPRINGS WASH OUTFALL

LAUGHLIN BAY TO HIKO SPRINGS WASH DETENTION BASIN

LOCAL STORM SDN3 CENTERED OVER DOWNSTREAM WATERSHED-7% BULKING FOR SEDIMEN

STATION NO	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL	ENERGY	SUPER	CRITICAL	HGT/ DIA	BASE/ ID NO.	ZL PIER
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L/ELEM	SO	SF AVE	HF	NORM DEPTH	ZR
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9496.48	833.33	0.157	833.486	1.0	4.57	0.324	833.810	0.00	0.248	7.00	0.00	0.00
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1.60	0.04565				.030393	0.05			0.140	0.00		
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9498.08	833.40	0.162	833.564	1.0	4.35	0.294	833.858	0.00	0.248	7.00	0.00	0.00
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1.08	0.04565				.026522	0.03			0.140	0.00		
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9499.16	833.45	0.168	833.620	1.0	4.15	0.267	833.887	0.00	0.248	7.00	0.00	0.00
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0.84	0.04565				.023151	0.02			0.140	0.00		
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9500.00	833.49	0.173	833.663	1.0	3.95	0.243	833.906	0.00	0.248	7.00	0.00	0.00
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JUNCT STR	0.00200				.037916	0.19			0.00			
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9505.00	833.50	0.140	833.640	1.0	5.43	0.459	834.099	0.00	0.248	7.00	0.00	0.00
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755.35	0.04818				.054273	41.00			0.140	0.00		
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10260.35	869.89	0.140	870.030	1.0	5.43	0.459	870.489	0.00	0.248	7.00	0.00	0.00
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5.91	0.04818				.052090	0.31			0.140	0.00		
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10266.26	870.17	0.142	870.316	1.0	5.29	0.435	870.751	0.00	0.248	7.00	0.00	0.00
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24.09	0.04818				.046742	1.13			0.140	0.00		
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10290.35	871.34	0.147	871.482	1.0	5.05	0.396	871.878	0.00	0.248	7.00	0.00	0.00
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4.20	0.04818				.040799	0.17			0.140	0.00		
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10294.55	871.54	0.152	871.689	1.0	4.81	0.359	872.048	0.00	0.248	7.00	0.00	0.00
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2.27	0.04818				.035513	0.08			0.140	0.00		
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10296.82	871.65	0.156	871.803	1.0	4.59	0.327	872.130	0.00	0.248	7.00	0.00	0.00
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1.37	0.04818				.030943	0.04			0.140	0.00		
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10298.19	871.71	0.162	871.875	1.0	4.37	0.296	872.171	0.00	0.248	7.00	0.00	0.00
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1.04	0.04818				.027014	0.03			0.140	0.00		
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WATER SURFACE PROFILE LISTING

HIKO SPRINGS WASH OUTFALL

LAUGHLIN BAY TO HIKO SPRINGS WASH DETENTION BASIN

LOCAL STORM SDN3 CENTERED OVER DOWNSTREAM WATERSHED-7% BULKING FOR SEDIMEN

STATION NO	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL AVE	VEL HF	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH	HGT/ DIA	BASE/ ID NO.	ZL PIER
L/ELEM	SO				SF AVE	HF		NORM DEPTH		ZR		

10299.23	871.76	0.167	871.930	1.0	4.17	0.270	872.200	0.00	0.248	7.00	0.00	0 0.00
0.77	0.04818				.023544	0.02			0.140	0.00		
10300.00	871.80	0.173	871.973	1.0	3.98	0.246	872.219	0.00	0.248	7.00	0.00	0 0.00
JUNCT STR	0.01000				.031129	0.16				0.00		
10305.00	871.85	0.150	872.000	1.0	4.90	0.373	872.373	0.00	0.248	7.00	0.00	0 0.00
1156.43	0.03695				.040318	46.62			0.150	0.00		
11461.43	914.58	0.150	914.725	1.0	4.90	0.373	915.098	0.00	0.248	7.00	0.00	0 0.00
5.08	0.03695				.039267	0.20			0.150	0.00		
11466.51	914.76	0.151	914.914	1.0	4.83	0.362	915.276	0.00	0.248	7.00	0.00	0 0.00
23.71	0.03695				.035770	0.85			0.150	0.00		
11490.22	915.64	0.156	915.795	1.0	4.61	0.330	916.125	0.00	0.248	7.00	0.00	0 0.00
4.32	0.03695				.031181	0.13			0.150	0.00		
11494.54	915.80	0.161	915.959	1.0	4.39	0.299	916.258	0.00	0.248	7.00	0.00	0 0.00
2.18	0.03695				.027214	0.06			0.150	0.00		
11496.72	915.88	0.167	916.046	1.0	4.18	0.272	916.318	0.00	0.248	7.00	0.00	0 0.00
1.49	0.03695				.023741	0.04			0.150	0.00		
11498.21	915.93	0.172	916.106	1.0	3.98	0.246	916.352	0.00	0.248	7.00	0.00	0 0.00
1.01	0.03695				.020691	0.02			0.150	0.00		
11499.22	915.97	0.178	916.149	1.0	3.80	0.224	916.373	0.00	0.248	7.00	0.00	0 0.00
0.78	0.03695				.018048	0.01			0.150	0.00		
11500.00	916.00	0.184	916.184	1.0	3.62	0.204	916.388	0.00	0.248	7.00	0.00	0 0.00
JUNCT STR	0.00200				.028563	0.14				0.00		

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WATER SURFACE PROFILE LISTING

HIKO SPRINGS WASH OUTFALL

LAUGHLIN BAY TO HIKO SPRINGS WASH DETENTION BASIN

LOCAL STORM SDN3 CENTERED OVER DOWNSTREAM WATERSHED-7% BULKING FOR SEDIMEN

STATION NO	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL	ENERGY	SUPER	CRITICAL	HGT/ DIA	BASE/ ID NO.	ZL PIER
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L/ELEM	SO	SF AVE	HF	NORM DEPTH	ZR
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11505.00	916.01	0.150	916.160	1.0	4.90	0.373	916.533	0.00	0.248	7.00	0.00	0.00	0	0.00
1770.66	0.03482				.040318	71.39			0.150	0.00				
13275.66	977.67	0.150	977.820	1.0	4.90	0.373	978.193	0.00	0.248	7.00	0.00	0.00	0	0.00
5.02	0.03482				.038626	0.19			0.150	0.00				
13280.68	977.85	0.152	977.997	1.0	4.76	0.352	978.349	0.00	0.248	7.00	0.00	0.00	0	0.00
105.98	0.03482				.034567	3.66			0.150	0.00				
13386.66	981.54	0.157	981.693	1.0	4.55	0.321	982.014	0.00	0.248	7.00	0.00	0.00	0	0.00
5.01	0.03482				.030186	0.15			0.150	0.00				
13391.67	981.71	0.163	981.873	1.0	4.33	0.291	982.164	0.00	0.248	7.00	0.00	0.00	0	0.00
2.54	0.03482				.026349	0.07			0.150	0.00				
13394.21	981.80	0.168	981.966	1.0	4.13	0.265	982.231	0.00	0.248	7.00	0.00	0.00	0	0.00
1.61	0.03482				.022934	0.04			0.150	0.00				
13395.82	981.86	0.173	982.028	1.0	3.94	0.241	982.269	0.00	0.248	7.00	0.00	0.00	0	0.00
1.08	0.03482				.019984	0.02			0.150	0.00				
13396.90	981.89	0.179	982.071	1.0	3.76	0.219	982.290	0.00	0.248	7.00	0.00	0.00	0	0.00
0.80	0.03482				.017438	0.01			0.150	0.00				
13397.70	981.92	0.185	982.105	1.0	3.58	0.199	982.304	0.00	0.248	7.00	0.00	0.00	0	0.00
0.62	0.03482				.015205	0.01			0.150	0.00				
13398.32	981.94	0.191	982.132	1.0	3.41	0.181	982.313	0.00	0.248	7.00	0.00	0.00	0	0.00
0.48	0.03482				.013249	0.01			0.150	0.00				
13398.80	981.96	0.197	982.155	1.0	3.26	0.165	982.320	0.00	0.248	7.00	0.00	0.00	0	0.00
0.39	0.03482				.011537	0.00			0.150	0.00				

HIKO SPRINGS WASH OUTFALL
 LAUGHLIN BAY TO HIKO SPRINGS WASH DETENTION BASIN
 LOCAL STORM SDN3 CENTERED OVER DOWNSTREAM WATERSHED-7% BULKING FOR SEDIMEN

733.55	.XCE	H	.	R
783.22	.XCE	H	.	R
832.89	.XC E	H	.	TX
882.57	.XX E		.	R
932.24	.		.	
981.91	.		.	
1031.58	.		.	
1081.26	.IWX	E	.	R
1130.93	.		.	
1180.60	.		.	
1230.27	.		.	
1279.95	.		.	
1329.62	.IWX	E	.	R
1379.29	.		.	
1428.96	.		.	
1478.64	.IXH	E	.	R
1528.31	.		.	
1577.98	.IWX	E	.	R
1627.65	.		.	
1677.32	.XX	E	.	R
1727.00	.		.	
1776.67	.IXH	E	.	R
1826.34	.IWX	E	.	TX
1876.01	.IXH	E	.	JX
1925.69	.IXH	E	.	R
1975.36	.IWX	E	.	TX
2025.03	.IX	E	.	R
2074.70	.IX	E	.	R
2124.38	.		.	
2174.05	.		.	
2223.72	.		.	
2273.39	.		.	
2323.07	.		.	
2372.74	.		.	
2422.41	.		.	
2472.08	.		.	
2521.75	.		.	
2571.43	.		.	
2621.10	.		.	
2670.77	.		.	
2720.44	.		.	
2770.12	.		.	
2819.79	.		.	
2869.46	.IWX	E	.	R
2919.13	.		.	
2968.81	.		.	
3018.48	.		.	
3068.15	.		.	
3117.82	.		.	
3167.50	.		.	
3217.17	.		.	
3266.84	.		.	
3316.51	.		.	
3366.18	.		.	
3415.86	.		.	
3465.53	.		.	
3515.20	.		.	

3564.87	IX E	R
3614.55		
3664.22		
3713.89		
3763.56		
3813.24	IX E	R
3862.91		
3912.58		
3962.25	IX E	R
4011.93	IX E	R
4061.60		
4111.27	IWX E	R
4160.94	IX E	R
4210.61	INH E	R
4260.29	IX E	R
4309.96	IX E	R
4359.63	IX E	JX
4409.30	IXHE	R
4458.98	XCHE	R
4508.65		
4558.32		
4607.99		
4657.67		
4707.34	XX E	R
4757.01		
4806.68		
4856.36		
4906.03		
4955.70		
5005.37		
5055.04		
5104.72	IXHE	JX
5154.39	IXHE	R
5204.06		
5253.73		
5303.41		
5353.08		
5402.75		
5452.42		
5502.10	IWX E	R
5551.77		
5601.44		
5651.11		
5700.79		
5750.46		
5800.13		
5849.80		
5899.47		
5949.15	IXHE	JX
5998.82	IXHE	R
6048.49		
6098.16		
6147.84		
6197.51		
6247.18		
6296.85		
6346.53		
6396.20		
6445.87		
6495.54		
6545.22	IXHE	R
6594.89		
6644.56		
6694.23		
6743.90		

6793.58		
6843.25		
6892.92		
6942.59	XX E	R
6992.27		
7041.94		
7091.61		
7141.28		
7190.96		
7240.63	IXHE	R
7290.30		
7339.97		
7389.65	IXHE	R
7439.32	IXX	R
7488.99	IXHE	R
7538.66	XXE	JX
7588.33	XXE	R
7638.01	XXE	R
7687.68	IXX	R
7737.35	IXX	R
7787.02	IXX	R
7836.70	IXX	R
7886.37	XX	R
7936.04	XX	R
7985.71	XX	TX
8035.39	XHE	R
8085.06	XHE	R
8134.73	XHE	JX
8184.40	XHE	TX
8234.08	XXE	R
8283.75	XXE	R
8333.42	IXE	R
8383.09	IXX	R
8432.76	IXX	R
8482.44	IXX	R
8532.11	IXX	R
8581.78	XX	R
8631.45	XX	R
8681.13	XX	R
8730.80	IX	R
8780.47	IX	R
8830.14	IX	R
8879.82	IX	JX
8929.49	XH	R
8979.16	XH	R
9028.83	X H	R
9078.51	X H	R
9128.18	X H	R
9177.85	X H	R
9227.52	X H	R
9277.19	X H	R
9326.87	X H	R
9376.54	X H	R
9426.21	X H	JX
9475.88	X H	R
9525.56	XH	R
9575.23	XH	JX
9624.90	XH	R
9674.57	X H	R
9724.25	X H	R
9773.92	X H	R
9823.59	X H	R
9873.26	XEH	R
9922.94	XEH	R
9972.61	XEH	R

10022.28 .	XEH	JX
10071.95 .	XEH	R
10121.62 .		
10171.30 .		
10220.97 .		
10270.64 .	XH	R
10320.31 .	XH	R
10369.99 .	X H	R
10419.66 .	X H	R
10469.33 .	X H	R
10519.00 .	X H	R
10568.68 .	X H	R
10618.35 .	X H	JX
10668.02 .	X H	R
10717.69 .		
10767.37 .		
10817.04 .		
10866.71 .		
10916.38 .		
10966.05 .		
11015.73 .		
11065.40 .		
11115.07 .		
11164.74 .		
11214.42 .		
11264.09 .		
11313.76 .		
11363.43 .		
11413.11 .		
11462.78 .	X H	R
11512.45 .	X H	R
11562.12 .	X H	R
11611.80 .	XEH	R
11661.47 .	XEH	R
11711.14 .	XEH	R
11760.81 .	XEH	R
11810.48 .	XXH	JX
11860.16 .	XXH	R
11909.83 .		
11959.50 .		
12009.17 .		
12058.85 .		
12108.52 .		
12158.19 .		
12207.86 .		
12257.54 .		
12307.21 .		
12356.88 .		
12406.55 .		
12456.23 .		
12505.90 .		
12555.57 .		
12605.24 .		
12654.91 .		
12704.59 .		
12754.26 .		
12803.93 .		
12853.60 .		
12903.28 .		
12952.95 .		
13002.62 .		
13052.29 .		
13101.97 .		
13151.64 .		
13201.31 .		

13250.98 .
13300.66 .
13350.33 .
13400.00 .

X H . R
X H . R
X H . R

503.85 552.36 600.88 649.40 697.91 746.43 794.94 843.46 891.97 940.49 989.00

NOTES

1. GLOSSARY

I = INVERT ELEVATION

C = CRITICAL DEPTH

W = WATER SURFACE ELEVATION

H = HEIGHT OF CHANNEL

E = ENERGY GRADE LINE

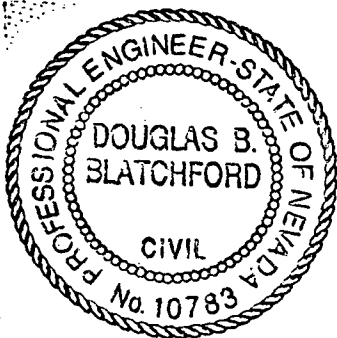
X = CURVES CROSSING OVER

B = BRIDGE ENTRANCE OR EXIT

Y = WALL ENTRANCE OR EXIT

2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY

ENERGY DISSIPATOR DESIGN



PB86-180205

HYDRAULIC DESIGN OF ENERGY DISSIPATORS FOR CULVERTS AND CHANNELS, HYDRAULIC ENGINEERING CIRCULAR (HEC) 14

FEDERAL HIGHWAY ADMINISTRATION
WASHINGTON, DC

SEP 83

U.S. DEPARTMENT OF COMMERCE
National Technical Information Service

NTIS[®]

CONTRA COSTA ENERGY DISSIPATOR

1. Outlet depth must be less than or equal to $D/2$: $D=12'$, $D/2 = 6'$; outlet depth is 5.84'
=>OK
2. Assume $y_e = y_o = 5.84'$
3. $Fr^2 = 2.95$
4. $W = 2D = 12'$
5. Use calculations in lieu of nomograph to find h_2 , L_2 and L_3 :

$$\frac{L_2}{h_2 Fr^2} = \frac{1.35 (h_2)^{-1.83}}{(y_e)}$$

6. From trial and error, use $h_2 = 4.0$, $L_2 = 31.6$, $L_3 = 43'$
7. Calculate y_2 from trial and error:

$$\frac{y_2}{h_2} = 1.3 \left(\frac{L_2}{h_2} \right)^{0.36}$$

8. Calculate $y_3 = 0.09(y_2) = 0.1'$
9. Dimensions of structure:

	W(ft)	First Baffle(ft)	Second Baffle(ft)	End Sill (ft)
Horizontal Distance	12	15.8	31.6	74.6
Height	--	2.0	4.0	1
Length	--	12	12	12

VIII-A. CONTRA COSTA ENERGY DISSIPATOR

INTRODUCTION

The Contra Costa energy dissipator (VIII-A-1) was developed at the University of California, Berkeley, in conjunction with Contra Costa County, California. The dissipator was developed to meet the following conditions: (1) to reestablish natural channel flow conditions downstream from the culvert outlet; (2) to have self-cleaning and minimum maintenance properties; (3) to drain by gravity when not in operation; (4) to be easily and economically constructed; and (5) to be applicable for a wide range of culvert sizes and operating conditions.

Field experience with this dissipator has been very limited. Its use should not be extended beyond the range of the model tests.

The dissipator is best suited to small and medium size culverts of any cross section where the depth of flow at the outlet is less than the culvert height. It is applicable for medium and high velocity effluents. The dissipator design is such that the flow leaving the structure will be at minimum energy when operating without tailwater. When tailwater is present, the performance will improve. A sketch of the dissipator arrangement is shown in Figure VIII-A-1.

DESIGN DISCUSSION

The initial step is to determine the equivalent depth of flow (y_e) at the culvert outfall: For box culverts $y_e = y_n$ or y brink. For oval, elliptical, circular, or other shapes, convert the areas of flow at the culvert outfall to an equivalent rectangular cross section with a width equal to twice the depth of flow $y_e = (A/2)^{1/2}$. In so doing, the design information is applicable to oval, elliptical, and circular culverts.

The Froude number is computed by using y_e rather than the actual depth of flow at the culvert outfall, $Fr = V/\sqrt{gy_e}$. By entering Figure VIII-A-2 with Fr^2 , and an assumed value of L_2/h_2 , a trial height of the second baffle, h_2 , can be determined. The equation of the lines in figure VIII-A-2 has been changed slightly from that presented in the original

paper to compensate for replacing the depth of flow in a circular pipe (y_0) by the equivalent rectangular flow depth, y_e . The original equation

$$L_2/h_2 Fr^2 = 1.2 (h_2/y_0)^{1.8}$$

has been revised to

$$L_2/h_2 Fr^2 = 1.35 (h_2/y_e)^{1.8} \quad \text{. VIII-A-1}$$

The remaining two equations, used for determining other dimensions of the dissipator, remain unchanged; these are given below and plotted on figures VIII-A-3 and 4.

$$L_3/L_2 = 3.75 (h_2/L_2)^{0.68} \quad \text{. VIII-A-2}$$

$$y_2/h_2 = 1.3 (L_2/h_2)^{0.36} \quad \text{. VIII-A-3}$$

The three equations may be used for proportioning the dissipator but figures VIII-A-2, 3, and 4 are more convenient and practical to use for design purposes.

The value of L_2/h_2 varied from 2.5 to 7.0 in the experiments and a value of 3.5 is recommended for best performance wherever economically feasible. The value of h_2/y_e should always be greater than unity. After determining values of h_2 and L_2 from figure VIII-A-2, the dimension L_3 can be obtained by entering figure VIII-A-3 with L_2 and the assumed value of L_2/h_2 . Should the dimensional proportioning thus obtained be uneconomical or fail to properly fit the site, a second value of L_2/h_2 is assumed and the process repeated.

From figure VIII-A-1, the height h_1 of the first baffle is half the height of the second baffle h_2 , and the position of the first baffle is half way between the culvert outlet and the second baffle or $L_2/2$. Side slopes of the trapezoidal basin for all experimental runs were 1:1. The width of basin (W) may vary from one to three times the width of the culvert. The floor of the basin should be essentially level. The height of the end sill may vary from $0.06(y_3)$ to $0.10(y_3)$. After obtaining satisfactory basin dimensions, the approximate maximum water surface depth, y_2 , without tailwater, can be obtained from figure VIII-A-4.

DESIGN PROCEDURE

The dissipator design should only be applied within the design limitations:

$$\begin{aligned} 2.5 < L_2/h_2 < 7.0 \\ D < W < 3D \\ y_0 < D/2 \\ \text{and side slopes of 1:1} \end{aligned}$$

VIII-A-2

The following steps outline the procedure for the design of the Contra Costa energy dissipator:

1. Analyze flow conditions that are expected to occur at the outfall of culvert for the design discharge.

If the depth of flow at the outlet is one half culvert diameter or less, the Contra Costa dissipator is applicable.
2. Compute y_e :
 $y_e = y_o$; for rectangular
 $y_e = (A/2)^{1/2}$; for other shapes
3. Compute the parameter $Fr^2 = V_o^2 / g y_e$
4. The width of the basin floor is selected to conform to the natural channel. If there is no defined channel, the width is set at a maximum of three times the culvert width.
5. Assume a value of L_2/h_2 between 2.5 and 7 and with the aid of figures VIII-A-2 and 3, determine h_2 , L_2 and L_3 : Give due consideration to the optimum value of $L_2/h_2 = 3.5$ as well as to the engineering and economic requirements of the particular situation. Repeat the procedure, if necessary, until a dissipator is defined which optimizes the design requirements. The first baffle height (h_1) is $0.5h_2$.
6. The approximate maximum water surface depth without tailwater can be obtained for the final arrangement from figure VIII-A-4.
7. Riprap may be necessary downstream especially for the low tailwater cases. See chapter II for design recommendations. Freeboard and a cutoff wall also should be considered to prevent overtopping and undermining of the basin.

Example Problem

Given: Diameter of culvert 4.0 feet
 $Q=300$ c.f.s.
 $y_o=2.3$ ft.
 $V_o=40$ f.p.s.
 $A=7.50$ sq. ft.

Find: A Contra Costa energy dissipator dimensions

Solution:

1. $y_0 = 2.3 \text{ ft.} = D/2$, OK
2. $y_e = (7.5/2)^{1/2} = 1.94 \text{ ft.}$
3. $Fr^2 = V_0^2 / g(y_e) = 40^2 / 32.2 \times 1.94 = 25.6$
4. $W = 2D = 8 \text{ ft.}$
5. By assuming $L_2/h_2 = 3.5$ and entering figure VIII-A-2 with $Fr^2 = 25.6$, a value of 3.50 is obtained for h_2/y_e . Therefore,

$$h_2 = 3.50(1.94) = 6.8 \text{ ft. and}$$

$$h_1 = .5(6.8) = 3.4 \text{ ft.}$$

$$L_2 = 3.5(6.8) = 23.8 \text{ ft.}$$

Entering figure VIII-A-3 with $L_2 = 23.8$ feet and $L_2/h_2 = 3.5$, L_3 is found to be 38 feet. If the maximum rise in water surface, without tailwater, is desired, this can be obtained from figure VIII-A-4. Strictly speaking, the value of y_2 from this chart applies for a bottom width $W/D = 2$ and 1:1 side slopes. For the problem at hand, these values are essentially correct.

6. Entering figure VIII-A-4 with $h_2 = 6.8 \text{ ft.}$ and $L_2/h_2 = 3.5$, gives $y_2 = 13.9$ feet. If the height of end sill is based on this value,

$$h_3 = 0.09(y_2) = 0.09(13.9) = 1.25 \text{ ft.}$$

If the above proportioning proves compatible with the topography at the site and the dissipator is economically satisfactory, the above dimensions are final; if not, a different value of L_2/h_2 is selected and the design procedure repeated. Assuming the first computation is acceptable, the various dimensions of the dissipator are:

Dimensions in Feet and Inches

	W	First Baffle	Second Baffle	End Sill
Hor. Distance	8-0	12-0	24-0	62-0
Height	-	3-6	7-0	1-3
Length (baffle)	-	8-0	8-0	10-6

VIII-A-1. Keim, R. S., THE CONTRA COSTA ENERGY DISSIPATOR.
Journal of Hydraulics Division, A.S.C.E. paper 3077,
March 1962, p. 109.

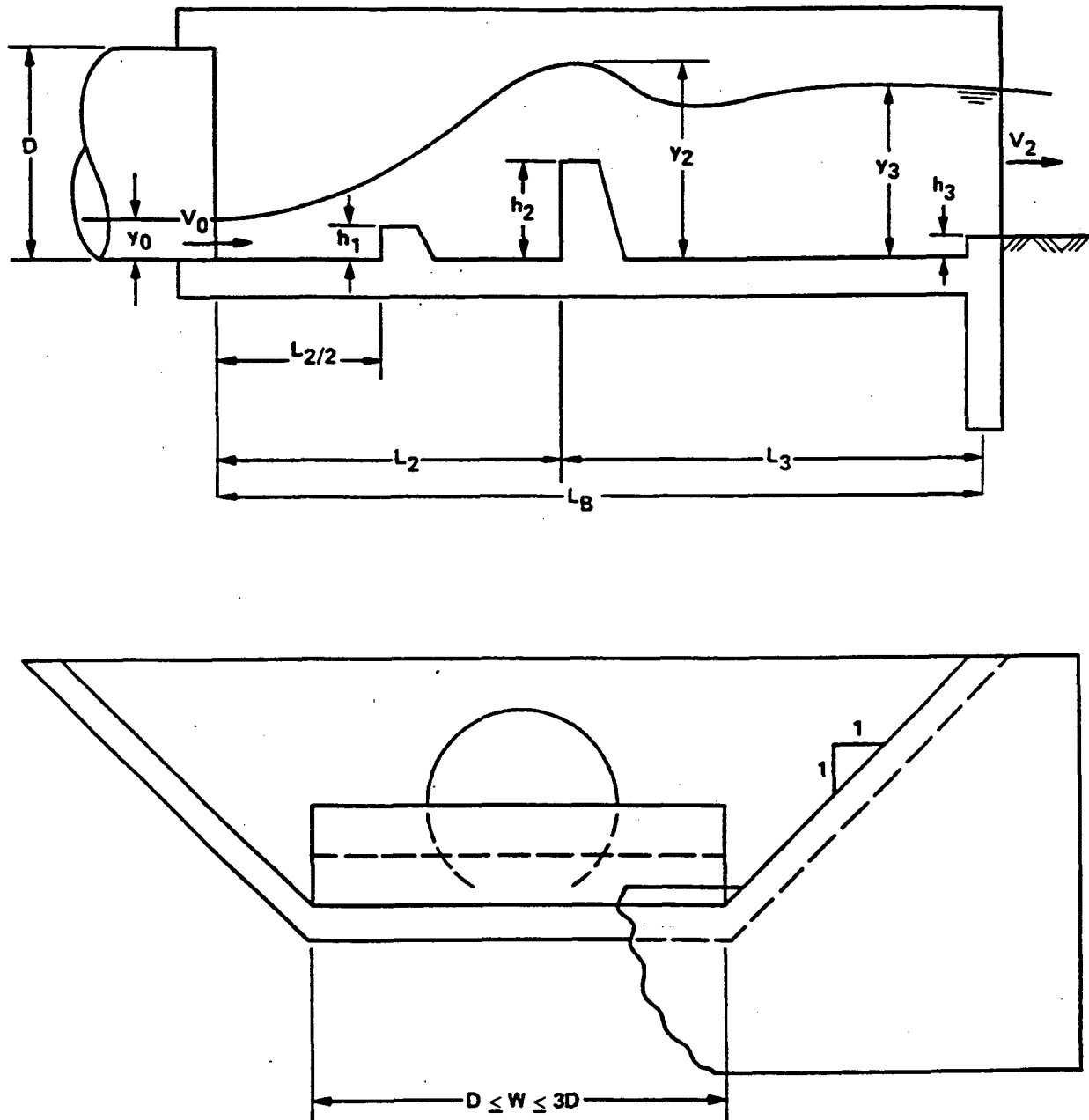


FIGURE VIII-A-1. CONTRA COSTA ENERGY DISSIPATOR

VIII-A-5

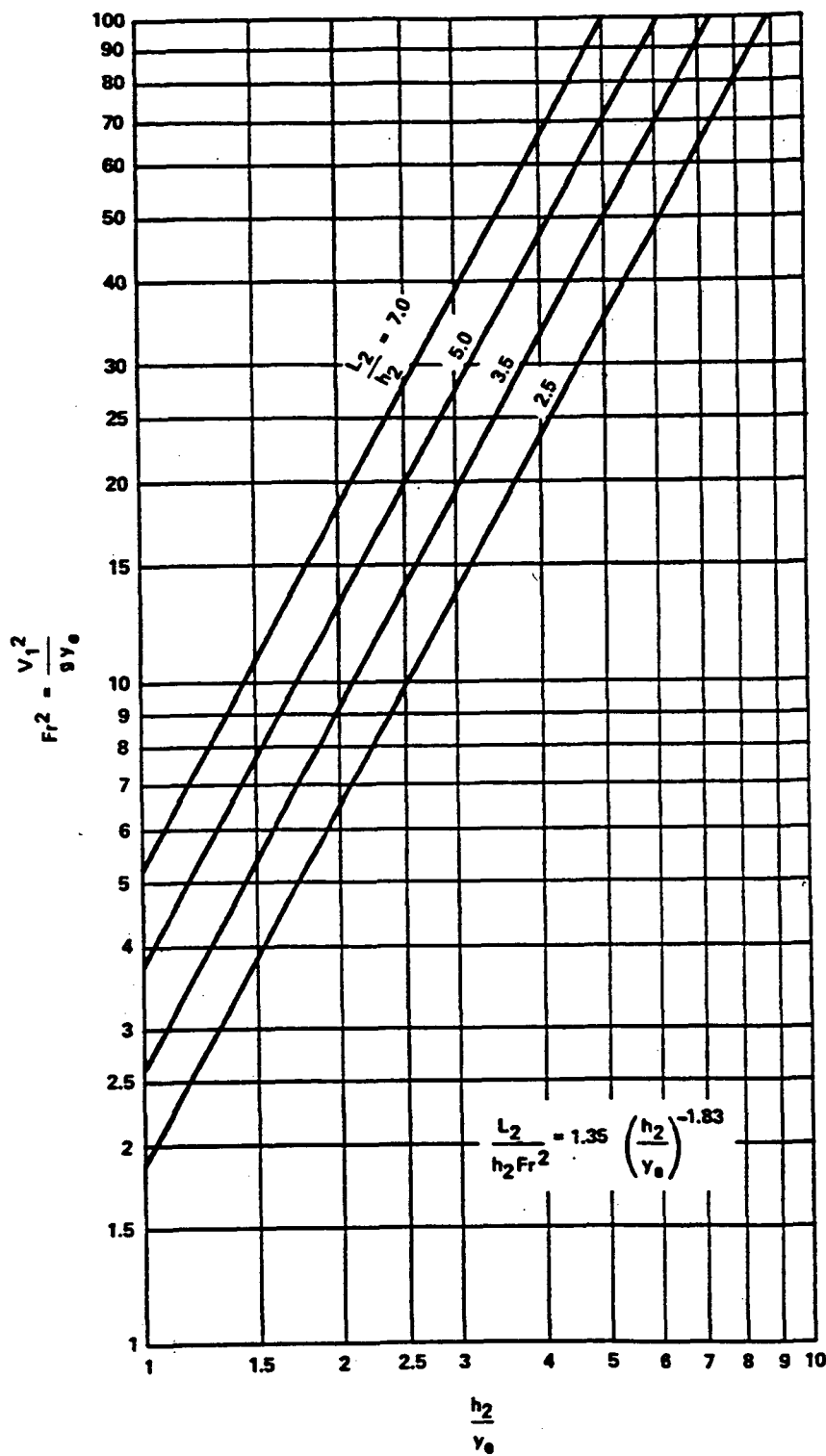
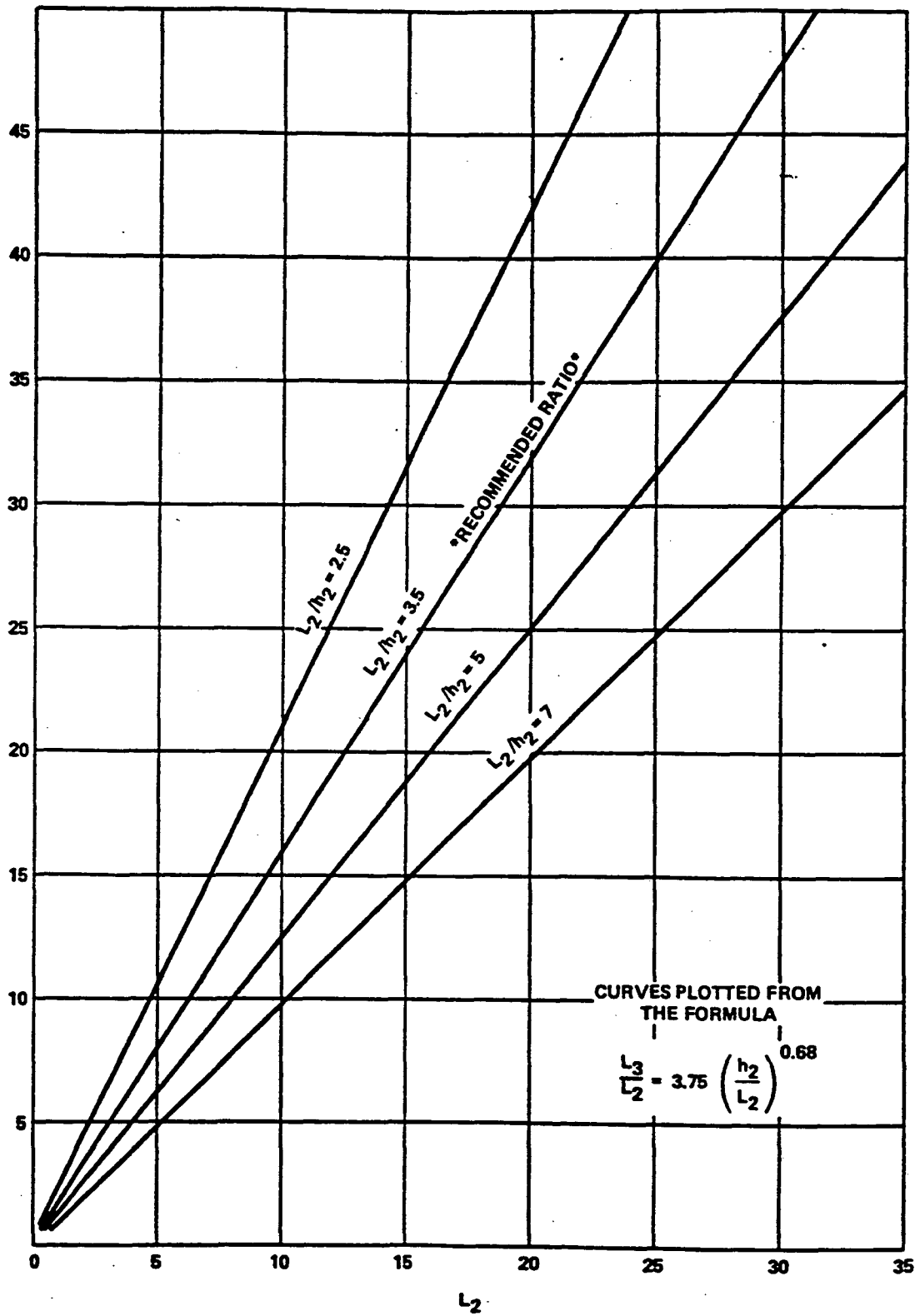


