

11-09-2931 P



MWH

BUILDING A BETTER WORLD

RFCD

2011 JUN -1 AM 10: 56

May 19, 2011

Attention LOMR Managers
LOMC Clearinghouse
7390 Coca Cola Drive, Suite 204
Hanover, MD 21076

Subject: Request for Letter of Map Revision for the Tropical Parkway Channel East

Dear LOMR Managers:

With this letter, we are requesting that FEMA review the enclosed documents in support of a LOMR for the Community Panel Number 320003C 1769 and 1788D, effective date September 27, 2002 in the City of North Las Vegas, Clark County Nevada. Our request is based on the analyzed floodplain in the LOMR issued by FEMA on July 19, 2006 and September 28, 2007 (Case Numbers 06-09-B002P, and 06-09-BE46P) in which the 100-year flood was contained in the existing wash as shown on Figure 4.

The purpose of this Request for LOMR is to revise the 1% (100-year) annual chance flow to the Unnamed Tributary floodplain Zone A. The Unnamed Tributary drains in a southeast direction and is bordered to the north by Tropical Parkway, to the west by Revere Street, and to the east by the Las Vegas Wash and its improvements.

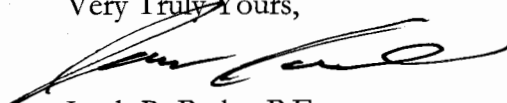
A new Zone A floodplain boundary has been determined due to the reduction of flows being intercepted by the constructed Centennial Parkway Channel East and Tropical Parkway Channel East regional facilities. An annotated FEMA FIRM (Figure 4) is shown to reflect the changes to the flood boundary based on the analysis performed. The HEC-RAS model output and diskette is also included for your review in the Appendix. Enclosed with this letter is the documentation in support of the LOMR. This includes:

Appendix

- Technical Hydrology Hydraulics Memorandum
- HEC-RAS Analysis
- Referenced Material

Should any additional information be required or should you have any questions, please do not hesitate to contact Jarah Parke, P.E. at 702-878-8010.

Very Truly Yours,



Jarah R. Parke, P.E.

3010 West Charleston Boulevard
Suite 100
Las Vegas, Nevada 89102

TEL 702 878 8010
FAX 702 878 7833
www.mwhglobal.com

**U.S. DEPARTMENT OF HOMELAND SECURITY - FEDERAL EMERGENCY MANAGEMENT AGENCY
OVERVIEW & CONCURRENCE FORM**

O.M.B No. 1660-0016
Expires: 12/31/2010

PAPERWORK BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 1 hour per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless a valid OMB control number appears in the upper right corner of this form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, U.S. Department of Homeland Security, Federal Emergency Management Agency, 500 C Street, SW, Washington DC 20472, Paperwork Reduction Project (1660-0016). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

A. REQUESTED RESPONSE FROM DHS-FEMA

This request is for a (check one):

- ☐ CLOMR: A letter from DHS-FEMA commenting on whether a proposed project, if built as proposed, would justify a map revision, or proposed hydrology changes (See 44 CFR Ch. 1, Parts 60, 65 & 72).
- ☒ LOMR: A letter from DHS-FEMA officially revising the current NFIP map to show the changes to floodplains, regulatory floodway or flood elevations. (See 44 CFR Ch. 1, Parts 60, 65 & 72)

B. OVERVIEW

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

Community No.	Community Name	State	Map No.	Panel No.	Effective Date
Ex: 480301 480287	City of Katy Harris County	TX	480301 48201C	0005D 0220G	02/08/83 09/28/90
32007	City of North Las Vegas	NV	32003C	1969E	07/19/06
32007	City of North Las Vegas	NV	32003C	1788E	09/28/07

2. a. Flooding Source: Unnamed Tributary to the Las Vegas Wash

- b. Types of Flooding: ☒ Riverine ☐ Coastal ☐ Shallow Flooding (e.g., Zones AO and AH)
- ☐ Alluvial fan ☐ Lakes ☐ Other (Attach Description)

3. Project Name/Identifier: Tropical Parkway Channel East

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

5. Basis for Request and Type of Revision:

a. The basis for this revision request is (check all that apply)

- ☒ Physical Change ☐ Improved Methodology/Data ☐ Regulatory Floodway Revision ☐ Base Map Changes
- ☐ Coastal Analysis ☐ Hydraulic Analysis ☒ Hydrologic Analysis ☐ Corrections
- ☐ Weir-Dam Changes ☐ Levee Certification ☐ Alluvial Fan Analysis ☐ Natural Changes
- ☐ New Topographic Data ☐ Other (Attach Description)

Note: A photograph and narrative description of the area of concern is not required, but is very helpful during review.

b. The area of revision encompasses the following structures (check all that apply)

- Structures: ☒ Channelization ☐ Levee/Floodwall ☐ Bridge/Culvert
- ☐ Dam ☐ Fill ☐ Other (Attach Description)

C. REVIEW FEE

Has the review fee for the appropriate request category been included?

☒ Yes

Fee amount: \$5,300

☐ No, Attach ExplanationPlease see the DHS-FEMA Web site at http://www.fema.gov/plan/prevent/fhm/firm_fees.shtm for Fee Amounts and Exemptions.**D. SIGNATURE**

All documents submitted in support of this request are 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: Gabriela Estrada

Company: MWH, Americas

Mailing Address:
3010 W. Charleston Blvd, Suite 100
Las Vegas, NV 89102

Daytime Telephone No.: 702-878-8010

Fax No.: 702-878-7833

E-Mail Address: Maria.G.Estrada@us.mwhglobal.com

Signature of Requester (required):

Date: 5/19/11

As the community official responsible for floodplain management, I hereby acknowledge that we have received and reviewed this Letter of Map Revision (LOMR) or conditional LOMR request. Based upon the community's review, we find the completed or proposed project meets or is designed to meet all of the community floodplain management requirements, including the requirement that no fill be placed in the regulatory floodway, and that all necessary Federal, State, and local permits have been, or in the case of a conditional LOMR, will be obtained. In addition, we have determined that the land and any existing or proposed structures to be removed from the SFHA are or will be reasonably safe from flooding as defined in 44CFR 65.2(c), and that we have available upon request by FEMA, all analyses and documentation used to make this determination.

Community Official's Name and Title: Jennifer Doody, P.E. CFM, Manager

Community Name: City of North Las Vegas

Mailing Address:
2266 Civic Center Drive
North Las Vegas, 89030

Daytime Telephone No.: 702-633-1223

Fax No.: 702-649-4696

E-Mail Address: doodyj@cityofnorthlasvegas.com

Community Official's Signature (required):

Date: 5/24/11

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

This certification is to be signed and sealed by a licensed land surveyor, registered professional engineer, or architect authorized by law to certify elevation information data, hydrologic and hydraulic analysis, and any other supporting data. All documents submitted in support of this request are correct to the best of my knowledge. All analyses have been performed correctly and in accordance with sound engineering practices. All project works are designed in accordance with sound engineering practices to provide protection from the 1% annual chance flood. If "as-built" conditions data/plan provided, then the structure(s) has been built according to the plans being certified, is in place, and is fully functioning. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Certifier's Name: Jarah R. Parke

License No.: 20945

Expiration Date: 12-31-11

Company Name: MWH Americas

Telephone No.: 702-878-8010

Fax No.: 702-878-7833

Signature:

Date: 5-19-2011 5/19/11

Ensure the forms that are appropriate to your revision request are included in your submittal.

Form Name and (Number)**Required if ...**

- | | |
|---|---|
| ☒ Riverine Hydrology and Hydraulics Form (Form 2) | New or revised discharges or water-surface elevations |
| ☐ Riverine Structures Form (Form 3) | Channel is modified, addition/revision of bridge/culverts, addition/revision of levee/floodwall, addition/revision of dam |
| ☐ Coastal Analysis Form (Form 4) | New or revised coastal elevations |
| ☐ Coastal Structures Form (Form 5) | Addition/revision of coastal structure |
| ☐ Alluvial Fan Flooding Form (Form 6) | Flood control measures on alluvial fans |

Seal (Optional)

Jill Reilly

From: Jill Reilly
Sent: Monday, June 20, 2011 1:57 PM
To: 'Jarah Parke'
Cc: Wessam Daoud
Subject: RE: TPCE LOMR

Thanks for the quick reply. I'll forward this along to Kevin and will let you know if we have further comments or questions.

From: Jarah Parke [<mailto:Jarah.R.Parke@us.mwhglobal.com>]
Sent: Monday, June 20, 2011 1:49 PM
To: Jill Reilly
Cc: Wessam Daoud
Subject: RE: TPCE LOMR

Jill, Thank you for your review of the LOMR. Please see my responses below. If you have any questions, feel free to call.

Jarah

From: Jill Reilly [<mailto:JReilly@regionalflood.org>]
Sent: Monday, June 20, 2011 10:16 AM
To: Jarah Parke
Subject: TPCE LOMR

Jarah,
I just read through the LOMR for Tropical Pkwy Channel East and came to the following conclusion: Even if we increase capacity of the facility in Tropical upstream of Commerce, which would eliminate flow in Commerce (131 cfs), there will still be a floodzone downstream, most likely from flow out of the Sierra Ranch development and localized runoff. Do you agree? Yes I agree. The flow would be reduced but there would still be a flood zone.

Is flow in Commerce contained within the curbs? Figure 3 indicates that flow might encroach on driveways or within landscape areas on the west side – there's not an even edge like on the east side. No, in some locations the flow extends over the sidewalk and into driveways hence the uneven edge. The flood zone was modified where it could be but along Commerce the flood zone did not change much even with the reduction in flow. Also the curb and sidewalk on the west side of Commerce are slightly lower than the east. Just curious whether this area needs revising with the lower flowrate.

Thanks,
Jill

RFCD

2011 JUN 11 AM 10:56

3010 West Charleston Boulevard
Suite 100
Las Vegas, Nevada 89102

TEL 702 878 8010
FAX 702 878 7833
www.mwhglobal.com

Date: May 31, 2011

To: Jill Reilly, P.E.
Regional Flood Control District
600 S. Grand Central Pkwy Suite 300
Las Vegas, NV 89106-4511

From: Jarah Parke, PE

Re: Request for LOMR for the
Tropical Parkway Channel East

The following items are:

- | | | | |
|--------------------------------------|--|--|--|
| ☐ Requested | ☒ Enclosed | ☒ Sent via Courier | |
| ☐ Report | ☐ Specification | ☐ Cost Estimate | ☐ Shop Drawings |
| ☐ Test Result | ☐ Prints | ☐ Test Sample | ☐ Other |

No. of Copies	Description
1	Request for LOMR Package for Tropical Parkway Channel East Project

This data is submitted:

- | | |
|--|--|
| ☐ At your request | ☐ For your action |
| ☐ For your approval | ☒ For your files |
| ☐ For your review | ☐ For your information |

General Remarks.

U.S. DEPARTMENT OF HOMELAND SECURITY - FEDERAL EMERGENCY MANAGEMENT AGENCY
RIVERINE HYDROLOGY & HYDRAULICS FORM

O.M.B No. 1660-0016
Expires: 12/31/2010

PAPERWORK REDUCTION ACT

Public reporting burden for this form is estimated to average 3.25 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless a valid OMB control number appears in the upper right corner of this form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, U.S. Department of Homeland Security, Federal Emergency Management Agency, 500 C Street, SW, Washington DC 20472, Paperwork Reduction Project (1660-0016). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

Flooding Source: Unnamed Tributary to the Las Vegas Wash
Note: Fill out one form for each flooding source studied

A. HYDROLOGY

1. Reason for New Hydrologic Analysis (check all that apply)

- ☐ Not revised (skip to section B) ☐ No existing analysis ☒ Improved data
☐ Alternative methodology ☐ Proposed Conditions (CLOMR) ☒ Changed physical condition of watershed

2. Comparison of Representative 1%-Annual-Chance Discharges

Location	Drainage Area (Sq. Mi.)	Effective/FIS (cfs)	Revised (cfs)
N. 5 th and El Campo Grand	13.45	N/A	557
Ann Road and Bruce Street	13.45	N/A	557

3. Methodology for New Hydrologic Analysis (check all that apply)

- ☐ Statistical Analysis of Gage Records ☐ Precipitation/Runoff Model
☐ Regional Regression Equations ☒ Other (please attach description)
(Referenced Developed Condition Flows from Stanley Consultants)

Please enclose all relevant models in digital format, maps, computations (including computation of parameters) and documentation to support the new analysis.

4. Review/Approval of Analysis

If your community requires a regional, state, or federal agency to review the hydrologic analysis, please attach evidence of approval/review.

5. Impacts of Sediment Transport on Hydrology

Was sediment transport considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation for why sediment transport was not considered.

B. HYDRAULICS

1. Reach to be Revised

	Description	Cross Section	Water-Surface Elevations (ft.)	
			Effective	Proposed/Revised
Downstream Limit	Tie into Upper Las Vegas Wash	0.45	1977.31	1976.99
Upstream Limit	Tropical Parkway and Kitamaya Street	31	2078.77	2078.77

Note: Water surface elevations are from the HEC-RAS model. FIS Maps show Zone A with no published water surface elevations.

2. Hydraulic Method/Model Used

Hydraulic Analysis using HEC-RAS

B. HYDRAULICS (CONTINUED)

3. Pre-Submittal Review of Hydraulic Models

DHS-FEMA has developed two review programs, CHECK-2 and CHECK-RAS, to aid in the review of HEC-2 and HEC-RAS hydraulic models, respectively. These review programs may help verify that the hydraulic estimates and assumptions in the model data are in accordance with NFIP requirements, and that the data are comparable with the assumptions and limitations of HEC-2/HEC-RAS. CHECK-2 and CHECK-RAS identify areas of potential error or concern. **These tools do not replace engineering judgment.** CHECK-2 and CHECK-RAS can be downloaded from http://www.fema.gov/plan/prevent/fhm/firm_soft.shtm. We recommend that you review your HEC-2 and HEC-RAS models with CHECK-2 and CHECK-RAS. Review of your submittal and resolution of valid modeling discrepancies may result in reduced review time.

4. Models Submitted

<u>Datum</u>	<u>Natural Run</u>	<u>Floodway Run</u>
Duplicate Effective Model*	File Name: Plan Name:	File Name: Plan Name:
Corrected Effective Model*	File Name: Plan Name:	File Name: Plan Name:
Existing or Pre-Project Conditions Model	File Name: orion_lomr.prj Plan Name: File Name: Plan Name:	
X <u>Revised or Post-Project Conditions Model</u>	File Name: villages_lomr.prj Plan Name: File Name: Plan Name:	
X <u>NAVD88</u>	File Name: tpce.prj Plan Name: File Name: Plan Name:	
Other - (attach description)	File Name: Plan Name: File Name: Plan Name:	

* For details, refer to the corresponding section of the instructions.

☒ Digital Models Submitted? (Required)

C. MAPPING REQUIREMENTS

A **certified topographic map** must be submitted showing the following information (where applicable): the boundaries of the effective, existing, and proposed conditions 1%-annual-chance floodplain (for approximate Zone A revisions) or the boundaries of the 1%- and 0.2%-annual-chance floodplains and regulatory floodway (for detailed Zone AE, AO, and AH revisions); location and alignment of all cross sections with stationing control indicated; stream, road, and other alignments (e.g., dams, levees, etc.); current community easements and boundaries; boundaries of the requester's property; certification of a registered professional engineer registered in the subject State; location and description of reference marks; and the referenced vertical datum (NGVD, NAVD, etc.).

☐ Digital Mapping (GIS/CADD) Data Submitted

Note that the boundaries of the existing or proposed conditions floodplains and regulatory floodway to be shown on the revised FIRM and/or FBFM must tie-in with the effective floodplain and regulatory floodway boundaries. Please attach a **copy of the effective FIRM and/or FBFM**, annotated to show the boundaries of the revised 1%- and 0.2%-annual-chance floodplains and regulatory floodway that tie-in with the boundaries of the effective 1%- and 0.2%-annual-chance floodplain and regulatory floodway at the upstream and downstream limits of the area of revision.

☒ Annotated FIRM and/or FBFM (Required)

D. COMMON REGULATORY REQUIREMENTS*

1. For LOMR/CLOMR requests, do Base Flood Elevations (BFEs) increase? ☐ Yes ☒ No
- a. For CLOMR requests, if either of the following is true, please submit **evidence of compliance with Section 65.12 of the NFIP regulations**:
- The proposed project encroaches upon a regulatory floodway and would result in increases above 0.00 foot.
 - The proposed project encroaches upon a SFHA with or without BFEs established and would result in increases above 1.00 foot.
- b. For LOMR requests, does this request require property owner notification and acceptance of BFE increases? ☐ Yes ☒ No
If Yes, please attach **proof of property owner notification and acceptance (if available)**. Elements of and examples of property owner notification can be found in the MT-2 Form 2 Instructions.
2. Does the request involve the placement or proposed placement of fill? ☐ Yes ☒ No
If Yes, the community must be able to certify that the area to be removed from the special flood hazard area, to include any structures or proposed structures, meets all of the standards of the local floodplain ordinances, and is reasonably safe from flooding in accordance with the NFIP regulations set forth at 44 CFR 60.3(a)(3), 65.5(a)(4), and 65.6(a)(14). Please see the MT-2 instructions for more information.
3. For LOMR requests, is the regulatory floodway being revised? ☐ Yes ☒ No
If Yes, attach **evidence of regulatory floodway revision notification**. As per Paragraph 65.7(b)(1) of the NFIP Regulations, notification is required for requests involving revisions to the regulatory floodway. (Not required for revisions to approximate 1%-annual-chance floodplains [studied Zone A designation] unless a regulatory floodway is being added. Elements and examples of regulatory floodway revision notification can be found in the MT-2 Form 2 Instructions.)
4. For LOMR/CLOMR requests, does this request have the potential to impact an endangered species? ☐ Yes ☒ No
If Yes, please submit documentation to the community to show that you have complied with Sections 9 and 10 of the Endangered Species Act (ESA). Section 9 of the ESA prohibits anyone from "taking" or harming an endangered species. If an action might harm an endangered species, a permit is required from U.S. Fish and Wildlife Service or National Marine Fisheries Service under Section 10 of the ESA.

For actions authorized, funded, or being carried out by Federal or State agencies, please submit documentation from the agency showing its compliance with Section 7(a)(2) of the ESA.

* Not inclusive of all applicable regulatory requirements. For details, see 44 CFR parts 60 and 65.

**FEDERAL EMERGENCY MANAGEMENT AGENCY
PAYMENT INFORMATION FORM**

Community Name: City of North Las Vegas

Project Identifier: Tropical Parkway Channel East LOMR

THIS FORM MUST BE MAILED, ALONG WITH THE APPROPRIATE FEE, TO THE ADDRESS BELOW OR FAXED TO THE FAX NUMBER BELOW.

Type of Request:

☐ MT-1 application }
☒ MT-2 application }

FEMA
Fee Charge System Administrator
7390 Coca Cola Drive, Suite 204
Hanover, MD 21076

☐ EDR application }

FEMA Project Library
847 South Pickett St.
Alexandria, VA 22304
FAX (703) 212-4090

Request No.: _____ (if known)

Amount: \$5,300

☐ INITIAL FEE* ☒ FINAL FEE ☐ FEE BALANCE** ☐ MASTER CARD ☐ VISA ☒ CHECK ☐ MONEY ORDER

*Note: Check only for EDR and/or Alluvial Fan requests (as appropriate).

**Note: Check only if submitting a corrected fee for an ongoing request.

COMPLETE THIS SECTION ONLY IF PAYING BY CREDIT CARD

CARD NUMBER

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

EXP. DATE

	—	
Month		Year

Date

Signature

NAME (AS IT APPEARS ON CARD): _____
(please print or type)

ADDRESS: _____
(for your
credit card
receipt—please
print or type)

DAYTIME PHONE: _____

APPENDIX

- TECHNICAL HYDROLOGY/HYDRAULICS MEMORANDUM
- TPCE HEC-RAS ANALYSIS
- REFERENCE DOCUMENTATION
 - 2008 MPU Figure F-20, F-21
 - Stanley Consultants
 - Technical Drainage Study
 - Request for LOMR
 - Orion Engineering and Surveying
 - Request for LOMR
 - MWH TPCE Civil Drawings

TECHNICAL HYDRLOGY/HYDRAULICS MEMORANDUM

TECHNICAL MEMORANDUM NO. 1

TO: Mark Escobedo, P.E.

DATE: May 19, 2011

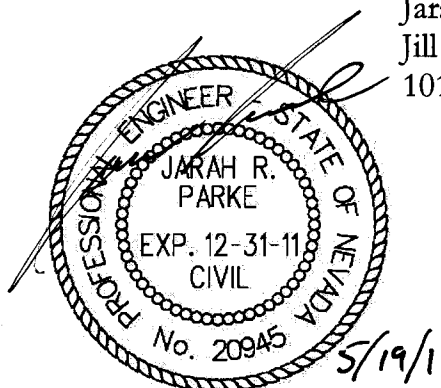
FROM: Gabriela Estrada

PROJECT: Tropical Parkway Channel
East LOMR

CC: Wessam Daoud, P.E.
Jarrah R. Parke, P.E.
Jill Riley, CCRFCD
1010851_6.7

TM NO.: 1

SUBJECT: Hydrology/Hydraulic
Analysis



INTRODUCTION

On March 2011, the City of North Las Vegas contracted MWH to perform a hydrology and LOMR review for the *Request for LOMR Villages at Sierra Ranch (Request for LOMR)* performed by Stanley Consultants. The task involved verifying if the existing Special Flood Hazard Area (SFHA) flood zone "A," previously analyzed by Stanley Consultants, can be revised due to regional facility improvements that were not constructed at the time of the preparation and approval of the *Request for LOMR* by Stanley Consultants.

After evaluating the Stanley Consultants approved technical drainage study and approved *Request for LOMR*, it was found that flows utilized to analyze the SFHA flood zone "A" can be substantially reduced based on recent construction of flood control facilities. At the time of the *Request for LOMR*, two regional flood conveyance facilities were not constructed, the Centennial Parkway Channel East (CPCE) and the Tropical Parkway Channel East (TPCE). Both facilities are constructed and fully operational.

Soon after Stanley Consultants *Request for LOMR*, Orion Engineering and Surveying (Orion Engineering) also prepared a *Request for LOMR* to remove a small section, located in the northeast corner of their proposed development, from SFHA flood zone "A." They utilized Stanley Consultants LOMR flows to perform their analysis.

TECHNICAL MEMORANDUM NO. 1

After a meeting held with the City of North Las Vegas, the Clark County Regional Flood Control District and MWH, it was discussed that due to the regional improvements, flows contributing to the SFHA flood zone can be reduced. The City of North Las Vegas then instructed MWH to move forward with a *Request for LOMR* to revise the SFHA flood zone "A" area for a portion of an Unnamed Tributary to the Las Vegas Wash.

This Technical Memorandum (TM) summarizes flows from the approved *Request for LOMRs* by Stanley Consultants and Orion Engineering, and documents MWH's analysis based on current conditions that result in a change to the floodplain.

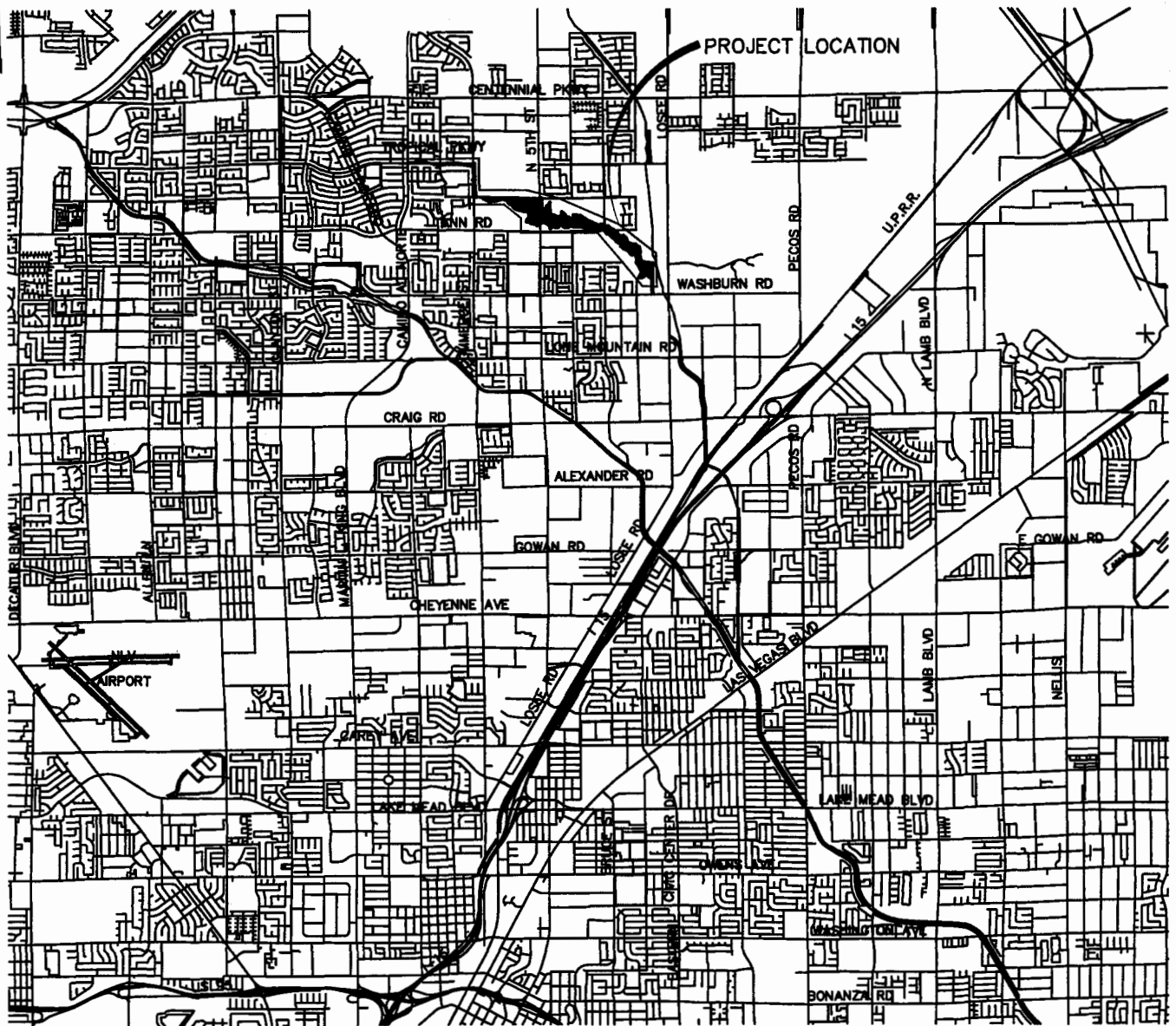
SCOPE

The scope of this task is to summarize flows utilized in the approved LOMRs by Stanley Consultants and Orion Engineering for the flood zone "A." The scope also includes revising the flood zone to reflect decreased flows due to recent development of regional conveyance facilities. Furthermore, MWH is to update the HEC-RAS models prepared by Stanley Consultants and prepare a LOMR application for submittal to FEMA. **Figure 1** (following this page) is a Vicinity Map showing the location of the existing SFHA flood zone "A."

PREVIOUS STUDIES

In preparation for the hydrologic/hydraulic analysis to revise the flood zone "A" Unnamed Tributary to the Las Vegas Wash, MWH collected and reviewed the previously approved drainage studies and *Request for LOMR's*:

- *Technical Drainage Study for the Villages at Sierra Ranch*, Stanley Consultants, September 2004 by the City of North Las Vegas
- *Request for LOMR for Villages at Sierra Ranch* (FEMA Case Number 06-09-B002P), Stanley Consultants, October 2005
- *Request for CLOMR for Villages at Sierra Ranch* (FEMA Case Number 05-09-0040R), Stanley Consultants, October 2004
- *Surveying Request for LOMR for the Bruce and Hammer* (FEMA Case Number 06-09-BE46P), Orion Engineering, July 2006.
- *Request for CLOMR for the Bruce and Hammer* (FEMA Case Number 05-09-1091R), Orion Engineering and Surveying, May 2005.



MWH

3010 W. Charleston Blvd, Suite 100
Las Vegas, NV 89102
Ph: 702-878-8010
Fax: 702-878-7833

TROPICAL PARKWAY CHANNEL
EAST LOMR

FIGURE 1
VICINITY MAP

TECHNICAL MEMORANDUM NO. 1

MWH reviewed these studies and concurs with the findings and/or analysis prepared by the above mentioned companies.

REGIONAL FLOOD CONTROL FACILITIES

At the time the Stanley Consultants and Orion Engineering LOMR's were prepared, the CPCE and TPCE regional flood conveyance facilities were not in place. Figure F-20 and F-21 of the 2008 CCRFCD Master Plan Update (2008 MPU) present the two regional facilities, Tropical Road Channel East (TREA 0005) located on Tropical Parkway from North 5th Street to the Upper Las Vegas Wash (LVUP 0215), and the Centennial Parkway Channel East (CNEA 0123, 0153, 0175, and 0176) located on Centennial Parkway from Revere Street to the Upper Las Vegas Wash (LVUP 0268). The 2008 MPU facility figures F-20 and F-21 are provided in the Appendix.

HYDROLOGY

Stanley Consultants *Request for LOMR* Hydrology:

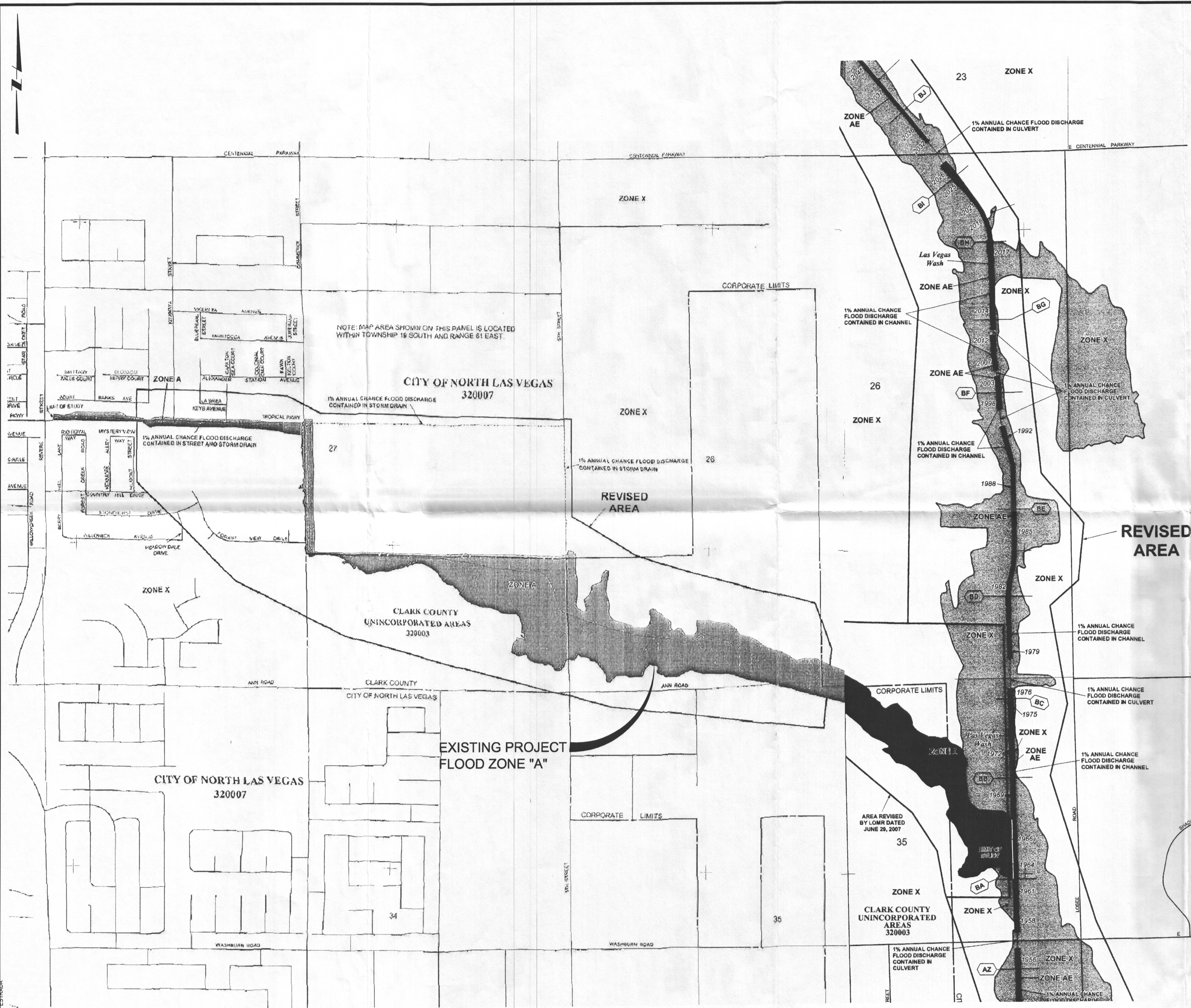
After review of the Stanley Consultants technical drainage study and *Request for LOMR*, it was found that the Stanley Consultants LOMR of the Villages at Sierra Ranch assumed the following physical characteristics of the region:

1. The Villages at Sierra Ranch development was assumed to be fully developed
2. The CPCE on Centennial Road, north of Tropical Parkway was not constructed
3. The TPCE facility on Tropical Parkway was not constructed

Flows modeled in their HEC-RAS analysis submitted to FEMA in their *Request for LOMR* utilized interim condition flows, which did not account for the construction of the CPCE and TPCE facilities. Developed flows, accounting for the CPCE were analyzed but not used for the *Request for LOMR*. For a representation of the existing FEMA FIRM Panel exhibiting the flood zone for the Unnamed Tributary analyzed by Stanley Consultants, refer to **Figure 2** (following this page).

Orion Engineering *Request for LOMR* Hydrology:

The Orion Engineering *Request for LOMR*, for the downstream development, builds upon the Stanley Consultants *Request for LOMR*. The upstream interim flow of 1467 cfs is used for their HEC-RAS analysis and flood zone delineation. At the downstream end of their analysis, Orion Engineering utilized the City of North Las Vegas North Neighborhood Study Existing Condition flows of 4,522 cfs. **Figure 2** (following this page) presents the existing flood zone analyzed by Orion Engineering. Due to construction of residential developments and improvements to the Las Vegas Wash at the last two HEC-RAS cross



PANEL 1769E

FIRM
FLOOD INSURANCE RATE MAP
CLARK COUNTY,
NEVADA
AND INCORPORATED AREAS

PANEL 1769 OF 4090
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
CLARK COUNTY 320003 1769 E
CLARK COUNTY UNINCORPORATED AREAS 320003 1769 E
NORTH LAS VEGAS CITY OF 320007 1769 E

REVISED TO
REFLECT LOMR
DATED JUL 19 2006

MAP NUMBER
32003C1769E
EFFECTIVE DATE
SEPTEMBER 27, 2002

Federal Emergency Management Agency

PANEL 1788E

FIRM
FLOOD INSURANCE RATE MAP
CLARK COUNTY,
NEVADA
AND INCORPORATED AREAS

PANEL 1788 OF 4090
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
CLARK COUNTY 320003 1788 E
CLARK COUNTY UNINCORPORATED AREAS 320003 1788 E
NORTH LAS VEGAS CITY OF 320007 1788 E

REVISED TO
REFLECT LOMR
EFFECTIVE SEP 28 2007

MAP NUMBER
32003C1788E
MAP REVISED
SEPTEMBER 27, 2002

Federal Emergency Management Agency

FIGURE 2
EXISTING FIRM MAP

**TROPICAL PARKWAY
CHANNEL EAST LOMR**

SCALE :
HORIZONTAL : 1"=500'
VERTICAL : N/A
DRAWN BY: MGE
DESIGNED: MGE
CHECKED: XXX
PROJECT NO: XXX

STAMP

City of North Las Vegas
Department of Public Works
Engineering Services Division



3010 WEST
CHARLESTON BLVD.
SUITE 100
LAS VEGAS, NV. 89102
(702) 878-8010

REV DESCRIPTION BY DATE APPROVAL

TECHNICAL MEMORANDUM NO. 1

sections from the Orion Engineering approved CLOMR and LOMR, the cross sections will not be utilized in the TPCE LOMR. They are deleted and removed from the HEC-RAS analysis.

TPCE LOMR Review Hydrology:

After review of the Stanley Consultants technical drainage study, it was determined that their developed flows are very similar to the 100-year flow analyzed by MWH for the TPCE regional facility. Since flows are similar and Stanley Consultants analyzed flow splits at street intersections, MWH utilized Stanley Consultants developed condition flows for the TPCE LOMR. The following conditions were incorporated:

1. The CPCE facility is fully improved, as shown in Figure F-21 of the 2008 MPU provided in the Appendix.
2. The TPCE facility is fully improved, as shown in the plan and profile civil drawings for the TPCE Project. Plan drawings are provided in the Appendix.

Since the CPCE is currently fully improved with 100-year capacity, runoff north of the regional facility is cut-off, thereby reducing flows at the intersection of Commerce Street and Tropical Parkway. Reduction in flow decreases the runoff draining south on Commerce Street and Tropical Parkway from 230 cubic feet per second (cfs) to 131 cfs. Flows along Tropical Parkway west of Commerce Street do not change from what was previously analyzed and approved in the *Request for LOMR* by Stanley Consultants.

In the Stanley Consultants technical drainage study, surface runoff was analyzed to split at the North 5th and Tropical Parkway intersection. A portion of the flow drains south to El Campo Grande, and another portion drains east on Tropical Parkway. The drop inlets constructed for the TPCE project were sized to accept all the surface runoff, so no flow will be splitting or crossing Tropical Parkway on North 5th Street. The only flow that will run south on North 5th Street at Tropical Parkway will be runoff produced by the Sierra Villages development in the amount of 47 cfs. Figure 8 from the Stanley Consultants *Request for LOMR* presents the developed basin map flows, provided in the Appendix-Referenced Documentation from Stanley Consultants.

A comparison of the Stanley Consulting and Orion Engineering flows to the revised flows modeled in HEC-RAS is provided in **Table 1** (following this page).

