Request for a Letter of Map Revision
Alexander Channel
Commerce Street to the Western Tributary
City of North Las Vegas, Nevada

Prepared for

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

Clark County Regional Flood Control District
600 S. Grand Central Parkway
Las Vegas, NV 89155

Prepared by

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July 2005

TABLE OF CONTENTS

Description **Page**

Introduction 1

Hydrology 2

Hydraulics 3

Results 4

Conclusion 5

References 6

APPENDICES

Appendix A — FEMA Forms

-FEMA 'Overview and Concurrence Form'-MT-2 Form 1
-FEMA 'Riverine Hydrology & Hydraulics Form'- MT-2 Form 2
-FEMA 'Hydraulic Structures Form'-MT-2 Form 3
-Statement of Explanations

Appendix B — Figures

-Figure 1 Area/Vicinity Map
-Figure 2 CCRFCD Flood Control Facilities Map
-Figure 2A CCRFCD Flood Control Facilities Inventory
-Figure 3A – 3B FEMA Flood Zone Map
-Figure 4A – 4B FEMA Annotated Flood Zone Map
-Figure 5 Work Map
-Figure 6 Proposed Flood Zone Delineation Map

Appendix C — Hydraulic Models

- WSPG Hydraulic Models
- Flowmaster Worksheets

Appendix D — Plans

- Alexander Wash Improvement Plans prepared by VTN (Commerce Street to Western Tributary)
- Gleneagles Regional Facility LV05-0131

Appendix E — References

- LOMR FEMA Case #02-09-1104P, prepared by Southwest Engineering
- Ultimate Build-Out Hydrology, prepared by VTN

Appendix F — Data CD

-Electronic Hydraulic Models
-Figures

INTRODUCTION

This request for a Letter of Map Revision (LOMR) is to address recently completed channel improvements to a portion of the Alexander Wash from Commerce Street to the Western Tributary ("A" Channel). The "A" channel drains to the King Charles Diversion Channel that ultimately drains to the Las Vegas Wash. Please refer to Figure 1 Area/Vicinity Map for an overall view of the project area. Also, refer to Figure 2 and Figure 2A, Clark County Regional Flood Control District (CCRFCD) Flood Control Facilities Map and Inventory, showing the existing and proposed facilities within and adjacent to the project area.

The flood control improvements for the Alexander Wash consist of 7,675 linear feet of concrete lined rectangular open channel and reinforced concrete box culverts. The channel ranges in size (width x height) from 12' x 7' at the upstream end to 30'x 10' at the most downstream end of the existing channel improvements. The Alexander Channel improvements addressed in this report consist of the following primary components:

1. Approximately 7,765 feet of rectangular concrete lined channel (Variable height and width)
2. 30' x 4' RCB crossing with 12" center pier at Commerce Street
3. 12' x 7' RCB crossing at Goldfield Street
4. 12' x 7' RCB crossing at N. 5th Street
5. (3) 16' x 7.75' RCB crossing for commercial driveway access
6. 16' x 5.5' RCB crossing at Donna Street
7. 16' x 7' RCB crossing for commercial driveway access
8. 16' x 8.75' RCB crossing for commercial driveway access
9. 16' x 8.75' RCB crossing for commercial driveway access
10. 20' x 7' RCB crossing at Bruce Street
11. 20' x 7' RCB crossing for commercial driveway access
12. Numerous side drains (RCP stubs) for future drainage connection

As described in the VTN Design Report, the system allows for the adequate collection and conveyance of existing and future condition 100-year flows. Additional details on the Alexander Channel can be found in the design plans located in Appendix D. Note that a certification letter dated July 14, 2005 from Mr. Joemel Llamado with the City of North Las Vegas has also been provided in Appendix D. The letter certifies that the channel has been constructed in substantial conformance to the approved design plans. Also, the improvement plans for the channel associated with the Gleneagles development are included in Appendix D.

The project ties into an existing riprap lined channel at the upstream end of the study reach via a 30' x 4' reinforced box culvert passing under Commerce Street. A LOMR was prepared and submitted by Southwest Engineering in 2002 for the existing channel immediately upstream of Commerce Street. The included LOMR request provides a tie-in to the downstream end of the previously mentioned LOMR approved by FEMA, Case No. 02-09-1104P.

This LOMR request analyzes Alexander Wash channel improvements from Commerce Street to the Western Tributary and demonstrates that the revised conditions no longer warrant the flood zone delineation as shown on the current effective FIRM Panel 2160 dated September 27, 2002 revised to reflect a LOMR dated December 11, 2003 and FIRM Panel 2176 dated September 27, 2002 revised to reflect a LOMR dated September 27, 2004. Refer to Figures 3A & 3B, FEMA Floodzone Map, for the current effective FIRM Panels. Figures 4A & 4B, Annotated Post Project FEMA Floodzone Map, are revised to reflect the flood zone delineation resulting from the Alexander Channel improvements.

HYDROLOGY

The regulatory discharge in the channel for the 100-year storm is 520 cfs as established in the previously mentioned LOMR (Case No. 02-09-1104P). The regulatory discharge hydrologic reference material is provided in Appendix E.

However, it should be noted that the channel design is based on the ultimate build-out condition in which the tributary watershed is assumed fully developed. This discharge ranges from 910 cfs at the upstream end to 1,760 cfs at the confluence with the Western Tributary. The ultimate build out condition hydrology used for the channel design is included as a reference in Appendix E, VTN Ultimate Build-Out Hydrology.

Also, this LOMR represents a condition in which the new channel may not warrant the removal of the flood zone by itself. As shown on Figure 3A, the subject flood zone is located north of the existing channel. As a result of this offset, there remains flow tributary to the flood zone from the area between the channel and San Miguel. As a result, PBS&J has prepared an additional analysis to demonstrate that the remaining tributary area does not warrant the flood zone.

Therefore, using the basins and hydrology prepared by VTN, two cross-sections have been cut at the downstream end of the delineated flood zone to demonstrate that the hydraulic depth is less than one-foot. Please refer to Figure 7 for the cross-section locations and Appendix C for the Flowmaster worksheets. A summary of the reference hydrology from VTN can be found in Table 1. The 100-year flow from Subbasins 10, 11, 14, 15, 16, and 19 (382 cfs) have been used in cross-sections A and B. This represents a conservative approach as not all the flow from these basins is currently tributary to the flood zone. Please refer to Appendix E for a copy of VTN's Drainage Basin Map that shows the delineation of Subbasins 1 through 23 and their respective overall flow paths. Cross-Sections A and B are based on 2' topographic contours provided by the City of North Las Vegas and represent current conditions for these undeveloped areas (see Figure 5 Work Map for section locations).

Table 1.
VTN Subbasin Flow Summary

HEC-1 Basin	Drainage Area (acres.)	100-Yr Discharge (cfs)
1	0.06	98
2	0.06	94
3	0.03	50
4	0.03	54
5	0.04	65
6	0.01	14
7	0.01	21
8	0.01	20
9	0.05	72
10	0.01	14
11	0.01	17
12	0.05	66
13	0.05	76
14	0.07	94
15	0.04	65
16	0.10	148
17	0.05	66
18	0.23	291
19	0.06	106
20	0.25	279
21	0.06	109
22	0.06	109
23	0.06	109

HYDRAULICS

The Water Surface Pressure Gradient for Windows™ (WSPGW) modeling program, Civil Design software Version 12.99, was used to analyze the Alexander Channel reach extending from the reinforced box culvert inlet crossing Commerce Street downstream to the confluence with the Western Tributary. The above described model was prepared by VTN for the hydraulic analysis of the Alexander Channel. A second model was prepared by PBS&J using WSPG that includes a portion of the Gleneagles channel for this LOMR request.

Both hydraulic models conform to local standards specified in the CCRFCD Hydrologic Criteria and Drainage Design Manual. The models are based on the North American Vertical Datum of 1988 (NAVD88).

The downstream segment of the previously approved LOMR, Case No. 02-09-1104P, is superceded by the channel alignment shown in the improvement plans for Alexander Channel. The channel alignment upstream of the headwall inlet to the double box culvert crossing Commerce Street, HEC-RAS cross section 200 (WSPGW station 80+50.79) remains as shown in the improvement plans for the channel traversing through the Gleneagles residential development. However, as a result of this new culvert crossing at the downstream end of the approved LOMR, the WSEL's established at the downstream end by the approved LOMR are no longer valid. Therefore, the WSPG model prepared by VTN for the channel design was appended to include HEC-RAS cross-sections 300 and 400 to provide a hydraulic tie-in. Please refer to Figure 5 – Work Map that shows both plan and WSPG stationing for the Alexander Channel. Figure 5 also shows the location of the HEC-RAS cross-sections for the upstream channel.

The WSPG models are included in Appendix C. The detailed HEC-RAS output for the Gleneagles Channel associated with LOMR 02-04-1104P can be found in Appendix D. Also, the electronic input and output files can be found in Appendix F.

ALEXANDER CHANNEL RESULTS

A 54 inch reinforced concrete pipe served as the channel crossing under Commerce Street prior to construction of the Alexander Channel and is modeled as such in the previously approved LOMR, Case No. 02-09-1104P. The portion of the Alexander Channel addressed in this LOMR request is designed to convey the ultimate build-out 100-year discharge. As a result of this design criterion, the culvert was upsized from the 54 inch reinforced concrete pipe size to a 30 foot by 4 foot box culvert. The hydraulic analysis is updated in this study to reflect the new culvert crossing. The regulatory discharge of 520 cfs is contained within the channel, as is the 100-year ultimate build-out discharge.

The water surface elevation at HEC-RAS cross-section 400 (from the approved LOMR, Case No. 02-09-1104P) is 2047.63 feet. The water surface elevation established by this LOMR at the corresponding location (WSPG Station 83+98.97) is 2047.43 feet, a 0.20' decrease in WSEL.

The downstream limit of the proposed project conditions model results in a water surface elevation of 1910.95 feet. The downstream reach coincides with the confluence of Alexander Channel with the Western Tributary ("A" Channel), which coincides with WSPG station 13+75.87. Note that the WSPG model was extended further downstream into the A Channel to WSPG station 10+00.

The flow for the study reach is supercritical with no hydraulic jumps occurring. The results show that the flow is contained within the channel throughout the improvements.

Figure 6 shows that the Zone A flood zone delineation is contained within the Alexander Channel improvements.

CONCLUSION

The proposed flood zone revision for Alexander Channel within this request for a Letter of Map Revision is based on the best available data, approved improvement plans, and supporting calculations. Based on this information, we believe the flood zone revisions are warranted. Please refer to Figure 3A and Figure 3B, FEMA Flood Zone Map, and Figure 4A and Figure 4B, Annotated FEMA Flood Zone Map.

Figure 6 shows the proposed revisions to the current effective flood zone delineation. Based upon the findings of this analysis, a revision to the Zone A flood zone delineation in accordance with Figure 6 is requested.

REFERENCES

HCDDM — Clark County Regional Flood Control District, *Hydrologic Criteria and Drainage Design Manual*, 1999.

2002 MPU — Clark County Regional Flood Control District, *2002 Master Plan Update*. Prepared by PBS&J, Louis Berger and G.C. Wallace.

LOMR — Case No. 02-09-1104P, Southwest Engineering, dated December 2003.

VTN — Improvement Plans for Alexander Channel – Commerce Street to Western Tributary. Prepared by VTN, dated January 2004.

WSPGW — Water Surface Pressure Gradient for Windows™, Civil Design Version 12.99.

WSPG — Water Surface Pressure Gradient, CivilSoft (1989) Version 1.21.

Appendix A: FEMA Forms

MT-2 FORM 1

C. REVIEW FEE

Has the review fee for the appropriate request category been included? ☐ Yes Fee amount: $_____

☒ No, Attach Explanation

Please see the FEMA Web site at http://www.fema.gov/fhm/frm_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: Brian K. Loffman	Company: PBS&J	
Mailing Address: 2270 Corporate Circle Drive Suite 100 Henderson, NV 89074-7755	Daytime Telephone No.: 702-263-7275	Fax No.: 702-263-7200
	E-Mail Address: bloffman@pbsj.com	
Signature of Requester (required):		Date: 7/18/05

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, PE, Manager, Development & Flood Control		Telephone No.: 702-633-1223
Community Name: City of North Las Vegas	Community Official's Signature (required):	Date: 7/18/05

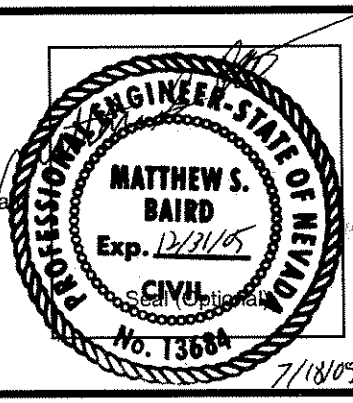
CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

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. 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.

Certifier's Name: Matthew S. Baird	License No.: NV 13684	Expiration Date: 12/31/06
Company Name: PBS&J	Telephone No.: 702-263-7275	Fax No.: 702-263-7200
Signature:		Date: 7/18/05

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 da
☐ 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)

FEDERAL EMERGENCY MANAGEMENT AGENCY

OVERVIEW & CONCURRENCE FORM

O.M.B No. 3067-0148
Expires September 30, 2005

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, Federal Emergency Management Agency, 500 C Street, SW, Washington DC 20472, Paperwork Reduction Project (3067-0148). 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 FEMA

This request is for a (check one):

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

☒ LOMR: A letter from FEMA officially revising the current NFIP map to show the changes to floodplains, regulatory floodway or flood elevations. (See Parts 60 & 65 of the NFIP Regulations.)

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	City of Katy	TX	480301	0005D	02/08/83
480287	Harris County	TX	48201C	0220G	09/28/90
320007	City of North Las Vegas	NV	32003C	2160D	09/27/02
007	City of North Las Vegas	NV	32003C	2176D	09/27/02

2. Flooding Source: Alexander Channel - Tributary to the Western Tributary ("A" Channel

3. Project Name/Identifier: Alexander Channel- Commerce Street to the Western Tributary

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 ☐ 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 types of flooding and structures (check all that apply)

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

MT-2 FORM 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE HYDROLOGY & HYDRAULICS FORM

O.M.B No. 3067-0148
Expires September 30, 2005

PAPERWORK REDUCTION ACT

Public reporting burden for this form is estimated to average 3 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, Federal Emergency Management Agency, 500 C Street, SW, Washington DC 20472, Paperwork Reduction Project (3067-0148). 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: Alexander Channel
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 2) ☒ 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.)	FIS (cfs)	Revised (cfs)
Alexander Wash	1.41	n/a	910 to 1,761

Methodology for New Hydrologic Analysis (check all that apply)

☐ Statistical Analysis of Gage Records ☒ Precipitation/Runoff Model HEC-1 [TR-20, HEC-1, HEC-HMS etc.]
☐ Regional Regression Equations ☐ Other (please attach description)

Please enclose all relevant models in digital format, maps, computations (including computation of parameters) and documentation to support the new analysis. The document, "Numerical Models Accepted by FEMA for NFIP Usage" lists the models accepted by FEMA. This document can be found at: http://www.fema.gov/fhm/en_modl.shtm.

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	Water-Surface Elevations (ft.) Proposed/Revised
Downstream Limit	Confluence with Western Tributary	WSPG Sta 1375.87	N/A	1910.95
Upstream Limit	Tie-in to Gleneagles Channel	WSPG Sta 8398.97	2047.63	2047.43

Hydraulic Method Used

Hydraulic Analysis WSPGW-Civil Design V 12.99; HEC-RAS V 3.1.1 [HEC-2 , HEC-RAS, Other (Attach description)]

B. HYDRAULICS (CONTINUED)

3. Pre-Submittal Review of Hydraulic Models

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 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/fhm/frm_soft.shtm. We recommend that you review your HEC-2 and HEC-RAS models with CHECK-2 and CHECK-RAS. If you disagree with a message, please attach an explanation of why the message is not valid in this case. Review of your submittal and resolution of valid modeling discrepancies will result in reduced review time.

HEC-2/HEC-RAS models reviewed with CHECK-2/CHECK-RAS? ☐ Yes ☒ No

4. Models Submitted

Duplicate Effective Model*	Natural File Name:		Floodway File Name: N/A
Corrected Effective Model*	Natural File Name:		Floodway File Name: N/A
Existing or Pre-Project Conditions Model	Natural File Name:		Floodway File Name: N/A
Revised or Post-Project Conditions Model	Natural File Name:	alex.dat,alex.prj	Floodway File Name: N/A
Other - (attach description)	Natural File Name:		Floodway File Name:

*Not required for revisions to approximate 1%-annual-chance floodplains (Zone A) – for details, refer to the corresponding section of the instructions.

The document "Numerical Models Accepted by FEMA for NFIP Usage" lists the models accepted by FEMA. This document can be found at: http://www.fema.gov/fhm/en_modl.shtm.

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.).

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.

D. COMMON REGULATORY REQUIREMENTS

1. For CLOMR requests, do Base Flood Elevations (BFEs) increase? ☐ Yes ☐ No

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 BFEs established and would result in increases above 1.00 foot.

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 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.

STATEMENT OF EXPLANATIONS

- MT-2 FORM –1

  C: Clark County Regional Flood Control District will submit fee upon receiving an invoice from FEMA.

- MT-2 FORM –2

  A: Sediment transport was not considered as the upstream watershed is predominantly developed.

MT-2 FORM 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE STRUCTURES FORM

O.M.B. No. 3067-0148
Expires September 30, 2005

PAPERWORK REDUCTION ACT

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Flooding Source: Alexander Channel
Note: Fill out one form for each flooding source studied

A. GENERAL

Complete the appropriate section(s) for each Structure listed below:

Channelization .....complete Section B
Bridge/Culvert .....complete Section C
Dam .....complete Section D
Levee/Floodwall .....complete Section E
Sediment Transport.....complete Section F (if required)

Description Of Structure

1. **Name of Structure: Alexander Channel**

   Type (check one): ☒ Channelization ☐ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

   Location of Structure: Commerce Street to confluence with Western Tributary - "A" Channel

   Downstream Limit/Cross Section: Sta 76+75.92

   Upstream Limit/Cross Section: Sta 12+21.19

2. **Name of Structure: 30' x 4' Reinforced Concrete Box Culvert with 12" Center Pier**

   Type (check one): ☐ Channelization ☒ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

   Location of Structure: Commerce Street

   Downstream Limit/Cross Section: Plan Sta 12+21.19

   Upstream Limit/Cross Section: Plan Sta 10+00

3. **Name of Structure: 12' x 7' Reinforced Concrete Box Culvert**

   Type (check one) ☐ Channelization ☒ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

   Location of Structure: Goldfield Street

   Downstream Limit/Cross Section: Plan Sta 25+60

   Upstream Limit/Cross Section: Plan Sta 24+45

NOTE: For more structures, attach additional pages as needed.

FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE STRUCTURES FORM

O.M.B. No. 3067-0148
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Flooding Source: Alexander Channel
Note: Fill out one form for each flooding source studied

A. GENERAL

Complete the appropriate section(s) for each Structure listed below:

Channelization .....complete Section B
Bridge/Culvert .....complete Section C
Dam .....complete Section D
Levee/Floodwall .....complete Section E
Sediment Transport.....complete Section F (if required)

Description Of Structure

A.4 **Name of Structure: 12' x 7' Reinforced Concrete Box Culvert**

Type (check one): ☐ Channelization ☒ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

Location of Structure: N. 5th Street

Downstream Limit/Cross Section: Plan Sta 42+50

Upstream Limit/Cross Section: Plan Sta 37+95

A.5 **Name of Structure: 16' x 7.75' Reinforced Concrete Box Culvert**

Type (check one): ☐ Channelization ☒ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

Location of Structure: Between N. 5th Street and Donna Street

Downstream Limit/Cross Section: Plan Sta 45+49

Upstream Limit/Cross Section: Plan Sta 45+03

A.6 **Name of Structure: 16' x 7.75' Reinforced Concrete Box Culvert**

Type (check one) ☐ Channelization ☒ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

Location of Structure: Between N. 5th Street and Donna Street

Downstream Limit/Cross Section: Plan Sta 46+81.50

Upstream Limit/Cross Section: Plan Sta 46+35.50

NOTE: For more structures, attach additional pages as needed.

FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE STRUCTURES FORM

O.M.B. No. 3067-0148
Expires September 30, 2005

PAPERWORK REDUCTION ACT

Public reporting burden for this form is estimated to average 7 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, Federal Emergency Management Agency, 500 C Street, SW, Washington DC 20472, Paperwork Reduction Project (3067-0148). 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: Alexander Channel
Note: Fill out one form for each flooding source studied

A. GENERAL

Complete the appropriate section(s) for each Structure listed below:

Channelization .....complete Section B
Bridge/Culvert .....complete Section C
Dam .....complete Section D
Levee/Floodwall .....complete Section E
Sediment Transport.....complete Section F (if required)

Description Of Structure

1. **Name of Structure:**

Type (check one): ☐ Channelization ☐ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

Location of Structure:

Downstream Limit/Cross Section:

Upstream Limit/Cross Section:

2. 7 **Name of Structure: 16' x 7.75' Reinforced Concrete Box Culvert**

Type (check one): ☐ Channelization ☒ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

Location of Structure: Between N. 5th Street and Donna Street

Downstream Limit/Cross Section: Plan Sta 53+90

Upstream Limit/Cross Section: Plan Sta 50+53

2. 8 **Name of Structure: 16' x 5.5' Reinforced Concrete Box Culvert**

Type (check one) ☐ Channelization ☒ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

Location of Structure: Donna Street

Downstream Limit/Cross Section: Plan Sta 55+01.66

Upstream Limit/Cross Section: Plan Sta 53+90

NOTE: For more structures, attach additional pages as needed.

FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE STRUCTURES FORM

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Flooding Source: Alexander Channel
Note: Fill out one form for each flooding source studied

A. GENERAL

Complete the appropriate section(s) for each Structure listed below:

Channelization .....complete Section B
Bridge/Culvert .....complete Section C
Dam .....complete Section D
Levee/Floodwall .....complete Section E
Sediment Transport.....complete Section F (if required)

Description Of Structure

X 9 **Name of Structure: 16' x 7' Reinforced Concrete Box Culvert**

Type (check one): ☐ Channelization ☒ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

Location of Structure: Approxiamtely 265 feet downstream of Donna Street

Downstream Limit/Cross Section: Plan Sta 61+35

Upstream Limit/Cross Section: Plan Sta 57+65

X 10 **Name of Structure: 16' x 8.75' Reinforced Concrete Box Culvert**

Type (check one): ☐ Channelization ☒ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

Location of Structure: Approxiamtely 800 feet downstream of Donna Street

Downstream Limit/Cross Section: Plan Sta 63+38

Upstream Limit/Cross Section: Plan Sta 62+92

X 11 **Name of Structure: 16' x 8.75' Reinforced Concrete Box Culvert**

Type (check one) ☐ Channelization ☒ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

Location of Structure: Approxiamtely 1000 feet downstream of Donna Street

Downstream Limit/Cross Section: Plan Sta 65+28

Upstream Limit/Cross Section: Plan Sta 64+82

NOTE: For more structures, attach additional pages as needed.

FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE STRUCTURES FORM

O.M.B. No. 3067-0148
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Flooding Source: Alexander Channel
Note: Fill out one form for each flooding source studied

A. GENERAL

Complete the appropriate section(s) for each Structure listed below:

Channelization .....complete Section B
Bridge/Culvert .....complete Section C
Dam .....complete Section D
Levee/Floodwall .....complete Section E
Sediment Transport.....complete Section F (if required)

Description Of Structure

1. 12 **Name of Structure: 20' x 7' Reinforced Concrete Box Culvert**

Type (check one): ☐ Channelization ☒ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

Location of Structure: Bruce Street

Downstream Limit/Cross Section: Plan Sta 68+41

Upstream Limit/Cross Section: Plan Sta 67+10

2. 13 **Name of Structure: 20' x 7' Reinforced Concrete Box Culvert**

Type (check one): ☐ Channelization ☒ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

Location of Structure: Approxiamtely 700 feet downstream of Bruce Street

Downstream Limit/Cross Section: Plan Sta 75+96.18

Upstream Limit/Cross Section: Plan Sta 74+85.53

3. **Name of Structure:**

Type (check one) ☐ Channelization ☐ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

Location of Structure:

Downstream Limit/Cross Section:

Upstream Limit/Cross Section:

NOTE: For more structures, attach additional pages as needed.

B. CHANNELIZATION

Flooding Source: Alexander Wash

Name of Structure: Alexander Channel

1. Accessory Structures

The channelization includes (check one):

- ☐ Levees [Attach Section E (Levee/Floodwall)]
- ☐ Superelevated sections
- ☐ Debris basin/detention basin
- ☒ Other (Describe): Concrete Lined Channel
- ☐ Drop structures
- ☒ Transitions in cross sectional geometry
- ☐ Energy dissipator

2. Drawing Checklist

Attach the plans of the channelization certified by a registered professional engineer, as described in the instructions.

3. Hydraulic Considerations

The channel was designed to carry 1760 (cfs) and/or the 100-year flood.

The design elevation in the channel is based on (check one):

☐ Subcritical flow ☐ Critical flow ☒ Supercritical flow ☐ Energy grade line

If there is the potential for a hydraulic jump at the following locations, check all that apply and attach an explanation of how the hydraulic jump is controlled without affecting the stability of the channel.

☐ Inlet to channel ☐ Outlet of channel ☐ At Drop Structures ☐ At Transitions
☐ Other locations (specify):

4. Sediment Transport Considerations

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

C. BRIDGE/CULVERT

Flooding Source: Alexander Wash

Name of Structure: Alexander Channel

1. This revision reflects (check one):

- ☒ New bridge/culvert not modeled in the FIS
- ☐ Modified bridge/culvert previously modeled in the FIS
- ☐ New analysis of bridge/culvert previously modeled in the FIS

2. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8): WSPGW, Civil Design V 12.99
If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structures. Attach justification.

3. Attach plans of the structures certified by a registered professional engineer. The plan detail and information should include the following (check the information that has been provided):

- ☒ Dimensions (height, width, span, radius, length)
- ☒ Shape (culverts only)
- ☒ Material
- ☐ Beveling or Rounding
- ☐ Wing Wall Angle
- ☐ Skew Angle
- ☒ Distances Between Cross Sections
- ☐ Erosion Protection
- ☐ Low Chord Elevations – Upstream and Downstream
- ☐ Top of Road Elevations – Upstream and Downstream
- ☒ Structure Invert Elevations – Upstream and Downstream
- ☐ Stream Invert Elevations – Upstream and Downstream
- ☒ Cross-Section Locations

4. Sediment Transport Considerations

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

D. DAM

Flooding Source:

Name of Structure:

1. This request is for (check one): ☐ Existing dam ☐ New dam ☐ Modification of existing dam

2. The dam was designed by (check one): ☐ Federal agency ☐ State agency ☐ Local government agency

   ☐ Private organization Name of the agency or organization:

3. Does the project involve revised hydrology? ☐ Yes ☐ No

   If Yes, complete the Riverine Hydrology & Hydraulics Form (Form 2).

4. Does the submittal include debris/sediment yield analysis? ☐ Yes ☐ No

   If yes, then fill out Section F (Sediment Transport).
   If No, then attach your explanation for why debris/sediment analysis was not considered.

5. Does the Base Flood Elevation behind the dam or downstream of the dam change?

   ☐ Yes ☐ No If Yes, complete the Riverine Hydrology & Hydraulics Form (Form 2) and complete the table below.

Stillwater Elevation Behind the Dam

FREQUENCY (% annual chance)	FIS	REVISED
10-year (10%)		
50-year (2%)		
100-year (1%)		
500-year (0.2%)		
Normal Pool Elevation		

6. Please attach a copy of the formal Operation and Maintenance Plan

E. LEVEE/FLOODWALL

1. System Elements

a. This Levee/Floodwall analysis is based on (check one):

☐ upgrading of an existing levee/floodwall system
☐ a newly constructed levee/floodwall system
☐ reanalysis of an existing levee/floodwall system

b. Levee elements and locations are (check one):

☐ earthen embankment, dike, berm, etc.	Station	to
☐ structural floodwall	Station	to
☐ Other (describe):	Station	to

c. Structural Type (check one):

☐ monolithic cast-in place reinforced concrete
☐ reinforced concrete masonry block
☐ sheet piling
☐ Other (describe):

d. Has this levee/floodwall system been certified by a Federal agency to provide protection from the base flood?

☐ Yes ☐ No

If Yes, by which agency?

e. Attach certified drawings containing the following information (indicate drawing sheet numbers):

1. Plan of the levee embankment and floodwall structures. Sheet Numbers:
2. A profile of the levee/floodwall system showing the Base Flood Elevation (BFE), levee and/or wall crest and foundation, and closure locations for the total levee system. Sheet Numbers:
3. A profile of the BFE, closure opening outlet and inlet invert elevations, type and size of opening, and kind of closure. Sheet Numbers:
4. A layout detail for the embankment protection measures. Sheet Numbers:
5. Location, layout, and size and shape of the levee embankment features, foundation treatment, floodwall structure, closure structures, and pump stations. Sheet Numbers:

2. Freeboard

a. The minimum freeboard provided above the BFE is:

Riverine

3.0 feet or more at the downstream end and throughout	☐ Yes	☐ No
3.5 feet or more at the upstream end	☐ Yes	☐ No
4.0 feet within 100 feet upstream of all structures and/or constrictions	☐ Yes	☐ No

Coastal

1.0 foot above the height of the one percent wave associated with the 1%-annual-chance stillwater surge elevation or maximum wave runup (whichever is greater).	☐ Yes	☐ No
2.0 feet above the 1%-annual-chance stillwater surge elevation	☐ Yes	☐ No

2. Freeboard (continued)

Please note, occasionally exceptions are made to the minimum freeboard requirement. If an exception is requested, attach documentation addressing Paragraph 65.10(b)(1)(ii) of the NFIP Regulations.

If No is answered to any of the above, please attach an explanation.

b. Is there an indication from historical records that ice-jamming can affect the BFE? ☐ Yes ☐ No

If Yes, provide ice-jam analysis profile and evidence that the minimum freeboard discussed above still exists.

3. Closures

a. Openings through the levee system (check one): ☐ exists ☐ does not exist

If opening exists, list all closures:

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

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

Note: Geotechnical and geologic data

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

4. Embankment Protection

a. The maximum levee slope landside is:

b. The maximum levee slope floodside is:

c. The range of velocities along the levee during the base flood is: (min.) to (max.)

d. Embankment material is protected by (describe what kind):

e. Riprap Design Parameters (check one): ☐ Velocity ☐ Tractive stress
Attach references

Reach	Sideslope	Flow Depth	Velocity	Curve or Straight	Stone Riprap			Depth of Toedown
					D_{100}	D_{50}	Thickness	
Sta to								
Sta to								
Sta to								
Sta to								
Sta to								
Sta to								

(Extend table on an added sheet as needed and reference each entry)

4. Embankment Protection (continued)

f. Is a bedding/filter analysis and design attached? ☐ Yes ☐ No

g. Describe the analysis used for other kinds of protection used (include copies of the design analysis):

Attach engineering analysis to support construction plans.

5. Embankment And Foundation Stability

a. Identify locations and describe the basis for selection of critical location for analysis:

☐ Overall height: Sta. ; height ft.

☐ Limiting foundation soil strength:

Sta. , depth to

strength ϕ = degrees, c = psf

slope: SS = (h) to (v)

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

b. Specify the embankment stability analysis methodology used (e.g., circular arc, sliding block, infinite slope, etc.):

c. Summary of stability analysis results:

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

(Reference: USACE EM-1110-2-1913 Table 6-1)

d. Was a seepage analysis for the embankment performed? ☐ Yes ☐ No

If Yes, describe methodology used:

e. Was a seepage analysis for the foundation performed? ☐ Yes ☐ No

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

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

h. The duration of the base flood hydrograph against the embankment is hours.

Attach engineering analysis to support construction plans.

E. LEVEE/FLOODWALL (CONTINUED)

6. Floodwall And Foundation Stability

a. Describe analysis submittal based on Code (check one):

☐ UBC (1988) or ☐ Other (specify):

b. Stability analysis submitted provides for:

☐ Overturning ☐ Sliding If not, explain:

c. Loading included in the analyses were:

☐ Lateral earth @ P_A = psf; P_p = psf

☐ Surcharge-Slope @ , ☐ surface psf

☐ Wind @ P_w = psf

☐ Seepage (Uplift); ☐ Earthquake @ P_{eq} = %g

☐ 1%-annual-chance significant wave height: ft.

☐ 1%-annual-chance significant wave period: sec.

d. Summary of Stability Analysis Results: Factors of Safety.

Itemize for each range in site layout dimension and loading condition limitation for each respective reach.

Loading Condition	Criteria (Min)		Sta	To	Sta	To
	Overturn	Sliding	Overturn	Sliding	Overturn	Sliding
Dead & Wind	1.5	1.5				
Dead & Soil	1.5	1.5				
Dead, Soil, Flood, & Impact	1.5	1.5				
Dead, Soil, & Seismic	1.3	1.3				

(Ref: FEMA 114 Sept 1986; USACE EM 1110-2-2502)

(Note: Extend table on an added sheet as needed and reference)

e. Foundation bearing strength for each soil type:

Bearing Pressure	Sustained Load (psf)	Short Term Load (psf)
Computed design maximum		
Maximum allowable		

f. Foundation scour protection ☐ is, ☐ is not provided. If provided, attach explanation and supporting documentation:

Attach engineering analysis to support construction plans.

E. LEVEE/FLOODWALL (CONTINUED)

7. Settlement

a. Has anticipated potential settlement been determined and incorporated into the specified construction elevations to maintain the established freeboard margin? ☐ Yes ☐ No

b. The computed range of settlement is ft. to ft.

c. Settlement of the levee crest is determined to be primarily from :

☐ Foundation consolidation
☐ Embankment compression
☐ Other (Describe):

d. Differential settlement of floodwalls ☐ has ☐ has not been accommodated in the structural design and construction.

Attach engineering analysis to support construction plans.

8. Interior Drainage

a. Specify size of each interior watershed:

Draining to pressure conduit: acres
Draining to ponding area: acres

b. Relationships Established

Ponding elevation vs. storage	☐ Yes	☐ No
Ponding elevation vs. gravity flow	☐ Yes	☐ No
Differential head vs. gravity flow	☐ Yes	☐ No

c. The river flow duration curve is enclosed: ☐ Yes ☐ No

d. Specify the discharge capacity of the head pressure conduit: cfs

e. Which flooding conditions were analyzed?

• Gravity flow (Interior Watershed)	☐ Yes	☐ No
• Common storm (River Watershed)	☐ Yes	☐ No
• Historical ponding probability	☐ Yes	☐ No
• Coastal wave overtopping	☐ Yes	☐ No

If No for any of the above, attach explanation.

f. Interior drainage has been analyzed based on joint probability of interior and exterior flooding and the capacities of pumping and outlet facilities to provide the established level of flood protection. ☐ Yes ☐ No

If No, attach explanation.

g. The rate of seepage through the levee system for the base flood is cfs

h. The length of levee system used to drive this seepage rate in item g: ft.

8. Interior Drainage (continued)

i. Will pumping plants be used for interior drainage? ☐ Yes ☐ No

If Yes, include the number of pumping plants:
For each pumping plant, list:

	Plant #1	Plant #2
The number of pumps		
The ponding storage capacity		
The maximum pumping rate		
The maximum pumping head		
The pumping starting elevation		
The pumping stopping elevation		
Is the discharge facility protected?		
Is there a flood warning plan?		
How much time is available between warning and flooding?		

Will the operation be automatic? ☐ Yes ☐ No

If the pumps are electric, are there backup power sources? ☐ Yes ☐ No

(Reference: USACE EM-1110-2-3101, 3102, 3103, 3104, and 3105)

Include a copy of supporting documentation of data and analysis. Provide a map showing the flooded area and maximum ponding elevations for all interior watersheds that result in flooding.

9. Other Design Criteria

a. The following items have been addressed as stated:

Liquefaction ☐ is ☐ is not a problem
Hydrocompaction ☐ is ☐ is not a problem
Heave differential movement due to soils of high shrink/swell ☐ is ☐ is not a problem

b. For each of these problems, state the basic facts and corrective action taken:

Attach supporting documentation

c. If the levee/floodwall is new or enlarged, will the structure adversely impact flood levels and/or flow velocities floodside of the structure?
☐ Yes ☐ No

Attach supporting documentation

d. Sediment Transport Considerations:

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

E. LEVEE/FLOODWALL (CONTINUED)

10. Operational Plan And Criteria

a. Are the planned/installed works in full compliance with Part 65.10 of the NFIP Regulations? ☐ Yes ☐ No

b. Does the operation plan incorporate all the provisions for closure devices as required in Paragraph 65.10(c)(1) of the NFIP regulations?
☐ Yes ☐ No

c. Does the operation plan incorporate all the provisions for interior drainage as required in Paragraph 65.10(c)(2) of the NFIP regulations?
☐ Yes ☐ No

If the answer is No to any of the above, please attach supporting documentation.

11. Maintenance Plan

a. Are the planned/installed works in full compliance with Part 65.10 of the NFIP Regulations? ☐ Yes ☐ No
If No, please attach supporting documentation.

12. Operations and Maintenance Plan

Please attach a copy of the formal Operations and Maintenance Plan for the levee/floodwall.

F. SEDIMENT TRANSPORT

Flooding Source:

Name of Structure:

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the Base Flood Elevation (BFE); and/or based on the stream morphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including scour and deposition) to affect the BFEs, then provide the following information along with the supporting documentation:

Sediment load associated with the base flood discharge: Volume acre-feet

Debris load associated with the base flood discharge: Volume acre-feet

Sediment transport rate (percent concentration by volume)

Method used to estimate sediment transport:

Most sediment transport formulas are intended for a range of hydraulic conditions and sediment sizes; attach a detailed explanation for using the selected method.

Method used to estimate scour and/or deposition:

Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport:
Please note that bulked flows are used to evaluate the performance of a structure during the base flood; however, FEMA does not map BFEs based on bulked flows.

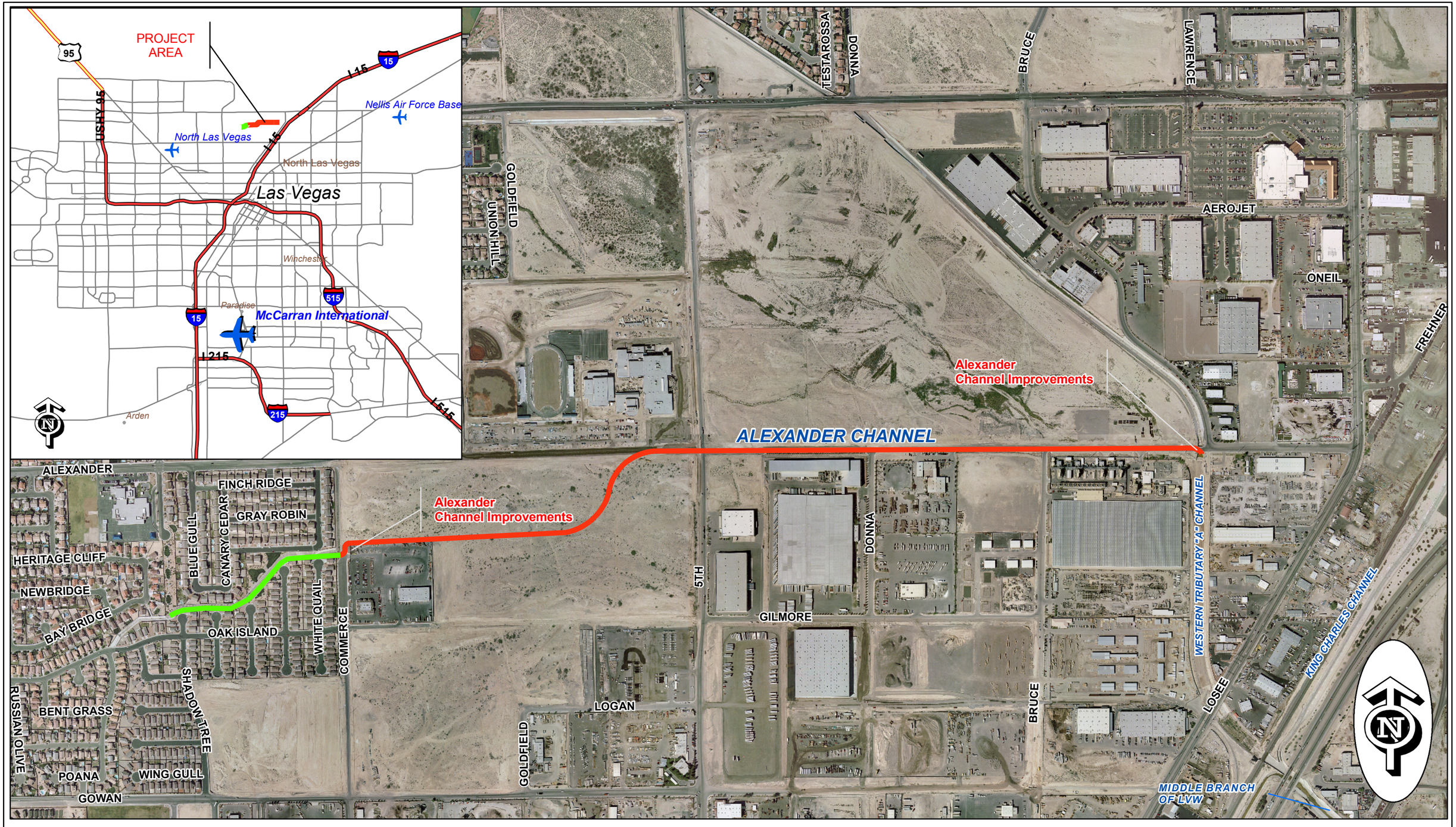
If a sediment analysis has not been performed, an explanation as to why sediment transport (including scour and deposition) will not affect the BFEs or structures must be provided.

STATEMENT OF EXPLANATIONS

- MT-2 FORM-3

  B-4 & C-4: Sediment transport was not considered since the watershed is largely developed, the flow is supercritical and any sediment entering the system would be transported downstream.

Appendix B: Figures



GRAPHIC SCALE

700 350 0 700 1,400 2,100

(In Feet)

1 inch = 700 ft.

FIGURE 1: VICINITY MAP

Alexander Channel Improvements LOMR

Alexander Channel Per VTN Plans

Alexander Channel Per Southwest Engineering Plans

PBS&J
2270 Corporate Circle
Suite 100
Henderson, Nevada 89074
Tele: 702-263-7275
Fax: 702-263-7200
ENGINEERING - PLANNING - SURVEYING - CONSTRUCTION SERVICES

FIGURE 1

Z:\Projects\IS\Nevada\CLOMR\AlexandarWash\mxd\Figure1.mxd 03/29/05

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT

2002 LAS VEGAS VALLEY FLOOD CONTROL MASTER PLAN UPDATE

LEGEND

- Ultimate Development Boundary
- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities
- Local Existing Facilities
- Local Proposed Facilities
- Detention Basin
- Culvert
- Bridge
- Pipeline
- Lined Channel
- Unlined Channel
- Dike
- Natural Wash
- ID-Mile Separator

N
W E
S

0 1,000 2,000 3,000 4,000 5,000
Feet

SCALE: 1 inch = 3000 feet

US95 I-15 I-215

1	2			
3	4	5	6	
7	8	9	10	
11	12	13	14	
15	16	17	18	
19	20	21	22	
23	24	25	26	
27	28	29		

FLOOD CONTROL FACILITIES

PBS&J

G. C. WALLACE, INC.

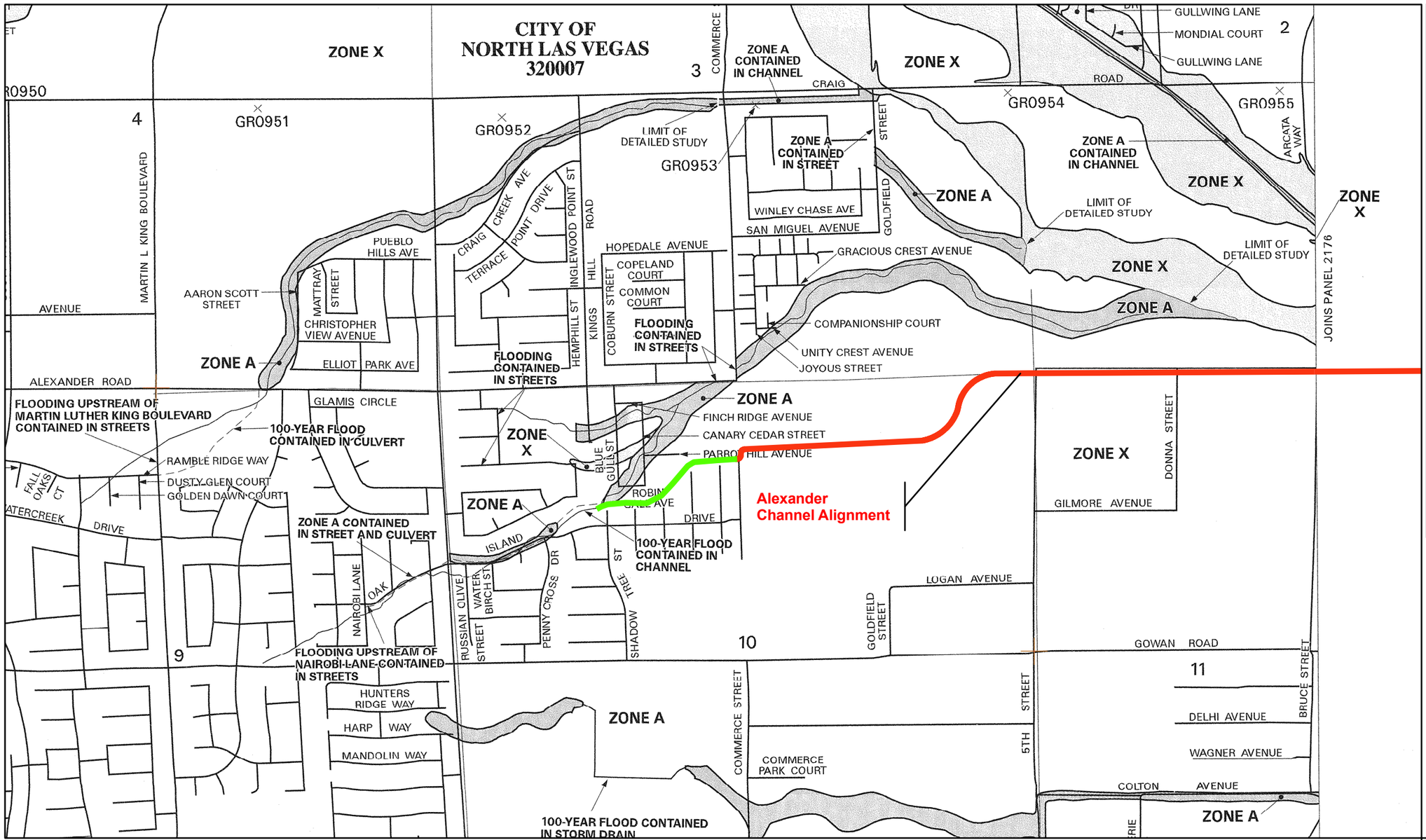
FIGURE 2

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**						
0000	P1	8' X 6' RCB	4600	635	CNN142-C	CWEST3	1.07	0.97
CNEA		**CENTENNIAL PKWY CHANNEL EAST**						
0000	P3	4: 12' X 6' RCB	4000	1973	CNN138-C	CWEST3	2.44	0.20
0076	P3	2: 10' X 6' RCB	2707	1230	CNN093-C	CWEST3	1.45	0.55
0123	P3	Conc Chnl 15'W 6.5'D 0:1 SS	2550	1230	CNN093-C	CWEST3	1.45	1.04
0175	P3	15' X 6' RCBC @ Revere	115	948	CNN078-C	CWEST3	1.13	1.04
0176	P3	Conc Chnl 15'W 6.5'D 0:1 SS	1500	948	CNN078-C	CWEST3	1.13	0.86
GOOF		**GOWAN OUTFALL FACILITIES**						
0000	E	Conc Chnl 20'W 7'D 2:1 SS	2500	5252	CPT-2B-3	GW5SC	14.5	1.25
0040	E	Conc Chnl 20'W 7'D 2:1 SS	1900	5024	CPT2C-1*	GW4SC	11.61	0.60
0074	E	2: 16' X 7' RCBC @ Camino al Norte	131	5024	CPT2C-1*	GW4SC	11.61	1.30
0077	E	Conc Chnl 20'W 7'D 2:1 SS	3157	5024	CPT2C-1*	GW4SC	11.61	1.40
KCNC		**KING CHARLES - N CHANNEL**						
0000	E	Conc Chnl 13'W 8.3'D 0:1 SS	69	892	N	CWEST5	13.71	0.70
0001	E	Conc Chnl 16.5'W 6'D 0:1 SS	67	892	N	CWEST5	13.71	0.70
0003	E	Conc Chnl 10'W 7'D 2:1 SS	800	892	N	CWEST5	13.71	0.70
LV05		**TRIBUTARY TO WESTERN TRIBUTARY AT ALEXANDER RD**						
0000	E	Conc Chnl 30'W 10'D 0:1 SS	400	1310	CLV99B-6	CWEST3	1.43	0.47
0008	E	20' X 7' RCBC	100	1310	CLV99B-6	CWEST3	1.43	0.47
0009	E	Conc Chnl 20'W 11'D 0:1 SS	800	1310	CLV99B-6	CWEST3	1.43	0.47
0023	E	20' X 7' RCBC @ Bruce	125	1310	CLV99B-6	CWEST3	1.43	0.47
0025	E	Conc Chnl 16'W 10'D 0:1 SS	600	1310	CLV99B-6	CWEST3	1.43	0.78
0036	E	16' X 7' RCBC	300	1310	CLV99B-6	CWEST3	1.43	0.78
0042	E	Conc Chnl 16'W 10'D 0:1 SS	300	1310	CLV99B-6	CWEST3	1.43	0.78
0048	E	16' X 5.5' RCBC @ Donna	110	1072	CLV99B-4	CWEST3	1.17	1.20
0051	E	Conc Chnl 16'W 9'D 0:1 SS	1300	1072	CLV99B-4	CWEST3	1.17	1.20
0066	E	12' X 7' RCBC @ N. 5th Street	135	1072	CLV99B-4	CWEST3	1.17	1.20
0067	E	Conc Chnl 12'W 7'D 0:1 SS	2825	1072	CLV99B-4	CWEST3	1.17	1.80
0130	E	2: 14.5' X 4' RCBC @ Commerce	220	646	CLV99B-3	CWEST3	0.64	1.70
0131	E	Conc Chnl 28'W 3'D 3:1 SS	1300	646	CLV99B-3	CWEST3	0.64	0.76
LV06		**TRIBUTARY TO WESTERN TRIBUTARY AT CRAIG RD**						
0000	E	2: 9' X 6' RCB	1450	1259	CLV99A-4	CWEST3	1.73	1.00
0015	E	Conc Chnl 12'W 6'D 2:1 SS	1400	1259	CLV99A-4	CWEST3	1.73	0.71
0024	E	2: 10' X 6' RCBC	140	1259	CLV99A-4	CWEST3	1.73	2.36
0025	E	Conc Chnl 8'W 4.5'D 2:1 SS	1320	1123	CLV99A-3	CWEST3	1.31	1.54
0050	E	2: 8' X 6' RCB	729	1123	CLV99A-3	CWEST3	1.31	1.20
0063	E	2: 7' X 6' RCB	631	1123	CLV99A-3	CWEST3	1.31	1.17
0075	E	Conc Chnl 12'W 6'D 0:1 SS	1593	1123	CLV99A-3	CWEST3	1.31	0.74
0105	E	2: 8' X 6' RCBC @ Revere	105	1123	CLV99A-3	CWEST3	1.31	1.71
0107	E	Conc Chnl 12'W 6'D 2:1 SS	2600	1123	CLV99A-3	CWEST3	1.31	0.54
0147	E	12' X 6' RCBC @ Alexander	150	644	CLV99A-2	CWEST3	0.74	1.16
LV15		**FREEWAY CHANNEL**						
0000	E	Conc Chnl 20'W 10'D 1:1 SS	1800	5053	2CLV1E-3	CWEST4	11.31	0.18
0032	E	Conc Chnl 20'W 10'D 1:1 SS	200	4669	2CLV1D-5	CWEST4	10.41	0.18
0038	E	2: 15' X 12' RCB	2200	4669	2CLV1D-5	CWEST4	10.41	0.18
0059	E	Conc Chnl 20'W 10'D 1:1 SS	1600	4669	2CLV1D-5	CWEST4	10.41	0.18
0080	E	Conc Chnl 20'W 10'D 1:1 SS	4100	4346	CLV1D-4	CWEST4	9.61	0.18
0190	E	Conc Chnl 20'W 10'D 1:1 SS with Drop Structures	100	4185	CW1C2	NW4SC	9.04	0.18
0191	E	Conc Chnl 20'W 10'D 1:1 SS with Drop Structures	100	4185	CW1C2	NW4SC	9.04	0.18
0193	E	Conc Chnl 20'W 10'D 1:1 SS with Drop Structures	1300	4185	CW1C2	NW4SC	9.04	0.18
LV5C		**5TH STREET COLLECTOR**						
0000	P1	8' X 7' RCB	3900	726	CNN109-C	CWEST3	0.73	0.82
LVBR		**LAS VEGAS - BROOK**						
0000	P1	Conc Chnl 12'W 4.5'D 2:1 SS	700	994	CLV1D-5	CWEST3	0.8	2.90
0011	P1	8' X 7' RCBC @ N. 5th St.	100	994	CLV1D-5	CWEST3	0.8	2.90
0013	E	Conc Chnl 12'W 4.5'D 2:1 SS	850	994	CLV1D-5	CWEST3	0.8	2.60
0014	P1	8' X 7' RCBC @ Losee	100	994	CLV1D-5	CWEST3	0.8	2.60
0026	P1	Conc Chnl 12'W 4.5'D 2:1 SS	850	994	CLV1D-5	CWEST3	0.8	4.30
LVCL		**LAS VEGAS WASH - COLTON**						
0000	P1	108" RCP	3600	1078	CLV1E-3	CWEST3	0.9	1.50
0068	P1	96 RCP	2400	851	CLV1E-2	CWEST3	0.71	1.70
LVKC		**LAS VEGAS WASH - KING CHARLES CHANNEL**						
0000	E	Conc Chnl 35'W 10'D 0:1 SS	494	5158	CNN170-C*	CWEST4	11.48	0.40
0009	E	Conc Chnl 21.8'W 10'D 1.5:1 SS	3280	5158	CNN170-C*	CWEST4	11.48	0.40
0071	E	Conc Chnl 28'W 10.5'D 1.5:1 SS	341	5158	CNN170-C*	CWEST4	11.48	0.40
0078	E	Conc Chnl 52.6'W 8.6'D 0:1 SS	70	5158	CNN170-C*	CWEST4	11.48	0.40
0079	E	4 Span Bridge 52.6'W 9.5'D	61	5158	CNN170-C*	CWEST4	11.48	0.40
0080	E	Conc Chnl 15'W 10.5'D 2:1 SS	860	5158	CNN170-C*	CWEST4	11.48	0.40
0097	E	Conc Chnl 35'W 11'D 0:1 SS	747	5158	CNN170-C*	CWEST4	11.48	0.40

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
LVLO		**LAS VEGAS WASH - LOSEE**						
0000	P1	96" RCP	2600	345	NN174-C	CWEST3	0.33	0.38
LVLV		**LAS VEGAS BLVD DRAIN**						
0000	P1	2: 10' X 9' RCB	2600	1031	CLW075-4	CWEST3	1.03	0.10
LVMD		**LAS VEGAS WASH - MIDDLE**						
1421	E	Earth Chnl 60'W 8'D 1:1SS	3221	8782	CLW64-4	CCWEST5	77.37	0.60
1421	P2	Conc Chnl 84'W 10'D 0:1 SS	3221	8782	CLW64-4	CCWEST5	77.37	0.33
1482	E	5: 120" CMP @ Carey	120	8782	CLW64-4	CCWEST5	77.37	0.40
1482	P2	2 Span Bridge 84'W 6.5'D @ Carey	120	8782	CLW64-4	CCWEST5	77.37	0.39
1483	E	Earth Chnl 75'W 6'D 2:1SS	2693	8782	CLW64-4	CCWEST5	77.37	0.40
1483	P2	Conc Chnl 80'W 10'D 1.5:1 SS	1300	8782	CLW64-4	CCWEST5	77.37	0.36
1509	P2	Conc Chnl 80'W 10'D 1.5:1 SS	1400	8712	2CLW1A-4	CCWEST5	76.42	0.36
1534	E	5: 12' X 7' RCBC @ Las Vegas Blvd	120	8712	2CLW1A-4	CCWEST5	76.42	0.70
1534	P2	2 Span Bridge 95.5'W 6'D @ Las Vegas Blvd	120	8712	2CLW1A-4	CCWEST5	76.42	0.70
1535	E	Earth Chnl 80'W 6'D 3:1SS	730	8578	2CLW100	CCWEST5	74.73	0.90
1535	P2	Conc Chnl 80'W 10'D 1.5:1 SS	899	8578	2CLW100	CCWEST5	74.73	0.52
1549	E	Earth Chnl 70'W 8'-10'D 1:1 SS	2376	8226	CHYPEAK	CCWEST5	74.73	0.50
1549	P2	Conc Chnl 80'W 10'D 1.5:1 SS	2218	8226	CHYPEAK	CCWEST5	74.45	0.52
1594	E	5: 132" CMP @ Cheyenne	120	8226	CHYPEAK	CCWEST5	74.45	1.00
1594	P2	2 Span Bridge 90'W 5.5'D @ Cheyenne	120	8226	CHYPEAK	CCWEST5	74.45	0.39
1595	P2	Conc Chnl 90'W 7'D 0:1 SS	700	8226	CHYPEAK	CCWEST5	74.45	0.40
1643	P2	64,000 cfs PMF Spillway		64000	CHYPKIN	CCWEST5	74.45	
1644	P2	2: 34' X 7' RCB Outlet	221	8226	CHYPEAK	CCWEST5	74.45	0.15
1645	P2	440 ac-ft Cheyenne Peaking Basin		11703	CHYPKIN	CCWEST5	74.45	
1646	P2	Conc Chnl 70'W 8'D 0:1 SS	1771	11703	CHYPKIN	CCWEST5	74.45	0.15
1647	E	3 Span Bridge 95'W 8'-10'D 2:1 SS @ Civic Center	120	11675	3C99B-7	CCWEST5	74.13	0.70
1663	E	Conc Chnl 80'W 10'D 2:1 SS	700	11675	3C99B-7	CCWEST5	74.13	0.70
1664	E	3 Span Bridge 75'W 10'D 2:1 SS @ I-15	200	11675	3C99B-7	CCWEST5	74.13	0.70
1665	E	Conc Chnl 80'W 10'D 2:1 SS	214	7181	CLV99B-5	WEST5	50.09	0.70
1669	E	Free Span Bridge 55'W 12'D @ UPRR	80	7181	CLV99B-5	WEST5	50.09	0.70
1670	E	Earth Chnl 75'W 10'D 2:1 SS	185	7181	CLV99B-5	WEST5	50.09	0.70
1670	P2	Conc Chnl 85'W 10'D 2:1 SS	185	7181	CLV99B-5	WEST5	50.09	0.35
1673	E	Drop Structure 75'W 3'D 2:1 SS	185	7181	CLV99B-5	WEST5	50.09	
1673	P2	Drop Structure 80W 10'D 2:1SS	10	7181	CLV99B-5	WEST5	50.09	
1674	E	Earth Chnl 80'W 10'D 2:1 SS	185	7181	CLV99B-5	WEST5	50.09	0.50
1674	P2	Conc Chnl 80'W 10'D 2:1 SS	185	7181	CLV99B-5	WEST5	50.09	0.49
1677	E	Earth Chnl 75'W 10'D 2:1 SS	100	7181	CLV99B-5	WEST5	50.09	0.50
1677	P2	Conc Chnl 80'W 10'D 2:1 SS	100	7181	CLV99B-5	WEST5	50.09	0.49
1679	E	4 Span Bridge 100'W 12'D 2:1 SS @ Losee	120	7181	CLV99B-5	WEST5	50.09	0.70
1680	E	Earth Chnl 75'W 10'D 3:1 SS	2008	7181	CLV99B-5	WEST5	50.09	0.50
1680	P2	Conc Chnl 80'W 10'D 2:1 SS	2008	7181	CLV99B-5	WEST5	50.09	0.36
1715	E	Energy Dissipator 70'W 18'D	10	7068	CNN134-C	WEST5	48.06	0.40
1716	E	Bridge 40'W 10.5'D @ Alexander	40	7068	CNN134-C	WEST5	48.06	0.36
1717	E	Conc Chnl 20'W 10'D 2:1 SS	3718	7068	CNN134-C	WEST5	48.06	1.00
1789	E	7 : 8' X 8' RCBC	100	7030	2C99A-4	WEST5	47.77	1.56
1790	E	Conc Chnl 18'W 10'D 2:1 SS	3200	6624	CNN118-C	WEST5	46.04	1.56
1816	E	6: 8' X 8' RCBC	100	6624	CNN118-C	WEST5	46.04	0.83
1817	E	Conc Chnl 32'W 13'D 0:1 SS	1200	6624	CNN118-C	WEST5	46.04	0.83
1876	E	3: 13' X 10.75' RCBC	125	6592	CNN104-C	WEST5	45.64	0.80
1877	E	Conc Chnl 30'W 10'D 1:1 SS	1800	6592	CNN104-C	WEST5	45.64	1.10
1905	E	Conc Chnl 12'W 10'D 1.65:1 SS	2500	3387	CNN086-C	WEST5	30.78	1.00
1953	E	3: 16' X 12' RCBC	100	3387	CNN086-C	WEST5	30.78	0.99
1954	E	Conc Chnl 30'W 5.5'D 2:1 SS	1979	3387	CNN086-C	WEST5	30.78	1.77
2048	E	68,000 cfs PMF Spillway		68000	LOWERIN	WEST5	30.21	
2049	E	4: 7' X 7' RCB Outlet	150	3333	LOWERDB	WEST5	30.21	
2050	E	600 ac-ft Lower Las Vegas Wash Detention Basin		7211	LOWERIN	WEST5	30.21	
LVNC		**LAS VEGAS WASH - N CHANNEL**						
0000	E	Earth Chnl 40'W 8'-10'D 2:1 SS	400	987	CLW100	CWEST5	13.99	0.70
0000	P1	Conc Chnl 12'W 5.5'D 2:1 SS	400	987	CLW100	CWEST5	13.99	0.70
0007	E	Drop Structure 18'W 2.8'D 3:1 SS	50	987	CLW100	CWEST5	13.99	0.70
0008	E	Conc Chnl 18'W 10'D 2:1 SS	1531	987	CLW100	CWEST5	13.99	0.70
0037	E	2: 132" CMP	120	987	CLW100	CWEST5	13.99	0.70
0038	P1	Conc Chnl 12'W 5.5'D 2:1 SS	2746	987	CLW100	CWEST5	13.99	0.70
0090	E	3 : 10' X 6' RCBC	120	987	CLW100	CWEST5	13.99	0.70
0091	P1	Conc Chnl 12'W 5.5'D 2:1 SS	2500	987	CLW100	CWEST5	13.99	0.70
0138	E	4: 8' X 4' RCBC	100	892	N	CWEST5	13.71	0.70
0140	P1	Conc Chnl 12'W 5'D 2:1 SS	500	892	N	CWEST5	13.71	0.70
0154	E	2 : 12' X 5.5' RCBC	100	892	N	CWEST5	13.71	0.70
0155	E	Earth Chnl 65'W 5'D 2:1 SS	1109	892	N	CWEST5	13.71	0.70
0176	E	36" CMP	100	36				1.00

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
LVSR		**LAS VEGAS WASH - SMOKE RANCH**						
0020	E	60" RCP	1320	1451	CS1-C	NW3SC	1.59	3.03
0020	P1	10' X 6' RCB	1320	1451	CS1-C	NW3SC	1.59	3.03
0045	E	54" RCP	1320	1451	CS1-C	NW3SC	1.59	3.41
0045	P1	10' X 6' RCB	1320	1451	CS1-C	NW3SC	1.59	3.41
0070	E	66" RCP	4118	1126	CS	NW3SC	1.12	0.73
0070	P1	10' X 8' RCB	4118	1126	CS	NW3SC	1.12	0.73
0148	E	54" RCP	2587	1126	CS	NW3SC	1.12	0.58
0148	P1	11' X 8' RCB	2587	1126	CS	NW3SC	1.12	0.58
LVUP		**UPPER LAS VEGAS WASH**						
0000	E	7 : 8' X 8' RCBC	100	5158	CNN170-C	CWEST4	11.48	0.40
0001	P1	Conc Chnl 20'W 9.5'D 2:1 SS	3000	5158	CNN170-C	CWEST4	11.48	0.63
0067	P1	4: 10' X 10' RCBC @ Lone Mountain	200	5158	CNN170-C	CWEST4	11.48	0.71
0071	P1	Conc Chnl 20'W 9.5'D 2:1 SS	1300	5158	CNN170-C	CWEST4	11.48	0.47
0087	P1	4: 12' X 10' RCBC @ La Madre	100	5158	CNN170-C	CWEST4	11.48	0.50
0089	P1	Conc Chnl 20'W 9'D 2:1 SS	900	4838	CNN144-C	CWEST4	10.41	0.67
0104	P1	4: 10' X 10' RCBC @ Washburn	600	4838	CNN144-C	CWEST4	10.41	0.67
0115	P1	Conc Chnl 20'W 9'D 2:1 SS	2600	4645	C156-C	CWEST4	9.59	0.58
0164	P1	Conc Chnl 20'W 9'D 2:1 SS	800	4645	C156-C	CWEST4	9.59	0.50
0179	P1	4: 10' X 10' RCBC @ Ann	300	4281	CNN156-C	CWEST4	8.52	0.50
0185	P1	Conc Chnl 20'W 8.5'D 2:1 SS	1600	4281	CNN156-C	CWEST4	8.52	0.63
0215	P1	4: 10' X 9' RCBC @ Tropical	100	4236	2C141-C*	CWEST4	8.07	0.63
0217	P1	Conc Chnl 20'W 8.5'D 2:1 SS	2700	4236	CNN153-C	CWEST3	6.84	0.74
0268	P1	4: 10' X 9' RCBC @ Centennial	200	4236	CNN153-C	CWEST3	6.84	0.74
0270	P1	Conc Chnl 20'W 7.0'D 2:1 SS	1600	3227	CNN137-C	WEST5	75.57	0.94
0300	P1	4: 9' X 8' RCBC @ Bruce	500	3227	CNN137-C	WEST5	75.57	0.94
RWAL		**ALTO CONVEYANCE**						
0000	P1	Conc Chnl 12'W 7'D 2:1 SS	3600	2749	C318D2	RW3	3.39	1.81
0068	P1	Conc Chnl 12'W 6.5'D 2:1 SS	2700	2749	C318D2	RW3	3.39	2.78
RWCC		**RANGE WASH - CENTENNIAL COLLECTOR**						
0000	P1	8' X 7' RCB	1300	545	CNN178C	RW3	0.87	0.40
RWEA		**RANGE WASH - EAST TRIBUTARY**						
0000	P1	Conc Chnl 25'W 7'D 2:1 SS	1925	3857	C318A2	RW3SC	3.91	0.95
0043	E	Unknown Culvert	80	3857	C318A2	RW3SC	3.91	1.00
0043	P1	4: 10' X 8' RCBC @ Hollywood	80	3857	C318A2	RW3SC	3.91	0.95
0044	P1	Conc Chnl 25'W 6.5'D 2:1 SS	1700	3110	C317-4	RW3SC	2.66	0.95
RWHW		**RANGE WASH - HOLLYWOOD BRANCH**						
0080	P1	Conc Chnl 12'W 10'D 2:1 SS	1800	3151	C47A4	RW3SC	4.16	0.28
0136	P1	Gabion Chnl 12'W 10'D 2:1 SS	2000	2187	C312F2	SPDWY4	8.58	1.05
0137	P1	Gabion Chnl 12'W 8'D 2:1 SS	1900	1228	C312D3	RW3	1.09	0.53
0173	P1	12' X 10' RCBC @ Las Vegas Blvd	100	2187	C312F2	SPDWY4	8.58	1.05
0174	P1	Gabion Chnl 12'W 8.5'D 2:1 SS	1300	2187	C312F2	SPDWY4	8.58	1.43
0201	P1	Gabion Chnl 12'W 9.5'D 2:1 SS	4000	1905	C312E4	SPDWY4	8.15	1.13
0277	P1	Gabion Chnl 12'W 6'D 2:1 SS	3500	97	CSPDWY	SPDWY3	6.06	1.71
RWLA		**RANGE WASH - LAMB**						
0000	P1	10' X 6' RCB	2500	915	CNN209C	RW3	0.82	1.09
0047	P1	7' X 6' RCB	1300	625	NN224-C	RW3	0.51	1.32
RWRR		**RANGE WASH - RAILROAD CHANNEL**						
0000	E	Conc Chnl 12'W 7.5'D 2:1 SS	600	2492	CCNN217C	RW3SC	0.19	2.00
0011	E	2 Span Bridge 21'W 12'D @ UPRR	40	2492	CCNN217C	RW3SC	3.00	1.46
0012	P1	Rip Rap Chnl 12'W 9'D 2:1 SS	2000	1588	CCNN214C	RW3SC	1.00	0.85
0050	P1	Rip Rap Chnl 12'W 8.5'D 2:1 SS	2200	1397	CCNN209C	RW3SC	1.02	0.82
0092	P1	Rip Rap Chnl 12'W 5.5'D 2:1 SS	5000	561	CNN226-C	RW3SC	0.00	0.90
0187	P1	6' X 6' RCBC @ Centennial	100	271	CNN230C	RW3SC	0.00	0.90
0189	P1	Rip Rap Chnl 12'W 4'D 2:1 SS	1700	271	CNN230C	RW3SC	0.00	1.18
0221	P1	42" RCP	200	71	BELT	RW3	3.20	1.18
RWSL		**RANGE WASH - SLOAN**						
0390	E	Conc Chnl 38'W 6'D 3:1 SS	2640	1046	C318D1	CONFDB	20.76	0.36
0446	E	Conc Chnl 20'W 6'D 2:1 SS	2650	1009	CONFDB	RW5SC	20.23	0.38
0447	E	Earth Chnl 25'W 9'D 2:1 SS	4050	1691	SLOAN	RW4SC	10.93	0.42
0447	P0	Rip Rap Chnl 25'W 8'D 2:1 SS	4050	1691	SLOAN	RW4SC	10.93	0.42
0489	E	Earth Chnl 12'W 9'D 2:1 SS	3200	1691	SLOAN	RW4SC	10.93	0.42
0489	P0	Rip Rap Chnl 12'W 10'D 2:1 SS	3200	1691	SLOAN	RW4SC	10.93	0.42
0499	E	72,000 cfs PMF Spillway		72000	CCOND	RW5SC	20.23	
0500	E	2: 8' X 7' RCB Outlet	126	1009	CONFDB	RW5SC	20.23	
0501	E	1,025 ac-ft Confluence Detention Basin		6166	CCOND	RW5SC	20.23	
0502	E	Grass Chnl 60'W 6'D 3:1 SS	1100	4540	D2C47B3*	RW4SC	10.93	0.37
0524	E	Grass Chnl 60'W 6'D 3:1 SS	2400	4540	D2C47B3	RW4SC	10.93	0.37
0560	E	Rip Rap Chnl 50'W 6'D 0:1 SS	580	4540	D2C47B3	RW4SC	10.93	0.37
0560	P1	Conc Chnl 55'W 6.5'D 2:1 SS	580	4540	D2C47B3	RW4SC	10.93	0.37

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
RWSL		**RANGE WASH - SLOAN -- continued**						
0574	E	2 Span Bridge 24'W	50	4540	D2C47B3	RW4SC	10.93	0.38
0575	E	Diversion Structure	15	6232	2C47B3	RW4SC	10.93	
0576	E	Earth Chnl 16'W 9'D 2:1 SS	4450	6232	2C47B3	RW4SC	10.93	0.38
0576	P1	Conc Chnl 40'W 8.5'D 2:1 SS	3010	6232	2C47B3	RW4SC	10.93	0.38
0609	P1	Conc Chnl 30'W 9.5'D 2:1 SS	1440	6232	2C47B3	RW4SC	10.93	0.38
0663	E	3: 10' X 8' RCBC @ Tyndall Street	60	6232	2C47B3	RW4SC	10.93	0.38
0663	P0	Add 4: 10' X 9' RCBC	60	3152	2C47B3	RW4SC	10.93	0.38
0664	E	Conc Chnl 16'W 9'D 1.5:1 SS	520	5444	CCSLNL	RW4SC	8.62	0.56
0671	E	3: 10' X 7' RCBC @ Nellis	100	5444	CCSLNL	RW4SC	8.62	0.56
0671	P0	Add 3: 12' X 7' RCBC	100	2266	CCSLNL	RW4SC	8.62	0.56
0672	E	Conc Chnl 14'W 8'D 1.5:1 SS	1200	2943	CC47C-4	RW3SC	3.94	0.56
0694	E	Conc Chnl 10'W 8'D 1.5:1 SS	1500	1722	C47C4	RW3SC	2.39	0.56
0727	E	3: 10' X 8' RCBC	100	1620	C307E3	RW3SC	2.24	0.56
0728	E	Conc Chnl 12'W 8.5'D 1.5:1 SS	1500	1620	C307E3	RW3SC	2.24	0.56
0745	E	7: 10' X 7' RCBC @ Las Vegas Blvd	200	1620	C307E3	RW3SC	2.24	0.56
RWWA		**RANGE WASH - WALNUT**						
0000	P1	10' X 6' RCB	3000	1030	CNN217-C	RW3	1.13	1.17
0057	P1	8' X 7' RCB	2750	854	CNN213-C	RW3	0.88	1.00
0108	P1	7' X 6' RCB	1300	523	CNN197-C	RW3	0.48	1.15
RWWE		**RANGE WASH - WEST TRIBUTARY**						
0000	P2	Conc Chnl 12'W 7'D 2:1 SS	1500	1477	C307B2	RW3SC	2.01	0.31
0026	E	4: 12' X 10' RCBC @ Alexander	100	1477	C307B2	RW3SC	2.01	0.40
0027	E	Conc Chnl 32'W 8'D 2:1 SS	1650	1477	C307B2	RW3SC	2.01	0.79
0054	E	3: 9' X 6' RCBC	60	884	C307E1	RW3SC	1.26	0.76
0055	P2	Conc Chnl 12'W 5'D 2:1 SS	2200	884	C307E1	RW3SC	1.26	0.76
0088	E	2: 8' X 4' RCBC @Craig	60	228	VANDDB	RW3SC	5.10	0.91
0089	E	Conc Chnl 8'W 4'D 1.5:1 SS	325	228	VANDDB	RW3SC	5.10	0.91
0096	E	2: 8' X 4' RCBC	60	228	VANDDB	RW3SC	5.10	0.91
0097	E	Conc Chnl 8'W 4'D 1.5:1 SS	680	228	VANDDB	RW3SC	5.10	0.91
0105	E	2: 8' X 4' RCBC	60	228	VANDDB	RW3SC	5.10	0.91
0106	E	Conc Chnl 8'W 4'D 1.5:1 SS	1040	228	VANDDB	RW3SC	5.10	0.91
0125	E	2: 9' X 3' RCBC	60	228	VANDDB	RW3SC	5.10	0.91
0126	E	Conc Chnl 8'W 4'D 1.5:1 SS	740	228	VANDDB	RW3SC	5.10	0.91
0139	E	8' X 6' RCBC @ Lone Mountain	100	228	VANDDB	RW3SC	5.10	0.91
0140	E	Conc Chnl 12'W 3'D 2:1 SS	1500	228	VANDDB	RW3SC	5.10	0.91
0167	E	3: 12' X 10' RCB Culverts @ I-15	200	228	VANDDB	RW3SC	5.10	0.91
0168	E	5' X 2.75' RCB Outlet	115	228	VANDDB	RW3SC	5.10	0.30
0169	E	36" RCP Outlet	4300	30	VANDDB	RW3SC	5.10	0.28
0170	E	342 ac-ft Vandenberg Detention Basin		3906	VANDIN	RW3SC	5.10	
0202	E	12' X 8' RCBC @ UPRR	60	1399	CNN202C	RW3SC	2.29



Alexander Channel Per VTN Plans

Alexander Channel Per Southwest Engineering Plans

GRAPHIC SCALE

1,000 500 0 1,000 2,000 3,000 4,000

(In Feet)

1 inch = 1000 ft.

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2160 E

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY,
NEVADA AND
INCORPORATED AREAS

PANEL 2160 OF 4090

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
NORTH LAS VEGAS, CITY OF	320007	2160	E
LAS VEGAS, CITY OF	325276	2160	E
CLARK COUNTY, UNINCORPORATED AREAS	320003	2160	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
32003C2160 E

MAP REVISED:
SEPTEMBER 27, 2002

Federal Emergency Management Agency

FIGURE 3a

FEMA FLOODZONE MAP

PBS&J
2270 Corporate Circle
Suite 100
Henderson, Nevada 89074
Tele: 702-263-7275
Fax: 702-263-7200

ENGINEERING - PLANNING - SURVEYING - CONSTRUCTION SERVICES

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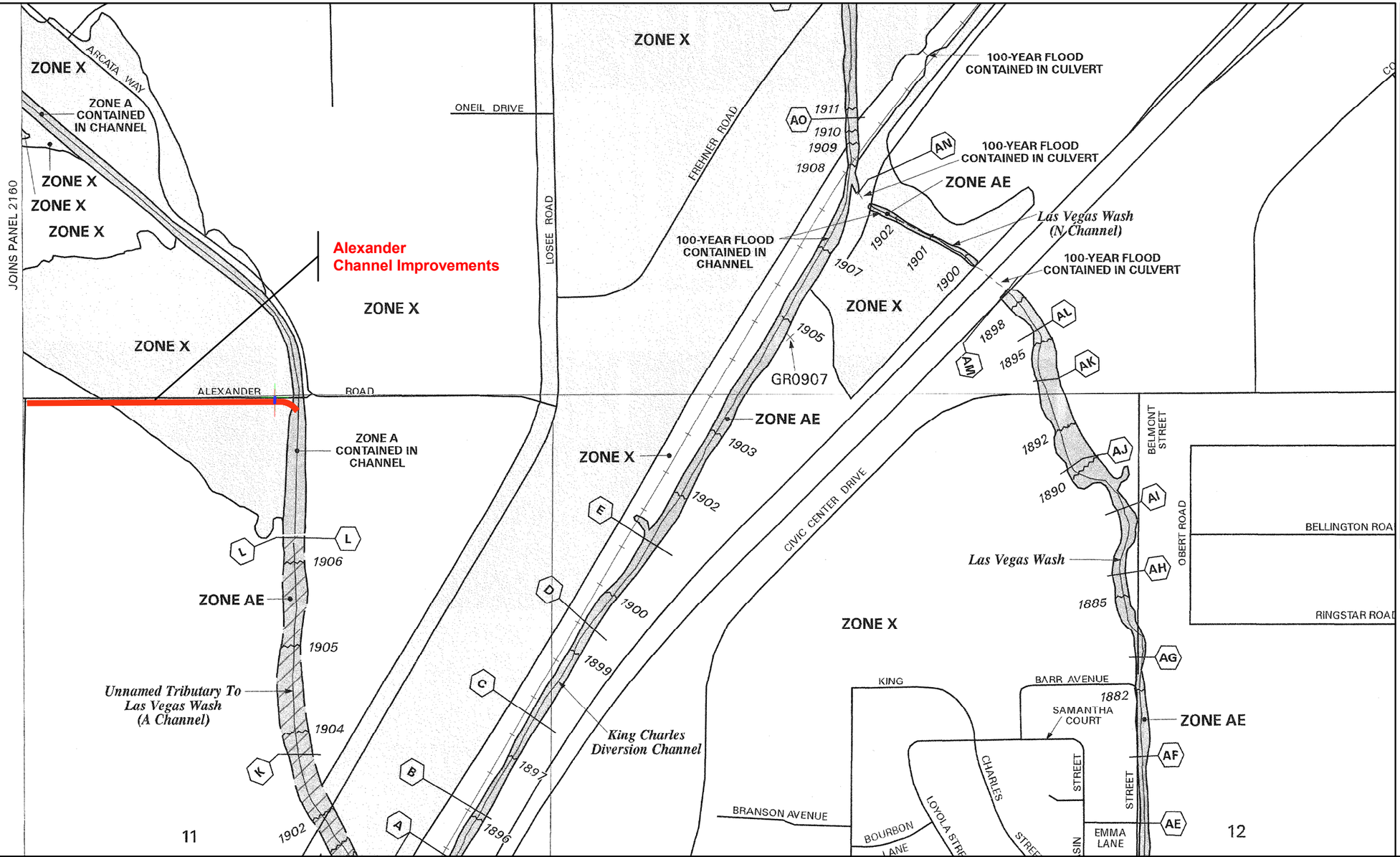


Alexander Channel Per VTN Plans

GRAPHIC SCALE

500 250 0 500 1,000 1,500 2,000

(In Feet)

1 inch = 500 ft.

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2176 E

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY, NEVADA AND INCORPORATED AREAS

PANEL 2176 OF 4090

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
NORTH LAS VEGAS, CITY OF	320007	2176	E
CLARK COUNTY, UNINCORPORATED AREAS	320003	2176	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER 32003C2176 E

MAP REVISED: SEPTEMBER 27, 2002

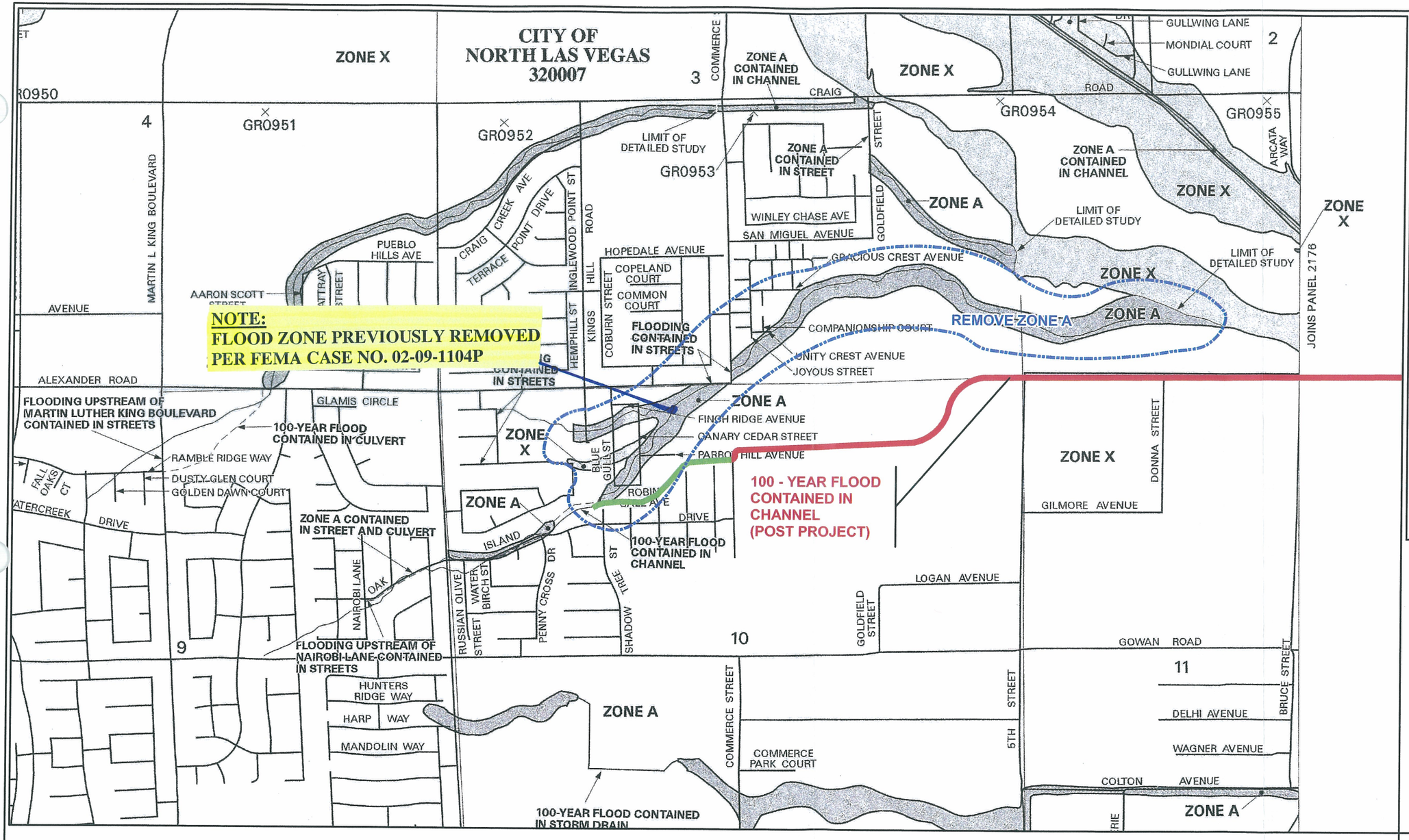
Federal Emergency Management Agency

FIGURE 3b

FEMA FLOODZONE MAP

PBS&J
2270 Corporate Circle
Suite 100
Henderson, Nevada 89074
Tele: 702-263-7275
Fax: 702-263-7200

ENGINEERING - PLANNING - SURVEYING - CONSTRUCTION SERVICES



PANEL 2160 E

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

PANEL 2160 OF 4090
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS

COMMUNITY	NUMBER	PANEL	SUFFIX
NORTH LAS VEGAS, CITY OF	320007	2160	E
LAS VEGAS, CITY OF	320276	2160	E
CLARK COUNTY, UNINCORPORATED AREAS	320033	2160	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
32003C2160 E

MAP REVISED:
SEPTEMBER 27, 2002

Federal Emergency Management Agency

Alexander Channel Per VTN Plans
Alexander Channel Per Southwest Engineering Plans
Remove Zone A

GRAPHIC SCALE

1,000 500 0 1,000 2,000 3,000 4,000
(In Feet)

1 inch = 1000 ft.

FIGURE 4a

ANNOTATED POST PROJECT FEMA FLOODZONE MAP

PBS&J
2270 Corporate Circle
Suite 100
Henderson, Nevada 89074
Tele: 702-263-7275
Fax: 702-263-7200

ENGINEERING - PLANNING - SURVEYING - CONSTRUCTION SERVICES

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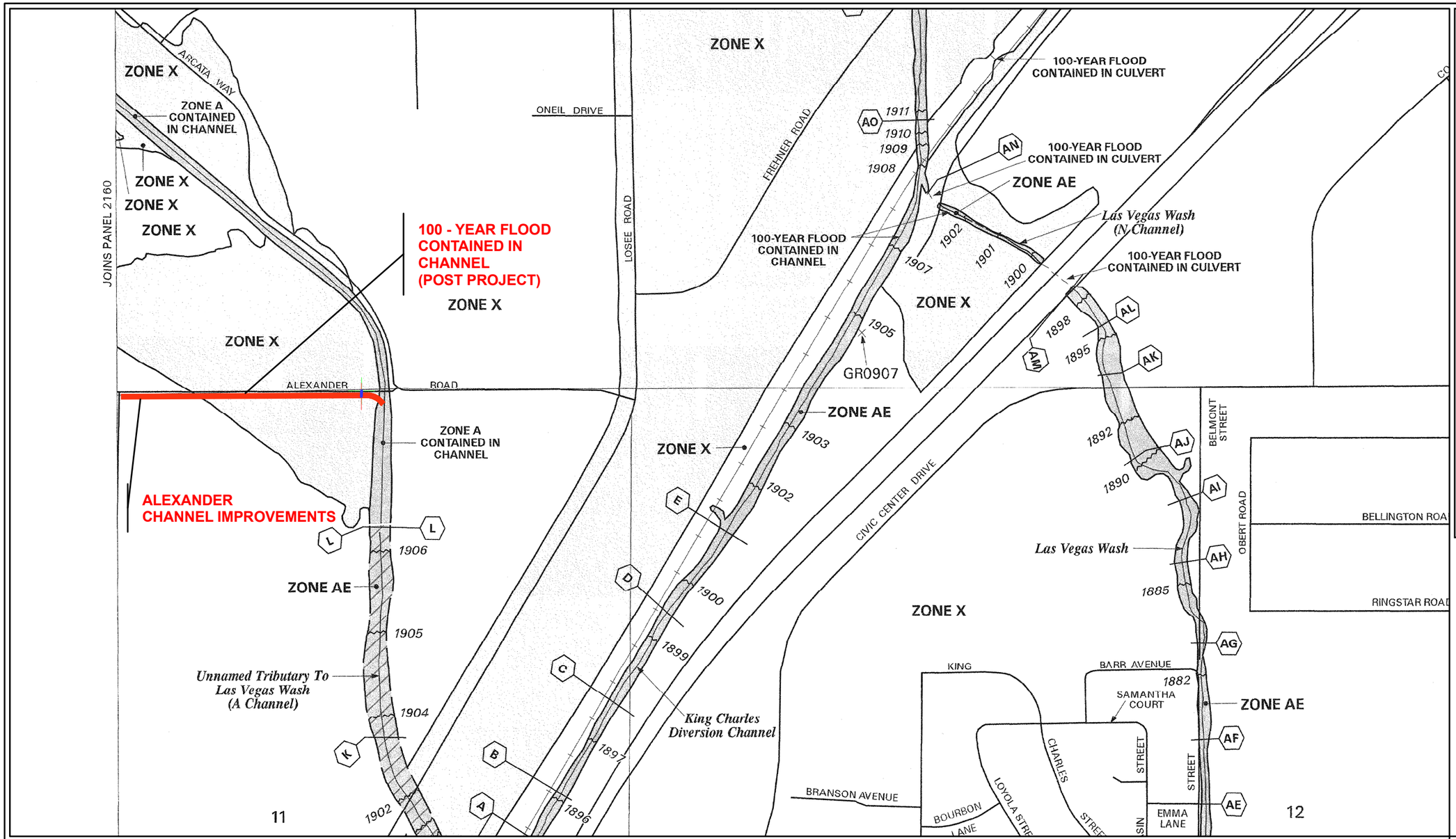


Alexander Channel Per VTN Plans

GRAPHIC SCALE

500 250 0 500 1,000 1,500 2,000

(In Feet)

1 inch = 500 ft.

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2176 E

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY, NEVADA AND INCORPORATED AREAS

PANEL 2176 OF 4090

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
NORTH LAS VEGAS, CITY OF	320007	2176	E
CLARK COUNTY, UNINCORPORATED AREAS	320033	2176	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER 32003C2176 E

MAP REVISED: SEPTEMBER 27, 2002

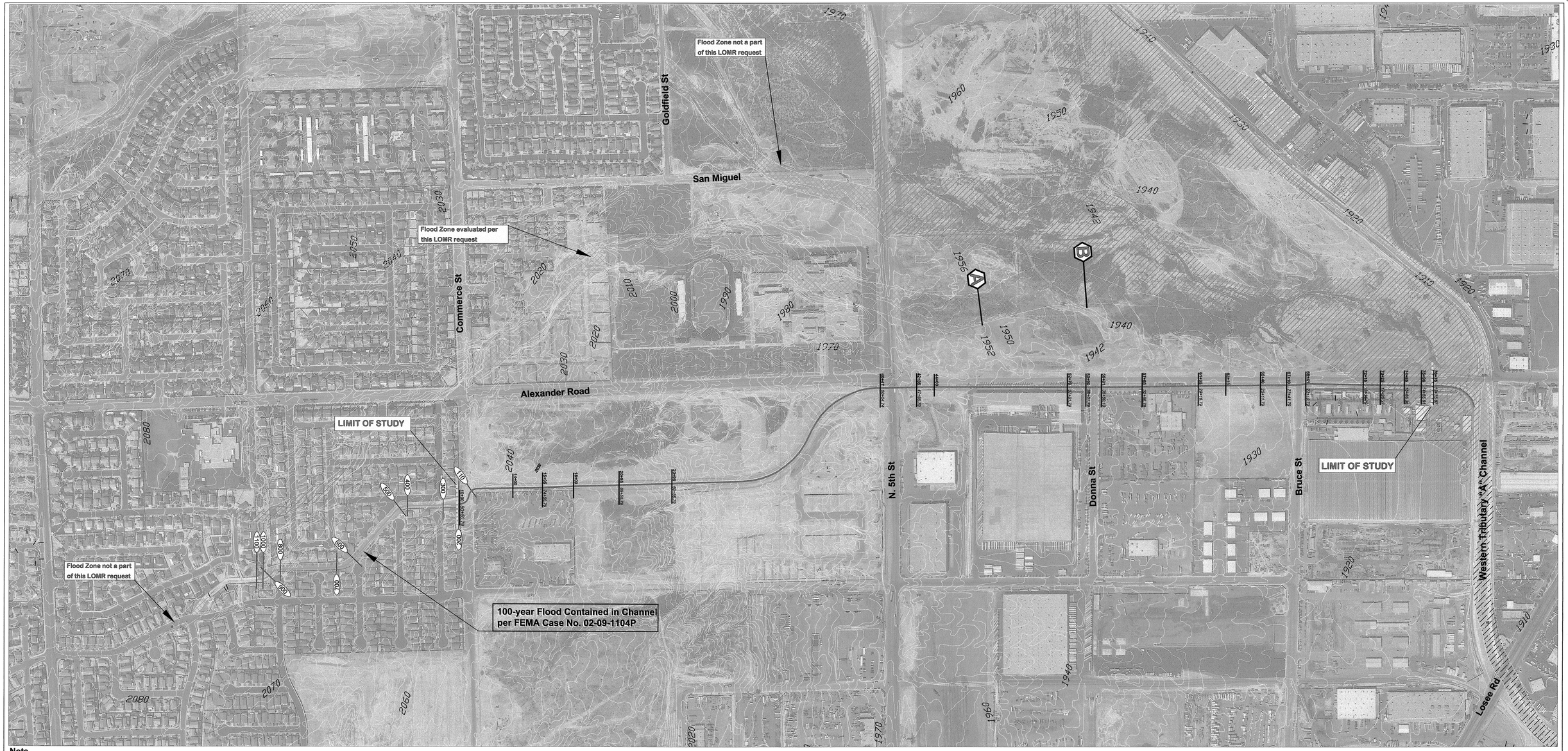
Federal Emergency Management Agency

FIGURE 4b

ANNOTATED POST PROJECT FEMA FLOODZONE MAP

PBS&J
2270 Corporate Circle
Suite 100
Henderson, Nevada 89074
Tele: 702-263-7275
Fax: 702-263-7200

ENGINEERING - PLANNING - SURVEYING - CONSTRUCTION SERVICES



Note

Aerial photo as of Spring 2005.

Topographic data as of 1996.

Legend

- 1100 — HEC-RAS Cross-Section
- A — Flowmaster Cross-Section Location
- 15+95 (Plan Sta.) / 74+56.79 (WSPG Sta.) — Station Location
- Alexander Channel per VTN
- Gleneagles Channel per Southwest Engineering
- Zone A Flood Zone
- Zone AE Flood Zone
- Shaded Zone X Flood Zone

FIGURE 5: Work Map

Alexander Channel Letter of Map Revision

The hydraulic analysis and proposed flood zone delineations completed for this LOMR are based on topographic information shown on this map and the channel plans provided in Appendix D

I hereby certify that the information used in this LOMR substantially conforms with current conditions.

Matthew S. Baird, NV 13684 — Date 7/18/05

N

GRAPHIC SCALE

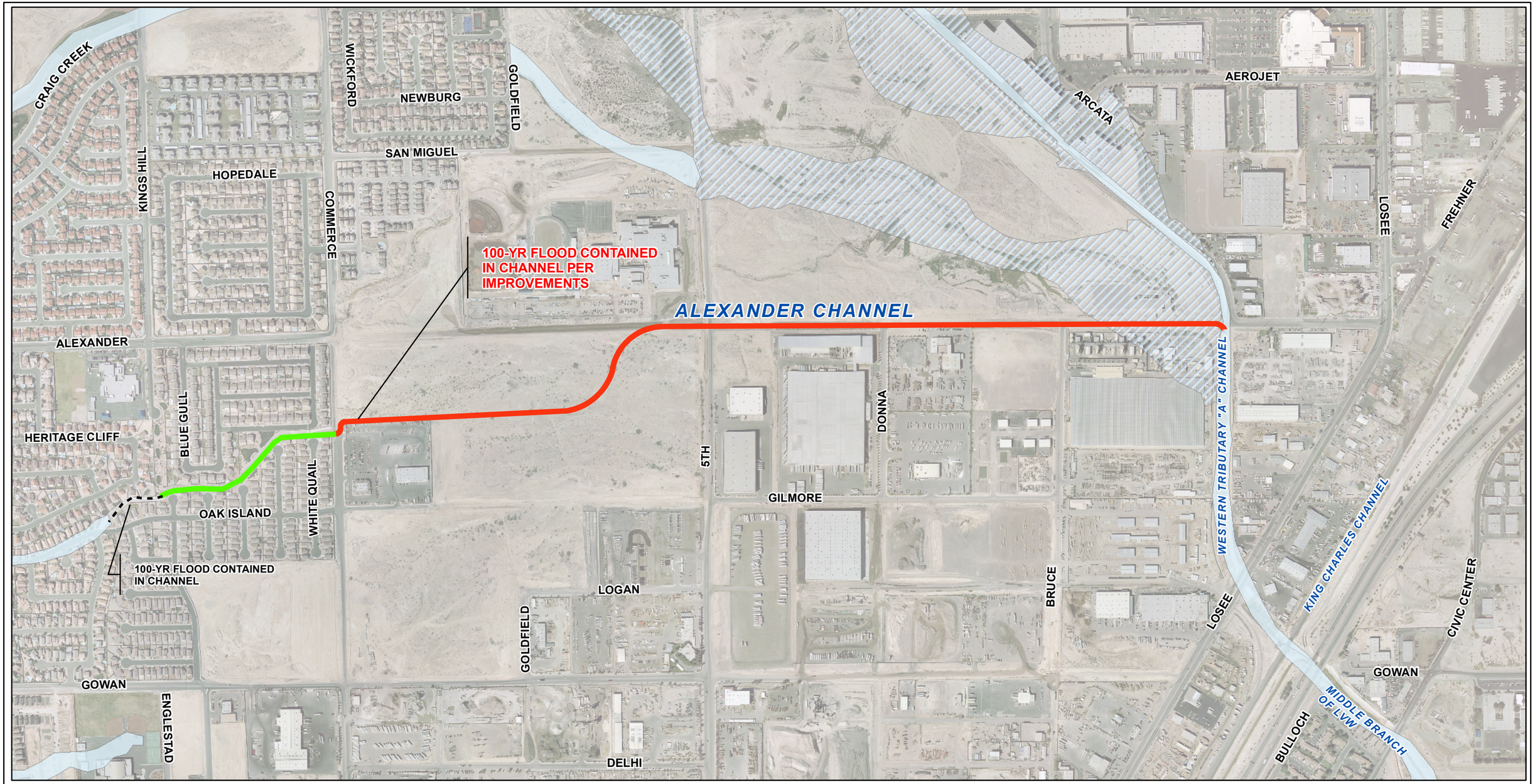
300 0 150 300 600 1200

(IN FEET)

1 inch = 300ft.

PBSJ
2270 Corporate Circle
Suite 100 Henderson,
Nevada 89014
Telephone: 702/263-7275
Fax: 702/263-7200
ENGINEERING • PLANNING • SURVEYING • CONSTRUCTION SERVICES

FIGURE 5



Proposed Zone A Contained in Channel Per VTN Plans

Proposed Zone A Contained in Channel Per Southwest Engineering Plans

ZONE A

ZONE X

N

700 350 0 700 1,400

(In Feet)

1 inch = 700 ft.