FIGURE VIII-A-2. BAFFLE HEIGHT, CONTRA COSTA ENERGY DISSIPATOR

VIII-A-6



VIII-A-7

FIGURE VIII-A-3. LENGTH OF CONTRA COSTA ENERGY DISSIPATOR

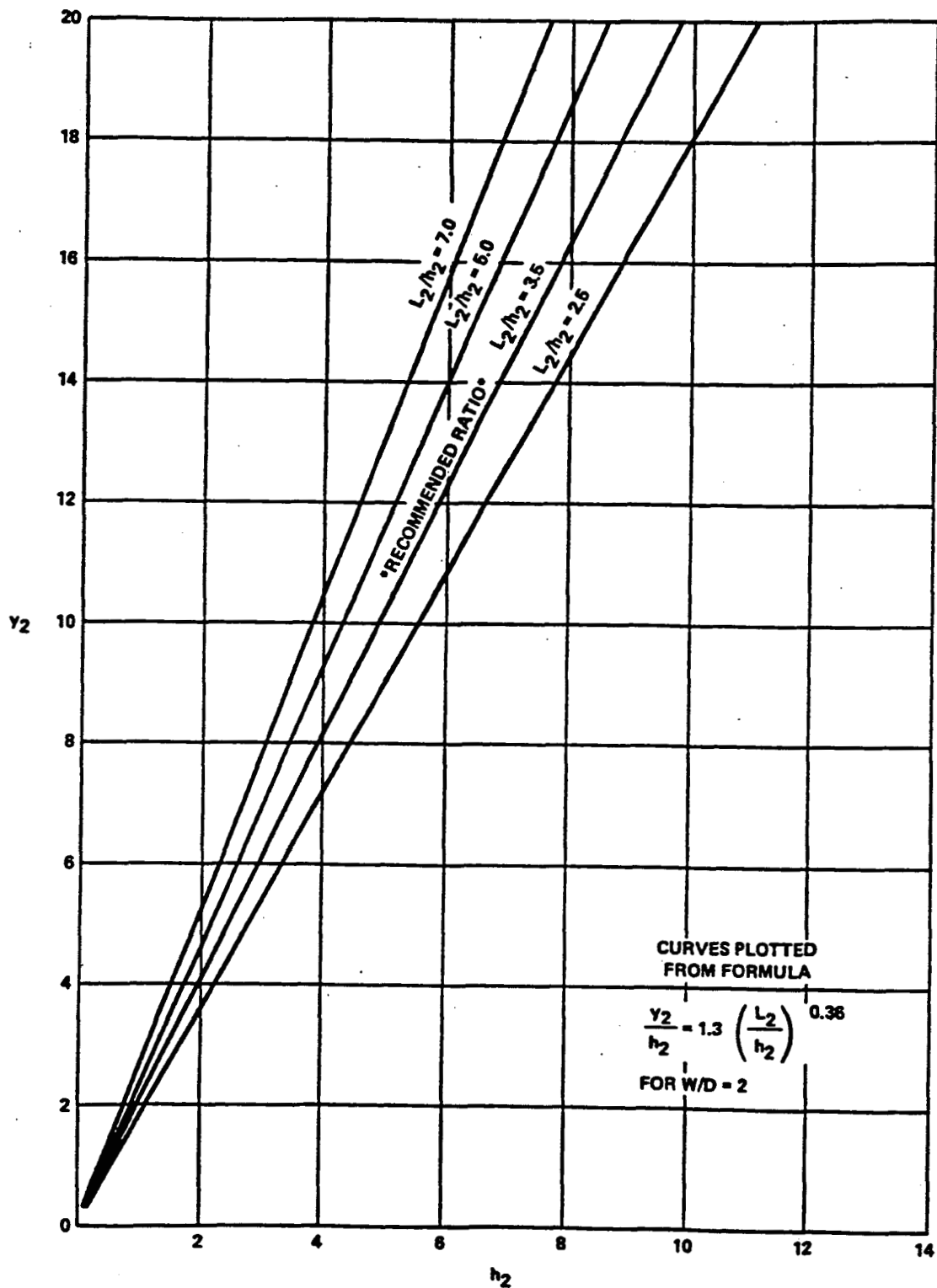


FIGURE VIII-A-4. DEPTH OVER BAFFLE-CONTRA COSTA ENERGY DISSIPATOR
VIII-A-8

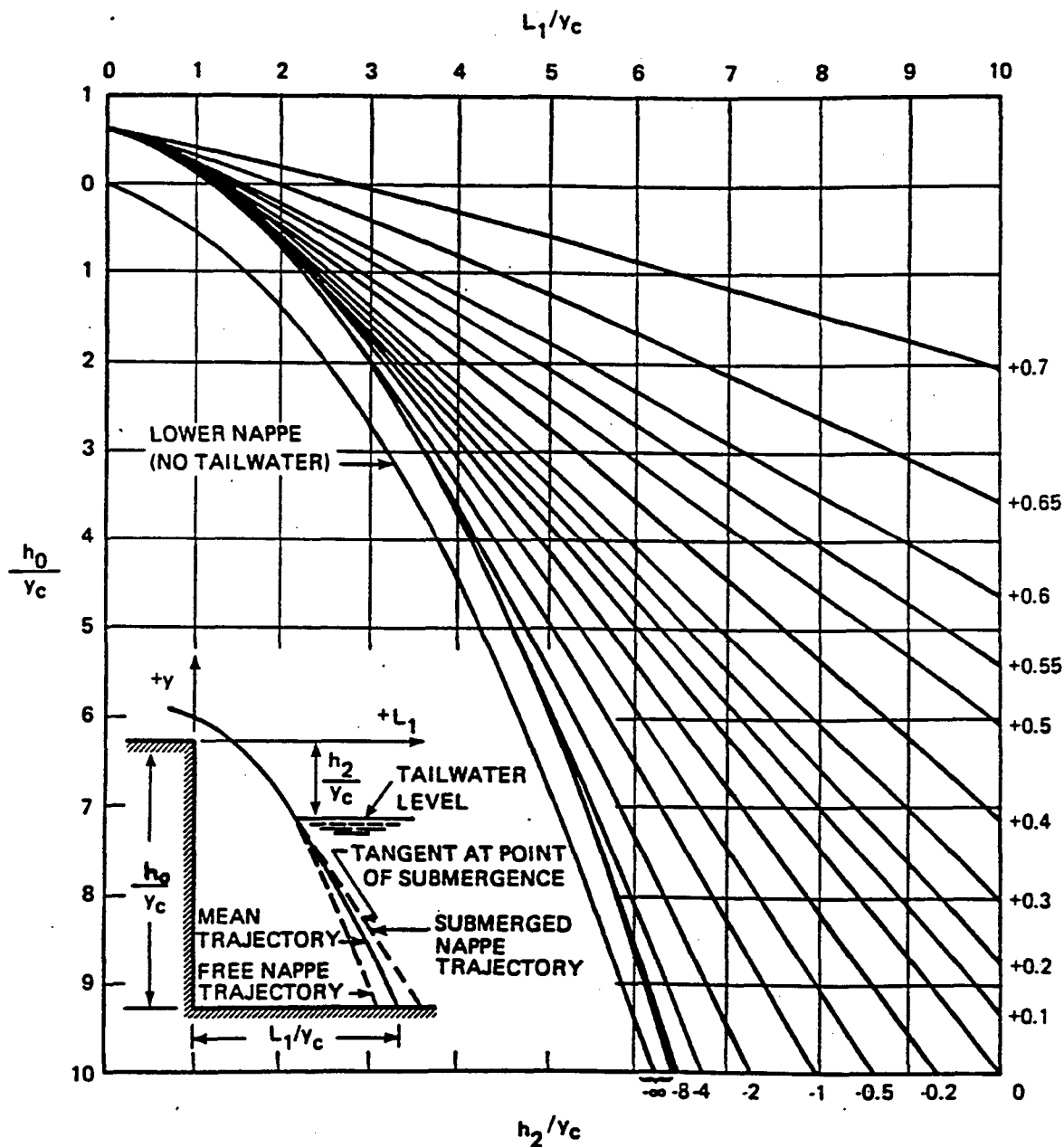


FIGURE IX - A - 2 DESIGN CHART FOR DETERMINATION OF L_1

IX-A-6

SEDIMENTATION ANALYSIS

Sediment Transport Analysis

Introduction

This section summarizes the analysis of sediment transport to the box culverts at El Mirage Way and Needles Highway. The sediment berm upstream from the Hiko Springs Wash Detention Basin outfall structure will trap the majority of the sediment transported by the storm centered over the watershed upstream from the basin. Therefore, local storm events were used to determine the sediment loads at El Mirage Way and Needles Highway since the local storm generated the greatest potential for sediment transport. Once the sediment loads at each of the box culvert locations were determined, the culvert capacities were evaluated to determine if sufficient capacity was available to pass the combined hydraulic and sediment loads.

In anticipation of submitting a Letter of Map Revision (LOMR) application to Federal Emergency Management Agency (FEMA) for the Hiko Outfall/local outfall conveyance system, existing as well as future developed conditions were analyzed. Existing conditions will be the basis for the LOMR while design of the conveyance system will be based on future conditions, with provisions to accommodate existing conditions.

Background

Boyle Engineering¹ completed a sediment analysis of the entire Hiko Springs Wash watershed based on the Universal Soil Loss Equation (USLE). The Boyle analysis indicated that the upland watershed is highly erodible due to its steep gradient and lack of ground cover. The USLE, which has been widely used in predicting the sediment yield from agricultural lands and stripmining locations based on average annual rainfall, vegetative cover, and other factors, is an empirical method for approximating gross erosion for drainage areas. A Sediment Delivery Ratio (SDR) is used with the USLE to allocate the portion of the gross yield which reaches downstream points of interest. Like the USLE, the methods of estimating SDRs are highly empirical and do not take into account the physical hydraulic parameters of the transport mechanism.

Black & Veatch concurs with the Boyle report on the condition of the Hiko Springs watershed; the watershed appears to contain an abundance of sediment. Thus, the Black & Veatch² analysis for the Hiko Springs Wash Detention Basin included the assumption that the amount of sediment transported to a point of interest is controlled by the transport capacity of the runoff rather than the availability of sediment.

To estimate the transport capacity of the inflow to the Hiko Springs Wash Detention Basin, Black & Veatch used the Meyer-Peter (MP) and Meyer-Peter and Muller (MPM) relations for the sediment analysis. The MP and MPM relations are physically well founded, theoretically correct, and among the most widely used. In continuation of the previous work, these methods were also used for the Wash below the detention basin to estimate the transport capacity of the natural Wash.

Sediment Analysis

As stated above, the USLE method provides an approximation of the gross sediment yield available in the watershed, whereas the MP and MPM relations estimate the sediment transport capacity of the conveyance system (e.g., Hiko Springs Wash). The lower value of the available yield and transport capacity will be the estimated volume of sediment expected at downstream points of interest.

The MP and MPM methods were used to estimate the amount of sediment the existing Hiko Springs Wash can transport during periods of peak runoff. Although a conveyance system will be constructed in the Wash, the natural conditions will give an indication of the preconstruction sediment transport capacity of the Wash. This will estimate the sediment load currently impacting the box culverts at the road crossings and Laughlin Bay.

Sediment Yield

The USLE method was developed by the USDA Soil Conservation Service to predict the gross sediment amount produced by sheet flow and rill erosion. The equation is composed of dimensionless factors which account for watershed characteristics, such as soil type, steepness of terrain, and vegetation. The equation is defined as follows:

$$A = RKLSCP$$

where: A = Soil loss per unit area (tons/acre),
R = Rainfall factor,
K = Soil erodibility factor,
LS = Length-slope factor,
V = Vegetal cover factor, and
P = Conservation practice factor.

To estimate the sediment availability in the watershed below the detention basin, the vegetal cover factor, C, was adjusted to represent existing (i.e., natural) conditions and future developed conditions. Table 3-1 summarizes the results of the USLE method. The calculations, assumptions, and references are included in Appendix C.

Table 3-1

USLE Method - 100-year Event Hiko Springs Wash			
Conditions	Gross Sediment Yield		Percent Peak Flow (Bulking Factor)
	ton/acre	ac-ft	
Existing	29.9	7.8	7.2
Future	22.4	5.9	4.0

The above figures do not incorporate an SDR and are, therefore, conservative estimates of the sediment available during the 100-year storm event in the Hiko Springs Wash watershed below the detention basin.

Sediment Transport

Sediment transport equations have been developed based on theoretical relationships, laboratory experiments, and field measurements. However, most of these relationships are very limited in terms of practical application. Furthermore, much of the available information applies to flowing rivers or alluvial streams, and do not relate to flash floods

in dry desert washes. A discussion of sediment transport methodology follows, and calculations and reference information are provided in Appendix C.

Sediment Transport Methodology. Because the Hiko Springs Wash is very broad, the utilization of sediment transport equations is complicated by the fact that bed width is a function of discharge. For the purpose of this analysis, the width of flow for a given discharge was determined based on the FEMA methodology³. Since flow in the Wash is broad and shallow, it is assumed that the top width of the flow path is equal to the channel bed width. The relations follow:

$$\begin{aligned}\text{Top Width, } T &= 9.5 \times Q^{0.4} \\ \text{Flow Depth, } y &= 0.07 \times Q^{0.4}\end{aligned}$$

Sediment loads for flood frequencies of 2, 5, 10, 25, 50, and 100 years were estimated at the two road culvert systems for both existing and future conditions. Storm hydrographs generated using HEC-1 were combined with the sediment discharge equations to develop sediment graphs, which were then used to compute the volume of sediment delivered to the box culverts.

Meyer-Peter. The sediment discharge equation for this relation can be readily combined with a flood hydrograph because the MP equation has only three variables: slope, discharge, and median particle diameter of the bed material. However, as is the case with most sediment discharge equations, it does have limitations. The MP relationship was developed from experiments with well-sorted river sediments ranging in median size from 3.1 to 28.6 mm⁴. The Meyer-Peter relation is of the form:

$$g_s^{2/3} = 39.25q^{2/3} \times S - 9.95d_{50}$$

where:

g_s	=	Sediment transport rate (lbs/ft/sec),
q	=	Unit discharge of channel (cfs/ft),
S	=	Channel slope (ft/ft), and
d_{50}	=	Median particle diameter (ft).

In review of the geotechnical data (Appendix A) for this project, the median particle size of the bed material contained in the Wash is approximately 1.8 mm at El Mirage Way and approximately 1.7 mm at Needles Highway. For the MP equation, the Hiko Springs Wash soil gradation is outside the range of laboratory data. The implication is that fine-grained sediments tend to produce bedforms such as ripples or dunes which, in turn, increase the roughness of the channel bed. Conversely, coarser sediments do not produce rugged bed forms thus, bed roughness is a function of only sediment grain roughness. As a result, the use of the MP relationship for this analysis is a rough approximation because the potential increase in flow resistance attributed to bedforms is not accounted for.

Meyer-Peter and Muller. The use of this method is more complicated. The MPM relation was developed from flume data with sediments of "effective size" ranging from 0.4 to 30 mm, where the effective bed grain size is determined as the geometric mean⁴. This range better fits the median particle diameters in Hiko Springs Wash. The MPM relation is applicable for graded sediments subjected to flow conditions that give rise to bedforms.

In utilizing the MPM relationship for this analysis, variation of the bed width created additional computation problems. The results of the MP method indicate that most of the sediment transport occurs near the peak stages of a flood event. Thus, to simplify the MPM analysis, bed width was adjusted for each frequency event, but not for each hydrograph ordinate. Results obtained using the MPM methodology were slightly higher than those obtained from the MP methodology.

Results. Concurrent with the higher peak runoffs for future conditions, the sediment transport capacity of the Wash was also higher under future conditions. At El Mirage Way, the existing condition sediment load is approximately 67 percent lower than the future conditions. The existing sediment load at Needles Highway is 79 percent lower than those for future conditions. The preconstruction sediment transport capacity of the Wash for future peak runoff conditions is summarized in Table 3-2.

Table 3-2

Sediment Transport Capacity at Box Culverts (acre-feet)				
Flood Event Frequency	El Mirage Way		Needles Highway	
	MP	MPM	MP	MPM
100-yr	0.72	0.85	2.04	2.10
50-yr	0.62	0.71	1.73	1.78
25-yr	0.49	0.56	1.38	1.43
10-yr	0.35	0.40	0.98	1.02
5-yr	0.27	0.30	0.75	0.78
2-yr	0.16	0.19	0.46	0.49

The MP and MPM methods produced sediment load estimates that would equate to bulking factors ranging from 1.7 to 2.1 percent of the peak runoff for the 100-year storm event. These values are low compared to sediment bulking factors of between 5 and 10 percent typically used in design of structures on alluvial fans such as the Hiko Springs watershed.

Box Culvert Capacity

The hydraulic capacity of the box culverts at El Mirage Way and Needles Highway was evaluated using the guidelines presented in the Clark County Regional Flood Control District Hydrologic Criteria and Drainage Design Manual (Manual). The purpose of this evaluation was to estimate the performance of the box culverts under existing conditions prior to the improvements discussed in subsequent sections of this report. The results of this cursory evaluation are summarized below.

El Mirage Way

The box culvert system at El Mirage Way consists of two sets of six 12-foot by 6-foot culverts. Using the nomographs in the Manual along with the topographical and survey information obtained by Black & Veatch, each set of six box culverts has a

capacity of approximately 4,700 cfs. The local storm event produces a peak runoff of 467 cfs at El Mirage Way under future conditions. Therefore, a sediment load bulking factor of up to 1000 percent would still not exceed the capacity of one set of six box culverts. The second set of six box culverts is not required to pass the 100-year peak discharge from the local storm event.

Needles Highway

The box culvert system at Needles Highway is not nearly as substantial as the culverts at El Mirage Way. The Needles Highway structure consists of four 8-foot by 3.8-foot culverts. The culverts were designed to have a capacity of 1,170 cfs. Using the nomographs in the Manual along with the topographical and survey information, the box culverts have a capacity of approximately 1,344 cfs. The local storm event produces a peak runoff of 1,339 cfs at Needles Highway under future conditions. Therefore, the culverts currently do not have the capacity to pass sediment-laden runoff from the local storm event.

Conclusion

Both the Meyer-Peter and Meyer-Peter and Muller sediment transport relations were used to analyze the sediment transport capacity of the existing Hiko Springs Wash. The Meyer-Peter relation is based on a median sediment grain diameter which is smaller than the particles sampled from the Wash. While the Meyer-Peter and Muller relation is based on a wider range of sediment sizes and appears more applicable to the Hiko Springs Wash environment, the results are not congruous with sediment loads expected on alluvial fans.

The USLE method estimated a sediment supply in the watershed which exceeded the transport capacity of the Wash. Since a constructed conveyance system will have a higher transport capacity (due to higher velocities of flow) than the natural Wash, it will be conservatively assumed that the gross sediment supply will be the limiting factor. The USLE bulking factor estimate for future conditions, 7 percent, will be used for design of the Hiko Springs Wash Outfall conveyance system.

References

1. "Facilities Plan for Hiko Springs and Unnamed Wash Laughlin - Big Bend Area, Clark County Nevada"; Boyle Engineering Corporation; May 1989; and "Design Memorandum for Hiko Springs Wash in Laughlin, Clark County, Nevada;" Boyle Engineering Corporation; April 1991.
2. "Hiko Springs Wash Detention Basin Design Memorandum ," Black & Veatch, August 1994.
3. Hydraulic Processes on Alluvial Fans; R.H. French; Elsevier; 1987.
4. Sedimentation Engineering; Vito A. Vanoni; ASCE Task Committee; 1975.

Owner CCPR
Plant Hiko Springs Outfall Unit _____
Project No. 31825.200 File No. _____
Title USLE / MUSLE Estimation
of Sediment Yields
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Verified By _____
Date 19
Computed By HR

USLE = Universal Soil Loss Equation
A = RKLSCP where, R = rainfall factor
K = soil erodibility factor
L = length - slope factor
C = vegetal cover factor
P = conservation practice factor
dimensionless

MUSLE = Modified USLE
 $Y = 95(Q \times A)^{0.56}$ KLSCLP

where, Y = single storm sediment yield (tons)
Q = peak discharge (cfs)
A = runoff volume (ac-ft)
K, L, S, C, P = as defined above.

Variable values - Hiko Springs Outfall, Laughlin, Nevada.

* $R_{ann} = 30$ (Ref. 1, Fig. 2, Appendix A1) = avg. annual event

K: base on geotechnical data - Ref. 2

Determine % fragments < 2 mm (becomes the sample, or 100%)
Determine % sand, 0.10mm to 2mm = 85.9%
Determine % silt & very fine sand, < 0.1mm = 14.1%
Determine % organic matter = 0%
(See spreadsheet 1)

Use nomograph in Ref. 1, Chart 1, Appendix 2.

Soil Structure = mod. to coarse granular, type 3
Permeability = mod. to rapid, type 2

R = 11

* For 100-yr. event, $R_{100} = 19.25 P^{2.2} = \frac{19.25 (4.58)^{2.2}}{6^{0.4672}} = 237$ (Ref. 3)



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Variable Values (cont)

LS: Reach from HSWDB to Magic Way

$$L = 5730$$

$$78+70 \text{ to } 136+00$$

$$S = 0.0386$$

Reach from Magic Way to Needles Hwy.

$$L = 3560$$

$$48+10 \text{ to } 78+70$$

$$S = 0.042$$

Reach from Needles Hwy to Casino Ctr. Dr.

$$L = 2980$$

$$13+30 \text{ to } 43+10$$

$$S = 0.035$$

Reach from CC Dr. to Laughlin Bay

$$L = 630$$

$$7+00 \text{ to } 13+30$$

$$S = 0.027$$

Using representative segments from four reaches in Fig. 4, Ref. 1, Appendix A, the weighted LS factor is:

$$LS = 4.309$$

Since this data fell on the dashed portions of the figure lines, try using curve formula:

$$LS = \left(\frac{2}{72.6} \right)^m \left(\frac{430x^2 + 30x + 0.43}{6.613} \right) \quad (\text{Ref. 3})$$

Where, z = field slope length, ft

x = slope gradient, ft/ft

$m = 0.3$ for $x < 3\%$, 0.4 for $x = 4\%$, and 0.5 for $x \geq 5\%$

See spreadsheet 2 for calculations.

Use LS = 1.622



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Variable Values (con't)

C: Assume weighted value for watershed.

Basin MW

$$\text{Area} = 0.214 \text{ sq. mi} = 28.7\%$$

Assume developed conditions imply; lawns, shrubs, & sparse tree growth.

Existing conditions = no appreciable canopy, tall weeds or short brush. Vegetation is sparse.

Basin NH

$$\text{Area} = 0.377 \text{ sq. mi} = 50.6\%$$

Basin LI

$$\text{Area} = 0.154 \text{ sq. mi} = 20.7\%$$

For natural or existing conditions, $C = .24$
(no appreciable canopy, type W, 20% ground cover.)

For developed conditions, $C = 0.10$
(no appreciable canopy, type G, 40% ground cover.)

(Ref. 1, Table 2, Appendix A)

See Spreadsheet 3 for calculations.

$$\underline{\underline{C = 0.167}}$$

$P = 1$ for noncrop land.

USLE calculations shown on Spreadsheet 4.

$$\underline{\underline{A = 2.84 \text{ ton/acre/yr.}}}$$

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Page 4 of 10MUSLE

For 100-yr storm event, use peak flowrates & volumes from HEC-1 models. (Ref. 4)

Convert to ac-ft of sediment.

Assume sediment specific weight = 84 pcf.

$$Y \text{ tons} \times \frac{2000 \text{ lbs}}{\text{ton}} \times \frac{2 \text{ ft}}{84 \text{ pcf}} \times \frac{1}{43560 \text{ sf}} = Y * 5.47 \times 10^{-5} \text{ ac-ft/ton}$$

See spreadsheet 5

Conclusion/Summary

The USLE Method generates the following gross sediment loads (no allowance for a sediment delivery ratio), as a percentage of the peak runoff volume

Future condition, 4 %
Existing condition, 7.2 %

The MUSLE Method generates the following:

Future Condition, 1.9 %
Existing Condition, 2.75 %

The MUSLE method falls in the range of the MPM results. Since "rule of thumb" estimates range from 5 % to 10 % sediment loads on alluvial fans, suggest USLE values be considered as bulking factors.

BLACK &
VEATCH



Owner CCPW Computed By FR
Plant Hiko Springs Outfall Unit _____ Date 6-12 19 97
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Reference:

1. "Guides for Erosion and Sediment Control in Nevada," August 1976, U.S. Dept. of Agriculture, Soil Conservation Service.
2. "Design Level Geotechnical Investigation, Hiko Springs Wash Outfall from Hiko Springs Detention Basin to Needles Highway, Clark County, Nevada," April 14, 1997, Converse Consultants Southwest, Inc.
3. Applied Hydrology and Sedimentology for Disturbed Areas, Bartfield, B.Y., Warner, R.C., Hoan, C.T., 1985, Oklahoma Technical Press.
4. "Draft Hiko Springs Wash Outfall Improvements for Clark County Public Works," by Black & Veatch, April 1997.

Soil Erodibility Factor, K

Percent Finer		% Silt	% Silt	% Sand
Boring No.	% < 2mm	(.002 - .1 mm)	of < 2 mm	of < 2 mm
B- 3	0.470	0.060	0.128	0.872
B- 4	0.670	0.180	0.269	0.731
B- 5	0.570	0.060	0.105	0.895
B- 6	0.560	0.070	0.125	0.875
B- 7	0.540	0.070	0.130	0.870
B- 8	0.500	0.080	0.160	0.840
B- 9	0.460	0.070	0.152	0.848
B- 10	0.450	0.060	0.133	0.867
B- 11	0.650	0.060	0.092	0.908
B- 12	0.530	0.070	0.132	0.868
B- 13	0.620	0.080	0.129	0.871
B- 14	0.640	0.090	0.141	0.859
Average	55.5%		14.1%	85.9%

Length-Slope Factor, LS

Channel Alignment

Reach No.	Length	d elev.	Slope	% Length
DB-MW 1	5730	221	0.0386	44.42%
MW-NH 2	3560	149	0.0419	27.60%
NH-CC 3	2980	105	0.0352	23.10%
CC-LB 4	630	17	0.0270	4.88%
Total	12900	492	0.0357	

Reach No.	Segments	Length	LS
DB-MW 1	5	1146	0.95
MW-NH 2	5	712	0.95
NH-CC 3	5	596	0.63
CC-LB 4	1	630	0.34
		Weighted	0.845

Curve Equation

Reach No.	Length	Slope	m	LS
DB-MW 1	5730	0.0386	0.4	1.933
MW-NH 2	3560	0.0419	0.4	1.750
NH-CC 3	2980	0.0352	0.35	1.121
CC-LB 4	630	0.0270	0.3	0.449
		Weighted		1.622

Vegetal Cover Factor, C

Basin	Area	frac Area	Future		Existing	
			frac Devel	C avg	frac Devel	C avg
MW	0.214	0.29	0.50	0.175	0.10	0.235
NH	0.377	0.51	0.50	0.175	0.30	0.205
L1	0.154	0.21	0.75	0.138	0.25	0.213
Total	0.745		Weighted	0.167	Weighted	0.215

Assume: C nat = 0.25
C dev = 0.10

USLE Calculations

Rann = 30
 R100 = 237
 K = 0.11
 P = 1

Sed. sp. wt. 84 pcf
 Area 476.8 ac

Reach No.	Single Storm		100-yr Storm		
	Future A (T/ac)	Existing A (T/ac)	Future A (T/ac)	Existing A (T/ac)	
DB-MW 1	1.12	1.50	8.82	11.84	
MW-NH 2	1.01	1.18	7.98	9.35	
NH-CC 3	0.51	0.79	4.02	6.21	
CC-LB 4	0.20	0.31	1.61	2.49	
Total	2.84	3.78	22.43	29.89	ton/ac
Total	0.74	0.99	5.85	7.79	ac-ft
% Peak			4.03%	7.15%	

MUSLE Calculations - 100-year storm event
(K, LS, C, & P values as calculated for USLE)

Basin	Future		Existing	
	Q peak	Runoff V	Q peak	Runoff V
MW	476	42	476	42
NH	1339	114	1089	90
L1	1655	145	1314	109
Basin	Y fut (T)	Y ex (T)	Y fut (ac-ft)	Y ex (ac-ft)
MW	905	1216	0.49	0.66
NH	2559	2339	1.40	1.28
L1	1660	1921	0.91	1.05
Total	5124	5476	2.80	2.99
		% Peak fut	1.93%	
		% Peak ex	2.75%	

(B)

SEDIMENT TRANSPORT BY MEYER-PETER AND MUELLER

by

Michael A. Stevens

May 1989

Master File Name is MPMS.MAS

GENERAL.- This is a BASICA program to compute the bed-load transport by the Meyer-Peter and Mueller method (see Sedimentation Engineering, p 193). The Meyer-Peter and Muller formula is

$$q_b = 8 \left(\frac{\gamma_s}{\gamma_s - \gamma} \right) \left(\frac{g}{\gamma} \right)^{1/2} \left[\left(\frac{k_r}{k'_r} \right)^{3/2} \gamma_r S - 0.047 (\gamma_s - \gamma) D_m \right]$$

where q_b = sediment transport rate in units of mass per second per unit width of channel;

γ_s = unit weight of sediment ($\gamma_s = \rho_s/g$);

γ = unit weight of water;

g = acceleration due to gravity;

k_r/k'_r = fraction of the total bed shear stress which acts on the grains on the bed;

r_b = hydraulic radius of the bed;

S = slope of the bed;

D_m = effective diameter of the bed sediment.

The Meyer-Peter and Muller equation is of the general form

$$q_b = A (\alpha \tau - \tau_c)^{3/2}$$

which

A = coefficient depending on the density of the sediment particles;

α = coefficient depending on the fraction of the total bed shear stress which is acting on the grains;

τ = total bed shear stress ($\tau = \gamma_r S$);

τ_c = critical bed shear stress, the stress at which significant motion of the bed particles begins.

For gravel and cobble bed rivers, it can be assumed that the total bed shear stress acts entirely on the grains - there are no bed forms. Then $k_r/k'_r = 1$ and $\alpha = 1$. When the bed is wide the hydraulic radius is nearly equal to the depth so $y = r_b$. Therefore

$$A = 8 \left(\frac{\gamma_s}{\gamma_s - \gamma} \right) \left(\frac{g}{\gamma} \right)^{1/2}$$

$$q_b = A (\tau - \tau_c)^{3/2}$$

$$\tau = \gamma_s S.$$

is inconvenient to employ the Meyer-Peter and Muller expression

$$k_r = \frac{26}{(D_{90})^{1/6}}$$

because it is valid only in SI units. We convert to the Darcy-Weisbach friction factor f by noting that

$$U = k_r y^{1/2} S^{1/2} \quad \text{and} \quad U = \frac{8g}{f} y^{1/2} S^{1/2}$$

Equating both values of U and solving for f , we obtain

$$f = 0.116 \left(\frac{D_{90}}{y} \right)^{1/3}$$

which is valid in both sets of units.

Inputs.- The inputs are:

1. Choice of either English or SI units;
2. Grain size distribution curve for the bed material;
3. Specific gravity of the solids;
4. Bed slope;
5. Discharge per unit width.

Outputs.- The outputs are:

1. All the inputs (in case one wants a printout of these);
2. Depth of flow;
3. Friction factor;
4. Shear stress;
5. Bed-material load.

All outputs are written on the screen. If you want a written record of the calculations on paper, use the "PRINT SCREEN" keys.

```
CLS
PRINT "BED-LOAD TRANSPORT USING THE MEYER-PETER AND MUELLER FORMULA"
PRINT : PRINT
DEFINT I
DIM D(20), F(20)
```

```
PUT
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```
PRINT : PRINT
```

Handwritten note:
Marginal note
line number.

$$k_r y^{1/2} S^{1/2} = \left(\frac{8g}{f} \right)^{1/2} y^{1/2} S^{1/2}$$

$$k_r^2 y^{1/2} S^{1/2} = \frac{8g}{f} y^{1/2} S^{1/2}$$

$$f = \frac{8g}{k_r^2} = \frac{8g (D_{90})^{1/3}}{y^{1/3} 26^2}$$

$$U = \left[\frac{8g}{0.116 \left(\frac{D_{90}}{y} \right)^{1/3}} \right]^{1/2} y^{1/2} S^{1/2}$$

SEDIMENTATION ENGINEERING

Vito A. Vanoni, Editor

PREPARED BY
THE ASCE TASK COMMITTEE
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H. Sediment Discharge Formulas

56. General.—Engineers engaged in river regulation and design and operation of canal systems have great need for methods of computing sediment discharge. In fact, obtaining such methods is probably the most important practical objective of research in sedimentation. Unfortunately, available methods or relations for computing sediment discharge are far from completely satisfactory with the result that plans for works involving sediment movement by water cannot be based strongly on such relations. At best these relations serve as guides to planning and usually the engineer is forced to rely strongly on experience and judgment in such work. The guiding provided turns out to be important especially when the conditions in the problem area differ from those in the experience of the planning engineers. For this reason it seems pertinent to present some of the available relations in this section.

Relations for calculating sediment discharge will be referred to as formulas even though parts or all of some relations are presented in graphical form and, strictly speaking, are not formulas. The objective of presenting them is to make them conveniently available to those who may need to employ them and to give some information that may help in evaluating them.

Many formulas have appeared in the literature since DuBoys (1879) presented his tractive force relation. The problem of the engineer is to select one or more of these for use in solving his particular problem. This selection is not straightforward since the results of different formulas often differ drastically and it is not possible to determine positively which one gives the most realistic result. To help engineers select formulas, a brief outline of the data on which each formula is based will be given and an attempt will be made to evaluate the formulas by comparing observed sediment discharges in rivers with values calculated by the formulas. Only a few of the many formulas available will be presented and discussed. These were selected because they are used by many engineers or because it may appear that they show promise of being adopted in the future. Some formulas considered important by many experts in sedimentation have probably been omitted because of this subjective method of selection. No derivations will be attempted in this section because the fundamental ideas upon which the derivations are based are discussed in Chapter II, Section G.

In addition to the formulas, procedures will be presented for estimating the discharge of bed sediment from suspended load samples and normal stream flow measurements. This approach to obtaining sediment discharge is one of the most important developments in river sedimentation in recent years. By making use of observed quantities it gives results that are very much more reliable than those given by the formulas. A compilation of sediment discharge formulas by Shulits and Hill (1968) gives computer programs for a number of the formulas listed herein.

57. Formulas.—All of the formulas presented in this section are for discharge of bed sediment under conditions of uniform steady flow and do not include the wash load. The formulas are as follows:

DuBoys (Brown, 1950), 1879	Eq. 2.224
Meyer-Peter (Meyer-Peter and Muller, 1948)	Eq. 2.225
Schoklitsch (Shulits, 1935)	Eq. 2.226
Shields (1936)	Eq. 2.227

Meyer-Peter and Muller (1948)	Eq. 2.228
Einstein-Brown (Brown, 1950)	Eq. 2.229
Einstein Bed Load Function (Einstein, 1950)	Eq. 2.230
I. aursen (1958)	Eq. 2.231
Blench Regime Formula (Blench, 1966a)	Eq. 2.232
Colby (1964a-b)	Eq. 2.233
Engelund-Hansen (Engelund, 1966; Engelund and Hansen, 1967)	Eq. 2.234
Inglis-Lacey (Inglis, 1968)	Eq. 2.235
Toffaletti (1969)	Eq. 2.236

To apply these formulas the flow depth, d , and slope, S , or mean velocity, depth, and slope must be given.

DuBoys Formula (Brown, 1950)

$$g_s = \Psi_D \tau_o (\tau_o - \tau_c) \dots\dots\dots (2.224)$$

in which g_s = sediment discharge, in pounds per second per foot of width; Ψ_D = coefficient with dimensions of cubic feet per pound per second; $\tau_o = \gamma r_b S$ bed shear stress, in pounds per square foot; γ = specific weight of water, in pounds per cubic foot; τ_c = critical bed shear stress at which sediment movement begins; r_b = bed hydraulic radius, in feet (determined by the Side-wall Correction method outlined in Chapter II, Section F); and S = slope of stream, in feet per foot. Values of Ψ_D and τ_c obtained by Straub and reported in Brown, 1950 are given as functions of median size of the bed sediment, d_{50} , in Fig. 2.95. These quantities were based mainly on data from experiments by Gilbert (1914; Johnson, 1943) in small flumes. Eq. 2.224 as presented herein is valid only for the foot-pound-second system of units.

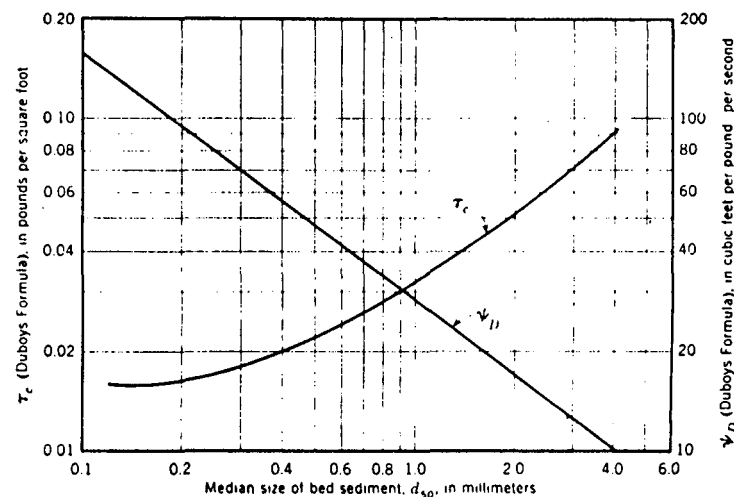


FIG. 2.95.—Coefficient Ψ_D and Critical Shear Stress τ_c for DuBoys Eq. 2.227 as Functions of Median Size of Bed Sediment

Meyer-Peter Formula (Meyer-Peter and Muller, 1948)

$$g_i^{2/3} = 39.25 q^{2/3} S - 9.95 d_{50} \quad (2.225)$$

in which q = water discharge, in cubic feet per second per foot of width; d_{50} = median size of bed sediment, in feet; and g_i and S are as defined previously. Eq. 2.225 is valid only for the foot-pound-second system of units. For the meter-kilogram-second units the numbers 39.25 and 9.95 in Eq. 2.225 are replaced by 250 and 42.5, respectively.

The constants in Eq. 2.225 were determined by fitting the equation to data obtained in experiments with five well-sorted river sediments ranging in median size from 3.1 mm–28.6 mm. The experiments with three of these sediments were made by Gilbert (1914) in flumes 8 in., 12 in., and 16 in. wide with flow depths ranging from 1 in.–6 in. The experiments with the 28.6-mm sediment and one other were made in a flume 2 m wide. These coarse sediments do not produce rugged bed forms so that in these experiments the flow resistance was due mainly to grain roughness. Therefore Eq. 2.225 is valid only for beds of relatively coarse sediments for which the flow resistance due to bed forms is a small part of the total resistance.