Table 1 - Flow and Water Surface Elevation Summary

CROSS SECTION	REVISED CROSS SECTION (1)	Stanley Consultants FLOW (cfs) WSE (ft)	Orion Engineering FLOW (cfs) WSE (ft)	MWH FLOW (cfs) WSE (ft)	DIFFERENCE IN WSE (2) (ft)
31		260 2078.77		260 2078.77	0.00
30		260 2075.80		260 2075.80	0.00
29		260 2072.40		260 2072.40	0.00
28		260 2067.82		260 2067.82	0.00
27.3	x	260 2066.28		260 2066.27	-0.01
27.2	x	260 2064.56		260 2064.50	-0.06
27.1	x	260 2063.28		260 2062.66	-0.62
27	x	274 2062.43	Trip/Commerce	274 2061.89	-0.54
26	Flow split	203 2061.55	Flow in Commerce	131 2061.48	-0.07
25	x	203 2060.06		131 2059.96	-0.10
24	x	203 2058.08		131 2057.97	-0.11
23	x	203 2054.91		131 2054.80	-0.11
22		203 2053.04	Commerce/El Campo G.	131 2052.92	-0.12
21		161 2051.79		156 2051.78	-0.01
20		161 2050.99		156 2050.96	-0.03
19		161 2049.81		156 2049.76	-0.05
18		161 2048.05		156 2048.04	-0.01
17		161 2046.31		156 2046.30	-0.01
16		161 2043.82		156 2043.81	-0.01
15		559 2041.30	Q to Santa Rosa de Alamo	322 2040.98	-0.32
14		559 2040.15		322 2040.01	-0.14
13		559 2038.45		322 2038.30	-0.15
12		559 2035.81		322 2035.46	-0.35
11		559 2033.57		322 2033.29	-0.28
10		747 2032.52		510 2032.41	-0.11
9		1467 2030.50	No 5m/El Campo G.	557 2030.20	-0.30
8		1467 2029.00		557 2028.66	-0.34
7		1467 2027.59		557 2027.36	-0.23
6		1467 2025.46		557 2024.60	-0.86
5		1467 2022.69		557 2022.13	-0.56
4		1467 2020.89		557 2020.12	-0.77
3		1467 2020.30		557 2019.49	-0.81
2		1467 2018.64		557 2018.00	-0.64
1.75		1467 2013.02		557 2012.86	-0.16
1.5	x		1467 2008.36	557 2007.86	-0.50
1	x	Ann/Bruce	1467 2001.86	557 2001.27	-0.59
0.99			1467 1999.42	557 1998.84	-0.58
0.95			1467 1998.05	557 1997.49	-0.56
0.90			1467 1995.92	557 1995.35	-0.57
0.85			1467 1993.66	557 1993.22	-0.44
0.80			1467 1991.26	557 1990.77	-0.49
0.75			1467 1989.19	557 1988.91	-0.28
0.70			1467 1987.14	557 1986.68	-0.46
0.60			1467 1983.04	557 1981.43	-1.61
0.55			1467 1981.58	557 1981.00	-0.58
0.50			1467 1979.75	557 1979.17	-0.58
0.45		LILVW Chm?	1467 1977.31	557 1976.99	-0.32

Notes:

- (1) Cross section revised to reflect existing street improvement conditions
- (2) Negative number is for decrease in water surface elevation

TECHNICAL MEMORANDUM NO. 1

HYDRAULICS

The revised flows depicting current physical characteristics of the region are incorporated in the HEC-RAS analysis. The combined runoff at the intersection of El Campo Grande and North 5th Street decreased from 1,467 cfs to 557 cfs due to the full operation of the CPCE and TPCE regional facilities.

Flows were revised to reflect developed conditions as analyzed in the Stanley Consultants approved technical drainage study, *Request for CLOMR* and approved *Request for LOMR*.

The revised flows impacted cross sections 1 to 31 for the TPCE LOMR HEC-RAS model, as well as flows for cross sections 0.45 to 0.99 taken from the Orion Engineering model.

The TPCE HEC-RAS model includes the cross sections from the Orion Engineering *Request for LOMR* model, since the downstream area is impacted by the decrease in flow. Cross sections 0.99 to 0.45 were taken from the Orion Engineering HEC-RAS model and incorporated in to the TPCE HEC-RAS analysis. Cross sections 0.40 and 0.35 were not utilized from the Orion Engineering HEC-RAS model due to regional and residential improvements.

In addition to revising the flows in the CNLV LOMR HEC-RAS model, cross sections 27.3, 27.2 and 27.1, 25, 24, 23 from the Stanley Consultants HEC-RAS analysis were also revised to depict fully improved right-of-way conditions. At the time of the LOMR analysis by Stanley Consultants, the development northwest of Commerce Street and Tropical Parkway was not fully developed but undeveloped open land; Stanley Consultants modeled the cross sections along that area as a half improved street. MWH revised the cross sections to model the 80 foot fully improved right of way.

Table 1 provides a comparison of water surface elevations for cross sections in the Stanley Consultants *Request for LOMR*, Orion Engineering *Request for LOMR* and the revised TPCE LOMR HEC-RAS model. The HEC-RAS model for the TPCE LOMR revision is provided in the Appendix.

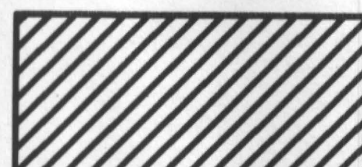
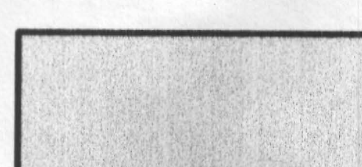
Refer to **Figure 3**, **Figure 4** and **Figure 5** (following this page) for a representation of the proposed floodplain removals and revised floodplain.

CONCLUSIONS

The *Request for LOMR's* prepared by Stanley Consulting and Orion Engineering utilized flows from the Stanley Consulting hydrologic analysis assuming the CPCE flood conveyance facility was not constructed. Due to the construction of the CPCE and TPCE facilities, flows are decreased resulting in a reduction to the SFHA flood zone "A."



LEGEND

- | | |
|---|---|
|  | STREET CENTERLINE |
|  | EXISTING FEMA FLOODPLAIN AREA |
|  | PROPOSED FLOODPLAIN |
| RS-
BFE | CROSS SECTION
BASE FLOOD ELEVATION |

SCALE _____	1"=400'
HORIZONTAL : _____	
VERTICAL : _____	N/A
DRAWN BY: _____	MGE
DESIGNED: _____	MGE
CHECKED : _____	XXX
PROJECT NO: _____	XXX

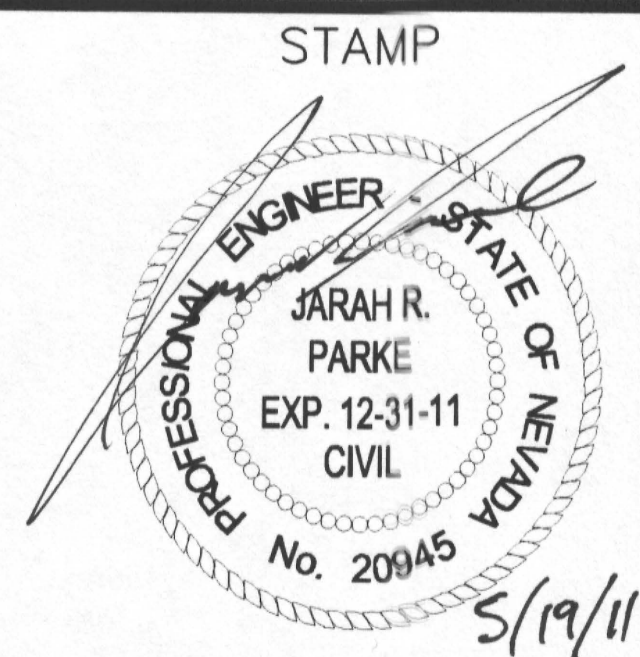


FIGURE 3
100-YEAR EXISTING AND PROPOSED
FLOOD BOUNDARIES

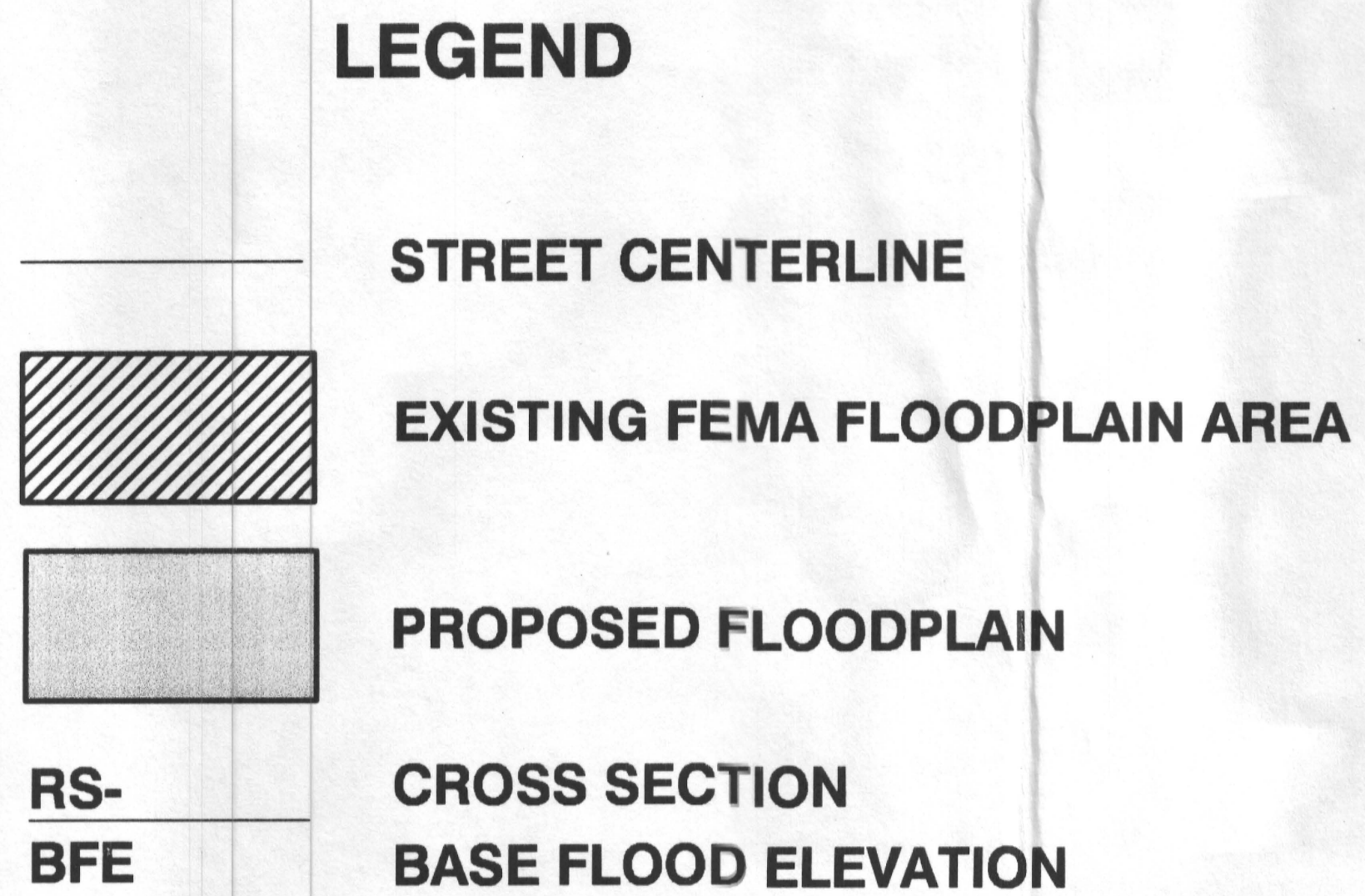
**TROPICAL PARKWAY CHANNEL
EAST LOMR**

City of North Las Vegas
Department of Public Works
Engineering Services Division



3010 WEST
CHARLESTON BLVD.
SUITE 100
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[illegible]



City of North Las Vegas
Department of Public Works
Engineering Services Division

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LAS VEGAS, NV. 89102
(702) 878-8010

STAMP

PROFESSIONAL ENGINEER - STATE OF NEVADA

JARAH R. PARKE

EXP. 12-31-11

CIVIL

No. 20945

REV	DESCRIPTION	BY	DATE	APPROVAL
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TECHNICAL MEMORANDUM NO. 1

Maximum flow at the intersection of El Campo Grande and North 5th Street decreased from 1467 cfs to 557 cfs. The revised flow decreases the flood zone running in a southeast direction from Commerce Street to the Las Vegas Wash.