PROPOSED FLOODZONE

ALEXANDER CHANNEL
AT LOSEE RD
FIGURE 6

PBS&J
2270 Corporate Circle
Suite 100
Henderson, Nevada 89074
Tele: 702-263-7275
Fax: 702-263-7200
ENGINEERING - PLANNING - SURVEYING - CONSTRUCTION SERVICES

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Appendix C: Hydraulic Models

WSPG Models

FEMA Flow WSPG Model
Q = 520 cfs

FEMA Flow of 520cfs

STORM DRAIN ANALYSIS PLUS

Original version by Los Angeles County Public Works
Portions Copyrighted by CIVILSOFT, 1986, 1987, 1989

Version
Serial Number

Jun 17, 2005 9: 3:17

Input file : alex.dat
Output file: alex.out

INPUT FILE LISTING

```
T1 Alexander Channel
T2 Start at Commerce Street FEMA Q=520 cfs
T3 WSPG file: ALEX2ALT.dat, by: JLW, VTN, 12/9/2003
SO  1000.00 1903.94 17
R    1275.87 1908.02 17       .015                          175.00 90.32
R    1375.87 1908.49 17       .015
TS   1455.61 1908.86 14       .015
R    1566.26 1909.38 13       .015                         1800.00  3.52
R    1726.34 1910.13 14       .015                         2600.00  3.53
R    2210.79 1912.39 14       .015
R    2275.26 1912.69 13       .015                          500.00  7.39
R    2334.33 1912.97 13       .015                          500.00  6.77
JX   2341.79 1913.00 13 15    .015  300.0          1913.00          45.0
TS   2511.79 1920.00 11       .015
R    2581.79 1920.54 12       .015
R    2701.79 1921.49 11       .015
R    2771.79 1922.03 12       .015
R    2916.79 1923.17 11       .015
R    3286.79 1926.07 10       .015
R    3305.34 1926.21  9       .015
R    3528.43 1927.96  9       .015
R    3550.13 1928.13  9       .015
JX   3661.79 1929.00  8 16    .015   90.0          1929.00          45.0
R    3781.79 1935.00  7       .015
R    3998.79 1937.60  7       .015
R    4370.29 1942.05  6       .015
R    4416.29 1942.61  7       .015
R    4491.79 1943.51  6       .015
R    4561.79 1944.35  7       .015
R    4766.79 1946.80  6       .015
TS   4801.79 1947.22  5       .015
TS   4866.79 1948.00  4       .015
JX   5004.74 1950.43  4 16    .015  170.0          1950.43          45.0
R    5256.79 1954.88  4       .015                                500.00 28.88
R    5276.79 1955.24  3       .015                                500.00  2.29
R    5376.79 1957.00  3       .015                                500.00 11.46
R    5582.38 1963.05  3       .015                                500.00 23.56
R    6148.38 1979.72  3       .015                                500.00 64.86
R    6446.79 1988.50  3       .015
R    6526.79 1992.50  3       .015
JX   6611.79 1996.75  3 15    .015  290.0          1996.75          45.0
R    6956.79 2014.00  3       .015
R    7456.79 2023.00  3       .015
R    7730.60 2034.08  3       .015
TS   7830.60 2038.13  2       .015
BX   7830.60 2038.13  1
R    7881.60 2039.00  1       .015
R    7955.67 2040.26  1       .015                                60.00 70.73
R    7976.50 2040.62  1       .015
R    8050.79 2041.88  1       .015                                60.00 70.94
R    8154.96 2043.00 17       .035
R    8398.97 2045.00 17       .035
SH   8398.97 2045.00 17       .035
1                                                                    SP
                                  WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING                                  PAGE   1
0 CARD  SECT  CHN   NO OF  AVE PIER  HEIGHT 1  BASE    ZL    ZR   INV   Y(1)  Y(2)  Y(3)  Y(4)  Y(5)  Y(6)  Y(7)  Y(8)  Y(9)  Y(10)
  CODE   NO   TYPE  PIERS   WIDTH    DIAMETER  WIDTH                DROP

  CD      1    3       1      1.00      4.00   30.00    .00   .00   .00
  CD      2    2       0       .00      7.00   30.00                .00
  CD      3    2       0       .00      7.00   12.00                .00
  CD      4    3       0       .00      7.00   12.00    .00   .00   .00
  CD      5    2       0       .00      7.00   14.60                .00
  CD      6    2       0       .00      9.00   16.00                .00
  CD      7    3       0       .00      7.75   16.00    .00   .00   .00
  CD      8    3       0       .00      5.50   16.00    .00   .00   .00
  CD      9    2       0       .00      9.50   16.00                .00
  CD     10    3       0       .00      7.00   16.00    .00   .00   .00
  CD     11    2       0       .00     10.00   16.00                .00
  CD     12    3       0       .00      8.75   16.00    .00   .00   .00
  CD     13    3       0       .00      7.00   20.00    .00   .00   .00
  CD     14    2       0       .00     11.00   20.00                .00
  CD     15    4                       4.00
  CD     16    4                       3.00
  CD     17    1       0       .00      3.00   28.00   3.00  3.00   .00
 ERROR MESSAGE NUMBER  7 IN SEQUENCE CHECKING THRU CHANNEL DEFINITION DATA
 INVALID CARD CODE ENCOUNTERED WHILE PROCESSING CD AND PTS CARDS - CODE =
1                                                                                                          PAGE NO   1
0                                 WATER SURFACE PROFILE - TITLE CARD LISTING
0HEADING LINE NO 1 IS -
0                                   Alexander Channel
0HEADING LINE NO 2 IS -
0                                   Start at Commerce Street FEMA Q=520 cfs
0HEADING LINE NO 3 IS -
0                                   WSPG file: ALEX2ALT.dat, by: JLW, VTN, 12/9/2003
1                                                                                                          PAGE NO   2
0                                 WATER SURFACE PROFILE - ELEMENT CARD LISTING
0 ELEMENT NO   1 IS A SYSTEM OUTLET      *          *      *
```


Approved LOMR
Case # 02-09-1104P

HEC-RAS Section 200

HEC-RAS Section 300

HEC-RAS Section 400

```
                    U/S DATA   STATION    INVERT  SECT                                          W S ELEV
                                1000.00 1903.94   17                                              .00
0 ELEMENT NO   2 IS A REACH              *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                          RADIUS  ANGLE  ANG PT  MAN H
                                1275.87 1908.02   17               .015                        175.00  90.32     .00      0
0 ELEMENT NO   3 IS A REACH              *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                          RADIUS  ANGLE  ANG PT  MAN H
                                1375.87 1908.49   17               .015                          .00    .00     .00      0
0 ELEMENT NO   4 IS A TRANSITION         *        *     *
                    U/S DATA   STATION    INVERT  SECT              N
                                1455.61 1908.86   14               .015
 WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
0 ELEMENT NO   5 IS A REACH              *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                          RADIUS  ANGLE  ANG PT  MAN H
                                1566.26 1909.38   13               .015                       1800.00   3.52     .00      0
 WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
0 ELEMENT NO   6 IS A REACH              *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                          RADIUS  ANGLE  ANG PT  MAN H
                                1726.34 1910.13   14               .015                       2600.00   3.53     .00      0
0 ELEMENT NO   7 IS A REACH              *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                          RADIUS  ANGLE  ANG PT  MAN H
                                2210.79 1912.39   14               .015                          .00    .00     .00      0
 WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
0 ELEMENT NO   8 IS A REACH              *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                          RADIUS  ANGLE  ANG PT  MAN H
                                2275.26 1912.69   13               .015                        500.00   7.39     .00      0
0 ELEMENT NO   9 IS A REACH              *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                          RADIUS  ANGLE  ANG PT  MAN H
                                2334.33 1912.97   13               .015                        500.00   6.77     .00      0
0 ELEMENT NO  10 IS A JUNCTION           *        *     *     *                 *                       *        *
                    U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3       Q4    INVERT-3 INVERT-4  PHI 3   PHI 4
                                2341.79 1913.00   13    15     0   .015    300.0       .0  1913.00      .00  45.00     .00
0 ELEMENT NO  11 IS A TRANSITION         *        *     *
                    U/S DATA   STATION    INVERT  SECT              N
                                2511.79 1920.00   11               .015
 WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
0 ELEMENT NO  12 IS A REACH              *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                          RADIUS  ANGLE  ANG PT  MAN H
                                2581.79 1920.54   12               .015                          .00    .00     .00      0
1                                                                                                                PAGE NO   3
0                          WATER SURFACE PROFILE - ELEMENT CARD LISTING
 WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
0 ELEMENT NO  13 IS A REACH              *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                          RADIUS  ANGLE  ANG PT  MAN H
                                2701.79 1921.49   11               .015                          .00    .00     .00      0
 WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
0 ELEMENT NO  14 IS A REACH              *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                          RADIUS  ANGLE  ANG PT  MAN H
                                2771.79 1922.03   12               .015                          .00    .00     .00      0
 WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
0 ELEMENT NO  15 IS A REACH              *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                          RADIUS  ANGLE  ANG PT  MAN H
                                2916.79 1923.17   11               .015                          .00    .00     .00      0
 WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
0 ELEMENT NO  16 IS A REACH              *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                          RADIUS  ANGLE  ANG PT  MAN H
                                3286.79 1926.07   10               .015                          .00    .00     .00      0
 WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
0 ELEMENT NO  17 IS A REACH              *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                          RADIUS  ANGLE  ANG PT  MAN H
                                3305.34 1926.21    9               .015                          .00    .00     .00      0
0 ELEMENT NO  18 IS A REACH              *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                          RADIUS  ANGLE  ANG PT  MAN H
                                3528.43 1927.96    9               .015                          .00    .00     .00      0
0 ELEMENT NO  19 IS A REACH              *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                          RADIUS  ANGLE  ANG PT  MAN H
                                3550.13 1928.13    9               .015                          .00    .00     .00      0
0 ELEMENT NO  20 IS A JUNCTION           *        *     *     *                 *                       *        *
                    U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3       Q4    INVERT-3 INVERT-4  PHI 3   PHI 4
                                3661.79 1929.00    8    16     0   .015     90.0       .0  1929.00      .00  45.00     .00
 WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
0 ELEMENT NO  21 IS A REACH              *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                          RADIUS  ANGLE  ANG PT  MAN H
                                3781.79 1935.00    7               .015                          .00    .00     .00      0
0 ELEMENT NO  22 IS A REACH              *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                          RADIUS  ANGLE  ANG PT  MAN H
                                3998.79 1937.60    7               .015                          .00    .00     .00      0
 WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
0 ELEMENT NO  23 IS A REACH              *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                          RADIUS  ANGLE  ANG PT  MAN H
                                4370.29 1942.05    6               .015                          .00    .00     .00      0
1                                                                                                                PAGE NO   4
0                          WATER SURFACE PROFILE - ELEMENT CARD LISTING
 WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
0 ELEMENT NO  24 IS A REACH              *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                          RADIUS  ANGLE  ANG PT  MAN H
                                4416.29 1942.61    7               .015                          .00    .00     .00      0
 WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
0 ELEMENT NO  25 IS A REACH              *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                          RADIUS  ANGLE  ANG PT  MAN H
                                4491.79 1943.51    6               .015                          .00    .00     .00      0
 WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
0 ELEMENT NO  26 IS A REACH              *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                          RADIUS  ANGLE  ANG PT  MAN H
                                4561.79 1944.35    7               .015                          .00    .00     .00      0
 WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
0 ELEMENT NO  27 IS A REACH              *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                          RADIUS  ANGLE  ANG PT  MAN H
                                4766.79 1946.80    6               .015                          .00    .00     .00      0
0 ELEMENT NO  28 IS A TRANSITION         *        *     *
                    U/S DATA   STATION    INVERT  SECT              N
                                4801.79 1947.22    5               .015
0 ELEMENT NO  29 IS A TRANSITION         *        *     *
                    U/S DATA   STATION    INVERT  SECT              N
                                4866.79 1948.00    4               .015
0 ELEMENT NO  30 IS A JUNCTION           *        *     *     *                 *                       *        *
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                    U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3       Q4     INVERT-3 INVERT-4  PHI 3   PHI 4
                                5004.74 1950.43    4    16     0   .015    170.0        .0  1950.43      .00  45.00     .00
0 ELEMENT NO  31 IS A REACH              *        *      *
                    U/S DATA   STATION    INVERT  SECT               N                                        RADIUS  ANGLE  ANG PT  MAN H
                                5256.79 1954.88    4                .015                                      500.00  28.88     .00      0
 WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
0 ELEMENT NO  32 IS A REACH              *        *      *
                    U/S DATA   STATION    INVERT  SECT               N                                        RADIUS  ANGLE  ANG PT  MAN H
                                5276.79 1955.24    3                .015                                      500.00   2.29     .00      0
0 ELEMENT NO  33 IS A REACH              *        *      *
                    U/S DATA   STATION    INVERT  SECT               N                                        RADIUS  ANGLE  ANG PT  MAN H
                                5376.79 1957.00    3                .015                                      500.00  11.46     .00      0
0 ELEMENT NO  34 IS A REACH              *        *      *
                    U/S DATA   STATION    INVERT  SECT               N                                        RADIUS  ANGLE  ANG PT  MAN H
                                5582.38 1963.05    3                .015                                      500.00  23.56     .00      0
1                                                                                                                        PAGE NO   5
0                          WATER SURFACE PROFILE - ELEMENT CARD LISTING
0 ELEMENT NO  35 IS A REACH              *        *      *
                    U/S DATA   STATION    INVERT  SECT               N                                        RADIUS  ANGLE  ANG PT  MAN H
                                6148.38 1979.72    3                .015                                      500.00  64.86     .00      0
0 ELEMENT NO  36 IS A REACH              *        *      *
                    U/S DATA   STATION    INVERT  SECT               N                                        RADIUS  ANGLE  ANG PT  MAN H
                                6446.79 1988.50    3                .015                                        .00    .00     .00      0
0 ELEMENT NO  37 IS A REACH              *        *      *
                    U/S DATA   STATION    INVERT  SECT               N                                        RADIUS  ANGLE  ANG PT  MAN H
                                6526.79 1992.50    3                .015                                        .00    .00     .00      0
0 ELEMENT NO  38 IS A JUNCTION           *        *      *      *                                  *      *
                    U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3       Q4     INVERT-3 INVERT-4  PHI 3   PHI 4
                                6611.79 1996.75    3    15     0   .015    290.0        .0  1996.75      .00  45.00     .00
0 ELEMENT NO  39 IS A REACH              *        *      *
                    U/S DATA   STATION    INVERT  SECT               N                                        RADIUS  ANGLE  ANG PT  MAN H
                                6956.79 2014.00    3                .015                                        .00    .00     .00      0
0 ELEMENT NO  40 IS A REACH              *        *      *
                    U/S DATA   STATION    INVERT  SECT               N                                        RADIUS  ANGLE  ANG PT  MAN H
                                7456.79 2023.00    3                .015                                        .00    .00     .00      0
0 ELEMENT NO  41 IS A REACH              *        *      *
                    U/S DATA   STATION    INVERT  SECT               N                                        RADIUS  ANGLE  ANG PT  MAN H
                                7730.60 2034.08    3                .015                                        .00    .00     .00      0
0 ELEMENT NO  42 IS A TRANSITION         *        *      *
                    U/S DATA   STATION    INVERT  SECT               N
                                7830.60 2038.13    2                .015
0 ELEMENT NO  43 IS A BRIDGE EXIT                        *
                    U/S DATA   STATION    INVERT  SECT
                                7830.60 2038.13    1
0 ELEMENT NO  44 IS A REACH              *        *      *
                    U/S DATA   STATION    INVERT  SECT               N                                        RADIUS  ANGLE  ANG PT  MAN H
                                7881.60 2039.00    1                .015                                        .00    .00     .00      0
0 ELEMENT NO  45 IS A REACH              *        *      *
                    U/S DATA   STATION    INVERT  SECT               N                                        RADIUS  ANGLE  ANG PT  MAN H
                                7955.67 2040.26    1                .015                                      60.00  70.73     .00      0
0 ELEMENT NO  46 IS A REACH              *        *      *
                    U/S DATA   STATION    INVERT  SECT               N                                        RADIUS  ANGLE  ANG PT  MAN H
                                7976.50 2040.62    1                .015                                        .00    .00     .00      0
1                                                                                                                        PAGE NO   6
0                          WATER SURFACE PROFILE - ELEMENT CARD LISTING
0 ELEMENT NO  47 IS A REACH              *        *      *
                    U/S DATA   STATION    INVERT  SECT               N                                        RADIUS  ANGLE  ANG PT  MAN H
                                8050.79 2041.88    1                .015                                      60.00  70.94     .00      0
 WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
0 ELEMENT NO  48 IS A REACH              *        *      *
                    U/S DATA   STATION    INVERT  SECT               N                                        RADIUS  ANGLE  ANG PT  MAN H
                                8154.96 2043.00   17                .035                                        .00    .00     .00      0
0 ELEMENT NO  49 IS A REACH              *        *      *
                    U/S DATA   STATION    INVERT  SECT               N                                        RADIUS  ANGLE  ANG PT  MAN H
                                8398.97 2045.00   17                .035                                        .00    .00     .00      0
0 ELEMENT NO  50 IS A SYSTEM HEADWORKS                   *                        *
                    U/S DATA   STATION    INVERT  SECT                                                W S ELEV
                                8398.97 2045.00   17                                                     .00
 NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING

  ** WARNING NO. 2 ** - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS, W.S.ELEV = INV + DC
1                                                                                                                        PAGE    1
                                                WATER SURFACE PROFILE LISTING

                          Alexander Channel
                          Start at Commerce Street FEMA Q=520 cfs
                          WSPG file: ALEX2ALT.dat, by: JLW, VTN, 12/9/2003
0 STATION     INVERT   DEPTH     W.S.         Q        VEL      VEL      ENERGY   SUPER  CRITICAL          HGT/    BASE/     ZL    NO  AVBPR
                ELEV   OF FLOW    ELEV                        HEAD    GRD.EL.    ELEV    DEPTH                DIA     ID NO.          PIER
0 L/ELEM        SO                                          SF AVE      HF                    NORM DEPTH                        ZR
*****************************************************************************************************************************************
0  1000.00  1903.94     2.24   1906.18   1370.0   17.63     4.83   1911.01   2.97     3.66                    3.00    28.00    3.00    0     .00
0   156.18   .01479                                        .01348     2.10                    2.20                                3.00
0  1156.18  1906.25     2.29   1908.54   1370.0   17.16     4.58   1913.12   2.84     3.66                    3.00    28.00    3.00    0     .00
0   119.69   .01479                                        .01209     1.45                    2.20                                3.00
0  1275.87  1908.02     2.38   1910.40   1370.0   16.36     4.16   1914.56    .00     3.66                    3.00    28.00    3.00    0     .00
0    19.55   .00470                                        .01160      .23                    3.04                                3.00
0  1295.42  1908.11     2.34   1910.45   1370.0   16.71     4.34   1914.79    .00     3.66                    3.00    28.00    3.00    0     .00
0    41.97   .00470                                        .01286      .54                    3.04                                3.00
0  1337.39  1908.31     2.25   1910.56   1370.0   17.52     4.77   1915.33    .00     3.66                    3.00    28.00    3.00    0     .00
0    38.48   .00470                                        .01481      .57                    3.04                                3.00
0  1375.87  1908.49     2.16   1910.65   1370.0   18.38     5.25   1915.90    .00     3.66                    3.00    28.00    3.00    0     .00
0TRANS STR   .00464                                        .01038      .83                                                        3.00
0  1455.61  1908.86     4.59   1913.45   1370.0   14.92     3.46   1916.91    .00     5.26                    7.00    20.00     .00    0     .00
0   110.65   .00470                                        .00502      .56                    4.66                                .00
0  1566.26  1909.38     4.53   1913.91   1370.0   15.14     3.56   1917.47    .05     5.26                   11.00    20.00     .00    0     .00
0   160.08   .00469                                        .00546      .87                    4.67                                .00
0  1726.34  1910.13     4.34   1914.47   1370.0   15.78     3.87   1918.34    .00     5.26                   11.00    20.00     .00    0     .00
0     4.88   .00466                                        .00581      .03                    4.68                                .00
0  1731.22  1910.15     4.33   1914.49   1370.0   15.81     3.88   1918.37    .00     5.26                   11.00    20.00     .00    0     .00
0   116.91   .00466                                        .00626      .73                    4.68                                .00
0  1848.12  1910.70     4.13   1914.83   1370.0   16.58     4.27   1919.10    .00     5.26                   11.00    20.00     .00    0     .00
0    92.48   .00466                                        .00720      .67                    4.68                                .00
1                                                                                                                        PAGE    2
                                                WATER SURFACE PROFILE LISTING

                          Alexander Channel
                          Start at Commerce Street FEMA Q=520 cfs
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WSPG file: ALEX2ALT.dat, by: JLW, VTN, 12/9/2003

0 STATION / 0 L/ELEM	INVERT ELEV / SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD / SF AVE	ENERGY GRD.EL. / HF	SUPER ELEV	CRITICAL DEPTH / NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL / ZR	NO PIER	AVBPR
0 1940.61	1911.13	3.94	1915.07	1370.0	17.39	4.70	1919.77	.00	5.26	11.00	20.00	.00	0	.00
0 78.94	.00466					.00829	.65		4.68			.00		
0 2019.54	1911.50	3.76	1915.25	1370.0	18.24	5.17	1920.42	.00	5.26	11.00	20.00	.00	0	.00
0 69.94	.00466					.00956	.67		4.68			.00		
0 2089.48	1911.82	3.58	1915.41	1370.0	19.13	5.69	1921.09	.00	5.26	11.00	20.00	.00	0	.00
0 63.29	.00466					.01102	.70		4.68			.00		
0 2152.77	1912.12	3.41	1915.53	1370.0	20.06	6.25	1921.79	.00	5.26	11.00	20.00	.00	0	.00
0 58.02	.00466					.01270	.74		4.68			.00		
0 2210.79	1912.39	3.26	1915.65	1370.0	21.04	6.88	1922.53	.00	5.26	7.00	20.00	.00	0	.00
0 11.71	.00465					.01382	.16		4.68			.00		
0 2222.50	1912.44	3.22	1915.67	1370.0	21.25	7.02	1922.69	.00	5.26	7.00	20.00	.00	0	.00
0 52.76	.00465					.01512	.80		4.68			.00		
0 2275.26	1912.69	3.07	1915.76	1370.0	22.29	7.72	1923.48	.00	5.26	7.00	20.00	.00	0	.00
0 .00	.00465					.01620	.00		4.68			.00		
0 2275.26	1912.69	3.07	1915.76	1370.0	22.29	7.72	1923.48	.00	5.26	7.00	20.00	.00	0	.00
0 10.27	.00474					.01644	.17		4.65			.00		
0 2285.54	1912.74	3.04	1915.78	1370.0	22.51	7.87	1923.65	.00	5.26	7.00	20.00	.00	0	.00
0 48.79	.00474					.01797	.88		4.65			.00		
0 2334.33	1912.97	2.90	1915.87	1370.0	23.60	8.66	1924.53	.00	5.26	7.00	20.00	.00	0	.00
0JUNCT STR	.00403					.02421	.18					.00		
0 2341.79	1913.00	2.16	1915.16	1070.0	24.80	9.56	1924.71	.00	4.46	7.00	20.00	.00	0	.00
0TRANS STR	.04118					.01852	3.15					.00		

1

WATER SURFACE PROFILE LISTING

Alexander Channel
Start at Commerce Street FEMA Q=520 cfs
WSPG file: ALEX2ALT.dat, by: JLW, VTN, 12/9/2003

0 STATION / 0 L/ELEM	INVERT ELEV / SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD / SF AVE	ENERGY GRD.EL. / HF	SUPER ELEV	CRITICAL DEPTH / NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL / ZR	NO PIER	AVBPR
0 2511.79	1920.00	3.97	1923.97	1070.0	16.84	4.41	1928.38	.00	5.18	8.75	16.00	.00	0	.00
0 70.00	.00771					.00790	.55		4.00			.00		
0 2581.79	1920.54	3.96	1924.50	1070.0	16.89	4.43	1928.93	.00	5.18	10.00	16.00	.00	0	.00
0 120.00	.00792					.00794	.95		3.96			.00		
0 2701.79	1921.49	3.96	1925.45	1070.0	16.90	4.44	1929.89	.00	5.18	8.75	16.00	.00	0	.00
0 70.00	.00771					.00799	.56		4.00			.00		
0 2771.79	1922.03	3.94	1925.97	1070.0	16.97	4.47	1930.45	.00	5.18	10.00	16.00	.00	0	.00
0 145.00	.00786					.00813	1.18		3.97			.00		
0 2916.79	1923.17	3.91	1927.08	1070.0	17.10	4.54	1931.62	.00	5.18	7.00	16.00	.00	0	.00
0 179.59	.00784					.00848	1.52		3.97			.00		
0 3096.38	1924.58	3.83	1928.41	1070.0	17.47	4.74	1933.15	.00	5.18	7.00	16.00	.00	0	.00
0 190.41	.00784					.00939	1.79		3.97			.00		
0 3286.79	1926.07	3.65	1929.72	1070.0	18.32	5.22	1934.94	.00	5.18	9.50	16.00	.00	0	.00
0 18.55	.00755					.01015	.19		4.03			.00		
0 3305.34	1926.21	3.62	1929.83	1070.0	18.45	5.29	1935.12	.00	5.18	9.50	16.00	.00	0	.00
0 .00	.00755					.01025	.00		4.03			.00		
0 3305.34	1926.21	3.62	1929.83	1070.0	18.45	5.29	1935.12	.00	5.18	9.50	16.00	.00	0	.00
0 36.64	.00784					.01046	.38		3.97			.00		
0 3341.98	1926.50	3.58	1930.07	1070.0	18.70	5.43	1935.51	.00	5.18	9.50	16.00	.00	0	.00
0 104.20	.00784					.01146	1.19		3.97			.00		
0 3446.18	1927.31	3.41	1930.72	1070.0	19.61	5.98	1936.70	.00	5.18	9.50	16.00	.00	0	.00
0 82.25	.00784					.01318	1.08		3.97			.00		

1

WATER SURFACE PROFILE LISTING

Alexander Channel
Start at Commerce Street FEMA Q=520 cfs
WSPG file: ALEX2ALT.dat, by: JLW, VTN, 12/9/2003

0 STATION / 0 L/ELEM	INVERT ELEV / SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD / SF AVE	ENERGY GRD.EL. / HF	SUPER ELEV	CRITICAL DEPTH / NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL / ZR	NO PIER	AVBPR
0 3528.43	1927.96	3.25	1931.21	1070.0	20.57	6.58	1937.79	.00	5.18	9.50	16.00	.00	0	.00
0 21.70	.00784					.01441	.31		3.98			.00		
0 3550.13	1928.13	3.20	1931.33	1070.0	20.87	6.77	1938.10	.00	5.18	9.50	16.00	.00	0	.00
0JUNCT STR	.00779					.02150	2.40					.00		
0 3661.79	1929.00	2.43	1931.43	980.0	25.23	9.89	1941.32	.00	4.89	5.50	16.00	.00	0	.00
0JUNCT STR	.00779					.02829	.00					.00		
0 3661.79	1929.00	2.43	1931.43	980.0	25.23	9.89	1941.32	.00	4.89	7.75	16.00	.00	0	.00
0 .76	.05000					.02825	.02		2.01			.00		
0 3662.55	1929.04	2.43	1931.47	980.0	25.20	9.87	1941.34	.00	4.89	7.75	16.00	.00	0	.00
0 32.90	.05000					.02633	.87		2.01			.00		
0 3695.45	1930.68	2.55	1933.23	980.0	24.03	8.97	1942.21	.00	4.89	7.75	16.00	.00	0	.00
0 25.43	.05000					.02281	.58		2.01			.00		
0 3720.88	1931.95	2.67	1934.63	980.0	22.91	8.16	1942.79	.00	4.89	7.75	16.00	.00	0	.00
0 20.22	.05000					.01977	.40		2.01			.00		
0 3741.10	1932.97	2.80	1935.77	980.0	21.85	7.42	1943.19	.00	4.89	7.75	16.00	.00	0	.00
0 16.36	.05000					.01715	.28		2.01			.00		
0 3757.45	1933.78	2.94	1936.72	980.0	20.83	6.74	1943.47	.00	4.89	7.75	16.00	.00	0	.00
0 13.37	.05000					.01488	.20		2.01			.00		
0 3770.82	1934.45	3.08	1937.54	980.0	19.86	6.13	1943.67	.00	4.89	7.75	16.00	.00	0	.00
0 10.97	.05000					.01292	.14		2.01			.00		
0 3781.79	1935.00	3.23	1938.23	980.0	18.94	5.57	1943.81	.00	4.89	7.75	16.00	.00	0	.00
0 217.00	.01198					.01204	2.61		3.24			.00		

1

WATER SURFACE PROFILE LISTING

Alexander Channel
Start at Commerce Street FEMA Q=520 cfs
WSPG file: ALEX2ALT.dat, by: JLW, VTN, 12/9/2003

0 STATION / 0 L/ELEM	INVERT ELEV / SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD / SF AVE	ENERGY GRD.EL. / HF	SUPER ELEV	CRITICAL DEPTH / NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL / ZR	NO PIER	AVBPR
0 3998.79	1937.60	3.23	1940.83	980.0	18.97	5.59	1946.42	.00	4.89	9.00	16.00	.00	0	.00
0 371.50	.01198					.01256	4.66		3.24			.00		
0 4370.29	1942.05	3.15	1945.20	980.0	19.47	5.89	1951.09	.00	4.89	7.75	16.00	.00	0	.00
0 46.00	.01217					.01314	.60		3.22			.00		
0 4416.29	1942.61	3.13	1945.74	980.0	19.57	5.95	1951.69	.00	4.89	9.00	16.00	.00	0	.00
0 75.50	.01192					.01351	1.02		3.24			.00		
0 4491.79	1943.51	3.09	1946.60	980.0	19.84	6.11	1952.71	.00	4.89	7.75	16.00	.00	0	.00
0 70.00	.01200					.01411	.99		3.23			.00		

0	4561.79	1944.35	3.04	1947.39	980.0	20.15	6.31	1953.70	.00	4.89		9.00	16.00	.00	0	.00
0	101.11	.01195					.01517	1.53			3.24			.00		
0	4662.90	1945.56	2.94	1948.50	980.0	20.82	6.74	1955.24	.00	4.89		9.00	16.00	.00	0	.00
0	103.89	.01195					.01712	1.78			3.24			.00		
0	4766.79	1946.80	2.81	1949.61	980.0	21.83	7.41	1957.01	.00	4.89		9.00	16.00	.00	0	.00
0	TRANS STR	.01200					.01772	.62						.00		
0	4801.79	1947.22	3.09	1950.31	980.0	21.73	7.34	1957.64	.00	5.19		7.00	14.60	.00	0	.00
0	TRANS STR	.01200					.01565	1.02						.00		
0	4866.79	1948.00	3.90	1951.90	980.0	20.94	6.82	1958.72	.00	5.92		7.00	12.00	.00	0	.00
0	JUNCT STR	.01761					.01690	2.33						.00		
0	5004.74	1950.43	3.04	1953.48	810.0	22.17	7.64	1961.11	.00	5.21		7.00	12.00	.00	0	.00
0	JUNCT STR	.01761					.01961	.00						.00		
0	5004.74	1950.43	3.04	1953.48	810.0	22.17	7.64	1961.11	.00	5.21		7.00	12.00	.00	0	.00
0	119.53	.01766					.02036	2.43			3.16			.00		

1

WATER SURFACE PROFILE LISTING

Alexander Channel
Start at Commerce Street FEMA Q=520 cfs
WSPG file: ALEX2ALT.dat, by: JLW, VTN, 12/9/2003

0	STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH		HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
0	L/ELEM	SO					SF AVE	HF			NORM DEPTH			ZR		
0	5124.27	1952.54	2.97	1955.51	810.0	22.74	8.04	1963.55	.00	5.21		7.00	12.00	.00	0	.00
0	132.52	.01766					.02268	3.01			3.16			.00		
0	5256.79	1954.88	2.83	1957.71	810.0	23.85	8.84	1966.55	.42	5.21		7.00	12.00	.00	0	.00
0	20.00	.01800					.02456	.49			3.14			.00		
0	5276.79	1955.24	2.81	1958.05	810.0	24.06	9.00	1967.04	.43	5.21		7.00	12.00	.00	0	.00
0	20.61	.01760					.02525	.52			3.16			.00		
0	5297.40	1955.60	2.78	1958.38	810.0	24.31	9.19	1967.57	.44	5.21		7.00	12.00	.00	0	.00
0	79.39	.01760					.02754	2.19			3.16			.00		
0	5376.79	1957.00	2.65	1959.65	810.0	25.50	10.11	1969.75	.49	5.21		7.00	12.00	.00	0	.00
0	205.59	.02943					.02946	6.06			2.65			.00		
0	5582.38	1963.05	2.65	1965.70	810.0	25.50	10.11	1975.80	.49	5.21		7.00	12.00	.00	0	.00
0	163.14	.02945					.02946	4.81			2.65			.00		
0	5745.52	1967.85	2.65	1970.50	810.0	25.50	10.11	1980.61	.49	5.21		7.00	12.00	.00	0	.00
0	402.86	.02945					.03021	12.17			2.65			.00		
0	6148.38	1979.72	2.60	1982.32	810.0	25.94	10.45	1992.78	.00	5.21		7.00	12.00	.00	0	.00
0	116.17	.02942					.03160	3.67			2.65			.00		
0	6264.55	1983.14	2.57	1985.70	810.0	26.30	10.75	1996.45	.00	5.21		7.00	12.00	.00	0	.00
0	182.24	.02942					.03467	6.32			2.65			.00		
0	6446.79	1988.50	2.45	1990.95	810.0	27.58	11.82	2002.77	.00	5.21		7.00	12.00	.00	0	.00
0	26.32	.05000					.03616	.95			2.21			.00		
0	6473.11	1989.82	2.49	1992.31	810.0	27.10	11.42	2003.72	.00	5.21		7.00	12.00	.00	0	.00
0	53.68	.05000					.03293	1.77			2.21			.00		

1

WATER SURFACE PROFILE LISTING

Alexander Channel
Start at Commerce Street FEMA Q=520 cfs
WSPG file: ALEX2ALT.dat, by: JLW, VTN, 12/9/2003

0	STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH		HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
0	L/ELEM	SO					SF AVE	HF			NORM DEPTH			ZR		
0	6526.79	1992.50	2.61	1995.11	810.0	25.84	10.38	2005.49	.00	5.21		7.00	12.00	.00	0	.00
0	JUNCT STR	.05000					.03906	3.32						.00		
0	6611.79	1996.75	1.68	1998.43	520.0	25.85	10.39	2008.81	.00	3.88		7.00	12.00	.00	0	.00
0	JUNCT STR	.05000					.04750	.00						.00		
0	6611.79	1996.75	1.68	1998.43	520.0	25.85	10.39	2008.81	.00	3.88		7.00	12.00	.00	0	.00
0	115.87	.05000					.04562	5.29			1.65			.00		
0	6727.66	2002.54	1.72	2004.27	520.0	25.16	9.84	2014.10	.00	3.88		7.00	12.00	.00	0	.00
0	88.11	.05000					.04080	3.60			1.65			.00		
0	6815.78	2006.95	1.81	2008.76	520.0	23.99	8.94	2017.70	.00	3.88		7.00	12.00	.00	0	.00
0	49.40	.05000					.03533	1.75			1.65			.00		
0	6865.18	2009.42	1.89	2011.31	520.0	22.87	8.13	2019.44	.00	3.88		7.00	12.00	.00	0	.00
0	33.33	.05000					.03060	1.02			1.65			.00		
0	6898.51	2011.09	1.99	2013.07	520.0	21.81	7.39	2020.46	.00	3.88		7.00	12.00	.00	0	.00
0	24.49	.05000					.02652	.65			1.65			.00		
0	6923.00	2012.31	2.08	2014.39	520.0	20.79	6.72	2021.11	.00	3.88		7.00	12.00	.00	0	.00
0	18.86	.05000					.02300	.43			1.65			.00		
0	6941.86	2013.25	2.19	2015.44	520.0	19.83	6.11	2021.55	.00	3.88		7.00	12.00	.00	0	.00
0	14.93	.05000					.01996	.30			1.65			.00		
0	6956.79	2014.00	2.29	2016.29	520.0	18.90	5.55	2021.85	.00	3.88		7.00	12.00	.00	0	.00
0	.00	.05000					.01855	.00			1.65			.00		
0	6956.79	2014.00	2.29	2016.29	520.0	18.90	5.55	2021.85	.00	3.88		7.00	12.00	.00	0	.00
0	195.18	.01800					.01941	3.79			2.32			.00		

1

WATER SURFACE PROFILE LISTING

Alexander Channel
Start at Commerce Street FEMA Q=520 cfs
WSPG file: ALEX2ALT.dat, by: JLW, VTN, 12/9/2003

0	STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH		HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
0	L/ELEM	SO					SF AVE	HF			NORM DEPTH			ZR		
0	7151.97	2017.51	2.22	2019.74	520.0	19.48	5.90	2025.64	.00	3.88		7.00	12.00	.00	0	.00
0	127.03	.01800					.02183	2.77			2.32			.00		
0	7279.00	2019.80	2.12	2021.92	520.0	20.43	6.49	2028.41	.00	3.88		7.00	12.00	.00	0	.00
0	76.77	.01800					.02517	1.93			2.32			.00		
0	7355.77	2021.18	2.02	2023.20	520.0	21.43	7.14	2030.34	.00	3.88		7.00	12.00	.00	0	.00
0	56.17	.01800					.02903	1.63			2.32			.00		
0	7411.95	2022.19	1.93	2024.12	520.0	22.48	7.85	2031.97	.00	3.88		7.00	12.00	.00	0	.00
0	44.84	.01800					.03351	1.50			2.32			.00		
0	7456.79	2023.00	1.84	2024.84	520.0	23.57	8.64	2033.47	.00	3.88		7.00	12.00	.00	0	.00
0	93.72	.04047					.03373	3.16			1.77			.00		
0	7550.51	2026.79	1.92	2028.71	520.0	22.58	7.93	2036.64	.00	3.88		7.00	12.00	.00	0	.00
0	56.88	.04047					.02945	1.67			1.77			.00		
0	7607.39	2029.09	2.01	2031.11	520.0	21.53	7.20	2038.31	.00	3.88		7.00	12.00	.00	0	.00
0	37.26	.04047					.02552	.95			1.77			.00		
0	7644.65	2030.60	2.11	2032.71	520.0	20.53	6.55	2039.26	.00	3.88		7.00	12.00	.00	0	.00
0	26.87	.04047					.02214	.59			1.77			.00		
0	7671.52	2031.69	2.21	2033.90	520.0	19.57	5.95	2039.86	.00	3.88		7.00	12.00	.00	0	.00
0	20.39	.04047					.01921	.39			1.77			.00		
0	7691.90	2032.51	2.32	2034.84	520.0	18.66	5.41	2040.25	.00	3.88		7.00	12.00	.00	0	.00
0	15.93	.04047					.01668	.27			1.77			.00		
0	7707.83	2033.16	2.44	2035.59	520.0	17.79	4.92	2040.51	.00	3.88		7.00	12.00	.00	0	.00

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0    12.65   .04047                                    .01450      .18                  1.77                  .00
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WATER SURFACE PROFILE LISTING

Alexander Channel
Start at Commerce Street FEMA Q=520 cfs
WSPG file: ALEX2ALT.dat, by: JLW, VTN, 12/9/2003

0 STATION / 0 L/ELEM	INVERT ELEV / SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD / SF AVE	ENERGY GRD.EL. / HF	SUPER ELEV	CRITICAL DEPTH / NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL / ZR	NO PIER	AVBPR
0 7720.48	2033.67	2.55	2036.22	520.0	16.97	4.47	2040.70	.00	3.88	7.00	12.00	.00	0	.00
0 10.12	.04047					.01260	.13		1.77			.00		
0 7730.60	2034.08	2.68	2036.76	520.0	16.18	4.07	2040.83	.00	3.88	7.00	12.00	.00	0	.00
0TRANS STR	.04050					.01361	1.36					.00		
0 7830.60	2038.13	1.27	2039.40	520.0	13.68	2.91	2042.31	.00	2.11	7.00	30.00	.00	0	.00
0BRIDGE EXIT												.00		
0 7830.60	2038.13	1.32	2039.45	520.0	13.56	2.86	2042.31	.00	2.15	4.00	30.00	.00	1	1.00
0 51.00	.01706					.01577	.80		1.30			.00		
0 7881.60	2039.00	1.34	2040.34	520.0	13.36	2.77	2043.12	.00	2.15	4.00	30.00	.00	1	1.00
0 8.21	.01701					.01533	.13		1.30			.00		
0 7889.81	2039.14	1.35	2040.49	520.0	13.32	2.76	2043.24	.00	2.15	4.00	30.00	.00	1	1.00
0 65.86	.01701					.01420	.94		1.30			.00		
0 7955.67	2040.26	1.41	2041.67	520.0	12.70	2.51	2044.18	.00	2.15	4.00	30.00	.00	1	1.00
0 20.83	.01728					.01260	.26		1.29			.00		
0 7976.50	2040.62	1.45	2042.07	520.0	12.34	2.37	2044.44	.00	2.15	4.00	30.00	.00	1	1.00
0 7.74	.01696					.01181	.09		1.30			.00		
0 7984.24	2040.75	1.47	2042.22	520.0	12.19	2.31	2044.53	.00	2.15	4.00	30.00	.00	1	1.00
0 22.42	.01696					.01079	.24		1.30			.00		
0 8006.65	2041.13	1.54	2042.67	520.0	11.63	2.10	2044.77	.00	2.15	4.00	30.00	.00	1	1.00
0 15.12	.01696					.00931	.14		1.30			.00		
0 8021.77	2041.39	1.62	2043.01	520.0	11.09	1.91	2044.92	.00	2.15	4.00	30.00	.00	1	1.00
0 10.60	.01696					.00804	.09		1.30			.00		

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1                                                                                                              PAGE   10
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WATER SURFACE PROFILE LISTING

Alexander Channel
Start at Commerce Street FEMA Q=520 cfs
WSPG file: ALEX2ALT.dat, by: JLW, VTN, 12/9/2003

0 STATION / 0 L/ELEM	INVERT ELEV / SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD / SF AVE	ENERGY GRD.EL. / HF	SUPER ELEV	CRITICAL DEPTH / NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL / ZR	NO PIER	AVBPR
0 8032.38	2041.57	1.70	2043.26	520.0	10.57	1.74	2045.00	.00	2.15	4.00	30.00	.00	1	1.00
0 7.48	.01696					.00694	.05		1.30			.00		
0 8039.86	2041.69	1.78	2043.47	520.0	10.08	1.58	2045.05	.00	2.15	4.00	30.00	.00	1	1.00
0 5.16	.01696					.00599	.03		1.30			.00		
0 8045.02	2041.78	1.87	2043.65	520.0	9.61	1.43	2045.08	.00	2.15	4.00	30.00	.00	1	1.00
0 3.34	.01696					.00518	.02		1.30			.00		
0 8048.36	2041.84	1.96	2043.80	520.0	9.16	1.30	2045.10	.00	2.15	4.00	30.00	.00	1	1.00
0 1.85	.01696					.00448	.01		1.30			.00		
0 8050.21	2041.87	2.05	2043.92	520.0	8.73	1.19	2045.11	.00	2.15	4.00	30.00	.00	1	1.00
0 .58	.01696					.00387	.00		1.30			.00		
0 8050.79	2041.88	2.15	2044.03	520.0	8.32	1.08	2045.11	.00	2.15	4.00	30.00	.00	1	1.00
0 8050.79	2041.88	2.04	2043.92	520.0	7.46	.87	2044.79	.00	2.04	3.00	28.00	3.00	0	.00
0 1.55	.01075					.01418	.02		2.25			3.00		
0 8052.34	2041.90	2.13	2044.02	520.0	7.11	.79	2044.81	.00	2.04	3.00	28.00	3.00	0	.00
0 9.90	.01075					.01231	.12		2.25			3.00		
0 8062.24	2042.00	2.21	2044.22	520.0	6.78	.72	2044.93	.00	2.04	3.00	28.00	3.00	0	.00
0 28.14	.01075					.01110	.31		2.25			3.00		
0 8090.38	2042.31	2.25	2044.56	520.0	6.64	.69	2045.24	.00	2.04	3.00	28.00	3.00	0	.00
0 64.58	.01075					.01076	.69		2.25			3.00		
0 8154.96	2043.00	2.25	2045.25	520.0	6.64	.69	2045.94	.00	2.04	3.00	28.00	3.00	0	.00
0 .00	.01075					.01076	.00		2.25			3.00		
0 8154.96	2043.00	2.25	2045.25	520.0	6.64	.69	2045.94	.00	2.04	3.00	28.00	3.00	0	.00

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1                                                                                                              PAGE   11
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WATER SURFACE PROFILE LISTING

Alexander Channel
Start at Commerce Street FEMA Q=520 cfs
WSPG file: ALEX2ALT.dat, by: JLW, VTN, 12/9/2003

0 STATION / 0 L/ELEM	INVERT ELEV / SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD / SF AVE	ENERGY GRD.EL. / HF	SUPER ELEV	CRITICAL DEPTH / NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL / ZR	NO PIER	AVBPR
0 15.65	.00820					.01005	.16		2.43			3.00		
0 8170.61	2043.13	2.34	2045.47	520.0	6.33	.62	2046.10	.00	2.04	3.00	28.00	3.00	0	.00
0 60.10	.00820					.00878	.53		2.43			3.00		
0 8230.71	2043.62	2.43	2046.05	520.0	6.06	.57	2046.62	.00	2.04	3.00	28.00	3.00	0	.00
0 168.26	.00820					.00821	1.38		2.43			3.00		
0 8398.97	2045.00	2.43	2047.43	520.0	6.06	.57	2048.00	.00	2.04	3.00	28.00	3.00	0	.00
0 .00	.00820					.00410	.00		2.43			3.00		
0 8398.97	2045.00	2.43	2047.43	520.0	6.06	.57	2048.00	.00	2.04	3.00	28.00	3.00	0	.00

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Alexander Channel
Start at Commerce Street FEMA Q=520 cfs
WSPG file: ALEX2ALT.dat, by: JLW, VTN, 12/9/2003

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      .         .         .         .         .         .         .         .         .         .         .
1000.00    .IWX E                                                                                        .    R
1032.31    .                                                                                             .
1064.62    .                                                                                             .
1096.93    .                                                                                             .
1129.24    .                                                                                             .
1161.55    . I XC E                                                                                      .    R
1193.86    .                                                                                             .
1226.17    .                                                                                             .
1258.48    .                                                                                             .
1290.79    .  I XC E                                                                                     .    R
1323.10    .  I XC E                                                                                     .    R
1355.41    .   IWX E                                                                                     .    R
1387.72    .   IWX  E                                                                                    .    TX
1420.03    .                                                                                             .
1452.34    .                                                                                             .
1484.65    .   I  WCHE                                                                                   .    R
1516.96    .                                                                                             .
1549.27    .                                                                                             .
1581.58    .   I  WC E H                                                                                 .    R
1613.89    .                                                                                             .
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1646.20    .                                                                                                                .
1678.51    .                                                                                                                .
1710.82    .                                                                                                                .
1743.13    .    I  X E H                                                                                                    .  R
1775.44    .    I  X  EH                                                                                                    .  R
1807.75    .                                                                                                                .
1840.06    .                                                                                                                .
1872.37    .    I  WC E H                                                                                                   .  R
1904.68    .                                                                                                                .
1936.99    .                                                                                                                .
1969.30    .    I  WC E H                                                                                                   .  R
2001.61    .                                                                                                                .
2033.92    .     I WC  EH                                                                                                   .  R
2066.23    .                                                                                                                .
2098.54    .     I W C E H                                                                                                  .  R
2130.85    .                                                                                                                .
2163.16    .     I  WC  EH                                                                                                  .  R
2195.47    .                                                                                                                .
2227.78    .     I  WCH E                                                                                                   .  R
2260.09    .     I  WCH  E                                                                                                  .  R
2292.40    .      I WCH  E                                                                                                  .  R
2324.71    .      I WCH  E                                                                                                  .  R
2357.02    .      I WCH  E                                                                                                  .  JX
2389.33    .      I WC H  E                                                                                                 .  TX
2421.64    .      IW C H  E                                                                                                 .
2453.95    .                                                                                                                .
2486.26    .                                                                                                                .
2518.57    .           I WC EH                                                                                              .  R
2550.88    .                                                                                                                .
2583.19    .           I  WC EH                                                                                             .  R
2615.50    .                                                                                                                .
2647.81    .                                                                                                                .
2680.12    .                                                                                                                .
2712.43    .            I WC  X                                                                                             .  R
2744.74    .                                                                                                                .
2777.04    .            I  WC EH                                                                                            .  R
2809.35    .                                                                                                                .
2841.66    .                                                                                                                .
2873.97    .                                                                                                                .
2906.28    .                                                                                                                .
2938.59    .             I  X HE                                                                                            .  R
2970.90    .                                                                                                                .
3003.21    .                                                                                                                .
3035.52    .                                                                                                                .
3067.83    .                                                                                                                .
3100.14    .              I WC HE                                                                                           .  R
3132.45    .                                                                                                                .
3164.76    .                                                                                                                .
3197.07    .                                                                                                                .
3229.38    .                                                                                                                .
3261.69    .                                                                                                                .
3294.00    .               I WC  X                                                                                          .  R
3326.31    .               I W C EH                                                                                         .  R
3358.62    .               I W C EH                                                                                         .  R
3390.93    .               I  WC EH                                                                                         .  R
3423.24    .                                                                                                                .
3455.55    .                I WC  X                                                                                         .  R
3487.86    .                                                                                                                .
3520.17    .                                                                                                                .
3552.48    .                I W C  X                                                                                        .  R
3584.79    .                I  WC  X                                                                                        .  JX
3617.10    .                                                                                                                .
3649.41    .                                                                                                                .  JX
3681.72    .                 I WCH   E                                                                                      .  R
3714.03    .                 I WC H  E                                                                                      .  R
3746.34    .                 I WC H  E                                                                                      .  R
3778.65    .                  I WC H  E                                                                                     .  R
3810.96    .                   I WC H E                                                                                     .  R
3843.27    .                    I WC H E                                                                                    .  R
3875.58    .                    I W C HE                                                                                    .  R
3907.89    .                     I WC HE                                                                                    .  R
3940.20    .                     I WC HE                                                                                    .  R
3972.51    .                                                                                                                .
4004.82    .                        I WC  X                                                                                 .  R
4037.13    .                                                                                                                .
4069.44    .                                                                                                                .
4101.75    .                                                                                                                .
4134.06    .                                                                                                                .
4166.37    .                                                                                                                .
4198.68    .                                                                                                                .
4230.99    .                                                                                                                .
4263.30    .                                                                                                                .
4295.61    .                                                                                                                .
4327.92    .                                                                                                                .
4360.23    .                                                                                                                .  R
4392.54    .                          I WC HE                                                                               .  R
4424.85    .                          I  WC  X                                                                              .
4457.16    .                                                                                                                .
4489.47    .                                                                                                                .
4521.78    .                           I WC HE                                                                              .  R
4554.09    .                                                                                                                .
4586.40    .                            I WC  X                                                                             .  R
4618.71    .                                                                                                                .
4651.02    .                                                                                                                .
4683.33    .                            I W C  X                                                                            .  R
4715.64    .                                                                                                                .
4747.95    .                                                                                                                .  TX
4780.26    .                             I W C HE                                                                           .  TX
4812.57    .                              I WCH  E                                                                          .
4844.88    .                                                                                                                .  JX
4877.19    .                               I  WCH  E                                                                        .
4909.50    .                                                                                                                .
4941.81    .                                                                                                                .
4974.12    .                                                                                                                .
5006.43    .                                  I WC H E                                                                      .  JX
5038.74    .                                  I WC H E                                                                      .  R
```

```
5071.05    .                                                                                                .
5103.36    .                                                                                                .
5135.67    .                        I W CH  E                                                               .    R
5167.98    .                                                                                                .
5200.29    .                                                                                                .
5232.60    .                                                                                                .
5264.91    .                         I WC H  E                                                              .    R
5297.22    .                         I W CH  E                                                              .    R
5329.53    .                         I W CH   E                                                             .    R
5361.84    .                                                                                                .
5394.15    .                          I W CH   E                                                            .    R
5426.46    .                                                                                                .
5458.77    .                                                                                                .
5491.08    .                                                                                                .
5523.39    .                                                                                                .
5555.70    .                                                                                                .
5588.01    .                              IW CH   E                                                         .    R
5620.32    .                                                                                                .
5652.63    .                                                                                                .
5684.94    .                                                                                                .
5717.25    .                                                                                                .
5749.56    .                                I WC H   E                                                      .    R
5781.87    .                                                                                                .
5814.18    .                                                                                                .
5846.49    .                                                                                                .
5878.80    .                                                                                                .
5911.11    .                                                                                                .
5943.42    .                                                                                                .
5975.73    .                                                                                                .
6008.04    .                                                                                                .
6040.35    .                                                                                                .
6072.66    .                                                                                                .
6104.97    .                                                                                                .
6137.28    .                                                                                                .
6169.59    .                                      I W CH   E                                                .    R
6201.90    .                                                                                                .
6234.21    .                                                                                                .
6266.52    .                                       I W CH    E                                              .    R
6298.83    .                                                                                                .
6331.14    .                                                                                                .
6363.44    .                                                                                                .
6395.75    .                                                                                                .
6428.06    .                                                                                                .
6460.38    .                                          I W CH    E                                           .    R
6492.68    .                                           I W CH    E                                          .    R
6524.99    .                                                                                                .
6557.30    .                                            I W CH   E                                         .    JX
6589.61    .                                                                                                .
6621.92    .                                              IW C H  E                                         .    JX
6654.23    .                                              IW C H  E                                         .    R
6686.54    .                                                                                                .
6718.85    .                                                                                                .
6751.16    .                                                 IW C H  E                                      .    R
6783.47    .                                                                                                .
6815.78    .                                                    IW C H E                                    .    R
6848.09    .                                                                                                .
6880.40    .                                                     IWC  H E                                   .    R
6912.71    .                                                      IW C HE                                   .    R
6945.02    .                                                       IWC  HE                                  .    R
6977.33    .                                                       I WC HE                                  .    R
7009.64    .                                                        IW C X                                  .    R
7041.95    .                                                        IW C X                                  .    R
7074.26    .                                                                                                .
7106.57    .                                                                                                .
7138.88    .                                                                                                .
7171.19    .                                                          I WC HE                               .    R
7203.50    .                                                                                                .
7235.81    .                                                                                                .
7268.12    .                                                                                                .
7300.43    .                                                            IW C HE                             .    R
7332.74    .                                                                                                .
7365.05    .                                                             IW C HE                            .    R
7397.36    .                                                                                                .
7429.67    .                                                              IWC H E                           .    R
7461.98    .                                                              IW C H E                          .    R
7494.29    .                                                                                                .
7526.60    .                                                                                                .
7558.91    .                                                                 IWC  H E                       .    R
7591.22    .                                                                                                .
7623.53    .                                                                  I WC H E                      .    R
7655.84    .                                                                   I WC HE                      .    R
7688.15    .                                                                    I WC HE                     .    R
7720.46    .                                                                     IWC  X                     .    R
7752.77    .                                                                     I WC X                     .    R
7785.08    .                                                                      IWC X                     .    R
7817.39    .                                                                      I WC X                    .    TX
7849.70    .                                                                         IXBEBH                 .    BX
7882.01    .                                                                         IXHE                   .    R
7914.32    .                                                                         IWCX                   .    R
7946.63    .                                                                         IWCX                   .    R
7978.94    .                                                                          IWCX                  .    R
8011.25    .                                                                          IWCX                  .    R
8043.56    .                                                                          IWCX                  .    R
8075.87    .                                                                           IXEH                 .    R
8108.18    .                                                                           IXEH                 .    R
8140.49    .                                                                           IWXH                 .    R
8172.80    .                                                                           IWXH                 .    R
8205.11    .                                                                           IWXH                 .    R
8237.42    .                                                                           I XH                 .    R
8269.73    .                                                                           I XH                 .    R
8302.04    .                                                                           I XH                 .    R
8334.35    .                                                                           I X                  .    R
8366.66    .                                                                           I X                  .    R
8398.97    .                                                                           I X                  .    R
           .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .
0          1903.94   1918.35   1932.75   1947.16   1961.56   1975.97   1990.38   2004.78   2019.19   2033.60   2048.00
```

1

N O T E S

1. GLOSSARY

I = INVERT ELEVATION
C = CRITICAL DEPTH
W = WATER SURFACE ELEVATION
H = HEIGHT OF CHANNEL
E = ENERGY GRADE LINE
X = CURVES CROSSING OVER
B = BRIDGE ENTRANCE OR EXIT
Y = WALL ENTRANCE OR EXIT

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

1

Ultimate Condition WSPG Model
Q = 910 cfs

Design flow model

STORM DRAIN ANALYSIS PLUS

Original version by Los Angeles County Public Works
Portions Copyrighted by CIVILSOFT, 1986, 1987, 1989

Version
Serial Number

Jun 17, 2005 9:11:47

Input file : alexdf.dat
Output file: alexdf.out

INPUT FILE LISTING

```
T1 Alexander Channel
T2 Start at Commerce Street FEMA Q=520 cfs
T3 WSPG file: ALEX2ALT.dat, by: JLW, VTN, 12/9/2003
SO  1000.00 1903.94 17
R   1275.87 1908.02 17      .015                        175.00 90.32
R   1375.87 1908.49 17      .015
TS  1455.61 1908.86 14      .015
R   1566.26 1909.38 13      .015                       1800.00  3.52
R   1726.34 1910.13 14      .015                       2600.00  3.53
R   2210.79 1912.39 14      .015
R   2275.26 1912.69 13      .015                        500.00  7.39
R   2334.33 1912.97 13      .015                        500.00  6.77
JX  2341.79 1913.00 13 15   .015  300.0         1913.00          45.0
TS  2511.79 1920.00 11      .015
R   2581.79 1920.54 12      .015
R   2701.79 1921.49 11      .015
R   2771.79 1922.03 12      .015
R   2916.79 1923.17 11      .015
R   3286.79 1926.07 10      .015
R   3305.34 1926.21  9      .015
R   3528.43 1927.96  9      .015
R   3550.13 1928.13  9      .015
JX  3661.79 1929.00  8 16   .015   90.0         1929.00          45.0
R   3781.79 1935.00  7      .015
R   3998.79 1937.60  7      .015
R   4370.29 1942.05  6      .015
R   4416.29 1942.61  7      .015
R   4491.79 1943.51  6      .015
R   4561.79 1944.35  7      .015
R   4766.79 1946.80  6      .015
TS  4801.79 1947.22  5      .015
TS  4866.79 1948.00  4      .015
JX  5004.74 1950.43  4 16   .015  170.0         1950.43          45.0
R   5256.79 1954.88  4      .015                        500.00 28.88
R   5276.79 1955.24  3      .015                        500.00  2.29
R   5376.79 1957.00  3      .015                        500.00 11.46
R   5582.38 1963.05  3      .015                        500.00 23.56
R   6148.38 1979.72  3      .015                        500.00 64.86
R   6446.79 1988.50  3      .015
R   6526.79 1992.50  3      .015
JX  6611.79 1996.75  3 15   .015  290.0         1996.75          45.0
R   6956.79 2014.00  3      .015
R   7456.79 2023.00  3      .015
R   7730.60 2034.08  3      .015
TS  7830.60 2038.13  2      .015
BX  7830.60 2038.13  1
R   7881.60 2039.00  1      .015
R   7955.67 2040.26  1      .015                         60.00 70.73
R   7976.50 2040.62  1      .015
R   8050.79 2041.88  1      .015                         60.00 70.94
R   8154.96 2043.00 17      .035
R   8398.97 2045.00 17      .035
SH  8398.97 2045.00 17      .035
1                                                        SP
```

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

0 CARD CODE	SECT NO	CHN TYPE	NO OF PIERS	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	3	1	1.00	4.00	30.00	.00	.00	.00										
CD	2	2	0	.00	7.00	30.00			.00										
CD	3	2	0	.00	7.00	12.00			.00										
CD	4	3	0	.00	7.00	12.00	.00	.00	.00										
CD	5	2	0	.00	7.00	14.60			.00										
CD	6	2	0	.00	9.00	16.00			.00										
CD	7	3	0	.00	7.75	16.00	.00	.00	.00										
CD	8	3	0	.00	5.50	16.00	.00	.00	.00										
CD	9	2	0	.00	9.50	16.00			.00										
CD	10	3	0	.00	7.00	16.00	.00	.00	.00										
CD	11	2	0	.00	10.00	16.00			.00										
CD	12	3	0	.00	8.75	16.00	.00	.00	.00										
CD	13	3	0	.00	7.00	20.00	.00	.00	.00										
CD	14	2	0	.00	11.00	20.00			.00										
CD	15	4			4.00														
CD	16	4			3.00														
CD	17	1	0	.00	3.00	28.00	3.00	3.00	.00										

ERROR MESSAGE NUMBER 7 IN SEQUENCE CHECKING THRU CHANNEL DEFINITION DATA
INVALID CARD CODE ENCOUNTERED WHILE PROCESSING CD AND PTS CARDS - CODE =

1 PAGE NO 1

0 WATER SURFACE PROFILE - TITLE CARD LISTING

0HEADING LINE NO 1 IS -
0 Alexander Channel
0HEADING LINE NO 2 IS -
0 Start at Commerce Street FEMA Q=520 cfs
0HEADING LINE NO 3 IS -
0 WSPG file: ALEX2ALT.dat, by: JLW, VTN, 12/9/2003

1 PAGE NO 2

0 WATER SURFACE PROFILE - ELEMENT CARD LISTING
0 ELEMENT NO 1 IS A SYSTEM OUTLET * * *

```
                    U/S DATA   STATION    INVERT  SECT                                          W S ELEV
                                 1000.00 1903.94   17                                              .00
0 ELEMENT NO   2 IS A REACH          *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                                    RADIUS  ANGLE  ANG PT  MAN H
                                 1275.87 1908.02   17              .015                                   175.00  90.32     .00      0
0 ELEMENT NO   3 IS A REACH          *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                                    RADIUS  ANGLE  ANG PT  MAN H
                                 1375.87 1908.49   17              .015                                     .00    .00     .00      0
0 ELEMENT NO   4 IS A TRANSITION     *        *     *
                    U/S DATA   STATION    INVERT  SECT              N
                                 1455.61 1908.86   14              .015
 WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
0 ELEMENT NO   5 IS A REACH          *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                                    RADIUS  ANGLE  ANG PT  MAN H
                                 1566.26 1909.38   13              .015                                  1800.00   3.52     .00      0
 WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
0 ELEMENT NO   6 IS A REACH          *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                                    RADIUS  ANGLE  ANG PT  MAN H
                                 1726.34 1910.13   14              .015                                  2600.00   3.53     .00      0
0 ELEMENT NO   7 IS A REACH          *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                                    RADIUS  ANGLE  ANG PT  MAN H
                                 2210.79 1912.39   14              .015                                     .00    .00     .00      0
 WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
0 ELEMENT NO   8 IS A REACH          *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                                    RADIUS  ANGLE  ANG PT  MAN H
                                 2275.26 1912.69   13              .015                                   500.00   7.39     .00      0
0 ELEMENT NO   9 IS A REACH          *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                                    RADIUS  ANGLE  ANG PT  MAN H
                                 2334.33 1912.97   13              .015                                   500.00   6.77     .00      0
0 ELEMENT NO  10 IS A JUNCTION       *        *     *        *                    *                *          *
                    U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3       Q4    INVERT-3 INVERT-4  PHI 3   PHI 4
                                 2341.79 1913.00   13    15     0   .015    300.0       .0  1913.00      .00  45.00     .00
0 ELEMENT NO  11 IS A TRANSITION     *        *     *
                    U/S DATA   STATION    INVERT  SECT              N
                                 2511.79 1920.00   11              .015
 WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
0 ELEMENT NO  12 IS A REACH          *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                                    RADIUS  ANGLE  ANG PT  MAN H
                                 2581.79 1920.54   12              .015                                     .00    .00     .00      0
1                                                                                                                    PAGE NO   3
0                          WATER SURFACE PROFILE - ELEMENT CARD LISTING
 WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
0 ELEMENT NO  13 IS A REACH          *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                                    RADIUS  ANGLE  ANG PT  MAN H
                                 2701.79 1921.49   11              .015                                     .00    .00     .00      0
 WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
0 ELEMENT NO  14 IS A REACH          *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                                    RADIUS  ANGLE  ANG PT  MAN H
                                 2771.79 1922.03   12              .015                                     .00    .00     .00      0
 WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
0 ELEMENT NO  15 IS A REACH          *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                                    RADIUS  ANGLE  ANG PT  MAN H
                                 2916.79 1923.17   11              .015                                     .00    .00     .00      0
 WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
0 ELEMENT NO  16 IS A REACH          *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                                    RADIUS  ANGLE  ANG PT  MAN H
                                 3286.79 1926.07   10              .015                                     .00    .00     .00      0
 WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
0 ELEMENT NO  17 IS A REACH          *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                                    RADIUS  ANGLE  ANG PT  MAN H
                                 3305.34 1926.21    9              .015                                     .00    .00     .00      0
0 ELEMENT NO  18 IS A REACH          *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                                    RADIUS  ANGLE  ANG PT  MAN H
                                 3528.43 1927.96    9              .015                                     .00    .00     .00      0
0 ELEMENT NO  19 IS A REACH          *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                                    RADIUS  ANGLE  ANG PT  MAN H
                                 3550.13 1928.13    9              .015                                     .00    .00     .00      0
0 ELEMENT NO  20 IS A JUNCTION       *        *     *        *                    *                *          *
                    U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3       Q4    INVERT-3 INVERT-4  PHI 3   PHI 4
                                 3661.79 1929.00    8    16     0   .015     90.0       .0  1929.00      .00  45.00     .00
 WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
0 ELEMENT NO  21 IS A REACH          *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                                    RADIUS  ANGLE  ANG PT  MAN H
                                 3781.79 1935.00    7              .015                                     .00    .00     .00      0
0 ELEMENT NO  22 IS A REACH          *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                                    RADIUS  ANGLE  ANG PT  MAN H
                                 3998.79 1937.60    7              .015                                     .00    .00     .00      0
 WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
0 ELEMENT NO  23 IS A REACH          *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                                    RADIUS  ANGLE  ANG PT  MAN H
                                 4370.29 1942.05    6              .015                                     .00    .00     .00      0
1                                                                                                                    PAGE NO   4
0                          WATER SURFACE PROFILE - ELEMENT CARD LISTING
 WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
0 ELEMENT NO  24 IS A REACH          *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                                    RADIUS  ANGLE  ANG PT  MAN H
                                 4416.29 1942.61    7              .015                                     .00    .00     .00      0
 WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
0 ELEMENT NO  25 IS A REACH          *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                                    RADIUS  ANGLE  ANG PT  MAN H
                                 4491.79 1943.51    6              .015                                     .00    .00     .00      0
 WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
0 ELEMENT NO  26 IS A REACH          *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                                    RADIUS  ANGLE  ANG PT  MAN H
                                 4561.79 1944.35    7              .015                                     .00    .00     .00      0
 WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
0 ELEMENT NO  27 IS A REACH          *        *     *
                    U/S DATA   STATION    INVERT  SECT              N                                    RADIUS  ANGLE  ANG PT  MAN H
                                 4766.79 1946.80    6              .015                                     .00    .00     .00      0
0 ELEMENT NO  28 IS A TRANSITION     *        *     *
                    U/S DATA   STATION    INVERT  SECT              N
                                 4801.79 1947.22    5              .015
0 ELEMENT NO  29 IS A TRANSITION     *        *     *
                    U/S DATA   STATION    INVERT  SECT              N
                                 4866.79 1948.00    4              .015
0 ELEMENT NO  30 IS A JUNCTION       *        *     *     *                    *                *          *
```

```
                    U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3       Q4     INVERT-3 INVERT-4  PHI 3   PHI 4
                               5004.74 1950.43    4    16     0   .015    170.0        .0  1950.43      .00  45.00     .00
0 ELEMENT NO  31 IS A REACH          *         *      *
                    U/S DATA   STATION    INVERT  SECT               N                                        RADIUS  ANGLE  ANG PT  MAN H
                               5256.79 1954.88    4                  .015                                     500.00  28.88     .00      0
 WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
0 ELEMENT NO  32 IS A REACH          *         *      *
                    U/S DATA   STATION    INVERT  SECT               N                                        RADIUS  ANGLE  ANG PT  MAN H
                               5276.79 1955.24    3                  .015                                     500.00   2.29     .00      0
0 ELEMENT NO  33 IS A REACH          *         *      *
                    U/S DATA   STATION    INVERT  SECT               N                                        RADIUS  ANGLE  ANG PT  MAN H
                               5376.79 1957.00    3                  .015                                     500.00  11.46     .00      0
0 ELEMENT NO  34 IS A REACH          *         *      *
                    U/S DATA   STATION    INVERT  SECT               N                                        RADIUS  ANGLE  ANG PT  MAN H
                               5582.38 1963.05    3                  .015                                     500.00  23.56     .00      0
1                                                                                                                                PAGE NO   5
0                                WATER SURFACE PROFILE - ELEMENT CARD LISTING
0 ELEMENT NO  35 IS A REACH          *         *      *
                    U/S DATA   STATION    INVERT  SECT               N                                        RADIUS  ANGLE  ANG PT  MAN H
                               6148.38 1979.72    3                  .015                                     500.00  64.86     .00      0
0 ELEMENT NO  36 IS A REACH          *         *      *
                    U/S DATA   STATION    INVERT  SECT               N                                        RADIUS  ANGLE  ANG PT  MAN H
                               6446.79 1988.50    3                  .015                                        .00    .00     .00      0
0 ELEMENT NO  37 IS A REACH          *         *      *
                    U/S DATA   STATION    INVERT  SECT               N                                        RADIUS  ANGLE  ANG PT  MAN H
                               6526.79 1992.50    3                  .015                                        .00    .00     .00      0
0 ELEMENT NO  38 IS A JUNCTION       *         *      *      *                    *                    *                 *
                    U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3       Q4     INVERT-3 INVERT-4  PHI 3   PHI 4
                               6611.79 1996.75    3    15     0   .015    290.0        .0  1996.75      .00  45.00     .00
0 ELEMENT NO  39 IS A REACH          *         *      *
                    U/S DATA   STATION    INVERT  SECT               N                                        RADIUS  ANGLE  ANG PT  MAN H
                               6956.79 2014.00    3                  .015                                        .00    .00     .00      0
0 ELEMENT NO  40 IS A REACH          *         *      *
                    U/S DATA   STATION    INVERT  SECT               N                                        RADIUS  ANGLE  ANG PT  MAN H
                               7456.79 2023.00    3                  .015                                        .00    .00     .00      0
0 ELEMENT NO  41 IS A REACH          *         *      *
                    U/S DATA   STATION    INVERT  SECT               N                                        RADIUS  ANGLE  ANG PT  MAN H
                               7730.60 2034.08    3                  .015                                        .00    .00     .00      0
0 ELEMENT NO  42 IS A TRANSITION     *         *      *
                    U/S DATA   STATION    INVERT  SECT               N
                               7830.60 2038.13    2                  .015
0 ELEMENT NO  43 IS A BRIDGE EXIT                   *
                    U/S DATA   STATION    INVERT  SECT
                               7830.60 2038.13    1
0 ELEMENT NO  44 IS A REACH          *         *      *
                    U/S DATA   STATION    INVERT  SECT               N                                        RADIUS  ANGLE  ANG PT  MAN H
                               7881.60 2039.00    1                  .015                                        .00    .00     .00      0
0 ELEMENT NO  45 IS A REACH          *         *      *
                    U/S DATA   STATION    INVERT  SECT               N                                        RADIUS  ANGLE  ANG PT  MAN H
                               7955.67 2040.26    1                  .015                                        .00    .00     .00      0
0 ELEMENT NO  46 IS A REACH          *         *      *
                    U/S DATA   STATION    INVERT  SECT               N                                        RADIUS  ANGLE  ANG PT  MAN H
                               7976.50 2040.62    1                  .015                                        .00    .00     .00      0
1                                                                                                                                PAGE NO   6
0                                WATER SURFACE PROFILE - ELEMENT CARD LISTING
0 ELEMENT NO  47 IS A REACH          *         *      *
                    U/S DATA   STATION    INVERT  SECT               N                                        RADIUS  ANGLE  ANG PT  MAN H
                               8050.79 2041.88    1                  .015                                      60.00  70.94     .00      0
 WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
0 ELEMENT NO  48 IS A REACH          *         *      *
                    U/S DATA   STATION    INVERT  SECT               N                                        RADIUS  ANGLE  ANG PT  MAN H
                               8154.96 2043.00   17                  .035                                        .00    .00     .00      0
0 ELEMENT NO  49 IS A REACH          *         *      *
                    U/S DATA   STATION    INVERT  SECT               N                                        RADIUS  ANGLE  ANG PT  MAN H
                               8398.97 2045.00   17                  .035                                        .00    .00     .00      0
0 ELEMENT NO  50 IS A SYSTEM HEADWORKS                *                        *
                    U/S DATA   STATION    INVERT  SECT                                                W S ELEV
                               8398.97 2045.00   17                                                       .00
 NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING

  ** WARNING NO. 2 ** - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS, W.S.ELEV = INV + DC
1                                                                                                                                PAGE    1
                                                WATER SURFACE PROFILE LISTING

                          Alexander Channel
                          Start at Commerce Street FEMA Q=520 cfs
                          WSPG file: ALEX2ALT.dat, by: JLW, VTN, 12/9/2003
0 STATION     INVERT   DEPTH     W.S.          Q       VEL      VEL      ENERGY   SUPER  CRITICAL          HGT/    BASE/     ZL    NO  AVBPR
                ELEV   OF FLOW    ELEV                         HEAD    GRD.EL.   ELEV    DEPTH                DIA     ID NO.          PIER
0 L/ELEM        SO                                          SF AVE      HF                    NORM DEPTH                        ZR
*************************************************************************************************************************************
0  1000.00  1903.94      2.57   1906.51    1760.0    19.16     5.71   1912.22   3.68     4.24                 3.00    28.00   3.00    0     .00
0    20.51   .01479                                        .01411      .29                        2.54                          3.00
0  1020.51  1904.24      2.57   1906.82    1760.0    19.14     5.69   1912.51   3.67     4.24                 3.00    28.00   3.00    0     .00
0   255.36   .01479                                        .01317     3.36                        2.54                          3.00
0  1275.87  1908.02      2.68   1910.70    1760.0    18.25     5.17   1915.87    .00     4.24                 3.00    28.00   3.00    0     .00
0     7.12   .00470                                        .01237      .09                        3.49                          3.00
0  1282.99  1908.05      2.66   1910.72    1760.0    18.37     5.24   1915.96    .00     4.24                 3.00    28.00   3.00    0     .00
0    48.38   .00470                                        .01343      .65                        3.49                          3.00
0  1331.36  1908.28      2.56   1910.84    1760.0    19.27     5.77   1916.61    .00     4.24                 3.00    28.00   3.00    0     .00
0    44.51   .00470                                        .01545      .69                        3.49                          3.00
0  1375.87  1908.49      2.46   1910.95    1760.0    20.21     6.35   1917.30    .00     4.24                 3.00    28.00   3.00    0     .00
0TRANS STR   .00464                                        .01080      .86                                                   3.00
0  1455.61  1908.86      5.40   1914.26    1760.0    16.29     4.12   1918.39    .00     6.22                 7.00    20.00    .00    0     .00
0   110.65   .00470                                        .00521      .58                        5.55                          .00
0  1566.26  1909.38      5.30   1914.68    1760.0    16.59     4.28   1918.96    .07     6.22                11.00    20.00    .00    0     .00
0   160.08   .00469                                        .00571      .91                        5.55                          .00
0  1726.34  1910.13      5.08   1915.21    1760.0    17.34     4.67   1919.88    .00     6.22                11.00    20.00    .00    0     .00
0    30.12   .00466                                        .00616      .19                        5.56                          .00
0  1756.46  1910.27      5.02   1915.29    1760.0    17.52     4.77   1920.06    .00     6.22                11.00    20.00    .00    0     .00
0   118.60   .00466                                        .00671      .80                        5.56                          .00
0  1875.06  1910.82      4.79   1915.61    1760.0    18.37     5.24   1920.86    .00     6.22                11.00    20.00    .00    0     .00
0    99.04   .00466                                        .00771      .76                        5.56                          .00
1                                                                                                                                PAGE    2
                                                WATER SURFACE PROFILE LISTING

                          Alexander Channel
                          Start at Commerce Street FEMA Q=520 cfs
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WSPG file: ALEX2ALT.dat, by: JLW, VTN, 12/9/2003

0 STATION / 0 L/ELEM	INVERT ELEV / SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD / SF AVE	ENERGY GRD.EL. / HF	SUPER ELEV	CRITICAL DEPTH / NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL / ZR	NO PIER	AVBPR
0 1974.10	1911.29	4.57	1915.85	1760.0	19.27	5.77	1921.62	.00	6.22	11.00	20.00	.00	0	.00
0 86.88	.00466					.00886	.77		5.56			.00		
0 2060.99	1911.69	4.35	1916.05	1760.0	20.21	6.35	1922.39	.00	6.22	11.00	20.00	.00	0	.00
0 78.24	.00466					.01019	.80		5.56			.00		
0 2139.22	1912.06	4.15	1916.21	1760.0	21.19	6.98	1923.19	.00	6.22	11.00	20.00	.00	0	.00
0 71.57	.00466					.01172	.84		5.56			.00		
0 2210.79	1912.39	3.96	1916.35	1760.0	22.23	7.68	1924.03	.00	6.22	7.00	20.00	.00	0	.00
0 64.47	.00465					.01347	.87		5.57			.00		
0 2275.26	1912.69	3.78	1916.47	1760.0	23.29	8.43	1924.90	.00	6.22	7.00	20.00	.00	0	.00
0 59.07	.00474					.01543	.91		5.53			.00		
0 2334.33	1912.97	3.61	1916.58	1760.0	24.37	9.23	1925.81	.00	6.22	7.00	20.00	.00	0	.00
0JUNCT STR	.00403					.02132	.16					.00		
0 2341.79	1913.00	2.74	1915.74	1460.0	26.68	11.06	1926.80	.00	5.49	7.00	20.00	.00	0	.00
0TRANS STR	.04118					.01707	2.90					.00		
0 2511.79	1920.00	4.91	1924.91	1460.0	18.58	5.36	1930.28	.00	6.37	8.75	16.00	.00	0	.00
0 70.00	.00771					.00802	.56		4.97			.00		
0 2581.79	1920.54	4.89	1925.43	1460.0	18.65	5.40	1930.84	.00	6.37	10.00	16.00	.00	0	.00
0 120.00	.00792					.00810	.97		4.92			.00		
0 2701.79	1921.49	4.87	1926.36	1460.0	18.72	5.45	1931.81	.00	6.37	8.75	16.00	.00	0	.00
0 70.00	.00771					.00822	.58		4.97			.00		
0 2771.79	1922.03	4.85	1926.88	1460.0	18.83	5.51	1932.39	.00	6.37	10.00	16.00	.00	0	.00
0 145.00	.00786					.00844	1.22		4.94			.00		

1 PAGE 3

WATER SURFACE PROFILE LISTING

Alexander Channel
Start at Commerce Street FEMA Q=520 cfs
WSPG file: ALEX2ALT.dat, by: JLW, VTN, 12/9/2003

0 STATION / 0 L/ELEM	INVERT ELEV / SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD / SF AVE	ENERGY GRD.EL. / HF	SUPER ELEV	CRITICAL DEPTH / NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL / ZR	NO PIER	AVBPR
0 2916.79	1923.17	4.78	1927.95	1460.0	19.08	5.66	1933.61	.00	6.37	7.00	16.00	.00	0	.00
0 203.81	.00784					.00905	1.85		4.94			.00		
0 3120.60	1924.77	4.62	1929.38	1460.0	19.77	6.07	1935.46	.00	6.37	7.00	16.00	.00	0	.00
0 166.19	.00784					.01020	1.69		4.94			.00		
0 3286.79	1926.07	4.40	1930.47	1460.0	20.73	6.68	1937.15	.00	6.37	9.50	16.00	.00	0	.00
0 18.55	.00755					.01100	.20		5.01			.00		
0 3305.34	1926.21	4.37	1930.58	1460.0	20.88	6.77	1937.35	.00	6.37	9.50	16.00	.00	0	.00
0 .00	.00755					.01111	.00		5.01			.00		
0 3305.34	1926.21	4.37	1930.58	1460.0	20.88	6.77	1937.35	.00	6.37	9.50	16.00	.00	0	.00
0 18.86	.00784					.01123	.21		4.94			.00		
0 3324.20	1926.36	4.34	1930.70	1460.0	21.02	6.87	1937.57	.00	6.37	9.50	16.00	.00	0	.00
0 112.14	.00784					.01217	1.36		4.94			.00		
0 3436.34	1927.24	4.14	1931.38	1460.0	22.05	7.56	1938.93	.00	6.37	9.50	16.00	.00	0	.00
0 92.09	.00784					.01396	1.29		4.94			.00		
0 3528.43	1927.96	3.95	1931.91	1460.0	23.13	8.31	1940.22	.00	6.37	9.50	16.00	.00	0	.00
0 21.70	.00784					.01519	.33		4.94			.00		
0 3550.13	1928.13	3.90	1932.03	1460.0	23.41	8.52	1940.55	.00	6.37	9.50	16.00	.00	0	.00
0JUNCT STR	.00779					.02049	2.29					.00		
0 3661.79	1929.00	3.14	1932.14	1370.0	27.23	11.52	1943.67	.00	6.11	7.75	16.00	.00	0	.00
0 13.12	.05000					.02490	.33		2.51			.00		
0 3674.91	1929.66	3.20	1932.85	1370.0	26.78	11.15	1944.00	.00	6.11	7.75	16.00	.00	0	.00
0 31.40	.05000					.02270	.71		2.51			.00		

1 PAGE 4

WATER SURFACE PROFILE LISTING

Alexander Channel
Start at Commerce Street FEMA Q=520 cfs
WSPG file: ALEX2ALT.dat, by: JLW, VTN, 12/9/2003

0 STATION / 0 L/ELEM	INVERT ELEV / SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD / SF AVE	ENERGY GRD.EL. / HF	SUPER ELEV	CRITICAL DEPTH / NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL / ZR	NO PIER	AVBPR
0 3706.31	1931.23	3.35	1934.58	1370.0	25.53	10.13	1944.71	.00	6.11	7.75	16.00	.00	0	.00
0 25.03	.05000					.01973	.49		2.51			.00		
0 3731.33	1932.48	3.52	1935.99	1370.0	24.35	9.21	1945.21	.00	6.11	7.75	16.00	.00	0	.00
0 20.27	.05000					.01716	.35		2.51			.00		
0 3751.61	1933.49	3.69	1937.18	1370.0	23.21	8.37	1945.55	.00	6.11	7.75	16.00	.00	0	.00
0 16.58	.05000					.01494	.25		2.51			.00		
0 3768.19	1934.32	3.87	1938.19	1370.0	22.13	7.61	1945.80	.00	6.11	7.75	16.00	.00	0	.00
0 13.60	.05000					.01301	.18		2.51			.00		
0 3781.79	1935.00	4.06	1939.06	1370.0	21.10	6.92	1945.98	.00	6.11	7.75	16.00	.00	0	.00
0 217.00	.01198					.01220	2.65		4.07			.00		
0 3998.79	1937.60	4.04	1941.64	1370.0	21.21	6.99	1948.63	.00	6.11	9.00	16.00	.00	0	.00
0 371.50	.01198					.01289	4.79		4.07			.00		
0 4370.29	1942.05	3.91	1945.96	1370.0	21.90	7.45	1953.41	.00	6.11	7.75	16.00	.00	0	.00
0 46.00	.01217					.01361	.63		4.05			.00		
0 4416.29	1942.61	3.89	1946.50	1370.0	22.03	7.54	1954.04	.00	6.11	9.00	16.00	.00	0	.00
0 75.50	.01192					.01401	1.06		4.08			.00		
0 4491.79	1943.51	3.83	1947.34	1370.0	22.34	7.76	1955.10	.00	6.11	7.75	16.00	.00	0	.00
0 70.00	.01200					.01461	1.02		4.07			.00		
0 4561.79	1944.35	3.77	1948.12	1370.0	22.69	8.00	1956.12	.00	6.11	9.00	16.00	.00	0	.00
0 75.21	.01195					.01540	1.16		4.08			.00		
0 4637.00	1945.25	3.70	1948.95	1370.0	23.16	8.34	1957.28	.00	6.11	9.00	16.00	.00	0	.00
0 129.79	.01195					.01705	2.21		4.08			.00		

1 PAGE 5

WATER SURFACE PROFILE LISTING

Alexander Channel
Start at Commerce Street FEMA Q=520 cfs
WSPG file: ALEX2ALT.dat, by: JLW, VTN, 12/9/2003

0 STATION / 0 L/ELEM	INVERT ELEV / SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD / SF AVE	ENERGY GRD.EL. / HF	SUPER ELEV	CRITICAL DEPTH / NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL / ZR	NO PIER	AVBPR
0 4766.79	1946.80	3.53	1950.33	1370.0	24.29	9.17	1959.49	.00	6.11	9.00	16.00	.00	0	.00
0TRANS STR	.01200					.01764	.62					.00		
0 4801.79	1947.22	3.90	1951.12	1370.0	24.08	9.01	1960.13	.00	6.49	7.00	14.60	.00	0	.00
0TRANS STR	.01200					.01571	1.02					.00		
0 4866.79	1948.00	4.95	1952.95	1370.0	23.09	8.28	1961.23	.00	7.00	7.00	12.00	.00	0	.00
0JUNCT STR	.01761					.01749	2.41					.00		
0 5004.74	1950.43	3.94	1954.37	1200.0	25.35	9.99	1964.36	.00	6.77	7.00	12.00	.00	0	.00
0 105.88	.01766					.02131	2.26		4.17			.00		

0	5110.62	1952.30	3.85	1956.15	1200.0	25.95	10.47	1966.62	.00	6.77		7.00	12.00	.00	0	.00
0	146.17	.01766					.02359	3.45			4.17			.00		
0	5256.79	1954.88	3.67	1958.55	1200.0	27.22	11.51	1970.07	.55	6.77		7.00	12.00	.00	0	.00
0	20.00	.01800					.02545	.51			4.14			.00		
0	5276.79	1955.24	3.65	1958.89	1200.0	27.43	11.69	1970.58	.56	6.77		7.00	12.00	.00	0	.00
0	100.00	.01760					.02759	2.76			4.17			.00		
0	5376.79	1957.00	3.48	1960.48	1200.0	28.77	12.86	1973.34	.62	6.77		7.00	12.00	.00	0	.00
0	205.59	.02943					.02946	6.06			3.48			.00		
0	5582.38	1963.05	3.48	1966.53	1200.0	28.77	12.86	1979.39	.62	6.77		7.00	12.00	.00	0	.00
0	40.81	.02945					.02946	1.20			3.48			.00		
0	5623.19	1964.25	3.48	1967.73	1200.0	28.77	12.86	1980.59	.62	6.77		7.00	12.00	.00	0	.00
0	525.19	.02945					.03086	16.21			3.48			.00		
0	6148.38	1979.72	3.37	1983.09	1200.0	29.70	13.71	1996.80	.00	6.77		7.00	12.00	.00	0	.00
0	116.70	.02942					.03308	3.86			3.48			.00		

1 PAGE 6

WATER SURFACE PROFILE LISTING

Alexander Channel
Start at Commerce Street FEMA Q=520 cfs
WSPG file: ALEX2ALT.dat, by: JLW, VTN, 12/9/2003

0	STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH	NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
0	L/ELEM	SO					SF AVE	HF						ZR		
0	6265.08	1983.15	3.31	1986.46	1200.0	30.22	14.20	2000.66	.00	6.77		7.00	12.00	.00	0	.00
0	181.71	.02942					.03639	6.61			3.48			.00		
0	6446.79	1988.50	3.15	1991.65	1200.0	31.70	15.62	2007.27	.00	6.77		7.00	12.00	.00	0	.00
0	80.00	.05000					.03680	2.94			2.89			.00		
0	6526.79	1992.50	3.28	1995.78	1200.0	30.48	14.44	2010.22	.00	6.77		7.00	12.00	.00	0	.00
0	JUNCT STR	.05000					.03940	3.35						.00		
0	6611.79	1996.75	2.50	1999.25	910.0	30.36	14.32	2013.57	.00	5.63		7.00	12.00	.00	0	.00
0	129.95	.05000					.04131	5.37			2.39			.00		
0	6741.74	2003.25	2.61	2005.86	910.0	29.01	13.08	2018.94	.00	5.63		7.00	12.00	.00	0	.00
0	76.09	.05000					.03605	2.74			2.39			.00		
0	6817.83	2007.05	2.74	2009.79	910.0	27.66	11.89	2021.68	.00	5.63		7.00	12.00	.00	0	.00
0	50.84	.05000					.03138	1.60			2.39			.00		
0	6868.68	2009.59	2.88	2012.47	910.0	26.37	10.81	2023.28	.00	5.63		7.00	12.00	.00	0	.00
0	37.14	.05000					.02732	1.01			2.39			.00		
0	6905.81	2011.45	3.02	2014.47	910.0	25.14	9.82	2024.29	.00	5.63		7.00	12.00	.00	0	.00
0	28.48	.05000					.02381	.68			2.39			.00		
0	6934.30	2012.88	3.16	2016.04	910.0	23.97	8.93	2024.97	.00	5.63		7.00	12.00	.00	0	.00
0	22.49	.05000					.02076	.47			2.39			.00		
0	6956.79	2014.00	3.32	2017.32	910.0	22.86	8.12	2025.44	.00	5.63		7.00	12.00	.00	0	.00
0	.00	.05000					.01935	.00			2.39			.00		
0	6956.79	2014.00	3.32	2017.32	910.0	22.86	8.12	2025.44	.00	5.63		7.00	12.00	.00	0	.00
0	132.47	.01800					.01988	2.63			3.40			.00		

1 PAGE 7

WATER SURFACE PROFILE LISTING

Alexander Channel
Start at Commerce Street FEMA Q=520 cfs
WSPG file: ALEX2ALT.dat, by: JLW, VTN, 12/9/2003

0	STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH	NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
0	L/ELEM	SO					SF AVE	HF						ZR		
0	7089.26	2016.38	3.26	2019.64	910.0	23.29	8.43	2028.07	.00	5.63		7.00	12.00	.00	0	.00
0	176.58	.01800					.02192	3.87			3.40			.00		
0	7265.85	2019.56	3.10	2022.67	910.0	24.43	9.27	2031.94	.00	5.63		7.00	12.00	.00	0	.00
0	109.66	.01800					.02514	2.76			3.40			.00		
0	7375.51	2021.54	2.96	2024.50	910.0	25.62	10.20	2034.70	.00	5.63		7.00	12.00	.00	0	.00
0	81.28	.01800					.02886	2.35			3.40			.00		
0	7456.79	2023.00	2.82	2025.82	910.0	26.87	11.22	2037.04	.00	5.63		7.00	12.00	.00	0	.00
0	.00	.01800					.03085	.00			3.40			.00		
0	7456.79	2023.00	2.82	2025.82	910.0	26.87	11.22	2037.04	.00	5.63		7.00	12.00	.00	0	.00
0	68.68	.04047					.02909	2.00			2.57			.00		
0	7525.47	2025.78	2.94	2028.72	910.0	25.77	10.32	2039.04	.00	5.63		7.00	12.00	.00	0	.00
0	53.36	.04047					.02557	1.36			2.57			.00		
0	7578.84	2027.94	3.09	2031.02	910.0	24.57	9.38	2040.41	.00	5.63		7.00	12.00	.00	0	.00
0	38.65	.04047					.02229	.86			2.57			.00		
0	7617.49	2029.50	3.24	2032.74	910.0	23.43	8.53	2041.27	.00	5.63		7.00	12.00	.00	0	.00
0	29.38	.04047					.01945	.57			2.57			.00		
0	7646.87	2030.69	3.39	2034.09	910.0	22.34	7.76	2041.84	.00	5.63		7.00	12.00	.00	0	.00
0	22.96	.04047					.01697	.39			2.57			.00		
0	7669.83	2031.62	3.56	2035.18	910.0	21.30	7.05	2042.23	.00	5.63		7.00	12.00	.00	0	.00
0	18.22	.04047					.01483	.27			2.57			.00		
0	7688.05	2032.36	3.73	2036.09	910.0	20.31	6.41	2042.50	.00	5.63		7.00	12.00	.00	0	.00
0	14.56	.04047					.01296	.19			2.57			.00		

1 PAGE 8

WATER SURFACE PROFILE LISTING

Alexander Channel
Start at Commerce Street FEMA Q=520 cfs
WSPG file: ALEX2ALT.dat, by: JLW, VTN, 12/9/2003

0	STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH	NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
0	L/ELEM	SO					SF AVE	HF						ZR		
0	7702.61	2032.95	3.92	2036.86	910.0	19.36	5.83	2042.69	.00	5.63		7.00	12.00	.00	0	.00
0	11.62	.04047					.01134	.13			2.57			.00		
0	7714.23	2033.42	4.11	2037.53	910.0	18.46	5.30	2042.82	.00	5.63		7.00	12.00	.00	0	.00
0	9.20	.04047					.00993	.09			2.57			.00		
0	7723.44	2033.79	4.31	2038.10	910.0	17.60	4.82	2042.91	.00	5.63		7.00	12.00	.00	0	.00
0	7.16	.04047					.00870	.06			2.57			.00		
0	7730.60	2034.08	4.52	2038.60	910.0	16.78	4.38	2042.98	.00	5.63		7.00	12.00	.00	0	.00
0	TRANS STR	.04050					.01088	1.09						.00		
0	7830.60	2038.13	1.87	2040.00	910.0	16.23	4.09	2044.09	.00	3.06		7.00	30.00	.00	0	.00
0	BRIDGE EXIT													.00		
0	7830.60	2038.13	1.95	2040.08	910.0	16.07	4.01	2044.10	.00	3.13		4.00	30.00	.00	1	1.00
0	51.00	.01706					.01429	.73			1.86			.00		
0	7881.60	2039.00	2.00	2041.00	910.0	15.69	3.82	2044.82	.00	3.13		4.00	30.00	.00	1	1.00
0	24.28	.01701					.01344	.33			1.87			.00		
0	7905.88	2039.41	2.03	2041.45	910.0	15.44	3.71	2045.15	.00	3.13		4.00	30.00	.00	1	1.00
0	49.79	.01701					.01224	.61			1.87			.00		
0	7955.67	2040.26	2.13	2042.39	910.0	14.72	3.37	2045.76	.00	3.13		4.00	30.00	.00	1	1.00
0	20.83	.01728					.01085	.23			1.86			.00		
0	7976.50	2040.62	2.20	2042.82	910.0	14.28	3.17	2045.99	.00	3.13		4.00	30.00	.00	1	1.00
0	.00	.01728					.01035	.00			1.86			.00		
0	7976.50	2040.62	2.20	2042.82	910.0	14.28	3.17	2045.99	.00	3.13		4.00	30.00	.00	1	1.00

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0    11.17   .01696                                    .01006      .11                    1.87                    .00
1                                                                                                                  PAGE    9
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WATER SURFACE PROFILE LISTING

Alexander Channel
Start at Commerce Street FEMA Q=520 cfs
WSPG file: ALEX2ALT.dat, by: JLW, VTN, 12/9/2003

STATION	INVERT ELEV / L/ELEM	DEPTH OF FLOW / SO	W.S. ELEV	Q	VEL	VEL HEAD / SF AVE	ENERGY GRD.EL. / HF	SUPER ELEV	CRITICAL DEPTH / NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL / ZR	NO PIER	AVBPR
7987.67	2040.81	2.24	2043.05	910.0	14.01	3.05	2046.10	.00	3.13	4.00	30.00	.00	1	1.00
21.40	.01696					.00912	.20		1.87			.00		
8009.07	2041.17	2.35	2043.52	910.0	13.36	2.77	2046.29	.00	3.13	4.00	30.00	.00	1	1.00
15.16	.01696					.00790	.12		1.87			.00		
8024.22	2041.43	2.46	2043.89	910.0	12.73	2.52	2046.41	.00	3.13	4.00	30.00	.00	1	1.00
10.76	.01696					.00685	.07		1.87			.00		
8034.99	2041.61	2.58	2044.20	910.0	12.14	2.29	2046.49	.00	3.13	4.00	30.00	.00	1	1.00
7.45	.01696					.00594	.04		1.87			.00		
8042.44	2041.74	2.71	2044.45	910.0	11.58	2.08	2046.53	.00	3.13	4.00	30.00	.00	1	1.00
4.83	.01696					.00516	.02		1.87			.00		
8047.28	2041.82	2.84	2044.66	910.0	11.04	1.89	2046.56	.00	3.13	4.00	30.00	.00	1	1.00
2.67	.01696					.00448	.01		1.87			.00		
8049.95	2041.87	2.98	2044.85	910.0	10.52	1.72	2046.57	.00	3.13	4.00	30.00	.00	1	1.00
.84	.01696					.00389	.00		1.87			.00		
8050.79	2041.88	3.13	2045.01	910.0	10.03	1.56	2046.57	.00	3.13	4.00	30.00	.00	1	1.00
8050.79	2041.88	2.87	2044.75	910.0	8.65	1.16	2045.92	.00	2.87	3.00	28.00	3.00	0	.00
3.18	.01075					.01295	.04		3.08			3.00		
8053.97	2041.91	2.99	2044.90	910.0	8.25	1.06	2045.96	.00	2.87	3.00	28.00	3.00	0	.00
24.10	.01075					.01141	.27		3.08			3.00		
8078.07	2042.17	3.08	2045.25	910.0	7.93	.98	2046.23	.00	2.87	3.00	28.00	3.00	0	.00
76.89	.01075					.01076	.83		3.08			3.00		
8154.96	2043.00	3.08	2046.08	910.0	7.93	.98	2047.06	.00	2.87	3.00	28.00	3.00	0	.00

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1                                                                                                                  PAGE   10
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WATER SURFACE PROFILE LISTING

Alexander Channel
Start at Commerce Street FEMA Q=520 cfs
WSPG file: ALEX2ALT.dat, by: JLW, VTN, 12/9/2003

STATION	INVERT ELEV / L/ELEM	DEPTH OF FLOW / SO	W.S. ELEV	Q	VEL	VEL HEAD / SF AVE	ENERGY GRD.EL. / HF	SUPER ELEV	CRITICAL DEPTH / NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL / ZR	NO PIER	AVBPR
16.40	.00820					.01007	.17		3.32			3.00		
8171.36	2043.13	3.20	2046.33	910.0	7.56	.89	2047.22	.00	2.87	3.00	28.00	3.00	0	.00
70.39	.00820					.00879	.62		3.32			3.00		
8241.75	2043.71	3.32	2047.03	910.0	7.22	.81	2047.84	.00	2.87	3.00	28.00	3.00	0	.00
157.22	.00820					.00820	1.29		3.32			3.00		
8398.97	2045.00	3.32	2048.32	910.0	7.22	.81	2049.13	.00	2.87	3.00	28.00	3.00	0	.00

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1
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Alexander Channel
Start at Commerce Street FEMA Q=520 cfs
WSPG file: ALEX2ALT.dat, by: JLW, VTN, 12/9/2003

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      .         .         .         .         .         .         .         .         .         .         .
1000.00    .IWX  E                                                                                      .   R
1036.09    .IWHC E                                                                                      .   R
1072.19    .                                                                                            .
1108.28    .                                                                                            .
1144.37    .                                                                                            .
1180.46    .                                                                                            .
1216.56    .                                                                                            .
1252.65    .                                                                                            .
1288.74    .  I XC  E                                                                                   .   R
1324.83    .  I XC  E                                                                                   .   R
1360.93    .  I WX  E                                                                                   .   R
1397.02    .   IWHC  E                                                                                  .   TX
1433.11    .                                                                                            .
1469.20    .   I   XHE                                                                                  .   R
1505.30    .                                                                                            .
1541.39    .                                                                                            .
1577.48    .   I   WC EH                                                                                .   R
1613.57    .                                                                                            .
1649.67    .                                                                                            .
1685.76    .                                                                                            .
1721.85    .                                                                                            .
1757.94    .    I  WC EH                                                                                .   R
1794.04    .    I  WC  X                                                                                .   R
1830.13    .                                                                                            .
1866.22    .                                                                                            .
1902.31    .    I   WC EH                                                                               .   R
1938.41    .                                                                                            .
1974.50    .     I  WC  X                                                                               .   R
2010.59    .                                                                                            .
2046.68    .                                                                                            .
2082.78    .     I  WC  X                                                                               .   R
2118.87    .                                                                                            .
2154.96    .     I  WC   X                                                                              .   R
2191.05    .                                                                                            .
2227.15    .     I  W X  E                                                                              .   R
2263.24    .                                                                                            .
2299.33    .      I W X   E                                                                             .   R
2335.42    .      I W CH   E                                                                            .   JX
2371.52    .      I W CH   E                                                                            .   TX
2407.61    .                                                                                            .
2443.70    .                                                                                            .
2479.79    .                                                                                            .
2515.89    .           I  WC HE                                                                         .   R
2551.98    .                                                                                            .
2588.07    .           I  WC  X                                                                         .   R
2624.16    .                                                                                            .
2660.26    .                                                                                            .
2696.35    .                                                                                            .
2732.44    .            I  WC HE                                                                        .   R
2768.53    .                                                                                            .
2804.63    .            I  WC  X                                                                        .   R
2840.72    .                                                                                            .
2876.81    .                                                                                            .
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2912.90    .                                                                .
2949.00    .          I  WCH E                                              .  R
2985.09    .                                                                .
3021.18    .                                                                .
3057.27    .                                                                .
3093.37    .                                                                .
3129.46    .           I  WCH E                                             .  R
3165.55    .                                                                .
3201.64    .                                                                .
3237.74    .                                                                .
3273.83    .                                                                .
3309.92    .            I  WC HE                                            .  R
3346.01    .            I  WC H E                                           .  R
3382.11    .            I  WC H E                                           .  R
3418.20    .            I  WC H E                                           .  R
3454.29    .             I W C H E                                          .  R
3490.39    .                                                                .
3526.48    .                                                                .
3562.57    .            I  WC  HE                                           .  R
3598.66    .            I  W C H E                                          .  JX
3634.76    .                                                                .
3670.85    .             I W CH    E                                        .  R
3706.94    .             I W C H   E                                        .  R
3743.03    .              I  WC H   E                                       .  R
3779.13    .               I  WCH   E                                       .  R
3815.22    .                I W CH  E                                       .  R
3851.31    .                I  W CH E                                       .  R
3887.40    .                 I  WCH E                                       .  R
3923.50    .                                                                .
3959.59    .                                                                .
3995.68    .                                                                .
4031.77    .                    I W C HE                                    .  R
4067.87    .                                                                .
4103.96    .                                                                .
4140.05    .                                                                .
4176.14    .                                                                .
4212.24    .                                                                .
4248.33    .                                                                .
4284.42    .                                                                .
4320.51    .                                                                .
4356.61    .                                                                .
4392.70    .                  I W CH  E                                     .  R
4428.79    .                  I  WC H E                                     .  R
4464.88    .                                                                .
4500.98    .                   I W CH  E                                    .  R
4537.07    .                                                                .
4573.16    .                   I  W C HE                                    .  R
4609.25    .                                                                .
4645.35    .                    I W C H E                                   .  R
4681.44    .                                                                .
4717.53    .                                                                .
4753.62    .                                                                .
4789.72    .                     I W C H  E                                 .  TX
4825.81    .                     I  W X   E                                 .  TX
4861.90    .                                                                .
4897.99    .                      I  W X   E                                .  JX
4934.09    .                                                                .
4970.18    .                                                                .
5006.27    .                        I W X    E                              .  R
5042.36    .                                                                .
5078.46    .                                                                .
5114.55    .                         I W CH    E                            .  R
5150.64    .                                                                .
5186.73    .                                                                .
5222.83    .                                                                .
5258.92    .                          I W X     E                           .  R
5295.01    .                          I W CH    E                           .  R
5331.10    .                                                                .
5367.20    .                                                                .
5403.29    .                           I W  X     E                         .  R
5439.38    .                                                                .
5475.47    .                                                                .
5511.57    .                                                                .
5547.66    .                                                                .
5583.75    .                              I  W X     E                      .  R
5619.84    .                                                                .
5655.94    .                               I W  X     E                     .  R
5692.03    .                                                                .
5728.12    .                                                                .
5764.21    .                                                                .
5800.31    .                                                                .
5836.40    .                                                                .
5872.49    .                                                                .
5908.58    .                                                                .
5944.68    .                                                                .
5980.77    .                                                                .
6016.86    .                                                                .
6052.96    .                                                                .
6089.05    .                                                                .
6125.14    .                                                                .
6161.23    .                                    I W CH     E                .  R
6197.33    .                                                                .
6233.42    .                                                                .
6269.51    .                                     I W  X     E               .  R
6305.60    .                                                                .
6341.70    .                                                                .
6377.79    .                                                                .
6413.88    .                                                                .
6449.97    .                                       I W CH       E           .  R
6486.07    .                                                                .
6522.16    .                                                                .
6558.25    .                                        I  W X       E          .  JX
6594.34    .                                                                .
6630.44    .                                           I W CH      E        .  R
6666.53    .                                                                .
6702.62    .                                                                .
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      6738.71    .                                                                                .
      6774.81    .                                                I W CH     E                    .    R
      6810.90    .                                                                               .
      6846.99    .                                              IW CH     E                     .    R
      6883.08    .                                               I W CH    E                    .    R
      6919.18    .                                                 I WCH   E                    .    R
      6955.27    .                                                 I WCH   E                    .    R
      6991.36    .                                                 I  WCH  E                    .    R
      7027.45    .                                                 I  WCH  E                    .    R
      7063.55    .                                                                              .
      7099.64    .                                                   I W CH  E                  .    R
      7135.73    .                                                                              .
      7171.82    .                                                                              .
      7207.92    .                                                                              .
      7244.01    .                                                                              .
      7280.10    .                                                     I W CH   E               .    R
      7316.19    .                                                                              .
      7352.29    .                                                                              .
      7388.38    .                                                      I  WCH    E             .    R
      7424.47    .                                                                              .
      7460.56    .                                                     IW CH    E              .    R
      7496.66    .                                                     IW CH    E              .    R
      7532.75    .                                                      I W CH    E            .    R
      7568.84    .                                                                              .
      7604.93    .                                                       I W CH  E              .    R
      7641.03    .                                                        I W CH  E             .    R
      7677.12    .                                                         I W CH E             .    R
      7713.21    .                                                         I  WCH  E            .    R
      7749.30    .                                                          I  WCH E            .    R
      7785.40    .                                                          I  WCH E            .    R
      7821.49    .                                                           I  WX E            .    R
      7857.58    .                                                           I  WCHE            .    R
      7893.67    .                                                           I  WCHE            .    TX
      7929.77    .                                                              IWCBEH          .    BX
      7965.86    .                                                              IWCHE           .    R
      8001.95    .                                                               IWX E          .    R
      8038.04    .                                                               IWCHE          .    R
      8074.14    .                                                               I WXE          .    R
      8110.23    .                                                                 IWXE         .    R
      8146.32    .                                                                 IWXE         .    R
      8182.42    .                                                                 IWCX         .    R
      8218.51    .                                                                 I XHE        .    R
      8254.60    .                                                                 I XHE        .    R
      8290.69    .                                                                 I XHE        .    R
      8326.79    .                                                                 I WXE        .    R
      8362.88    .                                                                 I WXE        .    R
      8398.97    .                                                                 I  XE        .    R
                 .         .         .         .         .         .         .         .         .         .
0             1903.94   1918.46   1932.98   1947.50   1962.02   1976.54   1991.05   2005.57   2020.09   2034.61   2049.13
1
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N O T E S

1. GLOSSARY

   I = INVERT ELEVATION
   C = CRITICAL DEPTH
   W = WATER SURFACE ELEVATION
   H = HEIGHT OF CHANNEL
   E = ENERGY GRADE LINE
   X = CURVES CROSSING OVER
   B = BRIDGE ENTRANCE OR EXIT
   Y = WALL ENTRANCE OR EXIT

2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY
1

DATE: 5/22/2001
TIME: 11:17

F0515P

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIERS	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	2	0	0.00	10.00	30.00			0.00										
CD	2	2	0	0.00	7.00	20.00			0.00										
CD	3	2	0	0.00	7.00	16.00			0.00										
CD	4	4			3.00														
CD	5	2	0	0.00	7.00	12.00			0.00										
CD	6	4			4.00														
CD	7	2	0	0.00	4.00	30.00			0.00										
CD	8	2	0	0.00	10.00	50.00			0.00										

- Taken from VTN design report

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1000.00	1903.94	1	0.00

ELEMENT NO 2 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1275.87	1908.02	1	0.015	175.00	90.32	0.00	0

ELEMENT NO 3 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1375.87	1908.49	1	0.015	0.00	0.00	0.00	0

ELEMENT NO 4 IS A TRANSITION

U/S DATA	STATION	INVERT	SECT	N
	1455.61	1908.86	2	0.015

ELEMENT NO 5 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1566.26	1909.38	2	0.015	0.00	0.00	0.00	0

ELEMENT NO 6 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1726.37	1910.12	2	0.015	0.00	0.00	0.00	0

ELEMENT NO 7 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1836.79	1910.64	2	0.015	0.00	0.00	0.00	0

ELEMENT NO 8 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2210.79	1912.39	2	0.015	0.00	0.00	0.00	0

ELEMENT NO 9 IS A JUNCTION

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	2341.79	1913.00	2	6	0	0.015	300.0	0.0	1913.00	0.00	45.00	0.00

ELEMENT NO 10 IS A TRANSITION

U/S DATA	STATION	INVERT	SECT	N
	2511.79	1920.00	3	0.015

ELEMENT NO 11 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2916.79	1923.17	3	0.015	0.00	0.00	0.00	0

ELEMENT NO 12 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	3286.79	1926.07	3	0.015	0.00	0.00	0.00	0

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

Alexander Channel - Alternative #1 (Open channel between North 5th and Bru

HEADING LINE NO 2 IS -

Start at Commerce Street Q=910 cfs

HEADING LINE NO 3 IS -

WSPG file: Alex_1.dat, by: HT, VTN, 5/22/2001

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 13 IS A REACH

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	3550.13	1928.13	3	0.015	0.00	0.00	0.00	0

ELEMENT NO 14 IS A JUNCTION

	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
U/S DATA	3661.79	1929.00	3	4	0	0.015	90.0	0.0	1929.00	0.00	45.00	0.00

ELEMENT NO 15 IS A REACH

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	3781.79	1935.00	3	0.015	0.00	0.00	0.00	0

ELEMENT NO 16 IS A REACH

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	4766.79	1946.80	3	0.015	0.00	0.00	0.00	0

ELEMENT NO 17 IS A TRANSITION

	STATION	INVERT	SECT	N
U/S DATA	4866.79	1948.00	5	0.015

ELEMENT NO 18 IS A JUNCTION

	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
U/S DATA	5004.74	1950.43	5	4	0	0.015	170.0	0.0	1950.43	0.00	45.00	0.00

ELEMENT NO 19 IS A REACH

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	5376.79	1957.00	5	0.015	500.00	42.63	0.00	0

ELEMENT NO 20 IS A REACH

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	5582.38	1963.01	5	0.015	500.00	23.56	0.00	0

ELEMENT NO 21 IS A REACH

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	6148.38	1979.57	5	0.015	500.00	64.86	0.00	0

ELEMENT NO 22 IS A REACH

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	6436.79	1988.00	5	0.015	0.00	0.00	0.00	0

ELEMENT NO 23 IS A REACH

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	6526.79	1992.50	5	0.015	0.00	0.00	0.00	0

ELEMENT NO 24 IS A JUNCTION

	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
U/S DATA	6611.79	1996.75	5	6	0	0.015	290.0	0.0	1996.75	0.00	45.00	0.00

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 25 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	6956.79	2014.00	5	0.015	0.00	0.00	0.00	0

ELEMENT NO 26 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	7456.79	2023.00	5	0.015	0.00	0.00	0.00	0

ELEMENT NO 27 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	7780.60	2036.13	5	0.015	0.00	0.00	0.00	0

ELEMENT NO 28 IS A TRANSITION

U/S DATA	STATION	INVERT	SECT	N
	7880.60	2040.19	7	0.015

ELEMENT NO 29 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	7955.67	2040.94	7	0.015	60.00	71.69	0.00	0

ELEMENT NO 30 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	7976.50	2041.15	7	0.015	0.00	0.00	0.00	0

ELEMENT NO 31 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	8050.79	2041.89	7	0.015	60.00	70.94	0.00	0

ELEMENT NO 32 IS A WALL ENTRANCE

U/S DATA	STATION	INVERT	SECT	FP
	8050.79	2041.89	8	0.500

ELEMENT NO 33 IS A SYSTEM HEADWORKS

U/S DATA	STATION	INVERT	SECT	W S ELEV
	8050.79	2041.89	8	0.00

NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING

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

WATER SURFACE PROFILE LISTING

Alexander Channel - Alternative #1 (Open channel between North 5th and Bru
Start at Commerce Street Q=910 cfs
WSPG file: Alex_1.dat, by: HT, VTN, 5/22/2001

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH		HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF			NORM DEPTH			ZR		
1000.00	1903.94	2.879	1906.819	1760.0	20.38	6.449	1913.268	2.21	4.747		10.00	30.00	0.00	0	0.00
50.60	0.01479					.012862	0.65			2.766			0.00		
1050.60	1904.69	2.907	1907.595	1760.0	20.18	6.323	1913.918	2.17	4.747		10.00	30.00	0.00	0	0.00
144.40	0.01479					.011792	1.70			2.766			0.00		
1195.00	1906.82	3.049	1909.873	1760.0	19.24	5.748	1915.621	1.97	4.747		10.00	30.00	0.00	0	0.00
80.87	0.01479					.010169	0.82			2.766			0.00		
1275.87	1908.02	3.198	1911.218	1760.0	18.35	5.226	1916.444	0.00	4.747		10.00	30.00	0.00	0	0.00
35.60	0.00470					.009784	0.35			4.009			0.00		
1311.47	1908.19	3.122	1911.309	1760.0	18.79	5.485	1916.794	0.00	4.747		10.00	30.00	0.00	0	0.00
64.40	0.00470					.010960	0.71			4.009			0.00		
1375.87	1908.49	2.976	1911.466	1760.0	19.71	6.033	1917.499	0.00	4.747		10.00	30.00	0.00	0	0.00
TRANS STR	0.00464					.008376	0.67						0.00		
1455.61	1908.86	5.438	1914.298	1760.0	16.18	4.067	1918.365	0.00	6.220		7.00	20.00	0.00	0	0.00
110.65	0.00470					.005090	0.56			5.549			0.00		
1566.26	1909.38	5.356	1914.736	1760.0	16.43	4.191	1918.927	0.00	6.220		7.00	20.00	0.00	0	0.00
160.11	0.00462					.005529	0.89			5.581			0.00		
1726.37	1910.12	5.138	1915.258	1760.0	17.13	4.555	1919.813	0.00	6.220		7.00	20.00	0.00	0	0.00
110.42	0.00471					.006191	0.68			5.545			0.00		
1836.79	1910.64	4.951	1915.591	1760.0	17.78	4.906	1920.497	0.00	6.220		7.00	20.00	0.00	0	0.00
11.78	0.00468					.006567	0.08			5.557			0.00		
1848.57	1910.69	4.928	1915.623	1760.0	17.86	4.952	1920.575	0.00	6.220		7.00	20.00	0.00	0	0.00
109.79	0.00468					.007100	0.78			5.557			0.00		

WATER SURFACE PROFILE LISTING

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STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH		HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF			NORM DEPTH			ZR		
1958.36	1911.21	4.699	1915.908	1760.0	18.73	5.447	1921.355	0.00	6.220		7.00	20.00	0.00	0	0.00
93.78	0.00468					.008155	0.76			5.557			0.00		
2052.14	1911.65	4.480	1916.128	1760.0	19.64	5.991	1922.119	0.00	6.220		7.00	20.00	0.00	0	0.00
83.21	0.00468					.009373	0.78			5.557			0.00		
2135.35	1912.04	4.271	1916.308	1760.0	20.60	6.591	1922.899	0.00	6.220		7.00	20.00	0.00	0	0.00
75.44	0.00468					.010781	0.81			5.557			0.00		
2210.79	1912.39	4.073	1916.463	1760.0	21.61	7.250	1923.713	0.00	6.220		7.00	20.00	0.00	0	0.00
JUNCT STR	0.00466					.018838	2.47						0.00		
2341.79	1913.00	2.737	1915.737	1460.0	26.67	11.046	1926.783	0.00	5.492		7.00	20.00	0.00	0	0.00
TRANS STR	0.04118					.017033	2.90						0.00		
2511.79	1920.00	4.922	1924.922	1460.0	18.54	5.336	1930.258	0.00	6.373		7.00	16.00	0.00	0	0.00
405.00	0.00783					.008261	3.35			4.944			0.00		
2916.79	1923.17	4.783	1927.953	1460.0	19.08	5.651	1933.604	0.00	6.373		7.00	16.00	0.00	0	0.00
203.59	0.00784					.009047	1.84			4.942			0.00		
3120.38	1924.77	4.618	1929.384	1460.0	19.76	6.063	1935.447	0.00	6.373		7.00	16.00	0.00	0	0.00
166.41	0.00784					.010190	1.70			4.942			0.00		
3286.79	1926.07	4.403	1930.473	1460.0	20.72	6.669	1937.142	0.00	6.373		7.00	16.00	0.00	0	0.00
69.56	0.00782					.011300	0.79			4.945			0.00		
3356.35	1926.61	4.290	1930.904	1460.0	21.27	7.024	1937.928	0.00	6.373		7.00	16.00	0.00	0	0.00
105.69	0.00782					.012580	1.33			4.945			0.00		
3462.04	1927.44	4.091	1931.532	1460.0	22.31	7.726	1939.258	0.00	6.373		7.00	16.00	0.00	0	0.00
88.09	0.00782					.014432	1.27			4.945			0.00		

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STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH		HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF			NORM DEPTH			ZR		
3550.13	1928.13	3.900	1932.030	1460.0	23.40	8.499	1940.529	0.00	6.373		7.00	16.00	0.00	0	0.00
JUNCT STR	0.00779					.020443	2.28						0.00		
3661.79	1929.00	3.147	1932.147	1370.0	27.21	11.498	1943.645	0.00	6.108		7.00	16.00	0.00	0	0.00
14.62	0.05000					.024773	0.36			2.510			0.00		
3676.41	1929.73	3.207	1932.938	1370.0	26.70	11.072	1944.010	0.00	6.108		7.00	16.00	0.00	0	0.00
30.92	0.05000					.022506	0.70			2.510			0.00		
3707.33	1931.28	3.363	1934.640	1370.0	25.46	10.065	1944.705	0.00	6.108		7.00	16.00	0.00	0	0.00
24.67	0.05000					.019564	0.48			2.510			0.00		
3732.00	1932.51	3.527	1936.038	1370.0	24.28	9.150	1945.188	0.00	6.108		7.00	16.00	0.00	0	0.00
20.00	0.05000					.017018	0.34			2.510			0.00		
3752.00	1933.51	3.699	1937.210	1370.0	23.15	8.318	1945.528	0.00	6.108		7.00	16.00	0.00	0	0.00
16.36	0.05000					.014813	0.24			2.510			0.00		
3768.36	1934.33	3.880	1938.209	1370.0	22.07	7.562	1945.771	0.00	6.108		7.00	16.00	0.00	0	0.00
13.43	0.05000					.012902	0.17			2.510			0.00		
3781.79	1935.00	4.069	1939.069	1370.0	21.04	6.875	1945.944	0.00	6.108		7.00	16.00	0.00	0	0.00
131.03	0.01198					.012030	1.58			4.073			0.00		
3912.82	1936.57	4.066	1940.635	1370.0	21.06	6.887	1947.522	0.00	6.108		7.00	16.00	0.00	0	0.00
522.85	0.01198					.012935	6.76			4.073			0.00		
4435.67	1942.83	3.877	1946.710	1370.0	22.09	7.576	1954.286	0.00	6.108		7.00	16.00	0.00	0	0.00
201.00	0.01198					.014852	2.99			4.073			0.00		
4636.67	1945.24	3.696	1948.937	1370.0	23.17	8.333	1957.270	0.00	6.108		7.00	16.00	0.00	0	0.00
130.12	0.01198					.017063	2.22			4.073			0.00		

WATER SURFACE PROFILE LISTING

Alexander Channel - Alternative #1 (Open channel between North 5th and Bru
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STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH		HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF			NORM DEPTH			ZR		
4766.79	1946.80	3.524	1950.324	1370.0	24.30	9.167	1959.491	0.00	6.108		7.00	16.00	0.00	0	0.00
TRANS STR	0.01200					.016292	1.63						0.00		
4866.79	1948.00	4.949	1952.949	1370.0	23.07	8.263	1961.212	0.00	7.399		7.00	12.00	0.00	0	0.00
JUNCT STR	0.01761					.017442	2.41						0.00		
5004.74	1950.43	3.949	1954.379	1200.0	25.32	9.959	1964.338	0.48	6.774		7.00	12.00	0.00	0	0.00
130.33	0.01766					.021441	2.79			4.169			0.00		
5135.07	1952.73	3.833	1956.564	1200.0	26.09	10.568	1967.132	0.51	6.774		7.00	12.00	0.00	0	0.00
139.81	0.01766					.023941	3.35			4.169			0.00		
5274.88	1955.20	3.655	1958.855	1200.0	27.36	11.624	1970.479	0.56	6.774		7.00	12.00	0.00	0	0.00
101.91	0.01766					.027397	2.79			4.169			0.00		
5376.79	1957.00	3.485	1960.485	1200.0	28.70	12.786	1973.271	0.61	6.774		7.00	12.00	0.00	0	0.00
205.59	0.02923					.029254	6.01			3.485			0.00		
5582.38	1963.01	3.484	1966.494	1200.0	28.70	12.793	1979.287	0.61	6.774		7.00	12.00	0.00	0	0.00
41.73	0.02926					.029264	1.22			3.484			0.00		
5624.11	1964.23	3.484	1967.715	1200.0	28.70	12.793	1980.508	0.61	6.774		7.00	12.00	0.00	0	0.00
524.27	0.02926					.030827	16.16			3.484			0.00		
6148.38	1979.57	3.362	1982.932	1200.0	29.74	13.737	1996.669	0.00	6.774		7.00	12.00	0.00	0	0.00
120.06	0.02923					.033345	4.00			3.485			0.00		
6268.44	1983.08	3.295	1986.374	1200.0	30.35	14.299	2000.673	0.00	6.774		7.00	12.00	0.00	0	0.00
168.35	0.02923					.036812	6.20			3.485			0.00		
6436.79	1988.00	3.142	1991.142	1200.0	31.83	15.729	2006.871	0.00	6.774		7.00	12.00	0.00	0	0.00
90.00	0.05000					.037031	3.33			2.891			0.00		

WATER SURFACE PROFILE LISTING

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STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH		HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF			NORM DEPTH			ZR		
6526.79	1992.50	3.281	1995.781	1200.0	30.48	14.427	2010.208	0.00	6.774		7.00	12.00	0.00	0	0.00
JUNCT STR	0.05000					.039419	3.35						0.00		
6611.79	1996.75	2.497	1999.247	910.0	30.36	14.317	2013.564	0.00	5.633		7.00	12.00	0.00	0	0.00
125.85	0.05000					.041479	5.22			2.393			0.00		
6737.64	2003.04	2.607	2005.649	910.0	29.08	13.135	2018.784	0.00	5.633		7.00	12.00	0.00	0	0.00
78.05	0.05000					.036333	2.84			2.393			0.00		
6815.69	2006.94	2.735	2009.680	910.0	27.73	11.941	2021.621	0.00	5.633		7.00	12.00	0.00	0	0.00
51.80	0.05000					.031619	1.64			2.393			0.00		
6867.49	2009.54	2.868	2012.403	910.0	26.44	10.856	2023.259	0.00	5.633		7.00	12.00	0.00	0	0.00
37.70	0.05000					.027534	1.04			2.393			0.00		
6905.19	2011.42	3.008	2014.428	910.0	25.21	9.869	2024.297	0.00	5.633		7.00	12.00	0.00	0	0.00
28.85	0.05000					.023994	0.69			2.393			0.00		
6934.04	2012.86	3.155	2016.017	910.0	24.04	8.971	2024.988	0.00	5.633		7.00	12.00	0.00	0	0.00
22.75	0.05000					.020922	0.48			2.393			0.00		
6956.79	2014.00	3.309	2017.309	910.0	22.92	8.156	2025.465	0.00	5.633		7.00	12.00	0.00	0	0.00
186.72	0.01800					.020499	3.83			3.403			0.00		
7143.51	2017.36	3.197	2020.558	910.0	23.72	8.734	2029.292	0.00	5.633		7.00	12.00	0.00	0	0.00
142.52	0.01800					.023084	3.29			3.403			0.00		
7286.03	2019.93	3.049	2022.975	910.0	24.87	9.608	2032.583	0.00	5.633		7.00	12.00	0.00	0	0.00
96.50	0.01800					.026485	2.56			3.403			0.00		
7382.53	2021.66	2.907	2024.570	910.0	26.09	10.568	2035.138	0.00	5.633		7.00	12.00	0.00	0	0.00
74.26	0.01800					.030409	2.26			3.403			0.00		

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STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH		HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF			NORM DEPTH			ZR		
7456.79	2023.00	2.772	2025.772	910.0	27.36	11.625	2037.397	0.00	5.633		7.00	12.00	0.00	0	0.00
15.41	0.04055					.032215	0.50			2.570			0.00		
7472.20	2023.62	2.789	2026.414	910.0	27.19	11.479	2037.893	0.00	5.633		7.00	12.00	0.00	0	0.00
84.88	0.04055					.029857	2.53			2.570			0.00		
7557.08	2027.07	2.925	2029.992	910.0	25.92	10.436	2040.428	0.00	5.633		7.00	12.00	0.00	0	0.00
55.43	0.04055					.026007	1.44			2.570			0.00		
7612.51	2029.31	3.068	2032.382	910.0	24.72	9.487	2041.869	0.00	5.633		7.00	12.00	0.00	0	0.00
39.86	0.04055					.022669	0.90			2.570			0.00		
7652.37	2030.93	3.218	2034.149	910.0	23.57	8.624	2042.773	0.00	5.633		7.00	12.00	0.00	0	0.00
30.18	0.04055					.019773	0.60			2.570			0.00		
7682.55	2032.15	3.375	2035.529	910.0	22.47	7.841	2043.370	0.00	5.633		7.00	12.00	0.00	0	0.00
23.54	0.04055					.017258	0.41			2.570			0.00		
7706.09	2033.11	3.539	2036.648	910.0	21.42	7.128	2043.776	0.00	5.633		7.00	12.00	0.00	0	0.00
18.65	0.04055					.015075	0.28			2.570			0.00		
7724.74	2033.87	3.712	2037.577	910.0	20.43	6.480	2044.057	0.00	5.633		7.00	12.00	0.00	0	0.00
14.90	0.04055					.013177	0.20			2.570			0.00		
7739.64	2034.47	3.893	2038.362	910.0	19.48	5.891	2044.253	0.00	5.633		7.00	12.00	0.00	0	0.00
11.91	0.04055					.011526	0.14			2.570			0.00		
7751.55	2034.95	4.083	2039.035	910.0	18.57	5.355	2044.390	0.00	5.633		7.00	12.00	0.00	0	0.00
9.44	0.04055					.010089	0.10			2.570			0.00		
7760.99	2035.34	4.283	2039.618	910.0	17.71	4.868	2044.486	0.00	5.633		7.00	12.00	0.00	0	0.00
7.36	0.04055					.008837	0.07			2.570			0.00		

WATER SURFACE PROFILE LISTING

Alexander Channel - Alternative #1 (Open channel between North 5th and Bru
Start at Commerce Street Q=910 cfs
WSPG file: Alex_1.dat, by: HT, VTN, 5/22/2001

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH		HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF			NORM DEPTH			ZR		
7768.35	2035.63	4.492	2040.125	910.0	16.88	4.426	2044.551	0.00	5.633		7.00	12.00	0.00	0	0.00
5.58	0.04055					.007748	0.04			2.570			0.00		
7773.93	2035.86	4.711	2040.571	910.0	16.10	4.023	2044.594	0.00	5.633		7.00	12.00	0.00	0	0.00
4.03	0.04055					.006797	0.03			2.570			0.00		
7777.96	2036.02	4.941	2040.964	910.0	15.35	3.658	2044.622	0.00	5.633		7.00	12.00	0.00	0	0.00
2.64	0.04055					.005967	0.02			2.570			0.00		
7780.60	2036.13	5.182	2041.312	910.0	14.63	3.325	2044.637	0.00	5.633		7.00	12.00	0.00	0	0.00
TRANS STR	0.04060					.006931	0.69						0.00		
7880.60	2040.19	2.187	2042.377	910.0	13.87	2.988	2045.365	2.99	3.058		4.00	30.00	0.00	0	0.00
5.69	0.00999					.008247	0.05			2.061			0.00		
7886.29	2040.25	2.193	2042.440	910.0	13.84	2.972	2045.412	2.97	3.058		4.00	30.00	0.00	0	0.00
69.38	0.00999					.007639	0.53			2.061			0.00		
7955.67	2040.94	2.300	2043.240	910.0	13.19	2.702	2045.942	0.00	3.058		4.00	30.00	0.00	0	0.00
20.83	0.01008					.006818	0.14			2.055			0.00		
7976.50	2041.15	2.353	2043.503	910.0	12.89	2.581	2046.084	2.58	3.058		4.00	30.00	0.00	0	0.00
17.31	0.00996					.006337	0.11			2.063			0.00		
7993.81	2041.32	2.409	2043.731	910.0	12.59	2.462	2046.193	2.46	3.058		4.00	30.00	0.00	0	0.00
24.81	0.00996					.005678	0.14			2.063			0.00		
8018.62	2041.57	2.526	2044.096	910.0	12.01	2.238	2046.334	2.24	3.058		4.00	30.00	0.00	0	0.00
15.80	0.00996					.004889	0.08			2.063			0.00		
8034.42	2041.73	2.650	2044.377	910.0	11.45	2.035	2046.412	2.03	3.058		4.00	30.00	0.00	0	0.00
9.68	0.00996					.004210	0.04			2.063			0.00		

WATER SURFACE PROFILE LISTING

Alexander Channel - Alternative #1 (Open channel between North 5th and Bru
Start at Commerce Street Q=910 cfs
WSPG file: Alex_1.dat, by: HT, VTN, 5/22/2001

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH		HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF			NORM DEPTH			ZR		
8044.10	2041.82	2.779	2044.602	910.0	10.91	1.850	2046.452	1.85	3.058		4.00	30.00	0.00	0	0.00
5.14	0.00996					.003628	0.02			2.063			0.00		
8049.24	2041.87	2.915	2044.790	910.0	10.41	1.682	2046.472	1.68	3.058		4.00	30.00	0.00	0	0.00
1.55	0.00996					.003126	0.00			2.063			0.00		
8050.79	2041.89	3.058	2044.948	910.0	9.92	1.528	2046.476	0.00	3.058		4.00	30.00	0.00	0	0.00
WALL	ENTRANCE												0.00		
8050.79	2041.89	4.882	2046.772	910.0	3.73	0.216	2046.988	0.00	2.175		10.00	50.00	0.00	0	0.00

Alexander Channel - Alternative #1 (Open channel between North 5th and Bru
Start at Commerce Street Q=910 cfs
WSPG file: Alex_1.dat, by: HT, VTN, 5/22/2001