Schoklitsch Formula (Shulits, 1935)

$$g_i = \sum p_i \frac{25.3}{\sqrt{d_{ni}}} S^{3/2} (q - q_{ci}) \quad (2.226a)$$

$$q_{ci} = 0.638 \frac{d_{ni}}{S^{4/3}} \quad (2.226b)$$

in which q_{ci} = critical value of q for initiating motion of sediment of mean size, d_{ni} , as given by Eq. 2.226b; p_i = fraction by weight of that fraction of the bed sediment with mean size, d_{ni} ; the symbol, Σ , denotes summation for all sets of values of p_i , d_{ni} , and q_{ci} ; and other symbols are as defined previously. All quantities in Eq. 2.226b are expressed in the foot-pound-second system of units.

To determine sets of values of p_i and d_{ni} a mechanical analysis of a representative sample of the bed sediment is made and a size distribution curve prepared. A set of size grades is then selected and the corresponding p_i values can be determined from the size distribution curve. The size grades frequently used are those shown in Table 2.1. The mean size, d_{ni} , of a fraction is often taken as the geometric mean of the extreme sizes in the fraction.

The Schoklitsch formula was based mainly on data from experiments by Gilbert (1914) in small flumes with well-sorted and also graded sediments with median sizes ranging from 0.3 mm–5 mm. Sediment discharges calculated with the formula also agreed well (Shulits, 1935) with bed load discharges measured with samplers in two European rivers that have gravel beds. This suggests that it is a bed load formula that should not be applied to sand bed streams that carry considerable bed sediment in suspension.

Shields Formula (Shields, 1936)

$$g_i = 10q S \frac{(\tau_o - \tau_c)}{(\frac{\gamma_s}{\gamma} - 1)^2 d_{50}} \quad (2.227)$$

in which γ_s = specific weight of the sediment grains; τ_c = critical bed shear stress for sediment of size d_{50} given by Shields graph, Chapter II, Section E, Fig. 2.43; γ_s = the specific weight of the sediment; and all other quantities in Eq. 2.227 are already defined except that since the equation is dimensionally homogeneous, the quantities can be expressed in any consistent set of units.

(In the formulas presented in this section, sediment discharge and concentration are usually given in weight units even though they should be given in mass units. In the traditional systems of units, i.e., foot-pound-second and meters-kilogram-second this confusion gives no difficulty since pounds and kilograms of mass are numerically equal to those of weight. However, in the SI system of units the formulas as presented will give sediment discharge and concentration in terms of Newtons that numerically are 9.8 times as large as the same quantities expressed in kilograms of mass.)

The Shields formula is based mainly on data from two flumes with widths of 40 cm and 80 cm, respectively, with five sediments of specific gravities ranging from 1.06–4.2. The lightest sediment was made of amber particles with a median size of 1.56 mm. The other sediments were well sorted with median sizes ranging from 1.7 mm–2.5 mm. Ripples were produced on the bed but none of them was very high or steep. Because the sediments in the experiments were coarse and the shear stresses low, essentially all of the sediment moved as bed load.

Meyer-Peter and Muller Formula (1948)

$$\left(\frac{k_s}{k_s'}\right)^{3/2} \gamma_r S = 0.047 (\gamma_s - \gamma) d_m + 0.25 \left(\frac{\gamma}{g}\right)^{1/3} \left(\frac{\gamma_s - \gamma}{\gamma_s}\right)^{2/3} g_i^{2/3} \quad (2.228a)$$

$$\frac{k_s}{k_s'} = \sqrt{\frac{f_b}{8}} \frac{V}{\sqrt{g r_b S}} \quad (2.228b)$$

in which g = acceleration of gravity; f_b = Darcy-Weisbach bed friction factor for the sand grain roughness defined in Chapter II, Section F; and V = mean flow velocity of the stream. The quantities, k_s and k_s' , are defined by

$$V = k_s r_b^{2/3} S^{1/2} \quad (2.228c)$$

$$\text{and } V = k_s' r_b^{2/3} S^{1/2} \quad (2.228d)$$

in which S' is that part of the total slope, S , required to overcome the grain resistance and is defined in terms of f_b as

$$V = \sqrt{\frac{8}{f_b}} \sqrt{g r_b S'} \quad (2.228e)$$

The friction factor, f_b , is obtained from the well-known pipe friction graph of the Nikuradse pipe friction data in which the friction factor, f , is expressed as a function of Reynolds number VD/ν and relative roughness D/k_s , in which D = pipe diameter; ν = kinematic viscosity of the water; and k_s = the grain size of the sand forming the roughness at the pipe wall. To obtain f_b from the pipe friction graph, the diameter, D , is replaced by $4r_b$ and k_s is replaced by d_{90} , the grain size of the bed sediment for which 90% is finer. When the boundary

Reynolds number, $\sqrt{(f_b/8)} V(d_{90}/\nu)$, equals or exceeds a value of approx 100, the boundary will be hydrodynamically rough and k'_s is given by

$$k'_s = \frac{26}{d_{90}^{1/6}} \quad (2.228f)$$

in which d_{90} is in meters and k'_s is in meters to the one-third power per second. The quantity, d_m , is the effective diameter of the sediment given by

$$d_m = \sum p_i d_{mi} \quad (2.228g)$$

in which p_i , d_{mi} , and the summation sign are as in the Schoklitsch formula.

Eqs. 2.228a, 2.228b, and 2.228e are dimensionally homogeneous so that any consistent set of units may be used with them. On the other hand, Eq. 2.228f is valid only when d_{90} is expressed in meters and time is in seconds. When k'_s is obtained from Eq. 2.228f the quantity, k_s , is to be calculated from Eq. 2.228c in which V and r_b are expressed, respectively, in meters per second and meters. Once k_s and k'_s are obtained in meter-second units any other consistent set of units may be used for all other quantities in Eqs. 2.228a, 2.228b, and 2.228e.

The Meyer-Peter and Muller formula is based on data from experiments in flumes ranging in width from 15 cm–2 m with slopes varying from 0.0004–0.02 and water depths ranging from 1 cm–120 cm. The sediments used in the experiments ranged from coal with a small specific gravity, $\gamma_s/\gamma = 1.25$, to river sediment to barite with a specific gravity in excess of four. Some of the sediments were graded and others were sorted. The mean sizes and effective diameters, d_m , of the sediments ranged from 0.4 mm–30 mm. The advantage of this formula over the older Meyer-Peter formula, Eq. 2.225, is that it can be used for graded sediments under flow conditions that give rise to dunes and other bed forms. Most of the data upon which the formula is based were obtained in flows with little or no suspended load that suggests that the formula is not valid for flows with appreciable suspended loads.

Einstein-Brown Formula (Brown, 1950)

This formula was presented in Chapter XII of Rouse, 1950. It is a modification developed by Hunter Rouse, M. C. Boyer, and E. M. Laursen of a formula by Einstein (1942). Its name derives from the name of the original author and the author of the chapter where the formula first appeared. The formula is

$$\Phi = f\left(\frac{1}{\Psi}\right) \quad (2.229a)$$

in which the function, $f(1/\Psi)$, as given in Rouse (1950) is shown in Fig. 2.96

$$\text{and } \Phi = \frac{g_s}{\gamma_s F_1 \sqrt{g \left(\frac{\gamma_s}{\gamma} - 1 \right) d_s^3}} \quad (2.229b)$$

$$\frac{1}{\Psi} = \frac{\tau_o}{(\gamma_s - \gamma) d_s} = \tau_* \quad (2.229c)$$

$$F_1 = \sqrt{\frac{2}{3} + \frac{36\nu^2}{gd_s^3 \left(\frac{\gamma_s}{\gamma} - 1 \right)}} - \sqrt{\frac{36\nu^2}{gd_s^3 \left(\frac{\gamma_s}{\gamma} - 1 \right)}} \quad (2.229d)$$

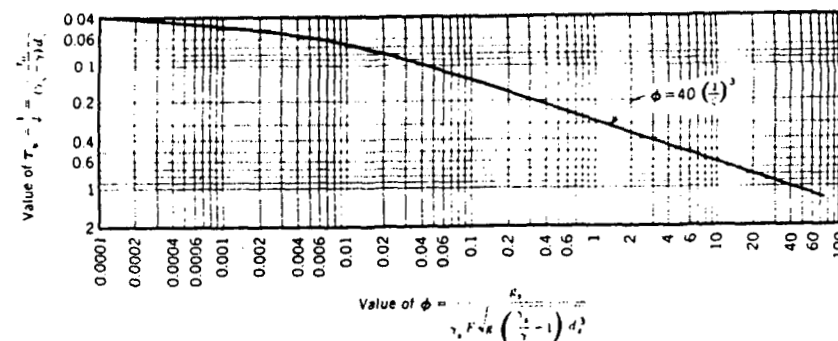


FIG. 2.96.—Function $\phi = f(1/\Psi)$ for Einstein Brown Eq. 2.229

As shown by Fig. 2.96, Eq. 2.229a becomes $\Phi = 40(1/\Psi)^3$ for $1/\Psi$ in excess of 0.09.

The quantity, d_s , is the representative size of bed sediment and is usually taken as the median size, d_{50} , or geometric mean size, d_g . The bed shear stress, τ_o , is usually taken as $\gamma r_b S$. The quantity, F_1 , appears in the Rubey (1933) formula for fall velocity w of sediment of size d_s :

$$w = F_1 \sqrt{\left(\frac{\gamma_s}{\gamma} - 1 \right) g d_s} \quad (2.229e)$$

Note that $1/\Psi$ is the same as the dimensionless shear stress, τ_* , introduced by Shields (1936). Since all of Eqs. 2.231 are dimensionally homogeneous any consistent set of units may be used in them.

The Einstein-Brown formula was based on flume data by Gilbert (1914) and Meyer-Peter and Muller with well-sorted sediments. The Gilbert data were obtained in small flumes with river sediment with median sizes from 0.3 mm–7 mm. The other data used were obtained with a flume 2 m wide with 28.6-mm gravel and with a smaller flume with 5.21-mm gravel, barite, and coal. The specific gravities of the barite and coal were 4.2 and 1.25, respectively.

Einstein Bed Load Function (Einstein, 1950)

In this method the sediment discharge is computed for individual size fractions of the bed material. This means that one also obtains the size distribution of the sediment load. The equations and relations used in the calculations follow:

$$g_s = \sum g_{si} \quad (2.230a)$$

$$G_s = b g_s \quad (2.230b)$$

$$g_{si} = g_{sb} [P_r I_1(\eta_{oi}, z_i) + I_2(\eta_{oi}, z_i) + 1] \quad (2.230c)$$

In these equations g_s = discharge of bed sediment in weight per unit width and time as defined previously; G_s = the total bed sediment discharge of the stream, in weight per unit time; b = the bed width of the stream; g_{si} = discharge of bed sediment of mean size d_{si} , i.e., the i th size fraction, per unit width; the summation sign, Σ , indicates the sum of g_{si} for all size fractions; and g_{sb} = discharge of bed

GEOTECHNICAL INVESTIGATION



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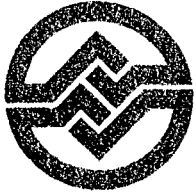
**HIKO SPRINGS WASH OUTFALL
FROM HIKO SPRINGS DETENTION
BASIN TO NEEDLES HIGHWAY
CLARK COUNTY, NEVADA**

Prepared for:

**Black & Veatch
1900 East Flamingo Road
Las Vegas, NV 89119**

Converse Project No. 96-33746-01

June 18, 1997



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Engineering and Environmental Sciences

June 18, 1997

96-33746-01

Mr. Douglas Blatchford, P.E.
Black & Veatch
1900 East Flamingo Road, Suite 295
Las Vegas, NV 89119

Subject: Design Level Geotechnical Investigation
Hiko Springs Wash Outfall
Clark County, Nevada

Dear Mr. Blatchford:

Enclosed is the design level geotechnical investigation conducted for the proposed Hiko Springs Wash Outfall, from the existing Hiko Springs Wash Detention Basin to Needles Highway near Laughlin in Clark County, Nevada.

The report presents the results of our engineering analysis and the field and laboratory data obtained along the outfall channel route during this investigation. Recommendations are provided for design and construction. Subsurface soils generally consisted of sands and gravels.

If you have questions concerning the information contained in this report, please contact us at your convenience.

Respectfully submitted,

CONVERSE CONSULTANTS

Al Stilley, P.E.
Vice President

ANS:gm

48/2BG

48/2BG

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL ENGINEERING REPORT

More construction problems are caused by site subsurface conditions than any other factor. As troublesome as subsurface problems can be, their frequency and extent have been lessened considerably in recent years, due in large measure to programs and publications of ASFE/ The Association of Engineering Firms Practicing in the Geosciences.

The following suggestions and observations are offered to help you reduce the geotechnical-related delays, cost-overruns and other costly headaches that can occur during a construction project.

A GEOTECHNICAL ENGINEERING REPORT IS BASED ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS

A geotechnical engineering report is based on a subsurface exploration plan designed to incorporate a unique set of project-specific factors. These typically include: the general nature of the structure involved, its size and configuration; the location of the structure on the site and its orientation; physical concomitants such as access roads, parking lots, and underground utilities, and the level of additional risk which the client assumed by virtue of limitations imposed upon the exploratory program. To help avoid costly problems, consult the geotechnical engineer to determine how any factors which change subsequent to the date of the report may affect its recommendations.

Unless your consulting geotechnical engineer indicates otherwise, *your geotechnical engineering report should not be used:*

- When the nature of the proposed structure is changed, for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one;
- when the size or configuration of the proposed structure is altered;
- when the location or orientation of the proposed structure is modified;
- when there is a change of ownership, or
- for application to an adjacent site.

Geotechnical engineers cannot accept responsibility for problems which may develop if they are not consulted after factors considered in their report's development have changed.

MOST GEOTECHNICAL "FINDINGS" ARE PROFESSIONAL ESTIMATES

Site exploration identifies actual subsurface conditions only at those points where samples are taken, when they are taken. Data derived through sampling and subsequent laboratory testing are extrapolated by geo-

technical engineers who then render an opinion about overall subsurface conditions, their likely reaction to proposed construction activity, and appropriate foundation design. Even under optimal circumstances actual conditions may differ from those inferred to exist, because no geotechnical engineer, no matter how qualified, and no subsurface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than a report indicates. Actual conditions in areas not sampled may differ from predictions. *Nothing can be done to prevent the unanticipated, but steps can be taken to help minimize their impact.* For this reason, *most experienced owners retain their geotechnical consultants through the construction stage, to identify variances, conduct additional tests which may be needed, and to recommend solutions to problems encountered on site.*

SUBSURFACE CONDITIONS CAN CHANGE

Subsurface conditions may be modified by constantly-changing natural forces. Because a geotechnical engineering report is based on conditions which existed at the time of subsurface exploration, *construction decisions should not be based on a geotechnical engineering report whose adequacy may have been affected by time.* Speak with the geotechnical consultant to learn if additional tests are advisable before construction starts.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes or ground-water fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical report. The geotechnical engineer should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

GEOTECHNICAL SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND PERSONS

Geotechnical engineers' reports are prepared to meet the specific needs of specific individuals. A report prepared for a consulting civil engineer may not be adequate for a construction contractor, or even some other consulting civil engineer. Unless indicated otherwise, this report was prepared expressly for the client involved and expressly for purposes indicated by the client. Use by any other persons for any purpose, or by the client for a different purpose, may result in problems. *No individual other than the client should apply this report for its intended purpose without first conferring with the geotechnical engineer. No person should apply this report for any purpose other than that originally contemplated without first conferring with the geotechnical engineer.*

DESIGN LEVEL GEOTECHNICAL INVESTIGATION

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DRAWING NOS. 1 and 2

APPENDIX A - FIELD AND LABORATORY INVESTIGATIONS

DESIGN LEVEL GEOTECHNICAL INVESTIGATION

INTRODUCTION

GENERAL AND PROJECT DESCRIPTION

This report presents the results of a design level geotechnical investigation for the proposed Clark County Department of Public Works Hiko Springs Wash Outfall, from the existing Hiko Springs Wash Detention Basin to the Needles Highway near the Colorado River in Laughlin, Nevada. A vicinity map showing the location of the proposed alignment within the Laughlin area is provided on Drawing No. 1.

We understand the project will consist of design and construction of approximately 2.25-miles of storm water transmission facility, either open channel or buried pipe of approximately 84 inch diameter, or equal capacity box culvert. It will begin at the Hiko Springs Wash Detention Basin and extend toward the south-southeast to Laughlin Bay. This report is for the geotechnical investigation for 1.5-miles of the outfall alignment from the Hiko Springs Wash Detention Basin to the Needles Highway.

Along the route, the pipeline/channel will cross beneath El Mirage Way and Needles Highway. We understand that the existing structures at El Mirage Way and Needles Highway will be retained if possible, and new water channeling, debris control, or other structures may be required at those road crossings. It is assumed the bottom of the pipe will be at a depth in the range of 10 to 15 feet over most of the route. It is assumed that pipe will consist of reinforced concrete or concrete lined welded steel pipe. In areas where open channel may be used, it is expected to be concrete lined and trapezoidal in shape.

SCOPE OF SERVICES

The scope of services for this investigation was outlined in our subcontract agreement dated February 11, 1997 and included the following tasks:

- A field exploration program was conducted which consisted of drilling 14 borings to depths of 20 feet. The approximate locations of the explorations are shown on the enclosed Drawing No. 2. Continuous logs of the soil conditions were recorded and samples were obtained during the field exploration

program and were taken to our laboratory for further evaluation and testing. Summaries of the subsurface conditions encountered are presented on the boring and test pit logs, Drawing Nos. A-1 through A-14, included in Appendix A.

- Laboratory tests were conducted on selected soil samples. Tests included moisture content and dry density, solubility, laboratory maximum density, grain size distribution, direct shear, Miller Box Resistivity and chemical analysis. The description and results of the laboratory tests are presented in Appendix A.
- This report was prepared to present the findings, conclusions and recommendations of our geotechnical and geological investigation regarding foundation design, bearing capacity, lateral earth pressures, and the control of other earthwork related features for the project.

SITE CONDITIONS

SITE DESCRIPTION

At the time of our field investigation, the alignment of the proposed outfall was located in the bottom of Hiko Springs Wash from the Hiko Springs Wash Detention Basin Dam to where Needles Highway crosses the wash. The wash drains from the dam south under Needles Highway and eventually to the Colorado River. The depth of the wash varies from approximately 30 feet near the dam to less than 5 feet near the Needles Highway crossing. The wash bottom, which varies in width from approximately 700 to 1,500 feet, was generally undisturbed and covered with sparse desert vegetation and scattered trash. An area of the wash extending north about 1,000 feet from the Needles Highway crossing had been rough graded and contoured. Several dirt roads and trails crisscrossed the wash. El Mirage Way crosses the wash about midway between the dam and Needles Highway by means of box culverts. The wash was bordered on the west by residential developments and on the east by commercial/retail stores and offices along Needles Highway.

SUBSURFACE CONDITIONS

The subsoils encountered by the borings at the site during this investigation generally consisted of loose poorly graded gravel with sand near the surface overlying medium dense to dense well graded sand with silt and gravel. The subsurface conditions encountered at the site are described in detail on the enclosed boring logs in Appendix A

A summary of the laboratory test results and soil is presented in Table No. 1. Complete laboratory data is presented in Appendix A.

Table No. 1: Summary of Laboratory Test Results and Soil Properties

<u>*Properties</u>	<u>Range of Results</u>
Solubility	0.1 to 1.0 percent
Water Soluble Sulfates	0.03 to 0.05 percent
Water Soluble Sodium Sulfates (chemical heave)	0.03 to 0.05 percent
Laboratory Maximum Density (ASTM D1557)	124 to 133 pcf
Plasticity Index	Non-Plastic
Dry Density	94 - 137 pcf

*The laboratory tests are described in detail in Appendix A.

Laboratory test results indicate that soils have moderate dry densities, a low degree of solubility, a low chemical (salt) heave potential, and contain sulfate salts in concentrations considered to be corrosive to metal and harmful to normal strength concrete.

The stratification lines shown on the enclosed boring logs represent the approximate boundary between soil types. The actual transition may be gradual. Due to the nature and depositional characteristics of the natural soils, care should be taken in interpolating subsurface conditions beyond the boring locations.

GROUNDWATER

Free groundwater was not observed in the exploratory borings to the maximum exploration depth of 20 feet. Based on our experience in the area, we do not anticipate that groundwater will significantly influence construction operations or performance of the proposed facilities.

GEOLOGIC AND SEISMIC CONDITIONS

GEOLOGIC SETTING

The proposed project lies in a section of the Basin and Range physiographic province within the Colorado River Basin. The Laughlin area is bounded by the lower fringes of the Newberry Mountains on the west, Lake Mead National Recreation Area on the north, and the Colorado River and Fort Mohave Indian Reservation on the east and south. Geologic features in the Laughlin area can be divided into three classifications; consolidated rocks, alluvial deposits, and fluvial (river/flood plain) deposits.

Bedrock in the Laughlin area is predominantly Precambrian granitic and metamorphic rocks with minor areas of Tertiary volcanic rocks. These units are exposed to the west, and in localized areas north and south of Laughlin. The depth to bedrock in the Laughlin area is considered related to the ancient topography which is now mostly buried by younger alluvial sequences of varying age.

The unconsolidated alluvial and fluvial deposits consist of alluvial fan deposits interbedded with former river terrace and floodplain deposits, as well as modern river floodplain deposits. The alluvial fan deposits are composed of coarse grained, moderately to poorly graded decomposed granitic sands and gravels derived from the Newberry Mountains. The former river deposits consist of finer-grained, moderately to poorly graded sands, silts and clays which also include coarser-grained channel sands, gravels, and cobbles. These older river and floodplain deposits are generally capped by wind-blown sand and may, in part, grade laterally into the alluvial fan deposits. They are locally interfingered with thin bedded, poorly-graded fine sand, silt, and clay probable lacustrine (lake bed) origin.

Modern river flood plain deposits, which immediately underlie and border the Colorado River, consist primarily of finer-grained, poorly graded river gravels, sands, silts, and clays. They are overlain by a thin layer of wind-blown silt and sand that exhibit some dune development.

Active wash deposits consisting of decomposed granitic sands and gravels with occasional pebble, cobble, and boulder-sized clasts can be found in the modern wash channels and are generally similar to the older alluvial fan deposits. Cemented deposits (caliche) are present on the tops of the terraces and bluffs and are occasionally found as widely scattered discontinuous thin lenses with alluvial fan deposits.

LOCAL FAULTING AND SEISMICITY

No bedrock or tectonic faults are known to transect the lakebed and alluvial deposits in the area of the proposed wash outfall.

Laughlin is located in Seismic Zone 2B as categorized by the Uniform Building Code. This represents a low to moderately active seismic area.

SITE EVALUATION

Based on the results of the field and laboratory investigations and geological evaluations, it is our opinion that the proposed route is suitable for the Hiko Springs Wash Outfall. The on-site soils encountered will consist of sands and gravels. The pipeline, reinforced box culvert, rectangular and trapezoidal concrete channels should receive adequate support when founded on medium dense to very dense granular soils or on properly placed and compacted structural fill. We anticipate that the uncemented soils may be excavated with conventional earth moving equipment. Partially to fully cemented soils were not encountered in the exploratory borings to the maximum exploration depth of 20 feet.

The following report sections present recommendations for pipeline channel bedding and backfill, design parameters including allowable bearing capacity, lateral earth pressures, coefficient of friction, drain and weephole requirements, requirements for fill and backfill material, and construction considerations including excavatability of on-site materials.

GEOTECHNICAL ANALYSIS AND RECOMMENDATIONS

GENERAL RECOMMENDATIONS

The design of the Hiko Springs Wash Outfall Channel should be performed in general accordance with the recommendations of *Hydrologic Criteria and Drainage Design Manual* of the Clark County Flood Control District, October 1990.

The proposed pipeline, trapezoidal channel, rectangular channel or RCBs may be supported by medium dense to very dense granular soils or on properly placed and compacted structural fill. Based on our test results, the native on-site soils generally meet the requirements of trench backfill and vertical wall backfill. Pipe and box bedding may possibly be produced from on site soils by processing.

SITE GRADING AND EARTHWORK RECOMMENDATIONS

Site and Subgrade Preparation

We recommend that all debris and surface vegetation together with roots to a depth of 6 to 12 inches below the existing grade should be removed. Organic and inorganic materials resulting from the clearing and grubbing operations shall be hauled away from the site. Any undocumented fill soils should be removed from the channel area and stockpiled for use as structural fill. Any loose or disturbed native soils should be scarified, moisture conditioned, and recompacted. When the loose or disturbed soil depth is greater than 1-foot, removal and stockpiling of the upper loose soils may be required to achieve the required compaction of all the loose soils down to medium dense to very dense granular soils or moderately hard to hard cemented soils.

The soils subgrade in all areas to receive fill should be scarified to a minimum depth of 6 inches, the soil moisture adjusted to within 2 percent of optimum moisture content, and compacted to at least 90 percent of the maximum laboratory density as determined by ASTM D1557.

Backfill Materials

Structural fill is defined as fill supporting or placed behind structures. Suitable materials obtained from the on-site soils or imported soils shall be used for struc-

tural fill or backfill materials. These materials may include poorly graded or well graded sand or silty sand with gravel or well graded sand with silt and gravel or properly sized fragments of cemented sand and gravel or caliche. Soils used as structural fill or backfill shall have the following characteristics:

1. Both imported and on-site fill materials should be free of organic matter, miscellaneous inorganic debris and inert rubble larger than 6 inches nominal size.
2. Imported fill soils should have a swell potential less than 2 percent after they have been processed and placed as structural fill. Swell potential is defined as the percent of vertical expansion of an air-dry soil when it is inundated with water and allowed to swell with a confining pressure of 60 psf.
3. Imported fill material should have less than 1.5 percent sulfate salts, if possible. If laboratory test results indicate import fill materials contain more than 1.5 percent sulfate salts, a concrete mix should be designed to resist the sulfate levels indicated by the laboratory test results.
4. On-site soils and any import materials should have a solubility less than 3 percent after it has been processed and placed as structural fill. Testing procedures are described in Appendix A.

Fill Placement and Compaction

All fill materials should be placed in approximately horizontal layers in maximum 9-inch loose layers. Each layer should be moisture conditioned to within 2 percent of optimum moisture content and compacted to at least 90 percent of the maximum dry density as determined by ASTM D1557.

Material Volume Changes

There will be material losses due to clearing and grubbing operations. Also, there will be shrinkage losses or swell when excavating and compacting the on-site, non-cemented soils. An estimated shrinkage factor of 5 to 15 percent is applicable for the natural surficial soils. A subsidence factor of 0.1 should be used in all areas where the native soils are scarified and recompactd to a depth of 6

inches. We recommend that the contractor verify these factors before and/or during construction.

STRUCTURE BACKFILL

Pipe or Pre-Cast Box Bedding and Zone Backfill

The trench bottom should be smooth, dry, and free of soft or hard spots, large rocks, and any foreign material. The undisturbed granular soils or properly placed backfill should provide suitable support for the proposed pipe or pre-cast box culvert. If the exposed native soils are loose sands, or soils disturbed by the trenching operations, the exposed soils should be densified prior to placing bedding material.

A granular bedding material should be used to level out the irregular trench bottom and to allow an easily-shaped bedding surface. The thickness of bedding material should be a minimum of 6 inches. The minimum permissible sidewall clearance between installed pipe or pre-cast box culvert and each trench wall is 12 inches. The pipe zone backfill should extend from the pipe bedding up to at least 12 inches above the top of the pipe.

The pipe and box bedding and pipe zone backfill should consist of *Type II Aggregate Base, Crushed Rock, or Sand Backfill*, as described in the *Uniform Standard Specifications for Public Works' Construction, Off-Site Improvements, Clark County Area, Nevada*, Third Edition, (USSPWC) Section 629.03.03, 208.03.02 and 208.03.03. *Type II Aggregate Base, Crushed Rock, and Sand Backfill* are described in the USSPWC Sections 208.02.04, 208.02.07, and 208.02.03, respectively. The pipe and box bedding and pipe zone materials should be densified to a minimum of 90 percent of the maximum dry density as determined by ASTM D1557.

Depending on the gradation of the materials obtained during the excavation process, it may be possible to process the material to obtain the desired gradations for pipe bedding and zone backfill.

Pipe or Box Trench Backfill

The trench backfill above the pipe or box zone should consist of on-site or imported soils that meet the requirements of *Granular Backfill, Selected Backfill*,

Slurry Cement Backfill as described in the USSPWC Section 629.03.04 and 208.03.03. *Granular Backfill*, *Selected Backfill*, and *Slurry Cement Backfill* are described in the USSPWC Sections 207.02.02, 207.02.01, and 208.02.06, respectively.

The trench backfill should be non-gypsiferous, have low corrosion potential and have material no larger than 3 inches. In those portions of the alignment within street right-of-ways, it is recommended that the trench backfill be placed as specified for paved areas in the USSPWC Section 208.03.03.

The results of grain size distribution tests on representative samples indicate that the native granular soils meet the requirements for *Selected Backfill* and *Granular Backfill* to be used for trench backfill material. Trench backfill should be placed and densified in lifts by mechanical methods up to the top of the trench.

Vertical Wall Backfill

Common backfill placed behind vertical walls should be similar to structural fill discussed in the *Earthwork* section of this report, with the following exceptions:

1. Backfill materials placed within 3 feet of the wall should have a maximum nominal size of 3 inches. Beyond 3 feet, the maximum nominal size should not exceed 6 inches.
2. Heavy, high-energy compaction equipment should not be used within 5 feet of the wall so that overstressing of the wall does not occur.
3. The backfill material should be moisture conditioned to within 2 percent of optimum moisture content and then densified to at least 90 percent of maximum dry density as determined by ASTM D1557. Overcompaction adjacent to walls should be avoided.

RECTANGULAR AND TRAPEZOIDAL CONCRETE CHANNELS

At this time it is unknown whether concrete rectangular or trapezoidal channels will be used for the Hiko Springs Wash Outfall. If they are used we have assumed that they will be between 9 to 12 feet deep with bottom widths on the

order of 12 to 34 feet and have side slopes ranging from vertical for the rectangular channel to 2:1 (horizontal to vertical) for the trapezoidal channel. We have assumed that the average design water depth will be at least 7 feet for a channel depth of about 9 feet or more.

To reduce the possibility of development of hydrostatic pressure behind the wall, 3-inch diameter weepholes should be installed in the wall near the bottom of the channel (about 3 to 9 inches from the channel bottom) at a center spacing of about 15 to 25 feet. The weepholes should be protected against clogging by using perforated PVC pipes embedded in on-site granular backfill or by other suitable means. The gravel bedding should be compacted to at least 90 percent of the maximum dry density as determined by ASTM D1557 at a moisture content within 2 percent of optimum. Backfill behind vertical walls of the channel or RCBs should be placed in accordance with the recommendations of the following section.

To ensure integrity of the concrete channel lining and to minimize seepage of surface water to the lining, a longitudinal cut-off should be provided at the top of the slope to a depth of at least 3 feet below the lining. This is done by providing a turned down edge to the lining at the top of the slope. To lengthen the seepage path and to reduce erosion/piping of the subgrade soils below the bottom of the concrete slab, a transverse concrete cut-off should be installed below the channel bottom at a maximum spacing of 90 feet. The cut-off should be at least 3 feet deep.

All concrete placement, curing and control joint spacing operations for the channel lining should be in accordance with American Concrete Institute (ACI) recommendations.

REINFORCED CONCRETE BOXES

It is recommended that subsurface walls for the reinforced concrete boxes be designed to resist lateral soil pressures as described in the *Lateral Earth Pressures* section of this report. Values presented in the *Lateral Earth Pressures* section assume that no hydrostatic pressures are to be allowed to build up behind the walls. The backfill placed behind the walls should consist of on-site granular

soils as described in the Vertical Wall section of this report. If hydrostatic pressures are to be allowed to buildup behind the walls of the RCBs, they should be designed to resist the lateral soil pressures shown in Figure No. 1. The cast-in-place reinforced concrete boxes should be placed on at least 6-inches of scarified and recompact native soils as described in the *Earthwork* section of this report. Pre-cast reinforced concrete boxes should be placed on a granular bedding material as described in *Pipe and Pre-Cast Box Bedding and Zone Backfill* section of this report.

LATERAL EARTH PRESSURES

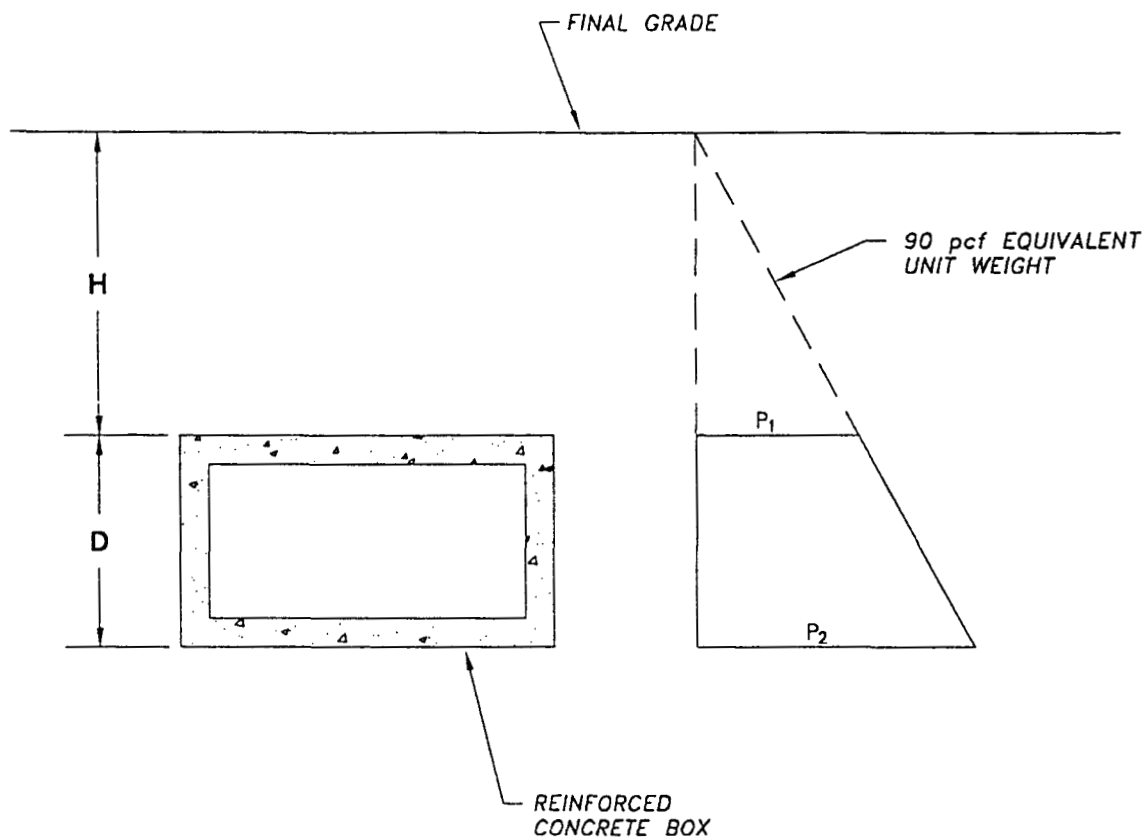
The rectangular channels and RCBs should be designed using the following lateral earth pressures, provided that no hydrostatic pressures are allowed to build behind the walls. Figure No. 1 should be used for the design of RCBs which will allow hydrostatic pressure.

Active Earth Pressure

The lateral earth pressure which will be imposed by compacted backfill, placed in accordance with our recommendations, on a cantilevered structure wall may be computed using an equivalent fluid pressure of 35 pounds per cubic foot. The pressure assumes that weepholes with perforated pipe and on-site granular backfill will be provided behind the wall and no hydrostatic pressures will develop behind the wall. This pressure also assumes the walls are free to move outward a slight amount (active pressure). A pressure coefficient of 0.28 should be used for surcharge loads above the structure wall. A unit weight of 130 pcf may be used for backfill above the wall (see Figure No. 2).

Active to At-Rest Earth Pressure

The lateral earth pressure which will be imposed by compacted backfill, placed in accordance with our recommendations, on a partially restrained structure wall may be computed using an equivalent fluid pressure of 45 pounds per cubic foot. The pressure assumes that weepholes with perforated pipe and on-site granular soils will be provided behind the wall and no hydrostatic pressures will develop behind the wall. A pressure coefficient of 0.36 should be used for surcharge loads above the structure wall. A unit weight of 130 pcf may be used for backfill above the wall (see Figure No. 2).



WHERE:

LATERAL EARTH PRESSURE, $P_1 = 90H$

LATERAL EARTH PRESSURE, $P_2 = 90(H+D)$

- NOTE:**
1. ALL PRESSURES ARE IN psf, ALL HEIGHTS ARE IN ft.
 2. THE PRESSURES ASSUME NO WEEP HOLES AND INCLUDES HYDROSTATIC PRESSURE.