TPCE HEC-RAS ANALYSIS

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```

X   X XXXXXX   XXXX   XXXX   XX   XXXX
X   X X       X   X   X   X   X   X
X   X X       X   X   X   X   X   X
XXXXXXXX XXXX   X   XXX XXXX   XXXXXX   XXXX
X   X X       X   X   X   X   X   X
X   X X       X   X   X   X   X   X
X   X XXXXXX   XXXX   X   X   X   X   XXXXX

```

PROJECT DATA

Project Title: CNLV_LOMR REV 5-9-11
Project File : tpce.prj
Run Date and Time: 5/17/2011 8:17:25 AM

Project in English units

Project Description:

Villages at Sierra Ranches-FEMA LOMR REVISION by MWH

PLAN DATA

Plan Title: Plan 02
Plan File : C:\Documents and Settings\Maria G Estrada\My Documents\4.2011 Desktop\LOMR\tpce.p02

Geometry Title: improved sections-new_topo

Geometry File : C:\Documents and Settings\Maria G Estrada\My Documents\4.2011 Desktop\LOMR\tpce.g01

Flow Title : revised developed

Flow File : C:\Documents and Settings\Maria G Estrada\My Documents\4.2011 Desktop\LOMR\tpce.f02

Plan Summary Information:

Number of: Cross Sections =	47	Multiple Openings =	0
Culverts =	0	Inline Structures =	0
Bridges =	0	Lateral Structures =	0

Computational Information

Water surface calculation tolerance =	0.01
Critical depth calculation tolerance =	0.01
Maximum number of iterations =	20
Maximum difference tolerance =	0.3
Flow tolerance factor =	0.001

Computation Options

Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: revised developed
Flow File : C:\Documents and Settings\Maria G Estrada\My Documents\4.2011 Desktop\LOMR\tpce.f02

Flow Data (cfs)

River	Reach	RS	PF 1
RIVER-1	Reach-1	31	260
RIVER-1	Reach-1	27	274
RIVER-1	Reach-1	26	131
RIVER-1	Reach-1	21	156
RIVER-1	Reach-1	15	322
RIVER-1	Reach-1	10	510
RIVER-1	Reach-1	9	557

Boundary Conditions

River	Reach	Profile	Upstream
Downstream			
RIVER-1	Reach-1	PF 1	Normal S = 0.0144
= 0.01			Normal S

GEOMETRY DATA

Geometry Title: improved sections-new_topo
 Geometry File : C:\Documents and Settings\Maria G Estrada\My Documents\4.2011
 Desktop\LOMR\tpce.g01

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 31

INPUT

Description: upstream end

Station Elevation Data		num=	9								
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2080.9	9.28	2078.4	14.28	2078.32	14.95	2077.81	50	2078.73		
83.91	2077.86	84.51	2078.38	89.51	2078.5	89.52	2080				

Manning's n Values		num=	4								
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.03	9.28	.013	14.95	.016	83.91	.013				

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
0	89.51		257	257	257	.1	.3

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 30

INPUT

Description:

Station Elevation Data		num=	9								
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2077.96	9.63	2075.46	14.63	2075.36	15.28	2074.88	50	2075.7		
84.43	2074.72	85.06	2075.42	90.06	2075.5	90.07	2077				

Manning's n Values		num=	4								
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.03	9.63	.013	15.28	.016	84.43	.013				

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
0	90.06		248	248	248	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 29

INPUT

Description: 04-09-0152R Section A-A - updated with survey data

Station	Elevation	Data	num=	12					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2077.3	.0001	2072.3	10	2072.1	15	2072.07	15.5	2072.07
15.50001	2071.57	50	2072.3	84.5	2071.57	84.5	2072.08	85	2072
90	2072.1	97	2073.3						

Manning's n Values		num=	6						
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.013	.0001	.027	10	.013	15.50001	.016	84.5	.013
90	.035								

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	.0001	90		300	300		.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 28

INPUT

Description: 04-09-0152R Section A1-A1

Station	Elevation	Data	num=	12					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2073.2	.0001	2069.8	10	2067.3	15	2067.18	15.5	2067.18
15.5001	2066.68	50	2067.61	84.5	2067.3584	50001	2067.88	85	2067.88
90	2068	121	2067.68						

Manning's n Values		num=	6						
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.013	.0001	.03	10	.013	15.5001	.016	84.5	.013
90	.035								

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	.0001	90		213.18	209		.1	1
Right Levee	Station=	90	Elevation=	2068				

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 27.3

INPUT

Description:

Station	Elevation	Data	num=	9					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2066.46	12.9	2066.04	17.9	2065.94	17.9	2065.44	50	2065.83
84.56	2065.18	85.08	2065.65	90.08	2065.75	115.17	2067.72		

Manning's n Values		num=	5						
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.03	12.9	.013	17.9	.016	84.56	.013	90.08	.03

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	12.9	90.08		200	200		.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 27.2

INPUT

Description:

Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2065.91	5	2064	10	2063.98	10	2063.48
84	2063.8	84	2064.3	89	2064.4	125.26	2065.24

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.03	5	.013	10	.016	84	.013
						89	.03

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

5	89	162.68	166	161.02	.1	.3
---	----	--------	-----	--------	----	----

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 27.1

INPUT

Description:

Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2067	16	2062.6	21	2062.5	21	2062
78	2062.55	125	2061.93	125	2062.43	130	2062.53
						150	2064

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.03	16	.013	21	.016	125	.013
						130	.03

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

16	130	152.46	154	158.62	.1	.3
----	-----	--------	-----	--------	----	----

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 27

INPUT

Description: 04-09-0152R Section B updated with survey data

Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2065	14	2061.74	19	2061.64	19	2061.14
113	2061	113	2061.5	118	2061.49	140	2064
						66	2061.2

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.03	14	.013	19	.016	113	.013
						118	.03

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

14	140	60	160	250	.1	.3
----	-----	----	-----	-----	----	----

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 26

INPUT

Description:

Station Elevation Data num= 36

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
182	2063.6	217	2061.31	217.5	2061.31	217.5	2060.81
252	2061.5	268.31	2061	278.09	2060.84	307.37	2060.9
313.83	2061	313.83	2061.3	318.83	2061.47	322.37	2061.62
328.05	2062	333.94	2062.4	338.4	2062.72	341.78	2062.86
350.86	2063.2	356	2063.4	372.95	2064	382.55	2064
387.82	2063.7	391.15	2063.62	395.68	2063.62	396.58	2063.6
409.47	2063.86	416.52	2063.93	422.32	2063.88	430.93	2063.94
442.44	2064.21					435	2064

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
182	.027	217	.016	313.83	.013	318.83	.027	382.55	.016

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

182	372.95	167.26	344.62	911.99	.1	.3
-----	--------	--------	--------	--------	----	----

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 25

INPUT

Description:

Station Elevation Data num= 37

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
435.25	2061.4	470.25	2059.7	470.75	2059.7	470.75	2059.2	472.25	2059.37
505.25	2060.03	518.16	2059.55	522.32	2059.5	547.01	2059	547.01	2059.5
552.01	2059.6	563.32	2060	566.58	2061	573.66	2063	578.41	2064
584.82	2065	610.65	2066	626.11	2065.76	634.06	2065.68	644.08	2065.7
658.34	2065.68	660.62	2065.7	665.5	2065.6	670.65	2065.6	681.46	2065.7
688.86	2065.65	712.11	2065.64	739.51	2065.65	743.91	2065.64	787.6	2065.64
788.74	2065.6	795.3	2065.7	806.26	2065.67	823.22	2065.72	841.4	2066
858.38	2066	862.69	2066.06						

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
435.25	.027	470.25	.016	547.01	.013	552.01	.027	563.32	.027
610.65	.016								

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

435.25	610.65	217.73	402.96	1310.73	.1	.3
--------	--------	--------	--------	---------	----	----

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 24

INPUT

Description:

Station Elevation Data num= 33

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
889.48	2058.9	924.48	2057.8	924.98	2057.8	924.98	2057.3	926.48	2057.43
959.48	2057.94	970.26	2057.64	999.34	2057	999.34	2057.5	1004.34	2057.59
1007.41	2057.59	1014.39	2058	1015.63	2059	1019.28	2060	1030	2061
1051.86	2061	1054.27	2060.58	1058.6	2060.82	1070.21	2061.2	1079.69	2061.4
1081.52	2061.37	1102.86	2061.42	1106.93	2061.5	1116.35	2061.51	1129.37	2061.91
1135.53	2062	1166.5	2062.2	1167.17	2062.13	1185.18	2062.13	1217.83	2062.2
1242.62	2062.92	1248.15	2063	1264.47	2063				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
889.48	.027	924.48	.016	999.34	.013	1004.34	.027	1014.39	.027

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

889.48	1030	133.28	268.48	1406.92	.1	.3
--------	------	--------	--------	---------	----	----

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 23

INPUT

Description:

Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1071.15	2056.3	1106.15	2054.8	1106.65	2054.8	1106.65	2054.3	1108.15	2054.42
1141.15	2055.35	1157.54	2054.62	1184.57	2054	1184.57	2054.5	1189.87	2054.5

1193.09	2055	1197.2	2056	1202.27	2057.02	1208.19	2057.6	1211.73	2057.38
1223.64	2057.1	1232.15	2057	1240.65	2057.28	1258.74	2058	1281.56	2060
1288.19	2061	1305.84	2061.7	1313.94	2062	1332.77	2062.5	1349.52	2063
1352.15	2063								

Manning's n Values		num= 4	
Sta	n Val	Sta	n Val
1071.15	.027	1106.15	.016
		1184.57	.013
		1189.87	.027

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	1071.15	1208.19		90.37	188.5	1571.09	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 22

INPUT

Description:

Station Elevation Data		num= 23	
Sta	Elev	Sta	Elev
1233.62	2055.8	1268.62	2052.52
1303.62	2052.96	1336.62	2052.08
1361.48	2054	1364.76	2054
1408.68	2058	1420.73	2057.61
1485.97	2060.4	1491.95	2060.26
			1538.55
			2060.4

Manning's n Values		num= 4	
Sta	n Val	Sta	n Val
1233.62	.027	1268.62	.016
		1361.48	.03
		1381.24	.027

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	1233.62	1408.68		71.82	66.75	2311.06	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 21

INPUT

Description:

Station Elevation Data		num= 54	
Sta	Elev	Sta	Elev
1235.49	2055.5	1250.49	2051.28
1275.49	2051.08	1276.46	2051.78
1317.92	2054	1327.09	2054
1362.97	2057.14	1369.11	2057.5
1406.02	2057.5	1424.73	2058
1500.02	2058.92	1506.65	2058.46
1585.2	2056	1600.33	2054.86
1686.07	2053.66	1701.68	2053.44
1763.27	2053.7	1782.37	2053.61
1952.83	2053	1978.42	2053.05
2119.69	2055.23	2162.21	2055.7
			2227.89
			2056
			2297.25
			2056

Manning's n Values		num= 3	
Sta	n Val	Sta	n Val
1235.49	.027	1250.49	.016
		1275.49	.03

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	1235.49	1391.83		136.36	116.42	2116.99	.1	.3
Right Levee	Station=	1448.6	Elevation=	2060				

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 20

INPUT

Description:

Station Elevation Data										num=	45
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1235.9	2054.7	1250.9	2050.17	1251.4	2050.17	1251.4	2049.67	1252.9	2049.84		
1275.9	2050.19	1287.01	2053	1292.27	2054	1300.3	2052	1304.54	2051.6		
1316	2052.4	1323.36	2052.6	1345.98	2052.2	1374.79	2053	1403.41	2052.88		
1431.47	2054	1441.46	2055.48	1463.39	2056.55	1476.9	2057.48	1488.59	2056		
1539.58	2054.4	1575.25	2054.29	1599.06	2054.41	1626.5	2054	1659.5	2052		
1696.39	2052	1702.25	2051.55	1713.11	2051.51	1730.85	2051.95	1759.8	2052		
1764.48	2050.6	1774.17	2050.4	1790.78	2050.74	1806.18	2050.79	1851.08	2051.32		
1891.1	2052	1937.65	2052	1959.39	2051.58	1991.89	2051.84	2020.92	2052.36		
2060	2052.9	2067.24	2052.6	2075.23	2052.85	2105.85	2052.47	2132.98	2052.99		

Manning's n Values

num=				3	
Sta	n Val	Sta	n Val	Sta	n Val
1235.9	.027	1250.9	.016	1275.9	.03

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	1235.9	1476.9		164.84	178.05	2207.97	
Right Levee		Station=	1476.9		Elevation=	2057.48	

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1 RS: 19

INPUT

Description:

Station Elevation Data										num=	57
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1178.59	2052.9	1193.59	2048.88	1194.09	2048.88	1194.09	2048.38	1195.59	2048.55		
1218.59	2048.87	1222.73	2050	1235.32	2049.5	1256.4	2049	1259.8	2050		
1264.03	2050.33	1280.35	2050.3	1292.39	2049.6	1305.79	2050.14	1323.17	2050		
1337.99	2050.3	1349.11	2051	1370.49	2050.78	1376.61	2050.56	1395.52	2050.9		
1430.32	2052	1446.33	2053.13	1455.05	2053.2	1467.28	2052.82	1487.71	2051.9		
1497.93	2052	1504.47	2051.68	1522.53	2051.3	1560.58	2050.94	1562.63	2051.07		
1606.92	2050	1608.98	2049.6	1614.86	2050	1672.8	2050	1690.64	2050.18		
1718.41	2050.15	1741.01	2050.55	1782.26	2050.58	1806.05	2050.31	1814.96	2050		
1840.64	2050.24	1843.2	2050.56	1856.62	2050.8	1866.49	2050.31	1885.63	2050.36		
1907.66	2049.8	1920.16	2050	1939.51	2049.9	1952.74	2050.42	1978.07	2050		
2004.02	2050.23	2019.48	2050	2025.45	2050.25	2031.87	2050	2061.97	2051.4		
2078.99	2052	2122.62	2052.39								

Manning's n Values

num=				3	
Sta	n Val	Sta	n Val	Sta	n Val
1178.59	.03	1193.59	.016	1218.59	.03

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	1178.59	2122.62		484.71	223.44	2373.65	
Right Levee		Station=	1264.03		Elevation=	2050.33	

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1 RS: 18

INPUT

Description:

Station Elevation Data										num=	50
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1333.19	2050.5	1348.19	2047.19	1348.69	2047.19	1348.69	2046.69	1350.19	2046.82		
1373.19	2047.36	1373.67	2047	1378.63	2049.49	1390.46	2047.85	1400.22	2047.47		
1412	2048	1437.62	2048	1439.96	2047	1449.65	2047.5	1472.98	2048		
1491.58	2047.7	1523.93	2047.98	1561.46	2048	1588.67	2048.98	1608.26	2048.17		
1618.99	2048.2	1651.55	2049.84	1664.51	2050	1731.04	2048.28	1737.62	2048		
1787.56	2048	1818.66	2048.57	1845.15	2048.6	1862.44	2048	1877.23	2048		
1899.31	2048.79	1935.73	2048.2	1962.88	2047.6	2004.67	2048.06	2032.38	2047.4		
2052.36	2047.9	2087.92	2047.83	2119.18	2048.51	2133.3	2048.3	2146.08	2048.9		

2171.74	2048.74	2220.73	2048	2242.6	2048	2272.56	2049.07	2303.64	2050
2379.26	2050	2398.24	2050.5	2409.69	2051.27	2415.92	2051.2	2428.55	2051.85

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
1333.19	.03	1348.19	.016	1373.19	.03	1664.51	.03

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	1333.19	1664.51		185.4	214.27		.1	.3
Right Levee	Station=	1588.67		Elevation=	2048.98			

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 17

INPUT

Description:

Station Elevation Data		num= 51							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1412.39	2049	1427.39	2045.45	1427.89	2045.45	1427.89	2044.95	1429.39	2045.08
1452.39	2045.55	1464.51	2045.86	1496.27	2046.03	1555.18	2046	1635.94	2046.4
1663.1	2046.29	1681.59	2046.4	1695.11	2046.2	1720.8	2046.17	1731.61	2046.32
1750.53	2046	1805.84	2046	1848.8	2045.5	1871.42	2045.36	1879.26	2045.5
1893.14	2045.2	1910.7	2045.7	1936.16	2045.17	1955.54	2045.55	1958.46	2046
1988.08	2046	2000.35	2047.64	2010.38	2048	2021	2048	2030.12	2047.18
2034.5	2046	2055.97	2046.94	2075.75	2048	2086.5	2048	2094.14	2047.58
2113.51	2047.5	2134.55	2048.1	2171.07	2048.32	2195.36	2048.7	2205.74	2048.64
2207.31	2048.3	2232.51	2048	2245.32	2048	2264.67	2049.14	2279.76	2049.73
2287.61	2049.62	2292.6	2048.93	2298.39	2048.8	2318.51	2049.57	2344.91	2050
2360.81	2050								

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
1412.39	.03	1427.39	.016	1452.39	.03	2021	.03

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	1412.39	2021		202.21	259.99		.1	.3
Right Levee	Station=	1635.94		Elevation=	2046.4			

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 16

INPUT

Description:

Station Elevation Data		num= 43							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1043.12	2046.8	1058.12	2043.41	1058.62	2043.41	1058.62	2042.91	1060.12	2043.04
1083.12	2043.41	1100.41	2044.16	1115.5	2044	1135.35	2043	1147.34	2043
1166.4	2044	1191.04	2044.11	1219.1	2044	1338.06	2044	1366.56	2043.83
1407.76	2043.7	1429.27	2044	1454.83	2044	1474.65	2043.8	1496.41	2043.99
1540.94	2043.91	1560.26	2044	1572.08	2045.19	1576.6	2045.23	1580.91	2046
1591.86	2046	1593.99	2045.73	1608.53	2046	1622.22	2044.42	1634.98	2044
1656.54	2044.13	1686.39	2043.97	1710.7	2044.27	1716.65	2044	1735.3	2044
1745.04	2044.19	1755.6	2044	1792.96	2044	1797.37	2044.2	1810.59	2044
1891	2044	1941.47	2044.9	1972.53	2045.6				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1043.12	.03	1058.12	.016	1083.12	.03

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	1043.12	1972.53		200.1	266.06		.1	.3
Right Levee	Station=	1192.48		Elevation=	2044.15			

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 15

INPUT

Description:

Station Elevation Data num= 55

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
593.28	2042.84	750.32	2041.99	850.32	2041.12	923.32	2039.8	950.32	2040.97
978.02	2041.78	990.58	2041.37	1009.07	2041.71	1020.47	2041.68	1023.44	2042
1033.1	2041.96	1044.05	2041.7	1065.31	2041.92	1070.14	2041.75	1086.7	2041.69
1090	2041.5	1105	2041.5	1109.82	2041.76	1123.7	2042.19	1157.2	2042.81
1171.51	2042.88	1187.96	2042.3	1201.46	2042	1214.6	2042	1218.62	2042.48
1278.29	2042.16	1298.58	2042.25	1305.79	2042.75	1332.17	2042.93	1358.82	2042.8
1388.41	2042.39	1397.72	2042	1417.19	2042	1434.72	2042.28	1450.76	2042.4
1471.25	2042.2	1502.47	2042.55	1504.53	2042.28	1520.43	2042.4	1523.79	2042.3
1536.69	2042.5	1562.8	2042.18	1569.84	2042.3	1611.33	2042.11	1627.75	2042.2
1655.48	2042.21	1668.14	2042.04	1691.32	2042	1700.87	2042.11	1729.57	2042
1731.15	2042.1	1754.56	2042.2	1769.25	2042.07	1789.79	2042.26	1858.47	2043.84

Manning's n Values num= 2

Sta	n Val	Sta	n Val
593.28	.016	950.32	.03

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
593.28 1858.47 184.5 231.19 2292.4 .1 .3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
593.28	810.32	2043	F

Right Levee Station= 1109.82 Elevation= 2041.76

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 14

INPUT

Description:

Station Elevation Data num= 64

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
732.86	2041.4	747.86	2039.23	748.36	2039.23	748.36	2038.73	749.86	2038.86
772.86	2039.4	782.83	2039.52	791.98	2040	796.38	2039.51	808.34	2040
812.92	2039.33	821.34	2039.54	837.33	2041	842.52	2043	852.56	2043.36
871.94	2041	875.06	2040	929.99	2039.67	945.48	2039.72	964.93	2039.37
984.46	2039.88	1018.14	2039.9	1065.34	2039.7	1101.23	2039.71	1131.78	2040.2
1165.9	2039.9	1176.46	2040.46	1205.21	2040.58	1220.79	2040	1249.44	2041.38
1256.9	2041.54	1295.45	2040	1360.36	2039.78	1369.01	2040.1	1388.88	2040.04
1413.84	2039.7	1431.03	2040	1470	2040.05	1489.19	2039.87	1542.79	2040
1608.56	2042	1646.01	2042	1693.32	2040.97	1708.56	2040.99	1725.83	2040.49
1737.65	2040.5	1782.4	2041.4	1799.39	2041.2	1815.84	2040.4	1830.39	2040.5
1848.7	2039.89	1877.79	2039.83	1887.35	2040.22	1929.54	2041.4	1934.55	2041
1954.53	2041.29	1965.93	2041.16	2002.79	2042.63	2006.02	2042.17	2037.15	2042.1
2072.08	2042.4	2105.03	2042	2135.97	2042	2141.48	2041.8		

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
732.86	.03	747.86	.016	772.86	.03	2002.79	.03

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
732.86 2002.79 183.4 251.14 2249.62 .1 .3

Right Levee Station= 1131.78 Elevation= 2040.2

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 13

INPUT

Description:

Station Elevation Data		num= 74									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
571.03	2038.9	586.03	2037.97	586.53	2037.97	586.53	2037.47	588.03	2037.6		
611.03	2037.78	622.9	2038.44	652.92	2038	658.84	2038	672.99	2038.4		
686.54	2038.21	691.86	2037.72	698.89	2038	703.23	2037	710.57	2037		
714.52	2038	739.26	2038.47	772.32	2038	791.21	2038	836.91	2038.13		
862.14	2038	896.21	2038	902.46	2038.14	965.71	2037.96	993.88	2038		
1013.25	2037.82	1021.27	2038	1047.05	2037.99	1071.15	2037.75	1085.5	2037.92		
1114.04	2037.86	1142.79	2038.5	1180.11	2038	1202.69	2038.4	1215.42	2038.14		
1252.93	2037.96	1266.78	2038	1305.18	2037.9	1337.94	2038.09	1378.32	2037.91		
1441.87	2038.14	1457.72	2038	1485.79	2038.3	1499.29	2038.57	1500.95	2038.41		
1518.01	2038.28	1519	2038.6	1527.37	2038.11	1535.05	2038	1549.1	2038.51		
1563.54	2038.49	1565.82	2038.2	1589.7	2038.94	1607.59	2040	1617.62	2042		
1645.13	2042	1660.03	2040	1677.85	2038.6	1688.35	2038.29	1698.2	2038.74		
1713.1	2038.5	1745.35	2037.6	1778.18	2037.79	1783.86	2038	1844.35	2038		
1895.11	2039.67	1903.19	2040	1915.9	2040	1929.25	2039.44	1943.88	2039.52		
1976.88	2039.4	2016.05	2040	2042.18	2040.1	2057.57	2040.05				

Manning's n Values		num= 4									
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
571.03	.03	586.03	.016	611.03	.03	1903.19	.03				

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
571.03	1903.19		207.95	343.21	2179.82			
Right Levee	Station=	1142.79	Elevation=	2038.5				

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 12

INPUT

Description:

Station Elevation Data		num= 75									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
451.16	2036.1	466.16	2034.89	466.66	2034.89	466.66	2034.39	468.16	2034.52		
491.16	2035.16	497.41	2035.1	510.37	2034.9	524.32	2034.9	539.52	2034.53		
545.06	2034.6	557.47	2034.42	563.49	2035	598.12	2035.3	600.96	2035.27		
622.64	2035.66	633.37	2036.21	640.47	2036.18	643.42	2035.92	658.21	2035.8		
672.5	2036.27	690.85	2036.41	712.02	2036.2	715.6	2036	781.89	2036		
801.06	2035.88	806.12	2036	865.86	2036	883.21	2036.06	929.39	2036.1		
951.95	2036	962.2	2035.82	975.21	2036	999.72	2036.05	1039.27	2036		
1090.24	2035.69	1128.72	2035.62	1156.72	2035.8	1192.2	2035.68	1217.33	2035.8		
1264.83	2035.65	1276.62	2035.85	1279.11	2035.7	1288.67	2035.74	1306.21	2035.65		
1323.77	2035.83	1338.53	2036.07	1354.38	2035.92	1370.24	2036	1380.63	2036.23		
1392.11	2036.22	1420.26	2036.2	1440.5	2036.31	1457.67	2036.3	1469.39	2036.18		
1516.41	2035.9	1544.73	2035.91	1557.81	2036	1566.69	2035.79	1579.01	2035.7		
1603.33	2036	1615.5	2036	1650.97	2035.72	1663.65	2035.47	1672.37	2035.6		
1689.42	2035.59	1717.76	2036	1765.09	2036	1783.17	2036.2	1801.72	2036.71		
1821.84	2036.76	1843.72	2036.9	1876.71	2037.35	1917.32	2038	1921.35	2038.16		

Manning's n Values		num= 3									
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
451.16	.03	466.16	.016	491.16	.03						

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
451.16	1921.35		229.98	279.95	1953.63			
Right Levee	Station=	1338.05	Elevation=	2036.07				

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 11

INPUT

Description:

Station Elevation Data		num= 85									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
228.16	2034.7	228.16	2033.8	243.16	2032.34	243.66	2032.34	243.66	2031.84		

245.16	2031.97	268.16	2032.32	285.42	2033.2	295.1	2033	310.35	2032
312.46	2032	320.83	2033	325.82	2034	343.07	2034	385.89	2033
408.73	2033.03	468.15	2033.24	485.3	2033.66	494.79	2033.69	509.43	2033.51
521.63	2033.46	532.69	2033.6	545.83	2033.41	562.33	2033.55	595.37	2033.72
605.2	2034	659.16	2034	663.19	2033.89	666.55	2033.51	693.12	2033.4
704.35	2033.43	713.44	2033.62	731.74	2033.43	751.82	2033.55	764.35	2033.94
773.33	2034.01	805.73	2033.75	813.3	2033.63	820.69	2033.7	830.91	2034
881.06	2034	910.5	2033.71	920.35	2033.46	928.46	2033.64	955.75	2033.6
988.43	2033.73	1005.83	2033.64	1011.32	2033.76	1048.53	2033.69	1066.09	2033.8
1074.88	2033.76	1108.95	2033.98	1121.72	2033.99	1151.35	2033.7	1167.72	2033.82
1188.06	2033.83	1191.79	2034	1236.12	2034.03	1261.28	2033.95	1273.34	2034.02
1301.97	2034	1314.79	2034.3	1343.41	2034.28	1363.22	2034	1376.57	2034
1384.32	2033.87	1398.61	2033.96	1408.09	2033.77	1421.38	2033.8	1445.51	2033.83
1451.33	2034	1483.49	2034	1499.78	2033.8	1504.55	2033.91	1522.19	2033.93
1545.16	2033.7	1560.9	2033.8	1570.68	2033.7	1580.82	2033.87	1605.3	2034
1636.1	2035.04	1646.38	2035.2	1662.87	2036	1702.66	2036	1712.69	2036.2

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
228.16	.03	243.16	.016	268.16	.03	1662.87	.03

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 228.16 1662.87 156.73 186.29 1629.42 .1 .3
 Right Levee Station= 1191.79 Elevation= 2034

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 10

INPUT

Description:

Station	Elevation	Data	num=	98	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
16.94	2035	16.94	2031.69	31.75	2031.35	46.75	2030.66	47.25	2030.66			
47.25	2030.16	48.75	2030.29	71.75	2031.18	75.12	2033	87.36	2033			
88.06	2033.34	98.87	2033.9	107.23	2033.82	113.75	2033.6	136.72	2033.96			
140.45	2033.79	146.6	2033	160.38	2032.65	183.22	2032.36	220.49	2032.19			
228.85	2032.4	251	2032.56	259.75	2032.57	285	2032.29	326.15	2032.27			
328.36	2032.32	353.61	2032.27	362.92	2032.3	376.07	2032.15	388.38	2032.25			
398.86	2032.19	416.44	2032.4	453.25	2032.7	481.26	2032.7	493.51	2032.3			
512.02	2032.48	532.16	2032.9	555.54	2033.16	565.02	2033.13	581.88	2032.72			