```
1000.00  .IW C  X                                                          .  R
1043.79  .                                                                 .
1087.59  .I WC  EH                                                         .  R
1131.38  .                                                                 .
1175.17  .                                                                 .
1218.97  . I  WC EH                                                        .  R
1262.76  .                                                                 .
1306.56  .  I WC  EH                                                       .  R
1350.35  .  I W C EH                                                       .  R
1394.14  .   I WC  X                                                       .  TX
1437.94  .                                                                 .
1481.73  .   I   XHE                                                       .  R
1525.52  .                                                                 .
1569.32  .   I   XH E                                                      .  R
1613.11  .                                                                 .
1656.91  .                                                                 .
1700.70  .                                                                 .
1744.49  .    I  WX E                                                      .  R
1788.29  .                                                                 .
1832.08  .                                                                 .
1875.87  .    I  WCH E                                                     .  R
1919.67  .    I  WCH E                                                     .  R
1963.46  .    I   WX E                                                     .  R
2007.26  .                                                                 .
2051.05  .                                                                 .
2094.84  .     I  WX  E                                                    .  R
2138.64  .     I  WCH E                                                    .  R
2182.43  .                                                                 .
2226.22  .     I  WCH  E                                                   .  JX
2270.02  .                                                                 .
2313.81  .                                                                 .
2357.61  .      IW CH    E                                                 .  TX
2401.40  .                                                                 .
2445.19  .                                                                 .
2488.99  .                                                                 .
2532.78  .          I   WX E                                               .  R
2576.57  .                                                                 .
2620.37  .                                                                 .
2664.16  .                                                                 .
2707.96  .                                                                 .
2751.75  .                                                                 .
2795.54  .                                                                 .
2839.34  .                                                                 .
2883.13  .                                                                 .
2926.92  .            I   WX  E                                            .  R
2970.72  .                                                                 .
3014.51  .                                                                 .
3058.31  .                                                                 .
3102.10  .                                                                 .
3145.89  .              I  WX  E                                           .  R
3189.69  .                                                                 .
3233.48  .                                                                 .
3277.27  .                                                                 .
3321.07  .              I  W X  E                                          .  R
3364.86  .               I  WCH E                                          .  R
3408.65  .                                                                 .
3452.45  .                                                                 .
3496.24  .              I  W X  E                                          .  R
3540.04  .                                                                 .
3583.83  .               I W CH  E                                         .  JX
3627.62  .                                                                 .
3671.42  .               I  W X    E                                       .  R
3715.21  .                I W CH    E                                      .  R
3759.00  .                 I W CH   E                                      .  R
3802.80  .                  I W CH  E                                      .  R
3846.59  .                  I  W X   E                                     .  R
3890.39  .                   I  WCH  E                                     .  R
3934.18  .                   I  W X  E                                     .  R
3977.97  .                     I W X  E                                    .  R
4021.77  .                                                                 .
4065.56  .                                                                 .
4109.35  .                                                                 .
4153.15  .                                                                 .
4196.94  .                                                                 .
4240.74  .                                                                 .
4284.53  .                                                                 .
4328.32  .                                                                 .
4372.12  .                                                                 .
4415.91  .                                                                 .
4459.70  .                        I W CH  E                                .  R
4503.50  .                                                                 .
4547.29  .                                                                 .
4591.09  .                                                                 .
4634.88  .                                                                 .
4678.67  .                         I  W X   E                             .  R
4722.47  .                                                                 .
4766.26  .                                                                 .
4810.05  .                          I  W X   E                             .  TX
4853.85  .                                                                 .
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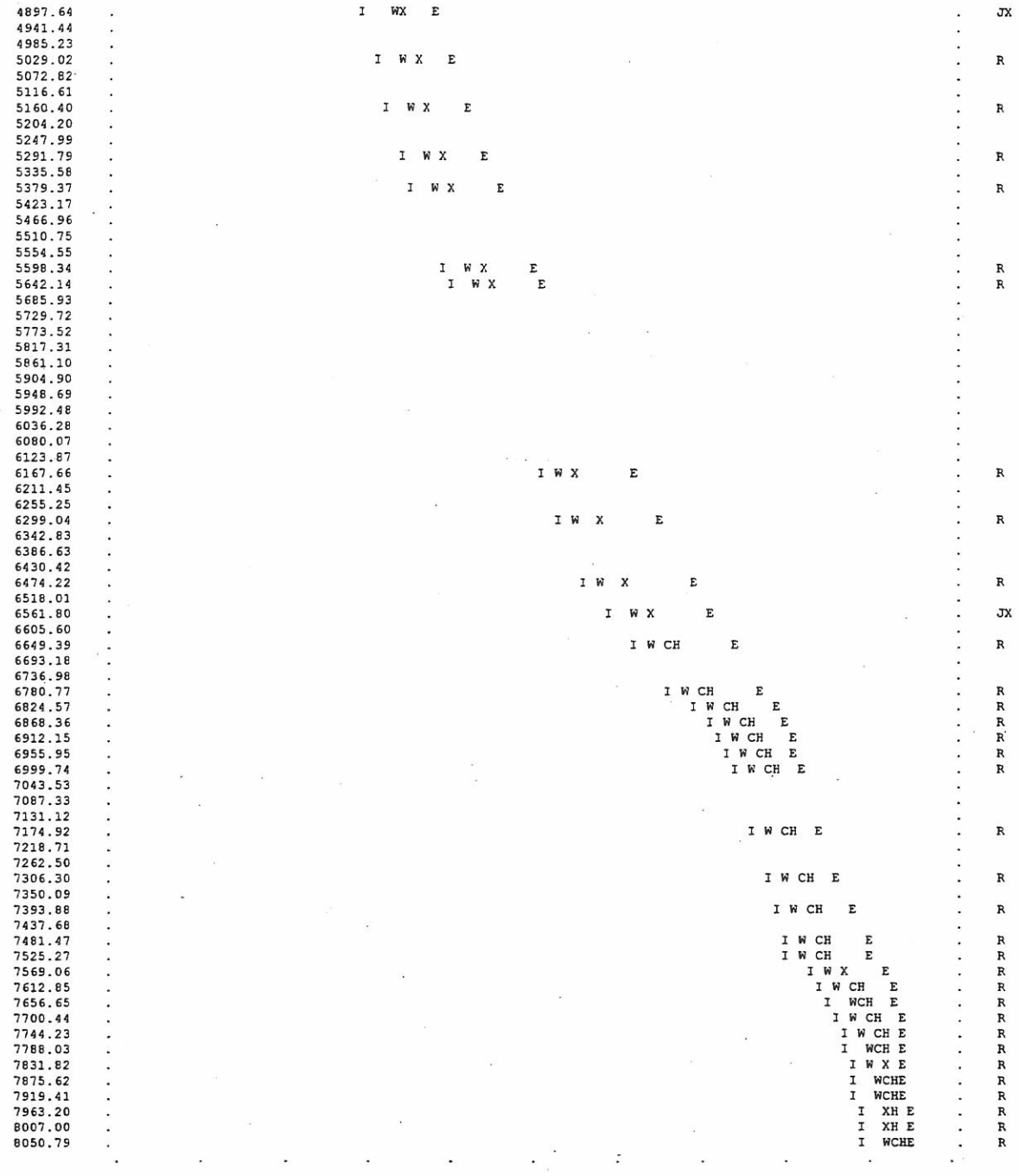


N O T E S

1. GLOSSARY
   - I = INVERT ELEVATION
   - C = CRITICAL DEPTH
   - W = WATER SURFACE ELEVATION
   - H = HEIGHT OF CHANNEL
   - E = ENERGY GRADE LINE
   - X = CURVES CROSSING OVER
   - B = BRIDGE ENTRANCE OR EXIT
   - Y = WALL ENTRANCE OR EXIT
2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY_

Flowmaster Worksheets

Worksheet for Section A

Project Description		
Flow Element:	Irregular Section	
Friction Method:	Manning Formula	
Solve For:	Normal Depth	

Input Data		
Channel Slope:	2.10000	%
Discharge:	382.00	ft^3/s

Options	
Current Roughness Weighted Meth	ImprovedLotters
Open Channel Weighted Roughnes	ImprovedLotters
Closed Channel Weighted Roughne	Hortons

Results		
Roughness Coefficient:	0.030	
Water Surface Elevation:	1951.81	ft
Elevation Range:	1949.00 to 1954.00 ft	
Flow Area:	71.30	ft^2
Wetted Perimeter:	110.57	ft
Top Width:	109.74	ft
Normal Depth:	2.81	ft
Critical Depth:	2.90	ft
Critical Slope:	0.01503	ft/ft
Velocity:	5.36	ft/s
Velocity Head:	0.45	ft
Specific Energy:	3.26	ft
Froude Number:	1.17	
Flow Type:	Supercritical	

Hydraulic Depth

$\frac{A}{T_w} = \frac{71.3}{109.74} = 0.649'$

Segment Roughness		
Start Station	End Station	Roughness Coefficient
(0+00, 1954.00)	(2+30, 1954.00)	0.030

Section Geometry	
Station	Elevation
0+00	1954.00
0+22	1952.00

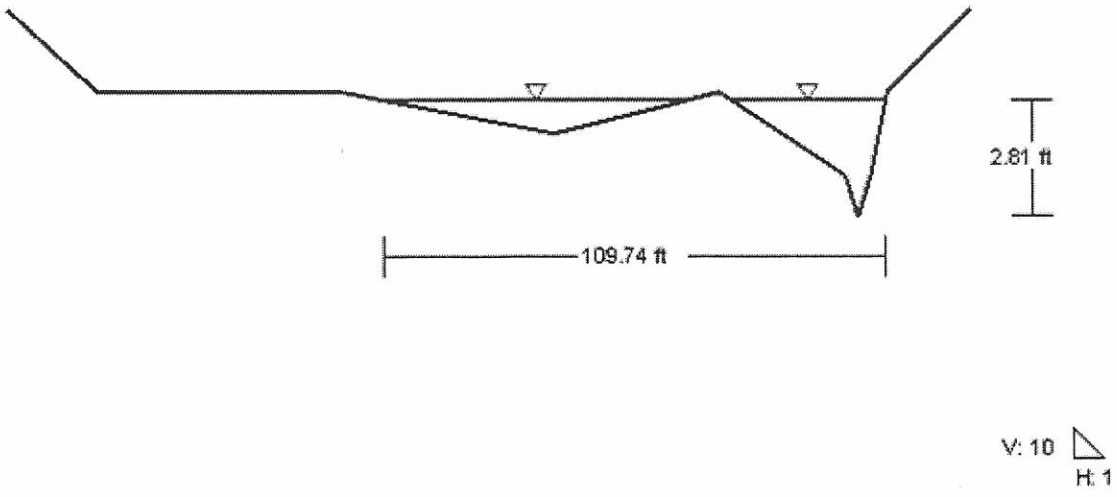
Worksheet for Section A

Station	Elevation
0+80	1952.00
1+30	1951.00
1+70	1952.00
1+85	1951.00
2+00	1950.00
2+03	1949.00
2+06	1950.00
2+10	1952.00
2+30	1954.00

Section A
Cross Section for Section A

Project Description		
Flow Element:	Irregular Section	
Friction Method:	Manning Formula	
Solve For:	Normal Depth	

Section Data		
Roughness Coefficient:	0.030	
Channel Slope:	2.10000	%
Normal Depth:	2.81	ft
Elevation Range:	1949.00 to 1954.00 ft	
Discharge:	382.00	ft^3/s



Worksheet for Section B

Project Description		
Flow Element:	Irregular Section	
Friction Method:	Manning Formula	
Solve For:	Normal Depth	

Input Data		
Channel Slope:	2.10000	%
Discharge:	382.00	ft³/s

Options	
Current Roughness Weighted Meth	ImprovedLotters
Open Channel Weighted Roughnes	ImprovedLotters
Closed Channel Weighted Roughne	Hortons

Results		
Roughness Coefficient:	0.030	
Water Surface Elevation:	1940.72	ft
Elevation Range:	1939.50 to 1942.00 ft	
Flow Area:	73.32	ft²
Wetted Perimeter:	118.58	ft
Top Width:	118.55	ft
Normal Depth:	1.22	ft
Critical Depth:	1.30	ft
Critical Slope:	0.01508	ft/ft
Velocity:	5.21	ft/s
Velocity Head:	0.42	ft
Specific Energy:	1.64	ft
Froude Number:	1.17	
Flow Type:	Supercritical	

Hydraulic Depth

$\frac{A}{T_w} = \frac{73.32}{118.55} = 0.62'$

Segment Roughness		
Start Station	End Station	Roughness Coefficient
(0+00, 1942.00)	(2+40, 1942.00)	0.030

Section Geometry	
Station	Elevation
0+00	1942.00
0+50	1940.00

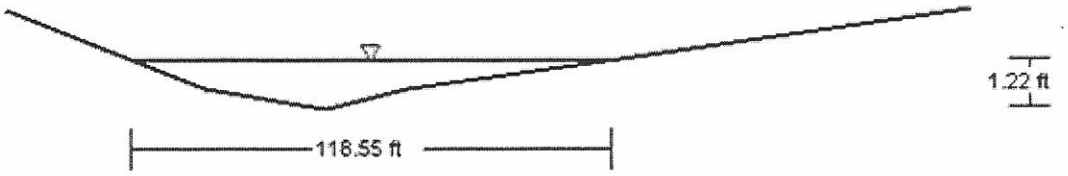
Worksheet for Section B

Station	Elevation
0+80	1939.50
1+00	1940.00
2+40	1942.00

Section B
Cross Section for Section B

Project Description		
Flow Element:	Irregular Section	
Friction Method:	Manning Formula	
Solve For:	Normal Depth	

Section Data		
Roughness Coefficient:	0.030	
Channel Slope:	2.10000	%
Normal Depth:	1.22	ft
Elevation Range:	1939.50 to 1942.00 ft	
Discharge:	382.00	ft^3/s



V: 10
H: 1

Appendix D: Plans

Gleneagles Drainage Channel Plans

C.N.L.V. GENERAL CONSTRUCTION NOTES

1 CURB AND GUTTER WITH A GRADE OF LESS THAN 0.4 PERCENT SHALL BE CONSTRUCTED BY FORMING EACH JOINT SHALL BE CHECKED FOR GRADE PRIOR TO CONSTRUCTION AND WATER FLOW TESTED AS SOON AS POSSIBLE AFTER CONSTRUCTION STAKING SHALL BE AT MINIMUM 25' INTERVALS

2 CONTRACTOR SHALL PROVIDE ALL NECESSARY HORIZONTAL AND VERTICAL TRANSITIONS BETWEEN NEW CONSTRUCTION AND EXISTING SURFACES TO PROVIDE FOR PROPER DRAINAGE AND FOR INGRESS AND EGRESS TO OFF-SITE PROPERTIES EXTENT OF TRANSITIONS TO BE DETERMINED BY THE CITY ENGINEER

3 ALL MANHOLES, WATER VALVES, AND CLEANOUTS THAT LIE WITHIN THE LIMITS OF ROADWAY CONSTRUCTION SHALL BE PLATED AT SUBGRADE LEVEL AFTER PLACEMENT OF THE BASE MATERIALS AND ASPHALT PAVEMENT, THE MANHOLES WATER VALVES AND CLEANOUTS SHALL BE BROUGHT TO FINISH GRADE AND A COLLAR SHALL BE CONSTRUCTED FOR ALL VALVE CAPS AND MANHOLES INSPECTORS ARE TO BE NOTIFIED IN ADVANCE TO INSPECT WORK AT THE TIME OF ADJUSTMENT

4 WHERE SIDEWALK IS NOT REQUIRED AT THE TIME OF STREET CONSTRUCTION, ALL UTILITY BOXES AND VAULTS TO BE LOCATED WITHIN THE FUTURE SIDEWALK AREA MUST BE CONSTRUCTED TO THE FINISH GRADE OF THE FUTURE SIDEWALK

5 WHERE OTHER AGENCIES, SUCH AS THE NEVADA DEPARTMENT OF TRANSPORTATION, HAVE JURISDICTION WITHIN THE PROJECT AREA IT IS THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN THE APPLICABLE AGENCY'S APPROVAL PRIOR TO START OF CONSTRUCTION

6 ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OF OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA", LATEST ISSUE, THE UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION, CLARK COUNTY AREA, NEVADA", LATEST ISSUE, ANY OTHER APPLICABLE APPROVED STANDARDS ISSUED BY THE CONTROLLING AGENCY, THE UNIFORM BUILDING CODE, AND/OR ALL LOCAL CODES AND ORDINANCES APPLICABLE EXCEPT AS NOTED ON THESE PLANS

7 THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A SEARCH OF AVAILABLE RECORDS THE CONTRACTOR IS REQUIRED TO TAKE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN AND ANY OTHER LINES NOT OF RECORD OR NOT SHOWN ON THESE PLANS EXISTING UTILITIES ARE LOCATED IN THE PLANS ONLY FOR THE CONVENIENCE OF THE CONTRACTOR EXISTING UTILITY SERVICE LATERALS MAY NOT BE SHOWN ON THE PLANS AND THE CONTRACTOR IS ADVISED TO CALL 1/800/227-2600 BEFORE DIGGING

8 THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING IMPROVEMENTS WHICH ARE TO REMAIN IN PLACE FOLLOWING CONSTRUCTION OF THESE IMPROVEMENTS ANY SUCH IMPROVEMENTS OR STRUCTURES DAMAGED BY CONTRACTOR'S OPERATIONS SHALL BE REPAIRED OR RECONSTRUCTED TO THE SATISFACTION OF THE CITY AT THE EXPENSE OF THE CONTRACTOR

9 ALL CONSTRUCTION SHALL BE AS SHOWN ON THESE PLANS ANY ALTERATION MUST HAVE PRIOR WRITTEN APPROVAL OF THE CITY ENGINEER

10 TYPE V CEMENT SHALL BE USED IN ALL OFF-SITE CONCRETE WORK AND THE MIX SHALL BE DESIGNED FOR SOLUBLE SULFATES IN THE SUBGRADE OF 1 5% OR GREATER THIS REQUIRES A MINIMUM 6 SACK MIX WITH FLYASH AND A WATER/CEMENT RATIO NOT TO EXCEED 50 OR A 6 5 SACK MIX WITH A WATER/CEMENT RATIO NOT TO EXCEED 0 45 (REFERENCE UNIFORM STANDARD SPECIFICATIONS SECTION 701 01 03) ALL MIX DESIGNS SHALL BE APPROVED PROJECT SPECIFIC BY THE QUALITY CONTROL DIVISION PRIOR TO PLACEMENT THE CONCRETE MIX SHALL MAINTAIN A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 4500 PS

11 PERMITS ARE REQUIRED FOR ALL WORK WITHIN THE PUBLIC RIGHT-OF-WAY THE CONTRACTOR SHALL SECURE ALL PERMITS AND SCHEDULE INSPECTIONS REQUIRED FOR THIS CONSTRUCTION

12 EXPANSION JOINTS ARE REQUIRED AT A MAXIMUM SPACING OF 300 FEET FOR EXTRUDED TYPE CURB

13 AC PAVEMENT SHALL BE FINISHED 0 5 INCHES ABOVE LIP OF CURB GUTTERS OR VALLEY GUTTERS AT FINAL LIFT

14 APPLY FOG SEAL ONLY AFTER ALL A C CORRECTIONS AND ADJUSTMENTS HAVE BEEN MADE

15 SIDEWALK RAMPS SHALL BE CONSTRUCTED IN EACH QUADRANT OF AN INTERSECTION PER UNIFORM STANDARD DRAWINGS CLARK COUNTY AREA, DRAWING NUMBER 235 (1 THROUGH 4) AND 235 1

16 EXACT LOCATION OF ALL SAWCUT LINES MAY BE DETERMINED IN THE FIELD BY A CITY INSPECTOR IF LOCATION ON THE PLANS IS NOT CLEARLY SHOWN OR IF EXISTING CONDITIONS REQUIRE RELOCATION

17 THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO PROTECT EXISTING PERMANENT SURVEY MONUMENTS ANY MONUMENTS DISTURBED SHALL BE REPLACED AND ADJUSTED PER AVAILABLE RECORDS IN ACCORDANCE WITH NRS STATUTE 625-550

18 THE CONTRACTOR IS TO FIELD VERIFY ALL EXISTING SITE CONDITIONS PRIOR TO CONSTRUCTION IF A CONFLICT EXISTS BETWEEN WHAT IS SHOWN ON THESE PLANS AND WHAT EXISTS IN THE FIELD, CONTRACTOR IS TO NOTIFY THE ARCHITECT OR ENGINEER IMMEDIATELY

19 SEPARATE PERMITS MUST BE OBTAINED FROM THE CITY OF NORTH LAS VEGAS'S BUILDING DEPARTMENT FOR PRIVATE IMPROVEMENTS, INCLUDING BLOCK WALLS

20 CONTRACTOR TO CONFORM TO CITY OF NORTH LAS VEGAS TRENCH BACKFILL POLICY

21 ANY SITE FIVE (5) ACRES OR MORE REQUIRES A NATIONAL POLLUTANT ELIMINATION DISCHARGE SYSTEM (NDPES) CONSTRUCTION PERMIT FOR INFORMATION TO OBTAIN THIS PERMIT, CONTACT ROB SAUNDERS WITH THE NEVADA DIVISION OF ENVIRONMENTAL PROTECTION AT (702)687-4670 EXTENSION 3149

22 AIR QUALITY PERMITS ARE REQUIRED FOR CERTAIN PROCESSES CONTACT NEW SOURCE REVIEW AT THE AIR POLLUTION CONTROL DIVISION AT (702)383-1276.

REVISED 12/8/98

ABBREVIATIONS

@	– AT	MAX	– MAXIMUM
ACP	– ASBESTOS CEMENT PIPE	MIN	– MINIMUM
AVE	– AVENUE	MLCP	– MORTAR LINED & COATED PIPE
BLVD	– BOULEVARD	MTN	– MOUNTAIN
CLV	– CITY OF LAS VEGAS	N	– NORTH
CLR	– CLEAR	NO	– NUMBER
CML	– CEMENT MORTAR LINED	NTS	– NOT TO SCALE
CONN	– CONNECT	OC	– ON CENTER
CONST	– CONSTRUCT	PT	– POINT
Δ	– DELTA ANGLE	PP	– POLYVINYL CHLORIDE
DEPT	– DEPARTMENT	PVC	– POWER POLE
DI	– DROP INLET	RCP	– REINFORCED CONCRETE PIPE
DIM	– DIMENSION	RD	– ROAD
DIST	– DISTANCE	REQ'D	– REQUIRED
DR	– DRIVE	ROW	– RIGHT-OF-WAY
DWG	– DRAWING	SCH	– SCHEDULE
E	– EAST	SDMH	STORM DRAIN MANHOLE
EP	– EDGE OF PAVEMENT	STLT	– STREET LIGHT
EXIST	– EXISTING	S	– SLOPE
FG	– FINISH GRADE	SO	– SOUTH
FH	– FIRE HYDRANT	SEC	– SECTION
FL	– FLOWLINE	SHT	– SHEET
GV	– GATE VALVE	SPECS	– SPECIFICATIONS
HGL	– HYDRAULIC GRADE LINE	ST	– STREET
HORIZ	– HORIZONTAL	STA	– STATION
HPS	– HIGH PRESSURE SODIUM	STD	– STANDARD
ID	– INSIDE DIAMETER	TC	– TOP OF CURB
INT	– INTRESECTION	TEL	– TELEPHONE
INV	– INVERT ELEVATION	TYP	– TYPICAL
LF	– LINEAL FEET	VCP	– VITRIFIED CLAY PIPE
LN	– LANE	VERT	– VERTICAL
LVVWD	– LAS VEGAS VALLEY WATER DIST	W	– WEST
MH	– MANHOLE	W/	– WITH

NOTICE TO CONTRACTOR !

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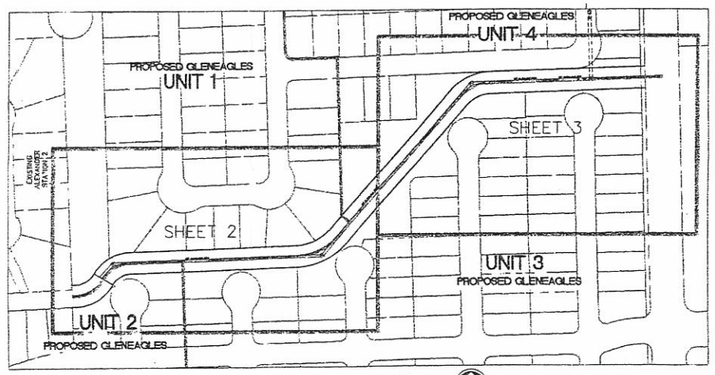
AVOID CUTTING UNDERGROUND UTILITIES IT'S COSTLY

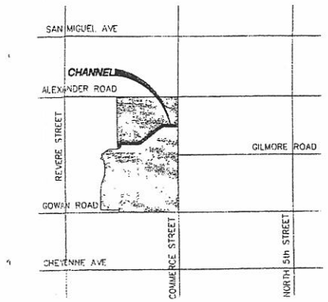
CALL before you Dig 1-800-227-2600 UNDERGROUND SERVICE (USA)

AVOID HITTING OVERHEAD POWER LINES IT'S COSTLY

DRAINAGE CHANNEL
REGIONAL FACILITY (LV05-0131)
AT GLENEAGLES
IMPROVEMENT PLANS
FOR
LHN
IN THE
CITY OF NORTH LAS VEGAS
STATE OF NEVADA



SITE PLAN
NOT TO SCALE



VICINITY MAP
NOT TO SCALE

QUANTITY ESTIMATE

DESCRIPTION	PUBLIC
10' CONCRETE ACCESS ROAD	1,117± SF
2" A.C. SIDEWALK & JOGGING PATH	8,959± SF
RIP-RAP (D_{50} = 9")	75± CY
FILTER FABRIC	3,750± SF
TYPE II AGGREGATE BASE	455± CY
SIDEWALK UNDER-DRAIN	0 EA
RETAINING WALL	1,415± LF
STORM DRAIN MANHOLES	4 EA
66" STORM DRAIN	1054 LF
78" STORM DRAIN	276 LF

SHEET INDEX

1 COVER SHEET
2 CHANNEL PLAN & PROFILE (STA 13+00 TO STA 22+50)
3 CHANNEL PLAN & PROFILE (STA 22+50 TO STA 30+00)
4 GRADING NOTES & CHANNEL DETAILS
5 CHANNEL DETAILS
6 CHANNEL DETAILS

LEGAL DESCRIPTION

A PORTION OF THE NORTHWEST QUARTER (NW1/4) OF SECTION 10, T 20 S., R 61 E., M.D.M., CITY OF NORTH LAS VEGAS, CLARK COUNTY, NEVADA

PROPERTY OWNER

BECKER AND SONS
50 S JONES BLVD
LV, NV 89170

DEVELOPER

LHN
2625 N GREEN VALLEY
SUIT 250
HENDERSON, NV, 89104

BENCHMARK

CITY OF NORTH LAS VEGAS VERTICAL CONTROL
STATION NLV011ONWS
ELEVATION= 636 327 METERS (NAVD88)
2087 684 FEET

RIVET AND ROUND ALUMINUM DISC IN TOP OF CURB
SOUTHEAST CORNER OF ALEXANDER RD AND REVERE STREET

BASIS OF BEARING

THE BASIS OF BEARINGS BEING THE EAST LINE OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 10 TOWNSHIP 20 SOUTH, RANGE 61 EAST, M D M WHICH BEARS NORTH 01°29 59" WEST AS SHOWN BY MAP IN THE OFFICE OF THE CLARK COUNTY, NEVADA RECORDER IN FILE 66 OF PLATS PAGE 70

APPROVALS

JAMES A BELL, P E DATE
DEPUTY DIRECTOR OF PUBLIC WORKS/CITY ENGINEER

KELLY R CHUMA, P E DATE
MANAGER OF DEVELOPMENT & FLOOD CONTROL

RAYMOND H BURKE, TRAFFIC ENGINEER DATE

CNLV DEVELOPMENT DIVISION (UTILITIES) DATE

APPROVAL OF THESE PLANS SHALL NOT BE CONSTRUED TO BE A PERMIT FOR CONSTRUCTION A COMMITMENT TO SUPPLY WATER SERVICE OR AN APPROVAL OF ANY VIOLATION OF CNLV WATER SERVICE DISTRICT RULES AND REGULATIONS OR DESIGN CONSTRUCTION STANDARDS

CNLV FIRE DEPARTMENT DATE

CNLV DEPARTMENT OF BUILDING/SAFETY DATE

APPROVAL OF THESE PLANS DOES NOT CONSTITUTE APPROVAL FOR CONSTRUCTION OF ANY STRUCTURES WALLS OR TRASH ENCLOSURES PROVISIONS MUST BE MADE FOR THE PREPARATION AND MAINTENANCE OF ALL CUT SLOPES FILL SLOPES AND AREAS OF DISCHARGE TO AGAINST EROSION

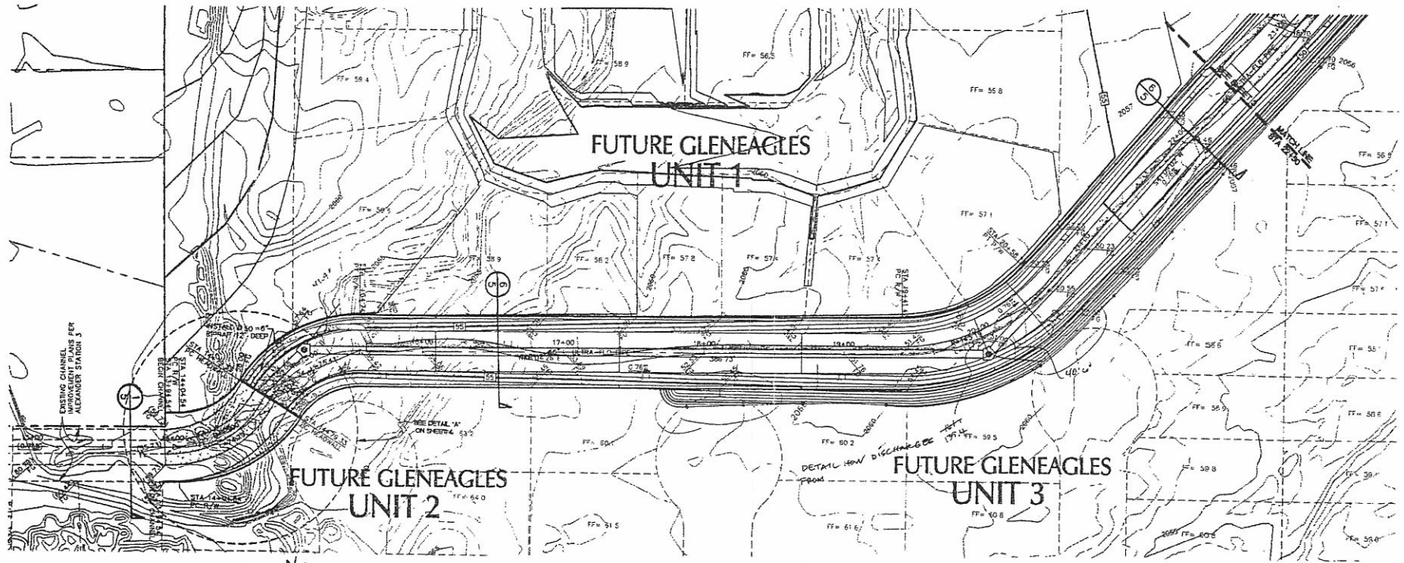
NO	BY	DATE APPVD	REVISION DESCRIPTION

STAMP DATE 12/9/98

3610 North Rancho Drive
Las Vegas, Nevada 89130
Telephone: (702) 645-2422
Fax: (702) 648-4143
ENGINEERING SOUTHWEST LAND PLANNING • MAPPING • DEVELOPMENT

TITLE COVER SHEET
PROJECT DRAINAGE CHANNEL @ GLENEAGLES LHN

WORK ORDER NO 971208
DESIGN BY PL/BTF
DATE 6-2-98
SCALE NONE
CADFILE CHCOV
SHEET 1 OF 6 SHEETS



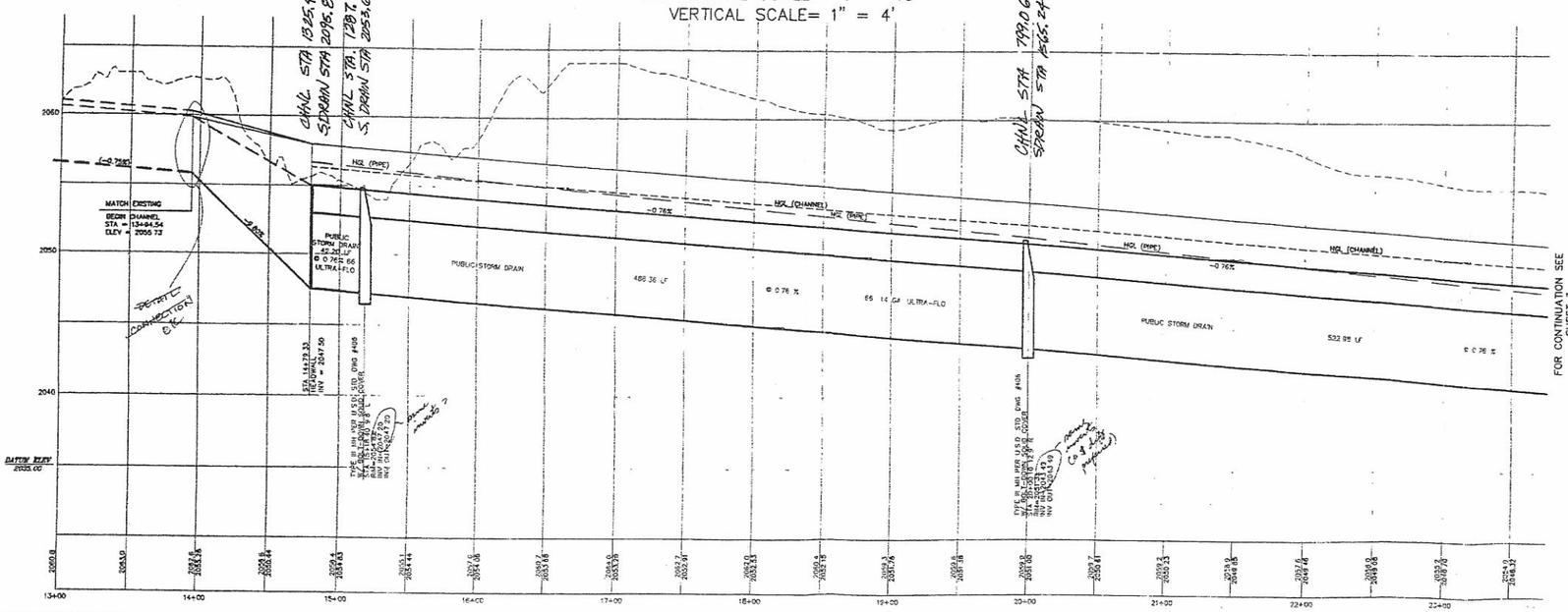
GRAPHIC SCALE

(IN FEET)
1 inch = 40 ft

BENCHMARK

CITY OF NORTH LAS VEGAS VERTICAL CONTROL
STATION NLV011ONWS
ELEVATION= 636.327 METERS (NAVD88)
2087.684 FEET
RIVET AND ROUND ALUMINUM DISC IN TOP OF CURB
SOUTHEAST CORNER OF ALEXANDER RD AND REVERE STREET

HORIZONTAL SCALE = 1" = 40'
VERTICAL SCALE= 1" = 4'



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1-800-227-2600
UNDERGROUND SERVICE (USA)

AVOID HITTING OVERHEAD POWER LINES IT'S COSTLY
CALL BEFORE YOU DO OVERHEAD
CALL 1-702-593-8111

NO.	BY	DATE	APP'D	DATE	REVISION DESCRIPTION

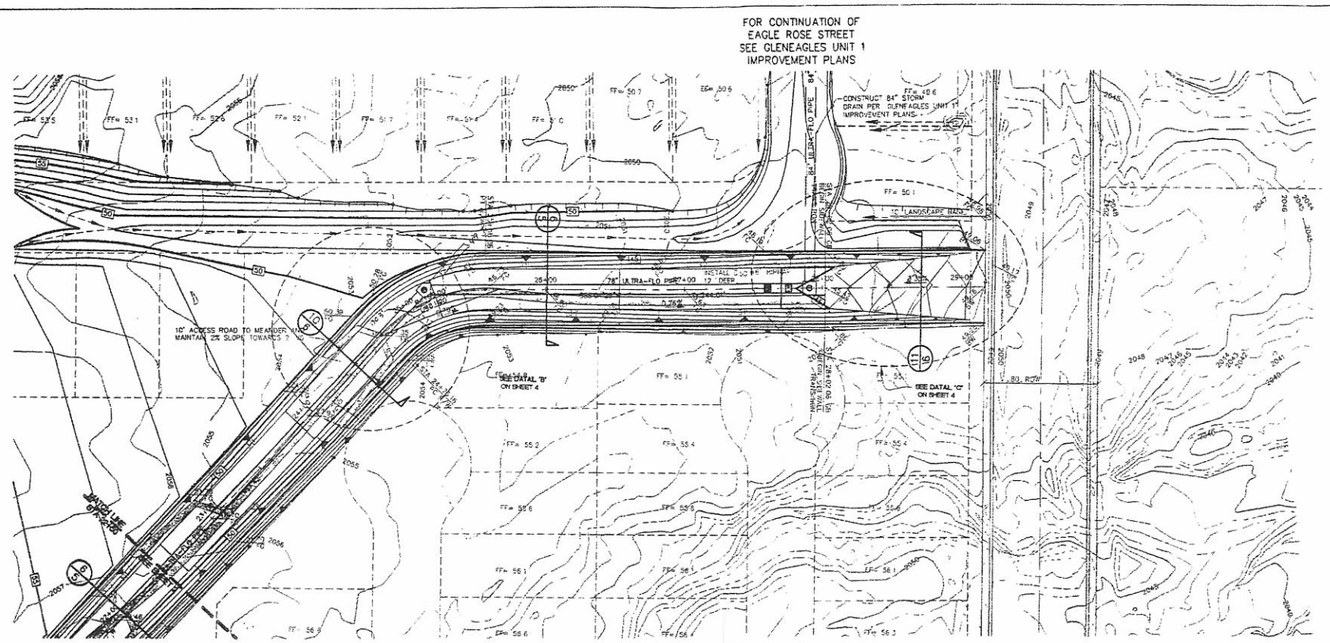
TIMOTHY J. MCKENNA
No. 9361
STATE OF NEVADA
PROFESSIONAL ENGINEER
STAMP DATE 11/3/99

3610 North Rancho Drive
Las Vegas, Nevada 89130
Telephone: (702) 645-9700
Fax: (702) 645-1143
SOUTHWEST ENGINEERING
LAND PLANNING • MAPPING • DEVELOPMENT

TITLE
CHANNEL PLAN & PROFILE
STA. 13+00 TO STA. 22+50

PROJECT
DRAINAGE CHANNEL @ GLENEAGLES
LHN

WORK ORDER NO. 971208
DESIGN BY PL/REH
DATE 06/16/98
SCALE 1" = 40'
CADFILE CHGP1
SHEET 2 OF 6 SHEETS



HORIZONTAL SCALE = 1" = 40'
VERTICAL SCALE= 1" = 4'

CL CURVE DATA TABLE

LINE	DIRECTION	DISTANCE
CH-L1	N87°20'52"E	131.05
CH-L2	N78°04'29"E	385.73'
CH-L3	N57°18'37"E	29.20'
CH-L4	N49°41'01"E	75.15
CH-L5	N41°09'02"E	417.42
CH-L6	N58°04'26"E	344.00
CH-L7	N89°13'57"E	703.13'
CH-L8	N42°04'26"E	91.89

CURVE	RADIUS	LENGTH	BEARING	DELTA
CH-C1	25.00'	10.94	N69°08'27"E	25°04'50"
CH-C2	63.50	81.40	S71°31'29"W	73°27'06"
CH-C3	124.50	178.69	N64°16'44"E	82°13'23"
CH-C4	68.50	72.48	S64°35'45"W	60°37'37"

GRAPHIC SCALE

(IN FEET)
1 inch = 40 ft

BENCHMARK

CITY OF NORTH LAS VEGAS VERTICAL CONTROL STATION
NLV011ONWS
ELEVATION= 636.327 METERS (NAVD88)
2087.684 FEET
RIVET AND ROUND ALUMINUM DISC IN TOP OF CURB
SOUTHEAST CORNER OF ALEXANDER RD AND REVERE STREET

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UNDERGROUND SERVICE (USA)

AVOID HITTING OVERHEAD POWER LINES - IT'S COSTLY
CALL BEFORE YOU DIG OVERHEAD
CALL 1-702-363-8111

CHANNEL PLAN & PROFILE

NO	DESCRIPTION	DATE	APP'D	DATE	BY

STAMP DATE 12/5/05

SOUTHWEST ENGINEERING
LAND PLANNING • MAPPING • DEVELOPMENT
3610 North Rancho Drive
Las Vegas, Nevada 89130
Telephone (702) 648-4100
fax (702) 648-4113

TITLE: CHANNEL PLAN & PROFILE
STA. 22+50 TO STA. 31+50
LHN

PROJECT: DRAINAGE CHANNEL @ GLENEAGLES

WORK ORDER NO 9701.208
DESIGN BY PL/REH
DATE 05/15/98
SCALE 1" = 40'
CADFILE CHGP2
SHEET 3 OF 6 SHEETS

GENERAL GRADING AND DRAINAGE NOTES

1. ALL DESIGN ELEVATIONS ARE TO THE FINISH GRADE ELEVATION
2. THE CONTRACTOR SHALL VERIFY ALL ASPECTS OF THESE PLANS AND REPORT ANY DISCREPANCIES TO THE ENGINEER PRIOR TO COMMENCEMENT OF ANY WORK
3. ANY QUANTITIES SHOWN HEREON ARE FOR ESTIMATING ONLY AND ARE NOT TO BE USED FOR BIDDING
4. THE CONTRACTOR SHALL FURNISH TO THE ENGINEER AS-BUILT DRAWINGS FOR UTILITY SERVICES AND HOOK-UPS

N/A 5. REFER TO THE IMPROVEMENT PLANS FOR STREET SECTIONS, DETAILS AND NEW UTILITY LOCATIONS

6. ALL GRADING SHALL CONFORM TO THE SOILS REPORT

N/A 7. ALL FINISH FLOOR ELEVATIONS TO BE 12" (1'0") ABOVE PAD ELEVATIONS, UNLESS OTHERWISE NOTED

8. ALL WORK PERFORMED OUTSIDE THE PROJECT BOUNDARY AND ON PRIVATE PROPERTY SHALL NOT BE PERFORMED UNTIL WRITTEN PERMISSION HAS BEEN OBTAINED FROM THE PROPERTY OWNER

* SUB-GRADE PREPARATION PER GEOTECHNICAL REPORT "GEOTECHNICAL EVALUATION FOR A 916 ACRE PARCEL LOCATED IN THE SOUTHWEST CORNER OF ALEXANDER ROAD AND COMMERCE STREET" DATED FEBRUARY 27, 1998, BY GOETECK, INC. REPORT NUMBER 1531-LV UPDATED MAY 26, 1999 RECOMMENDATIONS FOR GLENEAGLES CHANNEL

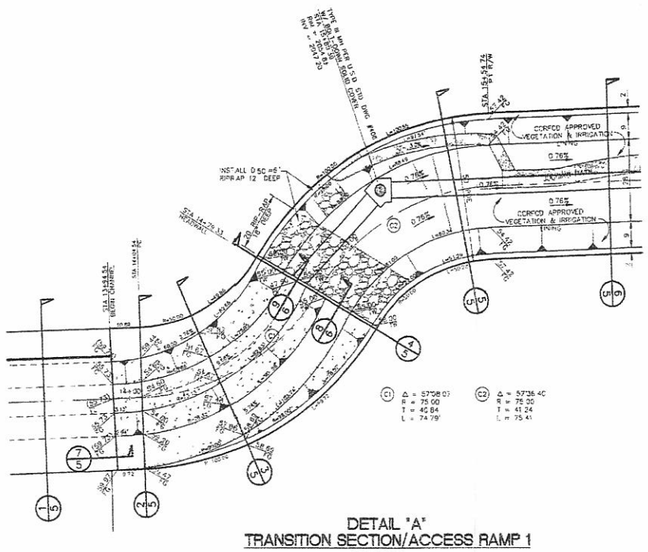
C.N.L.V. GRADING AND DRAINAGE PLANS GENERAL NOTES

1. ALL WORK AND MATERIALS NOT IN ACCORDANCE WITH THE LATEST "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, CLARK COUNTY AREA " IS SUBJECT TO REMOVAL AND REPLACEMENT AT THE CONTRACTOR'S EXPENSE
2. A GRADING PERMIT IS REQUIRED UNDER ORDINANCE NUMBER 883
3. EXCAVATING CONTRACTOR SHALL GIVE LOCATION FOR WASTING EXCESS EXCAVATION AND A LETTER FROM THE OWNER GIVING PERMISSION FOR DUMPING PRIOR TO STARTING ON-SITE CONSTRUCTION
4. CITY ENGINEER'S OFFICE SHALL BE NOTIFIED BEFORE ANY ON-SITE CONSTRUCTION BEGINS, PHONE 633-1220

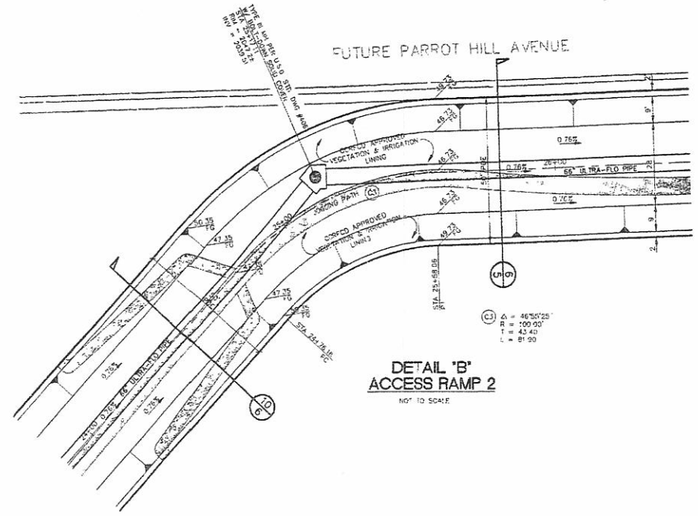
N/A 5. STAKING PAD AND/OR FINISH FLOOR ELEVATIONS IS THE RESPONSIBILITY OF THE DEVELOPER AND HIS ENGINEER IN NON-CRITICAL AREAS. DEVELOPER'S ENGINEERS SHALL SUBMIT CERTIFICATION OF CONSTRUCTED "BUILDING PAD ELEVATIONS", AND COMPACTING REPORTS OF ALL FILLS AND FOUNDATIONS AND SLAB SUB-GRADES PRIOR TO POURING OF CONCRETE IF IN CRITICAL DRAINAGE AREA, SUBSTITUTE "BUILDING FLOOR ELEVATION" IN ABOVE NOTE

6. A SEPARATE PERMIT IS REQUIRED FOR ANY OFF-SITE CONSTRUCTION
7. A GRADING AND DRAINAGE PLAN SHALL BE ON THE JOB SITE AT ALL TIMES DEVIATIONS FROM THE PLAN MUST BE PRECEDED BY AN APPROVED PLAN REVISION.
8. AS-BUILT FINISH FLOOR ELEVATIONS SHALL BE CERTIFIED BY
   ENGINEER SOUTHWEST ENGINEERING
   ADDRESS 3610 N. RANCHO DRIVE
   TELEPHONE NUMBER 648-9700

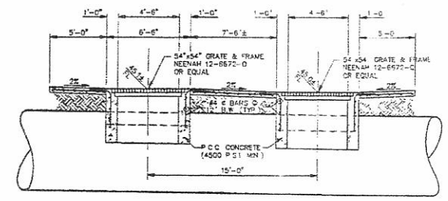
REVISED 11/97



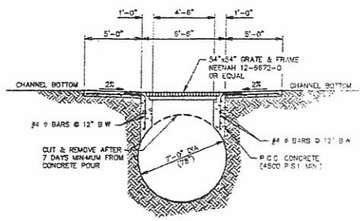
DETAIL "A"
TRANSITION SECTION/ACCESS RAMP 1
NOT TO SCALE



DETAIL "B"
ACCESS RAMP 2
NOT TO SCALE

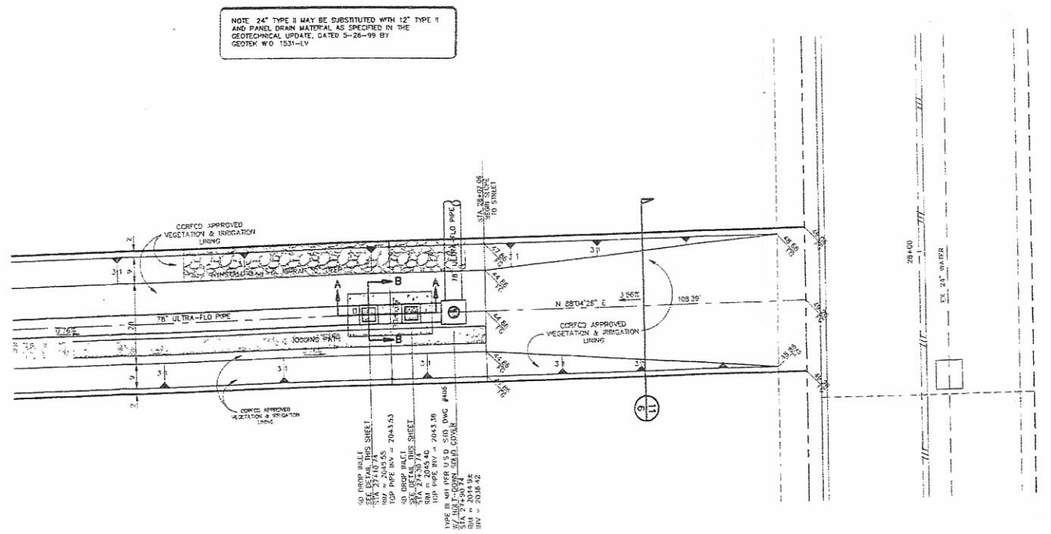


DROP INLET SECTION A-A
NOT TO SCALE



DROP INLET SECTION B-B
NOT TO SCALE

NOTE 24" TYPE II MAY BE SUBSTITUTED WITH 12" TYPE II AND PANEL DRAIN MATERIAL AS SPECIFIED IN THE GEOTECHNICAL UPDATE, DATED 5-26-99 BY GEOTEK W.O. 1531-LV



DETAIL "C"
TRANSITION SECTION/CULVERT
NOT TO SCALE

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CALL 1-702-593-6111

NO.	BY	DATE	APPVD	DATE	REVISION DESCRIPTION

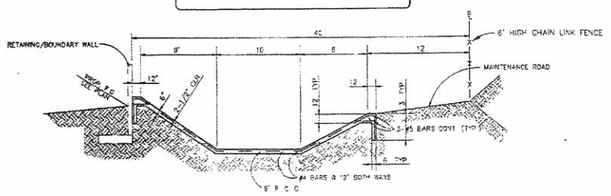
SOUTHWEST ENGINEERING
LAND PLANNING • MAPPING • DEVELOPMENT
3610 North Rancho Drive
Las Vegas, Nevada 89130
Telephone: (702) 648-9700
Fax: (702) 648-4143

REGISTERED PROFESSIONAL ENGINEER STATE OF NEVADA
TIMOTHY E. LOWE
No. 10361
STAMP DATE 12/3/99

TITLE: GRADING NOTES & CHANNEL DETAILS
REGIONAL FACILITY (LV05-0131)
PROJECT: DRAINAGE CHANNEL @ GLENEAGLES
LHN

WORK ORDER NO. 971208
DESIGN BY PL/REH
DATE 5-2-98
SCALE NONE
CADFILE CHGN1
SHEET 4 OF 6 SHEETS

NOTE: 24" TYPE E MAY BE SUBSTITUTED WITH 12" TYPE II AND PANEL DRAIN MATERIAL AS SPECIFIED IN THE GEOTECHNICAL UPDATE, DATED 5-26-99 BY GEOTEK W.O. 1531-LV



EXISTING CHANNEL SECTION (1)
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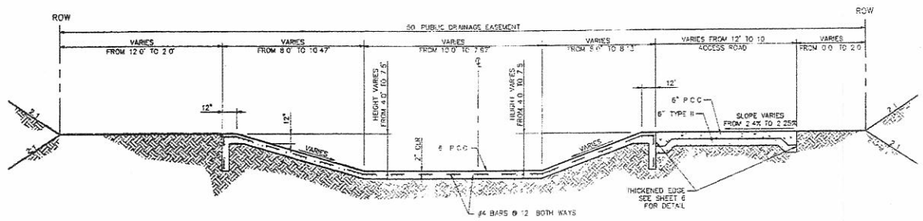
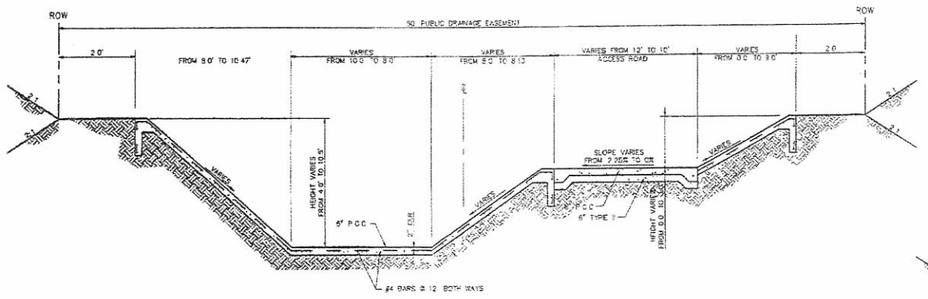
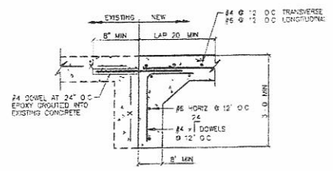


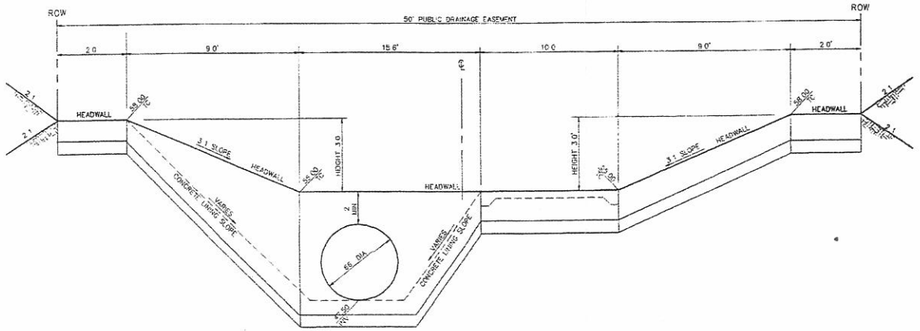
FROM STA 13+94.54 TO STA 14+19.20
SECTION (2)
SCALE N.T.S.



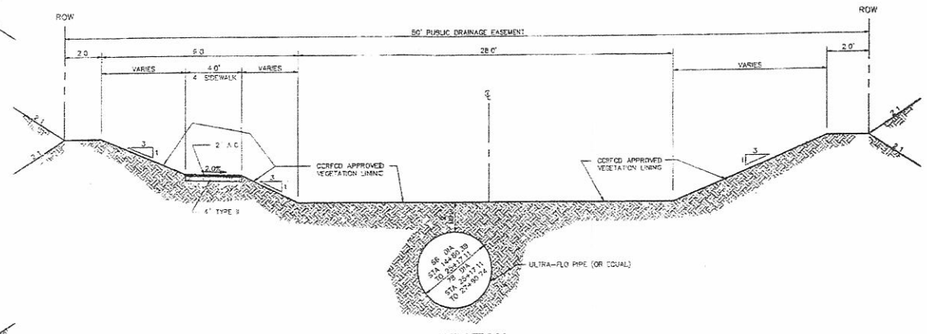
FROM STA 14+19.20 TO 14+80.39
SECTION (3)
SCALE N.T.S.



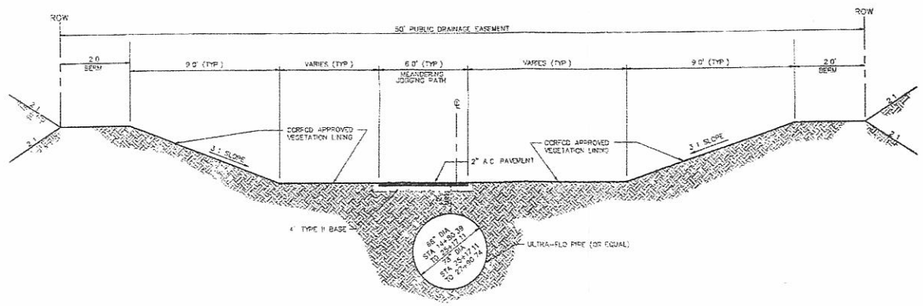
SECTION (7)
SCALE N.T.S.



HEADWALL STA 14+80.39
SECTION (4)
SCALE N.T.S.



SECTION (5)
SCALE N.T.S.



FROM STA 14+80.39 TO STA 27+90.74
SECTION (6)
SCALE N.T.S.

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NO	BY	DATE	APPVD	DATE	REVISION DESCRIPTION

PROFESSIONAL ENGINEER STATE OF NEVADA DIMITRIOS VARELIDIS No. 9313 STAMP DATE 12/3/99

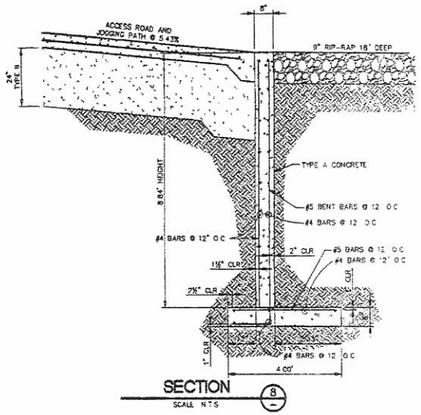
3610 North Rancho Drive
Las Vegas, Nevada 89130
Telephone: (702) 648-3700
Fax: (702) 648-9140

DANIELSON SOUTHWEST
LAND PLANNING • MAPPING • DEVELOPMENT

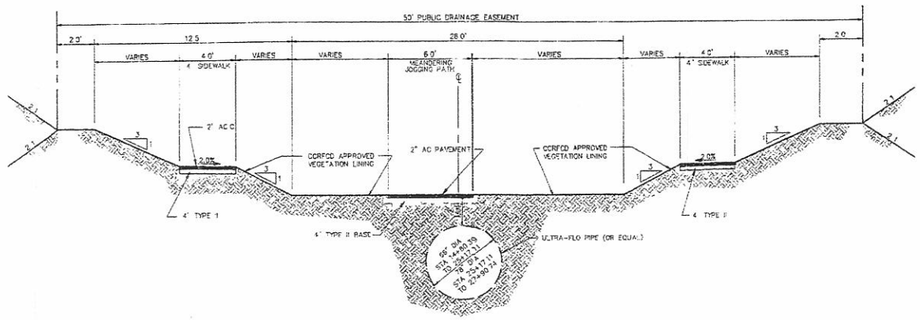
TITLE: CHANNEL DETAILS
REGIONAL FACILITY (LV05-0131)
LHN

PROJECT: DRAINAGE CHANNEL @ GLENEAGLES

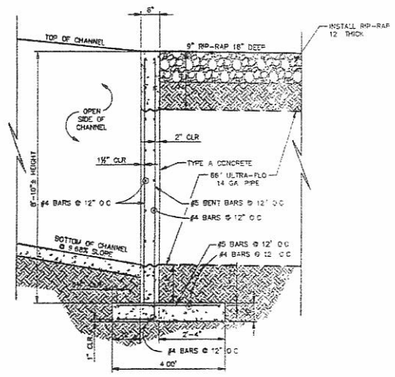
WORK ORDER NO. 971208
DESIGN BY PL/REH
DATE 10-09-98
SCALE NONE
CADFILE CHDN2
SHEET 5 OF 6 SHEETS



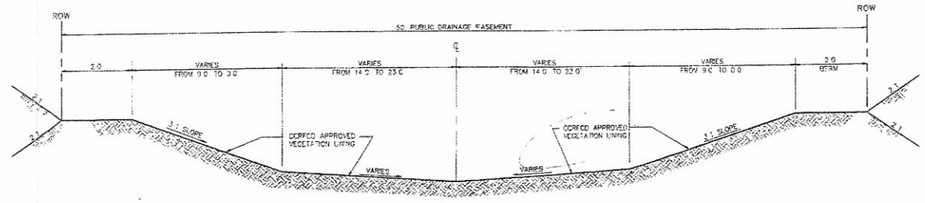
SECTION 8
SCALE N.T.S.



SECTION 10
SCALE N.T.S.

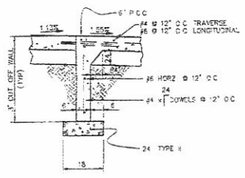


SECTION 9
SCALE N.T.S.

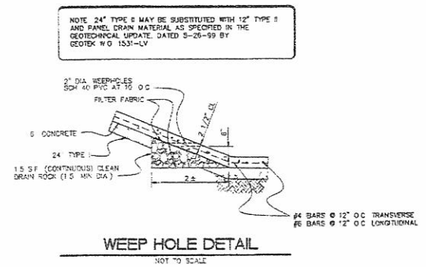


FROM STA 27+90.74 TO STA 29+06.24

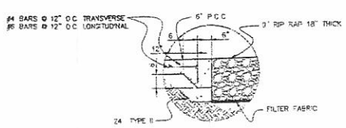
SECTION 11
SCALE N.T.S.



SECTION B
CUT-OFF WALL
NOT TO SCALE



WEEP HOLE DETAIL
NOT TO SCALE



THICKENED EDGE DETAIL
NOT TO SCALE

NOTICE TO CONTRACTOR !

EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION

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CALL before you Dig

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UNDERGROUND SERVICE (USA)

AVOID HITTING OVERHEAD POWER LINES. IT'S DEADLY

CALL BEFORE YOU DO SOMETHING SILLY

CALL 1-702-593-5111

NO	BY	DATE	APPVD	DATE	REVISION DESCRIPTION

PROFESSIONAL ENGINEER — STATE OF NEVADA — No. 10161

STAMP DATE 12/3/99

3610 North Rancho Drive
Las Vegas, Nevada 89130
Telephone (702) 645-2600
fax: (702) 645-4143

ENGINEERING
SOUTHWEST
LAND PLANNING • MAPPING • DEVELOPMENT

TITLE: CHANNEL DETAILS
REGIONAL FACILITY (LV05-0131)

PROJECT: DRAINAGE CHANNEL @ GLENEAGLES
LHN

WORK ORDER NO. 971206
DESIGN BY PL/REH
DATE 10-09-98
SCALE NONE
CADFILE CHGN3
SHEET 6 OF 6 SHEETS

Alexander Channel Plans

Mayor
Michael L. Montandon

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

CITY OF
NORTH LAS VEGAS
Your Community of Choice

City Manager
Gregory E. Rose

Assistant City Manager
Dan Tarwater

Public Works Department
Engineering Services Division
2829 Fort Sumter Drive • North Las Vegas, Nevada 89030
Telephone: (702) 633-2036 • Fax: (702) 642-0390 • TDD: (800) 326-6868
www.cityofnorthlasvegas.com

July 14, 2005

Mr. Mike Godesky, P.E.
Project Engineer – Region IX
Federal Emergency Management Agency
Mitigation Division
500 C Street, SW
Washington, DC 20472

RE: AS-BUILT CERTIFICATION FOR LETTER OF MAP REVISION APPLICATION FOR ALEXANDER CHANNEL
PBS&J REFERENCE NO.: 511606.00

Dear Mr. Godesky,

I, Joemel D. Llamado, hereby certify that the Alexander Channel (from Commerce Street to its confluence with the "A" Channel) was constructed in substantial conformance with the improvement plans dated December 12, 2003. Please refer to Appendix D for the plans entitled *Alexander Channel – Commerce Street to Western Tributary Record Drawings (Information Supplied by Contractor June 2005).*

Sincerely,

Joemel D. Llamado, P.E.
Construction Manager
City of North Las Vegas
Public Works Department

JL:gw

PROFESSIONAL ENGINEER-STATE OF NEVADA
JOEMEL D. LLAMADO
EXP: 12/31/07
CIVIL
No. 17123

CITY OF NORTH LAS VEGAS, NEVADA

DEPARTMENT OF PUBLIC WORKS

ALEXANDER CHANNEL

COMMERCE STREET TO THE WESTERN TRIBUTARY

BID NO. 1155

LABOR COMMISSION NO. CL-2004-76

FUNDED BY:

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT

(TRIBUTARY TO THE WESTERN TRIBUTARY AT ALEXANDER ROAD)

BASIS OF BEARINGS

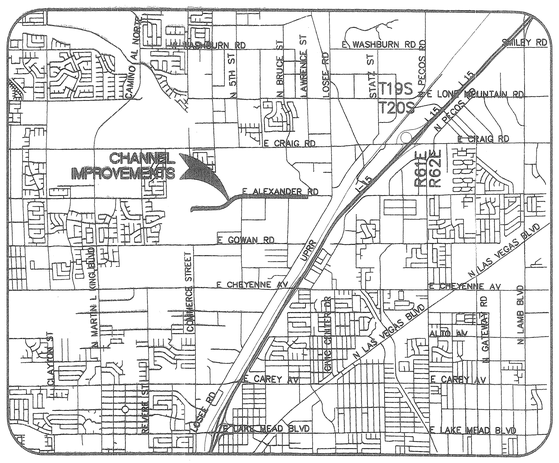
THE BASIS OF BEARINGS FOR THIS SURVEY IS N 88°22'21" E, BEING THE NORTH LINE OF THE NORTHWEST QUARTER OF SECTION 10 TOWNSHIP 20 SOUTH, RANGE 61 EAST, AS DEFINED BY THE CENTRAL MERIDIAN OF THE CITY OF NORTH LAS VEGAS USER DEFINED TRANSVERSE MERCATOR PROJECTION; SAID MERIDIAN BEING COINCIDENT WITH 115°05' 53.00" WEST OF THE GREENWICH MERIDIAN. ORIENTATION IS DEFINED BY THE HIGH ACCURACY REFERENCE NETWORK OF NEVADA, NATIONAL GEODETIC SURVEY. (EPOCH 1994)

NAVD88 BENCHMARK

NLV011ONWS ELEVATION 636.327 METERS (2087.683 FEET) RIVET AND 2" ROUND ALUMINUM DISK, STAMPED NORTH LAS VEGAS BM No. NLV011ONWS, IN THE TOP OF CURB AT THE SOUTHEAST CORNER OF THE INTERSECTION OF ALEXANDER ROAD AND REVERE.

SHEET INDEX

DRAWING NO.	DRAWING TITLE
G1	COVER SHEET
G2	ABBREVIATIONS, LEGEND AND UTILITY CONTACTS
G3	CITY OF NORTH LAS VEGAS STANDARD NOTES
SC1-SC2	SURVEY CONTROL PLAN
CH1-CH9	CHANNEL PLAN & PROFILE
SD1 - SD4	STORM DRAIN DETAILED PLAN VIEWS
F1 - F5	FENCING & SIGN PLANS
XS1-XS10	STATION TO STATION SECTIONS
S1 - S8	STRUCTURAL DETAILS
D1 - D3	MISCELLANEOUS DETAILS
D4	MODIFIED TYPE 'C' DROP INLET DETAILS
D5	ORNAMENTAL FENCE AND GATE DETAILS



VICINITY MAP

NOT TO SCALE

CITY OF NORTH LAS VEGAS

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NEVADA POWER ENVIRONMENT AND SAFETY SERVICES DEPARTMENT

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1-800-227-2600

UNDERGROUND SERVICE (USA)

ALL DRAWINGS, SPECIFICATIONS AND SPECIAL TECHNICAL REQUIREMENTS ASSOCIATED WITH THE PROJECT AND IMPROVEMENTS PRESENTED HEREIN HAS BEEN ACCOMPLISHED UNDER THE SUPERVISION OF RESPONSIBLE PROFESSIONAL(S) HAVING THE APPROPRIATE REGISTRATION TO SERVE IN THIS CAPACITY BASED ON THE SCOPE OF THIS SPECIFIC PROJECT, AND IN ACCORDANCE WITH THE STATUTORY PROVISIONS OF THE NEVADA REVISED STATUTES (NRS) AND THE NEVADA ADMINISTRATIVE CODE (NAC) INCLUDING: NRS 278, 338, NRS 623; NRS 625; NAC 338, NAC 623 AND NAC 625 CERTIFICATION SIGNIFYING COMPLIANCE WITH STATUTORY AND RELATED ADMINISTRATIVE CODE REQUIREMENTS IS HEREBY PROVIDED BY THE RESPONSIBLE PROFESSIONAL(S) IN THE FORM OF A STAMP OR SEAL PLACED ON THE PROJECT DOCUMENTS.

NEVADA POWER COMPANY ACKNOWLEDGES THAT WE HAVE RECEIVED YOUR PLANS AND WILL PROVIDE SERVICE TO ALL ELECTRICAL NEEDS ASSOCIATED WITH THIS PROJECT. NEVADA POWER COMPANY RESERVES THE RIGHT TO ADDRESS ANY EXISTING OR FUTURE CONFLICTS ONCE THE FINAL DESIGN IS COMPLETED. THE NEW SERVICE AND THE RESOLUTION OF ANY CONFLICTS WILL BE ACCOMPLISHED PURSUANT TO THE NEVADA PUBLIC UTILITY COMMISSION'S RULES AND REGULATIONS.

"The affixed Sprint Nevada approval does not assume or guarantee liability for known or unknown conflicts with existing or proposed improvements. Resolution of any conflict will be accomplished pursuant to Local Ordinances, Nevada Revised Statutes and/or Public Utility Commission Rules and Regulations."

*APPROVALS:

ROBERT M. HARARY, P.E. — 1/6/04
ASSISTANT PUBLIC WORKS DIRECTOR / ENGINEERING SERVICES

BRIAN D. MARTIN, P.E. — 1/6/04
PRINCIPAL ENGINEER / ENGINEERING SERVICES

LENNY BADGER, P.E. — 12/23/03
MANAGER, DEVELOPMENT & FLOOD CONTROL

GALE WM. FRASER II, P.E. — 12/23/03
GENERAL MANAGER / CHIEF ENGINEER
CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT

REVIEWED BY:

RAYMOND H. BURKE — 12/23/03
ASSISTANT DIRECTOR PUBLIC WORKS / TRANSPORTATION SERVICES

for KIRK D. MEDINA — 12/29/03
MANAGER, UTILITIES

LESLIE LONG, P.E. — 12/23/03
MANAGER, ENVIRONMENTAL SERVICES

ROBERT McLAUGHLIN, P.E. — 12/23/03
MANAGER, UTILITY TECHNICAL SERVICES

RANDAL D. CAGLE, SR/WA — 12/23/03
MANAGER, REAL PROPERTY SERVICES

DALE DAFFERN, P.E. — 12/23/03
MANAGER, CONSTRUCTION SERVICES

BARTLETT C. DALTON, P.L.S. — 23 Dec 03
CITY SURVEYOR

DENNIS SCOTT — 12-23-03
ASSISTANT MANAGER, ROADWAY OPERATIONS

COX COMMUNICATIONS LAS VEGAS, INC. — 12-17-03

NEVADA POWER COMPANY — 12-16-03

SOUTHWEST GAS — 12-18-03

SPRINT — 12/17/03

* APPROVAL OF THESE IMPROVEMENT DRAWINGS AND SPECIFICATIONS IS MADE BASED ON THE REPRESENTATIONS MADE BY THE PROFESSIONAL(S) THAT THEY HAVE EXECUTED THEIR RESPONSIBILITIES AND PREPARED COMPLETE DOCUMENTS WHICH COMPLY WITH CITY OF NORTH LAS VEGAS REQUIREMENTS FOR CONSTRUCTION OF THE IMPROVEMENTS DECPICTED HEREIN.

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

REVISIONS

NO.	DESCRIPTION	DATE	BY
△			
△			
△			
△1	RECORD DRAWING INFORMATION AS PROVIDED BY CAPRIATI CONSTRUCTION	6/30/2005	DRF

SCALE: N/A
DESIGN: HT/DJB
DRAWN: DJB
CHECKED: LVG
APPROVED: KDG
DATE: 12/12/2003

REGISTERED PROFESSIONAL ENGINEER STATE OF NEVADA KEN G. BRETH EXP. 06/30/05 CIVIL No. 9177

vtn nevada
CONSULTING ENGINEERS
PLANNERS
LAND SURVEYORS
2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-5148
PHONE (702) 873-7550
FAX (702) 362-2597

(DRAWING TITLE) COVER SHEET

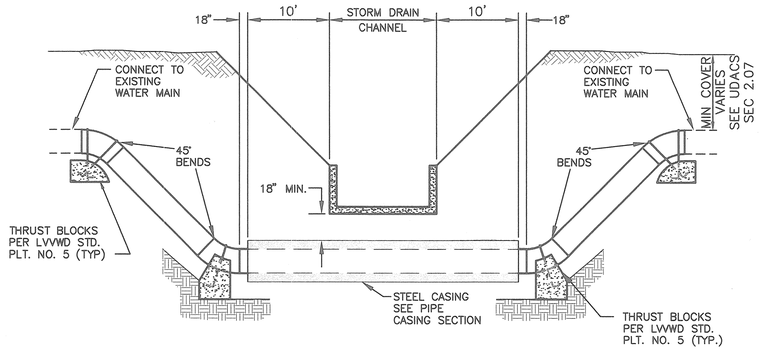
(PROJECT TITLE) ALEXANDER CHANNEL

(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

SHEET NO. G1

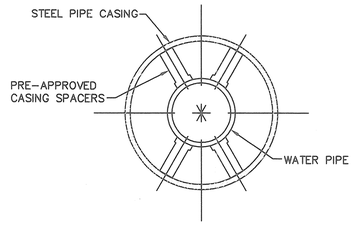
OF 46 SHEETS

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR - JUNE 2005



WATER MAIN RELOCATION LOWERING CONDITION

N.T.S.



NOTES:

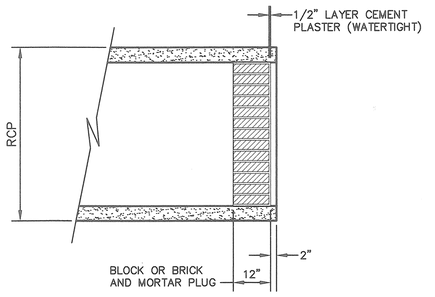
1. STEEL PIPE CASING SYMMETRICAL ABOUT WATER MAIN CENTERLINE.
2. PRE-APPROVED CASING SPACERS AND PRE-APPROVED END SEALS INSTALLED PER MANUFACTURER'S SPECIFICATIONS. (REDWOOD SKIDS **NOT** ALLOWED. UDACS SECTION 3.26 NOT APPLICABLE). USE A "CENTERED" CONFIGURATION AND PROVIDE THE MANUFACTURER WITH THE FOLLOWING:
   - PIPE O.D.
   - CASING I.D.
   - CASING LENGTH

PIPE CASING NOTES

1. STEEL PIPE CASING SHALL BE FABRICATED FROM A MINIMUM OF 1/4" THICK STEEL PLATES CONFORMING TO THE REQUIREMENTS ASTM, A283, GRADE B,C, OR D. ALL JOINTS SHALL BE WELDED. INTERIOR JOINTS SHALL BE GROUND TO A SMOOTH FINISH. ALL WELDING SHALL BE PERFORMED IN ACCORDANCE WITH AWWA C200, "AWWA STANDARD FOR FABRICATED ELECTRICALLY WELDED STEEL WATER PIPE." COATINGS FOR STEEL CASING ARE NOT REQUIRED.
2. PIPE CASING SHALL BE LAID TRUE TO LINE AND GRADE WITH NO BENDS OR CHANGES IN GRADE FOR THE FULL LENGTH OF THE CASING.
3. THE PIPE SHALL BE SUPPORTED AT EACH END JOINT WITH SPACERS. AFTER PIPE INSTALLATION, THE CASING SHALL BE SEALED AT BOTH ENDS WITH CASING END SEALS. DUCTILE IRON PIPE JOINTS INSIDE CASING ARE TO BE RESTRAINED.

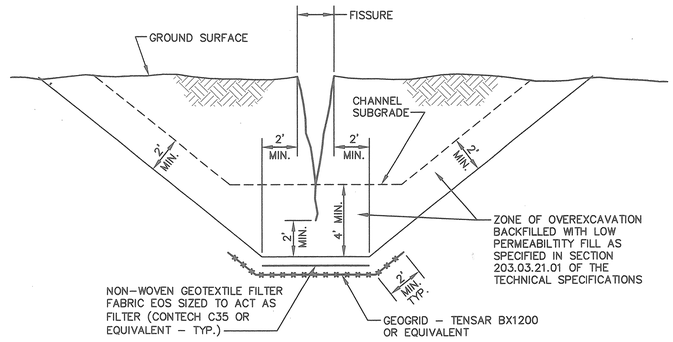
WATER MAIN PIPE CASING DETAIL

N.T.S.



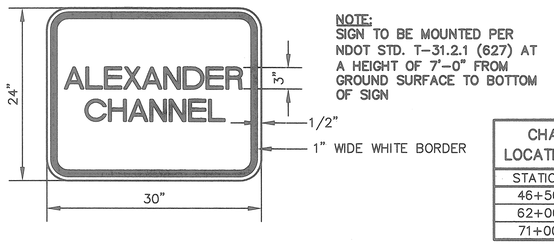
RCP PLUG

N.T.S.



FISSURE MITIGATION DETAIL

N.T.S.



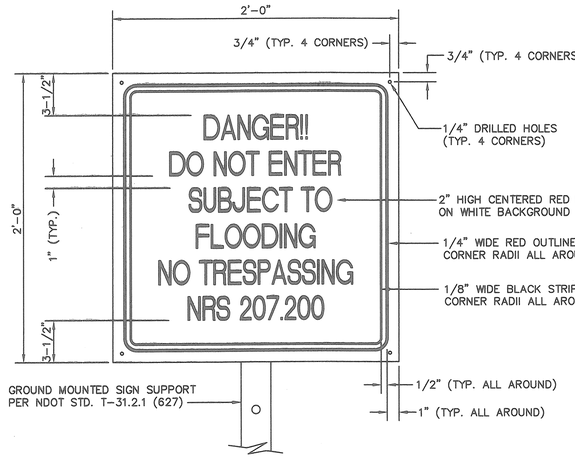
NOTE:
SIGN TO BE MOUNTED PER NDOT STD. T-31.2.1 (627) AT A HEIGHT OF 7'-0" FROM GROUND SURFACE TO BOTTOM OF SIGN

GREEN SIGN PANEL WITH 3" HIGH WHITE LETTERING

CHANNEL SIGN LOCATION SCHEDULE	
STATION	OFFSET
46+50	18.0' LT.
62+00	18.0' LT.
71+00	11.25' LT.

ALEXANDER CHANNEL SIGN DETAIL

N.T.S.



FLOOD WARNING SIGN LOCATION SCHEDULE	
STATION	OFFSET
11+53	12' RT.
24+65	29' RT.
39+02	0'
42+22	14' LT.
42+23	20' RT.
46+02	18' LT.
54+00	17' LT.
62+00	18' LT.
71+00	11.25' LT.

FLOOD WARNING SIGN DETAIL

N.T.S.