LATERAL EARTH PRESSURES WITH HYDROSTATIC PRESSURE (NO WEEP HOLES)

HIKO SPRINGS WASH OUTFALL
 From Hiko Springs Detention Basin to Needles Highway
 Laughlin, Nevada

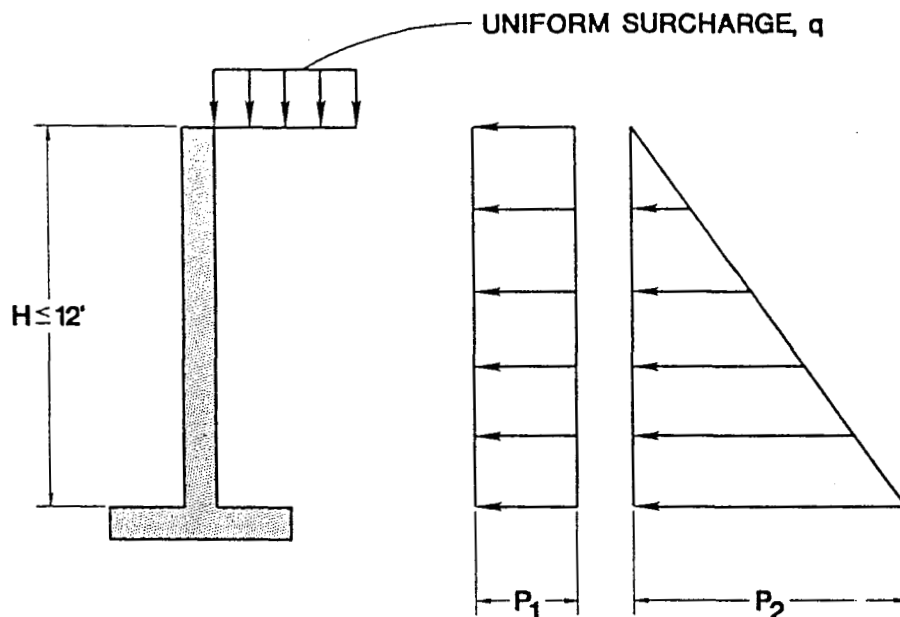
Scale N.T.S.
 Date 4/14/97
 Prepared by RJB
 Checked by EGG
 Approved by

File No. 746010f2
 Project No. 96-33746-01
 Figure No.



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TOTAL EARTH PRESSURE, P

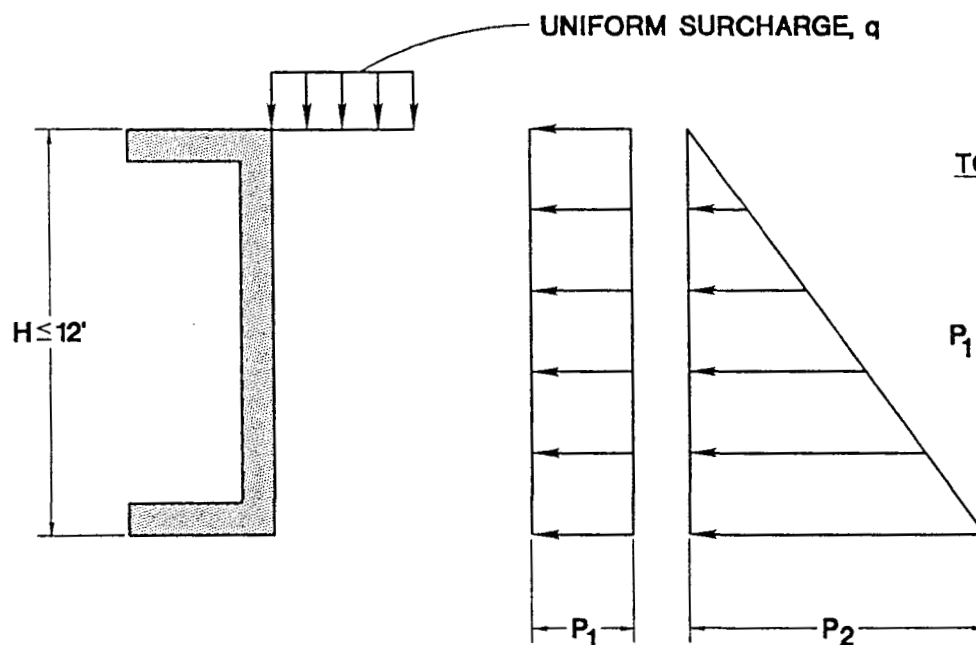
$$P = P_1 + P_2$$

WHERE

$$P_1 = 0.28q \text{ (Surcharge Pressure)}$$

$$P_2 = 35H$$

UNRESTRAINED SUBSURFACE WALL PRESSURES



TOTAL EARTH PRESSURE, P

$$P = P_1 + P_2$$

WHERE

$$P_1 = 0.36q \text{ (Surcharge Pressure)}$$

$$P_2 = 45H$$

RESTRAINED SUBSURFACE WALL PRESSURES

- NOTE:**
1. ALL PRESSURES ARE IN psf, ALL HEIGHTS ARE IN FEET
 2. ASSUMES WEEP HOLES WILL BE USED AND DOES NOT INCLUDE HYDROSTATIC PRESSURE

LATERAL EARTH PRESSURES WITHOUT HYDROSTATIC PRESSURES (WITH WEEP HOLES)

HIKO SPRINGS WASH OUTFALL
From Hiko Springs Detention Basin to Needles Highway
Laughlin, Nevada

Scale	N.T.S.	File No.	746010f3
Date	4/14/97	Project No.	96-33746-01
Prepared by	RJB	Figure No.	
Checked by	EGG		
Approved by			



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Coefficient of Friction

Horizontal loads may be resisted by friction at the base of the channel. The friction at the base may be computed using a coefficient of friction of 0.45 with respect to the normal dead load

PIPE OR BOX LOADS

The external loads that will be imposed on the buried pipe or box are dependent on the subsurface conditions, the type of pipe or box, width of trench, the height of soil above pipe or box, the method of placement, and backfill conditions. The effect of traffic loads on the pipeline or box should be considered for the portion of the alignment which extends beneath streets. Additional traffic loads should be added to the soil loads. A unit soil weight of 130 pcf should be used to calculate soil overburden pressures.

CONSTRUCTION CONSIDERATIONS

Excavatability of On-Site Materials

Based on observations made during our field observations and geological evaluation of the on-site materials, it is our opinion that the uncemented on-site soils can probably be excavated with conventional earth moving equipment.

Cemented soils were not encountered in the exploratory borings. Should they be encountered during construction one of the following three alternatives is recommended to minimize damaging differential settlement: (1) locate a control joint at the material change; (2) the cemented soils may be overexcavated by 6 to 9 inches and backfilled with structural fill; or (3) the uncemented soils may be overexcavated to expose the cemented soils and the overexcavation backfilled with lean concrete or *Type II Aggregate Base* material compacted to at least 90 percent of the maximum laboratory dry density as determined by ASTM D1557.

Temporary Excavation Stability

Based on observations made during our field investigation, temporary excavations in sands and gravels are not expected to stand vertically for depths greater than 4 feet. Therefore, any excavations over 4 feet in depth should be laid back to

safe slopes or properly shored. The excavations should be sloped back in accordance with the maximum allowable slope ratios presented in Appendix B to Subpart P of *Occupational Safety and Health Standards for the Construction Industry* (OSHA) 29 CFR, *State of Nevada, Division of Occupational Safety and Health*, Part 1926. The slopes of temporary excavations in the uncemented soils should be no steeper than 1 ½ horizontal to 1 vertical. The soil type definitions in Appendix A to Subpart P of OSHA 29 CFR, Part 1926 should be applied to soils encountered in the sides of excavations to determine maximum allowable slope ratios for the excavations.

Temporary excavations may be shored for sidewall support in place of sloping the sides. Shoring should be designed to accommodate adjacent traffic and surcharge loads and in accordance with Appendices C and D to Subpart P of OSHA 29 CFR, Part 1926. The soil type definitions in Appendix A to Subpart P of OSHA 29 CFR, Part 1926 should be applied to soils encountered in sides of excavations. Shoring should be designed by a registered engineer experienced in shoring design.

Surface drainage should be directed away from the top edge of the slope, by providing a berm. Surcharge loads such as construction equipment or stockpiled materials should not be placed within three feet of the top of slope. Traffic should be routed as far away from the excavation as practical during construction.

Safety during construction is the Contractor's responsibility. Contractors should meet the *Occupational Safety and Health Standards for the Construction Industry* (OSHA) 29 CFR, Part 1926, *State of Nevada, Division of Occupational Safety and Health, Subpart P - Excavations, Trenching, and Shoring*, Sections 1926:650 through 1926:653 for safety requirements during construction operations, as currently amended.

SOIL CORROSION

The on-site soils have water-soluble sulfate concentrations between 0.03 and 0.05 percent. The soils should be considered corrosive to buried metal and harmful to normal strength concrete. Consideration should be given to corrosion

protection systems for buried metal such as wrappings or coatings or the use of PVC where permitted by local building codes. All concrete in contact with Zone I or Zone II soils should contain one of the following concrete mixes:

Type of Cement	Minimum Sacks of Cement Per Cubic Yard	Maximum Water Cement (plus Fly Ash) Ratio
Type II and Fly Ash*	5.5	0.50
Type V	5.5**	0.53
Type V and Fly Ash*	5.5**	0.53

* Type F fly ash as defined in ASTM C628

** Cement to be removed and replaced with fly ash shall be 13% to 20% of the weight of cement. Fly ash added at the mixer shall be in a proportion of 1.2 minimum to the weight of cement removed.

CONSTRUCTION MONITORING

We recommend that all prepared subgrades be observed by a geotechnical engineer before placing of foundations and fills. All fills and other construction materials should be tested on a continuous basis during construction.

REVIEW OF PLANS AND SPECIFICATIONS

We recommend that the final plans and specification of the Hiko Springs Wash Outfall be reviewed by us to determine that they are in compliance with the assumptions and requirements of the geotechnical report.

CLOSURE

Our assumptions, conclusions, recommendations and opinions presented herein are: (1) based upon the geologic site evaluation; (2) based upon our evaluation and interpretation of the findings of the field exploration and laboratory programs; (3) based upon an interpolation of soil conditions between and extrapolation beyond the explored locations; (4) based on our geotechnical experience in the locale; (5) subject to confirmation of the conditions encountered during construction; and (6) prepared in accordance with generally accepted professional geotechnical engineering principles and practice. We make no other warranty, either express or implied.

It has been our pleasure to serve you on this project. If you have any questions, please contact this office.

Respectfully submitted,

CONVERSE CONSULTANTS

Larry H. Bogg

for Eric Giles, E.I.T.
Project Manager

Reviewed by:

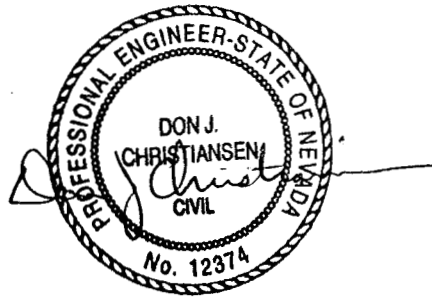
Don J. Christiansen

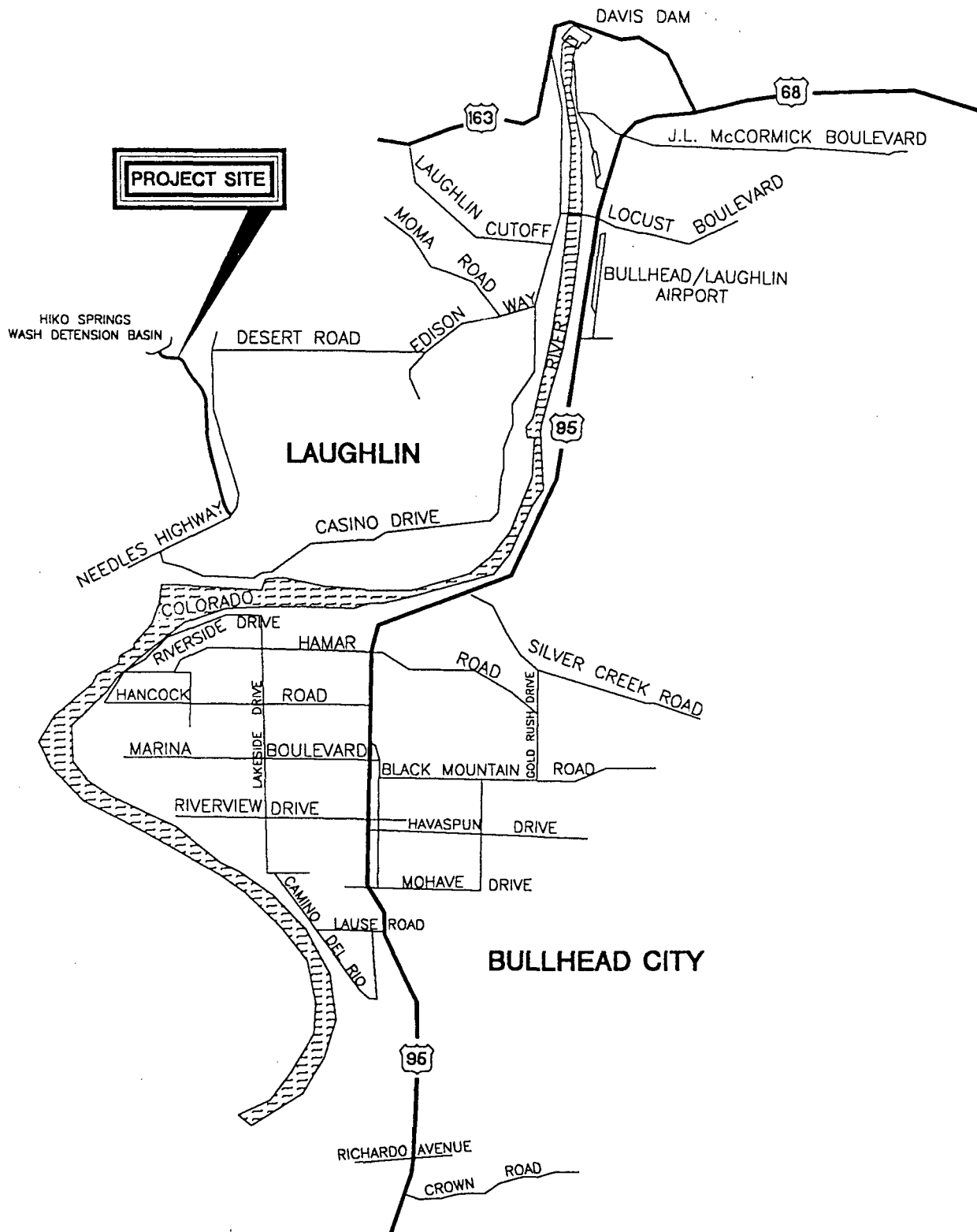
Don J. Christiansen, P.E.
Senior Engineer

DJC:EGG:gm
48/28G

Encl.: Drawing Nos. 1 through 4
Appendix A

Dist.: 8/Addressee





APPROX. SCALE: 1" = 5000'

LAUGHLIN / BULLHEAD CITY VICINITY

HIKO SPRINGS WASH OUTFALL
From Hiko Springs Detention Basin to Needles Highway
Laughlin, Nevada

Project No.

96-33746-01

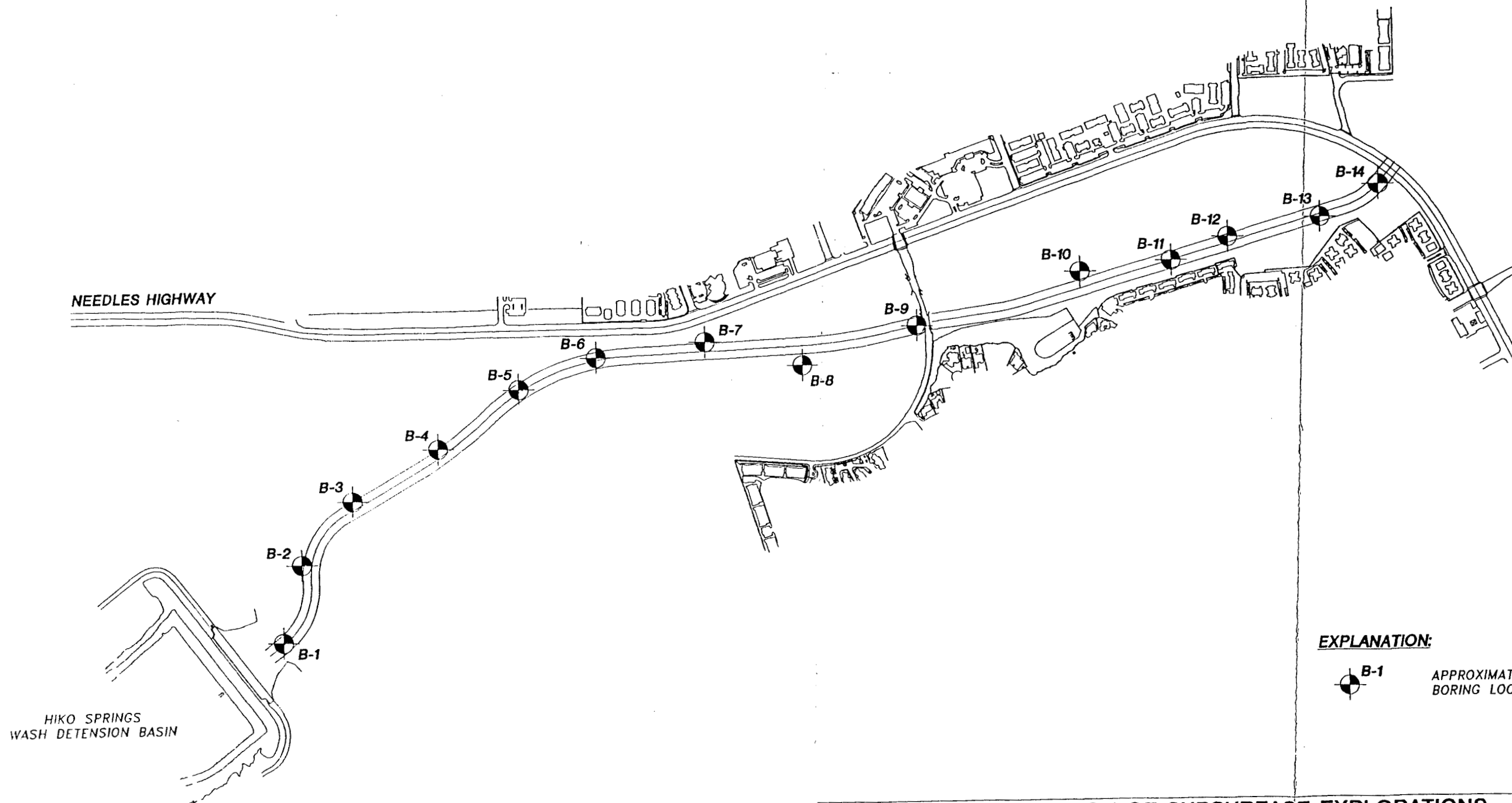


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Drawing No.

1



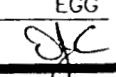
EXPLANATION:

 **B-1** APPROXIMATE SOIL BORING LOCATION

LOCATION OF SUBSURFACE EXPLORATIONS

HIKO SPRINGS WASH OUTFALL
From Hiko Springs Detention Basin to Needles Highway
Laughlin, Nevada

 **Converse Consultants Southwest, Inc.** Geotechnical Engineering and Applied Sciences

Scale	1" = 800'	File No.	74601002
Date	4/11/97	Project No.	96-33746-01
Prepared by	RJB	Drawing No.	2
Checked by	EGG		
Approved by			

FIELD AND LABORATORY INVESTIGATIONS

FIELD INVESTIGATION

The subsurface soil conditions were explored by drilling fourteen (14) exploratory borings to depths of approximately 20 feet. The approximate locations of the explorations are shown on Drawing No. 2. Continuous logs of the subsurface conditions as encountered in the explorations were recorded at the time of drilling by a field geologist. The subsurface conditions encountered were visually classified in accordance with ASTM D2488. Summaries of the subsurface conditions encountered are presented on the boring logs, Drawing Nos. A-1 through A-14. A key to soil symbols and terms is found on Drawing No. A-15. A summary of ASTM D2487, *Classification of Soils for Engineering Purposes* is presented on Drawing No. A-16.

Drilling was accomplished with a truck-mounted hollow stem auger drill rig equipped for soil sampling. Relatively undisturbed soil samples were obtained using a 2.4-inch inside diameter Converse sampler driven with a 140-pound hammer free-falling through a distance of 30 inches. Sampler driving resistance, expressed as blows per foot of penetration, is presented on the boring logs at the respective sampling depths. The sampled soil is retained in brass rings one inch in height which line the sampler. A representative portion of each sample was retained and carefully sealed in waterproof plastic containers for transport to the laboratory. Representative bulk samples of the surficial soils were retained in plastic bags for transport to the laboratory.

LABORATORY INVESTIGATION

Laboratory tests were conducted on representative soil samples for the purpose of classification, and determination of their physical properties and engineering characteristics. The amount and selection of the types of testing for a given study are based on the geotechnical conditions of the project. A summary of the various laboratory tests conducted for this project and the test results are presented as follows.

Moisture Content and Dry Density

Data obtained from these tests, performed on relatively undisturbed samples obtained from the field, were used in the classification and correlation of the soils and to provide qualitative information regarding soil strength and compressibility. Test results are presented on the boring logs on Drawing Nos. A-1 through A-14.

Solubility

Solubility tests were performed to determine the amount of water-soluble materials (principally gypsum) present in the soil. After drying the specimen weighing approximately 150 grams each in a 60-degree centigrade oven, about 2.0 liters of tap water was passed through the specimen. The soil was then oven-dried and the percent of soluble materials lost was calculated based on the initial dry weight of the specimen. The results of the solubility test are presented in the following table:

Exploration Location	Sample Depth (Feet)	Soil Description	Solubility (% by Unit Weight)
B-1	4	Sand with Gravel	0.2
B-3	14	Well Graded Sand with Gravel	0.2
B-5	14	Well Graded Sand with Silt	0.7
B-6	5-9	Well Graded Sand with Gravel	0.1
B-7	9	Well Graded Sand with Gravel	1.0
B-9	9	Well Graded Sand with Gravel	0.3
B-10	14	Well Graded Sand with Gravel	0.3
B-11	14	Well Graded Sand with Silt	0.3
B-13	4	Well Graded Sand with Gravel	0.2
B-14	9	Well Graded Sand with Gravel	0.2

Grain Size Distribution

Grain size distribution for 12 soil specimens was determined by sieve analysis in accordance with ASTM C136. Basically, a sieve analysis is conducted by passing the soil through a number of different sized sieves and measuring the amount of soils retained on each sieve. The test results are presented on Drawings A-17 through B-28 and in the following table for percent passing the 6, 3, 2 and 1 inch Sieves and Sieve Nos. 4, 16, and 200:

Sample Location	B-3	B-4	B-5	B-6	B-7	B-8	B-9	*Selected Backfill (SB)	*Granular Backfill (GB)	*Type I Aggregate Base 3 Inch
Depth (ft)	10-14	1-4	9-14	5-9	14-19	9-14	4-9			
Percent Passing Sieves										
6"	100	100	100	100	100	100	100	100		
3"	100	100	100	100	100	100	100	80-100	100	100
2"	100	100	100	100	100	100	100			90-100
1"	100	100	100	98	100	100	97			70-90
No. 4	77	87	87	84	81	82	74	35-100	35-100	30-65
No. 16	31	54	38	39	37	35	32		25-100	15-40
No. 200	6	18	6	7	7	8	7		0-15	2-12
**Plasticity	NP	NP	NP	NP	NP	NP	NP			
Meets *SB	Yes	Yes	Yes	Yes	Yes	Yes	Yes			
Meets *GB	Yes	Yes	Yes	Yes	Yes	Yes	Yes			
Meets	No	No	No	No	No	No	No			
*Type I										

Sample Location	B-10	B-11	B-12	B-13	B-14	*Selected Backfill (SB)	*Granular Backfill (GB)	*Type I Aggregate Base 3 Inch
Depth (ft)	6-9	2	12-16	4-9	1-4			
Percent Passing Sieves								
6"	100	100	100	100	100	100		
3"	100	100	100	100	100	80-100	100	100
2"	98	100	100	100	100			90-100
1"	97	100	100	100	100			70-90
No. 4	78	93	82	89	89	35-100	35-100	30-65
No. 16	32	46	37	45	47		25-100	15-40
No. 200	6	6	7	8	9		0-15	2-12
**Plasticity	NP	NP	NP	NP	NP			
Meets *SB	Yes	Yes	Yes	Yes	Yes			
Meets *GB	Yes	Yes	Yes	Yes	Yes			
Meets	No	No	No	No	No			
*Type I								

* Uniform Standard Specification for Public Works Construction Off-Site Improvements, Clark County Area, Nevada, Third Edition specifications as provided in Sections 207.02.01, 207.02.02 and 704.03.02, respectively.

**NP = Non Plastic

Miller Box Resistivity

Miller Soil Box tests were performed on selected samples to measure the resistivity of the soil as an indication of the relative ability of the soil to carry electrical current. A voltage is impressed between 2 outer electrodes and the resistance between 2 inner electrodes is measured using a Vibroground Model 293. Samples were tested in a saturated moisture condition. The test data are provided in the following table:

Exploration Location	Sample Depth (Feet)	Soil Description	Resistivity (ohm-cm)
B-3	10-14	Well Graded Sand with Gravel and Silt	> 13120
B-10	6-9	Well Graded Sand with Gravel and Silt	12595
B-11	14-18	Well Graded Sand with Silt	> 13120

Direct Shear Strength

A progressive direct shear test was performed on a remolded sample formed from the material in the bulk samples. The test specimen was trimmed and placed in the shear machine, a specified normal load was applied, and the specimen was sheared until a maximum shear strength was developed. After the soil specimen had developed maximum shear resistance under the first normal load, the normal load was removed and the specimen was pushed back to its original undeformed configuration. Another normal load was then applied, and the specimen was sheared a second time. This process was repeated for three different normal loads. Results of the direct shear test are presented in the following table:

Exploration Location	Depth (feet)	Soil Description	Angle of Internal Friction (deg)	Coulomb Cohesion (psf)
B-2	9	Well Graded Sand with Gravel	39	0
B-10	6-9	Well Graded Sand with Silt and Gravel	40	0
B-14	1-4	Well Graded Sand with Silt	40	0

Laboratory Maximum Density

A laboratory maximum density test was performed on a selected sample of the surficial granular soils. The purpose of the test was to define the compaction characteristics of these soils, and to aid in estimating soil shrinkage. The laboratory maximum density test was performed in general accordance with the ASTM D1557 test method. This test procedure uses 25 blow of a 10-pound hammer falling a height of 18 inches on each of five layers of soil in a 1/30 or 1/13 cubic foot cylinder. The test result are presented in Drawing Nos. A-29 through A-31 and on the following table:

Exploration Location	Depth (Feet)	Soil Description	Maximum Dry Unit Weight (pcf)	Optimum Moisture Content (percent) of dry weight)
B-4	1-4	Well Graded Sand with Gravel	133	6
B-6	5-9	Well Graded Sand with Gravel	124	8
B-12	12-16	Poorly Graded Gravel with Sand	130	7

Chemical Analysis

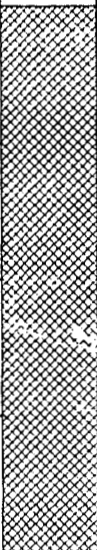
Chemical tests were performed on representative soil specimens to investigate the potential for soil corrosivity and chemical heave. The chemical analysis for water soluble sulfates, corrosivity, resistivity, and sodium was performed by Atlas Chemical Testing Laboratories, Inc. in Las Vegas, Nevada. The results of the chemical tests are presented on Drawing Nos. A-32 through A-37.

Log of Boring No. B-1

Date of Drilling: 3/4/97
Driller: D. Wilson
Logged By: C. Stringer

Location: See Drawing No. 2
Borehole Diameter: 5.125"
Groundwater Depth (ft): None Observed

Coordinates and Elevation: 62896.2 N, 47697.7 E, 992.1'
Equipment: Hollow Stem Auger
Driving Wt. and Drop: 140# Converse Sampler, 30"

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples		Blow Count	Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
			Drive	Bulk					
2		<u>FILL</u> : Gravel With Sand; loose, light brown, moist	▲		59				
4		--Sand With Gravel; medium dense, brown, moist	▲		65				
6			▲						
8			▲						
8		CONCRETE							
10		Refusal at 9.0'							
12									
14									
16									
18									

End of Exploration at 9.0'

 Converse Sampler (white symbol=no recovery)

 SPT Sampler (white symbol=no recovery)

HIKO SPRINGS WASH OUTFALL
From Hiko Springs Detention Basin to Needles Highway
Laughlin, Nevada

Project No.

96-33746-01



Converse Consultants

Geotechnical and Environmental
Engineering and Applied Science

Drawing No.

A-1

Log of Boring No. B-2

Date of Drilling: 3/4/97
Driller: D. Wilson
Logged By: C. Stringer

Location: See Drawing No. 2
Borehole Diameter: 5.125"
Groundwater Depth (ft): None Observed

Coordinates and Elevation: 62761.7 N, 48249.0 E, 973.3'
Equipment: Hollow Stem Auger
Driving Wt. and Drop: 140# Converse Sampler, 30"

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples		Blow Count	Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
			Drive	Bulk					
0		POORLY GRADED GRAVEL With Sand (GP); loose, brown, moist							
2		WELL GRADED SAND With Gravel (SW); loose, brown, moist ---medium dense	▲		29		3	106	
4		---medium dense, light brown	▲		57		2	104	Ch
6									
8									
10		WELL GRADED SAND With Silt and Gravel (SW-SM); medium dense, brown, moist	×		45				DS
12									
14		POORLY GRADED GRAVEL With Sand (GP); medium dense, brown, moist	▲		50		1	94	
16		WELL GRADED SAND With Gravel and Silt (SW-SM); medium dense, brown, moist							
18			×		18				
End of Exploration at 20.0'									



Converse Sampler (white symbol=no recovery)



SPT Sampler (white symbol=no recovery)

HIKO SPRINGS WASH OUTFALL
From Hiko Springs Detention Basin to Needles Highway
Laughlin, Nevada

Project No.

96-33746-01



Converse Consultants

Geotechnical and Environmental
Engineering and Applied Science

Drawing No.

A-2

Log of Boring No. B-3

Date of Drilling: 3/4/97
 Driller: D. Wilson
 Logged By: C. Stringer

Location: See Drawing No. 2
 Borehole Diameter: 5.125"
 Groundwater Depth (ft): None Observed

Coordinates and Elevation: 62393.8 N, 48694.6 E, 956.4'
 Equipment: Hollow Stem Auger
 Driving Wt. and Drop: 140# Converse Sampler, 30"

DRAFTED BY RJB

APPROVED BY C ON 6-18-97

SUMMARY OF SUBSURFACE CONDITIONS

This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.

Samples

Depth (ft)	Graphic Log		Drive	Bulk	Blow Count	Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
WELL GRADED SAND With Gravel and Silt (SW-SM); few boulders, loose, brown, moist									
2		---medium dense	X	X	30				
4		---light brown	X		28				
10		WELL GRADED SAND With Silt and Gravel (SW-SM); medium dense, light brown, moist	X	X	61				
14		---trace clay, loose	X		23		2	107	Sol
18			X		30				

End of Exploration at 20.0'

 Converse Sampler (white symbol=no recovery)

 SPT Sampler (white symbol=no recovery)

HIKO SPRINGS WASH OUTFALL
 From Hiko Springs Detention Basin to Needles Highway
 Laughlin, Nevada

Project No.

96-33746-01



Converse Consultants

Geotechnical and Environmental
 Engineering and Applied Science

Drawing No.

A-3

Log of Boring No. B-4

Date of Drilling: 3/4/97
 Driller: D. Wilson
 Logged By: C. Stringer

Location: See Drawing No. 2
 Borehole Diameter: 5.125"
 Groundwater Depth (ft): None Observed

Coordinates and Elevation: 61782.2 N, 49060.6 E, 927.0'
 Equipment: Hollow Stem Auger
 Driving Wt. and Drop: 140# Converse Sampler, 30"

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples		Blow Count	Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
			Drive	Bulk					
0		POORLY GRADED GRAVEL With Sand (GP); loose, brown, moist							
2		SILTY SAND With Gravel (SM); medium dense, brown, moist			45				G;Ch P
4		WELL GRADED SAND With Gravel and Silt (SW-SM); medium dense, light brown, moist			54				
6									
8									
10					49				
12									
14					60				
16		---few boulders							
18									
20		POORLY GRADED GRAVEL With Sand (GP); medium dense, light brown, moist			55				

End of Exploration at 20.0'

Converse Sampler (white symbol=no recovery)

SPT Sampler (white symbol=no recovery)

HIKO SPRINGS WASH OUTFALL
 From Hiko Springs Detention Basin to Needles Highway
 Laughlin, Nevada

Project No.

96-33746-01



Converse Consultants

Geotechnical and Environmental
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Drawing No.

A-4

Log of Boring No. B-5

Date of Drilling: 3/4/97
Driller: D. Wilson
Logged By: C. Stringer

Location: See Drawing No. 2
Borehole Diameter: 5.125"
Groundwater Depth (ft): None Observed

Coordinates and Elevation: 61206.3 N, 49476.7 E, 897.0'
Equipment: Hollow Stem Auger
Driving Wt. and Drop: 140# Converse Sampler, 30"

DRAFTED BY RTB

6-18-97

APPROVED BY JC ON

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples			Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
			Drive	Bulk	Blow Count				
0 - 1		POORLY GRADED GRAVEL With Sand (GP); loose, brown, moist							
1 - 2		WELL GRADED SAND With Gravel (SW); medium dense, brown, moist			43		1	116	
2 - 4		WELL GRADED SAND With Gravel and Silt (SW-SM); medium dense, light brown, moist							
4 - 8		WELL GRADED SAND With Silt (SW); few gravel, medium dense, light brown, moist			26				
8 - 14		WELL GRADED SAND With Silt (SW); few gravel, medium dense, light brown, moist			23				G
14 - 16		WELL GRADED SAND With Silt (SW); few gravel, medium dense, light brown, moist			40		2	137	Sol
16 - 18		WELL GRADED SAND With Silt (SW); few gravel, medium dense, light brown, moist			41		3	115	

End of Exploration at 20.0'

Converse Sampler (white symbol=no recovery)

SPT Sampler (white symbol=no recovery)

HIKO SPRINGS WASH OUTFALL
From Hiko Springs Detention Basin to Needles Highway
Laughlin, Nevada

Project No.

96-33746-01

Drawing No.

A-5



Converse Consultants

Geotechnical and Environmental
Engineering and Applied Science

Log of Boring No. B-6

Date of Drilling: 3/4/97
 Driller: D. Wilson
 Logged By: C. Stringer

Location: See Drawing No. 2
 Borehole Diameter: 5.125"
 Groundwater Depth (ft): None Observed

Coordinates and Elevation: 60658.4 N, 49692.9 E, 869.5'
 Equipment: Hollow Stem Auger
 Driving Wt. and Drop: 140# Converse Sampler, 30"

DRAFTED BY RJB	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples		Blow Count	Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk					
APPROVED BY <i>gjc</i> ON 6-18-97			WELL GRADED SAND With Gravel and Silt (SW-SM); loose, brown, moist	▲		45		4	117	Sol;G P
	2		WELL GRADED SAND With Silt and Gravel (SW-SM); medium dense, brown, moist	▲						
	4		---loose	⊗	⊗	14				
	10			⊗		27				
	14			▲		52		2	116	
	18			⊗		33				
End of Exploration at 20.0'				⊗ Converse Sampler (white symbol=no recovery)		⬛ SPT Sampler (white symbol=no recovery)				

HIKO SPRINGS WASH OUTFALL
 From Hiko Springs Detention Basin to Needles Highway
 Laughlin, Nevada

Project No.

96-33746-01



Converse Consultants

Geotechnical and Environmental
 Engineering and Applied Science

Drawing No.

A-6

Log of Boring No. B-7

Date of Drilling: 3/1/97
Driller: D. Wilson
Logged By: C. Stringer

Location: See Drawing No. 2
Borehole Diameter: 5.125"
Groundwater Depth (ft): None Observed

Coordinates and Elevation: 59887.2 N, 49789.8 E, 838.8'
Equipment: Hollow Stem Auger
Driving Wt. and Drop: 140# Converse Sampler, 30"

DRAFTED BY RJB	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples		Blow Count	Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk					
			POORLY GRADED GRAVEL With Sand (GP); loose, brown, moist							
	2		WELL GRADED SAND With Gravel (SW); loose, brown, moist	X		24				
	4			X		44		2	114	
	6		WELL GRADED SAND With Gravel and Silt (SW-SM); medium dense, light brown, slightly moist							
	10		WELL GRADED SAND With Silt and Gravel (SW-SM); medium dense, light brown, moist	X		67		1	110	Sol
	14			X		38				
	18			X		40		1	113	G;Ch
End of Exploration at 20.0'										



Converse Sampler (white symbol=no recovery)



SPT Sampler (white symbol=no recovery)

HIKO SPRINGS WASH OUTFALL
From Hiko Springs Detention Basin to Needles Highway
Laughlin, Nevada

Project No.

96-33746-01



Converse Consultants

Geotechnical and Environmental
Engineering and Applied Science

Drawing No.