602.65	2032.43	619.72	2032	622.05	2031.74	641.46	2032.28	651.85	2032.23			
654.67	2032.1	669.88	2032	681.01	2032.04	684.93	2032.21	710.25	2032.4			
732.15	2032.3	741.21	2032.4	756.87	2032	777.88	2032.4	795.03	2032.45			
823.19	2032	827.53	2032	855.41	2032.27	884.16	2032.34	901.3	2032.27			
918.83	2032.33	954.47	2032.06	981.29	2032.23	984.5	2032.39	997.16	2032.43			
1023.58	2032.32	1024.86	2032.42	1037.7	2032.45	1047.7	2032.37	1067.83	2032.4			
1077.91	2032.28	1084.22	2032	1126.6	2032	1136.78	2032.12	1143.51	2032			
1153.66	2033.4	1186.47	2032	1224.49	2032.36	1238.18	2032	1244.74	2032.04			
1248.45	2032.3	1261.77	2032.4	1282.27	2032	1289.2	2032	1306.76	2032.3			
1313.93	2032.65	1329.37	2032.78	1335.22	2032.64	1346.57	2032.57	1399.49	2032			
1428.7	2032	1437.6	2032.62	1450.45	2034	1472.4	2035.01	1478.11	2035.17			
1490.82	2035.29	1509.26	2035.16	1512.89	2034.88							

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
16.94	.03	46.75	.016	71.75	.03	1490.82	.03

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 31.75 1490.82 469.55 229.09 1906.7 .1 .3
 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 16.94 31.75 2035 F
 Right Levee Station= 795.03 Elevation= 2032.45

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1

RS: 9

INPUT

Description:

Station Elevation Data		num=		101							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2030.7	7.42	2030.69	57.36	2030.3	81.46	2030.18	81.78	2030.6		
89.22	2030.6	95.11	2030.25	114.06	2030.05	116.45	2030.16	131.42	2030.02		
153.47	2030.15	184.78	2030.7	193.74	2030.95	243.33	2032	280.77	2032		
297.23	2030	311.41	2029.76	314.54	2030.3	344.39	2030.63	350.51	2029.88		
362.24	2030	371.44	2031.3	379.79	2032	407.6	2030.39	407.81	2030		
414.43	2030	446.34	2029.75	470.29	2030	475.67	2031	490.76	2030.73		
513.3	2030.2	527.6	2030.19	564.78	2030.67	567.34	2031.19	569.02	2030.5		
581.33	2030.73	592.6	2030.75	618	2031.08	626.4	2031.1	641.18	2030.8		
660.41	2030.95	664.73	2030.6	686.54	2030.79	699.44	2030.7	714.89	2030.37		
720.42	2030	752.01	2030	780.55	2030.09	781.09	2030	797.14	2030.2		
808.09	2030.16	834.27	2030.24	855.83	2030.16	885.15	2030.5	896.95	2030.94		
908.35	2031.05	919.5	2030.89	930.22	2030.39	935.2	2030.4	954.47	2031.9		
962.08	2031.64	986.69	2030	996.57	2029.88	1050.31	2029.58	1067.57	2029.7		
1073.12	2029.9	1108.29	2029.9	1130.92	2030.1	1166.58	2030.31	1187.92	2030.3		
1210.68	2030.2	1228.54	2030.23	1257.34	2030.2	1278.41	2030.09	1314.83	2030.05		
1354.84	2030.15	1380.7	2030	1412.66	2030	1418.1	2029.63	1431.42	2029.85		
1450.38	2029.9	1465.66	2029.71	1479.83	2029.8	1487.62	2029.67	1497.72	2029.71		
1550.87	2030.12	1574.92	2030.08	1583.4	2030	1621.27	2030.54	1656.21	2030		
1668.29	2030.82	1684.76	2031.07	1687.44	2031.2	1708.55	2031.22	1715.86	2031		
1746.11	2030.4	1761.73	2030.2	1800.89	2029.87	1808.78	2029.72	1822.42	2029.8		
1830.25	2030										

Manning's n Values

num=

9

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.03	379.79	.016	470.29	.03	475.67	.5	513.3	.03
618	.5	660.41	.03	720.42	.016	834.27	.03		

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	280.77	1687.44		100	170			
					260			
Left Levee		Station=	619.47	Elevation=	2031.09			
Right Levee		Station=	1621.27	Elevation=	2030.54			

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1

RS: 8

INPUT

Description:

Station Elevation Data		num=		250							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2030.6	.37	2030.61	4.21	2030.63	8.92	2030.63	14.7	2030.62		
21.7	2030.6	30.12	2030.54	39.84	2030.47	55.74	2030.35	74.44	2030.2		
88.08	2030.1	101.06	2030	102.34	2029.95	102.43	2029.95	110.95	2029.69		
117.06	2029.5	121.59	2029.41	125.3	2029.34	128.72	2029.29	132.14	2029.25		
135.6	2029.2	139.13	2029.2	142.76	2029.19	146.65	2029.19	151.01	2029.21		
156.09	2029.2	161.96	2029.3	168.66	2029.39	185.29	2029.65	205.75	2030		
254.37	2031.8	260.47	2032	273.25	2032	280.69	2032	280.95	2031.92		
289.58	2030	290.85	2029.86	293.89	2029.68	297.8	2029.53	302.62	2029.41		
305.22	2029.4	307.85	2029.32	310.49	2029.28	312.68	2029.64	333.25	2029.88		
337.39	2029.3	341.83	2029.38	346.02	2029.43	349.8	2029.48	352.96	2029.54		
355.35	2029.6	357.8	2029.78	360.84	2030	360.86	2030	369	2031.6		
370.95	2032	377.54	2031.55	380.18	2031.4	381.67	2031.35	383.26	2031.31		
384.91	2031.3	386.42	2031.27	387.56	2031.27	394.62	2031.48	399.45	2031.77		
402.77	2032	406.1	2031.88	438.13	2030.6	450.62	2030.11	453.28	2030		
468.01	2029.8	480.63	2029.7	491.63	2029.61	501.41	2029.53	515.64	2029.44		
522.09	2029.4	527.13	2029.43	528.41	2029.4	531.81	2029.37	544.56	2029.35		
566.32	2029.3	578.82	2029.34	585.37	2029.34	589.61	2029.36	615.16	2029.51		
623.94	2029.5	630.64	2029.56	636.87	2029.59	643.11	2029.6	646.69	2029.6		
648.2	2029.6	649.54	2029.59	653.8	2029.56	655.66	2029.55	660.35	2029.56		
662.42	2029.5	672.01	2029.51	678.57	2029.49	681.57	2029.41	689.23	2029.31		
691.37	2029.2	692.56	2029.22	693.89	2029.22	697.52	2029.22	703.61	2029.23		
720.88	2029.3	727.96	2029.27	735.84	2029.25	740.16	2029.26	756.37	2029.28		
777.45	2030	777.68	2030	779.04	2030.71	781.93	2032	782.05	2032.14		

783.6	2033.4	784.62	2034	785.45	2034.51	786.28	2034.76	787.76	2034.88
791.74	2035.3	793.66	2035.09	794.58	2034.8	804.06	2034.1	804.36	2034.04
804.79	2034	807.03	2033.07	811.76	2032.43	812.47	2032.19	814.32	2032
819.92	2030.6	820.9	2030.31	822.76	2030	833.86	2030	837.63	2030
843.88	2030	850.68	2030	851.12	2030	927.43	2030	929.19	2030
929.75	2030	931.3	2030	978.74	2028.48	979.27	2028.48	979.71	2028.48
980.73	2028.5	983.42	2028.43	984.71	2028.41	988.94	2028.44	989.38	2028.45
989.8	2028.5	990.74	2028.46	991.68	2028.46	993.39	2028.45	994.07	2028.45
997.38	2028.5	1001.59	2028.5	1006.68	2028.57	1008.85	2028.57	1019.28	2028.56
1031.9	2028.5	1035.29	2028.5	1038.93	2028.53	1040.17	2028.56	1040.46	2028.59
1042.65	2028.7	1045.54	2028.65	1057.54	2028.61	1065.04	2028.43	1068.78	2028.41
1081.83	2028.4	1083.68	2028.33	1104.64	2028	1128.04	2028	1137.5	2028
1169.13	2028	1171.6	2028	1179.27	2028	1216.04	2028.05	1251.15	2028.1
1271.64	2028.1	1289.31	2028.14	1307.89	2028.16	1310.71	2028.15	1311.25	2028.14
1313.22	2028.1	1316.45	2028.11	1318.79	2028.1	1328.5	2028.08	1334.56	2028.05
1348.71	2028	1354.52	2028	1361.07	2028	1371.81	2028	1417.16	2028
1424.33	2028	1427.89	2028	1429.99	2028	1432.57	2028	1433.97	2028
1437.38	2028	1437.88	2028	1463.36	2028	1463.79	2028	1468.39	2028
1471.42	2028	1475.89	2028	1482.67	2028	1513.67	2028	1519.47	2028
1521.24	2028	1535.14	2028.26	1535.78	2028.26	1626.26	2029.13	1628.39	2029.14
1629.31	2029.1	1629.6	2029.14	1629.88	2029.18	1629.93	2029.22	1630.01	2029.32
1630.56	2029.3	1631.49	2029.33	1632.06	2029.32	1632.66	2029.31	1634.4	2029.28
1636.9	2029.2	1640.51	2029.2	1648.16	2029.13	1654.27	2029.08	1655.55	2029.06
1656.81	2029	1671.4	2028.77	1674.6	2028.69	1676.63	2028.62	1678.31	2028.54
1679.4	2028.5	1680.69	2028.23	1684.45	2028.09	1687.58	2028	1688.88	2028
1692.55	2028	1710.8	2028	1713.05	2028	1717.99	2028	1763.62	2027.42
1769.56	2027.4	1778.11	2027.43	1780.12	2027.42	1787.99	2027.33	1790.17	2027.31

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.03	406.1	.016	480.63	.03	927.43	.03

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 791.74 1630.56 178.08 177.35 176.89 .1 .3
 Right Levee Station= 1632.74 Elevation= 2029.3

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 7

INPUT

Description:

Station	Elevation	Data	num=	319	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2027.9	5.1	2027.92	5.51	2027.92	6.47	2027.93	7.57	2027.93			
7.86	2027.9	8.15	2027.94	8.43	2027.94	8.69	2027.94	8.91	2027.94			
9.11	2027.9	9.3	2027.94	9.47	2027.94	9.66	2027.93	10.16	2027.93			
10.52	2027.9	11.01	2027.92	12.35	2027.91	13.12	2027.9	13.84	2027.9			
14.52	2027.9	16.36	2027.86	17.2	2027.85	18.42	2027.84	37.94	2027.73			
56.01	2027.6	72.07	2027.5	107.89	2027.2	116.79	2027.12	124.29	2027.06			
130.32	2027	134.92	2027	138.39	2026.99	140.94	2026.99	142.75	2027.01			
144.06	2027	146.2	2027.11	150.01	2027.31	151.32	2027.4	151.66	2027.66			
152.1	2028	154.91	2028.06	168.04	2028.36	177.3	2028.54	184.31	2028.65			
190.06	2028.7	195.28	2028.71	218.23	2028.55	225.81	2028.51	227.13	2028.52			
234.86	2028.5	236.27	2028.48	243.37	2028.49	244.82	2028.46	246.01	2028.43			
246.8	2028.4	247.8	2028.27	248.33	2028.21	248.68	2028.17	248.95	2028.15			
249.31	2028.1	249.75	2028.13	249.99	2028.12	250.22	2028.12	250.47	2028.12			
250.67	2028.1	252.54	2028.17	252.92	2028.12	253.32	2028.13	253.7	2028.13			
254.05	2028.1	254.34	2028.14	254.55	2028.15	254.78	2028.16	255.06	2028.18			
255.27	2028.2	256.7	2028.25	258.84	2028.34	260.8	2028.43	266.04	2028.73			
270.68	2029	280.72	2029.51	283.29	2029.54	290.51	2030	292.93	2030.2			
296.36	2030.4	298.98	2030.43	301.94	2030.49	307.67	2030.57	319.28	2030.69			
332.08	2030.6	332.33	2030.46	334.27	2030.32	338.45	2030.17	345.33	2030			
345.57	2030	382.89	2028.61	390.63	2028.44	393.03	2028.35	420.1	2028.03			
420.47	2028	422.92	2028	448.99	2027.9	449.85	2027.89	459.78	2027.86			
461.07	2027.8	471.29	2027.8	473.1	2027.78	493.33	2027.64	496.14	2027.62			
505.61	2027.6	522.25	2027.45	529.7	2027.43	543.63	2027.41	547.27	2027.38			
572.08	2027.4	575.68	2027.36	596.34	2027.38	607.43	2027.34	619.32	2027.35			
629.85	2027.3	634.8	2027.29	638.8	2027.27	643.26	2027.24	647.64	2027.23			

660.4	2027.1	665.64	2027.11	670.26	2027.07	674.98	2027.03	687.41	2026.98
693.82	2027	705.75	2026.96	712.36	2027.01	717.52	2026.99	723.1	2026.97
729.12	2027	735.3	2027	747.18	2027	759.03	2027	778.21	2027.15
792.46	2027.1	799.6	2027.19	807.21	2027.22	810.49	2027.22	813.02	2027.22
815.03	2027.2	819.41	2027.15	820.32	2027.1	821.55	2027.1	824.17	2027.1
826.11	2027.1	827.69	2027.12	829.24	2027.14	837.64	2027.26	840.86	2027.28
851.75	2027.3	861.41	2027.36	864.9	2027.37	867.56	2027.37	870.61	2027.37
873.85	2027.4	883.36	2027.33	884.72	2027.34	887.46	2027.33	889.93	2027.33
895.86	2027.4	897.67	2027.36	899.48	2027.36	901.34	2027.35	903.29	2027.34
905.42	2027.3	916.78	2027.15	920.63	2027.1	924.79	2027.05	925.43	2027.05
929.84	2027	931.75	2027	937.61	2026.93	939.11	2026.93	940.28	2026.93
941.05	2026.9	942.02	2027	944.19	2027.05	947.89	2027.08	951	2027.03
952.49	2027	957.5	2027	959.48	2027	961.95	2027.01	964.1	2027.02
966.77	2027.1	971.57	2027.14	973.75	2027.11	975.72	2027.13	977.63	2027.13
979.89	2027.1	982.4	2027.11	984.94	2027.1	987.45	2027.08	993.12	2027.1
995.62	2027.1	1000.28	2027.1	1004.6	2027.03	1008.56	2027.07	1009.53	2027.04
1010.08	2027	1010.15	2026.9	1023.65	2026.71	1028.93	2026.7	1030.56	2026.7
1032.71	2026.7	1034.02	2026.71	1034.92	2026.72	1036.43	2026.74	1037.98	2026.75
1039.61	2026.7	1044.65	2026.73	1054.01	2026.74	1064.4	2026.77	1069.71	2026.79
1083.9	2026.9	1085.81	2026.87	1088.02	2026.87	1090.08	2026.87	1092.88	2026.88
1095.16	2026.9	1098.38	2026.91	1102.47	2026.93	1104.11	2026.93	1110.9	2026.97
1113.97	2027	1117.06	2027	1122.18	2027.06	1128.47	2027.15	1130.19	2027.17
1132.29	2027.2	1134.84	2027.21	1137.56	2027.23	1145.89	2027.27	1152.05	2027.31
1155.48	2027.3	1157.13	2027.34	1158.7	2027.35	1160.22	2027.35	1161.71	2027.35
1164.89	2027.3	1168.75	2027.32	1173.35	2027.29	1178.09	2027.26	1182.38	2027.21
1184.99	2027.2	1188.35	2027.15	1192.41	2027.12	1196.93	2027.09	1201.65	2027.06
1204.76	2027.1	1208.22	2027.06	1212.97	2027.07	1225.57	2027.1	1229.66	2027.08
1242.34	2027.1	1249.91	2027.08	1262.79	2027.12	1274.05	2027.09	1289.9	2027.14
1297.81	2027.1	1314.5	2027.18	1318.44	2027.18	1336.75	2027.25	1340.36	2027.25
1350.6	2027.3	1354.87	2027.34	1360.57	2027.35	1362.92	2027.35	1364.88	2027.35
1370.46	2027.3	1386.1	2027.41	1409.62	2027.5	1436.5	2027.61	1461.97	2027.72
1474.98	2028	1483.54	2028	1492.76	2028	1492.87	2028	1492.96	2028
1499.13	2028	1503.93	2028	1525.69	2028	1533.79	2028	1537.51	2028
1556.71	2028	1564.18	2028	1565.67	2028	1575.01	2028	1629.28	2027.12
1632	2027.1	1633.72	2027.13	1634.57	2027.12	1645.48	2026.92	1651.83	2027.05
1652.48	2027.1	1653.92	2027.08	1692.17	2026	1693.49	2026	1718.79	2025.7
1730.65	2026.7	1730.81	2026.73	1743.96	2025.88	1744.87	2025.86	1751.58	2025.7
1752.32	2025.7	1752.59	2025.65	1752.61	2025.63	1770.12	2025.41	1771.53	2025.41
1773.56	2025.4	1774.03	2025.41	1775.9	2025.39	1776.41	2025.38		

Manning's n Values		num= 4	
Sta	n Val	Sta	n Val
0	.03	345.33	.016
		393.03	.03
		889.93	.03

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	345.33	1564.18		206.3	173.32	203.74	.1
Left Levee		Station=	324.15	Elevation=	2031		
Right Levee		Station=	1522.12	Elevation=	2028.05		

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 6

INPUT

Description:

Station Elevation Data		num= 290	
Sta	Elev	Sta	Elev
0	2026.7	.83	2026.67
55	2026.2	70.27	2026.07
143.2	2025.4	156.3	2025.56
183.42	2026.6	184.3	2026.96
192.85	2030	193.72	2030.44
201.57	2032	208.01	2030
226.9	2027.7	228	2027.65
255.85	2027.3	262.51	2027.21
319.1	2026.7	333.59	2026.55
409.53	2025.5	410.45	2025.48
434.7	2025.2	440.17	2025.15
481.92	2025	487.15	2025.02
		493.55	2025.03
		501.53	2025.05
		510.53	2025.07
		10.87	2026.57
		77.35	2026
		164.87	2025.68
		187.79	2028
		196.71	2032
		211.81	2028.9
		215.05	2028
		241	2027.4
		244.72	2027.39
		295.06	2026.9
		380.84	2026
		417.34	2025.38
		423.54	2025.29
		445.89	2025.12
		463.74	2025.09
		477.36	2025.04
		78.93	2025.91
		179.58	2025.95
		191.57	2029.53
		201.26	2032
		201.44	2032
		222.52	2027.86
		249.75	2027.35
		306.49	2026.81
		394.39	2025.71
		429.25	2025.23
		477.36	2025.04
		79.8	2025.75
		182.32	2026
		192.56	2029.91

519.54	2025.1	554.97	2025.27	567.23	2025.36	576.88	2025.43	580.17	2025.45
589.18	2025.5	591.97	2025.52	594.01	2025.54	596.1	2025.56	597.27	2025.58
599.03	2025.6	600.27	2025.6	601.66	2025.61	603.06	2025.62	603.69	2025.62
604.29	2025.6	604.88	2025.62	605.5	2025.62	606.12	2025.62	607.35	2025.61
609.91	2025.6	611.35	2025.56	612.99	2025.55	615	2025.54	617.36	2025.53
622.14	2025.5	627.18	2025.51	638.87	2025.56	641.06	2025.56	641.98	2025.56
656.47	2025.6	657.17	2025.62	681.43	2025.7	681.93	2025.7	708.77	2025.8
709.13	2025.8	709.9	2025.81	710.71	2025.81	711.79	2025.83	712.12	2025.83
712.44	2025.8	712.74	2025.84	713.04	2025.84	713.35	2025.84	713.68	2025.84
714.06	2025.8	714.95	2025.84	716.49	2025.84	717	2025.84	717.5	2025.84
717.97	2025.8	719.64	2025.84	720.49	2025.84	720.95	2025.84	721.42	2025.84
721.9	2025.8	722.37	2025.84	722.82	2025.83	723.27	2025.83	724.09	2025.82
724.86	2025.8	726.11	2025.79	727.13	2025.78	727.74	2025.77	728.43	2025.76
737.31	2025.8	738	2025.77	745.12	2025.78	753.8	2025.77	754.51	2025.77
764.03	2025.8	764.84	2025.75	791.26	2025.67	798.08	2025.65	804.11	2025.64
820.39	2025.7	825.8	2025.73	830.88	2025.74	834.53	2025.74	835.31	2025.74
836.62	2025.7	838.31	2025.73	843.74	2025.7	846.52	2025.68	851.69	2025.66
853.84	2025.6	856.21	2025.63	862.3	2025.57	868.52	2025.49	889.05	2025.19
893.12	2025.1	896.8	2025.08	900.08	2025.05	903	2025.03	905.79	2025.02
908.69	2025	915.07	2025.03	920.54	2025.05	925.37	2025.08	935.48	2025.15
938.73	2025.2	944.34	2025.22	946.85	2025.26	951.16	2025.35	957.4	2025.58
959.88	2025.7	963.64	2025.75	969.15	2025.85	976.04	2025.95	976.28	2025.95
976.57	2026	980.43	2026	998.21	2026.08	1014.43	2026.19	1023.47	2026.24
1027.8	2026.3	1031.96	2026.28	1035.97	2026.28	1039.89	2026.28	1048.25	2026.25
1058.43	2026.2	1070.55	2026.14	1083.03	2026.05	1087.37	2026	1116.19	2024.9
1135.42	2024	1169.32	2022.55	1171.08	2022.48	1171.29	2022.47	1171.35	2022.47
1171.42	2022.5	1171.45	2022.47	1171.48	2022.47	1171.51	2022.47	1171.53	2022.47
1171.55	2022.5	1171.58	2022.47	1171.62	2022.47	1171.67	2022.47	1171.71	2022.47
1171.83	2022.5	1172.06	2022.48	1221.79	2024	1227.07	2024.16	1228.81	2024.17
1229.94	2024.2	1230.61	2024.18	1237.33	2024.31	1257.59	2024.71	1269.63	2024.92
1274.47	2025	1278.67	2025.06	1282.42	2025.11	1290.19	2025.19	1305.34	2025.5
1313.48	2025.6	1332.79	2026	1333.47	2026.01	1343.09	2026.11	1373.53	2026.31
1378.26	2026.3	1382.07	2026.38	1387.51	2026.45	1393.17	2026.61	1394.62	2026.66
1395.86	2026.7	1397.49	2026.7	1399.53	2026.7	1401.97	2026.69	1404.73	2026.66
1407.71	2026.6	1414.75	2026.38	1424.49	2026.06	1426.79	2026	1442.12	2024.78
1444.57	2024.8	1446.75	2024.79	1448.47	2024.84	1457.85	2024.41	1460.92	2024.3
1461.61	2024.3	1461.96	2024.25	1462.06	2024.26	1463.12	2024.29	1463.68	2024.3
1464.45	2024.3	1465.54	2024.31	1467.25	2024.31	1468.85	2024.32	1469.35	2024.33
1470.37	2024.4	1471.05	2024.39	1471.9	2024.4	1476.53	2024.45	1481.67	2024.5
1491.96	2024.6	1500.81	2024.81	1502.81	2024.81	1513.87	2025.02	1521.53	2025.17
1523.49	2025.2	1526.72	2025.27	1528.07	2025.3	1529	2025.34	1529.99	2025.41
1530.12	2025.4	1530.4	2025.44	1530.93	2025.45	1535.29	2025.47	1537.4	2025.48
1538.07	2025.5	1538.46	2025.49	1541.48	2025.49	1541.89	2025.49	1542.64	2025.5
1544	2025.5	1544.33	2025.56	1544.71	2025.57	1545.14	2025.57	1545.64	2025.58
1546.87	2025.6	1548.45	2025.59	1550.26	2025.59	1552.02	2025.59	1552.79	2025.59
1553.44	2025.6	1553.99	2025.58	1554.92	2025.56	1556.48	2025.51	1557.38	2025.49

Manning's n Values		num= 4	
Sta	n Val	Sta	n Val
0	.03	179.58	.016
		228	.03
		791.26	.03

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	215.05	1393.17		280.15	237.84	195.6	
Left Levee		Station=	828.32	Elevation=	2025.85		
Right Levee		Station=	1401.77	Elevation=	2026.64		

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 5

INPUT

Description:

Station Elevation Data		num= 266	
Sta	Elev	Sta	Elev
0	2022	11.3	2022
73.1	2023.3	99.25	2023.77
119.66	2024	121.71	2024
160.63	2023.8	164.52	2023.83
175.75	2023.9	176.33	2023.87
		41.32	2022.71
		111.12	2023.95
		132.51	2024
		169.09	2023.85
		176.64	2023.87
		51.09	2022.92
		115.44	2023.98
		135.95	2024
		174.27	2023.85
		177	2023.87
		56.32	2023.02
		116.79	2024
		145.04	2024
		175.46	2023.86
		177.42	2023.86

177.92	2023.9	178.54	2023.85	179.3	2023.84	180.21	2023.83	183.64	2023.77
190.59	2023.7	192.34	2023.7	200.83	2023.63	209.58	2023.53	212.58	2023.49
221.01	2023.4	224.96	2023.33	232.53	2023.23	238.88	2023.13	243.67	2023.1
253.98	2022.9	259	2022.93	266.8	2022.79	272.19	2022.68	274.32	2022.63
276.22	2022.6	278.04	2022.57	279.9	2022.54	281.91	2022.52	284.09	2022.51
286.46	2022.5	289	2022.5	294.2	2022.5	298.69	2022.5	300.38	2022.51
301.63	2022.5	302.72	2022.52	306.67	2022.6	312.15	2022.72	314.98	2022.78
328.44	2023	335.33	2023.13	342.67	2023.29	356.18	2023.66	368.87	2024
377.46	2024.07	383.49	2024.12	390.18	2024.16	396.98	2024.2	400.02	2024.2
402.89	2024.22	405.75	2024.22	408.71	2024.22	411.73	2024.21	417.62	2024.2
429.87	2024.04	433.74	2024	439.17	2023.9	449.53	2023.74	452.56	2023.8
463.28	2023.66	473.24	2023.6	475.17	2023.61	477.05	2023.62	479.19	2023.6
497.62	2023.54	514.4	2023.47	521.93	2023.44	524.94	2023.44	527.6	2023.4
530.02	2023.45	532.38	2023.47	537.64	2023.55	544.15	2023.68	556.43	2024
556.78	2024	560.65	2024.05	564.37	2024.09	567.96	2024.12	571.48	2024.1
575.12	2024.16	579.1	2024.17	583.55	2024.18	593.87	2024.17	611.82	2024.1
617.78	2024.13	623.5	2024.12	628.92	2024.12	648.16	2024.16	657.84	2024.2
663.02	2024.18	668.37	2024.17	673.76	2024.16	679.08	2024.13	684.26	2024.1
689.23	2024.07	697.26	2024	698.83	2023.94	698.94	2023.94	709.07	2023.5
710.43	2023.6	710.82	2023.61	711.39	2023.61	712.2	2023.6	722.57	2023.5
731.14	2023.33	752.76	2022.88	760.63	2022.71	763.59	2022.65	766.11	2022.6
768.3	2022.58	770.3	2022.56	772.19	2022.56	779.72	2022.58	785.43	2022.5
786.99	2022.53	792.64	2022.48	795.09	2022.47	805.27	2022.42	808	2022.4
821.1	2022.38	827.32	2022.32	841.07	2022.34	853.81	2022.36	856.5	2022.3
862.03	2022.35	863.78	2022.33	865.52	2022.32	867.38	2022.32	869.3	2022.3
873.09	2022.32	878.95	2022.35	884.99	2022.35	907.58	2022.53	912.43	2022.5
917.62	2022.54	938.26	2022.69	944.71	2022.71	953.33	2022.75	974.01	2022.9
984.31	2022.93	990.63	2022.96	994.96	2022.98	999.93	2022.98	1002.6	2023
1005.43	2022.96	1008.45	2022.94	1015.22	2022.87	1031.72	2022.65	1034.1	2022.7
1044.73	2022.53	1057.15	2022.41	1058.48	2022.41	1059.82	2022.4	1090.66	2022.2
1109.69	2022	1124.29	2021.82	1134.05	2021.74	1151.85	2021.66	1157.62	2021.7
1161.31	2021.68	1164.53	2021.7	1167.86	2021.67	1170.66	2021.64	1175.03	2021.5
1182.6	2021.28	1185.15	2021.21	1188.12	2021.16	1191.63	2021.12	1195.37	2021.1
1199.41	2021.06	1203.73	2021.04	1208.59	2021.04	1221.26	2021.06	1233.26	2021.1
1241.92	2021.11	1251.23	2021.3	1251.45	2021.33	1254.49	2021.36	1268.77	2021.4
1277.08	2021.58	1278.17	2021.66	1289.91	2022	1290.64	2022	1293.89	2022
1314.87	2022	1317.05	2022.39	1334.78	2022.64	1342.41	2022.74	1349.58	2022.8
1356.36	2022.9	1368.84	2023.03	1381.63	2023.14	1384.01	2023.17	1385.92	2023.2
1391.04	2023.31	1393.05	2023.35	1397.16	2023.41	1399.02	2023.44	1400.83	2023.5
1402.73	2023.48	1406.87	2023.52	1412.44	2023.56	1419.35	2023.62	1421.81	2023.6
1422.67	2023.64	1423.39	2023.64	1424.09	2023.64	1424.77	2023.64	1425.46	2023.6
1426.2	2023.62	1427.48	2023.57	1428.48	2023.53	1430.04	2023.45	1431.61	2023.3
1433.28	2023.22	1434.6	2023.16	1436.26	2023.09	1438.19	2023.03	1440.26	2023
1442.32	2022.94	1450.44	2023.05	1455.49	2023.13	1457.51	2023.17	1459.06	2023.2
1460.62	2023.33	1461.99	2023.7	1462.95	2023.86	1464.28	2024	1465.43	2024
1468.77	2024	1469.22	2023.97	1470.04	2023.45	1470.3	2023.26	1470.89	2023.2
1474.51	2023.33	1492.62	2024	1493.91	2024.05	1495.32	2024.1	1496.93	2024.1
1498.79	2024.17	1500.92	2024.19	1506.17	2024.22	1512.88	2024.23	1520.57	2024.2
1527.98	2024.24								

Manning's n Values num= 3
 Sta n Val Sta n Val
 0 .016 73.1 .03 766.11 .03

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 145.04 1527.98 218.12 151.74 126.69
 Left Levee Station= 414.16 Elevation= 2024.22
 Right Levee Station= 1461.95 Elevation= 2023.97

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 4

INPUT

Description:

Station	Elevation	Data	num=	199	Sta	Elev	Sta	Elev	Sta	Elev
0	2020	24.65	2020	27.61	2020	31.05	2020	31.26	2020	
32.49	2020	32.62	2020.05	32.72	2020.05	32.78	2020.04	32.81	2020.04	

36.66	2020.1	57.19	2020.41	155.74	2022	158.86	2022.1	172.11	2022.51
176.98	2022.6	181.13	2022.75	184.82	2022.82	188.33	2022.87	191.93	2022.9
195.76	2022.9	203.63	2022.94	214.26	2022.98	214.92	2023	240.37	2022.81
242.29	2022.5	245.38	2022.09	246.41	2022	250.91	2021.59	268.58	2020.09
276.66	2019.4	278.65	2019.25	282.23	2019.03	283.72	2018.96	284.43	2018.94
285.2	2018.9	287.05	2018.92	290.96	2018.95	295.97	2019.01	306.29	2019.17
310.98	2019.2	329.64	2020.6	330.59	2020.77	341.84	2021.8	344.24	2022
345.26	2022	353.26	2022.2	356.07	2022.23	360.16	2022.25	365.97	2022.25
373.15	2022.2	384.47	2022.18	391.37	2022.12	394.2	2022.07	396.44	2022.02
396.86	2022	408.13	2020.21	409.47	2020	414.51	2019.94	419.76	2019.9
424.93	2019.9	434.06	2019.84	444.01	2019.84	448.32	2019.86	450.63	2019.9
451.02	2020	462.58	2020.58	467.78	2020.78	473.87	2021.05	478.04	2021.15
482.36	2021.3	485.36	2021.4	487.65	2021.45	497.88	2021.5	499.81	2021.52
506.7	2021.5	516.1	2021.48	517.69	2021.46	528.2	2021.41	529.84	2021.41
539.16	2021.3	544.61	2021.37	547.79	2021.33	549.69	2021.34	551.75	2021.35
555.17	2021.3	560.77	2021.24	567.91	2021.07	577.05	2020.95	580.49	2020.85
591.78	2020.7	594.99	2020.64	600.47	2020.6	605.23	2020.59	610.3	2020.44
614.57	2020.5	618.95	2020.32	619.9	2020.3	620.68	2020.28	621.3	2020.27
621.77	2020.3	622.13	2020.26	622.68	2020.26	623.8	2020.29	624.14	2020.29
624.58	2020.3	625.12	2020.29	650.55	2020.47	657.34	2020.41	663.18	2020.44
669.49	2020.5	683.41	2020.47	687.14	2020.45	688.86	2020.44	690.44	2020.43
693.14	2020.4	696.54	2020.42	700.09	2020.43	721.74	2020.43	725.14	2020.43
726.65	2020.4	728.13	2020.44	734.4	2020.5	744.59	2020.49	748.16	2020.49
774.98	2020.3	778.72	2020.35	794.63	2020.2	797.75	2020.24	811.73	2020
814.63	2020	815.1	2019.96	842.14	2019.63	846.64	2019.66	848.75	2019.67
849.46	2019.7	850.01	2019.67	851.44	2019.63	852.29	2019.62	853.58	2019.6
855.28	2019.6	857.27	2019.56	874.88	2019.4	877.62	2019.38	891.18	2019.27
894.28	2019.3	905.2	2019.19	911.1	2019.18	933.52	2019.05	939.02	2019.06
946.61	2019	949.75	2019	952.47	2019	958.51	2019.02	978.58	2019.14
983.59	2019.2	988.45	2019.18	1012.66	2019.32	1018.67	2019.36	1036.73	2019.47
1041.44	2019.5	1055.42	2019.61	1083.93	2019.84	1084.46	2019.85	1099.82	2019.99
1100.48	2020	1127.37	2020.7	1132.94	2020.91	1144.02	2021.31	1156.25	2021.7
1164.02	2022	1174.33	2022.09	1197.17	2022.28	1225.15	2022.5	1234.97	2022.58
1238.42	2022.6	1241.28	2022.61	1244.05	2022.61	1246.77	2022.6	1249.49	2022.57
1252.45	2022.5	1257.49	2022.35	1261.43	2022.2	1265.37	2022	1270.22	2021.68
1277.66	2021.1	1280.48	2020.89	1281.79	2020.83	1289.63	2020.98	1291.44	2021.39
1294.13	2022	1298.94	2022.16	1304.48	2022.33	1306.75	2022.39	1308.75	2022.43
1310.92	2022.5	1313.68	2022.49	1343.59	2022.57	1351.69	2022.6		

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .03 240.37 .03 1238.42 .03

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 240.37 1238.42 170.71 179.58 192.83 .1 .3
 Left Levee Station= 497.88 Elevation= 2021.5