AVOID OVERHEAD POWER LINE CONTACT. IT'S COSTLY
Call before you Overhead
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CITY OF NORTH LAS VEGAS - DEPARTMENT OF PUBLIC WORKS - ENGINEERING SERVICES DIVISION

REVISIONS			
NO.	DESCRIPTION	DATE	BY
1			
2			
3			
4	RECORD DRAWING INFORMATION AS PROVIDED BY CARR AT CONSTRUCTION	6/30/2005	DRF

SCALE: AS NOTED
DESIGN: DJB
DRAWN: DJB
CHECKED: JNG
APPROVED: KDG
DATE: 12/31/2003

ORIGINAL CONSTRUCTION DRAWINGS ARE ON FILE WITH THE CITY OF NORTH LAS VEGAS. THE DOCUMENTS WERE SEALED ON 12/31/03 BY KEN D. GILDRETH UNDER LICENSE NO. 9777

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CONSULTING ENGINEERS
PLANNERS
LAND SURVEYORS
2727 SO. RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-5148
PHONE (702) 362-8844
FAX (702) 362-2597

MISCELLANEOUS DETAILS (DRAWING TITLE)

ALEXANDER CHANNEL (PROJECT TITLE)

COMMERCE STREET TO THE WESTERN TRIBUTARY (LOCATION)

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR - JUNE 2005

SHEET NO. D1 OF 46 SHEETS

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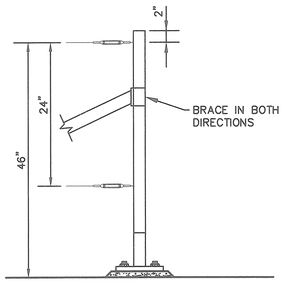
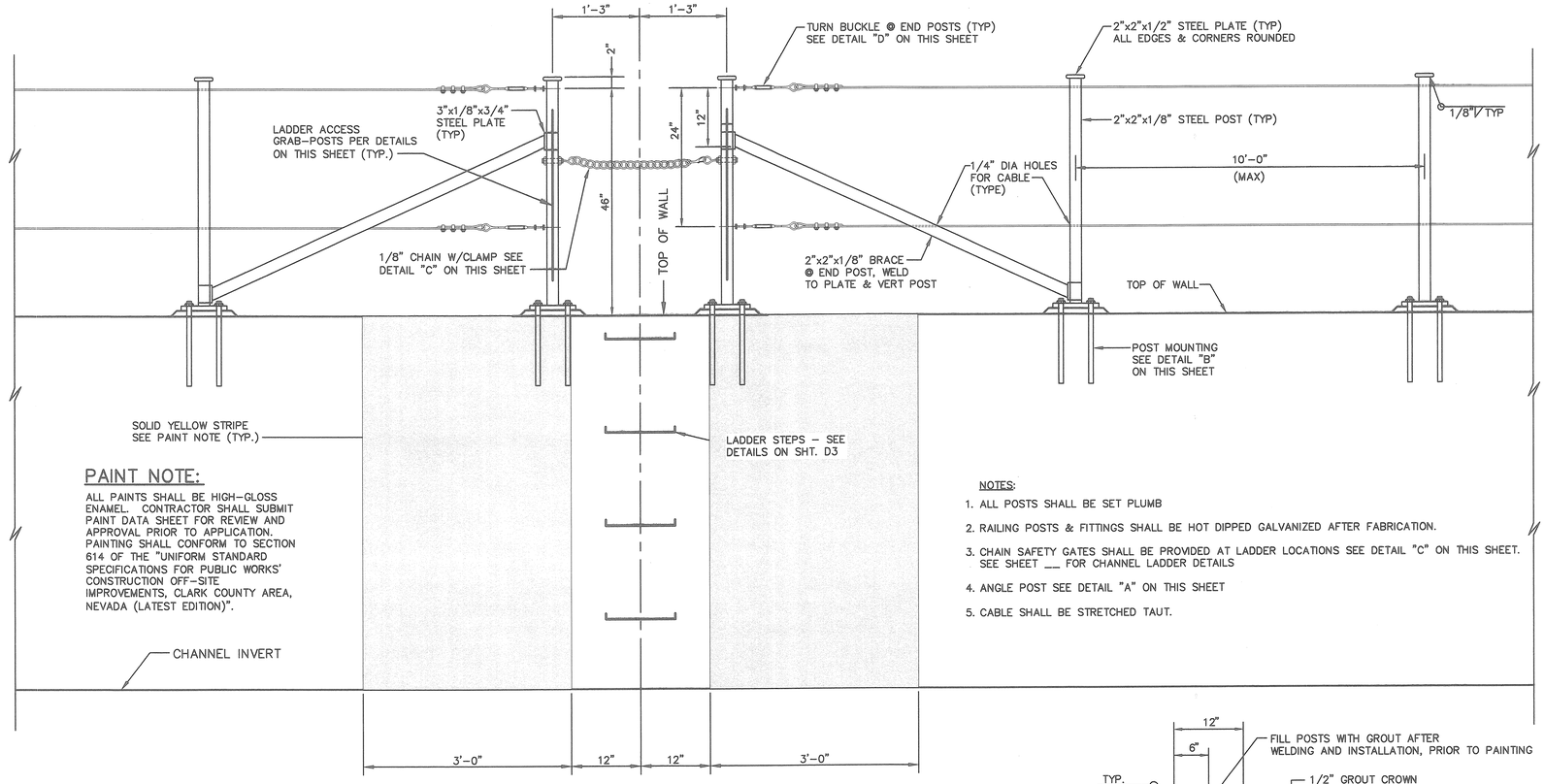
UNDERGROUND SERVICE (USA)



A – ANGLE POST
NOT TO SCALE

CHANNEL LADDER LOCATION SCHEDULE	
STATION	OFFSET
13+50	6.0' LT.
13+62	6.0' RT.
19+50	6.0' LT.
19+62	6.0' RT.
25+75	6.0' LT.
25+87	6.0' RT.
31+75	6.0' LT.
31+87	6.0' RT.
37+60	6.0' LT.
37+72	6.0' RT.
44+50	8.0' LT.
44+66	8.0' RT.
50+34	8.0' LT.
50+50	8.0' RT.
56+34	8.0' LT.
56+50	8.0' RT.
62+34	8.0' LT.
62+50	8.0' RT.
68+50	10.0' LT.
68+70	10.0' RT.
74+30	10.0' LT.
74+50	10.0' RT.



PAINT NOTE:

ALL PAINTS SHALL BE HIGH-GLOSS ENAMEL. CONTRACTOR SHALL SUBMIT PAINT DATA SHEET FOR REVIEW AND APPROVAL PRIOR TO APPLICATION. PAINTING SHALL CONFORM TO SECTION 614 OF THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS' CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA (LATEST EDITION)".

NOTES:

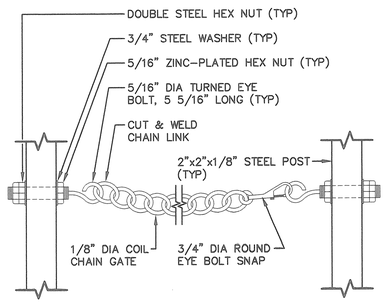
1. ALL POSTS SHALL BE SET PLUMB
2. RAILING POSTS & FITTINGS SHALL BE HOT DIPPED GALVANIZED AFTER FABRICATION.
3. CHAIN SAFETY GATES SHALL BE PROVIDED AT LADDER LOCATIONS SEE DETAIL "C" ON THIS SHEET. SEE SHEET ___ FOR CHANNEL LADDER DETAILS
4. ANGLE POST SEE DETAIL "A" ON THIS SHEET
5. CABLE SHALL BE STRETCHED TAUT.

POST AND CABLE RAILING WITH CHANNEL LADDER STEPS - ELEVATION

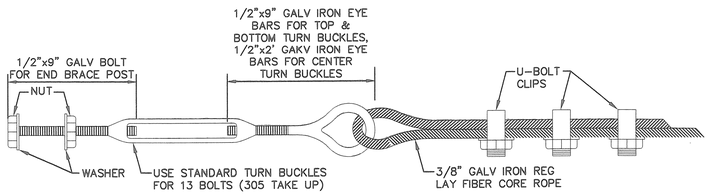
SCALE: 1"=1'-0"

NOTE:
ALL METAL PARTS OF THE HANDRAIL SHOULD BE GALVANIZED STEEL

B – POST MOUNTING
NOT TO SCALE



C – CHAIN SAFETY GATE
NOT TO SCALE



D – TURN BUCKLE
NOT TO SCALE

PAINT NOTE:

ALL PAINTS SHALL BE HIGH-GLOSS ENAMEL, AND FEDERAL CHIP COLOR "SAFETY YELLOW". CONTRACTOR SHALL SUBMIT PAINT DATA SHEET FOR REVIEW AND APPROVAL PRIOR TO APPLICATION. PAINTING SHALL CONFORM TO SECTION 614 OF THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS' CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA (LATEST EDITION)".

SECTION

LADDER ACCESS GRAB-POST NOTE:

ALL GRAB-POST COMPONENTS SHALL BE HOT-DIPPED GALVANIZED AFTER FABRICATION. PAINT STRIPES WITH YELLOW ENAMEL AFTER INSTALLATION. (SEE PAINT NOTE). GRAB-POSTS SHALL BE INSTALLED AT EXISTING LADDER LOCATIONS AS WELL AS CHANGE ORDER LADDER LOCATIONS ON ALL RECTANGULAR CHANNEL SECTIONS.

TYPICAL LADDER ACCESS GRAB-POST

SCALE: 1"=1'-0"

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

REVISIONS			
NO.	DESCRIPTION	DATE	BY
4			
3			
2			
1	RECORD DRAWING INFORMATION AS PROVIDED BY CONTRACT CONSTRUCTION	6/30/2005	DRF

SCALE: AS NOTED
DESIGN: DJB
DRAWN: DJB
CHECKED: JNS
APPROVED: KDG
DATE: 12/31/2003

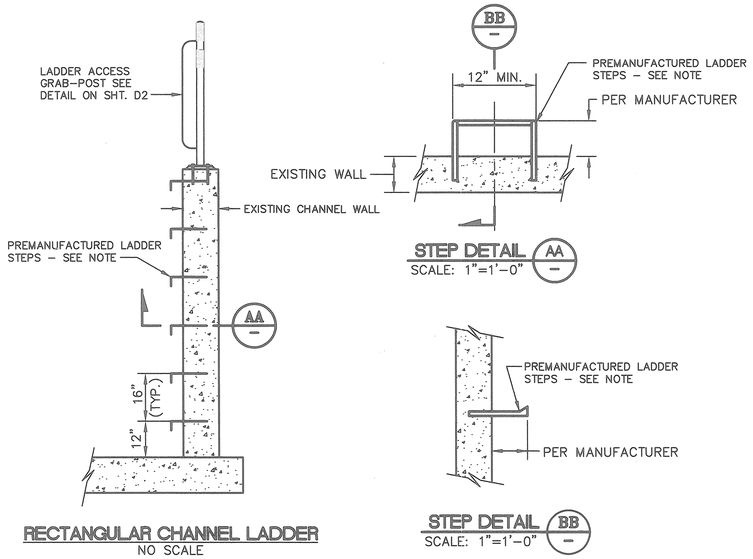
ORIGINAL CONSTRUCTION DRAWINGS ARE ON FILE WITH THE CITY OF NORTH LAS VEGAS. THE DOCUMENTS WERE SEALED ON 12/31/03 BY KEN D. GILBRETH UNDER LICENSE NO. 9177

vtn nevada
CONSULTING ENGINEERS
PLANNERS
LAND SURVEYORS
2121 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-5148
PHONE (702) 838-8200
FAX (702) 382-2597

(DRAWING TITLE) CHANNEL LADDER AND RAILING DETAILS
(PROJECT TITLE) ALEXANDER CHANNEL
(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR – JUNE 2005

SHEET NO. D2 OF 46 SHEETS

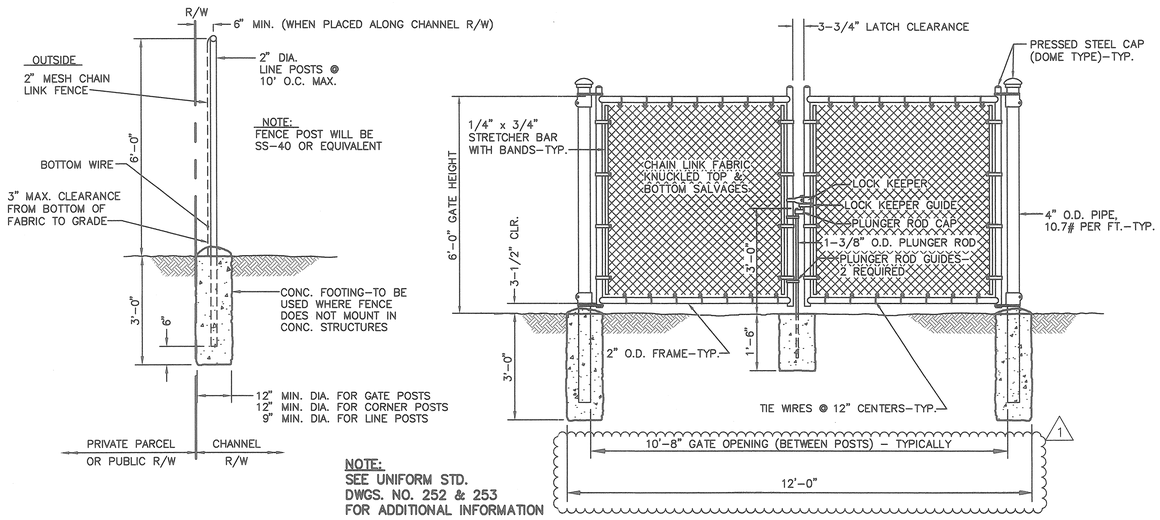


RECTANGULAR CHANNEL LADDER
NO SCALE

PREMANUFACTURED LADDER NOTE:

LADDER STEPS SHALL BE UV RESISTANT (NO POLYPROPYLENE WILL BE ALLOWED) PREMANUFACTURED COMPONENTS DESIGNED SPECIFICALLY FOR INSTALLATION INTO EXISTING CONCRETE STRUCTURES TO RESIST PULLOUT FORCES OF A MINIMUM OF 1500 POUNDS. CONTRACTOR SHALL SUBMIT MANUFACTURER DATA SHEET FOR REVIEW AND APPROVAL. ONCE APPROVAL IS OBTAINED, THE STEPS SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS. PULLOUT RESISTANCE TESTS MAY BE PERFORMED AFTER INSTALLATION AT THE OWNER'S AND/OR ENGINEER'S DISCRETION.

TYPICAL CHANNEL LADDER DETAIL
SCALE: 1/2"=1'-0"



NOTE:
SEE UNIFORM STD. DWGS. NO. 252 & 253 FOR ADDITIONAL INFORMATION

TYPICAL FENCE AND DOUBLE SWING GATE DETAIL
N.T.S.

AVOID OVERHEAD POWER LINE CONTACT. IT'S COSTLY
Call before you Overhead
1-702-593-6111
NEVADA POWER ENVIRONMENT AND SAFETY SERVICES DEPARTMENT

AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY.
Call before you Dig
1-800-227-2600
UNDERGROUND SERVICE (USA)

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

REVISIONS

NO.	DESCRIPTION	DATE	BY
Δ1	REVISED PER ADDENDUM NO. 1	1/23/2004	VTN
Δ2	RECORD DRAWING INFORMATION AS	6/30/2005	DRF
Δ	PROVIDED B" CAPRAT CONSTRUCTION		
Δ			
Δ			

SCALE: AS NOTED
DESIGN: DJB
DRAWN: DJB
CHECKED: JNG
APPROVED: KDG
DATE: 1/23/2004

ORIGINAL CONSTRUCTION DRAWINGS ARE ON FILE WITH THE CITY OF NORTH LAS VEGAS. THIS DOCUMENT IS WIDE SEALED ON 12/31/03 BY KEN D. GILBRETH UNDER LICENSE NO. 9177

vtn nevada
CONSULTING ENGINEERS
PLANNERS
LAND SURVEYORS
2127 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-5948
PHONE (702) 362-8844
FAX (702) 362-2597

(DRAWING TITLE)
MISCELLANEOUS DETAILS

(PROJECT TITLE)
ALEXANDER CHANNEL
COMMERCE STREET TO THE WESTERN TRIBUTARY

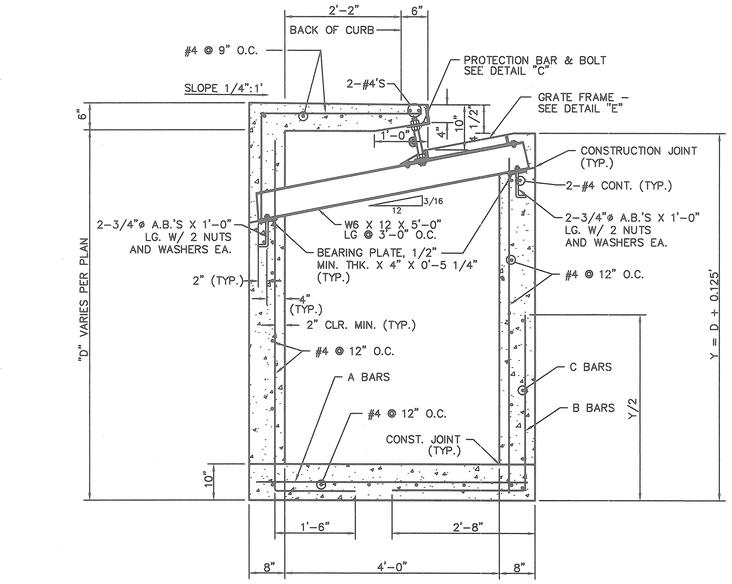
(LOCATION)

SHEET NO.
D3
OF 46 SHEETS

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR - JUNE 2005

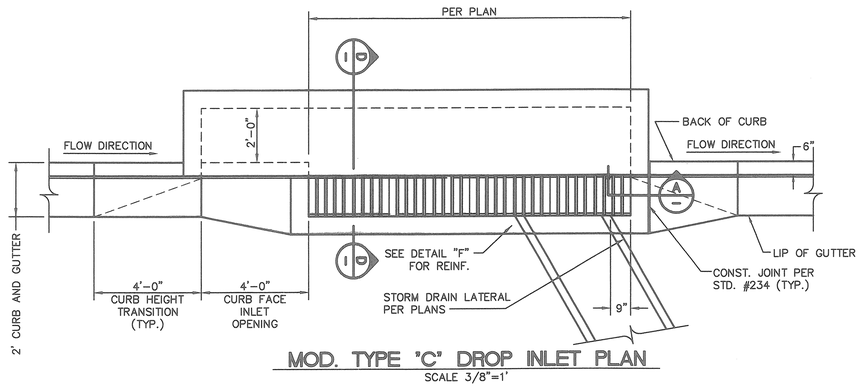
AVOID OVERHEAD POWER LINE CONTACT. IT'S COSTLY
Call before you Overhead
1-702-593-6111
NEVADA POWER ENVIRONMENT AND SAFETY SERVICES DEPARTMENT

AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY.
Call before you Dig
1-800-227-2600
UNDERGROUND SERVICE (USA)



"A" BARS ARE #4 @ 12" O.C.
"B" BARS ARE #5 @ 12" O.C.
"C" BARS ARE #4 @ 12" O.C.

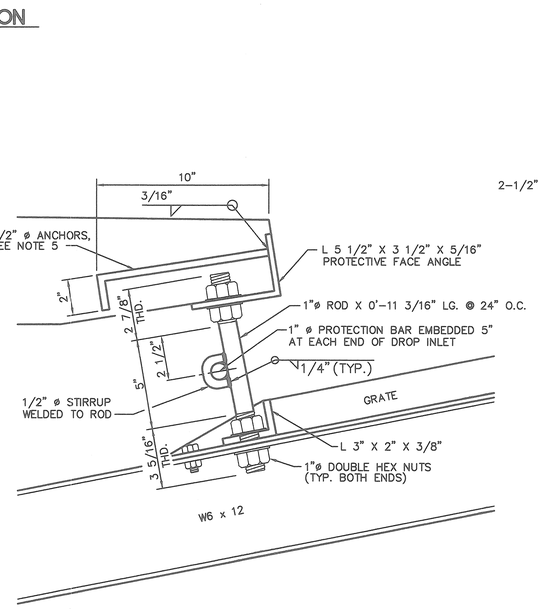
SECTION "D"
TYPE "CM" DROP INLET SECTION
SCALE 3/4"=1'



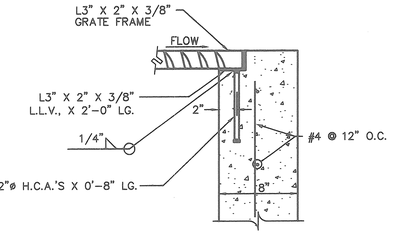
MOD. TYPE "C" DROP INLET PLAN
SCALE 3/8"=1'

ADD'L REINF. @ OPENING FOR RCP

DETAIL "F"
NO SCALE

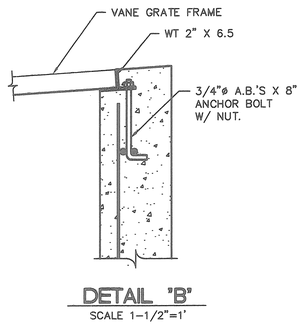


PROTECTION BAR AND ROD - DETAIL "C"
SCALE 3"=1'

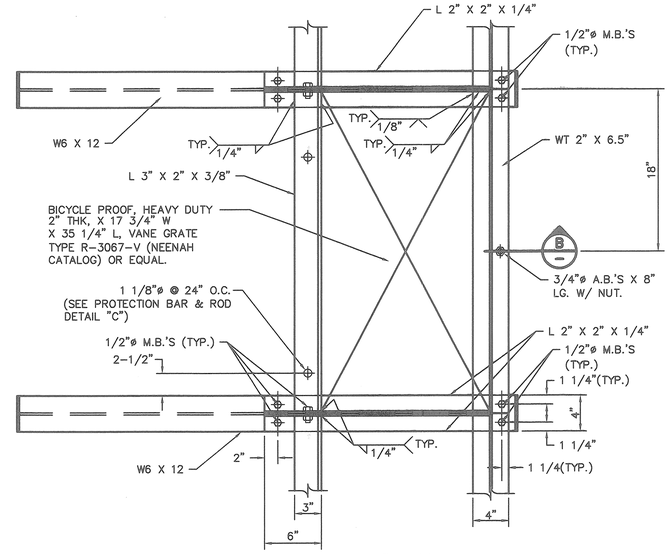


(TYP. ENDS OF DROP INLETS)

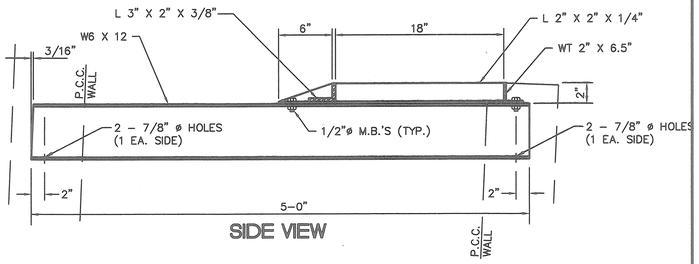
DETAIL "A"
SCALE 1-1/2"=1'



DETAIL "B"
SCALE 1-1/2"=1'



PLAN



SIDE VIEW

GRATE FRAME - DETAIL "E"
SCALE 1-1/2"=1'

NOTES:

1. ALL EXPOSED METALS SHALL BE HOT DIP GALVANIZED AFTER FABRICATION.
2. PROVIDE 1/2" (MIN.) CLEARANCE ALL AROUND THE STEEL BEAM, DRY PACK AFTER INSTALLATION.
3. WHEN REQUIRED BY LENGTH OF OPENING, PLATE ANGLE MAYBE DELIVERED IN SECTIONS AND BUTT WELDED IN PLACE.
4. ALL GALVANIZING DAMAGED BY WELDING SHALL RECEIVE TWO COATS OF GALVALLOY OR EQUAL.
5. ANGLE ANCHORS SHALL BE IMBEDDED MIDPOINT IN EACH ENDWALL AND EVENLY SPACED. (MAXIMUM SPACING OF 5')

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

NO.	REVISIONS DESCRIPTION	DATE	BY
1			
2			
3			
4	RECORD DRAWING INFORMATION AS PROVIDED BY CONTRACTOR - CONSTRUCTION	6/25/2005	DRF
5			

SCALE: AS NOTED
DESIGN: VTN
DRAWN: DJB
CHECKED: JNS
APPROVED: KDG
DATE: 12/31/2003

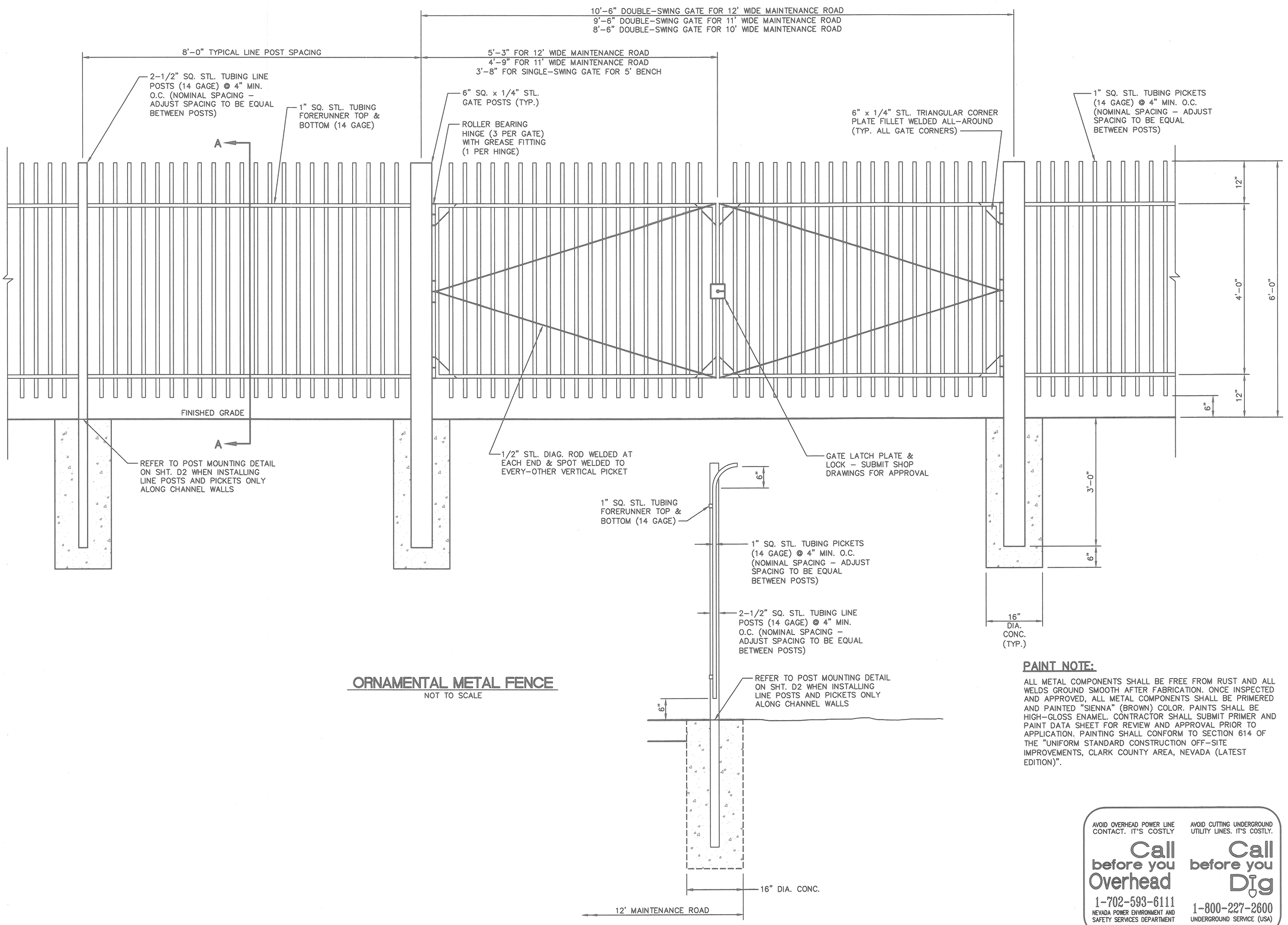
ORIGINAL CONSTRUCTION DRAWINGS ARE ON FILE WITH THE CITY OF NORTH LAS VEGAS. THE DOCUMENTS WERE SEALED ON 12/31/03 BY KEN D. GILBRETH UNDER LICENSE NO. 9177

vtn nevada
CONSULTING ENGINEERS
PLANNERS
LAND SURVEYORS
2470 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-5148
PHONE (702) 362-8844
FAX (702) 362-2597

(DRAWING TITLE) MODIFIED TYPE "C" DROP INLET
(PROJECT TITLE) ALEXANDER CHANNEL
(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

INFORMATION SUPPLIED BY CONTRACTOR - JUNE 2005
RECORD DRAWINGS

SHEET NO.
D4
OF 46 SHEETS



ORNAMENTAL METAL FENCE
NOT TO SCALE

SECTION A-A

PAINT NOTE:

ALL METAL COMPONENTS SHALL BE FREE FROM RUST AND ALL WELDS GROUND SMOOTH AFTER FABRICATION. ONCE INSPECTED AND APPROVED, ALL METAL COMPONENTS SHALL BE PRIMERED AND PAINTED "SIENNA" (BROWN) COLOR. PAINTS SHALL BE HIGH-GLOSS ENAMEL. CONTRACTOR SHALL SUBMIT PRIMER AND PAINT DATA SHEET FOR REVIEW AND APPROVAL PRIOR TO APPLICATION. PAINTING SHALL CONFORM TO SECTION 614 OF THE "UNIFORM STANDARD CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA (LATEST EDITION)".

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1-800-227-2600
UNDERGROUND SERVICE (USA)

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

REVISIONS			
NO.	DESCRIPTION	DATE	BY
1	RECORD DRAWING INFORMATION AS PROVIDED BY CAPRIATI CONSTRUCTION	6/30/2005	DRF

SCALE: NONE
DESIGN: DJB
DRAWN: DJB
CHECKED: JNS
APPROVED: KDG
DATE: 12/31/2003

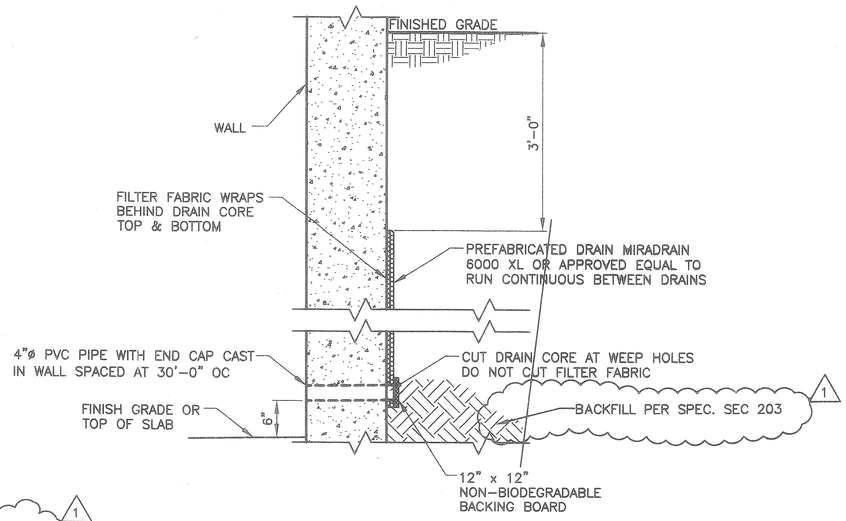
ORIGINAL CONSTRUCTION DRAWINGS ARE ON FILE WITH THE CITY OF NORTH LAS VEGAS. THE DOCUMENTS WERE SEALED ON 12/31/03 BY KEN D. GILBRETH UNDER LICENSE NO. 9177

vtn nevada
CONSULTING ENGINEERS
PLANNERS
LAND SURVEYORS
2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-5948
PHONE (702) 362-8844
FAX (702) 362-2697

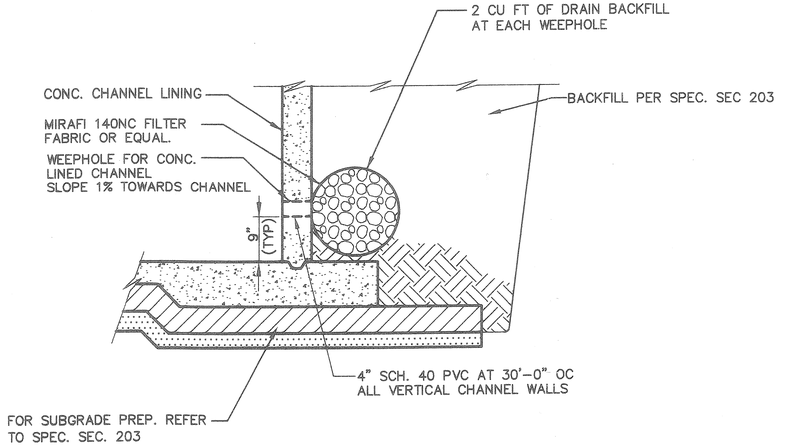
(DRAWING TITLE) ORNAMENTAL FENCE AND GATE DETAILS
PROJECT TITLE ALEXANDER CHANNEL
(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

SHEET NO. D5 OF 46 SHEETS

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR - JUNE 2005



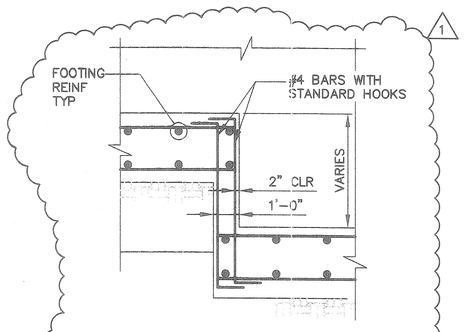
TYPE 1



TYPE 2

WALL DRAIN TYPICAL DETAIL

NOTES:
1. CONTRACTOR SHALL CHOOSE EITHER TYPE 1 OR TYPE 2 WALL DRAIN FOR INSTALLATION AT LOCATIONS SHOWN ON PLANS AND IN WALL SECTIONS.

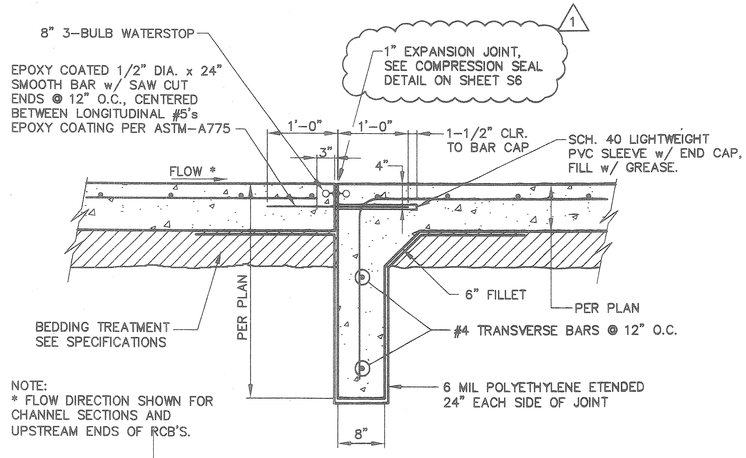


TYPICAL STEP SECTION

FOOTING STEP AND TOP ELEVATIONS APPLY TO RETAINING WALL ADJACENT TO SOUTHSIDE MAINTENANCE ROAD BETWEEN STATIONS 14+00 AND 19+00

TOP OF FOOTING ELEVATION TABLE

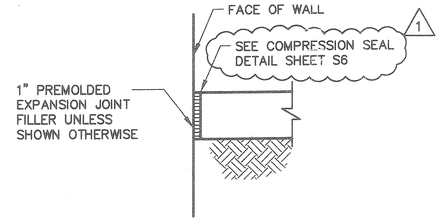
STATION TO STATION	ELEVATION
14+00.00 TO 14+65.00	2034.13
14+65.00 TO 15+30.00	2031.50
15+30.00 TO 15+95.00	2028.86
15+95.00 TO 17+62.00	2025.86
17+62.00 TO 19+00.00	2023.37



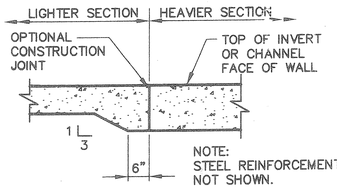
NOTE:
* FLOW DIRECTION SHOWN FOR CHANNEL SECTIONS AND UPSTREAM ENDS OF RCB'S.

TYPICAL CHANNEL CUTOFF WALL WITH WATERSTOP

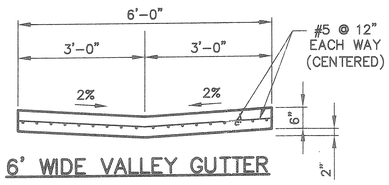
WATERSTOP TO BE USED IN THE EXPANSION JOINTS AT STATIONS 10+75.29 AND 10+96.12



EXPANSION JOINT TYPE "C"



TYPICAL TRANSITION DETAIL



6' WIDE VALLEY GUTTER

STA 19+06.67

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

REVISIONS

NO.	DESCRIPTION	DATE	BY
1	ADDENDUM	1/23/04	CEJ
2	RECORD DRAWING INFORMATION AS PROVIDED BY CAPRIATI CONSTRUCTION	6/30/2006	DRF

SCALE: NONE
DESIGN: AJR
DRAWN: JDS
CHECKED: CEJ
APPROVED: CEJ
DATE: 10/22/03

CHARLES E. JOSEPH, No. 16205, STATE OF NEVADA, CIVIL, REGISTERED PROFESSIONAL ENGINEER
EXP. DATE: 06/30/05

PARSONS TRANSPORTATION GROUP
LAS VEGAS, NEVADA
840 CRIER DRIVE, SUITE 140
LAS VEGAS, NEVADA 89119
PHONE (702) 435-2116
FAX (702) 435-8412

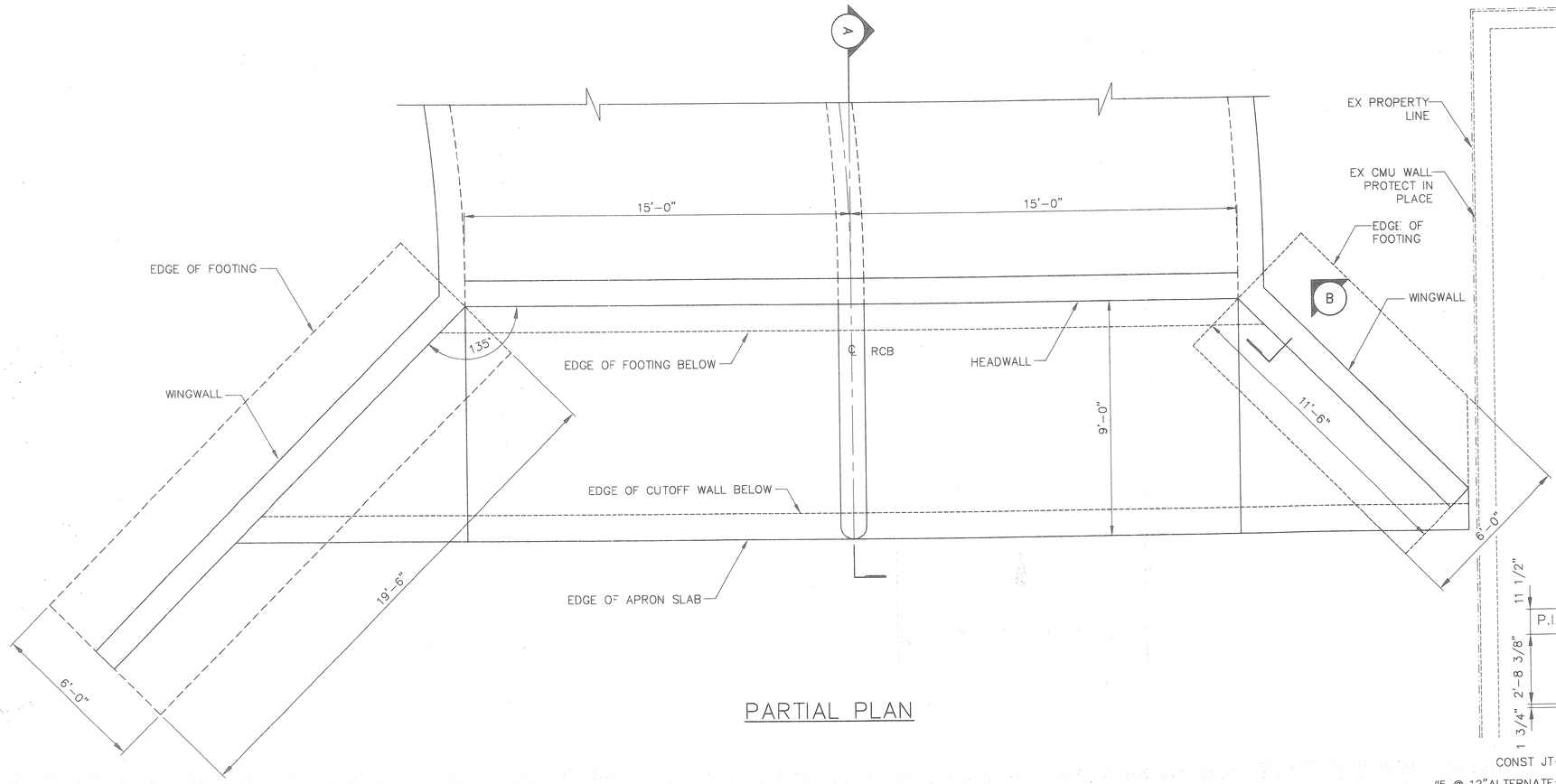
(DRAWING TITLE) MISCELLANEOUS DETAILS

(PROJECT TITLE) ALEXANDER CHANNEL

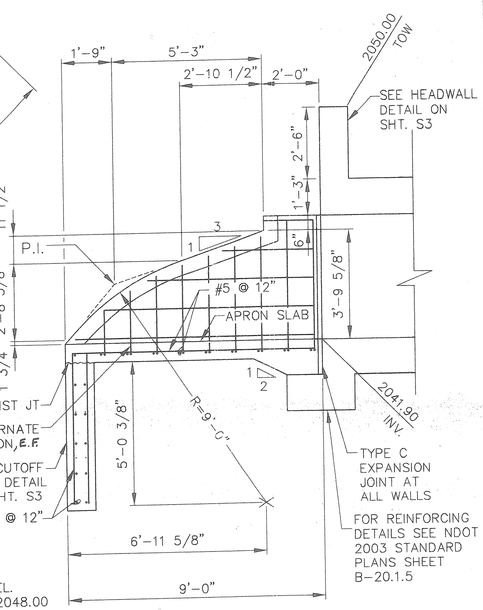
LOCATION: COMMERCE STREET TO THE WESTERN TRIBUTARY

SHEET NO. S8 OF 46 SHEETS

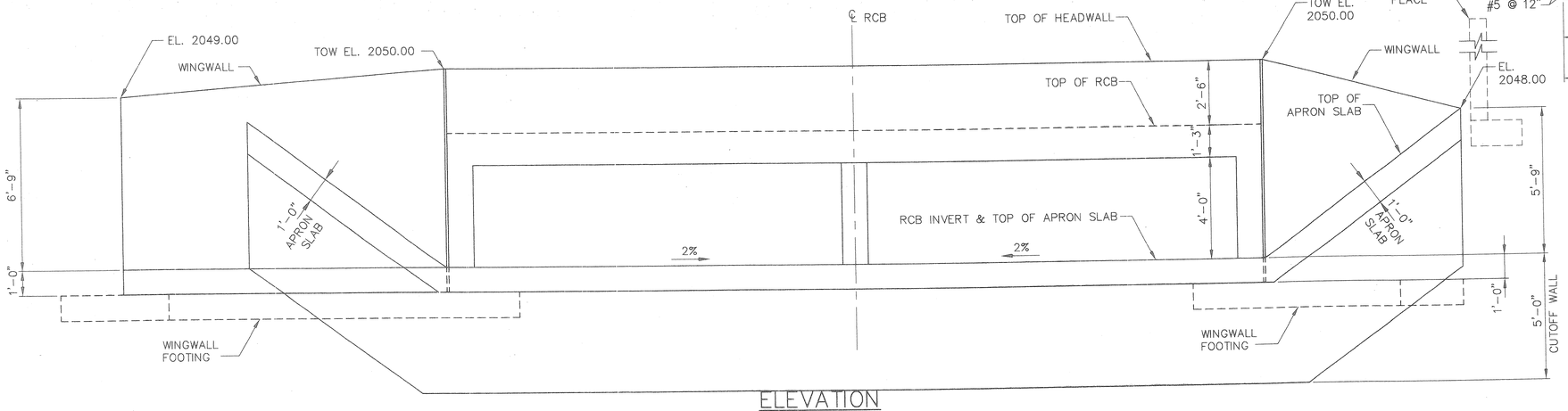
RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR - JUNE 2005



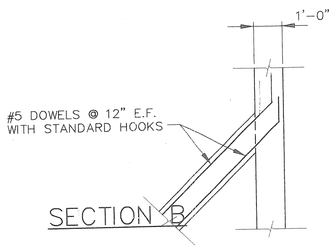
PARTIAL PLAN



SECTION A
STA 9+91.53 TO STA 10+00.00



ELEVATION



SECTION B

NOTES:

1. SEE NDOT 2003 STANDARD PLANS SHEET B-20.1.5 FOR ALL DETAILS NOT SHOWN.

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

NO.	REVISIONS DESCRIPTION	DATE	BY
△			
△			
△			
△1	RECORD DRAWING INFORMATION AS	6/30/2005	DRF
△	PROVIDED BY CAPRIATI CONSTRUCTION		

SCALE: NONE
DESIGN: AR
DRAWN: JDS
CHECKED: CEJ
ASSIGNED: CEJ
DATE: 10-28-03

REGISTERED PROFESSIONAL ENGINEER STATE OF NEVADA CHARLES JOSEPH EVANS No. 12008 CIVIL

PARSONS TRANSPORTATION GROUP
LAS VEGAS, NEVADA
8440 GRAND DRIVE SUITE 340
LAS VEGAS NEVADA 89123
PHONE: (702) 435-7272
FAX: (702) 435-8824

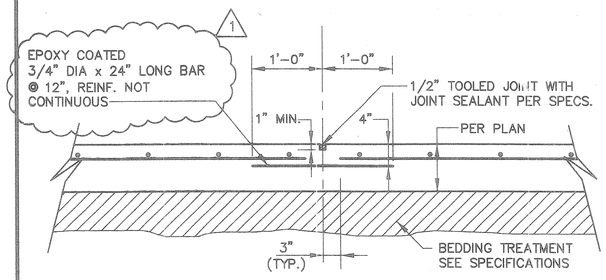
(DRAWING TITLE) CHANNEL WINGWALL AND APRON DETAILS

(PROJECT TITLE) ALEXANDER CHANNEL
COMMERCE STREET TO THE WESTERN TRIBUTARY

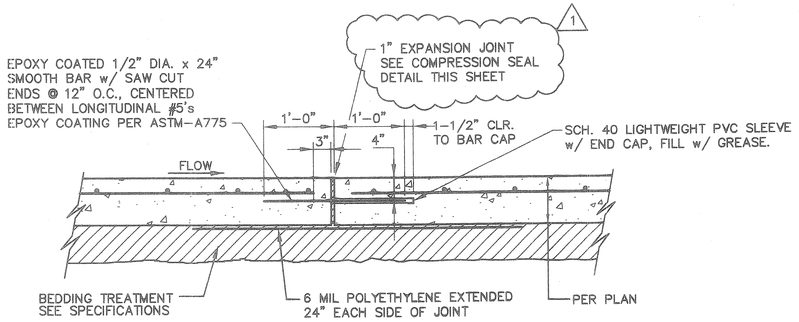
(JOB NO.)

SHEET NO. S7 OF 46 SHEETS

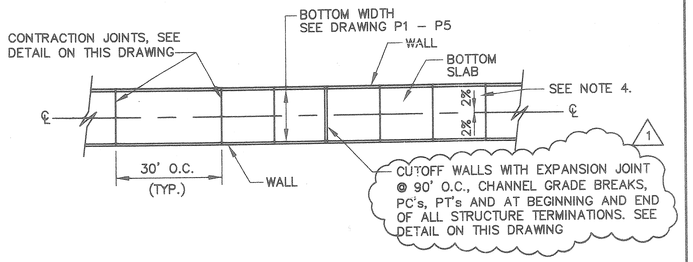
RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR - JUNE 2005



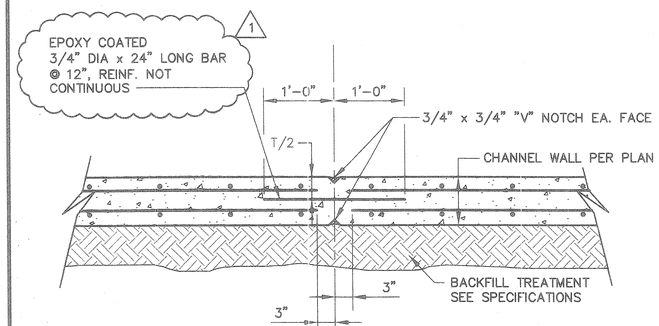
TYPICAL INVERT CONTRACTION JOINT DETAIL



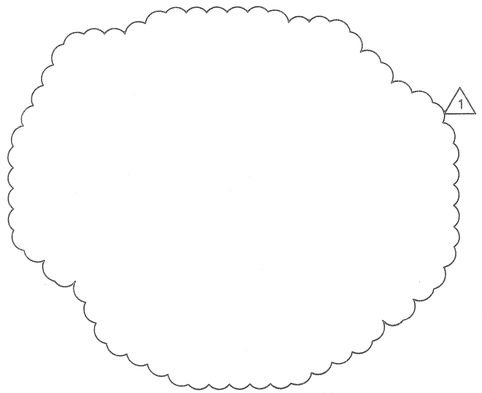
TYPICAL CHANNEL INVERT EXPANSION JOINT DETAIL



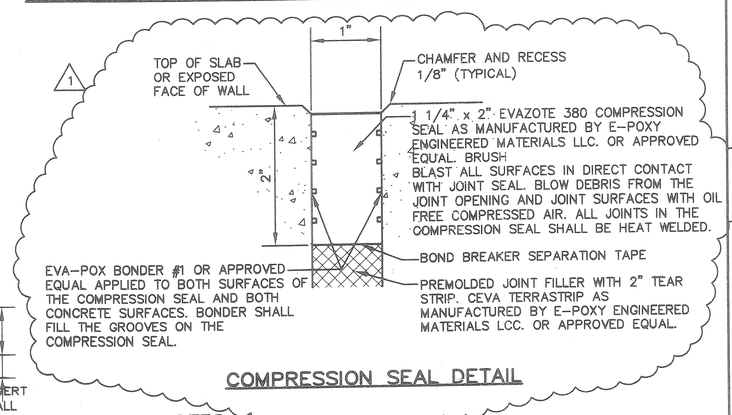
TYPICAL PLAN VIEW FOR RECTANGULAR CHANNEL & ACCESS RAMP EXPANSION AND CONTRACTION JOINTS



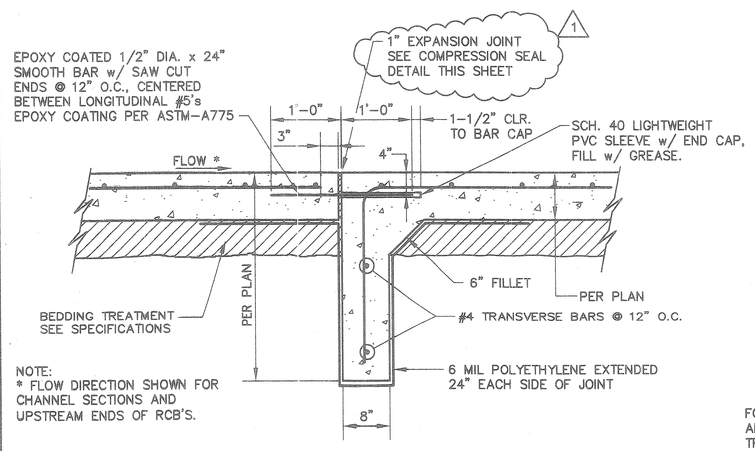
TYPICAL WALL CONTRACTION JOINT DETAIL TYPE "B"



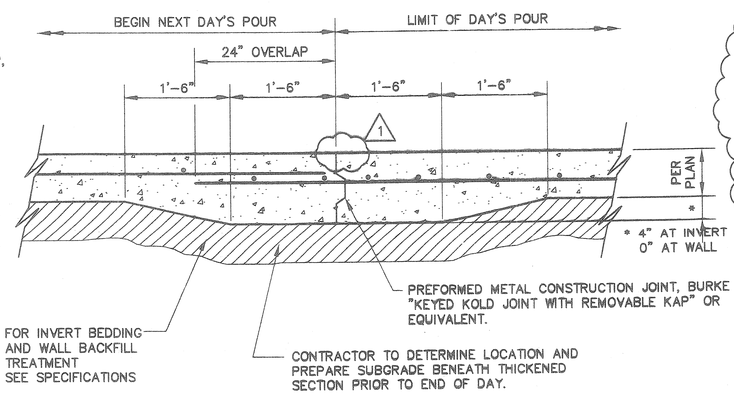
TYPICAL CHANNEL WALL EXPANSION JOINT DETAIL



COMPRESSION SEAL DETAIL



TYPICAL CHANNEL CUTOFF WALL WITH EXPANSION JOINT DETAIL



TYPICAL CHANNEL CONSTRUCTION JOINT DETAIL - WALL OR INVERT TYPE "J"

NOTES:

1. CHANNEL WALL JOINTS SHALL BE IN ALIGNMENT WITH CHANNEL FLOOR JOINTS.
2. TRANSVERSE JOINTS AROUND CURVES SHALL BE ON RADIAL LINES AT 30' CENTERS, SPACED ALONG CHANNEL CENTERLINE.
3. DETAIL SHALL BE USED FOR RECTANGULAR CHANNEL SECTIONS, TRANSITION CHANNEL SECTIONS & ACCESS RAMP.
4. ACCESS RAMP SLAB HAS -2.0% SLOPE FROM TOE OF OUTER WALL TO TOE OF INNER WALL

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

REVISIONS			
NO.	DESCRIPTION	DATE	BY
4	ADDENDUM	1/23/04	CEJ
3	RECORD DRAWING INFORMATION AS PROVIDED BY CAPRIATT CONSTRUCTION	6/30/2005	DRF
2			
1			

SCALE: NONE
DESIGN: MJS
DRAWN: ADL
CHECKED: CEJ
APPROVED: CEJ
DATE: 10/24/03
EXP. DATE: 06/30/05

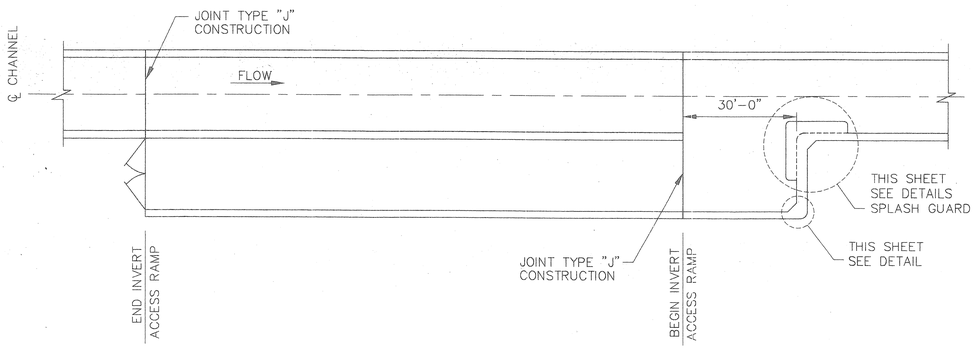
PARSONS TRANSPORTATION GROUP
LAS VEGAS, NEVADA
840 GRIER DRIVE, SUITE 140
LAS VEGAS, NEVADA 89119
PHONE (702) 435-2116
FAX (702) 435-9412

(DRAWING TITLE) CHANNEL JOINTS

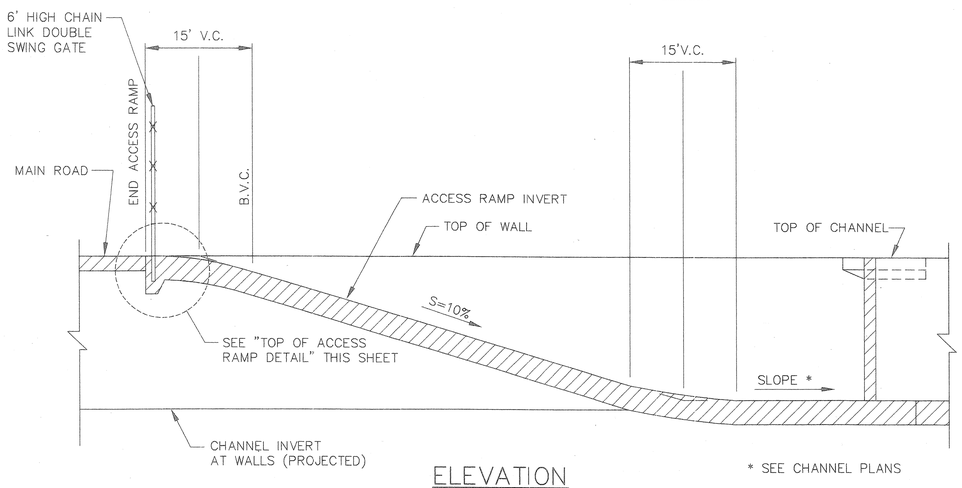
(PROJECT TITLE) ALEXANDER CHANNEL
COMMERCE STREET TO THE WESTERN TRIBUTARY

SHEET NO. S6
OF 46 SHEETS

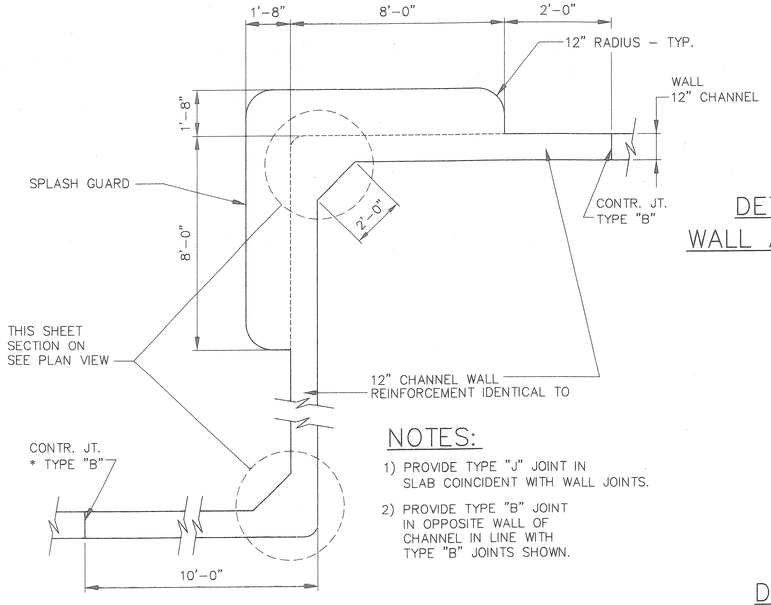
RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR - JUNE 2005



INVERT ACCESS RAMP PLAN



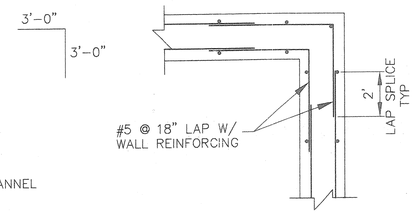
ELEVATION



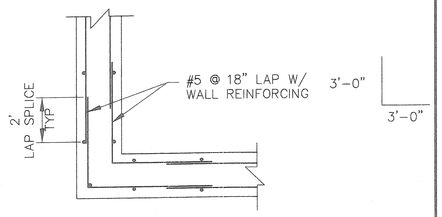
NOTES:

1) PROVIDE TYPE "J" JOINT IN SLAB COINCIDENT WITH WALL JOINTS.
2) PROVIDE TYPE "B" JOINT IN OPPOSITE WALL OF CHANNEL IN LINE WITH TYPE "B" JOINTS SHOWN.

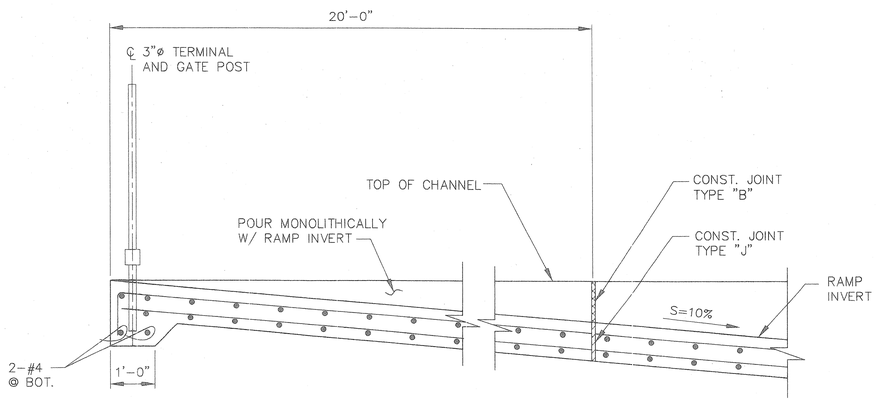
SPLASH GUARD PLAN VIEW



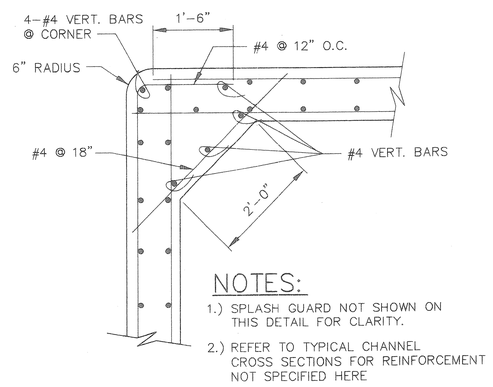
DETAIL @ INTERIOR CORNER WALL ANGLE POINT @ ACCESS RAMPS



DETAIL @ EXTERIOR CORNER WALL ANGLE POINT @ ACCESS RAMP



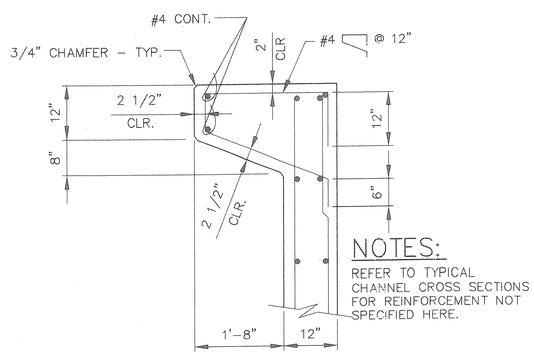
TOP OF ACCESS RAMP DETAIL



NOTES:

1.) SPLASH GUARD NOT SHOWN ON THIS DETAIL FOR CLARITY.
2.) REFER TO TYPICAL CHANNEL CROSS SECTIONS FOR REINFORCEMENT NOT SPECIFIED HERE

SPLASH GUARD REINFORCEMENT PLAN VIEW SECTION



NOTES:

REFER TO TYPICAL CHANNEL CROSS SECTIONS FOR REINFORCEMENT NOT SPECIFIED HERE.

SPLASH GUARD REINFORCEMENT PLAN VIEW ELEVATION

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

NO.	REVISIONS DESCRIPTION	DATE	BY
△			
△			
△ 1	RECORD DRAWING INFORMATION AS PROVIDED BY CONTRACTOR	6/30/2005	DRF
△			

SCALE: NONE
DESIGN: MJS
DRAWN: ADL
CHECKED: CEJ
APPROVED: CEJ
DATE: 10/24/03

REGISTERED PROFESSIONAL ENGINEER STATE OF NEVADA CHARLES EDWARD JOSEPH 12-31-03 CIVIL No. 12089 EXP. DATE: 06/30/05

PARSONS TRANSPORTATION GROUP
LAS VEGAS, NEVADA
840 GRIER DRIVE, SUITE 140
LAS VEGAS, NEVADA, 89119
PHONE (702) 435-2116
FAX (702) 435-8412

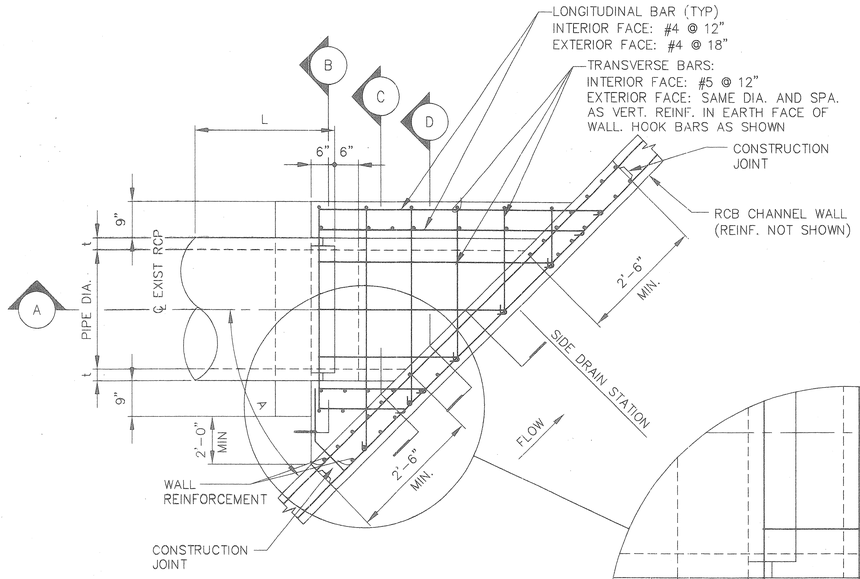
(DRAWING TITLE) ACCESS RAMP DETAILS

(PROJECT TITLE) ALEXANDER CHANNEL

(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

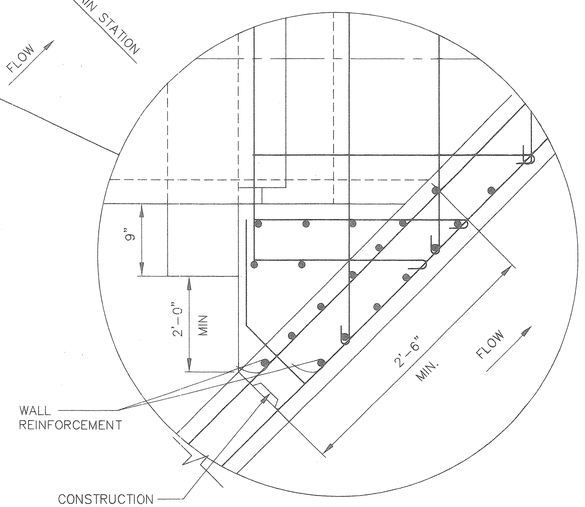
SHEET NO. S5 OF 46 SHEETS

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR - JUNE 2005



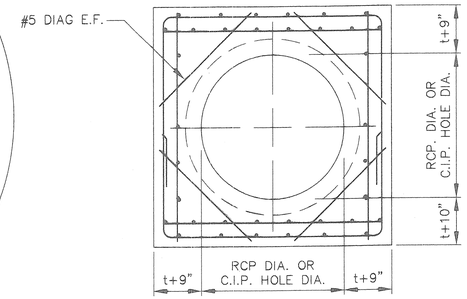
PLAN TOP SLAB

NOTE: BOTTOM SLAB IS SIMILAR.

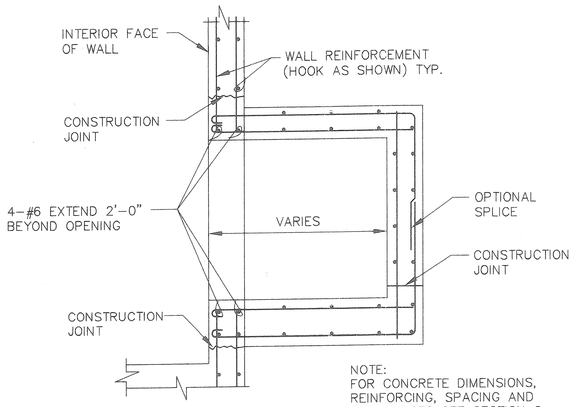


LATERAL STORM DRAINS SCHEDULE						
CHANNEL STATION	EL. "B"	EL. "C"	WALL (RT,LT)	PIPE TYPE	PIPE DIA. (in)	A (DEG.S)
40+40.00	1951.70	1950.68	LT	RCP	36"	45°
41+50.00	1949.86	1948.74	RT	RCP	60"	30°
41+71.50	1949.50	1948.36	LT	RCP	60"	30°
42+39.50	1948.50	1947.49	LT	RCP	36"	45°
53+85.00	1930.40	1929.41	LT	RCP	24"	45°
54+85.00	1929.26	1928.42	LT	RCP	48"	30°
54+85.00	1928.67	1928.42	RT	RCP	60"	30°
55+33.50	1929.00	1928.04	LT	RCP	24"	45°
67+00.00	1914.60	1913.61	LT	RCP	36"	45°
68+00.00	1913.80	1912.78	LT	RCP	60"	30°
68+00.00	1913.80	1912.78	RT	RCP	60"	30°
68+65.00*	1913.50	1912.48	LT	*	36"	45°
71+55.00*	1912.10	1911.12	LT	*	24"	45°
74+50.00	1910.70	1909.74	LT	RCP	24"	45°

* C.I.P CONNECTOR. THE CONNECTION BETWEEN DROP INLET AND CHANNEL TO BE C.I.P UTILIZING THE DETAILS SHOWN ON THIS SHEET. THE CONNECTION TO TO THE WALL OF THE DROP INLET SHALL BE THE SAME AS SHOWN ON DETAILS "PLAN TOP SLAB" AND " SECTION A". ALL WALLS AND SLABS FOR THE C.I.P. CONNECTOR SHALL BE 12" THICK WITH REINFORCING AS SHOWN ON THIS SHEET.

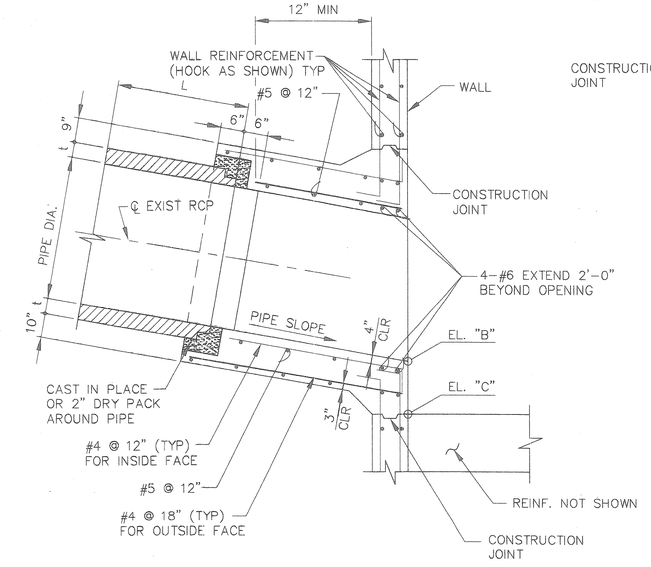


SECTION B

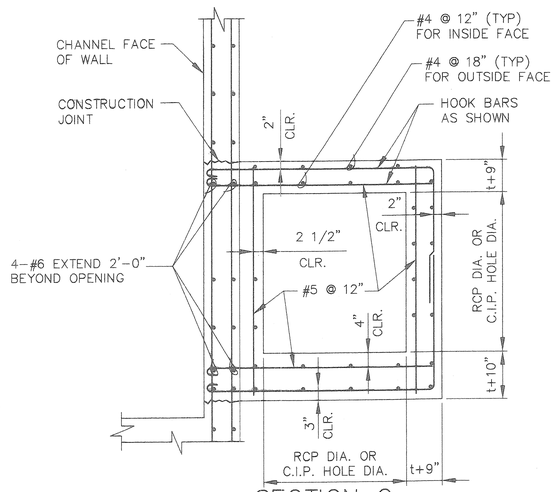


NOTE:
FOR CONCRETE DIMENSIONS, REINFORCING, SPACING AND CLEARANCES SEE SECTION C.

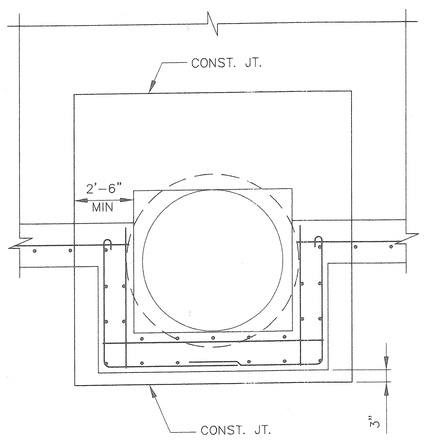
SECTION D
(VERTICAL WALL)



SECTION A
(VERTICAL WALL)



SECTION C



SECTION E

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

REVISIONS

NO.	DESCRIPTION	DATE	BY
△			
△			
△	RECORD DRAWING INFORMATION AS	6/30/2005	DRF
△	PROVIDED BY GABRIATT CONSTRUCTION		

SCALE: NONE
DESIGN: MJS
DRAWN: ADL
CHECKED: CEJ
APPROVED: CEJ
DATE: 10/24/03

PROFESSIONAL ENGINEER STATE OF NEVADA CHARLES E. JOSEPH No. 12259 12-31-03 CIVIL
EXP. DATE: 06/30/05

PARSONS TRANSPORTATION GROUP
LAS VEGAS, NEVADA
840 GRIER DRIVE, SUITE 140
LAS VEGAS, NEVADA 89119
PHONE (702) 435-2116
FAX (702) 435-8412

(DRAWING TITLE) STORM DRAIN LATERAL CONNECTION DETAILS

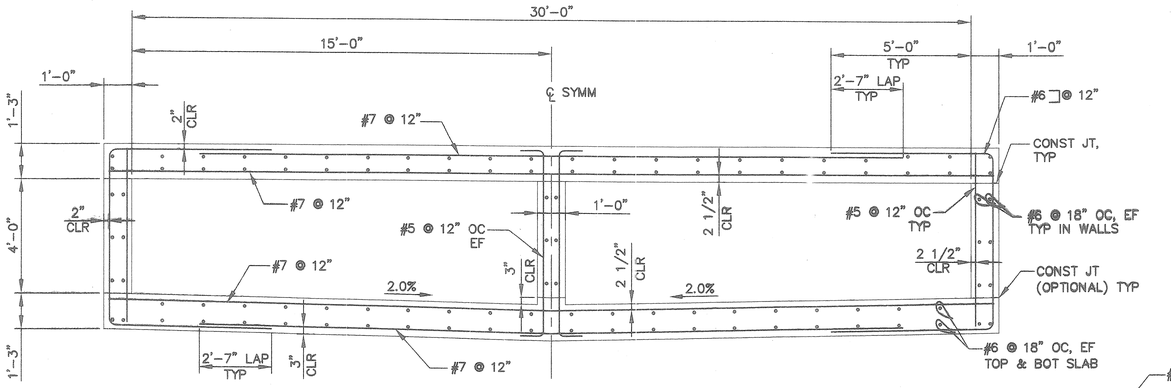
(PROJECT TITLE) ALEXANDER CHANNEL

(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

SHEET NO. S4

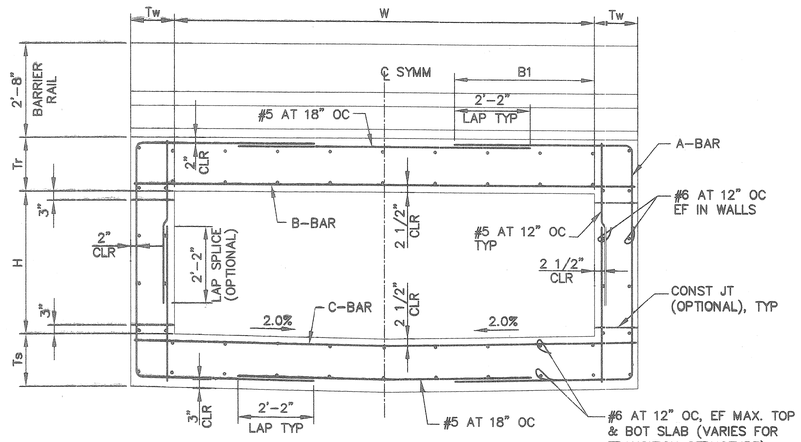
OF 46 SHEETS

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR - JUNE 2005

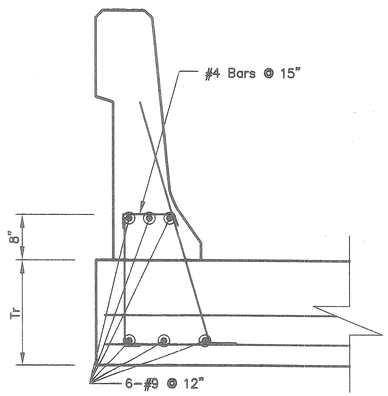


DUAL CELL RCB SECTION

STA 10+00.00 TO 12+21.19

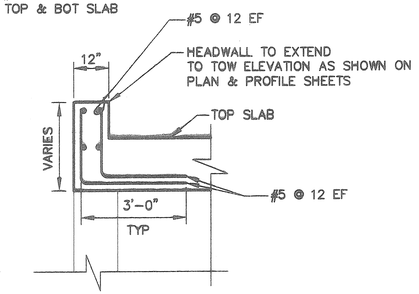


SINGLE CELL RCB SECTION

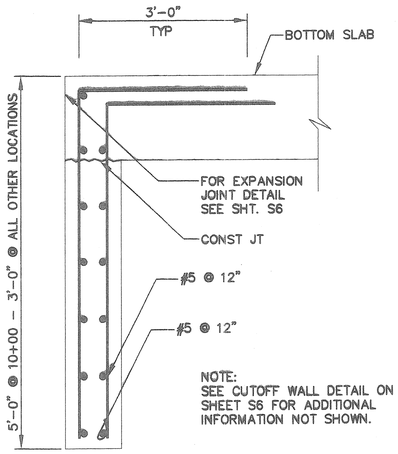


BARRIER RAIL SECTION

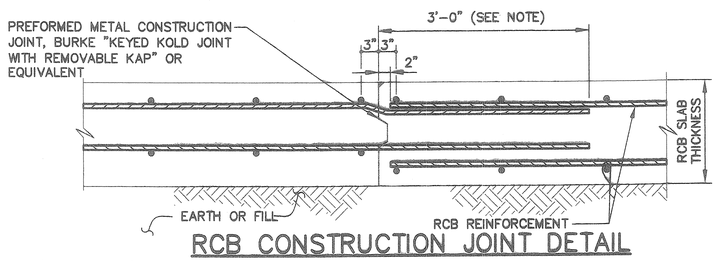
CONCRETE BARRIER RAIL
AT STA 44+90.00 & STA 45+60.00
AT STA 46+35.50 & STA 46+81.50
AT STA 50+53.00 & STA 50+99.00
ONLY.
FOR REINFORCING DETAILS, SEE BARRIER RAIL SECTION.



HEADWALL SECTION



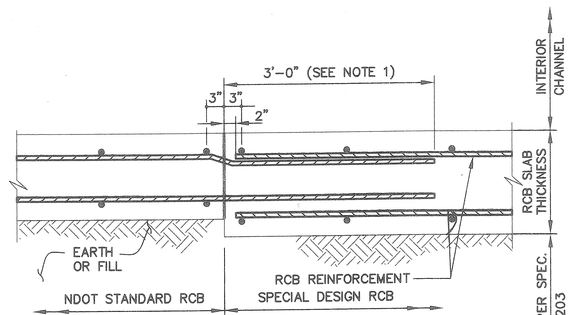
CUTOFF WALL AT RCB



RCB CONSTRUCTION JOINT DETAIL

NOTES:

1. FOR CONCRETE JOINTS NOT SPECIFIED, SEE SHEET S6
2. SUBGRADE PREPARATION PER SPECIFICATIONS SEC. 203.



CONSTRUCTION JOINT DETAIL

RCB SINGLE CELL DIMENSION SCHEDULE

SECTION	1	2	3	4	5
W	16'-0"	16'-0"	16'-0"	20'-0"	16'-0"
H	7'-0"	5'-6"	7'-9"	7'-0"	8'-9"
Tr	1'-3"	1'-3"	1'-3"	1'-9"	1'-3"
Ts	1'-3"	1'-3"	1'-3"	1'-9"	1'-3"
Tw	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
A-BAR	#5 @ 8"	#9 @ 12"	#6 @ 12"	#8 @ 12"	#7 @ 12"
B-BAR	#6 @ 8"	#9 @ 12"	#8 @ 12"	#10 @ 12"	#8 @ 12"
B1	5'-0"	8'-6"	5'-0"	6'-0"	5'-0"
C-BAR	#6 @ 12"	#9 @ 12"	#8 @ 12"	#9 @ 12"	#7 @ 12"

1

RCB SCHEDULE

FROM STATION	TO STATION	SECTION
10+00.00	12+21.19	DUAL
24+45.00	25+60.00	NDOT (12x7)***
37+95.00	39+00.00	NDOT (12x7)*
39+00.00	41+85.00	NDOT (12x7)
41+85.00 (12x7)	42+35.00 (14x7)	NDOT (14x7) **
42+35.00 (14x7)	42+50.00 (14.6x7)	1 **
45+02.00	45+48.00	3
46+35.50	46+81.50	3
50+53.00	53+90.00	3
53+90.00	55+01.66	2
57+65.00	61+35.00	1
62+92.00	63+38.00	5
64+82.00	65+28.00	5
67+10.00	68+41.00	4
74+85.53	75+96.18	4

FOR NDOT RCB SECTION, SEE NDOT STD. PLAN B-20.1.2

NOTES:

1. PROVIDE REINFORCING FOR SECTION SHOWN THRU CHANNEL TRANSITIONS.

* ADDITIVE ALTERNATE NO. 1

1 ** RCB TRANSITION STRUCTURE FROM STA 41+85.00 (12x7) TO STA 42+50.00 (14.6x7). FROM STA 42+35.00 TO STA 42+50 UTILIZE THE DIMENSIONS AND REINFORCING SHOWN UNDER SECTION 1 EXCEPT "W" WILL VARY FROM 14' TO 14.6'

*** ADDITIVE ALTERNATE NO. 2

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

NO.	REVISIONS DESCRIPTION	DATE	BY
1	ADDENDUM 3	2/2/04	CEJ
2	RECORD DRAWING INFORMATION AS PROVIDED BY CAPPELLATI CONSTRUCTION	6/30/2005	DRF

SCALE: NONE
DESIGN: MJS
DRAWN: ADL
CHECKED: CEJ
APPROVED: CEJ
DATE: 10/24/03
EXP. DATE: 06/30/05

PARSONS TRANSPORTATION GROUP
LAS VEGAS, NEVADA
840 GRIER DRIVE, SUITE 140
LAS VEGAS, NEVADA 89119
PHONE (702) 435-2116
FAX (702) 435-8412

(DRAWING TITLE) REINFORCED CONCRETE BOX AND SUMP DETAILS
(PROJECT TITLE) ALEXANDER CHANNEL
(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

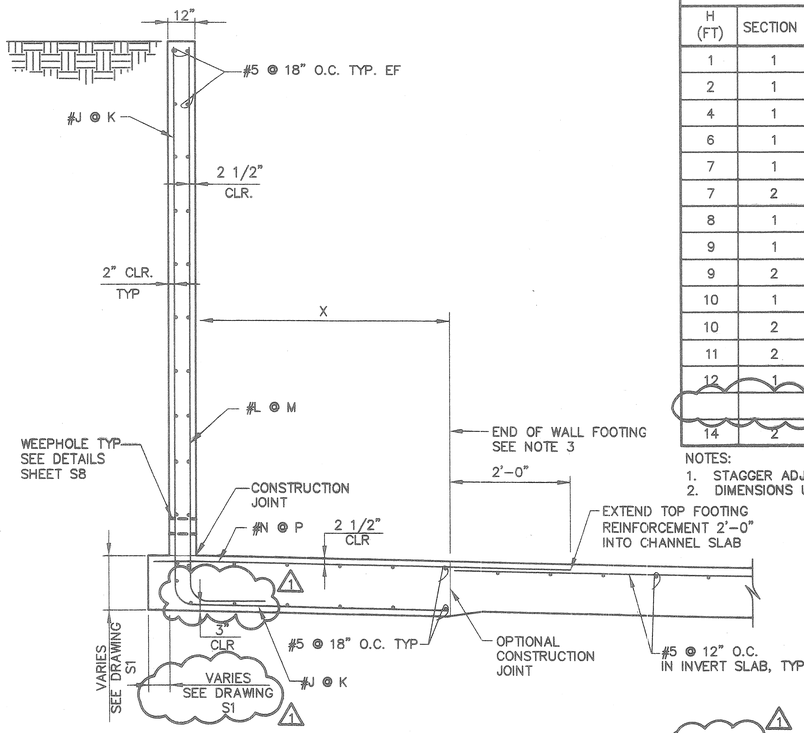
SHEET NO. S3 OF 46 SHEETS

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR - JUNE 2005

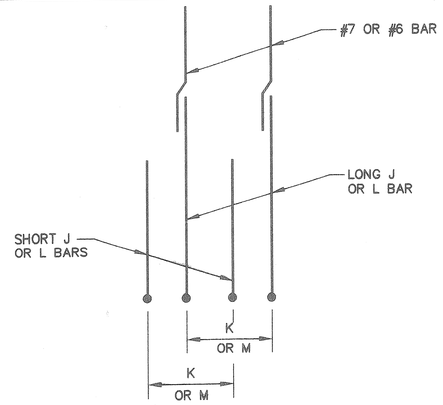
CHANNEL WALL REINFORCING SCHEDULE

H (FT)	SECTION	J	K (IN)	L	M (IN)	N	P (IN)	R	S	T	U	V	X (FT)
1	1	4	18	4	18	4	18						2'–0"
2	1	4	18	4	18	4	18						2'–0"
4	1	4	18	4	18	4	18						4'–0"
6	1	5	12	4	12	5	12						5'–6"
7	1	5	12	4	12	5	12						5'–6"
7	2	5	12	4	12	5	12						–NA–
8	1	6	12	5	12	5	12						6'–0"
9	1	6	12	5	12	5	12						6'–0"
9	2	6	9	5	12	5	12						–NA–
10	1	7	12	5	12	5	12						7'–11"
10	2	7	9	5	12	5	12						–NA–
11	2	7	10	5	12	5	12						–NA–
12	1	9	12	6	12	5	12						9'–6"
14	2	9	12	6	12	6	12						–NA–

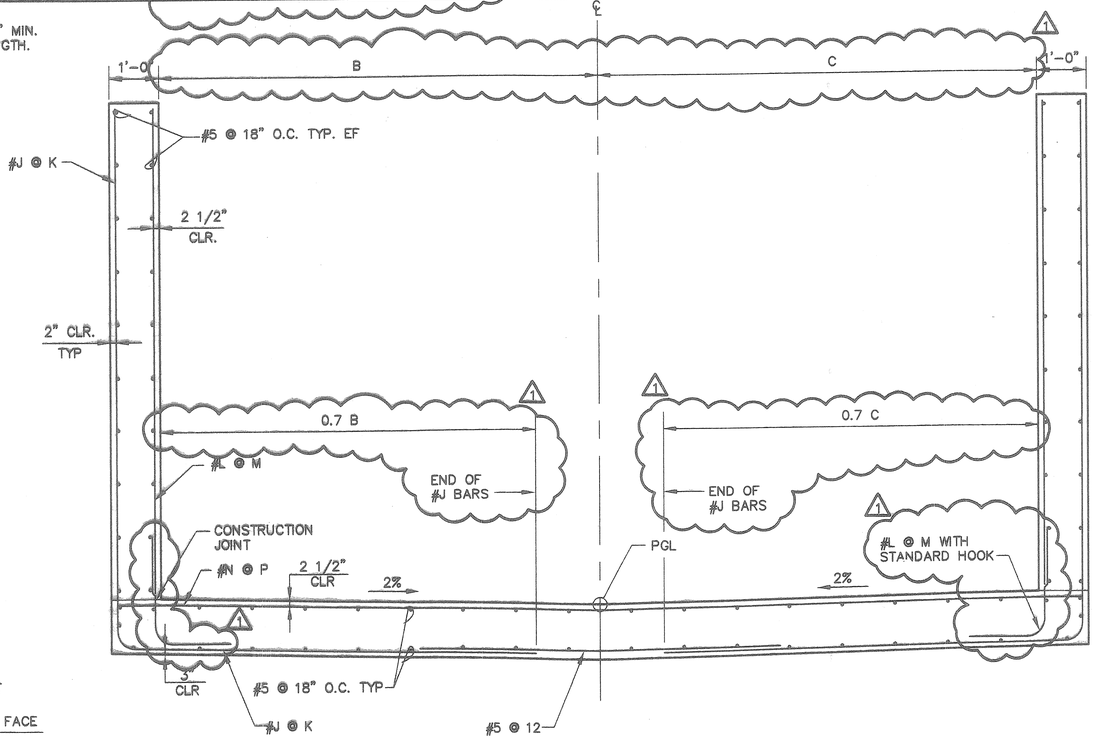
NOTES:
1. STAGGER ADJACENT LAP SPLICES, 24" MIN.
2. DIMENSIONS U & V ARE MINIMUM LENGTH.



TYPICAL CHANNEL SECTION 1 REINFORCEMENT H≤12'

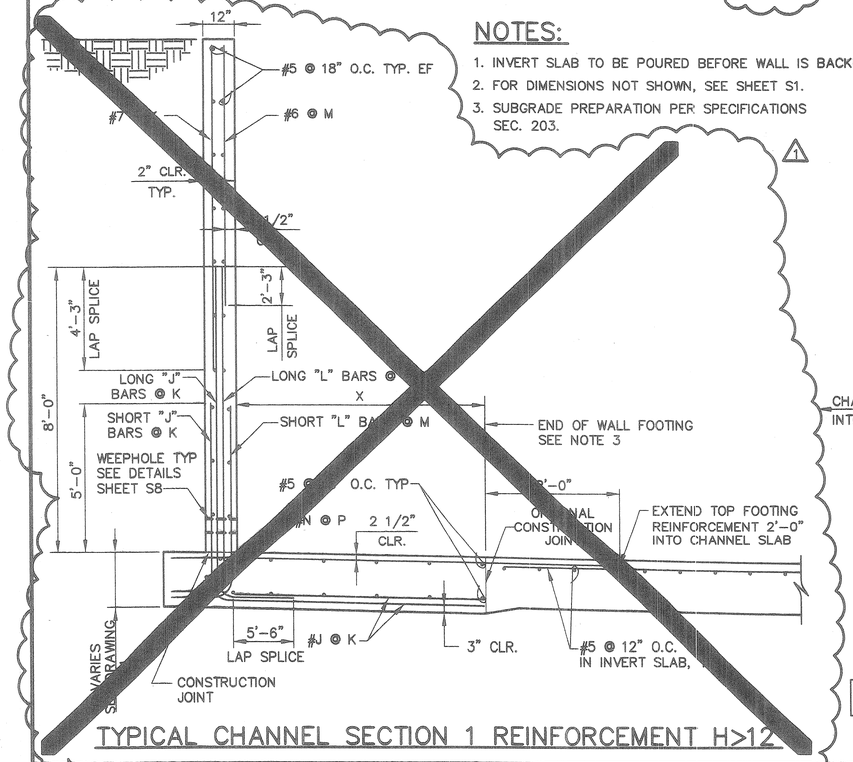


VERTICAL BAR LAYOUT DIAGRAM H>12'

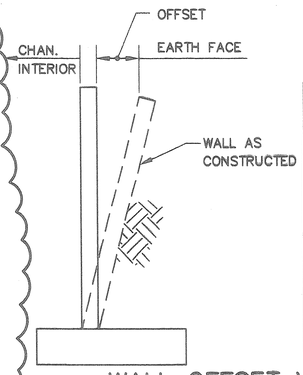


TYPICAL CHANNEL SECTION 2 REINFORCEMENT
FOR DIMENSIONS B & C, SEE SHEET S1

NOTES:
1. INVERT SLAB TO BE POURED BEFORE WALL IS BACKFILLED.
2. FOR DIMENSIONS NOT SHOWN, SEE SHEET S1.
3. SUBGRADE PREPARATION PER SPECIFICATIONS SEC. 203.



TYPICAL CHANNEL SECTION 1 REINFORCEMENT H>12'



WALL HEIGHT FEET	OFFSET
2	0
4	1/4"
6	3/8"
8	1/2"
10	5/8"
12	3/4"
14	1"
16	1 1/4"
18	1 1/2"
20	1 3/4"

WALL OFFSET VALUES

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

NO.	DESCRIPTION	DATE	BY
1	ADDENDUM 3	2/2/04	CEJ
2	(RECORD DRAWING INFORMATION AS PROVIDED BY CAPRIATI CONSTRUCTION	6/30/2005	DRF

SCALE: NONE
DESIGN: MJS
DRAWN: ADL
CHECKED: CEJ
APPROVED: CEJ
DATE: 10/24/03

CHARLES E. JOSEPH No. 9889 EXP. DATE: 06/30/05

PARSONS TRANSPORTATION GROUP
LAS VEGAS, NEVADA
840 GRIER DRIVE, SUITE 140
LAS VEGAS, NEVADA 89119
PHONE (702) 435-2116
FAX (702) 435-6412

(DRAWING TITLE) TYPICAL RECTANGULAR CHANNEL DETAILS
(PROJECT TITLE) ALEXANDER CHANNEL
(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

SHEET NO. S2 OF 46 SHEETS

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR – JUNE 2005

GENERAL NOTES

DESIGN SPECIFICATIONS: ACI 318-02 BUILDING REQUIREMENTS FOR STRUCTURAL CONCRETE.
AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES 2002

CONSTRUCTION SPECIFICATIONS: UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY, NEVADA (LATEST EDITION)

DESIGN LOAD: LOAD FACTOR DESIGN

SEISMIC LOAD: SEISMIC PERFORMANCE CATEGORY B
GROUND ACCELERATION=0.16g

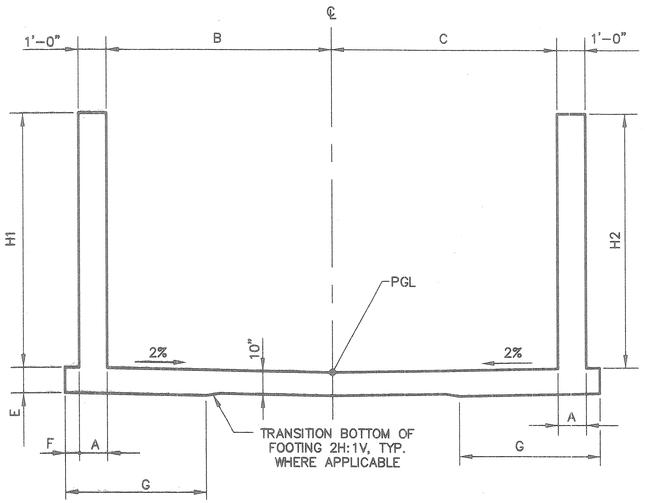
CONCRETE: WALLS-CLASS DA MODIFIED MAJOR f'c=4500PSI
CEMENT-ASTM C150 TYPE V
SLABS-CLASS AA MODIFIED MAJOR f'c=4500 PSI
CEMENT-ASTM C150 TYPE V

REINFORCING STEEL: ASTM A615 fy=60,000 PSI

SUBGRADE: SUBGRADE PREPARATION AND BACKFILL PER SPECIFICATIONS SEC, 203

TABLE 2	f'c=4.5 ksi & fy = 60ksi LAP SPLICE LENGTH IN FEET							
BAR SIZE	#4	#5	#6	#7	#8	#9	#10	#11
TOP BARS	2'-7"	3'-3"	3'-10"	5'-6"	6'-5"	7'-2"	8'-0"	8'-11"
OTHER BARS	2'-0"	2'-6"	2'-11"	4'-3"	4'-11"	5'-6"	6'-2"	6'-10"

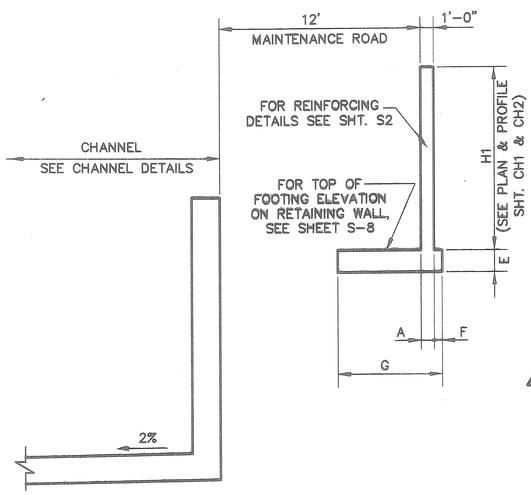
A. ALL SPLICES TO BE THE SPLICE LENGTH OF THE SMALLER BAR BUT NOT LESS THAN 1'-0".
B. SPLICES SHALL BE STAGGERED SO THAT NO MORE THAN 50% OF THE AREA OF STEEL IN A LAYER IS SPLICED WITHIN THE REQUIRED LAP LENGTH.
C. TOP BARS ARE HORIZONTAL BARS WITH MORE THAN 1'-0" OF CONCRETE BELOW THE BAR.



CHANNEL CROSS SECTION 1

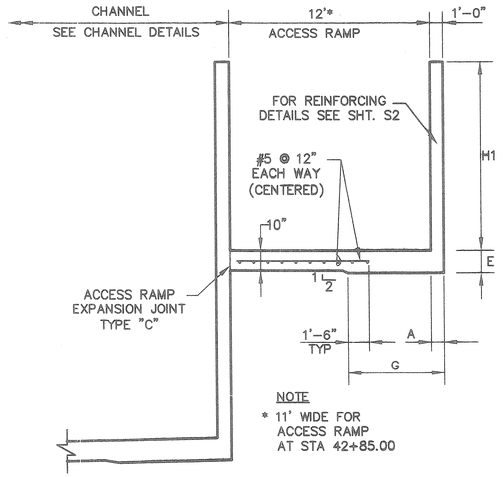
STA 12+21.19 TO STA 13+10.08
STA 27+04.21 TO STA 27+34.21
STA 43+87.25 TO STA 44+17.25
STA 75+96.18 TO STA 76+75.92
FOR REINFORCEMENT DETAILS, SEE SHEET S2

WALL DIMENSION TABLE - SECTION 1				
HEIGHT	A (FEET)	E (FEET)	F (FEET)	G (FEET)
1	1	0.83	0	2
2	1	1	0	3
4	1	1	0	5
6	1	1	0.5	6.5
7	1	1	0.5	7
8	1	1	1	8
9	1	1	1	9
10	1.083	1	1	10
12	1.25	1.25	1.25	12
14	1.33	1.25	1.25	14



CHANNEL CROSS SECTION

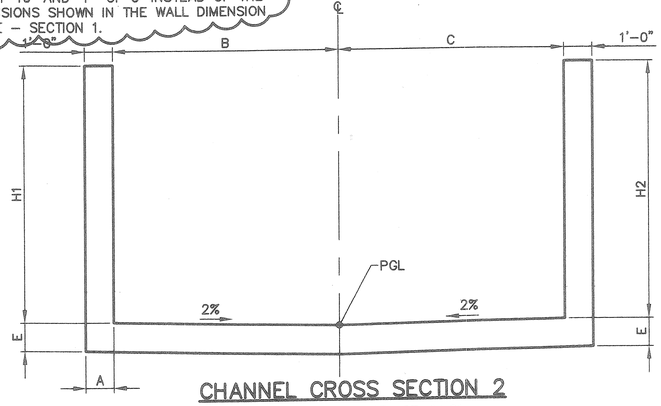
STA 14+00.00 TO STA 19+00.00
USE WALL SECTION 1 FOR DIMENSIONS AND REINFORCING



TYPICAL ACCESS RAMP CROSS SECTION

DIMENSION TABLE - RECTANGULAR CHANNEL					
FROM STATION	TO STATION	B (FEET)	C (FEET)	H1 (FEET)	H2 (FEET)
12+21.19	13+21.19	15'-0" - 6'-0"	15'-0" - 6'-0"	7'-0"	7'-0"
13+21.19	14+00.00	6'-0"	6'-0"	7'-0"	7'-0"
14+00.00 (1)	19+00.00 (1)	6'-0"	6'-0"	0'-6" - 7'-0"	N/A
14+00.00	27+04.21	6'-0"	6'-0"	7'-0"	7'-0"
24+25.00 (2)	24+45.00 (2)	6'-0"	6'-0"	7'-0" - 9'-3"	7'-0" - 9'-3"
25+60.00 (2)	26+05.00 (2)	6'-0"	6'-0"	9'-3" - 7'-0"	9'-3" - 7'-0"
27+04.21	27+34.21	6'-0"	19'-0"	7'-0"	6'-8 7/8"
27+35.21	38+70.00	6'-0"	6'-0"	7'-0"	7'-0"
37+75.00 (4)	37+95.00 (4)	6'-0"	6'-0"	7'-0" - 9'-3"	7'-0" - 9'-3"
38+70.00	39+00.00	6'-0"	6'-0"	7'-0" - 10'-3"	7'-0" - 10'-3"
42+50.00	42+85.00	7'-3 5/8" - 8'-0"	7'-3 5/8" - 8'-0"	10'-2 5/8"	10'-2 5/8"
42+85.00	43+87.25	8'-0"	8'-0"	9'-0"	9'-0"
43+87.25 (3)	44+17.25 (3)	8'-0"	20'-0"	9'-0"	8'-8 7/8"
44+18.25	45+02.00	8'-0"	8'-0"	9'-0"	9'-0"
45+48.00	46+35.50	8'-0"	8'-0"	9'-0"	9'-0"
46+81.50	50+53.00	8'-0"	8'-0"	9'-0"	9'-0"
55+01.66	55+23.36	8'-0"	8'-0"	10'-0" - 9'-6"	10'-0" - 9'-6"
55+23.36	57+46.45	8'-0"	8'-0"	9'-6"	9'-6"
57+46.45	57+65.00	8'-0"	8'-0"	9'-6" - 10"-0"	9'-6" - 10'-0"
61+35.00	62+92.00	8'-0"	8'-0"	10'-0"	10'-0"
63+38.00	64+82.00	8'-0"	8'-0"	10'-0"	10'-0"
65+28.00	65+40.00	8'-0"	8'-0"	10'-0"	10'-0"
65+40.00	67+10.00	8'-0" - 10'-0"	8'-0" - 10'-0"	10'-0" - 13'-9"	10'-0" - 13'-9"
68+41.00	74+85.53	10'-0"	10'-0"	11'-0"	11'-0"
75+96.18	76+75.92±	10'-0" - 15'-0"	10'-0" - 15'-0"	11'-0" - 10'-0"	11'-0" - 10'-0"

(1) RETAINING WALL SOUTH OF MAINTENANCE ROAD
(2) ADDITIVE ALTERNATE #2
(3) AT SOUTH SIDE OF CHANNEL, USE DIMENSION "G" OF 10' AND "F" OF 0' INSTEAD OF THE DIMENSIONS SHOWN IN THE WALL DIMENSION TABLE - SECTION 1.
(4) ADDITIVE ALTERNATE #1



CHANNEL CROSS SECTION 2

STA 13+10.08 TO STA 27+04.21
STA 27+34.21 TO STA 39+00.00
STA 42+50.00 TO STA 43+87.25
STA 44+17.25 TO STA 45+02.00
STA 45+48.00 TO STA 46+35.50
STA 46+81.50 TO STA 50+53.00
STA 55+01.66 TO STA 57+65.00
STA 61+35.00 TO STA 62+92.00
STA 63+38.00 TO STA 64+82.00
STA 65+28.00 TO STA 67+10.00
STA 68+41.00 TO STA 74+85.53
FOR REINFORCEMENT DETAILS, SEE SHEET S2

WALL DIMENSION TABLE - SECTION 2				
HEIGHT	A (FEET)	E (FEET)	F (FEET)	G (FEET)
7	1	1	-NA-	-NA-
9	1	1	-NA-	-NA-
10	1	1	-NA-	-NA-
11	1.25	1.25	-NA-	-NA-
14	1.75	1.75	-NA-	-NA-

NOTES

1. FOR ACTUAL WALL HEIGHTS BETWEEN THOSE SHOWN IN "WALL DIMENSION TABLE SECTIONS 1 & 2" USE THE NEXT HIGHEST VALUE
2. DESIGN HEIGHT MAY BE EXCEEDED BY 6" BEFORE UTILIZING THE NEXT HIGHEST DESIGN HEIGHT.
3. PROVIDE SMOOTH TRANSITION BETWEEN VARYING WALL BATTERS. FOOTING LENGTHS AND FOOTING THICKNESSES. SEE TYPICAL TRANSITION DETAIL.
4. FOR CONCRETE JOINTS NOT SPECIFIED, SEE SHEET S6.
5. FOR WEEPHOLE DETAILS SEE SHEET S8.