A-7

Log of Boring No. B- 8

Date of Drilling: 3/4/97
Driller: D. Wilson
Logged By: C. Stringer

Location: See Drawing No. 2
Borehole Diameter: 5.125"
Groundwater Depth (ft): None Observed

Coordinates and Elevation: 59194.9 N, 49617.2 E, 808.7'
Equipment: Hollow Stem Auger
Driving Wt. and Drop: 140# Converse Sampler, 30"

DRAFTED BY RJB	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples		Blow Count	Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk					
APPROVED BY <i>RJC</i> ON 6-18-97	0		POORLY GRADED GRAVEL With Sand (GP); few boulders, loose, brown, moist							
	2		WELL GRADED SAND With Gravel (SW); medium dense, brown, moist	▲		35				
	4			⊗	⊗	48				
	6									
	8		WELL GRADED SAND With Silt and Gravel (SW-SM); medium dense, light brown, slightly moist	⊗	⊗	35				
	10									
	12									
	14		---moist	⊗	⊗	30				
	16									
	18			⊗		51				
	20		End of Exploration at 20.0'	⊗						



Converse Sampler (white symbol=no recovery)



SPT Sampler (white symbol=no recovery)

HIKO SPRINGS WASH OUTFALL
From Hiko Springs Detention Basin to Needles Highway
Laughlin, Nevada

Project No.

96-33746-01



Converse Consultants

Geotechnical and Environmental
Engineering and Applied Science

Drawing No.

A-8

Log of Boring No. B-9

Date of Drilling: 3/4/97
Driller: D. Wilson
Logged By: C. Stringer

Location: See Drawing No. 2
Borehole Diameter: 5.125"
Groundwater Depth (ft): None Observed

Coordinates and Elevation: 58368.3 N, 49885.1 E, 772.1'
Equipment: Hollow Stem Auger
Driving Wt. and Drop: 140# Converse Sampler, 30"

DRAFTED BY RJTB	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples		Blow Count	Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk					
	0		POORLY GRADED GRAVEL With Sand (GP); few boulders, loose, light brown, moist			31				
	2		CLAYEY GRAVEL With Sand (GC); medium dense, brown, moist			32				
	4		WELL GRADED SAND With Silt and Gravel (SW-SM); medium dense, brown, moist			32		1	106	
	6									G:R DS
	8									
	10					38		2	110	Sol
	12									
	14		WELL GRADED SAND With Gravel (SW); loose, light brown, moist			21				
	16									
	18					17				
End of Exploration at 20.0'										



Converse Sampler (white symbol=no recovery)



SPT Sampler (white symbol=no recovery)

HIKO SPRINGS WASH OUTFALL
From Hiko Springs Detention Basin to Needles Highway
Laughlin, Nevada

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Converse Consultants

Geotechnical and Environmental
Engineering and Applied Science

Drawing No.

A-9

Log of Boring No. B-10

Date of Drilling: 3/5/97

Driller: D. Wilson

Logged By: C. Stringer

Location: See Drawing No. 2

Borehole Diameter: 5.125"

Groundwater Depth (ft): None Observed

Coordinates and Elevation: 57212.1 N, 50254.4 E, 722.4'

Equipment: Hollow Stem Auger

Driving Wt. and Drop: 140# Converse Sampler, 30"

DRAFTED BY RJB

APPROVED BY J/C ON 6-18-97

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples			Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
			Drive	Bulk	Blow Count				
0 - 2		POORLY GRADED GRAVEL With Sand (GP); loose, brown, moist			52				
2 - 4		POORLY GRADED SAND (SP); medium dense, brown, moist							
4 - 6		WELL GRADED SAND With Silt and Gravel (SW-SM); medium dense, brown, slightly moist			28				
6 - 8		WELL GRADED SAND With Gravel (SW); medium dense, light brown, moist							
8 - 10		---loose, light brown, slightly moist			32		5	114	G;R DS Ch
10 - 12		WELL GRADED SAND With Gravel (SW); medium dense, light brown, moist							
12 - 14		---loose			12		2	104	Sol
14 - 16		WELL GRADED SAND With Gravel (SW); medium dense, light brown, moist							
16 - 18		---loose			17				
18 - 20		---loose							

End of Exploration at 20.0'

Converse Sampler (white symbol=no recovery)

SPT Sampler (white symbol=no recovery)

HIKO SPRINGS WASH OUTFALL
From Hiko Springs Detention Basin to Needles Highway
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Converse Consultants

Geotechnical and Environmental
Engineering and Applied Science

Drawing No.

A-10

Log of Boring No. B-11

Date of Drilling: 3/5/97
 Driller: D. Wilson
 Logged By: C. Stringer

Location: See Drawing No. 2
 Borehole Diameter: 5.125"
 Groundwater Depth (ft): None Observed

Coordinates and Elevation: 36568.2 N. 50329.1 E. 695.0'
 Equipment: Hollow Stem Auger
 Driving Wt. and Drop: 140# Converse Sampler, 30"

DRAFTED BY RJB	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples		Blow Count	Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk					
			POORLY GRADED GRAVEL With Sand (GP); loose, brown, moist							
	2		WELL GRADED SAND With Silt (SW-SM); medium dense, brown, moist			33		3	108	G
	4		WELL GRADED SAND With Gravel and Silt (SW-SM); medium dense, brown, moist			34				
	6									
	8									
	10					37		1	101	
	12		SILTY SAND With Gravel (SM); medium dense, brown, moist							
	14		WELL GRADED SAND With Silt (SW-SM); medium dense, brown, moist			35		2	108	Sol
	16									R
	18					35				
End of Exploration at 20.0'										



Converse Sampler (white symbol=no recovery)



SPT Sampler (white symbol=no recovery)

HIKO SPRINGS WASH OUTFALL
 From Hiko Springs Detention Basin to Needles Highway
 Laughlin, Nevada

Project No.

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Converse Consultants

Geotechnical and Environmental
 Engineering and Applied Science

Drawing No.

A-11

Log of Boring No. B-12

Date of Drilling: 3/5/97
 Driller: D. Wilson
 Logged By: C. Stringer

Location: See Drawing No. 2
 Borehole Diameter: 5.125"
 Groundwater Depth (ft): None Observed

Coordinates and Elevation: 56163.0 N, 50494.2 E, 677.0'
 Equipment: Hollow Stem Auger
 Driving Wt. and Drop: 140# Converse Sampler, 30"

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples		Blow Count	Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
			Drive	Bulk					
0 - 2		POORLY GRADED GRAVEL With Sand (GP); few cobbles and boulders, medium dense, brown, moist							
2 - 4		WELL GRADED SAND With Gravel (SW); medium dense, brown, moist			43				
4 - 12		---light brown			29		1	108	
12 - 14		WELL GRADED SAND With Silt and Gravel (SW-SM); medium dense, light brown, moist			34				
14 - 16					42				
16 - 18					32				
18 - 20									

End of Exploration at 20.0'

Converse Sampler (white symbol=no recovery)

SPT Sampler (white symbol=no recovery)

HIKO SPRINGS WASH OUTFALL
 From Hiko Springs Detention Basin to Needles Highway
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Converse Consultants

Geotechnical and Environmental
 Engineering and Applied Science

Drawing No.

A-12

Log of Boring No. B-13

Date of Drilling: 3/5/97
Driller: D. Wilson
Logged By: C. Stringer

Location: See Drawing No. 2
Borehole Diameter: 5.125"
Groundwater Depth (ft): None Observed

Coordinates and Elevation: 55499.5 N. 50627.0 E. 647.4'
Equipment: Hollow Stem Auger
Driving Wt. and Drop: 140# Converse Sampler, 30"

DRAFTED BY RJB	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples			Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk	Blow Count				
	0		WELL GRADED SAND With Silt and Gravel (SW-SM); loose, brown, moist							
	2		---medium dense	X		20				
	4			X		24		2	113	Sol
	6		---few boulders							
	8		POORLY GRADED GRAVEL With Sand (GP); medium dense, brown, moist							
	10		WELL GRADED SAND With Gravel and Silt (SW-SM); medium dense, brown, moist	X		28				
	12									
	14		---light brown	X		25		2	110	
	16									
	18			X		20				
	20		End of Exploration at 20.0'							



Converse Sampler (white symbol=no recovery)



SPT Sampler (white symbol=no recovery)

HIKO SPRINGS WASH OUTFALL
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Converse Consultants

Geotechnical and Environmental
Engineering and Applied Science

Drawing No.

A-13

Log of Boring No. B-14

Date of Drilling: 3/5/97
Driller: D. Wilson
Logged By: C. Stringer

Location: See Drawing No. 2
Borehole Diameter: 5.125"
Groundwater Depth (ft): None Observed

Coordinates and Elevation: 55083.0 N, 50859.2 E, 622.9'
Equipment: Hollow Stem Auger
Driving Wt. and Drop: 140# Converse Sampler, 30"

DRAFTED BY RJB	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples		Blow Count	Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk					
			FILL: GRAVEL With Sand; loose, brown, slightly moist							
			WELL GRADED SAND With Silt and Gravel (SW-SM); medium dense, brown, moist							
	2			▲	■	36				
	4			▲	■	33		3		
	6									
	8									
	10			▲		51		2	110	Sol
	12									
	14		---loose, light brown	⊗		35				
	16									
	18			▲		25		1	108	
	20		End of Exploration at 20.0'	⊗						



Converse Sampler (white symbol=no recovery)



SPT Sampler (white symbol=no recovery)

HIKO SPRINGS WASH OUTFALL
From Hiko Springs Detention Basin to Needles Highway
Laughlin, Nevada

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96-33746-01



Converse Consultants

Geotechnical and Environmental
Engineering and Applied Science

Drawing No.

A-14

KEY TO SOILS SYMBOLS AND TERMS

Terms used in this report for describing soils according to their texture or grain size distributions are generally in accordance with the UNIFIED SOILS CLASSIFICATION SYSTEM.

TERMS DESCRIBING CONDITION, CONSISTENCY AND HARDNESS

COARSE GRAINED SOILS (major retained on No. 200 sieve): includes (1) clean gravels, (2) silty or clayey gravels and (3) silty, clayey or gravelly sands. Consistency is rated according to relative density, as determined by laboratory tests.

Descriptive Term	Relative Density
very loose	0 to 15%
loose	15 to 40%
medium dense	40 to 70%
dense	70 to 85%
very dense	85 to 100%

FINE GRAINED SOILS (major portion passing No. 200 sieve): includes (1) inorganic and organic silts and clays, (2) gravelly, silty or sandy clays, and (3) clayey silts. Consistency is rated according to shearing strength as indicated by penetrometer readings or by direct shear tests.

Descriptive Term	Shear Strength (ksf)
very soft	less than 0.25
soft	0.25 to 0.50
firm	0.50 to 1.00
stiff	1.00 to 2.00
very stiff	2.00 to 4.00
hard	4.00 and up

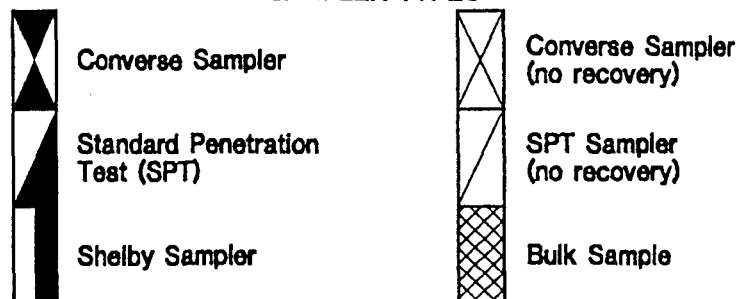
ROCK: includes gravels, cobbles, rock, caliche and bedrock materials. Hardness is related to field identification procedures described below.

Descriptive Term	Criteria
soft	Can be dug by hand and crushed by fingers.
moderately hard	Friable, can be gouged deeply with knife and will crumble readily under light hammer blows.
hard	Knife scratch leaves dust trace, will withstand a few hammer blows before breaking.
very hard	Scratched with knife with difficulty, difficult to break with hammer blows.

LEGEND OF LABORATORY TESTS

A	Liquid & Plastic limits	G	Grain	R	Resistivity
C	Consolidation	H	Horticultural Tests	S	Swell
Ch	Chemical	N	Chemical Heave	Sol	Solubility
Disp	Dispersion	pp	Unconfined compressive strength in tsf from	T	Triaxial
DR	Drill Rate sec./ft.		pocket penetrometer	UU	Unconsolidated, Undrained
DS	Direct Shear	P	Compaction		

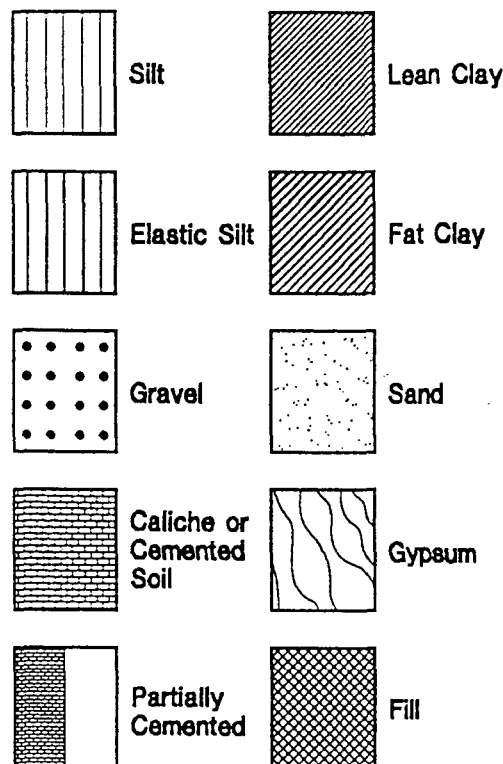
SAMPLER TYPES



SIZE PROPORTIONS

Designation	Percent by Weight
trace	0 to 5
few	5 to 10
little	15 to 25
some	30 to 45

SOIL TYPE GRAPHIC KEY

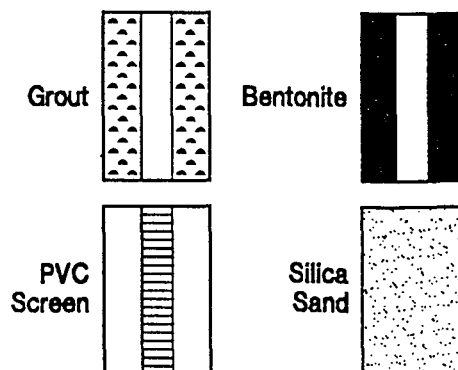


SOIL MOISTURE

From low to high the soil moisture is indicated by:

dry
slightly moist
moist
very moist
wet

WELL DESIGN GRAPHIC KEY



CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES

ASTM Designation: D 2487 - 93
(ASTM version of Unified Soil Classification System)

Criteria for Assigning Group Symbols and Group Names using Laboratory Tests ^a				Soil Classification				
				Group Symbol	Group Name ^b			
COARSE-GRAINED SOILS More than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on #4 sieve	Clean Gravels Less than 5% fines ^c	$Cu \geq 4$ and $1 \leq Cc \leq 3$ ^e	GW	Well-graded gravel ^f			
			$Cu < 4$ and/or $Cc < 1$ or $Cc > 3$ ^e	GP	Poorly graded gravel ^f			
		Gravels with Fines More than 12% fines ^c	Fines classify as ML or MH	GM	Silty gravel ^{f,g,h}			
			Fines classify as CL or CH	GC	Clayey gravel ^{f,g,h}			
	Sands 50% or more of coarse fraction passes #4 sieve	Clean Sands Less than 5% fines ^d	$Cu \geq 6$ and $1 \leq Cc \leq 3$ ^e	SW	Well-graded sand ⁱ			
			$Cu < 6$ and/or $Cc < 1$ or $Cc > 3$ ^e	SP	Poorly graded sand ⁱ			
		Sands with Fines More than 12% fines ^d	Fines classify as ML or MH	SM	Silty sand ^{g,h,i}			
			Fines classify as CL or CH	SC	Clayey sand ^{g,h,i}			
			FINE-GRAINED SOILS 50% or more passes the No. 200 sieve	Silts and Clays Liquid limit less than 50	Inorganic	PI > 7 and plots on or above "A" line ^j	CL	Lean clay ^{k,l,m}
						PI < 4 or plots below "A" line ^j	ML	Silt ^{k,l,m}
Organic	Liquid limit - oven dried Liquid limit - not dried < 0.75	OL			Organic clay ^{k,l,m,n} Organic silt ^{k,l,m,o}			
	Silts and Clays Liquid limit 50 or more	Inorganic			PI plots on or above "A" line	CH	Fat clay ^{k,l,m}	
PI plots below "A" line					MH	Elastic silt ^{k,l,m}		
Organic		Liquid limit - oven dried Liquid limit - not dried < 0.75			OH	Organic clay ^{k,l,m,p} Organic silt ^{k,l,m,q}		
		HIGHLY ORGANIC SOILS		Primarily organic matter, dark in color, and organic odor		PT	Peat	

a Based on the material passing the 3-in. (75-mm) sieve.

b If field sample contained cobbles or boulders, or both, add "with cobbles" or "with boulders", or both to group name.

c GW-GM well graded gravel with silt
GW-GC well graded gravel with clay
GP-GM poorly graded gravel with silt
GP-GC poorly graded gravel with clay

d Sands with 5-12% fines require dual symbols:
SW-SM well graded sand with silt
SW-SC well graded sand with clay
SP-SM poorly graded sand with silt
SP-SC poorly graded sand with clay

$$e \quad Cu = \frac{D_{60}}{D_{10}} \quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$

f If soil contains $\geq 15\%$ sand, add "with sand" to group name.

g If fines classify as CL-ML, use dual symbol GC-GM or SC-SM.

h If fines are organic, add "with organic fines" to group name.

i If soil contains $\geq 15\%$ gravel, add "with gravel" to group name.

j If Atterberg limits plot in hatched area, soil is a CL-ML silty clay.

k If soil contains 15-29% plus No. 200, add "with sand" or "with gravel", whichever is predominant.

l If soil contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.

m If soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

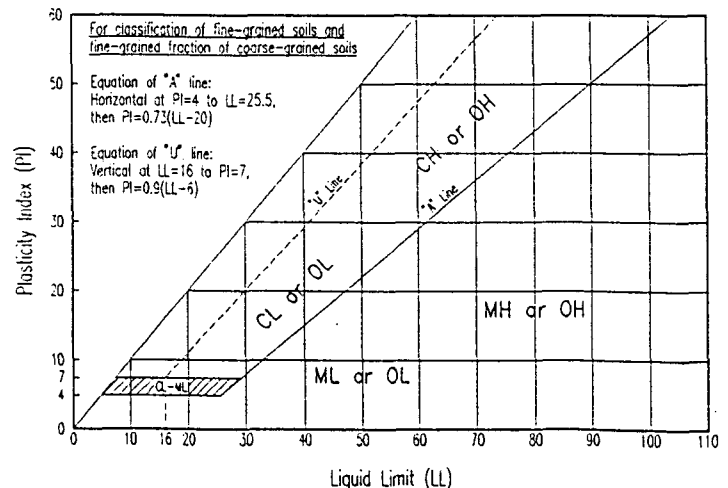
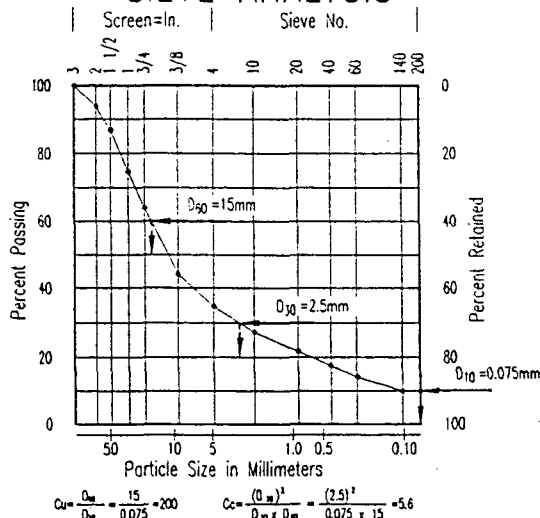
n PI ≥ 4 and plots on or above "A" line

o PI < 4 or plots below "A" line

p PI plots on or above "A" line

q PI plots below "A" line

SIEVE ANALYSIS



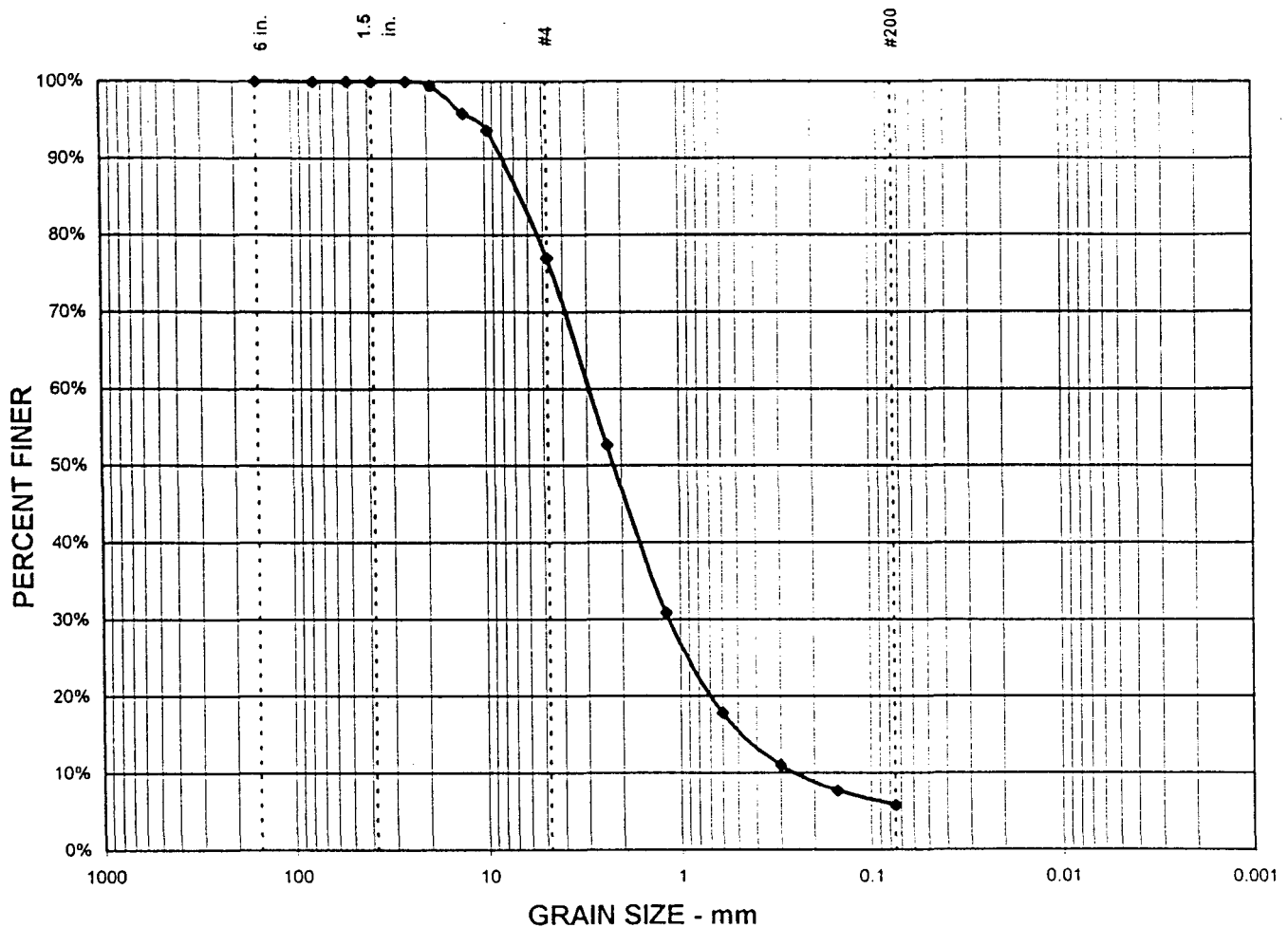
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Geotechnical Engineering
and Applied Science

Drawing No.

A-16

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY

% GRAVEL =	23%	$D_{85} = 6.6$	$D_{15} = 0.5$
% SAND =	71%	$D_{60} = 2.9$	$D_{10} = 0.2$
% SILT & CLAY =	6%	$D_{50} = 2.2$	$C_u = 12.0$
		$D_{30} = 1.1$	$C_c = 1.8$

Project No.: 96-33746-01

Project Name: HIKO SPRINGS

Date: 18-Mar-97

Location: B-3

Depth: 10-14

Material Description: WELLGRADED SAND with SILT and GRAVEL (SW-SM)

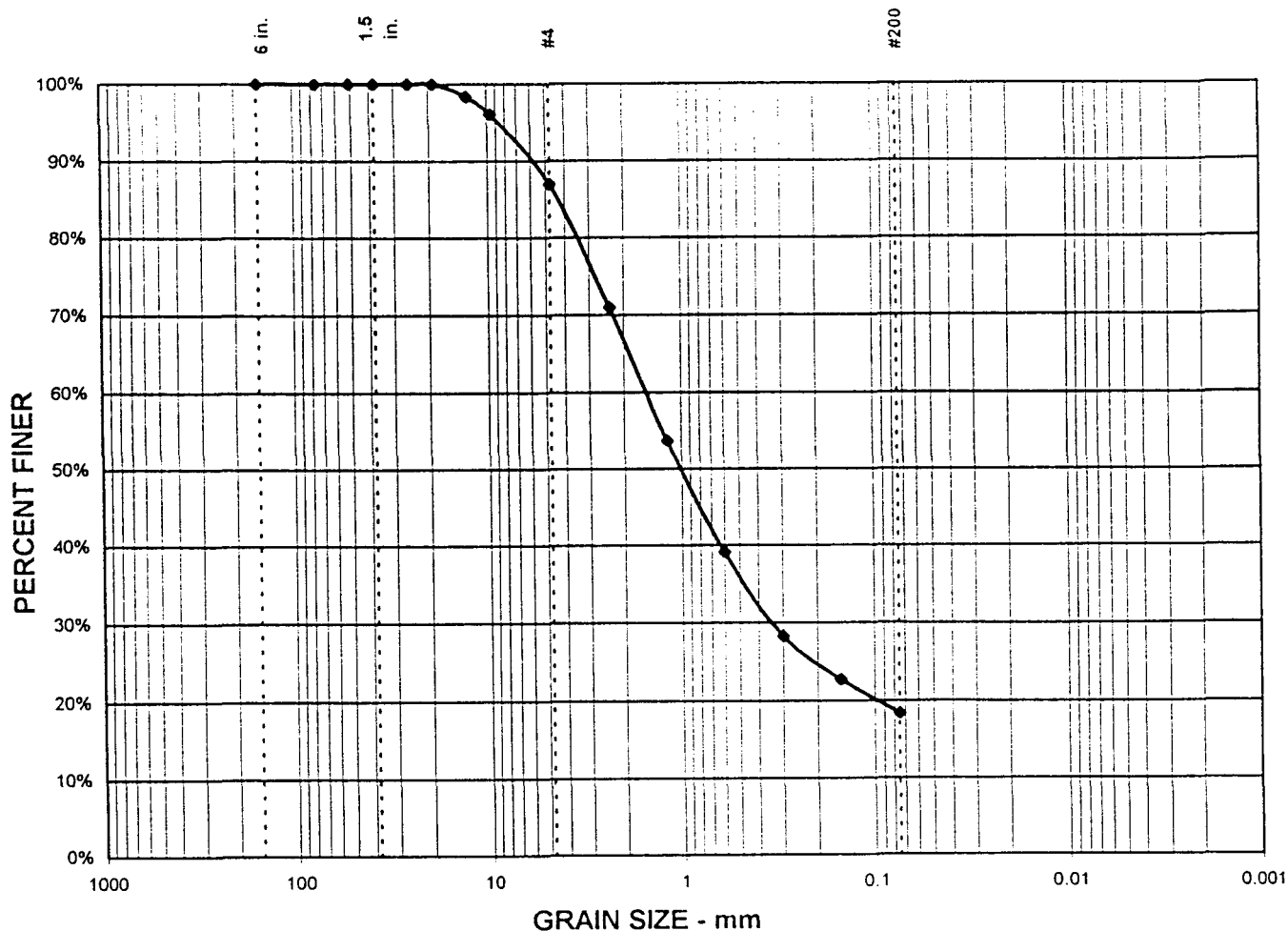
GRAIN SIZE DISTRIBUTION TEST REPORT

CONVERSE CONSULTANTS SOUTHWEST



Drawing No. A-17

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY

% GRAVEL =	13%	$D_{85} = 4.3$	$D_{15} =$
% SAND =	69%	$D_{60} = 1.5$	$D_{10} =$
% SILT & CLAY =	18%	$D_{50} = 1.0$	$C_u =$
		$D_{30} = 0.3$	$C_c =$

Project No.: 96-33746-01

Project Name: HIKO SPRINGS

Date: 18-Mar-97

Location: B-4

Depth: 1-4

Material Description: SILTY SAND (SM)

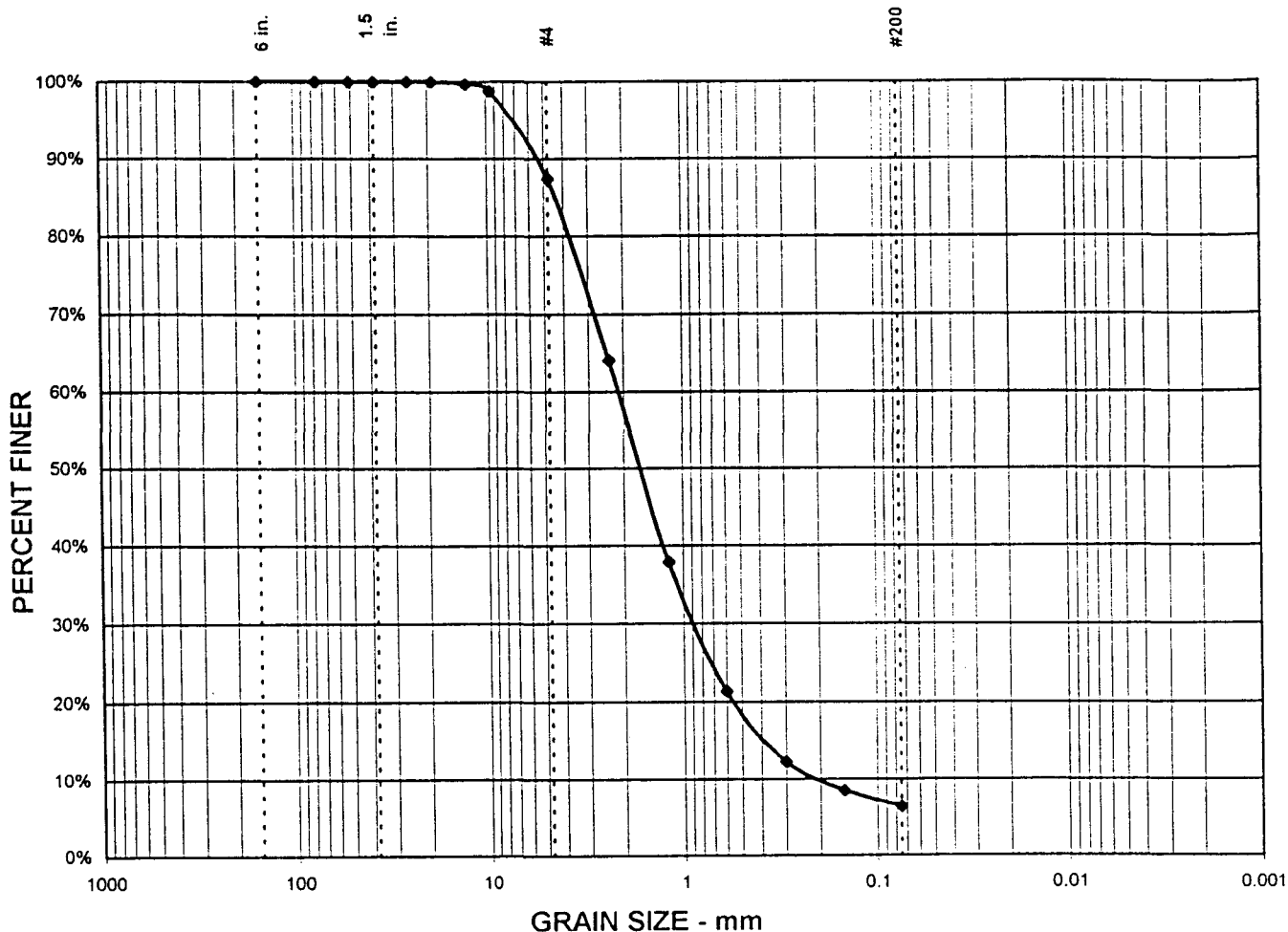


GRAIN SIZE DISTRIBUTION TEST REPORT

CONVERSE CONSULTANTS SOUTHWEST

Drawing No. **A-18**

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY

% GRAVEL =	13%	$D_{85} = 4.4$	$D_{15} = 0.4$
% SAND =	81%	$D_{60} = 2.1$	$D_{10} = 0.2$
% SILT & CLAY =	6%	$D_{50} = 1.6$	$C_u = 10.8$
		$D_{30} = 0.9$	$C_c = 1.8$

Project No.: 96-33746-01

Project Name: HIKO SPHINGS

Date: 18-Mar-97

Location: B-5

Depth: 9-14

Material Description: WELLGRADED SAND with SILT (SW-SM)

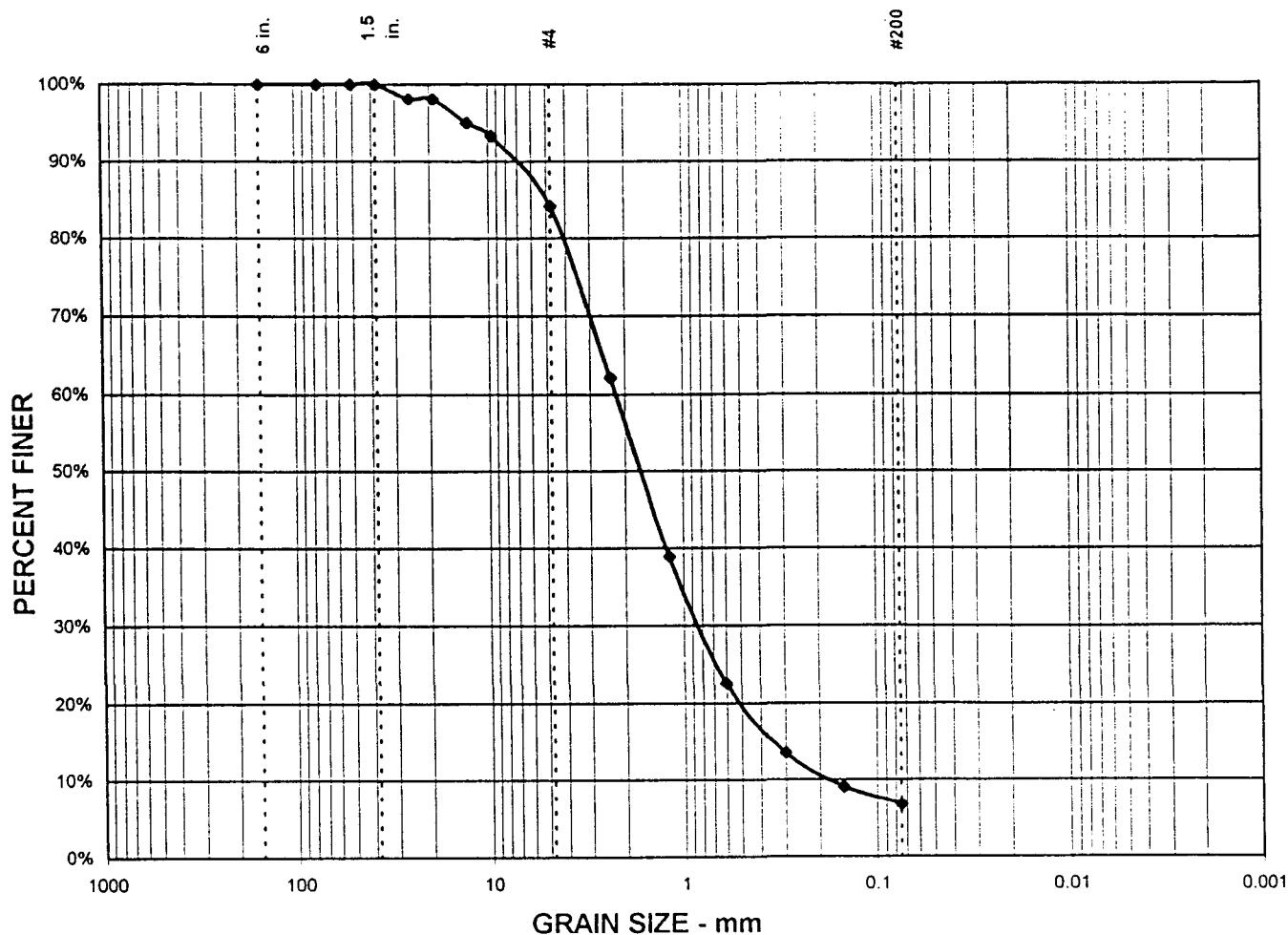


GRAIN SIZE DISTRIBUTION TEST REPORT

CONVERSE CONSULTANTS SOUTHWEST

Drawing No. **A-19**

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY

% GRAVEL =	16%	$D_{85} = 5.0$	$D_{15} = 0.3$
% SAND =	77%	$D_{60} = 2.2$	$D_{10} = 0.2$
% SILT & CLAY =	7%	$D_{50} = 1.6$	$C_u = 12.8$
		$D_{30} = 0.8$	$C_c = 1.7$