 Right Levee Station= 1245.13 Elevation= 2022.59

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 3

INPUT

Description:

Station	Elevation	Data	num=	210	Sta	Elev	Sta	Elev	Sta	Elev
0	2020	13.16	2020	21.62	2020	22.96	2020.22	31.45	2022	
36.92	2023.1	41.83	2023.39	47.11	2024	54.5	2022.75	55.37	2022.73	
58.45	2022	98.15	2020.04	98.91	2020	98.99	2020	140.89	2020	
144.29	2020	170.02	2020	170.4	2020	170.49	2020	170.58	2020	
171.54	2020	182.25	2021.46	185.25	2022	189.75	2022.93	193.96	2024	
194.88	2024	196.22	2024	200.15	2024	201.57	2023.63	206.92	2022	
208.22	2021.8	229.87	2020	232.91	2019.96	233.14	2019.96	250.97	2019.74	
275.62	2019.5	277	2019.52	297.66	2019.39	304.02	2019.36	306.41	2019.35	
310.22	2019.4	316.29	2019.51	327.43	2019.82	333.36	2020	337.83	2020.43	
343.45	2020.8	357.29	2022	357.36	2022.01	357.61	2022.04	373.07	2023.9	
374.62	2024	376.82	2024.01	380.36	2024.01	384.11	2024.01	391.94	2024	
393.09	2024	393.15	2023.97	400.02	2023.69	401.61	2023.74	401.93	2023.76	
402.3	2023.8	402.94	2023.75	404.21	2023.7	411.03	2023.42	421.22	2022.95	

427.17	2022.7	435.42	2022.2	438.58	2022	441.66	2021.59	452.44	2020
518.74	2019	535.53	2018.74	553.24	2018.5	560.34	2018.39	562.16	2018.36
564.24	2018.3	565.27	2018.31	569.71	2018.27	569.74	2018.28	570.01	2018.29
570.53	2018.3	571.37	2018.31	572.44	2018.31	573.06	2018.31	576.07	2018.26
579.88	2018.2	593.55	2018	606.32	2018	610.44	2018	625.81	2018
630.2	2018	635.61	2018	641.85	2018	642.73	2018	649.57	2018
658.24	2018	665.04	2018	672.05	2018	674.89	2018	683.22	2019.09
689.1	2020	727.81	2021.12	745.48	2021.64	747.59	2021.69	749.13	2021.72
750.24	2021.7	751.59	2021.75	752.01	2021.75	753.33	2021.72	754.57	2021.71
757.84	2022	785.83	2023.26	793.34	2023.58	794.21	2023.61	794.62	2023.63
794.82	2023.6	794.89	2023.65	797.06	2023.68	797.22	2023.67	797.43	2023.67
797.7	2023.7	797.99	2023.66	798.23	2023.65	798.38	2023.65	798.4	2023.66
799.86	2023.6	800.91	2023.62	802.33	2023.59	809.98	2023.41	871.44	2022
890.68	2020	891.06	2020	891.08	2020	891.09	2020	897.17	2019.2
900.18	2018.9	901.84	2018.69	902.85	2018.61	903.56	2018.59	904.13	2018.59
905.23	2018.7	907.73	2019.03	908.31	2019.02	915.09	2020	918.3	2020.11
928.75	2020.4	932.42	2020.49	935.55	2020.51	946.37	2020.56	956.69	2020.77
962.08	2020.9	970.1	2021.06	989.16	2021.93	989.94	2021.95	990.88	2022
997.43	2022	1004.69	2022	1011.34	2022	1045.97	2022	1049.06	2022
1054.42	2022	1057.77	2021.75	1062.29	2021.61	1070.22	2021.16	1074.16	2020.9
1076.28	2020.7	1117.28	2020.15	1124.66	2020	1125.41	2019.91	1130.03	2020
1180.31	2019	1185.37	2019.12	1188.41	2019.2	1191.6	2019.26	1195.32	2019.29
1196.22	2019.3	1200.19	2019.29	1203.35	2019.26	1205.33	2019.2	1206.56	2019.12
1207.32	2019	1210.81	2018.88	1212.87	2019.15	1214.25	2019.34	1214.97	2019.42
1215.78	2019.5	1216.86	2019.51	1218.26	2019.53	1223.16	2019.6	1224.35	2019.62
1225.46	2019.6	1226.55	2019.63	1227.66	2019.63	1230.19	2019.62	1236.83	2019.57
1238.51	2019.6	1240.39	2019.55	1242.97	2019.52	1244.83	2019.51	1263.24	2019.11
1265.91	2019.1	1267.85	2019.02	1269.39	2019.01	1278.32	2019.05	1280.47	2019.05
1282.58	2019	1284.54	2019.02	1286.35	2018.99	1292.19	2018.81	1292.62	2018.8

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	193.96	.03	797.06	.03

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	193.96	797.06		204.55 267.88	331.41	.1	.3
Left Levee		Station=	387.17	Elevation=	2024.02		
Right Levee		Station=	797.06	Elevation=	2023.68		

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 2

INPUT

Description:

Station Elevation Data		num= 229		Sta Elev		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2017.5	14.82	2017.65	16.15	2017.61	24.75	2017.73	25.82	2017.69		
35.33	2017.8	36.88	2017.78	37.96	2017.75	60.05	2017.99	60.08	2017.99		
60.13	2018	60.82	2018	80.55	2018.32	93	2018.67	102.32	2019.04		
107.61	2019.2	109.44	2019.38	110.73	2019.47	111.69	2019.54	112.1	2019.58		
113.34	2019.6	114.44	2019.63	116.38	2019.57	119.42	2019.5	128	2019.34		
141.38	2019.1	174.39	2018.35	190.5	2018	199.13	2018	199.85	2018		
200.6	2018	232.82	2018	235.48	2018	239.98	2018	241.93	2018		
243.88	2018	245.96	2018	248.32	2018	251.11	2018	258.86	2018		
284.05	2018	309.03	2018	318.79	2018	332.09	2018	346.75	2019.24		
353.17	2020	358.73	2020	367.62	2020	372.65	2018.94	377.04	2018		
381.26	2017.7	381.63	2017.69	382.05	2017.68	408.03	2016	437.27	2014.66		
441.41	2014.6	443.68	2014.53	445.83	2014.46	473.93	2014.17	474.95	2014.04		
475.35	2014	475.83	2013.93	476.43	2013.89	477.17	2013.86	478.1	2013.84		
479.22	2013.8	482.05	2013.84	487.54	2013.88	493.46	2013.93	494.61	2013.95		
495.58	2014	496.32	2013.99	497.35	2014.06	503.33	2014.73	507.61	2015.17		
515.72	2015.9	524.82	2016.72	537.3	2018	538.5	2018.23	539.21	2018.28		
545.7	2019.3	547.82	2019.15	560	2020	588.74	2018.59	590.5	2018.61		
591.84	2018.6	593.25	2018.55	600.95	2018.04	601.07	2018.04	601.69	2018		
605.17	2017.9	632.99	2017.13	642.86	2016.87	647.92	2016.74	651	2016.66		
653.23	2016.6	659.29	2016.5	661.99	2016.45	662.41	2016.44	662.75	2016.44		
663.61	2016.4	664.9	2016.42	665.88	2016.41	666.22	2016.41	666.49	2016.4		
666.7	2016.4	666.95	2016.39	667.03	2016.38	667.08	2016.38	667.15	2016.38		

667.36	2016.4	667.78	2016.39	667.9	2016.39	667.96	2016.39	668.75	2016.39
668.87	2016.4	669.69	2016.44	670.06	2016.45	670.55	2016.47	671.24	2016.49
673.41	2016.5	680.17	2016.69	691.54	2016.94	735.85	2017.94	738.29	2018
738.55	2018.1	747.16	2020	757.49	2020.19	775.28	2020.49	781.62	2020.6
803.2	2020.7	803.4	2020.6	804.2	2020.56	805.69	2020.54	807.95	2020.53
814.23	2020.6	820.07	2020.63	833.85	2020.76	840.79	2020.83	845.15	2020.88
854.9	2021.1	859	2021.12	862.33	2021.15	863.46	2021.16	865.57	2021.1
870.55	2021	876.05	2020.89	878.39	2020.85	881.14	2020.8	883.55	2020.83
896.5	2020.7	900.54	2020.65	904.86	2020.56	909.1	2020.44	912.85	2020.28
916.18	2020.1	916.9	2020	943.71	2019.3	970.3	2018.59	977.56	2018.39
992.65	2018	1023.42	2018	1030.85	2018	1038.65	2018	1045.85	2018
1046.5	2018	1046.51	2018	1050.25	2018.03	1053.92	2018.08	1061.38	2018.26
1070.35	2018.5	1073.35	2018.65	1077.67	2018.93	1083.63	2018.75	1090.63	2018.57
1100.25	2018.4	1105.26	2018.28	1110.35	2018.23	1111.1	2018.22	1113.82	2018.2
1114.64	2018.2	1114.95	2018.18	1115.22	2018.18	1115.46	2018.18	1115.7	2018.19
1115.96	2018.2	1116.56	2018.22	1118.86	2018.36	1119.48	2018.39	1120.16	2018.42
1124.61	2018.4	1125.28	2018.44	1126.07	2018.46	1138.88	2018.64	1139.88	2018.66
1143.48	2018.7	1144.69	2018.72	1146.78	2018.75	1151.36	2018.8	1155.15	2018.8
1158.42	2018.8	1164.17	2018.66	1174.55	2018.35	1175.4	2018.33	1176.41	2018.3
1189.58	2018	1196.44	2017.64	1204.06	2017.19	1208.35	2016.84	1213.8	2016
1220.57	2014.5	1223.62	2014.16	1225.29	2014	1229.73	2014	1232.18	2014
1251.79	2015.1	1255.73	2015.29	1258.51	2015.42	1260.44	2015.5	1261.81	2015.55
1262.9	2015.6	1263.88	2015.6	1266.93	2015.61	1267.98	2015.61	1268.94	2015.62
1286.12	2016	1299.96	2016.15	1309.54	2016.26	1317.13	2016.38		

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .03 659.29 .03 1317.13 .03

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 659.29 1317.13 420 390 370
 Left Levee Station= 560.62 Elevation= 2020.04
 Right Levee Station= 747.16 Elevation= 2020

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 1.75

INPUT

Description:

Station	Elevation	Data	num=	199						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
0	2012.9	25.11	2012.82	26.51	2012.83	37.56	2012.59	38.5	2012.59	
61.34	2012.1	61.79	2012.11	67.15	2012	68.17	2011.94	73.17	2011.65	
76.65	2011.5	77.87	2011.44	78.9	2011.42	80.99	2011.44	83.28	2011.55	
86.61	2012	110.22	2012.39	121.98	2012.58	129.97	2012.69	135.66	2012.76	
139.98	2012.8	143.51	2012.8	152.88	2012.77	160.45	2012.75	166.35	2012.89	
170.4	2012.9	179.58	2013.1	186.54	2013.24	203.01	2013.44	209.13	2013.57	
216.25	2013.7	223.37	2013.77	225.32	2013.8	230.76	2013.84	234.06	2013.84	
235.45	2013.8	249.06	2014	254.89	2014	257.76	2014	263.19	2014	
265.99	2014	315.69	2012.26	319.65	2012.17	320.87	2012.14	329.91	2012	
332.87	2012	340.46	2011.96	352.85	2011.94	363.61	2011.94	368.14	2011.94	
371.83	2012	374.75	2011.97	376.8	2012	384.05	2012.06	407.73	2012.31	
421.39	2012.5	427.45	2012.51	432.93	2012.55	437.81	2012.57	442.17	2012.58	
449.91	2012.5	456.66	2012.48	463.63	2012.34	469.22	2012.23	473.13	2012.18	
473.5	2012.2	477.73	2012.15	482.06	2012.14	482.39	2012.14	486.71	2012.15	
487.14	2012.2	487.56	2012.15	487.89	2012.14	488.23	2012.12	488.35	2012.12	
488.51	2012.1	488.68	2012.11	488.86	2012.11	489.01	2012.11	489.29	2012.12	
490.25	2012.2	491.05	2012.19	492.46	2012.24	495.11	2012.32	500.89	2012.4	
503.29	2012.5	509.93	2012.6	513.55	2012.71	518.19	2012.83	530.05	2013.12	
535.31	2013.2	547.13	2013.56	551.52	2013.61	553.39	2013.65	556.73	2013.71	
560.4	2013.7	561.56	2013.73	562.9	2013.78	563.3	2013.79	563.72	2013.8	
564.61	2013.8	565.82	2013.83	566.11	2013.83	566.74	2013.83	567.19	2013.83	
567.73	2013.8	568.33	2013.83	568.99	2013.82	571.52	2013.77	572.48	2013.76	
573.38	2013.7	579.91	2013.67	580.85	2013.66	581.57	2013.67	582.58	2013.69	
583.1	2013.7	583.82	2013.7	584.88	2013.69	586.37	2013.68	588.4	2013.65	
591.15	2013.6	599.11	2013.46	608.7	2013.27	613.93	2013.17	627.5	2012.97	
633.28	2012.9	657.89	2012.49	664.27	2012.39	667.27	2012.33	668.25	2012.31	
669.15	2012.3	669.99	2012.29	670.8	2012.29	671.58	2012.29	675.25	2012.31	

679.46	2012.3	684.34	2012.35	688.16	2012.33	693.61	2012.36	712.92	2012.4
719.86	2012.4	726.38	2012.37	739.68	2012.24	743.39	2012.27	755.51	2012.12
761.66	2012	762	2012	789.86	2011.75	794.6	2011.71	798.93	2011.69
803.14	2011.7	807.38	2011.68	816.16	2011.7	826.68	2011.74	841.16	2011.82
859.29	2011.9	859.6	2011.92	870.07	2012	884.6	2012.97	893.79	2014
900.59	2014.7	910.96	2016	917.09	2016.11	924.91	2016.23	929.31	2016.27
933.91	2016.3	938.48	2016.32	942.89	2016.32	947.15	2016.3	951.28	2016.27
959.44	2016.1	959.97	2016.14	967.23	2016	976.72	2015.19	984.12	2014.79
991.83	2014.4	995.8	2014.17	997.59	2014	1002.38	2014	1011.02	2014
1013.37	2014	1017.04	2014	1027.11	2012.85	1032.61	2012	1079.57	2012
1079.68	2012	1079.69	2012	1081.84	2012.1	1084.48	2012.18	1087.46	2012.23
1094.04	2012.3	1097.31	2012.31	1100.28	2012.34	1102.69	2012.38	1106.54	2012.59
1108.34	2012.6	1111.12	2012.65	1114.88	2012.67	1118.13	2012.68		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	257.76	.03	938.48	.03

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	257.76	938.48		464.44	469.5		488.11	
Left Levee	Station=	265.49	Elevation=	2014.05				
Right Levee	Station=	565.82	Elevation=	2013.83				

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 1.5

INPUT

Description:

Station	Elevation	Data	num=	174					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2007.9	.81	2007.86	7.21	2007.88	12.54	2007.92	16.86	2007.98
17.32	2008	21.85	2008.3	49.98	2010	58.38	2010.62	63.58	2010.96
66.2	2011.1	73.6	2011.32	74.35	2011.35	75.15	2011.36	75.97	2011.37
76.8	2011.4	77.64	2011.36	78.58	2011.33	79.74	2011.27	81.48	2011.14
94.26	2010	95.74	2009.79	109.17	2008	123.34	2006.53	127.91	2006
134.11	2006	149.07	2006	232.83	2007.55	244.8	2007.77	246.83	2007.81
249.36	2007.9	250.18	2007.86	250.82	2007.87	251.35	2007.88	251.81	2007.88
252.26	2007.9	252.69	2007.89	253.09	2007.89	253.48	2007.89	253.82	2007.89
254.1	2007.9	254.64	2007.87	254.88	2007.86	255.19	2007.85	255.53	2007.85
258.83	2008	290.56	2008.31	302.23	2008.45	338.61	2008.34	338.76	2008.26
340.19	2008.2	343.33	2008.13	347.61	2008.1	352.1	2008.08	355.98	2008.09
359.2	2008.1	371.68	2008.3	378.35	2008.4	380.24	2008.41	381.62	2008.4
383.12	2008.3	384.37	2008.17	386.85	2008.07	390.14	2008	392.37	2007.97
402.56	2007.9	418.77	2007.76	426.35	2007.71	427.37	2007.7	434.85	2007.61
436.22	2007.6	439.36	2007.61	439.98	2007.61	440.67	2007.61	441.6	2007.6
446.64	2007.5	449.14	2007.49	451.81	2007.46	454.28	2007.43	489.24	2006.96
498.78	2006.8	502.22	2006.76	505.37	2006.72	508.51	2006.69	516.8	2006.63
518.95	2006.6	520.87	2006.6	522.6	2006.58	527	2006.51	528.3	2006.48
529.57	2006.5	530.87	2006.46	532.12	2006.45	533.23	2006.45	534.12	2006.45
534.85	2006.5	536.06	2006.48	538.09	2006.53	540.16	2006.6	542.83	2006.69
546.48	2006.8	551.91	2007.07	555.27	2007.22	560.85	2007.39	561.96	2007.37
571.47	2007.6	574.18	2007.62	579.74	2007.75	581.61	2007.75	586.94	2007.88
587.25	2007.9	587.52	2007.88	592.64	2007.96	592.73	2007.96	597.35	2007.96
597.65	2008	597.7	2007.97	597.75	2007.97	597.79	2007.97	597.92	2007.97
597.98	2008	598.03	2007.96	603.08	2007.87	603.22	2007.87	608.37	2007.72
621	2007.2	624.14	2007.05	629.42	2006.88	633	2006.8	634.23	2006.77
635.22	2006.8	636.03	2006.76	636.71	2006.76	637.84	2006.78	645.57	2006.98
650.75	2007.1	668.87	2007.85	673.07	2008	692.05	2009.16	706.65	2010
710.03	2010.2	719.37	2010.76	721.71	2010.9	723.47	2011.08	724.02	2011.23
724.26	2011.3	724.63	2011.3	725.12	2011.33	725.73	2011.35	726.46	2011.36
727.33	2011.4	728.37	2011.38	729.58	2011.39	732.16	2011.39	733.39	2011.39
735.91	2011.4	738.82	2011.34	740.39	2011.32	742.01	2011.3	743.68	2011.27
745.39	2011.2	756.15	2010.83	773.77	2008.55	820.96	2007.88	820.96	2007.84
822.46	2007.7	822.46	2008.2	827.96	2008.3	845.11	2009.13	845.11	2014.13
845.78	2014.13	845.78	2008.13	860	2004.6	909.16	2003.95		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
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0 .03 489.24 .03 773.77 .016 820.96 .013 860 .03

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 489.24 909.16 450 600 690 .1 .3
 Left Levee Station= 307.52 Elevation= 2008.48
 Right Levee Station= 761.06 Elevation= 2010.64

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 1

INPUT

Description:

Station Elevation Data num= 110

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2004.5	1.38	2004.48	20.04	2004.21	29.34	2004.09	38.97	2004
67.37	2003.5	70.43	2003.5	71.43	2003.49	72.39	2003.48	74.7	2003.4
82.17	2003.1	94.5	2002.66	111.34	2002	121.33	2001.82	127.12	2001.76
141.62	2001.5	152.42	2001.36	166.59	2001.11	175.09	2000.94	180.66	2000.83
182.85	2000.8	184.83	2000.77	188.58	2000.73	199.64	2000.64	204.69	2000.6
213.05	2000.5	219.39	2000.46	222.79	2000.43	224.08	2000.42	225.09	2000.41
225.83	2000.4	226.36	2000.4	227.12	2000.41	228.08	2000.42	230.29	2000.48
231.38	2000.5	232.92	2000.54	236	2000.58	237.97	2000.61	240.75	2000.69
241.9	2000.7	243.27	2000.75	244.93	2000.77	247.71	2000.73	249.45	2000.76
252.18	2000.7	255.86	2000.77	266.99	2000.73	273.49	2000.76	278.41	2000.74
283.5	2000.7	285.22	2000.67	298.85	2000.45	299.62	2000.45	304.79	2000.37
305.39	2000.4	310.37	2000.32	310.89	2000.31	315.53	2000.3	316.07	2000.28
317.09	2000.2	317.92	2000.2	318.35	2000.17	320.06	2000.12	320.27	2000.12
320.88	2000.1	321.03	2000.1	321.17	2000.1	321.32	2000.1	321.46	2000.1
321.59	2000.1	321.7	2000.1	321.91	2000.1	322.15	2000.1	322.28	2000.1
322.75	2000.1	323.52	2000.13	324.53	2000.15	325	2000.16	325.46	2000.17
327.99	2000.3	328.68	2000.28	329.46	2000.3	330.36	2000.32	336.03	2000.36
337.13	2000.4	338.45	2000.41	365.99	2002	368.83	2002	369.68	2002
371.91	2002	382.6	2002.6	439.81	2002.15	449.59	2001.89	449.59	2001.85
450.59	2001.72	450.59	2002.22	451.09	2002.22	456.09	2002.32	459.62	2002.4
460.62	2002.4	460.62	2007.26	461.29	2007.26	461.29	2001.26	559.83	1999.71
565.33	1999.61	565.33	1999.11	566.83	1999.24	566.83	1999.28	584.83	1999.84

Manning's n Values num= 9

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.03	72.39	.03	382.6	.016	439.81	.013	451.09	.03
456.09	.013	459.62	.03	460.62	.013	461.29	.03		

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 72.39 584.83 241 227 213 .1 .3
 Right Levee Station= 460.62 Elevation= 2007.26

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 0.99

INPUT

Description:

Station Elevation Data num= 107

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2003.3	7.12	2003.04	10.52	2002.94	35.03	2002	48.44	2002
51.76	2002	55.01	2002	60.72	2002	82.41	2002	87.28	2002
129.92	2001.5	171.97	2002	175.69	2002	177.02	2002	178.98	2002
226.93	2002	241.4	2002	254.75	2002	267.56	2002	349.34	2000.26
355.07	2000	355.23	2000	355.4	2000	355.55	2000	360.11	2000
382.33	2000	390.63	2000	419.08	2000	422.86	2000	431.42	2000
449.3	1999	455.48	1998.98	471.11	1998.85	475.73	1998.71	490.05	1998.61
495.9	1998.5	524.53	1998	529.21	1998	533.98	1998	539	1998
554.64	1998	559.5	1998	571.45	1998	586.55	1998	645.74	1998
651.16	1998	655.54	1998	658.36	1998	671.12	1998	695.55	1998
705.72	1998	708.67	1998.19	727.36	2000	747.07	2000	769.62	2000
793.36	2000	799.2	2000	806.01	2000	820.69	2000	823.24	2000

825.64	1999.9	825.82	1999.93	838.58	1999.96	844.84	1999.96	844.96	1999.96
850.5	1999.9	850.7	1999.94	855.03	1999.89	855.41	1999.89	855.8	1999.89
860.72	1999.8	867.72	1999.72	872.01	1999.64	879.31	1999.51	929.57	1998.57
943.37	1998.4	949.03	1998.31	962.32	1998.16	963.14	1998.15	975.19	1998.05
977.46	1998	977.76	1998.05	985.29	1998.02	985.55	1998.02	992.71	1998.06
993.9	1998.1	995.38	1998.15	1004.35	1998.32	1005.29	1998.36	1013.2	1998.57
1014.28	1998.6	1020.53	1998.8	1025.1	1998.97	1026.04	1998.97	1031.86	1999.22
1066.08	1999.2	1083.39	1998.8	1085.53	1998.76	1111.64	1998	1133.8	1997.18
1135.75	1997.2	1177.35	1996.69	1179.72	1996.69	1184.2	1996.72	1186.18	1996.71
1195.9	1996.8	1200	1996.79						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	431.42	.03	727.36	.03

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	431.42	727.36		493.73	200	108.79	.1
Right Levee		Station=	747.07	Elevation=	2000		.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 0.95

INPUT

Description:

Station	Elevation	Data	num=	120					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1998.4	14.5	1999.64	18.13	2000	18.58	2000	20.37	2000
21.18	2000	22.94	2000	30.71	1998.56	33.33	1998	44.19	1996.5
47.43	1996	50.54	1996	51.24	1996	56.3	1996	75.33	1996
84.61	1996	100.15	1996.28	103.26	1996.33	129.03	1996.81	137.18	1996.92
145.37	1997.1	155.07	1997.18	160.42	1997.28	202.53	1997.71	212.27	1997.8
224.44	1997.9	225.33	1997.89	227.3	1997.87	232.95	1997.92	233.14	1997.92
233.37	1997.9	238.78	1997.92	239.02	1997.92	239.27	1997.92	252.86	1998
265.55	1998	271.89	1997.28	287.41	1998	302.18	1998	302.49	1998
302.79	1998	314.43	1998	319.19	1998	323.87	1998	348.41	1998.27
354.71	1998.3	355.45	1998.29	361.21	1998.33	365.81	1998.4	366.9	1998.4
421.82	1998.2	427.29	1998	461.03	1997.54	463.22	1997.52	465.33	1997.5
480.75	1997.3	483.03	1997.28	510.43	1996.99	512.65	1996.98	518.1	1996.92
519.87	1996.9	524.01	1996.86	558.69	1996.87	633.06	1996.6	636.58	1996.6
638.42	1996.6	641.88	1996.61	684.74	1996.47	717.7	1997.19	719.05	1997.16
729.61	1998	740.02	1998.45	741.47	1998.48	742.55	1998.5	761	1999.18
795.46	1999.6	805.31	1999.29	806.66	1999.29	812.38	1999.14	814.43	1999.11
821.78	1998.9	827.83	1998.78	836	1998.61	843.82	1998.48	860.37	1998.22
865.21	1998.2	866.39	1998.2	867.05	1998.21	872.4	1998.21	873.01	1998.21
879.04	1998.2	879.59	1998.24	885.75	1998.3	891.25	1998.37	934.33	1998.51
935.51	1998.5	947.46	1998.36	961.34	1998.23	967.21	1998.16	979.53	1998.09
980.57	1998.1	991.94	1998.05	992.14	1998.05	1001.65	1998.06	1004.48	1998.08
1005.12	1998.1	1014.11	1998.16	1016.98	1998.22	1025.77	1998.37	1041.23	1998.81
1072.59	2000	1081.94	2000	1088.11	2000	1103.42	1999.65	1107.81	1999.53
1126.81	1999.1	1153.89	1998.33	1158.45	1998.21	1166.69	1998	1200	1998

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	22.94	.03	795.46	.03

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	22.94	795.46		200	200	200	.1
Left Levee		Station=	365.81	Elevation=	1998.4		.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 0.90

INPUT

Description:

Station	Elevation	Data	num=	96
---------	-----------	------	------	----

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1994.2	10.98	1994	11.48	1994	12.48	1994	17.53	1994
25.78	1994	34.41	1994	37.19	1994	63.99	1994	93.21	1994.59
134.35	1995.2	135.74	1995.19	139.43	1995.22	144.15	1995.24	146.47	1995.27
193.12	1995.4	197	1995.43	198.8	1995.42	202.22	1995.4	204.34	1995.39
271.65	1995.3	274.08	1995.34	281.34	1995.34	317.2	1995.69	319.53	1995.69
324.25	1995.7	331.98	1995.78	340.92	1996	367.09	1996	375	1996.5
387.3	1996	399.82	1996	410.64	1996	445.03	1996	462	1994.98
469.91	1996	474.17	1996	475.43	1996	480.32	1996	484.96	1996
490.39	1996.18	498.84	1996	513.79	1995.12	519.22	1995	526.06	1994.66
532.42	1994.62	537.74	1994.62	545.77	1994.3	551.29	1994.3	562.62	1994.2
568.71	1994.23	569.2	1994.23	574.49	1994.27	609.27	1994.5	619.69	1994.67
629.77	1994.78	689.3	1995.07	691.23	1995.06	708.86	1996	717.26	1996.55
719.04	1996.61	720.32	1996.63	748.6	1997.35	756.21	1997.2	759.95	1997.15
762.7	1997.11	767.74	1996.96	771.46	1996.86	795.5	1996	829.69	1996
877.8	1996	877.96	1996	980.93	1997.74	981.57	1997.7	986.99	1997.8
987.53	1997.8	988.64	1997.82	1002.49	1997.77	1003.79	1997.7	1009.45	1997.72
1011.14	1997.68	1013.46	1997.63	1022.8	1997.52	1026.45	1997.4	1037.43	1997.27
1063.86	1996.74	1084.15	1996.32	1094.6	1996.12	1098.82	1996	1148.71	1996
1168.29	1996	1168.54	1996	1169.84	1996	1184	1996	1189.34	1996
1200	1996								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	498.84	.03	748.6	.03

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	498.84	748.6		200	200	.1	.3
Left Levee		Station=	490.39	Elevation=	1996.18		

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 0.85

INPUT

Description:

Station	Elevation	Data	num=	119					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1993.5	45.62	1992.72	49.46	1992.67	52.38	1992.63	63.93	1992.51
92.55	1992.4	95.39	1992.38	98.09	1992.36	104.18	1992.46	106.29	1992.46
121.09	1993.1	123.98	1993.25	125.05	1993.26	129.27	1993.5	130.12	1993.53
135.84	1993.8	141.19	1994	141.44	1994	144.22	1994	144.9	1994
145.32	1994	145.6	1994	153.11	1994	182.05	1994	216.81	1994
216.84	1994	217.13	1994	222	1994	222.94	1993.99	223.02	1993.98
223.12	1994	231.46	1993.74	232.55	1993.71	250.98	1993.1	252.91	1993.08
269	1992.5	283.82	1992.35	306.46	1992.6	309.28	1992.66	312.8	1992.69
316.09	1992.8	319.86	1992.82	325.01	1992.9	329.11	1992.96	340.94	1993.16
345.24	1993.2	354.87	1993.37	359.22	1993.38	401.14	1993.35	404.4	1993.28
408.86	1993.3	412.45	1993.18	416.48	1993.09	420.87	1993.05	425.03	1992.97
429.08	1992.9	433.17	1992.87	436.76	1992.8	439.77	1992.73	443.71	1992.72
448.49	1992.6	467	1992.36	472.35	1992.38	473.74	1992.37	479.51	1992.41
512.33	1992.5	524.58	1992.62	590.2	1992.85	613.46	1992.66	618.73	1992.77
621.47	1992.7	624.64	1992.69	627.1	1992.74	630.15	1992.72	632.27	1992.76
635.04	1992.8	637.61	1992.77	639.09	1992.78	641.46	1992.81	678.72	1993.11
682.2	1993.2	688.84	1993.29	694.83	1993.41	718.64	1993.47	719.36	1993.45
720.7	1993.5	721.44	1993.45	751.15	1994	764.67	1994	765.97	1994
774.16	1994	790.64	1994	835.35	1994	849.08	1994	850.3	1994
851.61	1994	855.59	1994	880.21	1994	895.81	1994	939.51	1995.02
972.36	1995.8	978.86	1996	981.4	1996	982.23	1996	984.93	1996
1013.87	1996	1056.96	1996	1068.66	1996	1069.74	1996	1076.33	1996
1083.72	1996	1084.46	1996	1102.83	1995.21	1111.37	1994.82	1125.87	1994
1128.31	1994	1177.37	1994	1191.64	1994	1200	1994		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	223.02	.03	751.15	.03

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	223.02	751.15		200	200	.1	.3

Left Levee Station= 222 Elevation= 1994

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1 RS: 0.80

INPUT

Description:

Station	Elevation	Data	num=	127					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1992	23.54	1992	24.32	1992	24.98	1992	29.93	1992
40.55	1991.6	69.1	1990.58	92.95	1990.04	94.94	1990	107.95	1990
125.24	1990	126.9	1990.41	133.49	1992	140.68	1992.67	154.44	1993.83
156.51	1994	163.69	1994	186.9	1994	212.85	1992.46	218.73	1992
225.03	1992	225.57	1992	230.21	1992	248.29	1991.09	250.4	1991.06
251.56	1991.1	252.58	1991.09	274.19	1991.15	281.24	1991.05	282.94	1991.05
329.38	1990.9	331.16	1990.93	333.35	1990.93	334.92	1990.94	340.64	1990.99
341.99	1991	374.76	1991.09	377.13	1991.08	379.52	1991.08	440.82	1990.54
447.52	1990.5	455.08	1990.37	463.05	1990.3	478.31	1990.15	480.26	1990.13
480.86	1990.1	494.51	1990	495.32	1990	508.7	1990	514.89	1990
557.84	1990	565.52	1990	567.3	1990	577.03	1990	581.82	1990
611.61	1990	622.7	1990	633.99	1991.32	640.53	1992	646.93	1992.74
648.45	1992.8	663.16	1992.68	664.02	1992.72	665.15	1992.72	676.82	1992
681.93	1991.8	684	1991.73	695.38	1991.25	698	1991.17	700.1	1991.12
704.12	1990.9	705.68	1990.91	710.62	1990.62	711.8	1990.64	728.6	1990.54
729.98	1990.6	733.83	1990.65	735.57	1990.68	737.38	1990.69	742.2	1990.82
810.12	1992	812.1	1992	828.71	1992	829.44	1992	830.25	1992
831.05	1992	834.44	1992	840.13	1992.29	843.4	1992.43	875.69	1994
901.22	1994	906.65	1994	922.29	1994	928.34	1994	943.95	1994
945.01	1994	945.44	1994	952.55	1994	956.48	1993.96	956.59	1993.96
979.22	1993.9	982.61	1993.87	990.74	1993.84	995.08	1993.78	1005.49	1993.69