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

NO.	REVISIONS DESCRIPTION	DATE	BY
1	ADDENDUM 3	2/2/04	CEJ
2	RECORD DRAWING INFORMATION AS PROVIDED BY GARRIAITI CONSTRUCTION	6/30/2005	DWF

SCALE: NONE
DESIGN: AR
DRAWN: JDS
CHECKED: CEJ
APPROVED: CEJ
DATE: 10/22/03

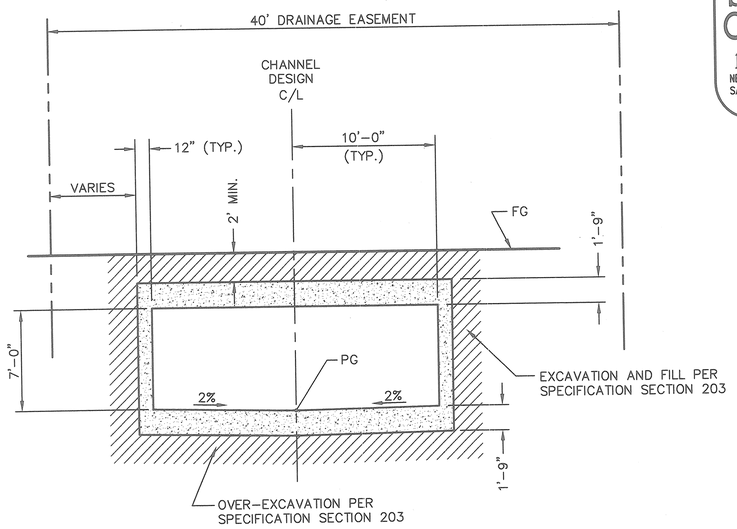
CHARLES JOSEPH JOHNSON 2004 CIVIL No. 12218 STATE OF NEVADA
EXP. DATE: 06/30/05

PARSONS TRANSPORTATION GROUP
LAS VEGAS, NEVADA
840 GRIER DRIVE, SUITE 140
LAS VEGAS, NEVADA 89119
PHONE (702) 435-2116
FAX (702) 435-8412

(DRAWING TITLE) TYPICAL RETANGULAR CHANNEL STRUCTURE SECTIONS
(PROJECT TITLE) ALEXANDER CHANNEL
(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

SHEET NO. S1 OF 46 SHEETS

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR - JUNE 2005

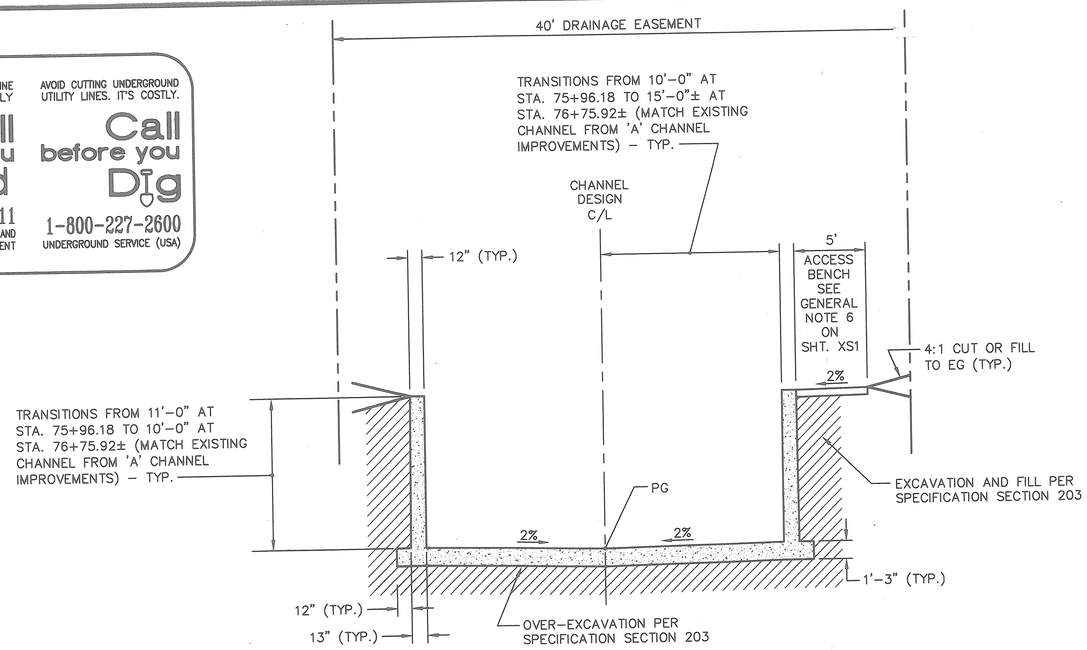


1 / XS10 **SECTIONAL ELEVATION STA. 74+85.53 TO STA. 75+96.18**

SCALE: 1"=5'

AVOID OVERHEAD POWER LINE CONTACT. IT'S COSTLY
Call before you Overhead
1-702-593-6111
NEVADA POWER ENVIRONMENT AND SAFETY SERVICES DEPARTMENT

AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY.
Call before you Dig
1-800-227-2600
UNDERGROUND SERVICE (USA)



2 / XS10 **SECTIONAL ELEVATION STA. 75+96.18 TO 76+75.92±**

SCALE: 1"=5'

NOTE:
REFER TO SHEET XS1 FOR GENERAL NOTES

STRUCTURAL DIMENSION NOTE:

THESE CROSS-SECTION ARE INTENDED TO GIVE A GENERAL LAYOUT OF THE CHANNEL SECTIONS FROM STATION TO STATION. THEY ARE NOT INTENDED FOR EXCAVATION OR FORMING SPECIFICS. NOT ALL DIMENSIONAL INFORMATION IS SHOWN OR IMPLIED ON THESE CROSS-SECTIONS. REFER TO STRUCTURAL SHEETS S1 THROUGH S8 FOR STRUCTURAL DIMENSIONAL SPECIFICS, AS WELL AS OTHER CHANNEL APPURTENANCES.

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

NO.	DESCRIPTION	DATE	BY
3	REVISED PER ADDENDUM NO. 3	1/03/2004	VTN
4	RECORD DRAWING INFORMATION AS PROVIDED BY CONTRACT CONSTRUCTION	6/30/2005	DRF

SCALE: 1"=5'
DESIGN: DJB
DRAWN: DJB
CHECKED: JNG
APPROVED: KDG
DATE: 1/03/2004

ORIGINAL CONSTRUCTION DRAWINGS WERE PREPARED UNDER THE CITY OF NORTH LAS VEGAS, THE DOCUMENTS WERE SEALED ON 2/3/04 BY KEN D. GILDRETH UNDER LICENSE NO. 9977

vtn nevada
CONSULTING ENGINEERS
PLANNERS
LAND SURVEYORS
2770 SOUTH MARYLAND PARKWAY BOULEVARD
LAS VEGAS, NEVADA 89146-5148
PHONE (702) 873-7550
FAX (702) 362-2597

(DRAWING TITLE) STATION-TO-STATION SECTIONS

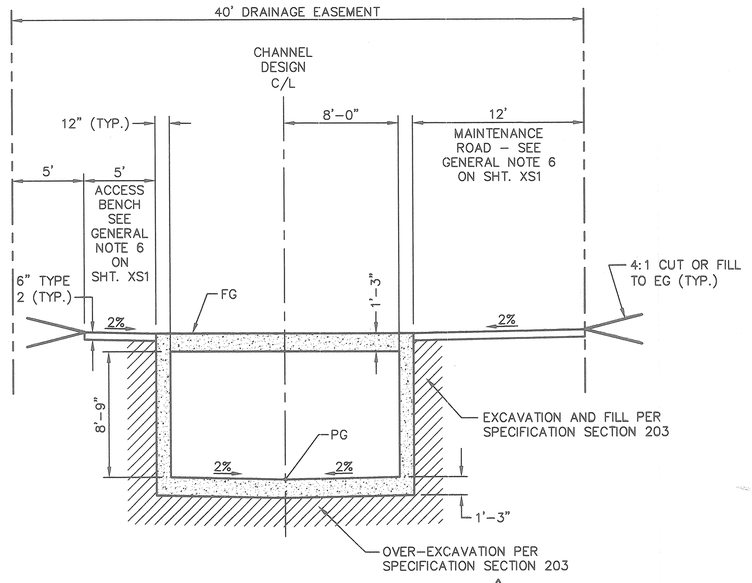
(PROJECT TITLE) ALEXANDER CHANNEL

(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

SHEET NO. XS10

OF 46 SHEETS

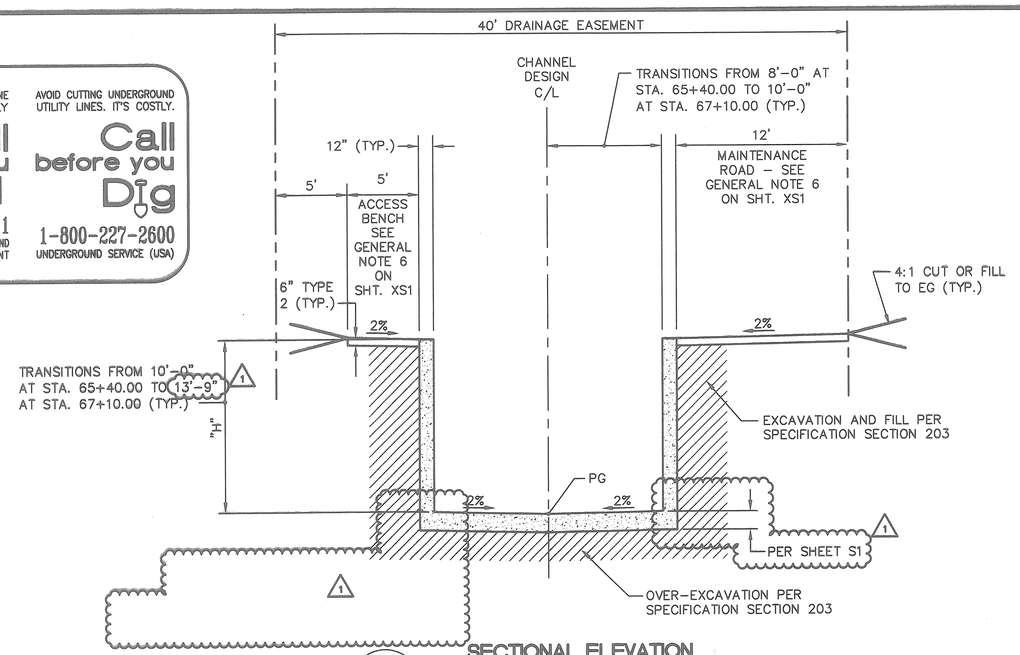
RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR - JUNE 2005



1 / XS9 **SECTIONAL ELEVATION**
STA. 64+82.00 TO STA. 65+28.00
SCALE: 1"=5'

AVOID OVERHEAD POWER LINE CONTACT. IT'S COSTLY
Call before you Overhead
1-702-593-6111
NEVADA POWER ENVIRONMENT AND SAFETY SERVICES DEPARTMENT

AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY.
Call before you Dig
1-800-227-2600
UNDERGROUND SERVICE (USA)



2 / XS9 **SECTIONAL ELEVATION**
STA. 65+40.00 TO STA. 67+10.00
SCALE: 1"=5'

NOTE:
REFER TO SHEET XS1 FOR GENERAL NOTES

STRUCTURAL DIMENSION NOTE:

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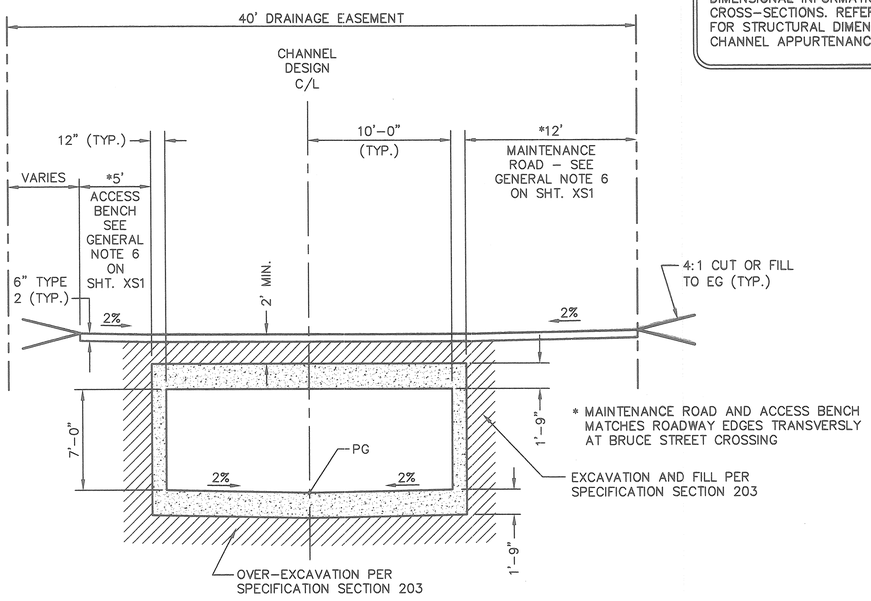
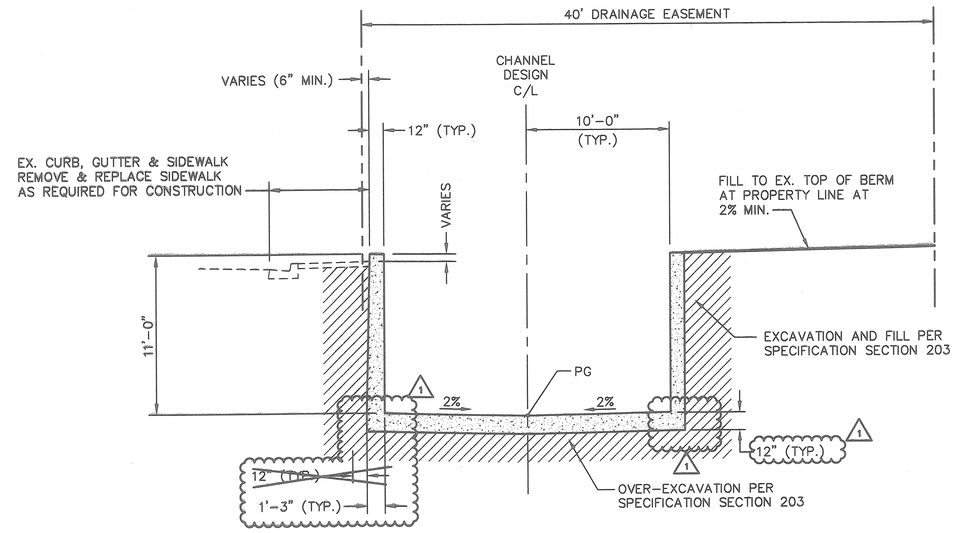


3 / XS9 **SECTIONAL ELEVATION**
STA. 67+10.00 TO STA. 68+41.00
SCALE: 1"=5'



4 / XS9 **SECTIONAL ELEVATION**
STA. 68+41.00 TO 74+85.53
SCALE: 1"=5'

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

NO.	DESCRIPTION	DATE	BY
1	REVISED PER ADDENDUM NO. 3	1/03/2004	VTN
2	RECORD DRAWING INFORMATION AS PROVIDED BY CAPRIATI CONSTRUCTION	6/30/2005	DRF

SCALE: 1"=5'
DESIGN: DJB
DRAWN: DJB
CHECKED: JNG
APPROVED: KDG
DATE: 1/03/2004

ORIGINAL CONSTRUCTION DRAWINGS WERE CERTIFIED WITH THE CITY OF NORTH LAS VEGAS. THE DOCUMENTS WERE SEALED ON 2/2/04 BY KEVIN D. GILBREATH LICENSED NO. 9777

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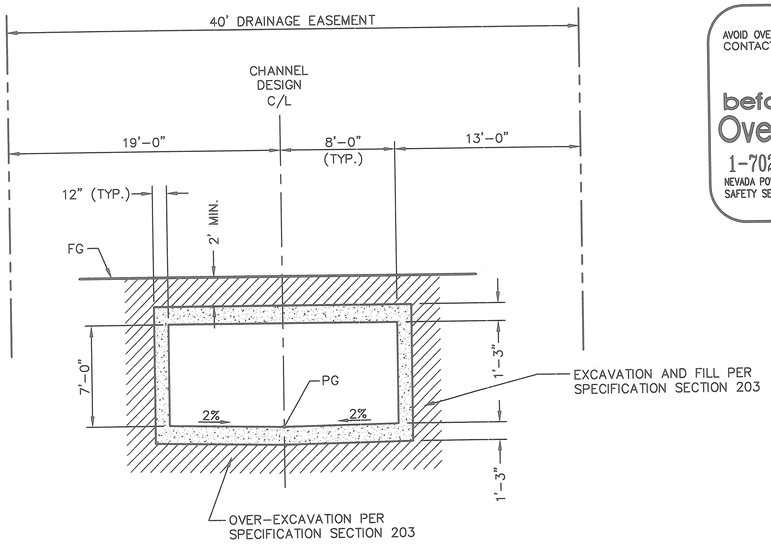
PLANNERS
LAND SURVEYORS
2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-5148
PHONE (702) 873-7550
FAX (702) 362-2597

(DRAWING TITLE) STATION-TO-STATION SECTIONS
(PROJECT TITLE) ALEXANDER CHANNEL
(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR - JUNE 2005

SHEET NO.
XS9
OF 46 SHEETS



1 / XS8 **SECTIONAL ELEVATION STA. 57+65.00 TO STA. 61+35.00**
SCALE: 1"=5'

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1-702-593-6111
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AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY.
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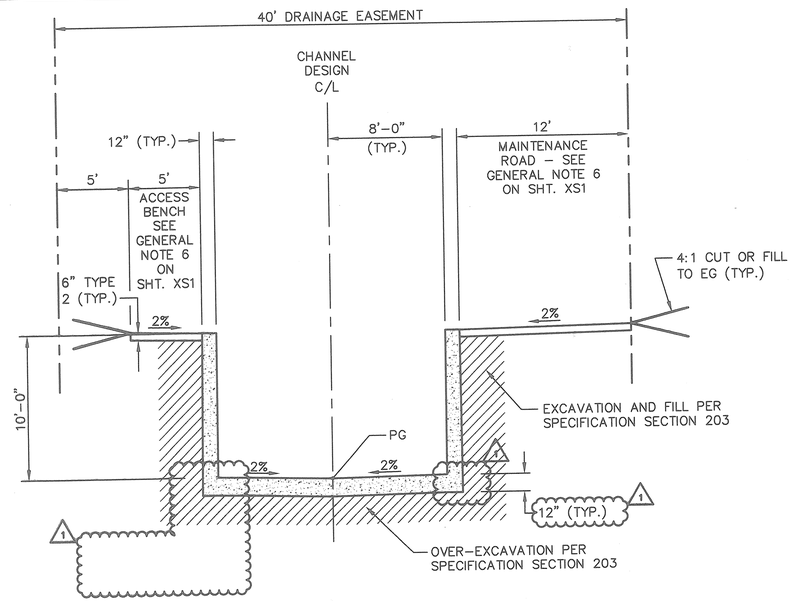
1-800-227-2600
UNDERGROUND SERVICE (USA)



2 / XS8 **SECTIONAL ELEVATION STA. 61+35.00 TO STA. 62+92.00**
SCALE: 1"=5'

NOTE:
REFER TO SHEET XS1 FOR GENERAL NOTES

STRUCTURAL DIMENSION NOTE:

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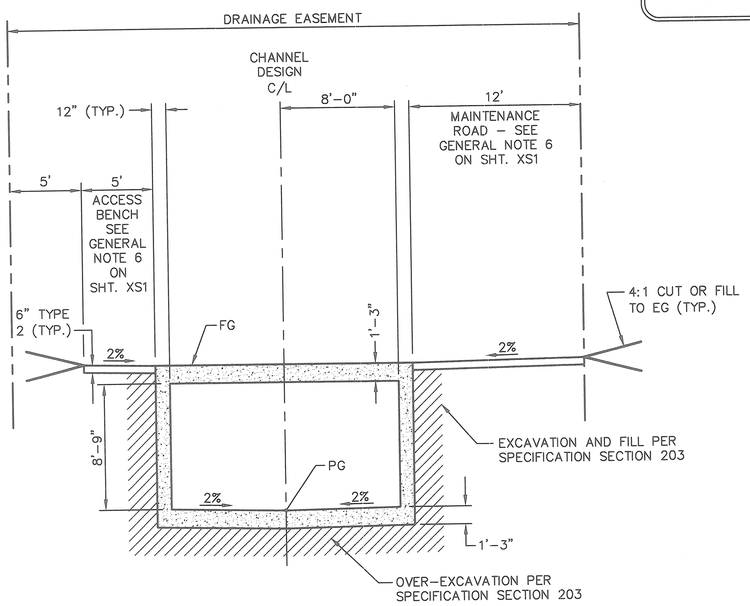
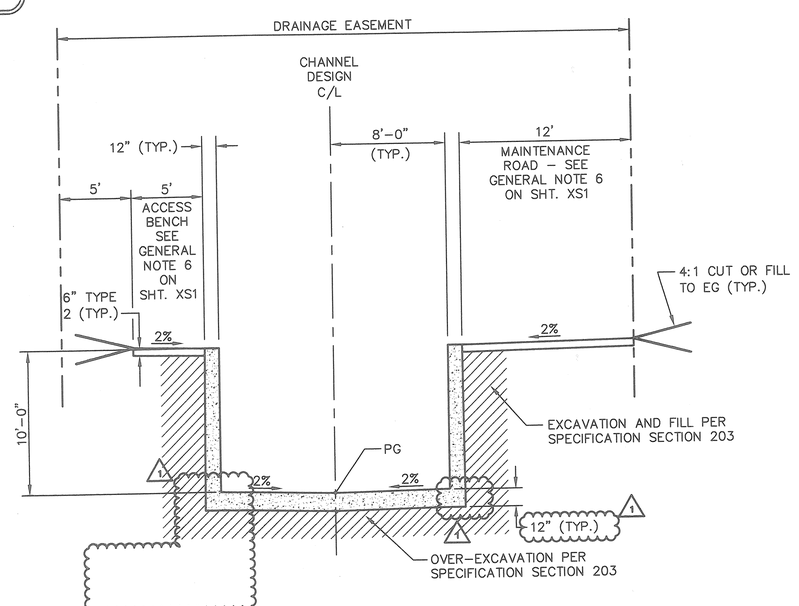


3 / XS8 **SECTIONAL ELEVATION STA. 62+92.00 TO STA. 63+38.00**
SCALE: 1"=5'



4 / XS8 **SECTIONAL ELEVATION STA. 63+38.00 TO STA. 64+82.00 STA. 65+28.00 TO STA. 65+40.00**
SCALE: 1"=5'

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

REVISIONS			
NO.	DESCRIPTION	DATE	BY
1	REVISED PER ADDENDUM NO. 3	1/03/2004	VTN
2	RECORD DRAWING INFORMATION AS PROVIDED BY CAPITAL CONSTRUCTION	6/30/2005	DRF

SCALE: 1"=5'
DESIGN: DJB
DRAWN: DJB
CHECKED: JNG
APPROVED: KDG
DATE: 1/03/2004

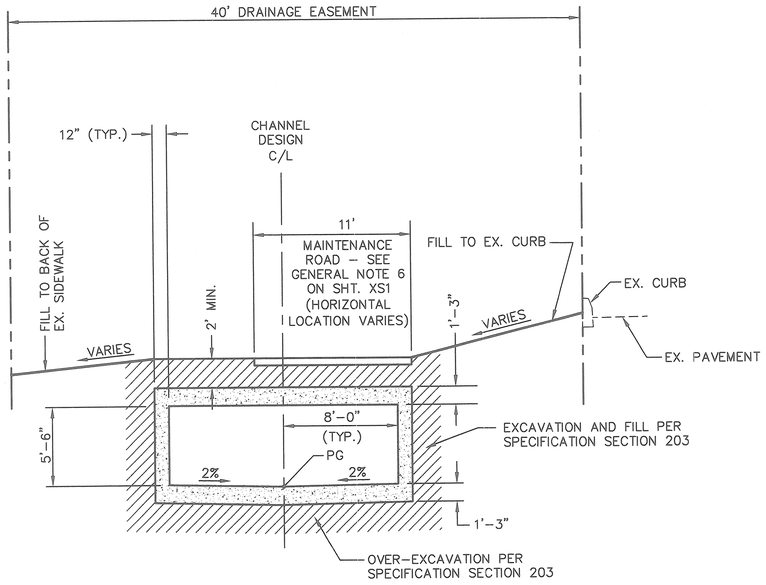
ORIGINAL CONSTRUCTION DRAWINGS ARE ON FILE WITH THE CITY OF NORTH LAS VEGAS. THE DOCUMENTS WERE SEALED ON 2/3/04 BY KEN D. GILGREITH UNDER LICENSE NO. 9977

vtn nevada
CONSULTING ENGINEERS
PLANNERS
LAND SURVEYORS
2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-5148
PHONE (702) 873-7550
FAX (702) 362-2597

(DRAWING TITLE) STATION-TO-STATION SECTIONS
(PROJECT TITLE) ALEXANDER CHANNEL
(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

SHEET NO.
XS8
OF 46 SHEETS

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR - JUNE 2005



1 / XS7 SECTIONAL ELEVATION
STA. 53+90.00 TO STA. 55+01.66
SCALE: 1"=5'

AVOID OVERHEAD POWER LINE CONTACT. IT'S COSTLY
Call before you Overhead
1-702-593-6111
NEVADA POWER ENVIRONMENT AND SAFETY SERVICES DEPARTMENT

AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY.
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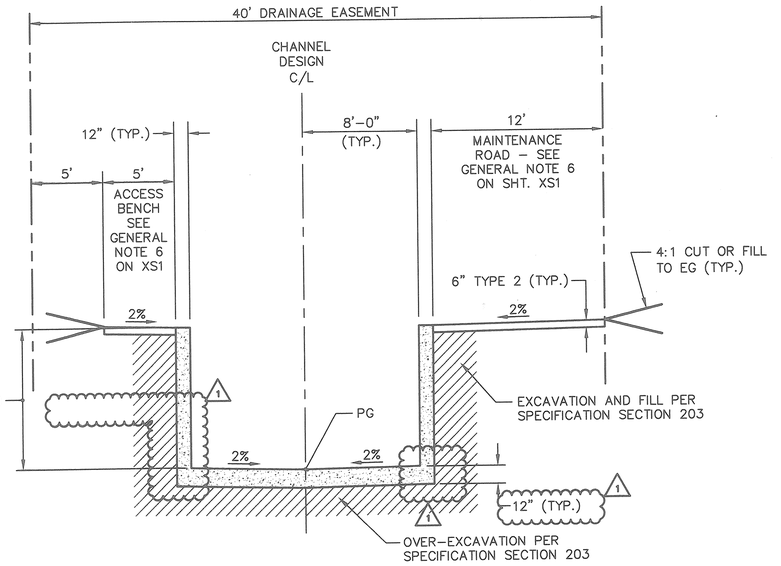
UNDERGROUND SERVICE (USA)



2 / XS7 SECTIONAL ELEVATION
STA. 55+01.66 TO STA. 55+23.36
SCALE: 1"=5'

NOTE:
REFER TO SHEET XS1 FOR GENERAL NOTES

STRUCTURAL DIMENSION NOTE:

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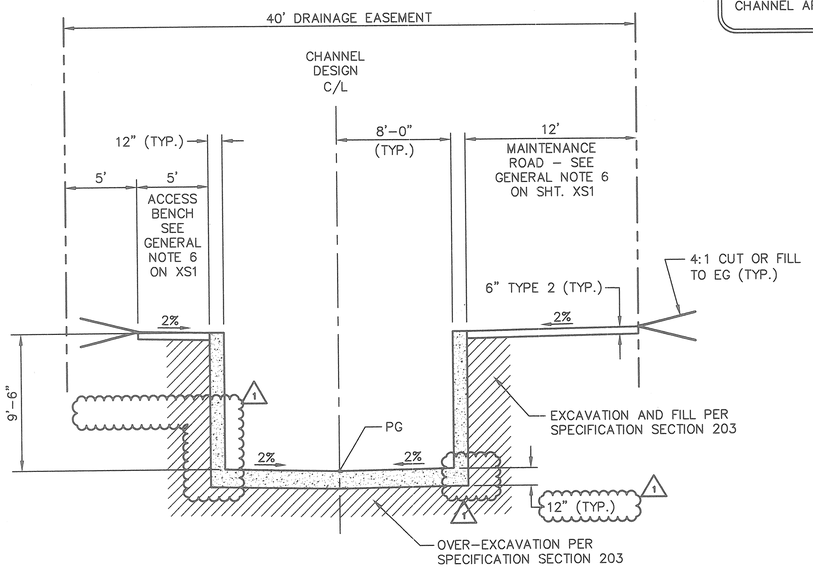
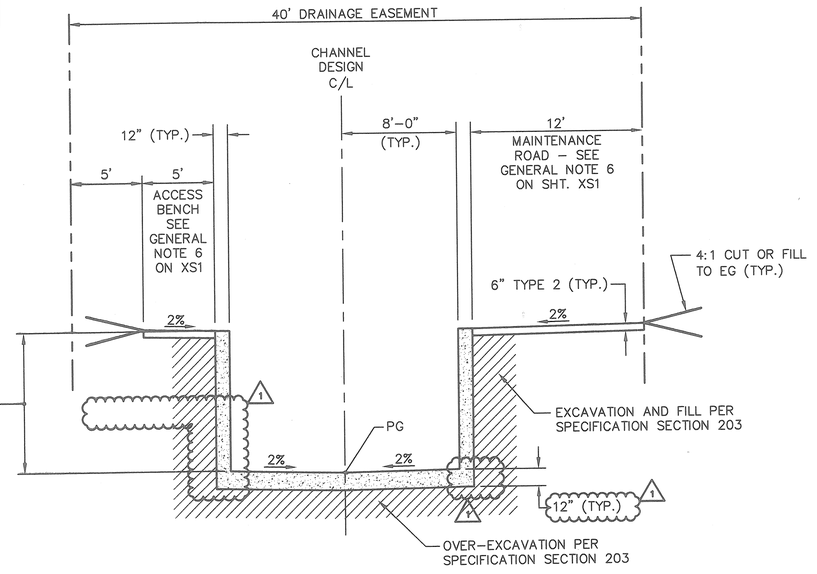


3 / XS7 SECTIONAL ELEVATION
STA. 55+23.36 TO STA. 57+46.45
SCALE: 1"=5'



4 / XS7 SECTIONAL ELEVATION
STA. 57+46.45 TO STA. 57+65.00
SCALE: 1"=5'

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

REVISIONS

NO.	DESCRIPTION	DATE	BY
1	REVISED PER ADDENDUM NO. 3	1/03/2004	VTN
2	RECORD DRAWING INFORMATION AS PROVIDED BY CAPRIATI CONSTRUCTION	6/30/2005	DRF
3			
4			
5			

SCALE: 1"=5'
DESIGN: DJB
DRAWN: DJB
CHECKED: JNG
APPROVED: KDG
DATE: 1/03/2004

ORIGINAL CONSTRUCTION DRAWINGS ARE ON FILE WITH THE CITY OF NORTH LAS VEGAS. THE DOCUMENTS WERE SEALED ON 2/3/04 BY KEN D. GILLMETH UNDER LICENSE NO. 9177

vtn nevada
• CONSULTING ENGINEERS
• PLANNERS
• LAND SURVEYORS
2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-5148
PHONE (702) 362-3566
FAX (702) 362-2592

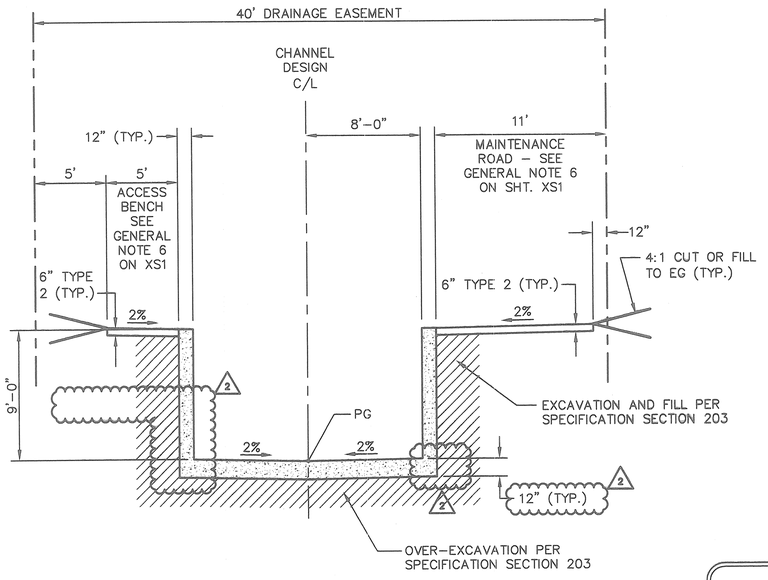
(DRAWING TITLE) STATION-TO-STATION SECTIONS

(PROJECT TITLE) ALEXANDER CHANNEL

(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

SHEET NO.
XS7
OF 46 SHEETS

INFORMATION SUPPLIED BY CONTRACTOR – JUNE 2005
RECORD DRAWINGS



1 / XS6 SECTIONAL ELEVATION
STA. 45+48.00 TO STA. 48+35.50
SCALE: 1"=5'

NOTE:
REFER TO SHEET XS1 FOR GENERAL NOTES

STRUCTURAL DIMENSION NOTE:

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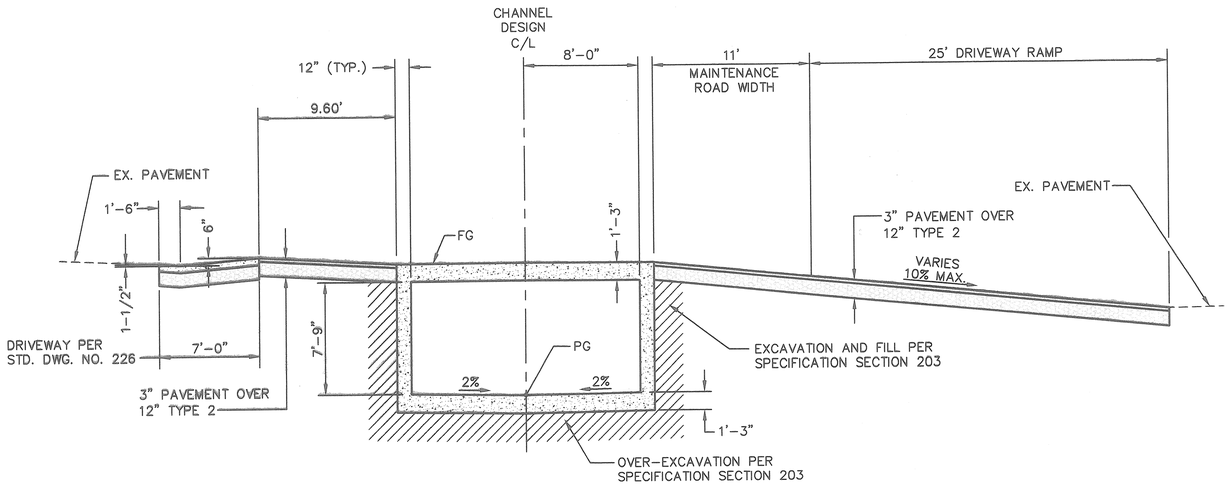
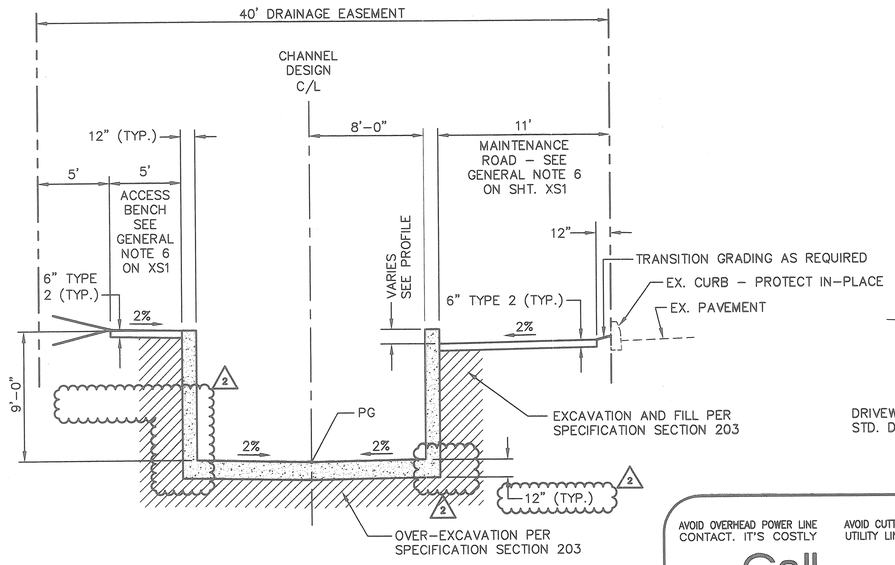


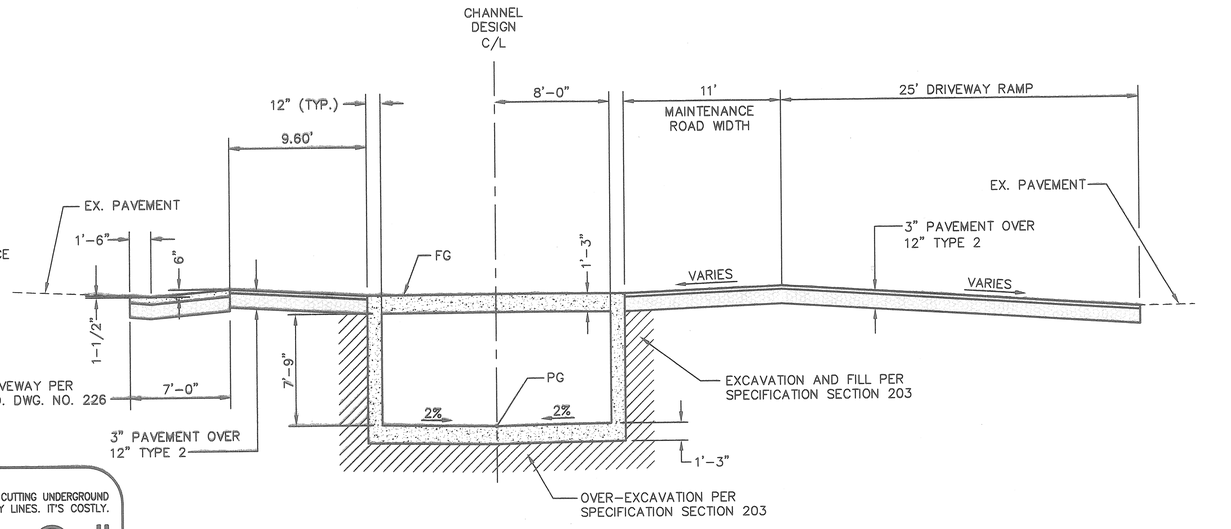
2 / XS6 SECTIONAL ELEVATION
STA. 46+35.50 TO STA. 46+81.50
SCALE: 1"=5'



3 / XS6 SECTIONAL ELEVATION
STA. 46+81.50 TO STA. 50+53.00
SCALE: 1"=5'

AVOID OVERHEAD POWER LINE CONTACT. IT'S COSTLY
Call before you Overhead
1-702-593-6111
NEVADA POWER ENVIRONMENT AND SAFETY SERVICES DEPARTMENT

AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY.
Call before you Dig
1-800-227-2600
UNDERGROUND SERVICE (USA)



4 / XS6 SECTIONAL ELEVATION
STA. 50+53.00 TO STA. 50+99.00
SCALE: 1"=5'

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

NO.	DESCRIPTION	DATE	BY
1	REVISED PER ADDENDUM NO. 1	1/29/2004	VTN
2	REVISED PER ADDENDUM NO. 3	2/04/2004	VTN
3	RECORD DRAWING INFORMATION AS	6/30/2005	DRF
	PROVIDED BY CAPRIATI CONSTRUCTION		

SCALE: 1"=5'
DESIGN: DJB
DRAWN: DJB
CHECKED: JNG
APPROVED: KDG
DATE: 1/03/2004

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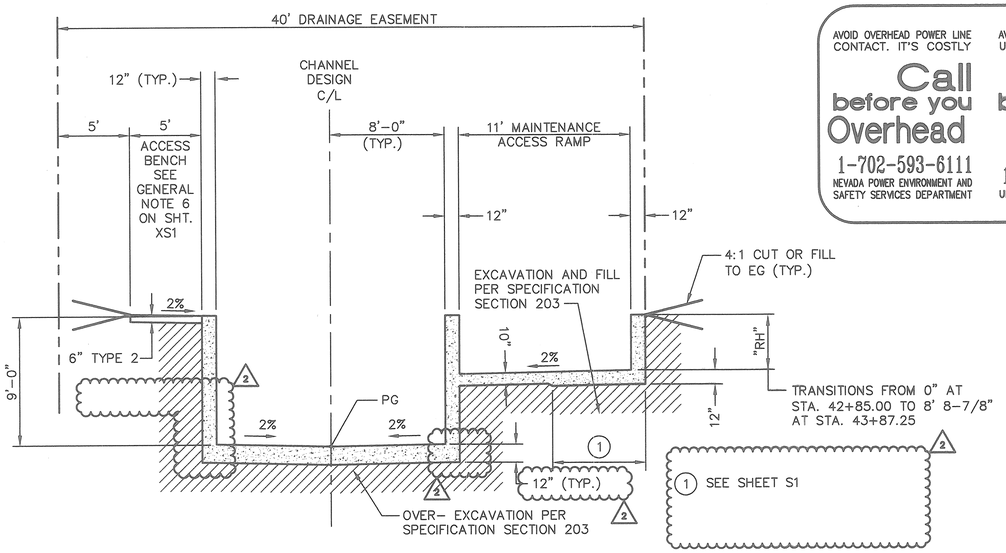
vtn nevada
CONSULTING ENGINEERS
PLANNERS
LAND SURVEYORS
2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-5148
PHONE (702) 873-7500
FAX (702) 362-2387

(DRAWING TITLE) STATION-TO-STATION SECTIONS
(PROJECT TITLE) ALEXANDER CHANNEL
(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

SHEET NO.
XS6
OF 46 SHEETS

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR - JUNE 2005



1 XS5 SECTIONAL ELEVATION STA. 42+85.00 TO STA. 43+87.25

SCALE: 1"=5'

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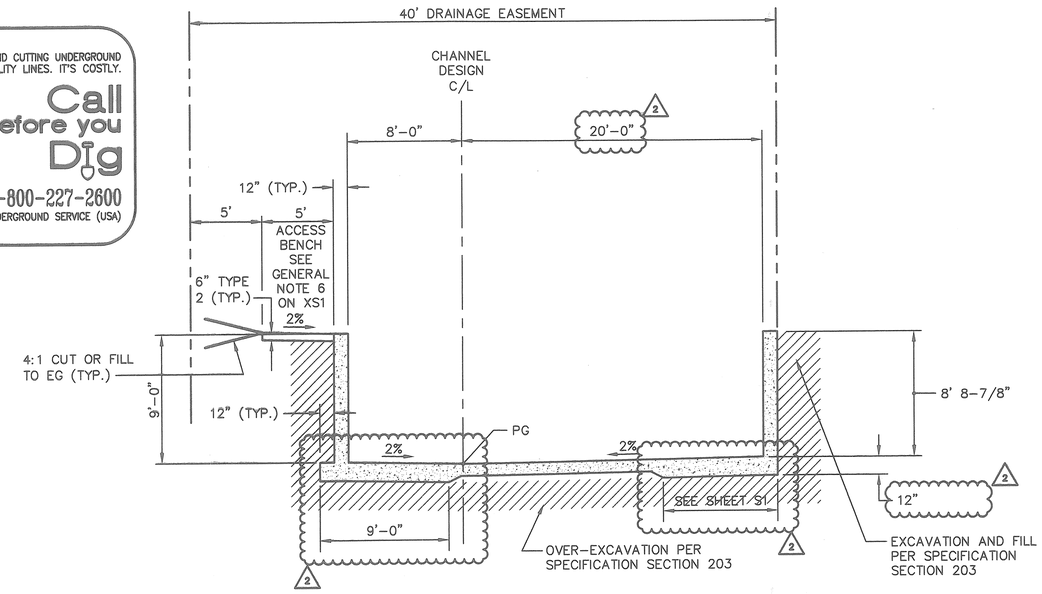

2 XS5 SECTIONAL ELEVATION STA. 43+87.25 TO STA. 44+17.25

SCALE: 1"=5'

NOTE:
REFER TO SHEET XS1 FOR GENERAL NOTES

STRUCTURAL DIMENSION NOTE:

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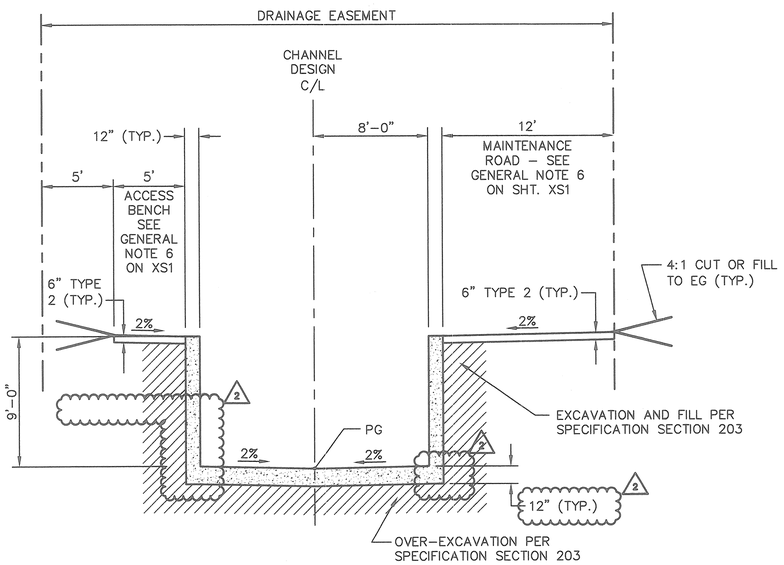
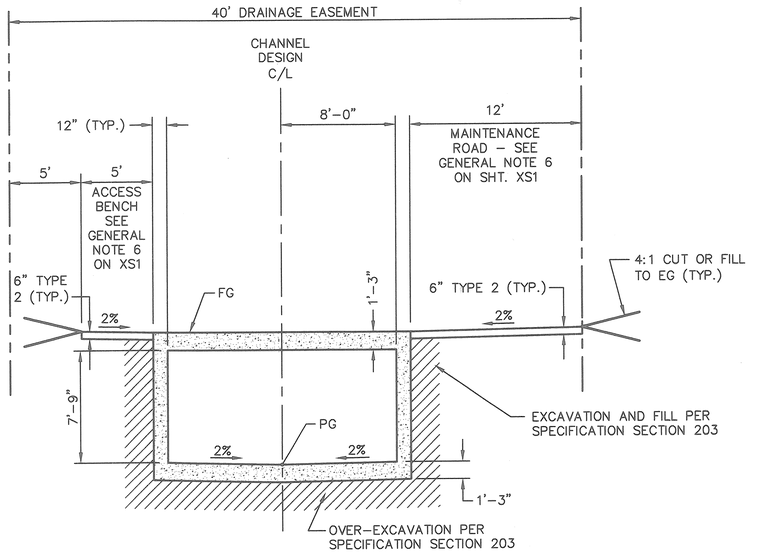


3 XS5 SECTIONAL ELEVATION STA. 44+17.25 TO STA. 45+02.00

SCALE: 1"=5'



4 XS5 SECTIONAL ELEVATION STA. 45+02.00 TO STA. 45+48.00 STA. 50+99.00 TO STA. 53+90.00.00

SCALE: 1"=5'

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

REVISIONS			
NO.	DESCRIPTION	DATE	BY
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	PROVIDED BY CAPRIATI CONSTRUCTION		

SCALE: 1"=5'
DESIGN: DJB
DRAWN: DJB
CHECKED: JNG
APPROVED: KDG
DATE: 1/03/2004

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PHONE (702) 873-7550
FAX (702) 362-2687

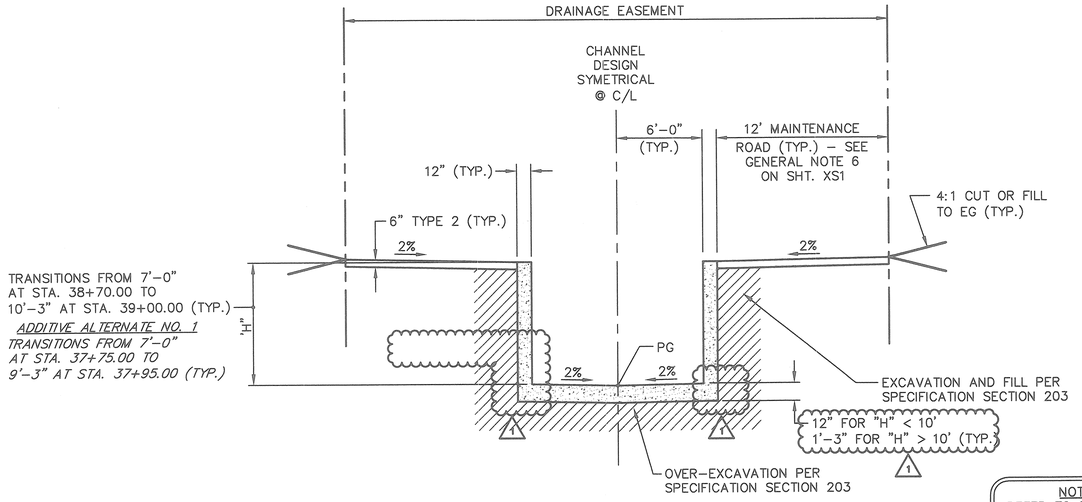
(DRAWING TITLE) STATION-TO-STATION SECTIONS

(PROJECT TITLE) ALEXANDER CHANNEL

(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

SHEET NO. XS5 OF 46 SHEETS

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR - JUNE 2005



1 / XS4 **SECTIONAL ELEVATION**
STA. 38+70.00 TO STA. 39+00.00
SCALE: 1"=5'

***ADDITIVE ALTERNATE NO. 1**
STA. 37+75.00 TO STA. 37+95.00

NOTE:
REFER TO SHEET XS1 FOR GENERAL NOTES

STRUCTURAL DIMENSION NOTE:

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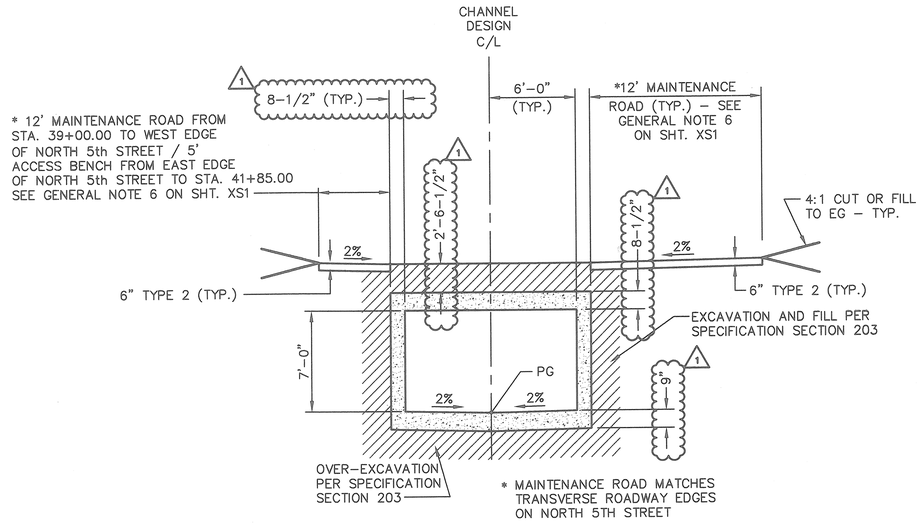

2 / XS4 **SECTIONAL ELEVATION**
STA. 39+00.00 TO STA. 41+85.00
SCALE: 1"=5'

***ADDITIVE ALTERNATE NO. 1**
STA. 37+95.00 TO STA. 41+85.00

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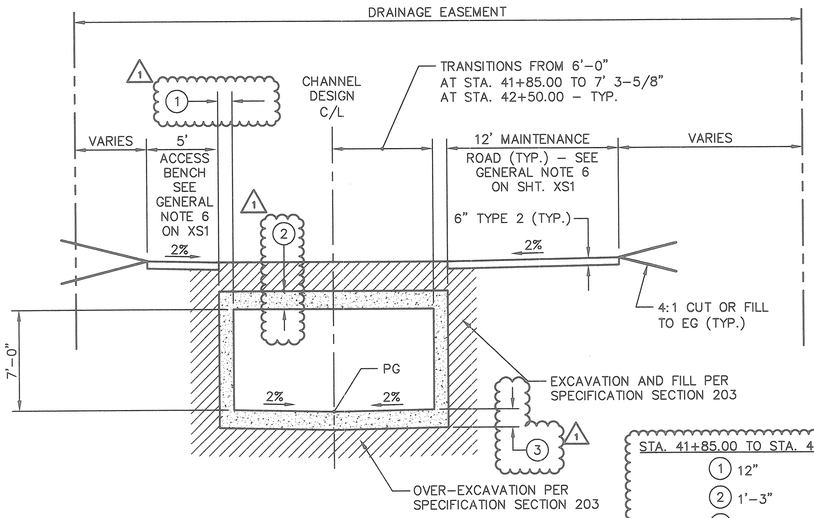
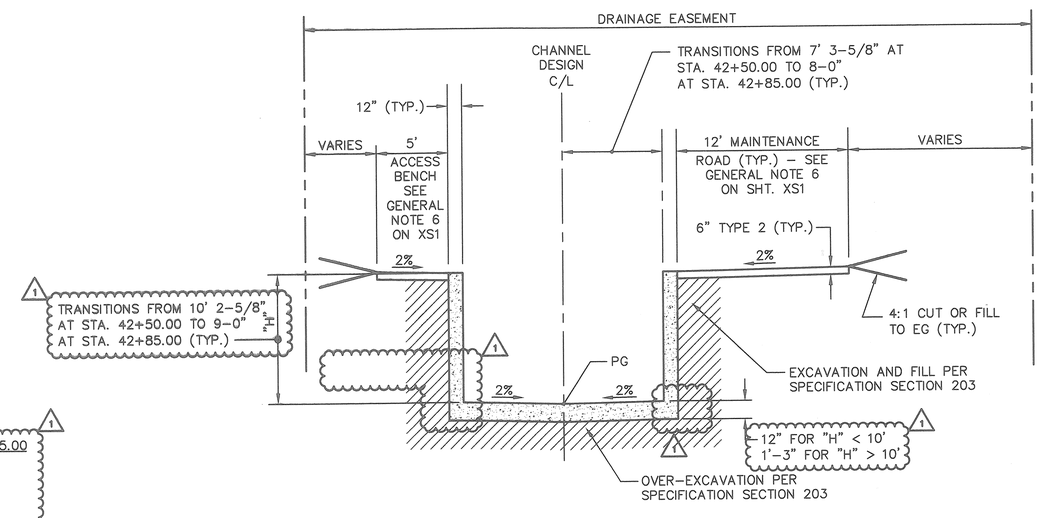


3 / XS4 **SECTIONAL ELEVATION**
STA. 41+85.00 TO STA. 42+50.00
SCALE: 1"=5'

STA. 41+85.00 TO STA. 42+35.00
(1) 12"
(2) 1'-3"
(3) 1'-3"

STA. 42+35.00 TO STA. 42+50.00
(1) 9-1/2"
(2) 9-1/2"
(3) 10"



4 / XS4 **SECTIONAL ELEVATION**
STA. 42+50.00 TO STA. 42+85.00
SCALE: 1"=5'

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

REVISIONS			
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2	RECORD DRAWING INFORMATION AS PROVIDED BY CAPRATI CONSTRUCTION	6/30/2005	DRF

SCALE: 1"=5'
DESIGN: DJB
DRAWN: DJB
CHECKED: JNG
APPROVED: KDG
DATE: 1/03/2004

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FAX (702) 362-2387

(DRAWING TITLE) STATION-TO-STATION SECTIONS

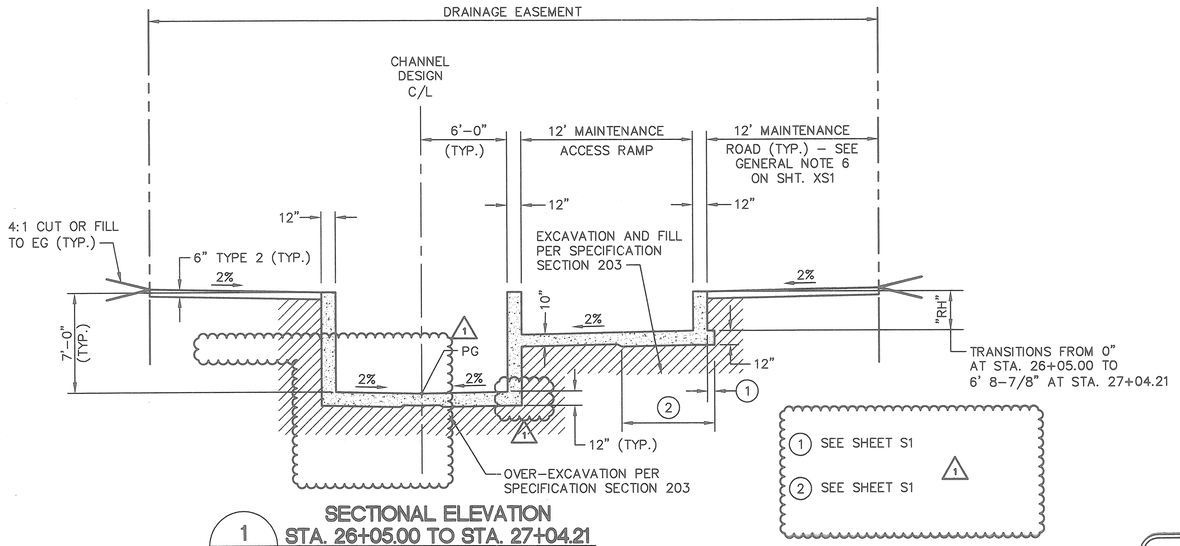
(PROJECT TITLE) ALEXANDER CHANNEL

(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

INFORMATION SUPPLIED BY CONTRACTOR – JUNE 2005

RECORD DRAWINGS

SHEET NO.
XS4
OF 46 SHEETS



1 / XS3 SECTIONAL ELEVATION
STA. 26+05.00 TO STA. 27+04.21
SCALE: 1"=5'

NOTE:
REFER TO SHEET XS1 FOR GENERAL NOTES

STRUCTURAL DIMENSION NOTE:

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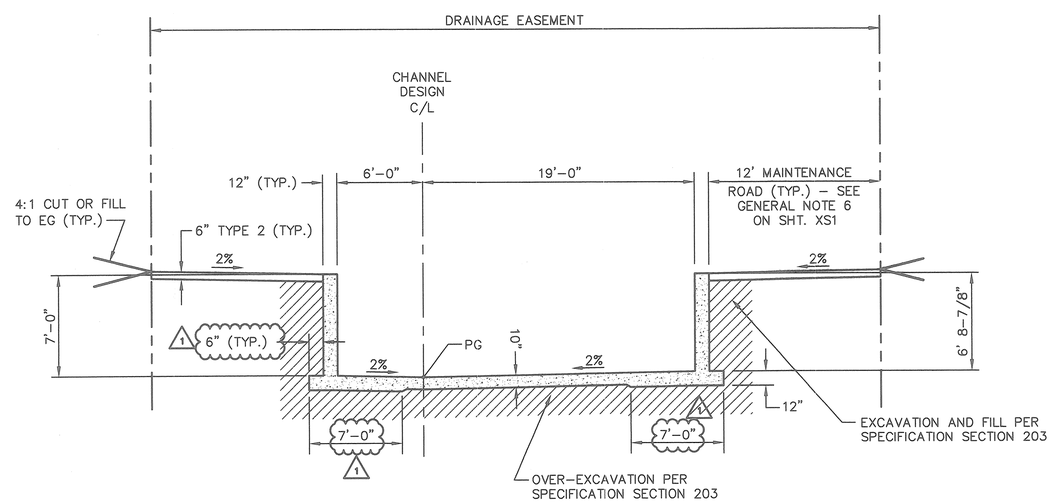
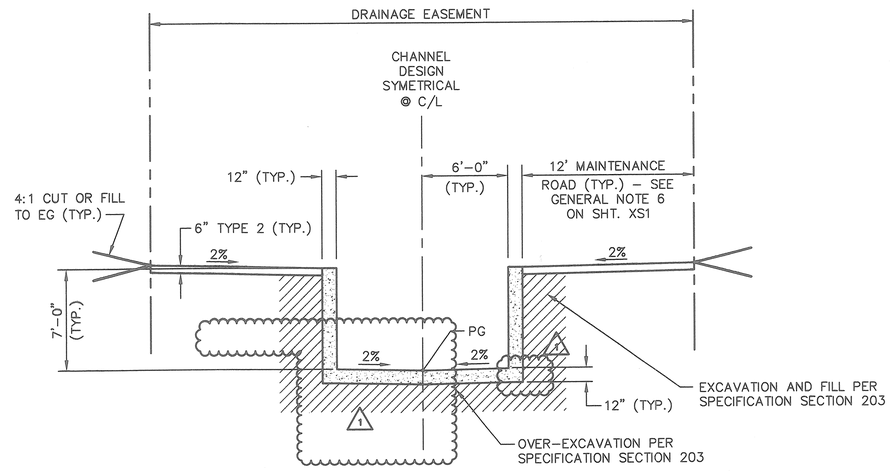


2 / XS3 SECTIONAL ELEVATION
STA. 27+04.21 TO STA. 27+34.21
SCALE: 1"=5'



3 / XS3 SECTIONAL ELEVATION
STA. 27+35.21 TO STA. 38+70.00*
SCALE: 1"=5'

*ADDITIVE ALTERNATE NO. 1
STA. 27+35.21 TO STA. 37+75.00

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UNDERGROUND SERVICE (USA)

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

NO.	REVISIONS DESCRIPTION	DATE	BY
3	REVISED PER ADDENDUM NO. 3	1/03/2004	YTN
4	RECORD DRAWING INFORMATION AS	6/30/2005	DRF
5	PROVIDED BY CAPRATI CONSTRUCTION		
6			
7			

SCALE: 1"=5'
DESIGN: DJB
DRAWN: DJB
CHECKED: JNG
APPROVED: KDG
DATE: 1/03/2004

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LAS VEGAS, NEVADA 89146-5148
PHONE (702) 233-7660
FAX (702) 362-2597

(DRAWING TITLE) STATION-TO-STATION SECTIONS

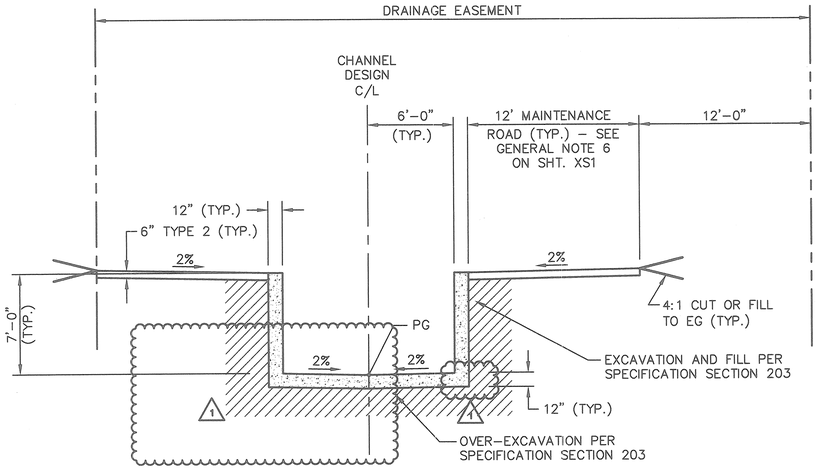
(PROJECT TITLE) ALEXANDER CHANNEL

(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

INFORMATION SUPPLIED BY CONTRACTOR - JUNE 2005

RECORD DRAWINGS

SHEET NO.
XS3
OF 46 SHEETS



1 XS2 **SECTIONAL ELEVATION STA. 19+00.00 TO STA. 26+05.00**

SCALE: 1"=5'

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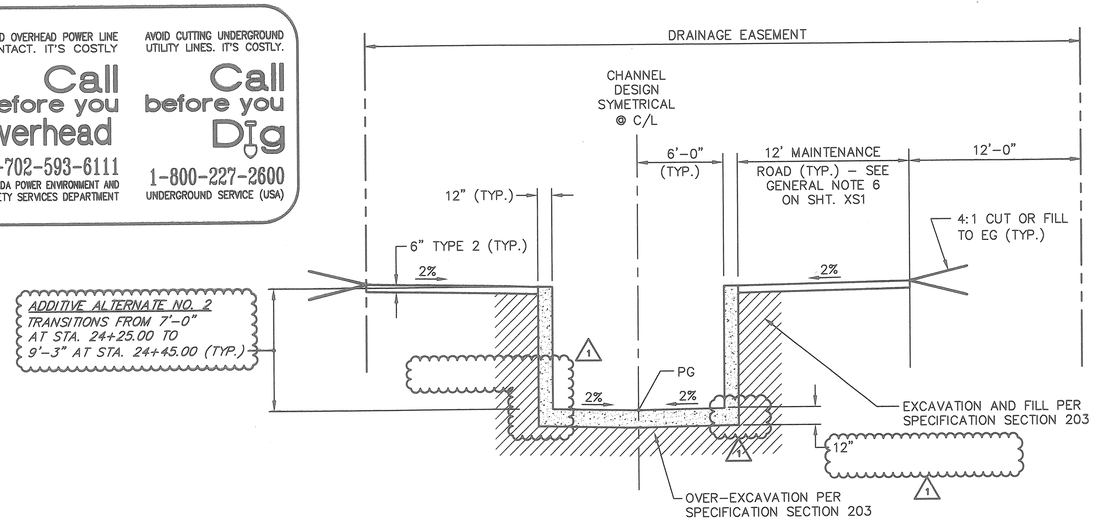

2 XS2 **ADDITIVE ALTERNATE NO. 2 STA. 24+25.00 TO STA. 24+45.00**

SCALE: 1"=5'

NOTE:
REFER TO SHEET XS1 FOR GENERAL NOTES

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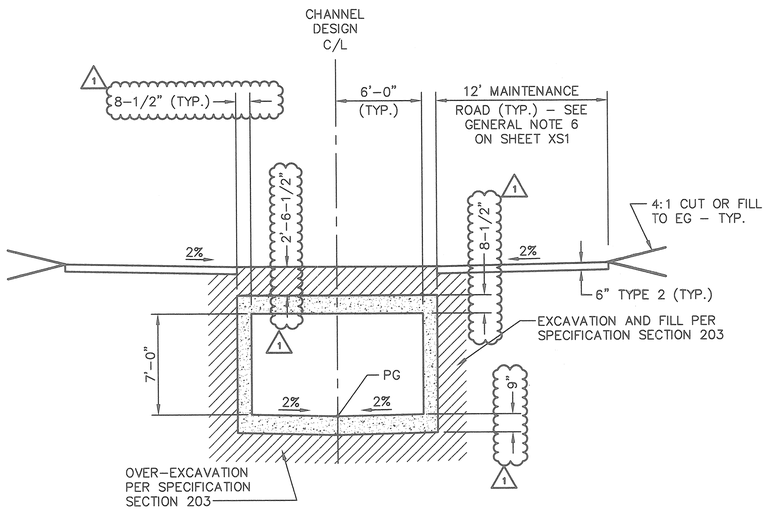
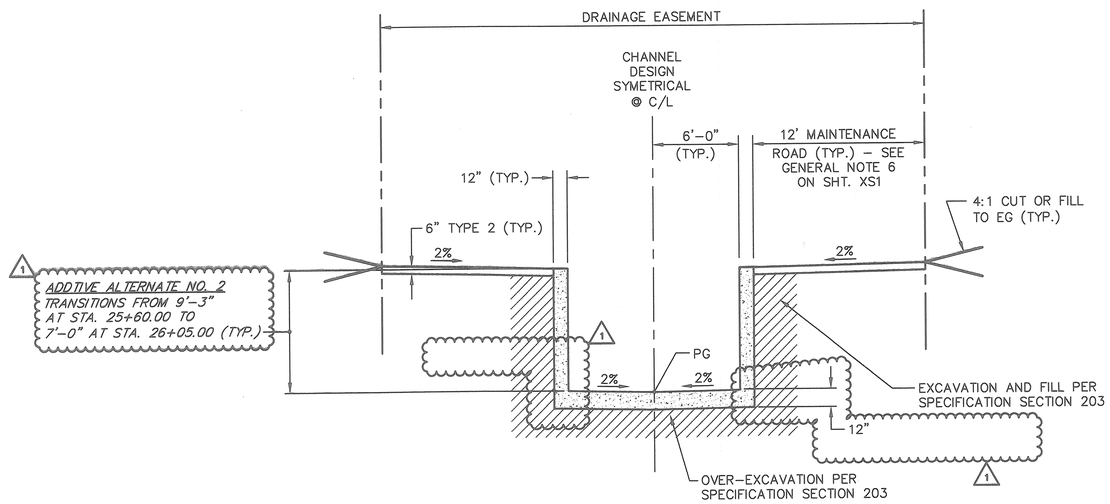


3 XS2 **ADDITIVE ALTERNATE NO. 2 STA. 24+45.00 TO STA. 25+60.00**

SCALE: 1"=5'



4 XS2 **ADDITIVE ALTERNATE NO. 2 STA. 25+60 TO STA. 26+05.00**

SCALE: 1"=5'

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

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4			
5			

SCALE: 1"=5'
DESIGN: DJB
DRAWN: DJB
CHECKED: JNG
APPROVED: KDG
DATE: 1/03/2004

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• CONSULTING ENGINEERS
• PLANNERS
• LAND SURVEYORS
2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-5148
PHONE (702) 873-7550
FAX (702) 362-2597

(DRAWING TITLE) STATION-TO-STATION SECTIONS

(PROJECT TITLE) ALEXANDER CHANNEL

(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

SHEET NO. XS2 OF 46 SHEETS

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR - JUNE 2005

GENERAL NOTES

1.) ALL SECTIONS ARE CUT LOOKING DOWNSTREAM AND UPSTATION.
2.) REFER TO SHEETS S1 THROUGH S8 FOR STRUCTURAL DETAILS.
3.) INSTALL POST & CABLE RAILING PER DETAILS ON SHT. D2 ON ALL VERTICAL WALLS AND HEADWALLS UNLESS NOTED OTHERWISE.
4.) REFER TO SHEETS F1 THROUGH F4 FOR FENCING LAYOUT PLAN AND DETAILS ON SHEET D3 FOR CHAIN LINK FENCING AND GATES.
5.) WEEPHOLES AND DRAIN ROCK NOT SHOWN IN THESE SECTIONS. REFER TO DETAILS ON SHEET S2.
6.) 6" TYPE 2 MAINTENANCE ROAD/ACCESS BENCH PER STANDARD SPECIFICATION 302.
7.) CONTRACTOR SHALL REFER TO "OCCUPATIONAL SAFETY AND HEALTH STANDARDS FOR THE CONSTRUCTION INDUSTRY (29 CFR PART 1926), WITH AMENDMENTS THROUGH THE DATE OF THE ADVERTISEMENT, STATE OF NEVADA, DIVISION OF OCCUPATIONAL SAFETY AND HEALTH", SUBPART P – EXCAVATIONS, TRENCHING, AND SHORING, SECTION 1926.650 THROUGH 1926.653 FOR SAFETY REQUIREMENTS DURING CONSTRUCTION OPERATIONS.
8.) THE MAXIMUM ALLOWABLE GRADING SLOPE FOR ANY PORTION OF THIS PROJECT SHALL NOT EXCEED 3:1 UNLESS NOTED OTHERWISE.

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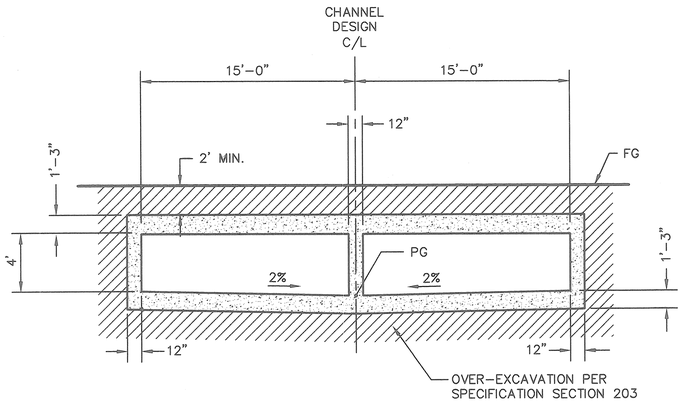
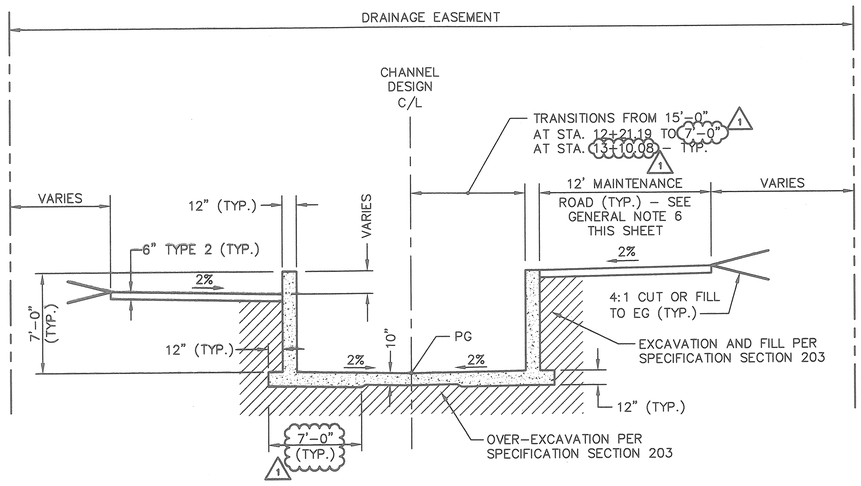
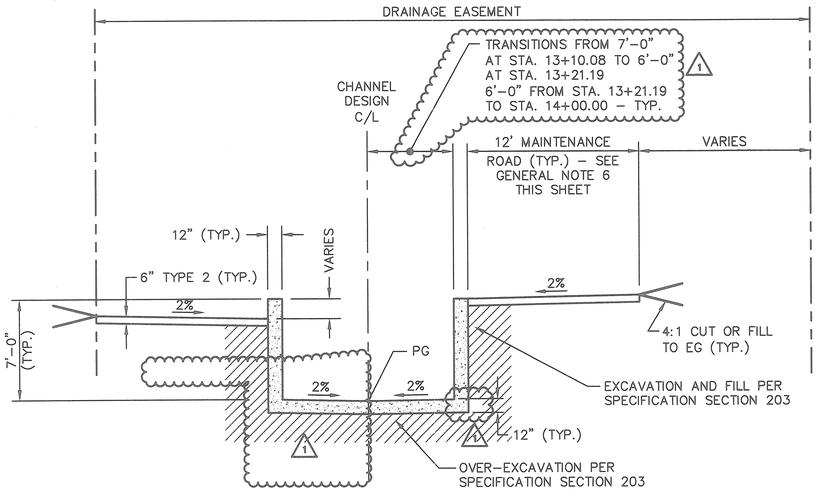


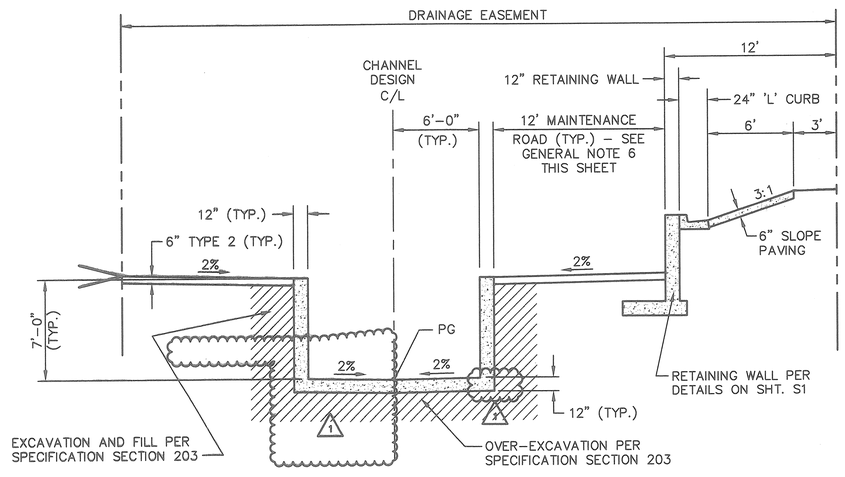
1 XS1 SECTIONAL ELEVATION STA. 10+00.00 TO STA. 12+21.19
SCALE: 1"=5'



2 XS1 SECTIONAL ELEVATION STA. 12+21.19 TO STA. 13+10.08
SCALE: 1"=5'



3 XS1 SECTIONAL ELEVATION STA. 13+10.08 TO STA. 14+00.00
SCALE: 1"=5'



4 XS1 SECTIONAL ELEVATION STA. 14+00.00 TO STA. 19+00.00
SCALE: 1"=5'

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

NO.	DESCRIPTION	DATE	BY
1	REVISED PER ADDENDUM NO. 3	1/03/2004	VTN
2	RECORD DRAWING INFORMATION AS PROVIDED BY CAPRIATI CONSTRUCTION	6/30/2005	DRF
3			
4			
5			

SCALE: 1"=5'
DESIGN: DJB
DRAWN: DJB
CHECKED: JNG
APPROVED: KDG
DATE: 1/03/2004

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LAS VEGAS, NEVADA 89146-5148
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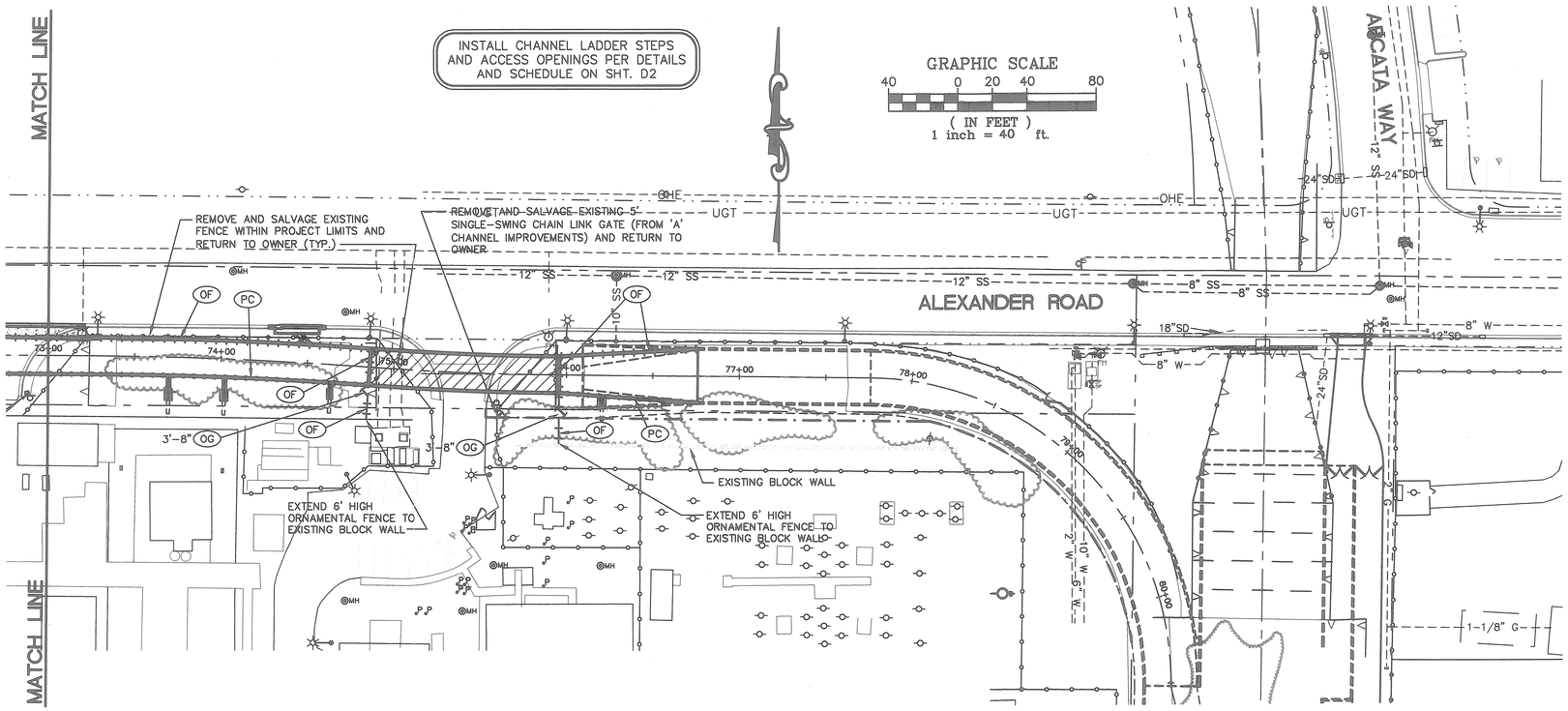
FAX (702) 362-2927

(DRAWING TITLE) STATION-TO-STATION SECTIONS
(PROJECT TITLE) ALEXANDER CHANNEL
(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR – JUNE 2005

SHEET NO.
XS1
OF 46 SHEETS



FENCE AND GATE KEY LEGEND

(PC) INSTALL POST & CABLE RAILING ALONG VERTICAL CHANNEL WALLS AND HEADWALL PER DETAILS ON SHT. D2

(OF) INSTALL 6' HIGH ORNAMENTAL FENCE PER DETAILS ON SHT. D5

3'-8" (OG) INSTALL 3'-8" WIDE x 6' HIGH ORNAMENTAL GATE PER DETAILS ON SHT. D5 (TYP.)

9'-6" (OG) INSTALL 9'-6" WIDE x 6' HIGH ORNAMENTAL GATE PER DETAILS ON SHT. D5 (TYP.)

AVOID OVERHEAD POWER LINE CONTACT. IT'S COSTLY
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CITY OF NORTH LAS VEGAS - DEPARTMENT OF PUBLIC WORKS - ENGINEERING SERVICES DIVISION

REVISIONS			
NO.	DESCRIPTION	DATE	BY
△			
△			
△			
△ 1	RECORD DRAWING INFORMATION AS PROVIDED BY CONTRACT CONSTRUCTION	6/30/2005	DRF

SCALE: 1"=40'
DESIGN: DJB
DRAWN: DJB
CHECKED: JNG
APPROVED: KDG
DATE: 12/31/2003

ORIGINAL CONSTRUCTION DRAWINGS ARE ON FILE WITH THE CITY OF NORTH LAS VEGAS. THE DOCUMENTS WERE SEALED ON 12/31/03 BY KEN D. COLBURN UNDER LICENSE NO. 9177

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PHONE (702) 362-2600
FAX (702) 362-2597

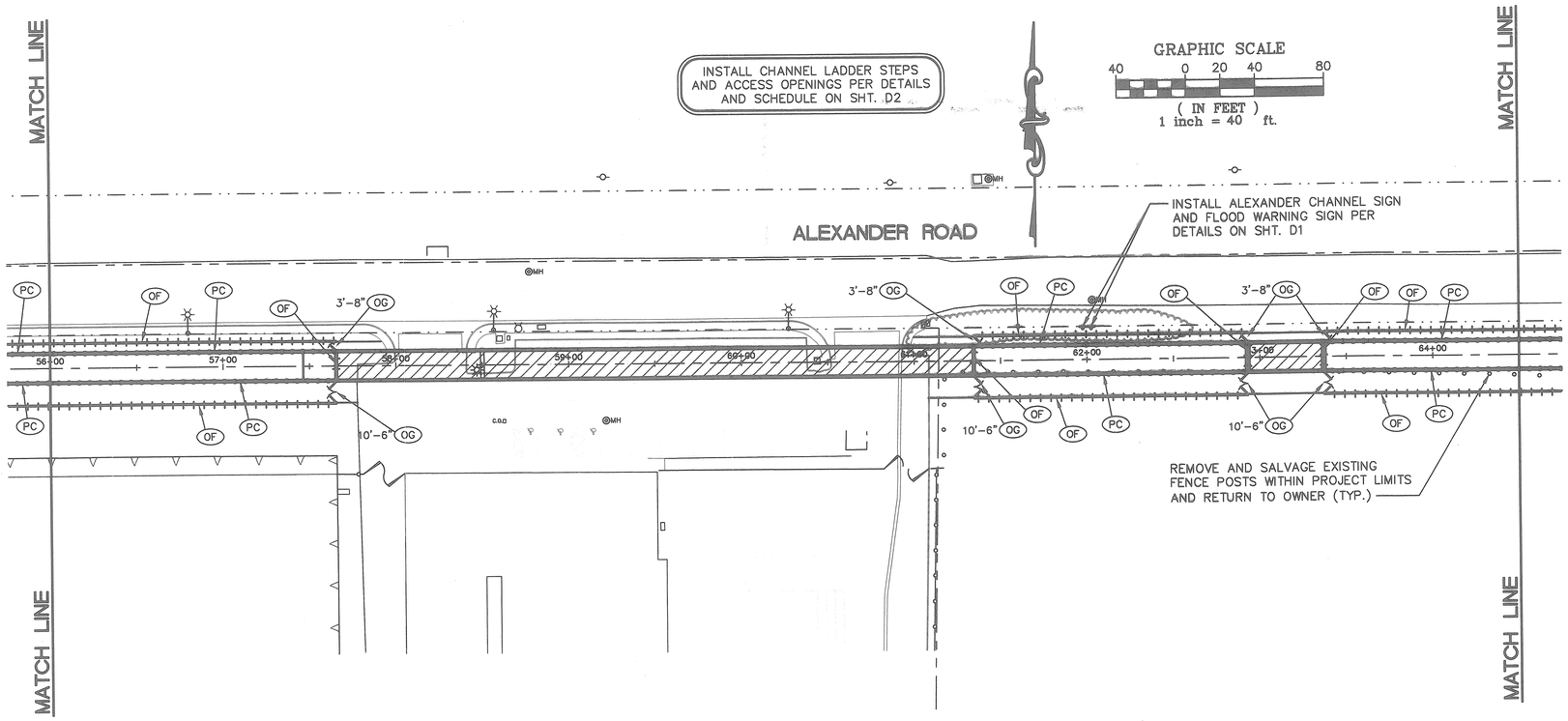
(DRAWING TITLE) FENCING & SIGN PLAN - STA. 70+50 TO PROJECT END

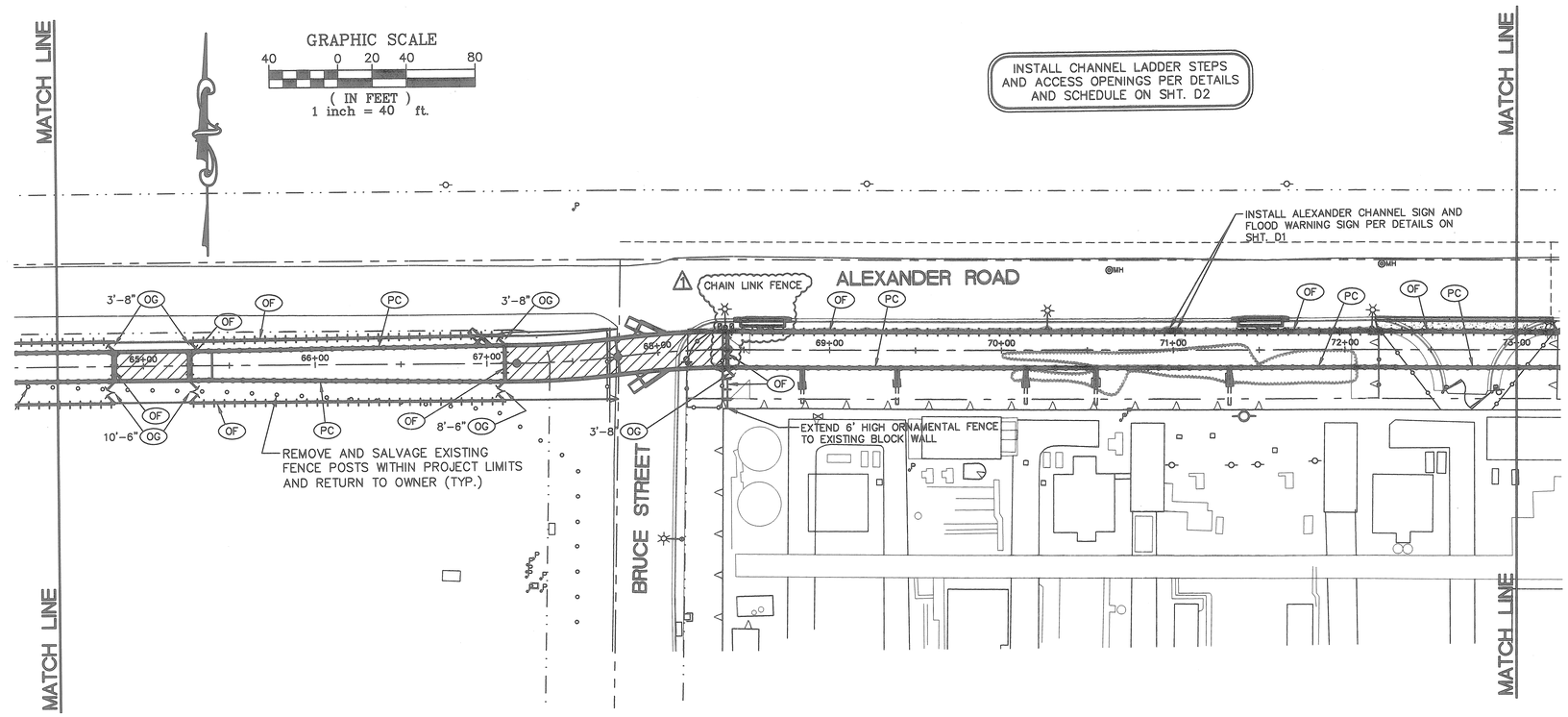
(PROJECT TITLE) ALEXANDER CHANNEL

(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

SHEET NO.
F5
OF 46 SHEETS

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR - JUNE 2005





FENCE AND GATE KEY LEGEND

- (PC) INSTALL POST & CABLE RAILING ALONG VERTICAL CHANNEL WALLS AND HEADWALL PER DETAILS ON SHT. D2
- (OF) INSTALL 6' HIGH ORNAMENTAL FENCE PER DETAILS ON SHT. D5
- 3'-8" (OG) INSTALL 3'-8" WIDE x 6' HIGH ORNAMENTAL GATE PER DETAILS ON SHT. D5 (TYP.)
- 8'-6" (OG) INSTALL 8'-6" WIDE x 6' HIGH ORNAMENTAL GATE PER DETAILS ON SHT. D5 (TYP.)
- 9'-6" (OG) INSTALL 9'-6" WIDE x 6' HIGH ORNAMENTAL GATE PER DETAILS ON SHT. D5 (TYP.)
- 10'-6" (OG) INSTALL 10'-6" WIDE x 6' HIGH ORNAMENTAL GATE PER DETAILS ON SHT. D5 (TYP.)

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UNDERGROUND SERVICE (USA)

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

NO.	DESCRIPTION	DATE	BY
1	RECORD DRAWING INFORMATION AS PROVIDED BY CONTRACT CONSTRUCTION	6/30/2005	DRF

SCALE: 1"=40'
DESIGN: DJB
DRAWN: DJB
CHECKED: JNG
APPROVED: KDG
DATE: 12/31/2003

ORIGINAL CONSTRUCTION DRAWINGS ARE ON FILE WITH THE CITY OF NORTH LAS VEGAS. THE DOCUMENTS WERE SEALED ON 12/31/03 BY KEN D. GILLMETH UNDER LICENSE NO. 9177

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LAND SURVEYORS
2727 SOUTH RAINBOW BOULEVARD
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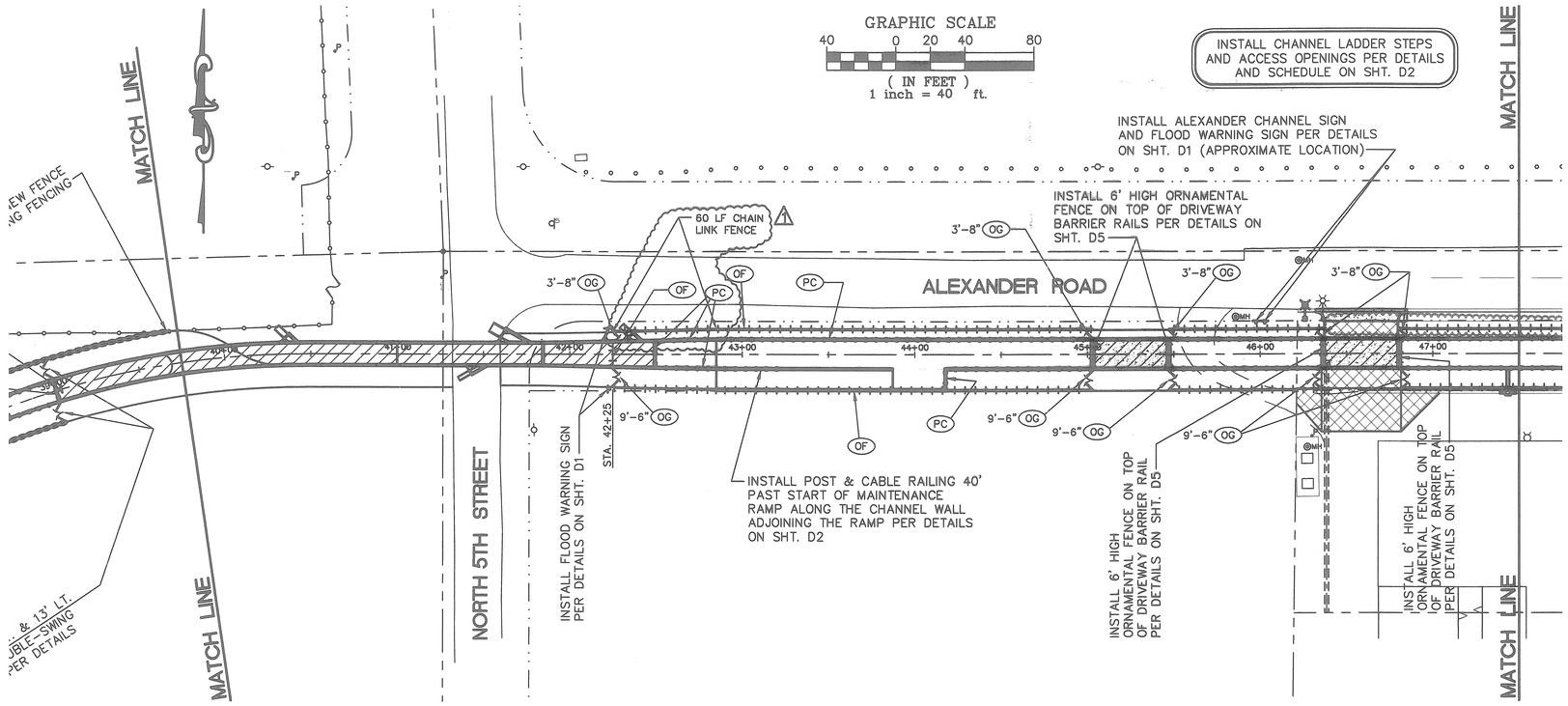
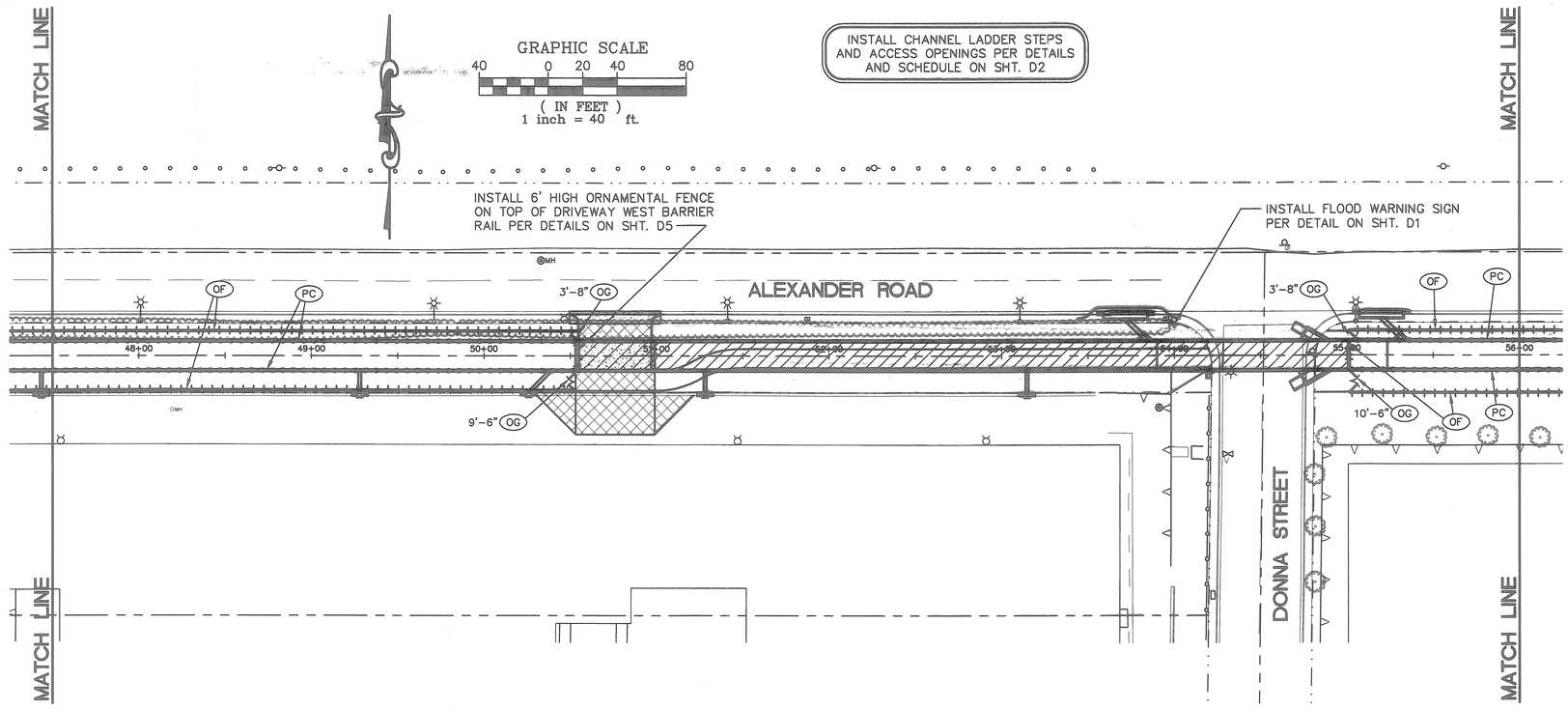
PHONE (702) 873-7550
FAX (702) 362-2597

(DRAWING TITLE) FENCING & SIGN PLAN - STA. 70+50 TO PROJECT END
(PROJECT TITLE) ALEXANDER CHANNEL
(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

SHEET NO. F4 OF 46 SHEETS

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR - JUNE 2005





FENCE AND GATE KEY LEGEND

- (PC) INSTALL POST & CABLE RAILING ALONG VERTICAL CHANNEL WALLS AND HEADWALL PER DETAILS ON SHT. D2
- (OF) INSTALL 6' HIGH ORNAMENTAL FENCE PER DETAILS ON SHT. D5
- 3'-8" (OG) INSTALL 3'-8" WIDE x 6' HIGH ORNAMENTAL GATE PER DETAILS ON SHT. D5 (TYP.)
- 9'-6" (OG) INSTALL 9'-6" WIDE x 6' HIGH ORNAMENTAL GATE PER DETAILS ON SHT. D5 (TYP.)
- 10'-6" (OG) INSTALL 10'-6" WIDE x 6' HIGH ORNAMENTAL GATE PER DETAILS ON SHT. D5 (TYP.)