Project No.: 96-33746-01

Project Name: HIKO SPRINGS

Date: 18-Mar-97

Location: B-6

Depth: 5-9

Material Description: WELLGRADED SAND with SILT and GRAVEL (SW-SM)

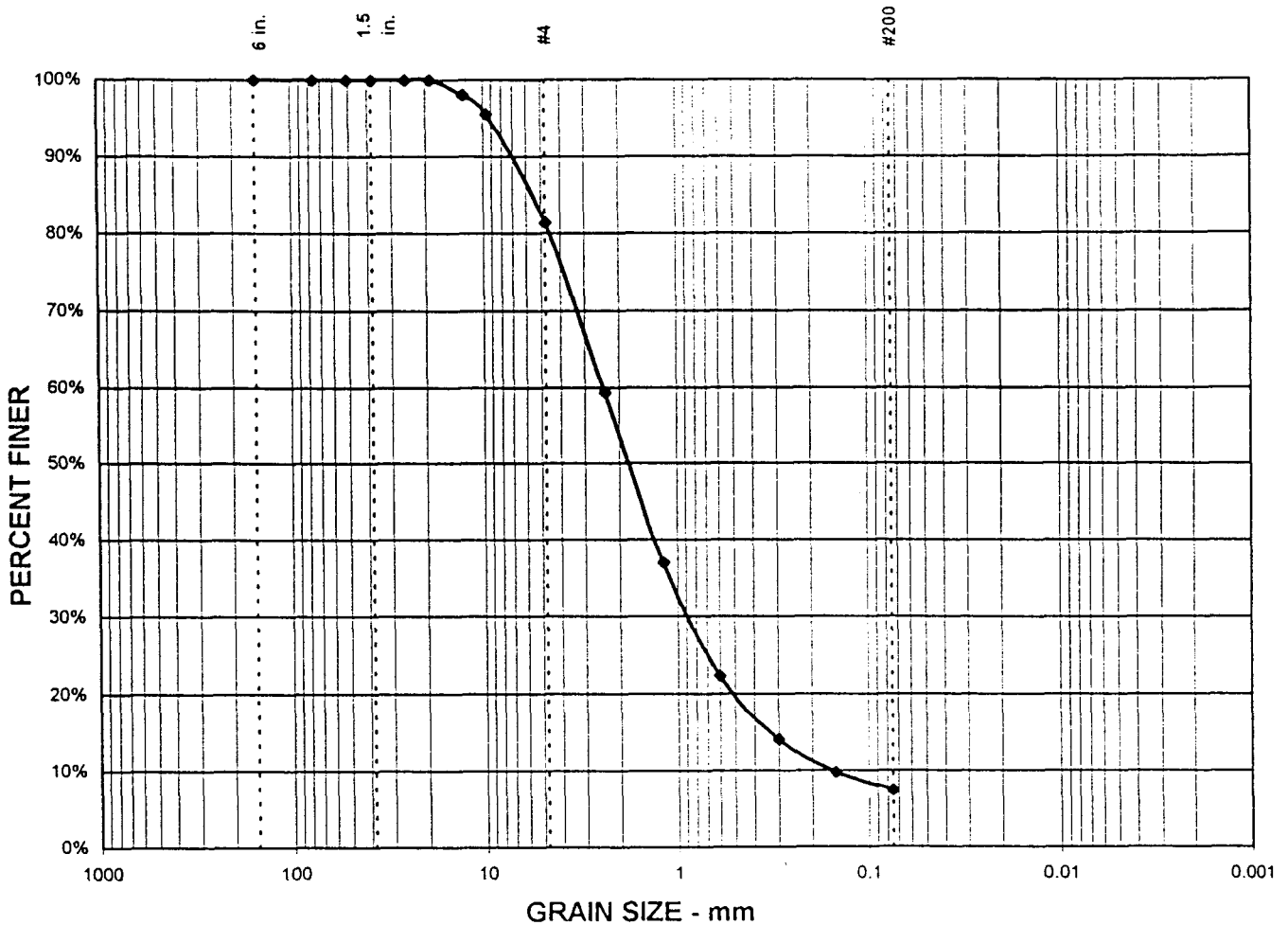
GRAIN SIZE DISTRIBUTION TEST REPORT

CONVERSE CONSULTANTS SOUTHWEST



Drawing No. **A-20**

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY

% GRAVEL =	19%	$D_{85} = 5.7$	$D_{15} = 0.3$
% SAND =	74%	$D_{60} = 2.4$	$D_{10} = 0.2$
% SILT & CLAY =	7%	$D_{50} = 1.8$	$C_u = 15.5$
		$D_{30} = 0.9$	$C_c = 2.0$

Project No.: 96-33746-01
 Project Name: HIKO SPRINGS
 Date: 18-Mar-97
 Location: B-7 Depth: 14-19
 Material Description: WELLGRADED SAND with SILT and GRAVEL (SW-SM)

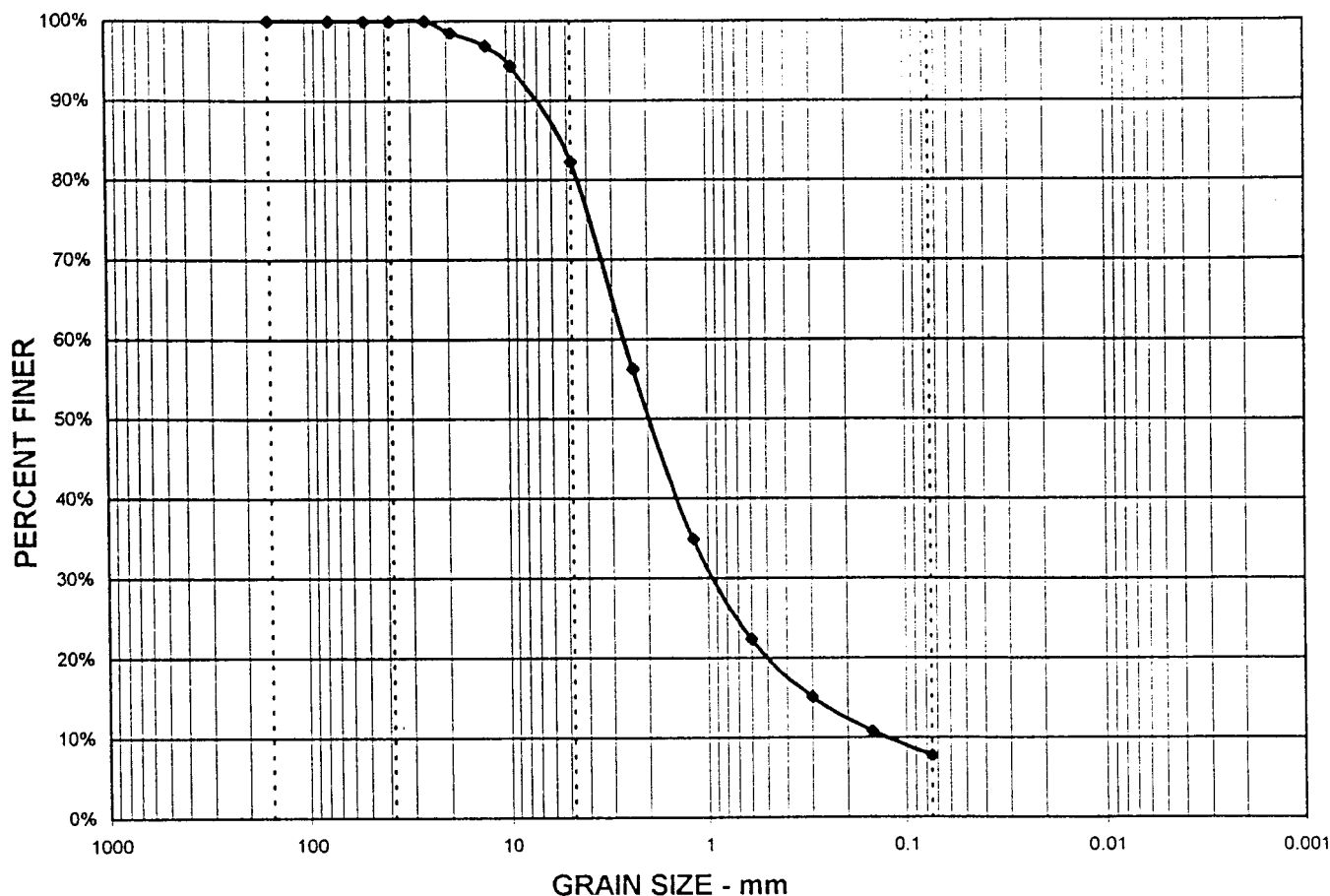
GRAIN SIZE DISTRIBUTION TEST REPORT

CONVERSE CONSULTANTS SOUTHWEST



Drawing No. **A-21**

6 in. 1.5 in. #4 #200



TEST SUMMARY

% GRAVEL =	18%	D ₈₅ = 5.5	D ₁₅ = 0.3
% SAND =	75%	D ₆₀ = 2.6	D ₁₀ = 0.1
% SILT & CLAY =	8%	D ₅₀ = 1.9	C _u = 20.9
		D ₃₀ = 0.9	C _c = 2.5

Project No.: 96-33746-01

Project Name: HIKO SPRINGS

Date: 18-Mar-97

Location: B-8

Depth: 9-14

Material Description: WELLGRADED SAND with SILT and GRAVEL (SW-SM)

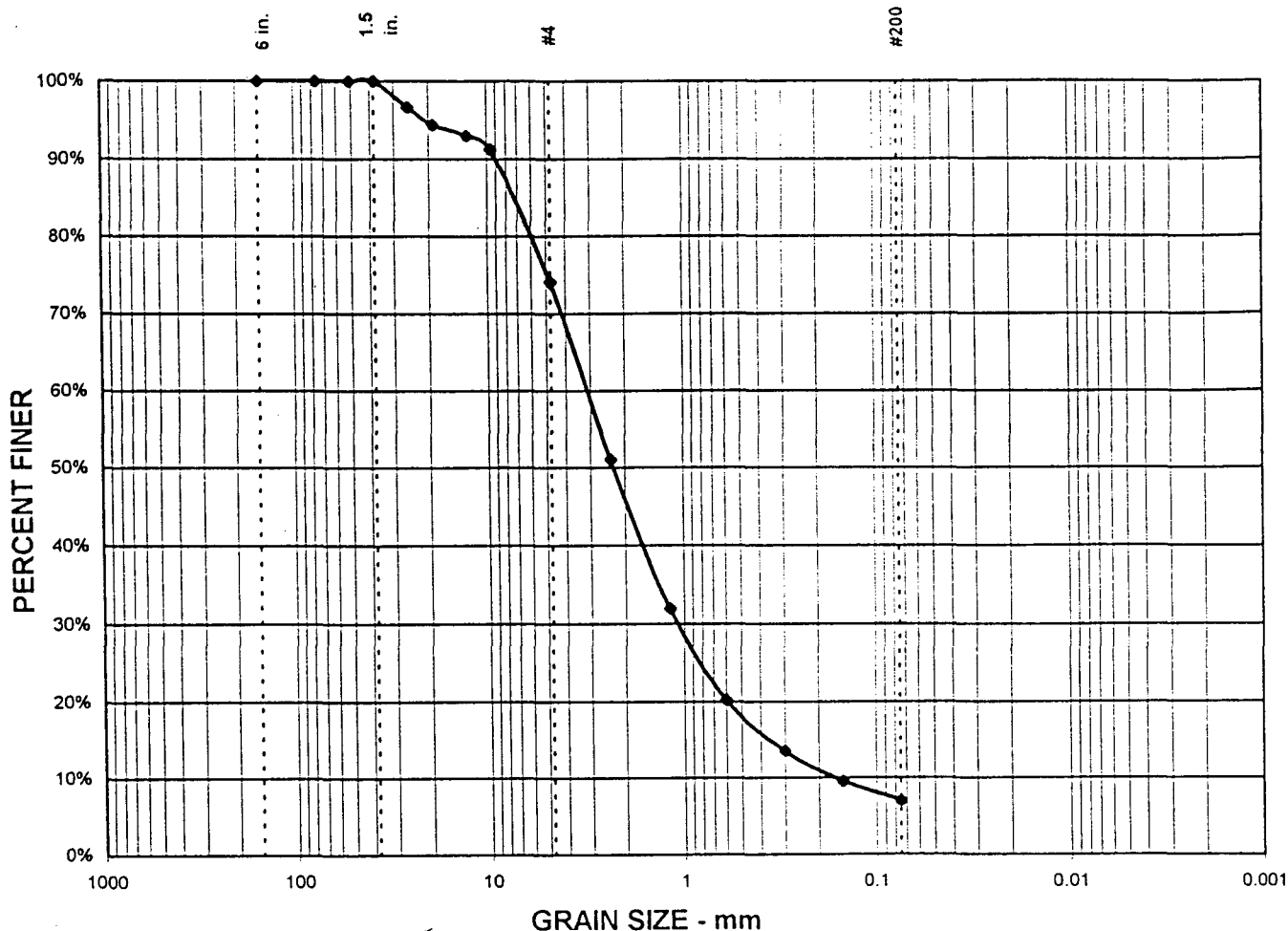


GRAIN SIZE DISTRIBUTION TEST REPORT

CONVERSE CONSULTANTS SOUTHWEST

Drawing No. **A-22**

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY

% GRAVEL =	26%	$D_{85} = 7.4$	$D_{15} = 0.4$
% SAND =	67%	$D_{60} = 3.1$	$D_{10} = 0.2$
% SILT & CLAY =	7%	$D_{50} = 2.3$	$C_u = 19.2$
		$D_{30} = 1.1$	$C_c = 2.2$

Project No.: 96-33746-01
 Project Name: HIKO SPRINGS
 Date: 18-Mar-97
 Location: B-9 Depth: 4-9
 Material Description: WELLGRADED SAND with SILT and GRAVEL (SW-SM)

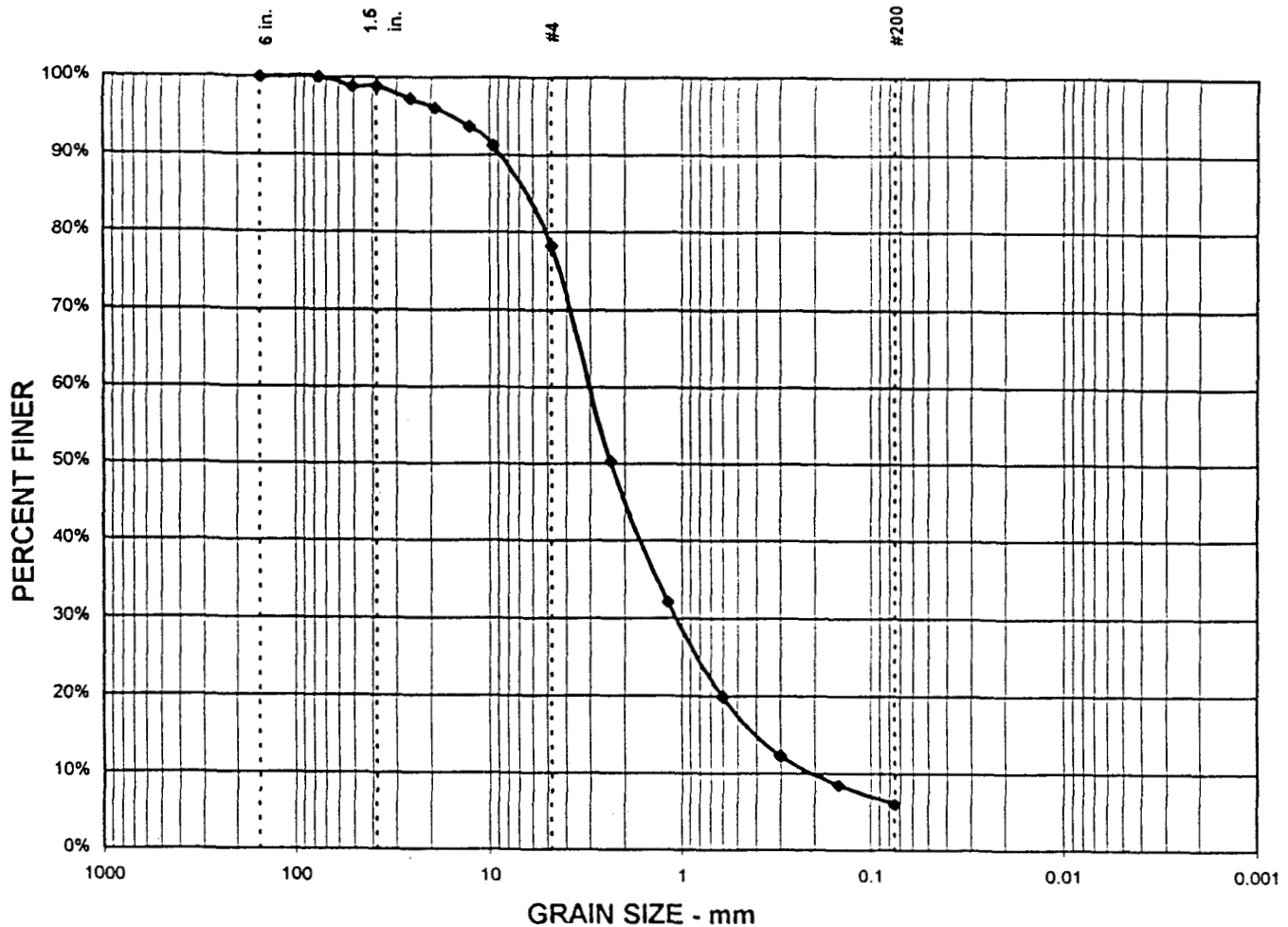
GRAIN SIZE DISTRIBUTION TEST REPORT

CONVERSE CONSULTANTS SOUTHWEST



Drawing No. **A-23**

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY

% GRAVEL =	22%	$D_{85} = 6.8$	$D_{15} = 0.4$
% SAND =	72%	$D_{60} = 3.0$	$D_{10} = 0.2$
% SILT & CLAY =	6%	$D_{50} = 2.3$	$C_u = 15.3$
		$D_{30} = 1.0$	$C_c = 1.9$

Project No.: 96-33746-01

Project Name: HIKO SPRINGS

Date: 18-Mar-97

Location: B-10

Depth: 6-9

Material Description: WELLGRADED SAND with SILT and GRAVEL (SW-SM)

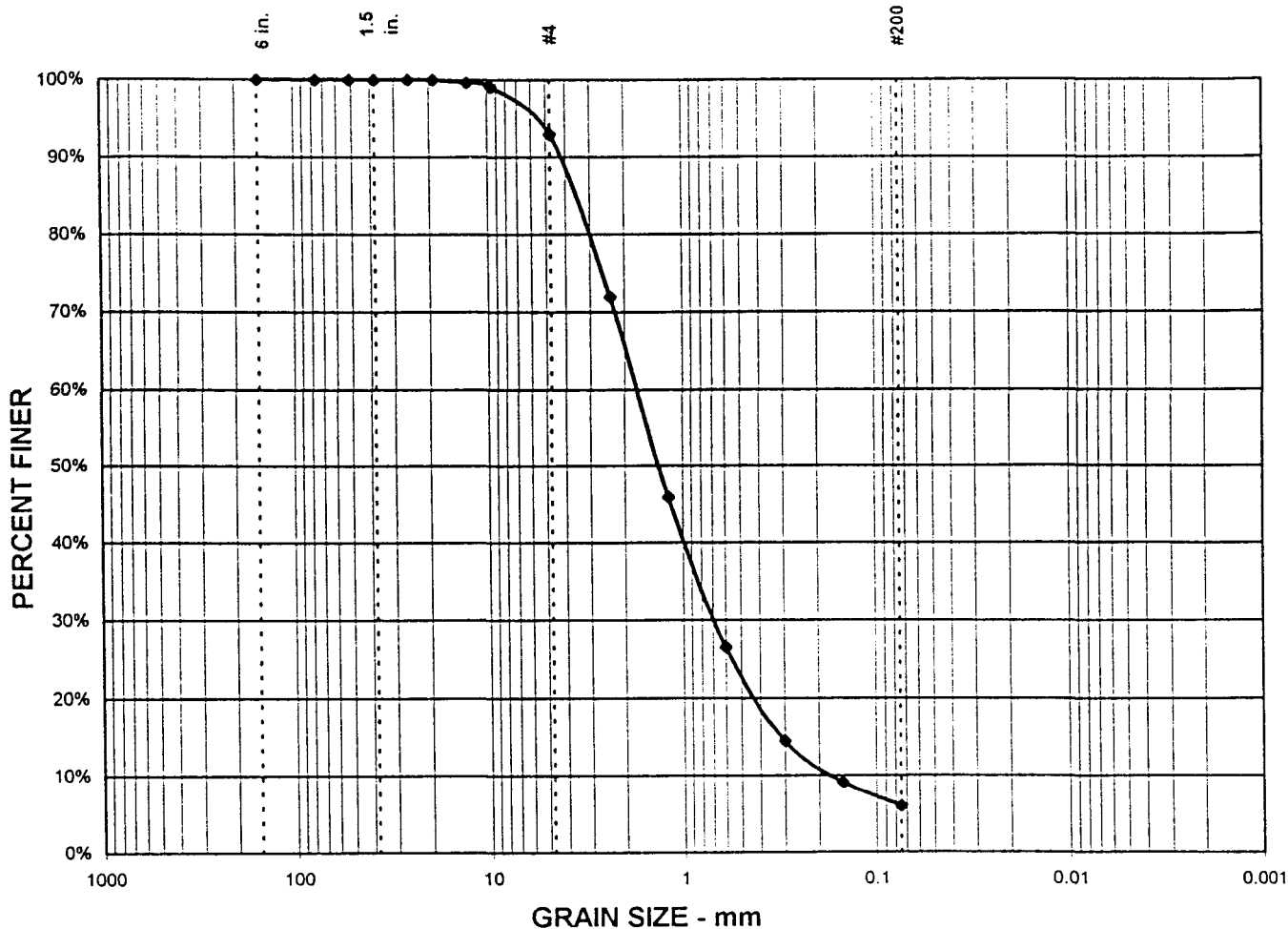
GRAIN SIZE DISTRIBUTION TEST REPORT

CONVERSE CONSULTANTS SOUTHWEST



Drawing No. A-24

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY

% GRAVEL =	7%	D ₈₅ = 3.6	D ₁₅ = 0.3
% SAND =	87%	D ₆₀ = 1.7	D ₁₀ = 0.2
% SILT & CLAY =	6%	D ₅₀ = 1.3	C _u = 10.1
		D ₃₀ = 0.7	C _c = 1.6

Project No.: 96-33746-01
Project Name: HIKO SPRINGS
Date: 18-Mar-97
Location: B-11 Depth: 2
Material Description: WELLGRADED SAND with SILT (SW-SM)

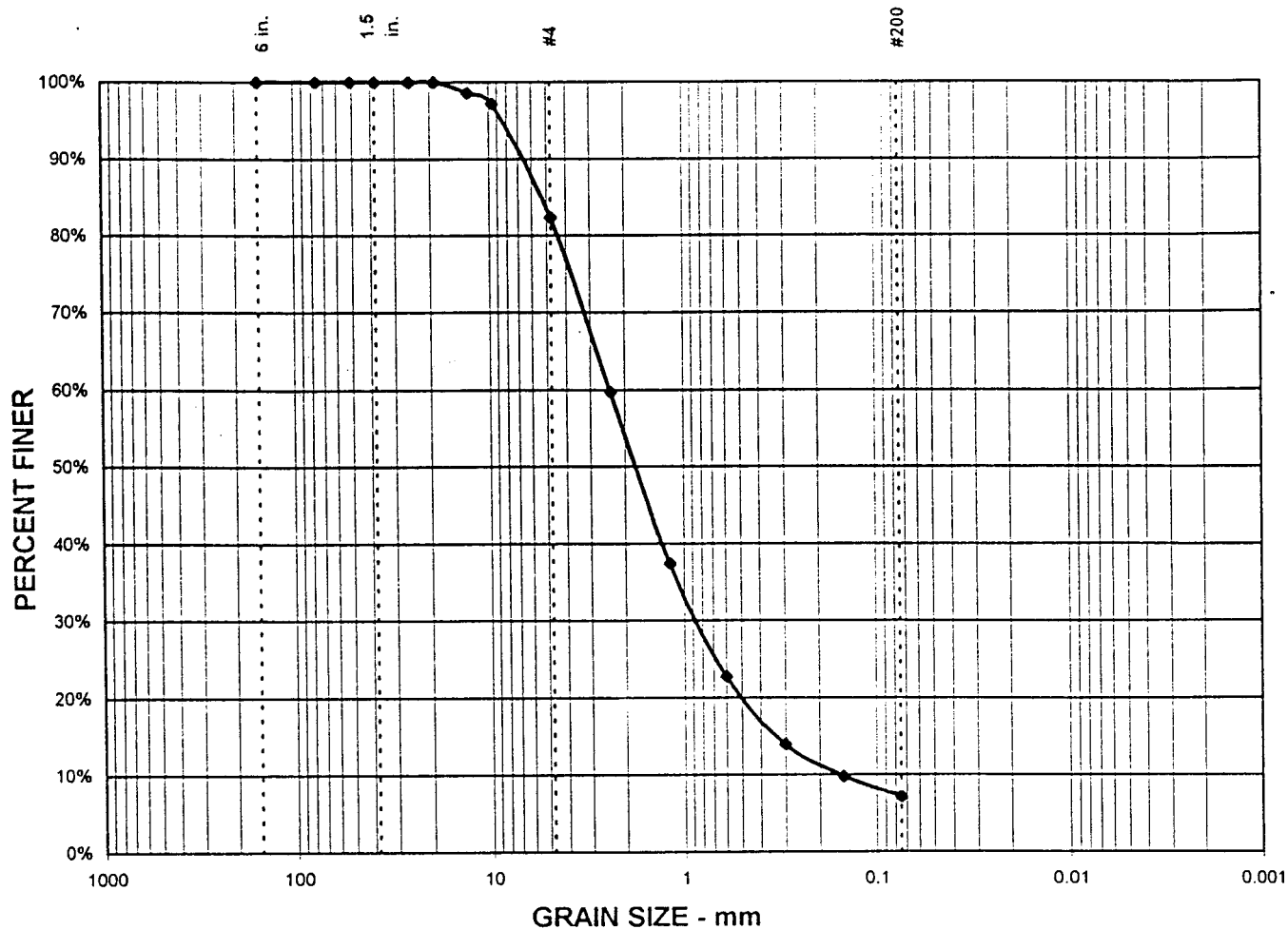


GRAIN SIZE DISTRIBUTION TEST REPORT

CONVERSE CONSULTANTS SOUTHWEST

Drawing No. **A-25**

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY

% GRAVEL =	18%	$D_{85} = 5.4$	$D_{15} = 0.3$
% SAND =	75%	$D_{60} = 2.4$	$D_{10} = 0.2$
% SILT & CLAY =	7%	$D_{50} = 1.7$	$C_u = 15.3$
		$D_{30} = 0.8$	$C_c = 1.9$

Project No.: 96-33746-01

Project Name: HIKO SPRINGS

Date: 18-Mar-97

Location: B-12

Depth: 12-16

Material Description: WELLGRADED SAND with SILT and GRAVEL (SW-SM)

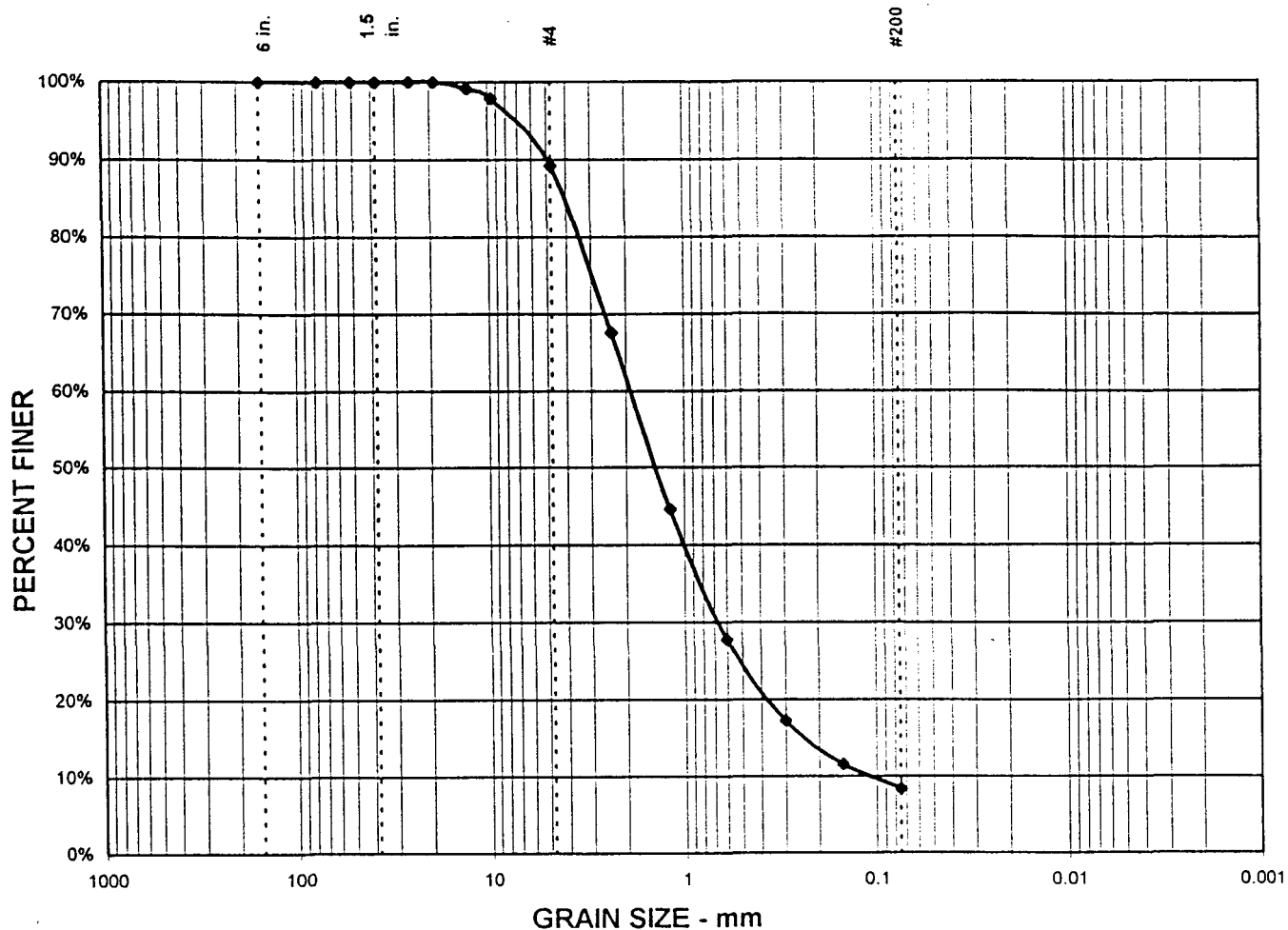
GRAIN SIZE DISTRIBUTION TEST REPORT

CONVERSE CONSULTANTS SOUTHWEST



Drawing No. **A-26**

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY

% GRAVEL =	11%	$D_{85} = 4.1$	$D_{15} = 0.2$
% SAND =	81%	$D_{60} = 1.9$	$D_{10} = 0.1$
% SILT & CLAY =	8%	$D_{50} = 1.4$	$C_u = 17.6$
		$D_{30} = 0.7$	$C_c = 2.2$

Project No.: 96-33746-01

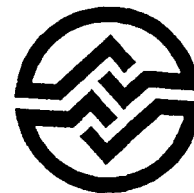
Project Name: HIKO SPRINGS

Date: 18-Mar-97

Location: B-13

Depth: 4-9

Material Description: WELLGRADED SAND with SILT (SW-SM)

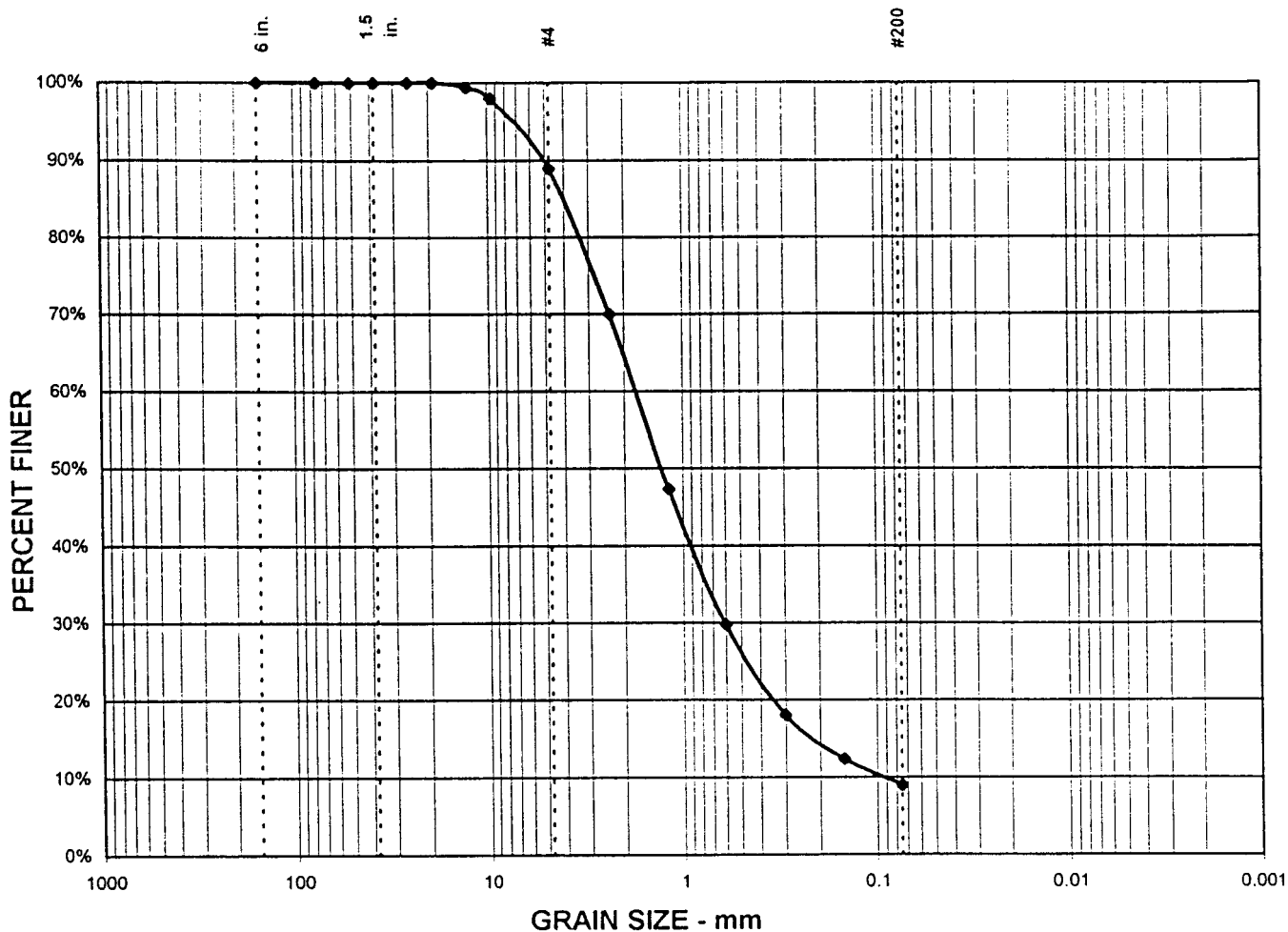


GRAIN SIZE DISTRIBUTION TEST REPORT

CONVERSE CONSULTANTS SOUTHWEST

Drawing No. **A-27**

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY

% GRAVEL =	11%	$D_{85} = 4.1$	$D_{15} = 0.2$
% SAND =	80%	$D_{60} = 1.7$	$D_{10} = 0.1$
% SILT & CLAY =	9%	$D_{50} = 1.3$	$C_u = 18.8$
		$D_{30} = 0.6$	$C_c = 2.3$