1016.21	1993.6	1018.56	1993.54	1028.69	1993.39	1042.74	1993.14	1051.91	1992.96
1059.99	1992.8	1069.26	1992.69	1082.33	1992.42	1090.86	1992.35	1098.16	1992.32
1101.47	1992.3	1106.84	1992.26	1109.28	1992.22	1113.33	1992.24	1115.24	1992.2
1124.17	1992.1	1134.71	1992.21	1135.35	1992.21	1156.6	1992.36	1157.71	1992.36
1167.22	1992.4	1200	1992.61						

Manning's n	Values	num=	3		
Sta	n Val	Sta	n Val	Sta	n Val
0	.03	186.9	.03	875.69	.03

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	186.9	875.69		200	200		.1	.3
Left Levee		Station=	163.59	Elevation=	1994			
Right Levee		Station=	648.45	Elevation=	1992.8			

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1 RS: 0.75

INPUT

Description:

Station	Elevation	Data	num=	130					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1990	22.9	1990	24.73	1990	27.21	1990	29.91	1990
48.44	1990	51.63	1990	63.53	1990	70.08	1990	72.12	1990
76.78	1990	80.4	1990.88	85.68	1992	87.78	1992	88.9	1992
96.44	1992	97.52	1991.86	105.6	1990	110	1989.61	113.36	1989.42
116.04	1989.3	125.56	1988.59	129.49	1988.49	135.62	1988.44	136.88	1988.36
143.23	1988.1	153.79	1988	162.93	1988	164.6	1988	177.43	1988
187.52	1988	201.74	1988	208.18	1988	227.09	1988	236.64	1989.11
242.8	1990	247.45	1991.33	250.28	1992	268.12	1992	269.94	1992
270.43	1992	277.64	1990.76	282.61	1990	293.75	1989.71	294.57	1989.7
306.71	1989.4	315.43	1989.22	341.45	1989.03	345.88	1988.97	349.74	1988.93
359.74	1988.7	362.82	1988.71	369.32	1988.58	389.2	1988.35	391.56	1988.35
402.43	1988.3	403.25	1988.34	406.64	1988.36	407.44	1988.36	515.99	1988.5
523.08	1988.5	524.45	1988.45	538.88	1988.37	541.38	1988.35	556.43	1988.29

557.47	1988.3	580.94	1988.28	581.6	1988.28	598.33	1988.22	604.04	1988.19
625.94	1988	633.03	1988	633.79	1988	634.99	1988	637.18	1988
649.69	1988	657.13	1988	668.53	1988	669.58	1988	670.17	1988
671.04	1988	673.99	1988.26	689.36	1990	690.89	1990.12	691.66	1990.15
709.88	1991.3	748.59	1991.88	749.36	1991.91	749.81	1991.92	753.14	1991.93
756.03	1992	764.92	1992	765.57	1992	766.47	1992	767.88	1992
770.53	1992	777.18	1992	782.42	1992	784.9	1992	786.35	1992
787.3	1992	792.22	1991.76	796.09	1991.43	804.19	1990.83	812.3	1990
827.36	1990	840.24	1990	860.01	1990	891.53	1990	893.07	1990
893.94	1990	896.23	1990.03	897.31	1990.03	906.74	1990.14	907.03	1990.14
993.74	1990.6	997.75	1990.61	998.94	1990.61	1002.97	1990.61	1082.38	1990.24
1089.12	1990.2	1090.55	1990.16	1110.68	1990	1137.23	1990	1163.73	1990
1169.69	1990.1	1170.08	1990.11	1170.38	1990.11	1190.62	1990.48	1200	1990.45

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	96.44	.03	1200	.03

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	96.44	1200		200	200		.1	.3
Left Levee		Station=	268.12	Elevation=	1992			

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 0.70

INPUT

Description:

Station	Elevation	Data	num=	122						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
0	1984.4	31.58	1984	50.22	1984	59.06	1984	69.5	1984	
88.38	1984	97.89	1985.54	100.84	1986	116.81	1987.41	119.25	1988	
123.56	1988	125	1988	126.04	1988	127.24	1988	136.5	1988	
153.48	1986.4	157	1986	158.52	1986	160.12	1986	171.06	1986	
175.03	1986	177.94	1986	180.23	1986	182.12	1986	185.04	1986	
189.96	1986	193.82	1986	205	1986	205.43	1986	210.61	1986	
254.94	1986	260.33	1986	287.3	1986	289.61	1986	314.18	1986.99	
335.77	1988	340.58	1988	347.2	1988	361.98	1987.58	363.81	1987.54	
365.7	1987.5	375.48	1987.26	377.89	1987.24	390.38	1986.97	392.98	1986.97	
400.5	1986.8	416.33	1986.78	417.3	1986.78	460.07	1986.42	466.49	1986.3	
467.46	1986.3	473.97	1986.18	474.74	1986.16	480.77	1986.1	481.64	1986.08	
486.63	1986.1	486.96	1986.06	491.01	1986.09	493.26	1986.06	493.47	1986.06	
501.66	1986.1	513.42	1986.23	514.53	1986.25	528.2	1986.4	529.86	1986.42	
564.43	1986.8	583.14	1987.04	585.99	1987.07	615.69	1987.26	619.01	1987.28	
635.72	1987.4	638.87	1987.38	650.79	1987.45	665.33	1987.56	683	1987.71	
684.79	1987.7	704.08	1987.92	711.5	1988	717.36	1988.15	767.49	1988.43	
772.71	1988.4	778.09	1988.32	782.66	1988.31	786.73	1988.27	790.8	1988.29	
791.77	1988.3	852.88	1988.32	859.14	1988.3	860.39	1988.28	880.45	1988.26	
886.45	1988.3	887.68	1988.27	894.32	1988.28	895.57	1988.29	902.46	1988.31	
909.24	1988.3	910.56	1988.35	917.09	1988.39	923	1988.44	924.39	1988.44	
929.66	1988.5	1015.61	1988.65	1023.56	1988.6	1025.65	1988.59	1034.6	1988.55	
1056.07	1988.5	1060	1988.46	1061.91	1988.47	1068.95	1988.46	1070.82	1988.46	
1077.29	1988.5	1079.05	1988.47	1117.88	1988.68	1128.33	1988.72	1131.21	1988.75	
1134.6	1988.8	1137.81	1988.79	1142.35	1988.82	1145.4	1988.84	1148.26	1988.88	
1155.16	1988.9	1200	1989.2							

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	136.5	.03	717.36	.03

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	136.5	717.36		200	200		.1	.3
Left Levee		Station=	127.24	Elevation=	1988			

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 0.6

INPUT

Description:

Station Elevation Data				num= 83					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1983.8	20.6	1983.65	21.59	1983.65	22.74	1983.64	26.65	1983.61
27.94	1983.6	66.1	1983.3	70.09	1983.3	71.5	1983.3	74.46	1983.28
75.52	1983.3	248.52	1982.7	350.52	1982	367.01	1982	368.71	1982
423.64	1982	426.41	1981.28	432.59	1980	441.96	1980	468.37	1980
475.89	1981.5	479.35	1982	485.09	1982	515.29	1982.35	516.34	1982.38
518.13	1982.4	520.81	1982.44	523.77	1982.49	528.8	1982.57	532.58	1982.66
535.71	1982.7	537.91	1982.77	540.2	1982.8	549.64	1983.1	552.51	1983.11
560.25	1983.3	563.14	1983.27	570.66	1983.41	574.7	1983.49	580.79	1983.58
597.06	1983.4	618.4	1983.51	643.99	1983.43	740.8	1984	740.82	1984
740.93	1984	783.05	1984	800.27	1984	801.71	1984	801.94	1984
814.58	1984	822.96	1984	831.02	1984	837.79	1984	850.52	1984
857.67	1984	865.78	1984	870.14	1984	896.76	1984.21	898.31	1984.21
906.11	1984.2	918.24	1984.28	919.23	1984.29	967.15	1984.52	1009.46	1984.42
1013.07	1984.4	1013.95	1984.4	1017.53	1984.4	1018.39	1984.4	1019.19	1984.4
1022.8	1984.4	1032.77	1984.4	1033.84	1984.41	1057.14	1984.59	1070.3	1984.71
1071.69	1984.7	1087.97	1984.88	1091.54	1984.92	1094.2	1984.95	1118.89	1985.2
1120.72	1985.2	1194.57	1985.49	1200	1985.49				

Manning's n Values				num= 3	
Sta	n Val	Sta	n Val	Sta	n Val
0	.03	0	.03	580.79	.03

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	0	580.79		200	200	.1	.3

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1

RS: 0.55

INPUT

Description:

Station Elevation Data				num= 100					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1982	17.83	1982	24.14	1982	34.09	1982	42.23	1982
48.19	1982	57.64	1982	61.99	1982	62.41	1982	63.25	1982
69.41	1982	70.31	1982	108.88	1982	136.49	1982	140.92	1982
159.34	1982	184.2	1982	194.59	1982	197.46	1982	205.86	1982
207.07	1982	211.8	1982	219.64	1982	219.96	1982	220.53	1982
253.64	1982	255.5	1982	271.28	1982	274.21	1982	278.53	1982
282.95	1982	285.96	1981.94	373.91	1981.29	378.93	1981.26	417.41	1981.01
420.7	1981	468.23	1980.71	470.9	1980.69	518.84	1980	536.68	1980
544.62	1980	553.31	1980	564.24	1980	566.12	1980	602.4	1980
640.15	1980	642.74	1980	643.04	1980	643.44	1980	643.95	1980
644.57	1980	645.25	1980	646.34	1980	701.61	1981.98	702.98	1982
705.45	1982	713.07	1982	714.83	1982	759.15	1981.74	782.02	1981.81
798.37	1981.8	852.19	1981.83	852.54	1981.83	857.29	1981.83	863.71	1981.81
884.28	1982	889.16	1982	894.11	1982	936.43	1982	939.19	1982
943.57	1982	944	1982	944.69	1982	945.93	1982	946.05	1982
946.22	1982	946.31	1982	946.49	1982	958	1982.13	959.62	1982.16
973.31	1982.3	995.81	1982.74	1054.77	1983.51	1055.71	1983.51	1068.97	1984
1072.14	1984	1078.15	1984	1080.85	1984	1086.2	1983.68	1094.68	1984
1103.87	1984	1110.19	1984	1114.93	1984	1137.08	1984	1142.82	1984
1144.11	1984	1145.37	1984	1149.78	1984	1151.25	1984	1200	1984

Manning's n Values				num= 3	
Sta	n Val	Sta	n Val	Sta	n Val
0	.03	282.95	.03	702.98	.03

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	282.95	702.98		15.47	200	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1

RS: 0.50

INPUT

Description:

Station Elevation Data		num= 87							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1982.1	10.5	1982	29.65	1982	32.81	1982	39.65	1982
47.09	1982	50.57	1982	55.73	1982	74.65	1982	77.51	1982
82.94	1982	83.78	1982	90.21	1982	91.79	1982	100.46	1982
104.54	1982	111	1982	113.82	1982	151.24	1982	155.51	1982
174.1	1982	177.68	1982	206.81	1981.64	207.51	1981.64	210.6	1981.63
211.3	1981.6	226.54	1981.59	227.98	1981.58	283.88	1981.34	338.03	1980.9
342	1980.9	345.49	1980.85	349.26	1980.82	353.44	1980.78	356.76	1980.75
374.62	1980.6	397.38	1980.48	442.5	1980.11	443.21	1980.1	455.33	1980
456.75	1979.7	466.81	1978	480.45	1978	493.2	1978	498.85	1978.85
507.01	1980	513.81	1980	517.65	1980	518.81	1980	521.4	1979.92
553.98	1979.3	568.51	1978	585.8	1978	588.55	1978	591.96	1978.06
592.66	1978.1	619.99	1978.49	625.46	1978.55	731.47	1979.14	732.81	1979.11
744.17	1979.2	757.89	1979.47	759.98	1979.44	776.29	1980	830.1	1980
861.58	1980	862.06	1980	865.09	1980	868.07	1980	870.55	1980
901.81	1979.6	902.85	1979.61	919.62	1979.44	941.43	1979.34	952.97	1979.26
959.98	1979.2	1010.9	1978.85	1013.91	1978.83	1017.01	1978.81	1019.88	1978.8
1022.45	1978.8	1060.89	1978.58	1064.48	1978.57	1086.82	1978.57	1093.07	1978.58
1095.63	1978.6	1200	1978.16						

Manning's n Values

num= 3					
Sta	n Val	Sta	n Val	Sta	n Val
0	.03	442.5	.03	776.29	.03

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	442.5	776.29		200	200	.1	.3
Right Levee		Station=	830.1	Elevation=	1980		

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1

RS: 0.45

INPUT

Description:

Station Elevation Data		num= 132							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1970	4.79	1970	13.93	1970	22.35	1970	50.83	1970
51.09	1970	52.35	1970	80.4	1974.45	90.77	1976.27	107.48	1978.68
111.17	1979.2	117.06	1980	131.39	1980.71	171.22	1980.57	176.13	1980.48
213.54	1980	214.9	1980	226.81	1980	227.86	1980	231.95	1980
237.4	1980	240.81	1980	241.39	1980	241.87	1980	247.1	1980
281.61	1979.7	282.86	1979.68	283.54	1979.68	287.1	1979.59	290.45	1979.64
301.58	1979.5	320.84	1979.04	335.47	1978.72	347.74	1978.43	354.89	1978.35
355.88	1978.4	356.74	1978.35	357.39	1978.35	357.83	1978.34	362.78	1978
366.69	1977.2	368.9	1976.59	371.2	1976	373.14	1976	374.55	1976
385.27	1976	387.52	1976.48	393.96	1978	398.33	1979.03	402.99	1980
413.62	1980	413.9	1980	414.44	1979.97	442.14	1978	466.69	1978
491.9	1978	500.71	1978	527.05	1978	541.4	1978	542.74	1978
545.35	1978	548.61	1977.82	565.77	1976.77	573.39	1976	587.39	1976
591.18	1976	594.33	1976	596.87	1976.45	599.08	1976.91	604.7	1978
622.33	1978	634.14	1978	636.95	1978	637.83	1978	642.29	1978
674.36	1978	678.04	1978	679.44	1978	680.79	1978	686.97	1978
698.3	1978	728.13	1978	729.58	1978	730.75	1978	731.39	1978
733.63	1978	747.78	1978	752.87	1978	765.53	1978	776.23	1978
785.66	1978	806.83	1978	836.7	1976.83	862.34	1976.29	863.05	1976.31
865.24	1976.3	865.97	1976.31	869.16	1976.35	870.02	1976.35	919.73	1976.16
921.07	1976.1	921.86	1976.14	922.63	1976.14	925.33	1976.14	927.41	1976.14
932.4	1976.2	933.48	1976.2	947.42	1976.42	949.4	1976.42	962.87	1976.66
965.27	1976.6	1017.22	1976.81	1028.32	1976.73	1034.43	1976.67	1052.85	1976.62
1057.82	1976.6	1059.03	1976.57	1063.67	1976.54	1064.56	1976.54	1068.57	1976.53
1097.45	1976.6	1099.33	1976.64	1103.1	1976.65	1105.22	1976.69	1107.6	1976.72
1111.61	1976.8	1117.18	1976.82	1135.42	1977.04	1184.09	1977.85	1186.06	1977.88
1192.86	1978	1200	1978						

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .03 131.39 .03 1200 .03

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 131.39 1200 1152 714 306 .1 .3
 Left Levee Station= 131.39 Elevation= 1980.71

SUMMARY OF MANNING'S N VALUES

River:RIVER-1

Reach n7	n8	River Sta. n9	n1	n2	n3	n4	n5	n6
Reach-1		31	.03	.013	.016	.013		
Reach-1		30	.03	.013	.016	.013		
Reach-1		29	.013	.027	.013	.016	.013	.035
Reach-1		28	.013	.03	.013	.016	.013	.035
Reach-1		27.3	.03	.013	.016	.013	.03	
Reach-1		27.2	.03	.013	.016	.013	.03	
Reach-1		27.1	.03	.013	.016	.013	.03	
Reach-1		27	.03	.013	.016	.013	.03	
Reach-1		26	.027	.016	.013	.027	.016	
Reach-1		25	.027	.016	.013	.027	.027	.016
Reach-1		24	.027	.016	.013	.027	.027	
Reach-1		23	.027	.016	.013	.027		
Reach-1		22	.027	.016	.03	.027		
Reach-1		21	.027	.016	.03			
Reach-1		20	.027	.016	.03			
Reach-1		19	.03	.016	.03			
Reach-1		18	.03	.016	.03	.03		
Reach-1		17	.03	.016	.03	.03		
Reach-1		16	.03	.016	.03			
Reach-1		15	.016	.03				
Reach-1		14	.03	.016	.03	.03		
Reach-1		13	.03	.016	.03	.03		
Reach-1		12	.03	.016	.03			
Reach-1		11	.03	.016	.03	.03		
Reach-1		10	.03	.016	.03	.03		
Reach-1		9	.03	.016	.03	.5	.03	.5
.03	.016	.03						
Reach-1		8	.03	.016	.03	.03		
Reach-1		7	.03	.016	.03	.03		
Reach-1		6	.03	.016	.03	.03		
Reach-1		5	.016	.03	.03			
Reach-1		4	.03	.03	.03			
Reach-1		3	.03	.03	.03			
Reach-1		2	.03	.03	.03			
Reach-1		1.75	.03	.03	.03			
Reach-1		1.5	.03	.03	.016	.013	.03	
Reach-1		1	.03	.03	.016	.013	.03	.013
.03	.013	.03						
Reach-1		0.99	.03	.03	.03			
Reach-1		0.95	.03	.03	.03			
Reach-1		0.90	.03	.03	.03			
Reach-1		0.85	.03	.03	.03			
Reach-1		0.80	.03	.03	.03			
Reach-1		0.75	.03	.03	.03			
Reach-1		0.70	.03	.03	.03			
Reach-1		0.6	.03	.03	.03			
Reach-1		0.55	.03	.03	.03			
Reach-1		0.50	.03	.03	.03			
Reach-1		0.45	.03	.03	.03			

SUMMARY OF REACH LENGTHS

River: RIVER-1

Reach	River Sta.	Left	Channel	Right
Reach-1	31	257	257	257
Reach-1	30	248	248	248
Reach-1	29	300	300	300
Reach-1	28	213.18	209	209
Reach-1	27.3	200	200	198
Reach-1	27.2	162.68	166	161.02
Reach-1	27.1	152.46	154	158.62
Reach-1	27	60	160	250
Reach-1	26	167.26	344.62	911.99
Reach-1	25	217.73	402.96	1310.73
Reach-1	24	133.28	268.48	1406.92
Reach-1	23	90.37	188.5	1571.09
Reach-1	22	71.82	66.75	2311.06
Reach-1	21	136.36	116.42	2116.99
Reach-1	20	164.84	178.05	2207.97
Reach-1	19	484.71	223.44	2373.65
Reach-1	18	185.4	214.27	2376.92
Reach-1	17	202.21	259.99	1937.08
Reach-1	16	200.1	266.06	2049.12
Reach-1	15	184.5	231.19	2292.4
Reach-1	14	183.4	251.14	2249.62
Reach-1	13	207.95	343.21	2179.82
Reach-1	12	229.98	279.95	1953.63
Reach-1	11	156.73	186.29	1629.42
Reach-1	10	469.55	229.09	1906.7
Reach-1	9	100	170	260
Reach-1	8	178.08	177.35	176.89
Reach-1	7	206.3	173.32	203.74
Reach-1	6	280.15	237.84	195.6
Reach-1	5	218.12	151.74	126.69
Reach-1	4	170.71	179.58	192.83
Reach-1	3	204.55	267.88	331.41
Reach-1	2	420	390	370
Reach-1	1.75	464.44	469.5	488.11
Reach-1	1.5	450	600	690
Reach-1	1	241	227	213
Reach-1	0.99	493.73	200	108.79
Reach-1	0.95	200	200	200
Reach-1	0.90	200	200	200
Reach-1	0.85	200	200	200
Reach-1	0.80	200	200	200
Reach-1	0.75	200	200	200
Reach-1	0.70	200	200	200
Reach-1	0.6	200	200	200
Reach-1	0.55	15.47	200	401.23
Reach-1	0.50	200	200	200
Reach-1	0.45	1152	714	306

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS

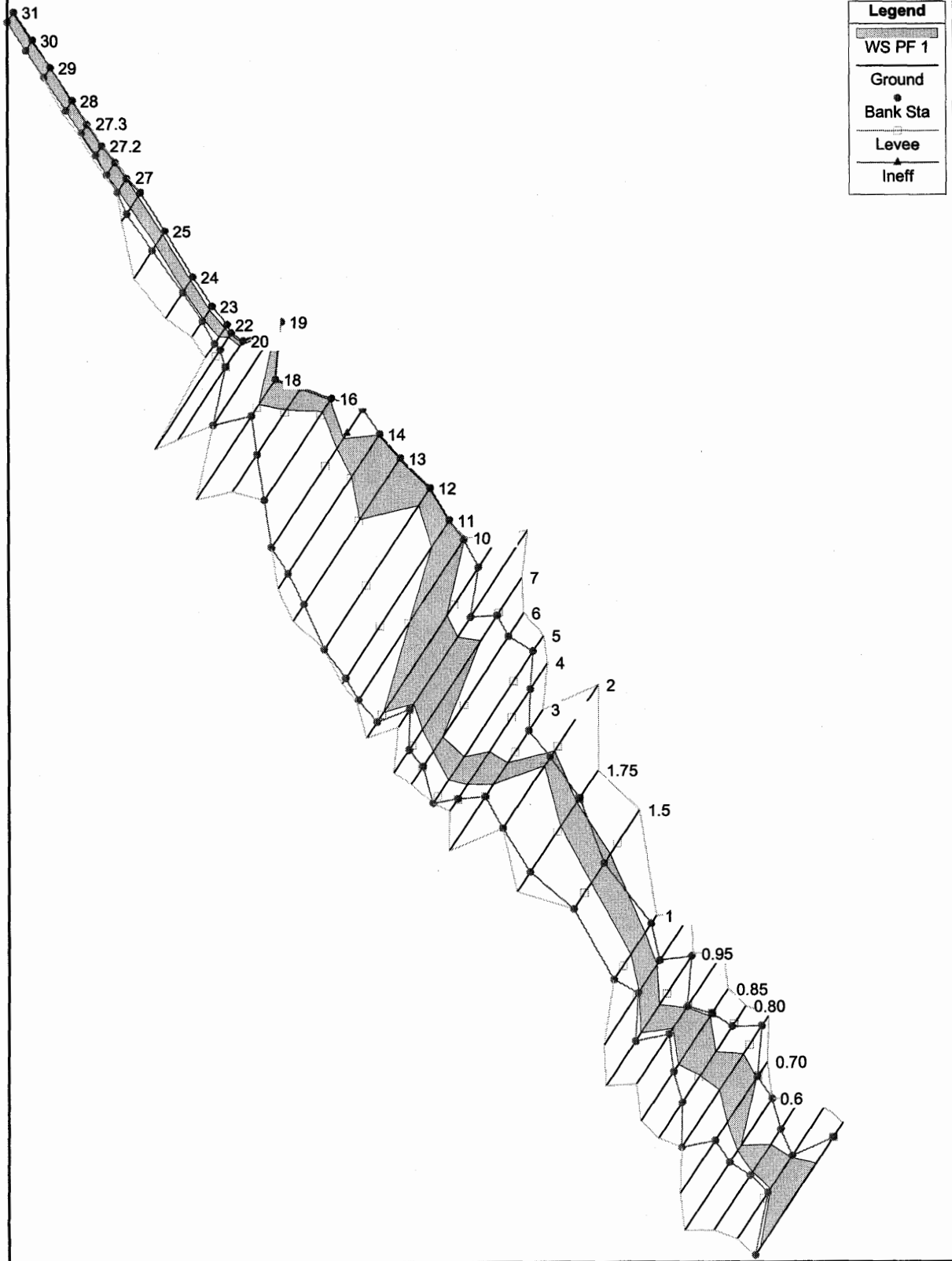
River: RIVER-1

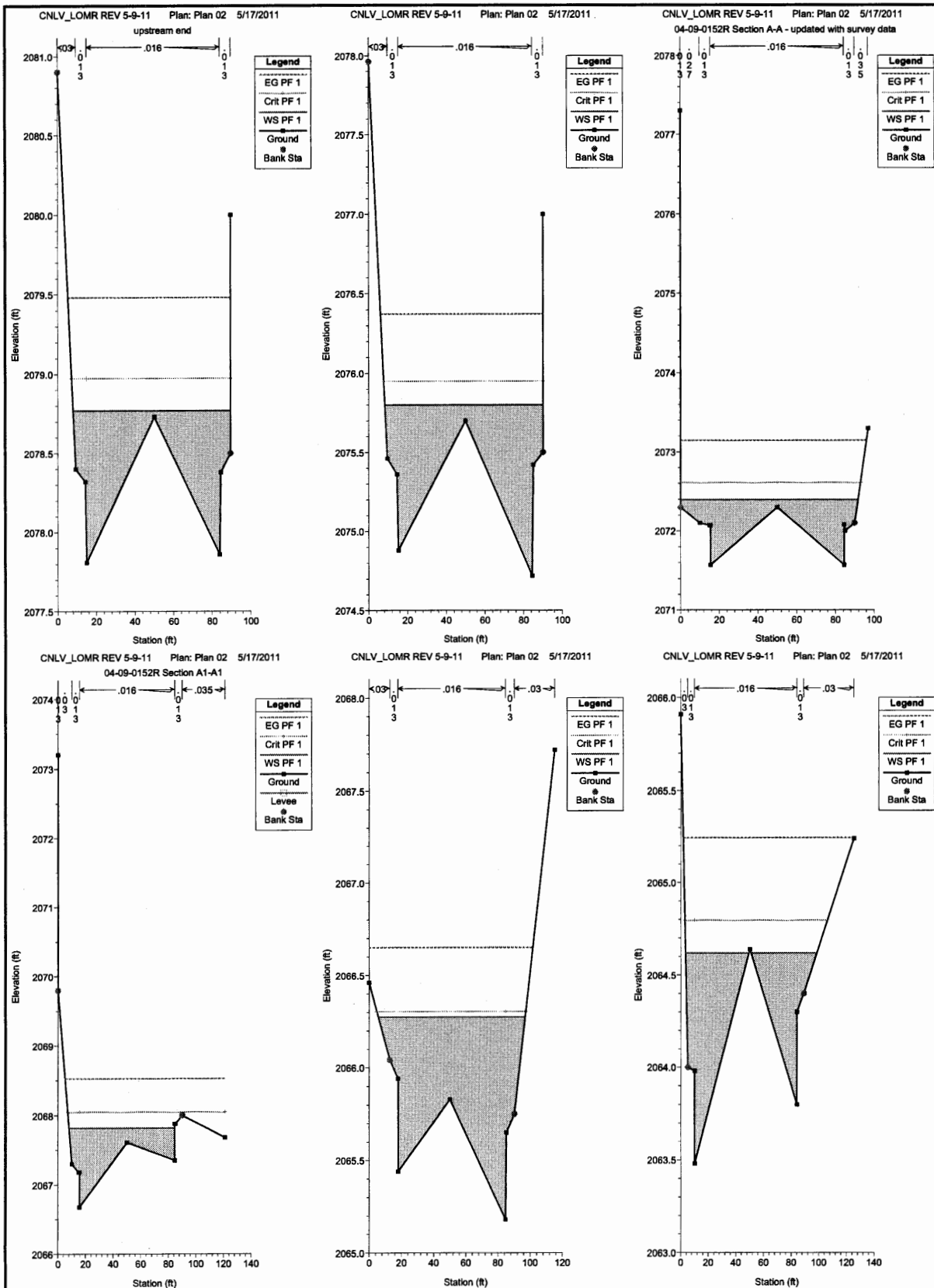
Reach	River Sta.	Contr.	Expan.
Reach-1	31	.1	.3
Reach-1	30	.1	.3
Reach-1	29	.1	.3
Reach-1	28	.1	1
Reach-1	27.3	.1	.3
Reach-1	27.2	.1	.3
Reach-1	27.1	.1	.3
Reach-1	27	.1	.3

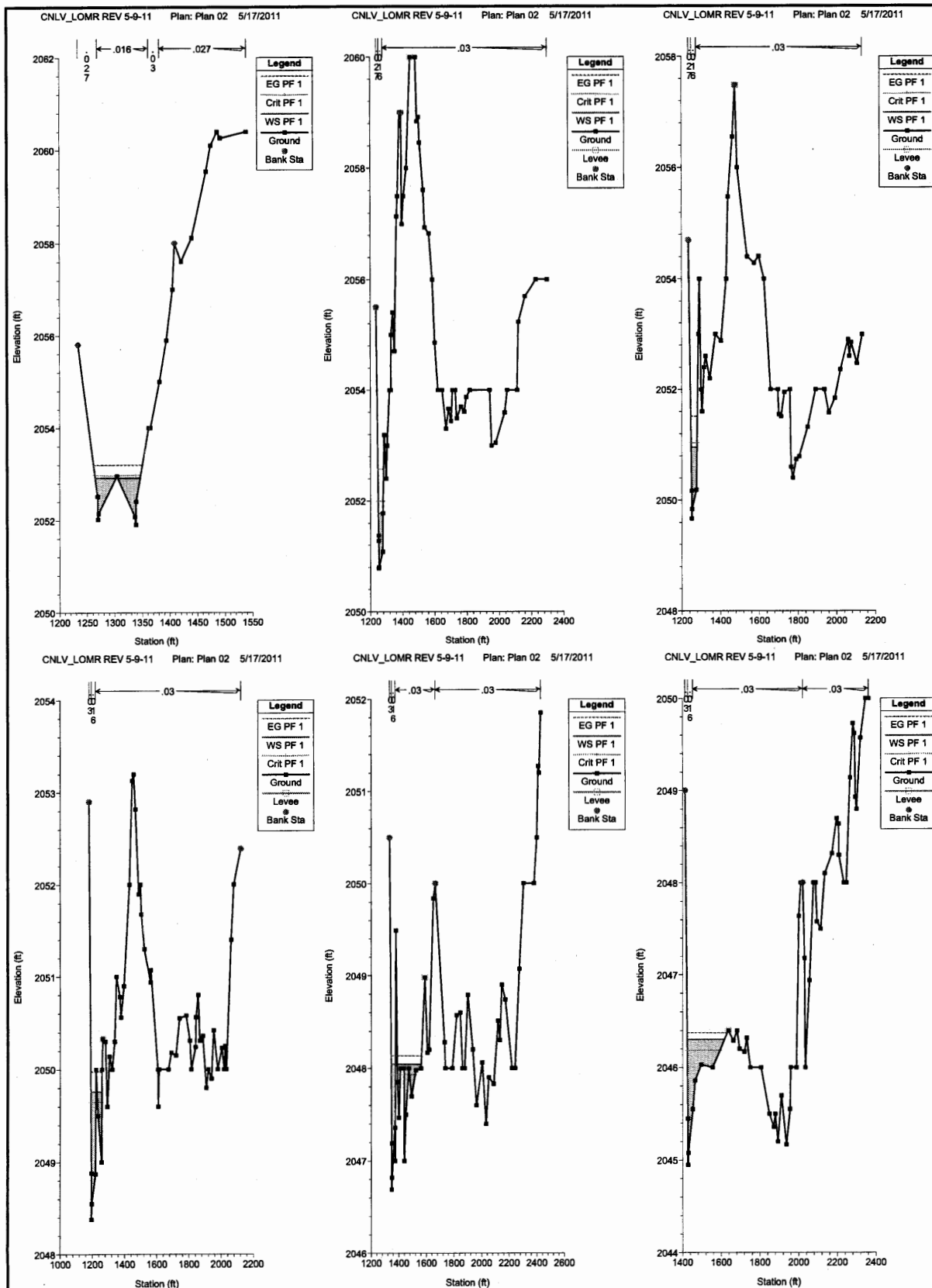
Reach-1	26	.1	.3
Reach-1	25	.1	.3
Reach-1	24	.1	.3
Reach-1	23	.1	.3
Reach-1	22	.1	.3
Reach-1	21	.1	.3
Reach-1	20	.1	.3
Reach-1	19	.1	.3
Reach-1	18	.1	.3
Reach-1	17	.1	.3
Reach-1	16	.1	.3
Reach-1	15	.1	.3
Reach-1	14	.1	.3
Reach-1	13	.1	.3
Reach-1	12	.1	.3
Reach-1	11	.1	.3
Reach-1	10	.1	.3
Reach-1	9	.1	.3
Reach-1	8	.1	.3
Reach-1	7	.1	.3
Reach-1	6	.1	.3
Reach-1	5	.1	.3
Reach-1	4	.1	.3
Reach-1	3	.1	.3
Reach-1	2	.1	.3
Reach-1	1.75	.1	.3
Reach-1	1.5	.1	.3
Reach-1	1	.1	.3
Reach-1	0.99	.1	.3
Reach-1	0.95	.1	.3
Reach-1	0.90	.1	.3
Reach-1	0.85	.1	.3
Reach-1	0.80	.1	.3
Reach-1	0.75	.1	.3
Reach-1	0.70	.1	.3
Reach-1	0.6	.1	.3
Reach-1	0.55	.1	.3
Reach-1	0.50	.1	.3
Reach-1	0.45	.1	.3

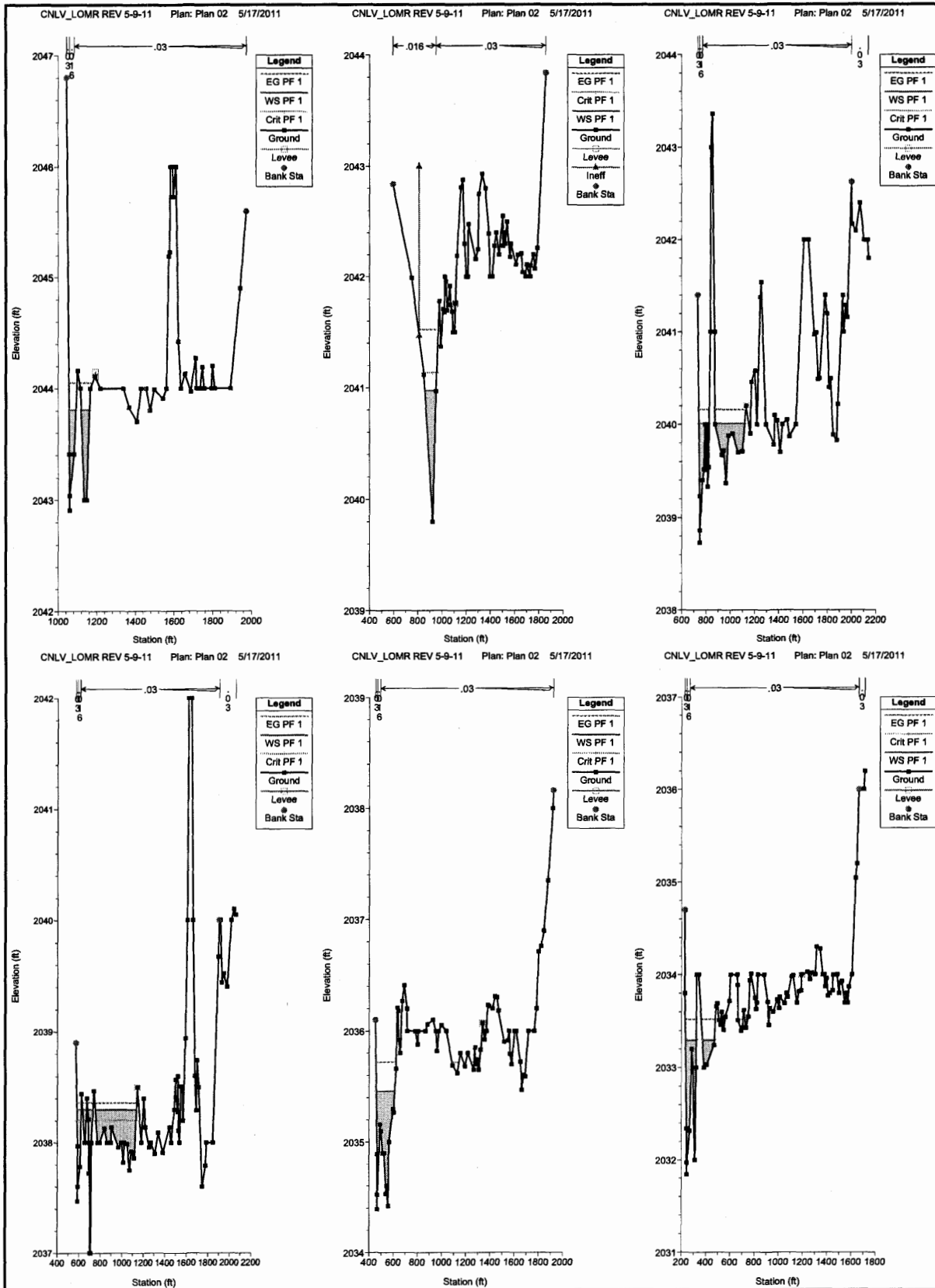
CNLV_LOMR REV 5-9-11

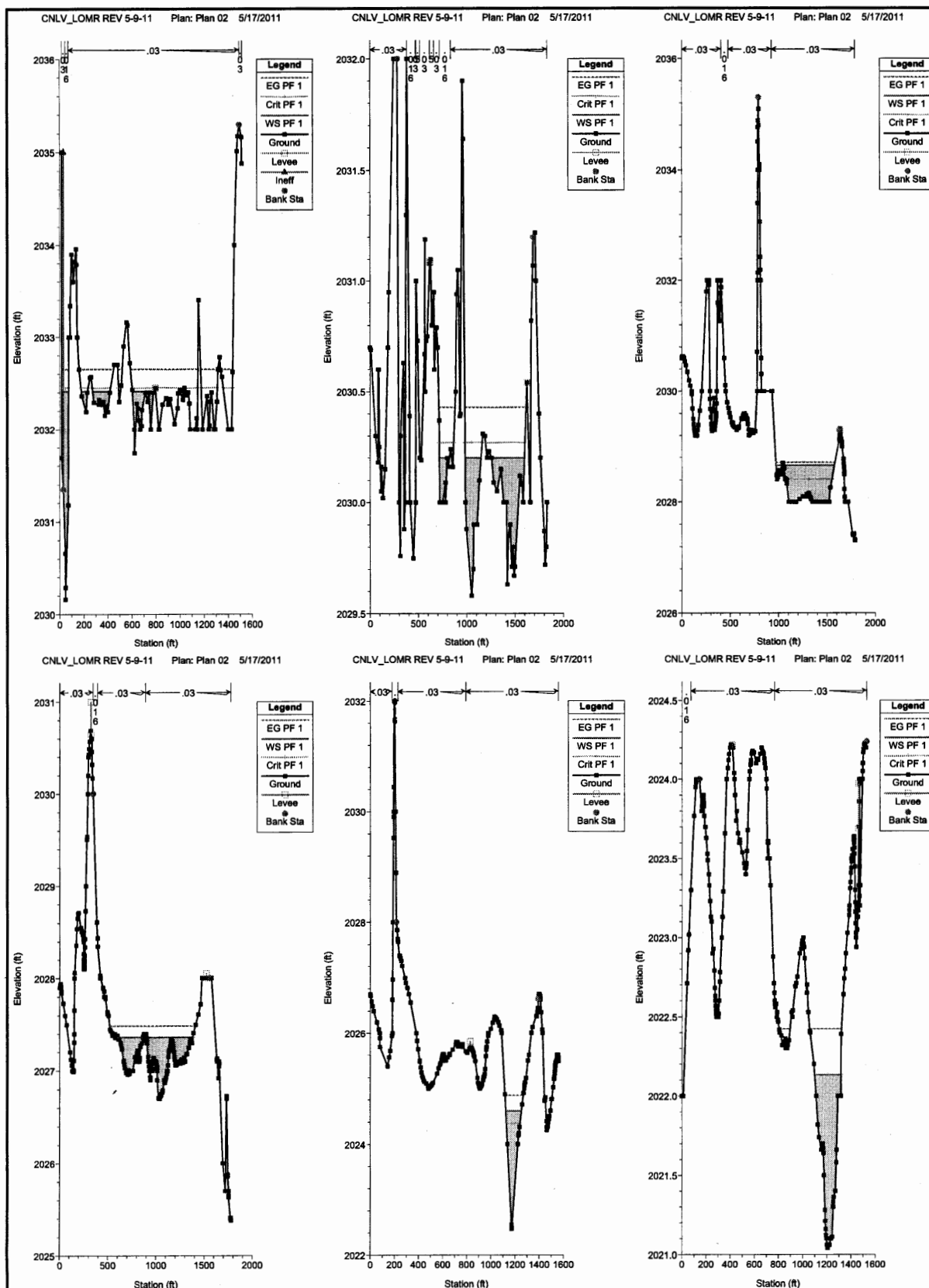
Plan: Plan 02 5/17/2011

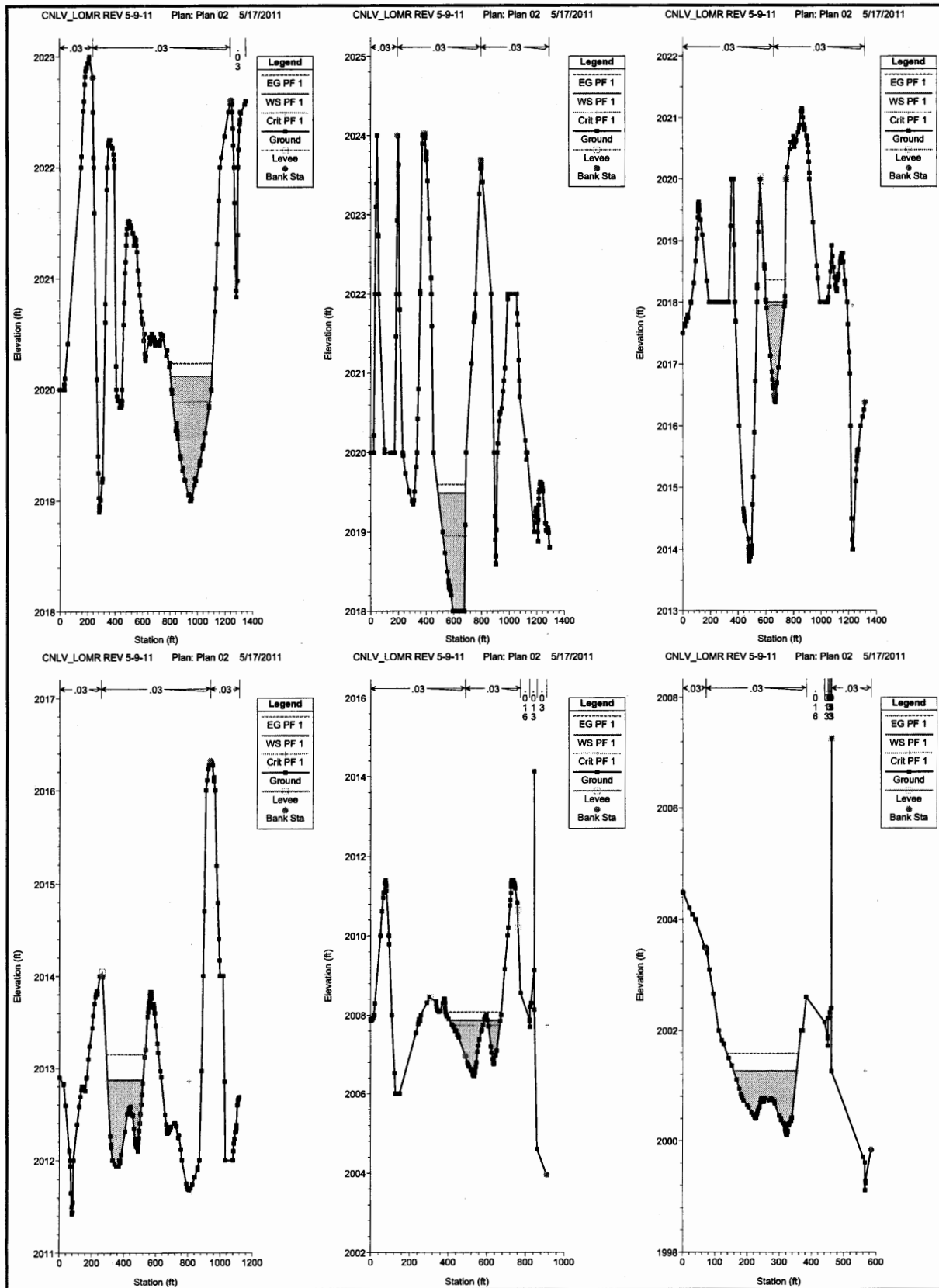


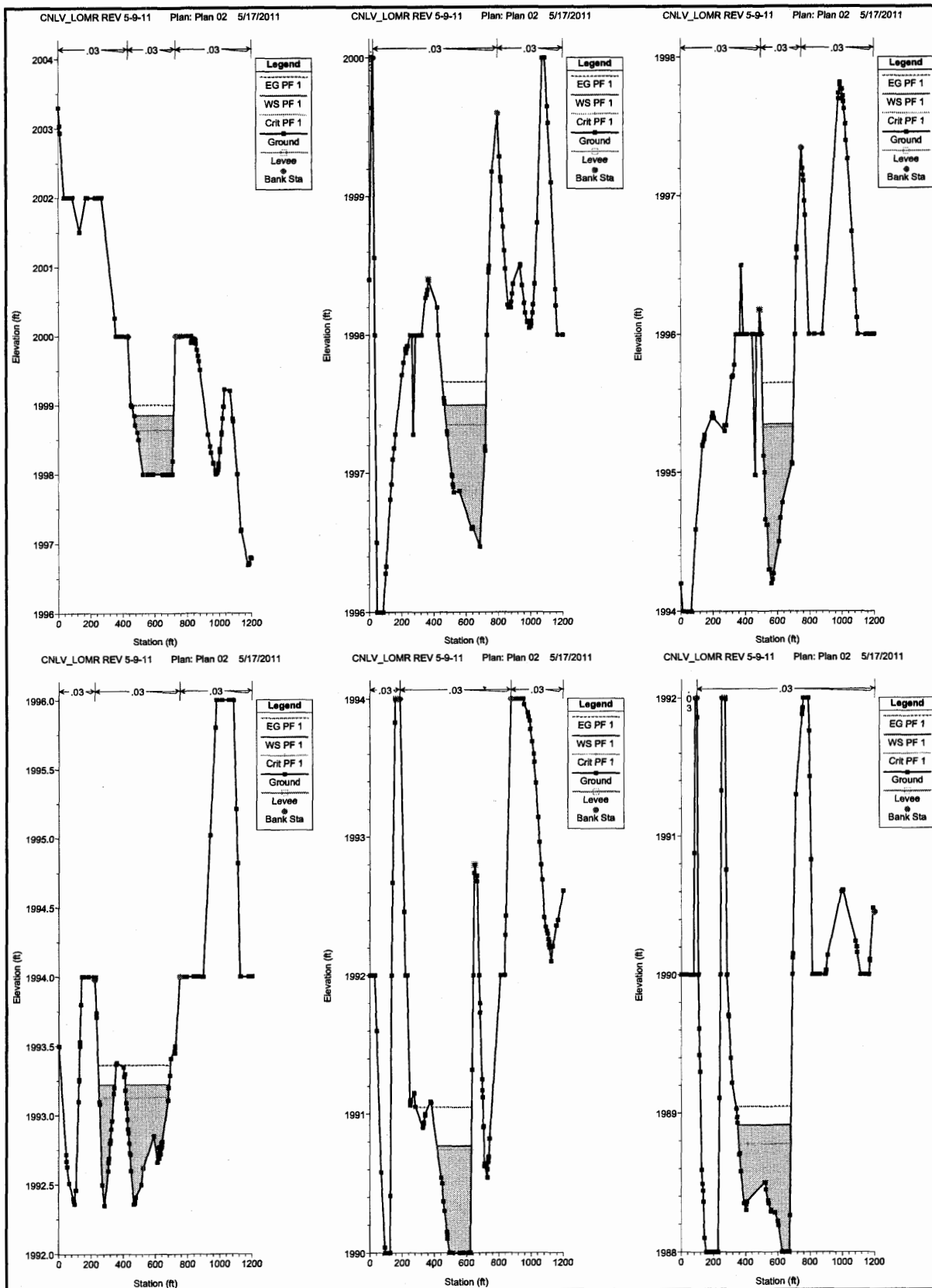


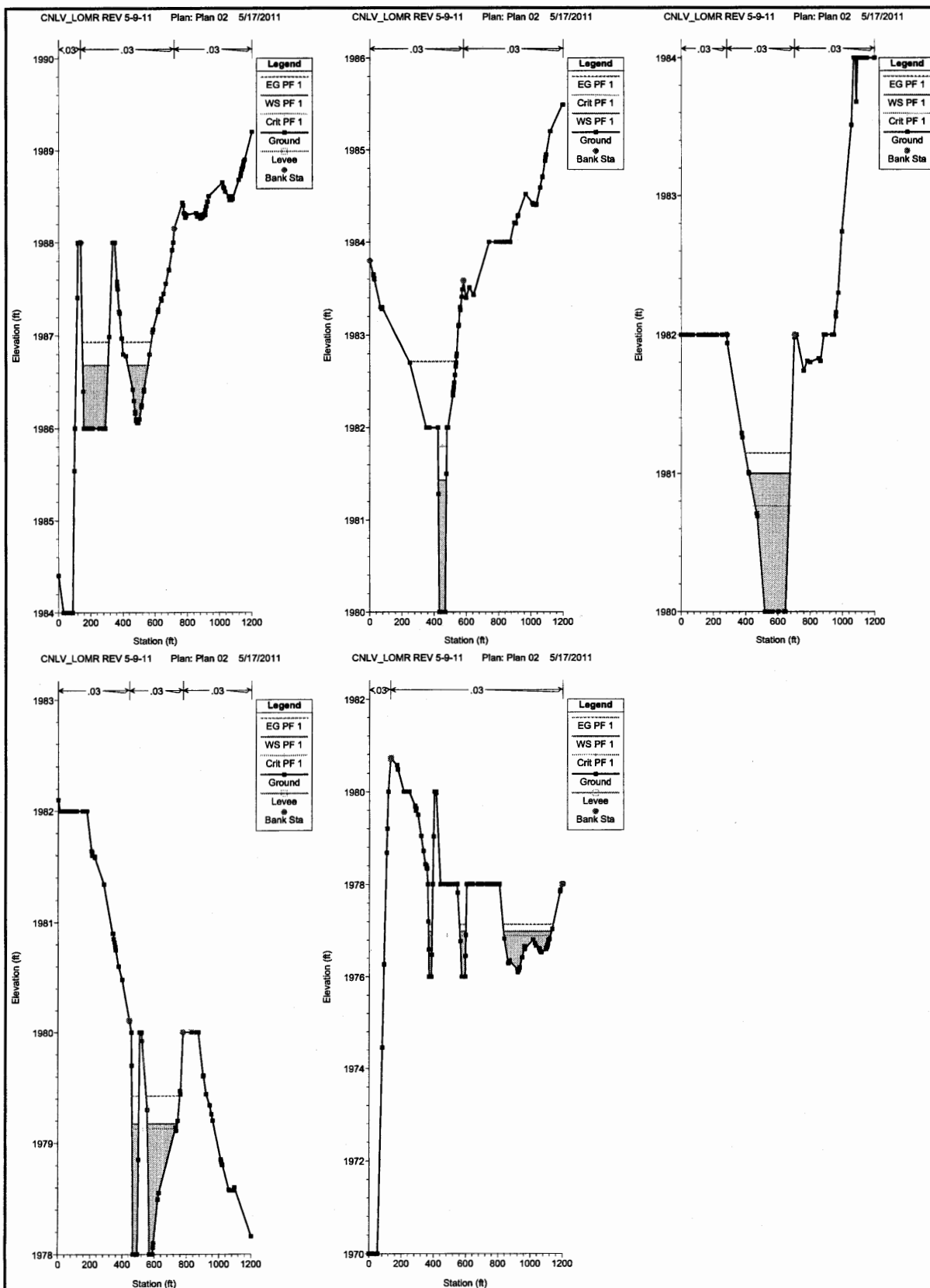












REFERENCED DOCUMENTATION

2008 MPU FIGURES



2008
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

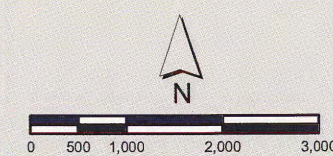
**FIGURE F-20
FLOOD CONTROL FACILITIES**

LEGEND

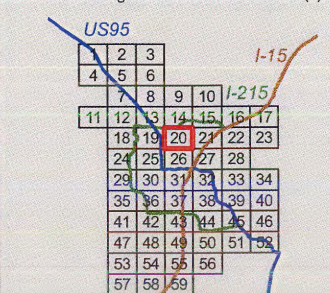
- Ultimate Development Boundary
- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities
- Local Existing Facilities
- Local Proposed Facilities
- Detention Basin
- Culvert or Bridge Crossing
- Stormdrain
- Lined Channel
- Unlined Channel
- Levee/Dike
- Natural Wash/Floodway
- ID-Mile Separator

Remove & Replace/Parallel Facilities

- | Category A | Category B |
|------------|------------|
| Channel | Channel |
| Stormdrain | Stormdrain |
| Crossing | Crossing |



Refer to Figure G-2 for Aerial Source(s)



ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
ANWE		ANN ROAD CHANNEL WEST						
0000	E	12' X 12' RCB	1400	2214	CNN043-C	CWEST3	3.41	0.66
0027	E	14' X 9' RCB	203	2214	CNN043-C	CWEST3	3.41	0.77
0031	E	12' X 10' RCB	2362	2214	CNN043-C	CWEST3	3.41	1.40
0076	E	16' X 8' RCB	350	2214	CNN043-C	CWEST3	3.41	0.93
0082	E	12' X 11' RCB	2217	1947	CNW3B2-C	CWEST3	2.99	0.71
0122	E	12' X 10' RCB	260	1947	CNW3B2-C	CWEST3	2.99	0.71
0127	E	10' X 8' RCB	1450	1947	CNW3B2-C	CWEST3	2.99	2.55
0157	E	10' X 9' RCB	1112	1257	CNW2D2-C	CWEST3	1.95	1.13
0177	E	12' X 10' RCB	2797	1257	CNW2D2-C	CWEST3	1.95	0.39
0232	E	12' X 8' RCB	714	1257	CNW2D2-C	CWEST3	1.95	0.43
0245	E	10' X 9' RCB	1721	993	CNW2D1-C	WEST3	6.84	0.80
0279	E	10' X 9' RCB	553	743	2CNW2B5C	WEST3	6.37	0.80
0290	E	8' X 8' RCB	2050	743	2CNW2B5C	WEST3	6.37	0.70
CNEA		CENTENNIAL PKWY CHANNEL EAST						
0123	E	14' X 6' RCB	1585	1457	CNN093-C	WEST3	1.67	0.92
0153	E	14' X 6' RCB	1125	1457	CNN093-C	WEST3	1.67	1.34
0175	E	15' X 6' RCB	125	1174	CNN078-C	WEST3	1.35	5.66
0176	E	Conc Chnl 15'W 6.5'D 0:1 SS	540	1174	CNN078-C	WEST3	1.35	0.70
CNWE		CENTENNIAL PKWY CHANNEL WEST						
0000	E	2: 27' X 10' RCBC @ Beltway	235	4465	CNW3D3-C	WEST3	6.41	1.51
0005	P2	2: 27' X 10' RCB	764	4465	CNW3D3-C	WEST3	6.41	1.10
0020	E	2: 27' X 10' RCBC @ Decatur	310	4465	CNW3D3-C	WEST3	6.41	2.58
0026	P2	2: 27' X 10' RCB	1006	4465	CNW3D3-C	WEST3	6.41	0.59
0045	P2	Conc Chnl 56'W 10'D 0:1 SS	1404	4465	CNW3D3-C	WEST3	6.41	0.59
0070	E	27' X 10' RCBC @ Bradley	155	2233^	CNW3D3-C^	WEST3	6.41	0.40
0071	P2	Add 1: 27' X 10' RCBC @ Bradley	155	2233^	CNW3D3-C^	WEST3	6.41	0.40
0075	P2	Conc Chnl 56'W 10'D 0:1 SS	1915	4465	CNW3D3-C	WEST3	6.41	0.40
0110	P2	2: 27' X 10' RCB	650	4382	2CW3B4-C	WEST3	6.15	0.40
0122	E	27' X 10' RCBC @ Jones	122	2191^	2CW3B4-C^	WEST3	6.15	0.40
0123	P2	Add 1: 27' X 10' RCBC @ Jones	122	2191^	2CW3B4-C^	WEST3	6.15	0.40
0129	P2	2: 27' X 10' RCB	1695	4382	2CW3B4-C	WEST3	6.15	0.40
0150	P2	Conc Chnl 42'W 10'D 0:1 SS	720	4233	CNW3B3-C	WEST3	5.64	0.40
0173	P2	42' X 10' RCBC @ Torrey Pines	190	4233	CNW3B3-C	WEST3	5.64	0.40
0176	P2	Conc Chnl 32'W 12'D 0:1 SS	795	4233	CNW3B3-C	WEST3	5.64	0.40
0189	P2	Conc Chnl 32'W 10'D 0:1 SS	1845	4067	CNW2D4-C	WEST3	5.15	0.54
GOA2		GOWAN OUTFALL - ALEXANDER BRANCH						
0000	P1	8' X 5' RCB	2281	523	CPT41-C	ALLGOW3	0.61	0.90
GOAL		GOWAN OUTFALL - ALEXANDER ROAD FACILITIES						
0000	P1	10' X 9' RCB	5280	1461	CPT5A2-C	ALLGOW3	3.23	1.00
0100	P1	10' X 8' RCB	540	1297	CCPT41-C	ALLGOW3	2.89	1.00
0111	P1	10' X 8' RCB	3000	880	CPT2B2	ALLGOW3	2.28	0.83
0168	P1	10' X 8' RCB	4200	880	CPT2B2	ALLGOW3	2.28	0.50
GOCL		GOWAN OUTFALL - CLAYTON BRANCH						
0000	P1	9' X 8' RCB	6785	814	CPT2B1-C	ALLGOW3	1.11	0.61
GOCR		GOWAN OUTFALL - CRAIG ROAD						
0000	E	Conc Chnl 20'W 6'D 2:1 SS	1380	3101	CPT3D-3	ALLGOW3	5.78	1.30
0022	E	2: 8' X 8' RCB	3000	1120	CPT4C-2	ALLGOW3	1.75	0.50
0080	E	120" RCP	5850	995	CPT4C-1	ALLGOW3	1.50	0.50
0180	E	114" RCP	350	238	PT4B3-C	ALLGOW3	0.28	0.30
0201	E	96" RCP	1090	238	PT4B3-C	ALLGOW3	0.28	0.35
GOLO		GOWAN OUTFALL - LONE MTN. ROAD BRANCH						
0000	E	72" RCP	1370	308^	CPT2AD-1^	ALLGOW3	3.28	0.53
0001	E	13' X 8' RCB	1370	1433^	CPT2AD-1^	ALLGOW3	3.28	0.45
0025	E	16' X 8' RCB	1464	1741	CPT2AD-1	ALLGOW3	3.28	0.39
0052	E	16' X 8' RCB	2564	1741	CPT2AD-1	ALLGOW3	3.28	0.42
0100	E	16' X 8' RCB	2732	1605	C2AC2-C	ALLGOW3	2.96	0.37
0152	P1	10' X 10' RCB	700	1605	C2AC2-C	ALLGOW3	2.96	0.71
0165	P1	10' X 8' RCB	3300	1415	CPT2AB2	ALLGOW3	2.59	1.21
0228	P1	10' X 8' RCB	1300	1244	C2AB1C	ALLGOW3	2.31	1.00
0253	P1	10' X 6' RCB	1200	986	CPT3AC1	ALLGOW3	2.10	1.25
GOLO		GOWAN OUTFALL - LONE MTN. ROAD BRANCH						
0275	P1	8' X 6' RCB	3000	590	CPT3AA2	ALLGOW3	1.16	0.77
GOOF		GOWAN OUTFALL FACILITIES						
0000	E	Conc Chnl 20'W 7'D 2:1 SS	2500	5233	CPT-2B-3	GW5SC	14.66	1.25
0040	E	Conc Chnl 20'W 7'D 2:1 SS	1900	5058	CCPT2C1*	GW4SC	11.84	0.60
0074	E	2: 16' X 7' RCBC @ Camino Al Norte	131	5058	CCPT2C1*	GW4SC	11.84	1.30
0077	E	Conc Chnl 20'W 7'D 2:1 SS	3157	5058	CCPT2C1*	GW4SC	11.84	1.40
0146	E	3: 12' X 5' RCBC @ Clayton	150	4014^	CCPT2C1**	GW4SC	11.84	1.33
0147	P1	Add 1: 12' X 7' RCBC @ Clayton	150	1044^	CCPT2C1**	GW4SC	11.84	1.33
0149	E	Conc Chnl 20'W 7'D 2:1 SS	1228	5058	CCPT2C1	GW4SC	11.84	1.13
0150	E	Conc Chnl 20'W 7'D 2:1 SS	612	4772	CCPT3D-3	GW4SC	10.86	1.13
0161	E	Conc Chnl 20'W 7'D 2:1 SS (Replace w/ GOOF0162)	625	4772	CCPT3D-3	GW4SC	10.86	0.90
0162	P3	Confluence Structure (Replaces GOOF0161)	625	4772	CCPT3D-3	GW4SC	10.86	0.90
0196	P3	37.66' X 5.66' Bridge @ Simmons (Replaces GOOF0197)	120	3101	CPT3D-3	ALLGOW3	5.78	0.90
0197	E	3: 12' X 5' RCBC @ Simmons (Replace w/ GOOF0196)	120	3101	CPT3D-3	ALLGOW3	5.78	0.90
0198	E	14' X 6' RCB	1344	1164^	CPT4C-3^	GW3SC	5.85	0.41
0199	P3	Add 1: 24' X 6' RCB	1344	1581^	CPT4C-3^	GW3SC	5.85	0.40
0224	P3	1: 20' X 6' RCB and 1: 14' X 6' RCB	2700	2745	CPT4C-3	GW3SC	5.85	0.40
0275	P3	1: 16' X 8' RCB and 1: 14' X 6' RCB	515	2582	CPT5C-3	GW3SC	5.59	0.40
0285	P1	2: 14' X 8' RCB	2650	2582	CPT5C-3	GW3SC	5.59	0.45
0325	P1	2: 14' X 8' RCB	2650	2458	CPT5C-2	GW3SC	5.36	0.37
0375	P1	2: 12' X 8' RCB	2700	2375	CPT5C-1	GW3SC	5.17	0.56
0427	E	96" RCP	1510	630	DGOW2A	GW3SC	1.38	0.47
0485	E	90" RCP	1160	630	DGOW2A	GW3SC	1.38	0.47
0486	E	8' X 5' RCB	3300	630	DGOW2A	GW3SC	1.38	0.60
0511	E	8' X 5' RCB	8390	699	CPT6B-C	GW3SC	1.08	0.50
LV03		CLAYTON STREET CHANNEL						
0000	E	33' X 16' RCBC @ Hammer	400	1044	CNN057-C	WEST3	1.22	0.42
0006	E	Conc Chnl 9'W 9.4'D 1.5:1 SS	1300	1044	CNN057-C	WEST3	1.22	0.42
0030	E	2: 9' X 7' RCBC @ Ann	120	1044	CNN057-C	WEST3	1.22	0.42
0031	E	Conc Chnl 8'W 8.1'D 1.5:1 SS	2600	757	CNN054-C	WEST3	0.81	0.40
0081	E	2: 10' X 7' RCBC @ Tropical	100	757	CNN054-C	WEST3	0.81	0.42
0082	E	Conc Chnl 7'W 7.1'D 1.5:1 SS	2444	757	CNN054-C	WEST3	0.81	2.80
0128	E	Conc Chnl 7'W 7.1'D 1.5:1 SS	167	257	1/2NN052-C	WEST3	0.55	2.80
0129	E	2: 10' X 6' RCB	801	257	1/2NN052-C	WEST3	0.55	1.60
0131	E	10' X 6' RCB	665	257	1/2NN052-C	WEST3	0.55	1.28
LV05		WESTERN TRIBUTARY AT ALEXANDER RD						
0131	E	Conc Chnl 28'W 3'D 3:1 SS	1300	567	CLV99B-3	WEST3	0.64	0.76
LV06		WESTERN TRIBUTARY AT CRAIG RD						
0053	E	16' X 6' RCAP	782	1080	CLV99A-3	WEST3	1.31	1.56
0063	E	14' X 6' RCAP	526	1080	CLV99A-3	WEST3	1.31	1.88
0075	E	12' X 6' RCB	1608	1080	CLV99A-3	WEST3	1.31	0.72
0105	E	2: 8' X 6' RCBC @ Revere	158	1080	CLV99A-3	WEST3	1.31	1.71
0107	E	Conc Chnl 17.3'W 6'D 0:1 SS	140	1080	CLV99A-3	WEST3	1.31	3.79
0110	E	Conc Chnl 12'W 5.5'D 2:1 SS	2451	1080	CLV99A-3	WEST3	1.31	0.87
0147	E	12' X 6' RCBC @ Alexander	150	629	CLV99A-2	WEST3	0.74	1.16
LVMD		LAS VEGAS WASH - MIDDLE						
1877	E	Conc Chnl 30'W 10'D 1:1 SS	1570	6423	CNN104-C	WEST5	44.33	1.10
1905	E	Conc Chnl 12'W 10'D 1.65:1 SS	2440	3245	CNN086-C	WEST5	29.30	1.00
1953	E	2: 24' X 10' RCBC @ Camino Al Norte	145	3245	CNN086-C	WEST5	29.30	0.94
1954	E	Conc Chnl 32'W 7'D 2:1 SS	1587	3245	CNN086-C	WEST5	29.30	0.99
1984	E	Transition Structure	550	3221	LOWERDB	CWEST5	19.67	0.99
2048	E	68,000 cfs PMF Spillway		68000	LOWERIN	CWEST5	19.67	
2049	E	4: 7' X 7' RCB Outlet	200	3221	LOWERDB	CWEST5	19.67	
2050	E	700 ac-ft Lower Las Vegas Wash Detention Basin		6729	LOWERIN	CWEST5	19.67	
2052	P1	Conc Chnl 50'W 6'D 0:1 SS	240	6636	2C057-C	CWEST5	19.28	3.11
2053	P1	Conc Chnl 60'W 12'D 0:1 SS	690	6636	2C057-C	CWEST5	19.28	0.15
2054	P1	Conc Chnl 60'W 12'D 0:1 SS	260	6636	2C057-C	CWEST5	19.28	11.97
2055	P1	Conc Chnl 60'W 12'D 0:1 SS	165	6636	2C057-C	CWEST5	19.28	0.15
2060	E	4: 12.75' X 16' RCBC @ Clayton	144	6171	2C044-C	CWEST5	18.06	0.15
2061	E	Conc Chnl 54'W 16'D 0:1 SS	425	6171	2C044-C	CWEST5	18.06	0.15
LVMD		LAS VEGAS WASH - MIDDLE						
2062	E	Conc Chnl 54'W 9'D 0:1 SS	1200	6171	2C044-C	CWEST5	18.06	1.35
2089	E	Conc Chnl 54'W 9'9.5'D 0:1 SS	908	6171	2C044-C	CWEST5	18.06	0.50
2124	E	2: 26.5' X 10' RCBC @ Simmons	110	6046	2C043-C	CLVMD5	15.94	0.50
2125	E	Conc Chnl 54'W 9'D 0:1 SS	1571	6046	2C043-C	CLVMD5	15.94	0.77
2170	E	4: 12' X 10' RCBC @ Ann Road	500	6046	2C043-C	CLVMD5	15.94	1.42
2172	E	Conc Chnl 50'W 10'D 0:1 SS	1289	5734	2C3D4-C*	CLVMD4	11.98	1.15
2192	E	2: 24.5' X 10' RCBC @ Allen	110	5734	2C3D4-C*	CLVMD4	11.98	1.15