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

REVISIONS			
NO.	DESCRIPTION	DATE	BY
△			
△			
△			
△1	RECORD DRAWING INFORMATION AS PROVIDED BY CAPRIATI CONSTRUCTION	6/30/2005	DRF

SCALE: 1"=40'
DESIGN: DJB
DRAWN: DJB
CHECKED: JNG
APPROVED: KDG
DATE: 12/31/2003

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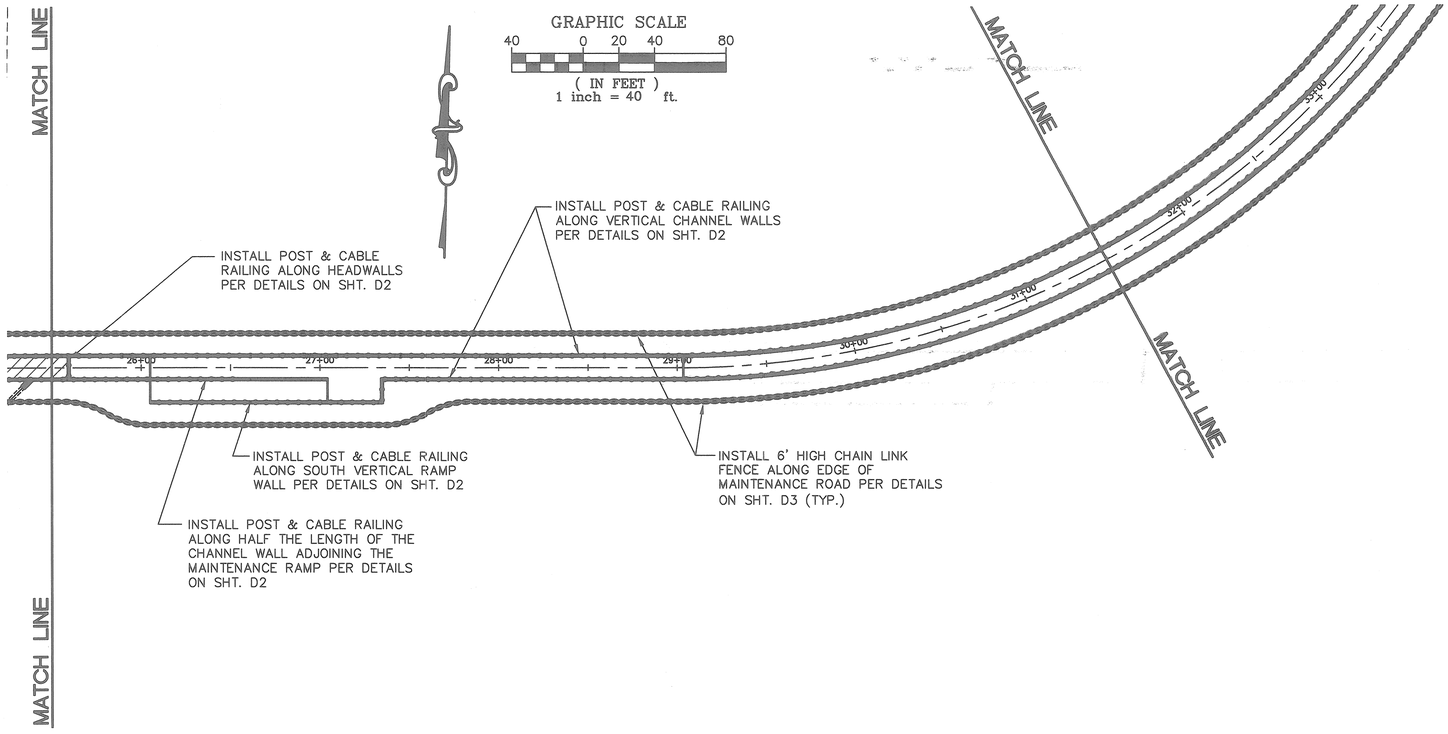
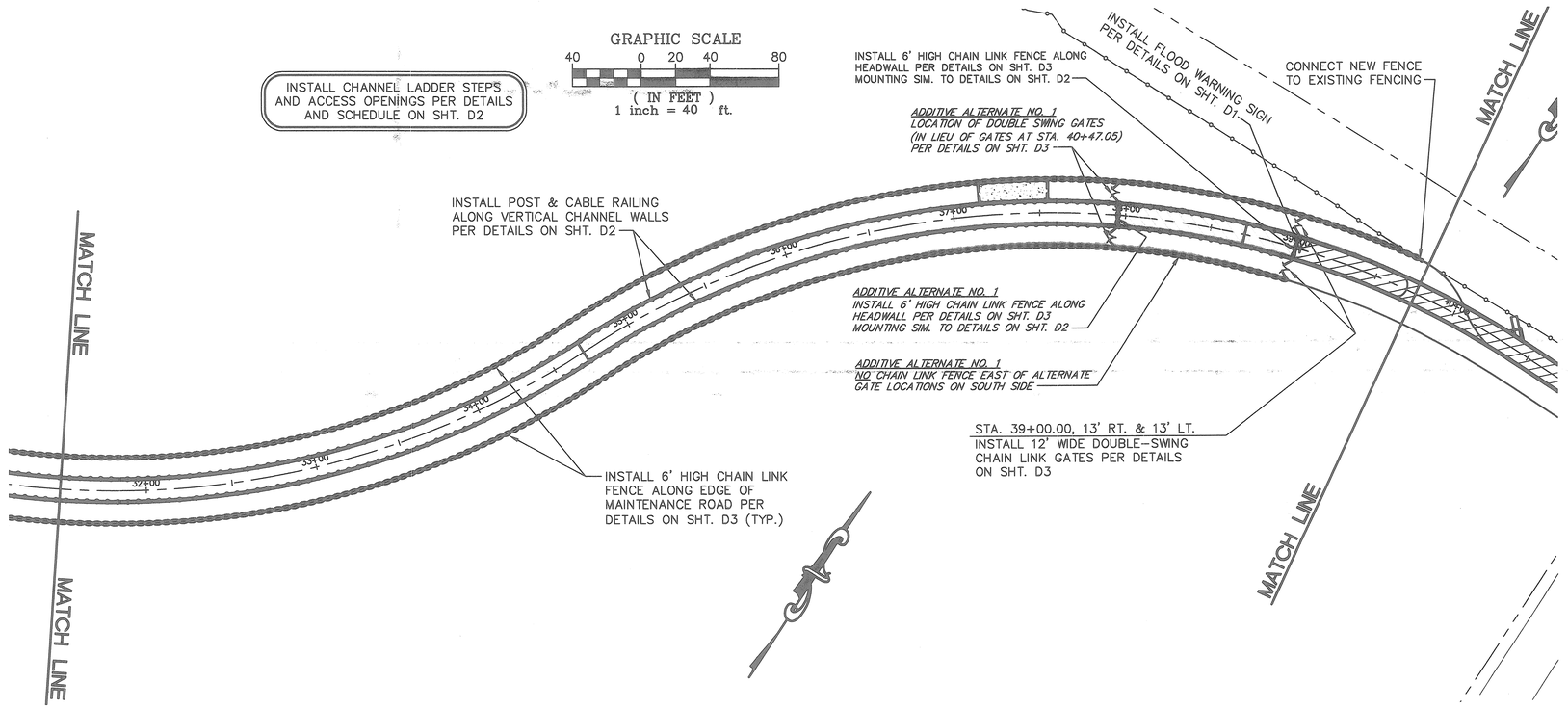
FAX (702) 382-2897

(DRAWING TITLE) FENCING & SIGN PLAN - STA. 48+50 TO STA. 70+50
(PROJECT TITLE) ALEXANDER CHANNEL
(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR - JUNE 2005

SHEET NO.
F3
OF 46 SHEETS





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UNDERGROUND SERVICE (USA)

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

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CHECKED: JNG
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DATE: 12/31/2003

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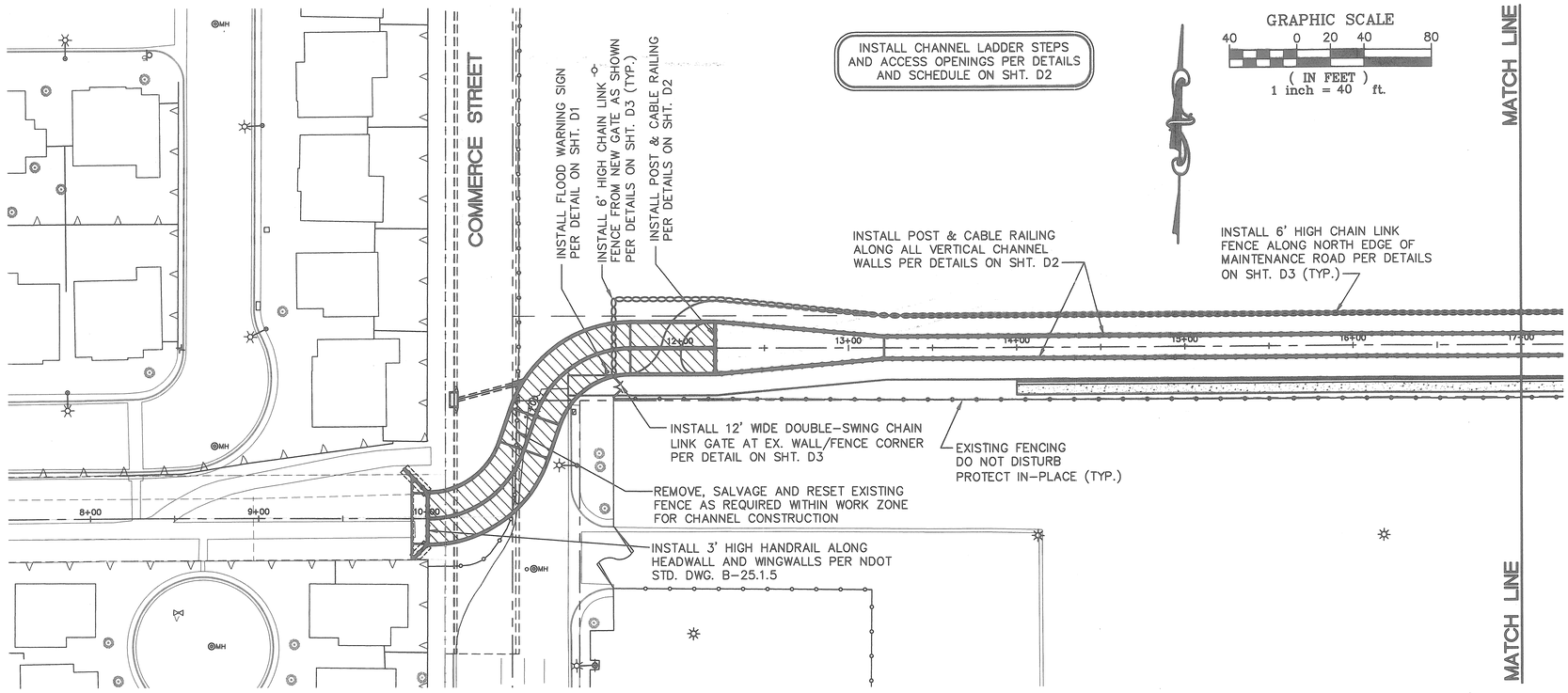
(DRAWING TITLE) FENCING & SIGN PLAN - STA. 29+50 TO STA. 48+50

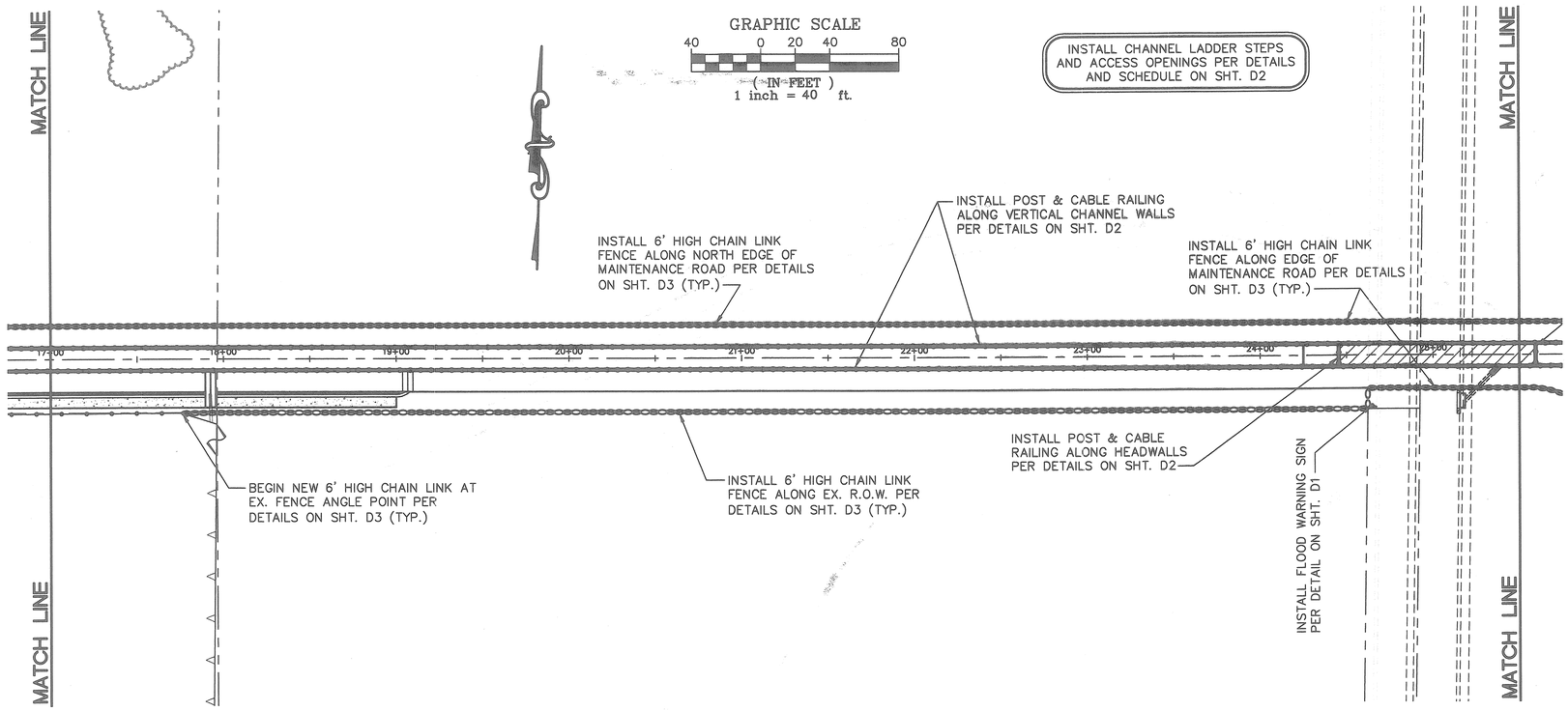
(PROJECT TITLE) ALEXANDER CHANNEL

(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

SHEET NO. F2 OF 46 SHEETS

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR - JUNE 2005





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

REVISIONS

NO.	DESCRIPTION	DATE	BY
△			
△			
△			
△			
△ 1	RECORD DRAWING INFORMATION AS PROVIDED BY CAPRIATI CONSTRUCTION	6/30/2005	DRF
△			

SCALE: 1"=40'
DESIGN: DJB
DRAWN: DJB
CHECKED: JNG
APPROVED: KDG
DATE: 12/31/2003

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(DRAWING TITLE) FENCING & SIGN PLAN - PROJECT START TO STA. 29+50
(PROJECT TITLE) ALEXANDER CHANNEL
(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

SHEET NO.
F1
OF 46 SHEETS

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR - JUNE 2005

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UNDERGROUND SERVICE (USA)

GRAPHIC SCALE

10 0 5 10 20 40

(IN FEET)
1 inch = 10 ft.

ALEXANDER ROAD

CONSTRUCT 21' MODIFIED TYPE 'C' D.I. PER DETAILS ON SHT. D4

REFER TO SHEETS CH1 THROUGH CH9 FOR CHANNEL DESIGN, GRADING AND EXISTING UTILITIES

EXISTING CURB, GUTTER AND SIDEWALK RECONSTRUCT AS REQUIRED

STA. 71+50.67, 14.33' LT.
24" INV. OUT
= 1913.63

6.13'±

INSTALL 6.13± L.F.
24" RCP @ 25.00%

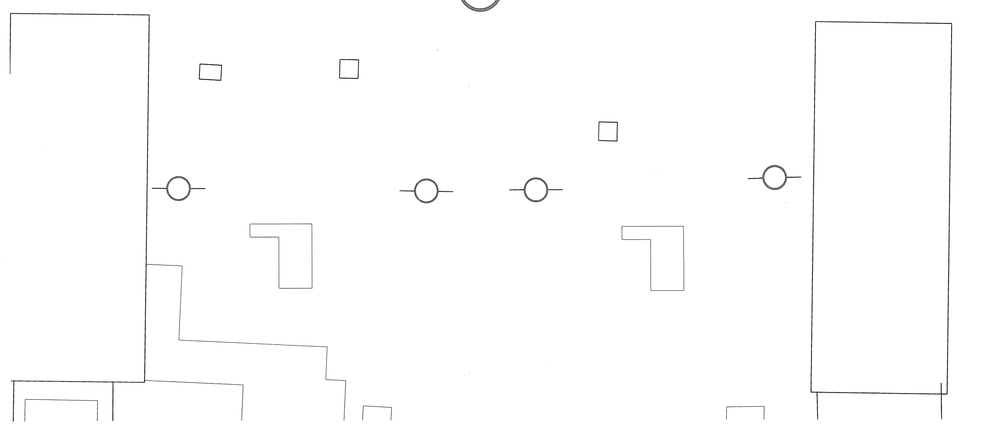
45°

71+00

72+00

STA. 71+55.00, 10.00' LT.
24" INV. IN=1912.10

STORM DRAIN LATERAL EXTENSION
REFER TO SHEET CH8



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UNDERGROUND SERVICE (USA)

GRAPHIC SCALE

10 0 5 10 20 40

(IN FEET)
1 inch = 10 ft.

ALEXANDER ROAD

CONSTRUCT 21' MODIFIED TYPE 'C' D.I. PER DETAILS ON SHT. D4

REFER TO SHEETS CH1 THROUGH CH9 FOR CHANNEL DESIGN, GRADING AND EXISTING UTILITIES

EXISTING CURB, GUTTER AND SIDEWALK RECONSTRUCT AS REQUIRED

STA. 74+43.05, 17.01' LT.
24" INV. OUT
= 1913.18

9.90'±

INSTALL 9.90± L.F.
24" RCP @ 25.00%
PER DETAILS ON SHT. S4

45°

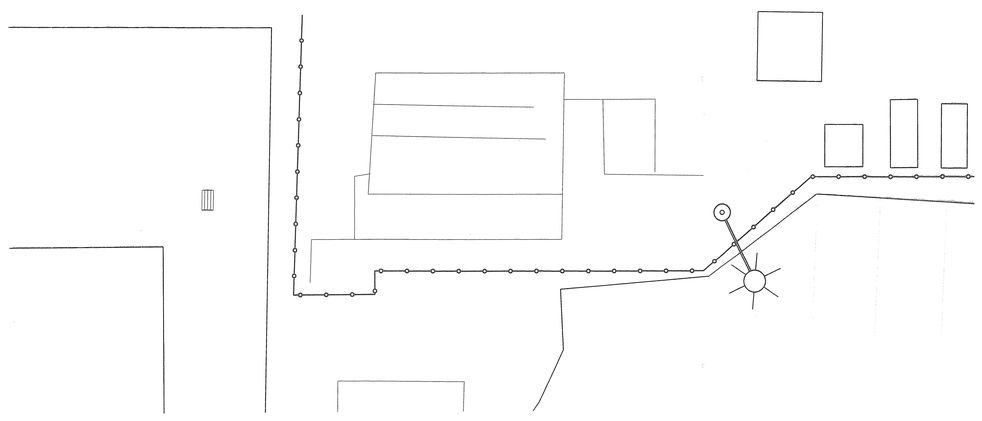
74+00

PRC=74+85.53

75+00

STA. 74+50.00, 10.00' LT.
24" INV. IN=1910.70

STORM DRAIN LATERAL EXTENSION
REFER TO SHEET CH8



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

REVISIONS			
NO.	DESCRIPTION	DATE	BY
1			
2			
3	RECORD DRAWING INFORMATION AS PROVIDED BY CAPRIATI CONSTRUCTION	6/30/2005	DRF

SCALE: 1"=10'
DESIGN: DJB
DRAWN: DJB
CHECKED: JNG
APPROVED: KDG
DATE: 12/31/2003

ORIGINAL CONSTRUCTION DRAWINGS ARE ON FILE WITH THE CITY OF NORTH LAS VEGAS. THE DOCUMENTS WERE SEALED ON 12/24/03 BY KEN D. GILSWORTH UNDER LICENSE NO. 9177

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LAS VEGAS, NEVADA 89146-5148
PHONE (702) 822-3500
FAX (702) 382-2597

(DRAWING TITLE) STORM DRAIN DETAILED PLAN VIEW

(PROJECT TITLE) ALEXANDER CHANNEL IMPROVEMENTS

(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

SHEET NO.
SD4
OF 46 SHEETS

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR - JUNE 2005

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UNDERGROUND SERVICE (USA)

REFER TO SHEETS CH1 THROUGH CH9 FOR CHANNEL DESIGN, GRADING AND EXISTING UTILITIES

ALEXANDER ROAD

BRUCE STREET

BRICK & MORTAR PLUG PER DETAIL ON SHT. D1 60" INV. = 1917.94

INSTALL 36" x 8' RCP STUB @ 25.00% PER DETAILS ON SHT. S4

13.37'

6'

FUTURE CURB, GUTTER AND SIDEWALK – TYP.

FUTURE 21' MODIFIED TYPE 'C' D.I.

EXISTING R.O.W.

5' ACCESS BENCH

FUTURE 36" RCP STORM DRAIN

45°

STA. 67+00.00, 10.00' LT. 36" INV. IN = 1914.60

67+00

PC = 67+17.46

MAINTENANCE ROAD

FUTURE 60" RCP STORM DRAIN

R=50'

BRICK & MORTAR PLUG PER DETAIL ON SHT. D1 60" INV. = 1914.18

PRC = 67+76.53

68+00

30°

INSTALL 60" x 8' RCP STUB @ 2.0% PER DETAILS ON SHT. S4

18.88'

8'

EX. STREET LIGHT – REMOVE AND RESET TO ORIGINAL CONDITION AND LOCATION AS REQUIRED FOR CHANNEL CONSTRUCTION

STA. 68+00.00, 10.00' LT. 60" INV. IN = 1913.80

CONSTRUCT 21' MODIFIED TYPE 'C' D.I. PER DETAILS ON SHT. D4

INSTALL 5.75 L.F. 36" RCP @ 25.00%

STA. 68+60.94 14.06' LT. 36" INV. OUT = 1914.94

5.75'

EXISTING CURB, GUTTER AND SIDEWALK RECONSTRUCT AS REQUIRED

45°

STA. 68+65.00, 10.00' LT. 36" INV. IN = 1913.50

69+00

PT = 68+41.00

STORM DRAIN LATERAL EXTENSION REFER TO SHEET CH8

EX. STOP SIGN – REMOVE AND RESET TO ORIGINAL CONDITION AND LOCATION AS REQUIRED FOR CHANNEL CONSTRUCTION

BRICK & MORTAR PLUG PER DETAIL ON SHT. D1 60" INV. = 1914.20

8'

19.84'

INSTALL 60" x 8' RCP STUB @ 2.0% PER DETAILS ON SHT. S4

STA. 68+00.00, 10.00' RT. 60" INV. IN = 1913.80

FUTURE 60" RCP STORM DRAIN

R=50'

GRAPHIC SCALE

10 0 5 10 20 40

(IN FEET)

1 inch = 10 ft.

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

NO.	DESCRIPTION	DATE	BY
1	RECORD DRAWING INFORMATION AS PROVIDED BY CAPRATI CONSTRUCTION	6/30/2005	DRF

SCALE: 1"=10'
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LAS VEGAS, NEVADA 89146-5148
PHONE (702) 362-7520
FAX (702) 362-2797

(DRAWING TITLE) STORM DRAIN DETAILED PLAN VIEW

(PROJECT TITLE) ALEXANDER CHANNEL IMPROVEMENTS

(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR – JUNE 2005

SHEET NO.

SD3

OF 46 SHEETS

REFER TO SHEETS CH1 THROUGH CH9 FOR CHANNEL DESIGN, GRADING AND EXISTING UTILITIES

EXISTING STREET LIGHT – PROTECT IN–PLACE OR SALVAGE AND RESET TO ORIGINAL CONDITION AND LOCATION IF REQUIRED FOR CONSTRUCTION (NOT A PAYABLE ITEM)

ALEXANDER ROAD

INSTALL 15.13± L.F. 24" RCP STUB @ 25.00% PER DETAILS ON SHT. S4

RE–ROUTE EXISTING FIBER–OPTIC CONDUIT WITH NEW CONDUIT 2' IN FRONT OF EXISTING LIP OF GUTTER FOR DROP INLET INSTALLATION

CONSTRUCT 21' MODIFIED TYPE 'C' D.I. PER DETAILS ON SHT. D4

STA. 53+71.71, 21.29' LT.
INV. OUT=1935.10

18.79'±

13.86'±

EXISTING CURB, GUTTER AND SIDEWALK – TYP.

EXISTING R.O.W.

45°

54+00

11' MAINTENANCE ROAD

STA. 53+85.00, 8.0' LT.
24" INV. IN = 1930.40

STA. 54+21.40
HORIZ. ANGLE PT.

SSMH

BRICK & MORTAR PLUG PER DETAIL ON SHT. D1
INV. = 1929.63

FUTURE 48" RCP STORM DRAIN

INSTALL 48" x 8' RCP STUB @ 2.0% PER DETAILS ON SHT. S4

8'

18.45'

R=25'

INSTALL 15.80± L.F. 24" RCP @ 22.80% PER DETAILS ON SHT. S4

CONSTRUCT 21' MODIFIED TYPE 'C' D.I. PER DETAILS ON SHT. D4

19.30'±

14.36'±

STA. 55+19.85, 21.64' LT.
INV. OUT=1933.40

EXISTING CURB, GUTTER AND SIDEWALK PROTECT IN–PLACE

5' ACCESS BENCH

30°

45°

STA. 54+85.00, 8.0' LT.
INV. IN = 1929.26

STA. 55+01.66
HORIZ. ANGLE PT.

55+00

STA. 55+33.50, 8.0' LT.
24" INV. IN = 1929.0

STA. 54+85.00, 8.0' RT.
INV. IN = 1928.67

30°

12' MAINTENANCE ROAD

STA. 54+19.79, 11.5' RT. INSTALL MOD. N.D.O.T. TYPE 2A DROP INLET
GRATE ELEV. = 1939.00
18" INV. OUT = 1932.00

SSMH

10"W

INSTALL 18" x 2.5' RCP STUB @ 25.00% SHL. TO DETAILS ON SHT. S4

RELOCATE EXISTING STREET LIGHT 4' TO THE SOUTH AS REQUIRED FOR CHANNEL CONSTRUCTION

FUTURE CURB, GUTTER AND SIDEWALK – TYP.

BRICK & MORTAR PLUG PER DETAIL ON SHT. D1
INV. = 1929.06

R=25'

8'

19.46'

INSTALL 60" x 8' RCP STUB @ 2.0% PER DETAILS ON SHT. S4

DONNA STREET

30.00'

8"SS

AVOID OVERHEAD POWER LINE CONTACT. IT'S COSTLY
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1–702–593–6111
NEVADA POWER ENVIRONMENT AND SAFETY SERVICES DEPARTMENT

AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY.
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UNDERGROUND SERVICE (USA)

GRAPHIC SCALE
10 0 5 10 20 40
(IN FEET)
1 inch = 10 ft.

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

REVISIONS			
NO.	DESCRIPTION	DATE	BY
1			
2			
3			
4	RECORD DRAWING INFORMATION AS PROVIDED BY CAPRIATI CONSTRUCTION	6/30/2005	DRF

SCALE: 1"=10'
DESIGN: DJB
DRAWN: DJB
CHECKED: JNG
APPROVED: KDG
DATE: 12/31/2003

ORIGINAL CONSTRUCTION DRAWINGS ARE ON FILE WITH THE CITY OF NORTH LAS VEGAS. THE DOCUMENTS WERE SEALED ON 12/5/06 BY KEN D. GILSDORF UNDER LICENSE NO. 9177

vtn nevada
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• LAND SURVEYORS
2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146–5148
PHONE (702) 892–7550
FAX (702) 362–2597

(DRAWING TITLE) STORM DRAIN DETAILED PLAN VIEW

(PROJECT TITLE) ALEXANDER CHANNEL IMPROVEMENTS

(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

SHEET NO. SD2

OF 46 SHEETS

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR – JUNE 2005

REFER TO SHEETS CH1 THROUGH CH9 FOR CHANNEL DESIGN, GRADING AND EXISTING UTILITIES

GRAPHIC SCALE

(IN FEET)
1 inch = 10 ft.

SECTION LINE

ALEXANDER ROAD

40.00'

INSTALL 36" x 8' RCP STUB @ 25.00% PER DETAILS ON SHT. S4

FUTURE CURB, GUTTER AND SIDEWALK – TYP.

FUTURE 21' MODIFIED TYPE 'C' D.I.

13.42'

8'

FUTURE 36" RCP STORM DRAIN

45°

40+00

STA. 40+40.00, 6.00' LT.
36" INV. IN = 1951.70

BRICK & MORTAR PLUG PER DETAIL ON SHT. D1
36" INV. = 1955.06

PT=40+47.05

FUTURE 60" RCP STORM DRAIN

BRICK & MORTAR PLUG PER DETAIL ON SHT. D1
60" INV. = 1949.89

INSTALL 60" x 8' RCP STUB @ 2.0% PER DETAILS ON SHT. S4

8'

19.46'

30°

41+00

STA. 41+71.50, 6.00' LT.
60" INV. IN = 1949.50

12' MAINTENANCE ROAD

30°

8'

16.43'

STA. 41+50.00, 6.00' RT.
24" INV. IN = 1949.86

FUTURE 24" RCP STORM DRAIN

INSTALL 24" x 8' RCP STUB @ 2.0% PER DETAILS ON SHT. S4

BRICK & MORTAR PLUG PER DETAIL ON SHT. D1
24" INV. = 1950.19

NORTH 5TH STREET

FUTURE CURB, GUTTER AND SIDEWALK – TYP.

FUTURE CURB, GUTTER AND SIDEWALK – TYP.

FUTURE 21' MODIFIED TYPE 'C' D.I.

INSTALL 36" x 8' RCP STUB @ 25.0% PER DETAILS ON SHT. S4

8'

13.29'

R.O.W.

FUTURE 36" RCP STORM DRAIN

5' ACCESS BENCH

45°

42+00

STA. 42+89.50, 7.09' LT.
36" INV. IN = 1948.50

11' MAINTENANCE ROAD

BRICK & MORTAR PLUG PER DETAIL ON SHT. D1
36" INV. = 1954.80

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

REVISIONS			
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2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-5148
PHONE (702) 382-1170
FAX (702) 382-2597

(DRAWING TITLE) STORM DRAIN DETAILED PLAN VIEW

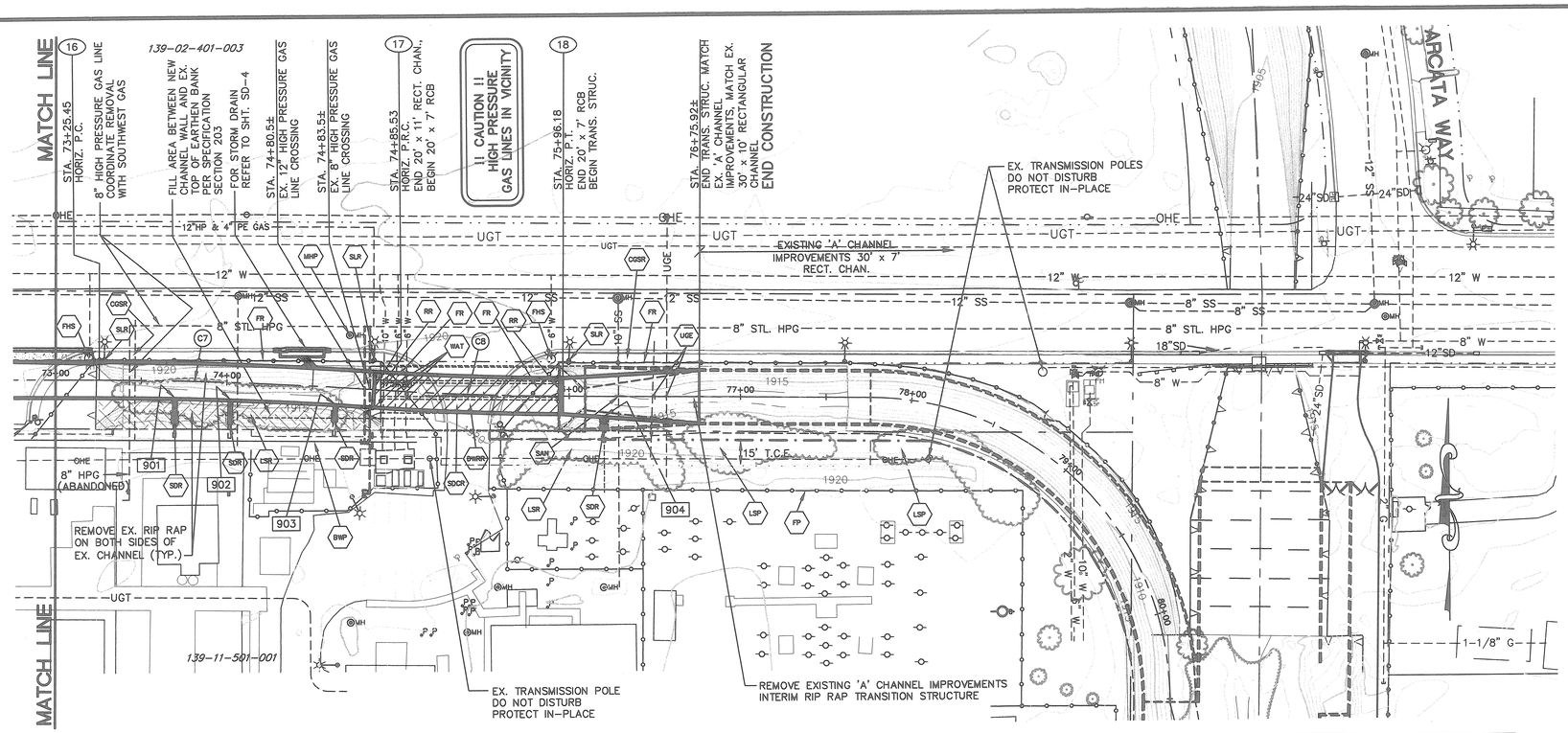
(PROJECT TITLE) ALEXANDER CHANNEL IMPROVEMENTS

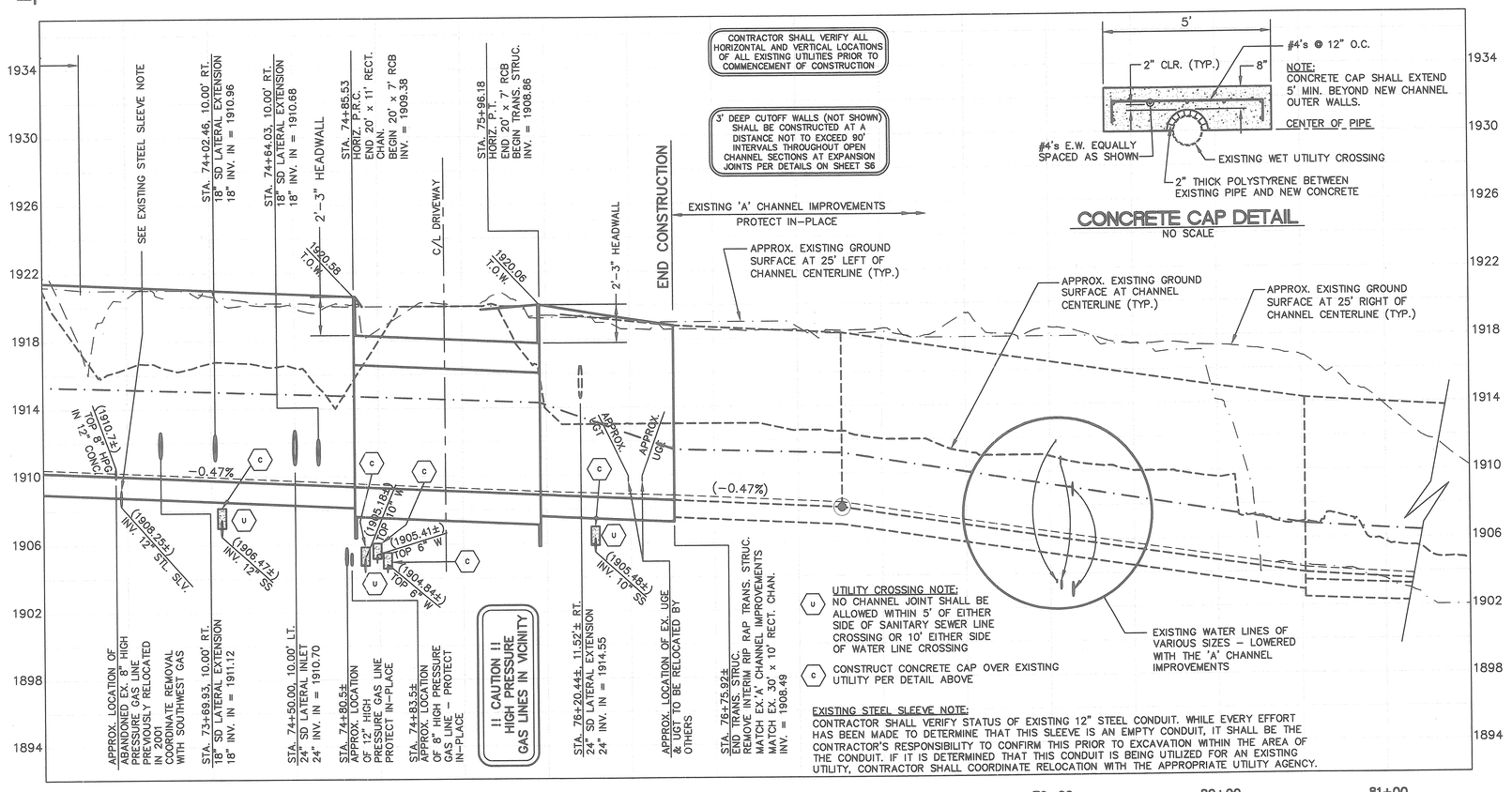
(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

INFORMATION SUPPLIED BY CONTRACTOR – JUNE 2005

RECORD DRAWINGS

SHEET NO.
SD1
OF 46 SHEETS





SEE SPECIFICATION SECTION 203 FOR EXCAVATION AND SUBGRADE REQUIREMENTS

FOR FENCING AND GATING REFER TO SHEETS F1 THROUGH F5

FOR STATION TO STATION SECTIONS REFER TO SHEETS XS1 THROUGH XS10

*CENTERLINE CONTROL COORDINATES

(16) N. 68507.1430, E. 67608.5232

(17) N. 68500.7101, E. 67768.4549

(18) N. 68496.2583, E. 67878.9981

*CENTERLINE CURVE DATA

(C7) R=2600.00'
L=160.09'
Δ=03°31'40"

(C8) R=1800.00'
L=110.65'
Δ=03°31'20"

* CENTERLINE CONTROL IS BASED ON SURVEY DATA PROVIDED BY THE CITY OF NORTH LAS VEGAS. REFER TO SHEETS SC1 AND SC2 FOR SURVEY CONTROL.

EXISTING UTILITY CROSSINGS

(SAN) SANITARY SEWER LINE

(UGE) UGE LINE(S)

(WAT) WATER LINE

RELOCATE EXISTING UTILITY CROSSINGS THAT ARE IN CONFLICT AS REQUIRED FOR CHANNEL CONSTRUCTION. COORDINATE RELOCATIONS WITH APPROPRIATE UTILITY AGENCIES AND PERSONNEL.

CONSTRUCTION NOTES

(BWP) EX. BLOCK WALL – PROTECT IN–PLACE

(CGSR) EX. CURB, GUTTER AND SIDEWALK – CONTRACTOR SHALL REMOVE WITHIN WORK ZONE AND REPLACE TO ORIGINAL GRADES AFTER COMPLETION OF CHANNEL CONSTRUCTION.

(DWRP) EX. DRIVEWAY – REMOVE AND REPLACE TO ORIGINAL GRADES WITH 3" PAVEMENT OVER 12" TYPE II

(FHS) EX. FIRE HYDRANT – RELOCATE TO ORIGINAL CONDITION AND LOCATION

(FP) EX. FENCING – PROTECT IN–PLACE

(FR) EX. FENCING – REMOVE, SALVAGE AND RETURN TO OWNER

(LSP) EX. LANDSCAPING – PROTECT IN–PLACE

(LSR) EX. LANDSCAPING – REMOVE & REPLACE TO ORIGINAL CONDITION AS REQUIRED FOR CHANNEL CONSTRUCTION

(MHP) EX. MANHOLE – PROTECT IN–PLACE

(RR) EX. RAILING – REMOVE

(SDCR) EX. (4) 8'x4' RCB WITH 1.67' CENTER PIERS STORM DRAIN CULVERT – REMOVE CULVERT AND APRONS FOR CHANNEL CONSTRUCTION

(SDR) EX. STORM DRAIN OUTLET. REMOVE CONCRETE STRUCTURE AND FLAP GATES AS REQUIRED FOR LATERAL EXTENSION TO CHANNEL.

(SLR) EX. STREET LIGHT – REMOVE AND RESET TO ORIGINAL CONDITION AND LOCATION AS REQUIRED FOR CHANNEL CONSTRUCTION

ADDITIONAL DESIGN CONTROL

[901] STA. 73+69.93±, 10.00' RT.
C/L 18"x15' RCP EXTENSION INTO NEW CHANNEL

[902] STA. 74+02.46±, 10.00' RT.
C/L 18"x15' RCP EXTENSION INTO NEW CHANNEL

[903] STA. 74+64.03±, 10.00' RT.
C/L 18"x11' RCP EXTENSION INTO NEW CHANNEL

[904] STA. 76+20.44±, 11.52'± RT.
C/L 18"x7' RCP EXTENSION INTO NEW CHANNEL

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NEVADA POWER ENVIRONMENT AND SAFETY SERVICES DEPARTMENT

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UNDERGROUND SERVICE (USA)

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

NO.	DESCRIPTION	DATE	BY
Δ			
Δ			
Δ			
Δ	RECORD DRAWING INFORMATION AS PROVIDED BY CAPRIATI CONSTRUCTION	6/30/2005	DRF

SCALE: 1"=40'
DESIGN: DJB/HT
DRAWN: DJB
CHECKED: JNG
APPROVED: KDG
DATE: 12/31/2003

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PHONE (702) 873-7550
FAX (702) 362-2699

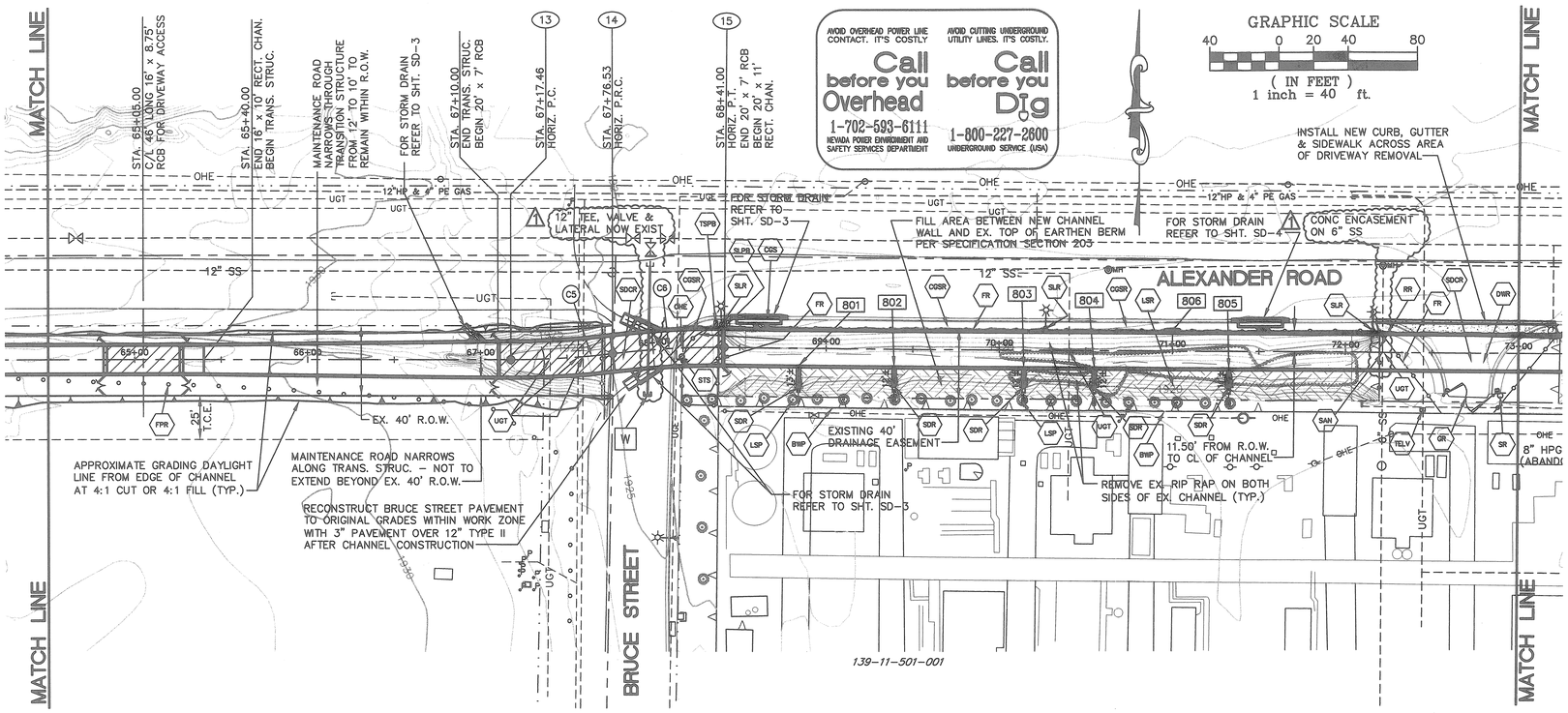
(DRAWING TITLE) PLAN AND PROFILE - STA. 73+00 TO PROJECT END

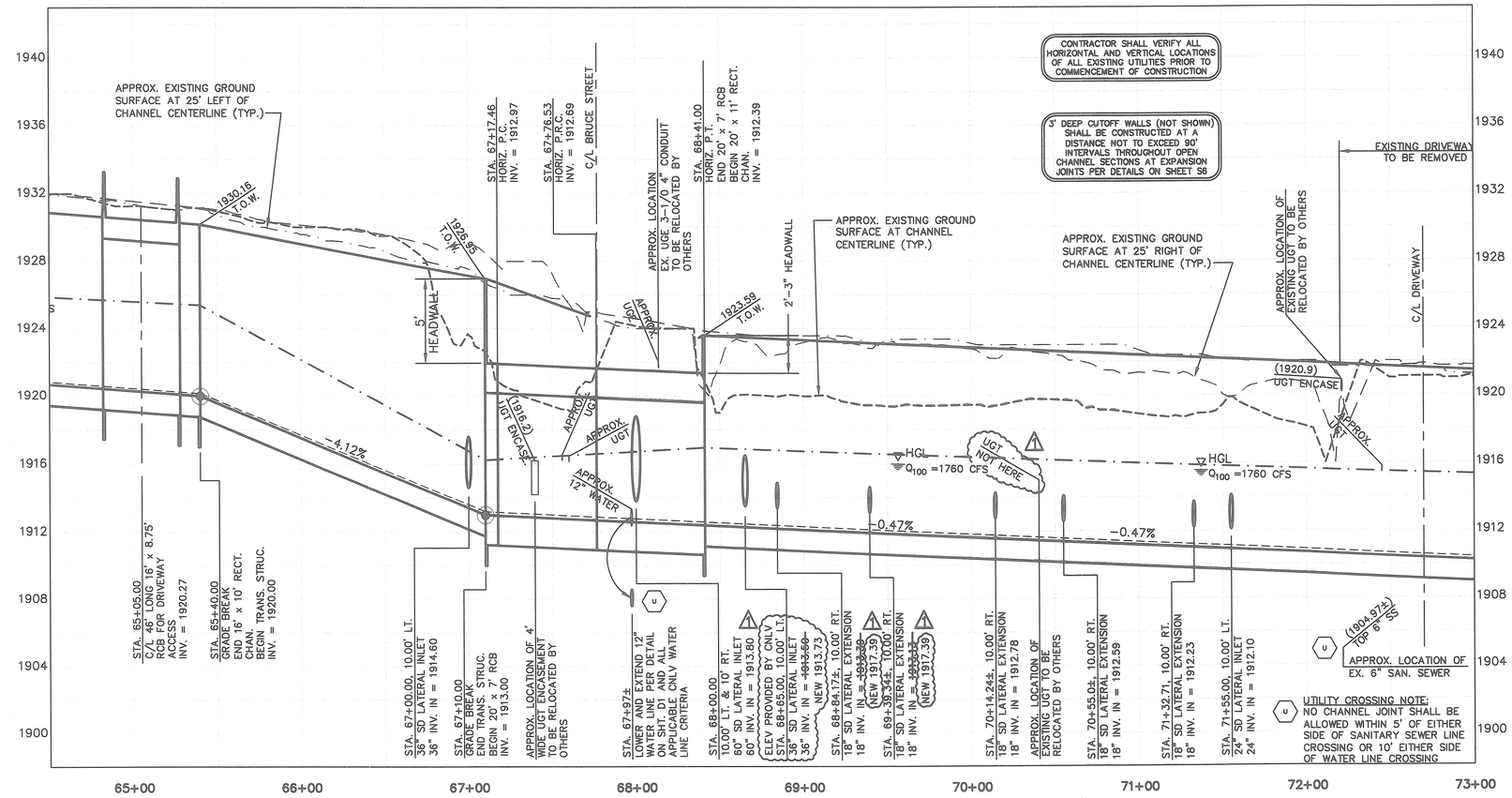
(PROJECT TITLE) ALEXANDER CHANNEL

(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

SHEET NO. CH9 OF 46 SHEETS

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR – JUNE 2005





UTILITY CROSSING NOTE:
NO CHANNEL JOINT SHALL BE ALLOWED WITHIN 5' OF EITHER SIDE OF SANITARY SEWER LINE CROSSING OR 10' EITHER SIDE OF WATER LINE CROSSING

SEE SPECIFICATION SECTION 203 FOR EXCAVATION AND SUBGRADE REQUIREMENTS

FOR FENCING AND GATING REFER TO SHEETS F1 THROUGH F5

FOR STATION TO STATION SECTIONS REFER TO SHEETS XS1 THROUGH XS10

⊕CENTERLINE CONTROL COORDINATES

(13) N. 68504.5911, E. 67000.8458
(14) N. 68508.1583, E. 67059.7692
(15) N. 68511.7040, E. 67124.1007

⊕CENTERLINE CURVE DATA

(CS) R=500.00'
L=59.07'
Δ=06°46'06"

(CS) R=500.00'
L=64.47'
Δ=07°23'17"

* CENTERLINE CONTROL IS BASED ON SURVEY DATA PROVIDED BY THE CITY OF NORTH LAS VEGAS. REFER TO SHEETS SC1 AND SC2 FOR SURVEY CONTROL.

EXISTING UTILITY CROSSINGS

(GAS) GAS LINE(S)
(OHE) OHE LINE(S)
(UGE) UGE LINE(S)
(UGT) UGT LINE(S)
(SAN) SANITARY SEWER LINE

RELOCATE EXISTING UTILITY CROSSINGS THAT ARE IN CONFLICT AS REQUIRED FOR CHANNEL CONSTRUCTION. COORDINATE RELOCATIONS WITH APPROPRIATE UTILITY AGENCIES AND PERSONNEL.

CONSTRUCTION NOTES

(BWP) EX. BLOCK WALL – PROTECT IN–PLACE
(CGS) EX. CURB GUTTER & SIDEWALK – REMOVE AS REQUIRED FOR DROP INLET INSTALLATION
(CGSR) EX. CURB, GUTTER AND SIDEWALK – CONTRACTOR SHALL REMOVE WITHIN WORK ZONE AND REPLACE TO ORIGINAL GRADES AFTER COMPLETION OF CHANNEL CONSTRUCTION.
(DWR) EX. DRIVEWAY – REMOVE CURB, GUTTER, SIDEWALK & PAVEMENT, REPLACE WITH NEW CURB, GUTTER & SIDEWALK FRONTING ALEXANDER
(FPR) EX. FENCE POSTS – REMOVE AS REQUIRED FOR CHANNEL CONSTRUCTION
(FR) EX. FENCING – REMOVE, SALVAGE AND RETURN TO OWNER
(GR) EX. GATE – REMOVE
(LSP) EX. LANDSCAPING – PROTECT IN–PLACE
(LSR) EX. LANDSCAPING – REMOVE & REPLACE TO ORIGINAL CONDITION AS REQUIRED FOR CHANNEL CONSTRUCTION
(RR) EX. RAILING – REMOVE
(SDCR) EX. (4) 8'x4' RCB WITH 1.67' CENTER PIERS STORM DRAIN CULVERT – REMOVE CULVERT AND APRONS FOR CHANNEL CONSTRUCTION
(SDR) EX. STORM DRAIN OUTLET. REMOVE CONCRETE STRUCTURE AND FLAP GATES AS REQUIRED FOR LATERAL EXTENSION TO CHANNEL.
(SLR) EX. STREET LIGHT – REMOVE AND RESET TO ORIGINAL CONDITION AND LOCATION AS REQUIRED FOR CHANNEL CONSTRUCTION
(SR) EX. SIGN – REMOVE
(STS) EX. STOP SIGN – REMOVE AND RESET AS REQUIRED FOR CHANNEL CONSTRUCTION.
(TELV) EXISTING TELEPHONE VAULT – PROTECT IN–PLACE
(TSPB) EXISTING TRAFFIC SIGNAL PULLBOX – PROTECT IN–PLACE
(SLPB) EXISTING STREET LIGHT PULL BOX – PROTECT IN–PLACE

ADDITIONAL DESIGN CONTROL

[801] STA. 68+84.17±, 10.00' RT.
C/L 18"x13' RCP EXTENSION INTO NEW CHANNEL

[802] STA. 69+39.34±, 10.00' RT.
C/L 18"x12' RCP EXTENSION INTO NEW CHANNEL

[803] STA. 70+14.24±, 10.00' RT.
C/L 18"x12' RCP EXTENSION INTO NEW CHANNEL

[804] STA. 70+55.0±, 10.00' RT.
C/L 18"x12' RCP EXTENSION INTO NEW CHANNEL

[805] STA. 71+32.71±, 10.00' RT.
C/L 18"x11' RCP EXTENSION INTO NEW CHANNEL

[806] N. 68520.7650, E. 67383.1932
STA. 71+00,
INSTALL ALEXANDER CHANNEL SIGN & FLOOD WARNING SIGN PER DETAIL ON SHT. D1

[W] LOWER AND EXTEND 12" WATER LINE PER DETAIL ON SHT. D1 AND ALL APPLICABLE CNLV WATER LINE CRITERIA. VERIFY LOCATION, ELEVATION AND SIZE PRIOR TO CONSTRUCTION.

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

REVISIONS			
NO.	DESCRIPTION	DATE	BY
△			
△			
△			
△1	RECORD DRAWING INFORMATION AS PROVIDED BY CAPRIATI CONSTRUCTION	6/30/2005	DRF

SCALE: 1"=40'
DESIGN: DJB/HT
DRAWN: DJB
CHECKED: JNG
APPROVED: KDG
DATE: 12/31/2003

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LAS VEGAS, NEVADA 89146-5148
PHONE (702) 873-7550
FAX (702) 362-2987

(DRAWING TITLE) PLAN AND PROFILE – STA. 64+50 TO STA. 73+00
(PROJECT TITLE) ALEXANDER CHANNEL
(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

SHEET NO. CH8 OF 46 SHEETS

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR – JUNE 2005

!! CAUTION !!
HIGH PRESSURE
GAS LINES IN VICINITY

MATCH LINE

12' WIDE MAINTENANCE ROAD ON SOUTH SIDE OF CHANNEL – 5' ACCESS BENCH ON NORTH SIDE OF CHANNEL U.N.O. (TYP.)

STA. 57+46.45
END 16' x 9.5' RECT. CHAN.
BEGIN WALL HT. TRANS.

STA. 57+65.00
END WALL HT. TRANS.
BEGIN 16' x 7' RCB

12"x6" TEE, VALVE & LATERAL NOW EXIST

LOWERED EXIST SEWER LATERAL FROM 1927.23 TO 1921.73

STA. 61+35.00
END 16' x 7' RCB
BEGIN 16' x 10' RECT. CHAN.

STA. 63+15.00
C/L 46' LONG 16' x 8.75' RCB FOR DRIVEWAY ACCESS

139-02-401-003

OHE
UGT
UGE
12" W
12" SS
PE GAS
12"HP & 4" PE GAS
4" PE GAS
2" PE GAS

56+00 57+00 58+00 59+00 60+00 62+00 63+00 64+00

EXISTING 40' DRAINAGE EASEMENT

12' MAINTENANCE ROAD

21' T.C.E.

APPROXIMATE GRADING DAYLIGHT LINE FROM EDGE OF ROAD AT 4:1 CUT (TYP.)

139-11-102-001

EXISTING 40' DRAINAGE EASEMENT

139-11-102-001

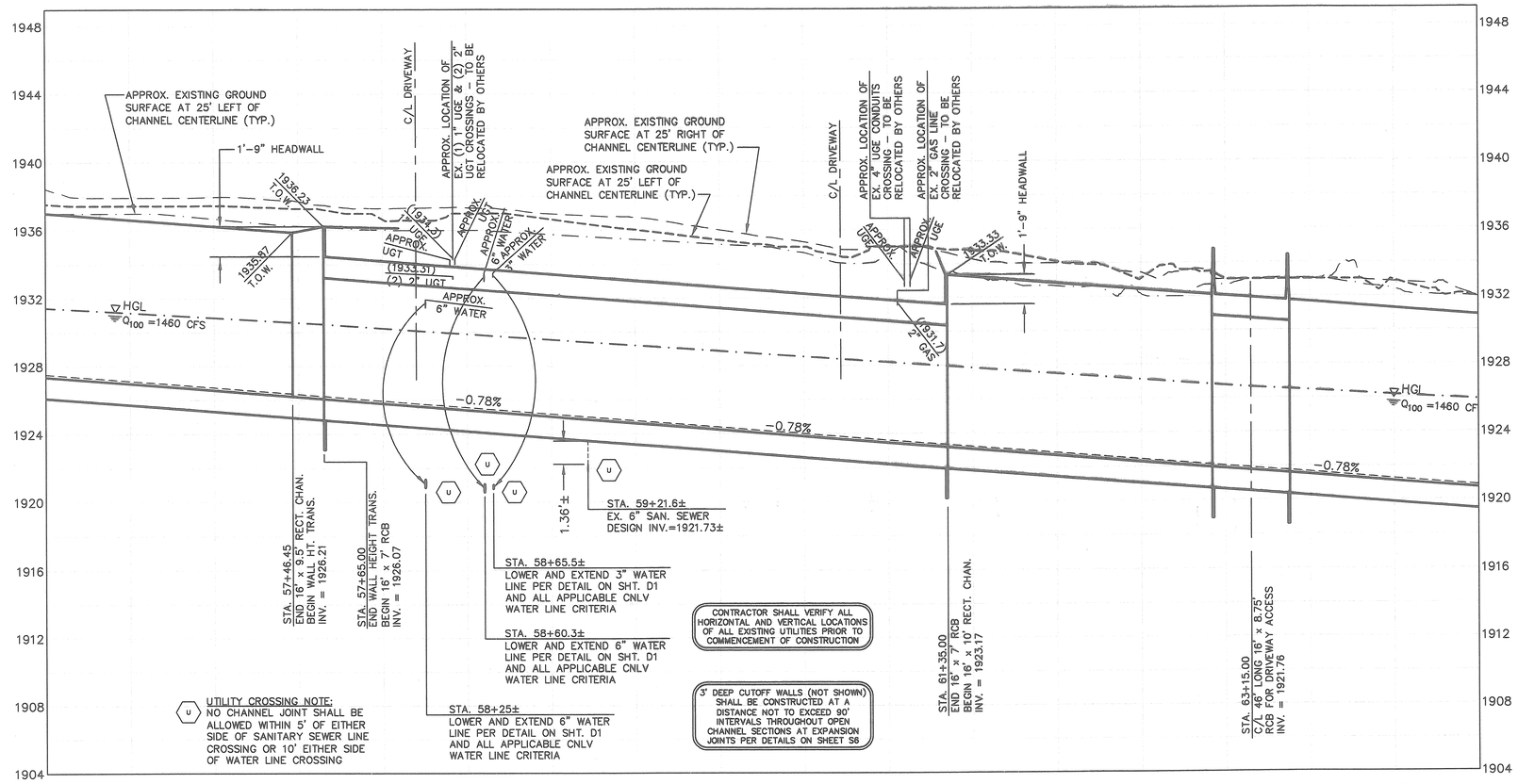
139-11-102-002

40' R.O.W.

25' T.C.E.

12' WIDE MAINTENANCE ROAD ON SOUTH SIDE OF CHANNEL – 5' ACCESS BENCH ON NORTH SIDE OF CHANNEL U.N.O. (TYP.)

GRAPHIC SCALE
40 0 20 40 80
(IN FEET)
1 inch = 40 ft.



U UTILITY CROSSING NOTE:
NO CHANNEL JOINT SHALL BE ALLOWED WITHIN 5' OF EITHER SIDE OF SANITARY SEWER LINE CROSSING OR 10' EITHER SIDE OF WATER LINE CROSSING

CONTRACTOR SHALL VERIFY ALL HORIZONTAL AND VERTICAL LOCATIONS OF ALL EXISTING UTILITIES PRIOR TO COMMENCEMENT OF CONSTRUCTION

3' DEEP CUTOFF WALLS (NOT SHOWN) SHALL BE CONSTRUCTED AT A DISTANCE NOT TO EXCEED 90' INTERVALS THROUGHOUT OPEN CHANNEL SECTIONS AT EXPANSION JOINTS PER DETAILS ON SHEET S6

SEE SPECIFICATION SECTION 203 FOR EXCAVATION AND SUBGRADE REQUIREMENTS

FOR FENCING AND GATING REFER TO SHEETS F1 THROUGH F5

FOR STATION TO STATION SECTIONS REFER TO SHEETS XS1 THROUGH XS10

EXISTING UTILITY CROSSINGS

GAS GAS LINE(S)
OHE OHE LINE(S)
UGE UGE LINE(S)
UGT UGT LINE(S)

RELOCATE EXISTING UTILITY CROSSINGS THAT ARE IN CONFLICT AS REQUIRED FOR CHANNEL CONSTRUCTION. COORDINATE RELOCATIONS WITH APPROPRIATE UTILITY AGENCIES AND PERSONNEL.

CONSTRUCTION NOTES

BPVP EX. BACKFLOW PREVENTION VALVE – PROTECT IN–PLACE
CGSP EX. CURB GUTTER & SIDEWALK – PROTECT IN–PLACE
CGSP EX. CURB, GUTTER AND SIDEWALK – CONTRACTOR SHALL REMOVE WITHIN WORK ZONE AND REPLACE TO ORIGINAL GRADES AFTER COMPLETION OF CHANNEL CONSTRUCTION.
CVP EX. CHECK VALVE – PROTECT IN–PLACE
ETR EX. ELECTRIC TRANSFORMER. TO BE RELOCATED TO THE NORTH SIDE OF THE RCB CHANNEL (BY OTHERS). COORDINATE CHANNEL CONSTRUCTION WITH NEVADA POWER COMPANY.
FHP EX. FIRE HYDRANT – PROTECT IN–PLACE
FPR EX. FENCE POSTS – REMOVE AS REQUIRED FOR CHANNEL CONSTRUCTION
FRR EX. FIRE RISER – REMOVE AND RELOCATE. REINSTALL PER NATIONAL FIRE PROTECTION ASSOCIATION CODE NO. 13, APPENDIX A, FIGURE A–4–14.1.1.8 USE 4" MIN. DIAMETER RISER PIPE. TOP OF RISER TO BE 3' MIN., 4' MAX. ABOVE GROUND SURFACE. INSTALL RISER PER CODE, EXCEPT VAULT NOT REQUIRED. IN LIEU OF VAULT, INSTALL VALVE BOX PER STD. DWG. NO. 517. COORDINATE RELOCATION WITH CNLV UTILITIES DEPT. & FIRE DEPT.
FS EX. FENCE – SALVAGE AND RESET TO ORIGINAL CONDITION. RE–ALIGN PER SHT. F4
LSP EX. LANDSCAPING – PROTECT IN–PLACE
LSR EX. LANDSCAPING – REMOVE & REPLACE TO ORIGINAL CONDITION AS REQUIRED FOR CHANNEL CONSTRUCTION
MHP EX. MANHOLE – PROTECT IN–PLACE
PKR EX. PARKING LOT – RECONSTRUCT TO ORIGINAL GRADES & CONFIGURATION AFTER CHANNEL CONSTRUCTION
PLTS EX. POLE LIGHT – SALVAGE AND REINSTALL TO ORIGINAL CONDITION & LOCATION
PR EX. PAVEMENT – RECONSTRUCT WITH 3" PAVEMENT OVER 12" TYPE II
PSS EX. PRIVATE LIGHTED SIGNAGE – SALVAGE AND RELOCATE TO ORIGINAL CONDITION NORTH OF NEW CHANNEL. COORDINATE RELOCATION WITH OWNER
SLP EX. STREET LIGHT – PROTECT IN–PLACE
SSCO EX. SANITARY SEWER CLEANOUT – PROTECT IN–PLACE
TELPB EX. TELEPHONE PULLBOX – PROTECT IN–PLACE
TSPB EX. TRAFFIC SIGNAL PULLBOX – PROTECT IN–PLACE
WMP EX. WATER METER – PROTECT IN–PLACE

ADDITIONAL DESIGN CONTROL

701 N. 68523.0702, E. 66483.3492
INSTALL ALEXANDER CHANNEL SIGN PER DETAIL ON SHT. D1

W LOWER AND EXTEND 6" WATER LINE PER DETAIL ON SHT. D1 AND ALL APPLICABLE CNLV WATER LINE CRITERIA. VERIFY LOCATION, ELEVATION AND SIZE PRIOR TO CONSTRUCTION.

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NEVADA POWER ENVIRONMENT AND SAFETY SERVICES DEPARTMENT

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

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1	RECORD DRAWING INFORMATION AS PROVIDED BY CAPRIATI CONSTRUCTION	6/30/2005	DRF

SCALE: 1"=40'
DESIGN: DJB/HT
DRAWN: DJB
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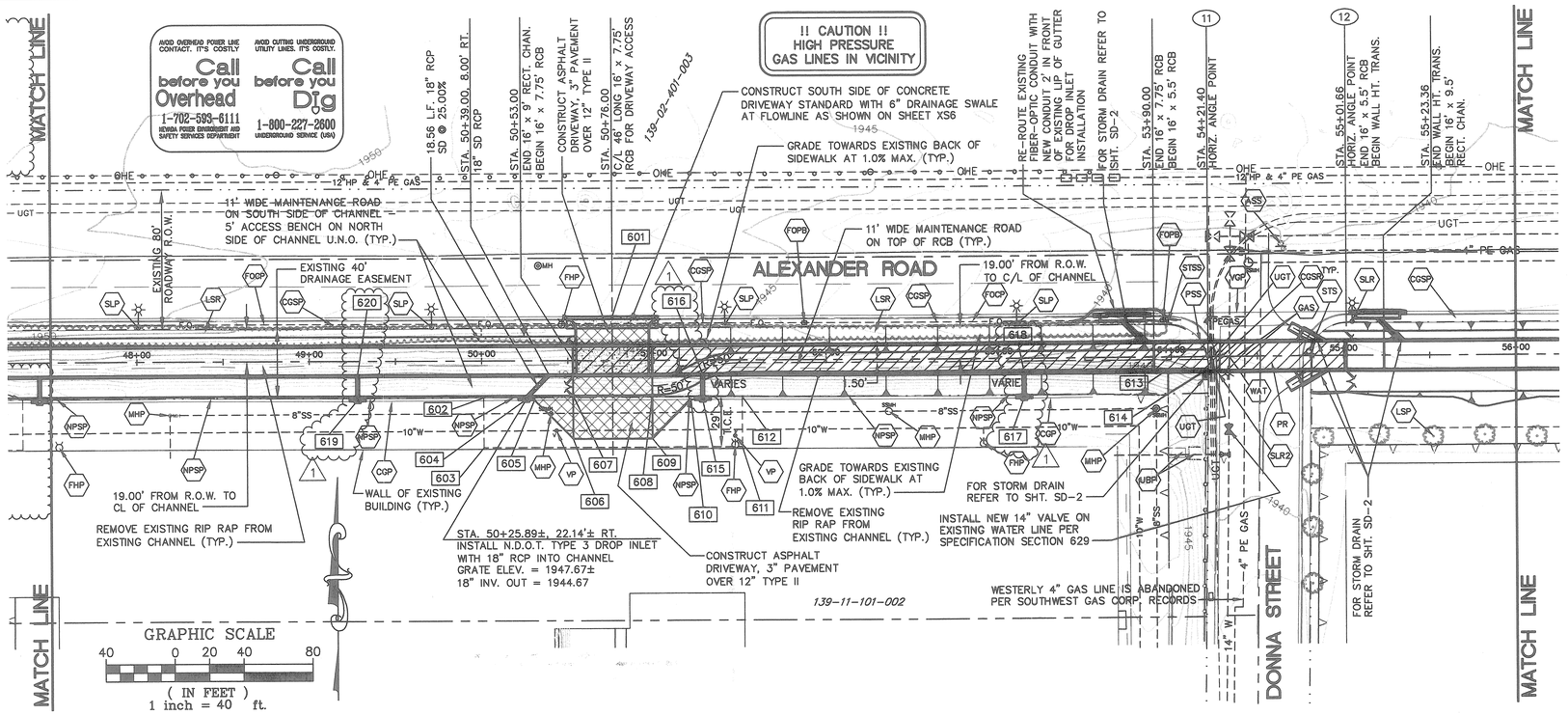
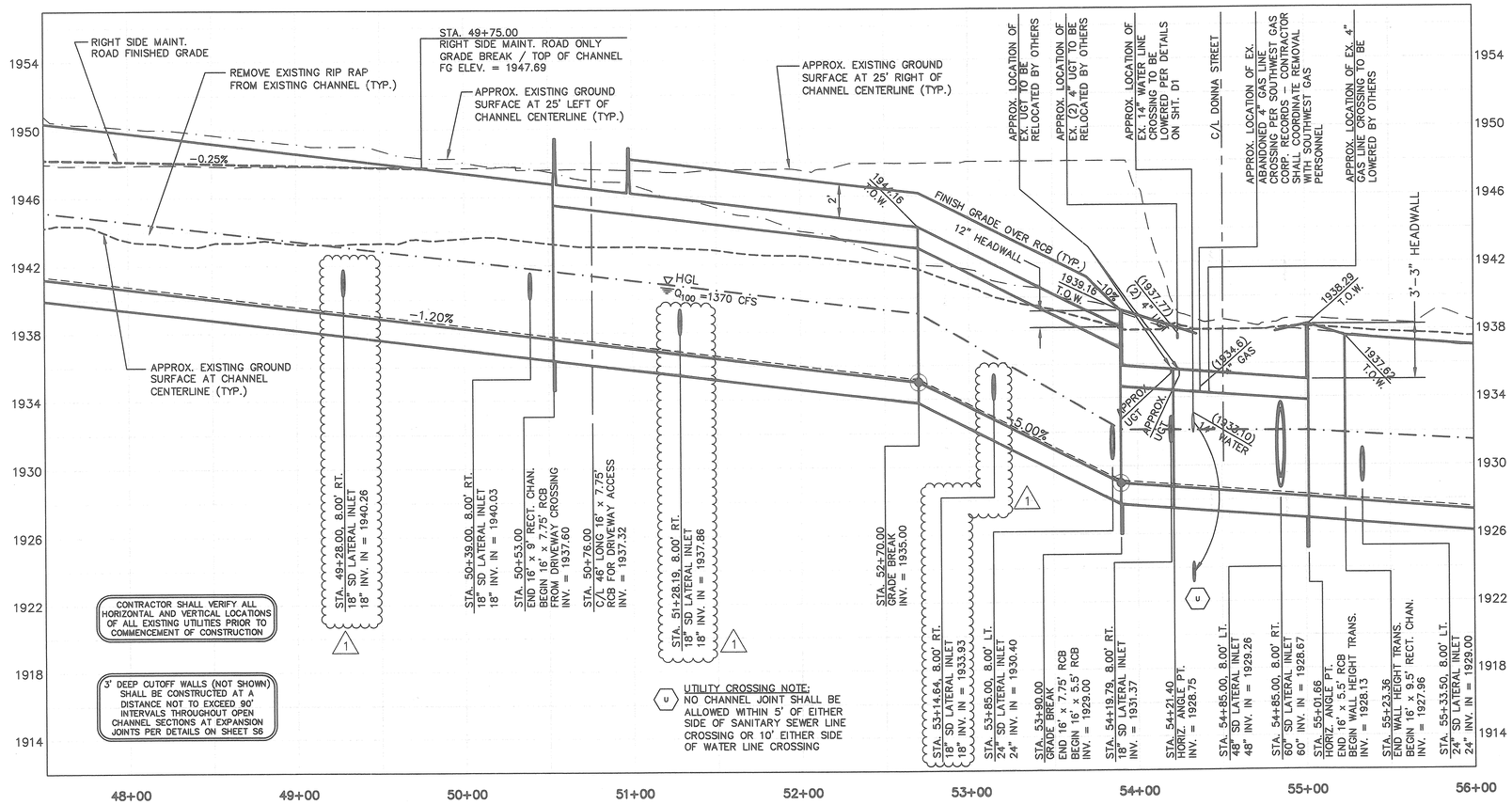
2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-5148
PHONE (702) 362-2599
FAX (702) 362-2597

(DRAWING TITLE) PLAN AND PROFILE – STA. 56+00 TO STA. 64+50
(PROJECT TITLE) ALEXANDER CHANNEL
(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

SHEET NO.
CH7
OF 46 SHEETS

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR – JUNE 2005





SEE SPECIFICATION SECTION 203 FOR EXCAVATION AND SUBGRADE REQUIREMENTS

FOR FENCING AND GATING REFER TO SHEETS F1 THROUGH F5

FOR STATION TO STATION SECTIONS REFER TO SHEETS XS1 THROUGH XS10

CENTERLINE CONTROL COORDINATES

(11) N. 68502.8312, E. 65704.7855

(12) N. 68502.8871, E. 65785.0465

* CENTERLINE CONTROL IS BASED ON SURVEY DATA PROVIDED BY THE CITY OF NORTH LAS VEGAS. REFER TO SHEETS SC1 AND SC2 FOR SURVEY CONTROL.

EXISTING UTILITY CROSSINGS

(GAS) GAS LINE(S)

(UGT) UGT LINE(S)

RELOCATE EXISTING UTILITY CROSSINGS THAT ARE IN CONFLICT AS REQUIRED FOR CHANNEL CONSTRUCTION. COORDINATE RELOCATIONS WITH APPROPRIATE UTILITY AGENCIES AND PERSONNEL.

CONSTRUCTION NOTES

(ASS) ARROW SIGN – SALVAGE AND REINSTALL AFTER CONSTRUCTION

(CGP) EX. CURB & GUTTER – PROTECT IN-PLACE

(CGSP) EX. CURB, GUTTER & SIDEWALK – PROTECT IN-PLACE

(CGSR) EX. CURB, GUTTER & SIDEWALK – CONTRACTOR SHALL REMOVE WITHIN WORK ZONE AND REPLACE TO ORIGINAL GRADES AFTER COMPLETION OF CHANNEL CONSTRUCTION.

(FHP) EX. FIRE HYDRANT – PROTECT IN-PLACE

(FOCP) EX. FIBER CONDUIT – PROTECT IN-PLACE

(FOPB) EX. FIBER OPTIC PULL BOX – PROTECT IN-PLACE

(FP) EX. FENCE – PROTECT IN-PLACE

(LSR) EX. LANDSCAPING – REMOVE & REPLACE TO ORIGINAL CONDITION AS REQUIRED FOR CHANNEL CONSTRUCTION

(LSP) EX. LANDSCAPING – PROTECT IN-PLACE

(MHP) EX. MANHOLE – PROTECT IN-PLACE

(NPSP) EX. "NO PARKING" SIGN – PROTECT IN-PLACE

(PR) EX. PAVEMENT – RECONSTRUCT WITH 3" PAVEMENT OVER 12" TYPE II

(PSS) EX. PRIVATE SIGNAGE – SALVAGE AND RELOCATE TO ORIGINAL CONDITION ADJACENT TO AND NORTH OF NEW CHANNEL

(SLP) EX. STREET LIGHT – PROTECT IN-PLACE

(SLR) EX. STREET LIGHT – REMOVE AND RESET TO ORIGINAL CONDITION AND LOCATION AS REQUIRED FOR DROP INLET CONSTRUCTION

(SLR2) EX. STREET LIGHT – REMOVE AND RELOCATE 4' TO THE SOUTH AS REQUIRED FOR CHANNEL CONSTRUCTION

(STS) EX. STOP SIGN – SALVAGE AND RESET TO ORIGINAL CONDITION AND LOCATION

(STSS) EX. STREET SIGN – PROTECT IN-PLACE

(UBP) EX. UTILITY BOXES – PROTECT IN-PLACE

(VGP) EXISTING VALLEY GUTTER – PROTECT IN-PLACE

(VP) EXISTING VALVE – PROTECT IN-PLACE

(WAT) APPROX. LOCATION OF EX. 14" WATER LINE CROSSING – TO BE LOWERED PER DETAILS ON SHT. D1

ADDITIONAL DESIGN CONTROL

601 N. 68527.9556, E. 65359.3454, ELEV.= 1946.91± C/L 42' WIDE DRIVEWAY PER STD. DWG. NO. 226 (1)

602 N. 68481.1856, E. 65284.5528, ELEV.= 1947.89± T.C.E. CORNER

603 N. 68452.1856, E. 65284.5934, ELEV.= 1946.60± T.C.E. CORNER

604 N. 68480.1185, E. 65309.3030, ELEV.= 1947.67 C/L N.D.O.T. TYPE 3 DROP INLET WITH 18" RCP INTO CHANNEL INV. OUT = 1944.67

605 N. 68479.6272, E. 65314.0537, ELEV.= 1947.88± CORNER OF DRIVEWAY RAMP TRANSITION APRON

606 N. 68457.2583, E. 65336.4477, ELEV.= 1945.81± CORNER DRIVEWAY RAMP, MATCH EX. PAVEMENT

607 N. 68482.2980, E. 65336.4114, ELEV.= 1947.17 DRIVEWAY RAMP GRADE BREAK

608 N. 68482.3646, E. 65382.4114, ELEV.= 1946.81 DRIVEWAY RAMP GRADE BREAK

609 N. 68457.3646, E. 65382.4476, ELEV.= 1945.74± CORNER DRIVEWAY RAMP, MATCH EX. PAVEMENT

610 N. 68479.7858, E. 65404.8040, ELEV.= 1947.66± CORNER DRIVEWAY RAMP TRANSITION APRON MATCH EX. LIP OF GUTTER

611 N. 68452.3958, E. 65434.5933, ELEV.= 1945.35± T.C.E. CORNER

612 N. 68481.3958, E. 65434.5526, ELEV.= 1947.92± T.C.E. CORNER

613 N. 68495.7975, E. 65681.4770, ELEV.= 1941.09 EDGE OF MAINTENANCE ROAD

614 N. 68481.7975, E. 65681.4973, ELEV.= 1945.67± TOP OF BANK GRADING, MATCH EX.

615 N. 68479.8905, E. 65411.8042 C/L N.D.O.T. TYPE 3 DROP INLET WITH 18" RCP INTO CHANNEL 18" INV. OUT = 1944.00 (1)

616 STA. 51+28.19, 8.00' RT. 18" SD RCP INV. INTO CHANNEL

617 N. 68480.1370, E. 65598.0553 C/L N.D.O.T. TYPE 3 DROP INLET WITH 18" RCP INTO CHANNEL 18" INV. OUT = 1944.00

618 STA. 53+14.64, 8.00' RT. 18" SD RCP INV. INTO CHANNEL

619 N. 68479.6270, E. 65211.4132 C/L N.D.O.T. TYPE 3 DROP INLET WITH 18" RCP INTO CHANNEL 18" INV. OUT = 1943.90

620 STA. 49+28.00, 8.00' RT. 18" SD RCP INV. INTO CHANNEL

REVISIONS		
NO.	DESCRIPTION	DATE	BY
Δ1	REVISED PER ADDENDUM NO. 1	1/23/2004	VTN
Δ2	RECORD DRAWING INFORMATION AS PROVIDED BY CAPRIATI CONSTRUCTION	6/30/2005	DRF
Δ			
Δ			

SCALE: 1"=40'
DESIGN: DJB/HT
DRAWN: DJB
CHECKED: JNG
APPROVED: KDG
DATE: 1/23/2004

ORIGINAL CONSTRUCTION DRAWINGS ARE ON FILE WITH THE CITY OF NORTH LAS VEGAS. THE DOCUMENTS WERE SEALED ON 1/26/06 BY KEN D. GILBRETH UNDER LICENSE NO. 9917

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2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-5148
PHONE (702) 362-8844
FAX (702) 362-2597

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

(DRAWING TITLE) PLAN AND PROFILE - STA. 47+50 TO STA. 56+00

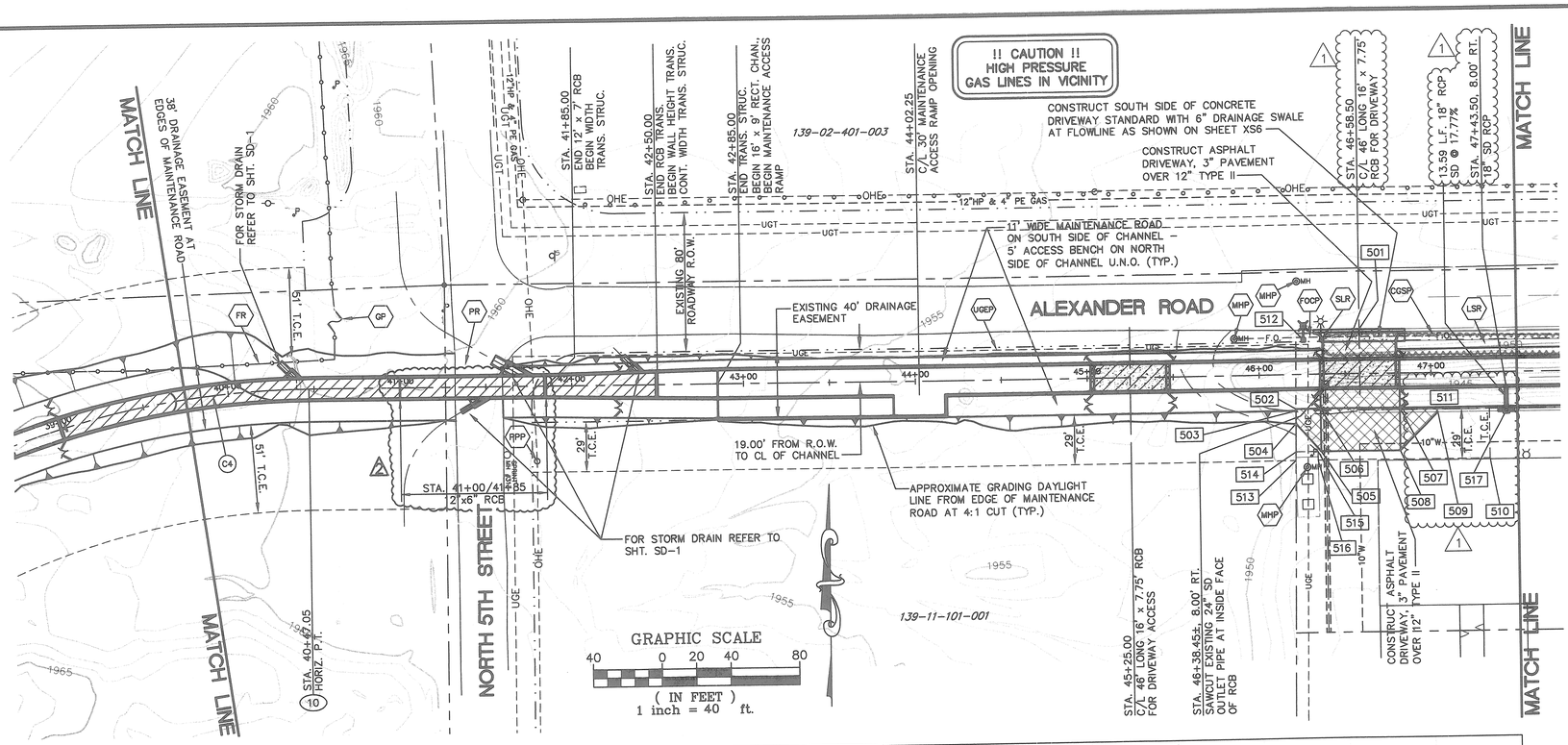
(PROJECT TITLE) ALEXANDER CHANNEL

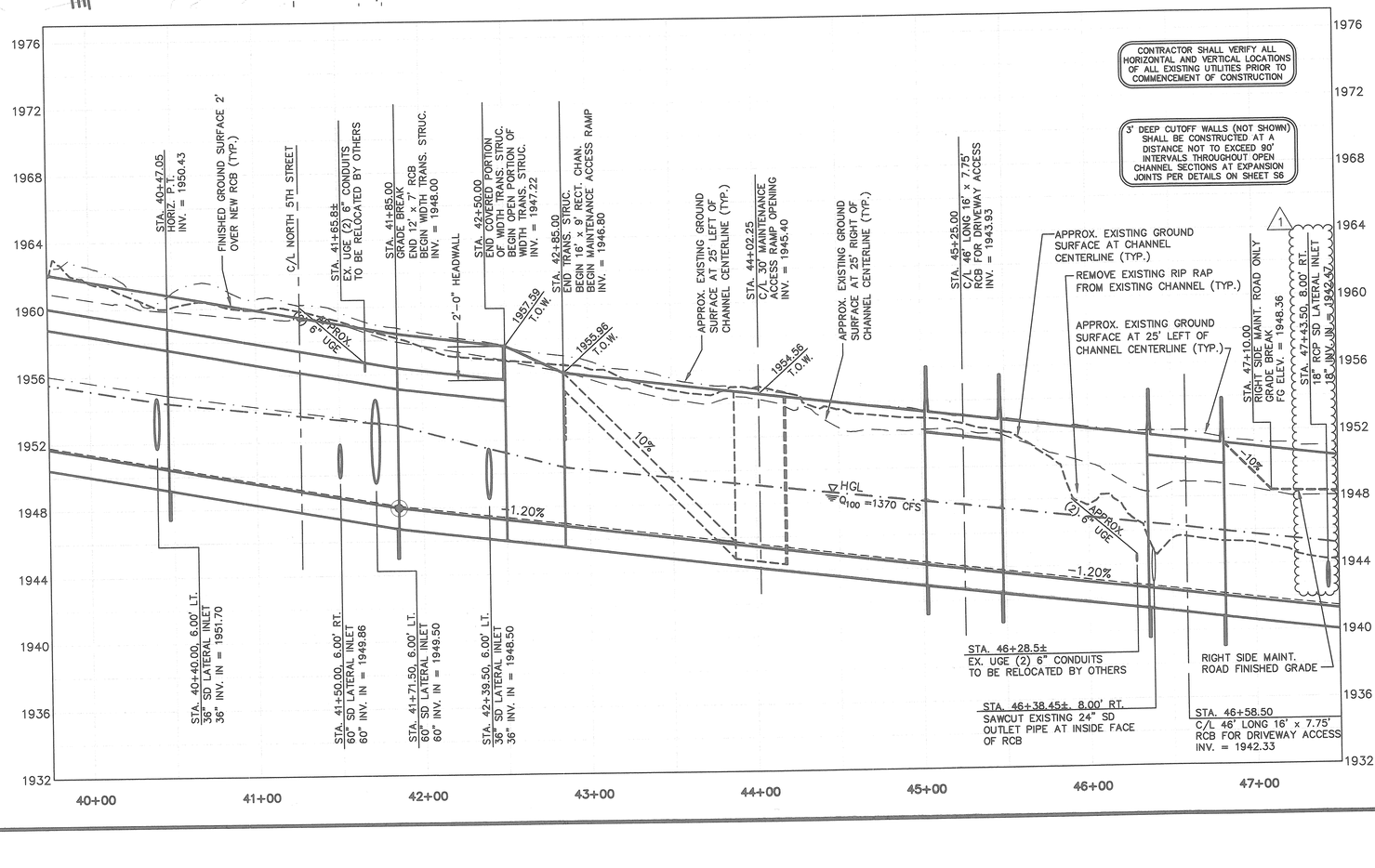
(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

INFORMATION SUPPLIED BY CONTRACTOR – JUNE 2005

RECORD DRAWINGS

SHEET NO. CH6 OF 46 SHEETS





SEE SPECIFICATION SECTION 203 FOR EXCAVATION AND SUBGRADE REQUIREMENTS

FOR FENCING AND GATING REFER TO SHEETS F1 THROUGH F5

FOR STATION TO STATION SECTIONS REFER TO SHEETS XS1 THROUGH XS10

*CENTERLINE CONTROL COORDINATES

(10) N. 68500.8418, E. 64330.4336

*CENTERLINE CURVE DATA

(C4) R = 500.00'
L = 577.64'
Δ= 66°11'33"

* CENTERLINE CONTROL IS BASED ON SURVEY DATA PROVIDED BY THE CITY OF NORTH LAS VEGAS. REFER TO SHEETS SC1 AND SC2 FOR SURVEY CONTROL.

CONSTRUCTION NOTES

- (CGSP) EX. CURB, GUTTER & SIDEWALK – PROTECT IN–PLACE
- (FOCP) EX. FIBER–OPTIC CONDUIT – PROTECT IN–PLACE
- (FP) EX. FENCING – PROTECT IN–PLACE
- (FR) EX. FENCING REMOVE – SEE SHT. F2
- (GP) EX. GATE – PROTECT IN–PLACE
- (LSR) EX. LANDSCAPING – REMOVE & REPLACE TO ORIGINAL CONDITION AS REQUIRED FOR CHANNEL CONSTRUCTION
- (MHP) EX. MANHOLE – PROTECT IN–PLACE
- (PPP) EX. POWER POLE – PROTECT IN–PLACE
- (PR) EX. PAVEMENT – RECONSTRUCT WITH 3" PAVEMENT OVER 12" TYPE II
- (SLR) EX. STREET LIGHT – REMOVE, SALVAGE AND RELOCATE (SEE ADDITIONAL DESIGN CONTROL POINT NO. 512)
- (UGEP) EX. UNGERGROUND ELECTRIC LINE(S) – PROTECT IN–PLACE

ADDITIONAL DESIGN CONTROL

501 N. 68527.3146, E. 64941.8458, ELEV.= (1952.00±) (1)
C/L 42' WIDE DRIVEWAY PER STD. DWG. NO. 228

502 N. 68481.6728, E. 64904.5059, ELEV.= (1951.07) (1)
EDGE OF 11' WIDE MAINTENANCE ROAD

503 N. 68480.6728, E. 64904.5074, ELEV.= (1950.99) (1)
EDGE OF 12' WIDE MAINTENANCE ROAD

504 N. 68473.1891, E. 64904.4246, ELEV.= (1949.05±) (1)
CORNER OF DRIVEWAY RAMP TRANSITION APRON

505 N. 68456.6936, E. 64918.9481, ELEV.= (1948.48±) (1)
CORNER DRIVEWAY RAMP, MATCH EX. PAVEMENT

506 N. 68481.6936, E. 64918.9119, ELEV.= (1950.67) (1)
DRIVEWAY RAMP GRADE BREAK

507 N. 68481.7602, E. 64964.9118, ELEV.= (1950.12) (1)
DRIVEWAY RAMP GRADE BREAK

508 N. 68456.7602, E. 64964.9480, ELEV.= (1948.18±) (1)
CORNER DRIVEWAY RAMP, MATCH EX. PAVEMENT

509 N. 68479.0164, E. 64987.1398, ELEV.= (1948.35±) (1)
CORNER DRIVEWAY RAMP TRANSITION APRON MATCH EX. LIP OF GUTTER

510 N. 68451.8358, E. 65017.1792
CORNER OF T.C.E.

511 N. 68480.8108, E. 65017.1386
CORNER OF T.C.E.

512 N. 68521.6598, E. 64909.3534
CENTER OF RELOCATED STREET LIGHT POLE

513 N. 68451.6525, E. 64904.1865
T.C.E ANGLE POINT

514 N. 68456.6525, E. 64904.2418
T.C.E ANGLE POINT

515 N. 68456.6705, E. 64917.0722
T.C.E. ANGLE POINT

516 N. 68451.6705, E. 64917.0794
T.C.E. ANGLE POINT

(1) 517 N. 68479.2575, E. 65026.9176
C/L N.D.O.T. TYPE 3 DROP INLET WITH 18" RCP INTO CHANNEL
18" INV. OUT = 1943.25

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1-702-593-6111
NEVADA POWER ENVIRONMENT AND SAFETY SERVICES DEPARTMENT

AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY.
Call before you Dig
1-800-227-2600
UNDERGROUND SERVICE (USA)

REVISIONS		
NO.	DESCRIPTION	DATE	BY
1	REVISED PER ADDENDUM NO. 1	1/23/2004	VTN
2	RECORD DRAWING INFORMATION AS PROVIDED BY CAPRIATI CONSTRUCTION	6/30/2005	DRF

SCALE: 1"=40'
DESIGN: DJB/HT
DRAWN: DJB
CHECKED: JNG
APPROVED: KDG
DATE: 1/23/2004

ORIGINAL CONSTRUCTION DRAWINGS ARE ON FILE WITH THE CITY OF NORTH LAS VEGAS. THE DOCUMENTS WERE SEALED ON 1/30/04 BY KEN D. GILBRETH UNDER LICENSE NO. 9777

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PLANNERS
LAND SURVEYORS
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PHONE (702) 873-7500
FAX (702) 362-2987

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

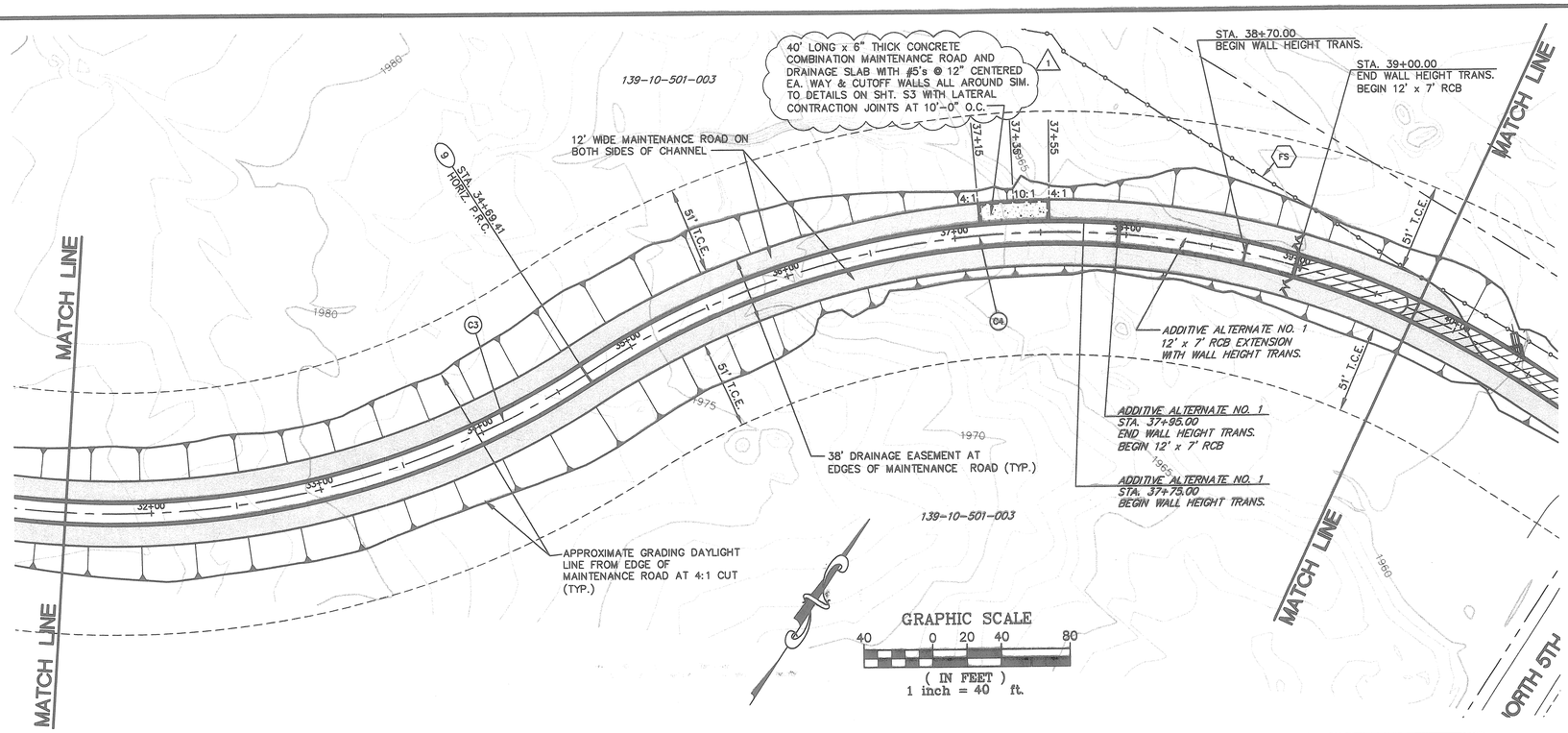
(DRAWING TITLE) PLAN AND PROFILE - STA. 39+75 TO STA. 47+50

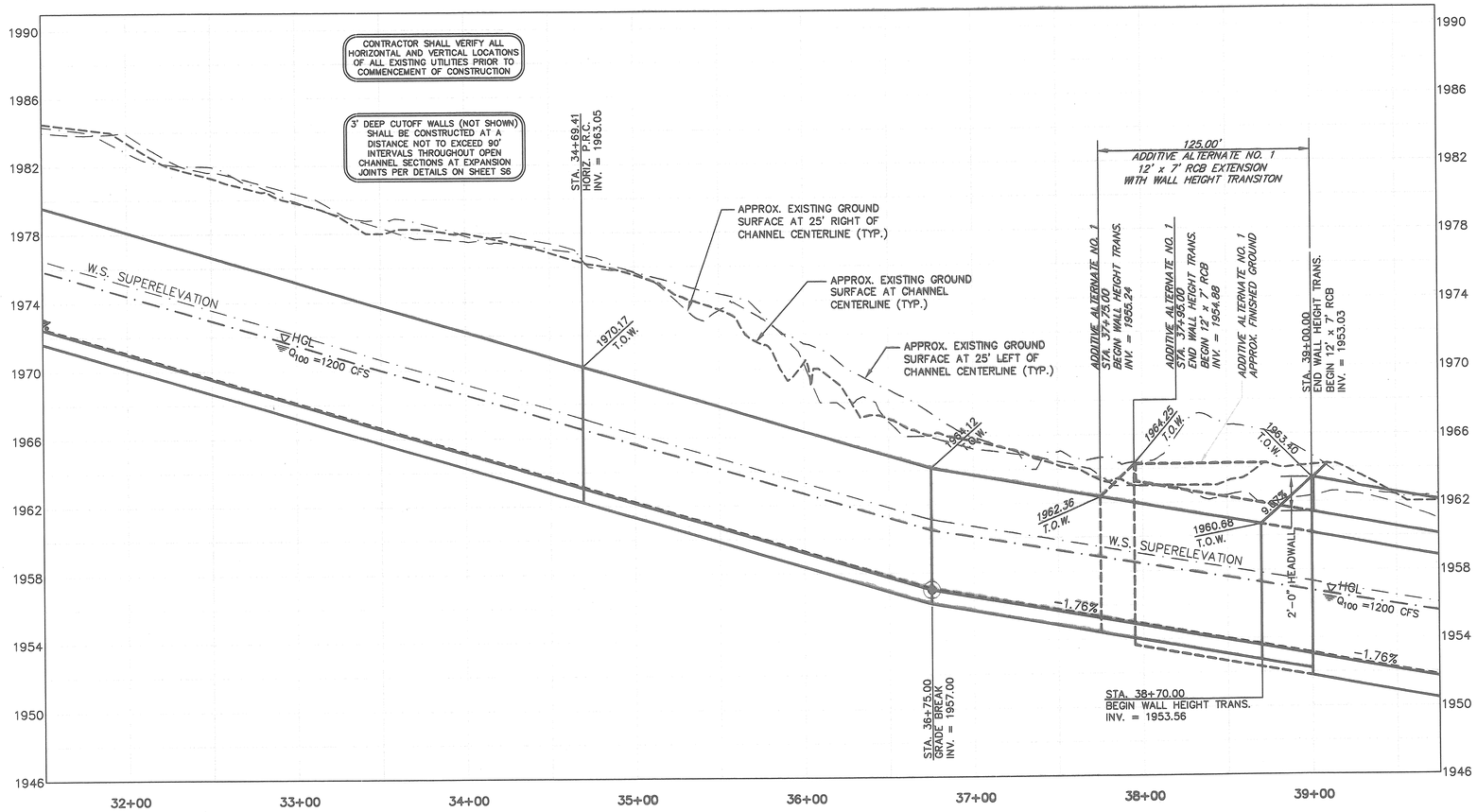
(PROJECT TITLE) ALEXANDER CHANNEL

(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

SHEET NO. CH5 OF 46 SHEETS

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR – JUNE 2005





SEE SPECIFICATION SECTION 203 FOR EXCAVATION AND SUBGRADE REQUIREMENTS

FOR FENCING AND GATING REFER TO SHEETS F1 THROUGH F5

FOR STATION TO STATION SECTIONS REFER TO SHEETS XS1 THROUGH XS10

*CENTERLINE CONTROL COORDINATES

(9) N. 68202.0120, E. 63873.4121

*CENTERLINE CURVE DATA

(C3) R=500.00'
L=566.00'
Δ=64°51'32"

(C4) R = 500.00'
L = 577.64'
Δ= 66°11'33"

* CENTERLINE CONTROL IS BASED ON SURVEY DATA PROVIDED BY THE CITY OF NORTH LAS VEGAS. REFER TO SHEETS SC1 AND SC2 FOR SURVEY CONTROL.

CONSTRUCTION NOTES

(FS) EX. FENCING – SALVAGE AND RESET TO ORIGINAL CONDITION. RE-ALIGN PER SHT. F2

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Call before you Overhead
1-702-593-6111
NEVADA POWER ENVIRONMENT AND SAFETY SERVICES DEPARTMENT

AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY.
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1-800-227-2600
UNDERGROUND SERVICE (USA)

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

REVISIONS		
NO.	DESCRIPTION	DATE	BY
1	REVISED PER ADDENDUM NO. 1	1/29/2004	VTN
2	RECORD DRAINAGE INFORMATION AS PROVIDED BY CAPRA/I CONSTRUCTION	6/30/2005	DRF

SCALE: 1"=40'
DESIGN: DJB/HT
DRAWN: DJB
CHECKED: JNG
APPROVED: KDG
DATE: 1/29/2004

ORIGINAL CONSTRUCTION DRAWINGS ARE ON FILE WITH THE CITY OF NORTH LAS VEGAS. THE DOCUMENTS WERE SEALED ON 2/2/04 BY KEN D. GILLSMITH UNDER LICENSE NO. 9177

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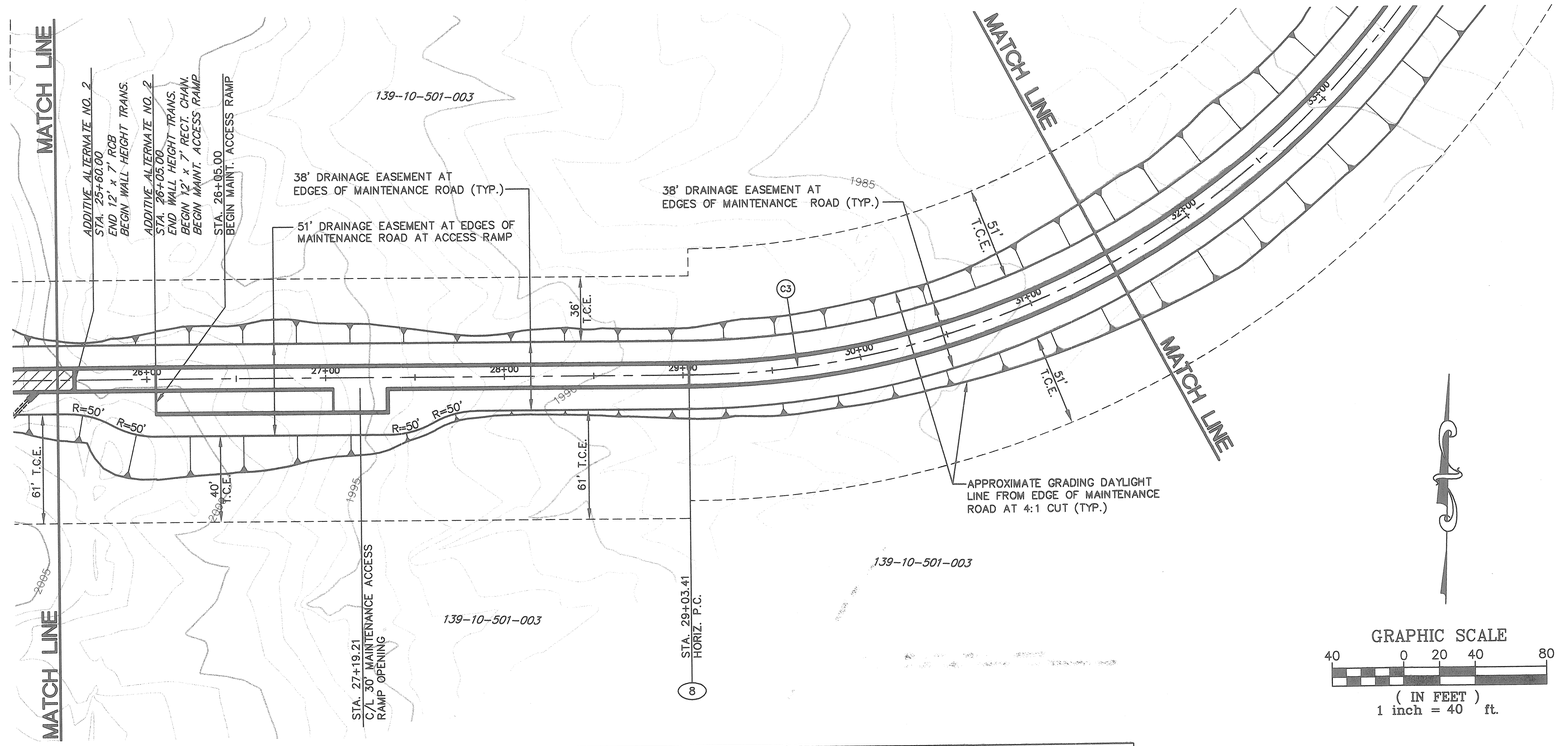
LAS VEGAS, NEVADA 89146-5148
PHONE (702) 873-7550
FAX (702) 362-2337

(DRAWING TITLE) PLAN AND PROFILE - STA. 31+50 TO STA. 39+75
(PROJECT TITLE) ALEXANDER CHANNEL
(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

SHEET NO.
CH4
OF 46 SHEETS

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR – JUNE 2005



SEE SPECIFICATION SECTION 203 FOR EXCAVATION AND SUBGRADE REQUIREMENTS

FOR FENCING AND GATING REFER TO SHEETS F1 THROUGH F5

FOR STATION TO STATION SECTIONS REFER TO SHEETS XS1 THROUGH XS10

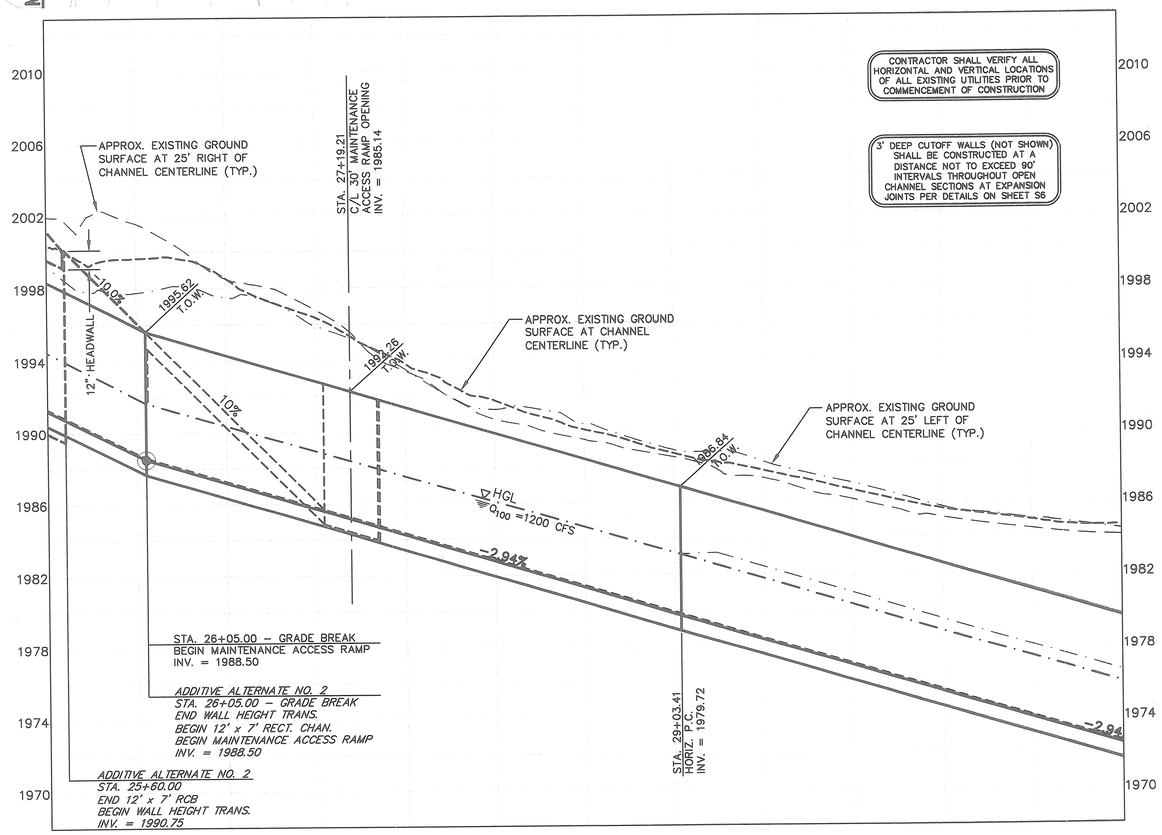
*CENTERLINE CONTROL COORDINATES

(8) N. 67903.3344, E. 63428.0277

*CENTERLINE CURVE DATA

(C3) R=500.00'
L=566.00'
Δ=64°51'32"

* CENTERLINE CONTROL IS BASED ON SURVEY DATA PROVIDED BY THE CITY OF NORTH LAS VEGAS. REFER TO SHEETS SC1 AND SC2 FOR SURVEY CONTROL.