Project No.: 96-33746-01

Project Name: HIKO SPRINGS

Date: 18-Mar-97

Location: B-14

Depth: 1-4

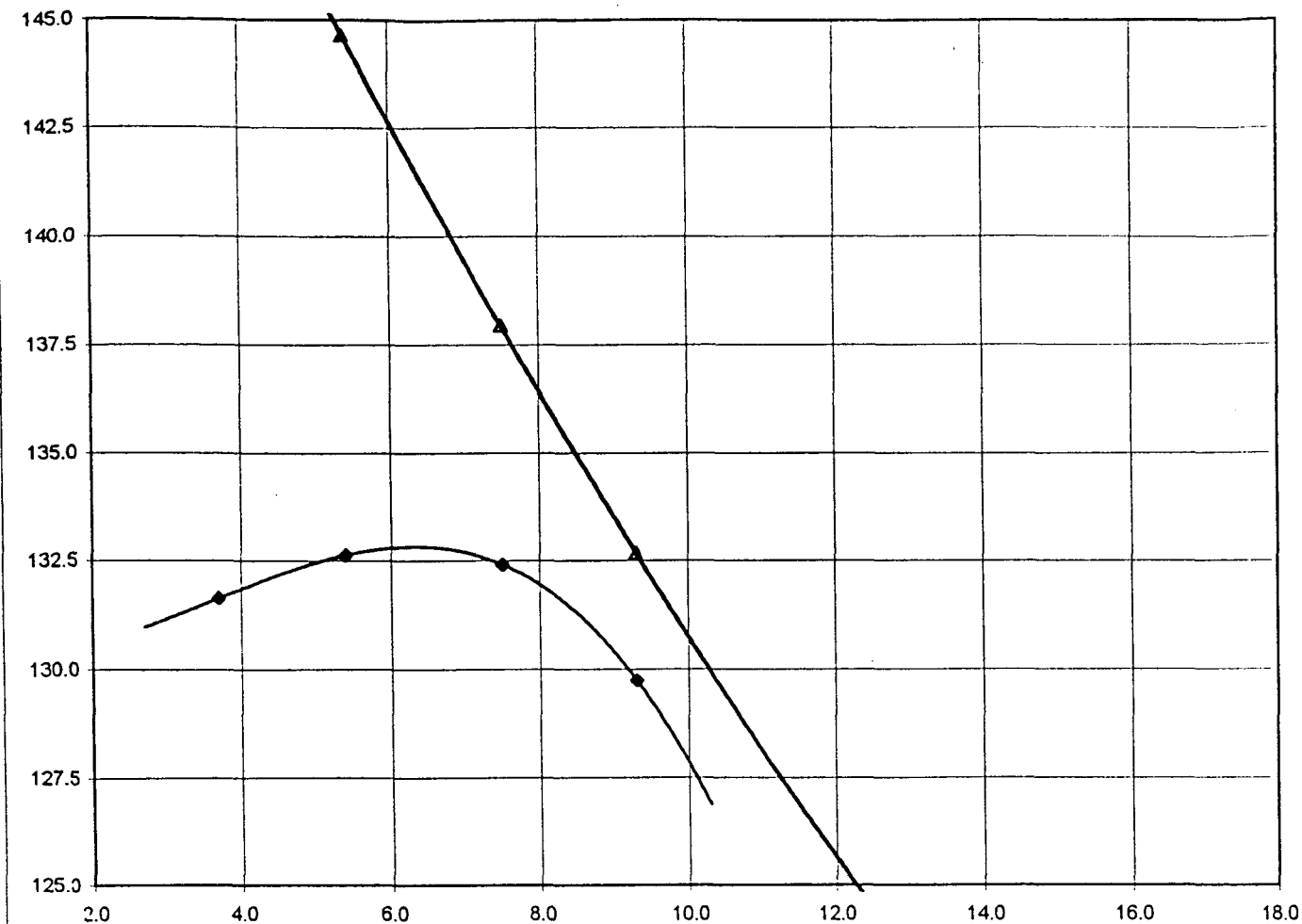
Material Description: WELLGRADED SAND WITH SILT (SW-SM)



GRAIN SIZE DISTRIBUTION TEST REPORT

CONVERSE CONSULTANTS SOUTHWEST

Drawing No. **A-28**



Specific Gravity Zero air void line:

2.65

Maximum Density, pcf:

CORRECTED

UNCORRECTED

Optimum Moisture, %:

133.0

6.2

Sample Location: _____

Comments: _____

Project No.: 96-33746-01

Project Name: Hiko Springs

Date: 4-Apr-97

Boring No.: B4

Depth: 1-4

Material Description:

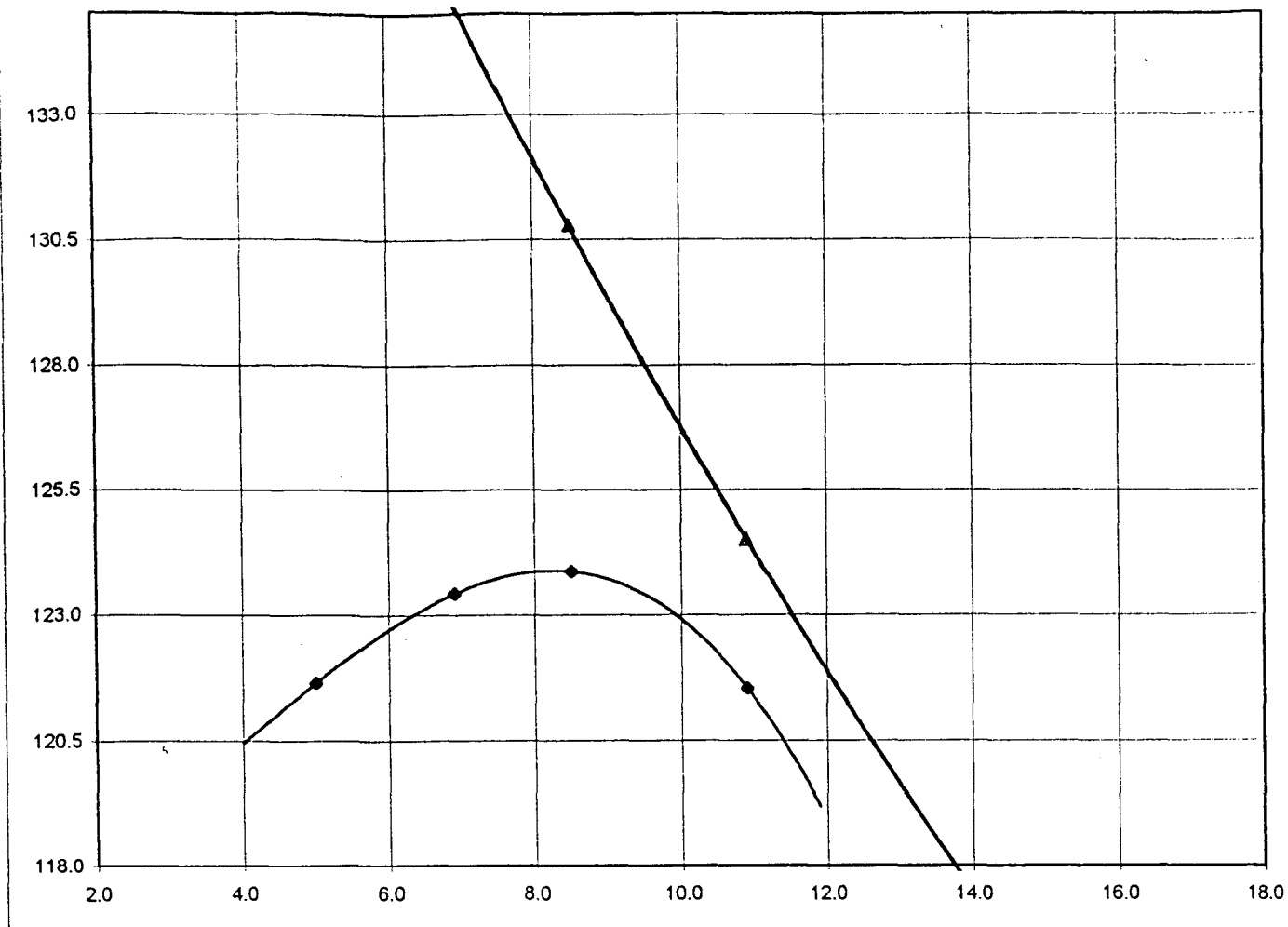


MOISTURE DENSITY TEST REPORT

CONVERSE CONSULTANTS SOUTHWEST

Drawing No.

A-29



Specific Gravity Zero air void line:

2.55

CORRECTED

UNCORRECTED

Maximum Density, pcf:

124.0

Optimum Moisture, %:

8.1

Sample Location: _____

Comments: _____

Project No.: 96-33746-01

Project Name: Hiko Springs

Date: 4-Apr-97

Boring No.: B-6

Depth: 5-9

Material Description:

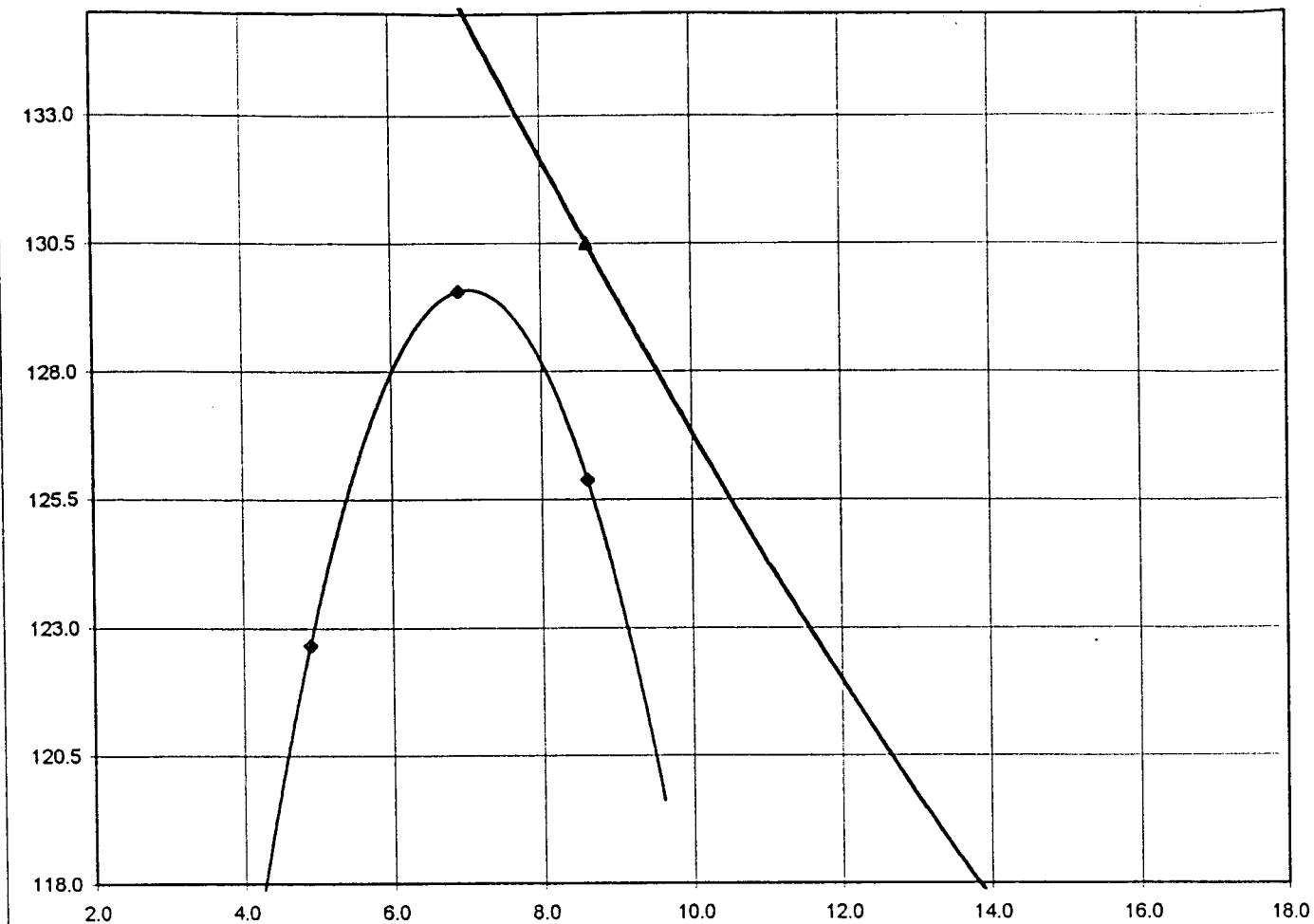


MOISTURE DENSITY TEST REPORT

CONVERSE CONSULTANTS SOUTHWEST

Drawing No.

A-30



Specific Gravity Zero air void line:

2.55

Maximum Density, pcf:

129.6

Optimum Moisture, %:

6.9

Sample Location:

Comments:

Project No.: 96-33746-01

Project Name: Hiko Springs

Date: 4-Apr-97

Boring No.: B12

Depth: 12-16

Material Description:



MOISTURE DENSITY TEST REPORT

CONVERSE CONSULTANTS SOUTHWEST

Drawing No.

A-31

Atlas Chemical Testing Laboratories

2120 Western Avenue, Suite C-6 • Las Vegas, Nevada 89102
(702) 383-1199 • Fax (702) 383-4983

CHEMICAL
PHYSICAL
FORENSIC

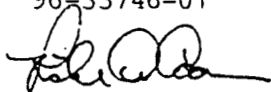
member of
AMERICAN SOCIETY FOR
TESTING MATERIALS

ACT LAB NO: 7581(c)

DATE: 3/14/97

PROJECT NO: 96-33746-01

ANALYZED BY:



P.O. 15314

WATER SOLUBLE SALT ANALYSIS IN SOIL
1:5 (soil:water) Aqueous Extraction

AWWA 3500-Na D., ASTM D 516

HIKO SPRINGS

Sample No.	Location	Depth (Feet)	Sodium (Percent)	Sulfate (Percent)	Total Available Water Soluble Sodium Sulfate (Percent)
	B-2	4-9	0.01	0.05	0.04
	B-7	14-19	0.02	0.04	0.05

Notes: The results for each constituent denote the percentage of that analyte, soluble in water at a 1:5 (soil:water) extraction ratio, which is present in the soil. Sodium was determined by flame photometry, sulfate turbidimetrically, and sodium sulfate by calculation.

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CHEMICAL
PHYSICAL
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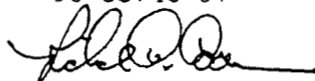
member of
AMERICAN SOCIETY FOR
TESTING MATERIALS

ACT LAB NO: 7581(b)

DATE: 3/14/97

PROJECT NO: 96-33746-01

ANALYZED BY:



P.O. 15314

WATER SOLUBLE SALT ANALYSIS IN SOIL
1:5 (soil:water) Aqueous Extraction

AWWA 3500-Na D., ASTM D 516

HIKO SPRINGS

Sample No.	Location	Depth (Feet)	Sodium (Percent)	Sulfate (Percent)	Total Available Water Soluble Sodium Sulfate (Percent)
	B-4	1-4	0.01	0.05	0.03
	B-8	9-14	0.01	0.05	0.05

Notes: The results for each constituent denote the percentage of that analyte, soluble in water at a 1:5 (soil:water) extraction ratio, which is present in the soil. Sodium was determined by flame photometry, sulfate turbidimetrically, and sodium sulfate by calculation.

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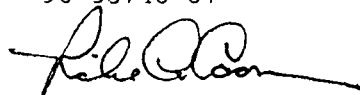
ACT LAB NO: 7596(c)

DATE: March 18, 1997

PROJECT NO: 96-33746-01

P.O. 15336

ANALYZED BY:



WATER SOLUBLE SALT ANALYSIS IN SOIL
1:5 (soil:water) Aqueous Extraction

AWWA 3500-Na D., ASTM D 516

Sample No.	Location	Depth (Feet)	Sodium (Percent)	Sulfate (Percent)	Total Available Water Soluble Sodium Sulfate (Percent)
	B-10	6-9	0.01	0.04	0.04
	B-14	1-4	0.01	0.03	0.04

Notes: The results for each constituent denote the percentage of that analyte, soluble in water at a 1:5 (soil:water) extraction ratio, which is present in the soil. Sodium was determined by flame photometry, sulfate turbidimetrically, and sodium sulfate by calculation.

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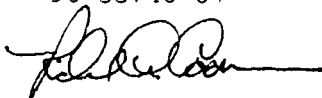
ACT LAB NO: 7596(b)

DATE: March 18, 1997

PROJECT NO: 96-33746-01

P.O. 15336

ANALYZED BY:



WATER SOLUBLE SALT ANALYSIS IN SOIL
1:5 (soil:water) Aqueous Extraction

AWWA 3500-Na D., ASTM D 516

Sample No.	Location	Depth (Feet)	Sodium (Percent)	Sulfate (Percent)	Total Available Water Soluble Sodium Sulfate (Percent)
	B-12	12-16	0.01	0.04	0.04

Notes: The results for each constituent denote the percentage of that analyte, soluble in water at a 1:5 (soil:water) extraction ratio, which is present in the soil. Sodium was determined by flame photometry, sulfate turbidimetrically, and sodium sulfate by calculation.

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LABORATORY NO: 7581(c) DATE: 3/14/97
SAMPLE: Soil P.O.: 15314
MARKED: 96-33746-01 HIKO SPRINGS
DATE RECEIVED: 3/13/97
SUBMITTED BY: Converse Consultants Southwest, Inc.

REPORT OF DETERMINATION

BORING NUMBER	B-2	B-7				
SAMPLE NUMBER						
DEPTH (feet)	4-9	14-19				
pH VALUE	9.59	9.13				
RED-OX (MV)	+593	+585				
SULFATE (ppm)	100	75				
SULFIDE (ppm)	Nil	Nil				
TOTAL SALTS (ppm)	60	53				
CHLORIDE (ppm)	10	5				
RESISTIVITY (Ohm-cm)	13,333	15,151				

Respectfully submitted,
ATLAS CHEMICAL TESTING LABORATORIES



Richard A. Coomes

- NOTES:**
1. The soil water extract ratio was 1:5, therefore, to convert a solution ppm (or mg/l) to a soil ppm (or mg/kg) for this extract ratio multiply by five (5). To convert soil ppm to a weight percent divide by ten thousand (10,000).
 2. The standard methods used for the determination above are the glass electrode/silver-silver chloride, ASTM D 1498; Turbidimetric/Std. Meth. 426C; Methylene Blue/Std. Meth. 427C, Electrical Conductivity, factor empirically determined/Std. Meth. 205 and Argentometric/Std. Meth. 407A respectively.

Atlas Chemical Testing Laboratories

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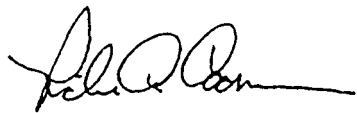
member of
AMERICAN SOCIETY FOR
TESTING MATERIALS

LABORATORY NO: 7596(b) DATE: March 18, 1997
SAMPLE: Soil P.O.: 15336
MARKED: 96-33746-01
DATE RECEIVED: March 17, 1997
SUBMITTED BY: Converse Consultants Southwest, Inc.
731 Pilot Road, Suite "H"
Las Vegas, NV 89119-4429

REPORT OF DETERMINATION

BORING NUMBER	B-12					
SAMPLE NUMBER						
DEPTH (feet)	12-16					
pH VALUE	9.60					
RED-OX (MV)	+610					
SULFATE (ppm)	75					
SULFIDE (ppm)	Nil					
TOTAL SALTS (ppm)	43					
CHLORIDE (ppm)	10					
RESISTIVITY (Ohm-cm)	18,519					

Respectfully submitted,
ATLAS CHEMICAL TESTING LABORATORIES



Richard A. Coomes

- NOTES:** 1. The soil water extract ratio was 1:5, therefore, to convert a solution ppm (or mg/l) to a soil ppm (or mg/kg) for this extract ratio multiply by five (5). To convert soil ppm to a weight percent divide by ten thousand (10,000).
2. The standard methods used for the determination above are the glass electrode/silver-silver chloride, ASTM D 1498; Turbidimetric/Std. Meth. 426C; Methylene Blue/Std. Meth. 427C, Electrical Conductivity, factor empirically determined/Std. Meth. 205 and Argentometric/Std. Meth. 407A respectively.

FORM 12

Alluvial Fan Flooding Form

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 1.0 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.

Community Name: Unincorporated Areas of Clark County, Nevada (Laughlin, Nevada)

Flooding Source: Hiko Springs Wash Detention Basin (HSWDB)

Project Name/Identifier: Hiko Springs Wash Outfall Improvements

AREA TO BE REVISED

Downstream limit: Laughlin Bay on the Colorado River

Upstream limit: Hiko Springs Wash Detention Basin

Describe flood zone designation as shown on the effective FIRM for area to be revised (i.e., Zone AO with depth and velocity, Zone AO with depth, or Zone A) Zone AO, depth 1 ft. velocity 4 fps; Zone AO, depth 1 ft. velocity 3 fps.

Attach a topographic map(s) which show the following items:

- ☒ The revised flood boundaries with revised depths and velocities (if applicable) that tie into the effective boundaries
- ☒ The correct alignment and location of all structural features

STRUCTURAL FLOOD CONTROL MEASURES

The following structures are proposed or built: (Check all that apply).

- ☒ Channelization (Attach completed form)
- ☐ Levee/Floodwall (Attach completed form)
- ☐ Dam (Attach completed form)
- ☐ Sedimentation Basin
- ☐ Other (describe) _____

Have the impacts and the design and maintenance requirements of the structural measures been reviewed and approved by all impacted communities and by state and local agencies that have jurisdiction over flood control activities?

☒ Yes ☐ No

Attach copies of letters stating communities' and agencies' approval. These will be submitted with the LOMR application.

HYDROLOGIC AND SEDIMENT ANALYSIS

1. 100-year discharge at the apex: Peak Flow 850 cfs

Is the 100-year apex discharge that is listed above, the discharge presented in the effective FIS?

☒ Yes ☐ No

If no, submit the following:

- a) Attach a plot of the flood frequency curve on log-normal probability paper and include the name of the flooding source and the drainage area above the apex, and the mean, standard deviation, and skew coefficient of the curve.
- b) Attach the Hydrologic Analysis Form.

2. Sediment load associated with the 100-year apex discharge:

Peak Flow 850 cfs

Volume 0 acre-feet

Explain method used to estimate sediment load. Attach all calculations.

The trap efficiency of the detention basin is greater than 95%. The existing sedimentation berm blocks sediment from entering the primary box culvert spillway, therefore allowing very little sediment to pass into the Hiko Springs Wash Outfall.

3. Debris load associated with the 100-year apex discharge:

Peak Flow 850 cfs

Volume 0 acre-feet

Explain method used to estimate debris load. Attach all calculations.

Debris is blocked at the primary spillway with a trash rack. This trash rack prevents debris from entering the Hiko Springs Wash Outfall, therefore keeping debris within the Hiko Springs Wash Detention Basin.

HYDROLOGIC AND SEDIMENT ANALYSES (Cont'd)

4. List the bulking factor, if any, used for this project 7%

5. Complete the following for potential adverse conditions (such as deforestation of the watershed by fire):
Because the area is barren, deforestation and /or wildfires in the watershed will have no affect on erosion.

100-year discharge at the apex	Peak Flow <u>850</u> cfs
	Volume <u>0</u> acre-feet
Sediment load associated with the 100-year discharge	Peak Flow <u>850</u> cfs
	Volume <u>0</u> acre-feet
Debris load associated with the 100-year discharge	Peak Flow <u>850</u> cfs
	Volume <u>0</u> acre-feet

Attach all supporting calculations.

6. Attach engineering analyses which demonstrate that flooding (including local runoff) from sources other than the apex is insignificant or has been accounted for in the design. Attached is the sedimentation analysis for downstream of the Hiko Springs Wash Detention Basin.

STRUCTURAL ANALYSES

For channelization and/or levee/floodwall projects, answer the following:

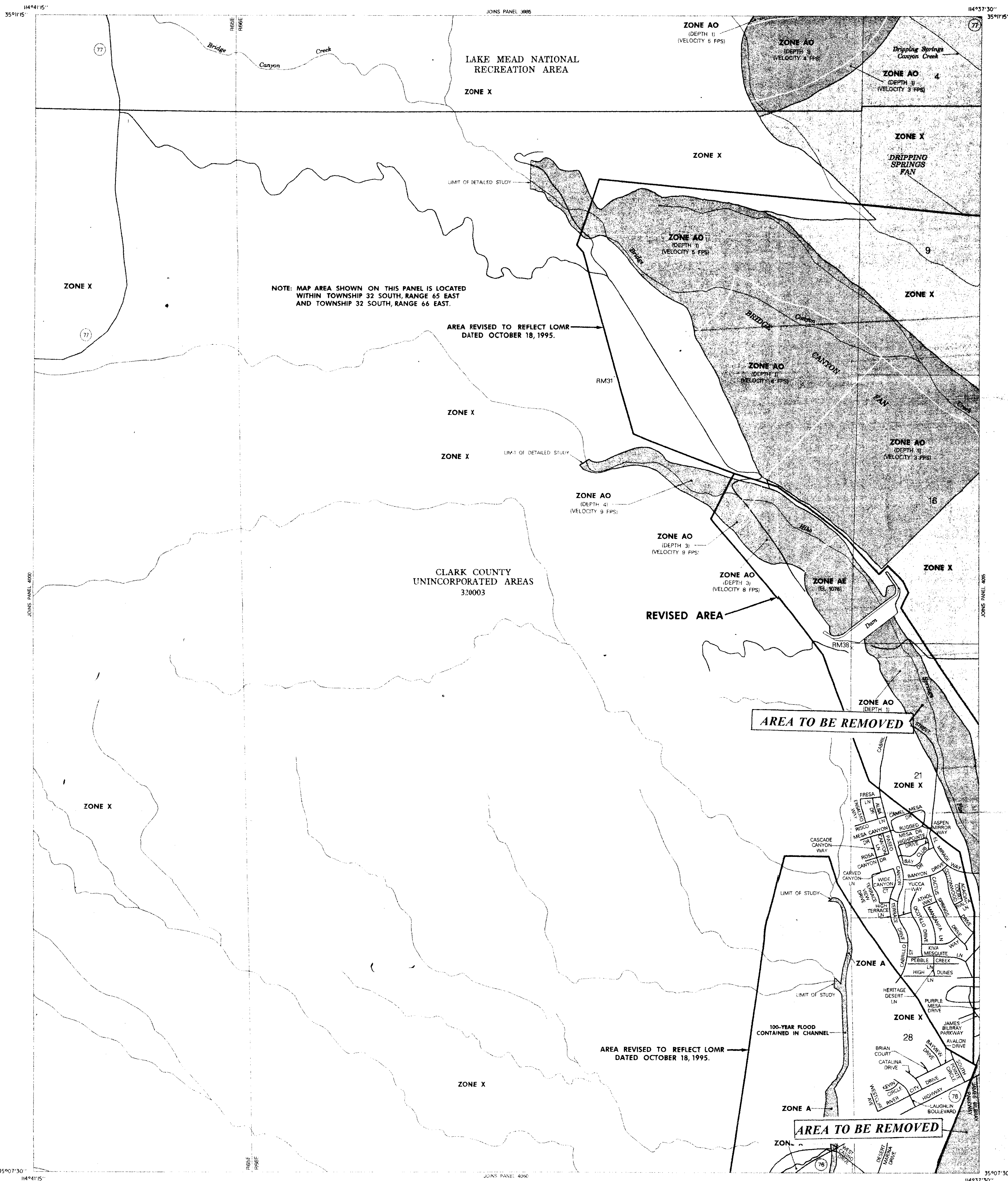
1. Do the constructed or proposed structural measures provide protection from hazards associated with the possible relocation of flow paths from other parts of the fans? ☒ Yes ☐ No

2. Do the constructed or proposed structural measures affect flood hazards (including depth, velocity, scour, and sediment deposition) on other areas of the fans? ☐ Yes ☒ No

Explain the methodology used to assess the impact. putting underground

Note: Attach detailed engineering analyses to support answers if not included as part of completion of other forms.

REFERENCE ELEVATION MARK (FEET NGVD)	DESCRIPTION OF LOCATION
RM31 1396.99	Set spike approximately 1.39 miles west of Needles Highway and approximately 1.36 miles south of the intersection of Needles Highway and State Highway 163.
RM38 1044.83	Set spike in dirt road approximately 2,640 feet west of Needles Highway and approximately 2.3 miles south of the junction of Needles Highway and Highway 163.
RM47 525.13	5.4 miles southwest of Davis Dam along dirt road, 500 feet east of a double pole powerline, 40 feet west of Y-road intersection with Needles Highway (just north of Needles Highway), in concrete post, standard tablet stamped "12 NR 1948 525."



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

- ZONE A** No 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 A99** To be protected from 100-year flood by Federal flood protection system under construction; no base elevations determined.
- ZONE V** Coastal flood with velocity hazard (wave action); base flood elevations determined.
- ZONE VE** Coastal flood with velocity hazard (wave action); base flood elevations determined.
- FLOODWAY AREAS IN ZONE AE**
- OTHER FLOOD AREAS**
- ZONE X** Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile, and areas protected by levees from 100-year flood.
- OTHER AREAS**
- ZONE X** Areas determined to be outside 500-year floodplain.
- ZONE D** Areas in which flood hazards are undetermined.
- UNDEVELOPED COASTAL BARRIERS**
- 1980** Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.
- 1990** Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.
- 1995** Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.
- Flood Boundary**
- Floodway Boundary**
- Zone D Boundary**
- Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.**
- Base Flood Elevation Line** Elevation in Feet. See Map Index for Elevation Datum.
- Cross Section Line** Base Flood Elevation in Feet Where Uniform Within Zone. See Map Index for Elevation Datum.
- Elevation Reference Mark**
- River Mile** Horizontal Coordinates Based on North American Datum of 1927 (NAD 27) Projection.

NOTES

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, or all planimetric features outside Special Flood Hazard Areas.

Coastal base flood elevations apply only landward of 0.0 NGVD, and include the effects of wave action; these elevations may also differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

Areas of Special Flood Hazard (100-year flood) include Zones A, AE, AH, AO, A99, V, and VE.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

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 Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Floodway widths are provided in the Flood Insurance Study Report.

This map may incorporate approximate boundaries of Coastal Barrier Resource System Units and/or Otherwise Protected Areas established under the Coastal Barrier Improvement Act of 1980 (PL 101-681).

Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent to the issuance of this map.

For community map revision history prior to countywide mapping, see Section 6.0 of the Flood Insurance Study Report.

For adjoining map panels and base map source see separately printed Map Index.

MAP REPOSITORY
Refer to Repository Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP:
AUGUST 16, 1995

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL:

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE DATE shown on this map to determine when actuarial rates apply to structures in zones whose elevations or depths have been established.

To determine if flood insurance is available, contact an insurance agent or call the National Flood Insurance Program at (800) 838-6820.

APPROXIMATE SCALE IN FEET
1000 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

EFFECTIVE FIRM

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY, NEVADA AND INCORPORATED AREAS

PANEL 3995 OF 4090
(SEE MAP INDEX FOR PANELS NOT PRINTED)

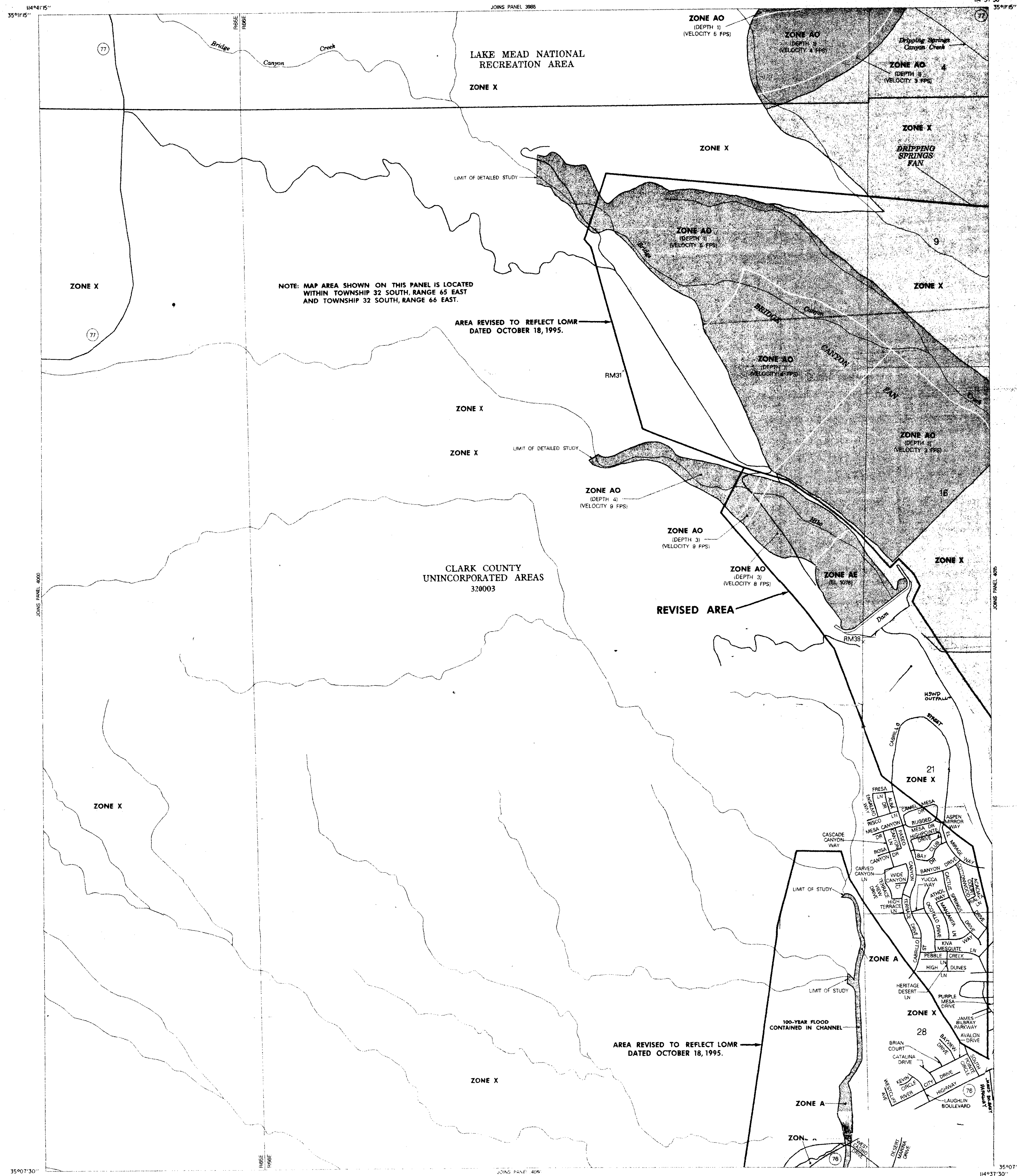
CONTAINS: COMMUNITY NUMBER PANEL SUFFIX
CLARK COUNTY UNINCORPORATED AREAS 320003 3995 0

REVISED TO REFLECT LOMR DATED NOV 21 1996

MAP NUMBER 32003C3995 D

EFFECTIVE DATE: AUGUST 16, 1995

REFERENCE ELEVATION MARK (FEET NGVD)	DESCRIPTION OF LOCATION
RM31 1396.99	Set spike approximately 1.39 miles west of Needles Highway and approximately 1.36 miles south of the intersection of Needles Highway and State Highway 163.
RM38 1044.83	Set spike in dirt road approximately 2.648 feet west of Needles Highway and approximately 2.3 miles south of the junction of Needles Highway and Highway 163.
RM47 525.12	5.4 miles southwest of Davis Dam along dirt road, 500 feet east of a double pole powerline, 40 feet west of Y-road intersection with Needles Highway (just north of Needles Highway), in concrete post standard tablet stamped "12 WR 1948 525."



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR 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 flood flow on sloping terrain); average depths determined. For areas of shallow fan flooding, velocities also determined.
- ZONE A99** To be protected from 100-year flood by federal flood protection system under construction; no base elevations determined.
- ZONE V** Coastal flood with velocity hazard (wave action); no base flood elevations determined.
- ZONE VII** Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

- ZONE X** Area of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than square miles and areas protected by levees from 100-year flood.

OTHER AREAS

- ZONE X** Areas determined to be outside 500-year floodplain.
- ZONE D** Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS

- 1982** Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.
- 1990** Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.
- Outline** Protected Areas

Map Symbols:

- Flood Boundary**
- Floodway Boundary**
- Zone D Boundary**
- Boundary** Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.
- Base Flood Elevation Line** Elevation in Feet. See Map Index for Elevation Datum.
- Cross Section Line** Base Flood Elevation in Feet Where Uniform Within Zone. See Map Index for Elevation Datum.
- Elevation Reference Mark**
- River Mile** Horizontal Coordinates Based on North American Datum of 1927 (NAD 27) Projection.

NOTES

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, or all permanent features outside Special Flood Hazard Areas.

Coastal base flood elevations apply only landward of 0.0 NGVD, and include the effects of wave action; these elevations may also differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

Areas of Special Flood Hazard (100-year flood) include Zones A, AE, AH, AO, A99, V, and VII.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

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 Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Floodway widths are provided in the Flood Insurance Study Report.

This map may incorporate approximate boundaries of Coastal Barrier Resource System Units and/or Other Protected Areas established under the Coastal Barrier Improvement Act of 1980 (PL 101-581).

Corporate limits shown are current as of the date of this map. The user should consult appropriate community officials to determine if corporate limits have changed subsequent to the issuance of this map.

For community map revision history prior to countywide mapping, see Section 6.0 of the Flood Insurance Study Report.

For adjoining map panels and base map source see separately printed Map Index.

MAP REPOSITORY

Refer to Repository Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP:

AUGUST 16, 1995

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL:

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE DATE shown on this map to determine when actual rates apply to structures in zones where questions or doubts have been established.

To determine if flood insurance is available, contact an insurance agent or call the National Flood Insurance Program at (800) 638-0920.