2197	E	Conc Chnl 50'W 10'D 0:1 SS	1385	5734	2C3D4-C*	CLVMD4	11.98	1.37
2223	E	50' X 10' RCBC @ El Campo Grande	275	5734	2C3D4-C*	CLVMD4	11.98	1.60
2228	E	Conc Chnl 50'W 10'D 0:1 SS	1600	5734	2C3D4-C*	CLVMD4	11.98	1.83
2266	E	2: 24.5' X 10' RCBC @ Tropical	575	5734	2C3D4-C*	CLVMD4	11.98	1.04
2276	E	Conc Chnl 50'W 10'D 0:1 SS	985	5734	2C3D4-C*	CLVMD4	11.98	0.80
2294	E	2: 24.5' X 10' RCBC @ Ranchhouse	292	5734	2C3D4-C	CLVMD4	11.98	1.04
2300	E	Transition Structure	200	5734	2C3D4-C	CLVMD4	11.98	1.50
2304	E	Conc Chnl 70'W 10'D 0:1 SS	220	5734	2C3D4-C	CLVMD4	11.98	1.50
2308	E	Confluence Structure	480	5734	2C3D4-C	CLVMD4		

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **	ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **	ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **	ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **		
ANEA		ANN ROAD CHANNEL EAST							LVMD		LAS VEGAS WASH - MIDDLE							RWCC		RANGE WASH - CENTENNIAL COLLECTOR							RWWE		RANGE WASH - WEST TRIBUTARY								
0000	E	42' X 6' RCB	1650	706	CNN142-C	WEST3	1.07	0.77	1647	E	Conc Chnl 120' 10' 0" 1 SS	800	11998	CHYPKIN	CWEST5	73.97	0.40	0000	E	10' X 7' RCB	1300	660	CNN178C	RW3	0.80	0.40	0168	E	5' X 2.75' RCB Outlet	285	207	VANDDB	RW3SC	3.84	0.75		
0008	P3	10' X 7' RCB							1648	E	3 Span Bridge 95W 8'-10'D 2:1 SS @ Civil Center	120	11998	CHYPKIN	CWEST5	73.97	0.70	0000	E	9' X 6' RCB	940	874	CCNN209C	RW3SC	0.74	1.22	0169	E	36" RCP Outlet	4495	3121	VANDIN	RW3SC	3.84	0.28		
0040	P1	8' X 7' RCB	2600	706	CNN142-C	WEST3	1.07	0.97	1663	E	Conc Chnl 80'W 10'D 2:1 SS	700	11966	3C99B-7	CWEST5	73.66	0.70	0018	E	15' X 6' RCB	220	874	CCNN209C	RW3SC	0.74	0.60	0202	E	12' X 8' RCB	185	1361	CNN202C	RW3SC	1.77	10.04		
CNEA		CENTENNIAL PKWY CHANNEL EAST							1664	E	3 Span Bridge 75W 10'D 2:1 SS @ I-15	120	11966	3C99B-7	CWEST5	73.66	0.70	0022	E	15' X 3.9' RCB	80	874	CCNN209C	RW3SC	0.74	0.19	0207	E	2' 9' X 6' RCB	57	1361	CNN202C	RW3SC	1.77	6.74		
0000	E	42' X 6' RCB	450	2413	CNN138-C	WEST3	2.79	0.56	1665	E	Transition Structure	200	7358	CLV99B-5	WEST5	48.77	0.36	0024	E	15' X 6' RCB	270	874	CCNN209C	RW3SC	0.74	0.53	0208	E	12' X 8' RCB @ UPRR	60	1361	CNN202C	RW3SC	1.77	1.06		
0009	E	2' 20' X 6' RCB	3415	2413	CNN138-C	WEST3	2.79	0.26	1669	E	Free Span Bridge 55W 12'D @ UPRR	40	7358	CLV99B-5	WEST5	48.77	0.36	0029	E	9' X 6' RCB	1060	874	CCNN209C	RW3SC	0.74	0.90	0209	E	Conc Chnl 22'W 13'D 0:1 SS	330	1361	CNN202C	RW3SC	1.77	0.69		
0074	E	2' 15' X 6' RCB	150	2180	CCNN109	WEST3	2.50	0.70	1670	E	Conc Chnl 82'W 10'D 0:1 SS	370	7358	CLV99B-5	WEST5	48.77	1.69	0047	E	60" RCP	1300	396	NN225-C	RW3	0.29	1.29	0215	E	20' X 8.1' RCAP	2866	1361	CNN202C	RW3SC	1.77	0.40		
0076	E	15' X 6' RCB	2710	1457	CNN093-C	WEST3	1.67	0.73	1677	E	Conc Chnl 80'W 10'D 2:1 SS	119	7358	CLV99B-5	WEST5	48.77	0.37	RWRR		RANGE WASH - RAILROAD CHANNEL									0270	E	18' X 6.9' RCAP	1835	1171	CNN183C	RW3SC	1.52	0.65
0123	E	14' X 6' RCB	1585	1457	CNN093-C	WEST3	1.67	0.92	1679	E	4 Span Bridge 100W 12'D 2:1 SS @ Losee	120	7358	CLV99B-5	WEST5	48.77	0.37	0000	E	12' X 8' RCB	520	1775	CCNN217	RW3SC	1.85	3.11	0305	E	18' X 6.9' RCAP	645	1171	CNN183C	RW3SC	1.52	0.47		
0153	E	14' X 6' RCB	1125	1457	CNN093-C	WEST3	1.67	1.34	1680	E	Conc Chnl 80'W 10'D 2:1 SS	480	7358	CLV99B-5	WEST5	48.77	0.37	0010	E	10' X 6' RCB	95	1775	CCNN217	RW3SC	1.85	5.06	0317	E	14' X 6' RCAP	1205	1171	CNN183C	RW3SC	1.52	0.64		
GOOF		GOWAN OUTFALL FACILITIES							1689	E	Conc Chnl 70'W 10'D 2:1 SS	1050	7241	2C99B-6	WEST5	48.18	0.37	0012	E	2' 12' X 8' RCB	140	1775	CCNN217	RW3SC	1.85	3.19	0340	E	12' X 6' RCAP	1170	963	CNN181C	RW3SC	1.25	0.69		
0000	E	Conc Chnl 20'W 7'D 2:1 SS	2500	5233	CPT-2B-3	GWSSC	14.66	1.25	1715	E	Conc Chnl 70'W 10'D 0:1 SS	316	6902	CNN134-C	WEST5	46.75	0.37	0014	E	2 Span Bridge 21'W 12'D @ UPRR	40	1775	CCNN217	RW3SC	1.85	1.85	0362	E	8' X 6' RCAP	60	660	CCNN178C	RW3SC	0.80	0.44		
LV05		WESTERN TRIBUTARY AT ALEXANDER RD							1716	E	Bridge 40'W 11'-11.5'D @ Alexander	119	6902	CNN134-C	WEST5	46.75	0.37	0015	E	Confluence Structure	135	1775	CCNN217	RW3SC	1.85	0.50	0363	P1	8' X 7' RCB	2790	660	CCNN178C	RW3SC	0.80	0.78		
0000	E	Conc Chnl 30'W 10'D 0:1 SS	639	1282	CLV99B-6	WEST3	1.43	0.92	1717	E	Conc Chnl 20'W 10'D 2:1 SS	3718	6902	CNN134-C	WEST5	46.75	1.00	0018	E	Confluence Structure	125	1029	CNN214C	RW3SC	0.94	0.50	0397	P1	24" RCP Outlet	500	57	VNORTH	RW3	3.63	1.00		
0008	E	20' X 7' RCBC @ Access Road	111	1282	CLV99B-6	WEST3	1.43	0.47	1789	E	7' 8' X 8' RCBC @ Craig	260	6845	2C99A-4	WEST5	46.45	0.50	0020	E	Conc Chnl 20'W 8.62'-13'D 0:1 SS	1800	1029	CNN214C	RW3SC	0.94	0.76	0406	P1	28,290 cfs PMF Spillway	29290	VNORTHIN	RW3	3.63				
0009	E	Conc Chnl 20'W 10'D 0:1 SS	645	1282	CLV99B-6	WEST3	1.43	0.47	1790	E	Conc Chnl 18'W 10'D 2:1 SS	1365	6479	CNN118-C	WEST5	44.72	1.56	0050	E	Conc Chnl 20'W 7'-8'D 0:1 SS	1990	1029	CNN214C	RW3SC	0.94	0.71	0407	P1	290 ac-ft Vandenberg North Detention Basin	2929	VNORTHIN	RW3	3.63				
0023	E	20' X 7' RCBC @ Bruce	131	1282	CLV99B-6	WEST3	1.43	0.47	1803	E	5' 10' X 8.5' RCBC @ N. 5th St	130	6479	CNN118-C	WEST5	44.72	1.56	0092	E	8' X 6' RCB	820	277	CNN226C	RW3SC	0.25	0.50	SLEB		SLOAN CHANNEL EAST BRANCH								
0025	E	Conc Chnl 16'W 10'D 0:1 SS	575	1282	CLV99B-6	WEST3	1.43	4.12	1805	E	Conc Chnl 18'W 10'D 2:1 SS	1475	6479	CNN118-C	WEST5	44.72	1.56	0107	P1	Riprap Chnl 12'W 4'D 2:1 SS	4400	277	CNN226C	RW3SC	0.25	0.90	0000	E	Conc Chnl 10'W 8'D 1.5:1 SS	840	1322	C310B2	RW3	1.54	0.43		
0036	E	16' X 7' RCB	370	1282	CLV99B-6	WEST3	1.43	0.78	1817	E	Conc Chnl 32'W 13'D 0:1 SS	1280	6479	CNN118-C	WEST5	44.72	0.83	0187	P1	6' X 6' RCBC @ Centennial	100	277	CNN226C	RW3SC	0.25	0.90	0015	E	3' 10' X 6' RCBC @ Goodin Wy	30	1322	C310B2	RW3	1.54	0.43		
0042	E	Conc Chnl 16'W 9.5'D 0:1 SS	263	1282	CLV99B-6	WEST3	1.43	0.78	1876	E	3' 13' X 10.75' RCBC @ Commerce	125	6423	CNN104-C	WEST5	44.33	0.80	0189	P1	24" RCP Outlet	200	69	BELT	RW3	3.40		0016	E	Conc Chnl 20'W 7'D 1.5:1 SS	1365	1322	C310B2	RW3	1.54	0.43		
0048	E	16' X 5.5' RCBC @ Donna	112	1014	CLV99B-4	WEST3	1.17	0.78	1877	E	Conc Chnl 30'W 10'D 1:1 SS	1570	6423	CNN104-C	WEST5	44.33	1.10	0190	P1	19,930 cfs PMF Spillway	19930	BELTIN	RW3	3.40		0044	E	6' 12' X 7' RCBC @ LV Blvd	120	1322	C310B2	RW3	1.54	0.67			
0051	E	16' X 7.75' RCB	337	1014	CLV99B-4	WEST3	1.17	2.55	1905	E	Conc Chnl 12'W 10'D 1.65:1 SS	2440	3245	CNN086-C	WEST5	29.30	1.00	0200	P1	226 ac-ft Beltway Detention Basin	1993	BELTIN	RW3	3.40		0046	P1	Conc Chnl 46'W 5'D 0:1 SS	310	1322	C310B2	RW3	1.54	0.26			
0054	E	Conc Chnl 16'W 9'D 0:1 SS	803	1014	CLV99B-4	WEST3	1.17	1.20	LVNC		LAS VEGAS WASH - N CHANNEL							RWSL		RANGE WASH - SLOAN									0053	P3	Conc Chnl 46'W 5'D 0:1 SS	790	1322	C310B2	RW3	1.54	0.50
0066	E	12' X 7' RCBC @ N. 5th Street	455	1014	CLV99B-4	WEST3	1.17	1.76	0038	P1	Conc Chnl 12'W 5.5'D 2:1 SS	2590	1182	CLW100	CWEST5	13.62	0.70	0665	E	Conc Chnl 16'W 9'D 1.5:1 SS	435	5187	CCSLNL	RW4SC	8.62	0.56	0068	E	Conc Chnl 25'W Depth Varies 0:1 SS	110	915	C310B1-1	RW3	1.04	0.88		
0074	E	Conc Chnl 12'W 7'D 0:1 SS	1235	1014	CLV99B-4	WEST3	1.17	2.83	0090	E	3' 12' X 6' RCB	120	1182	CLW100	CWEST5	13.62	0.70	0670	E	3' 10' X 7' RCBC @ Nellis	100	3178*	CCSLNL*	RW4SC	8.62	0.56	0070	E	2' 12'X6' RCBC @ Valmark	45	915	C310B1-1	RW3	1.04	0.40		
0097	E	12' X 7' RCBC @ Goldfield	115	1014	CLV99B-4	WEST3	1.17	5.00	0091	E	14' X 6' RCAP	1325	1182	CLW100	CWEST5	13.62	0.52	0671	P1	Add 3' 12' X 7' RCBC @ Nellis	100	2009*	CCSLNL*	RW4SC	8.62	0.56	0071	E	Conc Chnl 25'W 9'D 0:1 SS	270	915	C310B1-1	RW3	1.04	0.40		
0100	E	Conc Chnl 12'W 7'D 0:1 SS	1224	567	CLV99B-3	WEST3	0.64	3.35	0116	E	14' X 6' RCAP	644	1182	CLW100	CWEST5	13.62	0.95	0672	E	Conc Chnl 14'W 8'D 1.5:1 SS	1130	2824	CC47C-4	RW3SC	3.94	0.56	0073	E	2' 12' X 6' RCBC @ Vista Sandia	50	915	C310B1-1	RW3	1.04	0.40		
0130	E	30' X 4' RCBC @ Commerce	221	567	CLV99B-3	WEST3	0.64	1.35	0128	E	20' X 6.5' RCAP	361	1182	CLW100	CWEST5	13.62	1.04	0694	E	Conc Chnl 10'W 8'D 1.5:1 SS	1500	1696	C47C-4	RW3SC	2.40	0.56	0074	E	Conc Chnl 25'W 7'D 0:1 SS	285	915	C310B1-1	RW3	1.04	0.54		
0131	E	Conc Chnl 28'W 3'D 3:1 SS	1300	567	CLV99B-3	WEST3	0.64	0.76	0135	E	Conc Chnl 20'W 7.5'D 0:1 SS	306	1182	CLW100	CWEST5	13.62	0.96	0727	E	3' 10' X 8' RCBC	100	1601	C307E3	RW3SC	2.25	0.56	0076	E	2' 8'X4' RCBC @ San Miguel	35	915	C310B1-1	RW3	1.04	0.53		
LV06		WESTERN TRIBUTARY AT CRAIG RD							0138	E	4' 8' X 4' RCBC @ Alexander	96	1081	N	CWEST5	13.34	0.10	0728	E	Conc Chnl 12'W 8.5'D 1.5:1 SS	1345	1601	C307E3	RW3SC	2.25	0.56	0077	E	Conc Chnl 10'W 6'D 1:1 SS	700	915	C310B1-1	RW3	1.04	0.67		
0000	E	2' 8' X 6' RCB	825	1196	CLV99A-4	WEST3	1.73	1.40	0140	E	Conc Chnl 18'W 5.5'D 1.5:1 SS	410	1081	N	CWEST5	13.34	0.70	0745	E	7' 10' X 7' RCBC @ Las Vegas Blvd	200	1601	C307E3	RW3SC	2.25	0.56	0090	E	Earth Chnl 16'W 6'D 2:1 SS	530	915	C310B1-1	RW3	1.04	0.67		
0004	E	2' 9' X 6' RCB	419	1196	CLV99A-4	WEST3	1.73	1.08	0147	E	2' 12' X 5.5' RCBC @ I-15	275	1081	N	CWEST5	13.34	0.70	RWWA		RANGE WASH - WALNUT									0098	E	10' X 4' RCBC @ W Craig	325	915	C310B1-1	RW3	1.04	1.04
0011	E	2' 10' X 6' RCBC @ N. 5th Street	227	1196	CLV99A-4	WEST3	1.73	1.31	0152	E	Conc Chnl 10'W 7'D 2:1 SS	555	1081	N	CWEST5	13.34	0.70	0000	E	20' X 7.14' RCAP	330	810	CNN217C	RW3	0.92	0.75	0101	E	Grass Chnl 29'W 3.5'D 2:1 SS (Replace w/ SLEB0102)	2280	915	C310B1-1	RW3	1.04	0.42		
0015	E	Conc Chnl 20'W 6'D 0:1 SS	138	1196	CLV99A-4	WEST3	1.73	1.55	0162	E	2' 7' X 6' RCBC @ Donovan Way	75	1081	N	CWEST5	13.34	0.70	0006	E	20' X 7.5' RCAP	1050	810	CNN217C	RW3	0.92	0.83	0102	P1	2' 13' X 4' RCB (Replaces SLEB0101)	2280	915	C310B1-1	RW3	1.04	0.42		
0018	E	Conc Chnl 12'W 6'D 2:1 SS	1008	1196	CLV99A-4	WEST3	1.73	3.29	0164	E	2' Conc Chnl 4'-7'W 6'D 0:1 SS	120	1081	N	CWEST5	13.34	0.70	0026	E	18' X 6.75' RCAP	1690	810	CNN217C	RW3	0.92	0.54	0145	E	Riprap Chnl 20'W 2:1 SS (Replace w/ SLEB0146)	260	696	C					

- **STANLEY CONSULTANTS**

Request for LOMR

Villages at Sierra Ranch

06-09-B002P

KB Home
5655 Badura Avenue
Las Vegas, Nevada 89118

Stanley Consultants, Inc.

5620 South Eastern Avenue, Suite 200

Las Vegas, Nevada 89119

Phone: (702) 369-9396



Stanley Consultants INC.

A Stanley Group Company
Engineering, Environmental and Construction Services - Worldwide



Department of Development Services

Civil Engineering Division

500 S Grand Central Pky 1st Fl • PO Box 551799 • Las Vegas NV 89155-1799
(702) 455-4600 • Fax (702) 388-2550

Phil Rosenquist, Director • Carla J. Pearson, Assistant Director

December 8, 2004

04-27899
LTR

Stanley Consultants, Inc.
5820 S. Eastern Avenue, Suite 200
Las Vegas, NV 89119

Subject: **Technical Drainage Study Concurrence for Villages at Sierra Ranch**
Study Dated: February 18, 2004
Addendum Dated: May 3, 2004
Second Addendum Dated: July 20, 2004
Third Addendum Dated: September 30, 2004
Supplemental Dated: November 11, 2004
Location: Northwest corner of 5th Avenue and El Campo Grande Avenue
(Sec. 27, T. 19 S., R. 61 E.)
CNLV: 14376
HTE #04-27899

The above-referenced project is located in the City of North Las Vegas adjacent to Clark County unincorporated areas. The drainage study was submitted to the County for concurrence. The County has reviewed the technical drainage study, and addenda. In addition, the County has received the acceptance letter dated September 20, 2004 for the technical drainage study from the City of North Las Vegas.

The County concurs with the acceptance of this drainage study by the City of Las Vegas. Please note that the County's review of this development is limited to drainage issues significant to Clark County unincorporated areas. The study relies on several approved drainage studies for flood protection and upstream flow conveyance. The County concurrence is based on the assumptions that these upstream properties are fully developed.

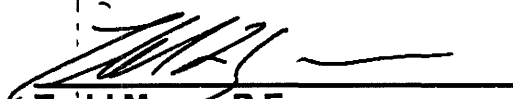
1. The site shall be graded with respect to drainage as shown on "Villages at Sierra Ranch," sheets DT-1 through DT-5, DT-8, PP7, PP8, PP9, SD-1 through SD-5 signed and sealed by Steven A. Hagel, P.E., on November 11, 2004.
2. The following drainage facilities shall be constructed:
 - a. Approximately, 1027 lf of 12 inch PVC pipe with 2 manholes located in the southern half of El Campo Grande Avenue

- b. An earthen swale located in the southern half of El Campo Grande Avenue and western half of Donna Street at the outlet of the facility in 2(a) as shown on detail ASD5
3. A bond estimate must be submitted to Clark County Civil Engineering Division for the above-mentioned stormwater management facilities;
4. Mylars of the grading plan must be submitted to the Clark County Civil Engineering Division Plan Check for approval signatures prior to map recordation.
5. Right-of-way dedication must be verified.

No liability is assumed by the County for information, data, and conclusions of the consulting engineer.

DEPARTMENT OF DEVELOPMENT SERVICES

By


Todd Myers, P.E.
Senior Civil Engineer
Civil Engineering Division

cc: Development File
Steven E. Casmus, P.E., City of North Las Vegas
KB Home



Department of Development Services

Civil Engineering Division

500 S Grand Central Pky 1st Fl • PO Box 551799 • Las Vegas NV 89155-1799
(702) 455-4600 • Fax (702) 388-2550

Phil Rosenquist, Director • Carla J. Pearson, Assistant Director

October 27, 2004

Stanley Consultants, Inc.
5820 S. Eastern Avenue, Suite 200
Las Vegas, NV 89119

SUBJECT: Technical Drainage Study for Villages at Sierra Ranch
Study Dated: February 18, 2004
Addendum Dated: May 3, 2004
Second Addendum Dated: July 20, 2004
Third Addendum Dated: September 30, 2004
Location: Northwest corner of 5th Avenue and El Campo Grande Avenue
(Sec. 27, T. 19 S., R. 61 E.)
HTE #04-27899

This letter is being faxed in order to expedite the review process. We have completed our review of the above referenced Technical Drainage Study and have the following comments:

1. Street flow depth calculations for El Campo Grande must be limited to the right-of-way width.
2. It appears from the grading plan that a low flow earthen swale in El Campo Grande at Donna Street may need to daylight on to private property. The study must clarify the limits of the offsite grading for drainage purposes. Notarized, written permission for this grading and drainage will be required prior to drainage study approval, if on private property, however interim grading along the El Campo Grade right-of-way may be conditionally approved upon grading plan approval.
3. The HEC-RAS developed models indicate that flow velocities are erosive at HEC-RAS stations 19 through 21. The graphic output of the HEC-RAS sections do not clearly show whether or not the flows are contained to the roadway paving. The study must address whether the pavement in this area will require any erosion protection.
4. At the request of Clark County Development Services Department, drainage/grading plans for the proposed development have been reviewed for compliance to the requirements set forth in the "Minimum Drainage Study Criteria Checklist, "Drainage Plan Information," dated July 15, 1997. **The plans submitted do not meet the minimum**

BOARD OF COUNTY COMMISSIONERS
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THOM REILLY, County Manager

requirements and must be revised prior to Drainage Study approval, to address the following:

- a. Provide a detail of the outflow drainage swale at the end of the low flow pipe
- b. Show the limits of the grading in El Campo Grande at Donna Street

The grading plan has been red-lined and is available by request at the Clark County Department of Development Services. If the red-lines are picked up, failure to resubmit the red-lined grading plan will prevent further review of the project.

All addenda must be submitted directly to Clark County. The items listed herein must be thoroughly addressed and submitted for review prior to acceptance of this study.

**DEVELOPMENT SERVICES DEPARTMENT
Civil Engineering Division**

BY



**Todd Myers, P.E.
Senior Civil Engineer
Civil Engineering Division**

TM:gsh

cc. American Premiere Homes
City of N. Las Vegas



Department of Development Services

Civil Engineering Division

500 S Grand Central Pky 1st Fl • PO Box 551799 • Las Vegas NV 89155-1799
(702) 455-4600 • Fax (702) 388-2550

Phil Rosenquist, Director • Carla J. Pearson, Assistant Director

June 24, 2004

Stanley Consultants, Inc.
5820 S. Eastern Avenue, Suite 200
Las Vegas, NV 89119

SUBJECT: **Technical Drainage Study** for Villages at Sierra Ranch
Study Dated: February 18, 2004
Addendum Dated: May 3, 2004
Location: Northwest corner of 5th Avenue and El Campo Grande Avenue
(Sec. 27, T. 19 S., R. 61 E.)
HTE #04-27899

We have completed our initial review of the above-referenced drainage study for the City of North Las Vegas concurrence and have the following comments. The following comments pertain to only those areas impacting Clark County properties:

1. The study must clarify whether the engineer had contacted Clark County RFCD to verify that the flows used in the SFHA Zone A analysis have been adopted from the FIS study. If not, the hydraulics modeling must also include an analysis using the effective FIS model flows.
2. It appears that the storm drain in El Campo Grande Avenue is located within private property and within Clark County, however, the grading plans show the storm drain along the center line. The most recent storm drain improvement plans must match the grading plans submitted. The improvements will be performed outside of the project boundary and on private property. Notarized, written permission must be obtained from the offsite owner and included with the next submittal
3. A street flow depth calculation for El Campo Grande Avenue using the fully developed, urban street cross section must be provided. Both interim and future developed half street flow depth calculations must be re-submitted with the flows contained to the right-of-way.
4. Interim flows in El Campo Grande Avenue are erosive. The study and plans must address mitigating designs to protect the public improvements in El Campo Grande Avenue.

BOARD OF COUNTY COMMISSIONERS
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THOM REILLY, County Manager

5. The Standard Form 6 and the available storm drain plan and profiles do not match. A more current version of the modeling and/or plans must be provided. The hydraulics of the El Campo Grande Avenue storm drain will be reviewed with the next submittal.
6. It appears that the hydraulic control of the storm drain system in El Campo Grande Avenue is the EGL at the bubbler outlet. The revised Standard Form 6 must reflect this hydraulic control.
7. A street flow depth calculation for section M must be provided under ultimate drainage conditions.
8. The study must clarify why the flows of 606 and 318 doesn't match the flow total at CD34FS and must be discussed.
9. Coordination and notarized, written permission must be obtained for the outflow storm drain pipe as it appears to discharge on to a private property.
10. The study must determine the maximum amount of flow depth at the bubbler based on the hydraulics analysis. The depth of flow at the bubbler must meet Clark County RFCD Design Manual criteria within the right-of-way.
11. The HEC-RAS analysis must also include a pre and post condition summary table to review changes to the water surface elevation, velocities, top width of flow and Froude numbers between the two models.
12. The HEC-RAS exhibits showing both the pre and post areas of inundation must be provided.
13. The stationing on the HEC-RAS cross section map doesn't match the HEC-RAS model summary table. A revised HEC-RAS map must be provided.
14. The exhibit summarizing interim flows in Figure 7 and future condition flows on Figure 9 don't appear to match the flows in the HEC-RAS models. The study must clarify how the flows were determined for the hydraulic modeling.
15. It appears that the flows in interim and developed HEC-RAS section 2667.8 through 2342.78 shouldn't be split from the street section, but should remain in the half street section. The models must be revised.
16. The HEC-RAS model existing cross section map must be re-submitted with the onsite improvements removed to improve clarity.

17. A copy of the HEC-RAS hydraulics analysis must be included with a diskette.
18. A separate HEC-RAS model must be provided for the El Campo Grande Avenue alignment and the upstream boundary conditions based on the modeling in Commerce Street.
19. At the request of Clark County Development Services Department, drainage/grading plans for the proposed development have been reviewed for compliance to the requirements set forth in the "Minimum Drainage Study Criteria Checklist, "Drainage Plan Information," dated July 15, 1997. **The plans submitted do not meet the minimum requirements and must be revised prior to Drainage Study approval, to address the following:**
 - a. Provide detail drawings of the bubbler and upstream inlet
 - b. Label any Patent easements along the El Campo Grande Avenue
 - c. Label the types of manholes
 - d. Remove the bubbler from proposed valley gutters
 - e. Relocated the bubbler across the El Campo Grande Avenue intersection and extend the storm drain
 - f. Provide details of the storm drain laterals
 - g. Label the HGL profile on all storm drain profile sheets
 - h. Daylight the 18 inch low flow storm drain pipe
 - i. Label the right-of-width
 - k. Any additional comments on the plans

The grading plan has been red-lined and is being returned to the engineer. The red-lined grading plan must be resubmitted with the revised drawings. Failure to resubmit the red-lined grading plan will prevent further review of the project.

All addenda must be submitted directly to Clark County. The items listed herein must be thoroughly addressed and submitted for review prior to acceptance of this study.

Villages at Sierra Ranch
HTE # 04-27899
June 24, 2004
Page 4

**DEVELOPMENT SERVICES DEPARTMENT
Civil Engineering Division**

BY



**Todd Myers, P.E.
Senior Civil Engineer
Civil Engineering Division**

TM:gsh

cc. American Premiere Homes
City of N. Las Vegas



Stanley Consultants INC

FAX COVER PAGE

FAX 702.369.9793

5820 S. Eastern Avenue • Suite 200 • Las Vegas, NV 89119-3057

Tel. 702.369.9396

To:	<u>Glenn Hale</u>	No. of Pages, Including this sheet:	<u>3</u>
Firm/Location:	<u>Clark County</u>	Date:	<u>December 8, 2004</u>
Fax No.:	<u>388-2550</u>	Originals	
		Will be sent by mail	<u> </u>
From:	<u>Angela Elizondo</u>	Will not be sent by mail	<u>X</u>
Telephone No.:	<u>702-369-9396</u>	Project No.:	<u>Villages at Sierra Ranch</u>
E-mail Address:	<u>elizondoangela@stanleygroup.com</u>	Compressed Code:	<u> </u>
Subject:	<u>Technical Drainage Approval Letter for Villages</u>	Member No.:	<u>6760</u>
	<u>At Sierra Ranch</u>		

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Message:

Per your request.



IF COPY IS INCOMPLETE OR UNREADABLE, PLEASE CALL 702.369.9396

Mayor
Michael L. Montandon

Council Members
William E. Robinson
Stephanie S. Smith
Shari Buck
Robert L. Eliason



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City Manager
Gregory E. Rose

Assistant City Manager
Dan Turvater

RECEIVED

SEP 22 2004

STANLEY CONSULTANTS

September 20, 2004

Dennis R. Brown, P. E.
Stanley Consultants, Inc.
5820 south Eastern Avenue, Suite 200
Las Vegas, NV 89119

Re: Addendum #2 to the Technical Drainage Study for Villages at Sierra Ranch
CNLV No. 14376

Dear Mr. Brown:

Staff has reviewed the above referenced study, dated July 20, 2004, and found it to meet the minimum accepted standards for a technical drainage study. Final acceptance of this study is conditional pending the following:

1. Concurrence of the Clark County Regional Flood Control District (CCRFCD) is required prior to the approval of any improvement plans. Copies of the Technical Drainage Study and its two addenda have been forwarded to the CCRFCD for review.
2. Concurrence of the Clark County Public Works Department (CCPWD) is required prior to the approval of any improvement plans. Copies of the Technical Drainage Study and its two addenda must be submitted to the CCPWD for review.
3. An application for a Conditional Letter of Map Revision must be submitted to the Federal Emergency Management Agency (FEMA) prior to the issuance of grading permits for areas located in Special Flood Hazard Areas. Building Permits and Certificates of Occupancy shall be issued in accordance with Section 303.6.1 of the CCRFCD Hydrologic Criteria and Drainage Design Manual (August 1999).

Acceptance of this drainage study does not imply approval of the grading plan. A detailed review of the grading plan is performed by staff during the improvement plan review process.

Dennis R. Brown, P.E.