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NEVADA POWER ENVIRONMENT AND SAFETY SERVICES DEPARTMENT

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UNDERGROUND SERVICE (USA)

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

REVISIONS			
NO.	DESCRIPTION	DATE	BY
1			
2			
3			
4	RECORD DRAWING INFORMATION AS PROVIDED BY CAPRIATI CONSTRUCTION	6/30/2005	DRF

SCALE: 1"=40'
DESIGN: DJB/HT
DRAWN: DJB
CHECKED: JNG
APPROVED: KDG
DATE: 12/31/2003

ORIGINAL CONSTRUCTION DRAWINGS ARE ON FILE WITH THE CITY OF NORTH LAS VEGAS. THE DOCUMENTS WERE SEALED ON 12/31/03 BY KEN D. GILSWITH UNDER LICENSE NO. 9177

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LAS VEGAS, NEVADA 89146-5148
PHONE (702) 873-7550
FAX (702) 362-2592

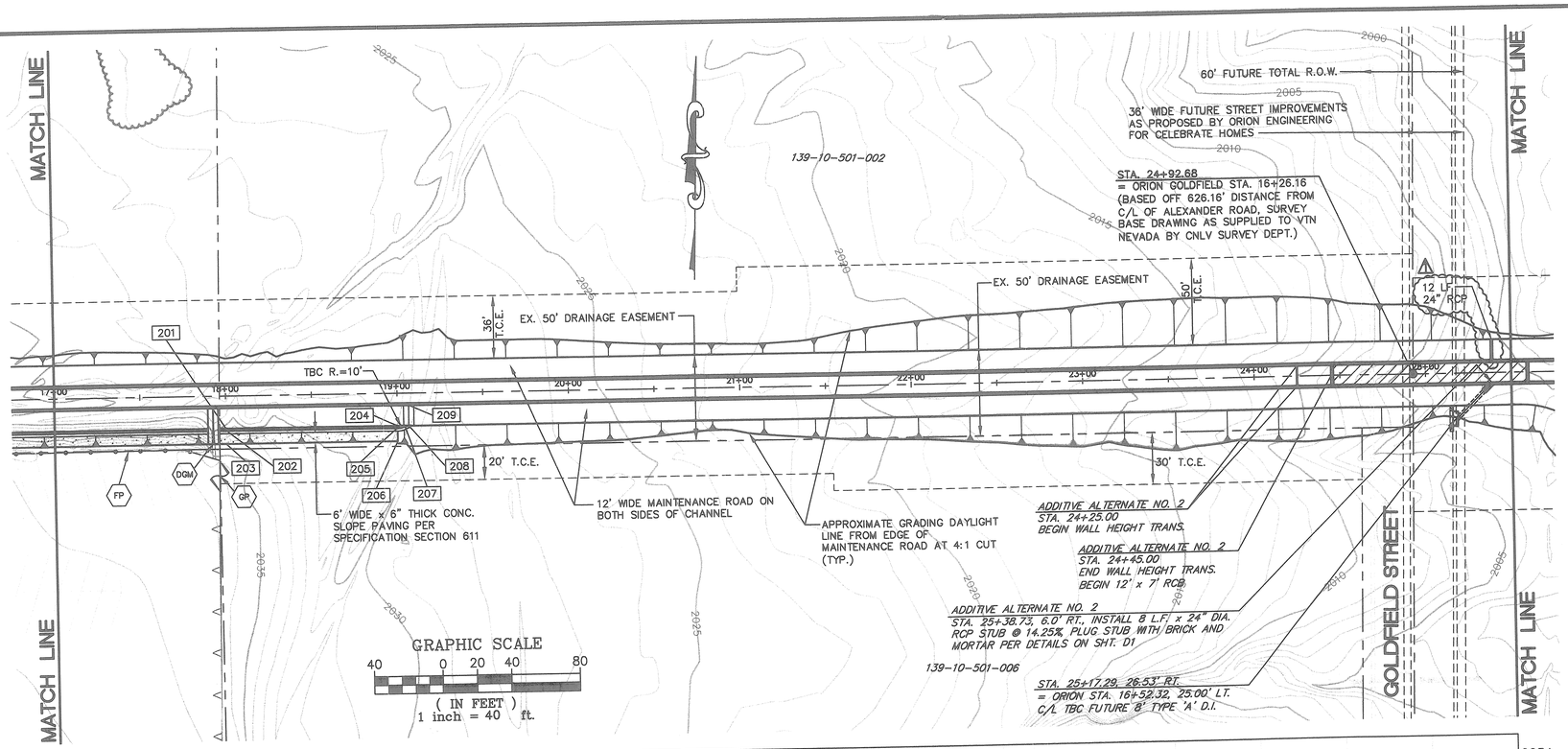
(DRAWING TITLE) PLAN AND PROFILE - STA. 25+50 TO STA. 31+50

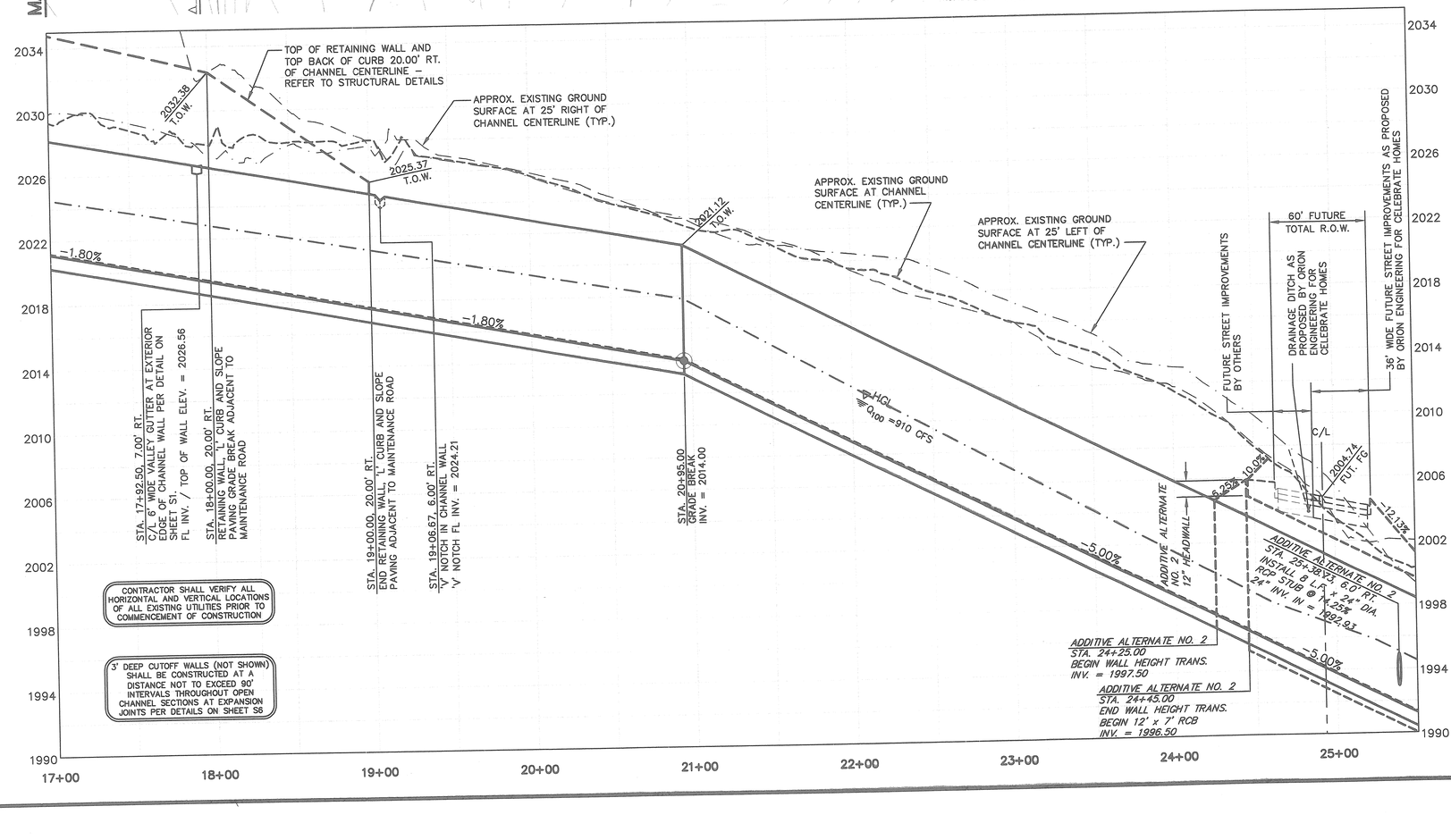
(PROJECT TITLE) ALEXANDER CHANNEL

(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

SHEET NO.
CH3
OF 46 SHEETS

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR – JUNE 2005





SEE SPECIFICATION SECTION 203 FOR EXCAVATION AND SUBGRADE REQUIREMENTS

FOR FENCING AND GATING REFER TO SHEETS F1 THROUGH F5

FOR STATION TO STATION SECTIONS REFER TO SHEETS XS1 THROUGH XS10

CONSTRUCTION NOTES

DGM STA. 17+92.50± – EX. DRAINAGE GUTTER – SAWCUT AND EXTEND TO CHANNEL WITH 6' WIDE VALLEY GUTTER PER DETAIL ON SHEET S1.

GP EX. GATE – PROTECT IN–PLACE

FP EX. FENCING – PROTECT IN–PLACE

ADDITIONAL DESIGN CONTROL

201 N. 67857.0618, E. 62325.4243, ELEV.= 2026.67 EDGE OF MAINTENANCE ROAD

202 N. 67856.0621, E. 62325.4490, ELEV. = 2032.38 TOP OF RETAINING WALL & TOP BACK OF CURB PER DETAILS ON SHT. S1

203 N. 67848.0646, E. 62325.6468, ELEV. = 2034.00 TOP OF SLOPE PAVING PER SPECS.

204 N. 67859.5340, E. 62425.3937, ELEV. = 2024.87 EDGE OF MAINTENANCE ROAD

205 N. 67858.5343, E. 62425.4184, ELEV. = 2025.37 TOP OF RETAINING WALL, TOP BACK OF CURB & CURB P.C. PER DETAILS ON SHT. S1

206 N. 67850.5368, E. 62425.6162, ELEV. = 2027.42 TOP OF SLOPE PAVING PER SPECS.

207 N. 67859.6418, E. 62429.7513, ELEV. = 2025.00 TOP OF RETAINING WALL & TOP BACK OF CURB

208 N. 67859.6990, E. 62432.0644, ELEV. = 2024.50 FLOWLINE 6' WIDE VALLEY GUTTER PER DETAILS ON SHT. S8

209 N. 67871.6953, E. 62431.7678, ELEV. = 2024.21 CHANNEL WALL 'V' DITCH FLOWLINE FOR 6' WIDE VALLEY GUTTER PER DETAILS ON SHT. S8

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PUBLIC WORKS – ENGINEERING SERVICES DIVISION

REVISIONS			
NO.	DESCRIPTION	DATE	BY
1			
2			
3			
4			
5	RECORD DRAWING INFORMATION AS PROVIDED BY CAPRIATI CONSTRUCTION	6/30/2005	DRF

SCALE: 1"=40'
DESIGN: DJB /HT
DRAWN: DJB
CHECKED: JNG
APPROVED: KDG
DATE: 12/31/2003

ORIGINAL CONSTRUCTION DRAWINGS ARE ON FILE WITH THE CITY OF NORTH LAS VEGAS. THE DOCUMENTS WERE SEALED ON 12/31/03 BY KEN D. GALBREATH UNDER LICENSE NO. 9777

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2725 VIRGINIA ROBIN BOULEVARD
LAS VEGAS, NEVADA 89146-5148
PHONE (702) 873-7550
FAX (702) 382-2597

CITY OF NORTH LAS VEGAS – DEPARTMENT OF PUBLIC WORKS

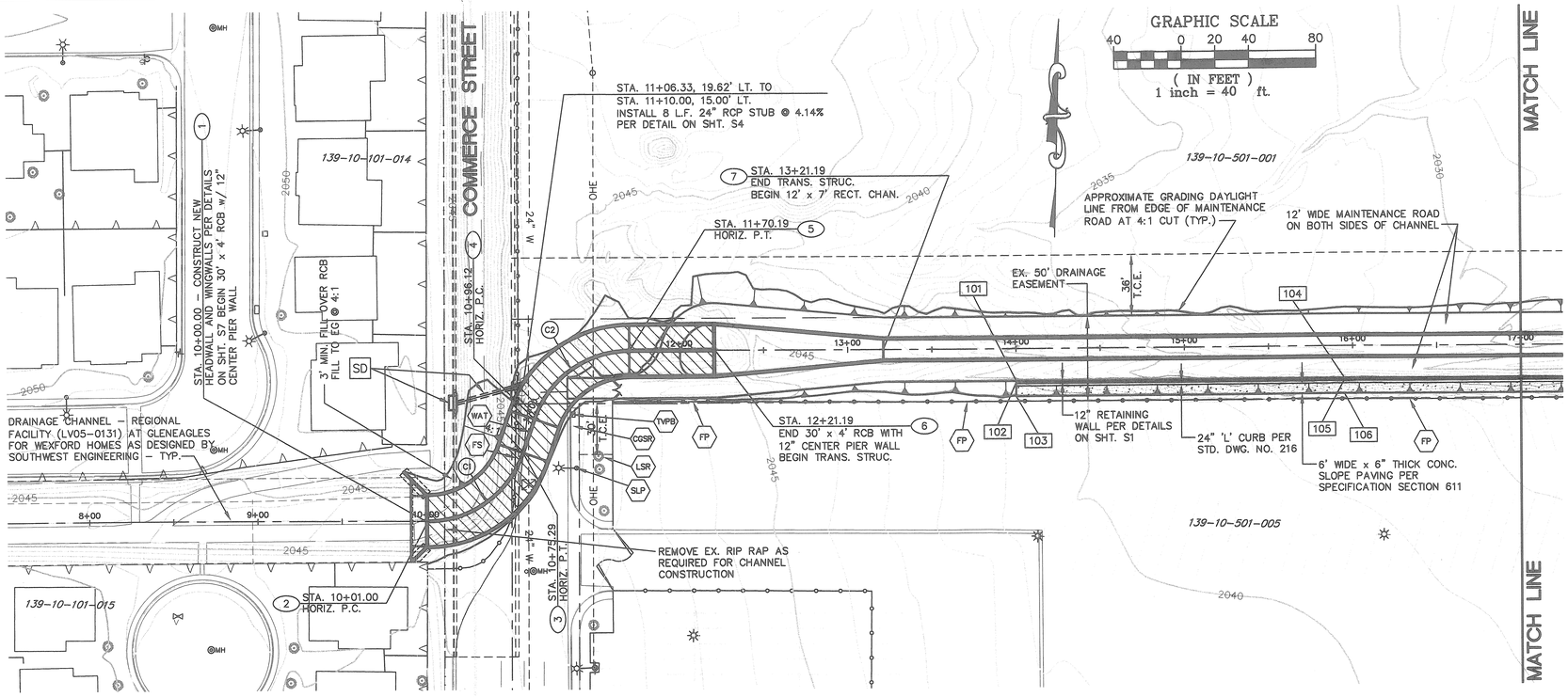
(DRAWING TITLE) PLAN AND PROFILE – STA. 17+00 TO STA. 25+50

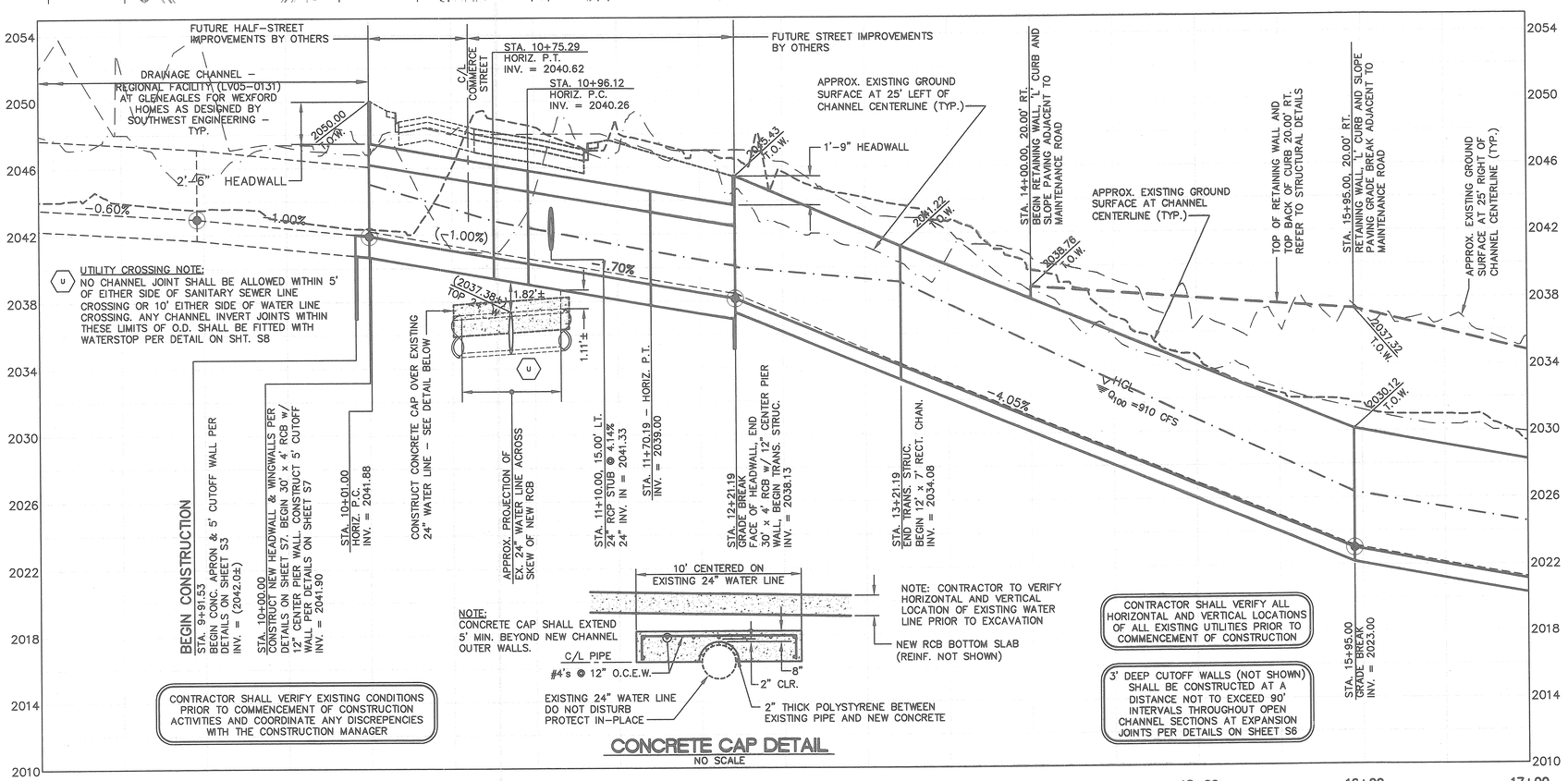
(PROJECT TITLE) ALEXANDER CHANNEL

(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

SHEET NO. CH2 OF 46 SHEETS

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR – JUNE 2005





CONCRETE CAP DETAIL
NO SCALE

SEE SPECIFICATION SECTION 203 FOR EXCAVATION AND SUBGRADE REQUIREMENTS

FOR FENCING AND GATING REFER TO SHEETS F1 THROUGH F5

FOR STATION TO STATION SECTIONS REFER TO SHEETS XS1 THROUGH XS10

*CENTERLINE CONTROL COORDINATES

(1) N. 67757.4658, E. 61576.4675
(2) N. 67757.4868, E. 61577.4673
(3) N. 67799.0754, E. 61633.3186
(4) N. 67818.9024, E. 61639.7060
(5) N. 67860.4858, E. 61695.3323
(6) N. 67861.7466, E. 61746.3167
(7) N. 67864.2188, E. 61846.2861

*CENTERLINE CURVE DATA

(C1) R=60.00' L=74.29' Δ=70°56'30"

(C2) R=60.00' L=74.06' Δ=70°43'36"

* CENTERLINE CONTROL IS BASED ON SURVEY DATA PROVIDED BY THE CITY OF NORTH LAS VEGAS. REFER TO SHEETS SC1 AND SC2 FOR SURVEY CONTROL.

CONSTRUCTION NOTES

(CGSR) EX. CURB, GUTTER AND SIDEWALK – CONTRACTOR SHALL REMOVE WITHIN WORK ZONE AND REPLACE TO ORIGINAL GRADES AFTER COMPLETION OF CHANNEL CONSTRUCTION.

(FP) EX. FENCING – PROTECT IN–PLACE

(FS) EX. FENCING – SALVAGE AND RESET TO ORIGINAL LOCATION AND CONDITION

(LSR) EX. LANDSCAPING – REMOVE AND REPLACE TO ORIGINAL CONDITION

(SLP) EX. STREET LIGHT – PROTECT IN–PLACE

(TYPB) EX. CATV PULL BOX – TO BE REMOVED AND REINSTALLED BY OTHERS COORDINATE WITH COX COMMUNICATIONS.

(WAT) EX. 24" WATER LINE – PROTECT IN–PLACE. CONSTRUCT CONCRETE CAP AS SHOWN ON THIS SHEET

(SD) FUTURE DROP INLET AND 24" RCP STORM DRAIN TO BE INSTALLED BY OTHERS AS DESIGNED FOR GLENEAGLES, UNIT 4, BY SOUTHWEST ENGINEERING.

ADDITIONAL DESIGN CONTROL

101 N. 67847.1731, E. 61925.5465, ELEV.= 2038.26 EDGE OF MAINTENANCE ROAD, BEGIN RETAINING WALL PER DETAILS ON SHT. S1

102 N. 67846.1734, E. 61925.5712, ELEV. = 2038.76 TOP OF RETAINING WALL & TOP BACK OF CURB PER DETAILS ON SHT. S1

103 N. 67838.1758, E. 61925.7690, ELEV. = 2040.38 TOP OF SLOPE PAVING PER SPECS.

104 N. 67851.9938, E. 62120.4869, ELEV. = 2030.36 EDGE OF MAINTENANCE ROAD

105 N. 67850.9941, E. 62120.5116, ELEV. = 2037.32 TOP OF RETAINING WALL & TOP BACK OF CURB PER DETAILS ON SHT. S1

106 N. 67842.9966, E. 62120.7094, ELEV. = 2038.94 TOP OF SLOPE PAVING PER SPECS.

AVOID OVERHEAD POWER LINE CONTACT. IT'S COSTLY
Call before you Overhead
1–702–593–6111
NEVADA POWER ENVIRONMENT AND SAFETY SERVICES DEPARTMENT

AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY.
Call before you Dig
1–800–227–2600
UNDERGROUND SERVICE (USA)

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

REVISIONS		
NO.	DESCRIPTION	DATE	BY
1			
2			
3	RECORD DRAWING INFORMATION AS PROVIDED BY CAPRIATI CONSTRUCTION	6/30/2005	DRF

SCALE: 1"=40'
DESIGN: HT/DJB
DRAWN: DJB
CHECKED: JNG
APPROVED: KDG
DATE: 12/31/2003

ORIGINAL CONSTRUCTION DRAWINGS ARE ON FILE WITH THE CITY OF NORTH LAS VEGAS. THE DOCUMENTS WERE SEALED BY KEN D. GILBRETH ON 12/31/03 UNDER LICENSE NO. 9117

vtn nevada
• CONSULTING ENGINEERS
• PLANNERS
• LAND SURVEYORS
2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146–5148
PHONE (702) 362–8844
FAX (702) 362–2597

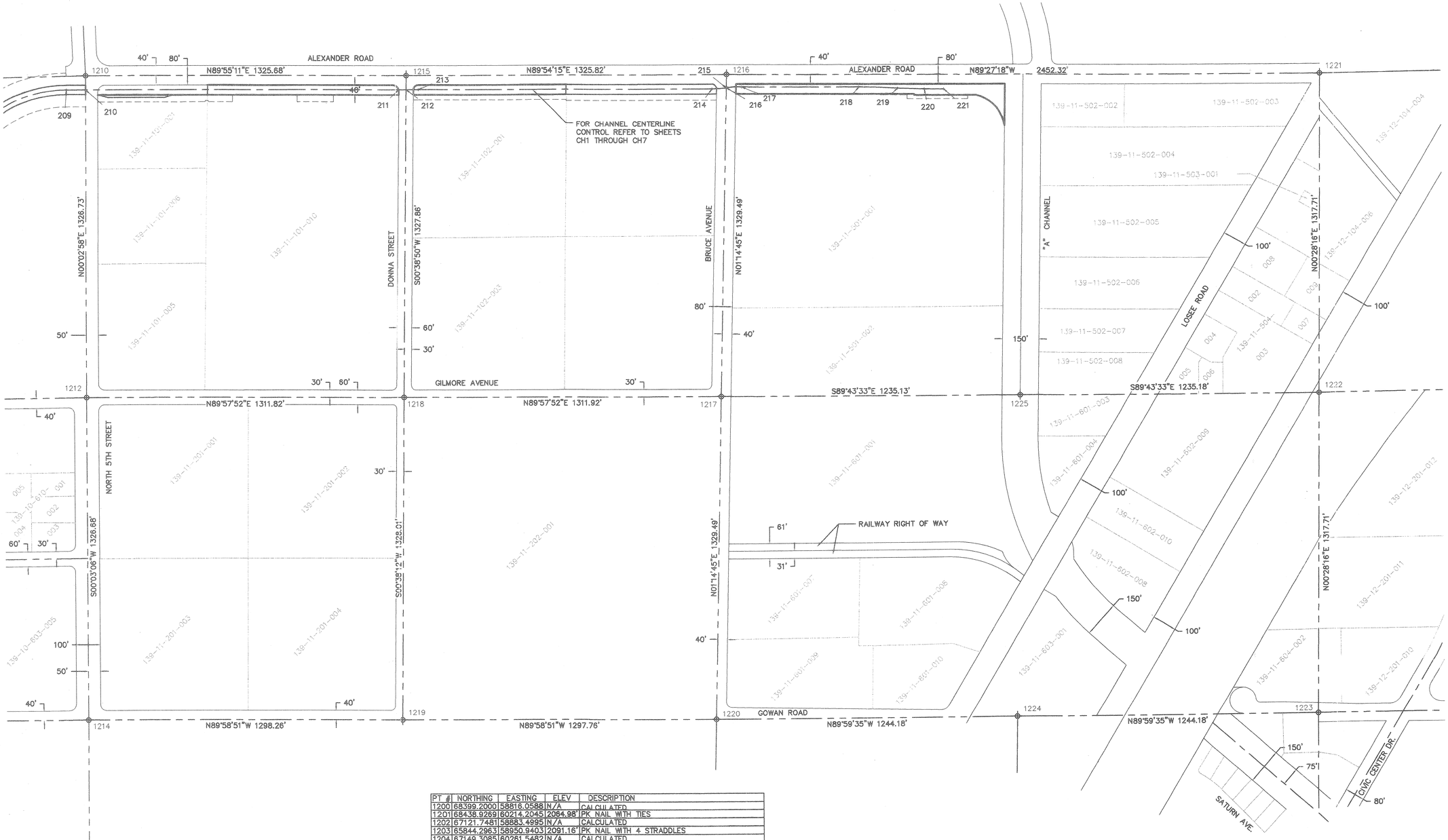
(DRAWING TITLE) PLAN AND PROFILE – PROJECT START TO STA. 17+00

(PROJECT TITLE) ALEXANDER CHANNEL

(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

SHEET NO. CH1 OF 46 SHEETS

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR – JUNE 2005



CHANNEL CENTERLINE CONTROL INFORMATION

209	68500.8418	64330.4336	STA. 40+47.05 P.T.
210	68500.9571	64409.9942	CL CHANNEL/SECTIONLINE
211	68502.8312	65704.7855	STA. 54+21.40 HORIZ. ANGLE
212	68502.8523	65735.0549	CL CHANNEL/SECTIONLINE
213	68502.8871	65785.0465	STA. 55+01.66 HORIZ. ANGLE
214	68504.5911	67000.8458	STA. 67+17.46 P.C.
215	68508.1583	67059.7692	STA. 67+76.53 P.R.C.
216	68508.2260	67060.3292	CL CHANNEL/SECTIONLINE
217	68511.7040	67124.1007	STA. 68+41.13 P.T.
218	68507.1430	67608.5232	STA. 73+25.45 P.C.
219	68500.7101	67768.4549	STA. 74+85.53 P.R.C.
220	68496.2583	67878.9981	STA. 75+96.18 P.T.
221	68495.4996	67958.7345	STA. 76+75.92

PT #	NORTHING	EASTING	ELEV	DESCRIPTION
1200	68399.2000	58816.0588	N/A	CALCULATED
1201	68438.9269	60214.2045	2064.98'	PK NAIL WITH TIES
1202	67121.7481	58883.4995	N/A	CALCULATED
1203	65844.2963	58950.9403	2091.16'	PK NAIL WITH 4 STRADDLES
1204	67149.3085	60261.5482	N/A	CALCULATED
1205	65859.7160	60308.7470	2072.93'	1 1/2" ALUMINUM CAP "PLS 8848"
1206	65875.2210	61667.0390	2048.36'	2" BRASS CAP "PLS 6895"
1207	67176.8701	61639.8580	N/A	CALCULATED
1208	68478.6537	61612.3502	N/A	CALCULATED
1209	68519.3068	63011.1976	N/A	CALCULATED
1210	68559.9600	64410.0450	1961.80'	4" CITY OF NORTH LAS VEGAS ALUMINUM CAP
1211	67205.0502	63024.2645	2012.14'	1 1/2" ALUMINUM MONUMENT "VTN RLS 6201"
1212	67233.2310	64408.9020	1960.23'	5/8" REBAR
1213	65890.8212	63037.3359	2012.72'	1 1/2" ALUMINUM CAP ILLEGIBLE
1214	65906.5560	64407.7080	1972.30'	TYPE I MONUMENT "VTN RLS 6201"
1215	68561.8180	65735.7210	1937.82'	CONCRETE NAIL
1216	68564.0388	67061.5430	1924.66'	2" BRASS CAP "PLS 7008"
1217	67234.8595	67032.6376	N/A	CALCULATED
1218	67234.0452	65720.7221	1935.93'	PK NAIL
1219	65906.1200	65705.9880	1932.88'	2" BRASS CAP "PLS 6625"
1220	65905.6842	67003.7324	N/A	CALCULATED
1221	68540.7070	69513.7520	1908.39'	4" CITY OF NORTH LAS VEGAS ALUMINUM CAP
1222	67223.0425	69502.9190	N/A	CALCULATED
1223	65905.3780	69492.0860	N/A	CALCULATED
1224	65905.4909	68247.9094	N/A	CALCULATED
1225	67228.9511	68267.7579	N/A	CALCULATED

LEGEND

- TEMPORARY CONSTRUCTION EASEMENT
- SECTIONLINE
- RIGHT-OF-WAY LINE
- AQUIRE RIGHT-OF-WAY
- 1201 CONTROL POINT NUMBER
- CONTROL POINT

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

NO.	DESCRIPTION	DATE	BY
△			
△			
△			
△1	RECORD DRAWING INFORMATION AS	6/30/2006	DRF
△	PROVIDED BY CAPRIATI CONSTRUCTION		

REVISIONS

SCALE: 1" = 200'
DESIGN:
DRAWN: T. COCHRAN
CHECKED: B. DALTON
APPROVED:
DATE: 5 JAN 04

PROFESSIONAL LAND SURVEYOR STATE OF NEVADA BARTLETT C. DALTON Exp. 12-31-04 No. 10161

CITY OF NORTH LAS VEGAS
SURVEY DIVISION
DEPT. OF PUBLIC WORKS
340 EAST BRIDGER AVENUE
NORTH LAS VEGAS, NEVADA

(DRAWING TITLE) SURVEY CONTROL PLAN

(PROJECT TITLE) ALEXANDER CHANNEL IMPROVEMENTS
COMMERCE STREET TO THE WESTERN TRIBUTARY

(LOCATION)

SHEET NO. SC2 OF SC2 SHEETS

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR – JUNE 2005

SCALE 1" = 200'

CHANNEL CENTERLINE CONTROL INFORMATION

200	67757.4858	61576.4675	STA. 10+00.00
201	67757.4868	61577.4673	STA. 10+01.00 P.C.
202	67799.0754	61633.3186	STA. 10+75.29 P.T.
203	67818.9024	61639.7060	STA. 10+96.12 P.C.
204	67858.7553	61625.3540	EXTENSION OF CL CHANNEL/SECTIONLINE
205	67860.4858	61695.3323	STA. 11+70.19 P.T.
206	67893.1804	63017.4228	CL CHANNEL/SECTIONLINE
207	67903.3344	63428.0277	STA. 29+03.41 P.C.
208	68202.0120	63873.4121	STA. 34+69.41 P.R.C.
209	68500.8418	64330.4336	STA. 40+47.05 P.T.
210	68500.9571	64409.9942	CL CHANNEL/SECTIONLINE

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1223	65905.3780	69492.0860	N/A	CALCULATED
1224	65905.4909	68247.9094	N/A	CALCULATED
1225	67228.9511	68267.7579	N/A	CALCULATED

BASIS OF BEARINGS

THE BASIS OF BEARINGS FOR THIS SURVEY IS N 88°22'21" E, BEING THE NORTH LINE OF THE NORTHWEST QUARTER OF SECTION 10 TOWNSHIP 20 SOUTH, RANGE 61 EAST, AS DEFINED BY THE CENTRAL MERIDIAN OF THE CITY OF NORTH LAS VEGAS USER DEFINED TRANSVERSE MERCATOR PROJECTION; SAID MERIDIAN BEING COINCIDENT WITH 115°05' 53.00" WEST OF THE GREENWICH MERIDIAN. ORIENTATION IS DEFINED BY THE HIGH ACCURACY REFERENCE NETWORK OF NEVADA, NATIONAL GEODETIC SURVEY. (EPOCH 1994)

CITY OF NORTH LAS VEGAS USER DEFINED TRANSVERSE MERCATOR PROJECTION PARAMETERS:

CENTRAL MERIDIAN = 115°05' 53.00" WEST
LATITUDE OF ORIGIN = 36°15' 00.00" NORTH
ORIGIN NORTHING = 75000.0000 U.S. FEET
ORIGIN EASTING = 75000.0000 U.S. FEET
SCALE ALONG CENTRAL MERIDIAN = 1.000093468437

REFERENCE ELLIPSOID = GRS-80
SEMI-MAJOR AXIS = 20,925,604.474 U.S. FEET
FLATTENING (1/f) = 298.25722154
X TRANSLATION = 0.0000
Y TRANSLATION = 0.0000
Z TRANSLATION = 0.0000

VERTICAL ADJUSTMENT PARAMETERS:

A VERTICAL ADJUSTMENT HAS BEEN APPLIED USING A PRIMARY RESIDUAL GEOID MODEL BASED UPON THE ORIGINAL PARAMETERS OF GEOID '96 AND FURTHER REFINED USING LOCAL ELEVATIONS. THE ORTHOMETRIC ELEVATIONS USED TO DEVELOP SAID PRIMARY RESIDUAL MODEL ARE IN REFERENCE TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 AND WERE TAKEN FROM THE CITY OF NORTH LAS VEGAS BENCHMARK BOOK, REVISED, AUGUST 1ST, 1997.

SURVEYOR'S NOTE:

MEASUREMENTS FOR THIS SURVEY WERE COMPILED UTILIZING TRIMBLE 4000SSI AND 4700 DUAL FREQUENCY GLOBAL POSITIONING (GPS) RECEIVERS OPERATED IN THE FAST-STATIC AND REAL-TIME KINEMATIC MODES. INFORMATION PERTAINING TO THIS SURVEY IS ON FILE AND MAY BE REVIEWED AT THE OFFICE OF THE NORTH LAS VEGAS CITY SURVEYOR DURING NORMAL BUSINESS

NAVD88 BENCHMARK

NLV0110NWS ELEVATION 636.327 METERS (2087.683 FEET)
RIVET AND 2" ROUND ALUMINUM DISK, STAMPED NORTH LAS VEGAS BM No. NLV0110NWS, IN THE TOP OF CURB AT THE SOUTHEAST CORNER OF THE INTERSECTION OF ALEXANDER ROAD AND REVERE.

LEGEND

- TEMPORARY CONSTRUCTION EASMENT
- SECTIONLINE
- RIGHT-OF-WAY LINE
- AQUIRE RIGHT-OF-WAY
- 1201 CONTROL POINT NUMBER
- CONTROL POINT

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

NO.	DESCRIPTION	DATE	BY
1	RECORD DRAWING INFORMATION AS PROVIDED BY CAPRIATI CONSTRUCTION	6/30/2005	DRF

SCALE: 1" = 200'
DESIGN:
DRAWN: T. COCHRAN
CHECKED: B. DALTON
APPROVED:
DATE: 5 Jan 06

STATE OF NEVADA PROFESSIONAL ENGINEER BARTLETT D. DALTON Exp: 12-31-06 No. 10180 5 Jan 06

CITY OF NORTH LAS VEGAS

DEPT. OF PUBLIC WORKS
ENGINEERING SERVICES DIVISION
NORTH LAS VEGAS, NEVADA

SURVEY DIVISION

(DRAWING TITLE) SURVEY CONTROL PLAN

(PROJECT TITLE) ALEXANDER CHANNEL IMPROVEMENTS

(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

SHEET NO. SC1 OF SC2 SHEETS

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR - JUNE 2005

GENERAL CONSTRUCTION NOTES

1. THE CONTRACTOR IS RESPONSIBLE FOR SECURING ALL PROJECT PERMITS, EXCEPT THOSE NOTED AS HAVING BEEN OBTAINED BY THE CITY, AND COMPLYING WITH ALL TERMS AND CONDITIONS IMPOSED BY THE PERMITTING AGENCIES.

2. THE CONTRACTOR SHALL PROVIDE AT LEAST SEVENTY-TWO (72) HOURS NOTICE TO EACH OF THE FOLLOWING AGENCIES CONFIRMING THE SCHEDULED START OF CONSTRUCTION:

CITY OF NORTH LAS VEGAS UTILITIES DIVISION	(702) 633-1290
COX COMMUNICATION	(702) 385-3644
NEVADA POWER COMPANY	(702) 227-2600
SPRINT TELEPHONE COMPANY	(702) 227-2600
SOUTHWEST GAS CORPORATION	(702) 227-2600
KERN RIVER PIPELINE	(702) 399-1612

3. INFORMATION NOTED ON THE DRAWINGS CONCERNING THE EXISTENCE AND LOCATION OF EXISTING UNDERGROUND UTILITIES AND OTHER UNDERGROUND STRUCTURES WERE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. THE CITY OF NORTH LAS VEGAS (CITY), AND RESPONSIBLE PROFESSIONAL MAKE NO ASSURANCES CONCERNING THE ACCURACY OF SUCH INFORMATION. THE CONTRACTOR SHALL EXERCISE CAUTION AND USE BEST AVAILABLE CONSTRUCTION TECHNIQUES TO DETERMINE THE ACTUAL LOCATION OF AND PROTECTION FOR ALL UNDERGROUND UTILITIES WHETHER OR NOT THEY ARE SHOWN ON THE PLANS. THE CONTRACTOR SHALL:

CALL BEFORE YOU DIG	1-800-227-2600
CALL BEFORE YOU OVERHEAD	1-702-593-6111

4. THE CONTRACTOR SHALL EXERCISE CAUTION AND USE BEST AVAILABLE CONSTRUCTION TECHNIQUES TO PROTECT AND PRESERVE EXISTING PERMANENT SURVEY MONUMENTS. ALL SURVEY MONUMENTS DISTURBED SHALL BE REPLACED AND/OR REHABILITATED IN ACCORDANCE WITH STANDARDS BY A PROFESSIONAL LAND SURVEYOR RETAINED BY THE CONTRACTOR.

5. THE CONTRACTOR SHALL EXERCISE CAUTION AND USE BEST AVAILABLE CONSTRUCTION TECHNIQUES TO PROTECT AND PRESERVE EXISTING PUBLIC AND PRIVATE FEATURES LOCATED IN CLOSE PROXIMITY TO OR ABUTTING IMPROVEMENTS SHOWN ON THESE PLANS. RESTORATION OF DAMAGED FEATURES SHALL BE ACCOMPLISHED BY THE CONTRACTOR AT THE CONTRACTOR'S EXPENSE TO THE SATISFACTION OF THE CONSTRUCTION MANAGER.

6. THE LOCATION OF ALL SAWCUT LINES FOR THE PROJECT WILL BE DETERMINED BY THE CONSTRUCTION MANAGER IF THE LOCATION IS NOT CLEARLY SHOWN ON THE DRAWINGS OR IF EXISTING CONDITIONS REQUIRE ADJUSTMENT TO THE LOCATION SHOWN ON THE DRAWINGS.

7. THE CONTRACTOR SHALL COOPERATE AND COORDINATE WITH THE CONSTRUCTION MANAGER IN PROVIDING INGRESS AND EGRESS TO ABUTTING PROPERTIES, AND SHALL PROTECT SUCH PROPERTIES FROM PROJECT RELATED STORM WATER AND NUISANCE RUNOFF BY PROVIDING TEMPORARY POSITIVE DRAINAGE CONTROL.

8. PLANTMIX BITUMINOUS ASPHALT SHALL BE FINISHED TO A HEIGHT OF BETWEEN 3/8 INCHES AND 5/8 INCHES ABOVE THE LIP OF CURB GUTTERS AND VALLEY GUTTERS.

9. TYPE V CEMENT SHALL BE USED FOR ALL OFF-SITE IMPROVEMENTS.

10. CURB AND GUTTER HAVING A DESIGN GRADE OF 0.5 PERCENT OR LESS SHALL BE CONTRUCTED BY FORMING. FORM GRADES AND ELEVATIONS SHALL BE VERIFIED PRIOR TO PLACEMENT OF CONCRETE AND WATER FLOW TESTED AS SOON AFTER PLACEMENT AS AS CURING ALLOWS.

11. CONCRETE AND ASPHALT CONCRETE MIX DESIGNS SHALL BE PROJECT SPECIFIC, INTER-AGENCY QUALITY ASSURANCE COMMITTEE (IQAC) LISTED, AND APPROVED BY THE CONSTRUCTION MANAGER AND CONSTRUCTION SERVICES DIVISION PRIOR TO PLACEMENTS.

12. UTILITY BOXES AND VAULTS LOCATED IN THE SIDEWALK AREA ARE TO BE CONSTRUCTED TO THE FINISH DESIGN GRADE. THE ELEVATION SHALL BE CONSISTENT WITH THAT REQUIRED FOR THE STANDARD CONCRETE CITY SIDEWALK EVEN IF THE CONCRETE SIDEWALK CONSTRUCTION IS DEFERRED TO A FUTURE DATE.

13. THE CONTRACTOR SHALL PROVIDE REASONABLE ACCOMMODATIONS FOR CITY SURVEY DIVISION TO OBTAIN GPS/GIS DATA ON ALL UNDERGROUND UTILITIES AND INFRASTRUCTURE.

14. ALL OFF-SITE IMPROVEMENTS SUBGRADE MUST BE CERTIFIED BY THE CONSTRUCTION SERVICES DIVISION.

15. THE CONTRACTOR SHALL INSCRIBE AN "S", 3-INCHES IN HEIGHT, INTO THE CURB AT THE POINT WHERE THE SEWER LATERAL ENTERS EACH SUBDIVISION LOT OR PRIVATE LAND PARCEL.

16. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS' CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA (LATEST EDITION)" AND UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS' CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA (LATEST EDITION)", UNLESS OTHERWISE SPECIFIED BY NOTE ON THE PLANS AND/OR SPECIAL PROVISIONS.

17. A SOILS REPORT HAS BEEN PERFORMED BY KLEINFELDER AND IS AVAILABLE FOR PURCHASE AT PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION, 2288 CIVIC CENTER DRIVE, NORTH LAS VEGAS, NEVADA, 89030. THIS GEOTECHNICAL REPORT IS A REFERENCED DOCUMENT ONLY AND IS NOT PART OF THE CONTRACT. KLEINFELDER REPORT NO. 31-110033, DATED MAY 4, 2001.

18. TOPOGRAPHY PROVIDED BY AEROTECH MAPPING, FLIGHT DATE OF JULY 21, 2003.

19. ALL LEFT AND RIGHT REFERENCES ARE LOOKING UPSTATION / DOWNSTREAM.

20. CONTRACTOR SHALL OBTAIN APPROVAL FROM THE CITY OF NORTH LAS VEGAS FOR DISPOSAL SITES AND HAUL ROUTES. CONTACT RAY BURKE AT (702) 633-1238.

GENERAL WATER LINE CONSTRUCTION NOTES

1. NO WATER MAIN MAY BE SHUT DOWN TO MAKE CONNECTIONS WITHOUT PRIOR APPROVAL OF THE CITY'S MANAGER OF UTILITIES.

2. ALL WATER METERS TWO (2) INCHES AND SMALLER SHALL BE OBTAINED FROM THE CITY. REQUESTS FOR WATER METERS MUST BE MADE TO THE NORTH LAS VEGAS UTILITIES DIVISION AT LEAST ONE (1) BUSINESS DAY PRIOR TO PICKUP. (TELEPHONE NUMBER (702) 633-1277).

3. ALL SERVICE LATERALS TWO (2) INCHES AND SMALLER SHALL BE COPPER TUBING WITH APPROVED SERVICE SADDLES. CORPORATION STOPS AND ANGLE METER STOPS SHALL BE THE SAME SIZE AS THE SERVICE LATERAL. ANGLE METER STOPS AND METER SHALL BE CENTERED IN THE METER BOX.

4. ALL METER BOXES SHALL BE EQUIPPED WITH TRAFFIC BEARING COVERS AND INSTALLED TO THE FINISH DESIGN GRADE AND ELEVATION. IF SUCH IS NOT SHOWN ON THE PLANS, THE ELEVATION WILL BE ESTABLISHED BY THE CONSTRUCTION MANAGER.

5. WARNING TAPE SHALL BE REQUIRED ABOVE ALL WATER MAINS, SERVICE LATERALS THAT ARE SIX (6) INCHES AND LARGER, AND ANY SERVICE LATERAL NOT INSTALLED PERPENDICULAR TO THE MAIN LINE.

6. ALL WATER MAINS SHALL BE FILLED, PRESSURE TESTED IN ACCORDANCE WITH THE SPECIAL PROVISIONS, DISINFECTED, FLUSHED, REFILLED AND AN ACCEPTABLE WATER SAMPLE OBTAINED, PRIOR TO CONNECTION TO THE CITY'S WATER DISTRIBUTION SYSTEM. WATER QUALITY SAMPLES WILL BE COLLECTED BY THE CITY. CONTACT THE CITY UTILITIES DIVISION TWENTY-FOUR (24) HOURS IN ADVANCE TO SCHEDULE SAMPLING.

7. ALL BACKFLOW PREVENTION ASSEMBLIES SHALL BE TESTED AND CERTIFIED BY THE CITY PRIOR TO PLACING THE WATER SYSTEM IN SERVICE. CONTACT THE CITY UTILITIES DIVISION TWENTY-FOUR (24) HOURS IN ADVANCE TO SCHEDULE TESTING.

8. ON ANY BUILDING CONSTRUCTION PROJECT UTILIZING COMBUSTIBLE CONSTRUCTION, THE CONTRACTOR SHALL INSTALL ACCESSIBLE FIRE HYDRANTS BEFORE ACTUAL CONSTRUCTION COMMENCES. FIRE HYDRANTS SHALL BE PROVIDED WITHIN 300 FEET OF COMBUSTIBLE MATERIAL STORAGE AND FRAMING CONSTRUCTION. A HYDRANT FLOW TEST IS REQUIRED, WHICH SHALL INCLUDE STATIC PRESSURE AND WATER FLOW VOLUME SHOWING THE ABILITY TO MEET THE REQUIRED FIRE FLOW, AND MUST BE PRESENTED TO THE NORTH LAS VEGAS FIRE DEPARTMENT AND PUBLIC WORKS.

GENERAL GRADING AND DRAINAGE NOTES

1. THE CONTRACTOR'S OPERATIONS SHALL NOT TRESPASS BEYOND THE PROJECT PROPERTY LINES UNLESS A PERMIT OR WRITTEN AUTHORIZATION HAS BEEN OBTAINED FROM THE PROPERTY OWNER(S) INVOLVED. COPIES OF SUCH WRITTEN AUTHORIZATION SHALL BE FURNISHED TO THE CONSTRUCTION MANAGER PRIOR TO START OF CONSTRUCTION.

2. THE CONSTRUCTION MANAGER SHALL BE NOTIFIED TWO (2) WORKING DAYS BEFORE ANY ON-SITE CONSTRUCTION WORK BEGINS.

3. THE CONSTRUCTION SERVICES DIVISION SHALL CERTIFY THAT ALL FILLS, FOUNDATIONS AND SUBGRADES MEET THE MINIMUM COMPACTION REQUIREMENTS PRIOR TO PLACING CONCRETE.

GENERAL TRAFFIC AND WIRING NOTES

1. THE CONTRACTOR SHALL SUBMIT A WRITTEN AND DIAGRAMED TRAFFIC CONTROL AND BARRICADE PLAN ON 24" x 36" REPRODUCIBLE MYLAR FOR APPROVAL. ALL BARRICADING, CONSTRUCTION SIGNING, TRAFFIC DELINEATION AND MARKINGS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES AND / OR WORK ZONE TRAFFIC CONTROL HANDBOOK. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO SEE THAT ALL TRAFFIC CONTROL DEVICES ARE INSTALLED IN ACCORDANCE WITH THE APPROVED TRAFFIC CONTROL AND BARRICADE PLAN AND ARE PROPERLY INSTALLED AND MAINTAINED THROUGHOUT THE DURATION OF THE PROJECT.

2. IF THE PROJECT IMPROVEMENTS NECESSITATE, TEMPORARY REMOVAL AND/OR RELOCATION OF TRAFFIC CONTROL SIGNS, MARKINGS OR ANY OTHER TRAFFIC CONTROL DEVICES, THEY SHALL BE MAINTAINED THROUGHOUT THE ENTIRE DURATION OF THE PROJECT AND SHALL BE RESTORED TO THE SATISFACTION OF THE CONSTRUCTION MANAGER.

3. PAINTED MARKINGS SHALL NOT BE USED FOR TEMPORARY CONDITIONS. ALL TEMPORARY MARKINGS SHALL BE A REMOVABLE GRADE TAPE. ALL OTHER MARKINGS SHALL BE PER CLARK COUNTY UNIFORM STANDARD DRAWING 244 THROUGH 248 AND MEET THE SATISFACTION OF THE MANAGER OF ROADWAY OPERATIONS.

4. ALL PERMANENT TRAFFIC CONTROL DEVICES SHALL BE PROPERLY INSTALLED IN ACCORDANCE WITH THE LATEST EDITION OF THE MUTCD AND/OR THE RTC STANDARDS PRIOR TO ALLOWING ANY PUBLIC TRAFFIC ONTO THE STREETS, REGARDLESS OF THE STATUS OF THEIR COMPLETION.

5. ALL TEMPORARY REGULATORY SIGNAGE SHALL BE GROUND MOUNTED IN ACCORDANCE WITH THE UNIFORM STANDARD DRAWING NUMBER 249 AND MEET THE MOST RECENT MUTCD REQUIREMENTS.

6. THE LOCATIONS OF CONDUIT ENDS OF ALL CONDUIT IN STRUCTURES OR TERMINATING AT CURBS SHALL BE MARKED BY A (X) AT LEAST 3 INCHES HIGH CUT INTO THE FACE OF CURBS, GUTTER, OR WALL DIRECTLY ABOVE THE CONDUIT. ALL CONDUITS AT LIMITS OF CONSTRUCTION SHALL BE STUBBED AND CAPPED 5 FEET PAST PROPERTY LINE AND/OR CONNECTED TO EXISTING STREET LIGHTING CONDUIT.

7. ALL CONDUITS FOR FUTURE USE SHALL BE BLOWN OUT WITH COMPRESSED AIR, CLEANED, MANDRELLED, TRACE WIRE AND PROVIDED WITH A 200 POUND PULL LINE; ALL ENDS OF CONDUITS SHALL BE CAPPED.

8. ALL SERVICE PANELS SHALL BE PER CLARK COUNTY UNIFORM STANDARD SPECIFICATION DRAWING NO. 330. THE PHOTO CELL SHALL BE A TYPE II, TORK 2007 OR EQUAL AND BE MOUNTED ON TOP OF THE NEAREST PERMANENT STREET LIGHT POLE. A SWITCH SHALL BE INCLUDED FOR MANUAL OPERATION (USS 623 L.02.06).

9. THE CONSTRUCTION SERVICES DIVISION SHALL BE NOTIFIED 24 HOURS IN ADVANCE TO SCHEDULE AN INSPECTION OF THE WIRING MAKEUP/SERVICE POINT.

10. STREET LIGHTS SHALL BE PLACED IN ACCORDANCE WITH UNIFORM STANDARD DRAWING NUMBER 320 THRU 320A, UNLESS OTHERWISE NOTED. STANDARDS AND MAST ARMS SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A-120.

11. "NO PARKING" ZONES AT CURB RETURNS, FIRE HYDRANT ZONES AND SCHOOL ZONES SHALL BE PAINTED RED TO THE LIMITS NOTED ON THE PLANS.

AVOID OVERHEAD POWER LINE CONTACT. IT'S COSTLY
Call before you Overhead
1-702-593-6111
NEVADA POWER ENVIRONMENT AND SAFETY SERVICES DEPARTMENT

AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY.
Call before you Dig
1-800-227-2600
UNDERGROUND SERVICE (USA)

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

REVISIONS			
NO.	DESCRIPTION	DATE	BY
1			
2			
3			
4	RECORD DRAWING INFORMATION AS PROVIDED BY CAPRIATI CONSTRUCTION	6/30/2005	DRF
5			

SCALE: N/A
DESIGN: N/A
DRAWN: DJB
CHECKED: JNG
APPROVED: KDG
DATE: 12/31/2003

ORIGINAL CONSTRUCTION DRAWINGS ARE ON FILE WITH THE CITY OF NORTH LAS VEGAS. THE DOCUMENTS WERE SEALED ON 12/29/03 BY KEN D. GILBRETH UNDER LICENSE NO. 9177

vtn nevada
• CONSULTING ENGINEERS
• PLANNERS
• LAND SURVEYORS
2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-5148
PHONE (702) 362-2759
FAX (702) 362-2597

(DRAWING TITLE) CITY OF NORTH LAS VEGAS STANDARD NOTES

(PROJECT TITLE) ALEXANDER CHANNEL

(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

SHEET NO. G3 OF 46 SHEETS

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR - JUNE 2005

ABBREVIATIONS

&	AND
@	AT
AC	ASPHALTIC CONCRETE
ALT	ALTERNATE
ANG.	ANGLE
APN	ASSESSORS PARCEL NUMBER
APPROX	APPROXIMATE
ASSY	ASSEMBLY
ASTM	AMERICAN SOCIETY OF TESTING MATERIALS
BC	BOLT CIRCLE
BFV	BUTTERFLY VALVE
BK	BOOK
BLK	BLOCK
CCSD	CLARK COUNTY SANITATION DISTRICT
CFS	CUBIC FEET PER SECOND
CHAN	CHANNEL
CI	CUBIC INCH
CL OR ℄	CENTER LINE
CLR	CLEAR
CLF	CHAIN LINK FENCE
COMB	COMBINATION
CONC	CONCRETE
CONST	CONSTRUCT
D OR Δ	DELTA
DI	DUCTILE IRON
DIA	DIAMETER
DWG	DRAWING
DWGS	DRAWINGS
E	EAST
EG	EXISTING GROUND
EL OR ELEV	ELEVATION
ELEC	ELECTRICAL
EP	EDGE OF PAVEMENT
ESMT	EASEMENT
ETC	ETCETERA
EX OR EXIST	EXISTING
FG	FINISH GRADE
FL	FLOW LINE
FLG	FLANGE
FO	FIBER OPTICS
FT	FEET
FUT	FUTURE
GALV	GALVANIZED
H or HORIZ	HORIZONTAL
HD	HEAD
HGL	HYDRAULIC GRADE LINE
INST	INSTRUMENT
INV	INVERT
L	LENGTH
LF	LINEAL FEET
LG	LONG
LT	LEFT
MAINT	MAINTENANCE
MAX	MAXIMUM
MECH	MECHANICAL
MIN	MINIMUM
MJ	MECHANICAL JOINT
MLC	MORTAR LINED AND COATED
MLCP	MORTAR LINED AND COATED PIPE
MOD	MODIFIED
N	NORTH
N.D.O.T.	NEVADA DEPARTMENT OF TRANSPORTATION
NTS	NOT TO SCALE
NC	NATIONAL COARSE THREAD
NO	NUMBER
NRS	NEVADA REVISED STATUTES/NON-RISING STEM
NW	NORTHWEST
OC	ON CENTER
OD	OUTSIDE DIAMETER
OH	OVERHEAD
PG	PROFILE GRADE
P/R	PATENT RESERVATION
PC	POINT OF CURVATURE
PCC	POINT OF COMPOUND CURVE
PE	PLAIN END/POLYETHYLENE PIPE
PG	PROFILE GRADE
PKWY	PARKWAY
PLS	PROFESSIONAL LAND SURVEYOR
PO	PUSH ON
PROP	PROPOSED
PSI	POUNDS PER SQUARE INCH
PT	POINT OF TANGENCY
PVC	POLYVINYL CHLORIDE
R/W	RIGHT OF WAY
R	RADIUS
RCB	REINFORCED CONCRETE BOX
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
RECT	RECTANGULAR
REQD	REQUIRED
RFCD	REGIONAL FLOOD CONTROL DISTRICT
RJ	RIGID JOINT
RP	RADIUS POINT
RT	RIGHT
S	SOUTH OR SLOPE
S/W	SIDEWALK
SCH	SCHEDULE
SD	STORM DRAIN
SDMH	STORM DRAIN MANHOLE
SEC	SECTION
SHT	SHEET
SPECS	SPECIFICATIONS
SQ	SQUARE
SS	SANITARY SEWER/STAINLESS STEEL
SSMH	SANITARY SEWER MANHOLE
ST	STREET
STA	STATION
STD	STANDARD
STL	STEEL
SWG	SOUTHWEST GAS COMPANY
T	TANGENT
T.C.E.	TEMPORARY CONSTRUCTION EASEMENT
TEL	TELEPHONE
TEMP	TEMPORARY
THK	THICK
THR	THRUST
TOW	TOP OF WALL
TRAP	TRAPEZOIDAL
TYP	TYPICAL
UG	UNDERGROUND
U.N.O.	UNLESS NOTED OTHERWISE
V or VERT	V or VERTICAL
VAR	VARIES
VICT	VICINITY
W	WEST
W/	WITH

GENERAL LEGEND

- EXISTING CURB & GUTTER
- EXISTING EDGE OF PAVEMENT
- EXISTING RIGHT-OF-WAY
- EXISTING CABLE TELEVISION LINE(S) (CATV)
- EXISTING GAS LINE (SIZE VARIES) (4" G)
- EXISTING SEWER LINE (SIZE VARIES) (12" SS)
- EXISTING WATER LINE (SIZE VARIES) (8" W)
- EXISTING TELEPHONE CABLE/CONDUIT(S) (TEL)
- EXISTING STORM DRAIN (SIZE VARIES) (18" SD)
- EXISTING UNDERGROUND ELECTRIC LINE(S) (UGE)
- EXISTING FENCE LINE
- EXISTING BLOCK AND/OR RETAINING WALL
- EXISTING VALVE
- EXISTING MANHOLE OR POWER POLE
- (2220.25) EXISTING ELEVATION
- PROPOSED RIGHT-OF-WAY
- PROPOSED TEMPORARY GRADING EASEMENT
- PROPOSED CHAIN LINK FENCE LINE
- PROPOSED ORNAMENTAL FENCE LINE
- PROPOSED POST & CABLE CHANNEL RAILING
- PROPOSED DOUBLE-SWING GATE
- PROPOSED SINGLE-SWING GATE
- PROPOSED TEMPORARY GRADING EASEMENT
- PROPOSED CONCRETE
- PROPOSED MAINTENANCE ROAD
- PROPOSED DRIVEWAY PAVEMENT
- PROPOSED RIP RAP
- PROPOSED RCB

UTILITY CONTACT LIST

UTILITY	CONTACT	PHONE NO.
AT & T FIBER OPTIC CABLE	EARL ALVEY	736-3470
COX COMMUNICATIONS	DONEY VILLAREAL	384-8084
CNLV - WATER/SEWER	KIRK MEDINA	633-1283
FAST	NEIL T. ROHLEDER	299-6611
MCI WORLD-COM	JON H. NICK, JR.	697-2356
NEVADA POWER	PRISCILLA RAUDENBUSH	657-4349
SNWA	PAUL SNIPES	568-1637
SOUTHWEST GAS	WILLIAM GRENNAN	365-2438
SPRINT	JOYCE VEITHS	244-6040

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UNDERGROUND SERVICE (USA)

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

REVISIONS			
NO.	DESCRIPTION	DATE	BY
Δ			
Δ			
Δ			
Δ	RECORD DRAWING INFORMATION AS PROVIDED BY CAPRIATI CONSTRUCTION	6/30/2005	DRF

SCALE: N/A
DESIGN: N/A
DRAWN: DJB
CHECKED: JNG
APPROVED: KDG
DATE: 12/31/2003

ORIGINAL CONSTRUCTION DRAWINGS ARE ON FILE WITH THE CITY OF NORTH LAS VEGAS. THE DOCUMENTS WERE SEALED ON 12/27/00 BY KEN D. GILBRETH UNDER LICENSE NO. 9977

vtn nevada
CONSULTING ENGINEERS
PLANNERS
LAND SURVEYORS
2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-5148
PHONE (702) 382-1555
FAX (702) 382-2597

(DRAWING TITLE) ABBREVIATIONS, LEGEND AND UTILITY CONTACTS

(PROJECT TITLE) ALEXANDER CHANNEL

(LOCATION) COMMERCE STREET TO THE WESTERN TRIBUTARY

SHEET NO. G2 OF 46 SHEETS

RECORD DRAWINGS INFORMATION SUPPLIED BY CONTRACTOR - JUNE 2005

Appendix E: References

LOMR Reference Material

Case No. 02-09-1104P

Federal Emergency Management Agency

Washington, D.C. 20472

2002 SEP 23 PM 2:33 RFCD

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 02-09-1104P

The Honorable Michael Montandon
Mayor, City of North Las Vegas
2200 Civic Center Drive
North Las Vegas, NV 89030

Community: City of North Las Vegas, NV
Community No.: 320007
Panel Affected: 32003C2160 D
Effective Date of This Revision: SEP 17 2002

102-D

Dear Mayor Montandon:

This responds to a request that the Federal Emergency Management Agency (FEMA) revise the effective Flood Insurance Rate Map (FIRM) for Clark County, Nevada and Incorporated Areas (the effective FIRM for your community), in accordance with Part 65 of the National Flood Insurance Program (NFIP) regulations. In a letter dated June 5, 2002, Mr. Grant Tokumi, Southwest Engineering, requested that FEMA revise the FIRM to show the effects of a constructed channel along an unnamed wash from approximately 400 feet downstream of Penny Cross Drive to just upstream of West Alexander Road (extended) and construction of two 54-inch-diameter corrugated-metal pipe culverts near the intersection of West Alexander Road (extended) and Commerce Street. This request follows up on a Conditional Letter of Map Revision issued on February 1, 2001.

All data required to complete our review of this request were submitted with letters from Mr. Tokumi.

We have completed our review of the submitted data and the flood data shown on the effective FIRM. We have revised the FIRM to modify the floodplain boundary delineations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) along the above-referenced revised reach of the unnamed wash. As a result of the modifications, the base flood is contained in the channel along the above-referenced revised reach of the unnamed wash. Also as a result of the modifications the following two flood hazard areas were removed: a Special Flood Hazard Area (SFHA), an area that would be inundated by the base flood, designated Zone A, with no Base Flood Elevations determined, that began just east of Kings Hill Street and joined the unnamed wash approximately 350 feet upstream of West Alexander Road (extended); and an area designated Zone X (shaded), an area that would be inundated by the base flood with average depths of less than 1 foot or with a drainage area less than 1 square mile, that began approximately 700 feet east of Desert Oak Street and joined the unnamed wash approximately 800 feet upstream of West Alexander Road (extended). The modifications are shown on the enclosed annotated copy of FIRM Panel 32003C2160 D. This Letter of Map Revision (LOMR) hereby revises the above-referenced panel of the effective FIRM dated August 16, 1995.

The modifications are effective as of the date shown above. The map panel listed above and as modified by this letter will be used for all flood insurance policies and renewals issued for your community.

A review of the determination made by this LOMR and any requests to alter this determination should be made within 30 days. Any request to alter the determination must be based on scientific or technical data.

We are processing a revised FIRM and Flood Insurance Study (FIS) report for Clark County, Nevada and Incorporated Areas. The FIRM and FIS report, which include flood hazard information for your community, will become effective on September 27, 2002. Because the effective date has already been established, we will not incorporate the modifications made by this LOMR into the FIRM and FIS report before they become effective. Therefore, the modifications made by this LOMR will be superseded when the FIRM and FIS report become effective. After the effective date, we will issue a letter to revalidate the modifications made by this LOMR and revise the newly effective FIRM and FIS report.

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

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

Because this LOMR will not be printed and distributed to primary users, such as local insurance agents and mortgage lenders, your community will serve as a repository for these new data. We encourage you to disseminate the information reflected by this LOMR throughout the community, so that interested persons, such as property owners, local insurance agents, and mortgage lenders, may benefit from the information. We also encourage you to prepare an article for publication in your community's local newspaper. This article should describe the changes that have been made and the assistance that officials of your community will give to interested persons by providing these data and interpreting the NFIP maps.

This determination has been made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and is in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria are the minimum requirements and do not supersede any State or local requirements of a more stringent nature. This includes adoption of the effective FIRM to which the regulations apply and the modifications described in this LOMR.

If you have any questions regarding floodplain management regulations for your community or the NFIP in general, please contact the Consultation Coordination Officer (CCO) for your community. Information on the CCO for your community may be obtained by calling the Chief, Community

Mitigation Programs Branch, Mitigation Division of FEMA in Oakland, California, at (510) 627-7184. If you have any questions regarding this LOMR, please call our Map Assistance Center, toll free, at 1-877-FEMA MAP (1-877-336-2627).

Sincerely,

Max H. Yuan, P.E., Project Engineer
Hazards Study Branch
Federal Insurance and
Mitigation Administration

For: Matthew B. Miller, P.E., Chief
Hazards Study Branch
Federal Insurance and
Mitigation Administration

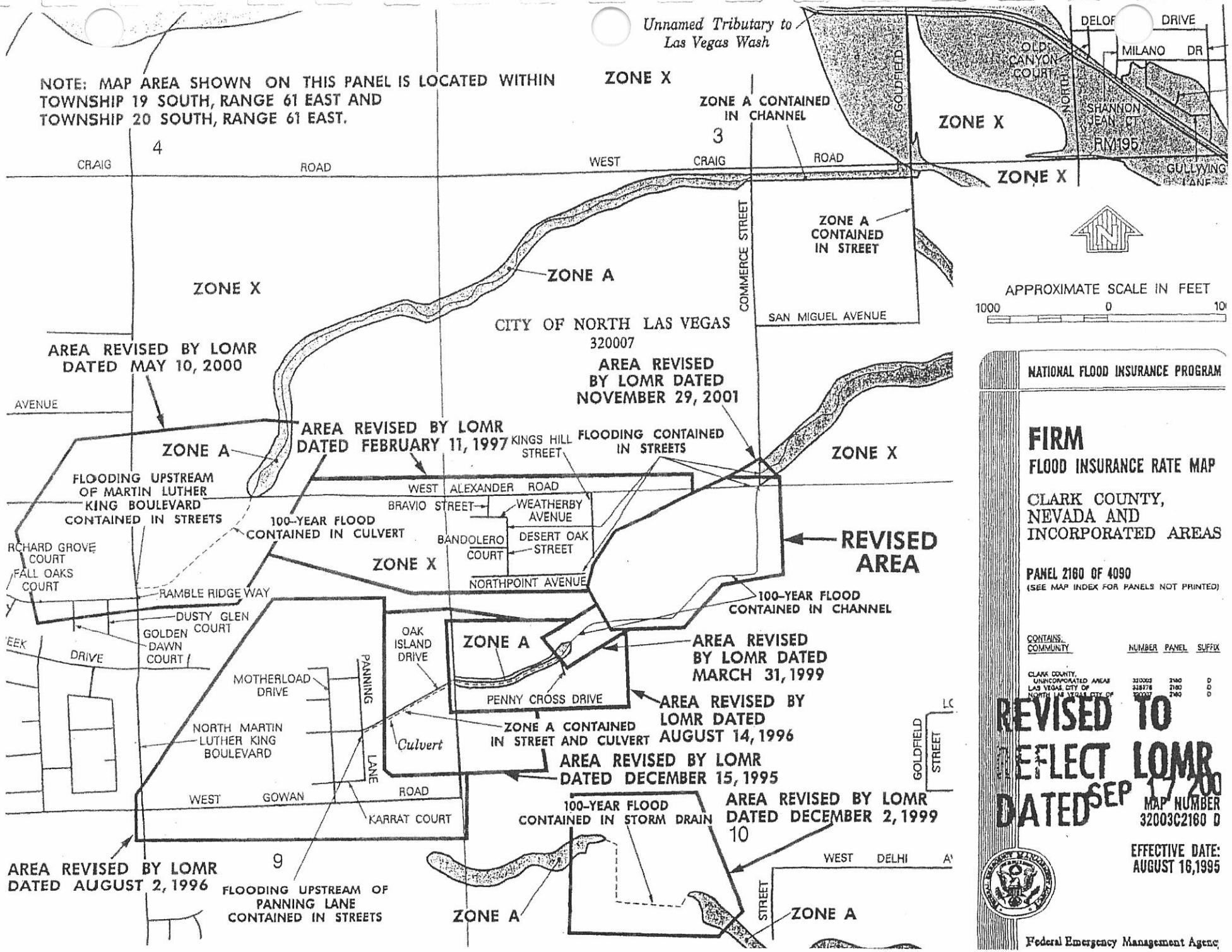
Enclosure

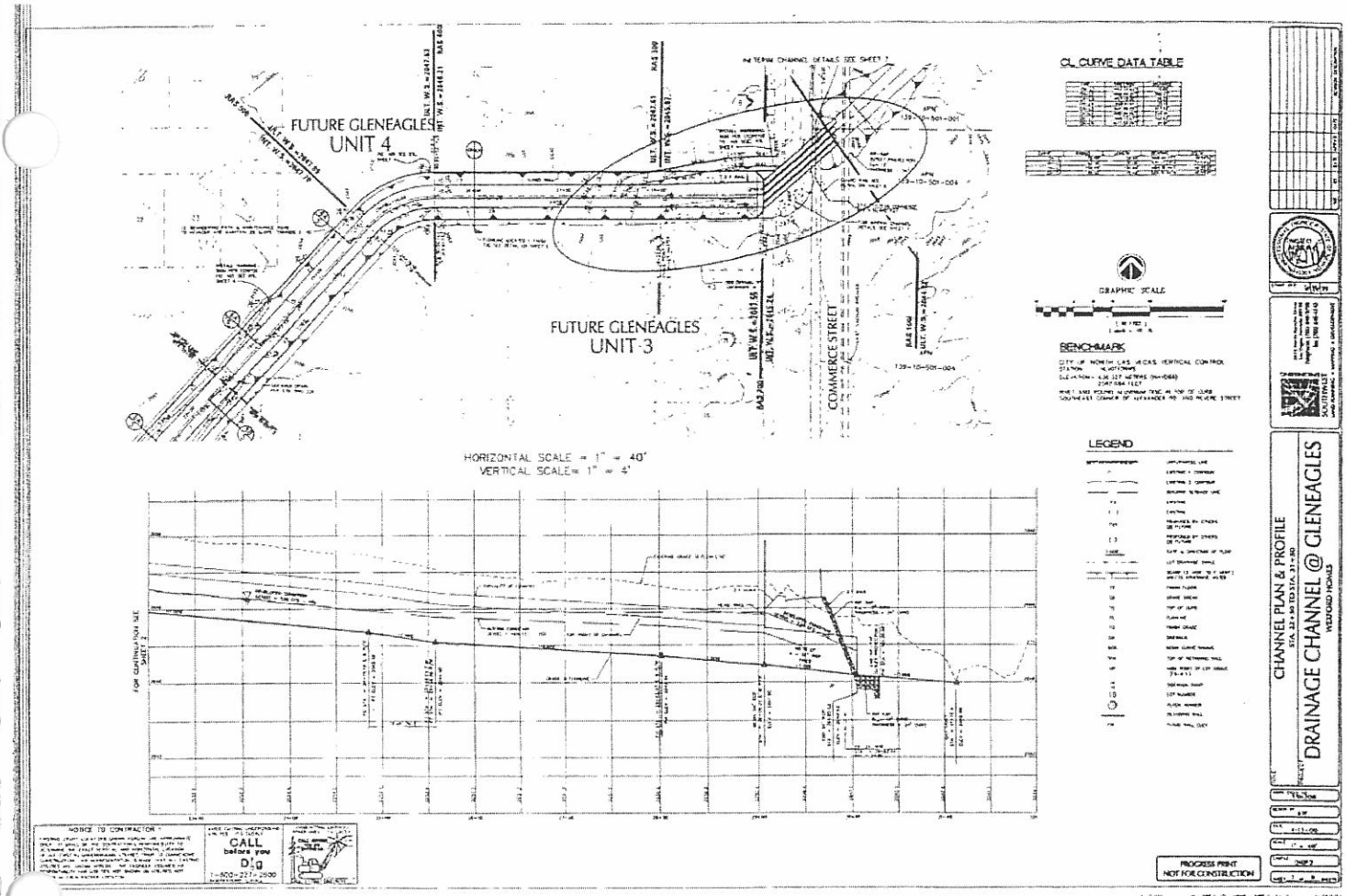
cc: Mr. Stephen E. Casmus, P.E.
Development and Flood Control Coordinator
City of North Las Vegas

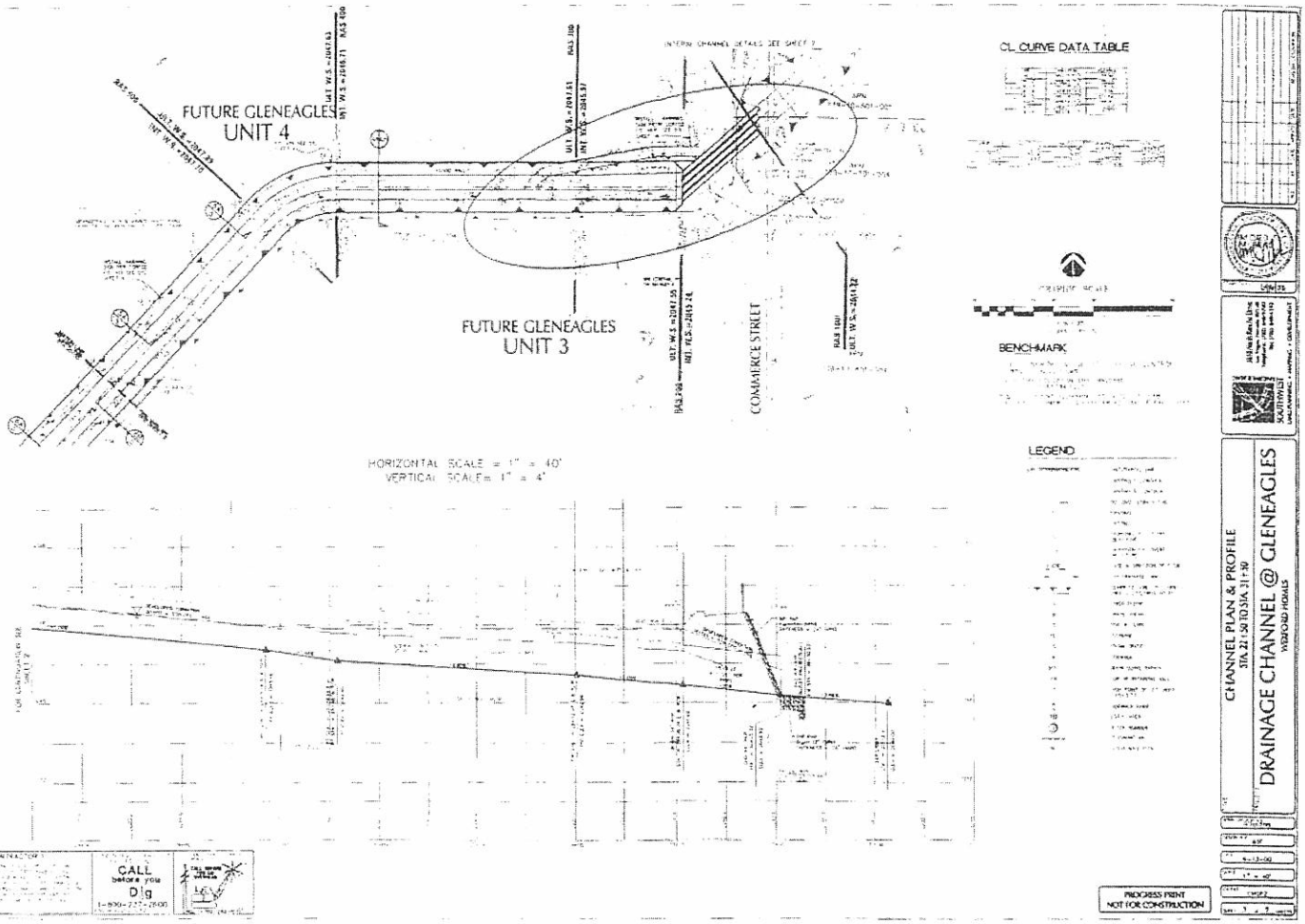
Mr. Kevin Eubanks, P.E.
Assistant General Manager
Clark County Regional Flood
Control District

Ms. Michelle Beare
Longford Group, Inc.

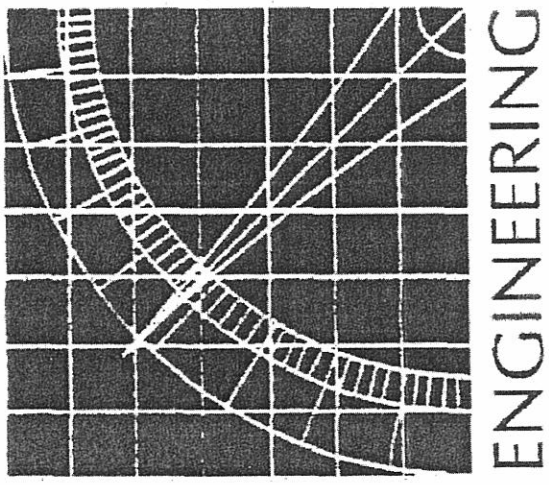
Mr. Grant Tokumi
Southwest Engineering


NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 19 SOUTH, RANGE 61 EAST AND TOWNSHIP 20 SOUTH, RANGE 61 EAST.
Unnamed Tributary to Las Vegas Wash
ZONE X
ZONE A CONTAINED IN CHANNEL
ZONE X
ZONE X
DELOF DRIVE
MILANO DR
OLD CANYON COURT
NORTH
SHANNON JEAN CT.
RM195
GULLYING LANE
GOLDFIELD
4
3
CRAIG ROAD
WEST CRAIG ROAD
ZONE A CONTAINED IN STREET
COMMERCE STREET
ZONE A
ZONE X
SAN MIGUEL AVENUE
CITY OF NORTH LAS VEGAS
320007
APPROXIMATE SCALE IN FEET
1000 0 10
AREA REVISED BY LOMR DATED MAY 10, 2000
AREA REVISED BY LOMR DATED NOVEMBER 29, 2001
AVENUE
AREA REVISED BY LOMR DATED FEBRUARY 11, 1997
KINGS HILL STREET
FLOODING CONTAINED IN STREETS
ZONE A
ZONE X
FLOODING UPSTREAM OF MARTIN LUTHER KING BOULEVARD CONTAINED IN STREETS
WEST ALEXANDER ROAD
BRAVIO STREET
WEATHERBY AVENUE
100-YEAR FLOOD CONTAINED IN CULVERT
BANDOLERO COURT
DESERT OAK STREET
REVISED AREA
ZONE X
RICHARD GROVE COURT
FALL OAKS COURT
NORTHPOINT AVENUE
RAMBLE RIDGE WAY
100-YEAR FLOOD CONTAINED IN CHANNEL
DUSTY GLEN COURT
GOLDEN DAWN COURT
OAK ISLAND DRIVE
ZONE A
AREA REVISED BY LOMR DATED MARCH 31, 1999
DRIVE
MOTHERLOAD DRIVE
PENNY CROSS DRIVE
AREA REVISED BY LOMR DATED AUGUST 14, 1996
PANNING LANE
NORTH MARTIN LUTHER KING BOULEVARD
Culvert
ZONE A CONTAINED IN STREET AND CULVERT
AREA REVISED BY LOMR DATED DECEMBER 15, 1995
GOLDFIELD STREET
WEST GOWAN ROAD
KARRAT COURT
100-YEAR FLOOD CONTAINED IN STORM DRAIN
AREA REVISED BY LOMR DATED DECEMBER 2, 1999
10
9
WEST DELHI
AREA REVISED BY LOMR DATED AUGUST 2, 1996
FLOODING UPSTREAM OF PANNING LANE CONTAINED IN STREETS
ZONE A
ZONE A
STREET
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
CLARK COUNTY, NEVADA AND INCORPORATED AREAS
PANEL 2160 OF 4090
(SEE MAP INDEX FOR PANELS NOT PRINTED)
CONTAINS:
COMMUNITY
NUMBER
PANEL
SUFFIX
CLARK COUNTY, UNINCORPORATED AREAS 320003 2160 D
LAS VEGAS, CITY OF 320018 2160 D
NORTH LAS VEGAS, CITY OF 320007 2160 D
REVISED TO REFLECT LOMR DATED SEP 17 200
MAP NUMBER
32003C2160 D
EFFECTIVE DATE:
AUGUST 16,1995
Federal Emergency Management Agency


FUTURE GLENEAGLES
UNIT 4
FUTURE GLENEAGLES
UNIT 3
COMMERCE STREET
CL CURVE DATA TABLE
GRAPHIC SCALE
BENCHMARK
LEGEND
HORIZONTAL SCALE = 1" = 40'
VERTICAL SCALE = 1" = 4'
CALL
before you
Dig
1-800-227-2600
PROGRESS PRINT
NOT FOR CONSTRUCTION
CHANNEL PLAN & PROFILE
DRAINAGE CHANNEL @ GLENEAGLES
WESTFORD HOMES


FUTURE GLENEAGLES
UNIT 4
FUTURE GLENEAGLES
UNIT 3
COMMERCE STREET
CL CURVE DATA TABLE
BENCHMARK
LEGEND
HORIZONTAL SCALE = 1" = 40'
VERTICAL SCALE = 1" = 4'
CALL
before you
Dig
1-800-727-7600
PROGRESS PRINT
NOT FOR CONSTRUCTION
CHANNEL PLAN & PROFILE
STA 21+50 TO STA 31+50
DRAINAGE CHANNEL @ GLENEAGLES
WYEFORD HOMES

~~APPENDIX B~~



SOUTHWEST ENGINEERING

LAND PLANNING • MAPPING • DEVELOPMENT

PERMANENT CHANNEL ANALYSIS

FREEBOARD

SUBCRITI Fb=0.5+V^2/2g

SUPERCR Fb=1.0+0.025V(d)^1/3

PERMANENT CHANNEL

RIVER STATION	MIN CH ELEV	W.S. ELEV	V (fps)	D (ft)	Froude #	Fb REQD (ft)	SUPER ELEVATION (ft)	REQD BANK ELEV
1100	2055.73	2059.11	8.75	3.38	1	1.69		2060.80
1000	2055.63	2058.54	10.32	2.91	1.27	1.37	1.08	2060.99
900	2054.81	2056.78	10.69	1.97	1.58	1.34	1.62	2059.74
800	2054.21	2057.01	6.22	2.8	0.75	1.10	0.62	2058.73
700	2050.90	2053.34	7.49	2.44	0.97	1.37	0.45	2055.16
600	2049.63	2052.26	6.79	2.63	0.84	1.22	0.38	2053.85
500	2045.46	2047.89	7.52	2.43	0.97	1.38	0.65	2049.92
400	2044.4	2047.63	4.98	3.23	0.57	0.89	0.33	2048.85
300	2042.94	2047.61	2.61	4.67	0.24	0.61		2048.22
200	2041.9	2047.55	2.98	5.65	1.21	1.13		2048.68

Superelevation
0.5 sub
2.0 super

Freeboard can be no less than 1'

R = 50'

SUPER-ELEVATION CALCULATIONS

DRAINAGE CHANNEL @ GLENEAGLES

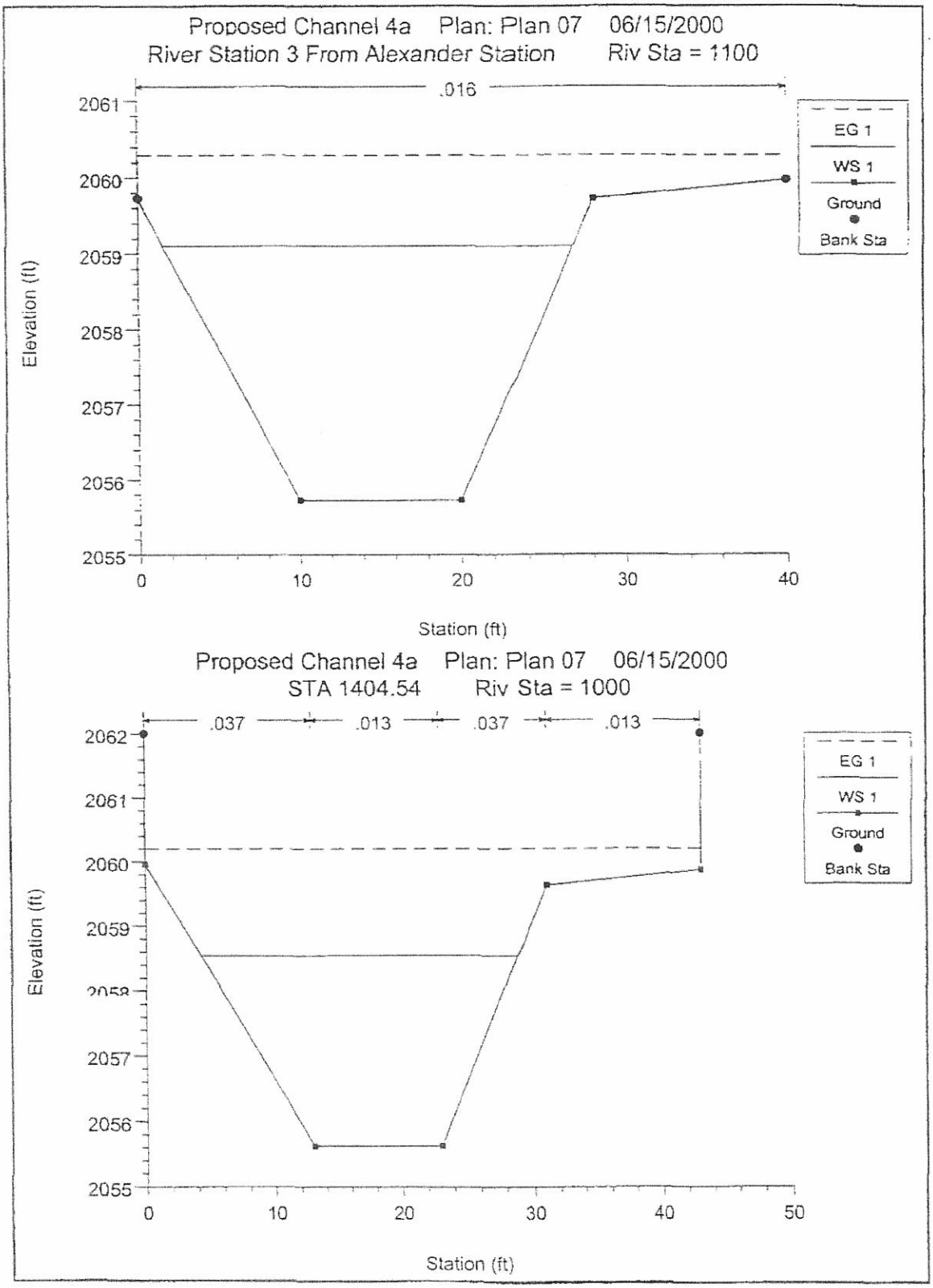
EQUATION R=C(V^2T) / (S(G))

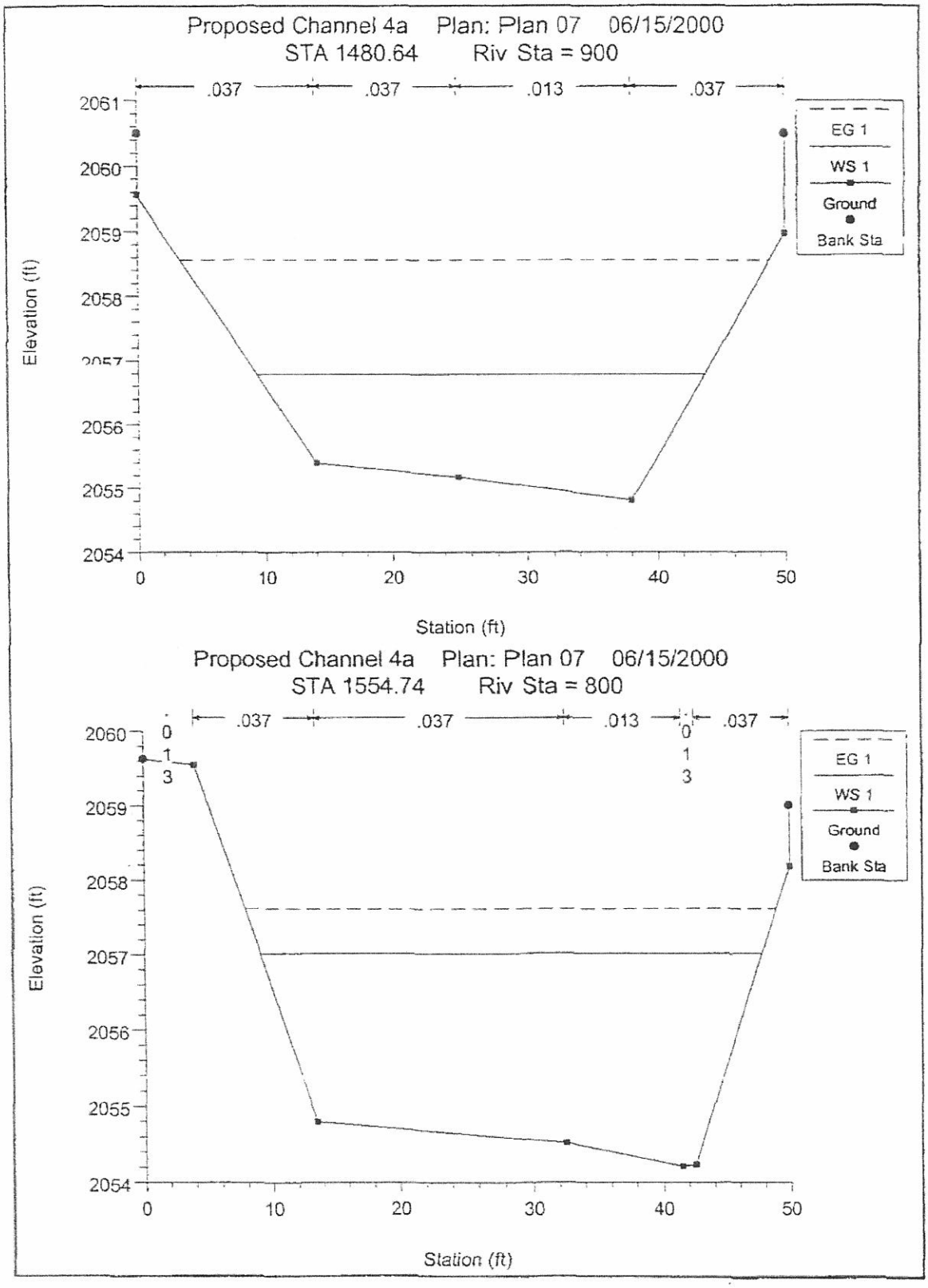
100-YEAR CONDITONS

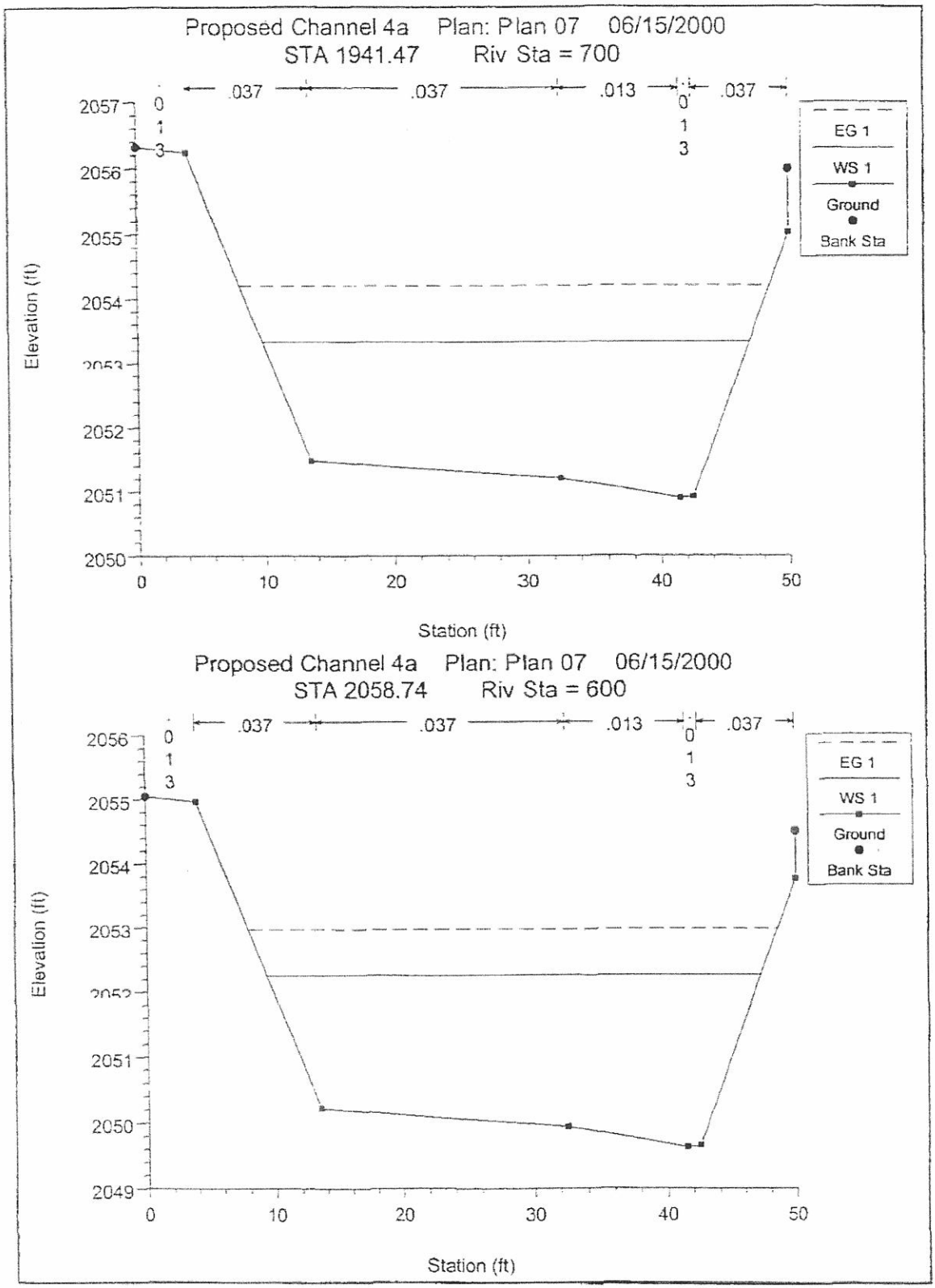
STATION	(R) RADIUS OF CURVATURE	(C) SUPER-ELEVATION COEFFICIENT (=1 FOR SUB-CRITICAL FLOW)	(T) TOP WIDTH OF THE DESIGN WATER SURFACE (FT)	(V) MEAN DESIGN VELOCITY (FPS)	(G) ACCELERATION OF GRAVITY (FT/SEC2)	(S) SUPER-ELEVATION WATER SURFACE INCREASE (FT)	
400	100.0	1	43.41	4.98	32.2	0.33	
500	100.0	1	37.07	7.52	32.2	0.65	0.5 max
600	143.2	1	37.83	6.79	32.2	0.38	
700	143.2	1	37.1	7.47	32.2	0.45	
800	75.0	1	38.71	6.22	32.2	0.62	0.5 max
900	75.0	1	34.33	10.69	32.2	1.62	
1000	75.0	1	24.58	10.32	32.2	1.08	

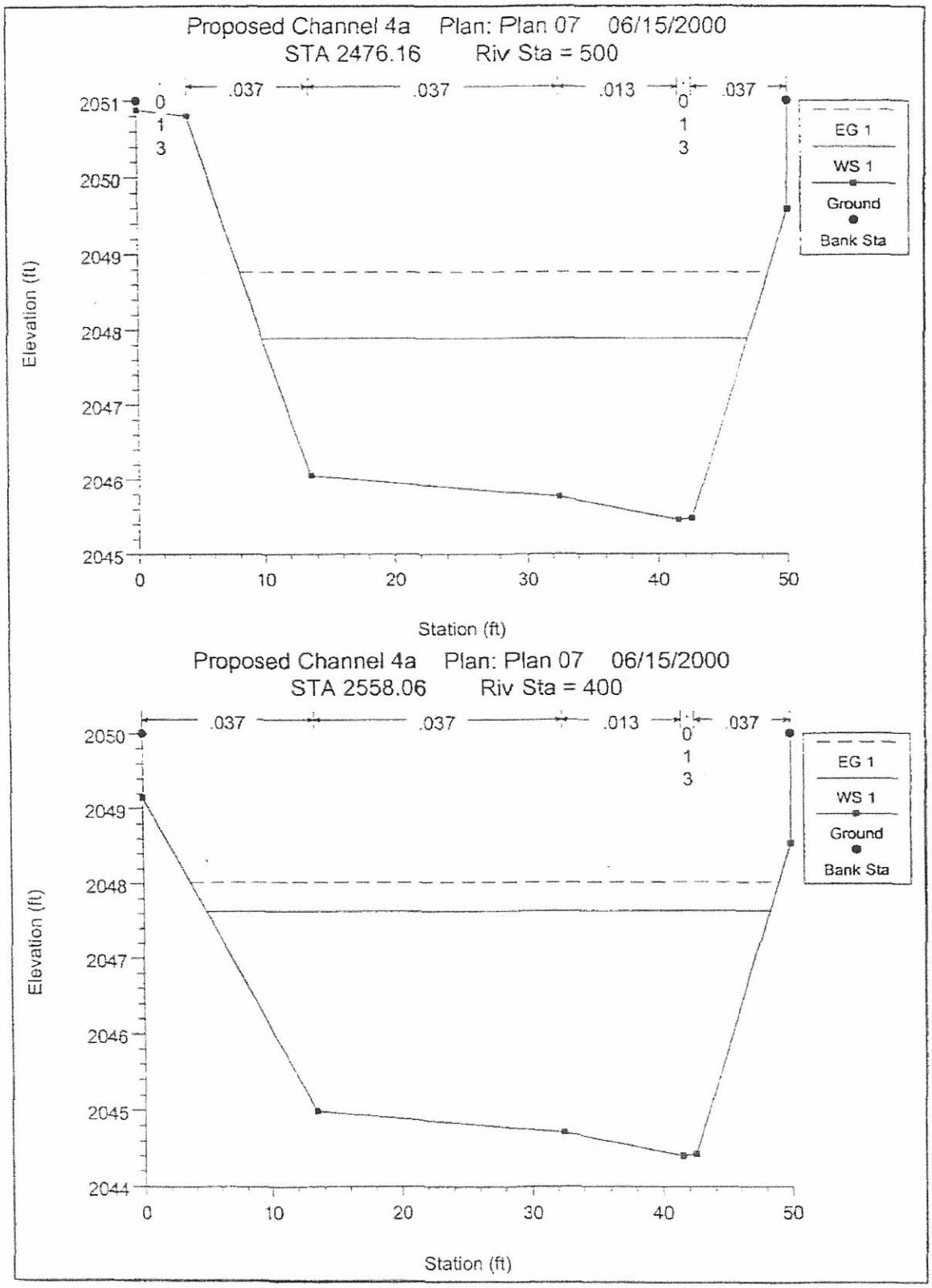
HEC-RAS Plan: Plan 07 Reach: RF LV05-0131 08/15/2000