APPROXIMATE SCALE IN FEET

1000 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

REVISED FIRM FIRM FLOOD INSURANCE RATE MAP

CLARK COUNTY, NEVADA AND INCORPORATED AREAS

PANEL 3995 OF 4090
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS: COMMUNITY NUMBER PANEL SUFFIX
CLARK COUNTY UNINCORPORATED AREAS 320003 3995 0

REVISED TO REFLECT LOMR DATED NOV 21 1995

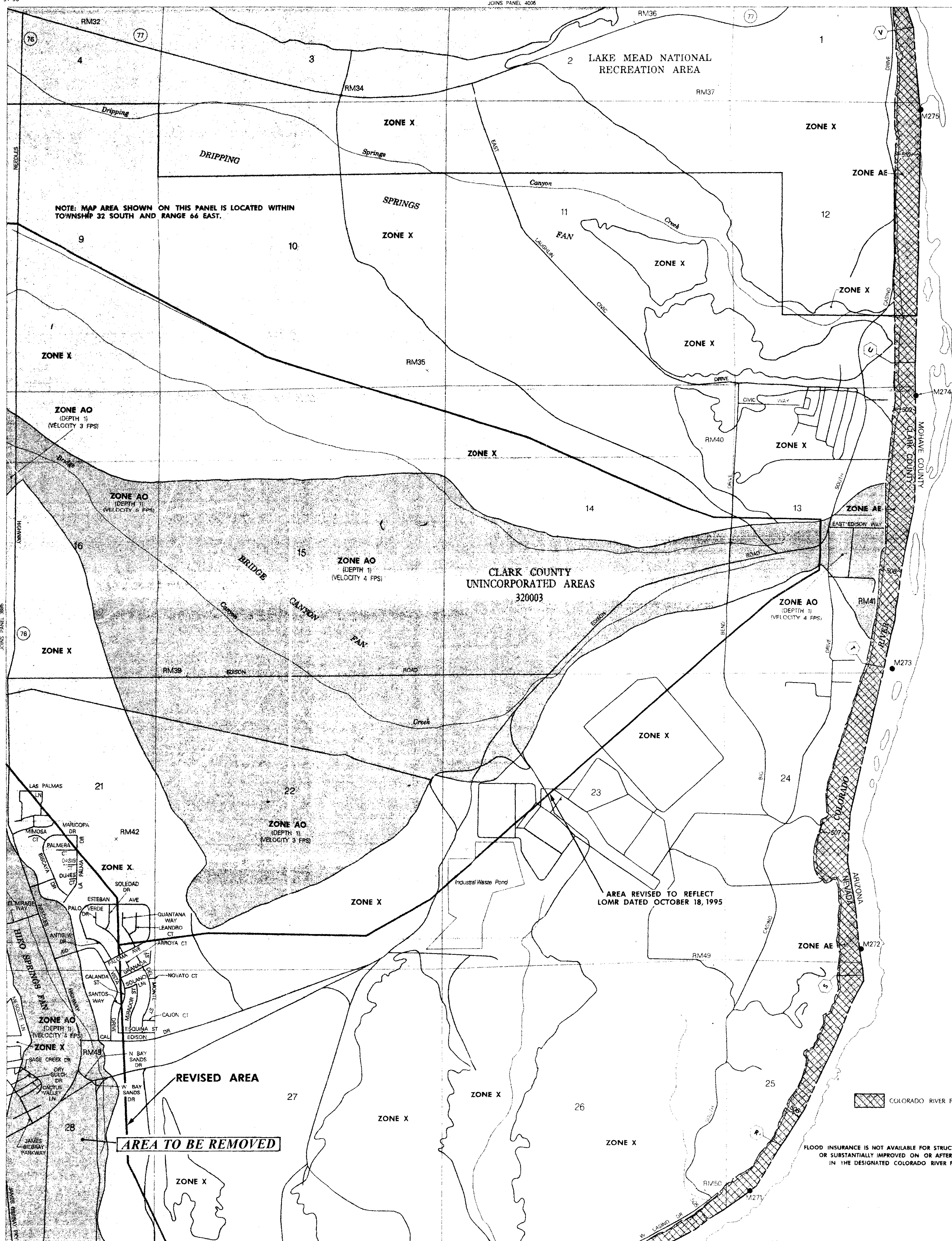
MAP NUMBER 32003C3995 D

EFFECTIVE DATE: AUGUST 16, 1995

Federal Emergency Management Agency

REFERENCE MARK	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
RM32	1178.24	Davis Dam, 3.5 miles west of U.S. Post Office, along State Highway 163; 48 feet south of center of highway; in concrete post; standard tablet stamped "71 WR 1948 1178.24"
RM34	956.60	Davis Dam, 3.5 miles west of U.S. Post Office, along State Highway 163; 36 feet south of highway and country road crossing; 6 feet northeast of sign "SWAIN"; on rock projecting 4 inches above ground; chiseled square
RM35	814.49	Davis Dam, 1.8 miles southwest of U.S. Post Office; in southeast corner of southeast quarter Section 10, Township 22 south, Range 66 east; along double pole powerline; 22 feet northwest of powerline road; in concrete post; standard tablet stamped "10 WR 1948 814.49"
RM36	749.06	Davis Dam, 1.4 miles west of U.S. Post Office, along State Highway 163; 43 feet north of and 4 feet higher than center of highway; in concrete post; standard tablet stamped "10 WR 1948 749.06"
RM37	827.03	Located approximately 1 mile southwest of Davis Dam; on a sandy hill south of river; A standard GLO pipe and cap stamped "7325 S1 52 S11 512 866 1932," projecting 0.5 feet above ground
RM39	891.01	Located approximately 0.5 mile east of the intersection of Needles Highway and Edison Road, along Edison Road, on the south side. Station Mark: A standard GLO pipe and cap stamped "7325 S1 52 S11 512 866 1932," projecting 0.4 foot above ground
RM40	662.78	Set spike approximately 600 feet west of dirt road; approximately 2.218 feet north of Edison Road and approximately 3.66 miles east of Needles Highway
RM41	526.14	Set 1/2 inch rebar at the edge of the river between Pioneer and Edgewater Casinos on empty lot between 2 large soil cedar trees
RM42	825.84	Davis Dam, 3.8 miles southeast of along a double pole powerline; 30 feet west of powerline road; 10 feet west of west powerline wire; in concrete post; standard tablet stamped "11 WR 1948 825.84"
RM48	657.70	PK nail in centerline of Needles Highway at point of curve of pavement
RM49	704.50	Set 1/2 inch rebar approximately 1/4 mile east of east fence around Mahone Generating Station near Southeast corner Section 23, Township 32 South, Range 66 East
RM50	542.71	Set 1/2 inch rebar west side river atop small bluff near intersection of west line Section 25 and river, Township 32 South, Range 66 East

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 32 SOUTH AND RANGE 66 EAST.



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR 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 shallow fan flooding velocities also determined.
- ZONE A99** To be protected from 100-year flood by Federal flood protection system under construction; no base elevations determined.
- ZONE V** Coastal flood with velocity hazard (wave action); no base flood elevations determined.
- ZONE VE** Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

- ZONE X** Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

- ZONE X** Areas determined to be outside 500-year floodplain.
- ZONE D** Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS

- Identified 1983
- Identified 1990
- Otherwise Protected Area

Map Symbols:

- Flood Boundary
- Floodway Boundary
- Zone D Boundary
- Boundary Dividing Special Flood Hazard Zones and Boundaries
- Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones
- Base Flood Elevation Line; Elevation in Feet. See Map Index for Elevation Datum.
- Cross Section Line
- Base Flood Elevation in Feet Where Uniform Within Zone. See Map Index for Elevation Datum.
- Elevation Reference Mark
- River Mile
- Horizontal Coordinates Based on North American Datum of 1927 (NAD 27) Projection.

NOTES

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 or all planimetric features outside Special Flood Hazard Areas.

Coastal base flood elevations apply only to landward of 0.0 NGVD and include the effects of wave action; these elevations may also differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

Areas of Special Flood Hazard (100-year flood) include Zones A, AE, AH, AO, A99, V, and VE.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

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 Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Floodway widths are provided in the Flood Insurance Study Report.

This map may incorporate approximate boundaries of Coastal Barrier Resource System (landward of or otherwise protected) areas established under the Coastal Barrier Improvement Act of 1990 (PL 101-591).

Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent to the issuance of this map.

For community map revision history prior to countywide mapping, see Section 8.0 of the Flood Insurance Study Report.

For adjoining map panels and base map source see separately printed Map Index.

MAP REPOSITORY

Refer to Repository Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP:

AUGUST 16, 1995

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL:

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE DATE shown on this map to determine when actual rates apply to structures in zones where elevations or depths have been established.

To determine if flood insurance is available contact an insurance agent or call the National Flood Insurance Program at (800) 638-6602.

APPROXIMATE SCALE IN FEET

1000 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

EFFECTIVE FIRM

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY, NEVADA AND INCORPORATED AREAS

PANEL 4015 OF 4090
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS: COMMUNITY NUMBER PANEL SURF

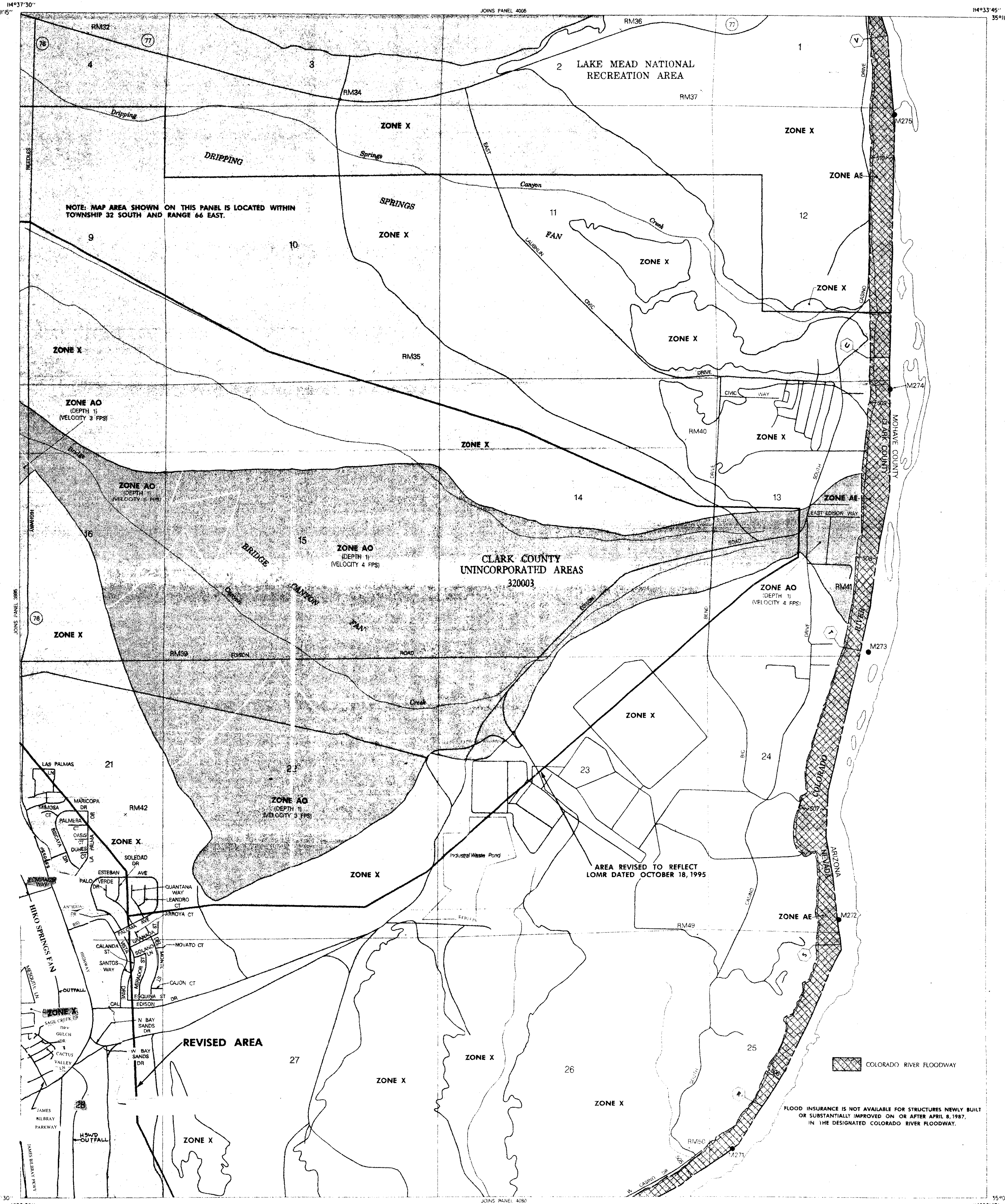
CLARK COUNTY UNINCORPORATED AREAS 320003 4015 0

REVISED TO REFLECT LOMR DATED NOV 21 1995

MAP NUMBER 32003C4015 D

EFFECTIVE DATE: AUGUST 16, 1995

REFERENCE ELEVATION MARK (FEET NGVD)	DESCRIPTION OF LOCATION
RM32 1178.24	Davis Dam 2.5 miles west of U.S. Post Office along State Highway 163; 48 feet south of center of highway; in concrete post; standard tablet stamped "7 WR 1948 1178."
RM34 956.60	Davis Dam 2.5 miles west of U.S. Post Office along State Highway 163; 36 feet south of highway and country road crossing; 8 feet northeast of sign "SWAIN"; on rock projecting 4 inches above ground; chiseled square.
RM35 814.49	Davis Dam 1.8 miles southwest of U.S. Post Office; in southeast corner of southeast quarter Section 10, Township 32 south, Range 66 east; along double pole powerline; 22 feet northwest of powerline road; in concrete post; standard tablet stamped "10 WR 1948 814."
RM36 749.06	Davis Dam 1.4 miles west of U.S. Post Office along State Highway 163; 43 feet north of and 4 feet higher than center of highway; in concrete post; standard tablet stamped "8 WR 1948."
RM37 827.03	Located approximately 1 mile southeast of Davis Dam; on 0.75 mile west of the Colorado River; on a sandy hill. Station mark: A standard GLO pipe and cap stamped "T325 S1 S2 S11 S12 R668 1932," projecting 0.5 feet above ground.
RM39 891.01	Located approximately 0.5 mile east of the intersection of Needles Highway and Edison Road, along Edison Road, on the south side. Station Mark: A standard GLO pipe and cap stamped "T325 R668 S16 S15 S21 S22 1932," projecting 0.4 feet above ground.
RM40 662.78	Set spike approximately 600 feet west of dirt road; approximately 2,218 feet north of Edison Road and approximately 2.66 miles east of Needles Highway.
RM41 526.14	Set 1/2 inch rebar at the edge of the river between Pioneer and Edgewater Caudins; an empty lot between 2 large salt cedar trees.
RM42 828.84	Davis Dam 3.8 miles southeast of along a double pole powerline; 30 feet west of powerline road; 10 feet west of west powerline wire; in concrete post; standard tablet stamped "11 WR 1948 828."
RM48 657.70	PX nail in centerline of Needles Highway at point of curve of pavement.
RM49 704.50	Set 1/2 inch rebar approximately 1/4 mile east of west fence around Mohave Generating Station near Southeast corner Section 23, Township 32 South, Range 66 East.
RM50 542.71	Set 1/2 inch rebar west side river atop small bluff near intersection of west line Section 25, and river. Township 32 South, Range 66 East.



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDED BY 100-YEAR FLOOD

- ZONE A** No base flood elevations determined.
- ZONE AE** Base flood elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet locally areas of ponding; base flood elevations determined.
- ZONE AO** Flood depths of 1 to 3 feet locally short flow on sloping terrain; average depths determined. For areas of situated fan flooding, velocities also determined.
- ZONE A99** To be protected from 100-year flood by Federal flood protection system under construction; no base flood elevations determined.
- ZONE V** Coastal flood with velocity hazard (wave action); no base flood elevations determined.
- ZONE VE** Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

- ZONE X** Areas of 100-year flood areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

- ZONE X** Areas determined to be outside 500-year floodplain.
- ZONE D** Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS

- Identified 1983
- Identified 1990
- Otherwise Protected Areas

Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.

Boundaries

- Flood Boundary
- Floodway Boundary
- Zone D Boundary
- Boundary Dividing Special Flood Hazard Zones and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones

Elevations

- Base Flood Elevation Line: Elevation in Feet See Map Index for Elevation Datum.
- Cross Section Line
- Base Flood Elevation in Feet Where Uniform Within Zone. See Map Index for Elevation Datum, Elevation Reference Mark.
- River Mile

Horizontal Coordinates Based on North American Datum of 1927 (NAD 27) Projection.

NOTES

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 or all potential features outside Special Flood Hazard Areas.

Coastal base flood elevations apply only to landward of 0.0 NGVD, and include the effects of wave action; these elevations may also differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

Areas of Special Flood Hazard (100-year flood) include Zones A, AE, AH, AO, A99, V, and VE.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

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 Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Floodway widths are provided in the Flood Insurance Study Report.

This map may incorporate approximate boundaries of Coastal Barrier Resource System Units and/or Otherwise Protected Areas established under the Coastal Barrier Improvement Act of 1980 (PL 101-581). Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent to the issuance of this map.

For community map revision history prior to countywide mapping, see Section 6.0 of the Flood Insurance Study Report.

For additional map panels and base map source see separately printed Map Index.

MAP REPOSITORY

Refer to Repository Listing on Map Index.

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP:

AUGUST 18, 1995

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL:

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE DATE shown on this map to determine when actual rates apply to structures in zones where elevations or depths have been established.

To determine if flood insurance is available, contact an insurance agent or call the National Flood Insurance Program at (800) 638-6620.

APPROXIMATE SCALE IN FEET

1000 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

REVISED FIRM

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY, NEVADA AND INCORPORATED AREAS

PANEL 4015 OF 4090
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS: COMMUNITY

NUMBER: PANEL SUFFIX

CLARK COUNTY UNINCORPORATED AREAS 320003 4015 D

REVISED TO REFLECT LOMR DATED NOV 21 1995

MAP NUMBER 32003C4015 D

EFFECTIVE DATE: AUGUST 16, 1995

REFERENCE MARK	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
RM43	611.04	Set Cotton Spindle on side of mountain on west side of Needles Highway.
RM44	504.44	Set 1/2 inch rebar on west bank of river on edge of Dike Road South and west of Hancock Road extension on Arizona side.
RM45	903.46	Round U.S. GLO. B.C. quarter Corner Sections 5 and 6, Township 33 South, Range 66 East.
RM46	586.55	Set 1/2 inch rebar east side Needles Highway at pipeline pump station near northeast 1/4 corner of Section 8, Township 33 South, Range 66 East.



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR 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 A99 To be protected from 100-year flood by Federal flood protection system under construction; no base elevations determined.

ZONE V Coastal flood with velocity hazard (wave action); no base flood elevations determined.

ZONE VE Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

ZONE X Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

ZONE X Areas determined to be outside 500-year floodplain.

ZONE D Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS

Identified 1987
Identified 1990
Observed

Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.

Flood Boundary
Floodway Boundary
Zone D Boundary
Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.
Base Flood Elevation Line: Elevation in Feet. See Map Index for Elevation Datum.
Cross Section Line
Base Flood Elevation in Feet Within Uniform Within Zone. See Map Index for Elevation Datum.
Elevation Reference Mark
River Mile
Horizontal Coordinates Based on North American Datum of 1927 (NAD 27) Projection.

NOTES

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, or all parametric features outside Special Flood Hazard Areas.

Coastal base flood elevations apply only to landward of 0.0 NGVD, and include the effects of wave action; these elevations may also differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

Areas of Special Flood Hazard (100-year flood) include Zones A, AE, AH, AO, A99, V, and VE.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

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 Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Floodway widths are provided in the Flood Insurance Study Report.

This map may incorporate approximate boundaries of Coastal Barrier Resource System Units and/or Observed Protected Areas established under the Coastal Barrier Improvement Act of 1960 (PL 86-581).

Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent to the issuance of this map.

For community map revision history prior to countywide mapping, see Section 6.0 of the Flood Insurance Study Report.

For adjoining map panels and base map source see separately printed Map Index.

MAP REPOSITORY
Refer to Repository Listing on Map Index.

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP:
AUGUST 16, 1995

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL:

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE DATE shown on this map to determine when actuarial rates apply to structures in zones where elevations or depths have been established.

To determine if flood insurance is available, contact an insurance agent or call the National Flood Insurance Program at (800) 638-6920.

APPROXIMATE SCALE IN FEET
1000 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

EFFECTIVE FIRM FIRM FLOOD INSURANCE RATE MAP

CLARK COUNTY, NEVADA AND INCORPORATED AREAS

PANEL 4060 OF 4090
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS: COMMUNITY NUMBER PANEL SURVEY

CLARK COUNTY UNINCORPORATED AREAS 320003 4060 D

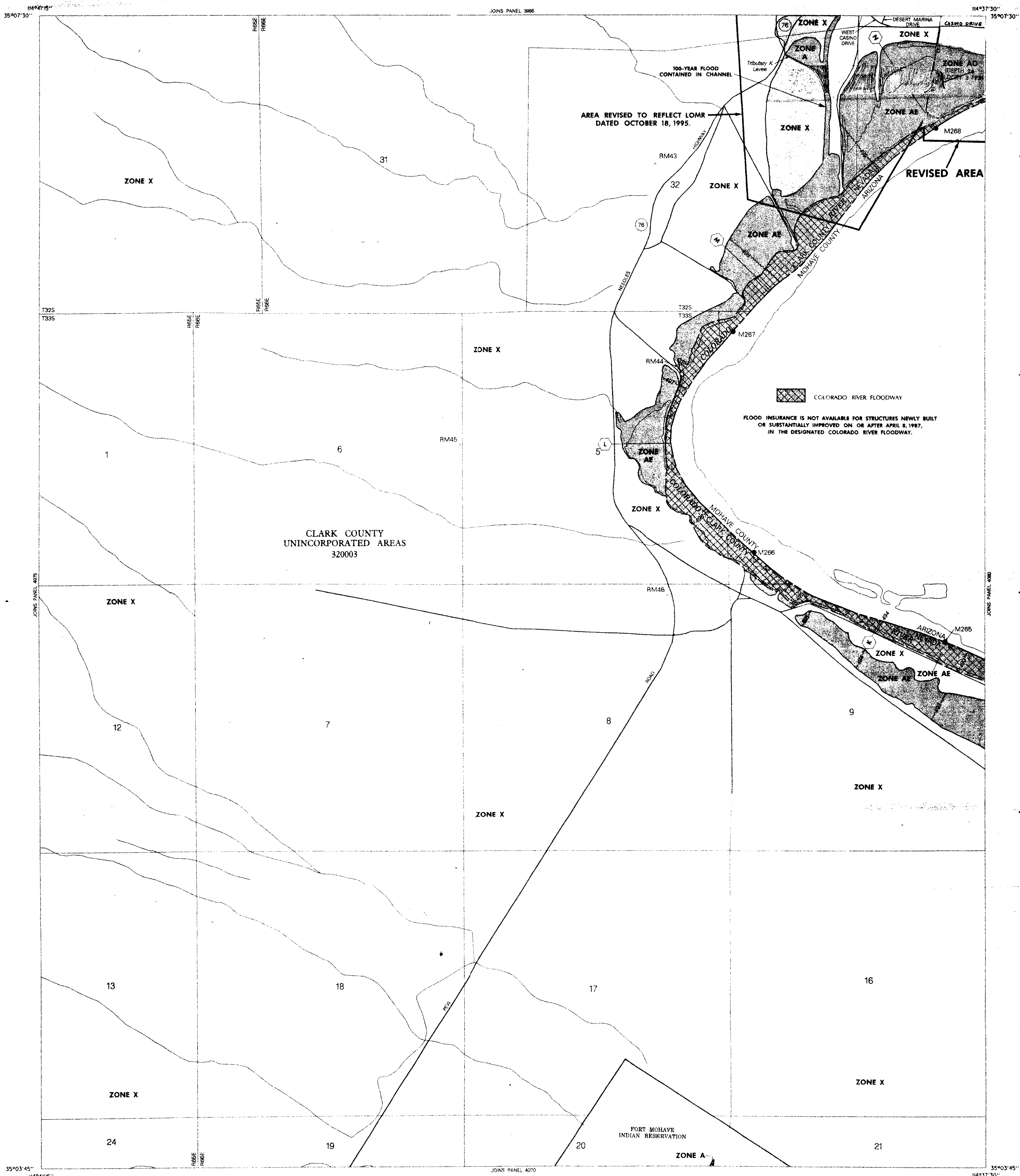
REVISED TO REFLECT LOMR DATED MAY 21 1995

MAP NUMBER 32003C4060 D

EFFECTIVE DATE: AUGUST 16, 1995



REFERENCE MARK	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
RM43	611.04	Set Cotton Spindle on side of mountain on west side on Needles Highway.
RM44	504.44	Set 1/2 inch rebar on west bank of river on edge of Dike Road South and west of Hancock Road extension on Arizona side.
RM45	903.46	Round U.S. GLO B.C. quarter Corner Sections 5 and 6, Township 33 South, Range 66 East.
RM46	586.53	Set 1/2 inch rebar east side Needles Highway at pipeline pump station near northeast 1/4 corner of Section 8, Township 33 South, Range 66 East.



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR 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 APP To be protected from 100-year flood by Federal flood protection system under construction; no base elevations determined.

ZONE V Coastal flood with velocity hazard (wave action); no base flood elevations determined.

ZONE VE Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

ZONE X Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

ZONE D Areas determined to be outside 500-year floodplain.

ZONE U Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS

Identified 1983

Identified 1993

Otherwise Protected Areas

Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.

Flood Boundary

Floodway Boundary

Zone D Boundary

Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones

Base Flood Elevation Line; Elevation in Feet. See Map Index for Elevation Datum.

Cross Section Line

Base Flood Elevation in Feet When Uniform Within Zone. See Map Index for Elevation Datum.

Elevation Reference Mark

River Mile

Horizontal Coordinates Based on North American Datum of 1927 (NAD 27) Projection.

NOTES

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 or small size, or all planning features outside Special Flood Hazard Areas.

Coastal base flood elevations apply only to landward of 0.0 NGVD, and include the effects of wave action; these elevations may also differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

Areas of Special Flood Hazard (100-year flood) include Zones A, AE, AH, AO, APP, V, and VE.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

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 Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Floodway widths are provided in the Flood Insurance Study Report.

This map may incorporate approximate boundaries of Coastal Barrier Resource System Units and/or Otherwise Protected Areas established under the Coastal Barrier Improvement Act of 1980 (PL 96-380).

Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent to the issuance of this map.

For community map revision history prior to countywide mapping, see Section 6.0 of the Flood Insurance Study Report.

For adjoining map panels and base map source see separately printed Map Index.

MAP REPOSITORY

Refer to Repository Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP:

AUGUST 16, 1995

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL:

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE DATE shown on this map to determine when actuarial rates apply to structures in zones where elevations or depths have been established.

To determine if flood insurance is available, contact an insurance agent or call the National Flood Insurance Program at (800) 658-8620.

APPROXIMATE SCALE IN FEET

1000 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

REVISED FIRM

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY, NEVADA AND INCORPORATED AREAS

PANEL 4060 OF 4090
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS: COMMUNITY

NUMBER: CLARK COUNTY, UNINCORPORATED AREAS 320003

PANEL: 4060

SUFFIX: D

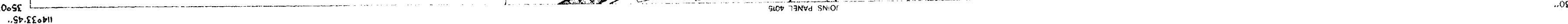
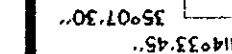
REVISED TO REFLECT LOMR DATED MAY 21, 1995

MAP NUMBER 32003C4060 D

EFFECTIVE DATE: AUGUST 16, 1995

Federal Emergency Management Agency

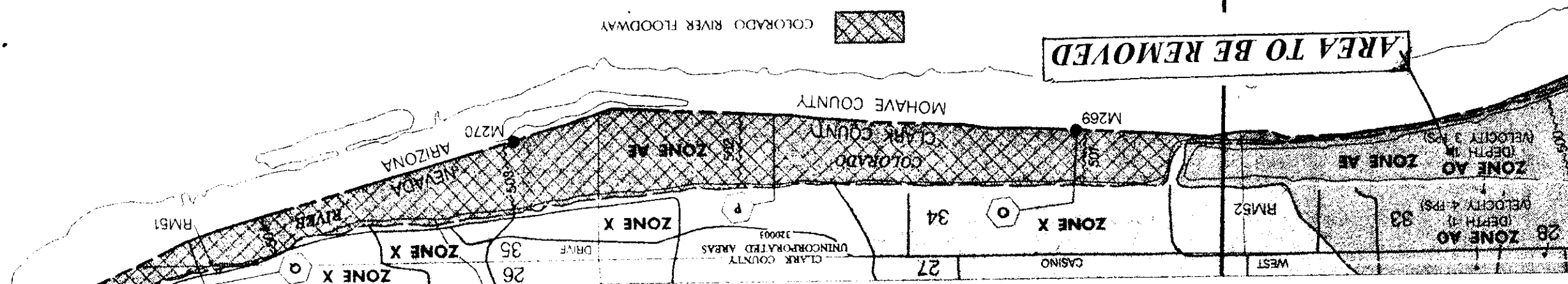
SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD



FLOOD INSURANCE IS NOT AVAILABLE FOR STRUCTURES NEWLY BUILT OR SUBSTANTIALLY IMPROVED ON OR AFTER APRIL 8, 1987, IN THE DESIGNATED COLORADO RIVER FLOODWAY.

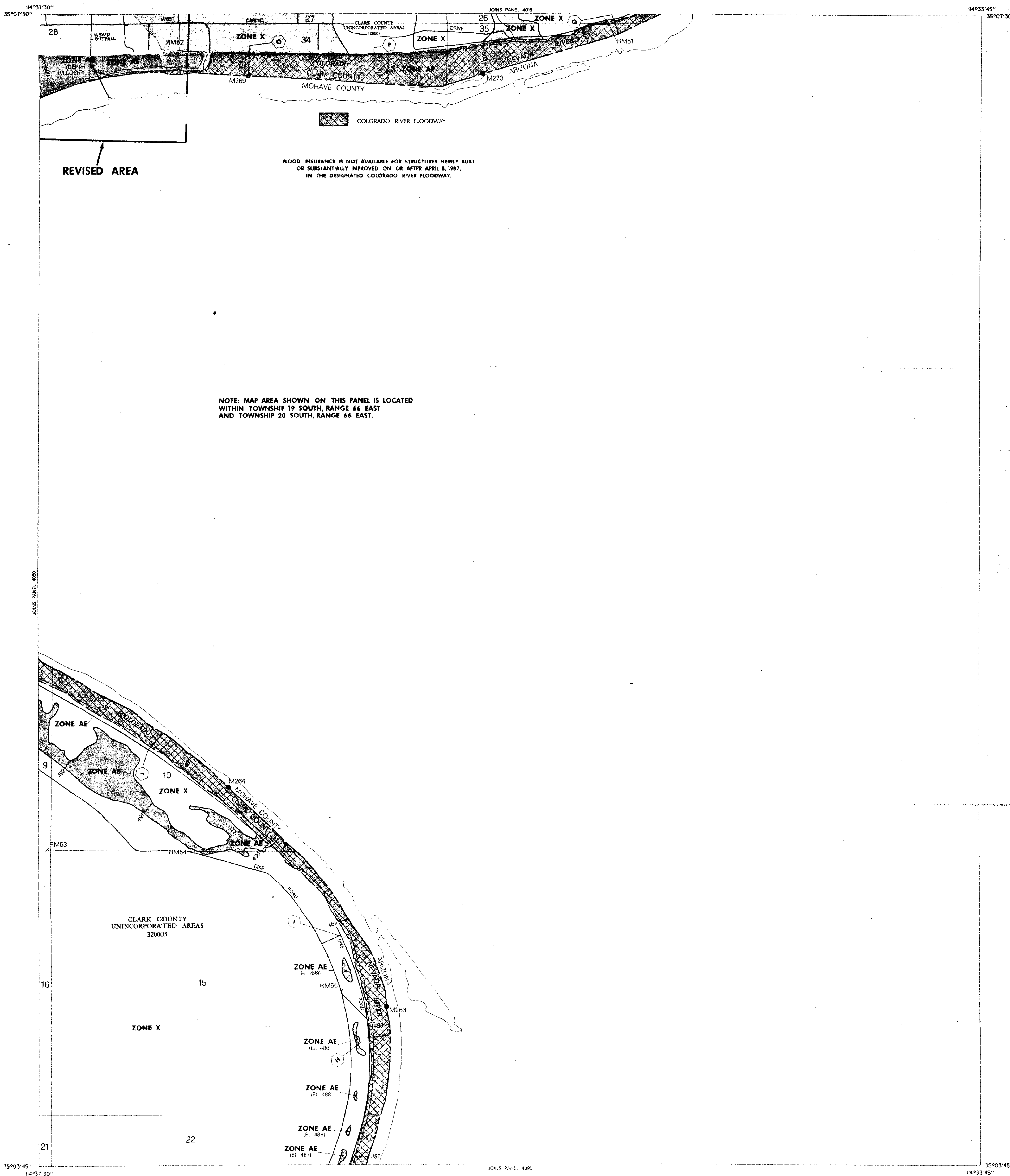
REVISSED AREA

AREA TO BE REMOVED



NW51 (FEET NVD)	DESCRIPTION OF LOCATION
522.00	Set 1/2 inch "labor oil" containing diesel opposite intersection of Arden Boulevard and Highway 55 on Arden side of river.
517.48	South in empty lot opposite Longford Drive on south side of river in Arden.
NW52	Section 15, Q10 & C, Section Corner Range 6 East, Township 33 South, Range 6 East.
503.40	Set 1/2 inch "labor west side of Dike" north line of Section 15, Township 33 South, Range 6 East.
NW54	Set 1/2 inch "labor west side of Dike" north line of Section 15, Township 33 South, Range 6 East.
505.04	Set 1/2 inch "labor west side of Dike" north line of Section 15, Township 33 South, Range 6 East.
NW55	Set 1/2 inch "labor west side of Dike" north line of Section 15, Township 33 South, Range 6 East.

REFERENCE MARK	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
RM51	522.02	Set 1/2 inch rebar at centerline dike road west side of river, more or less opposite intersection of Arcadia Boulevard and Highway 93 on Arizona side of river.
RM52	517.84	Set 1/2 inch rebar on north river bank in empty lot opposite Longford Drive on south side of river in Arizona.
RM53	503.40	Found U.S. GLO. B. C. Section Corner Sections 9, 10, 16, Township 33 South, Range 66 East.
RM54	507.19	Set 1/2 inch rebar west side of river and on northeast side of dike road along the north line of Section 15, Township 33 South, Range 66 East.
RM55	505.04	Set 1/2 inch rebar west side of river at fork in dike road in Section 15, Township 33 South, Range 66 East.



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

- ZONE A** No base flood elevations determined.
- ZONE AE** Base flood elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet usually occur on sloping terrain; average depths determined; for areas of shallow fan flooding, velocities also determined.
- ZONE AO** Flood depths of 1 to 3 feet usually occur on sloping terrain; average depths determined; for areas of shallow fan flooding, velocities also determined.
- ZONE APP** To be protected from 100-year flood by Federal flood protection system under construction; no base elevations determined.
- ZONE V** Coastal flood with velocity hazard (wave action); base flood elevations determined.
- ZONE VE** Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

- ZONE X** Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

- ZONE X** Areas determined to be outside 500-year floodplain.
- ZONE D** Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS

- Identified 1983 Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.
- Identified 1990 Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.
- Otherwise Protected Areas

Map Symbols:

- Flood Boundary
- Floodway Boundary
- Zone D Boundary
- Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones
- Base Flood Elevation Line; Elevation in Feet See Map Index for Elevation Datum.
- Cross Section Line
- Base Flood Elevation in Feet Where Uniform Within Zone. See Map Index for Elevation Datum.
- Elevation Reference Mark
- River Mile
- Horizontal Coordinates Based on North American Datum of 1983 (NAD 83) Projection.

NOTES

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, or all phenomena features outside Special Flood Hazard Areas.

Coastal base flood elevations apply only to areas of 0.5 MWAD, and include the effects of wave action; these elevations may also differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

Areas of Special Flood Hazard (100-year flood) include Zones A, AE, AH, AO, APP, V, and VE.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

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 Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Floodway widths are provided in the Flood Insurance Study Report.

This map may incorporate appropriate boundaries of Coastal Barrier Resource System Units and/or Otherwise Protected Areas established under the Coastal Barrier Improvement Act of 1960 (PL 86-363).

Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent to the issuance of this map.

For community map revision history prior to countywide mapping, see Section 8.0 of the Flood Insurance Study Report.

For adjoining map panels and base map source see separately printed Map Index.

MAP REPOSITORY
Refer to Repository Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP:
AUGUST 16, 1995

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL:

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE DATE shown on this map to determine when actuarial rates apply to structures in zones where elevations or depths have been established.

To determine if flood insurance is available, contact an insurance agent or call the National Flood Insurance Program at (800) 838-6520.

APPROXIMATE SCALE IN FEET
0 1000 1000

NATIONAL FLOOD INSURANCE PROGRAM

REVISED FIRM
FIRM
FLOOD INSURANCE RATE MAP

CLARK COUNTY, NEVADA AND INCORPORATED AREAS

PANEL 4080 OF 4090
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS COMMUNITY	NUMBER	PANEL	SUFFIX
CLARK COUNTY UNINCORPORATED AREAS	32003	4080	D

REVISED TO REFLECT LOMR DATED NOV 21 1996
MAP NUMBER 32003C4080 D
EFFECTIVE DATE: AUGUST 16, 1995