Addendum #2 to the T. D. S. for Villages at Sierra Ranch

September 20, 2004

Page 2

Please be advised that all land surface area disturbances over 1 acre require a Nevada Department of Environmental Protection (NDEP) stormwater discharge permit. A stormwater discharge permit application may be downloaded from the web site:
http://ndep.nv.gov/bwpc/storm_cont03.htm

Projects that disturb more than one acre of land must submit to NDEP a "Notice of Intent" for inclusion under Stormwater Permit No. NVR100000 along with the appropriate filling fee.

The City assumes no responsibility for the information, data, and conclusions presented in this report. If you have any questions concerning this matter, please contact me at 633-1912.

Sincerely,

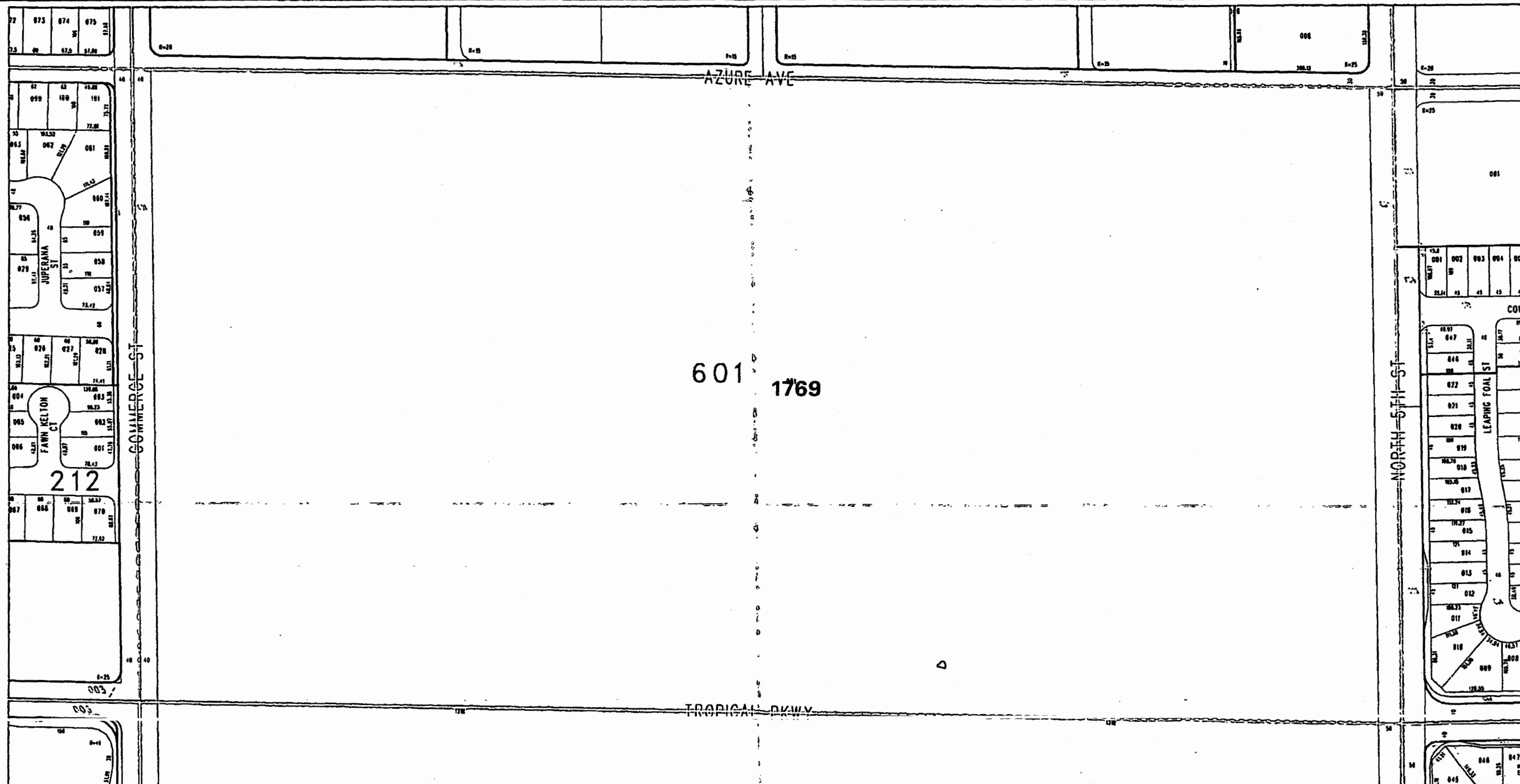


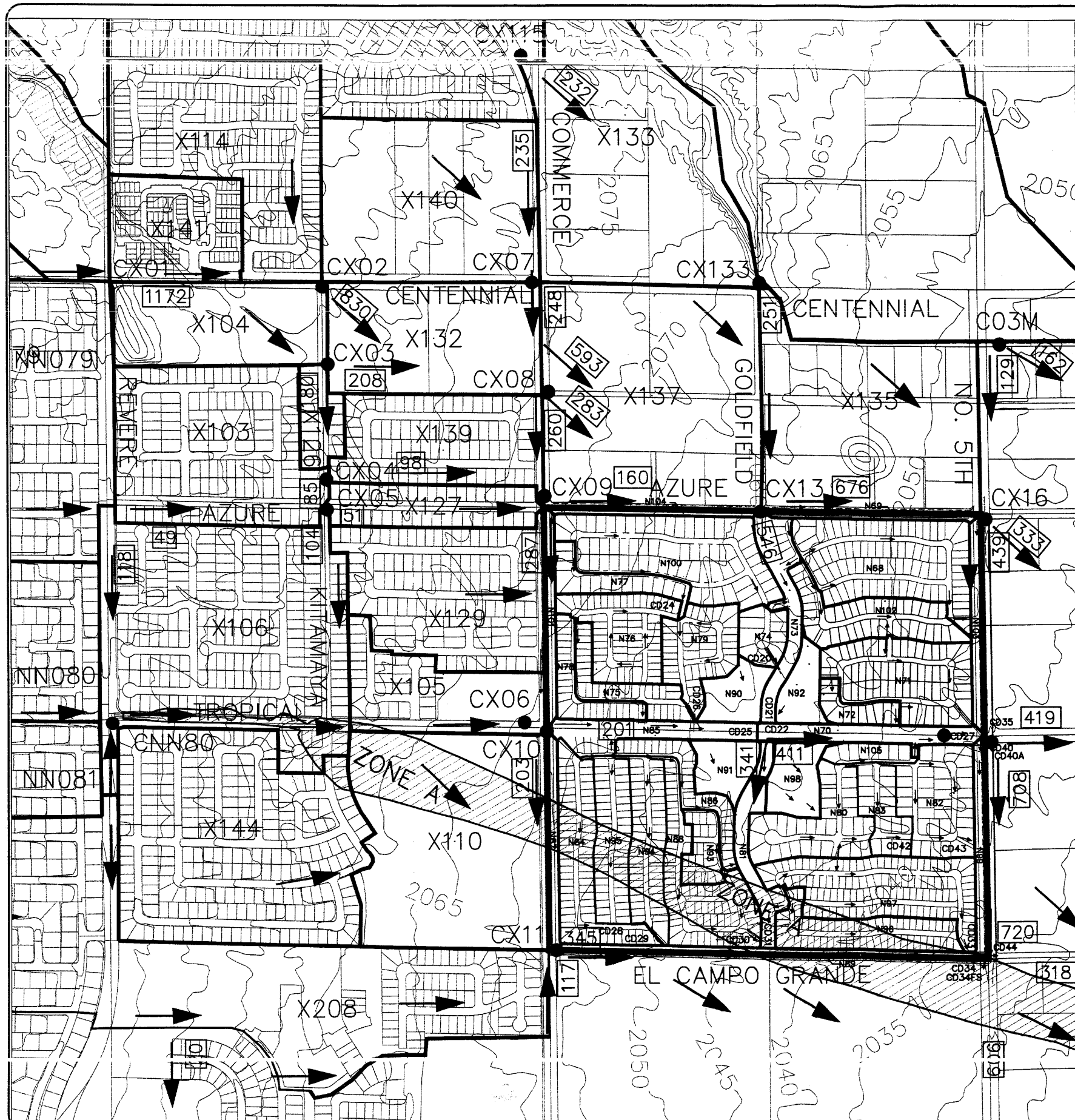
Stephen E. Casmus, P.E.

Senior Engineer

Development and Flood Control Division

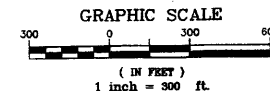
PARCEL INFORMATION				EASEMENT INFORMATION				PUBLIC WORKS EASEMENTS CLARK COUNTY, NEVADA				SHEET 27				S 2 NE 4				124-27-6																																																											
PARCEL BOUNDARY	001	PARCEL NUMBER		EASEMENT TYPE:		CITIES:		Compiled from: Clark County GIS Parcel Data Clark County Public Works GIS Easement Data Scale: 1"=200' Consult HTE/GIS for Parcel Activity 05/26/04				<table border="1"> <tr><td colspan="4"></td></tr> <tr><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr> <tr><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td></tr> <tr><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td></tr> <tr><td>19</td><td>20</td><td>21</td><td>22</td><td>23</td><td>24</td></tr> <tr><td>25</td><td>26</td><td>27</td><td>28</td><td>29</td><td>30</td></tr> <tr><td>31</td><td>32</td><td>33</td><td>34</td><td>35</td><td>36</td></tr> </table>								6	5	4	3	2	1	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	<table border="1"> <tr><td>5</td><td>1</td><td>5</td><td>1</td></tr> <tr><td>6</td><td>2</td><td>6</td><td>2</td></tr> <tr><td>7</td><td>3</td><td>7</td><td>3</td></tr> <tr><td>8</td><td>4</td><td>8</td><td>4</td></tr> <tr><td>5</td><td>1</td><td>5</td><td>1</td></tr> </table>				5	1	5	1	6	2	6	2	7	3	7	3	8	4	8	4	5	1	5	1
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PM/LD BOUNDARY	PB 25-45	PLAT RECORDING NUMBER		☐ TRAFFIC FACILITY		☐ LV																																																																									
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This map is compiled from assessment data and does NOT represent a survey. No liability is assumed for the accuracy of the data delineated herein.				☐ GAS LINE		☐ 100-YR ZONES																																																																									
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						☐ AE ZONE																																																																									
						☐ 2568 PANEL																																																																									





HEC-1 SUMMARY TABLE

Basin	Area (Acres)	Perimeter (Feet)
X114	3353.00	771
X140	368.33	425
X132	261.08	380
X133	93.18	132
CX01	1172	04, X108, X206, X142
X121	12.25	35
X124	28.72	60
CX02	1208	CX01, X141, X114
CX02	830	Over Eastbound Flow
CX02	378	
X104	15.28	35
CX03	388	CX02, X104
CX03	208	Over Eastbound Flow
CX03	180	
X126	3.47	8
CX04	183	CX03, X126
CX04	98	Over Eastbound Flow
CX04	85	
NN079	454.68	167
NN079	118	Referenced from NNS by PBSJ
NN079	49	Over Southbound Flow
NN079	57	NN079, DN079
X103	26.58	57
CX05	106	CX04, DN079, X103
CX05	104	Over Southbound Flow
CX05	51	
NN080	22.40	118
NN080	128	Referenced from NNS by PBSJ
NN080	83.20	Referenced from NNS by PBSJ
NN080	176	NN080, NN085
NN080	51	Over flow to storm drain, NNS by PBSJ
OTRPSD	125	
OTRPSD	42	Over southbound flow, NNS by PBSJ
NN080	83	Remaining eastbound, NNS by PBSJ
NN080	483.50	116
NN081	470.53	48
NN081	118	Referenced from NNS by PBSJ
NN081	320	Referenced from NNS by PBSJ
NN081	320	NN080, NN080, NN081, DN081
X108	47.38	89
X108	12.44	27
CX06	677.82	380
CX06	447.70	196
CX06	551	Referenced from Atlanta Study by GCW
2A	385	Referenced from Atlanta Study by GCW
2A	196	Referenced from Atlanta Study by GCW
INT	44.00	43
1A	201	Referenced from Atlanta Study by GCW
1-1	6.70	14
1B	203	Referenced from Atlanta Study by GCW
D1	117	Referenced from Atlanta Study by GCW
D1B	58	Referenced from Atlanta Study by GCW
2-2A	5.90	16
2-2B	20.50	48
2-2C	58	Referenced from Atlanta Study by GCW
2-3	16.50	9
2-3	22.50	54
2-3	18.10	40
2-3	94	Referenced from Atlanta Study by GCW
2-3	154	Referenced from Atlanta Study by GCW
D2	148	Referenced from Atlanta Study by GCW
INT13	348.00	381
INT13	426	D2, INT13
INT13	92.30	227
INT13	467	CX13, X115
INT13	222	Over Eastbound Flow
INT13	235	
X140	30.43	65
CX07	248	CX15, X140
CX07	830	RETRIEVED FROM CX02
CX07	208	RETRIEVED FROM CX03
X132	20.48	31
CX08	1138	CX07, CX02, CX03, X132
CX08	893	Over Eastbound Flow
CX08	543	
CX08	283	Over Eastbound Flow
CX08	280	
CX08	148	RETRIEVED FROM CX04
CX08	104	RETRIEVED FROM CX05
X139	16.78	34
X127	7.81	16
CX09	447	CX08, CX04, CX05, X138, X127
CX09	180	Over Eastbound Flow
CX09	287	
NT01	1.732	4
X129	23.85	51
CX10	619	CX08, CX08, NT01, X129
CD010	215	Over flow to storm drain, SD Total = 288
CX10	404	
CX10	201	Over Eastbound Flow
CX10	203	
NT07	1.967	5
X144	42.33	91
X110	35.01	83
X110	88.55	137
CX11	20	Over subdivision flow to Ann Rd
CX11	117	
CX11	345	CX10, NT07, X144, X110, X208
N84	7.752	14
N86	4.988	11
CX12	28	N84, N85
N84	5.371	36
CX12	36	CX12, N84
N83	1.440	5
N88	8.052	15
CX13	20	N83, N88
N86	3.102	8
N81	2.964	8
N81	2.705	1
CX13	5.527	13
N87	10.589	22
CX13	33	N86, N87
N88	2.420	5
CX13	42.83	90
RDD115	232	Reference flow from CX115
CX13	251	X133, RDD115
RDC08A	583	Reference flow from CX08
RDC08B	283	Reference flow from CX08
RDC08C	190	Reference flow from CX08
X137	42.08	88
N104	1.257	3
CX13	1222	RDC08A, RDC08B, RDC08C, X137, N104
CX13	548	Over southbound flow



- LEGEND**
- BASIN BOUNDARY
 - FLOW LINE
 - INX BASIN NAME
 - CXX CONCENTRATION POINT
 - ## SURFACE FLOW
 - (##) STORM DRAIN

HEC-1 SUMMARY (cont.)

INT14	313.60	286	Referenced from Centennial Pkwy Chnl
INT16	83.20	103	Referenced from Centennial Pkwy Chnl
CD03M	252	252	Referenced from Centennial Pkwy Chnl
CD03M	182	129	Over Eastbound Flow
X135	32.98	59	
N89	1.280	3	
CX16	772	772	CX13, CD03M, X135, N89
CX16	333	333	Over Eastbound Flow
N88	11.876	28	
N102	8.314	14	
N102	2.083	5	
CD36	446	446	CX16, N88, N102, N103
N85	3.488	201	RETRIEVED FROM CX10
RDD10	2.878	7	
N77	6.085	14	
CD24	21	21	N77, N78
N75	5.306	7	
N78	3.700	11	
N78	2.879	39	CD24, N75, N79
N80	2.781	4	
CD25	218	218	N85, RDD10, CD28, N78, N80
N100	12.482	25	
D100	9	9	Over Flow
N100	17	17	
N74	2.282	6	
CD20	22	22	N100, N74
RDD10	9	9	RETRIEVED FROM N100
N73	3.181	9	
RDC13	548	548	RETRIEVED FROM CX13
CD21	554	554	CD28, RDD10, N73, RDC13
CD22	752	752	CD28, CD21
CD22	341	341	DIVERT TO EL CAMPO GRANDE
CD22	411	411	
N70	4.398	9	
N72	2.242	4	
N71	8.350	22	
N82	1.758	4	
N105	1.480	4	
CD27	416	416	CD25, CD22, N70, N72, N71, N82, N108
CD40	881	881	CD36, CD27
CD40	419	419	Over Eastbound Flow
CD40	442	442	
RDD10B	215	215	Reference flow from Storm Drain
RDD10B	51	51	Reference flow from Storm Drain
CRSD	298	298	Combine Storm Drain Flow
CD40A	706	706	CD40, CRSD
N86	3.396	3	
N80	6.575	14	
N83	3.108	7	
CD42	24	24	N86, N80, N83
N82	6.140	19	
CD43	42	42	CD42, N82
N89	2.122	720	CD40, CD43, N89
CD44	747	747	CX14 = Reference flow from CX129

AMERICAN PREMIER HOMES
VILLAGES AT SIERRA RANCH

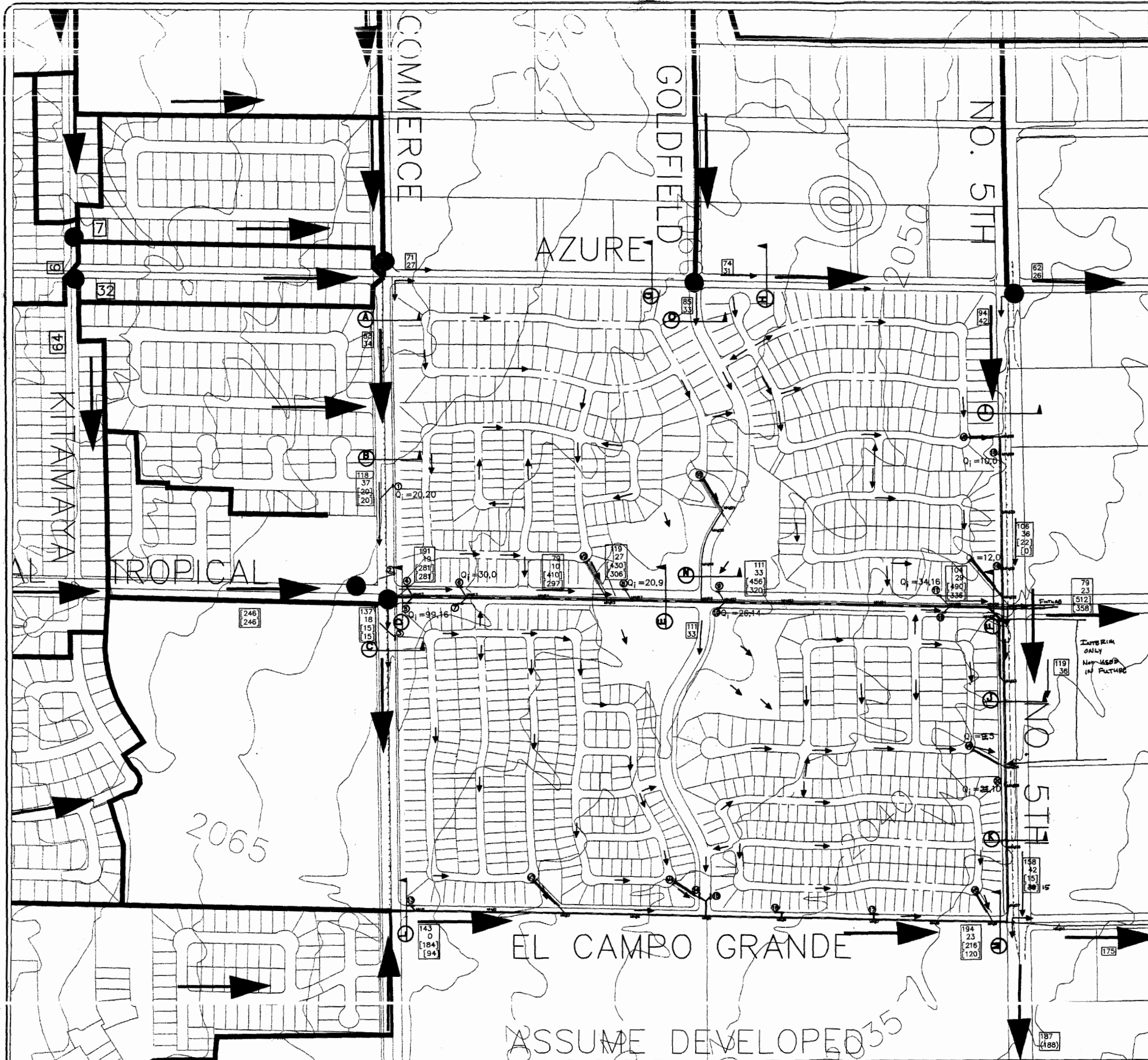
TECHNICAL DRAINAGE STUDY ADDENDUM #1
INTERIM BASINS MAP

SHEET
1 OF 1 SHEETS
SDI PROJECT# 15980

5820 S. Eastern Avenue, Suite 200
Las Vegas, Nevada 89119
(702) 369-3398 Fax (702) 369-9793
www.stanleygroup.com

Stanley Consultants INC.
NEVADA

CHECKED BY DWS
DATE 4/21/2004



LEGEND

- FLOW LINE
- ### 100-YR STREET FLOW
- ## 10-YR STREET FLOW
- [##] 100 YR FLOW IN STORM DRAIN
- [##] 10 YR STREET FLOW
- A STREET FLOW CROSS SECTION
- # DROP INLET DESIGNATION
- $Q_i = \#.\#$ Q -INTERCEPT IN 10-YEAR, 100-YEAR

DEVELOPED CONDITIONS STREET FLOW SUMMARY

Section	Street	(ft)	Q_{10}	(ft)	(ft/sec)	$D_{10} \times V_{10}$	Q_{100}	(ft)	(ft/sec)	$D_{100} \times V_{100}$
A	Commerce	0.71	34	0.68	3.00	2.04	83	0.86	3.52	3.03
B	Commerce	0.4	37	0.75	2.41	1.81	118	1.03	2.97	3.06
C	Commerce	0.4	18	0.63	2.12	1.34	131	1.06	3.04	3.22
D	Tropical	1.5	20	0.46	3.79	1.74	192	0.88	5.54	4.88
E	Tropical	0.9	20	0.50	3.00	1.50	102	0.79	3.90	3.08
F	Tropical	0.91	24	0.52	3.12	1.82	92	0.77	3.85	2.96
G	See Section H	0.82				N/A				N/A
H	Azure	0.5				N/A	74	0.58	4.02	2.33
I	North 5th	0.4	42	0.69	2.41	1.86	154	1	3.05	3.05
J	North 5th	0.4	36	0.66	2.36	1.56	240	1.13	3.48	3.93
K	See Section I	0.4				N/A				N/A
L	El Campo Grande	0.82				N/A	143	0.84	5.03	4.23
M	See Section L	0.82				N/A				N/A
N	Goldfield	0.5	46	0.68	2.81	1.91	120	0.89	3.72	3.31
O	Goldfield	0.5	34	0.63	2.57	1.82	86	0.8	3.36	2.69

5600 S. Eastern Avenue, Suite 200
 Las Vegas, NV 89119
 (702) 369-3386 Fax (702) 369-9793
 www.stanleygroup.com



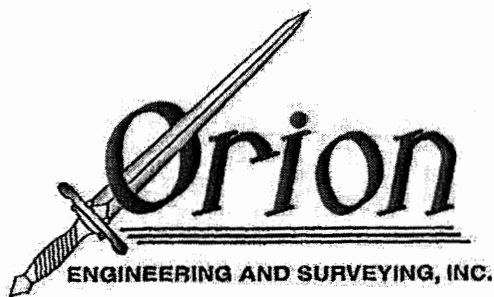
Stanley Consultants Inc.

AMERICAN PREMIER HOMES
 VILLAGES AT SIERRA RANCH
 TECHNICAL DRAINAGE STUDY
 STORM DRAIN EXHIBIT

SHEET
 1 OF 1 SHEETS
 PROJECT #
 18800

DATE 4/21/2004

- **ORION ENGINEERING AND SURVEYING**



**REQUEST FOR
LETTER OF MAP REVISION (LOMR)
FOR
BRUCE AND HAMMER**

Job No. 141-0506

July 24, 2006

Prepared by:

**Orion Engineering and Surveying, Inc.
7391 Prairie Falcon Road, Suite 150
Las Vegas, Nevada 89128**

Prepared for:

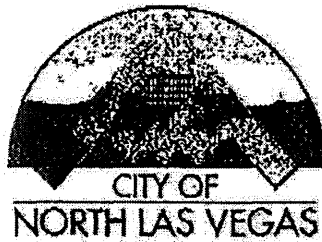


**2920 N. Green Valley Pkwy., Suite 811
Henderson, NV 89014
Telephone: (702) 458-770
Fax: (702) 458-7708**

BRUCE AND HAMMER
(Orion Engineering and Surveying)

Mayor
Michael L. Montandon

Council Members
William E. Robinson
Stephanie S. Smith
Shari Buck
Robert L. Eliason



City Manager
Gregory E. Rose

Assistant City Manager
Dan Tarwater

Year Community of Choice
Public Works Department - Development & Flood Control
2266 Civic Center Drive • North Las Vegas, Nevada 89030
Telephone: (702) 633-1200 • Fax: (702) 649-4696
www.cityofnorthlasvegas.com

August 18, 2004

Dean W. Rasmuson, PE
Orion Engineering and Surveying, Inc.
7391 Prairie Falcon Road, Suite 150
Las Vegas, NV 89128

Re: Addendum to the Technical Drainage Study for Bruce and Hammer
CNLV No. 16319; Orion No. 057-0404

Dear Mr. Rasmuson:

Staff has reviewed the above referenced study, dated August 9, 2004, and found it to meet the minimum accepted standards for a technical drainage study. This acceptance is contingent upon the following conditions:

1. Concurrence must be obtained by the Clark County Regional Flood Control District due to the proposed improvements proximity to Regional Flood Control Facilities. Please submit the study and a copy of this conditional approval letter to the Clark County Regional Flood Control District at your earliest convenience.
2. Concurrence must be obtained by the Clark County Development Services Department due to the proposed improvements proximity to corporate boundary. Please submit the study and a copy of this conditional approval letter to the Clark County Development Services at your earliest convenience.
3. No modifications may be made within the FEMA SFHA until a CLOMR has been submitted to FEMA; no building permits will be issued until a favorable response from the CLOMR is received from FEMA; and no COO's will be issued until a LOMR has been issued by FEMA.

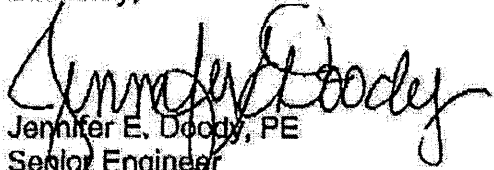
Please be advised that all land surface area disturbances over 1 acre and/or any area adjacent to a water way must submit to the Nevada Division of Environmental Protection a "Notice of Intent" to discharge that certifies that a stormwater pollution prevention plan has been developed and is maintained onsite. For more information, including forms and application see <http://ndep.nv.gov/bwpc/storm01.htm> or call (775) 687-9429.

Dean W. Rasmuson, PE
Addendum to the TDS for Bruce & Hammer
August 18, 2004
Page 2

Acceptance of this drainage study does not imply approval of the grading plan or the structural calculations associated with the drainage for this site. A detailed review of the grading plan is performed by staff during the improvement plan review process.

The City assumes no responsibility for the information, data, and conclusions presented in this report. If you have any questions concerning this matter, please contact me at 633-2088.

Sincerely,

A handwritten signature in black ink, appearing to read "Jennifer E. Doody". The signature is fluid and cursive, with the first name "Jennifer" and last name "Doody" clearly distinguishable.

Jennifer E. Doody, PE
Senior Engineer
Development and Flood Control Division

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

cc: Larry
Angie
Maid
Process



Gale Wm. Fraser, II, P.E.
General Manager/Chief
Engineer

BOARD OF DIRECTORS

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City of Las Vegas

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City of Mesquite

Roger Tobler
City of Boulder City

Bruce L. Woodbury
Clark County

October 14, 2004

Mr. Stephen E. Casmus, P.E.
City of North Las Vegas Public Works
2266 Civic Center Drive
North Las Vegas, NV 89030

OCT 23 REC'D

DISTRICT CONCURRENCE: BRUCE & HAMMER (CNLV NO. 16319)
(RFCD NO. 04-5980)

Dear Mr. Casmus:

Clark County Regional Flood Control District (District) reviewed Technical Drainage Study dated June 30, 2004 and Addendum No. 1 dated August 9, 2004, for the above-mentioned project as submitted by Orion Engineering. In addition, District is in receipt of the Conditional Letter of Acceptance from City of North Las Vegas Public Works dated August 18, 2004.

District concurs with acceptance of this Technical Drainage Study by City of North Las Vegas Public Works.

District's review of this project was limited to issues of Regional Flood Control Significance as defined in *Uniform Regulations for the Control of Drainage*. As noted in study, site resides in a Special Flood Hazard Area (SFHA) designated as "Zone A" per the effective Flood Insurance Rate Map (FIRM). Therefore, consultant should be advised that this acceptance does not serve to amend the FIRM or remove the SFHA.

Please be aware that as additional information becomes available and/or restudies of Flood Insurance Studies are performed, information submitted by Orion Engineering may be superseded. Compliance with regulatory elements and design standards specified in *Uniform Regulations for the Control of Drainage* does not imply a guarantee that properties will be free from flooding or flood damage. The District, its officials, or employees assume no liability for information, data, or conclusions presented by consulting engineers. We, therefore, make no warranties, either expressed or implied, in conducting this review.

GALE WM. FRASER, II, P.E.
General Manager/Chief Engineer

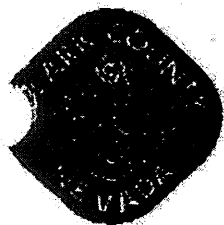
BY:

Andrew R. Trelease, P.E.
Senior Civil Engineer

ART:css

c: Donald A. Haselhoff, P.E., Orion Engineering

File: 19-61-35.ORI



Department of Development Services Civil Engineering Division

500 S Grand Central Pky 1st Fl • PO Box 551799 • Las Vegas NV 89155-1799
(702) 455-4600 • Fax (702) 388-2550

Phil Rosenquist, Director

May 5, 2005

Orion Engineering & Surveying
7391 Prairie Falcon Rd. Suite 150
Las Vegas, Nevada 89128

- Larry
- Aimee
- Angie
- main

CLARK COUNTY CONCURRENCE: TECHNICAL DRAINAGE STUDY FOR BRUCE & HAMMER - SEC. 35, T. 19 S., R. 61 E. - H.T.E. 05 - 13123

The above-referenced project is located in the City of North Las Vegas adjacent to Clark County unincorporated areas. The drainage study was submitted to the County for concurrence. The County has reviewed the technical drainage study and addendum. In addition, the County has received a copy of the acceptance letter from the City of North Las Vegas, dated August 18, 2004.

The County concurs with the acceptance of this drainage study by the City of North Las Vegas. Please note that the County's review of this development is limited to drainage issues significant to Clark County unincorporated areas.

No liability is assumed by the County for information, data, and conclusions of the consulting engineer.

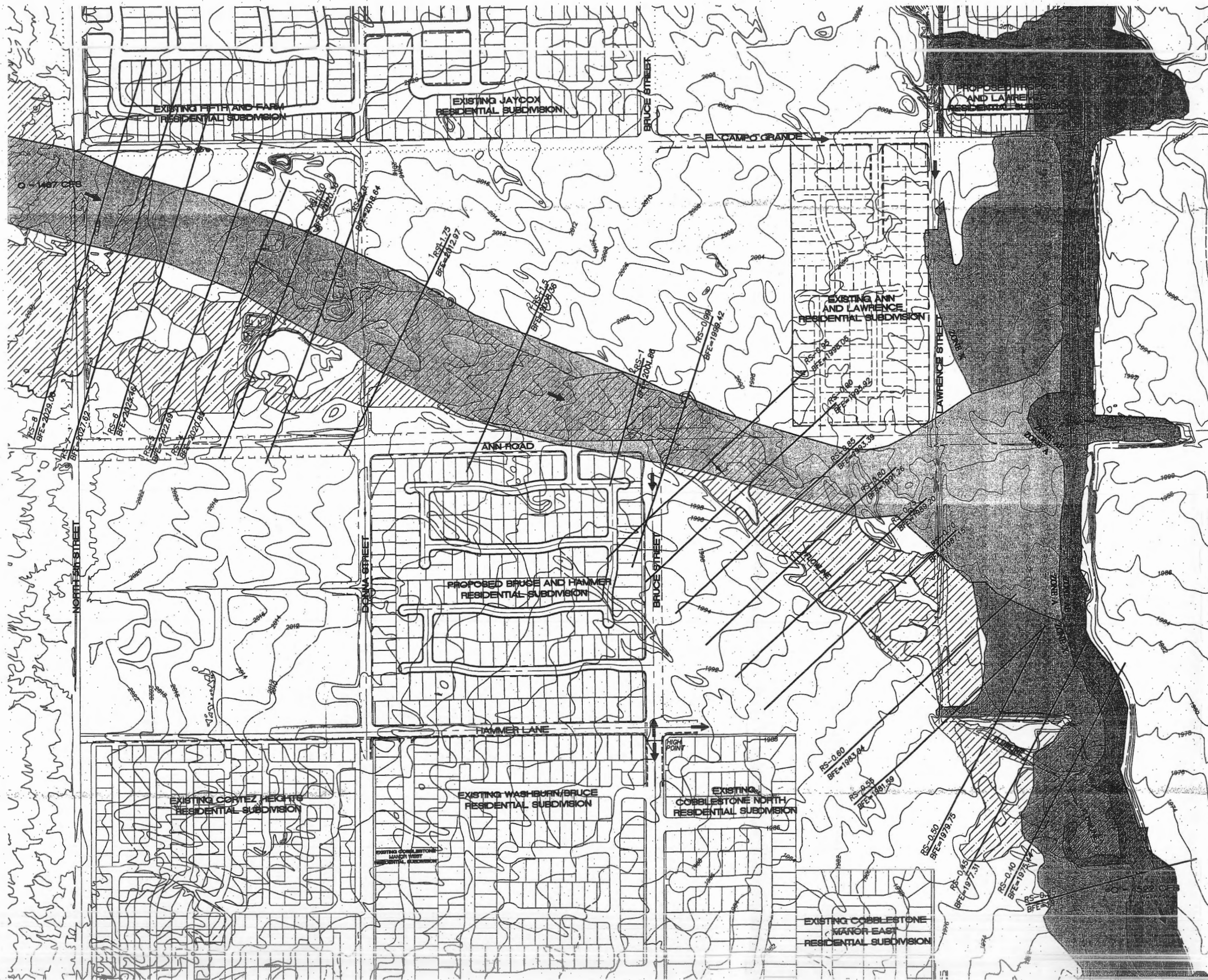
DEPARTMENT OF DEVELOPMENT SERVICES

By


DAVE BETLEY, P.E.
Principal Engineer, Civil Engineering Div.

DB: mil

cc: Jennifer E. Doody, P.E.
City of North Las Vegas Department of Public Works



LEGEND	
	BASIN BOUNDARY
	PARCEL LINE
	100-YEAR FLOW RATE (cfs)
	FLOW ARROW
	CONCENTRATION POINT
	CROSS SECTION
	BASE FLOOD ELEVATION
	DETERMINED FLOODPLAIN
	EXISTING FEMA FLOODZONE AREA
	FLOW LINE

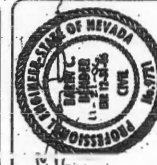
WATER SURFACE ELEVATION

STATION	W.S.E. (FT)
RS-0.35	1971.56
RS-0.40	1975.44
RS-0.45	1977.31
RS-0.50	1979.75
RS-0.55	1981.59
RS-0.60	1983.04
RS-0.70	1987.15
RS-0.75	1989.20
RS-0.80	1991.26
RS-0.85	1993.39
RS-0.90	1995.92
RS-0.95	1998.05
RS-0.99	1999.42
RS-1	2001.86
RS-1.5	2008.36
RS-1.75	2013.00
RS-2	2018.64
RS-3	2020.30
RS-4	2020.89
RS-5	2022.69
RS-6	2025.46
RS-7	2027.62
RS-8	2029.00

*NOTE: THE EXISTING RUNOFF CONVEYING THROUGH THE UPPER LAS VEGAS WASH IS REFERENCED FROM FIGURE E-15 OF THE CITY OF NORTH LAS VEGAS (CNLV) NORTH NEIGHBORHOOD FLOOD CONTROL MASTER PLAN, VOLUME II, CONDUCTED BY P&S&J, DATED JULY 2002. THE PEAKING TIME FOR THIS FLOW DOES NOT COINCIDE WITH THE PEAKING TIME FOR THE ON-SITE AND ADJACENT OFF-SITE RUNOFF. THE RUNOFF FROM THE CITY OF NORTH LAS VEGAS FLOW RATE OF 4522 CFS, WITHIN THE EXISTING WASH, SHALL BE CONSIDERED A SEPARATE EVENT. REFER TO FIGURES E-15 AND F-15, LOCATED IN THE APPENDIX C.

¹NOTE: THE CROSS SECTIONS HAVE BEEN REFERENCED FROM THE REQUEST FOR CLOMR FOR THE VILLAGES AT SIERRA RANCH, CONDUCTED BY STANLEY CONSULTANTS, DATED OCTOBER 2004. THE FLOW RATE OF 1487 CFS IS REFERENCED FROM FIGURE 9, POST-CONSTRUCTION HEC-RAS MAP OF THE STANLEY CONSULTANTS CLOMR REQUEST (FEMA CASE NO. 05-09-0040R).

²NOTE: THE CROSS SECTIONS HAVE BEEN EXCERPTED AND REVISED FROM THE REQUEST FOR CLOMR FOR THE VILLAGES AT SIERRA RANCH, CONDUCTED BY STANLEY CONSULTANTS, DATED OCTOBER 2004.



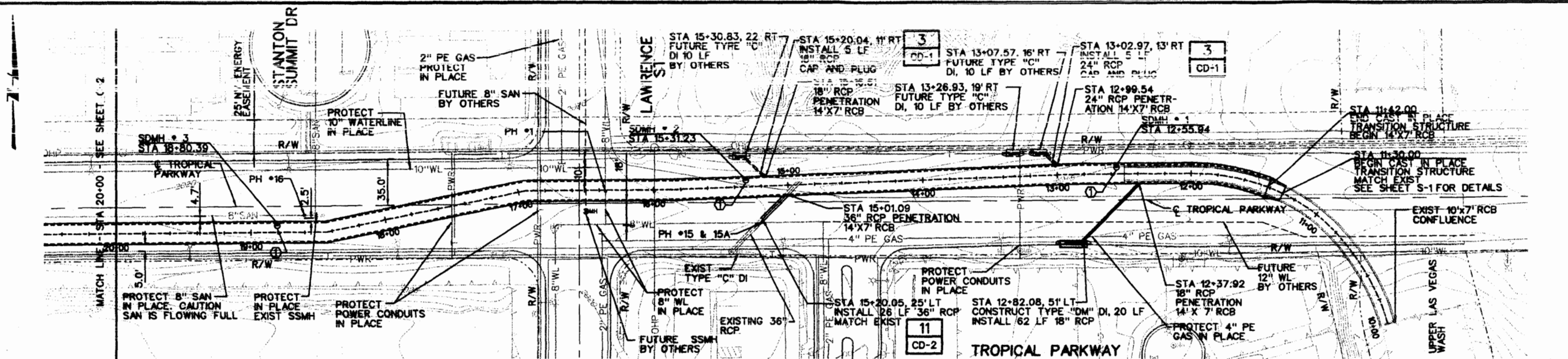
DESIGNED BY:	DRAWN BY: LP	DATE: 11/20/08
CHECKED BY: LP	JOB NUMBER: 141,0506	BY: DATE
NO.	REVISION	

FIGURE 4 DEVELOPED HEC-RAS ANALYSIS BRUCE AND HAMMER LOMR LENNAR HOMES

ORION ENGINEERING AND SURVEYING, INC.
7391 PRAIRIE FALCON ROAD, SUITE 150
LAS VEGAS, NEVADA 89128
(702) 739-5921 FAX (702) 739-5929



- MWH TPCE Civil Drawings



STORM DRAIN NOTES:

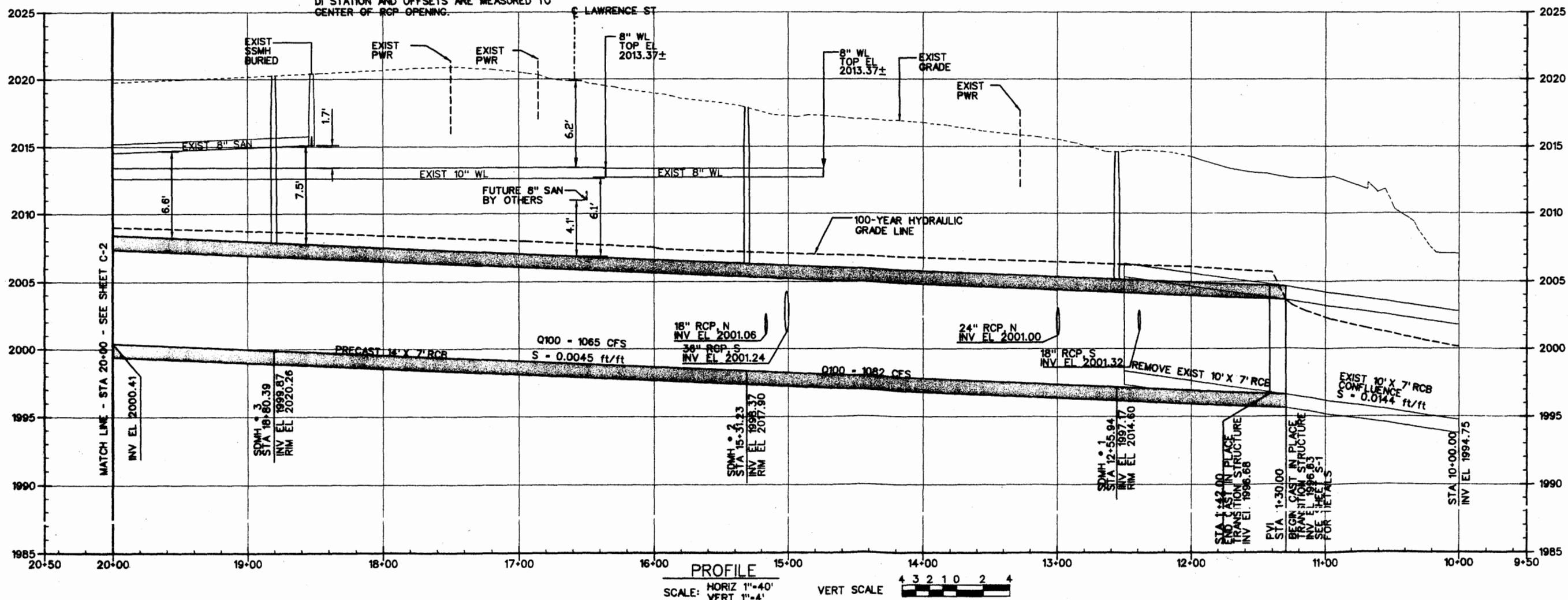
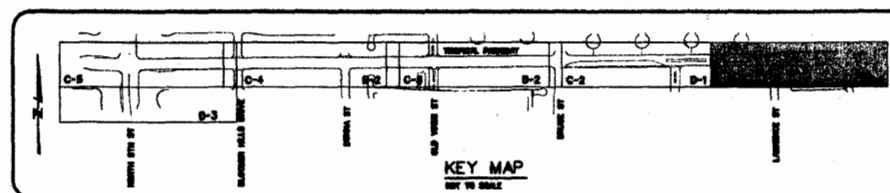
1. ALL PIPE LENGTHS MEASURED ALONG PIPE CENTERLINE TO CENTER OF MANHOLE OR TO INSIDE EDGE OF DI, RCB, OR STRUCTURE.
2. ALL DIMENSIONS SHOWN ARE FROM THE OUTSIDE WALL TO OUTSIDE WALL.
3. SEE STRUCTURAL SHEETS FOR PRECAST BOX CULVERTS.
4. ALL STORM DRAIN PIPES ARE CLASS III UNLESS OTHERWISE NOTED.

5. CONSTRUCTION OF DI SHALL INCLUDE REPLACEMENT OF EXISTING CURB & GUTTER, SIDEWALK, LANDSCAPE AND RELOCATION OF UTILITIES. REFER TO SECTION 609 OF SPECIAL PROVISIONS FOR DETAILS.
6. SEE SHEET C-6 FOR DI AND LATERAL PROFILES.
7. SEE SHEET CD-2 FOR TRENCH DETAILS.
8. FOR PENETRATION OPENINGS W/ DIAMETERS 12" OR LARGER, SEE S-144/SHEET GS-2 FOR ADDITIONAL REINFORCEMENT REQUIREMENTS.
9. ALL OFFSETS MEASURED FROM CENTERLINE OF RCB. DI STATION AND OFFSETS ARE MEASURED TO CENTER OF RCP OPENING.

PLAN
HORIZ SCALE 40 30 20 10 0 20 40

CONSTRUCTION NOTES:

- ① CONSTRUCT MANHOLE RISER WITH COVER. (SEE DETAIL 6/CD-1)

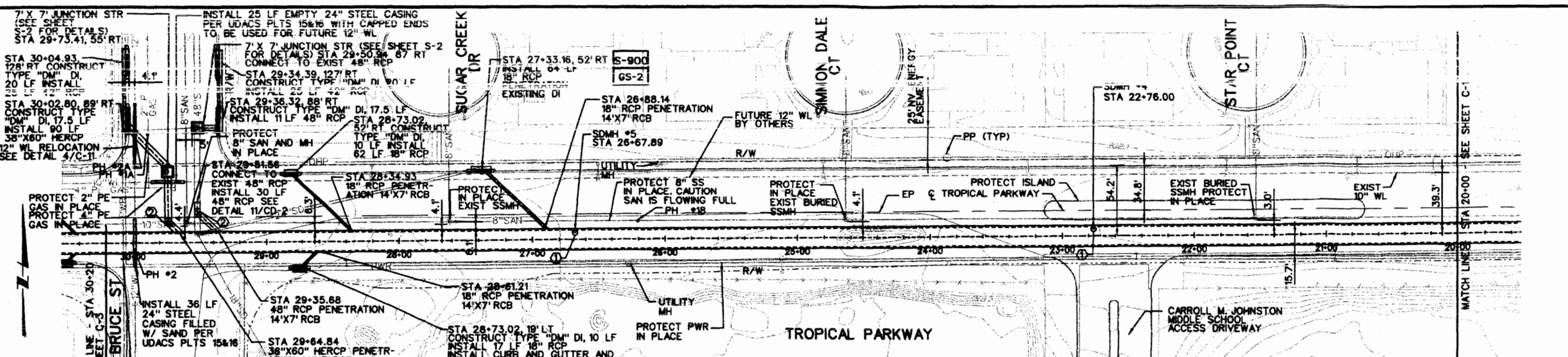


PROFILE
SCALE: HORIZ 1"=40' VERT SCALE 4 3 2 1 0 2 4

CITY OF NORTH LAS VEGAS - DEPARTMENT OF PUBLIC WORKS - ENGINEERING SERVICES DIVISION

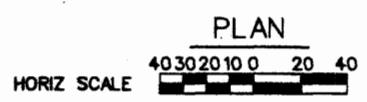
STORM DRAIN PLAN AND PROFILE - STA 10+00 TO 20+00	DESIGN: J. PARKER	SCALE: AS SHOWN	REVISIONS
TROPICAL PARKWAY CHANNEL EAST	DRAWN: J. PARKER	DATE: 4/14/09	NO. DESCRIPTION
NORTH 5TH STREET TO UPPER LAS VEGAS WASH	CHECKED: H. DUNHAM	PROJECT NO.	BY
	APPROVED: W. DAVID		

SHEET NO.
C-1
SHEET 9 OF 26

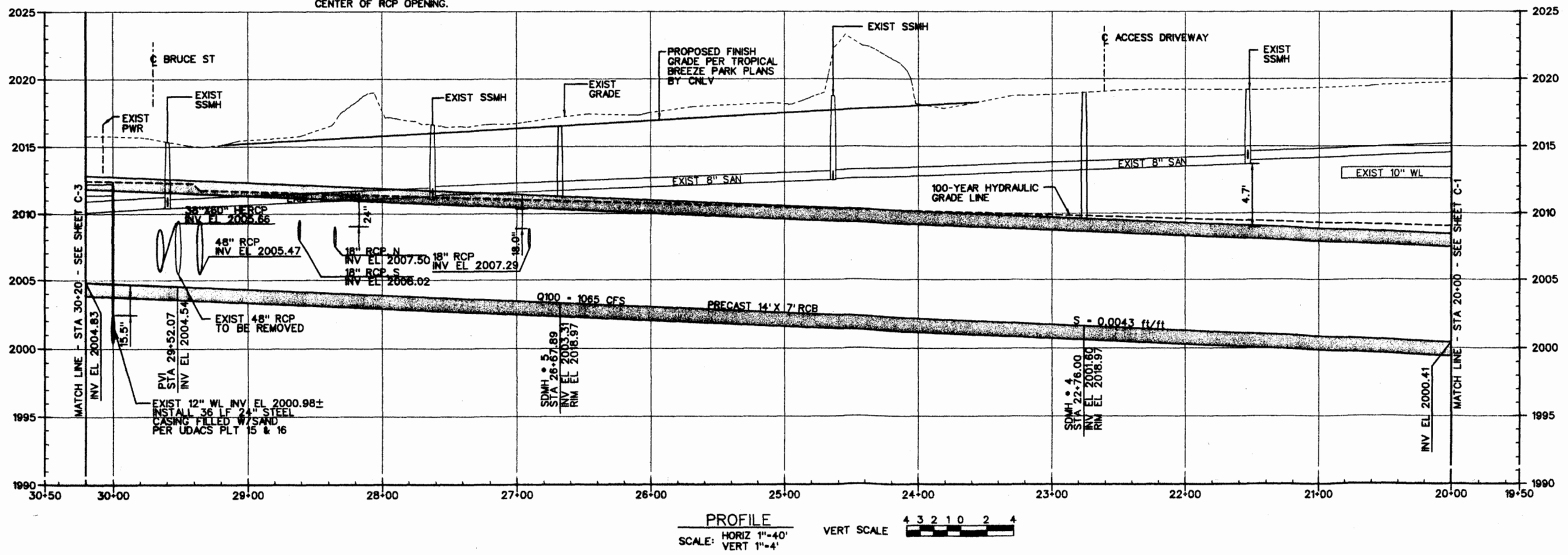
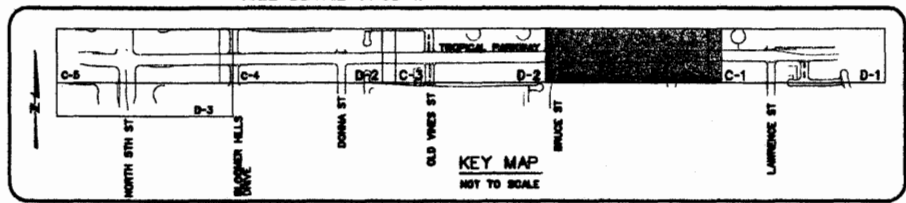


- STORM DRAIN NOTES:**
1. ALL PIPE LENGTHS MEASURED ALONG PIPE CENTERLINE TO CENTER OF MANHOLE OR TO INSIDE EDGE OF DI, RCB, OR STRUCTURE.
 2. ALL DIMENSIONS SHOWN ARE FROM THE OUTSIDE WALL TO OUTSIDE WALL.
 3. SEE STRUCTURAL SHEETS FOR PRECAST BOX CULVERTS.
 4. ALL STORM DRAIN PIPES ARE CLASS III UNLESS OTHERWISE NOTED.

5. CONSTRUCTION OF DI SHALL INCLUDE REPLACEMENT OF EXISTING CURB & GUTTER, SIDEWALK, LANDSCAPE AND RELOCATION OF UTILITIES. REFER TO SECTION 609 OF SPECIAL PROVISIONS FOR DETAILS. PROTECT IN PLACE EXISTING LANDSCAPE IN FRONT OF SCHOOL ALONG TROPICAL PARKWAY.
6. SEE SHEETS C-6 AND C-7 FOR DI AND LATERAL PROFILES.
7. SEE SHEET CD-2 FOR TRENCH DETAILS.
8. FOR PENETRATION OPENINGS W/ DIAMETERS 12" OR LARGER, SEE S-144/SHEET GS-2 FOR ADDITIONAL REINFORCEMENT REQUIREMENTS.
9. ALL OFFSETS MEASURED FROM CENTERLINE OF RCB. DI STATION AND OFFSETS ARE MEASURED TO CENTER OF RCP OPENING.



- CONSTRUCTION NOTES:**
1. CONSTRUCT MANHOLE RISER WITH COVER. (SEE DETAIL 6/CD-1)
 2. CONSTRUCT ENCASED 45° RCP BEND (SEE DETAIL 7/CD-1)



CITY OF NORTH LAS VEGAS - DEPARTMENT OF PUBLIC WORKS - ENGINEERING SERVICES DIVISION

STORM DRAIN PLAN AND PROFILE - STA 20+00 TO 30+20

TROPICAL PARKWAY CHANNEL EAST

NORTH 5TH STREET TO UPPER LAS VEGAS WASH

SHEET NO. C-2

SHEET 10 OF 26

REVISIONS

NO.	DESCRIPTION	DATE
1	AS SHOWN	

SCALE: AS SHOWN

DESIGN: J. PARKER

DRAWN: J. PARKER

CHECKED: H. DUNHAM

APPROVED: W. DAUD

DATE: 4/14/09

PROJECT NO.

STATE OF NEVADA

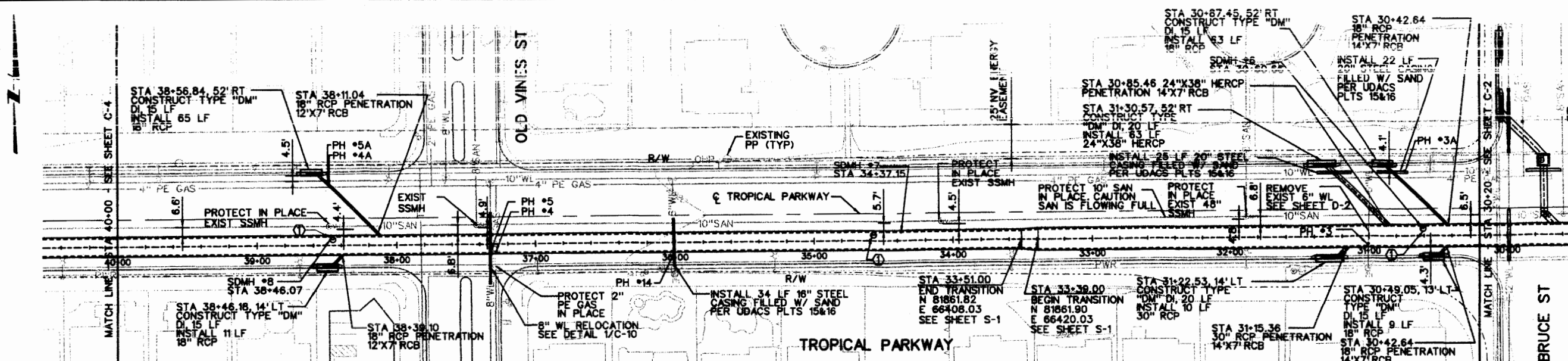
WESAM DAUD

EXP. 12-31-10

CIVIL

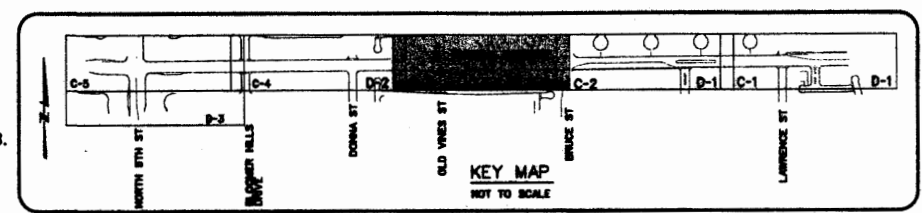
NO. 1178

3000 WEST CHARLES BLVD. SUITE 100 LAS VEGAS, NV 89102 (702) 878-8010

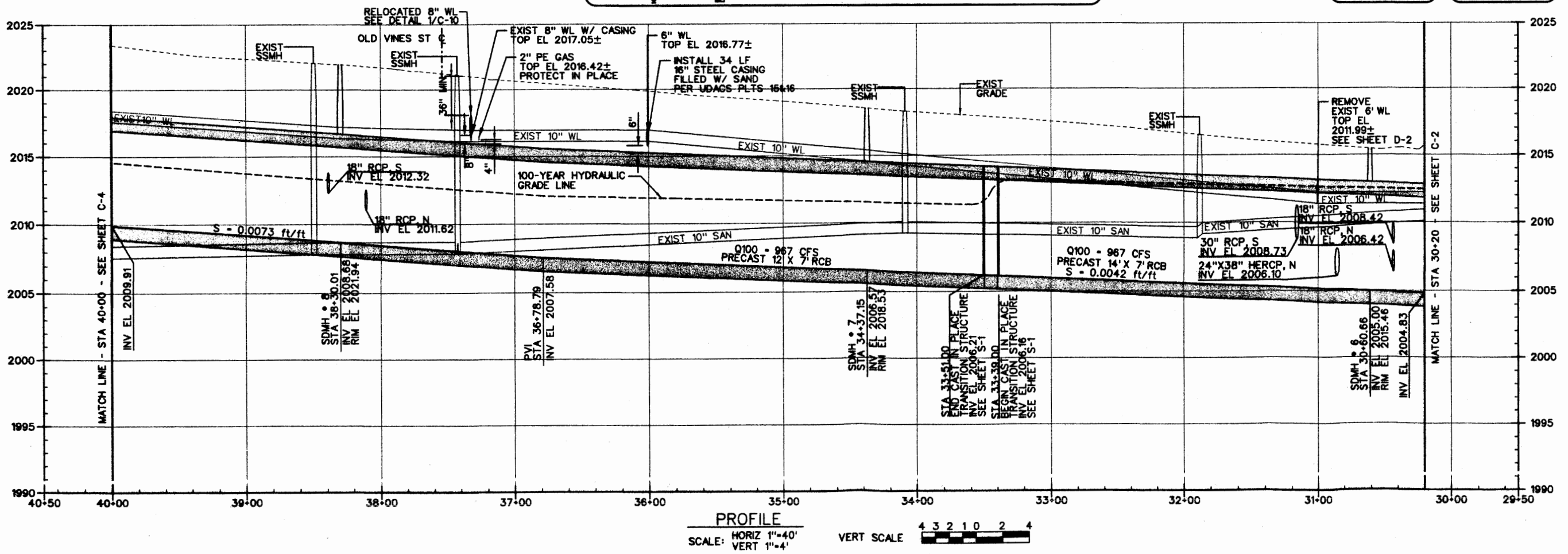


- STORM DRAIN NOTES:**
1. ALL PIPE LENGTHS MEASURED ALONG PIPE CENTERLINE TO CENTER OF MANHOLE OR TO INSIDE EDGE OF DI, RCB, OR STRUCTURE.
 2. ALL DIMENSIONS SHOWN ARE FROM THE OUTSIDE WALL TO OUTSIDE WALL.
 3. SEE STRUCTURAL SHEETS FOR PRECAST BOX CULVERTS.
 4. ALL STORM DRAIN PIPES ARE CLASS III UNLESS OTHERWISE NOTED.

5. CONSTRUCTION OF DI SHALL INCLUDE REPLACEMENT OF EXISTING CURB & GUTTER, SIDEWALK, LANDSCAPE AND RELOCATION OF UTILITIES. REFER TO SECTION 609 OF SPECIAL PROVISIONS FOR DETAILS.
6. SEE SHEET C-7 FOR DI AND LATERAL PROFILES.
7. SEE SHEET CD-2 FOR TRENCH DETAILS.
8. FOR PENETRATION OPENINGS W/ DIAMETERS 12" OR LARGER, SEE S-144/SHEET GS-2 FOR ADDITIONAL REINFORCEMENT REQUIREMENTS.
9. ALL OFFSETS MEASURED FROM CENTERLINE OF RCB. DI STATION AND OFFSETS ARE MEASURED TO CENTER OF RCP OPENING.

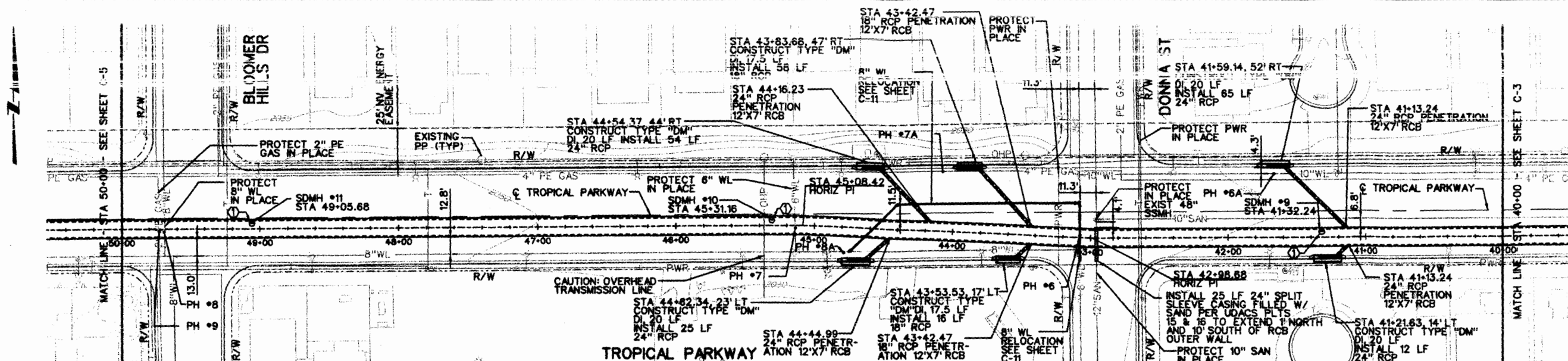


- CONSTRUCTION NOTES:**
- ① CONSTRUCT MANHOLE RISER WITH COVER. (SEE DETAIL 6/CD-1)



CITY OF NORTH LAS VEGAS - DEPARTMENT OF PUBLIC WORKS - ENGINEERING SERVICES DIVISION

STORM DRAIN PLAN AND PROFILE - STA 30+20 TO 40+00		 3000 WEST CHARLESTON BLVD. SUITE 100 LAS VEGAS, NV 89102 (702) 878-8010
TROPICAL PARKWAY CHANNEL EAST NORTH 5TH STREET TO UPPER LAS VEGAS WASH		
SHEET NO. C-3		SHEET 11 OF 26
REVISIONS NO. DESCRIPTION DATE BY 1. 10/14/09 W. DAVID		

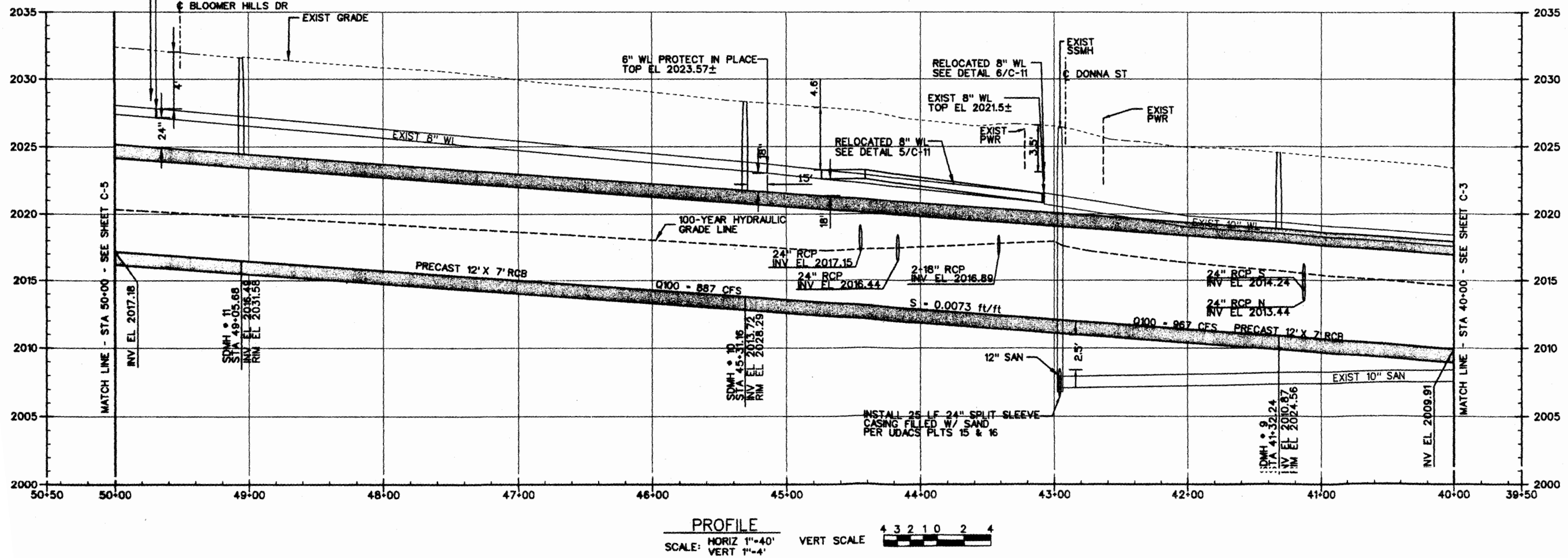
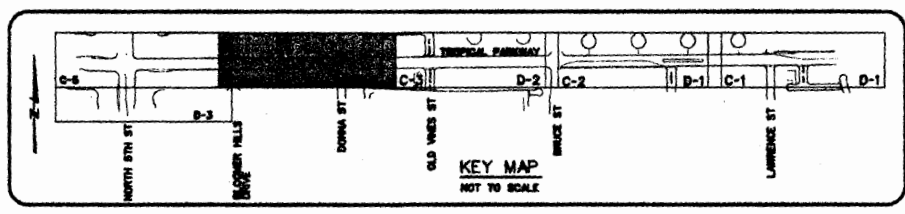


CONSTRUCTION NOTES:
 ① CONSTRUCT MANHOLE RISER WITH COVER. (SEE DETAIL 6/CD-1)

PLAN
 HORIZ SCALE 40 30 20 10 0 20 40

STORM DRAIN NOTES:
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 2. ALL DIMENSIONS SHOWN ARE FROM THE OUTSIDE WALL TO OUTSIDE WALL.
 3. SEE STRUCTURAL SHEETS FOR PRECAST BOX CULVERTS.
 4. ALL STORM DRAIN PIPES ARE CLASS III UNLESS OTHERWISE NOTED.

- CONSTRUCTION OF DI SHALL INCLUDE REPLACEMENT OF EXISTING CURB & GUTTER, SIDEWALK, LANDSCAPE AND RELOCATION OF UTILITIES REFER TO SECTION 609 OF SPECIAL PROVISIONS FOR DETAILS.
- SEE SHEET C-8 FOR DI AND LATERAL PROFILES.
- SEE SHEET CD-2 FOR TRENCH DETAILS.
- FOR PENETRATION OPENINGS W/ DIAMETERS 12" OR LARGER, SEE S-144/SHEET GS-2 FOR ADDITIONAL REINFORCEMENT REQUIREMENTS.
- ALL OFFSETS MEASURED FROM CENTERLINE OF RCB, DI STATION AND OFFSETS ARE MEASURED TO CENTER OF RCP OPENING.



PROFILE
 SCALE: HORIZ 1"=40' VERT SCALE 4 3 2 1 0 2 4

CITY OF NORTH LAS VEGAS - DEPARTMENT OF PUBLIC WORKS - ENGINEERING SERVICES DIVISION

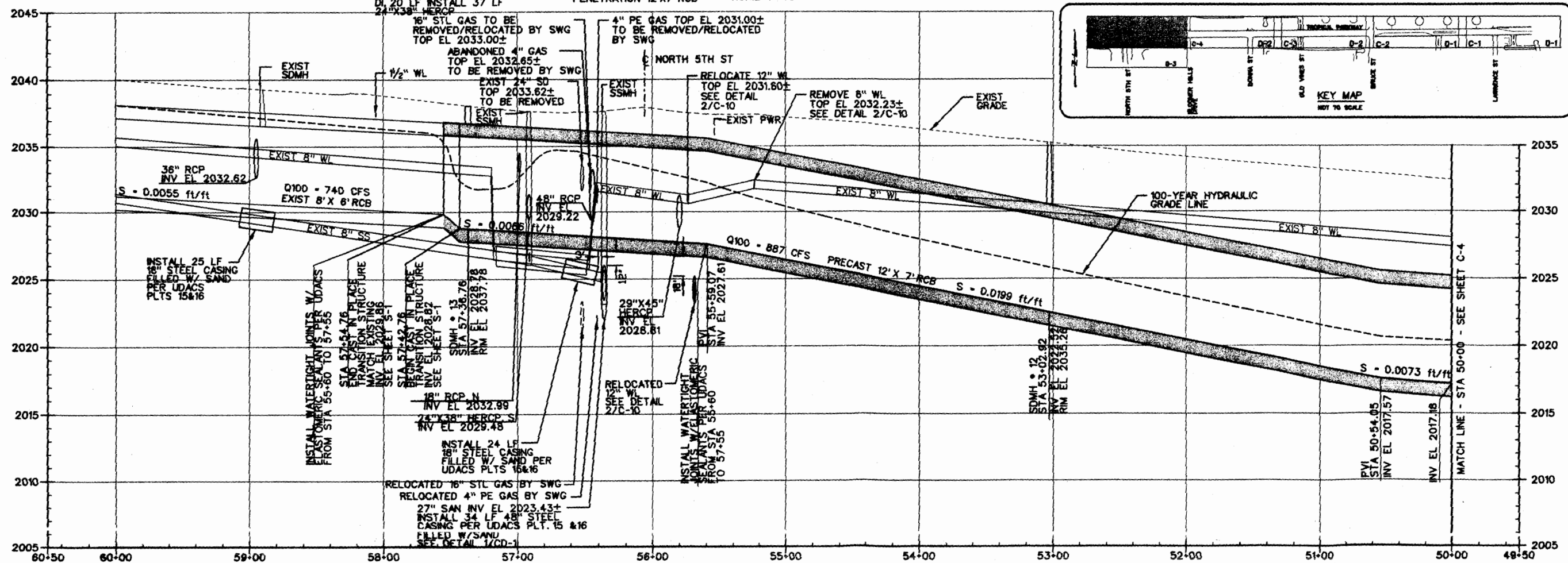
NO.	DESCRIPTION	DATE	BY
1	DESIGN	4/14/08	J. PARKER
2	DRAWN	4/14/08	J. PARKER
3	CHECKED	4/14/08	H. DUNHAM
4	APPROVED	4/14/08	W. DAVID

PROJECT NO. 4/14/08

STATE OF NEVADA
 MWH
 3010 WEST CHARLESTON BLVD.
 LAS VEGAS, NV 89102
 (702) 878-8010

STORM DRAIN PLAN AND PROFILE - STA 40+00 TO 50+00
TROPICAL PARKWAY CHANNEL EAST
NORTH 5TH STREET TO UPPER LAS VEGAS WASH

SHEET NO.
C-4
SHEET 12 OF 26



SHEET NO
C-5
SHEET 13 OF 26