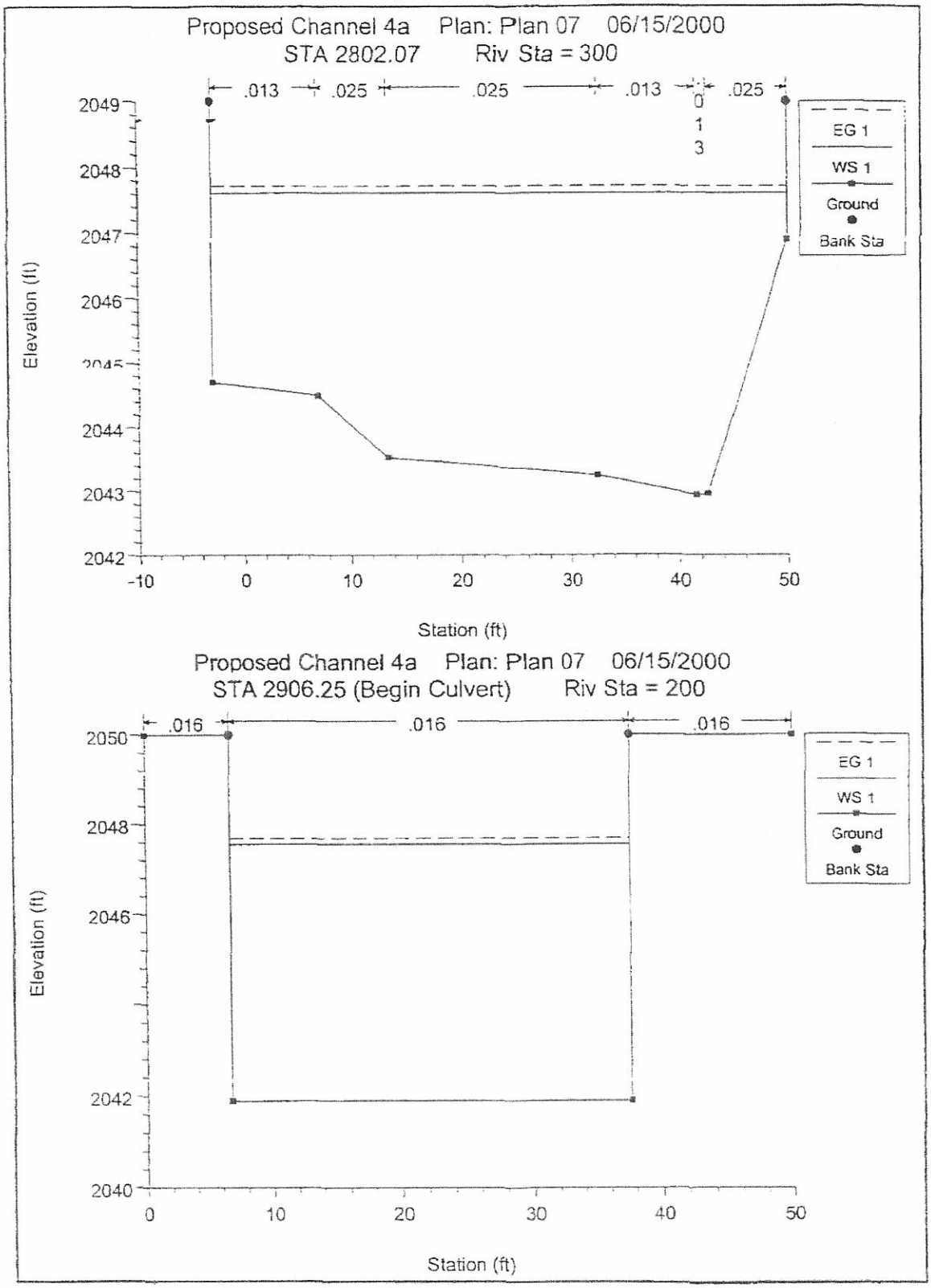
River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (fps)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl	Sta W.S. Lft (ft)	Sta W.S. Rgt (ft)	Q Right (cfs)
1100	520.00	2055.73	2059.11	2059.11	2060.30	0.003050	8.75	59.40	25.19	1.00	1.50	26.75	
1000	520.00	2055.63	2058.54	2058.93	2060.20	0.016519	10.32	50.39	24.58	1.27	4.25	28.83	
900	520.00	2054.81	2056.78	2057.32	2058.56	0.028487	10.69	48.66	34.33	1.58	9.35	43.68	
800	520.00	2054.21	2057.01		2057.61	0.006072	6.22	83.59	38.71	0.75	9.07	47.78	
700	520.00	2050.90	2053.34	2053.28	2054.21	0.011497	7.49	69.40	37.10	0.97	9.81	46.91	
600	520.00	2049.63	2052.26		2052.97	0.008596	6.79	76.55	37.83	0.84	9.43	47.26	
500	520.00	2045.46	2047.89	2047.84	2048.77	0.011034	7.52	69.13	37.07	0.97	9.82	46.89	
400	520.00	2044.40	2047.63		2048.01	0.003826	4.98	104.35	43.42	0.57	4.94	48.35	
300	520.00	2042.94	2047.61		2047.72	0.000253	2.61	199.14	53.00	0.24	-3.00	50.00	
200	520.00	2041.90	2047.55	2043.06	2047.69	0.000155	2.98	174.33	30.86	0.57	6.71	37.57	
150.97	520.00												
100	520.00	2040.92	2044.22	2043.26	2044.66	0.005001	5.36	97.05	35.84	0.57	7.99	43.83	

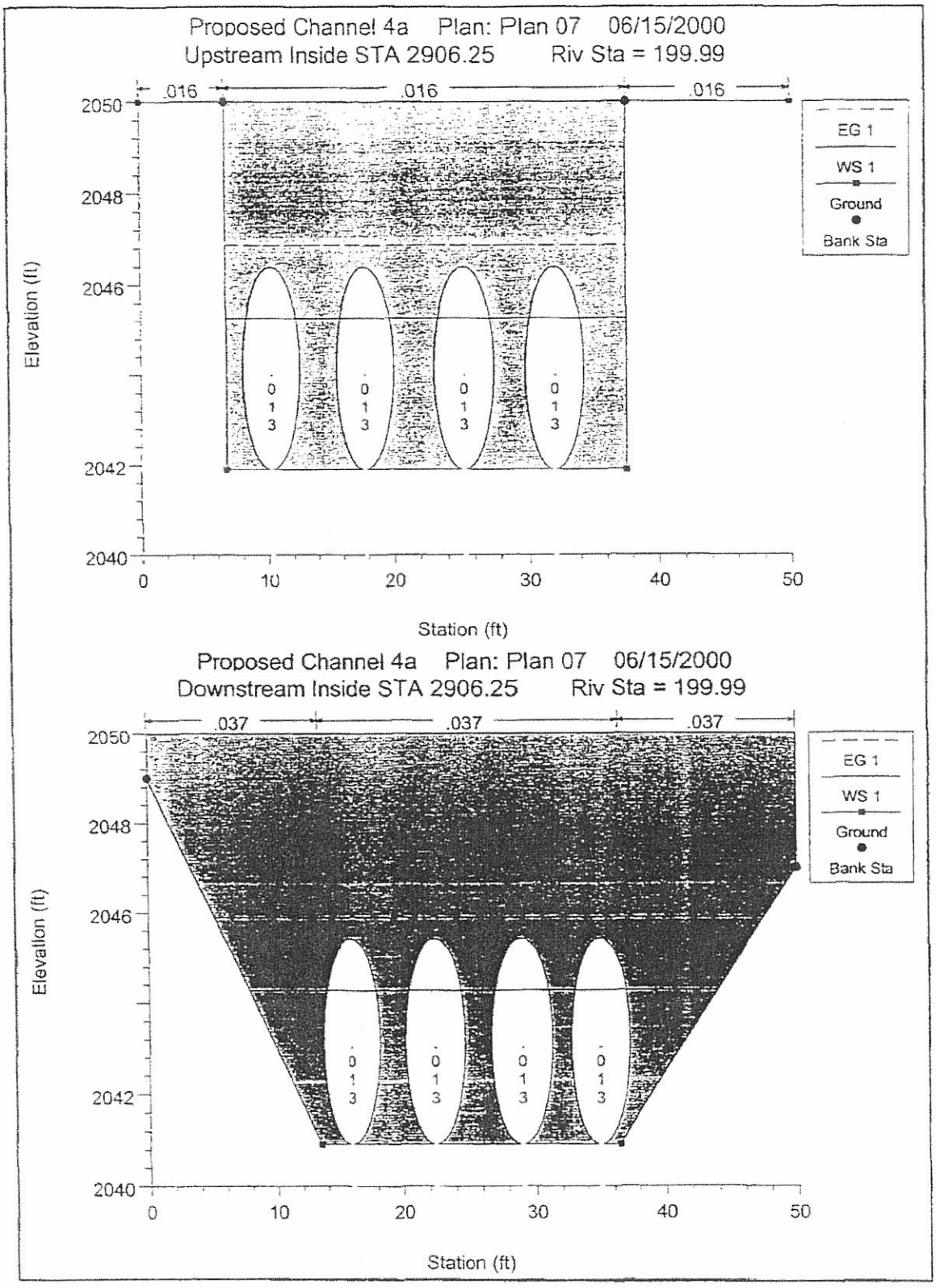

Proposed Channel 4a Plan: Plan 07 06/15/2000
River Station 3 From Alexander Station Riv Sta = 1100
.016
EG 1
WS 1
Ground
Bank Sta
Elevation (ft)
2061
2060
2059
2058
2057
2056
2055
0
10
20
30
40
Station (ft)
Proposed Channel 4a Plan: Plan 07 06/15/2000
STA 1404.54 Riv Sta = 1000
.037
.013
.037
.013
EG 1
WS 1
Ground
Bank Sta
Elevation (ft)
2062
2061
2060
2059
2057
2056
2055
0
10
20
30
40
50
Station (ft)

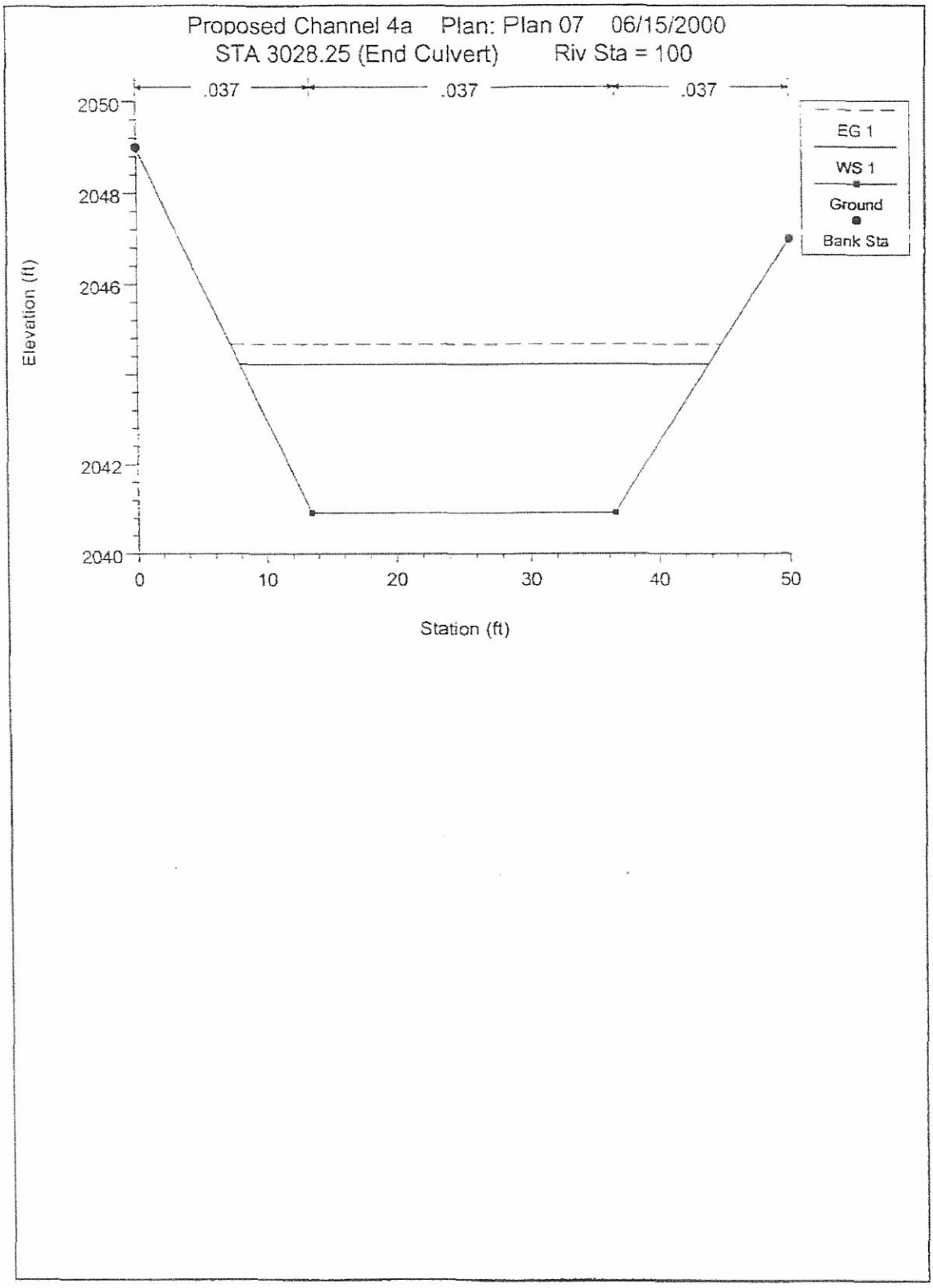

Proposed Channel 4a Plan: Plan 07 06/15/2000
STA 1480.64 Riv Sta = 900
.037
.037
.013
.037
EG 1
WS 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Proposed Channel 4a Plan: Plan 07 06/15/2000
STA 1554.74 Riv Sta = 800
.037
.037
.013
.037
EG 1
WS 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


Proposed Channel 4a Plan: Plan 07 06/15/2000
STA 1941.47 Riv Sta = 700
.037
.037
.013
.037
0
1
3
0
1
3
EG 1
WS 1
Ground
Bank Sta
Elevation (ft)
2057
2056
2055
2054
2053
2052
2051
2050
0
10
20
30
40
50
Station (ft)
Proposed Channel 4a Plan: Plan 07 06/15/2000
STA 2058.74 Riv Sta = 600
.037
.037
.013
.037
0
1
3
0
1
3
EG 1
WS 1
Ground
Bank Sta
Elevation (ft)
2056
2055
2054
2053
2052
2051
2050
2049
0
10
20
30
40
50
Station (ft)


Proposed Channel 4a Plan: Plan 07 06/15/2000
STA 2476.16 Riv Sta = 500
.037
.037
.013
.037
0
1
3
0
1
3
2051
2050
2049
2048
2047
2046
2045
Elevation (ft)
0
10
20
30
40
50
Station (ft)
EG 1
WS 1
Ground
Bank Sta
Proposed Channel 4a Plan: Plan 07 06/15/2000
STA 2558.06 Riv Sta = 400
.037
.037
.013
.037
0
1
3
2050
2049
2048
2047
2046
2045
2044
Elevation (ft)
0
10
20
30
40
50
Station (ft)
EG 1
WS 1
Ground
Bank Sta


Proposed Channel 4a Plan: Plan 07 06/15/2000
STA 2802.07 Riv Sta = 300
.013
.025
.025
.013
.025
0
1
3
EG 1
WS 1
Ground
Bank Sta
Elevation (ft)
2049
2048
2047
2046
2044
2043
2042
-10
0
10
20
30
40
50
Station (ft)
Proposed Channel 4a Plan: Plan 07 06/15/2000
STA 2906.25 (Begin Culvert) Riv Sta = 200
.016
.016
.016
EG 1
WS 1
Ground
Bank Sta
Elevation (ft)
2050
2048
2046
2042
2040
0
10
20
30
40
50
Station (ft)


Proposed Channel 4a Plan: Plan 07 06/15/2000
Upstream Inside STA 2906.25 Riv Sta = 199.99
.016
.016
.016
.013
.013
.013
.013
EG 1
WS 1
Ground
Bank Sta
Elevation (ft)
2050
2048
2046
2042
2040
0
10
20
30
40
50
Station (ft)
Proposed Channel 4a Plan: Plan 07 06/15/2000
Downstream Inside STA 2906.25 Riv Sta = 199.99
.037
.037
.037
.013
.013
.013
.013
EG 1
WS 1
Ground
Bank Sta
Elevation (ft)
2050
2048
2046
2042
2040
0
10
20
30
40
50
Station (ft)


Proposed Channel 4a Plan: Plan 07 06/15/2000
STA 3028.25 (End Culvert) Riv Sta = 100
.037
.037
.037
EG 1
WS 1
Ground
Bank Sta
Elevation (ft)
2050
2048
2046
2042
2040
0
10
20
30
40
50
Station (ft)

HEC-RAS Version 1.2 April 1996
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street, Suite D
Davis, California 95616-4687
(916) 756-1104

```
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    X
XXXXXXX  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     X  XXXXXX    XXXX       X    X    X    X   XXXXX
```

****

PROJECT DATA
Project Title: Proposed Channel 4a
Project File : pr-chnl5.prj
Run Date and Time: 06/15/2000 10:16:08 AM

Project in English units

****

PLAN DATA

Plan Title: Plan 07
Plan File : h:\jobs\971208\drainage\chnl0400\pr-chnl5.p07

Geometry Title: Plan 07
Geometry File : h:\jobs\971208\drainage\chnl0400\pr-chnl5.p07

Flow Title : Plan 07
Flow File : h:\jobs\971208\drainage\chnl0400\pr-chnl5.p07

Plan Summary Information:
Number of: Cross Sections = 65 Mulitple Openings = 0
Culverts = 1 Inline Weirs = 0
Bridges = 0

Computational Information
Water surface calculation tolerance = .01
Critical depth calculaton tolerance = .01
Maximum number of interations = 20
Maximum difference tolerance = .3
Flow tolerance factor = .001

Computational Flow Regime: Mixed Flow

Encroachment Data: None

Flow Distribution Locations: None

```
*****************************************************************************

FLOW DATA

Flow Title: FIS Approved Flow Rate - 61798a
Flow File : h:\jobs\971208\drainage\chnl0400\pr-chnl5.f03

Flow Data (cfs)
*********************************
* Reach       Riv Sta *    PF#1 *
*********************************
* RF LV05-01311100    *     520 *
*********************************
Boundary Conditions
*****************************************************************************
* Reach        Profile *            Upstream                  Downstream    *
*****************************************************************************
* RF LV05-0131       1 *        Known WS =  57.15         Normal S =  .005 *
*****************************************************************************

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

GEOMETRY DATA

Geometry Title: Channel Design - 05/22/00
Geometry File : h:\jobs\971208\drainage\chnl0400\pr-chnl5.g07

CROSS SECTION INPUT    Reach: RF LV05-0131   River Station: 1100
Description: River Station 3 From Alexander Station

Station Elevation Data,  num = 5
    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.
       0 2059.73      10 2055.73      20 2055.73      28 2059.73      40 2059.97

Manning's n Values,  num = 3
    Sta.   Value    Sta.   Value    Sta.   Value
       0    .016       0    .016      40    .016

Bank Sta: Left   Right    Lengths: Left Channel   Right    Coeff Contr.   Expan.
             0      40               10      10      10             .1       .3

CROSS SECTION INPUT    Reach: RF LV05-0131   River Station: 1000
Description: STA 1404.54

Station Elevation Data,  num = 7
    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.    Sta.   Elev.
       0    2062       0 2059.96      13 2055.63      23 2055.63      31 2059.63
      43 2059.87      43    2062

Manning's n Values,  num = 6
    Sta.   Value    Sta.   Value    Sta.   Value    Sta.   Value    Sta.   Value
       0    .013       0    .037      13    .013      23    .037      31    .013
      43    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right    Coeff Contr.   Expan.
             0      43           63.32   74.79   86.26             .3       .5
```

CROSS SECTION INPUT Reach: RF LV05-0131 River Station: 900
Description: STA 1480.64

Station Elevation Data, num = 7

Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0	2060.5	0	2059.57	14	2055.4	25	2055.17	38	2054.81
50	2058.98	50	2060.5						

Manning's n Values, num = 6

Sta.	Value	Sta.	Value	Sta.	Value	Sta.	Value	Sta.	Value
0	.013	0	.037	14	.037	25	.013	38	.037
50	.013								

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	50	86.97	75.41	63.85	.3	.5

CROSS SECTION INPUT Reach: RF LV05-0131 River Station: 800
Description: STA 1554.74

Station Elevation Data, num = 8

Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0	2059.63	4	2059.55	13.5	2054.8	32.5	2054.52	41.5	2054.21
42.5	2054.23	50	2058.18	50	2059				

Manning's n Values, num = 7

Sta.	Value	Sta.	Value	Sta.	Value	Sta.	Value	Sta.	Value
0	.013	4	.037	13.5	.037	32.5	.013	41.5	.013
42.5	.037	50	.013						

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	50	386.83	386.83	386.83	.3	.5

CROSS SECTION INPUT Reach: RF LV05-0131 River Station: 700
Description: STA 1941.47

Station Elevation Data, num = 8

Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0	2056.32	4	2056.24	13.5	2051.49	32.5	2051.21	41.5	2050.9
~~42.5~~	2050.92	50	2055.03	50	2056				

32.5 ! 41.5

Manning's n Values, num = 7

Sta.	Value	Sta.	Value	Sta.	Value	Sta.	Value	Sta.	Value
0	.013	4	.037	13.5	.037	32.5	.013	41.5	.013
42.5	.037	50	.013						

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	50	102.61	117.27	131.93	.3	.5

CROSS SECTION INPUT Reach: RF LV05-0131 River Station: 600
Description: STA 2058.74

Station Elevation Data, num = 8

Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0	2055.05	4	2054.97	13.5	2050.22	32.5	2049.94	41.5	2049.63
42.5	2049.65	50	2053.76	50	2054.5				

Manning's n Values, num = 7

Sta.	Value	Sta.	Value	Sta.	Value	Sta.	Value	Sta.	Value
0	.013	4	.037	13.5	.037	32.5	.013	41.5	.013
42.5	.037	50	.037						

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	50	417.42	417.42	.3	.5

CROSS SECTION INPUT Reach: RF LV05-0131 River Station: 500
Description: STA 2476.16

Station Elevation Data, num = 9

Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0	2051	0	2050.88	4	2050.8	13.5	2046.05	32.5	2045.77
41.5	2045.46	42.5	2045.48	50	2049.59	50	2051		

Manning's n Values, num = 8

Sta.	Value	Sta.	Value	Sta.	Value	Sta.	Value	Sta.	Value
0	.013	0	.013	4	.037	13.5	.037	32.5	.013
41.5	.013	42.5	.037	50	.013				

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	50	92.14	81.9	.3	.5

CROSS SECTION INPUT Reach: RF LV05-0131 River Station: 400
Description: STA 2558.06

Station Elevation Data, num = 8

Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0	2050	0	2049.15	13.5	2044.99	32.5	2044.71	41.5	2044.4
42.5	2044.42	50	2048.53	50	2050				

Manning's n Values, num = 7

Sta.	Value	Sta.	Value	Sta.	Value	Sta.	Value	Sta.	Value
0	.013	0	.037	13.5	.037	32.5	.013	41.5	.013
42.5	.037	50	.013						

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	50	244.01	244.01	.3	.5

CROSS SECTION INPUT Reach: RF LV05-0131 River Station: 300
Description: STA 2802.07

Station Elevation Data, num = 9

Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
-3	2049	-3	2044.7	7	2044.5	13.5	2043.53	32.5	2043.25
41.5	2042.94	42.5	2042.96	50	2046.9	50	2049		

Manning's n Values, num = 8

Sta.	Value	Sta.	Value	Sta.	Value	Sta.	Value	Sta.	Value
-3	.013	-3	.013	7	.025	13.5	.025	32.5	.013
41.5	.013	42.5	.025	50	.013				

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-3	50	104.17	104.17	.3	.5

CROSS SECTION INPUT Reach: RF LV05-0131 River Station: 200

Description: STA 2906.25 (Begin Culvert)

Station Elevation Data, num = 6

Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0	2050	6.71	2050	6.71	2041.9	37.57	2041.9	37.57	2050
50	2050								

Manning's n Values, num = 6

Sta.	Value	Sta.	Value	Sta.	Value	Sta.	Value	Sta.	Value
0	.016	6.71	.016	6.71	.016	37.57	.016	37.57	.016
50	.016								

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
6.71	37.57	101	101	.3	.5

CULVERT INPUT Reach: RF LV05-0131 River Station: 199.99
Description: STA 2906.25
Distance from Upstream XS = 1
Deck/Roadway Width = 100
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew =
Upstream Deck/Roadway Coordinates, num = 2

Sta.	Hi Cord	Lo Cord	Sta.	Hi Cord	Lo Cord
0	2050	2041.9	50	2050	2041.9

Downstream Deck/Roadway Coordinates, num = 2

Sta.	Hi Cord	Lo Cord	Sta.	Hi Cord	Lo Cord
0	2050	2040.92	50	2050	2040.92

Elevation at which weir flow begins =
Maximum allowable submergence for weir flow = .95
Submergence criteria :Broad Crested

Number of Culverts = 1

Culvert Name	Shape	Rise	Span
Culvert #1	Circular	4.5	

FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 1 - Square edge entrance with headwall

Culvert Length	n Value	Entrance Loss Coef	Exit Loss Coef
100	.013	.5	1

Number of Barrels = 4
Upstream Elevation = 2041.9
Centerline Stations

Sta.	Sta.	Sta.	Sta.
10.3	17.8	25.3	32

Downstream Elevation = 2040.92
Centerline Stations

Sta.	Sta.	Sta.	Sta.
16	22.5	29	35

CULVERT OUTPUT Reach: RF LV05-0131 Riv Sta: 199.99 Profile # 1
Culvert ID : Culvert #1

* Culv Q (cfs)	*	520.00	* Culv Ful Lngh (ft) *		*
* # Barrels	*	4	* Culv Vel In (ft/s) *	10.22	*
* Q Barrel (cfs)	*	130.00	* Culv Vel Out (ft/s)*	10.22	*

* W.S. US. (ft)	*	2047.55	* Culv Frctn Ls (ft)	*	0.00 *
* E.G. US. (ft)	*	2047.69	* Culv Ext Lss (ft)	*	1.23 *
* E.G. IC (ft)	*	2047.54	* Culv Ent Lss (ft)	*	0.81 *
* E.G. OC (ft)	*	2047.69	* Q Weir (cfs)	*	*
* Culv WS In (ft)	*	2045.26	* Weir Sta Lft (ft)	*	*
* Culv WS Out (ft)	*	2044.28	* Weir Sta Rgt (ft)	*	*
* Culv Nml Depth (ft)	*	2.69	* Weir Submerg	*	*
* Culv Crt Depth (ft)	*	3.36	* Weir Max Depth (ft)	*	*

****

Note - The water surface is below critical depth at the outlet and the culvert is steep. Therefore, the inlet will be at critical depth.

CROSS SECTION INPUT Reach: RF LV05-0131 River Station: 100
Description: STA 3028.25 (End Culvert)

Station Elevation Data, num = 4

Sta.	Elev.	Sta.	Elev.	Sta.	Elev.	Sta.	Elev.
0	2049	13.5	2040.92	36.5	2040.92	50	2047

Manning's n Values, num = 4

Sta.	Value	Sta.	Value	Sta.	Value	Sta.	Value
0	.037	13.5	.037	36.5	.037	50	.037

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	50	0	0	.3	.5

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*            SEPTEMBER 1990             *
*              VERSION 4.0              *
*                                       *
*  RUN DATE  08/13/2001  TIME  09:33:00 *
*                                       *
*****************************************
```

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

```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 26 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


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

                        *DIAGRAM
*** FREE ***
               1        ID          **************************************************************
               2        ID          *              ALEXANDER CHANNEL HYDROLOGY STUDY             *
               3        ID          *                                                            *
               4        ID          *                    DEVELOPED CONDITIONS                    *
               5        ID          *                                                            *
               6        ID          **************************************************************
               7        ID
               8        ID   PREPARED FOR: CITY OF NORTH LAS VEGAS PUBLIC WORKS DEPARTMENT
               9        ID   PREPARED BY:  L. GOOKIN, VTN NEVADA
              10        ID   DATE:  18 DECEMBER 2000
              11        ID   MODIFIED 1-15-01
              12        ID   FILE:  ALEX-C.DAT
              13        ID     ADD THREE SUBBASINS, 21, 22, 23, TO SOUTH END OF ALEXANDER CHANNEL
              14        ID     CN FOR SUBBASINS 21, 22, 23 INCREASED TO 95
              15        ID
              16        ID   DEVELOPED CONDITIONS
              17        ID
              18        ID       DESIGN PT       AREA      DARF
              19        ID          A            0.21      0.99
              20        ID          B            0.32      0.99
              21        ID          C            0.43      0.98
              22        ID          D            0.91      0.97
              23        ID          E            1.04      0.97
              24        ID          F            1.10      0.97
              25        ID          G            1.41      0.95
              26        ID
              27        ID   JR CARD RATIOS REPRESENT DEPTH-AREA REDUCTION FACTORS (DARF'S)
              28        ID
              29        ID   100-YEAR,  6-HOUR STORM,  SDN3
              30        ID
              31        IT       5       0       0      300
              32        IO       5       0       0
              33        IN       5       0       0
              34        JR    PREC    1.00    0.99    0.98    0.97    0.96    0.95    0.93
                        *
              35        KK       1
              36        KM   FLOW FROM SUBBASIN 1
              37        BA   0.063
              38        PB    2.77
              39        PC   0.000   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.13
              40        PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.18
              41        PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.24
              42        PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.40
              43        PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.85
              44        PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.97
              45        PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.99
              46        PC   0.998   0.999   1.000
              47        LS      0    92.0
              48        UD    0.15
```



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

              49        KK      r1
              50        KM   ROUTE 1 TO POINT 2
              51        RK    1400    0.02   0.017       0    TRAP      60       0

              52        KK       2
              53        KM   FLOW FROM SUBBASIN 2
              54        BA   0.063
              55        LS       0    91.0
              56        UD    0.16

              57        KK    c1-2
              58        KM   COMBINE FLOWS 1 AND 2
              59        HC       2

              60        KK    rc1-2
              61        KM   ROUTE COMBINED FLOW c1-2 TO POINT A
              62        RK    1000   0.016   0.017       0    TRAP      60       0
```

```
 63          KK       3
 64          KM   FLOW FROM SUBBASIN 3
 65          BA   0.033
 66          LS      0    90.0
 67          UD    0.11

 68          KK      r3
 69          KM   ROUTE FLOW 3 TO POINT A
 70          RK     300   0.016   0.015       0    CIRC     1.5

 71          KK       4
 72          KM   FLOW FROM SUBBASIN 4
 73          BA   0.033
 74          LS      0    92.0
 75          UD    0.11

 76          KK    c3-4
 77          KM   COMBINE FLOWS 3 AND 4
 78          HC       2

 79          KK       6
 80          KM   FLOW FROM SUBBASIN 6
 81          BA   0.009
 82          LS      0    90.0
 83          UD    0.10

 84          KK      r6
 85          KM   ROUTE FLOW 6 TO 7
 86          RK     400   0.016   0.017       0    TRAP      60       0

 87          KK       7
 98          KM   FLOW FROM SUBBASIN 7
 89          BA   0.013
 90          LS      0    92.0
 91          UD    0.11
1                                      HEC-1 INPUT                                                    PAGE  3

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

 92          KK    c6-7
 93          KM   COMBINE FLOWS 6 AND 7
 94          HC       2

 95          KK   rc6-7
 96          KM   ROUTE COMBINED FLOW TO POINT A
 97          RK     300   0.016   0.017       0    TRAP      60       0

 98          KK    cPTA
 99          KM   COMBINE FLOWS AT POINT A
100          HC       3

101          KK   rcPTA
102          KM   ROUTE COMBINED FLOW TO POINT 5
103          RK    1100   0.016   0.015       0    CIRC      2

104          KK       5
105          KM   FLOW FROM SUBBASIN 5
106          BA   0.041
107          LS       0      92
108          UD    0.13

109          KK      c5
110          KM   COMBINE FLOWS AT 5
111          HC       2

112          KK     rc5
113          KM   ROUTE c5 TO PTB
114          RK     400   0.010   0.015       0    TRAP      10       2

115          KK       8
116          KM   FLOW FROM SUBBASIN 8
117          BA   0.011
118          LS      0    94.0
119          UD    0.10

120          KK      r8
121          KM   ROUTE FLOW FROM 8 TO 9
122          RK     600   0.016   0.017       0    TRAP      60       0

123          KK       9
124          KM   FLOW FROM SUBBASIN 9
125          BA   0.050
126          LS       0      90
127          UD    0.16

128          KK    cPTB
129          KM   COMBINE FLOWS AT PTB
130          HC       3
1                                      HEC-1 INPUT                                                    PAGE  4

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

131          KK   rcPTB
132          KM   ROUTE FLOW TO PT C
133          RK    1600   0.016   0.017       0    TRAP      10       2

134          KK      10
135          KM   FLOW FROM SUBBASIN 10
136          BA   0.009
137          LS      0    90.0
138          UD    0.10

139          KK     r10
140          KM   ROUTE FLOW FROM 10 TO 11
141          RK    1400   0.016   0.017       0    TRAP      60       0

142          KK      11
143          KM   FLOW FROM SUBBASIN 11
144          BA   0.009
145          LS      0    94.0
146          UD    0.05
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147          KK  c10-11
148          KM   COMBINE FLOWS AT 11
149          HC       2

150          KK rc10-11
151          KM   ROUTE FLOW TO 12
152          RK    1300   0.016   0.017       0    TRAP      60       0

153          KK      12
154          KM   FLOW FROM SUBBASIN 12
155          BA   0.045
156          LS       0    90.0
157          UD    0.15

158          KK     c12
159          KM   COMBINE FLOWS AT 12
160          HC       2

161          KK    rc12
162          KM   ROUTE COMBINED FLOW c12 TO POINT C
163          RK     600   0.016   0.017       0    TRAP      60       0

164          KK      13
165          KM   FLOW FROM SUBBASIN 13
166          BA   0.050
167          LS       0    92.0
168          UD    0.17

169          KK    cPTC
170          KM   COMBINE FLOWS AT PTC
171          HC       3
1                                        HEC-1 INPUT                                                    PAGE  5

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

172          KK   rcPTC
173          KM   ROUTE COMBINED FLOW cPTC TO POINT D
174          RK    3000   0.010   0.015       0    TRAP      10       2

175          KK      14
176          KM   FLOW FROM SUBBASIN 14
177          BA   0.067
178          LS       0    90.0
179          UD    0.17

180          KK     r14
181          KM   ROUTE FLOW TO 15
182          RK     750   0.016   0.017       0    TRAP      60       0

183          KK      15
184          KM   FLOW FROM SUBBASIN 15
185          BA   0.044
186          LS       0    90.0
187          UD    0.14

188          KK     c15
189          KM   COMBINE FLOWS AT 15
190          HC       2

191          KK     r15
192          KM   ROUTE FLOW TO 16
193          RK    2000   0.016   0.017       0    TRAP      60       0

194          KK      16
195          KM   FLOW FROM SUBBASIN 16
196          BA   0.100
197          LS       0    92.0
198          UD    0.18

199          KK     c16
200          KM   COMBINE FLOWS AT 16
201          HC       2

202          KK    rc16
203          KM   ROUTE FLOW TO PTD
204          RK    1300   0.016   0.017       0    TRAP      60       0

205          KK      17
206          KM   FLOW FROM SUBBASIN 17
207          BA   0.045
208          LS       0    93.0
209          UD    0.18

210          KK      18
211          KM   FLOW FROM SUBBASIN 18
212          BA   0.227
213          LS       0    92.0
214          UD    0.28
1                                        HEC-1 INPUT                                                    PAGE  6

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

215          KK    CPTD
216          KM   COMBINE FLOWS AT PTD
217          HC       4

218          KK   rCPTD
219          KM   ROUTE FLOW TO PTE
220          RK    1300   0.010   0.015       0    TRAP      10       2

221          KK      19
222          KM   FLOW FROM SUBBASIN 19
223          BA   0.064
224          LS       0    94.0
225          UD    0.15

226          KK      21
227          KM   FLOW FROM SUBBASIN 21
228          BA   0.064
229          LS       0    95.0
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```
 230          UD    0.15

 231          KK    cPTE
 232          KM    COMBINE FLOWS AT PTE
 233          HC       3

 234          KK    rcPTE
 235          KM    ROUTE FLOW TO PTF
 236          RK     1250   0.010   0.015       0    TRAP      10       2

 237          KK       22
 238          KM    FLOW FROM SUBBASIN 22
 239          BA    0.064
 240          LS        0    95.0
 241          UD     0.15

 242          KK    cPTF
 243          KM    COMBINE FLOWS AT PTF
 244          HC       2

 245          KK    rcPTP
 246          KM    ROUTE FLOW TO PTG
 247          RK     1250   0.010   0.015       0    TRAP      10       2

 248          KK       20
 249          KM    FLOW FROM SUBBASIN 20
 250          BA    0.247
 251          LS        0    92.0
 252          UD     0.33

 253          KK       23
 254          KM    FLOW FROM SUBBASIN 23
 255          BA    0.064
 256          LS        0    95.0
 257          UD     0.15
1                                        HEC-1 INPUT                                        PAGE  7

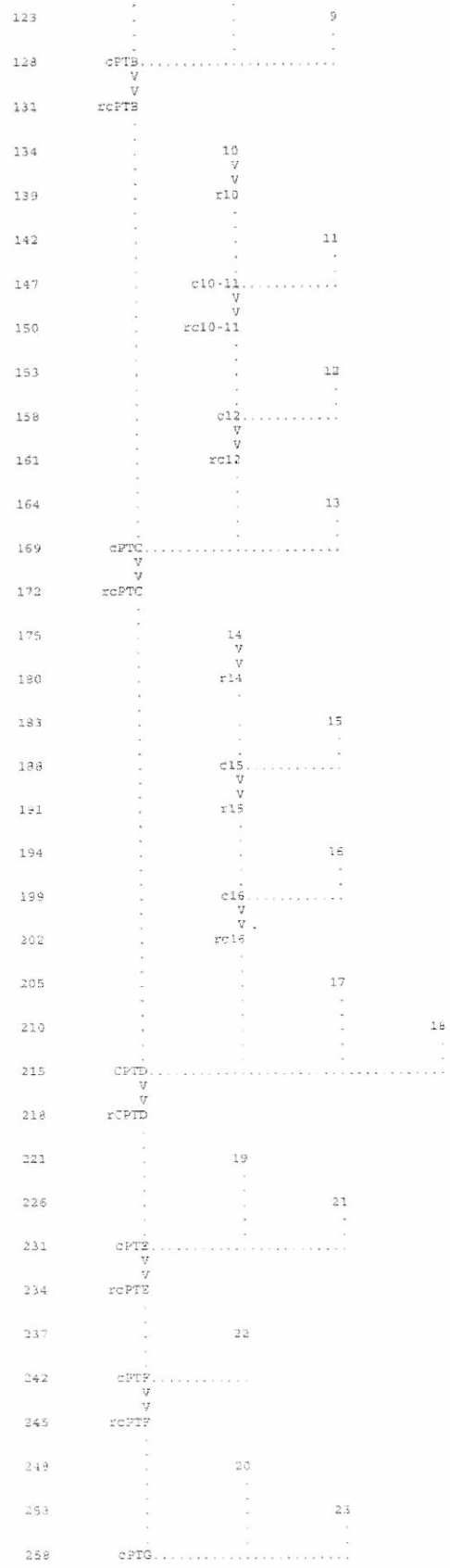
        LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 258          KK    cPTG
 259          KM    COMBINE FLOWS AT PTG
 260          HC       3
 261          ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

    35           1
                 V
                 V
    49          r1
                 .
                 .
    52           .           2
                 .           .
                 .           .
    57        c1-2............
                 V
                 V
    60        rc1-2
                 .
                 .
    63           .           3
                 .           V
                 .           V
    68           .          r3
                 .           .
                 .           .
    71           .           .           4
                 .           .           .
                 .           .           .
    76           .         c3-4...........
                 .           .
                 .           .           .
    79           .           .           5
                 .           .           V
                 .           .           V
    84           .           .          r5
                 .           .           .
                 .           .           .
    87           .           .           .           7
                 .           .           .           .
                 .           .           .           .
    92           .           .         c5-7...........
                 .           .           V
                 .           .           V
    95           .           .        rc5-7          .
                 .           .           .           .
                 .           .           .           .
    98        cPTA.........................
                 V
                 V
   101        rcPTA
                 .
                 .
   104           .           6
                 .           .
                 .           .
   109          c6............
                 V
                 V
   112         rc6
                 .
                 .
   115           .           8
                 .           V
                 .           V
   120           .          r8
                 .           .
```



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

****
* *
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* SEPTEMBER 1990 *
****

****
* *
* U.S. ARMY CORPS OF ENGINEERS *
* HYDROLOGIC ENGINEERING CENTER *
****

```
*****************************************
*            VERSION 4.0                *
*                                       *
*  RUN DATE  08/13/2001  TIME  09:33:00 *
*                                       *
*****************************************
```


```
*****************************************
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```


```
*****************************************************************
*                ALEXANDER CHANNEL HYDROLOGY STUDY              *
*                                                               *
*                      DEVELOPED CONDITIONS                     *
*                                                               *
*****************************************************************
```

PREPARED FOR: CITY OF NORTH LAS VEGAS PUBLIC WORKS DEPARTMENT
PREPARED BY: L. GOOKIN, VTN-NEVADA
DATE: 18 DECEMBER 2000
MODIFIED 1-15-01
FILE: ALEX-C.DAT
ADD THREE SUBBASINS, 21, 22, 23, TO SOUTH END OF ALEXANDER CHANNEL
CN FOR SUBBASINS 21, 22, 23 INCREASED TO 95

DEVELOPED CONDITIONS

DESIGN PT	AREA	DARF
A	0.21	0.99
B	0.32	0.99
C	0.43	0.98
D	0.91	0.97
E	1.04	0.97
F	1.10	0.97
G	1.41	0.95

JR CARD RATIOS REPRESENT DEPTH-AREA REDUCTION FACTORS (DARF'S)

100-YEAR, 6-HOUR STORM, SCS3

```
 32 IO          OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                     NMIN           5  MINUTES IN COMPUTATION INTERVAL
                    IDATE      1    0  STARTING DATE
                    ITIME         0000  STARTING TIME
                       NQ          300  NUMBER OF HYDROGRAPH ORDINATES
                   NDDATE      2    0  ENDING DATE
                   NDTIME         0055  ENDING TIME
                    ICENT           19  CENTURY MARK

                  COMPUTATION INTERVAL      .08 HOURS
                      TOTAL TIME BASE    24.92 HOURS

        ENGLISH UNITS
             DRAINAGE AREA          SQUARE MILES
             PRECIPITATION DEPTH    INCHES
             LENGTH, ELEVATION      FEET
             FLOW                   CUBIC FEET PER SECOND
             STORAGE VOLUME         ACRE-FEET
             SURFACE AREA           ACRES
             TEMPERATURE            DEGREES FAHRENHEIT

    JP          MULTI-PLAN OPTION
                     NPLAN          1  NUMBER OF PLANS

    JR          MULTI-RATIO OPTION
                   RATIOS OF PRECIPITATION
                  1.00      .99       .98       .97       .96       .95       .93
```

1

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 1.00	RATIO 2 .99	RATIO 3 .98	RATIO 4 .97	RATIO 5 .96	RATIO 6 .95	RATIO 7 .93
HYDROGRAPH AT											
+	1	.06	1	FLOW	100.	98.	97.	96.	95.	93.	91.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO											
+	r1	.06	1	FLOW	96.	95.	94.	93.	92.	90.	88.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	2	.06	1	FLOW	95.	94.	92.	91.	90.	89.	86.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT											
+	c1-2	.13	1	FLOW	191.	189.	186.	184.	181.	179.	174.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO											
+	rc1-2	.13	1	FLOW	186.	184.	181.	179.	176.	174.	169.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	3	.03	1	FLOW	51.	50.	49.	49.	48.	47.	46.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO											
+	r3	.03	1	FLOW	50.	49.	49.	48.	47.	47.	45.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58

HYDROGRAPH AT											
+	4	.03	1	FLOW	55.	54.	53.	52.	52.	51.	50.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT											
+	c3-4	.07	1	FLOW	104.	102.	101.	100.	98.	97.	94.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
HYDROGRAPH AT											
+	6	.01	1	FLOW	14.	14.	14.	14.	14.	13.	13.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO											
+	r6	.01	1	FLOW	14.	13.	13.	13.	13.	13.	13.
				TIME	3.50	3.50	3.50	3.50	3.58	3.58	3.58
HYDROGRAPH AT											
+	7	.01	1	FLOW	21.	21.	21.	21.	20.	20.	20.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT											
+	c6-7	.02	1	FLOW	35.	35.	34.	34.	33.	33.	32.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO											
+	rc6-7	.02	1	FLOW	35.	34.	34.	33.	33.	32.	32.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT											
+	cPTA	.21	1	FLOW	324.	320.	315.	311.	307.	303.	295.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO											
+	rcPTA	.21	1	FLOW	320.	316.	312.	307.	303.	299.	291.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	5	.04	1	FLOW	66.	65.	65.	64.	63.	62.	61.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT											
+	c5	.25	1	FLOW	386.	381.	376.	371.	366.	361.	351.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO											
+	rc5	.25	1	FLOW	384.	379.	374.	369.	364.	359.	349.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	8	.01	1	FLOW	20.	20.	20.	19.	19.	19.	18.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO											
+	r8	.01	1	FLOW	19.	19.	18.	18.	18.	18.	17.
				TIME	3.50	3.50	3.50	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	9	.05	1	FLOW	73.	72.	71.	70.	69.	68.	66.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT											
+	cPTB	.32	1	FLOW	475.	469.	463.	457.	451.	445.	433.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO											
+	rcPTB	.32	1	FLOW	466.	460.	454.	448.	442.	436.	424.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	10	.01	1	FLOW	14.	14.	14.	14.	14.	13.	13.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
ROUTED TO											
+	r10	.01	1	FLOW	14.	14.	14.	14.	13.	13.	13.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	11	.01	1	FLOW	17.	17.	17.	16.	16.	16.	16.
				TIME	3.50	3.50	3.50	3.50	3.50	3.50	3.50
2 COMBINED AT											
+	c10-11	.02	1	FLOW	29.	28.	28.	28.	27.	27.	26.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO											
+	rc10-11	.02	1	FLOW	29.	28.	28.	28.	27.	27.	26.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	12	.05	1	FLOW	66.	66.	65.	64.	63.	62.	60.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT											
+	c12	.06	1	FLOW	95.	94	93.	91	90.	89.	86.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO											
+	rc12	.06	1	FLOW	94.	92.	91.	90.	88.	87.	85.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	13	.05	1	FLOW	76.	76.	75.	74.	73.	72.	70.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT											
+	cPTC	.43	1	FLOW	638.	628.	620.	611.	603.	595.	578.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO											
+	rcPTC	.43	1	FLOW	609.	599.	591.	583.	575.	566.	550.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58

HYDROGRAPH AT											
+	14	.07	1	FLOW	95.	94.	93.	91.	90.	89.	86.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO											
+	r14	.07	1	FLOW	93.	91.	90.	89.	87.	86.	84.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	15	.04	1	FLOW	66.	65.	64.	63.	62.	61.	60.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT											
+	c15	.11	1	FLOW	158.	156.	154.	152.	150.	148.	143.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO											
+	r15	.11	1	FLOW	149.	147.	145.	143.	141.	139.	135.
				TIME	3.58	3.58	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	16	.10	1	FLOW	150.	148.	146.	144.	142.	140.	136.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT											
+	c16	.21	1	FLOW	299.	295.	291.	287.	283.	278.	271.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
ROUTED TO											
+	rc16	.21	1	FLOW	289.	285.	281.	278.	274.	270.	263.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	17	.05	1	FLOW	67.	66.	66.	65.	64.	63.	61.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	18	.23	1	FLOW	299.	295.	291.	287.	284.	280.	272.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
4 COMBINED AT											
+	CPTD	.91	1	FLOW	1245.	1230.	1214.	1198.	1183.	1167.	1136.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
ROUTED TO											
+	rCPTD	.91	1	FLOW	1244.	1228.	1212.	1197.	1181.	1165.	1134.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	19	.06	1	FLOW	108.	106.	105.	104.	103.	101.	99.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
HYDROGRAPH AT											
+	21	.06	1	FLOW	111.	109.	108.	107.	106.	104.	102.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT											
+	cPTE	1.04	1	FLOW	1426.	1408.	1390.	1372.	1354.	1336.	1301.
				TIME	3.58	3.58	3.67	3.67	3.67	3.67	3.67
ROUTED TO											
+	rcPTE	1.04	1	FLOW	1425.	1407.	1389.	1371.	1353.	1336.	1300.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	22	.06	1	FLOW	111.	109.	108.	107.	106.	104.	102.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT											
+	cPTF	1.10	1	FLOW	1517.	1498.	1479.	1460.	1441.	1422.	1385.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
ROUTED TO											
+	rcPTF	1.10	1	FLOW	1516.	1496.	1477.	1458.	1439.	1420.	1382.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
HYDROGRAPH AT											
+	20	.25	1	FLOW	287.	283.	279.	276.	272.	268.	261.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT											
+	23	.06	1	FLOW	111.	109.	108.	107.	106.	104.	102.
				TIME	3.58	3.58	3.58	3.58	3.58	3.58	3.58
3 COMBINED AT											
+	cPTG	1.41	1	FLOW	1878.	1855.	1831.	1807.	1784.	1761.	1714.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67

1

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

VTN Hydrology

Hydrologic Parameters

Ultimate Build-Out Condition HEC-1Model

HCDDM EXHIBITS

SIX HOUR DEPTH-AREA REDUCTION FACTORS

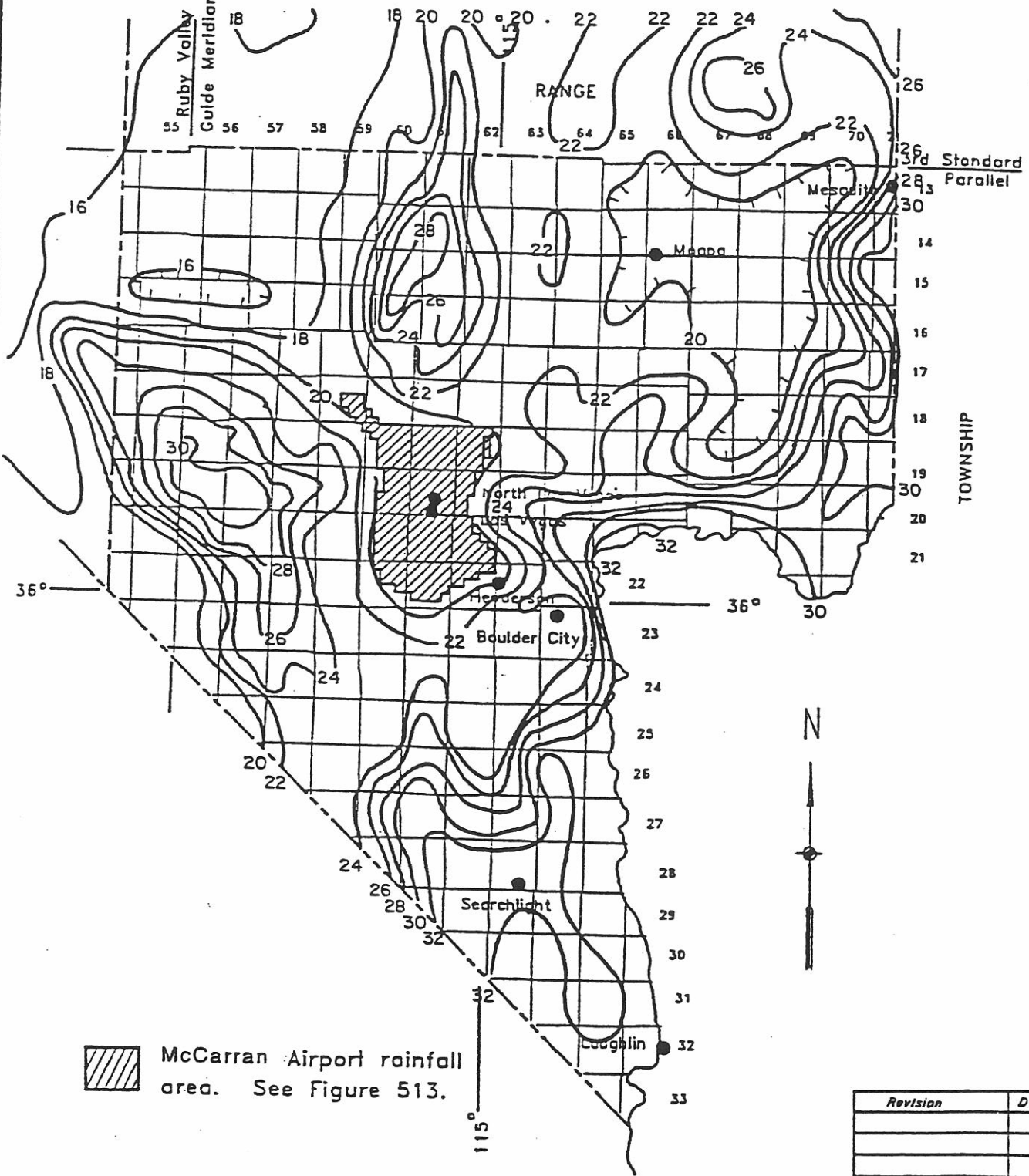
Drainage Area (Square Miles)	Six-Hour Depth-Area Reduction Factor
0.0	1.00
0.5	0.98
1.0	0.97
2.0	0.93
4.0	0.91
6.0	0.90
8.0	0.88
10.0	0.86
20.0	0.79
30.0	0.74
50.0	0.68
100.0	0.60
150.0	0.55
200.0	0.51
300.0	0.46
400.0	0.42
500.0	0.39

NOTES: 1. A graphical representation of these factors is presented in Figure 514.

2. Consult with the local entity and/or the CCRFCD for guidance in using the Depth-Area Reduction Factors for drainage areas greater than 200 square miles.

Revision	Date

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



Revision	Date

WRC ENGINEERING

REFERENCE:
NOAA ATLAS 2, VOLUME VII NEVADA, 1973

FIGURE 506

RUNOFF CURVE NUMBERS
(URBAN AREAS[1])

Cover description		Curve numbers for hydrologic soil group—			
Cover type and hydrologic condition	Average percent impervious area[2]	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.)[3]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved: curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved: open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only)[4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					

See Table 602A

Developing urban areas					
Newly graded areas (pervious areas only, no vegetation)[5]		77	86	91	94

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

2 The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system. Impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using Figure 603.

3 CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

4 Composite CN's for natural desert landscaping should be computed using Figure 603 based on the impervious area percentage (CN #98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

5 Composite CN's to use for the design of temporary measures during grading and construction should be computed using Figure 603 based on the degree of development impervious area percentage) and the CN's for the newly graded pervious areas.

Revision	Date

HEC-1 MODEL OUTPUT

```
1**************************************
*                                    *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            SEPTEMBER 1990          *
*              VERSION 4.0           *
*                                    *
*  RUN DATE  01/16/2001  TIME  10:02:24 *
*                                    *
**************************************
```

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

```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


```
          LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
                    *DIAGRAM
*** FREE ***
               1    ID          **************************************************************************
               2    ID          *              ALEXANDER CHANNEL HYDROLOGY STUDY                         *
               3    ID          *                                                                        *
               4    ID          *                          DEVELOPED CONDITIONS                          *
               5    ID          *                                                                        *
               6    ID          **************************************************************************
               7    ID
               8    ID    PREPARED FOR: CITY OF NORTH LAS VEGAS PUBLIC WORKS DEPARTMENT
               9    ID    PREPARED BY:  L. GOOKIN, VTN-NEVADA
              10    ID    DATE:  18 DECEMBER 2000
              11    ID    FILE:  ALEX-C.DAT
              12    ID      CN FOR 21, 22, AND 23 INCREASED TO 95
              13    ID      ASSUMES THAT 21, 22, AND 23 ARE CONVEYED TO ALEXANDER CHANNEL
              14    ID
              15    ID    MODIFIED 1-15-00
              16    ID    ADD THREE SUBBASINS TO SOUTH OF ALEXANDER CHANNEL AT END OF RUN
              17    ID
              18    ID   DEVELOPED CONDITIONS
              19    ID
              20    ID      DESIGN PT        AREA              DARF
              21    ID          A            0.21              0.99
              22    ID          B            0.32              0.99
              23    ID          C            0.43              0.98
              24    ID          D            0.91              0.97
              25    ID          E            1.04              0.97
              26    ID          F            1.10              0.97
              27    ID          G            1.41              0.95
              28    ID
              29    ID   JR CARD RATIOS REPRESENT DEPTH-AREA REDUCTION FACTORS (DARF'S)
              30    ID
              31    ID   100-YEAR,  6-HOUR STORM,  SDN3
              32    ID
              33    IT       5       0       0     300
              34    IO       5       0       0
              35    IN       5       0       0
              36    JR    PREC    0.99    0.98    0.97    0.95
                    *
              37    KK       1
              38    KM   FLOW FROM SUBBASIN 1
              39    BA   0.063
              40    PB    2.77
              41    PC   0.000   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.13
              42    PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.18
              43    PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.24
              44    PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.40
              45    PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.85
              46    PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.97
              47    PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.99
              48    PC   0.998   0.999   1.000
              49    LS       0    92.0
              50    UD    0.15
```

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

  51      KK      r1
  52      KM    ROUTE 1 TO POINT 2
  53      RK     1400     0.02    0.017        0     TRAP       60        0

  54      KK       2
  55      KM    FLOW FROM SUBBASIN 2
  56      BA    0.063
  57      LS        0     91.0
  58      UD     0.16

  59      KK     c1-2
  60      KM    COMBINE FLOWS 1 AND 2
  61      HC       2

  62      KK    rc1-2
  63      KM    ROUTE COMBINED FLOW c1-2 TO POINT A
  64      RK     1000    0.016    0.017        0     TRAP       60        0

  65      KK       3
  66      KM    FLOW FROM SUBBASIN 3
  67      BA    0.033
  68      LS        0     90.0
  69      UD     0.11

  70      KK      r3
  71      KM    ROUTE FLOW 3 TO POINT A
  72      RK      800    0.016    0.015        0     CIRC      1.5

  73      KK       4
  74      KM    FLOW FROM SUBBASIN 4
  75      BA    0.033
  76      LS        0     92.0
  77      UD     0.11

  78      KK     c3-4
  79      KM    COMBINE FLOWS 3 AND 4
  80      HC       2

  81      KK       6
  82      KM    FLOW FROM SUBBASIN 6
  83      BA    0.009
  84      LS        0     90.0
  85      UD     0.10

  86      KK      r6
  87      KM    ROUTE FLOW 6 TO 7
  88      RK      400    0.016    0.017        0     TRAP       60        0

  89      KK       7
  90      KM    FLOW FROM SUBBASIN 7
  91      BA    0.013
  92      LS        0     92.0
  93      UD     0.11
```

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

   94     KK    c6-7
   95     KM   COMBINE FLOWS 6 AND 7
   96     HC       2

   97     KK   rc6-7
   98     KM   ROUTE COMBINED FLOW TO POINT A
   99     RK     300   0.016   0.017       0    TRAP      60       0

  100     KK    cPTA
  101     KM   COMBINE FLOWS AT POINT A
  102     HC       3

  103     KK   rcPTA
  104     KM   ROUTE COMBINED FLOW TO POINT 5
  105     RK    1100   0.016   0.015       0    CIRC       2

  106     KK       5
  107     KM   FLOW FROM SUBBASIN 5
  108     BA   0.041
  109     LS       0      92
  110     UD    0.13

  111     KK      c5
  112     KM   COMBINE FLOWS AT 5
  113     HC       2

  114     KK     rc5
  115     KM   ROUTE c5 TO PTB
  116     RK     400   0.010   0.015       0    TRAP      10       2

  117     KK       8
  118     KM   FLOW FROM SUBBASIN 8
  119     BA   0.011
  120     LS       0    94.0
  121     UD    0.10

  122     KK      r8
  123     KM   ROUTE FLOW FROM 8 TO 9
  124     RK     600   0.016   0.017       0    TRAP      60       0

  125     KK       9
  126     KM   FLOW FROM SUBBASIN 9
  127     BA   0.050
  128     LS       0      90
  129     UD    0.16

  130     KK    cPTB
  131     KM   COMBINE FLOWS AT PTB
  132     HC       3
```

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

  133     KK   rcPTB
  134     KM   ROUTE FLOW TO PT C
  135     RK    1600   0.016   0.017       0    TRAP      10       2

  136     KK      10
  137     KM   FLOW FROM SUBBASIN 10
  138     BA   0.009
  139     LS       0    90.0
  140     UD    0.10

  141     KK     r10
  142     KM   ROUTE FLOW FROM 10 TO 11
  143     RK    1400   0.016   0.017       0    TRAP      60       0

  144     KK      11
  145     KM   FLOW FROM SUBBASIN 11
  146     BA   0.009
  147     LS       0    94.0
  148     UD    0.09

  149     KK  c10-11
  150     KM   COMBINE FLOWS AT 11
  151     HC       2

  152     KK rc10-11
  153     KM   ROUTE FLOW TO 12
  154     RK    1300   0.016   0.017       0    TRAP      60       0

  155     KK      12
  156     KM   FLOW FROM SUBBASIN 12
  157     BA   0.045
  158     LS       0    90.0
  159     UD    0.15

  160     KK     c12
  161     KM   COMBINE FLOWS AT 12
  162     HC       2

  163     KK    rc12
  164     KM   ROUTE COMBINED FLOW c12 TO POINT C
  165     RK     500   0.016   0.017       0    TRAP      60       0

  166     KK      13
  167     KM   FLOW FROM SUBBASIN 13
  168     BA   0.050
  169     LS       0    92.0
  170     UD    0.17

  171     KK    cPTC
  172     KM   COMBINE FLOWS AT PTC
  173     HC       3
```

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

  174     KK   rcPTC
  175     KM   ROUTE COMBINED FLOW cPTC TO POINT D
  176     RK    3000   0.010   0.015       0    TRAP      10       2

  177     KK      14
  178     KM   FLOW FROM SUBBASIN 14
  179     BA   0.067
  180     LS       0    90.0
  181     UD    0.17

  182     KK     r14
  183     KM   ROUTE FLOW TO 15
  184     RK     750   0.016   0.017       0    TRAP      60       0

  185     KK      15
  186     KM   FLOW FROM SUBBASIN 15
  187     BA   0.044
  188     LS       0    90.0
  189     UD    0.14

  190     KK     c15
  191     KM   COMBINE FLOWS AT 15
  192     HC       2

  193     KK     r15
  194     KM   ROUTE FLOW TO 16
  195     RK    2000   0.016   0.017       0    TRAP      60       0

  196     KK      16
  197     KM   FLOW FROM SUBBASIN 16
  198     BA   0.100
  199     LS       0    92.0
  200     UD    0.18

  201     KK     c16
  202     KM   COMBINE FLOWS AT 16
  203     HC       2

  204     KK    rc16
  205     KM   ROUTE FLOW TO PTD
  206     RK    1300   0.016   0.017       0    TRAP      60       0

  207     KK      17
  208     KM   FLOW FROM SUBBASIN 17
  209     BA   0.045
  210     LS       0    92.0
  211     UD    0.18

  212     KK      18
  213     KM   FLOW FROM SUBBASIN 18
  214     BA   0.227
  215     LS       0    92.0
  216     UD    0.25
```

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

  217     KK    CPTD
  218     KM   COMBINE FLOWS AT PTD
  219     HC       4

  220     KK   rCPTD
  221     KM   ROUTE FLOW TO PTE
  222     RK    1300   0.010   0.015       0    TRAP      10       2

  223     KK      19
  224     KM   FLOW FROM SUBBASIN 19
  225     BA   0.064
  226     LS       0    94.0
  227     UD    0.15

  228     KK      21
  229     KM   FLOW FROM SUBBASIN 21
  230     BA   0.064
  231     LS       0    95.0
  232     UD    0.15

  233     KK    cPTE
  234     KM   COMBINE FLOWS AT PTE
  235     HC       3

  236     KK   rcPTE
  237     KM   ROUTE FLOW TO PTF
  238     RK    1250   0.010   0.015       0    TRAP      10       2

  239     KK      22
  240     KM   FLOW FROM SUBBASIN 22
  241     BA   0.064
  242     LS       0    95.0
  243     UD    0.15

  244     KK    cPTF
  245     KM   COMBINE FLOWS AT PTF
  246     HC       2

  247     KK   rcPTF
  248     RK    1250   0.010   0.015       0    TRAP      10       2

  249     KK      20
  250     KM   FLOW FROM SUBBASIN 20
  251     BA   0.247
  252     LS       0    92.0
  253     UD    0.33

  254     KK      23
  255     KM   FLOW FROM SUBBASIN 23
  256     BA   0.064
  257     LS       0    95.0
  258     UD    0.15
```

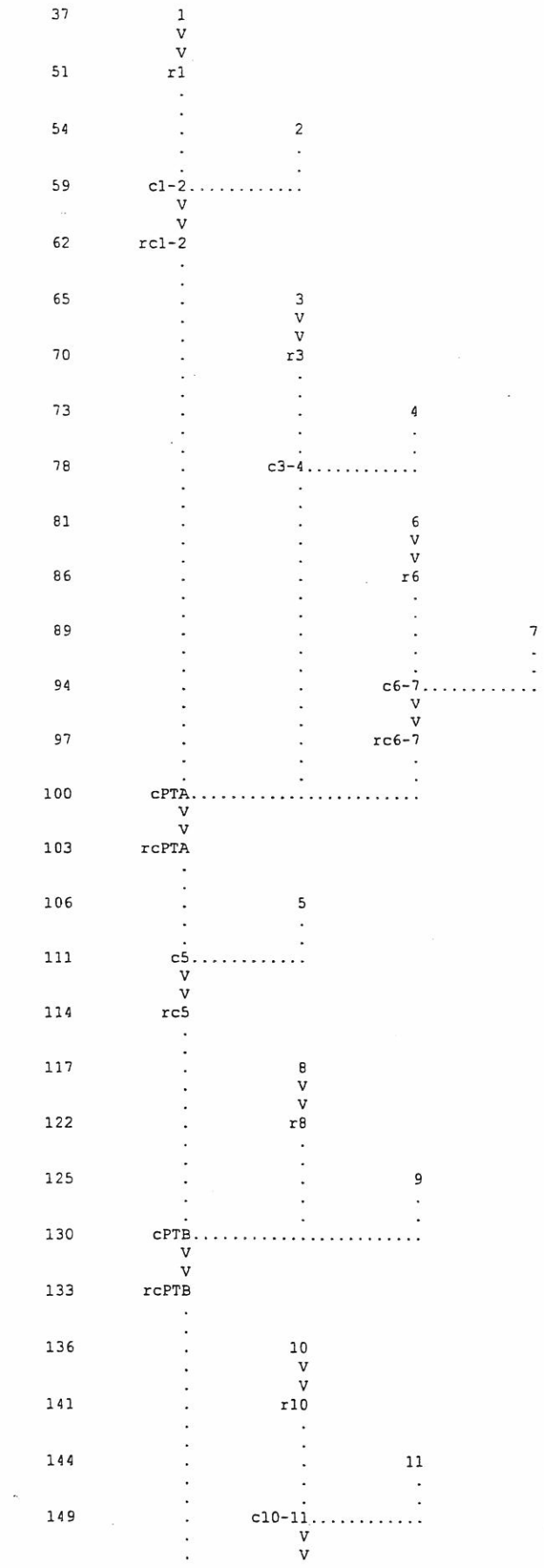
```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

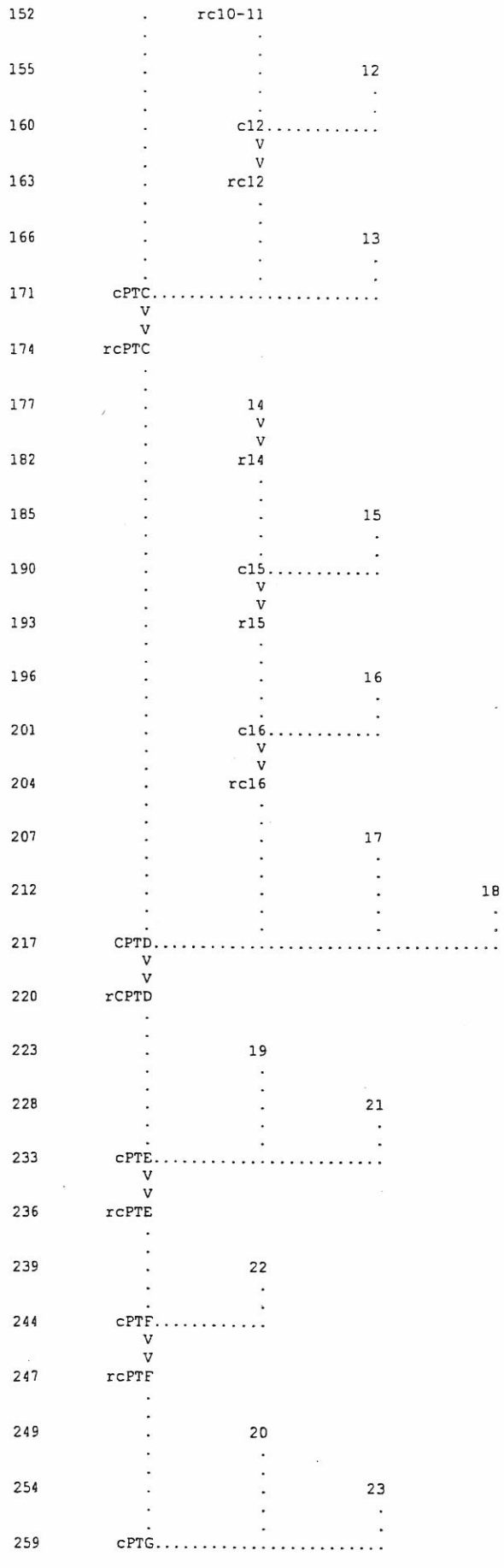
  259         KK    cPTG
  260         KM   COMBINE FLOWS AT PTG
  261         HC       3
  262         ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE NO.

(V) ROUTING
(.) CONNECTOR
(---->) DIVERSION OR PUMP FLOW
(<----) RETURN OF DIVERTED OR PUMPED FLOW




152 rc10-11
155 12
160 c12
163 rc12
166 13
171 cPTC
174 rcPTC
177 14
182 r14
185 15
190 c15
193 r15
196 16
201 c16
204 rc16
207 17
212 18
217 CPTD
220 rCPTD
223 19
228 21
233 cPTE
236 rcPTE
239 22
244 cPTF
247 rcPTF
249 20
254 23
259 cPTG

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1**************************************
*                                    *
*   FLOOD HYDROGRAPH PACKAGE (HEC-1) *
*         SEPTEMBER 1990             *
*          VERSION 4.0               *
*                                    *
*  RUN DATE  01/16/2001  TIME  10:02:24 *
*                                    *
**************************************
```


```
**************************************
*                                    *
*    U.S. ARMY CORPS OF ENGINEERS    *
*    HYDROLOGIC ENGINEERING CENTER   *
*          609 SECOND STREET         *
*       DAVIS, CALIFORNIA 95616      *
*           (916) 756-1104           *
*                                    *
**************************************
```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**********************************************************************
*            ALEXANDER CHANNEL HYDROLOGY STUDY                       *
*                                                                    *
*                        DEVELOPED CONDITIONS                        *
*                                                                    *
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PREPARED FOR: CITY OF NORTH LAS VEGAS PUBLIC WORKS DEPARTMENT
PREPARED BY: L. GOOKIN, VTN-NEVADA
DATE: 18 DECEMBER 2000
FILE: ALEX-C.DAT
CN FOR 21, 22, AND 23 INCREASED TO 95
ASSUMES THAT 21, 22, AND 23 ARE CONVEYED TO ALEXANDER CHANNEL

MODIFIED 1-11-01 & 1-15-00
ADD THREE SUBBASINS TO SOUTH OF ALEXANDER CHANNEL AT END OF RUN

DEVELOPED CONDITIONS

DESIGN PT	AREA	DARF
A	0.21	0.99
B	0.32	0.99
C	0.43	0.98
D	0.91	0.97
E	1.04	0.97
F	1.10	0.97
G	1.41	0.95

JR CARD RATIOS REPRESENT DEPTH-AREA REDUCTION FACTORS (DARF'S)

100-YEAR, 6-HOUR STORM, SDN3

```
34 IO          OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

   IT          HYDROGRAPH TIME DATA
                     NMIN           5  MINUTES IN COMPUTATION INTERVAL
                    IDATE      1    0  STARTING DATE
                    ITIME         0000  STARTING TIME
                       NQ          300  NUMBER OF HYDROGRAPH ORDINATES
                   NDDATE      2    0  ENDING DATE
                   NDTIME         0055  ENDING TIME
                   ICENT           19  CENTURY MARK

                 COMPUTATION INTERVAL      .08 HOURS
                      TOTAL TIME BASE    24.92 HOURS

        ENGLISH UNITS
             DRAINAGE AREA          SQUARE MILES
             PRECIPITATION DEPTH    INCHES
             LENGTH, ELEVATION      FEET
             FLOW                   CUBIC FEET PER SECOND
             STORAGE VOLUME         ACRE-FEET
             SURFACE AREA           ACRES
             TEMPERATURE            DEGREES FAHRENHEIT

   JP          MULTI-PLAN OPTION
                    NPLAN           1  NUMBER OF PLANS

   JR          MULTI-RATIO OPTION
                   RATIOS OF PRECIPITATION
                   .99       .98       .97       .95
```

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 .99	RATIO 2 .98	RATIO 3 .97	RATIO 4 .95	
HYDROGRAPH AT									
+	1	.06	1	FLOW	98.	97.	96.	93.	
				TIME	3.58	3.58	3.58	3.58	
ROUTED TO									
+	r1	.06	1	FLOW	95.	94.	93.	90.	
				TIME	3.58	3.58	3.58	3.58	
HYDROGRAPH AT									
+	2	.06	1	FLOW	94.	92.	91.	89.	
				TIME	3.58	3.58	3.58	3.58	
2 COMBINED AT									
+	c1-2	.13	1	FLOW	189.	186.	184.	179.	
				TIME	3.58	3.58	3.58	3.58	
ROUTED TO									
+	rc1-2	.13	1	FLOW	184.	181.	179.	174.	
				TIME	3.58	3.58	3.58	3.58	
HYDROGRAPH AT									
+	3	.03	1	FLOW	50.	49.	49.	47.	
				TIME	3.50	3.50	3.50	3.50	
ROUTED TO									
+	r3	.03	1	FLOW	49.	49.	48.	47.	
				TIME	3.58	3.58	3.58	3.58	
HYDROGRAPH AT									
+	4	.03	1	FLOW	54.	53.	52.	51.	
				TIME	3.50	3.50	3.50	3.50	
2 COMBINED AT									
+	c3-4	.07	1	FLOW	102.	101.	100.	97.	
				TIME	3.50	3.50	3.50	3.50	
HYDROGRAPH AT									
+	6	.01	1	FLOW	14.	14.	14.	13.	
				TIME	3.50	3.50	3.50	3.50	
ROUTED TO									
+	r6	.01	1	FLOW	13.	13.	13.	13.	
				TIME	3.50	3.50	3.50	3.58	
HYDROGRAPH AT									
+	7	.01	1	FLOW	21.	21.	21.	20.	
				TIME	3.50	3.50	3.50	3.50	
2 COMBINED AT									
+	c6-7	.02	1	FLOW	35.	34.	34.	33.	
				TIME	3.50	3.50	3.50	3.50	
ROUTED TO									
+	rc6-7	.02	1	FLOW	34.	34.	33.	32.	
				TIME	3.58	3.58	3.58	3.58	
3 COMBINED AT									
+	cPTA	.21	1	FLOW	320.	315.	311.	303.	
				TIME	3.58	3.58	3.58	3.58	PT A
ROUTED TO									
+	rcPTA	.21	1	FLOW	316.	312.	307.	299.	
				TIME	3.58	3.58	3.58	3.58	
HYDROGRAPH AT									
+	5	.04	1	FLOW	65.	65.	64.	62.	
				TIME	3.58	3.58	3.58	3.58	
2 COMBINED AT									
+	c5	.25	1	FLOW	381.	376.	371.	361.	
				TIME	3.58	3.58	3.58	3.58	
ROUTED TO									
+	rc5	.25	1	FLOW	379.	374.	369.	359.	
				TIME	3.58	3.58	3.58	3.58	
HYDROGRAPH AT									
+	8	.01	1	FLOW	20.	20.	19.	19.	
				TIME	3.50	3.50	3.50	3.50	

ROUTED TO									
+	r8	.01	1	FLOW	19.	18.	18.	18.	
				TIME	3.50	3.50	3.58	3.58	
HYDROGRAPH AT									
+	9	.05	1	FLOW	72.	71.	70.	68.	
				TIME	3.58	3.58	3.58	3.58	
3 COMBINED AT									
+	cPTB	.32	1	FLOW	469.	463.	457.	445.	
				TIME	3.58	3.58	3.58	3.58	PT B
ROUTED TO									
+	rcPTB	.32	1	FLOW	460.	454.	448.	436.	
				TIME	3.58	3.58	3.58	3.58	
HYDROGRAPH AT									
+	10	.01	1	FLOW	14.	14.	14.	13.	
				TIME	3.50	3.50	3.50	3.50	
ROUTED TO									
+	r10	.01	1	FLOW	14.	14.	14.	13.	
				TIME	3.58	3.58	3.58	3.58	
HYDROGRAPH AT									
+	11	.01	1	FLOW	17.	17.	16.	16.	
				TIME	3.50	3.50	3.50	3.50	
2 COMBINED AT									
+	c10-11	.02	1	FLOW	28.	28.	28.	27.	
				TIME	3.58	3.58	3.58	3.58	
ROUTED TO									
+	rc10-11	.02	1	FLOW	28.	28.	28.	27.	
				TIME	3.58	3.58	3.58	3.58	
HYDROGRAPH AT									
+	12	.05	1	FLOW	66.	65.	64.	62.	
				TIME	3.58	3.58	3.58	3.58	
2 COMBINED AT									
+	c12	.06	1	FLOW	94.	93.	91.	89.	
				TIME	3.58	3.58	3.58	3.58	
ROUTED TO									
+	rc12	.06	1	FLOW	92.	91.	90.	87.	
				TIME	3.58	3.58	3.58	3.58	
HYDROGRAPH AT									
+	13	.05	1	FLOW	76.	75.	74.	72.	
				TIME	3.58	3.58	3.58	3.58	
3 COMBINED AT									
+	cPTC	.43	1	FLOW	628.	620.	611.	595.	
				TIME	3.58	3.58	3.58	3.58	PT C
ROUTED TO									
+	rcPTC	.43	1	FLOW	599.	591.	583.	566.	
				TIME	3.58	3.58	3.58	3.58	
HYDROGRAPH AT									
+	14	.07	1	FLOW	94.	93.	91.	89.	
				TIME	3.58	3.58	3.58	3.58	
ROUTED TO									
+	r14	.07	1	FLOW	91.	90.	89.	86.	
				TIME	3.58	3.58	3.58	3.58	
HYDROGRAPH AT									
+	15	.04	1	FLOW	65.	64.	63.	61.	
				TIME	3.58	3.58	3.58	3.58	
2 COMBINED AT									
+	c15	.11	1	FLOW	156.	154.	152.	148.	
				TIME	3.58	3.58	3.58	3.58	
ROUTED TO									
+	r15	.11	1	FLOW	147.	145.	143.	139.	
				TIME	3.58	3.67	3.67	3.67	
HYDROGRAPH AT									
+	16	.10	1	FLOW	148.	146.	144.	140.	
				TIME	3.58	3.58	3.58	3.58	
2 COMBINED AT									
+	c16	.21	1	FLOW	295.	291.	287.	279.	
				TIME	3.58	3.58	3.58	3.58	
ROUTED TO									
+	rc16	.21	1	FLOW	285.	281.	278.	270.	
				TIME	3.67	3.67	3.67	3.67	

HYDROGRAPH AT									
+	17	.05	1	FLOW	66.	66.	65.	63.	
				TIME	3.58	3.58	3.58	3.58	
HYDROGRAPH AT									
+	18	.23	1	FLOW	295.	291.	287.	280.	
				TIME	3.67	3.67	3.67	3.67	
4 COMBINED AT									
+	CPTD	.91	1	FLOW	1230.	1214.	1198.	1167.	
				TIME	3.67	3.67	3.67	3.67	PT D
ROUTED TO									
+	rCPTD	.91	1	FLOW	1228.	1212.	1197.	1165.	
				TIME	3.67	3.67	3.67	3.67	
HYDROGRAPH AT									
+	19	.06	1	FLOW	106.	105.	104.	101.	
				TIME	3.58	3.58	3.58	3.58	
HYDROGRAPH AT									
+	21	.06	1	FLOW	109.	108.	107.	104.	
				TIME	3.58	3.58	3.58	3.58	
3 COMBINED AT									
+	cPTE	1.04	1	FLOW	1408.	1390.	1372.	1336.	
				TIME	3.58	3.67	3.67	3.67	PT E
ROUTED TO									
+	rcPTE	1.04	1	FLOW	1407.	1389.	1371.	1336.	
				TIME	3.67	3.67	3.67	3.67	
HYDROGRAPH AT									
+	22	.06	1	FLOW	109.	108.	107.	104.	
				TIME	3.58	3.58	3.58	3.58	
2 COMBINED AT									
+	cPTF	1.10	1	FLOW	1498.	1479.	1460.	1422.	
				TIME	3.67	3.67	3.67	3.67	PT F
ROUTED TO									
+	rcPTF	1.10	1	FLOW	1496.	1477.	1458.	1420.	
				TIME	3.67	3.67	3.67	3.67	
HYDROGRAPH AT									
+	20	.25	1	FLOW	283.	279.	276.	268.	
				TIME	3.75	3.75	3.75	3.75	
HYDROGRAPH AT									
+	23	.06	1	FLOW	109.	108.	107.	104.	
				TIME	3.58	3.58	3.58	3.58	
3 COMBINED AT									
+	cPTG	1.41	1	FLOW	1855.	1831.	1807.	1761.	
				TIME	3.67	3.67	3.67	3.67	PT G

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

STANDARD FORM 4

Hec model: ALEX-C.dat

DEVELOPMENT Alexander Channel

CALCULATED BY LG DATE 1/17/01

SUB-BASIN DATA					INITIAL/OVERLAND TIME (Ti)			TRAVEL TIME (Tt)				Tc CHECK (URBANIZED BASINS)		FINAL Tc	Tlag	REMARKS
DESIG. (1)	Cn	K (2)	AREA Ac. (3)	AREA Mi^2	LENGTH Ft (4)	SLOPE % (5)	Ti Min. (6)	LENGTH Ft. (7)	SLOPE % (8)	V1 fps (9)	Tt Min. (11)	TOTAL LENGTH (12)	Tc Min. (13)	Min.	0.6Tc/60	
1	92.0	0.824	40.0	0.063	150	1.0	6.08	2400	2.0	4.3	9.24	2550	24.17	15.32	0.15	DEVELOPED
2	91.0	0.811	40.0	0.063	150	1.0	6.37	2500	2.0	4.3	9.63	2650	24.72	16.00	0.16	DEVELOPED
3	90.0	0.798	21.0	0.033	150	1.0	6.66	1200	2.0	4.3	4.62	1350	17.50	11.28	0.11	DEVELOPED
4	92.0	0.824	21.0	0.033	150	1.0	6.08	1300	2.0	4.3	5.01	1450	18.06	11.08	0.11	DEVELOPED
5	92.0	0.824	26.0	0.041	150	1.0	6.08	1900	2.0	4.3	7.32	2050	21.39	13.39	0.13	DEVELOPED
6	90.0	0.798	6.0	0.009	150	1.0	6.66	800	2.0	4.3	3.08	950	15.28	9.74	0.10	DEVELOPED
7	92.0	0.824	8.0	0.013	150	1.0	6.08	1300	2.0	4.3	5.01	1450	18.06	11.08	0.11	DEVELOPED
8	94.0	0.851	7.3	0.011	150	1.0	5.49	1200	2.0	4.3	4.62	1350	17.50	10.12	0.10	DEVELOPED
9	90.0	0.798	32.0	0.050	150	1.0	6.66	2500	2.0	4.3	9.63	2650	24.72	16.29	0.16	DEVELOPED
10	90.0	0.798	6.0	0.009	150	1.0	6.66	800	2.0	4.3	3.08	950	15.28	9.74	0.10	DEVELOPED
11	94.0	0.851	6.0	0.009	150	1.0	5.49	800	2.0	4.3	3.08	950	15.28	8.57	0.09	DEVELOPED
12	90.0	0.798	29.0	0.045	150	1.0	6.66	2200	2.0	4.3	8.47	2350	23.06	15.13	0.15	DEVELOPED
13	92.0	0.824	32.0	0.050	150	1.0	6.08	2800	2.0	4.3	10.78	2950	26.39	16.86	0.17	DEVELOPED
14	90.0	0.798	43.0	0.067	150	1.0	6.66	2700	2.0	4.3	10.40	2850	25.83	17.06	0.17	DEVELOPED
15	90.0	0.798	28.0	0.044	150	1.0	6.66	1900	2.0	4.3	7.32	2050	21.39	13.98	0.14	DEVELOPED
16	92.0	0.824	64.0	0.100	150	1.0	6.08	3100	2.0	4.3	11.94	3250	28.06	18.01	0.18	DEVELOPED
17	92.0	0.824	29.0	0.045	150	1.0	6.08	3100	2.0	4.3	11.94	3250	28.06	18.01	0.18	DEVELOPED
18	92.0	0.824	145.0	0.227	150	1.0	6.08	4900	2.0	4.3	18.87	5050	38.06	24.95	0.25	DEVELOPED
19	94.0	0.851	41.0	0.064	150	1.0	5.49	2500	2.0	4.3	9.63	2650	24.72	15.12	0.15	DEVELOPED
20	92.0	0.824	158.0	0.247	150	1.0	6.08	6900	2.0	4.3	26.57	7050	49.17	32.65	0.33	DEVELOPED
21	95.0	0.864	41.0	0.064	150	1.0	5.20	2500	2.0	4.3	9.63	2650	24.72	14.83	0.15	DEVELOPED
22	95.0	0.864	41.0	0.064	150	1.0	5.20	2500	2.0	4.3	9.63	2650	24.72	14.83	0.15	DEVELOPED
23	95.0	0.864	41.0	0.064	150	1.0	5.20	2500	2.0	4.3	9.63	2650	24.72	14.83	0.15	DEVELOPED

$T_c = T_i + T_t$

$T_t = \frac{L}{60V}$

$T_i = \frac{1.8(1.1 - k)L^{1/2}}{S^{1/3}}$

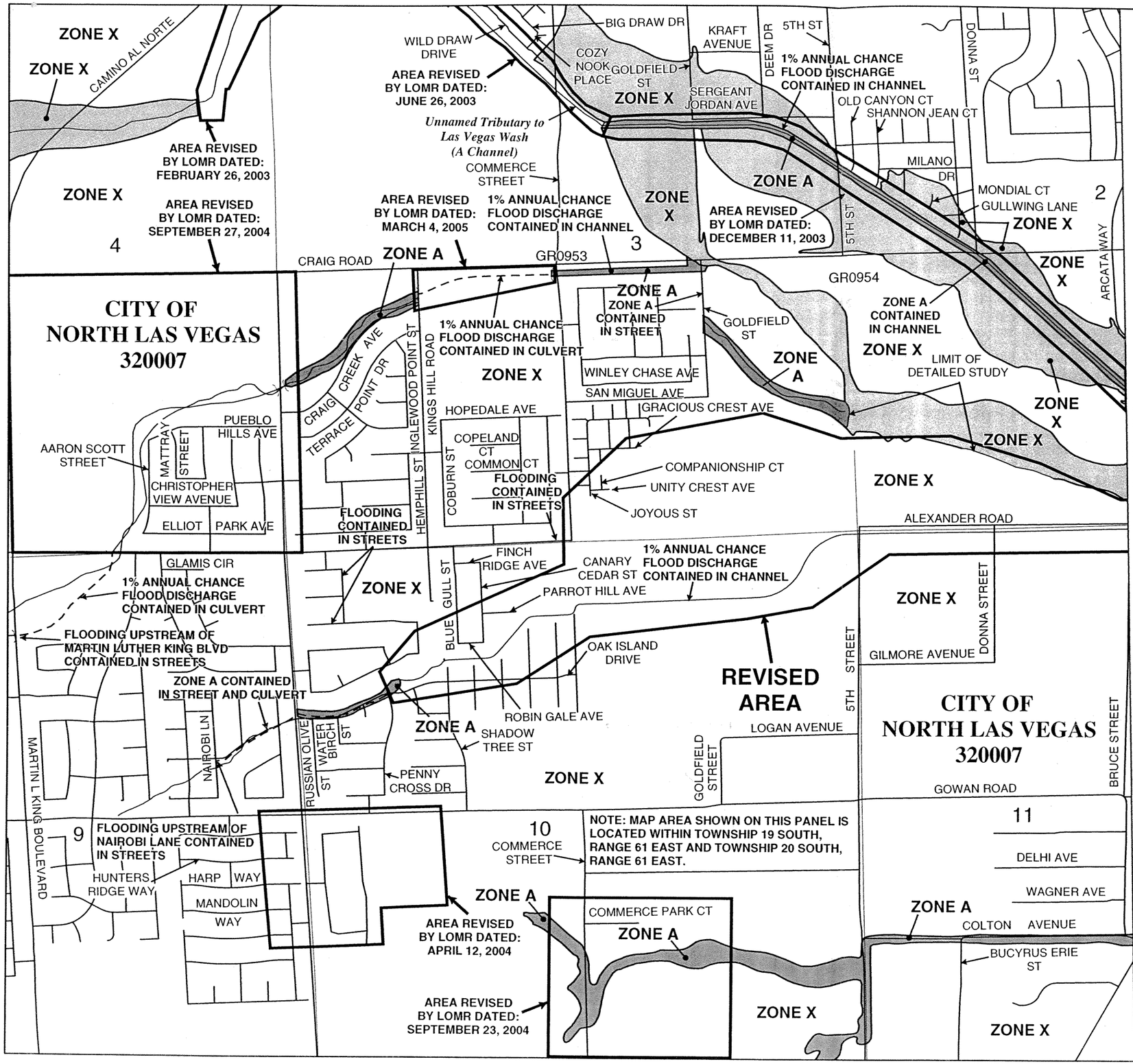
$k = 0.0132C_n - 0.39$

$V1 = CS^{1/2}$

where C = 30.6 for developed conditions, curb height flow

C = 29.4 for undeveloped conditions, wide channel flow with D=0.7' and n=0.04

Appendix F: Data CD



Legend

- 1% annual chance (100-Year) Floodplain
- 1% annual chance (100-Year) Floodway
- 0.2% annual chance (500-Year) Floodplain

MAP SCALE 1" = 1000'

500 250 0 500 1,000 1,500 2,000 Feet

300 150 0 300 600 Meters

NFIP

PANEL 2160 E

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY, NEVADA AND INCORPORATED AREAS

PANEL 2160 OF 4090

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CLARK COUNTY UNINCORPORATED AREAS	320003	2160	E
LAS VEGAS, CITY OF	325276	2160	E
NORTH LAS VEGAS, CITY OF	320007	2160	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER 32003C2160 E

MAP REVISED: SEPTEMBER 27, 2002

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

REVISED TO REFLECT LOMR EFFECTIVE JAN 19 2006

Federal Emergency Management Agency

Washington, D.C. 20472

JAN 19 2006

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Michael L. Montandon
Mayor, City of North Las Vegas
2200 Civic Center Drive
North Las Vegas, NV 89030

IN REPLY REFER TO:
Case No.: 05-09-A166P
(Formerly Case No.: 05-09-2100166P)
Community Name: City of North Las Vegas, NV
Community No.: 320007
Effective Date of This Revision: JAN 19 2006

Dear Mayor Montandon:

The Flood Insurance Rate Map for your community has been revised by this Letter of Map Revision (LOMR). Please use the enclosed annotated map panel(s) revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals issued in your community. Please note that the case number referenced above was changed to accommodate our digital processing.

Additional documents are enclosed which provide information regarding this LOMR. Please see the List of Enclosures below to determine which documents are included. Other attachments specific to this request may be included as referenced in the Determination Document. If you have any questions regarding floodplain management regulations for your community or the National Flood Insurance Program (NFIP) in general, please contact the Consultation Coordination Officer for your community. If you have any technical questions regarding this LOMR, please contact the Director, Federal Insurance and Mitigation Division of the Department of Homeland Security's Federal Emergency Management Agency (FEMA) in Oakland, California, at (510) 627-7175, or the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP). Additional information about the NFIP is available on our website at http://www.fema.gov/nfip.

Sincerely,

Michael B. Godesky, CFM, Project Engineer
Hazard Identification Section
Mitigation Division

For: Doug Bellomo, P.E., CFM, Chief
Hazard Identification Section
Mitigation Division

List of Enclosures:
Letter of Map Revision Determination Document
Annotated Flood Insurance Rate Map

cc: Mr. Lenny Badger, P.E., CFM
Manager, Development and Flood Control
Land Development Services
City of North Las Vegas

Ms. Jennifer Doody, P.E., CFM
Senior Engineer
Development and Flood Control
Land Development Services
City of North Las Vegas

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

Mr. Matthew S. Baird, P.E., CFM
Senior Program Manager
PBS&J

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT

COMMUNITY AND REVISION INFORMATION		PROJECT DESCRIPTION	BASIS OF REQUEST
COMMUNITY	City of North Las Vegas Clark County Nevada	CHANNELIZATION CULVERT	HYDRAULIC ANALYSIS NEW TOPOGRAPHIC DATA
	COMMUNITY NO.: 320007		
IDENTIFIER	Alexander Channel – Commerce Street to the Western Tributary	APPROXIMATE LATITUDE & LONGITUDE: 36.232, -115.134 SOURCE: USGS QUADRANGLE DATUM: NAD 83	

ANNOTATED MAPPING ENCLOSURES			ANNOTATED STUDY ENCLOSURES
TYPE: FIRM*	NO.: 32003C2160 E	DATE: September 27, 2002	NO REVISION TO THE FLOOD INSURANCE STUDY REPORT
TYPE: FIRM	NO.: 32003C2176 E	DATE: September 27, 2002	

Enclosures reflect changes to flooding sources affected by this revision.
* FIRM - Flood Insurance Rate Map; ** FBFM - Flood Boundary and Floodway Map; *** FHBM - Flood Hazard Boundary Map

FLOODING SOURCE(S) & REVISED REACH(ES)

Unnamed Tributary to A Channel – from approximately 1,800 feet upstream of Commerce Street to approximately 1,200 feet downstream of Bruce Street

SUMMARY OF REVISIONS

Flooding Source	Effective Flooding	Revised Flooding	Increases	Decreases
Unnamed Tributary to A Channel	Zone A	Zone X (unshaded)	NONE	YES

* BFEs - Base Flood Elevations

DETERMINATION

This document provides the determination from the Department of Homeland Security's Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the Flood Insurance Study (FIS) report and/or National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

Michael B. Godesky, CFM, Project Engineer
Hazard Identification Section
Mitigation Division

106979 10.3.1.05092100166 102-D

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

COMMUNITY INFORMATION

APPLICABLE NFIP REGULATIONS/COMMUNITY OBLIGATION

We have made this determination pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria, including adoption of the FIS report and FIRM, and the modifications made by this LOMR, are the minimum requirements for continued NFIP participation and do not supersede more stringent State/Commonwealth or local requirements to which the regulations apply.

NFIP regulations Subparagraph 60.3(b)(7) requires communities to ensure that the flood-carrying capacity within the altered or relocated portion of any watercourse is maintained. This provision is incorporated into your community's existing floodplain management ordinances; therefore, responsibility for maintenance of the modified channel and culverts rests with your community. We may request that your community submit a description and schedule of channel and culvert activities.

COMMUNITY REMINDERS

We based this determination on the 1-percent-annual-chance flood discharges computed in the FIS for your community without considering subsequent changes in watershed characteristics that could increase flood discharges. Future development of projects upstream could cause increased flood discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on flood discharges subsequent to the publication of the FIS report for your community and could, therefore, establish greater flood hazards in this area.

Your community must regulate all proposed floodplain development and ensure that permits required by Federal and/or State/Commonwealth law have been obtained. State/Commonwealth or community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction or may limit development in floodplain areas. If your State/Commonwealth or community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

We will not print and distribute this LOMR to primary users, such as local insurance agents or mortgage lenders; instead, the community will serve as a repository for the new data. We encourage you to disseminate the information in this LOMR by preparing a news release for publication in your community's newspaper that describes the revision and explains how your community will provide the data and help interpret the NFIP maps. In that way, interested persons, such as property owners, insurance agents, and mortgage lenders, can benefit from the information.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

Michael B. Godesky, CFM, Project Engineer
Hazard Identification Section
Mitigation Division

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Ms. Sally M. Ziolkowski
Director, Federal Insurance and Mitigation Division
Federal Emergency Management Agency, Region IX
1111 Broadway Street, Suite 1200
Oakland, CA 94607-4052
(510) 627-7175

STATUS OF THE COMMUNITY NFIP MAPS

We will not physically revise and republish the FIRM for your community to reflect the modifications made by this LOMR at this time. When changes to the previously cited FIRM panel(s) warrant physical revision and republication in the future, we will incorporate the modifications made by this LOMR at that time.

The entire base flood is contained in the channel and culverts along the unnamed tributary to A Channel from approximately 1,800 feet upstream of Commerce Street to approximately 1,200 feet downstream of Bruce Street.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

Michael B. Godesky, CFM, Project Engineer
Hazard Identification Section
Mitigation Division

Federal Emergency Management Agency

Washington, D.C. 20472

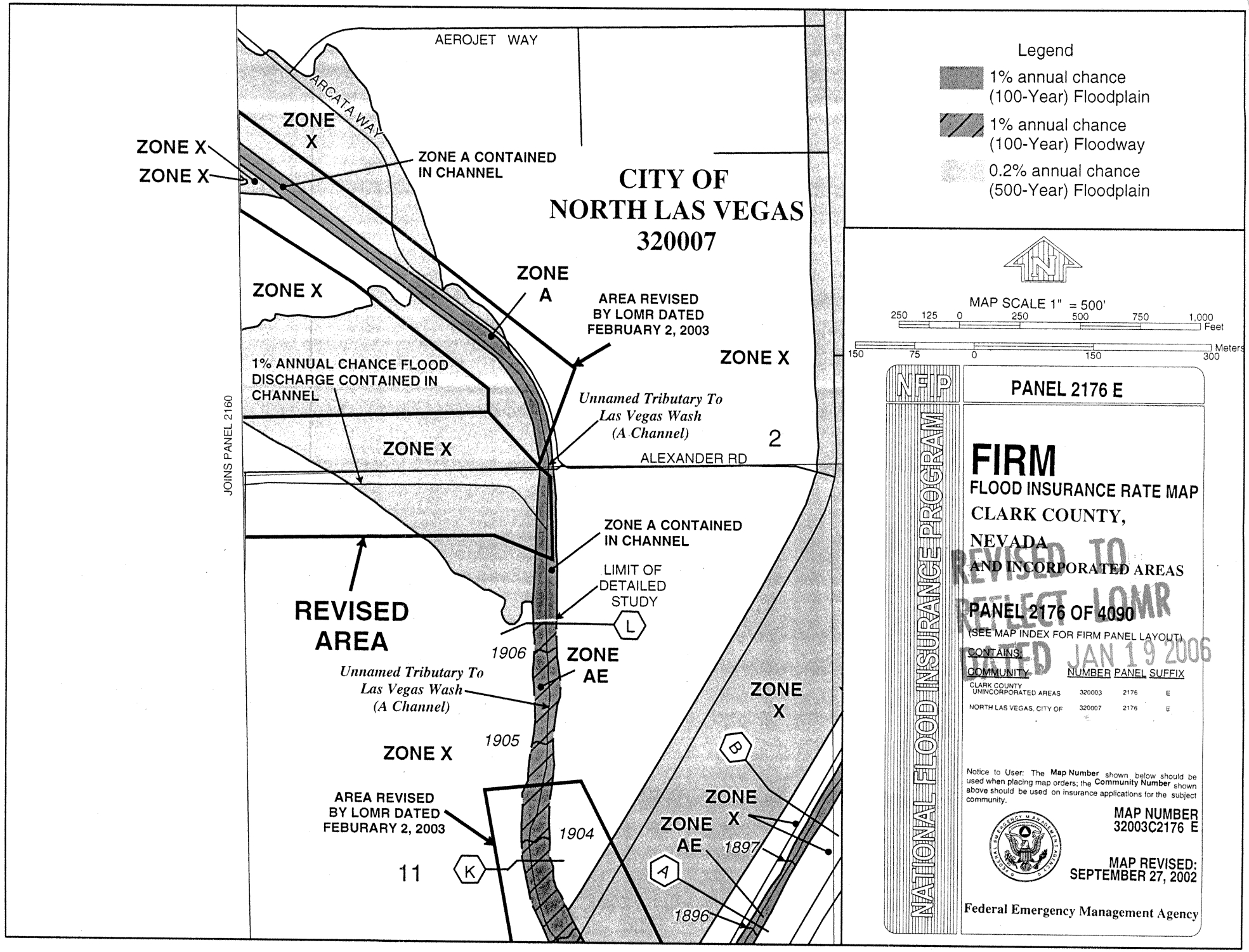
LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

COMMUNITY INFORMATION (CONTINUED)

This revision is effective as of the date of this letter. Any requests to review or alter this determination should be made within 30 days and must be based on scientific or technical data.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

Michael B. Godesky, CFM, Project Engineer
Hazard Identification Section
Mitigation Division


AEROJET WAY
ARCATA WAY
ZONE X
ZONE X
ZONE X
ZONE A CONTAINED IN CHANNEL
CITY OF NORTH LAS VEGAS 320007
ZONE X
ZONE A
AREA REVISED BY LOMR DATED FEBRUARY 2, 2003
ZONE X
1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CHANNEL
Unnamed Tributary To Las Vegas Wash (A Channel)
2
ALEXANDER RD
JOINS PANEL 2160
ZONE X
ZONE A CONTAINED IN CHANNEL
LIMIT OF DETAILED STUDY
L
REVISED AREA
1906
ZONE AE
Unnamed Tributary To Las Vegas Wash (A Channel)
ZONE X
1905
ZONE X
B
ZONE X
ZONE AE
1897
AREA REVISED BY LOMR DATED FEBURARY 2, 2003
1904
11
K
A
1896
Legend
1% annual chance (100-Year) Floodplain
1% annual chance (100-Year) Floodway
0.2% annual chance (500-Year) Floodplain
N
MAP SCALE 1" = 500'
250 125 0 250 500 750 1,000 Feet
150 75 0 150 300 Meters
NFIP
NATIONAL FLOOD INSURANCE PROGRAM
PANEL 2176 E
FIRM
FLOOD INSURANCE RATE MAP
CLARK COUNTY, NEVADA
AND INCORPORATED AREAS
REVISED TO REFLECT LOMR DATED JAN 19 2006
PANEL 2176 OF 4090
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
CLARK COUNTY UNINCORPORATED AREAS 320003 2176 E
NORTH LAS VEGAS, CITY OF 320007 2176 E
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.
MAP NUMBER 32003C2176 E
MAP REVISED: SEPTEMBER 27, 2002
Federal Emergency Management Agency